National Park Service

National Park Service
U.S. Department of the Interior

Value Analysis Study
July 10 – 11, 2018

National Park Service
Everglades National Park, Florida

Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements

Value Analysis Final Report

September 28, 2018

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Florida

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FORWARD

This report includes recommendations for Tamiami Phase II Roadway and Conveyance Improvements. They stem from a Value Analysis (VA) workshop initiated by the National Park Service. The VA workshop was held at the HDR Office located at 15450 New Barn Road, Miami, FL 33014, July 10 – 11, 2018.

Coordination of this VA was done by Daniel D. Ford, project manager, HDR. Stephen Kirk, a certified value specialist of Kirk Value Planners (Kirk Associates, LLC), led the team's deliberations during the workshop. The list of attendees is contained at the end of Section B.

Value Analysis Study
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SECTION A: EXECUTIVE SUMMARY

"He has the right to criticize who has the heart to help," A. Lincoln

Summary Description of Project:

Tamiami Trail is a 264-mile roadway (U.S. Highway 41/State Road 90) that was completed in 1928, to connect the growing cities of Tampa and Miami. Within the Everglades, the roadway embankment was constructed by excavating the underlying limestone, forming what is now the L-29 borrow canal. The excavated material was placed directly on top of the existing Everglades muck soil. Over time the muck has consolidated, which contributes to roadway instability problems. The eastern 10.7-miles of Tamiami Trail between the L-31N and L-67 Extension levees remained lower, limiting the ability to raise water levels and increase flows into Northeastern Shark River Slough.

The Tamiami Trail (U.S. Highway 41) has long been recognized as one of the primary barriers to flow of water through the ecosystem. The need to eliminate barriers to overland flow of water in the Everglades is considered one of the indisputable tenets of restoration. Much scientific information amassed in recent decades reinforces the importance of removing these barriers to water flow in order to restore natural marsh connectivity.

In November 2010, the National Park Service completed the Tamiami Trail Modifications: Next Steps Final Environmental Impact Statement; the Record of Decision was signed in early 2011. This report presented an environmental analysis of six alternatives: a no-action alternative, and five variations of additional bridging that could be constructed along the eastern roadway, while accommodating access to all of the adjacent developed areas (these include: two Miccosukee Indian camps, three commercial and one private airboat operations, and three radio/telemetry tower arrays). The environmentally preferred alternative (Alternative 6e) recommended the construction of up to 5.5-miles of additional bridging (in four potential locations), and complete reconstruction of the remaining roadway. The recommended roadway reconstruction would remove all of the unsuitable sub-base, and raise the top of the finished roadway elevation to approximately 13 feet (NGVD), to accommodate the future CERP projected design high water of 9.7 feet in the L-29 canal (see **Figures 1A and 1B**).

Figure 1A. The Modified Water Deliveries, Tamiami Trail modifications, with the 1-mile bridge (purple) and partial reconstruction of the roadway.

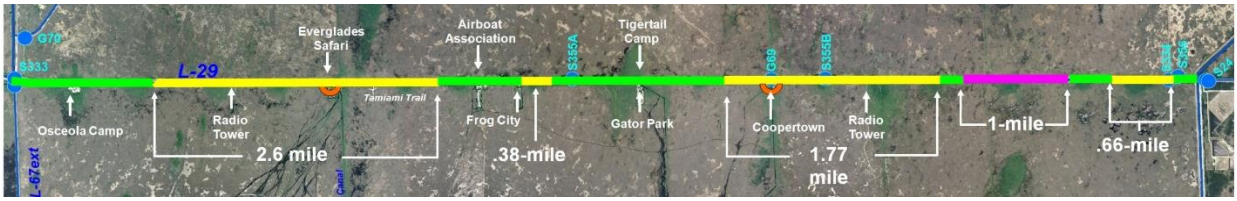

Figure 1B. Tamiami Trail Next Steps recommended plan (Alternative 6e), with up to 5.5-miles of additional bridging (yellow) and complete reconstruction of the remaining roadway.

In late 2013, Florida Governor Rick Scott pledged $90 million toward the project, with funding from the Florida Department of Transportation's (FDOT) budget. In early 2014 the National Park Service committed to funding 50% of the project total, up to $90M. A Memorandum of Agreement (MOA) was signed in early 2015 between the FDOT, the NPS, and the Federal Highway Administration (FHWA). FDOT awarded a construction contract for just over $97 million in June 2016. The original 2.6-mile western bridge was split into two bridge segments, and a within-corridor down ramp was substituted to improve access to Everglades Safari Park. The full Phase 1 project is on a fast track to be substantially complete by January 2019.

Planning for Tamiami Trail Next Steps Phase 2

No formal planning effort has been initiated for Phase 2. Once Phase 1 is complete, the remaining 6.5 miles of the eastern Tamiami Trail roadway will need to be bridged and/or reconstructed. NPS highest priority is to enhance the remaining roadway section to accommodate the 9.7 foot CERP design high water criteria without impacting roadway stability (see **Figure 2**) and to convey the required peak flow without excessive draw-down of the water surface elevation.

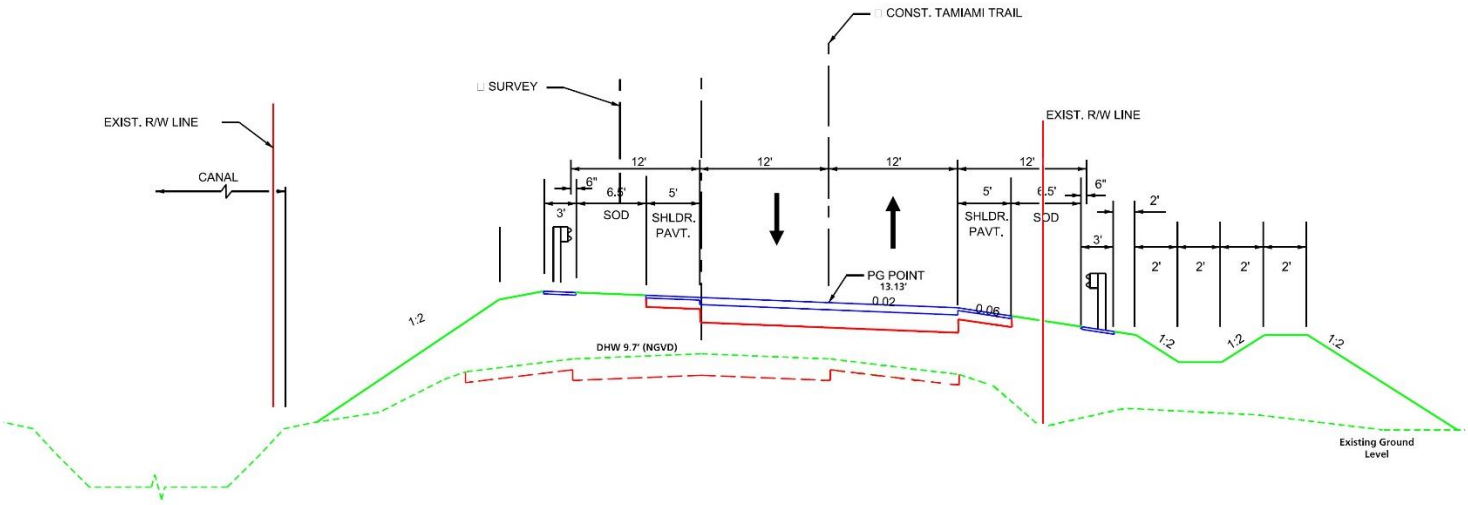

Figure 2. Typical cross-section of the reconstructed Tamiami Trail roadway looking east with the L-29 canal/left and ENP/right (Engineering Report, Appendix A, Tamiami Trail Next Steps Final EIS). The roadway will be raised several feet (with a crown elevation of just over 13 feet NGVD), and shifted to the south to maintain embankment stability.

The scope of the western 1.12 mile segment covers the roadway section from the western end of the Phase 1 construction, to a point where the new roadway can be tied into the higher elevated roadway located west of the L-67 Extension on top of the L-29 levee in western Shark River Slough.

Future bridge options evaluated in the FEIS include 0.38 mile, 0.66 mile and 1.77 mile bridges located with the remaining 6.5 miles to be reconstructed.

This value analysis study helped identify alternatives and developed recommendations for the programmatic needs for the Tamiami Phase II. The VA focused specifically on the options to reconstruct the 6.5 miles of Tamiami Trail and water conveyance options.

Project Budget

The net construction budget for the project has not yet been established.

Value Analysis Objectives

This VA workshop focused on:

- Selecting a preferred alternative using Choosing By Advantages (CBA) and Life Cycle Costing (LCC)
- Identifying impact of alternatives compared to original alternative 6E (advantages, costs)
- Modifications to FEIS Tables 2-11 & 2-13 based on preferred alternative to help inform compliance of EIS
- Constructability considerations
- Brainstorming ideas to add value to the project

- Identification of impacts to users of road
- Maintainability of structures
- Safety of operation
- Impact and accessibility to neighbors
- Reducing impacts to Tamiami Trail (as a cultural resource)
- Compatibility with regional water management operation
- Timely project schedule
- Meeting FDOT standards
- Environmental sensitivity during construction
- Maintenance of traffic (MOT) for visitors, community, tribes, private businesses

Alternatives Considered

The value analysis included a diverse range of possible alternatives. During the workshop, HDR and NPS presented three roadway alternatives.

During the brainstorming session many ideas were listed. During the reconsideration phase, further improvements were identified. Following is a summary:

Alternative:	**Description:**	**Status:**	**Initial Costs:**	**Life Cycle Costs:**
Alternative 1 (Bridging and raised roadway)	(FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile), Raise level of roadway	Evaluated in CBA	$175,000,000	$241,269,000
Alternative 2 (Raised roadway with expansion of culverted sections) **Preferred Alternative**	Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway	Evaluated in CBA	$97,201,000	$127,739,300
Alternative 3 (Raised roadway only)	Replace all existing culverts in kind and raise level of roadway.	Evaluated in CBA	$55,000,000	$85,538,000

Preferred Alternative for Exhibits (via CBA)

Alternative 2 was identified as the preferred alternative based on Choosing By Advantages (CBA) decision making approach. The advantages identified by CBA over the other Alternatives include the following:

- Better habitat improvement
- Much better marsh connectivity
- Significantly better improved water quality
- Much better limiting impact to cultural resources
- Significantly better improved public safety due to wider paved shoulder
- Much better/ more reliable for emergency evacuation
- Better maintainability
- Better due to saving 3 months of design time
- Much better minimizing constructability issues and risks
- Second lowest initial and life cycle cost

In addition to identifying advantages, the CBA process also included preparation of graphs to compare the importance of the advantages and costs. See **Figure 3**, which compares the "Importance to Initial Cost." It illustrates Alternative 2 has the highest importance of advantages (benefits) to initial cost compared to the other alternatives.

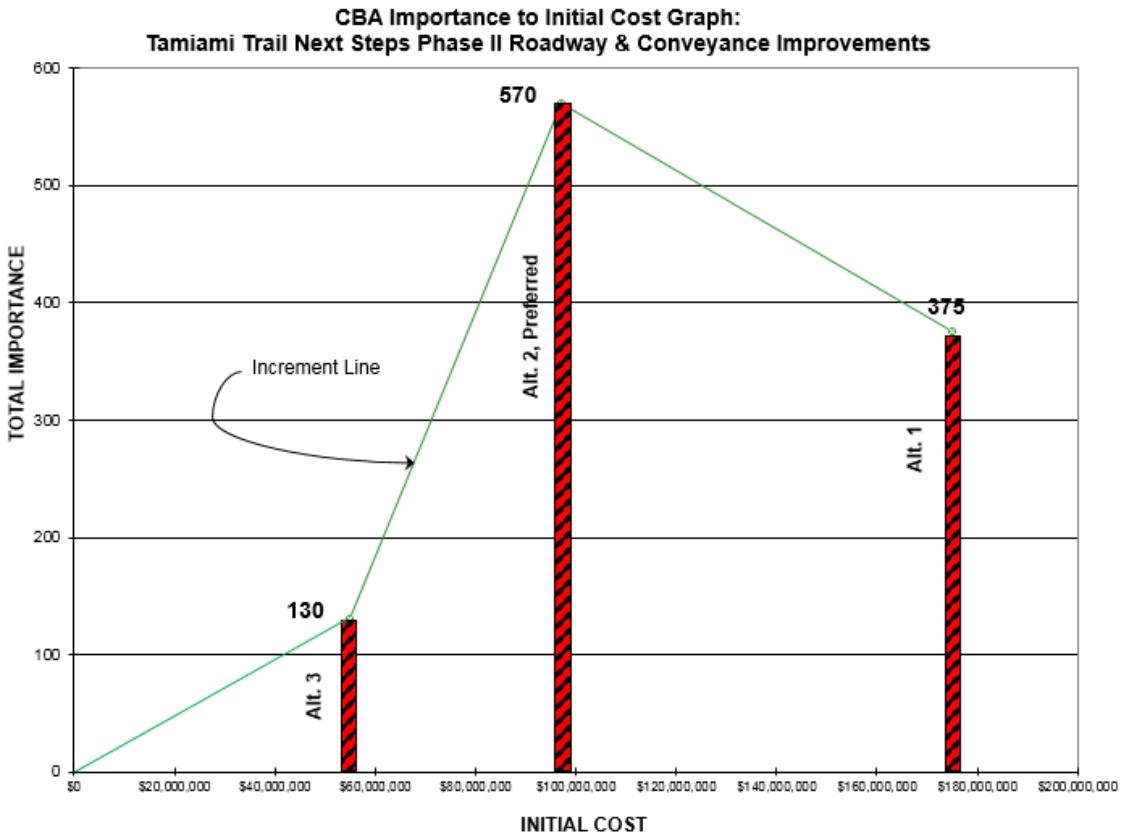

Figure 3: Importance to Initial Cost Graph – Roadway Alternatives

Refer also to **Figure 4**, which compares the Importance to Life Cycle Cost. This graph also confirms Alternative 2 has the highest importance of advantages (benefits) to life cycle cost.

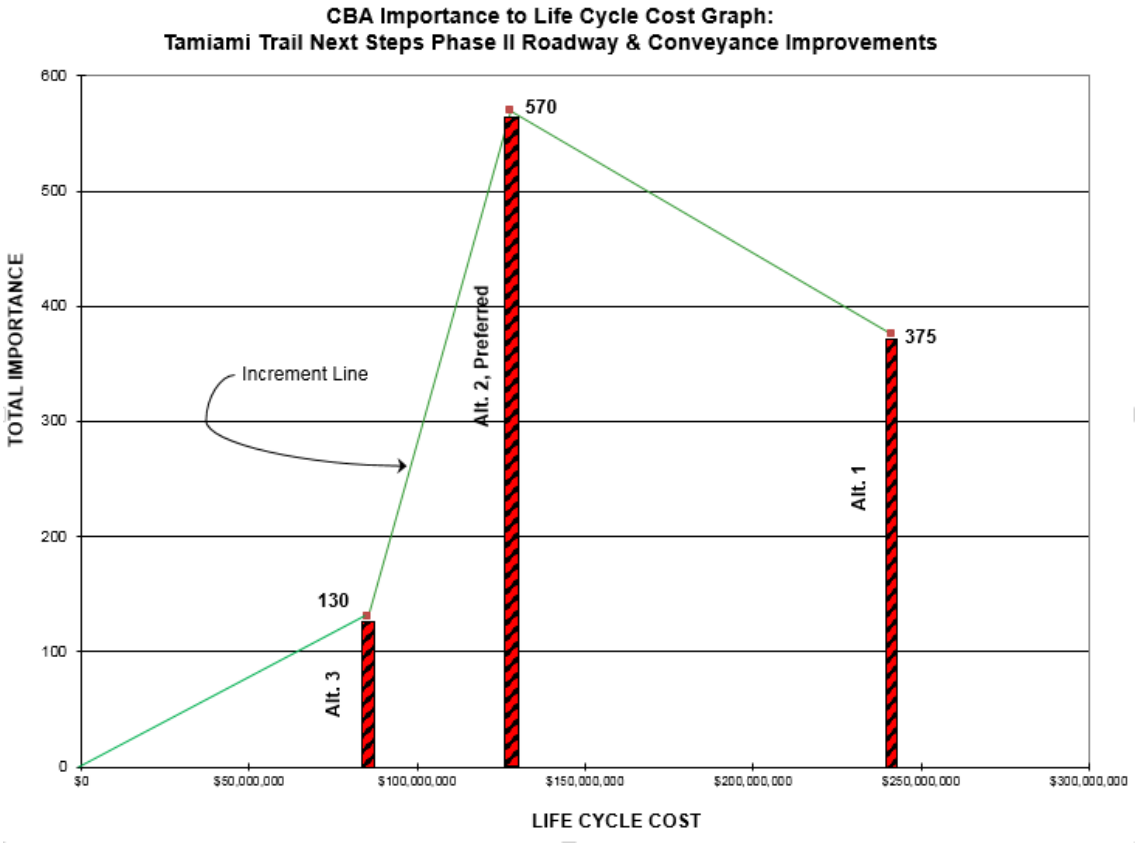

Figure 4: Importance to Life Cycle Cost Graph – Roadway Alternatives

Reconsideration: (Alternative 2)

Discussion followed the CBA evaluation of the alternatives. Although Alternative 2 scored the best, ideas from the other alternatives and ideas from the creative phase were also of interest.

Preferred Alternative

Alternative 2 received 100% consensus from the VA team as the preferred alternative to reconstruct 6.5 miles of Tamiami Trail and conveyance. This alternative replaces selected culverts with larger size and improves others (box culverts, etc.), creates wider shoulders, and stormwater features, and raises the level of roadway. Note it eliminates the proposed bridges of alternative 1. See **Appendix C** for a detailed breakdown of the cost estimate. The VA team also recommends further consideration of the following:

- Incorporate stormwater mitigation (bridge, ponds, roadway swales)
- Retain existing road base material with geogrid in lieu of removing material
- Add a bike path – possible funding source is River of Grass Bikeway
- Add shelves for wildlife crossing in box culverts
- Have swales on one side, pipe drain to the other side or,
- Have swales on both sides of road
- Use French drains (perforated pipe) under paved shoulder on both sides of road
- Add median barrier for safety considerations

Also refer to the Appendix for completed FEIS tables showing a comparison with the preferred alternative.

- FEIS Table 2-11: Analysis of How the Preferred Alternative Meets the Project Objective
- FEIS Table 2-13: Summary of Environmental Consequences for the Preferred Alternative

The VA study details are contained in **Section B** of this report which follows.

Value Analysis Study
Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements

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SECTION B: VALUE ANALYSIS STUDY

Phase I - Information
Study Specifics

Project Background

The 2009 Omnibus Appropriations Act (March 10, 2009) directed the National Park Service (NPS) to evaluate bridging alternatives to the Tamiami Trail (10.7-mile eastern section), beyond what was authorized by the 2008 Limited Reevaluation Report (LRR), in order to "restore more natural water flow to Everglades National Park (ENP) and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas." In response to this Congressional directive, the NPS completed an Environmental Impact Statement (EIS) for the Tamiami Trail Modifications: Next Steps (TTM:NS) project (Notice of Availability published in the Federal Register on December 20, 2010). The Record of Decision (ROD) for this EIS was published in the Federal Register on April 26, 2011. On December 23, 2011, Congress passed the Consolidated Appropriations Act of 2012 (Public Law 112-74) which authorized construction of the EIS selected plan, Alternative 6e. The first priority of TTM:NS Alternative 6e is the 2.60-mile bridge located between the Osceola Camp and the Airboat Association.

Measurable Results

Changes to the Tamiami roadway and conveyance systems will allow for the restoration of more natural water flow to Everglades National Park and Florida Bay and allow for restoration of habitat within the Park and the ecological connectivity between the Park and the Water Conservation Area.

Reference Documents

The design team of HDR Engineering, Inc. provided the VA team with the following reference documents:

- Everglades National Park Tamiami Trail Modifications: Next Steps, Final Environmental Impact Statement (FEIS), prepared by URS, November 2010
- Value Analysis Report, Construct 2.60-Mile Tamiami Trail Bridge, prepared by Kirk Associates with HDR, January 30, 2014
- Cost Estimates of Options 1 – 3, prepared by FDOT, February 2018
- US 41/ SR 90/ Tamiami Trail Road Raising Evaluation, prepared by FDOT District 6, May 25, 2018
- Tamiami Trail MOT Sequence, prepared by FDOT District 6, May 25, 2018
- Cost estimate and life cycle cost estimate of VA Alternatives, prepared by HDR, July 27 2018

Phase II - Function Analysis

Function Logic Diagram

Function analysis is core to any value analysis study. For this project, the VA team prepared a function logic diagram (**Figure 5**) to help understand the overall purposes of the project to “restore more natural water flow” to Everglades National Park and Florida Bay and for the purpose of “restoring habitat” within the Park and “restore the ecological connectivity” between the Park and the Water Conservation Areas. Functions are described using an abridged description with an active verb and a measurable noun. Reading to the right of the diagram answers “how” the mission is to be achieved with this project. Functions include:

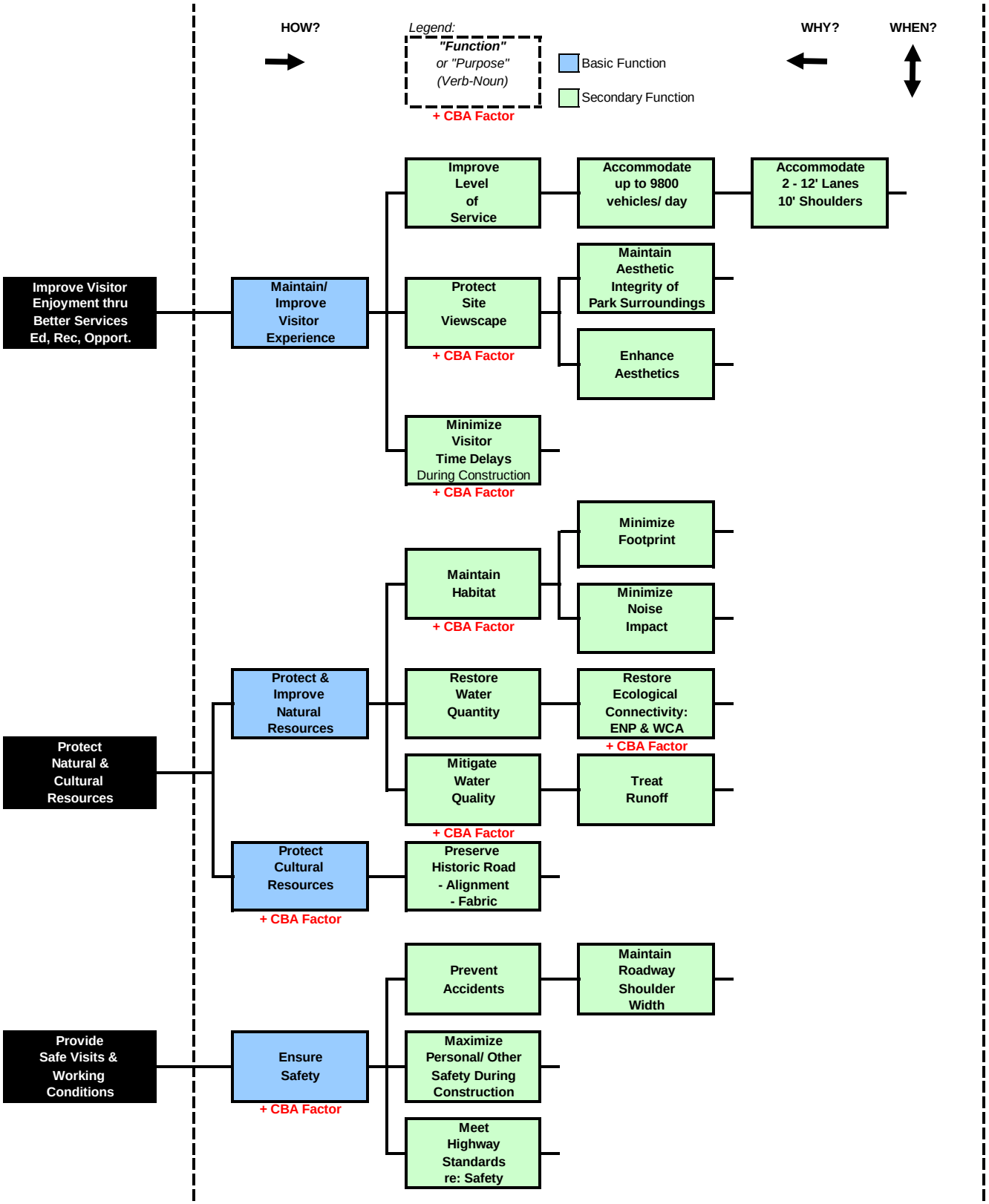
- Provide for visitor enjoyment
- Prevent loss, maintain, and improve the condition of the resources
- Protect public and employee health, safety and welfare
- Improve operational efficiency and sustainability
- Strengthen partnership and community relationships

Reading even further to the right answers “how” each of these functions are to be met with this project. Reading from right to left on the diagram answers “why” the specific functions of the project are to be done.

This function logic diagram was later used by the VA team to identify factors to evaluate the alternatives using the Choosing By Advantages (CBA) decision making approach. The functions used as factors are identified on the diagram. Those functions that are equally met by each alternative (no advantages to one alternative over another) did not need to be included as evaluation factors in the CBA.

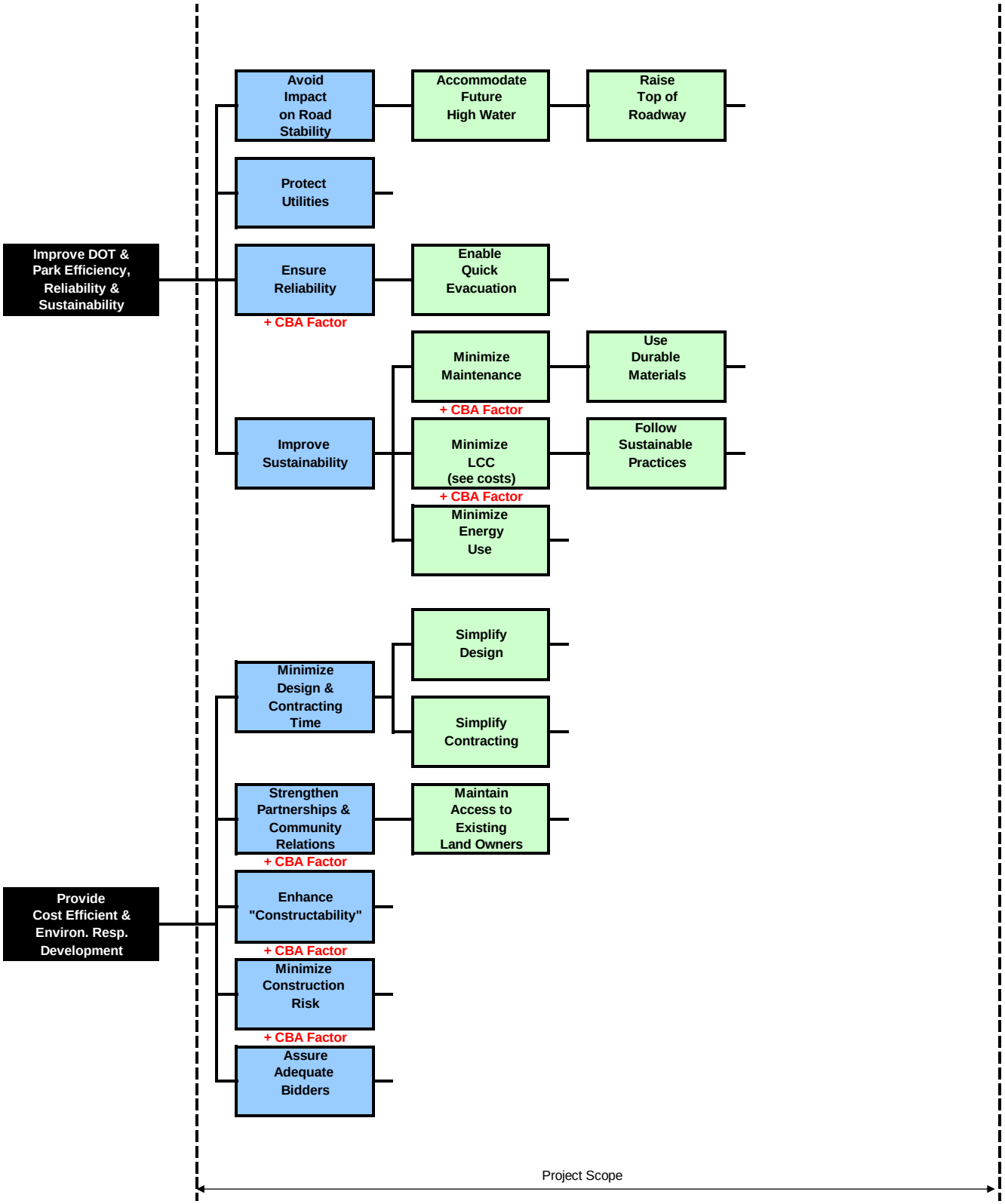
Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements Figure 5

Function Logic Diagram



Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements Figure 5

Function Logic Diagram



Phase III - Creativity

Creative Ideas

Some twenty (20) creative ideas were generated during the "brainstorming" portion of the VA workshop. Since time was not available to develop all the favorable ideas into recommendations, the engineering firm is encouraged to consider them as the design develops. Ideas in **Bold** are recommended for further consideration.

Following is a listing of ideas:

1A. Eliminate 0.66 mile bridge
1B. Manage all open structure culverts east of the USACE 1 mile bridge
2. Raise road to east (included in all alternatives)
3. Seepage Mitigation – by others, on eastern side
4. Manage surface flow of perpendicular culverts with manifold controls
5. Recover all 19 historical sloughs (note: One Mile Bridge recovers two)
6. Minimize widening of road to south (reduces environmental impact)
7. Raise road while maintaining center alignment (see Alternative 3)
8. Expand road to north if canal water can be accommodated
9. **Consider stormwater mitigation (bridge, ponds, roadway swales)**
10. Expand cross-section of culverts to avoid sediment build-up
11. Consider road runoff treatment (see idea 9)
12. Retain existing road base material with geogrid in lieu of removing material
13. Add bike path – possible funding source is River of Grass Bikeway
14. Add shelves for wildlife crossing in box culverts
15. Increase the number of sloughs reconnected using box culverts
16. Have swales on one side, pipe drain to the other side or,
17. Have swales on both sides of road
18. Add French drains (perforated pipe) under paved shoulder on both sides of road
19. Consider adding a median barrier for safety considerations

Phase IV - Evaluation (Part 1 – Factors & Definitions)

As the first task of the evaluation phase the team developed and discussed the CBA factors which would be used to evaluate the alternatives within each decision topic (goal). The study team then defined variables and sub factors to tailor the evaluation factors to the needs for each topic. The following table, **Figure 6**, is the evaluation factors and definitions used.

CBA Topics

NPS OBJECTIVE: Provide for Visitor Enjoyment	
Factor 1: Improve Visitor Services, Educational and Recreational Opportunities	
NPS OBJECTIVE: Protect Cultural and Natural Resources	
Factor 2: Prevent Loss, Maintain & Improve Resources	
NPS OBJECTIVE: Protect Public and Employee Health, Safety & Welfare	
Factor 3: Protect Public and Employee Health, Safety & Welfare	
NPS OBJECTIVE: Improve Efficiency of Park Operations	
Factor 4: Improve Operational Efficiency, Reliability and Sustainability	
NPS OBJECTIVE: Other Considerations	
Factor 5: Provide Other Advantages to NPS	
SPECIAL FACTOR: COST	
Sub-factor	Definition/Variables
Initial Cost (Short-term)	• Capital Costs
Life Cycle Cost (Long-term)	• Maintenance Costs • Operating Costs • Staffing Costs

Figure 6: CBA Evaluation Factors

Phase IV - Evaluation (Part 2 – Choosing by Advantages)

Alternatives within each decision topic were evaluated using a process called Choosing by Advantages, where decisions are based on the importance of advantages between alternatives. The value based decision making technique has been used by the NPS for many years to help identify the preferred alternative for further design development. The evaluation involves the identification of the attributes or characteristics of each alternative relative to the evaluation criteria, a determination of the advantages for each alternative within each evaluation factor, and then the weighing of importance of each advantage.

The highest importance advantage is identified in each factor. The paramount advantage, across factors, was determined and assigned a weight determined by the team. Remaining advantages were rated on the same scale. Construction and life cycle costs were developed for each alternative, as appropriate. Recommendations are based on a balance of cost and importance.

The evaluation sheets form the basis for presenting the alternatives and design sketches and cost estimates. The evaluation tables present many types of information. Attributes of an alternative are shown above the dotted line in the CBA table. Advantages between alternatives are shown below the dotted line. An anchor statement summarizes those advantages. The advantage with the highest importance within a factor is indicated by a highlight around the advantage cell.

The study team evaluated the benefit or “importance of advantage” to be realized from the Alternatives (see CBA Matrix for each decision topic). Relative initial cost estimates for the alternatives were developed by the VA team. Results were graphed with importance or benefit on the vertical scale and initial cost on the horizontal scale, as appropriate. The positive slope of the increment reflects good value and the highest benefit to cost ratio. Similarly, when the life cycle costs are considered, certain alternatives offer the best value and the highest benefit to cost ratio to the NPS and were selected as the preferred alternative.

Upon reconsideration, the VA team suggested the design team explore ways to add additional benefits and lower initial and life cycle costs to each of the preferred alternatives.

Phase V - Development

The development phase of the VA job plan includes preparing a variety of items to verify each creative idea truly adds value to the project. The results are then used to prepare a presentation.

For each of the five decisions, the following pages contain the following, as appropriate:

A. Value Analysis Recommendation
    - Original Design Alternatives
    - Preferred Alternative
    - Discussion
    - Life Cycle Cost Analysis
B. Sketches of Alternatives Considered
C. Choosing By Advantages Matrix
D. Life Cycle Cost Analysis
E. Total Importance Allocation to Advantages Scale
F. CBA Importance to Initial Cost Graph
G. CBA Importance to Life Cycle Cost

See **Figure 7** which documents the options to reconstruct 6.5 miles of Tamiami Trail & conveyance following the CBA process and the alternative selection.

Value Analysis Recommendation-Choosing By Advantages

Figure 7A

Project:	**Tamiami Phase II Roadway Conveyance Improvements**	**VA No.**
Item:	**Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance**	**CBA-1**

Original Design

The VA team reviewed the following alternatives for the project:

• Alternative 1: Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile), Raise level of roadway;

• Alternative 2: Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway;

• Alternative 3: Replace all existing culverts in kind and raise level of roadway.

Preferred Alternative

Based on the CBA analysis, the VA team identified the Alternative 2 as the preferred alternative.

Advantages of Preferred Alternative 2:

- Better habitat improvement
- Much better marsh connectivity
- Significantly better improved water quality
- Much better limiting impact to cultural resources
- Significantly better improved public safety due to wider paved shoulder
- Much better/ more reliable for emergency evacuation
- Better maintainability
- Better due to saving 3 months of design time
- Much better minimizing constructability issues and risks
- Second lowest initial and life cycle cost

Life Cycle Cost Summary

	Initial Cost	Life Cycle Cost
Proposed Design (Preferred Alternative 2)	**97,201,000**	**127,739,300**

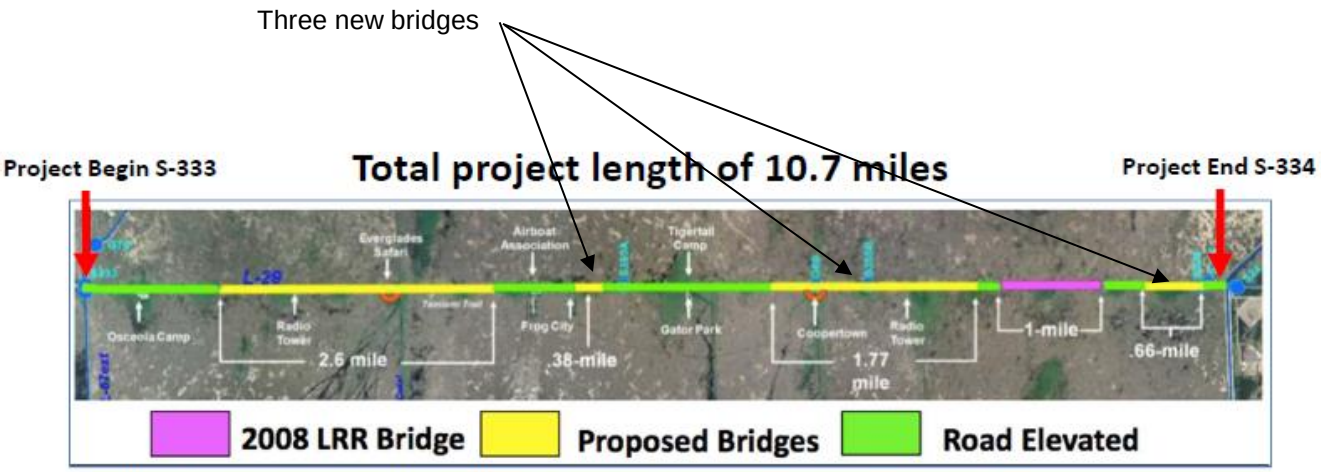
Sketch Worksheet

Figure 7B

Project: **Tamiami Phase II Roadway Conveyance Improvements** **VA No.**

Item: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance** **CBA-1**

Original Design	**Proposed Design**
Alternative 1	(FEIS Alt 6E)Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of roadway



LRR (Limited Reevaluation Report) from Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications Project

Sketch Worksheet

Figure 7B

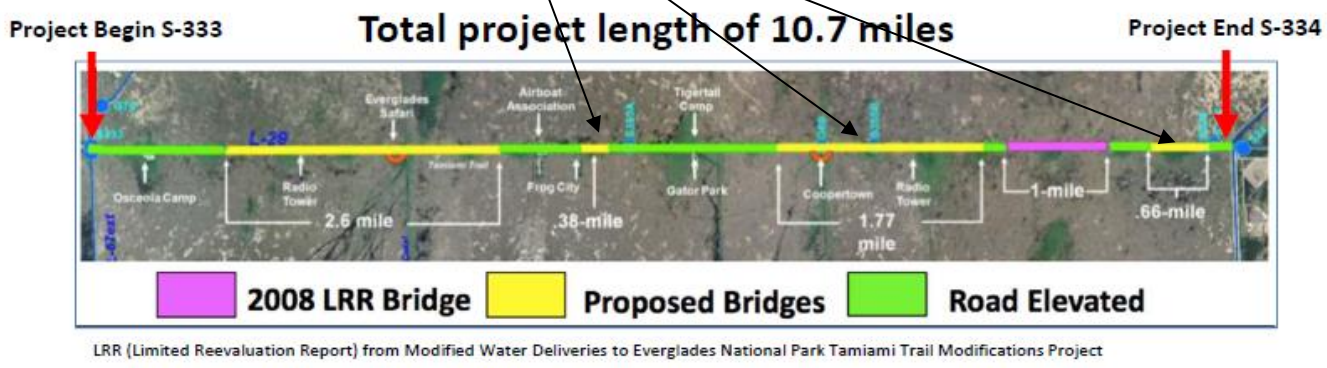
Project: **Tamiami Phase II Roadway Conveyance Improvements** **VA No.**

Item: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance** **CBA-1**

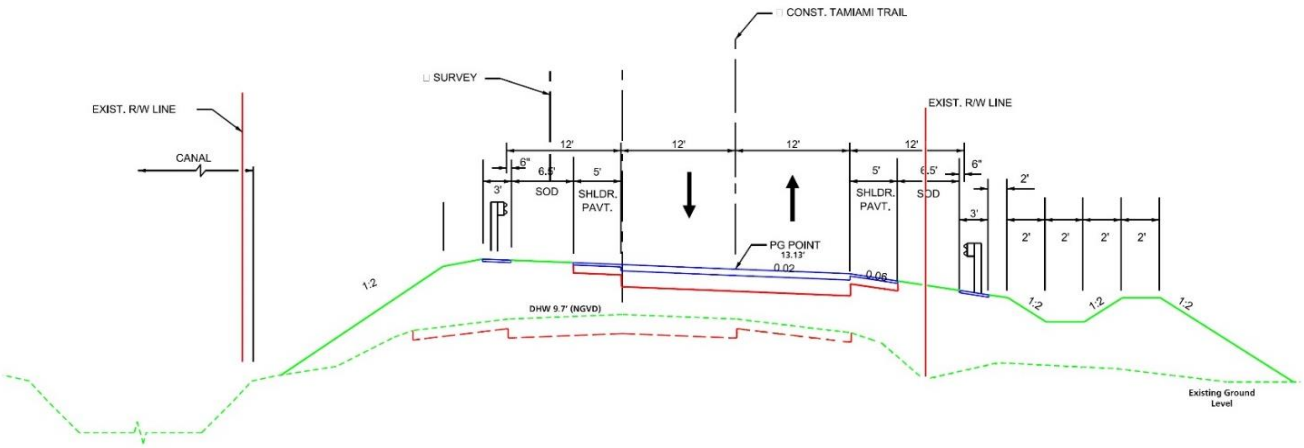
■ **Original Design** ☐ **Proposed Design**

Alternative 2 — Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway

No new bridges



LRR (Limited Reevaluation Report) from Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications Project



Road Section

Sketch Worksheet

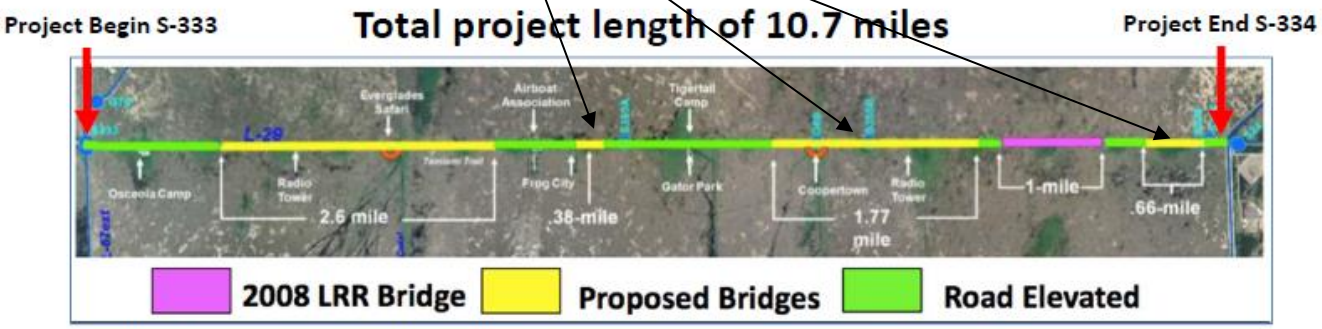
Figure 7B

Project: **Tamiami Phase II Roadway Conveyance Improvements** **VA No.**

Item: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance** **CBA-1**

■ Original Design	☐ Proposed Design
Alternative 3	Replace all existing culverts in kind and raise level of roadway

No new bridges



LRR (Limited Reevaluation Report) from Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications Project

Choosing By Advantages **Matrix** Figure 7C

Project/Location: **Tamiami Phase II Roadway Conveyance Improvements**

Component: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance**

Functions: **Restore Water Flow, Accommodate Future High Water**

Factors:	Alternative 1 (FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of roadway		Alternative 2 Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway		Alternative 3 Replace all existing culverts in kind and raise level of roadway	
Improving Visitor Services, Educational & Recreational Opportunities						
Sub Factor: Improve Visitor Experience						
Criterion: **- Viewscape, aesthetics**	Attribute: Opportunity to view natural marsh landscape at a higher elevation (12' above existing)		Attribute: Opportunity to view natural marsh landscape at a lower elevation (3' above existing)		Attribute: Opportunity to view natural marsh landscape at a lower elevation (3' above existing)	
Criterion: **- Time delay to complete construction (temporary issue)**	Attribute: 3 - 5 years of construction Most likely done in multiple phases		Attribute: 2 - 3 years of construction All construction at one time		Attribute: 2 - 3 years of construction All construction at one time	
Advantages:	**Much better visitor experience due to greater opportunities to view natural marsh**	**40**	**No advantage**	**0**	**No advantage**	**0**
Prevent loss of resources, Maintain / Improve Condition of Resources						
Sub Factor: Protect / Improve Natural Resources - Habitat						
Criterion: **- Footprint created (long term issue)**	Attribute: 10 acres of new footprint impact (5' shoulder)		Attribute: 20 acres of new footprint impact (10' shoulder)		Attribute: 5 - 10 acres of new footprint impact (5' shoulder)	
Criterion: **- Habitat created (long term issue)**	Attribute: Creates new habitat under bridges		Attribute: Creates some new habitat at box culverts		Attribute: No new habitat created	
Criterion: **- Noise created when installing piles (temporary issue)**	Attribute: Significant noise created when installing piles for bridges Minimal noise for road improvements		Attribute: Moderate noise created for long duration when installing box culverts Minimal noise for road improvements		Attribute: Moderate noise created when installing culverts Minimal noise for road improvements	
Advantages:	**Much better habitat improvement**	**95**	**Better habitat improvement**	**80**	**No advantage**	**0**
Sub Factor: Protect / Improve Natural Resources - Marsh Connectivity						
Criterion: **- Restoring ecological connectivity by removing roadway obstructions**	Attribute: 2.8 miles of road removed for improved connectivity		Attribute: 0.1 miles of connectivity due to box culverts		Attribute: 0.0 miles of connectivity	
Criterion: **- Connection of historic / original sloughs**	Attribute: Improved connection to 5 sloughs		Attribute: Improved connection to 5 sloughs		Attribute: No improvement to connection to sloughs	
Advantages:	**Significantly better marsh connectivity**	**100**	**Much better marsh connectivity**	**80**	**No advantage**	**0**
Sub Factor: Protect / Improve Natural Resources - Water Quality						
Criterion: **- Treatment of runoff**	Attribute: Bridges include ponds for treatment Roadway does not include swales for treatment		Attribute: Roadway includes swales for treatment		Attribute: Roadway does not include swales for treatment	
Criterion: **- Distribution of sediment & P load**	Attribute: Good distribution of sediment & P load		Attribute: Fair distribution of sediment & P load		Attribute: Poor distribution of sediment & P load	
Advantages:	**Much better improved water quality**	**70**	**Significantly better improved water quality**	**90**	**No advantage**	**0**
Sub Factor: Limit Impacts to Cultural Resources						
Criterion: **- Retain Historic fabric**	Attribute: Removes 2.8 miles of historic road		Attribute: Removes 0.1 miles of historic road		Attribute: Less than 0.1 removal of historic road	
Criterion: **- Maintain Historical Road/ Canal Alignment**	Attribute: Modifies alignment 50' to the south		Attribute: Maintains historic roadbed within road location		Attribute: Maintains historic roadbed within road location	
Advantages:	**No advantage**	**0**	**Much better limiting impact to cultural resources**	**25**	**Significantly better limiting impact to cultural resources**	**30**

Choosing By Advantages **Matrix** Figure 7C

Project/Location: **Tamiami Phase II Roadway Conveyance Improvements**

Component: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance**

Functions: **Restore Water Flow, Accommodate Future High Water**

Factors:	Alternative 1 (FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of roadway		Alternative 2 Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway		Alternative 3 Replace all existing culverts in kind and raise level of roadway	
Protect Public and Employee Health, Safety, Welfare						
Sub Factor: Public Safety - Roadway Shoulder						
Criterion: **- Width of roadway shoulder**	Attribute: Bridge, 10' width of shoulder Road, 5' pavement, 6.5' sod = 11.5' width of shoulder		Attribute: Road, 10' pavement width of shoulder		Attribute: Road, 5' pavement, 6.5' sod = 11.5 width of shoulder	
Advantages:	**Better improved public safety due to wider paved shoulder**	**70**	**Significantly better improved public safety due to wider paved shoulder**	**85**	**No advantage**	**0**
Improve Operational Efficiency, Reliability & Sustainability						
Sub Factor: Minimize Operational Needs - Reliability						
Criterion: **- Evacuation**	Attribute: In emergency could not use shoulder for traffic movement		Attribute: In emergency could use widened shoulder for temporary traffic movement		Attribute: In emergency could not use shoulder for traffic movement	
Advantages:	**No advantage**	**0**	**Much better/ more reliable for emergency evacuation**	**80**	**No advantage**	**0**
Sub Factor: Minimize Operational Needs - Maintenance by FDOT						
Criterion: **- Maintenance needs Bridge (performed by FDOT)**	Attribute: Requires significant maintenance (annual inspection, drainage system, trash removal)		Attribute: No bridges		Attribute: No bridges	
Criterion: **- Maintenance needs Roadway (performed by FDOT)**	Attribute: Requires moderate maintenance due to amount of turf		Attribute: Requires moderate low maintenance		Attribute: Requires moderate maintenance due to amount of turf	
Advantages:	**No advantage**	**0**	**Better maintainability**	**60**	**Moderately better maintainability**	**40**
Provide Cost Effective, Environmentally Responsible & Beneficial Development to NPS						
Sub Factor: Minimize Design & Contract Time						
Criterion: **- Design & Contracting Time**	Attribute: 24 months		Attribute: 21 months		Attribute: 21 months	
Advantages:	**No advantage**	**0**	**Better due to saving 3 months of design time**	**5**	**Better due to saving 3 months of design time**	**5**
Sub Factor: Strengthen Partnership with Land Owners						
Criterion: **- Maintain Access**	Attribute: Complicated access to Coopertown, Salem Radio Tower		Attribute: Maintains at grade access to all existing properties		Attribute: Maintains at grade access to all existing properties	
Advantages:	**No advantage**	**0**	**Significantly better access to land owners**	**20**	**Significantly better access to land owners**	**20**

Choosing By Advantages **Matrix** Figure 7C

Project/Location: **Tamiami Phase II Roadway Conveyance Improvements**

Component: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance**

Functions: **Restore Water Flow, Accommodate Future High Water**

Factors:	Alternative 1 (FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of roadway		Alternative 2 Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway		Alternative 3 Replace all existing culverts in kind and raise level of roadway	
Sub Factor: Minimize Constructability and Risks						
Criterion: **- Constructability needs**	Attribute: Creates difficult constructability issues		Attribute: Creates moderately difficult constructability due to cranes for construction		Attribute: Limited constructability issues	
Criterion: **- Maintenance of Traffic (MOT)**	Attribute: Limited work zone for road limiting impacts to traffic patterns Bridge constructed outside work zone		Attribute: Large work zone for road limiting impacts to traffic patterns		Attribute: Limited work zone for road causing significant impacts to traffic patterns	
Criterion: **- Risks issues such as schedule, cost, unforeseen conditions, length of piles, disposal of material, etc.**	Attribute: Creates significant risks associated with the construction of the bridge		Attribute: Minor risks		Attribute: Minimal risks	
Advantages:	**No Advantage**	**0**	**Much better minimizing constructability issues and risks**	**45**	**Better minimizing constructability issues and risks**	**35**
Total Importance of Advantages		**375**		**570**		**130**
Initial Cost	**$175,000,000**		**$97,201,000**		**$55,000,000**	
Life Cycle Cost	**$241,268,800**		**$127,739,300**		**$85,538,300**	

LIFE CYCLE COST ANALYSIS (LCCA)

Figure 7D

Project/Location: **Tamiami Phase II Roadway Conveyance Improvements**
Subject: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance**
Description: **Restore Water Flow, Accommodate Future High Water**

Project Life Cycle = **75 Years**
Discount Rate = **0.5%**
Class C Estimate w/ markup

					Alternative 1 (FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of roadway		**Alternative 2** Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway		**Alternative 3** Replace all existing culverts in kind and raise level of roadway	
INITIAL COSTS	**Description**	**Quantity**	**UM**	**Cost / SF**	**Est.**	**PW**	**Est.**	**PW**	**Est.**	**PW**
Alternative 1	(FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of	1,166,880	Sq Ft	$149.97	175,000,000	175,000,000				
Alternative 2	Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway	1,166,880	Sq Ft	$83.30			97,201,000	97,201,000		
Alternative 3	Replace all existing culverts in kind and raise level of roadway	1,166,880	Sq Ft	$47.13					55,000,000	55,000,000
Total Initial Cost						**175,000,000**		**97,201,000**		**55,000,000**

REPLACEMENT COST/ SALVAGE VALUE

Description	**SF**	**Unit Cost**	**Year**	**PW Factor**						
Replace bridge components	697,330	$50.00	50	0.7793	34,866,480	27,170,962	0	0	0	0
Replace box culvert comp'ts	not required		75	0.6879	0	0	0	0	0	0
Replace culvert components	not required		75	0.6879	0	0	0	0	0	0
Roadway repaving, Alt. 1	662,429	$4.00	10	0.9513	2,649,715	2,520,801	0	0	0	0
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	10	0.9513	0	0	4,667,520	4,440,435	4,667,520	4,440,435
Roadway repaving, Alt. 1	662,429	$4.00	20	0.9051	2,649,715	2,398,158	0	0	0	0
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	20	0.9051	0	0	4,667,520	4,224,399	4,667,520	4,224,399
Roadway repaving, Alt. 1	662,429	$4.00	30	0.8610	2,649,715	2,281,483	0	0	0	0

LIFE CYCLE COST ANALYSIS (LCCA)

Figure 7D

Project/Location: **Tamiami Phase II Roadway Conveyance Improvements**
Subject: **Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance**
Description: **Restore Water Flow, Accommodate Future High Water**

Project Life Cycle = **75 Years**
Discount Rate = **0.5%**
Class C Estimate w/ markup

					Alternative 1 (FEIS Alt 6E) Construct 3 bridges (0.38 mile, 0.66 mile, 1.77 mile) and raise level of roadway		**Alternative 2** Replace selected culverts with larger size and improve others (box culverts, etc.), wider shoulders, and stormwater features, and raise level of roadway		**Alternative 3** Replace all existing culverts in kind and raise level of roadway	
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	30	0.8610	0	0	4,667,520	4,018,873	4,667,520	4,018,873
Roadway repaving, Alt. 1	662,429	$4.00	40	0.8191	2,649,715	2,170,484	0	0	0	0
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	40	0.8191	0	0	4,667,520	3,823,347	4,667,520	3,823,347
Roadway repaving, Alt. 1	662,429	$4.00	50	0.7793	2,649,715	2,064,886	0	0	0	0
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	50	0.7793	0	0	4,667,520	3,637,333	4,667,520	3,637,333
Roadway repaving, Alt. 1	662,429	$4.00	60	0.7414	2,649,715	1,964,425	0	0	0	0
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	60	0.7414	0	0	4,667,520	3,460,369	4,667,520	3,460,369
Roadway repaving, Alt. 1	662,429	$4.00	70	0.7053	2,649,715	1,868,851	0	0	0	0
Roadway repaving, Alt. 2 & 3	1,166,880	$4.00	70	0.7053	0	0	4,667,520	3,292,015	4,667,520	3,292,015
				1.0000	0	0	0	0		0
Total Replacement/Salvage Costs						**42,440,100**		**26,896,800**		**26,896,800**
ANNUAL COSTS			**Diff.**							
Description	**SF**	**Cost**	**Escl. %**	**PWA**						
Annual maintenance, bridge	697,330	$0.50	0.00%	62.414	348,665	21,761,441	0	0	0	0
Annual maint., roadway Alt.1	662,429	$0.05	0.00%	62.414	33,121	2,067,230	0	0	0	0
Ann. maint, roadway Alt.2 & 3	1,166,880	$0.05	0.00%	62.414	0	0	58,344	3,641,462	58,344	3,641,462
			0.00%	62.414	0	0	0	0	0	0
Total Annual Costs (Present Worth)						**23,828,700**		**3,641,500**		**3,641,500**
Total Life Cycle Costs (Present Worth)						**241,268,800**		**127,739,300**		**85,538,300**
Total Life Cycle Costs (Annualized)			**PP Factor**	**0.0160**	**3,865,642**	**Per Year**	**2,046,657**	**Per Year**	**1,370,506**	**Per Year**

Choosing By Advantages

Figure 7E

Tamiami Phase II Roadway Conveyance Improvements

Options to Reconstruct 6.5 Miles of Tamiami Trail & Conveyance

Total Importance Allocation to Advantages Scale

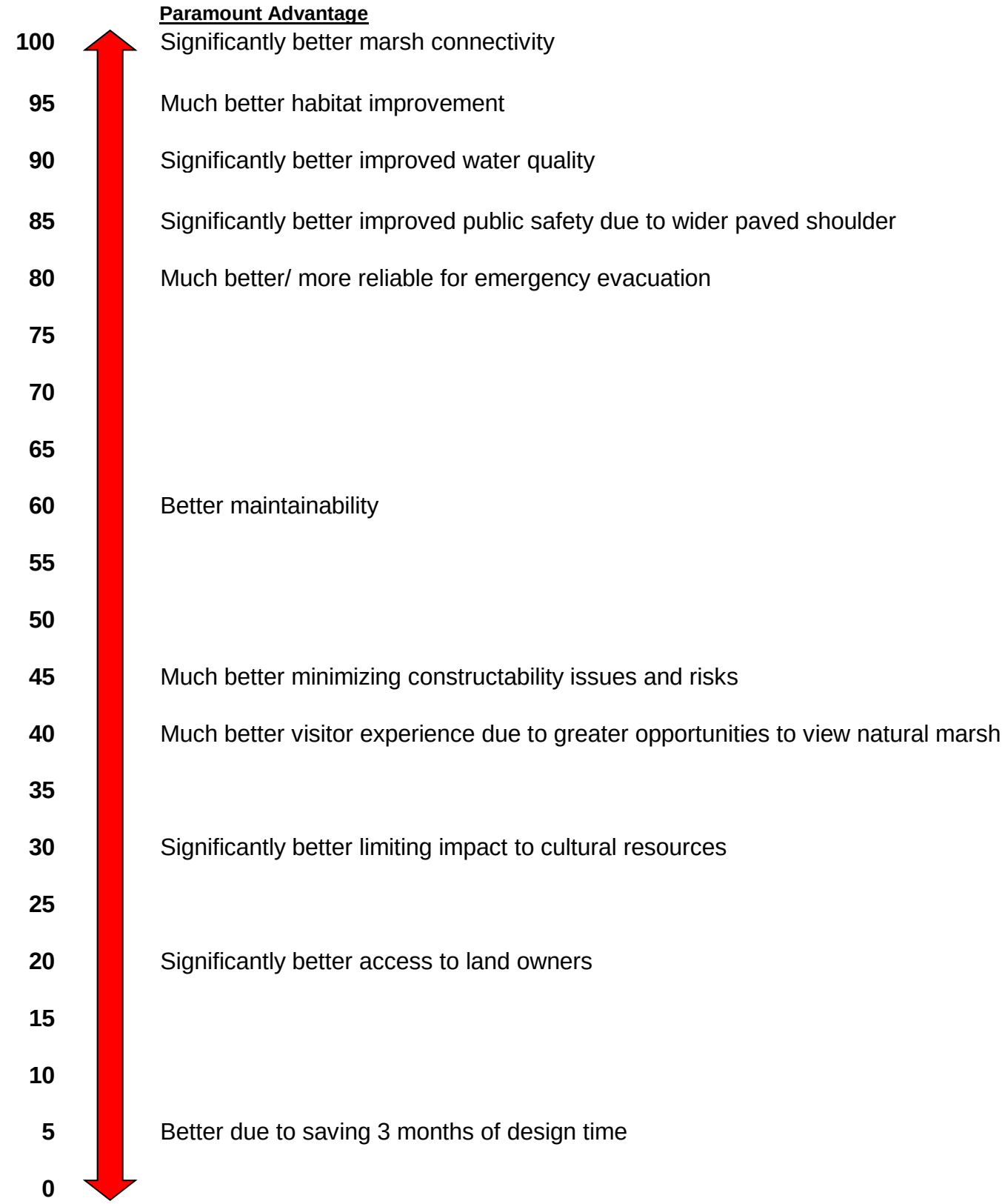


Figure 7F

CBA Importance to Initial Cost Graph:
Tamiami Trail Next Steps Phase II Roadway & Conveyance Improvements

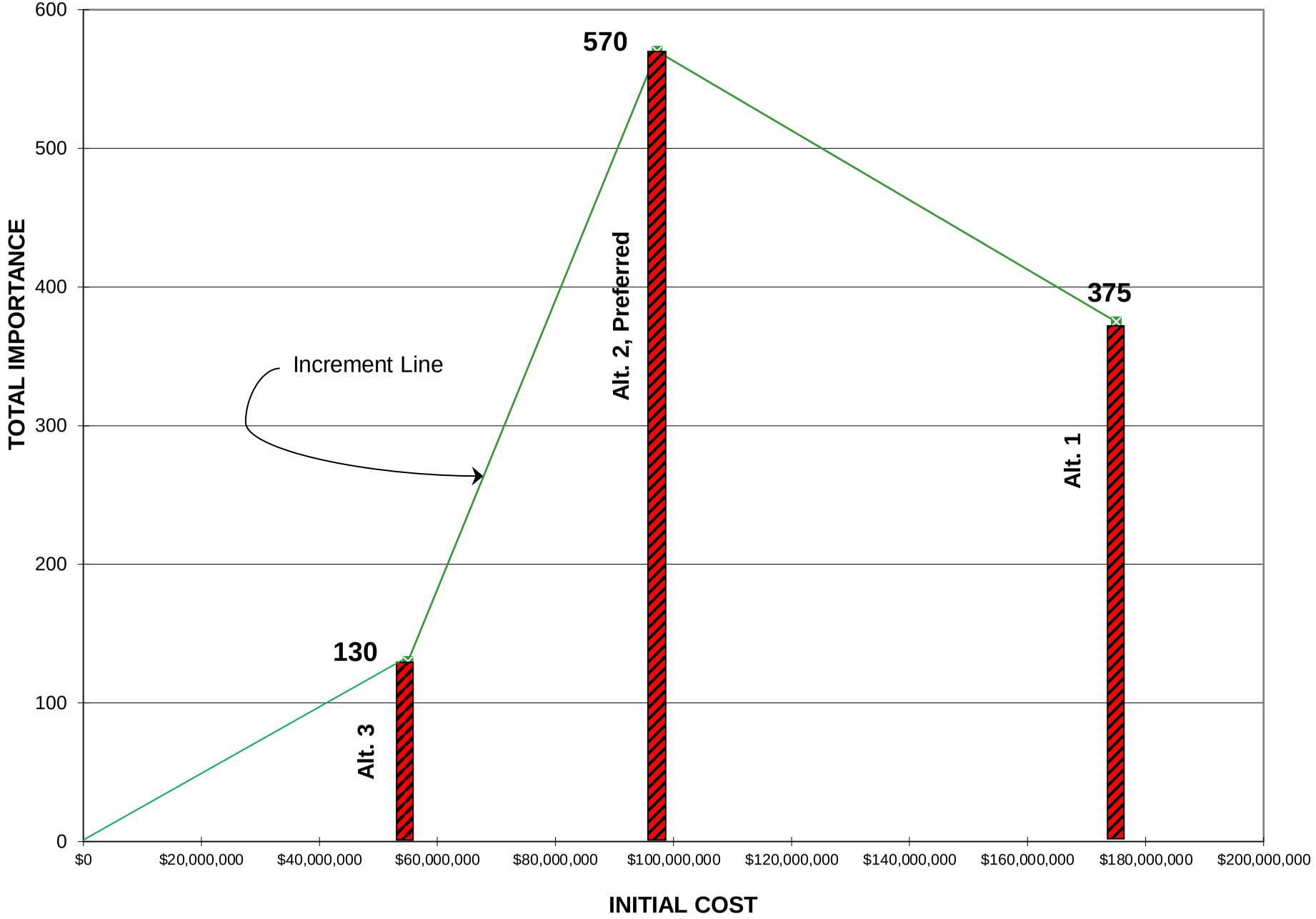
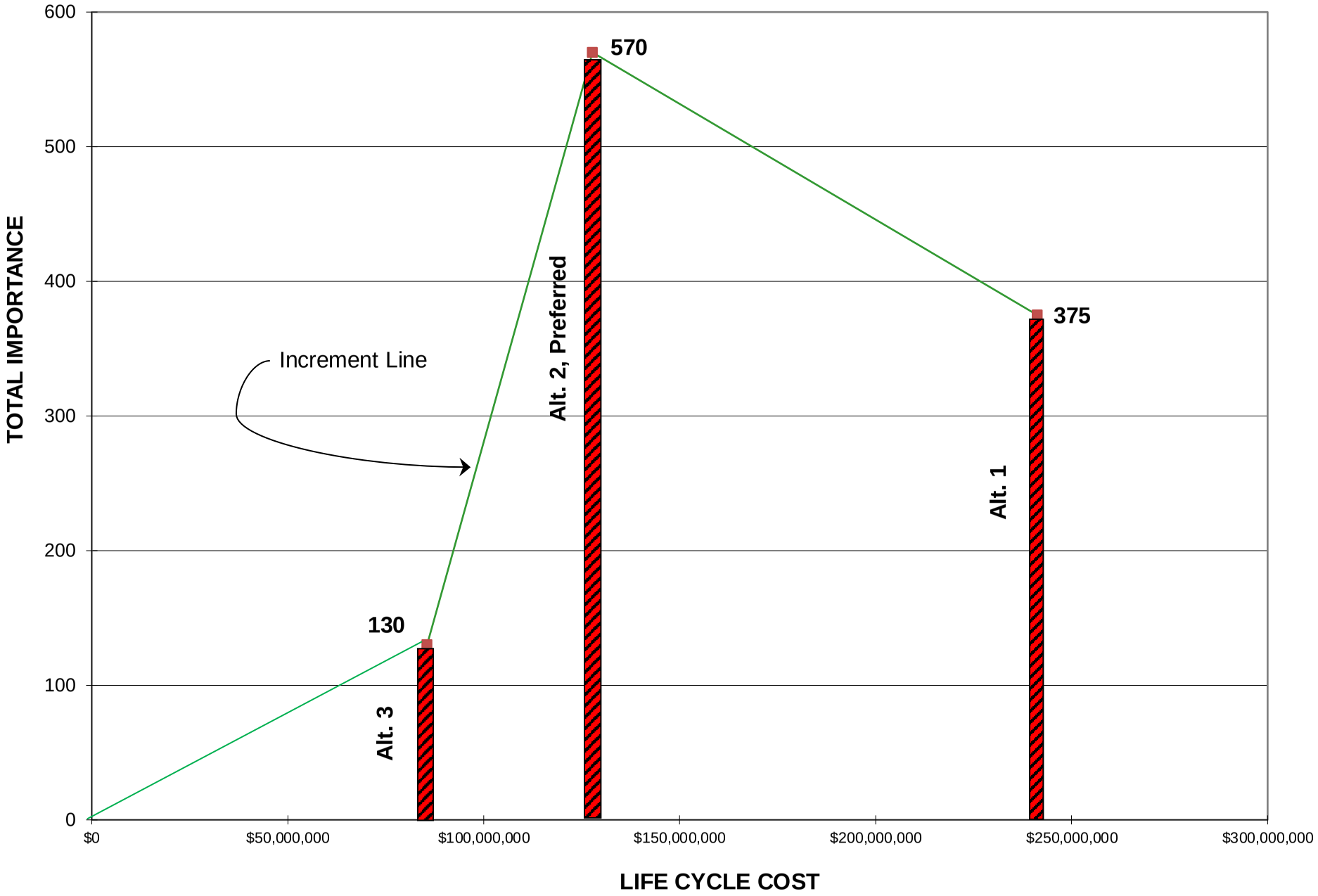


Figure 7G

CBA Importance to Life Cycle Cost Graph:
Tamiami Trail Next Steps Phase II Roadway & Conveyance Improvements



Phase VI - Recommendation

The final day of the VA workshop, the VA team summarized the workshop and the decisions reached.

The NPS project manager discussed next steps to maintain the design schedule. Following are important upcoming events:

Post Workshop

Finalize Cost Estimate & LCC (HDR)	1-2 weeks
Complete the EIS Tables (NPS)	2 weeks

VA Report

Submit Draft VA Report	July 30, 2018
Review / Comment	As Required
Finalize VA Report	September 2018

VA Team

The study team was composed of a mix of professional disciplines and varied design, construction, and maintenance experience. Members of the park staff, FDOT, and the Florida DEP grounded the team with knowledge of the intricacies of managing and working on this site.

Stephen Kirk, certified value specialist of Kirk Associates, led the team's deliberations during the workshop. A list of VA team participants is contained on **Figure 8** that follows.

ATTENDANCE LIST

Figure 8

Value Analysis Study

Project: **Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements**

Location: **Everglades National Park, Florida**

Date: **July 10 - 11, 2018**

PARTICIPANTS:

Name/ Title:	Job Function:	Phone:	Email:	Day 1	Day 2
NPS - Everglades National Park					
Tylan Dean	Biological / Wetland Resources	305-224-4239	tylan_dean@nps.gov	X	
Robert Johnson	Natural Resources/ Hydrology	305-224-4240	robert_johnson@nps.gov	X	X
Brien Culhane	Planning & Compliance	305-242-7717	brien_culhane@nps.gov	X	X
Penelope Del Bene	Chief, Cultural Resources	305-242-7755	penelope_delbene@nps.gov	X	
Jed Redwine	Ecologist/ Project Manager	305-224-4254	jed_redwine@nps.gov	X	
Agnes R. McLean	Ecologist	305-224-4235	agnes_mclean@nps.gov	X	
NPS - Denver Service Center, Transporation Division					
Charles Borders	Branch Chief	305-224-4234	charles_borders@nps.gov	X	X
NPS - Denver Service Center, Design & Construction Division					
Darin Thacker	Project Manager & COR	303-969-2428	darin_thacker@nps.gov	X	
Florida Department of Transporation					
Elsa Riverol	Project Manager	305-470-5105	elsa.riverol@dot.state.fl.us	X	X
Chris Tovella	Structural Engineering	305-470-5254	chris.tovella@dot.state.fl.us	X	
Steven Craig James	Environmental Management	305-470-5221	steven.james@dot.state.fl.us	X	X
Calvin Mason	PLEMO/ Value Engineer	305-470-5386	calvin.mason@dot.state.fl.us	X	X
Robert T. McMullen	Environmental Management	305-470-5149	robert.mcmullen@dot.state.fl.us	X	X
Pablo Orozco	Maintenance Engineer	305-470-5370	pablo.orozco@dot.state.fl.us	X	
Florida Department of Environmental Protection					
Inger Hansen	Project Manager	561-681-6709	inger.hansen@dep.state.fl.us	X	X
HDR Engineering					
Daniel Ford	Project Manager	305-725-5380c	daniel.ford@hdrinc.com	X	X
AECOM					
Laura Cherney	Ecologist	305-514-2426	laura.cherney@aecom.com	X	X
Kirk Value Planners (a Member of Kirk Associates, LLC)					
Steve Kirk, CVS	VA Workshop Facilitator	313-701-2084c	skirk@kirkvalueplanners.com	X	X

VA Team Photos

Acknowledgements

It would be a serious oversight in documenting this study without acknowledging the significant contributions made by the well-informed, spirited and cooperative staff of the VA team members. Their hard work and input from their specific expertise made this VA Study a success.

Value Analysis Study
Tamiami Trail Next Steps Phase II Roadway
and Conveyance Improvements

Everglades National Park
Florida

July 10 - 11, 2018

SECTION C: APPENDIX

VALUE ANALYSIS PROCESS

INTRODUCTION

Value Analysis (VA) is an organized, creative process, which focuses attention on the requirements of a project for the purpose of achieving essential functions and attendant benefits at the lowest, total costs for materials, equipment, staffing, energy usage, facilities, professional services, maintenance, etc. over the life of the project. In other words, value engineering is a systematic approach to obtain optimum ***value*** for each dollar spent. As a result of thorough investigation, using experienced, multi-disciplined teams, value and economy are improved by the study of alternate systems, concepts, materials, methods and procedures.

A Certified Value Specialist (CVS) guides a Value Analysis Study. Experience has shown that project studies performed by a person or team with little or no value engineering leadership will tend to steer in the direction of a superficial review and concentrate on errors made by others. A Value Analysis Study, on the other hand, focuses on both reducing the total cost of ownership and improving overall performance. Application of the VA methodology and coordination of the activities before and after the study also significantly increase the probability the recommendations will be implemented.

This approach has been successfully applied to projects of all types and magnitudes and allows value analysis teams to be responsive to clients by producing practical results. The VA approach also encourages participation of the clients in the study in order to take advantage of their experience and knowledge. Multi-disciplined teams, using a value analysis job plan, analyze the functions of the buildings, products or processes under study, identify high cost areas, ascertain the benefits sought and propose alternatives to those planned or currently being used.

A value analysis job plan is organized into three distinct parts: (1) Pre-Study Preparation, (2) Study Workshop, and (3) Post-Study Implementation.

PRE-STUDY PREPARATION

The success of a Value Analysis Study is largely dependent on proper preparation and coordination. Information and documents are furnished by the client and distributed to the team to enable them to prepare for their role in the study. All participants are briefed on the project and their responsibility prior to the study. The pre-study activities include the following tasks:

- Identification of context of the Value Analysis Study.
- Review of project documentation and distribution of information to team members. The VA team relies on the client for the completeness and organization of the material to be used.
- Finalization of team and team assignments.
- Preparation of analytic models, as appropriate.
- Finalization of arrangements for workshop.

Each VA study is designed in response to the goals of the client. The analytic models developed prior to the workshop are consistent with these goals and are based on the information provided to the study team. While not every model is used for every study, it is important the team have sufficient data to develop at least a few of the analytic models to ensure a measure of thoroughness and perspective.

STUDY WORKSHOP

During the workshop portion of a Value Analysis Study, a Study Plan is followed which usually includes specific phases to ensure a thoughtful, professional analysis.

Phase I - Information Phase

At the beginning of a Value Analysis Study, it is important to understand the background and decisions that have influenced the development of the client's goals. For this reason, the client normally describes the history and scope of the project.

Phase II - Function Phase

The functions of the project are the controlling elements in the overall value engineering approach. Explicitly identifying the functions that drive the project is essential to the team because it forces the participants to think in terms of the purposes for the project and the desired results and costs associated with those functions.

Phase III - Creativity Phase

This step in a Value Analysis Study involves the listing of creative ideas. During this portion of a workshop, the value analysis team thinks of as many ways as possible to provide the necessary functions, keeping in mind the benefits important to the client and, at the same time, the need to reduce costs in a responsible manner. During this creative session, judgement about the ideas is not permitted.

Phase IV - Evaluation Phase

All of the information created up to this point must undergo careful consideration. The value analysis team assesses the ideas stemming from the creativity session to test, first,

whether the creativity session addressed the problem areas, opportunities and functions identified earlier and, second, whether the specific strategies generated during the creativity session can be, at least in a preliminary fashion, linked with them. The value based decision-making technique of Choosing by Advantages is used to help select the preferred alternative(s). Other techniques such as life cycle costing are also used as appropriate to help the VA team discuss and evaluate alternatives.

Phase V - Development Phase

The development phase includes preparing sketches, engineering calculations, cost estimates and life cycle cost analyses to verify the idea adds value to the project. The results of this effort are then used to prepare a presentation.

Phase VI - Recommendation Phase

The last phase of the Value Analysis Study involves the presentation of recommendations. The team carefully reviews the recommendations before they are formally presented, generally on the last day of the workshop. The recommendations, the rationale that went into the development of each proposal and a summary of the cost savings are presented at this time so that the client can begin an evaluation of the value analysis recommendations prior to the receipt of the report itself.

POST-STUDY PROCEDURES

The post-study portion of a Value Analysis Study includes the preparation of a report describing the activities undertaken during the study and incorporating the recommendations stemming from the workshop. This post-study effort may require follow-up to resolve questions remaining from the study. Either the value analysis team leader or an appropriate team member may work directly with the client to further implementation strategies.

TAMIAMI TRAIL NEXT STEPS PHASE II
ROADWAY AND CONVEYANCE IMPROVEMENTS

Everglades National Park, Florida

VALUE ANALYSIS (VA) WORKSHOP
July 10 – 11, 2018

1.5 DAY AGENDA

Day 1: Tuesday July 10:

9:00 **INTRODUCTION TO WORKSHOP/ INFORMATION PHASE**

Welcome & Opening Remarks
Team Member Introductions
Objectives/ Workshop Organization & Agenda

9:15 **VALUE ANALYSIS BRIEFING**

9:30 **PROJECT DESIGN PRESENTATION** (By NPS/ Others)

Status (Current Stage of Design Process)
Project Goals (by Park/ Region, as desired)
New Alternatives Considered
Project Budget & Schedule

10:45 **FUNCTION ANALYSIS PHASE**

Review/ Edit Previous Function Logic Diagram

11:15 **CREATIVITY, EVALUATION, DEVELOPMENT PHASE**

Choosing by Advantages* as appropriate
Define CBA Alternatives (including sketches)
Define Evaluation Factors

12:00 **LUNCH**

1:00 p.m. **CREATIVITY, EVALUATION, DEVELOPMENT PHASE (Continued)**

Identify Attributes & Advantages
Score Importance of Advantages
Determine Total Importance of Each Alternative

5:00 **ADJOURN**

Day 2: Wednesday July 11:

9:00 a.m. **CREATIVITY, EVALUATION, DEVELOPMENT PHASE (Continued)**

Summary of Day 1; Day 2 Tasks
Estimate Construction Costs
Estimate O & M Costs
Determine Life Cycle Cost of Each Alternative
Importance to Cost Graphs
Reconsideration, Other Alternatives
CBA/ LCC/ Importance to Cost Graph Updates
Consensus of Preferred Alternative

11:30 **PRESENTATION PHASE**

VA Preferred Alternative & Advantages
Comments & Discussion
Next Steps (VA Implementation Plan)
Closing Remarks

12:30 **ADJOURN/ CELEBRATION!**

*** CHOOSING BY ADVANTAGES (CBA)**

Alternatives & Importance
Define CBA Alternatives (including sketches)
Define Evaluation Factors
Identify Attributes & Advantages
Score Importance of Advantages
Determine Total Importance of Each Alternative

Life Cycle Cost Analysis
Estimate Construction Costs
Estimate O & M Costs & Revenue Potential
Determine Life Cycle Cost of Each Alternative

Importance to LCC Graphs/ Reconsideration
Importance to Cost Graphs
Reconsideration, Other Alternatives
CBA/ LCC/ Importance to Cost Graph Updates
Consensus of Preferred Alternative

Value Analysis Study
Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements

Everglades National Park
Florida

July 10 - 11, 2018

Cost Estimate, Preferred Alternative 2

EVER - Tamiami Trail Next Steps - VA Workshop - Preferred Alternative 2 Cost Estimate

Prepared by NPS, Denver Service Center

September 28, 2018

Item Description	Unit	Quantity	Unit Cost	Total Cost
Sediment Barrier	LF	72,000.00	$3.00	$216,000.00
Floating Turbidity Barrier	LF	72,000.00	$15.00	$1,080,000.00
Clearing & Grubbing	AC	50.00	$10,050.00	$502,500.00
Excavation	CY	50,000.00	$7.84	$392,000.00
Embankment	CY	473,168.00	$22.00	$10,409,696.00
Type B Stabilization	SY	185,878.00	$5.25	$975,859.50
Geosynthetic Reinforcement	SY	371,756.00	$5.97	$2,219,383.32
Optional Base Group 2 (Shoulder)	SY	55,368.00	$12.00	$664,416.00
Optional Base Group 9 (Mainline)	SY	94,916.00	$18.00	$1,708,488.00
SuperPave Asphaltic Concrete (TLB) (2.5")	TN	13,051.00	$110.00	$1,435,610.00
Friction Course FC-12.5 (TLB) (PG 76-22)(1.5")	TN	12,398.00	$140.00	$1,735,720.00
Miscellaneous Asphalt Pavement	TN	3,559.00	$151.90	$540,612.10
Concrete Class II, Endwalls	CY	296.40	$1,464.32	$434,024.45
Reinforcing Steel, Roadway (For Endwall)	LB	18,070.00	$1.03	$18,612.10
Pipe Culvert, Optional Material, Round, 60"	LF	975.00	$1,000.00	$975,000.00
12 ft Span 6 rise	LF	2,400.00	$3,500.00	$8,400,000.00
Guardrail (TL3)	LF	71,187.00	$19.55	$1,391,705.85
Turf Establishment	Ac	25.00	$3,500.00	$87,500.00
Top Soil	SY	300,000.00	$3.00	$900,000.00
Guardrail End Anchorage (Parallel)	EA	28.00	$3,041.00	$85,148.00
			Subtotal	$34,172,275.32
		S&PM	5%	$1,708,613.77
			Subtotal	$35,880,889.08
		MOT	10%	$3,588,088.91
Supplemental MOT Items			**Subtotal**	$39,468,977.99
Temp Traffic Control, barriers, etc	LS	1	$1,100,000.00	$1,100,000.00
Sheet Piling, Steel, Temporary-Critical (MOT)	SF	750,000.00	$25.00	$18,750,000.00
Temporary Embankment (MOT)	CY	44,822.00	$11.69	$523,969.18
			Subtotal	$59,842,947.17
		Mobilization	10%	$5,984,294.72
			Subtotal	$65,827,241.89
Construction Management			8%	$5,266,179.35
		Contingency	20%	$13,165,448.38
		Design Cost	10%	$6,582,724.19
			Total	**$90,841,593.81**
Escalation to Construction year 2020 =7%			7%	$6,358,911.57
		Grand Total		**$97,200,505.37**

Value Analysis Study
Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements

Everglades National Park
Florida

July 10 - 11, 2018

FEIS Table 2-11: Analysis of How the Preferred Alternative Meets the Project Objectives

Value Analysis Study
Tamiami Trail Next Steps Phase II Roadway and Conveyance Improvements

Everglades National Park
Florida

July 10 - 11, 2018

FEIS Table 2-13: Summary of Environmental Consequences for the Preferred Alternative