I-595 (SR-862)

PROJECT DEVELOPMENT & ENVIRONMENT STUDY

FM No. 409354-1-22-01
FAP No. 5951 539 I
From the I-75 Interchange West of 136 Avenue
To the I-95 Interchange
Broward County, Florida

Prepared for:
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1.0 INTRODUCTION

The purpose of this document is to present the findings of the Essential Fish Habitat (EFH) Assessment conducted for the proposed improvements to I-595 as required by the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended through 1996 (Magnuson-Stevens Act). The 1996 amendments to the Magnuson-Stevens Act set forth a number of mandates for the National Marine Fisheries Service (NMFS), eight regional Fishery Management Councils (FMCs), and other federal agencies to identify and protect important marine and anadromous fish habitat. The FMCs, with assistance from NMFS, are required to delineate EFH for all managed species. Federal action agencies that fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH and to respond in writing to the NMFS's recommendations.

Project specific consultations may be abbreviated or expanded depending on what degree the action may adversely impact EFH. Abbreviated consultations are used with impacts that are expected to be minor. As the net impacts associated with this project are expected to be minor, an abbreviated consultation is anticipated.

The objectives of this EFH Assessment are to describe how the actions associated with the proposed improvements to I-595 may affect EFH designated by the NMFS and South Atlantic FMC for the area of influence of the project. The EFH identified in Fishery Management Plan Amendments of the South Atlantic FMC includes estuarine areas, estuarine emergent wetlands, estuarine scrub/shrub mangroves, submerged aquatic vegetation, oyster reefs and shell banks, intertidal flats, palustrine emergent and forested wetlands, aquatic beds, and estuarine water column.

The areas of influence of the project are the existing I-595 limited access right of way that crosses the South Fork New River and is immediately adjacent to Broward County Park and Recreation Department's Pond Apple Slough Natural Area, and the North New River Canal between US 441/SR 7 and the South Florida Water Management District (SFWMD) G-54 salinity control structure. This EFH Assessment includes a description of the proposed action; an analysis of the direct, secondary, and cumulative effects of the proposed action on EFH for the managed fish species and their major food sources; and proposed mitigation measures to minimize expected project effects.

Figure 1-1 shows the project location and limits of the I-595 PD&E Study.

RS&H Reynolds, Smith and Hills, Inc. Architecture, Engineering and Planning	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY	LOCATION MAP	FIGURE 1-1

2.0 PROJECT DESCRIPTION

The I-595 PD&E Study is a continuation of the I-595 Master Plan Study completed in March 2003. The Master Plan produced a Locally Preferred Alternative (LPA). Public comment on the LPA was received at a Public Hearing conducted on November 16, 2000, the LPA was adopted by the Broward County Metropolitan Planning Organization (MPO) on January 7, 2003, and subsequently was approved by the Federal Highway Administration (FHWA). The major components of the LPA that emerged from the Master Plan process include the following features.

- Reversible lanes at grade level serving express traffic from I-75 to east of SR 7
- Continuous connection of SR 84 between Davie Road and SR 7
- Collector-Distributor (C-D) system between Davie Road and I-95
- Two-lane off-ramps, as needed
- Braided interchange ramps to eliminate mainline weaving segments
- Combined ramps and cross-street bypasses to reduce congestion
- A westbound to northbound (WB-NB[1]) on-ramp at Florida's Turnpike
- Modifications to the I-595/Florida's Turnpike interchange
- Transit element, such as a commuter rail, integrated into the corridor (with details of the concept to be developed in a separate study)

Fifteen different build alternatives were evaluated during Tiers 1 and 2 of the Master Plan Study. The LPA consists of an integrated set of projects. This integration would be compromised if alternatives analyses for the individual projects resulted in design concepts that would necessitate a revisited corridor planning effort. Therefore, the I-595 Master Plan LPA served as the base build alternative for the I-595 PD&E Study.

The objective of the I-595 PD&E Study is to re-examine the original justifications for the Master Plan LPA to assure that federal, state and local policies enacted since initial development of the project concepts have been incorporated into its recommendations. The same is true of the design standards and technologies considered for application or implementation in the corridor. Complementary projects, either in progress or completed since earlier studies of the I-595 corridor were concluded, have also been considered in the development of recommendations. The detailed examination of these issues through the PD&E process assures that FDOT has identified the most cost-feasible, constructable improvements in the final recommended package. In addition to preserving both local and state interests, the PD&E process satisfies National Environmental Policy Act (NEPA) procedures. These measures are a prerequisite for receiving Location Design Concept Acceptance (LDCA) from FHWA, an essential step in qualifying for the federal funds needed to implement the proposed improvements.

[1] Throughout this document the following conventions are used: WB = westbound, NB = northbound, EB = eastbound and SB = southbound. Directional movements are written as shown in the following example: " . . . westbound to northbound travel . . . " will be written as ". . . WB-NB travel . . . "

2.1 PROJECT LOCATION

The I-595 corridor is located in central Broward County, Florida. The western study limits are the I-75/Sawgrass Expressway interchange (Mile Post 0.592); the eastern study limits are the I-95 interchange (Mile Post 10.407). The total project length is approximately 10 miles. The I-595 corridor passes through or lies immediately adjacent to six governmental jurisdictions: the Cities of Sunrise, Davie, Plantation, Ft. Lauderdale and Dania, as well as unincorporated areas of Broward County.

Unlike most interstate corridors in Florida, the majority of the I-595 corridor is comprised of two facilities: I-595 and SR 84. The I-595 portion of the corridor is a six-lane, limited access facility. In addition to interchanges with the two freeway systems at each end of the study corridor, there are nine other interchanges along the corridor at the following crossroads: SW 136th Avenue, Flamingo Road (SR 823), Hiatus Road, Nob Hill Road, Pine Island Road, University Drive (SR 817), Davie Road, Florida's Turnpike (SR 91), and SR 7 (US 441).

The SR 84 portion of the corridor lies both north and south of the I-595 mainline. The two lanes north of the mainline operate one-way WB while the two lanes south of the mainline operate one-way EB. In the area west of the I-75 interchange and continuing east to Davie Road, the SR 84 lanes serve as a collector-distributor system to the I-595 mainline. The SR 84 system is suspended through the I-595 interchanges with Florida's Turnpike and SR 7. East of the SR 7 interchange, the SR 84 and I-595 rights of way separate. The SR 84 alignment veers to the northeast and the I-595 alignment continues nearly due east.

2.2 NEED FOR IMPROVEMENT

The various improvements that comprise this project address a number of state, regional and corridor-specific needs. The following sections summarize the need for the proposed improvements. A more detailed discussion of the project justification is provided in Section 3.0 NEED FOR IMPROVEMENTS of the PD&E Study's accompanying *Preliminary Engineering Report* (PER).

2.2.1 Statewide Needs

The improvements proposed for the I-595 corridor are directly related to the FDOT Mission Statement.

> ***Florida will provide and manage a safe transportation system that ensures the mobility of people and goods, while enhancing economic competitiveness and the quality of our environment and communities.***

The proposed improvements to the I-595 corridor are directly related to the four goals that FDOT has adopted as its means of carrying out this Mission Statement.

1. **Safe Transportation** – The proposed improvements will enhance the safe operation of the corridor by increasing the number of persons, vehicles and travel modes that it can accommodate. This is an asset to residents, visitors and commerce.
2. **System Management** – The proposed improvements expand the service life of the corridor, expanding upon the original vision for whom and how the corridor operates to serve the Southeast Florida traveling public.
3. **Economic Competitiveness** – Because of its critical location in the center of Broward County and its proximity to a wide range of other major modes, such as the Port Everglades, Ft. Lauderdale-Hollywood International Airport, Florida East-Coast Rail Line and Tri-County Commuter Rail, as well as its connection to the region's major north-south expressways and principal highways, improvements to the I-595 corridor are a boost to the state and regional economic competitiveness in the global market.
4. **Quality of Life** – The proposed improvements to the I-595 corridor have been developed in a manner that ensures that the qualities of life that are of value to Florida citizens are sustained: preserving parklands, protecting sensitive wetlands and taking appropriate measures to mitigate any environmental impacts that may occur.

2.2.2 Regional (Areawide) Needs

There are a number of regional issues that serve to justify implementation of the proposed I-595 improvements. These regional issues include system linkages; transportation demand; federal, state and local authorities' support for the project; social demands and economic development; and modal interrelationships.

System Linkages

Within Dade, Broward and Palm Beach Counties, the I-595 corridor is the only east-west freeway providing connections to all of the region's principal north-south corridors, as well as freeways beyond the region's boundaries. West of the I-75/Sawgrass Expressway, I-595 becomes I-75, with direct connections to the population centers along the Gulf Coast. This linkage is important for many reasons.

- I-595 plays an important role in the distribution of products, both within the Southeast (SE) Florida area and between the region and other areas of the state and nation.
- I-595 is a critical link between other components of the Florida Intrastate Highway System (FIHS) network, such as US 27 (located west of the project corridor), Sawgrass Expressway, I-75, Florida's Turnpike and I-95. It is also an important link to Strategic Intermodal System (SIS) network components for other travel modes: freight and passenger rail, port, aviation and intercity bus. These linkages work to ensure an efficient transportation network.

- I-75 is an important facility in the area's emergency evacuation plans. Fox Trail Elementary School (1250 Nob Hill Road, Davie) is a designated emergency shelter and is located within one block of the corridor. I-595 is also a primary route for departure from the SE Florida area, while avoiding the coastal region.

Transportation Demand

Level of Service analyses were performed on Base Year 2002 (existing) travel conditions within the I-595 corridor. They examined each of the system's operating elements: mainline sections, mainline/ramp merge and diverge points, weave sections, ramps, and ramp/crossroad intersections. Table 2-1 identifies those elements of the project found to have volumes that resulted in less than acceptable levels of service, based on the local jurisdictions' adopted minimum standards.

Details of the levels of service assessment are provided in Section 6.0 TRAFFIC of the PER. Analysis of the traffic volumes forecast for the future years of this project (Year 2014 as the Year Open of proposed improvements and Year 2034 as the Design Year) showed that these deficiencies would only worsen in future years. Therefore, any degree of additional capacity that the corridor can contribute to the total system capacity will improve the responsiveness of the entire SE Florida regional transportation network to meet the needs of the motoring public.

Federal, State or Local Governmental Authority

It is important that any publicly-funded transportation project have the support of the public agencies charged with reviewing, approving, constructing and/or financing it. For a project on the interstate system, such as I-595, these agencies exist at the local, state and federal levels.

Local support for the I-595 PD&E Study and its related physical improvements are coordinated through the Broward County MPO. The *Broward County MPO 2030 Long-Range Transportation Plan* shows that the elements of the Master Plan-defined LPA are included.

Project #44 on the list of Cost-Feasible Highway Projects is broken down into two separate projects.

– The first is a 10-mile segment of I-595, from I-75 to SR 7, and includes adding reversible lanes in the median area.

– The second is a 14-mile segment of I-595, extending from I-75 to US 1.

Table 2-1 Corridor Elements Below Adopted Level of Service (LOS) Standards

System Component: Direction of Travel Element Location	AM Peak Hour LOS	PM Peak Hour LOS
Mainline I-595: EB		
• Viaduct between I-95 and SR 7/Florida's Turnpike	F	
I-595 Mainline/Ramp Merges & Diverges: EB		
• SR 7 – Diverge	F	
• Florida's Turnpike – Merge	F	
• SR 7 – Merge [1]	F	
I-595 Mainline/Ramp Merges and Diverges: WB		
• SR 7, from NB mainline – Merge		F
• SR 84/Davie Road, from C-D Rd [2] – Merge	E	F
• SW 136th Avenue – Diverge		E
Mainline Weave Analyses: I-595 EB		
• Between 136th Ave and Flamingo Rd	E	
• Between Flamingo Rd and Hiatus Rd	F	
• Between Hiatus Rd and Nob Hill Rd	F	
• Between Nob Hill Rd and Pine Island Rd	F	E
• Between Pine Island Rd and University Dr	F	F
Mainline Weave Analysis: I-595 WB		
• Between Florida's Turnpike and Davie Rd	E	F
• Between University Dr and Pine Island Rd	E	F
• Between Pine Island Rd and Nob Hill Rd	F	F
• Between Nob Hill Rd and Hiatus Rd	E	F
• Between Hiatus Rd and Flamingo Rd	E	F
• Between Flaming Rd and SW 136th Ave		E
Ramp Levels of Service		
No ramps had substandard levels of service		
SR 84 /Crossroad Intersections: EB		
• Nob Hill Rd	F	
• Pine Island Rd	F	
• University Dr	E	
• Davie Rd	E	
SR 84/Crossroad Intersections: WB		
• SW 136th Ave		E
• Pine Island Rd		F
• Davie Rd		E

1. Highway Capacity Manual Methodology recommends analyzing upstream and downstream basic freeway segments when there is an Add/Drop lane design on the ramp
2. C-D Road – Collector Distributor System developed using segments of parallel SR-84 and braided ramps between I-595 and SR 84

The South Florida Water Management District (SFWMD) has also been a partner in the development of this project. Throughout the development of proposed improvements, the FDOT worked closely with the SFWMD to ensure that their concerns were addressed in the design of project alternatives. From relocation of ramps and roadways to measures taken to mitigate such unavoidable impacts as stormwater retention and noise, SFWMD staff comments and concerns are reflected in designs throughout the corridor.

At the state level, the proposed improvements within the I-595 corridor are addressed in two different plans, one for each of the major corridor designations, FIHS and SIS. The FDOT prepared a comprehensive long-range plan for the FIHS network in 2000 with a planning horizon of 2020, with updates in 5-year cycles. The FDOT published its revised *FIHS 2025 Cost-Feasible Plan Update* in 2003. A number of the elements of the I-595 improvements package were retained in the state's FIHS Cost-Feasible Plan: the mainline reversible lanes, improvements to SR 84 EB and WB, and interchange improvements at SR 7, Florida's Turnpike and I-95.

The I-595 corridor is a Designated SIS Highway Corridor link of the state's Strategic Intermodal Transportation network. All components of the I-595 improvements package are included in the SIS "Unprogrammed Project Needs" list, published in early 2005, divided into eight separate project packages. Seven of these packages reference the Broward County MPO's Long Range Plan as the source of the project listing. The eighth package refers to a recently completed Intelligent Transportation Systems (ITS) study, FDOT District 4's *10-Year ITS Cost Feasible Plan*. The revised listing of SIS projects is anticipated to be published late in 2005. This listing will also include the proposed corridor improvements.

Federal agencies have also been involved in the development of the proposed improvements. In addition to FHWA, which has been involved with the project since its earlier Master Plan phase, several federal agencies have had opportunities to comment on the project. Because the New River, which lies north of SR 84 within the limits of the project, is a navigable waterway through much of the corridor, FDOT has also met with the U.S. Coast Guard to receive their input regarding the design and location of ramps and structures that overpass the river.

Social Demands and Economic Development

The I-595 PD&E Study maximizes the capacity of the corridor within the existing rights of way to the greatest extent feasible. Acquisition of additional rights of way has been restricted to very narrow confines. The directive to minimize acquisition of right of way worked to protect the Section 4(f) lands and the pristine waters and sensitive environmental features adjacent to the corridor. The protection of the natural assets of SE Florida enhances the area's attractiveness to potential business interests, developers and visitors.

Modal Interrelationships

The LPA for the I-595 corridor that emerged from the Master Plan study introduced several multimodal features into the I-595 corridor: light rail transit (LRT), special use lanes, integration with transit lines on crossroads, and non-motorized travel. Utilizing a comprehensive multimodal planning approach in these I-595 corridor studies will enable optimum performance to be derived from all parts of the system, balancing the needs of the various travel modes while minimizing their collective impacts.

2.2.3 Project Corridor Needs

In addition to the statewide and regional benefits of implementing the proposed corridor improvements, there are benefits that are specific to the corridor. These include reductions of incident-related delay and design solutions for the existing interchange design deficiencies and unsafe weaving and merging conditions within the project corridor.

2.3 EXISTING ROADWAY CHARACTERISTICS

I-595 is a limited access facility that runs in an east-west direction with a posted speed of 65 miles per hour (mph). I-595 is an integral part of the FIHS and SIS through its functional classification as a limited access expressway. There are one-way frontage roadways (SR 84) on the north and south sides of the mainline between SW 136th Avenue and Davie Road. SR 84 is functionally classified as a one-way collector with a posted speed of 50 mph. Florida's Turnpike, a major north-south intersecting highway, is a six-lane freeway toll facility, three lanes in each direction, with a posted speed of 65 mph.

2.3.1 Typical Sections

The I-595 corridor has four main typical sections which are described below. The following are their limits.

- Typical Section 1 SW 136th Avenue to University Drive
- Typical Section 2 University Drive to Florida's Turnpike
- Typical Section 3 Florida's Turnpike to west of SR 7
- Typical Section 4 West of SR 7 to I-95

<u>Typical Section 1 – SW 136th Avenue to University Drive</u>
Typical Section 1 includes a 64-foot median, 10-foot paved inside and outside shoulders (12-foot overall width), and three general purpose (GP) lanes in each direction. There are one or two auxiliary lanes between each pair of successive interchanges. Guardrails are located on the outside of the travel lanes to protect motorists in sections with high fill, while barrier walls are located on areas where mechanically stabilized earth (MSE) retaining walls are used.

Typical Section 1 has a frontage road system, SR 84, on the north and south sides of the I-595. SR 84 is a two-lane, one-way pair that acts as a collector/distributor (C-D) roadway to I-595. When I-595 was planned, the SR 84 right of way served as the original working alignment for the new Interstate connector. Typical Section 1 is depicted in Figure 2-1.

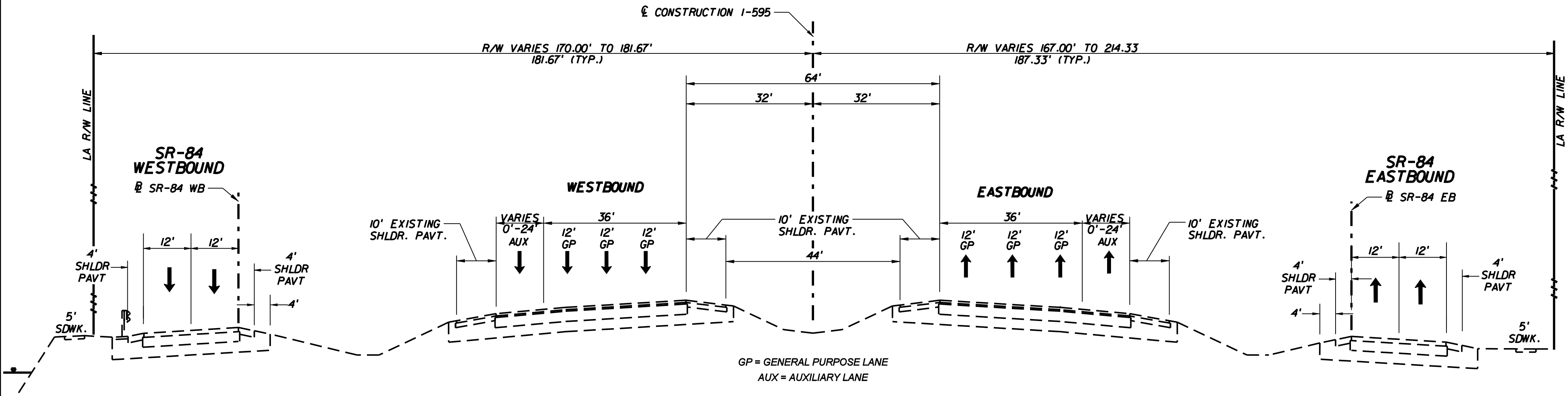
Typical Section 2 - University Drive to Florida's Turnpike
Typical Section 2 is similar to Typical Section 1, except that its median width is 68 feet (see Figure 2-2). The I-595 mainline has a frontage road system (SR 84) on its north and south sides along most of its length, from University Drive to Davie Road.

Typical Section 3 – Florida's Turnpike to West of SR 7
Typical Section 3 has median and inside shoulder widths that vary. This variability is due to a restriping project, completed in 2002, that created an additional WB auxiliary lane on I-595. The mainline alignment is on curve and superelevated through much of this area. No frontage roads are present along this section of I-595. One or two auxiliary lanes are present between interchanges in both directions. Typical Section 3 is shown in Figure 2-3.

Typical Section 4 – West of SR 7 to I-95
I-595 is on bridge structure through much of this area. Typical Section 4 area has a varying median width and 3-foot inside shoulders that resulted from the 2002 restriping project described above. Three general purpose and two auxiliary lanes are present within this segment of I-595; no frontage roads present (see Figure 2-4). East of SR 7, SR 84 resumes its original alignment north of – and separate from – the I-595 mainline.

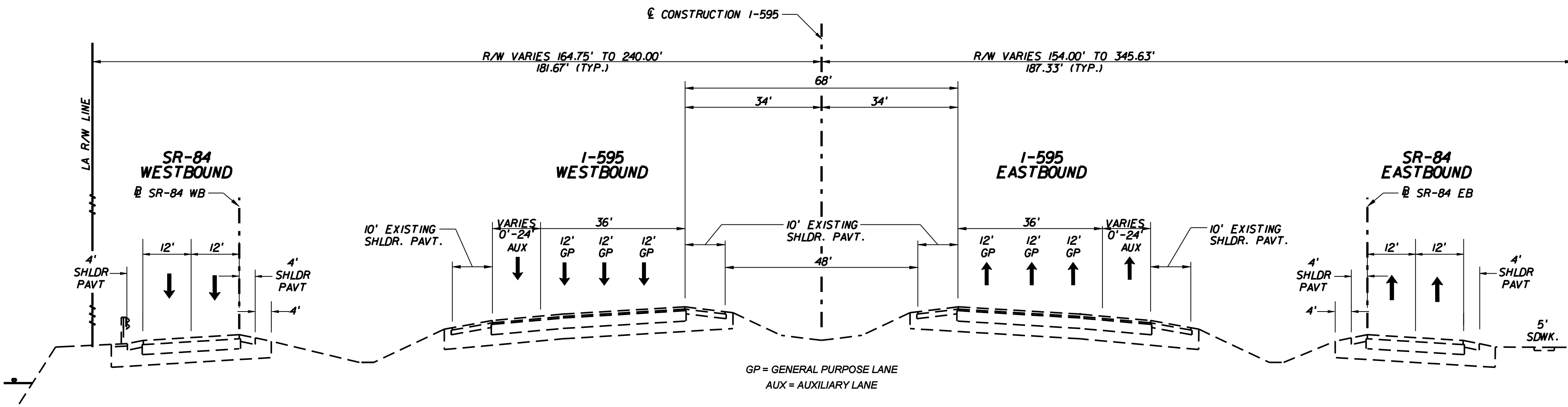
2.3.2 Right of Way

Between SW 136th Avenue and Pine Island Road, I-595 and its adjacent frontage roads lie within a 324-foot right of way. Between Pine Island Road and Davie Road, where the frontage road terminates, the right of way varies in width up to 500 feet. Following the I-595 right of way east from Davie Road, it widens to as much as 1,800 feet in the vicinity of the SR 7 interchange, then narrows to 360 feet west of I-95. East of the I-95 interchange, the I-595 right of way narrows to a minimum of 155 feet.



I-595 (SR-862) EXISTING TYPICAL SECTION 1
FROM SW 136th AVE. TO UNIVERSITY DR.
(64' EXISTING MEDIAN)

RS&H Reynolds, Smith and Hills, Inc. Architecture, Engineering and Planning	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY	EXISTING TYPICAL SECTIONS	FIGURE 2-1

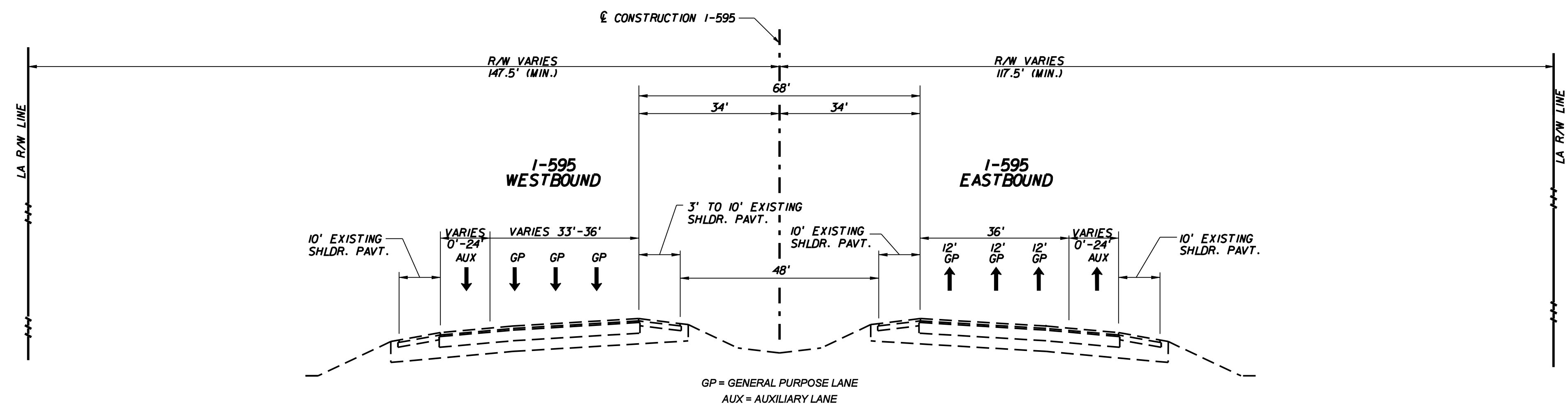


GP = GENERAL PURPOSE LANE

AUX = AUXILIARY LANE

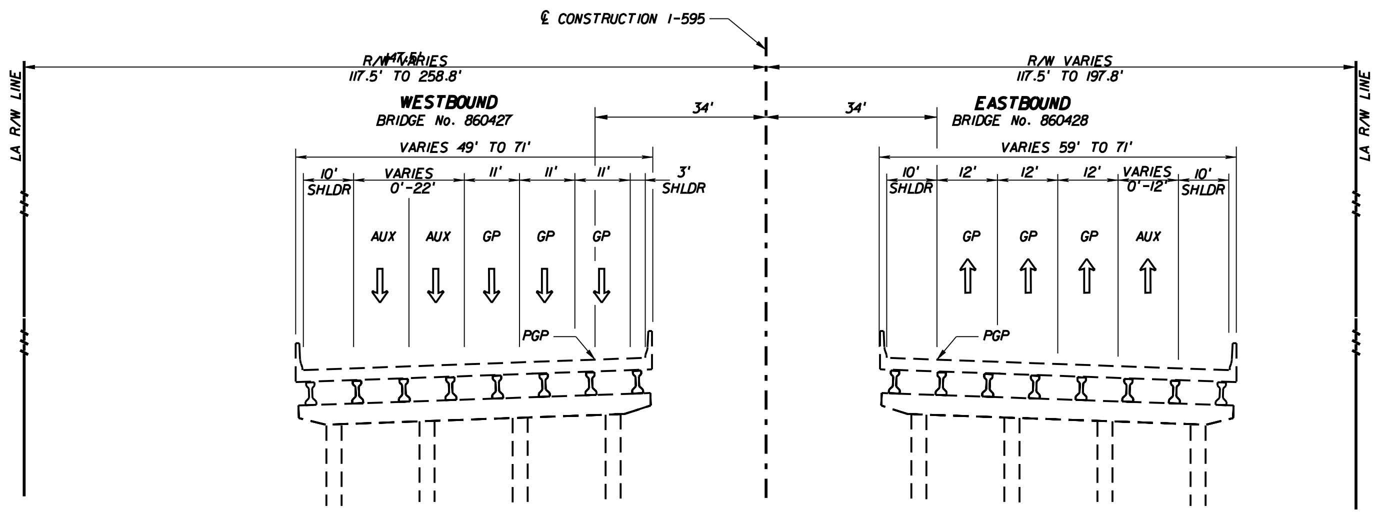
I-595 (SR-862) EXISTING TYPICAL SECTION 2
FROM UNIVERSITY DR. TO FLORIDA'S TURNPIKE
(68' EXISTING MEDIAN)

RS&H Reynolds, Smith and Hills, Inc. Architecture, Engineering and Planning	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY	EXISTING TYPICAL SECTIONS	FIGURE 2-2



I-595 (SR-862) EXISTING TYPICAL SECTION 3
FROM FLORIDA'S TURNPIKE TO WEST OF SR-7

RS&H Reynolds, Smith and Hills, Inc. Architecture, Engineering and Planning	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY	EXISTING TYPICAL SECTIONS	FIGURE 2-3



GP = GENERAL PURPOSE LANE
AUX = AUXILIARY LANE

I-595 (SR-862) EXISTING BRIDGE TYPICAL SECTION 4
FROM WEST OF SR-7 TO I-95

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Architecture, Engineering and Planning

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY

EXISTING TYPICAL SECTIONS

FIGURE 2-4

2.3.3 Intersections and Signalizations

There are 14 signalized intersections within the corridor under the control of the Broward County Traffic Engineering Division. The following intersections were evaluated as part of this study. Each of the signals is actuated. The cycle lengths vary from 80 seconds to 150 seconds.

- SR 84 EB at SW 136th Avenue
- SR 84 EB at Flamingo Road
- SR 84 EB at Hiatus Road
- SR 84 EB at Nob Hill Road
- SR 84 EB at Pine Island Road
- SR 84 EB at University Drive
- SR 84 EB at Davie Road
- SR 84 WB at SW 136th Avenue
- SR 84 WB at Flamingo Road
- SR 84 WB at Hiatus Road
- SR 84 WB at Nob Hill Road
- SR 84 WB at Pine Island Road
- SR 84 WB at University Drive
- SR 84 WB at Davie Road

2.4 ALTERNATIVE ANALYSIS

The Master Plan LPA was developed with a Design Year of 2020. The primary objective of the alternative analysis phase was to refine the LPA as necessary to satisfy future travel demand to a Design Year of 2034. The LPA was updated to include changed conditions within the corridor that have occurred since the Master Plan Study was completed. In addition, the LPA was refined to reflect comments received at public workshops, as well as an extensive Value Engineering/Design Review (VE/DR) process conducted during the PD&E Study. The following are critical elements that were considered during the refinement of the Master Plan LPA.

<u>PD&E Study Design Year 2034</u>
The Master Plan LPA was developed with a Design Year of 2020; the PD&E Study Design Year is 2034. The LPA was refined to accommodate traffic growth for an additional 14 years that required additional auxiliary lanes and ramp widening at select locations.

<u>North New River Greenway</u>
Broward County is developing the North New River Greenway, a shared-use bicycle/pedestrian trail, extending from Markham Park, west of I-75, to SR 7. A portion of the Greenway between Davie Road and SR 7 was relocated to the north side of the corridor as part of the I-595 improvements due to conflicts associated with modifications to the SR 84 alignment in that area.

Sewell Lock Park
The historic Sewell Lock Park, located on the North New River Canal along the north side of I-595 immediately west of Davie Road, presented an obstacle for the proposed LPA improvements in that area. The Master Plan LPA will impact the park and possibly create Section 4(f) involvement. To avoid impacts to the park, the alignment of the proposed braided ramps and typical sections for SR 84 and the on- and off-ramps between University Drive and Davie Road were modified.

Florida Power and Light (FP&L) Substation
The existing FP&L substation, located on the south side of I-595 west of Davie Road and across from Sewell Lock Park, extends into the SR 84 right of way. The Master Plan LPA most likely will require relocation of the substation. The roadway typical section and alignment in this area were adjusted to avoid impacts to the FP&L substation.

Central Broward East-West Transit Alternatives Analysis
Since the Master Plan Study, FDOT has initiated the Central Broward East-West Transit Alternatives Analysis. As a result of that study, the Broward County MPO endorsed the I-595 corridor in its meeting of April 14, 2005 as the preferred location for the East-West Transit Alignment. At the same time, the MPO identified light rail as the preferred transit mode. The preliminary transit concept provides for elevated light rail within the I-595 corridor between SW 136th Avenue and SR 7. The Master Plan LPA had proposed the transit alignment be elevated within the I-595 corridor as well, but placed it south of both I-595 and SR 84. Extensive coordination with transit officials has continued throughout the PD&E Study process to accommodate the potential transit alignment within the I-595 corridor.

Value Engineering/Design Review Process
As part of the PD&E Study design analysis, a comprehensive VE/DR Team was assembled, composed of senior staff from FDOT District 4, Broward County, Florida's Turnpike Enterprise and specialty consultants. The purpose of the VE/DR Team was to conduct detailed design reviews of the design alternatives at critical stages of the refinement process to assure that the project remained cost effective, constructable and made the most efficient uses of existing rights of way. The refinements to the LPA that emerged from the first four week-long VE/DR workshops were incorporated into a single PD&E design concept, **Alternative 1A**.

As the VE/DR alternative was developed further, it became apparent that extensive right-of-way acquisitions would be needed to construct the transit line along the south side of SR 84. As a result, the project team developed three additional concepts. The alternatives were developed in coordination with the transit study consultants, local municipalities and stakeholders, FHWA and the VE/DR Team. The three alternatives were designated as **Alternatives 1B**, **2A** and **2B**. The three alternatives maintained the basic design components of the Master Plan LPA (reversible lanes, auxiliary lanes, braided ramp systems, etc.) but made more efficient use of the space available within the existing corridor right of way.

A comparative analysis of the four design alternatives was performed that evaluated each build alternative using such criteria as traffic service; preliminary engineering, environmental and socio-economic impacts; and costs. Based on this analysis, Alternatives 1A and 2B were considered "fatally flawed" and eliminated from further consideration. The Concept Plans for all of the alternatives evaluated, including the No Build Alternative, are presented in Appendix D – Alternative Concept Plans of the PER.

Selection of the alternative for which LDCA will be sought from FHWA will be made after receiving public input during the I-595 PD&E Public Hearing in December 2005.

2.5 PROJECT ALTERNATIVES

The following section describes the primary characteristics of the **No Project Alternative** and the two design concepts, **Alternatives 1B and 2A**.

2.5.1 No Project Alternative

The No Project Alternative entails maintaining the existing I-595 corridor without implementing capacity, operational or safety improvements, except for those already funded and included in the Broward County MPO's *2005/06 – 2009/10 Transportation Improvement Plan*. The following is a summary of the key corridor characteristics.

- Three general purpose lanes with paved inside and outside shoulders per direction, separated by either a 64-foot or 68-foot grass median
- One or two auxiliary lanes between each pair of interchanges
- SR 84, configured as a two-lane one-way pair, with WB lanes north of the mainline and the North New River Canal and EB lanes south of the mainline; extends from SW 136th Avenue to Davie Road; has a design speed of 50 mph (e max = 0.10); has an open drainage; serves as I-595 C-D system
- No frontage road between Davie Road and SR 7; east of SR 7, both EB and WB lanes of SR 84 on the north side of the mainline and the North New River Canal, following its original alignment – separated and apart from the I-595 right of way

- Tight diamond with frontage road interchange configuration at the following crossroads:
  - SW 136th Avenue
  - Flamingo Road
  - Hiatus Road
  - Nob Hill Road
  - Pine Island Road
  - University Drive
  - Davie Road
- Two flyovers at the University Drive interchange carrying SB-EB and NB-WB movements
- 70 mph design speed on mainline; 50 mph design speed on ramps

The consequences of selecting the No Project Alternative include the acceptance of increased traffic congestion that will result from the increased travel demand associated with the continued significant growth of SE Florida that is expected to occur over the next 20 years. By contrast, the advantages of the No Project Alternative include no additional costs, other than maintenance of the existing facility; no need for acquisition of additional rights of way for construction of retention/detention ponds that will be needed for additions to the impervious areas within the corridor limits; and no impacts to traffic or surrounding neighborhoods as a result of construction activities.

The No Project Alternative remains under consideration throughout the study process to provide a baseline for comparison with project design alternatives.

2.5.2 Design Alternatives

The improvement alternatives initially proposed for the I-595 corridor during the 2003 Master Plan and further developed through this PD&E Study process, have a number of design elements.

- Mainline I-595
- Mainline I-595 Interchanges
- Reversible Lanes
- Reversible Lane Interchanges
- SR 84
- Pedestrian and Bicycle Facilities
- I-595/Florida's Turnpike Interchange
- Florida's Turnpike Mainline
- Transit Facilities
- Pond Apple Slough

Common elements of the design alternatives are discussed below and are followed by a discussion of the unique elements of each design alternative. In general terms, Alternative 1B proposes constructing the new reversible lanes at grade level within the median of the I-595 corridor. In Alternative 2A, the reversible lanes would be elevated above the existing I-595 mainline median area.

Shared Design Alternative Design Features

Mainline I-595 – Each of the design alternatives preserves the existing I-595 mainline general purpose lanes in their present location through much of the corridor, 34 feet left and right of the centerline of construction. Where needed, an additional auxiliary lane is proposed so that two auxiliary lanes per direction are provided between each pair of successive interchanges within the corridor. Mainline design speeds of 70 mph are also preserved.

Mainline I-595 Interchanges – Major improvements are proposed for the mainline interchanges to eliminate friction in the outer lanes caused by merge, diverge and weaving segments along the mainline. This will be accomplished by introducing braided ramps, a design feature that eliminates ramps by combining ramp movements and reversing the typical on-ramp/off-ramp sequence usually found between successive interchanges. The proposed improvements will either eliminate mainline weaving segments altogether or relocate them to the frontage roads where any delays would not impact mainline traffic flow.

All ramps will be of parallel type, with auxiliary lanes beginning/ending at the ramp gores. This configuration will improve the operation of merge and diverge segments. In addition, all ramps at interchanges within the study corridor will have 50 mph design speeds.

In addition, the existing flyovers at the University Drive interchange will be reconstructed, moving them to allow widening of the median as needed to accommodate the reversible express lanes.

Reversible Lanes – The reversible lanes will be located within the I-595 median area. Their horizontal and vertical alignments are to follow the existing I-595 alignment. At the present time, it is envisioned that the reversible lane system will flow EB during the AM peak period and WB during the PM peak period, allowing a large percentage of long distance through traffic to be removed from the GP lanes and augmenting the number of lanes flowing in the direction of greatest demand.

Reversible Lane Interchanges – Whether originating within the I-595 corridor only, as proposed under Alternative 1B, or within both the I-595 and Florida's Turnpike corridors, as proposed under Alternative 2A, the median areas are to be widened to accommodate the reversible lane interchanges. Two inside auxiliary lanes will be developed for access to the reversible lane system, separated from the mainline by a 4-foot buffer area. Overhead Dynamic Message Signs (DMSs) are proposed to guide motorists into or away from the auxiliary lanes leading to the reversible lanes (depending on the time of day). Opposing traffic will be prohibited from entering the reversible lanes by a series of gates that will extend from the inside barrier wall in the area of the auxiliary lanes. Drop down safety nets are also proposed to further prohibit motorists from entering the reversible lanes in the wrong direction. Barrier walls will be used along the I-595 mainline to eliminate clear zone violations in the reversible lane interchange area.

SR 84 – A number of factors make it impractical to maintain SR 84 as a rural (open drainage) facility. These factors include limited rights of way, addition of mainline auxiliary lanes, proposed realignments of ramps, proposed addition or expansion of bicycle and pedestrian facilities, and potential impacts to the North New River Canal. It is proposed that SR 84 be changed to a suburban facility with two 12-foot lanes per direction, installation of a Type F curb-and-gutter system on the outside and an 8-foot stabilized inside shoulder, of which 4 feet are paved. The proposed use of a curb-and-gutter system accomplishes several things: it allows the roadway drainage to be contained within the existing right of way; it allows for a pedestrian/bicycle path to be installed on the outside between Davie Road and SR 7; and it reduces clear zone requirements. A guardrail will be installed in the WB direction along the curb and gutter to protect users from the drop off hazard associated with the canal.

Additional rights of way are required along the north side of WB SR 84 for much of its length. Meetings were held with SFWMD regarding this issue. The SFWMD issued the following guidelines to be followed with respect to potential impacts to the North New River Canal.

- If the roadway footprint is within the SFWMD right of way, a bulkhead constructed with sheet piling will be installed to prevent encroachment on the canal.
- No reduction in the capacity of the canal cross section is permitted.
- No change in the conveyance of the canal is permitted.
- Sound walls may be installed on top of the bulkhead, but not within 100 feet of any bridge crossing the canal.

The reconstructed SR 84 will be located at the same elevation as the existing facility. It also will be located on the outside of I-595 mainline ramps and bypass ramps so that a continuous 4-foot undesignated bicycle lane can be maintained along the outside travel lane. The single exception to this occurs between Pine Island Road and Nob Hill Road.

As part of the SR 84 reconstruction, its intersections with SW 136th Avenue, Flamingo Road, Hiatus Road, Nob Hill Road, Pine Island Road, University Drive, and Davie Road will require reconstruction. Elimination of WB SR 84 access across the canal to and from SW 125th Avenue and Commodore Avenue will also be required, due to limited space between the widened I-595 mainline and the canal.

Improvements are also proposed for the EB lanes of SR 84. The improved EB lanes will be constructed at the elevation of the existing SR 84 Limited Access right-of-way line. The EB lanes will also be located outside of the I-595 mainline ramps and bypass ramps. This will enable access to the many driveways along EB SR 84 to be maintained, as well as allowing a continuous 4-foot undesignated bicycle lane to be constructed along the outside travel lane. At the present time, SR 84 ends a few hundred feet east of Davie Road, at which point EB traffic is forced onto the I-595 mainline. Both of the design alternatives propose to extend SR 84 farther east, eliminating the need for frontage road traffic to use any portion of the I-595 mainline.

Pedestrian/Bicycle Facilities – Broward County has designated the I-595 corridor as a major component of its Greenway system. A bi-directional shared-use path is currently being designed (by others) that will be located on the north side of the North New River Canal between the western I-595 PD&E project limit and University Drive. The path leaves the project corridor between University Drive and Davie Road, reentering it at Davie Road. Between Davie Road and SR 7, it runs along the south side of the North New River Canal to SR 7. Following discussion with County officials, FDOT has agreed to relocate the portion of Greenway between Davie Road and SR 7 to the north side of the canal as part of this I-595 PD&E project. The relocation will eliminate potential conflicts with proposed ramps within the I-595/Florida's Turnpike interchange.

In addition to the Greenway, FDOT has requested that a 12-foot shared-use, bi-directional path be located along the outside of EB SR 84 (south of the mainline), between SW 136th Avenue and University Drive. It will be constructed adjacent to the proposed curb and gutter. The path will be narrowed to 6 feet between University Drive and Davie Road because of the limited right of way in front of an existing FP&L substation. Four-foot undesignated bicycle lanes will also be incorporated into the design of the outside travel lane of SR 84 in both directions to accommodate advanced riders that currently use SR 84.

Turnpike Interchange – A new WB-NB slip ramp is proposed for the northeast quadrant of the I-595/Florida's Turnpike interchange. Addition of the WB-NB ramp will remove WB-NB traffic volumes from the short weaving section where EB and WB I-595 volumes converge before separating to travel either NB or SB on Florida's Turnpike. Following the opening of the new ramp, a barrier wall will be placed along the existing weave section to prohibit vehicles from making unnecessary weaving movements.

It also is proposed that the bridge carrying both EB-SB and WB-SB traffic between I-595 and Florida's Turnpike be reconstructed as a three-lane structure. The new ramp structure will have a larger radius than the one it is replacing. The Griffin Road SB off-ramp will be relocated farther north to accommodate the wider bridge. It also is proposed that the existing NB-EB and NB-WB two-lane off-ramps be replaced with a single three-lane off-ramp. The NB and SB traffic will separate once away from the mainline. This configuration will eliminate one of the two mainline exits to the Turnpike.

Pond Apple Slough – Both design alternatives propose widening the I-595 causeway structures over Pond Apple Slough between SR 7 and I-95. This improvement will allow for the extension of SR 84 as far east as I-95. The proposed design avoids wetland impacts to the fullest extent possible while providing the additional I-595 lanes needed to satisfactorily handle future traffic demand. After careful study, it was determined that the least invasive solution would be to widen the existing structures to the inside as much as physically possible. This approach minimizes widening to the outside and into the environmentally sensitive areas of Pond Apple Slough.

Alternative 1B – At-Grade Reversible Lanes

Mainline I-595 – Mechanically stabilized earthen barrier walls are proposed for use in areas where I-595 passes over cross streets. Barrier walls along the outside shoulders will be required for much of the I-595 mainline because of clear zone violations and grade differentials between I-595 and SR 84.

All entrance ramps along I-595 will be parallel type entrance ramps with a 50 mph design speed.

Reversible Lanes – In Alternative 1B, the reversible lanes will be located at grade level within the I-595 median. In this configuration, the proposed reversible lane facility will have two 12-foot lanes, with 10-foot paved shoulders on each side. The reversible lanes will be physically separated from the I-595 GP lanes by median barrier walls that will drain to the outside through barrier wall inlets.

Access to and egress from the reversible lanes will be limited to two points. The western access point will be located between the SW 136th Avenue and Flamingo Road interchanges; the eastern access point will be located between Florida's Turnpike and SR 7.

Reversible Lane Interchanges – The auxiliary lanes constructed to provide connections between the I-595 mainline and the proposed reversible lanes will be separated from the mainline by a 4-foot buffer area.

Turnpike Mainline – Alternative 1B has no significant impacts to the Florida's Turnpike mainline alignment. The proposed improvements will consist mainly of restriping, reconstructing ramp terminals, and widening to the outside of the NB Florida's Turnpike lanes to accommodate the increased number of lanes on the proposed WB-NB on-ramp.

Transit Facilities – The proposed transit alignment will be elevated on a dedicated structure within the limits of the I-595 right of way. The Alternative 1B transit envelope will be developed in the green space area created between SR 84 and I-595. Locating the transit in this area has several major benefits.

- Avoids the FP&L substation
- Avoids long spans when right-turn lanes are introduced along SR 84
- Minimizes right-of-way impacts and costs
- Allows for more visibility of businesses from SR 84

Alternative 2A – Elevated Reversible Lanes

Mainline I-595 – Alternative 2A recommends that the existing I-595 GP lanes be milled and resurfaced, with widening to the outside for the additional auxiliary lanes where needed. Mechanically stabilized earth walls are proposed where I-595 attains grade to pass over cross streets. Barrier walls along the outside shoulder are required for much of the I-595 mainline because of clear zone violations and grade differentials between I-595 and SR 84. All entrance ramps along I-595 will be of parallel type and will have 50 mph design speeds.

Reversible Lanes – In Alternative 2A, the reversible lanes will be located on elevated structure within the existing I-595 median. The reversible lanes will be located one level higher than the mainline, with the exception of the area near the University Drive flyovers. At these points, the reversible lanes will be raised to a fourth level to avoid the flyovers.

The proposed reversible lane structure will be 59 feet wide, with three 12-foot travel lanes and 10-foot paved shoulders on each side. Four points of access to and egress from the reversible lanes are proposed. The westernmost point will be located between the SW 136th Avenue and Flamingo Road interchanges. In clockwise sequence, the other points are along Florida's Turnpike, between Peters Road and I-595; between Florida's Turnpike and SR 7; and along Florida's Turnpike between I-595 and Griffin Road.

Reversible Lane Interchanges – The auxiliary lanes that carry traffic from the I-595 mainline to the reversible lanes will be elevated to a second level on MSE walls. Upon reaching a vertical clearance of 16.5 feet, the I-595 reversible lanes will be carried on structure, joining with the third lane. This third lane arises from or carries traffic to Florida's Turnpike and I-75.

Turnpike Mainline – The Florida's Turnpike mainline will require realignment in two areas: from north of Griffin Road to the south abutment of the Turnpike bridges over I-595, and from the north abutment of the Turnpike bridges over I-595 to Peters Road. Its median will also require widening to accommodate the I-595 reversible lane interchange areas, from its current 26 feet to 81.5 feet. In addition, the Turnpike's NB mainline lanes will be widened to the outside to incorporate the additional WB-NB on-ramp lanes.

Transit Facilities – Alternative 2A differs from Alternative 1B in that the transit corridor is located in the median under the elevated reversible lane structure. This requires raising the reversible lane structure from the second level to a third level. Transit traffic will enter and exit the I-595 median at Level 2 at two locations: east of Flamingo Road and west of University Drive. Once the transit line is away from the access/egress areas, it is lowered to the same profile as the I-595 mainline. This will allow the same benefits to be attained by both Alternatives 2A and 1B.

- Avoids the FP&L substation
- Minimizes the need for an additional transit structure
- Minimizes right-of-way impacts and costs
- Allows for more visibility of businesses from SR 84

Design Alternatives' Proposed Typical Sections

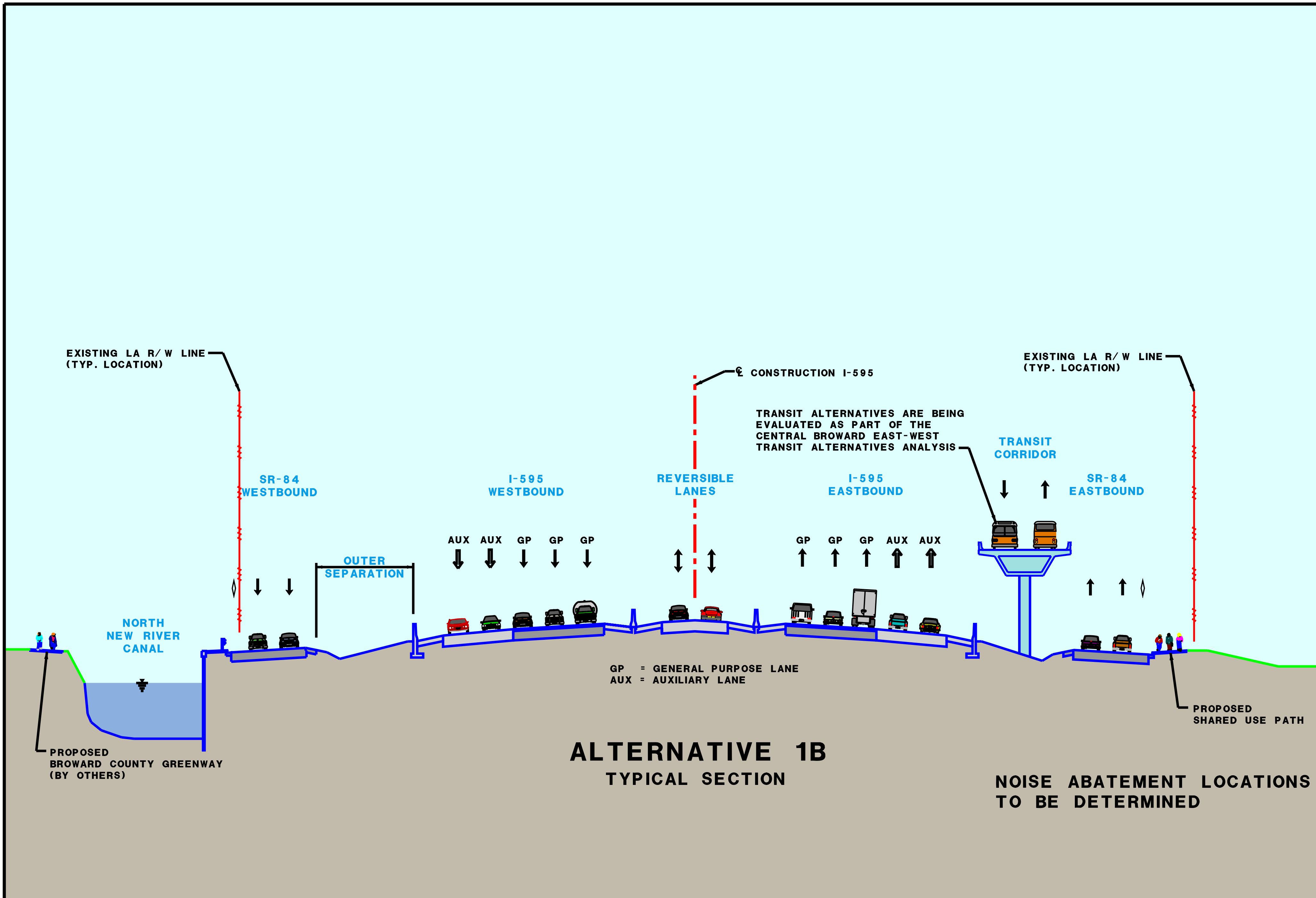
The typical sections proposed for Alternatives 1B and 2A will each provide six 12-foot wide general purpose lanes (three per direction) and two 12-foot auxiliary lanes between interchanges. The I-595 mainline will have 10-foot paved shoulders on both the inside and outside.

SR 84 will have two 12-foot lanes with 4-foot paved shoulders to the inside and to the outside. Type F curb and gutter and 6 feet to 12 feet of shared-use sidewalk/bicycle path will be included on the outside.

The configuration of the reversible lanes features is the primary way in which the two alternatives differ.

- **Alternative 1B** proposes that the reversible lanes be constructed at grade level within the I-595 median, separated from the mainline by median barrier walls. Under this design concept, there will be two 12-foot reversible lanes with 10-foot shoulders.
- **Alternative 2A** proposes that the reversible lanes be carried on a bridge structure that is 59 feet wide. It, too, will be located within the I-595 median. In Alternative 2A, there will be three 12-foot reversible lanes with 10-foot shoulders.

The proposed typical sections for **Alternatives 1B** and **2A** are shown in Figures 2-5 and 2-6. Figure 2-7 shows the system improvements proposed along the corridor.



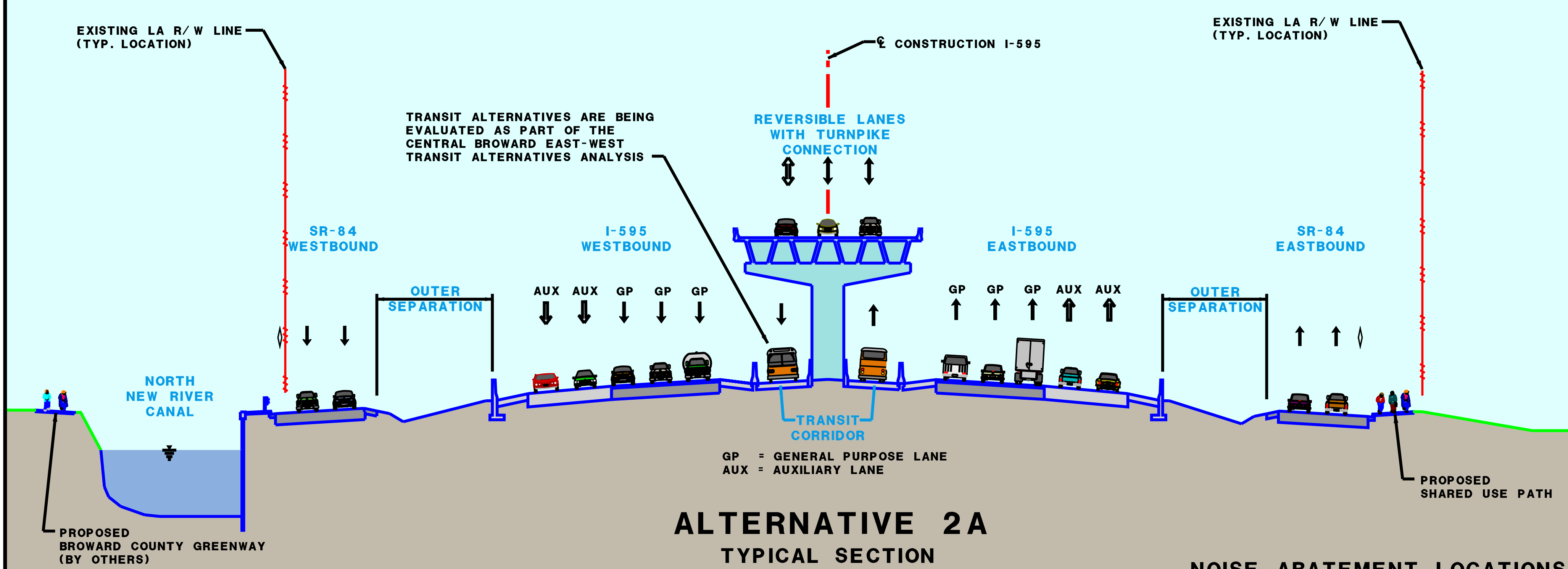
RS&H
Reynolds, Smith and Hills, Inc.
Architecture, Engineering and Planning

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY

ALTERNATIVE 1B TYPICAL SECTION

FIGURE 2-5

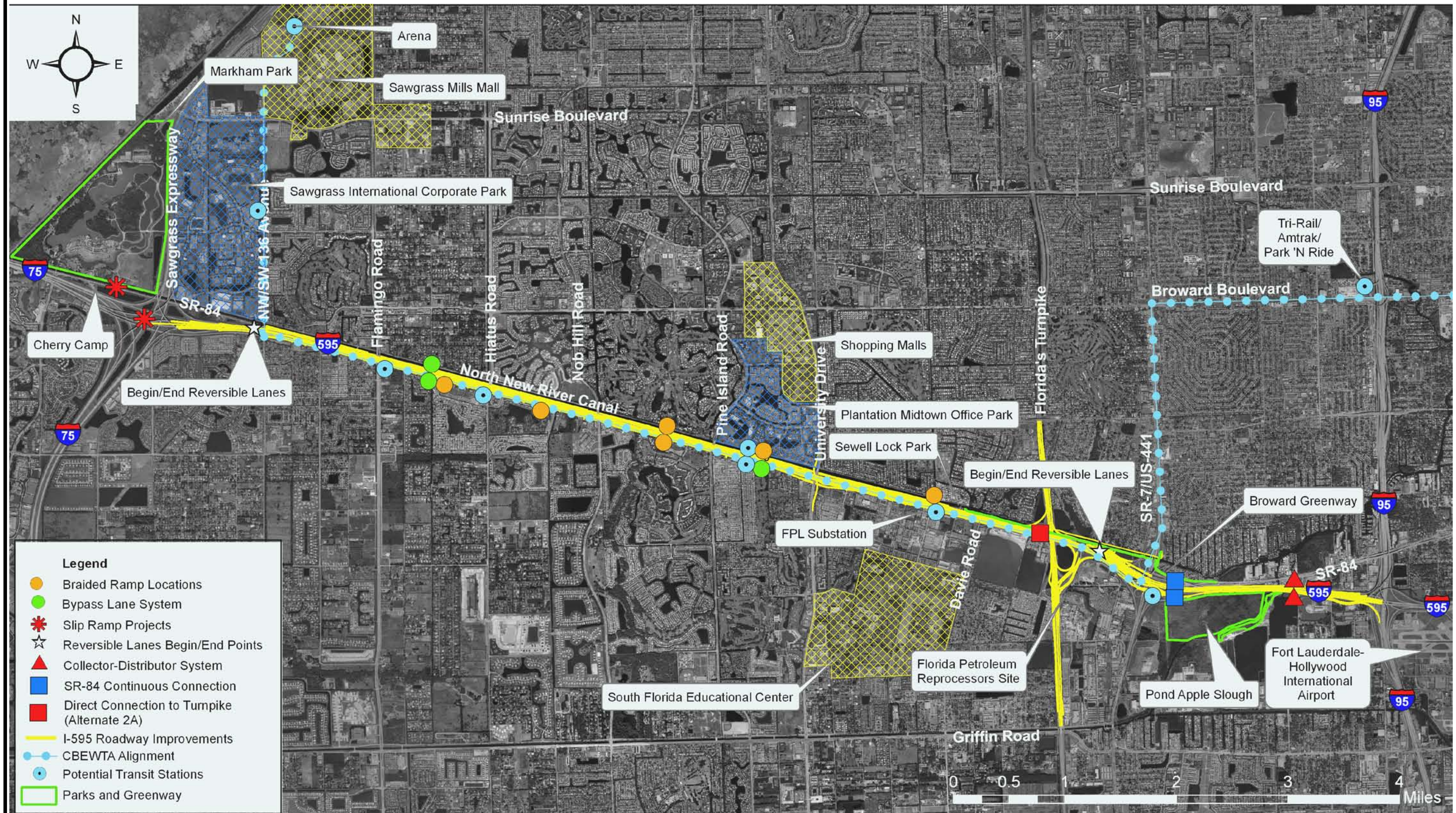


ALTERNATIVE 2A

TYPICAL SECTION

NOISE ABATEMENT LOCATIONS
TO BE DETERMINED

RS&H Reynolds, Smith and Hills, Inc. Architecture, Engineering and Planning	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY	ALTERNATIVE 2A TYPICAL SECTION	FIGURE 2-6



RS&H Reynolds, Smith and Hills, Inc. Architecture, Engineering and Planning	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I–595 PD&E STUDY	SUMMARY OF PROPOSED I–595 CORRIDOR IMPROVEMENTS	FIGURE 2–7

3.0 LAND USE

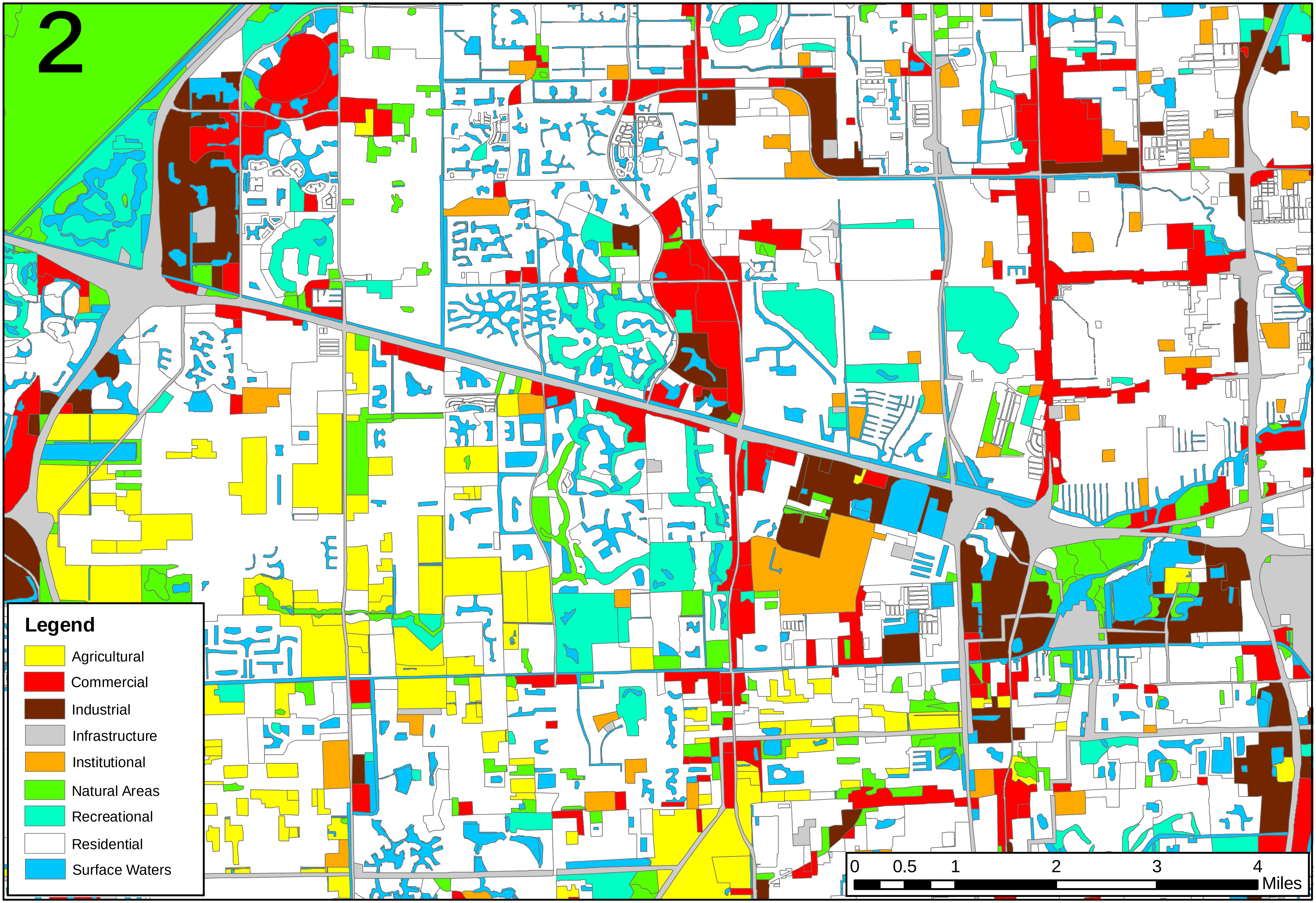
3.1 EXISTING LAND USE

The existing land uses along the project corridor are a mix of commercial and residential uses. The majority of the area is fully developed. The North New River Canal (C-15) parallels the north side of WB SR 84 through most of the project corridor, from SW 136th Avenue to SR 7. Land uses north of the canal are primarily residential, with some commercial development clustered near interchanges. Land uses along EB SR 84 and south of the corridor are generally strip commercial with adjacent multi-family and single-family residential development. Figure 3-1 illustrates existing land uses within the study area.

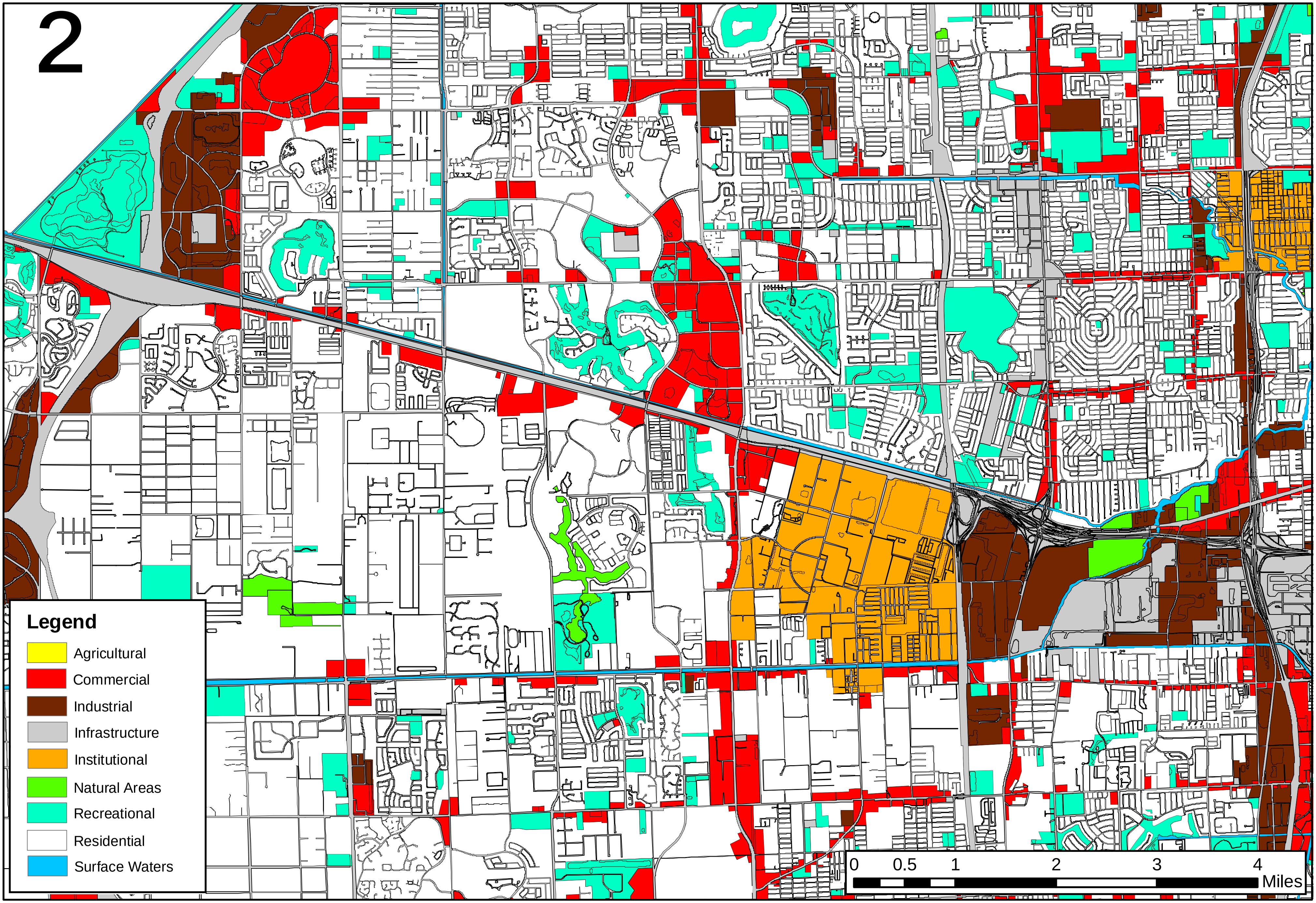
East of I-95 and the eastern project terminus, Ft. Lauderdale/Hollywood International Airport borders the south side of I-595. Light industrial land use is also found south of the corridor and east of Florida's Turnpike. A mixture of residential, industrial and open space land uses border the corridor northeast of the I-595/I-95 interchange area.

3.2 FUTURE LAND USE

The future land use in the project corridor is shown in Figure 3-2. This map was based on the Broward County Planning Council's *Future Land Use Plan*, an element of its Local Government Comprehensive Plan. Because the project area is almost entirely developed, future land uses will be similar to existing patterns. The future land use map shows continued mixed-use development in the project corridor, with a change from industrial/residential to institutional land use in the central portion of the I-595 corridor south of SR 84.



I-595 Project Development and Environment Study
Figure 3-1 Existing Land Use



I-595 Project Development and Environment Study
Figure 3-2 Future Land Use

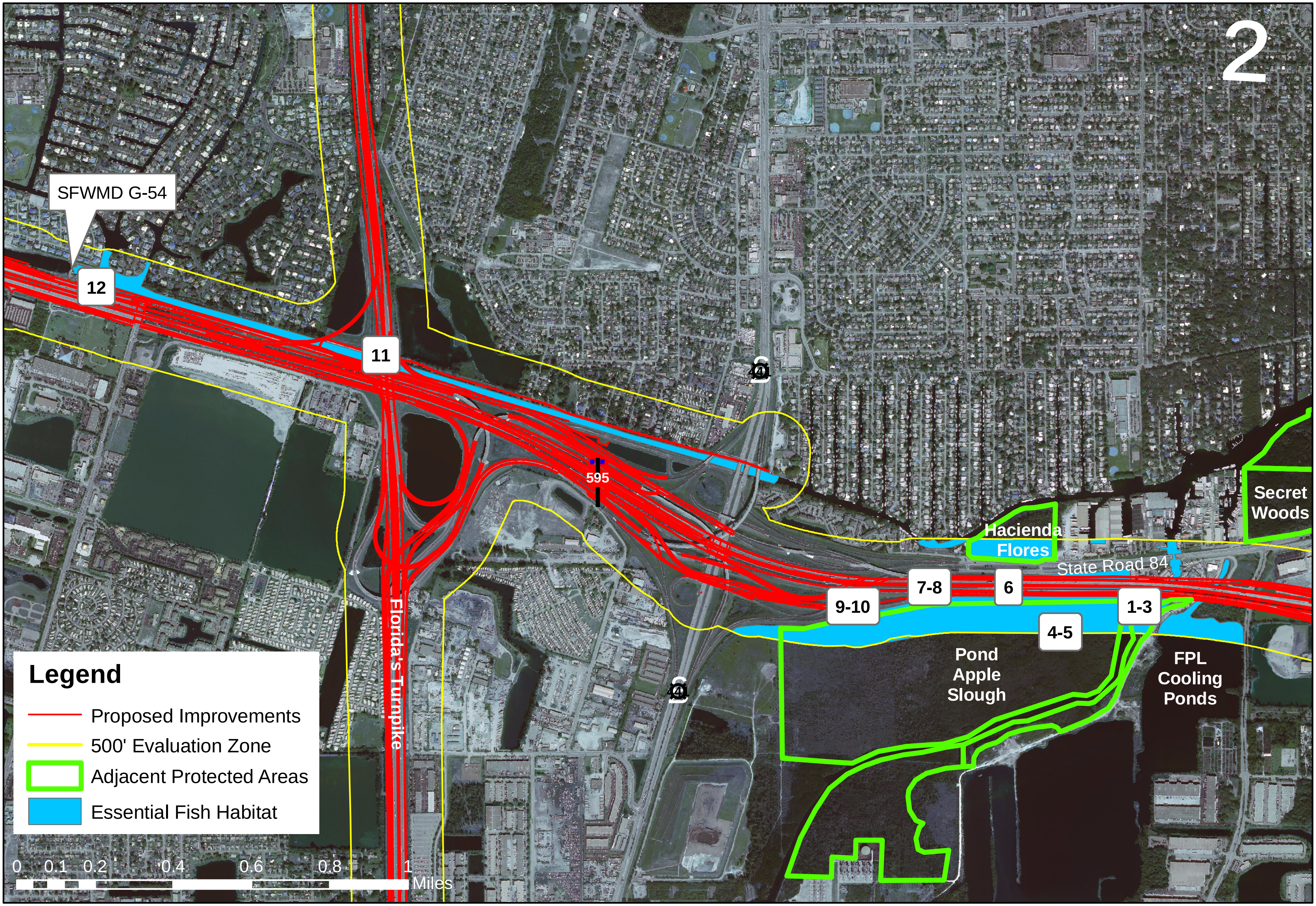
4.0 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Act defines EFH as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The rules promulgated by the NMFS in 1997 further clarify EFH with the following definitions: waters - aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate - sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary - the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and spawning, breeding, feeding, or growth to maturity - stages representing a species' full life cycle. EFH may be a subset of all areas occupied by a species. Acknowledging that the amount of information available for EFH determinations will vary for each species, the rules direct the FMCs to use the best information available, to take a risk averse approach to designations, and to be increasingly specific and narrow in their delineations as more refined information becomes available.

The EFH associated with this project includes all tidally-influenced surface waters and the hydrologically-connected freshwater wetlands downstream of the SFWMD G-54 salinity control structure. Figure 4-1 shows the location of EFH within 500 feet of the proposed improvements and the locations from which the photos that follow were taken.

On November 5, 2003, the Advance Notification for the project (see Appendix A) was distributed to the NMFS, US Fish and Wildlife Service (FWS), Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Environmental Protection (FDEP), Broward County Department of Planning and Environmental Protection (now the Broward County Environmental Protection Department, BCEPD) and other governmental agencies. The NMFS responded on December 31, 2003 (see Appendix B). On March 7, 2005, the FDOT submitted a Request for EFH Assessment Assistance to the NMFS, which included an abbreviated list of federally managed species (see Appendix C). On March 31, 2005, the NMSF responded (see Appendix D), requesting that the EFH assessment for the project address impacts to the following species and their habitats:

Common Name	Scientific Name	Management Unit
Brown shrimp	*Penaeus aztecus*	Peneaid Shrimp
Red drum	*Sciaenops ocellatus*	Red Drum
Gray snapper	*Lutjanus griseus*	Snapper-Grouper Complex
Jewfish	*Epinephelus itajara*	Snapper-Grouper Complex
Mutton snapper	*Lutjanus analis*	Snapper-Grouper Complex
White grunt	*Haemulon plumieri*	Snapper-Grouper Complex



RS&H	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY ESSENTIAL FISH HABITAT ASSESSMENT EFH WITHIN 500' AND PHOTO LOCATIONS	FIGURE 4-1

Photo 1 facing SSW

Photo 2 facing NNE

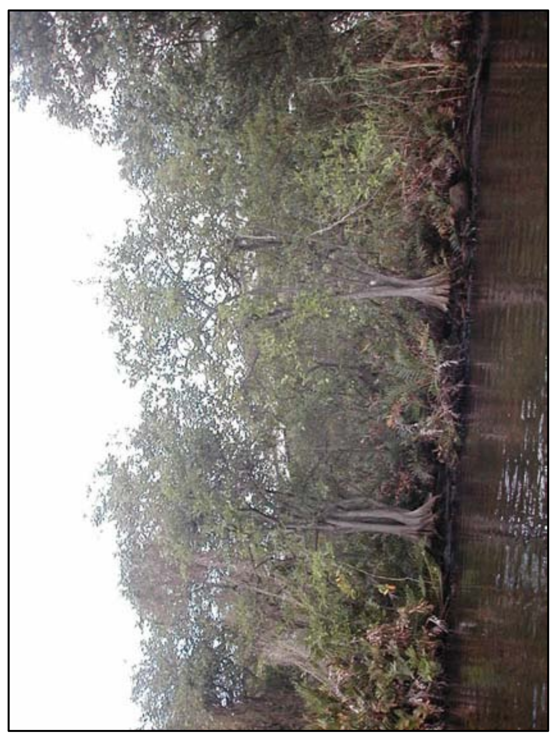


Photo 3 facing WSW

Photo 4 facing SW

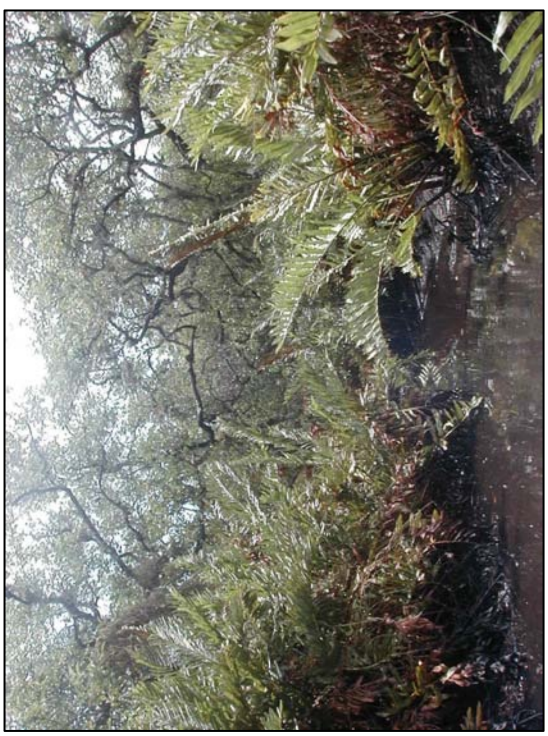


Photo 5 facing W

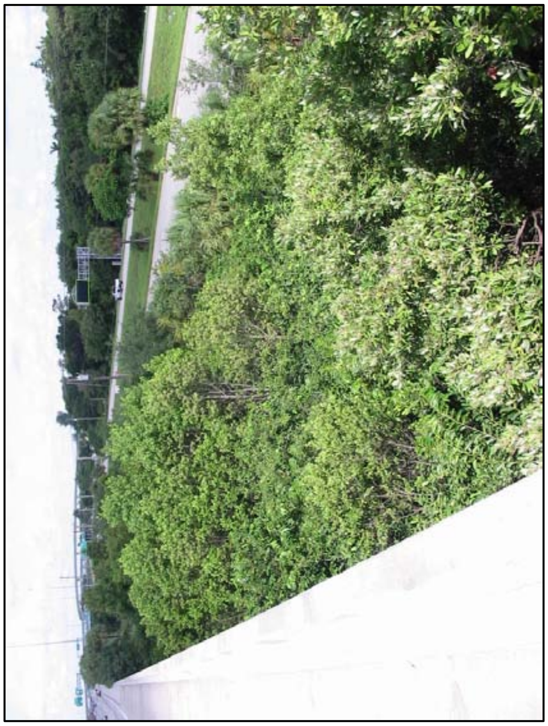


Photo 6 facing WNW

Photo 7 facing S

Photo 8 facing ENE

Photo 9 facing SE

Photo 10 facing SE

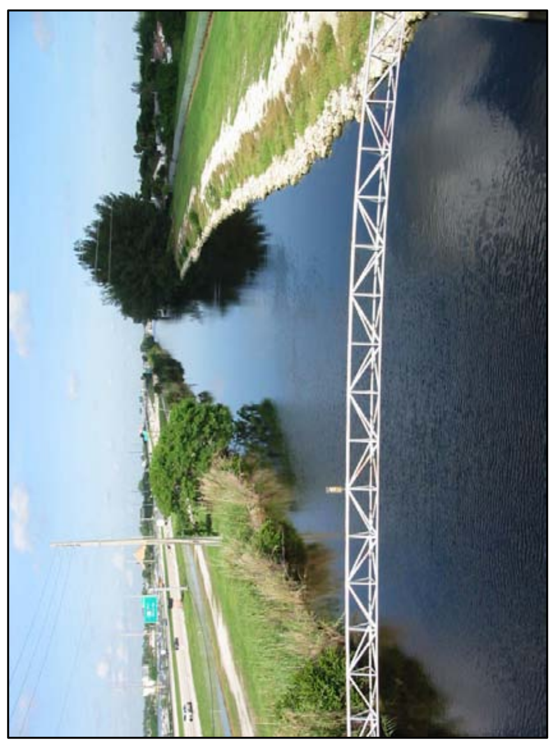


Photo 11 facing WNW

Photo 12 facing ESE

The South Atlantic FMC has defined EFH and habitat areas of particular concern (EFH-HAPC) for peneaid shrimp, red drum, and snapper-grouper species. The following summarizes the EFH and EFH-HAPC for each management unit.

4.1 PENEAID SHRIMP

The peneaid shrimp EFH includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non-vegetated flats.

Shrimp have a life cycle that requires a variety of habitats. The habitats can be divided into offshore and inshore. The high salinity, oceanic waters serve as habitat for large mature shrimp which spawn offshore. Brown and pink shrimp move to relatively deep continental shelf water and white shrimp remain nearshore in shallower water.

Offshore water also serves as habitat for larval and postlarval shrimp. These shrimp are planktonic and feed on zooplankton in the water column. There is some evidence that postlarval brown shrimp may overwinter in nearshore bottom sediments. The inshore phase of the life cycle is perhaps the most critical because most of the rapid growth occurs here. This critical habitat is dominated on the Atlantic coast by smooth cordgrass (*Spartina alterniflora*) which provides most of the primary production.

Shrimp enter the inshore habitat as postlarvae and maintain a benthic existence. The areas where juveniles appear most abundant have a mud-silt substrate and intermediate salinities. Juvenile shrimp appear to be most abundant at the cordgrass-water interface. This estuarine edge is the most productive zone in many estuaries. Because there is a minimum of wind-generated turbulence and stabilization of sediments, rich bands are found along the edge of marshes and the percentage of organic detritus in sediments along the shore in the Everglades estuary is several times greater than that a few meters offshore.

As shrimp increase in size, they begin migrating toward high salinity, oceanic waters. Water temperature directly or indirectly influences spawning, growth, habitat selection, osmoregulation, movement, migration, and mortality. Spring water temperature increases trigger spawning, and rapid water temperature declines in fall portend the end of spawning. Growth is fastest in summer and slow or negligible in winter. Water temperatures below 68°F inhibit growth of juvenile shrimp and growth is virtually arrested at 61°F. Growth rates increase rapidly as temperatures increase above 68°F. Increased water temperatures affect the molting rate. A strong correlation between heating-degree-days and catch/effort ratio for penaeid shrimp is similar to correlations of yield-per-acre versus latitude. Temperature and food supply limit the growth of postlarvae more than salinity differences between 2 and 35 ppt. Temporal and spatial shifts by brown, white, and pink shrimp help reduce direct interspecific competition especially for certain substrates.

Areas which meet the criteria for EFH-HAPCs for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp, and state-identified overwintering areas; however, none occur within the area of influence of the proposed project.

Estuarine tidal creeks and salt marshes that serve as nursery grounds are perhaps the most important habitats occupied by penaeid shrimp. The major factor controlling shrimp growth and production is the availability of nursery habitat. Remaining wetland habitat must be protected if present production levels are to be maintained. In addition, impacted habitats must be restored if future production is to increase. Other areas of specific concern are the barrier islands, since these land masses are vital to the maintenance of estuarine conditions needed by shrimp during their juvenile stage. Passes between barrier islands into estuaries are also important since the slow mixing of sea water and fresh water are of prime importance to estuarine productivity. Estuarine tidal creeks occur within the area of influence of the proposed project.

The I-595 limited access right of way (LA ROW) for the viaduct that crosses the South Fork of the New River and adjacent Pond Apple Slough Natural Area contain some tidal freshwater/estuarine emergent wetlands; tidal palustrine forested areas; mangroves; and intertidal and subtidal non-vegetated flats with mud-silt substrate. Additionally, both the bottom of the South Fork of the New River within the LA ROW and the bottom of the North New River Canal section that will be bulkheaded downstream of the SFWMD G-54 salinity control structure contain mud-silt substrate. These areas provide potential, albeit suboptimal habitat for peneaid shrimp.

4.2 RED DRUM

The red drum EFH includes all of the following habitats to a depth of 164 feet offshore: tidal freshwater; estuarine emergent vegetated wetlands (flooded saltmarshes, brackish marshes, and tidal creeks); estuarine scrub/shrub (mangrove fringe); submerged rooted vascular plants (sea grasses); oyster reefs and shell banks; unconsolidated bottom (soft sediments); ocean high salinity surf zones; and artificial reefs.

Red drum are distributed along the Atlantic coast, in the ocean and estuarine areas in relation to their stage of maturity. Juvenile red drum utilize the shallow backwaters of estuaries as nursery areas and remain there until they move to deeper water portions of an estuary associated with river mouths, oyster bars and front beaches. Estuarine wetlands are especially important to larval red drum. The types of estuarine systems vary along the Atlantic and subsequently, the preferred juvenile habitat also varies with distribution. Young red drum are found in quiet, shallow, protected waters with grassy or slightly muddy bottoms. Shallow bay bottoms or oyster reef substrates are preferred by subadult and adult red drum. Red drum utilize the oceanic system which is the area of the Atlantic ocean from the beachfront seaward. Large red drum are thought to migrate along the Atlantic coast and are subjected to human alterations of the natural system. Nearshore and offshore bar and bank areas have been identified as areas where concentrations of red drum may be located. Nearshore artificial reefs along the Atlantic are also known to attract red drum as they make their spring and fall migrations. In the fall and spring, red drum concentrate and move between inlets, shoals, capes, and from the surfzone to several miles offshore.

The distribution of red drum between estuarine habitat and oceanic waters is dependant mainly on the stage of development as well as temporal and environmental factors. Red drum are euryhaline. Adult and subadult red drum are most often found in diluted/concentrated seawater of 20 to 40 ppt and rarely above 50 ppt, while juveniles range into the freshest parts of estuaries. Eggs and newly hatched larvae require salinities above 25 ppt. Spawning occurs in or near passes of inlets with larvae being transported into the upper estuarine areas of low salinity. As larvae develop into juveniles and sub-adults, they utilize progressively higher salinity estuarine and beachfront surf zones. Red drum move out of estuarine areas as adults and occupy the high salinity surf zone of nearshore and offshore coastal waters.

Red drum also are eurythermal, occurring over a temperature range of 36° to 91°F, although they usually move into deeper water at extremes. Larger juveniles and adults are more susceptible to the effects of winter cold waves than small fish. High red drum mortality during freezes occurs and has the ability to decimate large portions of juvenile year classes. Thermal optimum is dependant on salinity, a characteristic of euryhaline fish.

Areas which meet the criteria for red drum EFH-HAPC include all coastal inlets; all state-designated nursery habitats of particular importance to red drum; documented sites of spawning aggregations; other spawning areas identified in the future; and habitats identified for submerged aquatic vegetation. None occur within the area of influence of the proposed project.

These areas include the most important habitats required during the life cycle of the species, including the spawning areas and estuarine nursery grounds. Other areas of specific concern are barrier islands in each state, as these structures are vital to maintain estuarine conditions needed by larval and juvenile stages. Passes between barrier islands into estuaries also are very important, as the slow mixing of sea water and fresh water is generally regarded as being of prime importance in the productivity of any estuary. A rapid change may cause environmental stresses too great for many estuarine organisms to withstand.

Seagrass beds and/or submerged aquatic vegetation prevalent in sounds and bays are also critical areas for red drum, particularly for 1 and 2 year old fish (>29.5 inches). Seagrass beds, shallow areas of estuarine rivers and mainland shorelines are where many red drum reside during the summer. There is seasonal movement out of the marsh and into deep holes and creek channel adjoining the marsh system during the winter months. The area of particular concern for early growth and development is seasonal and size dependant, encompassing the entire estuarine system from the lower salinity portions of the river systems through the inlet mouth or lower harbor areas. The water bodies within the area of influence of the proposed project contain no seagrass and very little submerged aquatic vegetation.

The various inlets, adjoining channels, sounds, and outer bars of ocean inlets are critical areas for spawning activity as well as feeding and daily movement and may be affected by constant dredging, jettying or excessive boat traffic. Adult red drum spend a lot of time in these areas during spring and fall with large concentrations located near the least trafficked inlets.

The I-595 LA ROW for the viaduct that crosses the South Fork of the New River and adjacent Pond Apple Slough Natural Area contain some tidal freshwater/estuarine emergent wetlands, estuarine scrub/shrub and unconsolidated bottom. Additionally, both the bottom of the South Fork of the New River within the LA ROW and the bottom of the North New River Canal section that will be bulkheaded downstream of the SFWMD G-54 salinity control structure contain unconsolidated bottom. These areas provide potential habitat for red drum.

4.3 SNAPPER-GROUPER COMPLEX

EFH for snapper-grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from the shore to at least 600 feet where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition, the Gulf Stream is an EFH because it provides a mechanism to disperse snapper-grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper-grouper species, EFH includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marshes); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; coral reefs and live/hard bottom.

Areas which meet the criteria for EFH-HAPC for species in the snapper-grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper-grouper; pelagic and benthic *Sargassum*; all hermatypic coral habitats and reefs.

The mangrove habitat in the I-595 LA ROW for the viaduct that crosses the South Fork of the New River and adjacent Pond Apple Slough Natural Area meet the criteria for EFH-HAPC for snapper-grouper species and also contain tidal creeks. Additionally, these areas as well as the bottom of the South Fork of the New River within the LA ROW and the bottom of the North New River Canal section that will be bulkheaded downstream of the SFWMD G-54 salinity control structure contain some estuarine emergent vegetated wetlands; estuarine scrub/shrub (within the LA ROW) and unconsolidated bottom.

5.0 MANAGED FISH SPECIES

5.1 BROWN SHRIMP

Juvenile and adult penaeids are omnivorous bottom feeders with most feeding activity occurring at night, although daytime feeding may occur in turbid waters. Food items consist of polychaetes, amphipods, nematodes, caridean shrimps, mysids, copepods, isopods, amphipods, ostracods, mollusks, foraminiferans, chironomid larvae, and various types of organic debris.

Brown shrimp appear to prefer a similar bottom type and adults may be found in areas where the bottom consists of mud, sand, and shell. They generally bury in the substrate during daylight, and become active at night. Shrimp are preyed upon by a wide variety of species at virtually all stages in their life history. Predation of postlarvae has been observed by sheepshead minnows, water boatmen, and insect larvae. Grass shrimp, killifishes, and blue crabs prey on young penaeid shrimp, and a wide variety of finfish are known to prey heavily on juvenile and adult penaeid shrimp.

Spawning is correlated with bottom water temperatures and has been reported to occur at bottom temperatures between 63° and 84°F, although spawning generally occurs between 72° and 84°F. Brown shrimp spawn in relatively deep water. Although spawning season is uncertain, there is an influx of postlarvae into the estuaries during February and March.

Brown shrimp have eleven larval stages (five nauplier, three protozoan, and three mysid) before developing into postlarvae. Duration of the larval period is dependent upon temperature, food, and habitat. Records indicate larval periods of 11-17 days for brown shrimp. Brown shrimp postlarvae overwinter in offshore bottom sediments. Postlarval shrimp sizes range from approximately 0.1-0.5 inches.

The mechanism by which postlarvae are brought from distant spawning areas to estuaries is not well-known. There is some data on brown shrimp that suggests postlarvae may overwinter in offshore waters and migrate into estuaries the following spring. After entering the estuaries, postlarval shrimp occupy nursery areas which offer abundant food, suitable substrate, and shelter from predators. In the South Atlantic, these areas are generally dominated by smooth cordgrass.

White and pink shrimp enter the estuaries at about the same time, usually beginning in April and early May in the southern part of their range and in June and July in the North Carolina sound, where white shrimp are uncommon. Large white shrimp begin emigrating out of the estuary to the commercial fishing areas in August and continue through December. Smaller white and pink shrimp may remain in the estuary during winter and are termed overwintering stocks. Juvenile and adult brown shrimp are rarely affected by severe winter weather because most have been captured by fishermen or predators and others have moved offshore prior to the onset of cold weather.

Growth rates of penaeid shrimp are highly variable and depend on factors such as season, water temperature, shrimp density, salinity, size, and sex. Adolescent shrimp grow rapidly with estimates ranging from 0.01-0.09 inches per day for brown shrimp. Salinity is also a factor determining growth rate in white shrimp. High salinities appear to inhibit growth. Density also affects growth of white shrimp. During years of low densities, the average size is generally larger.

Temperature also affects brown shrimp growth rates, with rates as high as 0.1 inches per day recorded when the temperature exceed 77°F but less than 0.03 inches per day when water temperature falls below 68°F. Salinity also affects growth rates in brown shrimp. Salinities in excess of 10 ppt seem to enhance growth rates.

On the Atlantic Coast, brown shrimp occur from Massachusetts to the Florida Keys. While they may occur seasonally along the Mid-Atlantic states, breeding populations apparently do not extend north of North Carolina. The species may occur in commercial quantities in waters as deep as 361 feet, but they are most abundant in water less than 180 feet.

5.2 RED DRUM

Red drum occur in a variety of habitats and spawn in the ocean along beaches and in the vicinity of inlets and passes and possibly in high salinity estuaries. Red drum spawn at night and produce planktonic, spherical eggs between 0.03 inches and 0.04 inches in diameter. Eggs are clear with a single, gold-colored oil droplet. Environmental requirements for optimum incubation require salinity between 25-35 ppt, below which the eggs would sink and above which the eggs would clump together. Optimum spawning occurs at temperatures between 72° and 86°F. Red drum eggs and larvae are carried by tidal and current movement into estuarine systems. Increased spawning activity is associated with new and full moon periods during the spawning season.

After maturation, adult red drum spend less time in the estuaries and more time in the ocean. They migrate seasonally along the coast, inshore and/or north in spring and offshore and/or south in fall. In winter, red drum have been found in the trawl fishery and in trawl surveys at depths between 33 and 131 feet.

Adult red drum migrate seasonally along the Atlantic coast. After their first or second year, some red drum move along the barrier island beaches during fall and spend winter in deep holes or sloughs, while others winter in an estuary. As they get older, they spend spring, early summer and fall along the beaches and winter offshore. As spring approaches, these adult fish move from offshore wintering grounds towards the beaches. They occur along beaches near inlets for one to two months and move inside in summer. In August, they school around inlets to spawn and remain along the beaches through November, then move offshore again.

Red drum tend to stay in the same general estuarine system from post larval stages through their third or fourth year of life. They then move out of the estuarine system into the spawning stock associated with nearshore and offshore areas. Some large fish move into bays, sounds and harbor systems, even after maturity, and are susceptible to capture.

Prey vary with fish size. Copepods are the predominant prey by volume for fish 0.2 to 0.6 inches, representing 27% of the total volume. Mysids comprises 34% of the total volume of prey for fish 0.6 to 1.2 inches. The highest level of consumption of juvenile red drum occurs in the 3 to 4 inch size class. A shift in composition of prey species occurs for red drum 8 to 12 inch size class. The predominant species observed in this size class are decapods (mainly mud crabs and fiddler crabs), which account for 96% by volume and 95% of the individuals.

5.3 GRAY SNAPPER

Spawning activity occurs offshore and peaks during the summer and early fall. Eggs and larvae are planktonic and occur offshore. Planktonic larval duration is estimated to range from 25 to 40 days, with a mean of 33 days postfertilization based on otolith microstructure. Settlement sizes range from approximately 0.4 to 0.8 inches. Larvae appear competent to settle between three to five weeks. The mean growth rate estimated for early juveniles is 0.04 inches per day. Maturity is reached at about eight inches total length, usually during the third year. Gray snapper reach an estimated maximum size of 2.4 feet and a maximum age at 10 years.

The majority of western Atlantic snappers are easily distinguished as adults and larger juveniles. However, newly settled stages of *Lutjanus griseus, L. apodus, L. jocu,* and *L. cyanopterus* can co-occur in shallow water, have essentially identical fin meristics, lack dorsolateral spots, and can be difficult to distinguish. Juvenile gray snapper are euryhaline and occur at salinities between 0 to 37 ppt. Exposure to freshwater pulses caused no mortality in laboratory experiments with juveniles. Lower lethal temperatures have been estimated at between 52° to 57°F and several authors report mortality at low water temperatures caused by freezes. Gray snapper are carnivorous at all life stages. Juveniles primarily prey on crustaceans, but can consume fish, mollusks and polychaetes. Adults are typically nocturnal predators, consuming mostly fish, but also prey on shrimp and crabs. Adults show seasonal spawning migrations.

Settlement stages and early juveniles primarily use grassbeds before migrating to hard structures in deeper waters with growth. Newly settled stages commonly occur in grassbeds, but do not occur in mangrove and hardbottom habitats, and are uncommon or rare in all habitats exceeding 16 feet in depth. Early juvenile stages (1 to 3 inches) are more widely distributed, particularly on the habitat scale, occurring among a variety of hard structures as well as mangroves and grassbeds. The absence of newly settled life stages from hardbottom and mangrove habitats may result from the older resident fauna and more concentrated predation pressures in these habitats.

Bottom types of high value include seagrass flats (*Thalassia, Syringodium,* and *Halodule*); soft marl bottoms, fine marl mud with shell and rock outcrops; mangrove roots; hardbottom structures; and shallow basins with seagrasses adjacent to mud banks. Adults are primarily marine and utilize deeper waters than juveniles, but can occur in estuaries and rivers. Adults are euryhaline, ranging between 0 to 47 ppt and have been reported at depths of 253 feet. Bottom types of high value for adults are diverse and include coral reefs, hardbottom, channel ledges, artificial structures, mangroves, grassbeds, alcyonarians, and sponges.

5.4 JEWFISH

In the South Atlantic, jewfish (also known as the Goliath grouper) are more abundant off the Florida east coast and in the Florida Keys. Historically, spawning aggregations were observed off Palm Beach, Florida. The occurrence of jewfish north of Florida is rare. This species is considered overfished in the most recent NMFS stock assessments and South Atlantic FMC analyses. The harvest or possession of jewfish is prohibited.

Jewfish are thought to be protogynous hermaphrodites (born female and changing to male later in life), similar to other groupers. It is not known whether jewfish are indeed protogynous hermaphrodites or gonochoristic (sexes separate). The size or age of sexual transition is unknown and it is possible that some males pass through an immature female stage and mature as males.

Females with ripe ova have been found from July through October. August to mid-October is the period of peak reproductive activity. Spawning aggregations of jewfish have been observed in waters as shallow as 30 to 40 feet. Female jewfish sexually mature at about 50 inches (105 pounds in weight). Jewfish are long-lived and can reach a size of 700 pounds. They consume fish, sea turtles, crabs, and lobsters. A large proportion of the jewfish's prey are crustaceans.

Adult and juvenile jewfish inhabit shallow waters and reside around bottom features which provide cover and protection (e.g. shipwrecks, reefs, ledges, piers, bridges and mangrove lined shores). Juveniles have been found along bulkheads, bridges and in upland canals. The preferred habitat of adults are high-relief ledges and wrecks further offshore. The habitat preferences of jewfish make them easily accessible to fishermen, and especially vulnerable to spearfishermen. Furthermore, their narrow habitat preference causes this species to be highly susceptible to hypothermia and red tide-induced mortalities. Large numbers of these fish are reported to aggregate around isolated reefs, rock ledges and wrecks in 150 foot depths and less on the southwest and southeast Florida shelf during the spawning season. Aggregations of as many as 24 fish at depths of 15 feet have been observed in Hobe Sound, Florida.

5.5 MUTTON SNAPPER

The mutton snapper is a premier demersal fishery species. Unlike the gray snapper, mutton snapper are not appreciably present north of central Florida or in the northern Gulf of Mexico. Spawning activity occurs offshore and may peak during the summer and fall. Sizeable aggregations can be formed during spawning. Eggs and larvae are planktonic and occur offshore. Planktonic larval duration is estimated to range from 27 to 37 days, with a mean of 31 days postfertilization. Settlement sizes range from approximately 0.4 to 0.8 inches. The mean growth rate estimated for early juveniles is 0.03 inches per day for winter-spawned individuals. They are estimated to reach a maximum size of three feet and a maximum age of 14 years.

Mutton snapper have been recorded at salinities ranging from 4.5 to 37.3 ppt and temperatures between 65° to 86°F. Mortality from hypothermal stress has been documented at 43° to 55°F. Larvae and newly settled stages are presumed to be planktivorous and benthic invertebrate foragers, respectively. Large juveniles and adults feed predominately on a wide array of crustaceans and fish, although gastropods and octopii may also be consumed.

In contrast to the gray snapper, there is little literature on habitat use in early stages of mutton snapper. Eggs and larvae probably utilize water column habitats over the continental shelf, based on similar snappers. Recruitment of early juveniles 0.4 to 1.0 inches occurs principally from June to November. Juveniles <0.8 inches have been captured in July and October through January.

Newly settled stages occur in seagrass meadows and generally use mangrove prop roots or adjacent shallow rock and coral reef formations as larger juveniles. Ocean inlet seagrass meadows are preferred habitat for juvenile mutton snapper. Adults utilize a variety of deeper environments over reef, sand and mud substrates and can occur to depths of 328 feet. Adults are generalized top predators of a variety of reef invertebrates and fishes, particularly slow-moving or sedentary benthic and epibenthic prey species. Feeding predominately takes place near the bottom during the day or night.

5.6 WHITE GRUNT

White grunts range from North Carolina to Brazil. Eggs and early larvae are pelagic, while juveniles and adults are found from the shore to at least 115 feet, occupying a variety of habitats including reefs and hardbottom, grass flats, and mangroves. They are often found individually or in small groups, but can form large schools over reefs and gorgonians, particularly during the day. Spawning occurs throughout much of the year with one or more peaks in warmer months. The mean growth rate of early juveniles has been estimated at 0.01 inches per day. Adults have a growth rate ranging from 0.06 to 0.14 inches per month. Maximum length is estimated between 17.7 and 18.1 inches.

White grunt are fished commercially and recreationally throughout their range. They are important in energy exchange between reef and seagrass communities because of their nocturnal foraging migrations. Newly settled stages feed on plankton directly from the water column during the day. Adults are generalized carnivores that feed mainly on benthic invertebrates. These invertebrates include echinoderms, polychaetes, majid crabs, alpheid shrimp, isopods, other shrimp, crabs, and small fish. Because of their abundance, they are probably important prey for many larger species of groupers and snappers.

6.0 ASSESSMENT OF IMPACTS AND MITIGATIVE MEASURES

This section examines potential impacts to managed species and EFH. Identifiable impacts associated with the proposed improvements to I-595 to the estuarine and marine components of the EFH are described. Potential environmental consequences that may result from impacts to EFH are reviewed, as well as the mitigative measures that will be taken to prevent or minimize impacts to EFH, when applicable.

6.1 DIRECT IMPACTS

6.1.1 LA ROW FOR THE VIADUCT OVER THE SOUTH FORK OF THE NEW RIVER

The I-595 LA ROW for the viaduct that crosses the South Fork of the New River contains tidal freshwater/estuarine emergent wetlands; tidal palustrine forested areas; mangroves; intertidal and subtidal non-vegetated flats with mud-silt substrate; unconsolidated bottom, and tidal creeks. It provides potential habitat for peneaid shrimp, red drum and snapper-grouper species. The mangrove habitat meets the criteria for EFH-HAPC for snapper-grouper species.

The widening of the viaduct will result in unavoidable direct impacts to approximately 2.1 acres of EFH and 4.3 acres of shading impacts to EFH, all of which potentially support the managed species previously identified. The areas beneath and immediately north of the viaduct were planted as mitigation for wetland impacts associated with the Cypress Creek Park and Ride Lot at the I-95/Cypress Creek Road Interchange. Appendix E contains a complete set of the final plans for that mitigation project.

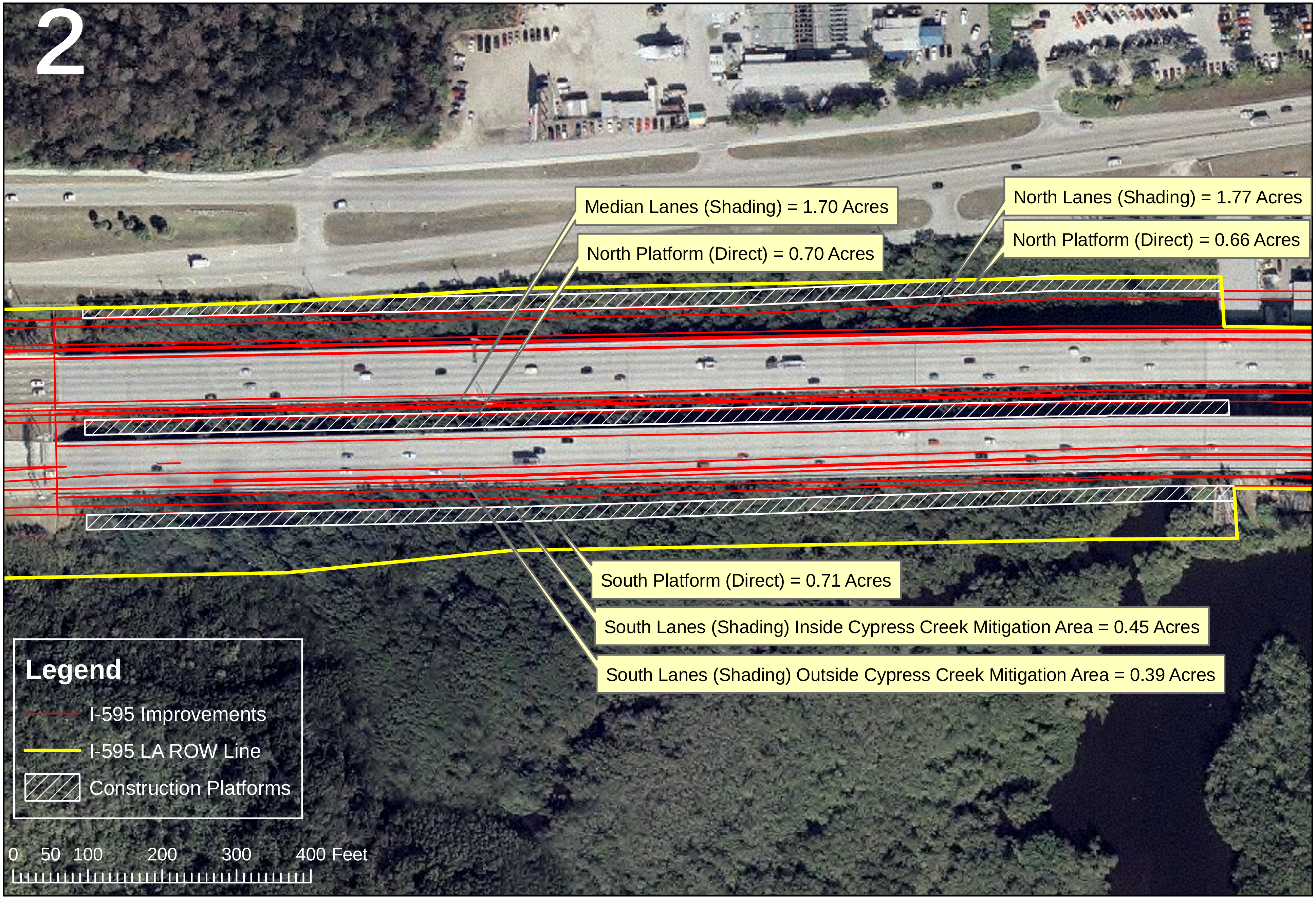
Planting of the mitigation areas commenced on September 7, 1993 and was completed on October 21, 1995. After removal of exotics and replanting, the mitigation area now contains the following wetland species.

Common Name	Scientific Name
Red maple	*Acer rubrum*
Leather fern	*Acrostichum danaeifolium*
Pond apple	*Annona glabra*
Saltbush	*Baccharis haliminifolia*
Cocoplum	*Chrysobalanus icaco*
Coconut palm	*Cocos nucifera*
Strangler fig	*Ficus aurea*
Dahoon holly	*Ilex cassine*
Wax myrtle	*Myrcia cerifera*
Myrsine	*Myrsine guianensis*
Red bay	*Persea palustris*

Common Name	Scientific Name
Laurel oak	*Quercus laurifolia*
Cabbage palm	*Sabal palmetto*
Willow	*Salix caroliniana*
Bald cypress	*Taxodium distichum*

Although the mitigation area was planted with freshwater species in accordance with the Broward County Parks and Recreation Department's desire to maintain the Pond Apple Slough Natural Area as a freshwater wetland, most of the area that will be impacted is tidally influenced and is being invaded by white mangrove (*Laguncularia racemosa*). If the freshwater hydrology is not restored and the eradication of the white mangroves (which was performed during the mitigation site maintenance period) is not continued, this area could transition into an estuarine ecosystem. Regardless of whether it is a freshwater wetland or transitioning into an estuarine ecosystem, and as long as it is not hydrologically isolated from the South Fork of the New River, it can support estuarine-dependent species and is EFH. Figure 6-1 illustrates the location of the impacts to the EFH within the I-595 LA ROW for the viaduct that crosses the South Fork of the New River.

As per the request from the NMFS, this area was evaluated using SFWMD's Wetland Rapid Assessment Procedure (WRAP), the Estuarine-WRAP, and the Uniform Wetland Mitigation Assessment Methodology (UWMAM). Copies of the WRAP, E-WRAP, and UWMAM worksheets are provided in Appendices F through H, respectfully. A copy of the E-WRAP procedure is also provided in Appendix I. In addition, copies of the *Pond Apple Slough Restoration Project Management Plan* (obtained from Broward County Parks and Recreation Department) and the *Pond Apple Slough Species List* (obtained from the Broward County Environmental Protection Department) are provided in Appendices J and K, respectively. They identified the federally listed wood stork, Florida manatee, American alligator, American crocodile and Eastern indigo snake as occurring in the Pond Apple Slough Natural Area. Though no evidence of these species was observed during any field surveys in Pond Apple Slough Natural Area, there is suitable habitat available for these species. Additional information regarding these assessments, expected wetland impacts, and listed species considerations is provided in the Wetland Evaluation Report and the Endangered Species Biological Assessment Report prepared for this project.



RS&H	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	I-595 PD&E STUDY ESSENTIAL FISH HABITAT ASSESSMENT EFH IMPACTS IN I-595 LA ROW	FIGURE 6-1

6.1.2 SOUTH FORK OF THE NEW RIVER

The South Fork of the New River is also known as the South Fork New River, and at the I-595 viaduct crossing it is also known as the South New River Canal. It is tidally influenced. The walls and bottom of the canal provide EFH that potentially supports the managed species previously identified. The section beneath the I-595 viaduct was cut into limestone and the rock walls provide a hard substrate to which algae and sessile invertebrate food sources can attach. The bottom of the canal provides sediments for boring invertebrate food sources. The scattered rocks and other debris provide potential refuge for larval and juvenile stages of the managed species as well as their food sources. Most of the banks beneath the I-595 viaduct are already bulkheaded, and where vegetation exists on the banks, it is periodically removed from the banks of the canal through the use of herbicides and mechanical means. Therefore, the banks do not support EFH or its managed species.

The proposed improvements will require the installation of additional pilings in the South Fork of the New River. No dredging is anticipated and due to the height of the viaduct, additional shading impacts are anticipated to be negligible. The installation of additional pilings will provide additional hard substrate to which algae and sessile invertebrate food sources can attach. Therefore, no long-term impacts are anticipated to affect the EFH within the South Fork of the New River**.**

6.1.3 NORTH NEW RIVER CANAL

The North New River Canal is tidally influenced downstream of the SFWMD G-54 salinity control structure. The walls and bottom of the canal provide EFH that potentially supports the managed species previously identified. The canal was cut into limestone and the rock walls provide a hard substrate to which algae and sessile invertebrate food sources can attach. The bottom of the canal provides sediments for boring invertebrate food sources. The scattered rocks and other debris provide potential refuge for larval and juvenile stages of the managed species as well as their food sources. Vegetation is periodically removed from the canal banks through the use of herbicides and mechanical means, so they do not support the EFH or managed species.

The proposed improvements between US 441/SR 7 and the SFWMD G-54 salinity control structure will require approximately 1¼ miles of the south bank of the North New River Canal to be bulkheaded. In addition, new ramps from I-595 to Florida's Turnpike will require the installation of more pilings in the canal and will result in approximately 0.5 additional acres of shading impacts.

The installation of the bulkhead will result in direct impacts to the rock walls that provide a hard substrate to which algae and sessile invertebrate food sources can attach.

However, it is anticipated that algae and sessile invertebrate food sources will also attach to the bulkhead, so this impact is considered temporary.

Because the SFWMD requires the cross sectional area of the canal to be maintained, it will also need to be dredged in the areas where the bulkhead will be installed. This will result in direct impacts to the sediment and debris on the bottom of the canal that may support managed species. However, as shown in Figure 6-1, the bottom area will increase as a result of the bulkheading and will provide additional sediment cover for boring invertebrate food sources. There will also be additional area for the accumulation of the scattered rocks and other debris that provide potential refuge for larval and juvenile stages of the managed species and their food sources. Therefore, this impact is also considered temporary.

The installation of pilings for the new ramps will provide additional hard substrate to which algae and sessile invertebrate food sources can attach. It is anticipated that this additional hard substrate will more than offset the minor impacts associated with the additional shading. Overall, no long-term impacts are anticipated to affect the North New River Canal EFH as a result of the proposed improvements**.**

6.2 SECONDARY IMPACTS

As illustrated in Figure 2-1 (page 2-2), the area surrounding the project corridor is urban with numerous anthropogenic impacts to the remaining natural habitat. Significant hydrological and water quality (e.g., chemical, physical, and biological properties) impacts are not expected to occur as a result of the proposed project because the proposed improvements are to an existing facility. With the exception of the bridge over the South Fork of the New River, which will continue to drain directly below through scuppers, the stormwater from the additional travel lanes will be managed within the facility. Because stormwater management standards have increased since I-595 was originally constructed, the project will result in overall water quality improvements in the project corridor to meet the new standards. Hydrological effects of the proposed project are described in a separate Drainage Report and a Water Quality Impact Evaluation has been performed to address water quality impacts.

Other secondary impacts resulting from environmental degradation can occur from:

- temporary disturbance and displacement of fish species;
- increased sediment loads and turbidity in the water column;
- temporary loss of food items to fisheries;
- limited disruption or destruction of live bottom habitats; and
- limited sediment transport and re-deposition.

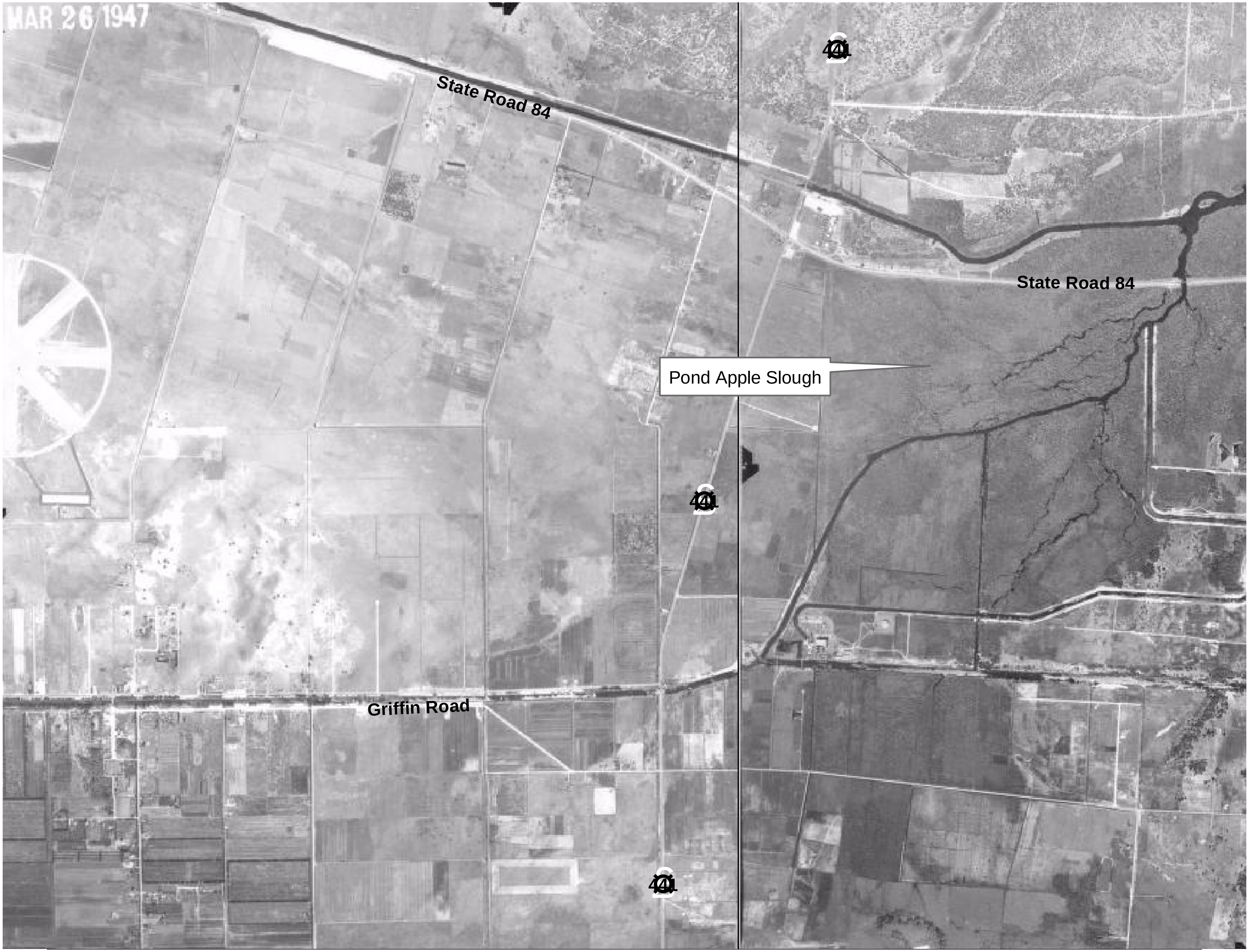
Most of these impacts are temporary and can be offset by special construction techniques and/or environmental protection guidelines. Some impacts are negligible considering the localized effect of the actions compared to the size of the area. Therefore, environmental degradation from the proposed improvements would have minor impacts on designated EFH or commercial fisheries. Direct loss to fish populations, if any, are likely to be negligible. Recovery of impacted EFH and commercial fisheries is expected to occur quickly (within one growing season) for the majority of the affected habitat.

6.3 CUMULATIVE IMPACTS

Cumulative impacts are defined as the direct and indirect effects of the proposed project under consideration as well as other projects that may be proposed within the general vicinity in the foreseeable future. Due to the extent of urban development in Broward County, only small fragments of naturally occurring ecological communities remain. Figure 6-2 shows the condition of Pond Apple Slough in 1947, prior to the development of the surrounding areas. Figure 6-3 shows the 1967 vegetative communities, as outlined by John H. Davis in the *General Map of Natural Vegetation of Florida*, 1967. Although Pond Apple Slough appears relatively unchanged in current aerial photographs, its hydrological alteration by the North New River Canal (completed in 1912), South New River Canal (completed circa 1915) and the nearby Peele-Dixie Wellfiield (completed in 1926) had already begun. Subsequent development of the surrounding areas resulted in additional hydrological impacts from increased surface water runoff and the resulting reduction in groundwater recharge. Figure 6-4 shows the remaining wetland coverage identified in the FWS's 2003 National Wetland Inventory (NWI). Figure 6-5 shows the 2003 vegetation and land cover identified by the FWC.

The overall effects of these hydrological changes have resulted in the gradual transition of Pond Apple Slough from a freshwater wetland towards an estuarine system. This transition has manifested itself in the loss of cypress trees and continuing encroachment of mangroves into what was historically a freshwater wetland community. Fragmentation and reduction of other available habitat in Broward County has also caused significant impacts on the habitat available to plant and animal species. These impacts were not the result of any one project, yet cumulatively they have been significant to the ecosystem. The construction of SR 84/Alligator Alley, the subsequent construction of I-595, the extensive urbanization of Broward County, and the increased consumption of freshwater in South Florida have all contributed to these cumulative impacts.

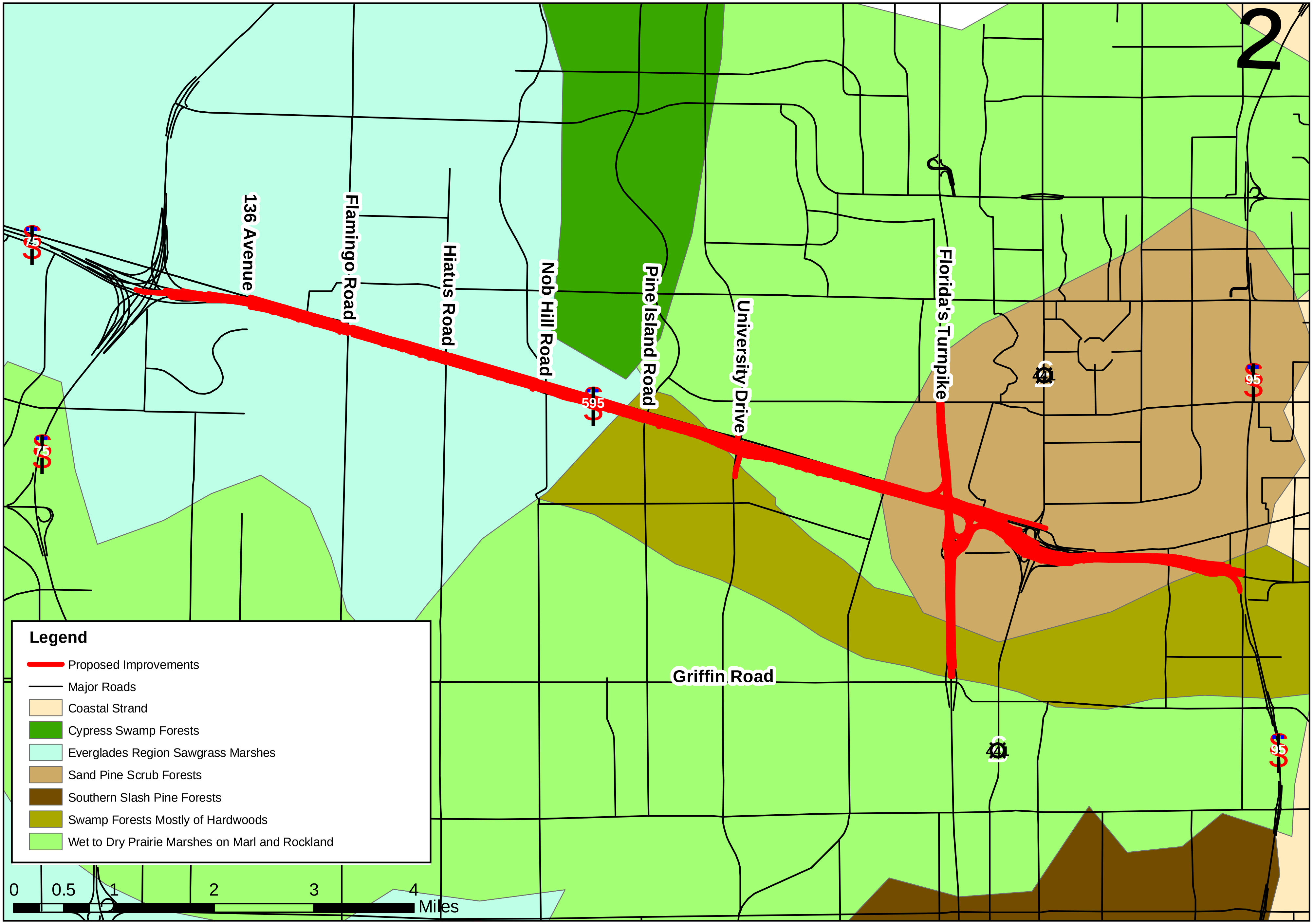
The proposed improvements to I-595 will also contribute to these cumulative impacts.



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY
ESSENTIAL FISH HABITAT ASSESSMENT
1947 AERIAL OF POND APPLE SLOUGH

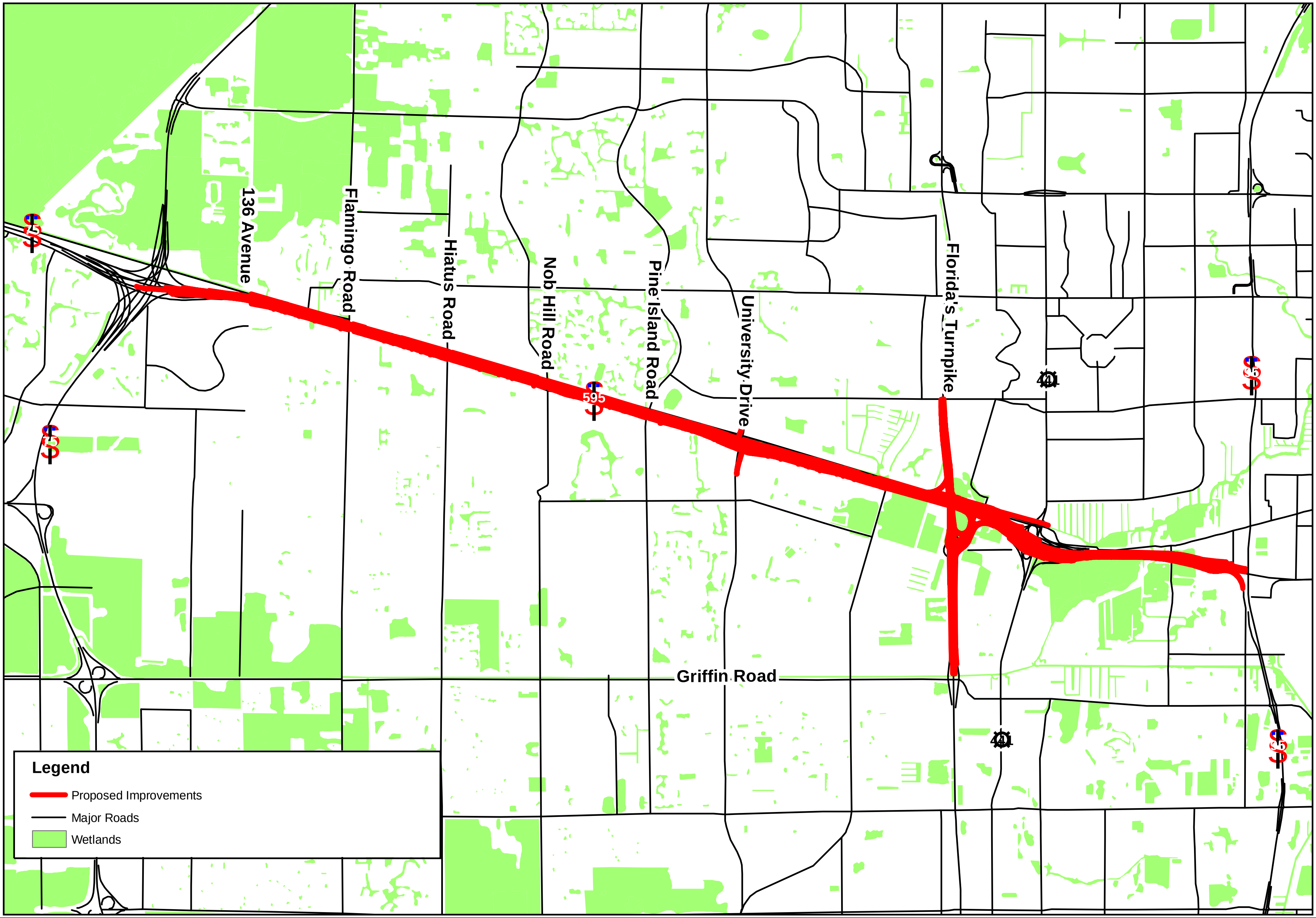
FIGURE 6-2



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY
ESSENTIAL FISH HABITAT ASSESSMENT
1967 VEGETATIVE COMMUNITIES

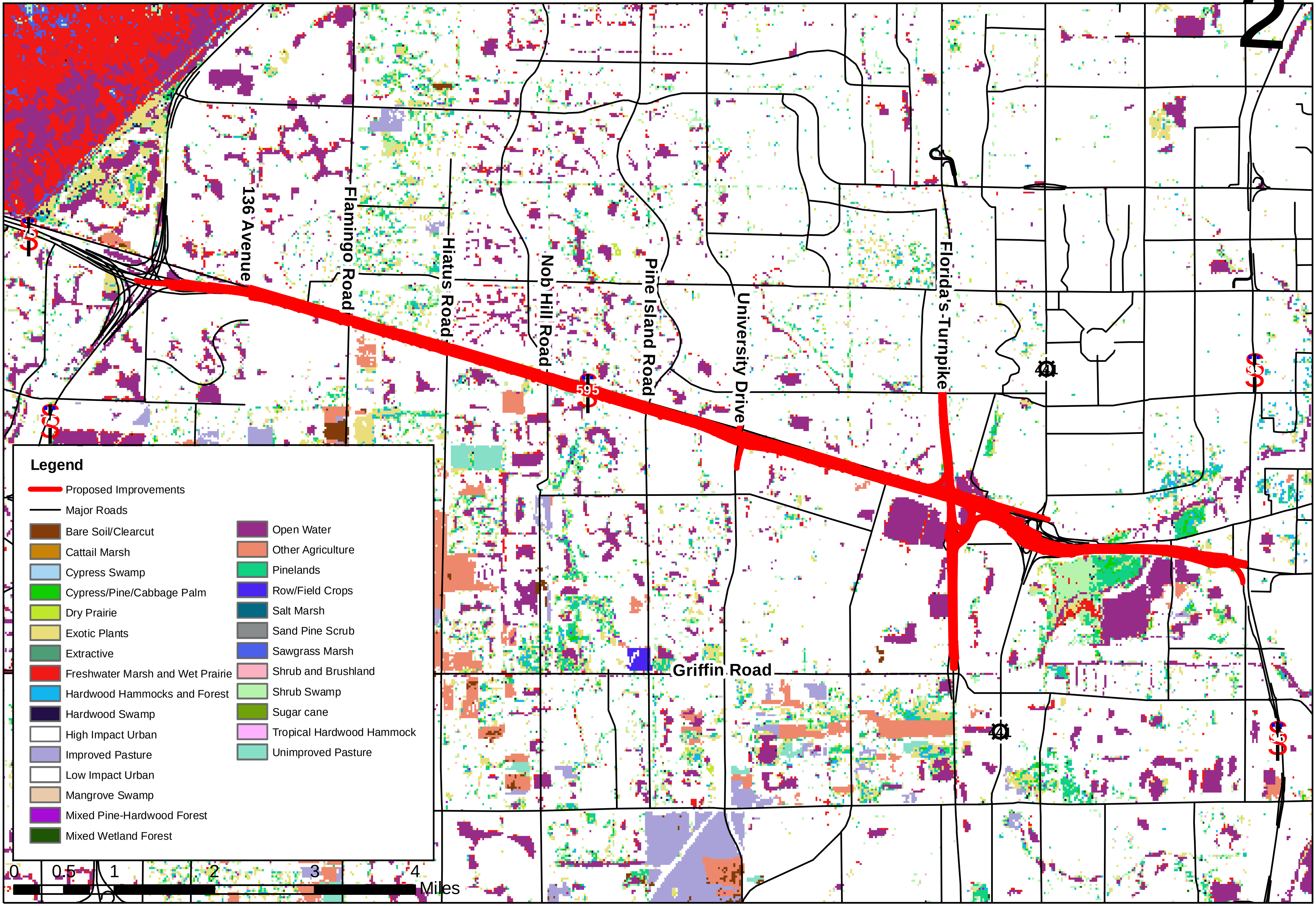
FIGURE 6-3



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY
ESSENTIAL FISH HABITAT ASSESSMENT
FWS 2003 NWI WETLANDS

FIGURE 6-4



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY
ESSENTIAL FISH HABITAT ASSESSMENT
FFWCC 2003 VEGETATION AND LAND COVER

FIGURE 6-5

6.4 AVOIDANCE AND MINIMIZATION

The scarcity of remaining habitat in Broward County, especially EFH wetlands, has been a focal point throughout the development of the proposed project. Impacts to habitat in the LA ROW adjacent to the Pond Apple Slough Natural Area have been avoided and minimized to the maximum extent practicable. Four alternatives were proposed for the area adjacent to the Pond Apple Slough limits. These alternatives offer different sets of modifications to the Master Plan LPA, required to meet Year 2034 travel demand. At the onset of the development of these concepts, FDOT issued a directive regarding the design of corridor features for this area.

- Location of proposed improvements was limited to the existing limits of the Limited Access Rights of Way south of the corridor.

Of the several alternatives developed for this area, the EFH impacts associated with Pond Apple Slough were kept to a minimum by widening into the median area. When additional width was required, the southern right-of-way line was held firm and all further widening occurred on the north side of the corridor.

The special design of the LPA attempted to limit impacts to the area within the LA ROW rather than encroaching into Pond Apple Slough Natural Area by implementing the following considerations:

- Widening of proposed improvements mainly to the north side of the existing structures.
- Utilizing the existing median area for proposed widening.
- Minimizing design standards to establish the smallest possible footprint.
- Implementing alternative improvements for this area of the corridor (no other major improvements are proposed for this section of I-595).

Even with these considerations, direct impacts will occur to approximately 2.1 acres of EFH wetlands and shading impacts will occur to 4.3 acres of EFH wetland habitat within the LA ROW immediately adjacent to Pond Apple Slough Natural Area. These impacts will be mitigated with the replacement of these wetlands at a minimum ratio of 1:1 to not only meet the environmental resource permitting regulations, but also provide improved EFH. Although no additional opportunities for avoidance and minimization are anticipated, they will continue to be explored throughout the project. Additional minimization will be implemented during construction through the use of any measures included in FDOT's "Standard Specifications for Road and Bridge Construction".

6.5 PROPOSED MITIGATIVE MEASURES AND GUIDELINES FOR PROTECTION

According to FHWA's Environmental Policy Statement (issued on April 20, 1990), FHWA will "fully participate in the costs of environmental mitigation for project impacts that are necessary to satisfy federal law while ensuring that mitigation necessitated by state law and all environmental enhancement measures represent a reasonable expenditure of highway funds". The FHWA mitigation policy in 23 CFR 777.11(f) states that "the reasonable cost of acquiring lands, or interests therein, to provide replacement lands with equivalent wetland function for privately owned wetlands that are directly impacted by a Federal-aid highway project is eligible for Federal participation". It is FHWA's preference in project development for FDOT to reach an early resolution with all federal and state regulatory agencies and regulatory review agencies regarding acceptable mitigation measures for a project.

The following discusses the mitigation options considered and those rejected as a result of consultation, economy and reasonableness. In considering the practicability of alternatives to the proposed action, the following criteria were considered: practicability was considered only for those actions that involve "new construction" in wetlands; consideration of alternatives should take into account only those alternatives that involve wetland avoidance or avoidance of new construction in wetlands, and not those that are, in essence, mitigative; and finally, consideration of avoidance alternatives should take into account all relevant environmental and economic factors. Additional cost does not necessarily render alternatives impractical in meeting the national wetland policy objectives established by EO 11990.

Federal funding for off-site mitigation is permitted in all cases where it can be shown that it is a necessary and reasonable expenditure. Off-site mitigation should have a direct correlation between the EFH functions that will be adversely affected and the mitigation option selected. Ideally, the replacement of EFH should be located in the same tidal regime. EFH functions gained from the proposed mitigation will approximate the lost values as closely as possible. Where out-of-kind mitigation is proposed, it must be clearly supported through documentation by the appropriate permitting agencies.

Because the permanent impacts to EFH also impact jurisdictional wetlands, the wetland mitigation proposed will also be used to mitigate EFH impacts as much as possible. The following outlines the conceptual mitigation plan for impact to wetlands as well as EFH for this project:

1. Ensure no additional avoidance and minimization opportunities exist.
2. If unavoidable wetland impacts remain, the FDOT will attempt to preserve additional land and create, restore or enhance EFH wetlands on it. The FDOT is currently evaluating the acquisition of five vacant parcels on the east side of the

South Fork New River, portions of which will be needed for construction of the proposed improvements, and creating approximately 6.0 acres of EFH wetlands on them. The properties will be scraped down to an elevation of approximately 2.0 feet and planted with hydrophytic vegetation, the species selected being dependent on the type of EFH impacts being mitigated. Mitigation for the EFH wetland impacts beneath and adjacent to the I-595 viaduct will require the use of the same plant assemblage used in the existing Cypress Creek Park and Ride Lot mitigation areas, and a berm will be constructed around the waterward perimeter of each site to minimize brackish water intrusion. However, if it is subsequently determined that the mitigation needs to offset impacts to the mangrove ecosystem that the Cypress Creek Park and Ride Lot mitigation areas are transitioning into, it will be planted with white mangroves with a fringe of red mangroves, possibly planted within riprap planters along the waterward perimeter of each site. Figure 6-6 shows the potential wetland/EFH mitigation areas that could be provided and Figure 6-7 shows the potential property acquisitions being evaluated.

3. Enhance existing EFH. Appendix L provides a copy of the Pond Apple Slough Hydrological Restoration plans. FDOT may consider participating with Broward County in the implementation of such a project as mitigation.
4. Purchase mitigation credits at the Florida Power and Light (FPL) Everglades Mitigation Bank in south Miami-Dade County.
5. Provide mitigation in accordance with Chapter 373.4137 Florida Statutes.

Additional mitigation opportunities will continue to be evaluated throughout subsequent Final Design phases, in coordination with the NMFS.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY
ESSENTIAL FISH HABITAT ASSESSMENT
POTENTIAL EFH MITIGATION AREAS

FIGURE 6-6

RS&H

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

I-595 PD&E STUDY
ESSENTIAL FISH HABITAT ASSESSMENT
POTENTIAL PROPERTY ACQUISITIONS

FIGURE 6-7

7.0 AGENCY COORDINATION

As noted previously, the Advanced Notification for this project was distributed on November 5, 2003 to the FWS, NMFS, FWC, BCEPD, and other governmental agencies. The NMFS responded on December 31, 2003 (see Appendix B), FWC responded on December 2, 2003 (see Appendix M); Florida Department of Environmental Protection (FDEP) responded on January 9, 2004 (see Appendix N); South Florida Regional Planning Council (SFRPC) responded on December 9, 2003 (see Appendix O); SFWMD (SFWMD) responded on December 11, 2003 (see Appendix P); and BCEPD responded on January 5, 2004 (see Appendix Q). Overall, the responses supported the assessment of the potential environmental impacts, the avoidance and minimization of impacts, and mitigation for the unavoidable impacts.

On October 21, 2004, an interagency meeting was held at the FDOT consultant's office in Plantation, Florida. Invitations to the meeting were sent to the FWS, NMFS, U.S. Army Corps of Engineers (ACOE), U.S. Coast Guard (USCG), U.S. Environmental Protection Agency (EPA), Federal Highway Administration (FHWA), FDOT, FWC, FDEP, SFWMD, SFRPC, BCEPD, and the Broward County Parks and Recreation Department (BCPRD). Representatives from the EPA, FHWA, FDOT, SFWMD, BCEPD, and BCPRD attended. The meeting included a presentation of the project, the associated environmental studies and reports that were being prepared, environmental considerations of the project, the history of Pond Apple Slough, the history of the Cypress Creek Mitigation Site, and the preliminary conceptual mitigation options being considered. The potential for obtaining conceptual permits was also discussed.

On December 10, 2004, the project was presented at a monthly permitting meeting with representatives from SFWMD, ACOE, and EPA at the SFWMD headquarters in West Palm Beach, Florida. The unavoidable wetland impacts were identified as being approximately 4.0 acres of shading impacts and 0.5 acres of direct impacts in order to to provide a construction road. A brief discussion of the preliminary conceptual mitigation options being considered and the feasibility of conceptual permitting ensued.

On January 28, 2005, FDOT's consultant and representatives from FDOT met with an NMFS Fisheries Biologist at Pond Apple Slough to discuss EFH issues.

On February 9, 2005, FDOT's consultant met with BCPRD representatives to review the Pond Apple Slough Management Plan.

On March 23, 2005, FDOT's consultant met with BCEPD representatives to review their Pond Apple Sough files.

On March 7, 2005, the FDOT submitted a Request for EFH Assessment Assistance to the NMFS, which included an abbreviated list of federally managed species (see Appendix C).

On March 31, 2005, the NMFS responded (see Attachment D), identifying species and their habitats that should be addressed in the EFH.

Public workshops on March 30 and March 31, 2004 were attended by BCEPD representatives; and public workshops on April 13 and April 14, 2005 were attended by BCEPD and NMFS representatives.

On June 28, 2005, an interagency meeting was held at the Nova Southeastern University's main campus in Davie, Florida. Invitations to the meeting were sent to the FWS, NMFS, ACOE, USCG, EPA, FHWA, FDOT, FWC, FDEP, SFWMD, SFRPC, BCEPD, and BCPRD. Representatives from the ACOE, FWS, NMFS, USCG, FDOT, FWC, BCEPD, and BCPRD attended. The meeting included a presentation of the project, the associated environmental studies and reports being prepared, environmental considerations of the project, the history of Pond Apple Slough, the history of the Cypress Creek Mitigation Site, and preliminary conceptual mitigation options being considered. The agencies stressed the need for avoidance and minimization of wetland impacts before mitigation was considered, and stated that the preferred mitigation should include preservation of additional land instead of enhancing existing wetlands. As a last resort, the agencies agreed that the FPL Everglades Mitigation Bank could be used to offset the unavoidable wetland impacts.

On July 6, 2005, the FDOT presented the project to FHWA.

The Public Hearing for the project was held on November 29, 2005. There were no comments regarding the EFH or wetland impacts.

Appendix R contains the meeting minutes.

8.0 CONCLUSION

The purpose of this document is to present the findings of the EFH Assessment conducted for the proposed improvements to I-595 as required by the Magnuson-Stevens Act. The objectives of this EFH Assessment are to describe how the actions associated with the proposed improvements to I-595 may affect EFH designated by the NMFS and South Atlantic FMC for the area of influence of the project. The EFH associated with this project includes all tidally-influenced surface waters and the hydrologically-connected freshwater wetlands downstream of the SFWMD G-54 salinity control structures.

There are no areas that meet the criteria for EFH-HAPCs for penaeid shrimp or contain smooth cordgrass critical habitat within the area of influence of the proposed project. The I-595 limited access right of way (LA ROW) for the viaduct that crosses the South Fork of the New River and adjacent Pond Apple Slough Natural Area contain some tidal freshwater/estuarine emergent wetlands; tidal palustrine forested areas; mangroves; and intertidal and subtidal non-vegetated flats with mud-silt substrate. Both the bottom of the South Fork of the New River within the LA ROW and the bottom of the North New River Canal section that will be bulkheaded downstream of the SFWMD G-54 salinity control structure contain mud-silt substrate. These areas provide potential, albeit suboptimal habitat for peneaid shrimp.

There are no areas that meet the criteria for EFH-HAPCs for red drum within the area of influence of the proposed project. The I-595 LA ROW for the viaduct that crosses the South Fork of the New River and adjacent Pond Apple Slough Natural Area contain some tidal freshwater/estuarine emergent wetlands, estuarine scrub/shrub and unconsolidated bottom. Both the bottom of the South Fork of the New River within the LA ROW and the bottom of the North New River Canal section that will be bulkheaded downstream of the SFWMD G-54 salinity control structure contain unconsolidated bottom. These areas provide potential habitat for red drum.

The mangrove habitat in the I-595 LA ROW for the viaduct that crosses the South Fork of the New River and adjacent Pond Apple Slough Natural Area meet the criteria for EFH-HAPC for snapper-grouper species and also contain tidal creeks. Additionally, these areas as well as the bottom of the South Fork of the New River within the LA ROW and the bottom of the North New River Canal section that will be bulkheaded downstream of the SFWMD G-54 salinity control structure contain some estuarine emergent vegetated wetlands; estuarine scrub/shrub and unconsolidated bottom. These areas provide potential habitat for snapper-grouper species.

The I-595 LA ROW for the viaduct that crosses the South Fork of the New River contains tidal freshwater/estuarine emergent wetlands; tidal palustrine forested areas;

mangroves; intertidal and subtidal non-vegetated flats with mud-silt substrate; unconsolidated bottom, and tidal creeks. It provides potential habitat for peneaid shrimp, red drum and snapper-grouper species. The mangrove habitat meets the criteria for EFH-HAPC for snapper-grouper species.

The widening of the I-595 viaduct over the South Fork of the New River will result in unavoidable direct impacts to approximately 2.1 acres of EFH and 4.3 acres of shading impacts to EFH, all of which potentially support the managed species previously identified. The areas beneath and immediately north of the viaduct were planted as mitigation for wetland impacts associated with the Cypress Creek Park and Ride Lot at the I-95/Cypress Creek Road Interchange.

The proposed improvements will require the installation of additional pilings in the South Fork of the New River. However, no dredging is anticipated and due to the height of the viaduct, additional shading impacts are anticipated to be negligible. Furthermore, the installation of additional pilings will provide additional hard substrate to which algae and sessile invertebrate food sources can attach. Therefore, no long-term impacts are anticipated to affect the EFH within the South Fork of the New River**.**

The proposed improvements between US 441/SR 7 and the SFWMD G-54 salinity control structure will also require approximately 1¼ miles of the south bank of the North New River Canal to be bulkheaded. In addition, new ramps from I-595 to Florida's Turnpike will require the installation of more pilings in the canal and will result in approximately 0.5 additional acres of shading impacts. The installation of the bulkhead will result in direct impacts to the rock walls that provide a hard substrate to which algae and sessile invertebrate food sources can attach. However, it is anticipated that algae and sessile invertebrate food sources will also attach to the bulkhead, so this impact is considered temporary.

The required dredging will also result in direct impacts to the sediment and debris on the bottom of the canal that support the managed species; however, the bottom area will increase as a result of the bulkheading and will provide additional sediment cover for boring invertebrate food sources; and there will be additional area for the accumulation of the scattered rocks and other debris that provide potential refuge for larval and juvenile stages of the managed species and their food sources. The installation of pilings for the new ramps will provide additional hard substrate to which algae and sessile invertebrate food sources can attach. It is anticipated that this additional hard substrate will more than offset the minor impacts associated with the additional shading. Overall, no long-term impacts are anticipated to affect the North New River Canal EFH as a result of the proposed improvements**.**

It is anticipated that the secondary impacts will be temporary and can be offset by special construction techniques and/or environmental protection guidelines. However, it is also anticipated that the proposed improvements to I-595 will contribute to cumulative impacts to EFH in Broward County.

Impacts to EFH were avoided and minimized to the maximum extent practicable; however the project will result in unavoidable impacts to EFH. Since the permanent impacts to EFH also permanently impact jurisdictional wetlands, the preferred mitigation options will offset the permanent impacts to both. The following outlines the conceptual mitigation plan for project impacts to EFH and jurisdictional wetlands:

1. Ensure no additional avoidance and minimization opportunities exist.
2. If unavoidable EFH wetland impacts remain, the FDOT will attempt to preserve additional land and create, restore or enhance EFH wetlands on it. The FDOT is currently evaluating the acquisition of five vacant parcels on the east side of the South Fork of the New River, portions of which will be needed for construction of the proposed improvements, and creating approximately 6.0 acres of EFH wetlands on them. The properties will be scraped down to an elevation of approximately 2.0 feet and planted with hydrophytic vegetation, the species selected being dependent on the type of EFH impacts being mitigated. Mitigation for the EFH wetland impacts beneath and adjacent to the I-595 viaduct will require the use of the same plant assemblage used in the existing Cypress Creek Park and Ride Lot mitigation areas, and a berm will be constructed around the waterward perimeter of each site to minimize brackish water intrusion. However, if it is subsequently determined that the mitigation needs to offset impacts to the mangrove ecosystem that the Cypress Creek Park and Ride Lot mitigation areas are transitioning into, it will be planted with white mangroves with a fringe of red mangroves, possibly planted within riprap planters along the waterward perimeter of each site.
3. Enhance existing EFH wetlands, possibly participating in the implementation of the Pond Apple Slough Hydrological Restoration project.
4. Purchase mitigation credits at the Florida Power and Light (FPL) Everglades Mitigation Bank in south Miami-Dade County.
5. Provide mitigation in accordance with Chapter 373.4137 Florida Statutes.

Additional mitigation opportunities will continue to be evaluated throughout subsequent Final Design phases, in coordination with the NMFS.

Appendix A

Florida Department of Transportation

JEB BUSH
GOVERNOR

PLANNING AND ENVIRONMENTAL MANAGEMENT – DISTRICT 4
3400 West Commercial Blvd., 3rd Floor, Ft. Lauderdale, FL 33309-3421
Telephone (954) 777-4601 Fax (954) 777-4671
Toll Free Number: 1-866-336-8435

JOSE ABREU
SECRETARY

November 5, 2003

Ms. Lauren P. Milligan, Environmental Consultant
Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 47
Tallahassee, Florida 32399-3000

Dear: Ms. Milligan:

SUBJECT: Advance Notification
SR-862 (I-595) Project Development & Environment Study
Financial Project ID: 409354-1-22-01
Federal Aid Project No: 5951 539 I
County: Broward

The attached Advance Notification Package is forwarded to your office for processing through appropriate State agencies in accordance with Executive Order 95-359. Distribution to local and Federal agencies is being made as noted.

Although more specific comments will be solicited during the permit coordination process, we request that permitting and permit reviewing agencies review the attached information and furnish us with whatever general comments they consider pertinent at this time.

This is a Federal-aid action and the Florida Department of Transportation, in consultation with the Federal Highway Administration, will determine what degree of environmental documentation will be necessary. The determination will be based upon in-house environmental evaluations and comments received through coordination with other agencies. Please provide a consistency review for this project in accordance with the State's Coastal Zone Management Program.

In addition, please review this improvement's consistency, to the maximum extent feasible, with the approved Comprehensive Plan of the local government jurisdiction(s) pursuant to Chapter 163, Florida Statutes.

We are looking forward to receiving your comments on the project within 60 days. Should additional review time be required, a written request for an extension of time must be submitted to our office within the initial 60-day comment period.

Your comments should be addressed to:

Mr. Gustavo Schmidt, P.E.
District Planning and Environmental Engineer
Florida Department of Transportation, District 4
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309-3421

Your expeditious handling of this notice will be appreciated.

Sincerely,

Gustavo Schmidt, P.E.
District Planning and Environmental Engineer

Attachments: Mailing List
Location Map
Advance Notification Fact Sheet
Federal Assistance Multipurpose Fact Sheet

MAILING LIST

cc:

Mr. Jim St. John, Division Administrator, Federal Highway Administration,
U.S. Department of Transportation
Mr. Jerry Franklin, Regional Administrator, Federal Transit Administration - Region IV,
U.S. Department of Transportation
Mr. Kenneth Burris, Jr., Regional Director, Region IV Office,
Federal Emergency Management Agency
Director, Office of Economic Analysis (RRP-32), Federal Railroad Administration
Mr. Michael Nedd, Director, Eastern States Office, Bureau of Land Management,
U.S. Department of Interior
Mr. Bruce Dawson, Field Manager Bureau of Land Management - Jackson Field Office,
U.S. Department of the Interior
Mr. Anthony Amato, Regional Environmental Officer,
U.S. Department of Housing and Urban Development
Chief, Review Unit, Environmental Affairs Program, U.S. Geological Survey Chief,
U.S. Department of Interior
Mr. James Palmer, Jr., Regional Administrator, Region 4,
U.S. Environmental Protection Agency
Ms. Beverly Banister, Director, Water Management Division,
U.S. Environmental Protection Agency
Mr. Jay Slack, Field Supervisor, U.S. Department of Interior,
U.S. Fish & Wildlife Service, South Florida Office,
Colonel James May, District Engineer, Regulatory Branch,
U.S. Army Corps of Engineers
Mr. John Studt, Branch Chief, U.S. Army Corps of Engineers,
South Permits Branch Office,
Mr. Mark Thompson, Habitat Conservation Division, SEFSC,
National Marine Fisheries Service, U.S. Department of Commerce
Dr. Roy Crabtree, Ph.D., Regional Administrator, Southeast Region Office,
National Marine Fisheries Service, U.S. Department of Commerce
Ms. Audra Livergood, Fisheries Management Specialist,
National Marine Fisheries Service
Vice Admiral Conrad Lautenbacher, Jr., Administrator,
National Oceanic and Atmospheric Administration,
U.S. Department of Commerce - Regulatory Environmental Compliance
Mr. Dean Stringer P.E., Orlando Airports District Office, Federal Aviation Administration
Dr. Henry Falk, MD, Director, U.S. Department of Health and Human Services
National Center for Environmental Health and Injury Control
Rear Admiral Jay Carmichael, Seventh District Commander (oan), U.S. Coast Guard

Mr. Jerry Belson, Regional Director, SE Regional Office, National Park Service
Bureau of Indian Affairs, U.S. Department of the Interior
Mr. Larry Scrimer, Director, Bureau of Indian Affairs - Office of Trust Responsibilities, U.S. Department of the Interior
Mr. Ed Tullis, Chairperson, Poarch Band of Creek Indians
Mr. Perry Beaver, Principal Chief, Muscogee (Creek) Nation of Oklahoma
Mr. Mitchell Cypress, Acting Chairman, Seminole Tribe of Florida
Mr. Billy Cypress, Chairperson, Miccosukee Tribe of Indians of Florida
Mr. Kenneth Chambers, Principal Chief, Seminole Nation of Oklahoma
Mr. David Brown, Chairman, Florida Transportation Commission
Mr. John Moulton, Interim Director, Southeast District Office, Florida Department of Environmental Protection
Mr. Brian Barnett, Interim Director, Florida Fish and Wildlife Conservation Commission, Office of Environmental Services
Mr. Mark Robson, Regional Director, South Region, Florida Fish and Wildlife Conservation Commission
Mr. Warren Henderson, Jr., State Soil Scientist, Natural Resources Conservation, Florida State Office, U.S. Department of Agriculture
Mr. Bob Jacobs, Regional Forester, Southern Region, U.S. Department of Agriculture
Ms. Carolyn Dekle, Executive Director, South Florida Regional Planning Council
Mr. Henry Dean, Executive Director, South Florida Water Management District
U.S. Senator Bill Nelson, United States Senate
U.S. Senator Bob Graham, United States Senate
U.S. Congressman Peter Deutsch, Congressional District 20
U.S. Congressman E. Clay Shaw Jr., Congressional District 22
U.S. Congressman Alcee Hastings, Congressional District 23
Florida Senator Steven Geller, State Senate District 31
Florida Senator Debbie Wasserman-Schultz, State Senate District 34
Florida Senator Larcenia Bullard, State Senate District 39
Florida Representative, State House District 91
Florida Representative Christopher Smith, State House District 93
Florida Representative Nan Rich, State House District 97
Florida Representative Roger Wishner, State House District 98
Florida Representative Timothy Ryan, State House District 100
Mr. Leroy Irwin, Manager, Environmental Management Office, Florida Department of Transportation
Mr. James Jobe, Federal-Aid Programs Coordinator, Florida Department of Transportation
Mr. James L. Ely, Executive Director, Florida Turnpike Enterprise
Mr. Joe Giulietti, Executive Director, South Florida Regional Transportation Authority/Tri-Rail Commuter Rail Authority

Broward County Board of County Commissioners, County Administrator, Roger S. Desjarlais
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Broward County Community Development Division, Director, Raymond Lubomski
Broward County Community Services Department, Director, Larry Lietzke
Broward County General Services Department, Director, Alfred Smith
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Broward County Traffic Engineering Division, Director, Jihad El Eid, P.E.
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Broward County Board of County Commissioners, County Commissioner, Kristin Jacobs
Broward County Board of County Commissioners, County Commissioner, Ben Graber, M.D.
Broward County Board of County Commissioners, County Commissioner, Jim Scott
Broward County Board of County Commissioners, County Commissioner, Lori Nance Parrish
Broward County Board of County Commissioners, County Commissioner, Sue Gunzburger
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Broward County Board of County Commissioners, County Commissioner, Josephus Eggelletion, Jr.
Broward County Metropolitan Planning Organization, Staff Director, Jennifer Schaufele
Broward County Metropolitan Planning Organization, Commissioner Josephus Eggelletion, Jr.
Broward County Metropolitan Planning Organization, Commissioner Kristin Jacobs
Broward County Metropolitan Planning Organization, Commissioner Ben Graber, M.D.

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Broward County Metropolitan Planning Organization, Commissioner Commissioner Scott Brook
Broward County Metropolitan Planning Organization, Commissioner Marc L. Sultanof
Broward County Metropolitan Planning Organization, Commissioner Michael Udine (Alternate)
Broward County Metropolitan Planning Organization, Mayor Albert R. Capellini
Broward County Metropolitan Planning Organization, Vice Mayor Joseph Varsallone (Alternate)
Broward County Metropolitan Planning Organization, Vice Mayor Carlton B. Moore
Broward County Metropolitan Planning Organization, Commissioner Cindi Hutchinson
Broward County Metropolitan Planning Organization, Vice-Mayor Layne Walls (Alternate)
Broward County Metropolitan Planning Organization, Commissioner Fran Russo
Broward County Metropolitan Planning Organization, Commissioner Sal Oliveri
Broward County Metropolitan Planning Organization, Mayor Joy Cooper (Alternate)
Broward County Metropolitan Planning Organization, Mayor Alex Fekete
Broward County Metropolitan Planning Organization, Mayor Annette Wexler (Alternate)
Broward County Metropolitan Planning Organization, Mayor Rae Carole Armstrong (Vice Chair)
Broward County Metropolitan Planning Organization, Council Member Judith Paul
Broward County Metropolitan Planning Organization, Commissioner Freddy Fiskelli (Alternate)
Broward County Metropolitan Planning Organization, Commissioner Kay McGinn
Broward County Metropolitan Planning Organization, Commissioner Bruce Tumin (Alternate)
Broward County Metropolitan Planning Organization, Commissioner Irwin Harlem
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Broward County Metropolitan Planning Organization, Mayor Sam Brown (Alternate)
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Broward County Metropolitan Planning Organization, School Board Member Darla Carter
Broward County Metropolitan Planning Organization, Representative (Vacant)
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City of Hollywood, Commissioner, Cathleen Anderson
City of Hollywood, Commissioner, Beam Furr
City of Hollywood, Commissioner, Sal Oliveri

City of Hollywood, Commissioner, Keith Wasserstrom
City of Hollywood, Commissioner, Frances Russo
City of Hollywood, Vice Mayor, Peter Bober
City of Hollywood, City Manager, Cameron Benson
City of Hollywood, Department of Parks, Recreation & Cultural Arts, Director, David Flaherty
City of Hollywood, Police Chief, James H. Scarberry
City of Hollywood, Fire Chief (Interim), Edward Moran
City of Hollywood, Office of Planning, Director, Jaye Epstein
City of Hollywood, Department of Public Works, Director, Greg Turek
City of Hollywood, Department of Building and Engineering Services, Director, Robert Rawls, P.E.
City of Hollywood, Department of Building and Engineering Services, City Engineer, Jonathan Vogt, P.E.
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Town of Davie, Councilwoman, Judy Paul
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Town of Davie, Fire Department, Fire Chief, Donald DiPetrillo
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City of Dania Beach, Commissioner, Patricia Flury
City of Dania Beach, Commissioner, Robert Mikes
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City of Plantation, Councilwoman, Sharon Uria

City of Plantation, Councilman, Ron Jacobs
City of Plantation, Councilman, Bruce Edwards
City of Plantation, Councilman, Jerry Fadgen
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City of Plantation, Department of Engineering, City Engineer, Brett Butler
City of Plantation, Director, Planning, Zoning & Economic Development, Marcia Berkley
City of Plantation, Plantation Police Headquarters, Chief Robert S. Pudney
City of Plantation, Park and Recreation Department, Director, James Romano
City of Plantation, Public Works Headquarters, Director, Frank DeCelles
City of Plantation, Plantation Police Headquarters, Chief Larry Massey
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City of Sunrise, Assistant Deputy Mayor, Joseph A. Scuotto
City of Sunrise, Acting City Attorney, Kimberly A. Register
City of Sunrise, Commissioner, Donald K. Rosen
City of Sunrise, Commissioner, Irwin Harlem
City of Sunrise, City Manager, Patrick Salerno
City of Sunrise, City Clerk, Felicia Bravo
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City of Weston, Commissioner, Robin Bartleman
City of Weston, Commissioner, Barbara Herrera-Hill
City of Weston, Commissioner, Daniel J. Stermer
City of Weston, Commissioner, Murray Chermak
City of Weston, City Manager, John R. Flint
City of Weston, Police Chief, Greg Page
City of Ft. Lauderdale, Mayor, Jim Naugle
City of Ft. Lauderdale, Vice Mayor, Carlton B. Moore
City of Ft. Lauderdale, Commissioner District 1, Christine Teel
City of Ft. Lauderdale, Commissioner District 2, Dean J. Trantalis
City of Ft. Lauderdale, Commissioner District 4, Cindi Hutchinson
City of Ft. Lauderdale, Acting City Manager, Alan A. Silva
City of Ft. Lauderdale, Assistant City Manager, Department of Public Services, Greg Kisela
City of Ft. Lauderdale, City Clerk, Lucy Kisela
City of Ft. Lauderdale, Office of the Fire Chief, Chief Otis J. Latin, Sr.
City of Ft. Lauderdale, Police Department, Chief Bruce G. Roberts
City of Ft. Lauderdale, Director Department of Community and Economic Development, Faye Outlaw
City of Ft. Lauderdale, Director Department of Engineering, Hector Castro
City of Ft. Lauderdale, Department of Parks and Recreation, Ernest Burkeen

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ADVANCE NOTIFICATION FACT SHEET

1.	Need for Project: Urbanized Southeast Florida is among the most densely populated areas in the State. Increases in population of the region, which is comprised of Miami-Dade, Broward and Palm Beach Counties, have consistently exceeded statewide growth percentages for each of the past three decades. The region's transportation system has been a critical factor in sustaining the area's growth and economic competitiveness. I-595 (SR-862) serves as the major east-west link in Broward County providing a direct connection between the region's major expressways, I-95, Florida's Turnpike and I-75. These connections link Southeast Florida's urban areas with central and north Florida as well as the Gulf Coast. I-595 also provides local connections to primary north-south arterials such as SR-7 (US-441) and SR-817 (University Drive) . Since the mainline opening in 1989, I-595 has maintained a steady increase in traffic volume that has lead to congestion in several areas throughout the corridor. In order to ensure the availability of sufficient capacity within the transportation network, traffic capacity improvements must be developed in an effort to sustain the region's growth. The proposed project is consistent with affected local government comprehensive plans as required under Chapter 163, F.S., and as attested to through the Florida Department of Community Affairs (DCA) annual review of the Florida Department of Transportation (FDOT) tentative Work Program, pursuant to Section 339.135(4)(f), F.S. The improvements are consistent with the approved 2025 Long Range Transportation Plan (LRTP) of the Broward County Metropolitan Planning Organization (MPO) and are contained in the Gubernatorially-approved Transportation Improvement Program (TIP) for Broward County.
2.	Description of the Project: The FDOT is conducting a Project Development and Environmental (PD&E) Study to improve traffic operations, capacity, and safety along the I-595 corridor in Broward County. The I-595 PD&E Study is an outgrowth of the I-95/I-595 Master Plan that lead to the development of the Locally Preferred Alternative (LPA) that was approved by the Broward County MPO in 2001 and has received favorable reviews from the FDOT Central Office and the Federal Highway Administration (FHWA). The LPA proposed the addition of reversible lanes in the median, a new collector-distributor road, and various interchange and ramp improvements. The PD&E Study is the next stage of the implementation process for the LPA. The project study limits extend from just west of I-75 to just east of I-95, an approximate project length of 12 miles. The attached Location Map illustrates the location and limits of the project.
3.	Environmental Information:
a.	Land Uses: Most of the section of I-595 included in this study was constructed between 1984 and 1989 along the existing alignment of SR-84. Prior to 1965, the western terminus of SR-84 was US-27; however, it was subsequently extended to Naples and named Alligator Alley. Alligator Alley, which is now incorporated into I-75, is one of the only east-west roadways connecting Southeast Florida and Southwest Florida across the Everglades, and hence has endured high traffic volumes

that have increased steadily as the population in both of these regions has grown. As the population of Broward County expanded westward, a veneer of commercial land use became established at most of the major north-south road intersections with SR-84. Residential land use filled in between and behind the commercial land uses, typically replacing agricultural land use.

From the western project terminus east to Davie Road, I-595 is flanked at grade by the remnant of SR-84, with eastbound lanes on the south side and westbound lanes on the north side. Another remnant of SR-84 flanks the north side of I-595 within the US-441 interchange and extends approximately one mile east before meandering in a northeast direction away from the I-595 corridor. The South Florida Water Management District's (SFWMD) North New River Canal runs along the north side of SR-84, from the western project terminus east to the US-441 interchange, where it then also meanders northeast away from I-595. Land uses on both sides of the corridor between the western terminus and the US-441 interchange are residential and commercial, with the exception of light industrial land use immediately southwest of the interchange. Immediately northeast of the US-441 interchange is residential land use, and Broward County's Local Area of Particular Concern (LAPC) #90 is located immediately north of SR-84 where it begins to diverge from I-595. Immediately southeast of the US-441 interchange is a landfill and Broward County's Pond Apple Slough (conservation land use). Pond Apple Slough also extends under the elevated portion of I-595 east of where it begins to diverge from I-595, and a small marina is located on the western bank of the South New River Canal where it is crossed by I-595. Between the South New River Canal and the I-95 interchange are large borrow pits and light industrial land uses on both sides. East of the I-95 interchange to the eastern project terminus, Hollywood-Fort Lauderdale International Airport is on the south side of I-595, and residential land use occurs on the north side.

As noted above, this project is needed to meet existing demand and provide capacity for projected growth in Broward County. No significant land use changes are anticipated in the vicinity of the project corridor. Potential changes in land use will be analyzed, and current and future land use maps will be prepared for this study.

b. Wetlands: A preliminary evaluation of potential involvement with wetland resources was performed using the U.S. Fish and Wildlife Service (USFWS) *National Wetland Inventory* (*NWI*). The *NWI* identifies many wetlands within 500 feet of the project corridor; classifying the South New River Canal and North New River Canal downstream of the G-54 structure (located west of Davie Road) as estuarine, the North New River Canal upstream of the G-54 structure as riverine, most lakes and borrow pits as lacustrine, and most ponds and Pond Apple Slough as palustrine.

Pond Apple Slough is a high quality forested wetland which has been restored and is being maintained through several wetland mitigation projects. The project will result in unavoidable shading of the fragment located between the existing eastbound and westbound lanes, which will result in direct impact to these wetlands.
The extent of all wetlands in the immediate vicinity of the project will be identified

and delineated in accordance with the U.S. Army Corps of Engineers' "Federal Manual for Identifying and Delineating Jurisdictional Wetlands" (ACOE, 1987) and the "Florida Wetlands Delineation Manual" (FDEP, 1995). The wetlands will be classified using the USFWS Classification System (Cowardin, et al. 1979) and assessed using the SFWMD Wetland Rapid Assessment Procedure (WRAP) and/or the new State-wide Uniform Wetland Mitigation Assessment Method, Broward County's Wetland Benefit Index (WBI), and possibly the ACOE Wetland Evaluation Technique (WET II) and/or hydrogeomorphic (HGM) evaluation model.

Wetland impacts will be minimized to the maximum extent practicable. A Wetland Evaluation Report (WER) will be prepared to summarize these findings and to present a conceptual mitigation plan for the unavoidable wetland impacts.

c. Floodplains: The project corridor is within the 100-year flood plain and traverses Flood Zones AE and AH (areas located within special flood hazard areas) and Flood Zones X and X500 (areas located outside special flood hazard areas). There are no regulatory floodways in the vicinity of the project area. This information was obtained from Geographical Information System (GIS) data that the Florida Geographic Data Library (FGDL) extracted from 1990 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Numbers 12011C0195F, 12011C0214F, 12011C0215F, 12011C0302F, and 12011C0306F (fema9606.shp).

d. Wildlife and Habitat: The Florida Natural Areas Inventory (FNAI) *Field Guide to Rare Plants and Animals of Florida* identifies 56 species in Broward County as having either State or Federal legal status, 17 of which are listed as Endangered (E) or Threatened (T) under the U.S. Endangered Species Act (ESA):

Common Name	Scientific Name	Status
Johnson's seagrass	*Halophila johnsonii*	T
Beach jacquemontia	*Jacquemontia reclinata*	E
Tiny polygala	*Polygala smallii*	E
Loggerhead turtle	*Caretta caretta*	T
Green turtle	*Chelonia mydas*	E
Leatherback turtle	*Dermochelys coriacea*	E
Hawksbill turtle	*Eretmochelys imbricata*	E
Kemp's ridley turtle	*Lepidochelys kempii*	E
American alligator	*Alligator mississippiensis*	T (S/A)
American crocodile	*Crocodylus acutus*	E
Eastern indigo snake	*Drymarchon couperi*	T
Crested caracara	*Caracara cheriway*	T
Bald eagle	*Haliaeetus leucocephalus*	T
Wood stork	*Mycteria americana*	E
Snail kite	*Rostrhamus sociabilis plumbeus*	E
Florida panther	*Puma concolor coryi*	E
Manatee	*Trichechus manatus*	E

Based on their habitat requirements, none of the plant or sea turtle species would occur within the project corridor; however, the other reptiles, birds and mammals could. The American alligator, which is listed as Threatened due to Similarity of Appearance (S/A) to the American crocodile, occurs in the North New River Canal and could access the project corridor, especially near the western terminus. The American crocodile typically inhabits coastal estuarine marshes and mangrove forests, and could potentially be encountered in the fringes of Pond Apple Slough and the South New River Canal. The Eastern indigo snake occupies a wide range of habitats, including mangrove forests, and could be encountered in the project corridor.

Any of the birds could potentially fly through the project corridor; however, crested caracaras are typically found in Central Florida and the only Broward County bald eagle nest identified on the Florida Fish and Wildlife Conservation Commission (FFWCC) database is located more than 25 miles west of the project terminus. Wood storks likely forage in the roadside swales of the project corridor and snail kites likely forage in the freshwater marshes located near the western project terminus. Water Conservation Area 2, located west of the western project terminus is designated under the ESA as Critical Habitat for the snail kite.

Although the Florida panther is very reclusive and is not usually found near urbanized areas, they have been recorded near the intersection of I-75 and US-27. The manatee frequents North and South New River Canal, and can likely pass through the SFWMD G-54 control structure on the North New River Canal. Downstream of the G-54 control structure, the North New River Canal is designated as a Slow Speed Zone and the South New River Canal is designated as an Idle Speed Zone to protect the manatee. Several of the borrow pits located east of the South New River Canal, including those crossed by I-595, are designated as a No Entry Zone year round.

A review of the rare species occurrence GIS data (fleo99.shp), obtained from the FNAI through the FGDL, did not identify any occurrences of Federally-listed species in the project corridor. However, it did identify several occurrences of gopher tortoises (*Gopherus polyphemus*) and burrowing owls (*Athene cunicularia floridana*) in the vicinity of the project corridor, both of which are listed by the FFWCC as Species of Special Concern (SSC). Though unlikely, either of these species could potentially access the project corridor and excavate a burrow in it. Impacts to active burrows of either species would need to be permitted through the FFWCC.

Most of the improvements proposed for this project will be constructed in the existing I-595 right of way and significant impacts to listed species are not anticipated. A comprehensive Endangered Species Biological Assessment (ESBA) will be prepared to assess the potential involvement with listed species and document any unavoidable impacts.

e. Outstanding Florida Waters: None occur in the vicinity of the project corridor.

f. Aquatic Preserves: None occur in the vicinity of the project corridor.

g. Coastal Zone Consistency Determination is Required : __X__ Yes _____ No

h. Cultural Resources: Using the FGDL GIS data (arcdot.shp and archis.shp), a preliminary assessment of potential involvement with archaeological and historic sites was performed. Two resources were identified within 1000 feet of the corridor; BD00058 – Lock 1, North New River Canal, 6521 West SR-84; and BD00082 - Cherry Camp, a midden located within the I-595/I-75 interchange. A thorough Cultural Resources Assessment Survey (CRAS) will be performed for all resources located within the Area of Potential Effect (APE) of this project. Qualified archaeologists and historians will determine the APE and complete the CRAS.

Based on the results of the CRAS performed for the *I-95/I-595 Master Plan Study*, no resources listed or potentially eligible for listing on the National Register of Historic Places (NRHP) will be impacted by the proposed improvements to I-595.

In addition, a preliminary evaluation of potential involvement with public parks and wildlife refuges (Section 4(f) properties) was performed using Broward County's GIS data (lapc.shp, citypark.shp, cntypark.shp, statpark.shp) and a field reconnaissance. The following properties were identified: Broward County's Markham Park, located northwest of the I-595/I-75 interchange; City of Sunrise's Oscar Wind Park, located southwest of the I-595/I-75 interchange; City of Plantation's Plantation Acres South Park, located north of the North New River Canal and west of Hiatus Road; a Broward County LAPC, located northeast of the I-595/US-441 interchange; Broward County's Pond Apple Slough and a LAPC, located east of Pond Apple Slough; and another Broward County LAPC located immediately southeast of the I-595/I-95 interchange. A thorough evaluation of direct and constructive use impacts will be performed for each of these and any other Section 4(f) properties subsequently identified during this study.

i. Coastal Barrier Resources: None occur in the vicinity of the project corridor.

j. Contamination: A preliminary contamination screening evaluation was performed using the FGDL GIS data for potential sources of contamination (epanpl.shp, eparf.shp, epatri.shp, and haz97.shp), Broward County Department of Planning and Environmental Protection (DPEP) GIS data for contaminated sites (ear.shp), and the U.S. Environmental Protection Agency (EPA) Superfund Information Systems (CERCLIS). Several known Hazardous Material Generators are located within the vicinity of the project. One facility on the National Priorities List (NPL or Superfund Site List) was identified in the vicinity of the project corridor:

Florida Petroleum Preprocessors, 3211 SW 50 Avenue, FLD984184127
Nine additional CERCLIS facilities that are not listed on the NPL were also identified

in the vicinity of the project corridor:
Cramer and Maurer (Oil Pit) and Neff Oil, 3830 SW 47 Avenue, FLD000602920
Broward County 21st Manor Dump, 2300 SW 46th Avenue, FLD981930506
(was previously listed on the NPL but has been since removed from it)
Fort Lauderdale Housing Site, Fort Lauderdale International Airport, FLN000407652
Hardrives Dump, 3000 SR-84, FLD984198325
National Resource Recovery, 3250 Fields Road, FLD984182014
Pasquariello Property, 2600 SW 36 Street, FLD984198333
Peele-Dixie Wellfield Site, US-441, FLD984259374
Uniweld Products Incorporated, 2850 Ravenswood Road, FLD004120523
Vision-Ease, 3301 SW 9 Avenue, FLD059859587

The following contaminated facilities in the vicinity of the project corridor were identified using the DPEP Contaminated Sites GIS dataset:
Amoco Station, 13652 West SR-84 (petroleum)
Cumberland Farms, 12450 West SR-84 (petroleum)
Dry Clean USA, 11252 West SR-84 (chlorinated solvents)
Dry Clean USA, 13608 West SR-84 (chlorinated solvents)
Dry Clean USA, 15984 West SR-84 (chlorinated solvents)
Formico Food, 3381 SW 15 Avenue, (petroleum)
Kenan Transport, 3210 SW 26 Terrace (phenols)
Markham Park Target Range, 16001 West SR-84 (metals)
Mobil Station, 8810 West SR-84 (petroleum)
Mobil Station, 15988 West SR-84 (petroleum)
Plaza Gas and Wash, 11400 West SR-84 (petroleum)
Warrickleen, 8820 West SR-84 (chlorinated solvents)
Westgate Shell Station, 16000 West SR-84 (petroleum)
Wright & Lopez, 5210 West SR-84 (petroleum)
7-Eleven, 8690 West SR-84 (petroleum)

A contamination screening evaluation will be conducted on the project. It will include a review of the above data, as well as the entire EPA Envirofacts database, EPA Emergency Response Notification System (ERNS), FDEP Brownfields database, FDEP Compliance and Enforcement Tracking (COMET) system, FDEP Dry Cleaning Facilities database, FDEP Storage Tank and Petroleum Contamination Monitoring (STCM) system, FDEP Solid Waste Facilities database, regulatory files, historic aerial photographs, previous reports prepared for the corridor, and a thorough field reconnaissance. The Contamination Screening Evaluation Report (CSER) will evaluate the potential involvement with contamination at each site identified, and will be used to compare alternative alignments, appraise property values for right-of-way acquisition, avoid the placement of drainage structures in contamination, and protect contractors from exposure to contamination.

k. Sole Source Aquifer: The project corridor is completely within the boundaries of the Biscayne Aquifer, a sole source aquifer that is the principal source of drinking water for 3 million residents of Miami-Dade, Broward and southern Palm Beach Counties.

It is a shallow, highly permeable, unconfined aquifer that underlies approximately 4,000 square miles of the eastern portions of these counties. Based on GIS data (wpz.shp) obtained from the Broward County DPEP, the project corridor intersects the proposed Sunrise System 3 Wellfield Protection Zone, located west of Flamingo Road; and is within ¼-mile of several other wellfield protection zones.

A Water Quality Impact Evaluation (WQIE) will be performed for this project, and this project will meet all the water quality standards of the U.S. EPA, SFWMD, and DPEP.

l. Noise: Several residential communities, public parks, wildlife refuges, and other noise sensitive receivers occur in the immediate vicinity of the project corridor. A Noise Study Report (NSR) will be prepared in accordance with 23 Code of Federal Regulations Part 772, Chapter 335.17 Florida Statutes, and FDOT PD&E Manual to identify unavoidable noise impacts and propose abatement for them, where appropriate.

m. Other Comments: It is anticipated that residents located immediately adjacent to the project corridor will actively object to the wetland and noise impacts associated with this project. The feasibility and reasonableness of noise barriers will be evaluated where required.

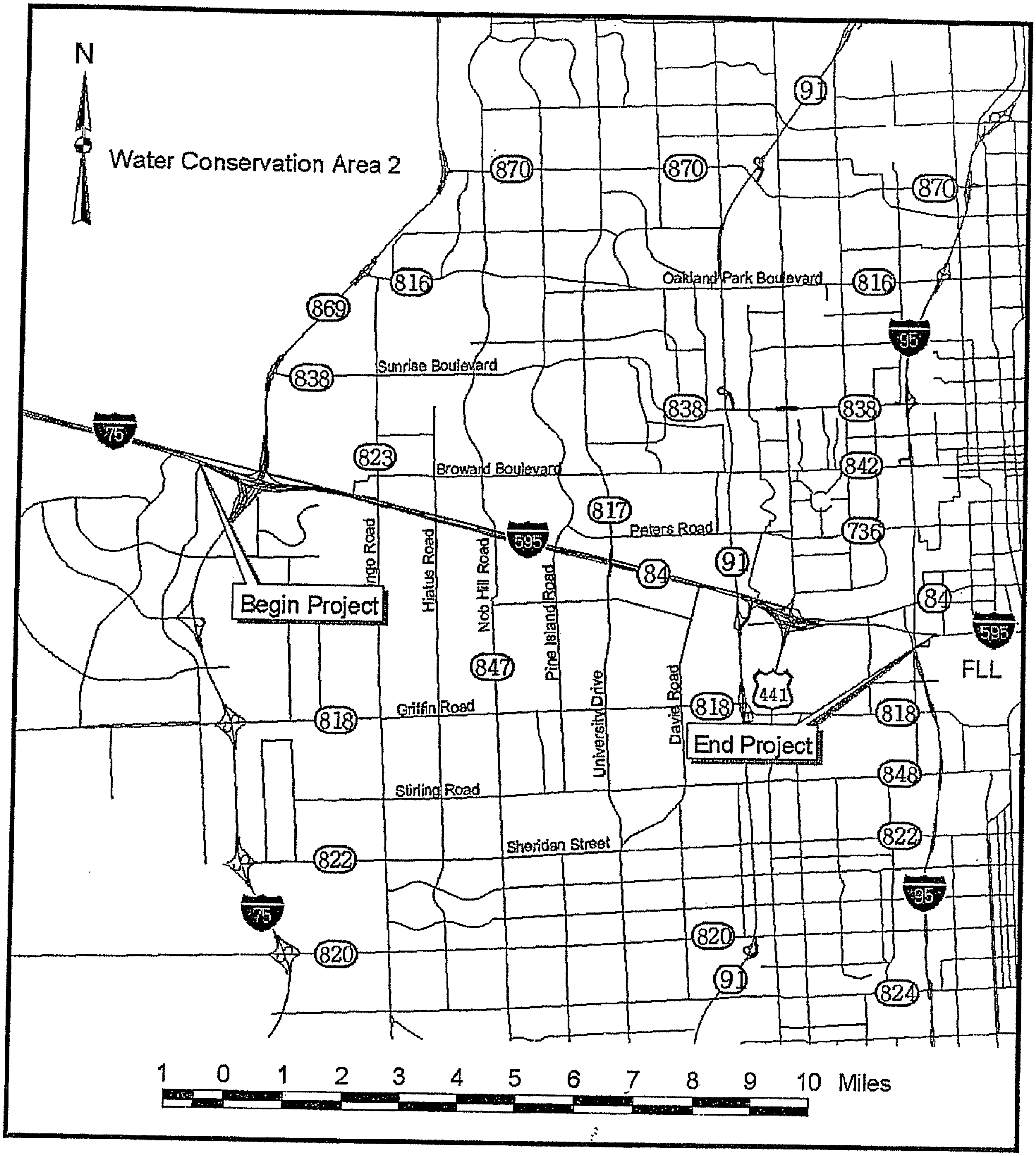
4. Navigable Waterway Crossing? __X__ Yes _____ No

A determination will be made later in the project study under 23 CFR 650, Subpart H, Section 650.805, regarding whether or not a U.S. Coast Guard permit is required.

5. List Permits Required:

Implementation of the preferred alternative may require the following permits:

U.S. ACOE Dredge and Fill Permit
U.S. Coast Guard Bridge Permit
U.S. EPA National Pollutant Discharge Elimination System
SFWMD Environmental Resource Permit
Broward County DPEP Environmental Resource License
Broward County DPEP Tree Removal License



LOCATION MAP

F.M. No. 409354-1-22-01
F.A.P. No. 5951 539 I
Broward County
I-595 PD&E Study
U.S.G.S. Quads. Cooper City
and Fort Lauderdale South

APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

2. DATE SUBMITTED October 31, 2003

Applicant Identifier FPID No.: 409354-1-22-01

1. TYPE OF SUBMISSION:

Application
- [x] Construction
- [ ] Non-Construction

Preapplication
- [ ] Construction
- [ ] Non-Construction

3. DATE RECEIVED BY STATE

State Application Identifier

4. DATE RECEIVED BY FEDERAL AGENCY

Federal Identifier

5. APPLICANT INFORMATION

Legal Name: Florida Department of Transportation

Organizational Unit: Office of Design

Address *(give city, county, State, and zip code)*:
605 Suwannee Street
Tallahassee, Leon County, Florida 32399-0450

Name and telephone number of person to be contacted on matters involving this application *(give area code)*
Gustavo Schmidt, P.E.: (954) 777-4629
District Planning and Environmental Engineer

6. EMPLOYER IDENTIFICATION NUMBER *(EIN)*: 59 – 6001874

7. TYPE OF APPLICANT: *(enter appropriate letter in box)* A

A. State	H. Independent School Dist.
B. County	I. State Controlled Institution of Higher Learning
C. Municipal	J. Private University
D. Township	K. Indian Tribe
E. Interstate	L. Individual
F. Intermunicipal	M. Profit Organization
G. Special District	N. Other (Specify) ________

8. TYPE OF APPLICATION:

- [x] New
- [ ] Continuation
- [ ] Revision

If Revision, enter appropriate letter(s) in box(es)

A. Increase Award B. Decrease Award C. Increase Duration
D. Decrease Duration Other*(specify)*:

9. NAME OF FEDERAL AGENCY:
U.S. Department of Transportation

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: 20 – 205

TITLE: Highway Planning and Construction

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:
FPID No.: 409354-1-22-01

12. AREAS AFFECTED BY PROJECT *(Cities, Counties, States, etc.)*:
Broward County

13. PROPOSED PROJECT

Start Date	Ending Date
6/24/03	6/24/06

14. CONGRESSIONAL DISTRICTS OF:

a. Applicant

b. Project
U.S. Congressional Districts 20, 22, and 23

15. ESTIMATED FUNDING:

a. Federal	$ 310,000,000 .00
b. Applicant	$ .00
c. State	$ .00
d. Local	$ .00
e. Other	$ .00
f. Program Income	$ .00
g. TOTAL	$ 310,000,000 .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE 10/31/03

b. No.
- [ ] PROGRAM IS NOT COVERED BY E. O. 12372
- [ ] OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

- [ ] Yes If "Yes," attach an explanation.
- [x] No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title	c. Telephone Number
Gustavo Schmidt, P.E.	District Planning and Env. Engineer	(954) 777-4629

d. Signature of Authorized Representative: [signature]

e. Date Signed: 11/5/03

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Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

Appendix B

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702-2432

December 31, 2003

RECEIVED
JAN 06 2004
Planning & Environmental Mgmt
District Four

Mr. Gustavo Schmidt, P.E.
District Planning and Environmental Engineer
Florida Department of Transportation, District 4
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309-3421

Subject: SR-862 (I-595) Project Development & Environment Study
Financial project ID#: 409354-1-22-01
Broward County, Florida

Dear Mr. Schmidt:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed the Florida Department of Transportation's (FDOT) Advance Notification (AN), dated November 5, 2003, regarding the Project Development & Environment (PD&E) Study to improve traffic operations, capacity, and safety along the I-595 corridor in Broward County, Florida. According to the AN, the subject improvements are needed to sustain population growth in the southeast Florida region. The project study area is approximately 12 miles in length and begins just west of I-75 and terminates just east of I-95. The Environmental Information section of the AN indicates the presence of wetland communities within 500 feet of the project corridor. Based on the U.S. Fish and Wildlife Service National Wetland Inventory and information contained in the AN, wetland systems within the project study area may be classified as estuarine (the South New River Canal and North New River Canal downstream of the G-54 structure); riverine (the North New River Canal upstream of the G-54 structure); lacustrine (most lakes and borrow pits); and palustrine (most ponds and Pond Apple Slough).

Estuarine and palustrine emergent and forested wetlands, and estuarine scrub/shrub mangroves have been designated as essential fish habitat (EFH) by the South Atlantic Fishery Management Council (SAFMC). Federally managed species associated with estuarine intertidal marshes include red drum, brown, white, and pink shrimp. EFH for penaeid shrimp (i.e., brown, white, and pink shrimp) includes inshore nursery areas such as tidal freshwater (palustrine), estuarine, and marine emergent wetlands; tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation; and subtidal and intertidal non-vegetated flats. EFH for red drum includes the following habitats to a depth of 50 meters offshore: tidal freshwater; estuarine emergent vegetated wetlands; estuarine scrub/shrub mangroves; seagrasses; and oyster reefs and shell banks.

Federally managed species associated with mangrove habitat include red drum; brown, white, and pink shrimp; gray, lane, mutton, and schoolmaster snappers; Goliath grouper; and white grunt. Detailed information on the snapper/grouper complex (containing ten families and 73 species), shrimp, red drum, and other federally managed fisheries and their EFH is provided in the Final Habitat Plan for the South Atlantic Region (October 1998). The Habitat Plan was prepared in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

The AN states that Pond Apple Slough, which is described as a high quality forested wetland, would be directly impacted by shading associated with the proposed project. In connection with our review of this project, NOAA Fisheries will require detailed and specific information concerning the anticipated work and its proposed direct, indirect, and cumulative impacts on wetland communities. Therefore, we recommend that the environmental assessment and/or impact statement for the project include the following information:

1. An EFH Assessment that includes a description of the proposed action; an analysis of anticipated direct, indirect, and cumulative impacts of the proposed action on EFH, federally managed species, and associated species by life history state; and the FDOT's views regarding the effects of the proposed project on EFH.

2. A habitat characterization of wetland communities within and in close proximity to the project corridor, including the number of wetland acres that would be directly and indirectly impacted by the proposed project.

3. Information on measures to avoid and/or minimize adverse impacts to wetlands within the project corridor.

4. A mitigation plan to fully compensate for unavoidable impacts to wetland communities that would be degraded or permanently eliminated by the proposed project. The proposed mitigation must comply with the national policy of no net loss of wetlands.

We appreciate the opportunity to provide these comments. Related correspondence should be addressed to the attention of Audra Livergood at our Miami Office. She may be reached at 11420 North Kendall Drive, Suite #103, Miami, Florida 33176, or by telephone at (786) 263-0028.

Sincerely,

Audra Livergood

(for) Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

Appendix C

Florida Department of Transportation

PLANNING AND ENVIRONMENTAL MANAGEMENT - DISTRICT 4
3400 West Commercial Blvd., Ft. Lauderdale, FL 33309-3421
Telephone (954) 777-4330 Fax (954) 777-4310
Toll Free Number: 1-866-336-8435

JEB BUSH
GOVERNOR

JOSÉ ABREU
SECRETARY

March 7, 2005

Ms. Madelyn Martinez
Fishery Biologist
Department of Commerce
NOAA Fisheries
Habitat Conservation Division
9701 Executive Center Drive N
Saint Petersburg, Florida 33702

Dear Ms. Martinez:

SUBJECT: **Request for EFH Assessment Assistance**
SR-862 (I-595) Project Development & Environment Study
Financial Project ID: 409354-1-22-01
Federal Project ID: 5951 539 I
County: Broward

The Florida Department of Transportation is conducting a Project Development and Environment (PD&E) Study to improve traffic operations, capacity, and safety along the I-595 corridor in Broward County. The I-595 PD&E Study is an outgrowth of the I-95/I-595 Master Plan that lead to the development of the Locally Preferred Alternative (LPA) that was approved by the Broward County Metropolitan Planning Organization (MPO) in 2001 and has received favorable reviews from the Federal Highway Administration (FHWA). The LPA proposed the addition of reversible lanes in the median, a new collector-distributor road, and various interchange and ramp improvements. The PD&E Study is the next phase of the implementation process for the LPA and is ongoing. The project study limits extend from just west of I-75 to just east of I-95, an approximate project length of 12 miles. The attached Location Map illustrates the location and limits of the project.

Attached to this correspondence is an abbreviated list of federally managed species and their EFH, as determined by FDOT as potentially negatively affected by the proposed project. It was developed from the South Atlantic Fisheries Management Council and NOAA Fisheries Federally Managed Species Lists, Fishery Management Plans, and associated habitat maps.

The FDOT requests that you indicate which species should be included in an EFH Assessment for this project. Please place a "check mark" next to the appropriate species on the attached list, and return to the FDOT so that a complete and accurate EFH Assessment can be prepared. If you have any questions or concerns, please feel free to contact me at (954) 777-4325. Thank you in advance for your assistance in this matter.

Sincerely yours,

Ann Broadwell

Ann Broadwell
Environmental Administrator

Attachments: Location Map
Abbreviated species and habitat list

Cc: FHWA
CEMO
Erik Neugaard - Reynolds, Smith and Hills, Inc.
Project File

Please place a "check mark" next to the species that should be included in the Essentail Fish Habitat (EFH) Assessment for the I-595 Project Development and Environment (PD&E) Study:

South Atlantic Snapper-Grouper

Balistidae--Triggerfishes

___ Gray triggerfish, *Balistes capriscus*
___ Queen triggerfish, *Balistes vetula*
___ Ocean triggerfish, *Canthidermis sufflamen*

Carangidae--Jacks

___ Yellow jack, *Caranx bartholomaei*
___ Blue runner, *Caranx crysos*
___ Crevalle jack, *Caranx hippos*
___ Bar jack, *Caranx ruber*
___ Greater amberjack, *Seriola dumerili*
___ Lesser amberjack, *Seriola fasciata*
___ Almaco jack, *Seriola rivoliana*
___ Banded rudderfish, *Seriola zonata*

Ephippidae--Spadefishes

___ Spadefish, *Chaetodipterus faber*

Haemulidae--Grunts

___ Black margate, *Anisotremus surinamensis*
___ Porkfish, *Anisotremus virginicus*
___ Margate, *Haemulon album*
___ Tomtate, *Haemulon aurolineatum*
___ Smallmouth grunt, *Haemulon chrysargyreum*
___ French grunt, *Haemulon flavolineatum*
___ Spanish grunt, *Haemulon macrostomum*
___ Cottonwick, *Haemulon melanurum*
___ Sailors choice, *Haemulon parrai*
___ White grunt, *Haemulon plumieri*
___ Blue stripe grunt, *Haemulon sciurus*

Labridae--Wrasses

___ Hogfish, *Lachnolaimus maximus*
___ Puddingwife, *Halichoeres radiatus*

Lutjanidae--Snappers

___ Black snapper, *Apsilus dentatus*
___ Queen snapper, *Etelis oculatus*
___ Mutton snapper, *Lutjanus analis*
___ Schoolmaster, *Lutjanus apodus*
___ Blackfin snapper, *Lutjanus buccanella*
___ Red snapper, *Lutjanus campechanus*
___ Cubera snapper, *Lutjanus cyanopterus*
___ Gray snapper, *Lutjanus griseus*
___ Mahogany snapper, *Lutjanus mahogoni*
___ Dog snapper, *Lutjanus jocu*
___ Lane snapper, *Lutjanus synagris*
___ Silk snapper, *Lutjanus vivanus*
___ Yellowtail snapper, *Ocyurus chrysurus*
___ Vermilion snapper, *Rhomboplites aurorubens*

Malacanthidae--Tilefishes

___ Blueline tilefish, *Caulolatilus microps*
___ Golden tilefish, *Lopholatilus chamaeleonticeps*
___ Sand tilefish, *Malacanthus plumieri*

Percichthyidae--Temperate basses

___ Wreckfish, *Polyprion americanus*

Serranidae--Sea Basses and Groupers
___ Bank sea bass, *Centropristis ocyurus*
___ Rock sea bass, *Centropristis philadelphica*
___ Black sea bass, *Centropristis striata*
___ Rock hind, *Epinephelus adscensionis*
___ Graysby, *Epinephelus cruentatus*
___ Speckled hind, *Epinephelus drummondhayi*
___ Yellowedge grouper, *Epinephelus flavolimbatus*
___ Coney, *Epinephelus fulvus*
___ Red hind, *Epinephelus guttatus*
___ Jewfish, *Epinephelus itajara*
___ Red grouper, *Epinephelus morio*
___ Misty grouper, *Epinephelus mystacinus*
___ Warsaw grouper, *Epinephelus nigritus*
___ Snowy grouper, *Epinephelus niveatus*
___ Nassau grouper, *Epinephelus striatus*
___ Black grouper, *Mycteroperca bonaci*
___ Yellowmouth grouper, *Mycteroperca interstitialis*
___ Gag, *Mycteroperca microlepis*
___ Scamp, *Mycteroperca phenax*
___ Tiger grouper, *Mycteroperca tigris*
___ Yellowfin grouper, *Mycteroperca venenosa*
Sparidae--Porgies
___ Sheepshead, *Archosargus probatocephalus*
___ Grass porgy, *Calamus arctifrons*
___ Jolthead porgy, *Calamus bajonado*
___ Saucereye porgy, *Calamus*
___ Whitebone porgy, *Calamus leucosteus*
___ Knobbed porgy, *Calamus nodosus*
___ Red porgy, *Pagrus pagrus*
___ Longspine porgy, *Stenotomus caprinus*
___ Scup, *Stenotomus chrysops*

Please note that no species from the following groups have been included on this abbreviated list:
- Coastal Migratory Pelagics
- Shrimp Fishery of the South Atlantic Region
- Spiny Lobster
- Golden Crab
- Coral, Coral Reefs, and Live/Hard Bottom Habitat
- Red Drum
- Calico Scallops
- Sargassum

If there are any additional species that should be considered, please add them here:

____

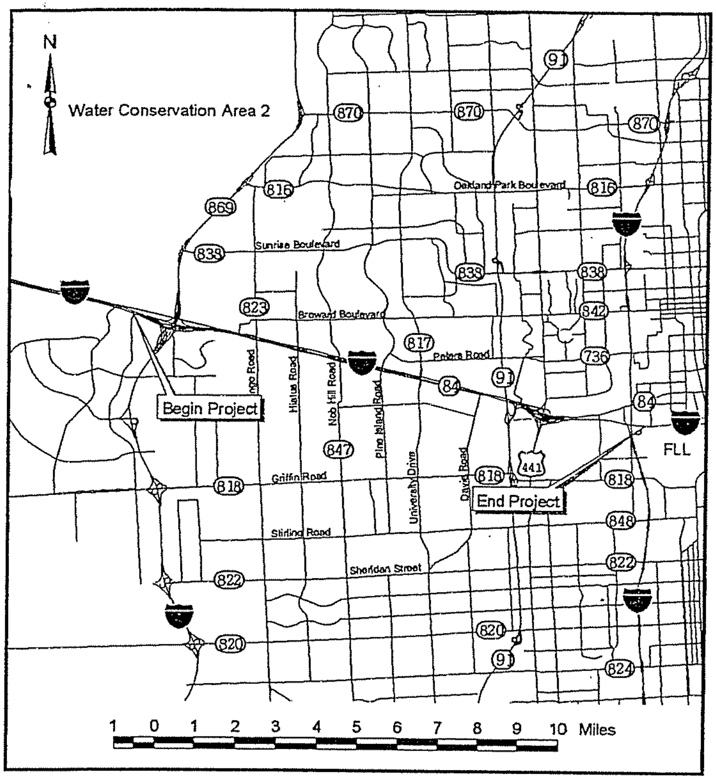
____

____

____

____

____



LOCATION MAP

F.M. No. 409354-1-22-01
F.A.P. No. 5951 539 I
Broward County
I-595 PD&E Study
U.S.G.S. Quads. Cooper City
and Fort Lauderdale South

Appendix D

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

March 31, 2005

APR - 5 2005
Planning & Environmental Mgmt
District Four

Ms. Ann Broadwell
Environmental Administrator
Florida Department of Transportation
District 4, Environmental Management Office
3400 West Commercial Blvd.
Ft. Lauderdale, Florida 33309-3421

I595 EFH.pdf

Dear Ms. Broadwell:

NOAA's National Marine Fisheries Service (NMFS) has reviewed information provided in the February 21, 2005, letter from the Florida Department of Transportation (FDOT) concerning SR862 (I-595) Widening Project in Broward County, Florida (Financial Project ID: 409354-1-22-01 and Federal Project ID: 5951-539-I). FDOT is currently preparing the Project Development & Environment Study (PD&E) document for the project Your letter requests assistance concerning fulfillment of the essential fish habitat (EFH) conservation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) P.L. 104-297.

The following species are managed by the South Atlantic Fishery Management Council and may occur in the project area. The EFH assessment for the project should address impacts to these species and their habitats if directly or indirectly impacted by the project:

Brown shrimp – *Penaeus aztecus*
Gray snapper – *Lutjanus griseus*
Red drum – *Sciaenops ocellatus*
Jewfish – *Epinephelus itajara*
Mutton snapper – *Lutjanus analis*
White grunt – *Haemulon plumieri*

(Source: South Atlantic Fishery Management Council, 1998. *"Final Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council"*, October 1988. pp 16-285, and National Marine Fisheries Service SER-HCD, 2003. *"Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies")*.

We appreciate your continued cooperation in the conservation of EFH and look forward to working with you and your staff in the future. Related questions or comments should be directed to the attention of Ms. Madelyn T. Martinez in our Southeast Regional Office, 263 13th Avenue South, St. Petersburg, FL 33701. She may be reached by telephone at (727) 824-5317or by fax at (727) 824-5300.

Sincerely,

David H. Rackley

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc:
COE, Miami
DEP, Marathon & Tallahassee
EPA, Marathon
FFWCC, Tallahassee
FHWA
FWS, Vero Beach
F/SER4 Martinez

Appendix E

STATE PROJ. NO.	SHEET NO.
86070-3423	M-1

WPI NO. 4140974

FINAL PLANS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

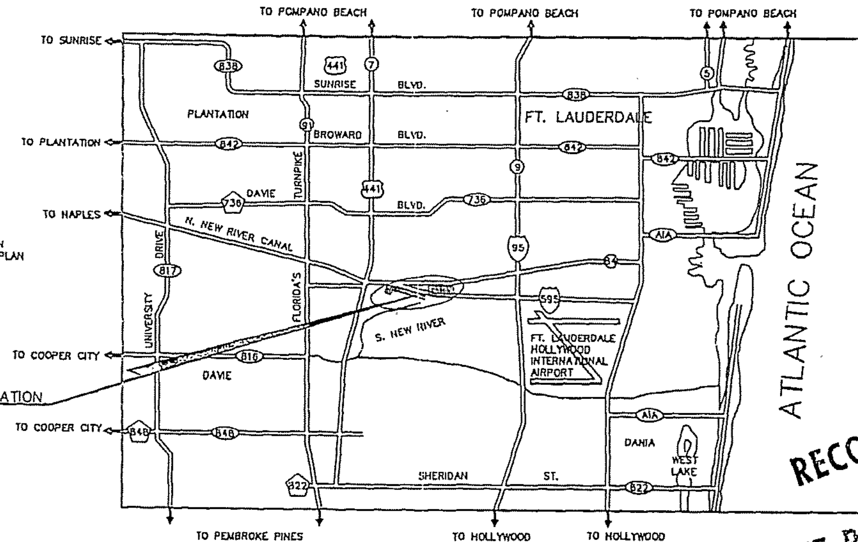
[redacted]

STATE HIGHWAY

STATE PROJECT NO. 86070-3423
BROWARD COUNTY
BROWARD CO. NOV FOR CYPRESS CREEK P & R LOT
MITIGATION AT POND APPLE SLOUGH

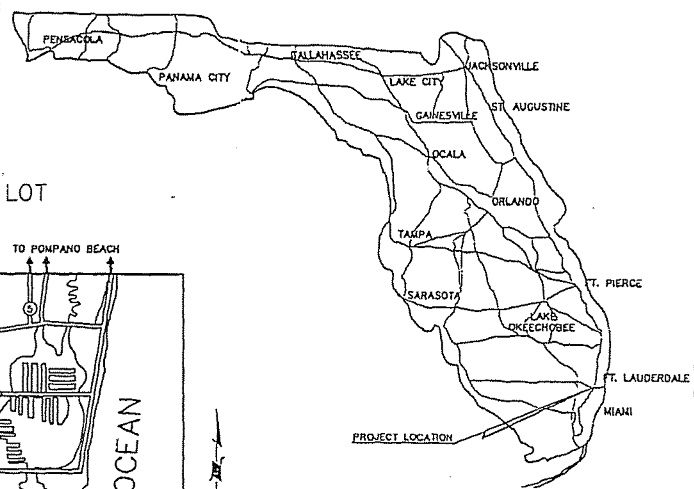
THIS CONTRACT PLAN SET INCLUDES

MITIGATION PLANS
PAY ITEM SUMMARY



PROJECT LOCATION

N.T.S.
SEC. 19
TWP. 50S
RGE. 42E



INDEX OF MITIGATION PLANS

SHEET NO.	SHEET DESCRIPTION
M-1	KEY SHEET
M-2	LOCATION MAP
M-3	LAYOUT PLAN
M-4	TYPICAL SECTIONS
M-5	SUMMARY OF QUANTITIES & NOTES
M-6	AREAS 1 & 2: EXISTING VEGETATION PLAN
M-7 TO M-8	AREAS 3 THRU 7: EXISTING VEGETATION PLAN
M-9	AREAS 1 & 2: MITIGATION PLAN
M-10 TO M-11	AREAS 3 THRU 7: MITIGATION PLAN
M-12	AREAS 1 & 2: CROSS SECTIONS
M-13 TO M-16	AREAS 3 THRU 7: CROSS SECTIONS

Contractor: Freedom Pipeline
District Sec.: R. Chesser
Resident Engr.: R. Taraska
Project Engr.: H. Henry
Date Work Started: 9-7-93
Date Work Completed (C.A.):
Date Work Accepted (F.A.): 10-21-95

RECORD COPY

SEE REVISION

PLANS PREPARED BY:

CONSULTING ENGINEERING & SCIENCE, INC.
8925 S.W. 148TH STREET
SUITE 100
MIAMI, FLORIDA 33176

ENGINEER OF RECORD
RICHARD BOCHNOVICH P.E.

THESE PLANS HAVE BEEN PREPARED IN ACCORDANCE WITH AND ARE GOVERNED BY STATE OF FLORIDA, DEPARTMENT OF TRANSPORTATION, ROADWAY AND TRAFFIC DESIGN STANDARDS (BOOKLET DATED JANUARY, 1992)

PROJECT AREAS

	SQUARE FEET	ACRES
AREA 1	77,537	1.78
AREA 2	34,412	0.79
AREA 3	47,916	1.10
AREA 4	16,117	0.37
AREA 5	94,525	2.17
AREA 6	60,984	1.40
AREA 7	212,137	4.87
TOTAL MITIGATION AREA	543,628	12.48

REVISIONS		
DATE	BY	DESCRIPTIONS

ATTENTION IS DIRECTED TO THE FACT THAT THESE PLANS MAY HAVE BEEN REDUCED IN SIZE BY REPRODUCTION. THIS MUST BE CONSIDERED WHEN OBTAINING SCALED DATA.

GOVERNING SPECIFICATIONS: STATE OF FLORIDA, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS, DATED 1991 AND SUPPLEMENTS THERETO IF NOTED IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

MITIGATION PLANS APPROVED BY: ______
DATE: ______
P.E. No. ______

DESIGNED BY: MILAGROS C. MORELLA

FDOT PROJECT MANAGER: BRUCE KOWALEWSKI

FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT CONTRACT SUMMARY OF QUANTITIES

CONTRACT NUMBER: E4703

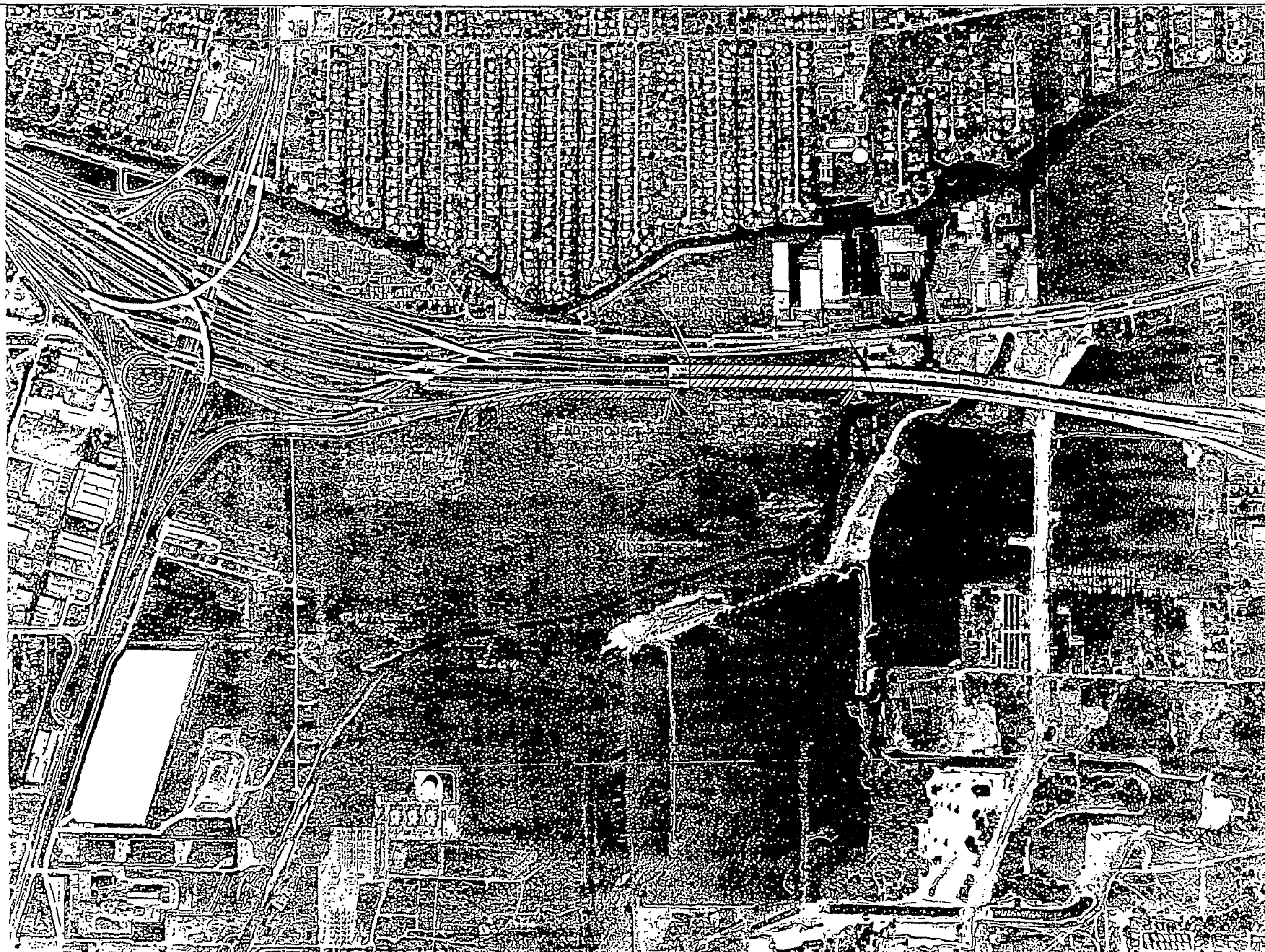
PAY ITEM NUMBER	PAY ITEM DESCRIPTION	BID UNIT	JOB NUMBER	PLAN QUANTITY	TOTAL QUANTITY
A101 1	MOBILIZATION	LS	860703423	1.000	1.000
A102 1	MAINT OF TRAFFIC	LS	860703423	1.000	1.000
A104 10	BALED HAY OR STRAW	TN	860703423	9.700	9.700
A104 11	FLOATING TURBIDITY BARRIE R	LF	860703423	200.000	200.000
A104 12	STAKED TURBIDITY BARRIER	LF	860703423	600.000	600.000
A110 1 1	CLEARING & GRUBBING	LS	860703423	1.000	1.000
A110 87 2	HERBICIDE CONTROL OF VEGE TATION(MODERATE DENSITY)	AC	860703423	45.270	45.270
A120 1	REGULAR EXCAVATION	CY	860703423	10,704.000	10,704.000
A530 1	RIPRAP (SAND-CEMENT)	CY	860703423	3.250	3.250
A550 76201	FENCE GATES (TYPE B)	EA	860703423	1.000	

FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT CONTRACT SUMMARY OF QUANTITIES

CONTRACT NUMBER: E4703

PAY ITEM NUMBER	PAY ITEM DESCRIPTION	BID UNIT	JOB NUMBER	PLAN QUANTITY	TOTAL QUANTITY
	(SINGLE 20')	EA			1.000
A570 5	FERTILIZER	TN	860703423	.100	.100
A570 9	WATER FOR GRASS	MG	860703423	12.000	12.000
A570 11	WATER FOR PLANT ESTABLISH MENT	MG	860703423	4,366.000	4,366.000
A575 1 1	SODDING (BAHIA)	SY	860703423	1,933.000	1,933.000
A580301 1	STAKING & GUYING (TREES)	EA	860703423	466.000	466.000
A582 2	SHRUBS (10" TO 18" HEIGHT OR SPREAD)	PL	860703423	16,371.000	16,371.000
A583 3	TREES (19" TO 7' HEIGHT OR SPREAD)	PL	860703423	4,144.000	4,144.000

STATE PROJECT NO. 86070-3423 SHEET NO. M-2



FLIGHT DATE 2-5-90

REVISIONS																
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		NAME	DATE	NAME	DATE
												DESIGNED BY	M.C.M.	2/93	DRAWN BY F.L.B.	2/93
												CHECKED BY	W.M.C.	2/93	CHECKED BY M.C.N.	2/93
												SUPERVISED BY	R.B.D.			2/93

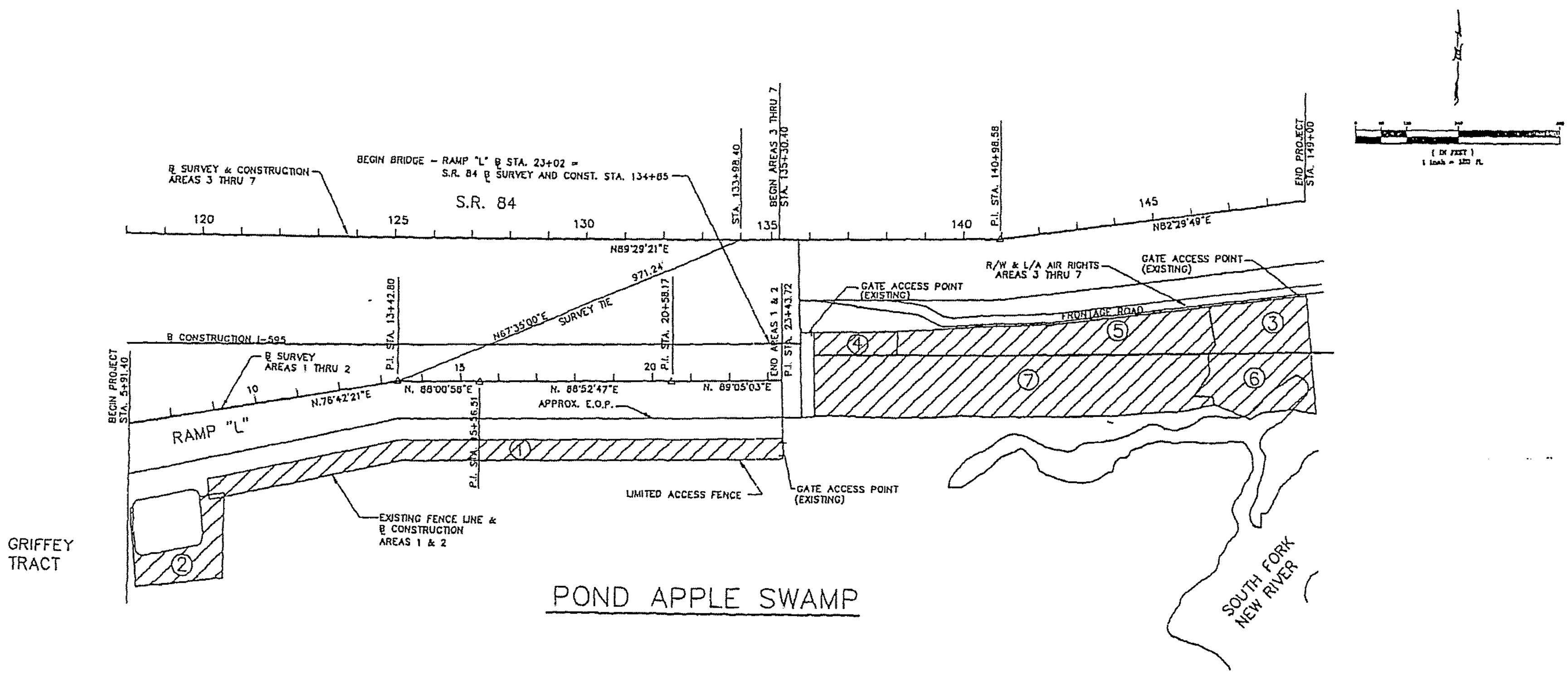
FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE

LOCATION PLAN

STATE PROJ. NO.	SHEET NO.
86070-3423	M-3



SURVEY NOTES

1. BASELINE SURVEY INFORMATION FOR S.R. 84 TAKEN FROM DATA PROVIDED IN FIELD BOOK 1005820.
2. BASELINE CONSTRUCTION INFORMATION FOR RAMP "L" TAKEN FROM DATA PROVIDED IN FIELD BOOK 1004295.
3. SURVEY TIE INFORMATION TAKEN FROM DATA PROVIDED IN FIELD BOOK 1001786.

REVISIONS

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

	NAME	DATE		NAME	DATE
DESIGNED BY	M.C.M.	2/93	DRAWN BY	F.L.B.	2/93
CHECKED BY	W.M.C.	2/93	CHECKED BY	M.C.M.	2/93
SUPERVISED BY:	R.B.B.				2/93

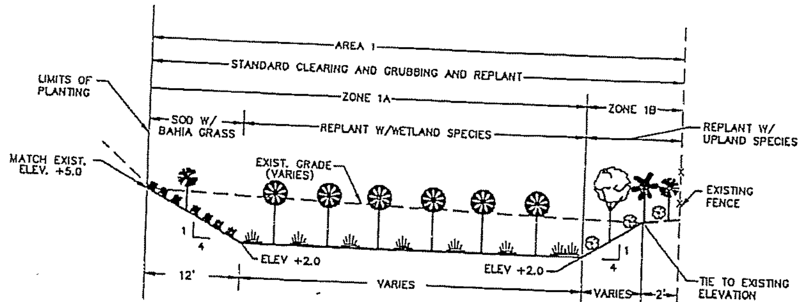
FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

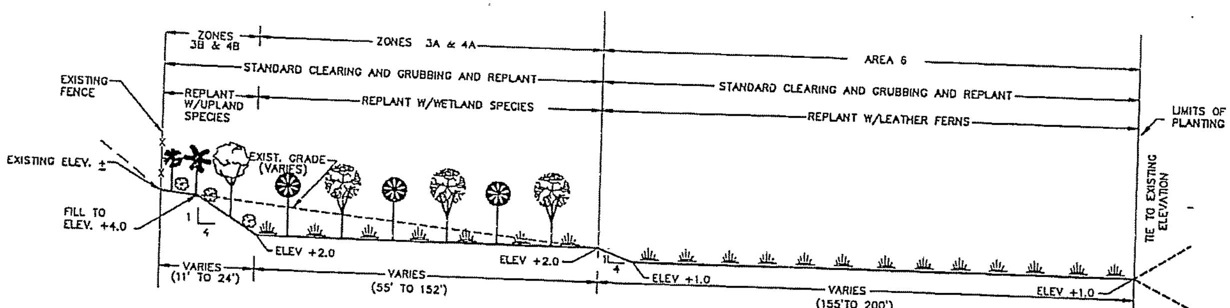
LAYOUT PLAN

STATE PROJ. NO.	SHEET NO.
86070-3423	M-4



TYPICAL SECTION 1

AREA 1 – STA. 8+88 TO STA. 23+38

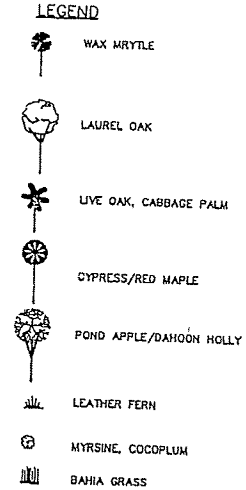


TYPICAL SECTION 2 & 3

AREAS 4A & 4B – STA. 135+43 TO STA. 138+20 +/–
AREAS 3A, 3B & 6 – STA. 147+00 TO STA. 148+90 +/–

NOTE: ZONE 3A WILL BE PLANTED WITH POND APPLE ONLY.

LEGEND



REVISIONS

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

	NAME	DATE		NAME	DATE
DESIGNED BY	M.C.M.	2/93	DRAWN BY	E.L.B.	2/93
CHECKED BY	W.M.C.	2/93	CHECKED BY	M.C.M.	2/93
SUPERVISED BY:	R.B.B.				2/93

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

TYPICAL SECTIONS

STATE PROJ. NO.	SHEET NO.
86070-3423	M-

GENERAL NOTES

1. ALL ELEVATIONS ARE REFERENCED TO THE 1929 NATIONAL GEODETIC VERTICAL DATUM (NGVD).
2. ALL MITIGATION CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH PERMIT REQUIREMENTS.
3. MITIGATION SITES ARE DIVIDED INTO SEVEN (7) AREAS AS DEPICTED ON THE LAYOUT PLAN.
4. EXOTIC/NUISANCE VEGETATION SHALL BE ERADICATED. TARGET SPECIES INCLUDE, BUT ARE NOT LIMITED TO:

BRAZILIAN PEPPER	(SCHINUS TEREBINTHIFOLIUS)	CATTAILS (TYPHA SPP.)
AUSTRALIAN PINE	(CASUARINA SPP.)	PRIMAROSE WILLOW (LUDWIGIA PERUVIANA)
MELALEUCA	(MELALEUCA QUINQUENERVIA)	GIANT REED (PHRAGMITES SPP.)

5. THREE TREATMENT AREAS ARE DEPICTED ON SHEETS M-09, M-10 AND M-11. TABLE 1 PRESENTS THE ACREAGE AND THE ESTIMATED NUMBER OF PLANTS TO BE TREATED. THE NUMBER OF EXOTIC PLANTS IN EACH AREA IS ESTIMATED FROM REPRESENTATIVE SAMPLING AND MAY VARY.
6. HERBICIDES SHALL BE APPLIED TO TARGET EXOTIC/NUISANCE PLANT SPECIES LOCATED IN THE SELECTIVE HERBICIDE TREATMENT AREAS AS SPECIFIED IN THE SPECIAL PROVISIONS. THESE HERBICIDES SHALL ALSO BE USED TO CONTROL REGROWTH OF THE TARGET SPECIES ON THE SITE UNTIL THE PROJECT'S FINAL ACCEPTANCE.
7. HERBICIDES SHALL BE APPLIED TO TARGET EXOTIC/NUISANCE PLANT SPECIES 15 TO 20 FEET OUTSIDE THE SELECTIVE HERBICIDE TREATMENT AREAS AS SPECIFIED IN THE PLANS AND GENERAL NOTES, WHERE NECESSARY, AS DETERMINED BY THE ENGINEER. LIMITED TO 200 TREES.
8. CONTRACTOR SHALL SUBMIT HIS PROPOSED METHODS OF CONTROLLING EXOTICS ONE MONTH AFTER AWARDING OF THE CONTRACT.
9. CONTRACTOR SHALL SUBMIT PLANTING SCHEMES FOR EACH AREA ONE MONTH AFTER AWARDING OF THE CONTRACT. SCHEMES SHALL BE BASED ON THE NUMBER OF PLANTS TO BE PLANTED AND CENTERS SPECIFIED FOR EACH SPECIES. PLANTING SCHEMES SHALL BE SUBMITTED TO THE PROJECT ENGINEER AND APPROVED BY THE DISTRICT ENVIRONMENTAL ADMINISTRATOR BEFORE ANY PLANTING SHALL BEGIN.
10. CONTRACTOR SHALL CONDUCT A VEGETATIVE BASELINE SURVEY AS DISCUSSED IN THE SPECIAL PROVISIONS. REQUIREMENTS OF THE BASELINE SURVEY WILL BE PROVIDED TO THE CONTRACTOR BY THE DISTRICT ENVIRONMENTAL ADMINISTRATOR.
11. THE CONTRACTOR SHALL INSTALL TWO PERMANENT REFERENCE MONUMENTS (PRM) IN THE MITIGATION AREA, WITH ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929. THE CONTRACTOR SHALL RETAIN A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF FLORIDA TO CERTIFY THE ELEVATIONS OF THE PRM(S). CONTACT THE DISTRICT ENVORONMENTAL ADMINISTRATOR FOR THE LOCATIONS WHERE THE PRM(S) ARE TO BE PLACED.
12. PLANTS REQUIRED FOR MITIGATION AREAS SHALL BE VERIFIED BY THE CONTRACTOR FOR PLANT AVAILABILITY WITH EAST COAST DISTRIBUTORS. THIS SHALL BE VERIFIED AT THE PRECONSTRUCTION MEETING.
13. ALL VEGETATION WITHIN THE LIMITS OF STANDARD CLEARING AND GRUBBING SHALL BE REMOVED FROM THE SITE. DISPOSAL OF SUCH MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR IN COMPLIANCE WITH ALL STATE AND LOCAL ORDINANCES FOR DISPOSAL OF PLANT MATERIAL.
14. PLANT LOCATIONS MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER DUE TO UNFORESEEN SITE CONDITIONS. SEE MITIGATION PLAN.
15. FLOATING AND STAKED TURBIDITY BARRIERS SHALL BE PLACED IN AREAS WHERE CONSTRUCTION ACTIVITIES MAY CAUSE TURBIDITY IN WATER, CHANGE THE NATURAL CONTOUR AND/OR CREATE DOWNHILL ACCUMULATIONS OF SILT INTO OTHER ADJACENT AREAS. THIS PLACEMENT SHALL BE DONE AT THE DISCRETION OF THE ENGINEER. THESE SHALL BE REMOVED AT JOB COMPLETION.
16. THE CONTRACTOR IS ADVISED THAT HE IS RESPONSIBLE FOR CONTROL OF EXOTIC/NUISANCE PLANT GROWTH FROM THE TIME THE MITIGATION AREAS ARE CLEARED AND GRUBBED UNTIL THE PROJECT'S FINAL ACCEPTANCE.
17. DURING PHASE III, THE CONTRACTOR SHALL INSPECT THE MITIGATION AREAS ON A MONTHLY BASIS FOR PRESENCE OF EXOTIC PLANT SPECIES. THESE INSPECTIONS SHALL BE ON A MONTHLY BASIS UNTIL THE COMPLETION OF THE PROJECT.
18. PLANTED MATERIAL SHALL BE STAKED AND GUYED WHERE NECESSARY AS DETERMINED BY THE ENGINEER.
19. UTILITY CLEARANCE LETTER HAS BEEN OBTAINED. NO UTILITY CONFLICTS ARE INVOLVED FOR THE PROJECT.
20. CONTRACTOR SHALL TAKE CARE SO AS NOT TO DISTURB OR IMPACT STRUCTURAL INTEGRITY OF BRIDGE FOUNDATIONS WHEN EXCAVATING IN AREA 6.
21. THE CONTRACTOR SHALL BE SURE TO USE ONLY THOSE AREAS DESIGNATED IN THE PLANS AS ACCESS POINTS.
22. THE CONTRACTOR SHALL CONFINE ALL WORK ACTIVITES TO WITHIN PROJECT LIMITS AS DELINEATED IN THE PLANS AND SHALL NOT IN ANYWAY IMPACT THE ADJACENT WETLAND AREAS. THIS IS WITH EXCEPTION TO THE WORK AS DELINEATED UNDER GENERAL NOTE #7.
23. THE CONTRACTOR SHALL CROSS SECTION EXCAVATED AREAS AND SUBMIT TO THE ENGINEER FOR APPROVAL TWO WEEKS BEFORE ANY PLANTING SHALL BEGIN. DUE TO THE SENSITIVE NATURE OF THE SITE, FINAL ELEVATIONS SHALL BE SHAPED TO WITHIN 0.2 FOOT ABOVE OR BELOW PLAN ELEVATIONS. THE ENGINEER MAY ALTER FINISH ELEVATIONS DUE TO CHANGE IN SITE CONDITIONS.
24. THE CONTRACTOR SHALL UTILIZE ONLY HAND HELD EQUIPMENT IN THE SELECTIVE HERBICIDE TREATMENT AREAS #2, #5 AND #7.

SUMMARY OF QUANTITIES

ITEM NUMBER	ITEM DESCRIPTION	UNIT	QUANTITY FA		QUANTITY NFA		TOTAL	
			P	F	P	F	P	F
101-1	MOBILIZATION	LS			1	–	1	
102-1	MAINTENANCE OF TRAFFIC	LS			1		1	
104-10	HAY OR STRAW BALED	TN			9.7		9.7	
104-11	TURBIDITY BARRIER FLOATING	LF			200		200	
104-12	TURBIDITY BARRIER STAKED	LF			600		600	
110-1-1	CLEARING & GRUBBING (STD)	AC			4.65		4.65	
110-87-2	SELECTIVE HERBICIDE	AC			45.27		45.27	
120-1	EXCAVATION	CY			10704		10704	
530-1	RIPRAP (SAND-CEMENT)	CY			3.25		3.25	
550-76-201	FENCE GATE TYPE B (SINGLE 20')	EA			1		1	
570-5	FERTILIZER	TN			0.1		0.1	
570-9	WATER FOR GRASS	MG			12		12	
570-11	WATER FOR ESTABLISHMENT	MG			4366		4366	
575-1-1	SODDING (BAHIA)	S.Y.			1933		1933	
580-301-1	STAKING AND GUYING OF TREES	EA			466		466	
582-2	SHRUBS (1-1.5') (3' CENTERS)	EA			16371		16371	
583-3	TREES	EA			4144		4144	

SUMMARY OF EARTHWORK

DESCRIPTION	P	F
	C.Y.	C.Y.
MITIGATION AREA EXCAVATION *	10,704	
MITIGATION AREA FILL	0	

* NOTE: IF NECESSARY, EXCAVATION MATERIAL SHALL BE USED TO BALANCE UNEVEN EXISTING GROUND TO MEET REQUIRED TYPICAL SECTIONS.

TABLE 1. ESTIMATED DENSITIES OF EXOTIC VEGETATION

AREA NUMBER	METHOD OF EXOTICS REMOVAL	AREA (ACRES)	ESTIMATED NO. OF EXOTICS PER ACRE	TOTAL ESTIMATED NO. OF EXOTICS/TREES TO BE TREATED *
2	SELECTIVE HERBICIDE TREATMENT	0.79	684	540
5	SELECTIVE HERBICIDE TREATMENT	2.17	152	330
7	SELECTIVE HERBICIDE TREATMENT	4.87	64	310

* NOTE: NUMBER OF TREES ARE ESTIMATED ONLY. ANY DEVIATION SHOWN FROM DENSITY ABOVE WILL NOT RESULT IN ADDITIONAL COMPENSATION TO CONTRACTOR.

PAY ITEM FOOTNOTES

101-1 INCLUDES THE COST OF LABOR AND MATERIALS NECESSARY FOR:
- PLACEMENT OF TWO PERMANENT MONUMENTS AS SPECIFIED GENERAL NOTES.
- VEGETATIVE BASELINE SURVEY AS SPECIFIED IN SPECIAL PROVISIONS AND GENERAL NOTES.

102-1 INCLUDES THE COST OF LABOR AND MATERIALS NECESSARY TO PROVIDE MAINTENANCE OF TRAFFIC IN ACCORDANCE WITH INDEX NO. 600.

104-10 ALL BALED HAY OR STRAW UTILIZED SHALL COMPLY WITH THE PROVISIONS OF 981-3.1 FOR DRY MULCH. WILL ALSO INCLUDE THE REMOVAL OF HAY BALES.

104-11
104-12 THIS WORK SHALL CONSIST OF INSTALLING, MAINTAINING AND REMOVAL OF TURBIDITY BARRIERS TO CONTAIN TURBIDITY THAT MAY OCCUR AS THE RESULT OF CONSTRUCTION ACTIVITIES WHICH MAY CAUSE TURBIDITY TO OCCUR IN THE WATERS OF THE STATE.

110-1-1 INCLUDES THE COST OF ALL LABOR AND MATERIALS NECESSARY FOR:
- CONSTRUCTION OF MAT MATERIAL FOR CONSTRUCTION EQUIPMENT ACCESS DURING CONSTRUCTION OPERATIONS.
- INSPECTION OF SITE FOR REGROWTH OF EXOTIC/NUISANCE VEGETATION AS SPECIFIED IN SPECIAL PROVISIONS AND GENERAL NOTES.
- PHOTOGRAPHIC DOCUMENTATION AS SPECIFIED IN SPECIAL PROVISIONS.
- CROSS SECTIONS OF EXCAVATED AREAS AS SPECIFIED IN SPECIAL PROVISIONS AND GENERAL NOTES.
- WEED CONTROL WITHIN THE PROJECT LIMITS AS SPECIFIED IN THE SPECIAL PROVISIONS AND GENERAL NOTES.
- ANY ADDITIONAL WATER AND/OR FERTILIZER REQUIRED UNDER PHASE III AS SPECIFIED IN THE SPECIAL PROVISIONS.

110-87-2 INCLUDES THE COST OF ALL LABOR, EQUIPMENT, MATERIALS AND THE DISPOSAL OF THESE MATERIALS NECESSARY FOR:
- INITIAL SELECTIVE HERBICIDE APPLICATION TO EXOTIC/NUISANCE VEGETATION WITHIN THE SELECTIVE HERBICIDE TREATMENT AREAS OF 7.83 ACRES AS SPECIFIED IN THE SPECIAL PROVISIONS AND GENERAL NOTES.
- SELECTIVE HERBICIDE APPLICATION TO BE APPLIED TO TARGET EXOTIC/NUISANCE PLANT SPECIES 15 TO 20FT. OUTSIDE THE SELECTIVE HERBICIDE TREATMENT AREAS AS SPECIFIED IN THE PLANS AND GENERAL NOTES.
- THREE SEPARATE SELECTIVE HERBICIDE APPLICATIONS TO EXOTIC/NUISANCE VEGETATION WITHIN THE ENTIRE MITIGATION AREA OF 12.48 ACRES AS SPECIFIED IN THE SPECIAL PROVISIONS AND GENERAL NOTES.

530-1 THE COST OF DRESSING AND SHAPING THE SUBGRADE FOR PLACING RIPRAP SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR SAND-CEMENT RIPRAP.

550-76-201 INCLUDES THE COST OF ALL LABOR AND MATERIALS NECESSARY FOR:
- REPLACEMENT OF EXISTING FENCE W/ GATE AT ONE (1) ACCESS POINT.
- FURNISH OF A LOCK, WITH EXTRA KEYS FURNISHED TO THE DEPARTMENT.

582-2
583-3 INCLUDES SLOW RELEASE FERTILIZER, FORMULATED AT 18-6-12 TO BE APPLIED AT THE TIME OF PLANTING. FERTILIZER SHALL BE PLACED IN HOLE EXCAVATED FOR THE PLANT, ONE TABLET PER TREE OR SHRUB.

570-11 INCLUDES WATER FOR ESTABLISHMENT OF TREES AND SHRUBS PLANTED UNDER PHASE III AS SPECIFIED IN THE SPECIAL PROVISIONS.

580-301-1 INCLUDES ALL LABOR AND MATERIAL FOR STAKING AND GUYING OF TREES GREATER THAN 18" IN HEIGHT.

GENERAL PLANT NOTES

1. ALL TREES AND SHRUBS SHALL BE FERTILIZED AT THE TIME OF PLANTING WITH A SLOW-RELEASE TABLET FERTILIZER (18-6-12 FORMULATION).
2. THE 4,144 TREES UNDER PAY ITEM NUMBER 583-3 REPRESENTS A TOTAL OF THE FOLLOWING:

TREES (3'-6')(5' CENTERS)	2,732 EA
TREES (4'-6')(10' CENTERS)	428 EA
TREES (6'-8')(10' CENTERS)	984 EA

REVISIONS

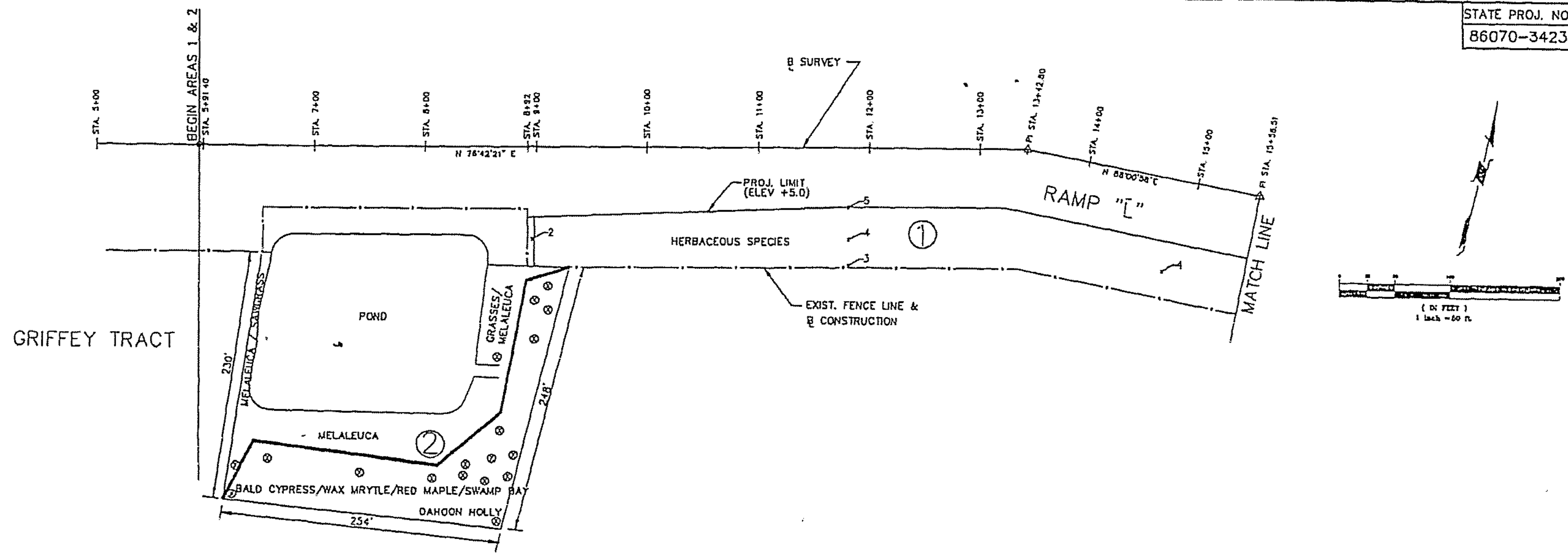
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

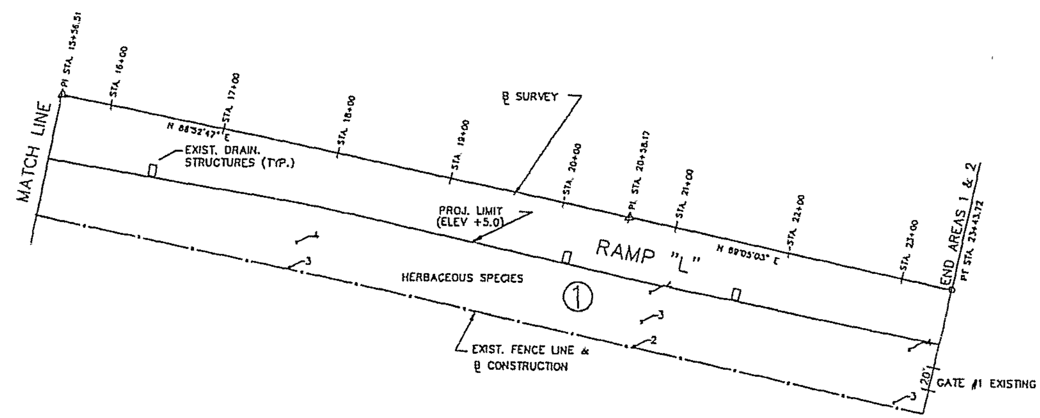
	NAME	DATE		NAME	DATE
DESIGNED BY	M.C.M.	2/93	DRAWN BY	F.L.B.	2/93
CHECKED BY	W.M.C.	2/93	CHECKED BY	M.C.M.	2/93
SUPERVISED BY: R.B.B.					2/93

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

SUMMARY OF QUANTITIES & NOTES

STATE PROJ. NO.	SHEET NO.
86070-3423	M-6





EXISTING CONDITION NOTES

AREA 1 – DOMINATED BY BURMARIGOLD, BORRERIA, DOG FENNELL, MUSKY MINT, COMMON MORNING GLORY, TORPEDO GRASS, FLEABANE, SALTMARSH MALLOW, CREEPING CHARLIE AND WHITE TUBER VINE. ALSO PRESENT ARE SCATTERED WILLOW, BALD CYPRESS, BRAZILIAN PEPPER, STRANGLER FIG, CABBAGE PALM AND MYRSINE.

AREA 2 – MELALEUCA TO THE SOUTH AND WEST OF THE POND IS DENSE. EXOTIC SPECIES PRESENT TO THE EAST OF THE POND ARE MELALEUCA AND BRAZILIAN PEPPER. EXOTIC SPECIES FOUND TO THE WEST OF THE POND ALSO INCLUDE AUSTRALIAN PINES AND BRAZILIAN PEPPER.

LEGEND

- ⊗ DEAD CYPRESS
- ① HERBACEOUS DOMINANT
- ② MELALEUCA DOMINANT
- SPOT ELEVATIONS
- VEGETATION BOUNDARY

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

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SUPERVISED BY: R.B.B.					2/93

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

AREAS 1 & 2
EXISTING VEGETATION PLAN

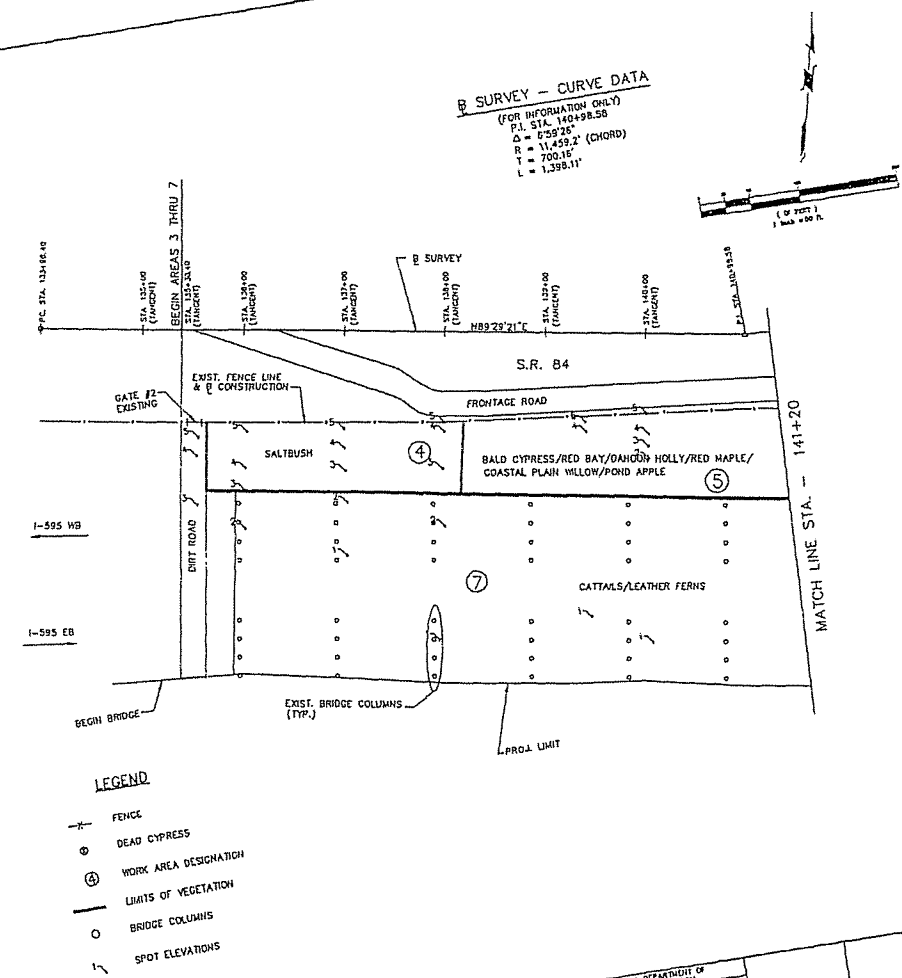
STATE PROJ. NO. 86070-3423 | SHEET NO. M-7

EXISTING CONDITION NOTES

AREA 4 – CONSISTS OF AN UPLAND HABITAT DOMINATED BY SALTBUSH. SMALL, SCATTERED CLUMPS OF AUSTRALIAN PINES, MELALEUCA, BRAZILIAN PEPPER, WILLOW AND BISHOPWOOD ARE PRESENT THROUGHOUT THIS AREA.

AREA 5 – DOMINATED BY BALD CYPRESS, RED BAY, DAHOON HOLLY, RED MAPLE AND WILLOW. EXOTIC SPECIES PRESENT ARE MULTI-TRUNKED BRAZILIAN PEPPER, EARLEAF ACACIA, AUSTRALIAN PINES AND GUAVA. THESE EXOTICS ARE SCATTERED THROUGHOUT THIS AREA.

AREA 7 – DOMINATED BY CATTAILS AND LEATHER FERNS. SMALL SCATTERED CLUMPS OF AUSTRALIAN PINES, BRAZILIAN PEPPER AND MELALEUCA ARE PRESENT.



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

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SUPERVISED BY: R.B.B.					

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY: DATE:

AREAS 3 THRU 7
EXISTING VEGETATION PLAN

STATE PROJ. NO.	SHEET NO.
86070-3423	M-8

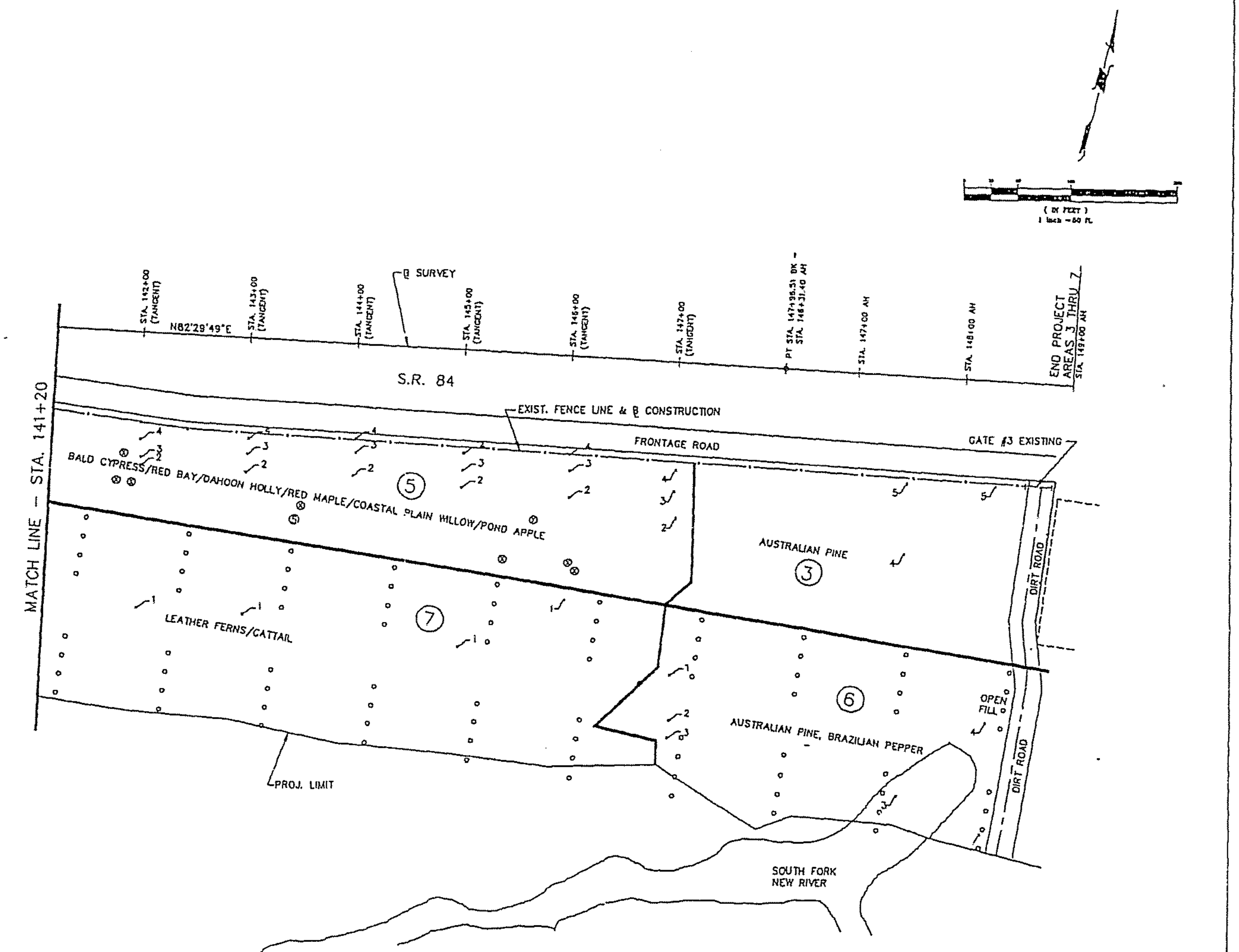
EXISTING CONDITION NOTES

AREA 3 – CONSISTS OF AN AUSTRALIAN PINE FOREST WITH UNDERSTORY OF BRAZILIAN PEPPER. OTHER SPECIES PRESENT ARE STRANGLER FIG, COCONUT PALM AND WILLOW.

AREA 5 – DOMINATED BY BALD CYPRESS, RED BAY, DAHOON HOLLY, RED MAPLE AND WILLOW. EXOTIC SPECIES PRESENT ARE MULTI-TRUNKED BRAZILIAN PEPPER, EARLEAF ACACIA, AUSTRALIAN PINES AND GUAVA. THESE SPECIES ARE SCATTERED THROUGHOUT THIS AREA.

AREA 6 – CONSISTS OF AN AUSTRALIAN PINE FOREST WITH UNDERSTORY OF BRAZILIAN PEPPER. OTHER SPECIES PRESENT ARE STRANGLER FIG, COCONUT PALM AND WILLOW.

AREA 7 – DOMINATED BY CATTAILS AND LEATHER FERNS. OCCASIONAL CLUMPS OF BRAZILIAN PEPPER AND AUSTRALIAN PINES ARE PRESENT.



LEGEND

- FENCE
- DEAD CYPRESS
- WORK AREA DESIGNATION
- LIMITS OF VEGETATION
- BRIDGE COLUMNS
- SPOT ELEVATIONS

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

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SUPERVISED BY:	R.B.B.				2/93

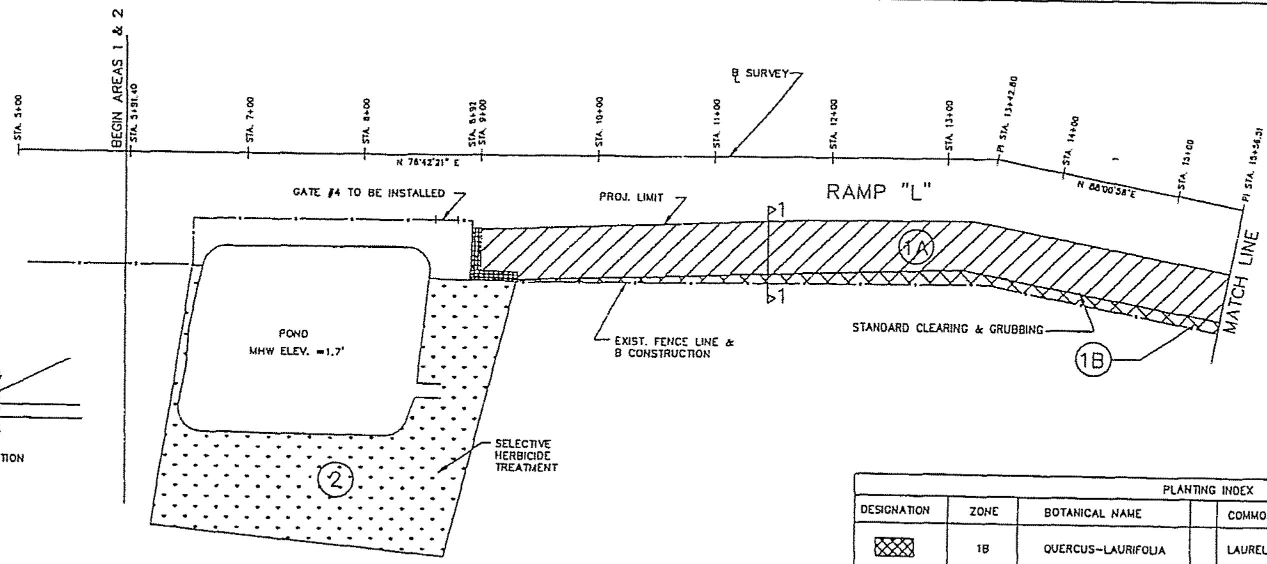
FLORIDA DEPARTMENT OF TRANSPORTATION

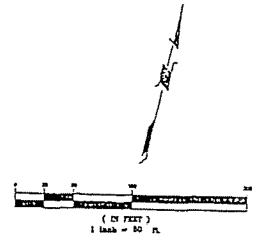
APPROVED BY:

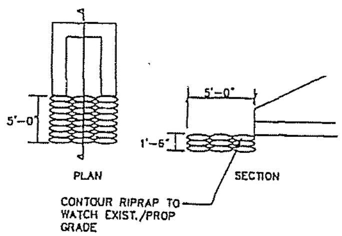
DATE:

AREAS 3 THRU 7
EXISTING VEGETATION PLAN

STATE PROJ. NO.	SHEET NO.
86070-3423	M-9





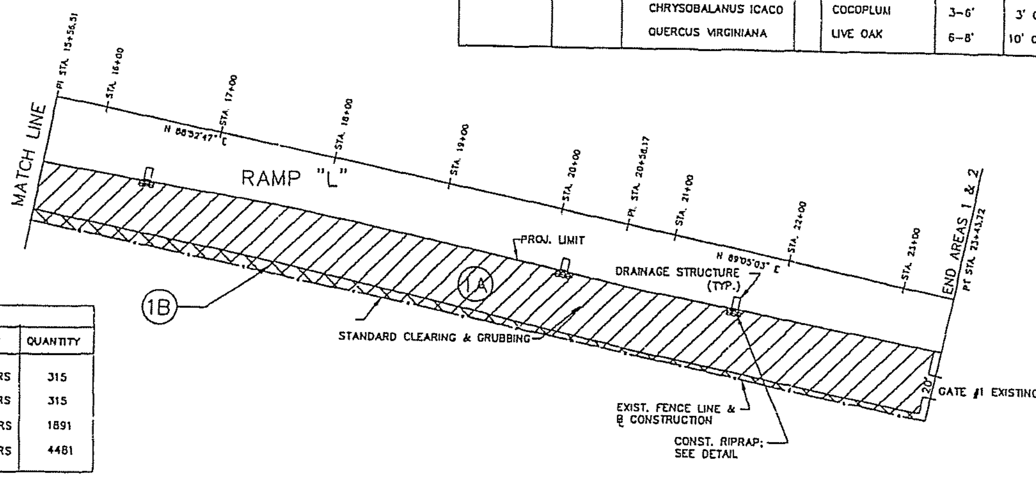


DRAINAGE STRUCTURE
RIPRAP DETAIL
N.T.S.

PLANTING INDEX							
DESIGNATION	ZONE	BOTANICAL NAME		COMMON NAME	SIZE	SPACING	QUANTITY
	1B	QUERCUS-LAURIFOLIA		LAUREL OAK	6-8'	10' CENTERS	48
		MYRSINE QUIANENSIS		MYRSINE	3-6'	5' CENTERS	218
		SABAL PALMETTO		CABBAGE PALM	6-8'	10' CENTERS	48
		CHRYSOBALANUS ICACO		COCOPLUM	3-6'	3' CENTERS	218
		QUERCUS VIRGINIANA		LIVE OAK	6-8'	10' CENTERS	48

LEGEND

- WORK ZONE 1A - STANDARD CLEARING & GRUBBING
- WORK ZONE 1B - STANDARD CLEARING & GRUBBING
- WORK AREA 2 - SELECTIVE HERBICIDE TREATMENT
- HAY BALES
- RIP-RAP



PLANTING INDEX							
DESIGNATION	TEXT	BOTANICAL NAME		COMMON NAME	SIZE	SPACING	QUANTITY
	1A	TAXODIUM DISTICHUM		CYPRESS	6-8'	10' CENTERS	315
		ACER RUBRUM		RED MAPLE	6-8'	10' CENTERS	315
		MYRICA CERIFERA		WAX MYRTLE	3-6'	5' CENTERS	1891
		ACROSTICHUM		LEATHER FERN	1-1.5'	3' CENTERS	4481

SEE TYPICAL SECTION 1, SHEET M-4

REVISIONS

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

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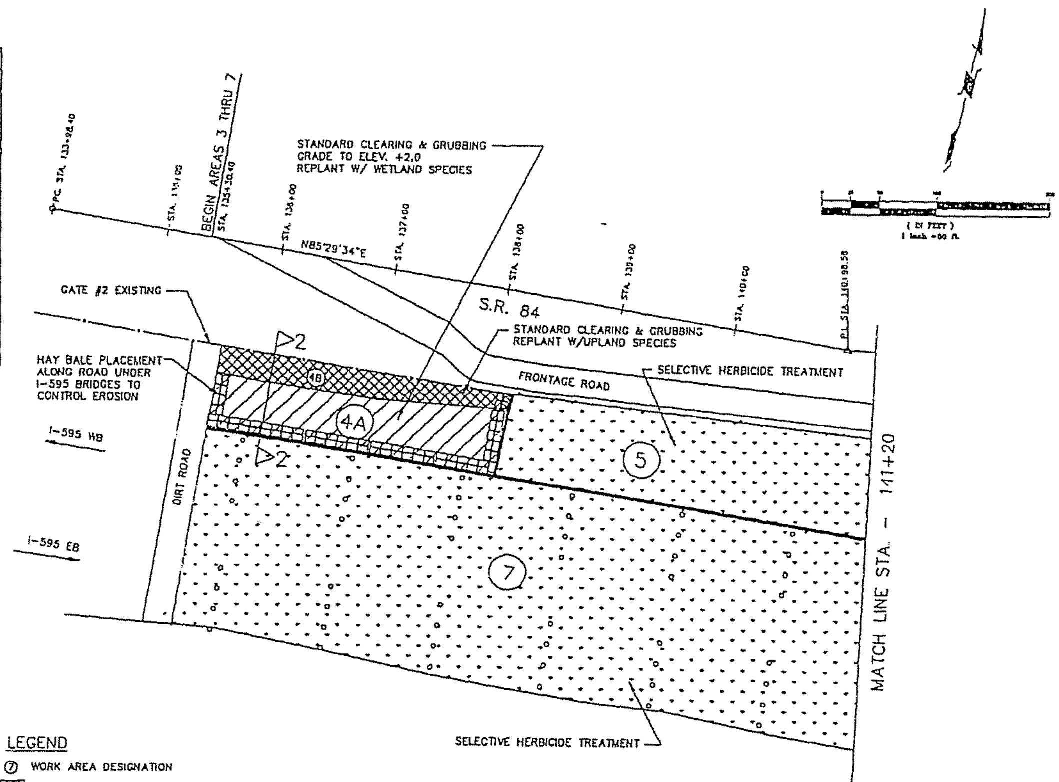
CHECKED BY	W.M.C.	2/93	CHECKED BY	M.C.M.	2/93
SUPERVISED BY: R.B.S.					2/93

FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:

AREAS 1 & 2
MITIGATION PLAN

STATE PROJ. NO.	SHEET NO.
86070-3423	M-10

PLANTING INDEX						
DESIGNATION	ZONE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	QUANTITY
		SOD ON SLOPES				
	4A	ANNONA GLABRA	POND APPLE	4-6'	10' CENTERS	26
		ACER RUBRUM	RED MAPLE	6-8'	10' CENTERS	26
		TAXODIUM DISTICHUM	CYPRESS	3-6'	10' CENTERS	26
		ILEX CASSINE	DAHOON HOLLY	6-8'	10' CENTERS	26
		ACROSTICHUM DANAEIFOLIUM	LEATHER FERN	1-1.5'	3' CENTERS	1053
	4B	QUERCUS LAURIFOLIA	LAUREL OAK	6-8'	10' CENTERS	19
		QUERCUS VIRGINIANA	LIVE OAK	6-8'	10' CENTERS	19
		SABEL PALMETTO	CABBAGE PALM	6-8'	10' CENTERS	19
		MYRICA CERIFERA	WAX MYRTLE	3-6'	5' CENTERS	57
		MYRSINE GUIANENSIS	MYRSINE	3-6'	5' CENTERS	57
		CHRYSOBALANUS ICACO	COCOPLUM	3-6'	3' CENTERS	57



LEGEND

- WORK AREA DESIGNATION
- WORK ZONE 4A STANDARD CLEARING & GRUBBING
- WORK ZONE 4B STANDARD CLEARING & GRUBBING
- WORK AREAS 5 & 7 SELECTIVE HERBICIDE TREATMENT
- HAY BALES
- BRIDGE COLUMNS

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

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SUPERVISED BY: R.B.B.					2/93

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

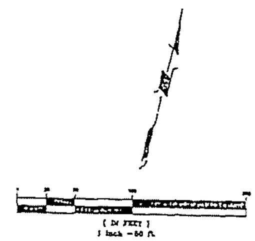
DATE:

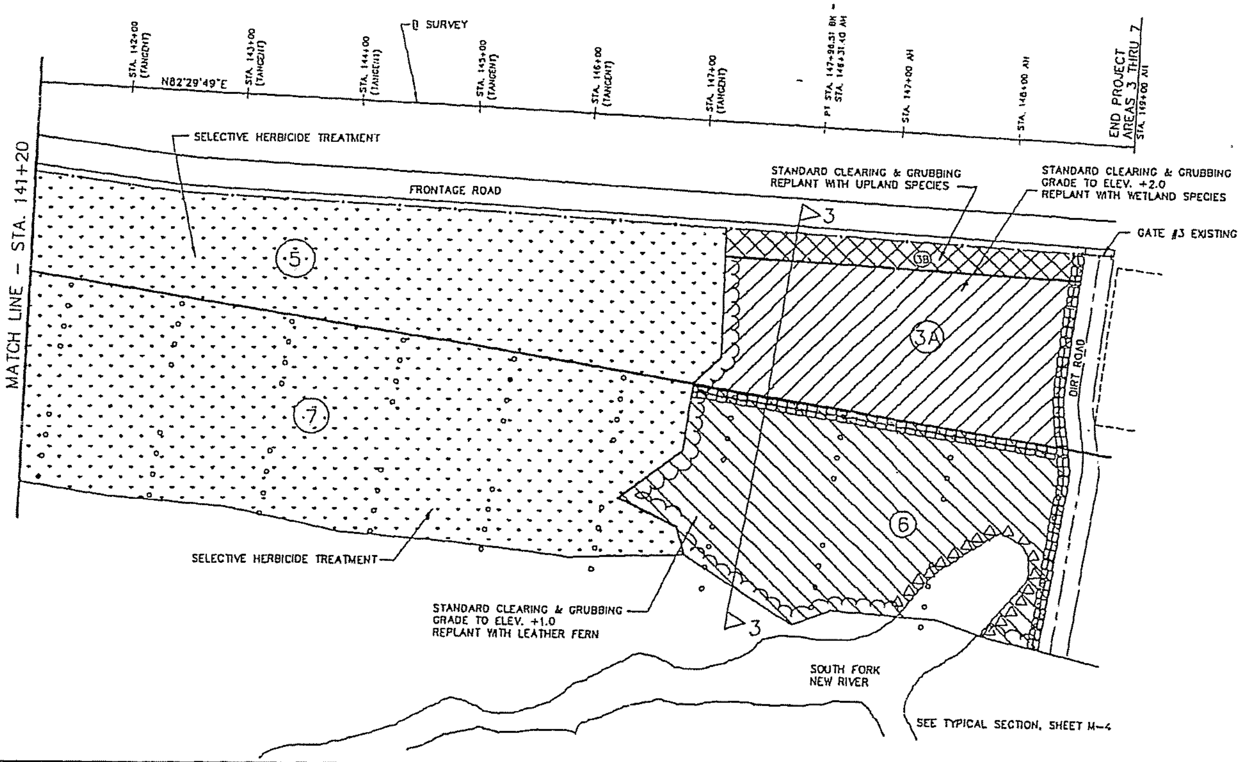
AREAS 3 THRU 7
MITIGATION PLAN

STATE PROJ. NO. 86070-3423 | SHEET NO. M-11

PLANTING INDEX

DESIGNATION	ZONE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	QUANTITY
	3A	ANNONA GLABRA	POND APPLE	4-6'	10' CENTERS	402
		ACROSTICHUM DANAEIFOLIUM	LEATHER FERN	1-1.5'	3' CENTERS	4061
	3B	QUERCUS LAURIFOLIA	LAUREL OAK	6-8'	10' CENTERS	25
		QUERCUS VIRGINIANA	LIVE OAK	6-8'	10' CENTERS	25
		SABEL PALMETTO	CABBAGE PALM	6-8'	10' CENTERS	25
		MYRICA CERIFERA	WAX MYRTLE	3-6'	5' CENTERS	78
		MYRSINE QUIANENGIS	MYRSINE	3-6'	5' CENTERS	78
		CHRYSOBALANUS ICACO	COCOPLUM	3-6'	5' CENTERS	78
	6	ACROSTICHUM DANAEIFOLIUM	LEATHER FERN	1-1.5'	3' CENTERS	6776





LEGEND

- ⑦ AREA DESIGNATION
- WORK ZONE 3A - STANDARD CLEARING & GRUBBING
- WORK ZONE 3B - STANDARD CLEARING & GRUBBING
- WORK AREAS 5 & 7 - SELECTIVE HERBICIDE TREATMENT
- WORK ZONE 6 - STANDARD CLEARING & GRUBBING
- HAY BALES
- △ FLOATING TURBIDITY BARRIER
- STAKED TURBIDITY BARRIER
- ○ BRIDGE SUPPORT

REVISIONS

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

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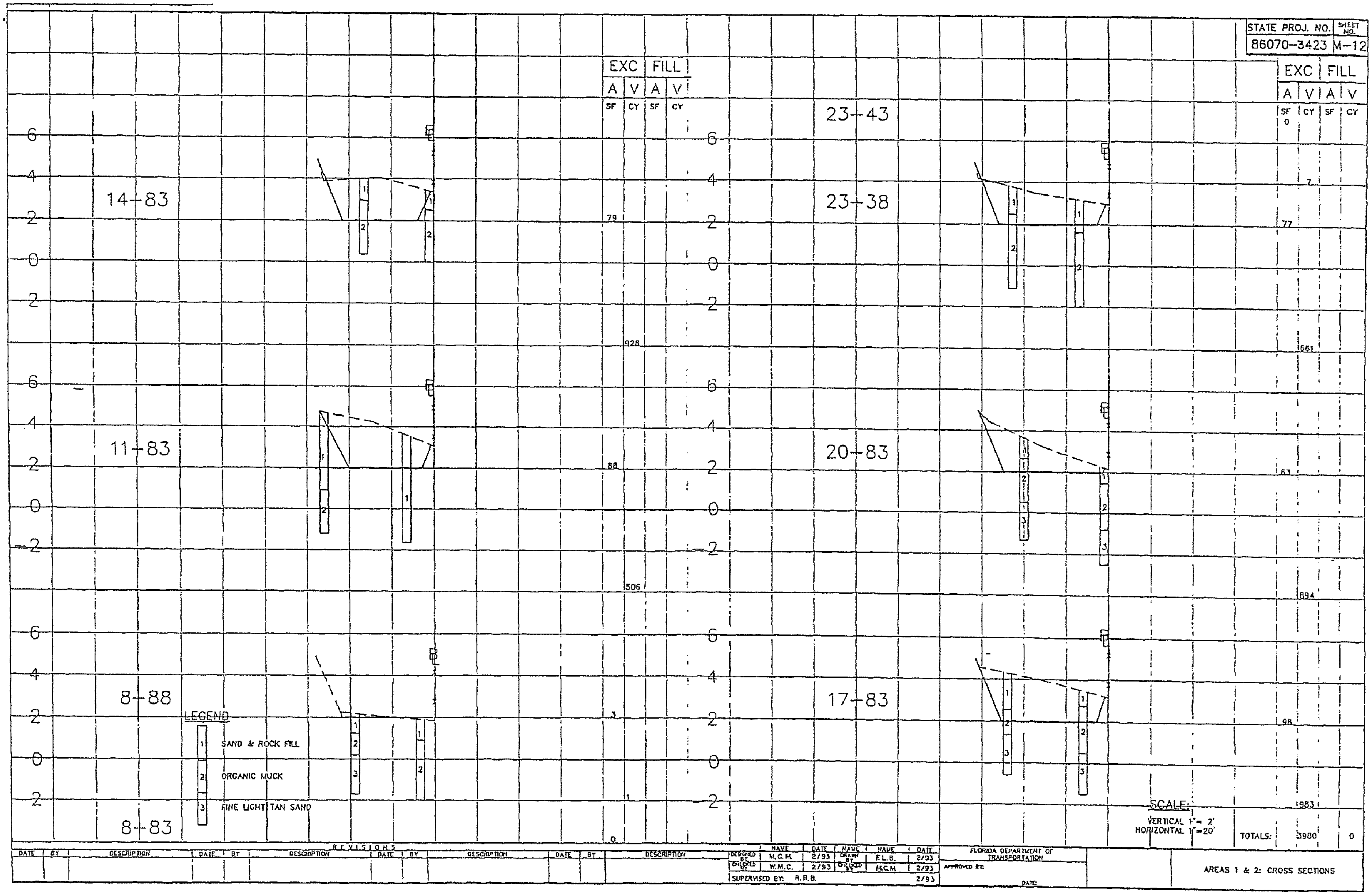
SUPERVISED BY: R.B.9.					2/93

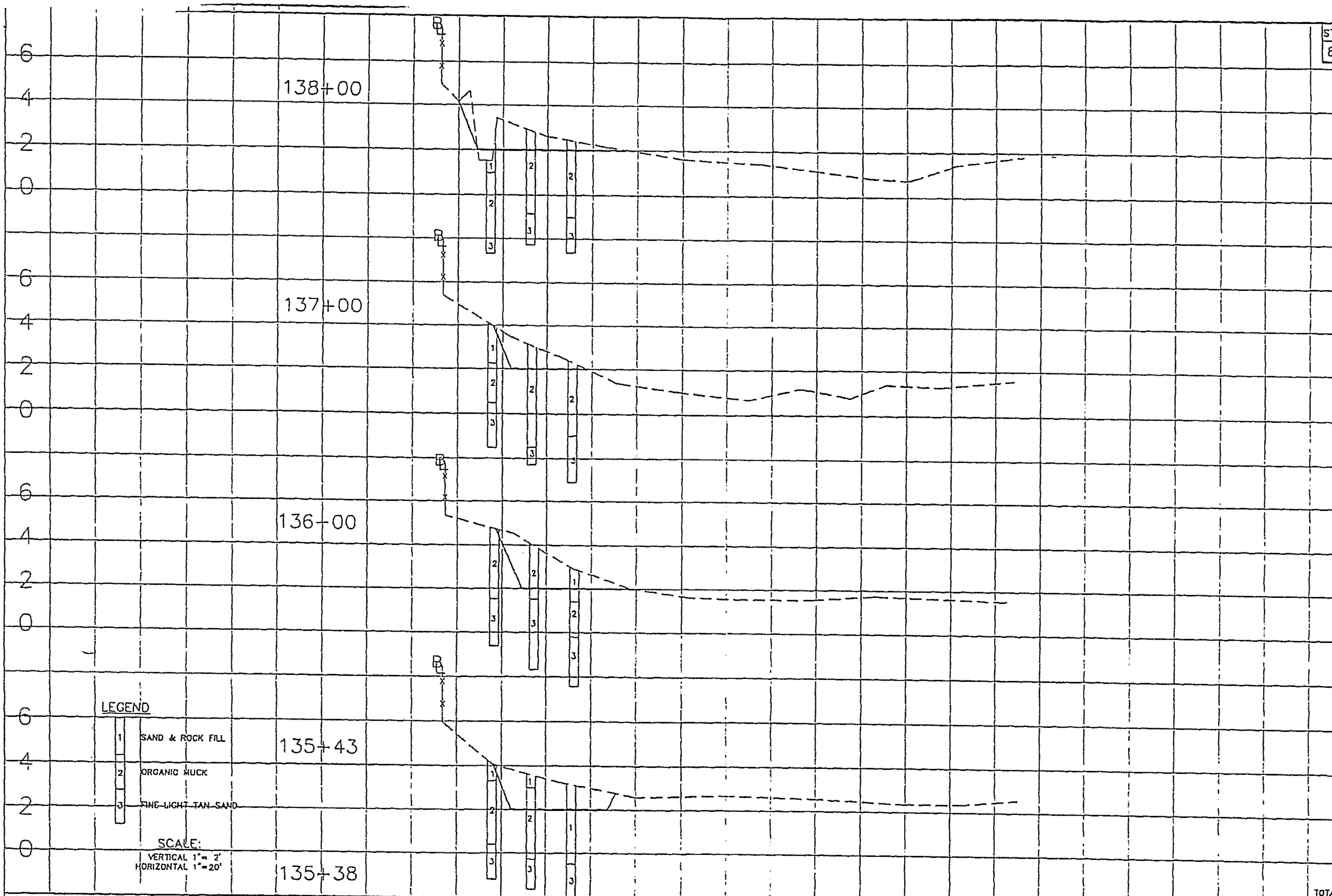
FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

AREA 3 THRU 7 MITIGATION PLAN


STATE PROJ. NO. 86070-3423
SHEET NO. M-12
EXC FILL
A V A V
SF CY SF CY
14-83
11-83
8-88
8-83
23-43
23-38
20-83
17-83
79
928
88
506
3
1
0
7
77
661
63
894
98
1983
TOTALS: 3980 0
LEGEND
1 SAND & ROCK FILL
2 ORGANIC MUCK
3 FINE LIGHT TAN SAND
SCALE:
VERTICAL 1"= 2'
HORIZONTAL 1"=20'
REVISIONS
DATE BY DESCRIPTION
DESIGNED BY M.C.M. 2/93
CHECKED BY W.M.C. 2/93
DRAWN BY F.L.B. 2/93
CHECKED BY M.C.M. 2/93
SUPERVISED BY: R.B.B. 2/93
FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY:
DATE:
AREAS 1 & 2: CROSS SECTIONS



STATE PROJ. NO.	SHEET NO.
86070-3423	M-13

EXC A (SF)	EXC V (CY)	FILL A (SF)	FILL V (CY)
44		3	
	139		
31		0	
	174		
63			
	134		
64			
	6		
0			
TOTALS:	453		0

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

REVISIONS

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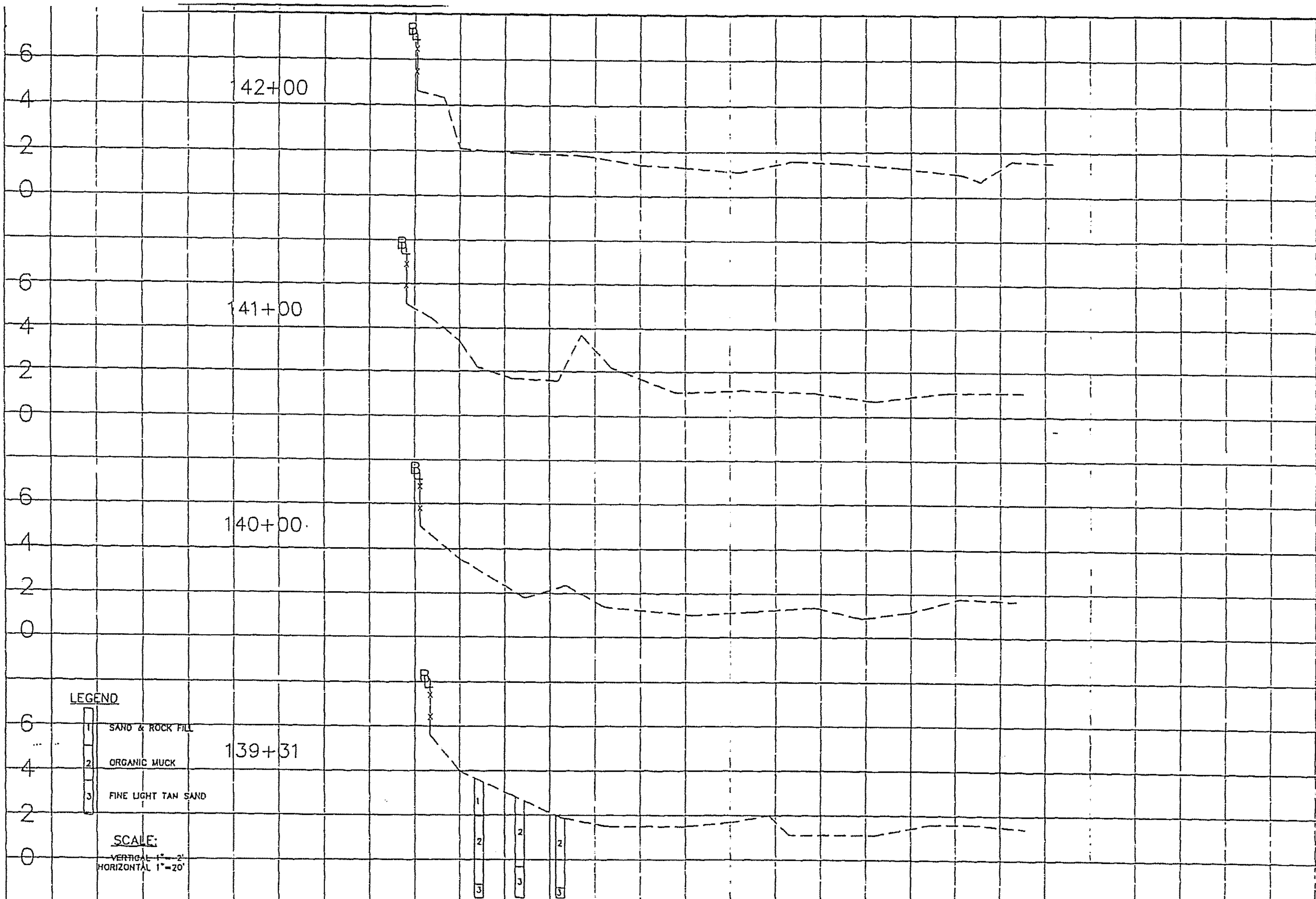
FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

AREAS 3 THRU 7: CROSS SECTIONS



STATE PROJ. NO.	SHEET NO.
86070-3423	M-14

	EXC		FILL	
	A	V	A	V
	SF	CY	SF	CY
	0		0	
		107		
TOTALS:		107		0

REVISIONS

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

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FLORIDA DEPARTMENT OF TRANSPORTATION

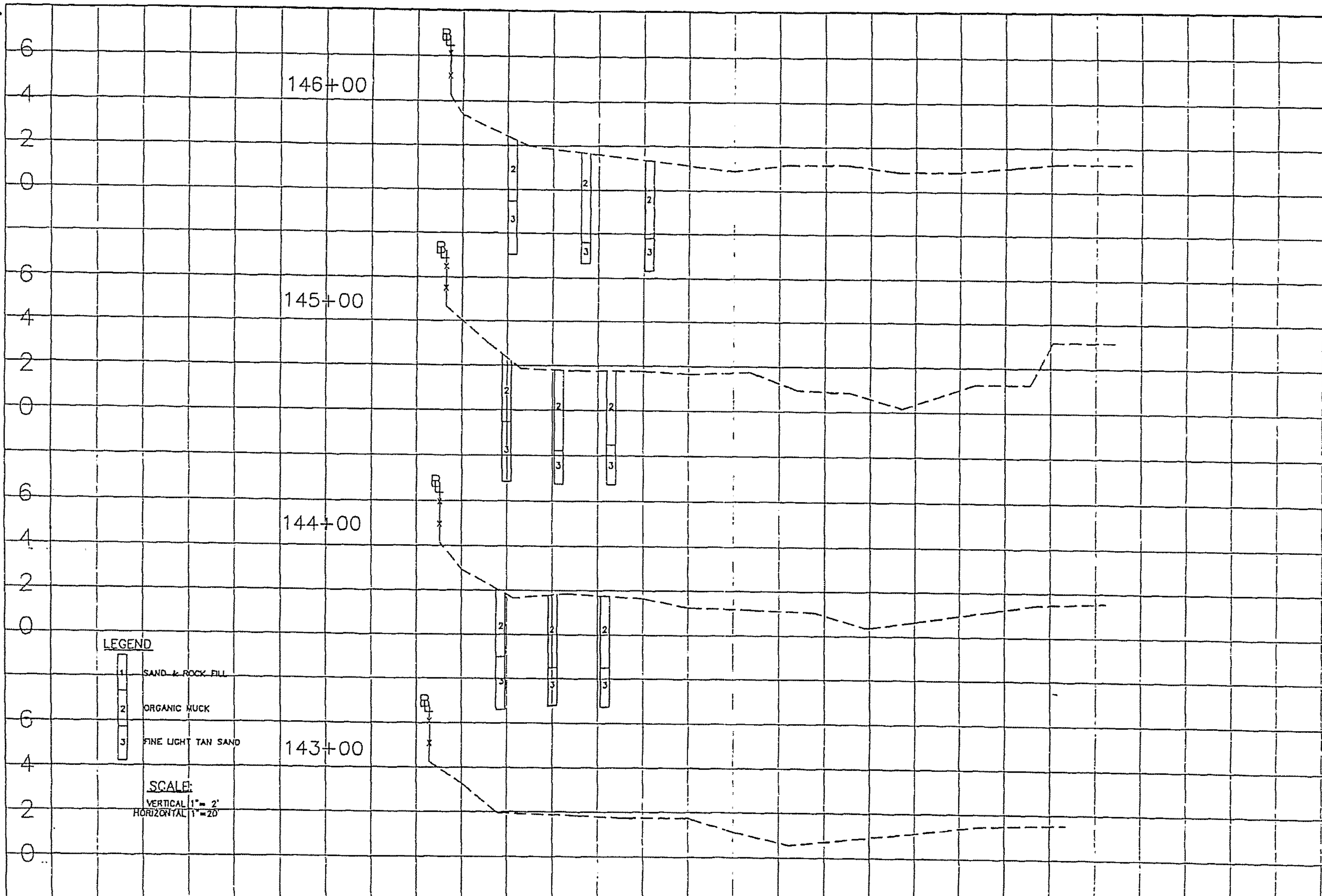
APPROVED BY:

DATE:

AREAS 3 THRU 7: CROSS SECTIONS

STATE PROJ. NO.	SHEET NO.
86070-3423	M-15

EXC		FILL	
A	V	A	V



TOTALS: 0 0

REVISIONS

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

	NAME	DATE		NAME	DATE
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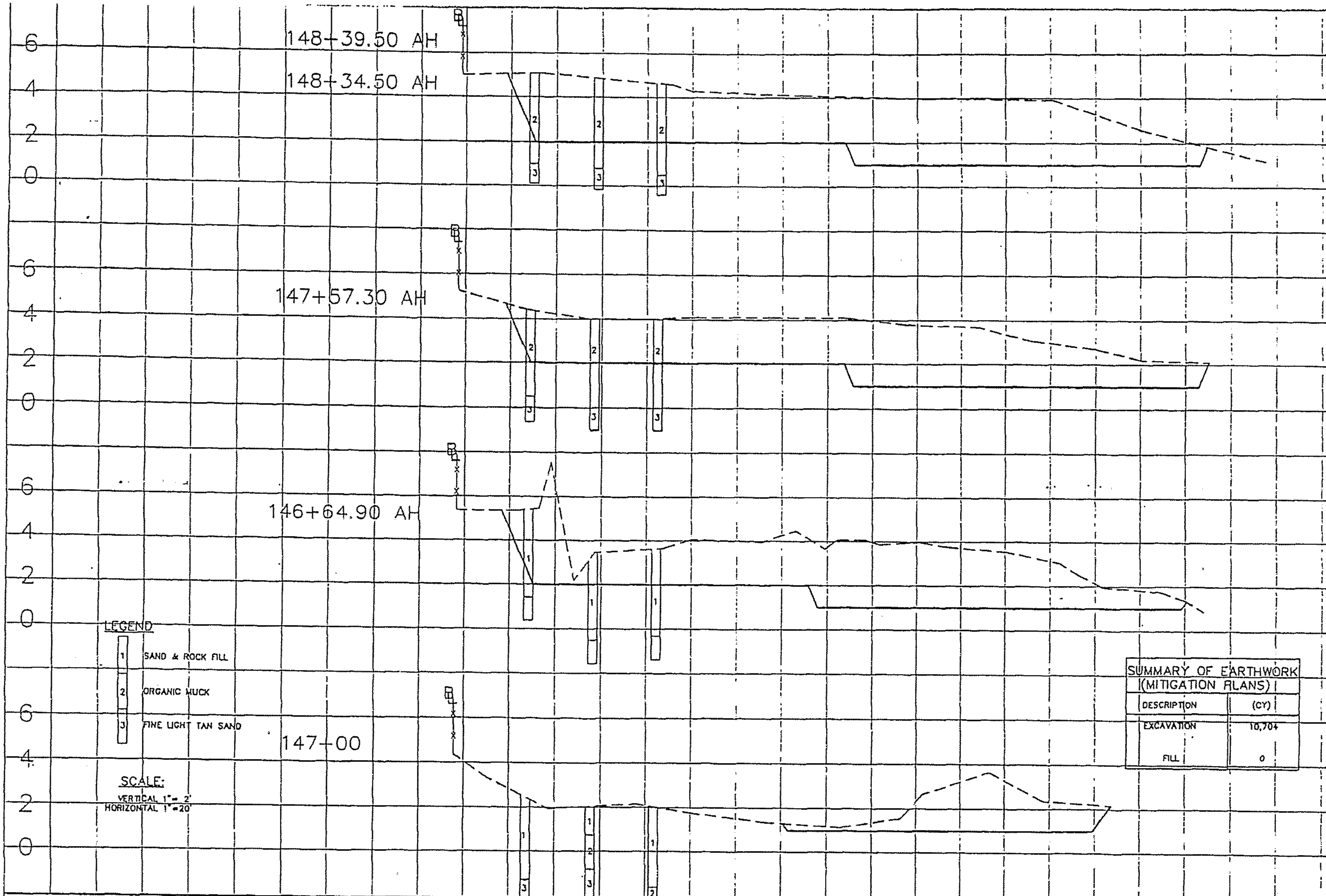
FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

AREAS 3 THRU 7: CROSS SECTIONS

STATE PROJ. NO.	SHEET NO.
86070-3423	M-16



EXC A	EXC V	FILL A	FILL V
0			
	70		
758			
	2003		
643			
	2168		
624			
	1923		
172			
TOTALS:	6164		0

SUMMARY OF EARTHWORK
(MITIGATION PLANS)

DESCRIPTION	(CY)
EXCAVATION	10,704
FILL	0

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

REVISIONS

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FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY:

DATE:

AREAS 3 THRU 7: CROSS SECTIONS

Appendix F

WETLAND RAPID ASSESSMENT PROCEDURE (WRAP) for I-595 Viaduct Limited Access Right of Way

☑ Check Box Existing Condition

☐ Check Box Proposed Condition

Application Number	Project Name	Date	Evaluator
TBD	I-595 Improvements	1/28/2005	Erik Neugaard

Land Use	Wetland Type	Wetland Acreage	FLUCCS Code: Description
I-595 Right of Way (N)	Palustrine	12.4	616 - Inland Slough

Fish & Wildlife Utilization	Overstory & Shrub	Field Hydrology	Ground Cover
2.0	2.0	1.0	N/A

Habitat Support / Buffer

Buffer Type	(Score) X	(% of Area)	Sub Totals
Highway	0	50	0
Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.50

Land Use Category (LU)

Land Use Category (LU)	(Score) X	(% of Area)	Sub Totals
Highway	1	50	0.5
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			2

WQ Input & Treatment (WQ)*

1.75

Pretreatment Category (PT)

Pretreatment Category	(Score) X	(% of Area)	Sub Totals
No Treatment	0	50	0
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.5

* The value of WQ is obtained by adding the TOTAL scores of Land Use Category and Pretreatment Category then dividing by 2.

WRAP SCORE

1.7

Field Notes:

Fish & Wildlife Utilization (WU)

The area no longer supports large mammals (i.e., deer and bobcats) due to isolation and surrounding urbanization. Noise levels from State Road 84 and I-595 make the adjacent Pond Apple Slough Natural Area more desirable for most species. Observation of a rat and opposum and raccoon tracks indicate use by small and medium sized mammals. Wading birds and forage fishes were also observed.

Overstory & Shrub (O/S)

As noted below, Pond Apple Slough has suffered significant hydrological impacts since the North New River Canal was completed and is now tidally-influenced and brackish. Although the Assessment Area was planted with freshwater hydrophytes, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing the Assessment Area. The white mangroves have been removed as exotics and are considered such in this assessment.

Wetland Ground Cover (GC)

Habitat Support/Buffer

The Assessment Area is located immediately south of State Road 84, beneath the I-595 bridges over the South Fork New River, and immediately north of Broward County's Pond Apple Slough Natural Area. Pond Apple Slough Natural Area is undeveloped, greater than 300 feet wide, contains predominantly desirable plant species, and is large enough to support habitat for large reptiles.

Field Hydrology (HYD)

Pond Apple Slough has suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the Assessment Area is now tidally-influenced and brackish. Although the Assessment Area was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the Assessment Area.

WQ Input & Treatment (WQ)

Pond Apple Slough Natural Area is a large open space/natural undeveloped area and there is no treatment for State Road 84 runoff.

WETLAND RAPID ASSESSMENT PROCEDURE (WRAP) for I-595 Viaduct Construction Platforms

☐ Check Box — Existing Condition

☑ Check Box — Proposed Condition

Application Number	Project Name	Date	Evaluator
TBD	I-595 Improvements	1/28/2005	Erik Neugaard

Land Use	Wetland Type	Wetland Acreage	FLUCCS Code: Description
I-595 Right of Way (N)	Palustrine	2.07	616 - Inland Slough

Fish & Wildlife Utilization	Overstory & Shrub	Field Hydrology	Ground Cover
0.0	0.0	0.0	N/A

Habitat Support / Buffer

Buffer Type	(Score) X	(% of Area)	Sub Totals
			0
			0
			0
			0
			0
TOTAL			0.00

Land Use Category (LU)

Land Use Category (LU)	(Score) X	(% of Area)	Sub Totals
			0
			0
			0
			0
			0
TOTAL			0

WQ Input & Treatment (WQ)*

0

Pretreatment Category (PT)

Pretreatment Category	(Score) X	(% of Area)	Sub Totals
			0
			0
			0
			0
			0
TOTAL			0

* The value of WQ is obtained by adding the TOTAL scores of Land Use Category and Pretreatment Category then dividing by 2.

WRAP SCORE

0

Field Notes:

Fish & Wildlife Utilization (WU)

Overstory & Shrub (O/S)

Wetland Ground Cover (GC)

Habitat Support/Buffer

Field Hydrology (HYD)

WQ Input & Treatment (WQ)

WETLAND RAPID ASSESSMENT PROCEDURE (WRAP) for I-595 Viaduct Shading Impacts

☐ Check Box Existing Condition

☑ Check Box Proposed Condition

Application Number	Project Name	Date	Evaluator
TBD	I-595 Improvements	1/28/2005	Erik Neugaard

Land Use	Wetland Type	Wetland Acreage	FLUCCS Code: Description
I-595 Right of Way (N)	Palustrine	4.31	616 - Inland Slough

Fish & Wildlife Utilization	Overstory & Shrub	Field Hydrology	Ground Cover
1.0	0.0	1.0	N/A

Habitat Support / Buffer

Buffer Type	(Score) X	(% of Area)	Sub Totals
Highway	0	50	0
Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.50

Land Use Category (LU)

Land Use Category (LU)	(Score) X	(% of Area)	Sub Totals
Highway	1	50	0.5
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			2

WQ Input & Treatment (WQ)*

1.75

Pretreatment Category (PT)

Pretreatment Category	(Score) X	(% of Area)	Sub Totals
No Treatment	0	50	0
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.5

* The value of WQ is obtained by adding the TOTAL scores of Land Use Category and Pretreatment Category then dividing by 2.

WRAP SCORE

1.1

Field Notes:

Fish & Wildlife Utilization (WU)

The area no longer supports large mammals (i.e., deer and bobcats) due to isolation and surrounding urbanization. Noise levels from State Road 84 and I-595 make the adjacent Pond Apple Slough Natural Area more desirable for most species. Observation of a rat and opposum and raccoon tracks indicate use by small and medium sized mammals. Wading birds and forage fishes were also observed.

Overstory & Shrub (O/S)

Most of the vegetation will be lost.

Wetland Ground Cover (GC)

Habitat Support/Buffer

The Assessment Area is located immediately south of State Road 84, beneath the I-595 bridges over the South Fork New River, and immediately north of Broward County's Pond Apple Slough Natural Area. Pond Apple Slough Natural Area is undeveloped, greater than 300 feet wide, contains predominantly desirable plant species, and is large enough to support habitat for large reptiles.

Field Hydrology (HYD)

Pond Apple Slough has suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the Assessment Area is now tidally-influenced and brackish. Although the Assessment Area was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the Assessment Area.

WQ Input & Treatment (WQ)

Pond Apple Slough Natural Area is a large open space/natural undeveloped area and there is no treatment for State Road 84 runoff.

Appendix G

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

☑ Check Box — Existing Condition

(E-WRAP) for I-595 Viaduct Limited Access Right of Way

☐ Check Box — Proposed Condition

Application Number	Project Name	Date	Evaluator
TBD	I-595 Improvements	1/28/2005	Erik Neugaard
Land Use	**Wetland Type**	**Wetland Acreage**	**FLUCCS Code: Description**
I-595 Right of Way (N)	Palustrine	12.4	616 - Inland Slough
Fish & Wildlife Utilization	**Overstory & Shrub**	**Field Hydrology**	**Ground Cover**
2.0	2.0	1.0	N/A

Habitat Support / Buffer

Buffer Type	(Score) X	(% of Area)	Sub Totals
Highway	0	50	0
Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.50

Land Use Category (LU)

Land Use Category (LU)	(Score) X	(% of Area)	Sub Totals
Highway	1	50	0.5
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			2

WQ Input & Treatment (WQ)*: 1.75

Pretreatment Category (PT)

Pretreatment Category	(Score) X	(% of Area)	Sub Totals
No Treatment	0	50	0
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.5

* The value of WQ is obtained by adding the TOTAL scores of Land Use Category and Pretreatment Category then dividing by 2.

WRAP SCORE

1.7

Field Notes:

Fish & Wildlife Utilization (WU)

The area no longer supports large mammals (i.e., deer and bobcats) due to isolation and surrounding urbanization. Noise levels from State Road 84 and I-595 make the adjacent Pond Apple Slough Natural Area more desirable for most species. Observation of a rat and opposum and raccoon tracks indicate use by small and medium sized mammals. Wading birds and forage fishes were also observed.

Overstory & Shrub (O/S)

As noted below, Pond Apple Slough has suffered significant hydrological impacts since the North New River Canal was completed and is now tidally-influenced and brackish. Although the Assessment Area was planted with freshwater hydrophytes, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing the Assessment Area. The white mangroves have been removed as exotics and are considered such in this assessment.

Wetland Ground Cover (GC)

Habitat Support/Buffer

The Assessment Area is located immediately south of State Road 84, beneath the I-595 bridges over the South Fork New River, and immediately north of Broward County's Pond Apple Slough Natural Area. Pond Apple Slough Natural Area is undeveloped, greater than 300 feet wide, contains predominantly desirable plant species, and is large enough to support habitat for large reptiles.

Field Hydrology (HYD)

Pond Apple Slough has suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the Assessment Area is now tidally-influenced and brackish. Although the Assessment Area was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the Assessment Area.

WQ Input & Treatment (WQ)

Pond Apple Slough Natural Area is a large open space/natural undeveloped area and there is no treatment for State Road 84 runoff.

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

(E-WRAP) for I-595 Viaduct Shading Impacts

☐ Check Box — Existing Condition

☑ Check Box — Proposed Condition

Application Number	Project Name	Date	Evaluator
TBD	I-595 Improvements	1/28/2005	Erik Neugaard

Land Use	Wetland Type	Wetland Acreage	FLUCCS Code: Description
I-595 Right of Way (N)	Palustrine	4.31	616 - Inland Slough

Fish & Wildlife Utilization	Overstory & Shrub	Field Hydrology	Ground Cover
1.0	0.0	1.0	N/A

Habitat Support / Buffer

Buffer Type	(Score) X	(% of Area)	Sub Totals
Highway	0	50	0
Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.50

Land Use Category (LU)

Land Use Category (LU)	(Score) X	(% of Area)	Sub Totals
Highway	1	50	0.5
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			2

WQ Input & Treatment (WQ)*

1.75

Pretreatment Category (PT)

Pretreatment Category	(Score) X	(% of Area)	Sub Totals
No Treatment	0	50	0
Undeveloped Preserve	3	50	1.5
			0
			0
			0
TOTAL			1.5

* The value of WQ is obtained by adding the TOTAL scores of Land Use Category and Pretreatment Category then dividing by 2.

WRAP SCORE

1.1

Field Notes:

Fish & Wildlife Utilization (WU)

The area no longer supports large mammals (i.e., deer and bobcats) due to isolation and surrounding urbanization. Noise levels from State Road 84 and I-595 make the adjacent Pond Apple Slough Natural Area more desirable for most species. Observation of a rat and opposum and raccoon tracks indicate use by small and medium sized mammals. Wading birds and forage fishes were also observed.

Overstory & Shrub (O/S)

Most of the vegetation will be lost.

Wetland Ground Cover (GC)

Habitat Support/Buffer

The Assessment Area is located immediately south of State Road 84, beneath the I-595 bridges over the South Fork New River, and immediately north of Broward County's Pond Apple Slough Natural Area. Pond Apple Slough Natural Area is undeveloped, greater than 300 feet wide, contains predominantly desirable plant species, and is large enough to support habitat for large reptiles.

Field Hydrology (HYD)

Pond Apple Slough has suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the Assessment Area is now tidally-influenced and brackish. Although the Assessment Area was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the Assessment Area.

WQ Input & Treatment (WQ)

Pond Apple Slough Natural Area is a large open space/natural undeveloped area and there is no treatment for State Road 84 runoff.

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE (E-WRAP) for I-595 Viaduct Construction Platforms

☐ Check Box — Existing Condition

☑ Check Box — Proposed Condition

Application Number	Project Name	Date	Evaluator
TBD	I-595 Improvements	1/28/2005	Erik Neugaard

Land Use	Wetland Type	Wetland Acreage	FLUCCS Code: Description
I-595 Right of Way (N)	Palustrine	2.07	616 - Inland Slough

Fish & Wildlife Utilization	Overstory & Shrub	Field Hydrology	Ground Cover
0.0	0.0	0.0	N/A

Habitat Support / Buffer

Buffer Type	(Score) X	(% of Area)	Sub Totals
			0
			0
			0
			0
			0
TOTAL			0.00

Land Use Category (LU)

Land Use Category (LU)	(Score) X	(% of Area)	Sub Totals
			0
			0
			0
			0
			0
TOTAL			0

WQ Input & Treatment (WQ)*

0

Pretreatment Category (PT)

Pretreatment Category	(Score) X	(% of Area)	Sub Totals
			0
			0
			0
			0
			0
TOTAL			0

* The value of WQ is obtained by adding the TOTAL scores of Land Use Category and Pretreatment Category then dividing by 2.

WRAP SCORE

0

Field Notes:

Fish & Wildlife Utilization (WU)

Overstory & Shrub (O/S)

Wetland Ground Cover (GC)

Habitat Support/Buffer

Field Hydrology (HYD)

WQ Input & Treatment (WQ)

Appendix H

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	**To be determined**	**I-595 Viaduct North Lanes (Shading)**

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	**Inland Slough**	**Impact**	**1.77** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i e OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	**South Fork New River (Class III)**	**None**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located beneath and north of the existing I-595 viaduct over South Fork New River. The AA is the width of the bridge widening multiplied by the length of the wetlands; however, it is offset 12.5 feet south to compensate for the shift in insolation. It is anicipated that vegetation will persist approximately 12.5 feet under the widened bridge as it does now.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The AA was previously used as a mitigation site for the Cypress Creek Park and Ride Lot @ I-95 (see attached plans).**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring also assumes total impact of all vegetation/wetland habitat in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
I-595 Improvements	**To be determined**	**I-595 Viaduct North Lanes (Shading)**
Impact or Mitigation: **Impact**	Assessment Conducted by: **Erik Neugaard**	Assessment Date: **01/28/05**

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Indicator	Current	With Impact
.500(6)(a) Location and Landscape Support	a Quality and quantity of **habitat support** outside of AA.	7	4
	b **Invasive plant species**.	7	7
	c **Wildlife access** to and from AA (proximity and barriers)	7	7
	d **Downstream benefits** provided to fish and wildlife	7 X	4
	e Adverse impacts to wildlife in AA from **land uses** outside of AA	4 X	0
	f **Hydrologic connectivity** (impediments and flow restrictions)	7	4
	g **Dependency** of downstream habitats on quantity or quality of discharges	7	4
	h. Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
Current: 7 / **With Impact**: 4	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise Pond Apple Slough is a freshwater system; white mangroves are considered exotic The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits Increase in traffic noise will also impact wildlife in AA Construction roads will mpact hydrologic connectivity	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(b) Water Environment (n/a for uplands)	a Appropriateness of **water levels and flows**.	4	4
	b. Reliability of **water level indicators**.	7	7
	c. Appropriateness of **soil moisture**.	10	10
	d. **Flow rates**/points of discharge.	4	4
	e. **Fire frequency**/severity.	10	10
	f. **Type of vegetation**.	7 X	0
	g. **Hydrologic stress** on vegetation.	4	4
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j **Water quality of standing water by observation** (I e , discoloration, turbidity).	7	7
	k **Water quality data** for the type of community	7	7
	l **Water depth, wave energy, and currents**.	4	4
Current: 6 / **With Impact**: 5	Notes: Water levels and flows are inapropriate for a freshwater slough. Water level indicators may not be reliable in planted vegetation Soil moisture and fire frequency are appropriate and will not be impacted. Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(c) Community Structure — X Vegetation; ___ Benthic; ___ Both	I Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution.	7	0
	V. Snags, dens, cavity, etc	4	0
	VI. Plants' condition.	4	0
	VII. Land management practices.	4	0
	VIII. Topographic features (refugia, channels, hummocks)	4	0
	IX. Submerged vegetation (only score if present)	N/A	N/A
	X. Upland assessment area	N/A	N/A
Current: 5 / **With Impact**: 0	Notes: Overall, community structure will be completely lost	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	**With Impact**
0.60	0.30

Impact Acres =	1.77

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.531

Impact Delta (ID)	
Current - w/Impact	0.30

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL) If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	**To be determined**	**I-595 Viaduct Median Lanes (Shading)**

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	**Inland Slough**	**Impact**	**1.70** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i e OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	**South Fork New River (Class III)**	**None**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located beneath the existing I-595 viaduct over South Fork New River. The AA is the width of the existing median plus 12.5 feet on each side of the median (to compensate for the loss vegetation that persists under the bridges) minus 20 feet for the construction platform AA (a separate assessment) multiplied by the length of the wetlands.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The AA was previously used as a mitigation site for the Cypress Creek Park and Ride Lot @ I-95 (see attached plans).**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring also assumes total impact of all vegetation/wetland habitat in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
I-595 Improvements	**To be determined**	**I-595 Viaduct Median Lanes (Shading)**
Impact or Mitigation: **Impact**	Assessment Conducted by: **Erik Neugaard**	Assessment Date: **01/28/05**

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Indicator	Current	With Impact
.500(6)(a) Location and Landscape Support	a. Quality and quantity **of habitat support** outside of AA	7	4
	b. **Invasive plant species.**	7	7
	c. **Wildlife access** to and from AA (proximity and barriers)	7	7
	d. **Downstream benefits** provided to fish and wildlife	7 X	4
	e. Adverse impacts to wildlife in AA from **land uses** outside of AA	4 X	0
	f. **Hydrologic connectivity** (impediments and flow restrictions)	7	4
	g. **Dependency** of downstream habitats on quantity or quality of discharges	7	4
	h. Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
Current: 7 / With Impact: 4	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise. Pond Apple Slough is a freshwater system; white mangroves are considered exotic. The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits. Increase in traffic noise will also impact wildlife in AA. Construction roads will mpact hydrologic connectivity.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(b) Water Environment (n/a for uplands)	a. Appropriateness of **water levels and flows**	4	4
	b. Reliability of **water level indicators.**	7	7
	c. Appropriateness of **soil moisture.**	10	10
	d. **Flow rates**/points of discharge.	4	4
	e. **Fire frequency**/severity.	10	10
	f. **Type of vegetation.**	7 X	0
	g. **Hydrologic stress** on vegetation.	4	4
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j. **Water quality of standing water by observation** (i.e., discoloration, turbidity).	7	7
	k. **Water quality data** for the type of community	7	7
	l. **Water depth, wave energy, and currents**	4	4
Current: 6 / With Impact: 5	Notes: Water levels and flows are inapropriate for a freshwater slough. Water level indicators may not be reliable in planted vegetation. Soil moisture and fire frequency are appropriate and will not be impacted. Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(c) Community Structure — X Vegetation; ____ Benthic; ____ Both	I. Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution.	7	0
	V. Snags, dens, cavity, etc.	4	0
	VI. Plants' condition.	4	0
	VII. Land management practices.	4	0
	VIII. Topographic features (refugia, channels, hummocks).	4	0
	IX. Submerged vegetation (only score if present).	N/A	N/A
	X. Upland assessment area	N/A	N/A
Current: 5 / With Impact: 0	Notes: Overall, community structure will be completely lost.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	**With Impact**
0.60	0.30

Impact Acres =	1.70

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.510

Impact Delta (ID)	
Current - w/Impact	0.30

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT

Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	**To be determined**	**I-595 Viaduct South Lanes (Shading) Inside Cypress Creek Mitigation Area**

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	**Inland Slough**	**Impact**	**0.45** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i e OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	**South Fork New River (Class III)**	**None**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located beneath the existing I-595 viaduct over South Fork New River for a width of 12.5 feet north of the southern edge of the viaduct multiplied by the length of the wetlands. The vegetation currently persists approximately 12.5 feet north of the southern edge of the viaduct (southern limit of the Cypress Creek Mitigation Area).

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The AA was previously used as a mitigation site for the Cypress Creek Park and Ride Lot @ I-95 (see attached plans).**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring also assumes total impact of all vegetation/wetland habitat in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
I-595 Improvements	**To be determined**	**I-595 Viaduct South Lanes (Shading) Inside Cypress Creek Mitigation Area**
Impact or Mitigation:	Assessment Conducted by:	Assessment Date:
Impact	**Erik Neugaard**	**01/28/05**

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Indicator	Current	With Impact
500(6)(a) Location and Landscape Support	a Quality and quantity of **habitat support** outside of AA	7	4
	b **Invasive plant species.**	7	7
	c **Wildlife access** to and from AA (proximity and barriers)	7	7
	d **Downstream benefits** provided to fish and wildlife	7 X	4
	e. Adverse impacts to wildlife in AA from **land uses** outside of AA	4 X	0
	f **Hydrologic connectivity** (impediments and flow restrictions)	7	4
	g **Dependency** of downstream habitats on quantity or quality of discharges	7	4
	h Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
Current: 7 / With Impact: 4	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise Pond Apple Slough is a freshwater system; white mangroves are considered exotic The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits Increase in traffic noise will also impact wildlife in AA. Construction roads will mpact hydrologic connectivity	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(b) Water Environment (n/a for uplands)	a Appropriateness of **water levels and flows**	4	4
	b. Reliability of **water level indicators.**	7	7
	c. Appropriateness of **soil moisture.**	10	10
	d. **Flow rates**/points of discharge.	4	4
	e. **Fire frequency**/severity.	10	10
	f. **Type of vegetation.**	7 X	0
	g **Hydrologic stress** on vegetation.	4	4
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j. **Water quality of standing water by observation** (I.e., discoloration, turbidity)	7	7
	k **Water quality data** for the type of community	7	7
	l **Water depth, wave energy, and currents.**	4	4
Current: 6 / With Impact: 5	Notes: Water levels and flows are inapropriate for a freshwater slough Water level indicators may not be reliable in planted vegetation Soil moisture and fire frequency are appropriate and will not be impacted Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(c) Community Structure — X Vegetation; ___ Benthic; ___ Both	I Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution.	7	0
	V. Snags, dens, cavity, etc.	4	0
	VI. Plants' condition.	4	0
	VII Land management practices.	4	0
	VIII. Topographic features (refugia, channels, hummocks)	4	0
	IX. Submerged vegetation (only score if present)	N/A	N/A
	X. Upland assessment area	N/A	N/A
Current: 5 / With Impact: 0	Notes: Overall, community structure will be completely lost	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	**With Impact**
0.60	0.30

Impact Acres =	0.45

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.135

Impact Delta (ID)	
Current - w/Impact	0.30

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	**To be determined**	**I-595 Viaduct South Lanes (Shading) Outside Cypress Creek Mitigation Area**

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	**Inland Slough**	**Impact**	**0.39** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	**South Fork New River (Class III)**	**None**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located immediately south of the southern edge of the existing I-595 viaduct over South Fork New River for a width of 11.0 feet multiplied by the length of the wetlands. The viaduct will be widened approximately 23.5 feet south. It is anticipated that the vegetation will persists approximately 12.5 feet north of the southern edge of the new viaduct as it does now.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The wetlands in this AA were previously impacted but restored circa 1990 per FDEP Consent Order OGC #90-0712**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes in response to per FDEP Consent Order OGC #90-0712, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring assumes total impact of all wetland function in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name: **I-595 Improvements**	Application Number: **To be determined**	Assessment Area Name or Number: **I-595 Viaduct South Lanes (Shading) Outside Cypress Creek Mitigation Area**
Impact or Mitigation: **Impact**	Assessment Conducted by: **Erik Neugaard**	Assessment Date: **01/28/05**

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Indicator	Current	With Impact
500(6)(a) Location and Landscape Support	a. Quality and quantity of **habitat support** outside of AA	7	4
	b. **Invasive plant species.**	7	7
	c. **Wildlife access** to and from AA (proximity and barriers)	7	7
	d. **Downstream benefits** provided to fish and wildlife.	7 X	4
	e. Adverse impacts to wildlife in AA from **land uses** outside of AA	4 X	0
	f. **Hydrologic connectivity** (impediments and flow restrictions).	7	4
	g. **Dependency** of downstream habitats on quantity or quality of discharges.	7	4
	h. Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
Current: 7 / **With Impact:** 4	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise. Pond Apple Slough is a freshwater system; white mangroves are considered exotic. The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits. Increase in traffic noise will also impact wildlife in AA. Construction roads will mpact hydrologic connectivity.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(b) Water Environment (n/a for uplands)	a. Appropriateness of **water levels and flows**	4	4
	b. Reliability of **water level indicators.**	7	7
	c. Appropriateness of **soil moisture.**	10	10
	d. **Flow rates**/points of discharge.	4	4
	e. **Fire frequency**/severity.	10	10
	f. **Type of vegetation.**	7 X	0
	g. **Hydrologic stress** on vegetation.	4	4
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j. **Water quality of standing water by observation** (I.e., discoloration, turbidity).	7	7
	k. **Water quality data** for the type of community.	7	7
	l. **Water depth, wave energy, and currents**	4	4
Current: 6 / **With Impact:** 5	Notes: Water levels and flows are inapropriate for a freshwater slough. Water level indicators may not be reliable in planted vegetation. Soil moisture and fire frequency are appropriate and will not be impacted. Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(c) Community Structure — X Vegetation; ___ Benthic; ___ Both	I. Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution.	7	0
	V. Snags, dens, cavity, etc.	4	0
	VI. Plants' condition.	4	0
	VII. Land management practices.	4	0
	VIII. Topographic features (refugia, channels, hummocks)	4	0
	IX. Submerged vegetation (only score if present)	N/A	N/A
	X. Upland assessment area	N/A	N/A
Current: 5 / **With Impact:** 0	Notes: Overall, community structure will be completely lost.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	**With Impact**
0.60	0.30

Impact Acres =	0.39

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.117

Impact Delta (ID)	
Current - w/Impact	0.30

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the miligaiton bank.

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	To be determined	I-595 Viaduct North Construction Platform

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	Inland Slough	Impact	0.66 Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i e OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	South Fork New River (Class III)	None

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located north of the existing I-595 viaduct over South Fork New River. The AA is 20 feet wide multiplied by the length of the wetlands.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The AA was previously used as a mitigation site for the Cypress Creek Park and Ride Lot @ I-95 (see attached plans).**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring also assumes total impact of all wetland function in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
I-595 Improvements	To be determined	I-595 Viaduct North Construction Platform
Impact or Mitigation: Impact	Assessment Conducted by: Erik Neugaard	Assessment Date: 01/28/05

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Indicator	Current	With Impact
.500(6)(a) Location and Landscape Support	a. Quality and quantity of **habitat support** outside of AA	7	0
	b. **Invasive plant species.**	7	0
	c. **Wildlife access** to and from AA (proximity and barriers)	7	0
	d. **Downstream benefits** provided to fish and wildlife.	7 X	0
	e. Adverse impacts to wildlife in AA from **land uses** outside of AA	4 X	0
	f. **Hydrologic connectivity** (impediments and flow restrictions)	7	0
Current: 7 / With Impact: 0	g. **Dependency** of downstream habitats on quantity or quality of discharges	7	0
	h. Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise Pond Apple Slough is a freshwater system; white mangroves are considered exotic The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits Increase in traffic noise will also impact wildlife in AA Construction roads will mpact hydrologic connectivity	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(b) Water Environment (n/a for uplands)	a. Appropriateness of **water levels and flows**	4	0
	b. Reliability of **water level indicators.**	7	0
	c. Appropriateness of **soil moisture.**	10	0
	d. **Flow rates**/points of discharge.	4	0
	e. **Fire frequency**/severity.	10	0
	f. **Type of vegetation.**	7 X	0
	g. **Hydrologic stress** on vegetation.	4	0
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j **Water quality of standing water by observation** (I e , discoloration, turbidity)	7	0
Current: 6 / With Impact: 0	k. **Water quality data** for the type of community.	7	0
	l. **Water depth, wave energy, and currents**	4	0
	Notes: Water levels and flows are inapropriate for a freshwater slough Water level indicators may not be reliable in planted vegetation Soil moisture and fire frequency are appropriate and will not be impacted Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(c) Community Structure X Vegetation ___ Benthic ___ Both	I Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution.	7	0
	V. Snags, dens, cavity, etc	4	0
	VI. Plants' condition.	4	0
	VII. Land management practices.	4	0
	VIII. Topographic features (refugia, channels, hummocks).	4	0
	IX. Submerged vegetation (only score if present)	N/A	N/A
Current: 5 / With Impact: 0	X. Upland assessment area	N/A	N/A
	Notes: Overall, community structure will be completely lost.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	With Impact
0.60	0.00

Impact Acres =	0 66

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.396

Impact Delta (ID)	
Current - w/Impact	0 60

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	**To be determined**	**I-595 Viaduct Median Construction Platform**

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	**Inland Slough**	**Impact**	**0.70** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i e OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	**South Fork New River (Class III)**	**None**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located beneath the existing I-595 viaduct over South Fork New River. The AA is 20 feet wide multiplied by the length of the wetlands.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The AA was previously used as a mitigation site for the Cypress Creek Park and Ride Lot @ I-95 (see attached plans).**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes for the Cypress Creek Park and Ride Lot @ I-95 mitigation project, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring also assumes total impact of all wetland function in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
I-595 Improvements	To be determined	I-595 Viaduct Median Construction Platform
Impact or Mitigation:	Assessment Conducted by:	Assessment Date:
Impact	Erik Neugaard	01/28/05

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Criterion	Current	With Impact
.500(6)(a) Location and Landscape Support	a. Quality and quantity of **habitat support** outside of AA	7	0
	b. **Invasive plant species.**	7	0
	c. **Wildlife access** to and from AA (proximity and barriers)	7 .	0
	d. **Downstream benefits** provided to fish and wildlife	7 X	0
	e. Adverse impacts to wildlife in AA from **land uses** outside of AA	4 X	0
	f. **Hydrologic connectivity** (impediments and flow restrictions)	7	0
	g. **Dependency** of downstream habitats on quantity or quality of discharges	7	0
	h. Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
Current: 7 / With Impact: 0	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise. Pond Apple Slough is a freshwater system; white mangroves are considered exotic. The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits. Increase in traffic noise will also impact wildlife in AA. Construction roads will mpact hydrologic connectivity.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(b) Water Environment (n/a for uplands)	a. Appropriateness of **water levels and flows**	4	0
	b. Reliability of **water level indicators.**	7	0
	c. Appropriateness of **soil moisture.**	10	0
	d. **Flow rates**/points of discharge.	4	0
	e. **Fire frequency**/severity.	10	0
	f. **Type of vegetation.**	7 X	0
	g. **Hydrologic stress** on vegetation.	4	0
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j. **Water quality of standing water by observation** (i.e., discoloration, turbidity)	7	0
	k. **Water quality data** for the type of community	7	0
	l. **Water depth, wave energy, and currents**	4	0
Current: 6 / With Impact: 0	Notes: Water levels and flows are inapropriate for a freshwater slough. Water level indicators may not be reliable in planted vegetation. Soil moisture and fire frequency are appropriate and will not be impacted. Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
.500(6)(c) Community Structure — X Vegetation; ___ Benthic; ___ Both	I. Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution	7	0
	V. Snags, dens, cavity, etc.	4	0
	VI. Plants' condition	4	0
	VII. Land management practices	4	0
	VIII. Topographic features (refugia, channels, hummocks)	4	0
	IX. Submerged vegetation (only score if present)	N/A	N/A
	X. Upland assessment area	N/A	N/A
Current: 5 / With Impact: 0	Notes: Overall, community structure will be completely lost.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	With Impact
0.60	0.00

Impact Acres =	0.70

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.420

Impact Delta (ID)	
Current - w/impact	0.60

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
I-595 Improvements	**To be determined**	**I-595 Viaduct South Construction Platform**

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
616	**Inland Slough**	**Impact**	**0.71** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i e OFW, AP, other local/state/federal designation of importance)
Coral Reef Basin #5108 Broward-Palm Beach Coast	**South Fork New River (Class III)**	**None**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

The AA is adjacent to Broward County's Pond Apple Slough Natural Area and the South Fork New River.

Assessment area description

The limited access right of way (L/A ROW) located approximately 23.5 feet south of the southern edge of the existing I-595 viaduct over South Fork New River for a width of 20.0 feet multiplied by the length of the wetlands.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
The AA is adjacent to Pond Apple Slough Natural Area and the South Fork New River.	**Pond Apple Slough Natural Area is one of the largest remaining undeveloped parcels in Broward County.**

Functions	Mitigation for previous permit/other historic use
The AA provides a buffer between SR-84 and Pond Apple Slough Natural Area and is an extension of its available habitat.	**The wetlands in this AA were previously impacted but restored circa 1990 per FDEP Consent Order OGC #90-0712**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Attached are lists of previously recorded species in the Pond Apple Slough Natural Area. Most of these species could potentially utilize the AA; however, due to traffic noise and other disturbances from SR-84 and I-595, this area is less desirable than Pond Apple Slough Natural Area.	**It is anticipated that any of the listed species that utilize Pond Apple Slough Natural Area could also utilize the AA; especially bird species. The American crocodile (E) could also potentially use the AA; however, the probability is low due to traffic noise and other disturbances from SR-84 and I-595.**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Few wildlife species were observed in the AA or immediate vicinity. Several cattle egrets (Bubulcus ibis), grackles (Quiscalus quiscula), a little blue heron (Egretta caerulea), giant land crabs (Cardisoma guanhumi), fiddler crabs (Uca spp.), an iguana (Iguana iguana) and a rat (Sigmondon hispidus) were observed within the L/A ROW at the time of the survey. Oppossum (Didelphys marsupialis) and raccoon (Procyon lotor) tracks were also observed.

Additional relevant factors:

The AA and Pond Apple Slough have suffered significant hydrological impacts since the North New River Canal was completed in 1912. Almost all of the AA is now tidally-influenced and brackish. Although the AA was planted with freshwater hydrophytes in response to per FDEP Consent Order OGC #90-0712, it has not been maintained as a freshwater hydrological system and white mangroves are colonizing most of the AA. The white mangroves have been removed as exotics and are considered such in this assessment. The scoring assumes total impact of all wetland function in the AA.

Assessment conducted by:	Assessment date(s):
Erik Neugaard	**01/28/05**

Form 62-345.900(1), F.A.C. [effective date]

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
I-595 Improvements	**To be determined**	**I-595 Viaduct South Construction Platform**
Impact or Mitigation: **Impact**	Assessment Conducted by: **Erik Neugaard**	Assessment Date: **01/28/05**

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Section	Indicator	Current	With Impact
.500(6)(a) Location and Landscape Support	a. Quality and quantity of **habitat support** outside of AA.	7	0
	b. **Invasive plant species.**	7	0
	c. **Wildlife access** to and from AA (proximity and barriers).	7	0
	d. **Downstream benefits** provided to fish and wildlife.	7 X	0
	e. Adverse impacts to wildlife in AA from **land uses** outside of AA.	4 X	0
	f. **Hydrologic connectivity** (impediments and flow restrictions).	7	0
	g. **Dependency** of downstream habitats on quantity or quality of discharges.	7	0
	h. Protection of wetland functions provided by uplands (**upland** AAs only)	N/A	N/A
Current: 7 / **With Impact:** 0	Notes: Adjacent remaining habitat within the L/A ROW will be impacted by noise. Pond Apple Slough is a freshwater system; white mangroves are considered exotic. The project will result in a total loss of vegetation/wetland habitat in the AA as well as downstream benefits. Increase in traffic noise will also impact wildlife in AA. Construction roads will mpact hydrologic connectivity.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(b) Water Environment (n/a for uplands)	a. Appropriateness of **water levels and flows**.	4	0
	b. Reliability of **water level indicators.**	7	0
	c. Appropriateness of **soil moisture.**	10	0
	d. **Flow rates/**points of discharge.	4	0
	e. **Fire frequency/**severity.	10	0
	f. **Type of vegetation.**	7 X	0
	g. **Hydrologic stress** on vegetation.	4	0
	h. **Use by animals** with hydrologic requirements.	4 X	0
	i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	7	0
	j. **Water quality of standing water by observation** (I e., discoloration, turbidity)	7	0
	k. **Water quality data** for the type of community	7	0
	l. **Water depth, wave energy, and currents**	4	0
Current: 6 / **With Impact:** 0	Notes: Water levels and flows are inapropriate for a freshwater slough. Water level indicators may not be reliable in planted vegetation. Soil moisture and fire frequency are appropriate and will not be impacted. Vegetation/plant community composition will be lost to shading and direct impacts, not hydrologic stress or water quality. Animal use will be significantly impacted. Water quality may	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	
500(6)(c) Community Structure X Vegetation ____ Benthic ____ Both	I. Appropriate/desirable species	7	0
	II. Invasive/exotic plant species	7	0
	III. Regeneration/recruitment	4	0
	IV. Age, size distribution.	7	0
	V. Snags, dens, cavity, etc.	4	0
	VI. Plants' condition.	4	0
	VII. Land management practices.	4	0
	VIII. Topographic features (refugia, channels, hummocks).	4	0
	IX. Submerged vegetation (only score if present)	N/A	N/A
	X. Upland assessment area	N/A	N/A
Current: 5 / **With Impact:** 0	Notes: Overall, community structure will be completely lost.	Place an "X" in the box above next to the two (2) most important criteria used in scoring this section	

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	**With Impact**
0.60	0.00

Impact Acres =	0.71

Impact Delta (ID)	
Current - w/Impact	0.60

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.426

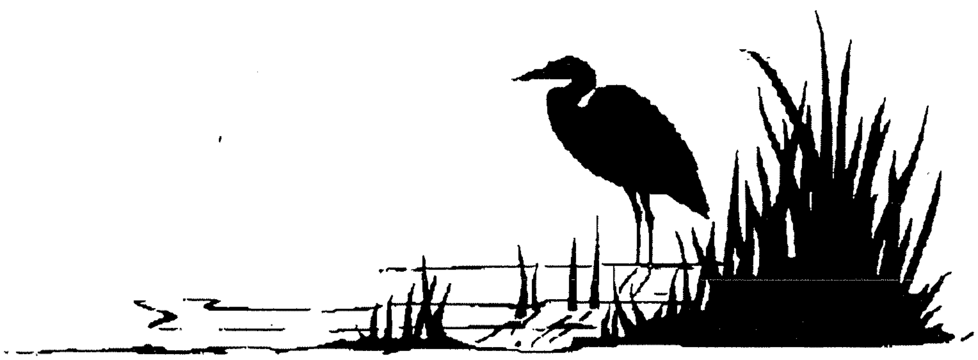
NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

Appendix I

DRAFT

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE FOR MITIGATION BANKS IN FLORIDA

Based on the Wetland Rapid Assessment Procedure (WRAP), South Florida Water Management District Technical Publication REG - 001, September 1997, by Raymond E. Miller Jr. and Boyd E. Gunsalus



ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE FOR MITIGATION BANKS IN FLORIDA

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ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE FOR MITIGATION BANKS IN FLORIDA

1.0 INTRODUCTION

The Estuarine Wetland Rapid Assessment Procedure (E-WRAP) is a matrix that was developed by the Mitigation Bank Review team (MBRT) to assist in the regulatory evaluation of estuarine wetland mitigation bank sites that are created, enhanced, preserved, or restored in order to increase wetland functional lift to mitigate for future wetland losses authorized through the state and federal permit process in Florida. This standardized matrix is to be used in combination with professional judgment to provide an accurate and consistent evaluation of wetland sites and their landscape setting. The evaluator must have a good understanding of Florida ecosystems (functions and species identification) in order for the results to be valid.

E-WRAP was developed from the Modified Wetland Rapid Wetland procedure (M-WRAP), which assesses freshwater functions specifically for use on mitigation bank projects. The *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* (FR Vol. 60. No. 228, November 28, 1995) for mitigation banking endorse the use of a functional assessment for assessing the ecological value of mitigation bank proposals. Florida's statutes on mitigation banking require the use of a functional assessment for this purpose as well. Once Hydrogeomorphic Functional Assessment Models (HGM) are developed for Florida's ecosystems, it is likely that they will be used for this purpose. Until they are available for use E-WRAP should be the functional assessment methodology applied to estuarine mitigation banks in Florida. Use of another functional assessment method may be proposed, but will result in significant additional review and evaluation time.

The E-WRAP matrix establishes a numerical ranking for individual ecological and anthropogenic factors (variables) that can strongly influence the success of mitigation projects. The numerical output for the variables is then used to evaluate the current and expected wetland conditions. The matrix can be used to evaluate a wide range of wetland/upland systems (i.e. - mangrove forests, estuarine marshes, mosquito impoundments, etc.), but it is not intended to compare different wetland community types (i.e. - mangrove forests to estuarine marshes) to each other. **Each wetland type is rated according to its own attributes and characteristics.** Because an interactive association among variables does exist, variables within the matrix can be individually weighted based on a consensus of the evaluation team. Individual variables can be eliminated from the evaluation if the evaluator determines the specific parameter is not applicable.

Use of the E-WRAP matrix is intended to accomplish a number of objectives: to establish an accurate, consistent and timely regulatory tool; to track trends over time (mitigation success, land use vs. wetland type) and to offer guidance for mitigation bank plan development.

E-WRAP is not a substitution for applied research science. It is a tool that is to be used by the regulatory community to ensure consistency and accuracy when evaluating a site through the regulatory process of permitting and post permit compliance. E-WRAP can be used as a tool to document baseline information for a site prior to and after project activities. E-WRAP input data consists primarily of field observations and professional experience. Some variables, such as exotic and nuisance plant coverage, can be quantified through aerial interpretations or ocular estimations.

2.0 METHODOLOGY

E-WRAP incorporates concepts from the U.S. Fish and Wildlife Service's "Habitat Evaluation Procedures" (HEP) and the South Florida Water Management District's "Save Our Rivers Project Evaluation Matrix" (SOR).

Ecological communities (i.e. mangrove forests, salt marshes, salt barrens etc.) and their associated attributes provide food, cover and reproductive functions for a variety of flora and fauna. The holistic concept of HEP is used to evaluate entire systems; both upland and wetland, and their interactive associations. HEP assumes that the value of a habitat can be evaluated at the species level by using a set of measurable variables that are important for a particular species. The use of HEP is restricted by the number of species models that have been developed and those species chosen for evaluation.

The SOR matrix was developed as a method of evaluating habitats to prioritize the allocation of taxpayer dollars toward acquisition, restoration and management of sensitive lands. The matrix is used to evaluate sites using variables such as water management, water supply, site manageability, habitat and species diversity, connectiveness, rare and endangered species, site vulnerability and human use.

The U.S. Fish and Wildlife Services' "Habitat Suitability Index" was used to determine specific habitat requirements for the fauna of Florida. This has been included (Appendix A) as a resource for evaluating the wildlife utilization variable of E-WRAP. In addition, community profiles for sites to be evaluated using E-WRAP are described in Appendix B. Common freshwater fishes and aquatic insect taxa associated with the specific habitats are found in Appendices C and D.

E-WRAP variables are the following:

- **Fish and Wildlife Utilization**
- **Vegetative Community Cover: Overstory/Shrub**
- **Vegetative Community Cover: Ground Cover**
- **Adjacent Upland/Wetland Buffer**
- **Field Indicators of Wetland Hydrology**
- **Water Quality Inputs and Treatment Systems**

2.1 METHODOLOGY FOR USING E-WRAP FOR MITIGATION BANKS

2.1.1 OFFICE EVALUATION

The E-WRAP evaluator completes the following steps before leaving the office:

1. Identify the project site. Acquire an aerial map for field use and mark the project boundaries.

2. Identify land uses adjacent to the project site (see glossary for land use definitions).
    a. Identify developmental encroachment and type.
    b. Identify adjacent natural areas.
    c. Identify roads, canals and other features (i.e. - wellfields) potentially separating or impacting the site.
3. Identify wetland areas within the project site.
    a. Label wetland areas for future scoring with E-WRAP.
    b. Utilize soil maps to verify or identify depressional map units that may not be readily apparent from aerial maps.
    c. Identify wetland types (i.e. mangroves, grassbeds, salt marshes, etc.) if possible (may need to be done at the time of the site visit).
    d. Identify access points to wetland areas.
    e. Identify berms, canals and ditches adjacent to the wetland areas.
    f. Set up potential transects through wetland ecotypes. Transects would be warranted if a particular wetland exhibited a number of vegetative community types. The transects could then be used for future monitoring events.

In addition, the evaluator should review on-site hydrology, site management, rotational impoundment management, maintenance plans, seasonal variability, droughts, fire and excessive rainfall and any other pertinent information.

2.1.2 FIELD EVALUATION

In the field each wetland that will be enhanced or restored by the mitigation bank proposal (wetland polygon) is evaluated separately. The degree to which the adjacent uplands augment the functional value of the wetland is captured in the E-WRAP.

1. Walk a minimum of 50 % of the wetland perimeter.
2. Visually inspect 100 % wetland perimeter.
   a. Look for signs of wildlife utilization (tracks, scats etc.) and direct observations.
   b. Look for signs of fishery utilization (dipnetting, castnetting, etc.) and direct observations.
   b. Identify plant community composition (ocular estimate) using predetermined transect (if necessary).
      1. Conduct an ocular estimate of the plant species coverage and composition for the wetland and adjacent areas.
      2. Conduct an ocular estimate of the coverage of exotic and nuisance plant species in wetland and adjacent areas.
      3. Note any shifts in plant communities (i.e. encroachment of upland or transitional plant species into the wetland).
   c. Identify any hydrologic indicators present (see glossary for list).
3. Document field observations to establish baseline for future reference.
   a. Document observations on field data sheet (Section 3.0)

2.1.3 SCORE WETLAND

Generate E-WRAP score for each wetland type (polygon) on the project site using scoring methodology described in section 2.2.

2.2 SCORING METHODOLOGY

Each variable associated with the matrix is scored using a point scale ranging from zero (0) to three (3). Each point on the matrix is accompanied with a "calibration description" used to assist the evaluator in accurately scoring each habitat parameter.

When applying the matrix a score designation of three (3) is considered the best a system can function (reference wetland) and zero (0) is a system that is severely impacted, exhibiting negligible attributes (eg. The wetland has been filled). An evaluator also has the option to score each parameter in half (0.5) or quarter (0.25) increments. This gives the evaluator the flexibility to score a variable that is not accurately described or fitted by the "calibration description". Half and quarter increments are utilized on the point scale from 0.25 through 2.75. When evaluating the expected, or "With Bank", scenario, the score should be based on the level of function that is reasonably likely to be attained. For example, some sites will be expected to score "3" for hydrology, while others will score "2" or "2.25" in the expected With Bank scenario.

When evaluating a particular system, that system is evaluated on its own attributes and is not to be compared to a different type of system (i.e., mangrove forest vs. salt marsh). If any variable does not apply to the habitat being rated, then the designation "NA" (not applicable) can be applied. When the designation "NA" is used for a specific variable it is omitted from the final calculations used to rate the habitat.

The amount of increase in ecological value (ecological lift) is obtained by scoring each wetland at the mitigation bank site as if the bank were successfully completed as compared to the bank's baseline conditions. An essential factor in this scoring is the quality of the baseline condition. The baseline condition is defined as the condition of the wetland assuming a reasonably expected "without bank" condition.

Each applicable variable is scored, totaled and divided by the sum total of the maximum score for each variable. The vegetative variables (overstory and groundcover) are averaged (added together and divided by two) and the one variable is added to the other applicable variables and divided by the sumof the maxium for each varaible.

The final rating score for each wetland polygon's "Habitat Assessment Variables" will be expressed numerically with a number between zero (0) and one (1). The final rating score can be expressed mathematically as follows;

E-WRAP Score = $\boldsymbol{\Delta} = \Delta / V_{max}$

(V_{max}) = Sum of maximum possible score for the rated variables.

where, V = (Vwildlife) + ((Voverstory + Vgroundcover)/2) + (Vbuffer) + (V hydrology) + (Vwater quality).

Δ = (Vpredicted - Vbaseline), where Δ (delta) is the ecological lift assigned to a wetland polygon.

2.3 WEIGHTING THE VARIABLES

Prior to final E-WRAP scoring, the assessment team may evaluate the regional significance of the mitigation bank site for the following Weighting Factors: Threatened and Endangered Species; Strategic Habitat Conservation Areas (Florida Game and Freshwater Fish Commission *Closing the Gaps*); Established Watershed Plans; Adjacent Land Uses. Each wetland polygon will then be weighted, if appropriate, based on the degree of contribution the "with bank" scenario will provide for each Weighting Factor. If the assessment team finds that weighting is not appropriate, then each variable will be scored equally and weighting will be considered "not applicable".

The "importance" or "value" of a given wetland function is a very different concept than the "capacity" of the function. Wetland functional assessment methodologies such as HGM and E-WRAP are used to evaluate changes in the capacity of wetland functions. The relative importance of the measured changes is not addressed in HGM. In other words, the HGM approach stops short of valuing the capacity of the function being evaluated. Unfortunately, trading in individual functional capacities is not practical thus a single unit of trade is needed for mitigation crediting and debiting. In E-WRAP, the capacities of each function are averaged to produce a single output. Taking the average, however means that each of the factors is of equal importance. This approach can be refined. The MBRT has devised a method to incorporate public interest considerations into the relative weighting of the wetland functions included in a given assessment methodology, with respect to use in mitigation banking.

STANDARD WEIGHTING ASSIGNMENT GUIDANCE

This is a method through which relative weights can be assigned to wetland function. More complex evaluation methods could be developed in the future if need be. For now, the MBRT proposes a simple list of criteria to consider in a matrix form. As the MBRT considers the items on the list they can numerically score relative weights. This list is not inclusive and additional items could be added, as warranted. At a minimum, the following weighting criteria should be considered:

Established Watershed Issues
Benefits to Important Adjacent Areas
Threatened or Endangered Species
Scarce Habitats
Special Considerations

The MBRT should consider the following issues or questions to help rank the weight for a given function for a given polygon. Some of these criteria will apply to all polygons within a bank or impact site, while others may be specific to a particular polygon.

Established Watershed Issues: The project will result in identifiable ecological benefits/detriments to established watershed issues recognized to be critical to the watershed of the project. Such issues should be identified in publicly sanctioned plans. For example:

- SWIM plans
- The Reedy Creek/Lake Marion Creek Watershed Conservation Project
- National Estuary Program Comprehensive Conservation and Management Plans
- Strategic Habitat Conservation Area in the GAP analysis
- Aquifer Recharge Are (Note: This weighting factor is scored a zero when a watershed plan has not been developed for the particular area or when a perceived benefit is not critical to the established plan.)

BenefitsTo Important Adjacent Lands: The project will result in identifiable ecological benefits to adjacent lands or waters of regional importance such as a State/National Park, State/National Forest, SWIM water body, OFW, AP, refuges and lands managed for conservation.

Threatened and Endangered Species: The establishment of the mitigation bank improves the status of federal and/or state listed threatened or endangered species, or federally listed candidate species. Simply protecting or conserving a site which currently exhibits use by listed species, where the status of that species will not be identifiably improved, will be considered as maintaining the status-quo. For impact projects which affect a federally Threatened or Endangered species, this issue will be handled in accordance with Section 7 of the Endangered Species Act.

Scarce Habitats: The assessment area contains (or will contain) ecological features considered to be unusual, unique or rare in the region and which are of sufficient size. Expansion or restoration of habitats which have been extensively lost in a region will generally be given greater consideration for this parameter.

Special Considerations: This criteria is reserved for unforeseen circumstances which may be considered important in the weighting of E-WRAP variables.

Weighting Criteria Worksheet: On the next page is a self-explanatory worksheet designed to select which of the previously described weighting criteria will be used for scoring purposes. Except for threatened and endangered species, a simple yes or no question is asked. A yes is scored 3 and a no is scored 0. The scoring for threatened and endangered species is further refined into increments of 0, 1, 2 and 3 according to the relative benefit that the mitigation bank will provide.

WHEN WEIGHTING FACTORS ARE NOT APPLICABLE: After reviewing the Weighting Criteria, the MBRT may elect not to apply any weighting factors at the mitigation bank or impact site. In this case, the five E-WRAP scores will be the only basis in establishing credits and debits.

WEIGHTING CRITERIA WORKSHEET FOR MITIGATION BANKS IN FLORIDA

	Score
Established Watershed Issues Yes .... 3 No 0	
Benefits to Important Adjacent Lands Yes .... 3 No 0	
Threatened and Endangered Species Increases population of one or more listed species .... 3 Meets identified tasks within a recovery plan for listed species or increases the population of one or more candidate species........ 2 Attracts listed species to the site .... 1 Maintains status quo 0	
Scarce Habitat Yes .... 3 No 0	
(Special Consideration) 3 0	
TOTAL	

In order to determine the relative weighting numbers for the five E-WRAP variables, the following matrix example is presented:

WEIGHTING CRITERIA MATRIX

Weighting Criteria	WU	VC	AB	HY	WQ
Established Watershed Issues	3	3	0	3	3
Benefits to Important Adjacent Areas	0	0	0	0	0
Threatened or Endangered Species	1	3	1	2	0
Scarce Habitats	0	0	0	0	0
Special Considerations	0	0	0	0	0
Total:	4	6	1	5	3

Where:
WU = Wildlife Utilization
VC = Vegetative Community
AB = Adjacent Buffer
HY = Hydrology
WQ = Water Quality

As presented in the hypothetical example Weighting Criteria Matrix above, the MBRT has determined that:

- Established Watershed Issues: Applies to Wildlife Utilization, Vegetative Community, Hydrology, and Water Quality variables.
- Benefits to Important Adjacent Areas: Does not apply (there are no important adjacent areas).
- Threatened and Endangered Species: Applies to Wildlife Utilization, Vegetative Community, Adjacent Upland/Wetland Buffer and Hydrology variables.
- Scarce Habitats: Does not apply (there are no scarc habitats on the site).
- Special Considerations: No other Special Considerations apply.

The MBRT believes that each of the five E-WRAP variables should have an equal minimum weight. In other words, each weighting factor will have two components. A fixed "minimum weight" component that is automatically given to each variable and an adjustable or "assigned weight" component which the MBRT determines. The Development Team proposes that the minimum weight be 10%. With 10% automatically assigned to each of the five E-WRAP variables, this leaves 50% of the available 100% for the assignment of weights (i.e., 100 –(5)(10)=50). The weighting formula is now:

$\text{Weight}_{WU}+\text{Weight}_{VC}+\text{Weight}_{AB}+\text{Weight}_{HY}+\text{Weight}_{WQ}=0.5$

Based on the total scores from the Weighting Criteria Matrix, the following equation is derived:

$$4x + 6x + 1x + 5x + 3x = 0.5$$

Solving for x: $19x = 0.5$, so $x = 0.0263$

Therefore, plugging 0.0263 back into the weighting formula for the five variables gives the following assigned weights:

Assigned Weight WU = 4 x 0.0263 = 0.1052
Assigned Weight VM = 6 x 0.0263 = 0.1578
Assigned Weight AB = 1 x 0.0263 = 0.0263
Assigned Weight HY = 5 x 0.0263 = 0.1315
Assigned Weight WQ = 3 x 0.0263 = 0.0789

(Remember, once the MBRT assigns the adjustable weights, 0.1 must be added to each of the assigned weights to bring the total weights to 100%)

Prior to integration of these assigned weights, the following must be done with the E-WRAP variable scores (for each bank polygon):

1) The E-WRAP individual variable scores, both "with" and "without bank" are each divided by the maximum score attainable (3.0).

2) The difference of these "averaged" scores is the unweighted E-WRAP "delta" (do for each of the five variables).

The assigned weights are then applied with the E-WRAP functional assessment as follows:

3) The "delta" for each E-WRAP variable is then multiplied by the sum of the assigned weight and the minimum weight of 0.1 to calculate the weighted E-WRAP "delta".

4) The five weighted E-WRAP variable deltas are multiplied by the acreage in each polygon to calculate total "credits" available in that polygon (Temporal Lag and Risk Factor multipliers have been left out here for simplicity).

5) Finally, the credits available in each polygon are summed to calculate the total credits available in the mitigation bank.

WHEN WEIGHTING FACTORS ARE NOT APPLICABLE: After reviewing the Weighting Criteria, the MBRT may elect not to apply any weighting factors at the mitigation bank or impact site. In this case, the five E-WRAP scores will be the only basis in establishing credits and debits.

2.4 METHODOLOGY FOR HABITAT ASSESSMENT VARIABLES

The matrix calibration descriptions for E-WRAP assessment variables follow. The functional attributes of each variable are qualitatively evaluated based on the calibration descriptions.

2.4.1.1 FISH AND WILDLIFE UTILIZATION

INTRODUCTION

Wetlands provide many species of wildlife with basic life sustaining needs such as water, food (i.e. macroinvertebrates and other wetland dependent species including plants) and nesting and roosting areas. While some animal species prefer uplands for nesting and rearing of young, their primary food sources are found within wetland systems. Water dependent species such as fish, some amphibians and birds have specific requirements in regard to length and magnitude of hydrologic inundation and access to appropriate habitat in order to complete their life cycles.

It is important for the evaluator to understand the basic habitat requirements of south Florida fauna to know which species or signs might be observed during site visits. Appendix A lists the habitat requirements for a number of fish and wildlife species found in coastal Florida. Included are food sources, protective cover, reproductive needs and habitat size. Appendices B (Habitat Community Profiles), C (Common Saltwater Fishes of Florida) and D (Common Aquatic Insect Taxa) list additional wildlife species. These appendices will be updated as more information is acquired for the areas of the state where E-WRAP is applied.

Though direct observation of fish and wildlife utilization is ideal, it is not always possible due to the time constraints of the regulatory review process and the secrecy, mobility, habits and seasonality of many species of fish and wildlife. The reviewer must rely on the presence of signs, including burrows, scat, tracks, rubs, and nests etc. In some instances a reviewer may have to assume that if habitat needs for a particular species are present then most likely this species does frequent the site. E-WRAP assessments will also be greatly affected by tidal cycles. Fishes and other motile organisms may be more readily observed during higher tides, while macroinvertebrates may be more readily observed during lower tidal cycles.

It is recommended that the reviewer use a D-frame dip net, cast net and/or seine to determine if fishes and macroinvertebrates are present. Several sweeps through the wetland vegetation and open water areas, in combination with direct observations, should provide the reviewer with an indication of the lower food trophic levels. It should be noted that the presence and diversity of macroinvertebrates are quite variable depending on a number of environmental factors such as temperature, pH, predation, and seasonality. During periods of low tide, the reviewer should look for available signs of epifauna (ie., oysters) and infauna (clams and marine worms).

Appendix F provides a list of guilds of wetland obligate and faoultative species to assist in E-WRAP scoring. The more guilds of species that are present, the higher the E-WRAP score, since the wetland supports more trophic levels in the food chain. Conversely, the fewer guilds present indicates a lower E-WRAP score, since the wetland supports fewer trophic levels in the food chain. The exact number of guilds required to reach a given score is not provided, but is left up the the judgement of the assessment team.

2.4.1.2 FISH AND WILDLIFE UTILIZATION MATRIX

Objective

The fish and wildlife utilization variable evaluates observations and noted signs (i.e. - scat, tracks etc.) of wildlife use, primarily wetland dependent species, and the use of the wetland by fishes and invertebrates. In addition, it also addresses potential fish and wildlife use through the noted presence or absence of food sources, nesting areas, roosting areas, den trees and protective cover.

EXISTING WETLAND EXHIBITS NO EVIDENCE OF FISH AND WILDLIFE UTILIZATION 0

The existing wetland is heavily impacted.
There is no evidence of fish and wildlife utilization.

EXISTING WETLAND EXHIBITS MINIMAL EVIDENCE OF FISH AND WILDLIFE UTILIZATION 1

There is minimal evidence of fish and wildlife utilization.
Wetland provides little habitat for macroinvertebrates, fish and wildlife (eg., clams, oysters, birds and small mammals).
Minimal representation of Species Guilds.
There are sparse or limited adjacent native habitats.
The site is not contiguous to naturally occurring vegetative communities (uplands, wetlands, or submerged aquatic vegetation).
Site may be located in residential, industrial or commercial developments with frequent human disturbances.

EXISTING WETLAND EXHIBITS MODERATE EVIDENCE OF FIAN AND WILDLIFE UTILIZATION 2

There is moderate evidence of fish and wildlife utilization.
There is evidence of wetland utilization by small or medium-sized mammals (observations, tracks, scat).
There is evidence of aquatic macroinvertebrates, amphibians and/or fishes.
Moderate representation of Species Guilds.
Adjacent upland native habitat is available.
There is minimal potential for human disturbance.
There is adequate protective cover for wildlife.
The site is contiguous and continuous on at least 50% of its perimeter to naturally occurring vegetative communities (uplands, wetlands, or submerged aquatic vegetation).

EXISTING WETLAND EXHIBITS STRONG EVIDENCE OF FISH AND WILDLIFE UTILIZATION 3

There is strong evidence of fish and wildlife utilization.
Wetland supports abundant aquatic macroinvertebrates, amphibians, fishes and/or wildlife.
Optimal representation of Species Guilds.
Abundant adjacent upland native habitat is available.
There is a high potential for fish and wildlife use.
The potential for human disturbance is negligible.
There is significant cover for wildlife within the wetland and adjacent upland.
The site is contiguous and continuous on at least 80% of its perimeter to naturally occurring vegetative communities (uplands, wetlands, or submerged aquatic vegetation).

2.4.2.1 VEGETATIVE COMMUNITY COMPOSITION: OVERSTORY AND SHRUB

INTRODUCTION

The Wetland Overstory/Shrub Canopy of Desirable Species variable evaluates the presence, health and appropriateness of the wetland overstory and shrub canopy at the bank site.

Canopy is defined as the plant stratum composed of woody plants and palms with a trunk that is four inches or greater in diameter at breast height (4.5'), except vines (DER. 1994). Subcanopy (which includes shrubs) is that plant stratum composed of all woody plants and palms, exclusive of canopy, with a trunk or main stem diameter at breast height (4.5') between one and four inches, except vines (DER, 1994).

Most of the estuarine wetland species have adapted to a restricted range of hydrologic regimes, slainity and temperature (South Florida Water Management District, 1995). Wetland overstory/shrub canopy provides many benefits to wildlife species such as cover, food, nesting and roosting areas. Wetlands can vary dramatically in the composition and density of overstory/shrub canopy species (Appendix B). This variable should be used when there is significant overstory/shrub canopy (i.e. the coverage of canopy/shrub species should exceed twenty (20) percent of the overall wetland acreage). The variable can also be used when there is potential (i.e. immature) canopy present or a mangrove wetland that has been cleared or otherwise disturbed.

E-WRAP categorizes the native wetland community composition into few, moderate and abundant trees present. Using these categories the reviewer evaluates the aereal coverage and density of the overstory/shrub canopy for a particular wetland.

Certain estuarine wetland types characterized as salt marsh, mudflats and salt barrens systems exhibit limited or no canopy or shrub species (Myers, 1990), (SCS, 1987), In these type of situations the variable would be designated "NA" (not applicable) and omitted from the final calculations.

The overall condition of a native estuarine wetland forest and shrub community composition can be evaluated by observing indicators such as presence of a large percentage of dead or dying trees or shrubs, soil subsidence, little or no seedling regeneration and the presence of an inappropriate understory plant species. Although short-term environmental factors such as flooding, extended drought and fire (Beever, unpublished) can temporarily impact the health of the canopy. The health and abundance of wetland groundcover can be significantly affected by extremes in wetland hydrology. Deepwater conditions through improper wetland control elevations or natural variability can drown wetland plant species (e.g., mosquito impoundments). Conversely, restricting tidal innundation to estuarine wetlands and natural variability can reduce the presence of many wetland species and allow for the encroachment of more upland/transitional species. The health of the vegetation can also be evaluated in terms of plant robustness. If the plants are chlorotic or spindly (provided they weren't just planted), it may be a sign of nutrient deficiency, improper soils or hydroperiod response.

Human activities such as flooding (i.e. - stacking water in retention systems) or draining systems via conveyance canals irreparably damage these systems. Human impacts (including the hydrological influences noted above) can promote significant changes in wetland ground cover. Mowing of herbaceous wetlands for aesthetics can interfere with seed production of certain plants. Grazing by cattle can influence the species composition of some wetlands due to the introduction of nuisance species of plants. Off-road vehicle traffic in wetlands creates soil disturbance and compaction as well the destruction of vegetation.

Exotic and nuisance plant species have become a serious problem in Florida, outcompeting and replacing native plant communities in many places. Wetlands containing E&N plant species are impacted in various ways depending on the type of wetland and the degree to which it is infested. There are approximately 200 species of exotic plants currently listed by the Florida's Exotic Pest Council's 1995 List of Florida's Most Invasive Species. Many of the listed species can be found invading Florida estuarine wetlands.

Nuisance plants are native species that under certain conditions can dominate a wetland. These plants are usually found dominating wetlands with disturbed soils, or where there have been alterations in hydrology or nutrient inputs from adjacent land uses (i.e. - cow manure, lawn fertilizer, etc.).

2.4.2.2 VEGETATIVE COMMUNITY COMPOSITION: OVERSTORY AND SHRUB MATRIX

Objective
The vegetative community composition: overstory and shrub variable evaluates the presence, health and appropriateness of the wetland's shrub and overstory canopy, where applicable. The functional assessment of the canopy strata is objectively evaluated based on food, cover, nesting potential, and appropriateness of the vegetative community. The canopy strata is evaluated based on the habitat type. This variable may not be applicable to estuarine habitats where overstory/shrub canopy are typically not present. The exotic and nuisance plant species factors evaluate the extent of nuisance plant infestation within the wetland and adjacent upland.

NO DESIRABLE WETLAND OVERSTORY/SHRUB CANOPY PRESENT 0

No desirable wetland trees or shrub species present.
If present, trees are newly planted seedlings providing little habitat support (i.e. - roosting, nesting and foraging).
Site may also have been subject to recent clear cutting with little evidence of canopy plant regeneration.
Wetland and adjacent areas are heavily infested (> 75%) with undesirable plant species, including exotic and nuisance species.

FEW DESIRABLE WETLAND OVERSTORY/SHRUB CANOPY PRESENT 1

Site may exhibit large amounts of undesirable or inappropriate tree or shrub species.
Desirable trees may be immature, but provide some potential for habitat support.
There are minimal signs of natural recruitment of canopy and shrub seedlings.
Live canopy trees exhibit stress.
Wetland and adjacent areas are infested 25% to 50% with undesirable plant species, including exotic and nuisance species.

MODERATE AMOUNT OF DESIRABLE WETLAND OVERSTORY/SHRUB CANOPY PRESENT 2

Few undesirable or inappropriate canopy trees/shrubs may be present (<25%).
Wetland overstory/shrub canopy is providing habitat support.
There is some evidence of natural recruitment of canopy/shrub seedlings.
Live canopy trees are healthy with minimal evidence of stress.
Areas adjacent may contain some exotic and nuisance plant species providing a seed source for future re-establishment.

ABUNDANT AMOUNT OF DESIRABLE WETLAND OVERSTORY/SHRUB CANOPY PRESENT 3

No nuisance or inappropriate canopy/shrub species present.
Desirable trees are providing good habitat support.
There is strong evidence of natural recruitment of canopy and shrub seedlings.
Live canopy trees are healthy with no evidence of stress.
Area contains no exotic plant species.
If present, negligible nuisance plants.
Adjacent area is mostly native plants species.
Site is void of nuisance vegetation and inappropriate vegetative species are minimal.

DELETE

Note: When scoring the vegetative variable, the Overstory and Ground Cover Variables are averaged (added together and divided by two), which "collapses" the two vegetative variables into one vegetative variable

2.4.3.1 VEGETATIVE COMMUNITY COMPOSITION: GROUND COVER

INTRODUCTION

The vegetative community composition: ground cover variable evaluates the presence, health and appropriateness of the wetland ground cover and herbaceous wetland communities at the mitigation bank site.

Groundcover will be defined as the plant stratum composed of all plants not found in the canopy or subcanopy. Ground cover vegetation can provide a refuge for macroinvertebrates, fish, reptiles, amphibians, small mammals and also provide a food source for small mammals and waterfowl.

Ground cover vegetation can be classified into herbaceous, graminoid, and woody type species and can also be characterized by its growth form such as emergent, floating-leaved, submersed, free-floating surface and subsurface. Most of these wetland species have adapted to a restricted range of hydrologic regimes (South Florida Water Management District, 1995). Species composition of groundcover varies between ecosystems although many species overlap (Appendix B).

The health and abundance of wetland groundcover can be significantly affected by extremes in wetland hydrology. Deepwater conditions through improper wetland control elevations or natural variability can drown wetland plant species (e.g., mosquito impoundments). Conversely, restricting tidal inundation to estuarine wetlands and natural variability can reduce the presence of many wetland species and allow for the encroachment of more upland/transitional species. The health of the vegetation can also be evaluated in terms of plant robustness. If the plants are chlorotic or spindly (provided they weren't just planted), it may be a sign of nutrient deficiency, improper soils or hydroperiod response.

Human activities such as flooding (i.e. - stacking water in retention systems) or draining via conveyance canals irreparably damage these systems. Human impacts (including the hydrological influences noted above) can promote significant changes in wetland ground cover. Mowing of herbaceous and graminoid wetlands for aesthetics can interfere with seed production of certain plants. Grazing by cattle can influence the species composition of some wetlands due to the introduction of nuisance species of plants. Off-road vehicle traffic in wetlands creates soil disturbance and compaction as well the destruction of vegetation.

Exotic and nuisance plant species have become a serious problem in Florida, outcompeting and replacing native plant communities in many places. Wetlands containing E&N plant species are impacted in various ways depending on the type of wetland and the degree to which it is infested. There are approximately 200 species of exotic plants currently listed by the Florida's Exotic Pest Council's 1995 List of Florida's Most Invasive Species. Many of the listed species can be found invading Florida estuarine wetlands.

Nuisance plants are native species that under certain conditions can dominate a wetland. These plants are usually found dominating wetlands with disturbed soils, or where there have been alterations in hydrology or nutrient inputs from adjacent land uses (i.e. - cow manure, lawn fertilizer, etc.).

2.4.3.2 VEGETATIVE COMMUNITY COMPOSITION: GROUND COVER MATRIX

Objective
The vegetative ground cover variable evaluates the presence, health and appropriateness of the wetland's shrub and overstory canopy, where applicable, and the ground cover vegetation. The functional assessment of the canopy strata is objectively evaluated based on food, cover, nesting potential, and appropriateness of the vegetative community. The canopy strata is evaluated based on the habitat type. This variable may not be applicable to estuarine habitats where overstory/shrub canopy are typically not present. The vegetative ground cover variable evaluates the presence, abundance, appropriateness and condition of vegetative ground cover within the wetland. Salt barrens and mud flats exhibit limited or no canopy or shrub species; thus, the sub-variables addressing tree and shrub species would be designated "NA" (not applicable). The exotic and nuisance plant species variable evaluates the extent of nuisance plant infestation within the wetland and adjacent upland.

GROUND COVER IS SEVERELY IMPACTED OR NON-EXISTENT 0

Ground cover may be dominated (>75%) by inappropriate or undesireable plant species, including exotic and nuisance vegetation.
Ground cover may be extensively impacted.
Site may exhibit no evidence of seed germination or natural recruitment.
Adjacent areas are heavily infested (> 75%) with inappropriate or undesireable plant species, including exotic and nuisance vegetation.

GROUND COVER IS EXTENSIVELY IMPACTED OR DOMINATED BY LARGE AMOUNTS OF INAPPROPRIATE PLANT SPECIES 1

Ground cover may consist primarily (25%-75%) of inappropriate or undesireable plant species, including exotic and nuisance vegetation.
Ground cover may be moderately impacted.
Site may exhibit some evidence of seed germination or natural recruitment.
Adjacent areas are moderately infested (25%-75%) with inappropriate or undesireable plant species, including exotic and nusiance vegetation.

GROUND COVER IS SLIGHTLY IMPACTED AND PROVIDES SOME FUNCTIONAL HABITAT 2

Ground cover is primarily (>75%) appropriate native vegetation.
Ground cover may be slightly impacted.
Site may exhibit extensive evidence of seed germination or natural recruitment.
Adjacent areas may contain some (10%-25%) inappropriate or undesireable plant species, including exotic and nusiance vegetation with potential for infestation to spread.

GROUND COVER IS EXTENSIVE WITH MINIMAL OR NO DISTURBANCES 3

There are minimal or no impacts to ground cover.
Area contains no exotic or nuisance vegetation.
If present, inappropriate plants are negligable.
Adjacent area is mostly (>90%) native plants species.

Note: When scoring the vegetative variable, the Overstory and Ground Cover Variables are averaged (added together and divided by two), which "collapses" the two vegetative variables into one vegetative variable

2.4.4.1 ADJACENT UPLAND/WETLAND BUFFER

Introduction

The adjacent upland/wetland buffer variable is a measure of the adjacent habitat support for the subject wetland. This variable is evaluated based on the adjacent buffer size and the ecological attributes (i.e., sediment removal, nutrient uptake, cover, food source, and roosting areas) the buffer area is providing for the wetland system that is being assessed.

Wetland systems are subjected to disturbances that originate in adjacent upland areas. These disturbances can impact biological, chemical and physical attributes of wetlands (Castelle, et al, 1994). Buffers are vegetated areas located between the jurisdictional wetland line and adjacent areas subject to human disturbance. Adjacent wetlands also serve as wetland buffers. Buffers may consist of areas that are undisturbed native vegetation, areas wholly or partially cleared and revegetated, or areas with varying degrees of exotic and nuisance vegetation.

The criteria for determining adequate buffer sizes should be partly based on the quality of the wetland and the intensity of the adjacent land use (Castelle, et al, 1992). Smaller buffers are more acceptable when the adjacent land use is low intensity. Larger buffers are necessary when the adjacent land use intensity is high and the quality of the buffer is low. Buffers provide benefits to wetlands through sediment control (Shisler, et al, 1987), removal of excess nutrients and metals from runoff by both physical filtration and plant uptake (Madison, et al, 1992), and maintenance of habitat diversity for animal species that require the adjacent upland buffer to meet specific habitat needs (Naiman, et al, 1988).

Buffers also form a transitional zone between the wetland and the adjacent development. The edge effect theory proposes that the numbers of plant and animal species increase at the edge, due to overlap of adjacent habitats and the creation of unique edge-habitat niches (Castelle, et al, 1994). Finally, buffers can act to reduce direct human impact by reducing access to the wetland and blocking noise and light pollution.

Castelle, et al, (1994) state that buffers less than 15-30 feet provide little protection for aquatic resources. Buffers should be a minimum of 45-90 feet under most conditions. The lower range (45 feet) is necessary for maintenance of physical and chemical protection, while the upper range (90 feet) is a minimum for the protection of biological components. Habitat Suitability Index models have demonstrated the need for buffers between 10 and 350 feet depending on the resource needs of the particular species.

Buffer quality is also very important. A good buffer might contain a mixture of native tree, shrub and ground cover plant species. This would provide a visual and sound barrier for the wetland as well as a food source, cover and nesting habitat for wildlife species. In addition, the ground cover plant species would act as a filtration system for incoming surface water. An example of a low quality buffer would be a ring of dense Brazilian pepper around the wetland. The dense growth of the pepper allows little wildlife utilization. In addition, little or no ground cover can grow in the dense shade.

Large buffers (greater than 300 feet) consisting primarily of pasture grasses may provide spatial protection and some sediment control for wetlands. However, these types of buffers provide less benefit as cover, food source and roosting areas than a good quality buffer.

This procedure considers high volume traffic roads or highways as a severance to existing buffers. Low volume traffic roads (i.e., dirt maintenance or fire break roads) are considered as a continuation to the existing buffer.

2.4.4.2 ADJACENT UPLAND /WETLAND BUFFER MATRIX

Objective

The adjacent upland /wetland buffer variable is a measure of the area adjacent to the subject wetland and the landscape setting of the wetland. This variable is evaluated based on the adjacent buffer size and the ecological attributes (i.e. cover, food source and roosting areas for wildlife) that this area is providing in association with the wetland that is being assessed.

NO ADJACENT UPLAND/WETLAND BUFFER 0

Buffer non-existent.

ADJACENT UPLAND/WETLAND BUFFER AVERAGES 30 FEET OR LESS. CONTAINING DESIRABLE PLANT SPECIES 1

Less than 30 feet average width.
Mostly desirable plant species which provide cover, food source, and roosting areas for wildlife
Not connected to wildlife corridors.

ADJACENT UPLAND/WETLAND BUFFER GREATER THAN 30 FEET BUT LESS THAN 300 FEET, CONTAINING PREDOMINANTLY DESIRABLE PLANT SPECIES 2

Greater than 30 feet but less than 300 feet average width.
Contains desirable plant species which provide cover, food. and roosting areas for wildlife
Portions connected with contiguous offsite wetland systems, wildlife corridors.
Greater than 300 feet but dominated (greater than 75%) by undesirable noninvasive plant species (e.g., pasture grasses).

ADJACENT UPLAND/WETLAND BUFFER AVERAGES GREATER THAN 300 FEET, CONTAINING PREDOMINANTLY DESIRABLE PLANT SPECIES 3

Greater than 300 feet wide average width, or of exceptional ecological significance.
Contains predominantly desirable plant species (less than 10% nuisance, and no exotic species) for cover, food, and roosting areas for wildlife.
Connected to wildlife corridor or contiguous with offsite wetland system or areas that are large enough to support habitat for large mammals or reptiles.

2.4.5.1 FIELD INDICATORS OF WETLAND HYDROLOGY

INTRODUCTION

Wetland hydrology can be a difficult variable to evaluate given the limited time frames associated with the regulatory process. Several field indicators of wetland hydrology exist that enable an evaluator to make inferences with regard to wetland hydrology. The duration and magnitude of tidal inundation within a wetland system can be estimated based on plant physiological responses, plant community structure and soil morphology.

Plant Physiological Responses - Several wetland plant species have developed physiological adaptations that enables them to survive extended periods of inundation. Many wetland tree and shrub species develop adventitious roots as a response to the duration of inundation (e.g. mangrove prop roots). Extended periods of inundation promote the development of these secondary roots along the basal stem of the plant. Adventitious roots are formed when the primary root stock is inundated to the extent that anaerobic conditions severely reduce root oxygen and nutrient transport. In addition, recent cypress tree knee growth is an indication of extended inundation. The bark on the apex of the knee will be spread exposing light brown or tan new growth tissue.

Other indicators include small plant species that colonize on the trunks of trees at the interface of the seasonal high water mark. These hydrologic indicators can be used to assist in the determination of the magnitude of inundation (Hale, 1984). Lichen lines colonize down to the seasonal high water mark. Conversely, moss collars predominantly colonize up to the seasonal high water mark.

Plant Community Structure - The plant community structure evaluates the plant community associated with the ground cover and the overstory/shrub canopy. The plant community structure (PCS) can be used to make inferences to hydrologic impacts resulting in an increased or reduced hydroperiod. The primary focus of the PCS is to evaluate the plant species for a specific habitat. The plant community profiles associated with specific wetland habitats has been documented for use with this procedure in Appendix B. Although this list is not inclusive, it lists plant species typically associated with a specific wetland system.

Transitional plant species such as wax myrtle, saltbush etc., encroaching into the wetland can be cautiously used to assess the existing hydroperiod of a wetland system (Rochow, 1994 and Mortellaro et. al., 1995). Evaluation of these transitional tree and shrub species allows an observer to make some inference to the wetland hydroperiod over the last 1 - 3 years. When evaluating the groundcover plant community it is important to remember that transitional changes within this plant community can occur within one (1) year (Thibodeau and Nickerson, 1985).

Plant Community Structure - Conversely, some wetland systems can be impacted by an increased hydroperiod. Before accurate inferences can be made to a reduced hydroperiod, it is necessary to first determine the extent of tidal inundation. Having knowledge of what the average tidal range will assist an evaluator with regard to this variable.

Soil Morphology - Soil morphology evaluates soil development and characteristics. A reduced hydroperiod has a direct impact on organic soil development and can result in soil subsidence due to oxidation (Synder and Davidson, 1994). When significant oxidation occurs the PCS for the overstory may show signs of tree falls, excessive tree leaning and exposed roots. In addition, if forested wetland systems are maintaining a proper hydroperiod then seedling regeneration will be occurring either in openings within the canopy or on the periphery of the system.

2.4.5.2 FIELD INDICATORS OF WETLAND HYDROLOGY MATRIX

Objective

This variable evaluates the hydrologic regime based on observed field indicators for the subject wetland. The evaluation considers hydroperiod duration and magnitude It is generally interpreted by using vegetative indictors and other signs of altered hydrology such as the encroachment of upland and transitional plant species into the wetland. In addition, hydrologic indicators such as wrack lines, algal communities, adventitious roots, basal water marks and attached epifauna are used.

HYDROLOGIC REGIME HAS BECOME SEVERELY ALTERED WITH STRONG EVIDENCE OF SUCCESSION TO TRANSITIONAL/UPLAND OR OPEN WATER PLANT COMMUNITY 0

The wetland hydrology has been severely altered.
There is an inadequate hydroperiod to support wetland plant species for the particular community type.
There is strong evidence that upland plants are encroaching into the historical wetland area.
Water levels are too high or too low, resulting in a die-off of wetland plant species.
There are no indicators of a hydrologic regime that would be typical for the subject community type.
In sites with an organic soil substrate, there is evidence of substantial soil subsidence.
In sites that have mineral soils and no natural organic surface horizons, the uppermost 6 inches of the soils at or below the target water surface elevation exhibit substantial changes in color value as measured by a Munsell Soil Color Chart (MSCC), as compared to the site's unaltered natural or its reference condition.

HYDROLOGIC REGIME INADEQUATE TO MAINTAIN A VIABLE WETLAND SYSTEM 1

The site does not exhibit an adequate hydroperiod to maintain a system that is being created, enhanced or preserved.
Succession of wetland plant species into transitional/upland plant species. Appropriate vegetation is stressed or dying from too much or too little water.
There are few, if any, indicators of a hydrologic regime that would be typical for the subject community type.
In sites with an organic soil substrate, there is evidence of unnatural soil subsidence or accretion.
In sites that have mineral soils and no natural organic surface horizons, the uppermost 6 inches of the soils at or below the target water surface elevation exhibit readily observable changes in color value as measured by a Munsell Soil Color Chart (MSCC), as compared to the site's unaltered condition.

HYDROLOGIC REGIME ADEQUATE TO MAINTAIN A VIABLE WETLAND SYSTEM. EXTERNAL FEATURES MAY AFFECT WETLAND HYDROLOGY 2

Wetland appears to exhibit adequate hydroperiod, although site conditions may exist that interfere or influence the natural hydroperiod of site (i.e. canals, ditches, swales, berms, culverts, pumps, control elevation and wellfields).
Plants appear healthy and exhibit no stress from too little water or too much water.
There are some indicators of a hydrologic regime that would be typical for the subject community type.
In sites with an organic soil substrate, there is evidence of little or no unnatural soil subsidence or accretion.
In sites that have mineral soils and no natural organic surface horizons, the uppermost 6 inches of the soils at or below the target water surface elevation shall exhibit only minor changes in color value as measured by a Munsell Soil Color Chart (MSCC), as compared to the site's reference condition.

HYDROLOGIC REGIME ADEQUATE TO MAINTAIN A VIABLE WETLAND SYSTEM 3

Plants are healthy with no stress resulting from an improper hydroperiod.
System exhibits a natural wetland hydroperiod.
If wetland is adjacent to canals, ditches, swales, berms or wellfields, there are no direct observable negative impacts to the wetland within the landscape setting.
There are a few to several indicators of a hydrologic regime that would be typical for the subject community type.
In sites with an organic soil substrate, there is no evidence of unnatural soil subsidence or accretion.
In sites that have mineral soils and no natural organic surface horizons, the uppermost 6 inches of the soils at or below the target water surface elevation exhibits no change in color value, as measured by a Munsell Soil Color Chart (MSCC), as compared to the site's unaltered natural or its reference condition.

2.4.6.1 WATER QUALITY INPUTS AND TREATMENT

INTRODUCTION

Evaluating water quality within the limited timeframes of the regulatory process is a very difficult task. Without the collection of long term water quality data it is virtually impossible to make any inferences to water quality within a wetland system. However, during the literature review, it became apparent that relatively comprehensive information is available for several water quality constituents including; total nitrogen, total phosphorus, ortho-phosphorus, BOD, TSS, total lead and total zinc (Harvey, 1990). It can be stated that for these selected constituents, runoff water quality varies with land use (Whalen and Cullum, 1988). The E-WRAP for MB'S procedure utilizes nine (9) land use categories to evaluate stormwater quality runoff and its associated impacts. The nine land use categories where taken from Stormwater Loading Rate Parameters for Central and South Florida (Harvey, 1990). The land use categories used in E-WRAP for MB'S include the following; low-density residential, single-family residential, multi-family residential, low-intensity commercial, high-intensity commercial, industrial, highways, agriculture and recreation/open space. Each of these land use categories are further defined within the glossary for this procedure. It is important to use these land use designations when applying this procedure in the field.

For initial mitigation bank establishment, selected water quality sampling is necessary to document baseline, site-specific water quality functions and to monitor future anticipated water quality improvement over the life of the mitigation bank. The Water Quality Indicators described below are separated into General Field Parameters, which will be measured at all mitigation bank sites, and Potential Parameters for Specific Sites based on the land use categories adjacent to a specific mitigation bank. The final selection of water quality criteria and the frequency, location and duration of water quality sampling are designed to be flexible, and will be tailored to each mitigation bank based on discussions with the Mitigation Bank Review Team, water quality experts, and the prospective mitigation banker.

Water quality sampling at a proposed mitigation bank site should begin early in the planning process and is designed to supplement the E-WRAP scoring described below. Initial water quality analyses should be submitted for review by the MBRT in the Mitigation Bank Prospestus, or soon thereafter, but prior to on-site inspection by the MBRT. In addition to documenting baseline conditions at a specific mitigation bank site, water quality data may document unique water quality issues needing resolution prior to bank approval, and will be utilized to quantifiably document improvement, or lack thereof, in water quality conditions over the life of the mitigation bank. As such, water quality criteria will be utilized during the establishment of credit release schedules and the ultimate release of credits based on documented water quality improvement.

Pollutant loading rates from recreation/open space are much lower than any other category. Loading rates for residential land uses increase steadily for each pollutant category from low-density to single-family to multi-family. Low intensity commercial mass loading is much less than high-intensity uses for all pollutant categories with industrial uses falling in between the two. Finally, contribution of nutrients from agricultural uses are much greater than loading rates for wetlands and open water, and appear to be similar to single-family pollutant loadings (Harvey, 1990). These land use categories and their associated loading rates have been used within this procedure to calibrate the water quality variable. It is important to recognize that the previously mentioned land use designations represent the vast majority of land uses within central and south Florida.

In addition to land use types, the efficiencies associated with different water management systems to remove pollutants shall be considered. Treatment for the pollution generated by stormwater runoff is required in the state of Florida through the regulatory process. There are several treatment methods that are suggested. Wet detention is the most commonly used mechanism, with approximately 70 percent of the water management systems permitted in south Florida being wet detention systems. Dry retention, and/or retention and some form of infiltration /filtration are the other types of treatment mechanisms that are commonly used (Whalen and Cullum, 1988).

Retention systems which include grass swales, achieve upwards of 90 percent reduction for nutrients and solids. Wet detention basins provide good to excellent pollutant removal efficiencies. The standing water column provides for several physicochemical processes to achieve pollutant removal (Whalen and Cullum, 1988).

Treatment of stormwater by use of dry retention basins is generally considered to be inferior to that achieved by wet detention. The reason for the low removal of pollutants is most likely due to the absence of a standing water column, which provides a mean for more extensive biological treatment (Whalen and Cullum, 1988).

The water quality component of E-WRAP evaluates the land use type (LU) adjacent to the subject wetland and the type of surface water management pretreatment (PT) associated with the subject land use. Both LU and PT will be independently assessed and then summed. The summed total is then divided by two (2) to calculate the water quality input and treatment (WQIT) score for E-WRAP. Many times on-site conditions exist that are either not accurately described or a combination of land uses exist adjacent to the subject wetland. In these instances the evaluator must evaluate each of the surrounding land use(s), and the surface water management system associated with each land use. This is mathematically expressed as follows;

(%surrounding x LU1) + (%surrounding x LU2) + (%surrounding x LU3) = LU total

and,

(%surrounding x PT1) + (%surrounding x PT2) + (%surrounding x PT3) = PT total

hence,

WQIT = (LU total + PT total)/2

The conclusions of the PT systems are given with the assumption that the guidelines for proper construction of these systems are followed and that operation and maintenance procedures for the systems are followed during post construction.

MITIGATION BANKS: SELECTION OF WATER QUALITY INDICATORS

1. Objectives: Quantifiable water quality criteria, which meet Florida's Class III standards and detection limits, must be used to assess anticipated water quality improvements attained at proposed mitigation banks. These criteria must be site-specific, and incorporate potential water quality impacts from adjacent and nearby lands. Sampling and analyses of water quality parameters must be performed by HRS approved laboratories using FDEP approved methods.

2. General Field Parameters: The following should be measured within ALL potential mitigation sites:

Specific conductance, pH, Dissolved oxygen, Turbidity, Hydrogen sulfide, Biological oxygen demand (BOD), Total hardness, Total dissolved solids, Total organic carbon, Chemical oxygen demand (COD), Unionized ammonia, Total nitrogen, Total phosphorus. Historic mosquito control treatment history, if applicable, may identify additional specific water quality criteria which need to be measured.

3. Potential Parameters for Specific Sites: The selection of water quality criteria will based on the following land use categories adjacent to a given mitigation bank on a case-by-case basis:

A. Agricultural lands/Golf courses: Pesticides (Chlordane, Endosulfan, Endrin, Heptachlor, Malathion, 2,4,5-TP, 2,4,-D, Aldrin, DDT).

B. Range/Pasture/Dairy and Feedlots: Total Coliform, Fecal coliform, Pesticides.

C. Residential/Commercial: Oils and greases, Pesticides, Aluminum, Chlorides, Total coliform, Fecal coliform, Chromium, Lead, Orthophosphate, Selenium, Semivolatile compounds, Volatile compounds, Zinc.

D. Industrial: Oils and greases, Pesticides, Aluminum, Chlorides, Chromium, Lead, Orthophosphate, Selenium, Semivolatile compounds, Volatile compounds, Zinc, Polynuclear aromatic hydrocarbons, Total Phenols, Polycyclic aromatic hydrocarbons, Phthalate esters, Polychlorinated biphenyls, Radioactive substances, Cyanides.

E. Highway: Oils and grease, Semivolatile compounds, Volatile compounds.

2.4.6.2 WATER QUALITY INPUT AND TREATMENT MATRIX

Objective

The water quality variable of the matrix is a measure of the quality of the surface water flowing into the subject wetland from adjacent land uses (LU). The percent and type of surrounding land uses as well as any on-site pretreatment (PT) of surface waters prior to the discharge into wetlands is considered.

The scores for land use types are as follows:

LAND USE CATEGORY (LU)	SCORE
open space / natural undeveloped areas	3
unimproved pasture / rangeland	2.5
citrus grove	2
sugarcane	2
low density residential	2
low intensity commercial	2
institutional	2
single-family residential	1.5
recreational	1.5
golf course	1.5
moderately intensive commercial	1.5
highways	1
industrial	1
mining	1
multi-family residential	1
improved pasture	1
row crop	1
high intensity commercial	0.5
dairy and feedlot	0

*see Glossary for definitions

The scoring increments for treatment systems are as follows:

PRE-TREATMENT CATEGORY (PT)	SCORE
natural undeveloped area	3
berms which prevent runoff from entering wetland	2.5
wet detention with swales	2.5
wet detention with dry retention	2.5
combination grass swales with dry retention	2
turbidity during construction	1.5
wetland system is part of treatment	1.5
grass swales only	1
dry retention only	1
no treatment	0

The scores for the PT systems are given with the assumption that the systems are built, operated and maintained in accordance with all applicable regulations and guidelines.

FORMULA FOR WATER QUALITY INPUT AND TREATMENT VARIABLE (WQIT)

Example: (%surrounding x LU1) +(%surrounding x LU2) + (%surrounding x LU3)= LU total

WQIT =(LU total + PT total) /2

APPENDIX E

SOME COMMON EXOTIC AND NUISANCE PLANT SPECIES FOUND IN WETLANDS OF SOUTHERN FLORIDA
(Includes Partial List of the Florida Exotic Pest Plant Council's 1995 Most Invasive Species)

COMMON NAME	SCIENTIFIC NAME	PLANT FORM
alligator weed	*Alternantera philoxeroides*	herb
shoebutton ardisia	*Ardisia elliptica*	shrub, small tree
bishopwood	*Bischofia javanica*	tree
para grass	*Brachiaria mutica*	grass
Australian pine	*Casuarina equisetifolia*	tree
taro	*Colocasia esculenta*	herb
carrotwood	*Cupaniopsis anacardioides*	tree
air-potato	*Dioscorea bulbiflora*	vine
water hyacinth	*Eichornia crassipes*	herb
Surinam cherry	*Eugenia uniflora*	shrub, small tree
water primrose	*Ludwigia octovalvis*	herb
primrose willow	*Ludwigia peruviana*	herb
Japanese climbing fern	*Lygodium japonicum*	vine
old world climbing fern	*Lygodium microphyllum*	vine
climbing hempweed	*Mikania scandens*	vine
melaleuca	*Melaleuca quinquenervia*	tree
torpedo grass	*Panicum repens*	grass
bahia grass	*Paspalum notatum*	grass
napier grass	*Pennisetum purpureum*	grass
water lettuce	*Pisfla stratiotes*	herb
guava	*Psidium gunjava*	tree
Chinese tallow	*Sapium sebiferum*	small tree
Brazilian pepper	*Schinus terebinthifolius*	tree
St. Augustine grass	*Stenotaphrum secunotatum*	grass
Java plum	*Syzygium cumini*	tree
seaside mahoe	*Thespesia populnea*	tree
cattail	*Typha spp.*	herb
Caesar's weed	*Urena lobata*	herb
wedelia	*Wedelia trilobata*	herb

Need additional
Salt water guilds

APPENDIX F

FLORIDA WILDLIFE GUILDS

WETLAND OBLIGATE AND FACULTATIVE SPECIES

	Common Name	Scientific Name
MAMMALS		
Wetland Herbivores	Round-tailed muskrat	*Neofiber alleni*
	White-tailed deer	*Odocoileus virginianus*
	Marsh rabbit	*Sylvilagus palustris*
	Rice rat	*Oryzomys palustis*
	Beaver	*Castor canadensis*
Wetland Carnivores	River otter	*Lutra canadensis*
	Mink	*Mustela vison*
	Bobcat	*Lynx rufus*
	Florida panther	*Felis concolor coryi*
	Raccoon	*Procyon lotor*
	Black bear	*Ursus americanus*
	Virginia opossum	*Didelphis virginiana*
BIRDS		
Wading Birds	Wood stork	*Mycteria americana*
	Great blue heron	*Ardea herodias*
	Great egret	*Casmerodius albus*
	Green-backed heron	*Butorides striatus*
	Little blue heron	*Egretta caerulea*
	Reddish egret	*Egretta rufescens*
	Snowy egret	*Egretta thula*
	Tricolored heron	*Egretta tricolor*
	Roseate spoonbill	*Ajaia ajaja*
	White ibis	*Eudocimus albus*
	Glossy ibis	*Plegadis falcinellus*
	Black-crowned night heron	*Nycticorax nycticorax*
	Yellow-crowned night heron	*Nycticorax violaceus*
	American bittern	*Botaurus lentiginosus*
	Least bittern	*Ixobrychus exilis*
Fish-Eating Birds	Terns	*Sterna spp.*
	Black skimmer	*Rynchops niger*
	Belted kingfisher	*Ceryle alcyon*
	Brown pelican	*Pelicanus occidentalis*
	Common loon	*Gavia immer*
	Grebes	*Podiceps, Podilymbus*
	Mergansers	*Mergus spp.*
	Anhinga	*Anhinga anhinga*
	Double-crested Cormorant	*Phalacrocorax auritus*
Aquatic Invertebrate-Eating Birds	Plovers	*Charadrius spp.*
	Black-necked stilt	*Himantopus mexicanus*
	American avocet	*Recurvirostra americana*
	Sandpipers and phalaropes	*Colopacidae*

	American oystercatcher	*Haematopus palliatus*
	Snail kite	*Rostrhamus sociabilis*
	Limpkin	*Aramus guarauna*
Raptors	Bald eagle	*Haliaeetus leucocephalus*
	Osprey	*Pandion haliaetus*
	Northern harrier	*Circus cyaneus*
	Peregrine falcon	*Falco peregrinus*
	Merlin	*Falco columbarius*
REPTILES		
Crocodylians	Alligator	*Alligator mississippiensis*
	American crocodile	*Crocodylus acutus*
Aquatic Turtles	Florida snapping turtle	*Chelydra serpentina*
	Peninsula cooter	*Chrysemys floridana*
	Florida redbelly turtle	*Chrysemys nelsoni*
	Yellowbelly slider	*Chrysemys scripta*
	Florida chicken turtle	*Deirochelys reticularia*
	Striped mud turtle	*Kinosternon bauri*
	Florida mud turtle	*Kinosternon subrubrum*
	Stinkpot	*Sternotherus odoratus*
	Florida softshell	*Trionyx ferox*
Aquatic Snakes	Water snakes	*Nerodia spp.*
	Striped crayfish snake	*Regina alleni*
	Florida swamp snake	*Seminatrix pygaea*
	Florida cottonmouth	*Agkistrodon piscivorus*
AMPHIBIANS		
	Treefrogs	*Hyla spp.*
	Cricket frogs	*Acris spp.*
	Chorus frogs	*Pseudacris spp.*
	Eastern narrowmouth toad	*Astrophryne carolinensis*
	Eastern spadefoot	*Scaphiopus hobrooki*
	True frogs	*Rana spp.*
	Two-toed amphiuma	*Amphiuma means*
	Dwarf salamander	*Eurycea quadridigitata*
	Peninsula newt	*Notophthalmus viridescens*
	Dwarf siren	*Pseudobranchus striatus*
	Eastern lesser siren	*Siren intermedia*
	Greater siren	*Siren lacertina*
FISH		
Predatory Fishes	Largemouth bass	*Micropterus salmoides*
	Gar	*Lepisosteus spp.*
Forage Fishes	Sunfish	*Centrarchidae*
	Killifishes	Cyprinodontidae
	Livebearers	Poeciliidae
MACROINVERTEBRATES		

Crayfish	Procambarus spp
Apple snail	*Pomacea paludosus*
Ram's horn snail	*Planorbella spp.*
Prawns	*Penaeus spp.*
Grass shrimp	*Paloaemonetes paludosus*
Dragonflies	Anisoptera
Mayflies	Ephemeroptera
Aquatic beetles	Dytiscidae/Gyrinidae/Hydrophilidae
Fishing spiders	*Dolomedes spp.*
Water striders	Gerridae
Aquatic bugs	Hemiptera
Leeches	Hirudinea
Water mites	Hydracarina
Aquatic moths	Lepidoptera

GLOSSARY

Agriculture - activities include cattle grazing, row crop, citrus and related activities

Appropriate plant species - plant species which are appropriate for a given community type (i.e. - *Rhyncosphora tracyii* in a wet prairie, *Nymphaea odorata* in a deepwater marsh).

Baseline condition - the condition of the wetland assuming a reasonably expected "without bank" condition.

Canopy - the plant stratum composed of all woody plants and palms with a trunk four inches or greater in diameter at breast height (4.5'), except vines.

Decreased hydroperiod - a decrease in the annual period of inundation, resulting in a change in the plant community composition and structure. The effect is an increase of transitional and upland plant species.

Desirable plant species - native plant species that are appropriate in a regional biological sense and provide benefits to wildlife in the form food, cover, and nesting potential.

Direct impacts - a physical act such as dredging or filling of wetlands.

Dry detention - impoundments in which stormwater is temporarily stored. They are designed so that no standing water remains in the basin after the bleed down period.

Exotic plant species - plants species that are non-native, purposefully or accidentally introduced to a geographic area, invasive in nature and disrupt native plant communities.

Extensively maintained - mowed, disked or impacted on more than a semi-annual basis.

Freshly mulched created mitigation area - the spreading of hydric soils (with viable native seed bank present) across a graded, newly constructed mitigation area.

Grass swales - a grassed swale is a linear depression, that is usually designed to capture, store, and convey stormwater runoff.

Ground cover - the plant stratum composed of all plants not found in the canopy or subcanopy.

Heavily impacted - impacted in such a degree as to significantly reduce the functionality of a system.

High intensity commercial - land use consisting of commercial with high levels of traffic volume with traffic constantly moving of the area; these include downtown areas, commercial office sites and regional malls.

High intensity land use - includes intensive agricultural operations such as dairy farming (including feedlots) and high-intensity commercial projects. These surrounding land uses are significantly disruptive to wetland systems through indirect and indirect impacts.

Highway - includes major road systems such as interstate highways, major arteries and thoroughfares.

Hydroperiod - the annual period of continuous inundation, but without regard to depth.

Hydrological indicators - indicators that may be used as evidence of inundation or saturation when evaluated with meteorological information, surrounding topography, and reliable hydrological data. Indicators include algal mats, aquatic mosses, aquatic plants, aufwachs, drift lines, elevated lichen lines, evidence of aquatic fauna, morphological plant adaptations, secondary flow channels, sediment deposition, vegetated tussocks and water marks.

Hydrology - water depth, flow patterns, and duration and frequency of inundation as influenced by precipitation, surface runoff and groundwater inputs and outputs.

Impervious surface - surfaces which do not allow for the percolation of water (i.e. - asphalt parking lots and roads, rooftops of buildings).

Inappropriate plant species - plant species which are not usually considered nuisance species, however may be indicative of other problems (i.e. - improper hydrology) and may dominate a particular stratum (e.g. *Rubus* sp. in a cypress forested wetland). These plant species are not considered appropriate for a particular habitat.

Increased hydroperiod - an increase in the annual period of inundation, resulting in a change in the plant community composition and structure. Can include an increase in the duration and magnitude of inundation.

Indirect impacts - impacts to wetlands such as increased nutrient loading, altered hydrology, impacts to wetland buffer, development of adjacent areas or disturbances by sound, air, light or noise pollution.

Industrial - includes manufacturing, shipping and transportation operations, sewage treatment plant facilities, water supply plants and solid waste disposal.

Infiltration trench - impoundments in which incoming runoff is temporarily stored until it gradually leaves the basin by infiltrating into the soils.

Institutional - includes schools, churches, libraries etc. Similar runoff concentrations to low-intensity commercial.

Landscape setting - the type of land use that surrounds a wetland (i.e. - agriculture, residential, commercial/industrial, undeveloped).

Low density residential - a rural area with lot sizes greater than 1 acre or less than one dwelling unit per acre.

Low-intensity commercial - areas that receive a moderate amount of traffic volume and are parked for only a portion of the day; these areas include universities, schools, churches, professional office sites and small shopping centers.

Low intensity land use - land uses such as low density residential, citrus and low intensity commercial.

Low plant biomass density - little accumulation of plant biomass due to numerous factors including mowing, grazing, recent vegetation installation, inappropriateness of planted species, improper hydrology (including drought) and other human perturbations such as disturbances by off-road vehicles.

Moderately intensive land use - includes single-family residential, multi-family residential, golf courses and golf course residential communities, industrial projects, highways and agricultural activities such as pasture and row crops.

Multi-Family residential - residential land use consisting primarily of apartments, condominiums and cluster homes.

Pretreatment or MSSW system - constructed systems designed to pretreat water (i.e. - removal of suspended solids and degrees of nutrient removal) prior to discharge. Systems can range in simplicity from grass swales, dry retention to secondary treatment and polishing ponds.

Routinely maintained - mowed or impacted on less than an annual basis.

Secondary productivity - macroinvertebrates, fishes and wildlife.

Single-Family residential - typical detached homes with lot sizes less than 1 acre and dwelling densities greater than 1 dwelling per acre; duplexes constructed on one-third to one-half acre also included.

Subcanopy - means the plant stratum composed of all woody plants and palms, exclusive of the canopy, with a trunk or main stem with a diameter breast height (4.5') between one and four inches, except vines.

Undesirable plant species - exotic, nuisance or inappropriate plant species for a given habitat.

Wet detention - impoundments in which stormwater runoff is temporarily stored until it gradually leaves the basin through an outflow control structure. They are designed so that a pool of standing water remains in the basin after the bleed-down period.

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Appendix J

POND APPLE SLOUGH

Restoration Project

Management Plan

LEWIS ENVIRONMENTAL SERVICES, INC.

POND APPLE SLOUGH
RESTORATION PROJECT

Management Plan

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and
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December 26, 1996

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1. EXECUTIVE SUMMARY

The Pond Apple Slough Ecosystem (PASE) is a 750-acre remnant wetland system located in eastern Broward County. Historically it was part of a much larger flow-way system that connected the Everglades with the New River and eventually the Atlantic Ocean during high water periods.

The existing ecosystem suffers from poor water quality due to saltwater intrusion, which has also severely modified the animal and plant communities present in the area. Invasion and replacement of native plant communities by invasive exotic plants has been facilitated by many years of uncontrolled drainage and land clearing.

Recommendations for future management include:

1. Designation of a single agency with overall management responsibilities for the entire ecosystem.
2. Expansion of the membership of the existing Pond Apple Slough Working Group (PASWG) to include a representative of Florida Power and Light and interested citizens who live in the ecosystem.
3. Continuation of regular meetings of the PASWG.
4. Use of an agreed-upon management unit designation system to facilitate targeted management efforts.
5. Continued annual budgeting of two maintenance workers, a boat, trailer, 4-wheel drive vehicle and chemicals for the control of exotic plant species in the Pond Apple Slough Ecosystem and ESL sites in Broward County ($81,000/year).
6. Contracting for a consultants update of the existing hydrology and hydrobiology of the ecosystem and recommendations for specific water management efforts ($35,000)
7. Provision of funds to support two continuing positions in support of the administrative and interpretive efforts within the PASE (estimated at $150,000/yr).
8. Institute a regular monitoring program using college or graduate level students in conjunction with County staff (estimated at $25,000/yr).

2. INTRODUCTION

The Pond Apple Slough is a 112-acre remnant freshwater wetland within a total freshwater, estuarine and upland ecosystem covering approximately 750 acres located in Broward County, Florida (Figures 1 and 2). The slough has a tree canopy predominantly of pond apple (*Annona glabra*), with an understory of leather fern (*Acrostichum* sp.). Red mangroves (*Rhizophora mangle*) and white mangroves (*Laguncularia racemosa*) are currently invading the lower tidal portions of the slough, and Brazilian pepper (*Schinus terebinthifolius*) and cattails (*Typha* spp.) become more dominant in the upper reaches of the slough. These upper reaches grade into bald cypress (*Taxodium distichum*), sawgrass (*Cladium jamaicense*), Brazilian pepper, cattails, Australian pine (*Casuarina* sp.) and melaleuca (*Melaleuca quinquenervia*).

The watershed for the Pond Apple Slough Ecosystem has been greatly reduced from historic times, and more recently with construction of I-595. The current major contributors to runoff into the slough are the adjacent 58-acre Griffey tract and the I-595 interchanges and roadways (Figure 2). The Griffey tract has less saltwater influence, although the previously intact berm on the South New River Canal has been breached and allowed some saltwater intrusion to occur. The tract supports primarily sawgrass, young cypress trees and a mixed shrub community of wax myrtle (*Myrica cerifera*), Brazilian pepper and small melaleuca. Several stands of larger melaleuca are located in the northern portions of the site.

In response to concerns raised about the changes in vegetation, particularly the toppling of pond apple trees due to boring activities of the isopod *Sphaeroma terebrans*, deaths of cypress trees due to salt stress, and invasion of the historic freshwater system by mangroves, Broward County decided in 1991 to utilize a $300,000 settlement of a wetlands violation case to attempt to restore the ecosystem (Appendix A). Lewis Environmental Services, Inc. (LES) was hired in 1992 to initially review a proposed restoration plan and offer professional recommendations (LES 1992). Following review by the Pond Apple Slough Working Group—an appointed panel of local experts and interested citizens (see Acknowledgments)—an interim plan was agreed upon which consisted of the five actions listed below:

1. Redirect retention pond discharge away from the current direct stream discharge;

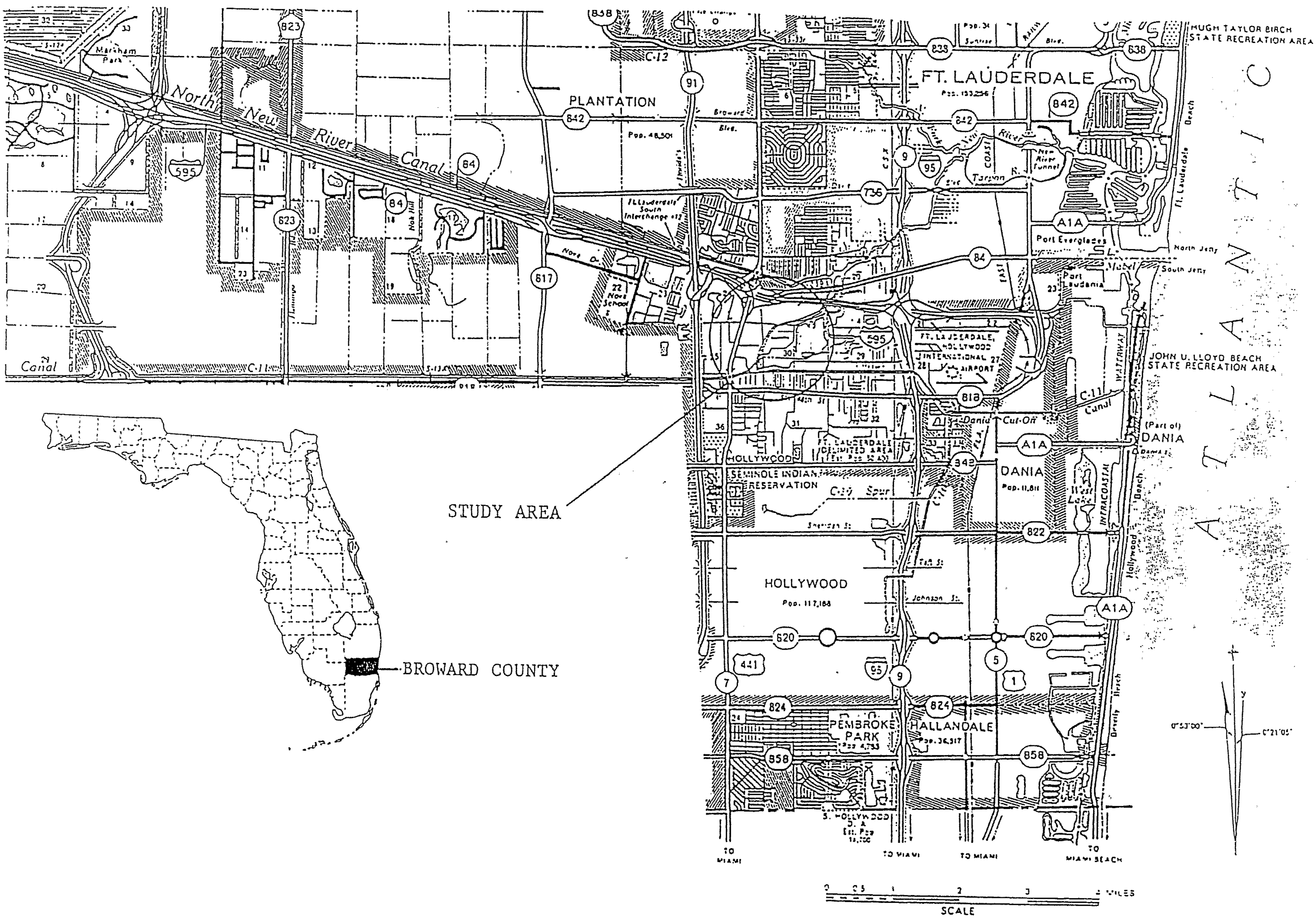

Figure 1 Map showing the location of the Study Area in the southeast portion of Broward County, Florida.

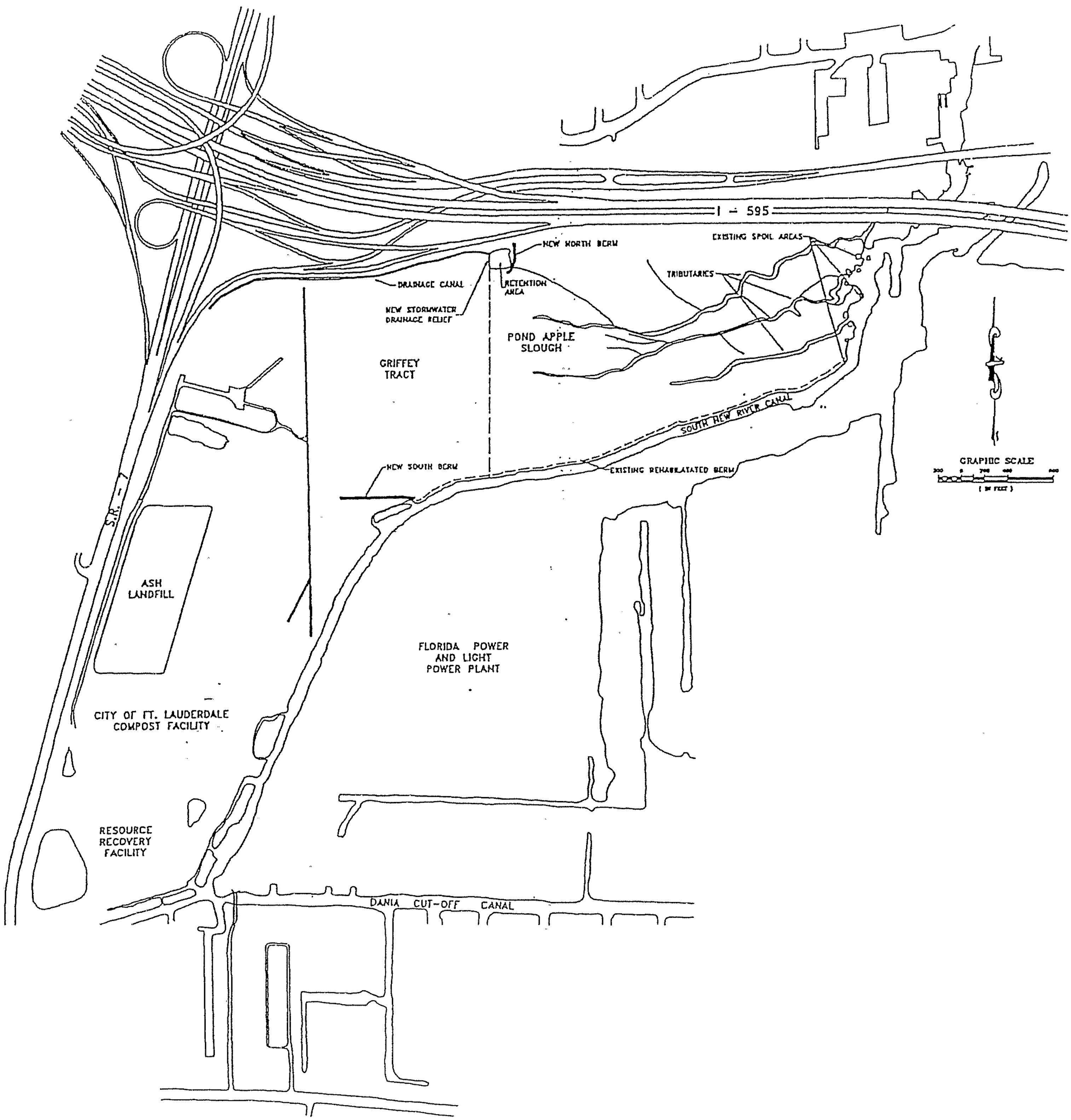

Figure 2. Existing conditions.

2. Prevent further damage to the Griffey Tract and Pond Apple Slough from surface saltwater intrusion by blocking the ash residue pond mitigation breach in the South New River berm and any other confirmed berm breaches;
3. Coordinate current exotic plant control efforts and recommend additional efforts to include the two-thirds of the Pond Apple Slough not currently in the exotic control plan;
4. Continue to seek additional sources of a freshwater subsidy or freshwater storage for the Slough;
5. Investigate the utility and priority need of constructing berms connecting existing spoil areas and the recently completed South New River west berm rehabilitation project on the east side of the Slough.

Through December of 1995 the first three of these items were completed (Appendix B), leaving a remaining budget balance from the original settlement of $12,428.35.

On December 19, 1995, LES was requested to consider preparing a management for the PASE for the remaining balance in the account (Appendix C). LES agreed to prepare the plan with the understanding that an updated hydrology study of the PASE could not be accomplished within that dollar amount. The existing hydrology study (Appendix D) and other existing documents on the PASE rewatering study (Appendices E and F) would have to stand on their own without detailed discussion (Appendix C). Authorization to proceed was verbally provided on January 4, 1996 with a due date for the draft document of February 15, 1996. This document represents the best efforts of all involved to prepare a document within a very short time, and critical review are being requested by all members of the PASWG. When these reviews are received, they will be incorporated within this document as Appendix I and addressed within the body of the document.

3. REGIONAL SETTING (modified from SFWMD 1991)

3.1 General Geographic Features

Broward County is located along the southeastern coast of the Florida peninsula and has a total area of 1,220 square miles. The county borders the Atlantic Ocean on the east, Palm Beach County on the north, Collier and Hendry Counties on the west, and Dade County on the south (Figure 1). The western two-thirds of the county are within the Water Conservation Areas (WCAs) of the South Florida Water Management District (SFWMD). The eastern third of Broward County is primarily urban and agricultural.

3.2 Meteorology

The climate of Broward County is subtropical marine, characterized by warm, humid summers and mild, dry winters. The mean annual temperature is 73 °F and the average rainfall ranges from about 52″ in the wester part of the county to as much as 60″ on the coast. About 75% of the rain falls during the west season that extends from June through October (Sherwood et al. 1973), with annual ranges of 30″ to 100″ (Figure 3).

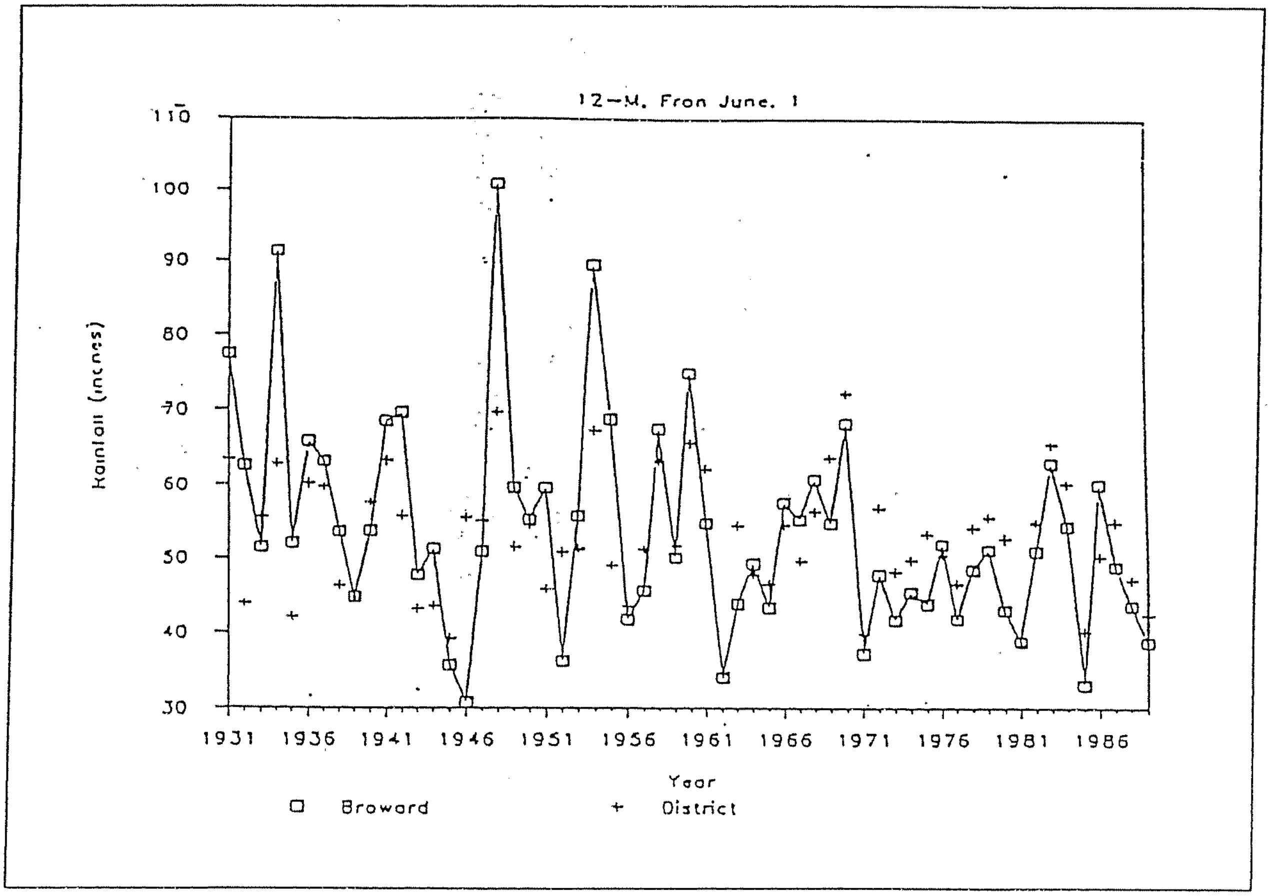

Figure 3. Monthly rainfall time series 12-M, from June 1. (from SFWMD 1992)

3.3 Topography and Drainage

Broward County is characterized by three principal physiographic zones situated contiguously from east to west: the Atlantic Coastal Ridge, the Sandy Flatlands, and the Everglades (Fish

1988, White 1970). The Atlantic Coastal Ridge parallels the coast and has a width of five miles or less. The ridge varies in elevation from 10′ above sea level in the south to 22′ in the north and forms a natural barrier to drainage of the interior, except where breached by canals, rivers or sloughs (Fish 1988). The Sandy Flatlands are lower in elevation than the coastal ridge and extend westward from it for five to eight miles. Prior to development, this zone was poorly drained and characterized by numerous intermittent ponds. West of the Sandy Flatlands and slightly lower in elevation, the Everglades extend some 40 miles inland. In Broward, the Everglades reaches a maximum elevation of some 13′ above sea level along the northern part of the county and a minimum elevation of about 5′ in the south-central part. In 1953, levee barriers were completed along the east border of the Everglades. These levees form the eastern boundary of the WCAs, large segments of Everglades habitat, most of which are wetlands. These areas serve multiple purposes, including environmental protection, recreation, flood control and water storage.

The present day drainage in the county is controlled by canal systems operated by the Water Management District and various local drainage districts. The nine major District canals in the area are used for transporting water eastward from the WCAs or Lake Okeechobee. These canals, in conjunction with secondary canals and ditches, are also used for the rapid removal of excess stormwater for flood control purposes. Detailed information on the canals and surface water management basins in eastern Broward county is contained in a report by Cooper and Lane (1987).

3.4 Geologic and Hydrologic Setting

Southern Florida occupies the southeastern corner of the Floridan Plateau, the edge of which lies only a few miles from the Atlantic coast of the peninsula (Parker et al. 1955). The core of the Floridan Plateau, consisting of metamorphic and igneous rocks, is covered by sediments that reach a cumulative thickness of more than 15,000′ in southern Florida.

The stratigraphic succession of formations in southern Florida was predominantly formed under a marine environment (Parker et al. 1955). Since at least early Tertiary times, the region has been characterized by shallow water conditions adjacent to a low lying land mass.

Relatively small amounts of suspended or bed load materials were carried by slow moving streams to the sea and shoreline processes provided the main mechanism for dispersing detrital material.

The sedimentary units in Broward County to a depth of approximately 200′–400′ consist generally of limestone, sandstone, sand, shell, marl, lime mud, silt, clay, peat and mixtures of these materials (Causaras 1985, Parker et al. 1955; Figure 4). These units range in age from late Miocene to Recent. From the water table to the relatively impermeable lower part of the Tamiami Formation, constitute the surficial aquifer system in Broward County (Fish 1988). Fish (1988) identified two aquifer units within the surficial aquifer system: the Biscayne Aquifer, the principal aquifer extending over most of Broward, and the "gray limestone aquifer" found at depth in west Broward.

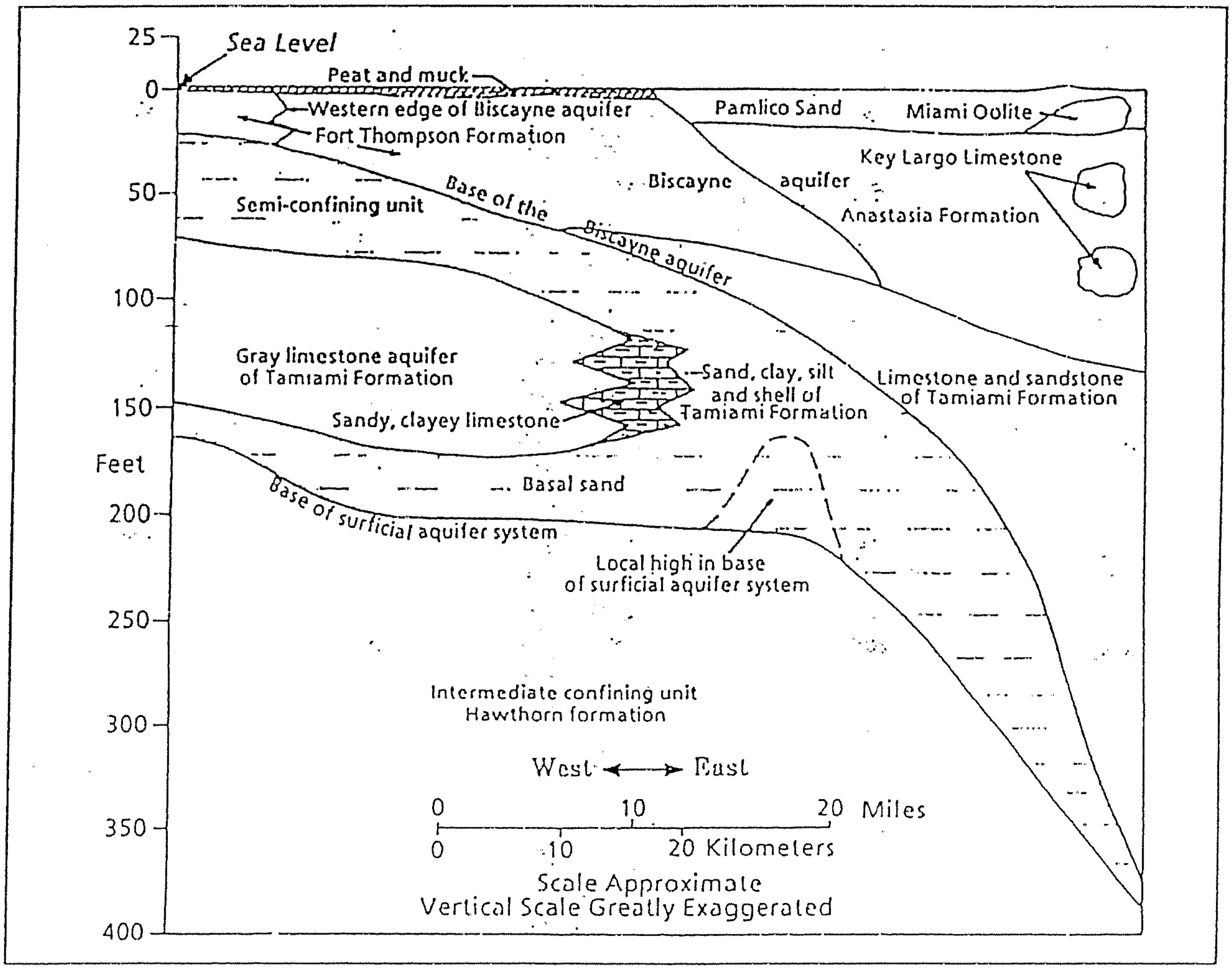

Figure 4. Hydrologic formations of the surficial aquifer system across Broward County, Florida. (Based on Fish 1988, from SFWMD 1992)

The uppermost Pleistocene unit in Broward County is the Pamlico Sand. The Pamlico, which is generally fairly permeable, reaches a maximum thickness of about 60′ and mantles large areas underlain by Miami Oolite and the Anastasia Formation (Parker et al. 1955, Causaras 1985). The Miami Oolite is a limestone unit of generally good permeability, although the extent of its occurrence in Broward is limited (Causaras 1985, Fish 1988). The Anastasia Formation is composed chiefly of coquina and has fair to high permeability (Parker et al. 1955, Hoffmeister 1974). Its thickness is over 150′ in parts of the county (Causaras 1985). The Anastasia interfingers with the Key Largo Formation which consists of coralline limestone and yields substantial quantities of water. The spatial distribution of the Key Largo in Broward County is limited, however (Causaras 1985, Fish 1988). The Key Largo Limestone and Anastasia Formation are considered to be equivalent in age to the marine deposits of the Fort Thompson Formation, which generally forms the base of the Pleistocene units in the county. The Fort Thompson is chiefly composed of solution-riddled marine and freshwater limestone (Parker et al. 1955, Hoffmeister 1974) and varies in thickness from 0 to over 100′ in Broward (Causaras 1985). In coastal Broward County, the Fort Thompson is highly permeable and yields great quantities of water.

The Upper Floridan Aquifer encompasses the units from the Suwannee Limestone to the upper Avon Park Limestone. The thickness of this aquifer varies from about 100′ in the western part of the county to 300′ in the eastern part (Miller 1986). The middle confining unit consists of rocks belonging to the lower part of the Avon Park Limestone and attains a cumulative thickness of about 900′ in Broward (Bush and Johnston 1988, Miller 1986). All the beds in the Floridan Aquifer system that lie below the middle confining unit and above the base of the aquifer system are included in the Lower Floridan Aquifer (Miller 1986). The Lower Floridan varies in thickness from approximately 1700′ in southeastern Broward to 2400′ in northwestern Broward. Historically, utilization of the Upper Floridan Aquifer System for water supply in Broward County has been limited due to high mineral content (Sherwood et al. 1973).

3.5 Water Resources

3.5.1 Surface Water Resources

The purpose of this section is to provide a general description of the surface water resources of eastern Broward County. This has been done by presenting summaries of the numerous canals and control structures located in that portion of the county. To make these summaries concise, the canals and structures are described for each of the surface water management basins (also known as drainage basins) that have been defined for Broward County. The eastern part of the county is subdivided into nine surface water management basins whereas the western part of the county lies within portions of the Everglades WCAs (Figure 5). Most of the following descriptions of the surface water resources of Broward county were summarized from pertinent sections of the Broward County Water Supply Plan (SFWMD 1991).

Eastern Broward County: The nine surface water management basins in eastern Broward County are:

- Hillsboro Canal Basin
- C-14 (Cypress Creek Canal) Basin
- Pompano Canal Basin
- C-13 (Middle River Canal) Basin
- C-12 (Plantation Canal) Basin
- North New River Canal Basin
- C-11 (South New River Canal) Basin
- C-10 (Hollywood Canal) Basin
- C-9 (Snake Creek Canal) Basin

The study area occupies portions of the North New River Canal Basin and the C-11 Basin (Figure 6).

The North New River Canal (NNRC) basin is divided into a western sub-basin and a relatively small eastern sub-basin (Figure 6). The basin contains three Project Canals: the NNRC, the L-35A borrow canal, and C-42. There are eight Project water control structures regulating flow in the NNRC basin: S-34, S-124, S-125, S-141, S-142, S-143, Sewell Lock (G-54) and G-123 (Figure 6).

The Project canals and control structures in the NNRC basin have four functions: to provide flood protection and drainage for the NNRC basin; to supply water to the basin during periods of low natural flow; to convey excess water from WCA-2A, WCA-2B and WCA-3A to

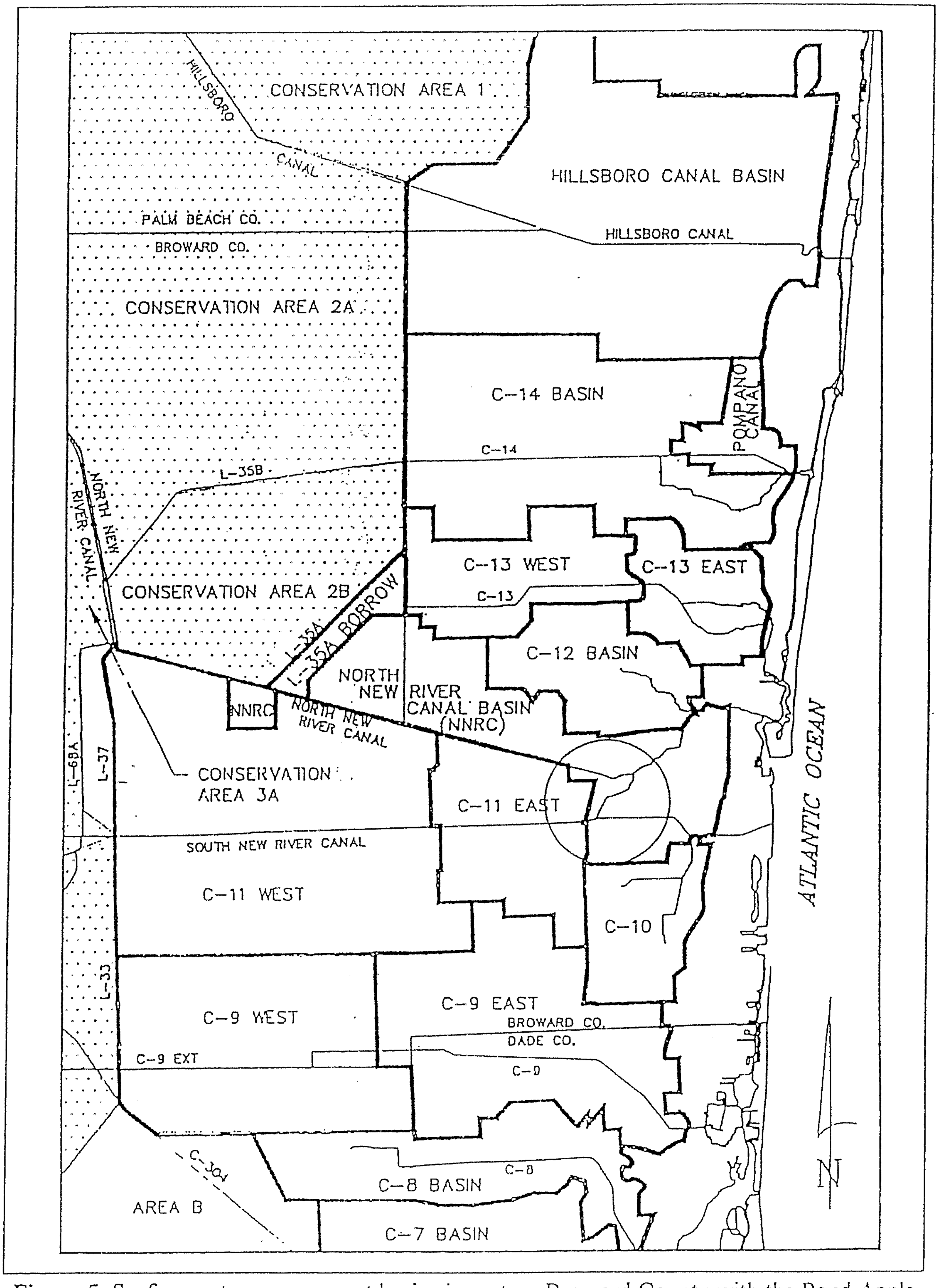

Figure 5. Surface water management basins in eastern Broward County with the Pond Apple Slough Ecosystem circled.

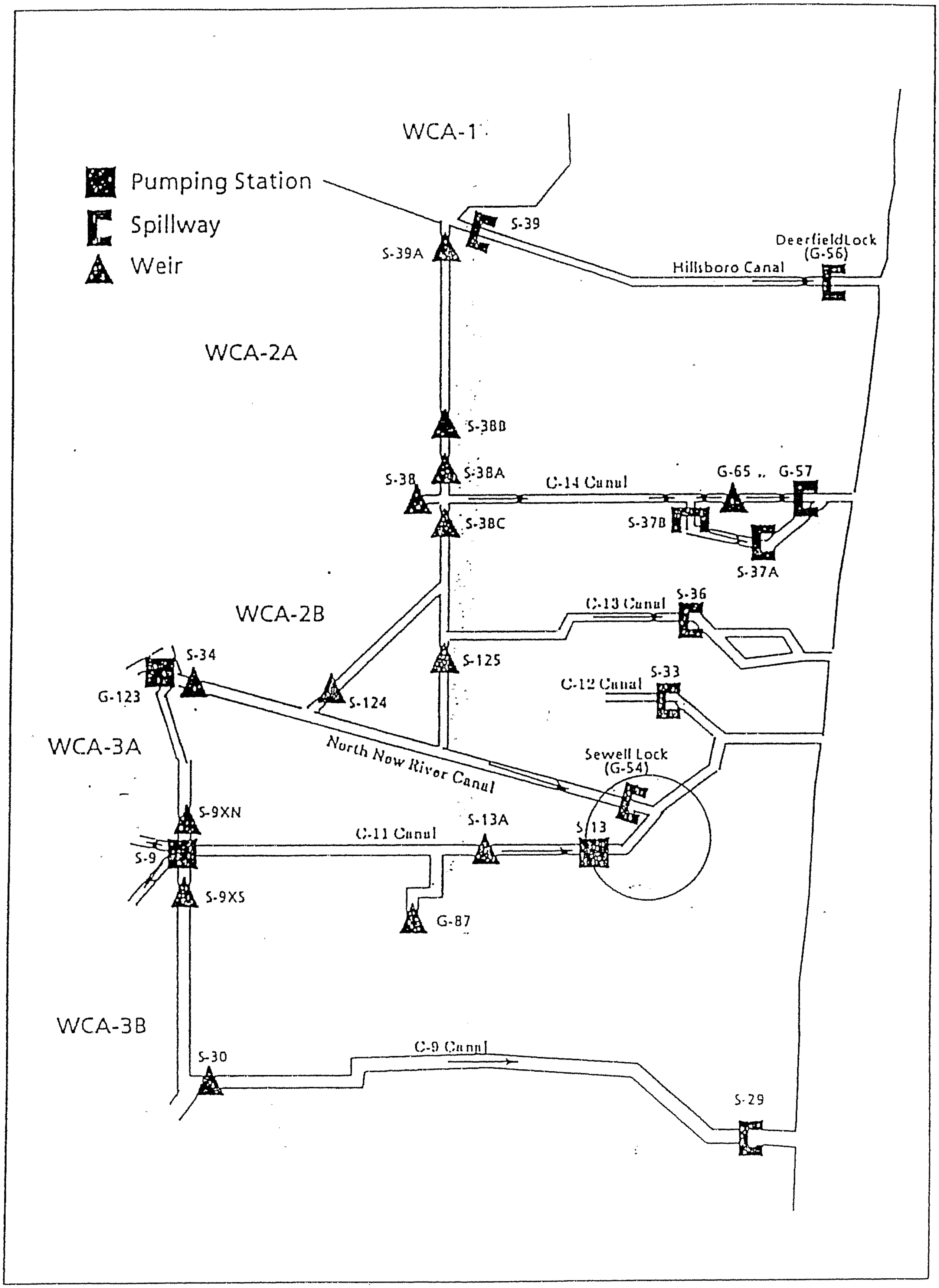

Figure 6. Schematic representation of the primary canal and control system in eastern Broward County. Pond Apple Slough Ecosystem is circled. (from SFWMD 1992)

tidewater; and to intercept and control seepage from WCA-2B. Excess stormwater in the basin is discharged to tidewater via the NNRC and Sewell Lock and is pumped to WCA-3A from the NNRC via G-123 and S-142. Excess stormwater in WCA-2A, WCA-2B or WCA-3A is discharged to the NNRC via S-143 and S-141, respectively, to the NNRC basin via S-34, and subsequently to tidewater via Sewell Lock. Sewell Lock also regulates the stage in the NNRC and S-42. Water supply to the basin is from WCA-2A via S-143 and S-34, and from local rainfall. S-125 is occasionally used to discharge water from the C-13 basin to the NNRC basin for water supply to the City of Plantation. S-125 usually divides flow in C-42 between the C-13 and NNRC basins.

The C-11 (South New River Canal) basin is located in south central Broward County and is divided into western and eastern sub-basins (Figure 5). There are four Project canals in the basin: C-11, C-11S, the section of the L-33 borrow canal between C-11 and Hollywood Boulevard, and the L-37 borrow canal. There are eight Project control structures that regulate flow in the basin: S-9, S-9XN, S-9XS, S-13, S-13A, G-86N, G-86S and G-87 (Figure 6).

The C&SF Project canals and control structures have four functions: to provide flood protection and drainage for the basin; to supply water to the basin during periods of low natural flow; to intercept and control seepage from WCA-3A; and to maintain a groundwater table elevation west of S-13 adequate to prevent saltwater intrusion.

Excess water in the eastern basin is discharged to the east via C-11 and S-13 to the South Fork of the New River. Excess water in the western sub-basin is pumped from C-11 into WCA-3A via S-9. If S-13 is not pumping to capacity, additional discharges of excess water from the western sub-basin can be made to the eastern sub-basin via S-13A. Water supply can come to the western sub-basin via seepage from WCA-3A to the L-37 borrow canal, and from WCA-3B to the L-33 borrow canal south of Hollywood Boulevard. The rate of seepage to the L-33 borrow canal is regulated by the stage held in the canal by S-9XS and in the L-37 borrow canal by the stage held in that canal by S-9XN. Drainage to C-11 from the area between L-33, L-37 and U.S. 27 also is controlled by G-86N and G-86S. G-87 divides flow in C-11S between the C-11 and C-9 basins.

3.5.2 Ground Water Resources

Overview of Regional Hydrostratigraphic Units: The aquifers located in Broward County fall into four distinct units. These units are classified according to the Florida Geological Survey's Special Publication Number 28 entitled *Hydrogeological Units of Florida*. The units are classified from the lower Sub-Floridan unit to the Upper Surficial Aquifer System. These units are shown in a typical cross-section in Figure 4. This cross-section enables the reader to get a view of the aquifers and how they are integrated within the state, regionally and locally. A brief description of the units and their hydrogeologic significance with regard to the Broward County Water Supply Plan is presented below.

Surficial Aquifer System: This system, commonly known as the Biscayne Aquifer, is composed of the permeable hydrogeologic unit from the land surface down to that portion of the aquifer which exhibits a zone of markedly lower permeability. This unit is composed of the following units: Miami Oolite, Key Largo Limestone, Anastasia Formation, Fort Thompson Formation and Caloosahatchee Marl. In parts of South Florida some portions of the Tamiami Formation are considered as part of the Surficial Aquifer System. This highly productive system is the predominant source of potable water in Broward county. It has been classified by the EPA as a Sole Source Aquifer.

Intermediate Aquifer System: This system is also known as the Intermediate Confining Unit. It is the main unit which restricts flow between the surficial aquifer system and the upper Floridan Aquifer System. This system starts with the base of the surficial system and ends with the upper Floridan Aquifer System. The unit is composed of parts of the Tamiami Formation, Hawthorn Formation and the Tampa Formation.

Floridan Aquifer System: The Floridan Aquifer System is present throughout the state and is the deepest part of the active groundwater flow system on mainland Florida (FGS 1988, Miller 1986). Where the aquifer is overlain by the Intermediate Aquifer System the Floridan Aquifer contains water under confined conditions; this is the case in the area of this study. The following subunits are contained in the Florida Aquifer System: Suwannee Limestone, Ocala

Group, Avon Park Limestone, Lake City Limestone, Oldsmar Limestone and part of the Cedar Keys Limestone.

Sub-Floridan Confining Unit: This is the unit which contains the sequence which has a low permeability and is the extent of groundwater circulation on mainland in Florida (FGS 1988). This unit's interface is not clearly defined because of inadequate geologic data points. The main subunit is the Cedar Keys Limestone. A more detailed description of the interaction of the various aquifer components will be developed in the following section.

3.5.3 Regional Water Use

During 1985, more than 4,000 million gallons per day (MGD) were withdrawn from the aquifers of Florida. This quantity of water withdrawal placed Florida sixth in the nation and the largest user east of the Mississippi River (Marella 1988). Sixty-two percent (2,480 MGD) of the total withdrawal came from the Floridan Aquifer system. The largest consumption of the Floridan is that for agricultural use followed by public water supply. Marella (1988) shows by a pie chart that groundwater withdrawals in Florida came from the five regional aquifers located throughout the state: the Floridan Aquifer (62%), the Biscayne Aquifer (20%), Surficial Aquifer in north Florida (9%), the Intermediate Aquifer (7%) and the Sand and Gravel Aquifer (2%). During 1985, the Floridan served as the source of 47% of the public water supply while the Biscayne accommodated 38%. Based on today's demands on the surficial aquifer in Broward County and the future anticipated EPA drinking water standards, the demands on the Upper Floridan Aquifer in the Lower District Planning Area will increase substantially.

3.6 Overview of Broward County Wetlands

Originally, Broward County wetlands were part of the historic Everglades system. The Everglades open marshland extended eastward to the low sandy coastal ridges. Most of the drainage tended toward the south and southwest to where it eventually emptied into Florida Bay. Some water flowed eastward during high rainfall periods by way of several shrub and forested drainage ways that formed at breaks in the coastal ridges. Species such as cypress, maples, oaks, pond apple and various tropical hardwoods dominated these systems. The major eastward flowways were Cypress Creek, Middle River, New River and, draining the Hollywood and Hallandale area, the Oleta River.

The picture today is quite different. most of western Broward County is still open marshland, but is now impounded to form Water Conservation Areas 2 and 3. The historic Everglades sheet flow has been altered for flood control and water supply purposes. Except for a few small fragmented remains such as Fern Forest Park, Secret Woods Park, and the Pond Apple Slough (Figure 7), the river drainageways in the eastern part of the county have all but disappeared. According to the National Wetlands Inventory (NWI), the majority of wetlands that now exist in eastern Broward County consist of the open water, excavated systems such as rock pits and the so-called "real estate lakes". Most of these are small units of less than 5 acres in size, the majority of which are backyard ponds dug as fill for house pads. Compared to the natural vegetated wetlands, these "real estate lakes" and rock pits have limited biological, hydrologic or social value. The larger ones to tend to become attractive sites for real estate development.

3.6.1 Present Condition of Broward County Wetlands

Many of the existing wetlands in eastern Broward County have been impacted and are suffering from stresses of one sort or another. The most obvious and widespread burden affecting the majority of these areas is a reduced hydroperiod. Rampant ditching and draining has decreased flooding durations in the remaining wetlands and has concentrated and consolidated the water into the permanently flooded manmade canals, ponds and lakes. Original hydroperiods ranged from a month to nearly year round. Today, water periodicity is categorized by the NWI as temporary in most areas.

Most of the original forested floodways that drained off excess water from historic western marshlands have been drained, filled, and converted to residential and commercial uses. The remaining fragments of mixed forest, like the Pond Apple Slough ecosystem, are subjected to reduced water table levels, altered or nonexistent surface water circulation patterns, various levels of polluted runoff, and human and mechanical traffic impacts. Their historic role as riparian habitats has ceased, but they do still support a high diversity of plants and animals

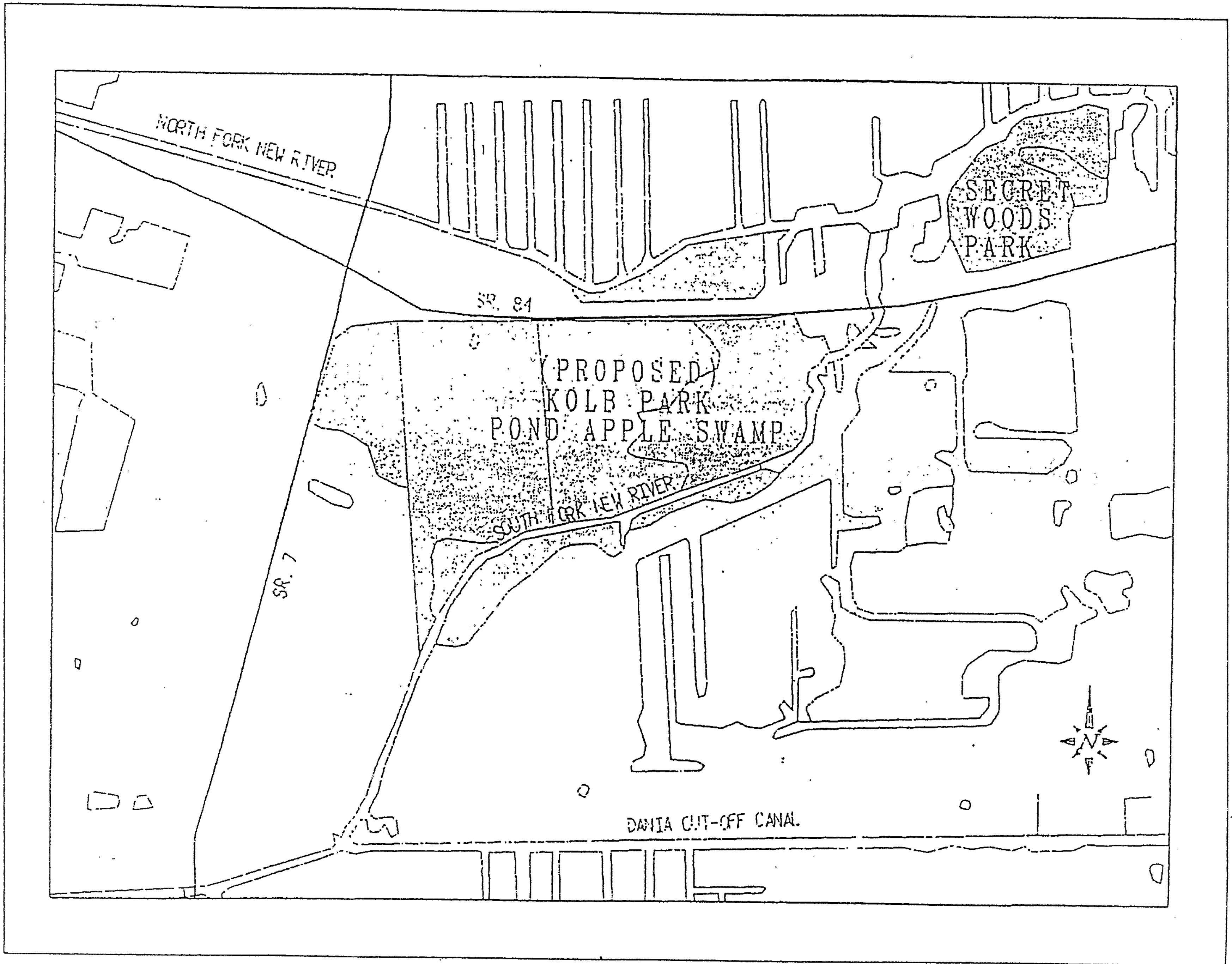

Figure 7. Examples of remnant forested wetlands of southeast Broward County (from SFWMD 1992).

(Tables 1 and 2, Section 4). The functions and benefits of these wetlands have suffered accordingly. The resultant reductions in both size and continuity of these former wetland systems are the root causes of their loss of value. The hydrologic functions, though not totally destroyed, are greatly diminished. The value to wildlife is reduced due to fragmentation and their isolation within the highly urban environment. The socioeconomic function is limited to casual recreational and educational pursuits.

Another forested habitat type that did not originally exist in the project area is melaleuca. This exotic nuisance species has a competitive advantage when hydroperiod reductions have occurred, due to its aggressive colonizing abilities. This is especially true west of the low sandy coastal ridges in the area formerly within the historic Everglades marshland system and in the Griffey Tract. These areas, although vegetatively transformed, still retain most of their hydrologic values. Wildlife values vary according to the density of the trees. The impenetrable, monotypic stands offer the least function and value as wildlife habitat.

3.7 Water Quality

Historically, concerns about water quality for both groundwater and surface water focused on basic chemical, physical and microbiological contamination. Evaluation of the contamination of water resources was conducted on a rather coarse level because of the limited understanding of the environmental and potential human health consequences of improper waste disposal. Wastes continued to be disposed of via the nearest watercourse or the closest dump with little thought given to the impact on the surface or groundwater resource.

As southern Florida and Broward County developed, rapid growth and the inability of wastewater utilities to keep up with that growth led to the proliferation of small wastewater package plants. Many of these plants were poorly operated and maintained and discharge low quality effluent into local canals. Contaminated urban and residential stormwater was also discharged directly to the canal systems without any treatment, and as a result, surface water quality was significantly degraded.

Waller and Miller (1982), in assessing the water quality of canals in eastern Broward County from 1968–1974, reported that sewage effluent and nutrient-laden runoff were among the primary sources of macronutrients in Broward County canals. Elevated trace element and herbicide concentrations in canal bottom sediments were attributed to sewage-affected sites. Bacterial cell counts indicated that canals affected by sewage were most likely to contain pathogenic microorganisms. Sewage effluent was identified as the primary factor in degrading canal water quality. Much of the 1970s was spent on removing the sources of contamination and on cleaning up the canal systems. The removal of these pollutant sources resulted in improved surface water quality.

Rapid growth also generated large quantities of garbage, trash, construction debris, and industrial and hazardous wastes most of which were disposed of in open dumps, seepage ponds or by other means which allowed pollutants to enter the groundwater. In areas where a central sewer system was not yet available, developments were served by septic tanks, providing yet another means of introducing pollutants into the groundwater.

Besides the introduction of human-generated pollutants into the waters of Broward County, efforts to drain wetland areas for development and construction of drainage canals to reduce flooding potential have resulted in an inland migration of saltwater near the coastline. A number of coastal canals continues to bring tidally influenced brackish water far inland in some parts of the county. The high growth rate and the attendant consumptive demand for the groundwater resource aggravate the saltwater intrusion problem along the coast. Several coastal public water supply wellfields continue to be threatened by saltwater intrusion and dozens of wells have been abandoned or removed from service as a result.

In Broward County there are two major types of saltwater contamination: 1) recent contamination due to seawater intrusion into the surficial aquifer system near the coast and adjacent to uncontrolled reaches of rivers and canals, and 2) contamination resulting from ancient sea inundations during Pleistocene time or due to connate seawater incorporated into sediments at the time of deposition (Parker et al. 1955). Localized areas of saltwater contamination in the surficial aquifer system may also result from upward leakage of saline artesian water from the Floridan Aquifer system through open well bores (Healy 1978, Aucott 1988).

Intrusion of saltwater is one of the prime water quality problems in coastal areas of Broward County. Because the majority of salts in saltwater are chlorides, the chloride content of water is generally used as the index of saltwater intrusion. The Florida drinking water standard for chloride is 250 mg/L. However, as commonly defined in the literature, saltwater intrusion is considered to have occurred if chloride concentrations of at least 1,000 mg/L are found at the base of the aquifer (Waller 1985).

Saltwater intrusion in Broward County and the rest of coastal southeastern Florida began in the early part of the 20th century with the construction of drainage canals inland from the sea (Sherwood et al. 1973). The increased drainage from these canals lowered inland groundwater levels and reduced the flow of freshwater to the sea, resulting in increased inland movement of saltwater into the aquifer system (Parker et al. 1955). This inland movement of saline water occurred in two basic forms: 1) lateral migration of saltwater at depth into the aquifer; and 2) landward movement of saltwater in canals during periods when the freshwater discharge was insufficient to restrict saltwater encroachment (Andersen at al. 1988). Due to its greater density, saline water that migrated into inland areas along canals leaked downward into underlying fresh groundwater (Hughes 1979). Increased population growth in coastal areas led to the construction of wellfields near the coast that contributed to the saltwater intrusion problem by further lowering water levels locally (Grafton 1967, Gratham and Sherwood 1968).

By 1962, most of the major works of a complex system of canals, levees, pump stations and Water Conservation Areas (WCAs) were completed (Leach et al. 1972). Water stored in the WCAs helps to sustain high ground water levels near the coast (Klein and Hull 1978*a*, 1978*b*). Control structures were constructed in all major canals to regulate inland water levels and to retard or halt saltwater intrusion. These control structures, and the use of feeder canals to convey freshwater into wellfield areas, have been effective in mitigating saltwater intrusion (Sherwood et al. 1973). The movement of saltwater up the North Fork was mitigated in the early 1970s by the construction of a control structure near its junction with Middle River Canal and the construction of a feeder canal from the latter into the North Fork to convey fresh water for groundwater recharge (Sherwood et al. 1973). Figure 8 shows the extent of saltwater intrusion in the county in 1970. Despite the control measures described, increased pumpage throughout the 1980s to meet rising water demands has caused saltwater intrusion to progress inland, especially along the central and southern parts of the county.

4. EXISTING SITE CONDITIONS

4.1 General Description and Surroundings

The Pond Apple Slough Ecosystem (PASE) covers approximately 750 acres located on both sides of the South New River Canal in Broward County, Florida (Figures 1 and 2). Prior to the major efforts to drain the Everglades in the late nineteenth century, the PASE probably covered several thousand acres and provided one of the eastern drainage routes for the Everglades during high water periods. Drainage from the PASE would have supplied one of the freshwater sources for the New River as it flowed to the Atlantic Ocean.

As previously described under regional characteristics, the construction of the numerous canals in the vicinity of the PASE and the general development of the area, including massive road construction, have resulted in a major reduction in natural wetlands in Broward County. The remnant systems are often too small to maintain themselves in their natural state due to loss of natural drainage from an intact watershed. Such is the case with the PASE. Under predisturbance conditions, it was a freshwater forested ecosystem with scattered stands of sawgrass. The dominant trees were pond apple and bald cypress, with the pond apple occurring in almost monotypic stands in areas too wet for cypress or where occasional droughts allowed minor incursions of salt water, which pond apple can tolerate but which cypress cannot.

4.2 Legal Description

(see appendix I)

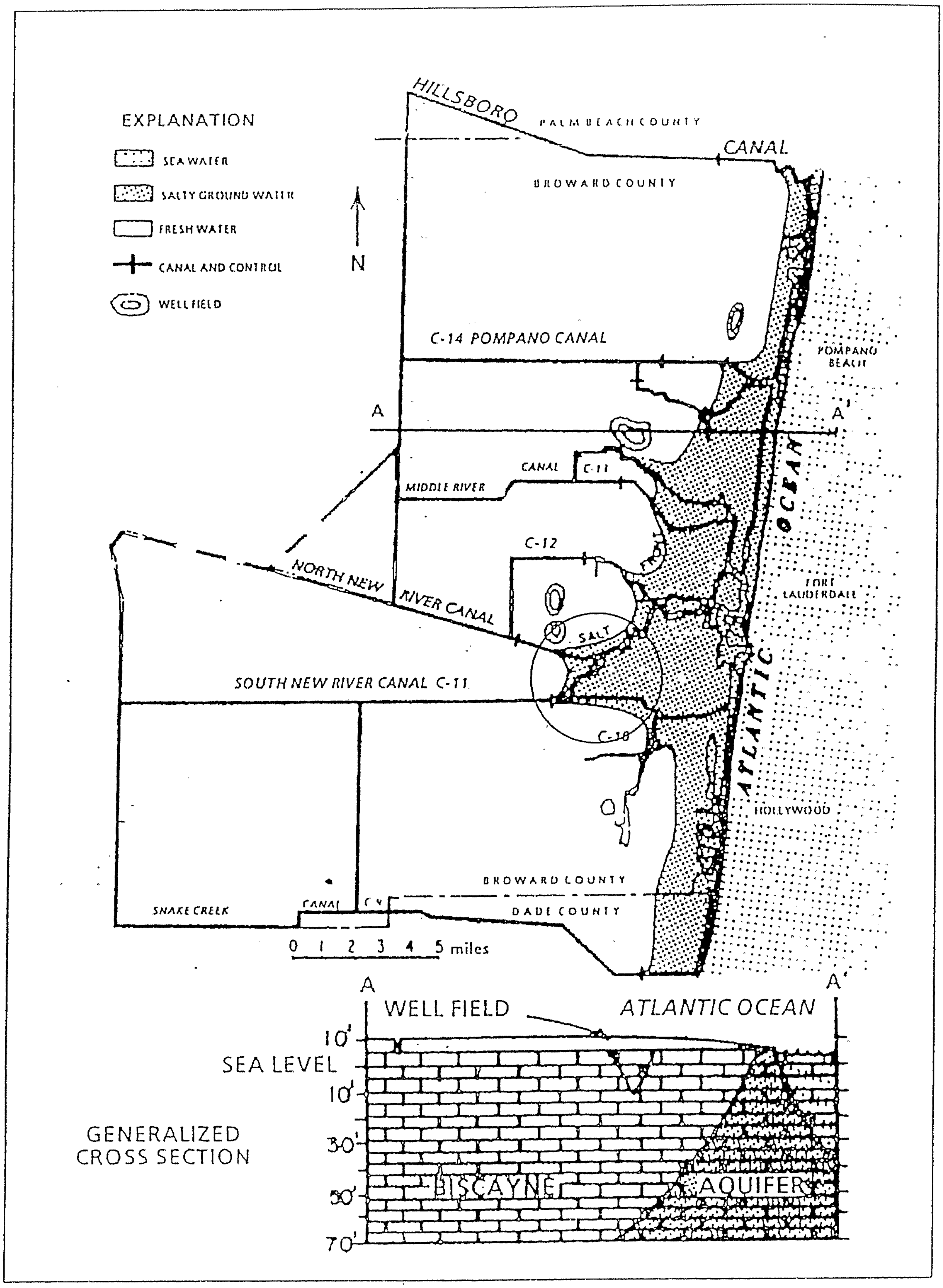

Figure 8. Extent of saltwater intrusion in 1970 (from Sherwood et al. 1973, in SFWMD 1992). Pond Apple Slough Ecosystem is circled.

4.3 The Existing Ecosystem

Figure 9 shows the general boundaries of the existing ecosystem, with major land, water and infrastructure identified. The major forested portions of the ecosystem have been dissected by manmade canals (North New River, South New River and Dania Cut-off Canals) and the construction of SR84 and I-595. The resulting loss of natural drainage to the system has allowed saltwater to intrude more frequently and farther up the modified New River while allowing more rapid drainage of the historical freshwater head that existed in the system. This, combined with oxidation and subsidence of the native organic soils, has allowed invasion of the system by invasive exotic non-native plant species like melaleuca, Brazilian pepper and Australian pine, and native species such as white mangrove and red mangrove that can tolerate more salt.

4.4 Topography and Geology

The natural unfilled elevations of the system range from +5.0′ MSL at the northwest corner of near the intersection of I-595 and SR7 to 0.0 MSL where the natural slough remnants enter the South New River Canal. Borings conducted under contract by the Florida Department of Transportation (FDOT), generally show 2–3′ of soil overlying caprock through out the system. The soil layer is mostly black muck over brown sand with some silt and a trace of clay. Occasionally 3–8″ of light gray, stratified, clayey silt overlies the muck at the surface.

4.5 Hydrology

A draft hydrologic study of the system is contained in Appendix D. The study has never been formally finished nor released. A brief summary of the hydrology of the Pond Apple Slough itself is presented in Exhibit C, Appendix E. The basic conclusion of studies to date is that tidal waters moving westward in the New River are entering the PAS and have resulted in the deaths of many cypress trees. Saltwater intrusion indirectly leads to the death of pond apple trees due to boring by a native marine isopod, *Sphaeroma terebrans*, which eventually kills the trees as they fall over into the brackish waters. This problem was originally to be solved by construction of a berm to block the entry of salt water into the PAS. After study, however, it was concluded that blocking another saltwater entry point located to the south of the sloughs, attempting to redivert stormwater from the stormwater pond adjacent to I-595, and

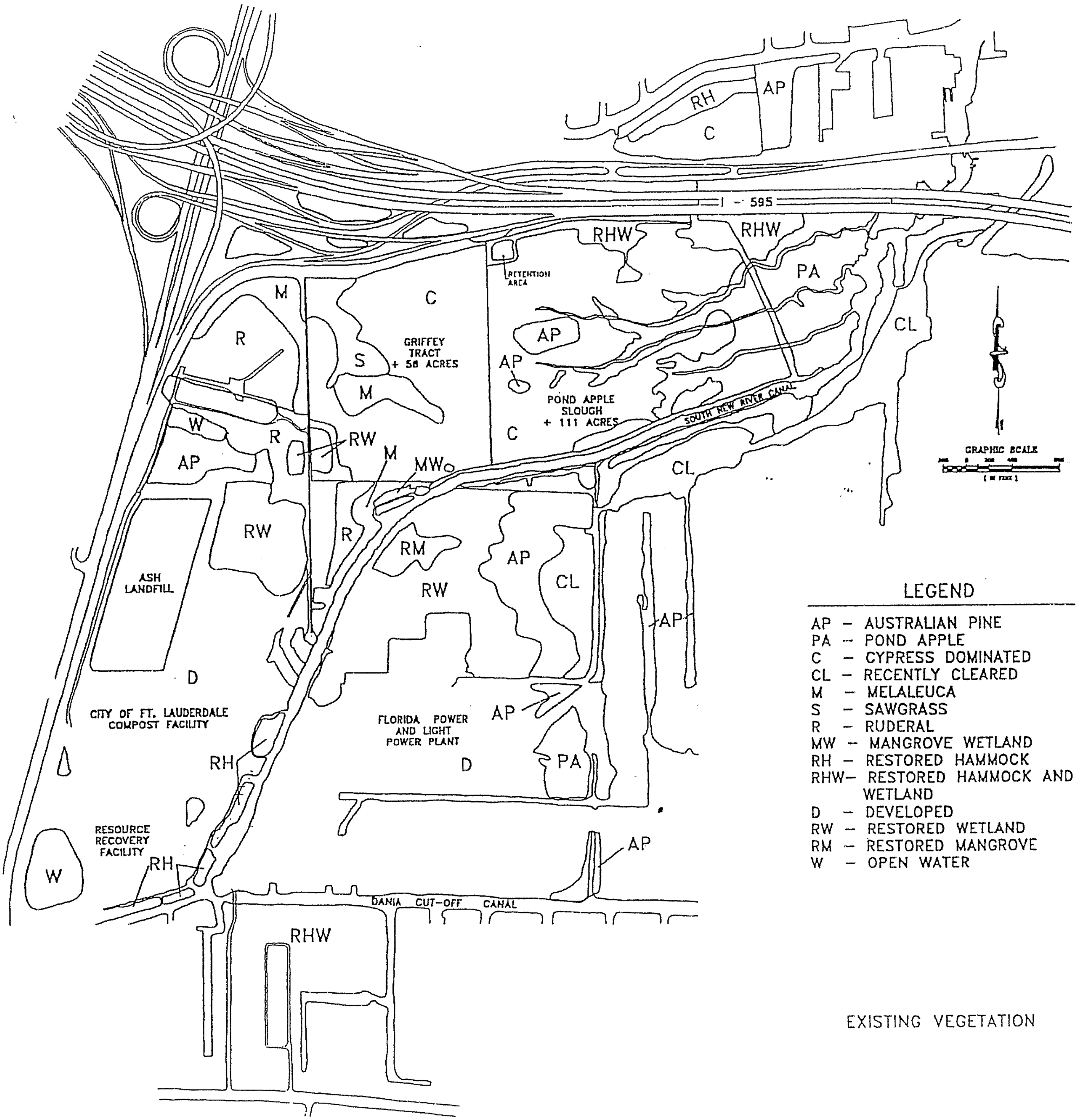

Figure 9. Existing vegetation in the Pond Apple Slough Ecosystem.

coordinating an exotic plant control effort needed to be undertaken first. These three tasks have now been completed (see Appendix B). Most of the members of the PASWG now believe that the draft hydrologic study needs to be reviewed and updated to continue to address the as-yet unanswered questions about what steps are needed to control saltwater intrusion into the PAS. A "rewatering" proposal has been prepared in preliminary form (see Appendix F), but the hoped-for hydrology "update" has not been funded to date.

4.6 Soils

Figure 10 shows the soils characterization for the system as depicted by Pendleton et al. (1984). Twelve of the 39 soil types found in eastern Broward County occur in the study area. The dominant soil types in the wetland portions of the area are Lauderhill muck,.Plantation muck and Okeelanta muck. All are described and are nearly level, very poorly drained organic soils underlain by sand and having a depth of 16 to 40 inches over caprock.

4.7 Vegetation

Figure 9 shows the existing plant communities in the PASE. Table 1 lists the plant species associated with these communities. There are three dominant native plant communities in those areas where extensive excavation, filling and drainage have not severely altered the natural soils. All three plant communities are true wetlands, and vary in location across the landscape largely as a function of ground elevation and thus proximity to ground or surface water, and the level of recent disturbance. The Griffey Tract, for example, was mechanically cleared by the former landowners over 20 years ago. This, combined with overdrainage and saltwater intrusion, produced conditions ideal for invasion and dominance of the site by aggressive, non-native (exotic) plants such as melaleuca, Brazilian pepper and Australian pine (Figure 11).

The first of the three native plant communities is sawgrass marsh, which is characteristic of most of the Griffey Tract. Scattered stands of young bald cypress dot the marsh areas. These represent natural colonization or recovery in this area after the site was cleared. Nearly all the adult exotic plants have been successfully eliminated by the FDOT management of the area, but many seedlings remain, mostly melaleuca. There are also a few melaleuca and many Australian pines and Brazilian peppers located on the Resource Recovery property adjacent to

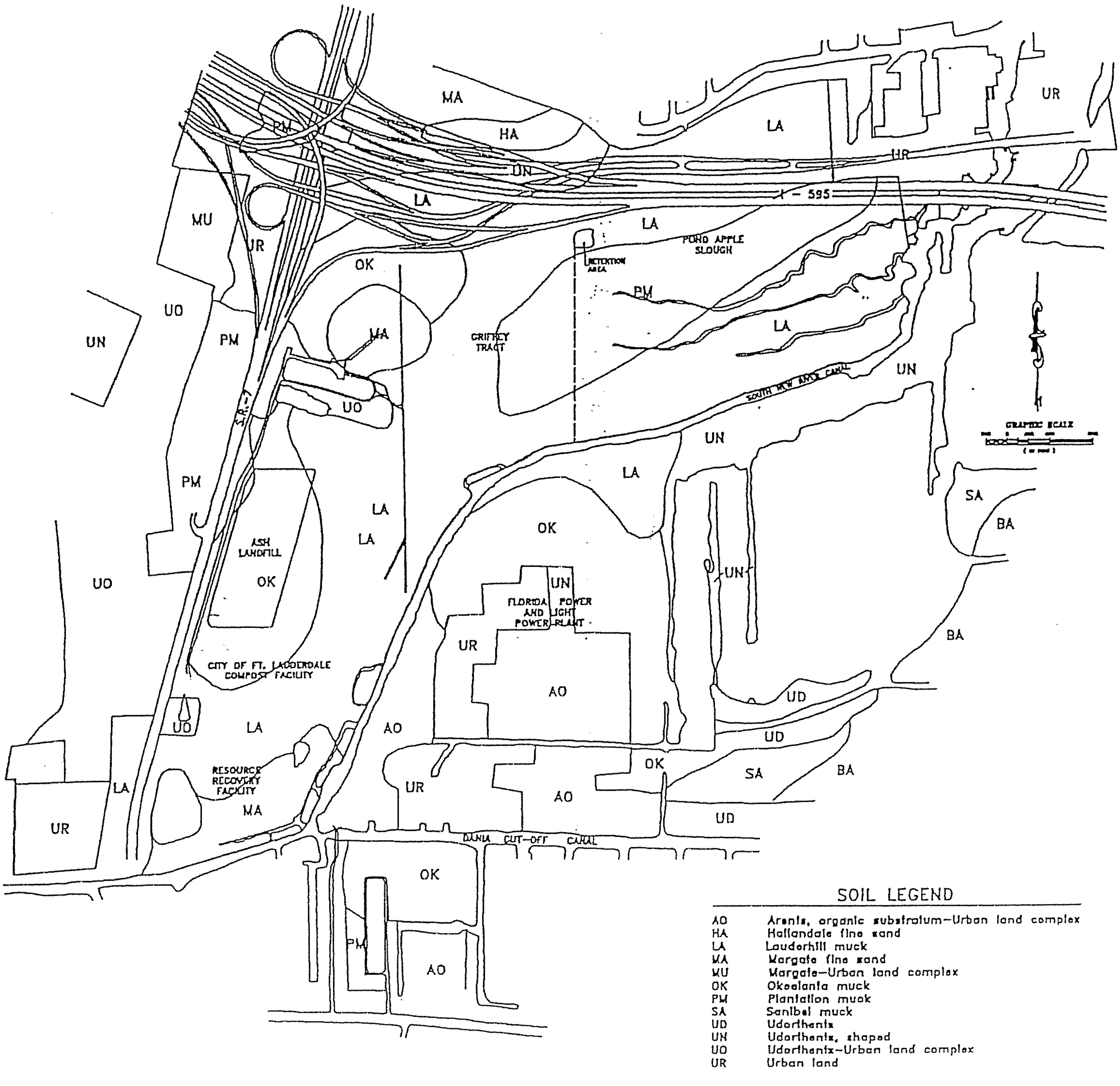

Figure 10. Soils of the Pond Apple Slough Ecosystem.

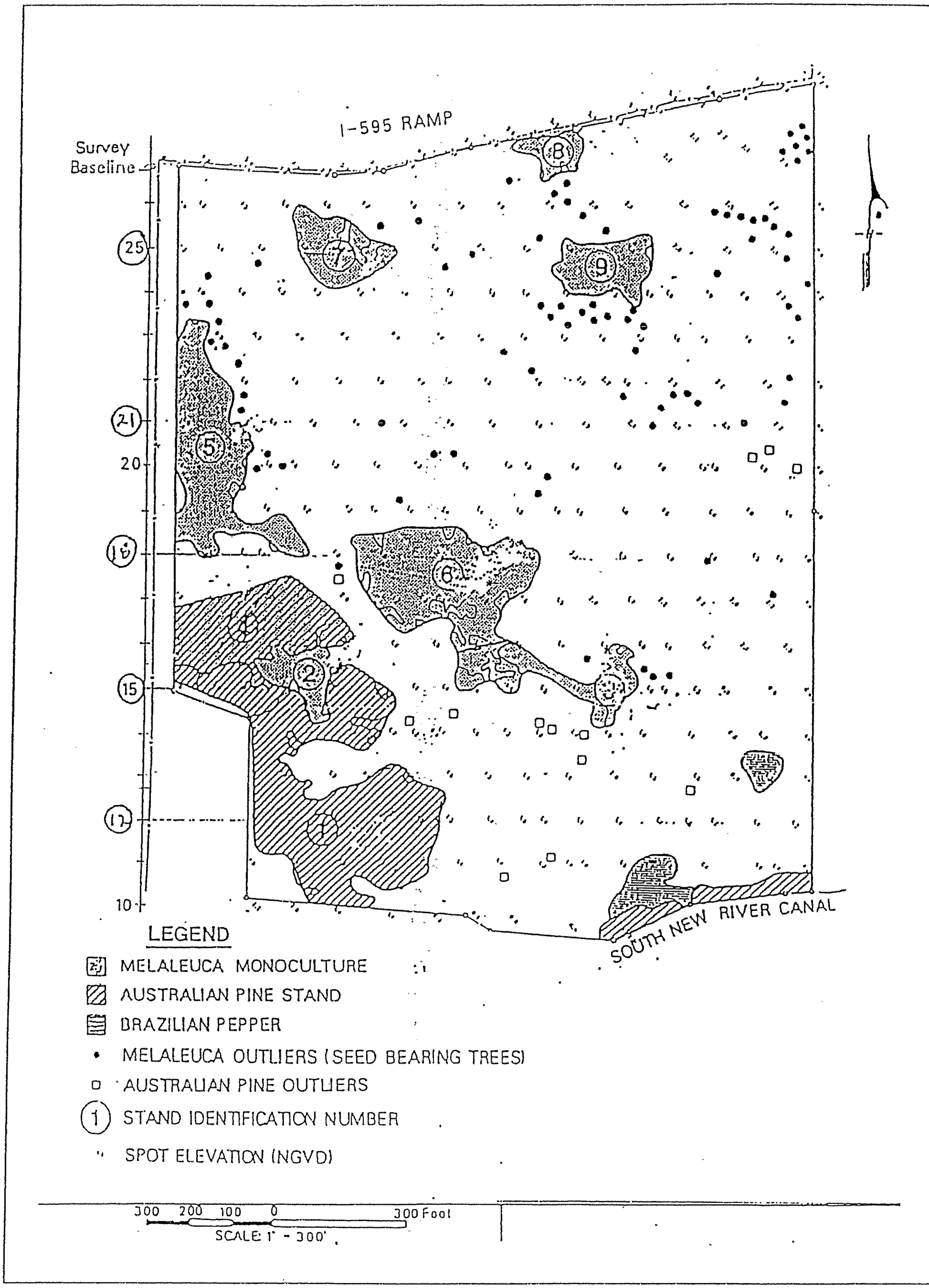

Figure 11. A map of the Griffey tract showing distribution of exotic plant species prior to initiation of control plan by FDOT (from SIGA, Inc. 1993)

Table 1. Reported plant species of the Pond Apple Slough ecosystem, Broward County, Florida (pers. comm., Woody Wilkes).

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
Acer rubrum	Red maple	*Hydrocotyle umbellata*	Water pennywort
Acrostichum danaeifolium	Giant leather fern	*Hypericum fasciculatum*	St. John's-wort
Amaranthus hybridis	Common pigweed	*Hyptis alata*	Musky mint
Andropogon virginicus	Broom sedge	*Ilex cassine*	Cassena
Annona glabra	Pond apple	*Ipomoea* sp.	Morning glory
Asclepias lanceolata	Butterfly weed	*Juncus effusus*	Soft rush
Asclepias tuberosa	Butterfly weed	*Lachnanthes caroliniana*	Bloodroot
Baccharis glomeruliflora	Groundsel tree	*Lachnanthes tinctoria*	Paintroot
Baccharis halimifolia	Saltbush	*Lachnocaulon* sp.	Bog buttons
Bacopa caroliniana	Lemon bacopa	*Laguncularia racemosa*	White mangrove
Bacopa monnieri	Water hyssop	*Lemna* sp.	Duckweed
Bidens alba	Beggartick	*Lepidum virginicum*	Poor-man's pepper
Bidens bipinnata	Spanish needles	*Leucothoe racemosa*	Swamp fetterbush
Blechnum serrulatum	Swamp fern	*Lippia stoechadifolia*	Lippia
Botrychium biternatum	Southern grape fern	*Lippia nodiflora*	Carpetweed
Casuarina spp.	Australian pine	*Ludwigia repens*	Red ludwigia
Centella asiatica	Coinwort	*Ludwigia alata*	—
Cephalanthus occidentalis	Buttonbush	*Ludwigia arcuata*	—
Ceratophyllum demersum	Coontail	*Ludwigia octovalis*	Ludwigia
Chrysobalanus icaco	Cocoplum	*Ludwigia peruviana*	Primrose willow
Cladium jamaicense	Sawgrass	*Magnolia virginiana*	Sweet bay
Commelina diffusa	Day flower	*Melaleuca quinquenervia*	Punk tree
Conoclinium coelestinum	Mistflower	*Memordica charantia*	Wild balsam apple
Crinum americanum	String lily	*Metopium toxiferum*	Poisonwood
Cyperus erythrothizos	—	*Mikania scandens*	Mikania
Cyperus polystachyos	—	*Mitreola petiolata*	Miterwort
Cyrilla racemiflora	Titi	*Myrica cerifera*	Wax myrtle
Decodon verticillatus	Swamp loosestrife	*Myriophyllum brasiliense*	Parrot's feather
Dicanthelium sp.	Crowfoot grass	*Myrsine quianensis*	Myrsine
Dichromena colorata	White top sedge	*Nuphar luteum*	Yellow pond lily
Diodia virginiana	Buttonweed	*Nymphaea odorata*	Waterlily
Eichhornia crassipes	Water hyacinth	*Osmunda regalis*	Royal fern
Eleocharis cellulosa	—	*Panicum hemitomon*	Maidencane
Eleocharis elongata	Spike rush	*Panicum repens*	Torpedo grass
Encyclia cochleata[1]	Shell orchid	*Panicum virgatum*	Switch grass
Encyclia tampensis[1]	Butterfly orchid	*Parthenocissus quinquefolia*	Virginia creeper
Epidendrum difforme[1]	Unbelled epidendrum	*Paspalum notatum*	Bahia grass
Erianthus giganteus	Sugarcane plumegrass	*Paspalum urvillei*	Vaseygrass
		Pennisetum purpureum	Napier grass
Eriocaulon compressum	Hat pin	*Persea borbonia*	Red bay
Eriochla polystachya	Carib grass	*Phragmites australis*	Common reed
Eupatorium capillifolium	Dog fennel	*Pluchea odorata*	Camphorweed
Ficus aurea	Strangler fig	*Polygonum hydropiperoides*	Smartweed
Galium tinctorium	Bedstraw	*Polygonum baldwinii*	Bachelor's button
Gordonia lasianthus	Loblolly bay	*Pontederia cordata*	Pickerelweed
Habenaria repens[1]	—	*Psychotria nervosa*	Wild coffee
Heliotropium leavenworthi	—	*Ptilimnium capillaceum*	Mock bishop's-weed

(continued)

Table 1 continued.

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
Quercus laurifolia	Laurel oak	*Smilax laurifolia*	Bamboo
Quercus virginiana	Live oak	brier*Solidago stricta*	Goldenrod
Rhizophora mangle	Red mangrove	*Stenotaphrum secundatum*	St. Augustine grass
Rhynchospora cephalantha	—	*Taxodium distichum*	Pond cypress
Rhynchospora globularis	—	*Thelypteris hispidula*	Thelypteris
Rhynchospora inundata	Beakrush	*Thelypteris palustris*[1]	Marsh fern
Rhynchospora microcarpa	—	*Tillandsia balbisiana*[1]	Air plant
Rhynchospora odorata	—	*Tillandsia circinata*[1]	Air plant
Rhynchospora sp.	Beakrush	*Tillandsia fasciculata*[2]	Common air plant
Rhynchospora tracyi	—	*Tillandsia flexuosa*[1]	Twisted air plant
Rumex verticillatus	Swampdock	*Tillandsia polystachia*[1]	Air plant
Sabal palmetto	Cabbage palm	*Tillandsia setacea*[1]	Air plant
Sagittaria graminea	Arrowhead	*Tillandsia utriculata*[2]	Giant air plant
Sagittaria lancifolia	Arrowhead	*Tillandsia valenzuelana*[1]	Air plant
Salix caroliniana	Carolina willow	*Typha* sp.	Cattail
Samolus ebracteatus	Water pimpernel	*Urena lobata*	Caesarweed
Schinus terebinthifolius	Brazilian pepper	*Utricularia inflata*	Floating bladderwort
Scutellaria integrifolia	Rough skullcap	*Vicia acutifolia*	Vetch
Senecio glabellus	Butterweed	*Vicia floridana*	Vicia
Setaria geniculata	Foxtail grass	*Xyris* sp.	Yellow-eyed grass
Sida sp.	Broomweed		

[1]Threatened, FDA
[2]Commercially exploited, FDA

this area. These will continue to supply new seed to the Tract until they are finally eliminated. For this reason continued monitoring and regular exotic plant control efforts are essential to ensure that the Tract does not return to its former condition. These efforts will have to continue even after FDOT completes its monitoring in 1998 and turns the property over to Broward County.

The second native plant community is dominated by bald cypress, including many dead trees killed by saltwater intrusion into the upper PAS. Here again, past management efforts have produced ideal conditions for exotic plant invasion. Although exotic plant control by Lewis Environmental Services, Inc., conducted as part of this restoration effort, has largely eliminated the adult trees, many new seedlings have germinated from seed. Unlike the Griffey Tract, only a portion of the PAS parcel (Management Units 4A, 4B, 4C, 4D, 1B and part of 1C) is currently being monitored for exotic plant re-invasion, and is under an active exotic plant control program (4B, 4C and 1B only). Other native species found mixed in this community are wax myrtle, saltbush, cocoplum, strangler fig, pond apple, red bay, myrsine, dahoon holly and wild coffee. There are also large numbers of epiphytic plants consisting of three orchids and nine species of wild pine that festoon both the cypress and pond apple trees.

The third native plant community is dominated by pond apple, and is in the easternmost half of the PAS along the tidal streams (sloughs) entering the PAS. This portion of the PASE has fewer exotic plants, mostly young Brazilian peppers, because salinities as high as 10-12 parts per thousand do not allow exotics to invade and thrive. However, native plants not normally found in a pond apple swamp, like white mangroves, red mangroves and cattails, have taken on the role of aggressive competitors of pond apples and should be regarded as invasive species in need of control or elimination.

A fourth plant community consists of planted areas, where exotics have been physically removed and the ground elevation lowered to restore wetlands, as in the consent area (Management Unit 4B) or to create wetlands from historic uplands (4C). The dominant planted species are wax myrtle, live oak, laurel oak, cabbage palm, red maple, dahoon holly, leather fern, pond apple, myrsine and cocoplum.

A fifth plant community, largely consisting of filled or disturbed land, has plant cover consisting mostly of escaped forage and landscape grasses and colonizing exotics.

Finally, there are areas composed almost entirely of large adult exotic trees like Australian pine. One of these is Management Unit 14, owned by the Broward County Office of Integrated Waste Management, and the other is adjacent to the FPL Lauderdale Power Plant on FPL property (Management Units 7A-D).

4.8 Wildlife

Table 2 lists the animals reported for the study area. The list was provided by Woody Wilkes of the Museum of Discovery and Science.

Table 2. Reported animals of the Pond Apple Slough ecosystem (pers. comm., Woody Wilkes).

	SCIENTIFIC NAME	COMMON NAME
MAMMALS	*Dasypus novemcinctus*	Nine-banded armadillo
	Didelphis virginiana	Opossum
	Felis rufus	Bobcat
	Neofiber alleni	Round-tailed muskrat
	Odocoileus virginianus	White-tailed deer
	Peromyscus gossypinus	Cotton mouse
	Procyon lotor	Raccoon
	Rattus rattus	Black rat
	Sigmodon hispidus	Hispid cotton rat
	Sylvilagus palustris	Marsh rabbit
BIRDS	*Agelaius phoeniceus*	Red-winged blackbird
	Ahninga anhinga	Anhinga
	Aramus guarauna	Limpkin
	Ardea herodias	Great blue heron
	Bubulcus ibis	Cattle egret
	Buteo lineatus	Red-shouldered hawk
	Butorides striatus	Green heron
	Cardinalis cardinalis	Northern cardinal
	Casmeroidius albus	Great egret
	Cathartes aura	Turkey vulture
	Charadrius vociferus	Killdeer
	Chordeiles minor	Common nighthawk
	Colaptes auratus	Common flicker
	Cyanocitta cristata	Bluejay
	Egretta caerulea	Little blue heron
	Egretta thula	Snowy egret
	Egretta tricolor	Tricolored heron
	Eudocimus albus[1]	White ibis
	Falco sparverius	American kestrel
	Grus canadensis pratensis	Florida sandhill crane
	Lanius ludovicianus	Loggerhead shrike
	Megaceryle alcyon	Belted kingfisher
	Mimus polyglottos	Northern mockingbird
	Mycteria americana[2,3]	Wood stork
	Sturnella magna	Eastern meadowlark
AMPHIBIANS & REPTILES	*Alligator mississipiensis*[1]	American alligator
	Bufo sp.	Toad
	Chrysemys floridana peninsularis	Peninsula cooter
	Deirochelys reticularia	Chicken turtle
	Kinosternon bauri	Striped mud turtle
	Nerodia cyclopion floridana	Florida green water snake
	Nerodia sipedon pictiventris	Florida water snake
	Rana grylio	Pig frog
	Rana pipiens sphenocephala	Southern leopard frog
	Sistrurus miliarius barbouri	Pygmy rattlesnake
	Terrapene carolina bauri	Florida box turtle
	Trionyx ferox	Florida softshell

(continued)

Table 2 continued.

	SCIENTIFIC NAME	COMMON NAME
FISHES	*Aequidens portalegrensis*	Black acara
	Amia calva	Bowfin
	Anguilla rostrata	American eel
	Aphredoderus sayanus	Pirate perch
	Centropomus undecimialis[1]	Snook
	Cyprinodon variegatus	Sheepshead minnow
	Dorosoma cepedianum	Gizzard shad
	Dorosoma petenense	Threadfin shad
	Elassoma evergladei	Everglades pygmy sunfish
	Enneacanthus gloriosus	Bluespotted sunfish
	Erimyzon sucetta	Lake chubsucker
	Esox americanus	Redfin pickerel
	Esox niger	Chain pickerel
	Etheostoma fusiforme	Swamp darter
	Fundulus chrysotus	Golden topminnow
	Fundulus confluentis	Marsh killifish
	Fundulus seminolis	Seminole killifish
	Fundulus notti	Starhead topminnow
	Gambusia affinis	Mosquitofish
	Heterandria formosa	Least killifish
	Ictalurus catus	White catfish
	Ictalurus natalis	Yellow bullhead
	Ictalurus nebulosus	Brown bullhead
	Ictalurus punctatus	Channel catfish
	Jordanella floridae	Flagfish
	Labidesthes sicculus	Brook silverside
	Lepisosteus osseus	Longnose gar
	Lepisosteus platyrhincus	Florida gar
	Lepomis gulosus	Warmouth
	Lepomis macrochirus	Bluegill
	Leposmis marignatus	Dollar sunfish
	Lepomis microlophus	Redear sunfish
	Lepomis punctatus	Spotted sunfish
	Lucania goodei	Bluefin killifish
	Megalops atlantica	Tarpon
	Micropterus salmoides	Largemouth bass
	Notemigonus chrysoleucas	Golden shiner
	Notropis maculatus	Taillight shiner
	Notropis petersonii	Coastal shiner
	Noturus gyrinus	Tadpole madtom
	Poecilia latipinna	Sailfin molly
	Pomoxis nigromaculatus	Black crappie
	Strongylura marina	Atlantic needlefish

[1]Species of special concern, FGFWFC
[2]Endangered, FGFWFC
[3]Endangered, USFWS

4.9 Listed or Special Species

Plant and animal species listed as threatened, endangered or of special concern are noted in the individual plant and animal species lists (Tables 1 and 2).

5. MANAGEMENT CONSIDERATIONS

5.1 History

As noted in Section 3.6.1, the present extent of the Pond Apple Slough ecosystem is a remnant of a much larger section of the historical eastern edge of the Everglades (Figure 7). The completion of construction of the north fork and south fork of the New River Canals in 1912–1913 (Blake 1980) began the isolation of the existing system from the sheet flow of fresh water that generally moved from west to east in times of high rainfall. The gradual completion of the north-south roadway system in Broward County over the next 70 years completed the process, since each road became a dike with minimal conveyance of water to the east, except by routing drainage to the New River Canals.

Local drainage from a small watershed covering about 2,000 acres was the primary source of fresh water to the system, with some unquantified contribution by groundwater up until the mid-1980s. At this time, two major construction projects were proposed, permitted and completed within a short time, and effectively reduced the watershed by two-thirds. The first was the Broward County North Resource Recovery Facility (see permit drawings, Appendix J). This project received permits to fill 97.3 acres of freshwater wetlands west of the Pond Apple Slough, altered drainage patterns into the Slough, and removed sections of the dredged berm on the west side of the South New River Canal. The berm removal was part of the wetland mitigation plan for the project, but resulted in the creation of brackish water wetlands instead of the proposed freshwater wetlands and the introduction of increased amounts of saltwater into the Slough. This damage has been partially repaired by the construction of a new berm to block surface intrusion of saltwater (Figure 2).

The second major project was the construction of Interstate 595 through the Slough, and the construction of the major intersection of SR 441 with I-595. Although the state purchased the 112-acre central core of the Slough, the adjacent 58-acre Griffey Tract and an additional 22.5 acres along the South New River Canal with the intent to restore these areas and turn them over to Broward County in a pristine condition at the completion of construction of the interstate, major problems still remain. As of the writing of this section (December 1996), the restoration work is not complete and Broward County still does not have ownership (pers. comm., Gill MacAdam).

The preparation of this management plan, the one-time removal of exotics from a major portion of the Slough, and the construction of the saltwater intrusion repair berm and a freshwater retention berm (Figure 2) were funded by a $300,000 trust fund established in 1991 by the Broward County Commission with settlement funds provided by Homart Development Corporation as a result of unpermitted filling of wetlands. Those funds are now exhausted and additional funding will be necessary to ensure the continuation of restoration and protection activities in the Pond Apple Slough Ecosystem.

5.2 Goals and Objectives

5.2.1 Hydrology

As previously discussed, the hydrology of the PASE has been largely modified by drainage modifications and by either blockage of historic sources of freshwater or reductions in the total watershed contributing to the area. There is still some controversy regarding what the ultimate goal for restored hydrology of the site should be. The initial concept was to block all saltwater entry points into the PAS, and convert it to a totally freshwater system, much as it was historically. Some allowance for overflow of large freshwater inputs would be essential to avoid drowning some plant species. More recently, some have suggested that freshening of the system could lead to greater dominance by exotic plant species, unless a funded plan is in place to keep them under control (LES 1993).

One key element needed for a goal to be defined is an up-to-date hydrology study to define what could economically be achieved. This remains a necessary item not currently funded. Absence of the study should not delay continued planning for the rerouting of freshwater normally discharged to tide through S-13 on the C-11 (see Appendices G and F). Ultimately, a target hydrology in terms of inundation stages, salinities and durations need to be defined that ensures the continued existence (defined as a reasonable time frame such as 50 to 100 years) of the largely freshwater nature of the PASE. Finally, the critical issues of greenhouse warming, sea level rise and the protection of eastern Broward County from flooding may control what can and should be done regarding long term protection of the PASE.

5.2.2 Vegetation

Section 4.7 and the associated Figures 10 and 11, and Table 1 have characterized the existing vegetation of the PASE. As noted in that section, non-native (exotic) invasive plant species like Brazilian pepper, melaleuca and Australian pine, and native invasive species such as cattails and white mangroves, have been major problems in the area. They displace the more desirable and valuable plant communities important to fish and wildlife that use the ecosystem now and could be expected to be restored as resident species in the future.

The primary goal of this management plan in relation to the existing plant community is to "reestablish the historical mix of native plant communities that existed in the PASE prior to its disturbance by man." This can be accomplished in four ways.

The first is the continued control of exotic and invasive plant species in those areas where control efforts have already been initiated (Management units 1A, 1B, 1C, 2B, 3, 4A, 4B, 4C, 17, 18A and 19, Figure 12). The second is to initiate control, including follow-up, at both publicly owned sites like 4D and privately owned sites like 7A-E. Control of exotics on privately owned land adjacent to publicly owned land is essential because most of the invasive plant problems cannot be solved without removing sources of seed outside the publicly owned land. This may be accomplished by providing incentives such as mitigation credits for the private landowners to use themselves or sell as mitigation banking credits. Funds collected by the County in the form of fines for violations of air pollution, water pollution or wetland protection laws are most easily used to activities like exotic plant control on publicly owned land. Their use on privately owned lands may require the placement of a voluntary conservation easement on the land parcel in question. This has been successfully done by the Florida Department of Environmental Protection in Hillsborough County, Florida.

The third tool in restoring natural plant communities is to ensure the long term maintenance of natural wetland hydrology. As noted in section 4.5, the proposed "rewatering" project may provide the necessary water to ensure restoration of normal hydrology. Exotic plants typically invade wetlands more easily if the normal hydrology is disrupted. In addition, melaleuca consumes larger quantities of water than native wetland species, thus further reducing the water supply available to support native wetland plants. The long term control of melaleuca will therefore be a form of hydrologic restoration.

Finally, planting of native vegetation can accelerate the restoration of native plant communities. FDOT has planted several thousand native plants as part of its I-595 and other road projects mitigation at several sites in the PASE (Management Units 1A, 1B, 4B and 4C). The Resource Recovery Plant mitigation areas have also been planted. A review of the required regulatory agency monitoring reports should be undertaken to determine which species have been most successful, and which species have failed to thrive, in order to provide guidance for future plantings.

5.2.3 Wildlife

The goal of these proposed management efforts should be to "restore to the extent possible the wildlife use of the PASE as it was prior to man's impact to the ecosystem."

It will be difficult to restore significant large animal use to the ecosystem because larger animals such as deer and panther require a large, contiguous land area within which to roam and feed without human disturbance or danger from road traffic. For example, the home range requirement for a single male panther is 135,800 acres, while a female panther requires 74,100 acres (Cox et al. 1994). It would thus not be possible to restore panthers to the PASE, due to its small size and surrounding land uses.

On the other hand, the ecosystem is large enough to support populations of amphibians and reptiles characteristic of freshwater wetlands. However, a significant limiting factor for some of these species is the seasonal availability of a dry upland area in which to forage and for some species, like freshwater turtles, to safely lay their eggs. Pending analysis of the proposed expansion plans for the Resource Recovery Plant and its residue storage areas, some portion of the county-owned property in the PASE should be designated as an upland preserve.

5.3 Public Interest and Use

In order to ensure long term public support for the protection and management of the PASE, it is imperative that limited public access, compatible with the management of the area, be provided. Any such usage needs to comply with the mutual agreements contained in the 1987 Land Use Agreement between Broward County and the Florida Department of Transportation (Appendix I). Section 6 of that agreement states that FDOT "agrees to assist the County in providing limited public access to the nature preserve ... and to incorporate such provisions as a part of the Departments on-going I-595 Expressway project, or such future construction as may be contemplated by Department in this area, at no cost to the County" (p. 3). Mention is also made in Section 8 of the same document of the potential future construction of "elevated walkways and/or viewing platforms for the purpose of scientific investigation or nature study..." (p. 4). At the present time, the only access to the publicly owned portions of the PASE is by water. There are no land access points with designated parking or informational signage. The limited size of the environmentally sensitive land parcels would necessitate very careful consideration of the design of any limited public access point to avoid damage by overuse of the area. The most likely scenario would be the establishment of an offsite interpretive area with bus transport to an onsite kiosk and short boardwalk and viewing platform. It is unlikely that more than 25–50 people could be accommodated in such a facility at any one time.

5.4 Habitat Restoration Analysis

Significant additional habitat restoration beyond that already initiated in the Griffey Tract, the Pond Apple Slough, Hacienda Flores, and the shoreline of the South Fork of the New River Canal by the County and FDOT is limited by two factors. These are the long-range plans for the Resource Recovery Property (Management Units 12, 13, 14, and 17), and the current and planned uses of the privately owned vacant land parcels (Management Units 5, 6, 7, 8, 9, 10, 11, 15 and 16). At the present time the authors of this report do not have access to any information about the intended uses of or long term land use plans for these areas. If such information is made available, this section can be expanded.

5.5 Rehydration of the Slough

As previously discussed in Sections 4.5 and 5.2.1, when an updated hydrologic study of the PASE is available, specific decisions about methods needed to ensure long term protection of the freshwater character of the PASE can be made. The two projects previously implemented (blockage of saltwater intrusion with the new south berm, and redirection of surface flow from the stormwater pond by the new north berm, Figure 2), combined with recent increases in rainfall, have improved the freshwater character of the PASE (pers. comm., W. Wilkes). The proposed diversion of freshwater normally discharged through Structure S-13 to "rewater" the PASE is generally supported by those familiar with the system and should be pursued.

5.6 Compatibility of Surrounding Uses

As reflected in Figures 2 and 13, the existing land uses of the parcels of land immediately surrounding the "core area" of the PASE (i.e. Griffey Tract and Pond Apple Slough) are compatible in terms of providing a secure buffer for the system since they are fenced and patrolled. Open public access and the possibility of damage to the core area are prevented. However, the adjacent parcels support significant areas of exotic vegetation that complicate control efforts since they provide a constant supply of new seeds of the same exotic species that are under control in portions of the core area (see Figure 13). For these reasons, the continued compatibility of the surrounding land uses should be encouraged with the added element of exotic plant control on these parcels in a coordinated effort with the PASWG.

5.7 Identification of Management Units

Figure 12 delineates the 35 suggested management units. These units are also identified on a larger blue-line aerial photograph in the back of this volume. The system of applying an identification number to each parcel is complicated by the fact that FDOT already has an identification system for some of the parcels. Every attempt has been made to use previous designation systems for compatibility. Also, parcel boundaries were delineated based upon ownership to the extent possible, with particular attention to distinguishing private vs. public ownership boundaries (Figure 13). Table 3 lists each management unit, its size and ownership if known.

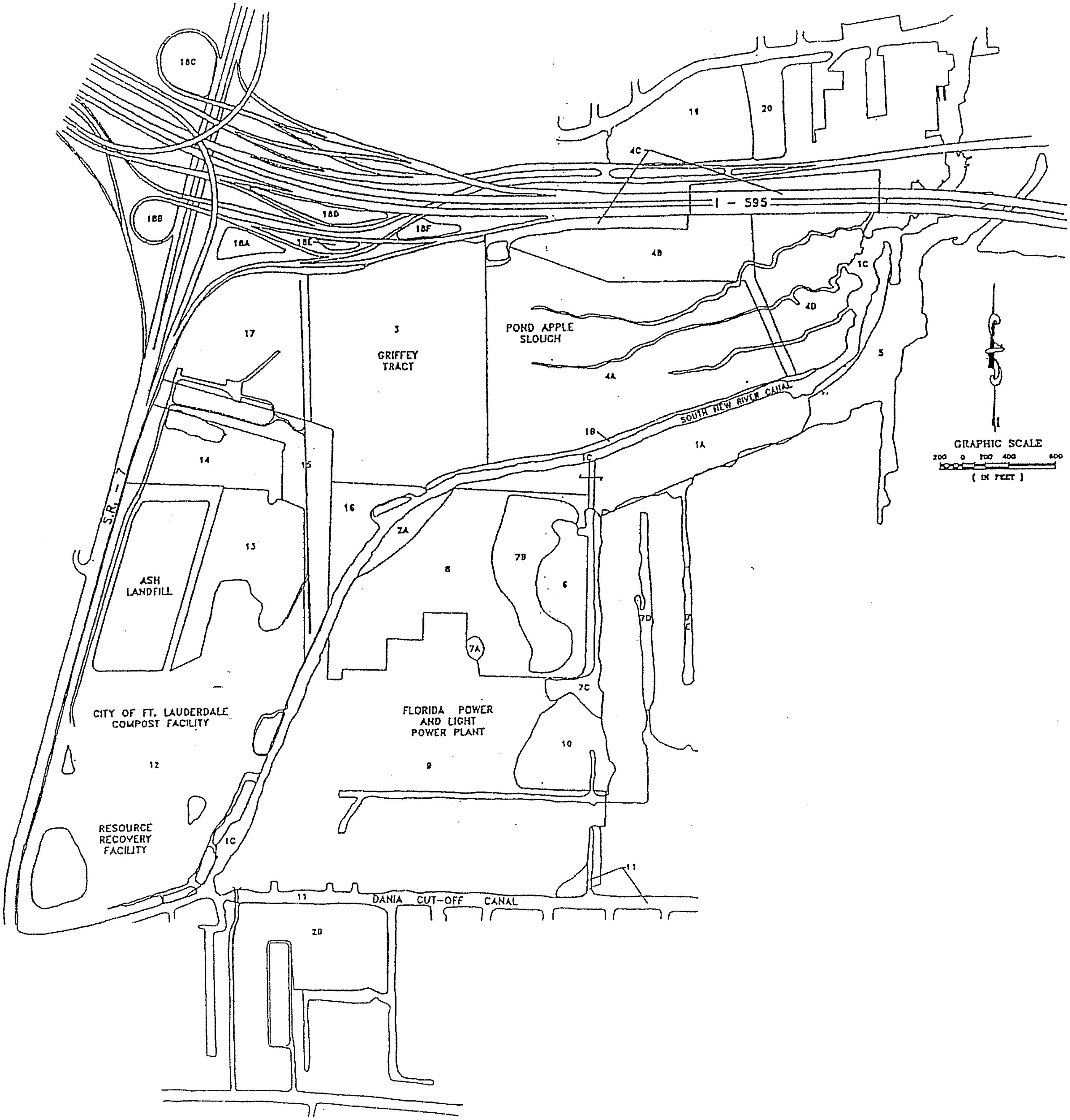

Figure 12. Suggested management units.

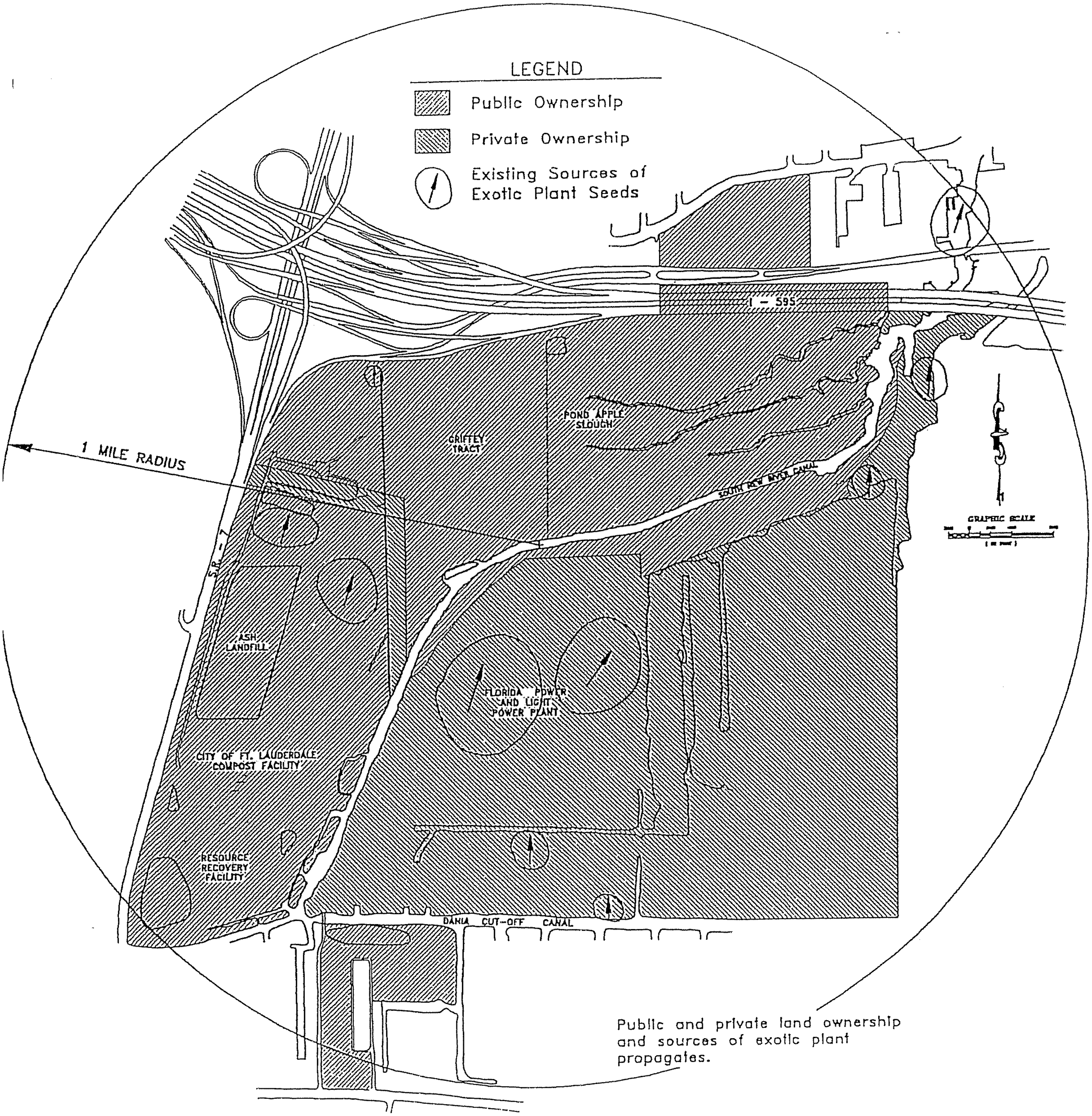

Figure 13. Public and private land ownership, and sources of exotic plant propagates.

Table 3. Listing of the suggested management units, Pond Apple Slough Ecosystem. FDOT—Florida Dept. of Transportation; FPL—Florida Power & Light; BCWM—Broward County Office of Integrated Waste Management.

NUMBER	IDENTIFICATION	AREA (ac.)	OWNERSHIP	NAME
1	1A	20.55	FDOT	—
2	1B	4.2	FDOT	—
3	1C	—	?	South New River Canal
4	2A	3.4	FDOT	—
5	2B	28	FDOT	—
6	3	58	FDOT	Griffey Tract
7	4A	73.8	FDOT	Pond Apple Slough
8	4B	21.4	FDOT	Pond Apple Slough
9	4C	16.6	FDOT	Pond Apple Slough
10	4D	24.6	FDOT	Pond Apple Slough
11	5	22.2	?	—
12	6	8.3	FPL	—
13	7A	0.8	FPL	Australian pine forest
14	7B	15.6	FPL	Australian pine forest
15	7C	4.7	FPL	Australian pine forest
16	7D	3.7	FPL	Australian pine forest
17	7E	1.4	FPL	Australian pine forest
18	8	36.8	FPL	—
19	9	117.3	FPL	—
20	10	12.1	FPL	—
21	11	—	various	Dania Cut-off Canal
22	12	134.6	BCWM	—
23	13	19.9	BCWM	—
24	14	15.6	BCWM	—
25	15	20.6	FPL	—
26	16	8.0	?	—
27	17	27.0	BCWM	—
28	18A	2.7	FDOT	Stormwater pond
29	18B	2.3	FDOT	Stormwater pond
30	18C	2.0	FDOT	Stormwater pond
31	18D	3.7	FDOT	Stormwater pond
32	18E	0.5	FDOT	Stormwater pond
33	18F	1.2	FDOT	Stormwater pond
34	19	17.2	Broward County	Hacienda Flores
35	20	5.8	private	Marina; Australian pines

5.8 Monitoring Requirements

Short-term Monitoring

The required monitoring program outlined as part of the permit issued for the new south berm and the redirection of flow from the stormwater pond with a new north berm (Figure 2) should be implemented as the short-term monitoring program. Specifically:

> The proposed monitoring and maintenance plan will consist of the preparation of a Time Zero report at the completion of construction, and the preparation and submittal of quarterly reports thereafter for a period of three years post-time zero, for a total of 13 reports (Time Zero, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 months post-time zero). The Time Zero report will document with maps and photos the actual construction of the projects and the establishment of monitoring plots in the disturbed areas and berms created by construction for the purpose of monitoring and controlling exotic plan re-invasion in these areas. At Time Zero, all exotic plants within 250 feet of the construction sites will be either removed by hand or treated with an approved herbicide. At each quarterly inspection, removal and retreatment as necessary to control re-invasion will be undertaken. All efforts and their results will be documented in the quarterly reports.

Long-term Monitoring

Nine long-term monitoring plots will be established. These will be located in order to overlap at least six of the 31 monitoring plots currently being monitored by FDOT as part of their monitoring of the Griffey Tract for compliance with existing permits and consent orders. An additional three plots will be located outside the Griffey Tract in the eastern portion of the Pond Apple Slough. Each plot will be 3m × 3m, as they are for the current monitoring program. The existing vegetation monitoring program will be continued with photographs from fixed points, number of non-herbaceous plants, average height, dbh of the five largest trees and species identification, percent cover by herbaceous plant species, and water level and salinity within a single centrally located shallow water well or staff gauge depending on whether it is a constantly flooded (tidally influenced) station. Water depth and salinity will be reported in reference to recent rainfall and tidal conditions at the time the data are collected.

Long-term monitoring should also include vertical true-color aerial photography of the ecosystem every five years at a negative scale of 1″= 2000′ (1:24,000), and interpretation and mapping of the plant communities and preparation of a report discussing the trends in vegetation changes (if any have occurred) and recommendations for future action. All data will be summarized in annual reports, and a discussion and conclusions regarding the success or failure of the permitted projects to reduce tidal intrusion and restore lower salinity conditions to the Griffey Tract and the Lower Pond Apple Slough will be part of the final (Time Zero plus 36 months) report.

5.9 Summary of Recommended Plan

1. Designation of a single agency with overall management responsibilities for the entire ecosystem;
2. Expansion of the membership of the existing Pond Apple Slough Working Group to include a representative of Florida Power and Light and interested citizens who live in the ecosystem;
3. Continuation of regular meetings of the Pond Apple Slough Working Group;
4. Use of an agreed-upon management unit designation system to facilitate targeted management efforts;
5. Continued annual budgeting for two maintenance workers, a boat, trailer, 4-wheel drive vehicle, and chemicals for the control of exotic plant species in the Pond Apple Slough Ecosystem and ESL sites in Broward County;
6. Contracting for a consultants' update of the existing hydrology and hydrobiology of the ecosystem and recommendations for specific water management efforts;
7. Provision of funds to support two continuing positions in support of the administrative and interpretive efforts within the Pond Apple Slough Ecosystem; and,
8. Institution of a regular monitoring program using college or graduate level students in conjunction with County staff.

6. PLAN IMPLEMENTATION

6.1 Management Responsibilities

Currently, management responsibilities for the PASE are informally assigned among private landowners, FDOT, Broward County Office of Integrated Waste Management and the various agencies represented on the PASWG. This has resulted in a patchwork of mixed responsibilities, with some management units receiving greater attention than others, and some receiving no attention at all. The PASE cannot be managed effectively if only publicly owned lands are considered.

Ecosystem management is a new buzzword with resource management agencies. It is easy to talk about but very difficult to implement, when, as here, many landowners with differing interests and capabilities own separate pieces of the ecosystem. Wildlife does not care who owns a particular piece of property. Brazilian pepper seeds carried by water flow or feeding birds cross boundaries of ownership very easily. All the effort to control exotic plants on one parcel of land can be defeated if an adjacent neighbor lets the same species grow wild and reseed the area of control.

Approximately two-thirds of the PASE is currently owned by or will be deeded in the near future to various entities of Broward County government. A single agency with county government needs to take a leadership role in coordinating the overall management of the PASE. Up to this point in the checkered history of the PASE, that role has largely fallen to the Department of Natural Resource Protection (DNRP). The DNRP has expressed the opinion that the Parks and Recreation Division (PRD) of the Department of Community Services should be the single management entity (see Appendix G). PRD requested two maintenance worker's level 1 in their last budget request along with a small boat, trailer, 4-wheel drive vehicle and herbicides to control exotic plants at PASE and other Environmentally Sensitive Land (ESL) sites. The budget for these workers and necessary support is $81,000 per year (pers. comm., G. MacAdam). This needs to be a recurring expenditure if there is to be any reasonable opportunity to keep exotic plants under control in the PASE.

If the PRD is to be the leadership agency, it will need to have one designated Environmental Coordinator with essentially full-time responsibility for supervising the two maintenance workers described above, initially concentrating on the PASE, with the anticipated successful experience being later applied to ESL sites. The PASWG needs to expand its membership to include other private landowners within the PASE boundaries like FPL, marina owners, boaters, and interested citizens resident in the area. The management of this group will also be the responsibility of the Environmental Coordinator. In addition, if it is the intent of the PASWG to provide for public access and educational opportunities within the PASE, a Park Naturalist with perhaps half-time responsibilities in the PASE will be necessary.

6.2 Management Unit Problems and Needs

Table 4 lists the individual Management Units and briefly describes their problems, needs and priorities.

Table 4. Listing of the suggested management units, problem identification and priority, Pond Apple Slough Ecosystem. A is highest priority, C is lowest.

NUMBER	IDENTIFICATION	PROBLEM STATEMENT	PRIORITY
1, 2	1A, 1B	FDOT permit compliance, erosion, exotic control	A
3	1C	Enforced no-wake zone year-round	A
4, 5	2A, 2B	FDOT permit compliance, long-term exotic control	A
6	3	FDOT permit compliance, long-term exotic control	A
7	4A	Initial exotic control follow-up	B
8, 9	4B, 4C	FDOT permit compliance, long-term exotic control	B
10	4D	Initial exotic control and follow-up needed	A
11, 12	5, 6	Australian pine removal and control	B
13, 14, 15	7A, 7B, 7C	Australian pine removal and control	B
16, 17	7D, 7E	Australian pine removal and control	B
18	8	Private exotic control	B
19	9	Cooling water use and impacts	A
20	10	Preservation on private property	B
21	11	Shoreline exotic control, erosion	A
22	12	Shoreline exotic control	A
23	13	Future use, exotic control	B
24	14	Australian pine seed source	A
25	15	Future management by FPL	B
26	16	Ownership? Exotic control	B
27	17	Minor exotic control	C
28, 29, 30	18A, 18B, 18C	Long-term exotic control	C
31, 32, 33	18D, 18E, 18F	Long-term exotic control	C
34	19	Long-term exotic control	C
35	20	Private control of exotics	A

6.3 Management Unit Costs

6.3.1 Exotic Plant Control

Appendix H suggests the best methods for exotic plant control using herbicides and provides background information on specific herbicides and application techniques and tools.

Initial control of mature exotic plants using herbicides without having to cut and remove the trees will cost about $2,000/acre, which includes 30-day and 6-month follow-ups to ensure all the larger plants are killed. Maintenance costs should run about $200/acre per year. (These costs are for contract labor using their own tools and herbicides; the expense could be reduced by 50% using county employees.)

6.3.2 Hydrologic Control

The estimated cost of the proposed rewatering project is $75,000.

6.3.3 Control of Nuisance Animals

No nuisance animal species problems were identified.

6.3.4 Desirable Plant and Animal Re-introduction

No re-introduction efforts are proposed at this time.

6.3.5 Short- and Long-Term Monitoring

The FDEP permit for the two hydrologic modification projects completed to date (see Appendix B, Specific Condition 11, FDEP Permit) required submittal of a proposed monitoring plan for determining success of the effort. A plan was submitted to the County on January 16, 1995 (see Section 5.8 and Appendix B). It is not known whether any plan has been implemented.

A long-term monitoring plan should be prepared in conjunction with the PASWG. The hydrologic portion of the plan could be prepared only after an updated hydrologic study is completed. Monitoring of vegetation and wildlife could be accomplished through funding of students or consultants. We would estimate that a budget of $25,000/year could fund a single student study of these parameters, while $50,000/year would probably be needed to hire a consulting firm.

6.4 Plan Review and Update Mechanisms

It is suggested for discussion that the PRD prepare an annual report about progress towards implementing this plan, with the first report due one year from the date the final plan is submitted to the PRD. Annual reports to the Board of County Commissioners would be required for the first three years, with a revised combined fourth year annual report and management plan due in the year 2000. Subsequent updates of the plan would be made every five years. The enlarged PASWG should meet no less than four times a year the first four years, and twice a year thereafter.

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BROWARD COUNTY

Public Works Department
Office of Environmental Services
2401 North Powerline Road
Pompano Beach, FL 33069

May 26, 1992

Mr. Steve Krupa
South Florida Water Management District
Post Office Box 24680
West Palm Beach, FL 33416-4680

RE: Pond Apple Slough (PAS)

Dear Steve:

You and I seem to keep missing each other at the PAS working group meetings so I'm sending you the data I've gathered so far.

Enclosed is a copy of a report written in 1990 describing our search for a source of fresh water for the Slough. Also enclosed is a copy of a memo to ONRP clarifying the C-11 Canal's (west of S-13) role in the water supply system.

Due to the value of the resource, it is important that little or no fresh water be wasted to tide. However, if properly managed, the minimal amount of water needed for the Slough should not be considered wasted. If at all possible, I'd appreciate your getting the Water Use Section's opinion of the plan and what the permit possibilities would be.

I look forward to discussing the project with you. We can't accomplish our goal without the SFWMD's help. If you have any questions, please call me at (305) 960-3186.

Very truly yours,

Dave Markward

Dave Markward
Water Resources Management Division

P.S. I understand the next meeting is scheduled for June 18.

DM/bp
CC: Working Group Members
Mr. Robin Lewis
BP16/19912FDM

POND APPLE SLOUGH
FRESH WATER RECHARGE STUDY

The Study's goal was to find a reliable source of water to protect and enhance the fresh water dependent natural resources of the Pond Apple Slough, reverse the damage caused by the salty water associated with the tidal influence of the South Fork of New River and, ultimately, create a favorable environment so the natural resource can regenerate itself.

The first step in the study plan was to determine the size of the present run-off area directed toward the Slough. F.DOT supplied the construction drawings of the I-595/State Road 7 Interchange. The drainage map showed that approximately 1/3 of the area was directed (after considerable retention) to the new retention pond adjecant to the Slough. The other 2/3's was designed to flow to the northwest and southwest quadrants of the interchange. Due to the water quanity measures required of the interchange, the long time of concentration makes the run-off from the highway an unreliable source of sufficient recharge water.

The search for a reliable source was expanded beyond the interchange. To the north is the Tidal portion of the New River Canal. To the south and east is the tidal South Fork of New River. To the west are several rock pits and artifical lakes. Also to the west is the Central Broward Drainage District (CBDD) N-1 Canal. The N-1 Canal is connected to the South Florida Water Management District (SFWMD) C-11 Canal, west of the salinity barrier S-13, by a series of 48 inch and 60 inch pipe culverts.

The next step was to design a method to connect this fresh water supply to the Pond Apple Slough. Plate 1 illustrates a series of pipe culverts which interconnects the rock pits, lakes and canals to each other and under State Road 7 to the Slough via the new I-595 ditch. The drainage area, west of State Road 7, is approximately 640 acres.

Like the Fern Forest Rewatering project, the study plan takes advantage of the existing man-made water management works trying to keep structural changes to a minimum. Taking advatage of the existing systems around Fern Forest kept that project's costs below $70,000 ($50,400 of the funds were supplied by a Florida Department of Environmental Regulation grant).

Also like Fern Forest, the water source targeted for the Slough is lower in elevation than the preserve, making pumping the water a neccessity. The CBDD N-1 Canal and its culverts were originally designed to discharge no more than 40 cfs under the design conditions of a 25-year 3-day storm event. The rock pits, lakes and canal can supply the I-595 ditch with 15 cfs under normal conditions (with the new pipes completely submerged). This figure increases to more than 25 cfs after a storm event.

To lift the water up into the Slough, a 4000 gpm water screw pump would be used to transfer the 15 cfs to the Slough's higher elevations. When a rain storm raises the water levels in the canal system, a second 2000 gpm pump would be turned on to take advantage of the increase to 25 cfs. The water would be pumped into a new pond in the northwest corner of the sawgrass area. The pond is designed to sheet flow water across the sawgrass area on its way to the lower areas of the Slough (please see Plate 2). Placing the new pond in the northwest corner will closer mimick the historical flows through the Slough than the present I-595 pond.

A berm will be constructed along the South Fork of New River to:

1. Act as a salinity barrier
2. Regulate discharge through the use of culverts with flap gates and stop log riser.
3. Create a fire control access road
4. Be used as a guided nature trail
5. Retard the gribble invasion.

The berm can be designed to retain and enhance the existing marine habitat on the River side. To keep construction costs down and so as not to impede navigation, the berm must remain out of the main boat channels. The first phase of the berm construction would be across the Slough outlets starting at the I-595 bridge. Plate 3 illustrates a typical section of the proposed berm with the necessary water control culverts. This proposed berm would be extended westerly and connect to the existing berm which is being mitigated presently by F DOT.

To accomplish this complex project requires the cooperation, endorsement and permits from the following government enities:

Town of Davie

Tindall Hammock Irrigation and
Soil Conservation District

Central Broward Drainage District

Enivironmental Quality Control Board

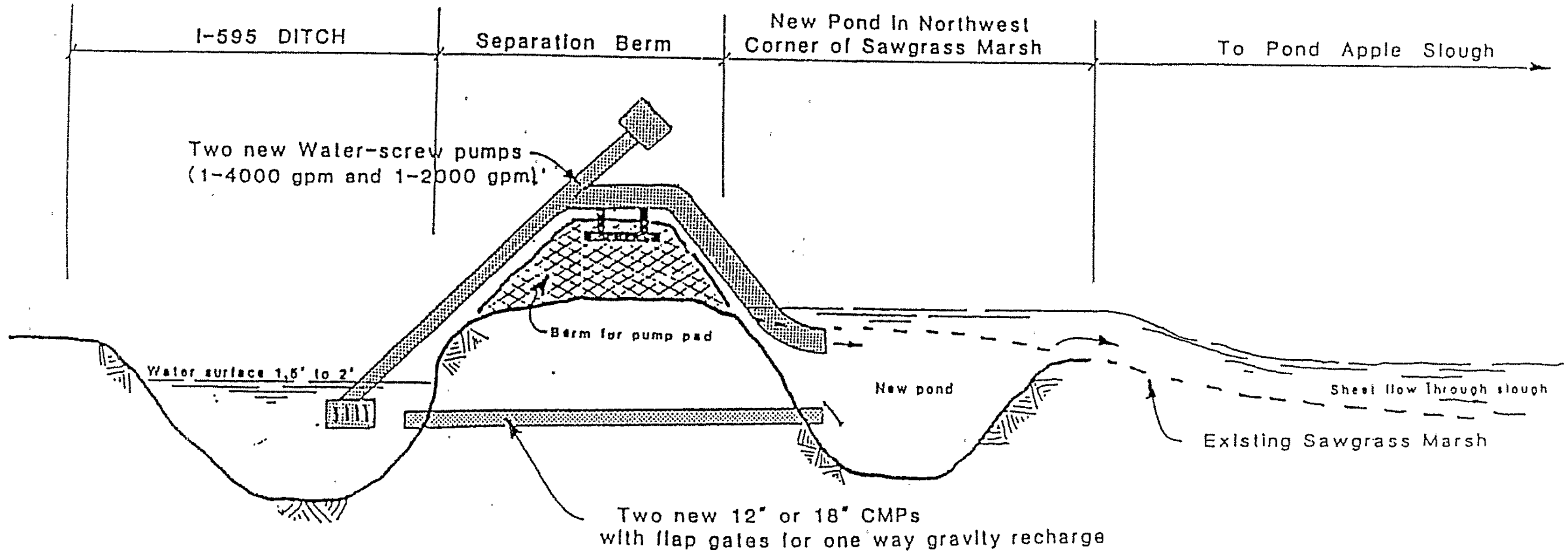
Florida Department of Transportation

Florida Department of Environmental Regulation

South Florida Water Management District

Department of Natural Resources

US Army Corps of Engineers



SECTION THROUGH PUMP STATION AND POND

The new culverts, together with the existing I-595 ditch, can supply 15 cfs to 31 cfs. Under normal operation the 4000 gpm pump fills the new recharge pond. As the pond fills, it sheet flows across the sawgrass marsh toward the slough. The 2000 gpm pump is used during and immediately after a rain event to capture as much rain runoff in the existing canal and lake system west of State Road 7 before it drains to the C-11 Canal. The fresh water is retained in the slough by the berm along the South Fork of New River.

Nov. 1990	FRESHWATER RECHARGE PLAN	POND APPLE SLOUGH	Plate 2

Specifications for Control of Woody Invasive Exotics in the Pond Apple Slough

Introduction

The following procedures are recommended for effective control and management of invasive exotics in the Pond Apple Slough Ecosystem (PASE). The major species of concern include:

Australian pine	*Casuarina* spp.
Brazilian pepper	*Schinus terebinthifolius*
Melaleuca or punk tree	*Melaleuca quinquenervia*

These three species present major invasion problems in the PASE. The most effective and economical way to permanently eradicate these species is to treat individual plants with herbicide. The dead plants can usually be left in place to decompose. In a situation where the dead tree could become a safety hazard (e.g., to a road, power line, structure, etc.) if it is left in place, it may be advisable to remove the tree and treat the stump. Alternatively, the tree can be treated and cut down 30 days later, leaving the dead stump. Herbicide treatment methods and procedures for these pest species in the PASE are outlined below.

Herbicide Treatment of Australian Pine and Brazilian Pepper

Methods are presented here for treatment of both plants to be left in place and stumps left after removal. Garlon 4 is the recommended herbicide for treatment of Australian pine and Brazilian pepper. The following procedure should be used to apply Garlon 4 to live trees. All users should read the Garlon 4 herbicide label (copy attached) and be familiar with its use.

Treatment of Plants Left in Place

Materials and Planning:

- Use Garlon 4 in a 10–15% solution with JLB Plus Oil (85–90% oil) for Brazilian pepper, 25% solution for Australian pine (75% oil). Cidekick II penetrant may be used to help facilitate entry of the Garlon into the plant and is premixed with the plant-based (non-petroleum) oil.

- Depending on the job location and size, hand pump sprayers or backpack sprayers are typically used. We recommend substituting the Gunjet spray gun for the wand sprayer on backpack sprayers.

- Avoid treating plants during wet periods. The occurrence of rain or high water within ten hours of treatment will wash herbicide away before it can penetrate the plant.

- Depending on size, trees will be dead within 30 to 45 days of herbicide application. The site should be checked and retreated as needed to ensure that all plants and parts are killed. If there is an untreated exotic seed source near the site it will be necessary to perform maintenance at regular intervals (6 months to one year) to eradicate new individuals. The first maintenance episode should be within 6 months at the most, and possibly sooner.

- Flowers and immature fruit are usually killed with the tree during herbicide treatment. Therefore, herbicide should be applied prior to ripening of seeds whenever possible. In the PASE, seed ripening for the three species is generally as follows:

Brazilian pepper	October–December
Australian pine	April–June
Melaleuca	April–June

- If the seeds have ripened enough so that they are no longer receiving nourishment from the tree, they will not be killed during treatment and will remain viable. If this occurs, maintenance visits will be necessary to treat any newly sprouted seedlings. Rodeo or Garlon 3A can be sprayed directly on the seedlings to control them.

- The dry season is the preferred time for treatment because the trees are already under stress and may be less resistant to the herbicide, and because it is easier to plan around the less frequent rain events.

Application: Use application recommendations on the Garlon 4 herbicide label for "Streamline Basal Bark Treatment (Southern States)". See the attached specimen label.

- Use a basal application completely around the tree at 3 to 18 inches from ground level in a six-inch wide band.

- For smaller stems (less than 1/2 inch) spray need only be applied in a 180 degree arc (halfway) around the stem and it will spread to the other side on its own, encircling the stem within 30 minutes. For larger stems, ensure that the stem is completely encircled when applying the herbicide.

- Spray directly on the main trunk or lower main branches so that the branch is thoroughly wetted all the way around, but not to the point of producing herbicide runoff. Multiple trunk species like Brazilian pepper require treatment of *all* the trunks.

- Spray high enough so that there is no runoff onto the ground and no spraying of the ground surface around the tree. Old or rough bark, found on larger trees, requires more spray (up to a 12-inch wide band) than smooth young bark.

Stump Treatment

- Prepare Garlon 4 herbicide mixture as described above and apply to the stump within one hour of tree removal, or as soon thereafter as possible.

- Use application recommendations on Garlon 4 label for "Cut Stump Treatment".

- Encircle the trunk with spray applied to the root collar area, sides of stump (in a 6-inch wide band), and outer portion of the cut surface including the cambium until thoroughly wet, but not to the point of runoff. Focus on the tree collar and cuts in the stump where herbicide can be absorbed most efficiently.

- Retreat stumps 60 days and 120 days after initial treatment if sprouts are present.

- Garlon 3A is less effective and is *not* recommended for use in controlling either adult Brazilian pepper or Australian pine.

Herbicide Treatment of Melaleuca

Treatment of melaleuca trees should be accomplished with the use of Arsenal herbicide. Because melaleuca has a thick cork-like bark, the effectiveness of the herbicide is greatly increased if it is applied directly to the cambium. As with other exotics, melaleuca should be treated prior to maturation of seeds, which usually occurs in the fall. After becoming familiar with the use of Arsenal by reading the herbicide label (copy attached), proceed as follows:

- Use a 10% solution of Arsenal and water.
- Make several incisions around the lower trunk area of the tree trunk (chest height is adequate) to the cambium layer (moist area below the bark).
- Apply the herbicide spray around the cuts in the basal area of the tree.
- Spray enough to thoroughly wet the cuts without producing runoff to the ground.
- Follow-up and treatment of cut stumps is the same as for Garlon 4.

Seedlings of all three species can be successfully treated with Rodeo or Garlon 3A applied to the new leaves. Follow up at 30, 60 and 90 days to ensure complete kill of all seedlings *is essential.*

Appendix K

POND APPLE SLOUGH

SPECIES LIST - PLANTS

As of 5-1-96

SCIENTIFIC NAME	COMMON NAME
Alcalypha setosa	
Acer rubrum	Red Maple
Achrostichum danaeifolium	Giant Leather Fern
Agalinis fasciculata	
Albizia lebbeck	Mimosa
Alternanthera philoxeroides	
Amaranthus spinosus	Common Pigweed
Ambrosia artemisiifolia	
Ammania latifolia	
Ampelopsis arborea	
Andropogon glaucopsis	
Andropogon virginicus var. *abbreviatus*	Broom Sedge
Anemia adiantifolia	
Annona glabra	Pond Apple
Apios americana	
Ardisia escallonioides	
Ardisia solanacea	
Asclepias incarnata	Swamp Milkweed
Asclepias curassavica	Scarlet Milkweed
Aster carolinensis	
Aster sp.	
Axonopus furcatus	
Azolla caroliniana	
Baccharis angustifolia	
Baccharis glomerulifolia	Groundsel Tree
Baccharis halimifolia	Saltbush
Bacopa caroliniana	Lemon Bacopa
Bacopa monnieri	Water Hyssop
Bidens alba	Beggartick
Blechnum serrulatum	Swamp Fern
Boehmeria cylindrica	
Borreria verticillata	
Buchnera floridana	
Bulbostylis ciliatifolia	
Callicarpa americana	
Capraria biflora	
Cassia ligustrina	
Casuarina equisetifolia	Australian Pine
Cenchrus incertus	

Centella asiatica	Coinwort
Cephalanthus occidentalis	Buttonbush
Ceratopteris thalictroides	
Cestrum diurnum	
Chamaesyce hyssopifolia	
Chamaesyce sp.	
Chenopodium ambrosioides	
Chloris glauca	
Chrysobalanus icaco	Cocoplum
Claudium jamaicensis	Sawgrass
Coccoloba uvifera	Sea Grape
Cocos nucifera	
Commelina diffusa	Day Flower
Conoclinium coelestinum	Mistflower
Conyza canadense	
Crinum americanum	String Lily
Crotalaria retusa	
Cynanchum angustifolium	
Cynanchum scoparium	
Cyperus compressus	
Cyperus elegans	
Cyperus globulosus	
Cyperus haspan	
Cyperus ligularis	
Cyperus planifolius	
Dactyloctenium aegyptium	
Dichromena colorata	White Top Sedge
Diospyros virginiana	
Encyclia cochleata	Clamshell Orchid
Encyclia tampensis	Butterfly Orchid
Epidendrum difforme	Unbelled Epidendrum
Eugenia axillaris	
Eugenia uniflora	
Eulophia alta	
Eupatorium capillifolium	Dog Fennel
Eupatorium mikanioides	
Eupatorium serotinum	
Eustoma exaltatum	
Ficus aurea	Strangler Fig
Fimbristylis spathacea	
Fuirena squarrosa	
Galium tinctorium	Bedstraw
Gaura angustifolia	
Heliotropium polyphyllum	
Heterotheca subaxillaris	

Hibiscus grandifolius	
Hibiscus tiliaceus	
Hydrocotyle umbellata	Water Pennywort
Hydrocotyle sp.	
Hydrolea corymbosa	
Hypericum brachyphylum	
Hypericum cistifolium	
Hypericum myrtifolium	
Hypericum tetrapetalum	
Hyptis alata	Musky Mint
Ilex cassine	Dahoon Holly
Ipomoea sagittata	Morning Glory
Juncus marginatus	
Juncus megacephalus	
Juncus polycephalus	
Justicia ovata	
Kosteletzkya virginica	
Lachnanthes caroliniana	Bloodroot
Lactuca intybacea	
Laguncularia racemosa	White Mangrove
Lantana camara	
Lantana involucrata	
Lemna minor	Duckweed
Lepidium virginicum	Poor-man's Pepper
Ludwigia alata	
Ludwigia microcarpa	
Ludwigia octovalvis	Ludwigia
Ludwigia peruviana	Primrose Willow
Ludwigia repens	Red Ludwigia
Lythrum lineare	
Lythrum sp.	
Magnolia virginiana	Sweet Bay
Manisurus rugosus	
Melaleuca quinquenervia	Paper Tree
Melanthera angustifolia	
Metopium toxiferum	Poisonwood
Mikania scandens	Mikania
Mitreola petiolata	Miterwort
Myrica cerifera	Wax Myrtle
Myrsine guianensis	Myrsine
Nephrolepis cordifolia	
Nephrolepis exaltata	
Nymphaea odorata	Waterlily
Osmunda regalis	Royal Fern
Oxalis corniculata	

Panicum hemitomon	Maidencane
Panicum repens	Torpedo Grass
Panicum sp.	
Parthenocissus quinquefolia	Virginia Creeper
Paspalum dilitatum	
Paspalum distichum	
Paspalum floridanum	
Paspalum urvillei	Vasey Grass
Passiflora suberosa	
Peltandra virginica	
Persea borbonia	Red Bay
Persea borbonia palustris	Swamp Bay
Phlebodium aureum	
Phragmites australis	Common Reed
Phyla nodiflora	
Phyllanthus caroliniensis	
Physalis viscosa ssp. *maritima*	
Phytolacca americana	
Pistia stratoites	
Plantago major	
Pluchea foetida	
Pluchea odorata	Camphorweed
Pluchea rosea	
Poinciana regia	
Poinsettia heterophylla	
Polygala grandiflora	
Polygonum punctatum	
Polypodium polypodioides	
Polypremum procumbens	
Pontederia cordata	Pickerelweed
Proserpinaca palustris	
Proserpinaca pectinata	
Psidium guajava	
Psilotum nudum	
Psychotria nervosa	Wild Coffee
Psychotria sulzneri	
Pteris vittata	
Quercus laurifolia	Laurel Oak
Quercus virginiana	Live Oak
Rhizophora mangle	Red Mangrove
Rhynchelytrum repens	
Rhynchospora caduca	
Rhynchospora inundata	Beakrush
Rhynchospora odorata	
Roystonea elata	Royal Palm

Rumex verticillatus	Swampdock
Sabal palmetto	Cabbage Palm
Sagittaria lancifolia	Duck-potato/Arrowhead
Salix caroliniana	Swamp Willow
Salvinia rotundifolia	
Sambucus canadensis	
Samolus parviflorus	
Sarcostemma clausum	
Saururus cernuus	
Schinus terebinthifolius	Brazilian Pepper
Scleria verticillata	
Setaria geniculata	Foxtail Grass
Sida acuta	Broomweed
Sida rhombifolia	Broomweed
Smilax laurifolia	Bamboo Brier
Solanum americanum	
Solidago sempervirens	
Sonchus oleraceus	
Sporobolus indicus	
Sporobolus poiretii	
Stachytarpheta jamaicensis	
Taxodium distichum	Bald Cypress
Taxodium distichum ssp.	Pond Cypress
Terminalia catappa	
Teucrium canadense	
Thelypteris interrupta	
Thelypteris kunthii	
Thelypteris palustris	Marsh Fern
Tillandsia balbisiana	Tulip Air Plant
Tillandsia circinnata	Air Plant
Tillansis fasciculata	Stiff-leaved Wild Pine
Tillandsia flexuosa	Twisted Air Plant
Tillandsia polystachia	Air Plant
Tillandsia recurvata	Ball Moss
Tillandsia setacea	Air Plant
Tillandsia usneoides	Spanish Moss
Tillandsia utriculata	Giant Pitcher Plant
Tillandsia valenzuelana	Air Plant
Toxicodendron radicans	
Trema micrantha	
Trifolium repens	
Typha angustifolia	Cattail
Typha domingensis	Cattail
Typha latifolia	Cattail
Urena lobata	Caesarweed

Verbesina virginica	
Vigna luteola	
Vitis aestivalis	
Vitis rotundifolia	
Vittaria lineata	
Wedelia trilobata	
Xyris sp.	Yellow-eyed Grass
Zizaniopsis miliacea	

POND APPLE SLOUGH

As of 5-1-96

SPECIES LIST - BIRDS

SCIENTIFIC NAME	COMMON NAME
Podilymbus podiceps	Pied-billed Grebe
Phalacrocorax auritus	Double-crested Cormorant
Anhinga anhinga	Anhinga
Ardea herodias	Great Blue Heron
Butorides virescens	Green Heron
Egretta caerulea	Little Blue Heron
Bubulcus ibis	Cattle Egret
Casmerodias albus	Great Egret
Egretta thula	Snowy Egret
Egretta tricolor	Louisiana Heron
Nyctucorax nycticorax	Black-crowned Night Heron
Nyctanassa violacea	Yellow-crowned Night Heron
Botayrus lentiginosus	American Bittern
Mycteria americana	Woodstork
Plegadis falcinellus	Glossy Ibis
Eudocimus albus	White Ibis
Anas platyrhynchos	Mallard Duck
Anas fulvigula	Mottled Duck
Anas discors	Blue-winged Teal
Anas acuta	Pintail
Cathartes aura	Turkey Vulture
Coragyps atratus	Black Vulture
Accipiter striatus	Sharp-shinned Hawk
Accipiter cooperii	Cooper's Hawk
Buteo jamaicensis	Red-tailed Hawk
Buteo lineatus	Red-shouldered Hawk
Buteo platypterus	Broad-winged Hawk
Circus cyaneus	Marsh Hawk
Pandion haliaetus	Osprey
Falco peregrinus	Peregrine Falcon
Falco columbarius	Merlin
Falco sparverius	American Kestrel
Colinus virginianus floridanus	Bob White
Gallinula chloropus	Common Gallinule
Fulica americana	American Coot
Charadrius vociferus	Killdeer
Scolopax minor	American Woodcock
Chordeiles minor	Common Nighthawk
Archilochus colubris	Ruby-throated Hummingbird

Ceryle alcyon	Belted Kingfisher
Colaptes auratus	Common Flicker
Melanerpes carolinus	Red-bellied Woodpecker
Dryocopus pileatus	Pileated Woodpecker
Sphyrapicus varius	Yellow-bellied Sapsucker
Tyrannus tyrannus	Eastern Kingbird
Tyrannus dominicensis	Gray Kingbird
Myiarchus crinitus	Great Crested Flycatcher
Sayornis phoebe	Eastern Phoebe
Iridoprocne bicolor	Tree Swallow
Hirundo erythrogaster	Barn Swallow
Progne subis subis	Purple Martin
Cyanocitta cristata	Blue Jay
Corvus ossifragus	Fish Crow
Troglodytes aedon	House Wren
Thryothorus ludovicianus	Carolina Wren
Mimus polyglottos polyglottos	Mockingbird
Dumetella carolinensis	Catbird
Toxostoma rufum	Brown Thrasher
Turdis migratorius	American Robin
Polioptila caerulea	Blue-gray Gnatcatcher
Corthylio calendula calendula	Ruby-crowned kinglet
Bombycilla cedrorum	Cedar Waxwing
Lanius ludovicianus ludovicianus	Loggerhead Shrike
Sturnus vulgaris vulgaris	Starling
Vireo griseus griseus	White-eyed Vireo
Larus delawareness	Ring-billed Gull
Larus atricilla	Laughing Gull
Columba livia	Rock Dove
Zeniada macroura	Mourning Dove
Crotophaga Ani	Smooth-billed Ani
Tytoalba pratincola	Barn Owl
Otus asio	Screech Owl
Bubo virginianus virginianus	Great Horned Owl
Strix varia	Barred Owl
Anrostomus carolinensis	Chuck-will's Widow
Vireocalidris barbatulus	Black-whiskered Vireo
Mniotilta varia	Black and White Warbler
Vermivora celata celata	Orange-crowned Warbler
Compsothlypis americana	Northern Parula
Dendroica coronata	Myrtle Warbler
Dendroica striata	Blackpoll Warbler
Dendroica pinus	Pine Warbler
Dendroica discolor	Prairie Warbler
Dendroica palmarum	Palm Warbler

Seiurus aurocapillas	Ovenbird
Seiurus noveboracensis noveboracensis	Northern Waterthrush
Geothlypis trichas trichas	Common Yellowthroat
Wilsonia pusilla pusilla	Wilson's Warbler
Setophaga ruticilla	American Redstart
Passer domesticus	House Sparrow
Dolichonyx oryzivorus	Bobolink
Sturnella magna	Eastern Meadowlark
Agelaius phoeniceus	Red-winged Blackbird
Icterus pectoralis	Spot-breasted Oriole
Icterus galbula galbula	Northern Baltimore Oriole
Quiscalus major	Boat-tailed Grackle
Quiscalus quiscula	Common Grackle
Cardinalis cardinalis	Cardinal
Piranga rubra	Summer Tanager
Passerina cyanea	Indigo Bunting
Passerina ciris	Painted Bunting
Carduelis tristis	American Goldfinch
Pipiloerythrophtalmus	Rufous-sided Towhee
Ammodramus savannarum	Grasshopper Sparrow
Passerculus sandwichensis	Savannah Sparrow
melospiza georgiana	Swamp Sparrow

POND APPLE SLOUGH

As of 5-1-96

SPECIES LIST - MAMMALS

Dysypus novemcinctus	Armadillo
Didelphis marsupialis	Opossum
Lynx rufus	Bobcat
Oryzomus palustris	Rat
Peromyscus sp.	Field Mouse
Procyon lotor	Racoon
Scalopus aquaticus	Mole
Sciupus carolinensis	Florida Gray Squirrel
Sigmondon hispidus	Cotton Rat
Sylvilagus palustris	Marsh Rat
Trichechus manatus	West Indian Manatee
Urocyon cinereoargenteus	Gray Fox

POND APPLE SLOUGH

As of 5-1-96

SPECIES LIST - REPTILES

Agkistrodon piscivorus conanti	Water Moccasin
Alligator mississippiensis	American Alligator
Anolis carolinensis	Green Anole
Anolis segrei	Brown Anole
Caiman crocodilus	Spectacled Caimen
Coluber constrictor priapas	Black Racer
Crocodylus acutus	American Crocodile
Diadophis punctatus punctatus	Ringneck Snake
Drymarchon corais couperi	Indigo Snake
Elaphe guttata guttata	Red Rat Snake
Elaphe obsoleta quadrivittata	Yellow Rat Snake
Elaphe obsoleta rosalleni	Everglades Rat Snake
Eumeces inexpectatus	Five-lined Skink
Farancia abacura	Mud Snake
Kinosternon bauri	Striped Mud Turtle
Leiolopisma laterale	Ground Skink
Nerodia taxispilota	Brown Water Snake
Ophisaurus ventraus	Glass Lizard
Pseudemys floridana	Florida Slider
Pseudemys nelsoni	Red-bellied Slider
Sistrurus miliarius barbouri	Pigmy Rattlesnake
Storeria dekayi victa	Dekay Brown Snake
Terrepene carolina bauri	Florida Box Turtle
Thamnophis sauritus sackeni	Ribbon Snake

POND APPLE SLOUGH

As of 5-1-96

SPECIES LIST - FISH

Astronotus ocellatus	Oscar
Caranx hippos	Jack Crevalle
Centropomus undecimalis	Snook
Fundulus sp.	Killifish
Gambusia affinis	Gambusia
Gerres cinereus	Mojarra
Gobidae gobidae	Sleeper Goby
Jordanella floridae	American Flagfish
Lepsosteus platyrhynchus	Florida Gar
Lepomis macrochirus	Bluegill
Megalops atlanticus	Tarpon
Micropterus salmoides	Largemouth Bass
Mollienesia latipinna	Green Sailfin Molly
Mugil curema	White Mullet

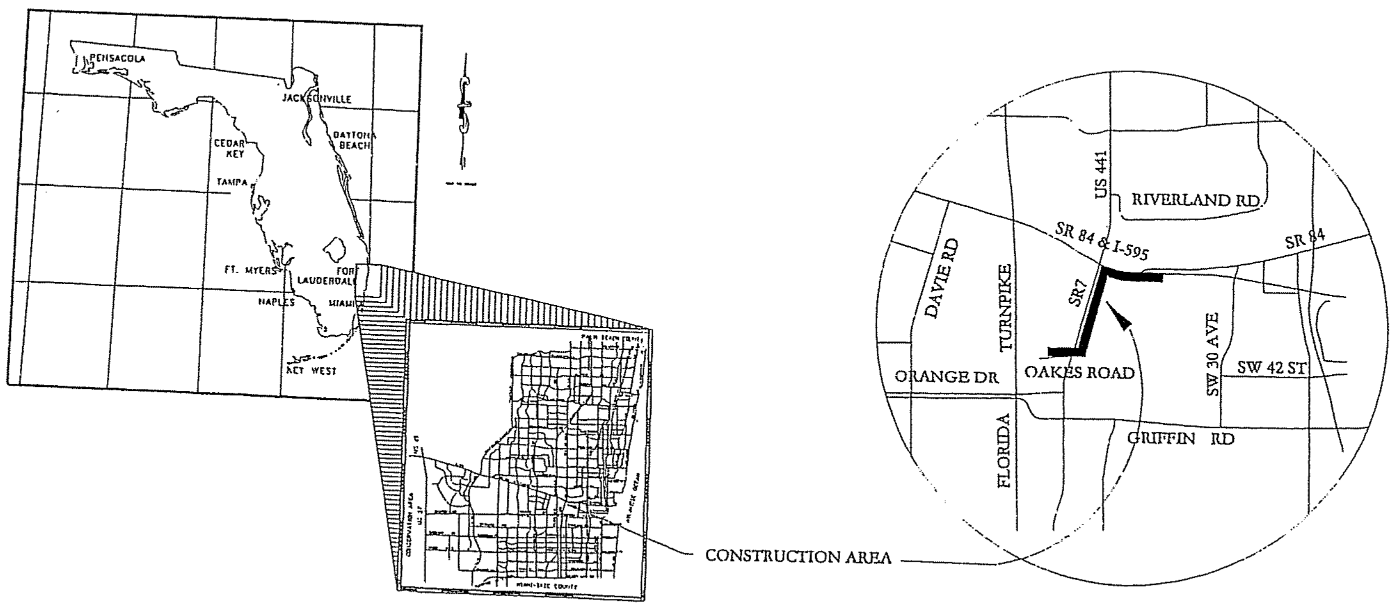
SPECIES LIST - AMPHIBIANS

Acris acris gryllus	Cricket Frog
Bufo guercicus	Oak Toad
Bufo terrestris	Southern Toad
Gastrophnyne carolinensis	Narrow-mouthed Toad
Hyla cinerea	Floridas Green Tree Frog
Rana palustris	Pickerel Frog
Rana utricularia	Southern Leopard Frog
Hyla septentrionalis	Cuban Tree Frog

Appendix L

POND APPLE SLOUGH
HYDROLOGICAL RESTORATION

DECEMBER 11, 2000



RING
INC.
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81-0870

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Mechanical & Electrical
Consulting Engineers
4826 South U.S. 1 • Ft. Pierce, Fl. 34982
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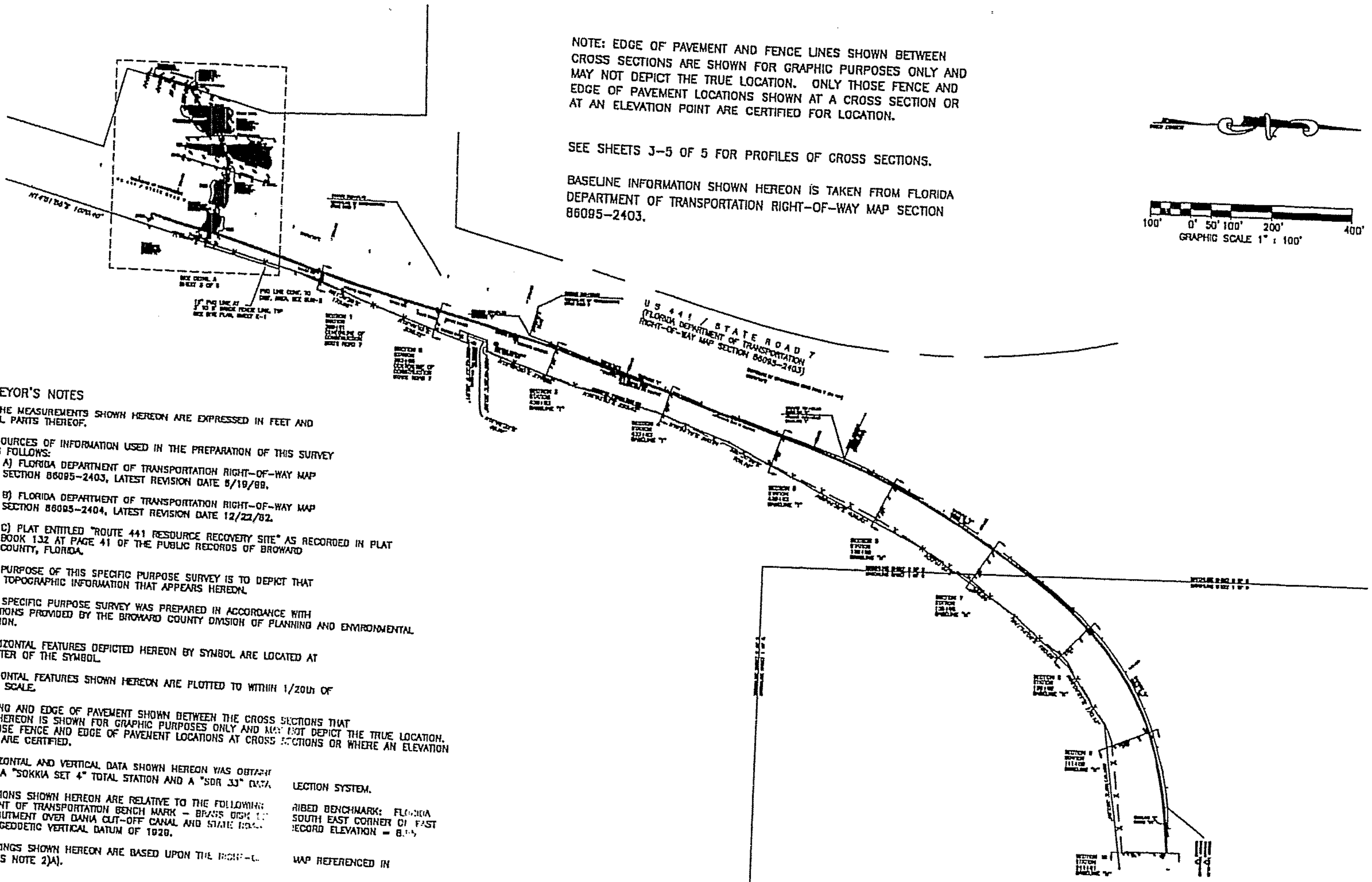


NOTE: EDGE OF PAVEMENT AND FENCE LINES SHOWN BETWEEN CROSS SECTIONS ARE SHOWN FOR GRAPHIC PURPOSES ONLY AND MAY NOT DEPICT THE TRUE LOCATION. ONLY THOSE FENCE AND EDGE OF PAVEMENT LOCATIONS SHOWN AT A CROSS SECTION OR AT AN ELEVATION POINT ARE CERTIFIED FOR LOCATION.

SEE SHEETS 3–5 OF 5 FOR PROFILES OF CROSS SECTIONS.

BASELINE INFORMATION SHOWN HEREON IS TAKEN FROM FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY MAP SECTION 86095-2403.

SURVEYOR'S NOTES

1) THE MEASUREMENTS SHOWN HEREON ARE EXPRESSED IN FEET AND DECIMAL PARTS THEREOF.

2) SOURCES OF INFORMATION USED IN THE PREPARATION OF THIS SURVEY ARE AS FOLLOWS:
   A) FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY MAP SECTION 86095-2403, LATEST REVISION DATE 5/19/89.
   B) FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY MAP SECTION 86095-2404, LATEST REVISION DATE 12/22/82.
   C) PLAT ENTITLED "ROUTE 441 RESOURCE RECOVERY SITE" AS RECORDED IN PLAT BOOK 132 AT PAGE 41 OF THE PUBLIC RECORDS OF BROWARD COUNTY, FLORIDA.

3) THE PURPOSE OF THIS SPECIFIC PURPOSE SURVEY IS TO DEPICT THAT CERTAIN TOPOGRAPHIC INFORMATION THAT APPEARS HEREON.

4) THIS SPECIFIC PURPOSE SURVEY WAS PREPARED IN ACCORDANCE WITH INSTRUCTIONS PROVIDED BY THE BROWARD COUNTY DIVISION OF PLANNING AND ENVIRONMENTAL PROTECTION.

5) HORIZONTAL FEATURES DEPICTED HEREON BY SYMBOL ARE LOCATED AT THE CENTER OF THE SYMBOL.

6) HORIZONTAL FEATURES SHOWN HEREON ARE PLOTTED TO WITHIN 1/20th OF THE MAP SCALE.

7) FENCING AND EDGE OF PAVEMENT SHOWN BETWEEN THE CROSS SECTIONS THAT APPEAR HEREON IS SHOWN FOR GRAPHIC PURPOSES ONLY AND MAY NOT DEPICT THE TRUE LOCATION. ONLY THOSE FENCE AND EDGE OF PAVEMENT LOCATIONS AT CROSS SECTIONS OR WHERE AN ELEVATION APPEARS ARE CERTIFIED.

8) HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS OBTAI... UTILIZING A "SOKKIA SET 4" TOTAL STATION AND A "SDR 33" DATA ...LECTION SYSTEM.

9) ELEVATIONS SHOWN HEREON ARE RELATIVE TO THE FOLLOWING ...RIBED BENCHMARK: FLORIDA DEPARTMENT OF TRANSPORTATION BENCH MARK – BRASS DISK ... SOUTH EAST CORNER OF EAST BRIDGE ABUTMENT OVER DANIA CUT-OFF CANAL AND STATE RO... RECORD ELEVATION = 8.... NATIONAL GEODETIC VERTICAL DATUM OF 1929.

10) BEARINGS SHOWN HEREON ARE BASED UPON THE RIGHT-O... MAP REFERENCED IN SURVEYOR'S NOTE 2)A).

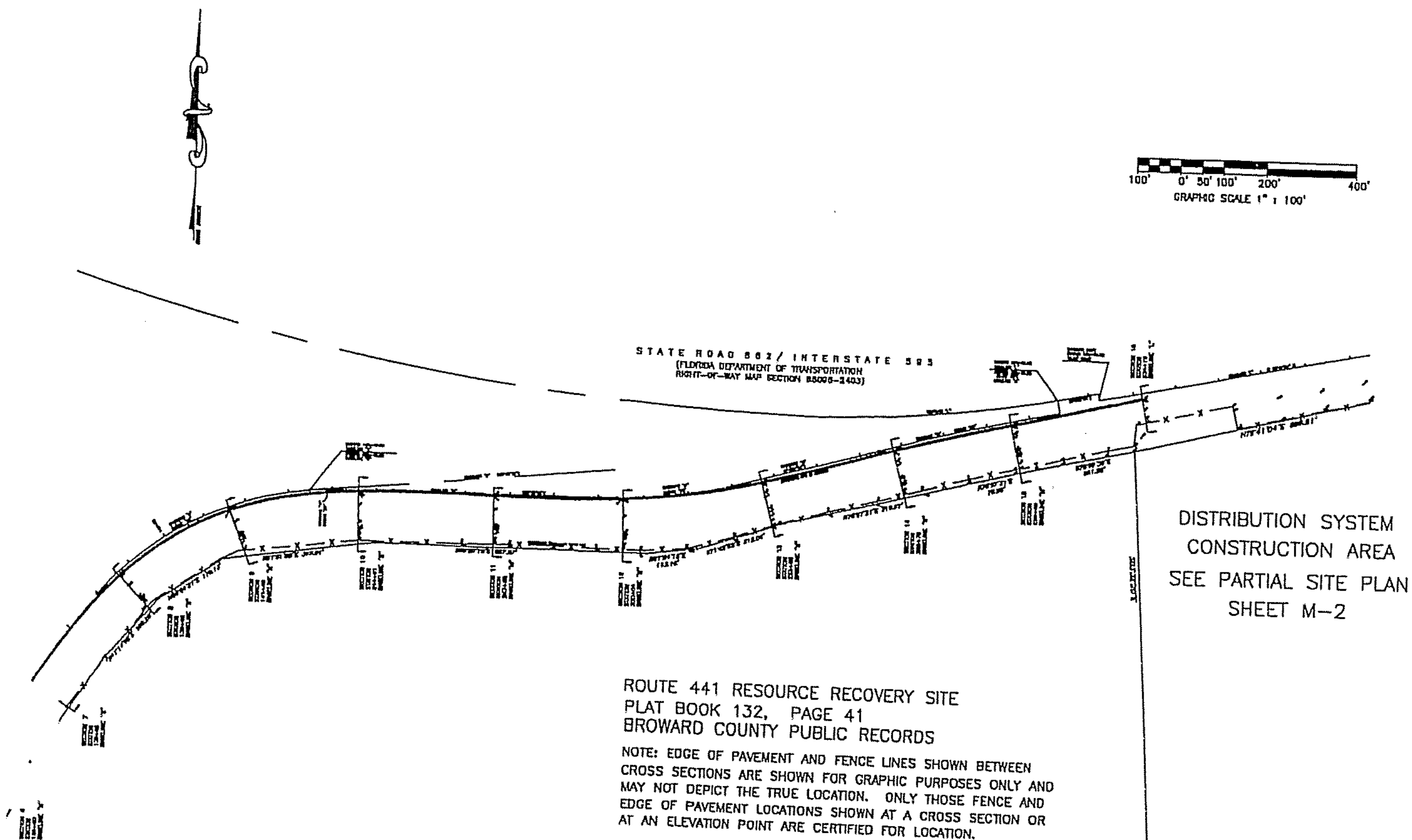
POND APPLE SLOUGH HYDROLOGICAL RESTORATION

SURVEY LAYOUT

HYD... ...OCIATES, U.S. ...IC.
8925 ...reet, Suite 212
Mian...
Phon... ...(305) ...874

SKS ENGINEERING & PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project
Date 12/7/00
Scale
Sheet SUR-1



ROUTE 441 RESOURCE RECOVERY SITE
PLAT BOOK 132, PAGE 41
BROWARD COUNTY PUBLIC RECORDS

NOTE: EDGE OF PAVEMENT AND FENCE LINES SHOWN BETWEEN CROSS SECTIONS ARE SHOWN FOR GRAPHIC PURPOSES ONLY AND MAY NOT DEPICT THE TRUE LOCATION. ONLY THOSE FENCE AND EDGE OF PAVEMENT LOCATIONS SHOWN AT A CROSS SECTION OR AT AN ELEVATION POINT ARE CERTIFIED FOR LOCATION.

SEE SHEETS 3-5 OF 5 FOR PROFILES OF CROSS SECTIONS.

BASELINE INFORMATION SHOWN HEREON IS TAKEN FROM FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY MAP SECTION 86095-2403.

HYD

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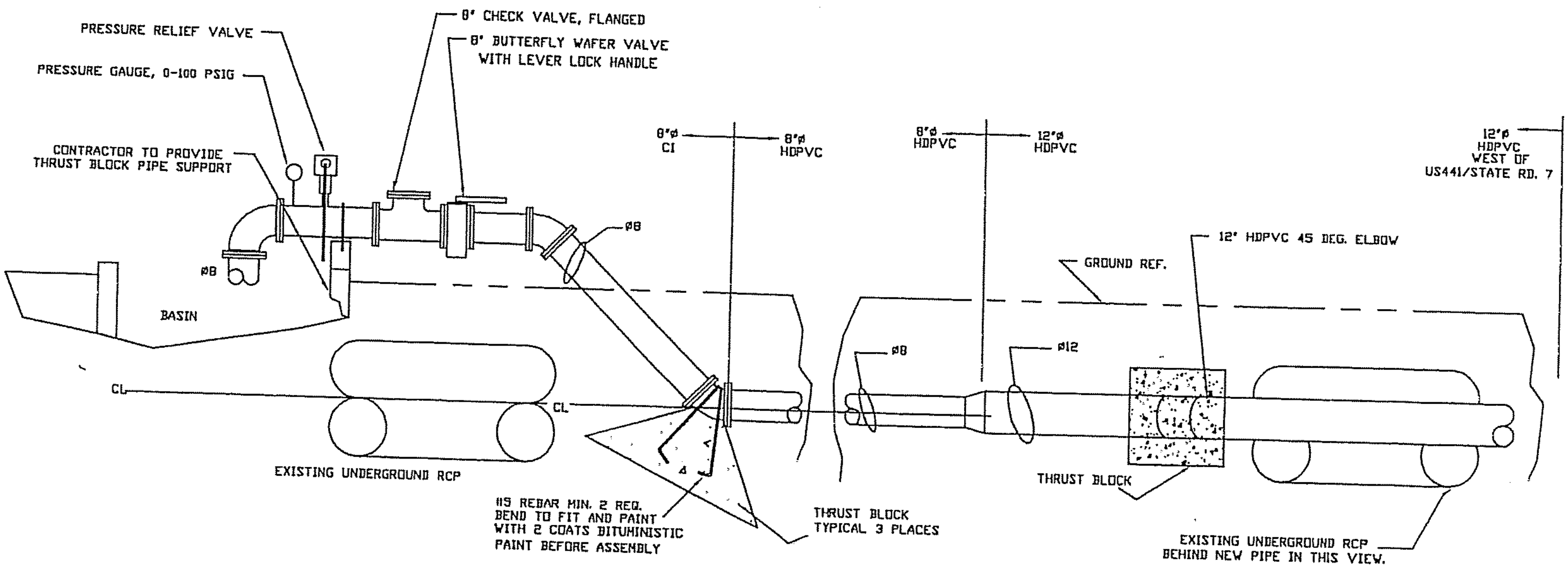
?PLE SLOUGH
:AL RESTORATION

.Y LAYOUT

TES, U.S.
212
(305)

SKS ENGINEERING & PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312

Project	Sheet
Date 12/7/00	SUR-2



SEE SHT M-1B FOR CONT. OF SYSTEM

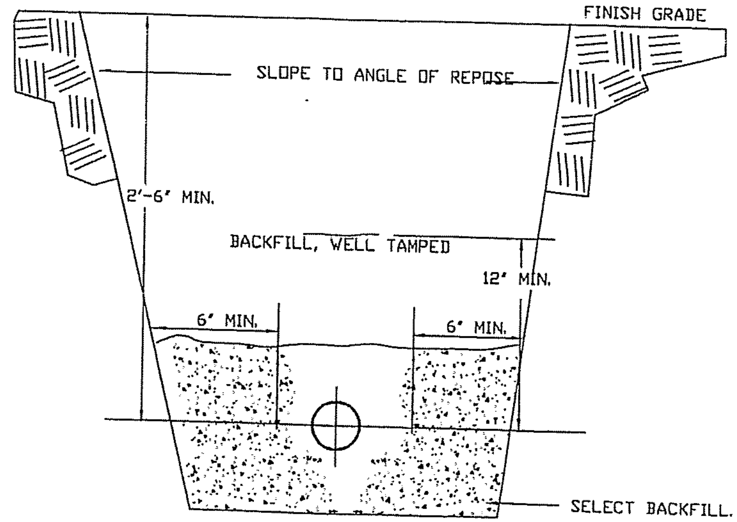
THRUST BLOCK:
ALL THRUST BLOCKS SHALL BE FORMED. LAID FORMS SHALL BE INSPECTED BY ENGINEER PRIOR TO POURING OF CONCRETE AND SHALL ALSO BE INSPECTED PRIOR TO COVERING. LOCATIONS WHICH REQUIRE CONCRETE REACTIONS (THRUST) BLOCKS. FOR PRESSURE MAINS FOUR INCHES (4") AND GREATER SHALL HAVE 2500 P.S.I. MINIMUM STRENGTH AT TWENTY EIGHT (28) DAYS AND BEAR AGAINST UNDISTURBED ...LE SOILS, AREA OF CONTACT SHALL BE GOVERNED BY PIPE SIZE, MAXIMUM ...SURE IN PIPE, AND BEARING CAPACITY OF SOIL. PROTECT FITTINGS, BOLTS, BY COVERING WITH VISQUEEN OR OTHER ACCEPTABLE MATERIAL. CONCRETE BE A MINIMUM OF TWELVE INCHES (12") THICK (8" PIPE 6.6 SQ. FT., 12" PIPE ... FT.)

ELEVATION LAYOUT

HYDROLOGIC ASSOCIATES, U.S.A
8925 S.W. 148th Street, Suite 212
Miami, FL 33176
Phone: (305) 252-7118 Fax: (305) 2

SKS ENGINEERING & PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312

Project	
Date 12/7/00	Sheet M-1A



TYPICAL UNDERGROUND DETAIL

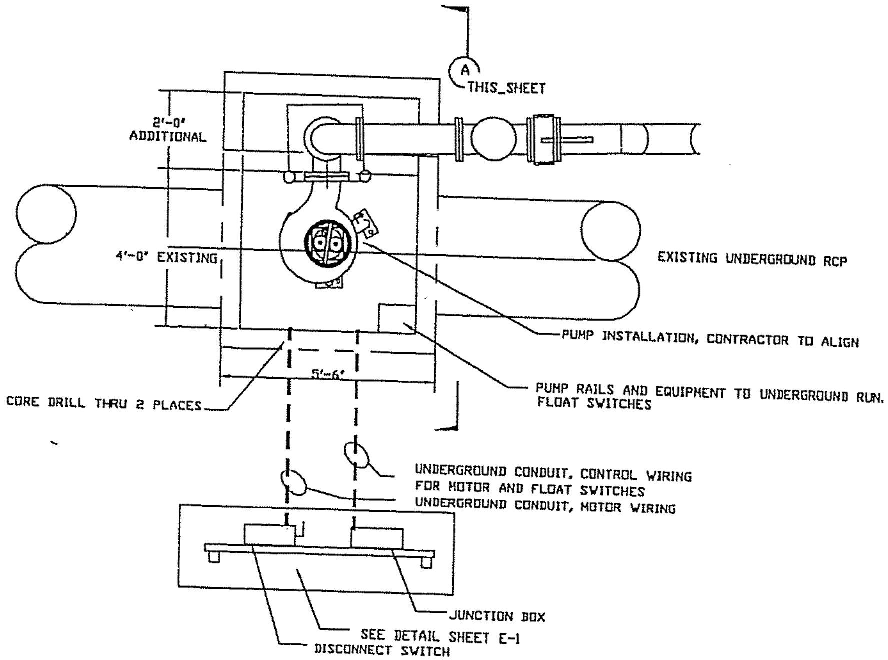
NOT TO SCALE

POND
HYDROLO:
MECHA

ASSOCIATES, U.S.A., INC.
:1 Street, Suite 212
'6
.2-7118 Fax: (305) 254-0874

SKS ENGINEERING
& PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project	Sheet
Date 12/7/00	M-1C
Scale NOT TO SCALE	



...IAL PUMP PLAN VIEW

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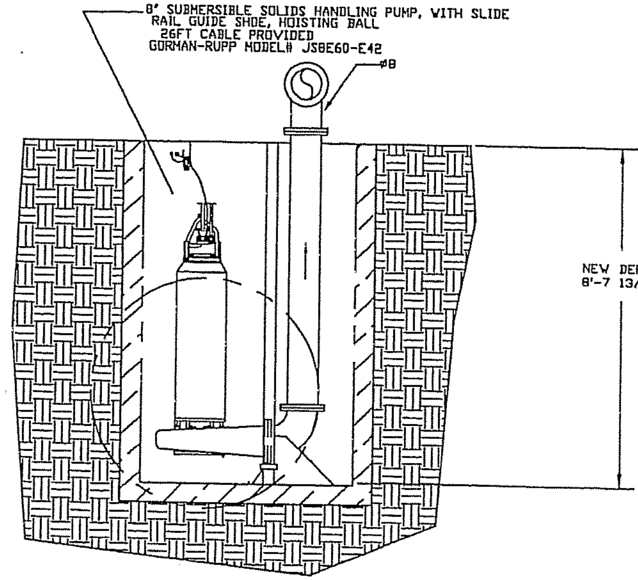

SECTION A THIS SHEET

NOT TO SCALE

HYDROLOGIC ASSOCIATES, U.S
8925 S.W. 148th Street, Suite 212
Miami, FL 33176
Phone: (305) 252-7118 Fax: (305)

SKS ENGINEERING & PLANNING, INC.
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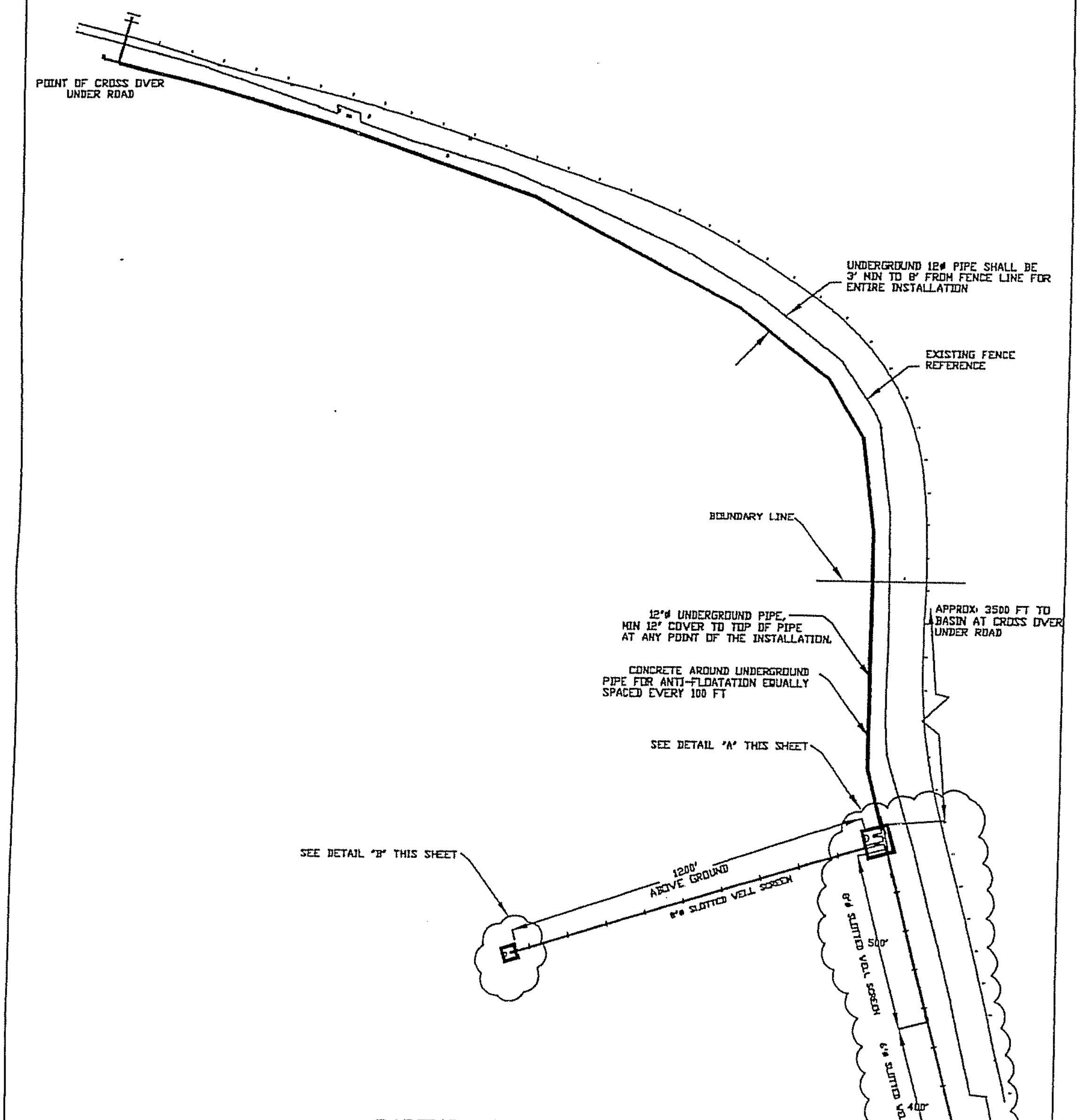
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project	Sheet M-1D
Date 12/7/00	
Scale	



PARTIAL SITE PLAN

NOT TO SCALE

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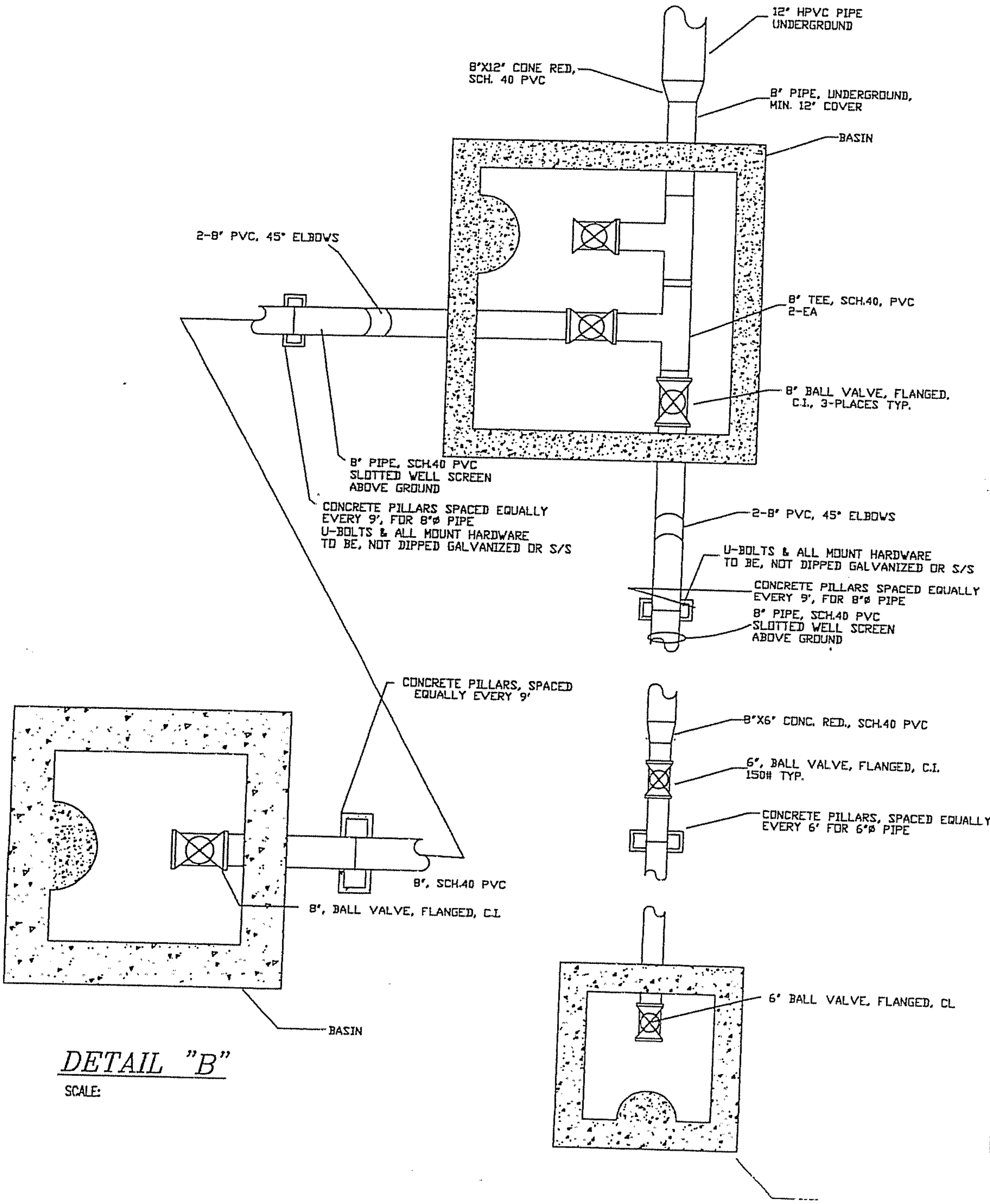
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

HYDROLOGIC ASSOCIATES, U.S.A., INC.
8925 S.W. 148th Street, Suite 212
Miami, FL 33176
Phone: (305) 252-7118 Fax: (305) 254-0874

Date 12/7/00

Sheet M-2A



DETAIL "B"

SCALE:

DETAIL "A"

SCALE:

Sheet M-2B

Date 12/7/00

SKS ENGINEERING & PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-087

YDROLOGIC ASSOCIATES, U.S.A., INC.
5 S.W. 148th Street, Suite 212
mi, FL 33176
ne: (305) 252-7118 Fax: (305) 254-0874

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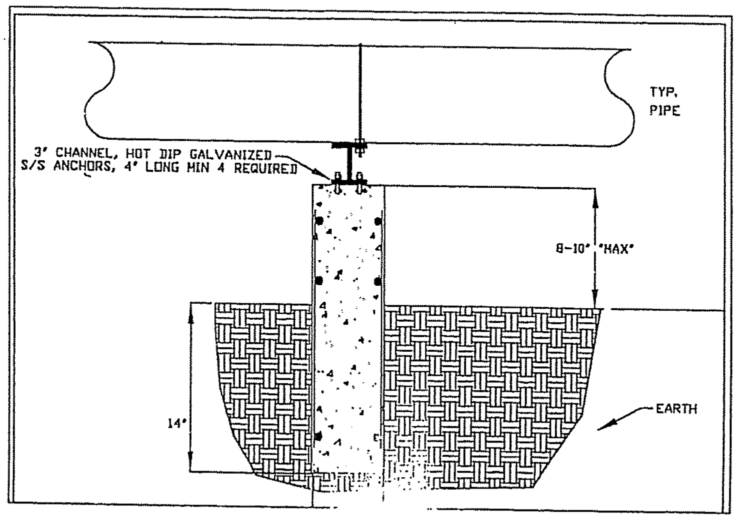
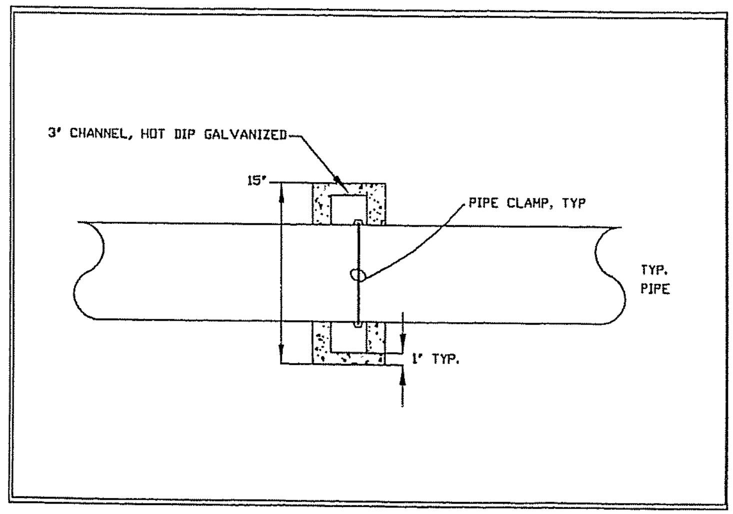
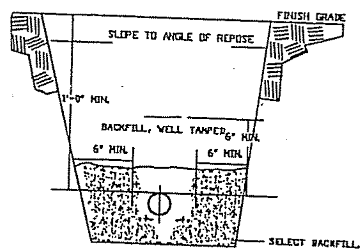


PIPE SU... DETAIL
1/8"



PLAN VIEW–PIPE SUPPORT DETAIL
SCALE: 1/8"

POND APPLE SLOU... HYDROLO...CAL RESTO... MECH... AL DET...	...S.A., INC. ...12 ...5) 254-0874	**SKS ENGINEERING & PLANNING, INC.** 4425 S.W. 26TH AVENUE FORT LAUDERDALE, FL 33312 (954) 986-7131 FAX (954) 981-0870	Project: Date: 12/7/00 Scale: NOT TO SCALE Sheet: M-2C



PIPE BURIAL DETAIL

SCALE:

LEGEND

	CONCETRIC REDUCER
	BALL VALVE FLANGED

POND APPLE SLOUGH
HYDROLOGICAL RESTORATION

MECHANICAL DETAILS

SKS ENGINEERING
& PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project

Date 12/7/00

Scale NOT TO SCALE

Sheet M-2D

ELECTRICAL GENERAL NOTES

1. CONTRACTOR TO INSTALL A COMPLETE ELECTRICAL SYSTEM FOR POWER FROM THE POINT OF ATTACHMENT TO THE POWER COMPANY TO AND THROUGH THE MAIN SERVICE DISCONNECT, DISTRIBUTION PANELS, BRANCH PANELS TO AND INCLUDING ALL, DEVICES AND EQUIPMENT FURNISHED BY OTHERS AS MAY BE REQUIRED.

2. CONTRACTOR TO COMPLETE ALL WORK INCIDENTAL TO MECHANICAL TRADES FOR A COMPLETE INSTALLATION, INCLUDING CONTROL WIRING, MOTOR STARTERS, DISCONNECT SWITCHES AND EQUIPMENT GROUNDS.

3. CONTRACTOR TO MAKE NECESSARY PROVISIONS FOR THE INSTALLATION OF TELEPHONE SYSTEM INCLUDING RACEWAYS, CABINETS, PULL BOXES AND OUTLETS.

4. MATERIALS AND EQUIPMENT SHALL MEET U.L. REQUIREMENTS.

5. THE TOTAL ELECTRICAL INSTALLATION MUST MEET THE REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (1999).

6. COLOR CODE FOR 2[illegible] 3ϕ SYSTEM SHALL BE: BLK,RED,BL, WHT, & GRN. FOR 277/480V 3ϕ [illegible] BROWN, ORANGE, YELLOW, GRAY & GREEN.

7. SHARED NEUTRALS [illegible]DS ARE NOT PERMITED FOR 1ϕ CIRCUITS.

[illegible]LE SLOUGH
[illegible]L RESTORATION
[illegible]L DETAILS

HYDRCLO[illegible] ASSOCIATES, U.S.
8925 [illegible] W. [illegible]h Street, Suite 212
Miami [illegible] [illegible]6
Phone [illegible] [illegible]2-7118 Fax: (305)

SKS ENGINEERING & PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project
Date 12/7/00
Scale NOT TO SCALE
Sheet E-1A

ELECTRICAL GENERAL NOTES, CONT.

8. PANELBOARDS, SWITCHBOARDS AND DISCONNECT SWITCHES SHALL HAVE COPPER BUS.

9. MAIN DISCONNECTS SHALL HAVE PAD-LOCKING AND SEALING PROVISIONS. METER CENTERS SHALL PERMIT OVERHEAD OR UNDERGROUND SERVICE ENTRANCE. THE MAIN BREAKER OR FUSIBLE DISCONNECT SHALL BE QUICK-MAKE, QUICK-BREAK, LOAD-BREAK DEVICE.

10. CONDUCTORS SHALL BE THHN/THWN EXCEPT WHERE SPECIFIED OTHERWISE ON THE DRAWINGS. CONDUCTORS NO. 8 AWG AND LARGER SHALL BE JOINED BY AN APPROVED PRESSURE CONNECTOR. CONNECTION TO GROUND CONDUCTORS NO 1/0 AWG AND LARGER SHALL BE CAST BY FUSIBLE METAL PROCESS. ALL CONDUCTORS MUST BE INSTALLED IN CONDUIT.

11. NO WIRE SMALLER THAN 12 AWG SHALL BE USED FOR POWER AND LIGHTING. ALL CONDUCTORS SHALL BE COPPER.

12. CONDUIT FOR UNDERGROUND SHALL BE SCHEDULE 40 PVC UNLESS OTHERWISE SHOWN AND/OR REQUIRED BY CODE.

CONDUIT FOR ABOVE GRADE SHALL BE "GRC", "EMT", "LIQUID-TIGHT", AND FLEXABLE PVC. SPA CONDUITS SHALL HAVE A PULL WIRE INSTALLED.

HYDROLOGIC ASSOCIATES, U.S.A.
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Miami, FL 33176
Phone: (305) 252-7118 Fax: (305) 2.

SKS ENGINEERING & PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0878

Date 12/7/00

Sheet E-1B

ELECTRICAL GENERAL NOTES, CONT.

14. ELECTRICAL PANELS SHALL HAVE PERMANENT ENGRAVED NAME PLATES ATTACHED. IDENTIFICATION MUST CONFORM TO ELECTRICAL DRAWINGS.

15. CONTRACTOR SHALL CONNECT PUMPS UNDER THIS SECTION.

16. CONTRACTOR SHALL MAKE TESTS AND ADJUSTMENTS AS REQUIRED, UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE BY THE OWNER. THE CONTRACTOR SHALL TEST THE COMPLETE ELECTRICAL SYSTEM IN THE PRESENCE OF THE ENGINEER/ARCHITECT FOR CONTINUITY, FUNCTION, CONTROL, PERFORMANCE, LOAD BALANCE, GROUNDS, SHORTS AND TO INSURE SATISFACTORY OPERATION AND CONFORMANCE TO CONTRACT REQUIREMENTS.

17. EQUIPMENT, LABOR AND MATERIAL REQUIRED FOR TESTING SHALL BE FURNISHED BY THE CONTRACTOR AS PART OF THIS CONTRACT.

18. AFTER COMPLETION OF THE WORK, THE CONTRACTOR SHALL SECURE CERTIFICATES OF FINAL INSPECTION AND APPROVAL FROM AUTHORITIES HAVING JURISDICTION.

27. ...KMANSHIP, MATERIALS AND APPARATUS UNDER THIS CONTRACT SHALL BE ...ANTEED FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPT ...HE OWNER.

HY

HYDROLOGIC ASSOCIATES, U.S.A., INC.
8925 S.W. 148th Street, Suite 212
Miami, FL 33176
Phone: (305) 252-7118 Fax: (305) 254-0874

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4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project	Sheet E-1C
Date 12/7/00	
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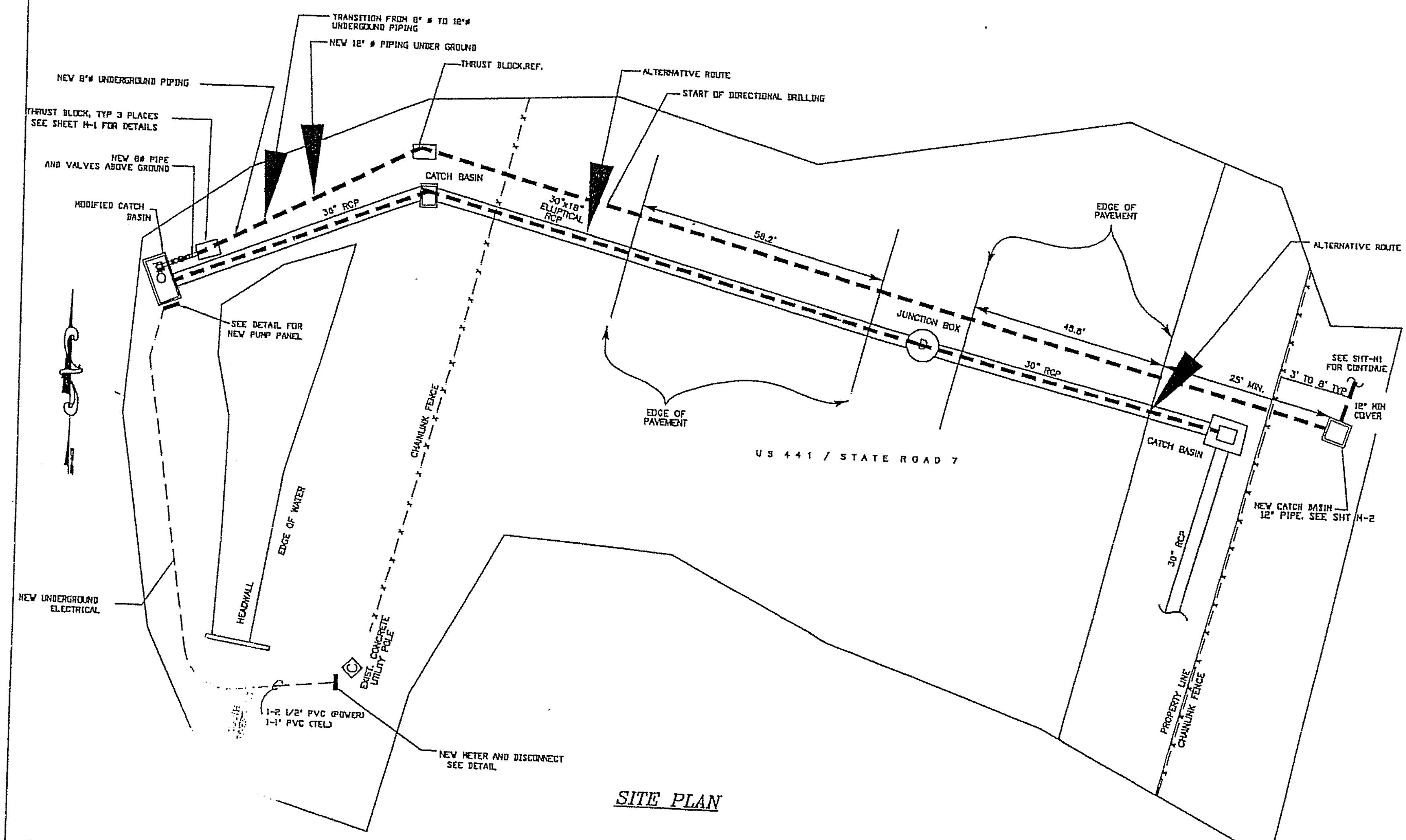

SITE PLAN

POND APPLE SLO
HYDROLOGICAL REST

ELECTRICAL DET

ROLOGIC ASSOCIATES, U.S.A., INC.
. S.W. 148th Street, Suite 212
l, FL 33176
e: (305) 252-7118 Fax: (305) 254-0874

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(954) 986-7131 FAX (954) 981-0870

Project

Date 12/7/00

Sheet E-1D

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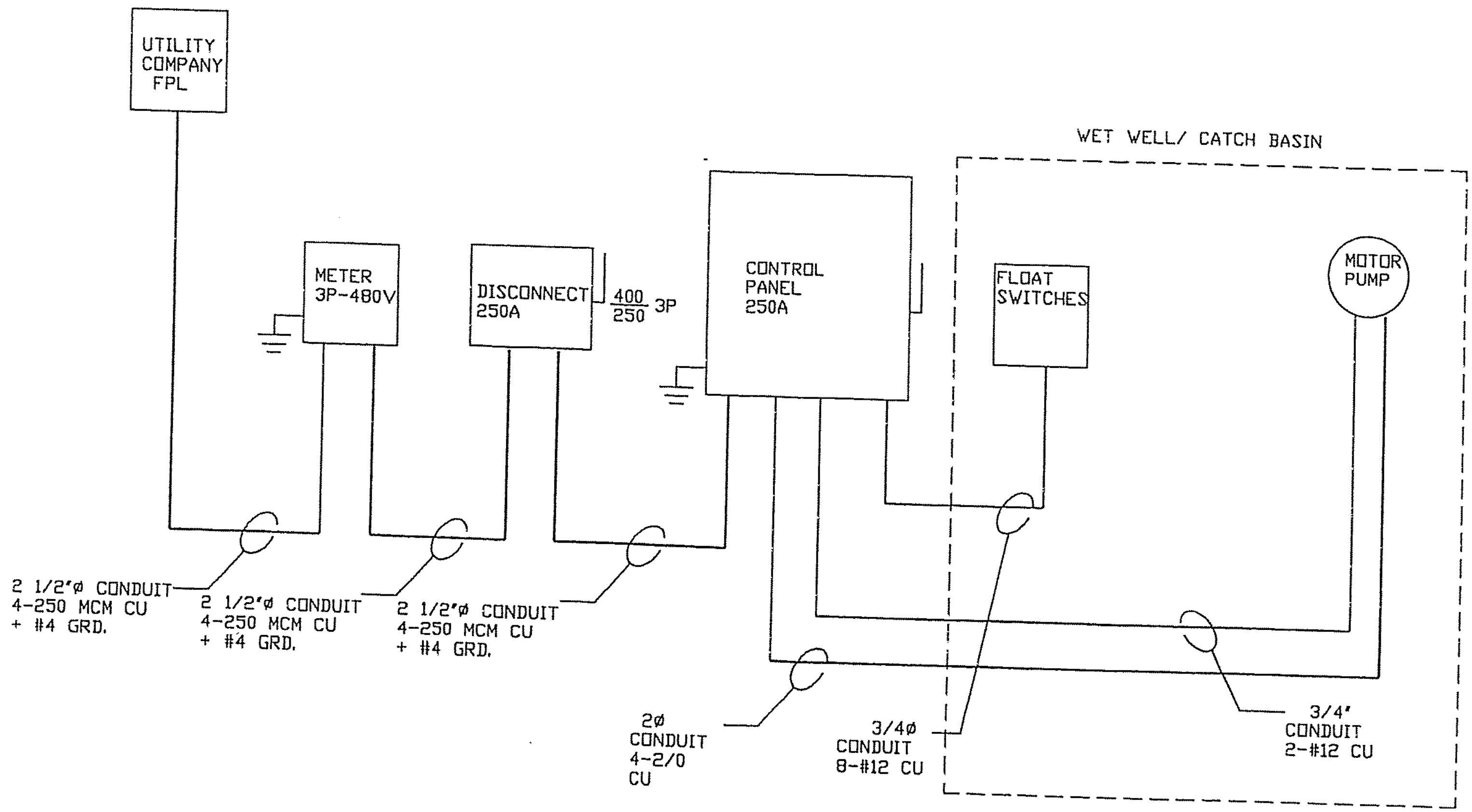

RISER DIAGRAM

POND APPLE SLOUGH HYDROLOGICAL RESTORATION

ELECTRICAL DETAILS

HYDROLOGIC ASSOCIATES, U.S.A., INC.
8925 S.W. 148th Street, Suite 212
Miami, FL 33176
Phone: (305) 252-7118 Fax: (305) 254-0874

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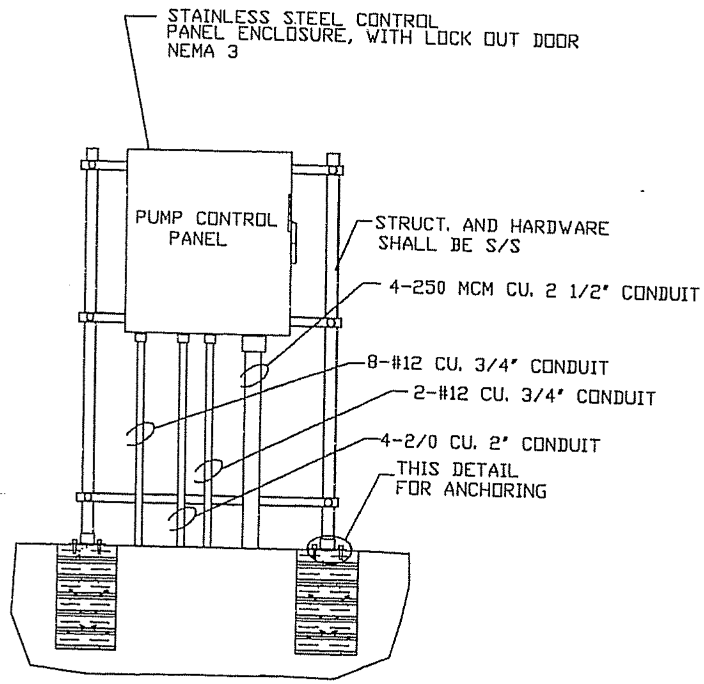
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project

Date 12/7/00

Scale AS SHOWN

Sheet E-1E



PUMP PANEL ELEVATION

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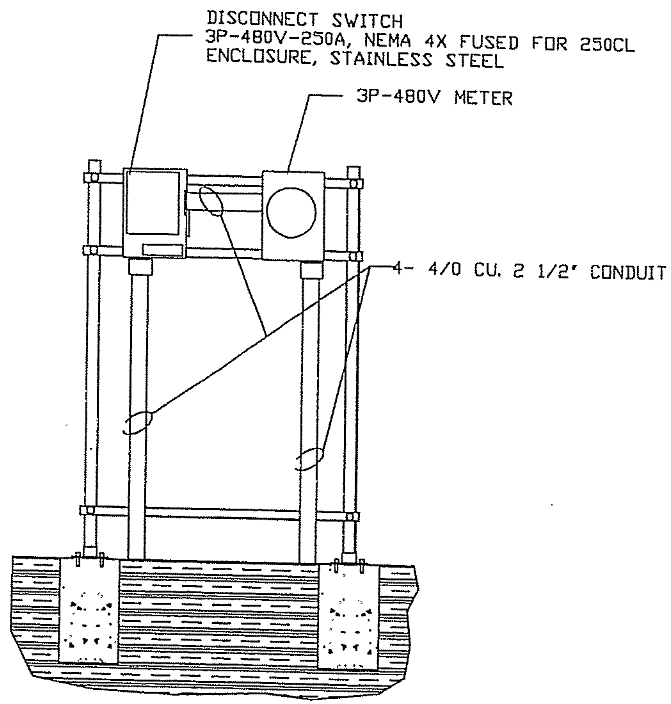
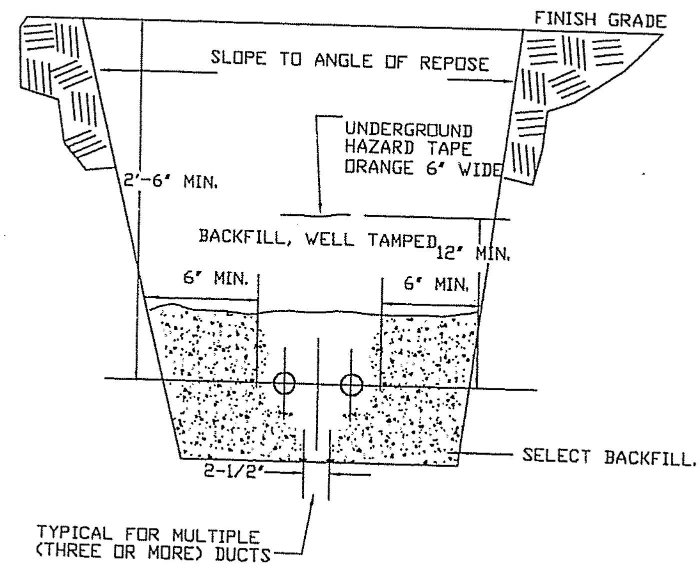


PUMP DISCONNECT/METER ELEVATION

NOT TO SC ALE

POND APPLE SLOUGH HYDROLOGICAL RESTORATION ELECTRICAL DETAILS	HYDROLOGIC ASSOCIATES, U.S.A., INC. 8925 S.W. 148th Street, Suite 212 Miami, FL 33176 Phone: (305) 252-7118 Fax: (305) 254-0874	SKS ENGINEERING & PLANNING, INC. 4425 S.W. 26TH AVENUE FORT LAUDERDALE, FL 33312 (954) 986-7131 FAX (954) 981-0870	Project Date 12/7/00 Scale AS SHOWN Sheet E-1F



TYPICAL DUCT DETAIL

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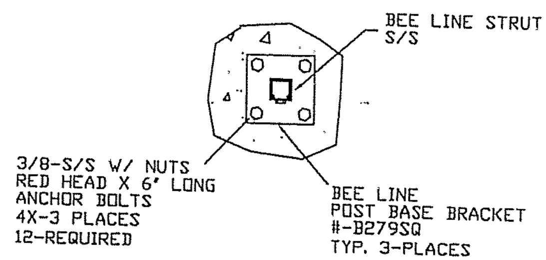

TYPICAL ANCHOR DETAIL

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POND APPLE SLOUGH
HYDROLOGICAL RESTORATION

ELECTRICAL DETAILS

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& PLANNING, INC.
4425 S.W. 26TH AVENUE
FORT LAUDERDALE, FL 33312
(954) 986-7131 FAX (954) 981-0870

Project

Date 12/7/00

Scale AS SHOWN

Sheet E-1G

Appendix M

COUNTY: BROWARD

DATE: 11/12/2003
COMMENTS DUE DATE: 12/12/2003
CLEARANCE DUE DATE: 1/11/2004
SAI#: FL200311134550C

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
COMMUNITY AFFAIRS	SOUTH FLORIDA WMD	ENVIRONMENTAL POLICY UNIT	
ENVIRONMENTAL PROTECTION			
X FISH and WILDLIFE COMMISSION			
STATE			

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

X Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.

_ Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.

_ Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.

_ Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

DEPARTMENT OF TRANSPORTATION - ADVANCE NOTIFICATION - SR 862 (I-595) PD&E STUDY - FINANCIAL PROJECT ID: 409354-1-22-01, FEDERAL AID PROJECT NO: 5951 539 I - BROWARD COUNTY, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA

- ☒ No Comment
- ☐ Comment Attached
- ☐ Not Applicable

Federal Consistency

- ☒ No Comment/Consistent
- ☐ Consistent/Comments Attached
- ☐ Inconsistent/Comments Attached
- ☐ Not Applicable

From:

Division/Bureau: OES
Reviewer: Stephen R. Law
Date: 12/2/03

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OFFICE OF ENVIRONMENTAL SERVICES

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OFFICE OF ENVIRONMENTAL SERVICES

REC'D NOV 20 2003

(FISH & WILDLIFE)

Appendix N

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard, MS 47
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

January 9, 2004

Mr. Gustavo Schmidt, P.E.
District Planning and Environmental Engineer
Florida Department of Transportation, District 4
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309-3421

RECEIVED
JAN 21 2004
Planning & Environmental Mgmt
District Four

RE: U.S. Department of Transportation – Advance Notification – SR 862 (I-595) PD&E Study – Financial Project ID: 409354-1-22-01 – Federal Aid Project No. 5951 539 I – Broward County, Florida
SAI: FL200311134550C

Dear Mr. Schmidt:

The Florida State Clearinghouse, pursuant to Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the above-referenced advance notification.

The South Florida Water Management District (SFWMD) indicates that highway construction activities will require issuance of an Environmental Resource Permit (ERP) by the SFWMD. A Water Use Permit may also be required for certain de-watering activities (if proposed), particularly if there are any contamination sites in the vicinity. If so, a pre-application meeting with SFWMD and DEP staff should be scheduled to discuss the details of the proposed de-watering activities. Please refer to the enclosed SFWMD comments.

The South Florida Regional Planning Council (SFRPC) indicates that the project must be consistent with the goals and policies of the cities of Fort Lauderdale, Hollywood, Davie, Dania Beach, Plantation, Sunrise, Weston, and Broward County comprehensive plan and their corresponding land development regulations. It is important for the permit grantor to coordinate its permit with the local government granting permits for development at the subject site. Please refer to the enclosed SFRPC comments.

Based on the information contained in the advance notification and the enclosed state agency comments, the state does not object, at this stage, to the allocation of federal funds for the above-referenced project. The applicant is encouraged to address the agency concerns that are summarized above, and enclosed, at the earliest opportunity in the planning process. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews.

It is recommended that any additional studies or reports be submitted to the Clearinghouse for further review. Final concurrence with the project will be determined during the permitting process.

Thank you for the opportunity to review this project. If you have any questions regarding this letter, please contact Lindy McDowell at 850-245-2163.

Sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lbm

Enclosures

CC: Mr. Jim Golden, South Florida Water Management District
Ms. Christina Miskis, South Florida Regional Planning Council

Appendix O

South
Florida
Regional
Planning
Council

December 9, 2003

Ms. Lauren P. Milligan
Florida Coastal Management Program
Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 47
Tallahassee, Florida 32399-3000

RE: SFRPC #03-1113 SAI# FL200311134550C, Request for comments on the Advance Notification for a project development and environmental study to improve traffic operations, capacity, and safety along the I-595 corridor in Broward County, Florida Department of Transportation, Fort Lauderdale, Hollywood, Davie, Dania Beach, Plantation, Sunrise, Weston, Broward County.

Dear Ms. Milligan:

We have reviewed the above-referenced Advance Notification and have the following comments:

- The project must be consistent with the goals and policies of the cities of Fort Lauderdale, Hollywood, Davie, Dania Beach, Plantation, Sunrise, Weston, and Broward County comprehensive plan and their corresponding land development regulations. It is important for the permit grantor to coordinate its permit with the local government granting permits for development at the subject site.

- Staff recommends that 1) impacts to the natural systems be minimized to the greatest extent feasible and 2) the permit grantor determine the extent of sensitive wildlife, marine life, and vegetative communities in the vicinity of the project and require protection and or mitigation of disturbed habitat. This will assist in reducing the cumulative impacts to native plants and animals, wetlands and deep-water habitat and fisheries that the goals and policies of the *Strategic Regional Policy Plan for South Florida* (SRPP) seek to protect.

- The project is located over the Biscayne Aquifer and Class I and II Waters, natural resources of regional significance designated in the SRPP. The goals and policies of the SRPP, in particular those indicated below, should be observed when making decisions regarding this project:

Strategic Regional Goal

3.2 Develop a more efficient and sustainable allocation of the water resources of the region.

Regional Policies

3.2.5 Ensure that the recharge potential of the property is not reduced as a result of a proposed modification in the existing uses by incorporation of open space, pervious areas, and impervious areas in ratios which are based upon analysis of on-site recharge needs.

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DEC 15 2003

OIP/OLGA

3440 Hollywood Boulevard, Suite 140, Hollywood, Florida 33021
Broward (954) 985-4416, State (800) 985-4416
SunCom 473-4416, FAX (954) 985-4417, Sun Com FAX 473-4417
email: sfadmin@sfrpc.com, website: www.sfrpc.com

3.2.6 When reviewing proposed projects and through the implementation of the SRPP, discourage water management and proposed development projects that alter the natural wet and dry cycles of Natural Resources of Regional Significance or suitable adjacent buffer areas or cause functional disruption of wetlands or aquifer recharge areas.

3.2.9 Require all inappropriate inputs into Natural Resources of Regional Significance to be eliminated through such means as; redirection of offending outfalls, suitable treatment improvements or retrofitting options.

3.2.10 The discharge of freshwater to Natural Resources of Regional Significance and suitable adjacent natural buffer areas shall be designed to imitate the natural discharges in quality and quantity as well as in spatial and temporal distribution.

3.2.11 Existing storm water outfalls that do not meet or improve upon existing water quality or quantity criteria or standard, or cause negative impacts to Natural Resources of Regional Significance or suitable adjacent natural buffer areas shall be modified to meet or exceed the existing water quality or quantity criteria or standard. The modification shall be the responsibility of the outfall operator, permittee or applicant.

Strategic Regional Goal

3.4 Improve the protection of upland habitat areas and maximize the interrelationships between the wetland and upland components of the natural system.

Regional Policies

3.4.8 Remove invasive exotics from all Natural Resources of Regional Significance and associated buffer areas. Require the continued regular and periodic maintenance of areas that have had invasive exotics removed.

3.4.9 Required maintenance shall insure that re-establishment of the invasive exotic does not occur.

In addition;

- Council staff finds that the proposed improvements to I-595 are generally consistent with the goals and policies of the *Strategic Regional Policy Plan for South Florida (SRPP)* in that it addresses the importance of improving transportation infrastructure to support the region's economic development. In doing so, the proposed project will further our goals for a more livable, sustainable, and competitive region.

- Council staff generally agrees that the proposed project is particularly compatible with the *Strategic Regional Plan for South Florida's* (SRPP) goals and policies listed below:

Strategic Regional Goal

4.1 Achieve a competitive and diversified regional economy, including lower unemployment rate and higher per capita income than the state and national average for Dade, Broward and Monroe Counties through the achievement of cutting edge human resources, economic development infrastructure and other resources to ensure a sustainable regional community.

Regional Policies

4.1.28 Encourage the investment in the land and infrastructure needed for sustainable economic growth. Investments should include land for highway and mass transit corridors, stations and public-private joint venture development opportunities.

Thank you for the opportunity to comment. Please do not hesitate to call should you have any questions or comments.

Sincerely,

Carlos Andres Gonzalez
Senior Planner

CAG/kal

cc: Elliot Auerhahn, Acting Director, Broward County DPEP
Laurence Leeds, Director, Growth Management, Dania Beach
Mark Kutney, Director, Planning & Zoning, Davie
Chris Wren, Planning Manager, Fort Lauderdale
Jaye Epstein, Director, Community Planning, Hollywood
Marcia Berkley, Planning Director, Plantation
Thomas Kassawara, Planning and Development, Sunrise
Shelley Eichner, Growth Management Director, Weston
Gustavo Schmidt, P.E., FDOT-District 4

Appendix P

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
3301 Gun Club Road, West Palm Beach, Florida 33406 • (561) 686-8800 • FL WATS 1-800-432-2045 • TDD (561) 697-2574
Mailing Address: P.O. Box 24680, West Palm Beach, FL 33416-4680 • www.sfwmd.gov

GOV 04-40

RECEIVED
DEC 15 2003
Planning & Environmental Mgmt
District Four

December 11, 2003

Mr. Gustavo Schmidt, P.E.
District Planning and Environmental Engineer
Florida Department of Transportation
3400 West Commercial Boulevard
Ft. Lauderdale, FL 33309-3421

Subject: S.R. 862 (I-595) Project Development & Environment Study Advance Notification [FP#: 409354-1-22-01] [SAI#: FL200311134550C]

Dear Mr. Schmidt:

In response to your request, South Florida Water Management District (SFWMD) staff has reviewed the Advance Notification for the above subject project located in FDOT District 4. According to the Fact Sheet, a Project Development and Environment (PD&E) Study will be performed to improve traffic operations, capacity, and safety along the I-595 corridor in Broward County. The project study limits extend from just west of I-75 to just east of I-95, an approximate project length of 12 miles.

The following comments should be considered in the design, construction, and permitting of this project.

(1) The proposed roadway improvements will require an Environmental Resource Permit (ERP), pursuant to Rules 40E-1, 40E-4, 40E-40, 40E-41, and 40E-400, F.A.C.

(2) The proposed roadway improvements must meet the SFWMD's water quality and water quantity criteria as specified in the Basis of Review for Environmental Resource Permit Applications.

(3) It appears that the proposed roadway improvements may involve wetland impacts. To the extent possible, any wetland impacts due to location, design, and construction techniques should be minimized. Please note that information documenting that any proposed wetland impacts are unavoidable will be required at the time of permit application, as well as information on the alternatives considered to reduce the proposed impacts. Mitigation will be required for any unavoidable wetland impacts.

The SFWMD has concerns regarding any proposed impacts to existing wetland mitigation areas (Pond Apple Slough). These concerns include locating appropriate mitigation to compensate for this type of wetland impact (i.e., mangroves).

FDOT staff should contact Carolyn Farmer, Senior Environmental Analyst in the SFWMD's Natural Resource Management Division, at (561) 682-6856 to schedule a pre-application meeting and site inspection to evaluate the proposed project.

(4) A Water Use Permit may be required for any dewatering activities associated with the proposed roadway improvements, pursuant to Rule 40E-2, F.A.C. Please contact the SFWMD's Water Use Division at (561) 682-6926, prior to the initiation of any dewatering activities and subsequent to the completion of the Contamination Screening Evaluation Report, to schedule a pre-application conference to discuss the details of the proposed dewatering activities.

Please note that, if the proposed roadway improvements include dewatering activities within contamination areas or if the dewatering activities have the potential to result in the induced movement of the contamination plume, a pre-application meeting involving SFWMD Water Use staff and the appropriate staff from the Florida Department of Environmental Protection should be scheduled to discuss management of dewatering effluent, including the design of appropriate containment/treatment methods.

(4) A Right Of Way Occupancy Permit will be required for any proposed use of and/or occupancy of the North New River Canal right-of-way.

(5) Lighting for the proposed project should incorporate full cut-off fixtures to minimize energy waste and light pollution to non-target and environmentally sensitive areas.

If any of the above requires additional clarification, please contact me at (561) 682-6862.

Sincerely,

James J. Golden, AICP
Senior Planner
Environmental Resource Regulation

/jjg

c: Lauren Milligan, DCA

Appendix Q

BROWARD COUNTY FLORIDA

DEPARTMENT OF PLANNING AND ENVIRONMENTAL PROTECTION – Biological Resources Division
218 S.W. 1st Avenue • Fort Lauderdale, Florida 33301 • 954-519-1230 • FAX 954-519-1412

RECEIVED
JAN 09 2004
Planning & Environmental Mgmt.
District Four

01/05/04

Mr. Gustavo Schmidt, P.E.
District Planning and Environmental Engineer
Florida Department of Transportation, District 4
3400 West Commercial Blvd.
Ft. Lauderdale, FL 33309-3421

Re: SR-862 (I-595) Project Development & Environment Study

Dear Mr. Schmidt:

I am writing in regards to the 11/5/03 advanced notification letter for the SR-862 (I-595) Project. Thank you for the opportunity to comment on this important project. Our Department concurs with many items addressed in the Fact Sheet attached to the 11/5/03 letter. Of specific concern are issues related to preserve lands adjacent to the project; assessment of wetland impacts and mitigation; and effects on adjacent County Park lands.

There are many wetlands and surface waters that occur within the project corridor, and we support the appropriate level of assessment, avoidance and minimization that is required by Environmental Resource regulations. Also in accordance with Environmental Resource regulations, we support any mitigation that is required to offset wetland impacts being located as close to the project site as possible.

Also, as identified in the 11/5/03 letter, we believe that the project must be designed so as to avoid impacts that construction and operation of the project might have on preserved lands such as Pond Apple Slough; or threatened and endangered species such as the manatee.

We appreciate the opportunity to comment on this project and would like to be copied on further notices in the future.

Sincerely,

Kent Edwards

Kent Edwards
Wetlands and Uplands Section Manager

Appendix R

MEETING MINUTES

1/05/05

SFWMD FIELD OFFICE – DAVIE, FLORIDA

Participants: Jeff Bowen – RS&H
Steve Braun - FDOT
Keith Brockman – RS&H
Tom Fratz - SFWMD
Michael Massa - SFWMD
Shandra Davis-Sanders - FDOT
Jose Varon - SFWMD
Mary Tery Vilches - FDOT
Patrick Webster – FDOT

A meeting was held with the South Florida Water Management District to discuss I-595 roadway improvements and potential impacts/encroachment to the North New River Canal adjacent to the I-595 corridor. The following are items/issues discussed:

- FDOT initiated coordination of the I-595 improvements with the SFWMD during the PD&E phase of the project. This early coordination effort will allow the SFWMD to be part of the decision-making process regarding improvements to I-595 and State Road 84.
- For canal impacts, FDOT should focus on bank stabilization, maintaining flow and reducing/eliminating maintenance areas. This should occur at any location FDOT encroaches into SFWMD right-of-way.
- Broward County is currently maintaining the area between the southside of the canal and SR 84 in areas where bike/pedestrian path facilities exist.
- Do not reduce the area behind the existing SR 84 guardrail and the canal to include shoulders for canal maintenance purposes. Shoulders provide no benefit for the SFWMD in regards to maintaining the canal. If encroachment occurs in these areas, bulk heading the affected area would be the preferred solution.
- SFWMD staging areas will be required at all crossroad locations for the purpose of debris removal. FDOT must demonstrate that the current staging areas are being maintained or improved. At a minimum, FDOT must provide access from the northwest side of the canal at crossroad locations. At Hiatus Road, FDOT can relocate the existing north/south lateral canal to create a staging area in the northwest quadrant of the interchange.
- Maintaining barrier wall and/or guardrail along the north side of SR 84 (westbound) will not impact the SFWMD's ability to maintain the canal.
- The SFWMD would prefer soundwalls over trees between the north side of SR 84 and the adjacent canal.

- Existing access locations along the north side of SR 84 must be maintained unless maintenance issues have been eliminated. All transition areas from bulkhead to slope embankment will require access for maintenance purposes. Existing access locations maybe relocated as long as similar access is provided to the same area.
- Any additional piers placed in the canal must be in-line with existing pier locations.

Additional Noise Wall related comments received from the SFWMD

- The required minimum gap for any vertical wall structure crossing the SFWMD's lot # 29 is 25 feet.
- The maximum encroachment into the SFWMD R/W for noise walls on the north side of the SFWMD's R/W is four (4) feet. This is in areas where the existing canal R/W is over 44 feet in width providing a minimum of 40 feet of space from the top of bank to the wall. This would also set a straight alignment of the wall, offset four (4) feet from the R/W line.
- An asphalt mow strip (similar to guard rail treatment), three (3) feet in width, will be required in front of the noise walls.

RS&H
Architectural, Engineering, Planning and Environmental Services

Reynolds, Smith and Hills, Inc.
300 South Pine Island Road, Suite 300
Plantation, Florida 33324
954.474.1304
Fax 954.474.1304

FL Cert. Nos. AAC001886 • EB0005620 • LCC000210

Date: March 8, 2005 **(Revised April 6, 2005)**

To: Mr. Steve Braun, PE
Project Manager
Florida Department of Transportation
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309-3421

From: Phil Schwab, PE

RE: **I-595 PD&E Meeting With SFWMD Local Field Office**
FM NOS. 409354-1-22-01
BROWARD COUNTY

A coordination meeting was held at the local field office of the South Florida Water Management District (SFWMD). The purpose of the meeting was to discuss the potential of placing noisewalls within SFWMD Canal Right-of-Way with the above referenced project. The meeting was held on March 7, 2005. Attending the meeting were:

Name	Affiliation	Phone
Jose Varon	SFWMD	954.452.4814(x4822)
Mike Mass	SFWMD	954.452.4814(x4821)
Tom Fratz(by Phone)	SFWMD	1-800-432-2045
Steve Braun	FDOT	954.777.4143
Pat Webster	FDOT	954.777.4344
Shandra Davis	FDOT	954.677.7896
Phil Schwab	RS&H	954.236.7386
Keith Brockman	RS&H	954.236.7370

The Project Team gave an overview of the proposed noisewall locations associated with the referenced project. There were numerous locations along and within the north side of the SFMWD Canal R/W between 136th Avenue and SR-7 that proposed noisewalls were discussed. The following is a list of concerns and issues that were discussed regarding the noise wall locations:

- FDOT would place the wall typically +/- 4 feet from the residential property line to allow for the foundation and wall construction.
- The walls will be most effective against noise the closer they can get to the residents.

- SFWMD is concerned with the +/- 4' on the North side of the Noisewalls. The concern is over maintenance or non-maintenance of this area as well as how encroachments will be handled.
- It was agreed to not meander the wall for trees and fences but to hold to the R/W line and the +/- 4' offset.
- SFWMD will provide copies of any permits that have been granted including docks, utilities, fences and landscaping along the SFWMD property.
- It may be necessary to provide access to docks south of the Noisewalls. To accomplish this it may be necessary to stagger the walls, which would ultimately reduce the berm width.
- SFWMD has concerns wherever the Berm width is reduced beyond 40 Feet.
- SFWMD owns lot 29 adjacent to the Sewell lock. This is needed for access. The plans will need to show a gap in the wall at this location. It will be shown @ 100' until SFWMD is able to commit to anything less.
- The sea grapes adjacent to SW 21 Court in the City of Plantation have been permitted by the city through SFWMD.
- Typical ground mounted walls will be 22ft.
- Walls will have an anti-graffiti coating
- SFWMD requested that they be provided with the wind loading that will be used to design the Noisewalls.
- SFWMD will require a 100-foot staging area next to all bridge structures.
- Overall, SFWMD is very supportive of working with the Department and allowing the noiswalls within SFWMD property. With the main concerns noted above.

Additional informational items added April 6, 2005

- The required minimum gap in the wall for SFWMD's "Lot #29" is 25 ft.
- The maximum encroachment into SFWMD R/W for the Noise Walls on the north side of the SFWMD's R/W is 4 ft. where the existing canal R/W is over a minimum of 44 ft. This provides a minimum of 40 ft. for SFWMD in these areas (top of bank to the wall). This would also set a straight alignment of the wall offset 4 ft. from the R/W line.
- SFWMD requests a 3 ft Asphalt Mow Strip (similar to guardrail treatment) in front of the noise walls. This will assist SFWMD with the maintenance adjacent to the wall.

copy: Attendees
Jeff Bowen, PE (RS&H)
File

Reynolds, Smith and Hills, Inc.
Architectural, Engineering, Planning and Environmental Services

MEETING MINUTES

Copies to:	Participants Steve Braun, FDOT Jeff Bowen, RS&H File D.5	**Date:**	March 9, 2005
Project:	I-595 PD&E (DOT Dist. 4) Plantation, Florida	**Project Nos:**	
Meeting Place:	SFWMD West Palm, Florida	**Meeting Date:**	February 11, 2005
		Meeting Time:	8:45 AM
Participants:	Tony Waterhouse, SFWMD Carlos Derojas, SFWMD Pat Webster, FDOT Shandra Davis, FDOT Phil Schwab, RS&H Hamid Ashtari, RS&H Erik Neugaard, RS&H		
Purpose:	SFWMD Pre-Application Meeting		
Prepared By:	Hamid Ashtari, RS&H		

After project introduction by Shandra Davis and Phil Schwab, Hamid Ashtari talked about RS&H's understanding of permitting requirements. Hamid explained that the permits for the original construction of the I-595 were issued in the mid nineteen eighties. A review of the existing permits indicates that treatment one inch of runoff over the impervious surface areas has been provided for most of the I-595 corridor, utilizing French Drains and shallow swales. RS&H's understanding of the criteria is to provide treatment for 2.5 inches of runoff over the proposed impervious surface areas, in addition to providing treatment volume for the existing paved areas based on their construction permit. Compensatory treatment could be provided by providing 2.5 inches of treatment over both existing and proposed paved areas in lieu of not treating some proposed pavement where it is not feasible to do so. SFWMD agreed with concept indicating that the arithmetic needs to work such that we are not taking compensation credit for treating more than 2.5 inches of runoff. We may also provide treatment for the existing untreated areas of SR 84 in lieu of providing treatment for the proposed widening.

On attenuation, Hamid explained that the outfall for the entire project is the North New River Canal, and that attenuation volume could be provided in the infield areas of the interchanges within the project limits. SFWMD agreed with the concept saying that it is possible to compensate for attenuation of runoff for segments of roadway between the interchanges by providing extra attenuation within the interchange areas.

Erik Neugaard addressed the unavoidable wetland impacts. He stated that the only wetland impacts would occur at Pond Apple Slough, and would entail approximately 4 acres of permanent shading impacts from the viaduct widening and approximately 0.6 acres of impact from the construction road that would be required on the south side of the viaduct. Rob Robbins asked if the construction road impacts would be temporary. Erik stated that at this time, FDOT was planning to leave the road for bridge maintenance and the total unavoidable impacts would be approximately 4-1/2 acres.

Erik stated that FDOT was still in the Project Development and Environment (PD&E) phase and that they were currently in the process of identifying conceptual wetland mitigation options. He stated that FDOT was still considering participation in Broward County Environmental Protection Department's hydrological restoration plans for Pond Apple Slough to offset some of the wetland impacts, and was looking for areas to provide the minimum 2:1 replacement ratio also requested by Broward County Environmental Protection Department at an inter-agency meeting previously held for the project. He also stated that FDOT was interested in holding another inter-agency meeting, possibly at Pond Apple Slough, next month.

Erik stated that a portion of the project was within the horizontal extent of the Florida Petroleum Reprocessors Superfund Site, but FDOT had coordinated with the EPA and EPA is allowing FDOT to manage stormwater from I-595 within the horizontal extent of the Superfund plume. He also stated that most of the contamination was deep due to the higher specific gravity of the contaminants and that natural attenuation was being used for remediation.

Carolyn Farmer asked if FDOT was still interested in obtaining a conceptual permit for this project, as discussed at the previous inter-agency meeting. Pat Webster stated that they would probably not request one. Rob Robbins noted that even though Erik stated the wetland impacts had been minimized to the maximum extent practicable, the SFWMD would still look for additional minimization possibilities.

The meeting concluded at approximately 9:30 AM

I-595 PD&E STUDY
Pond Apple Slough Agency Coordination Meeting

PROJECT: I-595 from I-75 to East of I-95 PD&E Study
FM No.: 409354-1-22-01

DATE: June 28, 2005
LOCATION: Nova Southeastern University (Carl D Building – Room 1053)
SUBJECT: Pond Apple Slough

ATTENDEES: See attached lists

MEETING MINUTES:
By Wendy G. Lasher, AICP, PBS&J

I. Welcome (Ms. Ann Broadwell, FDOT)

- Over the past month several things have occurred that effect FDOT work schedule and agency interaction.
  - Strategic Intermodal Systems (SIS) program is being funded. The SIS is to connect ports to railroads to airports to Federal Interstate Highway Systems (FIHS) facilities which push for economic development in Florida.
  - On June 26, 2005 – Governor Jeb Bush signed the "Pay as You Grow" Senate Bill 360, 444, and 362. This is a growth management plan that promises to provide room on the roads, space in the classrooms and water available for the natural environment within three years of local government's approval for new development.
  - The Florida Department of Transportation (FDOT) was issued an additional $1.7 billion for the entire State. Projects will be going through the Work Program at a more rapid pace.
  - FDOT will have to further streamline their processes.
  - The FDOT wants to make sure what is produced in Project Development goes directly into design and the permitting phase so that the permit application does not become a roadblock.

II. Goals and Objectives (Ms. Ann Broadwell, FDOT)

- The PD&E Study is a Type II Categorical Exclusion (CE).
- The Endangered Species Biological Assessment (ESBA) will be submitted to US Fish and Wildlife Service (USFWS) and the Cultural Resource Assessment Survey (CRAS) to the State Historic Preservation Officer (SHPO) for review. The Wetland Evaluation Report (WER) will not be submitted to the regulatory agencies for review, but a copy will be sent to USFWS.
- Meeting Goals
  - No surprises during permitting

- Document agency input in the PD&E Study
- The FDOT wants to identify things that need to be done in order to mitigate impacts to wetlands. There will be wetland impacts to Pond Apple Slough (PAS).

III. Project Overview (Mr. Steve Braun, FDOT I-595 Project Manager and Mr. Erik Neugaard, RS&H)

- The presentation gave an overview and history of I-595 and connections, project schedule, need, PD&E focus areas, explanation of reversible lanes, alternatives, design approach to the "Viaduct" section and impacts from shading, construction platforms, and roadway widening to wetlands at Pond Apple Slough. This project is within a Strategic Intermodal Corridor and is the only east-west expressway in Broward County. The PowerPoint presentation is attached.

- There were questions about the construction platforms that will be built on the north side, south side, and in between the two Viaduct structures. Mr. Mike Bone (Construction) explained that the platforms could be a limerock pad would be used to hold heavy equipment for construction of the bridge and routine bridge inspections and maintenance after the construction is complete. By Federal mandate, a complete bridge inspection must occur at a minimum of once a year. The platforms would be approximately 30 feet (ft.) wide by 5 ft. deep. These platforms would be permanent. Conventional methods of using a snooper truck will not be possible because of the bridge width. It is still unknown whether there will be a need to demuck. By the time construction occurs there may be other methods available. Mr. Bone also explained that the construction of the Viaduct portion would start with access roads and then piers would be built, beams set, and the deck poured.

- Ms. Madelyn Martinez, National Marine Fisheries Service (NMFS), inquired if there are any other wetland impacts. Mr. Neugaard stated that there would be stormwater management system impacts that could be considered wetlands. These impacts would be offset with other stormwater ponds elsewhere.

- Mr. Braun explained the design schedule, approach, and design constraints and considerations from the master plan to current design that avoided or minimized impacts to PAS. All four alternatives evaluated ties into the geometry of the Viaduct section. Construction at PAS is within the right-of-way (R/W). This PD&E Study will be broken into approximately 15 design and construction projects. The last component of construction is the Viaduct section and collector distributor roads. The schedule is based on current funding sources. A Public Hearing is scheduled for November 2005, Location Design Concept Acceptance (LDCA) in June 2006, Phased Final Design begins in July 2006, and Phased Construction begins 2011. This project design could be advanced in future years depending on funding sources. District Four competes with other Districts for funding. Currently the Viaduct section design is scheduled for 2015 and Construction will be in approximately 2020.

- Mr. Braun said that the FDOT wants to get the agencies involved and document their comments and ideas so there are no surprises in the permitting stage. This project is not using the ETDM process. From this meeting the FDOT wants to know how the agencies want these permitting packages delivered to them.

- Mr. Braun also noted that at the Public Workshop the attendees had positive feedback and support for the elevated reversible lanes.

- Mr. Neugaard noted that the Broward County Greenway is adjacent to the project and that there could be possible issues or impacts. Also, Mr. Neugaard is setting up individual field reviews with agencies for the entire project.

- Ms. Broadwell explained that for the SR 60 project, St. Johns River Water Management District gave a 20-year conceptual permit for seven segments. When each segment goes forward the conceptual permit will be revised and the permit issued for that particular segment.

- Mr. Keith Brockman, RS&H, and Ms. Broadwell showed the aerials that depicted the alignments, canals, PAS, and the R/W. Mr. John Wrublick asked how reversible lanes work. Ms. Brockman indicated that they are shut down for 30 minutes to reverse direction. The use of variable message boards are used (ITS).

- Ms. Martinez asked about light rail. Ms. Broadwell explained that the transit portion is under a separate study (Central Broward East-West Transit Alternatives Analysis) and schedule from the roadway project. An Environmental Impact Statement (EIS) for the light rail is being prepared for Federal Transit Administration (FTA) approval. They are looking at several different funding methods for the transit including a Referendum on the November ballot. The transit project is being provided for in the corridor.

- Mr. Brodie Rich, U.S. Coast Guard (USCG), commented:
  - There is a special interest group at Plantation Isles (Bob Beacham) located downstream (east of Sewell Lock) that wants improved navigational access. This is a waterway oriented community who wants the bridges raised and pilings out of waterways to improved navigation up to the Plantation Isles area.
  - Anything downstream or east of Sewell Lock is navigational (tidal) which requires a USCG permit.
  - There are no clear guide clearances for this waterway.
  - East of the Lock new bridge structures need to have 55 ft. vertical clearance above mean high water (MHW) for fixed structures which is consistent with what has been permitted in this waterway. Mr. Braun asked even if bridges upstream and downstream are not. Mr. Rich indicated yes and that the USCG is trying to get all bridges in the area of 55 ft. as they are being replaced or constructed even in the Plantation Isles area. If Plantation Isles objects, it will cause a delay in the permit. Mr. Rich did not think the FDOT would get even get a permit at that point.

- There is a bridge support pile in the waterway (north New River Canal) that this interest group wants removed. Mike Liebram can answer questions about this pile and why it was put in the waterway.
- Concerning a sheet pile wall along the canal, do not encroach on the horizontal clearance.

IV. History of Pond Apple Slough (Ms. Wendy Cyriaks, CECOS Environmental Consultants)

➢ The presentation gave history of events for PAS. Ms. Cyriaks noted that there was a Management Plan for PAS created by the County in the early 1990's, but did not know if this is still in use. Also, PAS had a Working Group that focused on how to address saltwater intrusion, reduced freshwater flow occurring, and removal/prevention of exotics. The PowerPoint presentation is attached.

V. Agency "Must Haves" and Discussion of Creative Mitigation Opportunities (Ms. Ann Broadwell, FDOT)

Ms. Broadwell asked each agency what they would need in order to permit this project and documented their comments individually on a notepad posted on the wall. Ms. Broadwell also had two questions to discuss during this portion. Can you go back and impact a site that you have restored for in another project? Is pursuing the rehydration project suitable mitigation for impacting 6.5 acres (ac.)? The agency comments were as follows:

<u>US Fish and Wildlife Service (USFWS) – Mr. John Wrublik</u>

- Wants to see ESBA address potential impacts to woodstork (core foraging areas) and manatee (covered under permit provisions).
- Ms. Broadwell added that she wants the ESBA to cover both the USFWS and NMFS species.

<u>National Marine Fisheries Service (NMFS) – Ms. Madelyn Martinez</u>

Comments:
- Small tooth saw fish – protected species.
- Indirect effects to water quality; introduction of freshwater.
- EFH conservation measures.
- Why there are no sea turtles in waterway? They are listed, but not likely there.
- Wants proof of PAS being kept as freshwater state.
- Would like a copy of the original Memorandum of Agreement, the Management Plan that was developed by the County in the 1990's, and a copy of the WRAP/UMAM report that states the wetland impacts.

Suggestions:
- Conduct a saltwater edge range (where are limits of saltwater edge).
- Type of water quality.

- Conduct a Photopoints Study. Ms. Martinez has an example of this and methodology which she can give to the FDOT.

US Army Corp of Engineers (USACE) – Ms. Alisa Zarbo

- FDOT will need to apply for an Individual Permit.
- Expressed her understanding of the need for the project.
- Utilize ways of avoidance, minimization, and measures of mitigation after avoidance and minimization is shown.
- USACE is implementing UMAM.
- Was there a conservation easement in the USACE permit? Ms. Cyriaks said that in her review there is no conservation easement. It was permitted as deconstruction of wetlands.
- Ms. Broadwell added that the FDOT has typical sections that show what the project first started out as with separate structures and how these structures were pulled in. This shows the FDOT's first step in PD&E of avoidance and minimization.

Broward County Parks and Recreation – Mr. Kurt Volker

- Parks and Recreation would like PAS to have fresh water delivery facilitated and to have passive recreational use such as canoeing and non-motorized boats.
- Has a concern that the construction road at the canal just west of the South Fork will block major flow. Mr. Neugaard stated that this will be evaluated in design for possible structures, box culverts, etc. Mr. Braun added that this will be documented as a recommendation in the PD&E document to minimize haul road impacts to natural flow areas.

Broward County Environmental Protection Department (EPD) – Ms. Linda Sunderland and Mr. Kent Edwards

- Also, utilize ways of avoidance, minimization, and measures of mitigation after avoidance and minimization are shown.
- Concerned with impacts to species such as the manatee and woodstork.
- Construction methodology as it pertains to turbidity controls.
- Wants to see wildlife and vegetation lists along with relocation of orchids. Submit a list of how the FDOT will address these species.
- Check if there are any existing conservation easements that could be amended. Conservation easements can be amended at a cost, but this is not easy and would require a good reason to amend it.
- Address water flow issue of historic freshwater delivery systems into PAS.
- Wants UMAM worksheets.
- Wants a mitigation plan.
- The County does not issue conceptual permits. The County issues five-year Environmental Resource License. FDOT is not required to get a County license.
- Need an agreement in place for work on County property.

- Would like to see a topographic map of PAS and provide "experimental flow" on the map. Ms. Broadwell stated that the FDOT has excellent aerial plots that they will also supply to the County.
- Mr. Steve Krupa was doing a study of monitoring wells out there (SWFWMD Saltwater Intrusion study results).
- Have concerns about groundwater and hazardous waste. Mr. Neugaard indicated that they will work with the County and this will be part of the Contamination Screening Report.

<u>Florida Fish and Wildlife Conservation Commission (FFWCC) – Ms. Yvette Alger and Mr. Tim Reagan</u>

- There are crocodiles in the area. FFWCC has removed some in the FPL area (Parcel 28). They are expanding and reinhabiting their original range. Will need to have construction avoidance measures.
- Document nesting bird activity and have setback distances not to disturb nesting wading birds.
- Ms. Broadwell stated that the FDOT will need to have special provisions for crocodiles.

<u>US Coast Guard (USCG) – Mr. Brodie Rich</u>

- Comments stated earlier.
- Areas that are tidally influenced are navigational waters.
- It was established at this meeting that there is no navigation in PAS.
- There have been waterway usage changes including lights on bridges.
- Ms. Broadwell inquired that since we are adding to the current structure what would our clearance need to be? Mr. Rich replied that FDOT would need to maintain the existing vertical clearance (for the Viaduct section).
- Contact and coordinate with the Marine Safety Office about restricting or closing the channel.

During this portion of the meeting there was a detailed discussion on mitigation opportunities and measures. Ms. Broadwell initiated the discussion by asking again if you can go back and impact a site that you have already impacted and mitigated for in another project. Ms. Zarbo stated that USACE typically does not allow new (additional) impacts to mitigation areas. Mitigation areas are usually put into a conservation easement. The FDOT would have to go back and mitigate for the original impacts on top of the new impacts. In other words, if the FDOT is impacting a mitigation area from a previous project, then we have to include those in addition to the impacts identified with the current project.

Mr. Volker and Ms. Sunderland said that the Parks and Recreation Department is acquiring properties that will be available for mitigation. The County is attempting to acquire the Elmore property (owner of the previous Alandco Tract) for mitigation. He suggested that FDOT send a letter to the Real Properties Department expressing an interest in joint partnership in purchasing the Elmore property. Ms. Zarbo stated that she is interested in seeing more land acquisition and putting it under public ownership. Also, the FDOT can get mitigation credit if you are impacting wetlands for doing land acquisition and turning it over to the County for public use once the property has been restored. If we impact wetlands we need to be creating wetlands. Typically do not allow wetland impacts to be offset by uplands. Since the Elmore property is an upland she does not know if there is any way some portions of it can be restored to wetlands.

Ms. Broadwell inquired if we are mitigating for three separate systems (freshwater, upper tidal, and lower tidal) which is the existing conditions or for what was historically there? Also how did the consent order want it to be maintained? Ms. Cyriaks stated the consent order was in PAS, but not in the current impacted area. It was just in the Cypress Creek impact area which was planted as a freshwater system. Mr. Volker felt that FDOT should try to maintain what is in PAS without future degradation. Set goals for desired systems and have future eradication of white mangroves.

Ms. Zarbo stated that the last resort option would be for FDOT to use Florida Power and Light (FPL) Everglades mitigation bank which is within the service area. She indicated that FDOT needed to get a mitigation plan together and explore other options. Ms. Sunderland agreed. She said that the FDOT would have to go down the list and could not just go to the banks. The guidance that the County follows, in order, is to:

- avoid,
- minimize,
- mitigate,
- mitigate off-site,
- mitigate off-site as close by as possible,
- mitigate off-site in the same drainage basin
- mitigate off-site in a close drainage basin, and so on with mitigation banks as the last option.

Ms. Sunderland suggested that mitigation should be as much on site as possible. The Broward County wants to keep mitigation within the County as much as possible. Mr. Wrublik's stated that his first choice is for the FDOT to try to acquire lands that are not protected first before acquiring public lands. This can be in addition to replantings (restoration).

Mr. Volker said that there is an opportunity to restore Parcel 1 (Alandco Tract) rock area which is currently owned by the County. Ms. Broadwell said there are also enhancement opportunities available along the south side of the Griffey Tract in reestablishing the berm. Mr. Volker said the berm is something that Parks and Recreation is still very interested in. Ms. Broadwell stated that the FDOT had a problem with either USACE or NMFS on whether or not it would be suitable because of bare bottom impact issues and the berm would be above MHW; therefore it was not accepted. Ms. Broadwell noted that there are other enhancement opportunities, but FDOT needs to know if agencies can apply mitigation credits to it and needs to convert it into a cost resulting in an economic mitigation activity. The Senate Bill is available, but this does not seem to be working in Broward County because of land prices.

Mr. Neugaard felt that the FDOT needed to know from this meeting the magnitude of mitigation required for the three (3) ac. of direct and three (3) ac. of shading impacts that will occur from the project and how much land will need to be purchased. Ms. Sunderland indicated that they would need the UMAM to determine which Mr. Neugaard said had been completed. Ms. Zarbo said that USACE would need to take a closer look at the mitigation areas that are being impacted and could not commit to ratios or numbers during the meeting. Ms. Broadwell offered the suggestion of contacting Jim Wilt (PBS&J) to help with mitigation questions since he has over 30 years permitting experience while working for the FDOT. Mr. Wilt may have access to historic information on how impacts to wetlands mitigation within R/W have been permitted and what were the ratios used. The FDOT could also check the files and do a historic survey to see what other Districts have done to give a ratio that USACE can use or consider. Ms. Broadwell stated that they need to know a ratio or number soon in order to apply for funding in advance. The USACE will need old permits, what other Districts have done with impacting mitigation sites within R/W, and UMAM to determine.

Mr. Braun asked when land is acquired does the FDOT give money and the local agencies do the restoration or enhancement work or does the FDOT do this work and then turn the land over to the agency? Mr. Volker said that this may be a policy issue that would need to be coordinated with the County possibly through a partnership agreement. He indicated that maybe there can be a middle of the road approach with construction by the FDOT and monitoring and maintenance by the County.

VI. Close (Ms. Ann Broadwell, FDOT)

- The FDOT has opportunities to do the following:
  - Participate in land acquisition.
  - Further restoration of the Alenco Tract.
  - Entertaining rehydration and figuring out a way of putting mitigation credits on this activity.
  - Enhancement opportunities available with reestablishment of the berm.
  - Acquiring other lands in the PAS area.
- The FDOT established during this meeting that they will need to:
  - Apply UMAM to the site.
  - Determine what the ratios or numbers are going to be.
  - Develop several different scenarios that all of the agencies would be willing to move forward with.
  - Present a plan that mitigation credit can be applied to.
- Ms. Broadwell requested that in the next 2 to 4 weeks the agencies discuss PAS with their supervisors and e-mail any additional thoughts and ideas to Ms. Broadwell.

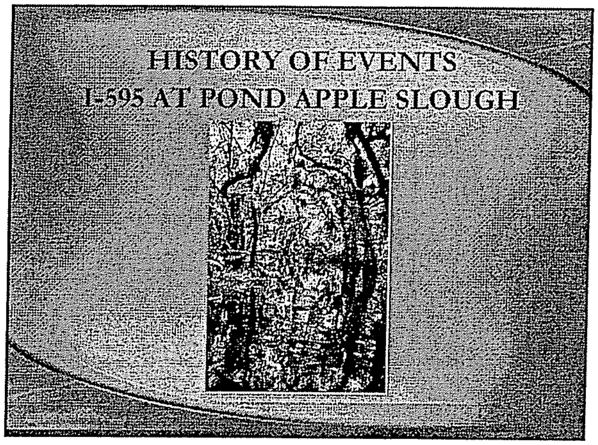
The meeting ended at approximately 1 p.m.

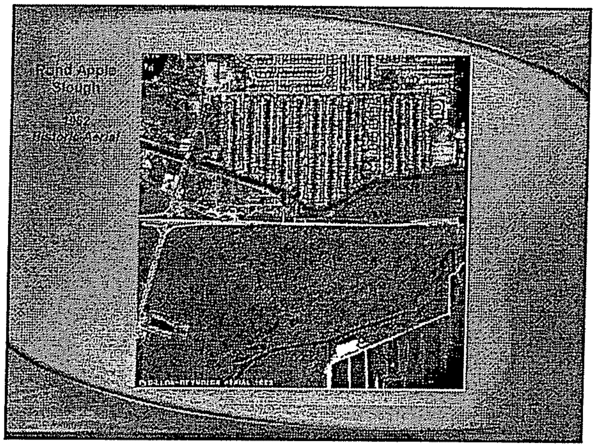
I-595 PD&E STUDY
Pond Apple Slough Agency Meeting

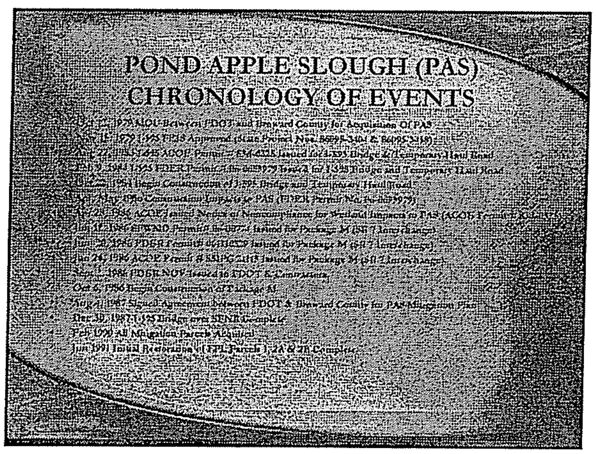
Tuesday, June 28, 2005

Sign-in Sheet
PLEASE PRINT

Name	Street	City	Zip
~~Mike Bune~~			
MIKE BONE	3800 N. 29th AVE	H'wood FL	33020
Linda Sunderland	1 N. Univ. Dr. (EPD)	Plantation	33324
ERIK NEUGAARD (RSH)	300 S. Pine Island Road #300	Plantation	33324
SHANDRA DAVIS-SANDERS	FDOT		
Ann Broadwell	FDOT		33317
BRODIE RICH	U.S. COAST GUARD	MIAMI	33130
John Wrublik	USFWS	Vero Beach	32960
Madelyn T. Martinez	NMFS 263 13th Ave. South	St. Petersburg	33701
Laura Sowers	DBEco	Boca	
WENDY LASHER	PBS+J	TAMPA	
Kurt Volker	BCPRD (Broward County)	Ft. L.	33309
Tim Regan	8535 Northlake Blvd, WPB FL 33412	West Palm	33412
Alisa Zarbo	ACOE		


HISTORY OF EVENTS
I-595 AT POND APPLE SLOUGH


Pond Apple
Slough
1962
Historic Aerial


POND APPLE SLOUGH (PAS)
CHRONOLOGY OF EVENTS
Aug 4, 1987 Signed Agreement between FDOT & Broward County for PAS Mitigation Plan
Dec 30, 1987 I-595 Bridge over SFNR Complete
Feb 1990 All Mitigation Parcels Acquired
Jun 1991 Initial Restoration of FPL Parcels 1, 2A & 2B Complete

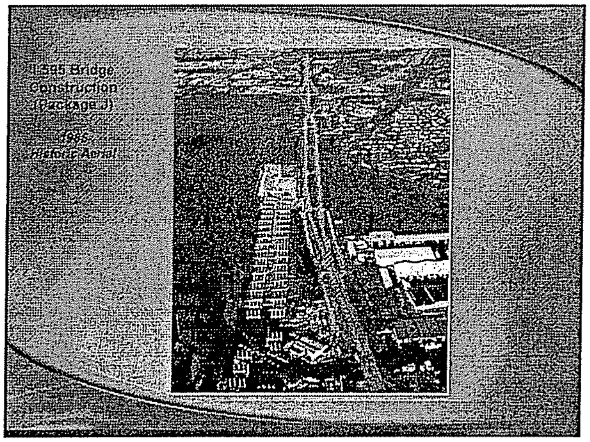
POND APPLE SLOUGH (PAS) CHRONOLOGY OF EVENTS

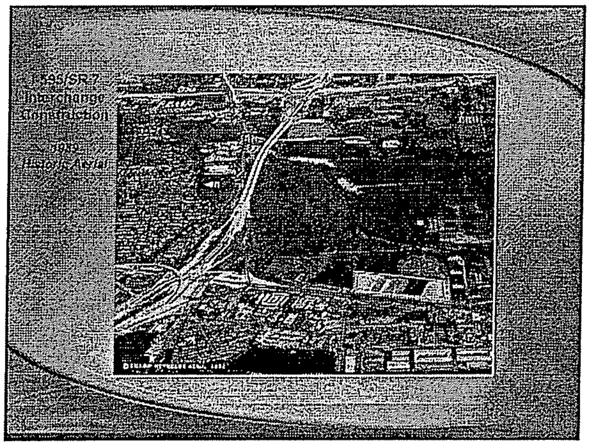
- Aug 1, 1991 Consent Order (FDER # 86-0632) Signed (FDER And FDOT) for Restoration of PAS
- [illegible] Establishment of Broward County Working Group For PAS
- Mar 18, 1992 DNEP Issues Permit for Cypress Creek Wetland Impacts & Authorizes Mitigation at PAS
- Jun 2, 1992 I-95 at Broward Blvd Mitigation Complete along the West Berm of the SFNR
- Jul 1992 Consent Order – Initial Restoration of 9.4 Acres Complete
- Jul 7, 1992 Consent Order (FDER Permit # 86-0632) Amendment for Time Extension
- Mar 1993 Begin Enhancement of Griffey Tract
- Dec 29, 1993 Issuance of FDER Permit # 062505706 for Enhancing the Freshwater Head in PAS [illegible] Point Source Discharge & Berm Excavation
- June 1994 Remedial Maintenance/Selective Clearing of Exotic Vegetation on Parcels 1, 1A & 2B
- 1994/95 PAS Activities Funded by Hunter Trust Fund
- Jan 18, 1995 ACOE Issued Permit to Excavate & Plug Areas of Retention Pond to Divert Freshwater [illegible] and Construct a Salinity Control Berm along South End of the Griffey Tract
- Jan 1995 Completion of Cypress Creek Mitigation
- Jun 2, 1995 SFWMD Sign-off on Permit # [illegible]
- Aug 8, 1995 Mitigation Requirements on Parcels 1, 2A, & 2B are Signed Off By FDEP

POND APPLE SLOUGH (PAS) CHRONOLOGY OF EVENTS

- [illegible] 1996 FDEP Letter Stating Consent Order Requirements Fulfilled (Package M)
- Jul 1997 Griffey Tract Restoration Complete
- March 1998 Additional Installation of Riprap along PAS & Parcel 2b
- [illegible] 1998 Quit Claim Deed Transferring PAS & Associated Mitigation Properties to Broward Co[illegible]
- June 17, 1998 PAS Closing (Transfer of all Properties to Broward County Complete
- 1999-2000 Stone Harbor Mitigation – Enhancement within PAS and Parcels 1 & 1A
- [illegible] 1999 Broward Co to Develop "PAS Restoration Plan" to be Funded by SFWMD ([illegible] Trust Fund)
- [illegible] 2000 Broward Co. Submits ERP Application to SFWMD for PAS Restoration – Recharge [illegible]
- Jan 17, 2001 ACOE Issues NW Permit Associated with PAS Restoration Plan
- Jan 19, 2001 RAI Received from SFWMD
- April 13, 2001 Response to RAI
- August 3, 2001 Broward Co. DPEP Letter to SFWMD on Status of Rehydration Project & [illegible] Recommendations to Move Project Forward

I-595 CONSTRUCTION PROJECTS





Wetland Impacts

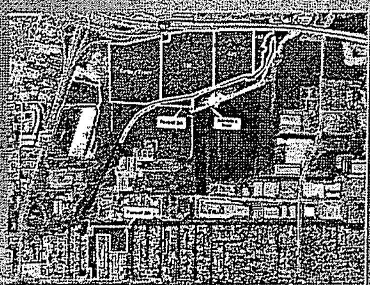
Package J Wetland Impacts = 21 acres
Package M Wetland Impacts = 56 acres

TOTAL Wetland Impacts = 77 acres

I-595 MITIGATION PLAN

- 1979 MOU BETWEEN FDOT AND BROWARD COUNTY FOR ACQUISITION OF PAS
- 1987 AGREEMENT BETWEEN FDOT AND BROWARD COUNTY BASED ON MITIGATION PLAN FOR I-595
  - CONSERVATION EASEMENT FOR GRIFFEY TRACT
  - TRANSFER OF PAS (OWNED BY FDOT)
  - ACQUISITION AND TRANSFER OF FPL PARCELS
  - DOT WILL PROVIDE PUBLIC ACCESS TO PAS
  - ALL LANDS WILL BE PRESERVED IN NATURAL STATE

FDOT PAS MITIGATION SITES



I-595 MITIGATION PLAN
(PRESERVATION, ENHANCEMENT & RESTORATION)

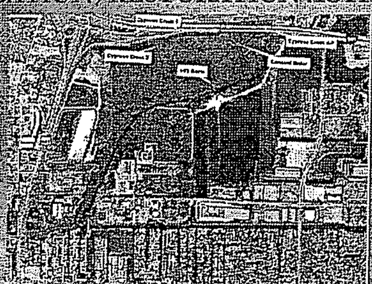
- POND APPLE SLOUGH – Purchase of 112.4± acres.
- GRIFFEY TRACT – Purchase of a Conservation Easement from Broward County for 58.8± acres. Enhancement include exotic removal. Complete 1993.
- ALANDCO TRACT (Parcel I) – Purchase of 22.8 acres of riverfront. Enhancement includes removal of exotics & replanting with native species. Placement of riprap along SFNR. Construction Complete 1991.

I-595 MITIGATION PLAN con't.

- FPL TRACT 2A - Purchase of 4.5 acres of riverfront property along SFNR. Enhancement of parcel including exotic removal, replanting with native species and placement of riprap. Construction Complete 1991.
- FPL TRACT 2B - Purchase of 28.5 acres with frontage along Dania Cut-off Canal. Restoration/Enhancement includes scrape down, exotic removal and replanting of native species. Construction Complete 1991.
- RESTORATION OF TEMPORARY HAUL ROAD Associated with Bridge construction – Approximately 7.16 acres

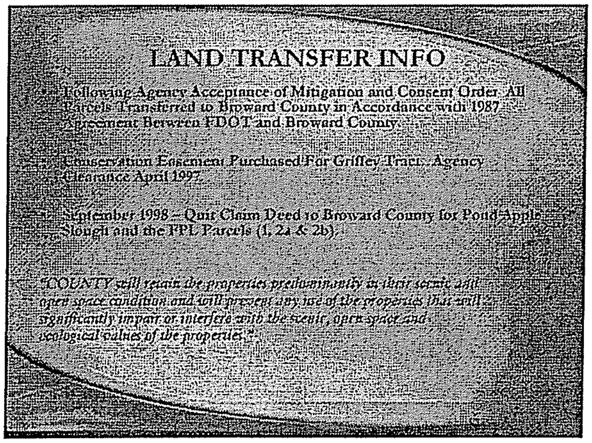
TOTAL AREA PRESERVED > 215 ACRES
TOTAL AREA ENHANCED > 90 ACRES

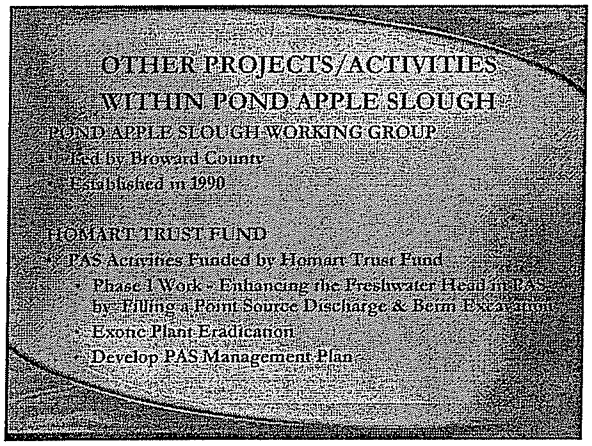
ADDITIONAL FDOT MITIGATION/RESTORATION ACTIVITIES

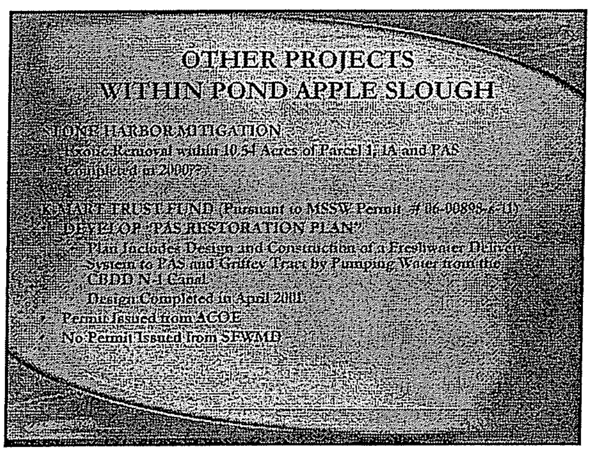


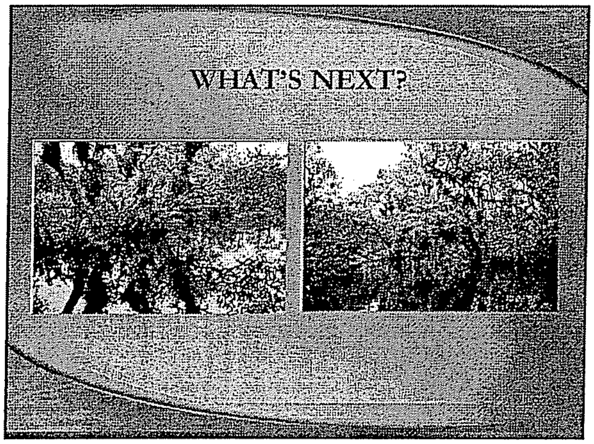
ADDITIONAL FDOT MITIGATION/RESTORATION ACTIVITIES

- I-595 Consent Order
  - Restoration of 9.4 acres of PAS due to Construction Impacts
    - Construction Complete July 1992
- I-95 @ Broward Blvd. Mitigation
  - Restoration of 1,500 lin feet of SFNR Berm Restoration & Mangrove Planting
    - Construction Complete June 1992
- Cypress Creek NOV Mitigation
  - Creation of 6.5 acres Freshwater Wetlands for mitigation
  - Creation/Enhancement of 6.0 acres Voluntary wetlands, Adjacent to PAS (underneath & adjacent to I-595 bridges)
    - Construction Complete January 1995


LAND TRANSFER INFO
Following Agency Acceptance of Mitigation and Consent Order, All Parcels Transferred to Broward County in Accordance with 1987 Agreement Between FDOT and Broward County.
Conservation Easement Purchased For Griffey Tract. Agency Clearance April 1997.
September 1998 – Quit Claim Deed to Broward County for Pond Apple Slough and the FPL Parcels (1, 2a & 2b).
"COUNTY will retain the properties predominantly in their scenic and open space condition and will prevent any use of the properties that will significantly impair or interfere with the scenic, open space and ecological values of the properties."


OTHER PROJECTS/ACTIVITIES WITHIN POND APPLE SLOUGH
POND APPLE SLOUGH WORKING GROUP
Led by Broward County
Established in 1990
HOMART TRUST FUND
PAS Activities Funded by Homart Trust Fund
Phase I Work - Enhancing the Freshwater Head in PAS by Filling a Point Source Discharge & Berm Excavation
Exotic Plant Eradication
Develop PAS Management Plan


OTHER PROJECTS WITHIN POND APPLE SLOUGH
STONE HARBOR MITIGATION
Exotic Removal within 10.54 Acres of Parcel 1, 1A and PAS
Completed in 2000??
K-MART TRUST FUND (Pursuant to MSSW Permit # 06-00898-S-11)
DEVELOP "PAS RESTORATION PLAN"
Plan Includes Design and Construction of a Freshwater Delivery System to PAS and Griffey Tract by Pumping Water from the CBDD N-1 Canal
Design Completed in April 2001
Permit Issued from ACOE
No Permit Issued from SFWMD


WHAT'S NEXT?

HISTORY OF EVENTS
I-595 AT POND APPLE SLOUGH

POND APPLE SLOUGH (PAS)
CHRONOLOGY OF EVENTS

- **October 12, 1979** MOU between FDOT and Broward County for acquisition of PAS
- **November 15, 1979** I-595 FEIS Approved (State Project Nos: 86095-3404 & 86095-3458)
- **August 22, 1983** I-595 ACOE Permit No. 83D-0325 Issued for I-595 Bridge and Temporary Haul Road
- **February 9, 1984** I-595 FDER Permit No. 06-0653979 Issued for I-595 Bridge and Temporary Haul Road
- **October 22, 1984** Construction begins on the I-595 Bridge and Temporary Haul Road
- **April & May 1986** Construction impacts to PAS (FDER Permit No. 06-0653979)
- **April 28, 1986** ACOE issued Notice of Noncompliance for wetland impacts (ACOE Permit No. 83D-0325)
- **June 12, 1986** SFWMD Permit No. 06-00774 issued for Package M construction of SR 7 Interchange – includes 12 miles of roadway and 19 bridges
- **June 20, 1986** FDER Permit No. 061110329 issued for Package M construction of SR 7 Interchange – 56 acres of wetland impact identified; mitigation plan reference. Required submittal of a detailed plan in 6 months.
- **June 24, 1986** USACOE Permit No. 85IPG 21113 issued for Package M (Construction of SR 7 Interchange). 56 acres of wetland impact identified. Draft mitigation plan identified including areas 1, 2A, 2B, 3 (Griffey Tract), and 4 (Pond Apple Slough).
- **September 2, 1986** FDER NOV issued to FDOT, Hardrives, and John P. Pike & Sons for wetland impacts to PAS observed on April 25, 1986 and May 2, 1986.
- **October 6, 1986** Construction begins on Package M
- **August 4, 1987** Agreement is signed between FDOT and Broward County based on mitigation plan for PAS
- **December 30, 1987** Construction of the I-595 Bridge over the South Fork of the New River (SFNR) is complete
- **1990** Establishment of Broward County Working Group for PAS

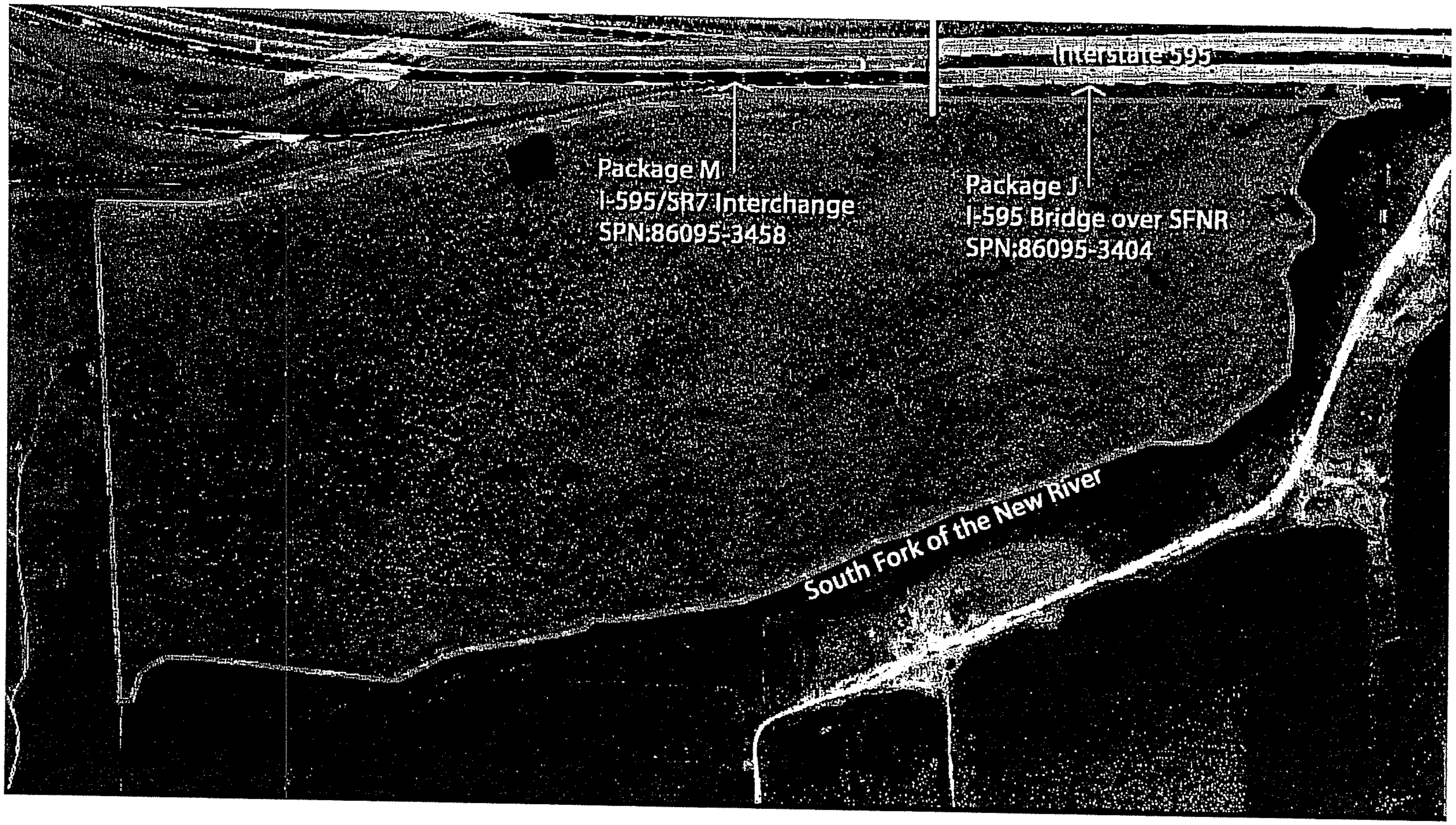
POND APPLE SLOUGH (PAS)
CHRONOLOGY OF EVENTS

- **February 1990** All Mitigation Parcels are acquired
- **June 1991** Initial restoration of FPL Parcels 1, 2A And 2B Complete
- **August 1, 1991** Consent Order (FDER No. 86-0632) signed (FDER AND FDOT) for restoration of PAS due to construction impacts on bridge project.
- **March 18, 1992** Broward County DNRP issues after-the-fact permit for wetland impacts at I-95/Cypress Creek Interchange and authorizes mitigation at the PAS.
- **June 7, 1992** I-95 at Broward Blvd. Mitigation Project complete along the southern berm of the PAS (BCDNRP License No.DF92-1152 and FDER Permit No. 061876436) -3 years of quarterly monitoring and maintenance required.
- **July 1992** Consent Order – Initial restoration on 9.4 acres is completed.
- **July 7, 1992** Consent Order (FDER No. 86-0632) Amendment for time extension.
- **May 1993** Enhancement work on Griffey Tract begins.
- **June 1994** Remedial maintenance/selective clearing of exotic vegetation on Parcels 1, 2A, & 2B.
- **1994/95** PAS activities funded by Homart Trust Fund
- **December 28, 1994** Issuance of FDER Permit No. 062505206 to excavate and plug areas of retention pond to divert freshwater into PAS and construct a salinity berm along the south end of the Griffey Tract. Project managed by Broward County and funded with Homart Trust Fund.
- **January 19, 1995** ACOE issued Permit to enhance hydrology of PAS. Project managed by Broward County and funded with Homart Trust Fund.

POND APPLE SLOUGH (PAS)
CHRONOLOGY OF EVENTS

- **January 1995** Cypress Creek mitigation construction completed – 5 years of quarterly monitoring required.
- **June 2, 1995** SFWMD signs off on Permit No. 06-00774 (Package M Mitigation).
- **August 3, 1995** Mitigation requirements of Parcels 1, 2A, & 2B are signed off by FDEP.
- **May 16, 1996** FDER letter stating Consent Order requirements are fulfilled.
- **January 1997** Griffey Tract enhancement (exotic vegetation removal) is complete.
- **March 1997** Additional installation of riprap along the PAS and Parcel 2B is complete.
- **September. 9, 1998** Quick Claim Deed transferring PAS & associated mitigation properties to Broward County.
- **September 17, 1998** PAS closing (Transfer of all properties to Broward County is complete).
- **1999/2000** Stone Harbor Mitigation – Enhancement within PAS and Parcels 1 & 1A.
- **February 23, 1999** Broward County approved hiring Hydrologic Associates to develop "PAS Restoration Plan" to be funded by SFWMD (K-Mart Trust Fund pursuant to MSSW Permit No. 06-00898-S-11)
- **December 13, 2000** Broward County submits Standard General ERP application for PAS restoration – recharge water.
- **January 17, 2001** USACOE issues Nationwide Permit associated with PAS restoration plan.
- **January 19, 2001** Request for Additional Information (RAI) Received from SFWMD.
- **April 13, 2001** Response to RAI
- **August 7, 2003** Broward County DPEP letter to SFWMD on status of rehydration project and additional recommendations moving project forward.

I-595 CONSTRUCTION PROJECTS



PERMITS/PERMIT REQUIREMENTS

I-595 Bridge over the SFNR – State Project No. 86095-3404(Package J)

The following permits were issued for construction of the I-595 Bridge over the South Fork of the New River and the construction of a temporary haul road impacting 21 acres of wetlands.

- DER Permit No. 060653479 - Issued 2/9/84
- ACOE Permit No. 83D-0325 - Issued 8/22/83
- SFWMD Permit No. GP 8338 – Issued N/A
- USCG Permit No. 11-83-7 – Issued N/A

Mitigation included acquisition of remaining parcel in PAS in accordance with MOU between FDOT and Broward County (October 12, 1979) and restoration of a temporary haul road.

I-595 SR 7 Interchange – State Project No. 86095-3458 (Package M)

The following permits were issued for construction of the I-595/S.R. 7 Interchange:

- FDER Permit No. 061110329 – Issued 6/20/86
- ACOE Permit No. 85IPG-21113 – Issued 6/24/86
- SFWMD Permit No. 06-00774-S – Issued 6/12/86

The FDER and ACOE Permit authorized the construction of the SR 7 Interchange with 56 acres of wetland impacts and the development of a conceptual mitigation plan. Submittal of a detailed mitigation plan was required within 6 months of issuance of the permits. A Draft Mitigation Plan was identified which included the purchase of Parcels 1, 2A, 3 (Griffey Tract), and 4 (PAS).

PERMITS/PERMIT REQUIREMENTS (Continued)

I-595 Project Impacts* (SR 7 to SFNR)

Activities associated with construction of I-595 from State Road 7 to the South Fork of the New River were going to impact the following wetland areas:

- **Broward County Resource Recovery Facility** (Area 1) - 15.88 Acres

  This area could be described as a disturbed freshwater wetland vegetated with wax myrtles, bays, maples, cypress, sawgrass and invasive species, such as, melaleuca and brazilian pepper.

- **Griffey Tract** (Area 2) - 22.03 ACRES

  This parcel of land was an abandoned agricultural area predominantly vegetated with sawgrass, wax myrtle, cypress, cabbage palms and invasive species such as, melaleuca.

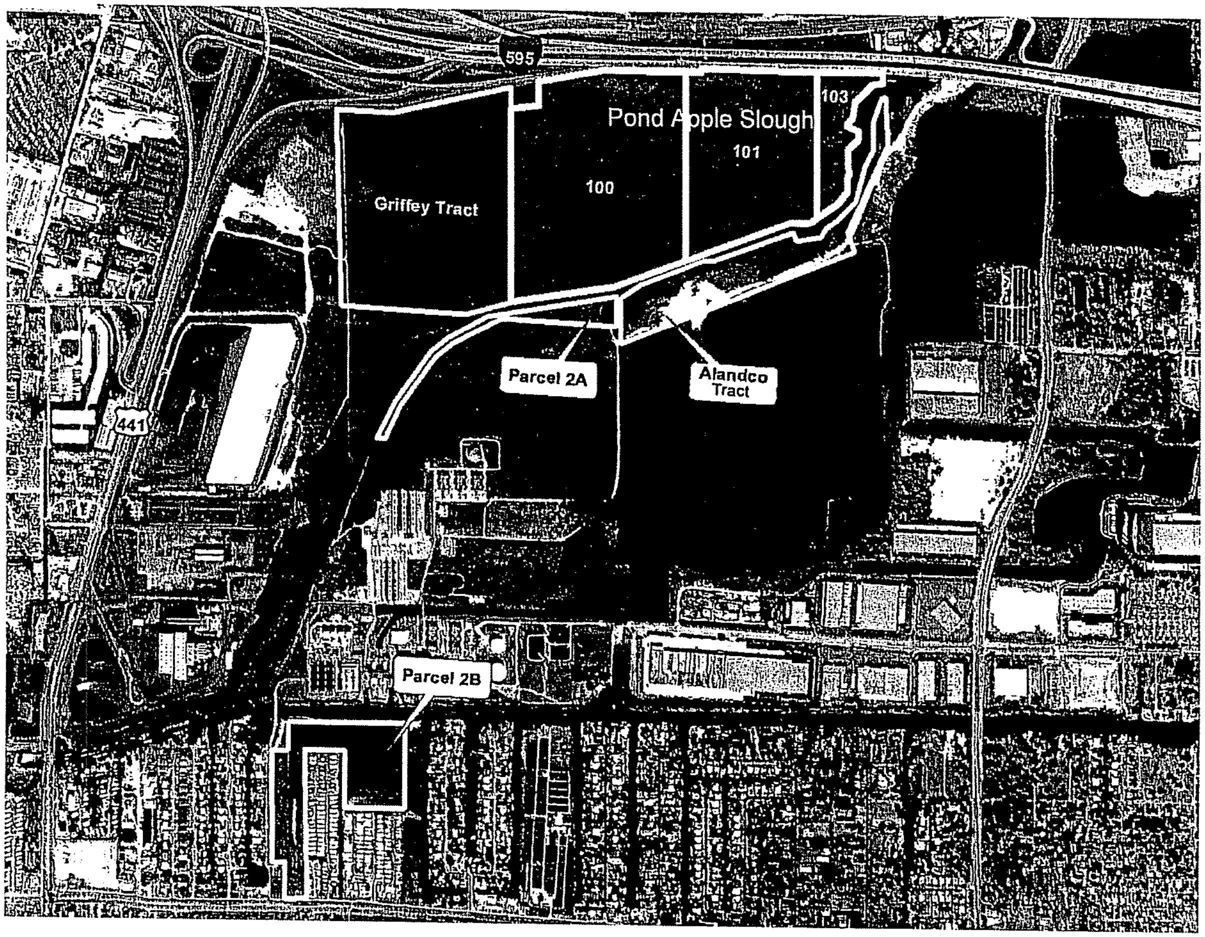
- **Pond Apple Slough** (Area 3) ~ 18.44 ACRES

  This area was considered a freshwater wetland predominately vegetated with cypress, pond apple, maple, wax myrtle, leather fern and invasive species such as, melaleuca and brazilian pepper.

Approximately 56.35 acres of wetlands were anticipated to be impacted by I-595 construction. An additional 10± acres were impacted but not filled.

*The wetland impact information for each area was obtained from the SFWMD Permit #06-00774 & the impact acreage was consistent with the other permits.

FDOT I-595 PAS MITIGATION SITES



I-595 MITIGATION PLAN (PRESERVATION, ENHANCEMENT & RESTORATION)

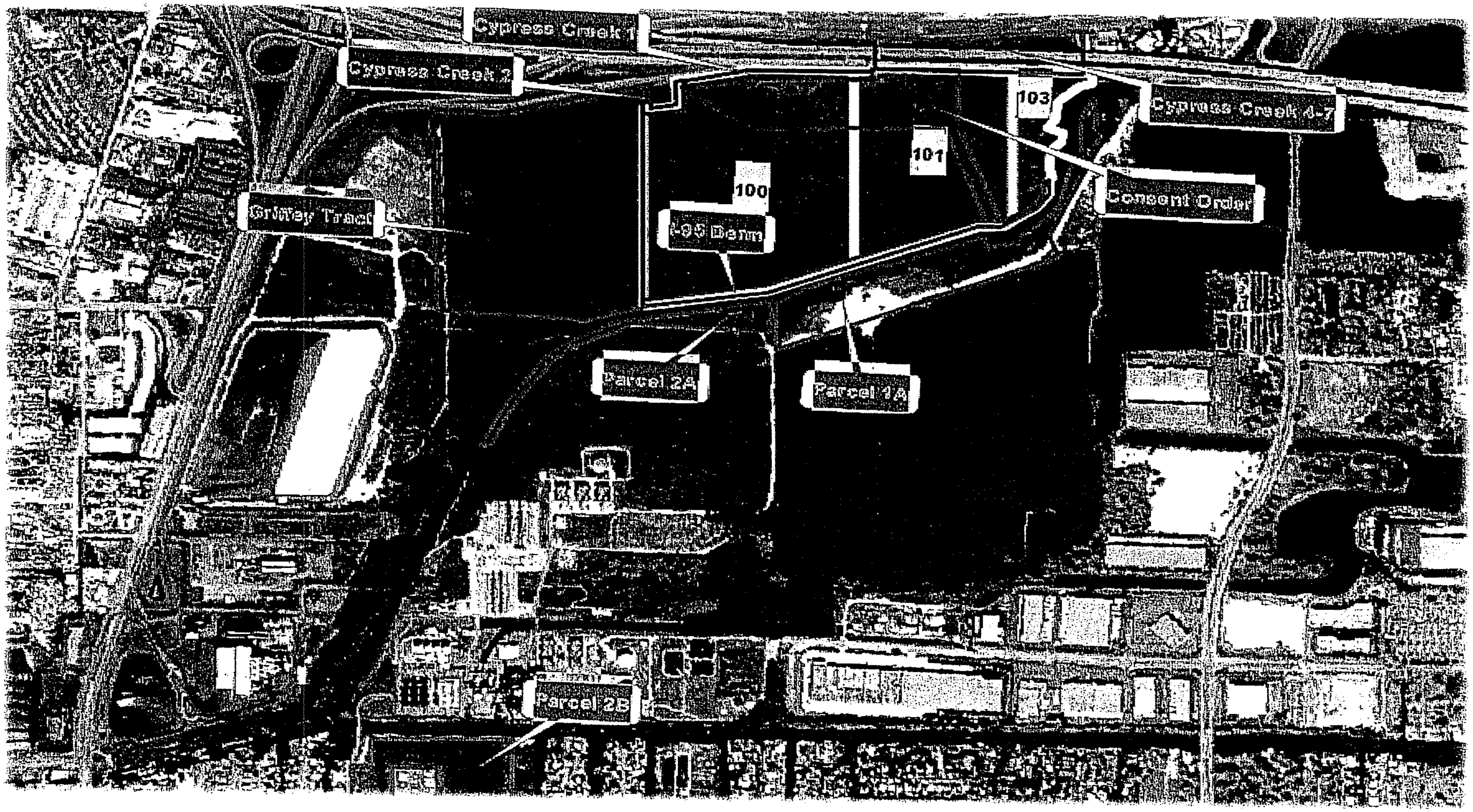
FDOT was required to fulfill the following mitigation activities to compensate for the wetland impacts and to fulfill the permit requirements.

- **Pond Apple Slough** - Purchase remaining 112.4± acres.
- **Griffey Tract** – Purchase a conservation easement from Broward County covering the remaining 58.8 acres and enhance the site by removing all exotic vegetation.
- **Alandco Tract (Parcel 1)** – Purchase 22.5 acres of riverfront property and enhance approximately 10 acres of the parcel by removing exotic vegetation and replanting with native vegetation.
- **FPL Parcel 2A** - Purchase 4.5 acres of riverfront property and enhance the parcel by removing exotic vegetation and replanting with native vegetation.
- **FPL Parcel 2B** – Purchase 20.5 acres of canal frontage property. Restore and enhance the parcel with scrape down activities, removal of exotic vegetation and replanting with native vegetation.
- Restore 7.16 acres used as a temporary haul road associated with bridge construction by replacing stockpiled muck and replanting with native vegetation.

As part of the mitigation plan, FDOT was required to sign an agreement with Broward County to preserve the Pond Apple Slough and place the Griffey Tract under a Conservation Easement. In 1987 the agreement was signed and included the following list of requirements:

- FDOT was required to pay Broward County over 2 million dollars to place the Griffey Tract under a Conservation Easement.
- FDOT was required to transfer ownership of the Pond Apple Slough, and Parcels 2A and 2B over to Broward County upon completion of all mitigation activities.
- The Pond Apple Slough would be preserved in its natural state.
- FDOT would provide public access to the Pond Apple Slough.

ALL FDOT
MITIGATION/RESTORATION ACTIVITIES



All FDOT MITIGATION/RESTORATION ACTIVITIES

I-595 Mitigation:

- Enhancement/Restoration of Parcels 1, 2A, & 2B
  - Construction complete June 1991
  - Maintenance/Monitoring complete June 1994
  - Agency sign-off August 1995

- Enhancement of the Griffey Tract
  - Initial exotic removal complete December 1993
  - Maintenance/Monitoring complete January 1997
  - Agency sign off April 1997

I-595 Consent Order

Restoration of 9.4 acres of PAS due to construction impacts. Activities included removal of sediment in northern areas of PAS, removal of fill along haul road and replanting with native vegetation.

- Construction complete July 1992
- Maintenance/Monitoring complete January 1997
- Agency sign-off May 1996

I-95 @ Broward Blvd Mitigation – SFNR Berm restoration and mangrove planting

Restoration of 3,500 linear feet of the PAS southern berm of the PAS along the South Fork of the New River. Activities included removal of exotic vegetation, placement of rubble rip-rap, creation of mangrove planters, installation of native hammock species and mangrove species.

- Construction complete June 1992
- Maintenance/monitoring complete July 1995
- Agency sign-off August 1995

All FDOT MITIGATION/RESTORATION ACTIVITIES (Continued)

Cypress Creek NOV – Mitigation
Creation of 4.7 acres of freshwater wetlands and enhancement of 7.8 acres of freshwater wetlands located within FDOT's right-of-way adjacent to the PAS (Underneath and adjacent to I-595 Bridges). Broward County required 6.5 acres of mitigation, but an additional 6.0 acres of voluntary wetland creation was completed to restore all areas underneath I-595.

- Construction complete January 1995
- Maintenance/Monitoring complete December 2000

Riprap Installation Along the SFNR
Riprap was placed along the southern berm of PAS and along Parcel 2B. SFWMD requested removal of Australian pines on Parcel 2B along the Dania Cut-off Canal. The berm along the canal started to erode. so FDOT placed rubble riprap along the berm of Parcel 2B to protect the site. The southern berm of the PAS was also eroding away, so FDOT placed additional rubble in the areas of concern.

- Construction complete March 1997

Land Transfer Information

- Following Agency Acceptance of Mitigation and Consent Order All Parcels Transferred to Broward County in Accordance with 1987 Agreement Between FDOT and Broward County.
- Conservation Easement Purchased For Griffey Tract. Agency Clearance April 1997.
- September 1998 – Quit Claim Deed to Broward County for Pond Apple Slough and the FPL Parcels (1, 2a & 2b).

OTHER PROJECTS/ACTIVITIES WITHIN POND APPLE SLOUGH

Pond Apple Slough Working Group

- Led by Broward County
- Established in 1990

Homart Trust Fund

PAS Activities Funded by Homart Trust Fund ($71,300)

- Phase I Work - Enhancing PAS hydrology by excavating and berming the FDOT retention pond to divert freshwater from the pond into the PAS. Additional work included the construction of a salinity control berm along the south end of the Griffey Tract to help control salt water intrusion from the SFNR.
- Exotic Plant Eradication
- Develop PAS Management Plan

Stone Harbor Mitigation

- Exotic Removal within 10.54 Acres of Parcel 1, 1A and PAS
- Completed in 2000

K-Mart Trust Fund (Pursuant to MSSW Permit # 06-00898-s-11)

- DEVELOP "PAS RESTORATION PLAN"
  - Plan Includes Design and Construction of a Freshwater Delivery System to PAS and Griffey Tract by Pumping Water from the CBDD N-1 Canal.
  - Design Completed in APRIL 2001
- Permit Issued from ACOE
- No Permit Issued from SFWMD