2.0 HISTORY OF 2005 RGRR RECOMMENDED PLAN COSTS

2.1 Selected Plan from 2005 Revised General Reevaluation Report

The selected plan from the 2005 RGRR is Alternative 14, a plan with a total of three miles of openings in the Tamiami Trail to improve the quantity and distribution of flows from the WCAs to Shark River Slough and ENP. More specifically, the 2005 selected plan for Tamiami Trail consists of installing a two-mile and a one-mile bridge and raising the remaining roadway surface to avoid damage resulting from the required higher water levels (up to 9.7 feet NGVD) in the L-29 Canal. The two-mile bridge would be located near the western end of the 10.7 mile project area of Tamiami Trail, and the one-mile bridge would be located near the eastern end (***Figure 2-1***). The bridges would be located at points where the road was constructed through the historically deepest sloughs to provide the necessary conveyance of water south from WCA-3B into the NESRS section of ENP. The bridges would be constructed immediately south of the existing road (***Figure 2-2***). The existing road adjacent to the new bridges would be removed. The remaining eight miles of roadway would be raised by about two feet to avoid damage to the granular base due to higher stages in the L-29 Canal (***Figure 2-3***). It would also be widened to support the increased elevation. The bridges would reduce the number of existing culverts sets from 19 (55 individual culverts) to 14 (40 individual culverts). The remaining culverts would require lengthening to extend beyond the widened roadway (***Figure 2-3***).

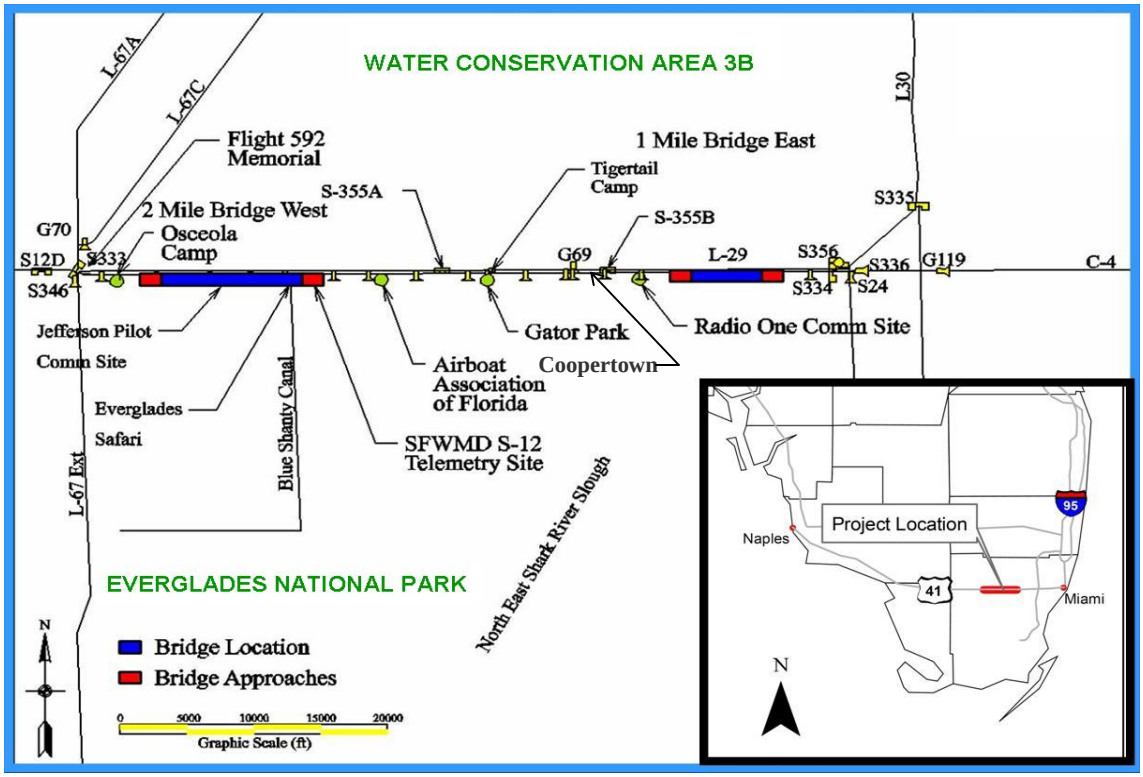

FIGURE 2-1: THE 2005 RGRR RECOMMENDED PLAN, ALTERNATIVE 14, STAGE CONSTRAINT = 9.7 FEET

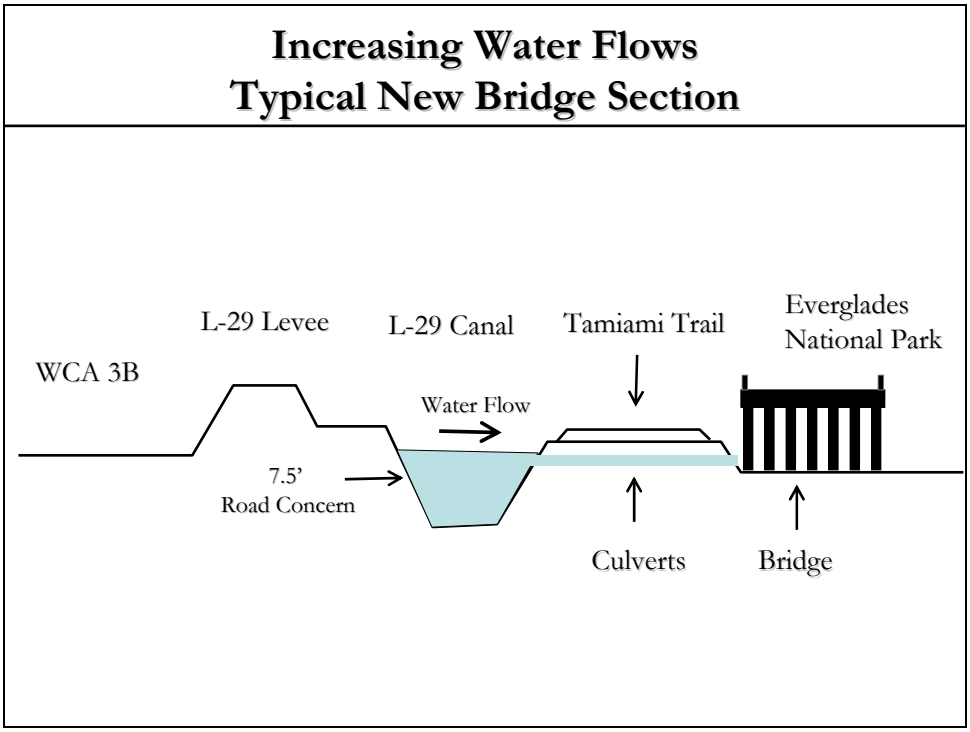

FIGURE 2-2: ALIGNMENT OF BRIDGES IN THE 2005 RGRR RECOMMENDED PLAN
(Compared to the existing Tamiami Trail and the L-29 Canal)

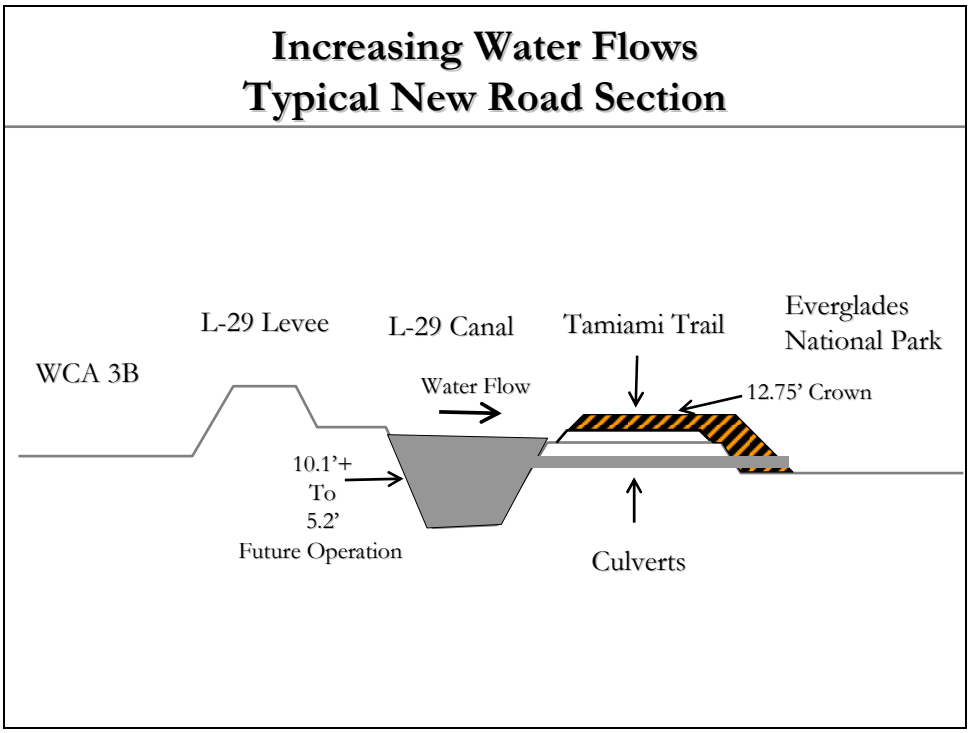

FIGURE 2-3: NEW ROAD SECTION FOR THE 2005 RGRR RECOMMENDED PLAN
(Showing the increased height above and width beyond the existing Tamiami Trail and the lengthened culverts)

2.2 Cost Update Purpose

Project cost estimates consist of several individual cost components. These components are often expressed as some percentage of the cost to construct the project. The components include:

- Construction Costs
- Non-Construction Costs including:
  - Real Estate
  - Pre-construction Engineering and Design (PED)
  - Supervision and Administration (S&A)
  - Escalation
  - Contingency

In the planning stages of a project, a variety of alternatives are developed as potential solutions to the problems and opportunities for the project. In alternative selection, the cost of an alternative is an important factor that plays a significant role in the selection of an alternative. When developing project alternatives, often only limited engineering design and details are available, resulting in preliminary project cost estimates with high uncertainty and large contingency costs. Once an alternative is selected and proceeds through engineering and design, additional data are collected (e.g., survey, geotechnical). These usually result in reduced uncertainty and reduced contingency costs.

The purpose of the cost update is to reexamine the 2005 selected plan presented in the 2005 RGRR, update the project costs to current cost levels and include new project costs associated with real estate and risk. The following sections will discuss the cost increases associated with the 2005 RGRR selected plan and provide an explanation for the discrepancy in costs between the 2005 cost estimate and the cost estimate in this report for same plan.

2.2.1 Cost Development of 2005 Revised General Reevaluation Report Recommended Alternative

During the development of the RGRR, both the design and the cost estimate were coordinated closely with FDOT. For the cost estimate in particular, price quotes and USACE developed unit prices were validated against the historic bid prices maintained by FDOT. In addition, both FDOT and Federal Highway Administration (FHWA) reviewed the engineering design and the construction cost estimate presented in the RGRR and established that the work performed by USACE was technically adequate and in-line with FDOT and FHWA experiences.

To illustrate the parity between the USACE estimate and FDOT pricing, nine items were selected that represent 50 percent of the total RGRR estimate. As

shown below, the unit prices developed during the RGRR are comparable to FDOT unit prices from 2004 and 2005 as shown in ***Table 2-1*** (note that only partial data was available from FDOT for 2005 when the RGRR estimate was developed):

TABLE 2-1: FDOT UNIT PRICES FOR 2004 AND 2005

		GRR/SEIS Unit Price (July 2005)	2004 FDOT Unit Price	2005 FDOT Unit Price
Reinforced Concrete	CY	$984	$850	$1,085
24" Prestressed Concrete Piling	VLF	$121	$78	$62
24" Prestressed Concrete Test Piles	VLF	$456	$160	$200
Prestressed Concrete Beams-72" Florida Bulb T-Beams	LF	$258	$106	$233
Prestressed Concrete Beams-Type IV AASHTO Beams	LF	n/a	n/a	n/a
Paving-Asphaltic Concrete	TON	$104	$73	$82
Paving-Asphaltic Concrete-Friction Course	TON	$128	$83	$104
Barrier Wall	LF	$130	$115	$183
Embankment Fill	CY	$15	$15	$28
Drainage System	LF	$285	No direct comparison available	

CY-cubic yard; VLF-vertical linear foot; LF-linear foot; TON-ton

Much of the cost growth occurred in late 2005 and 2006 and has been experienced by other agencies such as FDOT, SFWMD, etc. In fact, if the cost of the 2005 RGRR recommended plan is estimated using the FDOT historic unit price data available in the summer of 2005, the estimated construction cost is approximately $110 million (compared to the USACE RGRR construction estimate of $125.1 million). One year later, the cost of the exact same RGRR plan increased by approximately 80% using the FDOT historic unit price data available in the summer of 2006. These numbers are intended to illustrate the magnitude of the construction cost increases that were occurring in the construction market during late 2005 and early 2006.

2.2.2 Present Day Cost for 2005 Revised General Reevaluation Report Recommended Alternative

Since the original cost estimate for the 2005 RGRR selected plan, costs of construction labor, equipment and material have significantly increased. ***Figure 2-4*** illustrates the dramatic surge in construction costs beginning in late 2003 and early 2004.

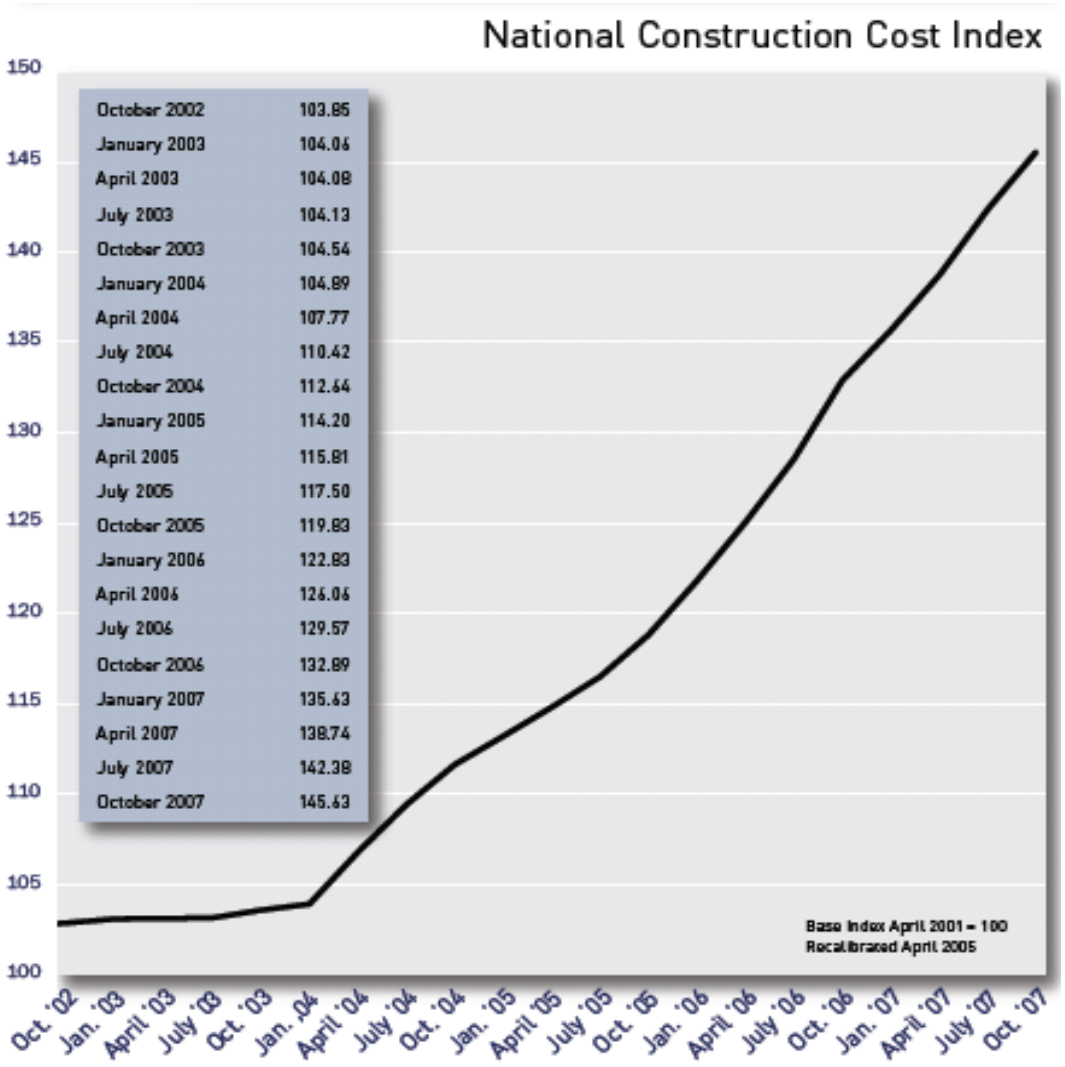

FIGURE 2-4: CHANGE IN THE NATIONAL CONSTRUCTION COST INDEX FROM 2002–2007

(Source: Quarterly Construction Cost Report, 2007 Fourth Quarter Issue -Rider Levett Bucknall)

These changes can largely be attributed to extraordinary economic developments that have occurred globally, regionally, and locally (refer to Appendix C: Cost Estimates for and in-depth analysis of these global, regional, and local economic developments and how they have played an important role in increasing the costs of labor, equipment, and materials). These developments have caused unprecedented increases in the cost of construction materials, equipment, and labor. It is critical to understand that these economic developments would affect construction costs estimates for all of the alternative plans evaluated during the RGRR study or, for that matter, on all alternative plans formulated since. ***Table 2-2*** displays the cost changes for the 2005 RGRR selected plan that have

occurred over the last two years as a result of economic developments and cost increases in labor equipment, and material.

TABLE 2-2: SIGNIFICANT CHANGES IN CONSTRUCTION COST ESTIMATE OF 2005 RGRR RECOMMENDED ALTERNATIVE
(Over a Two Year Period of Time)

Estimate	Date of Estimate	Price Level of Estimate	Construction Cost With Contingency
RGRR	August 2005	FY05	$125.1 Million
30 Percent Design	March 2007	FY07	$277.1 Million
DOI Independent Report	March 2007	FY07	$254.3 Million

The overall effect of these economic developments on cost increases to this project are much more evident than for most USACE projects since more than 65 percent of the project costs for the 2005 RGRR selected plan are for construction materials needed for the project. Construction labor, equipment and materials generally make up only one-third of the total project cost expenses for USACE Civil Works projects. Between the completion of the RGRR study and the 30 percent design for same plan, construction materials price increases have added approximately $60 million dollars to the construction cost. Except for some increases in asphalt and embankment quantities resulting from more accurate survey and geotechnical data obtained during the past two years, the design parameters of the project have not changed.

2.2.3 Cost Increases in the Current Working Estimate

As the design of the Tamiami Trail project has developed, the current working estimate (CWE) has also been updated and revised to reflect current pricing and refined design assumptions. It is important to note that there has not been any significant scope growth or quantity "busts" as the design has progressed except for the increases in asphalt and embankment quantities. For these elements, the design parameters have not changed, but much more accurate survey data has been obtained during 2007. For the RGRR, these quantities were calculated from as-built drawings and a small number of cross-sections taken over the entire 10.7-mile project area. For the current design, these quantities are based on a full survey and digital terrain model of the roadway.

One other change in quantity resulted from a Bridge Optimization Study, which is a standard FDOT cost-effectiveness analysis. As a result of this analysis, it was found that it was less expensive to use shorter Type IV AASHTO beams with more bents than the longer Florida Bulb T-Beams with fewer bents presented in the RGRR. While this design requires more bents and

subsequently, more piles, the overall cost for the bridge system (beams, bents, and piles) is less.

The CWE was developed based on material quotes received from manufacturers, conversations with FDOT and construction contractors regarding construction methods and equipment, and estimates of labor costs based on the very competitive construction environment in south Florida. As the CWE has developed, pricing data has continually been referenced to and validated against FDOT experience. According to FDOT engineers, bids for many of their projects are coming in approximately 40 percent more than their estimates which are based on their adjusted unit prices. Many of the current unit prices are in rough alignment with FDOT experience as shown in ***Table 2-3***:

TABLE 2-3: COMPARISON OF CURRENT WORKING ESTIMATE UNIT PRICES TO 2006 FDOT UNIT PRICES

		30% CWE Unit Price (Oct 2006)	2006 FDOT Unit Price
Reinforced Concrete	CY	$1,172	$1,241
24" Prestressed Concrete Piling	VLF	$220	$280
24" Prestressed Concrete Test Piles	VLF	$655	$670
Prestressed Concrete Beams-72" Florida Bulb T-Beams	LF	n/a	n/a
Prestressed Concrete Beams-Type IV AASHTO Beams	LF	$434	$283
Paving - Asphaltic Concrete	TON	$145	$96
Paving-Asphaltic Concrete-Friction Course	TON	$152	$130
Barrier Wall	LF	$340	$165
Embankment Fill	CY	$50	$17
Drainage System	LF	$753	No Direct Comparison

CY-cubic yard; LF-linear foot; VLF-vertical linear foot; TON-ton

CWE unit prices are based on estimates of the labor, equipment, and materials needed to construct the work. For example, the CWE unit price for Type IV AASHTO beams is based on actual quotes for beams and construction equipment needed to place them. The FDOT unit price is based on historic data from early in 2006. When recent FDOT experience is considered, these prices are more closely aligned. Again, it is important to note that FDOT unit prices are used as a validation of the developed unit price in the CWE and not as the basis for the CWE.

The price increases and quantity changes discussed above account for over $60 million of cost growth. Other significant cost increases include:

- Maintenance of Traffic (MOT): Based on the new survey information and more detailed design information, the MOT costs have increased by approximately $6 million.
- Mobilization: Based on new survey information and the loss of a planned staging area identified in the RGRR, mobilization costs have increased by approximately $7 million.
- Escalation through Construction: The RGRR MCACES construction cost estimate did not include escalation of construction costs based on the construction schedule. This is standard USACE procedure for planning reports since escalation is programmed elsewhere. However, as projects approach bid, this cost must be incorporated into the independent government estimate (IGE) since it is a legitimate cost to the contractor. The CWE contains approximately $10 million for this cost.

This summary illustrates the magnitude of and reasons for much of cost growth seen in the 30 percent CWE. However, it should not be taken as a comprehensive cost analysis for the entire project. In addition, there are several conservative assumptions included in this estimate that need to be refined as the project design progresses.

2.2.4 Cost Verification

The costs for labor, equipment and material used in estimating the 2005 RGRR selected plan cost estimate were based on FDOT unit pricing. Since the project is similar to standard FDOT work, the use of FDOT unit pricing was considered reasonable and prudent. These unit prices were independently verified by USACE to ensure accuracy and were validated against the historic bid prices maintained by FDOT. Both FDOT and FHWA reviewed the RGRR preliminary design and the construction cost estimate and found the work technically adequate and in-line with their experiences. For the 30 percent and 60 percent design estimates, costs were based on actual construction material price quotes received from manufacturers, conversations with FDOT and construction contractors regarding construction methods and equipment, and estimates of labor costs based on the very competitive construction environment in south Florida.

The USACE Cost Engineering Center of Expertise (Walla Walla District) conducted an Independent Technical Review (ITR) of the 30 percent design cost estimate in December 2006. The ITR team's overall conclusion was that the estimate accurately captured anticipated construction costs given the design and market conditions. Additionally, a DOI contractor also conducted an independent construction cost estimate based on the 30 percent design completed by the USACE. A technical analysis of the DOI cost estimate found several differences in scope and engineering assumptions.

While different design assumptions were made in developing the 2005 RGRR cost estimate and the 30 percent design cost estimate (i.e., better survey data, current pricing data, optimized bridge design), no errors or omissions have been found. The increased costs between the 2005 RGRR cost estimate and the 30 percent cost estimate can be largely attributed to the result of extraordinary unforeseen market conditions resulting in increasing labor equipment, and material costs that would affect any other construction alternative similarly.

2.3 New Costs: Real Estate and Risk and Uncertainty

2.3.1 Real Estate/Private Property

There are two separate types of private property impacts that would occur with the Tamiami Trail modifications–construction and operations (additional flows). Under the RGRR selected plan, both of these impacts occur to seven separate private properties adjacent to Tamiami Trail, six within the Everglades expansion area and one located outside of the Everglades boundary line. Current owners of these parcels are identified below:

Within ENP Expansion Area:

- Florida Power and Light
- Radio One
- Coopertown
- Gator Park
- Everglades Safari
- Lincoln Financial Media (formerly Jefferson Pilot Communication Site)

Outside ENP Expansion Area

- Airboat Association of Florida

Funding and responsibility for the six properties within the ENP expansion area acquisitions are strictly borne by the ENP, hence the costs for those acquisitions are not included in this report. Under the Expansion Act, these properties were included within the ENP boundary map that was established by Congress; therefore, DOI is clearly responsible for acquisition of those properties. The Real Estate Appendix describes the estates needed on these properties as a result of increased water elevations. The Airboat Association of Florida property was explicitly excluded from acquisition under the Expansion Act. The new real estate costs represent the estimated cost of a flowage easement for the Airboat Association of Florida property for all alternatives that increase the stage constraint in the L-29 Canal. Alternatives which maintain the existing stage constraint of 7.5 feet NGVD do not require this easement.

The RGRR addressed USACE's need to acquire a real estate interest in portions of the private properties that would lie within the construction footprint of the

reconstructed road and bridges and the disposition of the utilities within the road right-of-way. However, it did not address induced flooding impacts that would result from the operations of the MWD project. The RGRR assumed that the NPS would acquire the necessary real estate interests in these private parcels of land adjacent to the south side of Tamiami Trail before the completion of construction of the Tamiami Trail project and before initiation of ecosystem restoration water flows directed south into ENP under the combined structural and operational plan (CSOP). However, because the NPS must complete its General Management Plan (GMP) before is can proceed with real estate acquisitions, it is unable to meet the schedule for Tamiami Trail construction. At the request of NPS, USACE proceeded with the work needed to complete the necessary acquisition for Tamiami Trail Modifications. This real estate cost was not previously part of the MWD budget and added over $44 million to the project budget.

Through the GMP, the DOI-NPS is evaluating, the appropriate use and disposition of parcels within the project area. The Airboat Association's ten-acre parcel located off of Tamiami Trail was exempt from the ENP boundary.

Since this particular parcel of land was exempt from full acquisition by DOI-NPS in the PL and it has been determined that a minimum of perpetual flowage and perpetual road easements are required over portions of this property for construction, operation and maintenance of this project, USACE would acquire the needed real estate interests. As stated in the previous section on the cost of the RGRR selected plan, a real estate cost of $1,511,000 was the estimate in 2005 for the Airboat Association of Florida parcel. This cost estimate includes the acquisition costs and associated administrative costs on obtaining a fee value of the land.

2.3.2 Risk and Uncertainty

The cost estimates for the RGRR and the 30 percent design did not include risk and uncertainty analyses. Jacksonville District recognized the need to perform a risk based analysis on the 30 percent CWE; however at the time it was decided that it was more important to begin resolving the problem of significant cost growth revealed by the 30 percent CWE. The ITR team also identified several areas of risk and uncertainty that needed to be included in the risk analysis. Combined, these risk elements had the potential to drive the actual construction costs significantly higher.

2.4 Updated Cost of 2005 Plan

Therefore, based on the results of the 30% current working estimate, the Independent Technical Review by the USACE Cost Engineering Center of Expertise, and the independent estimate prepared by USDOI, the total project

cost for the 2005 RGRR recommended plan in Spring 2007 was approximately $429.7 million based on the following breakdown:

Estimated Construction Cost	$ 277.1 million
Additional Risk & Uncertainty	$ 100.0 million
Future PED	$ 1.5 million
EDC (2%)	$ 7.5 million
S&A (10%)	$ 37.7 million
Real Estate	$ 5.9 million
Total Project Cost	$ 429.7 million

The cost of the 2005 RGRR recommended plan, when escalated to the mid-point of construction, is roughly comparable to Alternative 4.2.3 of the LRR alternative array discussed in Section 4 of this report.