NOVEMBER 2001

CENTRAL AND SOUTHERN FLORIDA PROJECT

TAMIAMI TRAIL FEATURE

DRAFT GENERAL REEVALUATION REPORT/SUPPLEMENT TO THE 1992 FINAL ENVIRONMENTAL IMPACT STATEMENT (GRR/SEIS) ON MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK

US Army Corps of Engineers
Jacksonville District

South Florida Water
Management District

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U.S. ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT
SOUTH ATLANTIC DIVISION

SOUTH FLORIDA WATER
MANAGEMENT DISTRICT

NOVEMBER 2001

ABSTRACT

CENTRAL AND SOUTHERN FLORIDA PROJECT

DRAFT GENERAL REEVALUATION REPORT/ SUPPLEMENT to the 1992 final ENVIRONMENTAL IMPACT STATEMENT (GRR/SEIS) ON MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, FLORIDA

ABSTRACT: The 1989 Everglades National Park (ENP) Protection and Expansion Act authorized improvements in the delivery of water from Water Conservation Area 3B (WCA 3B) to the ENP expansion area in Northeast Shark River Slough immediately south of Tamiami Trail (U.S. Highway 41). Such improvements were documented in a General Design Memorandum and Final Environmental Impact Statement (EIS), issued in 1992. At that time, it was believed that the existing 19 sets of individual culverts under Tamiami Trail were sufficient to pass the required volume of water from the adjoining Tamiami Canal on the north into ENP to the south without collateral effects. Since that time, it has been determined that, under some high discharge conditions, the required elevation of water in the canal would raise groundwater levels under the highway to the point that damage could result to the highway subgrade. Under extreme conditions, low spots along the highway could be overtopped. This supplement to the 1992 Final EIS addresses this problem and analyzes eight alternative plans to protect the highway. Compatibility with envisioned larger scope projects to be studied during the Comprehensive Everglades Restoration Plan (CERP) was evaluated. Each alternative involves increasing the cross-section of openings under the highway in order to minimize the rise in water level in the canal necessary to pass the required volume of water, and to spread the water flow to the south as evenly as practicable. The alternatives include adding additional culverts under the highway, constructing one or more bridges within or outside the existing highway right-of-way, or elevating the highway for the full 10.7-mile section within the project area. Where appropriate, an option was included for raising the highway profile on either side of the bridges or culverts to prevent subgrade damage under the rare event when the full design flow could occur. In addition, each alternative included an option to provide water quality treatment of storm water runoff from the reconstructed portions of the highway. The preliminarily recommended alternative calls for a 3,000-foot bridge, without water quality treatment, and associated real estate interests to provide for conveyance to be constructed between Blue Shanty Canal and Coopertown, at an estimated cost of $23,045,733. All information provided in the 1992 Final EIS is incorporated herein by reference.

SEND YOUR COMMENTS TO THE DISTRICT ENGINEER BY 4 FEBRUARY 2002.

If you would like further information on this statement, please contact:

Jon Moulding
U.S. Army Corps of Engineers, PD-ES
P.O. Box 4970
Jacksonville, FL 32232
Telephone: 904-232-2286
e-mail: jon.moulding@usace.army.mil

EXECUTIVE SUMMARY

CENTRAL AND SOUTHERN FLORIDA STUDY

DRAFT GENERAL REEVALUATION REPORT/ SUPPLEMENT to the 1992 final ENVIRONMENTAL IMPACT STATEMENT (GRR/SEIS) ON MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, FLORIDA

EXECUTIVE SUMMARY

Background. The Everglades National Park Protection and Expansion Act, December 1989, authorized the Secretary of the Army to undertake certain actions to improve water deliveries to the Everglades National Park (ENP) and to take steps to restore natural hydrologic conditions to the extent practicable. The General Design Memorandum (GDM) called for in the Act was completed in June 1992. Under the provisions of this GDM and Environmental Impact Statement (EIS) for Modified Water Deliveries (MWD) to ENP, water would be transferred from WCA-3B to the L-29 Canal (Tamiami Canal) and through the existing culvert system south under U.S. Highway 41 (the Tamiami Trail) into Northeast Shark River Slough. When the GDM was completed in 1992, it was believed that existing culverts under the roadway would be adequate to convey the flow of water. Subsequent hydrological analyses, however, revealed that the head height in the L-29 Canal required for the culverts to convey the increased water could adversely affect the structure of Tamiami Trail and overtop low areas along the highway under certain conditions. The purpose of this project is to identify conveyance requirements for the Tamiami Trail that would provide for the authorized flow of water from WCA 3B and the L-29 Canal to the Northeast Shark River Slough and the Everglades National Park south of the Tamiami Trail. The project must provide compliance with the Reasonable and Prudent Alternatives (RPA) of the February 19, 1999, U.S. Fish and Wildlife Service Final Biological Opinion on the Cape Sable seaside sparrow. This calls for at least 30% of the regulatory water discharges from WCA 3A to be re-routed into Northeast Shark River Slough beginning on March 1, 2000. These waters would traverse WCA 3B and the Tamiami Trail, and enter ENP instead of being discharged through the S-12 structures. This would rise to 45 percent and 60 percent in March 1, 2001 and March 1, 2002, respectively.

Purpose. Under the authority of the modification to the Central and Southern Florida Project known as the Modified Waters Deliveries Project to Everglades National Park (Project) it has become necessary to address the needs of the Project for conveyance through Tamiami Trail (US Highway 41).

The purpose of this GRR is to define and describe the project features needed to convey the increased flows through Tamiami Trail. The project features consist of the real estate interests for (1) a 3,000-foot conveyance channel/easement to be located between Blue Shanty Canal and Coopertown, (2) the perpetual right for conveyance through the existing structures (57 culverts) along Tamiami Trail, and (3) a flowage easement throughout the remaining segment of Tamiami Trail between S333 and S334. These real estate interests are the project features and are necessary to convey the authorized design flows of the MWD Project through Tamiami Trail. The modifications to Tamiami Trail to pass the MWD flows are considered substitute facilities, not project features, and serve as the compensation to the current real estate owner.

The 3,000-foot conveyance channel easement, use of the conveyance structures, and a flowage easement are the project features, which are needed for the project to function and are to be operated and maintained by the Non-Federal Sponsor.

This GRR sets forth the evaluation of the substitute facilities proposed for construction as compensation for the required real estate interests. The substitute facilities are not project features and are not needed for the project to function. They are provided to the owner as substitutes for the affected public utilities (U.S. 41) so that the public utilities can continue to function. The substitute facilities will not be operated and maintained by the Federal or Non-Federal Sponsor. The substitute facilities for the preliminary recommended plan consist of two items: (a) a 3,000-foot bridge and (b) pavement upgrades to the unbridged portion of Tamiami Trail road between S333 and S334.

As part of the recommended plan, the Federal government will acquire the real estate interests needed for the Tamiami Trail project. The appropriate organizations at the Federal and State levels will develop and approve an agreement containing the details and method of implementation. It is the intention of the Federal government not to expend any more funds than necessary to construct substitute facilities for the Tamiami Trail that a future project under CERP may impact.

The substitute facilities that are constructed as part of this MWD project must be compatible with Project purposes. Thorough discussions and evaluations of the substitute facilities occurred during the plan formulation process and are presented in the body of the GRR.

Authorization under this GRR is sought for only the Project features needed to complete this MWD Project. The description, evaluation, and recommendation of the substitute facilities are provided to establish that substitute facilities can be implemented to pass the anticipated MWD flows.

Alternatives. Alternatives evaluated were (1) maintain the existing alignment and profile of the highway and add four new bridges, (2) maintain the existing alignment of the highway, but raise the profile and add four new bridges, (3) build a new roadway to the north of the L-29 Levee with eight new bridges, (4) build a new roadway to the south of the existing roadway with four new bridges, (5) construct an elevated roadway within existing right of way, (6) maintain the existing alignment of the highway, but raise the profile and a four-mile-long bridge, (7) maintain the existing alignment of the highway, but raise the profile and add a 3,000-foot-long bridge, and (8) maintain the existing alignment of the highway, but raise the profile and add box culverts along the roadway. Variations within each of the alternatives included the incorporation of treatment for highway runoff.

Major Findings and Conclusions. All alternatives except for Alternative 1 and the No-Action plan would provide an ability to convey required water volumes without having water either damaging or overtopping the highway. Potential impacts of the various alternatives included highway alignments that encroached on the Tigertail or Osceola camps, loss of structures and facilities at existing businesses, incorporation of South Florida Water Management District and ENP wetlands into the highway right-of-way, and encroachment toward rookeries of the wood stork, an endangered species.

Issues Raised by the Public. Several concerns were raised by individuals during the scoping process. These included concerns that elevated water levels would cause flooding or relocation of the Tigertail Camp or affect the Homestead Agricultural Community. Traffic issues included concerns that moving the road closer to the Osceola or Tigertail camps would cause disruptions and increased noise levels. Other traffic concerns included the effect of construction on traffic flow, especially during hurricane evacuation. Wildlife concerns included the effects of the highway on wildlife mortality and a request that wildlife corridors be considered to incorporate ecological connectivity. Recreation issues included concern that canals would be filled, access to boat ramps would be lost, and that fisheries habitat would be impacted. Concerns were expressed about the separation of the MWD project into three separate EISs, thereby possibly masking the combined impacts of the projects. An opinion was expressed that because there have been delays in implementing the MWD projects, tribal lands have not been protected. There were concerns expressed as to how the MWD-recommended flows would be achieved before the required studies are completed.

Preliminary Recommended Plan. The preliminary recommended plan is Alternative 7a, Existing Alignment with Raised Profile and 3000-foot Bridge without Water Quality Treatment.

Alternative 7a consists of modifying the existing Tamiami Trail embankment profile and typical section between Blue Shanty Canal and Coopertown. The centerline will fall very close to the centerline of the existing highway. The existing asphalt pavement will be left in place to serve as a base. Low areas will be leveled to a minimum elevation of 11.0 feet, and a 6-inch asphalt overlay will be added. Approximately 3,000 feet of the roadway would be reconstructed as an elevated structure. The bridge would have two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The existing Tamiami Trail embankment will be removed adjacent to the bridge. Access will be provided to the Airboat Association of Florida site be means of a 35’-1” wide bridge with two 12-foot travel lanes and four-foot shoulders. Surface access to the Osceola Camp, the Tigertail Camp, and three businesses along the highway will be provided. Facilities for the treatment of highway runoff would not be included in this plan. The construction cost for Alternative 7a is estimated to be $23,045,733, and the total life cycle cost is estimated to be $31,003,830.

The 3,000-foot bridge will provide sufficient hydraulic opening to convey projected MWD Flows. The existing culvert system under the highway, which would be retained, would assist in maintaining sheet flow.

The bridge would provide an opening that would provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail. Wetland impacts associated with Alternative 7a include a loss of 3.42 functional units.

Regarding threatened and endangered species, 2,295 linear feet of US 41 are located in the primary zone, and 2,122 linear feet are in the secondary zone of the Tamiami West Wood Stork colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Construction restrictions will be placed in these areas. No restrictions will be placed on construction within the 449 feet of the alignment that traverses the Frog City Colony in WCA-3B. Although these restrictions will require

phasing of construction, no significant impacts to threatened or endangered species are expected.

Alternative 7a would involve modifying the Tamiami Trail, which has been identified as a historic cultural resource. Aesthetics will be enhanced by the removal of exotic vegetation on the southern side of the Tamiami Trail, which is necessary for the modifications and reconstruction under this action alternative.

Alternative 7a would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three-airboat tour businesses. Short-term traffic disruptions and noise, which are expected during construction when the road profile is modified, could possibly affect the Osceola Camp community and the businesses.

Noise modeling indicates that Alternative 7a, although predicted to exceed FDOT approach criteria, appears to have no impact when compared to future without project conditions.

There would be temporary impacts to fishing from the Tamiami Trail right-of-way during construction. Access to boat ramps, will not be affected under this alternative.

Areas of Controversy / Unresolved Issues. Several issues are controversial or unresolved.

The selection of Alternative 7a rather other than Alternative 5 (Construction of an Elevated Roadway) as the preliminary recommended plan is controversial. Individuals with resource and regulatory agencies, environmental advocacy organizations, and the public have expressed a strong preference for providing an elevated highway that would provide environmental enhancements with few impacts. This has not been recommended due to fiscal and other constraints.

ENP is in the process of taking public comment on updating their management plan, which will determine continued operations for three airboat tour businesses along the south side of Tamiami Trail. ENP has planned to acquire the property and possibly eliminate commercial operations in the area. However, because it appears that this action will not occur before construction begins for this project, access allowances must be made for the businesses. Access roads to businesses must be provided both during and after construction. Alternatives that incorporate water quality treatment would significantly impact businesses, which would lose facilities and structures.

Whether or not wildlife enhancement features (barriers, underpasses, and bridges would be incorporated into the project is unresolved. These are considered “enhancements” that the South Florida Water Management or the Department of Interior has the option of providing.

Recreational interests have requested that the alternatives evaluated include bridging at a height that would allow for the passage of airboats. These features are not required to meet the project purpose of water deliveries to NESRS and are not features of the recommended plan. Currently there is no airboat passage between the north and south side of Tamiami Trail in this area. An airboat passage feature was not evaluated for purposes of this project. Such features may be considered later as betterments, if

recommended and funded by the local sponsor, or an airboat passage feature may be considered with a later project.

The resolution of these issues will be subject, in part, to comments received in response to the review of this draft document by agencies and the public.

Modified Water Delivery Strategy for Integration with CERP WCA3 Decompartmentalization Phase. Numerous requests from the public have stated that the Modified Water Deliveries project should be evaluated, designed and constructed with the CERP WCA3 Decompartmentalization Phase I project which modifies Tamiami Trail in the same location in order to insure design consistency and avoid duplication of costs. A similar intent was expressed in the CERP Restudy.

This report is prepared under the authority of the Everglades National Park Protection and Expansion Act of 1989, and to implement completion of the project to improve water deliveries authorized in that Act (Modified Water Deliveries Project). It is not intended to be the project implementation report to implement the Initial Project in the Comprehensive Everglades Restoration Plan discussed in § 601(b)(2)(C) of the Water Resources Development Act of 2000, nor is it intended to prejudge the results of that project implementation report. That project implementation report will be done at a later date. In some cases, completion of the Modified Water Deliveries Project is a prerequisite to actions under CERP, and a delay in completion of the Modified Water Deliveries Project would delay implementation of CERP.

It is recognized that:

a. Only limited funding is provided by the Modified Water Deliveries Project for modifications to the Tamiami Trail;

b. Full restoration of natural flows to Northeast Shark River Slough (NESS) and Everglades National Park may be accomplished only through implementation of MWD Project features coupled with the restoration features of the CERP, once the seepage control features for the projected high water levels in NESS are fully mitigated.

c. Additional funding and restoration capability is authorized by CERP Decompartmentalization (Phase 1) for Tamiami Trail, subject to the constraints of WRDA 2000. Future adjustments may occur to Tamiami Trail using CERP authority, and additional features may augment the MWD project features by increasing the ecological connectivity between the Water Conservation Areas and the ENP, thereby restoring a more natural sheetflow regime to ENP.

d. Current funding levels identified for Tamiami Trail in CERP are limited.

e. Per the CERP Restudy, 9.1.7.2 "The purpose of these features {Water Conservation Area 3 Decomparmentalization and Sheetflow Enhancement (AA, QQ and SS)} is to reestablish the ecological and hydrological connection between Water Conservation Areas 3A, and 3B, and the Everglades National Park, and Big Cypress National Preserve." 10.6.2.3 "This project is included {Water Conservation Area 3 Decomparmentalization and Sheetflow Phase-1} in the initial authorization for two reasons: (1) to provide immediate opportunities

for enhanced sheetflow within Water Conservation Area 3 and between Water Conservation Area 3 and Everglades National Park and (2) to integrate with ongoing modifications that are being made in the detailed design and construction of the Modified Water Deliveries to Everglades National Park project. The Project Implementation Report will address the scope and method to be used for Miami Canal Backfilling, conveyance improvements to the North New River Canal and, the bridging of Tamiami Trail, and L-29 modifications that are necessary to enable unrestricted flow from Water Conservation Area 3 into Everglades National Park… These project modifications will be coordinated with the existing Modified Water Deliveries to Everglades National Park Project. The benefits to the project from this feature are that restoring sheet flow will reduce the unnatural discontinuities in the landscape."

f. Not intended to be the PIR to implement the initial project in the CERP WRDA or prejudge the results of the PIR.

g. Final CERP features for Tamiami Trail have not yet been identified the proposed modifications will be analyzed in a public forum consistent with NEPA.

h. Without prejudging the results of the project implementation report (PIR) required by WRDA 2000, the intent of this GRR/SEIS is to maximize the compatibility and avoid retrofitting costs of MWD project features with future CERP features.

i. The intent of this GRR/SIES is to have a clear design for MWD onto which a CERP design can follow.

j. Completion of the MWD project is a pre-requisite to actions under CERP and a delay in completion of MWD would delay implementation of CERP.

k. Subject to approval of a Project Management Plan (PMP) for Decompart-mentalization (Phase I) under CERP, two PIRs will be prepared for WCA 3 Decompartmentalization (Phase I). One PIR will study and identify the recommended alternative for Tamiami Trail under CERP. The second PIR will address all other Decompartmentalization (Phase I) components.

Planning efforts underway for the CERP WCA3 Decompartmentalization (Phase I) project for Tamiami Trail are scheduled to be completed prior to construction for MWD Tamiami Trail Modifications.

Adaptive management is a way to insure design consistency and avoid duplication of costs. This report is prepared under the authority of the Everglades National Park Protection and Expansion Act of 1989, and to implement completion of the project to improve water deliveries authorized in that Act (Modified Water Deliveries Project). It is not intended to be the project implementation report to implement the Initial Project in the Comprehensive Everglades Restoration Plan discussed in § 601(b)(2)(C) of the Water Resources Development Act of 2000, nor is it intended to prejudge the results of that project implementation report. That project implementation report will be done at a later date. In some cases, completion of the Modified Water Deliveries Project is a prerequisite to actions under CERP, and a delay in completion of the Modified Water Deliveries Project would delay implementation of CERP.

The implementation strategy for adaptive management is a direct product of the MWD delivery strategy as described above.

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GENERAL REEVALUATION REPORT/SUPPLEMENTAL IMPACT STATEMENT (GRR/SEIS) FOR THE TAMIAMI TRAIL

SECTION 1.0
INTRODUCTION

In December 1989, the Secretary of the Army was authorized by the Everglades National Park Protection and Expansion Act to undertake certain actions to improve water deliveries to the Everglades National Park (ENP) and take steps to restore natural hydrologic conditions. As a means to identify the steps needed to restore natural hydrologic conditions, a General Design Memorandum (GDM) for Modified Water Deliveries (MWD) was complete in June 1992 that outlined how water would be transferred from WCA 3B to the L-29 Canal and through the existing culverts south under U.S. Highway 41 (Tamiami Trail) into Northeast Shark River Slough. Upon completion of the GDM, it was believed that the existing culverts under Tamiami Trail would be adequate to convey the flow of water anticipated under MWD. However, subsequent hydrological analyses revealed that the head height in the L-29 Canal required for the culverts to convey the increased flows could adversely affect the structure of the road and possibly overtop some sections under certain conditions. The purpose of this General Reevaluation Report (GRR) is to identify a technical solution to provide modifications to Tamiami Trail so that there will be unimpeded conveyance of water from WCA 3B and the L-29 Canal to the Northeast Shark River Slough and the Everglades National Park south of the Tamiami Trail. This document is an integrated Supplemental Environmental Impact Statement and General Design Memorandum (GRR/SEIS).

The project area of focus for this GRR is the Tamiami Trail, as shown in Figure 1, which is within the overall project boundaries of the Modified Water Deliveries to Everglades National Park project. The project area is located in Miami-Dade County, in southern Florida, adjacent to the northern boundary of ENP. As stated, the intent of this project component of MWD is to identify a means for conveying increased flows of water under the Tamiami Trail into ENP. This is being accomplished as part of the MWD Program to restore natural hydrological conditions to the extent practicable in ENP as authorized in the Everglades Protection and Expansion Act of 1989. The projected (maximum) MWD flow is 4,000 cubic feet per second (cfs), which will flow through the 10.7-mile project area along Tamiami Trail.

This section of the report describes the study's authority, partners, purpose, and scope. It includes discussions of compliance with the National Environmental Policy Act (NEPA) and provides a brief overview of the MWD program and other related studies, reports, and programs.

Under the authority of the modification to the Central and Southern Florida Project, known as the Modified Waters Deliveries Project to Everglades National Park (Project), it has become necessary to address the needs of the Tamiami Trail Project Component for conveyance through Tamiami Trail (US Highway 41).

The purpose of this GRR is to define and describe the project features needed to convey the increased flows through Tamiami Trail. The project features consist of the real estate interests for (1) a 3,000-foot conveyance channel/easement to be located between Blue Shanty Canal and Coopertown, (2) the perpetual right for conveyance through the existing structures (57 culverts) along Tamiami Trail, and (3) a flowage easement throughout the remaining segment of Tamiami Trail between S333 and S334.

These real estate interests are the project features and are necessary to convey the authorized design flows of the MWD Project through Tamiami Trail. The modifications to Tamiami Trail to pass the MWD flows are considered substitute facilities, not project features, and serve as the compensation to the current real estate owner.

The 3,000-foot conveyance channel easement, use of the conveyance structures, and a flowage easement are the project features, which are needed for the project to function and are to be operated and maintained by the Non-Federal Sponsor.

This GRR sets forth the evaluation of the substitute facilities proposed for construction as compensation for the required real estate interests. The substitute facilities are not project features and are not needed for the project to function. They are provided to the owner as substitutes for the affected public utilities (U.S. 41) so that the public utilities can continue to function. The substitute facilities will not be operated and maintained by the Federal or Non-Federal Sponsor. The substitute facilities for the preliminary recommended plan consist of two items: (a) a 3,000-foot bridge and (b) pavement upgrades to the unbridged portion of Tamiami Trail road between S333 and S334.

As part of the recommended plan, the Federal government will acquire the real estate interests needed for the Tamiami Trail project. The appropriate organizations at the Federal and State levels will develop and approve an agreement containing the details and method of implementation. It is the intention of the Federal government not to expend any more funds than necessary to construct substitute facilities for the Tamiami Trail that a future project under CERP may impact.

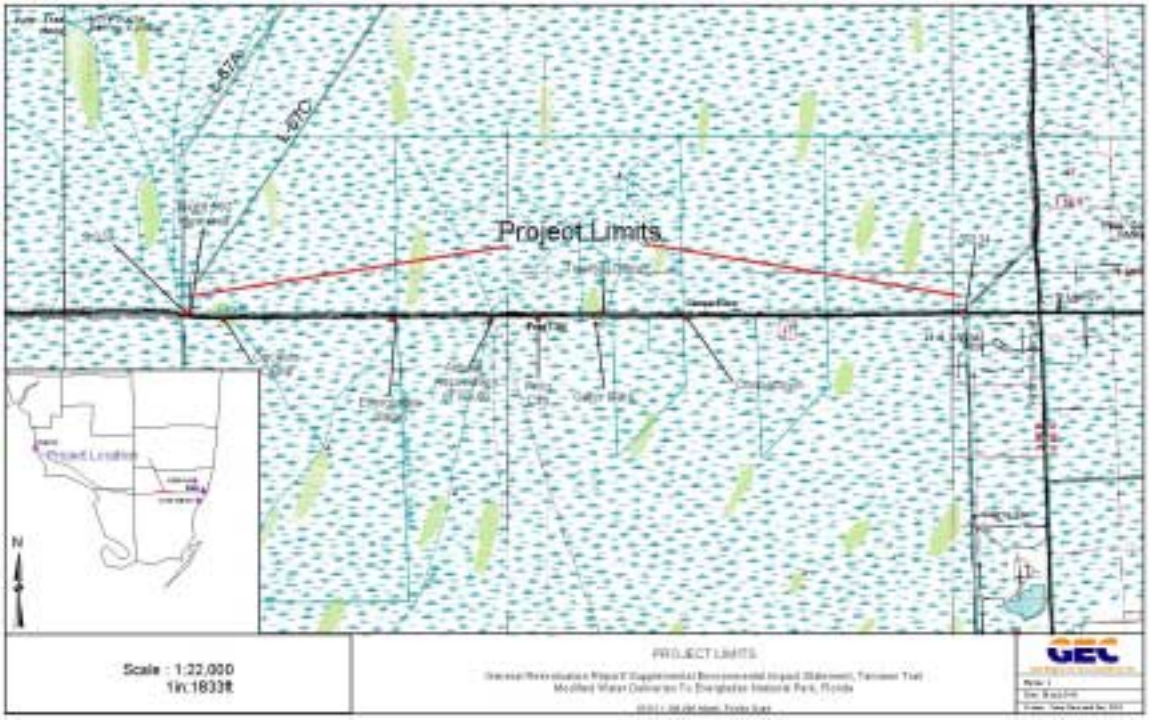
The substitute facilities that are constructed as part of this MWD project must be compatible with Project purposes. Thorough discussions and evaluations of the substitute facilities occurred during the plan formulation process and are presented in the body of the GRR.

Authorization under this GRR is sought for only the Project features needed to complete this MWD Project. The description, evaluation, and recommendation of the substitute facilities are provided to establish that substitute facilities can be implemented to pass the anticipated MWD flows.

1.1 STUDY AUTHORITY

The Everglades National Park Protection and Expansion Act (PL101-229, Section 104, 16 U.S.C. Part 410r-5 *et seq*.), December 1989 (Appendix A) authorized the Secretary of the Army to undertake certain actions to improve water deliveries to ENP and to the extent practicable to restore natural hydrologic conditions. This act provides the underlying authority for this project. Section 104 of the Act states:

> *The Everglades National Park is a nationally and internationally significant resource and the park has been*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> *adversely affected and continues to be adversely affected by external factors which have altered the ecosystem including the natural hydrologic conditions within the park. Wildlife resources and their associated habitats have been adversely impacted by the alteration of natural hydrologic conditions within the park, which has contributed to an overall decline in fishery resources and a 90 percent population loss of wading birds.*

The Act also provided direction for the U.S. Army Corps of Engineers (USACE) to initiate corrective actions to alleviate deterioration in natural resources of ENP attributed to changes in water conditions associated with construction of the Central and Southern Florida (C&SF) water management system. The Act stated:

> *Upon completion of a final report by the Chief of the Army Corps of Engineers, the Secretary of the Army, in consultation with the Secretary, is authorized and directed to construct modifications to the Central and Southern Florida Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park.*
>
> *Such modifications shall be based upon the findings of the Secretary's experimental program authorized in Section 1302 of the 1984 Supplemental Appropriations Act (97 Stat. 1292) and generally as set forth in a General Design Memorandum to be prepared by the Jacksonville District entitled* Modified Water Deliveries to Everglades National Park*. The Draft of such Memorandum and the Final Memorandum, as prepared by the Jacksonville District, shall be submitted as promptly as practicable to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works of the United States Senate and the Committee on Natural Resources and the Committee on Public Works and Transportation of the United States House of Representatives.*

The General Design Memorandum (GDM) called for in the Act was completed in June 1992. This GDM and Environmental Impact Statement (EIS) for MWD to ENP is the authorizing document for structural modifications and additions to the existing C&SF Project required for the modification of water deliveries for ecosystem restoration in ENP. The 1992 GDM stated:

> *The future-without project condition will lead to the further deterioration of unique and outstanding ecological resources of he Everglades that are recognized and valued throughout the world. Therefore, based on the*

> *direction provided in ENP Protection and Expansion Act of 1989, the goal is to restore natural hydrologic conditions in the Park to the extent practicable. Meeting this goal will lead to improvements in the abundance, diversity and ecological integrity of native plants and animals in the Park.*

1.2 PROJECT PARTNERS

The South Florida Water Management District (SFWMD) is the local, non-Federal sponsor for this project. An interagency advisory team, consisting of the U.S. Department of Interior (Fish and Wildlife Service [USFWS], National Park Service Everglades National Park, the Florida Fish and Wildlife Conservation Commission (FFWCC), the Florida Department of Transportation (FDOT), the Miami-Dade County Department of Environmental Resource Management (DERM), the Miccosukee Tribe, and the Florida Department of Environmental Protection (FDEP), provided initial technical input for this report.

1.3 PURPOSE AND SCOPE OF STUDY

1.3.1 Purpose and Need for Action

Under the current authorized and approved plan, water would be passed from WCA-3B through two water-control structures, S-355A and S-355B, to the L-29 Canal and through the existing culvert system under the Tamiami Trail into Northeast Shark River Slough (NESRS) within ENP. When the GDM was completed in 1992, it was believed that existing culverts under the roadway would be adequate to convey the flow of water without any collateral impacts. Subsequent hydrological analyses, however, revealed that the head height in the L-29 Canal required for the culverts to convey the increased water could adversely affect the structure of Tamiami Trail and even overtop the highway under certain conditions.

The purpose of this project is to identify the conveyance requirements for Tamiami Trail that would provide for the authorized flow of water from the L-29 Canal north of the Tamiami Trail to the NESRS and ENP south of the Tamiami Trail, as provided by the 1992 GDM for Modified Water Deliveries to the Everglades National Park.

1.3.2 Study Area

Per the 1992 GDM, a flow of 4,000 cfs was identified as being the MWD flow.

The study area is located in the western-central portion of Miami-Dade County, Florida. The potentially impacted local areas lie in a narrow strip on either side of the existing U.S. Highway 41, commonly called the Tamiami (Tampa to Miami) Trail. The Tamiami Trail, the L-29 Canal, and particularly the L-29 levee on its north side, form the southern boundary of WCA-3B. The south side of the project area is bounded by ENP.

The limits of the project begin slightly more than one mile west of the intersection of Krome Avenue (State Road 997) and the Tamiami Trail and extend approximately 10.7 miles to the west to Water Control Structure S-334. The L-29 Canal, also known as the

Tamiami Canal, runs along the north side of the Tamiami Trail through this area. The project limits are more definitively marked at each end by two water-control structures across the canal, S-334 on the east and S-333 on the west. Bridges on top of these structures provide vehicular access across the Tamiami Canal to boat ramps and recreation sites on the north side of the canal. Unimproved roadways, one along the canal bank and one about 100 feet from the canal bank on top of the levee, parallel the canal and provide routes for vehicles. The road atop the levee appears as only two wheel tracks. These roadways are surfaced with crushed limerock. The roadways provide vehicle access for the members of the Miccosukee Indian Tribe living in the Tigertail Camp, for four boat launch ramps, and for recreational fishermen who wish to fish from the L-29 Levee.

1.4 NATIONAL ENVIRONMENTAL POLICY ACT REQUIREMENTS

The 1992 GDM/FEIS for Modified Water Deliveries to the Everglades National Park provided for the selection of a preferred plan (the Full Structural Plan) to improve hydrologic conditions in ENP, for the construction of selected structures to facilitate the natural flow of water, and the operational design of a system to achieve maximum ecosystem restoration. This General Reevaluation Report and Supplemental Environmental Impact Statement (GRR/SEIS) for the Tamiami Trail component of the MWD Project is a supplement to the 1992 GDM/FEIS. The SEIS is a self-supporting document that is included as part of the GRR and complies with the requirements of NEPA, as provided in 40 CFR Part 1500-1508. Compliance of each alternative with all relevant Federal laws, regulations, and Executive Orders is included in Appendix B.

1.5 HISTORY OF THE AREA

Historically, the Everglades was a shallow wetland conveying water from Lake Okeechobee to the southern coast of Florida. Although modifications to the flow of water were begun in the 1880s, most of the flow alterations were associated with the development of the C&SF Flood Control Project, which was originally authorized by Congress in 1948 and completed in the 1960s. With the construction of WCA-3A and WCA-3B and the extension of Levee 67 (L-67 ext.), flows to ENP became subject to water supply deficits during the dry season and flood control during the wet season. As a result, ENP experienced a decline in ecological quality. Consequently, Congress passed PL 91-282 in June 1970 to establish a minimum water delivery schedule to protect ENP resources

The Flood Control Act of 1968 provided for modifications to the C&SF Project through the implementation of the Everglades National Park-South Dade Conveyance System (ENP-SCDS). The intent was to improve the supply and distribution of water to ENP and to provide for increased agricultural and urban water needs of Miami-Dade County.

The Experimental Program of Water Deliveries to ENP (Section 1302 of the Supplemental Appropriations Act of 1984; PL 98-181) authorized modifications to the minimum water delivery schedule of PL 91-282. This was a two-year experimental program for the development of an improved schedule of water deliveries to ENP. This led to the preparation of the General Plan for Implementation of an Improved Water Delivery Schedule to Everglades National Park, Florida, which was approved by the Secretary of the Army in February 1985. This plan recommended the preparation of a GDM and EIS

and extensions of time limits. Extensions were authorized by PL 99-190 (to January 1989) and PL 100-676 (to January 1992).

In 1989, Congress passed the Everglades National Park Protection and Expansion Act (PL 101-229), the basic authorization for the GDM.

Section 528 of the Water Resources Development Act enacted October 1996 (Public Law [PL] 102-580) was entitled *Everglades and South Florida Ecosystem Restoration*. This authorized a number of ecosystem restoration studies, formerly referred to as "the Restudy," and now collectively known as the Comprehensive Everglades Restoration Plan (CERP). As a result of this Act, the Corps submitted a report to Congress on July 1, 1999, containing this comprehensive blueprint for Everglades restoration. Implementation of CERP will further increase the flow of water entering NESRS. The plan was approved as part of the Water Resources and Development Act (WRDA) of 2000. Before some of the CERP projects can have funds appropriated for con-struction, the MWD project must be completed per the conditions of WRDA 2000.

1.6 PRIOR STUDIES/REPORTS/RELATED PROJECTS

This study includes evaluating alternatives that will allow the passage of the MWD design flow to NESRS such that the sub-grade of the existing Tamiami Trail would not be impacted by elevated water levels in the Tamiami Canal along the north shoulder of the highway. Several previous studies are relevant to the current study.

1.6.1 General Design Memorandum and Environmental Impact Statement, Modified Water Deliveries to Everglades National Park, June 1992.

This document describes the evolution of alternative plans considered for improving water deliveries to ENP. It describes the relationships between hydrologic and ecological conditions in the Everglades, historic conditions, the existing baseline conditions, and the expected future conditions of the Everglades without improved water deliveries.

There are four separable components of the 1992 MWD GDM:

1. Conveyance of water between WCA-3A and WCA-3B (Conveyance and Seepage).

2. Conveyance of water south across the Tamiami Trail to the NESRS portion of ENP (Tamiami Trail Modifications).

3. Flood Protection of the 8.5 Square Mile Area (SMA) residential development along the eastern side of NESRS (8.5 Square Mile Area).

4. An overall operational plan for the water control structures incorporated in the above (CSOP and MWD for C-111).

The 8.5 SMA was the subject of a GRR completed in 2000 for which construction is pending. The conveyance of water within WCA-3 is being addressed in a study

beginning in 2001 and will be combined with the overall operational study in an EIS scheduled for 2002.

This GRR/SEIS addresses the second feature: conveyance of water across Tamiami Trail.

The 1992 GDM also provided an explanation of the chronology that was followed during plan formulation and formulating alternative plans. Alternative plans were evaluated and screened out or selected for further analysis. Basic alternative plans were developed to meet the objectives of location, timing, and volume of water to be delivered to ENP. The GDM contained several features, which included raising an approximately 1,500-foot section of the Tamiami Trail adjacent to structure S-334. Since approval of the GDM, several developments have led to the need to readdress the original recommendation for the Tamiami Trail. The 1992 GDM/FEIS is incorporated by reference into this GRR/SEIS.

1.6.2 Integrated General Reevaluation Report and Environmental Impact Statement, Canal 111 (C-111), South Miami-Dade County, Florida, May 1994

This report, which integrates a feasibility report level of documentation with an EIS, proposed to provide an assessment of the authorized C&SF Flood Control Project within the C-111 basin to ensure that measures recommended for implementation are feasible and consistent with the protection of the natural values associated within ENP and maintenance of flood control within the C-111 basin east of L-31N and C-111. Subsequent to coordination efforts concerning alternative plans, a recommended plan gradually developed. This plan included both structural and non-structural com-ponents, as well as modifications to the existing work within the C-111 basin. It is expected to restore the natural utility of ENP, in addition to maintaining flood protection within the C-111 basin east of L-31N and C-111. Consideration was given to all-important aspects of the recommended plan, including engineering feasibility and economic, social, and environmental effects.

1.6.3 U.S. Fish and Wildlife Service Final Biological Opinion for the U.S. Army Corps o f Engineers, Modified Water Deliveries to Everglades National Park, Experimental Water Deliveries Program, Canal 111 Project, February 19, 1999

This biological opinion, predicated on consultation by the Corps, ENP, SFWMD, USFWS, and FFWCC, encompassed three interrelated Everglades restoration projects: the MWD project, the C-111 projects, and the Experimental Program. This report chronicled data on the biology and ecology of threatened and endangered species in the action area, previous biological opinions prepared for similar actions in the action area, the Technical Agency Draft of Volume I of the Multi-Species Recovery Plan for the Threatened and Endangered Species of South Florida, and other published and unpublished sources of information. The biological opinion on the Cape Sable seaside sparrow required that the MWD project be completed by December 31, 2003, to meet the requirements of the Endangered Species Act. The final biological opinion was delivered to the Corps on February 19, 1999.

1.6.4 Interim Structural and Operational Plan for Hydrologic Compliance with the Cape Sable Seaside Sparrow Biological Opinion for the Year 2000

This plan, dated February 19, 1999, documented modifications from the existing rules of operations for the southern portion of the C&SF project needed to circumvent endangering the Cape Sable Seaside Sparrow (CSSS). This report discussed a reasonable and prudent alternative (RPA) that can achieve the objectives of the opinion and ancillary terms and conditions needed for compliance. Specifically, the RPA demanded that, in order to meet the requirements of the Endangered Species Act:

> *(1) By March11, 1999, a minimum amount of sparrow habitat be protected from unusually high or low water levels;*
> *(2) By May 1, 1999, a fire management plan be initiated;*
> *(3) Between March 1, 2000, and 2003, incrementally increase protections from unusually high or low water levels; and*
> *(4) Annual reports must be submitted detailing progress implementing the RPA.* Other reasonable and prudent measures and recommendations were discussed. Of particular note is the necessity that the MWD project be completed by December 31, 2003.

1.6.5 General Reevaluation Report and Final Supplemental Environmental Impact Statement, 8.5 Square Mile Area, July 2000, Record of Decision Signed 6 December 2000

This document developed a thorough arrangement of alternatives for providing flood mitigation to the 8.5 Square Mile Area (8.5 SMA), which is an inhabited area bounded on the west by ENP and separated from developed urban lands to the east by the L-31N flood protection levee and borrow canal. The report chronicled project authorization and needs and considered all significant aspects of the project, including hydrologic modeling simulations, social impact assessments, policy analysis, real estate information, engineering design and cost analysis, environmental impact assessment, economics, and review of public concerns. A general agreement was reached that the Recommended Plan would be a favorable solution for providing flood mitigation (not flood protection) to the areas east of the perimeter levee. This plan (Alternative 6D) would consist of perimeter and interior levees, a seepage canal, and adequate water quality treatment features necessary to meet applicable water quality standards and permitting requirements.

SECTION 2.0
EXISTING CONDITION/AFFECTED ENVIRONMENT

2.1 GEOLOGY AND SOILS

Florida geology has been shaped by a succession of marine and non-marine processes driven by major sea level fluctuations. The Florida platform is composed primarily of limestone sequences 2,000 ft thick to the north and more than 5,000 ft thick to the south. The platform, situated in warm tropical and subtropical seas with depths less than 100 meters, created favorable conditions for carbonate production and deposition, forming predominantly limestone lithostratigraphy of Florida. Sea level fluctuations caused widespread dissolution of accreted limestone, creating large caverns, sinkholes, springs, and other porous features that define karst terrains. These karst features occur in most limestone units, largely affecting surface expression and aquifer characteristics.

Florida lithology, chiefly composed of limestone, varies throughout the platform because of physiographic differences throughout the state. The southern part of the state, due to higher subsidence rates, remained mostly submerged and produced carbonate sediments throughout most of depositional history. For 120 million years, from mid-Jurassic to the beginning of the Tertiary period, salt deposits left from evaporation known as Cedar Creek Formation, form the confining base of the Floridan aquifer. From Tertiary to the late Oligocene epoch, with the Suwannee Trough preventing clastic incursions north, clean and pure limestone deposits dominated the lithology. During this period, the Suwannee Limestone and the Ocala Limestone, including the Avon Park Formation and the Oldsmar Formation formed. These deposits make up the Floridan Aquifer in South Florida. During the early Miocene, a major drop in sea level and an increase in siliciclastic sediment intrusion from the north curtailed most carbonate deposition except along southern peninsular Florida. Eventually the siliciclastic sediments covered all parts of the platform. The Hawthorn Group, which acts as the intermediate aquifer system and confining group, resulted from this depositional pattern. Overlying the Hawthorn Group in southeast Florida is the Pleistocene age Miami Limestone, which forms the unconfined Biscayne Aquifer.

Underlying structural features on the Florida Peninsula have influenced depositional patterns throughout its geologic history. One such feature, the Florida Peninsular Arch, extended from southern Georgia to just above Lake Okeechobee. Positive, higher elevation features tended to become subaerial (exposed to atmosphere) and eroded, whereas negative, topographically low features often remained submerged and accretional. This pattern tended to create unconfined, surficial aquifers in elevated areas and confined aquifers in the depressed areas. Unconfined aquifers in topographic highs became recharge areas. Lows, such as the Suwannee Trough, tended to remain depositional, often resulting in the formation of confining layers atop or within the limestone deposits. Topographic highs, such as the Peninsular Arch, were the first to become subaerial when sea levels dropped. Once subaerially exposed, dissolution of the exposed limestone from surface water – groundwater interaction and groundwater – seawater interactions, creating significant secondary porosity within the limestone. This karst, secondary porosity resulted in the formation of the Floridan Aquifer, one of the largest aquifer systems in the world.

During the last 20,000 years, the sea level has risen approximately 120 meters. Approximately 8,000 years ago, the rate of sea level rise sharply decreased to almost zero. Sediments depositing during this period, which overlie much of Florida's older sediments, including the Miami Limestone, are most often quartz sands, and often make up parts of the surficial aquifer. The Miami Limestone bedrock is soft oolitic, generally less than 40 feet thick, and considered to be a part of Biscayne aquifer. The base of the aquifer is generally considered the deepest porous limestone bed in the section above the relatively impermeable sand, silt, and clay of Hawthorn Group or "tight" sand in the Tamiami Formation. Other sediments deposited during the sharp decrease in sea level rise include peat deposits, clay beds, and freshwater carbonates in the Everglades area. This newest layer is known collectively as the Undifferentiated Pleistocene-Holocene Sediments.

The Lower East Coast on the Atlantic Coastal Ridge is mostly underlain by thin sand and Miami Limestone that are highly permeable and moderately to well drained. The soil of the Tamiami Trail project area is mainly of the Lauderhill-Dania-Pahokee Association, which consists of nearly level, poorly drained soils containing organic material eight to more than 51 inches deep over limestone bedrock. These soils extend west from Atlantic Coastal Ridge into the Everglades. Typically, the soils are black to dark brown muck underlain by soft porous limestone. The soil limitations that affect building site development and water management are considered severe due to high subsidence, ponding, excess humus, low strength, and the depth to bedrock features.

2.2 WATER MANAGEMENT

SFWMD is working cooperatively with other agencies to develop scientifically sound approaches for managing the distribution and timing of water to the remaining natural systems. The studies are focused on: (1) water supply needs of lakes and wetlands in terms of water levels, duration, timing, and distribution of water deliveries; (2) minimum water levels and the time duration that these levels need to be maintained to protect groundwater systems from overuse or from saltwater intrusions; (3) minimum flows and levels for rivers and estuaries needed to maintain streamflow characteristics and biological communities. Florida law requires the designation of the areas in SFWMD where water resources are critical or anticipated to become critical over the next 20 years as Water Resource Caution Areas. Much of South Florida including the Everglades has been designated as Water Resource Caution Area.

2.2.1 Water Supply

Levees and canals divide the former Everglades into areas designated for development and areas for fish and wildlife benefits, natural system preservation, and water storage. The natural areas are divided into the three WCAs and ENP. The WCAs store excess surface water during wet periods and are a main source of recharge during the dry season for the coastal aquifers along the lower east coast.

The water management of the project area is mainly controlled by the activities of WCAs. The primary purposes for the WCAs and their appurtenant levees, canals, structures, and pump stations include flood control, water conservation, prevention of salt-water intrusion, recreation, preservation of fish and wildlife, and water supply for

ENP. WCAs include about 1,400 miles of canals and levees, 181 major water control structures, over 2,000 minor control structures, and 18 major pumping stations. The WCAs are completely contained by levees, except for about seven miles on the western side of WCA-3A, which has a tieback levee. There are also levees on the eastern side of the Everglades that protect the agricultural and industrial areas that otherwise would be short hydroperiod wetlands from inundation. The main canals are West Palm Beach Canal, Miami Canal, Bolles and Cross Canals, North New River Canal, South New River Canal, Hillsboro Canal, and Tamiami Canal.

The WCAs provide detention for excess water from the agricultural area and parts of the East Coast region and for flood discharge from Lake Okeechobee to the sea. The levees to prevent floodwaters from inundating the east coast urban areas; provide a water supply for east coast areas and ENP; improve the water supply for east coast communities by recharging underground freshwater reservoirs; reduce seepage; ameliorate salt-water intrusion in coastal wellfields; and benefit fish and wildlife in the Everglades. The regulation schedules on how project spillways are to be operated to maintain water levels in the WCAs essentially represent the seasonal and monthly limits of storage. The schedules vary from high stages in the late fall and winter to low stages at the beginning of the wet season. This seasonal range permits the storage of runoff during the wet season for use during the dry season. In addition, it serves to maintain and preserve the vegetative regimen in the WCAs, which are essential to fish and wildlife and the prevention of wind tides. Regulation schedules must take into account various, and often conflicting, purposes. Conceptually, reservoir storage is commonly divided into the inactive zone, the water supply (conservation) zone, and the flood control zone. The distribution of water between the flood control and water supply zones varies seasonally in the WCAs. The regulation schedules for WCA-1, WCA-2A, and WCA-3A include a minimum water level, as measured in canals, below which water releases are not permitted unless water is supplied from another source. When water levels fall below the minimum levels, transfers from Lake Okeechobee or the WCAs are made to meet water supply demands. Currently, stages in the L-29 Canal are controlled at 7.5 feet or below based on legal constraints imposed by the Experimental Water Delivery Program.

2.2.2 Flooding

One of the Nation's worst natural disasters was the hurricane of 1928 when over 1,600 people were killed in the Everglades area. The Everglades area had already received 21 inches of rain during the first 15 days of September before the arrival of the Category 4 hurricane. The maximum-recorded flood stage in the Rocky Glades area occurred in the middle of the East Everglades in October 1947, following the passage of the third hurricane of the season. A stage of 9.0-ft NGVD was measured at L-31N and 168th Street. The area wide average May through October rainfall of 73.54 inches has a recurrence interval of about once every 35 years. The next year, a flood stage of 8.7 ft was measured. The 1959-60 flood was another notable flood. The construction of L-29 in 1962 would have significantly reduced these stages. Since then, only the 1968-1969 flood has caused widespread flooding in the area. Tropical storm *Dennis* in August 1981 caused extensive flooding and damages but it was centered more over Homestead where 19.39 inches was recorded in August 16-18. Most recently, Hurricane *Irene* (1999) impacted the area with water levels similar to those experienced during Tropical storm *Dennis*. Surface water levels in the area remained elevated long

after the passage of the storm, resulting in property damage and loss of crops. According to the Miami-Dade County Agricultural Extension Service, losses throughout Miami-Dade County due to Hurricane Irene were approximately $77,000,000 for vegetables, $2,500,000 for field crops, $150,000 for aquaculture, and $126,000,000 for ornamental crops.

Many of the developed areas in southeastern Florida were formerly part of the Everglades. These areas depend on the C&SF system for flood protection. The regional canal systems provide flood protection to developed areas in eastern Dade, Broward, and Palm Beach counties. Local stormwater management systems collect and route stormwater to the regional canals, then discharge to the ocean via estuaries. Pollutants from agricultural and urban activities are also washed into stormwater and eventually discharge to receiving waters such as wetlands, lakes, and estuaries. South Florida Water Management District works with other local government and agencies to encourage integration, among land use, watershed management, and stormwater master plans. Under flood conditions, the focus of stormwater management becomes rapid and efficient removal of floodwaters regardless of impacts on water supply and natural systems.

The WCAs provide a detention reservoir for excess water from the agricultural area and parts of the Lower East Coast region and for flood discharge from Lake Okeechobee. Currently, stages in the L-29 Canal are artificially controlled at 7.5 feet or below. The design stage upstream of the L-29 Canal and downstream of Tamiami Trail is 9 feet. Prior to the construction of the C&SF project features, flow in the Everglades was uncontrolled, stages varied greatly and at times overtopped Tamiami Trail. The Tigertail Camp, a Miccosukee Indian Villages situated on the berm strip formed between the L-29 Levee and the L-29 Canal is located about five miles west of S-334. The Tigertail Camp mitigation plan has been completed and the Tigertail Camp has been raised above the anticipated water stages.

The Flood Control Act of 1965 authorized a plan to provide seasonal flood protection in Southwest Miami-Dade County. The plan consisted of levees, canals, water control structures, and pumping stations capable of removing 15 inches of runoff per month plus seepage into the area following a 10-year flood. The project was officially deauthorized after Congress expanded ENP to include most of the area that would have been protected.

2.3 WATER QUALITY

2.3.1 Surface Water

General. The water quality of the Everglades has been greatly influenced by development-related activities. Hydrologic alterations have led to significant changes in the landscape by opening large land tracts for urban development and agricultural practices and by the construction of extensive drainage networks. Natural drainage patterns in the region have been disrupted by an extensive array of levees and canals such that nonpoint source (stormwater) runoff and point sources of pollution (waste-water discharges) are now part of the normal hydrological regime in many areas. Pollutants of concern include:

- Metals - mercury, copper, cadmium, lead, zinc, arsenic
- Pesticides - DDT and derivatives, atrazine, simazine, ametryn, endosulfan compounds, ethion, bromacil, 2,4-D, aldecarb, and fenamiphos
- Nutrients - phosphorus, nitrite/nitrate, and ammonia/un-ionized ammonia
- Biological - fecal coliforms and pathogens, and chlorophyll-a
- Physical parameters - pH, dissolved oxygen, conductivity, turbidity, oil and grease, temperature, and salinity)
- Other constituents - polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, sulfate, chloride, tributyltin (TBT), polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs).

Under Section 303(d) of the Clean Water Act (CWA), states are to develop Total Maximum Daily Loads (TMDLs) for water bodies not meeting designated standards under technology-based controls for pollution. For the C&SF project study area, over 160 priority waterbodies/segments were listed by FDEP. Of these waterbodies, 95 are listed in the Southeast Florida Basin, which includes WCAs and the Tamiami Trail project area. The primary constituents of concern are nutrients, dissolved oxygen (DO), mercury, biochemical oxygen demand (BOD), and coliforms. Canals bordering the WCAs generally have very low DO levels typical of marsh waters. Nutrient levels at the marsh perimeter are elevated, probably from the breakdown of organic debris as well as agricultural drainage. The key water quality problems in WCA-3A and 3B are total phosphorus (TP), DO, conductivity, mercury, and nitrite/nitrate nitrogen. For the period from 1979 to 1993 the mean TP concentration collected in the WCA-3A basin was 0.032 mg/l, while the mean concentration in the WCA-3B basin was 0.013 mg/l. For the period from 1979 to 1993, the mean DO concentration was 4.8 mg/l in WCA-3A and 3.7 mg/l in WCA-3B. From 1979 to 1993, the mean specific conductance value in WCA-3A was 718.4 µmhos/cm and 686.4 µmhos/cm in WCA-3B. Mercury bio-accumulation in Everglades water and biota is complicated by inter-relationships of several factors such as sulfate, sulfide, phosphorus, oxygen, carbon, peat chemical characteristics, biodilution and aquatic food web structure. Table 1 shows recent results of analysis of water released from structures in the project area, S-355A&B, from WCA-3B to ENP.

Phosphorus and nitrogen are the most common nutrients that limit the growth of aquatic plants, and even small increases in concentrations can have significant ecological impacts. Phosphorus generally occurs in quite low concentrations (less than 0.01 mg/l) in unimpacted wetlands of southern Florida and at higher concentrations (median concentration of 0.06 mg/l) in the northern Everglades. The higher concentrations have been implicated in changes in wetland communities. The main source of phosphorus in agricultural areas includes commercial fertilizers and manure, livestock grazing, non-agricultural fertilization, and on-lot septic systems. Inorganic forms of phosphorus (orthophosphate) originate from a class of minerals known as apatites. These minerals are calcium phosphates exhibiting a low solubility and

Table 1. Water Quality Analysis of Stations 355A and B

Parameter	November 16, 1999		June 15, 2000	
	S355A	**S355B**	**S355A**	***S355B***
Color (cpu)	25	20	50	45
NH3 (ammonia nitrogen, mg/l)	0.082	0.083	0.160	0.269
NO2_NO3 (nitrate- nitrite, mg/l)	<0.004	<0.004	0.077	0.134
TKN (total Kjeldahl nitrogen, mg/l)	0.32	0.39	1.16	1.57

Parameter	November 16, 1999		June 15, 2000	
TP (total phosphorus, mg/l)	0.028	0.022	0.032	0.044
OP (ortho-phosphorus, mg/l)	<0.002	<0.002	0.016	0.020
TSS (total suspended solids, mg/l)	7	4	8	13
DO Field (dissolved oxygen, mg/l)	6.7	6.6	7.8	5.0
Field Conductivity (µmhos/cm)	240	260	360	510

Source: USACE, 2000.

existing in several forms in which the orthophosphate ions are generated via chemical weathering process. Erosion from agricultural lands is a major source of diffuse phosphorus transfer. This erosion is often associated with high rates of particulate phosphorus transfer from land to surface water bodies. Unlike nitrogen, phosphorus is not particularly mobile in soils; phosphate ions do not leach readily. Therefore, phosphorus in most agricultural watersheds is removed from soils via either crop uptake or erosion. However, the surface and subsurface composition of a given watershed can result in high contributions of phosphorus from shallow subsurface flow, particularly in watersheds dominated by limestone geology (Sharpley and Syers, 1979; Pionke *et al.*, 1996).

Extensive agricultural Best Management Practices implemented in the Everglades Agricultural Area in the past several years have reduced the phosphorus load leaving the Everglades Agricultural Area; however, this area remains a primary source of pollutants for the WCAs. Water moving south from Lake Okeechobee and the Everglades Agricultural Area is pumped into the WCA canals, effectively making these areas act as nutrient filters. The highly altered hydroperiod, resulting from the levees and pump operations, may exacerbate water quality conditions in the WCAs, as evidenced by a general degradation of water quality in the areas along the canals and adjacent to pump stations and by comparisons to conditions in the central portions of the basins. In the central Everglades, phosphorus concentrations entering ENP were lower in 1997 than the interim and long-term limits established by the 1992 Settlement Agreement (Walker, 1998). The Everglades Settlement Agreement (1991) specifies phosphorus limit as 11 ppb. Water quality data in the central Everglades indicate an average concentration of 13 ppb of phosphorus over a 13-year period (1983-1996). In order to predict future phosphorus concentrations and to design phosphorus removal models, inflow concentrations, mean depth, and hydraulic residence time are utilized as main parameters, and atmospheric deposition, seepage inflow, and seepage outflow are considered as secondary parameters (Walker, 1998)

A Surface Water Improvement Management (SWIM) Plan is being developed by SWFMD to resolve water quality issues in the Everglades Agricultural Areas and the WCAs. If the goals of the SWIM Plan are accomplished, the threat posed by phosphorus loading from the agricultural areas would be eliminated. Thus, satisfactory water quality for the lower WCA-3B and ENP would be achieved.

In the past five years, while no significant trends in annual average mercury concentrations in water, sediment, or fish have been observed, mercury concentrations in fish tissue were high enough to warrant a no-consumption advisory for largemouth bass throughout most of the eastern two thirds of ENP and a recommendation of limited

consumption for the southeast corner of ENP. The best water quality conditions in ENP were found in the central Shark River Slough (SRS) and along the coastal regions of the basin. The high concentrations of mercury in the biota are related to processes in the water and sediment that favor methylation of mercury and concentration of mercury in the Everglades food chain.

The most recent water quality study along Tamiami Trail was conducted by the U.S. Geological Survey (USGS), National Water-Quality Assessment Program in 1996-1997 and reported in 1999. This study covers 80-mile section of Tamiami Trail from Big Cypress Swamp to Everglades and 24-mile transect down SRS. The project area of interest is between miles 60 to 81 covering sampling stations at structures S-12-A to D, 5.3 miles east of S-12-D, and Bridge 870585. The report concluded that the quality of water along the Trail is spatially variable due to natural and human influences. Concentrations of chloride, sulfate, specific conductance and dissolved organic carbon tended to be relatively low in the undeveloped part of Tamiami Trail from the Turner River (mile 30.4) to about S-12-C (mile 66.6) and relatively high at the more developed west and east ends. Relatively high concentrations of these constituents occurred to the east of S-12-C due to the inflow of mineralized water from the northern Everglades through a network of canals. Twelve pesticides or pesticide degradation products were detected along the Tamiami Trail, with highest concentrations at Tomato Road in the west and S-12-D in the east where agricultural influences were greatest. Total phosphorus tends to decrease from west to east along the Trail. A more detailed discussion of this report is summarized below.

Specific conductance is a measure of the electrical conductivity of dissolved ions in water and provides a rough estimate of total dissolved solids (TDS) contributed by chloride, sulfide, other major ions, dissolved organic carbon, and silica. Specific conductance along the 80-mile section of the Tamiami Trail varied widely depending on location, season, upstream land use, and proximity to the coast. Specific conductance values were generally higher along the western Big Cypress Swamp and the Everglades sections of the Trail than in the central section. Higher specific conductance values in the Everglades are attributed to canal transport of mineralized water from the northern Everglades. The sources of the mineralized water include Lake Okeechobee; the Everglades Agricultural Area south of Lake Okeechobee; and naturally occurring, shallow, mineralized water beneath the northern Everglades (Parker *et al.,* 1955). Specific conductance values in SRS tended to decline slightly downstream of the S-12 structures.

Chloride concentrations along the Tamiami Trail show a U-shaped trend with the highest concentrations occurring near the west and east ends of the study area. Concentrations in the central section of the Tamiami Trail were typically about 10 to 30 mg/l and increased to 40 mg/l or more in the western Big Cypress Swamp and the Everglades from about S-12-C and eastward. The higher concentrations of chloride in Everglades east of S-12-C, compared with concentrations in the central section, are due to the canal transport of mineralized water from the northern Everglades (Parker *et al*., 1955). Like chloride, the plot of sulfate concentration across the Tamiami Trail is U-shaped. The higher concentrations in the western Big Cypress Swamp are due to the effects of seawater and the higher concentrations in the Everglades are due to the effects of mineralized water from the north. In the central section of the Tamiami Trail most sulfate concentrations were quite low.

Concentrations of total phosphorus along the Everglades section of the Tamiami Trail and at sites in SRS were generally less than 0.01 mg/l, except for higher concentrations at S-12-D (0.030 mg/l) and at the headwaters of Rookery Branch (0.027 mg/l) in SRS. Across the gauged sections of the Trail, daily loads of TP and total Kjeldahl nitrogen (TKN), total organic nitrogen plus ammonia) were usually highest in the Everglades section through the S-12 structures. This was due more to the large flows from the northern Everglades than to high concentrations at the S-12 structures. The maximum daily loads for TP (57 kg) and TKN (6,300 kg) occurred at the S-12 structures during the rainy season in August 1997. Biomass and growth rate of periphyton (biological communities living on submerged surfaces such as rocks and aquatic plants) can provide indications of the availability of nutrients. The influence of water-column phosphorus on the biomass and growth rate of periphyton communities in Everglades has been addressed in a number of studies. Periphyton biomass accumulation rates were found to range from 0.09 to 0.9 g/sqm/d as ash-free dry mass (AFDM) and 0.05 to 1.0 mg/sqm/d as chlorophyll-a, which were comparable with rates at a low nutrient (TP of 0.011 mg/l) marsh site in northern Everglades reported by Swift and Nicholas (1987).

Dissolved organic carbon (DOC) is of ecological significance because it can (1) reduce the amount of light available for the growth of submerged aquatic plants, (2) serve as a source of carbon for bacterial growth, and (3) form complexes with trace elements (such as mercury) and make them more soluble and mobile in water. DOC con-centrations near the Tamiami Trail ranged from 4.8 to 26.9 mg/l with a U-shaped trend similar to chloride and sulfate ions. Lowest concentrations of DOC occurred in the central section of the Tamiami Trail, and highest concentrations were at bridges 64 and 70 in the west and between S-12-B and culverts east of S-12-D.

Water samples collected along the Tamiami Trail were analyzed for mercury. While the highest value for total mercury (8.3 ng/l) occurred at Tomato Road (mile 6.8), all other values were within 1.4 and 3.7 ng/l. Concentrations of mercury in fish provides better time-integrated samples. The highest mercury concentration was detected in Florida gar (160 μg/l) at Loop Road. Largemouth bass from the L-67A Canal had a mercury concentration of 26 μg/l at L-67A Canal.

Herbicides are applied in agricultural and urban areas, sprayed directly into canals to kill nuisance aquatic weeds, and sprayed onto weeds and shrubs along the roadsides and canal banks. Pesticides can be detected at remote areas from the point of application due to their nature of transportation for long distances by air (Majevski and Capel, 1995). Along the Tamiami Trail, atrazine was the most frequently detected pesticide, followed by tebuthiuron, and metolachlor. The greatest numbers of detections were at S-12-D and Tomato Road. Metolachlor exceeded the aquatic life criteria at S-12-D and Tomato Road. Fish and bottom sediments provide time-integrated samples of pesticide occurrence. DDT compounds were the only pesticides detected in fish at sampling sites including S-12 structures and L-67A Canal. DDT concentrations were ranged from 5 to 6 μg/kg in largemouth bass and 11 to 17 μg/kg in Florida gar.

The quality of surface water flowing southward in the Everglades and Big Cypress Swamp near an 80-mile section of the Tamiami Trail is spatially variable due to natural and human influences. The water quality characteristics suggest three distinct subsections along Tamiami Trail: the undeveloped center from Turner Road to about

S-12-C, and the more developed western and eastern ends. Relatively high concentrations at the west end are due to agricultural and marine inputs, and at the east end are due to the inflow of mineralized water from the northern Everglades through a network of canals. Seasonal variations in water quality complicate the spatial variations in the area. Concentrations of many dissolved constituents and total phosphorus increase during the dry season due to the processes such as movement of seawater at the west, evapotranspiration, groundwater inflow, or the higher population of wildlife around the Tamiami Trail.

Highway Runoff. The definition of highway runoff differs among various investigators, and has been considered to either include or exclude contaminants from atmospheric deposition or runoff from sites adjacent to highways. Because the Tamiami Trail is rural and has a negligible amount of area within the Everglades for receipt of atmospheric deposition, the environmental effects of materials deposited on the highway from the atmosphere are considered insignificant. Only highway use by vehicles is considered.

Highway Runoff Characterization. Highway use results in the introduction of metals, fuels, lubricants, combustion products, and toxic chemicals as potential environmental contaminants. Table 2 summarizes several of the major constituents in runoff from highway use and their primary sources.

Table 2. Highway Runoff Constituents and Their Primary Sources

Constituents	Primary Sources
Lead	Leaded gasoline (exhaust), tire wear, lubrication, bearing wear
Zinc	Tire wear, motor oil
Iron	Rust, vehicle/engine wear
Copper	Metal plating, bearing/bushing wear, engine wear, brake wear
Cadmium	Tire wear, metal plating
Chromium	Metal plating, engine wear, brake wear
Nickel	Exhaust, lubricants, plating, brake wear
Organic compounds	Vehicle exhaust, fuel leaks, lubricants

Source: USEPA, 1993.

Organic compounds of relevance include semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs). Petroleum hydrocarbons, oil and grease, and polycyclic aromatic hydrocarbons (PAHs) in crankcase oil and vehicle emissions are the major SVOCs detected in highway runoff (Lopes and Dionne, 1998). VOCs include toluene, xylenes, and benzene, which are constituents of gasoline. The most significant factor affecting SVOC concentrations in suspended solids concentrations is that approximately 80 percent of SVOCs are associated with suspended solids (Lopes and Dionne, 1998). However, Lopes and Dionne (1998) noted that the regression analyses developed in the 1970s and 1980s are of limited use in estimating current loads of SVOCs because the recent use of cleaner fuels and the increased proportion of vehicles with catalytic converters has lowered release of SVOCs in vehicle exhaust. VOCs are more generally associated with urban stormwater, and their occurrence and concentrations are affected markedly by ambient temperature.

The concentration of pollutants in runoff is dependent on a number of factors, including the amount of traffic to which the road is subjected. Table 3 illustrates the differences in concentration of pollutants in highway runoff relative to vehicle usage.

Table 3. Pollutant Concentrations in Highway Runoff

Pollutant	Event Mean Concentration for Highways with Fewer than 30,000 Vehicles /Day* (mg/l)	Event Mean Concentration for Highways with More than 30,000 Vehicles /Day* (mg/l)
Total Suspended Solids	41	142
Volatile Suspended Solids	12	39
Total Organic Carbon	8	25
Chemical Oxygen Demand	49	114
Nitrite and Nitrate	0.46	0.76
Total Kjeldahl Nitrogen	0.87	1.83
Phosphate Phosphorus	0.16	0.40
Copper	0.022	0.054
Lead	0.080	0.400
Zinc	0.080	0.329

* Event mean concentrations are for the 50 percent median site.

Source: Driscoll, *et al*. (1990)

Effects of Highway Runoff on Wetland Biota. In general, highway runoff contains pollutants that have a potential to adversely affect species dependent on wetland habitat for all or part of their lifecycles, that can lead to the pollution of wetlands, and that can cause a decline of wetland values (Clairmont Graduate University and Rails-to-Trails Conservancy, 1998). However, documentation of adverse effects of highway runoff on aquatic organisms and communities does not provide a clear relationship. The effects of highway runoff on individual organisms, populations, and communities have been examined for over 25 years. However, there are data gaps, deficiencies in study designs, and differences in geography, site characteristics, traffic counts, etc., associated with diverse objectives and monitoring goals. Granato, *et al*. (1998) expressed the need for data and procedures that are current, valid, and technically supportable. The Federal Highway Administration (FHWA) (1997) noted that: *The effects of highway runoff on wetlands is an area of concern and continued research. But here, too, we must update or inventory the pollutants that affect our wetlands today and our methods of quantifying those pollutants, and then we can see if highway runoff is a cause of pollution to wetlands. Studies to date indicate that highway runoff is not a significant source of wetland pollution.*

Effects of the different contaminants present in highway runoff depend on study location, environmental setting, and the characteristics of receiving waters. Cumulative effects on biological systems from highway-runoff quality include effects of all bio-available contaminants and any interactions among them (Buckler and Granato, 1999).

Buckler and Granato (1999) concluded that different methods among studies and a general lack of sufficient documentation preclude quantitative comparisons among the various studies. They noted that, qualitatively, the literature indicates that constituents from highway runoff are found in the tissues of aquatic biota, and that the diversity and productivity of biological communities may be affected, even though bioassays would suggest that highway runoff is not often toxic to the aquatic biota. Different contaminants were stated by Buckler and Granato (1999) to have varying biological effects, depending on the physical and chemical properties of each constituent, the concentrations found in an environmental system, the sensitivities of organisms to the runoff, and the ability of the system, and individual organisms to assimilate the constituent(s).

Buckler and Granato (1999) reviewed the effects of highway runoff constituents on biota at the biochemical/physiological level, the whole-organism/species level, and the population/community level. The first interactions of contaminants with an organism occur at the biochemical/physiological level. Metals typically tend not to accumulate to the extent shown by organic compounds, but they are associated with a number of toxicological conditions, including interference with the regulation of metals and interference with biochemical pathways. PAHs can interfere with a number of biochemical pathways, including interference with reproduction.

At the whole organisms-species level, there have been numerous toxicity testing investigations on the effects on organisms by metals and organic compounds, such as those found in highway runoff. These have included algae assays, invertebrate assays, and toxicity studies of the early life stages of fishes. Assessments have included effects on survival, growth, and reproduction (Buckler and Granato, 1999). Corbett and Manner (1975) were reported by Buckner and Granato (1999) to have found that when compared to control sites, areas affected by highway runoff had fewer sensitive species of aquatic organisms.

The application of biodiversity assessments to highway runoff, while not fully developed, involves the attempt to determine the abundance and distribution of various species as indicators of population and community stress. Presence or absence, numerical abundance, and spatial distribution of indicator species are used to determine status. Functional analysis techniques focus on community respiration, nutrient cycling, etc. Effects of contaminants have included spatial distribution of various components of the community, deformities, and community metrics (Buckler and Granato, 1999).

Typically, ecological effects of highway runoff quality on receiving waters have been predicted using statistical models of contaminant concentration and loadings. These predictive approaches, which compare concentrations and loadings to published regulatory limits, indicate that there should not be measurable effects at sites with annual average daily traffic (ADT) volumes with less than 30,000 vehicles per day (vpd) (Driscoll *et al*., 1990). Smith and Kaster (1983) reported that along a rural highway with relatively low vehicle counts (7,000-8,000 vdp) disruptions of benthic macroinvertebrate communities were negligible. However, other biological studies have shown changes in individual organisms and community structures at sites with low traffic volumes (Buckler and Granato, 1999). Dupuis *et al*. (1985) reported that at some sites with low traffic volume (7,400 vpd), runoff caused no changes in abundance or distribution, but at other sites along the same highway there appeared to be effects.

Runoff from the Tamiami Trail. Because there are no known studies of the quality or quantity of runoff from the Tamiami Trail, the quality of the runoff and the effects to the Everglades ecosystem must be inferred. The ADT traffic volume along the Tamiami Trail, approximately 5,200 vpd, is quite low. Therefore, based on studies from other locations, it would be expected that the biological effects of the runoff would be minimal.

USGS water quality data have been collected from various locations along the Tamiami Canal since the 1940s (Figure 2). Among the data were concentrations of cadmium, chromium, copper, iron, lead, nickel, and zinc, all of which are constituents of highway runoff (Table 4). For most of the metals information, the database contained only the total fraction of the metals. Current *Florida Criteria for Surface Water Quality, Class III, Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, Predominately Fresh Waters (Section 62-302.530, F.A.C.)* calls for metals to be expressed as the total recoverable fraction, which is a more restrictive criterion. Lead, which has largely been eliminated from highway runoff since its removal from gasoline, frequently exceeded water quality standards during the 1970s. A comparison of the historical data to the State Criteria showed that with the exception of lead, metals concentrations in the Tamiami Canal generally complied with water quality standards, with a rate of exceedance of approximately five percent. Similar results were found by Sullivan, *et al*. (1996).

There are potential sources of these metals in addition to highway runoff, such as airboat franchises and residential areas along the Tamiami Trail, and there is a potential for transport of metals from other locations by the network of canals. It appears that with the removal of lead from gasoline, runoff has little impact on the quality of water in the Tamiami Canal.

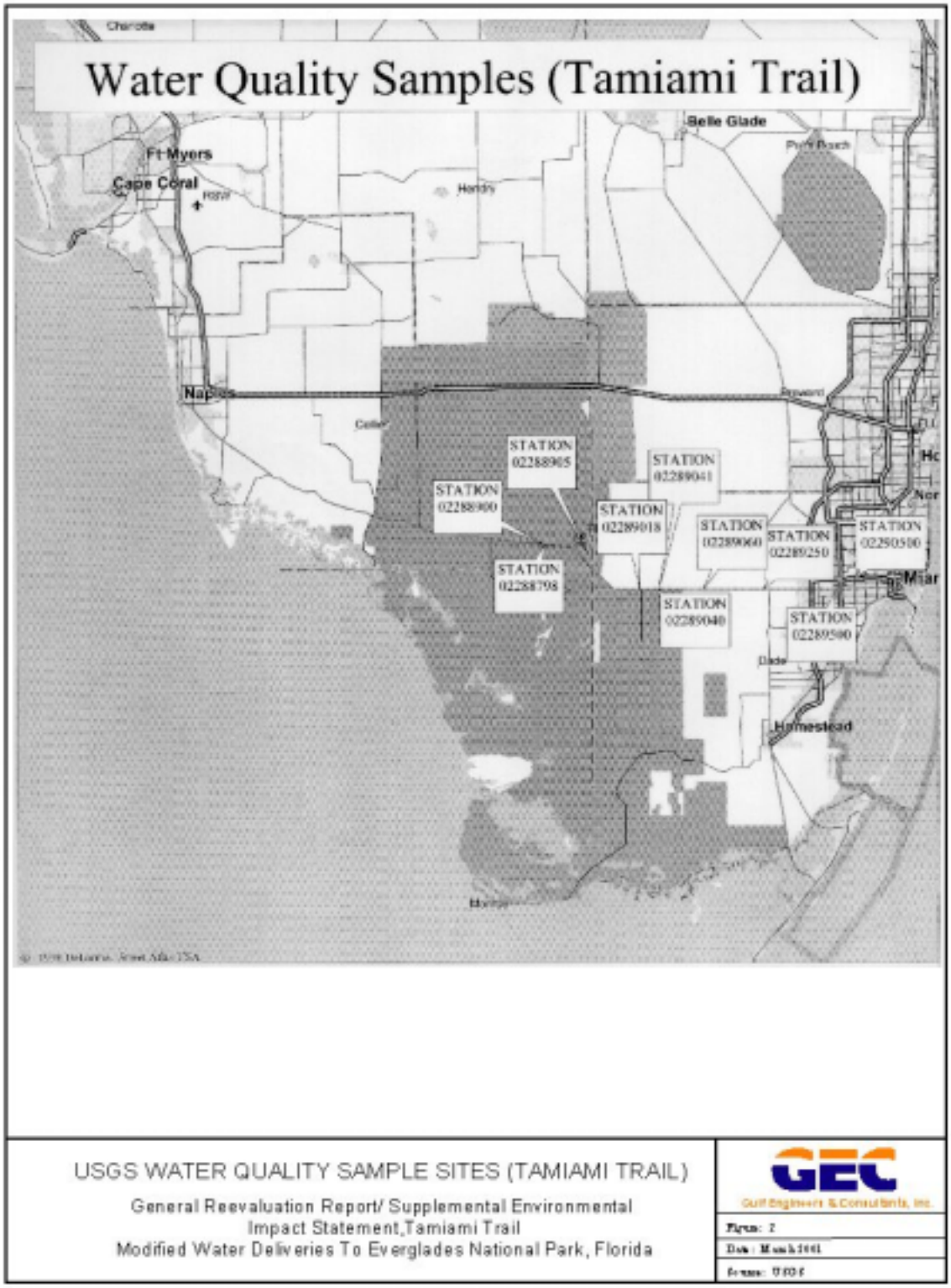

Water Quality Samples (Tamiami Trail)
Belle Glade
Ft Myers
Cape Coral
Naples
STATION 02288905
STATION 02288900
STATION 02288798
STATION 02289018
STATION 02289041
STATION 02289060
STATION 02289250
STATION 02289040
STATION 02289500
Homestead
USGS WATER QUALITY SAMPLE SITES (TAMIAMI TRAIL)
General Reevaluation Report/ Supplemental Environmental Impact Statement,Tamiami Trail
Modified Water Deliveries To Everglades National Park, Florida
GEC
Gulf Engineers & Consultants, Inc.

Table 4. USGS Water Quality Data for the Tamiami Trail and Florida Water Quality Criteria

USGS 02288900

Total Cadmium			Total Chromium			Total Copper			Total Iron		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
9/8/72	1.69	0	3/25/70	330.37	0	9/8/72	18.26	0	4/26/70	</=1000	60
6/9/73	1.89	nd .0	5/13/70	371.74	10	10/17/75	19.26	6	9/8/72	</=1000	50
10/23/73	1.82	<2	9/25/70	294.90	0	1/7/76	17.73	<2	6/9/73	</=1000	40
5/23/74	2.11	nd .0	10/17/75	330.37	<20	4/8/76	18.26	<2	10/23/73	</=1000	140
5/8/75	1.92	nd .0	1/7/76	305.16	<20	7/28/76	19.73	<2	5/23/74	</=1000	2400
10/17/75	1.78	<2	4/8/76	313.98	<20	10/21/76	20.17	nd .0	5/8/75	</=1000	1900
1/7/76	1.65	2	7/28/76	338.04	20	1/25/77	19.73	2	10/17/75	</=1000	90
4/8/76	1.69	3	10/21/76	345.41	<20	4/13/77	16.57	3	1/7/76	</=1000	70
7/28/76	1.82	nd .0	1/25/77	338.04	<20	3/14/78	18.77	5	4/8/76	</=1000	1100
10/21/76	1.85	nd .0	4/13/77	286.00	<20	4/13/78	20.17	9	7/28/76	</=1000	120
1/25/77	1.82	nd .0	3/14/78	322.36	<20	7/13/78	17.73	<2	10/21/76	</=1000	50
4/13/77	1.55	2	4/13/78	345.41	<20	9/27/78	19.73	2	1/25/77	</=1000	50
9/7/77	1.65	nd .0	7/13/78	305.16	<20	10/24/78	19.26	<2	4/13/77	</=1000	430
3/14/78	1.73	nd .0	9/27/78	338.04	<20	1/17/79	20.61	nd .0	9/7/77	</=1000	70
4/13/78	1.85	2	10/24/78	330.37	<20	7/11/79	20.17	3	1/25/78	</=1000	70
7/13/78	1.65	7	1/17/79	352.51	20	10/17/79	18.26	2	3/14/78	</=1000	190
9/27/78	1.82	30	7/11/79	345.41	20	1/16/80	21.43	1	4/13/78	</=1000	180
10/24/78	1.78	11	10/17/79	313.98	20	4/9/80	20.17	2	7/13/78	</=1000	150
1/17/79	1.89	nd .0	1/16/80	365.97	20	7/11/80	18.77	3	9/27/78	</=1000	160
7/11/79	1.85	5	4/9/80	345.41	10	11/19/80	18.26	3	10/24/78	</=1000	200
10/17/79	1.69	0	7/11/80	322.36	<10	7/16/81	19.73	4	1/17/79	</=1000	100
1/16/80	1.96	0	11/19/80	313.98	30	12/1/81	21.82	7	7/11/79	</=1000	1100
4/9/80	1.85	0	7/16/81	338.04	20	7/18/82	18.77	10	10/17/79	</=1000	170
7/11/80	1.73	0	12/1/81	372.37	<10				1/16/80	</=1000	190

Table 4 (cont'd). USGS Water Quality Data for the Tamiami Trail and Florida Water Quality Criteria

USGS 02288900 (Cont'd)

Total Lead			Total Nickel			Total Zinc			Total Iron		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
11/19/80	1.69	0	7/18/82	322.36	20	9/8/72	186.02	30	4/9/80	</=1000	210
7/16/81	1.82	<1	6/9/73	273.27	4	1/7/76	180.46	30	7/11/80	</=1000	300
12/1/81	1.99	<1	10/23/73	261.70	8	4/8/76	186.02	30	11/19/80	</=1000	680
7/18/82	1.73	<1	5/23/74	308.33	16	7/28/76	201.26	30	7/16/81	</=1000	300
9/8/72	6.08	0	5/8/75	278.75	<2	10/21/76	205.94	30	12/1/81	</=1000	260
6/9/73	7.28	2	10/17/75	255.56	nd .0	1/25/77	201.26	<20	12/1/81	</=1000	260
10/23/73	6.82	10	1/7/76	235.45	10	4/13/77	168.41	20	7/18/82	</=1000	270
5/23/74	8.73	12	4/8/76	242.47	nd .0	3/14/78	191.32	20			
5/8/75	7.50	17	7/28/76	261.70	2	4/13/78	205.94	20			
10/17/75	6.58	14	10/21/76	267.59	nd .0	7/13/78	180.46	nd .0			
1/7/76	5.82	36	1/25/77	261.70	<2	9/27/78	201.26	20			
4/8/76	6.08	80	4/13/77	220.19	2	10/24/78	196.39	20			
7/28/76	6.82	5	3/14/78	249.17	6	1/17/79	210.45	nd .0			
10/21/76	7.05	2	10/17/79	242.47	0	7/11/79	205.94	60			
1/25/77	6.82	4	1/16/80	284.06	1	10/17/79	186.02	10			
4/13/77	5.26	13	4/9/80	267.59	0	1/16/80	219.03	20			
9/7/77	5.82	12	7/11/80	249.17	1	4/9/80	205.94	20			
3/14/78	6.33	24	11/19/80	242.47	6	7/11/80	191.32	10			
4/13/78	7.05	30	7/16/81	261.70	6	11/19/80	186.02	20			
7/13/78	5.82	120	12/1/81	289.19	2	7/16/81	201.26	20			
9/27/78	6.82	600	7/18/82	249.17	2	12/1/81	223.12	50			
10/24/78	6.58	140				7/18/82	191.32	20			
1/17/79	7.28	50									
7/11/79	7.05	4									
10/17/79	6.08	1									
1/16/80	7.72	4									
4/9/80	7.05	2									
7/11/80	6.33	0									
11/19/80	6.08	12									
7/16/81	6.82	8									
12/1/81	7.93	3									
7/18/82	6.33	5									

Table 4 (cont'd). USGS Water Quality Data for the Tamiami Trail and Florida Water Quality Criteria

USGS 02289018

Total Cadmium			Total Chromium			Total Copper			Total Iron		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
4/26/72	1.65	1	5/27/69	329.59	0	4/26/72	180.46	0	5/27/69	</=1000	0.13
10/3/72	1.65	nd .0	5/13/70	324.80	0	10/3/72	180.46	nd .0	9/25/70	</=1000	160
6/9/73	2.05	nd .0	9/25/70	291.01	0				4/26/72	</=1000	330
5/23/74	1.99	<2	10/3/72	305.16	nd .0				10/3/72	</=1000	400
4/19/76	1.89	2							6/9/73	</=1000	20
4/13/77	1.69	nd .0							5/23/74	</=1000	630
10/12/77	1.60	nd .0							4/19/76	</=1000	210
									4/13/77	</=1000	290
									10/12/77	</=1000	220
Total Lead			Total Nickel			Total Zinc					
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**			
4/26/72	5.82	0	6/9/73	273.27	4	4/26/72	180.46	10			
10/3/72	5.82	2	5/23/74	308.33	16	10/3/72	180.46	<20			
10/23/73	6.82	10	4/19/76	273.27	nd .0						
6/9/73	8.34	12	4/13/77	242.47	<2						
5/23/74	7.93	17	10/12/77	228.04	nd .0						
4/19/76	7.28	14									
4/13/77	6.08	36									

Table 4 (cont'd). USGS Water Quality Data for the Tamiami Trail and Florida Water Quality Criteria

USGS 02289040

Total Cadmium		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/16/72	1.60	<2
10/30/73	1.73	9
4/15/74	2.05	nd .0
10/30/74	1.69	<20
4/30/75	1.96	nd .0

Total Zinc		
Date	**Water Quality Criteria (UG/L)**	**Water Quality Criteria (UG/L)**
7/28/69	170.93	10
10/30/73	191.32	30
4/15/74	230.95	<20
10/30/74	186.02	30
4/30/75	219.03	5

Total Chromium		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
6/27/69	272.18	0
7/28/69	290.02	0
1/26/70	298.71	0
10/16/72	295.86	30
10/30/73	322.36	nd .0
4/15/74	384.62	nd .0
10/30/74	313.98	<20
4/30/75	365.97	<20

Total Copper		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/30/73	18.77	3
4/15/74	22.57	5
10/30/74	18.26	<2
4/30/75	21.43	2

Total Lead		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/16/72	5.82	7
4/16/73	8.53	3
10/30/73	6.33	2
4/15/74	8.34	9
10/30/74	6.08	nd .0
4/30/75	7.72	3

Table 4 (cont'd). USGS Water Quality Data for the Tamiami Trail and Florida Water Quality Criteria

USGS 02289040

Total Cadmium		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/17/72	2.02	nd .0
10/30/73	2.05	3
4/15/74	2.14	nd .0
10/30/74	2.17	nd .0
4/30/75	2.25	nd .0
4/25/78	2.08	nd .0
10/16/78	2.17	nd .0
10/16/79	2.02	0

Total Chromium		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
4/16/73	407.19	nd .0
10/30/73	384.62	<2
4/15/74	401.76	<20
10/30/74	407.19	<20
4/30/75	422.74	<20
4/25/78	390.49	<20
10/16/78	407.19	<20
10/16/79	378.59	30

Total Copper		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/30/73	22.57	2
4/15/74	23.62	2
10/30/74	23.95	<2
4/30/75	24.91	nd .0
4/25/78	22.93	4
10/16/78	23.95	2
10/16/79	22.20	3

Total Iron		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/6/53	</=1000	0.13
11/25/53	</=1000	0.28
12/28/53	</=1000	0.17
2/11/54	</=1000	0.18
3/12/54	</=1000	0.09
4/20/54	</=1000	0.59
5/18/54	</=1000	0.19
6/23/54	</=1000	0.02
7/29/54	</=1000	0.52
8/18/54	</=1000	0.51
10/1/54	</=1000	0.07
11/10/54	</=1000	0.03
12/16/54	</=1000	0.03
1/12/55	</=1000	0.02
3/15/55	</=1000	0.02
4/13/55	</=1000	0.18
8/16/72	</=1000	860
10/17/72	</=1000	730
1/8/73	</=1000	710
4/16/73	</=1000	680
7/15/73	</=1000	280
10/30/73	</=1000	950
1/16/74	</=1000	50
4/15/74	</=1000	670
10/30/74	</=1000	810
4/30/75	</=1000	380
4/25/78	</=1000	950
10/16/78	</=1000	870
5/14/79	</=1000	490
10/16/79	</=1000	1300

Total Zinc		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/30/73	230.95	30
4/15/74	241.94	20
10/30/74	245.42	<20
4/30/75	255.42	nd .0
4/25/78	234.70	20
10/16/79	227.09	10

Total Lead		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
10/17/72	8.13	7
10/30/73	8.34	25
4/15/74	8.92	10
10/30/74	9.11	nd .0
4/30/75	9.65	9
4/25/78	8.53	nd .0
10/16/79	8.13	2

Total Nickel		
Date	**Water Quality Criteria (UG/L)**	Sample **Result (UG/L)**
4/25/78	303.74	7
10/16/78	317.17	4
10/16/79	294.18	0

Table 4 (cont'd). USGS Water Quality Data for the Tamiami Trail and Florida Water Quality Criteria

USGS 02289500

Total Cadmium			**Total Chromium**			Total Copper			Total Nickel		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
4/15/76	2.08	nd .0	4/3/78	378.59	<20	4/3/78	22.20	3	4/15/76	303.74	3
4/3/78	2.02	nd .0	2/22/79	390.49	20	2/22/79	22.93	3			
2/22/79	2.08	5	3/10/80	384.62	20	3/10/80	22.57	5			
3/10/80	2.05	0									

USGS 02290500

Total Cadmium			**Total Chromium**			**Total Copper**			**Total Iron**		
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	**Date**	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**
2/10/72	2.01	0	2/10/72	376.12	0	2/10/72	22.05	0	2/10/72	</=1000	460
Total Lead			**Total Zinc**								
Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**	Date	**Water Quality Criteria (UG/L)**	**Sample Result (UG/L)**						
2/10/72	8	3	2/10/72	225.51	10						

2.3.2 Groundwater

South Florida contains three major carbonate aquifer systems. The surficial aquifer system is comprised of rocks and sediments from the land surface to the top of an intermediate-confining unit. The discontinuous and locally productive water bearing units of the surficial aquifer include the Biscayne Aquifer, the undifferentiated surficial aquifer, the coastal aquifer of Palm Beach and Martin Counties and the shallow aquifer of southwest Florida. Practically all municipal and irrigation water is obtained from the surficial aquifer system. The intermediate aquifer system consists of beds of sand, sandy limestone, limestone and dolostone that dip and thicken to the south and southwest. In much of south Florida, the intermediate aquifer represents a confining unit that separates the surficial aquifer system from the Floridan aquifer system. The Floridan aquifer system is divided by a middle confining unit into the Upper and Lower Floridan aquifers. In the Lower East Coast, from Jupiter to south Miami, the Upper Floridan aquifer is being considered for storage of potable water in an aquifer storage and recovery program. The Floridan aquifer system is one of the most productive aquifers in the world and is a multiple-use aquifer system. In the Lower Floridan aquifer there are zones of cavernous limestones and dolostones with high transmissivities. Because these zones contain saline water, they are not used for drinking water supply and are used primarily for injection of treated sewage and industrial wastes. Where the aquifer contains fresh water, it is the principal source of water supply.

Groundwater in the surficial Biscayne aquifer and the Floridan aquifer are both critical to the ecology and economy of south Florida. The Biscayne aquifer has been classified as a Sole Source Aquifer under the Federal Safe Drinking Water Act based on the aquifer's susceptibility to contamination and the fact that it is a principal source of drinking water. Well fields in this aquifer can generally yield in excess of 2,000 gal/min. Because the Biscayne Aquifer is highly permeable and is at or near the land surface in many locations, it is readily susceptible to groundwater contamination. Well fields in the aquifer can be recharged rapidly and effectively from the Water Conservation Areas and the coastal canal system. Major sources of groundwater contamination are saltwater intrusion and infiltration of contaminants carried in canal water.

Saltwater intrusions into the North Central Miami-Dade County water supply come primarily from the tidally influenced canal system and pumpage from the Hialeah-Miami Springs and Northwest Well Fields. In South Florida, uncontrolled discharge from an estimated 6,500 abandoned wells that tap the brackish waters of Floridan aquifer system caused discharge of 359 mgd of saline water into freshwater aquifers. Two possible sources of saltwater into the well fields are nearby tidal reaches of the Miami and Tamiami Canals and the coastal interface. Another source of saltwater is residual seawater trapped in the aquifer during deposition because of high sea levels during interglacial periods or effects of storm tides. Additional sources of groundwater contamination include direct infiltration of contaminants, such as chemicals or pesticides applied to or spilled on the land, or fertilizers carried in surface runoff; leachate from landfills, septic tanks, sewage-plant treatment ponds; and wells used to dispose of storm water runoff or industrial waste.

Most disposal wells discharge into aquifers containing saltwater that underlie the Biscayne aquifer, but they are a potential source of contamination where they are improperly constructed. Numerous hazardous waste sites (e.g., Superfund and

Resource Conservation and Recovery Act [RCRA] sites) have been identified in the area underlain by the Biscayne aquifer. Superfund sites can contribute to groundwater quality degradation through the leaching of site pollutants into groundwater, as well as to surface water quality degradation through storm water runoff. Miami-Dade County currently has seven National Priority List (NPL) ("Superfund") sites. Although each site poses unique environmental threats, trichloroethylene (TCE) and vinyl chloride are generally identified as common contaminants of concern in groundwater at these sites. Both of these organic compounds are carcinogens associated with degreasing agents that have enforceable drinking water standards (3 ppb for TCE and 1 ppb for vinyl chloride). The RCRA facilities that treat, store, and/or dispose (TSDs) of hazardous waste may contribute to groundwater contamination through past spills and poor waste management practices resulting in the leaching of pollutants into the subsurface. Miami-Dade County currently has four RCRA TSDs. As with Superfund sites, though each facility presents unique environmental threats, Non-Aqueous Phase Liquids (NAPLs) and TCE and its daughter products, particularly vinyl chloride, are of greatest concern with respect to groundwater contamination. This is due to the prevalence of these contaminants, the difficulty of remediating and preventing further degradation of the groundwater, and the toxicological effects of the contaminants.

2.4 HAZARDOUS, TOXIC, OR RADIOLOGICAL WASTE

The hazardous, toxic, or radioactive waste (HTRW) preliminary assessment indicated that in general, no evidence of HTRW exists within the project area. During project construction, further HTRW awareness should be practiced.

The HTRW database review (Figure 3) indicated that no contamination exists along Tamiami Trail within the project area. Evidence of a leaking underground storage tank (UST) was found on the western boundary of the project area. However, based upon information available at this time, it does not appear to pose a risk to the project area because the UST was upgraded in 1999 and associated contaminates remediated.

2.5 ENVIRONMENTAL RESOURCES

The historic Everglades was a broad, shallow wetland flowing very slowly over 3,900 square miles from Lake Okeechobee to the mangrove zone at the southern tip of Florida. The sheetflow that naturally occurred over this region was influenced by rainfall and the land's relatively small surface relief. Sheetflow provided the necessary conditions for the development of the natural Everglades ecosystem that consisted of numerous animal and plant species.

The portion of the Tamiami Trail within the project area is bordered by important ecological areas such as ENP and NESRS to the south and WCA-3B to the north. Other important environmental resources near the project area include unique flora and fauna and threatened and endangered species. The following subsections describe the existing conditions of environmental resources that may be affected by the project.

2.5.1 Everglades National Park (ENP)

Recognized by the U.S. Congress as a nationally and internationally significant resource, ENP lies at the southern extremity of the Everglades and below the south end of the C&SF Project. In addition to recognizing ENP as a significant resource, the Everglades National Park Protection and Expansion Act of 1989 (Public Law 101-229) authorized the acquisition of land to benefit the natural resources of ENP. The Act was to:

> *…increase the level of protection of the outstanding natural values of Everglades National Park and to enhance and restore the ecological values, natural hydrologic conditions, and public enjoyment of such area…*

The Department of Interior, National Park Service (NPS) has identified lands for incorporation into ENP. These lands include historic Everglades that have had limited manmade influences and for the most part, avoid agricultural land. Within the project area, several commercial properties south of the Tamiami Trail are currently being acquired as a result of the Everglades National Park Protection and Expansion Act of 1989.

ENP provides habitat for approximately 25 terrestrial species and two aquatic species of mammals. The avian fauna of ENP is especially rich; over 300 species of birds have been identified. South Florida's location makes it a migratory crossroads for West Indian and Central and South American birds while numerous North American species are residents. The majority of this continent's species of wading birds, shorebirds, and waterfowl are found within ENP during different times of the year. One of the key reasons for the establishment of ENP was to protect the nesting areas and feeding grounds of wading birds such as herons, egrets, and ibis.

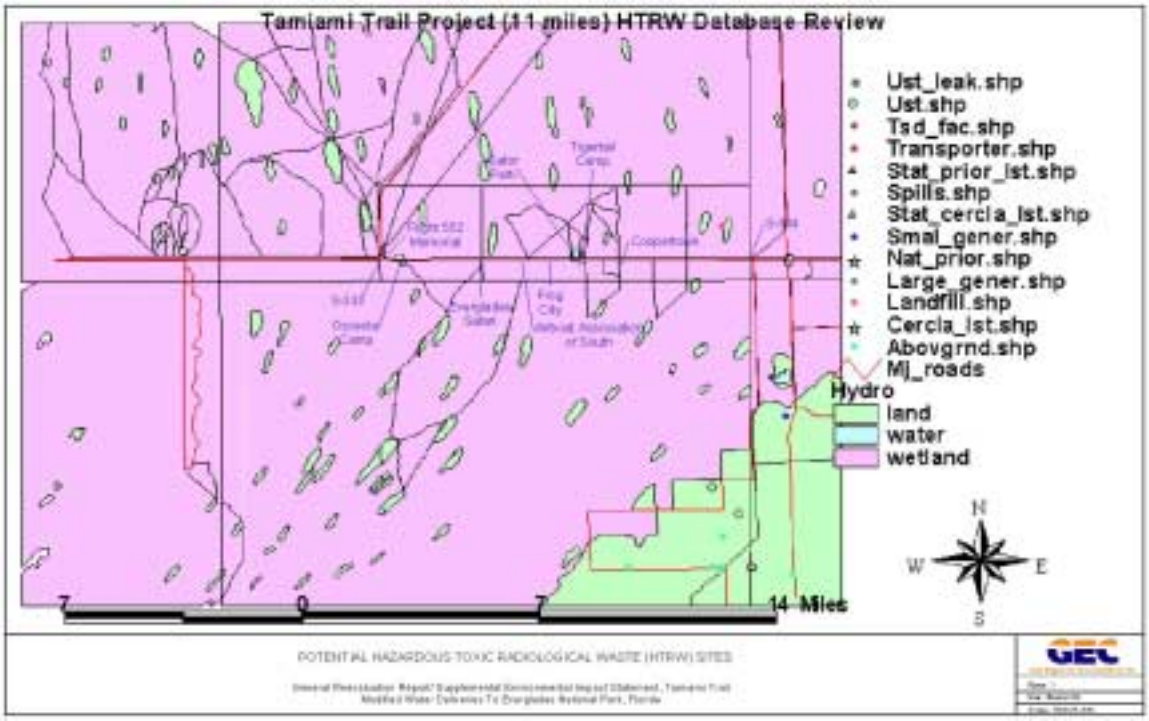
The reptiles and amphibians of the region include two species of crocodilians, three or four species of salamanders, 6 species of lizards, 10 species of land and freshwater turtles, five species of sea turtles, 12 species of frogs, and 23 species of snakes. The waters of the Everglades and ENP support a large variety of fishes in both freshwater and estuarine habitats. Fishes provide a major part of the diet of most of the other vertebrate animal inhabitants.

2.5.2 Shark River Slough East and West Basins

SRS is the southern, relatively deep, Everglades flow-way entering ENP from the north and flowing across ENP to Florida Bay. The seasonal expansion and contraction of water supply to SRS provides the dynamic pulses of aquatic and semiaquatic plants and animals.

2.5.3 Water Conservation Area 3B

WCA-3B is located to the north of the L-29 Levee for the entire length of the project. This area is managed by FFWCC as a recreation area. WCA-3B is dominated by a generally unimpacted wetland sawgrass community. This area has historically been used to assist in the management of water levels and flow quantities. The area


Tamiami Trail Project (11 miles) HTRW Database Review
Ust_leak.shp
Ust.shp
Tsd_fac.shp
Transporter.shp
Stat_prior_lst.shp
Spills.shp
Stat_cercla_lst.shp
Smal_gener.shp
Nat_prior.shp
Large_gener.shp
Landfill.shp
Cercla_lst.shp
Abovgrnd.shp
Mj_roads
Hydro
land
water
wetland
N
W
E
S
7
0
7
14 Miles
POTENTIAL HAZARDOUS TOXIC RADIOLOGICAL WASTE (HTRW) SITES

provides nesting and foraging habitat for a variety of terrestrial and aquatic species including the Federally endangered snail kite.

2.5.4 Biological Communities

Historically, the eastern Everglades was a mosaic of wet prairies, varying in surface elevation, hydroperiod, and vegetation type. Residential, commercial, and industrial developments, as well as agriculture, have altered portions of the Everglades. The project area is bordered to the north by WCA-3B and to the south largely by ENP, which are mostly natural areas with long and short hydroperiod wetlands with an abundance of interspersed willowheads, bayheads, and hardwood hammocks. Sawgrass (*Cladium jamaicense*) communities dominate the long hydroperiod wetlands while muhly grass (*Muhlenbergia capillaris*) and black sedge (*Schoenus nigricans*) dominate the short hydroperiod wetlands mostly influenced by NESRS and local rainfall. There are four herbaceous wetland cover types in the Everglades: (1) sloughs with deep, permanent water levels, (2) sawgrass marshes with semi-permanent water levels and long hydroperiods, (3) wet peat prairies, and (4) wet marl prairies with shorter hydroperiods. These are characterized by the average flooding depth and the duration of the flooding period, and by their predominant plant cover.

SFWMD prepared a comprehensive vegetation cover map that includes the project area (Figure 4). Vegetation communities present along the portion of the Tamiami Trail in the project study area include swamp forest bayheads (*Magnolia virginiana, Annona glabra, Chrysobalanus icaco, Persea borbonia, Ilex cassine, Metopium toxiferum*, among others), maidencane/spike-rush (mix of shallow open water, *Eleocharis* spp. *and Panicum hemitomon*, which can include sparse association of low-stature *C. jamaicense, Typha* spp., *Sagittaria lancifolia, Pontederia lanceolata, Nymphaea*. spp., etc. typical of SFWMD impounded conservation areas), graminoid (grasses, sedges, and rushes), non-graminoid emergent marsh (*P. lanceolata, Sagittaria* spp., *Nymphaea odorata, Typha* spp., with *Ludwigia repens* and *Utricularia* spp. as possible submergents), saw grass (*C. jamaicense*), cat-tail (*Typha* spp.), scrub hardwood (species such as *M. toxiferum, P. borbonia, Myrica cerifera, I. cassine, M. virginiana, Myrsine floridana, Conocarpus erectus, C. icaco*, and others, often with a moderate-to-heavy component of mixed grasses) and willow *shrublands (Salix caroliniana*). Other classifications along the Tamiami Trail include open water, spoil areas, areas influenced by human activities, major roads, and canals.

2.5.5 Threatened or Endangered Species

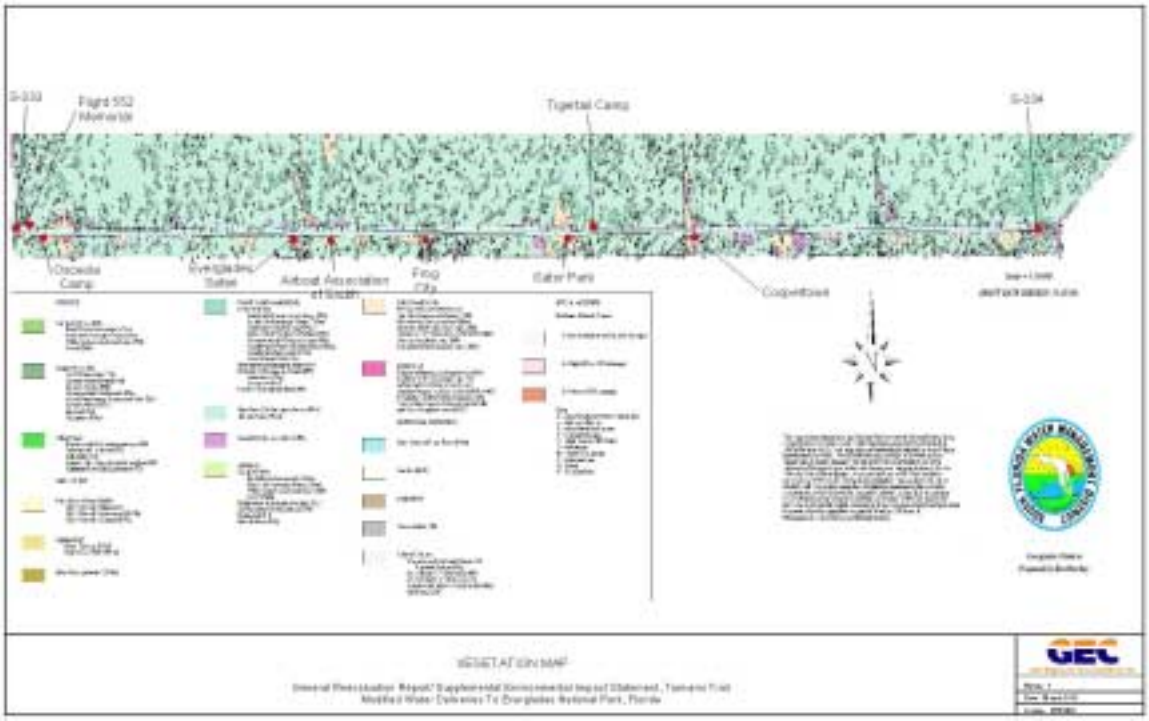
A variety of species listed as threatened, endangered, or of special concern occurs or potentially occurs in the study area. Preliminary coordination with FFWCC showed that there are known wading bird rookery sites within two miles of the highway within the project corridor (Figure 5). These rookeries have supported nesting efforts by the wood stork (federally endangered), snowy egret, tricolored heron, little blue heron, and white ibis (Florida Species of Special Concern). Nest initiation by the wood stork has begun as early as February, with the initiation of nesting by the other species of special concern beginning as early as March. Nesting activities in these rookeries usually lasts until the rains have dispersed prey, leading to the cessation of nesting.

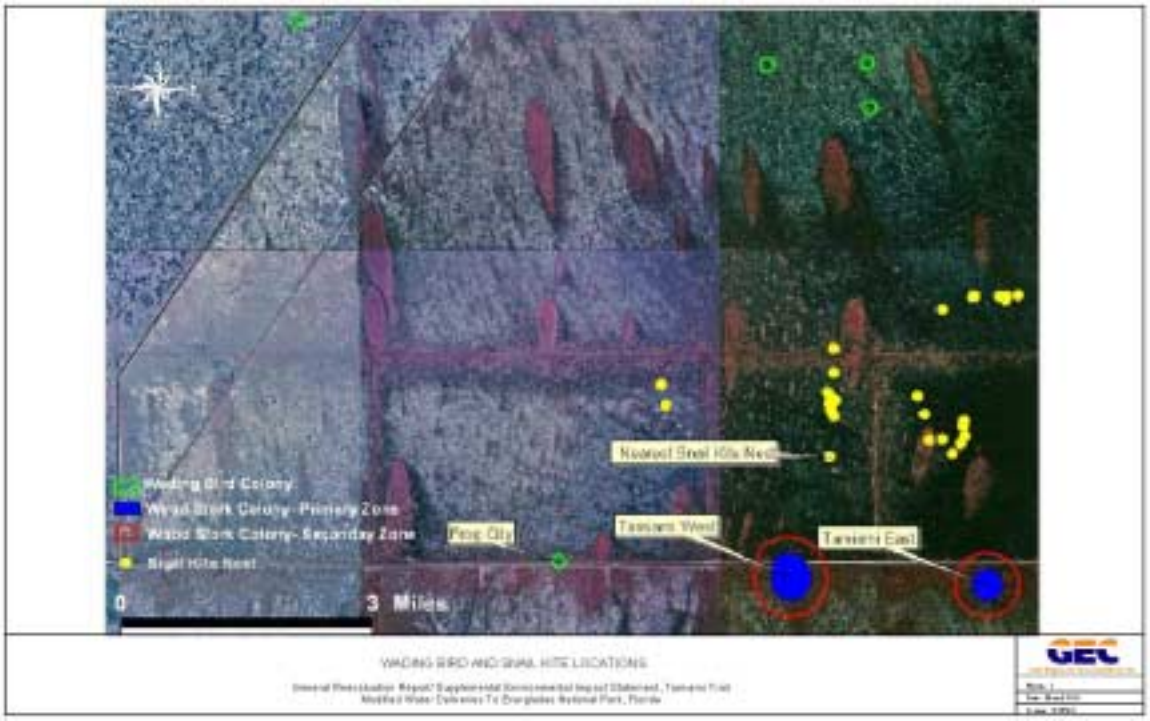
Federally listed species which are know to occur or could occur in the action area or be affected by construction and operation of the action include: the endangered snail kite *(Rostrhamus sociabili*s), wood stork *(Mycteria american*a), Cape Sable seaside sparrow *(Ammodramus maritimus mirabili*s), and the threatened eastern indigo snake *(Drymarchon corais couper*i). In a letter dated October 18, 2000, FFWCC identified six avian species of special concern that may nest or otherwise be found in the vicinity of Tamiami Trail between S-334 and the L-67s: tricolored heron, snowy egret, little blue heron, limpkin, roseate spoonbill, and white ibis. In addition, the snail kite and wood stork, are also listed by FFWCC as endangered. The American alligator (a species of special concern) and the Everglades mink (listed as threatened) also are found along the Tamiami Trail corridor.

- **Snail Kite (*Rostrhamus sociabilis plumbeus*).** Snail kites, listed as endangered in 1967, require long hydroperiod wetlands that remain inundated throughout the year. This preference is associated with the apple snail (*Pomacea paludosa*), its primary food source, which requires nearly continuous flooding of wetlands for greater than one year. Suitable habitat for the kite includes freshwater marsh and shallow vegetated lake margins where apple snails can be found. Critical habitat for the snail kite was designated in 1977 and includes WCA-1, 2, and 3A, and portions of ENP, as well as Lake Okeechobee shorelines and portions of the St. Johns marsh. Preferred nesting habitat includes small trees and shrubs such as willow, bald cypress, pond cypress, sweet bay, dahoon holly, southern bayberry, and elderberry. During dry periods when suitable shrubs and trees experience dry conditions, herbaceous species such as sawgrass, cattail, bulrush, and common reed are used for nest sites. The breeding season can vary from year to year depending on rainfall and water levels. Ninety-eight percent of nesting attempts occur from December through July with 89 percent initiated between January and June.

- **Wood Stork (*Mycteria americana*).** The wood stork was listed as endangered in 1984 due to loss of foraging habitat and colony nesting failures. Preferring freshwater wetlands for nesting, roosting, and foraging, wood storks can be found throughout central and southern Florida. Nests are typically constructed in tree stands within swamps or stands surrounded by large areas of open water. Due to its tactile feeding methods, storks feed most effectively in shallow water settings where prey items are concentrated. During the winter and spring dry seasons, when water levels recede, prey items are often further concentrated, providing foraging areas with abundant food supplies. Drainage in southern Florida may be responsible for delayed nesting by the stork, moving from an early nesting start in November to February or March. Initiation of nesting this late is believed to contribute to nest failures and colony abandonment due to the dispersal of prey items associated with the onset of the wet season (May-June). There is no designated critical habitat for the wood stork.

- **Indigo Snake (*Drymarchon corais couperi)*.** The indigo snake was listed as threatened in 1979 due to the loss of habitat associated with farming, construction, forestry, and other land use conversions, as well as over-


Tigertail Camp
Osceola Camp
Eve Glades Safari
Airboat Association of Florida
Frog City
Gator Park
Coopertown


Wading Bird Colony
Wood Stork Colony- Primary Zone
Wood Stork Colony- Secondary Zone
Bald Kite Nest
Nearest Bald Kite Nest
Fiesta City
Tamiami West
Tamiami East
0
3 Miles
WADING BIRD AND BALD KITE LOCATIONS

collecting for the pet trade. The snake is a large, non-venomous docile species, which seems to be strongly associated with high, dry, well-drained sandy soils typically inhabited by the gopher tortoise. The indigo snake will frequent streams, swamps, and sometimes flatwoods in the warmer months. Gopher tortoise burrows and other subterranean caverns are used for dens and laying eggs. The home range of the indigo snake varies considerably depending on the season and based on studies has a average winter range of 4.8 hectares, 42.9 hectares during the spring or early summer, and 97.4 hectares during late summer and fall.

The USFWS and FFWCC issued separate Coordination Act Reports (CARs) that document potential impacts to biological resources. Copies of the USFWS and FFWC CAR are included in appendices A and B, respectively.

2.5.6 Wetlands

The majority of the project is dominated by wetlands to the north and south of the Tamiami Trail. WCA-3B is adjacent to the project area to the north, and ENP lands abut the project area to the south. Wetlands to the north in WCA-3B begin immediately north of the L-29 Levee, and wetlands associated with the ENP begin immediately south of the Tamiami Trail. There are several small areas classified as non-wetlands south of the Tamiami Trail in private ownership, which constitute fill placed in wetlands.

Dominant wetland communities adjacent to the project area, as mapped by the SFWMD include:

- sawgrass
- cattail
- broadleaf and floating emergents
- cattail/sawgrass
- mix of shallow open water
- shrubland mix
- pond apple/willow mix
- Brazilian pepper/shrubland mix

2.6 CLIMATE

The subtropical climate of South Florida, with distinct wet and dry seasons, high rates of evapotranspiration, and climatic extremes of floods, droughts, and hurricanes represents a major physical driving force that sustains the Everglades while creating water supply and flood control issues in the agricultural and urban segments. Temperatures are moderated by the Atlantic Ocean and Gulf Stream, but the moderating effects quickly diminish inland. The average temperature is 68° F in winter and 82° F in summer. Seasonal rainfall patterns in south Florida resemble the wet and dry season patterns of the humid tropics more than the winter and summer patterns of temperate latitudes. Of the 53 inches of rain that south Florida receives annually on the average, 75 percent falls during the wet season months of May through October. During the wet season, thunderstorms that result from easterly tradewinds and land-sea convection patterns occur almost daily. The prevailing wind is from the east-southeast. Wet season rainfall follows a bimodal pattern with peaks during May-June and

September-October. Tropical storms and hurricanes also provide major contributions to wet season rainfall with a high level of interannual variability and low level of predictability. During the dry season, rainfall is governed by large-scale winter weather fronts that pass through the region approximately weekly. High evapotrans-piration rates in South Florida roughly equal annual precipitation. Recorded annual rainfall in South Florida has varied from 37 to 106 inches, and interannual extremes in rainfall result in frequent years of flood and drought. Multi-year high and low rainfall periods often alternate on a time scale approximately on the order of decades.

2.7 AIR QUALITY

In accordance with the Code of Federal Regulations Part 81, November 6, 1991, and with the 1990 Clean Air Act Amendments (CAAA), the USEPA designated the South-east Florida Airshed, consisting of Miami-Dade, Broward, and Palm Beach counties, as nonattainment for the air pollutant ozone and its precursors. On April 25, 1995, the airshed was redesignated as attainment for ozone and is currently classified as an air quality maintenance area. Miami-Dade County is an attainment area for carbon monoxide. Nitrogen dioxide, sulfur dioxide, and total suspended particulates are present at con-centrations that are better than national standards. EPA has not made a designation for airborne lead in southeastern Florida.

2.8 RECREATION

The Airboat Association of Florida is a recreational association whose site is located on the south side of the highway about three miles east of the western end of the project area. Facilities include a caretaker's house and storage structures for airboats belonging to members.

Three tourist-oriented businesses located on the south side of Tamiami Trail in the study area offer airboat trips, souvenirs, and restaurant facilities. The particular attraction of the businesses is ecotourism, *i.e.*, guided airboat tours into ENP with explanations about the nature of the Everglades as an ecological area, and information on some of the plants and animals. According to the owners/managers of the businesses, approximately 90 percent of all visitors who stop do so in order to inquire about or take the airboat tours. (Personal communication-business owners/managers, multiple dates, 2000.)

Primary access to boat ramps on the north side of the L-29 Canal is provided by the S-333 and S-334 water control structures which control the east-west flow in L-29 and mark the ends of the study area. Roads across these structures allow access to several boat ramps and to bank fishing on the north bank of L-29 Canal. S-334 provides access to an airboat ramp located at the structure and to a boat ramp (Boat Ramp 153) three miles to the east. The airboat ramp allows entrance into WCA-3B; the boat ramp allows boat launching into the L-29 Canal. There is a picnic area associated with the boat ramp. Control structure S-333 provides access across L-29 Canal to one airboat ramp and two boat ramps. The airboat ramp allows entrance into WCA-3B, and there is one boat ramp each on canals 67-A and 67-C. The S-333 structure also pro-vides access to the Flight 592 memorial site. The 67-A and 67-C canals are heavily used by boat fishermen. The airboat ramps provide access to deer and waterfowl hunters as well as

to recreational airboaters. There are approximately 10.5 miles of the north bank of the L-29 Canal available for bank fishing.

Bank fishing is popular from the shoulders of the Tamiami Trail. Fishermen frequent the 10.7 miles of the south bank of the L-29 Canal (north shoulder of the Trail) and at points along the south shoulder of the highway where culverts discharge water passing under the highway.

FFWCC personnel conducted angler counts along the Tamiami Trail from December 1998 to May 1999. The mean number of anglers per mile for weekdays and weekend days respectively was 0.95 and 2.28 respectively. Ninety-four percent were bank anglers. (Personal communication, FFWCC, September 28, 2000) These numbers would translate into an estimated 10 fishermen per weekday and 23 per weekend day, totaling approximately 5,000 man-days of fishing per year within the 10.7-mile study area extent. Personal observation showed 25 bank fishermen and two boats with two fishermen in the project study segment at approximately 10:00 AM on a Saturday in September 2000. Almost all the bank fishermen were fishing on either side of the highway right-of-way, with only a few on the north bank of the L-29 Canal.

2.9 CULTURAL RESOURCES

Studies for historic and archaeological resources were designed and implemented to comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) as implemented by 36 CFR 800 *(Protection of Historic Properties),* Chapter 267 of the *Florida Statutes,* Section 4(f) of the Department of Transportation Act of 1966, and the minimum field methods, data analysis, and reporting standards embodied in the Florida Division of Historical Resources *(FDHR) Historic Compliance Review Program* (November 1990, final draft). In addition, the results presented herein were prepared in conformity with standards set forth in Part 2, Chapter 12 *(Archa-eological and Historic Resources)* of the FDOT *Cultural Resource Management Handbook* (December 1995), the Florida Archaeological Council (FAC), and the Register of Professional Archaeologists (ROPA). All work performed to date conforms to professional guidelines set forth in the Secretary of Interior's Standards and Guide-lines for Archaeology and Historic Preservation (48 FR 44716). The objective of the cultural resources survey was to assess all cultural resources within the project's area of potential effect for listing in the National Register of Historic Places according to the criteria set forth in 36 CFR 60.4.

Cultural resource specialists conducted a literature search and site file review to identify previously recorded sites and obtain cultural, historical, and environmental information about the project area. Research consisted of a review of the Florida Master Site File, the list of Historic Sites designated by the Miami-Dade Historic Preservation Board, and the Miami-Dade County Historic Survey. It should be noted that the site files reflect listings current to 1998. Additionally, books, maps, and other historic and archaeo-logical literature were reviewed for information relating to the project area and its general vicinity. The results of this research and the use of environmental variables were used to develop site probability zones to assess the project area's potential to contain cultural resources.

The archaeological survey consisted of surface inspections, subsurface testing, and judgmental shovel tests. Shovel tests were placed at 25-, 50-, or 100-m (82-, 164-, or 328-ft) intervals for high, moderate, and low site probability zones, respectively. Judgmental shovel tests were placed within low probability zones and in areas deemed likely to contain archaeological resources. The historic resources survey used standard field methods to identify and record historic resources. All resources within the Area of Potential Effect (APE) received a preliminary visual reconnaissance. Any resource with features indicative of 1950s or earlier construction materials, building methods, or architectural styles were noted on aerial photographs and a USGS quadrangle map.

The reconnaissance and cultural resource assessment surveys were conducted to assess National Register-listed or potentially eligible resources that could be impacted by the improvement project. The findings of the study are presented in a report entitled Cultural Resource Assessment Survey for the Tamiami Trail Project Area (November 2000). The eligibility assessments presented in the report have been coordinated with the Florida State Historic Preservation Office (SHPO).

The cultural resource assessment survey conducted for the area of potential effects of the Tamiami Trail project area resulted in the identification of three sites considered potentially eligible for listing in the National Registry of Historic Places (NRHP). Table 5 lists the three resources considered potentially eligible (see Figure 6).

Table 5. Sites Potentially Eligible for Listing In the National Registry of Historic Places

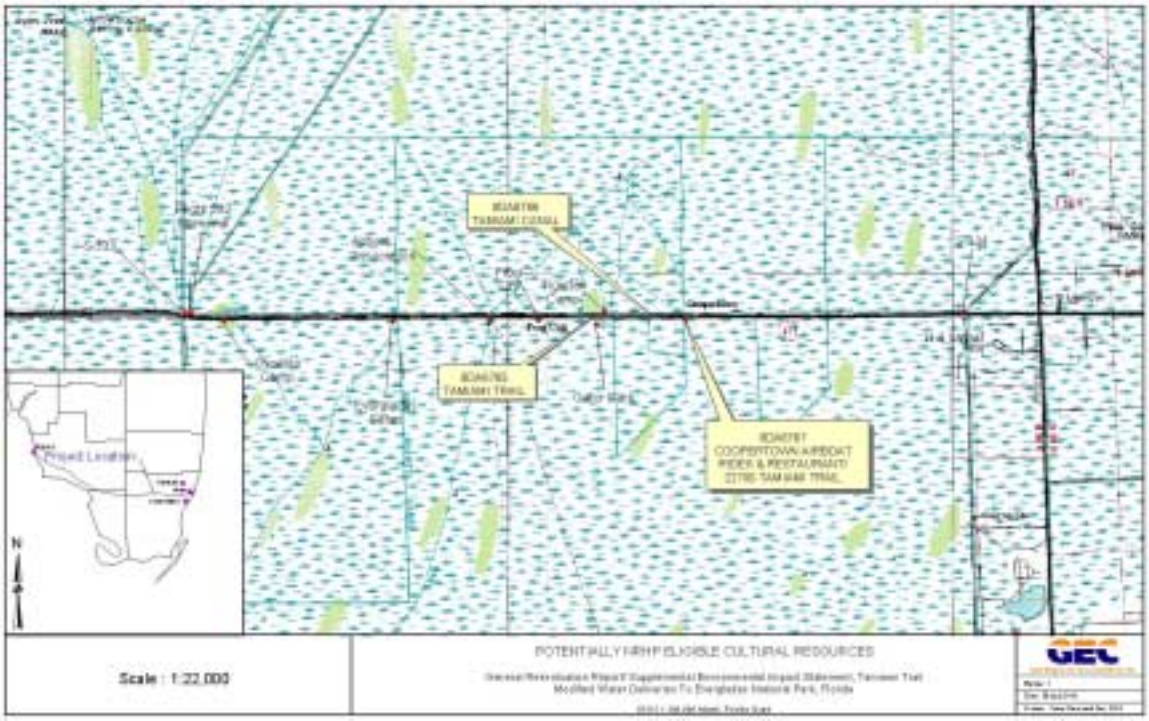
Site Name/Address	Site No.	NR Eligibility Status
Tamiami Trail	8DA6765	Potentially Eligible
Tamiami Canal	8DA6766	Potentially Eligible
Coopertown Airboat Rides & Restaurant 22700 Tamiami Trail	8DA6767	Potentially Eligible

Source: Janus Research, Inc., 2000

The Tamiami Canal is considered significant based on its connection with the development of the Tamiami Trail and its role in the development of South Florida. Because it is an example of an early water management system, it has engineering significance.

These three resources identified above are considered potentially eligible for listing in the NRHP.

The Airboat Association of Florida site is not included in this list. Although the Airboat Association of Florida building remains in good condition, its common design and building materials limit its significance. Based on a lack of significance this resource (8DA6768) is considered ineligible for listing in the NRHP.


Project Location
N
Scale : 1:22,000
POTENTIALLY NRHP ELIGIBLE CULTURAL RESOURCES

- **Tamiami Trail.** The portion of the Tamiami Trail that is located in the project area traverses through Township 54 South, Ranges 37 and 38 East, and Sections 7 through 12. The overall Tamiami Trail is 245 miles in length, and the Miami-Dade County portion is approximately 24 miles in length. Although the roadway has experienced changes over the years, such as the paving of the original limerock road with asphalt, slight widening of the road, and the addition of low metal barriers on both sides of the road, the Tamiami Trail continues to retain its historic character. Additionally, the road's historic feeling, association, design, and setting are still evident. Based on its associations with the developmental, commercial, and transportation history of Florida and Miami-Dade County, the Miami-Dade County segment of the Tamiami Trail, including the portion within the project area, is considered a significant historic resource. The Tamiami Trail also maintains importance as one of the state's major engineering projects during the early 20th century. The portion of the Tamiami Trail located within the project area, as part of the Miami-Dade County segment of the Trail, is considered potentially eligible for listing in the NRHP in the areas of Transportation and Engineering.

- **Tamiami Canal.** The portion of the Tamiami Canal that is located in the project area traverses through Township 54 South, Ranges 37 and 38 East, and sections 7 through 12. The Tamiami Canal's history is inextricably connected with the construction of the Tamiami Trail. During the construction activities for the roadway, dredging formed the Tamiami Trail and the Tamiami Canal located directly north of the highway. Throughout its history, the canal has served as a transportation corridor for local Native Americans and provided drainage for the roadway and surrounding area.

  The portion of the Tamiami Canal located within the project area, as part of the Miami-Dade County segment of the canal, is considered potentially eligible for listing in the NRHP due to its link with the history of the significant Tamiami Trail and its importance to Florida and Miami-Dade County.

- **Coopertown Airboat Rides and Restaurant/22700 Tamiami Trail.** Located on the south side of the Tamiami Trail, the one-story frame vernacular restaurant and residence was constructed in 1947 by Coopertown's original owner, John Cooper. According to several sources, the current location of Coopertown was historically a Seminole camp that was perhaps inhabited by a Native American known as Jimmy Osceola. The property was also used as a work camp in the 1920s during the construction of the Tamiami Trail. Following World War II, Florida gained popularity as a vacation destination, and the history of the complex began when the Tamiami Trail served as one of the main east-west travel routes for tourists and the transportation of goods across the state.

  Coopertown Airboat Rides and Restaurant is significant based on its importance in tourism and community planning and development. This historic resource represents not only the heritage of tourist attractions along

the Trail, but also illustrates Florida's long history as a destination for tourists. Within the Miami-Dade County portion of the Tamiami Trail, Coopertown is the oldest continuously operating airboat tour business. Based on its historical associations with the development of the area and its important contributions to tourism in the region, the Coopertown Airboat Rides and Restaurant complex is considered potentially eligible for listing in the NRHP in the areas of Entertainment/Recreation and Exploration/ Settlement.

2.10 AESTHETICS

The views afforded motorists traversing the project segment of the Tamiami Trail are interesting, but somewhat limited and constrained. On the north side of the highway are the L-29 Canal and the L-29 levee, which extend along the entire 10.7 miles of the project segment. The view of the north side of the canal and levee is broken up by several water control structures and the Tigertail Camp. A panoramic view of the sawgrass and occasional hammocks or tree islands is largely blocked by the height of the levee. On the south side, the view is often blocked by tall vegetation along the roadside. Occasional breaks allow some distance views. The Osceola Camp and the grove of trees at the Airboat Association site provide some interest points.

2.11 NOISE ENVIRONMENT

Analyses conducted pursuant to project noise level impacts, as well as the outline of the information provided in this section and Section 5.7.11, are organized in accordance with guidance promulgated in the Florida Department of Transportation (FDOT) Environmental Management Office (EMO) Project Development and Environmental Manual (PD&E Manual), Part 2, Chapter 17, *Noise*.

The noise analysis guidance provided in the PD&E Manual is based on the regulatory material contained in 23 Code of Federal Regulations (CFR) Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* and Florida Statute Chapter 335.17.

The facility analyzed in this noise study consists of the Tamiami Trail from a point approximately one mile west of its intersection with Krome Avenue west for approximately 10.7 miles. It is bound on the north by the L-29 Canal and on the south by ENP.

The facility is a rural two-lane highway with a design speed of 60 miles per hour (mph) and a posted speed limit of 55 mph. The 1999 Average Daily Traffic (ADT) consisted of 5,200 vehicles per day (vpd) (Appendix C), including 11.5 percent heavy trucks, a directional distribution factor of 52.7 percent, and a peak hour to daily traffic ratio of 9.3 percent.

Noise analyses performed pursuant to this study were conducted using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM), Version 1.0b. TNM computes highway traffic noise at nearby receivers and aids in the design of highway

noise barriers. For this project, computer-aided design files were imported to TNM as background in order to aid in the digitizing process.

Analyses were conducted for existing conditions, future without project conditions, and the eight alternatives. Existing conditions were modeled using traffic estimates for 2000 based on the 1999 counts provided by in the Engineering Appendix. Future conditions were modeled using traffic estimates for 2020 interpolated from the 1999 data and 2022 forecasts. Traffic counts indicated a 1999 ADT of 5,200 vpd and a projected 2022 ADT of 9,200 vpd. By interpolating, ADTs of 5,375 vpd and 8,852 vpd were calculated for 2000 and 2020, respectively.

In accordance with the Transportation Research Board's *Highway Capacity Manual, Special Report 209* (HCM, Third Edition, updated 1994), and in order to analyze potential impacts in a conservative manner, projected ADTs were adjusted by a factor of 160 percent to account for heavier tourist season traffic. Using a peak hour to daily traffic ration of 9.29 percent, design hour volumes of 800 vph and 1,316 vph were calculated for 2000 and 2020, respectively. Final adjustments to projected traffic volumes were made in accordance with HCM Chapter 8 in order to arrive at the flow rates (vph) for the peak 15 minutes, and total for both directions of flow (service flow) along the project. Previously described design hour traffic volumes were divided by proscribed peak hour factors (PHF) resulting in service flows for 2000 and 2020 of 1,030 vph and 1,400 vph, respectively.

Based on current roadway geometry and traffic as well as roadway geometry for the alternatives and projected traffic volumes, LOS-A through LOS-E per HCM (Table 6) Chapter 8 were calculated using directional distribution and lane width factors of one. Heavy vehicle factors were calculated based on data indicating 11.47 percent heavy trucks. To account for tourist season traffic, it was assumed that recreational vehicles and buses each comprised seven percent of traffic flows.

Table 6. Project Corridor Levels of Service (LOS)

LOS	Speed	Service Flow
A	= 58	= 268
B	= 55	= 512
C	= 52	= 832
D	= 50	= 1,445
E	= 45	= 2,335

LOS = Level of Service

Source: GEC, March 2001. Speed (mph) and Service Flow (total vph, both directions) based on level terrain with 20 percent no passing zone two-lane highway; directional distribution, width, and grade factors of 1; and heavy vehicle factor of 0.834.

Table 7 presents ADT, Design Hour, Flow, LOS, and Speed estimates for project area existing conditions and the alternatives.

Table 7. Project Area Traffic Data

Alternative	Year	ADT (vpd)	Design Hr.	Flow (vph)	LOS	Avg. Speed (mph)
Existing	2000	5,375	800	860	D	50
No Action	2020	8,852	1,316	1,400	D	50
1	2020	8,852	1,316	1,400	D	50
2,6,7,8	2020	8,852	1,316	1,400	D	50
3	2020	8,852	1,316	1,400	D	50
4	2020	8,852	1,316	1,400	D	50
5	2020	8,852	1,316	1,400	D	50

Source: G.E.C., Inc., 2000. ADT (vpd), Design Hr., Flow (vph), Speed (average, mph).

Unlike project air quality impacts resulting from traffic emissions, where evaluations are required for January and July, traffic noise impacts were evaluated only for the case of maximum peak-hourly traffic (January). The PD&E Manual directs evaluations of noise impacts of maximum peak-hourly traffic at LOS C; however, this analysis indicates that using the maximum peak-hourly traffic at LOS D conditions results in worst-case levels. Although traffic noise impacts are greater at higher speeds, and analysis indicates that LOS-C conditions are likely (July), resulting in average maximum peak-hourly speeds of 52 mph, the differential of two mph is outweighed by the significant increases in volume (57 percent) that are predicted for LOS D conditions (January).

Because the geometry of all current alternatives is identical with respect to HCM operational analysis, projected flow rates, LOS, and average speeds are identical for a given year and month for all alternatives.

Sensitive receivers selected and evaluated for this analysis included the Flight 592 Memorial, Osceola Camp, Safari Park, Gator Park, Tigertail Camp, Coopertown Airboats, and the Airboat Association of Florida. Three sound levels were determined for each activity; (1) noise abatement criteria (NAC), (2) existing noise levels, and (3) predicted noise levels. Table 8, from the PD&E Manual, presents NAC for the various categories of sensitive receivers.

The Flight 592 Memorial, Osceola Camp, and Tigertail Camp were analyzed with respect to Category B criteria. Safari Park, Gator Park, Airboat Association of Florida, and Coopertown Airboats were evaluated with respect to Category C criteria. As defined by FDOT, the analysis considers a noise increase of 15 dBA as substantial. Noise abatement must be considered if predicted noise levels exceed the FDOT approach criteria presented in Table 8, or if predicted noise levels increase substantially over existing noise levels.

Table 8. Noise Approach Criteria for Sensitive Receivers

Approach Criterion	Abatement Level (L_{Aeq})	Sensitive Receiver Description

	FHWA	FDOT	
A	57	56 (E)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	66 (E)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, RV parks, day care centers and hospitals.
C	72	71 (E)	Developed lands, properties, or activities not included in Categories A and B above.
D			Undeveloped lands.
E	52	51 (I)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Note: All values Hourly A-Weighted Sound Level (decibels), (E) (exterior), (I) (interior).

Source: FDOT PD&E Manual, adapted from Table 1 of 23 CFR Part 772.

Noise levels were recorded for 16.5 hours on September 29, 2000 at the Osceola Camp and for 16.5 hours on September 30, 2000 at the Tigertail Camp in order to determine background and peak hour noise levels. Measurements indicate average background A-weighted hourly equivalents (LAeq1h) of 65.8 dBA at the Osceola Camp and 58.4 dBA at the Tigertail Camp. Peak hour levels were 68.0 dBA at the Osceola Camp and 61.0 dBA at the Tigertail Camp.

Combined noise level traffic counts at the Flight 592 Memorial, Osceola Camp, and Tigertail Camp on October 10, 2000 were conducted in order to verify TNM modeling input data (roadway geometry, traffic volume and composition, receiver location, elevations, etc.) through a comparison of TNM noise level predictions with field measurements. Model predictions were within 3.0 dBA of field noise measurements.

After verifying model predictions with field measurements, peak hour existing conditions were modeled using the traffic data presented in Table 7. The existing peak hour levels are presented in Table 9. The number of receivers chosen for each site varied, depending on the likelihood that sound levels might vary across the site. Significantly, modeling indicates that the northwest portion of the Osceola Camp currently exceeds the FDOT approach criteria of 66 dBA at peak hour existing conditions.

Table 9. Existing Peak Hour Noise Levels

Site	Receiver[1]				
	1	2	3	4	5
Flight 592 Memorial	59.9				

Osceola Camp	68.3	62.0	57.5	62.2	62.6
Safari Park[2]	69.6	69.9			
Gator Park	69.6	62.7			
Tigertail Camp	60.5	60.8			
Coopertown Airboats	69.6	69.9	62.7		

Note: [1] Hypothetical points at sites for computer model analysis
[2] Site not actually modeled due to similarity to Coopertown Airboats site. Values shown represent northern portion of site, in parking lot.

Source: G.E.C., Inc., 2000. All values LAeq1h.

2.12 EXISTING ROADWAY

The original Tamiami Trail was most likely constructed in the late 1920s and early 1930s primarily by digging the canal by steam shovel, dredging along the north side and throwing the spoil ahead to create the roadbed. In the mid-1940s, about 38 bridges were added at various locations within the project segment. In the early 1950s, the bridges were removed and replaced with the culverts that are currently in place. In 1968, the shoulders were widened and the pavement was overlaid. In 1970, a guardrail was added on the north side. Sometime in the 1980s or 1990s, another guardrail was added on the south side of the road. Finally, in 1993, the shoulders were widened, and the mainline pavement was resurfaced. Originally, part of the area between the edge of the shoulder and guardrail was planned to be sodded or grassed, but it was changed to asphalt sometime after final design.

FDOT requires that culverts be designed for a projected maintenance-free time or a Design Service Life (DSL) appropriate for the culvert function and highway type. Recently the FDOT Culvert Service Life Estimator Program was used with soil parameters to determine DSLs for four locations. The results indicated that the existing reinforced concrete pipe culverts under US 41 have an estimated DSL in excess of 300 years. Given that the existing culverts have been in operation for approximately 50 years and the Service Life Program estimates of 360 years, the existing culverts should continue to provide the required service to US 41. After the pavement was resurfaced in 1993, the first pavement condition rating was conducted in 1994. The results yielded an excellent rating in rutting, ride, and pavement conditions; however, the pavement cracking condition was rated as 6.0 on a 10-point scale.

Annual maintenance costs expended by FDOT over the past three years has averaged $39,537. FDOT District 6, which is responsible for this portion of the Tamiami Trail, expects maintenance costs to increase for the shoulder pavement repairs because of the age of the shoulder and its rate of deterioration. The costs can be expected to increase annually as the shoulders continue to deteriorate and the guardrails continue to degrade. Due to deterioration of the pavement in terms of cracking, rutting, and ride, FDOT determined that the portion of the Tamiami Trail within the project area is in need of rehabilitation. The highway is scheduled for improvement in the year 2002 at an estimated cost of approximately three million dollars, excluding maintenance of traffic costs.

2.13 TRANSPORTATION

In 1999 the Governor's Hurricane Evacuation Task Force identified seven limited access routes with a potential "need to reverse" to enhance regional evacuations (FDOT web site). US 41 (Tamiami Trail) is not one of the "officially designated" routes. However, due to its location as the southern-most east-west artery in the state, Tamiami Trail provides critical eastbound and westbound coast-to-coast access between Miami and Naples and would be utilized for evacuation, if necessary. Traffic would be maintained in both directions. The closest "officially designated" eastbound and westbound coast-to-coast hurricane evacuation route (with a need to reverse lane) is Interstate Highway 75 (Alligator Alley), which is located approximately 20 miles north of Tamiami Trail.

The use of Tamiami Trail as an "implied" evacuation route would require that the highway's capability to be utilized for evacuation be maintained during hurricane season. This may influence construction phasing and maintenance of traffic flows during construction (Appendix C).

Access to the Tigertail Camp, which is located on the northern side of the L-29 Canal across from the highway, is via motor vehicle and boat. Vehicle access is by means of unimproved roads adjacent to and on top of the L-29 Levee. The levee roads connect with the Tamiami Trail by canal crossings at each end of the project area. There is a small parking area along the northern side of the highway across the canal from the Tigertail Camp, with boat docks located adjacent to the parking area and also across the canal at the residential area. Boat access to the Tigertail Camp appears to be quite efficient, offering an alternative to driving several miles along the unimproved levee roads.

2.14 TRIBAL LANDS

The Miccosukee Indian Tribe has lived in what is now ENP for generations and has traditional, aboriginal, and statutory rights to live in the Everglades.

There are two Miccosuckee Tribe family group settlements within the project area: the Tigertail Camp and the Osceola Camp. The Tigertail Camp is located north of Highway 41 between the L-29 Canal and L-29 Levee. This camp is home to approximately 15-20 persons. Access to the Tigertail Camp is by road on the north bank of L-29 Canal or by the road on L-29. A parking area with boat access is along the Tamiami Trail opposite the camp. Some of the persons living at the camp park vehicles alongside the highway and ferry across the L-29 Canal by boat. The living facilities of the Tigertail Camp were recently elevated above the flow levels anticipated for MWD.

The Osceola Camp is home to 10-15 people. It is located on the south side of the Tamiami Trail approximately one-half mile east of the western end of the project area. Access is by vehicle directly from the highway. Structures in the Osceola Camp have not yet been raised above the MWD Project higher water elevations. The method of high water protection has not yet been determined for this site.

This report does not present information on private areas, and it identifies only those areas affected by the project.

2.15 ECONOMICS/SOCIOECONOMICS

The project study area is west of the "limits to urbanization" boundary established by the Miami-Dade Planning Department. Coupled with the protected natural areas north and south of the corridor, this effectively means that no additional development will be allowed along the corridor within the project limits.

The Miami-Dade County region is a major metropolitan area with a population in excess of two million people. There is a diverse economy with an emphasis on tourism, whole-sale and retail trade, manufacturing, and shipping/transport. Miami-Dade County, which encompasses more than 2,000 square miles, is located along the southeastern portion of the Florida peninsula. It is bounded by Biscayne Bay and the Atlantic Ocean to the east, ENP to the west, the Florida Keys to the south, and Broward County to the north. One-third of the Miami-Dade County area is within the boundary of ENP.

The population of the county is approximately three-quarters white and slightly less than one-quarter black. Approximately 55 percent of Miami-Dade residents identify themselves as Hispanic. In 1996, it is estimated that almost one-quarter of the county's residents were in poverty, with almost 40 percent of that number being children under the age of 18. Almost 1.2 million people had full or part-time jobs. Over 1.0 million were in private employment. Local, state, and federal government employment accounted for approximately 150,000 jobholders.

Three tourist-oriented businesses located on the south side of Tamiami trail in the study area offer airboat trips, souvenirs, and restaurant facilities. The particular attraction of the businesses is ecotourism, i.e., guided airboat tours into ENP with explanations about the nature of the everglades as an ecological area, and information on some of the flora and fauna. According to the owners/managers of the businesses, approxi-mately 90 percent of all the visitors who stop do so in order to inquire about or take the airboat tours. (Personal communication-business owners/managers, multiple dates, 2000)

The three businesses have approximately 15 permanent residents among them. One also has recreational vehicle sites, many of which are occupied for extended periods by “semi-permanent” residents. The businesses also employ approximately 30 full time and 20 part time people.

2.16 FLIGHT 592 MEMORIAL

The Valu Jet Flight 592 Memorial is located at the western end of the project area on the northern side of the L-29 Levee. The site consists of a parking area and a sculpture/ memorial consisting of 110 concrete pillars that symbolize each of the lives lost in the DC-9 crash on May 11, 1996. The pillars are arranged in a triangular pattern that points to the actual crash site eight miles away in the Everglades.

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SECTION 3.0
FUTURE WITHOUT PROJECT CONDITION

3.1 INTRODUCTION

The Future Without Project condition represents the condition of the study area, as it would be expected to exist in the future after implementation of the MWD project. All components of the MWD Project would be operated as generally described in the 1992 GDM and specifically described in subsequent study and design efforts.

The purpose of the MWD Project is to deliver greater volumes of water into the L-29 Canal for the restoration, to the extent practicable, of hydrology in Northeast Shark River Slough in ENP. This greater volume will create higher water levels in the Everglades and create a “backwater” effect on the south side of the Tamiami Trail. Given this higher water level, the configuration of the existing culverts (invert, size and location), and the head-loss through the culverts needed to pass the greater volume of water, water levels in the L-29 Canal will be even higher. It is these higher water levels that can cause road deterioration and present other safety issues. Additional openings in the Tamiami Trail are needed to minimize head-loss across the road and eliminate the safety concerns.

It has been determined that the Federal government does not have the land interests necessary to convey the MWD flows without compensation. Therefore, to obtain the perpetual right to flow water, which includes conveyance and easement interests, compensation must be provided to FDOT. This compensation comes in the form of modifications to Tamiami Trail, which will prevent the roadway from becoming impassable.

3.2 CURRENT WATER DELIVERIES

WCA-3B is completely enclosed by levees. Inflow into the area is via rainfall and outflow is through evapotranspiration and seepage. Water levels in WCA-3B are not managed.

Water levels in the L-29 Canal are controlled by inflows at S-333, outflows at S-334, rainfall and seepage. (If there is sufficient head, S-333 can contribute approximately 1,000 cfs into the L-29 Canal.) The L-29 canal is currently managed at elevation 7.5 feet NGVD or below. Water levels above 7.5 feet are associated with rainfall rather than flows. A series of water management constraints, including the 7.5-foot limit, was established as part of the “Experimental Water Delivery Program” in response to litigation and agreements. IOP and ISOP lift this constraint.

Water levels in ENP south of Tamiami Trail are not managed. Water levels are associated with flow through the Tamiami Trail culverts, rainfall, seepage, and evapotranspiration. The L-29 Canal has a large influence on water levels in this area.

3.3 FUTURE WATER DELIVERIES

The MWD project will modify the existing Central and Southern Florida Project to provide a more natural flow regime to ENP. North of the L-29 canal, the MWD project calls for connecting WCA-3A to WCA-3B through a series of structures in the L-67A and L 67C levees. The current approved project calls for gated control structures in these levees, however there is a proposal to use "passive" weirs instead. This proposal is known as the "Conveyance and Seepage" study. These gated structures have not yet been constructed. The MWD project calls for passing a volume of water through WCA-3B, but not significantly changing the water levels. (The volume introduced into WCA-3B will equal the volume released.) In addition, the L-67 Extension will be degraded upon completion of the project.

In addition to the current water control structures (S-333 & S-334), the MWD project includes the construction of S-355A&B in the L-29 Levee and pumping station S-356 at the eastern end of the project area. These structures will raise the flow conveyed under the Tamiami Trail to approximately 4,000 cfs. The S-355A&B water control structures will pass water from WCA-3B into ENP. The S-356 pumping station will return seepage water collected in the L-31N back to the L-29 Canal. As part of the "Conveyance and Seepage" study, there is a proposal to add additional "passive" weirs in the L-29 Levee. Once the MWD project features are complete and land acquired, constraints will be lifted.

Water levels south of Tamiami Trail will not be managed. Water levels are associated with flow through the Tamiami Trail culverts, rainfall, seepage, and evapotranspiration. However, because of the enhanced ability to provide water into the L-29 Canal and the lifting of the constraints, water levels will be much higher. Because of the greater flows and higher water levels, the study of modifications to Tamiami Trail is being conducted.

3.4 INTERIM FLOW TARGETS BETWEEN NOW AND CONSTRUCTION OF THE MWD PROJECT

Prior to 1989, in addition to rainfall, ENP received its inflow through the S-12 structures (S12A, B, C, and D). These structures are located west of L-67 Extension and deliver water to ENP from WCA-3A. As part of the "Seven Point Plan", the Park requested that water be delivered to the eastern portion of ENP (east of the L-67 Extension) into Northeast Shark River Slough. Congress authorized the Experimental Water Delivery program to permit testing of different water delivery schemes from the C&SF project. A series of tests have been used – most involve a "rainfall-based" delivery formula that specifies the amount of water to be delivered to ENP in weekly volumes through the S-12s and S-333 (east of the L-67 Extension). However, because of management constraints, S-333 usually could not deliver its required volume. Generally, the volume of flow that could not be delivered at S-333 was shifted back to the S-12s.

Several colonies of Cape Sable Seaside Sparrows (CSSS) were recently found within the MWD project area. The CSSS is an endangered species that requires particular hydrologic conditions for successful breeding. As part of the USFWS biological opinion on the project, reasonable and prudent alternatives (RPAs) were developed to "preclude

jeopardy" to the CSSS. These RPAs included a number of land and water management actions:

By March 1, 2000 ensure at 30-percent of all regulatory water releases crossing Tamiami Trail be east of L-67 Extension (L67 Ext.)

By March 1, 2001 ensure at 45-percent of all regulatory water releases crossing Tamiami Trail be east of L-67 Extension (L67 Ext.)

By March 1, 2002 ensure at 60-percent of all regulatory water releases crossing Tamiami Trail be east of L-67 Extension (L67 Ext.)

The Corps must take all actions necessary to complete full operational implementation of the Modified Water Deliveries project by December 2003.

3.5 EFFECTS OF FUTURE FLOWS ON ROADWAY

As stated in the Engineering Appendix (Appendix C), the road is currently in need of maintenance. The limestone base is approximately 85 percent saturated due to capillary action and is significantly deteriorated. The asphalt surface of the road has surface environmental stress cracks and subsurface fatigue cracks. Raising the water elevation to 9.3 feet will fully saturate the base of the road, and the water table will essentially reach the bottom of the asphalt pavement at low areas of the highway. The impact is that support for the asphalt pavement will decrease, the existing cracks will deteriorate, and additional cracks will develop. The higher water is expected to accelerate deterioration of the pavement, particularly at the low areas.

Current maintenance of Tamiami Trail contains items such as damaged guardrail, small pavement patching, mowing, and litter removal. Periodic maintenance items are programmed in the Work Program and would include a re-surfacing or complete guardrail replacement. FDOT District 6 is responsible for these tasks along this section of Tamiami Trail. The average amount spent on this portion of Tamiami Trail is approximately $40,000. District 6 has been maintaining this portion of Tamiami Trail in accordance with their policies and procedures. It should also be noted that this maintenance plan is based on the current water elevation of 7.5 feet, which is 0.3 feet below the limestone base (which is, in turn, 18 inches below the asphalt).

With the implementation of MWD, the primary concern from high water is damage to the embankment material, with a secondary concern from overtopping. Overtopping would cause erosion of the embankment and washouts of the shoulders and edges of the pavement. After a flow test was conducted in the spring of 2000, these types of damages did occur in localized areas. It appears that water may not need to overtop to cause damage, but only be within perhaps a foot of the pavement surface elevation to have sufficient wind/wave action to scour the grassy shoulders. Most of the damage witnessed was on the canal side.

There is potential for damage under the non-overtopping scenarios. The roadway embankment was built of uncontrolled fill. The concern is that the fine material will adsorb water to the saturation point via capillary action two feet above the water level.

FDOT currently has tests and policies in place to avoid this situation. The damage caused from the saturation weakens the support for the asphalt pavement. Because of this, the asphalt pavement will deflect more than normal under traffic, at which point structural fatigue cracking will occur, and shortly thereafter, potholes develop. This extensive fatigue marks the end of the pavement life, at which point the asphalt is rendered to be nothing more than a granular base. To fix this damage, it would be necessary either to remove the asphalt and build a new 6-inch asphalt pavement surface (but as long as the water levels will be high, the same failure will occur again rapidly), or level out the damaged areas and place a new 6-inch surface on top and begin raising the pavement elevation. The leveling and new 6-inch surfacing would cost approximately $11 million; resurfacing alone would cost approximately $3 million.

From a frequency standpoint, each time the water is at approximate *average* elevation 8.5 or higher, the above problems would occur. Large localized areas of failure would occur in many cases at approximately 8.0 feet. When the water elevation is 7.5 feet or lower, conditions will be no worse than what currently exists because the water is presently at elevation 7.5 feet. Between elevation 7.6 and 8.0 feet, there is a 50 percent change of failure occurring.

When MWD is implemented, the high water design elevation will be raised from 7.5 feet to 9.3 feet. Once water reaches an elevation of 9.3 feet elevation, it would be one inch into the asphalt of the shoulder, which is at elevation 9.23 feet, and the limestone base would be impacted. According to FDOT, the water elevation must be at a minimum of two inches below the base of the road for the limestone base to maintain its integrity. The top of the road (crown) is at elevation 9.8 feet at the low points of the highway and 10.1 feet at the high points. The limestone base is located approximately 18 inches below the asphalt, which is 6 inches thick.

Without the construction of modifications to Tamiami Trail, the future without project condition may involve constraints on water management operations in the project area. One potential area of conflict concerns overtopping and saturation of the subgrade of the highway during high water events (thereby potentially affecting public safety) and the safety needs of ENP. Water would begin overtopping of the highway at an event frequency of between 200 and 500 years.

SECTION 4.0
PROBLEMS AND OPPORTUNITIES

4.1 REDUCTION OF FLOOD DAMAGE TO ROAD

The hazards posed by the MWD project to US 41 are due to the higher water stages in the L-29 Canal. After the high water subsides, overtopped roadways could present unforeseen problems for motorists traveling along the roadway. Extended saturation of the materials supporting the roadway may cause deterioration of the subgrade from prolonged elevated water levels in the L-29 Canal.

When the water elevation is raised, the limerock base layer would become saturated and soften. The diminution of the strength of the base layer would accelerate the cracking of the road that currently exists.

The current costs for road maintenance in this portion of the roadway are approximately $40,000 annually. This amount does not include the routine cost of resurfacing and milling, the maximum interval of which is ten years. However, implementation of the project will expose the highway to a greater frequency of flooding, resulting in a potential increase in maintenance requirements. Flooding will aggravate the pavement condition and accelerate the settlement, resulting in a gradually increased frequency of pavement repair and restoration.

4.2 HURRICANE EVACUATION

In 1999 the Governor's Hurricane Evacuation Task Force identified seven limited access routes with a potential "need to reverse" to enhance regional evacuations. The Tamiami Trail is not one of the routes designated for reversing lanes during hurricanes. However, due to its location as the southern-most east-west artery in the state, Tamiami Trail provides critical eastbound and westbound coast-to-coast access between Miami and Naples and would be utilized for evacuation, if necessary. Traffic would be maintained in both directions. The closest "officially designated" eastbound and westbound coast-to-coast hurricane evacuation route (with a need to reverse lane) is Interstate Highway 75 Alligator Alley, which is located approximately 20 miles north of Tamiami Trail. The use of Tamiami Trail for evacuation would require that the highway's capability to be utilized for evacuation be maintained during hurricane season. This may influence construction phasing and maintenance of traffic flows during construction.

4.3 ENVIRONMENTAL RESOURCES

Problems and opportunities associated with the project related to environmental resources deal mostly with biological resources and hydrologic restoration. Implementation of any of the considered action alternatives provides the opportunity for enhanced north to south ecological connectivity. Ecological connectivity is limited to the bridge and culvert openings for alternatives 2, 4, 6, 7, and 8 and to the breaches in the

existing roadbed for alternatives 3 and 5. Under Alternative 5, however, the opportunity for full ecological connectivity exists if the existing roadbed were to be removed.

Alternative 5 offers the fullest potential for ecological connectivity between WCA-3B and ENP. (See Section 5.6.5 for a description of wildlife crossing options.)

Predominantly wetland communities are present immediately adjacent to and south of the existing Tamiami Trail (ENP) and north of the L-29 Levee (WCA-3B). Alternatives 2, 3, 4, 6, 7, and 8 would involve the deposition of fill in wetland areas. Opportunities for wetland restoration/enhancement exist to the south in the ENP, which could offset wetland impacts.

Additional problems/restraints for project implementation are the presence of wading bird colonies and endangered species rookery sites. The USFWS has delineated Primary and Secondary Zones, which impose construction restrictions during the nesting season. This is detailed in Section 5.7.5.6.

4.4 COMPATIBILITY WITH COMPREHENSIVE EVERGLADES RESTORATION PLAN (CERP)

Implementation of WCA-3 Decompartmentalization will increase the flow of water from 4,000 cfs to 5,500 cfs.

This project is prepared under the authority of the Everglades National Park Protection and Expansion Act of 1989, to implement completion of the project to improve water deliveries authorized in that Act. It is not intended to be the Project Implementation Report for the Initial Project in the Comprehensive Everglades Restoration Plan discussed in § 601(b)(2)(C) of the Water Resources Development Act of 2000, nor is it intended to prejudge the results of that Project Implementation Report. That Project Implementation Report will be prepared at a later date.

4.5 WCA-3 DECOMPARTMENTALIZATION (CERP)

Partitioning of the Everglades by levees, canals, and roads has created barriers to the free movement of organisms, particularly those with limited mobility, such as aquatic organisms (fishes, invertebrates, etc.).

The Tamiami Trail, the L-29 Canal, and the L-29 Levee are impediments to the free movement of organisms between ENP and WCA-3B. For aquatic organisms the L-29 Levee and its associated water control structures obstruct movement between the L-29 Canal and WCA-3B. Aquatic connectivity between the L-29 Canal and ENP is currently limited to the series of small culverts under the Tamiami Trail. For terrestrial organisms not only is the L-29 Canal is a potential obstruction that must be crossed by swimming, but traffic mortality on the Tamiami Trail reduces the free movement of animals.

A goal of CERP is to reduce compartmentalization of the Everglades and promote ecological connectivity. Ecological connectivity can be achieved through connections, corridors, or other means that provide organisms the ability to overcome the isolation of populations.

It may become desirable to restore ecological connectivity between WCA-3B and ENP through the removal of the L-29 levee and the filling of the Tamiami Canal. This is a project feature of CERP.

This project offers the opportunity to implement a CERP de-compartmentalization feature by reducing the barrier effects of the highway and promoting an increased opportunity for movement between the L-29 Canal and ENP.

4.6 CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT EFFECTS ON NATURAL HYDROLOGY

Major characteristics of South Florida hydrology are local rainfall, evapotranspiration, canals and water control structures, flat topography and the highly permeable Biscayne Aquifer. Water introduced from either direct rainfall or canals is rapidly removed by evapotranspiration, seepage into the aquifer, or canal and overland surface drainage to the Atlantic Ocean, Florida Bay, or the Gulf of Mexico.

In the last 50 years, the construction of the C&SF Project converted nearly half of the original Everglades ecosystem to agricultural and urban uses. The hydrology of the remaining Everglades has become altered by the operation of the C&SF Project. The average annual flows and surface water stages have been reduced, and regional groundwater has been lowered. Annual hydroperiods have been increased or decreased depending on location. Long and short hydroperiod wetlands have been relocated geographically. The extent of long hydroperiod refugia was reduced. The frequency, duration, and magnitude of interannual wet and dry cycles have been changed. Additionally, salinity levels in estuaries have been altered. The construction and operation of the C&SF Project provided a network of canals and levees that have accelerated the spread of polluted water, sediments, and exotic species. The project greatly reduced the water storage capacity within the remaining natural system and created an unnatural mosaic of impounded, fragmented, and both over-inundated and over-drained marshes throughout the system.

More water flow now occurs through canals to the east and less to ENP and Florida Bay than occurred historically. Generally, the Everglades receive too much water during wet periods and too little during droughts. As a result of flood protection plans, the wetlands are over-drained. In wet periods, water is impounded in the WCAs, and then discharged to Everglades or coastal canals. During dry periods, water can flow through the canals to coastal areas and bypass the wetlands. Everglades water quality is threatened by the runoff from adjacent urban and agricultural lands, since water delivered during dry periods may contain unwanted nutrients, dissolved minerals, pesticides, and pollutants from urban areas. Changes in hydrology have also altered Everglades topography due to drainage, soil oxidation, subsidence, and burning. Large areas remain flooded for long periods, while other areas are kept almost dry. The timing of wet and dry cycles has also been altered, resulting in water conditions that do not correspond to life cycles of native species.

The project is an element in the restoration to the extent practicable of near-natural flows to the Everglades. The modification of the Tamiami Trail offers the opportunity for water to be conveyed without obstruction to NESRS and ENP.

SECTION 5.0
FORMULATION OF ALTERNATIVE PLANS

5.1 INTRODUCTION

The planning process consists of a series of steps that identifies or responds to problems and opportunities associated with the Federal objective in the selection of a recommended plan. The process involves an orderly and systematic approach to making determinations and decisions at each step so that the public can be fully aware of the basic assumptions employed, the data and information analyzed, the areas of risk and uncertainty, the reasons and rationales used, and the significant implications of each alternative plan. Steps in this process are:

- The identification of problems and opportunities associated with the Federal objective.
- The inventory, forecast, and analysis of resource conditions within the planning area relevant to the identified problems and opportunities.
- The formulation of alternative plans through the establishment of goals and objectives, and the identification of planning requirements
- The evaluation of the effects of the alternative plans.
- The comparison of alternative plans.
- The selection of a recommended plan based on the comparison.

The final recommended plan must be consistent with the original MWD project goal: *. . . take steps to restore natural hydrologic conditions to the extent practicable in the Everglades National Park*. Consistency is defined as the ability of the plan to pass the peak flows expected under MWD in a natural spatial configuration.

In achieving this, each of the alternatives was evaluated according to criteria specified in Section 5.3 of this document. The alternatives and the criteria were developed from meetings, discussions, and coordination with representatives of affected or interested agencies, organizations, and the public.

5.2 FEDERAL OBJECTIVE

The objective of this project is to identify a technical solution to the Tamiami Trail component of the MWD Project that is also compatible with the expected hydraulic conveyance of CERP as modeled by the restudy and the Everglades National Park Protection and Expansion Act of 1989. The project must enable the passage of MWD flows of 4,000 cfs.

5.3 PLANNING CONSTRAINTS

While planning objectives describe the goals of the Study, there are certain limitations that must be considered in evaluating any plan for possible implementation. These limitations are considered to be planning constraints. Programmatic constraints that involve maintaining consistency with Federal and State programs and actions include:

- **Conveyance Capacity across Tamiami Trail.** This project must provide the appropriate capacity to convey MWD flows across the Tamiami Trail in a safe and effective manner that is consistent with the restoration objectives of this project.

- **FHWA and FDOT Requirements.** This project involves the modification of a Federal Highway (U.S. 41). The completed project must provide the public with a facility that meets the highway standards required by the Federal Highway Administration and the Florida Department of Transportation.

- **Florida Coastal Zone Management Program**. This project is located within the designated Coastal Zone of the State of Florida. Therefore, it is necessary that the project maintain consistency with the requirements of the Florida Coastal Zone Management Program. Part of that program involves the receipt of an official determination by FDEP that the project is consistent with the Florida Water Quality Criteria.

- **Flood Control.** This project must not adversely affect the ability of any channels or structures to provide currently authorized flood control measures to the public.

- **Other MWD Components.** This project is a component of the overall Modified Water Deliveries Program. Therefore, the project must maintain full consistency with the other MWD component projects.

- **National Park Protection and Expansion Act of 1989; CERP Goals and Objectives.** This project must, within the limits of its authorization, provide for the improvement of water deliveries as specified in the Everglades National Park Protection and Expansion Act of 1989. In addition, this project must provide compatibility with the overall goals and objectives of CERP as anticipated in the Restudy.

Other constraints that are based on limitations of area resources are discussed in the remainder of this section.

5.3.1 Socioeconomic Factors

There are two locations within the project area where Native Americans reside—the Tigertail Camp, located north of the Tamiami Trail on the L-29 Levee, and the Osceola Camp, located south of the Tamiami Trail at the western end of the project within ENP lands. A policy of avoidance and minimization of impacts at both locations is an important constraint in evaluating alternative actions. Additionally, the project must provide for access to these residential areas.

There are several private businesses along the south side of the Tamiami Trail in the project area, including airboat tour operators and restaurants. All of these operations (e.g., the Coopertown Air Boat Rides and Restaurant, the Gator Park, and Everglades Safari sites) include private residences with approximately 15 residents. Gator Park has a variable number of "semi-permanent" residents in RVs who stay for extended periods. Consistent with the 1989 Everglades Protection and Expansion Act, all private property south of Tamiami Trail is in the process of being acquired by ENP, with the exception of the Airboat Association of Florida site. The Park Management Plan is currently being revised and will reflect the potential for continued operations by these businesses as concessionaires.

For purposes of this study, it is assumed that business operations will continue during and after the scheduled period of construction, and therefore, access and other impacts to these businesses will be taken into account. Road construction of any kind would have a temporary adverse impact on the businesses by reducing visitation (up to 35 percent annually based on previous experience). (Personal communication, business owners/managers).

5.3.2 Wetlands

Wetlands are present to the north and south of the project corridor. ENP, which owns or is in the process of acquiring all lands south of the Tamiami Trail, abuts the Tamiami Trail to the south, and WCA-3B is located to the north of the L-29 Levee. The L-29 Canal is potentially regulated under Section 10 of the Rivers and Harbors Act.

5.3.3 Protected Species

Coordination with USFWS and FFWCC indicated that species listed by both Federal and State governments as threatened or endangered are located near the project.

There are stands of pond apple on the southern side of most of the sets of culverts along the length of the Tamiami Trail in the project area. It was suggested by ENP hydrologists that these stands result from elevated levels of nutrients present in the water passing under the culverts, although there are other potential causes, including the placement of dredged material. At two of these stands are wood stork rookeries: the Tamiami Trail East Rookery and the Tamiami Trail West Rookery. The larger is the Tamiami Trail West, which included approximately 1,500 nests during the 1999-breeding season. The rookery boundary is located approximately 300 feet south of the existing road. A primary and secondary restriction zone established by USFWS presents a constraint with respect to construction noise and alternative alignment location, as well a potential constraint to the timing of construction. These constraints are also imposed for the two additional rookeries in the project area, Tamiami East and Frog City. A detailed description of the rookeries and restrictions, as well as the associated figures, is included in Section 5.7.5.6.

The project must not preclude compliance with the RPAs of the February 19, 1999, USFWS Final Biological Opinion on the Cape Sable Seaside Sparrow. This calls for at least 30 percent of the regulatory water discharges from WCA-3A to be re-routed through WCA-3B into NESRS beginning on March 1, 2000. These waters would traverse WCA-3B and the Tamiami Trail, and enter ENP instead of being discharged

through the S-12 structures. The amount of water would rise to 45 percent and 60 percent of the regulatory water discharges in March 1, 2001, and March 1, 2002, respectively.

5.3.4 Transfer of Everglades National Park Property to the State of Florida

Upon completion of the project, ownership of any property incorporated into the highway right-of-way would be transferred to the Florida Department of Transportation for maintenance, management, and operation.

Expansion of the existing roadway onto ENP property or construction of a new roadway on ENP property presents constraints. If the project requires the transfer of more than 200 acres from ENP to the State of Florida, authorization by Congress would be required. The approval authority of a transfer of less than 200 acres rests with the office of the Secretary of the Interior. Alternative actions that incorporate ENP property into the roadway should be avoided if possible. If it is not possible to avoid incorporating ENP property into the roadway, the amount of property should be minimized to the extent practicable.

5.3.5 Recreation Areas

The Francis S. Taylor Wildlife Management Area, which includes WCA-3B, is managed by FFWCC. This area is managed for both consumptive (hunting, fishing) and non-consumptive (bird watching, boating, airboating, etc.) recreational use and environmental purposes.

WCA-3B is accessed on its south side by crossing the L-29 Canal at either S-333 or S-334 and utilizing the boat and airboat ramps proximate to these structures. The verge between the north bank of the L-29 Canal and the L-29 Levee can be used for passage along the canal, picnicking, or boat launch into L-29 Canal. A two-track roadway atop the L-29 Levee allows panoramic views to the north into WCA-3B. Fishing from the north shoulder of Tamiami Trail (south bank of L-29 Canal) is popular, as is fishing at the culvert outfalls on the south side of the highway. Three businesses on the south side of Tamiami Trail offer short excursions out into the Everglades. The airboat drivers also act as tour guides and provide information and explanation about the Everglades and the flora and fauna.

Under existing conditions, the views afforded to persons driving on the Tamiami Trail are limited. On the north side one sees the canal and the L-29 Levee. The view to the south is usually blocked by vegetation growing close to the south side of the roadway. Occasional breaks in the vegetative wall provide glimpses of the Everglades.

5.3.6 Section 4(f) Considerations

Section 4(f) of the Department of Transportation Act of 1966, which protects certain public lands and all historic sites, technically was repealed in 1983 when it was codified, without substantive change, as 49 U.S.C. 303. U.S. Department of Transportation regulations continue to refer to Section 4(f), because it would create “needless confusion to do otherwise;” the policies engendered by Section 4(f) are widely referred to as "Section 4(f)" matters. A provision with the same meaning is found at 23 U.S.C. 138 and applies only to the Federal Highway Administration (FHWA).

Section 303, which provides that certain procedures that must be followed for Department of Transportation activities, reads as follows:

> *(a) It is the policy of the United States Government that special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.*
>
> *(b) The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities and facilities.*
>
> *(c) The Secretary may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, recreation area, refuge, or site) only if:*
>
> > *(1) there is no prudent and feasible alternative to using that land; and*
> >
> > *(2) the program or programs includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.*

Section 4(f) declares a national policy of preservation of public park and recreation lands, wildlife and waterfowl refuges and historic sites and prohibits the U. S. Department of Transportation (DOT) from approving any program that uses such publicly owned lands of local significance unless: (1) there is no feasible and prudent alternative, and (2) such use includes all possible planning to minimize harm.

Projects requiring DOT approval or using DOT funds may trigger the applicability of 4(f). Section 4(f) applies to all historic sites and to publicly owned public parks, recreation areas, wildlife and waterfowl refuges of local significance (4(f) lands). When a project "uses" 4(f) lands, a 4(f) evaluation is required. "Use" is broadly defined to include acquisition, occupancy, and substantial impairment amounting to constructive use.

The DOT has established regulations for compliance with Section 4(f), which include preparation and coordination of 4(f) documents. The 4(f) evaluation requires consideration of alternatives in light of the purpose and need for the project. Section 4(f) evaluations are generally performed in conjunction with a National Environmental Policy Act (NEPA) analysis when a transportation agency is preparing NEPA documentation. Otherwise, there is a separate 4(f) evaluation and interagency coordination to insure the statutory requirements are met. Projects that use "minor amounts" of 4(f) lands may qualify for programmatic 4(f) evaluations that streamline interagency coordination.

DOT involvement in the Tamiami Trail modifications could trigger the applicability of 4(f). Potential 4(f) lands that could be affected by Tamiami Trail modifications include Everglades National Park, WCA-3B and the existing US 41, itself.

5.3.7 Condition of Existing Highway

As stated previously the road is currently in need of maintenance. The limestone base is approximately 85 percent saturated due to capillary action and is significantly deteriorated. The asphalt surface of the road has surface environmental stress cracks and subsurface fatigue cracks. On the Pavement Condition Rating, by which road surfaces are rated on a scale of 1 to 10, the Tamiami Trail would receive a Florida Department of Transportation (FDOT) rating of 6. Whenever a road is rated at 6 or below, repair actions are typically required.

5.3.8 Hydraulics and Hydrology

Existing conditions are a result of implementation of the experimental program begun in 1989. This program is, in turn, restricted by a legally mandated water level in the L-29 Canal of 7.5 feet. This corresponds to a flow of approximately 1,300 cubic feet per second (cfs). Full flow for the MWD as it is presently configured is approximately 4,000 cfs. CERP implementation would add another 1,500 cfs, bringing total design flow across the project site to approximately 5,500 cfs.

As the MWD project is implemented and in accordance with Reasonable and Prudent Alternatives (RPA) agreed to by the Corps and USFWS, water deliveries across the project site, as a percentage of the regulatory water release component from WCA-3A to ENP, will increase from the current percentage of approximately 30 percent to 45 percent in 2001 and 60 percent by December, 2003. This is the target for full operational implementation of the MWD project.

The Corps modeled hydraulic conditions comparing water levels in the L-29 Canal adjacent to the road with and without improvements to the conveyance of water. If no improvements to the conveyance are made, the limestone base of the road would be inundated regularly. Overtopping of the road could occur under certain conditions. Inundation of the limestone base would be detrimental to the integrity of the highway and should be avoided. Overtopping would likely result in the closure of the road; because the Tamiami Trail is used for hurricane evacuation, closure has a potential for affecting public safety.

Because the L-29 Canal is a conveyor and equalizer for water flows prior to passage into ENP, alternatives that would interfere with the ability of the canal to provide conveyance and equalization of flows should be avoided. This would include any significant reduction in its width or the placement of structures that would affect its capacity. The L-29 Canal is regulated under Section 10 of the Rivers and Harbors Act.

5.3.9 Structural Factors

FDOT has certain minimum standards that are required for the construction of new roadways. It would be necessary for these standards to be followed.

5.3.10 Water Quality Treatment Requirements

In accordance with Section 62-302.700 of the Florida Administrative Code (FAC), ENP was designated an "Outstanding Florida Water" (OFW), which entitles ENP to special protection with the intent of maintaining its existing good water quality. In general, FDEP cannot issue permits for direct pollutant discharges to an OFW that would adversely affect existing water quality or indirect discharges that would significantly degrade the OFW. Permits for new dredging and filling must clearly be in the public interest. Only FDEP-permitted activities would be affected with the exception of stormwater permits required by SFWMD. Some activities with direct discharges of stormwater would be required to retain or treat a larger amount of stormwater than facilities that discharge to non-OFW waters. Water management districts (SFWMD, SRWMD, SWFWMD, SJRWMD) have been delegated stormwater permitting authority. Some indirectly associated activities, such as dredging and filling, are subject to OFW standards. Other activities, such as those for maintenance of existing facilities, activities to allow or enhance public usage, and construction activities that may temporarily affect water quality, are exempted from regular OFW criteria if special safeguards are used.

Requirements for the treatment of highway runoff are determined by FDEP. As described in Chapter 62-25, FAC, *Regulation of Stormwater Discharge*, FDEP requires that all stormwater runoff be collected and directed to treatment facilities that meet specific design and performance standards. Facilities must provide retention, or detention with filtration, of the runoff generated by the first one inch of rainfall. As an option, for projects or project subunits with drainage areas less than 100 acres, facilities may provide retention, or detention with filtration, of the runoff generated by the first one-half inch of rainfall. However, facilities discharging directly to OFW (described in Chapter 17-3 FAC) must provide additional treatment in accordance with Section 62-25.025(9) FAC. Additionally, retention or detention basins shall provide the capacity for the given volume of stormwater within 72 hours following the storm event. The additional storage volume must be provided by a decrease of water stored via percolation through soil, evaporation, or evapotranspiration.

However, FDEP provides that construction of stormwater treatment facilities is not required as long as travel lanes or capacity is not being added to the roadway.

Jurisdiction over water quality issues of this type is normally delegated by FDEP to the water management districts. Because SFWMD is a sponsor of the project, jurisdiction remains with FDEP.

Erosion and sediment control best management practices must be used as necessary during construction in order to retain sediment on site. Controls shall be developed with respect to specific site conditions.

5.3.11 Costs

Agency authorizations and budgetary constraints may limit the incorporation of features that would be desirable but not required.

5.4 PLANNING GOALS AND OBJECTIVES

In order to achieve a technical solution to the Tamiami Trail component of the MWD project, it was necessary to identify the objectives that any such solution should attain (see Table 10). The following planning objectives were established to address the problems and realize the opportunities identified, and to serve as guidelines for the formulation and evaluation of alternative plans.

- **Consider cost effectiveness**. Evaluation of the cost of the project takes into account the yearly maintenance cost, construction cost, and the life cycle cost. Cost effectiveness is not necessarily the least cost alternative, but includes the consideration of environmental gains and losses that would result from each alternative.

- **Maximize compatibility for future CERP actions**. Evaluations of how an alternative complies with possible operational changes and the alternative's CERP compatibility are considered. This includes the ability of the alternative to facilitate the CERP features of de-compartmentalization, ecological connectivity, and promotion of sheet flow. Additionally, the potential for an alternative to interfere with future CERP actions is considered.

- **Minimize impacts associated with construction**. The impacts to traffic, residents, businesses, wildlife, etc., along Tamiami Trail must be evaluated. The types of disruptions and the length of the construction schedule for completion of each alternative are included in this evaluation.

- **Minimize adverse socioeconomic impacts**. Socioeconomic impacts include social impacts to Native Americans and other residents, economic impacts to businesses and individuals, and the maintenance of the way of life chosen by persons in the project area. The ability of each alternative to avoid or minimize detrimental socioeconomic effects is evaluated.

- **Restore and enhance ecological function**. This project is part of the MWD project to promote hydrological restoration for ecological benefits to the Everglades. As a result, the benefits realized from each alternative, as well as the ecological costs of each alternative, must be considered.

- **Minimize impacts to recreation facilities**. Recreational activities include fishing, boating, wildlife viewing, etc., by visitors to the project area. The ability of each alternative to avoid and/or minimize adverse impacts or to enhance recreation is examined.

- **Minimize permanent/temporary loss of wetlands**. To the extent possible, the project should minimize both permanent and temporary losses of wetlands. The number of acres of wetlands that would be incorporated into the highway right-of-way is considered.

- **Minimize conveyance impacts to the L-29 Canal**. The L-29 Canal functions in both a water supply and flood control capacity, as well as a

Table 16. Summary of Performance Measures to Assess Compliance of Each Action Alternative with Project Objectives

Measure	Units	No Action	Alt 1*	Alt 1a	Alt 1b	Alt 1c*	Alt 1d*	Alt 1e*	Alt 1f*	Alt 1g*	Alt 1h*	Alt 1i*	Alt 1j*	Alt 1k*	Alt 1l*	Alt 1m*	Alt 1n	Alt 1o
Objective 1. Consider Cost-effectiveness																		
PM1. Construction Cost	$	Not Applicable	14,935,871	24,004,854	50,555,604	57,988,018	75,457,390	46,258,110	41,108,440	********	********	********	72,877,879	81,988,877	23,045,753	31,898,380	45,446,946	47,381,229
PM2. Annual Routine Maintenance	$	Not Applicable	40,000	40,000	40,000	40,000	40,000	40,000	40,000	Not Calculated	Not Calculated	Not Calculated	40,000	40,000	40,000	40,000	40,000	40,000
PM3. Rescoping/Maintenance (Resurfacing)	$	Not Applicable	13,646,872	16,153,247	32,778,918	32,981,601	35,809,171	35,462,382	36,053,886	1,386,428	1,386,428	1,386,428	32,235,870	16,842,628	16,981,022	20,980,600	14,302,117	28,328,219
PM4. Life Cycle Cost	$	Not Applicable	31,166,877	63,946,977	90,139,446	113,913,998	76,240,594	48,259,140	56,135,445	********	********	********	77,984,054	96,345,803	31,004,934	54,776,745	59,862,953	66,158,346
PM5. Average Annual Cost	$	3,150,000	1,286,288	1,847,792	2,783,519	3,888,008	3,801,498	2,179,783	2,280,289	9,128,866	9,423,807	8,847,308	6,177,370	6,608,870	1,852,379	3,033,244	3,430,381	5,370,868
Objective 2. Maximize Compatibility for Future CERP actions																		
PM6. Flexibility for Increased Flows, Stages, and Capacity Associated with CERP	Qualitative	n	n	f	f	f	f	f	f	f	f	f	p	f	f	f	f	f
PM7. Addition of Features to Increase Tail Water Flows	Qualitative	n	n	p	p	p	p	p	p	f	f	f	p	f	f	f	p	p
PM8. Ease of Adding Features to Improve Environmentalists	Qualitative	n	n	p	m	n	n	p	m	p	p	f	p	m	p	m	p	m
PM9. Ecological Connectivity	Qualitative	n	n	n	n	n	n	n	n	p	p	f	p	p	n	n	n	n
PM10. Potentially Degradable Linear Footage of Roadbed	linear feet	33,048	33,048	33,048	33,048	33,048	33,048	33,048	33,048	33,048	12,200	0	33,828	41,740	33,848	33,880	33,048	33,048
PM11. Minimal Acreage Needed	Qualitative	n	n	p	p	p	p	p	p	f	f	f	p	p	p	p	n	n
PM12. Potential Wetland Acreage Restored	acres	0	0	0	0	42	42	0	0	44	44	44	34	44	0	1.7	0	0
Objective 3. Minimize Construction Impacts																		
PM13. Ability to meet NWD implementation schedule	Qualitative	f	f	f	f	f	f	f	f	f	f	f	p	f	f	f	f	f
PM14. Temporary Impacts of Construction Activities on the Miccosukee Tribe and Businesses	Qualitative	f	f	f	m	p	p	m	m	p	p	p	p	m	f	m	f	f
PM15. Duration of Construction	Qualitative	Not Applicable	18	24	24	30	30	24	24	48	48	48	30	30	24	24	24	28
PM16. Access for Turbidity Control	Qualitative	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f
PM17. Is Phasing of Construction needed to Avoid Impacts to Wood Stork during Nesting Season	yes/no	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
PM18. Ability to Maintain Adequate Distances from Construction to Wood Stork Primary Zones	Qualitative	f	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
PM19. Ability to Maintain Distances from Construction to Wood Stork Secondary Zones	Qualitative	f	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
PM20. Ability to Maintain Adequate Distances from Construction to Bald Eagle Nesting Locations	Qualitative	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f

* Alts 1.2.c,d,j,k,l were not carried forward after evaluation of the performance measure tables and have not been considered for recommendation as the preliminary recommended plan. The rationale for their elimination is included in Section 5.10 of the GRR/SEIS.

Measure	Units	No Action	Alt 1	Alt 2a	Alt 2b	Alt 3a*	Alt 3b*	Alt 4a*	Alt 4b*	Alt 5a*	Alt 5b*	Alt 5c*	Alt 6a*	Alt 6b*	Alt 7a	Alt 7b	Alt 8a	Alt 8b
Objective 4. Minimize Adverse Socioeconomic Impacts.																		
PM1. Impacts to Businesses or Private Properties	Qualitative	r	r	p	p	r	r	m	m	r	r	r	p	p	r	r	p	p
PM2. Impacts on Access and Privacy at Tigertail Camp	Qualitative	r	r	r	r	m	m	r	r	r	r	r	r	r	r	r	r	r
PM3. Impacts on Access and Privacy at Osceola Camp	Qualitative	r	r	r	m	r	r	m	m	p	m	p	r	m	r	m	r	m
PM4. Noise Impacts to Tigertail Camp (FSUT Noise Approach Criteria exceeded)	yes/no	no	no	no	no	yes	yes	no	no	no	no	no	no	no	no	no	no	no
PM5. Noise Impacts to Osceola Camp (FSUT Noise Approach Criteria exceeded)	yes/no	no	no	no	yes	no	no	yes	yes	no	no	no	no	yes	no	yes	no	yes
Objective 5. Restore Ecological Function.																		
PM1. Wetland Functional Index	Ft/Ac (lost)	0	2.02	10.1	31.48	18.82	32.18	40.43	34.04	Not Applicable	Not Applicable	Not Applicable	0.0	22.11	3.42	49.35	3.31	48.08
PM2. Linear Footage of North/South Ecological Connectivity	linear feet	250	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	56,499	1,500	1,500	3,000	3,000	250	450
PM3. Exotic Vegetation Removed	linear feet	0	1,450	56,499	56,499	1,450	1,450	56,499	56,499	1,450	1,450	56,499	56,499	56,499	56,499	56,499	56,499	56,499
PM4. Hydrologic Restoration of WCA3B	Qualitative	n	p	p	p	p	p	p	p	p	p	r	r	r	p	p	p	p
PM5. Area with Affected Flow Magnitude	Qualitative	m	m	m	m	m	m	m	m	r	r	r	p	p	m	m	m	m
PM6. Difference Between Average Velocity in Tamiami Trail and Average Velocity in the marsh south of Tamiami Trail	Qualitative	n	m	m	m	m	m	m	m	r	r	r	p	p	m	m	m	m
Objective 6. Minimize Impacts to Recreation Facilities.																		
PM1. Access for Visitor Use	Qualitative	r	r	r	r	p	p	p	p	p	p	p	p	p	r	r	r	r
PM2. Duration of Temporary Access Restrictions	months	r	18	24	24	50	50	24	24	48	48	48	50	50	24	24	24	28
PM3. Access to Fishing from Tamiami Trail	Qualitative	r	r	r	r	r	r	r	r	m	m	m	p	p	p	p	r	r
PM4. Access to Fishing in the L-29 Canal	Qualitative	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
PM5. Boating Accessibility to WCA-3B	Qualitative	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
Objective 7. Minimize Permanent/Temporary Wetland Loss																		
PM1. Wetlands Permanently Lost	acres	r	0	11.9	88.2	14.3	28.9	88.4	105.8	Not Applicable	Not Applicable	Not Applicable	2.9	48.9	5.0	72.4	9.1	68.0
PM2. Wetlands Temporarily Lost During Construction	acres	r	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0
Objective 8. Minimize Impacts to L-29 Canal.																		
PM1. L-29 Canal Capacity	Qualitative	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
PM2. Effects on Flora and Wildlife	Qualitative	r	r	r	r	p	p	r	r	r	r	r	r	r	r	r	r	r

* Alts 1,2,3,4,5,6 were not carried forward after evaluation in the performance measure matrix and hence not been considered for recommendation as the preliminary recommended plan. The rationale for their elimination is included in Section 5.10 of the DRR/SEIS.

r = The performance measure indicates Full Compliance with the project objective.

p = The performance measure indicates Partial Compliance with the project objective.

m = The performance measure indicates Minimal Compliance with the project objective.

n = The project measure indicates Non Compliance with the project objective.

- habitat for fish and wildlife. Each alternative must be evaluated to ascertain adverse effects on the ability of the canal to convey water for these functions.

The final recommended plan must provide for the unimpeded conveyance of water from the L-29 Canal north of the Tamiami Trail to NESRS and ENP south of the Tamiami Trail, as stated by the 1992 GDM. The final recommended plan must be consistent with improved water deliveries to ENP as part of the effort to meet the original MWD project goal.

Each of the alternatives was evaluated according to the above objectives. The goals and objectives were developed from meetings, discussions, and coordination with representatives of affected or interested agencies, organizations, and the public.

5.5 PERFORMANCE MEASURES

Performance measures are quantitative or qualitative indicators of how well (or poorly) an alternative meets a specific objective. A set of performance measures was developed for use as the basis for evaluation of the various alternatives for this project. These performance measures have specific metrics related directly to each of the project objectives discussed in Section 5.4.

5.5.1 Objective 1. Consider Cost Effectiveness

PM1. Construction Cost. The total cost of constructing each alternative is compared quantitatively in dollars.

PM2 Annual Routine Maintenance Cost. This assessment is made to compare annual operations and maintenance (O&M) costs incurred after construction has been completed. This estimate is based on the past three-year average O&M cost of $39,537 for the 10.7-mile section of the Tamiami Trail under consideration. The unit of comparison is dollars.

PM3. Recurring Maintenance (Resurfacing). This is a comparison of recurring costs incurred for highway asphalt resurfacing and upkeep of traffic control appurtenances (guardrails, signage, etc). The unit of comparison is dollars.

PM4. Life Cycle Costs. This is a comparative measure of the total cost of each alternative over the 50-year life of the project, including initial capital costs, maintenance and repair, and operations. The unit of comparison is dollars.

PM5. Average Annual Costs. These costs are a comparative measure of the total costs of each alternative over the 50-year life of the project discounting future costs to a net present value using the appropriate discount rate. The unit of comparison is dollars.

5.5.2 Objective 2. Maximize Compatibility for Future CERP Actions

PM1. Flexibility for Increased Flows, Stages, and Capacity Associated with CERP Actions. Implementation of CERP may result in higher flows and higher stages of water in the L-29 Canal as part of hydrological restoration of the Everglades. This qualitative performance measure assesses the potential for alternatives to allow the higher flows and stages of water that may be associated with CERP.

PM2. Addition of Features to Achieve Full Sheet Flow to ENP. This is a qualitative measure of the difficulty of adding features to promote the sheet flow of water to ENP. This performance measure would include the potential for increasing sheet flow by removal of any unused portions of the existing Tamiami Trail roadway embankment.

PM3. Ease of Adding Features to Improve Decompartmentalization. This is a qualitative assessment to determine the ability of an alternative to aid in reducing the isolation of compartments and management areas within the Everglades. This also includes minimizing addition of construction barriers (such as the L-29 Levee and Canal), as well as the removal of barriers consistent with CERP objectives

PM4. CERP Compatibility (Ecological Connectivity). This is a qualitative measure of the compatibility of the various alternatives with CERP proposals to remove barriers isolating biological populations. The ability of an alternative to allow degradation of the L-29 Levee, remove the Tamiami Trail embankment, and fill the L-29 Canal under CERP are among features evaluated for each alternative.

PM5. Potentially Degradable Linear Footage of Roadbed. This performance measure is the length of the potentially degradable roadbed embankment that would be retained under each alternative. The unit of measurement is linear feet.

PM6. Minimal Retrofit Needed. This is a qualitative measure of the retrofit required for each alternative to enable the implementation of CERP objectives.

PM7. Potential Wetland Acreage Restored. This involves a quantitative measurement of acreage that could be restored to wetlands with each alternative. Wetland restoration areas include those for restoration only in conjunction with this project (i.e. degradation of existing Tamiami Trail and associated restoration), but do not include restoration of existing business sites; it is assumed that these sites could be restored regardless of the alternative selected.

5.5.3 Objective 3. Minimize Impacts Associated with Construction

PM1. Ability to Meet MWD Implementation Schedule and Satisfy RPA Requirements. This is a qualitative assessment of the ability of each alternative to meet the Federal schedule for implementing the MWD program and to comply with flow requirements for the Cape Sable seaside sparrow.

PM2. Temporary Impacts of Construction Duration on the Miccosukee Tribe and Businesses. The lengths of time that construction would affect the Tigertail and Osceola camps and businesses near the project area are assessed.

PM3. Duration of Construction. The amount of time required for the construction of each alternative is considered. The unit of measurement is in months.

PM4. Allowances for Turbidity Control. This is the ability of each alternative to allow the installation of features to control turbidity in runoff from construction areas.

PM5. Need for Phasing of Construction to Avoid Impacts to Wood Storks during Nesting Season. This is a qualitative assessment of each alternative for the need to phase road construction to minimize disturbances during that time of the year when wood storks are nesting.

PM6. Ability for Maintaining Adequate Distances from Road Construction to Wood Stork Primary Zones. Alternatives are qualitatively assessed for their ability to allow acceptable distances from wood stork primary zones during road construction.

PM7. Ability for Maintaining Adequate Distances from Road Construction to Wood Stork Secondary Zones. Alternatives are qualitatively assessed for their ability to allow acceptable distances from wood stork secondary zones during road construction.

PM8. Ability for Maintaining Adequate Distances from Road Construction to Snail Kite Nesting Locations. Alternatives are qualitatively assessed for their ability to allow acceptable distances from snail kite nesting locations during road construction.

5.5.4 Objective 4. Minimize Adverse Socioeconomic Impacts

PM1. Impacts to Businesses or Private Properties. Alternatives are qualitatively assessed for likely impacts on existing businesses. Among factors considered are: duration of reduced traffic flow in the construction phase; reduced physical access in the

construction phase; physical access following construction; extent of roadway encroachment on business parking and facilities during construction; and the extent of roadway encroachment on business parking and facilities after construction.

PM2. Impacts on Access and Privacy at the Tigertail Camp. Alternatives are qualitatively measured to assess the impacts to the Tigertail Camp for access, privacy, and encroachment both during the construction phase and after construction are completed.

PM3. Impacts on Access and Privacy at the Osceola Camp. Alternatives are qualitatively measured to assess the impacts to the Osceola Camp for access, privacy, and encroachment both during the construction phase and after construction is completed.

PM4. Noise Impacts to Tigertail Camp (Are FDOT Noise Approach Criteria Exceeded?). Alternatives are assessed with regard to predictions for exceedences of FDOT Approach Criteria at the Tigertail Camp. If there are exceedences beyond the future without project alternative, it would be necessary to consider noise abatement measures.

PM5. Noise Impacts to Osceola Camp (Are FDOT Noise Approach Criteria Exceeded?). Alternatives are assessed with regard to predictions for exceedences of FDOT Approach Criteria at the Osceola Camp. If there are exceedences beyond the future without project alternative, it would be necessary to consider noise abatement measures.

5.5.5 Objective 5. Restore Ecological Function

PM1. Wetland Functional Units. Wetland functional unit losses or gains associated with each alternative are quantified using the Wetland Rapid Assessment Procedure methodology. This is a measurement of the area and value of wetlands incorporated into the highway right-of-way.

PM2. Linear Footage of North-South Ecological Connectivity. The length of hydrologic connectivity between the L-29 Canal and ENP is measured for each alternative. This is the combined width of new bridges or breaches in the existing Tamiami Trail roadway embankment. The unit of measurement is linear feet.

PM3. Exotic Vegetation Removed. The extent of exotic vegetation to be removed under each alternative is measured. Removal of exotic vegetation would be during construction where the alignment shifts to the south of the existing Tamiami Trail. For Alternative 3, exotic vegetation would be removed at the locations of breaches in the existing roadway. The unit of measurement is linear feet.

PM4. Hydrologic Restoration of NESRS. This is a qualitative measurement of the capability of each alternative to meet the requirements for hydrologic restoration of NESRS.

PM5 Area with Affected Flow Magnitude. Per information obtained from DOI, "It is widely believed that the magnitude and direction of flow through the Everglades landscape are critical factors in the development and maintenance of Ridge and Slough micro-topography" and that "shorter flow openings force higher velocities in the structures and immediately downstream while the longer flow openings have spatially far-reaching, though less severe, effects." This performance measure identifies the area qualitatively. This DOI information is included for evaluation purposes. The Corps has not validated the methodology.

PM6 Difference between Average Velocity at the Road and Average Velocity in the Marsh. Per information obtained from DOI, "The difference between mean velocities at the road and in the marsh is used as an indication of the severity of the effect on flow magnitudes." These data are measured qualitatively. The Corps does not necessarily agree or disagree with the methodology used to develop the data. The Corps has not validated the methodology.

5.5.6 Objective 6. Minimize Impacts to Recreation Facilities

PM1. Maintenance of Access for Visitor Use. Alternatives are qualitatively assessed for their ability to allow access by visitors for recreation purposes. Among factors considered are the extent and duration of restrictions or the elimination of access both during the construction phase and after construction is completed.

PM2. Duration of Temporary Access Impacts. The length of time of limited access to portions of the project area during the construction phase of the project is assessed for each alternative. The unit of measurement is months.

PM3. Access to Fishing from the Tamiami Trail. Alternatives are qualitatively assessed to evaluate impacts to bank fishing from either side of the existing roadway.

PM4. Access to Fishing in the L-29 Canal. Alternatives are qualitatively assessed to evaluate impacts to bank and boat fishing in the L-29 Canal. This includes access to the L-29 Levee for bank fishing.

PM5. Maintain Boating Accessibility to Francis S. Taylor Wildlife Management Area (WCA-3B). Alternatives are qualitatively compared to assess access to WCA-3B for recreational boating, including airboats.

5.5.7 Objective 7. Minimize Permanent/Temporary Loss of Wetlands

PM1. Permanent Loss of Wetland Acreage. This is a quantification of permanent wetland impacts associated with each alternative. The unit of measurement is acreage.

PM2. Temporary Loss of Wetland Acreage during Construction. This is a quantification of temporary wetland impacts associated with each alternative. The unit of measurement is acreage.

5.5.8 Objective 8. Minimize Impacts to the L-29 Canal

PM1. Capacity. This performance measure considers the effects of alternatives on the capacity of the L-29 Canal to convey required volumes of water for existing flood control and water supply requirements.

PM2. Effects on Fish and Wildlife. Effects of each alternative on the fish and wildlife resources of the L-29 Canal are expressed qualitatively.

5.6 ALTERNATIVES

5.6.1 Future without Project Condition (No-Action Alternative)

Under this alternative the construction of bridges or other appurtenances to facilitate the passage of water from the L-29 Canal under the Tamiami Trail to NESRS would not take place. The road would remain in its existing configuration, and deterioration of the road would continue or accelerate. Although this alternative fails to meet the planning goals, objectives, and requirements, its evaluation is required by Section 1502.14 of the Council on Environmental Quality regulations implementing the National Environmental Policy Act of 1970.

5.6.2 Preliminary Array of Alternatives

The Corps, agency representatives, and the public during public scoping workshops developed a listing of 13 potential alternatives and posted these alternatives with a listing of the advantages and disadvantages of each on the Jacksonville District web site (Appendix D). This array of alternatives was developed by a Corps multidisciplinary team, which provided expertise in the area of hydraulics/hydrology, geotechnical engineering, planning procedures, and project management/project implementation. This information was used as an initial step in the planning process and as a basis for additional refinement of alternatives. The following describes the outcome of this initial investigation into the original 13 alternatives.

- **No-Action.** Under this alternative, the roadway would not be modified. Although this alternative would not meet the requirements or objectives of the project, it was retained for further evaluation to satisfy the requirements of NEPA.

- **New Tamiami Trail Alignment North of Existing Road.** This alternative involves the relocation of the roadway to the north of the L-29 Canal on the northern side of the L-29 Levee. The subgrade of the relocated roadway would be constructed at a higher elevation. *This alternative was retained for further evaluation as Alternative 3 in subsequent sections of this report*.

- **New Tamiami Trail Alignment South of Existing Road**. Under this alternative, the roadway would be relocated to a location immediately to the south of the existing roadway. The subgrade of the roadway would be constructed at a higher elevation. *This alternative was retained for further evaluation as Alternative 4 in subsequent sections of this report.*

- **Raising Low Portions of Tamiami Trail**. This alternative was not retained for further evaluation because of complications associated with the rerouting of traffic and the potential for subgrade inundation.

- **Incorporation of Bridge Spans on Current Tamiami Trail Alignment.** This alternative involves the construction of bridges along the existing roadway*. This alternative was retained for further evaluation as Alternative 1 in subsequent sections of this report*.

- **Placement of Underground Distribution Pipe South of Tamiami Trail**. This alternative was not retained for further evaluation because the discharge would not be distributed evenly to NESRS, the potential for disturbance to ENP lands during construction, encroachment on ENP land due to the limited right-of-way, the potential for subgrade inundation, potential impacts to wood stork rookeries, and the loss of wetland habitat.

- **Placement of Additional Culverts in Tamiami Trail.** This alternative was not retained for further evaluation because of complications from rerouting traffic around construction zones and the potential for subgrade inundation.

- **Raising Entire 11-Mile Length of Tamiami Trail.** Under this alternative, the highway would be elevated along the entire length of the project area. *This alternative was retained for further consideration as Alternative 5 in subsequent sections of this report.*

- **Clearing of Exotic Vegetation South of Tamiami Trail**. This alternative involves the removal of vegetation to south of the existing culverts to reduce impediments to the flow of water. An examination of the culverts by FDOT (Appendix E) concluded that vegetation was not restricting flows and that "…the primary determining factor for flow rate through the culverts is the water level. Rapid flow rates coincide with dredged waterways south of the culverts and restricted flow rates are associated with shallow water wetlands…" ENP prefers not to allow removal of vegetation or land disturbance; temporary impacts to the ENP ecosystem could result from mobilization of machinery for vegetation removal and from possible water-borne transport of exotic seed sources due to clearing activities. This alternative was not retained for further evaluation.

- **Move Westbound Lane of Tamiami Trail to L-29 Levee.** Under this alternative the roadway would be reconstructed on top of the L-29 Levee. This alternative was not retained for further evaluation because of the high cost, the impacts to businesses south of the road, the L-29 Levee not designed for use as a roadway, the incompatibility with the CERP alternative of removing the L-29 Levee, the complications of placing a roadway on S-355 Structures, and the impacts to the Tigertail Camp.

- **Combination of Bridge Spans and Raising Portions of Tamiami Trail.** This alternative involves the construction of bridges along the existing roadway and the raising of portions of the roadway that would have the greatest potential for flooding. *This alternative was retained for further evaluation as Alternative 2 in subsequent sections of this report*.

- **Combination of Bridge Spans and Clearing of Exotic Vegetation South of Tamiami Trail.** This alternative is similar to the previous alternative, but it also includes the removal of vegetation that has a potential to interfere with the flow of water through culverts. This alternative was not retained for further consideration because it creates complications due to rerouting of traffic around construction zones and because of ENP preferences not to allow removal of vegetation or land disturbances. Additionally, the remaining vegetation could continue to hinder flows to NESRS, temporary impacts to the ENP ecosystem could occur due to mobilization of machinery used for vegetation removal, and waterborne transport of exotic seed sources may result from clearing activities.

- **Combination of Bridge Spans, Raising Portions of Tamiami Trail, Placement of Additional Culverts, and Clearing of Exotic Vegetation**. This alternative is similar to the previous alternative, except that it includes the installation of additional culverts under the road.

5.6.3 Ten-Bridge Plan

The CERP report originally discussed the concept of providing 10 bridges across the Tamiami Trail as a way to decompartmenalize WCA-3B and NESRS. This conceptual plan included ten 100-foot-long bridges that would be evenly spaced along the alignment as a means to distribute the flow evenly. The cost for these bridges, which are conceptual costs with little or no engineering design performed, was estimated to be $11.1 million. Initial estimates for a four-bridge plan, which were based on some engineering analysis, show that the cost would be approximately $14.4 million.

In addition to the bridge construction costs, other factors that were evaluated by the planning design team included roadway costs, spatial distribution of the flow, and maintenance of traffic (MOT) during construction. The roadway costs and the spatial distribution of flow were very similar for both the four-bridge and 10-bridge plans, while the MOT for the 10-bridge plan would be more complicated and, ultimately, more expensive. Based on this evaluation, the planning design team decided not to develop the 10-bridge plan. The four-bridge plan was subsequently incorporated into alternatives 1, 2, and 4.

5.6.4 Minimal Plans to Protect Tamiami Trail

In the early plan formulation process, minimal plans for modifications to Tamiami Trail were investigated. Armoring of Tamiami Trail with geotechnical fabric and riprap was considered as a possible means of protecting the road once the increased flows of 4,000 cfs were established. There are two major drawbacks in armoring Tamiami Trail: the cost would be approximately $46,000,000, and the sub-base of the road will continue to be saturated. By armoring the existing road, the problems with pumping, rutting, and over topping of the road are not solved. Another minimal plan would be the installation of sheet pile walls. There are two major drawbacks with the installation of sheet piling along Tamiami Trail: the high cost ($73,663,600), and the incompatibility with providing sheet flow to the park. Due to these two plan's infeasibilities, they were not developed as one of the original 13 alternatives.

5.6.5 Screening of Preliminary Alternatives

The initial set of 13 alternatives developed by the Corps, participating agencies, and the public was screened by a multi-disciplinary team study group comprised of Corps personnel. As stated in Section 5.6.2, several of the alternatives were not considered for further development, while others received additional consideration based on the advantages and disadvantages presented in Appendix D, as well as on refined hydraulic modeling. Six of the preliminary alternatives, including the no-action plan described in Section 5.6.1, were retained for further evaluation with the expectation that continued public and interagency input would result in one or more additional alternatives that would require further development. Three additional alternatives were identified during this process. After the final nine alternatives were selected, detailed engineering information was prepared so that a comparative analysis could be made. Descriptions and costs of alternatives presented in this section were excerpted from Engineering Analyses that were performed.

5.6.5.1 No- Action Alternative. Under the No-Action Alternative, none of the proposed means to prevent degradation of the roadway would be constructed. MWD flows of 4,000 cfs would be conveyed from the L-29 Canal to ENP by the existing culvert system under the Tamiami Trail. The inclusion of this alternative in an environmental impact statement is required by 40 CFR 1502.14.

5.6.5.2 Alternative 1. Existing Alignment and Profile with Four New Bridges. This alternative includes four bridges and components of the existing Tamiami Trail to be reassembled as transitions to the new bridges (Figure 7). The existing section consists of two 12-foot-wide travel lanes, a 10-foot-wide shoulder on the north side, and a 10-foot-wide shoulder on the south side. With this alternative, the Tamiami Trail would have a grade transition from the nominal average 11-foot elevation to roughly 17 feet at the bridge deck. A large segment of the Tamiami Trail would remain intact.

New bridges would be built on the existing alignment, with traffic temporarily detoured to the south while bridge construction is in progress. Two of the bridges would be aligned with S-355A and S-355B, and the other two would be situated approximately midway between these structures and the east and west ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 feet each, while the two outer bridges would have a hydraulic width of 425 feet each. The optimum span length for the superstructure system of the permanent bridges would be around 30 feet. The

substructure system for the bridges would embody 18-inch square piles. The 43'-1" wide bridge typical section for the four bridges within this alternative provides sufficient deck area for two 12-foot-wide travel lanes and 8-foot-wide shoulders on both sides of the travel lanes.

Because this alternative does not include reconstruction of the existing highway, no option for water quality treatment is included. However, best management practices (BMPs) suitable for erosion and sedimentation controls would be provided during construction.

Existing utilities within the existing roadway corridor near the bridges may be affected by the construction. Staging areas for construction equipment and materials would be located near the eastern end of the corridor and at the locations of businesses along the highway. Staging and other functions would possibly require the utilization of sections of the existing shoulder for temporary periods.

The construction cost for Alternative 1 is estimated to be $14,330,871, and the total life cycle cost is estimated to be $21,189,677.

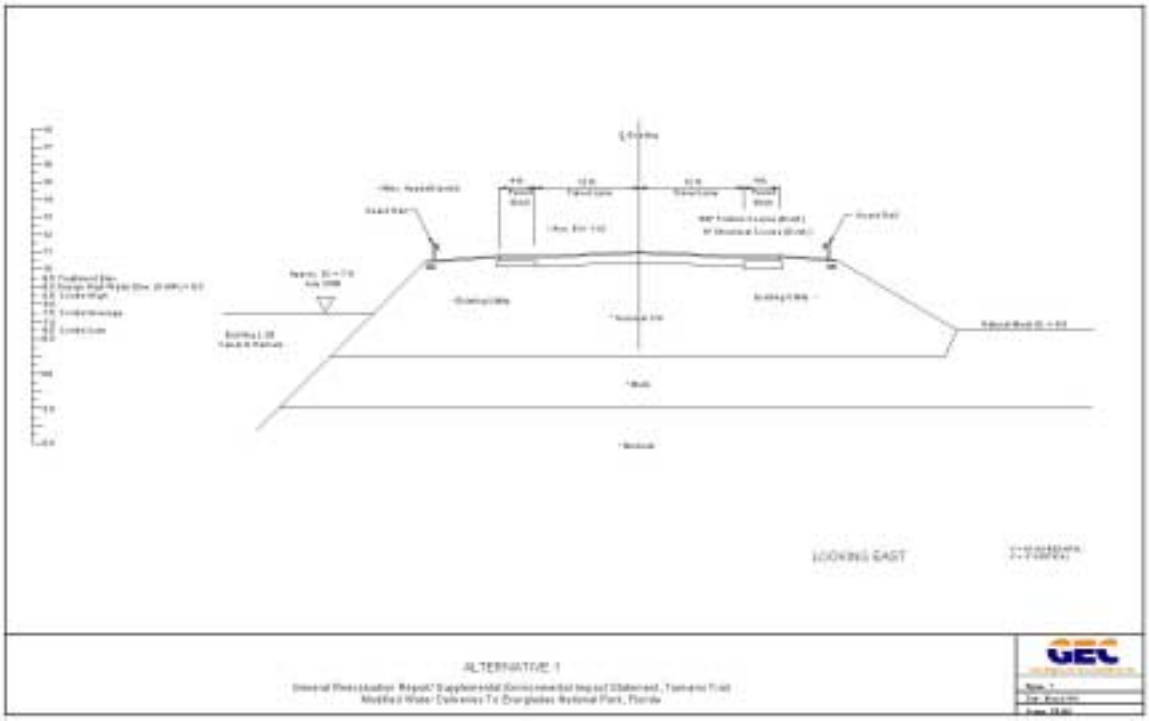
5.6.5.3 Alternative 2a. Existing Roadway Alignment with Raised Profile and Four New Bridges without Water Quality Treatment. Alternative 2 would involve the modification of the existing Tamiami Trail alignment, profile, and typical section, throughout the length of the study segment and would include the construction of four new bridges to convey MWD project flows from the L-29 Canal to ENP (Figure 8). The typical section consists of two 12-foot-wide travel lanes and 8-foot-wide shoulders on each side of the roadway. Five feet of this shoulder would be paved.

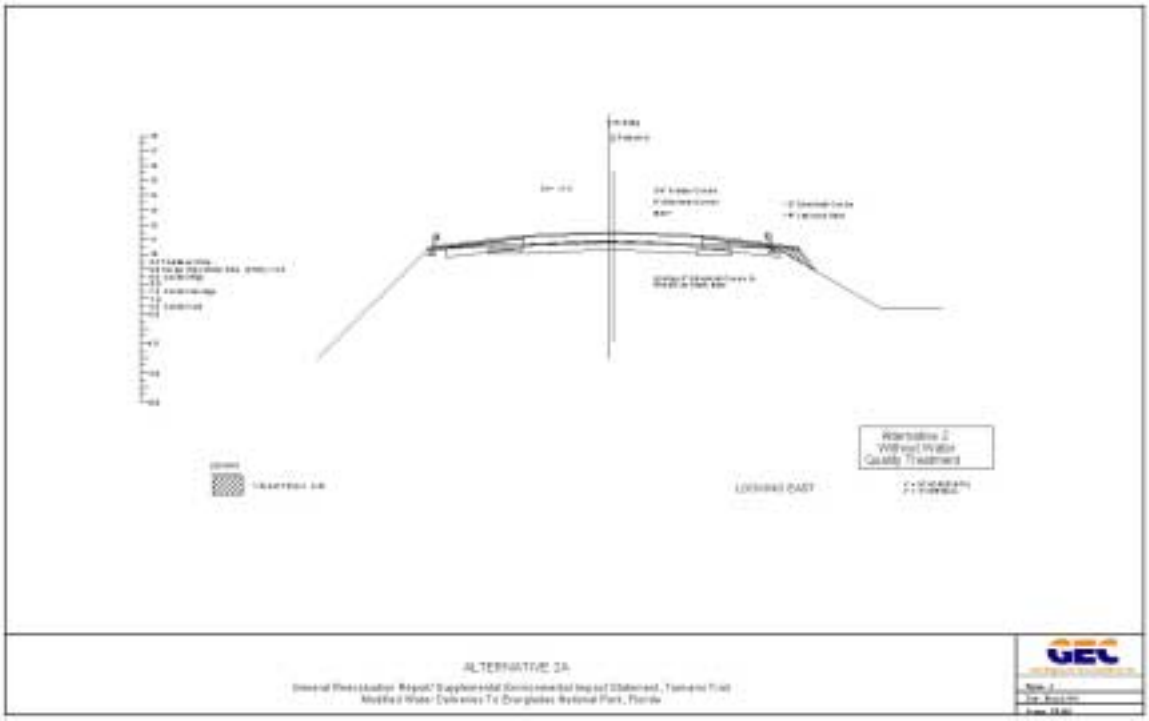
The construction of the bridges would be accomplished as described for Alternative 1. Two of the bridges would be aligned with S-355A and B, and the other two would be located approximately midway between these structures and the east and west ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 feet each, while the two outer bridges would have a hydraulic width of 425 feet each. The 43'-1" wide bridge typical section for the four bridges within this alternative would provide sufficient deck area for two 12-foot-wide travel lanes, and 8-foot shoulders on both sides of the travel lanes.

Alternative 2 has been divided into two sub-alternatives (2a and 2b) to consider the treatment of highway runoff to improve water quality.

Alternative 2a would provide for the upgrading of the existing roadway to accommodate a design high water elevation of 9.3 feet and traffic for 50 years. With this approach, the existing asphalt pavement would be left intact so that it may act as a construction platform and serve as a black base. Low areas along the highway would be raised to a minimum elevation of 11.0 feet throughout the project. A 6-inch asphalt overlay would also be included. A 7-year resurfacing interval for this option would appear warranted.

Traffic is to be maintained as it exists today. The overlay of the existing roadway would be accomplished using a moving operation. Staging areas for construction equipment and materials could be located on the business parcels along the corridor that are to be acquired or are not actively used now. Otherwise, staging and other functions may need to utilize sections of the existing shoulder for temporary periods. It may be necessary to


LOOKING EAST
ALTERNATIVE 1


Alternative 2
Without Water
Quality Treatment
ALTERNATIVE 2A

have a staging area near the east end of the corridor, with materials moved in the remaining short distance on an “as needed, just-in-time” basis at the work site.

The construction cost for Alternative 2a is estimated to be $24,354,651, and the total life cycle cost is estimated to be $32,530,077.

5.6.5.4 Alternative 2b. Existing Roadway Alignment with Raised Profile and Four New Bridges with Water Quality Treatment. Alternative 2b (Figure 9) would require widening the embankment footprint to provide water quality treatment facilities on each side of the roadway. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended.

Water quality treatment would be achieved with dry linear retention facilities adjacent to the roadway that would be used to collect highway runoff during rainfall events. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation.

Under Alternative 2b, temporary barricades would be spaced every 50 feet at the north edge of the westbound travel lane line. In one-quarter mile increments, the existing guardrail would be removed and replaced with a temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A 10-foot-wide strip of temporary pavement placed south of the existing centerline would allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement. Staging areas for construction equipment and materials would possibly be located at the businesses along the corridor. Other staging areas may be necessary near the east end of the corridor.

Alternative 2b would require an additional 51 feet of right-of-way to accommodate the water treatment facilities on either side of the road and the slopes for the higher reconstructed highway.

The construction cost for Alternative 2b is estimated to be $58,550,658 and the total life cycle cost is estimated to be $50,126,440.

5.6.5.5 Alternative 3a. New Roadway to the North with Eight New Bridges without Water Quality Treatment. Alternative 3 involves the construction of a new roadway with eight bridges immediately north of the L-29 Levee on the north side of the Tamiami Trail (Figure 10). This alternative has been divided into two sub-alternatives (3a and 3b) to consider treatment of highway runoff to improve water quality. This alternative would enable flows to be conveyed from WCA-3B across the L-29 Levee to the L-29 Canal. The typical section consists of two 12-foot-wide travel lanes, and 8-foot-wide shoulders on each side of the roadway. Five feet of this shoulder would be paved. Alternative 3 would provide for a 15-foot-wide canal maintenance berm.

The eight bridges would be located:

- Over the L-29 Canal at the western end of the project.
- Over the L-29 Canal at the eastern end of the project.
- At the S-355A drainage structure
- At the S-355B drainage structure
- At the site of the Airboat Association of Florida
- At the Weir A location
- At the Weir B location
- At the Weir C location

The bridges would be aligned with existing S-355A and B (each with flow channel bottom widths of 60 feet), and with weirs A, B, and C, would be 200 feet, 150 feet, and 200 feet long, respectively. Bridges over the L-29 Canal near each end of the corridor would connect with the existing highway. A bridge over the canal would provide access to the site of the Airboat Association of Florida.

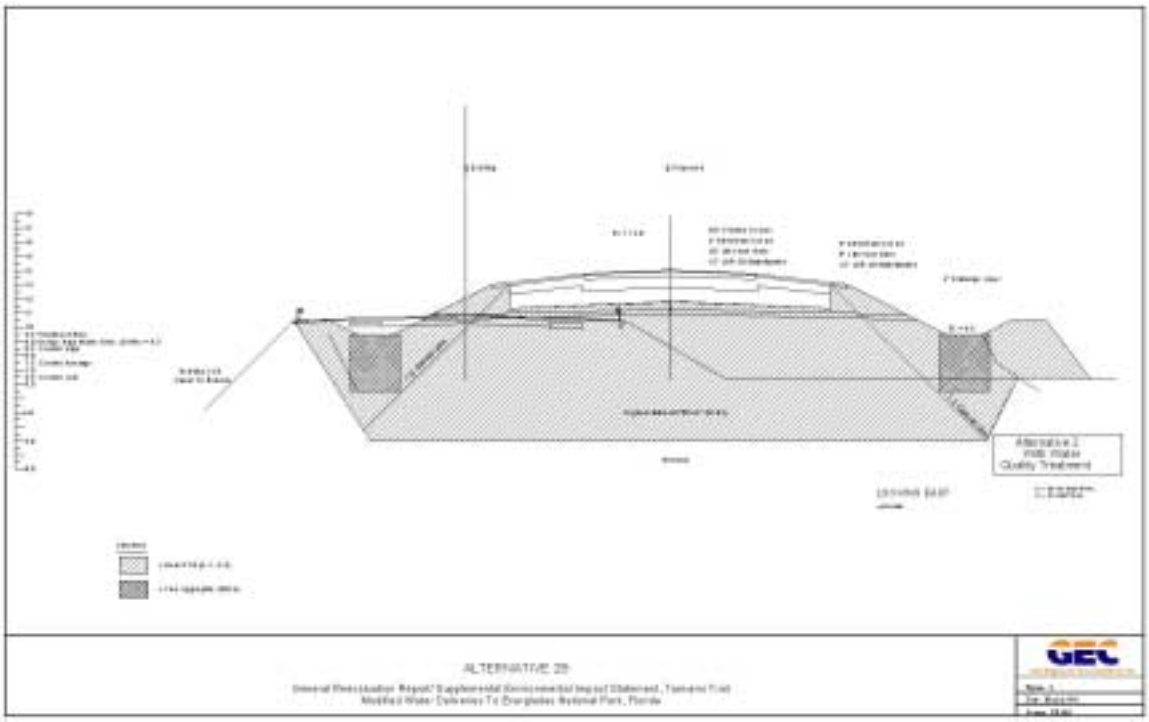
The 43-foot, 1-inch-wide bridge typical section applies to all eight bridges to provide sufficient deck area for two 12-foot-wide travel lanes and 8-foot shoulders on both sides of the travel lanes. A 35-foot, 1-inch-wide bridge typical section would apply to the access bridge to the Airboat Association of Florida site and would provide sufficient deck area for two 12-foot-wide travel lanes and 4-foot shoulders on both sides of the travel lanes.

The roadway elevation would be 17.4 feet to conform to the elevation of the future Pump Station 356 tieback levee. A nominal 4-foot pavement envelope would be required, which is ample clearance above the 9.3-foot design high water elevation. A periodic resurfacing interval of 12 years would be recommended. Utility relocations would be a necessity.

Because this alternative does not retain the centerline of the existing facility, alignment transitions would be required at either end of the project limits. Traffic would be maintained as it currently exists. Once a temporary transition roadway is completed, traffic would then be shifted while permanent transitions to the new roadway are constructed. Following construction of the new roadway, traffic would be shifted to the new alignment, and the existing roadway would be removed. Staging areas for construction equipment and materials would be located on the sites of the businesses along the corridor. Staging and other functions may require utilizing sections of the existing shoulder for temporary periods.

Access to the Flight 592 Memorial and the S-333 structure would be retained. The alignment would be shifted to the north to minimize impacts to the Tigertail Camp, S-355A, and S-355B. A portion of the existing roadway would be retained at the western end of the project area to provide access to the Osceola Camp.

The existing Tamiami Trail embankment would be breached at locations near those of the bridge locations for alternatives 1 and 2. This would allow conveyance of flows south into ENP.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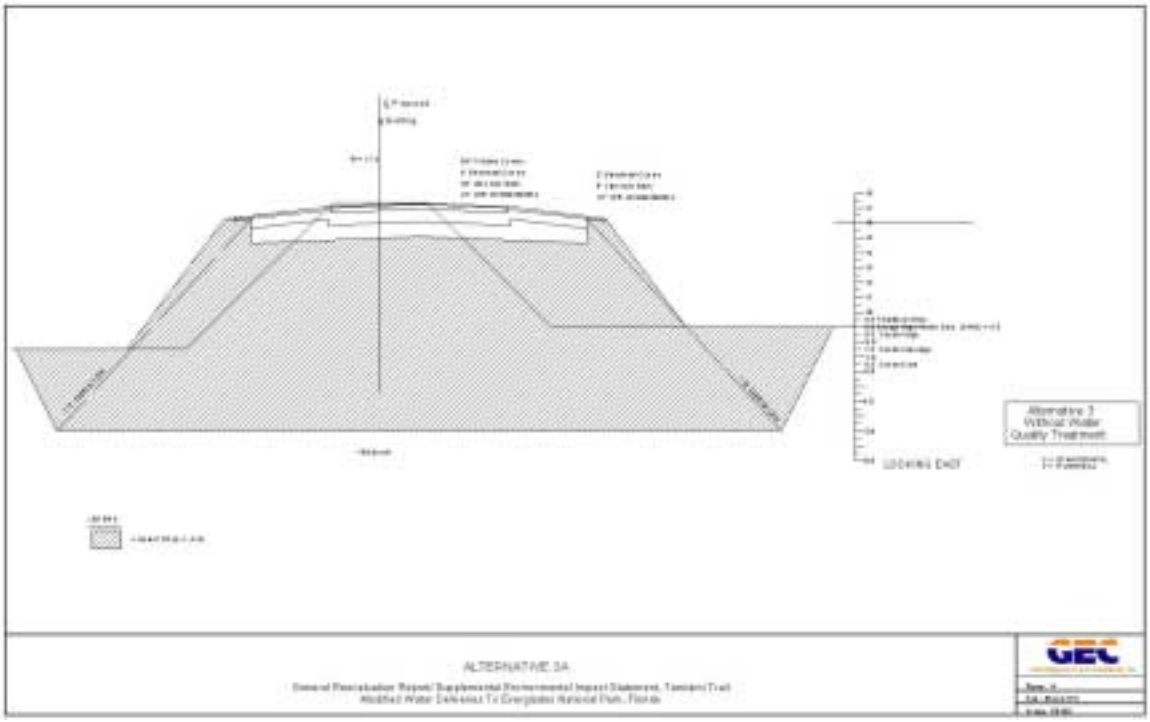

Alternative 3
Without Water
Quality Treatment
LOOKING EAST
ALTERNATIVE 3A

The construction cost for Alternative 3a is estimated to be $67,959,310 and the total life cycle cost is estimated to be $70,751,666.

5.6.5.6 Alternative 3b. New Roadway to the North with Eight New Bridges with Water Quality Treatment. Alternative 3b would have a slightly wider footprint than Alternative 3a because of the incorporation of water quality treatment (Figure 11), which would be achieved with dry linear retention facilities adjacent to the roadway. The treatment facilities would have a control elevation of 9.5 feet and an overall depth of one foot.

The construction cost for Alternative 3b is estimated to be $73,457,368, and the total life cycle cost is estimated to be $76,249,766.

5.6.5.7 Alternative 4a. New Roadway to the South with Four New Bridges without Water Quality Treatment. Alternative 4 consists of a new road constructed immediately to the south of the Tamiami Trail within the edge of ENP (Figure 12). This alternative has been divided into two sub-alternatives (4a and 4b) enabling consideration of incorporating treatment of highway runoff to improve water quality.

Two bridges of Alternative 4a would be aligned with S-355A and B (each with flow-channel bottom widths of 60 feet), and the other two would be located approximately midway between these structures at the eastern and western ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 feet each, while the two outer bridges would have a hydraulic width of 425 feet each. The existing roadway embankment would be breached at locations approximating the bridge locations for alternatives 1 and 2.

The 43-foot, 1-inch-wide bridge typical section for the four bridges within this alternative provides sufficient deck area for two 12-foot-wide travel lanes and 8-foot-shoulders on both sides of the travel lanes.

Because Alternative 4a does not retain the centerline of the existing facility, alignment transitions would be required at either end of the segment. At the eastern end of the corridor, the S-356 pump station, the S-334 spillway replacement, and adjustments to levees and the Tamiami Trail would be additional factors affecting the transition. The typical section consists of two 12-foot-wide travel lanes, and 8-foot-wide shoulders on each side of the roadway. Five feet of this shoulder would be paved.

Temporary barricades would be placed every 50 feet at the southern edge of the westbound travel lane line. In one-quarter mile increments, the existing guardrail would be removed and replaced with temporary barrier walls. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A 10-foot wide strip of temporary pavement would be placed south of the existing centerline to allow the roadway to slope to the north at two percent. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement.

Staging areas for construction equipment and materials may be located at the business sites along the corridor. Staging and other functions may also possibly require utilizing

sections of the existing shoulder for temporary periods, as well as locations near the eastern end of the corridor.

It would be necessary to obtain right-of-way from the Airboat Association of Florida to construct the roadway under this alignment.

The construction cost for Alternative 4a is estimated to be $45,235,110, and the total life cycle cost is estimated to be $48,233,140.

5.6.5.8 Alternative 4b. Build New Roadway to the South with Four New Bridges with Water Quality Treatment. Alternative 4b would have a wider footprint that Alternative 4a because of the incorporation of water quality treatment, which would consist of dry linear retention facilities adjacent to the roadway (Figure 13). The treatment elevation would be set at 9.5 feet. The treatment facilities would have an overall depth of one foot. Due to the proximity of the new alignment to the existing roadway, the treatment facilities on the north side of the new alignment would have to be constructed in the existing embankment.

The construction cost for Alternative 4b is estimated to be $47,128,438, and the total life cycle cost is estimated to be $50,126,440.

5.6.5.9 Alternative 5a. Elevated Roadway within Existing Right-of- Way without Water Quality Treatment. Alternative 5 involves the construction of an elevated roadway generally within the right-of-way of the existing Tamiami Trail (Figure 14). Alternative 5 has been divided into two sub-alternatives (5a and 5b) for evaluation of water quality measures, and 5c for considering the removal of the existing highway embankment.

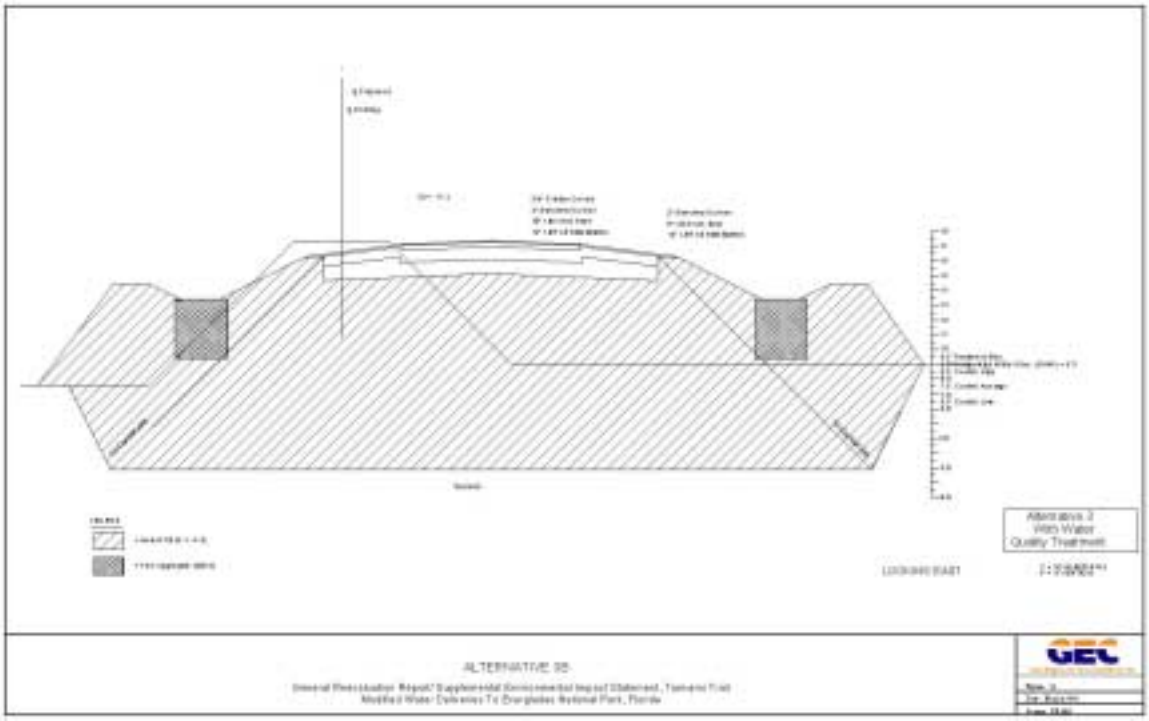
Alternative 5a consists of a bridge that covers the entire 10.7-mile length of the MWD project area. At each end, there would be short reconstruction segments of the roadway to transition to the new bridges. The pavement would have a grade transition from the nominal average of an 11-foot elevation to about an elevation of 22.5 feet at the bridge deck.

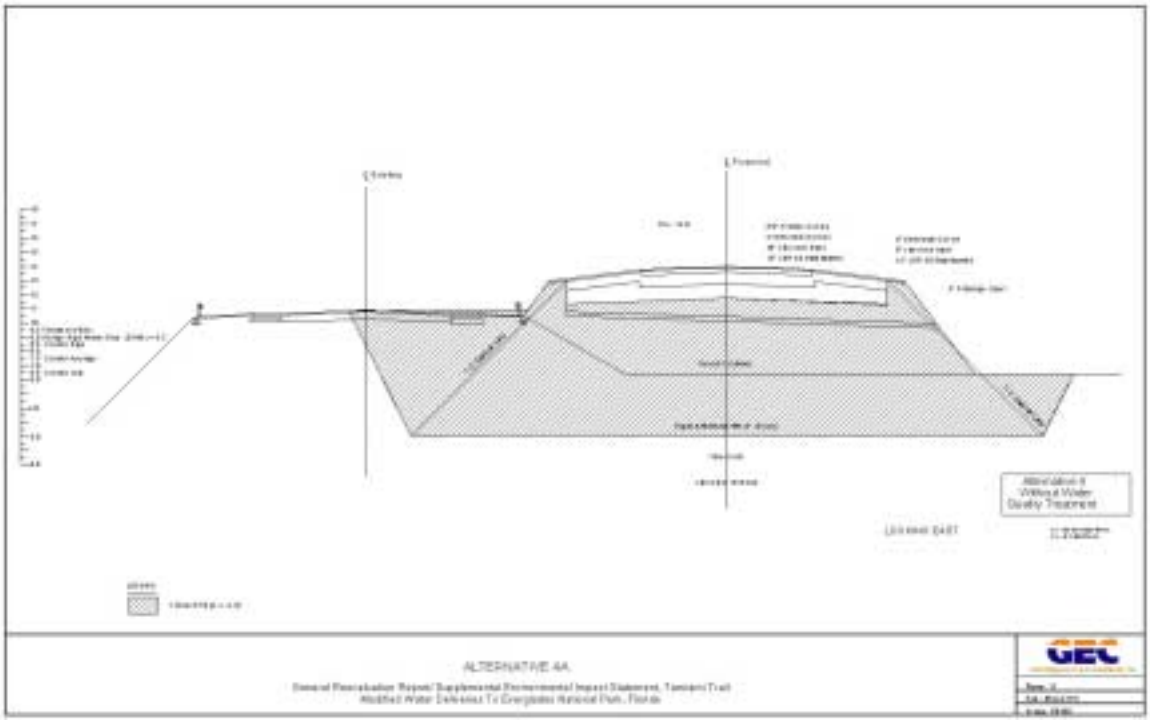
The 43-foot, 1-inch-wide bridge typical section would provide sufficient deck area for two 12-foot wide travel lanes and 8-foot shoulders on both sides of the travel lanes. Exceptions would occur where a surface connection for access or other reasons might be required. A 35-foot, 1-inch-wide bridge typical section would provide access to the Airboat Association of Florida and include sufficient deck area for two 12-foot-wide travel lanes, and 4-foot-wide shoulders on each side of the travel lanes. The new bridge deck would be equipped with drain scuppers that discharge directly to the area below.

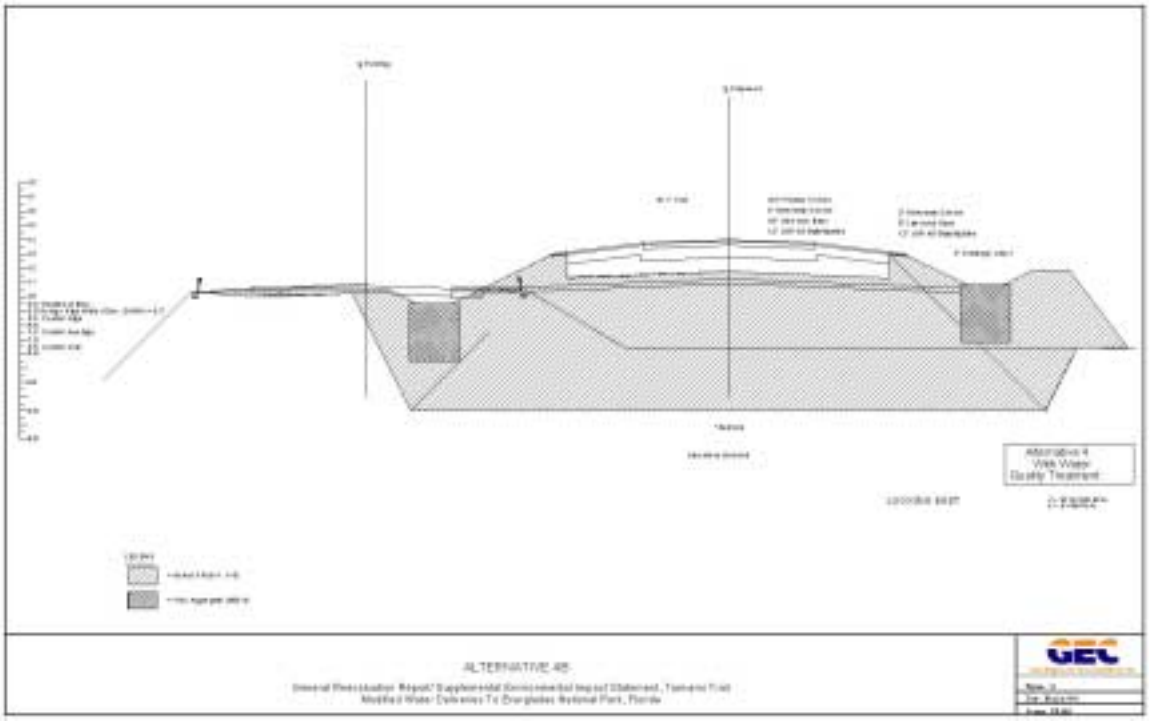
The existing Tamiami Trail embankment would be breached at locations similar to the bridge locations for alternatives 1 and 2.

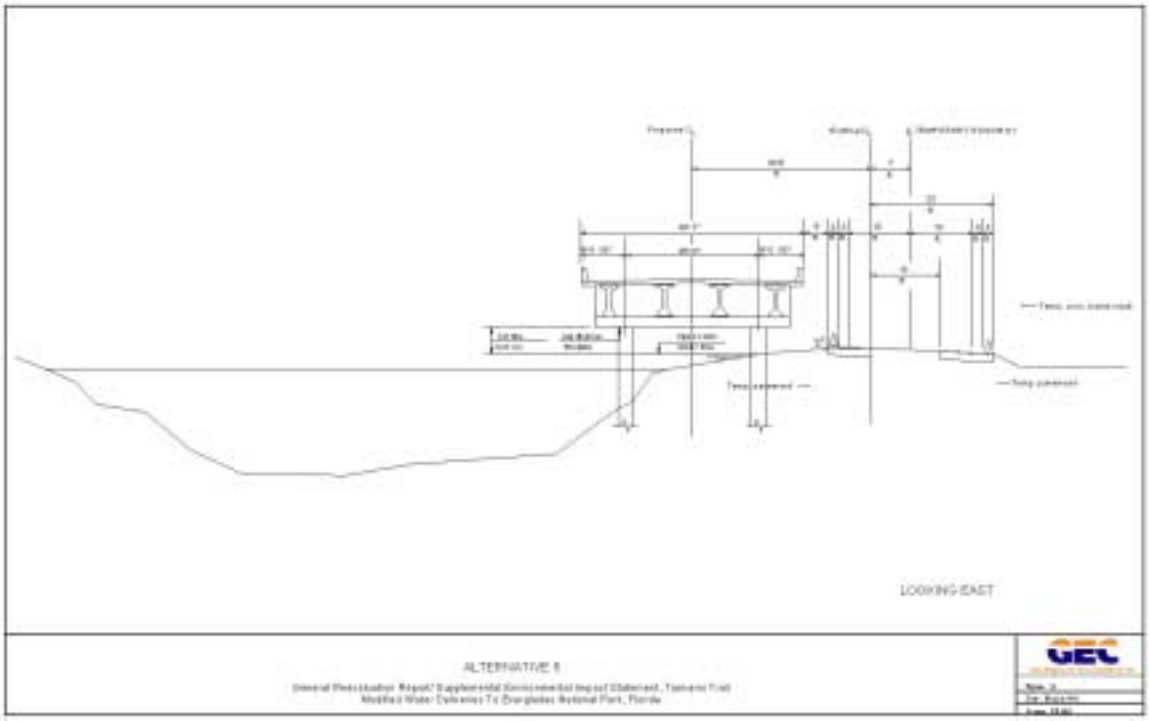
This alignment would be positioned to minimize impact and construction cost and to facilitate maintenance of traffic during construction. The alternative would require only a modest alignment transition at either end of the segment.

Temporary barricades would be placed every 50 feet at the southern edge of the westbound travel lane line. In ¼ mile increments the existing guardrail would be


Alternative 2
With Water
Quality Treatment
ALTERNATIVE 2B


ALTERNATIVE 4A


Alternative 4
Web Weir
Quality Treatment
ALTERNATIVE 4B


LOOKING EAST
ALTERNATIVE 8

removed and replaced with temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the south, utilizing the new pavement. A 10-foot-wide strip of temporary pavement would be placed north of the existing centerline to allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed one foot north of the southern edge of the temporary pavement. The bridge would then be constructed.

Staging areas for construction equipment and materials may be located at the sites of the businesses along the corridor. Staging and other functions would also possibly require utilizing sections of the existing shoulder for temporary periods. Staging areas may be necessary near the eastern end of the corridor.

Connecting roads would provide temporary access to the Airboat Association of Florida. Temporary access to the Osceola Camp would be accomplished via a connecting road from the west. In addition, turning lanes may be needed at these locations.

Existing utilities would be affected by the new construction.

The construction cost for Alternative 5a is estimated to be $135,915,000, and the total life cycle cost is estimated to be $135,994,180.

5.6.5.10 Alternative 5b. Elevated Roadway within Existing Right-of- Way with Water Quality Treatment. Alternative 5b includes the same alignment as described in Alternative 5a, but also incorporates water quality treatment. Piping would convey highway runoff to dry retention swales constructed on adjacent segments of the abandoned roadway embankment. Swales would be approximately 600 feet long and spaced at one-half mile intervals; there would be approximately 22 in the corridor. Maintenance of swales would be provided by workers using lightweight equipment transported by boat. Culverts under the existing roadway embankment would be unaffected by new construction except for breaches for water flow and would be left in place.

The construction cost for Alternative 5b is estimated to be $140,314,000, and the total life cycle cost is estimated to be $140,393,480.

5.6.5.11 Alternative 5c. Elevated Roadway within Existing Right-of- Way, without Water Quality Treatment, with Degradation of the Existing Highway Embankment. This alternative is identical to Alternative 5a except that it would incorporate the removal of the existing highway and the highway embankment beneath the elevated structure.

The construction cost for Alternative 5c is estimated to be $142,156,700, and the total life cycle cost is estimated to be $142,235,880.

5.6.5.12 Alternative 6a. Existing Alignment with Raised Profile, Four-Mile Bridge without Water Quality Treatment. Alternative 6 incorporates features of Alternative 2 and Alternative 5. It consists of raising the profile of the existing Tamiami Trail and constructing a four-mile bridge (Figure 15). This alternative has been divided into two sub-alternatives (6a and 6b) for the evaluation of water quality treatment measures.

Under Alternative 6a, the existing Tamiami Trail embankment profile and typical section would be modified for approximately three miles at the western end of the project and approximately four miles at the eastern end. The centerline would fall very close to the centerline of the existing highway. The existing asphalt pavement would be left in place to serve as a base. Low areas would be leveled to a minimum elevation of 11.0 feet, and a 6-inch asphalt overlay would be added.

Approximately four miles of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge would begin at the Blue Shanty Canal, approximately three miles from the western end of the project and extend to just east of the Cooperstown Canal. The bridge would be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment would be breached at four evenly spaced locations along the four-mile bridge totaling approximately 1,500 feet. Access would be provided to the Airboat Association of Florida site by means of a 35'-1" wide bridge with two 12-foot travel lanes and four-foot shoulders.

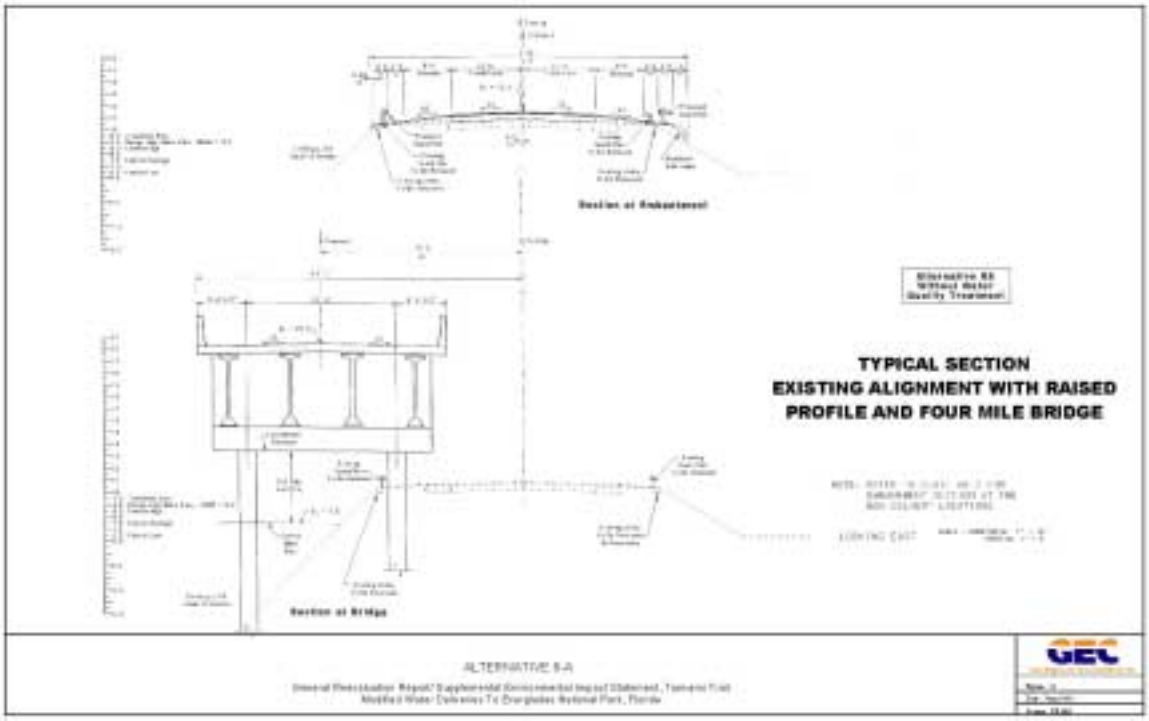
This alignment would be positioned to minimize impacts and construction costs and to facilitate maintenance of traffic during construction. There are no significant alignment transitions required at either end of the segment.

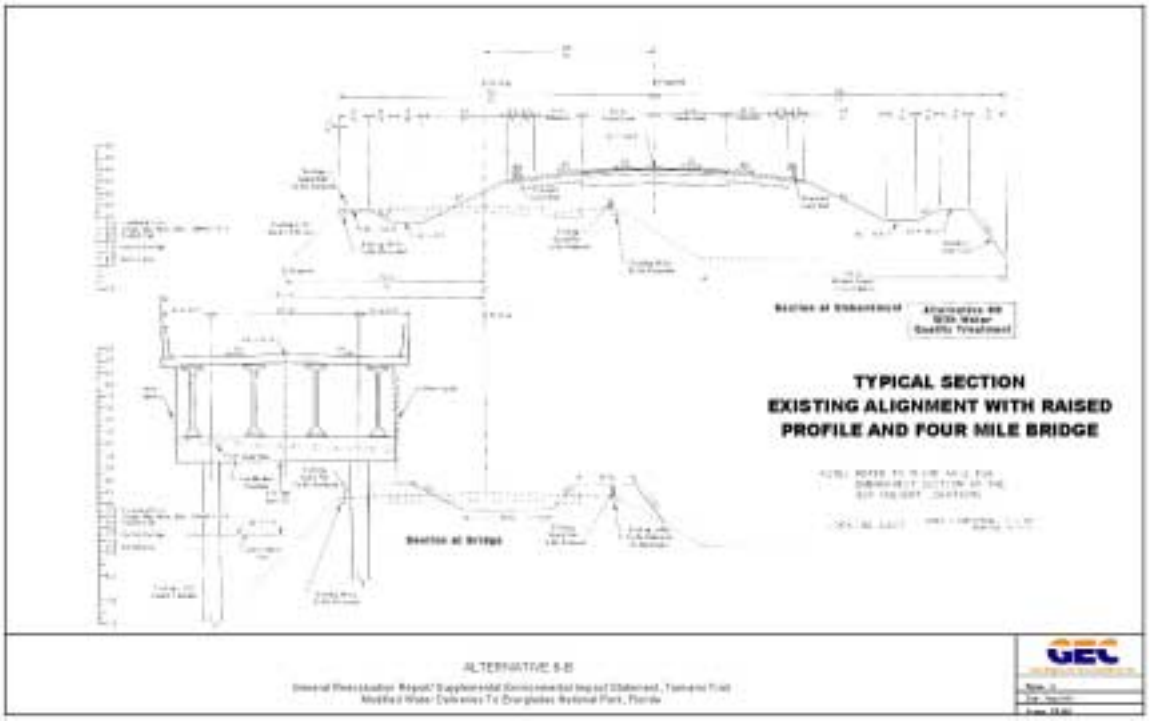
The construction cost for Alternative 6a is estimated to be $72,877,979, and the total life cycle cost is estimated to be $77,994,054.

5.6.5.13 Alternative 6b. Existing Alignment with Raised Profile, Four-Mile Bridge and Eight New Box Culverts with Water Quality Treatment. This alternative (Figure 16) would shift the centerline of the roadway approximately 27 feet to the south to provide for water quality treatment facilities on each side of the road. The existing roadway embankment would be removed down to the bedrock, and a new embankment would be constructed. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended.

Water quality treatment would be achieved with dry linear retention facilities adjacent to the roadway that would be used to collect highway runoff during rainfall events. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation. The bridge would be equipped with piping to convey the runoff to dry retention facilities constructed on adjacent segments of the abandoned existing roadway embankment. These swales would be approximately 600 feet long, and spaced at 0.5-mile intervals, such that there would be approximately seven of them adjacent to the bridge.

Maintenance would be provided by workers using lightweight equipment transported by boat.


TYPICAL SECTION
EXISTING ALIGNMENT WITH RAISED
PROFILE AND FOUR MILE BRIDGE
ALTERNATIVE 9-A


TYPICAL SECTION
EXISTING ALIGNMENT WITH RAISED
PROFILE AND FOUR MILE BRIDGE
Section at Bridge
ALTERNATIVE 5-B

For constructing the bridge portion, the existing roadway would be shifted to the south to prevent traffic flow underneath the structure. Construction staging would be done from a barge in the L-29 Canal. For roadway construction, traffic would be shifted to the north on a temporary pavement.

The right-of-way would extend 51 feet farther to the south than the existing right-of-way.

Box culverts can be installed as described for Alternative 6a.

The construction cost for Alternative 6b is estimated to be$81,369,677, and the total life cycle cost is estimated to be $83,245,822.

5.6.5.14 Alternative 7a. Existing Alignment with Raised Profile and 3,000-foot Bridge without Water Quality Treatment. Alternative 7 combines features of Alternative 5 and Alternative 2. It consists of modifying the existing Tamiami Trail profile and typical section at the beginning and end of the project area, and the construction of an approximately 3,000-foot bridge (Figure 17). The bridge would begin about one mile from the western end of the corridor. This alternative is divided into two sub-alternatives (7a and 7b) for considering the project both with and without water quality treatment of highway runoff.

Under Alternative 7a, the existing Tamiami Trail embankment profile and typical section would be modified for approximately one mile at the western end of the project and approximately 9.4 miles at the eastern end. The centerline would fall very close to the centerline of the existing highway. The existing asphalt pavement would be left in place to serve as a base. Low areas would be leveled to a minimum elevation of 11.0 feet, and a 6-inch asphalt overlay would be added.

Approximately 3,000 feet of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge would be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment would be removed adjacent to the bridge. Access would be provided to the Airboat Association of Florida site by means of a 35’-1” wide bridge with two 12-foot travel lanes and four-foot shoulders.

This alignment would be positioned to minimize impacts and construction costs and to facilitate maintenance of traffic during construction. There are no significant alignment transitions required at either end of the segment.

The construction cost for Alternative 7a is estimated to be $23,045,733, and the total life cycle cost is estimated to be $31,003,830.

5.6.5.15 Alternative 7b. Existing Alignment with Raised Profile and 3,000-foot Bridge with Water Quality Treatment. This alternative (Figure 18) would shift the centerline of the roadway approximately 27 feet to the south to provide for water quality treatment facilities on each side of the road. The existing roadway embankment would be removed down to the bedrock, and a new embankment would be constructed. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of

clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended.

Approximately 3,000 feet of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge would be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment would be removed adjacent to the bridge. Access would be provided to the Airboat Association of Florida site be means of a 35'-1" wide bridge with two 12-foot travel lanes and four-foot shoulders.

Water quality treatment would be achieved with dry linear retention facilities adjacent to the roadway that would be used to collect highway runoff during rainfall events. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation. The bridge would be equipped with piping to convey the runoff to dry retention facilities constructed at either end of the bridge.

For constructing the roadway portion of Alternative 7b, temporary barricades would be spaced every 50 feet at the north edge of the westbound travel lane line. In one-quarter mile increments the existing guardrail would be removed and replaced with a temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A 10-foot-wide strip of temporary pavement placed south of the existing centerline would allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement.

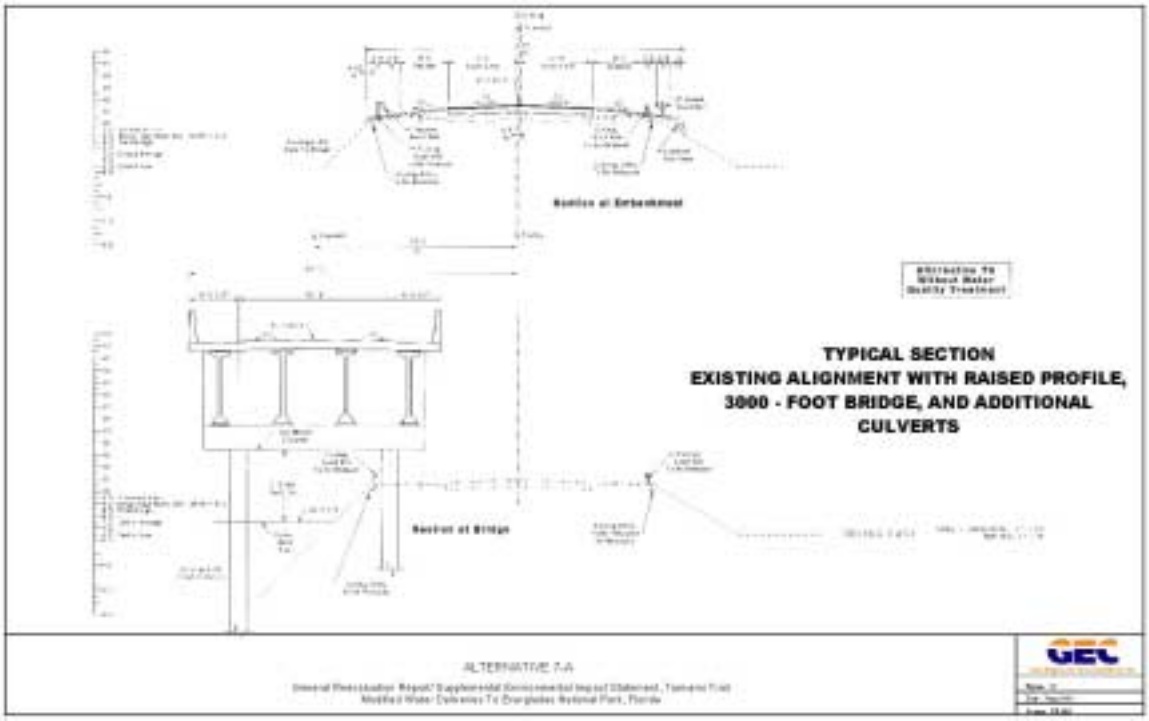
For constructing the 3,000-foot bridge portion, the existing roadway would be shifted to the south to prevent traffic flow underneath the structure. Construction staging would be done from a barge in the L-29 Canal.

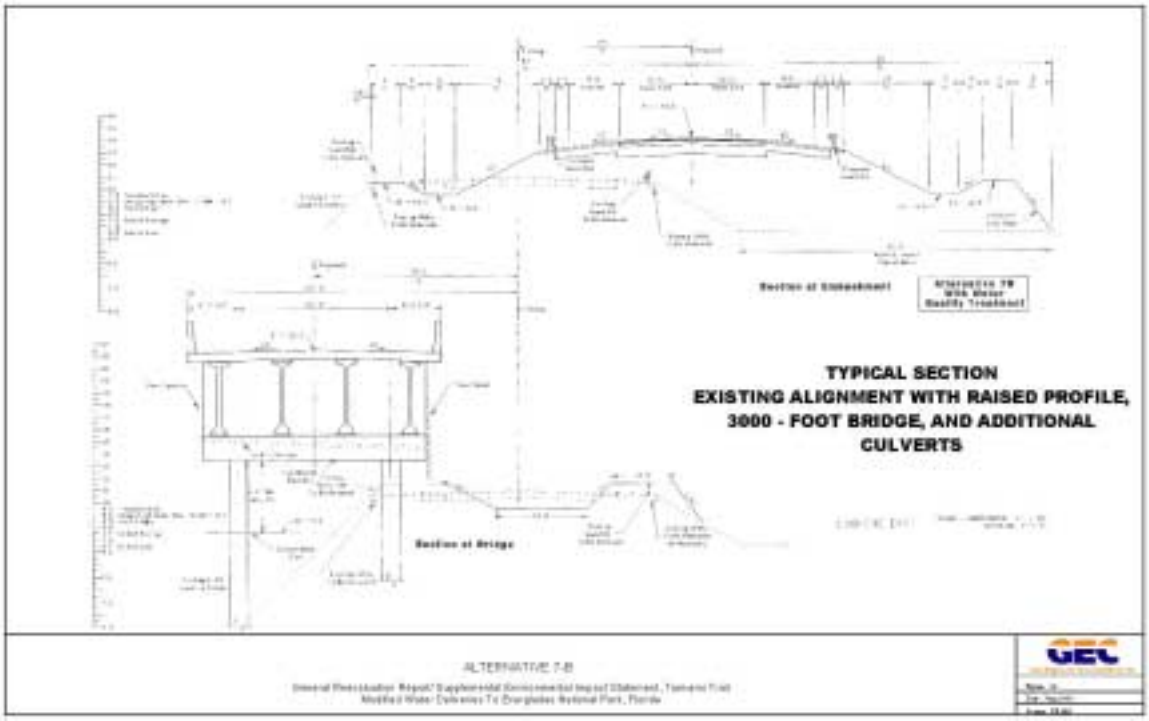
The right-of-way would extend 51 feet farther to the south than the existing right-of-way.

The construction cost for Alternative 7b is estimated to be $51,858,385, and the total life cycle cost is estimated to be $54,776,745.

5.6.5.16 Alternative 8a. Existing Alignment with Raised Profile and Additional Culverts without Water Quality Treatment. Alternative 8 involves modifying the existing Tamiami Trail profile and typical section throughout the length of the project and the construction of new box culverts to convey flows from the L-29 Canal to ENP. The box culverts would be 5 feet high and 10 feet wide (inside dimensions) with an invert elevation of 3.0 feet. They would be installed throughout the roadway alignment. This alternative is divided into two sub-alternatives, 8a and 8b, for conditions of with and without treatment facilities for highway runoff.

Under Alternative 8a, the existing embankment and culverts would be left in place, and 24 box culverts would be installed to supplement the existing 57 culverts. The centerline


TYPICAL SECTION
EXISTING ALIGNMENT WITH RAISED PROFILE,
3000 - FOOT BRIDGE, AND ADDITIONAL
CULVERTS
ALTERNATIVE 7-A


TYPICAL SECTION
EXISTING ALIGNMENT WITH RAISED PROFILE,
3000 - FOOT BRIDGE, AND ADDITIONAL
CULVERTS
ALTERNATIVE 7-B

would fall very close to the centerline of the existing highway, and little or no additional right-of-way would be required. The existing asphalt pavement would be left in place as a construction platform, and it would serve as a base for construction. The low areas of the roadway would be leveled to a minimum of 11.0 feet throughout the project. A 6-inch overlay would be placed on top.

This alignment would be positioned to minimize impacts and construction costs and to facilitate maintenance of traffic during construction. There are no significant alignment transitions required at either end of the segment.

The box culverts would consist of precast sections, with invert elevations of 3 feet. Because the elevation of the existing bedrock is nominally at 3 feet, shallow excavation of the bedrock would be required. Air hammers mounted to large track hoes would be used for excavation; blasting is not permissible. A sand-cement mixture would be used as a foundation for the box culverts. The existing roadway would be retained; the embankment would be excavated and the box culverts set.

Traffic would be maintained as it exists currently. The overlay of the existing roadway would be accomplished using a moving operation. Staging areas could be located at the locations of existing businesses, possibly augmented by utilizing sections of the existing shoulder and the eastern end of the corridor.

The construction cost for Alternative 8a is estimated to be $45,499,995, and the total life cycle cost is estimated to be $53,892,652.

5.6.5.17 Alternative 8b. Existing Alignment with Raised Profile and Additional Culverts with Water Quality Treatment. This alternative (Figure 19) would shift the centerline of the roadway approximately 35 feet to the south to provide for water quality treatment facilities on each side of the road. The existing roadway embankment would be removed down to the bedrock, and a new embankment would be constructed. With this option, the top of the pavement would be at an elevation of 14 feet. The bottom of the limerock base would be at an elevation of 12.75 feet, providing roughly 3.5 feet of clearance above the design high water elevation of 9.3 feet. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer would be placed beneath the LBR 40 subbase. A 12-year resurfacing interval would be recommended. This alternative involves the installation of 40 culverts, rather than the 24 culverts in Alternative 8a, because of the loss of the existing 57 culverts.

Water quality treatment would be achieved with dry linear retention facilities adjacent to the roadway that would be used to collect highway runoff during rainfall events. The invert elevations would be set one foot above the new high control elevation of the L-29 Canal. Based on water quality treatment criteria established by FDEP, the depth of the treatment area is estimated at 0.5 feet deep. All utilities within the typical section would require relocation.

For constructing the roadway portion of Alternative 8b, temporary barricades would be spaced every 50 feet at the north edge of the westbound travel lane line. In one-quarter mile increments the existing guardrail would be removed and replaced with a temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the

north, utilizing the new pavement. A temporary concrete barrier would be placed one foot north of the south edge of the temporary pavement.

The right-of-way would extend 57 feet farther to the south than the existing right-of-way.

The construction cost for Alternative 8b is estimated to be $47,081,029, and the total life cycle cost is estimated to be $50,587,749.

5.6.5.18 Bridge Alignment Alternatives. Bridge construction would be performed in one of three ways.

- **Bridge Option 1.** Under Bridge Option 1, new bridges will be built to the south of the existing road. Analysis showed this option to be the most cost-effective. Two reverse curves in the alignment at every bridge would be introduced.

- **Bridge Option 2.** Under Bridge Option 2, new bridges will be built on the existing alignment with a temporary detour to the south around the immediate area of construction. This option is less cost-effective than the previous option; however, it would reduce the amount of permanent wetland impacts. Alignment curvatures and permanent wetland disruption would be avoided.

- **Bridge Option 3.** Under Bridge Option 3, new bridges would be built on the existing alignment with temporary detour to the north (in the L-29 Canal). This option would avoid temporary impact to wetlands south of the road, but it requires a costly detour on structural elements located north of the existing road. This option would constitute over $52 million of the total project cost.

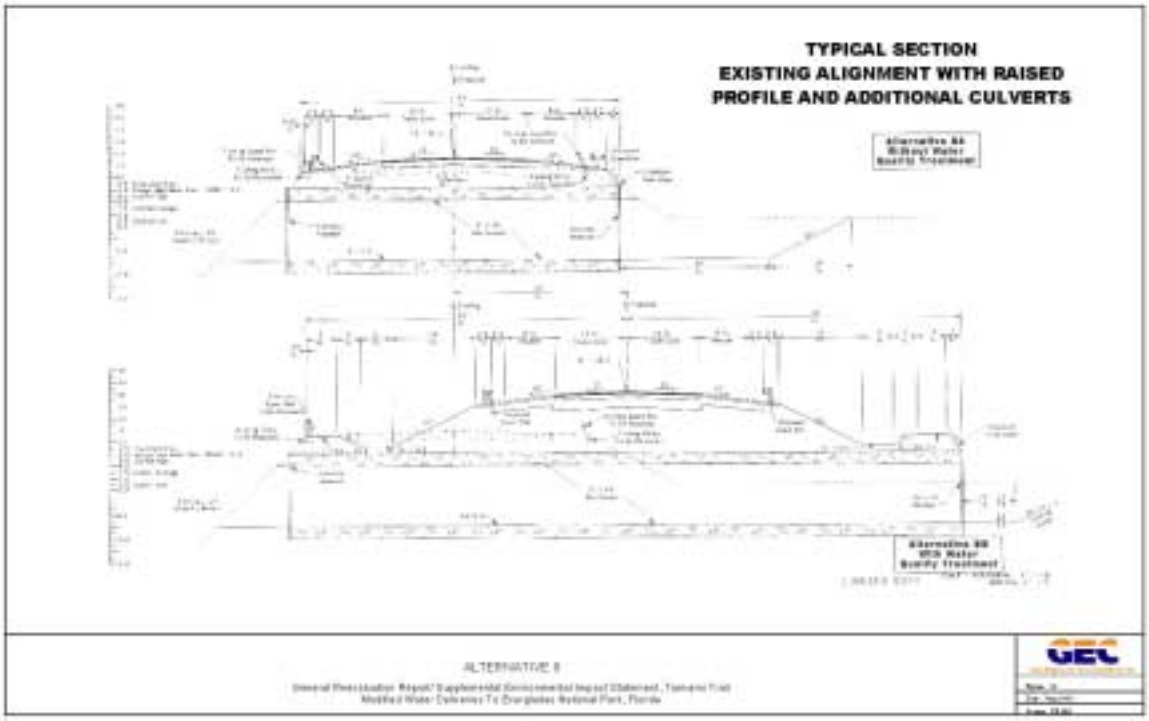
For the purposes of comparison of alternatives and life-cycle costs Bridge Option 2 was analyzed with each of the alternatives.

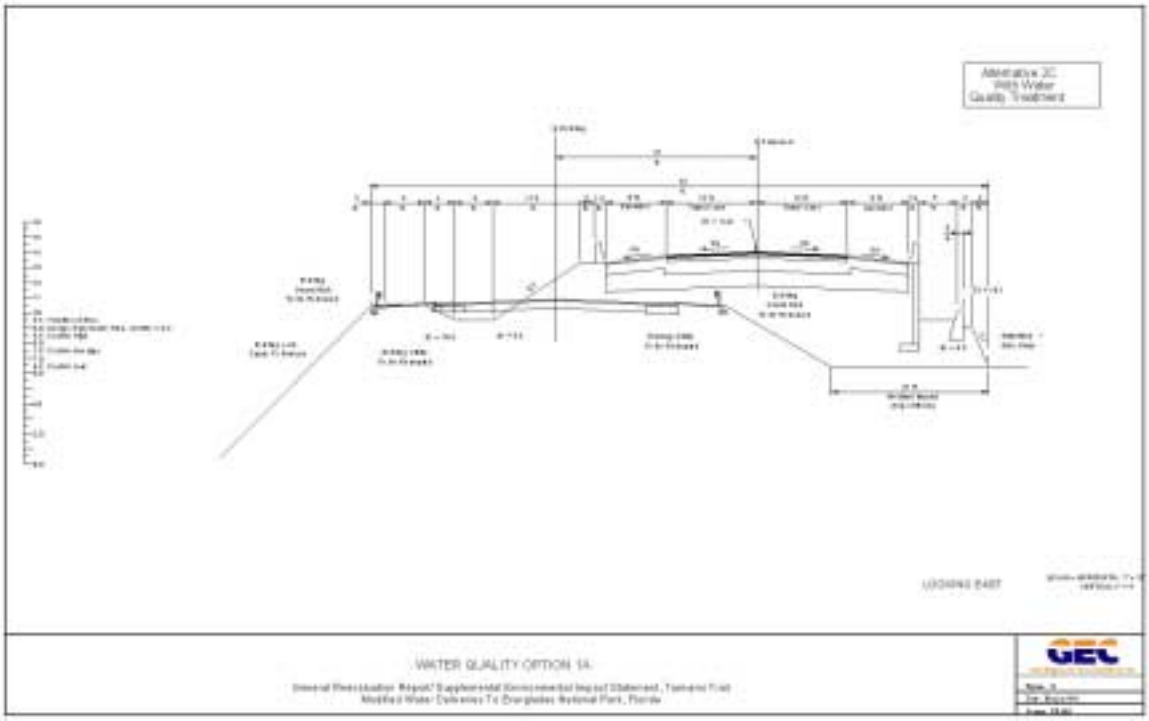
5.6.5.19 Water Quality Treatment Alternatives

Alternatives 2b, 3b, 4b**,** 6b, 7b, and 8b incorporate dry retention systems on both sides of the roadway for the treatment of highway runoff, whereas Alternative 5b incorporates the placement of dry retention on the remaining embankment. This type of system is relatively simple to build and maintain. However, in consideration of the wide footprint required for dry retention and the impacts to ENP wetlands, additional water quality treatment options were identified and evaluated.

Option 1: Shifting and/or Compressing the Roadway Section. This option entails shifting the typical section of Alternative 2b to the north. In conjunction with this option, encroachment into the L-29 Canal would be accommodated by widening the canal to the north, or by using vertical wall sections in two different configurations to reduce the width of the typical section in the area of the dry retention swales.

Option 1-A: Shift Alignment and Compress Swale with Wall Elements/South Side. In this option, the typical section would be compressed by installing a wall system on the southern side of the roadway that would reduce encroachment into ENP wetlands without any encroachment into the L-29 Canal (Figure 20). The construction of a reinforced wall along the south side of the existing roadway would serve to minimize the


TYPICAL SECTION
EXISTING ALIGNMENT WITH RAISED
PROFILE AND ADDITIONAL CULVERTS
ALTERNATIVE 8


WATER QUALITY OPTION 1A

extent of this encroachment, and the dry retention area is compressed between the reinforced wall and a short gravity wall.

The existing pavement, sub-grade, fill, and muck would be removed totally and back-filled with appropriate fill to the bottom of the sub-grade. A double wall section on the south side would provide a 5-foot-wide dry retention area. The placement of this walled section on the south side provides adequate space on the north side for a 5-foot-wide dry retention area with standard reinforced side slopes. Runoff from the south side of roadway would enter the south side swale through barrier wall inlets, whereas runoff from the north side would sheet flow into the north side retention area. The bottom elevation of the swales would be 9.5 feet.

Construction of this alternative would require that traffic lanes be shifted to the south and a temporary wall system installed adjacent to the roadway on the south side. The remaining existing embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of the new roadway. Traffic would be shifted to the new roadway, and the northern portion of the roadway would be excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration.

The additional profile elevation affects the section width, which would be 29 feet less than Alternative 2b. This option does not encroach into the hydraulic capacity of the L-29 Canal. The estimated cost for this alternative is $132,214,250 for the length of the corridor. This is a $73,663,592 additive to the cost of Alternative 2b.

Option 1-B: Shift Alignment and Compress Swale with Wall Elements/North Side. In this option, the typical section would be compressed by installing a wall system that would encroach into the L-29 Canal sufficiently so that there would be no encroachment into the wetlands of ENP on the south side of the roadway (Figure 21). The construction of a reinforced wall along the north side of the existing roadway entails the placement of piles and concrete panels in the L-29 Canal at an elevation near the bottom of the canal.

The existing pavement, sub-grade, fill, and muck would be removed totally and back-filled with appropriate fill to the bottom of the sub-grade. A double wall section on the north side would provide a 5-foot-wide dry retention area. The placement of this walled section on the north side would provide adequate space on the south side to provide again a 5-foot-wide dry retention area with standard reinforced side slopes. Runoff from the north side of roadway would enter the north side swale through barrier wall inlets, whereas runoff from the south side would sheet flow into the south side retention area. The bottom of the swales would be the same as for Alternative 2b - With Water Quality Treatment (Dry Retention Swales), which is at elevation 9.5 feet, with a depth of one foot.

Constructing this alternative would require that the traffic lanes be shifted to the south and a temporary wall system installed adjacent to this roadway on the south side. Then the remaining existing embankment on the south side would be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the north portion of the roadway excavated and reconstructed up to finish profile. The new roadway section

would then be completed and traffic shifted to the final configuration. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

This option would encroach into the L-29 Canal, removing about 200 square feet of flow area. This loss could be compensated for by removal of an equal area along the northern bank of the canal or by deepening the canal. The estimated cost for this alternative is $160,484,850 for the length of the corridor. This is a $101,934,192 additive to the cost of Alternative 2b.

Option 1-C: Shift Typical Section North into L-29 Canal. In this option, the typical section would be shifted northward, encroaching approximately 50 feet into the L-29 Canal (Figure 22). The southern bank of the canal would be filled in, and the northern bank of the canal would require excavation.

While this is conceptually feasible, there are several associated issues. First, because the canal is approximately 100 feet wide, the 50 feet of encroachment and resulting excavation would consume most of the maintenance road to the north of the canal. It may be possible to excavate the lower portion of this replacement widening at a steeper slope to replace the lost hydraulic capacity. This would allow for a relocated canal maintenance road and would permit the telephone and fiber optic utilities to remain in place.

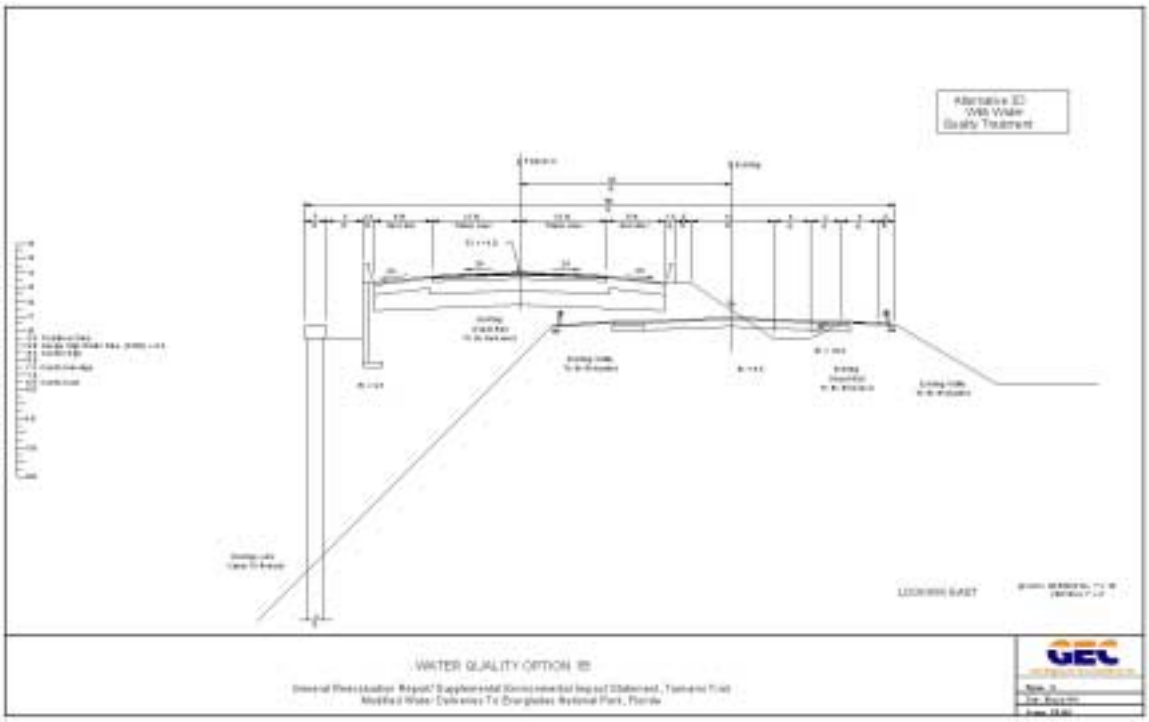
Another issue is the method for filling in the canal so that sufficient load capacity is achieved and that the fill is stable. It may be necessary to use the construction method noted for Option 1-B wherein a concrete panel wall is constructed to contain the fill material. This approach would also reduce the lost cross-sectional area in the canal and require less excavation to the north. However, this wall system would significantly increase the cost of the solution.

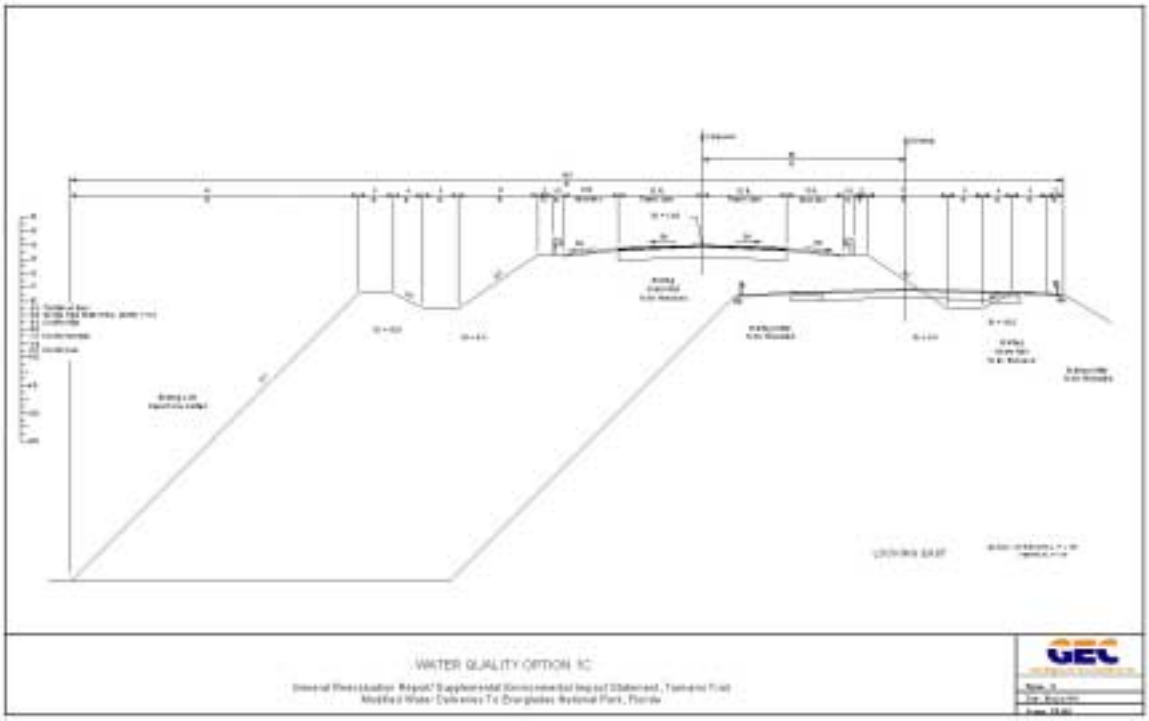
Other issues associated with this concept are preserving the required canal section near the Tigertail Camp, at the recreational area at structures S-355A and S-355B, and at the site of the four weir structures. In these areas, several solutions could be considered. The roadway section could be shifted to the south to avoid impacts, but shifting to the south would encroach into ENP.

In addition, such offsets could result in an unacceptably “wavy” alignment with safety implications. It appears that if the extent of canal excavation is reduced from 50 feet to 25-30 feet, then the existing and future water control structures would not be affected.

Another solution would be to place the roadway on structure in these areas over the canal. However, considering the lengths involved, this would add considerable costs. If impacts to water control structures are avoidable, then a compromise would be to shift the alignment at the Tigertail Camp and the eastern recreational area and incur some wetlands impact. A total distance of about 3,500 feet of the roadway would encroach into the wetlands in each of these areas, with the extent of the encroachment ranging up to 59 acres for Alternative 2b. This would yield a wetland impact of 2.7 acres per location or a total of 5.4 acres.

Construction of this alternative would require that the traffic lanes be shifted to the south within the existing roadway and a temporary wall system installed adjacent to this


Alternative 3D
With Water
Quality Treatment
LOOKING EAST
WATER QUALITY OPTION 3B


WATER QUALITY OPTION 1C

roadway on the north side. The remaining existing embankment on the north side would then be removed and the new embankment installed in this area and in the canal up to the elevation of the existing road. The existing pavement, sub-grade, fill, and muck would be removed and backfilled with appropriate fill to the bottom of the sub-grade.

This step would be preceded by the placement of the wall system in the canal, if that were determined to be necessary. The temporary wall system would be extended upward to allow the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the south portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. There is a cost premium associated with this phasing scheme because of the roadway elevation differentials and the need for the temporary wall.

This option encroaches into the hydraulic capacity of the L-29 Canal, removing about 900 square feet of flow area.

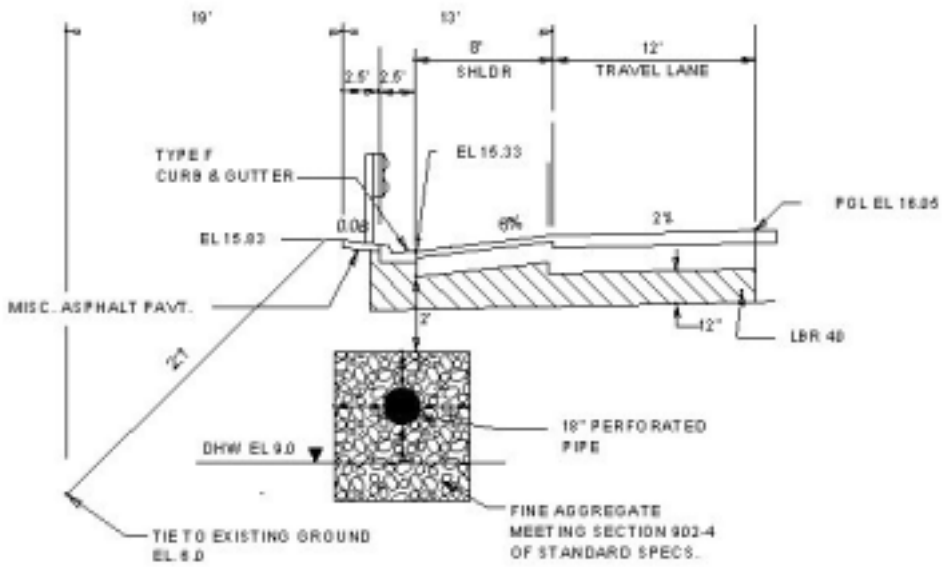
For the configuration where the canal fill is not contained by a wall, and a like area is excavated from the north bank, the estimated cost for this alternative is $73,917,450 for the length of the corridor. This would be a $15,366,792 addition to the cost of Alternative 2b. It is also assumed that the water control structures would not be affected and that the alignment would be shifted at the other two locations. These cost estimates do not include relocation of utilities on the levee or a wall system for retaining fill on the south bank of the canal.

Option 2: Exfiltration Trenches with Curb and Gutter. The second option is to use an exfiltration trench below the roadway, with roadway runoff routed from a curb and gutter section with inlets spaced every 200 feet (Figure 23). The exfiltration trench would be comprised of an 18-inch perforated pipe surrounded by coarse aggregate and extending for the length of the corridor, less the bridge sections, on both sides of the roadway.

The concept would allow the collected runoff in the pipe to infiltrate into the surrounding aggregate and dissipate into the adjacent fill material. The trench would have an envelope of filter fabric to prevent the introduction of sand into the rock trench. This option does require the invert of the exfiltration trench pipe to be above the design high water elevation of the L-29 Canal, which is elevation 9.3 feet. As such, the profile of the roadway would need to be approximately two feet higher than that of Alternative 2b, or a centerline elevation of 16.0 feet.

The additional profile elevation affects the section width, but requires 17 to 27 feet less width (without and with stabilized side slopes respectively) than Alternative 2b, for a net impact of 23 to 33 feet of wetland impact. This is in comparison to 50 feet of impact for the original Alternative 2b with dry retention.

Construction of this alternative would require traffic lanes to be shifted to the north and a temporary wall system installed adjacent to the southern side of the roadway. The remaining embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the northern portion of the



WATER QUALITY OPTION 2

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roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method for Options 1-A and 1-B. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for a temporary wall.

The estimated cost for this alternative is $76,116,250 for the length of the corridor. This is a $17,565,592 additive to the cost of Alternative 2b.

Option 3: Exfiltration Trenches with Shoulder Gutter. A third option is to use an exfiltration trench below the roadway, with roadway runoff routed from a shoulder gutter section with inlets spaced every 200 feet (Figure 24). As for Option 2, the exfiltration trench would be comprised of an 18-inch perforated pipe surrounded by coarse aggregate and extending for the length of the corridor, less the bridge sections, on both sides of the roadway.

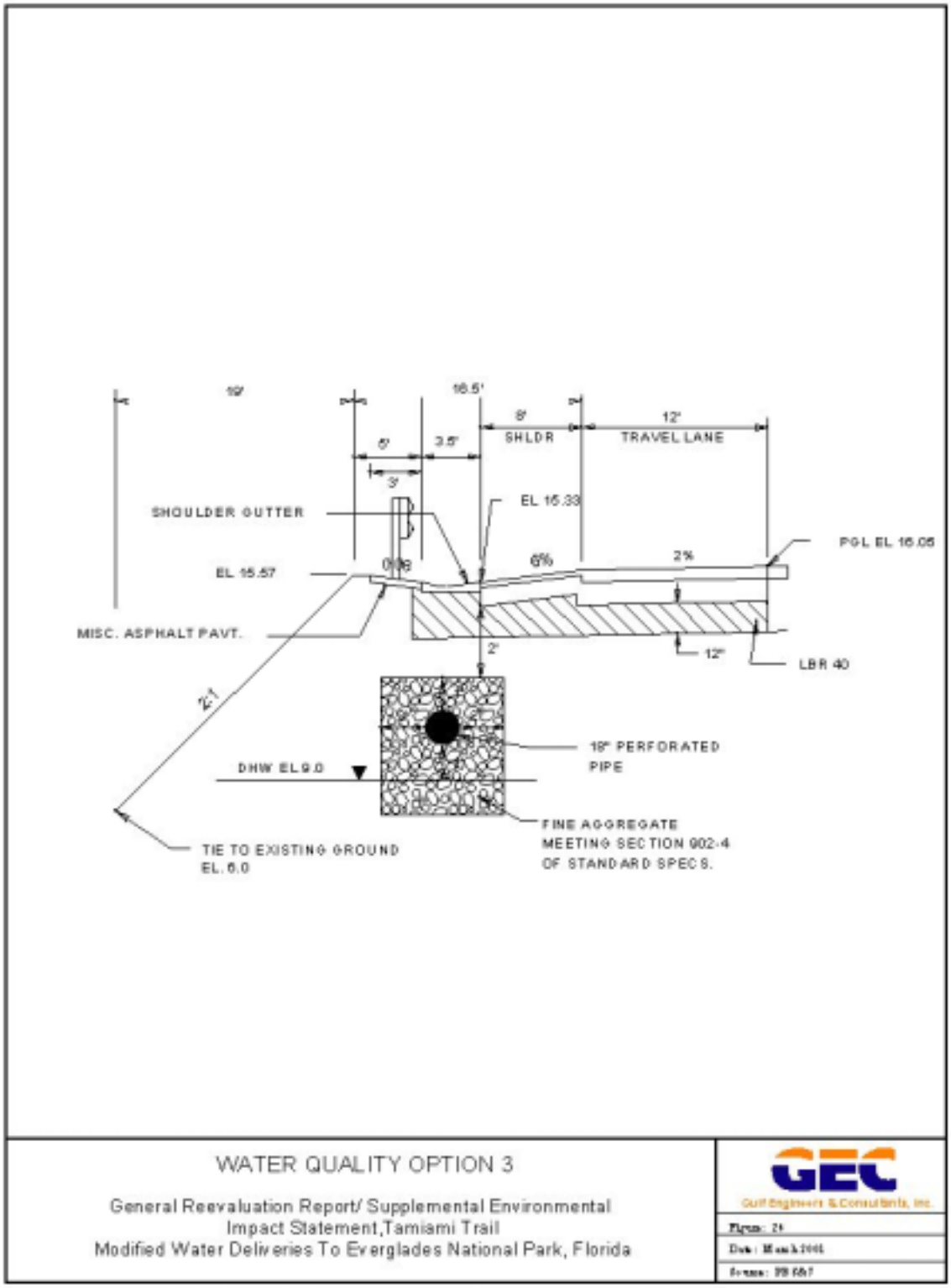
The collected runoff would infiltrate from the pipe into the surrounding aggregate and dissipate into the adjacent fill material. The trench would have an envelope of filter fabric to prevent the introduction of sand into the rock trench. This option requires the invert of the exfiltration trench pipe to be above the design high water elevation of the L-29 Canal, which is elevation 9.3 feet. The profile of the roadway would to be at a centerline elevation of 16.0 feet, approximately two feet higher than for Alternative 2b.

The additional profile elevation affects the section width, but requires 17 to 27 feet less width (without and with stabilized side slopes respectively) than Alternative 2b, for a net impact of 23 to 33 feet of wetland impact. This is in comparison to 50 feet of impact for the original Alternative 2b.

Construction of this alternative would require the traffic lanes to be shifted to the north and a temporary wall system installed adjacent to the southern side of the roadway. The remaining existing embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion a portion of the new roadway. Traffic would be shifted to the new roadway and the northern portion of the roadway excavated and reconstructed to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method for Options 1-A and 1-B. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

The estimated cost for this alternative is $76,394,750 for the length of the corridor. This is a $17,844,092 additive to the cost of Alternative 2b.

Option 4: Wet Detention System. Utilizing a wet detention system would require the treatment of one inch of runoff from the contributing area in contrast to a dry retention system, where the treatment volume is equal to one-half inch of runoff. It also would require a wider footprint than the dry retention design because the control elevation would be at the control elevation of the L-29 Canal rather than one foot above the control elevation. A minimum depth of two feet below the control elevation would provide for deposition of sediments. Wet detention systems typically require a minimum width of 100 feet at the control elevation and an average depth between six and eight feet, which


19'
16.5'
8'
12'
SHLDR
TRAVEL LANE
5'
3.5'
3'
SHOULDER GUTTER
EL 15.33
PGL EL 16.05
6%
2%
EL 15.57
MISC. ASPHALT PAVT.
2'
12"
LBR 40
12'
18" PERFORATED PIPE
DHW EL 9.0
FINE AGGREGATE MEETING SECTION 902-4 OF STANDARD SPECS.
TIE TO EXISTING GROUND EL. 6.0
WATER QUALITY OPTION 3
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would require a wider footprint. Incorporating a wet detention system would require a variance from the standard typically required for this type of treatment.

As depicted in the schematic in a narrow footprint, this option would require a distance of 55 feet beyond the edge of the shoulder (Figure 25). The dry retention system as originally requires 35 feet. Even if stabilized slopes were employed, the wet retention option would have slightly more impact than the dry retention technique. Alternative 2b has a 50-foot wetland impact with natural slope grading; the wet detention technique with similar slope treatment would add 40 feet of impact, for a total impact of 90 feet.

The estimated cost for this alternative is essentially unchanged from the cost of Alternative 2b, $58,550,658. The fill areas associated with each are nearly the same.

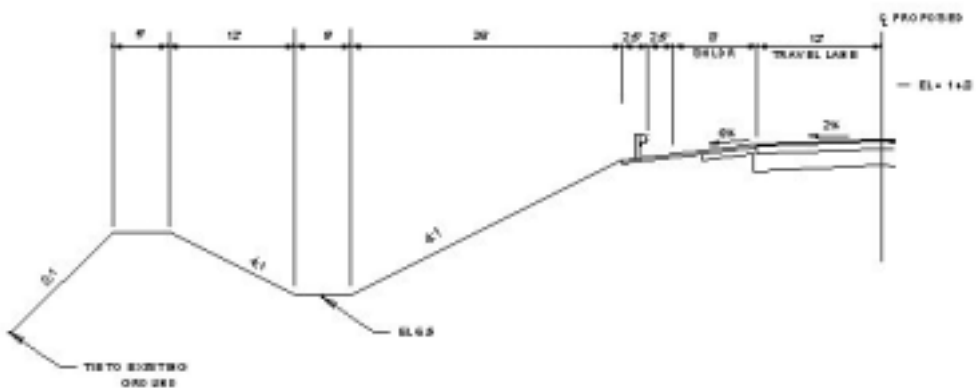
Option 5: Single Dry Retention Area System. In this option, there would be a dry retention area on only one side of the roadway (Figure 26). This single area would retain the standard 5-foot width. Drainage from the side of the roadway without treatment would be channeled via a shoulder gutter and gutter inlets and piped under the roadway to the dry retention area.

The roadway would require raising approximately 2.5 feet to accommodate an inlet and a connecting pipe. While this would eliminate a retention area on the north side of the roadway, the retention area on the south side of the road would be approximately 0.5 feet deeper and the sideslopes of the roadway wider due to the additional 2.5 feet of elevation. The net effect is that this footprint is 122 feet wide, while that for Alternative 2b is 112 feet wide, for an increased width of 10 feet.

If the dry retention area were constructed on the northern side of the road, the result would be similar. The new alignment must be offset from the canal by a minimum amount to accommodate maintenance of traffic requirements, and if the typical section is compressed sufficiently, then this maintenance of traffic criterion governs.

The construction cost for this option would be slightly greater than Alternative 2b because of the stormwater piping and gutter system. The estimated cost for this alternative is $67,015,550 for the length of the corridor. This is an $8,464,892 additive to the cost of Alternative 2b.

Grassed Strip (Minimal Water Quality Treatment). The use of grassed strips would involve an approximately 5-foot-wide grassed strip outside of the guardrail to the edge of a reinforced slope. This would provide minimal treatment of surface water runoff by allowing the runoff to sheet flow through this 5-foot wide grass strip for filtration. This concept was used in Tampa at the Howard Franklin Bridge and approved by SWFWMD in lieu of a normal dry retention system. This option could be adapted to Alternative 2a but with some additional cost for additional fill area and costs associated with a slight shift in the alignment. Under Alternative 2a, there would be a wetland encroachment of 11.0 to 15.0 feet, depending if stabilized slopes were used. The wetland encroachment could be avoided by encroaching into the L-29 Canal and building a short retaining wall or by building a retaining wall along the south right-of-way line. These options were not priced out, however, they would be significantly more expensive due to the wall section the entire length of the corridor.



WATER QUALITY OPTION 4

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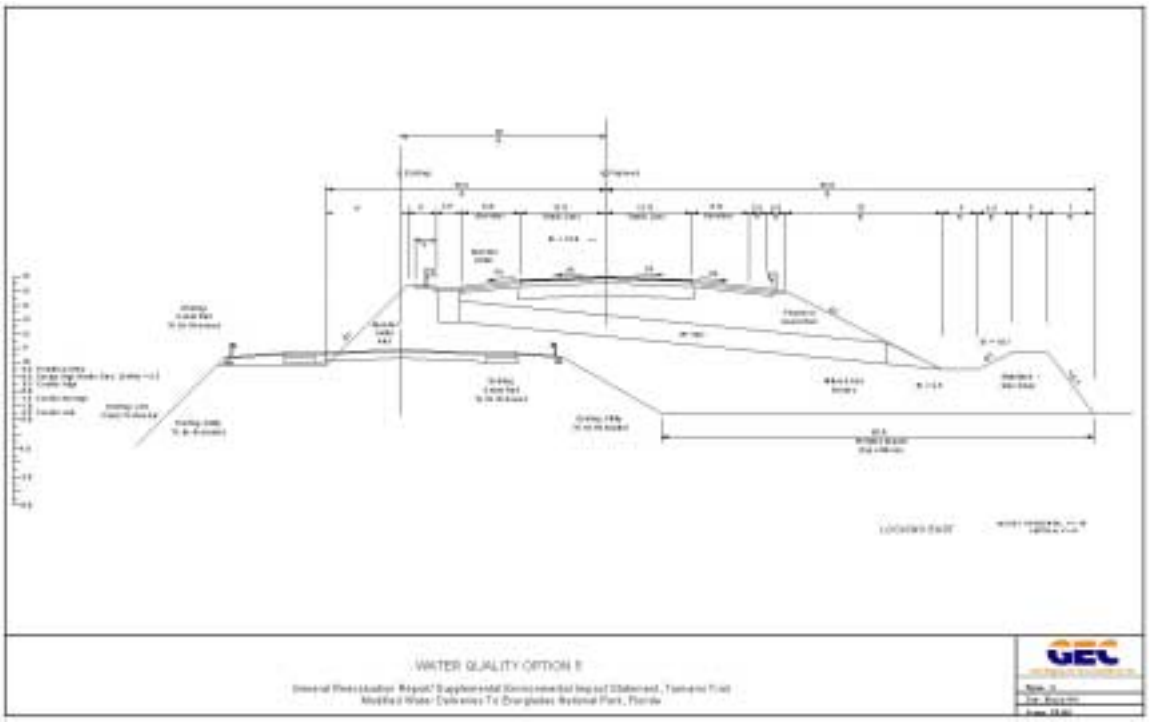
Figure: 23
Date: March 2001
Scale: NTS


WATER QUALITY OPTION 5

Under Alternative 2b, the dry retention swales would be removed and replaced by the grassed areas and stabilized side slopes on both sides of the roadway, and the roadway built to the finish profile elevation of 14.0 feet. This footprint would be somewhat wider than for Alternative 2a and would likewise have wetland encroachment if the bank of the L-29 Canal was held as the north limit. Alternatively, if the south existing roadway slope limit was kept so that wetlands were unaffected, then a wall in the L-29 Canal would be required.

Construction of this option would require that the traffic lanes be shifted to the north and a temporary wall system be installed adjacent to this roadway on the south side. Then the remaining existing embankment on the south side would be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the north portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method for options 1-A and 1-B. As stated earlier, there is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

Features of the various water quality options are summarized in Table 11.

5.6.6 WILDLIFE CROSSING OPTIONS

Consideration may be given to including wildlife features with the various alternatives. Were they to be included, the wildlife underpasses and land bridges over the L-29 Canal could be constructed in the embankment of alternatives 2a, 6a, 7a, and 8a, or in the reconstructed embankment of alternatives 2b, 4a, 4b, 6b, 7b, or 8b.

Wildlife crossing options provide the opportunity to enhance ecological connectivity among animal populations and reduce mortality to wildlife crossing the Tamiami Trail.

Wildlife Roadway Undercrossing Bridges. This would involve the construction of approximately 50-foot-long concrete slab bridges placed in the highway alignment to provide undercrossings for wildlife. Fencing would be needed on each side of the underpasses to funnel wildlife to the underpasses. The typical section for this 43-foot, one-inch-wide bridge for this purpose provides sufficient deck area for the 12-foot-wide travel lanes and 8-foot shoulders on both sides of the travel lanes.

The superstructure and substructure shown for the wildlife undercrossing is based on other wildlife undercrossing bridges of similar configuration developed for various FDOT construction projects. The bridge structural system would be a cast-in-place flat slab supported on pile bents using 18-inch square prestressed concrete piles installed and driven in holes predrilled to elevation –10.00 into the limerock bedrock. The abutments form a vertical wall with precast panels behind the piles retaining the embankment.

Methods for placement of cranes and delivery of material, such as piles, precast beams, and concrete are similar to other mainline bridge replacement alternatives for this project.

Each wildlife roadway undercrossing bridge is estimated to cost $2,030,026.

Table 11. Summary of Water Quality Treatment Options

Water Quality Treatment Options	Feasibility Assessment	Cost Differential Relative to Alt. 2b	Construc-tibility	Wetlands impacts to ENP	Applicability to Other Alternatives	Other Comments
Option 1-A Shift North and Compress Swale with Wall Elements/ South Side	Technically feasible. Reduces wetlands impacts. Relatively high cost.	+$73,663,592	Workable; centerline offset needed to execute MOT	21 ft of impact vs. 51 ft for Alt 2b	Applicable	Could reduce strikes on the road
Option 1-B Shift North and Compress Swale with Wall Elements/ North Side	Technically feasible. Reduces wetlands impacts. Relatively high cost.	+$101,934,192	Workable; centerline offset needed to execute MOT	No impact to ENP; affects L-29 Canal	Applicable	Could reduce strikes on the road
Option 1-C Shift North into L-29 Canal	Technically feasible. Reduces wetlands impacts. Higher cost.	+$15,366,792	Workable; requires temporary wall.	No impact to ENP; affects L-29 Canal	Applicable	None
Option 2 Exfiltration Trench with Curb and Gutter	Technically feasible. Reduces wetlands impacts. Higher cost.	+$17,565,592	Workable; requires temporary wall.	Up to 33 ft of impact vs. 51 f for Alt 2b	Applicable	None
Option 3 Exfiltration Trench with Shoulder Gutter	Technically feasible. Reduces wetlands impacts. Higher cost.	+$17,844,092	Workable; requires temporary wall.	Up to 33 ft of impact vs. 51 f for Alt 2b	Applicable	None
Option 4 Wet Detention System	Not Feasible. Permitting exception needed. Same cost.	+$0	Workable; requires temporary wall.	90 ft of impact vs. 51 f for Alt 2b	Not Applicable	None
Option 5 Single Swale Dry Detention System	Technically feasible, but no advantages over simpler options. Higher cost.	+$8,464,892	Feasible	60 ft of impact vs. 51 f for Alt 2b	Applicable	None

Source: PBS&J, 2001 (Engineering Appendix).

Wildlife Canal Crossings. These bridges, which would consist of a 24-foot-wide concrete bridge with two feet of soil spread on its surface for vegetation to grow, would enable terrestrial wildlife to cross the L-29 Canal. The typical section for this 27-foot, one-inch-wide bridge provides sufficient deck area for a 14-foot-wide wildlife passage bounded by a five-foot landscape buffer on each side. Figure 27 provides a description of the bridge length, the canal clearances, and the hydraulic opening.

Standard traffic railing barrier would retain natural earth on the bridge and provide an appearance similar to that of the vehicular traffic bridges.

The bridge structural system would be of an AASHTO Type II superstructure with cast-in-place concrete deck supported on pile bents using 18-inch square prestressed concrete piles. Standard construction procedures could be used for this bridge with little impact to existing traffic.

Each wildlife canal crossing is estimated to cost $326,427.

Wildlife Barriers. This element consists of the installation of a special wildlife barrier along both sided of the roadway embankment sections of the various alternatives.

The estimated cost for the wildlife barrier feature is $125.00 per linear foot.

A comparison of the costs of wildlife features for each alternative is presented in Table 12.

Table 12. Wildlife Feature Cost Summary

Alternative	Shelf at Bridge	Wildlife Under-crossing	Wildlife Canal Crossing	Linear Feet of Wildlife Barrier	Total Cost
	$50,000 each	$2,030,026 each	$326,427 each	$125 / L.F.	
1	0	3	3	113,000	$21,194,359
2a	4	2	2	110,000	$18.662.906
2b	4	2	2	110,000	$18,662,906
3a	4	2	2	110,000	$18,662,906
3b	4	2	2	110,000	$18,662,906
4a	4	2	2	110,000	$18,662,906
4b	4	2	2	110,000	$18,662,906
5a	2	0	0	0	$100,000
5b	2	0	0	0	$100,000
6a	2	2	2	70,800	$13,662,906
6b	2	2	2	70,800	$13,662,906
7a	2	3	3	107,000	$20,544,359
7b	2	3	3	107,000	$20,544,359
8a	0	3	3	113,000	$21,194,359
8b	0	3	3	113,000	$21,194,359

Source: PBS&J, 2001 (Engineering Appendix**).**

5.7 ENVIRONMENTAL EFFECTS OF ALTERNATIVES

5.7.1 Geology and Soils

No-Action Alternative. No effects on geology or soils would result from the no-action alternative.

Action Alternatives. Although various alternatives involve the movement of soils and drilling or making shallow excavations into the limestone bedrock, none of the action alternatives is anticipated to affect either the geological conditions or the soils along the Tamiami Trail. There are no prime or unique farmlands in the project area.

5.7.2 Water Management

The MWD program, of which this project is a component, would provide for structural modifications to the C&SF Project to enable the restoration of more natural water flows to NESRS in ENP. The action alternatives were designed to facilitate the passage of the required volumes of water from the L-29 Canal to help reestablish the natural distribution of water from WCA-3A and 3B to ENP.

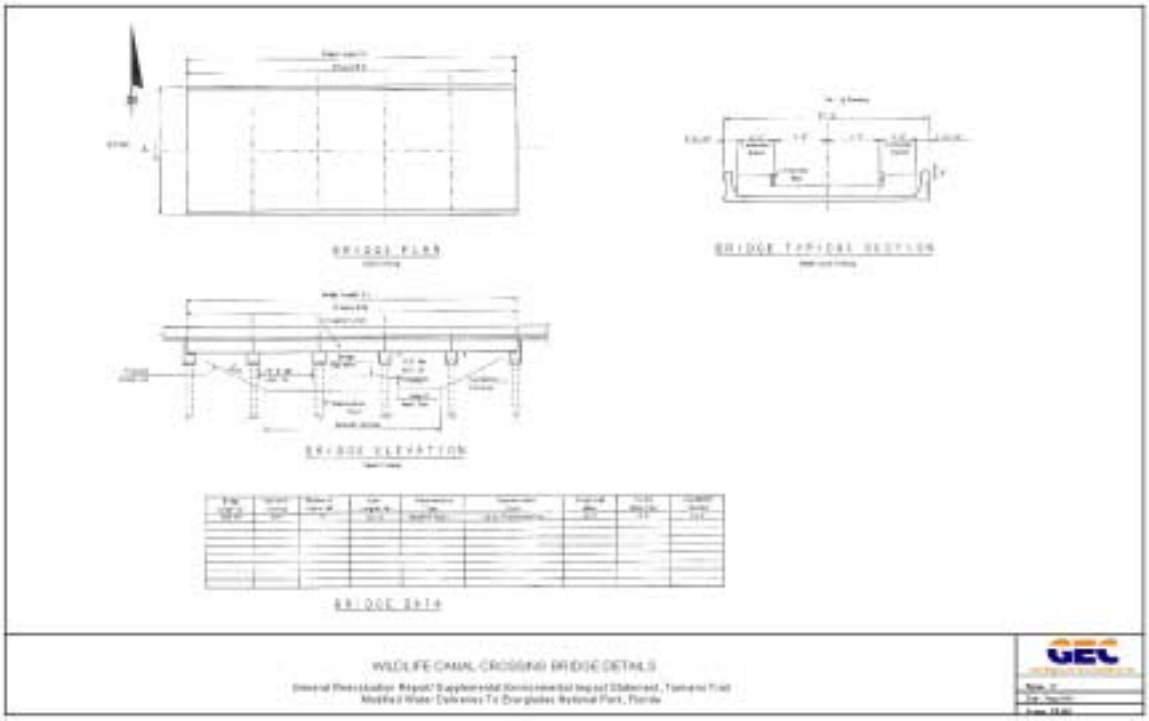
No-Action Alternative. Under the no-action alternative, occasional constraints on water management operations may be necessary. One potential area of conflict concerns overtopping of the highway during high water events (thereby potentially affecting public safety) and the needs of ENP. During periods of high water it may be necessary occasionally to restrict water levels in the L-29 Canal to prevent flooding of the highway.

Action Alternatives. The four bridges associated with alternatives 1, 2, and 4, and the breaches in the existing embankment with alternatives 3,and 5 each provide equivalent hydraulic capacity (ca. 1,450 feet total combined width of open area). The breaches in the existing embankment associated with Alternative 6 would provide approximately 1,500 of open area. Alternative 7 involves the removal of the existing Tamiami Trail embankment adjacent to the bridge; this would provide approximately 3,000 linear feet of open area for hydraulic passage. Alternative 8a involves the installation of approximately 24 ten-foot-wide box culverts throughout the length of the corridor; Alternative 8b includes 40 ten-foot-wide culverts. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, currently provides a general equalization of flows to ENP that approximates sheet flow. Although the bridges, breaches, or box culverts would be capable of conveying the required amount of water, the retention of the existing culvert system would assist in maintaining sheet flow. Alternatives 2b, 4, 6b, 7b, and 8b would result in the loss of the existing culvert system.

5.7.3 Water Quality

The MWD Project would result in increased stages and flows in the NESRS from water released from WCA-3A and 3B.

Pump Station S-9 discharges urban runoff from the western C-11 basin (Broward County) into the north end of WCA-3A. These waters eventually pass through WCA-3B to ENP through the Structure 12s (S-12s). Features of the MWD project would restore natural water flow patterns from WCA-3A through WCA-3B to ENP. WCA-3B has had


BRIDGE PLAN
BRIDGE TYPICAL SECTION
BRIDGE ELEVATION
BRIDGE DATA
WILDLIFE CANAL CROSSING BRIDGE DETAILS

only direct rainfall for many years, and concern exists about potential adverse impacts if water quality in WCA-3A is not improved prior to restoring flow WCA-3B. Water quality was not a project purpose when the MWD Project was authorized; this issue was not addressed in the MWD GDM in 1992.

No-Action Alternative. The 1992 GDM states that agricultural and urban areas elsewhere in the watershed, particularly the Everglades Agricultural Area south of Lake Okeechobee, are expected to continue to influence water quality in the study area and in ENP if no further action is taken. Major ion, color, and iron concentrations should continue to increase until they reach equilibrium primarily by the physical process of dispersion and dilution from rainfall and sheet flow. If inflow from the Everglades Agricultural Area is kept at the present level or greater, increases in nitrogen and phosphorus concentrations at the northern points of inflow to ENP would likely increase. In addition, depending on the volume and the rate of flow from the pumping stations, sediments and bottom material potentially contaminated with metals and pesticides would migrate slowly southward through the WCA canals. Highway runoff from the Tamiami Trail, because of low traffic volume, would be a minor source of metals and nutrients.

Action Alternatives. The alternatives studied by the Corps would not increase road capacity or cause increased traffic on the road. Thus, no alternative discussed in this report would cause increased pollutant discharge into adjoining wetlands. The status of the adjacent lands (Everglades National Park property to the south of the roadway, an Outstanding Florida Water [OFW]) was also considered by the Corps. The Corps does not believe any of the alternatives that have been considered would cause additional loading of the above-mentioned pollutants and therefore would not contribute in any way to degradation of the park.

Alternatives that included bridging would allow for either (1) degrading the existing roadway embankment; or (2) conversion of the old right-of-way to water quality treatment areas. The consensus of the planning team is that restoration to natural wetlands is a more beneficial use that conversion of the same lands to water treatment areas, in light of the information provided in the preceding paragraph. An elevated stormwater treatment area would still constitute a barrier or impediment to restoration of ecological connections between lands and wetlands to the north and those to the south. The Corps, upon review of the contractor's study, concludes that it would be more beneficial to the ecosystem as a whole to allow any road system that is bypassed, and is not needed to maintain access for existing residents or recreational users, to be restored to natural elevations. Restoration of the bypassed roadway sections would encourage wetland restoration, enhance ecological connectivity, and be more aesthetically pleasing.

Except for temporary adverse impacts associated with construction, none of the alternatives would directly affect surface water quality of the L-29 Canal or ENP. Because adverse effects associated with highway runoff are related to the amount of traffic using the highway, and because none of the alternatives would affect traffic along the Tamiami Trail, no net adverse effects on the Everglades environment would result from this project.

The construction of facilities for the treatment of highway runoff would reduce contaminant levels. However, because traffic volumes on the Tamiami Trail are quite

low, the pollutant loadings along the highway are also low. The acres of Everglades wetlands that would be required to incorporate water quality treatment and the differences in cost for constructing water treatment facilities are presented in Table 13. The high costs, both monetarily and ecologically, to further reduce already low contaminant levels must be weighed against the benefits.

Table 13. Comparison of Acres of Wetlands Permanently Lost and Construction Costs of Each Alternative

Alternative	Acres of Wetlands Lost	Construction Cost
2a (Without WQ Treatment)	11.8	$24,354,651
2b (With WQ Treatment)	86.0	$58,550,658
	Difference 74.2 acres	Difference $34,196,007
3a (Without WQ Treatment)	14.3	$67,959,310
3b (With WQ Treatment)	28.9	$73,457,368
	Difference 15.5 acres	Difference $ 5,498,058
4a (Without WQ Treatment)	68.4	$45,235,110
4b (With WQ Treatment)	103.9	$47,128,438
	Difference 35.5 acres	Difference $ 1,893,328
5a (Without WQ Treatment)		$135,915,000
5b (With WQ Treatment)	N/A	$140,314,000
		Difference $ 4,399,000
6a (Without WQ Treatment)	2.8	$72,877,979
6b (With WQ Treatment)	48.9	$81,369,677
	Difference 46.1 acres	Difference $ 8,491,698
7a (Without WQ Treatment)	5.0	$23,045,733
7b (With WQ Treatment)	72.4	$51,858,385
	Difference 67.4 acres	Difference $28,812,652
8a (Without WQ Treatment)	5.1	$45,499,995
8b (With WQ Treatment)	68.0	$47,081,029
	Difference 62.9 acres	Difference $ 1,581,034

Source: PBS&J and GEC, 2001

An independent assessment and position paper on water quality treatment in south Florida associated with highway and bridge construction is shown in Appendix F.

None of the alternatives would have any direct effect on ground water.

5.7.4 Hazardous, Toxic, or Radiological Waste

A preliminary assessment indicated that no HTRW or other harmful substances are impacting the project area. However, if contaminants are found during project construction, the site must be remediated before construction resumes.

Contaminants, if not detected during the site assessment, may be disturbed or released by increasing the water level and hydroperiod or by removing unnatural structures from the landscape. Experience has shown that the highly permeable ground substrate of that area results in rapid dilution of the residual contaminants.

5.7.5 Environmental Resources

5.7.5.1 Everglades National Park.

No-Action Alternative. Under the No-Action Alternative, no additional features would be added to the existing roadway for conveyance of flows associated with MWD implementation. The existing Tamiami Trail configuration, although capable of passing the required flows, is subject to saturation of the road base, thereby weakening the roadway, and overtopping. There is the potential that during periods of high water, desired flows to ENP could be reduced to prevent flooding of the highway and protect public safety.

Action Alternatives. All action alternatives would promote the hydrologic restoration of ENP by providing additional passage of MWD flows and enhancing the hydroperiod. All action alternatives meet the design stage performance requirements

5.7.5.2 Shark River Slough East and West Basins.

No-Action Alternative. Under the No-Action Alternative, impacts to the SRS would be similar to those described in Section 5.7.5.1.

Action Alternative. Alternatives 2, 3, 4, 5, 6, 7, and 8 would have the same effect hydrologically on NESRS. The bridges of alternatives 2 and 4 and the breaches of Alternatives 3, 5, and 6 would provide equivalent hydraulic openings at the same locations. All action alternatives would convey the desired MWD flows to NESRS.

5.7.5.3 Water Conservation Area 3B.

No-Action Alternative. Under the No-Action Alternative, there would be no impacts to WCA-3B

Action Alternative. All alternatives except Alternative3 are located south of the L-29 Canal and would have no impacts on WCA-3B. The Alternative 3 alignment to the north of the L-29 levee encroaches into WCA-3B in some areas resulting in a loss of 14.3 (Alternative 3a) or 30.15 (Alternative 3b) acres of wetlands. Prolonged inundation in WCA-3B would be reduced because the bridges and weirs would allow water to flow from WCA-3B into the L-29 Canal.

5.7.5.4 Biological Communities.

No-Action Alternative. Under the No-Action Alternative, biological communities near the project are expected to be generally unaffected. A potential effect would occur if increased head height in the L-29 Canal resulting from increased flows were to overtop the road, creating a motoring safety hazard. Under these conditions flows may be reduced to lower head height in the canal, thereby limiting the goal of restoring natural hydrologic conditions to ENP. Partitioning of the Everglades by levees, canals, and roads has created barriers to the free movement of organisms, particularly those with limited mobility, such as aquatic organisms (fishes, invertebrates, etc.). A goal of CERP is to reduce this partitioning and promote ecological connectivity, the reestablishment of access through connections, corridors, or other means to allow organisms the means to

overcome the isolation of populations. Under the No-Action Alternative, ecological connectivity between the L-29 Canal and ENP would remain limited.

Vehicle collisions along the Tamiami Trail have been shown to be a major cause of wildlife mortality in the Everglades. The FHWA has provided policy and guidance on addressing the issue of wildlife mortality (FHWA Final Guidance, Transportation Enhancement Activities, 23 U.S.C. AND TEA-21). This program is not limited to threatened and endangered species, but includes any wildlife mortality directly caused by vehicles. States are charged to recognize and develop a statement of purpose and need for such projects. The criteria used to determine a need for a wildlife crossing or control project in a specific location are determined based on migration patterns, habitat use and distribution, and crossing characteristics of the wildlife through data collection on safety of motorists, habitat fragmentation, and wildlife mortality. Under the No-Action Alternative, no measures to reduce wildlife mortality would be employed within the project area.

Action Alternative. Under each of the Action Alternatives, ecological connectivity would be enhanced. Connectivity between the L-29 Canal and ENP provided by the four bridges provided by alternatives 1, 2, and 4 would realize a combined hydraulic opening of 1,450 linear feet, which would provide partial connectivity between ENP and the L-29 Canal. Alternatives 3 and 5 would involve the abandonment of the existing road (except for access to the Osceola Camp and the Airboat Association of Florida) and its breaching to provide hydraulic openings equal to those provided by the bridges of alternatives 1, 2, and 4, thereby also providing partial connectivity between the L-29 Canal and ENP. Higher hydraulic capacities would be offered by Alternatives 5c (56,496 linear feet), Alternative 6 (1,500 linear feet), and Alternative 7 (3,000 linear feet). Alternative 8a would provide sufficient hydraulic capacity for MWD flows through 24 10-foot-wide box culverts throughout the length of the project corridor; Alternative 8b would provide 40 10-foot-wide box culverts.

If, in the future, it becomes desirable to restore ecological connectivity between WCA-3B and ENP through the removal of the L-29 Levee and the filling of the L-29 Canal, the degree of connectivity provided for the Tamiami Trail by alternatives 1, 2, 3, and 4 would be limited to the hydraulic openings of the bridges or breaches. The hydraulic capacity of Alternative 8 would be limited to culverts.

There are no specific provisions made to reduce wildlife mortality, although the bridge spans of the various alternatives would likely provide some reduction in mortality of wildlife crossing the Tamiami Trail. Alternatives 2 and 4 offer a combined span of 1,450 feet, while alternatives 6 and 7 provide four miles and 3,000 feet, respectively. Alternative 3 offers no additional structures that would decrease wildlife mortality. Alternative 5 would elevate traffic and virtually eliminate wildlife mortality in the project area. All alternatives provide options for incorporating corridors and barriers to enable wildlife to safely cross the highway and the L-29 Canal.

5.7.5.5 Wetlands.

No-Action Alternative. Under the No-Action Alternative, no impacts to wetlands associated with construction activities would occur.

Action Alternative. Potential impacts to wetlands for each of the alternatives were quantified using the WRAP (Wetland Rapid Assessment Procedure) protocol (WRAP Procedure, Technical Publication REG-001, Second Edition, April 1999). WRAP is a matrix developed to assist in the functional evaluation of wetland sites, which can be used in combination with professional judgment to provide an accurate and consistent evaluation of wetland sites. The WRAP matrix establishes a numerical ranking for individual ecological and anthropogenic factors (variables) that can strongly influence wetland function. The numerical output for the variables is then used to evaluate current wetland condition. Each wetland type is rated according to its attributes and characteristics. WRAP variables include the following: (1) wildlife utilization, (2) wetland overstory/shrub canopy of desirable species, (3) wetland vegetative ground cover of desirable species, (4) adjacent upland/wetland buffer, (5) field indicators of wetland hydrology, and (6) water quality input and treatment systems. The acreage of each wetland habitat type (polygon) is then multiplied by the WRAP score of that habitat type to derive "functional units" for comparison purposes.

Fieldwork for the WRAP to determine existing conditions was performed in November 2000 and December 2000. The results of the existing condition WRAP are included in Table 14. The "future with project" analysis was performed on January 31 and February 1, 2000. A complete discussion of the WRAP is included in the USFWS CAR (Appendix G); the results are summarized in this section.

On average, existing condition WRAP scores were slightly higher in the wetland areas north of the L-29 Levee (WCA-3B) than wetland areas south of the Tamiami Trail (ENP), primarily due to the proximity of the road adjacent to ENP. The consensus among WRAP team members was that the lower scores within ENP were a result of ENP being the recipient of highway runoff, and the general lack of a minimum 30-foot buffer between the highway and the adjacent wetlands. Except for those wetlands fringing the highway and those wetlands dominated by nuisance and exotic vegetation, the quality of wetlands in the project area is generally good.

Impacts were determined for each alternative for both a with-water-quality and a without-water-quality treatment scenario. Under the with-water-quality treatment scenario, the various water quality treatment options discussed in Section 5.6.5.19 were evaluated for each alternative. For each alternative with water quality treatment, the following treatment option corresponds with each alternative:

- b = Standard water quality treatment as originally proposed);
- b1 = Water Quality Treatment Option 1A;
- b2 = Water Quality Treatment Option 1B;
- b3 = Water Quality Treatment Option 1C;
- b4 = Water Quality Treatment Option with grass strips;
- b5 = Exfiltration trenches with curbs and gutters;
- b6 = Exfiltration trenches with shoulder gutter.

For example, "WRAP Alternative 2b3" would correspond to Alternative 2b with highway runoff being treated through Water Quality Treatment Option 1-C.

Table 15 contains the overall wetland functional losses associated with each alternative and associated scenario. Also included in the WRAP were areas that could be

potentially restored in ENP. Although restoration is not currently included under each of the alternatives, restoration sites were identified for use in future projects. These areas, along with the functional units that could be potentially gained if restoration were to occur, are included in Table 16.

Table 14. Existing Condition WRAP Wetland Functional Scores for 11 Wetland Polygons on the North (WCA-3B) and South (ENP) Sides of the Eastern 11-Mile Section of Tamiami Trail (November 14-15 and December 19, 2000)

Water Conservation Area 3B			Everglades National Park		
Site	**Coordinates**	**Score**	**Site**	**Coordinates**	**Score**
1-3B (PC/PGc)	547546 2849389	0.68	1-ENP (PGc/PGw)	532858 2849250	0.70
2-3B (PE)	574280 2849386	0.80	2-ENP (SB)	541784 2849272	0.69
3-3B (PGc/PGw)	546090 2849372	0.78	3-ENP (SB)	545591 2849287	0.69
4-3B (SBa/SBs)	541983 2849359	0.83	4-ENP (PC)	550370 2849489	0.48
5-3B (PGw)	540538 2849358	0.83	5-ENP (ES/SB)	549707 2849308	0.54
6-3B (PC)	535733 2849341	0.53			

Source: WRAP Team, 2000.

Table 15. Summary of With-Project Wetland Rapid Assessment Procedures (WRAP) Functional Units (FU) Lost and Gained with Different Water Quality Scenarios, Tamiami Trail Project, Modified Water Deliveries Project With Different Water Quality Treatment Scenarios

Alternative 2 (Existing Alignment)			
Alternative	**Direct Effects (FU)**	**Indirect Effects (FU)**	**Total Functional Unit Lost**
2a – w/o WQ Treatment	7.18	2.92	10.10
2b* – w/ WQ Treatment	34.55	2.92	37.48
2b1* – w/ WQ Treatment	30.70	2.92	33.62
2b2* – w/ WQ Treatment	5.45	2.92	8.37
2b3* – w/ WQ Treatment	5.45	2.92	8.37
2b4* – w/ WQ Treatment	5.45	2.92	8.37
2b5* – w/ WQ Treatment	5.45	2.92	8.37
2b6* – w/ WQ Treatment	5.42	2.92	8.34
Alternative 3 (North Alignment)			
Alternative	**Direct Effects (FU)**	**Indirect Effects (FU)**	**Total Functional Unit Lost**
3a – w/o WQ Treatment	11.06	7.76	18.82
3b* – w/ WQ Treatment	22.39	7.76	30.15
3b1* – w/ WQ Treatment	17.64	7.76	25.50
3b2* – w/ WQ Treatment	8.24	7.76	16.00
3b3* – w/ WQ Treatment	10.48	7.76	18.24
3b4* – w/ WQ Treatment	7.43	7.76	15.191
3b5* – w/ WQ Treatment	8.03	7.76	15.79
3b6* – w/ WQ Treatment	8.10	7.76	15.86
Alternative 4 (South Alignment)			
Alternative	**Direct Effects (FU)**	**Indirect Effects (FU)**	**Total Functional Unit Lost**
4a – w/o WQ Treatment	46.86	+6.43	40.43
4b* – w/ WQ Treatment	71.07	+6.43	64.64
4b1* – w/ WQ Treatment	42.91	+6.43	36.49
4b3* – w/ WQ Treatment	42.92	+6.43	36.49
4b4* – w/ WQ Treatment	42.03	+6.43	35.60
4b5* – w/ WQ Treatment	42.94	+6.43	36.51
4b6* – w/ WQ Treatment	42.92	+6.43	36.49
Alternative 5 (Elevated Causeway)			
Alternative		**Acres Restored**	**Functional Units Gained**
5a – w/o WQ Treatment; w/ a Berm		57.3	39.35
5b – w/ WQ Treatment; w/ a Berm		43.0	29.54
5c – w/o WQ Treatment; w/o a Berm		65.9	45.27
5d – w/ WQ Treatment; w/o a Berm		49.4	33.93

Alternative 6 (Four-Mile Bridge)			
Alternative	**Direct Effects (FU)**	**Indirect Effects (FU)**	**Total Functional Unit Lost**
6a – w/o WQ Treatment	2.26	0	2.26
6b* – w/ WQ Treatment	35.46	0	35.46
6b1* – w/ WQ Treatment	5.29	0	5.29
6b2* – w/ WQ Treatment	2.28	0	2.28
6b3* – w/ WQ Treatment	5.29	0	5.29
6b4* – w/ WQ Treatment	5.29	0	5.29
6b5* – w/ WQ Treatment	2.28	0	2.28
6b6* – w/ WQ Treatment	2.28	0	2.28
Alternative 7 (3,000-Foot Bridge)			
Alternative	**Direct Effects (FU)**	**Indirect Effects (FU)**	**Total Functional Unit Lost**
7a – w/o WQ Treatment	3.42	0	3.42
7b* – w/ WQ Treatment	49.55	0	49.55
7b1* – w/ WQ Treatment	7.18	0	7.18
7b2* – w/ WQ Treatment	3.42	0	3.42
7b3* – w/ WQ Treatment	7.18	0	7.18
7b4* – w/ WQ Treatment	7.18	0	7.18
7b5* – w/ WQ Treatment	3.42	0	3.42
7b6* – w/ WQ Treatment	3.42	0	3.42
Alternative 8 (Box Culverts)			
Alternative	**Direct Effects (FU)**	**Indirect Effects (FU)**	**Total Functional Unit Lost**
8a – w/o WQ Treatment	3.51	0	3.51
8b* – w/ WQ Treatment	46.56	0	46.56
8b1* – w/ WQ Treatment	7.48	0	7.48
8b2* – w/ WQ Treatment	3.51	0	3.51
8b3* – w/ WQ Treatment	7.48	0	7.48
8b4* – w/ WQ Treatment	7.48	0	7.48
8b5* – w/ WQ Treatment	3.51	0	3.51
8b6* – w/ WQ Treatment	3.51	0	3.51

*For each alternative with water quality, the following treatment option corresponds with each alternative: b=standard water quality treatment (originally proposed); b1=Option 1A; b2=Option 1B; b3=Option 1C; b4=Option with grass strips; b5=exfiltration trenches with curbs and gutters; b6=exfiltration trenches with shoulder gutter.

Source: WRAP Team, 2001.

Table 16. Potential Restoration Areas South of Tamiami Trail Between S-334 and the L67's

Site (From East to West)	Acres Potentially Available For Restoration	Functional Units Gained
1. Radio Tower	0.668	0.47
2. Coopertown Airboat Concession	1.391	0.96
3. Unnamed Site (adjacent to Coopertown)	0.429	0.30
4. Gator Park Airboat Concession	8.134	5.65
5. Unnamed Site East of Frog City	0.572	0.40
6. Frog City (owned by NPS)	6.836	4.76
7. Safari Airboat Concession	8.520	5.93
8. Radio Tower (west of Safari)	1.762	1.23
TOTAL POTENTIAL WETLAND FUNCTIONAL UNITS GAINED		19.70

Source: WRAP Team, 2001.

Based on the WRAP wetland functional assessment, Alternative 4b (Alternative 4 with dry retention water quality treatment) had the most significant wetland functional losses (- 64.64 FU) with Alternative 5c (elevated causeway with full restoration of existing US 41) had the most significant wetland functional gains (+ 45.27 FU). The ranking of all alternatives (most to least impacts) from a wetland functional loss/gain perspective only is displayed in Table 16.

Based on the ranking of total wetland functional units lost/gained by each alternative without water quality treatment, Alternative 5 (elevated causeway) is the least damaging to wetlands with the remaining alternatives exhibiting a range of impacts (see Table 16). Alternative 1 (existing alignment and profile with four new bridges) has relatively minor wetland functional loss (- 2.92 FU) attributable to temporary bypass roads and no other direct losses.

Under the with water quality treatment scenario, wetland functional losses are increased by slightly over 41 percent (22.79 FU) for all alternatives except for Alternative 5 which shows a decrease in wetland functional gains by 25 percent (a loss in gain of 10.58 FU). The water quality treatment options, as described below, are designed to significantly reduce wetland functional losses. When compared to average FU losses from the dry retention water quality treatment, the average FU losses are decreased by approximately 53 percent (20.68 FU).

Water Quality Treatment Option impacts, as shown in Table 17**,** are summarized as follows:

Option b1 (Water Quality Option 1 A - Shift Alignment and Compress Swale/South Side): Compared to Option b (original dry retention), Option b1 reduces wetland functional losses by about 25 percent (9.68 FU) on average. For Alternative 4 specifically, Option b1 would reduce wetland functional losses by 28.15 FU, or approximately 54 percent.

Table 17. Rankings of Tamiami Trail Project Alternatives (With and Without Water Quality Treatment) Based on Losses/Gains of Wetland Functional Units

Ranking of Alternatives W/o WQ Treatment (1 = best)			Ranking of Alternatives w/ WQ Treatment (1 = best)		
Rank	**Alternative**	**Functional Units**	**Rank**	**Alternative**	**Functional Units**
1	5c	+45.27	1	5d	+33.93
2	5a	+39.35	2	5b	+29.54
3	7a	-1.93	3	6b2, 6b5	-3.34
4	1	-2.92	4	7b2, 7b5, 7b6	-3.42
5	8a	-3.42	5	8b2, 8b5, 8b6	-3.51
6	6a	--6.60	6	6b6	-3.54
7	2a	-11.10	7	7b1, 7b3, 7b4	-7.18
8	3a	-18.82	8	8b1, 8b3, 8b4	-7.47
9	4a	-40.43	9	2b6	-8.34
			10	2b2, 2b5	-8.87
			11	3b6	--15.86
			12	3b5	-15.79
			13	3b4	-15.91
			14	3b2	-16.00
			15	3b3	-18.24
			16	6b1	-20.87
			17	6b	-22.77
			18	3b1	-25.40
			19	3b	-30.15
			20	2b1	-33.62
			21	4b4	-35.6
			22	4b1, 4b3, 4b6	-36.49
			23	4b5	--36.51
			24	4b2	-36.52
			25	2b	-37.48
			26	4b	--64.64

Source: WRAP Team, 2001.

Option b2 (Water Quality Option 1B - Shift Alignment and Compress Swale/North Side): Compared to Option b (original dry retention), Option b2 would reduce wetland functional losses by about 56 percent (21.71 FU) on average. The most significant wetland functional loss reduction for Option b2 compared to Option b is Alternative 2, where wetland functional loss would be reduced by 78 percent (29.11 FU).

Option b3 (Water Quality Option 1C - Shift Typical Section North into L-29 Canal): Compared to Option b (original dry retention), Option b3 would reduce wetland functional losses by 57 percent (22.15 FU) on average. The most significant wetland functional loss reduction for Option b3 compared to Option b is again Alternative 2, where wetland functional loss would be reduced by 78 percent (29.11 FU).

Option b4 (Grass Strips): Compared to Option b (original dry retention), Option b4 10 would reduce wetland functional losses by 59 percent (22.96 FU) on average. The most significant wetland functional loss reduction for Option b4 compared to Option b is again Alternative 2, where wetland functional loss would be reduced by 78 percent (29.11 FU).

Option b5 (Water Quality Option 2 – Exfiltration Trenches with Curb and Gutter): Compared to Option b (original dry retention), Option b5 would reduce wetland functional losses by 59 percent (22.76 FU) on average. The most significant wetland functional loss reduction for Option b5 compared to Option b is again Alternative 2, where wetland functional loss would be reduced by 78 percent (29.11 FU).

Option b6 (Water Quality Option 3 – Exfiltration Trenches with Shoulder Gutter): Compared to Option b (original dry retention), Option b6 would reduce wetland functional losses by 59 percent (22.70 FU) on average. The most significant wetland functional loss reduction for Option b5 compared to Option b is again Alternative 2, where wetland functional loss would be reduced by slightly more than 78 percent (29.42 FU).

5.7.5.6 Threatened or Endangered Species.

No-Action Alternative. Environmental resources near the project area and ENP are expected to be generally unaffected under the conditions of future without project.

Action Alternatives. The USFWS, using the *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Guidelines) (Ogden 1990) and the Tamiami West Colony photography of the colony during the 1999 nesting season, identified a primary and secondary zone for the Tamiami West Colony and the Tamiami East Colony. Based on photointerpretation, it was apparent that wood storks nested as close as 300 feet south of Tamiami Trail during the 2000 nesting season, when an estimated 1,300 storks nested at this site. A description of both the primary and secondary zones are as follows:

- The Primary Zone is the most critical area, and must be managed according to the guidelines to insure the colony site survives. Human activities inside the Primary Zone during the wood stork nesting season, in particular, should be conducted according to the Guidelines. Primary Zones normally extend between 1,000 and 1,500 feet in all directions from the colony boundaries based on the presence or absence of visual barriers between the colony and the disturbance. In no case should the Primary Zone be less than 500 feet. In the case of the Tamiami East and West colonies, a distance of 1,000 feet was chosen due to the visual barrier of the pond apple forest between the colony and Tamiami Trail, and the fact that storks appear to have become somewhat acclimated to highway traffic noise.

- Secondary Zones extend outward from the Primary Zone 1,000 to 2,000 feet or to a radius of 2,500 feet from the outer edge of the colony. Restrictions in this zone are needed to minimize disturbances that might impact the Primary Zone, and to protect essential areas outside the Primary Zone. The Secondary Zone may be used by wood storks for collecting nesting material, for roosting, loafing, and feeding (especially important for newly fledged young). For the application of the Guidelines to the Tamiami Trail Project, a distance of 1,000 feet from the Primary Zone, extending in all directions, was

chosen for both colonies for the reasons described above for the Primary Zone.

The USFWS has established restrictions for the Tamiami West, Tamiami East, and the Frog City rookeries located within the project area. Restrictions per colony are as follows:

- **Tamiami West** (Figure 28)

  (1) **Primary Zone:** From February (or the onset of nesting activity) and through the on-set of the rainy season (or when the young have fledged), highway construction *(e.g.* heavy/human equipment activity, pile driving, blasting) should not be permitted in the reach of the highway affected by that alternative.

  (2) **Secondary Zone:** No unauthorized human activity (on foot, airboat, or off-road vehicle) occur at any time of the year within the reach of highway affected by that alternative on the south side of the highway and particularly during the nesting season.

  (3) **Length of Restrictions:** These restrictions shall remain in effect during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected.

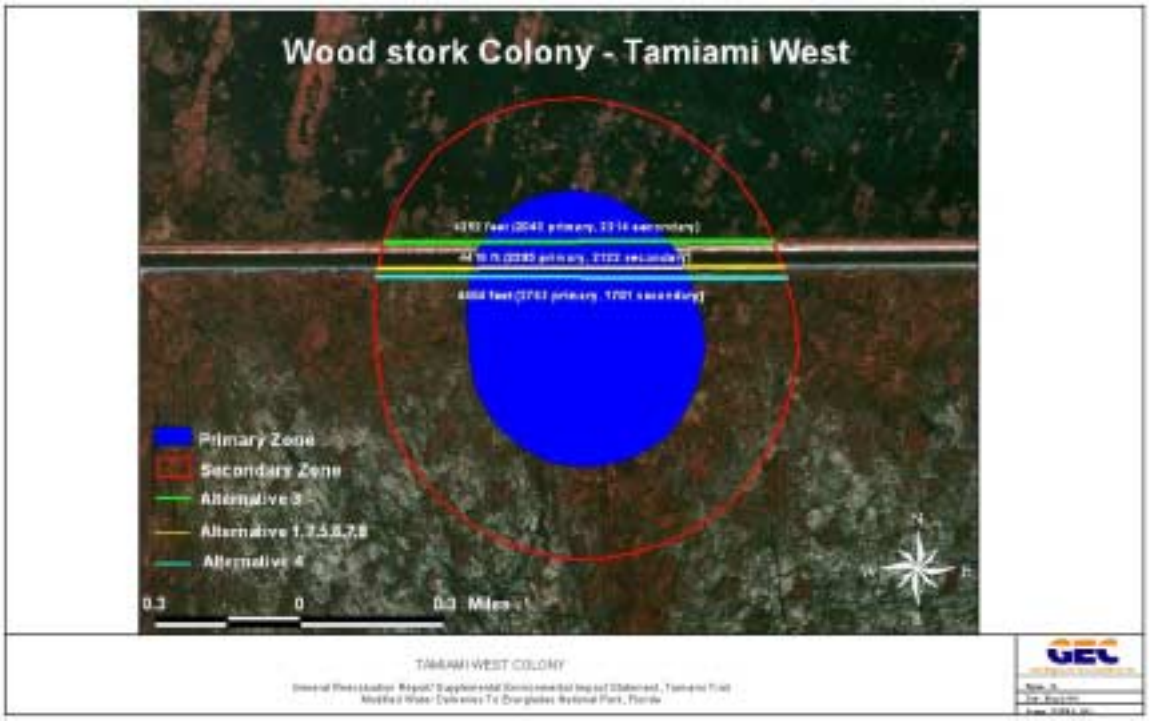
  (4) **Qualified Observer:** Subject to the approval of the FWS and FFWCC, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected. The observer shall monitor wood stork activity and shall notify USFWS, FFWCC, and the Corps if wood stork behavior is modified such that roosting, nest building, breeding, nesting, and/or fledging of young is disrupted or otherwise interfered with.

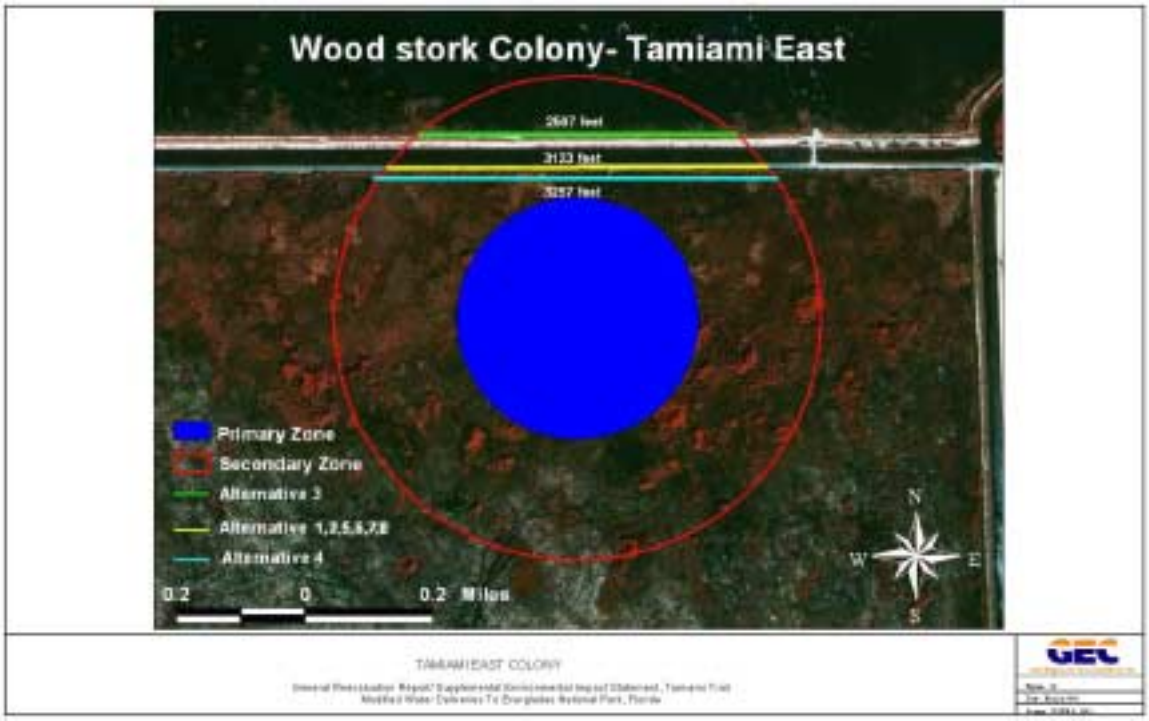
  (5) **Modification of Restrictions:** If new information becomes available concerning the Tamiami West Wood stork colony, the Corps, USFWS and FFWCC should immediately contact each other to determine what modifications, if any, are warranted.

- **Tamiami East** (Figure 29)

  (1) **Secondary Zone:** No unauthorized human activity (on foot, airboat, or ORV) occur at any time of the year within the reach of highway affected by that alternative on the 40 south side of the highway and particularly during the nesting season.

  (2) **Length of Restrictions:** These restrictions shall remain in effect during the construction phase of the Tamiami Trail Project, which is 18–48 months depending on the final alternative selected.


Wood stork Colony - Tamiami West
Primary Zone
Secondary Zone
Alternative 3
Alternative 1,2,5,6,7,8
Alternative 4
0.3
0
0.3 Miles
TAMIAMI WEST COLONY


Wood stork Colony- Tamiami East
2697 feet
3133 feet
3697 feet
Primary Zone
Secondary Zone
Alternative 3
Alternative 1,2,5,6,7,8
Alternative 4
0.2
0
0.2 Miles
N
W
E
S
TAMIAMI EAST COLONY

(3) **Qualified Observer:** Subject to the approval of the FWS and FFWCC, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail Project, which is 18–48 months depending on the final alternative selected. The Observer shall monitor wood stork activity and shall notify USFWS, FFWCC, and the Corps if wood stork behavior is modified such that roosting, nest building, breeding, nesting, and/or fledging of young is disrupted or otherwise interfered with.

(4) **Modification of Restrictions:** If new information becomes available concerning the Tamiami West Wood Stork Colony, the Corps, USFWS, and FFWCC should immediately contact each other to determine what modifications, if any, are warranted.

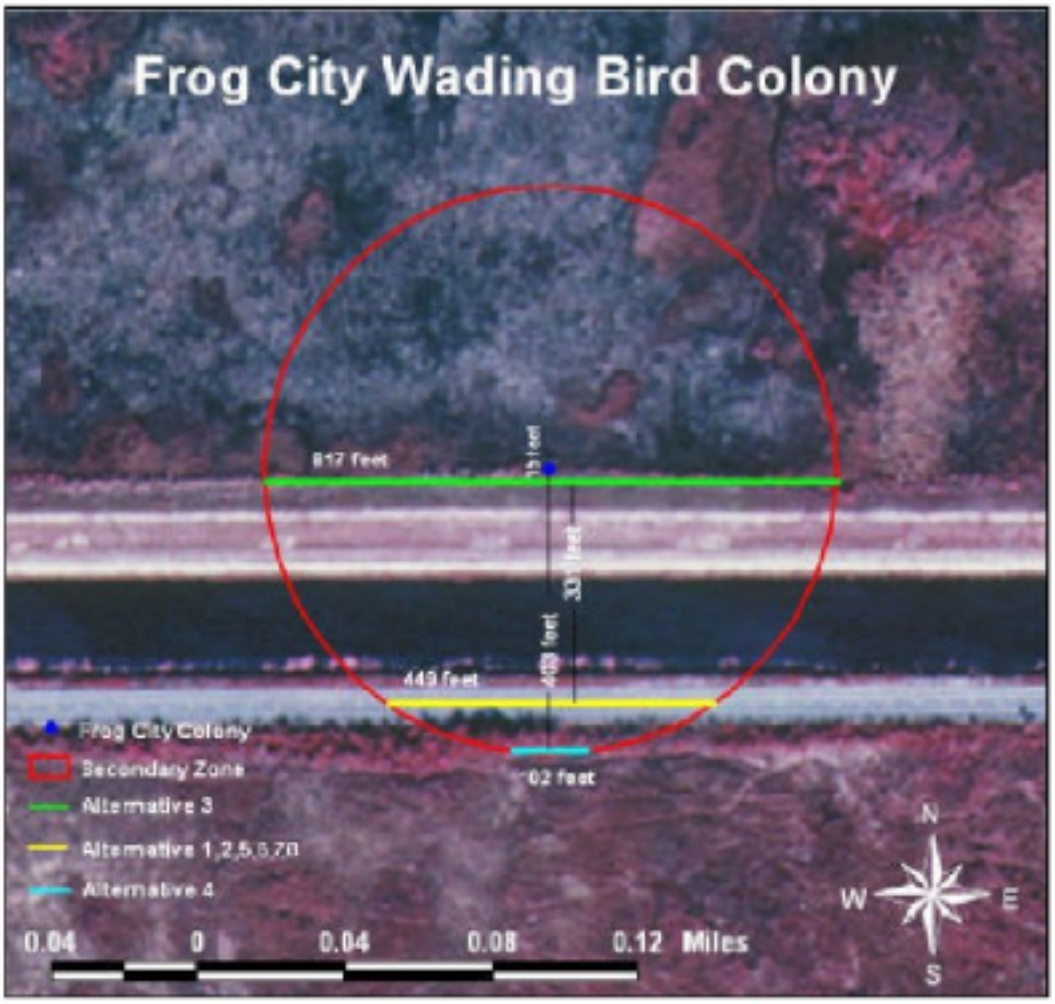
Frog City. This small colony (Figure 30) is situated in WCA-3B close to the L-29 Levee approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. These migratory birds are also protected under the provisions of the Migratory Bird Treaty Act. As such, they are protected species under the jurisdiction of FWS. The FFWCC and USFWS have applied the *Minimum Buffer Zone Requirements to Protect Nesting Bird Colonies from Human Disturbance*. For alternatives 1, 2, 4, 5, 6, 7, and 8, which are all located south of the L-29 Levee/Canal, USFWS and FFWCC did not recommend that any Buffer Zone restrictions be applied to the Frog City Colony. The colony is protected from highway construction noise by the approximately 20-foot high L-29 Levee, and the wading birds nesting at this colony have acclimated to continuous highway traffic and noise. Restrictions for this area apply to Alternative 3 and are as follows:

(1) **Alternative 3 (North alignment in WCA-3B):** It is recommended that Alternative 3 be eliminated from further consideration as a project alternative for the Tamiami Trail Project due to the potential abandonment of the Frog City Colony by the protected species it supports.

(2) **Buffer Zone:** No Buffer Zone restrictions are recommended for the Frog City Colony for alternatives 1, 2, 4, 5, and 6 during the construction phase of the Tamiami Trail Project.

(3) **Qualified Observer:** Subject to the approval of USFWS and FFWCC, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail Project, which is 18–48 months depending on the final alternative selected. The observer shall monitor wading bird activity and shall notify USFWS, FFWCC, and the Corps if wading bird behavior is modified such that roosting, nest building, breeding, nesting, and/or fledging of young is disrupted or otherwise interfered with.

(4) **New Information:** If new information becomes available concerning the Frog City Colony, the Corps, USFWS, and FFWCC should immediately contact each other to determine what actions, if any, are warranted.



FROG CITY WADING BIRD COLONY

General Reevaluation Report/ Supplemental Environmental Impact Statement,Tamiami Trail
Modified Water Deliveries To Everglades National Park, Florida

GEC
Gulf Engineers & Consultants, Inc.

With the application of the above referenced restrictions, alternatives 1, 2, 4, 5, 6, 7, and 8 (with and without water quality treatment) should not adversely impact threatened or endangered species.

Alternative 3 would result in adverse impacts to the Frog City Colony consequently resulting in significant adverse impacts to State listed and Federally protected species.

5.7.6 Climate

No effect on climate would result with or without implementation of the project.

5.7.7 Air Quality

No-Action Alternative. The trend in values from existing conditions in 2000 through future without project conditions in 2020 would increase from 4.8 ppm to 5.0 ppm of carbon monoxide at the Osceola Camp (a 4.2 percent increase) and from 4.0 ppm to 4.8 ppm (a 20 percent increase) at the Tigertail Camp. The increased concentrations are due solely to the projected increases in traffic volume. At neither location do the projected increases exceed the NAAQS eight-hour standard of 9.0 ppm.

Action Alternatives. Analyses conducted pursuant to project air quality impacts, as well as the organization of the information provided in this section, are in accordance with guidance promulgated in the FDOT Environmental Management Office (EMO) Project Development and Environment Manual (PD&E Manual), Part 2, Chapter 16, Air Quality Analysis. Although the proposed project does not increase traffic volumes, several alternatives involve a relocation of traffic closer to residential areas, thus the necessity that air quality be modeled.

Air quality considerations for this project focus on two perspectives. The first perspective is the applicability of transportation conformity, which is based on whether the project is located in an area that is in either nonattainment or maintenance of a National Ambient Air Quality Standard (NAAQS). The second perspective is the project level carbon monoxide hot spot analysis for all projects in all geographic areas regardless of the attainment status.

Pursuant to the 1990 Clean Air Act Amendments (CAAA) there are three levels of transportation conformity (plan, program, and project). For nonattainment and maintenance areas, plan and program-related conformity is first performed locally at the systems planning by the Metropolitan Planning Organization (MPO), utilizing regional emissions analysis methodologies and tools. The Federal Highway Administration and Federal Transit Authority, in conjunction with the USEPA, then issue conformity determinations and plans.

Because the project does not appear to qualify for a Programmatic or Type I Categorical Exclusion per FDOT's PD&E Manual, an impact analysis of the alternatives was conducted.

In accordance with PD&E Manual Section 16-2.2.2.1, the analysis includes all alternatives currently under consideration, including the no-build alternative.

Timeframes for the analysis include 2000 for the existing profile and alignment, 2006 as the first year the project will be open to traffic, and 2020 for the design year.

An initial screening of potential carbon monoxide (CO) impacts was conducted using COSCREEN software from FDOT's EMO an additional CO, volatile organic carbon (VOC), and oxides of nitrogen (NO_X)) analysis, and using EPA's MOBILE5A Mobile Source Emission Factor Model, a program that estimates such emissions for gasoline and diesel-fueled motor vehicles was also conducted. The program uses the calculation procedures presented in Compilation of Air Pollutant Factors – Volume II (AP-42, Fourth Edition, September 1985, and Supplement A to AP-42 Volume II, January 1991).

COSCREEN analyses were conducted for all alternatives using the rural setting and average cruise speed for projected traffic volumes for the projected project implementation date of 2006, a design year of 2020, and, for comparison with existing conditions, 2000. MOBILE5A calculates emission factors for eight individual vehicle types in two regions (low and high altitude) of the country. The emission factor estimates further depend on various conditions such as ambient temperatures, average travel speed, operating modes, fuel volatility, and mileage accrual rates.

In accordance with state and federal requirements and emission factors that are, among other factors, a function of temperature, traffic data were analyzed for the months of January and July (Table 18). Traffic data used for this analysis are presented in tables 19 and 20.

For January, traffic counts indicated a 1999 average daily traffic (ADT) of 5,200 vehicles per day (vpd) and a projected 2022 ADT of 9,200 vpd. ADTs of 5,375 vpd, 6,420 vpd, and 8,852 vpd for 2000, 2006, and 2020, respectively were interpolated. In accordance with the Transportation Research Board's Highway Capacity Manual, Special Report 209 (HCM, Third Edition, updated 1994), and in order to analyze potential air quality impacts in a conservative manner with respect to CO calculations, projected ADTs were adjusted by a factor of 160 percent to account for heavier tourist-season traffic. Using the peak hour to daily traffic ratio of 9.29 percent, design hour volumes of 800 vph, 955 vph, and 1,316 vph were calculated for 2000, 2006, and 2020, respectively. Final adjustments to projected traffic volumes were made in accordance with HCM Chapter 8 in order to arrive at the flow rates (vph) for the peak 15 minutes total for both directions of flow (service flow) along the project length. Previously described design hour traffic volumes were divided by proscribed peak hour factors (PHF) resulting in service flows for 2000, 2006, and 2020 of 860 vph, 1,030 vph, and 1,400 vph, respectively.

July (non-tourist season) traffic calculations were similar to calculations made for the January values; the only difference was that volumes were not increased by the 160 percent Sunday/holiday factor. As a result, flow rates of 500 vph, 596 vph, and 822 vph were calculated for 2000, 2006, and 2020, respectively.

In addition to temperature, emission factors are influenced by vehicle speed. Accordingly, Level of Service (LOS) evaluations were conducted in order to determine likely average vehicle speeds along the project corridor. Based on current roadway geometry and traffic as well as roadway geometry for the alternatives and projected traffic volumes, LOS-A through LOS-E were calculated per HCM Chapter 8, using directional distribution and lane width factors of one. Heavy vehicle factors were calculated based on data indicating 11.47 percent heavy trucks. For purposes of

conservative calculations and to account for tourist season traffic, it was assumed that recreational vehicles and buses each comprised seven percent of overall traffic flows.

Table 18. Traffic Data for 2000

Alternative	Month	ADT (vpd)	Design Hours	Flow (vph)	LOS	Avg. Speed (mph)
Existing Conditions	January	5,375	800	860	D	50
	July	5,375	500	549	C	52

Source: G.E.C., Inc., 2000.

Table 19. Traffic Data for 2006

Alternative	Month	ADT (vpd)	Design Hours	Flow (vph)	LOS	Avg. Speed (mph)
Future w/o Project	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 1	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 2	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 3	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 4	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 5	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 6	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 7	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52
Alternative 8	January	6,420	955	1,030	D	50
	July	6,420	596	648	C	52

Source: G.E.C., Inc., 2000. ADT (vpd), Design Hr./Flow (vph), Speed (average, mph).

Table 20. Traffic Data for 2020

Alternative	Month	ADT (vpd)	Design Hours	Flow (vph)	LOS	Avg. Speed (mph)
Future w/o Project	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 1	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 2	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 3	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 4	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 5	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 6	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 7	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50
Alternative 8	January	8,852	1,316	1,400	D	50
	July	8,852	822	884	D	50

Source: G.E.C., Inc., 2000. ADT (vpd), Design Hr./Flow (vph), Speed (average, mph).

With flow rate and average speed estimates for each alternative and analysis year, a preliminary screen of CO concentrations using COSCREEN was conducted for sensitive receptors located in the project area. CO, VOC, and NO_X emission factors were then computed using MOBILE5A. Table 21 presents the results of CO screening analysis with respect to potential concentrations near the Tigertail and Osceola camps. In accordance with FDOT requirements, the analysis is based on January temperatures and rural conditions. Alternatives 3 and 4 were analyzed separately because each involves a substantial offset from the alignments of all other alternatives. As discussed previously, the seven other alternatives (No-Action Alternative, alternatives 1, 2, 5, 6, 7, 8) were analyzed together because of similar alignment, geometry, and traffic flow.

Table 22 presents the results of MOBILE5A emission factor analysis for CO, VOC, and NO_X emissions. Inputs for cold starts, hot starts, Reid Vapor Pressure, and meteorological data were made in accordance with the PD&E Manual. Default MOBILE5A vehicle mix values were used. Inputs for operating modes, fuel volatility, mileage accrual rates, and other criteria are based on modeling data used for projects in similar areas that has been proven to provide conservative results. CO emission factors are based on January weather and traffic conditions. VOC and NO_X emission factors are based on July weather and traffic conditions.

Multiplying the emission factors from Table 20 by the projected flow rate volumes yields total emissions per mile for the various design years. Total flow rate hourly emissions are presented in Table 23.

Table 21. CO Screening Results

Alternative and Design Year	Background		Tigertail Camp		Osceola Camp	
	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr
2000 Existing Conditions	1.7	1.0	6.7	4.0	8.1	4.8
2006 Alternatives 1, 2, 5, 6, 7, 8 and Future without Project	1.7	1.0	6.3	4.8	8.0	4.8
2006 Alternative 3	1.7	1.0	8.0	4.8	4.8	2.9
2006 Alternative 4	1.7	1.0	5.9	3.5	8.1	4.8
2020 Alternatives 1, 2, 5, 6, 7, 8 and Future without Project	1.7	1.0	8.1	4.8	8.4	5.0
2020 Alternative 3	1.7	1.0	8.4	5.0	8.0	4.8
2020 Alternative 4	1.7	1.0	8.1	4.8	8.9	5.3

Source: G.E.C., Inc., 2000. All concentrations are in parts per million (ppm). Maximum concentrations at sensitive receptors include background concentrations.

Table 22. MOBILE5A Emission Factors

Design Year	Emission Factors		
	CO	VOC	NO_X
2000	9.656	1.479	2.819
2006	7.897	1.260	2.504
2020	8.024	1.150	2.251

Source: G.E.C., Inc., 2000. All values represent weighted average “All Vehicle,” in grams per mile (gpm).

Table 23. Total Flow Rate Hourly Emissions

Design Year	Total Emission		
	CO	VOC	NO_X
2000	8.30	0.81	1.55
2006	8.13	0.82	1.62
2020	11.23	1.02	2.00

Source: G.E.C., Inc., 2000. All values represent weighted average “All Vehicle” emissions in kilograms per mile per hour (Kg/mph).

Regarding the comparison between alternatives versus the future without project alternative, the data indicate that there would be no increase in CO concentrations at the

receptors except in design year 2020, and only in those cases where an alternative involves a new alignment that brings the roadway closer to the receptor.

Alternative 3 is projected to increase CO concentrations near the Tigertail Camp from a future without project concentration of 4.8 ppm to 5.0 ppm (a 4 percent increase). Alternative 4 is projected to increase CO concentrations near the Osceola Camp from a future without project concentration of 5.0 ppm to 5.3 ppm (a 6 percent increase). Again, in neither instance is the NAAQS standard of nine ppm exceeded.

MOBILE5A results indicate that total flow rate hourly emissions for CO, VOC, and NO_X would increase 35 percent, 26 percent, and 29 percent, respectively, from 2000 through 2020, regardless of the alternative. The projected increases, as discussed previously, are due solely to projected increases in traffic.

COSCREEN and MOBILE5A results indicate that implementation of the alternatives would have little impact on baseline air quality in the project area for the design years analyzed. Construction associated with the various alternatives has not been included in this analysis, and although it would cause minor short-term air quality impacts in the form of dust from earthwork and other activity, it is expected that such impacts would be minimized by adherence to all state and local regulations and to FDOT's Standard Specifications for Road and Bridge Construction.

FDEP does not require air emission permits for mobile sources such as construction equipment. Therefore, no air emission permits will be required for the project.

5.7.8 Recreation

No-Action Alternative. If the project is not implemented, there would be no effects on recreation in the area. Recreational boating, airboating, fishing, and wildlife observation are expected to continue. Currently there is an airboat ramp accessed via S-334. The maintenance road on the north bank of the L-29 Canal provides access to a boat ramp, a picnic area, and approximately 10.5 miles of bank fishing opportunity. Approximately 10.7 miles of the south bank of the L-29 Canal is available for fishing from the north shoulder of Tamiami Trail. There are 19 groups of culverts within the project boundaries. Some, but not all, of the culvert outfall locations on the south side of the Trail are used by bank fishermen. The unimproved vehicle track atop the L-29 Levee affords views to the north into WCA-3B. ENP is currently involved in the public process of revising their General Management Plan, which will determine the future status of these businesses. Until the GMP is implemented, the businesses will have access to the current uses of the area.

Action Alternatives. Under alternatives 2, 4, 6, and 7, there would be no effects on access to boat ramps via S-333 and S-334 other than those associated with normal traffic delays. No effect on bank fishing access to the north bank of the L-29 Canal is anticipated. The use of shoulders for temporary lanes would preclude parking on roadsides. A method of "rolling construction" would be employed, and impacts from construction would be localized. Therefore, bank fishing from the Tamiami Trail would be restricted from those portions of the roadway where construction takes place during the 24-month construction period of alternatives 2 and 7, and the 30-month construction period of Alternative 6. After the completion of construction, bank fishing from the south bank of L-29 Canal could resume fully. Fishing at the culvert outfall locations would be

eliminated under alternatives 2b, 6b, and 7b because the reconstruction of the highway does not include the reconstruction of culverts. Approximately six feet of clearance under the bridges of would allow some limited protection from rain or sun to bank fishermen.

Under Alternative 3, access to boat ramps at S-333 and S-334 would be maintained throughout the 30-month construction period. Access to the north bank and to Boat Ramp 153 could be impeded at times during the 30-month construction period because of staging of equipment and materials and ongoing construction activity. The completed roadway may offer better access to Boat Ramp 153 from an improved road but possibly at the expense of parking area. The area currently available for picnicking may be reduced. Approximately seven miles of bank lying between the eastern-most and western-most breaches would reduce bank fishing from the former roadway alignment. Approximately two miles of existing roadbed accessible from the east and 1.5 miles on the west would be free from through traffic and available for fishing. In addition to bank fishing these areas could be used as locations for various gatherings or events. Access to the Airboat Association site and to the three businesses would be unaffected during the construction phase. Bridges built across the L-29 Canal would provide access to these sites after the completion of construction. The roadway for this alternative would be elevated and would provide panoramic views to the north.

Under Alternative 4, there would be no effect on access to boat ramps via S-333 and S-334 other than normal traffic delays. Nor would there be any loss of access to bank fishing on the north bank of the L-29 Canal. The use of shoulders for temporary lanes would restrict roadside parking; therefore, access for bank fishing from the highway would be restricted at times at construction locations during the 24-month construction period. After construction bank fishing from the south bank of L-29 Canal could resume. Fishing at the culvert outfall locations would be eliminated because the reconstruction of the road would not include a reconstruction of culverts. Approximately six feet of clearance under the bridges would allow some limited protection from rain or sun to bank fishermen. Additional right-of-way requirements to the south of the existing alignment would encroach on the airboat tour operator's parking areas and buildings. Part of the Airboat Association property would be taken and new access would be required.

Under Alternative 5, access to boat ramps at S-333 and S-334 and fishing or other use of the north bank would not be affected. It is likely that bank fishing would be restricted at locations where construction is taking place along the south bank of the L-29 Canal during the 48-month construction phase. On completion of construction, approximately one mile of existing roadbed would remain accessible on the east and 0.5 mile on the west. Access ramps would be constructed to the Airboat Association of Florida and to the airboat tour businesses. These ramps could also be used to allow the general public access to portions of the existing roadbed that remain after breaches are made in the existing Tamiami Trail roadway. Because there would be no through traffic, some of the area may be suitable for picnicking or other activities. Fishermen using the south bank of the L-29 Canal would be partially sheltered by the elevated roadway. The elevated nature of the roadway would provide panoramic views to both north and south along the entire 10.7-mile length. Alternative 5b would offer essentially the same access opportunities as Alternative 5 except where inhibited by water treatment retention swales. Under Alternative 5c, degradation of the existing roadbed would eliminate bank fishing along virtually the entire existing roadway.

With Alternative 8, there would be no effect on access to boat ramps via S-333 and S-334 other than normal traffic delays. No effect on bank fishing access to the north bank of the L-29 Canal is anticipated. The use of shoulders for temporary lanes would preclude parking on roadsides; therefore, bank fishing from the Tamiami Trail would be restricted from portions of the roadway when construction takes place during the 24-month construction period of Alternative 8a or the 28-month construction period of Alternative 8b. After construction bank fishing from the south bank of L-29 Canal could resume fully. Fishing at the existing culvert outfall locations would be eliminated under Alternative 8b because the reconstruction of the highway does not include the reconstruction of culverts, but new box culverts would compensate by providing new fishing sites.

5.7.9 Cultural Resources

No-Action Alternative. Because no construction would be conducted under the without-project condition, there would be no alteration of cultural resources identified in the project area.

Action Alternatives. The cultural resource assessment survey resulted in the identification of four newly recorded historic resources:

- Coopertown Airboat Rides and Restaurant (8DA6767)
- Airboat Association of Florida (8DA6768)
- Tamiami Trail (8DA6765)
- Tamiami Canal (8DA6766)

The Tamiami Trail, the Tamiami Canal, and the Coopertown site are considered potentially eligible for listing in the National Registry of Historic Places. The Airboat Association site is considered not eligible for NRHP listing.

Under all alternatives, portions of the existing Tamiami Trail would be bridged or breached to facilitate flow from WCA-3B to ENP. All alternatives except Alternative 2a would result in extensive reconstruction. However, both the highway and its alignment have received modifications and relocations throughout its history.

Alternatives 2b, 6b, 7b, 8b (with water quality treatment) and 4 would encroach on the Coopertown Airboat Rides and Restaurant. Alternative 3 would not impact any of the cultural resources with the exception of breaching the existing trail. Alternative 5 would encroach slightly on the L-29 Canal, and portions of the Tamiami Trail.

Table 24 summarizes the impacts of the project on cultural resources.

Coordination with the Florida Department of State Division of Historical Resources was initiated in a letter dated September 27, 2001. The State Historic Preservation Officer concurred with the determinations and finds the cultural resource survey complete and sufficient. The coordination letter is attached in Appendix G.

While all the remaining alternatives would result in a modification of the highway, none would affect the Tamiami Canal or the Coopertown site.

Table 24. Summary of Effects of Alternatives on Cultural Resources

Alternative	Coopertown Airboat Rides & Restaurant	Airboat Association of Florida	Tamiami Trail	Tamiami Canal
1	No Impact	No Impact	Bridge Construction	No Impact
2a	No Impact	No Impact	Bridge Construction	No Impact
2b	Adverse Impacts	Adverse Impacts	Major Reconstruction	No Impact
3a	No Impact	No Impact	Major Reconstruction	No Impact
3b	No Impact	No Impact	Major Reconstruction	No Impact
4a	Adverse Impacts	Adverse Impacts	Major Reconstruction	No Impact
4b	Adverse Impacts	Adverse Impacts	Major Reconstruction	No Impact
5a	No Impact	No Impact	Major Reconstruction	Slight Encroachment
5b	No Impact	No Impact	Major Reconstruction	Slight Encroachment
5c	No Impact	No Impact	Major Reconstruction, Embankment Removed	Slight Encroachment
6a	No Impact	No Impact	Major Reconstruction	No Impact
6b	Adverse Impacts	Adverse Impacts	Major Reconstruction	No Impact
7a	No Impact	No Impact	Major Reconstruction	No Impact
7b	Adverse Impacts	Adverse Impacts	Major Reconstruction	No Impact
8a	No Impact	No Impact	Major Reconstruction	No Impact
8b	Adverse Impacts	Adverse Impacts	Major Reconstruction	No Impact

Source: G.E.C., Inc.

Mitigation measures to offset effects to significant historic resources will be developed among the Corps, SHPO, and FDOT. Mitigation for historic resources impacts are typically coordinated with the locally affected parties and SHPO and documented in a Memorandum of Agreement (MOA). Mitigation measures could include the following:

- Video that documents the developmental history of the Tamiami Trail and the diverse cultural resources located along the corridor;

- State Historic Markers could be placed at various areas of significance along the Tamiami Trail. The markers would include narratives describing the history and importance of various sites along the corridor;

- Formal NRHP designation reports for the significant historic resources identified in the project area;

- Large format 4x5 photographs of the affected resources according to Historic American Building Survey (HABS) standards, producing sketch drawings of the affected buildings' floorplans, and producing copies of architectural plans and drawings of the buildings (if available) according to archival standards. Any archival materials could be kept at public facilities such as the Historical Museum of Southern Florida in Miami and the SHPO in Tallahassee;

- Informational brochures, tours, and/or Web sites could be produced that would cover the history and significance of the Tamiami Trail and its related historic resources. At this time, the University of Miami has developed a Web-based digital display on the Tamiami Trail in Miami-Dade County that includes historic materials such as letters, maps, photos, and promotional pieces from the early twentieth century. Efforts to produce current brochures, tours, or Web sites could be coordinated with other organizations such as the University of Miami; and

- The Miami-Dade County portion of the Tamiami Trail could be associated with the interpretative plan and Tamiami Trail Scenic Highway designation of the Collier County portion of the Tamiami Trail.

Should construction activities uncover any archaeological remains, activity in the immediate area of the find will be stopped and the Corps notified. Construction will not continue until the remains are evaluated by a professional archaeologist and the Corps of Engineers provides a notice to proceed.

In the event that human remains are found during either construction or maintenance activities, the provisions of *Chapter 872, Florida Statute (872.05)* and the Native American Graves Protection and Repatriation Act (NAGPRA) will apply. Chapter 872, Florida Statute states:

> *When human remains are encountered, all activity that might disturb the remains shall cease and may not resume until authorized by the District Medical Examiner (if the remains are less than 75 years old) or the State Archaeologist (if the remains are more than 75 years)*.

If human remains less than 75 years are encountered or if they are involved in a criminal investigation, the District Medical Examiner has jurisdiction. If the remains are determined to be more than 75 years in age, then the State Archaeologist takes jurisdiction in determining appropriate treatment and options for the remains.

5.7.10 Aesthetics

No-Action Alternative. If the project is not implemented, the existing aesthetic quality of the area would continue.

Action Alternatives. The removal of exotic vegetation on the southern side of the Tamiami Trail would be necessary for the modifications and reconstruction associated with Alternative 2, 4, 5, 6, 7, and 8. Alternative 3 would involve the construction of a new road and would remove exotic vegetation along the north side of the L-29 Levee. All alternatives would enhance the aesthetic quality of the area by offering a view of the expanse of the Everglades throughout the length of the project corridor.

5.7.11 Noise Environment

Peak hour project noise levels for sensitive receptors, which are specific areas within a project area that can be directly affected by project activities, were modeled for the future-without-project alternative and various other alternatives for design year 2020 (tables 25 through 29). (See Section 2.11 for a description of modeling methodology). In most cases, of those alternatives with multiple variants (with or without water quality), only one variation, that likely to result in the greatest impact, was modeled. Additionally, some alternatives could be determined as having no impact without modeling. For example, because alternatives 2a and 4 (4a and 4b) are equivalent other than proximity to the Tigertail Camp, only that alignment nearest the camp, Alternative 2a, once it was determined as having no impact, required modeling.

- **Flight 592 Memorial.** Treatment of such special use areas (cemeteries, memorials) is not clearly defined in federal noise regulations. Assuming the Memorial can be considered a Category B activity, TNM modeling indicates no noise impacts resulting from any of the alternatives. Accordingly, noise abatement measures should not require consideration.

- **Osceola Camp.** Modeling indicates alternatives 1, 2a, 6a, 7a, and 8a, although predicted to exceed FDOT approach criteria, appear to have no impact when compared to future without project conditions. Alternatives 2b, 4, 6b, and 7b, and 8b are predicted to exceed FDOT approach criteria and cause impacts beyond the future without project alternative. As a result, noise abatement measures would require consideration. Alternatives 3 and 5 would have no impact.

- **Tigertail Camp.** Modeling indicates Alternative 3 would exceed the FDOT approach criteria, and noise abatement measures would require consideration. None of the other alternatives would affect the Tigertail Camp.

Table 25. Predicted Noise Levels – Flight 592 Memorial

Receiver	Existing	No Action	Alt. 1	Alt. 2	Alt. 3	Alt. 5	Alt. 6	Alt. 7	Alt. 8
1	59.9	62.0	62.0	62.2	63.9	63.4	62.0	62.0	62.0

Source: G.E.C., Inc., 2000. All values LAeq1h (dBA) for 2020 except existing (E, 2000).

Table 26. Predicted Noise Levels – Osceola Camp

Receiver	Existing	No Action	Alt. 1	Alt. 2a	Alt. 2b	Alt. 3	Alt. 4	Alt. 5	Alt. 6b	Alt. 7b	Alt. 8b
1	**68.3**	**70.5**	**70.5**	**70.4**	**71.3**	62.5	**73.4**	65.7	**71.3**	**71.3**	**71.3**
2	62.0	64.2	64.2	64.2	65.1	58.6	**66.0**	62.3	65.1	65.1	65.1
3	57.5	59.6	59.6	61.8	62.4	57.3	63.2	60.5	62.4	62.4	62.4
4	62.2	64.3	64.3	65.3	**66.1**	60.3	**67.0**	63.9	**66.1**	**66.1**	**66.1**
5	62.6	64.7	64.7	64.7	**66.0**	57.6	**67.7**	61.7	**66.0**	**66.0**	**66.0**

Source: G.E.C., Inc., 2000. All values LAeq1h (dBA) for 2020 except existing (E, 2000). Levels meeting FDOT NAC in **bold**.

Table 27. Predicted Noise Levels – Airboat Association of Florida, Safari Park and Coopertown Airboats

Receiver	Existing	No Action	Alt. 1	Alt. 2a	Alt. 2b	Alt. 4	Alt. 5	Alt. 6	Alt. 7a	Alt. 7b	Alt. 8a	Alt. 8b
1	69.6	**71.7**	**71.7**	**71.6**	**72.6**	**75.3**	67.1	67.1	**71.7**	**72.6**	**71.7**	**72.6**
2	69.9	**72.0**	**72.0**	**72.0**	**73.0**	**74.4**	67.4	67.4	**72.0**	**73.0**	**72.0**	**73.0**
3	62.7	64.8	64.8	67.1	67.6	68.5	64.2	64.2	64.8	67.6	64.8	67.6

Source: G.E.C., Inc., 2000. All values LAeq1h (dBA) for 2020 except existing (E, 2000). Levels meeting FDOT NAC in **bold**.

Table 28. Predicted Noise Levels – Gator Park

Receiver	Existing	No Action	Alt. 1	Alt. 2a	Alt. 2b	Alt. 4	Alt. 5	Alt. 6	Alt. 7a	Alt. 7b	Alt. 8a	Alt. 8b
1	69.6	**71.7**	**71.7**	**71.7**	**73.0**	**74.9**	67.1	67.1	**71.7**	**73.0**	**71.7**	**73.0**
2	62.7	64.9	64.9	64.9	66.2	67.3	63.7	63.7	64.9	66.2	64.9	66.2

Source: G.E.C., Inc. 2000. All values LAeq1h (dBA) for 2020 except existing (E, 2000). Levels meeting FDOT NAC in **bold**.

Table 29. Predicted Noise Levels – Tigertail Camp

Receiver	Existing	No Action	Alt. 1	Alt. 2	Alt. 3a	Alt. 3b	Alt. 5	Alt. 6	Alt. 7	Alt. 8
1	60.5	62.6	62.6	63.2	64.9	**66.7**	62.1	62.1	62.6	62.6
2	60.8	62.9	62.9	63.4	**66.0**	**68.6**	62.3	62.3	62.9	62.9

Source: G.E.C., Inc., 2000. All values LAeq1h (dBA) for 2020 except existing (E, 2000). Levels meeting FDOT NAC in **bold**.

- **Airboat Association of Florida, Safari Park, Gator Park, and Coopertown Airboats.** Modeling indicates alternatives 1, 2, 4, 7, and 8 although predicted to exceed FDOT approach criteria, appear to have no impact when compared to future with project conditions. The remaining alternatives would have no impact.

In accordance with the FDOT Environmental Management Office Project Development and Environment Manual I (PD&E Manual), an analysis and preliminary design of noise abatement barriers was performed for residential properties where estimated noise levels (1) met or exceeded FDOT NAC as a result of an alternative, and (2) are estimated to be noticeably higher (greater than or equal to 3dBA) than future without project noise levels. Noise abatement barriers were not considered in the case of commercial properties along the project. Per FDOT criteria, a unit barrier construction cost of $25.00 per square foot and a design insertion loss of 10 dBA were utilized.

Barriers were analyzed at the Osceola Camp for alternatives 2b, 6b, 7b, 8b, and 4 assuming a roadside barrier alignment. For Alternative 2b, 6b, 7b, and 8b, preliminary modeling indicates that a wall ranging in height from eight to 20 feet over a length of approximately 1,450 feet would be required. Total cost for such a structure is estimated at $425,000, or, assuming 14 residential structures benefited, $30,360 per residence.

Preliminary modeling for Alternative 4 (4a and 4b) indicates that a wall ranging in height from eight to 16 feet over a length of approximately 1,250 feet would be required. Total cost for the structure is estimated at $455,000 or approximately $32,500 per residence.

Barriers at the Tigertail Camp for alternatives 3a and 3b were also evaluated assuming a roadside barrier alignment. For Alternative 3a, modeling indicates the required wall would range in height from eight to 18 feet over a length of approximately 1,130 feet and would cost $465,100, or, assuming six residential structures benefited, $77,520 per residence.

Modeling for Alternative 3b indicates that a wall ranging in height from eight to 18 feet over a length of approximately 934 feet would be required. Total cost for the structure is estimated at $405,100, or $67,520 per benefited residence.

The FDOT unit cost threshold, $30,000 per benefited residence, is exceeded by all alternatives for which a barrier is indicated. Under FDOT criteria, when the cost per benefited residence exceeds $30,000, costs would be deemed not reasonable, and a noise barrier would not normally be constructed.

Construction and vibration noise generated because of the project would cause temporary impacts through increases in noise levels near the sensitive receptors. Noise emissions from construction equipment range generally from 70 dBA for pumps and portable equipment to approximately 95 dBA for tractors, graders, and other heavy equipment.

Avoidance and/or mitigation options will be developed during the project development and design phases and specified in construction plans for implementation by the contractor. In accordance with FDOT's *Standard Specifications for Road and Bridge Construction*, such avoidance and mitigation measures might include, but are not limited to:

1. Maintaining and operating construction equipment in a manner that minimizes noise;

2. Equipping engines with properly functioning mufflers;

3. Limiting noise emissions near sensitive receptors to the greatest extent possible;

4. Installing portable acoustic barriers around stationary construction equipment;

5. Locating stationary equipment as far from sensitive receptors as possible; and,

6. When possible, scheduling noisy operations for the middle of the day.

5.7.12 Transportation

No-Action Alternative. When the MWD project is completed, water elevation in the L-29 Canal will increase by approximately two feet. The roadway base would be subjected to increased saturation and would likely require more frequent maintenance. Any occurrence of overtopping could close the road or reduce traffic to one lane, thereby impacting motorists who use the roadway. Overtopping would require the deployment of traffic control devices to warn motorists and slow traffic. The implications could be severe if overtopping interferes with the passage of emergency vehicles or with hurricane evacuation.

Action Alternatives. Implementation of the action would neither increase nor decrease traffic on the Tamiami Trail under any alternative. Reconstruction of the roadway would eliminate undulations and cracks in the highway surface, and improve the drivability of the road.

During the construction phase of the project, it may be necessary under some conditions to temporarily close one lane of the highway. Under these situations, signage, signals, and other appropriate traffic controls would be utilized to ensure safety.

The existing boat access across the L-29 Canal to the Tigertail Camp would be replaced with a bridge across the canal under Alternative 5. Boat access to the Tigertail Camp would remain available under alternatives all other alternatives, and access to the camp by the unimproved road along the L-29 Levee would remain. Under Alternative 3, the existing Tamiami Trail would be abandoned, and boat access would become unnecessary; Alternative 3 provides access to the Tigertail Camp by means of a side road near the camp.

Highway construction in the area of the boat access area may temporarily eliminate its use. The use of shoulders for temporary lanes would restrict roadside parking; therefore, there may be no parking area for vehicles to allow individuals to access the Tigertail Camp by boat.

5.7.13 Tribal Lands

Under Alternatives 2b, 4a, 4b, 6b, 7b, and 8b, the parking lot at the Osceola Camp would be incorporated into the highway right-of-way. Under Alternative 4b a mobile home, a fixed residence, and an associated out-building would be incorporated into the right-of-way. No direct effects to the Tigertail Camp would result. Under all alternatives, access would be provided to both the Tigertail Camp and the Osceola Camp.

5.7.14 Economics/Socioeconomics

The U.S. Department of Commerce has developed a model based on the interaction of various segments within a local economy. Local data is input to calibrate the effects of dollar expenditures in one segment on other segments. The effects on all the other segments are totaled to obtain an estimate of the total impact to the local economy. The current iteration used by the Miami-Dade Planning and Zoning Department is the RIMS-2 version based on 1995 local data for the Miami-Dade region. This model gives a Construction Multiplier of 1.8792 and an earnings multiplier of 0.5136. For each dollar spent in construction, $1.8792 dollars of new business are generated throughout the local economy. Likewise, $0.5136 dollars of earnings (wages) are generated. For each million dollars spent the new business volume generated would equal $1,879,200 and the resultant earnings would be approximately $513,600.

Each million dollars spent in construction would generate employment demand equivalent to 22 full-time man-years. Table 30 summarizes the effects of construction expenditures for each alternative on the local economy.

Businesses. There are currently three businesses on the south side of the Tamiami Trail in the project corridor: Coopertown Airboat Tours and Restaurant, Gator Park, Inc. and Safari Airboat Rental. All provide airboat tours, and all have restaurants and gift shops on their premises. Access to these businesses would be provided under all alternative actions. However, during construction of the highway, while provisions are made to maintain the flow of traffic, there may be infrequent motoring delays due to slower speeds or occasional stops. Because some drivers may wish to avoid construction areas, the number of visitors to businesses during the period of construction may be reduced.

Several of the alternatives would require additional right-of-way to the south of the existing roadway. Those alternatives would involve the acquisition of property from businesses. Table 31 summarizes the additional footage needed for the increased right-of-way for each alternative and any facilities or structures that would be lost by the business owner. Alternative 4b extends the right-of-way boundary farther south than any other alternative, and it would have the greatest impact on businesses. The projected footprint for Alternative 4b would take virtually all of the parking areas of the three businesses, many of their facilities, and some of the buildings. It is unlikely the businesses could continue under this circumstance. The ecotourism opportunities provided by these operators would no longer be available.

Table 30. RIMS-2 Model Applied to Construction Costs

Alternatives	Construction Costs	New Business Volume	Earnings	Man Years Of Employment
1	$14,330,871	$26,930,573	$7,360,335	315
2a	$24,354,651	$45,828,122	$12,525,182	537
2b	$58,550,658	$110,028,397	$30,071,616	1,288
3a	$67,959,310	$127,709,139	$34,903,900	1,495
3b	$73,457,368	$138,041,086	$37,727,701	1,616
4a	$45,235,110	$85,005,819	$23,232,751	995
4b	$47,128,438	$88,563,761	$24,205,164	1,037
5a	$135,915,000	$255,411,468	$69,805,939	2,990
5b	$140,314,000	$263,678,069	$72,065,265	3,087
5c	$142,156,700	$267,140,871	$73,011,681	3,127
6a	$72,877,979	$136,952,298	$37,430,127	1,603
6b	$81,369,677	$152,909,897	$41,791,463	1,790
7a	$23,045,733	$43,307,541	$11,836,288	507
7b	$51,858,385	$97,452,277	$26,634,465	1,141
8a	$45,499,995	$85,503,591	$23,368,796	1,001
8b	$47,081,029	$88,474,670	$24,180,815	1,036

Source: PBS&J, 2001 (Engineering Appendix).

Airboat Association of Florida. The Airboat Association of Florida is a non-profit conservation and outdoor recreation organization. The Airboat Association site is located approximately 3.5 miles from the western end of the project corridor. All alternatives include provisions for maintaining access to the site. During construction, the flow of traffic on the Tamiami Trail would be maintained; however, motorists accessing the site may experience temporary delays because of traffic control measures.

Several of the alternatives would require the acquisition of additional right-of-way on the southern side of the highway. The most extensive is Alternative 4b, which relocates the right-of-way boundary 74 feet farther south than currently exists. It would involve the conversion of the Airboat Association parking lot into the highway right-of-way.

Osceola Camp. Under all alternatives, access to the Osceola Camp would be provided during construction and following completion of the project. However, the various alternatives present an array of effects of the project.

Those alternatives that would relocate the highway closer to the Osceola Camp are those that would create adverse effects, including increased noise, decreased privacy, increased proximity to exhaust emissions, and increased exposure of children at play to vehicles traveling at highway speeds. Under Alternative 2b, 4a, 4b, 6b, 7b, and 8b, the parking lot used by the Osceola Camp would be lost. Expansion of the highway right-of-way associated with Alternative 4b would encompass a model home, a fixed residence, and an associated out building.

Table 31. Direct Effects of Alternatives on Businesses

Alternatives	Additional Footage Required For Right-Of Way	Facilities/Structures Affected	
1	0	None	
2a	0	None	
2b	51feet	Coopertown Gator Park Everglades Safari	Boat Dock Parking Area Gift Shop/Restaurant Office/Tour Staging Facility Boat Dock Parking Area Parking Area
3a	N/A	None	
3b	N/A	None	
4a	50 feet	Coopertown Gator Park Everglades Safari	Boat Dock Parking Area Gift Shop/Restaurant Office/Tour Staging Facility Boat Dock Parking Area Parking Area
4b	74 feet	Coopertown Gator Park Everglades Safari	Major Portion of Business Area Residence Boat Dock/Basin Parking Area Gift Shop/Restaurant Boat Dock/Tour Staging Area Parking Area Several Structures
5a	N/A	None	
5b	N/A	None	
5c	N/A	None	
6a	0	None	
6b	51 feet	Coopertown Gator Park Everglades Safari	Boat Dock Parking Area Gift Shop/Restaurant Office/Tour Staging Facility Boat Dock Parking Area Parking Area
7a	0	None	
7b	51 feet	Coopertown Gator Park Everglades Safari	Boat Dock Parking Area Gift Shop/Restaurant Office/Tour Staging Facility Boat Dock Parking Area Parking Area

Alternatives	Additional Footage Required For Right-Of Way	Facilities/Structures Affected	
8a	0	None	
8b	51 feet	Coopertown	Boat Dock Parking Area Gift Shop/Restaurant Office/Tour Staging Facility
		Gator Park	Boat Dock Parking Area
		Everglades Safari	Parking Area

Source: G.E.C., Inc., 2001

Highway noise would be reduced under Alternative 3, which relocates the highway across the L-29 Canal, farther from the Osceola Camp. It would result in considerably more privacy for the Osceola Camp, since access would be only from the western end of the study area.

Under alternatives 2, 4, 5, 6, 7, and 8 short-term traffic disruptions and noise would be created due to construction. Alternative 3 appears to be a sufficient distance away so as not to have notable short-term effects.

Tigertail Camp. All alternatives would include provisions for access to the Tigertail Camp. However, Alternative 5, under which a 10.7-mile bridge would be constructed, would replace boat access to the Tigertail Camp with a bridge. Under Alternative 3, the shift in the highway to the north of the L-29 Canal would eliminate the need for boat access.

Alternative 3 would result in the camp being subjected to increased noise effects from highway traffic as well as exhaust fumes that are more concentrated than at present. Closer proximity of the highway could impair the visual aesthetics of the residents and decrease the existing physical privacy. There is also a concern for physical safety. The relocated highway could create greater safety risks by increasing the exposure of children at play to vehicles traveling at highway speeds. The other alternatives, all of which are located across the L-29 Canal, would have no impact on the Tigertail Camp.

It is likely that under Alternative 3 there would be some short-term traffic disruptions and noise due to construction. The remaining alternatives appear to be a sufficient distance away so as not to have notable short-term effects.

5.7.15 Flight 592 Memorial

No impacts on the Flight 592 Memorial are expected. Access to the site will be provided under all action alternatives.

5.7.16 Real Estate

No-Action Alternative. Under the No-Action Alternative, no impacts to real estate would occur.

Action Alternatives. The lands and easements needed to implement the Tamiami Trail modifications are currently under several ownerships. A complete copy of all real estate requirements and issues is included in Appendix H.

The footprints of alternatives 1, 2a, 2b, 5, 6a, 6b, 7a, 7b, 8a, and 8b fall within the maintenance right-of-way for the existing roadway and ownership is claimed by FDOT. This ownership claim is partially overlapped by SFWMD's right-of-way claim along the L-29 Canal. This apparently is common when a roadway parallels a canal, and in the past has been resolved through the exchange of quick claims between agencies to establish a contiguous right-of-way boundary shared by the two agencies. In some areas, SFWMD holds only flowage easements and fee title is held by approximately two dozen private landowners. Most of the private holdings involve large tracts, but a few are as small as two acres.

The footprint of Alternative 3 falls within the right-of-way claimed by the SFWMD. However, in some areas, SFWMD holds only flowage easements, and fee title is held by approximately two dozen private landowners. Most of the private holdings involve large tracts, but a few are as small as two acres.

The footprint of Alternative 4 extends to the south of the existing roadway and encompasses part of the Osceola Camp of the Miccosukee Tribe and the Airboat Association property. The Osceola Camp lies on property owned by the National Park Service. The rest of the land in the footprint for this alternative is either currently owned by or being purchased by the National Park Service.

No relocations (as described in Public Law 91-646) would be required by alternatives 1, 2a, 2b, 5, 6a, 6b, 7a, 7b, 8a, and 8b, as their footprints are generally within the existing right-of-way claims of FDOT. The footprint of Alternative 3 would require obtaining fee title ownership from approximately 24 private owners, but would not affect any residential or business improvements. The footprint of Alternative 4 would affect some facilities at the Airboat Association, which would require relocation payments as specified under the provision of Title II if Public Law 91-646, The Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended. The footprints for all of the alternatives would require obtaining fee title ownership from private owners, but would not affect any residential or business improvements. No relocation payments, as specified under the provision of Title II of Public Law 91-646, The Uniform Relocation Assistance and Real Property Acquisition Act of 1970, will be required.

Alternatives 2a and 2b would require the acquisition of 18.442 and 63 acres of land, respectively, to the immediate south of the existing right-of-way. The average appraised value per acre for land south of the Tamiami Trail is $646.00. The required additional acreage would be along the entire project length to alternatives 2a and 2b, and have an estimated cost of $11,913 and $41,064, respectively.

Alternatives 3a and 3b would require the acquisition of 95 and 157 acres of land, respectively. The average appraised value for land north of the Tamiami Trail is $206.00. The required additional acreage for alternatives 3a and 3b would have an estimated cost of $19,570.00 and $32,342.00, respectively.

Alternatives 4a and 4b would require the acquisition of 74 and 112 acres of land, respectively. The average appraised value per acre for land south of the Tamiami Trail

is $646.00. The required additional acreage for alternatives 4a and 4b would have an estimated cost of $47,804.00 and $72,352.00, respectively.

Alternative 5, although mostly within the existing right-of-way would require the acquisition of 10.115 acres of additional land. This land is north of the Tamiami Trail in the L-29 Canal. The average appraised value per acre for land south of the Tamiami Trail is $646.00. The required additional acreage would have an estimated cost of $6,534.

Alternative 6a would require the acquisition of 10.635 acres of land to the immediate north of the existing right-of-way, and 17.685 acres to the immediate south. Alternative 6b would require the acquisition of 32.504 acres of land to the immediate south of the existing right-of-way. The average appraised value per acre for land north of the Tamiami Trail is $206.00, and $646.00 per acre for land to the south. The required additional acreage for both alternatives would be along the entire project length, and have an estimated cost of $13,262.00 for alternative 6a and $20,998.00 for alternative 6b.

Alternative 7a would require the acquisition of 13.327 acres of land to the immediate north of the existing right-of-way, and 21.759 acres to the immediate south. Alternative 7b would require the acquisition of 41.270 acres of land to the immediate south of the existing right-of-way. The average appraised value per acre for land north of the Tamiami Trail is $206.00, and $646.00 per acre for land to the south. The required additional acreage for both alternatives would be along the entire project length, and have an estimated cost of $16,366.00 for alternative 7a and $26,660.00 for alternative 7b.

Alternative 8a would require the acquisition of 13.857 acres of land to the immediate north of the existing right-of-way, and 23.038 acres to the immediate south. Alternative 8b would require the acquisition of 43.720 acres of land to the immediate south of the existing right-of-way. The average appraised value per acre for land north of the Tamiami Trail is $206.00, and $646.00 per acre for land to the south. The required additional acreage for both alternatives would be along the entire project length, and have an estimated cost of $17,277.00 for alternative 8a and $28,243.00 for alternative 8b.

There are utilities within the existing corridor that may be affected by construction. There is a buried telephone facility behind the guardrail on the south side of the road and a 23 kilovolt overhead electric line running along the south side, approximately 100 feet south of the existing guardrail. Just north of the guardrail on the north side is an additional buried telephone facility. There are utilities along the L-29 Levee: a buried telephone cable at the base of the levee on the south side and power poles on the canal maintenance berm.

There are no additional non-project-related relocations of public highways or bridges affected by the alternatives under consideration.

5.7.17 Environmental Justice and Impacts on Children

An environmental justice analysis, which is intended to “analyze and address the distributional effects of environmental impacts on certain populations,” is included to

address the requirements of Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The purpose of the EO is to prevent the impacts of an action from falling disproportionately on a minority or low-income community. A determination that disproportionate impacts are evident can be subjective and a matter of legal interpretation. Disproportionate impacts occur when, in order to minimize or avoid impacts to another community or environmental resource, the impacts are instead focused on the minority or low-income community.

Tigertail Camp. Under all alternative actions, some short-term traffic disruptions and construction noise would likely be created. However, because of the distance to the Tigertail Camp from the placement of roadway associated with alternatives 1, 2, 4, 5, 6, 7, and 8, which remain across the L-29 Canal from the Tigertail Camp, no long-term adverse impacts to the affected community are expected. Likewise, no disproportionate impacts are expected.

Alternative 3, however, relocates the highway to the north of the L-29 Levee, placing the roadway in the proximity of the community. Under existing conditions, the Tamiami Trail is approximately 120 feet from the Tigertail Camp; under Alternative 3, the highway would be approximately 54 feet from the camp. This decreased distance coupled with the elevated nature of the roadway would increase traffic noise levels for the residents, and would likely create adverse long-term adverse social (lack of privacy) impacts. Due to the close proximity to the Tigertail Camp, the concept of "disproportionate shares of negative environmental consequences" may apply because impacts to wetlands and other natural resources are minimized while impacts to the Tigertail Camp are increased.

Osceola Camp. Under alternatives 1, 2, 4, 5, 6, 7, and 8 short-term traffic disruptions and noise would be created due to construction**.** Alternative 3 appears to be a sufficient distance away so as not to have significant short-term effects.

Alternatives 2b, 6b, 7b, and 8b, which include treatment of highway runoff, would place the road closer to the community than at present; Alternative 4 would incorporate portions of the Osceola Camp into the highway right-of-way. The increased noise and closer proximity of traffic, and the taking of property may create the condition of "disproportionate shares of negative environmental consequences" because of increased adverse impacts to the community brought about by efforts to minimize impacts to natural resources.

Impacts on Children. An investigation of environmental health risks and children is included to comply with the intent of EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. Data used to characterize the population within the affected area were obtained from local resources through interviews.

Because alternatives 1**,** 2a, 6a, 7a, 8a, and 5 do not significantly change the location of the highway, none is expected to increase either the environmental health or safety risks to children in either the Tigertail or the Osceola camps over existing conditions. Because Alternative 3 involves relocating the highway to the north of the L-29 Canal and places it in proximity to the Tigertail Camp, it may create greater safety risks by increasing the exposure of children at play to vehicles traveling at highway speeds and increasing noise. Noise Modeling indicates that Alternative 3 would exceed the FDOT approach criteria at the Tigertail Camp (see Section 5.7.11). Likewise, alternatives 2b,

6b, 7b, 8b, and 4, which relocate the roadway closer to the Osceola Camp, exceed FDOT approach criteria. Modeling indicates alternatives 1, 2a, 6a, 7a, and 8a, although predicted to exceed FDOT approach criteria, appear to have no impact on the Osceola Camp when compared to future without project conditions. A relocation of the highway to the south, closer to the Osceola Camp residents, may result in increased risks to children in that community.

5.8 SUMMARY OF ENVIRONMENTAL IMPACTS OF EACH ALTERNATIVE

5.8.1 No-Action

Under the no-action alternative, there would be no effects on geology, soils, surface or ground water quality, hazardous, toxic, or radiological waste, biological communities, threatened or endangered species, climate, air quality, recreation, cultural resources, aesthetics; and tribal lands. However, there is a potential area of conflict with respect to water management and transportation operations. Overtopping of the highway during high water events could potentially affect public safety and the needs of ENP. During periods of high water it may be necessary to restrict water levels in the L-29 Canal to prevent flooding of the highway. In the event that flooding occurs, traffic flow would likely be reduced to a single lane or the road could be closed. The implications could be severe if overtopping were to impede emergency vehicles or if it interferes with hurricane evacuation. Increased water levels in the L-29 Canal would increase the inundation of the road base, thereby accelerating the rate of deterioration of the highway.

ENP personnel have expressed concern that to alleviate the adverse effects of highway overtopping, it may become necessary to restrict water levels in the L-29 Canal through a reduction in flow rates. Such an action would be counter to plans to provide hydrologic restoration to ENP.

Noise levels along the Tamiami Trail are likely to increase over time due to projected increased levels of traffic.

Water quality in ENP is also a potential area of concern. If inflow from the Everglades Agricultural Area is kept at the present level or greater, increases in nitrogen and phosphorus concentrations at the northern points of inflow to ENP would likely increase. In addition, depending on the volume and the rate of flow from the pumping stations, sediments and bottom material potentially contaminated with metals and pesticides would migrate slowly southward through the WCA canals.

Contaminants contributed by highway runoff are currently at low concentrations. The concentrations of runoff substances would slowly increase as traffic volume increases.

Another area of concern is compartmentalization. Biological communities have been affected by the construction of levees, canals, and roads. These has created barriers to the free movement of organisms, particularly those with limited mobility, such as aquatic organisms (fishes, invertebrates, etc.) One of the goals is to reduce this partitioning and promote ecological connectivity. Under the No-Action Alternative, this MWD project would not provide compatibility with the CERP goal of improving ecological connectivity.

Finally, wildlife mortality is an area of concern. It has been reported that vehicle collisions along the Tamiami Trail are a major cause of wildlife mortality in the

Everglades. The FHWA has provided policy and guidance on addressing this issue. Certain criteria have been established to determine the need for a wildlife crossing. Under the No-Action Alternative, there would be no opportunity for the implementation of measures to reduce wildlife mortality within the project area.

5.8.2 Alternative 1. Existing Alignment and Profile with Four New Bridges

The four bridges associated with this alternative would provide sufficient hydraulic opening to convey projected MWD Flows under the Tamiami Trail. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, enables a general equalization of flows to ENP that approximates sheet flow.

The four bridges associated with Alternative 1 would provide connectivity between the L-29 Canal and ENP. Installation of the bridges would provide a combined hydraulic opening that would, in turn, provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail. Wetland impacts associated with Alternative 1 include a loss of 2.92 functional units (FU) (see Section 5.7.5.5 for an explanation of the WRAP model for determining wetland impacts).

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Under Alternative 1, 2,295 linear feet of US 41 is located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is situated in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. A buffer zone of 125 meters (410 feet) was established to prevent human disturbances during nesting season and periods where wading birds are roosting at the colony site. Under Alternative 1, 449 linear feet would be under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

The cultural resource assessment survey resulted in the identification of four newly recorded historic sites: Coopertown Airboat Rides and Restaurant, Airboat Association of Florida, Tamiami Trail, and L-29 Canal. Alternative 1 would result in some modification of the highway, but would not impact any of the other resources.

Alternative 1 would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three airboat tour businesses. Short-term traffic disruptions and noise, which are expected during construction, could possibly affect the Osceola Camp community.

Noise levels throughout the Tamiami Trail are an area of concern. Around the Osceola Camp area, modeling indicates that Alternative 1, although predicted to exceed FDOT approach criteria, would have no impact when compared to future without project conditions (see Section 2.11 for modeling methodology).

Air quality modeling (Section 5.7.7) indicates that Alternative 1 would have no significant effect on air quality.

This alternative would neither increase nor decrease traffic on the Tamiami Trail. During the construction phase of the project, it may be necessary under some conditions to temporarily close one lane of the highway. Under these situations, signage, signals, and other appropriate traffic controls would be utilized to ensure safety.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 1 would produce $26,930,573 in new business generated and generate $7,360,335 in wages in the local economy, which would represent approximately 315 man years of employment.

Alternative 1 may result in temporary impacts to fishing from the Tamiami Trail right-of-way at or near construction sites. Access to boat ramps would not be affected.

5.8.3 Alternative 2. Existing Roadway Alignment with Raised Profile and Four New Bridges

The four bridges associated with this alternative would provide sufficient hydraulic opening to convey projected MWD Flows under the Tamiami Trail. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, currently enables a general equalization of flows to ENP that approximates sheet flow. Although the bridges and breaches would be capable of conveying the required amount of water, the retention of the culvert system under Alternative 2a would assist in maintaining sheet flow.

The four bridges associated with Alternative 2 would provide connectivity between the L-29 Canal and ENP. Installation of the bridges would provide a combined hydraulic opening that would, in turn, provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail. Wetland impacts associated with Alternative 2a include a loss of 10.10 FUs; 37.48 FUs would be lost under Alternative 2b (see Section 5.7.5.5 for an explanation of the WRAP model for determining wetland impacts).

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Currently, under Alternative 2, 2,295 linear feet of US 41 are located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is situated in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. A buffer zone of 125 meters (410 feet) was established to prevent human disturbances during nesting season and periods where wading birds are roosting at the colony site. Under Alternative 2, 449 linear feet would be under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

The cultural resource assessment survey resulted in the identification of four newly recorded historic sites: Coopertown Airboat Rides and Restaurant, Airboat Association of Florida, Tamiami Trail, and L-29 Canal. Alternative 2a would involve modification of the Tamiami Trail, but would not impact any of the other resources. Alternative 2b would involve major reconstruction of the Tamiami Trail and would severely impact Coopertown Airboat Rides and Restaurant: two structures and the boat dock would be lost.

Aesthetics would be enhanced by the removal of exotic vegetation on the southern side of the Tamiami Trail, which is necessary for the modifications and reconstruction under this action alternative.

Alternative 2a would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three airboat tour businesses. Alternative 2b would create significant adverse impacts. The footprints under Alternative 2a fall within the maintenance right-of-way for the existing roadway and ownership claimed by FDOT; therefore, no relocations would be required. Relocations may be necessary under Alternative 2b. Short-term traffic disruptions and noise, which are expected during construction, could possibly affect the Osceola Camp community.

For the Osceola Camp area, noise modeling (Section 2.11) indicates that Alternative 2a, although predicted to exceed FDOT approach criteria, appears to have no impact when compared to future without project conditions. However, Alternative 2b is predicated to exceed FDOT approach criteria and cause impacts beyond the future without project alternative. A noise barrier that would reduce noise to acceptable levels would range in height from 8 to 20 feet over a length of 1,450 feet, and cost $425,000 or $30,360 per residence, which exceeds the FDOT unit cost threshold of $30,000 per benefited residence.

Air quality modeling (Section 5.7.7) indicates that Alternative 2 would have no significant effect on air quality.

This alternative would neither increase nor decrease traffic on the Tamiami Trail. During the construction phase of the project, it may be necessary under some conditions to temporarily close one lane of the highway. Under these situations, signage, signals, and other appropriate traffic controls would be utilized to ensure safety.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 2a would produce $24,387,038 in new business generated and generate $45,828,122 in wages in the local economy, which would represent approximately 537 man years of employment. Alternative 2b would result in $110,028,397 in new business volume, $30,071,616 in wages, and 1,288 man-years of employment.

Alternative 2 would result in temporary impacts to fishing from the Tamiami Trail right-of-way during construction. Alternative 2b involves a reconstruction of the highway that would eliminate the existing culverts, thus eliminating these spots for fishing. Access to boat ramps would not be affected under this action alternative.

5.8.4 Alternative 3. Build New Roadway to the North with Eight New Bridges

The eight bridges associated with this alternative and the breaches in the existing embankment would provide sufficient capacity for conveying MWD flows. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, currently enables a general equalization of flows to ENP that approximates sheet flow. Although the bridges and breaches would be capable of conveying the required amount of water, the retention of the culvert system under this alternative would assist in maintaining sheet flow.

Under the action alternatives, biological communities would benefit from the abandonment of the existing road (except for access to the Osceola Camp and the Airboat Association of Florida) and its breaching, which would provide hydraulic openings equal to those provided by the bridges of the other alternatives. This action would in turn provide partial connectivity between the L-29 Canal and ENP. Modeling (Section 5.7.5.5) shows that wetland impacts include a loss of 18.82 FUs with Alternative 3a and a loss of 18.82 FUs with Alternative 3b.

As described for Alternative 2, developmental restrictions on threatened and endangered species along the Tamiami Trail were evaluated. Under this alternative, 2,040 linear feet are located in the primary zone and 2,214 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 2,597 linear feet in the secondary zone. Approximately 817 linear feet of US 41 would be under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

Under this action alternative, air quality models (Section 5.7.7) projected that there would be a 4.0 percent increase in CO concentrations in the vicinity of the Tigertail Camp and a future without-project concentration of 4.8 ppm to 5.0 ppm. The NAAQS standard of 9.0 ppm would not be exceeded.

Of the four the cultural resource sites identified, only one, the Tamiami Trail, would be affected under Alternative 3. The existing road would be abandoned, and the embankment would be breached to facilitate flow to ENP.

Aesthetics would be enhanced by Alternative 3, which would provide vistas of the expanse of the Everglades, which, in turn, would be visible to motorists throughout the length of the project area.

The boat access across the L-29 Canal to the Tigertail Camp would be lost. Under Alternative 3, the existing road would be abandoned and boat access would be unnecessary. Access to the Tigertail Camp would be by means of a side road near the camp.

Noise modeling (Section 2.11) indicates that noise levels at the Tigertail Camp would exceed the FDOT approach criteria and cause impacts beyond the future without project alternative. For Alternative 3a, a noise barrier that would reduce noise to acceptable levels would range in height from 8 to 18 feet over a length of 1,130 feet, and cost $465,100 or $77,520 per residence. For Alternative 3b, a noise barrier that would

reduce noise to acceptable levels would range in height from 8 to 18 feet over a length of 934 feet, and cost $405,100 or $67,520 per residence. Both alternatives would exceed the FDOT unit cost threshold of $30,000 per benefited residence.

The lands and easements needed to implement the Tamiami Trail modifications are currently under ownership by several individuals. The footprint of Alternative 3 lies just to the north of the L-29 Canal on the north side of the existing roadway and falls within the right-of-way claimed by the SFWMD. Therefore, obtaining fee title ownership form approximately twenty-four private landowners would be necessary, but would not affect any residential or business improvements. However, in some areas, SFWMD holds only flowage easements and fee title is held by these landowners. Most of the private holdings involve large tracts, but a few are as small as two acres.

Alternative 3 relocates the highway to the north of the L-29 Levee, placing the roadway in the proximity of the Tigertail Camp. Under existing conditions, the Tamiami Trail is 120 feet from the Tigertail Camp; under Alternative 3, the highway would be relocated to 54 feet from the camp. This increased proximity coupled with the elevated nature of the roadway would likely create adverse long-term adverse social (lack of privacy) impacts. Due to the close proximity to the Tigertail Camp, the concept of “disproportionate shares of negative environmental consequences” may apply because impacts to wetlands and other natural resources are minimized while impacts to the Tigertail Camp are increased. It appears that short-term traffic disruptions, noise due to construction, and other potential impacts are sufficiently far enough away to not affect the Osceola Camp community.

Except for disruptions to traffic during construction, no adverse impacts to businesses are expected.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 3a would produce $127,709,139 in new business generated and generate $34,903,900 in wages in the local economy, which would represent approximately 1,495 man years of employment. Alternative 3b would result in $138,041,086 in new business volume, $37,727,701 in wages, and 1,616 man-years of employment.

Alternative 3 would have adverse impacts on the recreation. Fishing access from the north bank of the L-29 Canal may be impeded during construction. Once the existing roadway is breached, fishing access from the existing roadway would be reduced from 10.5 miles to approximately 8.5 miles. Some of the existing roadbed would remain accessible from the east and west ends of the project and some may be made accessible by bridges to the Airboat Association and to the businesses. Access to boat ramps would remain. Breaches in the existing roadway would allow passage to the L-29 Canal by airboats of the Airboat Association of Florida.

5.8.5 Alternative 4. Build New Roadway to the South with Four New Bridges

The four bridges associated with this alternative would provide sufficient hydraulic opening to convey projected MWD Flows.

The four bridges associated with Alternative 4 would provide connectivity between the L-29 Canal and ENP. Installation of the bridges would provide a combined hydraulic

opening that would, in turn, provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail. The WRAP model (Section 5.7.5.5) indicates that wetland impacts associated with Alternative 4a include a loss of 40.43 FUs; 64.64 FUs are lost under Alternative 4b.

Like alternatives 2 and 3, developmental restrictions on threatened and endangered species along the Tamiami Trail were evaluated. Under this alternative, 2,763 linear feet of highway would be constructed in the primary zone and 1,701 linear feet in the secondary zone for the Tamiami West Colony. At the Tamiami East Colony, 3,257 linear feet of highway would be constructed in the secondary zone. There would be 403 linear feet of highway constructed under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

Air quality under this alternative was measured using the same guidelines for all other alternatives (Section 5.7.7). Alternative 4 is projected to increase CO concentrations near the Osceola Camp from a future without project concentration of 5.0 ppm to 5.3 ppm (a six percent increase). Again, under this alternative, the NAAQS standard of 9.0 ppm is not exceeded.

Alternative 4 would impact two of the three cultural resources sites. The existing Tamiami Trail roadway and embankment would be relocated. Coopertown Airboat Rides and Restaurant would be severely impacted.

Aesthetics would be enhanced by Alternative 4, which would provide vistas of the expanse of the Everglades throughout the length of the project area.

Noise modeling (Section 2.11) indicates that Alternative 4 would exceed FDOT approach criteria at the Osceola Camp and cause impacts beyond the future without project alternative. For Alternative 4, a noise barrier that would reduce noise to acceptable levels would range in height from 8 to 16 feet over a length of 1,250 feet, and cost $455,500 or $32,500 per residence, which exceeds the FDOT unit cost threshold of $30,000 per benefited residence.

Alternative 4a would extend the right-of-way an additional 50 feet to the south; Alternative 4b would extend it an additional 74 feet. Both, but particularly Alternative 4b, would seriously impact the Osceola Camp, the Airboat Association of Florida, and the three businesses. The loss of facilities resulting from Alternative 4b would likely result in the closing of some of the businesses.

The lands and easements needed to implement the Tamiami Trail modifications are currently under ownership by several individuals. The footprint of this alternative lies just south of the existing roadway and would affect some facilities at the businesses and the Airboat Association. This would require relocation payments as specified under the provision of Title II of Public Law 91-646, The Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 4a would produce $85,005,819 in new business generated and generate $23,232,751 in wages in the local economy, which would

represent approximately 995 man years of employment. Alternative 4b would result in $88,563,761 in new business volume, $24,205,164 in wages, and 1,037 man-years of employment.

Fishing access from the Tamiami Trail to the L-29 Canal would be temporarily impacted during construction. Fishing at culvert outfalls would be eliminated. However, bank fishing opportunities may be enhanced somewhat by providing fishing under shelter of the bridges.

5.8.6 Alternative 5. Elevated Roadway within Existing Right-of-Way

The 10.7-mile bridge associated with this alternative would provide adequate capacity to convey projected MWD Flows. Under Alternatives 5a and 5b, effects on water management and biological communities would be similar those discussed under other alternatives. Alternative 5c, however, which includes the removal of the existing embankment, would provide for a much greater degree of ecological benefit.

The WRAP model (Section 5.7.5.5) indicates that Alternative 5c would result in significant wetland functional gains of +45.27 FUs. Based on the ranking of total wetland functional units lost/gained by all alternatives, this alternative is the least damaging to wetlands. Under Alternative 5b, wetland functional units are increased by slightly over 41 percent (29.54 FUs). Alternative 5a shows an increase in wetland functional gains of 39.35 FUs.

Removal of the highway and embankment associated with Alternative 5c would enhance ecological connectivity, promote sheet flow of water, and allow for the restoration of 66 acres of wetlands.

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Currently, under Alternative 5, 2,295 linear feet of US 41 is located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is situated in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. A buffer zone of 125 meters (410 feet) was established to prevent human disturbances during nesting season and periods where wading birds are roosting at the colony site. Under Alternative 5, 449 linear feet would be under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

Air quality under this alternative was measured using the same guidelines for all other alternatives (Section 5.7.7). Alternative 5 would not adversely impact the study area.

The cultural resource survey resulted in the identification of four newly recorded sites. Like all other alternatives Alternative 5 would bridge or breach portions of the existing

Tamiami Trail to facilitate flow from the L-29 Canal to ENP. In addition, Alternative 5 would encroach slightly on the L-29 Canal.

Under this alternative, because the right-of-way would not be extended closer to either the Osceola or Tigertail camps, there would be no potentially disproportionate impacts related to environmental justice or impacts on children.

Aesthetics would be enhanced by Alternative 5, which would provide vistas of the expanse of the Everglades throughout the length of the project area.

Noise modeling (Section 2.11) indicates that Alternative 5 would result in no significant effects in the project area.

Alternative 5 would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three airboat tour businesses. The footprints under Alternative 5 fall within the maintenance right-of-way for the existing roadway and ownership claimed by FDOT; therefore, no relocations would be required. Access would be provided to the Osceola and Tigertail camps, the Airboat Association of Florida, and the businesses.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 5a would produce $255,411,468 in new business generated and generate $69,805,939 in wages in the local economy, which would represent approximately 2,990 man years of employment. Alternative 5b would result in $263,678,069 in new business volume, $72,065,265 in wages, and 3,087 man-years of employment. Alternative 5c would result in $267,140,871 in new business volume, $73,011,681 in wages, and 3,127 man-years of employment.

Recreation, particularly access to boat ramps, would be maintained. Alternative 5 would generally eliminate fishing access from the existing Tamiami Trail right-of-way. Short segments of the existing roadway would be accessible at the east and west ends of the project area. Access bridges to the Airboat Association of Florida property and to the existing businesses would also allow access to some portions of the existing roadway between the breaches. Access to the L-29 Canal by airboats from the Airboat Association of Florida would not be provided; the height of the bridge (elevation 14 feet) would be insufficient to allow access by most airboats.

5.8.7 Alternative 6. Existing Alignment with Four-Mile Bridge

The four-mile bridge associated with this alternative would provide sufficient hydraulic opening to convey projected MWD Flows. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, currently enables a general equalization of flows to ENP that approximates sheet flow. Although the bridge and breaches would be capable of conveying the required amount of water, the retention of the culvert system under Alternative 6a would assist in maintaining sheet flow.

The four-mile bridge would provide connectivity between the L-29 Canal and ENP. The bridge would provide a hydraulic opening that would provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail.

WRAP modeling (Section 5.7.5.5) indicates that wetland impacts associated with Alternative 6a include a loss of 1.91 FUs; 33.36 FUs are lost under Alternative 6b.

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Currently, under Alternative 6, 2,295 linear feet of US 41 is located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony would be 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is situated in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. A buffer zone of 125 meters (410 feet) was established to prevent human disturbances during nesting season and periods where wading birds are roosting at the colony site. Under Alternative 6, 449 linear feet would be under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

Air quality modeling (Section 5.7.7) indicates that Alternative 6 would have no significant effect on air quality.

Alternative 6a would involve modification of the Tamiami Trail, but would not impact any of the other identified cultural resources. Alternative 6b would involve a reconstruction of the Tamiami Trail, and severely impact Coopertown Airboat Rides and Restaurant: two structures and the boat dock would be lost.

Aesthetics would be enhanced by the removal of exotic vegetation on the southern side of the Tamiami Trail, which is necessary for the modifications and reconstruction under this action alternative.

Alternative 6a would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three airboat tour businesses. Alternative 6b would create significant adverse impacts. The footprint of Alternative 6a falls within the maintenance right-of-way for the existing roadway and ownership claimed by FDOT; therefore, no relocations would be required. Relocations may be necessary under Alternative 6b. Short-term traffic disruptions and noise, which are expected during construction, could possibly affect the Osceola Camp community.

For the Osceola Camp area, noise modeling (Section 2.11) indicates that Alternative 6a, although predicted to exceed FDOT approach criteria, appears to have no impact when compared to future without project conditions. However, Alternative 6b is predicated to exceed FDOT approach criteria and cause impacts beyond the future without project alternative. A noise barrier that would reduce noise to acceptable levels would range in height from 8 to 20 feet over a length of 1,450 feet, and cost $425,000 or $30,360 per residence, which exceeds the FDOT unit cost threshold of $30,000 per benefited residence.

This alternative would neither increase nor decrease traffic on the Tamiami Trail. The existing boat access across the L-29 Canal to the Tigertail Camp would be retained

except possibly for temporary durations during the construction period when shoulders, currently used for parking, would be used for travel lanes. Access to the camp using the unimproved road along the L-29 Levee would continue.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 6a would produce $136,952,298 in new business generated and generate $37,430,127 in wages in the local economy, which would represent approximately 1,603 man years of employment. Alternative 6b would result in $152,909,897 in new business volume, $41,791,463 in wages, and 1,790 man-years of employment.

Alternative 6 would result in temporary impacts to fishing from the Tamiami Trail right-of-way during construction. Alternative 6b involves a reconstruction of the highway that would eliminate the existing culverts, thus eliminating these spots for fishing. Access to boat ramps would not be affected under this alternative. Access to the L-29 Canal by airboats from the Airboat Association of Florida would not be provided; the height of the bridge (elevation 14 feet) would be insufficient to allow access by most airboats.

5.8.8 Alternative 7. Existing Alignment with 3,000-foot Bridge

The 3,000-foot bridge associated with this alternative would provide sufficient hydraulic opening to convey projected MWD Flows. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, currently enables a general equalization of flows to ENP that approximates sheet flow. Although the opening would be capable of conveying the required amount of water, the retention of the culvert system under Alternative 7a would assist in maintaining sheet flow.

The 3,000-foot bridge would provide connectivity between the L-29 Canal and ENP. The bridge would provide a hydraulic opening that would provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail.

WRAP modeling (Section 5.7.5.5) indicates that wetland impacts associated with Alternative 7a would include a loss of 3.42 FUs; 49.55 FUs would be lost under Alternative 7b.

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Under Alternative 7, 2,295 linear feet of US 41would be located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is situated in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. A buffer zone of 125 meters (410 feet) was established to prevent human disturbances during nesting season and periods where wading birds are roosting at the colony site. Under Alternative 7, 449 linear feet would be under development restriction for wading birds. Although these restrictions would

require phasing of construction, no significant impacts to threatened or endangered species are expected.

Air quality modeling (Section 5.7.7) indicates that Alternative 7 would have no significant effect on air quality.

Alternative 7a would involve modification of the Tamiami Trail, but would not impact any of the other identified cultural resources. Alternative 7b would involve a reconstruction of the Tamiami Trail, and severely impact Coopertown Airboat Rides and Restaurant: two structures and the boat dock would be lost.

Aesthetics would be enhanced by the removal of exotic vegetation on the southern side of the Tamiami Trail, which is necessary for the modifications and reconstruction under this action alternative.

Alternative 7a would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three airboat tour businesses. Alternative 7b would create significant adverse impacts. The footprint of Alternative 7a falls within the maintenance right-of-way for the existing roadway and ownership claimed by FDOT; therefore, no relocations would be required. Relocations may be necessary under Alternative 7b. Short-term traffic disruptions and noise, which are expected during construction, could possibly affect the Osceola Camp community.

For the Osceola Camp area, noise modeling (Section 2.11) indicates that Alternative 7a, although predicted to exceed FDOT approach criteria, appears to have no impact when compared to future without project conditions. However, Alternative 7b is predicated to exceed FDOT approach criteria and cause impacts beyond the future without project alternative. A noise barrier that would reduce noise to acceptable levels would range in height from 8 to 20 feet over a length of 1,450 feet, and cost $425,000 or $30,360 per residence, which exceeds the FDOT unit cost threshold of $30,000 per benefited residence.

This alternative would neither increase nor decrease traffic on the Tamiami Trail. The existing boat access across the L-29 Canal to the Tigertail Camp would be retained except possibly for temporary durations during the construction period when shoulders, currently used for parking, would be used for travel lanes. Access to the camp using the unimproved road along the L-29 Levee would continue.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 7a would produce $43,307,541 in new business generated and generate $11,836,288 in wages in the local economy, which would represent approximately 507 man years of employment. Alternative 7b would result in $97,452,277 in new business volume, $26,634,465 in wages, and 1,141 man-years of employment.

Alternative 7 would result in temporary impacts to fishing from the Tamiami Trail right-of-way during construction. Alternative 7b involves a reconstruction of the highway that would eliminate the existing culverts, thus eliminating these spots for fishing. Access to boat ramps, would not be affected under this alternative. Access to the L-29 Canal by airboats from the Airboat Association of Florida would not be provided; the

height of the bridge (elevation 14 feet) would be insufficient to allow access by most airboats.

5.8.9 Alternative 8. Existing Alignment with Raised Profile and Box Culverts

The series of box culverts associated with this alternative would provide sufficient hydraulic opening to convey projected MWD Flows. The existing culvert system, which extends along the length of the Tamiami Trail in the project area, currently enables a general equalization of flows to ENP that approximates sheet flow. Although the new culverts would be capable of conveying the required amount of water, the retention of the existing culvert system under Alternative 7a would assist in maintaining sheet flow.

The culverts would provide some connectivity between the L-29 Canal and ENP. The hydraulic opening would provide partial connectivity between ENP and the L-29 Canal. Improving ecological connectivity would enhance aquatic biological communities south of the existing Tamiami Trail.

WPAP modeling (Section 5.7.5.5) indicates that wetland impacts associated with Alternative 8a include a loss of 3.51 FUs; 46.56 FUs are lost under Alternative 8b.

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Under Alternative 8, 2,295 linear feet of US 41 would be located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is situated in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. This small willow head supports nesting by tricolored herons and great egrets. A buffer zone of 125 meters (410 feet) was established to prevent human disturbances during nesting season and periods where wading birds are roosting at the colony site. Under Alternative 8, 449 linear feet would be under development restriction for wading birds. Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

Air quality modeling (Section 5.7.7) indicates that Alternative 8 would have no significant effect on air quality.

Alternative 8a would involve modification of the Tamiami Trail, but would not impact any of the other identified cultural resources. Alternative 8b would involve a reconstruction of the Tamiami Trail, and severely impact Coopertown Airboat Rides and Restaurant: two structures and the boat dock would be lost.

Aesthetics would be enhanced by the removal of exotic vegetation on the southern side of the Tamiami Trail, which is necessary for the modifications and reconstruction under this action alternative.

Alternative 8a would result in relatively minor impacts on the Osceola Camp, the Airboat Association of Florida, and the three airboat tour businesses. Alternative 8b would

create significant adverse impacts. The footprint of Alternative 8a falls within the maintenance right-of-way for the existing roadway and ownership claimed by FDOT; therefore, no relocations would be required. Relocations may be necessary under Alternative 8b. Short-term traffic disruptions and noise, which are expected during construction, could possibly affect the Osceola Camp community.

For the Osceola Camp area, noise modeling (Section 2.11) indicates that Alternative 8a, although predicted to exceed FDOT approach criteria, appears to have no impact when compared to future without project conditions. However, Alternative 8b is predicated to exceed FDOT approach criteria and cause impacts beyond the future without project alternative. A noise barrier that would reduce noise to acceptable levels would range in height from 8 to 20 feet over a length of 1,450 feet, and cost $425,000 or $30,360 per residence, which exceeds the FDOT unit cost threshold of $30,000 per benefited residence.

This alternative would neither increase nor decrease traffic on the Tamiami Trail. The existing boat access across the L-29 Canal to the Tigertail Camp would be retained except possibly for temporary durations during the construction period when shoulders, currently used for parking, would be used for travel lanes. Access to the camp using the unimproved road along the L-29 Levee would continue.

The RIMS-2 economic model (Section 5.7.14) indicates that expenditures associated with the construction of Alternative 8a would produce $85,503,591 in new business generated and generate $23,368,796 in wages in the local economy, which would represent approximately 1,001 man years of employment. Alternative 8b would result in $88,474,670 in new business volume, $24,180,815 in wages, and 1,036 man-years of employment.

Alternative 8 would result in temporary impacts to fishing from the Tamiami Trail right-of-way during construction. Alternative 8b involves a reconstruction of the highway that would eliminate the existing culverts, thus eliminating these spots for fishing. Access to boat ramps, would not be affected under this alternative.

5.9 EVALUATION OF ALTERNATIVE PLANS

5.9.1 Engineering Evaluation of Refined Alternatives

An in-depth engineering analysis was performed on each of the alternatives. The Engineering Appendix includes relevant summaries of the alternatives based on examinations of the existing highway, conceptual designs, knowledge of Florida requirements in road design, cost estimates, etc. The Engineering Appendix is available upon request.

5.9.2 Other Input

Copies of the Engineering Appendix were distributed to various Federal and State agencies for their review and input. Opinions and suggestions from those agencies were instrumental in the selection of the alternatives to be fully developed.

5.9.3 Alternative Evaluations and Comparisons

Several considerations are made in the evaluation of project alternatives and options. First, each alternative must enable achievement of the project goal. Each alternative is evaluated to determine how well the project objectives are met through performance measures developed for each alternative. Alternatives are then compared to each other with performance measure ratings (see Section 5.5 Performance Measures). Each performance measure provides the opportunity for alternatives to be compared on a quantitative or semi-quantitative basis.

Performance measures are considered to fall into several broad categories: the degree of reasonableness of the alternative; the alternative's feasibility; beneficial effects that would be realized from implementation of the alternative; and adverse social, economic, and/or environmental impacts that may or would result. Section 5.5 details the performance measures associated with each project objective. Section 5.12 contains the performance measure matrix and information showing how each alternative performs both quantitatively and qualitatively.

Average annual costs were developed for each of the alternatives and for the no-action alternative. Average annual costs for the no-action alternative are the higher maintenance costs for Tamiami Trail that would result from the implementation of the Mod-Waters Project with no associated corrective actions connected with Tamiami Trail. These costs included the higher maintenance costs of Tamiami Trail associated with the higher water levels that would result from Mod-Waters. The costs were developed based on damages to the roadway expected to occur as a result of the higher water surface elevations and the expected probability of their occurrence. Total average annual costs under the no-action alternative are $3.3 million. This figure was not included in Table 31 because no-action was never considered to be a realistic alternative for implementation.

The alternatives studied by the Corps would not increase road capacity or cause increased traffic on the road. Thus, no alternative discussed in this report would cause increased pollutant discharge into adjoining wetlands. The status of the adjacent lands (Everglades National Park property to the south of the roadway, an Outstanding Florida Water [OFW]) was also considered by the Corps. The Corps does not believe any of the alternatives that have been considered would cause additional loading of the above-mentioned pollutants and therefore would not contribute in any way to a degradation of the park. The incorporation of stormwater treatment as a project feature has been evaluated, and it was concluded that benefits resulting from the construction of facilities are minimal, and not outweighed by direct impacts to wetlands, businesses, Native Americans, and high costs.

Alternatives that included bridging would allow for either (1) degrading the existing roadway, now upon fill; or (2) conversion of the old right-of-way to water quality treatment areas. The consensus of the planning team is that restoration to natural wetlands is a more beneficial use that conversion of the same lands to water treatment areas, in light of the information provided in the preceding paragraph. An elevated stormwater treatment area would still constitute a barrier or impediment to restoration of ecological connections between lands and wetlands to the north and those to the south. The Corps, upon review of the contractor's study, concludes that it would be more beneficial to the ecosystem as a whole to allow any road system that is bypassed, and is

not needed to maintain access for existing residents or recreational users, to be restored to natural elevations. Restoration of the bypassed roadway sections would encourage wetland restoration, enhance ecological connectivity, and be more esthetically pleasing.

5.10 FURTHER SCREENING

5.10.1 Screening of Alternative 1

After further screening of the alternatives, it was concluded that Alternative 1 would not be considered for further evaluation because of noncompliance with FDOT/FHWA design criteria. As discussed in Section 5.6.4.2, Alternative 1 calls for no modifications to the existing roadway. With an expected high water level of 9.3 feet, the limerock base would be expected to soften and cause a reduction in strength of the road structure, therefore accelerating existing fatigue cracking and encouraging further damage. In addition, with the anticipated water elevation, overtopping could occur, thereby providing adverse implications to emergency vehicles and hurricane evacuation. For these reasons, Alternative 1 is eliminated from further consideration.

5.10.2 Screening of Alternatives 3 and 4

Alternative 3, construction of a new roadway to the North with eight new bridges, was developed as one of the original 13 conceptual alternatives for Tamiami Trail. Alternative 4, construction of a new roadway to the South with four new bridges, was also developed as one of the original 13 conceptual alternatives. Both alternatives were evaluated against established Project Objectives and Performance Measures. Based upon this evaluation, a decision was made not to evaluate these two alternatives further for possible implementation. When compared with the remaining alternatives, alternatives 3 and 4 show definite adverse impacts associated with their implementation.

Alternative 3 has direct impacts on the Miccosukee-Tigertail Camp during construction of the project. Alternative 4 has significant impacts on the Osceola Camp. Access and privacy to the Tigertail Camp would be directly impacted with the implementation of Alternative 3. With Alternative 4, impacts to the privacy and access of the Osceola Camp, as well as the loss of structures, are present. FDOT noise criteria are exceeded in the vicinity of the Tigertail Camp with Alternative 3 and at the Osceola Camp with Alternative 4. Increased wetland functional units are lost with the implementation of Alternative 3 and 4 when compared with the remaining alternatives. When considering permanent loss of wetlands, alternatives 3 and 4 impact more acres than the remaining alternatives. With the shifting of Alternative 3 to the north of the existing Tamiami Trail, there would be increased impacts to fish and wildlife. When considering the purpose of the MWD project, and compared with remaining alternatives, the costs of alternatives 3 and 4 do not perform as well. Their cost exceeds other alternatives that accomplish the same objectives. The cost of Alternative 3 is more than three times greater than the funds identified in the Capital Asset Plan.

Alternatives 3 and 4 would significantly affect biological resources and residential areas. Alternative 3 would reroute the highway north into WCA-3B, encroaching on the wading bird colony at Frog City. USFWS expressed concern that the Frog City colony would be abandoned. In addition, by relocating the highway closer to the Tigertail Camp, Alternative 3 would expose residents to greater traffic noise and create increased safety risks to children. Alternative 3 could result in environmental justice violations.

Alternative 4 also would relocate the highway to the south, potentially adversely affecting the wood stork colonies at the Tamiami East and Tamiami West sites. Alternative 4 would require the incorporation of more wetlands into the right-of-way than most other alternatives. At the Osceola Camp Alternative 4 would result in the loss of facilities and an increase in highway noise, and also could result in environmental justice violations. Businesses within the project corridor would lose facilities.

Alternatives 3 and 4 are not being considered for selection as the preliminary recommended plan due to the above listed adverse impacts**.**

5.10.3 Screening of Alternatives 5 and 6

Alternative 5 was developed as one of the original 13 conceptual alternatives for Tamiami Trail. It consists of a 10.7-mile causeway elevating the roadway above the North East Shark River Slough flow way. Alternative variation 5c completely removes the barriers to flow, Tamiami Trail, and allows for unimpeded sheet flow from the L-29 Canal into North East Shark River Slough. In addition to providing extensive uniform sheetflow, this alternative also allows for ecological connectivity between Water Conservation Area 3B and Everglades National Park. It is recognized as the plan that maximizes environmental outputs without regard to fiscal or other constraints. DOI in the Fish and Wildlife Coordination Act Report (CAR) designated Alternative 5 as the "Environmentally Preferred Alternative, Performs Best for Environmental Objectives without Regard to Fiscal Constraints." The complete CAR can be found in Appendix I.

Alternative 6, which consists of a 4-mile bridge, was developed as a scaled-down version of Alternative 5 based on coordination with the Department of Interior as another means to meet the objectives of Modified Water Deliveries, increase sheet flow, and promote ecological connectivity. It is recognized as the plan that provides substantial environmental output without regards to fiscal or other constraints. The CAR designated Alternative 6 as "Performs Well for Environmental Objectives without Regard to Fiscal Constraints." The CAR can be found in Appendix I.

Alternatives 5 and 6 are not being considered for the Preliminary Recommended Plan due to fiscal and other constraints.

5.10.3.1 Fiscal Constraints. The current level of funding available for Tamiami Trail Modification under Modified Water Deliveries is $20.215 million as identified in the DOI Capital Asset Plan. Reference on current funding levels can be made to the June 2001 version of the Capital Asset Plan (OMB Circular A-11 Exhibit 300 (b), Modified Water Deliveries).

Implementation of Alternatives 5 and 6 is not viable because they are not the most efficient use of funds to achieve the goals of this MWD project. Other alternatives that have been evaluated during development of this GRR satisfy the goals of the project in a more efficient manner. Therefore, these two alternatives are not being carried forward for further consideration. Alternative 5 is about 7 times greater than currently available in the Capital Asset Plan and Alternative 6 is about 3.5 times greater than the funds available. (Alternative 3 is also more than 3 times greater, however, as discussed above, there are additional reasons for excluding this as a practical alternative.) The Everglades Expansion and Protection Act does state that the MWD Project features are "justified by

the environmental benefits to be derived by the Everglades ecosystem in general and by the park in particular and shall not require further economic justification…." However, the Federal Government also recognizes that limited funds are available for the project as reflected in the CAR.

In addition to funding constraints, Alternatives 5 and 6 are not being recommended for implementation because of their extreme high cost and the uncertainties inherent in future detailed CERP efforts. All information and details provided in this report, however, should be useful to the future CERP study of this roadway.

Alternatives 5 and 6 may be significant elements of the eventual ecological restoration to be achieved via the now authorized CERP project. These alternatives realize the upper range of environmental benefits and may or may not be the ultimate solution to be recommended by future CERP detailed studies. Their inclusion is in response to very strong public interests (i.e. all environmental agencies and interests including Department of Interior), which at this time strongly believe construction of a causeway to be the ultimate solution.

5.10.3.2 Other Constraints. WRDA 2000 § 601(b)(2)(C) authorized raising and bridging of Tamiami Trail as an "Initial Project" of the Comprehensive Everglades Restoration Plan. Subsection 601(b)(2)(D) required the Secretary of Army to review and approve a project implementation report prepared under that § 601(f) and (h), and to submit that report to the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Environment and Public Works of the Senate. Prior to any appropriations being made, subsection 601(b)(d)(2) also required completion of the project to improve water deliveries to Everglades National Park authorized by Section 104 of the Everglades National Park Protection and Expansion Act of 1989, and approval of the project implementation report by those Committees.

Conditions:

> *(iv) MODIFIED WATER DELIVERY – No appropriation shall be made to construct the Water Conservation Area 3 Decompartmentalization and Sheetflow Enhancement Project (including component AA, Additional S-345 Structures; component QQ Phase 1, Raise and Bridge East Portion of Tamiami Trail and Fill Miami Canal within WCA 3; component QQ Phase 2, WCA 3 Decompartmentalization and Sheetflow Enhancement; and component SS, North New River Improvements) or the Central Lakebelt Storage Project (including components S and EEE, Central Lake Belt Storage Area) until the completion of the project to improve water deliveries to Everglades National Park authorized by section 104 of the Everglades National Park Protection and Expansion Act of 1989 (16 U.S.C. 410r-8)."*

The report is prepared under the authority of the Everglades National Park Protection and Expansion Act of 1989, and to implement completion of the project to improve water deliveries authorized in that Act. It is not intended to be the project implementation report to implement the Initial Project in the Comprehensive Everglades Restoration Plan discussed in § 601 of the Water Resources Development Act of 2000, nor is it intended to prejudge the results of that project implementation report. That project implementation report (Water Conservation Area 3 Decompartmentalization Phase 1) will be prepared at a later date.

It is recognized that:

1. Only limited funding is provided by the Modified Water Deliveries Project for modifications to the Tamiami Trail;

2. Full restoration of natural flows to Northeast Shark River Slough (NESS) and Everglades National Park may only be accomplished through implementation of MWD Project features coupled with the restoration features of the CERP, once the seepage control features for the projected high water levels in NESS are fully mitigated;

3. Additional funding and restoration capability is authorized by CERP Decompartmentalization (Phase 1) for Tamiami Trail, subject to the constraints of WRDA 2000, and future adjustments may occur to Tamiami Trail using CERP authority and that additional features may augment the MWD project features by increasing the ecological connectivity between the Water Conservation Areas and the ENP, thereby restoring a more natural sheetflow regime to ENP.

4. Current funding levels identified for Tamiami Trail in CERP are limited.

5. Per the CERP Restudy, 9.1.7.2 “The purpose of these features {Water Conservation Area 3 Decompartmentalization and Sheetflow Enhancement (AA, QQ and SS)} is to reestablish the ecological and hydrological connection between Water Conservation Areas 3A, and 3B, and the Everglades National Park, and Big Cypress National Preserve.” 10.6.2.3 “This project is included {Water Conservation Area 3 Decompartmentalization and Sheetflow Phase-1} in the initial authorization for two reasons; (1) to provide immediate opportunities for enhanced sheetflow within Water Conservation Area 3 and between Water Conservation Area 3 and Everglades National Park and (2) to integrate with ongoing modifications that are being made in the detailed design and construction of the Modified Water Deliveries to Everglades National Park project. . . The Project Implementation Report will address the scope and method to be used for Miami Canal backfilling, conveyance improvements to the North New River Canal and, the bridging of Tamiami Trail, and L-29 modifica-tions that are necessary to enable unrestricted flow from Water Conservation Area 3 into Everglades National Park . . These project modifications will be coordinated with the existing Modified Water Deliveries to Everglades National Park Project . . . The benefits to the project from this feature are that restoring sheet flow will reduce the unnatural discontinuities in the landscape.”

6. Not intended to be the PIR to implement the Initial Project in the CERP WRDA or prejudge the results of the PIR;

7. Final CERP features for Tamiami Trail have not yet been identified the proposed modifications will be analyzed in a public forum consistent with NEPA;

8. Without prejudging the results of the project implementation report (PIR) required by WRDA 2000, the intent of this GRR/SEIS is to maximize the compatibility and avoid retrofitting costs of MWD project features with future CERP features;

9. The intent of this GRR/SIES is to have a clear design for MWD onto which a CERP design can follow;

10. Completion of the MWD project is a prerequisite to actions under CERP, and a delay in completion of MWD would delay implementation of CERP;

11. Subject to approval of a Project Management Plan (PMP) for Decompartmentalization (Phase I) under CERP, two PIRs will be prepared for WCA 3 Decompartmentalization (Phase I). One PIR will study and identify the recommended alternative for Tamiami Trail under CERP. The second PIR will address all other Decompartmentalization (Phase I) components.

Planning efforts underway for the CERP WCA3 Decompartmentalization (Phase I) project for Tamiami Trail are scheduled to be completed prior to construction of modifications to Tamiami Trail under MWD.

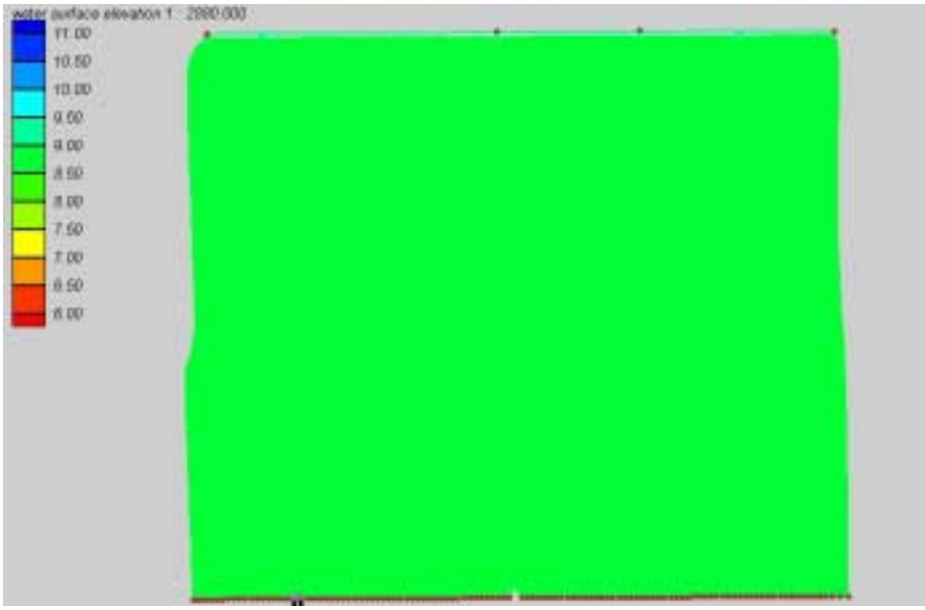
5.11 INCREMENTAL ANALYSIS

An Incremental Analysis was performed to determine the optimal bridge opening needed to pass MWD flows and achieve acceptable water distribution south of Tamiami Trail. This incremental analysis was instrumental in determining the width opening required to pass the expected MWD flows and in the determination of how the flows react south of Tamiami Trail with the various width openings investigated.

5.11.1 Four Bridges (Alternatives 2, 3, 4)

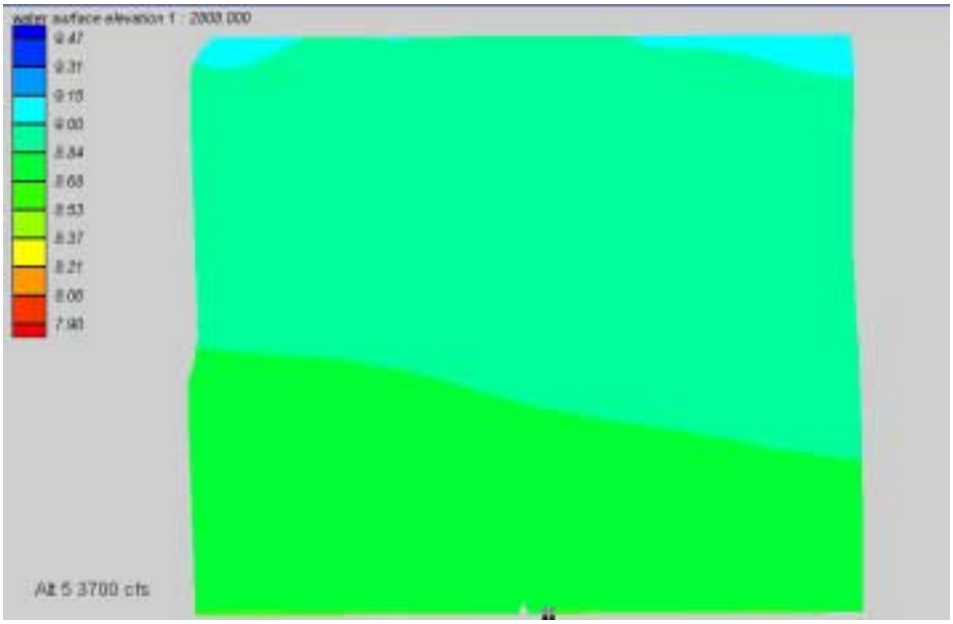
The Corps of Engineers has designed similar improvements to roads in ENP (Taylor Slough for the C-111 project). The purpose of the project was to add bridges to Park Road in the same manner as the project purpose for Tamiami Trail. That is, pass additional flows through a road structure for environmental enhancement/hydrologic conveyance. The same approach used for Park Road was used in solving the Tamiami Trail problem. Alternative 2 proposed adding a series of bridges into the existing Tamiami Trail alignment to accommodate the additional hydrologic conveyance needed for the MWD project. Hydrologic modeling was used to determine the necessary lengths to convey the higher flows with acceptable head-loss. Four bridges with a combined length of 1,450 feet met the hydrologic criteria. Proposed bridge locations were selected based on the following criteria: proximity to control structures (S-333, S355A&B, S-356); downstream obstructions (vegetation, airboat camps, etc); low areas in the road; and distribution along L-29 Borrow Canal. In alternatives 3 and 4, proposed openings in the existing Tamiami Trail performed equivalent to the proposed bridges in Alternative 2.

The graphic below depicts how four bridges (shown by the four marks) react and the water distribution south of Tamiami Trail.



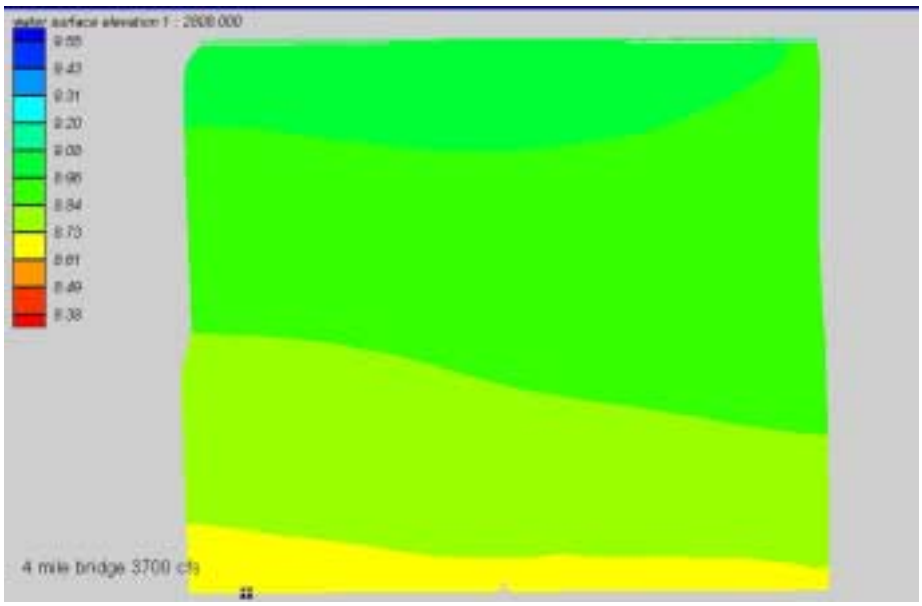
5.11.2 10.7-Mile Causeway (Alternative 5)

A full causeway spanning the entire project area of 10.7 miles was developed as one of the 13 conceptual alternatives for Tamiami Trail. This was carried forth as Alternative 5. Alternatives 2, 3, and 4 were viewed as minimal modifications to Tamiami Trail that would allow for the passage of 4000 cfs. Alternative 5, however, has been viewed as a plan that would completely remove barriers to sheet flow and provide maximum hydrologic and ecological connectivity. The graphic below depicts how a single opening of 10.7 miles would react and the water distribution south of Tamiami Trail.



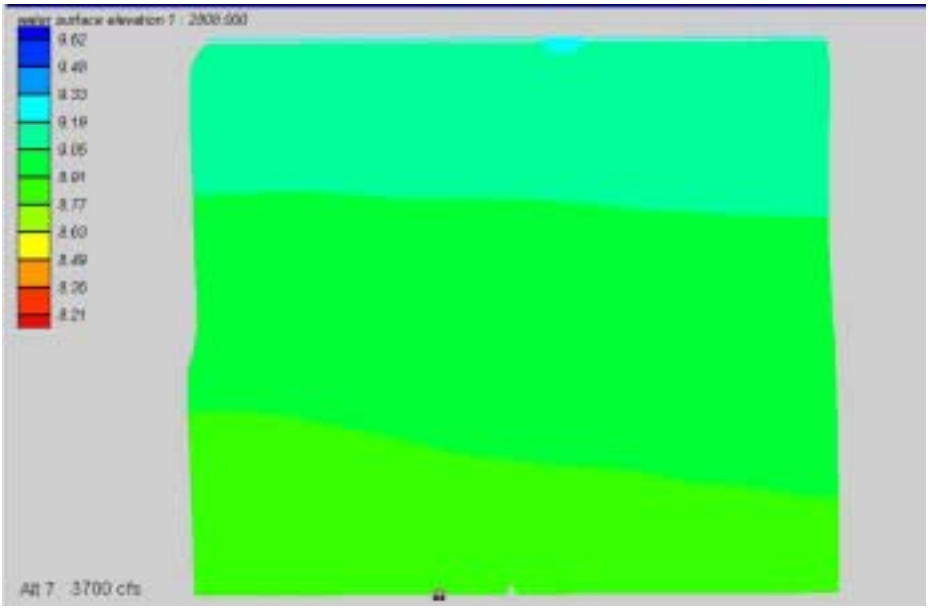
5.11.3 Four-Mile Bridge (Alternative 6)

A four-mile bridge alternative, Alternative 6, was developed as a less expensive, scaled-down version of Alternative 5. This alternative was developed based on coordination with the Department of Interior as another means to achieve sheet flow. Although not achieving complete hydrologic restoration, i.e., unimpeded sheet flow, this alternative was seen as a compromise between the minimum necessary to pass MWD flows and the maximum for hydrologic/ecological connectivity. The graphic below depicts how a single opening of four miles would react and the water distribution south of Tamiami Trail.



5.11.4 3,000-Foot Bridge (Alternative 7)

Further refinement of the width opening needed to pass MWD flows in a single location was investigated. Since preliminary siting located the opening near the center of the project limits, head loss in the L-29 Canal became a concern. Water deliveries from the eastern- and western-most water control structures caused a backwater effect in the L-29 Canal and raised stages in the L-29 Canal. Hydrologic modeling was used to determine the required single opening to convey the higher flows with acceptable head loss across the road. Modeling resulted in a 3,000-foot opening meeting these criteria (Alternative 7). In comparing this alternative to previous alternatives investigated, it was determined that the hydrologic connectivity was acceptable while meeting the other objectives of the project. The graphic below depicts how a single opening of 3,000 feet reacts and the water distribution south of Tamiami Trail.



5.11.5 Summary

Based on hydrologic modeling results analyzing the flow of water south of Tamiami Trail and how each alternative performs against established project objectives, it was determined that Alternative 7, with a 3,000-foot bridge opening, is the alternative that best meets all project objectives and establishes the required flow of water into ENP.

5.12 SELECTION OF THE PRELIMINARY RECOMMENDED PLAN

Based on extensive screening, as described in previous sections of this report, alternatives 2a, 7a, and 8a remain for possible recommendation.

A comparison of alternatives 2a, 7a, and 8a was made using Project Objectives and Performance Measures as shown in Table 32. A summary of that comparison follows:

- Cost Effectiveness - Alternatives 2a and 7a are of comparable cost. The cost of Alternative 8a is approximately double that of 2a and 7a.

- Compatibility with Future CERP Actions – For flexibility for increased water flows, states, and capacity, the three alternatives are equal. For capacity to add features to achieve full sheetflow, Alternatives 2a and 8a offer partial compliance; Alternative 7a offers full compliance. For ease of adding features to improve Decompartmentalization and ecological connectivity, all alternatives are considered equal. For opportunities to degrade the roadbed, Alternative 7 provides slightly fewer linear feet than alternatives 2a and 8a. Alternatives 2a and 7a would provide partial compliance with the project objective, while Alternative 8a would provide minimal compliance. Alternative 7a would provide approximately 3 acres for potential wetland restoration, while alternatives 2a and 8a would provide none.

Table 16. Summary of Performance Measures to Assess Compliance of Each Action Alternative with Project Objectives

Measure	Units	No Action	Alt 1*	Alt 2a	Alt 2b	Alt 2c*	Alt 2d*	Alt 3a*	Alt 3b*	Alt 3c*	Alt 3d*	Alt 4a*	Alt 4b*	Alt 5a	Alt 5b	Alt 6a	Alt 6b
Objective 1. Consider Cost-effectiveness																	
PM1. Construction Cost	$	Not Applicable	14,935,871	24,004,854	50,555,604	97,988,018	75,452,390	46,258,110	41,108,440	********	********	********	72,877,979	91,988,917	23,045,753	31,898,380	45,446,946	47,381,229
PM2. Annual Routine Maintenance	$	Not Applicable	40,000	40,000	40,000	40,000	40,000	40,000	40,000	Not Calculated	Not Calculated	Not Calculated	40,000	40,000	40,000	40,000	40,000	40,000
PM3. Rescuing/Maintenance (Rescheduling)	$	Not Applicable	13,646,872	16,153,247	32,778,918	32,981,601	26,809,171	20,462,382	26,003,886	1,386,428	1,386,428	1,386,428	12,235,870	16,842,628	16,981,022	20,986,600	14,302,117	28,328,219
PM4. Life Cycle Cost	$	Not Applicable	31,166,877	53,936,977	90,139,446	133,913,666	76,249,594	48,259,140	56,135,445	********	********	********	77,984,054	96,345,803	31,004,934	54,776,745	59,862,953	66,158,346
PM5. Average Annual Cost	$	3,150,000	1,286,288	1,847,792	2,783,519	3,888,008	3,801,468	2,179,783	2,280,289	9,128,866	9,423,807	8,847,308	6,177,270	6,608,870	1,852,379	3,033,244	3,430,381	5,370,868
Objective 2. Maximize Compatibility for Future CERP actions																		
PM6. Flexibility for Increased Flows, Stages, and Capacity Associated with CERP	Qualitative	n	n	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f
PM7. Addition of Features to Increase Tail Water Flows	Qualitative	n	n	p	p	p	p	p	p	f	f	f	f	f	f	f	p	p
PM8. Ease of Adding Features to Improve Environmentalists	Qualitative	n	n	p	m	n	n	p	m	p	p	f	p	m	p	m	p	m
PM9. Ecological Connectivity	Qualitative	n	n	n	n	n	n	n	n	p	p	f	p	p	n	n	n	n
PM10. Potentially Degradable Linear Footage of Roadbed	linear feet	33,048	33,048	33,048	33,048	33,048	33,048	33,048	33,048	33,048	33,048	12,200	0	33,828	41,740	33,848	33,880	33,048	33,048
PM11. Minimal Habitat Needed	Qualitative	n	n	p	p	p	p	p	p	f	f	f	p	p	p	p	n	n
PM12. Potential Wetland Acreage Restored	acres	0	0	0	0	42	42	0	0	44	44	44	34	44	0	1.7	0	0
Objective 3. Minimize Construction Impacts																		
PM13. Ability to meet NWD implementation schedule	Qualitative	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f
PM14. Temporary Impacts of Construction Activities on the Miccosukee Tribe and Businesses	Qualitative	f	f	f	m	p	p	m	m	p	p	p	p	m	f	m	f	f
PM15. Duration of Construction	Qualitative	Not Applicable	18	24	24	30	30	24	24	48	48	48	30	30	24	24	24	28
PM16. Access for Turbidity Control	Qualitative	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f
PM17. Is Phasing of Construction needed to Avoid Impacts to Wood Stork during Nesting Season	yes/no	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
PM18. Ability to Maintain Adequate Distances from Construction to Wood Stork Primary Zones	Qualitative	f	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
PM19. Ability to Maintain Distances from Construction to Wood Stork Secondary Zones	Qualitative	f	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
PM20. Ability to Maintain Adequate Distances from Construction to Bald Eagle Nesting Locations	Qualitative	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f

* Alts 1,2c,2d,3d were not carried forward after evaluation of the performance measure table and have not been considered for recommendation as the preferred recommended plan. The rationale for their elimination is included in Section 5.10 of the GRR/SEIS.

Measure	Units	No Action	Alt 1	Alt 2a	Alt 2b	Alt 3a*	Alt 3b*	Alt 4a*	Alt 4b*	Alt 5a*	Alt 5b*	Alt 5c*	Alt 6a*	Alt 6b*	Alt 7a	Alt 7b	Alt 8a	Alt 8b
Objective 4. Minimize Adverse Socioeconomic Impacts.																		
PM1. Impacts to Businesses or Private Properties	Qualitative	r	r	p	p	r	r	m	m	r	r	r	p	p	r	r	p	p
PM2. Impacts on Access and Privacy at Tigertail Camp	Qualitative	r	r	r	r	m	m	r	r	r	r	r	r	r	r	r	r	r
PM3. Impacts on Access and Privacy at Osceola Camp	Qualitative	r	r	r	m	r	r	m	m	p	m	p	r	m	r	m	r	m
PM4. Noise Impacts to Tigertail Camp (FSUT Noise Approach Criteria exceeded)	yes/no	no	no	no	no	yes	yes	no	no	no	no	no	no	no	no	no	no	no
PM5. Noise Impacts to Osceola Camp (FSUT Noise Approach Criteria exceeded)	yes/no	no	no	no	yes	no	no	yes	yes	no	no	no	no	yes	no	yes	no	yes
Objective 5. Restore Ecological Function.																		
PM1. Wetland Functional Index	FCI/Acres	0	2.02	12.1	31.48	18.82	32.18	40.43	34.04	Not Applicable	Not Applicable	Not Applicable	0.0	22.11	3.42	49.35	3.31	40.08
PM2. Linear Footage of North/South Ecological Connectivity	linear feet	250	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	50,499	1,500	1,500	3,000	3,000	250	450
PM3. Exotic Vegetation Removed	linear feet	0	1,450	50,499	50,499	1,450	1,450	50,499	50,499	1,450	1,450	50,499	50,499	50,499	50,499	50,499	50,499	50,499
PM4. Hydrologic Restoration of WCA3B	Qualitative	n	p	p	p	p	p	p	p	p	p	r	r	r	p	p	p	p
PM5. Area with Affected Flow Magnitude	Qualitative	m	m	m	m	m	m	m	m	r	r	r	p	p	m	m	m	m
PM6. Difference Between Average Velocity in Tamiami Trail and Average Velocity in the marsh south of Tamiami Trail	Qualitative	n	m	m	m	m	m	m	m	r	r	r	p	p	m	m	m	m
Objective 6. Minimize Impacts to Recreation Facilities.																		
PM1. Access for Visitor Use	Qualitative	r	r	r	r	p	p	p	p	p	p	p	p	p	r	r	r	r
PM2. Duration of Temporary Access Restrictions	months	r	18	24	24	50	50	24	24	48	48	48	50	50	24	24	24	28
PM3. Access to Fishing from Tamiami Trail	Qualitative	r	r	r	r	r	r	r	r	m	m	m	p	p	p	p	r	r
PM4. Access to Fishing in the L-29 Canal	Qualitative	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
PM5. Boating Accessibility to WCA-3B	Qualitative	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
Objective 7. Minimize Permanent/Temporary Wetland Loss																		
PM1. Wetlands Permanently Lost	acres	r	0	11.9	88.3	14.3	28.9	88.4	105.8	Not Applicable	Not Applicable	Not Applicable	2.9	48.9	5.0	72.4	0.1	68.0
PM2. Wetlands Temporarily Lost During Construction	acres	r	4.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0
Objective 8. Minimize Impacts to L-29 Canal.																		
PM1. L-29 Canal Capacity	Qualitative	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
PM2. Effects on Flora and Wildlife	Qualitative	r	r	r	r	p	p	r	r	r	r	r	r	r	r	r	r	r

* Alts 1,3,4,5,6,8 were not carried forward after evaluation in the performance measure matrix and removal from consideration for recommendation as the preliminary recommended plan. The rationale for their elimination is included in Section 5.10 of the DRR/SEIS.

r = The performance measure indicates Full Compliance with the project objective.

p = The performance measure indicates Partial Compliance with the project objective.

m = The performance measure indicates Minimal Compliance with the project objective.

n = The project measure indicates Non Compliance with the project objective.

- Minimization of Construction Impacts - The three alternatives are equal in their abilities to meet the MWD schedule, their temporary impacts on the Miccosuckee Tribe and businesses of the area, construction duration, turbidity controls, and their abilities to maintain distances and implement phasing to avoid impacts to wood storks and snail kites.

- Minimization of Socioeconomic Impacts – Alternative 7a provides full compliance with the objective of avoiding impacts to businesses, while Alternatives 2a and 8a offer partial compliance. The three alternatives are equal in impacts on access, privacy, and noise impacts on the Tigertail and Osceola camps.

- Restoration and Enhancement of Ecological Function – Alternative 2a offers the opportunity to restore 11.1 acres, while Alternative 7a offers 3.42 acres and Alternative 8a offers 3.51 acres. Alternative 7a offers more ecological connectivity (3,000 feet) than Alternatives 2a (1,450 feet) or 8a (240 feet). The three alternatives are equal in the amount of exotic vegetation removed, areas with affected flow magnitude, and differences between average velocity at the road and the marsh.

- Minimization of Impacts to Recreation Facilities – Alternative 7a would result in more impacts to recreational fishing from the Tamiami Trail right-of-way than Alternatives 2a or 8a. The alternatives are equal in their effects on maintaining access for visitor use, duration of construction impacts on recreation, access to fishing in the L-29 Canal, and maintaining boat accessibility to WCA-3B.

- Minimization of Wetland Losses – Alternatives 7a and 8a are approximately equal in the amount of permanent wetland loss (5.0 and 5.1 acres, respectively) and temporary wetland loss (1.0 and 0.0 acres respectively), while Alternative 2a would result in the permanent loss of 11.8 acres and the temporary loss of 4.9 acres.

- Minimization of Impacts to the L-29 Canal – The three alternatives were equal in their effects on the capacity of the L-29 Canal and their effects on fish and wildlife.

Based on this evaluation Alternative 7a was selected as the “Preliminary Recommended Plan” because it was judged to provide the best overall Performance Measure rankings. The implementation of Alternative 7a would result in no significant adverse impacts to the natural or human environments.

Wildlife features are not included in the Preliminary Recommended Plan. However, at the request of DOI, information and costs associated with providing wildlife protection have been developed (See Section 5.6.5 Wildlife Crossing Options). These features could be added as an enhancement to project and therefore funded by DOI.

The 3,000-foot bridge has been preliminarily sited between Blue Shanty and Coopertown. During the development of plans and specifications, the placement of the bridge may be reevaluated, and the bridge re-sited. Appropriate NEPA documentation would be prepared to address any re-siting.

As part of the recommended plan, the Federal government will compensate FDOT for the real estate rights needed for the Tamiami Trail project. In order to obtain the perpetual right to flow water, FDOT is entitled to compensation. This right includes both conveyance and easement interests. The appropriate organizations at the Federal and State levels will develop and approve an agreement containing the details and method of implementation. It is the intention of the Federal government not to expend any more funds than necessary to construct alternate facilities for the Tamiami Trail that a future project under CERP may impact.

SECTION 6.0
PRELIMINARY RECOMMENDED PLAN

ALTERNATIVE 7a: EXISTING ALIGNMENT WITH RAISED PROFILE AND 3000-FOOT BRIDGE WITHOUT WATER QUALITY TREATMENT.

6.1 DESCRIPTION

This alternative incorporates bridge features of Alternative 2, Existing Roadway Alignment with Raised Profile and Four New Bridges without Water Quality Treatment, and Alternative 5, Elevated Roadway within Existing Right-of- Way without Water Quality Treatment. It is defined as modifying the existing Tamiami Trail profile and typical section at the beginning and end of the study corridor, and the construction of a bridge with a span of approximately 3,000 feet to convey MWD project flows. The bridge would begin approximately one mile from the western end of the corridor.

The existing Tamiami Trail profile and typical section would be modified for approximately one mile at the western end of the project and approximately 9.4 miles to the east of the bridge. Existing culverts would be retained. The centerline of this alignment would fall very close to the centerline of the existing facility. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

The bridge portion of this alternative is defined as reconstruction of approximately 3,000 feet of the Tamiami Trail alignment as an elevated structure. This alignment would be positioned to minimize impacts and construction cost, and to facilitate maintenance of traffic during construction. The profile would be established per the applicable drift, maintenance, and navigation bridge clearance. This alternative requires only a modest alignment transition at either end of the bridge. The new bridge deck would be equipped with drain scuppers that would discharge directly to the area below.

The existing Tamiami Trail embankment would be removed adjacent to the 3,000-foot-long bridge. The bridge typical section would be standard the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barrier shapes. Exceptions would occur where a surface connection for access or other reasons might be required; at these locations, turning lanes might be needed.

6.1.1 Enhancements/Betterments

Items that are in addition to the project features are considered ”enhancements” or “betterments.” This section describes examples of each and how they could be incorporated.

Enhancement: Wildlife features. In the project Coordination Act Report from the Department of Interior, several features were recommended to reduce wildlife mortality along U.S. 41. These features are not required to meet the project purpose of water

deliveries to NESRS and are not features of the recommended plan. However, as enhancement features that would improve wildlife survival, the features can be recommended and funded by the Department of Interior.

The South Florida Water Management District may provide enhancements to the project for protecting and enhancing wildlife along the Tamiami Trail. Enhancements may include the construction of wildlife barriers to reduce wildlife mortality on the highway, and the incorporation of wildlife crossings for improving connectivity across the Tamiami Trail and the L-29 Canal. Enhancements such as wildlife crossings are outside the scope of this MWD project. However, if enhancements are desired to the recommended plan, they can be included at the request of DOI.

Betterment: Airboat Passage. Recreational interests have requested that the alternatives evaluated include bridging at a height that would allow for the passage of airboats. These features are not required to meet the project purpose of water deliveries to NESRS and are not features of the recommended plan. Currently there is no airboat passage between the north and south side of Tamiami Trail in this area. An airboat passage feature was not evaluated for purposes of this project. Such features may be considered later as betterments, if recommended and funded by the local sponsor, or an airboat passage feature may be considered with a later project.

6.1.2 Water Quality

Requirements for the treatment of highway runoff are determined by FDEP. As described in Chapter 62-25, FAC, *Regulation of Stormwater Discharge*, FDEP requires that all stormwater runoff be collected and directed to treatment facilities that meet specific design and performance standards. Facilities must provide retention, or detention with filtration, of the runoff generated by the first one inch of rainfall. As an option, for projects or project subunits with drainage areas less than 100 acres, facilities may provide retention, or detention with filtration, of the runoff generated by the first one-half inch of rainfall. However, facilities discharging directly to Outstanding Florida Waters (described in Chapter 17-3 FAC) shall provide additional treatment in accordance with Section 62-25.025(9) FAC. Additionally, retention or detention basins shall provide the capacity for the given volume of stormwater within 72 hours following the storm event. The additional storage volume must be provided by a decrease of water stored via percolation through soil, evaporation, or evapotranspiration.

Jurisdiction over water quality issues of this type is normally delegated by FDEP to the water management districts. Because SFWMD is a sponsor of the project, jurisdiction remains with FDEP.

Erosion and sediment control best management practices must be used as necessary during construction in order to retain sediment on site. Controls shall be developed with respect to specific site conditions.

6.2 TYPICAL SECTIONS AND PAVEMENT DESIGN

6.2.1 Roadway Typical Section

This typical section would consist of two 12-foot-wide travel lanes, and 8-foot- wide shoulders on each side of the roadway. Five feet of this shoulder would be paved. There would be guardrail located at the outside edges of these shoulders.

6.2.2 Bridge Typical Section

The bridge typical section would provide two 12-foot travel lanes with 8-foot shoulders and outside barriers.

6.2.3 Pavement Design

This alternative would consist of upgrading the existing roadway to accommodate a design high water elevation of 9.3 feet and traffic for 50 years. This would be achieved through placing a thick structural overlay. The upgrade would consider the impact of the design high water elevation, overtopping, and grade variations.

The recommended approach is to leave the existing asphalt pavement in place as a construction platform and to serve as a black base. The low areas would be leveled to minimum elevation of 11.0 feet throughout the project. Then a 6-inch asphalt overlay would be placed on the surface. This provides slightly more than one foot of clearance to the 9.3-foot design high water elevation. In areas where the roadway profiles dip as low as 10 feet, the bottom of the existing 6-inch asphalt is essentially at the design high water level.

After leveling to elevation of 11.0 feet with asphalt overbuild, the top six inches below elevation 11.0 feet would be considered black base. Elevation 11.0 feet provides for one foot of clearance from the bottom of the declared black base (elevation 10.5 feet) using either existing granular embankment or asphalt overbuild. In many cases, the asphalt overbuild would be 12 inches thick, providing a total asphalt thickness of 18 inches for over a mile before the structural overlay is placed.

The FWD testing conservatively estimated the embankment modulus at 5,000 psi (the FDOT method would predict it at 15,000 psi); to account somewhat for the higher water level, the modulus was reduced to 4,000 psi. Using the 50-year projected traffic and an embankment resilient modulus of 4,000 psi, the required structural number is 6.17 inches. Using the effective AASHTO structural number of the existing pavement structure, SNeff, of 3.5, a 6-inch asphalt overlay provides a structural number of 6.14. This is slightly less than the 6.17 required, which equates to 0.15 inches of asphalt. Considering this is a 50-year outlook and that there would be numerous periodic resurfacings, any additional thickness deemed necessary can be added with the resurfacings and considered a staged construction.

A key issue is that the roadway would be close to the design high water table, and that more frequent resurfacings are anticipated than a normal roadway. This is in part due to potential localized failures and some settlement of the muck. The buoyant force of the raised water elevation almost counteracts the weight of the additional asphalt. However, in areas where more than 12 inches of asphalt are placed, settlements are expected.

Similarly, if the water elevation seldom reaches 9.3 feet, then there is less buoyant force and additional settlement is expected.

Considering that the existing roadway was resurfaced seven years ago, and by its cracking condition of 6 is technically ready for a resurfacing, a 7-year resurfacing interval for this alternative appears warranted. This is considerably more frequent than a 10 to 15 year interval common in Florida; however, the Tamiami Trail is surrounded by the Everglades and exposed to water throughout the year. The recommended pavement section follows:

Alternative 7a - Without Water Quality Treatment

Centerline elevation = 11.5 feet
¾ inch friction course
6-inch structural asphalt
0-12 inch asphalt overbuild
Existing 6-inch asphalt pavement
Existing embankment

6.3 PLANS AND PROFILE

The profile is to be raised to provide a set clearance from the controlled high water elevation to the bottom of the roadway subgrade. The set clearance is to meet FDOT design criteria, as well as drainage criteria. The elevation at the crown of the roadway is 11.5 feet. The profile would be raised significantly at the bridge, and would be established per applicable drift, maintenance, and navigation bridge clearances, while minimizing humps in the profile.

6.4. STRUCTURES

The 43'-1'' wide bridge typical section provides sufficient deck area for two 12-foot-wide travel lanes and 8-foot shoulders on both sides of the travel lanes. Several super-structure and substructure alternatives were evaluated to determine the most cost-effective bridge structure. These systems include:

Superstructure Alternatives	Substructure Alternatives
Transversely Post-Tensioned Slab Units FDOT Precast Prestressed Double Tee System AASHTO Beams Types II, III, IV, V, and VI with Cast-in-Place Concrete Deck Florida Bulb Tees 72 and 78 with Cast in Place Concrete Deck	18 and 24 inch square Prestressed Concrete Piles (with pre-drilling) 3-foot diameter Drilled Shafts

The most cost-effective bridge structural system for all four bridges uses AASHTO Type V Beams with a composite cast-in-place concrete deck. The superstructure is supported on pile bents using two 3-foot-diameter drilled shafts.

Placement of cranes and delivery of material, such as piles, precast beams, and concrete were analyzed to ensure constructibility of the bridge for this alternative. Installation of the drilled shafts and erection of the precast beams for the barges over the L-29 Canal would most likely be performed from barge-mounted cranes. Crane size and lifting capability may be limited based on the size of barges that can be transported to and placed in the canal.

The minimum offset of the centerline of the bridge from the centerline of the roadway was established at 26 feet to allow a minimum buffer area of five feet from the temporary barrier to the edge of the bridge, to allow the construction of temporary pavement without impacting the wetland, and to allow a minimum of 50 feet of canal width for barge operations. This offset could be increased by 10 feet to allow for a pullout lane for precast beam delivery. This offset cannot be increased sufficiently to allow for crane placement on the south bank for the canal without either filling part of the canal or impacting the wetlands by shifting the traffic farther south.

6.5 DRAINAGE

The new bridge deck would be equipped with drain scuppers that would discharge directly to the area below.

Existing culverts under the roadway would be retained.

6.6 UTILITIES

There are existing utilities within the corridor that would be affected by the new construction. There is a buried telephone facility running behind the guardrail on the south side of the roadway. There is also a 23 kilovolt overhead electric line running along the south side, located about 100 feet south of the existing guardrail. Just behind the guardrail on the north side of the roadway is an additional buried telephone facility.

All utilities within the typical section would require relocation. Utility relocations would be coordinated with each utility owner. As the underground utilities appear to fall within the right-of-way, their relocation costs are not included in the cost estimates.

6.7 ENVIRONMENTAL FACTORS

Because the roadway portion of this alternative preserves the existing facility, it has limited environmental effects. The alignment does not encroach beyond the existing footprint to the south. The two detour roads at either end of the bridge would temporarily fill 3.5 acres of wetlands that would be restored after construction of the transitions is completed.

This alternative offers the option of incorporating wildlife barriers and wildlife crossings.

6.8 MAINTENANCE OF TRAFFIC DURING CONSTRUCTION

6.8.1 Roadway Portion

Traffic is to be maintained as it exists today. The overlay of the existing roadway would be accomplished using a moving operation. Staging areas for construction equipment and materials could be located on the business parcels along the corridor that are to be acquired or are not actively used now. Otherwise, staging and other functions may need to utilize sections of the existing shoulder for temporary periods. It may be necessary to have a staging area near the east end of the corridor, with materials moved in the remaining short distance on an “as needed, just-in-time” basis at the work site.

6.8.2 Bridge Portion

In order to construct this alignment, the existing roadway would be shifted to the south. This shift would prevent any traffic flow to be allowed underneath the structure. Once temporary pavement is constructed on the southern shoulder, traffic can be shifted out from under the alignment. Construction staging would be done from a barge in the L-29 Canal, minimizing the impact to both the wetlands and the traffic.

Temporary barricades spaced every 50 feet would be placed at the south edge of the eastbound travel lane. In ¼-mile increments, the existing guardrail would be removed and replaced with temporary barrier wall. The existing shoulder would be removed and replaced with temporary pavement. Once completed for the entire project length, traffic is shifted to the south, utilizing the new pavement. A 10-foot-wide strip of temporary pavement would be placed north of the existing centerline to allow the roadway to slope to the north at 2 percent. A temporary concrete barrier would be placed at the north-south edge of the temporary pavement. The bridge would then be constructed.

A temporary roadway would be constructed south of the existing alignment in the transition areas only. Once the temporary roadway is completed, traffic would be shifted onto it and the transitions to the new bridge would be constructed. Traffic to the new bridge would then shift to the new alignment, and the existing roadway would be removed.

Staging areas for construction equipment and materials could be located on the business parcels along the corridor that are to be acquired or not actively used now. Otherwise, staging and other functions may need to utilize sections of the existing shoulder for temporary periods. It may be necessary to have staging areas near the east end of the corridor, with materials moved in the remaining short distance on an “as-needed, just-in-time” basis at the work site.

6.9 CONSTRUCTION AND LIFE CYCLE COSTS

The cost of this alternative is $23,045,733. Most of the cost is related to the roadway elements (Table 33). All costs in this section include a Supervision and Administration factor that results in an increase of seven percent over costs listed in Table 31.

The life cycle costs for this alternative were developed for two cases: for the roadway alone, and for the total project. Pavement life cycle costs were calculated

at $16,961,032 while the total project life cycle costs were estimated to be $31,003,830.

Table 33. Construction Costs of Alternative 7a

ALTERNATIVE 7- Without Water Quality Control	
Roadway	$16,110,900
Bridge	$6,934,834
Total	$23,045,733

Source: PBS&J, 2001 (Engineering Appendix).

6.10 OPERATIONS AND MAINTENANCE

The project feature is a 3,000-ft conveyance channel through U.S. Highway 41, the Tamiami Trail. The local sponsor (SFWMD) will be responsible for maintenance of the conveyance channel and the conveyance aspects of the culverts as part of the project cost sharing agreement to insure that the project operates as designed. The 3,000-foot conveyance channel easement, use of the conveyance structures, and a flowage easement are the project features, which are needed for the project to function and are to be operated and maintained by the Non-Federal Sponsor. The substitute facilities will not be operated and maintained by the Federal or Non-Federal Sponsor. The substitute facilities for the preliminary recommended plan consist of two items: (a) a 3,000-foot bridge and (b) pavement upgrades to the unbridged portion of Tamiami Trail road between S333 and S334.

Maintenance of the 3,000-ft conveyance will also require maintaining the L-29 canal from S-333 to S-334 free of aquatic weeds so that the bridge channel does not become blocked and reduces the conveyance. Control of aquatic weeds is fairly routine and can be accomplished for $20,000 annually. Ensuring the culverts are free of aquatic vegetation through weed control is included in this cost. The Federal/Non-Federal cost share of this O&M is 75/25, respectively. Estimated costs are $15,000 Federal and $5,000 Non-Federal.

Features identified as public highway relocation and flowage easement compensation are a 3,000-ft bridge and the raising of the roadway. O&M for the bridge and resulting substitute facility is not the responsibility of the Non-Federal Sponsor because the compensation is the provision of the substitute facility. Responsibilities of the Non-Federal Sponsor are:

a. For so long as the project remains authorized, operate and maintain, repair, replace, and rehabilitate the completed Recommended Plan or functional portion of the Recommended Plan in accordance with applicable Federal and State laws and specific directions prescribed by the Federal Government.

b. Provide a cost share of 25 percent of the operation, maintenance, repair, replacement and rehabilitation of the Recommended Plan.

c. Hold and save the Federal Government free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the Recommended Plan. In addition, the Federal Government will be free from all damages arising from any project related betterments, except for damages due to the fault or negligence of the Federal Government or the Federal Government's contractors.

d. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Recommended Plan to the extent and in such detail as will properly reflect total project costs.

e. To the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the Recommended Plan in a manner that will not cause liability to arise under CERCLA.

f. Participate and comply with applicable Federal flood plain management and flood insurance programs in accordance with Section 402 of Public Law 99-662, as amended.

g. Prevent future encroachments on the project lands, easements, and rights-of-way that might interfere with the proper functioning the Recommended Plan.

h. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.

i. That as between the Government and the Non-Federal Sponsor that the Non-Federal Sponsor shall be the operator of the Project for purposes of the CERCLA liability.

j. That the Non-Federal Sponsor shall investigate for hazardous substances as are determined necessary by the Government to identify the existence and extent of a hazardous substance regulated under the Comprehensive Environmental Response, Compensation and Liability Act, (CERCLA), 42 USC 9601-9675, on lands being acquired by the Government for the construction, operation and maintenance of the Recommended Plan at the Government's expense.

6.11 OTHER ASPECTS

There are existing features that must remain undisturbed. The Flight 592 Memorial is located north of the L-29 Canal near the western limits of the project and would not be impacted with this alternative. Access would remain at the S-333, S-334, and S-336 structures. Access to Tigertail Camp, located on the north side of the canal, would remain. Connecting roads would be provided for access to the Florida Airboat Association site. Access to the Osceola Camp would be by way of a connecting road from the west.

Wildlife Features. In the project CAR from the Department of Interior, several features were recommended to reduce wildlife mortality along U.S. 41. These features are not required to meet the project purpose of water deliveries to NESRS and are not features of the recommended plan. However, as an enhancement feature that would improve

wildlife survival, the features can be recommended and funded by the Department of Interior.

Airboat Passage. Recreational interests have requested that the alternatives evaluated include bridging at a height that would allow for the passage of airboats. These features are not required to meet the project purpose of water deliveries to NESRS and are not features of the recommended plan. Currently there is not airboat passage between the north and south side of Tamiami Trail in this area. An airboat passage feature was not evaluated for purposes of this project. Such a feature may be considered later as betterments, if recommended and funded by the local sponsor.

6.12 SCHEDULE

The duration of construction of the preliminary recommended plan is 24 months.

6.13 COST SHARING

A Project Cooperation Agreement (PCA) will be required between the Corps of Engineers and the local sponsor. The LCA is a legally binding document between the Federal government and the local sponsor identifying the sponsor duties and obligations for this project. However, in accordance with current Federal policy, the LCA cannot be executed until construction funds for the project have been appropriated. The SFWMD is the project sponsor and represents local interests.

Because Section 104(a)(3) of the Everglades National Park Protection and Expansion Act authorized construction of the project based on “the environmental benefits to be derived by the Everglades ecosystem in general and by the park in particular,” all first costs shall be 100 percent Federal including the value of lands, easements, rights of way, and relocations provided for construction of the project. Operation and Maintenance (O&M), Repair, Replacement and Rehabilitation (RR&R) costs shall be not more than 75 percent Federal. These costs are consistent with staff agreements previously reached between the Office of Management and Budget and the Assistant Secretary of the Army (Civil Works).

Acquisition of lands for ENP expansion shall be in accordance with PL 101-229 and cost-shared between the Department of the Interior and the State of Florida.

The specific requirements of local cooperation will be prescribed by the MWD PCA and will comply with the following general guidelines:

- Contribute a minimum of 25 percent of total costs needed to operate and maintain, repair, replace, and rehabilitate the project works involved to mitigate the increased risk of flooding in the residential area including the levee and canal system, the pumping stations, and the structural works and modifications in the Water Conservation Area No. 3 and adjacent canals.

- Hold and save the United States free from damages due to the construction or subsequent operation and maintenance of the project, except any damage due to the fault of or negligence of the United States or its contractors,

- Prevent encroachment on the flood-carrying capacity of the project including the culvert system under U.S. 41, and

- Maintain and operate the works after completion in accordance with regulations prescribed by the Secretary of the Army, except for the water control structures and outlets in Water Conservation Area No. 3, which will be maintained and operated by the Corps of Engineers.

6.14 REAL ESTATE

The Federal government will compensate FDOT for the real estate rights needed for the Tamiami Trail project. In order to obtain the perpetual right to flow water, FDOT is entitled to compensation. This right includes both conveyance and easement interests. The appropriate organizations at the Federal and State levels will develop and approve an agreement containing the details and method of implementation. It is the intention of the Federal government not to expend any more funds than necessary to construct alternate facilities for the Tamiami Trail that a future project under CERP may impact.

6.14.1 Lands and Easements

The lands and easements needed to implement the Tamiami Trail modifications are currently under several ownerships. A complete copy of all real estate requirements and issues is included in Appendix H.

The footprint of Alternative 7a falls within the maintenance right-of-way of the existing roadway and ownership is claimed by FDOT. This ownership claim is partially overlapped by SFWMD's right-of-way claim along the L-29 Canal. This apparently is fairly common when a roadway parallels a canal, and in the past has been resolved through the exchange of quick claims between agencies to establish a contiguous right-of-way boundary shared by the two agencies. In some areas, SFWMD holds only flowage easements and fee title is held by approximately two dozen private landowners. Most of the private holdings involve large tracts, but a few are as small as two acres.

6.14.2 Construction Relocations

No relocations (as described in Public Law 91-646) will be required for Alternative 7a as the footprint is generally within the existing right-of-way claims of FDOT. The footprint will require obtaining fee title ownership from private owners, but will not affect any residential or business improvements. No relocation payments, as specified under the provision of Title II of Public Law 91-646, The Uniform Relocation Assistance, and Real Property Acquisition Act of 1970, will be required.

6.14.3 Public Highways and Bridges

There are no additional non-project-related relocations of public highways or bridges affected by the alternatives under consideration.

6.14.4 Utilities Relocation

There are utilities within the existing corridor that may be affected by construction. There is a buried telephone facility behind the guardrail on the south side of the road and

a 23 kilovolt overhead electric line running along the south side, approximately 100 feet south of the existing guardrail. Just north of the guardrail on the north side is an additional buried telephone facility. There are utilities along the L-29 Levee: a buried telephone cable at the base of the levee on the south side and power poles on the canal maintenance berm.

6.15 PROJECT IMPLEMENTATION

The Draft GRR/SEIS for Tamiami Trail will be provided to the non-Federal sponsor, SFWMD Staff, and published in the Federal Register on 7 December 2001. The Formal comment period for the NEPA process is 45 days for the Draft report. The purpose of this Draft document is to present the results of the study and gather comments/concerns from the sponsor and from supporting agencies and the public. The following steps will take place for full implementation of the selected plan:

- The Draft GRR/SEIS will be provided to the SFWMD Staff and published in the Federal Register in the fall of 2001.

- There will be a 45-day public comment period on the Draft GRR/SEIS beginning on the date of publication in the Federal Register. Comments will be accepted from the public and participating agencies. The non-Federal Sponsor will provide comments through the state clearinghouse process.

- At the close of the public comment period, approximately 45 days will be required to incorporate comments into the Final GRR/SEIS.

- The Final GRR/SEIS will be published in the Federal Register for a period of 30 days.

- After the close of the comment period for the Final GRR/SEIS, approximately 30 days will be required to compile responses to comments, append the Final GRR/SEIS, and prepare the Record of Decision. The non-Federal sponsor will present the Final GRR/SEIS to the SFWMD Governing board and will respond by board action as well as in writing.

- Approximately 30 days will be required for the approval of the Record of Decision.

- Once the Record of Decision is signed, a Project Cooperation Agreement Amendment will require approximately 120 - 180 days to execute with the non-Federal Sponsor, SFWMD.

- Design and construction will be complete approximately 4 years following approval of a Record of Decision.

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SECTION 7.0
ENVIRONMENTAL EFFECTS OF THE PRELIMINARY RECOMMENDED PLAN

7.1 INTRODUCTION

The Preliminary Recommended Plan anticipates pavement modifications to nearly 10.4 miles of the roadway.

7.2 GEOLOGY AND SOILS

Various alternatives involve the movement of soils and drilling or making shallow excavations into the limestone bedrock. Although limestone excavation increases the bedrock's surface area-volume ratio and increases the leaching effects of groundwater, none of the action alternatives will involve operations of a large enough scale to significantly affect either the geological conditions or the soils along the Tamiami Trail. There are no prime or unique farmlands in the project area.

7.3 WATER MANAGEMENT

The MWD program, of which this project is a component, would provide for structural modifications to the C&SF Project to enable the restoration of more natural water flows to NESRS in ENP. The action alternatives were designed to facilitate the passage of the required volumes of water from the L-29 Canal to help reestablish the natural distribution of water from WCA-3A and 3B to ENP. Alternative 7a involves the removal of a portion of the existing Tamiami Trail embankment adjacent to facilitate that flow. The retention of the existing culvert system would assist in maintaining sheet flow. The net effects of the project would be beneficial.

7.4 WATER QUALITY

Except for temporary adverse impacts associated with construction, Alternative 7a wlll have no direct effect on the surface water quality of the L-29 Canal or ENP. Because adverse effects associated with highway runoff are related to the amount of traffic using the highway, and because construction of the project would not affect traffic along the Tamiami Trail, no net adverse effects on the Everglades environment would result. All requirements for controlling turbidity and sediment transport would be followed during construction.

Continuity exists in the project area between surface water and ground water. None of the action alternatives would involve interruption of this continuity. None of the alternatives would therefore have any direct effect on ground water.

7.5 HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE

The preliminary assessment indicated that no HTRW or other harmful substances are impacting the project area. However, if contaminants are found during property procurement or project construction, the site would be remediated.

Contaminants, if not detected during the site assessment, may be disturbed or released by increasing the water level and hydroperiod or by removing unnatural structures from the landscape. Experience has shown that the highly permeable ground substrate of that area results in rapid mitigation of the residual contaminants.

7.6 ENVIRONMENTAL RESOURCES

7.6.1 Everglades National Park

The effects of the project would be of a beneficial nature.

The Preliminary Recommended Plan is consistent with the effort to meet the original MWD project goal: . . . *take steps to restore natural hydrologic conditions to the extent practicable in the Everglades National Park*. The recommended plan would promote the hydrologic restoration of ENP by providing the passage of MWD design flows of 4,000 cfs.

7.6.2 Shark River Slough East and West Basins

Alternative 7a would enable the conveyance of MWD design flows to NESRS.

7.6.3 Water Conservation Area 3B

Alternative 7a is located across the L-29 Levee and the L-29 Canal from WCA-3B. The project would have no impacts on WCA-3B.

7.6.4 Biological Communities

The project would have beneficial impacts on biological communities.

Under the Preliminary Recommended Plan, ecological connectivity would be enhanced by the 3,000-foot span of the bridge. Additionally, the recommended plan provides the opportunity for integrating the bridge into a corridor-wide raised facility, as well as be a part of a multi-bridge system with less retrofit than other alternatives. Although there are no specific provisions made to reduce wildlife mortality, the bridge spans is anticipated to provide some reduction in mortality of wildlife crossing the Tamiami Trail. The recommended plan provides options for incorporating corridors and barriers to enable wildlife to safely cross the highway and the L-29 Canal.

7.6.5 Wetlands

Wetland impacts were evaluated by an interdisciplinary team using Wetland Rapid Assessment Procedure methodology (Section 5.7.5.5). Alternative 7a would result in the permanent loss of approximately five acres of wetlands, which includes a loss of 3.42 FUs.

7.6.6 Threatened or Endangered Species

Effects on threatened and endangered species were evaluated. Primary and secondary zones were established for the Tamiami West wood stork colony, the Tamiami East wood stork colony, and the Frog City wading bird colony. The USFWS has developed

restrictions primarily on highway construction and human activity in these zones for periods ranging from 18 to 48 months. Currently, under Alternative 7a, 2,295 linear feet of U.S. 41 is located in the primary zone and 2,122 linear feet in the secondary zone for the Tamiami West Colony. The only restricted area for the Tamiami East Colony is 3,123 linear feet in the secondary zone. Furthermore, the small colony of wading birds located in Frog City is located in WCA-3B close to the L-29 Levee, approximately one-quarter mile west of the Tigertail Camp. Under Alternative 7a, no restriction would be placed on work within the vicinity of Frog City.

Although these restrictions would require phasing of construction, no significant impacts to threatened or endangered species are expected.

7.7 CLIMATE

No effect on climate would result from implementation of the recommended plan.

7.8 AIR QUALITY

Results of the air quality models, COSCREEN and MOBILE5A, indicate that implementation of the preliminary recommended plan would have little impact on baseline air quality in the project area for the design years analyzed (Section 5.7.7). Although construction associated with the project was not included in this analysis, and although there would likely be minor, short-term air quality impacts in the form of dust from earthwork and other activities, such impacts would be minimized by adherence to all state and local regulations and to FDOT's Standard Specifications for Road and Bridge Construction.

7.9 RECREATION

No significant impacts to recreation of the area would occur.

There would be no effects on access to boat ramps via S-333 and S-334 other than those associated with normal traffic delays. No effect on bank fishing access to the north bank of the L-29 Canal is anticipated. Although the use of shoulders for temporary lanes would preclude parking on roadsides, a method of "rolling construction" would be employed, and impacts from construction would be localized. Therefore, bank fishing from the Tamiami Trail would be restricted in those portions of the roadway where construction takes place during the 24-month construction period. After the completion of construction, bank fishing along the south bank of L-29 could resume fully. Fishing at the culvert outfall locations would remain.

7.10 CULTURAL RESOURCES

A cultural resource assessment survey resulted in the identification of three historic resources:

- Coopertown Airboat Rides and Restaurant (8DA6767)
- Tamiami Trail (8DA6765)
- Tamiami Canal (8DA6766)

Although the Preliminary Recommended Plan would result in bridging a portion of the Tamiami Trail and some reconstruction of the highway, both the highway and its alignment have received modifications and relocations throughout its history.

There would be no encroachment upon either the Coopertown Airboat Rides and Restaurant or the Tamiami Canal (L-29 Canal). Results of the cultural resources survey have been coordinated with the State Historic Preservation Officer; copies of the correspondence would be incorporated into the final report.

Mitigation measures to offset effects to significant historic resources would be developed among the Corps, SHPO, and FDOT. Mitigation for historic resources impacts are typically coordinated with the locally affected parties and SHPO and documented in a Memorandum of Agreement (MOA). Mitigation measures could include the following:

- Video that documents the developmental history of the Tamiami Trail and the diverse cultural resources located along the corridor;

- State Historic Markers could be placed at various areas of significance along the Tamiami Trail. The markers would include narratives describing the history and importance of various sites along the corridor;

- Formal NRHP designation reports for the significant historic resources identified in the project area;

- Large format 4x5 photographs of the affected resources according to Historic American Building Survey (HABS) standards, producing sketch drawings of the affected buildings' floor plans, and producing copies of architectural plans and drawings of the buildings (if available) according to archival standards. Any archival materials could be kept at public facilities such as the Historical Museum of Southern Florida in Miami and the SHPO in Tallahassee;

- Informational brochures, tours, and/or Web sites could be produced that would cover the history and significance of the Tamiami Trail and its related historic resources. At this time, the University of Miami has developed a Web-based digital display on the Tamiami Trail in Miami-Dade County that includes historic materials such as letters, maps, photos, and promotional pieces from the early twentieth century. Efforts to produce current brochures, tours, or Web sites could be coordinated with other organizations such as the University of Miami; and

- The Miami-Dade County portion of the Tamiami Trail could be associated with the interpretative plan and Tamiami Trail Scenic Highway designation of the Collier County portion of the Tamiami Trail.

Should construction activities uncover any archaeological remains, activity in the immediate area of the find will be stopped and the Corps notified. Construction will not continue until the remains are evaluated by a professional archaeologist and the Corps provides a notice to proceed.

In the event that human remains are found during either construction or maintenance activities, the provisions of *Chapter 872, Florida Statute (872.05)* and the Native American Graves Protection and Repatriation Act (NAGPRA) will apply. Chapter 872, Florida Statute states:

> *When human remains are encountered, all activity that might disturb the remains shall cease and may not resume until authorized by the District Medical Examiner (if the remains are less than 75 years old) or the State Archaeologist (if the remains are more than 75 years)*.

If human remains less than 75 years are encountered or if they are involved in a criminal investigation, the District Medical Examiner has jurisdiction. If the remains are determined to be more than 75 years in age, then the State Archaeologist takes jurisdiction in determining appropriate treatment and options for the remains.

7.11 AESTHETICS

The removal of exotic vegetation on the southern side of the Tamiami Trail would be necessary for the modifications and reconstruction associated with the recommended plan. Therefore, the project would enhance the aesthetic quality of the area by offering a view of the expanse of the Everglades throughout the length of the project corridor.

7.12 NOISE ENVIRONMENT

Peak hour project noise levels for sensitive receptors, which are specific areas within a project area that can be directly affected by project activities, were modeled for the future-without-project alternative and for the recommended plan for the design year 2020 using the TNM noise model (See Section 2.11).

- **Flight 592 Memorial.** TNM modeling indicates no noise impacts resulting from the recommended plan. Accordingly, noise abatement measures would not be required.

- **Osceola Camp.** Modeling indicates that the recommended plan, although predicted to exceed FDOT approach criteria, appears to have no impact when compared to future without project conditions. As a result, noise abatement measures would not be required.

- **Tigertail Camp.** Modeling indicates no noise impacts resulting from the recommended plan. Noise abatement measures would not be required.

- **Airboat Association of Florida, Safari Park, Gator Park, and Coopertown Airboats.** Modeling indicates that the recommended plan, although predicted to exceed FDOT approach criteria, appear to have no impact when compared to future with project conditions.

Construction and vibration noise generated because of the project probably would cause temporary impacts from increases in noise levels near sensitive receptors. Noise emissions from construction equipment range generally from 70 dBA for pumps and

portable equipment to approximately 95 dBA for tractors, graders, and other heavy equipment.

Avoidance and/or mitigation options will be developed during the project development and design phases and specified in construction plans for implementation by the contractor. In accordance with FDOT's *Standard Specifications for Road and Bridge Construction*, such avoidance and mitigation measures might include, but are not limited to:

1. Maintaining and operating construction equipment in a manner that minimizes noise;

2. Equipping engines with properly functioning mufflers;

3. Limiting noise emissions near sensitive receptors to the greatest extent possible;

4. Installing portable acoustic barriers around stationary construction equipment;

5. Locating stationary equipment as far from sensitive receptors as possible; and

6. When possible, scheduling noisy operations for the middle of the day.

7.13 TRANSPORTATION

Implementation of the Preliminary Recommended Plan would neither increase nor decrease traffic on the Tamiami Trail. Reconstruction of the roadway would eliminate undulations and cracks in the highway surface, and improve the drivability of the road.

During the construction phase of the project, it may be necessary under some conditions to temporarily close one lane of the highway. Under these situations, signage, signals, and other appropriate traffic controls would be utilized to ensure safety.

The existing boat access across the L-29 Canal to the Tigertail Camp would remain. However, highway construction in the area of the boat access area may temporarily eliminate its use. The use of shoulders for temporary lanes would restrict roadside parking; therefore, there would be no area for vehicles to park for accessing the boat access. Access by means of the unimproved road along the L-29 Levee would remain.

7.14 TRIBAL LANDS

There would be no direct impacts on tribal lands. Access would be provided to both the Tigertail Camp and the Osceola Camp.

7.15 ECONOMICS/SOCIOECONOMICS

No significant impacts on socioeconomic conditions are anticipated.

The effects by the Preliminary Recommended Plan on other segments of the local economy were evaluated using the RIMS-2 model (Section 5.7.14). Using Miami-Dade

County 1995 information, this model gives a construction multiplier of 1.8792 and an earnings multiplier of 0.5136. The construction costs of the recommended plan, $23,045,733, would generate $43,307,541 in new business volume, with resultant earnings of $11,836,288. In addition, the construction costs would generate employment demand of 513 man-years.

Access would be provided to all businesses in the project corridor and to the Airboat Association of Florida both during construction and after project completion. During construction of the highway, while provisions are made to maintain the flow of traffic, there may be infrequent motoring delays due to slower speeds or occasional stops. Because some drivers may wish to avoid construction areas, the number of visitors to businesses during the period of construction may be reduced.

The Osceola Camp is likely to be exposed to short-term construction noise, dust, inconvenience, and possible traffic delays during the period of construction. Because of its distance from the highway, The Tigertail Camp is less likely to be affected by construction noise, but boat access to the camp may be temporarily affected at times during construction. No other effects on the Osceola or Tigertail camps are likely to occur**.**

7.16 FLIGHT 592 MEMORIAL

No impacts on the Flight 592 Memorial are expected.

7.17 ENVIRONMENTAL JUSTICE AND IMPACTS ON CHILDREN

Because there are no adverse environmental effects on minority or low-income communities associated with the Preliminary Recommended Plan, there would be no disproportionate adverse environmental effects on minority or low-income communities. Refer to Section 5.7.17.

Because the Preliminary Recommended Plan does not change the location of the highway, this project is not expected to affect the environmental health or increase safety risks to children in either the Tigertail or Osceola camps over existing conditions.

7.18 CUMULATIVE IMPACTS

Cumulative impacts are those that result from . . .*the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time* (40CFR 1508.7).

This project is one component of the MWD project, which would restore to the extent practicable a portion of the Everglades ecosystem. This effort is also tied into the Central and Southern Florida Flood Control Project Comprehensive Restudy, now referred to as the Comprehensive Everglades Restoration Project (CERP). Table 34 lists several other past, current, and projected efforts that cumulatively affect the Southeastern Florida/Southern Everglades regional environment.

Table 34. Project Effects with Cumulative Affect on Southeastern Florida/ Southern Everglades Regional Environment

Project	Responsible Agency
Past Actions	
Modified Water Deliveries to Everglades National Park – Raising Tigertail Camp	USACE
Experimental Program of Water Deliveries to Everglades National Park – Test Iterations 1-5 (Shark River Slough)	USACE
Experimental Program of Water Deliveries to Everglades National Park – Test Iteration 6 (Taylor Slough)	USACE
Experimental Program of Water Deliveries to Everglades National Park – Test Iteration 7 (modified Taylor Slough)	USACE
Current Actions	
Experimental Program of Water Deliveries – Emergency Deviation from Test Iteration 7, Interim Structural and Operational Plan	USACE
Modified Water Deliveries to Everglades National Park – Conveyance between WCA-3A and WCA-3B (Conveyance and Seepage Control Project)	USACE
Modified Water Deliveries to Everglades National Park – 8.5 Square Mile Area	USACE
Additional Lands – 8.5 Square Mile Area (Willing Seller Land Acquisition Program)	FDEP
East Coast Buffer/Water Preserve Areas Project	SFWMD
Lower East Coast Regional Water Supply Interim Plan	SFWMD
Future Actions	
Comprehensive Everglades Restoration Plan	USACE/ SFWMD
South Dade (C-111) Project	USACE
Experimental Program of Water Deliveries – Emergency Deviation from Test Iteration 7 – Interim Operational Plan	USACE
Decompartmentilization	USACE/ SFWMD
Lower East Coast Regional Water Supply Plan – South Florida Ecosystem Restoration Plan	SFWMD

Source: U.S. Army Corps of Engineers.

Collectively, all of the above actions are needed to achieve the greatest possible hydrologic restoration of the southern Everglades. Virtually all the above actions were incorporated into the CERP analysis. The CERP analysis was designed to consider the entire South Florida ecosystem and, in doing so, modeled the hydrologic conditions of the area on a broad scale. In the hydrologic modeling analysis, a set of performance measures was applied to ecological targets to determine the restoration benefits of the hydrologic improvements. The CERP analysis also included some fundamental assumptions about the future status of the MWD project and other on-going projects within the ecosystem prior to completing the CERP modeling. It was assumed that the

MWD project was in place as designed and providing the expected flows to NESRS. No adverse environmental impacts were identified. Therefore, the Recommended Plan for Tamiami Trail Modification is expected to contribute to a net beneficial cumulative impact.

7.19 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The Preliminary Recommended Plan requires the irreversible and irretrievable commitment of resources; the expenditure of funding, labor, energy, and materials would be required for the construction of the roadway. Additional wetland acres would be incorporated into the right-of-way of the Tamiami Trail for all action alternatives with the exception of Alternative 5.

7.20 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The Preliminary Recommended Plan would involve a loss of approximately five acres of wetlands, which would be incorporated into highway right-of-way. Wading bird foraging habitat, as well as wetland habitat would be lost. However, sufficient habitat remains available to the north and south of the project area to absorb displaced wildlife. The overall beneficial effects to the Everglades resulting from the implementations of this project and the remaining MWD actions would greatly outweigh any unavoidable adverse impacts.

7.21 RELATIONSHIP BETWEEN SHORT TERM USES AND MAINTENANCE/ ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The overall goal of the MWD project, of which this project is a component, is to achieve hydrologic restoration of NESRS and associated wetlands of ENP. Short-term use represented by the action alternatives includes construction resources, dollars, and labor expended during road construction. They also include the short-term, construction-related impacts to traffic flow, businesses, and residents, as discussed in this document. Long-term enhancements in productivity relate to improved quality of the Everglades, specifically hydrologic conditions and biological community structure.

7.22 SECONDARY IMPACTS

Secondary impacts involve those linked to the project but which occur subsequent to construction. This project is a component of the MWD project, which is intended to facilitate hydrologic restoration of the Everglades by providing additional water to NESRS. For hydrologic restoration to be achieved, this project must be implemented. The intent of the project, therefore, is to facilitate beneficial secondary impacts, which would consist of improvements to the Everglades ecosystem subsequent to construction.

7.23 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

This project has been coordinated with agencies of Federal, state and local governments. Agency representatives have participated in workshops, meetings, and other project-related activities, and have provided reviews of this document. There is no known incompatibility with the objectives of Federal, state or local objectives.

7.24 CONFLICTS AND CONTROVERSY

There is a possibility of some opposition from the residents of the Miccosuckee Tribe, local businessmen, and recreational fishermen over potential loss of privacy, possible impacts on businesses, and loss of some recreational access at the expense of environmental restoration. Some environmental organizations may feel that this project offers insufficient benefits to the Everglades ecosystem. Other areas of controversy or conflict have not been identified.

Recreational interests have requested that the alternatives evaluated include bridging at a height that would allow for the passage of airboats. These features are not required to meet the project purpose of water deliveries to NESRS and are not features of the recommended plan. Currently there is no airboat passage between the north and south side of Tamiami Trail in this area. An airboat passage feature was not evaluated for purposes of this project. Such features may be considered later as betterments, if recommended and funded by the local sponsor, or an airboat passage feature may be considered with a later project.

7.25 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

The direct site-specific impacts of the Preliminary Recommended Plan can be predicted with a high degree of certainty; therefore, uncertainty is minimized. However, predictions of cumulative and secondary impacts are, to a degree, inherently uncertain. This project is based on the best available scientific and engineering information, and while no adverse impacts are expected, a low probability of risk is always present. The project design is not unique; thus, it should not create unique risks.

7.26 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

This project would not establish a precedent for future actions with significant effects or represent a decision in principle for future considerations.

7.27 ENVIRONMENTAL COMMITMENTS

The Tamiami Trail project is an integral part of the MWD project for hydrologic restoration in ENP. Portions of the MWD project have been implemented, but the benefits from the MWD project cannot be fully realized until the Tamiami Trail project has been completed.

The design of the Preliminary Recommended Plan will be further evaluated, refined, and optimized during subsequent project development phases. The following items list commitments to ensure that the Tamiami Trail project is developed in a manner consistent with the goals of maximizing the hydrologic restoration of NESRS and associated ENP wetlands while avoiding, minimizing, or mitigating adverse effects.

(a) Implementation of the Recommended Plan shall not adversely harm the restoration levels of ENP's hydrology greater than that simulated by hydrologic modeling as described in the appendices to this document.

(b) To the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the Recommended Plan in a manner that will not cause liability to arise under CERCLA.

(c) That the State of Florida shall be the operator of the project for purposes of CERCLA liability.

(d) A Biological Assessment (BA), if needed, will be prepared under the provision of Section 7 of the Endangered Species Act. The BA would likely evaluate project effects on five listed species that are known to, or might occur in the area affected by the project, including the wood stork, snail kite, American alligator, indigo snake, and Everglades mink. Coordination with USFWS will be initiated, and their concurrence with the determination requested.

7.28 ISSUE OF LOCAL COOPERATION/NON-FEDERAL DUTIES AND RESPONSIBILITIES

This section describes the local sponsor's responsibilities.

(a) Convey for fair market value of all lands, easements, and rights-of-way owned by the non-Federal sponsor to the Government for the Recommended Plan together with all maps, appraisals, and other acquisition materials that may be of use to the Government.

(b) Hold and save the Government free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the Recommended Plan and any project-related betterment, except for damages due to the fault of or negligence of the Government or the Government's contractors.

(c) Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Recommended Plan to the extent and in such detail as will properly reflect total project costs.

(d) Prevent future encroachments on the project lands, easements, and rights-of-way, which might interfere with the proper functioning of the Recommended Plan.

(e) Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Regulations Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

(f) Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled *Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army.*

7.29 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

Coordination and evaluation of required compliance with specific Federal acts, executive orders, and other policies for the various alternatives was achieved, in part, through the coordination of this document with appropriate agencies and the public. This compliance was established in conjunction with the 1992 GDM/EIS for the MWD project. This section documents compliance with all applicable Federal statutes, executive orders, and policies.

7.29.1 National Environmental Policy Act of 1969

The project complies with the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, *et seq.* P.L. 91-190.

7.29.2 Endangered Species Act of 1973

This project complies with the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, *et seq.* P.L. 93-205. Coordination between Federal and state wildlife officials will continue throughout the planning stage of the project.

7.29.3 Fish and Wildlife Coordination Act of 1958

This project is currently being coordinated with the U.S. Fish and Wildlife Service (USFWS). A Coordination Act Report (CAR) is in development by the USFWS and is included as Appendix I. A separate FWCA Report prepared by the FFWCC is also being prepared and is included as Appendix J.

7.29.4 National Historic Preservation Act of 1966 *(Inter Alia*)

Consultation with the Florida State Historic Preservation Officer (SHPO), has been initiated in accordance with the National Historic Preservation Act, as amended, 16 U.S.C. 470a, *et seq.* P.L. 89-655; the Archeological and Historic Preservation Act, as amended, and Executive Order 11593.

7.29.5 Clean Water Act of 1972

The project complies with the Clean Water Act, as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251, *et seq.* P.L. 92-500. A copy of the 404(b)(1) Evaluation is included in Appendix K.

7.29.6 Clean Air Act of 1972

At this stage of planning, this project complies with Section 309 of the Clean Air Act of 1972, as amended, 42 U.S.C. 1857h-7, *et seq.* P.L. 91-604.

7.29.7 Coastal Zone Management Act of 1972

This project is consistent with the Florida Coastal Zone Management Program (see Appendix L) and complies with the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451, *et seq.* P.L. 92-583.

7.29.8 Farmland Protection Policy Act of 1981

No prime or unique farmland would be impacted by implementation of this project. The Farmland Protection Policy Act of 1980 and 1995, P.L. 97-98 is not applicable.

7.29.9 Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be affected by project related activities. The Wild and Scenic River Act of 1968, as amended, 16 U.S.C. 1271, *et seq.* P.L. 90-542 is not applicable.

7.29.10 Marine Mammal Protection Act of 1972

No marine mammals would be affected by this project. Provisions of the Marine Mammal Protection Act of 1968, as amended, 16 U.S.C. 1361, *et seq.* P.L. 92-522, do not apply.

7.29.11 Estuary Protection Act of 1968

No designated estuary would be affected by project activities. The Estuary Protection Act of 1968, 16 U.S.C. 1221, *et seq.* P.L. 90-454 is not applicable.

7.29.12 Water Project Recreation Act

This project is in full compliance with the Federal Water Project Recreation Act, as amended, 16 U.S.C 460-1 (12), *et seq.* P.L. 89-72.

7.29.13 Fishery Conservation and Management Act of 1976

This project complies with the Fishery Conservation and Management Act of 1976, as amended, 16 U.S.C. 1801-1882, P.L. 94-265

7.29.14 Lands Act of 1953

This project is in compliance with the State Sovereignty and Submerged Lands program and the Submerged Lands Act of 1953, 43 U.S.C. 1301, *et seq.*

7.29.15 Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. The Coastal Barrier Resources Act, 16 U.S.C. 3501, *et seq.* P.L. 97-348, and Coastal Barrier Improvement Act of 1990 are not applicable.

7.29.16 Rivers and Harbors Act of 1899

This project would not obstruct navigable waters of the United States. The action has been subject to the public notice, public hearing, and other evaluations normally conducted for activities subject to the Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401, *et seq.* The project is in full compliance.

7.29.17 Anadromous Fish Conservation Act

As defined in the Anadromous Fish Conservation Act, 16 U.S.C. 757a-g, 79 Stat. 1125, as amended by P.L. 89-304, anadromous fish species would not be affected.

7.29.18 Migratory Bird Treaty Act and Migratory Bird Conservation Act

No migratory birds would be affected by project activities. The project is in compliance with the Migratory Bird Conservation Act, 16 U.S.C. 715-715d, 715e, 715f-715r; 45 Stat. 1222 and the Migratory Bird Treaties and other international agreements listed in the Endangered Species Act of 1973, as amended, Section 2(a)(4).

7.29.19 Marine Protection, Research, and Sanctuaries Act

The Marine Protection, Research and Sanctuaries Act, 33 U.S.C. 1401, *et seq.* P.L. 92-532 (3[33 U.S.C. 1402](f)) does not apply to this project.

7.29.20 Magnuson-Stevens Fishery Conservation and Management Act

Magnuson-Stevens Fishery Conservation Act, as amended in 1996, 16 U.S.C. 1801, *et seq.* P.L. 94-265. No adverse effect on fisheries would result from the project.

7.29.21 E.O. 11990, Protection of Wetlands

The wetlands of ENP would be enhanced by this project. This project complies with the goals of this Executive Order.

7.29.22 E.O. 11988, Flood Plain Management

Provisions of this executive order do not apply.

7.29.23 E.O. 12898, Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, provides that *each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations*.

This project is being developed in compliance with E.O. 12898.

7.29.24 E.O. 13045, Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires each Federal agency to *identify and assess environmental risks and safety risks that may disproportionately affect children* and *ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks*.

This project complies with the requirements of E.O. 13045.

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SECTION 8.0
RECOMMENDATIONS

It is recommended that the Tamiami Trail (U.S. Highway 41) be modified to allow for improved water deliveries to Everglades National Park in accordance with the Modified Water Deliveries Program of the Everglades National Park Protection and Expansion Act (PL101-229, Section 104, 16 U.S.C. Part 410r-5 *et seq*.), December 1989. The total estimated cost of the recommended plan is _____ and is 100 percent funded.

The above recommendations are made with the provision that prior to project implementation, the non-Federal sponsor shall enter into a binding agreement with the Federal Government to perform the following items of local cooperation:

1. Provide without costs to the United States all lands easements, and rights-of-way necessary for construction of the project, when and as required.

2. Hold and save the United States free from damages due to the construction of the project.

The recommendations contained herein reflect the information available at this time, and Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Office of management and Budget (OMB) as proposals for implementation funding. However, prior to transmittal to the OMB, any sponsor, the State, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

JAMES G. MAY
Colonel, U.S. Army
District Engineer

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SECTION 9.0
PUBLIC INVOLVEMENT, REVIEW AND CONSULTATION

9.1 PUBLIC INVOLVEMENT

In compliance with policies of the Corps of Engineers and the National Environmental Policy Act, input on projects is solicited from the public and other government agencies. The public was invited to comment during the scoping process and during public meetings, and comments were solicited for the draft and final versions of this document. Copies of Public Meeting and Workshop transcripts, as well as comments and responses are included in Appendix M.

9.2 SCOPING

Scoping is the phase in NEPA process whereby the initial scope of issues to be analyzed in the EIS is determined. This phase occurs as early in the process as possible and is an open process intended to obtain the views of the public and other interested agencies regarding the scope of the study.

Potentially interested individuals, agencies, and organizations were invited to attend and participate in a scoping meeting held at the Miami-Dade County Extension Office, 18710 SW 288th Street, Homestead, Florida, on June 8, 2000, at 6:30 p.m. The format of the meeting was to receive comments and concerns from the public on the issues and alternatives to be addressed.

On June 9, 2000, at the same location, a technical workshop was held to provide an interactive forum to discuss technical aspects of the project.

The topics discussed during the scoping process are of major importance in determining the pertinent issues to be analyzed in depth in the GRR/SEIS. To complete the scoping process the Corps allowed the record to remain open until June 21, 2000, for receipt of written statements. During the Scoping Meeting, the following issues and concerns were expressed:

- **Impacts to the Tigertail Camp.** A representative of the Miccosukee Tribe expressed concerns about the possibility of flooding or the relocation of the Tigertail Camp. A resident of the Tigertail Camp expressed disapproval of Alternative No. 3, the construction of the roadway to the north, because the camp would experience a lack of privacy with the construction of Alternative No. 3.

- **Impacts on Structures 355A and 355B**

- **Impacts on Businesses along the Roadway.** There are existing businesses along the south side of the roadway that may be adversely impacted by the project. A necessary feature of Alternative 3, the construction of a new roadway to the north, is to provide access to the old roadway for commercial and residential traffic. A representative of the Miccosukee Tribe expressed concerns about the businesses along the

roadway. A Tamiami Trail businessman expressed concern that constructing a new roadway to either the north or south would adversely impact businesses along the existing roadway.

- **Impacts to Wetlands**

- **Construction Impacts to Traffic Flow.** A representative of the Miccosukee Tribe expressed concerns that the high volume of traffic on the roadway would result in major disruptions with the implementation of traffic controls and detours. He expressed particular concern about the effects of traffic congestion on the Tigertail and Osceola camps.

- **Impacts to Hurricane Evacuation**

- **Effects of the Project on Loss of Private Land.** A private citizen expressed concern over the condemnation of private land for the purpose of environmental protection. His concern was that the land actually might later be used for commercial purposes. A recreational fisherman expressed concern that the National Park would get additional property and that access to that property by the public would be denied.

- **Impacts on the Osceola Camp.** A representative of the Miccosukee Tribe expressed concern that the project would adversely affect the Osceola Camp. The site of the camp appears to correspond with the location of Alternative 4, the construction of the road to the south.

- **Impacts of Changes in Area Hydrology**. There was concern expressed by a representative of the Miccosukee Tribe about the levels of water in the L-29 Canal, specifically, what will the water level be under the new modeling scenario. There was also a question on the necessity of the need for additional culvert capacity to transmit that water to the south. There was concern expressed by an individual that the filling of canals, which he understood would take place, could adversely impact flood control programs in South Florida. A representative of the Florida Biodiversity Project expressed a desire for a full hydrological analysis of the raising of the roadway. A businessman stated that the existing culverts are obstructed on the southern side, and that removal of the obstructions may enable an adequate flow.

- **Impacts on Recreation.** A recreational fisherman expressed concern about the implementation of the project, as well as other Mod Waters projects, on recreational fishing in the canals of the area. One of his concerns was that canals would be filled in. Points taken included the canals being the only nearby freshwater fishery, the canals serving as a refuge for fishes during droughts, and the economic importance of freshwater fishing in the vicinity.

- **Impacts on Wildlife.** A representative of the Florida Biodiversity Project requested that historical records be compiled on roadkills along I-75 and U.S. 41. A recreational fisherman expressed concerns that the effects of the project would include a loss of fisheries habitat.

- **Impacts on the Homestead Agricultural Community.** An individual expressed concerns that the elevation of water in the Northeast Shark River Slough would raise ground water levels in the South Dade agricultural areas and adversely impact farming operations.

- **Environmental Impact Assessment.** A representative of the Florida Biodiversity Project requested: that USFWS and the NPS be designated as cooperating agencies in the preparation of the EIS; that the analysis of all alternatives include direct, indirect, and cumulative impacts; that there should be full coordination with relevant agencies as required by NEPA and the Endangered Species Act; and that a scoping document regarding the scoping alternatives be released to the public. A representative of the Miccosukee Tribe expressed concern that the Modified Waters project had been divided into three separate EISs, thereby possibly masking the combined impacts of the projects. The individual expressed an opinion that because there have been delays in implementing the Mod Waters projects and restorations of the central Everglades, tribal lands have not been protected. Therefore, the delays have constituted a denial of justice to the Miccosukee Tribe.

A copy of the Scoping Document with a transcript of public comments is appended (Appendix M).

9.3 PUBLIC AGENCY MEETINGS

The Jacksonville District hosted a workshop for agencies, organizations, and individuals interested in the Modified Water Delivery (MWD) Project on July 9, 2000. Attendees and relevant comments included:

- **Coopertown Airboats** stated its understanding of possible benefits gained by an elevated highway but expressed concern over how residents and businesses would access properties currently located along the Tamiami Trail.

- **Everglades National Park** expressed concern over wetland loss caused by Tamiami Trail and then called for practices that would provide for a rapid and efficient exchange of technical information among interested agencies.

- **Florida Department of Environmental Protection** stated concerns related to water quality issues in general, and storm water issues in particular, that might arise during implementation of the project.

- **Florida Department of Transportation.** FDOT asked to review the Draft EIS before it is officially promulgated and stated its desire to participate in all aspects of the EIS and technical design.

- **Miccosukee Tribe** representatives reiterated their desire that the portion of the Tamiami Trail located within the project limits be removed and replaced with an elevated highway. Representatives stated that the Tamiami Trail serves as an ecological barrier and expressed a desire for focused attention on a possible wildlife corridor. Concerns were expressed regarding delays and detour associated with implementation of the project. Representatives also expressed concerns as to how the MWD-recommended flows would be achieved before the required studies are completed.

Subsequent interagency meetings were held on October 2 and 3, and December 4 and 5, 2000. Minutes of the meetings are appended (Appendix M).

9.4 PUBLIC WORKSHOP

A public workshop for the proposed project was conducted on February 6, 2001. The purpose of the workshop was to discuss input to the performance measures used to select the alternatives. A copy of the workshop transcript is included in Appendix M.

9.5 PUBLIC SUPPORT

Numerous letters have been received by the Corps of Engineers expressing full support for the construction of a 10.7-mile causeway. This alternative was developed as one of the original 13 conceptual alternatives for Tamiami Trail and consists of a 10.7-mile causeway that would elevate the existing roadway above the Northeast Shark River Slough flow way. This alternative is not being considered for the Preliminary Recommended plan due to fiscal and other constraints.

The current level of funding available for Tamiami Trail Modification under Modified Water Deliveries is $20.215 million as identified in the DOI Capital Asset Plan. Reference on current funding levels can be made to the June 2001 version of the Capital Asset Plan (OMB Circular A-11 Exhibit 300 (b), Modified Water Deliveries). Implementation of a 10.7-mile causeway is not possible due to the fiscal constraints of the project. This cost of a raised causeway is approximately 7 times greater than the funds available in the Capital Asset Plan.

A 10.7-mile causeway is not being recommended for implementation because of its extreme high cost and the uncertainties inherent in forthcoming CERP efforts. All information and details provided in this GRR, however, should be useful to the future CERP study of this roadway. A full causeway may have significant elements of the eventual ecological restoration to be achieved via the now authorized CERP project. This causeway realizes the upper range of environmental benefits and may or may not be the ultimate solution to be recommended by future CERP detailed studies. Inclusion of the information for the causeway is in response to very strong public interests (i.e. all environmental agencies and interests including DOI) that at this time strongly believe construction of a causeway to be the ultimate solution.

9.6 COMMENTS AND RESPONSES ON DRAFT AND FINAL DOCUMENTS

This document is available to agency personnel and the public for review and comment. Following the release of this document, the public will be invited to provide comments at

a public hearing. All comments will be reviewed and evaluated, and the Final GRR/SEIS will incorporate a response to each comment and, where appropriate, a revision of the text of the document.

9.7 PUBLIC MEETINGS

A public meeting is tentatively scheduled to receive public comments on the contents of this document on December 18, 2001.

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SECTION 10.0
LIST OF STUDY TEAM MEMBERS AND REPORT PREPARERS

Persons who were responsible for contributing to this EIS are listed in Table 35.

Table 35. Tamiami Trail GRR/SEIS List of Preparers

Name	Discipline/ Expertise	Experience	Organization	Role in Document Preparation
Cheryl P. Ulrich, P.E.	Civil Engineer	Senior Project Manager, Programs and Project Management Division	COE, Jacksonville	Document Review
Doris A. Marlin	MS Water Resources Management	16 Years with COE, 6 Years, Environmental PM Experience	COE, Jacksonville	Project Manager
Murika Davis, P.E.	Civil Engineer	BSCE, 5 Years, Engineering Division/Design Branch	COE, Jacksonville	Technical Project Engineer/ Contract Administrator
Shelley Trulock	Water Resources Planner/Plan Formulation	7 Years experience with Corps	COE, Jacksonville	Planning Technical Lead
Gwendolyn J. Nelson, P.E.	Project Engineer or Civil Engineer	13 years experience with Corps	COE, Jacksonville	Project Engineer
Scott Burch, P.E.	Civil Engineer	Master's Degree in civil engineering and 13 years with Corps	COE, Jacksonville	Project Engineer
Jim Riley	Environmental Engineer	7 Years experience with Corps Environmental Quality Section	COE, Jacksonville	Environmental Branch, Planning Division
Jon Moulding	Ecologist	PhD Ecology, 20 Years experience with Corps	COE, Jacksonville	NEPA Coordination
Edward Morente	Civil Engineer/Civil Works Site Design and Roadway	BA Biology, BSCE, P.E., 14 Years Civil Works Site Design and Roadway	COE, Jacksonville	Preparation of Engineering Appendix Task Order

Name	Discipline/ Expertise	Experience	Organization	Role in Document Preparation
Martin T. Gonzalez	Civil Engineer/ Plan Formulation	4 Years Planning/ 6 Years Specifications/12 Years Structures	COE, Jacksonville	Planning Technical Guidance
Theodore W. Cook	Realty Specialist	4 years with Federal Government	COE, Jacksonville	EIS/Report Preparation, Real Estate
James M. Baker	Planner/ Biologist	27 Year, Planning Division, Eco-system Restoration Branch	COE, Jacksonville	Assisted in NEPA Compliance
Michael Loden, Ph.D.	Environmental Scientist	Ph.D. Biology 26 Years Environmental Impacts Assessment	G.E.C., Inc.	EIS/Report Preparation, Supervision, Review,
Tre' Wharton	Biologist	10 Years Environmental Impact Assessment	G.E.C., Inc.	EIS/Report Preparation; Biology
Cade E. Carter, Jr., P.E.	Civil Engineer	10 Years Environmental Impact Assessment	G.E.C., Inc.	EIS/Report Preparation; Engineering
Patrick MacDanel	Environmental Scientist	20 Years Environmental Impact Assessment	G.E.C., Inc.	Quality Control; Internal Technical Review
Jeff Robinson, P.E.	Civil Engineer	6 Years Civil and Environmental Engineering	G.E.C., Inc.	EIS/Report Preparation; Noise and Air Quality
Howard Nass	Biologist	10 Years Environmental Impact Assessment	G.E.C., Inc.	EIS/Report Preparation; Noise
Anthony Nelson	Environmental Scientist	M.S. Degree Environmental Sciences	G.E.C., Inc.	EIS/Report Preparation; Environ-mental Justice
Don Ator	Economist	25 Years Economics and Planning	G.E.C., Inc.	EIS/Report Preparation; Real Estate; Socio-economics

Name	Discipline/ Expertise	Experience	Organization	Role in Document Preparation
James Hoover	Sociologist	M.S/ Sociology 25 Years Social Impact Assessment	G.E.C., Inc.	EIS/Report Preparation; Socio-economics; Recreation
Brady Turk	Environmental Scientist	B.S., 3 Years	G.E.C., Inc.	EIS/Report Preparation; Environ - mental Resources; Air Quality; Water Quality
Eugene Yerkes, AICP, P.E.	Civil Engineer	BSCE 29 Years	PBS&J	Contract Manager; Engineering Appendix; Technical Review GRR/SEIS
Jack Schnettler, P.E.	Transportation Engineer	BSCE, MSCE 30 Years	PBS&J	Consultant Project Manager; Engineering Appendix; Technical Review GRR/SEIS
John Anderson, P.E.	Pavement Engineer	Ph.D., MSCE, BS 15 Years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS
Mark Jansen, P.E.	Pavement Engineer	MSCE, BSC&EE 5 Years	PBS&J	Project Engineer; Engineering Appendix; Technical Review GRR/SEIS
Ralph Bingham, P.E.	Drainage Engineer	BSCE 25 Years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS

Name	Discipline/ Expertise	Experience	Organization	Role in Document Preparation
Pedro Beltran, EI	Cost Estimator	BSCE 8 Years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS
Glenn Myers, P.E.	Bridge Engineer	MSCE, BS 24 Years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS
Nick Novello, P.E.	Roadway Engineer	BSCE 6 Years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS
Bill Precht	Environmental Scientist	MA, MS, BA 20 Years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS
Robert Mantecon	Surveyor	28 years	PBS&J	Discipline Lead; Engineering Appendix; Technical Review GRR/SEIS

SECTION 11.0
GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS, AND CONVERSION TABLES

11.1 GLOSSARY

Ameliorate – to improve.

Appurtenant – auxiliary, accessory

Aquatic Life Criteria – standards used to compare the levels of a certain pollutant in its relationship with aquatic organisms.

Bioaccumulation – the process by which wastes and toxic chemicals gradually accumulate in living tissue.

Bioassay – method by which the strength of a substance is determined by comparing the effects on a test organism with that of a standard preparation.

Bioavailable – a form in which a chemical is can be absorbed into the tissues of an organism.

Biochemical Pathways – chemical processes within a living organism.

Biodilution – the process by which a substance is diluted in living tissue.

Biodiversity – abundance and variety of living organisms within an area.

Biomass – the total number of living organism in a particular area.

Biota – the plant and animal life of a region.

Capillary Action – water being elevated into the pores of soils above the free water table.

Carbonate Production – the ability of a soil type to produce elements such as limestone, etc.

Catalytic Converter – a device containing a catalyst for converting automobile exhaust into mostly harmless products.

Categorical Exclusion - occurs when a project will not have a significant impact on the environment or natural resources.

Type I Categorical Exclusion - occurs when a project does not lead directly to construction, etc.

Programmatic Categorical Exclusion - occurs when a project does not include adding turning lanes, roadways, upgrading guardrails, etc.

Clastic Incursions – a brief invasion of fragments of older rock.

Cold Starts - the ignition of an engine after a reasonable time for that engine to cool.

Coliforms – aerobic bacteria found in the colon.

Contiguous – adjacent.

Critical Habitat – specific habitat that is essential for the conservation of a species.

Endangered Species – a species identified and defined in the Federal Registry in accordance with the Endangered Species Act of 1976.

Environmental Justice - a term used to describe any disproportionately high and adverse affects of federal agency activities and programs on minority and low-income populations within a project area.

Evapotranspiration – the total water loss from the soil.

Exacerbate – to irritate or aggravate.

Fauna – animal life.

Flora – plant life.

Flow Rate - the number of items per unit of time.

Flowage Easements - easements acquired for the right to manipulate water levels in a certain area.

Habitat Fragmentation - the splitting of natural ecosystems into smaller, isolated units.

Home Range – the area covered by the normal annual mobility of a wildlife species.

Hydroperiod – the length of time an area is inundated with water.

Indicator Species - a species that indicates any particular property of a site.

Karst Terrains – a region made up of porous limestone containing deep fissures and sinkholes.

Lithologic Units – areas of rock formations.

Lithology – the scientific study of rocks

Lithostratigraphy – rocky areas beneath the soil surface.

Methylation – to mix with methanol.

Milling – removal of an asphalt layer on a road surface by means of mechanical cutters.

National Ambient Air Quality Standard - standard air pollutant levels set forth by the Environmental Protection Agency (EPA) under the Clean Air Act.

Nonattainment - describes an area where air pollution levels persistently exceed the National Ambient Air Quality Standards (NAAQS).

Oolitic – composed of calcium carbonate.

Overtopping – when flood waters rise above the top of a structure.

PAHs – Polynuclear aromatic hydrocarbons are often by products of petroleum processing or combustion. Some of these water insoluble compounds are highly carcinogenic at relatively low levels.

Porosity – the amount of pore space.

Prime and Unique Farmlands - land that has the best combination of physical and chemical characteristics for producing crops and/or specific high-value food (Farmland Protection Policy Act of 1991).

Passive Water Treatment Mechanism - a method of surface water treatment by collecting run-off in retention ponds or swale ditches.
Physiographic – describes the features and phenomena of nature.

Reid Vapor Pressure - a type of vapor pressure for petroleum fractions and their blends.

Semivolatile Organic Compounds (SVOCs) – a hydrocarbon that partially vaporizes when exposed to air such as DDT and chlordane.

Sequences - layers of deposit beneath the soil surface.

Sensitive Receptors - specific areas within a project area that can be directly affected by project activities such as noise levels and air contaminants.

Spatially Variable – not the same in all areas.

Specific Conductance – a measure of the electrical conductivity of dissolved ions in the water.

Spoil Area – an area where dredged or excavated soil or rock material is deposited.

Threatened Species – a species identified and defined in the Federal Registry in accordance with the Endangered Species Act of 1976.

Transmissivity – a measure of the amount of radiation propagated through a given medium.

Trichloroethylene – a nonflammable liquid used as a solvent and in dry-cleaning and removal of grease from metal.

Vinyl Chloride – a flammable gaseous carcinogenic compound used in making vinyl resins.

Volatile Organic Compounds (VOCs) – any compound of carbon that participates in atmospheric photochemical reactions such as benzene, toluene, and vinyl chloride.

Warm Starts - the ignition of an engine after the engine has been run for a given amount of time.

Watershed – the area drained by a river or river system.

11.2 ACRONYMS AND ABBREVIATIONS

ADT – average daily traffic
AFDM – ash-free dry mass
BOD - biochemical oxygen demand
C&SF - Central and Southern Florida
CAAA - Clean Air Act Amendments
CAR - Coordination Act Report
CERP - Comprehensive Everglades Restoration Plan
CO - carbon monoxide
cpu - color photometric units
CWA - Clean Water Act
DERM - Department of Environmental Resources Management
DO - dissolved oxygen
DOC - dissolved organic carbon
DSL - design service life
EIS - environmental impact statement
EMO - Environmental Management Office
ENP - Everglades National Park
EO - Executive Order
FAC - Florida Administrative Code
FAC - Florida Archaeological Council
FDEP - Florida Department of Environmental Protection
FDHR - Florida Division of Historical Resources
FDOT - Florida Department of Transportation
FFWCC - Florida Fish and Wildlife Conservation Commission
FHWA - Federal Highway Administration
ft - feet
GDM - general design memorandum
g/sqm/d – grams per square meter per day
GRR - general reevaluation report

HTRW - hazardous, toxic, and radiological waste
L-67 ext - extension of Levee 67
LOS - level of service
MPO – Metropolitan Planning Organization
MWD - Modified Water Deliveries
NAAQS - National Ambient Air Quality Standards
NAPLs - non-aqueous phase liquids
NEPA - National Environmental Policy Act
NESRS - Northeast Shark River Slough
mg - milligrams
NH_3 - ammonia nitrogen
NHPA - National Historic Preservation Act
NO_2 NO_3 - nitrate-nitrite
NO_x - oxides of nitrogen
NPL - National Priority List
NPS - National Park Service
NRHP - National Registry of Historic Places
NVGD – National Vertical Geodetic Datum
OMRR&R - Operation, Maintenance, Repair, Replacement, and Rehabilitation
OP - ortho-phosphorus
PAHs - polycyclic aromatic hydrocarbons
PCBs - polychlorinated biphenyls
PD&E Manual - Project Development and Environment Manual
ppm – parts per million
RCRA - Resource Conservation and Recovery Act
ROPA - Register of Professional Archaeologists
RPA - Reasonable and Prudent Alternatives
S-12s - Structure 12s
SCDS - South Dade Conveyance System
SEIS - supplemental environmental impact statement
SFWMD - South Florida Water Management District
SHPO - State Historic Preservation Office
SRS - Shark River Slough
SVOCs - semivolatile organic compounds
SWIM - surface water improvement management
TBT - tributyltin
TCE - trichloroethylene
TDS - total dissolved solids
TKN - total Kjeldahl nitrogen
TMDLs - total maximum daily loads
TP - total phosphorus
TSS - total suspended solids
USACE - U.S. Army Corps of Engineers
USEPA – U.S. Environmental Protection Agency
USFWS - U.S. Fish and Wildlife Service
USGS - U.S. Geological Survey
UST - underground storage tank
VOC - volatile organic carbon

VOCs - volatile organic compounds
vpd - vehicles per day
vph – vehicles per hour
WCA-3A - Water Conservation Area 3A
WCA-3B - Water Conservation Area 3B

11.3 CONVERSION TABLE

To Convert From	To	Multiply By
AREA		
Acres	square feet square meters hectares	43560 4046.9 0.40469
Hectares	acres square feet square meters	2.4710 107639 10000
Square centimeters	square inches	0.1550
Square feet	acres square meters	0.000022956 0.092903
Square kilometers	acres square miles	247.10 0.38610
Square meters	acres square feet	0.00024710 10.764
Square miles	acres square kilometers	640 2.590
Square yards	acres square meters	0.00020661 0.83613
FLOW RATE VOLUME		
cubic feet per minute	kilograms per minute	0.4536
cubic meters per hour	cubic centimeters per second cubic meters per second cubic meters per hour liters per second gallons (US) per second pounds of water per minute (at 68°F)	471.9 0.0004719 1.699 0.4719 0.2247 62.32
cubic meters per second	cubic meters per second cubic meters per minute cubic meters per hour gallons (US) per minute gallons (imp) per hour liters	0.028317 1.699 101.9 448.8 646315 28.32
Gallons (US) per minute	cubic meters per minute cubic meters per second gallons (US) per minute liters per second	0.016667 0.00027778 4.4033 0.27778
liters per minute	cubic meters per hour gallons (US) per minute	3600 15850

To Convert From	To	Multiply By
liters per second	cubic meters per second cubic meters per minute cubic meters per hour cubic feet per second cubic feet per hour liters per second	0.000063090 0.0037854 0.2771 0.002228 8.021 0.06309
Standard cubic feet per minute	cubic meters per second cubic meters per minute cubic meters per hour liters per minute gallons (US) per minute gallons (imp) per minute	0.001 0.06 3.600 60 15.85 13.20
LENGTH		
Feet	inches	0.3937
Inches	feet meters	6 1.8288
Kilometers	centimeters inches meters yards	30.480 12 0.30480 0.3333
Meters	centimeters meters millimeters micrometers	2.540 0.02540 25.40 25.4
Micrometers	feet miles	3280.8 0.62137
Millimeters	feet inches yards	3.2808 39.370 1.0936
Miles	inches	0.039370
Statute miles	millimeters	0.0254
Yards	feet kilometers meters	
MASS/WEIGHT		
Grams	grains grams ounces	27.344 1.7718 0.0625
Kilograms	grams ounces (avoir)	0.0648 0.0022857
metric tons (tonnes)	grains ounces (avoir) pounds (avoir)	15.432 0.035274 0.0022046
Ounces (avoir)	pounds tons (short)	2.2046 0.0011023
Pounds (avoir)	kilograms	1000

To Convert From	To	Multiply By
tons (long)	drams (avoir)	16
	grains	437.5
	grams	28.3495
	kilograms	0.028350
	pounds-avoir	0.06250
	metric tons	0.000028350
tons (short)	drams (avoir)	256
	grains	7000
	grams	453.59
	kilograms	0.45359
	ounces (avoir)	16
	metric tons	0.00045359
	tons (long)	0.00044643
short ton	kilograms	1016.0
	metric tons	1.0160
	pounds-avoir	2240
	tons (short)	1.120
VOLUME		
Barrels (oil)	cubic feet	43.560
	gallons (US)	325851
	cubic meters	1233.5
cubic centimeters	gallons (US)	31.5
cubic feet	cubic meters	0.11924
	gallons of oil	42
	cubic meters	0.15899
cubic inches	cubic inches	0.06102
	cubic feet	0.000035315
	cubic yards	0.000001308
	gallons (US)	0.0002642
	gallons (imp)	0.00022
	liters	0.001
cubic meters	cubic centimeters	28317
	cubic meters	0.028317
	cubic inches	1728
	cubic yards	0.03704
	gallons (US)	7.4805
	gallons (imp)	6.229
	liters	28.32
cubic yards	cubic centimeters	16.387
	cubic feet	0.0005787
	cubic meters	0.000016387
	cubic yards	0.00002143
	gallons (US)	0.004329
	gallons (imp)	0.03605
	liters	0.016387
Gallons (US)	cubic inches	1.8046
	liters	0.02957

To Convert From	To	Multiply By
Liters	cubic centimeters	4546.1
	cubic meters	0.0045461
	cubic feet	0.16054
	cubic yards	0.005946
	gallons (US)	1.20094
	liters	4.5461
	pounds of water at 62°F	10.000

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SECTION 12.0
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Appendix A

EVERGLADES NATIONAL PARK PROTECTION AND EXPANSION ACT OF 1989 (PL 101)

Public Law 101-229

Everglades National Park Protection and Expansion Act of 1989 (Enrolled Bill (Sent to President))

SECTION 1. SHORT TITLE.

This Act may be cited as the `Everglades National Park Protection and Expansion Act of 1989'.

TITLE I--EVERGLADES NATIONAL PARK EXPANSION

SEC. 101. FINDINGS, PURPOSES AND DEFINITION OF TERMS.

(a) FINDINGS- The Congress makes the following findings:

(1) The Everglades National Park is a nationally and internationally significant resource and the park has been adversely affected and continues to be adversely affected by external factors which have altered the ecosystem including the natural hydrologic conditions within the park.

(2) The existing boundary of Everglades National Park excludes the contiguous lands and waters of the Northeast Shark River Slough that are vital to long-term protection of the park and restoration of natural hydrologic conditions within the park.

(3) Wildlife resources and their associated habitats have been adversely impacted by the alteration of natural hydrologic conditions within the park, which has contributed to an overall decline in fishery resources and a 90 percent population loss of wading birds.

(4) Incorporation of the Northeast Shark River Slough and the East Everglades within the park will limit further losses suffered by the park due to habitat destruction outside the present park boundaries and will preserve valuable ecological resources for use and enjoyment by future generations.

(5) The State of Florida and certain of its political subdivisions or agencies have indicated a willingness to transfer approximately 35,000 acres of lands under their jurisdiction to the park in order to protect lands and water within the park, and may so transfer additional lands in the future.

(6) The State of Florida has proposed a joint Federal-State effort to protect Everglades National Park through the acquisition of additional lands.

(b) PURPOSE- The purposes of this Act are to--

(1) increase the level of protection of the outstanding natural values of Everglades National Park and to enhance and restore the ecological values, natural hydrologic conditions, and public enjoyment of such area by adding the area commonly known as the Northeast Shark River Slough and the East Everglades to Everglades National Park; and

(2) assure that the park is managed in order to maintain the natural abundance, diversity, and ecological integrity of native plants and animals, as well as the behavior of native animals, as a part of their ecosystem.

(c) DEFINITIONS- As used in this Act:

(1) The term `Secretary' means the Secretary of the Interior.

(2) The term `addition' means the approximately 107,600 acre area of the East Everglades area authorized to be added to Everglades National Park by this Act.
(3) The term `park' means the area encompassing the existing boundary of Everglades National Park and the addition area described in paragraph (2).
(4) The term `project' means the Central and Southern Florida Project.

SEC. 102. BOUNDARY MODIFICATION.

(a) AREA INCLUDED- The park boundary is hereby modified to include approximately 107,600 acres as generally depicted on the map entitled `Boundary Map, Everglades National Park Addition, Dade County, Florida', numbered 160-20,013B and dated September 1989. The map shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior.
(b) BOUNDARY ADJUSTMENT- The Secretary may from time to time make minor revisions in the boundaries of the park in accordance with section 7(c) of the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601-4 and following). In exercising the boundary adjustment authority the Secretary shall ensure all actions will enhance resource preservation and shall not result in a net loss of acreage from the park.
(c) ACQUISITION- (1) Within the boundaries of the addition described in subsection (a), the Secretary may acquire lands and interests in land by donation, purchase with donated or appropriated funds, or exchange. For purposes of acquiring property by exchange, the Secretary may, notwithstanding any other provision of law, exchange the approximately one acre of Federal land known as `Gilberts' Marina' for non-Federal land of equal value located within the boundaries of the addition. Any lands or interests in land which are owned by the State of Florida or any political subdivision thereof, may be acquired only by donation.
(2) It is the express intent of Congress that acquisition within the boundaries of the addition shall be completed not later than 5 years after the date of enactment of this section. The authority provided by this section shall remain in effect until all acquisition is completed.
(d) ACQUISITION OF TRACTS PARTIALLY OUTSIDE BOUNDARIES- When any tract of land is only partly within boundaries referred to in subsection (a), the Secretary may acquire all or any portion of the land outside of such boundaries in order to minimize the payment of severance costs. Land so acquired outside of the boundaries may be exchanged by the Secretary for non-Federal lands within the boundaries, and any land so acquired and not utilized for exchange shall be reported to the General Services Administration for disposal under the Federal Property and Administrative Services Act of 1949 (63 Stat. 377).
(e) OFFERS TO SELL- In exercising the authority to acquire property under this Act, the Secretary shall give prompt and careful consideration to any offer made by any person owning property within the boundaries of the addition to sell such property, if such owner notifies the Secretary that the continued ownership of such property is causing, or would result in undue hardship.
(f) AUTHORIZATION OF APPROPRIATIONS- (1) Subject to the provisions of paragraph (2), there are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

(2) With respect to land acquisition within the addition, not more than 80 percent of the cost of such acquisition may be provided by the Federal Government. Not less than 20 percent of such cost shall be provided by the State of Florida.

(g) ASSISTANCE- Upon the request of the Governor of the State of Florida, the Secretary is authorized to provide technical assistance and personnel to assist in the acquisition of lands and waters within the Kissimmee River/Lake Okeechobee/Everglades Hydrologic Basin, including the Big Cypress Swamp, through the provision of Federal land acquisition personnel, practices, and procedures. The State of Florida shall reimburse the Secretary for such assistance in such amounts and at such time as agreed upon by the Secretary and the State. Notwithstanding any other provision of law, reimbursement received by the Secretary for such assistance shall be retained by the Secretary and shall be available without further appropriation for purposes of carrying out any authorized activity of the Secretary within the boundaries of the park.

SEC. 103. ADMINISTRATION.

(a) IN GENERAL- The Secretary shall administer the areas within the addition in accordance with this Act and other provisions of law applicable to the Everglades National Park, and with the provisions of law generally applicable to units of the national park system, including the Act entitled `An Act to establish a National Park Service, and for other purposes', approved August 25, 1916 (39 Stat. 535; 16 U.S.C. 1-4). In order to further preserve and protect Everglades National Park, the Secretary shall utilize such other statutory authority as may be available to him for the preservation of wildlife and natural resources as he deems necessary to carry out the purposes of this Act.

(b) PROTECTION OF ECOSYSTEM- The Secretary shall manage the park in order to maintain the natural abundance, diversity, and ecological integrity of native plants and animals, as well as the behavior of native animals, as a part of their ecosystem.

(c) PROTECTION OF FLORA AND FAUNA- The park shall be closed to the operation of airboats--

(1) except as provided in subsection (d); and

(2) except that within a limited capacity and on designated routes within the addition, owners of record of registered airboats in use within the addition as of January 1, 1989, shall be issued nontransferable, nonrenewable permits, for their individual lifetimes, to operate personnally-owned airboats for noncommercial use in accordance with rules prescribed by the Secretary to determine ownership and registration, establish uses, permit conditions, and penalties, and to protect the biological resources of the area.

(d) CONCESSION CONTRACTS- The Secretary is authorized to negotiate and enter into concession contracts with the owners of commercial airboat and tour facilities in existence on or before January 1, 1989, located within the addition for the provision of such services at their current locations under such rules and conditions as he may deem necessary for the accommodation of visitors and protection of biological resources of the area.

(e) VISITOR CENTER- The Secretary is authorized and directed to expedite the construction of the visitor center facility at Everglades City, Florida, as described in the Development Concept Plan, Gulf Coast, dated February 1989, and upon

construction shall designate the visitor center facility as `The Marjory Stoneman Douglas Center' in commemoration of the vision and leadership shown by Mrs. Douglas in the protection of the Everglades and Everglades National Park.

SEC. 104. MODIFICATION OF CERTAIN WATER PROJECTS.

(a) IMPROVED WATER DELIVERIES- (1) Upon completion of a final report by the Chief of the Army Corps of Engineers, the Secretary of the Army, in consultation with the Secretary, is authorized and directed to construct modifications to the Central and Southern Florida Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park.

(2) Such modifications shall be based upon the findings of the Secretary's experimental program authorized in section 1302 of the 1984 Supplemental Appropriations Act (97 Stat. 1292) and generally as set forth in a General Design Memorandum to be prepared by the Jacksonville District entitled `Modified Water Deliveries to Everglades National Park'. The Draft of such Memorandum and the Final Memorandum, as prepared by the Jacksonville District, shall be submitted as promptly as practicable to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works of the United States Senate and the Committee on Interior and Insular Affairs and the Committee on Public Works and Transportation of the United States House of Representatives.

(3) Construction of project modifications authorized in this subsection and flood protection systems authorized in subsections (c) and (d) are justified by the environmental benefits to be derived by the Everglades ecosystem in general and by the park in particular and shall not require further economic justification.

(4) Nothing in this section shall be construed to limit the operation of project facilities to achieve their design objectives, as set forth in the Congressional authorization and any modifications thereof.

(b) DETERMINATION OF ADVERSE EFFECT- (1) Upon completion of the Final Memorandum referred to in subsection (a), the Secretary of the Army, in consultation with the South Florida Water Management District, shall make a determination as to whether the residential area within the East Everglades known as the `Eight and One-Half Square Mile Area' or adjacent agricultural areas, all as generally depicted on the map referred to in subsection 102(a), will be adversely affected by project modifications authorized in subsection (a).

(2) In determining whether adjacent agricultural areas will be adversely affected, the Secretary of the Army shall consider the impact of any flood protection system proposed to be implemented pursuant to subsection (c) on such agricultural areas.

(c) FLOOD PROTECTION; EIGHT AND ONE-HALF SQUARE MILE AREA- If the Secretary of the Army makes a determination pursuant to subsection (b) that the `Eight and One-Half Square Mile Area' will be adversely affected, the Secretary of the Army is authorized and directed to construct a flood protection system for that portion of presently developed land within such area.

(d) FLOOD PROTECTION; ADJACENT AGRICULTURAL AREA- (1) If the Secretary of the Army determines pursuant to subsection (b) that an adjacent agricultural area will be adversely affected, the Secretary of the Army is authorized

and directed to construct a flood protection system for such area. Such determination shall be based on a finding by the Secretary of the Army that:

(A) the adverse effect will be attributable solely to a project modification authorized in subsection (a) or to a flood protection system implemented pursuant to subsection (c), or both; and

(B) such modification or flood protection system will result in a substantial reduction in the economic utility of such area based on its present agricultural use.

(2) No project modification authorized in subsection (a) which the Secretary of the Army determines will cause an adverse effect pursuant to subsection (b) shall be made operational until the Secretary of the Army has implemented measures to prevent such adverse effect on the adjacent agricultural area: *Provided,* That the Secretary of the Army or the South Florida Water Management District may operate the modification to the extent that the Secretary of the Army determines that such operation will not adversely affect the adjacent agricultural area: *Provided further,* That any preventive measure shall be implemented in a manner that presents the least prospect of harm to the natural resources of the park.

(3) Any flood protection system implemented by the Secretary of the Army pursuant to this subsection shall be required only to provide for flood protection for present agricultural uses within such adjacent agricultural area.

(4) The acquisition of land authorized in section 102 shall not be considered a project modification.

(e) PERIODIC REVIEW- (1) Not later than 18 months after the completion of the project modifications authorized in subsection (a), and periodically thereafter, the Secretary of the Army shall review the determination of adverse effect for adjacent agricultural areas.

(2) In conducting such review, the Secretary of the Army shall consult with all affected parties, including, but not limited to, the Secretary, the South Florida Water Management District and agricultural users within adjacent agricultural areas.

(3) If, on the basis of such review, the Secretary of the Army determines that an adjacent agricultural area has been, or will be adversely affected, the Secretary of the Army is authorized and directed, in accordance with the provisions of subsection (d), to construct a flood protection system for such area: *Provided,* That the provisions of subsection (d)(2) shall be applicable only to the extent that the Secretary, in consultation with the Secretary of the Army, determines that the park will not be adversely affected.

(4) The provisions of this subsection shall only be applicable if the Secretary of the Army has previously made a determination that such adjacent agricultural area will not be adversely affected.

(f) CURRENT CANAL OPERATING LEVELS- Nothing in this section shall be construed to require or prohibit the Secretary of the Army or the South Florida Water Management District from maintaining the water level within any project canal below the maximum authorized operating level as of the date of enactment of this Act.

(g) NO LIMITATION ON OTHER CLAIMS- If the Secretary of the Army makes a determination of no adverse effect pursuant to subsection (b), such determination

shall not be considered as a limitation or prohibition against any available legal remedy which may otherwise be available.

(h) COORDINATION- The Secretary and the Secretary of the Army shall coordinate the construction program authorized under this section and the land acquisition program authorized in section 102 in such a manner as will permit both to proceed concurrently and as will avoid unreasonable interference with property interests prior to the acquisition of such interests by the Secretary under section 102.

(i) WEST DADE WELLFIELD- No Federal license, permit, approval, right-of-way or assistance shall be granted or issued with respect to the West Dade Wellfield (to be located in the Bird Drive Drainage Basin, as identified in the Comprehensive Development Master Plan for Dade County, Florida) until the Secretary, the Governor of the State of Florida, the South Florida Water Management District and Dade County, Florida enter into an agreement providing that the South Florida Water Management District's water use permit for the wellfield, if granted, must include the following limiting conditions: (1) the wellfield's peak pumpage rate shall not exceed 140,000,000 gallons per day; (2) the permit shall include reasonable, enforceable measures to limit demand on the wellfield in times of water shortage; and (3) if, during times of water shortage, the District fails to limit demand on the wellfield pursuant to (2), or if the District limits demand on the wellfield pursuant to (2), but the Secretary certifies that operation of the wellfield is still causing significant adverse impacts on the resources of the Park, the Governor shall require the South Florida Water Management District to take necessary actions to alleviate the adverse impact, including, but not limited to, temporary reductions in the pumpage from the wellfield.

(j) PROTECTION OF NATURAL VALUES- The Secretary of the Army is directed in analysis, design and engineering associated with the development of a general design memorandum for works and operations in the `C-111 basin' area of the East Everglades, to take all measures which are feasible and consistent with the purposes of the project to protect natural values associated with Everglades National Park. Upon completion of a general design memorandum for the area, the Secretary shall prepare and transmit a report to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works of the United States Senate and the Committee on Interior and Insular Affairs and the Committee on Public Works and Transportation of the United States House of Representatives on the status of the natural resources of the C-111 basin and functionally related lands.

Appendix B

COMPLIANCE OF EACH ALTERNATIVE WITH ALL RELEVANT FEDERAL LAWS, REGULATION, AND EXECUTIVE ORDERS

CENTRAL AND SOUTHERN FLORIDA STUDY

DRAFT GENERAL REEVALUATION REPORT/ SUPPLEMENTAL to the 1992 final ENVIRONMENTAL IMPACT STATEMENT (GRR/SEIS) ON MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, FLORIDA

Compliance of Each Alternative with All Relevant Federal Laws, Regulations, and Executive Orders

STATUTE / ORDER / POLICY	COMPLIANCE
National Environmental Policy Act of 1969	Full
Endangered Species Act of 1973	Full
Fish and Wildlife Coordination Act of 1968	Full
National Historic Preservation Act of 1966	Full
Clean Air Act of 1972	Full
Clean Water Act of 1972	Full
Coastal Zone Management Act of 1972	Full
Farmland Protection Policy Act of 1981	Full
Wild and Scenic River Act of 1981	Full
Federal Water Project Recreation Act	Full
Fishery Conservation and Management Act of 1976	Full
Rivers and Harbors Act of 1899	Full
Migratory Bird Treaty Act and Migratory Bird Conservation Act	Full
Magnuson-Stevens Fishery Conservation and Management Act	Full
E.O. 11980, Protection of Wetlands	Full
E.O. 11988, Flood Plain Management	Full
E.O. 12898,. Environmental Justice	Full
E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks	Full
E.O. 13077, Further Amendment to E.O. 13010, Critical Infrastructure Protection	Full

Appendix C

ENGINEERING APPENDIX

To request a copy of this information please contact:

Gwen Nelson
U.S. Army Corps of Engineers, EN-T
P.O. Box 4970
Jacksonville, Florida 32232
Telephone: 904/899-5052
Email: gwendolyn.j.nelson@usace.army.mil

Appendix D

PRELIMINARY ALTERNATIVES DEVELOPMENT TABLE

TABLE 1

ALTERNATIVE	PRO	CON
Do nothing.	1.No additional construction 2.No impacts to ENP	1.Unacceptable safety concern, Tamiami Trail (Monroe County hurricane evacuation route) would be impacted by increased flows to NESRS under Modified Water Deliveries to ENP. 2.High O&M costs for FDOT.
New Tamiami Trail alignment north of existing road.	1.Will place roadway north of area affected by backwater and north of L-29 borrow canal, while raising sub-grade of roadway to a higher elevation. This will prevent critical inundation of roadbed. 2.Traffic on current roadway will continue uninterrupted while new roadway is constructed on existing L-29 levee.	1.Inconsistent with Restudy alternatives which includes removing L-29 levee. 2.Impacts to Tigertail Camp. 3.L-29 levee was not designed for use as a roadway.
New Tamiami Trail alignment south of existing road.	1.Will raise sub-grade of roadway to a higher elevation, preventing critical inundation of roadbed. 2.Could provide a secondary storage area north of Tamiami Trail to allow a more controlled release to NESRS. 3.Traffic on current roadway will continue while new roadway is constructed to the south.	1.Potential disturbance of ENP land during construction. 2.Would encroach upon ENP land due to FDOT's limited right-of-way. 3.Impacts to wood stork nesting. 4.Loss of wetland habitat. 5.Impact to businesses south of road.
Raising low portions of Tamiami Trail.	1.Will raise sub-grade at low portions of the roadway to a higher elevation, preventing critical inundation of roadbed at these portions. 2.Will be relatively low cost due to raising of roadbed only in critical zones.	1.Creates complications due to rerouting of traffic around construction zones. 2.Potential for sub-grade inundation from backwater effects will remain at portions of the roadway due to downstream vegetation and roadway elevation not being increased at these portions.
Incorporation of bridge spans on current Tamiami Trail alignment.	1.Will place portions of the roadway above areas affected by backwater eliminating damages caused by backwater. 2.Bridge spans south of S-355A and S-355B will allow more direct discharges to NESRS. 3.Provides for greatest operational flexibility of discharges to NESRS.	1.Relatively high cost. 2.Creates complications due to rerouting of traffic around construction zones. 3.Potential for sub-grade inundation from backwater effects will remain at portions of the roadway due to downstream vegetation and bridge spans not being placed at these portions.
Placement of underground distribution pipe south of Tamiami Trail.	1.Extends discharge of water to NESRS over a larger area (east and west), reducing backwater effects. 2.Eliminates need to modify roadway.	1.Discharge will not be distributed evenly to NESRS (discharge will seek path of least resistance). 2.Potential disturbance of ENP land during construction. 3.Will encroach upon ENP land due to FDOT's limited right-of-way. 4.Potential for sub-grade inundation from backwater effects will remain due to downstream vegetation and roadway elevation not being increased. 5.Impacts to wood stork nesting. 6.Loss of wetland habitat. 7.Impact to businesses south of road.

TABLE 1 (cont'd)

ALTERNATIVE	PRO	CON
Placement of additional culverts in Tamiami Trail.	1.Relatively low cost.	1.Creates complications due to rerouting of traffic around construction zones. 2.Potential for sub-grade inundation from backwater effects will remain due to downstream vegetation and roadway elevation not being increased.
Raising entire 11-mile length of Tamiami Trail.	1.Will raise entire length of roadway sub-grade to a higher elevation, preventing critical inundation of roadbed over entire roadway length. 2.Provides for additional operational flexibility of discharges to NESRS.	1.Creates complications due to rerouting of traffic around construction zones. 2.High cost.
Clearing of exotic vegetation south of Tamiami Trail.	1.Low cost. 2.No work will be done on Tamiami Trail roadway, eliminating need for rerouting of traffic.	1.Vegetation remaining could continue to hinder flows to NESRS. 2.ENP preference to not allow removal of vegetation or disturbance of Park land. 3.Temporary impact to ENP ecosystem due to mobilization of machinery used for vegetation removal. 4.Possible waterborne transport of exotics' seed source due to clearing activities.
Move westbound lane of Tamiami Trail to L-29 levee.	1.Will provide sufficient right-of-way for eastbound lane minimizing need for realignment of roadway. 2.Depending upon construction sequence could provide minimal detouring of traffic. 3.Could provide passing lanes for both lanes of traffic. 4.No impacts to ENP.	1.High cost. 2.Impact to businesses south of road. 3.L-29 levee was not designed for use as a roadway. 4.Inconsistent with Restudy alternatives which includes removing L-29 levee. 5.Complications placing roadway on S-355 structures. 6.Impact to Tiger Tail camp.
Combination of; bridge spans, and raising portions of Tamiami Trail	1.Will raise sub-grade at low portions of the roadway to a higher elevation, preventing critical inundation of roadbed at these portions. 2.Will place portions of the roadway above areas affected by backwater eliminating damages caused by backwater. 3.Bridge spans south of S-355A and S-355B will allow more direct discharges to NESRS.	1.Creates complications due to rerouting of traffic around construction zones.

TABLE 1 (cont'd)

Combination of; bridge spans and clearing of exotic vegetation south of Tamiami Trail.	1.Will place portions of the roadway above areas affected by backwater eliminating damages caused by backwater. 2.Bridge spans south of S-355A and S-355B will allow more direct discharges to NESRS. 3.Provides for greatest operational flexibility of discharges to NESRS. 4.Vegetation clearing and correct site selection for bridges will avoid limited right-of-way issue and avoid raising roadway.	1.Creates complications due to rerouting of traffic around construction zones. 2.Vegetation remaining could continue to hinder flows to NESRS. 3.ENP preference to not allow removal of vegetation or disturbance of Park land. 4.Temporary impact to ENP ecosystem due to mobilization of machinery used for vegetation removal. 5.Possible waterborne transport of exotics' seed source due to clearing activities.
Combination of; bridge spans, raising portions of Tamiami Trail, placement of additional culverts, and clearing of exotic vegetation.	1.Will raise sub-grade at low portions of the roadway to a higher elevation, preventing critical inundation of roadbed at these portions. 2.Will place portions of the roadway above areas affected by backwater eliminating damages caused by backwater. 3.Bridge spans south of S-355A and S-355B will allow more direct discharges to NESRS. 4.Provides for greatest operational flexibility of discharges to NESRS.	1.Relatively high cost. 2.Creates complications due to rerouting of traffic around construction zones.

Appendix E

FLORIDA DEPARTMENT OF TRANSPORTATION CULVERT ANALYSIS SUMMARY REPORT

Chris Smith
EN-HH

Florida Department of Transportation

JEB BUSH
GOVERNOR

THOMAS F. BARRY, JR.
SECRETARY

District Six Environmental Management Office
1000 N.W. 111 Avenue, Room 6101
Miami, Florida 33172

August 13, 1999

Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: **Condition of Culverts under U.S. 41 / S.R. 90 / Tamiami Trail**

Dear Mr. Bonner:

Enclosed please find a report on the condition of the culverts under U.S. 41 / S.R. 90 / Tamiami Trail from Station 708 + 10.28 (M.P. 13.871, west of Krome Avenue) to Station 1299 + 46.28 in Miami-Dade County. As a follow-up to our February 15, 1999 correspondence to you, this field assessment and report were prepared by our consultant in response to your earlier request to assess the condition and need for maintenance of the existing culverts under Tamiami Trail in Miami-Dade County. The results of this assessment were previously relayed in my telephone discussion with Ms. Cheryl Ulrich, P.E., of your office on June 3, 1999. The enclosed report is forwarded for your files and provides additional details regarding the present condition of all culverts in this area.

In summary, there are 55 steel-reinforced concrete pipe culverts between the above referenced stations. These culverts are placed in groups (typically three) within a single head wall structure on either side of the roadway (please see report for photograph of typical culvert structure). A visual inspection of each culvert on both sides of the roadway revealed that all of the culverts were between 50% and 100% full of water . No culverts were observed with obstructions from substantial sediment, debris, or vegetation build-up inside of, or immediately adjacent to, the pipe openings. A southern flow of water was observed at each location with rates varying from slow to rapid. Based on the consultant's observations, it appears that at present, the primary determining factor for flow rate through the culverts is the water level. Rapid flow rates coincide with dredged waterways south of the culverts and restricted flow rates are associated with shallow water wetlands outside of the Department's right-of-way. There is some minor

maintenance needed on the southern side of the roadway at culverts #1, 2 and #3 (head wall structure #S-2), where it is recommended that a dense mat of water hyacinth be removed to improve flow. There is also an abandoned 55-gallon drum located on the south side of the roadway at culvert #55 (head wall structure #S-23). While this drum is not impeding flow, it should be removed and properly disposed of. Both the vegetation and the drum are outside the Department's right-of-way. They appear to be within Everglades National Park property, although this was not confirmed.

Based on the above findings, no maintenance of the culverts is needed at this time.
As mentioned previously, the Department is proceeding with plans to install two stadia adjacent to the canal, which will allow our maintenance personnel to regularly monitor water levels next to Tamiami Trail in this area.

We hope this information is helpful. If there are any questions regarding this report please call me at (305) 470-5220.

Sincerely,

Barbara B. Culhane, A.I.C.P.
District Environmental Administrator

cc: Richard Ring, ENP
Gary Evink, FDOT Central Office
Ron Steiner, FDOT Maintenance
Mike Ciscar, FDOT Environmental Mgmt
Marjorie Bixby, FDOT Environmental Mgmt.

TAMIAMI TRAIL CULVERT SURVEY REPORT
S.R. 90/U.S. 41/TAMIAMI TRAIL

FROM STATION 708+10.28 (M.P. 13.871, WEST OF KROME AVENUE)

TO STATION 1299+46.28

IN MIAMI-DADE COUNTY

FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT SIX

MAY, 1999

INTRODUCTION

The objective of this report is to provide a summary of our recent inspections of cross culverts under S.R. 90/U.S. 41/Tamiami Trail. There are a total of fifty-five (55) pipe culverts under Tamiami Trail with 37 headwall structures (north and south of the roadway) at nineteen (19) locations. They are located in an eleven (11) mile section of Tamiami Trail west of S.R. 997/S.W. 177 Ave/Krome Avenue. The typical structure is a group of three steel-reinforced concrete pipes in a north-south orientation (under the road) between two concrete headwalls that are orientated parallel to the road. Sample plan details of the culverts and structures are included with this report (see Attachment 1).

METHODOLOGY

The field inspections were conducted on February 23 and 24, 1999, by two biologists from Consulting Engineering & Science, Inc. Two goals of the inspections were characterizing any obstructions to the effective operation of the culverts and marking the culvert locations for any warranted FDOT maintenance crew activities. Potential obstructions due to wetland vegetation or sedimentary buildup in front of the pipes on either side of the roadway were investigated. We also noted the shape and approximate diameter of the pipes, as well as their general hydrologic operating conditions. Each location was marked by painting the structure number on the headwall and on the asphalt beneath the guardrail on both the north and south road shoulders. In addition, a numbered wooden stake flagged with pink survey tape was placed in front of the headwalls. Representative photographs and a table summarizing our findings are enclosed (see Attachments 2 and 3, respectively).

RESULTS

The overall condition of the culverts is good and no structural problems were observed. No culverts were observed with obstructions from substantial sediment, debris, or vegetation build-up inside of, or immediately adjacent to, the pipe openings. A southern flow of water was observed at each location, with rates varying from slow (noticeable by drifting periphyton) to rapid (with visibly turbulent water). Water was observed discharging mainly into shallow expanses of water surrounded by densely vegetated wetlands adjacent to the southern roadway shoulder (within Everglades National Park). However, several culverts discharged into dredged channels or sloughs (utilized as airboat docks and navigation channels at tourist establishments) which were relatively clear of vegetation and exhibited rapid flow rates.

The slow flow rates were observed at culvert locations that initially discharged to deep (3 to 4 foot depths) dredged water areas in front of southern headwalls. These dredged areas appeared to extend between 15 and 30 feet south of the discharge structures (based upon visual observations at several locations where vegetation did not obscure the view). However, the area then generally transitions at a steep slope to shallow-water (approximately 1 foot), densely vegetated wetlands to the south of Tamiami Trail.

Yellow cow lilies (Nuphar sp.) are the predominant emergent vegetative cover in front of the culverts. They occur in sparse (5 to 30 percent of surface water area) to moderate (30 to 70 percent) coverages. Other native, non-invasive aquatic vegetation present in front of the culverts included: bladderworts (Utricularia sp.), tape-grass (Vallisneria americana), and Illinois pondweed (Potamogeton illinoensis). Invasive exotic species present in front of the culverts included: water hyacinth (Eichhornia crassipes), fanworts (Cabomba sp.), and Hydrilla (Hydrilla verticillata). Only Culverts No. 1, 2, & 3 on the southside of the roadway (Structure No. S-2) had openings obstructed by a dense mat of vegetation (water hyacinth). However, based on construction plans, the FDOT right-of-way ends at the headwall at this location.

DISCUSSION

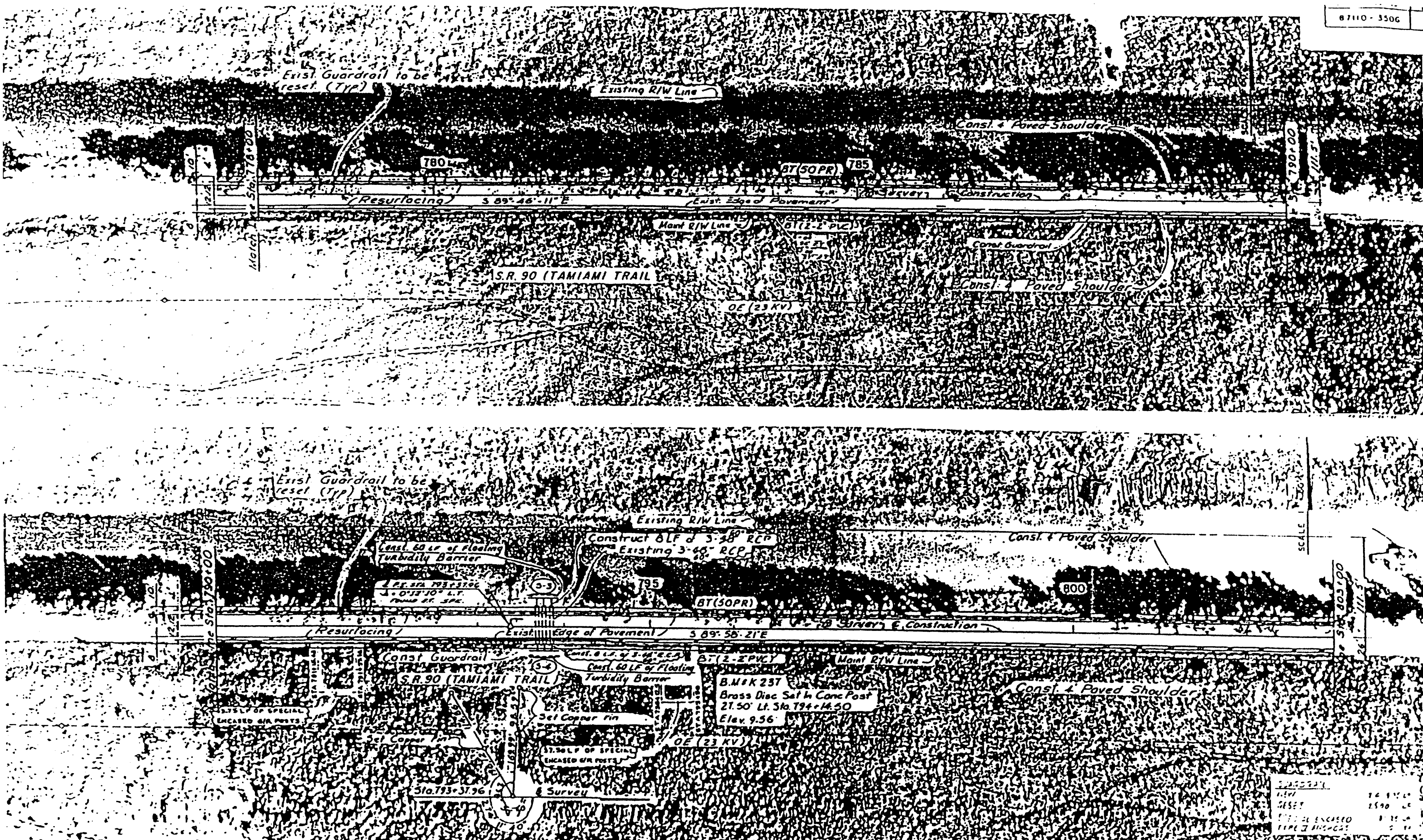
Based on our observations, it appears that the determining factor for flow rate through the culverts is hydrologic and not due to vegetation, debris, or sediment build-up. Rapid flow rates coincide with dredged waterways south of the culverts and restricted flow rates are associated with shallow water wetlands outside of FDOT right-of-way.

The mat of water hyacinth in front of Culverts 1, 2, & 3 (Structure No. S-2), located at the southern toe-of-slope near the western limits of the survey (M.P. 13.871) should be removed in order to improve flow at these culverts. This vegetation is outside of the FDOT right-of-way. It appears to be within Everglades National Park right-of-way, however this has not been confirmed. In addition, Culvert No. 35 (Structure No. S-23) has a 55-gallon drum which should be removed from the water in front of the pipe opening. This drum is outside of the FDOT right-of-way. Culvert No. 40 (Structure No. S-26) had cattails sucked into the pipe at this location but they did not appear to restrict water flow.

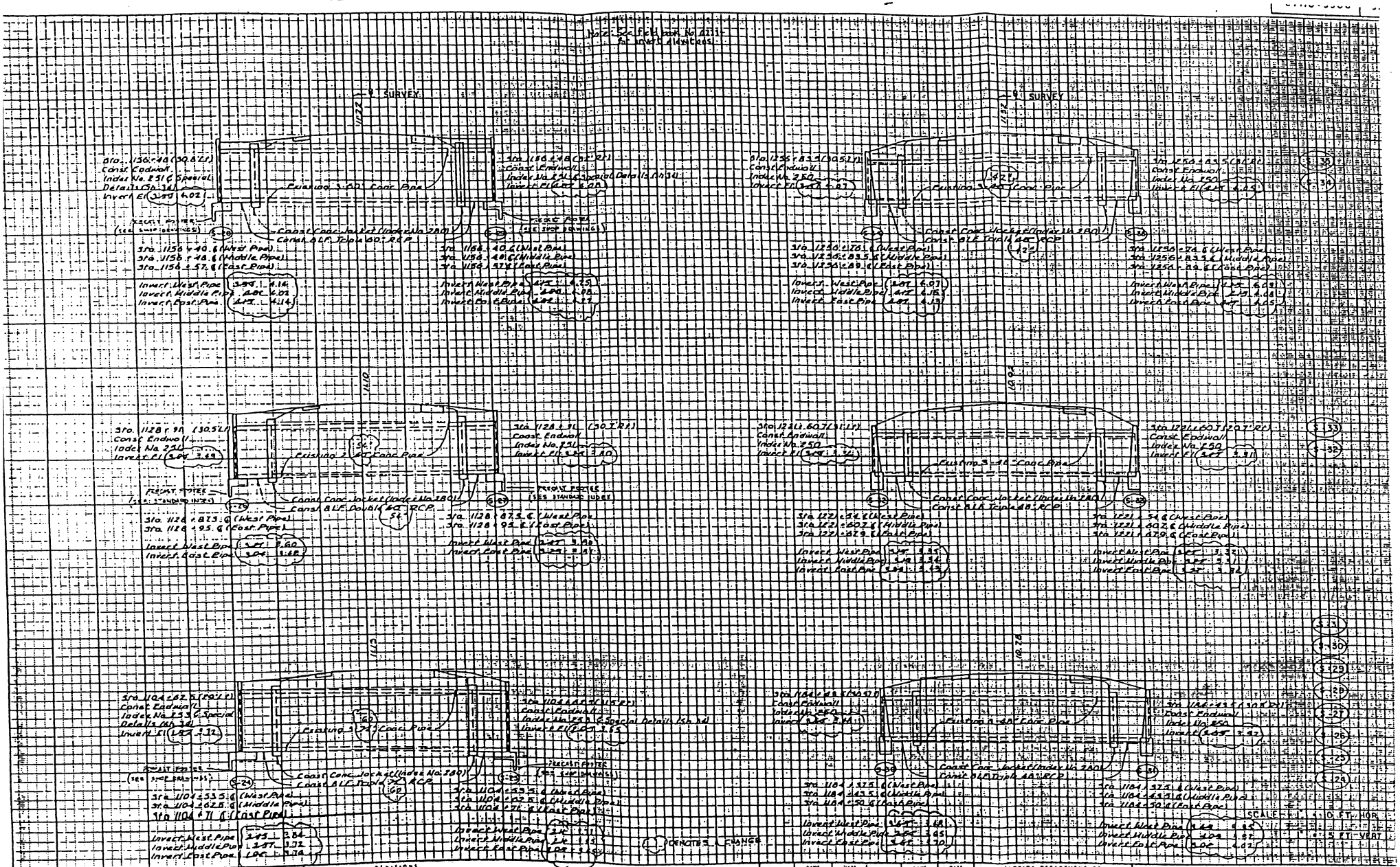
ATTACHMENT 1

SAMPLE CONSTRUCTION PLAN SHEETS

87110-3506 | 9



REVISIONS											
DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		
REVIEWED BY	C.B.		DRAWN BY			FLORIDA DEPARTMENT OF TRANSPORTATION					



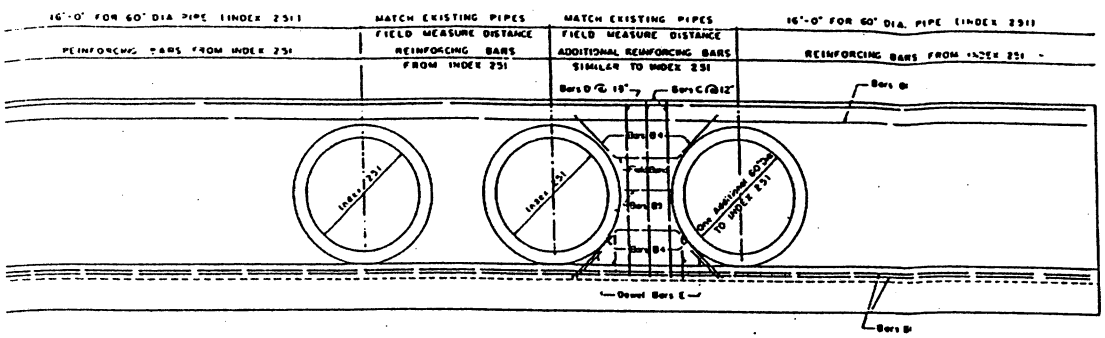
REVISIONS							
BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	P.V.	4/88	DRAWN BY	M.V.	4/88
CHECKED BY	M.V.	4/88	CHECKED BY	C.B.	4/88

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY

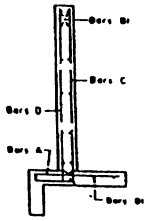
DRAINAGE STRUCTURES



ELEVATION OF TRIPLE 60" DIAMETER CONCRETE PIPE

N.T.S.

Reinforcing Steel Required in Addition to Index 251 (For Double Pipes).
See Index 251 For Dimensions and Reinforcing Details
For Drainage Structures S-16 and S-17 Consisting of 4-60" Dia Pipe, Repeat the Additional Reinforcing Bars Mark Shown Above For Bill of Additional Material is Tabulated Below



TYPICAL SECTION THRU ENDWALL

N.T.S.

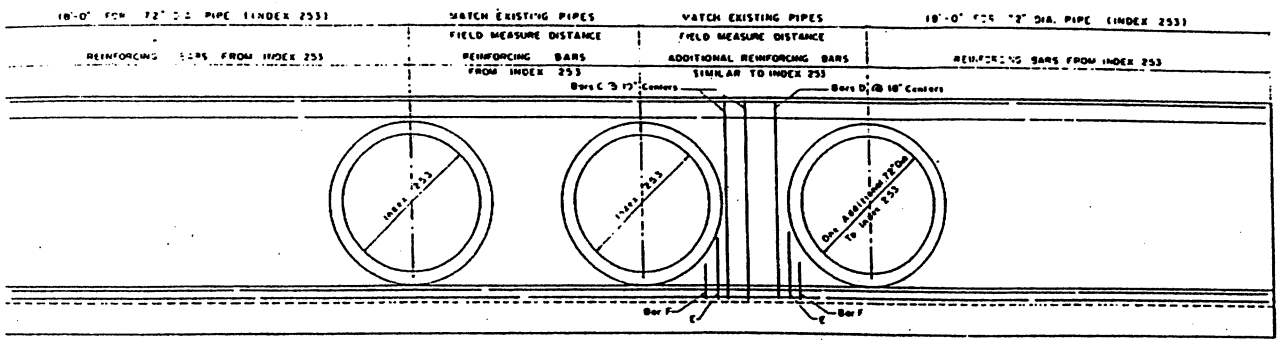
See Index 251 For All Dimensions and Reinforcing.

BILL OF ADDITIONAL REINFORCING STEEL 3-60" PIPE					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	4	9	4'-2"	Footing	Straight
B1	4	9	*48-8	Footing & Wall	Straight
B4	4	4	6'-0"	Wall	Field Bend
B3	4	2	*2'-2"	Wall	Straight
C	4	3	9'-9"	Footing & Wall	Bend
D	4	3	7'-10"	Footing & Wall	Straight
E	4	8	1'-8"	Footing & Wall	Straight

* FIELD MEASURE (APPROXIMATE LENGTH SHOWN)

ESTIMATED ADDITIONAL QUANTITIES 3-60" PIPE			
ITEM	UNIT	RCP	—
Concrete Class II	Cu. Yd.	2.32	—
Reinforcing Steel	Lb.	142	—

NOTE-ADD THESE QUANTITIES TO THOSE SHOWN IN INDEX 251

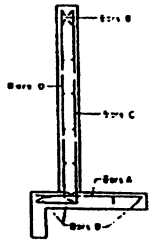


ELEVATION OF TRIPLE 72" DIAMETER CONCRETE PIPE * (VOID)

N.T.S.

Reinforcing Steel Required in Addition to Index 253. (For Double Pipes).
See Index 253 For Dimensions and Reinforcing Details.

* The endwall for a 72" Diameter Concrete Pipe was not needed because there are no 72" Pipes with in the Project Limits.



TYPICAL SECTION THRU ENDWALL

N.T.S

* (VOID)

BILL OF ADDITIONAL REINFORCING STEEL 3-72" PIPE					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	5	20	4'-11"	Footing	Straight
B	4	9	*55-8	Footing & Wall	Straight
C	5	9	10'-3"	Wall	Bend
D	4	7	8'-7"	Wall	Straight
E	4	4	2'-6"	Wall	Straight
F	4	4	1'-6"	Wall	Straight

* FIELD MEASURE (APPROXIMATE LENGTH SHOWN)

* (VOID)

ESTIMATED ADDITIONAL QUANTITIES 3-72" PIPE			
ITEM	UNIT	RCP	—
Concrete Class II	Cu. Yd.	3.02	—
Reinforcing Steel	Lb.	360	—

NOTE-ADD THESE QUANTITIES TO THOSE SHOWN IN INDEX 253

BILL OF ADDITIONAL REINFORCING STEEL 4-60" PIPE					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	4	16	4'-2"	Footing	Straight
B1	4	18	*57-6"	Footing & Wall	Straight
B4	6	4	12'-6"	Wall	Field Bend
B3	4	4	*2'-2"	Wall	Straight
C	4	6	9'-9"	Footing & Wall	Bend
D	4	6	7'-10"	Footing & Wall	Straight
E	4	16	1'-8"	Footing & Wall	Straight

* FIELD MEASURE (APPROXIMATE LENGTH SHOWN)

ESTIMATED ADDITIONAL QUANTITIES 4-60" PIPE			
ITEM	UNIT	RCP	—
Concrete Class II	Cu. Yd.	4.64	—
Reinforcing Steel	Lb.	250	—

NOTE-ADD THESE QUANTITIES TO THOSE SHOWN IN SHOWN IN INDEX 251

NOTES

1- FOR TRIPLE 48" DIA. PIPES SEE INDEX 250 (MULTIPLE PIPES).

2- THIS SHEET IS TO BE USED IN CONJUNCTION WITH INDEX 251 AND 253

3- FOR DRAINAGE STRUCTURES S-16 AND S-17 CONSISTING OF 4-60" DIA. PIPES REPEAT THE ADDITIONAL REINFORCING BARS, TWICE, AS SHOWN ABOVE IN TRIPLE PIPE ELEVATION.

4- COST ASSOCIATED WITH THE CONSTRUCTION OF THE ENDWALLS (INCLUDING COFFERDAMS, DEWATERING) SHALL BE INCLUDED IN THE COST OF CLASS II CONCRETE.

ATTACHMENT 2

PHOTOGRAPHS

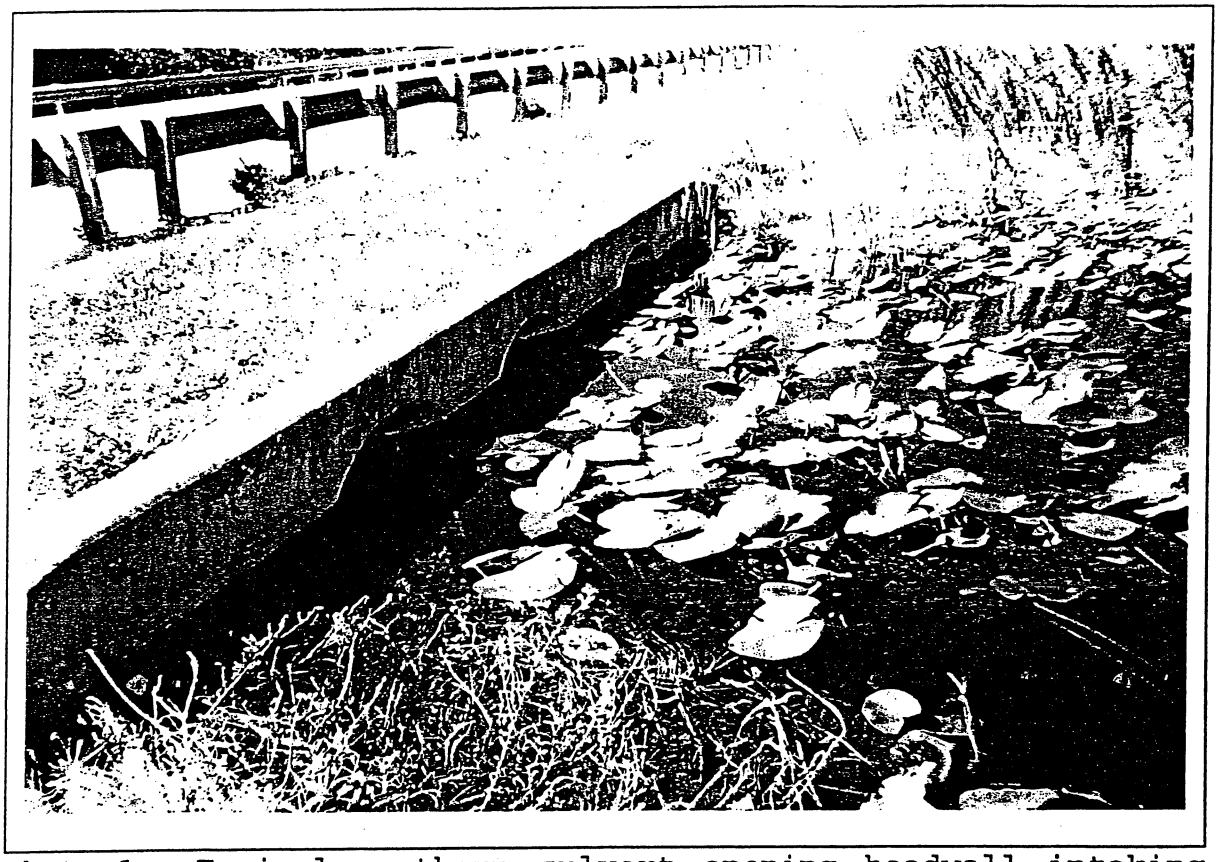


Photo 1: Typical northern culvert opening headwall intaking water from adjacent Tamiami Canal with slow flow through moderate wetland and aquatic vegetation.

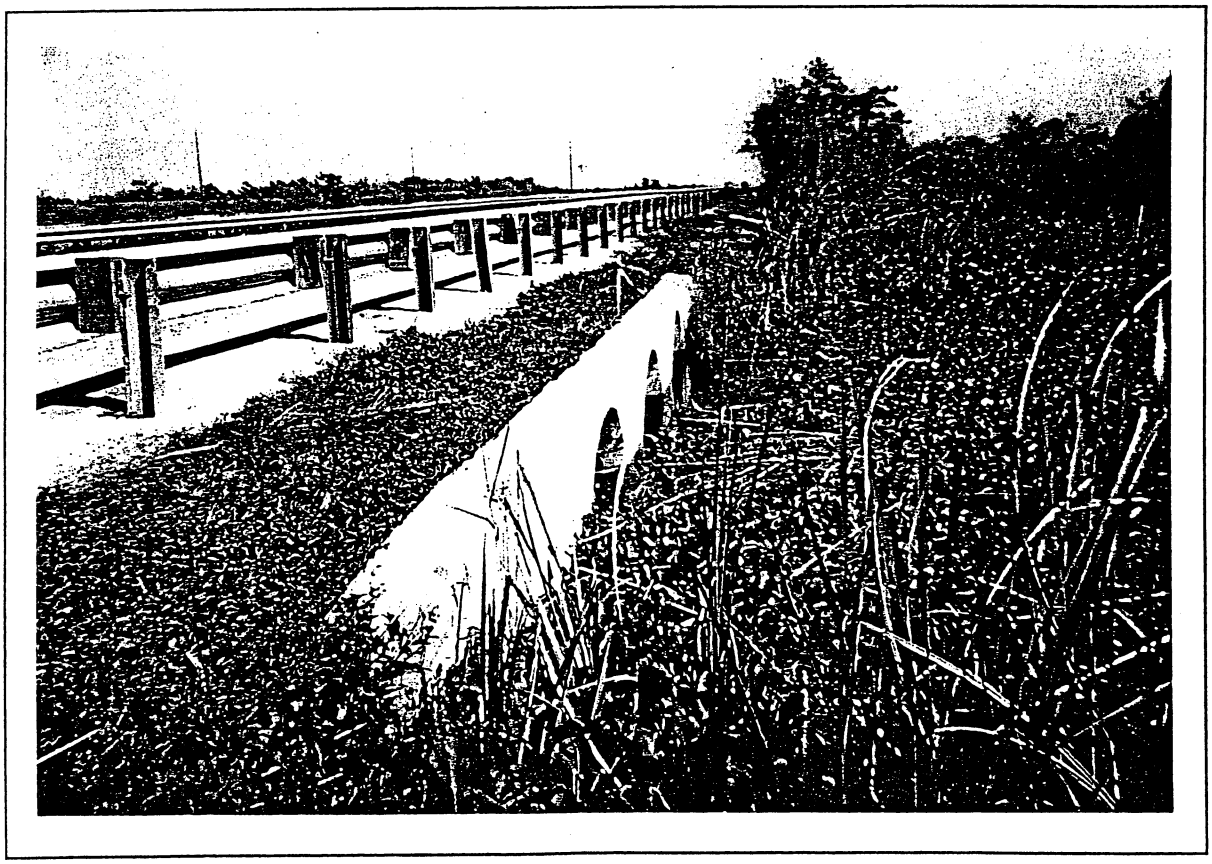


Photo 2: Culverts No. 1, 2, & 3 (Structure S-2), south of roadway, with a slow water discharge into a dense mat

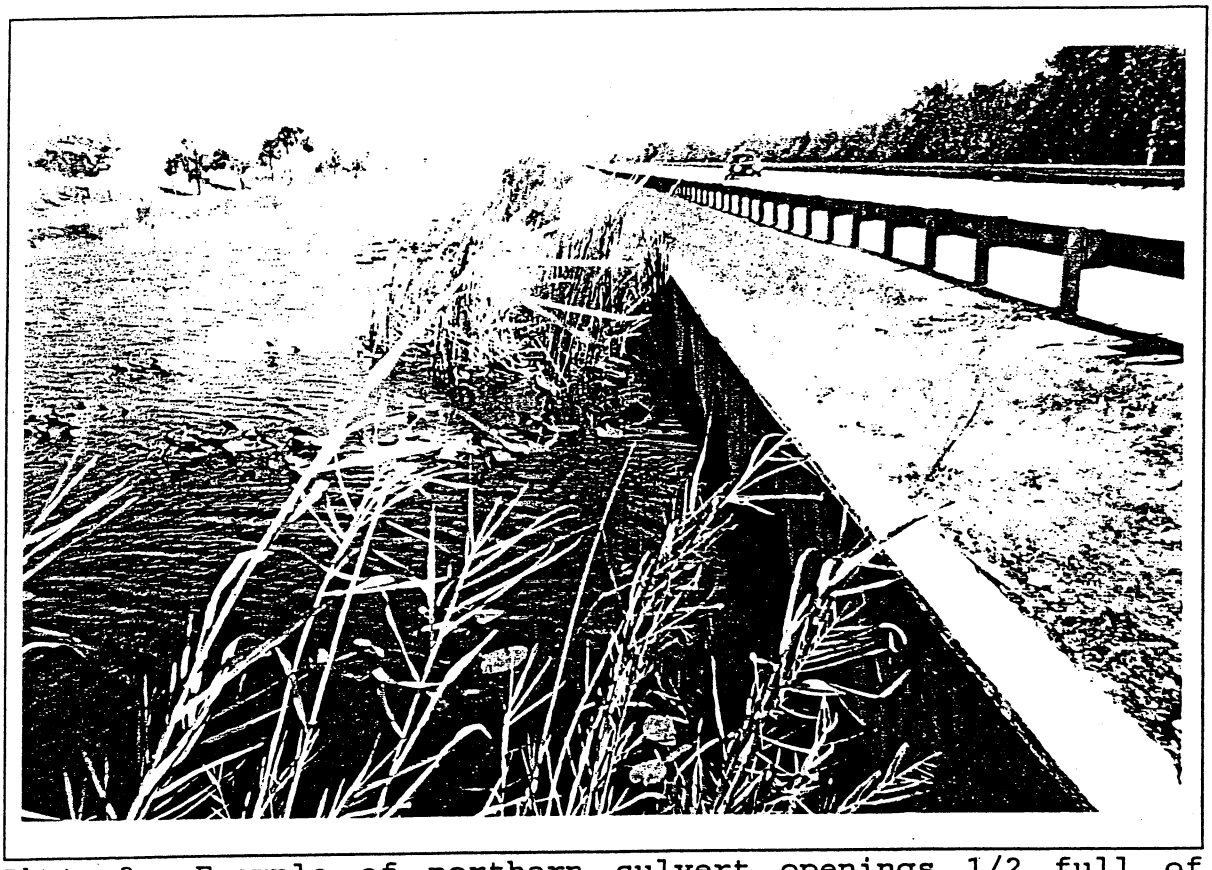


Photo 3: Example of northern culvert openings 1/2 full of water, with moderate to rapid flow, and sparse vegetation.

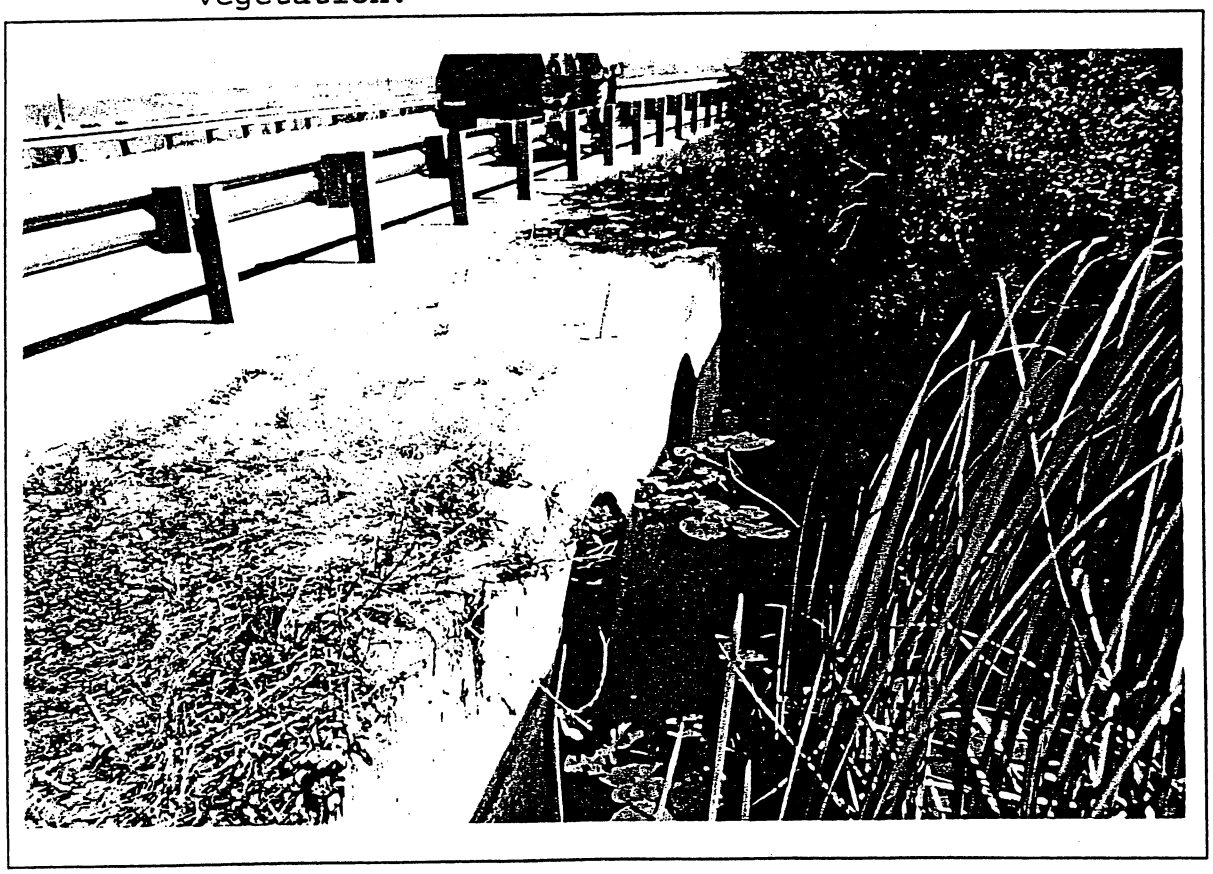


Photo 4: Example of 2/3 full southern culvert openings discharging a slow to moderate flow into sparse/ mainly open water dredged area (dredging limited to

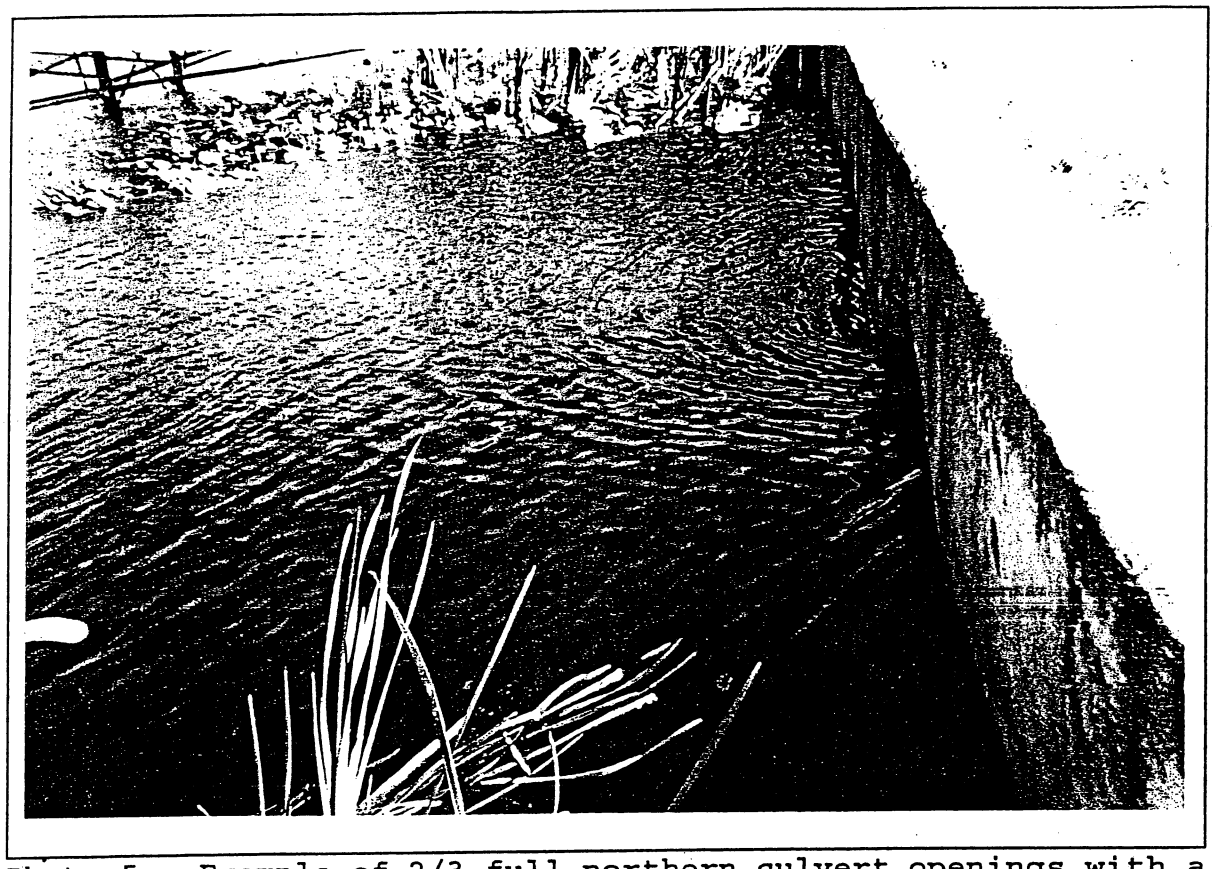


Photo 5: Example of 2/3 full northern culvert openings with a moderate water intake rate and open water - no vegetation.

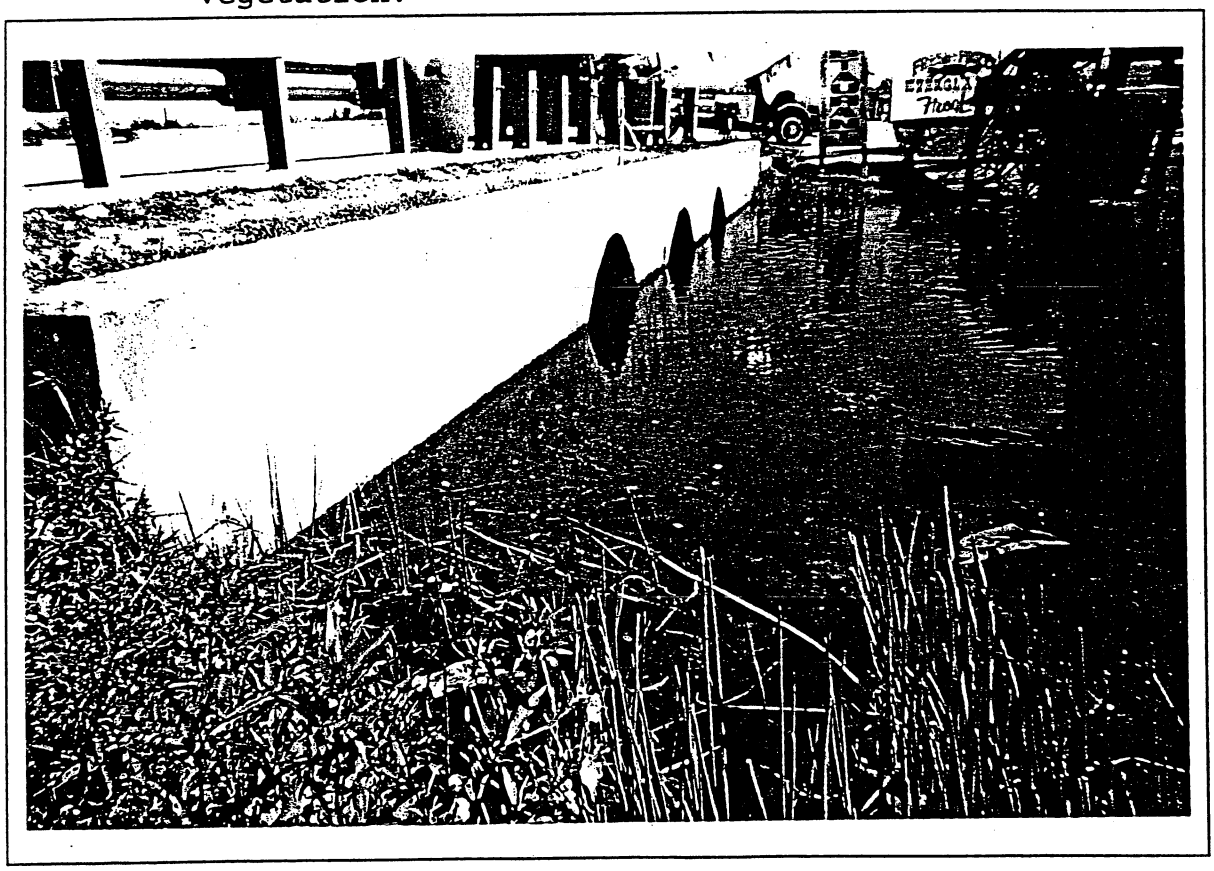


Photo 6: Example of 2/3 full southern culvert openings with a slow to moderate discharge of water to an airboat docking area/navigation channel, no vegetation in

ATTACHMENT 3

TABLE 1

TABLE 1

S.R. 90 / U.S. 41 / TAMIAMI TRAIL CROSS CULVERTS

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
1, 2, 3	S-1 (North)	Native/ Exotic	Round	44	open, 1/2 full, slow southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (moderate density) with saltbush, arrowhead, sawgrass and giant leather fern at the headwall abutments. Exotic species = Fanwort in front of culverts (moderate density).
	S-2 (South)	Exotic	Round	45	open, 1/2 full, slow southern flow	Minimal	Exotic species = Water hyacinth in a solid, floating mat (high density). Tire in front of center pipe, grasses at headwall abutments.
4, 5, 6	S-3 (North)	Native/ Exotic	Round	44	open, 2/3 full, slow southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (moderate density). Exotic species = Torpedo grass at headwall abutments.
	S-4 (South)	Native/ Exotic	Round	48	open, 2/3 full, slow southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density). Exotic species = Water hyacinth (high density) behind lilies, approximately 20 feet from the culverts.
7, 8, 9	S-5 (North)	Native/ Exotic	Round	48	open, full, slow southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density). Saltbush, arrowhead, pond apple, hydrocotyl, and spleenwort at abutments. Exotic species = Torpedo grass and fanwort at abutments.
	S-6 (South)	Native/ Exotic	Round	48	open, full, slow/ moderate southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density). Nuisance/Exotic species = Fanworts in front of culverts (moderate density). Cattails and grasses at the abutments.

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
10, 11, 12	S-7 (North)	Native/ Exotic	Round	48	open, full, slow southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (moderate density). Saltbush, broomsedge, and grasses at the abutments. Nuisance/Exotic species = Cattails and torpedo grass at abutments.
	S-8 (South)	Native/ Exotic	Round	48	open, full, slow/ moderate southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density), pickerelweed is present among lilies. Grasses, broomsedge, and willow at the abutments. Nuisance/Exotic species = Cattails at the abutments.
13, 14, 15	S-9 (North)	Native/ Exotic	Round	50 (North, concrete headwall) 54 (South, 3 corrugated steel pipes)	open, 1/2 full, rapid southern flow	Minimal	Only 1 structure number, steel pipes with no headwall on southside. Native species = Yellow cow lilies, tape grass and Illinois pond weed (moderate densities) in front of culverts with sections of open water. Pond apple, giant spikerush and arrowhead at the abutments. Exotic species = Torpedo grass at the abutments.
16, 17, 18	S-10 (North)	Native/ Exotic	Round	44	Open, full, moderate southern flow	Minimal	Native species = Yellow cow lilies and Illinois pond weed in front of culverts (moderate density). Pickerelweed at N.E. abutment. Nuisance/Exotic species = Fanwort in front of culverts (moderate density) and common reed at N.W. abutment.
	S-11 (South)	Native	Round	42	Open, 3/4 full, moderate southern flow	None	Native species = Yellow cow lilies in front of culverts (moderate density) with cattails and pickerelweed further south in shallow waters. Giant leather fern at S.E. abutment.
19, 20, 21	S-12 (North)	Native/ Exotic	Round	48	Open, 1/2 full, slow/moderate southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) with spikerush, broomsedge, arrowhead, pond apple, giant leather fern, and shield ferns at abutments. Nuisance/Exotic species = Torpedo grass and pickerelweed at abutments.

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
19, 20, 21	S-13 (South)	Native/ Exotic	Round	48	Open, 1/2 full, moderate southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) with pond apples, giant leather ferns, and shield ferns at abutments. Nuisance/Exotic species = Cattails in front of culverts (moderate density) with Brazilian pepper at abutments.
22, 23, 24	S-14 (North)	Native/ Exotic	Round	48	Open, 3/4 full, slow/moderate southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (moderate density) with sawgrass, arrowhead, and primrose willow at abutments. Nuisance/Exotic species = Fanwort in front of culverts (moderate density), with cattails, pickerelweed, and common reed at abutments.
	S-15 (South)	Native/ Nuisance	Round	48	Open, 3/4 full, slow southern flow	None	Native species = Yellow cow lilies, scattered in open water in front of culverts (sparse density), with flatsedge at one abutment. Nuisance species = Common reed at abutments.
25, 26, 27, 28	S-16 (North)	Native/ Exotic	Round	54	Open, full, slow/ moderate southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density), with giant spikerush, mowed pond apple saplings and sawgrass clumps at the abutments. Exotic species = Fanworts in front of culverts (moderate density).
	S-17 (South)	Native	Round	54	Open, full, slow southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) and at abutments, with arrowhead, coastal plain willow, arrowhead, and giant spikerush also at abutments. Nuisance species = Common reed at one abutment.
29, 30, 31	S-18 (North)	Native/ Exotic	Round	57	Open, full, moderate southern flow	Minimal	Native species = Mostly open water in front of culverts, some yellow cow lilies in front of culverts (sparse density), with some spikerush at abutments. Exotic species = Mostly open water in front of culverts, some fanworts in front of culverts (sparse density) and at abutments, with torpedo grass also present at the abutments.

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
29, 30, 31	S-19 (South)	Native/ Exotic	Round	54	Open, full, moderate southern flow	Minimal	Native species = Mostly open water in front of culverts, some yellow cow lilies in front of culverts (sparse density). Exotic species = Mostly open water in front of culverts, some fanworts in front of culverts (sparse density) with some mowed torpedo grass at abutments.
32, 33, 34	S-20 (North)	Native/ Exotic	Round	45	Open, full, slow southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) with mowed primrose willow and giant leather ferns at abutments. Exotic species = Fanworts in front of culverts (moderate density) with cattails and torpedo grass at abutments.
	S-21 (South)	Native/ Exotic	Round	44	Open, full, slow southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) with coastal plain willow, pond apple, red bay, giant leather fern, saltbush, and various grasses at abutments. Exotic species = Fanworts in front of culverts (moderate density).
35	S-22 (North)	Native/ Exotic	Round	58	Open, full, slow southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) with broomsedge, saltbush, arrowhead, primrose willow, and various ferns at abutments. Exotic/Nuisance species = Fanworts in front of culverts (moderate density) with mowed torpedo grass and common reeds at abutments.
	S-23 (South)	Native/ Exotic	Round	58	Open, full, no/slow southern flow	Minimal	Native species = Yellow cow lilies in front of culvert (moderate to high density) with sawgrass, arrowhead, giant spikerush, and various ferns at abutments. Exotic/Nuisance species = Fanworts in front of culvert (moderate to high density) with torpedo grass, hydrilla, Brazilian pepper, common reed, and cattails at abutments. Additionally, an open-ended, 55-gallon drum is in the water, approximately 1 meter south of the culvert opening.

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
36, 37, 38	S-24 (North)	Native/ Exotic	Round	53	Open, 3/4 full, moderate/ rapid southern flow	Minimal	Native species = No vegetation in front of culverts, open water with yellow cow lilies and giant spikerush at the abutments. Exotic/Nuisance species = Open water in front of the culverts, with fanworts and cattails at the abutments.
	S-25 (South)	Native/ Exotic	Round	53	Open, 3/4 full, moderate/ rapid southern flow	Minimal	Native species = Open water in front of culverts, with bladderwort, giant spikerush, pennywort, and primrose willow at the abutments. Exotic species = Fanworts and hydrilla in water BETWEEN the culverts, not in front of the culverts, with mowed torpedo grass at the abutments.
39, 40	S-26 (North)	Native/ Exotic	Round	48	Open, full, moderate southern flow	Minimal	Native species = Mainly open water in front of culverts, with some Illinois pondweed (moderate density), and with yellow cow lilies at the abutments. Nuisance/Exotic species = Cattails confined mainly to the abutments with common reeds and torpedo grass.
	S-27 (South)	Native/ Exotic	Round	48	Open, full, moderate southern flow	Minimal	Native species = Mainly open water in front of culverts, with some yellow cow lilies (sparse density), and coastal plain willow at the abutments. Exotic/Nuisance species = Hydrilla and cattails (sparse density) in open water with Brazilian pepper and cattails at the abutments.
41, 42, 43	S-28 (North)	Native/ Exotic	Round	56	Open, 1/2 full, slow/moderate southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (sparse density). Exotic/Nuisance = Fanworts in front of culverts (sparse density) with torpedo grass, cattails, and common reed at abutments.
	S-29 (South)	Native/ Exotic	Round	54	Open, 1/2 full, moderate southern flow	None	Native species = Yellow cow lilies in BETWEEN the culverts, not in front of the culverts (moderate density), with giant leather fern, coastal plains willow, broomsedge, and white beggar ticks at the abutments. Exotic species = Cabomba in BETWEEN the culverts, not in front of the culverts (moderate density), with Brazilian pepper and torpedo grass at the abutments.

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
44, 45, 46	S-30 (North)	Native/ Exotic	Round	48	Open, full, moderate southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (moderate density) with white beggar ticks, arrowheads, as well as mowed leather and shield ferns at the abutments. Exotic/Nuisance = Fanworts in front of culverts (moderate density) with torpedo grass at the abutments.
	S-31 (South)	Native/ Exotic	Round	48	Open, full, moderate southern flow	Minimal	Native species = Yellow cow lilies in front of culverts (moderate density) and at the abutments. Exotic/Nuisance = Fanworts in front of culverts (moderate density) with napier grass at the abutments.
47, 48, 49	S-32 (North)	Native/ Exotic	Round	48	Open, full, moderate/rapid southern flow	Minimal	Native species = Yellow cow lilies and Illinois pondweed in front of culverts (moderate density) with white beggar ticks, arrowheads, and bladderworts at the abutments. Exotic/Nuisance = Fanworts in front of culverts (moderate density) with torpedo grass at the abutments.
	S-33 (South)	Native/ Exotic	Round	44	Open, full, moderate/rapid southern flow	Minimal	Native species = Mainly open water in front of culverts, with some yellow cow lilies (sparse density) and some coastal plain willow, white beggar ticks, lantana, and broomsedge at the abutments. Exotic/Nuisance species = Hydrilla (sparse density) in open water with fanworts and hydrilla at the abutments.
50, 51, 52	S-34 (North)	Native/ Exotic	Round	38	Open, full, rapid southern flow	None	Native species = Mainly open water with some Illinois pondweed (sparse density) in front of culverts. Exotic/Nuisance species = Hydrilla (sparse density) in open water with cattails, torpedo grass and hydrilla at the abutments.
	S-35 (South)	Native/ Exotic	Round	38	Open, full, rapid southern flow	None	Native species = Open water in front of culverts, with yellow cow lilies and coastal plain willow at the abutments. Exotic/Nuisance species = Mainly open water in front of the culverts with hydrilla, cattails, and common reed at the abutments.

Culverts	Headwall Structure No.	Wetland Vegetation	Pipe Descriptions		Operating Conditions	Sedimentation Inside Pipe Openings	Notes
			Shape	Avg. Diameter (in inches)			
53, 54, 55	S-36 (North)	Native/ Exotic	Round	48	Open, full, rapid southern flow	None	Native species = Mainly open water in front of culverts with yellow cow lilies, Illinois pondweed, arrowheads, and white beggar ticks at the abutments. Exotic species = Mainly open water in front of culverts but with some strands of hydrilla sucked into the intake opening of at least one culvert and laying flat on the bottom. Fanworts and torpedo grass at the abutments.
	S-37 (South)	Native/ Exotic	Round	48	Open, full, rapid southern flow	Minimal	Native species = No vegetation, only open water in front of culverts with flatsedge and coastal plain willow at the abutments. Exotic/Nuisance species = No vegetation, only open water in front of culverts with Brazilian pepper, cattails, hydrilla, and torpedo grass at the abutments.

Appendix F

CHARACTERIZATION OF THE POTENTIAL IMPACT OF STORMWATER RUNOFF FROM TAMIAMI TRAIL ON THE NEIGHBORING WATERBODIES

CHARACTERIZATION OF THE POTENTIAL IMPACT OF STORMWATER RUNOFF FROM TAMIAMI TRAIL ON THE NEIGHBORING WATER BODIES

By:

PBS&J
482 South Keller Road, Orlando
FL 32810

April 2001

Introduction

This review provides a characterization of the potential impact of stormwater runoff from the subject project area of the Tamiami Trail on the neighboring water bodies. The first part of the report demonstrates a general background and a description of the problem. The present status of water quality standards is then discussed to identify the water quality criteria for the water bodies adjacent to Tamiami Trail. Based on literature review of the pollutant concentrations in stormwater runoff from highways, a description of the pollutants and their expected levels from the Trail is provided. Next, the methodology adopted for this study is presented and followed by discussion of the results and biological aspects. The report is then concluded by a summary of findings.

The study area for this investigation is the segment of Tamiami Trail / US 41 for an approximately 11 – mile segment beginning 1 mile west of Krome Avenue in western Miami Dade County, Florida. The Alternatives Analysis performed in the Engineering Appendix for the General Reevaluation Report provided an overall review of the reconstruction of Tamiami Trail with and without stormwater treatment systems including innovative treatment scenarios. The findings of the analysis indicated the inclusion of stormwater treatment systems resulted in both wetland impacts and increased construction costs, whereas innovative treatment systems reduced wetland impacts but significantly increased construction costs. Conversely, eliminating stormwater treatment facilities will substantially reduce wetland impacts to Everglades National Park (ENP) as well as the overall cost of the project. This paper provides scientific support to the decision makers on the necessity of constructing treatment facilities of storm water runoff.

Background

Florida's rapid growth and urbanization in the 1960's and 70's generated vast amounts of land clearing resulting in the creation of impervious surfaces. These activities resulted in increased flooding and water quality degradation. Stormwater runoff may contribute sediment, nutrients and heavy metals to these waters. There was a realization that some of our rivers and streams, lakes, wetlands, and estuaries were being damaged.

Recognition of these problems led to the adoption in 1982 of *Chapter 17-25* (now 62-25), of the *Florida Administration Code, Regulations of Stormwater Discharge*. This regulation's primary objective is to minimize the pollution of Florida waters from new stormwater discharges that are constructed after February 1, 1982. The vast number of new stormwater discharges resulting from rapid growth preceded the determination of individual discharge limitations. It was agreed a performance standard be established providing a minimum treatment level such that a stormwater system would remove at least 80% of the annual pollutant load.

Extensive studies prior to this time determined that the "first flush" of stormwater carried 90% of the pollutant load from a storm event. Treatment of the first one inch of rainfall would help ensure that the water quality impacts of stormwater runoff were minimized. It also corresponds with the fact that over 90% of all storm events produce an inch or less of rainfall in a year.

Extensive research through the 70's and early 80's attributes 80 to 95% of heavy metal contributions to our waters to be from highways and parking lots. These metals include lead, zinc, copper, cadmium, and chromium. Other contaminants associated with highways and parking lots include oils and grease. These pollutants in highway runoff originate from the operation of motor vehicles, direct atmospheric fallout and the degradation of roadway materials. The most abundant metals have been lead, zinc and copper, which account for over 90% of the dissolved heavy metals.

Present Status of Water Quality Standards

Surface water quality standards for the State of Florida are documented in *Chapter 62-302.500, Florida Administration Code, Surface Waters: Minimum Criteria, General Criteria*. These standards establish the criteria for water quality for the five classes of water, including special protection for Outstanding Florida Waters (OFW). The designation of OFW mandates that there will be no degradation of the ambient water quality within the area. The five classes include Class I - Potable Water Supplies, Class II - Shellfish Propagation, Class III - Recreation Waters, Class IV - Agriculture Water Supplies, and Class V - Navigation, Utility and Industrial Use. For each class of waters there is an established list of constituents for which a surface water criterion exists. Unless stated, all criteria express the maximum not to be exceeded at any time.

The Tamiami Trail is the boundary between two classes of waters. North of the Trail is considered Class III waters; whereas, the south side of the Trail falls within Everglades National Park and is considered Class III Outstanding Florida Waters.

Pollutant Concentrations in Stormwater Runoff from Highways

The concentration of pollutants in highway runoff is dependant on a number of factors including highway design, maintenance activity, surrounding land use, climate, and site specific traffic characteristics (Gupta et. al. 1981, Vol. I).

Highway stormwater runoff contains higher concentrations of trace metals, particularly lead and zinc, than the water samples from adjacent receiving water bodies (Yousef et al., 1986 and Harper, 1988). Soils adjacent to highways have higher concentrations of lead, chromium, and zinc than the background levels of these metals (Wanielista and Gennaro, 1977). Generally, lead, zinc, and copper are the major contributors to pollutant loading in highway runoff, with peak concentrations occurring within the first thirty minutes of rainfall.

Pollutant concentrations in stormwater runoff have been significantly reduced in the 1990's due to the stricter environmental regulations implemented to protect natural habitat and to enhance environmental conditions in rural/urban areas. One of the major milestones, in this regard, was the elimination of lead from gasoline and paint.

A recent study, conducted in 1996 by HDR Engineering, Inc. at the Howard Frankland Bridge (I-

275) in Tampa, Florida shows a substantial decrease in the average pollutant concentrations, of lead, zinc, iron, copper, and cadmium in water samples collected at the edge of pavement (to collect the samples just as it flowed off the impervious roadbed) than the average values detected by Gupta et. al 1981 in samples collected from seven locations in the eastern U.S. during 1967-77. In addition, the HDR study assessed the capability of the grassed shoulders to reduce contaminant levels in stormwater runoff from the highway. For most metals, documented treatment efficiencies ranged from 10 to 74%.

Stoker (1996) indicates similar decreases in the concentrations of lead, zinc, iron, cadmium, chromium, and copper in stormwater runoff samples from the Bayside Bridge in Pinellas County, Florida. Stoker's study shows improvements over those previously reported by Yousef et al., (1986) and Harper, (1988) for samples collected near I-4 in the Orlando area.

By comparing the metal contents in stormwater runoff from highways for the 1996 studies and 1980's studies, one can observe a decreasing trend in metal concentrations in the stormwater runoff over time.

Methodology

The methodology adopted in this analysis included a comparison of predicted pollutant concentrations from the Tamiami Trail to a) existing trace metal levels insitu and; b) Class III Fresh Water Criteria. Existing trace metal concentrations were obtained from South Florida Water Management District (SFWMD, 2000) for the study area (Northwestern limit: Lat. 25° 50`, Long. 80° 45` – Southeastern limit: Lat. 25° 40`, Long. 80° 20`) for the 1980's and 1990's. There are a total of ten sampling stations along Tamiami Trail, starting at Station S12D and ending with Station S334 (Figure 1). S12D is located at a spillway on levee L-29 in Conservation Area 3A; S333 is located at the Tamiami canal below S-333; S12E, G69, and S334 are located at gated culverts; S333DS is located downstream of S333 on US41 at the south side of the canal; FROGCITY is located at a culvert under US41 6.0 miles west of S334; S355A and S355B are Cape Sable seaside sparrow sampling locations; and TAMBR6 is located at a culvert under US41, 3.3 miles west of S334. SFWMD classifies these sampling locations as canal/ambient waters.

Class III Fresh Water Criteria for cadmium, chromium, copper, lead, nickel, and zinc were calculated according to the governing equations using the corresponding hardness values at each sampling station. Predicted contaminate levels were estimated using the data obtained from the Howard Frankland Bridge (I-275), Tampa, Florida and the Bayside Bridge, Pinellas County, Florida, as these projects represent the most recent studies, similar climate conditions, and geographical locations.

Tamiami Trail traffic counts recorded approximately 5,200 vehicles per day (VPD) in 2000, and are projected to reach 9,200 (VPD) in 2020 according to the Florida Department of Transportation. Drapper et. al. (2000) reported correlation of median pollutant concentrations (lead and total suspended solids) in stormwater runoff from highways to the Average Daily Traffic. This approach was utilized to predict pollutants levels in Tamiami Trail stormwater runoff for the estimated traffic

volumes (Tables 1, 2, and 3).

Based on the data recorded for the I-275 study, predicted levels of cadmium, chromium, copper, iron, lead, manganese, nickel, oil and grease, total solids, total suspended solids, and zinc for the Tamiami Trail are listed in Table 1. The Pinellas County study includes the analysis of these contaminates with the exception of manganese, oil and grease, and total solids. Predicted concentrations for Tamiami Trail based on the Pinellas County study are shown in Table 2. A summary of the predicted contaminant concentrations from both studies is presented in Table 3.

Discussion of Results

The results of the analysis indicate that there will be no significant impact on the quality of the water in the vicinity of Tamiami Trail (Table 4).

It should be noted that Class III Fresh Water Criteria for some pollutants varies from one location to the other, as they are dependant on hardness. For any given metal (e.g. Cadmium, Chromium (trivalent), Copper, Lead, Nickel, and Zinc), Florida Administrative Code (FAC) provides a mathematical formula to calculate the criterion as a function of water hardness. Consequently, as the hardness changes, the criteria change accordingly.

Hardness also does change over time depending on many factors. One of the most influencing factors is water pH. As the pH decreases, water become more acidic and the concentration of hardness decreases and vice versa. Any environmental factor that affects the pH will have an impact on the water hardness.

The water environment in wetlands is generally, acidic. During the wet season, rainwater often increases the water pH, bringing it to neutral or slightly basic condition resulting in an increase in the concentrations of hardness. This concept may explain the higher hardness values during the summer (wet season). To follow the FAC equations for calculating the criteria for different metals at different sampling stations, the average hardness values measured over the sampling period (more than 20 years at some locations) at each sampling station were used.

Class III Criterion for cadmium ranges from 1.20 μg/l at Station S355A to 2.20 μg/l at Station S333DS. Existing concentrations of cadmium along Tamiami Trail range from 0.10 to 1.14 μg/l. Maximum predicted concentrations (maximum values of the concentrations predicted using the two studies: I-275 and Bayside Bridge) of the of cadmium are 0.06 μg/l in year 2000 and 0.11 μg/l in year 2020. Minimum predicted concentrations (minimum values of the concentrations predicted using the two studies: I-275 and Bayside Bridge) are 0.04 μg/l and 0.06 μg/l in year 2000 and 2020, respectively. The conclusion of this comparison shows that there will be no predictable impact from cadmium on the neighboring water body. Similar conclusions may be drawn for chromium, and nickel.

Total suspended solids, total solids and manganese are not regulated under *Florida Administrative Code Chapter: 62-302.530, Criteria for Surface Water Quality Classifications*. However, the

predicted levels were calculated and documented for future reference.

For oil and grease, the predicted concentrations of 215.07 μg/l in year 2000 and 380.51 μg/l in year 2020 are much lower than the Class III Criteria of 5,000.00 μg/l. There are no records of the existing oil and grease concentrations at the sampling stations.

The analysis also predicts that there will be no significant impact from the primary polluting metals (copper, lead, and zinc) in the stormwater runoff. Predicted results from this study are consistent with the results reported by Driscoll et. al. (1990) for highways with less than 30,000 VPD. (Copper: 0.022 mg/l, Lead: 0.08 mg/l, Zinc: 0.08 mg/l).

Class III Criterion for copper ranges from 12.20 μg/l at Station S355A to 24.00 μg/l at Station S333DS. Existing concentrations of copper along Tamiami Trail range from 1.00 to 6.60 μg/l. Maximum predicted concentrations of copper are 1.48 μg/l in year 2000 and 2.62 μg/l in year 2020. Minimum predicted concentrations are 0.92 μg/l and 1.63 μg/l in year 2000 and 2020, respectively.

For iron, Class III Criterion is 1000 μg/l. Existing concentrations along Tamiami Trail range from 17.3 to 994 μg/l. Maximum predicted concentrations (in the runoff) of iron are 98.17 μg/l in year 2000 and 173.69 μg/l in year 2020. Minimum predicted concentrations are 30.49 μg/l and 53.95 μg/l in year 2000 and 2020, respectively.

For lead, Class III Criterion ranges from 3.30 μg/l at Station S355A to 9.10 μg/l at Station S333DS. Existing concentrations along Tamiami Trail ranged from 0.50 to 18.08 μg/l. Maximum predicted concentrations of lead are 2.51 μg/l in year 2000 and 4.43 μg/l in year 2020. Minimum predicted concentrations are 0.83 μg/l and 1.47 μg/l in year 2000 and 2020, respectively. It was noted that a single violation of Class III Fresh Water Criteria at Station S12D occurred in July 1992, where the existing lead concentration was 18.08 μg/l higher than the criterion (7.70 μg/l). The previous lead concentration measured at this station was 1.17 μg/l in June 1992, and the following measurement was 1.98 μg/l in September 1992. The next highest value recorded at this station was 2.65 μg/l, suggesting that the 18.08 μg/l record was a single incident or possibly an incorrect data notation in the record.

Class III Criterion for zinc ranges from 109.60 μg/l at station S355A to 213.90 μg/l at station S333DS. Existing concentrations of zinc along Tamiami Trail range from 4.00 to 329.01 μg/l. Maximum predicted concentrations of zinc are 10.02 μg/l in year 2000 and 17.73 μg/l in year 2020. Minimum predicted concentrations are 8.96 μg/l and 15.85 μg/l in year 2000 and 2020, respectively.

Predicted concentrations for some contaminants (e.g. zinc), although they did not violate Class III Fresh Water Criteria under any condition, can be found to be slightly higher than the existing minimum concentrations but well below the existing maximum concentrations. These observations are based on the data obtained from SFWMD and the results of the Howard Frankland Bridge and the Bayside Bridge studies. A detailed sampling and monitoring program for the Tamiami Trail is suggested to confirm these conclusions.

Biological Aspects

In general, highway runoff contains pollutants: that have a potential to adversely affect species dependent on wetland habitat for all or part of their life cycles; that can lead to the pollution of wetlands; and, that can cause a decline of wetlands values (Clairmont Graduate University and Rails-to-Trails Conservancy, 1998). However, documentation of adverse effects of highway runoff on aquatic organisms and their communities does not provide a clear relationship. Smith and Kaster (1983) reported that along a rural highway with relatively low vehicle counts (7,000 – 8,000 VPD) disruptions of benthic macroinvertebrate communities were negligible. However, other biological studies have documented changes in individual organisms and community structures at sites with low traffic volumes (Buckler and Granato, 1999). Generally, the ecological effects of highway runoff quality on receiving waters have been predicted using statistical models of contaminant concentrations and loadings. These predictive models indicate that there should be no measurable water quality effects at sites with annual daily traffic volumes supporting less than 30,000 VPD, (Driscoll et al., 1990).

Summary of Findings

This report has been prepared to investigate the impact of storm water runoff from Tamiami Trail on the adjacent water body. Predicted pollutant concentrations from the Trail were compared to a) existing pollutant concentrations from 10 sampling stations along the Trail and b) Class III Fresh Water Criteria. A brief literature review of stormwater runoff impact on the biological aspects of the neighboring aquatic environment was also conducted.

The data considered for the analysis were selected to be the most current (recent) data of metal concentrations and were gathered from locations having similar climatic and geographical characteristics.

The results of the investigation predicts/confirms that pollutant levels in stormwater runoff from the Tamiami Trail, for an average daily traffic of 5,200 VPD in 2000, and 9,200 VPD in 2020, will have little effect on the quality of the water and the surrounding aquatic habitat in the Tamiami Canal. The predicted concentrations are expected to be less than the contaminant concentrations delivered to the site from other locations by the network of canals. Therefore, this paper suggests that there is no immediate, water quality driven need to provide stormwater treatment facility. This conclusion is reached after comparing the predicted pollutant concentrations in the storm water runoff from the Trail based on both year 2000 and 2020 traffic volumes to a) Class III Fresh Water Criteria; and b) existing pollutant concentrations in the ambient waters adjacent to the Trail.

In summary, Tamiami Trail is a unique project since it is located between two classes of water bodies: Class III Fresh Water to the north and Class III Outstanding Florida Water to the South where no water quality degradation is allowed. Future increase in traffic may contribute to further minimal degradations generated from the past or current operations of the roadway. In the same future time

period, technology advances in the automotive industry are expected to further reduce the amount of contaminants (e.g. lead) released from roadways to the environment, as documented in the last 10 years or so in this report. Lastly, it would not appear prudent to provide stormwater treatment for existing conditions which do not violate standards or future conditions which predictably meet standards, at the expense of measurable, physical impacts to wildlife and wetlands supported and protected by National Park covenants. Furthermore, the construction of stormwater treatment facilities would result in additional turbidity, the release of extant nutrients, and contribute to instability in vegetation and soils.

Finally, the conclusions identified in this report could be evaluated and confirmed by designing and conducting a detailed sampling and monitoring program for the project area under normal operating conditions.

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Table 1: Predicted Contaminant Levels for Tamiami Trail Based on I-275, Tampa, Florida Study (1996).
(Concentrations are in milligrams per liter.) - DRAFT

mg/l	Medians of 5 sampling locations (103000 VPD)	Prorated Values for Tamiami Trail (5200 VPD)	Prorated Values for Tamiami Trail (9200 VPD)
Cadmium	0.001	0.000	0.000
Chromium	0.015	0.001	0.001
Copper	0.018	0.001	0.002
Iron	0.604	0.030	0.054
Lead	0.017	0.001	0.001
Manganese	0.036	0.002	0.003
Nickel	0.007	0.000	0.001
Oil&Grease	4.260	0.215	0.381
TS	308.000	15.550	27.511
TSS	50.500	2.550	4.511
Zinc	0.178	0.009	0.016

Source: HDR, 1996

Table 2: Predicted Contaminant Levels for Tamiami Trail Based on Pinellas County Study (1996).
(Concentrations are in milligrams per liter.)

mg/l	Mean Values (43593 VPD)	Prorated Values for Tamiami Trail (5200 VPD)	Prorated Values for Tamiami Trail (9200 VPD)
Cadmium	0.000	0.000	0.000
Chromium	0.004	0.001	0.001
Copper	0.012	0.001	0.003
Iron	0.823	0.098	0.174
Lead	0.021	0.003	0.004
Nickel	0.004	0.000	0.001
TSS	20.000	2.386	4.221
Zinc	0.084	0.010	0.018

Source: Stoker, 1996

Table 3: Expected Pollutant Concentrations for Tamiami Trail Based on Previous Studies Performed in Florida in 1996.
(Concentrations are in micrograms per liter.)

	I-275 Study		Pinellas Study	
	Tamiami (5200 VPD)	Tamiami (9200 VPD)	Tamiami (5200 VPD)	Tamiami (9200 VPD)
Cadmium	0.062	0.110	0.035	0.061
Chromium	0.732	1.295	0.513	0.907
Copper	0.919	1.626	1.479	2.617
Iron	30.493	53.950	98.172	173.688
Lead	0.833	1.474	2.505	4.432
Manganese	1.797	3.180	N/A	N/A
Nickel	0.334	0.590	0.477	0.844
Oil&Grease	215.068	380.505	N/A	N/A
TS	15549.515	27510.680	N/A	N/A
TSS	2549.515	4510.680	2385.704	4220.861
Zinc	8.961	15.854	10.020	17.728

N/A : Data were not available.

Table 4: Comparison of Existing Pollutant Concentrations, Class III Fresh Water Criteria, and Predicted Concentrations from Tamiami Trail Runoff Based on a) I-275 Study, and b) Pinellas County Study.

		Station	1	2	3	4	5	6	7	8	9	10
		Code	S12D	S333	S12E	S333DS	Frogcity	S355A	G69	TAMBR6	S355B	S334
Cadmium	Existing		0.1-1.59	0.1-1.14	0.30	0.23-0.622	0.3-0.76	0.30	N/A	0.3-0.44	0.3-0.37	0.3-0.39
	Class III Criteria		2.00	2.00	1.80	2.20	1.80	1.20	1.60	1.90	1.60	1.90
	Predicted	I-275	0.06 - 0.11									
		Pinellas	0.04 - 0.06									
Chromium	Existing		1.03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Class III Criteria		11.00									
	Predicted	I-275	0.73 - 1.30									
		Pinellas	0.51 - 0.91									
Copper	Existing		1-4.37	1-6.6	1.20	4.06-5.54	1.2-1.37	1.2-1.6	N/A	1.2-1.6	1.20	1.2-1.46
	Class III Criteria		21.40	22.30	20.10	24.00	20.10	12.20	17.70	20.40	16.80	20.60
	Predicted	I-275	0.92 - 1.63									
		Pinellas	1.48 - 2.62									
Iron	Existing		0.04-0.83	0.06-0.65	N/A	0.15	N/A	N/A	N/A	N/A	N/A	N/A
	Class III Criteria		1000.00									
	Predicted	I-275	30.49 - 53.95									
		Pinellas	98.17 - 173.69									
Lead	Existing		0.5-18.08	0.5-4.03	0.80	0.8-0.96	0.8-1.68	N/A	N/A	0.80	N/A	N/A
	Class III Criteria		7.70	8.20	7.00	9.10	7.00	3.30	5.80	7.20	5.40	7.30
	Predicted	I-275	0.83 - 1.47									
		Pinellas	2.51 - 4.43									
Manganese	Class III Criteria		None									
	Predicted	I-275	1.80 - 3.18									
		Pinellas	N/A									
Nickel	Existing		6.11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Class III Criteria		283.40	295.30	266.50	317.80	266.50	163.00	234.70	270.20	223.40	272.60
	Predicted	I-275	0.33 - 0.59									
		Pinellas	0.48 -0.84									
Oil&Grease	Class III Criteria		5000.00									
	Predicted	I-275	215.07 - 380.51									
		Pinellas	N/A									
Total Solids	Class III Criteria		None									
	Predicted	I-275	15549.52 - 27510.68									
		Pinellas	N/A									
Total Suspended Solids	Class III Criteria		None									
	Predicted	I-275	2549.52 - 4510.68									
		Pinellas	2385.70 - 4220.86									
Zinc	Existing		4-250.61	4-329.01	4.00	18-20	4-22.62	4-4.53	N/A	4-14.74	4.00	4.00
	Class III Criteria		190.70	198.70	179.30	213.90	179.30	109.60	157.80	181.80	150.30	183.40
	Predicted	I-275	8.96 - 15.85									
		Pinellas	10.02 - 17.73									

N/A : Data were not available.

1. Data analyzed are for the 1990's except for Nickel and Chromium as the most recent data for these two metals are from the 1980's.
2. Criteria reported for the chromium are those of hexavalent (trivalent concentrations have higher limits).
3. All concentrations reported are in micrograms/L (µg/l).
4. Cadmium predicted concentrations for Tamiami Trail based on I-275 study are 0.06 µg/l for 5200 VPD and 0.11 µg/l for 9200 VPD.

Appendix G

STATE HISTORIC PRESERVATION OFFICER COORDINATION

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Elections
Division of Corporations
Division of Cultural Affairs
Division of Historical Resources
Division of Library and Information Services
Division of Licensing
Division of Administrative Services

MEMBER OF THE FLORIDA CABINET
State Board of Education
Trustees of the Internal Improvement Trust Fund
Administration Commission
Florida Land and Water Adjudicatory Commission
Siting Board
Division of Bond Finance
Department of Revenue
Department of Law Enforcement
Department of Highway Safety and Motor Vehicles
Department of Veterans' Affairs

FLORIDA DEPARTMENT OF STATE
Katherine Harris
Secretary of State
DIVISION OF HISTORICAL RESOURCES

September 27, 2001

Mr. James C. Duck
Jacksonville District US Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: DHR No. 2001-08067 / Received by DHR: August 15, 2001
Cultural Resource Assessment Survey for the Tamiami Trail Project Area in Miami-Dade County, Florida (Preliminary Final Report)

Dear Mr. Duck:

Our office has received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966* (Public Law 89-665), as amended in 1992, and *36 C.F.R., Part 800: Protection of Historic Properties*. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties listed or eligible for listing in the *National Register of Historic Places*, assessing effects upon them, and considering alternatives to avoid or minimize adverse effects.

Results of the survey indicate that four previously unrecorded cultural resources were identified (8DA6765 – 8DA6768). Due to its common design, the Airboat Association of Florida building (8DA6768) is considered ineligible for listing in the *National Register of Historic Places*. It is the opinion of Janus Research that the remaining historic properties, which include the Tamiami Trail (8DA6765), the Tamiami Canal (8DA6766), and the Coopertown Airboat Rides and Restaurant (8DA6767), are potentially eligible for listing in the *National Register*.

Based on the information provided, this agency concurs with these determinations and finds the submitted report complete and sufficient. According to information provided in the document entitled *Abstract, Central and Southern Florida Study, Revised Preliminary Draft (95%), General Reevaluation Report/Supplemental Environmental Impact Statement (GRR/SEIS) for the Tamiami Trail, Modified Water Deliveries to Everglades National Park, Florida*, it is the opinion of this office that Alternative 7a will have an adverse effect to the Tamiami Trail (8DA6765), and possibly have an adverse effect to the Tamiami Canal (8DA6766). We look forward to consultation with your office regarding potential ways to mitigate adverse effects to these sites.

If you have any questions concerning our comments, please contact Mary Beth Fitts, Historic Sites Specialist, at mbfitts@mail.dos.state.fl.us or (850) 245-6333. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

Appendix H

REAL ESTATE

CENTRAL AND SOUTHERN FLORIDA STUDY

DRAFT GENERAL REEVALUATION REPORT/ SUPPLEMENT to the 1992 final ENVIRONMENTAL IMPACT STATEMENT (GRR/SEIS) ON MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, FLORIDA

REAL ESTATE PLAN

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1. STATEMENT OF PURPOSE

a. This Real Estate Plan is tentative in nature for planning purposes only and both the final real property acquisition lines and the real estate cost estimates provided are subject to change even after approval of the Modified Water Deliveries to Everglades National Park, Tamiami Trail General Re-evaluation Report.

b. A Real Estate Design Memorandum (REDM) was prepared and approved for the Modified Water Deliveries to Everglades National Park General Design Memorandum (GDM); however, both the REDM and GDM only addressed a portion of Tamiami Trail.

2. AUTHORIZATION

The Everglades National Park Protection and Expansion Act (PL101-229), Section 104, 16 U.S.C. Part 410r-5 *et seq.*, December 1989 (Annex A) authorized the Secretary of the Army to undertake certain actions to improve water deliveries to the Everglades National Park (ENP) and to take steps to restore natural hydrologic conditions. The act provides the underlying authority for this project. Section 104 of the Act stated:

" Upon completion of the final report by the chief of the Army Corps of Engineers, the Secretary, in consultation with the Secretary, is authorized and directed to construct modifications to the Central and Southern Florida Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park."

The Act also provided for the U.S. Army Corps of Engineers to initiate corrective actions to alleviate deterioration in natural resources for ENP attributed to changes in water conditions associated with construction of the Central and Southern Florida (C&SF) water management system.

The General Design Memorandum (GDM) called for in the Act was completed in June 1992. The Real Estate Design Memorandum was completed in March 1991 and approved in April 1995. This GDM and Environmental Impact Statement (EIS) for the Modified Water Deliveries (MWD) to the Everglades National Park is the authorizing document for structural modifications to the existing C&SF Project required for the modification of water deliveries for ecosystem restoration in the ENP. The 1992 GDM stated, "The future without project condition will lead to the further deterioration of unique and outstanding ecological resources of the Everglades that are recognized and valued throughout the world." Therefore, based on the direction provided in the Everglades National Park Protection and Expansion Act of 1989, the goal is to restore natural hydrologic conditions in the Park and to the extent practicable. Meeting this goal will lead to improvements in the abundance, diversity and ecological integrity of native

plants and animals in the Park." Both the GDM and the REDM contemplated raising only a portion of Tamiami Trail, approximately 3,000 feet.

3. PROJECT DESCRIPTION

The Everglades National Park Protection and Expansion Act, December 1989, authorized the Secretary of the Army to undertake certain actions to improve water deliveries to the Everglades National Park (ENP) and to take steps to restore natural hydrologic conditions. The General Design Memorandum (GDM) called for in the Act was completed in June 1992. Under the provisions of this GDM and Environmental Impact Statement (EIS) for Modified Water Deliveries (MWD) to the ENP, water would be transferred from Water Conservation Area 3B (WCA-3B) to the L-29 Canal; (Tamiami Canal) and through the existing culvert system under U.S. Highway 41 (Tamiami Trail) into Northeast Shark River Slough (NSRS). When the GDM was completed in 1992 it was believed that existing culverts under the roadway would be adequate to convey the flow of water. Subsequent hydrological analyses, however, revealed that as presently constructed the Tamiami Trail is an impediment to the designed flow of MWD waters to the ENP. Additionally the head height in the L-29 Canal required for the culverts to convey the increased water could adversely affect the structure of Tamiami Trail and overtop low areas along the highway under certain conditions. The purpose of this project is to identify a technical solution to provide modifications to the Tamiami Trail to provide for the unimpeded conveyance of water from WCA-3B and the L-29 Canal to the NSRS and the ENP south of the Tamiami Trail. The project must provide compliance with the Reasonable and Prudent Alternatives (RPA) of the February 19, 1999 U.S. Fish and Wildlife Service Biological Opinion on the Cape Sable seaside sparrow. This calls for a least 30% of the regulatory water discharge from the WCA-3 to be re-routed into NSRS beginning on March 1, 2000. These waters would traverse WCA-3B and the Tamiami Trail, and enter the ENP instead of being discharged through the S-12 structures. This would rise to 45% and 60% in March 1, 2001 and March 1, 2002, respectively. It is also prudent that the project be compatible with hydrologic restorations provided by the Comprehensive Everglades Restoration Program.

Under the Modified Waters Deliveries to Everglades National Park Project, authorized by the Everglades National Park Protection and Expansion Act of 1989, water deliveries to the ENP will be improved as a step to restore natural hydrologic conditions and increased flows to the ENP. Water from WCB-3B will enter the L-29 Canal, pass under Tamiami Trail and enter the ENP. Information found in this engineering appendix has been used to select preferred alternative and evaluate the plans' ability to provide for unimpeded flow of water from the L-29 Canal to ENP.

The centerline of the roadway may be adjusted southward to avoid encroachment into the L-29 Borrow Canal. Existing box culverts will be retained. The centerline of this alignment will fall very close to the centerline of the existing roadway. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels along the corridor.

The existing Tamiami Trail embankment will be removed adjacent to the 3000-foot long bridge. The bridge typical section would be standard the entire length, with two travel lanes of 12 feet, two shoulders of 8-feet, and outside barrier shapes. Exceptions would occur where surface connection for access or other reasons might be required. At these locations turning lanes might be needed.

The new bridge deck would be equipped with drain scuppers that would discharge directly to the area below. Piping would be convey runoff to dry retention facilities at either end of the bridge. These facilities would be approximately 600 feet long and spaced ½ mile intervals, such that there would be approximately 2 of them adjacent to the bridge.

Traffic is to be maintained, as it exists today. The overlay of the existing roadway will be accomplished using a moving operation. Staging areas for construction equipment and materials could be located on the business parcels along the corridor that are to be acquired or are not actively used now. Otherwise, staging and other functions may need to utilize sections of the existing shoulder for temporary periods. It may be necessary to have a staging area near the east end of the corridor, with materials moved in the remaining short distance on an "as needed, just-in-time" basis at the work site.

The proposed bridge structure may extend northerly 43-feet one-inch from the centerline of U.S. Highway 41. The existing maintenance right-of-way of Tamiami Trail extends northerly from the highway centerline from 40-feet to 42-feet. The Everglades National Park owns land on the northerly side of the existing highway. If required, necessary easements will be obtained from the National Park Service for Florida Department of Transportation.

There may also be some encroachment into the L-29 Lateral. If this is the case, the necessary easements from the South Florida Water Management District will have to be obtained for the South 5 feet of Section 3, Township 54 North, Range 37 East.

The construction and replacement of the portion of Tamiami Trail required for the Modified Water Deliveries to ENP Project will be a facility relocation and will therefore require a relocation contract to be executed between the Florida Department of Transportation and the Federal Government. In preliminary discussions with the Florida Department of Transportation, representatives have indicated the willingness to work toward this objective.

4. SPONSOR OWNED LANDS

A. FEDERAL

There are no lands in the project area owned by the Federal sponsor. However, the Department of Interior, National Park Service, Everglades National Park owns lands north and south of Tamiami Trail.

B. NON-FEDERAL

Lands immediately north of the project are owned in fee or controlled by South Florida Water Management District.

5. ESTATES-Neither the Government nor the South Florida Water Management District currently have any defined rights to flow water through the existing culverts under Tamiami Trail. These culverts were installed by the Florida Department of Transportation to discharge waters from the L-29 canal to the lands being acquired for the Everglades National Park Expansion area and to prevent erosion of the roadbed of Tamiami Trail. The culverts were in place at the time the L-29 canal was transferred to the SFWMD for the C&SF project. Construction of the proposed bridge will require acquisition of a channel easement. The proposed raising of the remainder of the road will require temporary easements. An alternative may be to acquire the below rights by irrevocable permits from Florida Department of Transportation, if more appropriate and to avoid condemnation. The terms of the permits would have to provide substantially the same rights as set forth below. Where National Park Service owns a portion of the lands required for the project, the estates may have to be adjusted (i.e., easement, license, or permit).

A. STANDARD ESTATES.

CHANNEL IMPROVEMENT EASEMENT

A perpetual and assignable right and easement to construct, operate and maintain channel improvement works on, over and across (*The land described in Schedule A*) (*Tracts Nos.*_____, _____ *and* _____) for the purposes as authorized by the Act of Congress approved _____, including the right to prohibit the construction of any structures below elevation 9.3 feet NGVD, and including the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, buildings, improvements and/or other obstructions therefrom; to excavate, dredge, cut away, and remove any and all of said land and to place thereon dredge or spoil material; and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easements hereby acquired.

TEMPORARY WORK AREA EASEMENT

A temporary easement and right-of-way in, on, over and across (*The land described in Schedule A*) (*Tracts Nos.*_____, _____ *and* _____), for a period not to exceed _____, beginning with date possession of the land is granted to the United States, its representatives, agents and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of

_____ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired.

B. NON-STANDARD ESTATES

A perpetual right to flow water through the existing culverts will also have to be acquired. Florida law may not provide the Florida Department of Transportation with the rights to convey these interests therefore they may have to be acquired by condemnation or non-revocable permits from the State.

FLOWAGE EASEMENT

The perpetual right, power, privilege and easement permanently to flow water in, under and through Tamiami Trail located and described *in Schedule A (Tracts Nos. _____, _____ and _____)*, to elevation 9.3 feet NGVD, in connection with the operation and maintenance of the Modified Deliveries to Everglades National Park project as authorized by the Act of Congress approved _____, provided that the existing culverts shall not be removed or altered without the express written permission of the representative in charge of the project; together with the right, but not the obligation, to clear and remove brush, debris and natural obstructions from the culverts which interfere with the flow of water; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

The relocation agreement between the Florida Department of Transportation and the Government shall include a provision that the FDOT will have the responsibility for maintaining conveyance, i.e., clearing. SFWMD would have the responsibility for cleaning out of the culverts to insure the flow of water is not impeded.

6. NAVIGATION SERVITUDE

No land in the area is subject to the navigation servitude.

7. PROJECT MAP

Tamiami Trail Alternative 7, INV. NO. DACW17-99-D-005 Drawing No. PLATE A7-3 depicts the area of this project.

8. INDUCED FLOODING

It has been determined that project implementation will cause an increase in duration in the water elevations on lands south of Tamiami Trail, located in the Everglades National Park Expansion Area, being acquired in fee by the National Park Service and on lands owned by the Airboat Association. As set forth in the Real Estate Design Memorandum dated March 1991, a perpetual flowage easement will be acquired by the Government over the lands owned by the Airboat Association.

9. REAL ESTATE BASELINE COST ESTIMATE

Real Estate costs are administrative costs for the relocation of the portion of Tamiami Trail. Costs are included to cover the costs associated with negotiation of agreement with Florida Department of Transportation.

Lands and Damages:	$ 0
Lands	
Perpetual Flowage Easement	
Easement:	
Temp Work Area	
Temp Road	
Perp Road	
Improvements	
Severance Damages	
Minerals	
Total Lands and Damages (Rounded):	$ 0
Acquisition/Administrative Costs	
Federal	$60,000
Public Law 91-646 Payments	0
Contingencies (25%) Rounded	$15,000
Total Estimates Real Estate Costs (RD)	$75,000

The project staging and construction areas are entirely within Florida Department of Transportation (FDOT) highway maintenance Right-of-Ways. Lands required for staging and construction are to be provided by FDOT at no cost.

10. RELOCATION ASSISTANCE BENEFITS

The Osceola Camp (Camp), which is located on the south side of the Tamiami Trail some 0.6 miles east of S-333 is located on land which the Department of Interior (DOI), National Park Service has acquired full fee title, as provided by the Everglades

National Park Expansion Act. The site will be subject to increased water levels under the Modified Waters Deliveries Project.

Structures in the Osceola Camp will have to be raised above the Modified Waters Project higher water levels. Interagency Agreement IA-5000-1-9501 makes such provisions. Relocation of the Osceola Camp is outside the scope of the authorized Corps project. The Everglades National Park (NPS) has accepted such a responsibility, and will make all necessary arrangements for relocation or elevation of the Camp.

No relocation costs are included in total project costs, as this is the responsibility of the NPS. There are no other known persons or businesses affected by this project.

11. MINERALS

No known minerals exist in the project area.

12. NON-FEDERAL SPONSOR'S AUTHORITY TO PARTICIPATE.

The South Florida Water Management District is the non-Federal Sponsor for this project. The South Florida Water Management District was created by virtue of Florida Statutes, Chapter 373, Section .069. The South Florida Water Management District was created to further the State policy of flood damage prevention, preserve natural resources of the State including fish and wildlife and to assist in maintaining the navigability of rivers and harbors. (There are other enumerated purposes but they are not directly applicable to this project.) The South Florida Water Management District is specifically empowered to

> *Cooperate with the United States in the manner provided by Congress for flood control, reclamation, conservation, and allied purposes in protecting the inhabitants, the land, and other property within the district from the effects of a surplus or a deficiency of water when the same may be beneficial to the public health, welfare, safety, and utility. (Section 373.103)*

To carry out the above purposes, the South Florida Water Management District is empowered to

> *...hold, control, and acquire by donation, lease, or purchase, or to condemn any land, public or private, needed for rights-of-way or other purposes, and may remove any building or other obstruction necessary for the construction, maintenance, and operation of the works; and to hold and have full control over the works and rights-of-way of the district.*

The term *works of the district* is defined by Section 373.019 to be

...those projects and works, including, but not limited to, structures, impoundments, wells, and other water courses, together with the appurtenant facilities and accompanying lands, which have been officially adopted by the governing board of the district as works of the district.

Section 373.139 specifically empowers the South Florida Water Management District

...to acquire fee title to real property and easements therein by purchase, gift, devise, lease, eminent domain, or otherwise for flood control, water storage, water management, and preservation of wetlands, streams and lakes, except that eminent domain powers which may be used only for acquiring real property for flood control and water storage.

13. REAL ESTATE MILESTONES

No Real Estate Milestones have been established for this project.

14. RELOCATIONS OF ROADS, BRIDGES, UTILITIES, TOWNS AND CEMETERIES

A. ROADS

U.S. Highway 41 (Tamiami Trail) will be raised for approximately 9.4 miles and a 3000 foot bridge constructed between Structures S-334 on the east and S-333 on the west. The purpose is to provide unimpeded conveyance of water from WCA 3B and the L-29 Canal to Northeast Shark River Slough. Based on evidence submitted by the Florida Department of Transportation and independent investigation, the Florida Department of Transportation owns fee title to portions of this area, road easements to portions of the area and prescriptive rights to other portions of the area. The National Park Service is acquiring or owns the underlying fee to those portions not owned in fee by the Florida Department of Transportation. As the Modified Water Deliveries to Everglades National Park Project is a federal acquisition and construction program, the responsibility for securing the Relocation Contract will be on the Federal government.

B. BRIDGES

None to be relocated.

C. UTILITIES

There are a number of utility companies that have their facilities located in the State owned right of way for U.S. Highway 41 (SR90, Tamiami Trail). These consist of electric, telephone and fiber optic cables.

The work on the Tamiami Trail will involve raising the roadbed and the construction of one or more bridges. The work will impact all the utilities facilities in the highway right of way necessitating their relocation.

The State Department of Transportation has issued permits to the various utilities to allow placement of their facilities within the right-of-way. The issue becomes whether under local law this gives the utilities a property right.

Copies of the permits have been requested from the Department of Transportation. However, they have not been received as yet. Other permits issued by the Department contain the following language: "It is expressly stipulated that this permit is a license for permissive use only and that the placing of facilities upon public property pursuant to this permit shall not operate to create a property right." The permit also provides:

Whenever it is necessary for the construction, repair, improvement, maintenance, safe and efficient operation, alteration or relocation of all, or any portion of said highway as determined by the Director, Division of Maintenance, any or all of said poles, wires, pipes, cables or other facilities and appurtenances authorized hereunder, shall be immediately removed from said highway or reset or relocated thereon as required by the Director, Division of Maintenance, and at the expense of the permittee unless reimbursement is authorized.

Since the work to be preformed is essentially a road construction project, the Department of Transportation will be asked to invoke the provision of the permit requiring the utilities to relocate their facilities at the utilities cost. Language will be inserted into the Relocation Agreement providing for this action. Assuming that the State Department of Transportation invokes this permit condition, the utility companies will have neither a real estate interest in the highway right of way, nor a compensable interest.

D. TOWNS OR CEMETERIES

No towns or cemeteries will be relocated as a result of this project.

15. PRESENCE OF CONTAMINANTS (HAZARDOUS, TOXIC AND RADIOACTIVE WASTES)

A site survey for hazardous materials, toxic and radioactive waste material was preformed by the Jacksonville District, Environmental Branch with negative results. The site audit includes a site visit and research of historical data.

16. ATTITUDE OF LANDOWNERS

The lands impacted by this project are owned by the South Florida Water Management District, Florida Department of Transportation and Everglades National Park who strongly support the project.

17. M-CACES

Real Estate costs are administrative costs for the relocation of the portion of Tamiami Trail. Costs are included to cover the costs associated with negotiation of agreement with Florida Department of Transportation.

REAL ESTATE CHART OF ACCOUNTS

01	Lands & Damages	$ 0
001AA	Project Planning	$50,000
Total Real Estate Costs Excluding Contingency		$50,000
Real Estate Contingency (25%) Cost		$15,000
Total Project Real Estate Cost		$75,000

Appendix I

USFWS FISH AND WILDLIFE COORDINATION ACT REPORT

CORPS RESPONSES TO RECOMMENDATIONS IN THE
DRAFT COORDINATION ACT REPORTS (CAR)

RESPONSES TO RECOMMENDATIONS IN DEPARTMENT OF INTERIOR'S CAR

I. DOI Draft Position on Alternatives

C. Other Alternatives

Recommendation: DOI recommends that the following alternatives be removed from further consideration: 1, 2A, 2B, 3A, 3B, 4A, 4B, 6B partial, 6B Full, 7B, 8A, 8B, 9A, and 9B.

Corps Response: Section 5.10 of the GRR/SEIS addresses this. Alternative 1 is eliminated. Alternatives 3A, 3B, 4A, 4B, and 6 are not being considered for selection. The other alternatives are being held in the final array of detailed plans.

II. DOI Draft Recommendations for Implementation of the Recommended Plan, Alternative 7A.

A. Recommendation: "DOI recommends that the Corps and the DOI jointly recognize the following guiding principles for implementation of the project features associated with the unique authorities for each project:" (List of 7 items follows).

Corps Response: These guiding principles are incorporated in the list shown on page ES-5 of the GRR/SEIS Executive Summary.

B. DOI recommends the following regarding site selection for the 3000-foot bridge.

Recommendations:

1. Begin at the Blue Shanty Canal and extend eastward for a distance of 3000 feet.

2. Conduct interagency on-site inspection of the area prior to final site selection.

3. Construct an elevated concrete apron on the western abutment for safe passage of terrestrial species.

4. Develop a long-term interagency wildlife mortality study on the Tamiami Trail.

Corps Responses: Concur with items 1 and 2. Item 3 would be considered an enhancement that could be constructed if specifically requested and funded by DOI or another agency. Item 4 could be carried out as part of the CERP project.

III. Additional DOI Recommendations.

A. FWS Threatened and Endangered Species Recommendations

1. Implement Construction Restrictions for wood storks and migratory birds.

2. Implement an interagency Wood Stork Monitoring Plan during and after project implementation.

3. Prepare Biological Assessment of project under provisions of the ESA.

Corps Responses: Items 1 and 2 will be considered if relevant to the final recommended plan. Item 3 will be prepared on the final recommended plan during Final SEIS preparation.

B. DOI Water Quality Recommendations

1. FDEP should conduct a thorough review of available water quality data provided by the Corps.

2. FDEP would have to agree to any such deferment.

C. DOI Recommendation on Mitigation for Wetland Functional Losses: Any wetland functional losses should be fully mitigated.

Corps Responses: Do not concur. The Corps believes that, because Tamiami Trail is part of an ecosystem restoration project, the project is self-mitigating.

D. DOI Recreation Recommendations: Replacement boat ramps should be constructed if any of the existing ramps are impacted by the project.

Corps Response: Concur, but no such impacts are expected.

E. DOI Recommendations on Wildlife Mortality/Connectivity FEatures

1. Include wildlife bridge and underpass east of S-334 in the project design.

2. Consider including additional wildlife features (e.g., barriers) in the final Federally Recommended Plan.

Corps Response: As discussed on page 207 of the GRR/SEIS, these are considered enhancements outside of the scope of this MWD project that could be included if specifically requested and funded by DOI or another agency.

F. DOI Recommendation on Control of Exotic Vegetation: Develop and implement an interagency Exotic Vegetation Removal Plan for the Tamiami Trail corridor.

Corps Response: Since it has been determined that existing vegetation is not an impediment to flow, the only removal envisioned would be in the construction area for the recommended plan features. Additional removal would be considered an enhancement, as discussed above.

RESPONSES TO RECOMMENDATIONS IN THE FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION'S CAR

1. Recommendation: "Recommend that a real estate agreement between the COE and the Florida Department of Transportation for the Tamiami Trail be pursued in lieu of raising the profile of the roadway."

Corps Response: Concur. Such an agreement is being sought. If agreement is reached, the recommended plan in the Final SEIS will not include raising of the roadbed profile.

2. Recommendation: Implement "a water quality monitoring plan to ascertain whether treatment would be desirable in the future."

Corps Response: Such monitoring would be undertaken if required by FDEP. Since the project will not cause an increase in traffic, no change in water quality is expected.

3. Recommendation: During construction, special attention should be given to the siting of staging areas to avoid blocking access to existing recreational facilities.

Corps Response: Concur.

4. Recommendation: If feasible, locate the Alternative 7 bridge to the east of Blue Shanty Canal and equip it with a wildlife crossing shelf.

Corps Response: Concur with the siting of the bridge, subject to a final on-site inspection as requested by DOI. The wildlife crossing shelf would be considered an enhancement that could be included if specifically requested and funded by DOI or another agency.

5. Recommendation: Surveys of endangered species should be conducted annually prior to construction to determine if any nesting efforts would be adversely affected by construction activities.

Corps Response: The Corps would make appropriate use of information from any such surveys by others.

6. Recommendation: Recommend that Alternatives 2b, 3a, 3b, 4a, 4b, 6b, 7b, and 8b be removed from further consideration.

Corps Response: Section 5.10 of the GRR/SEIS addresses this. Alternatives 3A, 3B, 4A, 4B, and 6 are not being considered for selection. The other alternatives are being held in the final array of detailed plans.

7. Recommendation: Recommend a more detailed wildlife mortality study be conducted on this portion of Tamiami Trail prior to completion of the design of CERP Decomp., Phase I.

Corps Response: This study could be carried out as part of the CERP project.

8. Recommendation: Compensation should be provided for any reduction in recreational access by this project. Implement a program whereby the development of needed recreational potential is more fully incorporated into project plans.

Corps Response: No adverse effects on recreational access is anticipated. Recreation development is not within the scope of the MWD project, but could be considered during CERP planning.

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

MODIFIED WATER DELIVERIES

TO EVERGLADES NATIONAL PARK:
TAMIAMI TRAIL PROJECT
MIAMI-DADE COUNTY, FLORIDA

U.S. Fish and Wildlife Service
South Florida Field Office
Vero Beach, Florida

November 15, 2001

National Park Service
Everglades National Park
Homestead, Florida

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United States Department of the Interior

National Park Service
Everglades National Park
40001 State Road 9336
Homestead, FL 33034

Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, FL 32960

November 15, 2001

Colonel James G. May
District Commander
Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attention: Planning Division

RE: Modified Water Deliveries to Everglades National Park, Tamiami Trail Project

Dear Colonel May:

The U.S. Fish and Wildlife Service (FWS) and the National Park Service (NPS) have prepared this Draft Fish and Wildlife Coordination Act (FWCA) Report for the Draft Supplemental General Reevaluation Report/Supplemental Environmental Impact Statement (GRR/SEIS), Modified Water Deliveries (MWD) to Everglades National Park (ENP), Tamiami Trail Project, Miami-Dade County, Florida. This GRR/SEIS analyzes and evaluates an array of alternatives to allow for restoration of ecological function and hydrological conditions in Northeast Shark Slough and the Rocky Glades in ENP, through the structural modification of U.S. 41/Tamiami Trail.

This Draft FWCA Report is provided in accordance with the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended (16 U.S.C. 661 *et seq*.) and section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.). After opportunity for public comment, anticipated in December 2001, and in conjunction with the views and recommendations the Florida Fish and Wildlife Conservation Commission, a Final FWCA Report will be prepared which will constitute the report of the Secretary of the Interior as required by section 2(b) of the FWCA. This Draft FWCA Report does not constitute a biological opinion under section 7 of the ESA. As discussed in earlier Planning Aid Letters and in meetings with your staff, the FWS awaits your Biological Assessment of the effects this federal action will have on threatened and endangered species.

The Department of the Interior (DOI) considers the full and successful restoration of Tamiami Trail to be a critical step toward restoring the hydrological and ecological connection between the Central and Southern Everglades. This effort is key to reestablishing more historic flows to ENP and Florida Bay. Eliminating the ecological and hydrological barrier of Tamiami Trail is also an essential component of the Comprehensive Everglades Restoration Plan (CERP), and will be the subject of a complex planning effort conducted under the Decompartmentalization (Phase 1) component of the CERP. Thus, the project under review as a component of the MWD Project will have a considerable impact on CERP implementation over the next decade.

After a thorough review of an array of nine project alternatives, the DOI has reached the following conclusions:

Environmentally Preferred Alternative

The DOI concludes that Alternative 5A (Full Causeway), without water quality treatment and with full removal of the existing Tamiami Trail, is clearly the Environmentally Preferred Alternative without regard to fiscal constraints. This conclusion is consistent with that of the Corps of Engineers (Corps) as described in the GRR/SEIS. The DOI, however, recognizes that fiscal limitations make the pursuit of this alternative infeasible at this time.

The DOI finds that this alternative plan for elevating Tamiami Trail and restoring flows to the ENP is the most consistent of all alternatives with the goals of the Everglades National Park Expansion and Protection Act (PL 101-229). Alternative 5A fully meets the stated goal in this Act of "*improving the abundance, diversity and ecological integrity of native plants and animals in the Park*." Alternative 5 is also fully consistent and complimentary with the goals set forth in the CERP authorized by the Water Resources Development Act of 2000 (PL 106-541). A summary of the performance assessment of Alternative 5A is provided in Chapter 10 of this report.

Environmentally Acceptable Plan

The Corps has identified Alternative 7A (3000-foot bridge without water quality treatment) as the Federally Recommended Plan. It is the position of the DOI that Alternative 7A is an environmentally acceptable plan, performing sufficiently well for all project objectives within the limits imposed by the project constraints. In developing this position, the DOI took into consideration the fact that the Corps has developed an expedited schedule for the implementation of the Tamiami Trail component of the CERP Decompartmentalization (Part 1), leading to a more seamless integration of these MWD and CERP efforts. The DOI is confident that this strategy will lead to the meaningful reconnection of the Central and Southern Everglades.

Alternative 7A also meets the Florida Department of Transportation (FDOT) concern for road safety by providing necessary mitigation to offset the adverse impacts to road safety associated with the projected high water following implementation of the MWD Project. While the DOI remains concerned that the current configuration of Alternative 7A specifies the need to raise the profile of more than 10 miles of existing highway that is potentially incompatible with future CERP-related modifications, the DOI is confident that the Corps will enter into an agreement with the FDOT to prevent, or significantly minimize, the expenditure of approximately $13 million for this potentially unneeded project feature.

To complete our review of Alternative 7A, the DOI requests the Corps provide the Tamiami Trail "risk analysis", the Draft FDOT Agreement, and an explanation of how NPS funds will be used to fulfill the terms of the Agreement. The DOI will review and comment on this material prior to the release of the Final FWCA Report in January 2002.

Remaining Alternatives

It is the position of the DOI that Alternatives 6A (four-mile causeway) and 9 (2.7-mile causeway) do not meet the requirements of the MWD Project due to the fiscal constraints imposed by the NPS. The DOI recommends that the remaining non-causeway alternatives, (Alternatives 1, 2, 3, 4, and 8), be eliminated from further consideration, as they were found to be incompatible with the goals of the MWD Project, and were found to potentially add additional cost to future CERP restoration.

Integration with CERP Decompartmentalization (Phase 1)

The DOI is pleased that the Corps has agreed to accelerate the Tamiami Trail component of Decompartmentalization (Phase 1) by preparing a separate and accelerated Project Implementation Report for the Tamiami Trail component. The DOI recommends that the Corps utilize, to the maximum extent practicable, the results of the MWD GRR/SEIS and the Final FWCA Report in this accelerated schedule. There is considerable interest amongst the interagency planning partners to develop an integrated and holistic plan that minimizes the expense associated with retrofitting project features constructed under the MWD authority. The DOI is confident that this accelerated effort will combine the technical and financial resources of both restoration authorities in order to develop an efficient, phased plan leading to a more significant and meaningful restoration, consistent with both the MWD and CERP authorities.

Issues Needing Further Clarification

Water Quality Treatment

The assumptions and selected water quality treatment facility design remain a concern to the

DOI. The conceptual plans for the CERP Decompartmentalization (Phase 1) Project specify the potential degradation of both the L-29 canal and levee. In order to minimize the loss of wetlands, the DOI prefers that any water quality treatment facilities be located in areas that are presently disturbed and not in areas of undisturbed wetlands. Furthermore, the DOI is concerned that there appears to be a persistent, yet unanswered, question regarding whether water quality treatment will be required for the MWD Tamiami Trail Project. Until these issues are resolved, the DOI is not supportive of facilities that result in the loss of additional undisturbed, high quality wetlands in either ENP or WCA 3B.

In order to clarify this issue, the DOI recommends that a thorough review of the available water quality data provided by the Corps for this project be conducted by the Florida Department of Environmental Protection (FDEP) to ensure compliance with applicable water quality standards. Should the FDEP require water quality features for the MWD Tamiami Trail Project, the DOI recommends deferring construction of these features until the fate of the L-29 canal and L-29 levee have been determined. The DOI understands that these features may be removed through implementation of future CERP projects, thereby providing an already disturbed area for construction of any required water quality treatment facilities and eliminating the need to destroy additional existing wetlands within either the ENP or WCA 3B.

Agreement with the FDOT

The current design of the Recommended Plan (Alternative 7A) includes provisions to mitigate the FDOT's concerns regarding potential damage to the road sub-grade and overtopping of the existing road surface due to the projected high water associated with the implementation of the MWD Project. The mitigation is in the form of raising the portion of the existing highway not elevated by the construction of the 3000-foot bridge. Specifically, implementation of the Recommended Plan would elevate over 10 miles of the existing road by approximately two feet through the addition of fill material and asphalt resurfacing. Depending on the plan recommended in the CERP Decompatmentalization (Phase 1) Project, the potential exists for portions of Tamiami Trail raised by the MWD Project to be removed as part of the CERP recommended plan. This could result in as much as $13 million in MWD Project funding being expended on unneeded features.

To avoid construction of potentially unneeded features, while still meeting the mitigation requirements to assure highway safety, the DOI recommends the Corps enter into an agreement with the FDOT to ensure that the safety requirements of the FDOT are met until the CERP project features can be identified and implemented. The DOI also recommends that the Corps closely coordinate the development of this agreement with ENP, FWS, and the Office of the Solicitor for the DOI.

Additional Recommendations

Additional recommendations concerning the placement of the 3000-foot bridge, threatened and endangered species conservation, hydrologic analyses, wildlife mortality reduction, wetland functional gains and losses, wetland mitigation, recreational effects, and water quality treatment are provided in the attached Draft FWCA Report.

We solicit your comments on the analyses and recommendations contained in the attached FWCA Report, and look forward to continued close coordination with you and your staff in this evolving project. The FWS and NPS remain confident that the strategy to closely coordinate the design and implementation of the MWD and CERP Tamiami Trail Projects will result in the successful reconnection of the Central and Southern Everglades, thereby greatly facilitating the future implementation of the CERP.

Please contact Mr. David Ferrell of the FWS at (561) 562-3909 (ext. 224), or Mr. David Sikkema of the NPS at (305) 242-7800, if you have any questions regarding the contents of this Draft FWCA Report.

Sincerely,

James J. Slack
Field Supervisor
South Florida Field Office

Maureen A. Finnerty
Superintendent
Everglades and Dry Tortugas National Parks

cc:

FWS, Assistant Regional Director (ES), Atlanta, GA (Attn: Cindy Dohner)
NPS, Regional Director, Atlanta, GA (Attn: Jerry Belson)
South Florida Water Management District, WPB, FL (Attn: Henry Dean)
Corps of Engineers, Jacksonville, FL (Attn: Doris Marlin)
Corps of Engineers, Jacksonville, FL (Attn: Shelley Trulock)
Florida Department of Transportation, Miami, FL (Attn: Barbara Culhane)
Florida Department of Environmental Protection, West Palm, FL (Attn: Herb Zebuth)
Florida Fish and Wildlife Conservation Commission, Vero Beach, FL (Attn: Joe Walsh)
Miccosukee Tribe of Indians of Florida, Miami, FL (Attn: Chairman Billy Cypress)

Executive Summary

This Draft Fish and Wildlife Coordination Act (FWCA) Report on the Modified Water Deliveries (MWD), Tamiami Trail Project, has been jointly prepared by the Fish and Wildlife Service (FWS) and National Park Service (NPS), and is provided in accordance with the provisions of the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended: 16 U.S.C. 661 *et seq.*). This report also includes the results on on-going informal consultation between the Corps of Engineers (Corps) and FWS in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. *et seq.*). This report does not contain the views and recommendations of the Florida Fish and Wildlife Conservation Commission, who will provide a separate FWCA Report on this project. When finalized, this Draft FWCA Report will represent the Secretary of the Interior's views and recommendations to Congress on the Tamiami Trail Project.

The purpose of this Draft FWCA Report is to provide the Corps with the recommendations of the Department of the Interior (DOI) and supporting documentation leading to the selection of a Federally Recommended Plan and Record of Decision for the Tamiami Trail Project to be released as a General Reevaluation Report/Supplemental Environmental Impact Statement (GRR/SEIS) for public review and comment in October 2001. The method used for the selection of the DOI Recommended Plan included an evaluation of environmental and other project objectives in the context of constraints imposed by highway safety, wetland losses, and funding limitations.

Based on an evaluation of the stated environmental objectives (see Figure ES-1) of the project, inclusive of nineteen separate hydrological and ecological performance measures, the DOI concludes that Alternative 5A (Full Causeway), with full removal of the existing Tamiami Trail, is clearly the Environmentally Preferred Alternative. It is the position of DOI that this plan is the most consistent of all alternatives with the intent and stated goals of the 1989 Everglades National Park Expansion and Protection Act (PL 101-229).

Evaluations of Alternative 5A (Environmentally Preferred Alternative) in the context of the fiscal constraints imposed by NPS revealed that construction costs for Alternative 5A exceed the currently available funding by more than seven times. Therefore, DOI was compelled to remove Alternative 5A, as well as five other alternatives, from further consideration due to fiscal constraints. Alternative 1 was also eliminated due to highway safety concerns. Should additional funding be made available, DOI would amend the decision on the current DOI Recommended Plan to reconsider plans that clearly exhibited superior performance for the environmental objectives.

Alternatives retained by DOI were further evaluated for performance to the other, non-environmental, project objectives. Based on these evaluations and in consideration of the relative costs for construction, Alternative 7A was selected as the DOI Recommended Plan. This decision was also made in recognition of future modifications to Tamiami Trail, anticipated as a result of the implementation of projects associated with the Comprehensive Everglades Restoration Plan (CERP). Additionally, DOI does not recommend consideration of any proposed alternatives designed to provide water quality treatment facilities. DOI concludes that the proposed

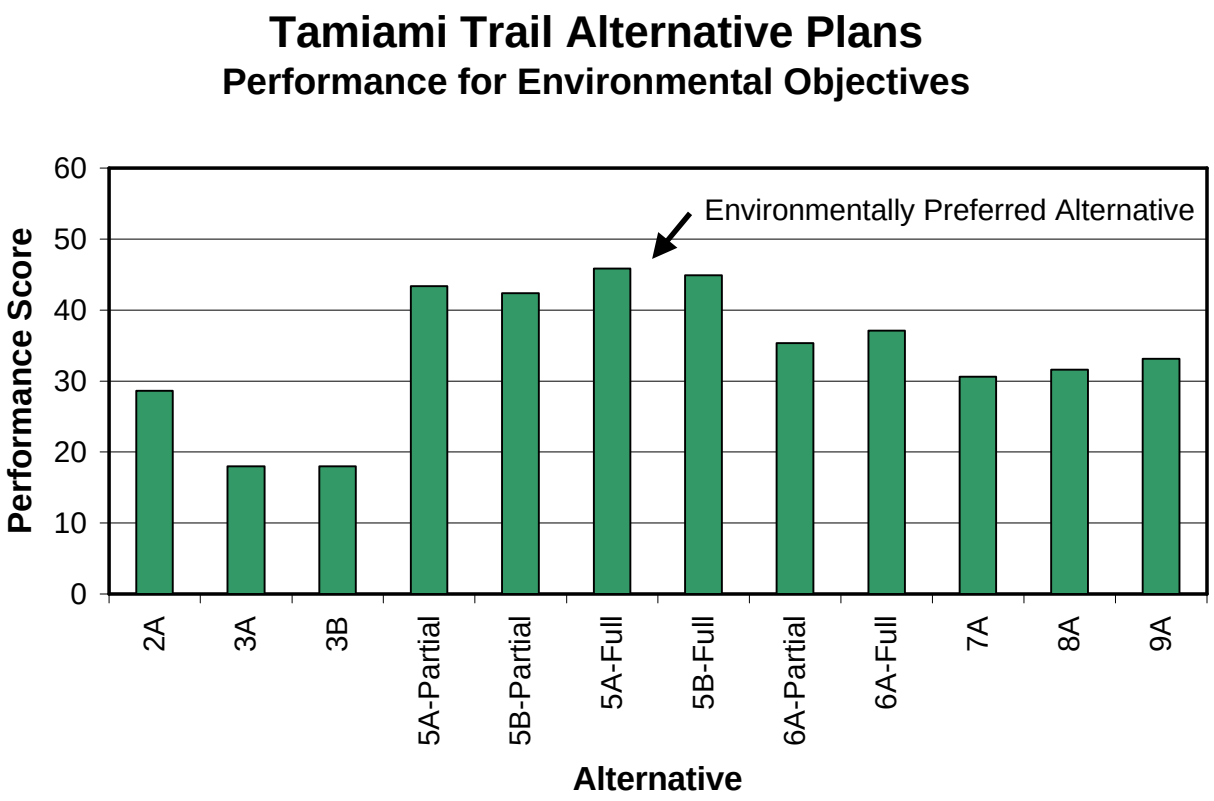

Figure ES-1: Performance for environmental objectives for Tamiami Trail alternative plans.

designs of these facilities result in destruction of wetlands which can be avoided through consideration of alternative designs in the future when the land associated with the L-29 canal and L-29 levee become available as a result of the implementation of CERP projects.

DOI further concludes that the implementation of the Alternative 7A as a MWD Project component must be eventually augmented with additional modifications to Tamiami Trail to attain the level of restoration ultimately desired. These additional modifications can be attained through proper implementation of the CERP Project Decompartmentalization (Phase 1). Given the authority now provided by CERP, DOI strongly recommends the Corps, in conjunction with DOI, jointly recognize the following when considering all proposed modifications to Tamiami Trail:

1. Only limited funding is provided by the MWD Project for modifications to the Tamiami Trail;
2. full restoration of natural flows to Northeast Shark Slough (NESS) and Everglades National Park (ENP) may only be accomplished through the implementation of MWD Project features coupled with the restoration of CERP, once the seepage control features for the projected high water levels in NESS are fully mitigated;

3. additional funding and restoration capability is authorized by CERP Decompartmentalization (Phase 1) for Tamiami Trail and future modifications may occur to Tamiami Trail using this authority that may augment the MWD project features by increasing the ecological connectivity between the Water Conservation Areas and ENP, thereby restoring a more natural sheetflow regime;
4. final CERP features for Tamiami Trail have not yet been identified and any proposed modifications will be analyzed in a public forum consistent with NEPA;
5. without prejudging the results of the Project Implementation Report required by WRDA 2000, the intent of the MWD Tamiami Trail GRR/SEIS and the recommendations contained in this Draft FWCA Report is to maximize the compatibility and avoid retrofitting of the MWD Project features with future CERP features;
6. the intent of the MWD Tamiami Trail GRR/SEIS and the recommendations contained in this Draft CAR is to have a clear design for MWD onto which a CERP design can follow; and
7. the need to accelerate the identification and implementation of the CERP project modifications for Tamiami Trail to better coordinate the planning and eventual construction of the features associated with the unique authorities of MWD and CERP.

DOI also strongly encourages the Corps to pursue all means available to prevent the construction of any features of Alternative 7A that, at present, may be eliminated upon CERP implementation. Specifically, Alternative 7A would raise approximately 10 miles of the existing road by approximately 2 feet through the addition of fill material and asphalt resurfacing. Depending on the plan recommended in the CERP Decompatmentalization (Phase 1) Project, the potential exists for portions of Tamiami Trail raised by the MWD Project to be removed as part of CERP recommended plan. This would result in as much as $16.4 million in MWD Project funding being expended on unneeded features.

Finally, the FWS awaits the Corps' final selection of a Federally Recommended Plan and Biological Assessment in order to complete Section 7 consultation in accordance with the provisions of the Endangered Species Act.

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CHAPTER 1- PURPOSE, SCOPE, AND AUTHORITY

Introduction

The Fish and Wildlife Service (FWS) and the National Park Service (NPS) have prepared this Draft Fish and Wildlife Coordination Act (FWCA) Report as cooperating agencies for the U.S. Army Corps of Engineers' (Corps) General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS). This GRR and SEIS supplement the Corps' 1992 General Design Memorandum (GDM) and Final Environmental Impact Statement, Modified Water Deliveries (MWD) to Everglades National Park (ENP), Miami-Dade County, Florida. The GRR and SEIS analyze and evaluate several alternatives to facilitate the restoration of ecologic function and hydrologic conditions in Northeast Shark Slough (NESS) and the Rocky Glades, as well as provide a flood protection system to address impacts to the Eight and One-half Square Mile Area (8.5 SMA) resulting from the implementation of the MWD Project. The South Florida Water Management District (SFWMD) is the local sponsor for this project. This Draft FWCA Report is provided in accordance the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.). Once the views and recommendations of the Florida Fish and Wildlife Commission (FFWC) have been incorporated into the draft document, a Final FWCA Report will be provided to the Corps that will constitute the Secretary of the Interior's Report to Congress on these proposed modifications to the MWD Project in accordance with Section 2(b) of the Act.

This Draft FWCA Report provides the Department of the Interior's (as the two Department of the Interior agencies involved with this document, NPS and FWS are collectively referred to as DOI in this document) analyses and recommendations pertaining to eight general alternatives, including several variations of these alternatives, proposed for implementation of the Tamiami Trail component of the MWD Project. Chapter 1 describes the purpose, scope, and authority for the Tamiami Trail component of the MWD Project. Contained within this chapter is an explanation of the authority for the MWD Project, a general description of the original 1992 design, as well as the responsibilities and decisions for each of the agencies having a role in the implementation of the Project. This chapter also details the objectives of the Tamiami Trail project component and the performance measures that were used in the evaluation sections of the report. The DOI completed an analysis of the Tamiami Trail alternatives based on these performance criteria under the legislative authorities discussed. Chapters 2, 3, and 4 describe the project's location and the natural resources of particular concern to the FWS and NPS. Chapters 2 and 3 contain an explanation of the existing and future without project conditions. Chapter 4 provides an explanation of the alternatives being considered for implementation. Chapters 5, 6, 7, 8 and 9 include all technical evaluations conducted by DOI. These evaluations focus on the hydrologic analyses, wetland function assessments, wildlife mortality, endangered species evaluations associated with each of the proposed alternatives, and effects on recreational activities. All of these analyses included on the performance measures specified in Chapter 1. Chapter 10 includes evaluations of the alternatives, contained within this portion of the document are numerous matrices that served as the evaluation tool used by DOI in comparing the alternatives. Chapter 11 is

reserved for the views and recommendations of the FFWC. Chapter 11 contains DOI's recommendations and draft position. DOI's draft position is based on the complete set of performance measures, including most of the Corps' performance measures, using the legislative authorities provided DOI as outlined in Chapter 1.

Purpose and Scope of Work

The purpose of this project is to maximize hydrologic and ecologic restoration through the evaluation of alternatives for the Tamiami Trail (US 41) which accommodate increased flows in NESS associated with the restoration of these wetlands through implementation of the Modified Water Deliveries project.

Authority

This project is authorized by Public Law (PL) 98-181 (The Supplemental Appropriations Act, November 30, 1983), PL 99-190 (ENP Protection and Expansion Act, December 13, 1989), and PL 101-229, Sections 102 and 104 (ENP Protection and Expansion Act, December 13, 1989: MWD to ENP).

Modified Water Deliveries Project

Following severe ecological impacts in ENP from droughts in the early 1960's, Congress passed the River Basin Monetary Authorization and Miscellaneous Civil Works Amendments Act of 1970 (PL 91-282), which established a Minimum Water Delivery to ENP. The delivery schedule called for an allocation of 260,000 acre-feet annually from Water Conservation Area (WCA)-3A via the S-12 structures into Shark River Slough to ENP in accordance with a monthly schedule based on water stages in WCA-3A. Through the intervening years, it became apparent that this method of water deliveries to ENP was both unnatural and oftentimes damaging to ENP resources. Excessive amounts of water were still released during flood conditions and the minimum deliveries were insufficient in meeting the park's needs during low water conditions.

As a result of continued damage to ENP resources, the Supplemental Appropriations Act of 1984 (Public Law 98-181) authorized the Secretary of the Army to conduct an experimental program for delivering water to ENP to protect and enhance its unique natural resources. This authorization permitted modification to the schedule of water deliveries from the Central and Southern Florida (C&SF) Project to ENP. However, direct compliance with the language and intent of PL 98-181 was not possible within the timeframe mandated by the Act.

The authorization to continue the experimental water deliveries program was subsequently extended by Congress throughout the years. A General Plan was prepared to develop a strategy for implementation of the authorization and was approved by the Assistant Secretary of the Army (Civil Works) in 1985. The General Plan recommended the preparation of a GDM and Environmental Impact Statement (EIS), addressing a MWD plan necessary to improve water deliveries

to ENP.

On 13 December 1989, the ENP Protection and Expansion Act became law (P. L. 101–229). This Act added NESS and the East Everglades to ENP. It also authorized the Secretary of the Army, in consultation with the Secretary of the Interior, to design and construct modifications to the C&SF Project. The purpose of these modifications was to improve delivery of water into ENP and, to the extent practicable, restore the natural hydrologic conditions. The Secretary of the Army was to base the modifications upon the findings of the Secretary of the Army's experimental program for delivering water to ENP, which Congress originally had authorized in 1984 (P. L. 98–181). This Act directed the Secretary of the Army to set forth the proposed modifications to the C&SF Project in a GDM entitled "Modified Water Deliveries to Everglades National Park".

1992 General Design Memorandum and Needs for Design Reevaluations

When the Corps released the GDM and EIS in 1992 addressing the modifications to the C&SF Project, the GDM specified modifications consisting of two general components: (1) conveyance and seepage control features and (2) the 8.5 SMA flood mitigation features. Since the completion of the 1992 GDM, considerable redesign work has occurred for these MWD components. In December 2000, the Corps issued a Record of Decision (ROD) for the selection of an alternative plan for the 8.5 SMA flood mitigation component. The Corps also completed a Value Engineering document in January 2001 identifying an alternative design to the original conveyance and seepage control features. These modifications to the 1992 GDM also underscore the need to conduct evaluations of the Tamiami Trail in a manner to ensure compatibility with the revised designs of the MWD Project components.

The conveyance components proposed in the GDM were designed to redirect water from WCA-3A and 3B into NESS under normal conditions of flow. The Corps also determined that the conveyance components of the project would raise water levels within WCA-3B and NESS. Consequently, the Corps also recognized that this would result in an increase in the stage within the L-29 canal and potential impacts on the Tamiami Trail. However, the modifications recommended by the Corps for improving Tamiami Trail were restricted to those portions of the roadway adjacent to the S-334 spillway. Specifically, the 1992 GDM called for elevating the S-334 structure's spillway (located at the eastern end of Tamiami Trail) from 14.0 feet to 17.4 ft-NGVD, and elevating 1,500 feet of the highway on each side of S-334 (for a total of 3,000 feet) from 10.6 to elevations varying up to 17.4 ft-NGVD, in order to protect the highway from increased stages in the L-29 borrow canal, which were projected to rise periodically to 10 ft-NGVD. Improvements to the S-334 spillway would allow for water levels to increase to 14.5 ft-NGVD under Standard Project Flood conditions west of the structure while still maintaining the tailwater stage on the east side of the structure at 5.0 ft-NGVD.

In addition, significant progress has been made in the collection and analysis of hydrologic and biological data from Everglades research resulting in more effective scientific modeling analy-

sis. New information regarding shifts in vegetation composition and dominance, hydropatterns, and transportation and assimilation of nutrients in south Florida ecosystems has been discovered. These scientific and engineering advancements have allowed a greater understanding of the restoration requirements of the ecosystem and also merit the reevaluation of the structural and operational features of existing projects such as the MWD Project.

Tamiami Trail Component of the Modified Water Deliveries Project

The portion of Tamiami Trail evaluated in this Draft FWCA Report is an eleven-mile stretch of the road between the L-31N canal and the L-67 extension canal, located immediately south of the L-29 canal. Figure 1.1.

Goals of the Tamiami Trail Component of the Modified Water Deliveries Project

The overall goal for the Tamiami Trail Project is to maximize hydrologic and ecologic restoration through modifications to the existing roadway to allow for more natural flow conditions in a manner that is compatible with the restoration requirements of the 1989 ENP Protection and Expansion Act. It is also desirable to ensure compatibility with ongoing restoration projects, such as the C–111 Project and future components of the Comprehensive Everglades Restoration Plan (CERP). Recognizing this overall goal, several objectives have been identified for the Tamiami Trail Project.

Listed below are the Objectives and Performance Measures for the Tamiami Trail Component of the MWD Project. DOI will utilize these Objectives and associated Performance Measures to select an environmentally preferred alternative and to provide DOI recommendations in the draft and Final FWCA Reports for the Tamiami Trail Project.

Tamiami Trail Component of the Modified Water Delivery Project Objectives and Performance Measures

At the December 4-5, 2000, interagency meeting considerable effort was expended to reach consensus on a set of Project Objectives and related Performance Measures for the Tamiami Trail Project. The DOI provided considerable input during this process. Below is the final set of Objectives and Performance Measures selected as most appropriate by DOI. The Objectives have bee divided into Environmental Objectives and Other Project Objectives. DOI will use these criteria to rank and select a preferred alternative and to provide other recommendations in the Final FWCA Report.

Environmental Objectives are project objectives that DOI considers to potentially provide significant environmental enhancement consistent with the project authorizing legislation or other

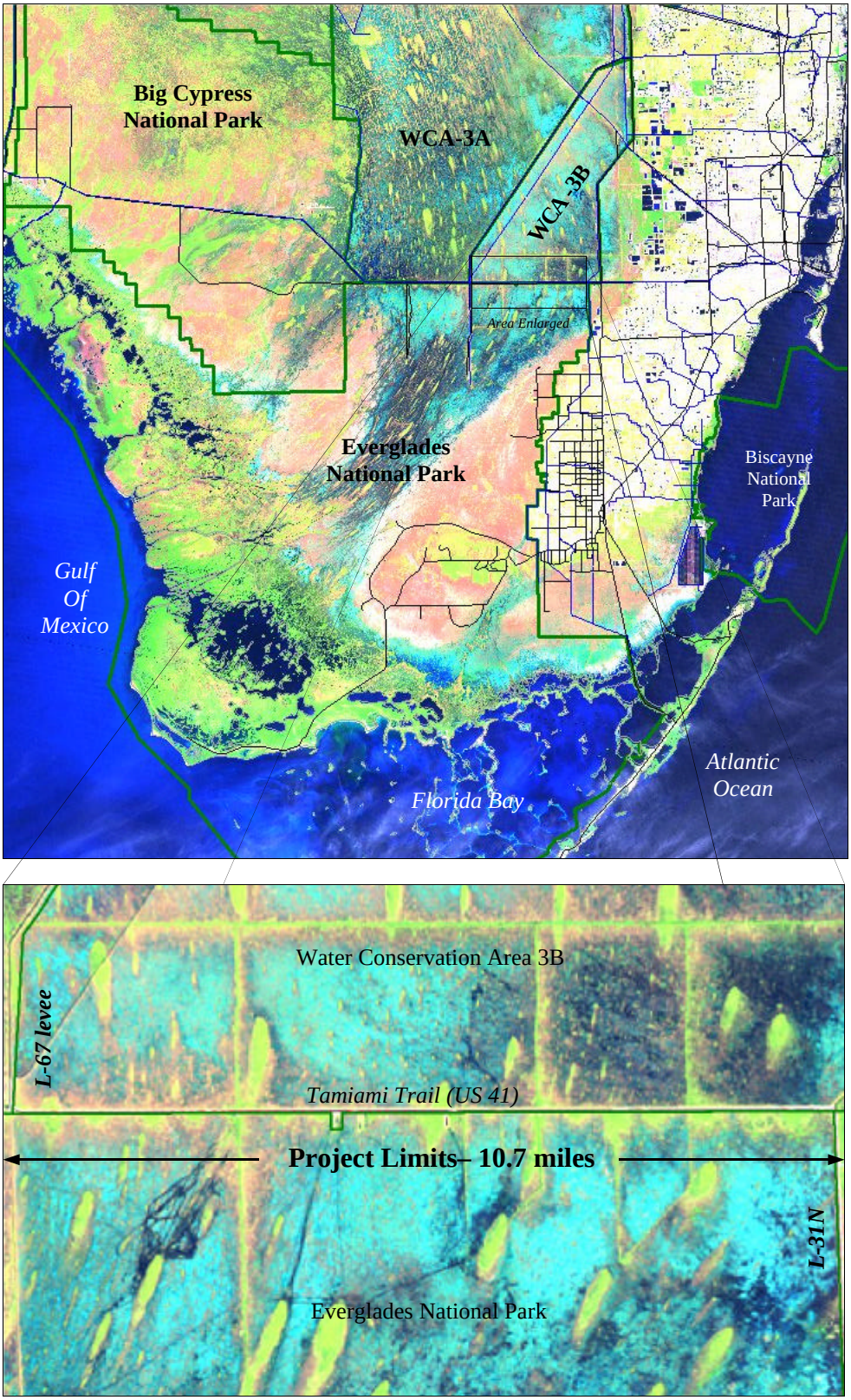

Figure 1.1. Regional and detailed project area map.

statutory requirements. Other Project Objectives are objectives that DOI considers to have the potential to maximize the overall benefits of the project but do not contribute significantly to environmental enhancement or restoration. Performance Measures are qualitative or quantitative criteria of how well a given objective has been met.

Environmental Objectives and Performance Measures

1. Minimize adverse effects to federally listed species with the Endangered Species Act (snail kite, wood stork, Eastern indigo snake).
   A. Linear feet of impact to the primary and secondary zones of the eastern wood stork colony
   B. Linear feet of impact to the primary and secondary zones of the western wood stork colony
   C. Linear feet of impact to snail kite nesting locations
   D. Number of days of construction restrictions in the primary and secondary zones of the eastern wood stork colony due to nesting and fledging
   E. Number of days of construction restrictions in the primary and secondary zones of the western wood stork colony due to nesting and fledging
   F. Implement Standard Construction Precautions for eastern indigo snake

2. Meet the Reasonable and Prudent Alternatives (RPA) for the Cape Sable seaside sparrow (CSSS) as specified in the FWS Biological Opinion (BO) of February 1999
   A. Design flow passing under the eastern section of Tamiami Trail (between the S-334 and the L-67s) meets 60 percent of the regulatory portion of the rainfall formula derived total flows across the Tamiami Trail

3. Minimize adverse effects to state listed endangered or threatened species of special concern consistent with State Statutes
   A. Impact to Frog City Wading Bird Colony Buffer Zone
   B. Distance from the Frog City Wading Bird Colony

4. Allow for restoration consistent with the 1989 ENP Protection and Expansion Act
   A. NESS Stage: Maintain the level and frequency of stage as modeled by the 8.5 SMA MODBRANCH model D13R 1995 simulation (D13R_C111_356_1995_95ops)
   B. Water Deliveries to ENP: Maintain a discharge capacity equivalent to historical (1939-1963 bridge flows) 1/10 year event, or 4458 cfs (equivalent to about a 1/200 year event according to SFWMM D13R derived return frequencies)
   C. Area with affected flow magnitude
   D. Difference between average velocity at the road and average velocity in the marsh

5. Enhance and restore ecological function
   A. Wetland function units gain or loss
   B. North/South connectivity between WCA-3B and ENP for aquatic fish and wildlife
   C. Exotic and nuisance vegetation removed

D. Reduction in wildlife mortality

6. Minimize permanent loss of wetlands in ENP and WCA-3B
   A. Wetland permanently lost in ENP
   B. Wetlands permanently lost in WCA-3B

Other Project Objectives and Performance Measures

1. Ensure no reduction in authorized flood control benefits
   A. Acres with altered flood protection

2. Maximize compatibility with future restoration actions
   A. Cubic yards of fill requiring removal to achieve completely unobstructed flow path (including removal of L-29 levee)
   B. Ability to accommodate additional flow capacity required by currently authorized CERP project features
   C. Ability to accommodate flow volume of 245,000 ac ft. as described in Sec. 601G of WRDA 2000

2. Maximize consistency with other Modified Water Deliveries components
   A. Ability to meet implementation schedule (satisfies RPA requirements)
   B. Construction duration and implementation time (construction completed by 2005)

3. Minimize impacts associated with construction
   A. Total duration of construction as measured in months
   B. Allows for turbidity control

4. Minimize adverse socio-economic effects
   A. Noise impacts to the Miccosukee Tiger Tail Camp
   B. Noise impacts to the Miccosukee Osceola Camp
   C. Provide access to Miccosukee Tiger Tail Camp
   D. Provide access to Miccosukee Osceola Camp

5. Minimize recreational effects
   A. Miles of available bank fishing
   B. Number of accessible boat ramps
   C. Miles of available culvert outfall fishing
   D. Sightseeing opportunities (1 poor-5 excellent)
   E. Maximum months of disruption due to construction

Corps of Engineers' Responsibilities and Decisions for Identification of Alternative Design

As described above, the 1989 ENP Protection and Expansion Act authorized and directed the

Corps (through the Secretary of the Army) to design and construct modifications to the C&SF Project. The purpose of the modifications is to improve the delivery of water into ENP and, to the extent practicable, take steps to restore ENP's natural hydrological conditions. In order to meet the requirements of the 1989 Act, the Corps has determined that modifications must now be made to the Tamiami Trail to ensure that the components of the MWD Project can be operated in a manner that is consistent with the project purpose.

Before the Corps can implement any proposed modifications to the C&SF Project, those modifications must be evaluated and disclosed under the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq*.). Due to its responsibilities for designing and constructing modifications to the C&SF Project, the Corps has assumed the lead agency's role for the analysis of proposed modifications to the Tamiami Trail under NEPA. In the role as lead agency, the Corps determined the proposed modifications potentially would have a significant effect on the human environment and the NEPA analysis would have to be documented in a SEIS.

As the lead agency, the Corps has the ultimate responsibility for the content of the SEIS. However, the SEIS is supposed to use the environmental analysis and recommendations of cooperating agencies with jurisdiction by law or special expertise to the maximum extent possible, consistent with the Corps' own responsibilities as lead agency (Section 1501.6(a)(2) of NEPA). If the lead agency leaves out a significant issue or ignores the advice and expertise of a cooperating agency, the EIS may be found later to be inadequate (CEQ 1981). This CAR contains the results of the FWS' and NPS' primary environmental analyses and recommendations regarding hydrological and ecological effects of the alternatives on ENP and fish and wildlife resources in the study area.

As discussed previously, the Corps released a GDM, Final EIS, and ROD on the MWD Project in 1992. Since the project was authorized in 1989 and the design approved in 1992, various concerns about the discharge capacity and elevation of the Tamiami Trail have arisen necessitating reconsideration of the Tamiami Trail component of the MWD Project. Much of the concern with the 1992 GDM design resulted from new information resulting from the extensive hydrologic modeling done in conjunction with the development of the conceptual plan for the CERP. This regional-based modeling enabled a more accurate characterization of the restoration requirements of the ecosystem.

Upon completion of this supplemental NEPA analysis, the Corps will issue a ROD after full consideration of all viewpoints. The ROD will identify the alternative selected by the Corps for implementation.

Department of the Interior's Responsibilities and Decisions for Identification of Alternative Design

Authority for the involvement of the DOI in the SEIS originates from various laws, agreements, and regulations. Each of these laws, agreements, and regulations are described below.

1989 ENP Protection and Expansion Act and Interagency Agreement for Project Implementation

The 1989 ENP Protection and Expansion Act authorizes the Secretary of the Army, in consultation with the Secretary of the Interior, to design and construct modifications to the C&SF Project. Consultation with the Secretary of Interior is needed because the specific purpose of the MWD Project is to benefit ENP's ecological resources, including federally listed threatened and endangered species. Since the MWD Project is dependent on the Tamiami Trail Project to be completely functional, DOI is providing this CAR to represent the Department's position and recommendations on the Tamiami Trail Project.

The Endangered Species Act

The Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) (ESA) specifically requires consultation and coordination between the Corps and the FWS. The ESA requires federal agencies to consult with the FWS and National Marine Fisheries Service regarding any effects that a federal action may have on federally listed threatened or endangered species or those proposed for listing as threatened or endangered. Section 7(a)(2) states that each Federal agency shall, in consultation with the Secretary of the Interior, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a federally listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency is to use the best scientific and commercial data available (FWS 1998). This section of the ESA sets out the consultation process, which is further implemented by regulation (50 CFR §402).

The FWS has determined several species listed as threatened or endangered occur or potentially occur in the study area. They include the snail kite (*Rostrhamus sociabilis*), wood stork (*Mycteria americana*), Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), Florida panther (*Felis concolor coryi*), and Eastern indigo snake (*Drymarchon corais couperi*).

Fish and Wildlife Coordination Act

The FWCA mandates coordination with the Corps regarding fish and wildlife resources. Both NPS and FWS have collaborated to provide this Draft FWCA Report because many of the fish and wildlife resources associated with the project are within ENP. The purpose of the FWCA is to recognize the contribution of these resources to the nation, the increasing public interest and significance thereof due to expansion of our national economy and other factors, and to provide that the conservation of fish and wildlife receives equal consideration and be coordinated with other features of water-resources development programs. The Secretary of the Interior, through the FWS, is authorized to assist and cooperate with federal, state and public or private agencies and organizations in the conservation and rehabilitation of fish and wildlife resources. The FWCA provides that whenever the waters of any stream or other body of water are proposed to be impounded, diverted, the channel deepened or otherwise controlled or modified, the Corps shall consult with the FWS and the agency administering the fish and wildlife resources of the

state (Corps 1998). The consultation shall consider conservation of wildlife resources with the view of preventing loss of and damages to such resources as well as providing for development and improvement in connection with such water resources development (Corps 1998).

Any reports and recommendations of these fish and wildlife agencies shall be included in authorization documents for construction or for modification of projects. The Corps shall give full consideration to the reports and recommendations of these fish and wildlife agencies and include such justifiable means and measures for wildlife mitigation or enhancement as the Corps finds should be adopted to obtain maximum overall project benefits (Corps 1998).

The National Environmental Policy Act

To facilitate the required consultation and coordination with DOI, the Corps has included both agencies (FWS and NPS) as cooperating agencies for the SEIS under the authority of NEPA. In addition to the responsibilities described above, the Council on Environmental Quality's (CEQ) regulations and guidelines for implementing NEPA confer specific rights and responsibilities to agencies functioning as cooperating agencies in the NEPA process. A cooperating agency is any agency, other than a lead agency (Corps in this case), that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action that might significantly affect the quality of the human environment. Where cooperating agencies have their own decisions to make and they intend to adopt the EIS and base their decisions on it, one document should include all of the information necessary for the decisions by the cooperating agencies (CEQ 1981). The Secretary of the Interior, through ENP and the FWS, intends to make a recommendation to the Corps on the project and alternatives analyzed in the SEIS.

Water Resources Development Act of 2000

Title V1, Sec 601 of the Water Resources Development Act of 2000 (WRDA 2000) authorizes 15 projects of CERP; 4 Pilot Projects, 10 Initial Projects, and 1 adaptive management project. Projects were selected based on their ability to, 1) provide immediate water quality and flow benefits; 2) use land already purchased; 3) link ongoing projects; and 4) maximize federal investments. Included as one of the initial projects is the modification to the Tamiami Trail (Sec 601. subsec. b, paragraph 2, subpar. C, item viii) , requesting that the eastern portion of the Tamiami Trail be raised and outfitted with bridges.

All Pilot Projects are subject to the constraints outlined in sub-paragraph D of the same section. Specifically, in regards to the modifying the Tamiami Trail, no appropriation will be made which would construct the WCA-3A Decompartmentalization and Sheetflow Enhancement Project until the completion of the MWD Project.

Executive Orders

Executive Orders (EOs) 11988 (Floodplain Management) and 11990 (Protection of Wetlands)

require federal agencies to evaluate the likely impacts of actions to floodplains and wetlands. The objectives of the EOs are to avoid, to the extent possible, the long-term and short-term adverse impacts associated with occupancy, modification, or destruction of floodplains and wetlands and to prevent development and new construction in such areas wherever there is a practicable alternative.

To document its evaluation for these EOs, the NPS prepares a Statement of Findings (SOF) that presents the purpose of the proposed project and documents the anticipated effects on wetlands and floodplains. ENP will prepare a SOF for the new alternatives for Tamiami Trail Project currently being evaluated and documented in the SEIS.

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CHAPTER 2- AREA SETTING

Project Location

Tamiami Trail (U.S. Highway 41) lies in the area of the Eastern Everglades biogeographical subregion and is located in southwest Miami-Dade County (see Figure 1.1, Chapter 1). The project area includes approximately 11 miles of the eastern portion of U.S. 41 between the S-334 Structure on the east and the S-333 Structure on the west. The area is bounded by Water Conservation Area (WCA) 3B on the north and Everglades National Park (ENP) on the south. U.S. 41 is directly proximal to ENP to the south and the L-29 Canal and Levee to the north.

Description of Study Area

The study area, historically a mosaic of sawgrass prairies and emergent marshes interspersed with tree islands, lies at the headwaters of Northeast Shark Slough (NESS). ENP lands within the study area to the south of Tamiami Trail are pristine natural areas consisting of sawgrass prairie interspersed with hardwood hammock tree islands. Immediately to the north of Tamiami Trail lies WCA-3B, which also consists of pristine Everglades habitat. Except for several north-south ditches excavated in WCA-3B by agricultural interests in the early 1900's, the landscape is relatively pristine and is managed by the Florida Fish and Wildlife Commission as a Wildlife Management Area.

Wetlands within the study area are infested to varying degrees with exotic vegetation such as Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina* spp.), *Melaleuca quinquenervia*, common reed (*Phragmites australis*), and Napier grass (*Pennisetum purpureum*). Exotic infestation is most evident along the perimeter of the U.S. 41 corridor and adjacent disturbed areas where dredge and fill activities have taken place.

There are two Miccosukee Indian camps in the study area, one on the south side of Tamiami Trail (Osceola Camp) and the other on the north side of the L-29 Canal (Tiger Tail Camp). In addition, the Airboat Association of Florida site will remain active after the project is completed.

History of Tamiami Trail

In 1915, under the authority of the newly formed Central Highway Commission, Dade County tax assessor Captain J.F. Jaudon spearheaded a plan for a road connecting Tampa and Miami. The project became known as the Tamiami Trail.

At the time, Florida's policy on road development forced communities to sell bonds as the means of financing construction projects within their districts. Consequently, districts with small populations were unable to raise adequate funds for completing construction within their boundaries, a problem which by 1921 forced the abandonment of large sections of the trail.

Frustrated by the lack of financial support a group, nicknamed the "Tamiami Trail Blazers", set out to cross the incomplete trail with the intention of raising support and proving that a west-east route could be a realized. Support came shortly after from Barron Collier; a wealthy advertiser from Tennessee and owner of 900,000+ acres in southwest Florida. Mr. Collier offered forth $350,000 and the use of his construction company, and once again get the project steamed forward.

Constructed on the trail proved to be a formidable task. Using a walking dredge (Figure 2.1); a machine capable of digging a 24 x 12-ft deep canal, construction progressed at an average speed of 1.1 miles per month through peat, muck, and limestone. Accompanying the dredge were mobile shelters to house workers and supplies, and blasting rigs for drilling holes and placing dynamite (Figure 2.2). The excavated debris would them be piled to form a roadbed three to six feet above the surrounding landscape.

Figure 2.1. Walking Dredge

Figure 2.2. Blasting Rig 1924

The Tamiami Trail was officially opened in 1928, complete with scarlet tunic clad motorcycle patrolmen and archway (Fig 2.3). A motorcade of 500 dignitaries was the first to travel from Tampa to Everglades City, then onward to Miami; a trip which prior to the completion of the trail would have taken 2 days by boat.

To overcome the constraint the road caused to water flow, a major engineering effort was undertaken in the mid-1940's with the construction of 38 bridges (21 within the MWD project area). Each bridge measured 45-ft long and was spaced 1/2 mile apart. These bridges were replaced in the early 50's with the current system of culverts.

Recently, the Tamiami Trail Scenic Highway Corridor Advocacy Group successfully lobbied for a State Scenic Highway designation for a 50-mile portion of the Tamiami Trail in Collier County. This designation was followed by the Federal designation of National Scenic Byway.

Figure 2.3. Tamiami Trail Archway 1928 marking the Collier-Dade County line

Hydrological Description

Prior to the construction of the Central and Southern Florida Project (C&SF) features, water deliveries to Shark Slough occurred through unimpeded sheet flow. Figure 2.4 illustrates the distribution of flows to the Shark Slough of ENP based on the available period of record. Prior to completion of the C&SF Project features in the WCA's, more than half (57%) of the water deliveries were made to NESS. Following the completion of L-67 and L-29 , much of the water was directed to Northwest Shark Slough (NWSS) and the percent discharge to NESS dropped to 25% for the POR 1963-1997.

Figure 2.5 illustrates the shift to the west of water releases across Tamiami Trail during this period. During the wet season, this distribution has resulted in drier than natural conditions in NESS and wetter conditions in NWSS. The hydrologic conditions following implementation of the Comprehensive Everglades Restoration Plan as represented by the D13R simulation of the South Florida Water Management Model, shows that the removal of the L-29 levee and borrow canal combined with opening up the road to north-south flows will result in a more natural distribution of flows to ENP. Under the Modified Water Deliveries Project (Tamiami Trail Component), the road will be opened up to north-south flows but the canal and levee (with 3 breaches) will remain, and the degree of restoration of NESS may be less than that demonstrated by the D13R simulation.

Ecological Description

Vegetation

Historically, most lands within the study area were herbaceous wet prairies dominated by saw-

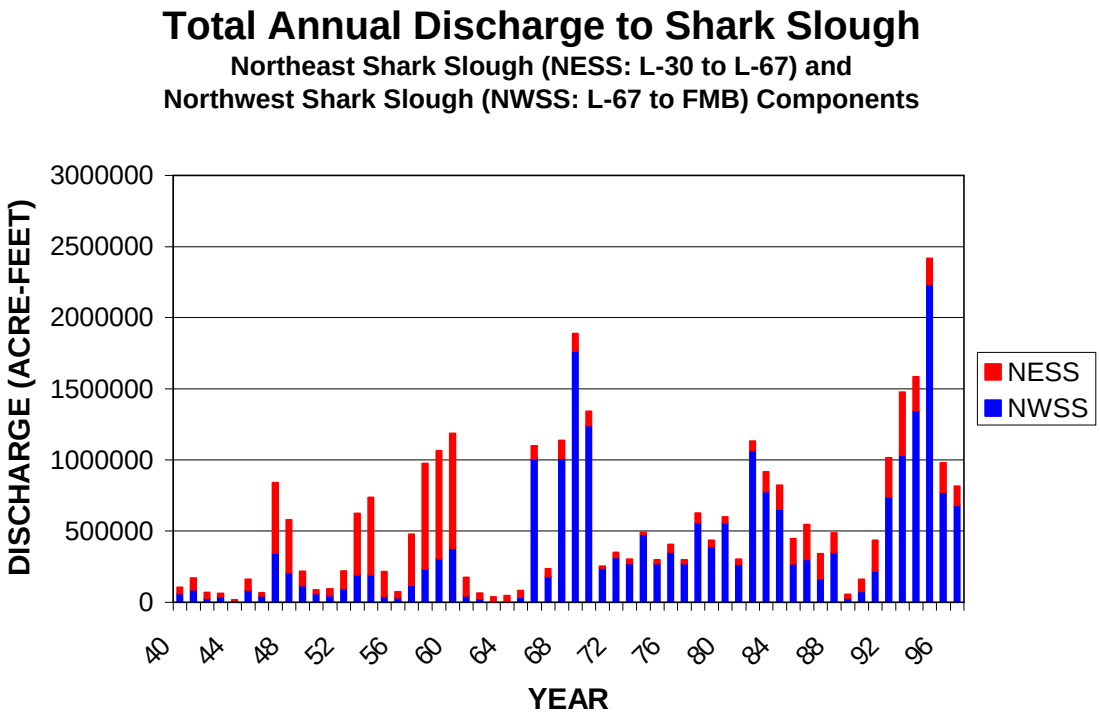

Figure 2.4. Total annual discharge to NESS and NWSS for the period of record, 1940-1997.

grass, Other common native species found on these wet prairies include, but are not limited to arrowhead *(Sagittaria lancifolia)*, spider lily (*Hymenocallis latifolia*), swamp lily (*Crinum americanum*), beakrush *(Rhyncospora* spp.), spikerush (*Eleocharis atropurpurea*), maidencane (*Panicum hemitomum*), Ludwigia (*Ludwigia repens*), primrose willow (*L. peruviana*). Information recorded from surveys conducted December 1999 identified sawgrass, arrowhead, beakrush (*R. tracyi*), spikerush, various bladderworts (*Utricularia* sp.), panic grass (*Panicum tenerium*), saltmarsh aster (*Aster tenuifolia*), bluestem (*Schizachrium* sp.), goldenrod (*Solidago* sp.), and pickerel weed (*Pontederia* sp.) in long hydroperiod graminoid wet prairies.

Forested wetlands consist of bayheads and willowheads. Species typical of bayheads in the study area include: red bay (*Persea palustris*), swamp bay (*Magnolia virginiana*), myrsine (*Myrsine guianensis*), wax myrtle (*Myrica cerifera*), dahoon holly (*Ilex cassine*), pond apple (*Annona glabra*), poisonwood (*Metopium toxiferum*), buttonbush (*Cephalanthus Occidentalis*), and willow (*Salix caroliniana*). Tropical hardwood species such as strangler fig *(Ficus aurea*), stopper (*Eugenia* sp.) and cocoplum (*Chrysobalanus icaca*) have established on the higher elevations with species indicative of bayheads and willowheads in the lower elevations and around the margins of the tree islands.

Along the edge of both the north and south sides of the Tamiami Trail corridor, invasive exotic species such as Brazilian pepper form a long, discontinuous and narrow (e.g. 20-foot wide) fringe.

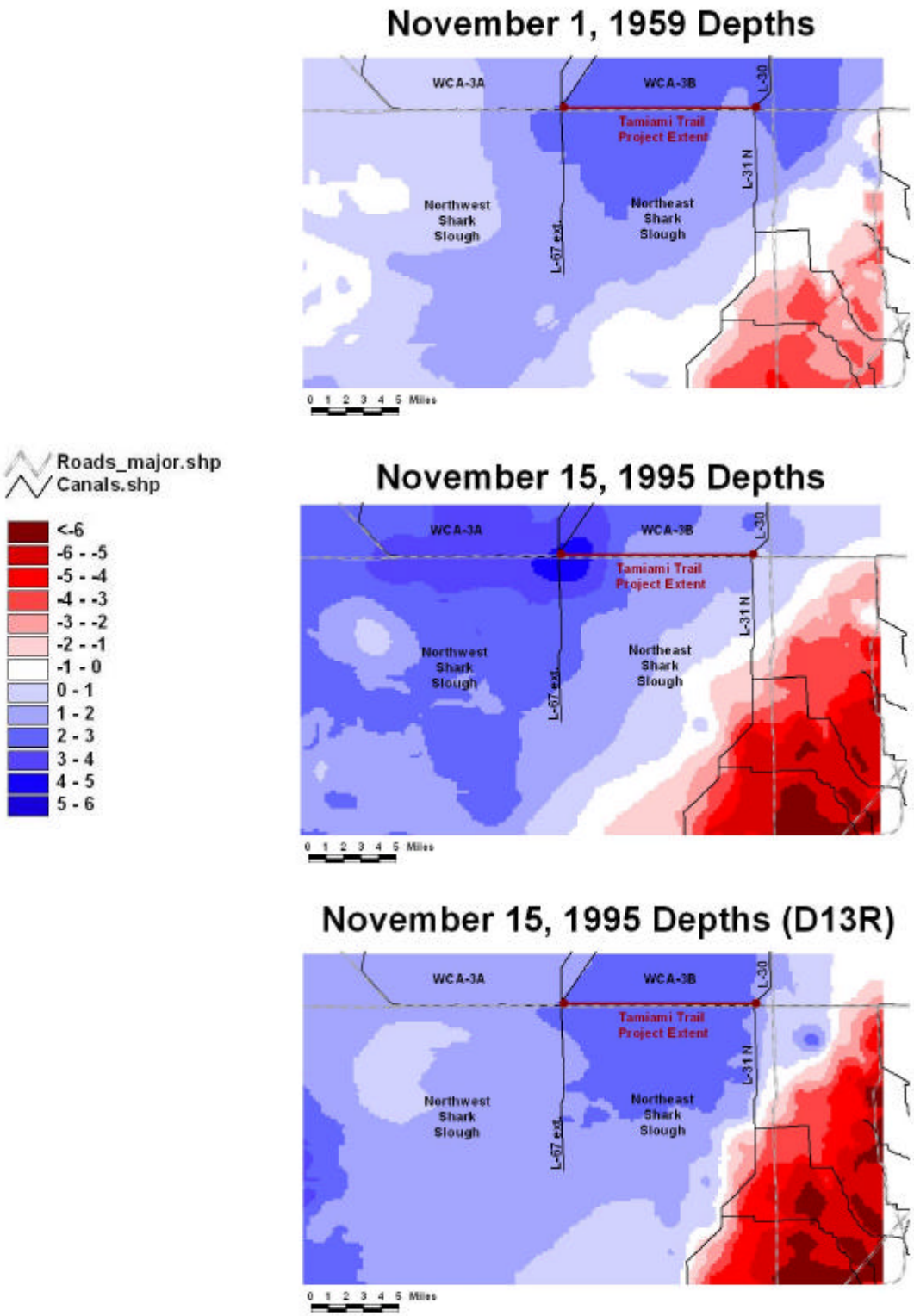

Figure 2.5. Water depth contour maps demonstrating changes in distribution of water releases across Tamiami Trail in 1959 and 1995, and under proposed restoration conditions.

Fish and Wildlife Resources

Avifauna

Avian diversity in this region of south Florida is high. Common aquatic species include double-crested cormorant (*Phalacrocorax auritus*), mottled duck (*Anas fulvigula*), anhinga (*Anhinga anhinga*), limpkin (*Aramus guarauna*), great blue heron (*Ardea herodias*), cattle egret (*Bubulcus ibis*), green heron (*Butorides striatus*), little blue heron (*Egretta caerulea*), black-crowned night heron (*Nycticorax nycticorax*), snowy egret (*E. thula*), great egret *(E. alba*), white ibis, (*Eudocimus albus*), and glossy ibis (*Plegadis falcinellus*). Common blackbirds found here include red-winged blackbird (*Agelaius phoeniceus*), common grackle (*Quiscalus quiscula*), boat-tailed grackle (*Q. major*), and brown-headed cowbird (*Molothrus ater*). Raptors found in the study area include the red-shouldered hawk (*buteo lineatus*), red-tailed hawk (*B. Jamaicensis*), marsh hawk (*Circus cyaneus*), black-shouldered kite (*Elanus caeruleus*), swallow-tailed kite (*Elanus forficatus*), turkey vulture (*Cathartes aura*), and black vulture (*Coragyps atratus*). Other common birds expected to be found along the Tamiami Trail corridor include northern cardinal (*Cardinalis cardinalis*), cedar waxwing (*Bombycilla cedrorum*), yellow-billed cuckoo (*Coccyzus americanus*), black-throated warbler (*Dendroica caerulescens*), yellow-rumped warbler (*D. Coronata*), prairie warbler (*D. Discolor*), palm warbler (*D. Pamarun*), mockingbird (*Mimus polyglottos*), house sparrow (*Passer domesticus*), rufous-sided towhee (*Pipilio erythrophthalmus*), American robin *(Turdus migratorius*), Carolina wren (*Thryothorus ludovicianus*), house wren (*Troglodytes aedon*), western kingbird (*Tyrannus verticalis*), white-eyed vireo (*Vireo griseus*), and the non-native european starling (*Sturnus vulgaris*).

Mammals

Aquatic mammals inhabiting the study area include the Everglades mink (*Mustela vison evergladensis*), river otter (*Lutra canadensis*), water rat (*Neofiber alleni*), marsh rabbit (*Sylvilagus palustris*). Terrestrial mammals include the bobcat (*Lynx rufus*), whitetail deer (*Odocoileus virginianus*), domestic dog (*Canis domesticus*), opossum (*Didelphis marsupialis*), striped skunk (*Mephitis mephitis*), house mouse (*Mus musculus*), cotton mouse (*Peromyscus gossypinus*), raccoon (*Procyon lotor*), black rat *(Rattus rattus*), hispid cotton rat (*Sigmodon hispidus*), eastern cottontail (*Sylvilagus floridanus*), and grey fox (*Urocyon cinereoargenteus*). Other mammals in the area include the nine-banded armadillo (*Dasypus novemcinctus*), eastern yellow bat (*Lasiurus intermedius),* evening bat (*Nycticeius humeralis*), rice rat (*Oryzomys palustris*), eastern mole (*Scalopus aquaticus*), spotted skunk (*Spilogale putorius*), and freetail bat (*Tadarida brasiliensis*).

Fish, amphibians and other aquatic animals

During surveys conducted by the Wetland Rapid Assessment Procedure Team, some small fish were recovered: least killifish (*Fundulus chrysotus*.), sailfin molly (*Poecilia latipinna*), pygmy sunfish (*Elassoma evergladei*), and mosquito fish (*Gambusia* sp.). Only mosquito fish were found in abundance. One species of frog (*Hyla* spp.) was observed frequently throughout sur-

veys within the wetlands, while leopard frogs (*Rana* spp.) were observed less frequently. Aquatic invertebrates were abundant and representative of Everglades wetland complexes. Common invertebrates identified include: gyrinid water beetle (*Gyrinus* spp.), giant water bug (*Belastoma* sp.), water strider (), mayfly (Order Ephemeroptera), water tiger (Order *Coleoptera*: *Dyticidae*), aquatic spiders (*Dolomedes* spp.), backswimmers (Order *Hemiptera: Corixidae*).

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CHAPTER 3- NATURAL RESOURCE CONCERNS

Wetland Loss Concerns

The Fish and Wildlife Service (FWS) and National Park Service (NPS) are greatly concerned that the existing footprint of disturbance of the US 41/L-29 Canal and Levee would be widened with the implementation of those alternatives that encroach into Everglades National Park (ENP) or Water Conservation Area (WCA) 3B. The US 41 highway/canal corridor has bisected the headwaters of Shark Slough, drastically altering hydrology and ecological connectivity. We estimate that this disturbance is approximately 400 ft wide and 11 miles long, encompassing an estimated 530 acres of historic Everglades. At the same time, this project is authorized as a restoration project, designed to restore the hydrology and ecology of ENP, and plans are underway to further restore US 41/L-29 Canal and Levee in the Comprehensive Everglades Restoration Plan (CERP) Decompartmentalization Project scheduled to begin this Spring. Therefore, any alternative that significantly *increases* wetland loss is viewed as contrary to both the authorized Modified Water Deliveries (MWD) restoration goals and the long-term CERP goals.

Fish and Wildlife Concerns

The four most important wildlife-related planning considerations for the Tamiami Trail Project are: 1) restoring fish and wildlife connectivity through the Tamiami Trail corridor between ENP and WCA-3B; 2) reducing wildlife highway-related mortality; 3) protecting nesting wading bird colonies, including State and Federally-listed species; and, 4) eliminating water quality degradation in the downstream receiving waters of ENP.

Regarding endangered wood storks, any alternative that would involve permanently moving this highway corridor into ENP would adversely affect the Tamiami West and East wood stork colonies. The Tamiami West colony is close to the highway, situated 300 feet south of the existing highway alignment in a pond apple forest. The Tamiami West Colony, in particular, is currently the largest wood stork colony in the southeast Everglades (over 1,300 wood storks, as well as other herons, egrets and ibis nested at the colony site last nesting season). Traffic noise, human disturbance, and potential mortality become factors affecting the long-term viability of these colonies. Therefore, permanent encroachment towards these colonies should be avoided.

Similarly, any alternative that permanently shifted the highway corridor to the north would result in encroachment towards endangered snail kite nesting sites. Based on recent nesting survey information, snail kite nesting is increasing in southeastern WCA-3B. This alternative would also eliminate snail kite foraging habitat. Site visits during the past three months by Wetland Rapid Assessment Procedure (WRAP) Team members conducting wetland functional assessments has documented snail kite foraging activity in the wetlands immediately north of the L-29 Levee. For example, on November 14, 2000, seven snail kites were observed foraging/perching within 500 feet of the L-29 Levee.

Restoring wildlife connectivity across the Tamiami Trail corridor between the ENP and the WCAs is also of major concern. The wildlife mortality survey described in this report attests to the need for protective barriers, wildlife underpasses, and land bridges over the L-29 canal to provide connectivity for wildlife moving north a south through the study area. These wildlife features are recommended to be included as project features in the Federally Preferred Plan

Integration with Other Modified Water Deliveries Components

As stated in the 1989 ENP Protection and Expansion Act, the primary purpose of the MWD Project is to restore, to construct modifications to the Central and Southern Florida Project to improve water deliveries into ENP and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park. As stated earlier, the three components of the project are conveyance and seepage control, the 8.5 SMA, and Tamiami Trail. Since the attainment of the overall purpose of the project requires successful integration of the components, alternatives designed for Tamiami Trail must be compatible with the other two components. For this reason, the FWS and NPS evaluated the performance of each Tamiami Trail alternative for performance related to the compatibility with the other MWD project features (Other Project Objective #3, Performance Measure A). Of primary concern in the evaluation of this particular performance measures whether the proposed alternatives were consistent with the Northeast Shark Slough stage requirements used to identify the recommended plan for the 8.5 SMA as well as the flow requirements identified in the seepage control and conveyance hydrologic modeling.

Comprehensive Everglades Restoration Plan Compatibility

CERP is the most ambitious ecosystem-related project ever proposed. With a total cost of nearly $8 billion, the U.S. Army Corps of Engineers (Corps), in cooperation with the South Florida Water Management District (SFWMD), propose to restore the south Florida ecosystem, provide for the urban and agricultural water supply needs of the growing south Florida population, and maintain or enhance the levels of flood protection for local residents and businesses. The conceptual plan for the project that was submitted to Congress in July 1999 identified 68 individual projects that will take more than 30 years to build. These projects include: 15 aboveground reservoirs, 2 wastewater reuse plants, 330 aquifer storage and recovery wells, 3 subsurface reservoirs, 19 stormwater treatment areas, the removal of 240 miles of existing canals and levees, and 6 pilot projects to test new engineering technologies.

The Water Resources Development Act of 2000 recently passed by Congress authorized the first series of projects to be implemented as components of the CERP. These projects are as follows:

1. Lake Okeechobee ASR – Pilot Project
2. L-31N Seepage Management – Pilot Project
3. Lake Belt In-Ground Reservoir – Pilot Project
4. Phase 1 - Everglades Agricultural Storage Reservoirs
5. Southern Golden Gate Estates Restoration Project

6. Wastewater Reuse Technology Pilot Project
7. C-111N Spreader Canal Project
8. WCA-3 Decompartmentalization Phase 1 Project
9. Water Preserve Areas Feasibility Study
10. Florida Bay Feasibility Study
11. Comprehensive Water Quality Strategy
12. Hillsboro Site I Impoundment and ASR – Pilot Project
13. Lake Okeechobee Watershed Projects
14. Caloosahatchee River Basin ASR
15. Part 1 C-43 Storage Reservoir Project

Included in Project 8, WCA-3 Decompartmentalization Phase 1 is modifications to existing structural features in WCA-3 that are also common to the MWD Project. These components are Tamiami Trail, L-67 A&C and the S-356 pump station. Decompartmentalization Phase 1 Project of CERP includes raising and bridging portions of Tamiami Trail below WCA-3B and filling portions of the Miami Canal within WCA- 3A to restore sheet flow and reduce unnatural discontinuities in the everglades landscape. The purpose of the project is to reestablish the ecological and hydrological connection within WCA-3A and reconnect ENP with WCA-3B. Ultimately, the CERP authority will remove sheetflow obstructions through the back filling of the Miami Canal and southern 7.5 miles of the L-67A borrow canal, removal of the L-67A, L-67C, L-29, L-28 and L-28 tieback levees and borrow canals and also elevating of Tamiami Trail. By ensuring that the project features implemented in the MWD authority are consistent with the features contemplated to be implemented under the CERP authority, both the Corps and the SFWMD will maximize the use of the funds available through both project authority's. Therefore, it is prudent to develop a federally recommended plan for the MWD Project that not only meets the requirements of the MWD Project but that can be readily adapted for meeting the requirements of CERP. For this reason, one of the primary objectives used in the evaluation of the Tamiami Trail alternatives was to maximize compatibility with future CERP actions (Objective 2, Performance Measures A-D).

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CHAPTER 4- PROJECT ALTERNATIVES

Alternative 1. Existing Alignment and Profile with Four New Bridges

This alternative would provide for the construction of four bridges and components of the existing Tamiami Trail to be reassembled as transitions to the new bridges (Figure 4.1). The existing section consists of two 12-ft-wide travel lanes, a 12-ft-wide shoulder on the north side, and an eight-ft-wide shoulder on the south side. With this alternative, the Tamiami Trail would have a grade transition from the nominal average 11 ft elevation to roughly 17 ft at the bridge deck. A large segment of the Tamiami Trail would remain intact.

New bridges will be built on the existing alignment, with traffic temporarily detoured to the south while bridge construction is in progress. Two of the bridges will be aligned with S-355A and S-355B, and the other two will be situated approximately midway between these structures and the east and west ends of the project, respectively. The two middle bridges will have a hydraulic width of 300 ft each, while the two outer bridges would have a hydraulic width of 425 ft each. The optimum span length for the superstructure system proposed for the permanent bridges would be around 30 ft. The substructure system for the bridges would embody 18-inch square piles. The proposed 43 ft, 1-in-wide bridge typical section for the four bridges within this alternative provides sufficient deck area for two 12-ft-wide travel lanes and 8-ft-wide shoulders on both sides of the travel lanes.

Because this alternative does not include reconstruction of the existing highway, no water quality treatment is proposed. However, Best Management Practices suitable for erosion and sedimentation controls will be provided during construction.

Existing utilities within the existing roadway corridor in the vicinity of the proposed bridges may be affected by the construction.

Staging areas for construction equipment and materials would be located near the eastern end of the corridor and at the locations of businesses along the highway. Staging and other functions would possibly require the utilization of sections of the existing shoulder for temporary periods.

Alternative 2A. Existing Roadway Alignment with Raised Profile and four New Bridges without Water Quality Treatment

Alternative 2 (Figure 4.2) will involve the modification of the existing Tamiami Trail alignment, profile, and typical section, throughout the length of the study segment and will include the construction of four new bridges to convey Modified Water Deliveries (MWD) Project flows from the L-29 borrow canal to Everglades National Park (ENP). The typical section consists of two 12-ft-wide travel lanes and 8-ft-wide shoulders on each side of the roadway. Five feet of this shoulder will be paved.

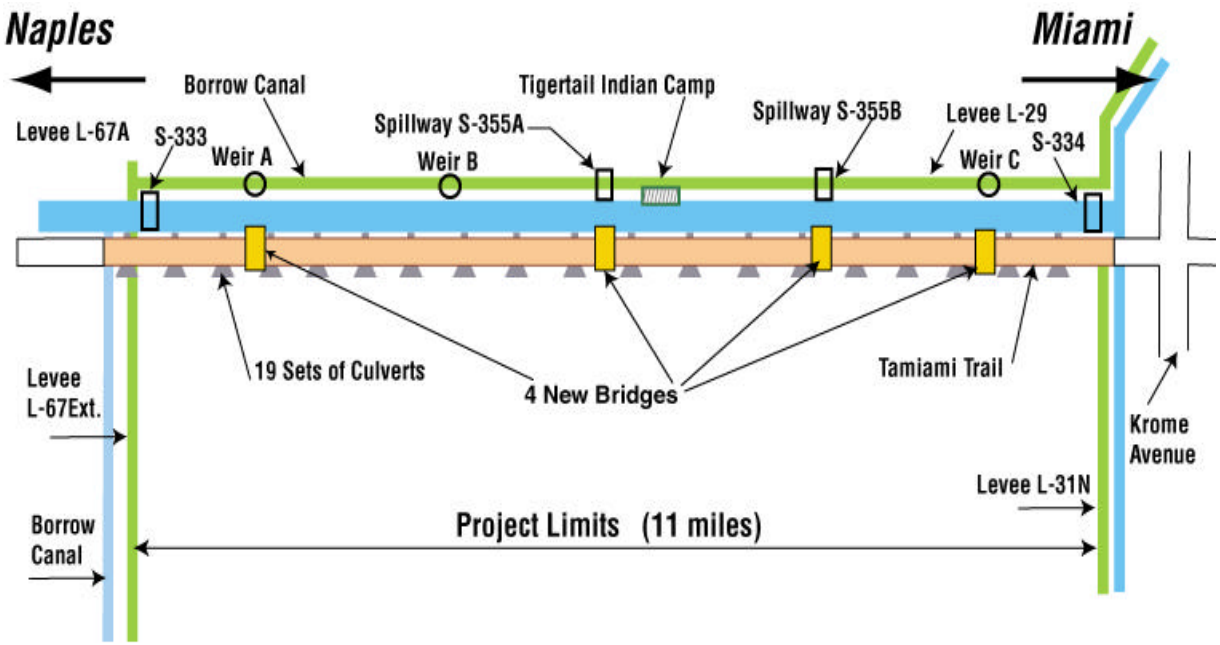

Figure 4.1. Alternative 1

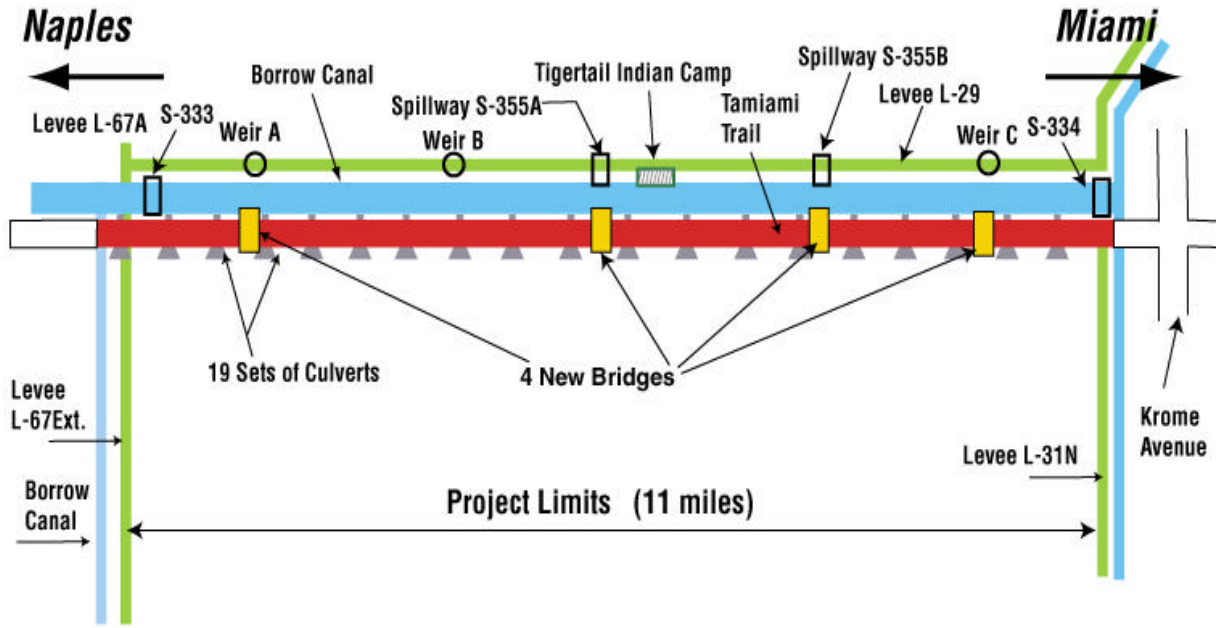

Figure 4.2. Alternative 2

The construction of the bridges would be accomplished as described for Alternative 1. Two of the bridges will be aligned with S-355A and B, and the other two will be located approximately midway between these structures and the east and west ends of the project, respectively. The two middle bridges would have a hydraulic width of 300 ft each, while the two outer bridges would have a hydraulic width of 425 ft each. The proposed 43 ft, 1-in-wide bridge typical section for the four bridges within this alternative would provide sufficient deck area for two 12-ft-wide travel lanes, and 8-ft shoulders on both sides of the travel lanes.

Alternative 2 has been divided into two sub-alternatives (2A and 2B) to consider the treatment of highway runoff to improve water quality.

Alternative 2A would provide for the upgrading of the existing roadway to accommodate a design high water elevation of 9.3 ft and traffic for 50 years. With this approach, the existing asphalt pavement would be left intact so that it may act as a construction platform and serve as a black base. Low areas along the highway would be raised to a minimum elevation of 11.0 ft throughout the project. A 6-inch asphalt overlay would also be included. A 7 year resurfacing interval for this option would appear warranted.

Traffic flow would be maintained during construction as it exists today.

Alternative 2B. Existing Roadway Alignment with Raised Profile and four New Bridges with Water Quality Treatment

Alternative 2B will require widening the embankment footprint to provide water quality treatment facilities on each side of the roadway. With this option, the top of the pavement will be at an elevation of 14 ft, the bottom of the limerock base at an elevation of 12.75 ft, providing roughly 3.5 ft of clearance above the design high water elevation of 9.3 ft. As a precaution against capillary rise from the water table, a 4-inch granular drainage layer will be placed beneath the LBR 40 sub-base. A 12 year resurfacing interval will be recommended.

Water quality treatment will be achieved with dry linear retention facilities adjacent to the proposed roadway. The invert elevations would be set one ft above the new high control elevation of the L-29 Canal. Based on water quality treatment requirements established by Florida Department of Environmental Protection (FDEP), the depth of the treatment area is estimated at 0.5 ft deep. All utilities within the proposed typical section would require relocation.

Under Alternative 2B, temporary barricades will be spaced every 50 ft at the north edge of the westbound travel lane line. In ¼ mile increments the existing guardrail will be removed and replaced with a temporary barrier wall. The existing shoulder will be removed and replaced with temporary pavement. Once completed for the entire project length, traffic will be shifted to the north, utilizing the new pavement. A 10-ft-wide strip of temporary pavement placed south of the existing centerline will allow the roadway to slope to the north at 2%. A temporary concrete barrier will be placed one ft north of the south edge of the temporary pavement. Staging areas for construction equipment and materials will possibly be located at the businesses along the corri-

dor. Other staging areas may be necessary near the east end of the corridor.

Alternative 3A. New Roadway to the North with Eight New Bridges without Water Quality Treatment

Alternative 3 involves the construction of a new roadway with eight bridges immediately north of the L-29 levee on the north side of the Tamiami Trail (Figure 4.3). This alternative has been divided into two sub-alternatives (3A and 3B) to consider of the treatment of highway runoff to improve water quality. This alternative will enable flows to be conveyed from WCA-3B across the L-29 levee to the L-29 Canal. The typical section consists of two 12-ft-wide travel lanes, and 8-ft-wide shoulders on each side of the roadway. Five feet of this shoulder will be paved. Alternative 3 will provide for a 15-ft-wide canal maintenance berm.

The eight bridges will be located:

- Over the L-29 Canal at the western end of the project.
- Over the L-29 Canal at the eastern end of the project.
- At the S-355A drainage structure
- At the S-355B drainage structure
- At the site of the Airboat Association of Florida
- At the proposed Weir A location
- At the proposed Weir B location
- At the proposed Weir C location
-

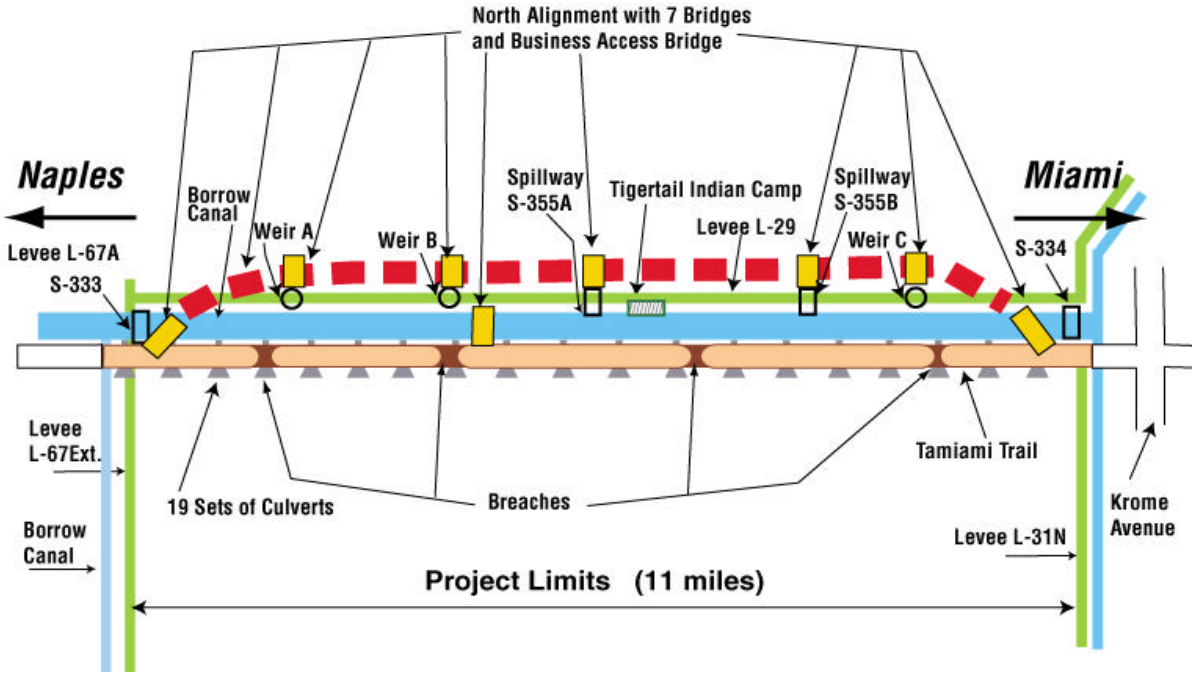

Figure 4.3. Alternative 3

The bridges would be aligned with existing S-355A and S-355B (each with flow channel bottom widths of 60 ft), and with proposed Weirs A, B, and C, will be 200 ft, 150 ft, and 200 ft long, respectively. Bridges over the L-29 Canal near each end of the corridor will connect with the existing highway. A bridge over the canal will provide access to the site of the Airboat Association of Florida.

The proposed 43 ft, 1-in-wide bridge typical section applies to all eight bridges to provide sufficient deck area for two 12-ft-wide travel lanes and 8 ft shoulders on both sides of the travel lanes. A proposed 35 ft, 1-in-wide bridge typical section would apply to the access bridge to the Airboat Association of Florida site and would provide sufficient deck area for two 12-ft-wide travel lanes, and 4 ft shoulders on both sides of the travel lanes.

The proposed roadway elevation will be 17.4 ft to conform to the elevation of the future Pump Station 356 tieback levee. A nominal 4-ft pavement envelope would be required, which is ample clearance above the 9.3 ft design high water elevation. A periodic resurfacing interval of 12 years would be recommended. Utility relocations would be a necessity.

Because this alternative does not retain the centerline of the existing facility, alignment transitions will be required at either end of the project limits. Traffic will be maintained as it currently exists; once a temporary transition roadway is completed, traffic will then be shifted while permanent transitions to the new roadway are constructed. Following construction of the new roadway, traffic will be shifted to the new alignment, and the existing roadway will be removed. Staging areas for construction equipment and materials will be located on the sites of the businesses along the corridor. Staging and other functions may require utilizing sections of the existing shoulder for temporary periods.

Access to the Flight 592 Memorial and the S-333 structure will be retained. The alignment will be shifted to the north to minimize impacts to the Tiger Tail Camp, S-355A, and S-355B. A portion of the existing roadway will be retained at the western end of the project area to provide access to the Osceola Camp.

The existing Tamiami Trail embankment will be breached at locations near those of the bridge locations for Alternatives 1 and 2.

Alternative 3B. New Roadway to the North with Eight New Bridges with Water Quality Treatment

Alternative 3B will have a slightly wider footprint than Alternative 3A because of the incorporation of water quality treatment, which will be achieved with dry linear retention facilities adjacent to the proposed roadway. The treatment facilities will have a control elevation of 11.5 ft and an overall depth of 1 ft. The invert elevation for the south treatment area is set 1 ft above the 8.5 ft control elevation of Canal L-29. Based on water quality requirements established by FDEP, the depth of the treatment area would be estimated at 0.5 ft deep.

Alternative 4A. New Roadway to the South with Four New Bridges without Water Quality Treatment

Alternative 4 (Figure 4.4) consists of a new road constructed immediately to the south of the Tamiami Trail within the edge of the ENP. This alternative has been divided into two sub-alternatives (4A and 4B) enabling consideration of incorporating treatment of highway runoff to improve water quality.

Two bridges of Alternative 4A will be aligned with S-355A and S-355B (each with flow-channel bottom widths of 60 ft), and the other two will be located approximately midway between these structures and the eastern and western ends of the project, respectively. The two middle bridges will have a hydraulic width of 300 ft each, while the two outer bridges will have a hydraulic width of 425 ft each. The existing roadway embankment will be breached at locations approximating the bridge locations for Alternatives 1 and 2. The proposed 43 ft, 1-inch-wide bridge typical section for the four bridges within this alternative provides sufficient deck area for two 12-ft-wide travel lanes and 8-ft-shoulders on both sides of the travel lanes.

The existing system of culverts will not be replaced; the culverts will be plugged with flowable fill.

Because Alignment 4A does not retain the centerline of the existing facility, alignment transitions will be required at either end of the segment. At the eastern end of the corridor, the proposed S-356 pump station, the S-334 spillway replacement and adjustments to levees and the

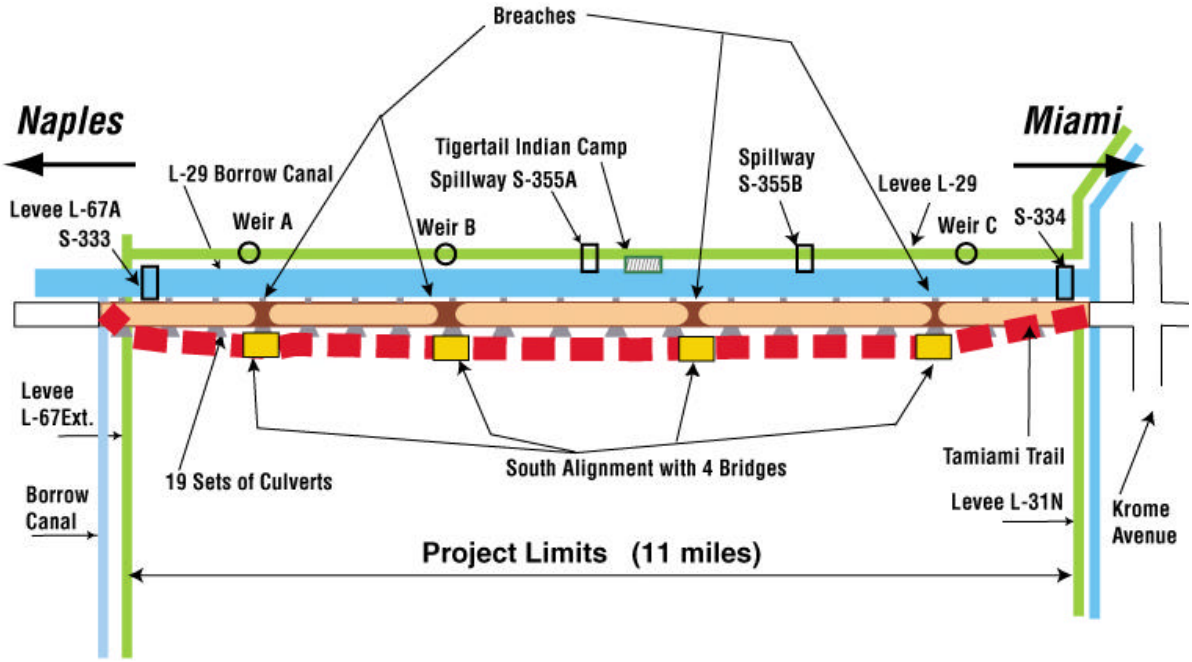

Figure 4.4. Alternative 4.

Tamiami Trail will be additional factors affecting the transition. The typical section consists of two 12-ft-wide travel lanes, and 8-ft-wide shoulders on each side of the roadway. Five feet of this shoulder will be paved.

Temporary barricades will be placed every 50 ft at the southern edge of the westbound travel lane line. In ¼ mile increments the existing guardrail will be removed and replaced with temporary barrier walls. The existing shoulder will be removed and replaced with temporary pavement. Once completed for the entire project length, traffic would be shifted to the north, utilizing the new pavement. A 10-ft wide strip of temporary pavement would be placed south of the existing centerline to allow the roadway to slope to the north at 2%. A temporary concrete barrier would be placed one ft north of the south edge of the temporary pavement.

Staging areas for construction equipment and materials may be located at the business sites along the corridor. Staging and other functions may also possibly require utilizing sections of the existing shoulder for temporary periods, as well as locations near the eastern end of the corridor.

It would be necessary to obtain rights-of-way from the Airboat Association of Florida to construct the roadway under this alignment.

Existing utilities within the corridor would be affected by the new construction.

Alternative 4B. Build New Roadway to the South with Four New Bridges with Water Quality Treatment

Alternative 4B will have a wider footprint that Alternative 4A because of the incorporation of water quality treatment, which would incorporate dry linear retention facilities adjacent to the proposed roadway. The invert elevations would be set 1 ft above the new high control elevation of Canal L-29, which is 8.5 ft. The treatment facilities would have a control elevation of 9.5 ft, and overall depth of 1 ft. Due to the proximity of the new alignment to the existing roadway, the proposed treatment facilities on the north side of the new alignment would have to be constructed in the existing embankment.

Alternative 5A. Elevated Roadway within Existing Right of Way without Water Quality Treatment

Alternative 5 (Figure 4.5) involves the construction of an elevated roadway generally within the right-of-way of the road. Alternative 5 has been divided into four sub-alternatives. 5A and 5B for evaluation of water quality measures and each with “Partial” and “Full” removal of the existing road.

Alternative 5A consists of a bridge that covers the entire 11 mile length of the MWD Project. At each end, there would be short reconstruction segments of the roadway to transition to the new bridges. The pavement would have a grade transition from the nominal average of an 11 ft ele-

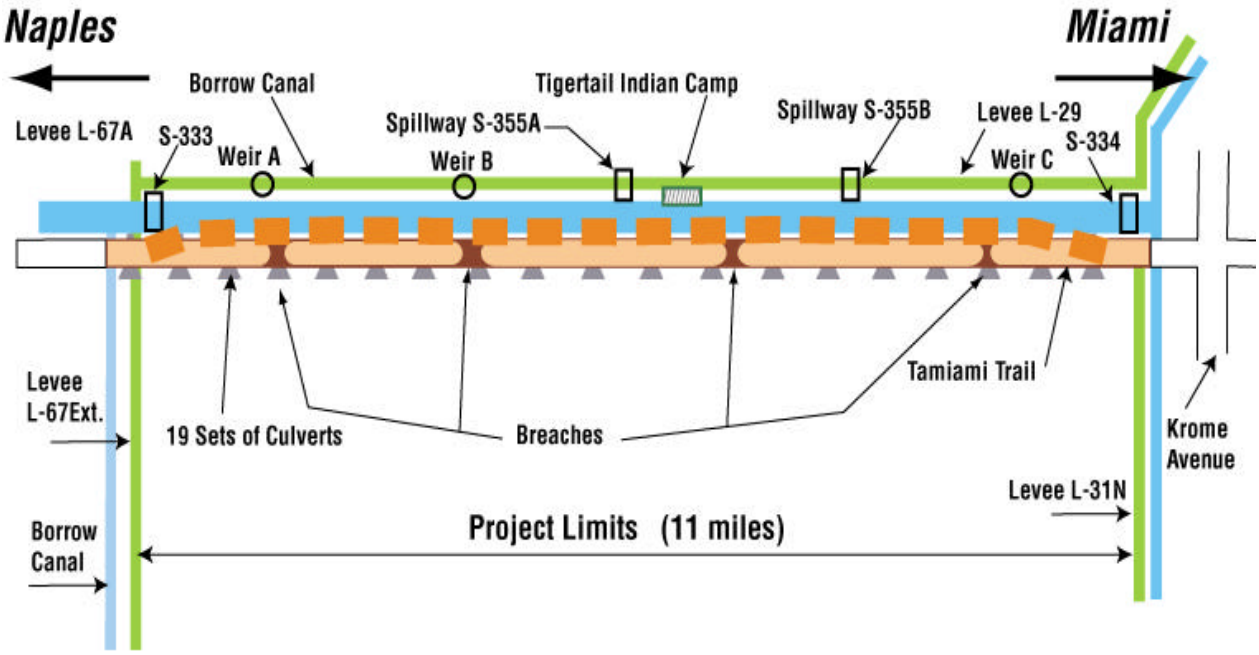

Figure 4.5. Alternative 5

vation to about an elevation of 17 ft at the bridge deck.

The proposed 43 ft, 1-inch-wide bridge typical section will provide sufficient deck area for two 12-ft wide travel lanes and 8-ft shoulders on both sides of the travel lanes. Exceptions would occur where a surface connection for access or other reasons might be required. A 35 ft, 1-inch-wide bridge typical section will provide access to the Airboat Association of Florida and include sufficient deck area for two 12-ft-wide travel lanes, and 4-ft-wide shoulders on each side of the travel lanes. The new bridge deck will be equipped with drain scuppers that discharge directly to the area below.

For the two "Partial" sub-alternatives, the existing Tamiami Trail embankment will be breached at locations similar to the bridge locations for Alternatives 1 and 2. For the two "Full" sub-alternatives, the full 10.7 miles of the existing road would be removed to allow unrestricted flow beneath the new elevated highway.

This alignment would be positioned to minimize impact and construction cost and to facilitate maintenance of traffic during construction. The alternative would require only a modest alignment transition at either end of the segment.

Temporary barricades will be placed every 50 ft at the southern edge of the westbound travel lane line. In ¼ mile increments the existing guardrail will be removed and replaced with temporary barrier wall. The existing shoulder will be removed and replaced with temporary pavement. Once completed for the entire project length, traffic will be shifted to the south, utilizing the new pavement. A 10-ft-wide strip of temporary pavement will be placed north of the existing center-

line to allow the roadway to slope to the north at 2%. A temporary concrete barrier will be placed 1 ft north of the southern edge of the temporary pavement. The bridge would then be constructed. Staging areas for construction equipment and materials may be located at the sites of the businesses along the corridor. Staging and other functions would also possibly require utilizing sections of the existing shoulder for temporary periods. Staging areas may be necessary near the eastern end of the corridor.

Connecting roads will provide temporary access to the Airboat Association. Temporary access to the Osceola Camp would be accomplished via a connecting road from the west. Turning lanes may be needed at these locations.

Existing utilities would be affected by the new construction.

Alternative 5B. Elevated Roadway within Existing Right of Way with Water Quality Treatment

Alternative 5B includes the same alignment as described in Alternative 5A, but also incorporates water quality treatment. Piping will convey highway runoff to dry retention swales constructed on adjacent segments of the abandoned roadway embankment. Swales will be approximately 600 ft long and spaced at ½ mile intervals; there will be approximately 22 within the corridor. Maintenance of swales will be provided by workers using lightweight equipment transported by boat. Under the "Partial" sub-alternative, culverts under the existing roadway embankment would be unaffected by new construction except for breaches for water flow and would be left in place. Under the "Full" sub-alternative, the old road would be removed except for "islands" which would remain to serve as dry retention areas for water quality treatment.

Alternative 6A. Existing Alignment Raised Profile with 4-Mile Structure without Water Quality treatment

Alternative 6 (Figure 4.6) is a hybrid between Alternative 5: New Alignment on Structure for the entire 11-mile project limits and Alternative 2: Existing Alignment with Raised Profile and Four New Bridges. It is defined as modifying the existing Tamiami Trail embankment with a modified profile and typical section and the construction of a bridge similar to that for Alternative 5 with a length of approximately 4 miles to convey MWD Project flows from the L-29 Borrow Canal to ENP. The bridge will begin at the Blue Shanty Canal about 3 miles from the west end of the corridor, and will extend just to the east of the Coopertown Canal.

Consideration may be given to including various wildlife features as part of this alternative. Were they to be included, the wildlife underpasses and land bridges over the L-29 Canal could be constructed in the embankment to the east and west ends of the 4 mile bridge. The underpasses consist of an approximately 50-ft-long concrete slab bridge placed in the highway alignment. The land bridges consist of a 24-ft-wide concrete bridge with 2 ft of soil spread on its surface for vegetation to grow. Fencing will be needed on each side of the 2 underpasses to funnel

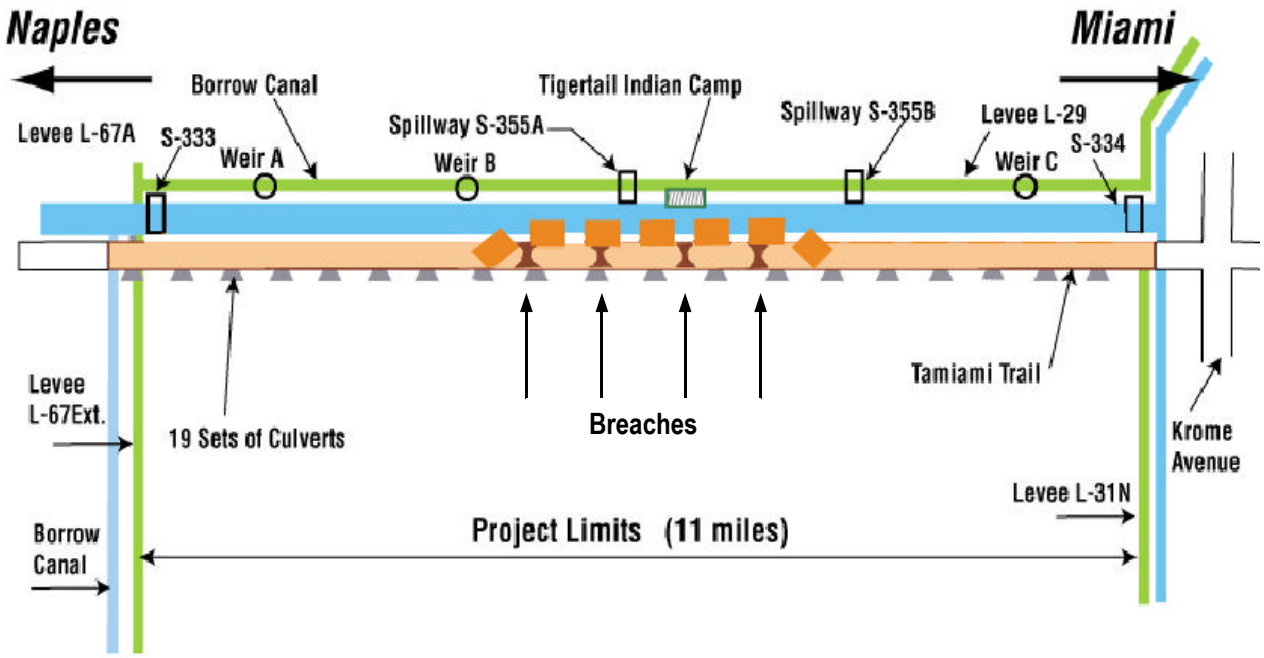

Figure 4.6. Alternative 6

wildlife to the underpasses.

The existing Tamiami Trail embankment profile and typical section will be modified for approximately 3 miles at the western end of the project and approximately 4 miles at the eastern end of the project. The centerline of the roadway may be adjusted southward to avoid encroachment into the L-29 Borrow Canal. Eight box culverts will be strategically placed in areas where the natural slough crosses Tamiami Trail to enhance the natural, historic sheet flow.

For Alternative 6A, where there is no water quality treatment, the centerline of this alignment will fall very close to the centerline of the existing facility. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor. As part of this option, the existing drainage culverts will be retained and extended 55 ft to connect through the widened typical section.

The bridge portion of this alternative is defined as reconstruction of approximately 4 miles of the Tamiami Trail alignment as an elevated structure. The alignment would be positioned to minimize impact and construction cost, and to facilitate maintenance of traffic during construction. The profile would be established per the applicable drift, maintenance and navigation bridge clearance. This alternative requires only a modest alignment transition at either end of the bridge.

The existing Tamiami Trail embankment would need to be breached at four evenly spaced locations along the 4-mile bridge totaling about 1,500 ft in length.. The bridge typical section would

be standard the entire length, with two travel lanes of 12 ft, two shoulders of 8 ft, and outside barrier shapes. Exceptions would occur where a surface connection for access or other reasons might be required; at these locations turning lanes might be needed.

For Alternative 6A, the new bridge deck would be equipped with drain scuppers that would discharge directly to the area below

Alternative 6B. Existing Alignment Raised Profile with 4-Mile Structure with Water Quality treatment

Alternative 6B requires widening the embankment footprint to provide water quality treatment facilities on each side of the roadway. The centerline of the alignment will fall approximately 27 ft to the south, with related wetland encroachment to the south of the existing roadway, due in part to the swales included on either side of the road.

Piping would convey runoff to dry retention facilities constructed on adjacent segments of the abandoned existing roadway embankment. These swales would be approximately 600 ft long and spaced at ½ mile intervals, such that there would be approximately 7 of them adjacent to the bridge. These would require maintenance to be provided by workers using lightweight equipment transported by boat.

Alternative 7A. Raised Profile with 3000-ft Structure without Water Quality Treatment

Alternative 7 (Figure 4.7) is a hybrid between the New Alignment on Structure for the entire 11 mile project limits (Alternative 5) and the existing alignment with Raised Profile (Alternative 2). It is defined as modifying the existing Tamiami Trail profile and typical section at the beginning and end of the study segment, and the construction of a bridge with a span of approximately 3,000 ft to convey MWD Project flows from the L-29 Borrow Canal to ENP. The bridge will begin approximately 1 mile from the west end of the corridor.

Consideration may be given to including various wildlife features as part of this alternative. Were they to be included, the wildlife underpasses and land bridges over the L-29 Canal could be constructed in the embankment to the east and west ends of the 4-mile bridge. The underpasses consist of an approximately 50-ft-long concrete slab bridge placed in the highway alignment. The land bridges consist of a 24-ft-wide concrete bridge with 2 ft of soil spread on its surface for vegetation to grow. Fencing will be needed on each side of the 2 underpasses to funnel wildlife to the underpasses.

The existing Tamiami Trail profile and typical section will be modified for approximately 1 mile at the western end of the project and approximately 9.4 miles to the east of the bridge. The centerline of the roadway may be adjusted southward to avoid encroachment into the L-29 Borrow Canal. Existing box culverts will be retained for the Without Water Quality Treatment option,

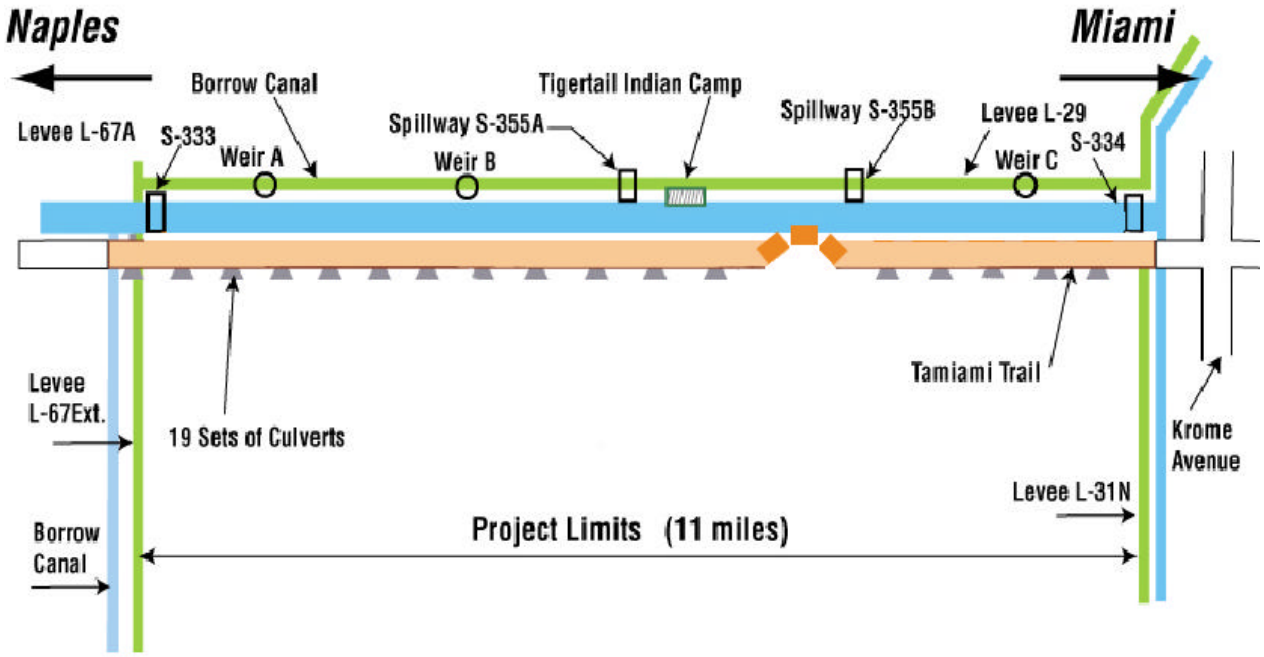

Figure 4.7. Alternative 7

and will be plugged or removed in the With Water Quality Treatment option.

For Alternative 7A where there would be no water quality treatment, the centerline of this alignment will fall very close to the centerline of the existing facility. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

The bridge portion of this alternative is defined as reconstruction of approximately 3,000 ft of the Tamiami Trail alignment as an elevated structure. The alignment would be positioned to minimize impact and construction cost, and to facilitate maintenance of traffic during construction. The profile would be established per the applicable drift, maintenance and navigation bridge clearance. This alternative requires only a modest alignment transition at either end of the bridge.

The existing Tamiami Trail embankment will be removed adjacent to the 3,000-ft-long bridge. The bridge typical section would be standard the entire length, with two travel lanes of 12 ft, two shoulders of 8 ft, and outside barrier shapes. Exceptions would occur where a surface connection for access or other reasons might be required; at these locations turning lanes might be needed.

For Alternative 7A, the new bridge deck would be equipped with drain scuppers that would discharge directly to the area below.

Alternative 7B. Raised Profile with 3000-ft Structure with Water Quality Treatment

This alternative requires widening the embankment footprint to provide water quality treatment facilities on each side of the roadway. For Alternative 7B, the centerline of the alignment will fall approximately 27 ft to the south, with related wetland encroachment to the south of the existing roadway, due in part to the swales included on either side of the road. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

Piping would convey runoff to dry retention facilities at either end of the bridge. These facilities would be approximately 600 ft long and spaced at ½ mile intervals, such that there would be approximately 2 of them adjacent to the bridge. These would require maintenance to be provided by workers using lightweight equipment transported by boat. By definition for this alternative, 3,000 ft of existing roadway embankment adjacent to the bridge will be breached and removed for hydraulic flow.

Alternative 8A. Existing Alignment with Raised Profile and Box Culverts without Water Quality Treatment

Alternative 8 (Figure 4.8) is defined as modifying the existing Tamiami Trail profile and typical section throughout the length of the study segment, and the construction of new box culverts to convey Modified Water Deliveries project flows from the L-29 Borrow Canal to ENP. The box culverts will be 5-ft-high by 10-ft-wide (inside dimensions) with an invert elevation of 3.0 ft. They will be installed throughout the roadway alignment and will extend through the embankment to ensure that flow is not impeded. For Alternative 8a the existing culverts are left in place and 24 new box culverts will be constructed

Consideration may be given to including various wildlife features as part of this alternative. Were they to be included, the wildlife underpasses and land bridges over the L-29 Canal could be constructed in the embankment to the east and west ends of the 4-mile bridge. The underpasses consist of an approximately 50-ft-long concrete slab bridge placed in the highway alignment. The land bridges consist of a 24-ft-wide concrete bridge with 2 ft of soil spread on its surface for vegetation to grow. Fencing will be needed on each side of the 2 underpasses to funnel wildlife to the underpasses.

For Alternative 8A the centerline of this alignment will fall very close to the centerline of the existing facility. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

Alternative 8B. Existing Alignment with Raised Profile and Box Culverts with Water Quality Treatment

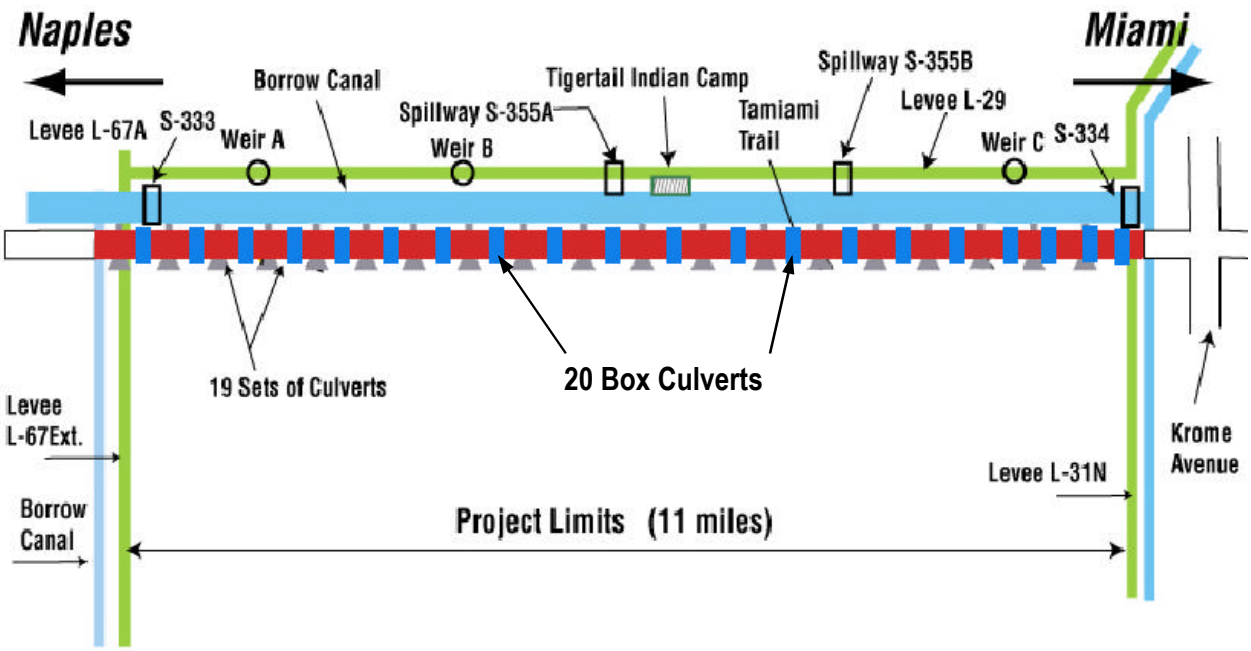

Figure 4.8. Alternative 8

For Alternative 8B, 40 box culverts are required and the existing culverts would be removed from the embankment. The centerline of the alignment will fall approximately 27 ft to the south, with related wetland encroachment to the south of the existing roadway, due in part to the swales included on either side of the road. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

Alternative 9A. Raised Profile with 2.7 mile Structure without Water Quality Treatment

Alternative 9 (Figure (4.9) is a hybrid between the New Alignment on Structure for the entire 11-mile project limits (Alternative 5) and the Existing Alignment with Raised Profile (Alternative 2). It is defined as modifying the existing Tamiami Trail profile and typical section at the beginning and end of the study segment, and the construction of a bridge with a span of approximately 2.7 miles to convey MWD Project flows from the L-29 Borrow Canal to ENP. The bridge will begin at the Blue Shanty Canal about 4.3 miles from the west end of the corridor, and will extend just to the east of the Coopertown Canal.

Consideration may be given to including various wildlife features as part of this alternative. Were they to be included, the wildlife underpasses and land bridges over the L-29 Canal could be constructed in the embankment to the east and west ends of the 4 mi bridge. The underpasses consist of an approximately 50-ft-long concrete slab bridge placed in the highway alignment. The land bridges consist of a 24-ft-wide concrete bridge with 2 ft of soil spread on its surface for

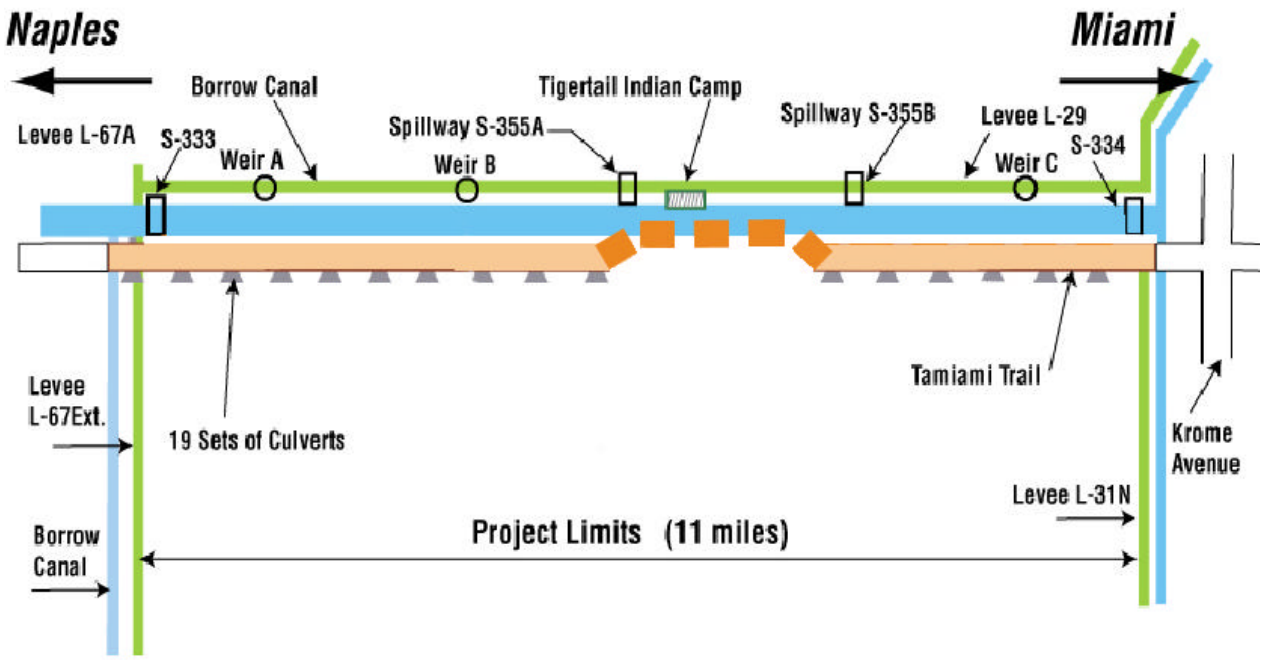

Figure 4.9. Alternative 9

vegetation to grow. Fencing will be needed on each side of the 2 underpasses to funnel wildlife to the underpasses.

The existing Tamiami Trail embankment profile and typical section will be modified for approximately 4.3 miles at the western end of the project and approximately 4 miles at the eastern end of the project. The centerline of the roadway may be adjusted southward to avoid encroachment into the L-29 Borrow Canal. Eight box culverts will be strategically placed in areas where the natural slough crosses Tamiami Trail to enhance the natural, historic sheet flow.

For Alternative 9A where there would be no water quality treatment, the centerline of this alignment will fall very close to the centerline of the existing facility. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

The bridge portion of this alternative is defined as reconstruction of approximately 2.7 miles of the Tamiami Trail alignment as an elevated structure. The alignment would be positioned to minimize impact and construction cost, and to facilitate maintenance of traffic during construction. The profile would be established per the applicable drift, maintenance and navigation bridge clearance. This alternative requires only a modest alignment transition at either end of the bridge.

The existing Tamiami Trail embankment will be removed adjacent to the 2.7-mile-long bridge. The bridge typical section would be standard the entire length, with two travel lanes of 12 ft, two shoulders of 8 ft, and outside barrier shapes. Exceptions would occur where a surface connection

for access or other reasons might be required; at these locations turning lanes might be needed.

For Alternative 9A, the new bridge deck would be equipped with drain scuppers that would discharge directly to the area below.

Alternative 9B. Raised Profile with 2.7 mile Structure with Water Quality Treatment

This alternative requires widening the embankment footprint to provide water quality treatment facilities on each side of the roadway. For Alternative 9B, the centerline of the alignment will fall approximately 27 ft to the south, with related wetland encroachment to the south of the existing roadway, due in part to the swales included on either side of the road. There are no significant alignment transitions required at either end of the segment, nor are there any significant impacts to parcels of concern along the corridor.

Piping would convey runoff to dry retention facilities at either end of the bridge. These facilities would be approximately 600 ft long and spaced at ½ mile intervals, such that there would be approximately 7 of them adjacent to the bridge. These would require maintenance to be provided by workers using lightweight equipment transported by boat. By definition for this alternative, 2.7 miles of existing roadway embankment adjacent to the bridge will be removed for hydraulic flow.

Bridge Alignment Alternatives

The construction of the proposed bridges as described in the proposed alternatives will be performed in one of three ways.

Bridge Option 1

Under Bridge Option 1, new bridges will be built to the south of the existing road. Analysis showed this option be the most cost-effective. Two reverse curves in the alignment at every bridge would be introduced.

Bridge Option 2

Under Bridge Option 2, new bridges will be built on the existing alignment with a temporary detour to the south. This option is less cost-effective than the previous option. Alignment curvatures and permanent wetland disruption would be avoided.

Bridge Option 3

Under Bridge Option 3, new bridges will be built on the existing alignment with temporary detour to the north (in the L-29 Canal). This option would avoid temporary impact to wetlands

south of the road but requires a costly detour on structural elements located north of the existing road. This option would constitute over $52 million of the total project cost.

Water Quality Treatment Alternatives

Alternatives 2B, 3B, 4B, and 5B incorporate dry retention systems on both sides of the roadway for the treatment of highway runoff. This type of system is relatively simple to build and maintain. However, in consideration of the wide footprint required for dry retention and the impacts to ENP wetlands, additional water quality treatment options were identified and evaluated.

Option 1: Shifting and/or Compressing the Roadway Section.

This option entails shifting the typical section of Alternative 2B to the north. In conjunction with this modification, the resulting encroachment into the L-29 Canal would be accommodated by widening the canal to the north, or by using vertical wall sections in two different configurations to reduce the width of the typical section in the area of the dry retention swales. Sub-alternatives for this option are described in detail in sections 5.10.2 - 5.10.4.

Option 1-A: Shift Alignment and Compress Swale With Wall Elements/South Side

In this option, the typical section would be compressed by installing a wall system on the southern side of the roadway that would reduce encroachment into ENP wetlands without any encroachment into the L-29 Canal. The construction of a reinforced wall along the south side of the existing roadway would to minimize the extent of this encroachment, and the dry retention area is compressed between the reinforced wall and a short gravity wall.

The existing pavement, sub-grade, fill, and muck will be removed totally and back-filled with appropriate fill to the bottom of the sub-grade. A double wall section on the south side would provide a 5-ft-wide dry retention area. The placement of this walled section on the south side provides adequate space on the north side for a 5-ft-wide dry retention area with standard reinforced side slopes. Runoff from the south side of roadway would enter the south side swale through barrier wall inlets, whereas runoff from the north side would sheet flow into the north side retention area. The bottom elevation of the swales would 9.5 ft, one ft above the high water level control elevation.

Construction of this alternative would require that traffic lanes be shifted to the north and a temporary wall system installed adjacent to the roadway on the south side. The remaining existing embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of the new roadway. Traffic would be shifted to the new roadway, and the northern portion of the roadway would be excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration.

The additional profile elevation affects the section width, which would be 29 ft less than Alternative 2B. This option does not encroach into the hydraulic capacity of the L-29 Canal.

Option 1-B: Shift Alignment and Compress Swale with Wall Elements/ North Side (Alt. 2D)

In this option, the typical section would be compressed by installing a wall system that would encroach into the L-29 Canal sufficiently so that there would be no encroachment into the wetlands of ENP on the south side of the roadway. The construction of a reinforced wall along the north side of the existing roadway entails the placement of piles and concrete panels in the L-29 Canal at an elevation near the bottom of the canal.

The existing pavement, sub-grade, fill and muck will be removed totally and back-filled with appropriate fill to the bottom of the sub-grade. A double wall section is proposed on the north side providing a 5-ft-wide dry retention area. The placement of this walled section on the north side provides adequate space on the south side to provide again a 5-ft-wide dry retention area with standard reinforced side slopes. Runoff from the north side of roadway would enter the north side swale through barrier wall inlets, whereas runoff from the south side would sheet flow into the south side retention area. The bottom of the swales would be the same as for Alternative 2B - With Water Quality Treatment (Dry Retention Swales), which is elevation 9.5 ft, one ft above the high water level control elevation, 8.5 ft.

Construction for this alternative would require that the traffic lanes are shifted to the north and a temporary wall system is installed adjacent to this roadway on the south side. Then the remaining existing embankment on the south side would be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the north portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

This option does encroach into the L-29 Canal, removing about 200 square ft of flow area. This loss can be compensated for by removal of a like area along the northern bank of the canal or by deepening the canal.

Option 1-C: Shift Typical Section North into L-29 Canal (Alt. 2E)

In this option, the typical section would be shifted northward, encroaching approximately 50 ft into the L-29 Canal. The southern bank of the canal would be filled in, and the northern bank of the canal would require excavation.

While this is conceptually feasible, there are several issues associated with it. First, because the

canal is approximately 100-ft-wide, the 50 ft of encroachment and resulting excavation will consume most of the maintenance road to the north of the canal. It may be possible to excavate the lower portion of this replacement widening at a steeper slope to replace the lost hydraulic capacity. This would allow for a relocated canal maintenance road and would permit the telephone and fiber optic utilities to remain in place.

Another issue is the method for filling in the canal so that sufficient load capacity is achieved and that the fill is stable. It may be necessary to use the construction method noted for Option 1-B wherein a concrete panel wall is constructed to contain the fill material. This approach would also reduce the lost cross-sectional area in the canal and require less excavation to the north. However, this wall system would significantly increase the cost of the solution.

Other issues associated with this concept are preserving the required canal section in the vicinity of the Tiger Tail Camp, at the recreational area at structures S-355A and S-355B, and at the site of the four proposed weir structures. In these areas, several solutions could be considered. The roadway section could be shifted to the south to avoid impacts, but shifting to the south would encroach into ENP. Also, such offsets could result in an unacceptably “wavy” alignment with safety implications. It appears that if the extent of canal excavation is reduced from 50 ft to 25-30 ft, then the existing and future water control structures would not be affected.

Another solution would be to place the roadway on structure in these areas over the canal. However, considering the lengths involved, this would add considerable costs.

If impacts to water control structures are avoidable, then a compromise would be to shift the alignment at the Tiger Tail Camp and the eastern recreational area and incur some wetlands impact. A total distance of about 3,500 ft of the roadway would encroach into the wetlands in each of these areas, with the extent of the encroachment ranging up to 59 for Alternative 2B. This would yield a wetland impact of 2.7 acres per location or a total of 5.4 acres.

Construction of this alternative would require that the traffic lanes are shifted to the south within the existing roadway and a temporary wall system installed adjacent to this roadway on the north side. The remaining existing embankment on the north side would then be removed and the new embankment installed in this area and in the canal up to the elevation of the existing road. The existing pavement, sub-grade, fill and muck would be removed and backfilled with appropriate fill to the bottom of the sub-grade.

This step would be preceded by the placement of the wall system in the canal, if that were determined to be necessary. The temporary wall system would be extended upward to allow the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the south portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. There is a cost premium associated with this phasing scheme because of the roadway elevation differentials and the need for the temporary wall.

This option encroaches into the hydraulic capacity of the L-29 Canal, removing about 900

square ft of flow area.

For the configuration where the canal fill is not contained by a wall, and a like area is excavated from the north bank, the estimated cost for this alternative is $73,917,450 for the length of the corridor. This would be a $15,366,800 addition to the cost of Alternative 2B. It is also assumed that the water control structures would not be affected and that the alignment would be shifted at the other two locations. These cost estimates do not include relocation of utilities on the levee or a wall system for retaining fill on the south bank of the canal.

Option 2: Exfiltration Trenches With Curb and Gutter

The second option is to use an exfiltration trench below the roadway, with roadway runoff routed from a curb and gutter section with inlets spaced every 200 ft. The exfiltration trench would be comprised of an 18-inch perforated pipe surrounded by coarse aggregate and extending for the length of the corridor, less the bridge sections, on both sides of the roadway.

The concept would allow the collected runoff in the pipe to infiltrate into the surrounding aggregate and dissipate into the adjacent fill material. The trench will have an envelope of filter fabric to prevent the introduction of sand into the rock trench. This option does require the invert of the exfiltration trench pipe to be above the design high water elevation of the L-29 Canal, which is elevation 9.3 ft. As such, the profile of the roadway would need to be approximately two feet higher than that of Alternative 2B, or a centerline elevation of 16.0 ft.

The additional profile elevation affects the section width, but requires 17 to 27 ft less width (without and with stabilized side slopes respectively) than Alternative 2B, for a net impact of 23 to 33 ft of wetland impact. This is in comparison to 50 ft of impact for the original Alternative 2B with dry retention.

Construction of this alternative would require traffic lanes to be shifted to the north and a temporary wall system installed adjacent to the southern side of the roadway. The remaining embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion of a portion of the new roadway. Traffic would be shifted to the new roadway and the northern portion of the roadway excavated and reconstructed up to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method proposed for Options 1-A and 1-B. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for a temporary wall.

The estimated cost for this alternative is $76,116,250 for the length of the corridor. This is a $17,565,600 additive to the cost of Alternative 2b.

Option 3: Exfiltration Trenches With Shoulder Gutter

A third option is to use an exfiltration trench below the roadway, with roadway runoff routed from a shoulder gutter section with inlets spaced every 200 ft. As for Option 2, the exfiltration trench would be comprised of an 18 inch perforated pipe surrounded by coarse aggregate and extending for the length of the corridor, less the bridge sections, on both sides of the roadway.

The collected runoff would infiltrate from the pipe into the surrounding aggregate and dissipate into the adjacent fill material. The trench will have an envelope of filter fabric to prevent the introduction of sand into the rock trench. This option requires the invert of the exfiltration trench pipe to be above the design high water elevation of the L-29 Canal, which is elevation 9.3 ft. The profile of the roadway would to be at a centerline elevation of 16.0 ft, approximately two feet higher than for Alternative 2B.

The additional profile elevation affects the section width, but requires 17 to 27 ft less width (without and with stabilized side slopes respectively) than Alternative 2B, for a net impact of 23 to 33 ft of wetland impact. This is in comparison to 50 ft of impact for the original Alternative 2B.

Construction of this alternative would require the traffic lanes to be shifted to the north and a temporary wall system installed adjacent to the southern side of the roadway. The remaining existing embankment on the south side would then be removed and the new embankment installed up to the elevation of the existing road. The temporary wall system would be extended upward to permit the completion a portion of the new roadway. Traffic would be shifted to the new roadway and the northern portion of the roadway excavated and reconstructed to finish profile. The new roadway section would then be completed and traffic shifted to the final configuration. This process would be generally similar to the construction method proposed for Options 1-A and 1-B. There is a cost premium associated with this scheme because of the roadway elevation differentials and the need for the temporary wall.

The estimated cost for this alternative is $76,394,750 for the length of the corridor. This is a $17,844,100 additive to the cost of Alternative 2B.

Option 4: Wet Detention System

Utilizing a wet detention system requires the treatment of one inch of runoff from the contributing area in contrast to a dry retention system, where the treatment volume is equal to 1/2 inch of runoff. It also requires a wider footprint than the dry retention design, because the control elevation would be at the control elevation of the L-29 Canal rather than one ft above the control elevation. A minimum depth of 2 ft is proposed below the control elevation for deposition of sediments. Wet detention systems typically require a minimum width of 100 ft at the control elevation and an average depth between 6 and 8 ft, which would require a wider footprint. Incorporating a wet detention system would require a variance from the standard typically required for this type of treatment.

As depicted in the schematic in a narrow footprint, this option would require a distance of 55 ft

beyond the edge of the shoulder. The dry retention system as originally proposed requires 35 ft. Even if stabilized slopes were employed, the wet retention option would have slightly more impact as the dry retention technique. Alternative 2B has a 50 ft wetland impact with natural slope grading; the wet detention technique with similar slope treatment would add 40 ft of impact, for a total impact of 90 ft.

The estimated cost for this alternative is essentially unchanged from the cost of Alternative 2B, $58,550,650. The fill areas associated with each are nearly the same.

Option 5: Single Dry Retention Area System

In this option, there would be a dry retention area on only one side of the roadway This single area would retain the standard 5 ft width. Drainage from the side of the roadway without treatment would be channeled via a shoulder gutter and gutter inlets and piped under the roadway to the dry retention area.

The roadway will require raising approximately 2.5 ft to accommodate an inlet and a connecting pipe. While this eliminates a retention area on the north side of the roadway, the retention area on the south side of the road is approximately 0.5 ft deeper and the side slopes of the roadway are wider due to the additional 2.5 ft of elevation. The net effect is that this footprint is 122-ft-wide, while that for Alternative 2B is 112-ft-wide, for an increased width of 10 ft.

If the dry retention area were constructed on the northern side of the road, the result would be similar. The new alignment must be offset from the canal by a minimum amount to accommodate maintenance of traffic requirements, and if the typical section is compressed sufficiently, then this maintenance of traffic criterion governs.

The construction cost for this option would be slightly greater than Alternative 2B because of the stormwater piping and gutter system. The estimated cost for this alternative is $67,015,550 for the length of the corridor. This is a $8,464,900 additive to the cost of Alternative 2B.

CHAPTER 5- HYDROLOGIC IMPACT EVALUATION

Introduction

The Tamiami Trail component of the Modified Water Deliveries (MWD) Project is necessary to provide a more natural distribution of flow in Shark Slough. When Everglades National Park (ENP) was created in 1947, a significant portion of the Shark Slough watershed, known as Northeast Shark Slough (NESS), was not included in the authorization. The water supply for the park was thus constrained to the western portion of Shark Slough. Since the 1960's, protection of the developed areas to the east has intensified the effort to confine flows to the west by releasing water to ENP through the S-12 structures west of the L-67 levees. As a result of this management strategy, NESS has experienced unnaturally low water levels and short hydroperiods while Northwest Shark Slough (NWSS) has been unnaturally wet. This condition has adversely affected the vegetative and wildlife communities in both areas.

The ENP Protection and Expansion Act of 1989 was a result of the realization that rehydration of NESS is critical to the viability of the ecosystem as a whole. Congress authorized the Department of Interior to acquire these lands and directed the U.S. Army Corps of Engineers (Corps) in consultation with the Secretary of the Department of the Interior to "improve delivery of water into Everglades National Park and, to the extent practicable, restore the natural hydrologic conditions within Everglades National Park." (1989 ENP Protection and Expansion Act – Section 410r-8a (1)). The MWD Project was proposed to provide the necessary changes in the conveyance systems to accomplish the restoration directive.

The restoration effort associated with the MWD Project will provide a more natural spatial and temporal distribution of stages and flows in Shark Slough. Modifications to the 10.7 mile section of Tamiami Trail between S-333 and S-334 are a critical element of this project. These modifications are necessary because the existing road bed would be degraded to the point of failure by the higher water levels proposed, and because the road obstructs the proposed increases in flow to NESS. The sole objective of this component is to identify a road design that is compatible with the restoration goals of the MWD Project. The operations required to achieve these goals will be provided by the Combined Structural and Operation Plan, for the MWD and C-111 projects. However, the structural features of the selected Tamiami Trail alternative will impose an upper limit on the operational stages in L-29.

This section will present the hydrologic analysis of the proposed alternatives for Tamiami Trail. Ecosystem restoration in general, and specific design considerations are discussed. Historical analyses of stage and discharge are provided and compared to model results. Finally, each of the hydrologic performance measures are described and applied to the proposed alternatives.

Ecosystem Restoration

Vegetation

The Tamiami Trail has affected a number of changes in vegetation along its length. Pond apple forests have developed at the outlets of the culverts due either to generally wetter conditions or to concentrated flow at those points. The damage to the vegetative community in the area, and the benefits expected by the proposed alternatives are discussed in depth in Chapter 6.

Wildlife

The Tamiami Trail has presented a significant barrier to terrestrial and aquatic species. The effect of the road on wildlife in the area, including wildlife mortality, is presented in depth in Chapters 7 and 8.

Ridge and Slough Landscape

The Tamiami Trail crosses Shark Slough in a landscape called "Ridge and Slough." Sawgrass ridges were elongated areas, with peat elevations approximately one and a half feet above the surrounding slough bottom elevations. Sloughs in turn were deeper water areas of open water or water lilies. Tree Islands formed the third main element, slightly elevated above the sawgrass ridge ground surface. The ecologic significance of the topographic variation within the ridge and slough landscape is that the sloughs provide year-round inundation adjacent to the shorter hydroperiod ridge habitat. When viewed from the air, the ridges, sloughs, and tree islands all formed an elongated, highly directional pattern. Obstruction of flow and lowered stages may have had the combined effect of masking these landscape features by causing an imbalance in either the decomposition and accretion rates or in the sediment transport rate or both. While these mechanisms have not been quantitatively studied in this ecosystem, it is the overwhelming scientific opinion that full ecological restoration will not occur without reestablishing historical stages and unrestricted flows. (This opinion was stated, in part, in a letter from the Science Coordination Team to the Corps dated June 12, 2001.)

Roadbed Constraints

The subgrade of the existing road is composed of peat and uncontrolled fill which have not settled uniformly. The road base (above the subgrade) is crushed limestone. The subgrade and base are frequently saturated under current conditions, but the raising of water levels is expected to weaken the lower portions of the limestone base and result in additional cracking of the surface. (Engineering Appendix for the Tamiami Trail Modifications General Reevaluation Report / Supplemental Environmental Impact Statement, December 22, 2000, pg. 27. Hereafter referred to as GRR/SEIS.)

In general, roadbeds consist of a friction course, over a structural course of asphalt, over a ten

inch crushed limestone or asphalt base course. Ideally, this pavement structure is constructed on top of a crushed limestone embankment that rests on the bedrock surface so that the problems associated with settling are minimized. The structural integrity of the road is protected when the water level remains one ft below an asphalt base course and two ft below a limestone base course. This guideline has direct implications for all of the alternatives except the elevated causeway (Alternative 5). The relative abilities of the alternatives to withstand high water levels are assessed under the "Justification and Evaluation of Hydrologic Performance Measures" heading at the end of this section.

The Florida Department of Transportation (FDOT) drainage manual (2000) recommends a minimum design frequency of 50 years for bridges on "Essential" roads (those required for emergency access or evacuation.) Tamiami Trail is an official hurricane evacuation route and should therefore be designed to satisfy the minimum 50-year return frequency for stage and discharge. (Florida Department of Community Affairs, pers. comm.). Analyses to determine stage and flow frequencies are outlined in following sections.

Stage- Historical and Projected

The construction of the Miami, North New River, and Hillsboro canals between 1906 and 1915 probably lowered water levels in Shark Slough, although a lack of stage records from this time period precludes a quantitative analysis. In 1928, the completion of the Tamiami Trail created a significant obstacle to flow, but it wasn't until 1953 when the L-31N canal was constructed, and 1963 when the L-67 and L-29 levees impounded WCA-3B, that lowered water levels in the vicinity were documented.

The earliest available stage data is from 1940 at bridge 45 of the Tamiami Trail, where stage was recorded until 1967. Stage records represent daily staff gage observations before 1950 when a graphic stage recorder was installed. Before impoundment in 1963, average wet season stages (June 1 – October 31) were 7.1 ft and average dry season stages (November 1 – May 31) were 6.7 ft. Since 1963, these stages have been lowered to 6.9 ft and 6.6 ft, respectively. According to the D13R simulation of the South Florida Water Management Model (SFWMM), (cell C22R22), wet and dry season stages can be expected to increase to average seasonal levels of 7.7 ft and 7.2 ft, respectively, under estimated restoration conditions, .

Stages that result in sustained inundation of the sub-base of the road can cause severe structural damage. Figure 5.1 shows the frequency analysis of maximum annual stages. Before 1963, peak stages of at least 7.8 ft could be expected in a typical year. Peak stages above 9.0 ft were recorded in 4 out of the 25 years, corresponding to a 6-year return frequency. Since 1963, peak stages have declined in all but the driest years and "1-in-20" year wet stages have fallen by about 1.5 ft. The D13R simulation predicts slightly lower than pre-1963 peak stages in wet years with greater than a 3-year return frequency, but higher than historical stages in drier years. Peak stages of 8.2 ft might be expected in a typical year.

Additional modeling has been performed for other components of the MWD Project. The MOD-

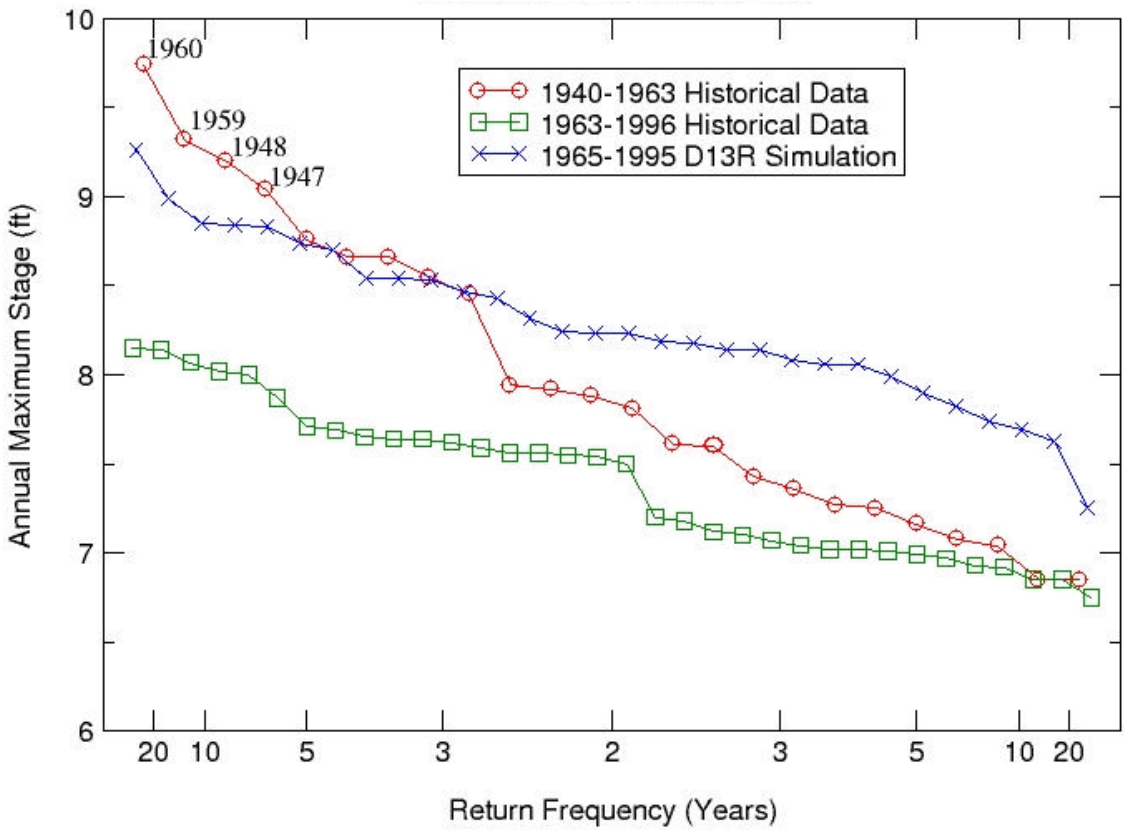

Figure 5.1. Frequency analysis of peak annual stage, L-67 ext. to L-30 section of L-29.

BRANCH D13R simulation was performed by the Corps for the 8.5 Square Mile Area component of the MWD Project. It predicted average stages along the road (cells 18815 to 18859) of greater than 9.5 ft for three consecutive weeks in late October of 1995. (The simulation included an additional one-in-ten year event in May which had the effect of raising stages at the road by 0.05 ft in late October over the stage that would have been predicted under the actual rainfall conditions. When the predicted high stage of 9.6 is corrected by this factor, the predicted high stage for the roughly "1-in-10" year event is 9.55 ft.) The Corps used the RMA-2 model, developed by Resource Management Associates of California, for the Tamiami Trail Component. The RMA-2 model predicted stages of 8.7 ft south of the road coincident with flows of 2700 cfs across the road which were considered to represent a 10-year return frequency. However, if historical "1-in-10" year flows are modeled (4,444 cfs), the resulting stage is between 9.2 and 9.3 ft on the south side of the road. Modeling of an extreme event with a flow rate of 5,550 cfs, demonstrated a backwater effect with 9.43 ft stages south of the road but 9.58 ft north of the road. (GRR/SEIS Appendix B, pg. 7.)

The design high water level used in the GRR/SEIS is 9.3 ft (pg. i). In order to ensure the design of a durable road, the mean peak stage along the road predicted by the MODBRANCH simulation (9.55 ft) was adopted by DOI as the minimum acceptable design stage. While this model ex-

hibits the highest predicted stage of the three models examined, it represents only a “1-in-10” year event. More severe, but less frequent, events will result in higher stages. Additionally, this stage is an average across the 11-mile section of the road encompassed by this project; locations to the west may experience higher stages than those influenced by the drainage of the L-30 and L-31N canals to the east. Further, frequency analysis of historical stage data shows that the 1960 peak stage of 9.74 might occur with roughly a “1-in-20” year return frequency (Figure 5.1).

Discharge - Historical and Projected

Rating curves, developed by U.S. Geological Survey, were used to translate stage data prior to 1963 into discharge. A frequency analysis of the annual peak flow data was performed in accordance with Bulletin 17B (Appendix A). Bulletin 17B was developed by the U.S. Water Resources Council to provide federal agencies with a standard method for calculating flood frequencies. Using this method, the flow distribution based on historic data is significantly higher than that predicted by the D13R simulation of the SFWMM. (Figure 5.2, Table 5.1) It should be noted that the D13R simulation also predicted lower flows than the Natural System Model (NSM) simulation by about 25%.

One explanation for this difference is that the daily stages and flows in the historical record might have been maximums for each day, while the D13R model output consists of daily averages. However, frequency analysis of peak two-day averages of the historic record resulted in very little change in the flow frequency compared to the daily peak data, indicating that the historical data is representative of sustained (at least 24-hour) flows (Table 5.1). In addition, while the model results are appropriate for prediction of total flows, 24-hour peak flows may not be accurately predicted.

The RMA-2 modeling performed by the Corps for this project analyzed the ability of the road to convey the flow rates predicted by the D13R simulation. Thus, the successful conveyance of 4,270 cfs by the alternatives satisfies the hydrologic requirements of a “1-in-100” year event according to D13R but only a “1-in-10” year event according to historical data. FDOT guidelines recommend a design frequency of “1-in-50” years for evacuation routes such as this one. If the historical analysis was accepted and the FDOT guidelines were followed, the design discharge for this project would be 8,973 cfs.

Because historic flows are not expected under either the MWD Project or the Comprehensive Everglades Restoration Plan (CERP), the satisfactory design flow is probably somewhere between 4,270 and 8,973 cfs.

L-29 Borrow Canal Capacity

Raising the crown elevation of the road necessitates broadening the road bed so as not to exceed standards for embankment slopes. If the current alignment (Alt. 2) is chosen over the northern (Alt. 3) or southern (Alt. 4) alignments, accommodation of water quality treatment would require the road to expand north into the L-29 borrow canal or south into the undisturbed wetlands of ENP. One of the major considerations in determining the preferred alternative is the acreage

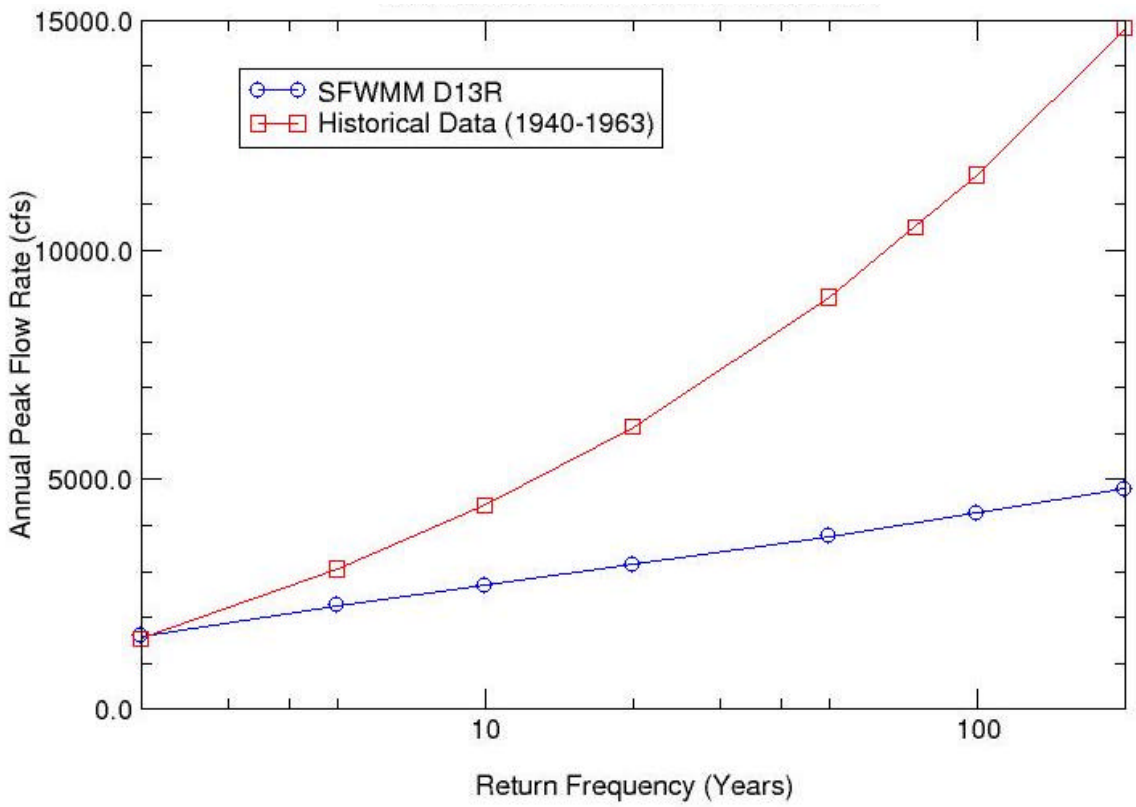

Figure 5.2. Frequency analysis of peak annual flow rates, L-67 ext. to L-30 section of Tamiami Trail

Table 5.1. Return frequencies for discharge across the L-67ext to L-30 section of Tamiami trail as predicted by the SFWMM D13R simulation and historical data from bridge 45

Return Frequency (wet)	**D13R Peak Annual Daily Flow (cfs)**	**Historical Peak Annual Daily Flow (cfs)**	**Historical Peak Annual 2-day Averaged Daily Flow (cfs)**
2-year	1,600	1,535	1,499
5-year	2,250	3,051	2,990
10-year	2,700	4,444	4,361
20-year	3,150	6,148	6,042
50-year	3,770	8,973	8,831
100-year	4,270	11,632	11,461
200-year	4,800	14,830	14,628

of wetlands lost (Objective 8, evaluated in Chapter 6). In an effort to minimize wetland loss, the current and future conveyance needs of the canal were assessed to determine the feasibility of expanding the road bed north into the canal.

The L-29 borrow canal is a component of the South Dade Conveyance System (SDCS). The primary purpose of the SDCS is to provide water supply to Miami-Dade County and ENP from the Central and Southern Florida (C&SF) Project. The system was completed around 1979 through an increase in the conveyance capacities of L-29, L-31N, and the C-111 canals. However, the SDCS has functioned as much as a flood control project as a water supply project since its completion in 1983.

The section of the L-29 canal under consideration is bounded by S-333 on the west and S-334 on the east. Both S-333 and S-334 are single-bay gated spillways that release water eastward to control water levels in the L-29 and L-31N canals. By design, they convey water from WCA-3A to Taylor Slough and south Miami-Dade County to supply municipal, industrial, and agricultural water users. S-333 has a design discharge capacity of 1,350 cfs; S-334 has a design discharge capacity of 1,230 cfs. Use of the structures is constrained by water levels in the developed areas just east of NESS. Specifically, S-333 is closed when water levels at G-3273 exceed 6.8 ft and when S-176 headwater stage exceeds 5.0 ft or S-331 headwater exceeds its target stage.

S-333 and S-334 have generally not been used for dry season water supply, the bulk of which is typically delivered through S-335. (Figure 5.3). Recent discharges through S-334 have been wet-

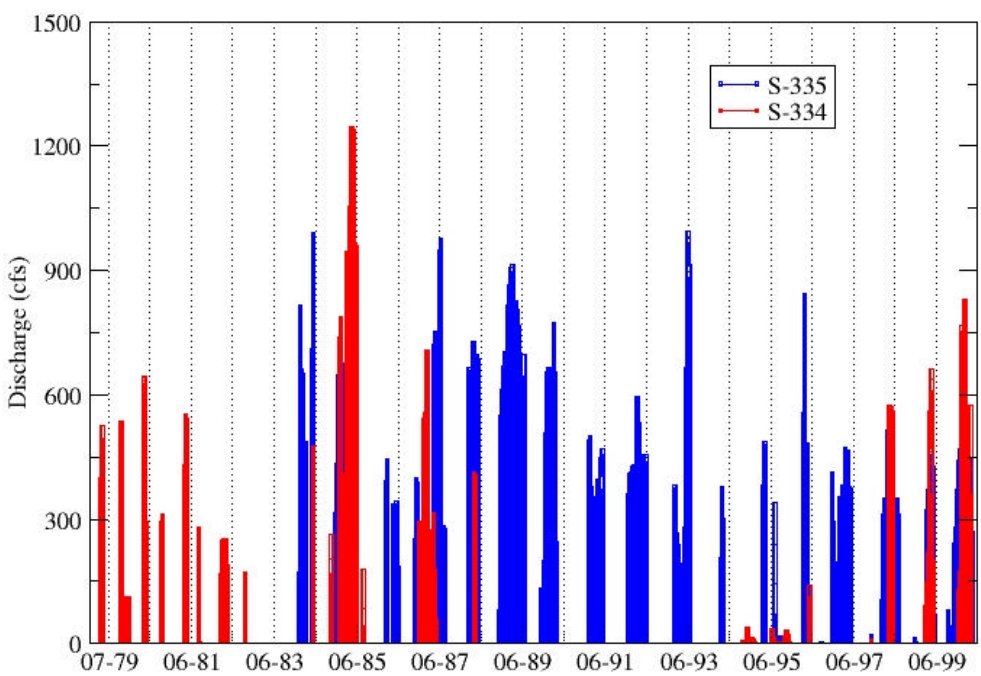

Figure 5.3. Discharge at S-334 and S-335

season discharges related to the Interim Structural Operations Plan, which sought to avoid excessive discharges to NWSS when WCA-3A regulatory releases were made. S-334 discharge (and therefore L-29 conveyance) exceeded 1000 cfs only once (January-June, 1985) since the SDCS has been operational. This conveyance satisfied water supply needs of South Dade, as did an event in May, 1984, (500 cfs). Only two other events required significant L-29 conveyance (January-March, 1987 at ~700 cfs and April, 1988 at ~400 cfs).

Once the Tamiami Trail is reconstructed to discharge water to NESS through bridges and culverts, regulatory releases from WCA-3A will be accomplished by releases to NESS through the road and will not require conveyance from S-333 through S-334 and down L-31N. At that time the L-29 borrow canal will serve as a spreader canal to equalize heads across the northern boundary of the park, and will serve to distribute inflows from S-333, S-355A, S-355B, and S-356, except for infrequent water supply releases.

The canal dimensions between S-333 and S-334 vary in width and depth with cross-sectional areas ranging from 1073.5 ft^2 (adjacent to S-334) to 1509.4 ft^2 (near the middle of the section.) (*Final Environmental Impact Statement South Dade Conveyance Canals and East Coast Backpumping*, (June 1975), Table 5, pg. 24, hereafter referred to as FEIS). (Relevant data summarized in Appendix B.)

The conveyance of this canal is limited by the head gradient along the length of the section. Manning's Equation was used to estimate the gradient required by the maximum flow at S-333 and S-334 for different cross-sectional areas. This calculated gradient was then compared to the design gradients reported in the FEIS (Appendix B).

Just downstream of S-333, at the maximum design discharge of 1,350 cfs, the head loss was 0.2 ft along a 14,350 ft section. This section has a design head loss of 0.6 ft (FEIS). If the width of the base of the canal in this section were reduced from 35 ft to 15 ft, the gradient required to convey 1,350 cfs would go up to 3.264×10^{-5} – a 0.5 ft drop along the section, still less than the design gradient.

In the section just upstream of S-334, at the maximum design discharge of 1,230 cfs, the head loss was 0.5 ft across the 29,200 ft section. The design head loss for this section is 1.2 ft (FEIS). If the width of the canal at this point were also reduced by 25 ft (from 60 ft to 35 ft), the gradient required to convey 1,230 cfs would go up to 3.189×10^{-5} – a 0.9 ft drop along the section, 0.3 ft less than the design gradient.

According to this preliminary analysis, 25 ft of the canal base could be filled by the design of the new road while maintaining the maximum conveyance capacity of the bounding structures without an unreasonable increase in gradient. Since the SDCS was completed in 1983, S-334 has passed more than 1000 cfs during only one event (4/29/1985 – 5/9/1985). Future conveyance requirements are expected to be lower under the MWD Project because of the increased discharge capacity from the canal into NESS. CERP, as currently modeled, eliminates the canal altogether.

It is our opinion, for all of these reasons, that the cross-sectional area of flow in the canal could be significantly reduced without impairing the operation of the system in the near future. Although this option has not been explored in the proposed alternatives, it should be considered if an alternative with substantial wetland loss is selected.

Discharge Requirements of the 1999 FWS Biological Opinion

Discharge to ENP across the northern boundary has been guided by "The Rainfall Formula" since 1985. The total water delivery to ENP is the sum of rainfall and regulatory components distributed between NESS (55%) and NWSS (45%). This formula is described in detail in SFWMD Technical Publication 89-3 (TP 89-3); A Two-year Field Test of the Rainfall Plan: A Management Plan for Water Deliveries to Everglades National Park.

The volume of the rainfall component is calculated weekly and is dependent in part on the antecedent rainfall and evaporation, the previous week's discharge, and historic means of flow, rain, and evapotransporation. According to TP 89-3, 45% of calculated rainfall discharges go through the S-12 structures to NWSS, and 55% go through S-333 to be released to NESS through the culverts under the Tamiami Trail. The distribution of this component remains unchanged under the Reasonable and Prudent Alternative (RPA). The maximum total calculated rainfall release since 1993 was 2863 cfs in late October of 1995. Under the distribution guidelines, NESS would have received 55% of this amount, or 1575 cfs.

The regulatory component is calculated by multiplying the difference between the three-gage average stage (Corps' gages 3A-3, 3A-4, and 3A-28) for WCA-3A and the Zone E regulation stage by 2500 cfs/ft to calculate the regulatory discharge in cfs. Under normal conditions, the current WCA-3A schedule calls for 45% of the discharge to be released through the S-12 structures to NWSS with the remaining 55% discharged through S-333 to NESS. However, when water levels to the east (as measured at G-3273) are higher than 6.8 ft, discharges through S-333 are not permitted and more water, up to 100% of the regulatory and rainfall components (at NPS discretion) is released to NWSS, none to NESS. It is this distribution under typical wet season stage conditions which jeopardizes populations of Cape Sable seaside sparrows found on the northwest and east edges of Shark Slough and leaves NESS without significant inflows during large portions of the wet season. The RPA requires scheduled increases in water releases to NESS over a period of three years by allowing flows through S-333 even during wet periods. Specifically, between March 1, 2000 and March 1, 2001, 30% of the regulatory releases were to be released to NESS. (In 2000, structural capacity was never the limiting factor in meeting RPA flows (Figure 5.4). Stages above 6.8 ft at G-3273 apparently limited discharges from S-333 and therefore releases to NESS.) Beginning in March of 2001, 45% must be released to NESS, and after March 2002, 60% must be released to NESS. The three-gage average stage, (corresponding to the late October, 1995 rainfall formula peak,) was 12.56 ft. Had the final form of the RPA been in effect during this event, the 12.56 ft stage would have translated into a regulatory discharge of 5400 cfs, of which 60% (3240 cfs) would be delivered to NESS.

The sum of the rainfall (1575 cfs) and the regulatory (3240 cfs) components of discharge to

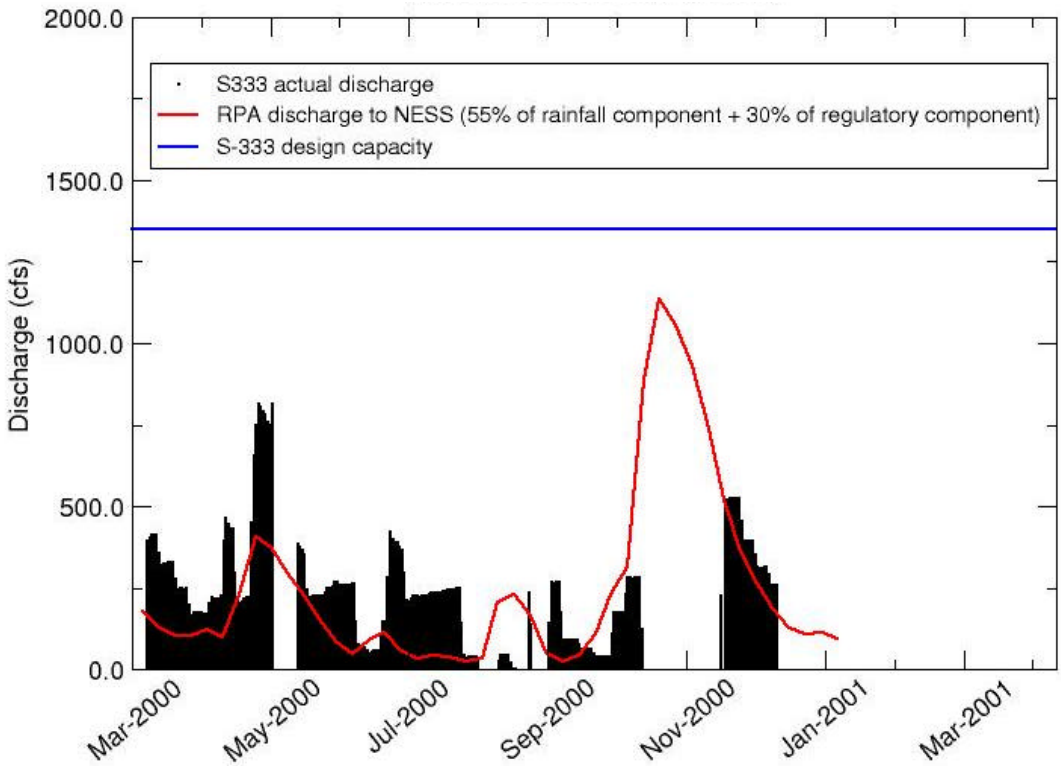

Figure 5.4. RPA Calculated and Actual Discharge, March 2000 to December 2000

NESS is 4815 cfs. However, the RPA permits an exception when C&SF Project features are incapable of delivering the required discharge to NESS, effectively limiting maximum discharges to NESS to the maximum combined capacity of the structures delivering water to the L-29 canal section between L-67 ext. and L-30. Therefore, the alternatives are considered to satisfy the RPA if they permit a discharge equal to the sum of the conveyances to L-29 canal.

Evaluation of Flow Distribution

It is widely believed that the magnitude and direction of flow through the Everglades landscape are critical factors in the development and maintenance of the Ridge and Slough microtopography. Faster velocities can be erosive and can carry heavy sediment loads. It is also understood that fish and aquatic invertebrates are effected by flow rates. While the function of these mechanisms in this landscape require further study, it is reasonable to assume that the closest approximation of marsh conditions at the road would be the preferred result of this project. In this section, attempts have been made to quantify the severity of the effect on flow velocities at the road and the area downstream required to slow the water down in the marsh.

The flow distributions for each of the Alternatives were simulated using RMA-2. (Alternative 8, with box culverts, was not simulated. A configuration with 10, 100-ft bridges was simulated, and has been used in this analysis to approximate the effects of Alternative 8.). Contour maps of velocity magnitude in the first 2 miles downstream of the road are presented in Figures 5.5 a-g.

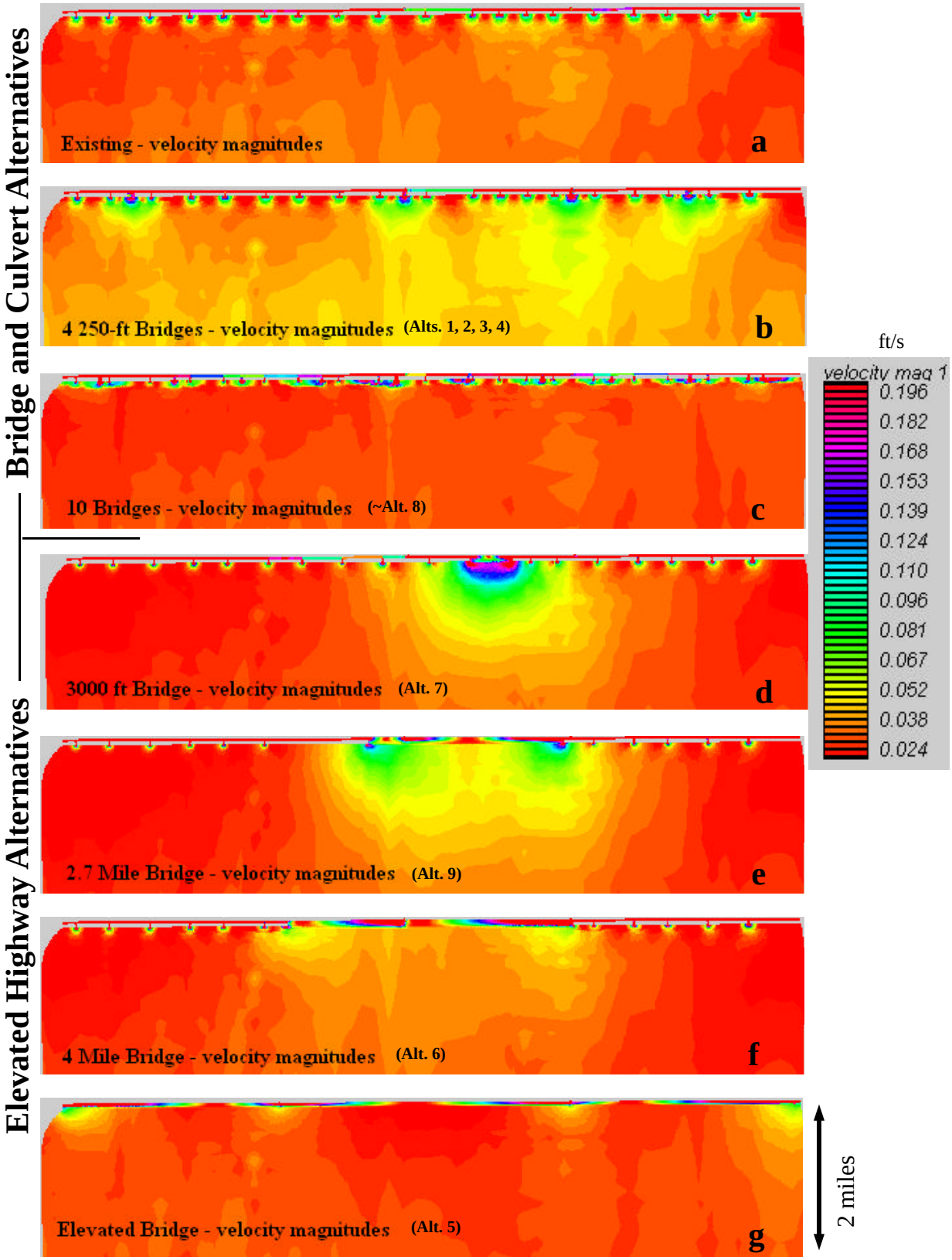

Figure 5.5 a-g. Contour maps of velocity. (Spatial extent is L-67 ext to L-31 N, Tamiami Trail to 2 miles south.)

These images clearly show the distribution of flow through culverts (a), short bridges (b, c), and long bridges (d, e, f, g). The shorter flow openings (culverts / short bridges) force higher velocities in the structures and immediately downstream while the longer flow openings have spatially far-reaching, though less severe, effects.

To assess the effects of the alternatives on velocities at the road and in the marsh, transects (1/4 mile thick) were selected at distances from the road of ¼, ½, 1, 2, and 5 miles. One additional transect (1/8 mile thick) was selected at the road. The mean velocity (speed) was calculated for each of these transects at the highest flow rate (5548 cfs). (Because of the irregular distribution of elements in the mesh, this mean is biased toward the faster velocities at the culvert and bridge outfalls in the 1/8 mile transect just south of the road. We intend to refine this analysis for the final draft.) The mean velocity graph, Figure 5.6, shows generally higher velocities near the road in alternatives that confine flow to culverts or narrow bridges. Most of the alternatives reach a steady marsh velocity of 0.029 ft/s within 2 miles of the road. Alternative 5, the causeway, shows a mean velocity at the road (0.03 ft/s) which is consistent with downstream velocities. Alternative 8 achieves a lower marsh velocity within the first ¼ mile, although at the road the mean velocity is much higher (0.052 ft/s.) Alternative 6, the 4-mile bridge, has a slightly higher mean velocity at the road (0.0375 ft/s) than downstream, and the velocity drops to a more natural velocity within the first ¼ mile. The existing condition, also achieves a more natural velocity within the first ¼ mile, although at the road it has a much higher velocity (0.052 ft/s). Alternative 9, the 2.7 mile bridge, has higher velocity at the road (0.043 ft/s) than Alternative 6, and does not fall to natural marsh velocity until 2 miles away from the road. Alternative 7 has roughly the same effect on marsh velocities, but has higher velocities at the road (0.057 ft/s) due to its shorter opening. Both Alternative 1 (existing condition) and Alternative 2, 3, 4, (four

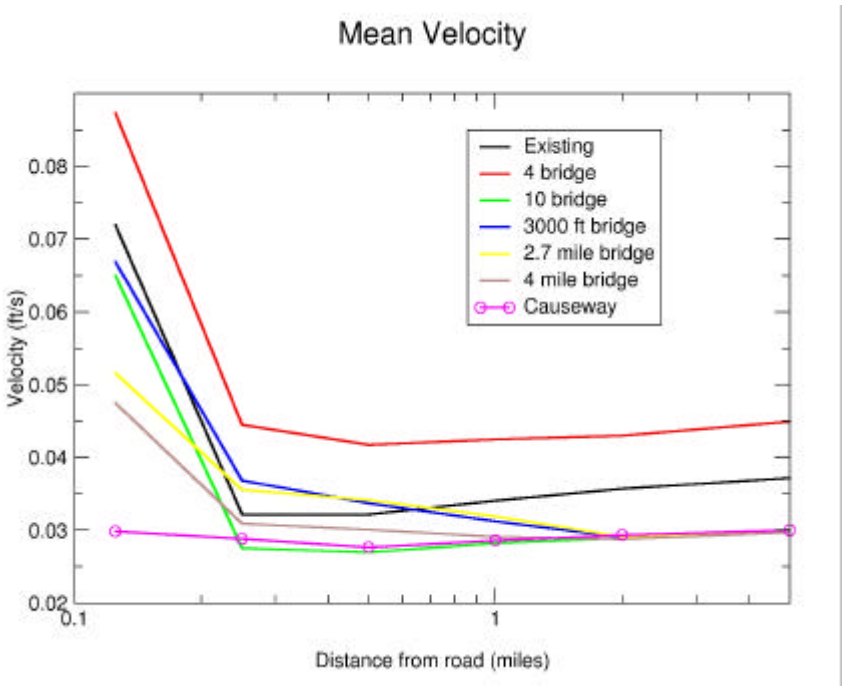

Figure 5.6. Mean Velocity as a function of distance from Tamiami Trail for each of the alternatives.

bridges) have higher velocities in the marsh more than 2 miles away from the road than any of the other alternatives (0.033 and 0.043 ft/s.) At this time, the explanation for this is unknown, and model error is suspected.

Standard deviation in the mean was also calculated for each transect. In the marsh, 5 miles from the road, the standard deviation for the simulations ranged from 0.003 to 0.005. To estimate the spatial extent of the higher velocities, the area inside the 0.045 ft/s contour (outside 3 standard deviations of the mean) was estimated for all of the alternatives. Because of the higher overall velocities in the four-bridge alternative, the analysis was performed using the mean marsh velocity of 0.043 ft/s (threshold of 0.58 ft/s) particular to this simulation. In general, the longer bridges required larger areas to slow water to marsh velocity with the 2.7 mile bridge affecting the largest area, 2567.7 acres. Culvert and short bridge options did better, requiring only 437.5-623.4 acres. The full elevated highway, with completely unobstructed flow required only 165.7 acres to reach normal velocity. (This acreage is located direction downstream of the 4 structures contributing water to the L-29 canal which is effectively a spreader canal in this alternative.)

Figure 5.7 compares the performance of the alternatives with respect to flow distribution. The difference between mean velocities at the road and in the marsh is used as an indication of the severity of the effect on flow magnitudes. Acreage required to slow the water down to within 3 standard deviations of marsh velocity is also shown. Clearly, the full elevated highway reduces both the severity of the effect of the road and the total area effected by not forcing flow through constricting openings. The 2.7 mile bridge is interesting because it produces a much slower velocity at the road than the 3000-ft bridge but a larger area of impact. This is because the veloci-

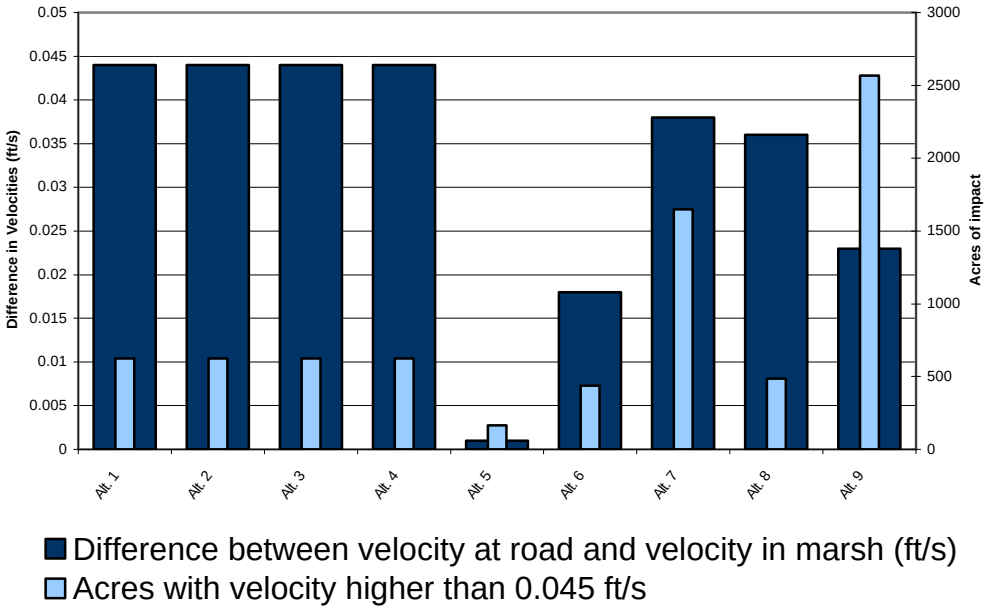

Figure 5.7. Comparison of Alternatives with respect to flow distribution.

ties are fast enough and distributed across a wide enough distance to require a large area to slow down. The four mile bridge spreads flow over a long distance, and therefore could have a large area of impact, but the velocities are slow enough coming through the road to reach comparable marsh velocities over a very short distance.

Justification and Evaluation of Hydrologic Performance Measures

A number of Performance Requirements require hydrologic information in the associated performance measure. Their justifications and applications are discussed below.

Satisfaction of the Reasonable and Prudent Alternative (RPA) (Environmental Objective 2)

If the RPA had been in place on October 20, 1995, the total discharge to NESS would have been calculated as 4815 cfs. The RPA requires 60% of regulatory discharges to be released to NESS, with three exceptions including instances when "failure to meet the requirement is due entirely to limited structural capacity of the C&SF Project works." (1999 FWS Biological Opinion). By the time the Tamiami Trail Modifications are made, conveyance into the L-29 canal will be at least 4300 cfs (the sum of the design capacities of S-333 (1350 cfs), S-355A and S-355B (each 1000 cfs), and S-356 (950 cfs).) All of the alternatives are designed to convey peak flows of 5550 cfs to NESS, and therefore should meet RPA requirements as conveyance to L-29 permits.

Consistency with the 1989 ENP Protection and Expansion Act (Environmental Objective 4)

Section 410r-8a(1) states that the Secretaries of the Army in consultation with the Secretary of the Interior are "…authorized and directed to construct modifications to the Central and Southern Florida Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park." While the Tamiami Trail component of the MWD Project does not determine water levels, the preferred alternative must be compatible with the higher water levels and flows that are the goal of the project. There is no specific stage or flow defined as a project goal in any of the legislation associated with the MWD Project. However, it would be sensible to design the new road to accommodate CERP stages and flows to prevent the necessity of costly retrofitting.

In the Engineering Appendix of the Final Design (100%) Submittal, (page 32), the design high water elevation is given as 9.3 ft. This stage does not satisfy the DOI minimum design stage of 9.55 ft, which is based on both historical observed and modeled CERP condition data.

The acceptability of each of the alternatives is summarized in Table 5.2 and demonstrated in Figure 5.8. Alternative 1 does not meet the performance criteria because degradation of the road surface would accelerate with the design high water elevation at the bottom of the asphalt base. (This alternative involves leveling the road to the average crown elevation of 11.0 ft.) Similarly,

Table 5.2. Evaluation of each Alternative with respect to the DOI design high water level (9.55 ft) to determine satisfaction of Environmental Objective 4.

Alternative Description	Base Type	Clearance required	Base Bottom Elevation / Clearance Provided	Compatible with 9.55 ft design high water elevation
Alternative 1 Without Water Quality	Asphalt	1 ft	9.3 ft / -0.25 ft	NO
Alternative 2A Without Water Quality	Asphalt	1 ft	10.3 ft / 0.75 ft	NO
Alternative 2B With Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES
Alternative 3A Without Water Quality	Crushed Limestone	2 ft	16.1 ft / 6.55 ft	YES
Alternative 3B With Water Quality	Crushed Limestone	2 ft	16.1 ft / 6.55 ft	YES
Alternative 4A Without Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES
Alternative 4B With Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES
Alternative 5	NA	NA	13.5 ft / 3.95 ft	YES
Alternative 6A Without Water Quality	Asphalt	1 ft	10.3 ft / 0.75 ft	NO
Alternative 6B With Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES
Alternative 7A Without Water Quality	Asphalt	1 ft	10.3 ft / 0.75 ft	NO
Alternative 7B With Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES
Alternative 8A Without Water Quality	Asphalt	1 ft	10.3 ft / 0.75 ft	NO
Alternative 8B With Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES
Alternative 9A Without Water Quality	Asphalt	1 ft	10.3 ft / 0.75 ft	NO
Alternative 9B With Water Quality	Crushed Limestone	2 ft	12.9 ft / 3.35 ft	YES

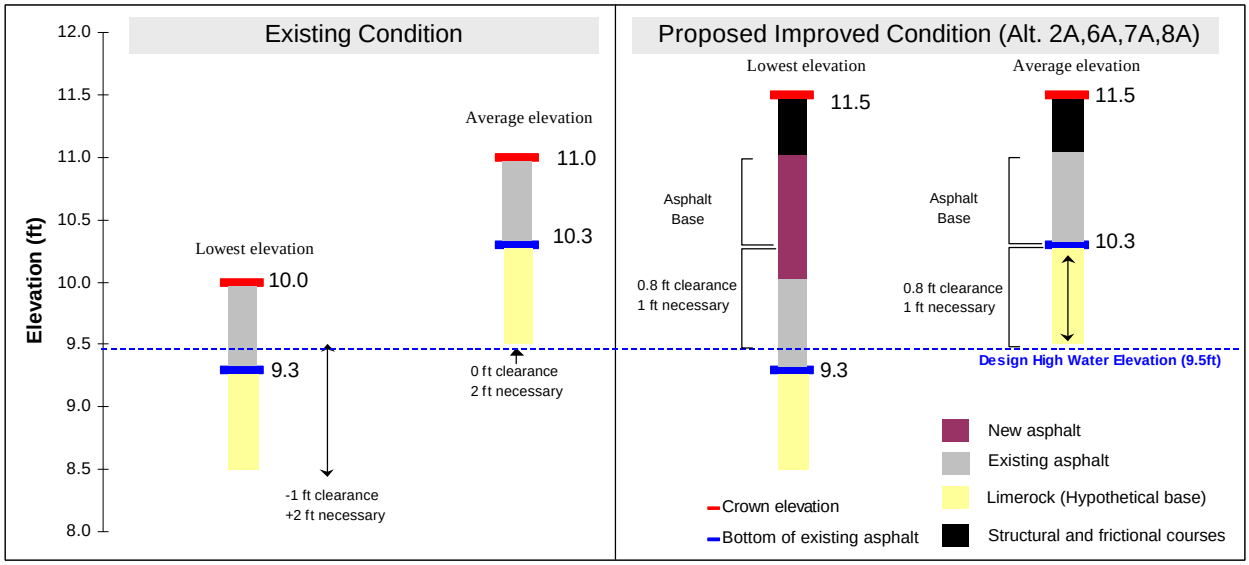

Figure 5.8. Existing and proposed improved roadbed compositions and elevations.

Alternatives 2A, 6A, 7A, 8A, and 9A (without water quality treatment) do not meet the performance criteria because the bottom of the asphalt base is within 1 ft of the DOI design high water elevation. We have recommended, (in Chapter 10) that these alternatives be raised by 0.25 ft to satisfy the DOI high water elevation of 9.55 ft. Alternatives 2B (with water quality), 3, 4, 5, 6B, 7B, 8B, and 9B meet the performance criteria because they provide satisfactory clearance from the DOI design high water elevation.

The assessment of achievement of a natural flow distribution is accomplished through two measures. First, the difference between the mean velocity at the road and the modeled mean marsh velocity as measured in a transect 5 miles downstream of the road was calculated for each of the alternatives. The results are summarized in Table 5.3. At the road the velocity most closely matches the marsh velocity in Alternative 5 which is ranked highest. The area in which the velocity was higher than the marsh velocity by 3 standard deviations (0.030 + 3*(0.005) ft/s) is also presented in Table 5.3. Alternative 5 produced the smallest acreage of high velocities and is therefore ranked highest.

Flood Control (Other Objective 1)

As specified in the 1989 ENP Protection and Expansion Act, mitigation of adverse impacts resulting from the MWD Project would be required. However, while the Tamiami Trail component of the MWD Project involves raising the road to mitigate for higher water levels, it does not itself produce higher water levels or more frequent high water levels. For this reason, there is no expectation that flood control might be compromised as a result of any of the alternatives under consideration in this component of the MWD Project.

Table 5.3. Flow distribution performance measures and ranks.

Alt. No.	Description	Difference between average velocity at the road and average velocity in the marsh and rank		Area with affected flow magnitude (acres) and rank	
1	4 bridge	0.037	6	623.4	6
2	4 bridge raised	0.037	3	623.4	6
3	4 bridge north	0.037	3	623.4	6
4	4 bridge south	0.037	3	623.4	6
5	Causeway	0	9	165.7	9
6	4-mile bridge	0.008	8	437.5	8
7	3000-ft bridge	0.027	4	1649.3	2
8	Box culverts	0.021 est.	6	485.8 est.	7
9	2.7 mile bridge	0.013	7	2567.7	1

Maximize compatibility with future restoration actions (Other Objective 2)

The calculation of cubic yards of fill requiring removal to achieve completely unobstructed flow path includes all fill associated with the new project road, the remaining sections of existing road, and the L-29 levee. Fill volume was calculated by determining the cross-sectional area of the roads and levees and multiplying by the length to be removed. For example, under Alternative 5A with full road removal, only the L-29 levee would remain to be removed under CERP (1.1 million yd^3) with the existing road having been completely removed under MWD. Fill volumes for all alternatives are summarized in Table 5.4. In general, alternatives that propose greater removal of the existing road under MWD have lower fill removal requirements under CERP.

The relative abilities of the alternatives to accommodate additional flow volumes either as a result of currently authorized CERP features or unauthorized but foreseen increases (245,000 acre-ft described in Sec. 601G of WRDA 2000) were based on the size of the proposed openings in the road. It was assumed that the larger openings would better handle increased flows. From best to worst the Alternatives rank as follows: Alt. 5, Alt. 6, Alt. 9, Alt. 7, Alts 1, 2, 3, 4, and 8.

Table 5.4. Volume of fill requiring removal after MWD is completed to achieve completely unobstructed flow.

Alternative Description	Millions of Cubic Yards
Alternative 1: Without Water Quality	1.6
Alternative 2A: Without Water Quality	1.7
Alternative 2B: With Water Quality	2.0
Alternative 3A: Without Water Quality	2.3
Alternative 3B: With Water Quality	2.8
Alternative 4A: Without Water Quality	2.5
Alternative 4B: With Water Quality	2.8
Alternative 5A partial: Partial Road Removal	1.6
Alternative 5A full: Full Road Removal	1.1
Alternative 5B partial: Partial Road Removal; With Water Quality	1.6
Alternative 5B full: Full Road Removal; With Water Quality	1.2
Alternative 6A partial: Partial Road Removal	1.5
Alternative 6A full: Full Road Removal	1.6
Alternative 6B partial: Partial Road Removal; With Water Quality	1.7
Alternative 6B full: Full Road Removal; With Water Quality	1.9
Alternative 7A: Without Water Quality	1.7
Alternative 7B: With Water Quality	2.0
Alternative 8A: Without Water Quality	1.7
Alternative 8B: With Water Quality	2.1
Alternative 9A: Without Water Quality	1.5
Alternative 9B: With Water Quality	1.9

CHAPTER 6- WETLAND FUNCTIONAL ANALYSIS

Wetland Rapid Assessment Procedure

In order to compare relative differences in wetland function between the "existing condition" and the "with-project condition", the Wetland Rapid Assessment Procedure (WRAP) was employed (SFWMD 1997). The WRAP methodology has been adopted by the U.S. Army Corps of Engineers (Corps) as the most reliable and consistent approach to account for changes in wetland function for Everglades restoration projects in south Florida (letter dated August 4, 1999.) An interagency WRAP Team was established in October 2000, and included representatives from the Fish and Wildlife Service (FWS), Corps, National Park Service (NPS), South Florida Water Management District (SFWMD), and Miami-Dade County Department of Environmental Resources Management (DERM). These representatives consisted of experienced biologists, ecologists and botanists who have applied the WRAP procedure on numerous occasions and are knowledgeable of wetland ecology in south Florida.

WRAP is a matrix developed to assist in the functional evaluation of wetland sites. The matrix can be used in combination with professional judgment to provide an accurate and consistent evaluation of wetland sites. The WRAP matrix establishes a numerical ranking for individual ecological and anthropogenic factors (variables) that can strongly influence wetland function. The numerical output for the variables is then used to evaluate current wetland condition. Each wetland type is rated according to its attributes and characteristics. WRAP variables include the following: 1) wildlife utilization, 2) wetland overstory/shrub canopy of desirable species, 3) wetland vegetative ground cover of desirable species, 4) adjacent upland/wetland buffer, 5) field indicators of wetland hydrology, and 6) water quality input and treatment systems. The acreage of each wetland habitat type (polygon) is then multiplied by the acreage of that habitat type to derive "functional units" for comparison purposes.

In November 2000 and December 2000, the WRAP Team conducted a series of on-site field investigations, consisting of 11 survey sites representative of the wetland habitat types (polygons) in the project area to establish the "existing condition" wetland functional conditions. On January 31 and February 1, 2000, the WRAP Team convened to calculate the "with-project" wetland functional projections for the 26 alternatives proposed for the project. The results of the WRAP assessment are described below.

Wetland Polygon Delineation

The WRAP Team utilized hard copy maps of wetland vegetation prepared by staff at the SFWMD (Figure 6.1). The study area included the entire 10.7 miles of the eastern section of Tamiami Trail extending approximately 100 ft into the wetlands on the north and south sides of the highway. Up to three categories of vegetation representing the dominate, co-dominate, and third dominant categories of vegetation were used to label wetland polygons. Color infrared aerial photography (1:24,000 scale) taken in 1995 was used as the base. After field verifying the

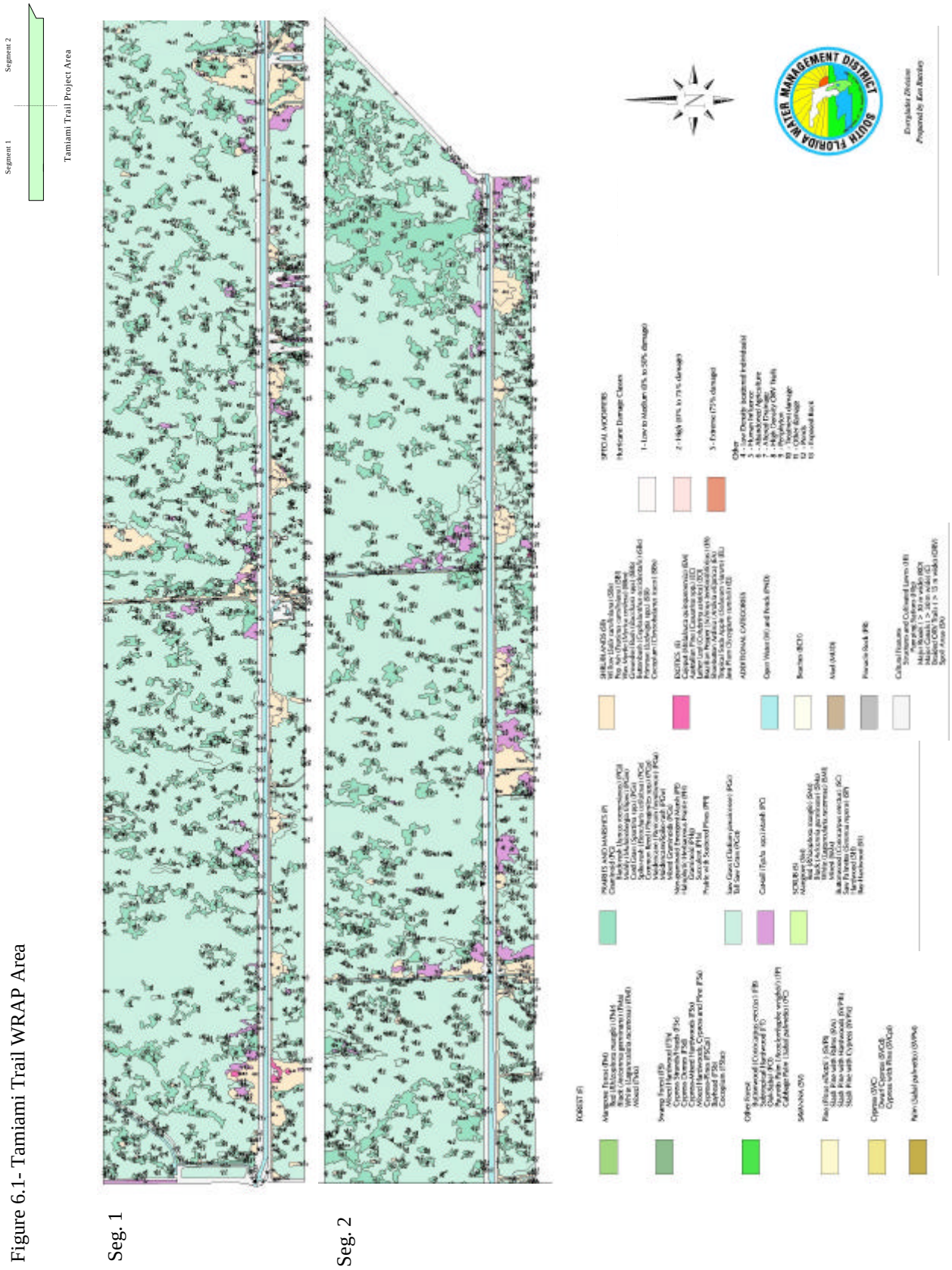

Figure 6.1- Tamiami Trail WRAP Area

wetlands on the south side Everglades National Park (ENP) of Tamiami Trail, the WRAP Team decided the ENP mapping should be re-done due to discrepancies in vegetative composition. The ENP mapping had previously been contracted to the University of Georgia Center for Remote Sensing and Mapping by the South Florida Natural Resources Center. SFWMD staff remapped the ENP wetlands and a seamless GIS plot was provided to the WRAP Team for use in the field.

The Corps' contractor prepared CADD maps for each of the project alternatives, which were overlain on the wetland polygon map. The acres of wetland impacts, by alternative and wetland polygon type, were then calculated for each alternative. Wetland polygon types impacted by the project and scored by the WRAP Team included:

Prairies and Marshes

Sawgrass (PGc)/(PGw*)
Cattail (PC)
(PGw*)
Broadleaf and floating Emergents (PE)
Cattail (PC/Sawgrass (PGc) mix
PGw* – Mix of shallow open water which can include spikerush, maidencane, sparse low stature sawgrass and/or cattail, sparse arrowhead and pickerel weed, and sparse white water lily

Shrublands and Exotics

Shrubland mix (SB)
Pond Apple (SBa)/Willow (SBs) mix
Brazilian pepper (ES)/Shrubland (SB) mix

WRAP Scoring Methodology

Wetland polygons were scored on-site by the WRAP Team after ground-truthing in accordance with the WRAP protocol (WRAP Procedure, Technical Publication REG-001, 2nd ed., April 1999). Final polygon scores were reached by consensus after discussing all appropriate Habitat Assessment Variables. Each polygon was evaluated on it own attributes and not compared to other polygons. Any variable that did not apply to a particular polygon was designated "NA" (not applicable). The WRAP scores for each polygon were then totaled and divided by the total maximum score for all variables to establish the final WRAP score. WRAP scores, by polygon, were then multiplied by the acres of that polygon impacted to determine Functional Units (FU) lost. Total FU's lost were then calculated for all affected polygons for each Project Alternative in order to compare relative wetland losses between all alternatives.

Results

Existing Condition Functional Analysis

Table 6.1 below provides the Existing Condition WRAP scores for each polygon within the study area. On average, existing condition WRAP scores were slightly higher in WCA-3B (0.74) when compared to ENP (0.62). This difference is attributable primarily to the location of US 41 adjacent to ENP, an acknowledgement by the WRAP Team that the ENP is the recipient of highway runoff, and the general lack of a minimum 30-foot buffer between the highway and the adjacent wetlands. As a result, the WRAP variables of Wildlife Utilization, Adjacent Upland/ Wetland Buffer, and Water Quality scored consistently lower in the ENP wetlands when compared to the WCA-3B wetlands.

Table 6.1. Existing Condition WRAP wetland functional scores for eleven wetland polygons on the north (WCA 3B) and south (ENP) sides of the eastern 11 mile section of Tamiami Trail (November 14-15 and December 19. 2000).

Water Conservation Area 3B			**Everglades National Park**		
Site	**Coordinates**	**Score**	**Site**	**Coordinates**	**Score**
1-3B (PC/PGc)	547546 2849389	0.68	1-ENP (PGc/ PGw)	532858 2849250	0.70
2-3B (PE)	547280 2849386	0.80	2-ENP (SB)	541784 2849272	0.69
3-3B (PGc/ PGw)	546090 2849372	0.78	3-ENP (SB)	545591 2849287	0.69
4-3B (SBa/ SBs)	541983 2849359	0.83	4-ENP (PC)	550370 2849489	0.48
5-3B (PGw)	540538 2849358	0.83	5-ENP (ES/Sb)	549707 2849308	0.54
6-3B (PC)	535733 2849341	0.53			

Existing condition WRAP scores ranged from a high of 0.83 for the sawgrass/emergent marsh and forested wetland (pond apple/willow) habitat types to a low of 0.48 for cattail dominated habitat. For perspective, a wetland habitat type with a score of 0.83 means that the wetland is functioning at 83 percent of its maximum potential of 1.0, whereas a wetland habitat type with a score of 0.48 is functioning at 48 percent (about one-half) of its maximum potential. Except for those wetlands fringing the highway and those wetlands dominated by nuisance and exotic vegetation, existing condition of the wetlands in the project area is generally quite good.

With-Project Condition Functional Analysis

On January 31, 2000, and February 1, 2000, the WRAP Team reconvened to conduct the With-Project WRAP. This effort included a review of 26 total alternative design/water quality options that had varying degrees of effects on wetland function. Prior to conducting the With-Project WRAP, the WRAP Team agreed upon the following set of assumptions:

Assumptions:

1. The WRAP projected into the future to the Standard Project Life of 50 years;
2. Construction would average two to four years, depending on the alternative;
3. The Modified Water Deliveries Project is in place;
4. Except for the Airboat Association, all concessions/radio towers would be removed;
5. Water quality (primarily nutrients) in the study area would be improved as a result of on-going efforts in the upstream portion of the Everglades (*e.g.* EAA Stormwater Treatment Areas);
6. Water quality treatment for highway runoff would likely be necessary;
7. Exotic and nuisance vegetation in the study area would be controlled with-in the next 50 years; and,
8. Traffic volume on US 41 would more than double.

In order to conduct a comprehensive WRAP assessment, in addition to the direct effects on wetland resources from the project alternatives, the WRAP also included: 1) an assessment of secondary adverse effects on adjacent wetlands due to highway relocation to WCA-3B; 2) an assessment of secondary beneficial effects of highway relocation out of ENP; 3) an assessment of the temporal wetland functional losses associated with temporary bypass roads; 4) an assessment of the wetland restoration potential of removal of concessions and radio towers inside ENP; 5) an assessment of the wetland restoration potential of partial and full restoration of US 41 (Alternative 5); and, 6) an assessment of the new four-mile bridge alternative proposed by FWS/NPS/FFWC.

The full results of these assessments are found Appendix C. A summary of the major findings is displayed below in Table 6.2.

Wetland Functional Gains Associated with Alternative 5 (Elevated Causeway)

The WRAP Team concluded that Alternative 5 had negligible direct wetland functional losses. Wetland losses associated with driving pilings were considered minimal (approximately 0.9 acres). On the other hand, the WRAP Team assessed the wetland functional gains associated with the partial and full removal of the existing Tamiami Trail, as shown below.

Wetland Restoration Potential in Everglades National Park

In addition to assessing the direct and indirect wetland functional effects of the Tamiami Trail

Table 6.2. Summary of With-Project Wetland Rapid Assessment Procedure (WRAP) Functional Units (FU) Lost and Gained, Tamiami Trail Project, Modified Water Deliveries Project.

Alternative	Direct Effects (FU)	Indirect Effects (FU)	Total Functional Units Lost
Alternative 1 (existing alignment and profile)			
1- w/o WQ Treatment	--	2.92	2.92
Alternative 2 (existing alignment)			
2a – w/o WQ Treatment	7.18	2.92	10.10
2b– w/ WQ Treatment	34.55	2.92	37.48
2b1 – w/ WQ Treatment	30.70	2.92	33.62
2b2 – w/ WQ Treatment	5.45	2.92	8.37
2b3 – w/ WQ Treatment	5.45	2.92	8.37
2b4 – w/ WQ Treatment	5.45	2.92	8.37
2b5 – w/ WQ Treatment	5.45	2.92	8.37
2b6 – w/ WQ Treatment	5.42	2.92	8.34
Alternative 3 (north alignment)			
3a – w/o WQ treatment	11.06	7.76	18.82
3b – w/ WQ Treatment	22.39	7.76	30.15
3b1 – w/ WQ Treatment	17.64	7.76	25.40
3b2 – w/ WQ Treatment	8.24	7.76	16.00
3b3 – w/ WQ Treatment	10.48	7.76	18.24
3b4 – w/ WQ Treatment	7.43	7.76	15.19
3b5 – w/ WQ Treatment	8.03	7.76	15.79
3b6 – w/ WQ Treatment	8.10	7.76	15.86
Alternative 4 (south alignment)			
4a – w/o WQ Treatment	46.86	+ 6.43	40.43
4b – w/ WQ Treatment	71.07	+ 6.43	64.64
4b1 – w/ WQ Treatment	42.91	+ 6.43	36.49
4b2 – w/ WQb2	42.95	+ 6.43	36.52
4b3 – w/WQ Treatment	42.92	+ 6.43	36.49
4b4 – w/ WQ Treatment	42.03	+ 6.43	35.60
4b5 – w/ WQ Treatment	42.94	+ 6.43	36.51
4b6 – w/ WQ Treatment	42.92	+ 6.43	36.49

Table 6.2 cont.

Alternative	Direct Effects (FU)	Indirect Effects (FU)	Total Functional Units Lost
Alternative 6 (four-mile bridge)			
6a	6.60		6.60
6b	22.77		22.77
6b1	20.87		20.87
6b2 - 6b6	3.34		3.34
6b3 - w/ WQb3	3.34		3.34
6b4 - w/ WQb4	3.34		3.34
6b5 - w/ WQb5	3.34		3.34
6b6 - w/ WQb6	3.54		3.54
Alternative 7			
7a – w/o WQ Treatment	3.42	--	3.42
7b – w/ Original WQ	49.55	--	49.55
7b1 – w/ WQ b1	7.18	--	7.18
7b2 – w/ WQ b2	3.42	--	3.42
7b3 – w/ WQb3	7.18	--	7.18
7b4 – w/ WQb4	7.18	--	7.18
7b5 – w/ WQb5	3.42	--	3.42
7b6 – w/WQb6	3.42	--	3.42
Alternative 8			
8a – w/o WQ Treatment	3.51	--	3.51
8b – w/ Original WQ	46.56	--	46.56
8b1 – w/ WQ b1	7.47	--	7.47
8b2 – w/ WQ b2	3.51	--	3.51
8b3 – w/ WQb3	7.47	--	7.47
8b4 – w/ WQb4	7.47	--	7.47
8b5 – w/ WQb5	3.51	--	3.51
8b6 – w/WQb6	3.51	--	3.51
Alternative 9			
9a – w/o WQ Treatment	1.91	--	1.91
9b – w/ Original WQ	33.35	--	33.35
9b1 – w/ WQ b1	4.74	--	4.74
9b2 – w/ WQ b2	1.93	--	1.93
9b3 – w/ WQb3	4.47	--	4.47
9b4 – w/ WQb4	4.47	--	4.47
9b5 – w/ WQb5	1.93	--	1.93
9b6 – w/WQb6	1.93	--	1.93

Table 6.2 cont.

Alternative 5 (elevated causeway)		
Alternative	**Acres Restored**	**Functional Units Gained**
5a – w/o WQ Treatment; w/ a Berm	57.3	39.35
5b - w/ WQ Treatment; w/ a Berm	43.0	29.54
5c – w/o WQ Treatment; w/o a Berm	65.9	45.27
5d – w/ WQ Treatment; w/o a Berm	49.4	33.93

Project, the WRAP Team identified eight developed sites in ENP which are scheduled to be purchased and potentially restored. (Table 6.3) Two additional sites, The Airboat Association of Florida and SFWMD radio tower were not included in this assessment, since they will remain operational into the foreseeable future. The WRAP Team envisioned the restored areas would include a wetland/tree island mosaic in a ratio of approximately 70 percent wetlands and 30 percent tree island. It is recommended that some fill areas be retained, contoured, and planted with appropriate tropical hardwood trees to increase overall habitat diversity.

Comparison of Alternatives

Figure 6.2 graphically displays the overall wetland functional losses and gains between Alternatives 1, 2, 3, 4, 5 and 6, including the various water quality treatment options, and wetland func-

Table 6.3. Summary of Potential Wetland Functional Units Gained by Restoring Eight Existing Developed Sites in Everglades National Park, South of the Eastern Section of Tamiami Trail Between the S-334 and the L-67.

Site (from East to West)	**Acres Restored**	**Functional Units Gained**
1) Radio Tower (acreage not complete)	0.668	0.47
2) Coopertown Airboat Concession	1.391	0.96
3) Unnamed Site (Adjacent to Coopertown)	0.429	0.30
4) Gator Park Airboat Concession	8.134	5.65
5) Unnamed Site East of Frog City	0.572	0.40
6) Frog City (Owned by NPS)	6.836	4.76
7) Safari Airboat Concession	8.520	5.93
8) Radio Tower (West of Safari)	1.762	1.23
TOTAL POTENTIAL WETLAND FUNCTIONAL UNITS GAINED:		**19.70**

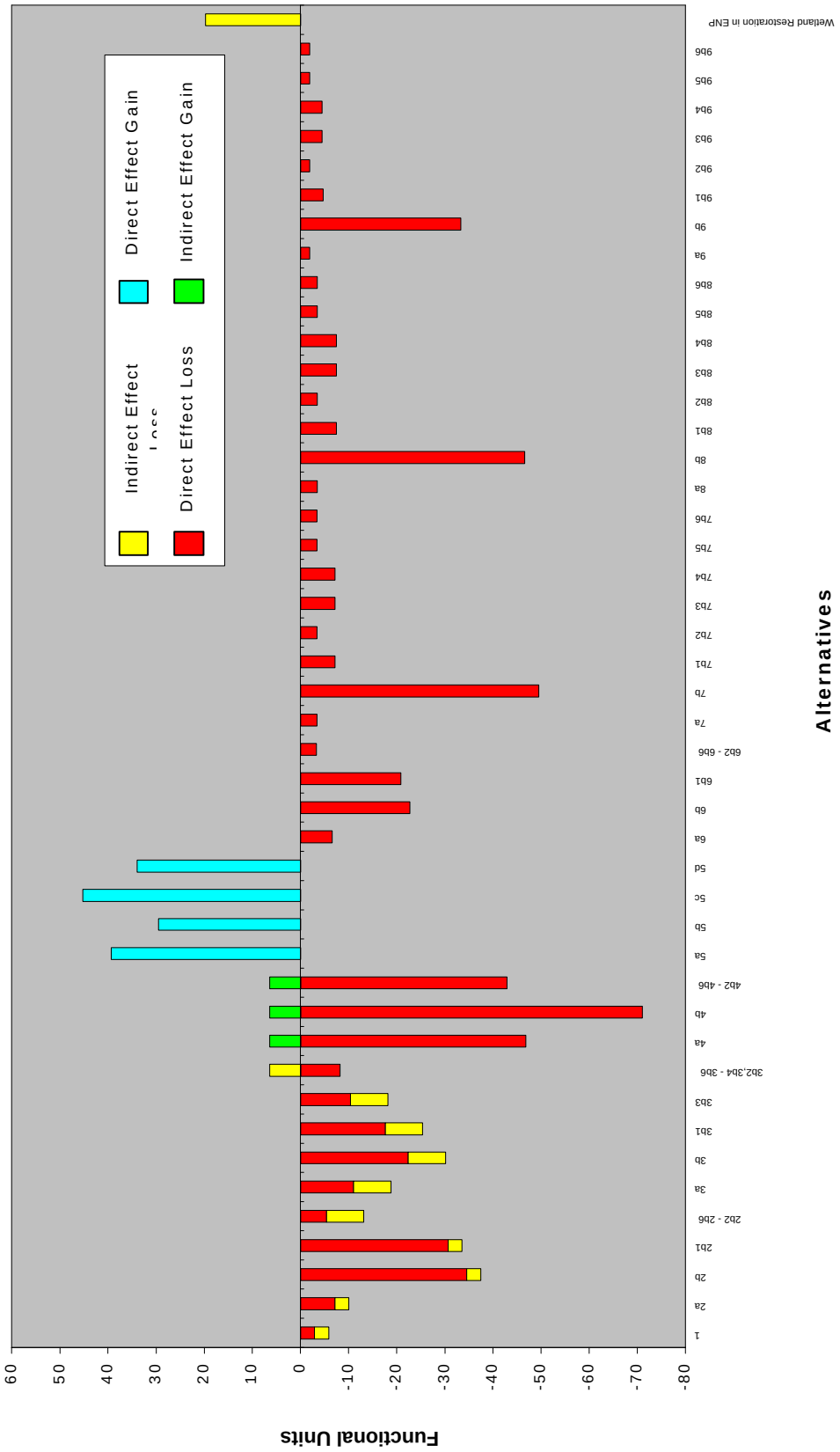

Figure 6.2. Comparison of wetland functional loss/gain for six alternatives and functional units gained from restoration of eight sites in ENP, Tamiami Trail Project, Modified Waters Deliveries project.

tional gains from restoring wetland function at eight sites in ENP. Based on the WRAP wetland functional assessment, Alternative 4b (with dry retention water quality treatment) had the most significant wetland functional losses (- 64.64 FU). On the other hand, Alternative 5 (elevated causeway with full restoration of existing US 41) had the most significant wetland functional gains (+ 45.27 FU). The difference between these two alternatives is a total of 109.91 FU. The ranking of al the alternatives from a wetland functional loss/gain perspective is displayed in Table 6.4

Wetland Functional Losses for Alternatives Without Water Quality Treatment

Based on the ranking of total wetland functional units lost/gained by each alternative without water quality treatment, it is clearly evident that Alternative 5 (elevated causeway) is the most favorable in that a *net gain in wetland function is realized*. All the remaining alternatives exhibited varying degrees of wetland functional losses. If water quality treatment is not required, the ranking of alternatives is relatively straightforward. From most favorable to least favorable, the ranking is as follows: Alternative 5, 1, 6, 2, 3, 4. As stated above, Alternative 5 results in a substantial wetland functional gain due to either the partial or total removal of the existing Tamiami Trail. Alternative 1 (existing alignment and profile), which does not require water quality treatment, has relatively minor wetland functional loss (- 2.92 FU) attributable to temporary bypass roads and no other direct losses. Alternative 6 (four mile bridge) also has relatively minor wetland functional losses (- 6.60 FU) due to the fact that the existing alignment is used and four miles of US 41 is removed. The remaining Alternatives (2, 3, and 4) have progressively larger wetland functional losses due to either elevating the existing profile or relocating the alignment south into ENP or north into WCA-3B. Alternative 4 (shifting the alignment south into ENP) has the greatest wetland functional loss (- 64.64 FU), which equates to an overall net loss of 109.91 FU when compared to the elevated causeway (Alternative 5).

Wetland Functional Losses for Alternatives With Water Quality Treatment

On average, the addition of water quality treatment to Alternative 5 decreases wetland functional gains by 25 percent (a loss in gain of 10.58 FU). For the remaining alternatives with dry retention water quality treatment, wetland functional losses are increased by slightly over 41 percent (22.79 FU). Thus, the dry retention water quality treatment option, on average, represents a sizeable portion of the wetland functional losses associated with Alternatives 2, 3, 4, and 6.

Comparing the Alternatives with the “creative” water quality treatment options/alignments is more complex. As designed, these options, in most cases, significantly reduce wetland functional losses. Comparing the average FU losses from the dry retention water quality treatment option to the average FU losses of the “creative” water quality treatment options, wetland functional losses are decreased by approximately 53 percent (20.68 FU). Thus, the “creative” water quality treatment options can substantially reduce wetland functional losses; however, this reduction has to be weighed against the possible loss of water quality treatment capability.

The effect the remaining “creative” water quality treatment options have on wetland function is

Table 6.4. Rankings of Tamiami Trail Project Alternatives (with and without water quality treatment) based on Losses/Gains of Wetland Functional Units.

Ranking of Alternatives w/o WQ Treatment (1 = best; 10 = worst)			**Ranking of Alternatives w/ WQ Treatment (1 = best; 29 = worst)**		
Rank	**Alternative**	**Functional Units**	**Rank**	**Alternative**	**Functional Units**
1	5a (full)	+ 45.27	1	Alternative	Functional Units
2	5a (part)	+ 39.35	2	5d	+ 33.93
3	9a	- 1.91	3	5b	+ 29.54
4	7a	-1.93	4	9b2, 9b5, 9b6	- 1.93
5	1	- 2.92	5	6b2-b5	-3.34
6	8a	- 3.42	6	7b2, 7b5, 7b6	- 3.42
7	6a (full and partial)	- 6.60	7	8b2, 8b5, 8b6	- 3.51
8	2a	- 11.10	8	6b6	- 3.54
9	3a	- 18.82	9	9b1, 9b3, 9b4	- 4.47
10	4a	- 40.43	10	7b1, 7b3, 7b4	- 7.18
			11	8b1, 8b3, 8b4	- 7.47
			12	2b6	- 8.34
			13	2b2-b5	- 8.87
			14	3b6	- 15.86
			15	3b5	- 15.79
			16	3b4	- 15.91
			17	3b2	- 16.00
			18	3b3	- 18.24
			19	6b1	- 20.87
			20	6b	- 22.77
			21	3b1	- 25.40
			22	3b	- 30.15
			23	2b1	- 33.62
			24	4b4	- 35.60
			25	4b1, 4b3, 4b6	- 36.49
			26	4b5	- 36.51
			27	4b2	- 36.52
			28	2b	- 37.48
			29	4b	- 64.64

summarized as follows:

- **Option b1 (Shift Alignment and Compress Swale/South Side):** Compared to Option b (original dry retention), Option b1 reduces wetland functional losses by about 25 percent (9.68 FU) on average. For Alternative 4 specifically, Option b1 reduced wetland functional losses by 28.15 FU, or approximately 54 percent.

- **Option b2 (Shift Alignment and Compress Swale/North Side):** Compared to Option b (original dry retention), Option b2 reduces wetland functional losses by about 56 percent (21.71 FU) on average. The most significant wetland functional loss reduction for Option b2 compared to Option b is Alternative 2, where wetland functional loss is reduced by 78 percent (29.11 FU).

- **Option b3 (Shift Typical Section North into L-29 Canal):** Compared to Option b (original dry retention), Option b3 reduces wetland functional losses by 57 percent (22.15 FU) on average. The most significant wetland functional loss reduction for Option b3 compared to Option b is again Alternative 2, where wetland functional loss is reduced by 78 percent (29.11 FU).

- **Option b4 (Grass Strips):** Compared to Option b (original dry retention), Option b4 reduces wetland functional losses by 59 percent (22.96 FU) on average. The most significant wetland functional loss reduction for Option b4 compared to Option b is again Alternative 2, where wetland functional loss is reduced by 78 percent (29.11 FU).

- **Option b5 (Exfiltration Trenches with Curb and Gutter):** Compared to Option b (original dry retention), Option b5 reduces wetland functional losses by 59 percent (22.76 FU) on average. The most significant wetland functional loss reduction for Option b5 compared to Option b is again Alternative 2, where wetland functional loss is reduced by 78 percent (29.11 FU).

- **Option b6 (Exfiltration Trenches with Shoulder Gutter):** Compared to Option b (original dry retention), Option b6 reduces wetland functional losses by 59 percent (22.70 FU) on average. The most significant wetland functional loss reduction for Option b5 compared to Option b is again Alternative 2, where wetland functional loss is reduced by slightly more than 78 percent (29.42 FU).

In summary, based on average wetland functional unit losses, the water quality options are ranked in Table 6.5.

Restoring Wetland Function in Everglades National Park

Based on the WRAP results of restoring the eight concession and radio tower sites described in Table 6.3, a *net gain* of 19.70 FU can be achieved. Factoring these results into the overall assessment of FU gains/losses of the Tamiami Trail Alternatives significantly changes the overall re-

Table 6.5. Ranking of Water Quality Treatment Options Based on Average Wetland Functional Units Lost, Tamiami Trail Project, Modified Water deliveries Project.

Water Quality Treatment Option	Ranking	Average Functional Units Lost
Grass Strips (b4)	1	15.80
Exfiltration Trenches w/ Curb and Gutter (b5)	2	16.00
Exfiltration Trenches w/ Shoulder Gutter (b6)	3	16.06
Shift Typical Section North into L-29 Canal (b3)	4	16.61
Shift Alignment and Compress Swale/North Side (b2)	5	17.05
Shift Alignment and Compress Swale/South Side (b1)	6	29.08
Original Dry Retention (b)	7	38.37

sultant wetland functional unit totals, as depicted in Table 6.6.

Including the ENP restoration sites into the overall WRAP assessment results in all the Alternatives without water quality treatment, except Alternative 4, changing to a *net gain in wetland function.* For Alternative 5, a total net gain of 65.97 FU is realized. On average, for Alternatives 1, 2, 3, 4, and 6, a net gain in 37.03 FU is achieved. Only Alternative 4 has a loss in wetland function (- 20.77 FU); however, the loss of wetland function for Alternative 4 is decreased by 50

Table 6.6. Summary of Changes in Wetland Functional Units (FU) for Project Alternatives as a Result of Restoring Eight Sites in Everglades National Park, Tamiami Trail Project, Modified Water Deliveries Project.

Alternative	Without Water Quality Treatment (FU)	With ENP Restoration (FU)	With Water Quality Treatment (FU)[1]	With ENP Reatoration (FU)
1	- 2.92	+ 16.78	--	+ 16.78
2	- 11.10	+ 8.60	- 37.48	- 19.90
3	- 18.82	+ 0.88	- 30.15	- 10.45
4	- 40.43	- 20.27	- 64.64	- 44.90
5	+ 45.27[2]	+ 65.97	+ 33.93	+ 53.63
6	- 6.60	+ 13.10	- 22.77	- 3.07

[1] Dry Retention Water Quality Treatment

[2] Full removal of US 41

percent when the ENP restoration is included.

Wetland losses for the Alternatives with water quality are similarly reduced. For example, wetland functional losses for Alternatives 4, 2, 3, and 6 are reduced by 31, 47, 66, and 87 percent, respectively. Alternative 5 (with water quality) experiences a 37 percent increase in wetland function for a total wetland functional gain of 53.63 FU.

In summary, the integration of the ENP restoration sites as project features to be restored during Tamiami Trail Project construction: 1) eliminates (mitigates) wetland functional losses for all but one Alternative (Alternative 4) without water quality; 2) reduces wetland functional losses for the Alternatives with water quality by 31 to 87 percent; and, 3) increases Alternative 5 (with water quality) wetland functional gains by 37 percent.

Exotic Vegetation Removal

The WRAP Team documented the presence of exotic vegetation in the project area as part of the wetland functional assessment. The dominant exotic species of vegetation was identified as Brazilian pepper. This small tree-sized exotic dominated (greater than 50 percent) the Tamiami Trail highway shoulder along the entire 10.7-mile project length for a width averaging between 10 to 30 feet. The shoulder also was mixed with *Ficus* and scattered bay trees. This highway shoulder fringe provides habitat for primarily passerine birds, provides a vegetative buffer between the highway and the marsh, and provides a corridor for east-west wildlife movement parallel to the highway. Wildlife skeletal remains (turtles, birds) were observed during surveys along the highway shoulder (see WRAP Sheet 5-ENP in Appendix F).

On the WCA-3B side of the highway corridor, a similar although less Brazilian pepper infested fringe also is present. The WRAP assessment found that Brazilian pepper, when present, represented less than 5 percent of the vegetative overstory (see WRAP Sheets 1-3B to 6-3B in Appendix F). The fringe along the L-29 Levee and marsh was 40 to 50 feet in width. This vegetated fringe also provides habitat for primarily passerine birds, provides a vegetative buffer between the levee and the marsh, and provides a corridor for east-west wildlife movement parallel to the levee.

Based on the WRAP survey data, an Exotic Removal Performance Measure was developed to compare the acres of exotic vegetation removed by alternative. The measure is based on the width of exotic vegetation and the relative dominance of Brazilian pepper present, by alternative. The results of this performance measure is found in the Matrix of Alternative Performance (page 115).

It should be noted that the ability of a given alternative to permanently remove exotic vegetation is based on the assumption that an Exotic Vegetation Maintenance Plan will be implemented as part of the Recommended Plan. Without such a plan, exotic vegetation would re-infest the highway fringes, and the existing condition would persist in the with-project condition.

Discussion

The WRAP results clearly demonstrate that Alternative 5 (elevated causeway), with or without water quality treatment, is the preferred alternative from a wetland perspective. This is particularly the case when US 41 is removed in its entirety (see Figure 6.2). Alternative 5 is the only alternative that exhibits wetland functional gains; all other alternatives exhibit varying degrees of wetland functional losses. Alternative 4 (shifting the alignment into ENP) had the greatest wetland functional losses (- 64.64 FU with dry retention water quality treatment). Alternative 1 (existing alignment without water quality treatment) exhibited the smallest wetland functional losses (- 2.92).

It is estimated that the US 41 highway/canal corridor has eliminated approximately 530 acres of historic Everglades. This habitat consisted of a ridge and slough mosaic interspersed with tree islands. In addition to the direct effects, the construction of Tamiami Trail in 1929 and the subsequent dredging of the L-29 Canal/Levee has indirectly affected an undetermined amount of adjacent wetlands through sedimentation and hydrologic changes. A review of 1940's photography of the Tamiami Trail corridor reveals that the Everglades ridge and slough landscape adjacent to Tamiami Trail had been so significantly altered at that time that those landscape features were indiscernible (Ken Rutchey, SFWMD, pers. comm.).

The federally recommended plan should fully integrate features that will restore the historic Everglades wetland landscape to the maximum possible degree. For example, the historic locations of ridges and sloughs bisected by the US 41/L-29 Canal/Levee corridor should be fully investigated and a plan developed to reconnect those landscape features as much as possible The location of historic tree islands should also be determined and a plan developed to restore tree island habitat. These plans should ultimately be carried forward in the CERP Decompartmentalization (Phase 1) planning process. In effect, this restoration project should be more than just meeting a particular discharge target under Tamiami Trail; it also should be an ecological restoration project taking into account the effects of flow on landscape features and ecological processes.

In the planning for the restoration of Tamiami Trail, it is also important to factor in the potential wetland functional gains derived from restoring wetland function in ENP. As demonstrated by the WRAP assessment, restoring wetland function in ENP effectively mitigates for all but one alternative (Alternative 4) without water quality, and increases the wetland functional gains for Alternative 5 by 37 percent.

The ENP will be developing a General Management Plan for the ENP expansion lands over the next several years. The WRAP assessment in this report will need to be factored into that Plan to take advantage of restoring wetland function on ENP lands.

Finally, when planning for the restoration of Tamiami Trail, it is important to avoid direct wetland functional losses by keeping the any new work within the footprint of the existing disturbed corridor as much as possible. This disturbance includes all construction activities, in addition to

the direct road work, including staging areas, haul roads, and any temporary project features.

CHAPTER 7- WILDLIFE MORTALITY AND CONNECTIVITY

Purpose

On December 19 and 20, 2000, and April 18, 2001, biologists from the Fish and Wildlife Service (FWS), Florida Fish and Wildlife Commission (FFWC) and U.S. Army Corps of Engineers (Corps) conducted a series of wildlife mortality surveys along five miles of Tamiami Trail. The purpose of the surveys was to document the classes and relative numbers and locations of animals (identified to species where possible) subject to mortality to assist with highway design and the placement of wildlife mortality reduction features.

Methodology

The surveys consisted of biologists walking the north and south shoulders of the highway and systematically documenting wildlife remains. The surveys were conducted during daylight hours in one-half mile segments at five locations: Site 1: one-half mile on each side of an agricultural canal four miles west of S-334; Site 2: Flight 592 Memorial extending one mile eastward; Site 3: L-30 Canal extending one mile west; Site 4: one-half mile on each side of the Tamiami Trail Wood Stork Colony; and, Site 5: one-half mile on each side of the Blue Shanty canal.

All remains found were identified whether freshly killed or previously killed. Some individuals were freshly killed (within weeks), while other remains were likely up to a year old.

Results

The results of the wildlife mortality surveys are presented in Tables 7.1 – 7.5. A total of 369 animal remains were identified within the surveyed five-mile reaches of Tamiami Trail. An average of 74 animal remains were found per mile of highway within the five-mile reach, or almost one-half of the total project length. Extrapolated over the entire project length (10.7 miles), 790 animal mortalities are realized.

On average, the north side of the highway resulted in 47 percent of all mortality, while the south side averaged 53 percent. Turtles accounted for 59 percent of all observed mortality. Fifty-six percent of all turtle mortality was associated with the north side of the highway. Turtle mortality averaged 43.4 individuals per mile, or 460 turtles extrapolated over the 10.7-mile length of highway. Twenty individual alligator remains were located during the surveys. Six mammal remains were clustered on the south side of Tamiami Trail at the Flight 592 Memorial site. This site has a vegetated buffer on the south side and the L-67s on the north side forming a corridor for terrestrial wildlife crossing Tamiami Trail.

Table 7.1. Site 1: Wildlife remains identified one-half mile on each side of Agricultural Canal south of Recreational Area four miles west of S-334 (December 19, 2000).

NORTH SIDE OF TAMIAMI TRAIL			
Class/Species	**East ½ mile**	**West ½ mile**	**Total**
Turtles	16	12	28
Snakes	1	2	3
Frogs	1	1	2
Alligators	0	0	0
Birds	0	0	0
Mammals	0	1	1
Unidentified	1	4	5
SOUTH SIDE OF TAMIAMI TRAIL			
Turtles	4	6	10
Snakes	0	3	3
Frogs	0	0	0
Alligators	0	1	1
Birds	4	1	5
Mammals	0	0	0
Unidentified	2	1	3
Total			**61**

Table 7.2. Site 2: Wildlife remains identified along one mile of Tamiami Trail beginning at the Flight 592 Memorial adjacent to the L-67 Canals and ending ½ mile east of Osceola Camp (December 20, 2000). (Begin: 532864 N; 2849266 E End: 534500 N; 2849254 E)

NORTH SIDE OF TAMIAMI TRAIL			
Class/Species	**East ½ mile**	**West ½ mile**	**Total**
Turtles	11	7	18
Snakes	0	0	0
Frogs	0	0	0
Alligators	0	0	0
Birds	3	0	3
Mammals	0	1	1
Unidentified	0	0	0

Table 7.2. Site 2: cont..

SOUTH SIDE OF TAMIAMI TRAIL			
Class/Species	**East ½ mile**	**West ½ mile**	**Total**
Turtles	5	4	9
Snakes	0	0	0
Frogs	0	0	0
Alligators	1	1	2
Birds	1	0	1
Mammals	2	4	6
Unidentified	2	2	4
Total			**44**

Table 7.3. Site 3: Wildlife remains identified on December 20, 2000 along one mile of Tamiami Trail beginning at the L-30 Canal extending one mile west and ending at a bank of culverts (Begin: 550299 N; 2849310 End: 548615 N; 2849297 E).

NORTH SIDE OF TAMIAMI TRAIL			
Class/Species	**East ½ mile**	**West ½ mile**	**Total**
Turtles	38	20	58
Snakes	0	0	0
Frogs	0	0	0
Alligators	0	0	0
Birds	3	0	3
Mammals	3	0	3
Unidentified	0	1	1
SOUTH SIDE OF TAMIAMI TRAIL			
Turtles	18	4	22
Snakes	0	0	0
Frogs	0	0	0
Alligators	1	1	2
Birds	1	2	3
Mammals	2	1	3
Unidentified	1	1	2
Total			**97**

Total # of individuals = 65 North + 32 South = 97
North side = 67% of the mortality.
Turtles represent 82% of the mortality (63% of turtles found on north side).
Species identified: 1- opossum, 1- armadillo, 1 - raccoon, 1- dog

Table 7.4. Wildlife remains identified by FWC on April 18, 2001, along one mile of Tamiami Trail (between culverts #44 to #46 at the Blue Shanty Canal [culvert #45]).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	18	3	21
Snakes	1	0	1
Frogs	0	0	0
Alligators	2	2	2
Birds	0	0	0
Mammals	0	1	1
Unidentified	1	1	2
SOUTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	19	12	31
Snakes	4	2	6
Frogs	0	0	0
Alligators	2	1	3
Birds	3	3	6
Mammals	1	5	6
Unidentified	1	0	1
Total			**80**

Table 7.5. Wildlife remains identified by FWC on April 18, 2001, along one mile of Tamiami Trail (between culverts #56 to #54 at the Tamiami Trail woodstork colony [culvert #55]).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	16	20	36
Snakes	5	3	8
Frogs	2	1	3
Alligators	1	2	3
Birds	4	6	10
Mammals	0	0	0
Unidentified	1	1	2
SOUTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	9	15	24
Snakes	23	7	30
Frogs	0	0	0
Alligators	2	2	4
Birds	4	3	7
Mammals	0	0	0
Unidentified	0	0	0
Total			**127**

During the April 18, 2001, survey by FFWC the marsh in Everglades National Park (ENP) dried to approximately one foot below the ground surface. Likewise, the marsh in Water Conservation Area (WCA) 3B had completely dried out. The drying of pools and shallow ditches near the highway likely resulted in the movement greater numbers of water-dependent reptiles in search of new aquatic refugia. Reptile activity during this time of year is also typically greater than during the winter due to higher ambient air temperature, while cooler temperatures at night would promote snake movement onto the pavement to absorb the warmth captured there during the day. The survey results support conclusion, as 88 percent of the 51 individual snakes identified were found during the April survey.

For the purpose of establishing a Wildlife Mortality Performance Measure, it was estimated that the individuals identified along Tamiami Trail represented approximately 50 percent of the total annual mortality due to the fact that roadkill individuals, particularly snakes and frogs, are predated (there are numerous vultures roosting on the L-29 Levee), and injured animals wander off the highway before dying and are not identified. Thus, 148 individuals per mile per year was used to establish the relative performance of each alternative for reducing roadkill along Tamiami Trail.

Discussion

Introduction

Trombulak and Frissel (2000) recently reviewed the scientific literature regarding the ecological effects of roads on terrestrial and aquatic communities. This comprehensive review concluded that roads affect terrestrial and aquatic ecosystems in seven general ways: 1) increased mortality from road construction, 2) increased mortality from collisions with vehicles, 3) modification of animal behavior, 4) alteration of the physical environment, 5) alteration of the chemical environment, 6) spread of exotic species and, 7) increased alteration and use of habitat by humans.

These general effects overlap somewhat. In some cases animals modify their behavior and avoid roads. Roads may facilitate the spread of invasive species by disrupting native communities and altering physical habitats. Roads may fragment populations through roadkill and avoidance. Despite the difficulty of categorizing discretely the causal basis in every example, these seven categories provide a useful framework for assessing what is known and unknown about the ecological effects of roads. The discussion below focuses on criteria 2; increased mortality from collisions with vehicles, as it relates to the proposed modification of Tamiami Trail.

Mortality from Collisions with Vehicles

Mortality of animals from collision with vehicles is well documented. Many reviews of the taxonomic breadth of the victims of vehicle collision have been published (*e.g.* Groot *et al*. 1996). Few, if any, terrestrial species of animal are immune. Large mammals ranging in size from moose to armadillos are the best-documented roadkills, probably due to interest in their demography and to their size (Bellis and Graves 1971; Puglisi *et al.* 1974; Davies *et al.* 1987; Bangs *et*

al. 1989).

Published accounts of roadkill bird species include raptors (hawks and owls), wading birds and tropical forest birds (Novelli *et al.*) to name a few. The endangered American crocodile has experienced considerable roadkill on Card Sound Road in Miami-Dade County, Florida (Kushlan 1988). Roadkill is nonspecific with respect to age, sex, and condition of the animal (Bangs *et al.* 1989).

Amphibians and some reptiles may be especially vulnerable to roadkill because their life histories often involve migration between wetland and upland habitats, and individuals are inconspicuous and sometimes slow-moving. Roads can be demographic barriers that cause habitat and population fragmentation. In the Netherlands, for example, roads with high traffic volume negatively impact occupancy of ponds by moor frogs (Vos and Chardon 1998). In Ontario, the local abundance of toads and frogs is inversely related to traffic density on adjacent roads, but the incidence of roadkill relative to abundance is higher on highly trafficked roads (Fahrig *et al.* 1995). Thus, even though populations in high-traffic areas have apparently been depressed from cumulative road mortality, they continue to suffer higher proportionate rates of roadkill.

Mitigation measures have been employed in different locations with varying degrees of success (Yanes *et al.* 1995). For example, underpasses on Interstate 75 in Florida have been partially successful in reducing roadkill of Florida panthers (Foster and Humphrey 1991). Despite mitigation efforts, roads are likely to be a persistent source of mortality for many species. In general, mortality increases with traffic volume (Rosen and Lowe 1994; Fahrig *et al.* 1995). Some species are less likely to be killed on high-speed roads than on medium-speed roads because the former usually have vegetation cleared back further from the road's shoulder creating less attractive habitat and greater visibility for both animals and drivers. Other species, however, are attracted to the modified habitat alongside and in the medians of high-speed roads (Cowardin *et al.* 1985), making them population sinks.

Road Mortality on Tamiami Trail

There has been no systematic study of wildlife roadkill along Tamiami Trail. The roadkill survey in this report represents a cursory look at the issue of Tamiami Trail road mortality. For example, the smaller amphibians and reptiles killed on this highway are easily scavenged by predators and are not well represented in a survey of this nature (*i.e.*, numerous vultures roost along the L-29 Levee and along adjacent telephones poles). Likewise, turtle remains are persistent and are more readily counted in the roadkill results presented here.

There are, however, published and unpublished reports of roadkill from areas adjacent to Tamiami Trail. For example, (Bernadino and Dalrymple 1992) examined the impact of seasonal visitation to ENP on the snake community of the Pa-hay-okee wetlands adjacent to Shark River Slough. This study found that seventy-three percent of all snakes observed on the Park's main road were either injured or dead (1,172 individuals from 16 taxa) within the study area. This study recommended various mitigation measures to reduce roadkill including construction of

wildlife underpasses, road closure during peak snake migration, and reduced speed zones. Fencing and funneling of snakes (and other reptiles and amphibians) to the underpass locations was recommended. The upper surface of the recommended underpasses (flush to the road surface) has slots that allow light penetration and near-ambient temperatures to be reached with the tunnels (Brehm 1989).

Another study conducted in ENP (Meshaka, unpub. data, in prep.) examined mammal roadkill along a 40-mile stretch of the Park's entrance road for a period of one year (February 1996 to January 1997). During this period, 106 raccoons, 37 opossum, 7 grey fox, 22 whited-tail deer, 1 bobcat, 4 marsh rabbit, 3 armadillo, 2 rodents and 1 feral cat were counted, for a total of 183 mammals. Keep in mind that this level of mortality occurred inside the Park where vehicle speeds are reduced and closely regulated.

Roadkill data collected for a period of about 10 years (July 1990 to September 2000) at Fakahatchee Strand State Preserve, which is bisected by US 41, documented that a total of 1,171 mammals, birds, reptiles and amphibians had been killed by collisions with vehicles on Jane's Scenic Drive (Mike Owen, pers. comm.). Jane's Scenic Drive is a gravel County Road posted at 35 mph. Even under these conditions, the following number of taxa and individuals have been recorded as roadkill on this gravel road: 283 mammals (including one State threatened Everglades mink, 12 white-tailed deer, 7 river otter, 2 bobcats, and 1 coyote); 148 birds (including bitterns, hawks, ducks, limpkins, and other passerines); 713 reptiles (including 578 snakes representing 22 taxa, one of which was an endangered eastern indigo, 42 lizards, and 23 alligators); and 24 amphibians (frogs and toads).

Based on the compilation of state-wide road mortality data by the State Bureau of Natural and Cultural Resources in State Parks and Preserves over the past nine years, 35,299 species of mammals, herps, and birds have been killed on 439.8 miles of roads in State managed lands in Florida (see Appendix G). During the 1999-2000 reporting period 3,036 individuals were recorded, including at least 13 species of State rare and endangered species: gopher tortoise, Everglades mink, Sherman's fox squirrel, white-crown pigeon, Eastern indigo snake, and American crocodile. Road mortality is considered a serious challenge to conserving native park wildlife.

Reducing Mortality on Tamiami Trail

Tamiami Trail (US 41) is a high-speed, two lane highway posted at 55 mph. Traffic volume is currently 5,200 vehicles per day and is projected to increase to 9,000 per day (almost double) by 2020. Bounded on the north side by the L-29 Canal, aquatic organisms leaving the canal and entering the highway are susceptible to vehicle collisions. Thus, it is not surprising that species of turtles dominated the roadkill count for the survey conducted for this report. Likewise, being bounded on the south by Everglades marsh, both aquatic and terrestrial species entering the highway have the potential to be hit by fast-moving vehicles. To add to this, driver visibility and highway shoulder widths are minimal.

The wildlife mortality and connectivity features presented in this report (the two wildlife under-

passes with land bridges and the herp barriers) are designed to significantly reduce roadkill on Tamiami Trail. The herp barrier design is based on the herp barrier constructed along a two-mile stretch of US 441 where it crosses Paynes Prairie State Preserve near Gainesville, Florida.

Mortality studies along this two-mile stretch of US 441 at Paynes Prairie documented more than 36,000 roadkill individuals from 82 taxa of vertebrates, of which over 50 percent were wetland vertebrate species, that had fallen victim to collisions with vehicles. Eighty-eight percent of all roadkill individuals were species of amphibians. This study concluded that the continual loss of wetland species is suspected to lead to population and marsh community instability. These losses may cause abnormal shifts in the positions of adjacent individuals as they attempt to fill "holes" left by killed individuals, thus bringing ever more animals into contact with the roadway, creating short- and long-term population sinks for many of these species. Wildlife kills also lead to changes in food pyramids in the marsh by affecting predator and prey densities and by attracting bird and mammal predators and scavengers to the highway, a habitat that would otherwise be avoided.

The Paynes Prairie "Ecopassage" project has now been completed by Florida's Department of Transportation (FDOT). Preliminary data indicate a drop in wildlife mortality along US 441. Success of the Ecopassage is currently being documented by the U.S. Geological Survey under contract to the FDOT through year-long pre- and post-construction roadkill surveys and monitoring of wildlife use of the passages under the highway.

The Paynes Prairie herp barrier design, in particular, would greatly reduce species of turtles, amphibians and reptiles being killed and injured by vehicles along Tamiami Trail based on the limited mortality survey conducted as part of this report. Any large, continuous opening (*e.g.* several miles of causeway) would substantially reduce roadkill and increase overall wildlife connectivity. Needless to say, the longer the causeway, the more compatible Tamiami Trail will become for wildlife movement and roadkill reduction. Alternatives which provide minimal openings under Tamiami Trail (*e.g.* box culverts), unless numerous, would not be anticipated to significantly reduce this mortality, unless road mortality reduction features such as those recommended in this report are integrated into project design.

The two wildlife underpasses proposed to be located at the eastern and western ends of the study area are targeted to safely pass terrestrial species under Tamiami Trail. FDOT has implemented this design on US 29 and other locations around Florida. The 50-foot wide structures, each with a 24-foot wide land bridge to facilitate passage of animals across the L-29 Canal, would also enhance north-south wildlife movement along the eastern periphery of WCA-3B and along the L-67 extension levees.

Without question, the full causeway alternative (Alternative 5), if implemented, would preclude the need for wildlife mortality features, as the full 11 miles of marsh between the Central and Southern Everglades would be connected and vehicle collisions virtually eliminated.

Therefore, unless wildlife features similar to those recommended in this report are incorporated in an alternative that provides less than full connectivity (all alternatives except the full cause-

way Alternative 5), long-term road mortality will continue to occur along the Tamiami Trail corridor.

Finally, a more detail study of road mortality issues associated with Tamiami Trail is recommended to understand the full scope of wildlife collisions with vehicles. For example, documenting mortality "hot spots" may be particularly important when designing bridged openings under Tamiami Trail.

Recommendations to Reduce Wildlife Mortality and Facilitate Connectivity

1) **Animal Barriers:** Based on the US 41 mortality survey, there is an established need to reduce mortality for species of reptiles (primarily turtles), snakes and amphibians). It is apparent that most turtle mortality is associated with turtles leaving the L-29 canal and moving south across a 10 to 15-foot grass strip onto the highway. The Payne's Prairie wildlife barrier just south of Gainesville, Florida, was designed for this purpose. It consists of a four-foot high vertical concrete wall capped with a six-inch concrete overhang to preclude species from climbing over the wall. FWS/ National Park Service (NPS) envision this barrier being placed along the length of project area of US 41 on both the north and south sides of the highway, between the bridge/box culvert locations. The Florida Department of Transportation (FDOT) cost of constructing this barrier for the Payne's Prairie project was about $1 million/mile. These barriers may also have the added benefit of eliminating the toe of fill in wetlands, thus reducing wetland losses. There is also a need to maintain the barrier free of brush and debris to ensure its functionality.

   One concern that needs to be considered is the maintenance of a "clear zone" between the highway and the barrier. The width of this zone is based on the highway design speed. We are uncertain if there is sufficient width between the highway and the L-29 canal to meet this requirement. Our desire is to leave some littoral zone (*e.g.* 8 to 10 feet) between the edge of the canal and the barrier as habitat for various aquatic organisms (*e.g.* turtle nesting substrate). This needs to be coordinated with FDOT.

2) **Wildlife Underpasses:** Based on wildlife mortality surveys, discussion with FFWC experts, and review of design plans from other wildlife underpasses around the State, it is recommended that two underpasses be located under US 41 to both reduce wildlife mortality and increase wildlife connectivity between WCA-3B and ENP.

3) **Underpass Locations:** The first underpass is recommended at the eastern end of the project near the intersection of the L-29 canal and the L-30 canal. This "T" shaped canal configuration is a significant impediment to north-south wildlife movement between the WCA-3B levee and the L-31 levee. An underpass at this location and land bridge over the L-29 canal would greatly facilitate the movement of terrestrial species.

   A second underpass is recommended at the western end of the project to facilitate wildlife

movement across US 41. A number of wildlife remains were found at this location (to the east of the bend in the highway). Wildlife moving along the L-67 levee appear to be experiencing higher rates of mortality when confronted by US 41. This underpass would facilitate north-south movements of wildlife.

4) **Underpass Design:** FWS and NPS recommend the adoption of the wildlife underpass design utilized by FDOT on US 29 (Appendix C). Based on the final design drawings, the underpasses consist of a 50-foot concrete slab bridge placed in the highway alignment. Clearance from the ground elevation to the bottom of the bridge is eight feet. The ends of the bridge are supported by vertical concrete sheetpile walls, with a pile support in the center of the bridge. This design was selected to maximize light penetration under the bridge and to provide sufficient height to pass some of the larger mammals.

   Fencing will be needed to funnel wildlife to the underpasses. Based on the wildlife species anticipated to use the underpasses, we recommend that a six-foot chain link fence, buried one foot into the ground, extend one-half mile on each side of the crossing locations on both the north and south sides of US 41. Our preliminary estimate is that one underpass could be constructed for $500,000. Maintenance of the underpass/fencing will be needed, but is not anticipated to be a significant cost. FDOT normally contracts the maintenance to firms specializing in that type of work.

5) **Land Bridges Over the L-29 Canal:** For the eastern and western underpasses, we recommend land bridges be constructed over the L-29 canal. A design successfully utilized by FDOT at other canal crossing consists of a 24-foot wide concrete bridge with two-feet of soil spread on its surface for vegetation to grow. These bridges would be designed for a minimal load bearing capacity. It is recommended that telephone pole posts be placed at each end of the bridge to prevent auto/ATV access. The planting of shrubs along the land bridge would facilitate wildlife passage. Maintenance of these features is expected to be minimal.

6) **Littoral Shelves:** It is recommended that vegetated littoral shelves (i.e. 15-ft-wide and varying from 1 to 2 ft in depth) be excavated to enhance the vertical-walled L-29 canal. This feature would benefit wading birds, fishes, reptiles and amphibians residing in the canal, as well as water quality.

CHAPTER 8- FEDERAL AND STATE LISTED THREATENED AND ENDANGERED SPECIES, AND STATE SPECIES OF SPECIAL CONCERN

Federally Listed Species

Federally listed species which are know to occur or could occur in the action area (Figure 8.1) or be affected by construction and operation of the proposed action include: the endangered snail kite (*Rostrhamus sociabilis*), wood stork (*Mycteria americana*), Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), Florida panther (*Puma (= Felis) concolor coryi*), West Indian manatee (*Trichechus manatus*), and the threatened Eastern indigo snake (*Drymarchon corais couperi*).

Status of Section 7 Consultation

On October 11, 2000, the U.S. Army Corps of Engineers (Corps) requested the Fish and Wildlife Service (FWS) provide a list of threatened and endangered which are likely to occur in the vicinity of the Tamiami Trail Project. In a Planning Aid Letter, dated November 14, 2000, the FWS responded to this request that the endangered snail kite (*Rostrhamus sociabilis plumbeus*), endangered wood stork (*Mycteria americana*), and threatened eastern indigo snake (*Drymarchon corais couperi*) travel, reside and/or forage, on lands in the project area. While not directly residing in the project area, the endangered Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) could be affected by the Tamiami Trail Project if the final design constrains flows into Northeast Shark Slough.

The FWS has recently been informed of a manatee mortality in the L-29 canal. This manatee died of cold-related stress sometime during the December/January cold weather event. Based on information from Florida Fish and Wildlife Commission (FFWC) (Penny Husted, pers. comm.), this manatee apparently migrated from Lake Okeechobee, where gates are open due to drought conditions, through a series of canals/structures, into the L-67 canals, and eventually to the L-29 canal. While this is an unusual event (the only record of a manatee in the eastern reach of the L-29 canal); it attests to the fact that manatees can be found within the project area.

The Florida panther may also be found in the project area. In accordance with the Standard Local Operating Procedures, dated August 18, 2000, between the Corps and FWS for conducting Section 7 consultations, the Tamiami Trail Project falls within the Consultation Area for the Florida panther. Therefore, this endangered species will also need to be considered in the Corps' Biological Assessment.

Therefore, once a Federally Preferred Plan has been selected, the Corps should be prepared to develop a Biological Assessment for the wood stork, snail kite, Cape Sable seaside sparrow, manatee, panther, and Eastern indigo snake which assesses the effects of the plan on those spe-

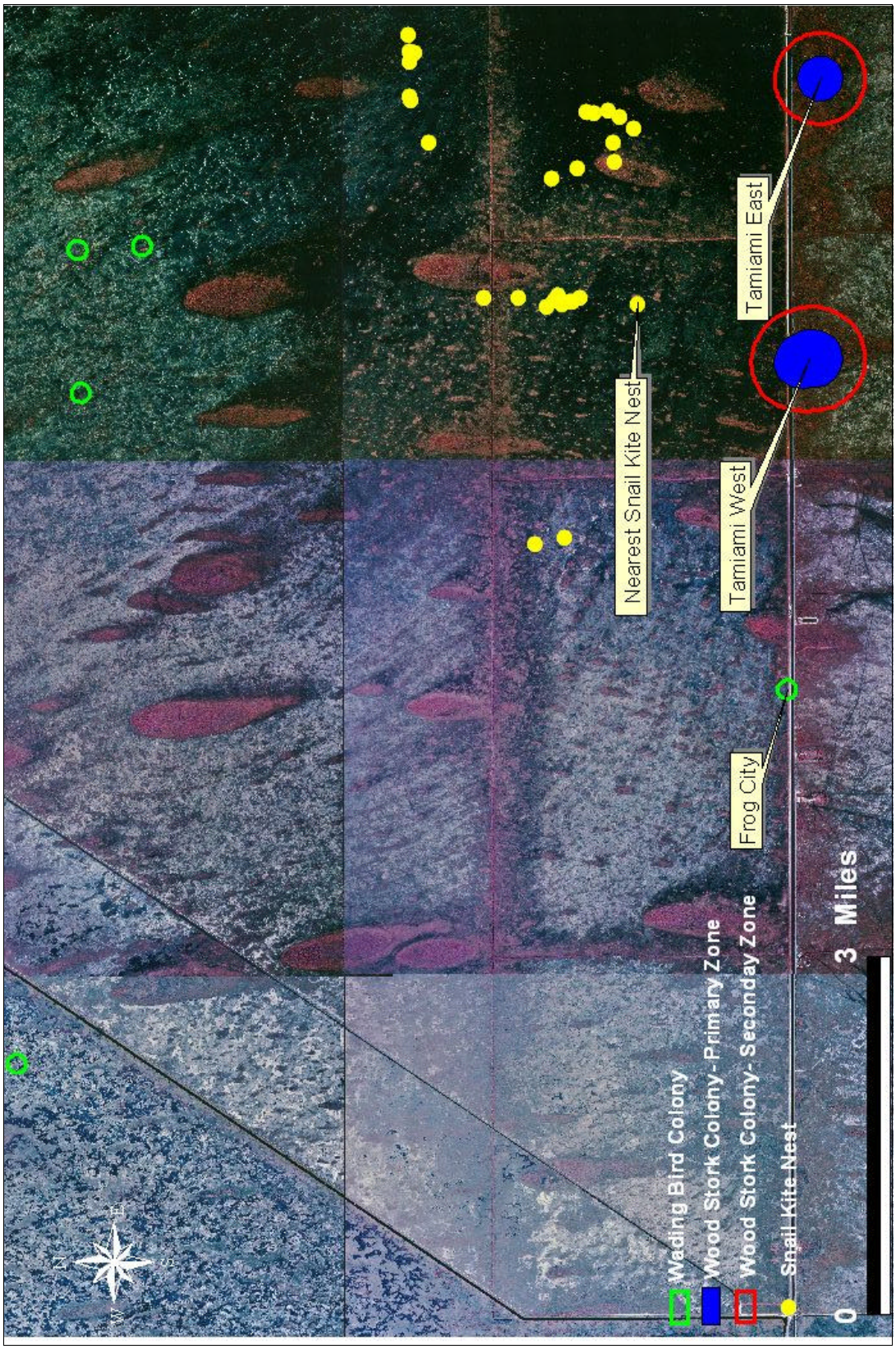

Figure 8.1. Action Area

cies in accordance with the Endangered Species Act– Section 7 implementing regulations.

The FWS also recommended the *Standard Construction Precautions for the Eastern indigo Snake* be included in the project design in order to minimize or avoid any potential adverse effects on this species (Appendix E).

As a result of ongoing informal consultation, the FWS recommends the Federal action incorporate the wood stork construction timing and set-back criteria into project scheduling, design, and construction as described below, and that an affect determination for this species be included in the Biological Assessment.

Finally, a determination by the Corps of whether the Federal action is likely to adversely affect snail kites should also be included in the Biological Assessment. Snail kite nesting can shift dramatically from year to year and, based on recent snail kite nesting data provided by Dr. Victoria Drietz, University of Florida, snail kite nesting appears to be on the increase in southern Water Conservation Area (WCA) 3B. The FWS, National Park Service (NPS), and FFWC will continue to monitor snail kite nesting patterns in both WCA-3A and Everglades National Park (ENP), and will notify the Corps of any nesting activity that may affect the Tamiami Trail Project.

Endangered Wood Stork Colonies

The FWS has applied the *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Guidelines) (Ogden 1990) to the Tamiami West Colony based on photography provided by Dr. Peter Fredericks, University of Florida, of the colony during the 1999 nesting season. The FWS has also applied the Guidelines to the smaller Tamiami East Colony based on mapped coordinates. Based on the digitized colony boundary, Primary and Secondary Zones were established for both colonies in accordance with the Guidelines. From the photograph of the Tamiami West Colony, it was apparent that wood storks nested as close as 300 feet south of Tamiami Trail during the 2000 nesting season, when an estimated 1,300 storks nested at this site. The Tamiami East and West colonies are mixed wading bird colonies also supporting nesting snowy egrets, great egrets, white ibis, and tricolored herons.

Primary Zone

The Primary Zone is the most critical area, and must be managed according to the guidelines to insure the colony site survives. Human activities inside the Primary Zone during the wood stork nesting season, in particular, should be conducted according to the Guidelines. Primary Zones normally extend between 1,000 and 1,500 feet in all directions from the colony boundaries based on the presence or absence of visual barriers between the colony and the disturbance. In no case should the Primary Zone be less than 500 feet. In the case of the Tamiami East and West colonies, a distance of 1,000 feet was chosen due to the visual barrier of the pond apple forest between the colony and Tamiami Trail, and the fact that wood storks appear to have become somewhat acclimated to highway traffic noise.

Secondary Zone

Secondary Zones extend outward from the Primary Zone 1,000 to 2,000 feet, or to a radius of 2,500 feet from the outer edge of the colony. Restrictions in this zone are needed to minimize disturbances that might impact the Primary Zone, and to protect essential areas outside the Primary Zone. The Secondary Zone may be used by wood storks for collecting nesting material, for roosting, loafing, and feeding (especially important for newly fledged young). For the application of the Guidelines to the Tamiami Trail Project, a distance of 1,000 feet from the Primary Zone, extending in all directions, was chosen for both colonies for the reasons described above for the Primary Zone.

Guidelines Applied to the Tamiami West Colony

As mapped in the manner described above, the Tamiami West Colony Primary and Secondary Zones overlap varying linear distances of the highway depending on the alternative (Figure 8.2.). Table 8.1 provides these linear distances, by alternative.

Table 8.1. Summary of Linear Distances of Overlap of Primary and Secondary Zones on US 41 for the Tamiami West Wood Stork Colony, Tamiami Trail Project, Modified Water Deliveries Project.

Alternative	Linear Feet of US 41 In the Primary Zone	Linear Feet of US 41 In the Secondary Zone
3 (North Alignment in WCA-3B)	2,040	2,214
1, 2, 5, 6, 7, 8, 9 (Existing Alignment)	2,295	2,122
4 (Southern Alignment in ENP)	2,763	1,701

Restrictions

The Guidelines specifically restrict such activities as **"**The construction of any building, roadway, tower, power line, canal, etc**."**, which are to be implemented when the colony is active (nesting is occurring). Therefore, between February (or the onset of nesting activity) and through the onset of the rainy season (or when the young have fledged), highway construction should not be permitted in the reach of the highway affected by that alternative. The initiation and cessation of nesting can only be accurately determined in the field by a qualified observer(s). Also, any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony should also be restricted during the nesting season.

For the Secondary Zone, it is recommended that no unauthorized human activity (on foot, airboat, or off-road vehicle [ORV]) occur at any time of the year within the reach of highway affected by that alternative on the south side of the highway and particularly during the nesting season.

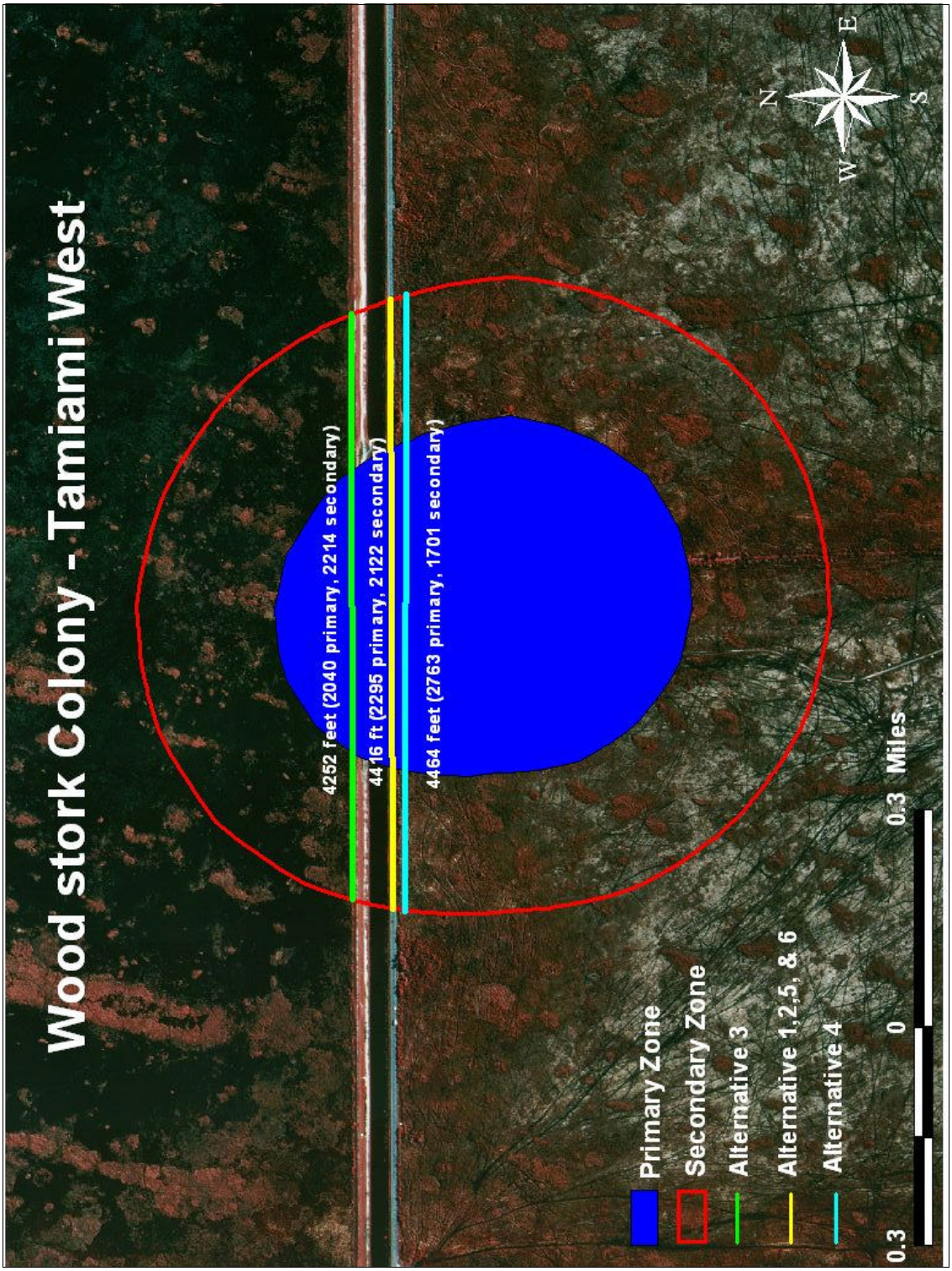

Figure 8.2. Tamiami west wood stork colony

In summary, the wood stork restrictions for the Tamiami West Colony include:

1) **Primary Zone:** Between February (or the onset of nesting activity) and through the onset of the rainy season (or when the young have fledged), highway construction (*e.g.* heavy/human equipment activity, pile driving, blasting) should not be permitted in the reach of the highway affected by that alternative;

2) **Secondary Zone:** No unauthorized human activity (on foot, airboat, or ORV) occur at any time of the year within the reach of highway affected by that alternative on the south side of the highway and particularly during the nesting season.

3) **Length of Restrictions:** These restrictions shall remain in effect during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected;

4) **Qualified Observer:** Subject to the approval of the FWS and FFWC, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected. The observer shall monitor wood stork activity and shall notify the FWS, FFWC and Corps if wood stork behavior is modified such that roosting, nest building, breeding, nesting and/or fledging of young is disrupted or otherwise interfered with;

5) **Modification of Restrictions:** If new information becomes available concerning the Tamiami West Wood Stork Colony, the Corps, FWS and FFWC should immediately contact each other to determine what modifications, if any, are warranted.

Guidelines Applied to the Tamiami East Colony

The Primary Zone of the Tamiami East Colony does not overlap any of the three alternative alignments for the Tamiami Trail Project (Figure 8.2.). Thus, no wood stork Primary Zone restrictions apply to highway construction activities in the vicinity of this colony, unless otherwise determined to be necessary by a qualified onsite observer(s). The Secondary Zone, however, does overlap varying linear distances of the highway depending on the alternative. Table 4.3 below provides these linear distances, by alternative.

For the Secondary Zone, it is recommended that no unauthorized human activity (on foot, airboat, or ORV) occur at any time of the year within the reach of highway affected by that alternative, particularly to the south side of the highway, and particularly during the nesting season.

In summary, the wood stork restrictions for the Tamiami East Colony include:

1) **Secondary Zone:** No unauthorized human activity (on foot, airboat, or ORV) occur at any time of the year within the reach of highway affected by that alternative on the south side of the highway and particularly during the nesting season.

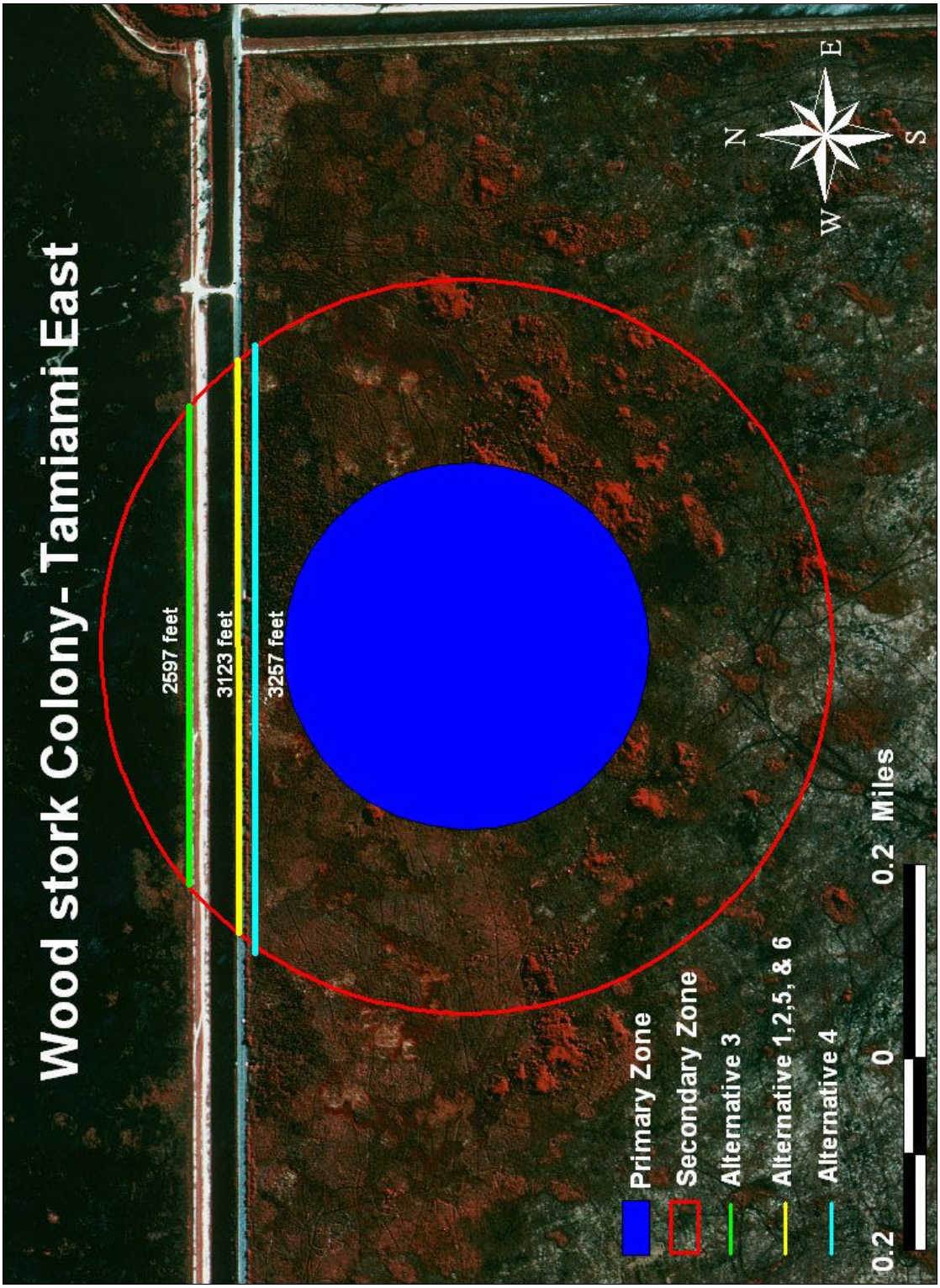

Figure 8.3. Tamiami east stork colony

Table 8.2. Summary of Linear Distances of Overlap of Primary and Secondary Zones on US 41 for the Tamiami East Wood Stork Colony, Tamiami Trail Project, Modified Water Deliveries Project.

Alternative	Linear Feet of US 41 In the Primary Zone	Linear Feet of US 41 In the Secondary Zone
3 (North Alignment in WCA-3B)	--	2,597
1, 2, 5, 6, 7, 8, 9 (Existing Alignment)	--	3,123
4 (Southern Alignment in ENP)	--	3,257

2) **Length of Restrictions:** These restrictions shall remain in effect during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected;

3) **Qualified Observer:** Subject to the approval of the FWS and FFWC, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected. The observer shall monitor wood stork activity and shall notify the FWS, FFWC and Corps if wood stork behavior is modified such that roosting, nest building, breeding, nesting and/or fledging of young is disrupted or otherwise interfered with;

4) **Modification of Restrictions:** If new information becomes available concerning the Tamiami West wood stork colony, the Corps, FWS and FFWC should immediately contact each other to determine what modifications, if any, are warranted.

Snail Kite

Based on the most recent snail kite nesting data, the closest snail kite nest to the Tamiami Trail Project is located in WCA-3B 6,586 feet north of the Alternative 3 alignment as depicted in Figure 8.1. Because the closest known snail kite nest is located over one mile north of the action area, the FWS does not recommend, at this time, that any restrictions need to be applied to the project on behalf of this species. The FWS and FFWC will continue to monitor snail kite nesting in subsequent nesting seasons in the project area, and will immediately notify the Corps if new information would warrant a change in this determination.

State Listed Threatened and Endangered Species, and Species of Special Concern

In a letter dated October 18, 2000, the FFWC has identified six avian species of special concern which may nest or otherwise be found in the vicinity of Tamiami Trail between the S-334 and the L-67s: tricolored heron, snowy egret, little blue heron, limpkin, roseate spoonbill, and white ibis. In addition, the snail kite and wood stork, both listed by FFWC as endangered, are also

known to occur in the area.

The American alligator (listed as a species of special concern) and the Everglades mink (listed as threatened) also are found along the Tamiami Trail corridor.

Frog City Wading Bird Colony

This small colony (Figure 8.4) is situated in WCA-3B close to the L-29 Levee approximately one-quarter mile west of the Tiger Tail Miccosukee Indian Camp. This small willow head supports nesting by tricolored herons and great egrets. These migratory birds are also protected under the provisions of the Migratory Bird Treaty Act. As such, they are protected species under the jurisdiction of FWS.

The FFWC and FWS have applied the *Minimum Buffer Zone Requirements to Protect Nesting Bird Colonies from Human Disturbance* (FFWC 19_). These Guidelines establish a 125 meter

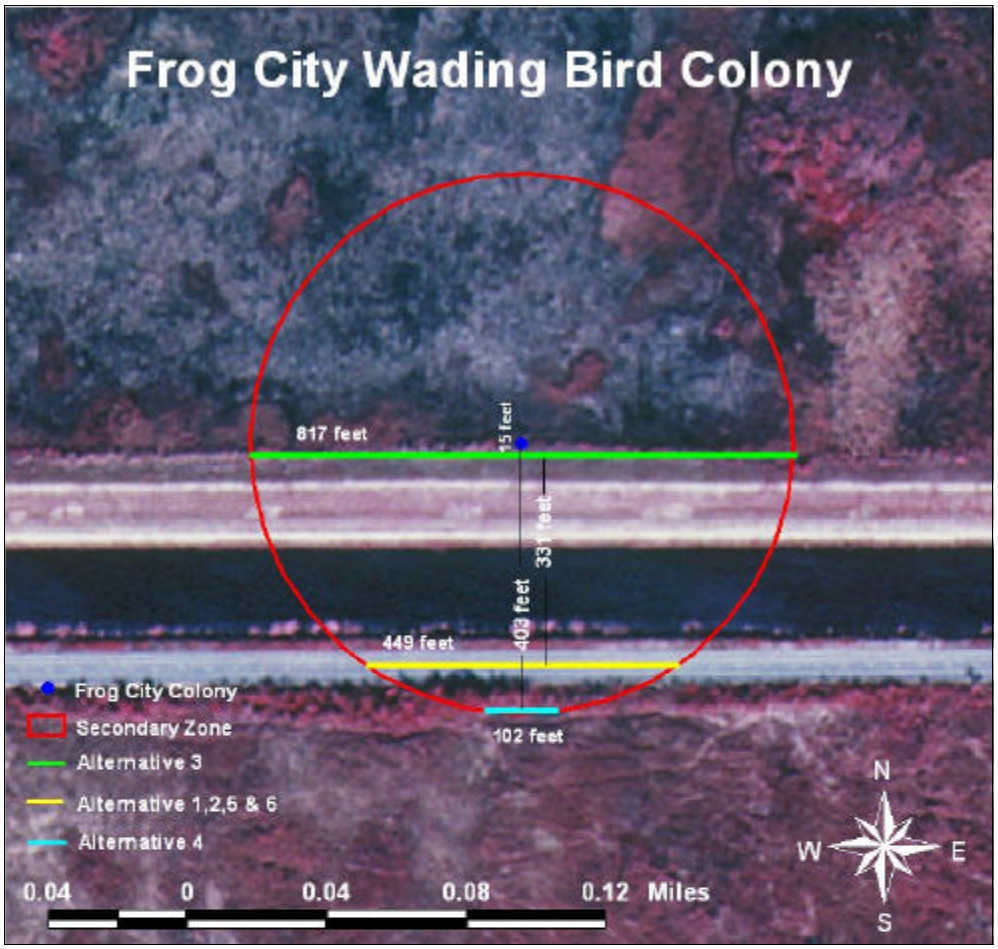

Figure 8.4. Frog City Wading Bird Colony

(410 feet) Buffer Zone around mixed wading bird colonies where human disturbance should be restricted during the nesting season, and during periods where wading birds are roosting at the colony site. The Buffer Zone for the Frog City Colony overlaps varying linear distances of the highway depending on the alternative. Table 8.3 provides these linear distances and linear distances of project alternatives from the colony, by alternative.

Table 8.3. Summary of Linear Distances of Overlap of the Buffer Zone on US 41 and Linear Distances from Project Alternatives for the Frog City Colony, Tamiami Trail Project, Modified Water Deliveries Project.

Alternative	Linear Feet of US 41 In the Buffer Zone	Distance from Colony to Project Alternatives
3 (North Alignment in WCA 3B)	--	2,597
1, 2, 5, 6, 7, 8, 9 (Existing Alignment)	--	3,123
4 (Southern Alignment in ENP)	--	3,257

Of particular concern for the Frog City Colony is that the Alternative 3 is located 15 feet from the colony. If this alternative alignment is selected, the Frog City Colony would certainly be abandoned by species of wading birds. Therefore, the FWS and FFWC recommend that Alternative 3 be eliminated from further consideration as a viable project alternative due to the significant adverse effects on State listed and Federally protected species (in addition to overall wetland functional losses and disruption to WCA-3B fish and wildlife resources described in other chapters of this Draft FWCA Report).

For Alternatives 1, 2, 4, 5, 6, 7, 8, and 9 which are all located south of the L-29 Levee/Canal, the FWS and FFWC do not recommend any Buffer Zone restrictions be applied to the Frog City Colony. This recommendation is supported by the fact that the colony is protected from highway construction noise by the approximate 20-foot high L-29 Levee, and that the wading birds nesting at this colony have acclimated to continuous highway traffic and noise.

In summary, the FWS and FFWC provide the following recommendations for the Frog City Colony for the Tamiami Trail Project:

1) **Alternative 3 (North alignment in WCA-3B):** It is recommended that Alternative 3 be eliminated from further consideration as a project alternative for the Tamiami Trail Project due to the resultant abandonment of the Frog City Colony and the protected species it supports;

2) **Buffer Zone:** No Buffer Zone restrictions are recommended for the Frog City Colony for Alternatives 1, 2, 4, 5, 6, 7, 8, and 9 during the construction phase of the Tamiami Trail Project;

3) **Qualified Observer:** Subject to the approval of the FWS and FFWC, a qualified ob-

server(s) shall be stationed onsite during the construction phase of the Tamiami Trail Project, which is 18 – 48 months depending on the final alternative selected. The observer shall monitor wading bird activity and shall notify the FWS, FFWC and Corps if wading bird behavior is modified such that roosting, nest building, breeding, nesting and/or fledging of young is disrupted or otherwise interfered with;

4) **New Information:** If new information becomes available concerning the Frog City Colony, the Corps, FWS and FFWC should immediately contact each other to determine what actions, if any, are warranted.

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CHAPTER 9- RECREATIONAL EFFECTS

Introduction

Recreational opportunities in the study area consist primarily of fishing for largemouth bass and other fish species (Centrarchids and catfish) along the L-29 canal, culverts under the Tamiami Trail and in Water Conservation Area (WCA) 3B, hunting for whitetail deer, frogging and some waterfowl hunting in WCA-3B, sightseeing/birding, and recreational airboating in both WCA-3B and Everglades National Park (ENP). Much of the recreational fishing is by bank fishermen along the L-29 canal, while access to culvert fishing on the south side of Tamiami Trail is limited by the narrowness of the highway shoulder and overall safety concerns.

Recreational fishing and hunting is managed by Florida Fish and Wildlife Commission (FFWC) in accordance with state wildlife laws. Recreational airboating in ENP is available from three commercial concessions located on the south side of Tamiami Trail: Airboat Association of Florida, Everglades Safari, and Gatorland. No recreational hunting is allowed south of Tamiami Trail in ENP lands and boating access is currently allowed only for the three concessions.

Under the existing condition in the study area, approximately 10.5 miles of the north bank of the L-29 canal and 10.7 miles of the south bank of the L-29 canal are accessible for fishing/ sightseeing. All of the existing culvert outfall sites are also accessible for fishing. The existing Tamiami Trail provides little to no sightseeing opportunities.

There are three airboat ramps in the project area, one at S-334, one at S-333, and a ramp (#153) located at the L-29 levee recreation area approximately three miles west of the S-334. The S-334 and S-333 ramps are “marsh ramps” providing access to WCA-3B, while the #153 ramp is a “canal ramp” providing access to the L-29 canal. In addition to these three ramps, there are three additional ramps adjacent to the project area: one at S-12D approximately one-half mile west of the S-333, one in the L-67A canal south of S-333 and one in the L-67C canal approximately one-quarter north on the L-67 levee. All six ramps have been permitted by the FFWC and are under an agreement with South Florida Water Management District (SFWMD). This agreement between FFWC and SFWMD requires that if access to any ramp is lost by changes in the water management system, the SFWMD will replace that ramp at a location determined to be suitable by FFWC.

Based on instantaneous angler counts along the Tamiami Trail by FFWC from January to June 1999, bank fishing effort was concentrated in two primary areas within the 11-mile study area: 1) the 1.5 miles of Tamiami Trail from Krome Avenue to the S-334 structure, and 2) the 1.0 mile beginning approximately 10 miles west of Krome Avenue to the S-333 structure (Figure 9.1). The intervening 9.5 miles of Tamiami Trail experienced nominal fishing pressure during the six-month angler survey. Only the extreme eastern and western ends of the study area support significant bank fishing. Therefore, the long-term effects of the Tamiami Trail Project on bank fishing should be minimal.

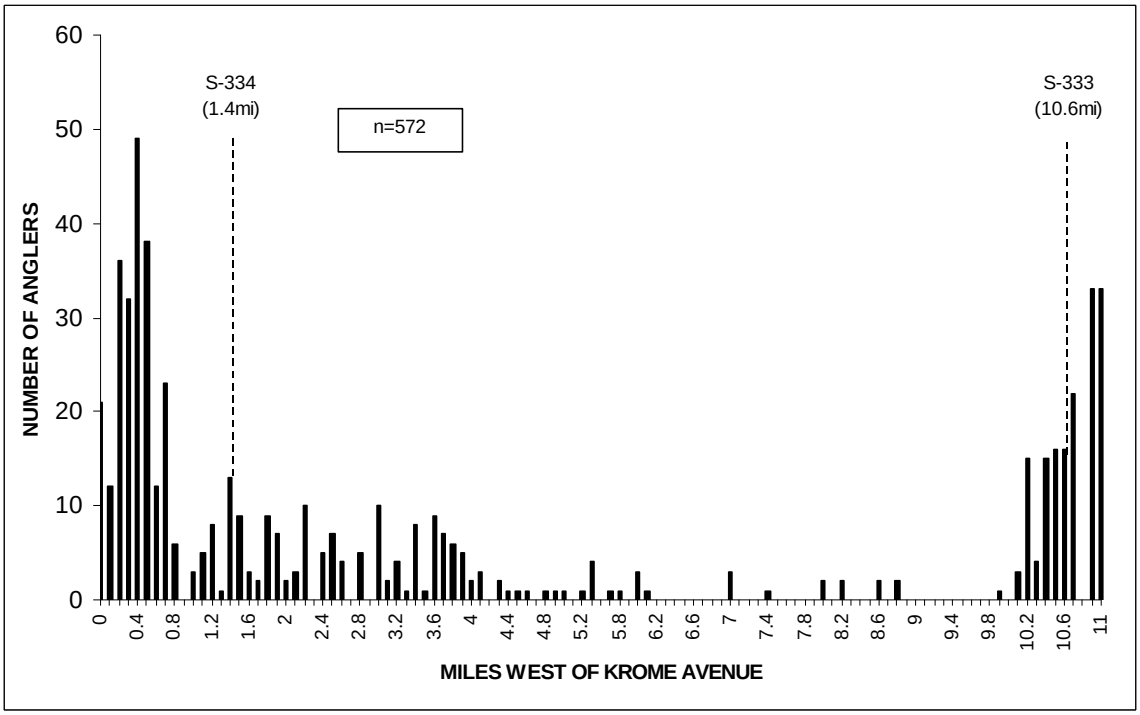

Figure 9.1. Distribution of totaled average instantaneous angler counts along Tamiami Trail (US 41) between Krome Avenue and S-333, from January to June 1999, in one-tenth increments (FWC, John Fury, unpublished data).

Future recreational use in WCA-3A is likely to change as Comprehensive Everglades Restoration Plan (CERP) components are implemented. With generally deeper water levels in WCA-3B, whitetail deer hunting is likely to decline as the deer herd diminishes in size. However, providing sufficient conveyance through the Tamiami Trail corridor is likely to lessen adverse effects to deer. Likewise, fishing opportunities, frogging, alligator hunting, and waterfowl hunting are likely to increase as water levels gradually increase.

Summary of Effects of Proposed Alternatives on Recreation

Alternative 1 (Existing Alignment and Profile)

Alternative 1 results in little or no change to existing conditions and would have minimal effect on current recreational activities in the study area. All existing airboat ramps would remain accessible, and the entire north and south banks of the L-29 canal (10.5 miles on the north bank and 10.7 miles on the south bank) remain accessible for bank fishing, except during the construction period of 18 to 24 months. Culvert fishing on the south side of Tamiami Trail would also be inaccessible during the construction period. Alternative 1 would provide no increased sightseeing opportunities.

Alternative 2 (Existing Alignment and Raised Profile)

All airboat ramps remain accessible under this alternative. Approximately 10.5 miles of the north bank of the L-29 canal would remain accessible for bank fishing. However, access to 10.7 miles of the south bank of the L-29 canal and the culvert outfalls for fishing would not be accessible during highway construction (18 – 24 months). The culvert fishing sites would remain open under this alternative Accessibility to the four bridge cuts for fishing is unknown. Alternative 2 would provide limited sightseeing opportunities at the four bridge locations.

Alternative 3 (Relocate Highway North into WCA 3B)

The airboat ramps at S-333 and S-334 remain accessible, while access to airboat ramp #153 is limited during the 30-month construction period. There is also the likelihood that the #153 ramp parking area will be reduced after construction, thus limiting access. The south bank of the L-29 canal and the culvert outfall fishing sites remain accessible. Pending completion of breaches in the old Tamiami Trail, access to the south bank of the L-29 canal and culvert outfall site would be limited to two miles on the east and 1.5 miles to the west. Alternative 3 offers full panoramic views of WCA-3B along its entire length.

Alternative 4 (Shift Highway to the South into ENP)

The recreational effects of this alternative are similar to Alternative 2, above.

Alternative 5 (Elevated Causeway)

All airboat ramps remain accessible under this alternative. Approximately 10.5 miles of the north bank of the L-29 canal remains accessible, while the south bank would be inaccessible during the 48-month construction period. Pending completion of breaches in the old Tamiami Trail, access to the south bank of the L-29 canal and culvert outfall site would be limited to one mile on the east and one-half mile to the west. Alternative 5 would provide full panoramic sightseeing to both WCA-3B and ENP for the entire length.

Alternative 6 (Four-Mile Bridge)

Alternative 6 has similar effects as Alternative 2, above, except for the three and three-quarter-mile section of highway removal occurs. At this location, there would be fewer culvert outfalls available for fishing; however, fishing at the ends of the bridge and at the Airboat Association of Florida would offset some of this lost opportunity. The four-mile bridge would provide substantial panoramic sightseeing opportunities of both WCA-3B and ENP.

Alternative 7 (3,000-Foot Bridge)

This bridge alternative calls for constructing an elevated structure slightly more than one-half mile long. All airboat ramps remain accessible, and 10.5 miles of bank fishing from the north

side of the L-29 Levee remains accessible. The south bank is inaccessible during the 24-month construction period; however, after construction, 10.1 miles of fishing along the south bank would become accessible for fishing. Sightseeing opportunities would increase slightly above existing conditions, but would remain overall limited.

Alternative 8 (Box Culverts)

Except during the construction period of 18-24 months, impacts to recreational opportunities are minimal. All three airboat ramps remain accessible, and bank fishing along the entire project length remain accessible after construction. Sightseeing opportunities are considered poor, with limited views of the Everglades marshes.

Alternative 9 (2.7-Mile Bridge)

All three airboat ramps remain accessible, and eight miles of bank fishing on the south bank and the entirety of the north bank remain accessible during the 24-30 month construction period. After construction, eight miles of the south bank will be accessible for bank fishing opportunities. Sightseeing opportunities would increase significantly with panoramic views of ENP and WCA-3B along the 2.7-mile bridge, and are considered overall good.

Wildlife Barrier/Wildlife Connectivity Features

Features to reduce wildlife mortality and increase wildlife connectivity (see Chapter 3) are proposed for all Alternatives except Alternative 5. Alternative 5, by design, would forego the need for these features, since full wildlife connectivity would be realized with the elevated causeway design. The effect these features would have on recreation for the remaining Alternatives is deemed to be similar. The wildlife barrier (4 ft in height) may hinder access for some bank fishermen, while the wildlife land bridges should provide additional fishing opportunities. Replacement of an unknown number of culverts by an unknown number of box culverts has the potential to reduce culvert outfall fishing potential; however, fishing opportunities are likely to increase at the box culvert sites and may be safer due to the existing narrow shoulder and unsafe conditions at the culvert outfall sites.

In summary, Table 9.1 depicts the significant recreational factors to be included in the comparison of Tamiami Trail Project alternatives. During construction, recreational opportunities would be affected for all alternatives. Sightseeing opportunities are most compatible with Alternatives 5 , 6, and 7. Boat ramps will remain accessible for all alternatives, with Alternative 3 affecting available parking at one ramp. Bank fishing opportunities on the south bank of the L-29 canal will be affected during construction; however, as described above, bank fishing activity is centered at the S-334 and S-333 structures and thus overall bank fishing impacts will be minimized. Fishing at the culvert outfalls will be effected to varying degrees, but are expected to be off-set by fishing opportunities generated by the addition of bridges and/or box culverts elsewhere in the highway alignment.

Table 9.1. Summary of effects of Tamiami Trail Project on recreation.

Alternative					
	Bank Fishing (miles)	**Boat Ramps (number)**	**Culvert Outfalls (number/miles)**	**Sightseeing (qualitative)**	**Construction (months)**
1	North: 10.5 South: 10.7	3 – remain accessible	Closed during construction Miles: 10.7	Poor (1)	18–24: outfalls, N/S bank fishing inaccessible
2	North: 10.5 South: 10.7	3 – remain accessible	Closed during construction Miles:10.7	Limited (2)	18-24: South bank inaccessible
3	North: 10.5 South: 3.5	3 – 1 ramp parking reduced	Open during construction East: 2 miles West: 1.5 miles	Good (3) WCA 3B	30 months: 1 ramp inaccessible
4	North: 10.5 South: 3.5	3 – remain accessible	Closed during construction Miles: 10.7	Limited (2)	18-24: South bank inaccessible
5	North: 10.5 South: 1.5	3 – remain accessible	Open during construction East: 1 mile West: 0.5 mile	Excellent (5)	48: South bank inaccessible
6	North: 10.5 South: 7.0	3 – remain accessible	Open during construction East 5 miles West: 2 miles	Very Good (4)	24-30: South bank inaccessible
7	North 10.5 South 10.1	3 – remain accessible	Open during construction East: 6 miles West: 4.1 miles	Limited (2)	24: South bank inaccessible
8	North: 10.5 South: 10.7	3 – remain accessible	Closed during construction Miles: 10.7	Poor (1)	18-24: South bank inaccessible
9	North: 10.5 South: 8.0	3 – remain accessible	Open during construction East: 3 miles West: 5 miles	Good (3)	24-30: South bank inaccessible

Discussion

Bank/Culvert Fishing

The primary area of concern related to short-term recreational impacts focuses on maintaining access to bank fishing and culvert outfalls along the L-29 canal during the 18 to 30 month construction phase of the Tamiami Trail Project. Construction activities, staging areas, and construction traffic will likely adversely affect fishing access along the L-29 canal. Depending on how construction is implemented, effects to the fishing public will vary.

During construction, the south bank of the L-29 canal will be inaccessible for Alternatives 2, 4, 5, 6, and 8. For Alternative 1, both the north and south sides of the canal will be inaccessible for 18 to 24 months. Alternative 3 (shifting the roadway into WCA-3B) has no effects on bank fishing.

After construction, bank fishing access between alternatives varies due to breaching or removing portions of the old Tamiami Trail. Alternatives 1, 2 and 8 maintain full bank fishing access, due to the fact that the existing alignment is utilized. Alternatives 3, 4, 5, 6, 7, and 9 reduce bank fishing access on the south bank by between 3.5 and 9.0 miles. However, new fishing opportunities at bridge and/or box culvert locations and at breaches in the old highway should help minimize the overall long-term effects.

Maintaining recreational fishing access to culvert outfalls also varies between alternatives. For Alternatives 1 and 2, all culvert outfalls remain accessible, again due to the fact that the existing alignment is used. Alternatives 3, 4, 5, and 6 decrease the number of miles that culvert outfalls are accessible. The case of Alternative 5 (full causeway) culvert outfall access is limited to only 1.5 miles.

For perspective, it is important to keep in mind that the heaviest bank fishing pressure is located to the east of the S-334 and to the west of the S-333 (see Figure 9.1). Based on the 1999 angler counts by FFWC, approximately 62 percent of all bank fishing activity along the 11 mile stretch occurs to the east of S-334 and west S-333. Because of the uneven distribution of fishing activity, adverse effects on the fishing public will be somewhat minimized.

Finally, the fate of recreational fishing, as we know it today, is likely to be dramatically altered during CERP implementation. The Decompartmentalization Project (Phase I) envisions totally degrading the L-29 levee and backfilling the L-29 canal. This situation may improve airboating, but fishing along canal banks and culvert outfalls will be eliminated, for all practical purposes.

Boat Ramps

The three boat ramps in the study area will remain accessible after construction is completed, and should also be accessible during construction. Alternative 3 is likely to effect available parking at the #153 ramp, but access at this location will remain. Therefore, in the short-term, airboat

access will be maintained.

During CERP implementation, it is likely that the #153 ramp will be degraded. However, airboating in WCA-3B should improve, as water levels slowly increase with an increase in CERP flows.

Sightseeing

In general, those alternatives (Alternatives 5, 6, and 9) which provide sections of elevated causeway across the marsh will provide more sightseeing (panoramic views) opportunities. Alternatives 1, 2, 4, 7, and 9 will provide limited sightseeing opportunities, whereas Alternative 3 will provide scenic views of WCA-3B.

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CHAPTER 10- EVALUATION OF ALTERNATIVE PERFORMANCE

Evaluation Process Used to Select the Department of the Interior's Recommended Plan

The Department of the Interior (DOI) alternative evaluation process was designed to allow for the identification of an alternative that maximizes performance for the stated project objectives, while also maintaining compatibility with the project constraints. This process was performed in recognition that future, yet-to-be identified, modifications to Tamiami Trail are authorized for implementation as part of the Comprehensive Everglades Restoration Plan (CERP) Project Decompatmentalization (Phase 1). Given the objectives presented earlier in this report and the constraints detailed below, the following five-step screening process was utilized to identify the DOI Recommended Plan:

Step 1: All alternatives (with and without water quality treatment features) were initially evaluated for their ability to comply with the Florida Department of Transportation (FDOT) road safety requirements. All alternatives not mitigating for the potential road damage due to the elevated water levels associated with the Modified Water Deliveries (MWD) Project were eliminated from further consideration by the DOI.

Step 2: All remaining alternatives (with and without water quality treatment features) were then evaluated for the quantity of wetland function lost in Everglades National Park (ENP) and Water Conservation Area (WCA) 3B. All alternatives resulting in a significant loss of wetland function due to implementation were eliminated from further consideration by the DOI.

Step 3: All remaining alternatives (with and without water quality treatment features) were next evaluated for relative performance based on the performance measures associated with the environmental objectives exclusively. This evaluation was performed to identify the Environmentally Preferred Alternative in a manner independent of the other project objectives.

Step 4: Based on the relative performance of the alternatives with respect to environmental performance, the alternatives were further screened based on fiscal constraints imposed by the National Park Service (NPS). All alternatives with construction costs that DOI considered beyond the capability of the NPS to fund were eliminated from further consideration.

Step 5: All remaining alternative plans were then assessed for relative performance for both environmental and other project objectives. Through the use of this evaluation process, the DOI Recommended Plan ultimately identified was the alternative that pro-

vided the maximum level performance for all project objectives while remaining within the limits imposed by the project constraints. In the view of the DOI, the final Recommended Plan is also the most compatible alternative with future Comprehensive Everglades Restoration Plan efforts to restore Tamiami Trail and reconnect the Central and Southern Everglades.

Project Constraints Affecting Alternative Selection

Several constraints were addressed in the evaluation and selection of a DOI Recommended Plan for Tamiami Trail. These constraints include:

1. the road safety considerations identified by the FDOT;
2. the potential need for water quality treatment of road runoff and the impact of these facilities on existing wetland resources; and,
3. the limited amount of funding available to the project from the NPS.

Each of these constraints is explained below.

Road Safety

The design water level elevation assumed by the U.S. Army Corps of Engineers (Corps) for all modifications to Tamiami Trail associated with the MWD Project is 9.3 feet. This water level is considerably higher than past and current levels of operations in the L-29 canal (7.5 feet). Furthermore, water levels during extreme events may result in overtopping the existing road surface elevation following implementation of the MWD Project. It is the opinion of the FDOT that either of these conditions present a significant safety concern. Persistent higher water levels in the L-29 canal will cause the road sub-grade to be saturated with sufficient frequency to potentially result in road failure, and overtopping during extreme events could be a potential hazard for motorists traveling along the highway.

Water Quality Treatment and Wetland Impacts

The waters upstream of the Tamiami Trail are designated as Class III (Recreational Waters) while the downstream waters in ENP are designated as Outstanding Florida Waters (OFW). Surface water quality standards of the State of Florida mandate that there be no degradation of the ambient water quality in OFW. Based on the fact that the predicted contaminant concentrations for Tamiami Trail were consistently lower than criteria for Class III waters, the Corps (PBS&J 2001) concluded “that there will be little impact on the quality of the water in the vicinity of Tamiami Trail.”

However, predicted contaminant concentrations of copper, iron, lead, and zinc in 2000 are higher than the minimum recorded concentrations in ENP, an OFW, indicating the potential for water quality degradation, with chromium added to the list by 2020. However, the Corps maintains (see Tamiami Trail GRR/SEIS) that because this project does not increase the number of

travel lanes (impervious road surface area remains unchanged by the project), and the project is not responsible for growth in traffic, water quality treatment is not required for this project. At the time of the completion of this Draft Fish and Wildlife Coordination Act (FWCA) Report, the Florida Department of Environmental Protection (FDEP), the agency responsible for issuing water quality certification for the project, was unclear as to whether water quality treatment would be required for this project.

The water quality treatment design selected and evaluated by the Corps specifies construction of dry retention facilities adjacent to the roadway to capture and treat potentially contaminated runoff. Since one of the design requirements established by the Corps included retaining the full conveyance capacity of the L-29 canal, the dry retention facilities had to be located in areas of existing wetlands, either in ENP (Alternatives 2, and 4 through 9) or WCA-3B (Alternative 3).

The assumptions and selected water quality treatment facility design remain a concern to the DOI. The conceptual plans for the CERP Decompartmentalization Phase 2 Project specify the degradation of both the L-29 canal and levee. In order to minimize the loss of wetlands, the DOI prefers that any water quality treatment facilities be located in areas that are presently disturbed and not in areas of undisturbed wetlands. Furthermore, DOI is concerned that there appears to be a persistent, yet unanswered, question regarding whether water quality treatment will be required for the project. Until these issues can be resolved, DOI is not supportive of facilities that result in a loss of wetlands from either ENP or WCA-3B.

NPS Fiscal Limitations

While the 1989 ENP Expansion and Protection Act states that the MWD Project features are "justified by the environmental benefits to be derived by the Everglades ecosystem in general and by ENP in particular and shall not require further economic justification…", the DOI also recognizes the fact that limited funds are available to the project from the NPS. The June 2001 version of the Capital Asset Plan (OMB Circular A-11 Exhibit 300[b], Modified Water Deliveries) indicates that the current level of funding available from the NPS for the Tamiami Trail component of the MWD Project is $20.215 million. While this level of funding does not represent the final amount that could potentially be made available by the NPS, it is the opinion of the DOI that alternatives **significantly** higher than the amounts stated in the Capital Asset Plan would not be supported due to the current funding priorities within the NPS.

Evaluation of Alternative Performance

Performance Measure Scoring Methodology

Numerous performance measures having widely disparate units were used in the evaluation of the proposed alternative plans in meeting the multiple projective objectives. The performance measure units range from the highly quantitative, such as acres impacted, to the less exact, such as a relative score based on best professional judgment. In order to present all of the performance measures for all of the objectives into a unified evaluation tool, all performance measures

were combined into a series of matrices for purposes of comparing alternatives. These matrices were then used in conjunction with the project constraints and the evaluation methodology described above to identify the DOI's Recommended Plan.

Data for all performance measures for each objective were incorporated into a single matrix (Table 10.1) for each of the alternative plans evaluated. For alternatives remaining after the initial screenings for road safety and wetland impacts, the alternatives were assigned a numeric performance score. The values of the performance score is provided in Table 10.2 and is based on the relative performance of each of the alternatives from worst (low numeric score) to best (high numeric score) corresponding to the relative performance for the given performance measure. The scores assigned to the alternatives were made to maintain the numeric range corresponding to the total number of alternatives evaluated as well as provide the greatest numeric separation of the alternatives. The exact value of the performance score was made through the use of the following scoring algorithm:

$$score = n + \frac{n + (m-1)}{(p-1)} + (m-1)$$

where n is the number of alternatives of a lower score, m is the number of alternatives sharing score, and p is the total number of alternatives considered. The lowest performing alternative was assigned a score of 1 and the remaining alternatives were scored according to the expression above. Non-integer results were rounded up to the next highest integer.

Screening of Alternatives Based on Road Safety

As stated earlier, the DOI will not consider implementation of any alternative that could result in the unmitigated deterioration of the road or other conditions that would result in a hazard to the continued use of the Tamiami Trail. With the exception of Alternative 1, all of the proposed alternative plans provide a mechanism to mitigate for potential damage to the road sub-grade or for overtopping of the road surface. Alternatives 2 through 4 and Alternative 8 provide for additional fill to raise the existing highway. Alternatives 5, 6, 7 and 9 specify an elevated highway in the form of a "skyway" for all or portions of the roadway and any sections not included in the skyway would be raised through the addition of fill material. Based on these designs and the DOI position on road safety, only Alternative 1 fails to meet the criteria for acceptability. For this reason, Alternative 1 was not considered in any of the alternative evaluations and therefore not included in the matrices found in Tables 10.1 and 10.2.

Screening of Alternatives Due to Wetland Impacts

All alternatives designated with a "B" in Tables 10.1 and 10.2 (e.g. Alternative 2B) include water quality treatment facilities. These facilities are in the form of a dry detention system constructed adjacent to the modified road surface and generally increase the road cross-section by

Table 10.1. Performance Data Matrix

	Units	Alternatives																			
		2		3		4		5				6				7		8		9	
		A	B	A	B	A	B	A Partial	A Full	B Partial	B Full	A Partial	A Full	B Partial	B Full	A	B	A	B	A	B
Environmental Project Objectives																					
1. Minimize adverse effects to federally listed species with the Endangered Species Act (Snail kite, Wood stork, Eastern indigo snake [pending Biological Assessment and effect from Corps])																					
A. Impact to East Colony of Wood Stork																					
Primary Zone	linear ft.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secondary Zone	linear ft.	3,123	3,123	2,597	2,597	3,257	3,257	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123	3,123
B. Impact to West Colony of Wood Stork																					
Primary Zone	linear ft.	2,295	2,295	2,040	2,040	2,763	2,763	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295	2,295
Secondary Zone	linear ft.	2,122	2,122	2,214	2,214	1,701	1,701	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122	2,122
C. Impact to Snail Kite nesting locations	**Pending the Corps' Biological Assessment**																				
D. Construction restrictions in the East Colony due to Wood stork nesting and fledging																					
Primary Zone	No. Days	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Secondary Zone	No. Days	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
E. Construction restrictions in the West Colony due to Wood stork nesting and fledging																					
Primary Zone	No. Days	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Secondary Zone	No. Days	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
F. Implement Standard Construction Precautions for Eastern indigo snake	**Pending the Corps' Biological Assessment**																				
2. Meet the RPA for the CSSS as specified in the FWS BO of Feb. 1999																					
A. Design flow passing under the eastern section of Tamiami Trail (between the S-334 and the L-67s) meets 60 percent of the regulatory portion of the rainfall formula derived total flows across the Tamiami Trail.	yes/no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3. Ensure no adverse effects to state listed endangered or threatened species of special concern consistent with State Statutes																					
A. Impact to Frog City Wading Bird Colony Buffer Zone	linear ft.	449	449	817	817	102	102	449	449	449	449	449	449	449	449	449	449	449	449	449	449
B. Distance from the Frog City Wading Bird Colony	linear ft.	331	331	15	15	403	403	331	331	331	331	331	331	331	331	331	331	331	331	331	331
4. Allow for restoration consistent with the 1989 ENP Protection and Expansion Act																					
A. NESS Stage: Maintain the level and frequency of stage as modeled by the 8.5 SMA MODBRANCH model D13R 1995 simulation (D13R_C111_356_1995_95ops)	yes/no	yes*	yes	yes	yes	yes*	yes	yes	yes	yes	yes	yes*	yes*	yes	yes	yes*	yes	yes*	yes	yes*	yes
B. Water Deliveries to ENP: Maintain a discharge capacity equivalent to historical (1939-1963 bridge flows) 1/10 year event, or 4458 cfs. (equivalent to about a 1/200 year event according to SFWMM D13R derived return frequencies.)	yes/no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Table 10.1 cont. Performance Data Matrix

	Units	Alternatives																			
		2		3		4		5				6				7		8		9	
		A	B	A	B	A	B	A Partial	A Full	B Partial	B Full	A Partial	A Full	B Partial	B Full	A	B	A	B	A	B
Environmental Project Objectives																					
4. cont.. Allow for restoration consistent with the 1989 ENP Protection and Expansion Act																					
C. Area with affected flow magnitude	Acres	623.4	623.4	623.4	623.4	623.4	623.4	165.7	165.7	165.7	165.7	437.5	437.5	437.5	437.5	1649.3	1649.3	485.8 est	485.8 est	2567.7	2567.7
D. Difference between average velocity at the road and average velocity in the marsh.	ft/s	0.044	0.044	0.044	0.044	0.044	0.044	0.001	0.001	0.001	0.001	0.018	0.018	0.018	0.018	0.038	0.038	0.036	0.036	0.023	0.023
5. Enhance and restore ecological Function																					
A. Wetland Function Units gain or loss	FU	-11.1	-61.75	-18.82	-30.15	-40.43	-64.64	39.35	45.27	29.54	33.93	-6.60042	-6.60042	-22.7757	-22.7757	-3.42	-49.55	-3.51	-46.56	-1.91	-33.35
B. N/S connectivity Between WCA-3b and ENP for aquatic fish and wildlife	linear ft.	1412	1412	5649.6	5649.6	1412.4	1412.4	55366.8	55366.08	42372	42372	20338.56	20338.56	20338.56	20338.56	3000	3000	240	400	14256	14256
C. Exotic and nuisance vegetation removed	acres	12.96	12.96	0.17	6.48	12.96	12.96	0.33	12.96	0.33	12.96	8.12	12.96	8.12	12.96	12.96	12.96	12.96	12.96	12.96	12.96
D. Reduction in wildlife Mortality	No.	40	40	158	158	40	40	1584	1584	1584	1584	570	570	570	570	84	84	7	7	400	400
6. Minimize permanent loss of wetlands in ENP and WCA-3B																					
A. Wetland permanently lost in ENP	Acres	11.8	49.32	0.00	0.00	68.45	103.87	0	0	0	0	0.3	0.3	46	46	3	67.7	2.3	74	2.77	48.87
B. Wetlands permanently lost in WCA-3B	Acres	0	0	14.29	28.94	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Project Objectives																					
1. Ensure no reduction in authorized flood control benefits																					
A. Acres with altered flood protection	acres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Maximize compatibility with future restoration actions																					
A. Cubic yards of fill requiring removal to achieve completely unobstructed flow path (including removal of L-29 levee.)	mil yd^3	1.7	2	2.3	2.8	2.5	2.8	1.6	1.1	1.6	1.2	1.5	1.6	1.7	1.9	1.7	2	1.7	2.1	1.5	1.9
B. Ability to accommodate additional flow capacity required by currently authorized CERP project features.	Score	1	1	1	1	1	1	5	5	5	5	4	4	4	4	2	2	1	1	3	3
C. Ability to accommodate flow volume of 245,000 ac ft. as described in Sec. 601G of WRDA 2000	Score	1	1	1	1	1	1	5	5	5	5	4	4	4	4	2	2	1	1	3	3

Table 10.1 cont. Performance Data Matrix

	Units	Alternative																			
		2		3		4		5				6				7		8		9	
		A	B	A	B	A	B	A Partial	A Full	B Partial	B Full	A Partial	A Full	B Partial	B Full	A	B	A	B	A	B
Other Project Objectives																					
3. Maximize consistency with other Modified Water Deliveries components																					
A. Ability to meet implementation schedule (satisfies RPA requirements)	yes/no	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
B. Construction duration and implementation time (construction compleated by 2005)	yes/no	yes	yes	yes	yes	yes	yes	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
4. Minimize impacts associated with construction																					
A. Total duration of construction as measured in months	Months	24	24	30	30	24	24	48	48	48	48	30	30	30	30	24	24	24	28	28	28
B. Allows for turbidity control	yes/no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
5. Minimize adverse socio-economic effects																					
A. Noise impacts to the Miccosukee Tiger Tail Camp (noise abatement critiria exceeded)	yes/no	no	no	yes	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
B. Noise impacts to the Miccosukee Osceola Camp (noise abatement critiria exceeded)	yes/no	no	yes	no	no	yes	yes	no	no	no	no	no	no	yes	yes	no	yes	no	yes	no	yes
C. Provide access to Miccosukee Tiger Tail Camp	yes/no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
D. Provide access to Miccosukee Osceola Camp	yes/no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
6. Minimize recreational effects																					
A. Miles of available bank fishing																					
North	Miles	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
South	Miles	10.7	10.7	3.5	3.5	3.5	3.5	1.5	1.5	1.5	1.5	7.0	7.0	7.0	7.0	10.1	10.1	10.7	10.7	8	8
B. Number of accessible boat ramps	No.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C. Miles of available culvert outfall fishing	Miles	10.7	10.7	3.5	3.5	10.7	10.7	1.5	1.5	1.5	1.5	7.0	7.0	7.0	7.0	4.7	4.7	10.7	10.7	8	8
D. Sightseeing opportunities (1 poor- 5 excellent)	Rank	2	2	3	3	2	2	5	5	5	5	4	4	4	4	2	2	1	1	3	3
E. Maximum months of disruption due to construction	Month	24	24	30	30	24	24	48	48	48	48	30	30	30	30	24	24	24	24	30	30

Table 10.2. Performance Score Matrix

	Alternatives											
	2	3		5				6		7	8	9
	A	A	B	A Partial	A Full	B Partial	B Full	A Partial	A Full	A	A	A
Environmental Project Objectives												
1. Minimize adverse effects to federally listed species with the Endangered Species Act (Snail kite, Wood stork, Eastern indigo snake [pending Biological Assessment and effect from Corps])												
A. Impact to East Colony of Wood Stork												
Primary Zone	1	1	1	1	1	1	1	1	1	1	1	1
Secondary Zone	1	12	12	1	1	1	1	1	1	1	1	1
B. Impact to West Colony of Wood Stork												
Primary Zone	1	12	12	1	1	1	1	1	1	1	1	1
Secondary Zone	12	1	1	12	12	12	12	12	12	12	12	12
C. Impact to Snail Kite nesting locations	Pending the Corps' Biological Assessment											
D. Construction restrictions in the East Colony due to Wood stork nesting and fledging												
Primary Zone	1	1	1	1	1	1	1	1	1	1	1	1
Secondary Zone	1	1	1	1	1	1	1	1	1	1	1	1
E. Construction restrictions in the West Colony due to Wood stork nesting and fledging												
Primary Zone	1	1	1	1	1	1	1	1	1	1	1	1
Secondary Zone	1	1	1	1	1	1	1	1	1	1	1	1
F. Implement Standard Construction Precautions for Eastern indigo snake	Pending the Corps' Biological Assessment											
2. Meet the RPA for the CSSS as specified in the FWS BO of Feb. 1999												
A. Design flow passing under the eastern section of Tamiami Trail (between the S-334 and the L-67s) meets 60 percent of the regulatory portion of the rainfall formula derived total flows across the Tamiami Trail.	1	1	1	1	1	1	1	1	1	1	1	1
3. Ensure no adverse effects to state listed endangered or threatened species of special concern consistent with State Statutes												
A. Impact to Frog City Wading Bird Colony Buffer Zone	12	1	1	12	12	12	12	12	12	12	12	12
B. Distance from the Frog City Wading Bird Colony	12	1	1	12	12	12	12	12	12	12	12	12
4. Allow for restoration consistent with the 1989 ENP Protection and Expansion Act												
A. NESS Stage: Maintain the level and frequency of stage as modeled by the 8.5 SMA MOD-BRANCH model D13R 1995 simulation (D13R_C111_356_1995_95ops)	1	1	1	1	1	1	1	1	1	1	1	1
B. Water Deliveries to ENP: Maintain a discharge capacity equivalent to historical (1939-1963 bridge flows) 1/10 year event, or 4458 cfs. (equivalent to about a 1/200 year event according to SFWMM D13R derived return frequencies.)	1	1	1	1	1	1	1	1	1	1	1	1

Table 10.2.

	Alternatives											
	2	3		5				6		7	8	9
	A	A	B	A Partial	A Full	B Partial	B Full	A Partial	A Full	A	A	A
Environmental Project Objectives												
4. cont.. Allow for restoration consistent with the 1989 ENP Protection and Expansion Act												
C. Area with affected flow magnitude	5	5	5	12	12	12	12	8	8	2	6	1
D. Difference between average velocity at the road and average velocity in the marsh.	1	1	1	12	12	12	12	8	8	4	5	6
5. Enhance and restore ecological Function												
A. Wetland Function Units gain or loss	3	2	1	11	12	9	10	5	5	7	6	8
B. N/S connectivity Between WCA-3b and ENP for aquatic fish and wildlife	2	5	5	12	12	10	10	8	8	3	1	6
C. Exotic and nuisance vegetation removed	12	1	4	3	12	3	12	5	12	12	12	12
D. Reduction in wildlife Mortality	2	5	5	12	12	12	12	8	8	3	1	6
6. Minimize permanent loss of wetlands in ENP and WCA-3B												
A. Wetland permanently lost in ENP	1	12	12	12	12	12	12	6	6	2	4	3
B. Wetlands permanently lost in WCA-3B	12	2	1	12	12	12	12	12	12	12	12	12
Other Project Objectives												
1. Ensure no reduction in authorized flood control benefits												
A. Acres with altered flood protection	1	1	1	1	1	1	1	1	1	1	1	1
2. Maximize compatibility with future restoration actions												
A. Cubic yards of fill requiring removal to achieve completely unobstructed flow path (including removal of L-29 levee.)	5	2	1	8	12	8	11	10	8	5	5	10
B. Ability to accommodate additional flow capacity required by currently authorized CERP project features.	1	1	1	12	12	12	12	8	8	5	1	6
C. Ability to accommodate flow volume of 245,000 ac ft. as described in Sec. 601G of WRDA 2000	1	1	1	12	12	12	12	8	8	5	1	6

Table 10.2.

	Alternative											
	2	3		5				6		7	8	9
	A	A	B	A Partial	A Full	B Partial	B Full	A Partial	A Full	A	A	A
Other Project Objectives												
3. Maximize consistency with other Modified Water Deliveries components												
A. Ability to meet implementation schedule (satisfies RPA requirements)	12	12	12	12	12	1	1	12	12	12	12	12
B. Construction duration and implementation time (construction compleated by 2005)	12	12	12	1	1	1	1	12	12	12	12	12
4. Minimize impacts associated with construction												
A. Total duration of construction as measured in months	12	8	8	1	1	1	1	8	8	12	12	8
B. Allows for turbidity control	1	1	1	1	1	1	1	1	1	1	1	1
5. Minimize adverse socio-economic effects												
A. Noise impacts to the Miccosukee Tiger Tail Camp (noise abatement critiria exceeded)	12	1	1	12	12	12	12	12	12	12	12	12
B. Noise impacts to the Miccosukee Osceola Camp (noise abatement critiria exceeded)	1	1	1	1	1	1	1	1	1	1	1	1
C. Provide access to Miccosukee Tiger Tail Camp	1	1	1	1	1	1	1	1	1	1	1	1
D. Provide access to Miccosukee Osceola Camp	1	1	1	1	1	1	1	1	1	1	1	1
6. Minimize recreational effects												
A. Miles of available bank fishing												
North	1	1	1	1	1	1	1	1	1	1	1	1
South	12	6	6	1	1	1	1	8	8	10	12	9
B. Number of accessible boat ramps	1	1	1	1	1	1	1	1	1	1	1	1
C. Miles of available culvert outfall fishing	12	6	6	1	1	1	1	9	9	7	12	10
D. Sightseeing opportunities (1 poor- 5 excellent)	3	6	6	12	12	12	12	8	8	3	1	6
E. Maximum months of disruption due to construction	12	9	9	1	1	1	1	9	9	12	12	9
Summary												
Environmental Objectives	**28.63**	**18.00**	**18.00**	**43.38**	**42.38**	**45.88**	**44.88**	**35.38**	**37.13**	**30.63**	**31.63**	**33.13**
Rank	10	11	11	3	4	1	2	6	5	9	8	7
Other Objectives	**32.42**	**24.67**	**24.33**	**25.75**	**20.25**	**27.08**	**21.25**	**35.92**	**35.25**	**33.92**	**32.08**	**34.58**
Rank	5	9	10	8	12	7	11	1	2	4	6	3
Total Project Objectives	**61.04**	**42.67**	**42.33**	**69.13**	**62.63**	**72.96**	**66.13**	**71.29**	**72.38**	**64.54**	**63.71**	**67.71**
Rank	10	11	12	4	9	1	6	3	2	7	8	5
Cost	***24.4***	***68***	***73.5***	***135.9***	***140***	***142.1***	***140***	***72.2***	***74.7***	***23.3***	***44.2***	***48***

more than 50 per cent. Due to the assumption made by the Corps not to encroach on the existing areas occupied by either the L-29 canal or the L-29 levee, all of the treatment facilities were located in the unaltered wetlands of either ENP or WCA-3B. The loss of wetlands associated with each of the alternatives is presented in Figure 10.1.

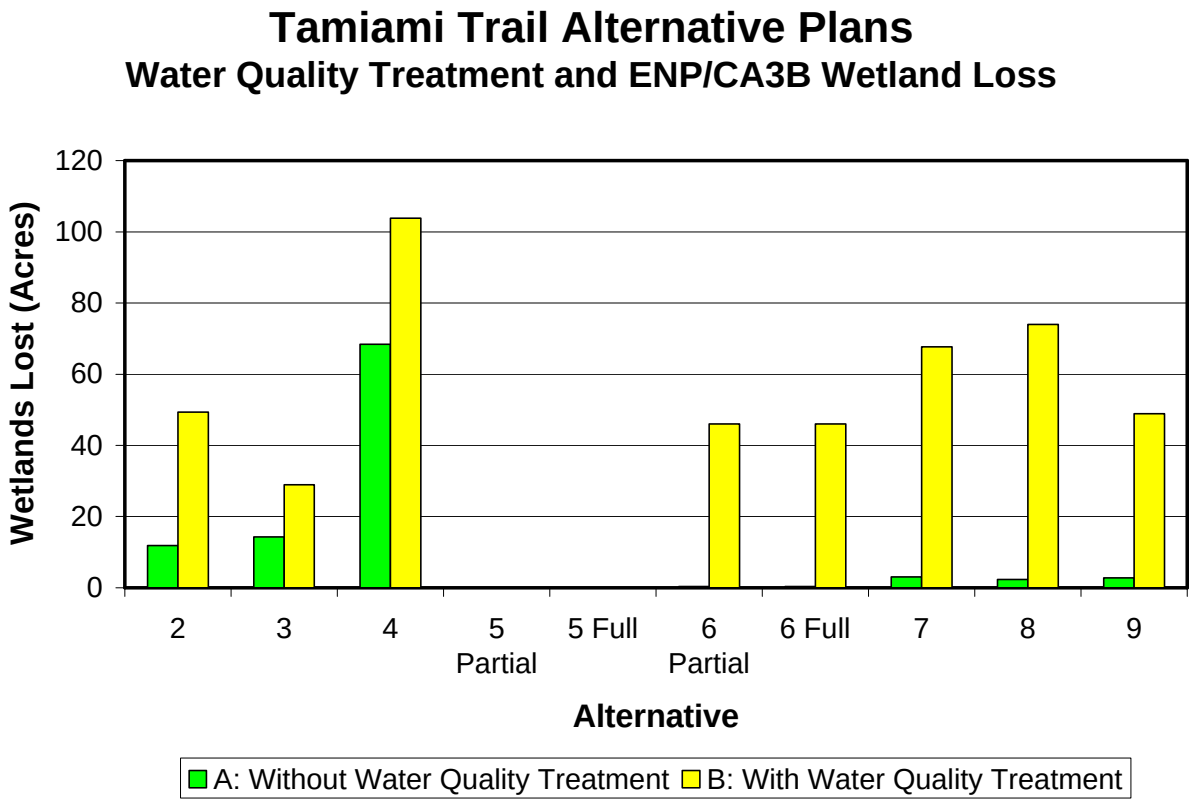

Figure 10.1. Acres of wetlands lost due to construction of the proposed Tamiami Trail Alternative Plan.

The range in acres lost due to alternative implementation varies from minimal, such as Alternatives 5 and 6, to more than 100 acres for Alternative 4B. These impacts, coupled with the uncertain position of FDEP regarding water quality treatment as a project requirement and the DOI concern that lands currently occupied by the L-29 canal/levee may be restored to wetlands during future CERP implementation, result in DOI concluding that it is premature to construct any alternative that causes a significant loss of wetlands. It should also be noted that each of the alternatives designed to provide water quality treatment also resulted in a substantial decrease in wetland function when compared to the alternative not designed to treat runoff from the road (see Figure 6.2). Therefore, the DOI eliminated Alternatives 2B, 4A, 4B, 6B Partial, 6B Full, 7B, 8B, and 9B from further consideration.

Screening of Alternatives Based on Environmental Objectives

To evaluate each of the remaining alternatives relative performance for the environmental objectives, the performance scores found in Table 10.2 were used. First, the mean of all performance measures scores for the each of the environmental objectives was calculated for each alternative. These mean scores for each objective were then summed across all environmental objectives to obtain an aggregate performance score for environmental performance. The mean performance score for each objective and the aggregate scores can also be found in Table 10.2. The composite score for environmental performance for all alternatives is graphically presented in Figure 10.2.

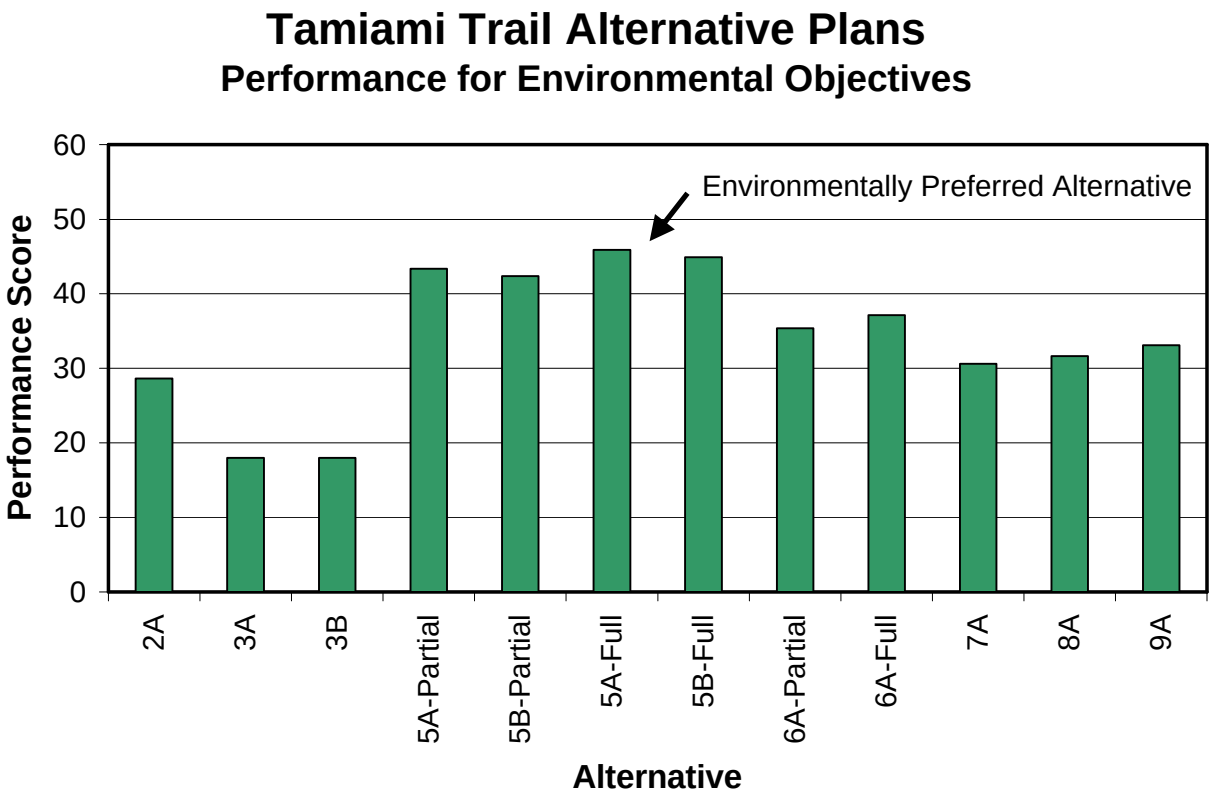

Figure 10.2. Performance for environmental objectives for Tamiami Trail alternative plans.

From the performance scores presented in Figure 10.2, Alternative 5 without water quality treatment and full removal of the existing Tamiami Trail (Alternative 5A Full or the 10.7-mile causeway) performed best for the environmental objectives examined. The composite performance score for this alternative is 46. Based on this level of performance, DOI concludes that Alternative 5A Full is the Environmentally Preferred Alternative. The alternative exhibiting the worst

performance with respect to the environmental objectives is 3B (new road north of the existing alignment with water quality treatment). The composite environmental performance score for this alternative is only 18. The remaining alternatives (Alternatives 2A through 6A Full) all performed similarly for the environmental objectives.

Screening of Alternatives Based on Fiscal Constraints

Each of the alternatives retained in the previous step of the evaluation process were next assessed for relative performance for the environmental objectives in the context of the fiscal constraints imposed by the NPS. All of the retained alternatives were arranged hierarchically according to performance and plotted against the construction cost associated with each alternative. Results are presented in Figure 10.3.

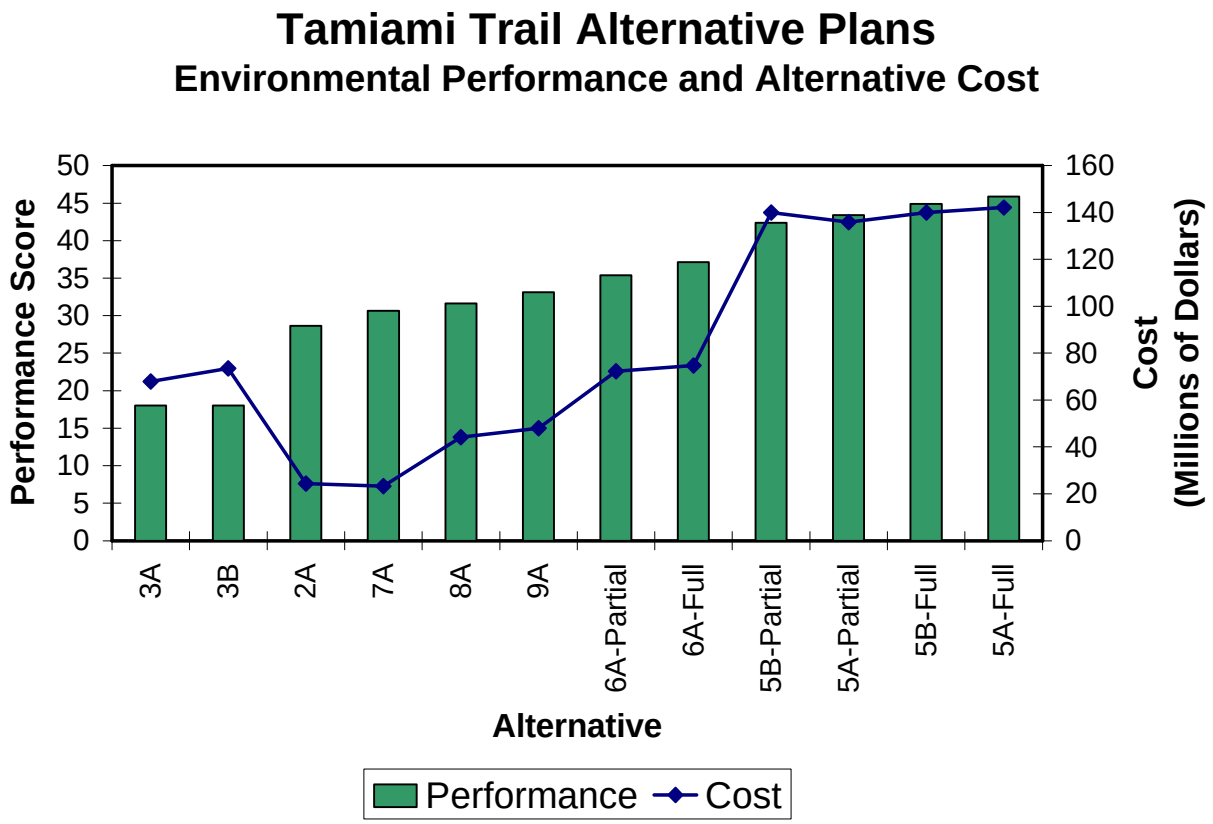

Figure 10.3. Performance for environmental objectives for Tamiami Trail alternative plans arranged hierarchically and the associated construction costs for each alternative.

These results indicate that, with the exception of Alternative 3A, alternatives exhibiting the best performance in meeting the environmental objectives also had the highest construction costs. As an example, the alternative exhibiting the best performance for the environmental objectives, Alternative 5A Full (Environmentally Preferred Alternative) has a construction cost of $146.6

million. This level of funding exceeds the current amount available ($20.2 million) from the NPS by more than seven times. While all of these alternatives exceed the current funding level of the NPS, many of the alternatives exceed this amount by more than three-fold. It is the opinion of the DOI that alternatives significantly exceeding the current level of funding, are beyond the capability of the NPS and should be eliminated from further consideration. Based on this decision, the DOI was compelled to screen from further consideration Alternatives 3A, 3B, 5A Full, 5A Partial, 6A Full, and 6A.

Should additional funding be made available from other sources, DOI would amend this position to include alternatives that clearly exhibited superior performance for the environmental objectives. However, in the absence of additional sources of funding only Alternatives 2A, 7A, 8A, and 9A were retained by DOI for further consideration.

Evaluation of Alternatives Based on All Project Objectives and Fiscal Constraints

The alternatives remaining from the fiscal constraint screening were next evaluated for performance for all of the project objectives, environmental and other. The mean scores and the aggregate scores for the Other Project Objectives were calculated in an identical manner as the environmental objectives discussed earlier. Results of these calculations are also presented in Table 10.2 and arranged hierarchically in Figure 10.4.

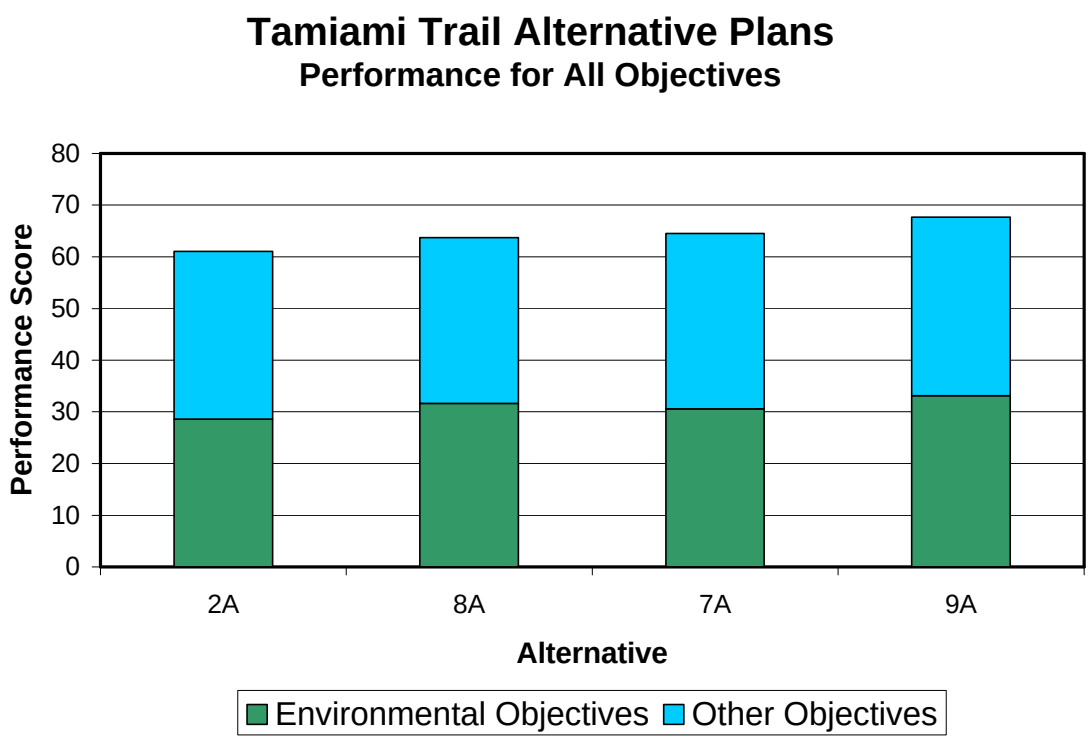

Figure 10.4. Performance for environmental and other project objectives for Tamiami Trail alternative plans retained after initial performance assessments and constraint screening.

According to the relative performance of each of the four alternatives. Based on the relative performance of the remaining alternatives for all project objectives, Figure 10.4 illustrates that the four remaining alternatives provided a very similar level of performance. Performance scores for these alternatives ranged from 61 for Alternative 2A (4 new bridges with raised road profile) to just 68 for Alternative 9A (2.7-Mile elevated bridge with raised profile).

Since each of the remaining four alternatives exhibited a similar level of total performance for the project objectives, the DOI again considered the construction costs for these alternatives in order to select the DOI Recommended Plan. The comparison of performance and construction costs is presented in Figure 10.5.

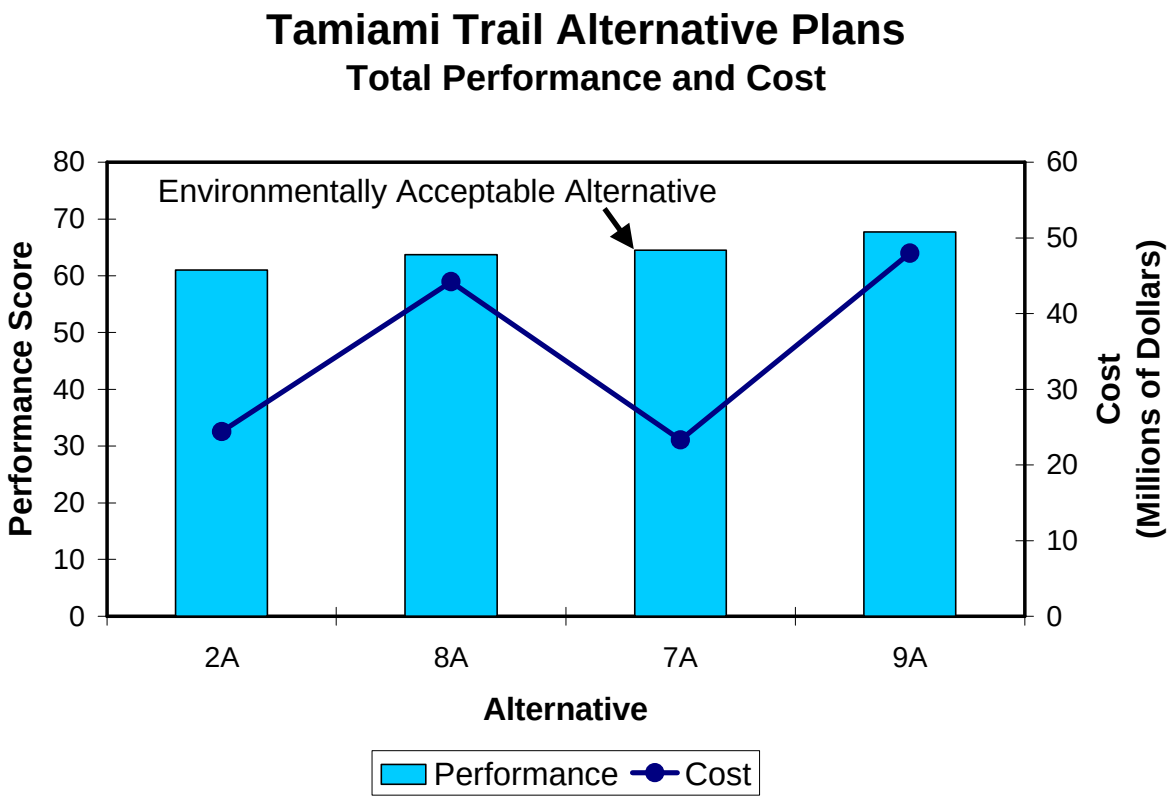

Figure 10.5. Performance for environmental and other project objectives for Tamiami Trail alternative plans retained and the associated construction costs for each alternative.

The comparison of cost and total performance indicates that Alternative 7A provides the second highest level of total performance for the least cost. While Alternative 9A may provide the highest level of performance for the remaining alternatives, the cost for construction of Alternative 9A is $48 million. This cost for Alternative 9A is more than twice the cost of Alternative 7A but had a performance score similar to Alternative 7A. For this reason, DOI selects Alternative 7A as the Recommended Plan. This decision is identical to the Recommended Plan identified by the Corps in the Draft GRR/SEIS.

Summaries of Alternative Performance

The results of the analysis of the Tamiami Trail alternatives are provided below in a bullet format to highlight the important performance characteristics of each alternative. DOI has also provided the Draft FWCA Report designation for each of the alternatives.

Alternative 1 - Existing Alignment and Profile with Four Bridges

Failed to Meet FDOT Highway Safety Criteria

- Results in a loss of 2.92 wetland Functional Units (FUs)
- North-south connectivity is 2 percent of the 10.7-mile project length
- Wood storks would not be effected by construction activities;
- Full bank fishing will remain accessible, but will be closed on the south side during the 18-24 month construction window; all boat ramps will remain; sightseeing opportunities are considered poor
- Only 0.33 acres of exotic vegetation would be removed
- Wildlife mortality remains a concern with a reduction of only 40 individuals, or a 2.5 percent reduction
- Likely to structurally fail under predicted high stage conditions
- Increases flow velocity in 623.4 acres
- Increases average velocity at the road by 0.037 ft/s over marsh velocity
- Construction cost is $13.5 million

Alternative 2 - Existing Alignment with Raised Profile and Four Bridges

Acceptable Performance for Environmental and Other Project Objectives
Poor Relative Performance for Fiscal Constraints

- Results in a loss of 11.1 wetland FUs without water quality and 61.75 FUs with water quality
- North-south connectivity is 2 percent of the 10.7-mile project length
- Wood storks would be effected during highway construction and the wood stork restrictions would apply
- Recreation effects are similar to Alternative 1, with sightseeing opportunities considered limited
- 12.96 acres of exotic vegetation would be removed
- Wildlife mortality remains a concern with a reduction of only 40 individuals, or a 2.5 percent reduction
- Increases flow velocity in 623.4 acres
- Increases average velocity at the road by 0.037 ft/s over marsh velocity
- Construction cost for Alternative 2A is $24.4 million
- Construction cost for Alternative 2B is $58.6 million

Alternative 3 - North Roadway Alignment in WCA-3B

Poor Performance for Environmental Objectives
Poor Relative Performance for Fiscal Constraints

- Results in a loss of 18.82 wetland FUs without water quality and 30.15 FUs with water quality
- North-south connectivity is 10 percent of the 10.7-mile project length
- Wood storks would be effected during highway construction and the wood stork restrictions would apply
- The Frog City wading bird rookery would be directly effected, resulting in abandonment
- Recreation effects include permanent reduced parking at one boat ramp, one boat ramp inaccessible during the 30 month construction window, south bank fishing limited to 3.5 miles and sightseeing opportunities in WCA-3B considered good
- 0.17 acres of exotic vegetation would be removed without water quality and 6.48 acres with water quality
- Wildlife mortality remains a concern with a reduction of 158 individuals, or a 10 percent reduction
- Increases flow velocity in 623.4 acres
- Increases average velocity at the road by 0.037 ft/s over marsh velocity
- Construction cost for Alternative 3A is $68 million
- Construction cost for Alternative 3B is 73.5 million

Alternative 4 - South Roadway Alignment in ENP

Failed to Meet Wetland Loss Requirements

- Results in a loss of 40.43 wetland FUs without water quality and 64.64 FUs with water quality
- North-south connectivity is 2.5 percent of the 10.7-mile project length
- Wood storks would be effected during highway construction and the wood stork restrictions would apply
- All three boat ramps accessible, south bank fishing is inaccessible during the 18-24 month construction window, south bank fishing limited to 3.5 miles and sightseeing opportunities considered limited
- 12.96 acres of exotic vegetation would be removed both with and without water quality
- Wildlife mortality remains a concern with a reduction of 40 individuals, or a 2.5 percent reduction
- Increases flow velocity in 623.4 acres
- Increases average velocity at the road by 0.037 ft/s over marsh velocity
- Construction cost for Alternative 4A is $45.2 million
- Construction cost for alternative 4B is $47.1 million

Alternative 5 – Elevated 10.7-Mile Roadway

Environmentally Preferred Alternative Without Regard to Fiscal Constraints

- Results in a gain of 45.27 wetland FUs without water quality and 33.93 FUs with water quality
- North-south connectivity is 100 percent of the 10.7-mile project length
- Wood storks would be affected during highway construction and the wood stork restrictions would apply
- All three boat ramps accessible, south bank fishing is inaccessible during the 48-month construction window, south bank fishing limited to 1.5 miles and sightseeing opportunities considered excellent
- 12.96 acres of exotic vegetation would be removed for full road removal both with and without water quality, and 0.33 acres removed for partial road removal both with and without water quality
- Wildlife mortality is nearly eliminated with a reduction of 1,584 individuals, or a 100 percent reduction
- Increases flow velocity in 165.7 acres
- No increase in average velocity at the road over marsh velocity
- Construction cost for Alternative 5A Partial is $135.9 million, 5B Partial is $140.3 million
- Construction cost for Alternative 5A Full is $142.4 million, 5B Full is $146.8 million

Alternative 6 - Four-Mile Bridge

Performs Well for Environmental Objectives Without Regard to Fiscal Concerns

- Results in a loss of 1.9 wetland FUs without water quality and 33.36 FUs with water quality
- North-south connectivity is 37 percent of the 10.7-mile project length
- Wood storks would be effected during highway construction and the wood stork restrictions would apply
- All three boat ramps accessible, south bank fishing is inaccessible during the 24-30-month construction window, south bank fishing limited to 7 miles and sightseeing opportunities considered very good
- 0.96 acres of exotic vegetation would be removed for full road removal both with and without water quality, and 8.12 acres removed for partial road removal both with and without water quality
- Wildlife mortality is significantly improved with a reduction of 570 individuals, or a 36 percent reduction
- Increases flow velocity in 437.5 acres
- Increases average velocity at the road by 0.008 ft/s over marsh velocity
- Construction cost for Alternative 6A Partial is $72.2 million, 6B Partial is $80.1 million
- Construction cost for Alternative 6A Full is $74.7 million, 6B Full is $82.6 million

Alternative 7 - 3000-Foot Bridge

DOI Recommended Plan-Environmentally Acceptable Alternative
Performs Well for Environmental and other Project Objectives
Best Relative Performance for Fiscal Constraints

- Results in a loss of only 3.42 wetland FUs
- North-south connectivity is 5.4 percent of the 10.7-mile project length;
- Wood storks would be effected during highway construction and the wood stork restrictions would apply;
- All three boat ramps accessible, south bank fishing is inaccessible during the 24 month construction window, south bank fishing limited to 10.1 miles and sightseeing opportunities considered limited;
- 12.96 acres of exotic vegetation would be removed both with and without water quality;
- Wildlife mortality remains a concern with a reduction of 84 individuals, or a 5.3 percent reduction;
- Increases flow velocity in 1649.3 acres;
- Increases average velocity at the road by 0.027 ft/s over marsh velocity;
- Construction cost for Alternative 7A is $23.3 million
- Construction cost for Alternative 7B is $50.5 million

Alternative 8 - Box culverts

Acceptable Performance for Environmental and Other Project Objectives
Poor Relative Performance for Cost Constraints

- Results in a loss of 3.51 wetland FUs without water quality and 46.56 FUs with water quality
- North-south connectivity is 0.4 percent of the 10.7-mile project length
- Wood storks would be effected during highway construction and the wood stork restrictions would apply
- All three boat ramps accessible, south bank fishing is inaccessible during the 18-24 month construction window; south bank fishing remains 10.7 miles and sightseeing opportunities considered poor
- 12.96 acres of exotic vegetation would be removed both with and without water quality
- Wildlife mortality remains a concern with a reduction of 7 individuals, or a 0.4 percent reduction
- Increases flow velocity in an estimated 485.8 acres
- Increases average velocity at the road by an estimated 0.021 ft/s over marsh velocity
- Construction cost for Alternative 8A is $44.3 million
- Construction cost for Alternative 8B is 96.4 million

Alternative 9 - 2.7-Mile Bridge

Acceptable Performance for Environmental and Other Project Objectives
Poor Relative Performance for Cost Constraints

- Results in a loss of 1.91 wetland FUs without water quality and 33.35 FUs with water quality
- North-south connectivity is 25.7 percent of the 10.7-mile project length;
- Wood storks would be effected during highway construction and the wood stork restrictions would apply
- All three boat ramps accessible, south bank fishing is inaccessible during the 24-30 month construction window; south bank fishing limited to 8.0 miles and sightseeing opportunities considered good
- 12.96 acres of exotic vegetation would be removed both with and without water quality
- Wildlife mortality is improved with a reduction of 400 individuals, or a 25.2 percent reduction
- Increases flow velocity in 2567.7 acres
- Increases average velocity at the road by 0.013 ft/s over marsh velocity
- Construction cost for Alternative 9A is $48.0 million
- Construction cost for Alternative 9B is $69.7 million

CHAPTER 11- DEPARTMENT OF THE INTERIOR'S VIEWS AND RECOMMENDATIONS FOR THE TAMIAMI TRAIL COMPONENT OF THE MODIFIED WATERS DELIVERIES TO EVERGLADES NATIONAL PARK

The overall goal of the Tamiami Trail component of the Modified Water Deliveries (MWD) Project is to construct the needed modifications to the existing roadway to allow for the restoration of more natural conditions in a manner consistent with the 1989 Everglades National Park Protection and Expansion Act. According to the Act, the purpose of the project is to construct modifications to the Central and Southern Florida (C&SF) Project "to improve delivery of water to Everglades National Park (ENP) and, to the extent practicable, restore the natural hydrological conditions within the park." This Draft Fish and Wildlife Coordination Act (FWCA) Report, when finalized, will represent the Secretary of the Interior's views and recommendations to Congress in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (PL 85-624). Project constraints included highway safety, wetland losses associated with proposed water quality treatment facilities, and funding limits imposed by the National Park Service (NPS).

Nine alternatives were evaluated using 36 performance measures associated with 12 project objectives. The twelve project objectives were classified by the Department of the Interior (DOI) into two general categories: Environmental Objectives and Other Project Objectives. Environmental Objectives are project objectives that the DOI considers as providing significant environmental enhancement or ecosystem restoration consistent with the project authorizing legislation or other federal/state statutory requirements. Other Project Objectives are project objectives that the DOI considers as maximizing the overall benefits of the project, but do not contribute to significant environmental enhancement or ecosystem restoration.

Data from the analysis of these performance measures represents a broad array of information provided through numerous sources, and represents the best available information at the time of this draft report. Each of the alternatives was evaluated initially for performance in meeting the environmental objectives of the project for the explicit purpose of identifying the environmentally preferred alternative. Subsequent evaluations utilized a broader set of project objectives and constraints in order to identify an alternative that would be environmentally acceptable in meeting the overall goal of the project but also within limits imposed by the project constraints.

I. DOI Draft Position on Alternatives

A. Environmentally Preferred Alternative Without Regard to Fiscal Constraints: Alternative 5A with Full Removal of the Existing Highway

The DOI concludes that Alternative 5 (10.7-mile elevated highway) exhibits superior performance in meeting the stated environmental objectives when compared to the other proposed alternatives. The DOI preliminary position is that Alternative 5A Full is the environmentally pre-

ferred alternative as evidenced by the following:

1. Alternative 5A Full provides the highest degree of unrestricted flow across the entire 10.7-mile project corridor between Water Conservation Area (WCA) 3B and ENP.
2. Alternative 5A Full provides for the maximum wetland functional gain. All other alternatives result in a loss of wetland function compared to this alternative.
3. Alternative 5A Full provides for a net gain in wetlands acres due to implementation.
4. Alternative 5A Full establishes full and permanent connectivity between the Central and Southern Everglades, providing benefits for the restoration of marsh flow regimes, enabling full wildlife movement, providing the greatest potential to restore the ridge and slough landscape, and providing the highest potential for eliminating wildlife mortality.
5. Alternative 5A Full does not require any retrofitting of project features and therefore has the highest potential for compatibility with future Comprehensive Everglades Restoration Plan (CERP) features.
6. Alternative 5A Full maintains sufficient recreational opportunities, and provides for significant scenic views and appreciation of America's Everglades for the benefit of the public.
7. While the DOI maintains that Alternative 5A Full provides the best performance in meeting the Environmental Objectives of the project, the DOI also recognizes that fiscal constraints prevent the NPS from providing full financial support for implementation. However, the DOI also maintains that should additional funding be made available to the project, implementation of Alternative 5A Full should be reconsidered.

B. Environmentally Acceptable Alternative: Corps Recommended Plan: Alternative 7A

The U.s Army Corps of Engineeres (Corps) has identified Alternative 7A (3000-foot bridge without water quality treatment) as the recommended plan. It is the position of the DOI that Alternative 7A is environmentally acceptable, performing sufficiently well for all project objectives and within the limits imposed by the project constraints as evidenced by the following:

1. Alternative 7A meets the Florida Department of Transportation (FDOT) concern for road safety by providing necessary mitigation to offset the adverse impacts to road safety associated with the projected high water following implementation of the MWD Project
2. Alternative 7A results in only 46 acres of wetlands lost due to implementation. This wetland loss is less than other alternatives providing similar levels of overall performance for the project objectives.
3. Alternative 7A provides the acceptable performance for all project objectives for the funds expended. The estimated construction costs are also within the capability of the limited funding available from the NPS.
4. While the DOI has concerns with the distortions in both the direction and velocity of

flow patterns that extend over approximately 1650 acres in Northeast Shark Slough (NESS) due to Alternative 7A, DOI anticipates that these distortions can be remedied through future CERP related modifications.

5. While the DOI has concerns that the current configuration of Alternative 7A provides only 5.4 percent of the potential connectivity between WCA-3B and NESS, DOI anticipates that additional connectivity can be provided through future CERP related modifications.
6. While the DOI has concerns that the current configuration of Alternative 7A specifies the need to raise the profile of more than 10 miles of existing highway that is potentially incompatible with future CERP related modifications, the DOI anticipates that the Corps will enter into an agreement with FDOT to prevent expending approximately $16.4 million for these potentially unneeded project features.

C. Other Alternatives

Alternative 1

The DOI concludes that Alternative 1 fails to meet the minimum requirements needed to provide a safe highway. DOI recommends that Alternative 1 be removed from further consideration based on the following:

1. Alternative 1 fails to provide mitigation for potential damages to the road sub-grade due to the projected high water levels following implementation of the MWD Project.
2. Alternative 1 fails to provide mitigation for potential hazards to transportation resulting from overtopping of the road surface due to the projected high water levels following implementation of the MWD Project.

Alternatives 3A and 3B

The DOI concludes that Alternatives 3A and 3B perform poorly for the environmental objectives and fiscal constraints. DOI recommends that these alternatives be removed from further consideration based on the following:

1. Alternatives 3A and 3B had poor relative aggregate scores for the environmental project objectives. Alternatives 3A and 3B had the lowest performance scores for the environmental objectives when compared to the other alternatives examined.
2. Alternatives 3A and 3B had higher construction costs when compared to other alternatives which provide a higher level of performance for the environmental objectives.

Alternatives 2B, 4A, 4B, 6B Partial, 6B Full, 7B, 8B, and 9B

The DOI concludes that Alternatives 2B, 4A, 4B, 6B Partial, 6B Full, 7B, 8B, and 9B have an

unacceptable level of wetland loss associated with their construction. Therefore, the DOI recommends that these alternatives be removed from further consideration based on the following:

1. Alternative 4A specifies construction of a new road south of the existing road alignment in ENP. This alternative would result in the destruction of approximately 68 acres of pristine wetlands within ENP.
2. Alternatives 2B, 4B, 6B Partial, 6B Full, 7B, 8B, and 9B all specify the construction of potentially unneeded water quality treatment facilities in ENP. These alternatives would result in the destruction of between 46 and 104 acres of pristine wetlands within ENP. DOI maintains that the need for water quality treatment is, at present, uncertain and that therefore the level of impact associated with the construction of the treatment facilities is unacceptable. Should the water quality treatment facilities be recommended or required by the Florida Department of Environmental Protection (FDEP), DOI recommends that these facilities be constructed in conjunction with the CERP related Tamiami Trail modifications when the areas now occupied by the L-29 canal and L-29 levee could be made available for the construction of these facilities.

Alternatives 5A Partial, 5B Partial, 6A Full, and 6A Partial

The DOI concludes that each of these alternatives performs well for the environmental objectives of the project. However, the DOI also recognizes that fiscal constraints prevent the NPS from providing support for their implementation. However, the DOI also maintains that should additional funding be made available to the project, implementation of these alternatives should be reconsidered.

Alternatives 2A, 8A, and 9A

The DOI concludes that Alternatives 2A, 8A, and 9A all perform similarly well for the environmental and other objectives of the project. Also these alternatives exhibited a similar level of performance when compared to the Recommended Plan, Alternative 7A. However, the construction costs for Alternatives 2A, 8A, and 9A all exceed the costs for construction of Alternative 7A and the funding constraints of NPS. Therefore, the DOI recommends these alternatives be removed from further consideration due to the overall improved performance of Alternative 7A with regard to the project's fiscal constraints.

II. DOI Draft Recommendations for Implementation of the Recommended Plan, Alternative 7A

A. MWD and CERP Modifications to Tamiami Trail

The DOI understands that only limited improvements can be made to Tamiami Trail under the current funding levels of the MWD Project. This fact is clearly evident when one considers that the NPS has only programmed $20.2 million for the Tamiami Trail component of the Project and the costs for the DOI's environmentally preferred alternative (Alternative 5A Full) exceed

$147 million.

The DOI also understands that the WRDA 2000 WCA-3 Decompartmentalization Project (Phase 1) also provides a separate authority for modifications to Tamiami Trail. The primary purpose of this CERP project is to remove many of the barriers to natural flow in WCA-3A and 3B, including L-67 A&C, L-29 as well as Tamiami Trail. Through careful planning, the combined effect of the authority of the MWD Project and WRDA 2000 will allow for a unique opportunity to implement a level of restoration for the Central and Southern Everglades currently impacted by Tamiami Trail that is not available under each authority when used independently.

In recognition of these facts, the DOI envisions that the modifications to Tamiami Trail will occur in two phases. The first phase of modifications will occur using the funding from the NPS to construct the Alternative 7A features, assuming the Recommended Plan is retained in the Final SEIS/GRR and Record of Decision. The second phase of Tamiami Trail modifications will occur using the separate authority of the WRDA 2000. While the DOI recognizes that these features will be identified through a separate public forum consistent with NEPA, the DOI also encourages the Corps and the South Florida Water Management District to consider the information compiled as part of the MWD alternatives analysis.

Based on this phased approach, the DOI recommends that the Corps and the DOI jointly recognize the following guiding principles for implementation of the project features associated with the unique authority for each project:

1. only limited funding is provided by the MWD Project for modifications to the Tamiami Trail;
2. full restoration of natural flows to NESS and ENP may only be accomplished through the implementation of MWD Project features coupled with the restoration of CERP, once the seepage control features for the projected high water levels in NESS are fully mitigated;
3. additional funding and restoration capability is authorized by CERP Decompartmentalization (Phase 1) for Tamiami Trail and future modifications may occur to Tamiami Trail using this authority that may augment the MWD Project features by increasing the ecological connectivity between the WCAs and ENP, thereby restoring a more natural sheetflow regime;
4. final CERP features for Tamiami Trail have not yet been identified and any proposed modifications will be analyzed in a public forum consistent with NEPA;
5. without prejudging the results of the Project Implementation Report (PIR) required by WRDA 2000, the intent of the MWD Tamiami Trail GRR/SEIS and the recommendations contained in this Draft FWCA Report is to maximize the compatibility and avoid retrofitting of the MWD Project features with future CERP features;
6. the intent of the MWD Tamiami Trail GRR/SEIS and the recommendations contained in this Draft FWCA Report is to provide a design for MWD onto which a CERP design can follow;
7. the need to accelerate the identification and implementation of the CERP project modifications for Tamiami Trail to better coordinate the planning and eventual con-

struction of the features associated with the unique authorities of MWD and CERP.

B. Location of the 3000-foot Bridge

The DOI recommends that the 3000-foot bridge be located along the Tamiami Trail corridor based on the following siting criteria, in priority order: 1) facilitate hydraulic passage of flows; 2) avoid or minimize adverse effects on state and federally listed species; 3) enhance ecological connectivity; 4) minimize wildlife mortality; 5) maintain CERP compatibility.

Based on these criteria, the DOI examined two locations along Tamiami Trail that were discussed in detail during the planning process. The first option (Blue Shanty Canal Site) specifies the bridge beginning at the Blue Shanty Canal (Everglades Safari) and extending 3000 feet eastward. The second option (Airboat Association Site) specifies the bridge beginning at the Airboat Association and extending 3000 feet westward. The two sites are approximately 1.2 miles apart.

Blue Shanty Canal Site

Wildlife Connectivity/Mortality: From a landscape perspective, the remnant Blue Shanty Canal is the dominant interior north/south feature adjacent to the eastern 11 miles of Tamiami Trail. Field examination of the canal during the WRAP assessment revealed a shallow (*i.e.* one to three feet below ground) approximate 30-feet wide degraded canal with vegetated spoil mounds containing natural vegetation (primarily pond apple) scattered along its length. There are also natural tree islands extending north and south from the canal in WCA-3A and ENP, respectively. This man-made landscape feature, coupled with natural tree islands, effectively forms a "string of tree islands" extending over four miles north and south of Tamiami Trail. For this reason, the FWS and FFWC have concluded this feature serves as a wildlife movement corridor. Along this corridor both upland and aquatic features are available for the passage of aquatic and terrestrial species (*i.e*., aquatic snakes, amphibians, otter, raccoons, bobcats, etc.). This conclusion is supported by the wildlife mortality study performed for this project (seven mammal mortalities when compared to other interior sites) and recorded mortalities of the state listed Everglades mink provided by ENP (four individuals) (ENP 1980).

Conveyance of Flows: From a flow conveyance perspective, the Blue Shanty site is located more directly downstream from the degradation of the southern four miles of the L-67A and C canal/ levee proposed in CERP Decompartmentalization (Phase 2). Also, water captured in the Blue Shanty Canal may augment flows across this 3000-foot bridge reach after CERP implementation (removal of the L-29 canal/levee and reconnecting WCA 3A and 3B), particularly during drought events. There are also no highway culverts located in this 3000-foot reach; thus, there has been little or no sedimentation build up at culvert discharge sites, which could impede southward flows. According to local airboat operators, the area is also generally lower in elevation and retains water longer during dry-down events.

Neither bridge site is located in alignment with the S-355 weirs (they fall to the west of S-

355A); however, the S-355 A-D structures are proposed for removal in CERP as part of the degradation of the L-29 levee. During the planning process, the center of the reach between the Airboat Association and the Blue Shanty Canal was selected as the site for a 400-ft bridge in one alternative examined.

Vegetation on the south side of this site is predominately sawgrass, whereas the north side is vegetated by a mixture of sawgrass, shrublands, and cattail. There also appears to be a small road leading to a fill pad on the south side of this 3000-ft reach.

Airboat Association Site

Wildlife Connectivity/Mortality: The Airboat Association site has no north/south connecting canal and tree island feature associated with it. Compared to the Blue Shanty Canal site, this site does not provide as much potential for enhancement of wildlife movement/connectivity. Likewise, it provides less potential to reduce wildlife mortality. Vegetation on the north side is dominated by sawgrass, while the south side is a mixture of shrublands, marshes and cattail. Two significant stands of pond apple forest are located at the discharge end of two banks of culverts located in this 3000-foot reach. There are also a series of airboat trails leading south from the Airboat Association into ENP. Other than for the lack of a north/south canal, the Airboat Association and Blue Shanty sites are in proximity to each other (within one mile) and would affect similar vegetative features.

The major distinction in land use between the two sites is that continued commercial operations at the Airboat Association is "grandfathered" under the 1989 Everglades National Park Expansion and Expansion Act, while operations at Everglades Safari are not. Thus, the Airboat Association is expected to continue to operate into the foreseeable future, while continued operation at the Everglades Safari is less certain. However, based on an anticipated expedited completion date for construction of the Spring of 2003, this land use distinction becomes less significant since both the Everglades Safari and Airboat Association will require access for continued operation.

Conveyance of Flows: The Airboat Association site spans two banks of three culverts. As such, the six culverts would be removed as part of highway removal in this 3000-foot reach, and the benefit these culverts provide in distributing flows in a more sheetflow manner would be lost. Also, a review of the WRAP vegetation map reveals that approximately 35 percent of this 3000-foot reach is vegetated with pond apple forest. This indicates that about 35 percent of this reach has experienced sedimentation build up along the south side of the highway. This situation, coupled with the presence of pond apple forest vegetation, may impede southward flows or otherwise interfere with flow distribution.

Listed Species: Neither site would affect federally listed species; however, placement of the bridge at the Blue Shanty Canal site is expected to enhance the safe passage of and reduce mortality of the state threatened Everglades mink.

Comparison of the Two Sites

From a trade-off analysis, each location has advantages and disadvantages. Table 12.1 compares the two alternative sites based on the criteria cited above. The two sites are ranked qualitatively, from 5 (best) to 1 (worst).

Table 12.1 Comparison of the two alternative site locations.

Siting Criteria	Alternative Sites	
	Blue Shanty	**Airboat Association**
Passage of Flows	5	3
Avoid/Minimize Listed Species	4	3
Enhance Ecological Connectivity	5	3
Minimize Wildlife Mortality	5	3
Maintain CERP Compatibility	3	5
Total Score	**22**	**17**

This qualitative comparative analysis indicates that the Blue Shanty Canal site more fully meets the Siting Criteria (average of 88 percent of full performance with criteria) when compared to the Airboat Association site (average of 68 percent of full performance of criteria). The Blue Shanty site was found to better meet passage of flows, ecological connectivity, mortality reduction, and listed species conservation. The Airboat Association site was found to be more compatible with CERP implementation, since this site will remain in operation into the foreseeable future.

DOI Recommendations Regarding Site Selection

Based on the above analysis the DOI recommends the following:

1. Design the Recommended Plan to begin at the Blue Shanty Canal site and extend eastward for a distance of 3000 ft.
2. Conduct an interagency on-site inspection of the area prior to final site selection.
3. Construct an approximately 20-ft wide elevated cement apron be included in the bridge design and be located on the western bridge abutment in proximity to the Blue Shanty Canal in order to facilitate safe passage of terrestrial species under the bridge.

The apron should be designed to remain above water, except under extreme high water events.

4. Develop a long-term wildlife mortality study to be implemented jointly by the DOI, Corps, FWC, SFWMD and other interested parties to examine the long-term effects of wildlife mortality on the Tamiami Trail and to assess the usage of wildlife along the 3000-foot bridge.

C. Avoidance of Unnecessary Costs and Additional Infrastructure

The current design of the Recommended Plan (Alternative 7A) includes provisions to mitigate FDOT concerns regarding potential damage to the road sub-grade and overtopping the existing road surface due to the projected high water associated with the implementation of the MWD Project. The mitigation is in the form of raising the portion of the existing highway not elevated by the construction of the 3000-foot bridge. Specifically, Alternative 7A would raise approximately 10 miles of the existing road by approximately 2 feet through the addition of fill material and asphalt resurfacing. Depending on the plan recommended in the CERP Decompatmentalization (Phase 1) Project, the potential exists for portions of Tamiami Trail raised by the MWD Project to be removed as part of CERP recommended plan. This would result in as much as $16.4 million in MWD Project funding being expended on unneeded features.

To avoid the construction of potentially unneeded features while still meeting the mitigation requirements to assure highway safety, the DOI recommends the Corps enter into an agreement with the FDOT that will ensure the safety requirements of FDOT are met until the CERP project features can be identified and implemented. The DOI also recommends that the Corps closely coordinate the development of this agreement with ENP, FWS, and the Office of the Solicitor for the DOI.

III. Additional DOI Recommendations

A. Threatened and Endangered Species

1 The FWS recommends that the Construction Restrictions for wood storks and migratory birds outlined in Chapter 4 of this report be integrated into the detailed design and specifications and construction documents during implementation of this project. These Construction Restrictions are designed to avoid adverse effects to state and federally listed species and other species of migratory waterbirds.

2 The FWS, FFWC, NPS and Corps jointly develop and implement a Wood Stork Monitoring Plan to assess wood stork behavior (roosting, nest building, breeding, nesting and fledging of young) during and after project implementation.

3 As previously recommended in the Planning Aid Letter, dated March 1, 2001, the FWS recommends the Corps, Jacksonville District, prepare a Biological Assessment and effect determination consistent with the provisions of the Endangered Species Act for the listed species identified in Chapter 4 of this report. (line up margin)

B. Water Quality

1. The DOI recommends that a thorough review of the available water quality data provided by the Corps be conducted by FDEP for implementation of modifications to Tamiami Trail to ensure compliance with applicable water quality standards.
2. Should FDEP require water quality features for the MWD Project, the DOI recommends deferring construction of these features until the fate of the L-29 canal and L-29 levee have been determined. The DOI understands that these C&SF project features may be removed through implementation of future CERP projects, thereby providing an already disturbed area for construction of the water quality treatment facilities and eliminate the need to destroy wetlands within ENP.

C. Mitigation for Wetland Functional losses

1 The DOI recommends that any wetland functional losses attributable to the Tamiami Trail project be fully mitigated consistent with the FWS Mitigation Policy, Executive Order 11990, and Corps regulations and policies. Any required mitigation should be in-kind (habitat type for habitat type) and located in proximity to the loss.

2 In this regard, Chapter 3 of this report provides specific, detailed wetland functional assessments of eight potential wetland restoration sites in ENP that may be suitable sites for mitigation. Specifically, the Frog City site, encompassing 6.8 acres of filled wetlands, is owned by NPS and, if restored, would provide enough wetland functional lift to offset the losses associated with Alternative 6 (without water quality treatment). All or a portion of this site should be considered for mitigation.

3 The DOI finds that Alternative 5 (Full Causeway) does not require wetland compensatory mitigation, since no wetland functional losses are associated with this alternative.

D. Recreation

1 The DOI recommends that if any of the three boat ramps in the project area (see Chapter 5) are impacted by project implementation, the Corps should consult with the FFWC and SFWMD to establish a replacement boat ramp at the discretion of FFWC. This recommendation is consistent with the current agreement between the FFWC and SFWMD.

E. Wildlife Mortality/Connectivity Features

1 The DOI recommends that those wildlife features (bridge across the L-29 canal and wildlife underpass) located to the east of the S-334 structure be included in the detailed design and construction of the Tamiami Trail Project. Wildlife connectivity is particularly lacking along the eastern periphery of the Everglades at this location, because the intersection of the L-30 canal and the L-29 canal form a barrier to north-south wildlife movement. These features would not require retrofitting as part of

CERP implementation. However, these features will significantly improve wildlife movement given that as CERP is implemented water levels in WCA-3B and ENP will rise thus displacing terrestrial species of wildlife to the periphery, particularly during periods of high water.

2 The remaining wildlife features presented in this report would likely require retrofitting during CERP implementation. The DOI recommends that the Corps consider these features for all alternatives (other than Alternative 5) in detailed design and specifications as integral components of the final Federally Recommended Plan.

F. Control of Exotic Vegetation

The DOI recommends that an Exotic Vegetation Removal Plan be developed jointly by the Corps, FWS, NPS, FFWC, and SFWMD, in cooperation with FDOT. Removal of exotic vegetation along the Tamiami Trail corridor should be conducted.

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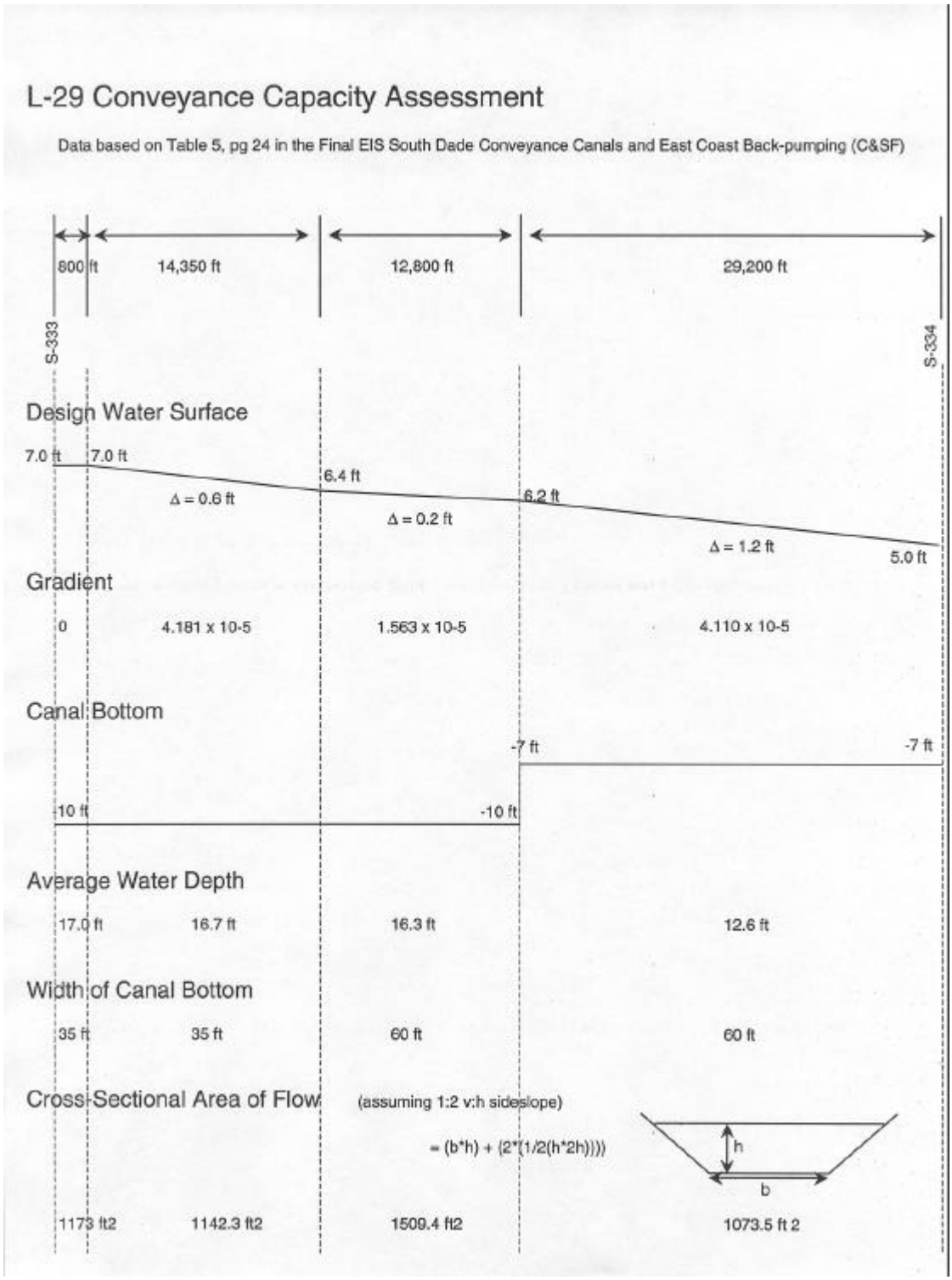
APPENDICES

Appendix A. Historical discharge frequency analysis according to Bulletin 17B (ref)

Appendix B. L-29 conveyance requirements according to Manning's equation.



Appendix B. cont

Manning's Equation (ft)

Q = 1.486/n * A * R^2/3 * S^1/2

method: Calculate A, R, based on canal dimensions
Use n=0.023 based on Civil Engineering Ref. Manual pg 5-23 (Appendix A) for firm gravel.
Use Q of adjacent structures

Solve for gradient (S) and compare with design S

Downstream of S-333

Q(S-333 max design) = 1,350 cfs
n = 0.023
A = 1142.3 ft^2
p = 35+2*38 = 111 ft
R = A/p = 10.3 ft
S=1.493 x 10^-5
S(design) = 4.161 x 10^-5

Downstream of S-334

Q(S-334 max design) = 1,230 cfs
n = 0.023
A = 1073.5 ft^2
p = 60+2*28.2 = 116.3 ft
R = A/p = 9.2 ft
S=1.631 x 10^-5
S(design) = 4.110 x 10^-5

Appendix C. Wetland Rapid Assessment Procedure (WRAP) Functional Units (FU) Lost and Gained, Tamiami Trail Project, Modified Water Deliveries Project.

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
2a	PGc/PGw	0.12	0.7	0.0854				
	SB	11.694	0.69	8.06886				
	PC	0	0.48	0				
	ES/SB	0.046	0.54	0.02484				
TOTAL FUNCTIONAL UNITS				**8.1791**	**2.92**			**11.0991**
2b w/ original WQ	PGc/PGw	5.147	0.7	3.6029				
	SB	44.005	0.69	30.36345				
	PC	0.84	0.48	0.4032				
	ES/SB	0.346	0.54	0.18684				
TOTAL FUNCTIONAL UNITS				**34.55639**	**2.92**			**37.47639**
2b1	PGc/PGw	2.877	0.7	2.0139				
	SB	41.06	0.69	28.3314				
	PC	0.388	0.48	0.18624				
	ES/SB	0.32	0.54	0.1728				
TOTAL FUNCTIONAL UNITS				**30.70434**	**2.92**			**33.62434**
2b2	PGc/PGw	0.078	0.7	0.0546				
	SB	7.81	0.69	5.3889				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**5.44782**	**2.92**			**8.36782**
2b3	PGc/PGw	0.078	0.7	0.0546				
	SB	7.81	0.69	5.3889				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**5.44782**	**2.92**			**8.36782**
2b4	PGc/PGw	0.078	0.7	0.0546				
	SB	7.81	0.69	5.3889				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**5.44782**	**2.92**			**8.36782**
2b5	PGc/PGw	0.078	0.7	0.0546				
	SB	7.81	0.69	5.3889				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**5.44782**	**2.92**			**8.36782**

Appendix C. cont.

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
2b6	PGc/PGw	0.08	0.7	0.056				
	SB	7.764	0.69	5.35716				
	PC	0	0.48	0				
	ES/SB	0.015	0.54	0.0081				
TOTAL FUNCTIONAL UNITS				**5.42126**	**2.92**			**8.34126**
3a	PC/PGc	0.094	0.68	0.06392				
	PE	1.567	0.8	1.2536				
	PGc/PGw	9.575	0.78	7.4685				
	SB	1.841	0.83	1.52803				
	PGW	0.342	0.83	0.28386				
	PC	0.867	0.53	0.45951				
TOTAL FUNCTIONAL UNITS				**11.05742**		**7.76**		**18.81742**
3b	PC/PGc	0.258	0.68	0.17544				
	PE	2.93	0.8	2.344				
	PGc/PGw	19.719	0.78	15.38082				
	SB	3.126	0.83	2.59458				
	PGW	1.196	0.83	0.99268				
	PC	1.712	0.53	0.90736				
TOTAL FUNCTIONAL UNITS				**22.39488**		**7.76**		**30.15488**
3b1	PC/PGc	0.183	0.68	0.12444				
	PE	2.38	0.8	1.904				
	PGc/PGw	15.501	0.78	12.09078				
	SB	2.423	0.83	2.01109				
	PGW	0.947	0.83	0.78601				
	PC	1.358	0.53	0.71974				
TOTAL FUNCTIONAL UNITS				**17.63606**		**7.76**		**25.39606**
3b2	PC/PGc	0.063	0.68	0.04284				
	PE	1.145	0.8	0.916				
	PGc/PGw	6.776	0.78	5.28528				
	SB	1.928	0.83	1.60024				
	PGW	0.119	0.83	0.09877				
	PC	0.567	0.53	0.30051				
TOTAL FUNCTIONAL UNITS				**8.24364**		**7.76**		**16.00364**
3b3	PC/PGc	0.293	0.68	0.19924				
	PE	1.145	0.8	0.916				
	PGc/PGw	7.54	0.78	5.8812				

Appendix C. cont.

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
3b3	SB	3.539	0.83	2.93737				
	PGW	0.147	0.83	0.12201				
	PC	0.797	0.53	0.42241				
TOTAL FUNCTIONAL UNITS				**10.47823**		**7.76**		**18.23823**
3b4	PC/PGc	0.062	0.68	0.04216				
	PE	1.113	0.8	0.8904				
	PGc/PGw	6.329	0.78	4.93662				
	SB	1.431	0.83	1.18773				
	PGW	0.119	0.83	0.09877				
	PC	0.525	0.53	0.27825				
TOTAL FUNCTIONAL UNITS				**7.43393**		**7.76**		**15.19393**
3b5	PC/PGc	0.062	0.68	0.04216				
	PE	1.145	0.8	0.916				
	PGc/PGw	6.748	0.78	5.26344				
	SB	1.71	0.83	1.4193				
	PGW	0.119	0.83	0.09877				
	PC	0.546	0.53	0.28938				
TOTAL FUNCTIONAL UNITS				**8.02905**		**7.76**		**15.78905**
3b6	PC/PGc	0.062	0.68	0.04216				
	PE	1.145	0.8	0.916				
	PGc/PGw	6.762	0.78	5.27436				
	SB	1.787	0.83	1.48321				
	PGW	0.119	0.83	0.09877				
	PC	0.546	0.53	0.28938				
TOTAL FUNCTIONAL UNITS				**8.10388**		**7.76**		**15.86388**
4a	PGc/PGw	19.086	0.7	13.3602				
	SB	46.542	0.69	32.11398				
	PC	2.234	0.48	1.07232				
	ES/SB	0.587	0.54	0.31698				
TOTAL FUNCTIONAL UNITS				**46.86348**			**6.43**	**40.43348**
4b	PGc/PGw	35.626	0.7	24.9382				
	SB	63.469	0.69	43.79361				
	PC	3.958	0.48	1.89984				
	ES/SB	0.821	0.54	0.44334				
TOTAL FUNCTIONAL UNITS				**71.07499**			**6.43**	**64.64499**

Appendix C. cont.

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
4b1	PGc/PGw	10.507	0.7	7.3549				
	SB	50.283	0.69	34.69527				
	PC	1.257	0.48	0.60336				
	ES/SB	0.493	0.54	0.26622				
TOTAL FUNCTIONAL UNITS				**42.91975**			**6.43**	**36.48975**
4b2	PGc/PGw	10.57	0.7	7.399				
	SB	50.259	0.69	34.67871				
	PC	1.258	0.48	0.60384				
	ES/SB	0.493	0.54	0.26622				
TOTAL FUNCTIONAL UNITS				**42.94777**			**6.43**	**36.51777**
4b3	PGc/PGw	10.508	0.7	7.3556				
	SB	50.28	0.69	34.6932				
	PC	1.251	0.48	0.60048				
	ES/SB	0.493	0.54	0.26622				
TOTAL FUNCTIONAL UNITS				**42.9155**			**6.43**	**36.4855**
4b4	PGc/PGw	10.495	0.7	7.3465				
	SB	49.006	0.69	33.81414				
	PC	1.258	0.48	0.60384				
	ES/SB	0.493	0.54	0.26622				
TOTAL FUNCTIONAL UNITS				**42.0307**			**6.43**	**35.6007**
4b5	PGc/PGw	10.507	0.7	7.3549				
	SB	50.309	0.69	34.71321				
	PC	1.262	0.48	0.60576				
	ES/SB	0.493	0.54	0.26622				
TOTAL FUNCTIONAL UNITS				**42.94009**			**6.43**	**36.51009**
4b6	PGc/PGw	10.506	0.7	7.3542				
	SB	50.28	0.69	34.6932				
	PC	1.257	0.48	0.60336				
	ES/SB	0.493	0.54	0.26622				
TOTAL FUNCTIONAL UNITS				**42.91698**			**6.43**	**36.48698**

Appendix C. cont.

Proposed Restoration of the Tamiami Trail - Alternative 5 Without Water Quality Treatment, and With a Levee for L-29 Control (57.3 Acres)			
Habitat	**Acres**	**Wrap Score**	**Functional Units Gained**
PGc/PGw	3.26	0.7	2.282
SB	52.92	0.69	36.5148
PC	0.699	0.48	0.33552
ES/SB	0.41	0.54	0.2214
	TOTAL FUNCTIONAL UNITS		**39.35372**

Proposed Restoration of the Tamiami Trail - Alternative 5 With Water Quality Treatment, and With a Levee for L-29 Control (43.0 Acres)			
Habitat	**Acres**	**Wrap Score**	**Functional Units Gained**
PGc/PGw	2.451	0.7	1.7157
SB	39.719	0.69	27.40611
PC	0.525	0.48	0.252
ES/SB	0.31	0.54	0.1674
	TOTAL FUNCTIONAL UNITS		**29.54121**

Proposed Restoration of the Tamiami Trail - Alternative 5 Without Water Quality Treatment, and No Levee for L-29 Control (65.9 Acres)			
Habitat	**Acres**	**Wrap Score**	**Functional Units Gained**
PGc/PGw	3.76	0.7	2.632
SB	60.87	0.69	42.0003
PC	0.804	0.48	0.38592
ES/SB	0.474	0.54	0.25596
	TOTAL FUNCTIONAL UNITS		**45.27418**

Proposed Restoration of the Tamiami Trail - Alternative 5 With Water Quality Treatment, and No Levee for L-29 Control (49.4 Acres)			
Habitat	**Acres**	**Wrap Score**	**Functional Units Gained**
PGc/PGw	2.81	0.7	1.967
SB	45.63	0.69	31.4847
PC	0.603	0.48	0.28944
ES/SB	0.356	0.54	0.19224
	TOTAL FUNCTIONAL UNITS		**33.93338**

Note: This information was generated by establishing a polygon south of the existing Tamiami Trail and placing the habitat types into the four categories (PGc/PGW - ES/SB). Acreage for the total land within the polygon (less HI, SA, RD and Open Water) was determined and the representative percent of the total was calculated. This percent was applied to the total available acreage (as provided by PBS&J) to generate the acres available per habitat. This was then multiplied by the WRAP Scores, the sum of which represents the Total Functional Units.

Appendix C. cont.

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
6a	PGc/PGw	0.48	0.7	0.336				
	SB	8.93	0.69	6.1617				
	PC	0.169	0.48	0.08112				
	ES/SB	0.04	0.54	0.0216				
TOTAL FUNCTIONAL UNITS				**6.60042**	**0**			**6.60042**
6b w original WQ	PGc/PGw	3.381	0.7	2.3667				
	SB	28.744	0.69	19.83336				
	PC	0.81	0.48	0.3888				
	ES/SB	0.346	0.54	0.18684				
TOTAL FUNCTIONAL UNITS				**22.7757**	**0**			**22.7757**
6b1	PGc/PGw	2.422	0.7	1.6954				
	SB	27.285	0.69	18.82665				
	PC	0.365	0.48	0.1752				
	ES/SB	0.32	0.54	0.1728				
TOTAL FUNCTIONAL UNITS				**20.87005**	**0**			**20.87005**
6b2	PGc/PGw	0.071	0.7	0.0497				
	SB	4.761	0.69	3.28509				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**3.33911**	**0**			**3.33911**
6b3	PGc/PGw	0.071	0.7	0.0497				
	SB	4.761	0.69	3.28509				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**3.33911**	**0**			**3.33911**
6b4	PGc/PGw	0.071	0.7	0.0497				
	SB	4.761	0.69	3.28509				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**3.33911**	**0**			**3.33911**
6b5	PGc/PGw	0.071	0.7	0.0497				
	SB	4.761	0.69	3.28509				
	PC	0	0.48	0				
	ES/SB	0.008	0.54	0.00432				
TOTAL FUNCTIONAL UNITS				**3.33911**	**0**			**3.33911**

Appendix C. cont

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					**INDIRECT IMPACTS (FUNCTIONAL UNITS)**			**TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE**
Alternative	Habitat	Acres	Wrap Score	Functional Units Lost	Temporary Impacts	Secondary Effects	Secondary Benefits	
PGc/PGw	PGc/PGw	PGc/ PGw	PGc/ PGw	0.0511				
SB	SB	SB	SB	3.47622				
PC	PC	PC	PC	0				
ES/SB	ES/SB	ES/SB	ES/SB	0.0081				
TOTAL FUNCTIONAL UNITS				**3.53542**	**0**			**3.53542**

NOTE: The acreage shown in the above table should be considered PRELIMINARY at this time. No engineering has been done for this alternative. Alignment information from Alternative 2 was used with the approximate 4 mile bridge excluded (with the exception of an approximate .25 mile area for the access to the Airboat Association. No temporary impacts were assumed for this analysis. This may be revised once engineering has been performed

Appendix C. cont

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
7a	PGc/PGw	0.044	0.7	0.0308				
	SB	4.914	0.69	3.39066				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.42146**				**3.42146**
7b	PGc/PGw	17.484	0.7	12.2388				
	SB	52.016	0.69	35.89104				
	PC	2.302	0.48	1.10496				
	ES/SB	0.592	0.54	0.31968				
TOTAL FUNCTIONAL UNITS				**49.55448**				**49.55448**
7b1	PGc/PGw	0.098	0.7	0.0686				
	SB	10.28	0.69	7.0932				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**7.18394**				**7.18394**
7b2	PGc/PGw	0.044	0.7	0.0308				
	SB	4.914	0.69	3.39066				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.42146**				**3.42146**
7b3	PGc/PGw	0.098	0.7	0.0686				
	SB	10.28	0.69	7.0932				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**7.18394**				**7.18394**
7b4	PGc/PGw	0.098	0.7	0.0686				
	SB	10.28	0.69	7.0932				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**7.18394**				**7.18394**
7b5	PGc/PGw	0.044	0.7	0.0308				
	SB	4.914	0.69	3.39066				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.42146**				**3.42146**
7b6	PGc/PGw	0.044	0.7	0.0308				
	SB	4.914	0.69	3.39066				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.42146**				**3.42146**

Appendix C. cont

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
8a	PGc/PGw	0.044	0.7	0.0308				
	SB	5.043	0.69	3.47967				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.51047**			**0**	**3.51047**
8b	PGc/PGw	13.071	0.7	9.1497				
	SB	52.587	0.69	36.28503				
	PC	1.79	0.48	0.8592				
	ES/SB	0.504	0.54	0.27216				
TOTAL FUNCTIONAL UNITS				**46.56609**			**0**	**46.56609**
8b1	PGc/PGw	0.098	0.7	0.0686				
	SB	10.709	0.69	7.38921				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**7.47995**			**0**	**7.47995**
8b2	PGc/PGw	0.044	0.7	0.0308				
	SB	5.043	0.69	3.47967				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.51047**			**0**	**3.51047**
8b3	PGc/PGw	0.098	0.7	0.0686			0	
	SB	10.709	0.69	7.38921				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**7.47995**			**0**	**7.47995**
8b4	PGc/PGw	0.098	0.7	0.0686				
	SB	10.709	0.69	7.38921				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**7.47995**			**0**	**7.47995**
8b5	PGc/PGw	0.044	0.7	0.0308				
	SB	5.043	0.69	3.47967				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.51047**			**0**	**3.51047**
8b6	PGc/PGw	0.044	0.7	0.0308				
	SB	5.043	0.69	3.47967				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**3.51047**			**0**	**3.51047**

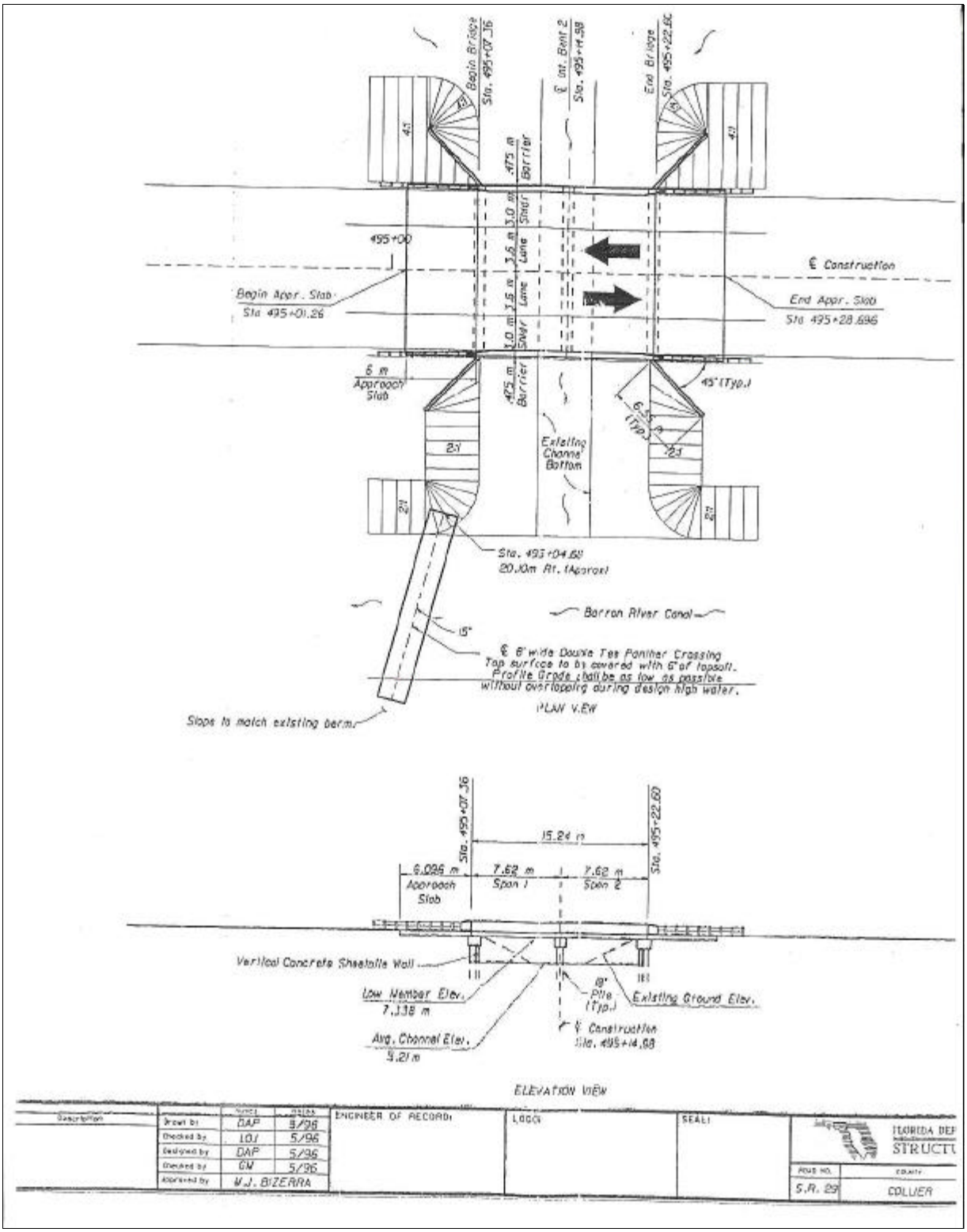
Appendix C. cont

Wetland Rapid Assessment Procedure (WRAP) Results								
DIRECT IMPACTS					INDIRECT IMPACTS (FUNCTIONAL UNITS)			TOTAL FUNCTIONAL UNITS LOST PER ALTERNATIVE
Alternative	**Habitat**	**Acres**	**Wrap Score**	**Functional Units Lost**	**Temporary Impacts**	**Secondary Effects**	**Secondary Benefits**	
9a	PGc/PGw	0.0039	0.7	0.00273				
	SB	2.767	0.69	1.90923				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**1.91196**				**1.91196**
9b w original WQ	PGc/PGw	12.522	0.7	8.7654				
	SB	33.847	0.69	23.35443				
	PC	1.912	0.48	0.91776				
	ES/SB	0.592	0.54	0.31968				
TOTAL FUNCTIONAL UNITS				**33.35727**				**33.35727**
9b1	PGc/PGw	0.087	0.7	0.0609				
	SB	6.362	0.69	4.38978				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**4.47282**				**4.47282**
9b2	PGc/PGw	0.039	0.7	0.0273				
	SB	2.767	0.69	1.90923				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**1.93653**				**1.93653**
9b3	PGc/PGw	0.087	0.7	0.0609				
	SB	6.362	0.69	4.38978				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**4.47282**				**4.47282**
9b4	PGc/PGw	0.087	0.7	0.0609				
	SB	6.362	0.69	4.38978				
	PC	0	0.48	0				
	ES/SB	0.041	0.54	0.02214				
TOTAL FUNCTIONAL UNITS				**4.47282**				**4.47282**
9b5	PGc/PGw	0.039	0.7	0.0273				
	SB	2.767	0.69	1.90923				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**1.93653**				**1.93653**
9b6	PGc/PGw	0.039	0.7	0.0273				
	SB	2.767	0.69	1.90923				
	PC	0	0.48	0				
	ES/SB	0	0.54	0				
TOTAL FUNCTIONAL UNITS				**1.93653**				**1.93653**

Appendix C. cont

POTENTIAL RESTORATION AREAS SOUTH OF U.S. 41 (TAMIAMI TRAIL)						
SITE NUMBER (From East to West)		**HABITAT TO BE RESTORED**	**ACRES**	**WRAP SCORE**	**FUNCTIONAL UNITS GAINED**	**TOTAL FUNCTIONAL UNITS GAINED PER SITE**
1	Radio Tower (Acreage not complete as Photography did not include all of site)	PGC/PGW	0.668	0.7	0.4676	0.4676
2	Cooper Town	SBa	1.391	0.69	0.95979	0.95979
3	Unknown adjacent to Cooper Town	SBa	0.429	0.69	0.29601	0.29601
4	Gator Park	SBa	4.88	0.69	3.3672	
		PGC/PGW	3.254	0.7	2.2778	5.645
5	Unknown east of Frog City	PGC/PGW	0.572	0.7	0.4004	0.4004
6	Frog City	SBa	2.05	0.69	1.4145	
		PGC/PGW	4.786	0.7	3.3502	4.7647
7	SFWMD Radio Tower	NOT INCLUDED			0	
8	Safarri Airboat	SBa	3.408	0.69	2.35152	
		PGC/PGW	5.112	0.7	3.5784	5.92992
9	Radio Tower west of Safarrii	PGC/PGW	1.762	0.7	1.2334	1.2334

Appendix D. Wildlife Underpass Schematic



STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE

1. An eastern indigo snake protection/education plan shall be developed by the applicant or requestor for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:
   a. a description of the eastern indigo snake, its habits, and protection under Federal Law;
   b. instructions not to injure, harm, harass or kill this species;
   c. directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
   d. telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, then frozen.

2. If not currently authorized through an Incidental Take Statement in association with a Biological Opinion, only individuals who have been either authorized by a section 10(a)(1)(A) permit issued by the Service, or by the State of Florida through the Florida Fish and Wildlife Conservation Commission for such activities, are permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the appropriate Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:
   a. any sightings of eastern indigo snakes;
   b. summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);
   c. other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 1-3B **UTM:** 547546; 2849389 **Summary Score: 0.68**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 14, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: PC/PGc: Cattail/Sawgrass Marsh

Site Description: This site is located on the north side of the L-29 Levee in WCA 3B near the eastern end of the project (across from a bank of culverts). The wetland habitat consists of cattail/sawgrass mixed prairie (60% cattail and 40% sawgrass). Some areas of sawgrass die-off noted (improper hydrology).

Score	Notes
2.5	**FISH AND WILDLIFE UTILIZATIO**N: Good wading bird use in area: two snail kites, great blue heron, little blue heron. Other birds: grackle, palm warbler, phoebe, gnatcatcher, loggerhead shrike. Apple snails, forage fishes.
NA	**OVERSTORY/SHRUB CANOPY:**
1.5	**VEGETATIVE GROUND COVER:** Up to 60% cattail, with sawgrass (some die-off). Scattered leather fern and small pond apples returning. Appears to be transitioning to increased hydrology. *Pontedaria, Ludwigia, Thelypteris, Nymphoides.*
2.0	**Upland/Wetland Buffer:** Approximately 40' buffer, < 5% Brazilian pepper, some willow, broomsedge. Provides some cover and foraging opportunities.
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; some pockets of standing water.
2.0	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Vegetated Levee (PT): 50% Veg. Strip = 1.0 Pretreatment (PT): 50% Highway = 2.0 PT Score: 3/2 = 1.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 2-3B **UTM:** 542280; 2849386 **Summary Score: 0.80**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 14, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: PE: Emergent Marsh

Site Description: This site is located on the north side of the L-29 Levee in WCA 3B near the middle of the project. The wetland habitat consists of emergent marsh species, small sawgrass patches and no cattail.

Score	Notes
2.5	**FISH AND WILDLIFE UTILIZATIO**N: Good wading bird use in area: snail kites, great blue heron, ibis. Alligator (bellow). Signs of wildlife trails, adjacent to old canal. Apple snails, grass shrimp, forage fishes. Some open water areas.
N/A	**OVERSTORY/SHRUB CANOPY:**
3.0	**VEGETATIVE GROUND COVER:** *Sagittaria, Paspalidium, Nymphae, Acrostichum,* some dead willows.
2.0	**Upland/Wetland Buffer:** 40' buffer. Dahoon holly, elderberry, *Baccharis.*
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; probably connected to canal. About a foot deep during inspection.
2.25	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Vegetated Levee (PT): 50% Veg. Strip = 1.0 Pretreatment (PT): 50% Highway = 2.0 PT Score: 3/2 = 1.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 3-3B **UTM:** 546090; 2849372 **Summary Score: 0.78**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 14, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: PGc: Sawgrass Marsh

Site Description: This site is located on the north side of the L-29 Levee in WCA 3B near the western portion of the project. The wetland habitat consists of sawgrass-dominated marsh.

Score	Notes
2.5	**FISH AND WILDLIFE UTILIZATIO**N: Good wading bird use in area: snail kites, tri-colored heron, kingfisher. Apple snails, crayfish, tadpoles, grass shrimp, forage fishes. Some open water areas.
N/A	**OVERSTORY/SHRUB CANOPY:**
3.0	**VEGETATIVE GROUND COVER:** Pure sawgrass stand, scattered willow and *Cephalanthus.*
2.0	**Upland/Wetland Buffer:** 40' buffer. Sabal palms, some pond apples, scattered Brazilian pepper.
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; Over a foot deep during inspection.
2.25	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Vegetated Levee (PT): 50% Veg. Strip = 1.0 Pretreatment (PT): 50% Highway = 2.0 PT Score: 3/2 = 1.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 4-3B **UTM:** 541983; 2849359 **Summary Score: 0.83**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 14, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: FS/FSb: Swamp Forest/Bayhead

Site Description: This site is a large tree island and is located on the north side of the L-29 Levee in WCA 3B just west of Tiger Tail Camp. The wetland habitat consists of mature swamp forest.

Score	Notes
2.7	**FISH AND WILDLIFE UTILIZATIO**N: Good cover and nesting habitat in canopy. Cat bird and warblers. Very diverse, micro-habitat. Crayfish, tadpoles, grass shrimp, forage fishes. Open water under canopy.
3..0	**OVERSTORY/SHRUB CANOPY:** Mature pond apples, sweet bay, red bay, cocoplum, *Cephalanthus, Ilex cassine*
3.0	**VEGETATIVE GROUND COVER:** Royal fern, *Blechnum, Peltandra, Thelypteris, Saururus.*
2.0	**Upland/Wetland Buffer:** Vegetated buffer > 40'. *Ficus*, no Brazilian pepper noted. Some human influence by levee (trash).
2.0	F**ield Indicators of Wetland Hydrology:** Adequate hydrology present; Over a foot deep during inspection.
2.25	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Vegetated Levee (PT): 50% Veg. Strip = 1.0 Pretreatment (PT): 50% Highway = 2.0 PT Score: 3/2 = 1.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 5-3B **UTM:** 540538; 2849358 **Summary Score: 0.83**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 14, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: PGw: Maidencane/Spike-rush Marsh

Site Description: This emergent marsh is located on the north side of the L-29 Levee in WCA 3B west of Tiger Tail Camp. The wetland habitat consists of an open-water emergent marsh.

Score	Notes
2.75	**FISH AND WILDLIFE UTILIZATIO**N: Good wading bird habitat; great blue heron, great egret. Crayfish, tadpoles, grass shrimp, forage fishes. Open water areas interspersed with marsh.
N/A	**OVERSTORY/SHRUB CANOPY:**
3.0	**VEGETATIVE GROUND COVER:** Water lily, *Eleocharis*, *Sagittaria*, *Utricularia*, *Pontedaria*, *Bacopa*, *Paspalidium*, *Chara*, small scattered pond apples. Marsh surrounded by sawgrass.
2.0	**Upland/Wetland Buffer:** Vegetated buffer > 40'. *Ficus*, no Brazilian pepper noted.
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; Over a foot deep during inspection.
2.25	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Vegetated Levee (PT): 50% Veg. Strip = 1.0 Pretreatment (PT): 50% Highway = 2.0 PT Score: 3/2 = 1.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 6-3B **UTM:** 533733; 2849341 **Summary Score: 0.53**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 14, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); David Jones (ENP); Kathy Fanning (DERM)

Wetland Classification: PC: Cattail

Site Description: This cattail-dominated wetland is located on the north side of the L-29 Levee in WCA 3B approximately one-half mile east of the S-333. The wetland habitat consists of dense cattail.

Score	Notes
1.5	**FISH AND WILDLIFE UTILIZATIO**N: Too dense for dip netting. One raccoon observed on levee. Habitat provides cover and some nesting potential sor some species.
N/A	**OVERSTORY/SHRUB CANOPY:**
0.25	**VEGETATIVE GROUND COVER: >** 75% cattail; Scattered willow and leather ferns.
2.0	**Upland/Wetland Buffer:** Vegetated buffer > 40'. *Ficus*, no Brazilian pepper noted.
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; Over a foot deep during inspection.
2.25	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Vegetated Levee (PT): 50% Veg. Strip = 1.0 Pretreatment (PT): 50% Highway = 2.0 PT Score: 3/2 = 1.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 1-ENP **UTM:** 532858; 2849250 **Summary Score: 0.70**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 15, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: PGc: Sawgrass Marsh

Site Description: This site is located on the south side of US 41 in ENP at the western end of the project near the curve in US 41. The wetland habitat consists of sawgrass-dominated prairie interspersed with leather fern and scattered emergent aquatic species. Brazilian pepper (< 10%) is found along the edge of the highway. This is good quality wetland habitat (70% of full functional capacity).

Score	Notes
1.75	**FISH AND WILDLIFE UTILIZATIO**N: Great blue heron, aquatic snails, killifish, Gambusia, grass shrimp. (Wildlife utilization affected by proximity of US 41: wildlife mortality and movement).
N/A	**OVERSTORY/SHRUB CANOPY:**
3.0	**VEGETATIVE GROUND COVER**: *Cladium, Acrostichum, Chara, Pontedaria, Sagittaira.* (Ground cover functioning at full capacity).
1.0	**Upland/Wetland Buffer:** < 30'; <10% *Schinus* (Minimal buffer zone).
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; highway to north impedes sheetflow.
2.0	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Pretreatment (PT): 50% Highway = 1.0 (Run-off from US 41 enters the wetland with minimal treatment).

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 2-ENP **UTM:** 541784; 284972 **Summary Score: 0.69**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 15, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: FSb/SB: Bayhead/Shrub

Site Description: This forested wetland is located just west of this Gatorland Airboat concession. The wetland habitat consists of forested trees and shrubs with good ground cover. A red-shouldered hawk was observed perching in the canopy. The proximity of the Gatorland Airboat concession was considered to have secondary effects on wildlife utilization.

Score	Notes
2.0	**FISH AND WILDLIFE UTILIZATIO**N: Red-shouldered hawk, aquatic snails, killifish, Gambusia, grass shrimp in water column. Adequate cover and food sources.
1.75	**OVERSTORY/SHRUB CANOPY:** Sweet bay, swamp bay, scattered pond apple, wax myrtle, Brazilian pepper (< 10%).
3.0	**VEGETATIVE GROUND COVER**: Leather fern common, *Sagittaria*, some *Ludwigia* along highway edge (< 10%).
1.75	**Upland/Wetland Buffer:** < 30'; <10% *Schinus*, elderberry food source.
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; highway to north impedes sheetflow.
2.0	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Pretreatment (PT): 50% Highway = 1.0

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 3-ENP **UTM:** 545591; 2849287 **Summary Score: 0.69**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: November 15, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); Kathy Fanning (DERM)

Wetland Classification: FS: Pond apple forest

Site Description: This site is the pond apple forest at the Tamiami West wood stork rookery. This is a mature forest at a culvert outfall. The forest begins at the edge of the highway side slope.

Score	Notes
2.0	**FISH AND WILDLIFE UTILIZATIO**N: Supports several species of nesting wading birds. Gambusia, grass shrimp and other forage fishes in the water column.
2.0	**OVERSTORY/SHRUB CANOPY:** Pond apple (good number of seedlings), swamp bay, red bay, wax myrtle, *Ficus* next to highway, Brazilian pepper along highway (< 25%).
2.75	**VEGETATIVE GROUND COVER**: *Cladium* (scattered), *Acrostichum, Chara, Pontedaria, Thelypteris, Leersia,* scattered *Baccharis* along highway.
1.75	**Upland/Wetland Buffer:** < 30'; <10% *Schinus*
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present (depths over 2'; highway to north impedes sheetflow, culvert flows significant
2.0	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Pretreatment (PT): 50% Highway = 1.0

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 4-ENP **UTM:** 545589; 2849291 **Summary Score: 0.48**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: December 19, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); David Jones, (ENP); Kathy Fanning (DERM)

Wetland Classification: PC: Cattail-dominated marsh.

Site Description: This cattail-dominated marsh is located at the eastern end of the project area about one-quarter mile from the L-31N levee. Herbiciding and vegetative die-off evident in some areas along highway.

Score	Notes
1.50	**FISH AND WILDLIFE UTILIZATIO**N: Dip-netting produced some aquatic invertebrates, *Gambusia.* Dense cattail provides some cover and nesting habitat.
N/A	**OVERSTORY/SHRUB CANOPY:**
0.25	**VEGETATIVE GROUND COVER**: Dense cattail.
1.75	**Upland/Wetland Buffer:** < 30'; <10% *Schinus*
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; highway to north impedes sheetflow.
2.0	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Pretreatment (PT): 50% Highway = 1.0

WETLAND EVALUATION SUMMARY
WETLAND RAPID EVALUATION PROCEDURE

Wetland Number: 5-ENP **UTM:** 549707; 2849308 **Summary Score: 0.54**

Project: Modified Water Deliveries to Everglades National Park, Tamiami Trail Modifications

Date of Site Visit: December 19, 2000

Assessment Team Members: Tre' Wharton (COE); Ken Rutchey (SFWMD); Tim Towles (FWC); David Ferrell (FWS); David Jones (ENP): Kathy Fanning (DERM).

Wetland Classification: E/SB: Fringe of exotic and shrub vegetation along south side of highway.

Site Description: This wetland polygon represents the exotic-dominated fringe of vegetation along the entire south side of the highway extending approximately 30' into the wetlands.

Score	Notes
1.5	**FISH AND WILDLIFE UTILIZATIO**N: Some small passerines (warblers) noted in shrubs. Provides cover/perching habitat. Screens highway from marsh. Wildlife skeletal remains noted (turtles, birds). (Wildlife utilization affected by proximity of US 41: wildlife mortality and movement).
1.5	**OVERSTORY/SHRUB CANOPY:** Dominated, in some areas, by Brazilian pepper, some scattered *Ficus*, scattered bays. Some areas of fringe contain < 10% Brazilian pepper.
N/A	**VEGETATIVE GROUND COVER**:
1.0	**Upland/Wetland Buffer:** < 30'; > 50% *Schinus* (Minimal buffer zone).
2.0	**Field Indicators of Wetland Hydrology:** Adequate hydrology present; highway to north impedes sheetflow.
2.0	**Water Quality Treatment and Inputs:** LU + PT/2 = WQ Score Land Use (LU): 50% Open space = 3.0 Pretreatment (PT): 50% Highway = 1.0 (Run-off from US 41 enters the wetland with minimal treatment).

Appendix G. Statewide wildlife mortality totals for Florida state parks

DISTRICT ONE						
Park	**Miles Surveyed**	**Mammals**	**Herps**	**Birds**	**Total**	**Notable Species**
Big Lagoon	5	7	5	0	12	
Blackwater River	0.7	25	11	0	36	E.Diamondback
Camp Helen	1.0	5	0	0	5	Grey Fox
Dead Lakes	0.5	0	0	0	0	
Deer Lake	1.5	6	1	0	7	
Falling Waters	1.0	0	2	1	3	
Econfina River	7.0	3	1	0	4	
Florida Caverns	3.0	14	7	0	21	White-tailed Deer
Grayton Beach	6.0	10	6	3	19	
Henderson Beach	6.0	1	9	3	13	
Lake Jackson Mounds	0.3	0	0	0	0	
Letchworth Mounds	0.5	0	0	0	0	
Maclay Gardens	2.2	0	2	0	2	
Natural Bridge	0.1	0	0	0	0	
Ochlockonee River	3.0	3	18	4	25	
Perdido Key	1.0	0	0	0	0	
Ponce DeLeon Springs	0.2	0	0	0	0	
River Bluff	0.5	0	0	0	0	
Rocky Bayou	4.0	8	11	1	20	
St. Andrews	3.0	0	0	0	0	
St. George	8.0	0	0	0	0	
St. Joseph Peninsula	5.3	8	62	8	78	E. Diamondback
Tallahassee-St. Marks Trail	16.0	0	0	0	0	
Three Rivers	10.0	4	0	0	4	
Topsail Hill	4.0	0	3	0	3	
Torreya	1.0	1	5	0	6	
Wakulla Springs	9.0	25	6	0	31	
District 1 Total	**99.8**	**120**	**149**	**20**	**289**	

Appendix G. cont.

DISTRICT TWO						
Park	**Miles Surveyed**	**Mammals**	**Herps**	**Birds**	**Total**	**Noteable Species**
Amelia Island	1.1	2	0	0	2	
Big Talbot	6.3	96	3	26	125	Long-billed Dowitcher, Gopher Tortoise, Great Horned Owl
Cedar Key Scrub	10.0	18	4	1	23	Peninsula Ribbon Snake, Striped Skunk
Devil's Millhopper	0.6	17	1	0	18	Gopher Tortoise
Ft. Clinch	6.2	7	6	0	13	Coachwhip (3), Gopher Tortoise
Ft. George	4.4	3	1	0	4	
Ichetucknee Springs	10.5	142	177	14	333	American Kestrel, Gopher Tortoise (3), Gopher Frog
Little Talbot	5.2	40	8	10	58	Common Loons (2), Coachwhip (2), Gopher Tortoise(2)
M. K. Rawlings	0.2	4	1	0	5	
Paynes Prairie	53.0	11	45	2	58	E. Diamondback, (2), Gopher Tortoise (2)
Peacock Springs	3.5	7	0	0	7	
Rainbow Springs	1.3	2	0	0	2	Striped Skunk
San Felasco Hammock	11.7	158	16	16	190	Gray Fox, Red-shouldered Hawk, Gopher Tortoise
District 2 Total	**106.5**	**507**	**262**	**69**	**838**	

Appendix G. cont.

DISTRICT THREE						
Park	**Miles Surveyed**	**Mammals**	**Herps**	**Birds**	**Total**	**Noteable Species**
Anastasia	5.5	5	2	1	8	
Blue Spring	2.0	16	12	2	30	
Bulow Creek	6.7	41	2	1	44	Gopher Tortoise, White-tailed Deer (8)
Bulow Plantation Ruin	1.3	4	1	0	5	
Catfish Creek	1.6	1	1	0	2	Coyote
DeLeon Springs	4.0	11	4	3	18	Bobcat
Faver-Dykes	2.0	8	3	1	12	
Flagler Beach	0.5	6	3	1	10	
Guana River	10.1	132	14	47	193	E. Diamondback (2), Gopher Tortoise, Cat (4)
Kissimmee Prairie	20.0	0	7	0	7	
Lake Griffin	2.0	1	0	1	2	
Lake Kissimmee	5.6	10	4	5	19	E. Diamondback
Lake Louisa	2.8	0	0	0	0	
Lower Wekiva River	0.6	7	3	0	10	FL Pine Snake, Gopher Tortoise (2)
North Peninsula	2.5	16	4	4	24	E. Diamondback, Spotted Skunk, Gopher Tortoise
Ravine Gardens	1.0	16	0	0	16	
Rock Springs Run	4.6	42	41	12	95	E. Diamondback, Gopher Tortoise (8), South-eastern Kestrel
Sebastian Inlet	3.0	56	11	46	113	Royal Tern, Gopher Tortoise (5), River Otter
Silver River	1.2	0	1	0	1	Two months surveyed
Tomoka	6.1	46	12	1	59	E. Diamondback, Gopher Tortoise (2)
Tosohatchee	13.2				0	No report
Washington Oaks	2.7	7	6	2	15	Gopher Tortoise
Wekiwa Springs	6.6	4	3	0	7	E. Diamondback, Gopher Tortoise
District 3 Total	**105.6**	**429**	**134**	**127**	**690**	

Appendix G. cont.

DISTRICT FOUR						
Park	**Miles Surveyed**	**Mammals**	**Herps**	**Birds**	**Total**	**Noteable Species**
Alafia River	5.0	38	0	5	43	Bobcat, Barn Owl, Great-horned Owl, White-tailed Deer
Collier-Seminole	9.0	6	4	1	11	Bobcat, Corn Snake
Dade Battlefield	0.7	0	1	0	1	Hognose Snake
Delnor-Wiggins Pass	1.5	1	0	0	1	Raccoon
Fakahatchee Strand	11.5	25	80	11	116	Everglades Mink, Barred Owl, American Alligators
Fort Cooper	3.6	0	0	0	0	
Highlands Hammock	7.1	25	18	2	45	Eastern Indigo Snake, Red-headed Woodpecker
Hillsborough River	4.0	7	5	0	12	Sherman's Fox Squirrel, 7-ft American Alligator
Honeymoon Island	6.0	6	10	2	18	Gopher Tortoise, E. Diamondback
Koreshan	2.0	0	2	0	2	Corn Snake, Southern Ringneck Snake
Lake Manatee	4.0	63	11	1	75	EasternSpotted Skunk, Gopher Tortoises, Bobcat, Gray Fox
Little Manatee River	2.0	2	2	0	4	Gopher Tortoise, American Alligator
Lovers Key	5.0	51	4	2	57	Ospreys, Raccoon (40)
Myakka River	12.0	125	20	20	165	River otter, Barred Owl (6), Bobcat, Great Blue Herons
Oscar Scherer	2.0	10	7	2	19	Bobcat
Paynes Creek	1.3	10	3	0	13	Scarlet Kingsnake
District 4 Total	**76.7**	**369**	**167**	**46**	**582**	

Appendix G. cont.

DISTRICT FIVE						
Park	**Miles Surveyed**	**Mammals**	**Herps**	**Birds**	**Total**	**Noteable Species**
Avalon	1.1	14	1	0	15	
Bahia Honda	3.5	6	4	8	18	Indigo Snake, Northern Gannet
Cape Florida	4.3	7	6	0	13	
Curry Hammocks	1.3	26	5	18	49	
FT. Pierce Inlet	1.5	3	1	0	4	
Hugh Taylor Birch	2.5	3	3	1	7	
MacArthur Beach	2.3	32	0	3	35	
John Pennekamp	1.4	5	0	3	8	
Lloyd Beach	2.5	14	2	4	20	
Jonathan Dickinson	6.5	66	57	7	130	Yellow-billed Cuckoo, Sandhill Crane, Gopher Tortoise (4)
Key Largo Hammocks	10.5	146	28	69	243	American Crocodile, Hispid Cotton Rat, Rose-ate Spoonbill
Lignumvitae Key	1.0	21	0	3	24	
Long Key	3.6	32	3	12	47	Long-billed Dowitcher (2), White-crowned Pigeon
Oleta River	5.3	17	5	2	24	
Savannas	4.0	0	0	0	0	
District 5 Total	**51.3**	**392**	**115**	**130**	**637**	

Appendix G. cont.

Statewide Totals

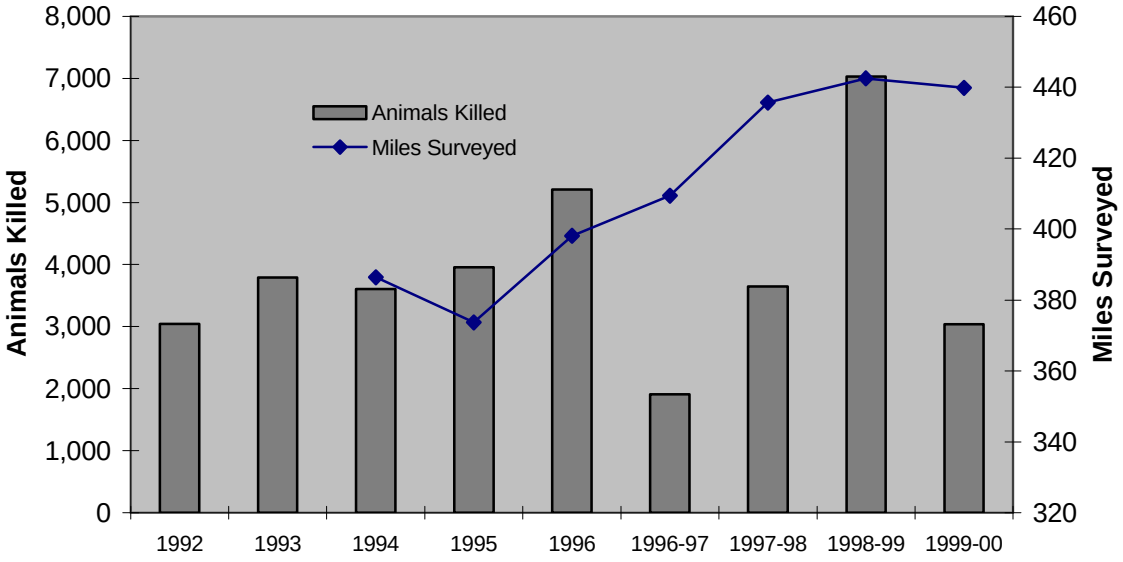
	# of Miles	Mammals	Herps	Birds	Total
District 1 Total	**99.8**	120	149	20	289
District 2 Total	**106.5**	507	262	69	838
District 3 Total	**105.6**	429	134	127	690
District 4 Total	**76.7**	369	167	46	582
District 5 Total	**51.3**	392	115	130	637
Statewide Totals	**439.8**	**1,817**	**827**	**392**	**3,036**

Nine-Year Summary

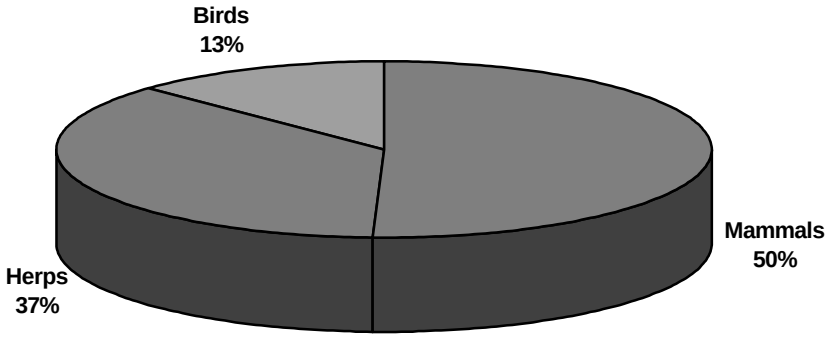
	Miles	Mammals	Herps	Birds	Total
1992	N/A	1,754	935	355	3,044
1993	N/A	2,184	1,068	539	3,791
1994	386.4	1,829	1,361	414	3,604
1995	373.7	2,254	1,062	640	3,956
1996	398.1	2,263	2,300	647	5,210
1996-97	409.4	1,173	474	265	1,912
1997-98	435.7	2,299	802	536	3,647
1998-99	442.5	2,225	4,110	694	7,029
1999-2000	439.8	1,817	827	392	3,036
TOTAL		**17,798**	**12,939**	**4,482**	**35,229**

Data for 1992-96 based on calendar year. 1996-97 data reflect the six-month period of January to June during which FPS switched to fiscal year accounting. Subsequent data are based on a July to June fiscal year.

Appendix G. cont.



Data for 1992-96 based on calendar year. 1996-97 data reflect the six-month period of January to June during which FPS switched to fiscal year accounting. Subsequent data are based on a July to June fiscal year.



Among the animals killed on state park roads are 13 species tracked by the Florida Natural Areas Inventory: gopher frog, fox squirrel, Southeastern kestrel, gopher tortoise, indigo snake, pine snake, Eastern diamondback rattlesnake, royal tern, Everglades mink, American crocodile, white-crowned pigeon and roseate spoonbill.

Appendix J

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION COORDINATION ACT REPORT

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

JULIE K. MORRIS
Sarasota

DAVID K. MEEHAN
St. Petersburg

H.A. "HERKY" HUFFMAN
Deltona

JOHN D. ROOD
Jacksonville

QUINTON L. HEDGEPETH, DDS
Miami

EDWIN P. ROBERTS, DC
Pensacola

RODNEY BARRETO
Miami

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

BRADLEY J. HARTMAN, DIRECTOR
OFFICE OF ENVIRONMENTAL SERVICES
(850)488-6661 TDD (850)488-9542
FAX (850)922-5679

September 14, 2001

Colonel James G. May
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: General Reevaluation Report/ Supplemental Environmental Impact Statement (GRR/SEIS) for the Tamiami Trail, Modified Water Deliveries to Everglades National Park, Miami-Dade County

Dear Colonel May:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the revised preliminary draft GRR/SEIS for the Tamiami Trail Project of Modified Water Deliveries to Everglades National Park ("Mod Waters"), dated June 2001. This project is one of four components that have arisen from the original 1992 Modified Water Deliveries General Design Memorandum. The other highly interrelated components include flood protection of the 8.5-square-mile area residential development along the eastern side of Northeast Shark River Slough (NESRS); conveyance of water between Water Conservation Area (WCA)-3A, WCA-3B, and NESRS; and an overall operational plan for the newly constructed water control structures. Our comments and concerns on the Tamiami Trail Project component are included in the following preliminary Coordination Act Report (CAR) which is being submitted under the authority of the Fish and Wildlife Coordination Act of 1958.

Description of Alternatives

This GRR/SEIS is being developed because new information acquired since the project was approved in 1992 indicates that the original design would be insufficient to pass the volume of water that would need to be conveyed under the Tamiami Trail via Mod Waters. In addition to the six basic alternatives (nine, if water quality treatment options are considered separately) previously addressed in our Planning Aid Letter (PAL), dated February 23, 2001, two completely new alternatives (seven and eight) have been developed, a modification of Alternative 5 (5C) has

been added, and Alternative 6 has now been formally accepted. Also, a new bridge alternative, "Alternative 9 ", with a 2.7-mile span length, intermediate between that of Alternatives 6 and 7, is being floated by the Department of the Interior as a possible compromise. Since we have recently been informed by your staff that any alternatives with bridge expanses much longer than what is deemed necessary to convey Mod Water flows are considered to be outside of your authority for this project, we have opted not to discuss the tentative "9a" and "9b" alternative options any further. For a short description of these 18 alternatives and their associated options, please refer to Table 1. Our three major areas of concern with regard to the potential impacts of this project remain as follows: (1) impacts to existing recreational facilities and access points of the Francis S. Taylor Wildlife Management Area (WCA-3B), (2) impacts to fish and wildlife resources, and (3) potential loss of Everglades marsh.

Impacts to Existing Recreational Facilities and Access Points

Those concerns that were previously addressed pertaining to potential impacts to FWC recreational facilities and access points under Alternatives 1 through 5 remain (please refer to our previous PAL [attached] dated February 23, 2001), and also apply to the three new alternatives (Alternatives 6, 7, and 8) added in this document. Since that letter, we have learned of an additional boat ramp, and also now provide supplementary information on the identification numbers of FWC boat ramps within or adjacent to the project area. We know of three boat ramps in the project area that provide access to the marsh of Francis S. Taylor Wildlife Management Area (FSTWMA). The westernmost ramp (#135) is located immediately east of the S-333 structure on the L-29 Levee and has unimproved parking capable of accommodating about ten vehicles. A popular marsh access ramp of unknown ownership is located on the L-29 Levee at Recreation Site No. 1, immediately south of the S-334 structure, and has unimproved parking. A third concrete boat ramp of unknown origin, previously unidentified, is located in a swale on the L-29 Levee opposite the Airboat Association of Florida. Of the three FWC maintained boat ramps that provide access to the canal system within the project area, two are located at Recreation Site No. 4. One of these (#96), immediately north of the S-333 structure, provides access to the popular L-67A canal, while the other boat ramp (#161), at the juncture of the L-67A and L-67C levees, provides access both to the L-67C canal and to the marsh in the "pocket" of WCA-3B. The remaining boat ramp (#153), located at Recreation Site No.2, is the sole access point for the eastern 11-mile stretch of the L-29 Canal.

A cursory look at the recreational fishing pressure along much of the 11- mile stretch of the L-29 Canal that is being examined under this project suggests that use may be relatively low, except near the S-334 and S-333 structures (FWC, unpublished data). However, changes that are soon anticipated to occur with implementation of the conveyance features of the Mod Waters Project, as well as certain features of the Comprehensive Everglades Restoration Plan (CERP), are likely to improve hydrological connections between the L-29 Canal and the marsh interface,

as well as prolong adjacent marsh hydroperiods both to the north and to the south of the L-29 Canal. Consequently, such predicted hydrological changes combined with the addition of new water management structures (bridges, culverts, weirs, etc) are likely to lead to an increase in local sport fish populations, followed by an increase in recreational fishing demand and concomitant changes in angler distribution patterns along this eastern stretch of the Tamiami Trail. It should be noted that prior to the construction of the L-67 and L-29 levees, this section of the Tamiami Canal (precursor to the L-29 Canal) was one of the premiere fishing areas in the Everglades. Creel surveys conducted during a study in 1960 (Game and Fresh Water Fish Commission [GFC], unpublished report) revealed that the first four miles of the Tamiami Canal west of the L-30 canal received an exceptional amount of use, and that the 11-mile stretch west of the L-30 canal received considerably more fishing pressure than the 9 miles of the Tamiami Canal west of the present-day L-67 Canal. The imminent decline of this great fishery, effected through a separation of the Tamiami Canal from the marsh with the completion of the L-29 Levee, was predicted in the aforementioned GFC report.

Besides recreational access for sport fishing purposes, the airboat ramps provide access to the natural resources of the Everglades marsh contained within the Francis S. Taylor Wildlife Management Area. Recreational frogging, airboating, and seasonal hunting are the primary activities pursued here. Recreational use of these access points may be relatively high during short hunting seasons, particularly when game population levels allow a liberal harvest. For instance, there were 140 airboat permits issued for an approximately 3-week deer season in the FSTWMA in 1984, and 156 permits issued the following year. Although deer population levels in WCA-3B are anticipated to decline under the projected deeper water regime that will occur with the implementation of Mod Waters and CERP, overall recreational use of the area for frogging, general airboating, duck hunting, and fishing is expected to increase. The potential impacts associated with each group of alternatives are listed as follows.

<u>Alternatives 2a, 2b to 2b6, 4a, and 4b to 4b6</u>. This document describes creative water quality treatment options b1 to b3 of Alternatives 2 and 4 as encroaching into the L-29 Canal. We understand from statements made by your staff that it will be necessary to maintain the water supply conveyance capacity of the L-29 Canal for some undefined period of time, which would necessitate maintaining deeper water conditions in this section of the canal. Nevertheless, the above-mentioned water quality treatment options would encroach into the south portion of the L-29 Canal and require widening of the canal to the north. This option would essentially eliminate any existing littoral zone on the south bank of the canal and would result in the loss of boat ramp #153 and impact Recreation Site No. 2 located on the north bank of the L-29 Canal. In the event that a boat ramp is impacted, the Army Corps of Engineers (COE) would be responsible for building a replacement ramp at a new location to be selected by the FWC.

Alternatives 3a and 3b. A reduction in available parking space for recreational users on the north side of the L-29 Canal would negatively impact recreational access to the canal. Recreation Site No. 2 would probably be negatively affected or eliminated by this northerly road alignment.

Alternatives 5a, 5b, and 5c. The effects of the new subalternative 5c are essentially the same as for Alternatives 5a and 5b, in that recreational access to all sites on the north bank of the L-29 Canal will not be affected. However, the entire south bank of the L-29 Canal would be inaccessible during the 4-year construction period. Following completion of the bridge, only culvert outfalls located within the first mile on the east end and within the last one-half mile on the west end of the project would potentially be available for angler use. This loss of access to the south bank of the L-29 Canal from the Tamiami Trail could possibly be ameliorated by the provision of some degree of fishing access from the elevated bridge span.

Alternatives 6a and 6b. Although approximately 4 miles of the southern bank of the L-29 Canal would be unavailable to bank anglers, the remaining 6 miles should still be accessible, as well as the entire northern canal bank. However, the employment of creative water quality treatment options 6b1 to 6b3 could potentially impact the L-29 Canal, as described previously under Alternatives 2 and 4. As in Alternative 5, less opportunity would be lost if fishing access were possible from the bridge span. The feasibility of providing limited fishing access from designated portions of such extensive bridge spans should be explored as a means of reducing public fishing access losses. All existing boat ramps would remain accessible under this alternative. Culvert outfalls south of the roadway would not be accessible during highway construction (18-24 months) in Alternative 6a, and would be plugged under Alternative 6b. The addition of eight box culverts at designated low points in Alternatives 6a and 6b may provide additional angler opportunities.

Alternatives 7a and 7b. Recreational access to all boat ramps and the north bank of the L-29 Canal would remain intact, while fishing access to the south bank of the canal would be blocked during the 2-year construction period. Most of the culvert outfall structures would be accessible during and after construction in Alternative 7a, but all would be filled and eliminated in Alternative 7b. Although the preliminarily selected preferred alternative is Alternative 7a, the decision as to whether additional water quality treatment will be required has not yet been officially decided. Should Alternative 7b be selected, it is not known how the channeling of all water outflows through the single 3,000-foot gap will affect the L-29 Canal fishery. Also, special attention would need to be given to the siting of construction staging areas so that access is not blocked to the three boat ramps and parking facilities associated with the popular Recreation Site No. 4 that provides access to the L-67 canals and FSTWMA, or to the boat ramp facility (#90) located 200 yards west of the S-12D structure.

Alternatives 8a and 8b. Alternative 8a should not impact existing recreation access sites, and could provide new fishing opportunities at the 24 additional box culverts, particularly if the culvert outfalls are scalloped out to improve the passage of water into northeast Shark River Slough. Alternative 8b would require filling the existing culverts, and could result in a loss of fishing opportunities unless the 40 new box culverts are constructed in a way that creates shallow collection basins at the outfalls.

Impacts to Fish and Wildlife Resources

Of particular concern are the impacts that an alternative could have on state-listed species of wildlife or important habitat components. There are three historic wading bird rookeries containing species listed by the state as endangered or species of special concern, recent records of endangered snail kite nests in southern WCA-3B, a number of records of the threatened Everglades mink along the highway corridor, and a single documented occurrence of the endangered West Indian manatee in the L-29 Canal. In addition, other listed species such as the limpkin and roseate spoonbill (both listed as species of special concern) utilize marsh areas, and the least tern (threatened) forages in canal habitats that could be impacted under certain alternatives. The potential impacts that could occur are listed by alternative groups as follows.

Alternatives 1 and 2a. The temporary road for detouring traffic while proposed bridge #3 is under construction would encroach into the pond apple forest at the Tamiami West wading bird colony, on the south side of the Tamiami Trail, that provides nesting substrate for white ibis, tricolored herons, little blue herons, snowy egrets, and wood storks. Consequently, a portion of this forested area would be eliminated as a nesting substrate for an unknown number of years. Any heavy construction activity that would be expected to occur within 600 meters of a known rookery location, including construction of the temporary road, should be conducted outside of the wading bird nesting season, which normally extends from early February to the onset of the rainy season.

Alternative 2b. This alternative encroaches to a greater extent (average of 51 feet) into the marsh south of the existing Tamiami Trail, with incursions of 5 to 6 additional feet at bridge approaches. Consequently, this alternative would have a greater permanent impact on the Tamiami East and Tamiami West wading bird colonies due to a greater permanent loss of nesting substrate as well as a decrease in the amount of buffer capacity available. The Everglades mink has been documented to use both natural and artificial upland areas for denning purposes; therefore, this alternative could potentially impact mink denning areas that may occur in either native upland areas or at the artificially created upland areas

where the airboat concession and radio tower sites are located. Option 2b1, which shifts the alignment to the north, is only a slight improvement over Alternative 2b.

The 2b creative water quality treatment options of 2b2 to 2b6 (Table 1) result in much more modest incursions into the two Tamiami wading bird colonies; however options 2b2 and 2b3 would eliminate littoral zone elements on the south shore of the L-29 Canal, eliminate reptile oviposition and basking sites on the south shore of the canal, and could result in the entrapment of terrestrial animals attempting to cross the canal.

Alternatives 3a and 3b. Both of these alternatives and the various 3b options presented would result in the loss of a significant amount of high quality wildlife habitat. The woody vegetation supporting the Frog City wading bird colony, which has been documented to contain nesting tricolored and little blue herons (both species of special concern), would be either eliminated or severely impacted by the road alignment, which would encroach further into the marsh at this point in order to avoid the Tigertail Camp. This northerly diversion of the road around the Tigertail Camp would also impact a high quality tree island (WRAP score of 0.83) that may also have a special cultural value to the Tigertail family. The relocation of a high speed highway to the north of the L-29 Levee would result in much greater wildlife mortality during high water episodes in WCA-3B than presently occurs. There could be dens of the Everglades mink in the L-29 Levee or on adjacent tree islands that are impacted, as well.

Alternatives 4a and 4b. Both of these alternatives would produce significant incursions into the Tamiami West and Tamiami East wading bird rookeries, as well as eliminate important swamp forest habitat along the remainder of the corridor. Although options 4b1-4b6 would reduce the amount of encroachment from Alternative 4b, they are only slightly better than Alternative 2b. The Everglades mink has been documented to use some of the man-made upland sites along this alignment for denning purposes, and could potentially be impacted by construction activity.

Alternatives 5a, 5b, and 5c. These alternatives are believed to be the most beneficial to wildlife, with little known impacts. These alternatives would leave important rookery vegetation intact on both sides of the Tamiami Trail and reduce potential impacts to mink denning areas. Road-related mortality of the Everglades mink, with at least 14 documented occurrences, would essentially be eliminated. However, the leaving in place of renovated sections of the old roadbed under Alternatives 5a and 5b could possibly provide suitable habitat for Everglades mink and oviposition sites for alligators and other egg-laying reptiles, as well as provide safe havens for terrestrial wildlife during high water periods.

Alternatives 6a and 6b. Alternative 6a would produce impacts to the two Tamiami rookeries as described for alternatives 1 and 2a, above. Alternative 6b and its various options would result in impacts to these rookeries and to the L-29 Canal identical to those described under Alternative 2b, above. Road-related mortality of the Everglades mink and other wildlife would be eliminated at the four-mile bridge, and mink survival could be further enhanced by providing elevated wildlife crossing shelves under the east and west ends of the extended bridge. Mink denning areas could also be protected by avoiding the need to encroach upon the upland sites south of the existing road. Mink habitat could actually be improved by planting the abandoned upland sites south of the Trail with shrubs and trees so as to resemble native Everglades tree island communities.

Alternatives 7a and 7b. Alternative 7a would have negligible permanent impacts on the two Tamiami rookeries, but Alternative 7b would result in impacts as described above for Alternative 2b. However, we believe that greater ecological and wildlife benefits may be derived from these alternatives by a shift of the 3,000-foot bridge to the east of the Blue Shanty Canal. This would result in water discharges onto a land surface with a slightly lower average ground elevation and would be more centrally located in present day northeastern Shark River Slough. This location may likewise facilitate the safe passage of wildlife, especially if the bridge were equipped with a wildlife shelf.

Alternatives 8a and 8b. Alternative 8a would likewise have little effect on the two Tamiami rookeries, as long as new box culverts are not constructed at the rookery locations. Alternative 8b would produce impacts similar to those described for Alternative 2b. The additional box culverts under these alternatives, if placed at strategic locations, could improve the passage of aquatic and semiaquatic fauna across the roadway, especially if animal barriers were erected to deflect animals to the culvert crossings.

Potential loss of Everglades marsh and connectivity effects

In order to ascertain the potential impacts that each alternative iteration would pose to the functionality of wetlands, a multi-agency team was assembled to apply the Wetland Rapid Assessment Procedure (WRAP) to the various wetland plant communities in the Tamiami Trail corridor. The results of this assessment found that the functional value of wetland communities immediately north of the L-29 Levee in WCA-3B were of somewhat higher quality (average score of 0.74) than similar wetlands situated immediately south of the Tamiami Trail in the Everglades Expansion Area of Everglades National Park (average score of 0.62).

Alternatives 1, 2a, 2b to 2b6, 4a, and 4b to 4b6. The nine water quality treatment options of 4b through 4b6, 2b, and 2b1 were predicted to result in the loss of from 34

(2b1) to 64 (4b) wetland functional units in the Everglades Expansion Area, whereas Alternative 4a (without water quality treatment) was little better, with a predicted loss of 40 wetland functional units (Table 1). By comparison, Alternative 2a, using the existing highway alignment and four new bridges, resulted in a relatively low loss of wetland function (10 units) at a substantially lower cost than the 2b2 to 2b6 water quality treatment options. Each of these alternatives physically connect the L-29 Canal to the marsh in Everglades National Park for only 2.5% of the entire project corridor length (i.e., create a 2.5% marsh-canal interface) by means of the four new bridges; however, creative water quality treatment options b1 to b3 of Alternatives 2, 4, and 6 would encroach into the L-29 Canal.

Alternatives 3a and 3b. The seven water quality treatment options of 3b through 3b6 presented for Alternative 3 were predicted to result in the loss of from 15 to 30 wetland functional units in WCA-3B, whereas Alternative 3a (without water quality treatment) was predicted to result in the loss of 19 functional units (Table 1). Although north-south connectivity for these alternatives is stated to be 10%, the primary purposes of the eight bridges that supposedly create this connectivity are to cross the L-29 Canal, and to span the two S-355 and three weir water conveyance structures on the L-29 Levee. Connectivity between the L-29 Canal and wetlands to the south would be no greater in Alternative 3 than under Alternatives 2 or 4, since no additional breaching of the Tamiami Trail is included under this alternative.

Alternatives 5a, 5b, and 5c. This suite of alternatives performs the best in that there is actually a net gain in functional units of wetlands (from 29 units in 5b to 45 units in 5c) compared to the base condition. Connectivity under Alternatives 5a (98%) and 5c (nearly 100%) are excellent, but if in situ water quality treatment is required (5b), connectivity would decrease markedly to 75% due to the need to leave sections of the old highway bed in place for dry retention. From a purely ecological perspective, without regard to cost or authority, Alternative 5 appears to exhibit the best overall performance.

Alternatives 6a and 6b. Alternative 6a would result in the loss of only 6.6 wetland functional units (< 10 acres) whereas Alternative 6b would result in significantly greater losses (22.8 functional units) due to the broad footprint necessary for water quality treatment. Alternative 6a is also estimated to result in about a 36% opening of the entire 10.7-mile length of the Tamiami Trail corridor, providing for a significant improvement in aquatic connectivity. Alternative 6b would provide a reduced level of connectivity (27%) due to the necessity to leave portions of the old Tamiami Trail for water quality treatment.

Alternatives 7a and 7b. Alternative 7a would result in a minimal loss of only 3.4 functional units (5 acres) of marsh. In contrast, the acreage demand for standard water

quality treatment along 10 miles of roadway in Alternative 7b would result in wetland losses approaching 50 functional units (72 acres). Both of these alternatives would result in a 5% increase in the connectivity of the L-29 Canal to Everglades marshes in the south near the western end of the project area. The ground elevation of the Everglades marsh at the western end of the project area appears to be slightly higher than at other locations to the east. If this is actually the case, the aquatic connectivity between the L-29 Canal and the marshes south of the Tamiami Trail would be severed sooner during low water conditions than would occur if such an opening were situated at a point east of the Blue Shanty Canal. Aquatic connectivity may even be reduced beyond current levels during periods of low water if Alternative 7b were selected, since the existing culverts would be filled in.

Alternatives 8a and 8b. Alternative 8a would likewise produce a minimal loss of only 3.5 wetland functional units, resembling Alternative 7a. However, wetland losses under Alternative 8b would be considerably greater (46.6 functional units). These alternatives rely on additional box culverts to convey Mod Waters flows, and would increase connectivity between the L-29 Canal and the marsh south of the roadway by a mere 0.4%. These alternatives are not compatible with the CERP concept of removing the Tamiami Trail as an impediment to flow by elevating portions of the roadway.

Features for reducing road-related wildlife mortality

In an effort to obtain some data that could be used for evaluating the need for highway features that could be employed to reduce road-related wildlife mortality, and that could be used as an aid in determining the placement of such features along the project corridor, biologists from the FWC, the U.S. Fish and Wildlife Service, and the COE conducted a survey of wildlife mortality along five miles of the Tamiami Trail corridor. Remains representing 411 individual animals were found during a walking survey of 3 miles of the Tamiami Trail on December 19-20, 2000 (Tables 2, 3, and 4) and of 2 miles on April 18, 2001 (Tables 5 and 6). During these single visit surveys, an average of 82 wildlife deaths were recorded per mile. If this same level of mortality is extrapolated for the entire 10.7 mile road corridor, the number of road-kill casualties observable on a given day would equal 880 individuals. However, since 60% of the survey length was surveyed during the coldest part of the year when reptile activity is at its lowest point, and since many carcasses are quickly scavenged from the road before they can be counted, we believe that the actual mortality would likely be several times greater than this. For example, during December, an average of 2 dead snakes and 1 alligator were documented per mile of highway; these numbers increased dramatically, following a marsh dry-down in April, to an average of 22 dead snakes and 7 alligators per mile. An Arizona study (Kline and Swann 1998) attempting to quantify wildlife road mortality found that only 24% of road-killed animals recorded during all-night surveys were discovered on surveys the following day. Likewise, a

daily walking survey of a section of central Florida secondary highway found that most road-killed snakes were present for only a day or two, with few remains detectable for as long as two weeks (Kristin Wood, pers com.). During our study, aquatic turtles were the most commonly encountered taxa group, accounting for 66% of the total recorded mortality, followed by snakes (13%), birds (10%), mammals (5.5%), alligators (4.5%), and frogs (1%). A total of 21 species were identifiable from the remains, including 4 turtles, 7 snakes, the alligator, 4 birds, and 5 mammals. Due to the tendency for turtle shell fragments to persist for long periods of time along the road, their prevalence may have actually been less than suggested in our surveys. Aquatic or semiaquatic reptiles dominated the survey with only one terrestrial snake (*Elape guttata*) detected. Of the mammals found, only the river otter and the marsh rat were semiaquatic. The other road-killed mammals, requiring an upland habitat component, included the racoon, the opossum, and the armadillo.

The construction of animal barriers along the Tamiami Trail corridor in between the bridges or culverts on both sides of the road could aid in reducing road-related wildlife mortality. Perhaps a barrier based on the design currently being used at Payne's Prairie State Preserve south of Gainesville, Florida would serve well here also. The review of an unpublished evaluation by Dick Franz (1996) on the effectiveness of different barrier heights ranging from one to four feet suggests that a 2-foot barrier would be sufficient for deterring all turtles, all small snakes and most large-bodied aquatic snakes, all ranid frogs, most alligators, and all rabbits. The addition of a six-inch overhang would further increase the effectiveness of this barrier. It would be difficult to exclude arboreal animals such as racoons, opossums, treefrogs, and rat snakes, and potentially large alligators, even with the 4-foot barrier design. Furthermore, the 4-foot barriers would be a difficult obstacle for bank fishermen to traverse, especially if an over-hanging lip is present. The scenic vistas of the Everglades from the highway would likewise be greatly reduced by a 4-foot barrier. For these reasons, and the high cost ($124.24/ linear foot) associated with constructing the higher concrete barriers, we recommend that a 2-foot barrier height be considered in project design. Further cost reductions could be achieved by using alternate barrier materials such as a low field fence with aluminum flashing at the base.

Since most mammal mortality was documented in the first and last mile of the project corridor (Tables 3 and 4), we believe that the use of wildlife underpasses and diversion fences to connect the L-30 to the L-31 Levee and the L-67A to the L-67 Extension Levee would help alleviate much of the mammalian mortality. A wildlife crossing at the L-30 Levee would be of most value since no crossing of the L-29 Canal currently exists here, and because the L-30 and L-31 levees must remain in place for flood protection. Neither would this location impede boat use of the L-29 Canal. A successful and economical design used on State Road 29 by the Florida Department of Transportation consists of a 50-foot concrete slab bridge placed in the highway alignment, providing a 24-foot-wide passageway with a clearance height of 8 feet. The diversion fences for channeling animals to the crossings should be of a small mesh design and extend for one-half mile on each side of the underpass. The only other section of road surveyed that

exhibited a trend of greater mammal mortality and where the greatest number of historic Everglades mink road-kills have been documented was the 1-mile section centered at the Blue Shanty Canal (Table 5). Consequently, if the western end of the bridge expanse were relocated to the vicinity of the Blue Shanty Canal, the installation of a bridge shelf there could create a safe passage corridor for mammals and other wildlife that utilize this tree-lined agricultural canal that traverses the Tamiami Trail. A shelf width of 10 to 15 feet placed at an elevation slightly above the mean high water line would accommodate the larger animals as well as the small.

Furthermore, an improved highway design will most likely lead to faster driving speeds by motorists, which may necessitate strict enforcement of posted speed limits and stiff fines to insure that wildlife mortality does not increase.

Concerns and Recommendations

Given the stated authority limitations of the COE and the financial limitations of Everglades National Park to implement alternatives such as Alternative 5 or 6 for the Tamiami Trail portion of the Mod Waters project, Alternative 7a, or a derivative thereof, would appear to be the most reasonable interim alternative to implement prior to the approval of a more permanent solution under CERP. Although implementation of Alternative 7a will not entirely remedy all of the predrainage flow characteristics that existed prior to construction of the Tamiami Trail, it is anticipated to be capable of handling a shift in the bulk of Shark River flow volumes that will be channeled from the west side of the L-67 Levee to the east and into northeastern Shark River Slough.

Lacking in-house hydrological expertise, we must rely on the COE's modeling results, which indicate that a design high water level of 9.3 feet is sufficient for protecting the integrity of the Tamiami Trail road base, as the basis for our support of Alternative 7a. We note that the approved CERP conceptual plan, Alternative D-13R, as designed, is not expected to return the Everglades entirely to its historical flow regimes. The CERP plan may, in fact, need to be improved upon in order to reduce unnaturally high water levels and inundation periods that have been predicted under Alternative D-13R for WCA-3B. However, should any re-evaluation by the COE suggest that the design high water level of 9.3 feet would not be adequate to efficiently move flood water out of WCA-3B, then we would favor the adoption of a higher criterion to lessen the likelihood of deleterious flooding impacts upon the wildlife and vegetative communities of WCA-3B.

In summary, we offer the following recommendations concerning the alternatives under consideration, including possible improvements to Alternative 7a, the preliminary preferred alternative.

1. We support the idea of selecting an alternative that would be as compatible as possible with the upcoming CERP Decompartmentalization Project, and recommend that a real estate agreement between the COE and the Florida Department of Transportation for the Tamiami Trail be pursued in lieu of raising the profile of the roadway.

2. We understand that water quality treatment will probably not be required at this time since the impervious surface of the highway is not expected to significantly increase. Due to the potential for significant losses of high quality wetlands, impacts to important wildlife habitats, impacts to bank fishing, and possible incompatibility with CERP that would occur by including water quality treatment, we support the implementation of a water quality monitoring plan to ascertain whether treatment would be desirable in the future.

3. We are concerned about the potential reduction in public recreational access to the FSTWMA and fishing sites along the Tamiami Trail that could occur under Alternatives 3a, 3b, and the water quality treatment options b1 to b3 of Alternatives 2, 4, and 6, since such access is anticipated to decline as a result of restoration activities associated with both the Conveyance and Seepage component of Mod Waters and with the Decompartmentalization of WCA-3A Project of CERP. We are pleased to see at this time that, apart from a temporary lack of access to the south bank of the L-29 Canal during construction, Alternative 7a is expected to have minimal impacts on recreational use. However, special attention will need to be given to the siting of construction staging areas so that access is not blocked to the three boat ramps and parking facilities associated with the popular Recreation Site No. 4, the boat ramp and parking facility at Recreation Site No. 1, or to the boat ramp facility located west of the S-12D structure.

4. Of the viable alternatives being considered for this project, Alternative 7a would appear to have the least amount of impact on fish and wildlife resources. However, we believe that greater ecological and wildlife benefits may be derived from this alternative by a shift of the bridge from the proposed site one mile east of the L-67 Levee to a location east of the Blue Shanty Canal. If feasible, the placement of the western end of the bridge span, equipped with a wildlife crossing shelf beneath it, at a location immediately east of the Everglades Safari Airboat concession could aid in the reduction of wildlife mortality, particularly of the threatened Everglades mink.

5. Since wading bird and snail kite nesting patterns, as well as Everglades mink territories may vary with the prevailing hydrological conditions, surveys should be conducted on an annual basis by qualified biologists to determine whether any

nesting efforts of state and federally protected bird species, or mink dens, would potentially be affected, prior to the commencement of construction activities.

6. Alternatives 2b, 3a, 3b, 4a, 4b, 6b, 7b, and 8b produce an unacceptable amount of wetland functional loss, result in permanent impacts to wading bird rookeries, and have the potential to impact the threatened Everglades mink population; therefore, we recommend that they be removed from further consideration as ecologically viable alternatives.

7. Results from our preliminary wildlife mortality surveys and historical information suggest that there is a need for a more detailed wildlife mortality study on this portion of the Tamiami Trail prior to the completion of the Decompartmentalization Phase I project design plans.

8. Any reduction in recreational access or use of the Francis S. Taylor Wildlife Management Area that occurs in connection with this project would need to be compensated for on terms amenable to the FWC. We urge that the COE devise a program whereby the development of the recreational potential, adequate to meet anticipated public-use requirements, is more fully incorporated into project plans.

Sincerely,

Brian Barnett, for

Bradley J. Hartman, Director
Office of Environmental Services

BHH/DTT
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cc: Mr. Jay Slack, FWS, Vero Beach
Ms. Maureen Finnerty, END, Homestead
Ms. Doris Marlin, COE, Jacksonville
Dr. Hanley "Bo" Smith, COE, Jacksonville
Mr. Mark Robson, FWC, South Region

Literature Cited

Florida Game and Fresh Water Fish Commission. 1960. Recommended Program for Conservation Area 3. Vero Beach, Florida.

Kline, N.C. and D.E. Swann. 1998. Quantifying Wildlife Road Mortality in Saguaro National Park *in* Proceedings of the International Conference on Wildlife Ecology and Transportation FL-ER-69-98, Florida Department of Transportation, Tallahassee, Florida. 263 pp.

Table 1. Description of Alternatives being considered for the Tamiami Trail Project and their effects on wetland extent and function as determined by the Wetland Rapid Assessment Procedure.

Alternative	Description	Acres Lost	Functional Units Lost- / Gained+
1	Existing alignment and profile with 4 new bridges without water quality treatment	-1.6	-2.9
2a	Existing alignment with raised profile and 4 new bridges without water quality treatment	-11.8	-10.1
2b	Existing alignment with raised profile, 4 new bridges, with standard dry detention water quality treatment	-86.0	-37.5
2b Options	"Creative" water quality treatment options		
2b 1	Shift alignment to north and compress swale with wall elements/south side	-44.6	-33.6
2b 2	Shift alignment to north and compress swale with wall elements/north side	-8.0	-8.4
2b 3	Shift typical section north encroaching approximately 50 ft. into L-29 Canal	-8.0	-8.4
2b 4	Grass strips	-8.0	-8.4
2b 5	Exfiltration trenches with curb and gutter	-8.0	-8.4
2b 6	Exfiltration trenches with shoulder gutter	-7.9	-8.3
3a	New north alignment in WCA-3B with raised profile and 8 new bridges without water quality treatment	-14.3	-18.8
3b	New north alignment in WCA-3B with raised profile, 8 new bridges, and standard dry detention water quality treatment	-28.9	-30.2
3b Options	"Creative" water quality treatment options		
3b 1	Modified 2b 1 Option	-22.8	-25.4
3b 2	Modified 2b 2 Option	-10.6	-16.0
3b 3	Modified 2b 3 Option	-13.5	-18.2
3b 4	Grass strips	-9.6	-15.2
3b 5	Same as 2b 5	-10.3	-15.8
3b 6	Same as 2b 6	-10.4	-15.9

Alternative	Description	Acres Lost	Functional Units Lost (-) / Gained
4a	New south alignment with raised profile and 4 new bridges without water quality treatment	-68.4	-40.4
4b	New south alignment with raised profile, 4 new bridges, and standard dry detention water quality treatment	-103.9	-64.4
4b Options	"Creative" water quality treatment options		
4b 1	Modified 2b 1 Option	-62.6	-36.5
4b 3	Modified 2b 3 Option	-62.5	-36.5
4b 4	Grass strips	-61.3	-35.6
4b 5	Same as 2b 5	-62.6	-36.5
4b 6	Same as 2b 6	-62.5	-36.5
5a	Elevated roadway within existing right-of-way without water quality treatment	57.3	39.3
5b	Elevated roadway within existing right-of-way with water quality treatment	43.0	29.5
5c	Elevated roadway within existing right-of-way, without water quality treatment, with degradation of the existing highway embankment	65.9	45.3
6a	Existing alignment with raised profile, 4-mile bridge and 8 new box culverts without water quality treatment	-9.6	-6.6
6b	Same as alternative 6a with standard dry detention water quality treatment	-33.3	-22.8
6b Options	"Creative" water quality treatment options		
6b 1	Same as Option 2b 1 applied to remaining roadway	-30.4	-20.9
6b 2-6b 5	Same as Option 2b 2 - 2b 5 applied to remaining roadway	-4.8	-3.3

Alternative	Description	Acres Lost	Functional Units Lost- / Gained+
7a	Existing alignment with raised profile and 3000-foot bridge without water quality treatment	-5.0	-3.4
7b	Existing alignment with raised profile and 3000-foot bridge with standard dry detention water quality treatment	-72.4	-49.5
7b Options	"Creative" water quality treatment options		
7b 1	Same as Option 2b 1 applied to remaining roadway	-10.4	-7.2
7b 2	Same as Option 2b 2 applied to remaining roadway	-5.0	-3.4
7b 3	Same as Option 2b3 applied to remaining roadway	-10.4	-7.2
8a	Existing alignment with raised profile and 24 additional culverts without water quality treatment	-5.1	-3.5
8b	Existing alignment with raised profile and 40 additional culverts with standard dry detention water quality treatment	-68.0	-46.6
8b Options	"Creative" water quality treatment options		
8b 1& 8b3	Same as Options 2b1& 2b 3 applied to remaining roadway	-15.9	-7.5
8b2	Same as Option 2b2 applied to remaining roadway	-5.1	-3.5
" 9a"	Existing alignment with raised profile, 2.7-mile bridge and 8 new box culverts without water quality treatment	-2.8	-1.9
"9b"	Existing alignment with raised profile, 2.7-mile bridge and 8 new box culverts with standard dry detention water quality treatment	-39.1	-33.4

Table 2. Wildlife remains identified along Tamiami Trail, one-half mile on each side of Agricultural Canal at Coopertown, located four miles west of S-334 (December 19, 2000).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	16	12	28
Snakes	1	2	3
Frogs	1	1	2
Alligators	0	0	0
Birds	0	0	0
Mammals	0	1	1
Unidentified	1	4	5
SOUTH SIDE OF TAMIAMI TRAIL			
	East ½ mile	West ½ mile	Total
Turtles	4	6	10
Snakes	0	3	3
Frogs	0	0	0
Alligators	0	1	1
Birds	4	1	5
Mammals	0	0	0
Unidentified	2	1	3

TOTAL: 61

Table 3. Wildlife remains identified along one mile of Tamiami Trail beginning at the Flight 592 Memorial adjacent to the L-67 Canals and ending ½ mile east of Osceola Camp (December 20, 2000).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	11	7	18
Snakes	0	0	0
Frogs	0	0	0
Alligators	0	0	0
Birds	3	0	3
Mammals	0	1	1
Unidentified	0	0	0

Table 3. Continued

SOUTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	5	4	9
Snakes	0	0	0
Frogs	0	0	0
Alligators	1	1	2
Birds	1	0	1
Mammals	2	4	6
Unidentified	2	2	4

TOTAL: 44

Table 4. Wildlife remains identified on December 20, 2000 along one mile of Tamiami Trail beginning at the L-30 Canal extending one mile west and ending at a bank of culverts (Begin: UTM 550299 N; 2849310 E End: 548615 N; 2849297 E).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	38	20	58
Snakes	0	0	0
Frogs	0	0	0
Alligators	0	0	0
Birds	3	0	3
Mammals	3	0	3
Unidentified	0	1	1
SOUTH SIDE OF TAMIAMI TRAIL			
	East ½ mile	West ½ mile	Total
Turtles	18	4	22
Snakes	0	0	0
Frogs	0	0	0
Alligators	1	1	2
Birds	1	2	3
Mammals	2	1	3
Snakes	1	1	2

TOTAL: 97

Table 5. Wildlife remains identified by FWC on April 18, 2001, along one mile of Tamiami Trail (between culverts #44 to #46 at the Blue Shanty Canal [culvert #45]).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	18	3	21
Snakes	1	0	1
Frogs	0	0	0
Alligators	2	2	4
Birds	0	0	0
Mammals	0	1	1
Unidentified	1	1	2
SOUTH SIDE OF TAMIAMI TRAIL			
Turtles	19	12	31
Snakes	4	2	6
Frogs	0	0	0
Alligators	2	1	3
Birds	3	3	6
Mammals	1	5	6
Unidentified	1	0	1

TOTAL: 82

Table 6. Wildlife remains identified by FWC on April 18, 2001, along one mile of Tamiami Trail (between culverts #56 to #54 at the Tamiami West woodstork colony [culvert #55]).

NORTH SIDE OF TAMIAMI TRAIL			
Class	East ½ mile	West ½ mile	Total
Turtles	16	20	36
Snakes	5	3	8
Frogs	2	1	3
Alligators	1	2	3
Birds	4	6	10
Mammals	0	0	0
Unidentified	1	1	2
SOUTH SIDE OF TAMIAMI TRAIL			
Turtles	9	15	24
Snakes	23	7	30
Frogs	0	0	0
Alligators	2	2	4
Birds	4	3	7
Mammals	0	0	0
Unidentified	0	0	0

TOTAL: 127

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FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

BARBARA C. BARSH
Jacksonville

QUINTON L. HEDGEPETH, DDS
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H.A. "HERKY" HUFFMAN
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DAVID K. MEEHAN
St. Petersburg

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Pensacola

JOHN D. ROOD
Jacksonville

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

OFFICE OF ENVIRONMENTAL SERVICES
BRADLEY J. HARTMAN, DIRECTOR
(850)488-6661 TDD (850)488-9542
FAX (850)922-5679

February 26, 2001

Colonel James G. May
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: General Reevaluation Report/ Supplemental Environmental Impact Statement, Tamiami Trail Modifications Project, Modified Water Deliveries to Everglades National Park, Miami-Dade County

Dear Colonel May:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the draft Supplement to the 1992 General Design Memorandum and Final Environmental Impact Statement (GRR/SEIS) for the Tamiami Trail Project of Modified Water Deliveries to Everglades National Park ("Mod Waters"), dated December 22, 2000. This planning aid letter is submitted under the authority of the Fish and Wildlife Coordination Act of 1973.

Description of Alternatives

The reason that a GRR/SEIS is being developed is that new information acquired since the project was approved in 1992 indicates that the original design would be insufficient to pass the volume of water that would need to be conveyed under the Tamiami Trail via Mod Waters. Nine basic alternatives, four of which contain from one to six different water quality treatment options, are being considered. After the GRR/SEIS was distributed, the Department of Interior submitted an additional alternative, referred to here as alternative six. In addition, we have been told that another alternative utilizing box culverts has been evaluated by your staff in house, but has not yet been distributed for wider review. For a short description of these alternatives, please refer to Table 1. We have three major areas of concern with regard to the potential impacts of this project: (1) impacts to existing recreational facilities and access points, (2) impacts to fish and wildlife resources, and (3) potential loss of Everglades marsh.

Impacts to Existing Recreational Facilities and Access Points

Consideration of impacts to recreation facilities developed by the Florida Game and Fresh Water Fish Commission under the authority of the Land and Water Conservation Fund Act (P.L. 88-578) and the Federal Water Project Recreation Act (P.L. 89-72) should be carefully examined. Within the project area, there exist at least six developed marsh or canal access points, of which at least four contain an FWC-maintained boat ramp permitted by the South Florida Water Management District, and all sites possess a limited amount of primitive parking space. Three of these boat ramp facilities provide access to the Francis S. Taylor Wildlife Management Area (Water Conservation Area [WCA]-3B), one (#153) is located approximately 3 miles west of the S-334 structure and provides access to the northern bank of the L-29 canal, while the other two, located at opposite ends of the project area, provide airboat access to the marsh. The boat ramp immediately north of the S-333 structure provides access to the popular L-67A canal, while another ramp at the juncture of the L-67A and L-67C levees provides access to the L-67C canal and to "the pocket" of WCA-3B. The last facility, located immediately west of the S-12D structure, provides access to the L-29 canal and adjacent marshes of WCA-3A, both portions of the Everglades Wildlife Management Area. Of the four established recreation sites, three are still present. Recreation site No. 1 is located on the L-29 levee immediately east of the S-334 structure. Recreation site No. 2 is located about 3 miles west of Site No. 1 and includes the only FWC boat ramp for access to this 11-mile stretch of the L-29 canal. Recreation site No. 4, located adjacent to the S-333 structure, harbors three boat ramps and is the most important access point on the Tamiami Trail for boaters.

It is probable that the enhanced connectivity created by the Seepage and Conveyance portion of the Mod Waters through employment of the two S-355 structures and the three weirs across the L-29 levee, combined with the accompanying greater water depths, will lead to an improved fishery along this eleven-mile stretch of the L-29 canal and at associated structures. Such an enhanced fishery would result a greater amount of use by the fishing public, and may warrant improved recreational access to the L-29 canal and its associated conveyance structures, particularly given the proximity of this area to greater Miami. Consequently, those aspects of the various alternatives that further enhance connectivity between the L-29 canal and the adjacent marsh habitats would have a positive effect on the L-29 canal fishery as well as improve compatibility with the Decompartmentalization Phase 1 Project of the Comprehensive Everglades Restoration Plan (CERP). Of course, all of the potential benefits that could be realized through increased connectivity between the L-29 canal and adjacent marshes are contingent on the maintenance of some deeper water habitat in the L-29 canal. The potential impacts associated with each group of alternatives are listed as follows.

1. <u>Alternatives 1, 2a, 2b to 2b6, 4a, and 4b to 4b6</u>. Each of these alternatives physically connect the L-29 canal to the marsh in Everglades National Park for only 2.5% of the entire project corridor length (i.e., create a 2.5% marsh-canal interface) by means of the four new bridges; however, creative water quality treatment options b1 to b3 of alternatives 2, 4, and 6 would encroach into the L-29 canal. We understand from

statements made by your staff that it will be necessary to maintain the water supply conveyance capacity of the L-29 canal for some undefined period of time, which would necessitate maintaining deeper water conditions in this section of the canal. Nevertheless, the above-mentioned water quality treatment options would encroach into the south portion of the L-29 canal, with a concomitant widening of the canal to the north. This option would essentially eliminate any existing littoral zone on the south bank of the canal and would result in the loss of the boat ramp located on the north bank of the L-29 canal.

2. Alternatives 3a and 3b. Each of these alternatives would provide a 10% marsh-canal interface along the project corridor through the addition of eight new bridges; however, a reduction in available parking space on the north side of the L-29 canal for recreational users in alternatives 3a and 3b would negatively impact recreational access. Recreation site No. 2 would also probably be negatively affected by this northerly road alignment.

3. Alternatives 5a and 5b. The ultimate increase in connectivity would be realized with alternative 5A, which would provide a 98% opening of the corridor, with alternative 5b providing a very beneficial 75% opening. Although access to the north bank of the L-29 canal would be reduced for bank anglers, fishing opportunities may still exist if fishing access is available to anglers from the elevated bridge span.

4. Alternatives 6a and 6b. This alternative is estimated to result in about a 35% opening of the entire length of the Tamiami Trail corridor. Although approximately 4 miles of the northern bank of the L-29 canal would be unavailable to bank anglers, the remaining 6 miles should still be accessible. As in alternative 5, less opportunity would be lost if fishing access is possible from the bridge span.

Impacts to Fish and Wildlife Resources

Of particular concern are the potential impacts that an alternative could have on state-listed species of wildlife or important habitat components. There are three historic wading bird rookeries containing species listed by the state as endangered or species of special concern, recent records of endangered snail kite nests in southern WCA-3B, a number of records of the threatened Everglades mink along the highway corridor, and the occasional occurrence of the endangered West Indian manatee in the L-29 canal. In addition, other listed species such as the limpkin and roseate spoonbill (both listed as species of special concern) utilize marsh areas, and the least tern (threatened) forages in canal habitats that could be impacted under certain alternatives. The potential impacts that could occur are listed by alternative groups as follows.

1 Alternatives 1 and 2a. The temporary road for detouring traffic while proposed bridge #3 is under construction would encroach into the pond apple forest at the Tamiami West colony, on the south side of the Tamiami Trail, that provides nesting substrate for white

ibis, tricolored herons, little blue herons, snowy egrets, and wood storks. Consequently, this forested area would be eliminated as a nesting substrate for an unknown number of years. Any heavy construction activity, including construction of the temporary road, should be conducted outside of the wading bird nesting season, which normally extends from early February to the onset of the rainy season.

2. Alternative 2b. This alternative encroaches to a greater extent (average of 51 feet) into the marsh south of the existing Tamiami Trail with incursions of 5 to 6 additional feet at bridge approaches. Consequently, this alternative would have a greater permanent impact on the Tamiami East and Tamiami West wading bird colonies due to a greater permanent loss of nesting substrate as well as a decrease in the amount of buffer capacity available. The Everglades mink has been documented to use both natural and artificial upland areas for denning purposes; therefore, this alternative could potentially impact mink denning areas that may occur in either native upland areas or at the artificially created upland areas where the airboat concession sites are located. Option 2b1, which shifts the alignment to the north, is only a slight improvement over alternative 2b.

The 2b creative water quality treatment options of 2b2 to 2b6 (Table 1) result in much more modest incursions into the two Tamiami wading bird colonies; however options 2b2 and 2b3 would eliminate littoral zone elements on the south shore of the L-29 canal, eliminate reptile oviposition and basking sites on the south shore of the canal, and could result in the entrapment of terrestrial animals attempting to cross the canal.

3. Alternatives 3a and 3b. Both of these alternatives and the various 3b options presented would result in the loss of a significant amount of high quality wildlife. The Frog City wading bird colony, which has been documented to contain nesting tricolored herons and great egrets, would be either eliminated or severely impacted by the road alignment, which encroaches further into the marsh at this point in order to avoid the Tigertail Camp. There could potentially be dens of the Everglades mink in the L-29 levee, as well.

4. Alternatives 4a and 4b. Both of these alternatives would produce significant incursions into the Tamiami West and Tamiami East wading bird rookeries, as well as eliminate important swamp forest habitat along the remainder of the corridor. Although options 4b1-4b6 would reduce the amount of encroachment from alternative 4b, they are only slightly better than alternative 2b. The Everglades mink has been documented to use some of the man-made upland sites along this alignment for denning purposes, and could potentially be impacted by construction activity.

5. Alternatives 5a and 5b. These alternatives are believed to be the most beneficial to wildlife, with no known impacts. These alternatives would leave important rookery vegetation intact on both sides of the Tamiami Trail and minimize potential impacts to mink denning areas. Road-related mortality of the Everglades mink, with at least 14

documented occurrences, would essentially be eliminated. Other mammals, reptiles, and amphibians would similarly benefit.

6. Alternatives 6a and 6b. Alternative 6a would produce impacts to the two Tamiami rookeries as described for alternatives 1 and 2a, above. Alternative 6b and its various options would result in impacts to these rookeries and to the L-29 canal identical to those described under alternative 2b, above. Road-related mortality of the Everglades mink and other wildlife would be eliminated at the four-mile bridge, and mink survival could be further enhanced by providing elevated wildlife crossing shelves under the east and west ends of the extended bridge. Mink denning areas could also be protected by avoiding the need to encroach upon the upland sites south of the existing road. Mink habitat could actually be improved by the planting of these upland sites to resemble native Everglades tree island communities.

Potential Loss of Everglades Marsh

In order to ascertain the potential impacts that each alternative iteration would pose to the functionality of wetlands, a multi-agency team was assembled and the Wetland Rapid Assessment Procedure (WRAP) applied to the various wetland plant communities in the Tamiami Trail corridor. The results of this assessment revealed that the functional value of wetland communities immediately north of the L-29 levee in WCA-3B were of somewhat higher quality (average score of 0.74) than similar wetlands situated immediately south of the Tamiami Trail in the Everglades Expansion Area of Everglades National Park (average score of 0.62). The seven water quality treatment options of 3b through 3b6 presented for alternative 3 were predicted to result in the loss of from 16 to 30 wetland functional units in WCA-3B, whereas alternative 3a (without water quality treatment) was predicted to result in the loss of 19 functional units (Table 1). Likewise, the nine water quality treatment options of 4b through 4b6, 2b, and 2b1 were predicted to result in the loss of from 34 to 65 wetland functional units in Everglades National Park, whereas alternative 4a (without water quality treatment) was predicted to result in the loss of 40 wetland functional units (Table 1). We believe that the amount of wetland function that would be lost under any of the above alternatives is unacceptable given the loss of native habitat that has already occurred in the Everglades. However, we would wholeheartedly support alternative 5 and its variations which actually results in gains of from 30 to 45 wetland functional units. The new four-mile bridge alternative (referred to in this document as alternative six) that has only recently been proposed to the Army Corps of Engineers by the U.S. Fish and Wildlife Service and Everglades National Park, with our support, would result in a minimal loss of wetland function. Alternatives 6b2 through 6b6 are predicted to result in the loss of only 3.3 wetland functional units. Alternatives 2b2 through 2b6, although not as desirable as alternative 5 or alternatives 6b2 through 6b6, would have relatively low impacts on wetlands, with only about 8 functional units lost (Table 1).

Summary and Recommendations

We are concerned about the potential loss of public recreational fishing and boating opportunities that could occur with this project, since such opportunities are anticipated to decline as a result of restoration activities associated with both the Conveyance and Seepage component of Mod Waters and the Decompartmentalization Project of CERP. Other upcoming components of CERP such as the Water Preserve Areas Feasibility Study are, as designed at this point, anticipated to offer little in terms of compensating for the recreational fishing opportunities that will be lost with the filling of internal canals in the Everglades and Francis S. Taylor Wildlife Management Areas. Consequently, in light of these anticipated losses, whenever an opportunity exists to maintain important recreational facilities and recreational opportunities that do not significantly impinge on the restoration of the greater Everglades ecosystem, we believe that the recreational value of such features to the local public should receive strong consideration in the decision-making process. In short, a program for the development of the recreational potential, adequate to meet anticipated public-use requirements, should be incorporated into project plans.

In terms of potential impacts to fish and wildlife, alternatives 5a and 5b appear to be the most desirable, since they would result in an increase in wetland function, avoid permanent impacts to wading bird rookeries, provide maximum connectivity across the Tamiami Trail, minimize wildlife road-related mortality, and could continue to provide recreational fishing and boating opportunities, provided that bank fishermen could access the L-29 canal from the bridge and boating access to the L-29 canal remains via public boat ramps. On the other hand, alternatives 2b, 3a, 3b, 4a, and 4b produce an unacceptable amount of wetland functional loss, result in permanent impacts to wading bird rookeries, and have the potential to impact the threatened Everglades mink population; therefore, we recommend that they be removed from further consideration as ecologically viable alternatives.

Sincerely,

Bradley J. Hartman

Bradley J. Hartman, Director
Office of Environmental Services

BJH/DTT
ENV 2-16/4
TamTrail_FWCAR.let
Enclosure
cc: Mr. Stephen Forsythe, FWS, Vero Beach
Ms. Maureen Finnerty, ENP, Homestead
Ms. Doris Marlin, COE, Jacksonville
Dr. Hanley "Bo" Smith, COE, Jacksonville

Table 1. Description of Alternatives being considered for the Tamiami Trail Project and their effects on wetland extent and function as determined by the Wetland Rapid Assessment Procedure.

Alternative	Description	Acres Lost	Functional Units Lost- / Gained+
1	Existing alignment and profile with 4 new bridges without water quality treatment	-1.6	-2.9
2a	Existing alignment with raised profile and 4 new bridges without water quality treatment	-1.6	-11.1
2b	Existing alignment with raised profile, 4 new bridges, with standard dry detention water quality treatment	-50.3	-37.5
2b Options	"Creative" water quality treatment options		
2b 1	Shift alignment to north and compress swale with wall elements/south side	-44.6	-33.6
2b 2	Shift alignment to north and compress swale with wall elements/north side	-8.0	-8.4
2b 3	Shift typical section north encroaching approximately 50ft. into L-29 Canal	-8.0	-8.4
2b 4	Grass strips	-8.0	8.4
2b 5	Exfiltration trenches with curb and gutter	-8.0	8.4
2b 6	Exfiltration trenches with shoulder gutter	-7.9	-8.3
3a	New north alignment in WCA-3B with raised profile and 8 new bridges without water quality treatment	-14.3	-18-8
3b	New north alignment in WCA-3B with raised profile, 8 new bridges, and standard dry detention water quality treatment	-28.9	-30.2
3b Options	"Creative" water quality treatment options		
3b 1	Modified 2b 1 Option	-22.8	-25.4
3b 2	Modified 2b 2 Option	-10.6	-16.0
3b 3	Modified 2b 3 Option	-13.5	-18.2
3b 4	Grass strips	-9.6	-15.2
3b 5	Same as 2b 5	-10.3	-15.8
3b 6	Same as 2b 6	-10.4	-15.9

Table 1 continued

Alternative	Description	Acres Lost	Functional Units Lost (-) / Gained
4a	New south alignment with raised profile and 4 new bridges without water quality treatment	-68.4	-40.4
4b	New south alignment with raised profile, 4 new bridges, and standard dry detention water quality treatment	-103.9	-64.6
4b Options	"Creative" water quality treatment options		
4b 1	Modified 2b 1 Option	-62.6	-36.5
4b 3	Modified 2b 3 Option	-62.5	-36.5
4b 4	Grass strips	-61.3	-35.6
4b 5	Same as 2b 5	-62.6	-36.5
4b 6	Same as 2b 6	-62.5	-36.5
5a	New alignment with an elevated bridge structure without water quality treatment	57.3	39.3
5b	New alignment with an elevated bridge span with water quality treatment	43.0	29.5
5c	New alignment with an elevated bridge span without water quality treatment and with L-29 levee removed	65.9	45.3
5d	New alignment with an elevated bridge span with water quality treatment and with L-29 levee removed	49.4	33.9
"6a"	New proposed FWS/ENP/FWC alternative on existing alignment with a 4-mile bridge between Cooper Town and the Blue Shanty Canal, and additional box culverts	N/A	-6.60
"6b"	Same as alternative 6a with standard dry detention water quality treatment	N/A	-22.8
6b Options	"Creative" water quality treatment options		
"6b 1"	Same as Option 2b 1 applied to remaining roadway	N/A	-20.9
"6b 2-6b 6	Same as Option 2b 2 - 2b 6 applied to remaining roadway	N/A	-3.3

a:\table.wpd

Appendix K

SECTION 404(b)(1)

SECTION 404(b)(1) EVALUATION

CENTRAL AND SOUTHERN FLORIDA STUDY
MODIFIED WATERS DELIVERY TO THE
EVERGLADES NATIONAL PARK

PROPOSED IMPROVEMENTS TO THE TAMAIMI TRAIL
DADE COUNTY, FLORIDA

I. Project Description

a. Location. The proposed work will be performed in the western-central portion of Miami-Dade County, Florida (Figure 1). The potentially impacted local areas lie in a narrow strip on the south side of the existing U.S. Highway 41 commonly called the Tamiami (Tampa to Miami) Trail, and the north side of the L-29 Levee. The Tamiami Trail, the L-29 Canal, and particularly the L-29 levee on its north side, form the southern boundary of the South Florida Water Management District's WCA 3B. The south side of the project area is bounded by the Everglades National Park.

The limits of the proposed project begin slightly more than one mile west of the intersection of Krome Avenue and Tamiami Trail and extend approximately 10.7 miles to the west. The L-29 Canal, also known as the Tamiami Canal, runs along the north side of the Tamiami Trail through this area. The project limits are more definitively marked at each end by two water-control structures across the canal, S-334 on the east, and S-333 on the west.

b. General Description. Under the current authorized and approved plan Modified Waters Delivery Plan, water would be transferred from WCA 3A to WCA 3B by constructing three new water control structures at Levee L-67A and three new water control structures at L-67C. Water would be passed from WCA-3B through S-355A and S-355B to the L-29 Canal and through the existing culvert system under the Tamiami Trail into Northeast Shark River Slough. When the General Design Memorandum (GDM) was completed in 1992 it was believed that existing culverts under the roadway would be adequate to convey the flow of water. Subsequent hydrological analyses, however, revealed that the head height in the L-29 Canal required for the culverts to convey the increased water could adversely affect the structure of Tamiami Trail and overtop the highway under certain conditions.

The proposed plan calls for identifying a technical solution to provide modifications to the Tamiami Trail culvert system that would allow for the unimpeded conveyance of water from WCA-3B and the L-29 Canal north of the Tamiami Trail to the Northeast Shark River Slough and the ENP south of the Tamiami Trail, as provided by the 1992 GDM.

The Preliminary Recommended Plan is Alternative 7a, which combines features of Alternative 5 and Alternative 2. It consists of modifying the existing Tamiami Trail profile and typical section at the beginning and end of the project area, and the construction of an approximately 3,000-foot bridge. The bridge will begin approximately one mile from the western end of the corridor. Alternative 7 is divided into two sub-alternatives (7a [without water quality treatment] and 7b [with water quality treatment]).

Under Alternative 7a the existing Tamiami Trail embankment profile and typical section will be modified for approximately one mile at the western end of the project and approximately 9.4 miles at the eastern end. The centerline will fall very close to the centerline of the existing highway. The existing asphalt pavement will be left in place to serve as a base. Low areas will be leveled to a minimum elevation of 11.0 feet, and a 6-inch asphalt overlay will be added.

Approximately 3,000 feet of the roadway would be reconstructed as an elevated structure. The bridge typical section would be standard throughout the entire length, with two travel lanes of 12 feet, two shoulders of eight feet, and outside barriers. The low member elevation would be at an elevation of 13.5 feet. The bridge will be equipped with drain scuppers that would discharge directly to the area below. The existing Tamiami Trail embankment will be removed adjacent to the bridge. Access will be provided to the Airboat Association of Florida site be means of a 35'-1" wide bridge with two 12-foot travel lanes and four-foot shoulders.

The construction cost for Alternative 7a is estimated to be $23,303,807, and the total life cycle cost is estimated to be $26,222,167.

c. Authority and Purpose. The Everglades National Park Protection and Expansion Act (PL101-229, Section 104, 16 U.S.C. Part 410r-5 *et seq.*, December 1989, authorized the Secretary of the Army to undertake certain actions to improve water deliveries to the Everglades National Park (ENP) and to take steps to restore natural hydrologic conditions. This act provides the underlying authority for this project. Section 104 of the Act stated:

- *The Everglades National Park is a nationally and internationally significant resource and the park has been adversely affected and continues to be adversely affected by external factors which have altered the ecosystem including the natural hydrologic conditions within the park. Wildlife resources and their associated habitats have been adversely impacted by the alteration of natural hydrologic conditions within the park, which has contributed to an overall decline in fishery resources and a 90 percent population loss of wading birds.*

The Act also provided direction for the U.S. Army Corps of Engineers to initiate corrective actions to alleviate deterioration in natural resources of ENP attributed to

changes in water conditions associated with construction of the Central and Southern Florida (C&SF) water management system. The Act stated:

- *Upon completion of a final report by the Chief of the Army Corps of Engineers, the Secretary of the Army, in consultation with the Secretary, is authorized and directed to construct modifications to the Central and Southern Florida Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park.*
- *Such modifications shall be based upon the findings of the Secretary's experimental program authorized in section 1302 of the 1984 Supplemental Appropriations Act (97 Stat. 1292) and generally as set forth in a General Design Memorandum to be prepared by the Jacksonville District entitled "Modified Water Deliveries to Everglades National Park." The Draft of such Memorandum and the Final Memorandum, as prepared by the Jacksonville District, shall be submitted as promptly as practicable to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works of the United States Senate and the Committee on Natural Resources and the Committee on Public Works and Transportation of the United States House of Representatives.*

The GDM called for in the Act was completed in June 1992. This GDM and its associated Environmental Impact Statement (EIS) for Modified Water Deliveries to ENP is the authorizing document for structural modifications and additions to the existing C&SF Project required for the modification of water deliveries for ecosystem restoration in the ENP. The 1992 GDM stated, "The future without project condition will lead to the further deterioration of unique and outstanding ecological resources of the Everglades that are recognized and valued throughout the world. Therefore, based on the direction provided in the Everglades National Park Protection and Expansion Act of 1989, the goal is to restore natural hydrologic conditions in the Park to the extent practicable. Meeting this goal will lead to improvements in the abundance, diversity and ecological integrity of native plants and animals in the Park."

Section 528 of the Water Resources Development Act enacted October 1996 (Public Law [PL] 102-580) was entitled "Everglades and South Florida Ecosystem Restoration." This authorized a number of ecosystem restoration studies, now collectively known as the Comprehensive Everglades Restoration Plan (CERP). As a result of this Act, the Corps submitted a report to Congress on July 1, 1999, containing this comprehensive blueprint for Everglades restoration. Implementation of CERP will further increase the flow of water entering Northeast Shark River Slough. The plan has been approved as the Water Resources and Development Act of 2000.

d. <u>General Description of Dredged or Fill Material</u>.

(1) General Characteristics of Material. According to Alternative 7a, no fill or dredged material outside the existing right-of-way will be necessary to upgrade the existing roadway. The recommended approach is to leave the existing asphalt pavement as a construction platform and serve as a black base. Low areas will be leveled to minimum elevation of 11.0 feet by constructing a thick structural overlay on top of the existing asphalt roadway.

(2) Quantity of Material. The amount of asphalt used to level the existing asphalt roadway will be calculated once the design phase of this proposed alternative is 100% complete.

(3) Source of Material. Asphalt will be used to level the existing asphalt pavement to a minimum elevation of 11.0 feet.

e. Description of the proposed Discharge Site.

(1) Location. Although there is not a proposed discharge site, the location of the proposed activity will be a 10.7 mile extent of the Tamiami Trail west of Krome Avenue in central Miami-Dade County.

(2) Size. The area to be constructed is a 10.7 mile portion of the Tamiami Trail.

(3) Type of Site. The site is located on the Tamiami Trail and is characterized as a paved asphalt roadway. The typical roadway section consists of two 12-foot wide travel lanes, an 8-foot wide shoulder on each side of the roadway, and a guardrail at each edge of the shoulder.

(4) Type of Habitat. Adjacent to the Tamiami Trail are mostly natural areas with long and short hydroperiod wetlands as well as an abundance of interspersed willowheads, bayheads, and hardwood hammocks. Sawgrass (*Cladium jamaicense*) communities dominate the long hydroperiod wetlands while muhly grass (*Muhlenbergia capillaris*) and black sedge (*Schoenus nigricans*) dominate the short hydroperiod wetlands mostly influenced by NESRS and local rainfall. There are four herbaceous wetland cover types in the Everglades: (1) sloughs with deep, permanent water levels, (2) sawgrass marshes with semi-permanent water levels and long hydroperiods, (3) wet peat prairies, and (4) wet marl prairies with shorter hydroperiods. These are characterized by the average flooding depth and the duration of the flooding period, and by their predominant plant cover.

(5) Timing and Duration of Discharge. The timing will be phased depending on the season and proximity to Federally endangered species locations. The total duration of discharge is 24 months.

f. Description of Disposal Method. According to this alternative, no material outside of the existing right-of-way is expected to be excavated or receive fill.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The elevation is between 10.06 and 11.92 NGVD, with very little slope.

(2) Sediment Type. The sediment associated with the proposed project area is typically black to dark brown muck underlain by soft porous limestone.

(3) Dredge/Fill Material Movement. Since no dredge or fill material will be used, there will be no material movement.

(4) Physical Effects on Benthos. The benthic community may be impacted during the bridge construction. These impacts will be temporary and confined to the period and location of construction. No additional physical effects on benthos are expected.

b. Water Circulation, Fluctuation and Salinity Determination.

(1) Water Column Effects. No effects on the water column are expected.

(2) Current Patterns and Circulation. Since the existing box culverts will remain in place, the current patterns and circulation should remain unchanged.

(3) Normal Water Level Fluctuations and Salinity Gradients. Water level fluctuations and salinity gradients are expected to remain the same.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. No change is expected in suspended particulates due to the fact that no fill or dredged material outside of the existing right-of-way is being used. Turbidity will be temporary in areas of slow-moving or shallow water.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Light penetration will be reduced temporarily during construction.

(b) Dissolved Oxygen. The effects on dissolved oxygen should be minimal.

(c) Toxic Metals, Organics, and Pathogens. None.

(d) Aesthetics. Aesthetics are expected to improve in the area with the removal of exotic vegetation and the construction of an elevated bridge which would offer a somewhat unimpeded view of the ENP.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. No effect, because light attenuation from very briefly suspended particulates would be negligible.

(b) Suspension/Filter Feeders. None.

(c) Sight Feeders. None.

d. Contaminant Determinations.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. None.

(2) Effects on Benthos. None.

(3) Effects on Nekton. None.

(4) Effects on the Aquatic Food Web. None.

(5) Effects on Special Aquatic Sites.

(a) Hardground and Coral Reef Communities. None.

(b) Sanctuaries and Refuges. The proposed project would enhance hydrologic flows into the NESRS.

(c) Wetlands. The project would impact approximately 5 acres within the ENP. The WRAP analysis indicated that the Functional Units lost would be 3.42.

(d) Mud Flats. None.

(e) Vegetated Shallows. None.

(f) Riffle and Pool Complexes. None.

(6) Endangered and Threatened Species. None.

(7) Other Wildlife. None.

(8) Actions to Minimize Impacts. Best Management Practices will be implemented during construction to assure no additional impacts to wetlands.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. No mixing zone is expected since no disposal site will be utilized.

(2) Determination of Compliance with Applicable Water Quality Standards. All standards will be complied with unless a variance should be required for unforeseen reasons.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No effect.

(b) Recreational and Commercial Fisheries. Alternative 7a would impact recreational bank fishing activities in the vicinity of the bridge.

(c) Water Related Recreation. No effect.

(d) Aesthetics. No short term effects. Long term contribution to the restoration of historical environmental conditions in ENP.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. The project is a portion of an overall program intended to restore ecological values to the ENP.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. The cumulative effects on the aquatic ecosystem should be positive due to the restoration of hydrologic patterns to the ENP, and the enhancement of ecological connectivity.

h. Determination of Secondary Effects on the Aquatic Ecosystem. All benefits to flora and fauna would be secondary, in that the direct effects would be hydrological, but the secondary effects would be ecologically beneficial.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials will not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. Alternative 7a will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended. Phasing of construction will be required by the USFWS in conjunction with selection of this alternative.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. On the basis of the guidelines, the proposed discharge of dredged or fill material associated with Alternative 7a is specified as complying with the requirements of these guidelines.

Southwest Florida Regional Planning Council

4980 Bayline Drive, 4th Floor, N. Ft. Myers, FL 33917-3909 (941) 656-7720

P.O. Box 3455, N. Ft. Myers, FL 33918-3455 SUNCOM 749-7720

FAX 941-656-7724

June 20, 2000

Mr. Elmar Kurzbach
Planning Division, Environmental Branch
U.S. Army Corps of Engineers
Post Office Box 4970
JACKSONVILLE, FL 32232-0019

RE: Mod Waters Project, Tamiami Trail/U.S. 41 Drainage Modifications For Shark River Slough.

Dear Mr. Kurzbach:

As per our telephone conversation, Southwest Florida Regional Planning Council staff has received and read the Corps' Notice regarding the four alternatives for modifying U.S. 41 to allow passage of greater flows into Shark River Slough. The Regional Planning Council has previously gone on record as supporting increased flows into Everglades National Park, provided that such flows are not deleterious to the environment or public safety.

As you know, U.S. 41 in this area is an evacuation route for both the Southwest Florida Region (particularly Collier County) and the South Florida Region (particularly Dade County). Therefore, any construction activities eventually planned to implement the increased flow regimen must take into account that the roadway will need to remain open; particularly during hurricane season (June 1 through December 1). Given this parameter, Regional staff submits the following comments.

Staff believes that, from an environmental standpoint, the existing roadway will require complete replacement. The original Tamiami Trail was built during the 1920s as a causeway across the Big Cypress Swamp and the Everglades. The culverts that were originally constructed within the roadway were never intended to do more than prevent the roadway from flooding. Environmental Protection was not a consideration. Therefore, staff believes that the original roadway should be removed, and replaced by a new roadway.

Staff is insufficiently familiar with the surrounding area to comment as to whether the new roadway should be north or south of the existing structure. However, the new roadway should be raised above the current elevation. Bridges, rather than culverts, should be used to allow passage of water through the roadway. Of course, the new roadway should be opened prior to the closing of the original.

Given the age and significance of the Tamiami Trail, staff believes that it may be listed in the National Register of Historic Places. Any redesign of the roadway will have to take this factor into account.

Also of importance with regard to redesign is maintenance of at least the current roadway parameters (number of lanes, official signage, width of the roadway, roadway drainage characteristics, etc.). The Southwest Florida Region's Metropolitan Planning Organizations may wish to comment upon these matters. If these agencies are not on your address list, Regional staff can provide their addresses to your office.

Please include the Southwest Florida Regional Planning Council on the address list for any further notices or correspondence regarding these matters. Please feel free to contact either myself, or the Council's Executive Director, Mr. Wayne Daltry, regarding matters associated with the Everglades Modifications and pertaining to the lower west coast of Florida.

Sincerely,

SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL

Glenn E. Heath

Glenn E. Heath, AICP
Senior Planner/Assistant DRI Coordinator

GEH/

cc: Mr. Wayne Daltry, Executive Director, Southwest Florida Regional Planning Council
Mr. Glen Ahlert, AICP, Coordinator, Lee County MPO

From: Heather_McSharry@fws.gov on 06/21/2000 08:05 AM

To: Cheryl P Ulrich/CESAJ/SAJ02@CESAJ, James M Baker/CESAJ/SAJ02@CESAJ
cc: dave_sikkema@nps.gov@SMTP@Exchange, Thomas_Van_Lent@nps.gov@SMTP@Exchange, Stephen_Forsythe@fws.gov@SMTP@Exchange
Subject: FHA contact for Tamiami Trail

Cheryl and Jim,

Here is a contact from FHA for the Tamiami Trail project. Jay talked to him about the project and he sounded interested. He said he has two staffers in the S. Florida area who could attend future meetings.

George Hadley
Environmental Coordinator
USDOT, Federal Highway Administration
227 N. Bronough St., Suite 2015
Tallahassee, FL 32301

805/942-9650, ex. 3011
fax 942-9691
george.hadley@igate.fhwa.dot.gov

Thanks!

- Heather

United States Department of the Interior

Fish and Wildlife Service
Office of the State Supervisor
P.O. Box 2676
Vero Beach, FL 32961

National Park Service
Everglades National Park
4001 State Road 9336
Homestead, FL 33034

June 22, 2000

Mr. Elmar Kurzbach
Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Kurzbach:

The Fish and Wildlife Service (FWS) and Everglades National Park provide the following comments with regard to the Army Corps of Engineers' (Corps) May 5, 2000, Notice of Intent to Prepare a Supplemental Environmental Impact Statement (SEIS) on Modified Water Deliveries to Everglades National Park (Mod Waters Project) to Address a Change in Design of U.S. Highway 41 (Tamiami Trail) Originally Proposed Modifications.

General Comments

In general, we are pleased that the Corps has begun planning for this important redesign effort that will allow for significant progress towards restoration of the Everglades ecosystem. However, we note that preliminary descriptions in the May 5, 2000, Notice of Intent of alternatives to be considered are not consistent with preliminary alternatives for this project described in the Corps' June 8, 2000, public scoping workshop and June 9, 2000, interagency meeting. Although we understand that alternatives being considered by the Corps may change in this early portion of the redesign effort, clarification of these apparent discrepancies will help us and other interested parties to focus our review on the most pertinent issues.

Specific Comments

The National Park Service (NPS) and FWS have agreed that the following issues should be carefully analyzed in the Corps' planning process and should guide your selection of a preferred alternative.

1. Minimize wetland loss and wetland impacts. Consistent with Executive Order 11990, the project should result in no net wetland loss. The existing L-29 and US 41 rights-of-way should be utilized such that there is no loss of wetlands or wetland function. Alternatives locating a new roadway north or south of the existing footprint or rebuilding the existing roadway with a wider footprint would result in substantial losses of pristine Everglades wetlands. Scenarios including temporary bypass roads may temporarily impact wetlands. Such impacts should be avoided as much as possible.

2. Expand project objective to include ecological considerations. The Corps needs to more broadly interpret the project objectives. The focus seems primarily related to hydraulic considerations in passing a specified discharge. The project objectives should be expanded to also include ecological considerations, such as increasing ecological connectivity, reducing wildlife mortality, and minimizing landscape-scale impacts on habitats resulting from sheetflow disruption. This is justified under the Everglades National Park Expansion Act of 1989 (PL 102-229). The Corps "is authorized and directed [...] to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrologic conditions within the park." Natural hydrologic conditions, including natural sheetflow, would certainly be related to and conducive to ecological connectivity and habitat protection. Moreover, the act has as one of its purposes "to enhance and restore the ecological values" of Everglades National Park, and the Corps is directed to take measures "consistent with the purposes of the project to protect natural values associated with Everglades National Park." Thus, including ecological considerations, and enhancing and restoring the ecological values of the Park in the design of Tamiami Trail modifications is entirely within the Corps' authority and entirely consistent with the purposes of the Modified Water Deliveries Project.

   Neglecting to consider ecological considerations may also lead to unnecessary future costs and difficulties. For example, the Comprehensive Everglades Restoration Plan (CERP) calls for removing L-29 levee and the S-355A&B structures. Not including features intended to minimize the ecological consequences of the road may mean the CERP will have to remove L-29, S355A&B, and redo any Tamiami Trail modifications. Certainly not considering the possibility of having US 41 on L-29 levee means that Alternative 3 is much more expensive because of the failure to design S-355A&B to include the potential for a downstream bridge.

Considering ecological values at the outset in developing alternatives will significantly improve the project. The existing roadway serves as a barrier to movement of many wildlife species between two major portions of the remaining Everglades system, reducing gene flow between populations and increasing mortality rates as individuals are killed while attempting to cross the road. The four new bridges contemplated in most of the preliminary alternatives may increase connectivity for fish and aquatic invertebrates, but are unlikely to substantially decrease road-related mortality for other species. Significant improvements in connectivity could be achieved through increased bridging, even to the extent of bridging of the entire roadway.

3. Minimize potential adverse effects on the endangered wood stork. The Tamiami West wood stork colony is located immediately south of the existing roadway near the S355B structure and could be impacted by bridge construction nearby and by relocating the roadway to the south or widening the existing footprint to the south. This colony has been the only active wood stork colony in Everglades National Park in recent years and is estimated to contain several hundred nesting pairs in some years. Therefore, impacts to wood storks could be substantial and should be avoided.

4. Address water quality concerns. All alternatives should include features to capture and treat stormwater runoff.

5. Minimize impacts to wildlife related recreational access. The existing roadway provides important access points for wildlife related recreational use of Water Conservation Area 3. Existing levels of access should be maintained or increased consistent with restoration objectives.

6. Minimize impacts to Everglades National Park lands. Everglades National Park is not likely to support alternatives that result in wetland loss within the Park. The specified purpose of Everglades National Park Expansion Act of 1989 was to limit habitat loss, and the Secretary of the Interior was directed to manage the area to "maintain natural abundance, diversity, and ecological integrity of the native plants and animals." Moreover, the Secretary of the Interior was directed to manage the area consistent with the National Park Service Organic Act of August 25, 1916. Therefore, alternatives that propose significant wetland loss, particularly within Everglades National Park, are likely to be viewed as inconsistent with project objectives.

7. Develop a complete and long-term solution. The Department of the Interior (Department) is expecting that the benefits of the Modified Water Deliveries Project will be delivered in perpetuity by the Central & Southern Florida (C&SF) Project. Alternatives that potentially limit the duration of expected benefits or saddle the Department with long-term, open-ended costs are not desirable. For example, if alternative 4 was selected, the maintenance agreement between the Corps and the Florida Department of Transportation (FDOT) should not, when it lapses, result in the withdrawal of Modified Water Deliveries benefits. Moreover, maintenance costs should be considered C&SF Project Operation and Maintenance costs, borne by the Corps. The Department is not likely to be in a position to bear long-term, open-ended costs as part of this project.

8. Make Tamiami Trail hydrologic investigations consistent with the conveyance and seepage features being considered in Modified Water Deliveries. A thorough examination of expected water levels in Northeast Shark Slough predicted by regional-scale models in the conveyance and seepage investigations for Modified Water Deliveries is instructive. Downstream of Tamiami Trail, water levels are expected to exceed 7.5 ft mean sea level (msl) for 30 days or more 4 years out of 5. Water levels are expected to exceed 8.5 ft msl for 30 days or more about 1 year in 10. Maximum 24 hour water levels are expected to exceed 9.0 ft msl with a frequency of 1 year in 10. These results vary markedly from predictions by the Corps in a separate and independent analysis dated 19 January 1999, where the Corps recommended four bridges. Assuring that the Tamiami Trail investigations are consistent with other Modified Water Deliveries features is necessary to assure full delivery of expected project benefits.

We appreciate the opportunity to comment. If you have any questions about this letter, please contact Biologist Heather McSharry at (561) 778-0896 or Dr. Thomas Van Lent at (305) 242-7804.

Sincerely yours,

Stephen W. Forsythe
State Supervisor
Ecological Services
Fish and Wildlife Service

Richard G. Ring
Superintendent
Everglades National Park &
Dry Tortugas National Park

cc:
Fish and Wildlife Service, ARD-ES, Atlanta, GA
Fish and Wildlife Service, South Florida Field Office, Vero Beach, FL
Florida Fish and Wildlife Conservation Commission, Vero Beach, FL
Florida Department of Transportation, Miami, FL
South Florida Water Management District, West Palm Beach, FL
Florida Dept. of Environmental Protection, Tallahassee, FL
Florida Dept. of Agriculture and Consumer Services, West Palm Beach, FL
Miccosukee Tribe, Miami, FL
Seminole Tribe, Hollywood, FL

Jon Moulding
06/23/2000 12:52 PM

To: James M Baker/CESAJ/SAJ02@CESAJ
cc:
Subject: Add to mailing list for Tamiami Trail modifications

Jim - Is he on the mail list?

---------- Forwarded by Jon Moulding/CESAJ/SAJ02 on 06/23/2000 12:51 PM ----------

From: amclean@sfwmd.gov AT Internet on 04/12/99 06:38 PM

To: Jon Moulding
cc: lhornun@sfwmd.gov AT Internet@ccmail
Subject: Add to mailing list for Tamiami Trail modifications

---

on, please add this individual to the mailing list for Tamiami Trail
ods:

ave Balman
boat Association of Florida
Box 650611
liami, FL 33165

hanks, Agnes

Appendix L

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM CONSISTENCY EVALUATION

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES

Tamiami Trail
Dade County , Florida

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed plans and information will be submitted to the state in compliance with this chapter. Construction will not be located seaward of the line of mean high water or where it might have an effect on natural shoreline processes.

2. Chapters 163 (part II), 186, and 187, County, Municipal, State and Regional Planning. These chapters establish the Local Comprehensive Plans, the Strategic Regional Policy Plans, and the State Comprehensive Plan (SCP). The SCP sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic, and physical growth.

Response: The proposed project has been coordinated with various Federal, State and local agencies during the planning process. The proposed project involves identifying a means for conveying increased flows of water under U.S. Highway 41(Tamiami Trail) to the Everglades National Park (ENP) as part of the Modified Water Deliveries (MWD) Program to restore natural hydrological conditions in ENP. The project would provide for the enhancement and assist is the restoration the Everglades ecosystem.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project would have little or no impact on disaster preparation. Full conformance and compliance consistent with the efforts of Division of Emergency Management is intended.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: Each type of resource protected to the extent practicable under this statute is addressed in the EIS. Full conformance and compliance with the requirements for protecting these resources is intended.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: Implementation of the proposed plan does not require State acquisition of lands for the purposes of protection of environmentally sensitive lands.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects

that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: To the northern boundary of the project area is a Water Conservation Area (WCA-3B) of the South Florida Water Management District, the Francis S. Taylor Wildlife Management Area. The Florida Fish and Wildlife Conservation Commission (FFWCC) manages this area for recreation. Full conformance and compliance with the requirements for protecting these resources is intended.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: This project has been coordinated with the State Historic Preservation Officer (SHPO). Historic Property investigations were conducted in the project area. An archival and literature search, in addition to an archaeological survey of the proposed project area was conducted. The SHPO concurred that the proposed project area contained three sites considered potentially eligible for listing in the National Registry of Historic Places (NRHP). The project is consistent with the goals of this chapter.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: This project would not adversely impact beneficial development, economic diversification, or tourism. Contribution from the project area to the State's tourism economy will not be compromised by project implementation. The recommended plan may enhance tourism traffic in the area as the elevated portion of the highway will offer an unimpeded view of the ENP

9. Chapters 334 and 339, Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: US Highway 41 (Tamiami Trail) is not one of the "officially designated" evacuation routes authorized for reverse laning. However, due to its location as the southern-most east-west artery in the state, Tamiami Trail provides critical eastbound and westbound coast-to-coast access between Miami and Naples. The use of Tamiami Trail as an "implied" evacuation route would require that the highway's capability to be utilized for evacuation be maintained during hurricane season. This may influence construction phasing and maintenance of traffic flows during construction. The project will be consistent with the goals of this chapter.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed project would not adversely impact saltwater living resources. Based on overall impacts of the project, the project is consistent with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The project has been closely coordinated with the FFWCC, and should have no significant adverse affects on freshwater aquatic or wild animal life. The project is expected to benefit wildlife through its contribution toward the hydrologic restoration of Northeast Shark River Slough in ENP.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: The plans for withdrawal, diversion, storage, and consumption of water are fully coordinated with the State at this stage, and a recommendation would be made with full concurrence from the State.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: The contract specifications will prohibit the contractor form dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. All activities will conform to State regulations.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The proposed project will not promote any large-scale development or have impact on regional development. Therefore, the project is consistent with the goals of this chapter.

16. Chapters 381 (selected subsections on on-site sewage treatment and disposal systems) and 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The projects will not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: The project is in compliance with both the Clean Water Act of 1972 and the Clean Air Act of 1972. Full compliance with State requirements is accomplished.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: The proposed project is not located near agricultural lands (prime or unique farmlands); therefore, this chapter does not apply.

Appendix M

PUBLIC INVOLVEMENT

July 2000

PUBLIC SCOPING MEETING SUMMARY REPORT FOR A GENERAL REEVALUATION REPORT/ SUPPLEMENTAL ENVIRONMENTAL IMAPCT STATEMENT (GRR/SEIS) ON TAMIAMI TRAIL MODIFICATIONS PORTION OF MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK

Submitted to

U.S. Army Corps of Engineers
Jacksonville District
Jacksonville, Florida

Submitted by

Gulf Engineers & Consultants

Environmental Division
Baton Rouge, Louisiana

Gulf Engineers & Consultants

July 2000

Contract No. DACW17-99-D-0043
Delivery Order No. 0009
GEC Project No. 27307509

PUBLIC SCOPING MEETING SUMMARY REPORT FOR A GENERAL REEVALUATION REPORT/ SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (GRR/SEIS) ON TAMIAMI TRAIL MODIFICATIONS PORTION OF MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK

Prepared for

U.S. Army Corps of Engineers
Jacksonville District
Jacksonville, Florida

Prepared by

G.E.C., Inc.
Environmental Division
Baton Rouge, Louisiana

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PUBLIC SCOPING MEETING SUMMARY REPORT

PUBLIC SCOPING MEETING SUMMARY REPORT FOR A GENERAL REEVALUATION REPORT / SUPPLEMENTAL ENVIRONMENAL IMPACT STATEMENT (GRR/SEIS) ON TAMIAMI TRAIL MODIFICATIONS PORTION OF MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK

I. INTRODUCTION

A. Background

The congressionally authorized Mod Waters project consists of structural modifications and additions to the existing Central & Southern Florida Project required for improvement of water deliveries for ecosystem restoration in Everglades National Park (ENP). The authorized plan calls for only minor modification of Tamiami Trail by increasing the elevation of about 3,000 linear feet of the roadbed. The existing culvert system was thought adequate to pass the maximum desired volume of water, however, additional analysis indicates that the existing culverts are not adequate to effectively do so. Therefore additional water conveyance methods will be analyzed.

The U.S. Army Corps of Engineers is currently preparing a General Re-evaluation Report and Supplement to the 1992 Final Environmental Impact Statement (GRR/SEIS) on Modified Water Deliveries to Everglades National Park (Mod Waters Project). The focus of the GRR/SEIS will be the proposed modifications to the Tamiami Trail for the purpose of conveying the increased flows and water levels to the Shark River Slough basin of the Everglades National Park.

The Draft GRR/EIS will analyze potential impacts to local businesses and residents, Everglades National Park, endangered species, wetlands, biological resources, water quality, and recreational fishing, as well as additional issues identified in the Public Scoping Meeting. Impact analysis will be limited to issues associated with the construction of the improvements. All general Mod Waters issues were addressed in the original Environmental Impact Statement.

The alternative plans will be reviewed under provisions of appropriate laws and regulations, including the Endangered Species Act, Fish and Wildlife Coordination Act, and Clean Water Act. The Draft GRR/SEIS is expected to be available for public review during the 4th quarter of calendar year 2000.

B. Purpose

The purpose of the Tamiami Trail modification project is to enable more effective passage of waters from Water Conservation Area 3B and the L-29 Canal north of the Tamiami Trail to the Northeast Shark River Slough south of the Tamiami Trail.

C. Scoping

Scoping is the phase in the National Environmental Policy Act (NEPA) process wherby the initial scope of issues to be analyzed in the EIS are determinedd. This phase occurs as early in the process as posible and is is an open process intended to obtain the views of the public and other interested agencies regarding the scope of the study.

Potentially interested individuals, agencies, and organizations were invited to attend and participate in a scoping meeting held at the Miami-Dade County Extension Office, 18710 SW 288th Street, Homestead, Florida, on June 8, 2000, at 6:30 p.m. The format of the meeting was to receive comments and concerns from the public on the issues and alternatives to be addressed in the General Reevaluation Report/Environmental Impact Statement (GRR/SEIS). A copy of the Public Scoping Meeting Announcement, and a list of invitees and meeting participants is included in Appendix A. The meeting was transcribed with a complete transcript included in Appendix B.

On June 9, 2000, at the same location, a Technical Workshop was held to provide an interactive forum for to discuss technical aspects of the proposed project. Al list of meeting attendees is also included in Appendix A and a summary of the discussions that ensued is included in this document.

The topics discussed during the scoping process are of major importance in determining the pertinent issues to be analyzed in depth in the GRR/SEIS. To complete the scoping process the Corps of Engineers allowed the record to remain open until June 21, 2000, for receipt of written statements. Written statements received during the comment period are included in Appendix B.

II. ALTERNATIVES

A. Alternatives Proposed by the Government and Presented at the Scoping Meeting

1. Rebuild the Roadway Along the Existing Alignment and Install Four New Bridges

Under this alternative the surface of the road would be raised one to two feet to comply with Florida Department of Transportation.

During construction, traffic management plans for Alternative 1 would have to be implemented. There is no firm determination yet, but a logical alternative would be to close one lane at a time for construction, and use the other lane and the shoulder for two-way traffic.

2. Build a New Roadway to the South of the Existing Roadway

A completely new roadway would be constructed with bridges on land that is predominantly owned by the National Park Service. This alternative would require that the existing road be breached at the same locations as the new bridges.

Under Alternative 2 traffic would be managed by allowing the use of the old roadway until construction has been completed. An alternative to traffic management would be to close the roadway during construction and provide alternative routes.

3. Build a New Roadway to the North of the Existing Roadway

A northern roadway would be constructed either to the north of the L-29 Canal or incorporated into the L-29 design. Under this alternative, it would be necessary to provide access to the old roadway for commercial and residential traffic. This alternative would require that the existing road be breached at the same locations as the new bridges.

Traffic management under alternative 3 would be similar to that discussed under Alternative 2.

4. Install Four New Bridges Without Rebuilding the Roadway, But Institute an Increased Maintenance Program

Under this alternative the necessary bridges would be constructed, but the increase in elevation required by the Florida Department of Transportation would not be provided. An increased program of road maintenance would be provided in case of damage to the roadbed caused by high water.

Traffic management under Alternative 4 would be similar to that discussed under Alternative 1.

B. Additional Potential Alternatives Identified During the Meeting

1. Two representatives of the Miccosukee Tribe expressed a desire that the entire roadway be elevated, thereby removing the Tamiami Trail as a barrier to the movement of water to the south. It was requested that all structures be removed to allow the water to flow unimpeded.

2. A representative of the Florida Biodiversity Project supported an elevated roadway (accompanied by the removal of the L-29 Levee) for the restoration of sheet flow in the area. The Florida Biodiversity Project feels that this action would reduce the amount of wildlife, including the Florida panther, killed on the roadway. This proposal would also include the elevating of the Tamiami Trail through the Big Cypress National Preserve and the Fakahatchee Strand State Preserve. To offset the cost of the elevation of the roadway, it was proposed that a toll be instituted.

3. An individual expressed opposition to an elevated roadway that would eliminate access to recreational areas for boating and fishing.

III. ISSUES AND CONCERNS

A. Impacts to the Tigertail Camp

A representative of the Miccosukee Tribe expressed concerns about the possibility of flooding or the relocation of the Tigertail Camp.

A resident of the Tigertail Camp expressed disapproval of Alternative No. 3, the construction of the roadway to the north, because the camp would experience a lack of privacy with the construction of Alternative No. 3.

B. Impacts on Structures 355A and 355B

C. Impacts on Businesses Along the Roadway

There are existing businesses along the south side of the roadway that have the potential to be adversely impacted by the proposed project. A necessary feature of Alternative 3, the construction of a new roadway to the north, is to provide access to the old roadway for commercial and residential traffic. A representative of the Miccosukee Tribe expressed concerns about the businesses along the roadway. A Tamiami Trail businessman expressed concern that constructing a new roadway either to the north or south would adversely impact businesses along the existing roadway.

D. Impacts to Wetlands

E. Construction Impacts to Traffic Flow

A representative of the Miccosukee Tribe expressed concerns that the high volume of traffic on the roadway would result in major disruptions with the implementation of traffic controls and detours. He expressed particular concern about the effects of traffic congestion on the Tigertail and Osceola camps.

F. Impacts to Hurricane Evacuation

G. Effects of the Proposed Project on Loss of Private Land

A private citizen expressed concern over the condemnation of private land for the purpose of environmental protection. His concern was that the land actually might later be used for commercial purposes. A recreational fisherman expressed concern that the National Park would get additional property and that access to that property by the public would be denied.

H. Impacts on the Osceola Camp

A representative of the Miccosukee Tribe expressed concern that the proposed project would adversely affect the Osceola Camp. The site of the camp appears to correspond with the location of Alternative 2, the construction of the road to the south.

I. Impacts of Changes in Area Hydrology

1. There was concern expressed by a representative of the Miccosukee Tribe about the levels of water in the L-29 Canal, specifically, what will the water level be under the new modeling scenario. There was also a question on the

necessity of the need for additional culvert capacity to transmit that water to the south.

2. There was concern expressed by an individual that the filling of canals, which he understood would take place, could adversely impact flood control programs in South Florida.

3. A representative of the Florida Biodiversity Project expressed a desire for a full hydrological analysis of the raising of the roadway.

4. A businessman stated that the existing culverts are obstructed on the southern side, and that removal of the obstructions may enable and adequate flow.

J. Impacts on Recreation

A recreational fisherman expressed concern about the implementation of the proposed project, as well as other Mod Waters projects, on recreational fishing in the canals of the area. One of his concerns was that canals would be filled in. Points taken included the canals being the only nearby freshwater fishery, the canals serving as a refuge for fishes during droughts, and the economic importance of freshwater fishing in the vicinity.

K. Impacts on Wildlife

A representative of the Florida Biodiversity Project requested that historical records be compiled on roadkills along I-75 and U.S. 41. A recreational fisherman expressed concerns that the effects of the project would include a loss of fisheries habitat.

L. Impacts on the Homestead Agricultural Community

An individual expressed concerns that the elevation of water in the Shark River Slough would raise ground water levels in the South Dade agricultural areas and adversely impact farming operations.

M. Environmental Impact Assessment

1. A representative of the Florida Biodiversity Project requested: that the U.S. Fish and Wildlife Service and the National Park Service be designated as cooperating agencies in the preparation of the EIS; that the analysis of all alternatives include direct, indirect, and cumulative impacts; that there should be full coordination with relevant agencies as required by NEPA and the Endangered Species Act; and that a scoping document regarding the scoping alternatives be released to the public.

2. An individual expressed concern that the Modified Waters project had been divided into three separate EISs, thereby possibly masking the combined impacts of the projects. The individual expressed an opinion that the delays in implementing the Mod Waters projects constituted a denial of justice to the Miccosukee Tribe.

IV. MOD WATERS TECHNICAL WORKSHOP

The U.S. Army Corps of Engineers, Jacksonville District, hosted a workshop for agencies, organizations, and individuals interested in the Modified Water Delivery (MWD) Project on July 9, 2000. A list of the meeting attendees is included in Appendix A.

Workshop discussion was organized in accordance with the following agenda:

- Opening Remarks and Administrative Information;
- Modified Waters Delivery (MWD) Project;
  - Conveyance and Seepage Control Project
  - 8.5 Square Mile Area Project
  - Tamiami Trail Project
- C-111 Project;
- Operational Environmental Impact Statement (OP EIS) for MWD and C-111; and
- Interim Operation Plan – CSSS.

This section summarizes points made during the meeting.

A. Opening Remarks and Administrative Information

1. The U.S. Army Corps of Engineers will post all MWD-related correspondence on its Jacksonville District web site.
2. Several of those present raised questions as to how alternatives are proposed and added for consideration.

B. Modified Waters Delivery (MWD) Project

1. Coopertown Airboats

Coopertown Airboats stated its understanding of possible benefits gained by an elevated highway but expressed concern over how residents and businesses would access properties currently located along the Tamiami Trail.

2. Everglades National Park (ENP)

ENP expressed concern over wetland loss caused by Tamiami Trail and then called for practices that would provide for a rapid and efficient exchange of technical information among interested agencies.

3. Florida Department of Environmental Protection (FDEP)

FDEP stated concerns related to water quality issues in general, and storm water issues in particular, that might arise during implementation of the project.

4. Florida Department of Transportation (FDOT)

FDOT will post a report on its web site presenting an assessment of Tamiami Trail culvert effectiveness.

FDOT stated that FDOT would like to review the Draft EIS before it is officially promulgated.

FDOT stateed its desire to participate in all aspects of the EIS and technical design.

5. G.E.C., Inc. (GEC)

GEC will prepare a report summarizing the Tamiami Trail Project Scoping Meeting and Technical Workshop.

GEC will prepare the General Re-evaluation Report and Supplemental EIS (GRR/SEIS) for the Tamiami Trail Project.

6. Miccosukee Tribe

Representatives reiterated their desire that that portion of the Tamiami Trail located within the proposed project limits be removed and replaced with an elevated highway.

Representatives stated that the Tamiami Trail serves as an ecological barrier and expressed a desire for focused attention on a possible wildlife corridor.

Representatives expressed concerns regarding delays and detours associated with implementation of the project.

Representatives expressed concerns as to how the MWD-recommended flows would be achieved before the required studies are completed.

7. PBS & J, Inc.

PBS & J will provide the technical consulting related to the Tamiami Trail Project.

PBS & J will provide a preliminary design report for Tamiami Trail in August.

8. U.S. Army Corps of Engineers (Corps)

The Corps stated that a separate EIS will be prepared for each of the three MWD projects so that the overall MWD project can advance on all fronts.

The Corps stated that if the 8.5 Square Mile EIS was resolved by the end of June 2000 then the Conveyance and Seepage Control EIS and Op EIS would be merged.

The Corps addressed National Environmental Policy Act (NEPA) procedures as they relate to the Tamiami Trail Project and asked for all interested parties for input and participation throughout the course of the project.

9. U.S. Fish and Wildlife Service (USFWS)

USFWS stated current design flow through Structure S333 is inadequate for accomplishing objectives of the Conveyance and Seepage Control Project. The Corps stated that design flow of the structure is adequate.

USFWS would like EIS data as soon as possible in order to ensure Wildlife Protection/Coordination Documents are completed in a timely fashion.

10. C-111 Project

The Corps stated that the Draft GRR and Supplemental EIS were due 29 June 2000 and that the final report was due not later than 23 October 2000.

11. Interim Operation Plan – CSSS

The Corps stated that the Draft IOP EIS was due 23 June 2000.

ENP representatives asked what alternatives were being considered in the EIS and the Corps replied that alternatives 2, 2A, and 2B were being considered in the EIS.

V. CONCLUSION

Issues identified and comments received, both verbally at the meeting and in writing during the public comment period, will be included and addressed in the GRR/SEIS.

Appendix A

ATTENDANCE LIST

TAMIAMI TRAIL GRR/SEIS PUBLIC SCOPING MEETING
ATTENDANCE LIST

Name	Business/Organization	Address	City,State,Zip
Ricardo Munoz		13101 SW 118th Street	Miami, FL 33186
Corena TigerTail-Lamm	Miccosukee Tribe	P.O. Box 440021	Miami, FL 33144
Gene Duncan	Miccosukee Tribe	P.O. Box 440021, Tamiami Trail Station	Miami, FL 33144
Rick Persson	Trail Glades Bassmasters	10901 SW 106 Ave.	Miami, FL 33176
Paul Raushenplat	Trail Glades Bassmasters	10221 SW 107 Street	Miami, FL 33176
Brian Scherf	Florida Biodiversity Project	P.O. Box 220615	Hollywood, FL 33022
Timothy P. Lamm	Miccosukee Tribe of Indian (Tigertail Camp)	P.O. Box 440021	Miami, FL 33144
Joette Lorion	Miccosukee Tribe	7700 N. Kendall Drive #303	Miami, FL 33176
Lena Doctor Tigertail	Miccouskee Tribe	P.O. Box 440021	Miami, FL 33144
Mike Richardson	First National Bank of Homestead	P.O. Box 128	Homestead, FL 33090
Brad Arnold	Trail Glades Bassmasters	3720 N. 57th Ave.	Hollywood, FL 33021
Kelly Bayer	Consul-Tech Engineering	10570 NW 27 Street, Suite 101	Miami, FL 33172
Lazaro Carbajal		14493 SW 172 Lane	Miami, FL 33177
Steve Camey	Camey Environmental	6435 SW 85 Street	Miami, FL 33143
Isabel Cruz		2852 SW 1st Street	Miami, FL 33138
Roy Cypress Jr.		Star Route Box W-9914	Ochopee, FL 34141
Karen Eskelin	University of Florida	15415 Garfield Drive	Liesure City, FL
Mr. & Mrs. Richard Farace	Everglades Safari	P.O. Box 535	Naples, FL 34106-0535
Richard Farace	Everglades Safari	P.O. Box 535	Naples, FL 34106-0535
Robert Johnson	National Park Service	40001 State Road 9336	Homestead, FL 33034
Jorge R. Gomez		5881 NW 38 Street	Miami, FL 33166
Jesse Kennen	CooperTown Airboats	P.O. Box 440727	Miami, FL 33144
Shawn Komlos	Audubon of Florida	444 Brickell Avenue Suite 850	Miami, FL 33131
Heather McSharry	USFWS	1360 US HWY.	Vero Beach, FL
William F. Precht	PBS & J (Consultant to the USACOE)	2001 NW 107th Ave.	Miami, FL 33172
Angel Rivera		19990 SW 128 Street	Miami, FL 33196
Freddie James			
David Sikkema	Everglades National Park	40001 State Road 9336	Homestead, FL 33034
Thomas Vanlent	Everglades National Park	40001 SR 9336	Homestead, FL 33034
Theresa Willie		Star Route Box W-9914	Ochopee, FL 34141

MOD WATERS TECHNICAL WORKSHOP

ATTENDEES

Jim Baker, Corps	904/232-2698
Marjorie Bixby, Florida Department of Transportation	304/470-5229
Gene Duncan, Miccosukee Tribe	305/223-8380
Karan Eskelin, University of Florida	305/248-0068
Martin Gonzales, Corps	904/232-1117
Jesse Kennon, Coopertown Airboats	305/226-6048
Joette Lorion, Miccosukee Tribe	305/279-3353
Heather McSharry, U.S. Fish and Wildlife Service	561/778-0896
Jon Moulding, Corps	904/232-2286
Jose Otero, Wildlife Management District	501/682-6578
Bill Precht, PBS & J, Inc.	305/592-7275
Jeff Robinson, G.E.C., Inc.	225/612-3000
Bo Smith, Corps	904/232-1685
Cheryl Ulrich, Corps	904/232-1700
Tom Van Lindt, Everglades National Park	
Herb Zebuth, Florida Department of Environmental Protection	561/681-6703

Appendix B

SCOPING MEETING TRANSCRIPT

1 U.S. ARMY ENGINEER DIVISION, SOUTH ATLANTIC
2 CORPS OF ENGINEERS
3 JACKSONVILLE DISTRICT
4 PUBLIC MEETING
5 TAMIAMI TRAIL MODIFICATIONS PORTION OF
6 MODIFIED WATER DELIVERIES TO
7 EVERGLADES NATIONAL PARK
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15
16
17
18
19 DATE: 6/08/2000
20 TIME: 6:30 P.M. - 7:30 P.M.
21 PLACE: Miami-Dade County Extension Office
22 18710 SW 288th Street
23 Homestead, Florida
24
25

1 Thereupon, the following proceedings were had:

2 DR. SMITH: Good evening, ladies and

3 gentlemen. This meeting will now come to

4 order.

5 I am Bo Smith, biologist with the planning

6 division for the Jacksonville District, U.S.

7 Army Corps of Engineers.

8 I would like to welcome you to this

9 scoping meeting for the supplemental EIS, that

10 is Environmental Impact Statement, for the

11 Tamiami Trail modifications portions of the

12 Modified Waters Delivery to Everglades National

13 Park.

14 Thank you all for being here this

15 evening.

16 The purpose of this meeting is to obtain

17 public input on the Supplemental Environmental

18 Impact Statement.

19 The authorized plan calls for some

20 modification of Tamiami Trail. However, the

21 existing culvert system was thought adequate to

22 pass the maximum desired volume of water.

23 Additional analysis indicates that the

24 existing culverts are not adequate to do so.

25 Therefore, other additional water

1 conveyance methods will be analyzed.

2 This meeting is sponsored by the U.S. Army

3 Corps of Engineers.

4 First, I would like to introduce

5 representatives from the U.S. Army Corps of

6 Engineers who are present tonight. Sitting

7 next to me, Mr. Martin Gonzalez of our planning

8 division, Ms. Cheryl Ulrich of our project

9 management division, and Mr. Jim Baker also of

10 our planning division.

11 We also have several people in the

12 audience with the Corps I would like to

13 introduce. Mr. Jon Moulding with our planning

14 division.

15 Jon, put your hand up.

16 Ms. Lois Obenchain with project

17 management. I don't see Lois in the room.

18 Mary Arnot with our real estate division.

19 Mary is in the back of the room.

20 John Simion with our office of counsel,

21 and Jennifer Merritt with information

22 management.

23 I also don't think Jennifer is in the

24 room.

25 We are here tonight to hear from you and

1 to gather your input. We have a court reporter

2 to record the meeting. The transcript of this
3 meeting, together with all of the written
4 statements, will be made a part of the official
5 record.
6 If you did not fill out an attendance card
7 when you came in, please raise your hand and
8 someone from my staff will give you one.
9 We would like a record of all of you
10 attending tonight. Please also indicate on the
11 card if you would like to speak.
12 If you would like to be put on the mailing
13 list to receive information about any
14 subsequent meetings, please check that box on
15 the form.
16 This evening we will have three speakers
17 addressing specific issues regarding the
18 supplement to the 1992 final Environmental
19 Impact Statement on Modified Water Deliveries
20 to the Everglades National Park.
21 Our first presenter will be Ms. Cheryl
22 Ulrich of our project management division.
23 She will give an overview of the Modified
24 Water Deliveries project.
25 Cheryl.

1 MS. ULRICH: Good evening. Tonight we are
2 going to be talking primarily about Tamiami

3 Trail, but I wanted to give you the bigger
4 picture view of the Modified Water Delivery
5 project of which that is one piece of.
6 Our presentation tonight, I am going to
7 discuss the three pieces of the Modified Water
8 Delivery project; the 8.5 Square Mile Area, the
9 conveyance and seepage control and, finally,
10 Tamiami Trail.
11 Next, Martin Gonzalez will follow me and
12 give you an idea what some of the preliminary
13 alternatives -- I don't have the mike. Okay.
14 Thank you.
15 I have a loud enough voice. I have two
16 mikes, but that is okay. We want it to be
17 recorded.
18 Martin Gonzalez will come up after me and
19 share with you some of the descriptions of the
20 preliminary alternatives that we are looking
21 at.
22 I just want to reemphasize to you that
23 these are very, very preliminary. We haven't
24 done any detail design yet on these. We wanted
25 to give you an idea of kind of the scope of

1 what we are looking at and hear from you if you
2 have any better refinements or improvements for
3 us.

4 And, then, finally, Jim Baker will follow
5 up describing the overall NEPA process for
6 those of you who have not had the pleasure of
7 participating in this before.
8 The Modified Water Delivery project was
9 authorized in 1989. The primary purpose of
10 this project is to construct modifications to
11 the CSF system to improve water deliveries into
12 Everglades National Park and shall, to the
13 extent practicable, take steps to restore the
14 natural hydrological conditions within the
15 park.
16 Real quickly, the whole purpose of this
17 project is about movement of water. What we
18 are trying to do is move some of the water in
19 Water Conservation Area 3A through L-67A and C
20 into Water Conservation Area 3B underneath
21 Tamiami Trail into Northeast Shark River
22 Slough.
23 There's two mitigation features to this
24 project. One is the Tigertail Camp here, along
25 Tamiami Trail. That portion of the project has

1 been completed and that family, basically their
2 houses were at such a low elevation that when
3 we increased the water levels, we were going to
4 impact those homes. So we raised the elevation

5 of those homes so that when we raise the water
6 levels they won't be impacted.
7 Another critical mitigation feature that
8 you probably heard a lot about is the 8.5
9 Square Mile Area down in this area.
10 As far as you will hear me talking about
11 conveyance and seepage control, when I talk
12 about that, I'm talking about these features up
13 here on L-67A and C and also what we call the
14 356 pump station right in this area.
15 Okay. 8.5 Square Mile Area. If you have
16 been reading the papers, you probably have been
17 keeping up pretty well. We are in the middle
18 of an Environmental Impact Statement and
19 General Reevaluation Report for this mitigation
20 feature.
21 We have outlined nine different
22 alternatives and looked at them to a great
23 level of detail.
24 This is before the South Florida Water
25 Management District governing board right now,

1 and we are hoping next week they are going to
2 take the vote and select a locally preferred
3 alternative.
4 If that occurs, we will be preparing a
5 final General Reevaluation Report and

6 Supplemental Environmental Impact Statement.
7 That will then be sent out to the public and
8 the public will have a 30 day comment period.
9 We will sign a record of decision and we
10 will be ready to go out and start doing the
11 design and construction for that mitigation
12 piece.
13 The second major effort within the
14 Modified Water Delivery project is the
15 conveyance and seepage control that I was
16 talking to you earlier about on the map.
17 Where we are on this effort is we have
18 done very extensive modelling using the two by
19 two model and we have looked at different
20 variations of those structures in the L-67A and
21 C canal and also that seepage control.
22 Precisely where we are is we found a
23 cheaper way to get the same kind of results for
24 that conveyance. However, the seepage control
25 is so dependant on what happens in the 8.5

1 Square Mile Area.
2 So what we are going to do right now is
3 wait and see if that vote occurs next week and
4 if it does occur, then we will know if the
5 water is going to be sent up to the north or if
6 it is going to be sent to the south.

7 Depending on which direction that water is
8 being sent, that will impact the size of that
9 seepage control.
10 So we are kind of in a holding pattern
11 here to wait and see how 8.5 Square Mile Area
12 is resolved.
13 Another thing that I want to give you a
14 heads up on is if that solution is found on the
15 8.5 Square Mile Area, what we are thinking
16 about doing is wrapping this whole effort of
17 the conveyance and seepage control features
18 into a much larger operational Environmental
19 Impact Statement for the whole Modified Water
20 Deliveries and C-111 projects.
21 Basically, we have the pieces. We know
22 what we want to construct to move the water.
23 Now we have to work out the operational scheme
24 and how we are going to operate the whole
25 system to move the water.

1 That hasn't been decided yet. That is
2 just the heads up. So stay tuned for more
3 detail on that.
4 Finally, what we are here to talk about
5 tonight is the Tamiami Trail. The whole reason
6 we are here is because we need a modified
7 Tamiami Trail in order to pass this design

8 flows into Northeast Shark River Slough.

9 Tonight is the start of the whole

10 process. This is what we call a scoping

11 meeting in Corps language. It is basically

12 like a kickoff meeting to inform the public of

13 what we are looking at and to hear from you on

14 any ideas that you might have, any issues that

15 you might have in terms of things that will be

16 impacting.

17 Tomorrow from 9:00 to 11:00 in the same

18 room, we are going to be having an agency

19 meeting. It is more on a technical level, but

20 anyone is welcome to join us if you would like

21 to.

22 Right now, our current schedule is to have

23 a draft report out on the street in November.

24 When you sign in on these cards, it is

25 really important to us because that is how we

1 get you on the mailing list so that you will be

2 getting copies of the documents we are

3 preparing.

4 Another piece of this project is being

5 done by Everglades National Park and it has to

6 do with the land acquisition in the expansion

7 area which is the land just south of Tamiami

8 Trail that we are looking at. This is supposed

9 to be completed in the year 2000.

10 As far as up-to-the-date information, we

11 do have a public web site in the Jacksonville

12 District. When you get on there, you will see

13 a whole bunch of buttons on the left-hand

14 side. If you scroll down to the very bottom

15 two buttons, the first one is this MWD C-111

16 button. If you click on that, that will then

17 take you to much more information in terms of

18 the Tamiami Trail, the Cape Sable Seaside

19 Sparrow, 8.5 Square Mile Area and the

20 conveyance and seepage control.

21 Then there is also another button just for

22 the sparrow alone if you are interested in

23 keeping up-to-date on that effort.

24 Now, Martin Gonzalez will be coming up to

25 talk to you about the project purpose and

1 explain to you some of the preliminary

2 alternatives that we are looking at.

3 MR. GONZALEZ: Can everybody hear me?

4 My name is Martin Gonzalez. I'm the study

5 manager for this effort. I have the overall

6 responsibility for the study document.

7 I would like to talk a little bit about

8 the project.

9 Basically, what we are doing is passing

10 flows. As Cheryl explained, this is one of the
11 components of Mod Waters. In the attempt to
12 get the water into the park, we have to
13 traverse the road.
14 When the 1992 GDM was done, it was thought
15 at that time that there was sufficient capacity
16 in the existing culvert and infrastructure to
17 pass those flows. Subsequent modelling has
18 determined that not to be the case.
19 So this is our purpose, passing the waters
20 from Water Conservation Area 3B and the L-29
21 canal into the Northeast Shark River Slough.
22 Problem, as I said a little earlier, for
23 the existing drainage infrastructure is
24 inadequate to pass the water in the required
25 timing, quantity and distribution.

1 Also, the additional volume of start
2 required may result in higher water stages
3 along the L-29 canal and these will adversely
4 impact the existing roadway.
5 This is just a cross section of the
6 existing Trail. Here is the canal, road.
7 We have come up so far with four
8 preliminary alternatives.
9 The first one, most logical, being to
10 rebuild the roadway along the existing

11 alignment and install four new bridges, which
12 will help accommodate the increased flows.
13 The second one was to build a new roadway
14 to the north.
15 A third would be to build a new roadway to
16 the south.
17 And the fourth is to leave the roadway as
18 it is. In other words, not rebuild it.
19 Construct four new bridges and institute an
20 increased maintenance program.
21 These are schematics that were done. We
22 just recently awarded the consulting contract
23 for this effort, and they have done a very good
24 job with the schematics, but as I said, it's
25 just been recent and we don't have a lot of

1 information right now.
2 Alternative one would rebuild the existing
3 roadway with four new bridges. The schematic
4 is pretty clear. Here is Tigertail Camp, 355A,
5 355B. This is the new -- well, this is the
6 existing roadway rebuilt.
7 Florida DOT requirements will increase the
8 roadway by about a foot or two.
9 We do not have a good feel for how we are
10 going to handle maintenance of traffic. The
11 logical assumption is to build this roadway,

12 rebuild it half at a time, close off one lane,
13 half the roadway, use the other half and the
14 shoulder, perhaps, as a two -- for traffic in
15 both directions. That is probably the more
16 logical approach to take.
17 Of course, the other alternative would be
18 to close off the roadway during construction
19 and provide alternative routes.
20 MS. LORION: Can I ask a question? How
21 long will it take to rebuild the roadway?
22 MR. GONZALEZ: I don't know. It will only
23 be Alligator Alley.
24 I need to continue the presentation. We
25 can answer questions later.

1 Alternative two would be to build a new
2 roadway to the south and install four new
3 bridges.
4 I believe most of this land belongs to the
5 park. It's on park lands, and in building it
6 to the south and building a brand new roadway,
7 we eliminate the problem for the maintenance of
8 traffic. We just use the old highway.
9 Alternative three is to build a highway to
10 the north. This is going to be slightly north
11 of L-29 or we could incorporate L-29 design.
12 It's unknown. We are not really sure.

13 This alternative to the north, the only
14 difference, we still need some bridges, but we
15 would also need a bridge to provide traffic,
16 business traffic to the old Tamiami Trail.
17 That is also like an alternative right now. We
18 really don't have a good feel for how we are
19 going to do this.
20 Alternative four is -- this is an
21 alternative whereby we leave the roadway as it
22 is. In other words, the difference between
23 four and one is that we would not build the
24 roadway up the one or two required by Florida
25 DOT. We would build the bridges that we need

1 in order to get the water through, but we would
2 also institute an increased road maintenance
3 program to handle any adverse impacts to the
4 roadway, road bed.
5 We have identified right now several areas
6 of concern with our project. Of course,
7 Tigertail Camp is located on L-29 and we need
8 to make sure we don't adversely impact the
9 residents there.
10 We have to deal with structures 355A and
11 B.
12 We know that we will have effects to the
13 businesses south of the roadway, existing

14 roadway.

15 We have to also consider and it's not

16 shown in the schematics, but part of the other

17 components for conveyance and seepage features

18 requires, as it stands now, three new weirs to

19 be installed on L-29 and we have to deal with

20 those.

21 Of course, there is the existing traffic

22 construction detour alignments, possible

23 impacts to wetlands when we build these.

24 We have the Everglades National Park lands

25 which border the road.

1 We have to be concerned about hurricane

2 evacuation. I am not quite sure. We have

3 heard that this road is designated an

4 evacuation route. I don't believe we have that

5 officially stated to us, but that is what our

6 understanding is.

7 We have to be concerned as in everything

8 we do in South Florida with compatibility with

9 the Restudy or what is now known as the

10 Comprehensive Plan.

11 And that is the extent of my

12 presentation.

13 I now turn this over to Jim Baker of

14 environmental.

15 DR. SMITH: Mr. Baker is going to explain
16 the National Environmental Policy Act
17 procedure.
18 Jim.
19 MR. BAKER: Good evening. Can you hear me
20 okay?
21 Before we open up the meeting to your
22 comments tonight, I just wanted to make sure
23 that everybody knows why we are here.
24 We sometimes neglect to realize that
25 people don't necessarily know.

1 To put this into context, I would like to
2 talk briefly about our decision-making process
3 and your role in that process.
4 This slide talks about NEPA requirements.
5 So what does the National Environmental Policy
6 Act or NEPA require of the Corps of Engineers
7 to do when we are considering building a
8 project?
9 NEPA requires that we give full
10 consideration to natural and cultural resources
11 and requires that we fully disclose our
12 decision-making process to you, the public.
13 In order to do that, we prepare and let
14 you review an Environmental Impact Statement or
15 commonly known as an EIS.

16 Slide two addresses the NEPA
17 decision-making process. So what is the
18 process?
19 Well, first we describe the purpose and
20 need for doing something in the first place.
21 Then we try to figure out the alternative ways
22 to satisfy that need and Martin has talked
23 about that to a degree.
24 Then we compare and contrast the merits of
25 those alternatives, and finally we make a

1 decision on what alternative or combination of
2 alternatives best satisfies the need that we
3 are addressing in the first place.
4 Getting down to why we are here tonight.
5 Slide three addresses the role of the public in
6 the decision-making process. You will have a
7 chance to tell us what you think about what we
8 are trying to do at least three times in the
9 process. The first is tonight. This is called
10 a public scoping meeting.
11 Second, after we draft the EIS and
12 hopefully address all the issues that have
13 arisen. In that case, for this project, we
14 hope to have the draft out around November or
15 December of this year.
16 The third time you will have a chance to

17 tell us what you think about the job we are
18 doing is when we prepare the final EIS.
19 The final EIS, the purpose of it is to
20 take the comments that you all gave us on the
21 draft and respond to those comments and
22 finalize the overall document to fully address
23 everything, hopefully, at that time.
24 No decisions will be made as to what
25 alternative to go with or combination until we

1 have gone through all of that.
2 Now, back to tonight. We are here tonight
3 to find out what you want us to address in the
4 EIS. Of course, there are already a number of
5 issues that we know we need to discuss. Martin
6 hit on some of those tonight. Obviously, it's
7 doubtful that we can think of everything. I am
8 sure you all will have good suggestions for
9 us.
10 So what we are doing here is asking you
11 what you want us to discuss in the upcoming EIS
12 and hope to be talking with you all regularly
13 and for the next several months until we get
14 through this process.
15 Thanks for your time.
16 Now I'll turn the floor over to Bo.
17 DR. SMITH: Thank you, Jim.

18 At this time we would like to take your
19 statements and comments relating to the
20 modification of Tamiami Trail.
21 This is your meeting and we invite your
22 active participation. I would ask that you
23 limit your remarks and presentations to this
24 specific action at hand.
25 In the interest of an orderly procedure, I

1 will call first on any U.S. senators or
2 representatives if present.
3 There appear to be none present.
4 Any members of the state legislature?
5 There appear to be none present.
6 Any elected officials of county government
7 will now speak.
8 Next, I will call individuals who have
9 indicated their desire to speak in the order
10 that their request were received.
11 We ask that you limit your comments to
12 five minutes.
13 I have a timer up here that I have never
14 used before but I have been assured -- I did
15 use it for about two minutes just before we
16 started -- that if I push this button when you
17 start, you will get four minutes of green.
18 Green will show up on that light right up

19 there.

20 When you have one minute left, it will

21 turn yellow and at the end of that minute it

22 will turn red and you will have this beeping

23 sound. Hold on. So please don't go beyond

24 five minutes.

25 MR. RICHARDSON: During the presentations

1 one gentleman indicated there would be an

2 opportunity to ask questions.

3 Typically, your comment periods do not

4 allow questions. It's a one-sided

5 presentation.

6 Do we have an opportunity to address some

7 questions to you before we get into the comment

8 session?

9 DR. SMITH: No. However, at the end of

10 the presentation all the staff members will be

11 present.

12 MR. RICHARDSON: I would like the

13 questions answered in public and not on an

14 individual one-on-one basis.

15 DR. SMITH: That is not the format for

16 this evening.

17 MR. RICHARDSON: You get to select the

18 format?

19 DR. SMITH: Yes, sir.

20 MR. RICHARDSON: Very well.

21 DR. SMITH: Let us begin.

22 MR. GONZALEZ: First comment will be by

23 Ricardo Munoz and he will be followed by Corena

24 Tigertail-Lamm.

25 MR. MUNOZ: Good evening, ladies and

1 gentlemen.

2 My only concern here was about the

3 condemnation of land. I would like to be more

4 specific. I am not near Tamiami Trail, so I

5 think I will be very brief.

6 I just lost five acres at 64th and 207th

7 Avenue to Environmental Protection.

8 Right now, I am in the same situation with

9 10 acres down on 408th and near U.S. 1.

10 My concern, again, is for most of the

11 people. It's easy to have a plan being

12 condemned by the government and five years

13 later or three years later they want to create

14 a golf course or a residential neighborhood and

15 we lost. The poor people lose the money that

16 they invested that work very hard and all of a

17 sudden they have a new condominium, new golf

18 course or whatever.

19 That was my only concern, but, again, I'm

20 not near Tamiami Trail, but I'm just down

21 below.

22 Thank you very much for your time.

23 MR. GONZALEZ: Corena Tigertail-Lamm to be

24 followed by Gene Duncan.

25 Can you all hear me okay?

1 MS. TIGERTAIL-LAMM: I have a concern on

2 number three for making the road in the back of

3 our camp. I have a concern about that because

4 I don't want any highway in the back of my

5 camp. That is the only concern I have.

6 DR. SMITH: Hold on a second. I'm having

7 trouble hearing. Maybe it's just me. Are you

8 okay?

9 Let's have the speakers come to this

10 speaker and let me move.

11 Could you repeat your comments?

12 MS. TIGERTAIL-LAMM: Okay. I have a

13 concern about alternative number three because

14 I don't want any road behind my camps for

15 traffic.

16 DR. SMITH: Thank you.

17 MS. TIGERTAIL-LAMM: That is it.

18 DR. SMITH: Will future speakers come to

19 the podium.

20 MR. GONZALEZ: Mr. Gene Duncan to be

21 followed by Mr. Rick Persson.

22 MR. DUNCAN: Good evening, Bo, again.

23 I was here last night and will be here

24 again tomorrow.

25 Gene Duncan for the Miccosukee Tribe.

1 We have a couple of concerns.

2 The first thing I would like to mention is

3 that none of your maps show the Osceola camp.

4 I assure you it does exist. It's to the south

5 side of the Tamiami Trail and it appears to be

6 exactly where you plan to put one of the

7 roads.

8 I would request that in the future you at

9 least locate the camp so we can see what the

10 impacts are going to be under the requirement

11 of full disclosure.

12 The impacts to the Tigertail Camp have

13 already been mentioned by Corena. If you

14 select the alternative that puts the road on

15 the north side of the canal, the Tigertail Camp

16 will not have any privacy whatsoever with

17 traffic passing by there.

18 Having to travel that road everyday coming

19 back and forth to work, I can assure you there

20 is a lot of traffic on that road. I have

21 pulled over from time to time to pick up

22 something on the edge of the road and the cars

23 come whizzing by. It's very hard to even cross
24 that road there is that much traffic.
25 So you are going to have a big problem

1 with traffic controls and detours, but I want
2 you to be aware you have the Tigertail Camp and
3 the Osceola Camp both of which are a concern to
4 the Miccosukee Tribe.
5 I'm also concerned about the level of
6 water that you say is going to be raised in the
7 L-29 canal. I would like to know what level of
8 water you anticipate under this new modelling
9 scenario.
10 Also I would like to know what the volume
11 of water that can pass through the culverts. I
12 understand just a few months ago you raised the
13 levels in the canal to check and see physically
14 how much water could pass through the
15 culverts. We haven't been provided any of that
16 information. So we don't know how much water
17 can pass through the culverts and we yet don't
18 know how much water you are planning to pass
19 through those culverts.
20 So it hasn't been demonstrated to us that
21 we need any of this additional, and none of
22 that was presented tonight. So we need to know
23 those kinds of details.

24 I'll say that from our perspective, we
25 would like to see Tamiami Trail on stilts. We

1 don't want to see the road acting as a
2 hydrologic barrier from the Everglades to the
3 north to the Everglades to the south.
4 One of the alternatives you need to look
5 at is raising the road to constant passing
6 under. I don't know if you have been in
7 Louisiana, but I-10 is on stilts. It doesn't
8 need to be that high, but that is really the
9 way we would like to see, one Everglades. Not
10 an Everglades to the north where you can shut
11 the gates and cause flooding to the north so
12 you can protect the park to the south. We want
13 one Everglades with all of the structures
14 removed so that water can flow naturally.
15 Everybody suffers an equal amount or everybody
16 benefits an equal amount.
17 So I would just ask you to please take
18 into consideration the two Indian camps that
19 are out there and the fact that that road is
20 very heavily trafficked and it will cause major
21 disruption if you back traffic up by closing
22 down one lane.
23 So those are things you need to think
24 about.

25 Thank you very much.

1 MR. GONZALEZ: Mr. Rick Persson to be
2 followed by Paul Rauschenplat.
3 MR. PERSSON: Hi. My name is Rick
4 Persson. I'm here to represent the
5 recreational fishermen in Dade, Broward and
6 Collier counties.
7 All the time I have been receiving
8 information on the Restudy and the Modified
9 Water Delivery plan I have not heard anyone say
10 anything about the impact these proposals will
11 have on recreational fishermen.
12 This canal, I don't know whether you plan
13 on filling this canal in. You said at one time
14 you were going to put some weirs in. Nothing
15 has been said about the handling of that
16 portion of the canal.
17 My understanding is that on the Restudy
18 plan, that canal was supposed to be filled in.
19 So one plan tells us one thing. Another plan
20 tells us another.
21 We would like to get an overall picture of
22 what is going to happen to all of it.
23 These canals are the only fresh water
24 fishery available to us without having to
25 travel a hundred miles to Lake Okeechobee.

1 And during the periods of low water if
2 these canals are all filled in, these fish are
3 going to go the same way the Cape Seaside
4 Sparrow is going to go. They are going to be
5 dead because there is going to be no water.
6 We go through periods of six to eight
7 months drought. The Everglades dry up.
8 Without these canals, those fish have nowhere
9 to go.
10 Also, I'm not sure if you people are aware
11 of the economic impact that fishermen have on
12 the South Florida area. But if you contact
13 John Fury, the game biologist in the area, he
14 can tell you because he keeps records of the
15 money spent by fishermen in the area. He can
16 also tell you that this area is one of the best
17 bass fishing areas in the state with a catch
18 ratio of over three times that of what the rest
19 of the state has during these low water
20 periods.
21 It's also my belief that South Florida
22 Water Management will lose a great deal of its
23 flood control if any of these canals are filled
24 in.
25 The state won't stop people from moving to

1 South Florida and builders will keep moving
2 further to the west in Dade and Broward
3 counties and further east from Fort Myers and
4 Naples.
5 You have to provide water to these people
6 and you also have to provide flood control as
7 witnessed by Hurricane Irene.
8 Even with the canal system that we have in
9 place, we had major flooding. First time -- I
10 have been here since 1939. First time I have
11 seen a flood since 1949.
12 So I do believe that compromises can be
13 made to best serve all the interests in the
14 community.
15 We, the fishermen, strongly believe in the
16 environment and conservation and want to be
17 considered in any plans in the future.
18 DR. SMITH: Thank you.
19 MR. GONZALEZ: Paul Rauschenplat
20 followed --
21 MR. RAUSCHENPLAT: Rick pretty well
22 covered what I had to say.
23 MR. GONZALEZ: You are Paul?
24 Brian Scherf followed by Timothy Lamm.
25 MR. SCHERF: Hello, I am Brian Scherf of

1 the Florida Biodiversity Project.
2 I think the alternatives that were
3 presented here are grossly inadequate. In
4 fact, I would even go beyond that and say it's
5 pathetic.
6 Here we are supposed to be talking about
7 Everglades restoration and it seems like we are
8 involved in this process of, you know, the
9 lowest common denominator theory of Everglades
10 restoration where we see how low we can go.
11 We start off with something good like the
12 Science Subgroup Report that talks about
13 decompartmentalization and then we wind up with
14 something where all we are talking about is
15 where to place four damn bridges in here.
16 Where is the visionary plans that we have
17 for Everglades restoration? Where is
18 decompartmentalization? Where is restoring
19 sheet flow.
20 To sensitive wildlife, almost nothing is
21 worse than a road. The U.S. Humane Society
22 estimates that almost one million animals are
23 killed per day in the United States on roads
24 and highways. They are the classic deathtrap.
25 There are over 6,000 literature citations

1 now that document the adverse effects of
2 roads.
3 In the case of the Everglades, U.S. 41
4 acts as a triple threat. It has an associated
5 levee. It has an elevated roadbed, and it has
6 a canal. All barriers to the ecosystem.
7 The road acts like a dam blocking sheet
8 flow. It alters natural vegetation patterns.
9 It acts as a corridor for the spread of exotics
10 and pollution. It causes fragmentation and
11 edge effects. It acts as a barrier to wildlife
12 movements and acts as a mortality sink with
13 massive roadkill.
14 For example, the highest historical source
15 of mortality for the Florida panther is
16 roadkill.
17 Culverts and bridges can alter flow
18 patterns. It can block or restrict the passage
19 of fish, amphibians and reptiles.
20 NEPA requires that agencies rigorously
21 explore and objectively evaluate all reasonable
22 alternatives.
23 Therefore, the Florida Biodiversity
24 Project strongly urges an alternative be added
25 that would evaluate raising the entire Tamiami

1 Trail and removing the L-29 levee through the
2 Everglades.
3 The Tamiami Trail should also be raised
4 through Big Cypress National Preserve and
5 Fakahatchee Strand State Preserve.
6 The Restudy draft EIS vigorously
7 recommended removing the L-29 levee and raising
8 the Tamiami Trail.
9 Therefore, analyzing this alternative is
10 entirely reasonable.
11 The road bed should be raised
12 approximately seven to eight feet to allow
13 passage of wildlife and the reduced shading
14 effects.
15 In regards to Mod Waters, the existing
16 road bed can't handle the restored that may be
17 needed and with the road bed elevated there
18 would be no need for the S-355's. Therefore,
19 these structures would be ripped out.
20 As far as economic concerns, most
21 opposition for raising the entire Tamiami
22 Trail, most people would say that the cost
23 would be excessive, but the construction cost
24 could be largely offset with a substantial
25 toll.

1 For example, the Florida turnpike costs
2 $6.50 to go from Fort Lauderdale for Fort
3 Pierce for just 100 miles. A toll of $5.00
4 could be instituted with annual passes for
5 residents.
6 For example, the recently constructed rest
7 area, recreation area at I-75 cost a whopping
8 40 million dollars, which is a scandal in
9 itself.
10 New techniques of modular construction
11 could reduce construction costs. One urban
12 interchange, for example, can cost a hundred
13 million dollars. We have built the overseas
14 highway. We have built the Chesapeake Bay
15 bridge in total. We have constructed I-12,
16 Interstate 12 in Louisiana as a viaduct over
17 the bayou swamps. Surely, we can raise the
18 Tamiami Trail all the way.
19 Where is the vision?
20 Just to sum up the recommendations: One
21 is include an alternative to raise the full
22 length of the Tamiami Trail, to remove the L-29
23 through the Everglades, Big Cypress and
24 Fakahatchee.
25 Number two, fully analyze direct, indirect

1 and cumulative effects of each alternative.

2 Number three, there should be a full
3 hydrological analysis of raising U.S. 41.
4 Number four, the Fish and Wildlife Service
5 and the National Park Service should be
6 designated and cooperating agencies in
7 preparing this draft EIS.
8 There should be full consultation with
9 relevant agencies as required by NEPA and the
10 Endangered Species Act.
11 Number six, we should compile historical
12 statistics for roadkills for I-75 and U.S. 41.
13 And number seven, a request that we
14 release a scoping report to the public and the
15 agencies on the different scoping alternatives
16 and the information gathered.
17 Thank you very much.
18 DR. SMITH: Thank you.
19 MR. GONZALEZ: Mr. Timothy Lamm to be
20 followed by Joette Lorion.
21 MR. LAMM: Hi. My name is Timothy Lamm.
22 I work for the Miccosukee Tribe. I also
23 married a Miccosukee Indian Tigertail Camp.
24 My concerns are basically that you don't
25 really need that road to be there. You should

1 make it a bridge the whole way. The water was
2 flowing way before the roads were there and the

3 levees were there or the canals were there.

4 The impact you are doing, basically

5 creating more of an impact adding more bridges,

6 derailing the water to flow where you wish to

7 put it, but not allowing nature to set its own

8 course. The water flowed before we came. It

9 will flow again.

10 Just directing and channeling the water

11 into certain areas is not going to -- all you

12 are creating is another impact for the next

13 board to step up and address that issue.

14 I'm also concerned about the Tigertail

15 Camp because I do live there and I married into

16 it. So I don't want that Tiger Camp to be

17 moved or washed away.

18 I am also probably concerned about many of

19 the businesses along Tamiami Trail because I do

20 live there and I'm sure they are just as

21 concerned as the rest of us.

22 Thank you.

23 DR. SMITH: Thank you.

24 MR. GONZALEZ: Joette Lorion followed by

25 Lena -- I can't make out the second name --

1 Tigertail.

2 MS. LORION: Good evening. I will leave

3 all the technical stuff to Gene. He knows it

4 much better than I do about this issue.

5 I did want to comment, though, on what

6 Cheryl said. She said, I'm going to give you a

7 bigger picture of Mod Waters that this is a

8 part of, and I agree with that, and I also

9 believe that the Modified Waters project has

10 been improperly segmented into three SEIS's so

11 that people do not see the full picture, and in

12 fact, 40 CFR 1508.25, connected actions which

13 are closely related should be examined in a

14 single Environmental Impact Statement.

15 Part of the problem you are having is that

16 people don't see -- they only see their impact

17 of what they are doing on the 8.5 or this

18 impact on Tamiami Trail and nobody is looking

19 at the full impact.

20 It concerns me greatly that you say your

21 final EIS will be done April 2001 and then you

22 are going to do some kind of combined

23 operational EIS that is what this should be,

24 and how in the world are you ever going to meet

25 the December 31st, 2003 deadline in the

1 biological opinion in the way you are going

2 right now. I don't believe you can.

3 The Modified Water Deliveries project is

4 critical to restoring the central Everglades,

5 protecting the Tribe's land, to many endangered
6 species.
7 I just, for the life of me, don't see how
8 you are ever going to meet that already delayed
9 deadline in the manner in which you are going
10 unless you somehow combine all these actions.
11 The Water Management District next week
12 may pick something that is unimplementable that
13 adversely impacts whatever you are trying to do
14 on Tamiami Trail and it's because nobody is
15 getting the big picture.
16 Some people in this room think we are
17 trying to do the Comprehensive Everglades
18 Restoration project and the Modified Water
19 Deliveries project.
20 That is not what Congress told you to do.
21 Congress told you, restore Shark River Slough
22 to the extent practicable. They didn't tell
23 you to do complete restoration.
24 That is a huge Restudy, SER project that
25 is going to be going on for 30 years. This is

1 a project that is supposed to already be
2 finished.
3 I would just like to end by reading into
4 the record again, and before I say that, you
5 also have a unique responsibility to the

6 Miccosukee Tribe and to the native Americans in
7 this room to protect their resources. You have
8 the Tigertails that could be adversely
9 impacted. They have already been impacted
10 once. The Osceolas.
11 It's very important to consult with them
12 and with the Tribe and to make sure that you
13 are not going to adversely impact them.
14 But getting back to Mod Waters, I would
15 like to, again, read into the record a case,
16 Nader versus FCC, 520 F2d 182, because Mod
17 Waters has been going on for 10 years and it is
18 destroying the Everglades not having it done.
19 So I would like to read something from
20 this case. Nine years should be enough time
21 for any agency to decide almost any issue.
22 There comes a point when relegating issues to
23 proceedings that go on without conclusion in
24 any kind of reasonable time frame is tantamount
25 to refusing to address the issues at all and

1 the result is a denial of justice. We must do
2 so, again, in the strongest terms for we
3 foresee the breakdown of the regulatory process
4 if the public and the regulated carriers must
5 wait as long as 10 years to have important
6 issues decided.

7 I think that there has been a denial of
8 justice to the Everglades by what is going on.
9 There is certainly a denial of justice to the
10 Miccosukee Tribe and the other native Americans
11 in this room.
12 Thank you.
13 DR. SMITH: Thank you.
14 MR. GONZALEZ: Lena Tigertail to be
15 followed by Mike Richardson who is the last
16 card that I have.
17 MS. TIGERTAIL-LAMM: My grandmother has
18 the same concerns as I do.
19 MR. GONZALEZ: Is she your grandmother?
20 MS. TIGERTAIL-LAMM: Yes. She is here.
21 MR. GONZALEZ: Last card I have is for
22 Mr. Mike Richardson.
23 MR. RICHARDSON: Good evening.
24 As you stated, my name is Mike
25 Richardson. I work for the First National Bank

1 of Homestead. Our main office is at 1550 North
2 Krome Avenue in Homestead, the City of
3 Homestead.
4 As you gathered from my earlier comments,
5 I am a little distressed about your
6 unwillingness to address questions on this
7 issue in a public forum so that it is on the

8 record and so that everybody has the same
9 information to deal with.
10 I found your briefing about the
11 alternatives basically quite superficial. I
12 understand you are early in the planning
13 process. You don't have a lot of the details
14 yet, but there is a lot of missing information
15 here that could have been presented as to what
16 happens to the L-29 levee, what happens to the
17 L-29 canal, what happens to the Tamiami Trail
18 once you build these other alternative routes.
19 There was just a lot of obvious questions and
20 you are unwilling to answer them and I'm sorry
21 for that.
22 A couple of issues that do jump out,
23 however, if the issue is to move more water
24 into the Northeast Shark River Slough and one
25 of the proposals that do that is to put

1 additional bridges across the Tamiami Trail,
2 your alternative to build the road to the north
3 side of the L-29 doesn't seem to accomplish
4 that.
5 You put in five bridges but all they are
6 doing is link each along the levee. There is
7 no additional water flow into Northeast Shark
8 River Slough. My assumption is you are leaving

9 the existing roadway in place. You inferred
10 that when you talked about providing a bridge
11 to the commercial operations that will remain
12 on the south side of the canal.
13 There is an obvious gap there. I don't
14 see how you are getting more water south.
15 As the central core issue that I'm here to
16 talk to, Joette mentioned the fact that we
17 recognize this is a part of the overall
18 Modified Waters program and consistently the
19 Homestead agricultural community has asked you
20 again and again and again and again and again
21 to make sure that when you increase the water
22 flows in the Shark River Slough that it will
23 not impact the water levels and the water
24 tables in the South Dade agricultural areas and
25 put our farming community out of business.

1 Cheryl, you heard me talk numerous times.
2 We are not just concerned about above ground
3 water flooding. It's a matter of lifting the
4 water tables into the rip zones of the plants
5 that will kill off our industry and I would
6 like some assurances as you deal with this
7 particular element of Mod Waters that you are
8 continuing to look at the downstream impacts
9 and ensure that you will not destroy our

10 agricultural economy.

11 Thank you very much.

12 DR. SMITH: Thank you.

13 Would anybody like to speak that did not

14 fill out a card?

15 MR. FARACE: I would like to say

16 something.

17 DR. SMITH: Would you give your name and

18 address, sir?

19 MR. FARACE: I'm Richard Farace at

20 Everglades Safari.

21 I'm concerned about building a road to the

22 north or to the south of us would wipe out all

23 the businesses on the Trail, but getting back

24 to making something simpler, and I don't know

25 if you did a study on those 19 culverts that

1 are in, existing right now, that they are all

2 pretty well blocked up, and going south of

3 those culverts, basically they are blocked up.

4 So maybe the first thing we could do is to

5 clean out all those culverts and to get the

6 water to flow further south and maybe that

7 might be enough to where we don't have to do

8 anything else. So I think that might be a

9 simpler program just to do that and see if it

10 works, and that is basically it, you know,

11 because in that area and I know some of the
12 culverts are plugged up and the water can't
13 flow through there.
14 So the studies that you have done so far,
15 maybe that is the problem. Just needs to be
16 cleaned up and get the canals to be
17 straightened out.
18 That is basically it.
19 DR. SMITH: Anyone else?
20 MR. RAUSCHENPLAT: I would like to pick up
21 my time that I left earlier.
22 DR. SMITH: Would you state your name
23 again, sir?
24 MR. RAUSCHENPLAT: My name is Paul
25 Rauschenplat.

1 I am a bass fisherman. I'm a resident of
2 Dade County since 1953.
3 I don't like what is going on in Dade
4 County right now with the water. I'm about to
5 be an ex-president, but the gentleman that just
6 spoke right now about clearing out the culverts
7 and the area south of the culverts, if they
8 were cleaned out just half as well as they
9 cleaned out the lily pads on L-29A, they took
10 out all the vegetation. It killed everything
11 in that canal practically with weed killers and

12 so forth. You know, it's nothing. They can
13 get water to move, but you can't get water to
14 move uphill and south of the Trail, it's
15 uphill, but I guess that is not spending enough
16 money. That is not bringing in enough big
17 bulldozers and big earth moving equipment to do
18 the job.
19 Just go in there and do the grading work
20 and the clearing work and you probably have all
21 the water you need down in Shark River Slough.
22 I don't know. I just don't like what is
23 going on with this. It just seems like a lot
24 of taxpayer's money that is being spent to
25 protect the National Park Service's desires for

1 a pristine area. They have their land. They
2 have grown and added more to it and now they
3 want to get everything around it and
4 surrounding it and make it to their liking. I
5 don't think that is quite right.
6 It's property that belongs to the people
7 and the people have a right to get access to
8 it.
9 I can foresee what you are going to do and
10 you are going to raise the Tamiami Trail, make
11 it like I-10 or I-12 in Louisiana. You are
12 probably going to make an overhead tunnel

13 surrounded by gates or fencing.

14 All you can do is drive across. You are

15 not going to have any recreation area. You are

16 not going to have any access to the canal by

17 fishermen such as myself, such as many other

18 fishermen that aren't here today that do spend

19 a lot of money.

20 I just bought a new boat. A bunch of

21 taxes went into that boat. I put a lot of

22 gasoline in the boat. I pay a lot of gasoline

23 taxes. I pay registration fees for the boat,

24 for the truck that pulls the boat, and I think

25 I would like to get a little something more for

1 my money than a tunnel up in the air to move

2 traffic.

3 And that is about all. I am just getting

4 a little disgusted with what is going on in

5 there.

6 Thank you.

7 DR. SMITH: Thank you, sir.

8 Anyone else who would like to make a

9 comment?

10 The record will remain open through June

11 21st, 2000 for those who desire to submit a

12 written statement to be included with the

13 record of this public meeting.

14 The written statement should be mailed to
15 the District Engineer, U.S. Army Corps of
16 Engineers, Post Office Box 4970, Jacksonville
17 Florida, 32232-0019.
18 If you didn't get that address, I'll be
19 happy to -- just come up and ask me
20 afterwards.
21 Handouts and fact sheets are available on
22 the table in the back.
23 This concludes our meeting.
24 Thank you very much.
25 As I said earlier, a number of our staff

1 are here. We will be happy to answer
2 questions. Stay as long as you wish. Thank
3 you.
4 (Thereupon, the hearing was concluded at
5 7:30 p.m.)
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1
2 CERTIFICATE
3 - - - - -
4
5 STATE OF FLORIDA
6 COUNTY OF DADE
7
8
9 I, MARY G. STEPHENSON, Notary Public,
10 do hereby certify that I was authorized to and
11 did stenographically report the foregoing
12 proceedings and that the transcript is a true
13 and correct transcription of my stenotype notes
14 of the proceedings.
15

16 Dated this 26th day of June, 2000.

17

18

19 _____

20 MARY G. STEPHENSON

21

22

23

24

25

TAYLOR REESE and ASSOCIATES
(305) 444-7331

Appendix C

COMMENTS RECEIVED DURING COMMENT PERIOD

Dept of Army

TO: District Corps of Engineers
P.O. Box 4970
Jacksonville FL 32232-0019
Attn James C Duck
Elmar Kurzbach

FOR: Re Mod Waters Project
Under U.S. 41 - Proposed
Changes From 1992 plan

Stan Carlin

P.O. BOX 517
MELBOURNE, FL 32902-0517
407-729-8387 • 305-559-4136

DATE: May 30, 2000

Gentlemen:

Look at your recent flood test - when Water Managems. tried to flood water over U.S. 41 - with all gates open & pumps running you could not flood water over U.S. 41.

Why not be honest with yourselves & tax payers

the 1992 Design plan is correct - the existing culverts are adequate.

If for any reason you want more water to flow south it would be much less costly to clean out existing culverts & existing "canals".

When White Construction had contract to widen culverts in 1992 + 1993 - White Construction said most of the existing culverts were at least 50% blocked with mud & trash.

Regards
Stan Carlin
Enclosed undated memo - James C Duck -

copies - vary

Cheryl P Ulrich
06/12/2000 02:46 PM

To: Mary Ann Poole <poolem@gfc.state.fl.us>@SMTP@Exchange
cc: "Towles, Tim" <towlest@mail.state.fl.us>@SMTP@Exchange, furyj@gfc.state.fl.us@SMTP@Exchange, coughls@gfc.state.fl.us@SMTP@Exchange, brashec@gfc.state.fl.us@SMTP@Exchange, Martin T Gonzalez/CESAJ/SAJ02@CESAJ, James M Baker/CESAJ/SAJ02@CESAJ
Subject: Re: Tamiami Trail raising

Hi Mary Ann

Info is in the mail. Also check on the website over the next week - We will be posting alot of the older correspondence and technical support data.

CPU
From: Mary Ann Poole <poolem@gfc.state.fl.us> on 06/07/2000 09:32 AM

From: Mary Ann Poole <poolem@gfc.state.fl.us> on 06/07/2000 09:32 AM
To: Cheryl P Ulrich/CESAJ/SAJ02@CESAJ
cc: "Towles, Tim" <towlest@mail.state.fl.us>@SMTP@Exchange, furyj@gfc.state.fl.us@SMTP@Exchange, coughls@gfc.state.fl.us@SMTP@Exchange, brashec@gfc.state.fl.us@SMTP@Exchange
Subject: Tamiami Trail raising

Cheryl -

Neither Tim nor I will be able to attend the public meetin on Thursday or the Friday interagency team meeting on Tamiami Trail raising, but I think you already know that our main issue is maintenance (or even improvement, if possible without additional expense) or recreational access to the L-29 canal, L-67 canal, and WCAs. Would it be possible to get ahold of the handouts? Surface mail, email, or FAX would all work for me, and then I'll make sure that they are distributed among our staff interested in this issue. I understand that you'll also be providing more info on the plans for the Mod Water/C-111 EIS, and I'd be especially interested in getting that, too. Thanks in advance - sorry to miss the meetings, though.

- Mary Ann

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

JAMES L. "JAMIE" ADAMS, JR. Bushnell
BARBARA C. BARSH Jacksonville
QUINTON L. HEDGEPETH, DDS Miami
H.A. "HERKY" HUFFMAN Deltona
DAVID K. MEEHAN St. Petersburg
JULIE K. MORRIS Sarasota
TONY MOSS Miami
EDWIN P. ROBERTS, DC Pensacola
JOHN D. ROOD Jacksonville

LAN L. EGBERT, Ph.D., Executive Director
TOR J. HELLER, Assistant Executive Director

OFFICE OF ENVIRONMENTAL SERVICES
BRADLEY J. HARTMAN, DIRECTOR
(850)488-6661 TDD (850)488-9542
FAX (850)922-5679

June 13, 2000

Mr. James C. Duck
Chief, Planning Division
ATTN: Mr. Elmar Kurzbach
U.S. Army Corps of Engineers
P.O. Box 4790
Jacksonville, Florida 32232-0019

Re: Scoping Notice for Modified Water Deliveries to Everglades National Park: Raising Tamiami Trail, Broward and Miami Dade Counties

Dear Mr. Duck:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission has received the scoping notice for the referenced project, and offers the following concerns that we would like to see addressed during the development of a General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS).

The reason that a GRR and SEIS are being developed is that new information acquired since the project was approved in 1992 indicates that the original design would be insufficient to pass the volume of water that would need to be conveyed under the Tamiami Trail via the program of Modified Water Deliveries to Everglades National Park. Four options are being considered: (1) construct four bridges and institute a maintenance program for the remaining roadway, (2) construct four bridges and raise the remaining roadbed one to two feet; (3) construct a new roadway north of the existing alignment, and (4) construct a new roadway south of the existing alignment. The portion of Tamiami Trail that would be affected by this project is limited to that stretch which lies between Water Conservation Area 3B and Everglades National Park; however, the extent to which construction might alter the highway immediately west and east of this stretch is not clear.

We have three major areas of concern with regard to the potential impacts of this project.

1. Maintenance or enhancement of existing recreational access points. Depending on the extent of construction, as many as five access areas to Water Conservation Area 3B and the eastern corner of Water Conservation Area 3A could be affected by the redesign and construction. We request that we be consulted early in the planning stages so that we

may work with the U.S. Army Corps of Engineers and the Florida Department of Transportation to maintain or, if feasible, improve these access points and reduce impacts during construction.

2. Potential loss of Everglades marsh. The third option would likely eliminate portions of Water Conservation Area 3B, particularly as the road would need to circumvent the Tigertail Camp, which lies along the L-29 levee. The fourth option would similarly affect Everglades National Park, particularly as the road would need to circumvent the Osceola Camp. Given the loss of native habitat that has already occurred in the Everglades, we would find it difficult to support any alternative that would result in further loss of native Everglades marsh.

3. Protection of nearby active rookeries. Two active rookeries occur very near this portion of Tamiami Trail. One of these, "Tamiami West," has had a recent history of nesting activity by wood storks (endangered) and tricolored herons, little blue herons, snowy egrets, and white ibis (all species of special concern). This past year, an estimated 1,200 to 1,300 wood stork nests were observed at this colony (T. Towles, FWC, pers. comm.). While the recent blasting for the S-355 structures did not appear to cause any disruption in nesting that was already underway at the time, we are concerned that prolonged construction that starts during the nesting season might prove to be more damaging; therefore, we would recommend that any construction near the rookery be started outside of the nesting season. Our staff would be happy to work with yours during the planning process to determine the appropriate distance to satisfy this particular concern.

Because our concerns with regard to recreational access are likely to be unique to the Florida Fish and Wildlife Conservation Commission, we intend to submit to you Planning Aid Letters and a Fish and Wildlife Coordination Act report independent of those submitted by the U.S. Department of the Interior. If you have any further questions, please feel free to contact Mr. Timothy Towles (561-778-5094) in our office in Vero Beach.

Sincerely,

Bradley J. Hartman

Bradley J. Hartman, Director
Office of Environmental Services

BJH/MAP
ENV 2-16/2/5
a:\tamiami.let.wpd

cc: Ms. Marjorie Bixby, FDOT, Miami
Mr. Stephen Forsythe, FWS, Vero Beach
Superintendent Richard Ring, ENP, Homestead

FLORIDA
BIODIVERSITY
PROJECT

June 19, 2000

Mr. Elmar Kurzbach
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: U.S. Highway 41 SEIS Scoping Comments

Dear Mr. Kurzbach ,

The Florida Biodiversity Project (FBP) submits the following scoping comments in response to the Federal Register notice on May 5th regarding the Corps intent to prepare an SEIS to address a change in design of U.S. Highway 41 (Tamiami Trail). These written comments supplement the oral comments presented by FBP at the June 8th scoping meeting in Homestead.

The SEIS presents an important opportunity to correct many of adverse ecological impacts of US 41. The Corps has an extensive history of building public works projects that have had severe adverse environmental effects (Morgan 1971). Although the Corps did not build U.S. 41 it manages water control structures such as gates, levees, and pumps along the highway. The FBP, therefore, is very concerned about the adverse ecological effects of US 41 including substantial impacts on wildlife. In general, the FBP finds the range of preliminary alternatives presented in scoping notice as grossly inadequate and in violation of NEPA for the reasons discussed below. The position of the FBP is the proposed project should be: 1) fully consistent with Everglades restoration goals and objectives and 2) adverse ecological impacts of US 41 should be minimized to the maximum extent practicable.

The FBP requests that these scoping comments be included in the administrative record. Additionally, the FBP requests to be placed on the "interested parties" list for this proposed action and related projects so that we may receive additional information including a scoping report and a copy of the draft SEIS.

I. NEPA SCOPING FRAMEWORK

To help assure that that the SEIS will meet the required standards of NEPA compliance the FBP will briefly summarize the NEPA scoping requirements. NEPA is our basic national charter for protection of the environment. 40 C.F.R. § 1500.1 (emphasis added). NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken.

Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. 40 C.F.R. § 1500.1 (emphasis added). "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analysis in

P.O BOX 220615 Hollywood, FL 33022 (954) 922-5828

environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement." 40 C.F.R. § 1502.24.

The Environmental Impact Statement "shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1 (emphasis added). Environmental Impact Statements "shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made." 40 C.F.R. § 1502.2(g) (emphasis added).

Scoping is the public process designed to determine the scope of issues to be addressed in the EIS. Scoping should occur as early as possible and should be an open process intended to obtain the views of other agencies and the public regarding the scope of the EIS.

A. Objectives

The objectives of scoping include:

- Notice and invitation of other agencies to participate
- Determine the scope and significance of issues
- Identify and eliminate issues determined to be insignificant
- Allocate assignments among agencies
- Identify related environmental documents being prepared
- Identify other environmental review and consultation requirements
- Set page and time limits
- Adopt procedures to combine the environmental analysis process with scoping

B. Definition of Scope and Actions evaluated

The scope of an EIS consists of the types of actions to be included, the range of alternatives, and the impacts to be considered. 40 C.F.R. § 1508.25. The lead agency should consider three types of actions, three types of alternatives, and three types of impacts. Scoping is also used to determine which specific impacts (e.g. hydrology, vegetation, wildlife) must be evaluated in the EIS.

1. Types of Actions to be evaluated.

The types of actions to be evaluated include "connected" actions, "similar" actions, and "cumulative" actions.

"Connected" actions are those that are closely related. Actions are closely related if they automatically trigger other actions, cannot proceed unless other actions are taken previously, or are interdependent parts of larger action and depend on the larger action for their justification.

"Similar" actions are those which when viewed with other reasonably foreseeable future proposed actions, have similarities that provide a basis for evaluating their environmental consequences together, but are not necessarily connected.

"Cumulative" actions have cumulative significant impacts when reviewed with other proposed actions and should be discussed in the same EIS.

2. Types and Range of Alternatives to be evaluated.

The scope of alternatives to the proposed action include the "No Action" alternative, other reasonable courses of action, and mitigation measures other than those included in the proposed action. The alternatives section is the heart of the EIS. The EIS must "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." C.F.R. § 1502.14(a) (emphasis added.)

3. Types of Impacts to be evaluated.

The scope of impacts to be evaluated in the EIS include direct impacts, indirect impacts, and cumulative impacts.

"Direct effects, which are caused by the action and occur at the same time and place." 40 C.F.R.§ 1508(a).

"Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems including ecosystems." 40 C.F.R. § 1508.8(b) (emphasis added).

"Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative actions can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.7 (emphasis added).

C. Scoping Reports

The lead agency may prepare a scoping report to make public the decisions that have been made during the scoping process. A scoping report generally contains a summary of the issues to be evaluated in the EIS and the views of those participating in the scoping process. CEQ Scoping Guidance, April 30, 1981, II(b)(6).

II. BACKGROUND

A. General

In 1928 the Tamiami Trail (US 41) was the first highway built across the wilderness of the Everglades and the Big Cypress Swamp. The highway crosses sensitive wetland habitat such as marshes, sloughs, prairies, and Cypress swamp. It is recognized as the first barrier to the natural sheet flow from the Everglades to Florida Bay. The two-lane highway consists of a raised road bed, a borrow canal on the northside, and an associated levee (L-29). Over the decades only minor improvements have been made such as installation of additional culverts, resurfacing, widening the roadbed and shoulder, and installation of guardrails. No major environmental improvements have been made.

B. Comprehensive Everglades Restoration Plan

Everglades restoration is a "connected" action of the US 41 project. In order to authorize Everglades restoration planning the Water Resources Development Act of 1996 (WRDA 1996) was passed. WRDA stated the purpose of the authorized comprehensive plan; "The Secretary shall develop, as expeditiously as practicable, a proposed comprehensive plan for the purpose of restoring, preserving, and protecting the South Florida ecosystem."

The Final Restudy components for Water Conservation Area 3 decompartmentalization include backfilling the L-29 canal and elevating the Tamiami Trail. Section 9.1.7.2 Water Conservation Area 3 Decompartmentalization and Sheetflow Enhancement (AA, QQ and SS) states:

> "These features include the construction of new water control structures and the modification or removal of levees, canals, and water control structures in Water Conservation Area 3A and B located in western Broward County. The purpose of these features is to reestablish the ecological and hydrological connection between Water Conservation Areas 3A and 3B, the Everglades National Park, and Big Cypress National Preserve. Sheetflow obstructions will be removed with the backfilling of the Miami Canal and southern 7.5 miles of L-67A Borrow Canal, removal of the L-68A, L-67C, L-29, L-28, and L-28 Tieback Levees and Borrow Canals, and elevating of Tamiami Trail" (USACE 1999) (emphasis added).

The Appendix A-4 describes component QQ6 , the decomparmentalization of WCA 3. Structural changes include removing the L-29 levee and canal to restore sheetflow into Everglades National Park. In addition, "elevate Tamiami Trail (U.S. 41) through the installation of a series of bridges between L-31N and L-28 consist with conveyance capacities determined at I-75 and any increases required due to inflows downstream of I-75 and upstream of Tamiami Trail" (USACE 1999).

WRDA 1996 also authorized a series of Critical Projects, one of which is the Tamiami Trail Culverts. The purpose of the Project is to improve water flows across US 41from SR 92 to 50

Mile Bend by constructing 87 additional culverts under the US 41 at 30 separate locations. While the Project may help restore a more natural hydopattern to the southern Big Cypress Basin, the Project will not substantially reduce barriers to wildlife movements, reduce roadkill, or address fragmentation and edge effects.

C. Modified Water Deliveries Project

Under current Corps water management operations approximately 80-85% percent of water flows are channeled into Western Shark Slough, rather than the 45% that would be the case under historical conditions. In 1992 the Corps issued its GDM for Modified Water Deliveries to Everglades National Park (MWD). The purpose of the project was to reroute large volumes of water to restore flows into NE Shark River Slough.

In 1999, the FWS issued its Final Biological Opinion on the MWD project and determined that the Corps water management scheme jeopardized the continued existence of the Sparrow and adversely modified its critical habitat (USFWS 1999a). To correct the problem the FWS presented a RPA that mandated that Corps by March 1, 2002 ensure that 60% of flows enter east of the L-67 extension to restore flows into NE Shark River Slough.

Also in 1999, Everglades National Park released a report that determined that some structural components as currently designed were not large enough to pass the large volume of water necessary to restore natural flows (Van Lent 1999). Some components would have to be five times larger in order to accommodate peak flows and that the elevation of Tamiami Trail seriously limits the amount of water that can be passed to NE Shark River Slough.

In the original MWD Project, the only US 41 component was to raise Tigertail camp (USFWS 1999a). Now with updated hydrological analysis the current proposed action to raise the roadbed has apparently been added to the list of MWD Project components.

III. ECOLOGICAL EFFECTS OF ROADS

A. General Effects

There is substantial, credible, and compelling evidence on the adverse ecological effects of roads. The literature contains over 6,000 scientific articles. Short of total destruction almost nothing is worse than a road through a natural area. Roads can alter hydrology, kill and injure wildlife, create habitat destruction and fragmentation, create edge effects, spread exotic species, encourage development, poaching, overhunting, act as a source of pollution, and spread refuse (Noss 1995).

Wildlife impacts are especially severe. The U.S. Humane Society arrived at a conservative estimate that approximately one million animals are killed per day on highways in the United States. Highways are the classic death trap. Roadkill attracts other animals which are in turn killed. Warm sun-baked pavement also attracts cold blooded reptiles and amphibians.

Many secondary and cumulative effects of roads are more subtle such as the long-term effects on ecological processes. Most government agencies disregard the ecological effects of

roads and justify existing road design as benefiting travel and recreation and that changes would be unacceptable to the motorist (Noss 1995).

B. US Highway 41

US Highway 41 is especially egregious since it slices through almost 90 miles of the Everglades/Big Cypress region , one of the worlds most endangered ecosystems. The highway which was completed in 1929 crosses through sensitive marshes, sloughs, prairies, and cypress domes. The highway presents a triple barrier: 1) a wide roadbed constructed of fill material; 2) a borrow canal; and 3) an associated levee. The highway has caused serious impacts on hydrology, vegetation, and wildlife.

Although the highway has a series of culverts it continues to acts like a dam blocking sheet flow. For example, the L-29 along the Tamiami Trail has increased the water depth in WCA 3A, altering the seasonal pattern of drying and flooding (Davis and Ogden 1994). The associated borrow canal increases drainage, creates artifical deep water habitats, fragments habitat, and acts as a conduit for pollution and exotic species.

Wildlife has been seriously impacted by US 41. Harris (1991) notes that while some native fauna evolved with water barriers, they did not evolve with the ability to evade the lethal effects of traffic. Collisions with motor vehicles is now the number one source of mortality on all of Florida's large vertebrate threatened and endangered species. Harris concludes that "poorly designed roads are more effective as an isolating force around habitat islands than is the sea that surrounds oceanic islands." Habitat fragmentation and isolation are key factors contributing to the erosion of biological diversity in the Everglades region (USACE 1999; USFWS 1999b). The effects are evident with the incidence of endangered species mortality.

The FBP is especially concerned about potential mortality impacts to the endangered Florida panther. Collisions with motor vehicles is the number one source of human caused mortality of the panther. Several panthers have already been killed on U.S. 41. While fencing and underpasses have been installed on I-75 and SR 29 to reduce mortality, it is our understanding no such protections are planned U.S. 41. Elevating US 41 would allow panthers, bears, deer, and other animals to cross the highway safely. Since the panther is one of the most endangered animals in the world, agency actions should minimize potential adverse impacts (USFWS 1999b).

Slow moving animals such as turtles and snakes are the most frequently seen victims of vehicles collisions on U.S. 41. Even more secretive species such as otters and the Everglades mink are killed (Humphrey 1992). Culverts and bridges can alter flow patterns and can block or restrict the passage of fish, amphibians and reptiles.

Vegetation along U.S. 41 has been altered since there is clear evidence of increased growth of woody vegetation on south side of U.S. 41. The highway acts as a corridor for the spread of exotic plant species. Higher filled and developed areas exhibit a more favorable habitat for the spread of exotics.

The Restudy in Section 5.5.1 elaborates on roads, canals, and fragmentation:

> Increasing spatial extent and improving habitat quality can provide a basis for improving species abundance and diversity. However, compartmentalization caused by construction of physical barriers such as dikes, canals, levees, and roads, or even hydrologic barriers (such as the Water Conservation Areas) has fragmented the system by creating a series of poorly connected natural areas. These barriers have restricted the movement of many fish and consequently reduced their range. Fragmented communities are more likely to lose species because the number of individuals in each fragment may be too small to persist. The smaller the fragment, the higher is the likelihood of losing species or favoring an imbalance in the species that do inhabit the areas. Moreover, fragmentation itself alters the landscape by breaking connections between the various habitat types that were distributed historically across the landscape. Therefore, improving the connectivity of habitats will improve the range of many animals and their prey-base and provide for a more natural balance of species within the system. The physical barriers that created the fragmented environment themselves affect species abundance. The introduction of deep canals which act to drain surrounding areas, affect the ability of wading birds to forage over large areas (USACE 1999) (emphasis added).

IV. SUSTANTIVE ISSUES

A. The SEIS must analyze a reasonable range of alternatives as required by NEPA.

NEPA requires that agencies rigorously explore and objectively evaluate all reasonable alternatives. C.F.R. § 1502.14(a). The FBP maintains that to comply with NEPA the SEIS should include a reasonable range of alternatives. The FBP believes the four preliminary alternatives presented in the scoping notice and handouts represents only variations of the same alternative -- - to build four or five bridges across a limited ten mile span. The alternatives only represent different locations of the bridges or the alignment of the roadbed. As noted above, NEPA requires that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The FBP is concerned that essentially analyzing just one alternative suggests that Corps may be engaging in post-hoc rationalization in the SEIS to justify decisions that have already been made.

A range of alternative elements could include but not be limited to the following:

- Range of water conveyance design – culverts, gates, bridges, elevated highway or combination.
- Range of project area – L-31N to L-67, L-31N to L-28, L-31N to CR 92.
- Methods of water conveyance – passive channelization, pumped channelization, spreader canals, natural sheetflow.

- Methods of water containment – removal or retention of levees, removal or retention of the borrow canals, elevation or current surface configuration of the roadbed.

A range of alternatives that could be analyzed but should not be limited to the following:

- The "No Action" alternative.
- Constructing the four or five bridges and removing the L-29 levee and borrow canal.
- Constructing four or more bridges and removing the L-29 levee and borrow canal from L-31N to L-28.
- Reconstructing US 41 as a viaduct raising the roadbed 8-10 feet high from L-31N to L-28.
- Constructing a continual series of bridges from L-31N to Collier Seminole State Park
- Reconstructing US 41 as a viaduct raising the roadbed 8-10 feet from L-31N to CR 92 (Collier Seminole State Park) and removing the borrow canal and L-29 levee.

The FBP strongly urges the Corps to include the alternative of raising US 41 8-10 feet above the water surface the entire 75 miles from L-31N to CR 92 (Collier Seminole State Park). This alternative would be consistent with the goals of WRDA 1996, the CERP, MWD Project, and the best available science.

The implementation of this alternative would likely greatly improve hydrology and restore sheet flow, restore native vegetation, reduce soil subsidence, vastly reduce roadkill and wildlife injury, enhance wildlife movement, reduce fragmentation and edge effects, and reduce pollution.

B. The SEIS must use the best available scientific information.

Consistent with NEPA the SEIS is required to use the best available scientific information. 40 C.F.R. § 1500.1; 40 C.F.R. § 1502.24. This should include a comprehensive literature review of the ecological effects of roads. For example, the conservation organization Wildlands Center for Preventing Roads (WCPR) maintains a database of over 6,000 citations on the ecological effects of roads. In addition, the journal *Conservation Biology* released a special issue in 1999 addressing the ecological impacts of roads. This information should be included in the SEIS. The FBP in conjunction with WCPR and the Biodiversity Legal Foundation will submit to the Corps additional relevant studies on the adverse ecological effects of roads which should be included in the SEIS.

Additionally the Corps must analyze historical data regarding hydrology, vegetation, soils, and wildlife. The FBP recommends the SEIS be peer reviewed by CROGEE.

C. The SEIS must fully analyze the direct, indirect, and cumulative impacts of the alternatives.

Consistent with 40 C.F.R.§§ 1508(a); 1508.8(b); 1508.7 the Corps must analyze the direct, indirect, and cumulative impacts of the alternatives. This should include impacts on the

major ecosystem components such as hydrology, soils, vegetation, wildlife, and growth inducing effects.

Hydrology analysis should include impacts on water quality, quantity, distribution, depth patterns, and timing. Past historical analysis of the 'No Action' alternative and cumulative impacts should be included. Altered hydrology has represented the greatest threat to the ecological integrity of the Everglades (Lodge 1994). Since there is considerable controversy surrounding the Natural System Model and the South Florida Water Management District Model, the SEIS should explicitly state how the alternatives will allow the conveyance of peak flows during wet years. Future modeling may indicate higher flows are required for restoration, therefore extra water conveyance capacity should be incorporated to avoid having to rebuild the highway a second time.

Wildlife analysis should include impacts on threatened, endangered, rare, imperiled species, and other non charismatic unlisted species that may be impacted by US 41 such as mammals, amphibians, reptiles, birds, and fish. The SEIS should incorporate the information of the FWS Multi-Species Recovery Plan (USFWS 1999b). The analysis should include the impacts of roadkill, injury, reduced fitness, habitat fragmentation, habitat degradation, restriction of wildlife movements, altered behavioral patterns, and harassment.

The Corps must also analyze any "growth inducing" effects of "improving" the highway such widening, providing additional traffic lanes, interchanges, or recreational access areas.

D. The SEIS must include a broad geographic scope.

Because highways have large spatial and temporal impacts that extend beyond the highway corridor, the geographic scope of the SEIS must be broad. The zone of influence must be expanded beyond the ten mile project corridor. The FBP recommends that the geographic scope include WCA's 2A, 2B, 3A, and 3B, Everglades National Park, Big Cypress National Preserve, Miccosukee Indian Reservation, Fakahatchee State Preserve, Collier Seminole State Park, Ten Thousand Islands National Wildlife Refuge, Everglades City, and Chokoloskee.

The FBP urges the Corps to not unduly restrict the study area. There may not be a second chance to correct the ecological impacts of US 41. The FBP understands that a broader geographic scope makes the analysis more complex and time consuming, but nonetheless, the FBP believes the recommended area is consistent with the spatial and temporal impacts of roads and the requirements of NEPA.

E. The proposed timeframe for preparation of the SEIS is inadequate.

The FBP is concerned that the Corps has proposed an unduly short timeframe for the preparation of the SEIS. The scoping notice states that the draft SEIS is expected to be available for public review during the 4th quarter of this year. Since scoping review and recommendations will take a month or more --- that leaves <u>only five months</u> to prepare the SEIS. In order to fully analyze a reasonable range of alternatives as mandated by NEPA a longer timeframe would likely be required. The proposed brief timeframe and essentially presenting only one preliminary

alternative for the SEIS gives the impression that the document will be used to justify decisions that have already been made.

The SEIS to fully comply with NEPA must comprehensively address many complex legal, ecological, financial, and technical issues. The preparation of the SEIS should not be rushed. The bottom line is that the Corps must get the draft SEIS right the first time to avoid needless litigation, expense, and delay. Realistically, there may not be another chance to comprehensively address the adverse impacts of U.S. 41 and have sufficient funding to reconstruct the highway in a manner that minimizes those impacts. Because of the complex issues involved, the FBP urges the Corps to take twelve months instead of five months to adequately prepare the SEIS.

F. The Corps should designate the FWS and the NPS as full cooperating agencies in the preparation of the SEIS.

A cooperating agency may be any federal agency other than the lead agency that has jurisdiction by law or special expertise with respect to the environmental impacts expected to result from a proposal. 40 C.F.R. § 1508.5 (emphasis added).

A lead agency must request must request the participation of cooperating agencies as early as possible in the NEPA process, use environmental analysis and proposals prepared by cooperating agencies as much as possible, and meet with cooperating agencies at their request. 40 C.F.R. 1501.6(a).

Because the proposed action will likely impact many endangered and threatened species and other wildlife species over large areas of the Greater Everglades ecosystem, the FWS should be designated as a full cooperating agency in the preparation of the SEIS. Likewise, because the project will have substantial impacts on the hydrology, wildlife, vegetation and soils in Everglades National Park, the NPS should be designated as a full cooperating agency in the preparation of the SEIS. NPS scientists have considerable expertise on the Park's hydrology, vegetation, and wildlife.

Designation of the FWS as a cooperating agency would help ensure early and full consultation under Section 7 of the ESA and wetland mitigation requirements.

G. The SEIS should include an analysis of funding options including a toll system.

The FBP is concerned that a viaduct highway alternative will be inappropriately dismissed as too expensive. While he cost of construction is a major issue that deserves analysis, it should not serve as a convenient excuse to inappropriately limit reasonable alternatives. The Corps should analyze the feasibility of instituting a toll system to offset the cost of construction. Presently, it costs $6.50 to drive the 100 miles from Ft. Lauderdale to Ft. Pierce on the Florida Turnpike. In contrast, it costs only $1.50 to drive across 78 miles of sensitive wetlands on I-75. For example, a toll of $5.00 could be implemented to offset the expenses of raising the roadbed

as a viaduct, thus minimizing the adverse ecological impacts. Various funding options require analysis.

H. The SEIS should analyze construction methods of elevating U.S 41.

Major highways crossing open water or swamps have been elevated. Two such examples include the Overseas Highway spanning the Florida Keys and Interstate 12 in Louisiana that crosses Cypress swamps. Technology is not a limiting factor to construction of a viaduct type highway. New modular construction methods are available that reduce the cost and time of construction. Although a viaduct type highway may take several years to complete it would have the most environmental benefits and serve as a pilot project for other highway modifications. These construction techniques merit analysis.

I. The Corps should issue a scoping report.

As discussed in Section I, in order to provide adequate public disclosure and possible additional input, the Corps should draft a scoping report that would summarize the results of the scoping comments and decisions by the Corps and cooperating agencies as to the scope of the SEIS. This report should be distributed to government agencies and the public as soon as practicable.

V. CONCLUSION

The history of South Florida over the last century is full of examples of infrastructure "improvements" such as roads and canals built in sensitive ecosystems that were initially and universally regarded as beneficial. Only when we learned more about science and ecology did we realize the extensive ecological damage that roads and other infrastructure projects cause to ecosystems such as the Everglades. Unfortunately, after extensive ecological damage is done the costs of restoration dwarf the original costs of these short-sighted projects.

The mistakes of the past do not have to be repeated in the future. WRDA and the CERP provide the legal, technical, and financial resources to achieve Everglades restoration. The fundamental question is whether elected officials and government agencies have the political will to achieve real "restoration" and not merely "tweak" the system by building "mega-projects" that largely serve to fuel future population growth. A minimum hydrological objective is to decompartmentalize the WCA's (Science Sub-Group 1993). Clearly, elevating U.S. 41 would help achieve this minimum objective. The FBP urges the Corps to use the best available science, fully comply with all statutes and regulations, and incorporate the above scoping recommendations in the draft SEIS.

Sincerely,

Brian Scherf

Brian Scherf
Board member

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DM
CPU ✓

Miccosukee Tribe of Indians
of Florida

Business Council Members
Billy Cypress, Chairman

Jasper Nelson, Ass't. Chairman
Max Billie, Treasurer

Andrew Bert Sr., Secretary
Jerry Cypress, Lawmaker

COL Joe R. Miller
District Engineer
US Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

June 20, 2000

SUBJECT: Tamiami Trail Modifications

Dear COL Miller:

I am writing to express the Miccosukee Tribe's concerns over the raising of Tamiami Trail. For decades, the Miccosukee Tribe has advocated that Tamiami Trail should be raised up on stilts along it's entire length. Finally, the COE has concurred in this assessment. At a minimum, the section between 40 Mile Bend and Krome Avenue should be elevated. The presence of Tamiami Trail presents a significant impediment to the natural flow of water southward into Everglades National Park. More importantly, the presence of Tamiami Trail causes water to back up and pond north of the Trail and causes over-drainage conditions south of the Trail. Impacts to wildlife are tremendous. Wildlife deaths occur on a daily basis along Tamiami Trail.

While we recognize the valid need to raise Tamiami Trail, the Tribe would like to make the following concerns known to the Corps of Engineers:

1. Presence of Tigertail Camp. COE plans cannot interfere with the traditional use and occupancy of the Tigertail family along the northern banks of the L-29 canal.

2. Presence of the Osceola Camp. COE plans cannot interfere with the traditional use and occupancy of the Osceola family along the southern edge of Tamiami Trail.

3. Tamiami Trail should be on stilts. Simply raising the road bed or installing additional bridges (the hydrologic solutions) will not prevent the continued loss of wildlife along Tamiami Trail.

4. Wood Stork Rookery. There is an active Wood Stork rookery located along the southern edge of Tamiami Trail. Their population has been estimated at 1800 breeding pairs. This needs to be factored into your decision.

P.O. Box 440021, Tamiami Station, Miami, Florida 33144, (305) 223-8380, fax (305) 223-1011
Constitution Approved by the Secretary of the Interior, January 11, 1962

5. Traffic Control. Tamiami Trail is a very busy highway. Steps must be taken to avoid traffic delays during construction. Tamiami Trail has been designated as a Hurricane Evacuation Route and cannot be obstructed. Additionally, police, fire and ambulance service must never be obstructed.

6. Impacts to Business. There are several businesses located along Tamiami Trail. Every effort should be taken to avoid impacts to their legal rights.

7. Surface Water Run-Off. After Tamiami Trail has been elevated onto stilts and the Old Trail removed, historic flows will have been returned. However, it may be necessary to leave small portions of the Old Trail intact to provide a treatment area for surface water run off from the highway. These islands of Old Trail could also serve as ramps which would allow access to the existing businesses and camps along the highway.

The Miccosukee Tribe wishes to be consulted every step of the way, as the COE develops plans to raise Tamiami Trail. Thank you for including the Tribe's concerns in your planning efforts. If you have questions concerning these comments or the Tribe's concerns, please do not hesitate to call me at (305) 223-8380, extension 2240.

Sincerely yours,

Truman E. Duncan, Jr.

Truman E. Duncan, Jr.
Water Resources Director

cc.
Billy Cypress, Tribal Chairman
Dexter Lehtinen, Tribal General Counsel
Tigertail Camp
Osceola Camp

Public Workshop
Tamiami Trail Modifications
Request for Public Input on Performance Measures for Alternative Selection

February 6, 2001

PUBLIC WORKSHOP
TAMIAMI TRAIL MODIFICATIONS

REQUEST FOR PUBLIC INPUT ON PERFORMANCE
MEASURES FOR ALTERNATIVE SELECTION

US ARMY CORPS OF ENGINEERS

JACKSONVILLE DISTRICT

BASS PRO SHOP

200 GULFSTREAM WAY

DANIA BEACH, FLORIDA

TUESDAY, FEBRUARY 6, 2001

7:10 P.M. - 9:50 P.M.

PANEL SPEAKERS

DORIS MARLIN

SHELLEY F. TRULOCK

SCOTT BURCH

AUDIENCE SPEAKERS

Brian Blackwell
Brad Waller
Mary Munson
Robert Yoder
Richard Persson
Bruce Rowlett
Dave Balman
Dave Kuczenski
Pedro Monteiro
Albert Bryan
Jonathan Olman
Robert Tirrell
Joel Marco
Ed Walker
Andrew Hanson
Joe Walsh

1 MS. MARLIN: Welcome everyone. Thank you for
2 coming tonight. The purpose of our meeting, of our
3 workshop, is to discuss input to the performance
4 measures that will be used to select the
5 alternatives for the Tamiami Trail modifications
6 that are proposed under the modified water
7 deliveries project.
8 I would just like to let you all know that we
9 have cards up front, and we're asking you to fill
10 in your name and address and indicate whether or
11 not you are an elected official, whether you would
12 like to be added to our mailing list for
13 publication on this project and other related
14 projects and whether or not you're interested in
15 speaking tonight, and if you indicated no and then
16 choose to, after the meeting, change your mind and
17 decide that you do want to make some comments,
18 you're more than welcome to, and we'll be making a
19 transcript and an audio recording of tonight's
20 meeting, and so if at the end of the meeting, you
21 decide that you would like a copy of the
22 transcript, you're welcome to contact our public
23 affairs office and get a copy of the transcript at
24 your own expense.
25 We will now begin the public workshop. Would

1 anyone like to turn in their card still that they
2 have out in the audience? I'm Doris Marlin, and I
3 am the project manager for the Tamiami Trail
4 modification under the modified water deliveries
5 project, and I am with the Florida Corps in the
6 Jacksonville district, and I would like to
7 introduce you to some of the other team members on
8 the project.
9 Scott Burch is with the engineering division
10 for the Corps of Engineers. He is a project
11 engineer. Shelley Trulock is also with the Corps
12 of Engineers, and she is the planning and technical
13 lead for this project, and we have Mr. John
14 Moulding who is responsible for following the
15 process as we prepare our documents.
16 As I stated earlier, our meeting purpose

17 tonight is to go through what some of the progress
18 is that we have made in developing alternatives for
19 the Tamiami Trail modification and get your input
20 to the performance measures that will be used to
21 select an alternative.
22 I just want to point out that there are hard
23 copies in the stack of paperwork over there that
24 are copies of all of the slides that you will be
25 seeing tonight.

1 We can go to the second slide. For our
2 agenda for the evening, I'll be giving you a little
3 bit of background information on the modified water
4 deliveries project, and then we will present what
5 are some alternatives that are being considered for
6 this project, and then we're going to give an
7 explanation of how we use performance measures in
8 the selection process followed by an explanation of
9 what we foresee some of the impact to recreation is
10 possibly impacting the recreation to be, and then
11 we will move into the question and comment period,
12 and please make sure that we get your name and
13 address if you are interested in being on the
14 mailing list for the documentation that will be
15 part of the process of selecting alternatives in
16 the process.
17 First of all, modified water delivery was
18 authorized by the Everglades National Park
19 Protection & Expansion Act of 1989. You are
20 probably very familiar with that, and within that,
21 there have been general designs that were completed
22 in 1992 that identified some of the features that
23 would be part of the modified water deliveries.
24 Those are listed about that, and it's an 8 1/2
25 square mile area, which some of you may be familiar

1 with.
2 These are the flood irrigation projects in
3 the Miami-Dade County area, which is a structural
4 and operational component of the modified water
5 delivery, and then what we're here to talk about
6 tonight are the Tamiami Trail modifications.
7 Also, we're beginning an environmental impact
8 statement to be in process to go through the

9 operation, and it's called the combined structural
10 and operational plan, which we refer to as a
11 ceaseup (phonetic) for modified water deliveries
12 and underwater projects and that scoping meeting
13 was kicked off last week, January 30th, and I know
14 some of you were in attendance that night down in
15 Homestead, and the purpose of that project is to
16 look at the components of the modified water
17 delivery, the structural components and come up
18 with an operational plan so we have published input
19 as to how all of the components were not just
20 modified water but also for the other projects that
21 will operate together, and so tonight, we're
22 focusing on the Tamiami Trail modifications so the
23 question is: Why is Tamiami Trail being affected?
24 This reference comes out of the Everglades
25 National Parks & Expansion effort. Here you can

1 see some of the components of the modified water
2 delivery project. This is the section of the
3 Tamiami Trail that we're here to talk about
4 tonight.
5 Here is another feature of the modified water
6 deliveries project, but basically, as stated in the
7 previous slide, one of the main purposes of
8 modified water deliveries is to move the reservoir
9 of water through the water conservation area into
10 the Northeast Shark River Slough and then down into
11 Everglades National Park, and so what we found, and
12 the reason why Tamiami Trail, in particular, is
13 being affected is because currently the culverts
14 that exist in Tamiami Trail cannot carry the
15 capacity that is required to move the water from
16 the water conservation down into the Northeast
17 Shark River Slough, and occasionally, the water
18 that is anticipated, the flows are anticipated to
19 be at such a level that it will affect the subgrade
20 of Tamiami Trail, and so we need to come up with a
21 solution to insure that the authorized water flows
22 are able to go through this section into the park
23 without causing any damage to Tamiami Trail, US 41.
24 Now, I'm going to turn my microphone over to
25 Scott Burch to explain some of the alternatives in

1 greater detail.
2 MR. BURCH: Thank you. As Doris said, I'm
3 the project engineer for this project, and what I'd
4 like to do is kind of go through this, and as many
5 of you may know, part of the plan formulation
6 process that we're in is to identify possible
7 alternatives, and then we'll compare those
8 alternatives to find the most effective ones for
9 the project, and so some of the things I'm going to
10 go through now are the ideas that we have come up
11 with as possible solutions.
12 These alternatives would be rated on a bunch
13 of different factors to come up with whatever the
14 selected plan is, so this will give you a little
15 bit of background about what we're doing. The
16 section of Tamimai Trail runs from Krome Avenue out
17 to the L-67 extension, and the L-67A and B levees
18 to go out and divide the water conservation area,
19 3A to 3B, and it's an 11-mile stretch of road in
20 here, and the existing road there was built a
21 number of years ago and there are culverts that run
22 under the road now that carry flow whenever the L
23 canal, Borrow Canal water is high and the bay flows
24 through Tamiami Trail and into this area south,
25 northeast under the Trail, and if you're going

1 through, looking at the hydraulics and doing the
2 hydraulic monitoring, you'll find that when you
3 raise the water level up, you'll find it passes no
4 longer south to the culvert during their wet season
5 or the high flow time, and then the water backs up
6 behind the culvert, and you can't get through, and
7 what happens is you end up saturating the
8 separated, right underneath the road, and you get a
9 degradation of the road, and during extreme events,
10 you can have overtopping of the road, and under the
11 future conditions, that's where we're going to pass
12 water through the south, and so to evaluate all of
13 the different alternatives, we've got an
14 engineering team who eventually brainstormed and
15 came up various alternatives in how to get the
16 water through Tamiami Trail without having
17 overtopping being a problem and still have a

18 functional roadway, and we came up with five basic
19 alternatives.
20 Alternative 1 is leave the roadway as it is,
21 and then come in and install four new bridges, and
22 the bridges are approximately 300 feet long, and
23 that would allow enough capacity to let the water
24 flow through the bridge opening, and in addition,
25 the culvert, the existing culvert, to let the water

1 get through, and we found when we do that, there
2 was still some road spots on Tamiami Trail, and
3 they're still under that alternative.
4 The second alternative was to raise the
5 existing road profile. We would go through and
6 fill in the low spots on Tamiami Trail and
7 basically do a whole new job across the whole Trail
8 and then add again the four bridges to allow the
9 water to flow through the bridges and to thereby
10 have the capacity, the hydraulic capacity.
11 Alternative 3. This would build an entire
12 new roadway to the north of Tamiami Trail. It
13 would involve eight bridges because you would need
14 spanning across the L-29 canal and running the
15 levee through the southern end of the water
16 conservation area, 3B, and then at the end of the
17 Tamimai Trail come back across the canal again.
18 Alternative 4 is to build an entire new
19 roadway south of the existing trail. That way you
20 wouldn't have to take out the existing roadway, and
21 that would run through the area that is currently
22 being acquired by Everglades National Park.
23 Alternative 5 was to raise the entire roadway
24 and to make like an elevated superstructure so it
25 would basically be like an interstate bridge that

1 would allow all the water to just lay underneath
2 the roadway, and it would continuously be a bridge,
3 not four independent bridges.
4 Other possible variations that we're
5 currently looking at are provided, and if you find
6 that you need to provide water quality treatment
7 for the storm runoff, there would be some addition
8 you would have to put on for the water quality.

9 Looking at size of the bridge openings and
10 rotation of the bridges and also the possibility
11 instead of building bridges you can build box
12 culverts and not have to actually build the entire
13 bridge span.
14 Here's the schematic to give you an idea of
15 what is there. Currently, you have a stretch of
16 Tamiami Trail where 19 sets of culverts are
17 underneath the Trail, and each set of culverts
18 consists of three or four individual culverts, and
19 the roadway, as I said before, is a fill.
20 It was built back in the early '20s and/or
21 '30s, and then there was a raising of the road to
22 raise it higher, but basically an uncontrolled
23 fill. That is, they just took the excavation out
24 of the limestone rock, out of the canal and threw
25 it up alongside the road, and all of that natural

1 organic store of the peat that was there, just got
2 covered up, so that's why when you drive across
3 there, the road bounces up and down.
4 The road is actually settled under the weight
5 of the roadway, and then under the embankment,
6 which you can see here is a layer of subgrades,
7 more of a structural drain material like gravel,
8 and then, of course, asphalt, and so that's what is
9 there right now.
10 Let me just point out, with a couple of the
11 roadways, some of the strengths, when we're looking
12 at various alignments, SU33 and SU34. Here there
13 are two existing spillways that are in L-29, S-355A
14 and B, and there is the Tigertail Indian Camp,
15 which is located on the berm in between the L-29
16 canal and the levee, and then there are a couple of
17 properties here on the south that aren't showing
18 here, but they were areas that were not going to be
19 acquired and needed to be dealt with, and if you
20 look at some of the plans, I think there is a
21 memorial right here at the corner of L67, a ValuJet
22 memorial for the victims of the crash several years
23 ago.
24 Next slide, please. This is alternative 1,
25 and basically it's coming in and putting in four of

1 the bridges. The rotation of these bridges was
2 selected on, based on the elevation of the roadway,
3 trying to pick the road spots and also areas that
4 are fairly clear of vegetation so that the water
5 would be able to flow south and not be obstructed
6 by trees and especially vegetation.
7 There is nothing magic about those spots.
8 That's part of the study process which is to find
9 the option to build the bridges, but basically, you
10 have got four 300-foot bridges, and under
11 alternative 1, that would be all you would do. You
12 go further, and then you walk away.
13 Next slide, please. Again, this is process
14 basically looking like that. Alternative 2 built
15 the same four bridges as these in the Tamiami
16 Trail, and then you come across the entire stretch
17 and raise the roadway, and we're looking at raising
18 the road about a foot to a foot and a half, and
19 basically, that would be to fill in asphalt paving,
20 and that would raise the roadway high enough that
21 it would not be on the top for the design there,
22 and you would still be able to pass on both sides.
23 Again, the process is basically the same except
24 this roadway is going to be a little bit higher
25 than it would be in the other alternatives.

1 Alternative 3 is an alignment that goes to
2 detail those, a bridge to cross over the canal and
3 then a new embankment that would be constructed
4 going across and through water conservation area 3B
5 and then another bridge back to get you back on
6 Tamiami Trail, and in addition, you still need the
7 four bridges to be able to convey the water
8 through, and you would also have to have some kind
9 of bridge structure here at the spillways so that
10 the water could pass through the spillways, and
11 then there would also be a requirement here for a
12 bridge to come across this canal in the middle so
13 that you can have access to some of the businesses
14 that will remain open, and then once the water
15 would pass through these bridges, it would go into
16 the L-29 canal south, and you would have to gap the
17 levee or gap the existing roadway at those

18 locations while the water flowed south.

19 On the next slide, we can see a cross section

20 here, and it says, instead of being on the south

21 side of the L-29 canal here, the L-29 canal is now

22 south of the roadway. There is the remnant of the

23 existing levee that is there, and then the new

24 roadway would fill out into water conservation area

25 3B, and they would actually act both as the road

1 and as the L-29 levee.

2 Next slide, please. Alternative 4 takes the

3 load to the south, so as you came into the

4 beginning of the project, you would turn and move

5 south, and a whole new embankment in the roadway

6 would be built again, using four bridges to pass

7 the flow through, going to the south, and then

8 again, you would need to gap these areas right here

9 and allow the flow to come down and get through and

10 get south into the park, so you can see the biggest

11 idea in all of these alternatives is how to get the

12 flow out the canal and south into the area that

13 you're driving to.

14 Next here, you can see again that this would

15 be the existing highway that would become abandoned

16 if this -- (outside of hearing of reporter) -- and

17 then a new alternative would be a new roadway,

18 which would be built just south, and then

19 Everglades National Park would border up against

20 the edge of that roadway.

21 Next slide, please. Alternative 5. This is

22 an alternative that kind of came out of some

23 brainstorming of several people trying to look at,

24 besides just building individual bridges, what is

25 the best way to address, not only the flow problem,

1 but try to achieve as much sheet flow and an

2 hydraulic connection between the north area, the

3 water conservation area and the structure, so this

4 alternative would consist of an elevated roadway

5 that would run along, just on the north side of

6 Tamiami Trail, and again, we show a gap in here

7 where you have to degrade a portion of the existing

8 roadway to get the water through, although we show

9 these gaps here, and these are the minimum gaps
10 that would be required to let the hydraulics flow,
11 to let the water come through and maintain the
12 flow. Of course, you can degrade as much of that
13 as you want to in that alternative.
14 Next slide, please. For this process, it
15 would look something like that. You would have a
16 high foundation, a pile design right up there, and
17 then you would have a bridge on girders that convey
18 the traffic along the roadway. It's very similar
19 to highway overpasses, and this would achieve
20 hydraulic capacity to let the water flow through
21 and also give you a connection between those two
22 areas to the other side.
23 Next slide? I think that's it. That's
24 basically as to the engineering, and if anybody has
25 any questions regarding the alignment, the

1 engineering behind that, I would be glad to answer
2 that. Does anybody have any questions on that? If
3 you have any questions on that engineering part
4 that I just went over ---
5 (Out of hearing of reporter.)
6 THE COURT REPORTER: I cannot hear him at
7 all.
8 MR. BURCH: Let me repeat what he asked.
9 MR. BRYAN: I go out there a lot, and I hunt
10 south of 41, and I go to the Indian camp a lot, and
11 I can tell you that this is a big area, and if you
12 go into that area, if you drive down the top of
13 L-29 and look to the north and look to the south,
14 you'll see water and the trees, and I can tell you
15 what happened.
16 There's too much water out there right now.
17 It's not just stacking up on the north, but it's
18 stacking up on the south too. I've been out there
19 a lot of times, and when you go a lot in the air
20 boat, you look at a lot of these tree islands, and
21 they're healthy trees and plants, and this is
22 all -- With all of the water out there, it's
23 rotting the roots, saturating the island with
24 water. You will have roots that are rotted there,
25 and then the wind -- It just is all dried over.

1 Everything you show here, on the north side, all
2 you're going to do is impact another area, and why
3 not utilize the area? We already have the Trail
4 that we already have just about ten bridges, and
5 then when you're involved with the restudy a lot,
6 they told us they were going to build -- Now we're
7 down to four bridges, and now we've got all these
8 different islands, and I want to know what happened
9 to all the original plans that you talked about.
10 MR. BURCH: We will need to remember that
11 there is kind of separation between what was in the
12 CERP plan and what is in water delivery plan, and
13 part of the CERP, the first set, before you can
14 implement the comprehensive restoration plans is to
15 get modified water deliveries in place, and for
16 that -- Actually, if you go through this
17 proceeding, that's one of the performance criteria,
18 is how well it matches with the plan that you're
19 talking about, and the rest of the comprehensive
20 restudy addresses decompartmentalizing and giving
21 more scope for number 3, and what we're looking at
22 right now is trying to implement modified water
23 deliveries, and then, the Everglades restoration
24 project, we would begin, and we would end up with
25 trying to get over the top, its hurricane

1 evacuation, so what we're trying to do is go and be
2 compatible with what is there and try to get more
3 hydraulics and a more plausible connection and
4 still be able to pass the water filter in the
5 meantime.
6 I can take more questions at the end, and so,
7 I mean, we have plenty of time to do that.
8 (Thereupon, an unidentified speaker spoke out
9 of the hearing of the reporter.)
10 MR. BURCH: The comment was to look at the
11 alternative bridge location during the Everglades
12 restoration study, and there are similar locations
13 where the personnel were over the day before.
14 (Thereupon, an unidentified speaker spoke out
15 of the hearing of the reporter.)
16 MR. BURCH: That's part of the process that
17 we're here tonight to try to identify these things

18 somehow, and if you look at the map and look at the
19 aerial photographs and view the areas, you take a
20 closer look and try to cite where it is, but
21 sometimes you miss things.
22 You may not have some background knowledge,
23 and that's why we have these meetings to try to
24 identify these things and the different plans to
25 address the whole thing so that we don't do

1 something like their use or its need impacting
2 somewhere else.
3 Any other questions on the engineering
4 portion? Let me put the microphone back here.
5 MR. KOMLOS: I was wondering if the EIS
6 includes the cost for the entire Tamimai Trail or
7 if you have some sort of a breakdown of the cost
8 for putting the breakouts in Tamimai Trail versus
9 moving the entire thing.
10 MR. BURCH: Yes, I think the report, and I
11 don't have that, but I can look those costs up and
12 get back to you, but they're differentiating,
13 looking in the week coming up with that
14 information.
15 UNIDENTIFIED SPEAKER: Again, as far as
16 estimating the construction that might take place
17 for the fishing areas, what about the boat ramp and
18 the accessibility to the areas to fish? Is that
19 part of your organization or another that we ---
20 MR. BURCH: That is part of our organization,
21 and I think we're going to get to that in just a
22 moment, but what we wanted to do was to give you a
23 background of the engineering alternatives that are
24 being considered, and then we're going to get more
25 detailed on the impact of how we can mitigate that,

1 and whichever of these alternatives may have
2 tremendous impact and which ones may not have any.
3 Any other questions on the engineering?
4 MR. BRYAN: There are a lot of recreational
5 places along the Trail, and that's what he just
6 said, and like all of these air boats, are they all
7 going to be able to have access? They bring a lot
8 of money into the community, and people don't

9 realize how many people around the world come there
10 to see the Everglades, and that's kind of our goal.
11 Are they trying to shut those people out or are
12 they going to give back to us for the property or
13 ---
14 MR. BURCH: Some of those areas are ---
15 MR. BRYAN: Nothing is going to stand out
16 there, but there are some land acquisitions that
17 are going on, and people are telling other people
18 to stay with the bridges. I don't. They have not
19 been designed. The question was are the bridges
20 high enough on the air boat to go under, and I
21 don't believe that they would be. That's not a
22 design. There is not a design for consideration of
23 this.
24 UNIDENTIFIED SPEAKER: Well, obviously, a lot
25 of guys are going there and making a bridge, which

1 is all enough to get at least the air boat. The
2 other thing is: Are they going to leave L-29 for
3 now, under? There's no reason to take that canal
4 out, is there?
5 MR. BURCH: As far as keeping the air boats
6 under the bridges, right now, they are not
7 currently designed. There wasn't a design
8 consideration. You would have to have an air boat
9 under, and we can do that.
10 Certainly now that would be a valid comment
11 as to whether that is part of the design to make
12 that high enough. As far as the L-29 canal, the
13 L-29 canal is an authorized controlled canal, and
14 unless that canal is to become deauthorized by
15 Congress, it would not be filled in, so all of
16 these alternatives that you see here, would leave
17 the L-29 canal in some shape or form as it is, and
18 if we have -- If for some reason we had to fill in
19 a portion of the canal, we would have to excavate
20 and fill out on the other side and be able to
21 maintain that, but the only way that we can fill it
22 in and get rid of it is if it would be deauthorized
23 by Congress, and we have to go through the entire
24 process like that, a public process on something
25 like that.

1 MR. BLACKWELL: I have a whole group of
2 questions that I have written up. Brian Blackwell,
3 with the environment center, and I have got 40
4 copies.
5 MS. MARLIN: We will take those at the end.
6 MR. BLACKWELL: You said to hang on until the
7 end of the meeting, but the basic question is: If
8 this is to be built today, if it probably can
9 acquire Tamimai Trail access, if there wasn't one
10 already, it's probably part of the elevated, like
11 the bay bridge or something of that magnitude, and
12 features into the difference in costs to elevating
13 some or most of the programs, and all of this about
14 the exact figures for them to be able to know how
15 the public can comment, that we prefer this
16 alternative to that alternative.
17 The fundamental aspect of this 8 million
18 dollar engineering project for the Everglades comes
19 out of a wealth of documents like the drafts and
20 the impact statement to remove the ecological
21 barriers between area 3 and the park, and obviously
22 there is a relative difference in the
23 accomplishment of each of these alternatives, so
24 it's cost feasible.
25 That's the basic question that you ask, and

1 so perhaps if I give you these, you could go down
2 any of these that you wish at this point or others
3 in their presentation could handle them.
4 MR. BURCH: Sure. Actually I'll be glad to
5 take that, and we can make copies available to
6 everyone, and I think what we will do, if there's
7 no any other specific questions on the engineering
8 aspects, is we can go on, and we'll have public
9 comments at the end.
10 Does this pertain to engineering?
11 UNIDENTIFIED SPEAKER: It pertains to
12 engineering. They told us they were going to take
13 out the north side of the L-29 levee. Now, I know
14 we've watched them put a fiber optic line right
15 down the middle, and then the structures that they
16 put in there, they said they had no permit to use
17 them, but they already had the money appropriated

18 to put the structures in, so they put the
19 structures in, and are you going to take out the
20 north side of the levee or not? Do you know what
21 I'm talking about?
22 MR. BURCH: What these are are alternatives
23 that we need to consider, and we want to be able to
24 consider all aspects. We rate the various pros and
25 cons of the various alternatives, and we write this

1 on all the alternatives through this. As you saw,
2 there's twice as many bridges to move it across,
3 and it becomes more expensive than some of the
4 other alternatives.
5 What we're looking at now are how did those
6 factors rate, and how did these alternatives
7 compare against each other, so there has been no
8 decision that: Okay, we're going to do one of
9 these right now or not. That's the process that
10 we're in now, and that's where we have been in when
11 we make that decision.
12 Yes, sir. Does this pertain to an
13 engineering question?
14 MR. WALLER: My name is Brad Waller, and I
15 have worked in the area for 30 years, and I have
16 some questions for you. What is the peak flow
17 design? What are the peak stage designs? What is
18 the overtopping stage of the roadway right now?
19 I've got some other questions after you answer
20 those.
21 MR. BURCH: The peak flow design is based on
22 this 4000 CFS that is in the modified water
23 delivery, and it's the general design memorandum
24 documents that we need to pass through to come up
25 with that, and we also looked at the CERP modeling,

1 and the bridges will pass, both the four bridges
2 that we presented because of the design
3 requirements of FDOT, the Florida Department of
4 Transportation, to be able to inspect the bridges,
5 and the bridges are up to elevation that they will
6 also cause the design CERP flows.
7 MR. WALLER: Which is what?
8 MR. BURCH: 5500 CFS. The water stages that

9 are associated with the modified water delivery
10 project are 4000 CFS at 9.3 feet, which is the head
11 water and L-29.
12 MR. WALLER: Average yearly average peak
13 head?
14 MR. BURCH: I don't know. I have got my
15 report. I have it from Chris Smith, from my
16 office, who is a hydraulic engineer who did that.
17 He was not able to be with us tonight. I've got
18 that in my report, and I'll get that out and give
19 an answer to you.
20 MR. WALLER: What is the stage when the
21 roadbed is over the top?
22 MR. BURCH: The roadbed? I think the lowest
23 point on the elevation of the roadbed was around
24 9.1, so there would be two or three areas where the
25 road had settled, and it's beneath that, and in

1 addition to the overtopping, there's the point
2 where the water gets up so high that it has
3 overtop, but the water is right in the foundation
4 of the roadway, and you get excessive degradation.
5 As the traffic drives over, the whole
6 foundation gets wet, and you get a pumping action,
7 and you have excessive degradation; serious
8 potholes and road failures, so there are two things
9 to consider, not just overtopping, but when the
10 water gets very close and how does that affect the
11 function of the road.
12 MR. WALLER: What models are you using for
13 design storm?
14 MR. BURCH: The design storm was taken out of
15 again the CERP model, which, I believe was the 2 X
16 2 model.
17 MR. WALLER: Natural system?
18 MR. BURCH: I don't know the answer to that.
19 We can look that up. I've got the hydraulic report
20 in there that they took in, and they did a Hecker
21 S. It's a model that is calculated to the back
22 waters to size the bridge over, so it's a
23 combination of the design. Some came from the 2 X
24 2 model that was from the CERP report and then the
25 back water was another model.

1 MR. WALLER: One last thing: In alternative
2 4, aren't you running the roadbed on Everglades
3 National Park property?
4 MR. BURCH: Yes, that would be natural
5 Everglades National Park property.
6 MR. WALLER: And that's a viable alternative?
7 MR. BURCH: It's an alternative.
8 MR. WALLER: It's okay?
9 MR. BURCH: It's an alternative to be
10 considered, and some of these alternatives might
11 not be viable for various reasons and some might.
12 MR. WALLER: I think that we should know or
13 you should explain that. Our stages now are about
14 7 1/2, and so we're looking at about 2 feet higher.
15 Is that what we're looking at?
16 MR. BURCH: That's correct, during the peak
17 storm, I think.
18 MR. WALLER: You're looking at it on a yearly
19 basis, if I read the documents right. You're not
20 looking at that as a hurricane storm but as a
21 yearly event?
22 MR. BURCH: The return frequency?
23 MR. WALLER: No, I mean for the design for
24 your roadbed.
25 MR. BURCH: No, it's based on the

1 hundred-year derm.
2 MR. WALLER: So you designed the roadbed for
3 the hundred-year ---
4 MR. BURCH: That's right, which is standard
5 DOT.
6 MR. WALLER: Okay. Now I think people should
7 know that we're looking at much higher stages on
8 both sides for restoration purposes.
9 MR. BURCH: That's correct.
10 Doris?
11 MS. MARLIN: Let's move on to the next part
12 of the presentation.
13 MR. BURCH: There will be, at the end of the
14 presentation, as we get into some of these, more
15 opportunities to comment on anything you would like
16 to comment on, and so we want to go ahead and get
17 through this, and if you want to get into these

18 areas of any of these other issues, we will be glad
19 to discuss that with you.
20 MS. TRULOCK: My name is Shelley Trulock, and
21 I'm the planning and technical lead for this
22 particular study, and the next thing I want to do
23 is discuss the plan formulation process.
24 Currently, this is where we are in this
25 study, and basically what this does is it allows us

1 to take these five potential alternatives. We
2 equally look at those against the objectives that
3 have been established, and in turn, we're able to
4 develop a matrix and establish values, either
5 qualitatively or quantitatively, and we'll be able
6 to come up with the best plan that will meet the
7 project goal, so if you would go back one previous
8 slide or go back two, please. Can you hear me?
9 In summary, plan formulation to me is three
10 different things. It's a process of building plans
11 that meet the objectives and avoid the constraints.
12 It was part of the view of stakeholders and others
13 in the groups outside of the corps to contribute to
14 the process with different perspectives.
15 That's why we're here today to find out what
16 is important to you, being the users of the area,
17 and finally, a plan formulation allows us to
18 capitalize on imagination and creativity. It's not
19 such a cookie cutter process, and in this way, we
20 do get the different perspectives in order to come
21 up with the best plan possible.
22 In going through this process, early on, we
23 were able to establish some requirements. Now
24 requirements are show stoppers. If an alternative
25 cannot meet a specific requirement, it's gone. We

1 can't go on with it. These have to be met, and so
2 I'll just go through these quickly, and then if you
3 want to, you can look at them some more after a
4 while.
5 We had to provide the conveyance that crossed
6 Tamiami Trail. This goes along with what Scott
7 just finished discussing with you, and we have to

8 meet all of the federal, highway and Florida
9 Department of Transportation requirements. We are
10 affecting a road, so these are some criteria that
11 we have to meet.
12 We have to maintain consistency with the
13 Florida Coastal Zone Management Program. This
14 deals with your state listed threatened and
15 endangered species. We have to meet the Miami-Dade
16 County and the Department of Environmental
17 Resources Management Water Quality criteria. We
18 have to meet all of the Endangered Species Act
19 requirements.
20 We cannot impact the currently authorized
21 flood control in the area, and we also have to
22 maintain consistency with the other water
23 components that Doris spoke about earlier. In
24 going through the plan formulation process, there
25 have been several series of meetings with the

1 stakeholders, federal agencies and also local
2 agencies. Through this process, we have been able
3 to identify and start a good listing of project
4 objectives. These eight objectives are what we
5 have done so far to date.
6 First of all, we have to consider cost
7 effectiveness. Even though this is an
8 environmental project, we still have to look at the
9 cost of the project, and is it a good use of the
10 money for the alternative that we're investigating.
11 We have to maximize the capability of future CERP
12 actions. We can't build something out there that
13 is going to be a temporary fix. It has to be
14 something that is in compliance with future
15 projects so no money is wasted in that aspect, and
16 we want to minimize the impact associated with
17 construction, traffic, cause of recreational
18 environmental impact, and we want to minimize the
19 adverse socioeconomic impact, so there are several
20 businesses along the Trail, so we want to try to
21 minimize any impact that they feel both during
22 construction and after. Restore and enhance
23 ecological function. This deals with moving the
24 water south across the Trail.
25 Number 6. We want to minimize the impact to

1 all of the recreational facilities.
2 Number 7. We want to minimize permanent and
3 temporary loss of wetlands, and the eighth one that
4 we've established is to minimize impact to the L-29
5 canal.
6 Now, for the sake of time, what we want to do
7 now is to really zero in on number 6 because I
8 think most people here have a pretty high interest
9 in this one. That would be talking about
10 minimizing the impact to recreational facilities in
11 the area, and for each objective, we establish
12 performance measures.
13 This is a way of grading each of the
14 alternatives against each other so we come out with
15 the best plan. We established eight performance
16 measures for this one objective, and the first
17 performance measure that we have established is to
18 maintain access for visitor use.
19 Now, in our opinion, this is a quantitative
20 performance measure. We can measure the number of
21 access points before construction of the project
22 and then also look at the number after the project.
23 Number 2 is a promotion of recreational
24 benefits. You can't really put a number on this.
25 This is a more qualitative performance measure.

1 You can look at a high, medium and low capacity,
2 and if it promotes increased recreation, it would
3 get a high categorization. If it detracts from
4 recreation, that would be a low.
5 Number 3. The effect on project features on
6 recreational access. This again would be
7 qualitatively high, medium and low.
8 Number 4. Duration and temporary access
9 impacts, and this is a quantitative. We can look
10 at the length of time that the impacts are going to
11 be. Each alternative has different construction
12 durations, and so in looking at it, your
13 alternative with the most time needed for
14 construction is going to have the most impact to
15 the recreational activity along the Trail.
16 Avoidance of permanent access impacts. This

17 is something we can look at qualitatively, and if
18 it does have access impacts, that could be a
19 negative thing for a particular alternative. We
20 can also look at this quantitatively, and this kind
21 of ties into number 1, in that we can look at the
22 numbers of access, if any are eliminated due to a
23 particular alternative.
24 Number 6 avoids the loss of fishing access,
25 looking at the ramps and also looking at the linear

35

1 feet of the canal currently available for fishing
2 off the bank. The different alternatives have a
3 different impact on that.
4 Number 7. Maintenance of the existing canal.
5 This is a qualitative performance measure again.
6 Number 8. The maintenance of accessibility
7 to practice as Taylor Wildlife Management Area,
8 water conservation area 3B, and this again would be
9 a qualitative means of measurement.
10 In addition to the recreational ones, you can
11 come back and feel free to comment on those. We
12 pulled some from our other objectives that we
13 thought that the audience here might have more
14 interest in, so what I've done here is I have
15 pulled several of the different objectives and just
16 the performance measures that we thought would be
17 most interesting to you.
18 Objective number 2 is to maximize capability
19 for future CERP actions.
20 Performance number 5 under that objective is
21 the measurement of nondegradable linear footage of
22 levees and canals due to project requirements.
23 This is talking about the linear feet of levees and
24 canals retained after construction of the
25 alternative.

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1 Objective 3 is to minimize impacts associated
2 with construction. There are two performance
3 measures right now that we feel have had impact to
4 the recreational aspects of the area, and that
5 would be performance number 3, which is the impact
6 of construction duration on the Miccosukee Tribe
7 and the businesses in the area, and the second one,

8 being performance measurement number 5, which is
9 allowances for turbidity control; this is stirring
10 up of the water, and it minimizes that stirring.
11 Objective number 4 is to minimize adverse
12 socioeconomic impact, and the two performance
13 measures again that go along with number 4, we want
14 to minimize impacts to the existing businesses
15 along the Trail and then specifically minimizing
16 impact to the Tigertail and Osceola camps.
17 Objective number 8 is to minimize impacts to
18 the L-29 canal, and the performance measures that
19 we feel are important with this right now is the
20 effects on fish and wildlife, so at this time -- I
21 was going to go straight into recreation, but it
22 might be a good idea, if you want to, we can go
23 back to the slides that have the performance
24 measures on objective number 6, and if you have
25 comments on that, we can take your comments at this

1 time or if you feel you would rather do that at the
2 end, we can do that as well. Is it okay if we go
3 on to recreation, and we can come back?
4 Let me introduce to you Mr. Jim Hoover, and
5 he is with the GEC Engineering firm that the Corps
6 has contracted with to help us in the preparation
7 of the general re-evaluation report. He has done a
8 lot of research on the recreational impact, and at
9 this time, he's going to go through these impacts
10 with you.
11 MR. HOOVER: Thank you, Shelley.
12 Now, you're all here, and this all part of an
13 ongoing process, and I'm sure that you're going to
14 catch me on some things that I don't know about,
15 and you're going to tell me, so thank you.
16 Again, these recreation effects, the way
17 they're listed this way, is that in the view that I
18 took of them, if you have an existing condition,
19 it's what is going on there now.
20 Alternative 1. It has certain effects.
21 Alternatives 2 and 4 of the effects that I
22 have that I took into account; there are figures
23 that are basically the same, and then there's
24 alternative 3, which is the alignment on the north
25 side of the L-29 canal, and alternative 5 which is

1 the elevator. Then we have some other
2 alternatives, one of which we have not quite
3 covered.
4 Adjusting conditions. Do you see the legend
5 here of roads and canals? Everybody here knows
6 this. Woops! Back up, please. Just to get you
7 oriented, of course, here is Krome Avenue, and
8 here's the L-30 canal, and this is the eastern end,
9 the S-334 structure, and there's an air boat ramp
10 right there, and about three miles down here, there
11 is a ramp into a boat ramp into the L-29 canal.
12 It's off of a north bank, and all of these
13 numbers are official wildlife designations for te
14 ramp, and then here, of course, is Cooperstown and
15 Tigertail Camp, and then down on this here, the
16 western end, there's a flight memorial, and you've
17 got the ramp right in here on L-67C, and you've got
18 two of them actually, and then there's another.
19 it's L67-A, and it is not shown on here because
20 it's outside of the project area, which is ramp 90.
21 That's the designation, which is off the Tamiami
22 Trail and 73 in between the Trail and the canal and
23 the canal from the south bank.
24 This is just showing some of the aerials of
25 the area's existing conditions. Here's the eastern

1 end of S-334, and if you look right here, this is
2 the air boat ramp. Back in there, the L-30 canal,
3 the L-30 canal extension. Here's a picture of the
4 air boat ramp, and that's the S-334 structure, and
5 I'm not even sure who is in charge of that ramp,
6 whether it's South Florida Water Management or
7 Kohler, but it's apparently not a fish and wildlife
8 air boat ramp.
9 This is the area that has the ramp that
10 enters, that you put into that stretch of L-29, and
11 there's also, as you will see, some picnic area.
12 Now these lines that are in here, this green line,
13 is a maximal taping as projected right now, and
14 this would be this alignment with the water quality
15 treatment, which we have not talked about at all,
16 but this would be the maximum amount to be taken,

17 and you can see that it takes out part of the
18 picnic area and part of the parking that's
19 available, but the ramp itself would remain open.
20 There's the western end. This is the ValuJet
21 flight memorial, and you can see some of the ramps,
22 the one right here, but you can't see that one
23 because it's off of the map.
24 For alternative 1, all of the boat and air
25 boat ramps are accessible. They would remain

1 accessible under alternative 1. There might be
2 some period where it would be somewhat awkward to
3 get to simply because of the traffic, but everybody
4 would be going through the same thing.
5 You have traffic controls. Approximately 10
6 1/2 miles on the north bank of the L-29 canal are
7 accessible under this and remain so, and the south
8 bank and culvert outfall are not available, at
9 least partially during the 18-month construction
10 period.
11 At times, when this construction is ongoing,
12 certain parts of the bank, the canal bank and the
13 outfalling canals would probably not be available,
14 but when the construction is complete, both of
15 those things would be accessible after completion
16 with alternative 1.
17 This is alternative 1, and these are
18 tentative locations for the bridges and where the
19 existing roadway would be breached that Scott
20 talked to you about earlier.
21 Alternatives 2 and 4. Again, all boat ramps
22 and air boat ramps are accessible and stay
23 accessible throughout the process, and there may be
24 some temporary inconvenience in getting to them,
25 but they should be open. And again, these are both

1 on the south side of the canal on the existing
2 roadway, pretty much, with alternative 4 being well
3 south of the existing roadway, as Scott pointed
4 out, so you still have your north bank of the L-29
5 accessible for bank fishing and the south bank of
6 the L-29 would be closed in various places,
7 understanding it's kind of a rolling sort of a

8 thing. It may not all be closed at one time, but
9 there would be some closure because of the
10 shoulders and that kind of thing which would be
11 needed too for a temporary roadway.
12 Now, this line here, the culvert outfall site
13 is closed permanently. Under the original
14 engineering document, as we were given, that was
15 the case. It was decided that they were not going
16 to be needed to pass additional warning through,
17 and there has been a lot of talk about it since.
18 This is part of the process of keeping
19 mistakes from being made, perhaps, and the talk now
20 is that they're looking very hard at either
21 replacing culverts if they have to do a complete
22 rebuild of the roadway, which, in some cases, they
23 will or extending them, which in the case of 2 and
24 4, since 2 is going to be elevated, the footprint
25 of the roadway would have to extend further to the

1 south.
2 That would have closed off those ends of
3 those culverts, but it looks like there would be --
4 It's being investigated as to what it would cost,
5 what it would take, what it would mean to leave
6 them open. The accessibility of the cuts under the
7 bridges is unknown. With just the four bridges,
8 and as Scott pointed out earlier, having them high
9 enough where people for air boats to get under was
10 not in the original design consideration, and also,
11 having them high enough for people to get under
12 them to fish off the bank under the bridges, that
13 wasn't an original design consideration, but after
14 this sort of meeting, those kinds of factors get
15 looked at.
16 Again, this just simply shows -- It's
17 basically the same thing you saw before, and it's
18 the same locations, but again, those locations have
19 not been set in concrete at all. Maybe that's a
20 bad term to use, but they haven't been finally
21 decided on.
22 Alternative 3. This is the north bank under
23 that plan. The air boat ramp is S-333 on the west
24 end and S-334, continue to remain accessible,
25 subject to some certain delays with perhaps traffic

1 and that sort of stuff. Access to the north bank
2 of L-29 and boat ramp 153 would be reduced during
3 the 30-month construction period.
4 Now, as you can imagine, if you're building a
5 roadway over there, it's going to be -- You're
6 going to have equipment moving around and all sorts
7 of stuff, and there will be certain staging
8 problems, and some portion of the north bank would
9 be closed periodically, but certainly not the
10 entire thing all the time.
11 The south bank and outfall would remain open
12 during the construction period, and I mentioned a
13 little bit earlier, when we showed you the air
14 photo, you would have possibly a reduced area for
15 recreation and boat ramp 153 parking on the north
16 bank of L-29, once the project is completed, and
17 again, that depends on the amount of footprint
18 that's required, whether it's going to have a water
19 quality treatment, what type it will be.
20 After the bridge is there, if the bridge is
21 in the roadway, and we'll see in a minute, are kept
22 where they are looked at now, where they are placed
23 now, and there's no guarantee. Those can be
24 adjusted as new information is developed. There
25 would be access to 2 miles on the east and 1 1/2

1 miles on the west of the project to the south bank
2 of L-29 and to the outfall sites because the
3 breaches would be coming in from the end, and so
4 you would have some end spaces there, and those
5 would be spaces of no traffic, and perhaps could be
6 used for all sorts of recreational purposes in the
7 future. Those are all of the things that need to
8 be explored.
9 Now, also, there will be a bridge to the Air
10 Boat Association and some of the other businesses
11 that will remain, and it's possible that the
12 general public would also be able to use those
13 bridges and have access to some of the existing
14 roadway that is cut off.
15 I mean, you would have a breach on each end
16 of it, but there are pieces there that you can get

17 to, and some of it can be substantial, as much as a
18 couple of miles, and again, that is a no traffic
19 zone, and it's all existing roadway, and how much
20 of that is going to have to be removed down the
21 road, is still to be determined. Again that's
22 alternative 3, and initially, they were looking at
23 five separate breaches along here and at these
24 locations tentatively.
25 Alternative 5. Again, this is the elevated

1 one. All air boat ramps at the east and west end
2 of the project area and also off of the north side
3 of L-29 would remain accessible. Again, you would
4 have the north bank of the canal itself for bank
5 fishing. The south bank of the L-29 would be
6 closed for various times during this construction
7 because the elevated roadway would run right over
8 it.
9 Now, whether it would be, you would have to
10 look at all of the phases of this sort of thing as
11 to exactly when it was closed or if it would all be
12 closed at once. That has not been determined yet.
13 After the breaches, you would have access to
14 at least a mile on the east and a half mile on the
15 west of the project to the south bank of L-29 and
16 to the outfall sites. That's because of the
17 location of the breaches again, which again, is
18 adjustable. We're going with the existing or a
19 first cut kind of approach on this, and that is
20 part of why we're here.
21 Access to the bridge to the Air Boat
22 Association. You have businesses to some of the
23 remnant roadway. These are initially, at this
24 point in time, where the breaches might be located,
25 and there's about seven of them throughout the

1 whole thing. You know, you mentioned this; a
2 gentleman mentioned earlier to start off with 10,
3 and now we're down to 4, and it depends on the
4 alternatives, as they're looking at it, and no firm
5 decision has been made as of yet, and some of that
6 will be when there is a final alignment, a final
7 plan for the various breaches, based on hydrologic

8 necessity and other concerns or other concerns are
9 in place, then we will better be able to tell how
10 much of those remnants on Tamiami Trail will be
11 available.
12 Now, do you want to go forward with the other
13 alternative? Another alternative that surfaced was
14 put forward by the Fish & Wildlife Service. Now,
15 go to the next one, and then we'll go back. Now
16 there, that program or that alternative consisted
17 of a 4-foot -- I mean, a 4-mile elevated bridge,
18 just like the 10-mile one or 11-mile, and with some
19 box culverts still in undisclosed places in here,
20 and one of the big concerns that they have is to be
21 able to have a path for animals to be able to
22 have -- It's called ecological productivity, for
23 the animals to safely pass across from the north
24 and south and back and forth, and there were a lot
25 of animals getting killed right in here, and they

1 would come down these levees and try to cross the
2 highways and they get killed in there, so the idea
3 is to put in some animal crossing bridges with some
4 guide fences on both sides of the road, and one at
5 that end and one at this end of the project.
6 Now, it depends on where they're located as
7 to whether they have any effect on this access
8 here, and the thing is that they can be located in
9 such a way that there's no access impediment at all
10 to these things. The way the initial plan that was
11 put forward, the fences, a half mile on each side
12 of this crossing, would -- Of the underpass rather,
13 yes, would close off that access, but there's no
14 way you're going to close off the access to the
15 Tigertail Camp, for example, and so it would have
16 to be some other kind of a bridge, so I don't think
17 that's a real concern.
18 Go back. Yes, go back. Now, another concern
19 that would affect access is that there's a proposed
20 guardrail or animal barrier that's a concrete
21 guardrail with a cap on the top. It's about 4
22 feet. As planned, it's about 4 feet high.
23 Well, when people want to fish along the bank
24 now, they can step over the guardrail. It would be
25 very difficult to step over a 4-foot concrete

1 barrier. However, you can put in crossings for
2 people; stiles and that sort of thing and
3 accomplish both things.
4 Now, the outfall site, since the road would
5 have to be rebuilt in the parks where you don't
6 have the elevated 4 miles of elevated bridge, that
7 would have to be rebuilt as, like I say, for
8 example, in alternative 2, and originally, that was
9 going to have covered up the south end of those
10 culverts, the outfalls, and so with the expectation
11 being that the outfall sites would have been
12 reduced as existing culverts were replaced by a
13 smaller number of marked capacity box culverts, but
14 that's also being looked at just right now whether
15 to even remove the culverts or even if the road is
16 rebuilt to put the culverts back so that you've got
17 a very good dispersal of a flow across the whole
18 thing.
19 One other thing we looked at was the idea of
20 sightseeing effects. People driving along Tamiami
21 Trail, which, you know, can be very attractive and
22 very pleasurable, and the alternatives, one which I
23 have left out here, and 2 and 4, the bridges would
24 be somewhat elevated; not a lot, but some, and they
25 would allow some of a little more of a panoramic

1 view to both the north and the south, and if the
2 bridges are elevated enough to pass the air boats
3 under and also for people to be able to get
4 underneath them and fish the cuts, then if that
5 becomes some of the criteria, then they'll indeed
6 have some panoramic views.
7 Alternative 3. Since it's going to be fairly
8 elevated running along the existing levee alignment
9 on the north side of the canal, it's going to offer
10 a panoramic view to the north along the entire
11 length, and to some extent in the few places to the
12 south, and vegetation doesn't interfere with it.
13 Alternative 5, being the elevated roadway,
14 offers panoramic views to both north and south
15 along the entire length, and the other alternative
16 with the 4-mile bridge, and I keep saying 4-foot
17 bridge, but it offers 4 miles of panoramic views to

18 the north and south, and just in case you haven't
19 been out there lately, this is the typical Tamiami
20 Trail view if you're looking east, and of course,
21 you've got a lot of vegetation there, that sort of
22 stuff, as some of this is -- The road beds are
23 reconstructed, and my understanding is that much of
24 the vegetation, particularly if it's exotic
25 vegetation that has been imported from other

1 places, will probably be removed, and this is a
2 typical Trail view looking west with the canal on
3 the right, and of course, the levee is there, so
4 your expansive review is not very great here, and
5 that's the reason for these pictures, but I don't
6 have anything elevating it so -- Any questions at
7 this time or would you rather wait until after?
8 MR. BRYAN: Maybe one. You're talking about
9 a view being to the south, being like blocked by
10 the -- That was the old roadbed from Tamiami Trail,
11 and those people probably don't know that, but
12 that's about the only place for all of the
13 fur-bearing animals to get out of the water, when
14 the water comes up, so when you take that out,
15 they're going to really have no where to go. I
16 have never seen an animal killed on Tamiami Trail.
17 There are a of guys here, but I've never seen a
18 deer or ---
19 MR. WHARTON: He's right. He's right, other
20 than a snake.
21 MR. BRYAN: I've never seen any snakes run
22 over. I have never seen any fur-bearing animals
23 dead on the Trail, so as far as putting -- What
24 scares me, is that if you're going to put up a
25 guardrail, that cuts off our access. We used to

1 have, on the south side, and it was open all the
2 way down, and we used to stop along there to go
3 hunting and fishing or whatever we wanted to, and
4 then they put the guardrail up, and they cut out --
5 They cut it all off for us, and so we still access
6 it through the private site for the fiber optics
7 tower or whatever it is back over there, and, you
8 know, you just keep cutting us off and cutting us

9 off here, and we're going to wind up in -- I don't
10 know if you guys are familiar with I-75, but these
11 bridges he's talking about, didn't they cost like a
12 million bucks apiece where they made these bridges
13 for the animals to cross from one side of the road
14 to the other side, and then they put the fence up?
15 I've never seen any animals cross on this road.
16 Never.
17 MR. WHARTON: We did a brief wildlife
18 mortality survey when we started the project, just
19 a couple of miles of walking, you know, in
20 half-mile increments, and we observed mostly, as I
21 said, snakes, turtles, some alligator remains and
22 small rodents and mammals, so we did observe some
23 remaining bones and birds, but that's about it.
24 MR. BRYAN: Well, I don't know what study
25 you're talking about; I've lived here all my life

1 and I haven't seen it.
2 MR. WHARTON: No, it has not been published,
3 but we ---
4 MR. BRYAN: I've never seen these dead
5 animals, and there are other guys here who maybe
6 want to comment, but all of our life is hunting and
7 fishing and air boats and everything else, and
8 we've never seen no animals.
9 There was no reason to put up a fence or even
10 a guardrail. I can see it on the canal side, but
11 on the south side, there's no reason to have that
12 guardrail if you make the shoulder a little bit
13 wider.
14 MR. WHARTON: I don't have that with me, but
15 I can get your name and number, and I can show you
16 if you would like the results of what we found.
17 UNIDENTIFIED SPEAKER: Some of us here in
18 this room were kind of under the impression that
19 you were going to have a public input or an
20 advisory committee where we could be involved in
21 some of these processes.
22 You know, you're pulling a rabbit out of a
23 hat here, and we went from 10 bridges down to this
24 and down to that, and now we're talking about a
25 4-mile bridge in front of the Air Boat Club, and

1 all of these other people that cut them out. I
2 mean, I want to know where all of this came from.
3 I mean, when we were involved with Steve Applebaum
4 and Colonel Miller, all of these other people came
5 down here to talk to us, and they were talking a
6 whole different situation here, and we got the
7 money approved for all of this, and that's the
8 impression that we were fighting for because those
9 bridges were never going to be in strategic spots.
10 We're going to help them, and there was a
11 scientist from the Army Corps of Engineers or from
12 water management who had talked to us about what
13 strategic spots would be good for these ten
14 different bridges, and now we're talking about a
15 whole other theory. These are apples and oranges.
16 MR. HOOVER: Well, that's a question that I
17 can't address, but Doris is here, and ---
18 MS. MARLIN: I am here, yes. What you're
19 talking about is the CERP program, and we're right
20 now focusing on the modified water deliveries, but
21 I understand what you're saying, but that, the ten
22 bridges that you're bringing up, is addressed under
23 the decompartmentalization for water conservation
24 area 3, which is in the CERP program, and those,
25 the development of that project is underway.

1 We just had an agency meeting, and we're
2 developing a project management plan that will move
3 into the project implementation where we solicit a
4 lot of the public comments from the stakeholders
5 like yourself, and I know that you keep referring
6 to the ten bridges, and what we're trying to do is
7 take the conceptual level of what you had proposed
8 and make sure that what is implemented under a
9 modified water delivery does address what you had
10 intended when you proposed ten bridges, and that's
11 one of the reasons why we're having a meeting like
12 this.
13 Jim, had you concluded your presentation?
14 MR. HOOVER: Yes.
15 MS. MARLIN: I'd like to move into the
16 remainder of our presentation, and as you can see,
17 we're in the planning phase, and that's why we're

18 here getting your input, so that the things that we
19 haven't thought of, and I'm sure there are plenty;
20 you raised the 2 and 4 so they can be considered in
21 the alternatives.
22 I'll now let Shelley finish the presentation,
23 and then we'll go back to the specific purpose of
24 the meeting, which was to develop and make sure
25 that we collected the performance measures that are

1 of interest to you, and we would also ask that over
2 the next ten days to two weeks that you mail in any
3 comments that you may not raise this evening, and
4 we will call upon the people who have requested
5 time to speak, and at that time, I would like for
6 you to limit your comments to about three minutes
7 in the interest of making sure that everyone has a
8 chance to make a statement or ask a question and
9 present their thoughts on the project, so at this
10 time, I'll turn the microphone back over to Shelley
11 so that she can finish up with her portion of the
12 presentation.
13 MS. TRULOCK: When you came in this evening,
14 you saw a white card over on the small table. That
15 is the standard sign-in card that we use. If you
16 would fill that out, we will make sure that your
17 name and address gets updated on a large mailing
18 list.
19 This is the best way for us to compile a list
20 that gets everybody who really does want to be
21 involved or notified of such a meeting that we can
22 do so, and so before you leave, if you would do
23 that, and there is also a place on that card for
24 you to put down if you would like to make a
25 statement as well, and then the second thing, if

1 you would do this, if you would like to receive
2 copies of the report that we're getting ready to
3 finalize and other reports related to either muddy
4 waters or CERP, if you would look at the tan card
5 that we have made up, and that specifically asked
6 you: Do you want to receive a copy of these
7 reports, and so if you would fill that out and
8 leave it with us, we will make sure that you get a

9 copy of that.

10 As I stated earlier, we really want to zero
11 in on the recreational aspects of the project. In
12 the back of the package that you can pick up over
13 at the table, you will find the other objectives
14 and the performance measurements that relate to
15 those. I don't know if you want to go through all
16 of those now, but in the time frame that you have
17 to do your review -- And I may have skipped this.

18 Go back one slide. I'm sorry. I'm sorry, I
19 did. After you leave here tonight, when you get
20 home, and you think of something that you want us
21 to address formally; any questions, comments,
22 concerns or whatever it may be, if you would stick
23 it in the mail to us, and my address is right here,
24 and it will come straight to me, and I'll make sure
25 that we do address that in the report, and then

1 also, if you could, that's two weeks from tonight,
2 if you could have those back to us so the planning
3 process keeps moving on the same schedule we're
4 heading towards, I would very much appreciate it.

5 If you need a little extra time, it's not
6 going to be the end of the world if it comes in two
7 or three days later. Nothing will happen with
8 that, but if you would, just if you think of
9 something, don't think it's not important. Go on
10 and send it in to us because we'll address every
11 comment that comes in.

12 As I was saying, we zeroed in on objective
13 number 6, the recreational impact, and at the back
14 of the packet, you will have the full listing of
15 all of the objectives developed to date and the
16 performance measures, and so if you want to review
17 that, you can base any comments on that.

18 That's basically provided for your
19 information. We would like input on that as well,
20 if you have any questions or comments on these, but
21 in the interest of time, we did not go through
22 every single one of those. We just tried to zero
23 in on the ones that might be the most important to
24 you.

25 Now, go back to 23. This is where we got to,

1 where we established objective number 6: Minimize
2 impact to recreational facility. Now what we'd
3 really like to do, and the purpose of why we're
4 here tonight, is to get your comments on these
5 performance measures, and if you don't feel one is
6 viable, we need to hear why.
7 If you think we have left something out, we
8 need to know that also because the way they're
9 going to evaluate these different alternatives is
10 based on your input. If we don't know something is
11 very important to you, we don't know what emphasis
12 to place on that, so we want you to tell us.
13 We're going to go through the cards now, and
14 whoever has stated that they want to make a
15 comment, we'll go through that now, and also, if
16 you keep thinking about these, we'll have time for
17 you to go through and give us your questions and
18 concerns on them because this is important to the
19 formulation process.
20 MS. MARLIN: I have left this light up so
21 that you can, as you make your comment, we can see
22 if we have already considered them in our draft
23 performance measures that we have developed to
24 date. I'd like to emphasize that these are draft
25 performance measures, and we're changing them based

1 on input from the different agencies and also from
2 the public input.
3 I would like to start with those individuals
4 who have requested speaking time this evening in
5 order to make comments or ask questions, and if
6 there are additional questions and comments
7 following the persons who have already indicated
8 they would like to speak, we can move on to those
9 persons.
10 We will begin with Mary Munson, and following
11 her is Carl Harper, and if you have changed your
12 mind and indicated that you wanted to speak but no
13 longer wish to, you can just waive your right.
14 MR. HARPER: I pass. Carl Harper passes.
15 MS. MARLIN: Carl Harper passes?
16 Mary Munson?

17 MS. MUNSON: Thank you. I'll make my remarks
18 brief. I'm Mary Munson with the National Parks &
19 Recreation Association. This was brought up a
20 little, but I just wanted to emphasize the
21 importance of remembering that the CERP project is
22 a big elephant that's sitting right now in the
23 room. I want to speak in strong support of
24 alternative 5, which would raise the entire Tamiami
25 Trail. I think that's an obvious and best choice.

1 Remember that Congress just passed a 7.8
2 million dollar project, and in that project, it
3 clearly calls for decompartmentalization and sheet
4 flow enhancements, and that's a major project in
5 CERP.
6 Now, this raising the whole Tamiami Trail
7 would be the only option that really is not only
8 consistent with that, but actually advanced this
9 project, and eventually that project is going to
10 come through where the sheet flow is eventually
11 restored, going underneath that bridge and over to
12 Southeast Shark River Slough.
13 Now, the problem that we all recognize is
14 that, of course, this project has been implemented
15 under the modified water deliveries project, and,
16 of course, CERP is a completely different project
17 and funds something from a different source.
18 The CERP legislation complicates the matter
19 further by actually saying the muddy waters have to
20 be completed before they can start the CERP
21 project, so the funding available for CERP is not
22 available for this project, and that is a
23 conundrum. That is absolutely an untenable
24 position because you must put those projects
25 together and do this project as if this CERP

1 project is going to be, which it eventually will be
2 put into effect, but they have to be done together
3 and paid for together, so what I'm asking you is
4 that when this EIS comes out to treat this project
5 as acknowledging that it is a chosen alternative
6 and is the best one for not only muddy waters but
7 also for CERP and also to acknowledge that if you

8 don't have enough money for it, save.
9 We're not doing this because there isn't
10 enough money, and perhaps this will signal to our
11 decision makers and congressmen that we need to get
12 rid of that provision in CERP and maybe pass
13 another law to get this money, so I think that's a
14 very important thing that we need to deal with.
15 Thank you.
16 MS. MARLIN: Thank you.
17 MS. MUNSON: I have longer written comments
18 that I'll submit. Could you put them on the
19 record?
20 MS. MARLIN: Yes.
21 Carl Harper has waived.
22 Next we have Robert Yoder followed by Brian
23 Scherf.
24 Robert Yoder?
25 MR. YODER: Thank you. Robert Yoder. First,

1 I would like to address you so you can take this
2 back to your peers. I don't know who filled in the
3 weir on all 67 boating hazards, and I'm sure it's
4 part of the Corps of Engineers' lack of money, I
5 guess. I have no idea what they did that for, but
6 whoever did that, we'd like it to not be a part of
7 this project unless it was -- I don't know, but I
8 hope you learned your lesson. If you don't want to
9 discuss it ---
10 MR. BURCH: Say that again?
11 MR. YODER: The L-67, the weir -- They tried
12 to fill in part of L-67 about halfway across the
13 Tamiami Trail. Now, we have a severe current
14 there. They put up buoys there, and the people are
15 having a hard time getting through there. We don't
16 know what the purpose of that was. We don't need
17 people like that spending our money unwisely on a
18 project like that. L-67A. I think that's it.
19 Secondly, Doris, when you discuss maximizing
20 CERP objectives, does CERP consider a decline in
21 the number of linear feet of the canal to be a plus
22 or a minus?
23 MS. MARLIN: I'm sorry, sir? Would you
24 repeat that?
25 MR. YODER: Does CERP consider the decline in

1 the number of linear feet of the canal to be a plus
2 or a minus on that CERP plan objective that you
3 have?
4 MS. MARLIN: In the CERP, we were considering
5 ecologic connectivity, and so we were just looking
6 at it in a measurable form, which would be linear
7 feet. We're not saying it's a plus or a minus.
8 We're just saying that one way to measure
9 ecological connectivity and sheet flow would be
10 numerically.
11 MR. YODER: Last of all, I'd like to say that
12 before spending money on boat ramps that go no
13 where, we don't need boat ramps on a canal that's
14 only accessible maybe a mile in one direction or
15 another. We would like to see L-67A stay open all
16 the way to the Trail and the boat ramp be
17 accessible at L-29, west of the dam there, so that
18 you can put in at L-29, have a boat ramp there and
19 still have access to L-67A and run back north.
20 I don't know if they have any plans on
21 filling in L-29 on the east side. Do you know if
22 they have plans of doing that? I didn't hear
23 anything about that this evening.
24 MS. MARLIN: L-29A?
25 MR. YODER: L-29 on the east side of the --

1 I'm talking about L-29 going back towards Krome
2 Avenue.
3 MS. MARLIN: Right.
4 MR. YODER: Are there any plans on filling
5 that canal in? I didn't hear anything this
6 evening.
7 MR. BURCH: No. Right now, that's an
8 authorized flood control project at capacity, so
9 the cost issue, as it relates to that canal, is an
10 authorized project, so if there was an initiative
11 to fill that in, it would have to go back through
12 an entire planning process and get public comments
13 and evaluate the impact, and then get congressional
14 approval to do that, but right now, there are no
15 plans. If there were an encroachment by one of the
16 features on L-29, then that encroachment would have
17 to be compensated for by excavating on the other

18 side or something like that.

19 MR. YODER: Now, on L67A, have you heard

20 anything more about whether they're going to keep

21 that open or not? I understand from the Homestead

22 meeting, and I don't know who was there and who

23 wasn't, that they're going to knock down the weir

24 on the south side of L-67A and fill in L-67B and

25 cut paths through there to allow water to run

1 across, is that correct?

2 MR. BURCH: That's correct.

3 MR. YODER: That's the plan as of right now?

4 MR. BURCH: That is the plan as of right now.

5 MR. YODER: They don't plan on filling in

6 L67A anywhere from Tamiami Trail to Holiday Park?

7 MR. BURCH: At this point, I'm not aware of

8 any plans of that sort. I think they're still in

9 that planning process, and things are evolving, so

10 if you were at the last meeting when they discussed

11 that, you probably have the latest information, and

12 if any major changes to that were going to be made,

13 there would be an additional public meeting to make

14 that information known to everyone.

15 MR. YODER: As a recreational boater, some

16 people in Miami got access to the Everglades to

17 fish, and we definitely need a ramp to access the

18 L-67 canal from Tamiami Trail. I live in Broward,

19 and I know the people in Miami have got to have

20 that, and I fish there a lot as well.

21 Thank you very much.

22 MS. MARLIN: Thank you for your comments.

23 We will now hear from Brian Scherf and then

24 from Richard Persson.

25 MR. SCHERF: My name is Brian Scherf, and I'm

1 with the Florida Biodiversity Project in Hollywood,

2 Florida. My first comment is on venue, and I was

3 wondering if there was going to be another meeting

4 that would focus more on ecological effects since

5 this particular meeting focuses more on

6 recreational aspects that would be appropriate and

7 fair play to consider the ecological effects and

8 focus on those, just as you have done on recreation

9 here.

10 One of the things, just about every

11 ecological report on the Everglades has come out

12 and always talked about the decompartmentalization

13 of the Everglades and how the central and northern

14 Everglades are basically a compartmentalized

15 reservoir system, and if there's any project that

16 screams out to be fixed as far as a really good

17 method of decompartmentalization, it would be the

18 removal of the roadbed and elevating it.

19 You know, canals may have a lot of society

20 benefit, but I think that early evaluation should

21 take into consideration the profound ecological

22 impact that canals have. You know, we have lost 90

23 percent of our wading birds, and there are over 600

24 imperiled species now in South Florida, and roads

25 are just about the worst thing that can happen to

1 leave an ecosystem short of full development, but

2 there's over 6,000 scientific citations now on the

3 ecological effect of the road, dealing with

4 hydrology, wildlife, vegetation and soils, and this

5 is the chance right now to have a precedent setting

6 project, a state of the art road project that would

7 avoid and minimize impacts and includes ecology of

8 the Everglades.

9 First, the EIS must be consistent with the

10 hydrological restoration. Tamiami Trail is

11 actually a three-pronged system, a three-pronged

12 barrier, if you will it has an elevated levee. It

13 has a canal in a roadbed, and that prevents a

14 triple threat to wildlife. You know, we have to be

15 fully consistent with the 1989 Everglades National

16 Park's true hydrological restoration of Northeast

17 Shark Slough, and we must provide sheet flow, and

18 as other people have touched on, we must have the

19 flexibility to comply with CERP.

20 You don't know what the final flow model is

21 going to be, and if you elevate the roadbed, that

22 will eliminate a lot of concern about whether the

23 roadbed is going to be high enough for future

24 flows.

25 Also, the alternatives must be consistent

1 with the three water standards. You have a lot of
2 heavy metal runoff in the first half inch or so of
3 rain. That's a concern, and we need creative water
4 quality strategies, either wet or dried attention,
5 to make sure we meet these water quality standards.
6 The most important is that we must address
7 the ecological restoration. Now, as I said,
8 Tamimai Trail is a triple threat with the canal
9 roadbed and also the levee, and we must be able to
10 minimize the effects to wildlife. There are some
11 general facts here.
12 You have mortality from road construction,
13 mortality from collision, and I know that the
14 Everglades National Park is going to study State
15 Road 9336. There has been a mink study on US 41
16 created for this informal wildlife mortality study
17 on US 41, and one of the gentlemen mentioned that
18 he didn't see any wildlife mortality on US 41.
19 Well, one of the scientific studies talks
20 about how that most of your mortality occurs over
21 the first two decades, and Tamiami Trail was built
22 in 1928, so I'm sure that most of this mortality
23 has occurred. You know, up until possibly the
24 '50s, and then after that, the population had
25 already declined by that point, and the Journal of

1 Conservation Biology, special issues on the
2 ecological effects of the road, they've come up
3 with hundreds of ecological citations regarding
4 these impacts.
5 MS. MARLIN: Mr. Scherf, can you bring your
6 comments to a conclusion, please?
7 MR. SCHERF: All right. Some of the other
8 effects are disruption for the physical
9 environment, alteration of the chemical
10 environment, unnatural vegetation section, the
11 spread of exotics, changes in the land/water use
12 where you get increased access and increased
13 development measures and loss of ecological
14 connectivity, and I just wanted to stress that the
15 EIS must be consistent with CERP.
16 The CERP calls eventually for the removal of
17 the L-29 canal and levee, and I think the roadbed

18 must be removed. Also, we need to create a funding
19 option. Mary had mentioned about trying to get
20 some of the CERP money, and we can also try to get
21 the funding from FDOT, possibly an implemented toll
22 system, you know, and the maintenance cost should
23 also be borne probably by FDOT or the Corps.
24 Just in conclusion, I think that the Corps
25 must select alternative 5 as the preferred

1 alternative. That breaks out the environment
2 that's most preferable, and I think it's the only
3 alternative that would be consistent with the
4 comprehensive interrelated restoration plan.
5 Thank you.
6 MS. MARLIN: Thank you.
7 Next we'll have Richard Persson, followed by
8 Bruce Rowlett.
9 MR. PERSSON: My name is Richard Persson, and
10 I'm an operational fisherman, and I represent one
11 taxpayer. Me. What is going on with the L-29
12 canal? I've asked for months and months what is
13 going to happen with it, and I would like to see it
14 remain as it is, personally, and number one, no one
15 has given me an estimate of the cost of all of
16 these projects, and I think that the most sensible
17 acceptable alternative is to go with alternative
18 number 1.
19 Leave the roadbed as it is, and go ahead and
20 build a few bridges there, and you've got 19
21 culverts going on this bridge now, and it is said
22 that they don't flow to one, but since they have
23 been built, they have never been maintained. They
24 haven't been cleared.
25 They haven't been maintained, so water hasn't

1 flown through there. What is going to happen with
2 the maintenance that's on this project that we
3 build now? Are they going to be built and
4 forgotten because they won't work if you don't
5 maintain them?
6 You have to have a budget for that also, and
7 I have always been against the filling in of any
8 canal in the Everglades, due to the loss of flood

9 control capability and the loss of recreational
10 fisheries.
11 Moving the road in alternative 4 and 5 will
12 impact the environment. We'll have more damage to
13 the Everglades. I think the most sensible thing is
14 to leave it the way it is, build the bridges that
15 will have the least amount of environmental impact
16 going on, and that's the only thing I have to say
17 about that. Thank you.
18 MS. MARLIN: Thank you, sir.
19 Next we have Bruce Rowlett followed by Dave
20 Balman.
21 MR. ROWLETT: Good evening, Folks. This is
22 Bruce Rowlett, and I have been going in the
23 Everglades some 45 years, and I feel that the
24 Tamiami Trail is like a ribbon that has just cut
25 the water flow off throughout the Everglades, and

1 the water flow is the blood of the Everglades.
2 Marjory Stoneman Douglas wrote about it. They
3 could possibly raise the bridge and put culverts of
4 500 feet, or in my opinion, build a bridge so we
5 have natural water flow. That's all I have.
6 MS. MARLIN: Thank you very much.
7 Dave Balman followed by Dave Kuczenski. Dave
8 Balman from the Air Boat Association?
9 MR. BALMAN: Yes, ma'am, I'm with the Air
10 Boat Association of Florida right in the middle of
11 the whole thing, and we watched you destroy the
12 Everglades for years, but what we would like to
13 recommend tonight is alternative 1, that you do not
14 touch 41. Leave it like it is and put in four
15 bridges; two of those bridges to be tall enough so
16 that you can access it by air boat from the north
17 to south, just like they have done to Alligator
18 Alley.
19 It hasn't flowed over since 1997 when the
20 water was at a hundred-year high, and it did not
21 degrade the roadbed because they demucked that area
22 right there where they did not demuck other areas
23 of 41, for those engineers who didn't know that.
24 That's why the road didn't wear away in 1997.
25 We'd like to see the L-29 levee degraded

1 enough so that it would become a fish hatchery area
2 when the water is at the appropriate level and the
3 L-29 Tamiami canal remaining like it is, and the
4 access to gain would be the Tigertail camp, and the
5 only other areas would be a bridge so that it would
6 not interfere with any public or private access
7 areas north or south of 41, and we will be working
8 with this committee steadily because evidently the
9 experts have never even been out there and know
10 what they're talking about, but anyhow, you have my
11 name and address, and we worked extensively at it.
12 Thank you very much.
13 MS. MARLIN: Thank you, sir.
14 Dave Kuczenski followed by Pedro Monteiro.
15 MR. KUCZENSKI: My name is David Kuczenski,
16 and I'm a self-employed businessman from West
17 Broward, and I'm here to speak on behalf of
18 alternative 5 because alternative 5 allows more of
19 the sheet water flow that goes back to recreating
20 the original river of grass.
21 The current culverts that exist now do not
22 carry sufficient capacity of water for Shark River
23 Slough, and any of the alternatives, 1 through 4,
24 create the possibility for additional settling,
25 more potholes and constant attention by the

1 government. There will always be spots developing
2 in any of those alternatives, and whether you go
3 with the four or the eight bridges, it will not be
4 enough to recreate the sheet flow and consequently
5 fresh water flow in Florida Bay.
6 Alternative 5 is also best suited to provide
7 air boat access. You can just amend the programs
8 to go up a little higher, and you have air boat
9 access. The best alternative will have the road
10 elevated for the most miles, and you can include --
11 I would like to know what is the cost per mile with
12 each of the alternatives that you have discussed
13 this evening. Thank you very much.
14 MR. BURCH: I don't have a cost per mile, but
15 I've got our cost estimate of the five alternatives
16 that I went through, and I'm going to give you the

17 estimate. In the report, there are multiple
18 variations and different scenarios, and as I said,
19 we haven't focused in on why, but this will give
20 you a ballpark idea of where we are.
21 Alternative 1, the cost, and again, this is
22 the total construction cost and not a life cycle
23 cost, so there is an O&M cost like the gentleman
24 mentioned earlier, of different costs like that, so
25 for simplicity, I've got the construction cost.

1 For alternative 1, the cost was approximately
2 14 million. For alternative 2, the cost is
3 approximately 40 million dollars. Alternative 3,
4 the cost is approximately 73 million. For
5 alternative 4, the cost is approximately 47 million
6 dollars.
7 MR. KUCZENSKI: What was that?
8 MR. BURCH: 47 million, and for alternative
9 5, the cost estimate is approximately 130 million
10 dollars.
11 MS. MARLIN: Next we have Pedro Monteiro,
12 followed by Albert Bryan.
13 MR. MONTEIRO: Hi, Pedro Monteiro, and I
14 would first like to point out that while we refer
15 again -- Some one mentioned earlier that this is
16 mainly directed at the recreational interests.
17 You haven't really compared any of these
18 alternatives in terms of their environmental
19 impact, and it concerns me that you expect
20 objective feedback from the recreational interests
21 when you only tell them half the story. I know
22 there is a time constraint, but I think it should
23 be a balanced presentation because what the
24 recreational people need to realize is that when
25 you improve the Everglades ecosystem, they will

1 benefit in the long term, and all the special
2 interest groups have to make sacrifices in the
3 short-term, but in the long term, it should benefit
4 the fishing interest also. Are you planning to
5 have more of these forums?
6 MS. MARLIN: When we have a draft document
7 available, just like you indicated on your card,

8 and if you are interested in receiving a draft of
9 our proposed alternatives, recommended alternatives
10 with all of the documentation that leads to its
11 selection, that can be provided, and once we have a
12 draft document, we would have another public
13 meeting that would address your comments as well as
14 have a 60-day comment period in which time frame
15 you can make any further comment to the document
16 that you believe needs to be represented.
17 MR. MONTEIRO: How is this meeting publicized
18 because I just learned about it this morning?
19 MS. MARLIN: We sent out over 200 flyers to
20 persons who were on our mailing list. That has
21 been updated in the Corps of Engineers throughout
22 the different public meetings, and we also
23 contacted the Bass Pro Shop, and they helped
24 publicize it. We put a notice in the newspapers,
25 and we made up a distribution of announcements to

1 local newspapers and agencies.
2 MR. MONTEIRO: I didn't see anything in the
3 Sun Sentinel, and I found two small paragraphs in
4 an article in the Sunday Herald, which is, I think
5 very recent; you know, that's a three-day warning,
6 and I hope in the future that we will have more
7 warning and perhaps better disbursement of these
8 meeting announcements.
9 MS. MARLIN: I apologize for any notice that
10 was received in an untimely manner. Did you have
11 any further comments?
12 MR. MONTEIRO: Yes, I would like to come out
13 strongly in favor of alternative 5 because
14 basically, between the levee, the canal and the
15 road, it's a dam that is really blocking the water
16 flow, and we have to remember that Congress passed
17 these bills to restore the Everglades, and I think
18 people seem to forget that.
19 Anything other than raising the road will not
20 amount to restoration. It will amount to slight
21 modification. We can't restore the sheet flow of
22 water, and we can't restore the animal access
23 between the north and south side of the Tamiami
24 Trail, and unless we raise the bridge -- I mean,
25 the best thing for the Everglades would be to get

1 rid of it entirely, but we know that that's not
2 realistic, but let's remember why we're here.
3 We're here too because Congress thought the
4 Everglades and the ecosystem was important. Thank
5 you a lot.
6 MS. MARLIN: Thank you very much.
7 Next we have Albert Bryan Followed by John
8 Olman.
9 MR. BRYAN: Thank you for the opportunity
10 again. I come here wearing two hats; one, I'm the
11 president of a conservation club, and the other one
12 is that I'm the father of four kids who like doing
13 hunting and fishing, and they like to go recreating
14 to the areas.
15 I take a lot of kids out there with me, and I
16 can tell you that one of the problems we have in
17 South Florida -- Those kids need to find something
18 out there that they can relate to, and I can tell
19 you that I take a lot of kids out there, and we do
20 fishing and things, and it's obvious that they
21 don't like to go fishing. You can tell by their
22 comments.
23 I just want to run down the list here real
24 quick, and to me, the only thing that really makes
25 sense here is alternative 1, and the only problem

1 with that is it's not enough bridges when you start
2 considering the vast 10-mile area. I know where
3 Shark Slough actually starts and where it finishes,
4 and a lot of people here probably don't know that,
5 and Taylor Slough is farther to the south, and one
6 model that I think we ought to consider is I-75, is
7 it should be a model for what we're trying to
8 accomplish right here because it's really -- It has
9 achieved the same thing. You have the sheet flow,
10 and you have these numerous bridges, and you try to
11 put one big massive bridge across there -- Well, I
12 had better keep it in order so I don't confuse
13 everybody.
14 Alternative 2 raises the road, only I don't
15 think it's necessary. I'm afraid there's a certain
16 fear; when you raise that road, they're going to be
17 tempted to put more muddy water out there. You

18 have already raised Tigertail Camp, and because I
19 was involved with the Indians when you were doing
20 that, to us, that's an indicator that you're going
21 to put more water out there. You have overkilled
22 numerous tree islands, and I know the Indians
23 already are upset about this. I'm surprised
24 they're not here tonight. They're probably not
25 aware of this meeting.

1 Another thing: I'm surprised that this
2 meeting is up here in Broward County when the
3 problems we're talking about are down in Dade
4 County, and I could have had 500 people here at
5 this meeting if we had had a little more notice if
6 it was in Dade County where the problem actually
7 exists, so I'm kind of questioning what we're doing
8 here.
9 Alternative 3. A new road to the north.
10 Well, I can tell you, this is not a good idea
11 because what you're going to do is you're going to
12 impact more area. Why destroy that area up there?
13 You know, you told us you were going to take out
14 the north side of the L-29 levee. They told us
15 they were going to take that out, and they were
16 going to take out that levee across the north side
17 to the ground level so we wouldn't have a sheet
18 flow.
19 You can build all of the bridges in the world
20 you want, but until you open up that levee, that
21 water is not going to flow. It doesn't make any
22 sense here. I don't understand where you got us
23 all confused or at least I am, and I can tell you
24 right now the Indians are not going to sit around
25 and let you build a highway right next to their

1 back door. That ain't going to fly; I can tell you
2 that right now. I know the Indians. I know Sandy
3 Tigertail, and I know Robert, and I know all of the
4 Indians camped there, and you're going to have a
5 real war on your hands. You're going to have to
6 take steps with Lee, and I don't know if you know
7 who he is, but they've got big guns.
8 Alternative 4, the new highway to the south,

9 leaves the old Tamiami Trail. I don't understand
10 what you want to do here, what you're trying to
11 accomplish. We have already moved; the new Tamiami
12 Trail that we have right now, we have already moved
13 it north, and that slough back to the south of the
14 Tamimai Trail is the old Tamiami Trail.
15 My step-grandfather was involved with both of
16 the Tamimai Trails, and he used to tell me a lot of
17 stories, and what happened now that we moved the
18 boat back to the north, that soil bank has become
19 like one big tree island, and you have a lot of
20 native trees there, not exotic trees. They've
21 already killed all the exotic trees that were
22 growing on that soil bank, so now you have fig
23 trees, and you have like elderberries, and you have
24 all this food that the animals are dependent on,
25 and now you're going to put them through another

1 major impact.
2 I'm going to tell you something right now.
3 I'm going to be out there with a camera, and when
4 these animals are dying, I'm taking their pictures,
5 and I'm going to plaster it all over the
6 newspapers, and I know Kelly Mitchell personally,
7 and I'm telling you, you don't want to go there.
8 Those are the only places they have to get
9 out of the water, and when you raise that water up
10 in that area, that's where the animals go, and I
11 don't like to say this publicly because I don't
12 want to see somebody over there trying to hunt in
13 that soil bank, but that's true, so they need that
14 soil bank.
15 Alternative 5. You are not going to have
16 access to the people to recreate, and it's not
17 going to be too cost effective. Why not? We have
18 something that works there. Why even block off
19 these culverts that are already there? Leave the
20 culverts there. Put in some more bridges. That
21 makes sense.
22 Let's do something that makes sense for a
23 change. We see people losing our monies. Let's
24 see it in a way that's going to make sense. I have
25 been involved in a restudy. I know what we've

1 said. We've had Colonel Miller come and talk to us
2 and Steve Applebaum, and I can list all of them,
3 and we are heavily involved here, and we thought we
4 had this thing -- We're all for modified water
5 delivery system. It makes sense.
6 It's the only way we're going to have a sheet
7 flow for the Everglades, but it's not necessary to
8 have one big massive bridge from one end to the
9 other. That's going to be a monumental job, and
10 it's going to be expensive, and you're still going
11 to have a levee to the north, and you're still
12 going to have the Old Tamimai Trail around.
13 According to what your documents are, you're
14 still going to have maintenance, so what sense is
15 that going to make? I'm trying to think of the
16 scientist that we worked with in outer management.
17 He asked me if we were meeting over in Naples, and
18 we were talking about it and -- Do you guys
19 remember his name?
20 Anyways, it's strategically putting these
21 water places in the right places because obviously
22 what happens now is the area is developed, and we
23 have natural sloughs, and you're going to start
24 putting in, arbitrarily putting in these, and you
25 need somebody who knows about the environment. You

1 need to go out there on an air boat, ride along
2 there and see how the environment has adapted to
3 itself and try to work with the environment, but
4 instead, I'll tell you something else if they're
5 going to put this -- You know, what scares me here
6 is they're going to put all this water in there,
7 and I was out there with Tom Shirley, and I don't
8 know if you guys know him, but he's a retired
9 captain with the Game Commission, and he has been
10 out there for about 50 years, and they're killing
11 the tree islands, left and right.
12 We have big beds out there in the Everglades.
13 To the north of the levee and 3B and to the south
14 of 41, we have these huge dead zones, and what it
15 is is it's all that water, and it's not only the
16 amount of water, but it's the duration of water
17 that's put in there for the duration of time.

18 You know, it's one thing to have a
19 catastrophic condition come along, and if you're
20 going to have high water, then you have a natural
21 system over where it will flow right now. It's not
22 going to be stacked out. What is happening now to
23 us in the past, the only way we have to get rid of
24 this water is to see the S-12 structure down there
25 by the 40-mile bend, and now we've got to keep them

1 shut because of the seaside sparrow.
2 We don't want to impact that, and so we've
3 got micromanaging of the whole area to protect that
4 one species, and we're killing all of the
5 fur-bearing animals to the north, and we're killing
6 all of these tree islands, and we need this
7 modified water delivery system.
8 This is important. It's got to start here,
9 you know, because this is what it is, and
10 everything that they do to the north end is not
11 going to matter if they're not going to take care
12 of the south end.
13 What scares me though is that when you open
14 up all of this on the south end, are we going to
15 have enough water for the north end because now
16 that you're going to have this natural pull of the
17 south end, are you going to be able to supply water
18 and keep a normal hydro period on the north end,
19 and that issue hasn't even been addressed here
20 tonight, so I really would like to be on that
21 advisory committee.
22 There are other people who are knowledgable
23 and have a lot more knowledge than I do, but
24 they're not here tonight. They should have been
25 here tonight. They should have been involved in

1 the process, and, you know, it's a labor of love.
2 We're not asking for money or anything else.
3 We go out there, and if you want to go out
4 there, we'll take you on our air boats, swamp
5 buggies or whatever, and we'll show you the
6 environment and learn the environment. You've got
7 to get out there and experience it. You cannot
8 learn the Everglades in a college.

9 It's a unique environment, and so you've got
10 to go out there, and you've got to experience it,
11 and you've got to see what we're talking about.
12 You've got to have your ear to the ground. You've
13 got to get off that boat, and you've got to walk
14 around out there to see what those animals are
15 going through, and unless you do that, you're never
16 really going to have a feel for what's going on,
17 and you can sit here and talk and analyze and play
18 with numbers all day long, but it's not going to
19 accomplish -- You know, we just want to ---
20 MS. MARLIN: I think we're going to have to
21 take you up on your offer.
22 MR. BRYAN: Believe me, we have no problem
23 with that. We can have a whole fleet of air boats,
24 and we can have everybody out there on the air
25 boats; I don't care.

1 MS. MARLIN: Could you please bring your
2 comments to a close?
3 MR. BRYAN: Yes, ma'am. I'm sorry. Pardon
4 me. I don't mean to be rude to you all, but this
5 is an emotional issue to me. I love the
6 Everglades; some people like to be out on the
7 ocean, and I like to be out in the Everglades, and
8 my family and my kids enjoy it, and it's just an
9 emotional issue.
10 I went out there with my dad, and I've seen
11 all of the changes that have happened, and it makes
12 me sick. You know, a lot of these people here,
13 they want to shut -- I know, I can see them who
14 don't like fishing, but I'm going to tell you
15 something: When you see those kids on drugs, you
16 might want to -- You know, what's the big deal
17 about catching a fish and turning him loose? You
18 know, you want to put regulations in there that
19 make sense. These people are catching these little
20 two-inch fish that they can't find. That doesn't
21 make sense. Anyways, I'm going to cut it off now.
22 Thank you.
23 MS. MARLIN: Thank you.
24 I just would like to point out that we do
25 have quite a few other performance measures that

include a lot of other aspects of the project, and we have provided those to you in a hard copy, but we did not discuss them in any great detail tonight, and a lot of the points that Mr. Bryan has raised, it is also appropriate to participate in the environment impact process that is beginning right now for the combined structural and operational plan for muddy waters and C-111, which was indicated on one of the first slides that we had.

Our last person who has requested to speak is Jonathan Olman. Following his comments, we will be able to take comments from the floor.

MR. OLMAN: Good evening. My name is Jonathan Olman, and I'm the Everglades representative from the Sierra Club. The Sierra Club's thousands of South Florida volunteers have been watching closely the Everglades restoration process, and we appreciate the opportunity to speak to you this evening.

Tamimai Trail is the road that cuts through the heart of the Everglades like a knife. The road, the decision can now be to a better future for all of us. Marjory Stoneman Douglas and her friends took day trips on this road. This was the

road that brought her to the Everglades.

Even though she knew the environmental damage that the road caused, it was a road that would soon tell the world of the appearance of the Everglades, but the road was built, and we didn't know any better. It was built when man sought to conquer the Everglades, and now we, as a society, seek to restore nature. To undo what we have damaged is one of the greatest abilities we hold, and we are lucky because today we have the ability and the technology to change Tamiami Trail and enter a road that poses little or no threat to the Everglades.

We humans now have the ability to travel east and west while letting the water and the wildlife flow north and south. Its called the skyway. It's called alternative 5, and it's called common sense.

The skyway concept has been used in Louisiana

18 extensively over the channel line of the wetlands.
19 The sky allows freedom for us and the wildlife, and
20 it is a drop in the bucket of the cost of the
21 overall 7.8 billion dollar Everglades restoration
22 plan. I heard a lot of people oooh and ahhh when
23 they heard that there was a small difference in the
24 millions of dollars between 5 and between the other
25 alternatives. Compared to the 7.8 billion dollar

1 plan, it's nothing, and you might as well do it
2 right because the American people demand the
3 Everglades' restoration, and that's what the Corps
4 of Engineers promised.
5 The raising of Tamiami Trail is not a new
6 concept. In fact, the Corps of Engineers said that
7 what it plans to do in its official plans, in all
8 of its promotional material, the question is: Are
9 you going to fix it right or are you just going to
10 get by?
11 In addition, there will have to be
12 alterations to the L-29 canal and the levee. If we
13 don't fix this right, the fishermen in the Florida
14 Keys and Florida Bay are going to suffer in a very
15 bad way.
16 We urge all recreationalists, regardless of
17 where they fish or what type of fish they catch, to
18 demand that the Corps put back the entire system so
19 we can move forward on the Everglades restoration
20 together. Build the skyway. The only thing that
21 can stop you is complacency.
22 Now, we also asked for another meeting in
23 Dade County. We believe it's important because
24 Dade County is the location where this project is
25 taking place. We would also suggest that you might

1 consider the Florida Keys because those are people
2 impacted by this project as well. Thank you. And
3 when I say meeting, I mean before the draft is put
4 out. That's very important. Thank you very much.
5 MS. MARLIN: Thank you.
6 I do have two more requests for speakers.
7 That would be Robert Tirrell, followed by Joel
8 Marko.

9 Is Robert Tirrell here?

10 MR. TIRRELL: Thank you. Good evening. I'm

11 Robert Tirrell, and I'm with the Florida DCLE,

12 representing the Everglades committee. I'd just

13 like to point out a couple of things that John and

14 Pedro mentioned, and that is that we feel that this

15 160 million for alternative 5 is not only a worthy

16 investment, but the best investment.

17 A good investment now will save millions of

18 dollars later and more to enhance the system and

19 return it to its natural order in Florida and will

20 lead to numerous other alternatives, not only with

21 jobs and fishing in Florida Bay and the Keys, but

22 we think that the taxpayer is being asked to spend

23 8 billion dollars for this project.

24 You want to start off on the right foot. The

25 Everglades are a system of extremes. The plants

1 and animals there are merged because of these

2 extremes. The animals can handle flood and fire,

3 but if we don't restore some of these extremes, the

4 system is being managed to death.

5 We want the Northeast Shark Slough, which is

6 only possible by removing what is blocking it,

7 which is Tamiami Trail, and raising it as much as

8 possible, is going to restore those overflows and

9 the subsurface flows and how these natural flows

10 can restore Northeast Shark Slough in the park.

11 The Everglades is a contiguous system, and if

12 we try to manage it too tight in one area of

13 Northeast Shark Slough, it's representative of the

14 problems when you try to manage water with levees

15 around it. Take out of the levee what is blocking

16 the north and south flow, and the Northeast Shark

17 Slough will be restored.

18 Alternative 5 is the best investment, and the

19 only follow-up I would have is that the Committee

20 for the Restoration of the Everglades Ecosystem

21 will have the opportunity to review this

22 alternative, the one that's chosen. Thank you very

23 much.

24 MS. MARLIN: Thank you, sir. Joel Marco.

25 MR. MARCO: Good evening everybody.

1 Recreational enthusiasts: Whatever you do, I'm
2 sure, like the rest of us, I really do feel that
3 this is the appropriate place for a meeting of this
4 type.
5 I also wish to have another meeting in Dade
6 County where the road is, as it makes sense to have
7 it not only here. I would like to also start out
8 with a question: What is the existing water medium
9 level we have in the Glades, if you know that, and
10 then what is the end medium level that you plan on
11 having after all the projects are done? Can you
12 answer that now? After all, that's what it's all
13 about.
14 MR. BURCH: I'm not sure on the medium water
15 level now. I believe it's around 7 1/2. I believe
16 Mr. Wall was correct in what he stated earlier.
17 MR. MARCO: 7 1/2 current?
18 MR. BURCH: I can verify that with you. We
19 have all of the data.
20 MR. MARCO: What do you intend it to be when
21 these projects are complete?
22 MR. BURCH: With the comprehensive CERP being
23 in place, if you put the water, the bridges, the
24 openings in to allow the water to pass, the water
25 level in L-29 -- You asked for the median?

1 MR. MARCO: Correct.
2 MR. BURCH: It would be approximately
3 elevation 9. If you didn't do ---
4 MR. MARCO: Will that include south of the
5 Trail? Do you expect that to be 9 also?
6 MR. BURCH: The data I have is for just north
7 of the Trail and L-29, and it would be
8 approximately the same, a few tenths of a foot
9 lower just south of the Trail. Once you get too
10 far out, I don't have that data with me.
11 MR. MARCO: Okay. Thank you.
12 MR. BURCH: If you didn't do anything to
13 L-29, if you didn't have any of the openings or to
14 Tamiami Trail, if you didn't do anything, the water
15 levels would stack up under the plan, and you would
16 have water levels around 10.
17 MR. MARCO: So that would be the difference?

18 That would be 10 on the north side of the Trail?
19 MR. BURCH: The north side, right. If we
20 just implemented all the water with the water
21 levels that are projected under the CERP plan
22 without doing anything to Tamiami Trail, the water
23 would back up in the L-29 canal.
24 MR. MARCO: Thank you.
25 UNIDENTIFIED SPEAKER: Well, speaking of

1 special interest groups, like I say, there are more
2 special interest groups here that are against
3 recreational, and our entire lifestyle, our
4 businesses, everything this store stands for.
5 People that are involved in the park and
6 other decisions on massive levels through lawsuits,
7 are now being challenged directly in court because
8 of the lies, lack of scientific evidence, and I
9 will impress upon you to consider anything else
10 that people state is scientific evidence, look at
11 and be bound to scientific evidence and not just
12 studies, reports, gut feelings here and could be,
13 should be, maybe is, but if you get concrete
14 scientific by definition, then proceed with it.
15 Currently Big Cypress National Park is a game
16 preserve, and the preserve is being all trashed out
17 to the recreational users, which surely impact
18 everybody in this room culturally and financially.
19 Testimony to the damage, and this is another thing
20 I wanted the people who are really heavy on
21 ecosystems, checking out the people from the usage
22 of federal lands, personal testimony again by what
23 one of the other gentleman said: The north side of
24 the Trail, you raise that water up -- I can take
25 you to a real creek that was flourishing for years

1 with several species of birds.
2 Water level comes up, stays up there a few
3 weeks, root rots everything, and boom, the trees
4 are gone and no more reef. At one time, it was
5 flooded. It killed more birds, damaged more
6 permanent habitats, and then everybody here is
7 getting in line with air boats, going straight
8 through with buggies or whatever you can think of,

9 and when you people raise and lower that water and
10 raise it for a long time, you're killing these
11 hammocks, all the pine limbs, and you're killing
12 the birds, the wading birds.
13 It's not the recreational people, so our
14 rights need to be not impeded as taxpaying citizens
15 for this, and we all bust our chops to pay the
16 salary and for the project. Keep us in, and keep
17 our children in. That's enough. You've heard
18 enough. Thank you.
19 MS. MARLIN: Thank you. That concludes the
20 persons who had indicated on the card that they
21 wanted to speak. Is there anyone else that would
22 like to make a comment at this time?
23 Yes, please. Please state your name when you
24 speak into the microphone.
25 MR. WALLER: My name is Brad Waller,

1 hydrologist, and I think just one thing that you
2 should make clear from these discussions is that
3 the hydraulic of the different alternatives can
4 pass the flow, just for the record, can pass the
5 flows of modified water deliveries and CERP.
6 Just so people know that the hydraulic sheet
7 flow from the north, the sheet flow to the south,
8 they're going to pass the design hydraulics of what
9 you want, which will be to increase in the future,
10 and I think that someone looking at alternatives,
11 looking at recreational, looking at wetland
12 impacts, looking at wildlife passages -- But the
13 hydraulics are being taken care of. That's just
14 the physics of the system.
15 MR. BURCH: That's right.
16 MR. WALLER: With the bridges, they're all
17 going to pass with the flow. That's what you want,
18 so I think that, just for the record, you should
19 state that.
20 MR. BURCH: Yes, that is a correct statement
21 that the four bridges in any of these alternatives
22 need the opening past the water flows for both the
23 modified water delivery project and the CERP
24 project.
25 When you look at various alternatives, more

1 bridges, causeways, you're looking at other
2 benefits besides the hydraulics. You're right.
3 Thank you.
4 MS. MARLIN: Do we have another speaker?
5 MR. WALKER: My name is Ed Walker, and I'm a
6 recreational fisherman, hunter, boater and I spend
7 about a hundred days a year in the Everglades from
8 Tamiami Trail to Alligator Alley and all the way to
9 29.
10 My biggest question to you is: Most of the
11 fishermen that I'm associated with are concerned
12 with L-67A and the three structures of S-349A, B
13 and C, whether or not that's going to impede
14 control, back up, slow down or increase water flow
15 in 67A.
16 We've been hearing for about a year that
17 there was a plan to take that big earthen levee and
18 fill in that canal down there. Approximately 7
19 miles is what I was told, so that was a year ago,
20 the information.
21 At this point, I've seen a couple of
22 Band-Aids with knocking out the weir and putting
23 the weir up, putting the weir out, and, put a
24 little turnaround plug there just north of the
25 weir, and I don't know what that does.

1 L-67C, a magic canal, is what I call it.
2 It's one of the most pristine waters out there.
3 Crystal clear. There is no access to it from any
4 other canal. It just goes down the Everglades
5 because you don't have any problems coming in
6 there.
7 There's no access from the sheet flow, we'll
8 call it. That canal alone would be severely
9 impacted if you cut those canals through from L-67,
10 L-67A and L-67C, those three passageways. Now, my
11 concern is what are those three passageways? Are
12 they dikes? Are they dams or levees or what are
13 they? It's on page 3 of your handout there.
14 MR. BURCH: Right. Right now, as you said,
15 there is some discussion. If you go back to the
16 original general design memorandum that came out in
17 1992, there were structures proposed there, and

18 that is being looked at right now.
19 I do not have the latest information to the
20 detail that you would probably like it, and I
21 really hate to tell you something that wouldn't be
22 completely correct.
23 I can get you that information. If you can
24 leave your name and address with me, we will make
25 sure we can get that information to you as to what

1 the current status of that is and what the current
2 proposed plans are.
3 MR. WALKER: But are we going to find out
4 after your draft is done and completed and have a
5 little forum here to discuss what you're going to
6 do or are we going to find out the proposal to what
7 you're going to do is already on your chart --
8 MR. BURCH: Right.
9 MR. WALKER: -- if they've already been
10 numbered and labeled and mapped out, so there has
11 to be a proposal somewhere to those sites?
12 MR. BURCH: Yes, sir.
13 MR. WALKER: Does that stand for the
14 structure? Does it stand for a dike, a levee, a
15 dam, a weir? What exactly is it on this map you
16 have right here? It's on page 3 of your handout,
17 because I can tell you, since you took out the weir
18 down south, there is not a drop of coon tail for 15
19 miles.
20 Three years ago, there was coon tail in the
21 muck and in the grass, and that water flowing
22 through or rippling through there now is 4 knots.
23 You've killed the grass, and Doug Barry, I've seen
24 him out there all the time, and we talk about it,
25 and I don't believe that it has been sprayed. It

1 wasn't killed, and you're talking about the most
2 productive stretch of that canal, and the problem
3 may be all of the Everglades, and for that matter,
4 may be all of Florida, the average tonnage of
5 pounds per square mile of bass fishermen.
6 Anybody in this room that knows what I'm
7 talking about, they can tell you that, and you're
8 going to impact the best waters in the entire

9 Everglades for fishing.

10 MR. BURCH: That's correct. The structures

11 that were from the original report, the general

12 design, those, I believe, are spillway structures.

13 MR. WALKER: But is a spillway a solid dam?

14 Is a spillway like you see out in the Everglades?

15 MR. BURCH: Yes.

16 MR. WALKER: So you're talking about access

17 denied from Holiday Park going south, that 30-mile

18 stretch? That's approximately one-fifth. That's

19 about 8 miles from Tamiami Trail. It's going to be

20 denied access to our recreational group, which is

21 thousands of people, and I understand the people in

22 Dade County, they want access to that, and that's

23 fine, and we want them to have access also, but

24 this issue that I'm talking about is going to be a

25 major issue if fishermen knew exactly what we were

1 talking about.

2 In other words, you're not coming right out

3 and saying it, but this other issue with the road

4 at Tamiami Trail, I understand all of that, and I

5 want the sheet also, but this other issue, for

6 recreational fishermen, if you were to go out to

7 Holiday on Saturday or Sunday, you would see how

8 many thousands of dollars are spent everyday, and

9 how many man hours of fishing is done in that

10 canal. It's incomprehensible to you.

11 I would imagine a hundred times greater than

12 the access of S-29, because I don't know anybody

13 who fished in S-29, that 10-mile stretch. You

14 know, it's a waterway, but nobody I know fishes

15 there. No one that I know.

16 Now, I can tell you where everybody who

17 fishes is, but no one fishes at S-29 that I know

18 of. No one. So my concern, and I guarantee you

19 the concerns of Broward and Dade County fishermen

20 is that access on L-67A; it's the most traveled

21 canal in the entire Everglades. I can guarantee

22 you that.

23 Without a doubt, short of maybe Alligator

24 Alley, but I can assure you that if this comes up,

25 and these structures are built without having one

of these formed to decide how, and maybe you want to involve the recreational fishermen. That's a huge impact to deny that 7 or 8 miles of access and then another 10 or 12 miles west of Tamiami Trail, and some fishermen will fish all the way down there, you know, and so I definitely don't want this to come up out of the bag, but just like the pump house they built in Holiday Park, and probably not a lot of people here know about that either, but they tried to pump it out and build that back east and out of the park. Do you know about that pump house?

MS. MARLIN: No, I'm sorry I don't know about it.

MR. WALKER: You don't know about it? Well, it's fifty guys there right now building a huge structure, and they're going to be there for two years, and instead of pulling the water west into the park from the runoff, now we're going to pull water out of the park to put water in the Fort Lauderdale water layers, to provide water, so they're not only going to pull water out of the park, but you're going to want the sheet flow, but we're going to be taking the water back out of Holiday to pump it east.

There's a huge structure going on right now. There's fifty guys who are working every day right in Holiday Park, so there are other issues that are going to capture your area there that aren't being brought up here that no one said a word about it, but I would think would have a great impact on your plan. The water has got to be able to exist to flow.

If you're sucking it out and pumping it south and pumping it east, you know, not to mention what's going on with Lake Okeechobee, and those are some of my concerns, and I just don't want this little project here at S-349A B and C to get passed, to get drafted and to get voted on and paid for and exclude all of the people that access that area because I'm sure there are people who came here tonight who may be thinking that that's what

18 we're here to come to talk about, and I didn't know
19 the entire meeting was about the 10-mile stretch of
20 S-29, so I was wondering if there is going to be
21 another forum on that particular issue.
22 MR. BURCH: Yes. Tonight we were here to
23 talk about Tamiami Trail. That part of the project
24 was termed the seepage and conveyance portion.
25 That project, the changes in that are being looked

1 at and evaluated, and like I said, I would be more
2 than happy to get you whatever the current
3 information is on that, and I would say that if
4 changes are proposed, we have already gone through
5 the process of the GDM and the changes are proposed
6 to what was in that general design memorandum, that
7 there will be public meetings and forums to gather
8 opinions before those changes will be implemented,
9 so, like I said, if you want to leave me your
10 address, I would be glad to send you every bit of
11 information that I have and get you as much
12 information as I have.
13 MR. WALKER: But has the proposal and the
14 gathering information been done already to build
15 those structures? I assume it is if it's on the
16 map already. Are you telling me that all of the
17 biological studies have already been done?
18 MR. BURCH: In 1992, there was a proposal to
19 put in a series of spillways in the canal and some
20 cross canals between L-67 and L-67C, and that went
21 through the public documentation process and was
22 commented on, and that project was approved by
23 Congress, but what we're looking at now, in light
24 of the changes that happened since 1992 with the
25 implementation of CERP, they're looking at

1 re-evaluating that portion of the project to see if
2 they can improve upon that design and be able to
3 achieve the flows across and be more compatible
4 with the fishermen and the recreational interests
5 and also the goals of CERP.
6 That is currently being evaluated and is in a
7 the study phase, and that's why I'm saying if
8 changes are proposed, that we say: Okay, we do not

9 want to do that that was in the document that we
10 published in 1992. In light of this new
11 information, we want to do something different,
12 that that would then be coordinated and have public
13 comments and public forums to present that plan and
14 to gather comments before it was done.
15 MR. WALKER: Thank you.
16 MR. BURCH: So I will send you whatever the
17 current status on that is. I don't know right now
18 off the top of my head.
19 UNIDENTIFIED SPEAKER: A lot of us are from
20 Broward County and are addressing the issue, and I
21 am an environmentalist and a fisherman, so you know
22 where I stand here, and we want a win/win
23 situation. As far as fishermen, we want to
24 continue what we have enjoyed for 30 years in the
25 area that you're talking about draining and

1 changing, and I still want the Everglades to get
2 their water too, so that's what this is about.
3 We want someone to come up with a firm
4 proposal that tells us how the Everglades will get
5 their water and we can still maintain a semblance
6 of the type of fishing that we had for the last 30
7 to 40 years, and I've been going out there, and
8 that's what we're looking for.
9 You know, I know you're trying to assimilate
10 all of the information, but we want some firm
11 solutions given to us and cost factors, and we have
12 8 million. What can we afford to do, and what are
13 you going to do? That's what I want to know. I'll
14 shut up, and I don't need the microphone.
15 MS. MARLIN: Thank you all very much for
16 attending. Please keep in mind that we're here to
17 get your input, and we call it into performance
18 measures, which would be the criteria used to
19 select a recommended plan, and I see that we have
20 someone else who would like to make a comment?
21 UNIDENTIFIED SPEAKER: Thank you.
22 MS. MARLIN: Please state your name.
23 MR. HANSON: Andrew Hanson, and I'm with the
24 Broward Air Boat & Conservation Program, and I'd
25 like to ask you some questions on this alternative

1 5, and it may be more of an engineering-type of a
2 question or questions.
3 I keep hearing a lot of people in here for
4 this alternative 5, and I'd like to clarify: What
5 is going to actually happen with alternative 5 on
6 the existing roadbed? You might want to bring it
7 up on the screen so that we can point to what it is
8 exactly that we're talking about. If I'm not
9 mistaken, by looking at the details you have here,
10 is the existing roadbed going to stay there on
11 alternative 5?
12 MS. MARLIN: Number 19. Page 19.
13 MR. HANSON: Part of the problem with what
14 they're saying, the people who are for that
15 alternative is that they keep referring to the
16 sheet flow, and the only problem is that this is
17 not natural, and it never will be.
18 Now, if we were to have built this road
19 originally back in the '20s, this type of bridge
20 system that you're talking about now, this would
21 leave us with just a wonderful situation, but it
22 didn't happen that way. We got a road out there,
23 and we're talking about mitigating the water
24 flowing through there for various reasons. Is that
25 roadbed a mistake?

1 MR. BURCH: For alternative 5, the breaches
2 that we show here, in order to pass the flow, would
3 only be the same as what the four bridges in
4 Tamiami Trail would be.
5 MR. HANSON: So we're talking about similar
6 to alternative 1?
7 MR. BURCH: Similar.
8 MR. HANSON: We've got an elevated skyway
9 bridge that goes the whole 10 miles?
10 MR. BURCH: That's correct. Part of the
11 problem that we have here is there are two -- I
12 think we had mentioned earlier, there were two
13 authorities. The Corps of Engineers can't do
14 anything unless Congress authorizes us to do
15 something, and they fund us and give us certain
16 monies to do certain things.
17 Now, we've got a modified water delivery

18 project which authorizes us to move water from 3B
19 down into the Shark River Slough. We also have a
20 separate project, the CERP project, which looks at
21 creating more decompartmentalization and more
22 ecological connections, so under the modified water
23 delivery plan, all you would need to get the water
24 through is these four gaps that would be equivalent
25 to alternative 1 for the bridges.

1 MR. HANSON: So basically, as far as the
2 water flow is concerned, it's very similar to
3 alternative 1 for water flow? Now, if under CERP
4 or under a different project, you wanted to come
5 and degrade the remainder of this roadbed, you
6 could do that, and you would gain additional
7 benefits, an ecologic connection, more natural
8 sheet flow, and certainly, if you took out all of
9 Tamiami Trail and put in an elevated roadway, you
10 would have more sheet flow than if you only have
11 four gaps, so that's, for the 140 million that
12 you're talking about earlier, that that roadbed
13 stay for that 140 million?
14 MR. BURCH: That's correct. The majority of
15 ---
16 MR. HANSON: So basically the only difference
17 between alternative 5 and alternative 1, for 65
18 million dollars, we're getting a bridge, and we're
19 getting real high up in the sky where you can see
20 way out, and that's the bottom line?
21 MR. BURCH: That would be the bottom line for
22 this. The difference that you would get though if
23 the feature, if you wanted to do something else --
24 MR. HANSON: -- which would take more money?

25 MR. BURCH: -- which would take more money,

1 you could come in and take out all of the rest of
2 the existing Tamiami Trail and then have much more
3 open space where if you only put in the four
4 bridges, you would still have traffic flowing on
5 the remainder of that embankment and to do
6 something in the future much different, but you're
7 correct; it would take additional money, money that

8 the process, that I stated, would only be to build
9 the bridge, the skylake and to breach the areas in
10 a few of the different places and not to take out
11 the -- You would have to come up with more money
12 under a project such as CERP to take out the
13 remainder of that.
14 MR. HANSON: Now with that in mind, now that
15 the water flow is basically the same, no matter
16 between the differences between alternative 1 and
17 alternative 5, other than the bridge, water flow is
18 the same, with a different flow of hydraulics, how
19 is this going to impact with the northern sector?
20 How are you going to get farther up to I-75
21 territory that you're talking about the area here
22 through the northerly area because that road has
23 just been built in the last few years, and that has
24 a bridge system very similar to alternatives 1 and
25 2, and so are we going to go back and tear them all

1 apart again? Somewhere in the future, are we going
2 to do a skyway bridge across that thing too?
3 MR. BURCH: Their aren't any plans to that
4 right now that I know of.
5 MR. HANSON: It just takes more money, right?
6 MR. BURCH: The CERP plan, the objective of
7 the CERP plan was to get comprehensive work in all
8 the Everglades so that if you were to go back, and
9 I'm really not the person to give you a briefing on
10 the CERP plan, but if that was the intent, to look
11 at all of the various components from Lake
12 Okeechobee all the way down to Florida Bay and come
13 up with a comprehensive plan to move water through
14 the entire ecosystem instead of having little
15 fragments here and there, and we also mentioned
16 there is going to be this new study, starting in
17 the next month or two, to look at how you implement
18 everything from area 3A and 3B down through Shark
19 River Slough, down through the C-111 basin into
20 Taylor Slough and to look at that whole operational
21 system and how you move the water around, and
22 that's a study that's underway.
23 MR. HANSON: All right. I'll end by making
24 this comment: With everything I have said in mind,
25 we have found ground. We're looking for water

1 hydrology, but we're talking about in dollar
2 figures and what you're actually going to get for
3 the money, and there are a lot of variations here,
4 but what we want to keep in mind here, some of the
5 factors that we've been seeking out here,
6 recreational accessibility, taxpayer funding on
7 these areas in these projects, and the fact, the
8 main fact that this area has been impacted since
9 back in the '20s, back before I was born, and I've
10 seen some of it in my lifetime, it's never going to
11 be natural no matter what we do. We can make it
12 better, but it will never be pristine.
13 MR. BURCH: Thank you.
14 MS. MARLIN: I would just like to emphasize
15 that what we've shown you here tonight are some of
16 the basics of the alternatives we're looking at,
17 and we're still considering variations to them,
18 which would include the degradation of the existing
19 highway, should we choose alternative 5.
20 Were there any further comments? Yes, there
21 are. Please state your name.
22 MR. WALSH: This is Joe Walsh of the Fish &
23 Wildlife Commission, and I'm actually assigned to
24 CERP, and I just wanted to make a quick comment: It
25 seems a little deceptive, to me, and I don't think

1 it's intentional, but you're telling people that
2 maybe CERP will come back later and do something to
3 increase flow or take out the roadbed at Tamiami
4 Trail.
5 I can tell you right now, the planners are
6 depending on modified water to do all of this.
7 There is no assumption that we're going to come
8 back later and do anything. Keep that in mind when
9 you talk about that.
10 MR. BURCH: Well, yes. In the CERP plan,
11 there is a portion of the CERP plan that addresses
12 decompartmentalization --
13 MR. WALSH: Right.
14 MR. BURCH: -- and the proposal in that
15 planning study was to include a series of ten
16 bridges across Tamiami Trail. I believe it was
17 ten, 100-foot bridges and the intention of that was

18 to create more sheet flow action and have more of a
19 natural system --
20 MR. WALSH: Right. That's true.
21 MR. BURCH: -- so there is money in there for
22 that portion of the work.
23 MR. WALSH: And what I'm telling you is that
24 CERP planners are assuming that all of this can be
25 taken care of by modified waters. I'm talking

1 about this project, Tamiami Trail, and CERP
2 planners are not dealing at all with Tamiami Trail.
3 MS. MARLIN: Well, okay. We'll need to look
4 into that.
5 MR. WALSH: That's from a scientific basis,
6 and with the recovery teams, the talk is that you
7 guys -- There's an assumption made that you guys
8 are going to do all of this and that that money
9 will never come out of CERP to do anything later,
10 so if the problem is on their end, then somebody
11 from modified water needs to clear it up over there
12 because that's the kind of question that we're
13 getting from outside agencies.
14 MR. BURCH: We'll make sure that we
15 coordinate that and confirm that.
16 MS. MARLIN: I'd like to thank everyone for
17 attending. Please make sure that we have your name
18 and address on the cards, especially if you would
19 like to be a recipient for future meeting
20 notifications and for any draft documents that we
21 put out for public comment as well as future
22 meetings, and I would like to especially thank the
23 Bass Pro Shop for hosting our meeting tonight.
24 MS. TRULOCK: I just need to put this on the
25 record: Mary Munson provided testimony on behalf

1 of the National Parks Conservation Association and
2 on their position, just on alternative 5 as the
3 preferred alternative, and Anthony Hodge provided
4 us with an excerpt from Bass Times talking about
5 control over the Corps and how they developed and
6 implemented an environmental project.
7 (Thereupon, the hearing was concluded at 9:50
8 p.m.)

SIGNATURE PAGE

I, JANET MARIE WILLITZ, RPR, state that I was authorized and did stenographically report the foregoing proceedings and that this transcript is a true record of the proceedings, which were within my range of hearing, due to the acoustical circumstances at the location of the hearing.

I further state that I am not a relative, employee, attorney, or counsel for any of the parties nor am I a relative or employee of any of the parties' attorney or counsel connected with the action, nor am I financially interested in the action.

Dated this 16th day of February, 2001.

_____

JANET MARIE WILLITZ, RPR

US Army Corps
of Engineers
Jacksonville District

Public Workshop
Tamiami Trail Modifications

Request for Public Input on Performance Measures for Alternative Selection

6 February 2001

Agenda

- Background
- What alternatives are being considered for Tamiami Trail?
- Input on Performance Measures (evaluation criteria) for each alternative.
- What are the potential impacts to recreational activities along Tamiami Trail?
- Gather mailing list for GRR/SEIS (feasibility study document) mailout.

Background

- What is Modified Water Deliveries (MWD)?
  - Everglades National Park Protection and Expansion Act 1989
  - Modified Water Deliveries General Design Memorandum 1992
  - Modified Water Deliveries currently divided into three parts:
    - 8.5 SMA — Flood Mitigation 8.5 SMA
    - Conveyance and Seepage — Structural and Operational
    - Tamiami Trail Modifications — Structural
  - Combined Structural and Operational Plan (CSOP) for MWD and C-111 (Scoping Meeting held 30 Jan 01)
- Why is Tamiami Trail being affected?

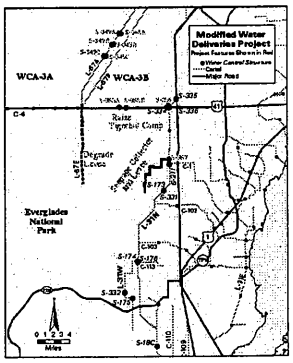
Modified Water Deliveries

ENP Protection and Expansion Act '89

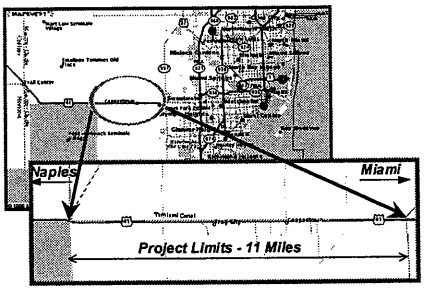
" Construct modifications to CS&F to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park."

MWD Project

- 8.5 SMA
- Conveyance and Seepage Control Features
- Tamiami Trail Modifications



Tamiami Trail Modifications Project Location



Why is Tamiami Trail Being Affected?

- Water must pass through Tamiami Trail in order to move water South into the Northeast Shark River Slough (NESRS) of Everglades National Park.

What alternatives are being considered for Tamiami Trail?

Alt 1 Existing roadway alignment and profile with 4 new bridges.

Alt 2 Existing roadway alignment with raised profile and 4 new bridges.

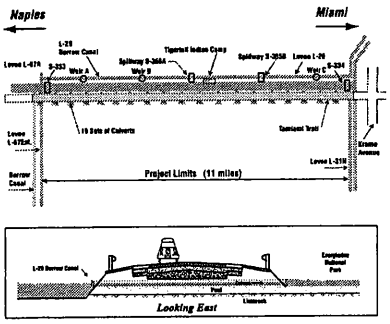
Alt 3 New roadway to the North with 8 new bridges.

Alt 4 New roadway to the South with 4 new bridges.

Alt 5 Entire roadway elevated on a continuous bridge.

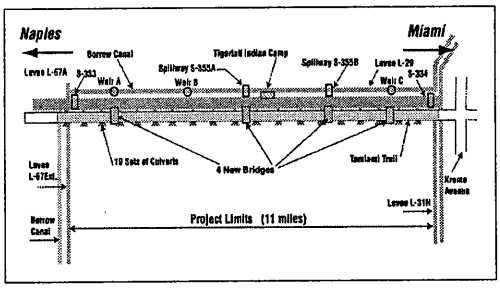
Other Potential Alternatives:
Variations providing water quality treatment.
Adjusting bridge openings and locations.
Providing expanded culvert openings.

Existing Tamiami Trail



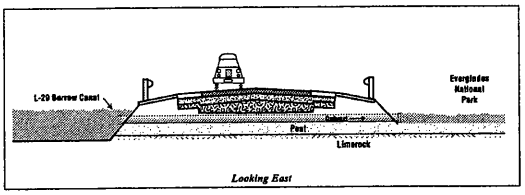
Alternative 1 - Schematic

(Existing Roadway with 4 New Bridges)



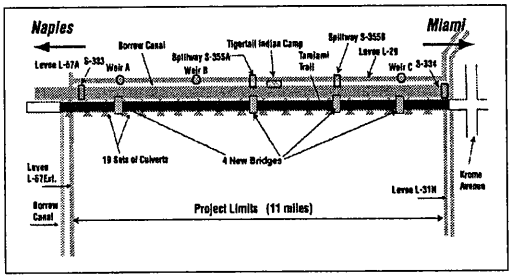
Alternative 1 - Profile

(Existing Roadway with 4 New Bridges)



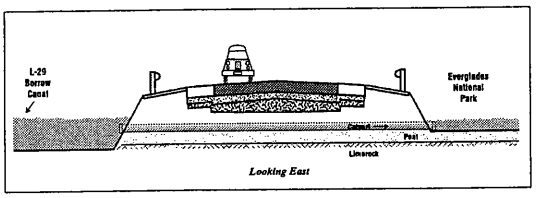
Alternative 2 - Schematic

(Existing Roadway with Raised Profile and 4 New Bridges)



Alternative 2 - Profile

(Existing Roadway with Raised Profile and 4 New Bridges)



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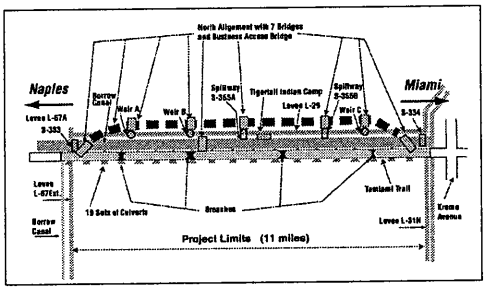
Alternative 3 - Schematic

(New Roadway to the North with 8 New Bridges)



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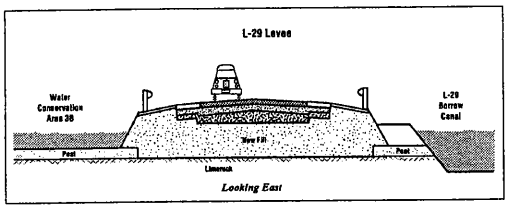
Alternative 3 - Profile

(New Roadway to the North with 8 New Bridges)



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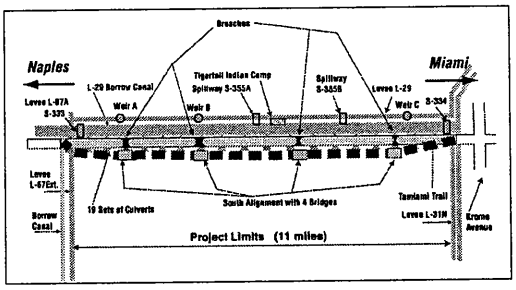
Alternative 4 - Schematic

(New Roadway to the South with 4 New Bridges)



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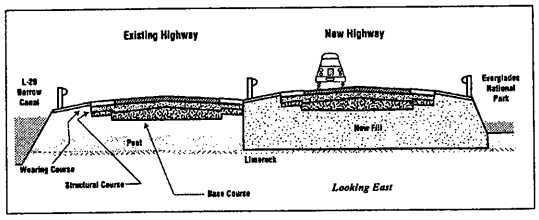
Alternative 4 - Profile

(New Roadway to the South with 4 New Bridges)



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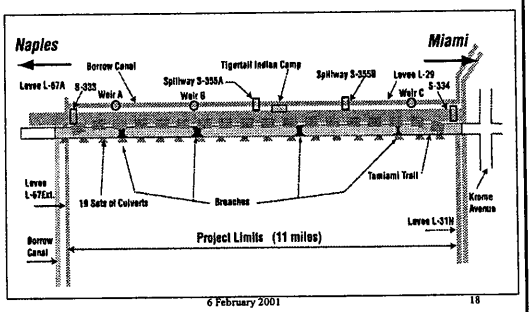
Alternative 5 - Schematic

(New Alignment on Structure)



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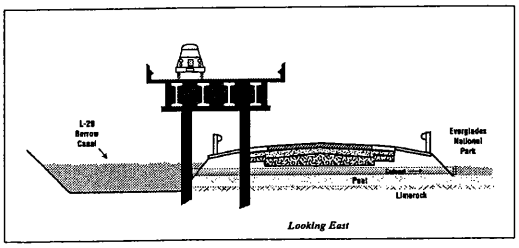
Alternative 5 - Profile
(New Alignment on Structure)



Input on Performance Measures (Evaluation Criteria)

- Plan Formulation is…the process of building plans that meet planning objectives and avoid constraints.
- Plan Formulation requires the views of stakeholders and others in agencies/groups outside the Corps to contribute to the process with different perspectives.
- The Plan Formulation process capitalizes on imagination and creativity.

Project Requirements (Draft)
A requirement MUST be accomplished in order for an alternative to be considered viable. Requirements are MANDATORY.

- Provide for conveyance capacity across Tamiami Trail consistent with restoration objectives.
- Meet all Federal Highway Administration and FDOT requirements.
- Maintain consistency with the Florida Coastal Zone Management Program. (Protection of State Listed Threatened and Endangered Species)
- Meet Miami-Dade County Department of Environmental Resources Management (DERM) water quality criteria.
- Meet all requirements of the Endangered Species Act of 1973
- Ensure no impacts to currently authorized flood control.
- Maximize consistency with other MWD components.

Project Objectives (Draft)
Project objectives set the basis for determining if an alternative can meet the project goal. Objectives are used to measure the performance of each alternative.

- **Objective 1 Consider cost effectiveness**
- **Objective 2 Maximize Capability for Future CERP Actions**
- **Objective 3 Minimize Impacts Associated with Construction**
- **Objective 4 Minimize Adverse Socioeconomic Impacts**
- **Objective 5 Restore and Enhance ecological Function**
- **Objective 6 Minimize Impacts to Recreation Facilities**
- **Objective 7 Minimize Permanent/Temporary Loss of Wetlands**
- **Objective 8 Minimize Impacts to the L-29 Canal**

Objective 6 Minimize Impacts to Recreation Facilities

- **PM1. Maintenance of Access for Visitor Use (Quantitative - # of access points)**
- **PM2. Promotion of Recreational Benefits (Qualitative)**
- **PM3. Effect of Project Features on Recreational Access (Qualitative)**
- **PM4. Duration of Temporary Access Impacts (Quantitative - length of time of impact)**
- **PM5. Avoid Permanent Access Impacts (Qualitative)**
- **PM6. Avoid Loss of Fishing Access (Quantitative - # of access points)**
- **PM7. Maintenance of Existing Canal (Qualitative)**
- **PM8. Maintenance of Accessibility to Francis S. Taylor Wildlife Management Area (WCA-3B) (Qualitative)**

Other Objectives/Performance Measures of Interest

- **Objective 2 Maximize Capability for Future CERP Actions**
  - **PM5. Non-Degradable Linear Footage of Levees and Canals Due to Project Requirements.** The length of levees and canals that would be retained under each alternative is compared. The unit of measurement is linear feet.
- **Objective 3 Minimize Impacts Associated with Construction**
  - **PM3. Impacts of Construction Duration on the Miccosukee Tribe and Businesses.** The alternatives are qualitatively assessed to determine the effects of the duration of construction of the Tigertail and Osceola camps and on businesses in the vicinity of the project area.
  - **PM5. Allowances for Turbidity Control.** This performance measure qualitatively compares the ability of each alternative to install a means to control turbidity in runoff from construction areas.

Other Objectives/Performance Measures of Interest

- **Objective 4** **Minimize Adverse Socioeconomic Impacts**
  - **PM1.** **Minimize impacts to existing businesses located along Tamiami Trail.**
  - **PM2.** **Minimize impacts to Tigertail and Osceola Camps.**

- **Objective 8** **Minimize Impacts to the L-29 Canal**
  - **PM2.** **Effects on Fish and Wildlife.** Effects of each alternative on fish and wildlife resources of the L-29 Canal are expressed qualitatively.

Mailing List for Future Meetings and Publications

- On the Attendance Card (white card) that you received, please fill out your complete name and address so that we can compile an accurate mailing list to ensure proper notification.

- Please indicate if you would like to receive a copy of future publications (tan card).

Additional Comments

- Mail additional comments to:

  US Army Corps of Engineers
  Jacksonville District
  Planning Division, Flood Control and Flood Plain Mgmt. Section
  Attn: Shelley Trulock
  400 West Bay Street
  Jacksonville, Fl 32202

- Please provide comments by 20 Feb 2001.

Additional Information on Objectives and Performance Measures

Project Objectives (Draft)

- **Objective 1** **Consider cost effectiveness**
  - **PM1.** **Construction Cost.** The total cost of constructing each alternative is compared quantitatively in dollars.
  - **PM2** **Annual Routine Maintenance Cost.** This assessment is made to compare annual maintenance costs after construction has been completed. The unit of comparison is dollars.
  - **PM3.** **Recurring Costs.** This is a comparison of recurring costs for highway resurfacing and upkeep of traffic control appurtenances (guardrails, signage, etc). The unit of comparison is dollars.
  - **PM4.** **Life Cycle Costs.** This is a comparative measure of the total cost of each alternative over the life of the project, including initial investment, maintenance and repair, and operations. The unit of comparison is dollars.

Project Objectives - Continued

- **Objective 2 Maximize Capability for Future Comprehensive Everglades Restoration Program (CERP) Actions**
  - **PM1. CERP Compatibility (Flexibility for Increased Flows, Stages, and Capacity).** This qualitative performance measure compares the potential for alternatives to allow implementation of hydrological restoration actions associated with CERP.
  - **PM2. CERP Compatibility (Addition of Features to Improve Sheet Flow).** This is a qualitative comparison of the potential for the ease of adding features that would promote sheet flow.
  - **PM3. CERP Compatibility (Addition of Features to Improve Decompartmentalization).** This qualitative assessment is to determine the ability of the alternative to comply with the CERP objective of reducing various compartments or management areas within the WCA's and Everglades.

Project Objectives - Continued

- **Objective 2 Maximize Capability for Future CERP Actions**
  - **PM4. CERP Compatibility (Ecological Connectivity).** This is a qualitative measure of the compatibility of the various alternatives with CERP proposals to remove barriers isolating biological populations.
  - * **PM5. Non-Degradable Linear Footage of Levees and Canals Due to Project Requirements.** The length of levees and canals that would be retained under each alternative is compared. The unit of measurement is linear feet.
  - **PM6. Extent of Retrofit Needed.** This is a qualitative measure of the amount of retrofit required for each alternative with the implementation of CERP.

Project Objectives - Continued

- **Objective 3 Minimize Impacts Associated with Construction**
  - **PM1. Ability to Meet Implementation Schedule.** This is a qualitative comparison of the ability of each alternative to meet the Federal schedule for implementing the MWD program and comply with flow schedule for the Cape Sable seaside sparrow.
  - **PM2. Construction Duration and Implementation Time.** This is a qualitative comparison of the construction and implementation time of each alternative.
  - * **PM3. Impacts of Construction Duration on the Miccosukee Tribe and Businesses.** The alternatives are qualitatively assessed to determine the effects of the duration of construction of the Tigertail and Osceola camps and on businesses in the vicinity of the project area.
  - **PM4. Duration of Construction.**

Project Objectives - Continued

- **Objective 3 Minimize Impacts Associated with Construction**
  - * **PM5. Allowances for Turbidity Control.** This performance measure qualitatively compares the ability of each alternative to install a means to control turbidity in runoff from construction areas.
  - **PM6. Favorable Effects to Wildlife.** With respect to construction, this performance measure qualitatively evaluates each alternative for beneficial effects to wildlife.
  - **PM7. Phasing of Construction to Avoid Impacts to Wood Storks during Nesting Season.** This is a qualitative assessment of the ability of each alternative to allow the phasing of construction to minimize disturbances to nesting wood storks.
  - **PM8. Allowances for Maintaining Adequate Distances from the Road Construction to the Wood Stork Primary Zone.** Alternatives are qualitatively compared to assess their ability to maintain acceptable distances from areas of road construction.

Project Objectives - Continued

- **Objective 3 Minimize Impacts Associated with Construction**
  - **PM9. Allowances for Maintaining Adequate Distances from Road Construction to the Wood Stork Secondary Zone.** Alternatives are qualitatively compared to assess their ability to maintain acceptable distances from wood stork secondary zones during road construction.
  - **PM10. Allowances for Maintaining Adequate Distances from Road Construction to Snail Kite Nesting Locations.** Alternatives are qualitatively compared to assess their ability to maintain acceptable distances from snail kite secondary zones during road construction.
  - **PM11. Minimization of Coincident Days of Construction Interference with Nesting and Fledging of Wood Storks and Snail Kites.**

Project Objectives - Continued

- **Objective 4 Minimize Adverse Socioeconomic Impacts**
  - * **PM1. Minimize impacts to existing businesses located along Tamiami Trail.**
  - * **PM2. Minimize impacts to Tigertail and Osceola Camps.**

Project Objectives - Continued

- **Objective 5 Restore and Enhance Ecological Function**
  - **PM1. Wetland Functional Units.** Wetland functional units gained/lost associated with each alternative are quantified using the Wetland Rapid Assessment Procedure methodology.
  - **PM2. Linear Footage of North-South Connectivity.** The length of connectivity between WCA-3B and ENP is measured for each alternative and compared. The unit of measurement is linear feet.
  - **PM3. Linear Footage of Animal Crossings.** The length of potential animal crossings along the Tamiami Trail is measured for each alternative. The unit of measurement is linear feet.

Project Objectives - Continued

- **Objective 5 Restore and Enhance ecological Function**
  - **PM4. Acres of Exotic Vegetation Removed**
  - **PM5. Hydrologic Restoration of NESRS Function.** This is a quantitative measurement of the ability of each alternative to provide sufficient water conveyance to meet the requirements for hydrologic restoration of NESRS. Units are depths of water in feet.

Project Objectives - Continued

- **Objective 6 Minimize Impacts to Recreation Facilities**
  - **PM1. Maintenance of Access for Visitor Use**
  - **PM2. Promotion of Recreational Benefits**
  - **PM3. Effect of Project Features on Recreational Access**
  - **PM4. Duration of Temporary Access Impacts**
  - **PM5. Avoid Permanent Access Impacts**

Project Objectives - Continued

- **Objective 6 Minimize Impacts to Recreation Facilities**
  - **PM6. Avoid Loss of Fishing Access**
  - **PM7. Maintenance of Existing Canal**
  - **PM8. Maintenance of Accessibility to Francis S. Taylor Wildlife Management Area (WCA-3B)**

Project Objectives - Continued

- **Objective 7 Minimize Permanent/Temporary Loss of Wetlands**
  - **PM1. Permanent Loss of Wetland Acreage.** This is a quantification of permanent wetland impacts for each alternative by habitat type. The unit of measurement for which this information is expressed as acreage, and is used to compare impacts associated with each alternative.
  - **PM2. Temporary Loss of Wetland Acreage During Construction.** This is a quantification of temporary wetland impacts for each alternative by habitat type. The unit of measurement for this information is acreage and is be used to compare impacts associated with each alternative.
  - **PM3. Quality of Wetland Acreage Impacted.** Wetland functional units are quantified for each alternative using the Wetland Rapid Assessment Procedure methodology to determine the quality of wetland acreage impacted for each alternative.

Project Objectives - Continued

- **Objective 7 Minimize Permanent/Temporary Loss of Wetlands**
  - **PM4. Wetland Acreage Restored.** This involves a quantitative measurement of acreage to be restored associated with each alternative. Wetland restoration evaluated includes those areas proposed for restoration in conjunction with this project only (i.e. degradation of existing Tamiami Trail and associated restoration), and will not include restoration of existing business sites as it is assumed that these sites could be restored regardless of the alternative selected.
  - **PM5. Removal of Exotic Species**

Project Objectives - Continued

- **Objective 8** **Minimize Impacts to the L-29 Canal**
  - **PM1.** **Capacity.** This performance measure qualitatively compares the effects the alternatives on the capacity of the L-29 Canal to convey required volumes of water for compliance with flood control and water supply requirements.
  - * **PM2.** **Effects on Fish and Wildlife.** Effects of each alternative on fish and wildlife resources of the L-29 Canal are expressed qualitatively.

Appendix N

PUBLIC COMMENTS REGARDING THE DRAFT SEIS AND RESPONSES

Information will be provided in final document.