Florida Department of TRANSPORTATION

Value Engineering Study Final Report

Malabar Road (SR 514) PD&E Study
From East of Babcock Street (SR 507) to US 1
Brevard County, Florida

FPID: 430136-1-22-01

ETDM: 13026

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding (MOU) dated December 14, 2016 and executed by the Federal Highway Administration and FDOT.

November 2014

Value Engineering
For Transportation Improvements

State Road 514 (Malabar Road) from Babcock Street to US 1 PD&E Study

Value Engineering Study Final Report

FM Number: 430136-1

Fed. Aid Project: No

Project Description: State Road 514 (Malabar Road) from Babcock Street to US 1

Study Dates: August 18 – 22, 2014

Project Development Phase			Study Identification Number		
PD&E	Design	Other	VE Item No.		
			Yr.	Dist.	No.
Atkins			14	005	08

This study has been performed in accordance with current applicable FDOT Value Engineering Procedures and Techniques

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Date: November 14, 2014

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EXECUTIVE SUMMARY 1

1.1 INTRODUCTION

A Value Engineering (VE) Study was held, during August 18 – 22, 2014 using the VE methodology to improve the State Road 514 (Malabar Road) from Babcock Street to US 1 PD&E study. The VE study analyzed value improvements for widening Malabar Road and the associated improvements. The project is located in South Brevard County, Florida and is within the jurisdictional boundaries of Florida Department of Transportation (FDOT) District Five, the Space Coast Transportation Planning Organization's 2035 Long Range Transportation Plan, and the St. Johns River Water Management District (SJRWMD). The documents reviewed during the study outlined the purpose and need for the project and identified proposed alternative improvements that are being considered.

The project begins east of Babcock Street (SR 507) (MP 3.060) and extends to US 1 (MP 6.698), and is approximately 3.6 miles. Malabar Road is a two lane west to east urban minor arterial that connects Interstate 95 to US 1 in Brevard County. Malabar Road is a designated emergency evacuation route. Adjacent land uses consist of residential, conservation/recreation and commercial parcels. There is also a Florida East Coast (FEC) rail crossing approximately 800 feet west of US 1.

SR 514 is not part of the Florida Intrastate Highway System nor is it part of the State's Strategic Intermodal System (SIS), but it is designated an Evacuation Route by the Florida Department of Emergency Management. SR 514 is four lanes from the I-95 Interchange east to Babcock Street where it transitions back to a two-lane facility that begins just east of Babcock Street at Enterprise Avenue. Speed limits vary along the corridor: beginning at Babcock Street where it is 45 mph, transitioning to 55 mph just east of Weber Road, then transitioning again to 45 mph west of Marie Street, and finally to 30 mph east of Marie Street to US 1. The existing right-of-way width in the corridor varies: It is 118 feet between Babcock Street and Enterprise Road, 83 feet from Enterprise Avenue to Weber Road, 66 feet from Weber Road to west of Marie Street feet, and 50 feet of right-of-way from west of Marie Street to US 1.

The project addresses potential improvements to traffic operations, intersections, bicycle and pedestrian facilities. The project is being considered to accommodate projected future traffic (Design Year 2038) demand along Malabar Road safely and efficiently.

Proposed Segment 1 is more urbanized in character and is from Babcock Street to Weber Road (approx. 1 mile). Land use along this portion of Malabar Road is mainly commercial, with the exception of Enchanted Lakes, a mobile home community. Examples of businesses along Segment 1 are: Palm Bay Hospital, Berri Patch Preschool, Moose Lodge, Little Impressions Academy, and the Life Care Center of Palm Bay.

Segment 2, from Weber Road to Marie Street, is primarily rural in nature and is approximately 2 miles in length. Segment 2 also includes sensitive environmental lands such as the Malabar Scrub Sanctuary (on the north side of the road), Malabar Disc Golf Course, Malabar Park, Fern Creek Crossing Park, and the Al Tuttle/Sandhill linear trail. These environmental lands are all Section 4(f) properties. In addition to the environmental lands, this segment of the roadway includes two intersections of concern within the corridor. The intersections of Malabar Road with Corey Road and Weber Road are the primary intersections of concern within the corridor.

Segment 3 of the study area is from Marie Street to US 1 (Approx. 0.6 miles). This segment of Malabar Road is more urbanized in nature and consists of residential housing and the small area of downtown Malabar that includes the Town Hall and several small businesses. A crossing of the Florida East Coast (FEC) rail line and signalized intersection with US 1 is also at the terminus of Segment 3.

The project location may be found on **Figure 1.1 - 1 Project Location Map**. By building this project, Brevard County and FDOT will be addressing capacity deficiencies resulting from projected future traffic volumes. The project will provide improved connectivity and operations within the region.

Figure 1.1 – 1
Project Location Map

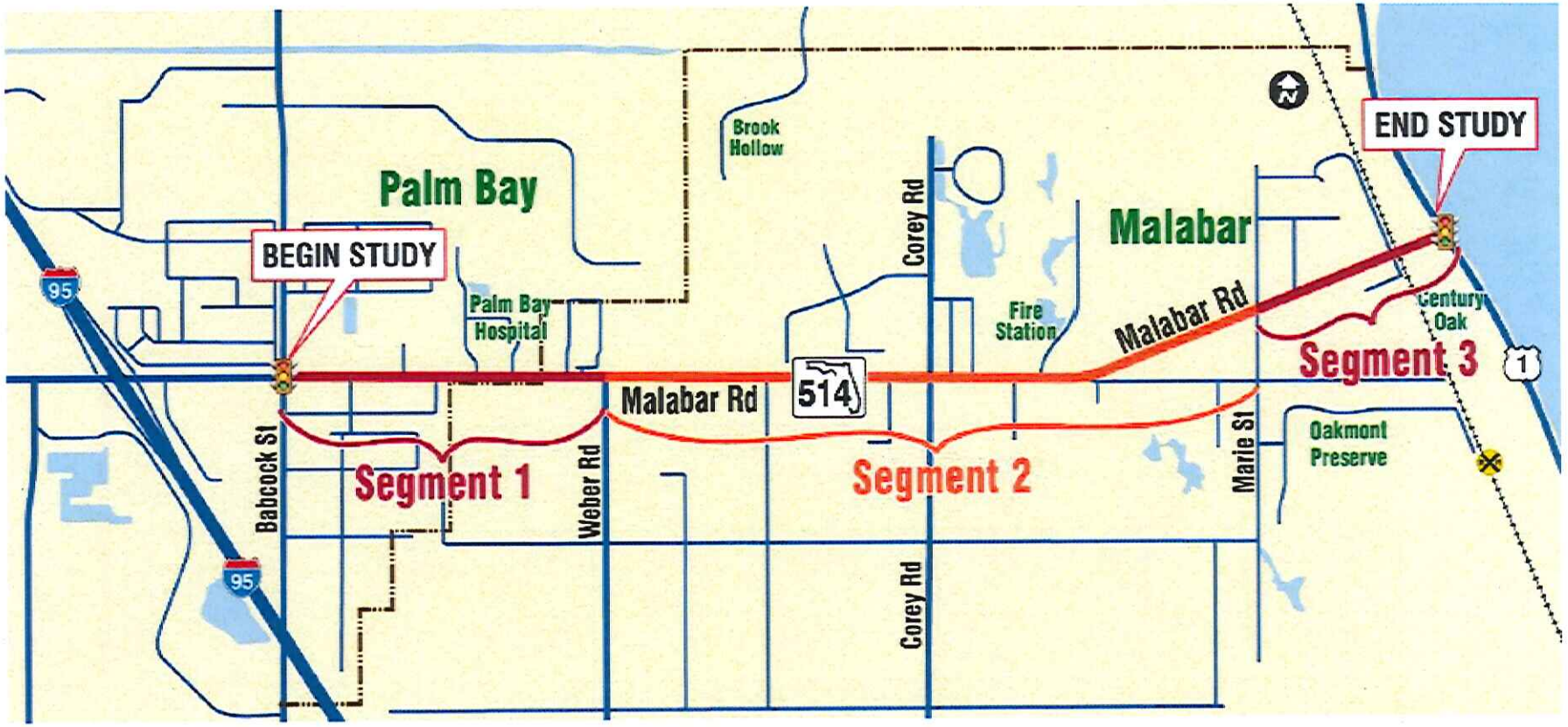


Table 1.1-1 Preliminary PD&E Cost Estimate on page 4 shows the preliminary estimated construction costs for the improvements for the alternatives being studied. The proposed improvements are to enhance operation and level of service in the design year.

1.2 GOALS AND OBJECTIVES

The objective of the study was to identify opportunities and recommend concepts that may improve value in terms of capital cost, constructability, maintenance of traffic, and the basic functional requirements of the project. This report documents the value engineering analysis performed to support decisions related to the planned project alternatives. Additionally, it summarizes existing conditions, documents the purpose and need for the project as well as documents other engineering, environmental, and social data related to preliminary design concepts.
Several issues and pre-existing conditions were stated during the initial briefing at the beginning of the VE study, the VE team considered the following major project constraints:

1. Malabar Scrub Sanctuary
2. Malabar Park
3. Malabar Disc Park
4. Fern Creek Crossing Park

The basic project functions are to enhance capacity and improve traffic operations on the regional transportation system. As shown in **Section 5**, the Functional Analysis System Techniques (FAST) Diagram illustrates the functions as determined by the VE team.

1.3 RESULTS OF THE STUDY

The VE team generated 19 ideas during the creative ideas phase of the VE job plan. The ideas were then evaluated based on the evaluation criteria for this project. The object of this evaluation was to identify ideas with the most promise to achieve savings while preserving functions or improving operations.

The team began the evaluation process of scoring the PD&E documents and the individual creative ideas. During this process it was agreed that the team had various ideas for all of the functions, but only certain ideas having the greatest potential value improvement were carried forward for further development. The remaining ideas either became design suggestions (many specific to a particular component within the project) or were eliminated as duplicate, not appropriate or improbable for acceptance. The VE team ultimately categorized eight ideas as recommendations and three design suggestions that should be further investigated, for the consultants and FDOT to consider. The developed ideas maintain the required functions while improving overall costs, constructability, minimizing time, minimizing utility conflicts and right-of-way issues, minimizing environmental impacts, as well as addressing regional issues, aesthetics and safety. The ideas and how they rated on a weighted scoring evaluation are listed in the table in **Section 6**. Those ideas that were eliminated are shown with strikeout font.

1.4 RECOMMENDED ALTERNATIVES

The recommendations for further consideration are shown in **Table 1.4-1, Summary of Highest Rated Recommendations.** Potential cost savings are shown in present day dollars.

The recommendations in the following table indicate the anticipated initial cost of the proposed recommendations. Acceptance of these recommendations may improve the value and be incorporated in the design of the facility. These recommendations appear to be the most cost-effective way to provide the required functions. Some of the recommendations cannot be taken with others, since some are mutually exclusive recommendations.

The recommendations developed by the VE study team will directly affect the existing project design. The recommended alternatives have been presented to FDOT, and no fatal flaws with the proposed recommendations were indicated at the presentation. It is understood that further analysis of these recommendations may be needed in order to make a final decision to accept them. FDOT will determine the acceptability of each recommendation. Each recommendation may be implemented individually or combined with others.

Table 1.1 – 1
Preliminary PD&E Cost Summary

Construction Item	Total Costs
Earthwork	$2,049,135.73
Roadway	$3,165,302.94
Shoulder	$1,052,302.33
Median	$378,288.56
Drainage	$2,607,572.02
Signing	$99,764.90
Lighting	$290,535.46
Misc. (Remove Concrete)	$1,662,500.00
Total Construction	**$11,305,401.94**
MOT (10%)	$1,130,540.19
Subtotal	**$12,435,942.13**
Mobilization (9%)	$1,119,234.79
Contingency	$135,551.77
Project Unknowns (0%)	$0.00
Subtotal	**$13,690,728.70**
Design (10%)	$1,369,072.87
CE1 (10%)	$1,369,072.87
Total	**$16,428,874.44**

Reference: FDOT Long Range Estimate, prepared by ATKINS, dated March 14, 2014

1.5 MANAGEMENT ACCEPTANCE & IMPLEMENTATION

Management action on each of the recommendations taken at the subsequent resolution meeting will be included in **Table 1.4 – 1** in the "Management Action" column. The FDOT Project Manager must ensure that all accepted recommendations are implemented and all pending actions are resolved for inclusion in the project design. Close coordination with the District Value Engineer is encouraged to ensure timely resolution of management action.

TABLE 1.4 – 1
SUMMARY OF HIGHEST RATED RECOMMENDATIONS

		PRESENT WORTH (PW) OF COST (FUTURE COST)		
Rec. No.	**Description**	**Management Action**	**Comments**	**Potential Cost Savings (Value Added)**
1	Maintain the existing two-lane typical section between Corey Road and the railroad tracks	NA		$5,144,000
5	Transition from 4-lane to a 2-lane existing west of Corey Road to avoid the Fern Creek Crossing Park and the Post Office	NA		$1,628,000
6	Maintain the existing two-lane typical section between Corey Road and US 1	NA		$5,895,000
7	Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1	NA		$5,851,000
11	Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR 514 and US 1	NA		($1,004,000)
12	Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad	A		($50,000)
17	Shift alignment to the south to avoid the taking of Hospital parking	A		$1,027,000

Management Action Legend: A=Accepted, NA=Not Accepted, FS=Further Study

VALUE ENGINEERING METHODOLOGY 2

2.1 GENERAL

This section describes the value analysis procedure used during the VE study. A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) pre-study preparations, 2) VE workshop study, and 3) post-study.

2.2 PRE-STUDY PREPARATIONS

Pre-study preparations for the VE effort consisted of scheduling study participants and tasks; reviews of documents; gathering necessary background information on the project; and compiling project data into a cost model. Information relating to the design, construction, and operation of the facility is important as it forms the basis of comparison for the study effort. Information relating to funding, project planning, operating needs, systems evaluations, basis of cost, production scheduling, and construction of the facility was also a part of the analysis.

2.3 VE WORKSHOP STUDY

The VE workshop was a five-day effort. During the workshop, the VE job plan was followed. The job plan guided the search for high value areas in the project and included procedures for developing alternative solutions for consideration while at the same time considering efficiency. The methodology includes these phases:

- Information Gathering Phase
- Function Identification and Cost Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation and Reporting Phase

2.3.1 Information Phase

At the beginning of the study, the conditions and decisions that have influenced the development of the project must be reviewed and understood. For this reason, the PD&E consultant project manager provided design information about the project to the VE team. Following the presentation, the VE team discussed the project using the documents listed in **Section 3.3**.

2.3.2 Function Identification and Cost Analysis Phase

Based on the bridge development report cost estimate, historical and background data, a cost model was developed for this project organized by major construction elements. It was used to distribute costs by project element in order to serve as a basis for alternative functional categorization. The VE team identified the functions of the various project elements and subsystems and created a Function Analysis System Technique Diagram to display the relationships of the functions.

2.3.3 Creative Phase

This VE study phase involved the creation and listing of ideas. During this phase, the VE team developed as many ideas as possible to provide a creative atmosphere and to help team members to "think outside the box." Judgment of the ideas was restricted at this point to insure vocal critics did not inhibit creativity. The VE team was looking for a large quantity of ideas and association of ideas.
Brevard County, FDOT, and the design team may wish to review the creative design suggestions that are listed in **Section 6**, because they may contain ideas, which can be further evaluated for potential use in the design.

2.3.4 Evaluation Phase

During this phase of the workshop, the VE team judged the ideas generated during the creative phase. Advantages and disadvantages of each idea were discussed and a matrix developed to help determine the highest-ranking ideas. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improvement to the project were "carried forward" for further development.

The creative listing was re-evaluated frequently during the process of developing ideas. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single idea. For these reasons, some of the originally high-rated ideas may not have been developed.

2.3.5 Development Phase

During the development phase, each highly rated idea was expanded into a workable solution. The development consisted of a description of the idea and a descriptive evaluation of the advantages and disadvantages of each proposed idea. Each idea was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The developed VE ideas are summarized in the section entitled **Section 7 – Recommended Alternatives**.

2.4 POST STUDY

The post-study portion of the VE study includes the draft and final preparation of this Value Engineering Study Report and the discussions and resolution meetings with FDOT personnel. The PD&E consultant team should analyze each alternative and prepare a short response, recommending incorporating the idea into the project, offering modifications before implementation, or presenting reasons for rejection. The VE team is available for consultation after the ideas are reviewed.

2.4.1 Presentation and Reporting Phase

The final phase of the study began with the presentation of the ideas on the last day of the VE Study. The VE team screened the VE ideas before a draft copy of the report was prepared. The initial VE ideas were arranged in the order indicated to facilitate cross-referencing to the final recommendations for revision to the PD&E documents.

2.4.2 Final Report

The acceptance or rejection of ideas described in this report is subject to Brevard County and FDOT's review and approval. The VE team is available to address any final draft report comments for incorporation into the final report.

WORKSHOP PARTICIPANTS AND PROJECT INFORMATION 3

3.1 PARTICIPANTS

Representatives from the PD&E consultant presented an overview of the project and the preferred concept on August 18, 2014. The purpose of this meeting was to acquaint the study team with the overall project and the main areas the VE team needed to focus on during this VE study.

The VE facilitator also reviewed and explained the value engineering improvement study agenda. He acquainted the team with the goals for the study based upon the study methodology that would be applied to improve the project. The study team included the following experts who participated in the study:

Participant Name	Role	Affiliation
Mark Meeks	Right of Way	URS
Doug Towson, PE	Traffic Operations	FDOT, District 5
Janusz Wagner, PE	Roadway Design	URS
Karen Snyder, PE	Drainage	FDOT, District 5
Jim Connelly	Construction/Operations	FDOT, District 5
Jerald Marks	Project Manager	FDOT, District 5
Tharwat Hannadawod, EI	Geotechnical	FDOT, District 5
Ty Garner	District VE Administrator	FDOT, District 5
Rick Johnson, PE, CVS	VE Team Leader	PMA Consultants LLC

3.2 PROJECT INFORMATION

The purpose of the project orientation meeting, on August 18, 2014, in addition to being an integral part of the Information Gathering phase of the VE study, was to bring the VE team "up-to-speed" regarding the overall project scope.

3.2 LIST OF VE STUDY MATERIAL REVIEWED

The PD&E consultant provided the following documents that the VE team reviewed prior to and during the study:

1. Draft Preliminary Engineering Report Malabar Road (SR 514) PD&E Study from Babcock Street (SR 507) to US 1, prepared by Atkins, dated July 2014
2. Draft Location Hydraulic Report SR 514 (Malabar Road), PD&E Study From Babcock Road to US 1, prepared by Atkins, dated July 2014
3. Draft Wetlands Evaluation and Biological Assessment Report, Malabar Road (SR 514) PD&E Study, From SR 507 (Babcock Street) to US 1, prepared by Atkins, dated June 2014
4. Draft Pond Siting Report, SR 514 (Malabar Road) PD&E Study, From Babcock Road to US 1, prepared by Atkins, dated July 2014
5. Final SR514 Design Traffic Technical, Memorandum For SR 514 Project Development and Environmental Study From Babcock Street (SR 507) to US, prepared by GMB Engineers & Planners, Inc., dated July 2014
6. Preliminary Soil Survey Report, State Road 514 PD&E Study State Road 507 to US 1, prepared by Antillian Engineering Associates, Inc., dated October 7, 2013
7. Level 1 Assessment Contamination Screening Evaluation Report, prepared by Geotechnical and Environmental Consultants, Inc., dated January 27, 2014

8. Report Of Preliminary Geotechnical Investigation For Ponds, prepared by Geotechnical and Environmental Consultants, Inc., dated October 31, 2013
9. SR 514 (Malabar Road) PD&E Study Utility Assessment Report, prepared by Omni Communications, dated March 20, 2014
10. Right of Way Cost Estimate, prepared by FDOT, dated March 26, 2014
11. FDOT Long Range Estimating System – Production, prepared by Atkins, dated March 13, 2014

3.4 SUMMARY OF GENERAL PROJECT INPUT - OBJECTIVES, POLICIES, DIRECTIVES, CONSTRAINTS, CONDITIONS & CONSIDERATIONS

The following is a summary of general project input, including the goals, objectives, directives, policies, constraints, conditions and considerations presented to the study team. Any "element" specific input is indicated by parentheses around the elements, disciplines and interests (i.e., right-of-way, roadway, environmental). Representatives from the FDOT and design team provided a project background, on the first day of the study.

3.4.1 Project Functions, Goals & Objectives (what the project should do as determined at the kickoff meeting and subsequent Workshops):

1. Improve LOS
2. Convey Traffic
3. Add Lanes
4. Convey Pedestrians
5. Permit Project
6. Provide Refuge
7. Build Project
8. Establish Elevation
9. Convey Water
10. Separate Traffic
11. Meet Standards
12. Design Project
13. Provide Documents
14. Prepare Alignment
15. Inform Motorists
16. Analyze Data
17. Minimize Maintenance
18. Mitigate Risk
19. Recommend Alternatives
20. Analyze Alternatives
21. Determine Need
22. Enhance Visibility
23. Accommodate Unforeseen
24. Assure Quality
25. Satisfy Specifications
26. Protect Environment
27. Accommodate Emergency
28. Perform Studies
29. Execute Construction
30. Satisfy Public

These functions were used by the VE team to create/brainstorm new ideas for potential improvement to the project.

3.4.2 Project Policies & Directives: (documented things the project must do or must not do)

1. The project shall meet economic, engineering design, environmental and social/cultural criteria requirements
2. Meet the goals of the FDOT Long Range Transportation Plans and Space Coast Transportation Planning Organization's 2035 Long Range Transportation Plan for future developments.

3.4.3 General Project Constraints: (unchangeable project restrictions)

1. Malabar Scrub Sanctuary
2. Malabar Park
3. Malabar Disc Park
4. Fern Creek Crossing Park

3.4.4 General Project Conditions & Considerations:

a. Refer to the design documents and backup documentation prepared by Atkins.

3.4.5 Site Review Comments and other observations:

1. Do we need the bid-directional turning lane?
2. Consider Pond S and move it adjacent to the right of way after taking the two homes on the north side of Malabar Road.
3. Look for an alternative to the shell pond (Pond U).
4. Are there options to locate the trail and connect to avoid the Scrub Sanctuary?
5. Is the trail along Malabar Road part of the Management Plan?
6. Enterprise Road is not as commercial as anticipated.

ECONOMIC DATA, COST MODELS AND ESTIMATES 4

4.1 ECONOMIC DATA

The study team used economic criteria for evaluation with information gathered from the design consultant's Long Range Estimate (LRE) that was provided August 5, 2014. In order to express costs in a meaningful manner the cost comparisons associated with alternatives are presented on the basis of the total life cycle cost and discounted present worth of the work. Project period interest rates are based on the following parameters:

Year of Analysis	2014
Economic Planning Life	20 years starting in 2018
Discount Rate/Interest	5.00%
Inflations/Escalation	3.00%

The LRE was used by the team for the major construction elements. The baseline estimate was determined based a combination of the original Project Development &Environment Alternatives A and C. The basis of cost is the FDOT LRE for unit costs and quantities where appropriate.

The estimated cost for roadway construction is $13,690,728.70. The estimated cost to acquire all right of way for the proposed Alternative C concept is $20,517,000.

Table 4.1 – 1
Preliminary PD&E Cost Estimate

Construction Item	Sequence 1	Sequence 2	Sequence 3	Sequence 4	Total Costs	Function
Earthwork	$1,017,755.89	$1,031,379.84			$2,049,135.73	Establish Elevation
Roadway	$1,412,084.95	$1,654,392.31	$98,825.68		$3,165,302.94	Convey Traffic
Shoulder	$386,882.99	$601,271.34	$64,148.00		$1,052,302.33	Provide Refuge
Median	$180,438.90	$197,849.66			$378,288.56	Separate Traffic
Drainage	$1,166,179.95	$118,944.74		$1,322,447.33	$2,607,572.02	Convey Water
Signing	$38,047.72	$38,748.48	$22,968.70		$99,764.90	Inform Motorists
Lighting	$290,535.46				$290,535.46	Enhance Visability
Misc. (Remove Concrete)	$831,250.00	$831,250.00			$1,662,500.00	Prepare Alignment
Total Construction	**$5,323,175.86**	**$4,473,836.37**	**$185,942.38**	**$1,322,447.33**	**$11,305,401.94**	
MOT (10%)	$532,317.59	$447,383.64	$18,594.24	$132,244.73	$1,130,540.19	Maintain Traffic
Subtotal	**$5,855,493.45**	**$4,921,220.01**	**$204,536.62**	**$1,454,692.06**	**$12,435,942.13**	
Mobilization (9%)	$526,994.41	$442,909.80	$18,408.30	$130,922.29	$1,119,234.79	Execute Construction
Contingency	$33,887.94	$33,887.94	$33,887.94	$33,887.94	$135,551.77	Accommodate Unforeseens
Subtotal	**$6,416,375.80**	**$5,398,017.75**	**$256,832.86**	**$1,619,502.29**	**$13,690,728.70**	
Design (10%)	$641,637.58	$539,801.78	$25,683.29	$161,950.23	$1,369,072.87	Provide Documents
CE1 (10%)	$641,637.58	$539,801.78	$25,683.29	$161,950.23	$1,369,072.87	Assure Quality
Total	**$7,699,650.96**	**$6,477,621.30**	**$308,199.43**	**$1,943,402.75**	**$16,428,874.44**	

Reference: FDOT Long Range Estimate, prepared by Atkins, dated March 14, 2014

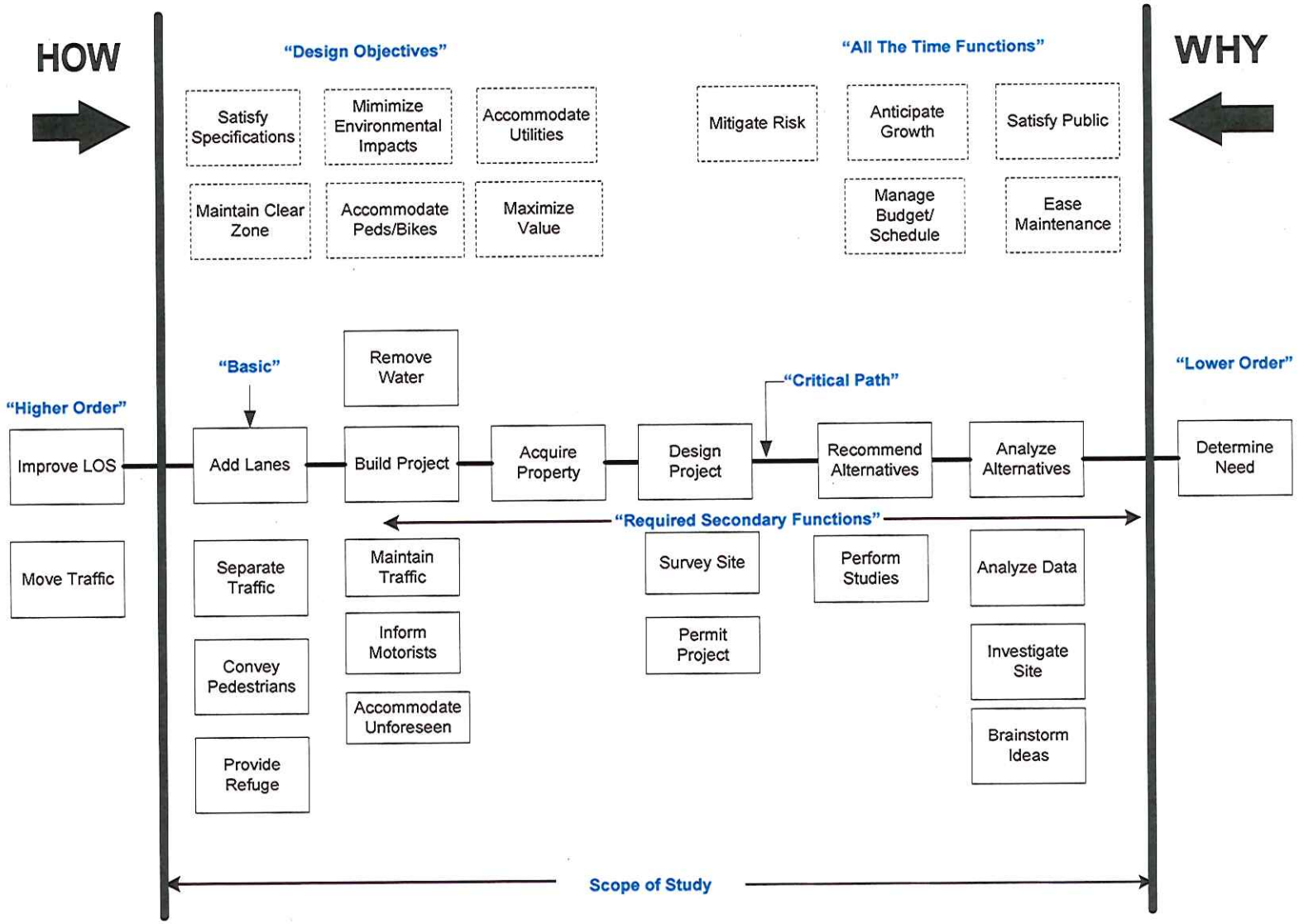
FUNCTION ANALYSIS AND FAST DIAGRAM 5

This project's Function Analysis was reviewed and developed by the team to define the requirements for the overall project (and each project element, if required) and to ensure that the VE team had a complete and thorough understanding of the functions (basic and others) needed to satisfy the project requirements. The primary Function Analysis System Technique Diagram for the project is included. The development of FAST diagrams help stimulate team members to think in terms of required functions, not just normal solutions, to enhance their creative idea development. The project's primary tasks, the critical path functions, the project's primary basic functions and other required functions that must be satisfied were identified and are indicated in the report.

A Functional Analysis was prepared to determine the basic function of the overall project and each area shown in the cost model. Functional Analysis is a means of evaluating the functions of each element to see if the expenditures for each of those elements actually provide the requirements of the project, or if there are disproportionate amounts of money being proposed to be spent for support functions. These elements add cost to the final project, but have a relatively low worth to the basic function. This creates a high cost-to-worth ratio.

A FAST diagram was developed to identify and display the critical functions path for the overall project. The basic and supporting secondary functions are illustrated on the following FAST Diagram.

Figure 5.1 – FAST Diagram
State Road 514 (Malabar Road) from Babcock Street to US 1 PD&E Study



EVALUATION 6

During the creative phase numerous ideas, alternative proposals and/or recommendations were generated for each required function using conventional brainstorming techniques and are recorded on the following pages. These ideas were discussed and evaluation criteria were determined. The VE team identified eight weighted evaluation criteria that included Capital Cost, Right of Way Impacts, Level of Service, Public Perception, Environmental Impacts, Ease of Maintenance, Constructability, and Maintenance of Traffic. The evaluation criteria were assigned a weighted value from 1 to 8 based on a VE team consensus on the importance of each item. Criteria with the most importance received an 8-weight and the least important received a 1-weight. The ideas were then individually discussed and given a score, on a scale of 1 to 5 with 1 being the least beneficial and 5 most beneficial. The score for each item is multiplied by the weighted criteria value and each multiplication product is added to obtain a total score for the idea.

Table 6.1 – 1 includes a list of ideas that were generated during the creative phase and each idea's score. **Table 6.1 – 2** illustrates the weighted values for the evaluation criteria and **Table 6.1 – 3** shows the evaluation matrix for idea ranking total scores for all ideas carried forward. The ideas that scored equal to or greater than the original design concept total score were sufficiently rated for further development. The ideas in the table with strike-throughs were not developed because they were combined with other ideas, not feasible, or were eliminated from consideration for other reasons.

There were 19 original creative ideas and 13 that were evaluated and scored. The write-ups for the developed ideas are in **Section 7**. The tables that follow show the original 19 ideas and three design suggestions with the ideas that survived the evaluation, analysis and development phases of the study becoming viable recommendations for value improvements. During the evaluation process the VE team identified three creative ideas as design suggestions for the designers to consider. Ideas that became design suggestions or design questions for the mid-point review are designated as "DS" on the evaluation worksheets. The major design suggestions identified by the VE team are:

DS-1 Review ideas for compensatory treatment along the US 1 corridor outside of the project limits

DS-2 Dedicate land for a park to replace a portion of the Fern Creek Crossing Park to avoid impacting the wetlands on the north side of Malabar Road

DS-3 At the post office avoid any potential taking of their property

No specific action is normally required to accept or not accept the suggestions, though it is often helpful, for documentation purposes, to formally list those suggestions that will be acted upon by the FDOT. Readers are encouraged to review the Creative Idea Listing and Evaluation Worksheets that follow, since they may suggest additional ideas that can be applied to the design or construction.

TABLE 6.1 –1
Value Engineering Study Ideas

Idea No.	Ideas	Capital Costs	R/W Impacts	LOS	Public Perception	Environmental Impacts	Ease of Maintenance	Constructability	Maintenance of Traffic
	Original Concept								
	PD&E Documents	3	3	3	3	3	3	3	3
	Roadway								
1	Maintain the existing two-lane typical section between Corey Road and the railroad tracks	4	4	2.5	2.5	4	3	4.5	3.5
2	~~Realign and 4-lane Malabar Road from the curve (Sta. 228) to US 1 along Glatter Road alignment~~								
3	~~Don't provide sidewalks from Corey Road to the Palm Bay Hospital~~								
4	~~Maintain Segment 1 typical section at 45 MPH all the way through Corey Road~~								
5	Transition from 4-lane to a 2-lane existing west of Corey Road to avoid the Fern Creek Crossing Park and the Post Office	4	4.5	2.75	3	4.5	3.25	3.25	3
6	Maintain the existing two-lane typical section between Corey Road and US 1	4	4.5	2.5	2.5	4.5	3	3.5	3.5
7	Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1	4	4	3	3	4.5	3	3.5	3.5
8	Realign and 4-lane Malabar Road from the curve (Sta. 228) to US 1 along Glatter Road alignment and bridge the railroad and flyovers to northbound and southbound US 1	1	2.5	4	2	2.25	1	1	4.5
9	~~In Segment 2 construct a 4-lane urban typical section with design speed of 50 MPH~~								
10	Don't provide sidewalks from Corey Road to the Palm Bay Hospital but continue the multi-use path to the hospital	3.25	3	3	2.5	3	3	3.25	3
	Drainage								
11	Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR 514 and US 1	2.5	2.5	3	3	3.5	2.5	2.5	3
12	Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad	3	3.5	3	3	4.5	2.75	2.75	3
DS-1	Review ideas for compensatory treatment along the US 1 corridor outside of the project limits	2.25	2.25	3	3	4.5	2.75	2.75	3
	Right of Way								
DS-2	Dedicate land for a park to replace a portion of the Fern Creek Crossing Park to avoid impacting the wetlands on the north side of Malabar Road								
15	Hold the right of way line at the southwest quadrant of Corey Road and shift the proposed roadway south	3	3.5	3	3	3	3	3.25	3
DS-3	At the post office avoid any potential taking of their property								
17	Shift alignment to the south to avoid the taking of Hospital parking	2.5	3.5	3	3	3	3	3	3
	Miscellaneous								
18	Consider widening the multi-use path to 12 feet	2.75	2.5	3	3.5	2.5	3	3	3
19	Consider a controlled pedestrian crossing at the Hospital	2.75	3	2	3.5	3	2.75	3	3

TABLE 6.1 –2
Value Engineering Study Weighted Values

Capital Costs	R/W Impacts	LOS	Public Perception	Environmental Impacts	Ease of Maintenance	Constructability	Maintenance of Traffic
3	6	8	4	7	2	1	5

TABLE 6.1 –3
Value Engineering Study Evaluation Scores

Idea No.		Capital Costs	R/W Impacts	LOS	Ease of Maintenance	Constructability	Maintenance of Traffic	TOTAL	FHWA CATEGORIES				
									Safety	Construction	Operations	Environment	Other
	Original Concept												
	PD&E Documents	9	18	24	6	3	15	93					
	Roadway												
1	Maintain the existing two-lane typical section between Corey Road and the railroad tracks	12	24	20	6	4.5	17.5	104.5		X		X	
5	Transition from 4-lane to a 2-lane existing west of Corey Road to avoid the Fern Creek Crossing Park and the Post Office	12	27	22	6.5	3.25	15	114.25		X		X	
6	Maintain the existing two-lane typical section between Corey Road and US 1	12	27	20	6	3.5	17.5	110		X		X	
7	Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1	12	24	24	6	3.5	17.5	113		X		X	
8	Realign and 4-lane Malabar Road from the curve (Sta. 228) to US 1 along Glatter Road alignment and bridge the railroad and flyovers to northbound and southbound US 1	3	15	32	2	1	22.5	76.75					
10	Don't provide sidewalks from Corey Road to the Palm Bay Hospital but continue the multi-use path to the hospital	9.75	18	24	6	3.25	15	92					
	Drainage												
11	Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR 514 and US 1	7.5	15	24	5	2.5	15	90.5		X		X	
12	Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad	9	21	24	5.5	2.75	15	105.75		X		X	
DS-1	Review ideas for compensatory treatment along the US 1 corridor outside of the project limits	6.75	13.5	24	5.5	2.75	15	96					
	Right of Way												
15	~~Hold the right-of-way line at the southwest quadrant of Corey Road and shift the proposed roadway south~~	9	21	24	6	3.25	15	96.25					
17	Shift alignment to the south to avoid the taking of Hospital parking	7.5	21	24	6	3	15	94.5		X			
	Miscellaneous												
18	Consider widening the multi-use path to 12 feet	8.25	15	24	6	3	15	87.75					
19	Consider a controlled pedestrian crossing at the Hospital	8.25	18	16	5.5	3	15	85.75					

RECOMMENDATIONS 7

The results of this VE study are shown as individual recommendations developed for each area of the project. These recommendations include a comparison between the VE team's proposal and the designer's original concept. Each proposal consists of a summary of the original design, a description of the proposed change, and a descriptive evaluation of the advantages and disadvantages of the proposed recommendation. Sketches and calculations are shown, if appropriate. The estimated cost comparisons reflect unit prices and quantities on a comparative basis. Value improvement is the primary basis for comparison of competing ideas. To ensure that costs are comparable within the ideas proposed by the VE team, the FDOT Long Range Estimate (LRE) costs were used as the pricing basis.

7.1 EVALUATION OF RECOMMENDATIONS

Some of the VE recommendations potential savings are interrelated, if one is accepted another one may or may not need to be added, or acceptance of one may mutually exclude another. The VE team identified potential savings as shown on **Table 1.4 – 1, Summary of Highest Rated Recommendations**. The write-ups for the individual developed ideas are included in this section and are shown in numerical order.

The FDOT and the design team should evaluate and determine whether to accept or not accept each recommendation. The recommendations that are accepted should be identified and listed for documentation purposes. For each idea that will not be accepted, the design team normally documents, in writing, the reason or reasons for the non-acceptance. The design suggestions are for consideration by FDOT and the designers. No specific action is normally required to accept or not accept the suggestions, though it is often helpful, for documentation purposes, to formally list those suggestions that will be incorporated by the designers.

7.2 CONSIDERATIONS AND ASSUMPTIONS

In the preparation of this report and the alternatives that follow, the study team made some assumptions with respect to conditions that may occur in the future. In addition, the study team reviewed the listed project documentation, relying solely upon the information provided by the designer and owner, and relying on that information as being true, complete and accurate. This value analysis and report are based on the following considerations, assumptions and conditions:

- The recommendations rendered herein are as of the date of this report. The study team or leaders assume no duty to monitor events after the date, or to advise or incorporate into any of the alternatives, any new, previously unknown technology.

- The study team or leaders assume that there are no material documents affecting the design or construction costs that the team has not seen. The existence of any such documents will necessarily alter the alternatives contained herein.

The study team or leaders do not warrant the feasibility of these recommendations or the advisability of their implementation. It is solely the responsibility of the designer in accordance with the owner, to explore the technical feasibility and make the determination for implementation.

RECOMMENDATION No. 1: Maintain the existing two-lane typical section between Corey Road and the railroad tracks

Recommended Alternative:
The PD&E Documents show the proposed roadway between Corey Road and US 1 mainly as a reconstruction/widening of existing two lanes to a 3-lane typical section with a bi-directional turning center lane. There is a transition from a 4-lane suburban typical section to existing 2-lane roadway that begins west of Corey Road and it ends approximately 1,500 feet east of Corey Road. The existing 2-lane roadway is utilized for approximately 3,000 feet. A proposed 3-lane typical section begins 300 feet west of Marie Street and ends at US 1.

VE Alternative:
This alternative would taper down from the proposed 4-lane rural typical section to the existing 2-lane rural typical section (no-build) until the railroad crossing at station 284+00.00. The Malabar Trail will be added within the "no-build" portion of the project from Corey Road to Marie Street. Eastbound beyond the railroad to US 1, the typical would follow the recommendations of the PD&E documents of a 3-lane urban typical with 4-ft. bike lanes and 6-ft sidewalks.

Advantages:

- Reduces the amount of right of way needed
- Minimizes the impacts to the Section 4(f) properties
- Reduces the construction costs
- Less environmental impacts (ponds)
- Maintains the rural community character along corridor

Disadvantages:

- The level of service could be reduced at peak travel times
- There may be a perception of no change for the east end residents
- There will be no pedestrian facilities east of Marie Street to accommodate the future multi-modal transportation

FHWA CATEGORIES

___Safety ___Operations __X__Environment __X__Construction ___Other

Potential Cost Savings: $5,144,000

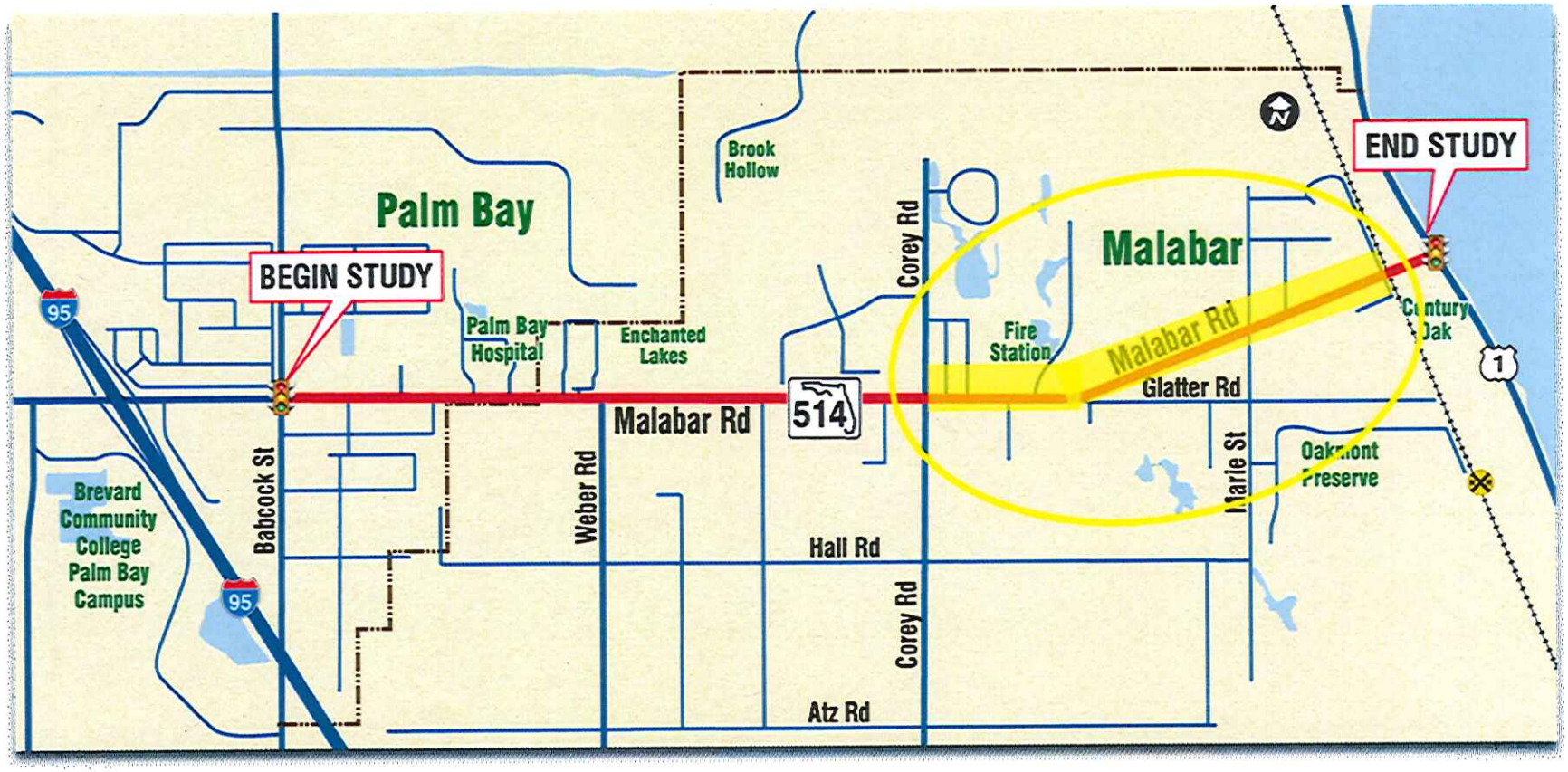
RECOMMENDATION No. 1: Maintain the existing two-lane typical section between Corey Road and the railroad tracks

Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Type B Stabilization	-38,622	SY	$2.50	($96,555)
Optional Base Group 6	-38,622	SY	$15.00	($579,330)
Superpave Asphaltic Conc. C	-2,124	TN	$85.00	($180,540)
Asphaltic Concrete C	-3,186	TN	$110.00	($350,460)
Type F Curb and Gutter	-15,800	LF	$12.52	($197,816)
4 inch concrete sidewalk	-10,533	SY	$27.73	($292,080)
Clearing and Grubbing	-13	AC	$14,182.37	($190,044)
Embankment	-64,956	CY	$5.00	($324,780)
Drainage Components	-1	LS	$280,000	($280,000)
Subtotal				($2,491,605)
MOT (10%)				($249,160)
Mobilization (9%)				($246,669)
Subtotal				($2,987,434)
Design (10%)				($298,743)
CEI (10%)				($298,743)
		CONSTRUCTION TOTAL		**($3,584,921)**

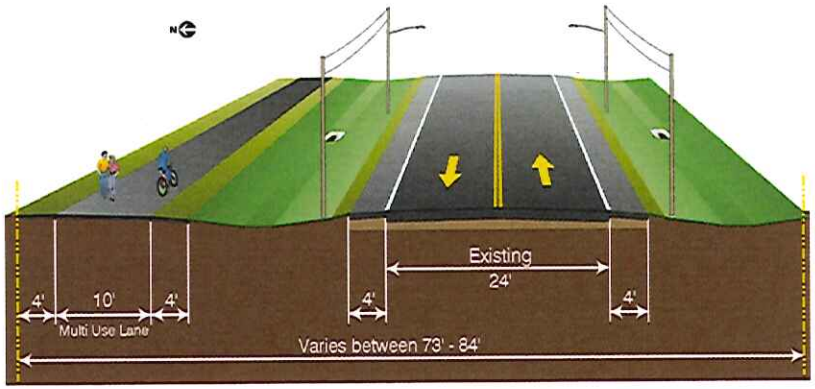
Right of Way Savings:	$1,558,100
Construction Savings:	$3,584,921
Total	$5,143,021

RECOMMENDATION No. 1: Maintain the existing two-lane typical section between Corey Road and the railroad tracks

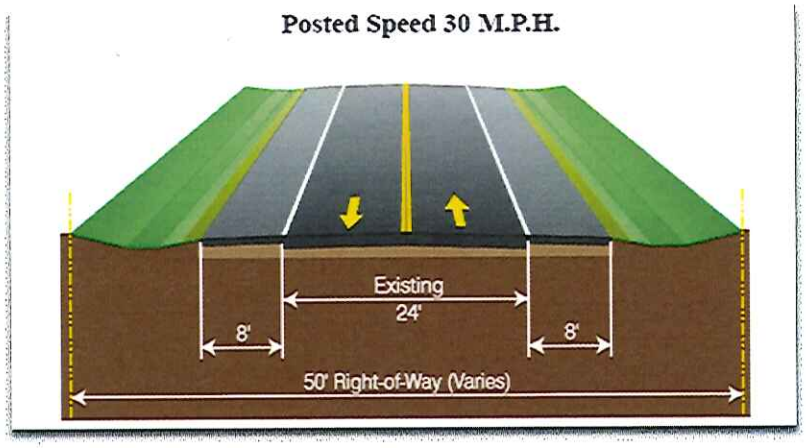


RECOMMENDATION No. 1: Maintain the existing two-lane typical section between Corey Road and the railroad tracks

Corey Rd. to Marie St.



Marie St. to FEC RR



RECOMMENDATION No. 5: Transition from 4-lane to a 2-lane existing west of Corey Road to avoid the Fern Creek Crossing Park and the Post Office

Recommended Alternative:
The PD&E Documents show a transition on the east side of Corey Rd. from a 4-lane to a 2-lane roadway. The transition is made to avoid the Section 4(f) Fern Creek Crossing Park in the southwest quadrant of the intersection of SR 514 and Corey Road.

VE Alternative:

Construct a transition on the west side of Corey Rd. to the existing 2-lane roadway that will allow the project to remain within the existing right of way and still avoid Fern Creek Crossing Park and the Post Office property that is east of Corey Road and is intended for a partial acquisition.

Advantages:

- Less cost – less 4-lane construction
- Less acquisition of right of way
- Minimizes impacts to the wetlands on the north side of the roadway
- Eliminates the acquisition of the Post Office property
- Avoids throw away for the pending intersection project (413761-1)

Disadvantages:

- Minor reduction to the level of service.

FHWA CATEGORIES

___Safety ___Operations _X_Environment _X_Construction ___Other

Potential Cost Savings: $1,628,000

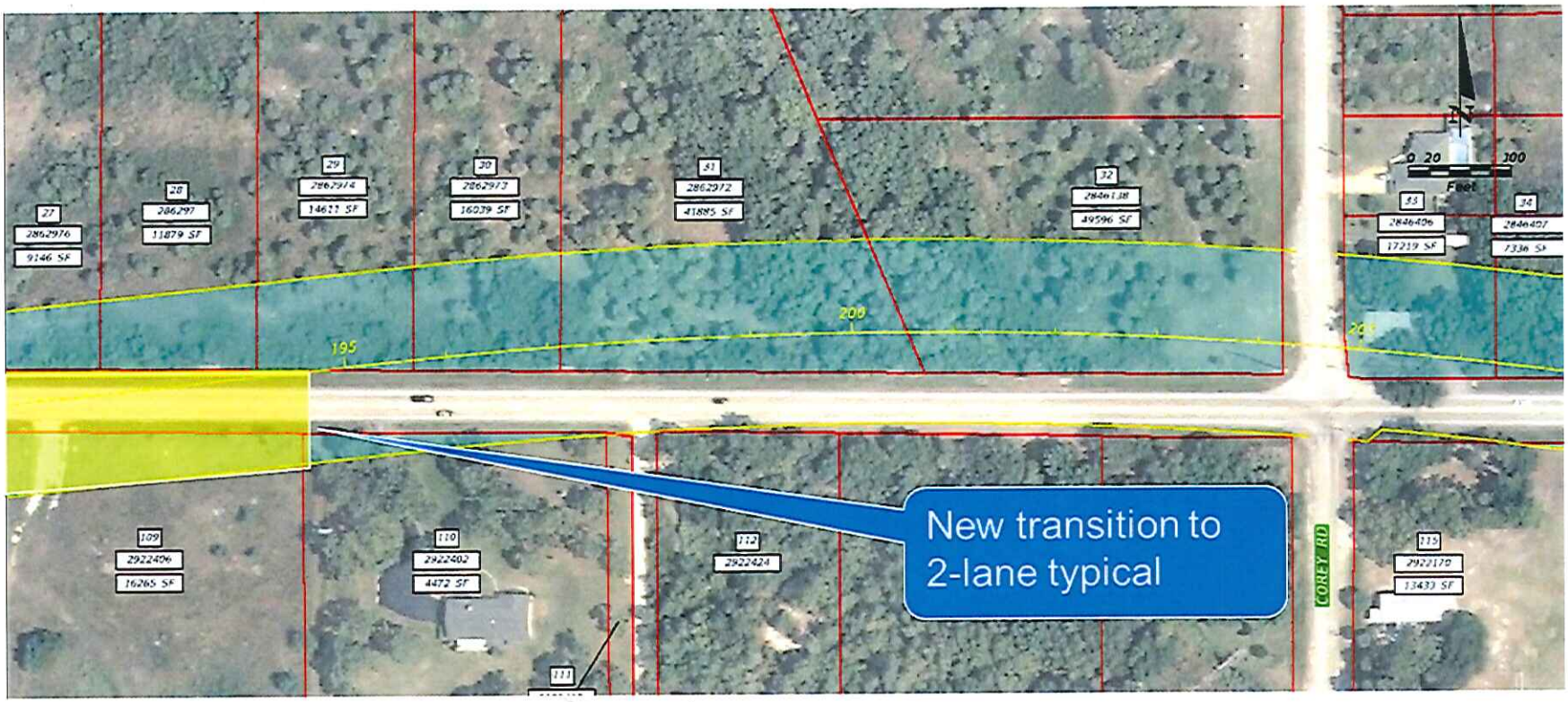
Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Asphalt	-770	TN	$85.00	($65,450)
Base	-4,667	SY	$16.00	($74,672)
RPM's	-80	EA	$3.27	($262)
FC-12.5	-187	TN	$95.00	($17,765)
Subtotal				($158,149)
MOT (10%)				($15,815)
Mobilization (9%)				($15,657)
Subtotal				($189,620)
Design (10%)				($18,962)
CE1 (10%)				($18,962)
			CONSTRUCTION TOTAL	**($227,544)**

Right of Way Savings: $1,400,000

RECOMMENDATION No. 5: Transition from 4-lane to a 2-lane existing west of Corey Road to avoid the Fern Creek Crossing Park and the Post Office

RECOMMENDATION No. 5: Transition from 4-lane to a 2-lane existing west of Corey Road to avoid the Fern Creek Crossing Park and the Post Office



RECOMMENDATION No. 6: Maintain the existing two-lane typical section between Corey Road and US 1

Recommended Alternative:
The PD&E Documents show the proposed roadway between Corey Road and US 1 mainly as a reconstruction/widening of existing two lanes to a 3-lane typical section with a bi-directional turning center lane. There is a transition from a 4-lane suburban typical section to existing 2-lane roadway that begins west of Corey Road and it ends approximately 1,500 feet east of Corey Road. The existing 2-lane roadway is utilized for approximately 3,000 feet. A proposed 3-lane typical section begins 300 feet west of Marie Street and ends at US 1.

VE Alternative:
Maintain the existing two-lane typical section between Corey Road and US 1.

Construct a transition on the west side of Corey Rd. to the existing 2-lane roadway that will allow the project to remain within the existing right of way and still avoid Fern Creek Crossing Park and the Post Office property that is east of Corey Road and is intended for a partial acquisition.

Advantages:

- Less cost
- Less right of way impacts (eliminating an impact on the Post Office at Gilmore Street)
- Less environmental impacts
- Less constructability issues
- Less maintenance of traffic

Disadvantages:

- Decreased Level Of Service
- There may be a perception of no change for the east end residents
- There will be no pedestrian facilities east of Marie Street to accommodate the future multi-modal transportation

FHWA CATEGORIES

___Safety ___Operations _X_Environment _X_Construction ___Other

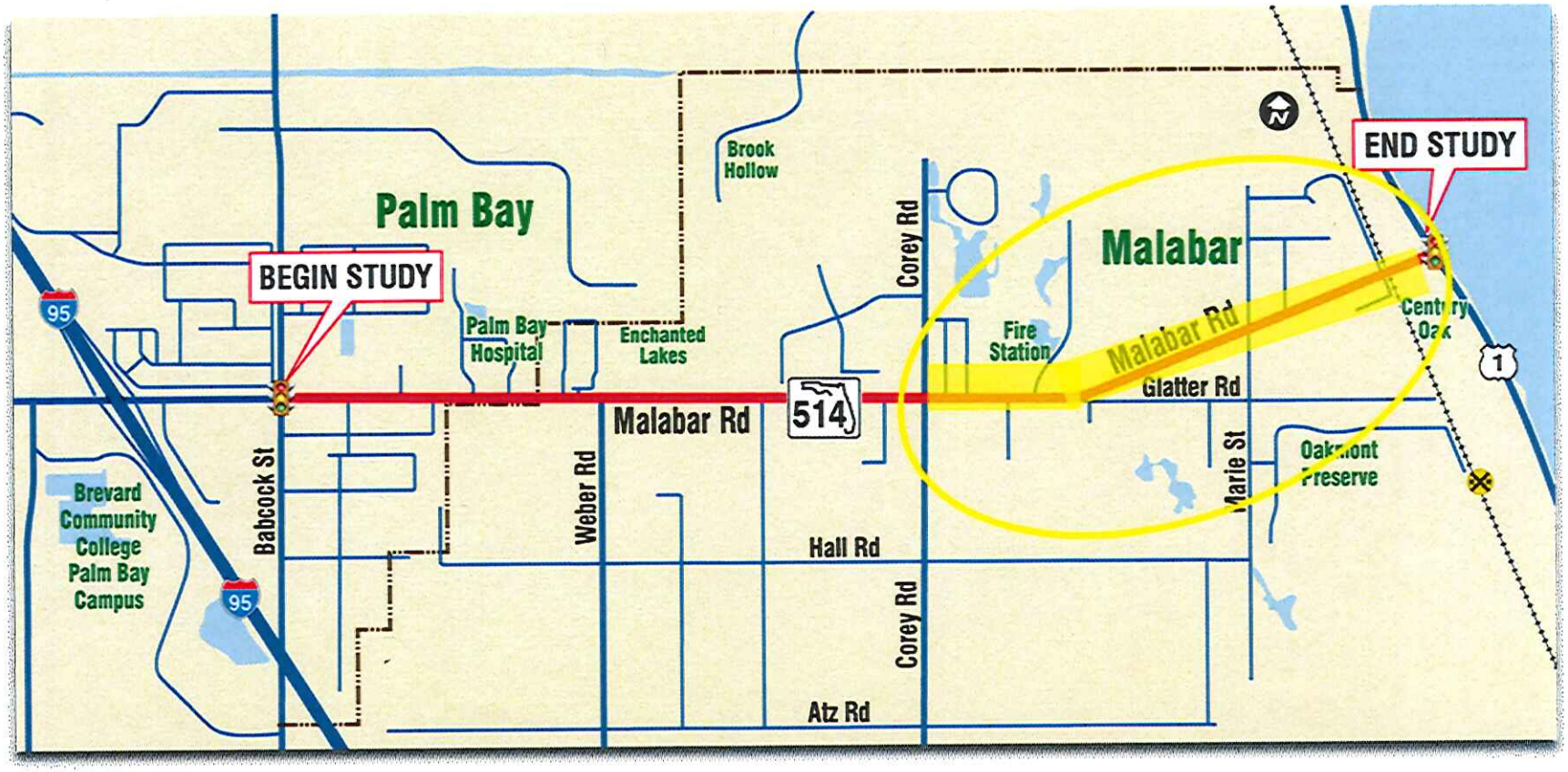
Potential Cost Savings: $5,895,000

RECOMMENDATION No. 6: Maintain the existing two-lane typical section between Corey Road and US 1

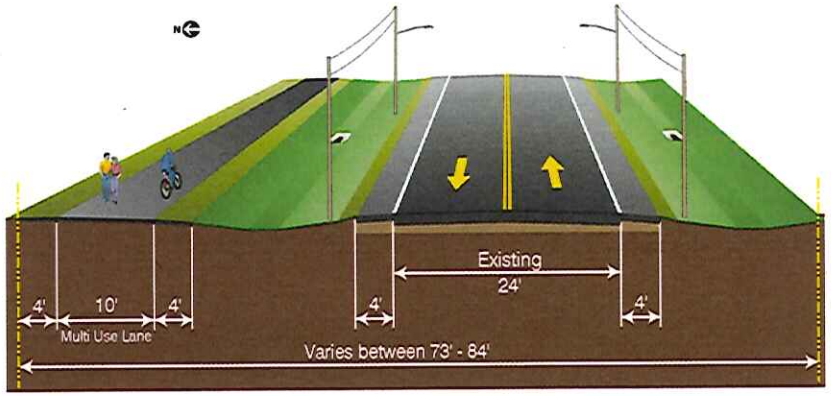
Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Type B Stabilization	-20,636	SY	$2.50	($51,589)
Optional Base Group 6	-20,636	SY	$15.00	($309,535)
Superpave Asphaltic Conc. C	-1,135	TN	$85.00	($96,479)
Asphaltic Concrete C	-1,702	TN	$110.00	($187,226)
Type F Curb and Gutter	-8,040	LF	$12.52	($100,661)
4 inch concrete sidewalk	-5,360	SY	$27.73	($148,633)
Clearing and Grubbing	-7	AC	$14,182.37	($96,440)
Embankment	-33,053	CY	$5.00	($165,265)
Drainage Components	-1	LS	$1,345,314	($1,345,314)
Subtotal				($2,501,141)
MOT (10%)				($250,114)
Mobilization (9%)				($247,613)
Subtotal				($2,998,868)
Design (10%)				($299,887)
CE1 (10%)				($299,887)
		CONSTRUCTION TOTAL		**($3,598,642)**

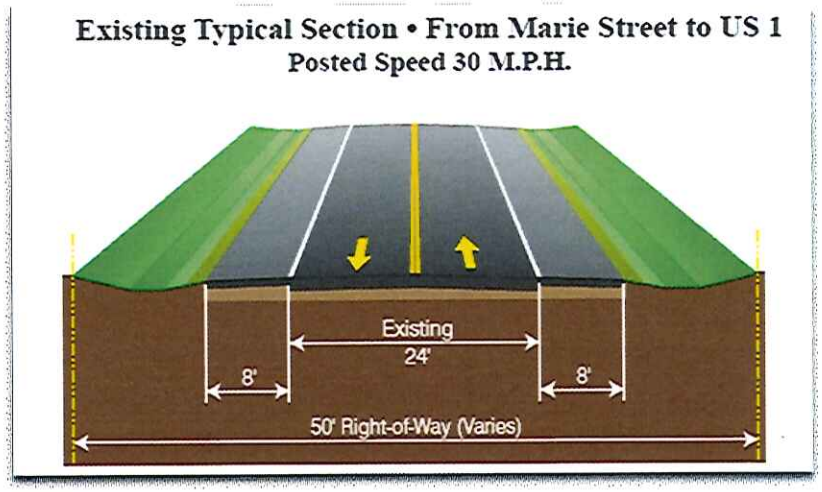
Right of Way Savings:	$2,296,100
Construction Savings:	$3,598,642
Total	$5,894,742


Palm Bay
Malabar
BEGIN STUDY
END STUDY
Brook Hollow
Palm Bay Hospital
Enchanted Lakes
Fire Station
Malabar Rd
Glatter Rd
Malabar Rd
514
Corey Rd
Babcock St
Weber Rd
Marie St
Hall Rd
Atz Rd
Brevard Community College Palm Bay Campus
95
1

Corey Rd. to Marie St.



Marie St. to FEC RR



RECOMMENDATION No. 7: Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1

Recommended Alternative:
The PD&E Documents show construction of a 4-lane suburban typical section transitioning to the existing 2-lane rural section from east of Corey Road to Shiflett Lane. A 10-foot multi-use path will be constructed on the north side of the roadway from east of Corey Road and continue east to Marie Street where it will be connected to the future Malabar Trailway. A 3-lane urban typical section will be constructed from east of Marie Street to US 1.

VE Alternative:
Maintain the existing two-lane section from Corey Road east to US 1 and construct an additional turn lane at the intersection of US 1 and Malabar Road. The multi-use path would still be constructed as shown in the PD&E documents (from Corey Road to Marie Street).

Advantages:

- Less right of way impacts on the north side and south side of the roadway between Corey Road and Shiflett Lane. (From east of Shiflett Lane to Marie Street the right of way impact will stay the same due to the construction of the multi-use path. From east of Marie Street to US 1 there would be no additional right of way impacts.
- Less right of way impact to the Post Office.
- Less roadway construction cost east of Corey Road to just west of Shiflett Lane as well as from east of Marie Street to US 1.
- Less environmental impact (No pond construction east of Marie Street to US 1).

Disadvantages:

- Would not improve access to businesses and residences along Malabar Road from east of Marie Street to US 1.
- Would not provide for multi-modal transportation that would facilitate the future construction of the Malabar Trailway.

FHWA CATEGORIES

___Safety ___Operations _X_Environment _X_Construction ___Other

Potential Cost Savings: $5,851,000

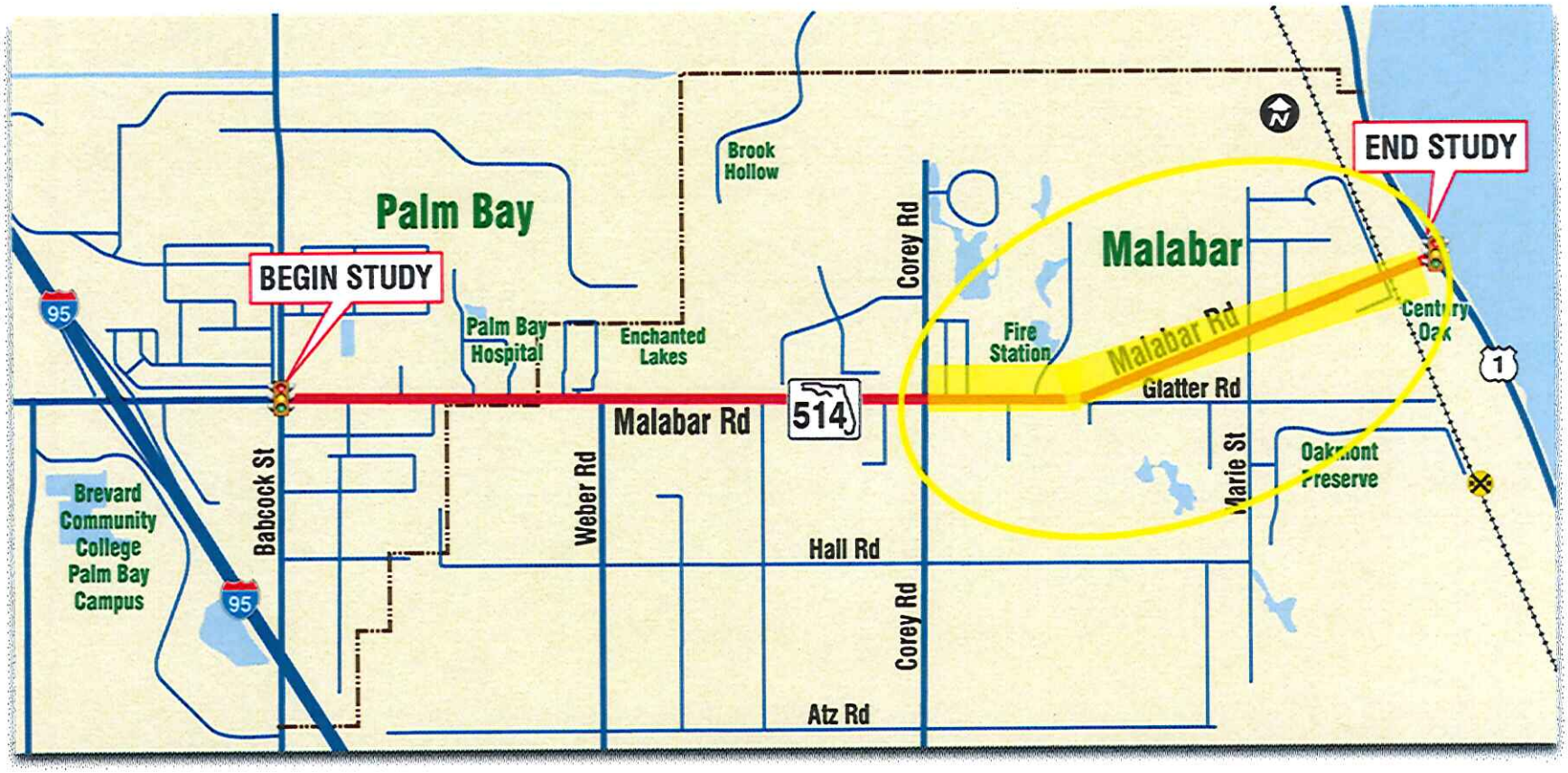
RECOMMENDATION No. 7: Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1

Calculations:

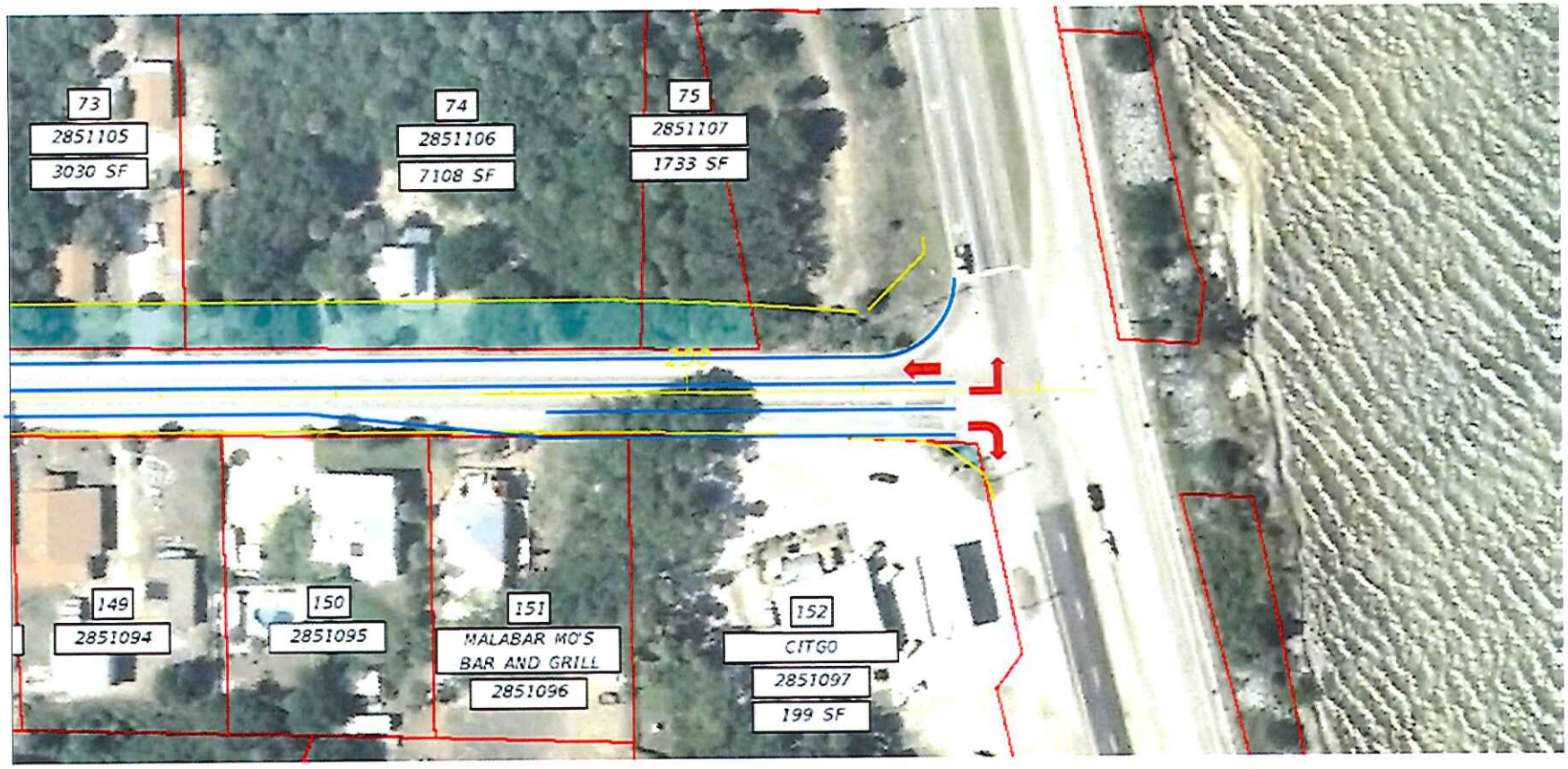
Description	Quantity	Unit	Unit Price	Extended Amount
Type B Stabilization	-19,653	SY	$2.50	($49,133)
Optional Base Group 6	-19,653	SY	$15.00	($294,795)
Superpave Asphaltic Conc. C	-1,081	TN	$85.00	($91,885)
Asphaltic Concrete C	-1,621	TN	$110.00	($178,310)
Type F Curb and Gutter	-8,040	LF	$12.52	($100,661)
4 inch concrete sidewalk	-5,360	SY	$27.73	($148,633)
Clearing and Grubbing	-7	AC	$14,182.37	($96,440)
Embankment	-33,053	CY	$5.00	($165,265)
Drainage Components	-1	LS	$1,345,314	($1,345,314)
Subtotal				($2,470,435)
MOT (10%)				($247,043)
Mobilization (9%)				($244,573)
Subtotal				($2,962,052)
Design (10%)				($296,205)
CE1 (10%)				($296,205)
		CONSTRUCTION TOTAL		**($3,554,462)**

Right of Way Savings:	$2,296,100
Construction Savings:	$3,554,462
Total	$5,850,562

RECOMMENDATION No. 7: Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1



RECOMMENDATION No. 7: Maintain the existing two-lane typical section between Corey Road and US 1 but make turning lane improvements at the intersection at US 1



RECOMMENDATION No. 11: Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR 514 and US 1

Recommended Alternative:
The SR 514 Malabar Road PD&E Study proposed stormwater management for Basin 9 consists of dry retention with recommended Pond U site and exfiltration. Pond U is located in the northwest quadrant of the SR 514 and US 1 (SR 5) intersection. The basin limits for Basin 9 are from the Florida East Coast Railroad at approximately station 284+00 to US 1 (SR 5) at approximately station 291+00.

VE Alternative:
Provide compensatory treatment in Basin 7 with recommended pond alternative Pond O site that discharges east to existing ditch systems located east of Marie Street and ultimately discharges to the FDOT outfall that is located 1,000 feet south of SR 514. This outfall ultimately discharges to the Indian River Lagoon. This will provide compensatory treatment in Basin 7 that is located within the recommended no-build Segment 2 from Corey Road to Marie Street that includes a multi-use path. This will eliminate the recommended stormwater alternative Pond U site.

Advantages:

- Eliminates proposed Pond U site in Basin 9 where the Cultural Resource Assessment (CRAS) has identified the presence of an intact shell midden (Malabar Site, 8BR0053). A Phase II CRAS is currently recommended if any construction is proposed in the vicinity of this site to further define existing conditions.
- Provide an overall improvement to the Indian River Lagoon from a pollutant loading reduction which has been listed for phosphorus and nitrogen impairments.
- Provide a drainage alternative for recommended Pond U in Basin 9 within the same overall drainage basin, Indian River Lagoon.

Disadvantages:

- Increase cost for this portion of Segment 2 to include construction of recommended alternative Pond O site.
- Potential protected species impacts for recommended Pond O site adjacent to existing Malabar Scrub Sanctuary.

FHWA CATEGORIES

___Safety ___Operations __X__Environment __X__Construction ___Other

Potential Value Added: **($1,004,000)** Provides a stormwater alternative for Basin 9

RECOMMENDATION No. 11: Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR 514 and US 1

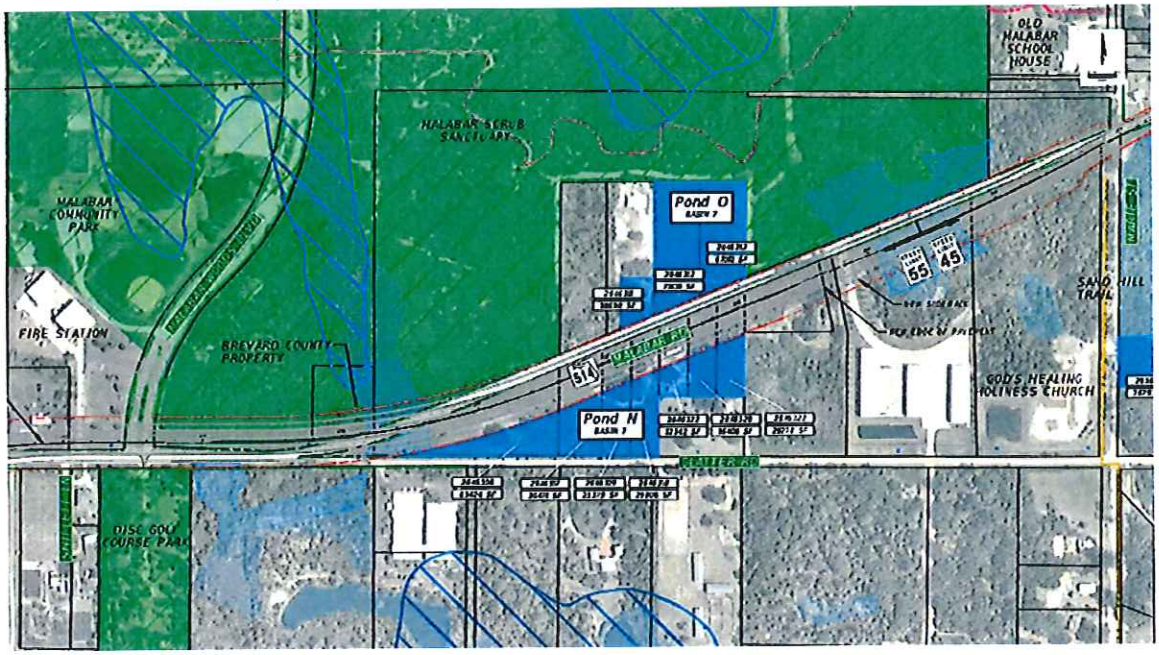
Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Alternative Pond U Site Construction	-1	LS	$95,218.00	($95,218)
Alternative Pond O Site Construction	1	LS	$280,000.00	$280,000
Subtotal				$184,782
MOT (10%)				$18,478
Mobilization (9%)				$18,293
Subtotal				$221,554
Design (10%)				$22,155
CE1 (10%)				$22,155
		CONSTRUCTION TOTAL		**$265,864**

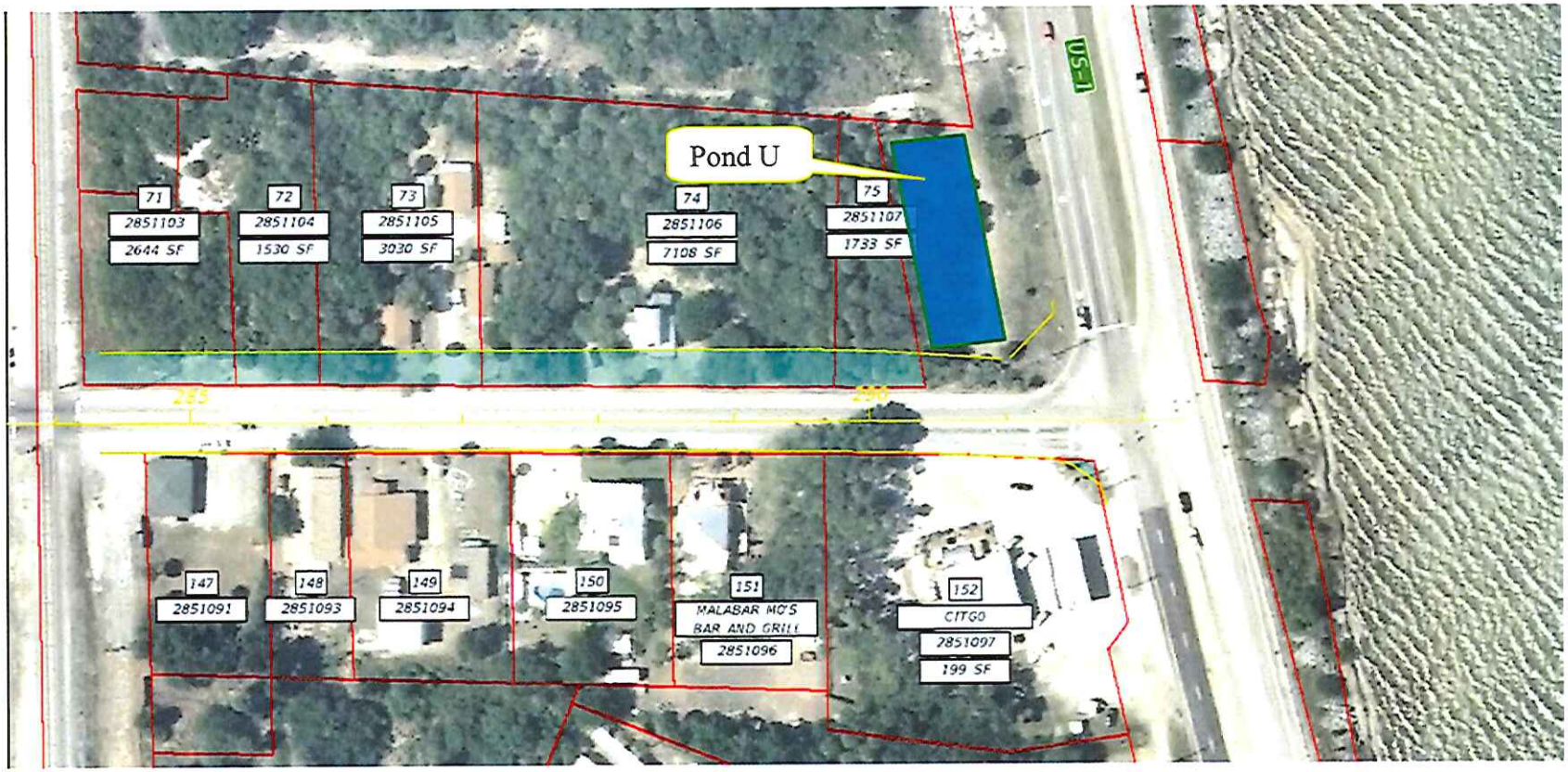
Right of Way Cost: $738,000

Total Enhanced Cost Estimate for Recommendation No. 11
$265,864 + $738,000 = $1,003,864

Notes:
Alternative Pond U Site – within existing FDOT right-of-way; It is anticipated that the construction cost estimates for Pond U *does not* include any mitigation costs if required for potential cultural resource impacts.



RECOMMENDATION No. 11: Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR 514 and US 1



RECOMMENDATION No. 12: Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad

Recommended Alternative:
The SR 514 Malabar Road PD&E Study proposed stormwater management for Basin 9 consists of dry retention with recommended Pond U site that is located in the northwest quadrant of the SR 514 and US 1 (SR 5) intersection. The basin limits for Basin 9 are from the Florida East Coast Railroad at approximately station 284+00 to US 1 (SR 5) at approximately station 291+00.

VE Alternative:

Utilize residential parcel No. 74 for stormwater management that is located on the north side of SR 514 between the Florida East Coast Railroad and US 1 that is partially being impacted by the SR 514 roadway improvements. This stormwater alternative will require full parcel acquisition for Basin 9 stormwater requirements in lieu of recommended Alternative Pond U site.

Advantages:

- Eliminates proposed Pond U site in Basin 9 where the Cultural Resource Assessment (CRAS) has identified the presence of an intact shell midden (Malabar Site, 8BR0053). A Phase II CRAS is currently recommended if any construction is proposed in the vicinity of this site to further define existing conditions.
- Provide an overall improvement to the Indian River Lagoon from a pollutant loading reduction which has been listed for phosphorus and nitrogen impairments.
- Provide a drainage alternative for recommended Pond U in Basin 9 within the same overall drainage basin, Indian River Lagoon.

Disadvantages:

- Need to confirm from topographic standpoint to ensure all of the intersection runoff at US 1 can be conveyed to this new alternative pond site for Basin 9.
- Will require full right-of-way acquisition for residential parcel No. 74.

FHWA CATEGORIES

___Safety ___Operations _X_ Environment _X_ Construction ___Other

Potential Value Added: ($50,000)

RECOMMENDATION No. 12: Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad

Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Alternative Pond U Site	-1	LS	$95,218.00	($95,218)
Excavation for Parcel 74 Pond Site	3,937	CY	$5.00	$19,685
Parcel 74 Pond Clearing and Grubbing	1	LS	$15,000.00	$15,000
Parcel 74 Pond Control Structure	1	LS	$4,000.00	$4,000
Subtotal				($56,533)
MOT (10%)				($5,653)
Mobilization (9%)				($5,597)
Subtotal				($67,783)
Design (10%)				($6,778)
CEI (10%)				($6,778)
		CONSTRUCTION TOTAL		**($81,340)**

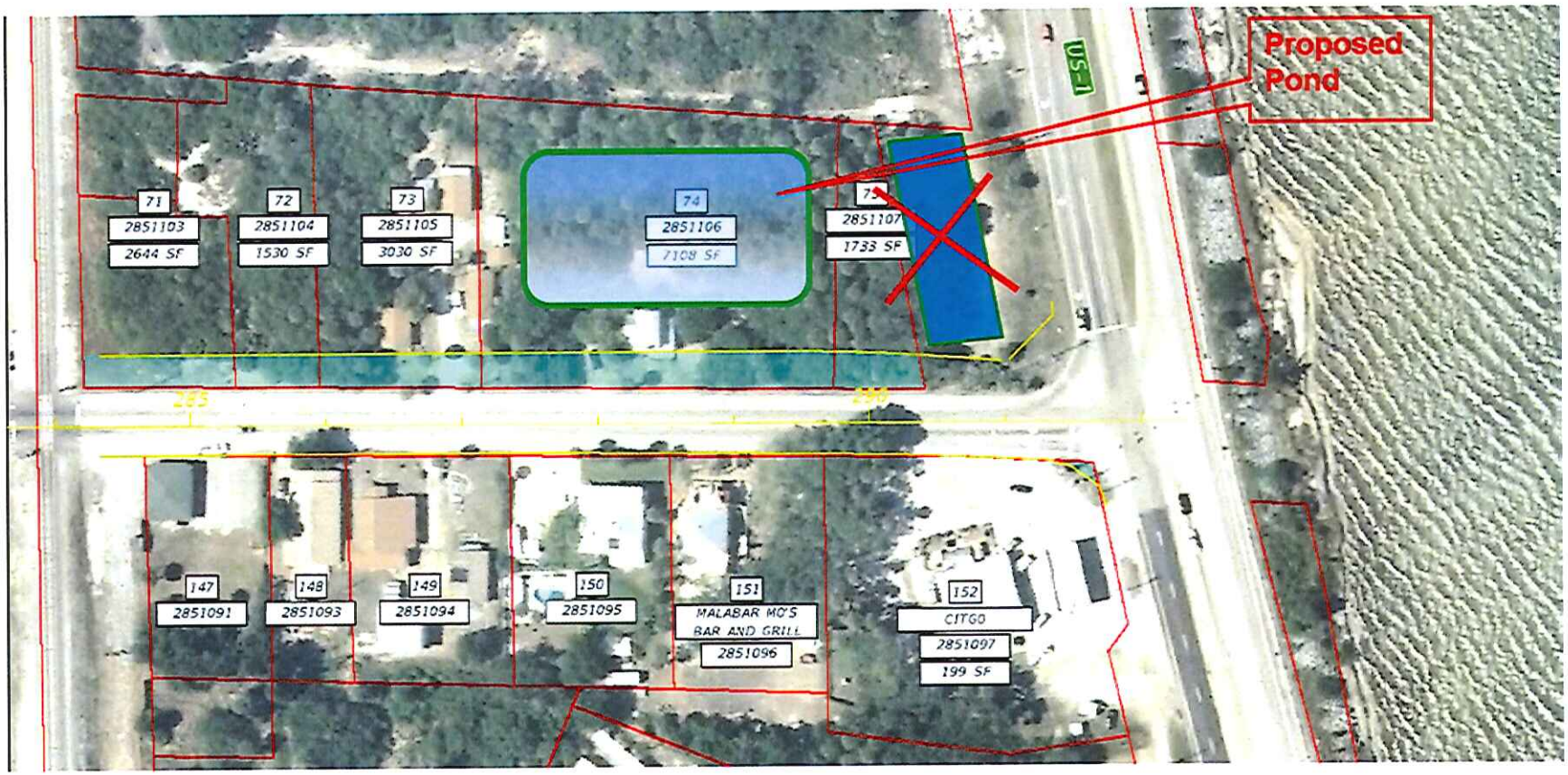
Right of Way Cost: $131,000

Right of Way Cost Estimate for full parcel acquisition for Residential Parcel No. 74: $36,000

Total Enhanced Cost Estimate for Recommendation No. 12
$131,000.00 – $81,340= $49,660

Notes:
Alternative Pond U Site – within existing FDOT right-of-way; It is anticipated that the construction cost estimates for Pond U *does not* include any mitigation costs if required for potential cultural resource impacts.

RECOMMENDATION No. 12: Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad



RECOMMENDATION No. 17: Shift alignment to the south to avoid the taking of Hospital Parking

Recommended Alternative:

The PD&E Documents shows the recommended alternative is a combination of Alternative A with Alternative C; the typical section of Segment 1 (from east of Babcock Street to Weber Rd.) is a 4-lane urban typical section with a design speed of 45 MPH. The right of way varies (112 feet min.); the alignment is affecting the parking lot of the Palm Bay Hospital on the north side of the road [almost taking 30 feet of the parking lot about 800 feet in length]. The alignment shifts to the north from Babcock Street to west of Weber Rd. to avoid concrete Florida Power & Light transmission poles on the south side of the road.

VE Alternative:

Shift the recommended alternative, Segment 1, to the south approximately 30 feet to avoid the taking of the Hospital parking lot. In order to accommodate 45 MPH speed and to achieve smooth transition, a horizontal distance of almost 1,500 feet is needed. The transition may start at Sta. 123+00 (Canova Street) shifting to the south and continue the alignment to connect back to the PD&E original alignment at Sta. 148+00, just 200 feet before Weber Road (Palm Bay Pediatrics).

Advantages:

- Less cost
- Easier construction
- Avoids business damages

Disadvantages:

- Potential impact to C-78 Canal due to extending the box culvert

FHWA CATEGORIES

___Safety ___Operations ___Environment _X_Construction ___Other

Potential Cost Savings: $1,027,000

Calculations:

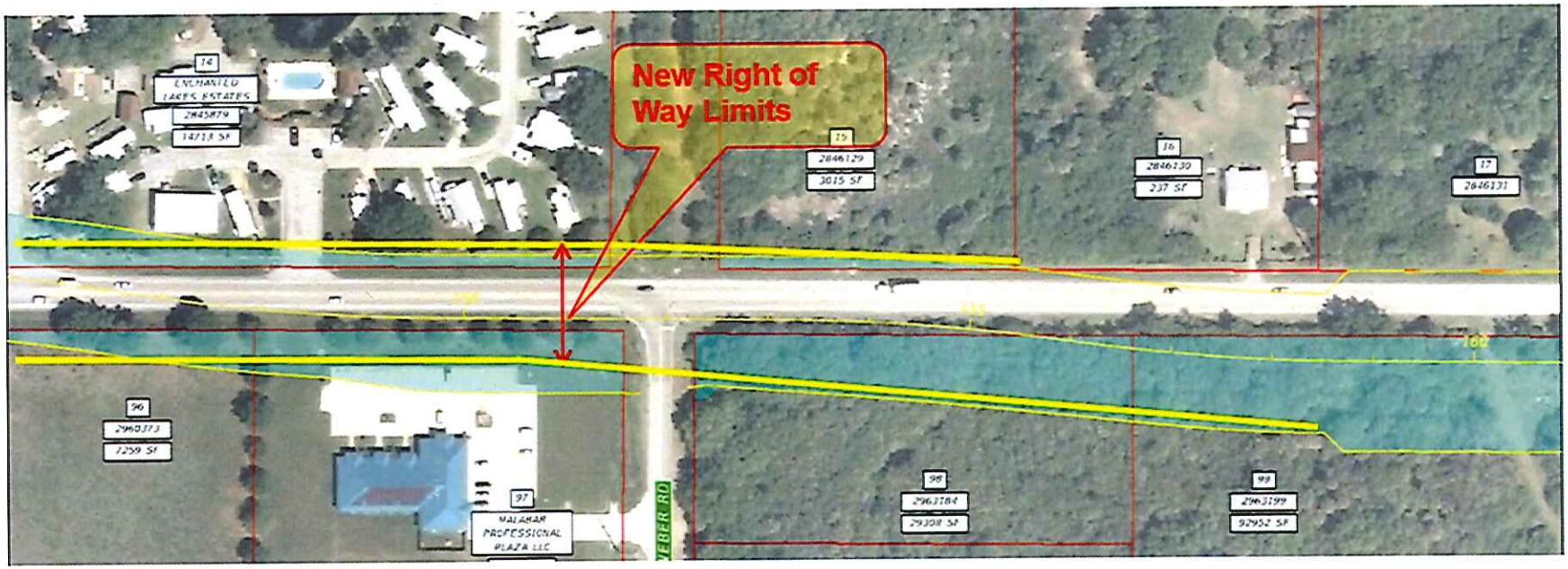
Description	Quantity	Unit	Unit Price	Extended Amount
Misc (Remove Conc.)	-1	LS	$108,030.00	($108,030)
Relocate 7 Utility Power poles	7	EA	$100,000.00	$700,000
Subtotal				$591,970
MOT (10%)				$59,197
Mobilization (9%)				$58,605
Subtotal				$709,772
Design (10%)				$70,977
CE1 (10%)				$70,977
		CONSTRUCTION TOTAL		**$851,726**

Right of Way Savings: $1,878,000

Note: At C-78 Canal [Station 125+05], existing Conc. Box Culvert 8 ft. x 4 ft. with length of 62 feet may need to be extended to the south to accommodate the shift of the road.

RECOMMENDATION No. 17: Shift alignment to the south to avoid the taking of Hospital Parking

RECOMMENDATION No. 17: Shift alignment to the south to avoid the taking of Hospital Parking



APPENDICES

Agenda
Sign In Sheets
Resolution Memo
Slide Presentation

Agenda
August 18 – 22, 2014

Day One	Kickoff Intro by VE Team Leader	8:00 am – 8:15 am
	Team Review and Discussions of Documents	8:15 am – 9:30 am
	Designer Orientation	9:30 am – 10:00 am
	Questions for Designers	10:00 am – 11:00 am
	Travel to Site	11:00 am – 12:00 pm
	Lunch	12:00 pm – 1:00 pm
	Site Review	1:00 pm – 3:30 pm
	Return to Hotel	3:30 pm – 4:30 pm
	Summarize Site Review & Constraints	4:30 pm – 5:00 pm
Day Two	Cost Model & Function Analysis	8:00 am –9:00 am
	FAST Diagram	9:00 am – 9:30 am
	Intro to Creative Thinking	10:00 am – 10:05 am
	Creative Idea Listing	10:05 am – 12:00 pm
	Lunch	12:00 pm – 1:00 pm
	Evaluation	1:00 pm – 5:00 pm
Day Three	Evaluation Phase	8:00 am – 12:00 pm
	Mid-point review and determine economic factors	10:00 am – 12:00 pm
	Lunch	12:00 pm – 1:00 pm
	Begin Development Phase	1:00 pm – 5:00 pm
Day Four	Continue Development	8:00 am – 5:00 pm
Day Five	Finish Development/Prepare Oral Presentation	8:00 am – 12:00 pm
	Lunch	12:30 pm – 1:30 pm
	Oral Presentation to FDOT/others (at District Office)	1:00 pm – 3:00 pm
	Begin Draft Value Engineering Report	3:00 pm – 5:00 pm

FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING KICKOFF

State Road 514 (Malabar Road) from Babcock to US 1

August 18, 2014

SIGN IN SHEET

Name	Representing	Phone Number	Email Address
DOUG TOWSON	FDOT D5 TRAFFIC OPS	386-943-5311	DOUG.TOWSON@DOT.STATE.FL.US
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JANUSZ WAGNER	URS - ROADWAY	407-422-0353	janusz.wagner@urs.com
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Ty Garner	FDOT-TE	386-943-5254	ty.garner@ . . . .
Staci Nester	FDOT. Utilities	386.943.5250	staci.nester@dot.state.fl.us
Lance Decuir	Atkins	407.806.4482	lance.decuir@atkinsglobal.com
Rick Johnson	PMA	321-418-8187	rjohnson@pmaconsultants.com

FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING MID-POINT REVIEW

State Road 514 (Malabar Road) from Babcock to US 1

August 20, 2014

SIGN IN SHEET

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Lance Decuir	Atkins	407.756.9655	lance.decuir@atkinsglobal.com
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Jazlyn Heywood	FDOT	386 943 5388	jazlyn.heywood@dot.state.fl.us
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FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING STUDY PRESENTATION

State Road 514 (Malabar Road) from Babcock to US 1

August 22, 2014

SIGN IN SHEET

Name	Representing	Phone Number	Email Address
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Amy Simons	FDOT-EMO	386-943-5401	amy.simons@dot.state.fl.us
EFREN RIVERA	FDOT. DRAINAGE	x-5430	efren.rivera@dot.state.fl.us
Rick Johnson	PMA	321-418-8187	rjohnson@pmaconsultants.com

Florida Department of Transportation
719 South Woodland Boulevard
Deland, FL 32720

Sign In - Sheet

FPN#: 430136 1 (SR 514)
DATE: Friday August 22, 2014
TIME: 1:00 - 2:00 p.m.
LOCATION: FDOT Deland District 5 Office - Cypress Conference Room

SUBJECT: VE Final Presentation to FDOT Management

Initials	First Name	Last Name	REPRESENTING	PHONE	EMAIL
	Jack	Adkins	Right of Way	(386) 943-5072	Jack.Adkins@dot.state.fl.us
	George	Borchik	Design	(386) 943-5163	george.borchik@dot.state.fl.us
	Annette	Brennan	Design	(386) 943-5543	annette.brennan@dot.state.fl.us
	Jeff	Cicerello	Technical Support	(386) 943-5416	jeffrey.cicerello@dot.state.fl.us
	Jim	Connelly	FDOT - Brevard Operations	(321) 634-3073	james.connelly@dot.state.fl.us
	Lance	Decuir	Atkins - Consultant	(407) 806-4482	lance.decuir@atkinsglobal.com
	Noranne	Downs	Secretary	(386) 943-5474	noranne.downs@dot.state.fl.us
	Mark	Garcia	District Maintenance	(386) 943-5277	mark.garcia@dot.state.fl.su
	Ty	Garner	VE & Utilities	(386) 943-5254	ty.garner@dot.state.fl.us
	Kathy	Gray	Geotechnical	(386) 740-3501	kathy.gray@dot.state.fl.us
	Tharwat "Sam"	Hannadawod	FDOT - Geotechnical	(386) 740-3493	tharwat.hannadawod@dot.state.fl.us
	John	Hatfield	Materials & Research	(386) 740-3469	john.hatfield@dot.state.fl.us
	Ferrell	Hickson	Drainage	(386) 943-5433	ferrell.hickson@dot.state.fl.us

Florida Department of Transportation
719 South Woodland Boulevard
Deland, FL 32720

Sign In - Sheet

FPN#: 430136 1 (SR 514)
DATE: Friday August 22, 2014
TIME: 1:00 - 2:00 p.m.
LOCATION: FDOT Deland District 5 Office - Cypress Conference Room

SUBJECT: VE Final Presentation to FDOT Management

Initials	First Name	Last Name	REPRESENTING	PHONE	EMAIL
	Alan	Hyman	Operations	(386) 943-5477	alan.hyman@dot.state.fl.us
	Rick	Johnson	PMA - Team Leader	(407) 321-217-5182	rjohnson@pmaconsultants.com
NL	Neil	Kenis	Structures	(386) 943-5419	neil.kenis@dot.state.fl.us
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	Mike	McPhail	Right of Way	(386) 943-5071	michael.mcphail@dot.state.fl.us
	Ron	Meade	Deland Maintenance	(386) 740-3450	ron.meade@dot.state.fl.us
	Mark	Meeks	URS - Right of Way		mark.meeks@urs.com
	Rick	Morrow	Traffic Operations	(386) 943-5309	rick.morrow@dot.state.fl.us
	Debbie	Mott	Surveying & Mapping	(386) 943-5116	deborah.Mott@dot.state.fl.us
	Staci	Nester	Utilities	(386) 943-5250	staci.nester@dot.state.fl.us
	Frank	O'Dea	Transportation Development	(386) 943-5476	frank.odea@dot.state.fl.us
	Suzanne	Phillips	Project Management	(386) 943-5141	suzanne.phillips@dot.state.fl.us
	Mark	Robinson	Design/Constructability	(386) 943-5727	mark.robinson@dot.state.fl.us

Florida Department of Transportation
719 South Woodland Boulevard
Deland, FL 32720

Sign In - Sheet

FPN#: 430136 1 (SR 514)
DATE: Friday August 22, 2014
TIME: 1:00 - 2:00 p.m.
LOCATION: FDOT Deland District 5 Office - Cypress Conference Room

SUBJECT: VE Final Presentation to FDOT Management

Initials	First Name	Last Name	REPRESENTING	PHONE	EMAIL
	Amy	Sirmans	PD&E	(386) 943-5404	amy.sirmans@dot.state.fl.us
	Karen	Snyder	FDOT - Drainage	(386) 943-5434	karen.snyder@dot.state.fl.us
	Brian	Stanger	PD&E	(386) 943-5391	brian.stanger@dot.state.fl.us
	Doug	Towson	FDOT - Traffic Operations	(386) 943-5311	doug.towson@dot.state.fl.us
	John	Tyler	Construction	(386) 943-5344	john.tyler@dot.state.fl.us
	Janusz	Wagner	URS - Roadway Design		janusz.wagner@urs.com
	gary	Skotronicki	FDOT - Structures	943-5424	gary.Skotronicki@dot.state.fl.us
	Vic	Poteat	Atkins	407/647-7275	vic.poteat@atkinsglobal.com
	Jason	Leamed	FDOT - EMO	x5320	jason.leamed@dot.state.fl.us

Resolution Memo

Florida Department of Transportation

RICK SCOTT
GOVERNOR

719 S. Woodland Blvd.
DeLand, FL 32720

ANANTH PRASAD, P.E.
SECRETARY

Value Engineering Final Resolution Memorandum

Date: November 6, 2014

To: Jazlyn Heywood – Project Manager

From: Ty Garner - D5 Utilities Value Administrator

Copies: Noranne Downs, Alan Hyman, Frank O'Dea, Mark Robinson, Annette Brennan, Suzanne Phillips, John Hatfield, Ron Meade, Kathy Gray, Jack Adkins, Mike McPhail, George Borchik, Ferrell Hickson, Neil Kenis, Jeff Cicerello, John Tyler, Mark Garcia, Rick Morrow, Brian Stanger, Dennis Kyle, Debbie Mott, Gary Roche, Amy Sirmans

Value Engineering Study
Financial Project Id#: 430136 1
County: Brevard
State Road: 514 (Malabar Road) From Babcock Road to US 1

Responses to the Draft VE Report and a resolution meeting held Thursday October 30, 2014 have produced the following resolutions to the VE proposals presented.

Recommendation #1 – Maintain the existing two-lane typical section between Corey Road and the railroad tracks.

This recommendation would leave a large portion of Malabar Road, between Marie Street and US 1, without multi modal accommodations. It is an initiative of the Florida Department of Transportation to provide multimodal accommodations on all state roads. The existing typical section does not accommodate pedestrians/bicycles. Additionally, the PD&E recommended a three lane typical section, which would provide additional traffic capacity in the downtown section of Malabar and opportunities for pedestrian refuges.

This recommendation also does not account for the necessary turn lanes at Malabar Road (SR 514) and US 1 for acceptable levels of service in the design year.

The PD&E team recommends **not accepting.**

Recommendation #5 - Transition from a 4-lane to the 2-lane existing typical section west of Corey Road to avoid Fern Creek Crossing Park and the post office.

Traffic Operational Analysis showed that the 4-lane improvement at the intersection with Corey Road and west is necessary for acceptable levels of service in the design year.

The intersection of Corey Road and Malabar is one of the key intersections in the corridor and operational improvements (additional through lanes and turn lanes) are necessary for acceptable levels of service along Malabar Road (SR 514).

As in Recommendation #1, this recommendation also does not account for multimodal accommodations in downtown Malabar and necessary turn lanes at Malabar Road (SR 514) and US 1. See Response for Recommendation #1.

The PD&E team recommends **not accepting.**

Recommendation #6 – Maintain existing two-lane typical section between Corey Road and US 1.
See response for Recommendation #1. The PD&E team recommends **not accepting.**

Recommendation #7 – Maintain the existing two-lane typical section between Corey Road and US 1, but make turn lane improvements at the intersection of US 1 and SR 514.

See response for Recommendation #1. Although this recommendation provides the necessary turn lanes at the intersection of Malabar Road (SR 514) and US 1, it does not provide multimodal accommodations.

The PD&E team recommends **not accepting this recommendation.**

Florida Department of Transportation
719 S. Woodland Blvd.
DeLand, FL 32720

RICK SCOTT
GOVERNOR

ANANTH PRASAD, P.E.
SECRETARY

Recommendation #11 – Can we treat the no-build section to provide compensatory treatment for Basin 9 located at the intersection of SR514 and US 1.

Based on accepting Recommendation #12 (below), it would be better to compensate for Basin #9 in one of the two properties on the north side of Malabar east of the railroad. Two of the impacted properties in Basin 9 will likely be full acquisitions, which would allow for ponds to be located on the properties instead of being compensated for in the no build section of Malabar Road (SR 514). It would be better to provide for ponds in Basin 9 on the impacted properties east of the FEC railroad.

The PD&E team recommends **not accepting this recommendation.**

Recommendation #12 – Build a pond on the two properties that we are taking on the north side of Malabar east of the railroad.

It was the PD&E team's initial understanding that the property located on the northwest quadrant of Malabar Road and US 1 was an FDOT property, but we understand that this property may have been recently purchased by a local business owner. The PD&E team will verify this, but if this is the case, it would make sense to locate a pond on a nearby property where a full acquisition will be likely.

The PD&E team recommends **accepting this recommendation.**

Recommendation #17 – Shift alignment to the south to avoid the taking of Hospital parking

The VE team's cost analysis show that it will be cheaper to impact the large transmission poles than to impact the front parking of the Palm Bay Hospital. In this case, it would be worth the shift in alignment in this section.

The PD&E team recommends **accepting this recommendation**

Value Engineering Team:

Rick Johnson	Team Leader
Jim Connelly	Construction/Operations
Karen Snyder	Drainage
Tharwat "Sam" Hannadawod	Geotechnical
Jerald Marks	Project Management
Mark Meeks (URS)	Right of Way (URS - mark.meeks@urs.com)
Janusz Wagner (URS)	Roadway Design (GEC) janusz.wagner@urs.com
N/A	Structure Design
N/A	Structures Maintenance
Doug Towson	Traffic Operations
N/A	Utilities

Frank O'Dea
District Director of Transportation Development

11/6/14
Date

SLIDE PRESENTATION


State Road 514 (Malabar Road)
from Babcock Street to US 1
VE Study Recommendations
Conducted August 18 – 22, 2014


State Road 514 (Malabar Road)
from Babcock Street to US 1
Team Members:
Karen Snyder, PE, Drainage
Jim Connelly, Brevard Operations
Janusz Wagner, PE, Roadway Design
Doug Towson, PE, Traffic Operations
Jerald Marks, Project Management
Tharwat Hannadawod, EI, Geotechnical
Mark Meeks, Right of Way
Rick Johnson, PE, CVS, Team Leader

SAVE International and FDOT Job Plan

- Information/Function
- Creative Brainstorming
- Evaluation
- Development
- Recommendation/Presentation
- Report

Information

- Information Gathering
- Reviewed Project Information
- Site Visit
- Verified Constraints
- Identified Functions

Project Scope

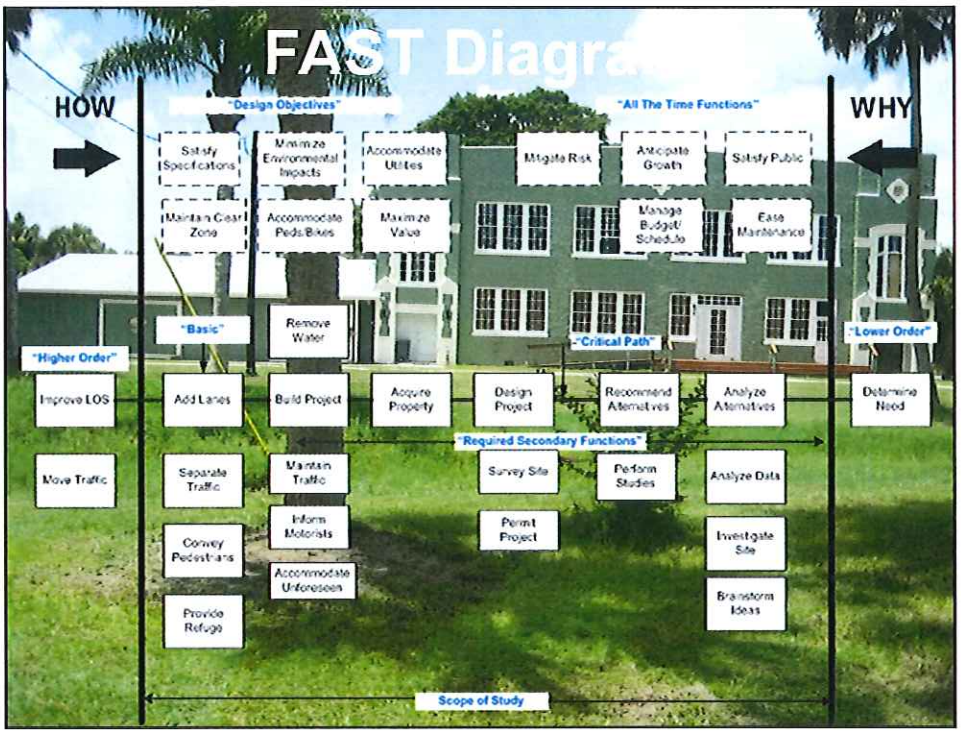
Segment 1 from SR 507 to Corey Rd. is proposed to be a 4-lane urban typical at 45 MPH with 5-ft. bike lanes and 5-ft sidewalks. Segment 2 will be a 4-lane suburban typical at 55 MPH from Weber Rd. to Corey Rd. from east of Corey Rd. to Marie St. will be No-Build with a 10-ft multi-use path. Segment 3 from Marie St. to US 1 is proposed as a three lane urban typical with a bi-directional center turn lane, 5-ft. bike lanes and 6-ft sidewalks.

Construction: $13.69M
Right of Way: $20.52M

Project Location


Constraints
Malabar Scrub Sanctuary
Malabar Park
Malabar Disc Park
Fern Creek Crossing Park


Function Analysis
Improve Level of Service
Add Lanes
Build Project
Acquire Right of Way
Design Project
Recommend Alternatives
Analyze Alternatives
Determine Need


FAST Diagram
HOW
WHY
"Design Objectives"
"All The Time Functions"
Satisfy Specifications
Minimize Environmental Impacts
Accommodate Utilities
Mitigate Risk
Anticipate Growth
Satisfy Public
Maintain Clear Zone
Accommodate Peds/Bikes
Maximize Value
Manage Budget/ Schedule
Ease Maintenance
"Basic"
Remove Water
"Critical Path"
"Lower Order"
"Higher Order"
Improve LOS
Add Lanes
Build Project
Acquire Property
Design Project
Recommend Alternatives
Analyze Alternatives
Determine Need
"Required Secondary Functions"
Move Traffic
Separate Traffic
Maintain Traffic
Survey Site
Perform Studies
Analyze Data
Inform Motorists
Permit Project
Investigate Site
Convey Pedestrians
Accommodate Unforeseen
Brainstorm Ideas
Provide Refuge
Scope of Study


Creative Brainstorming
Generated Ideas in Major Disciplines and for Each Function
Ideas were Consolidated by the VE Team for Further Development

Evaluation/Development

- Generated 19 Ideas and Identified Weighted Criteria
- Ideas that Improved the Preferred Alternative were Developed
- Compare the PD&E to the VE Alternative
- List Advantages and Disadvantages

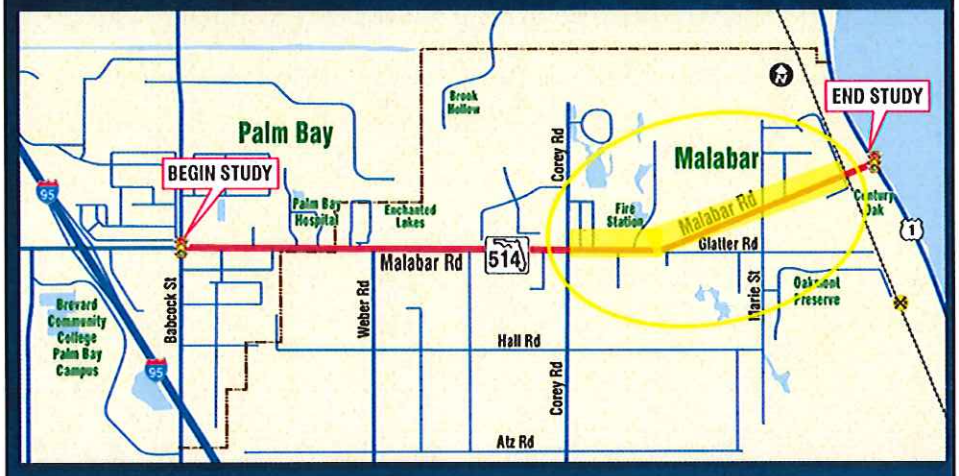
2-lane typical section between Corey Road and the RR tracks

- **PD&E Alternative:** The PD&E Documents show the 4-lane section on Malabar Rd. is reduced to 2-lane with a traffic separator past Corey Road and to a two-lane undivided rural section EB with a 55 MPH. The section reduces to 45 MPH and a three-lane urban section with 4-ft. bike lanes in both directions and continues until the US 1.

2-lane typical section between Corey Road and the RR tracks

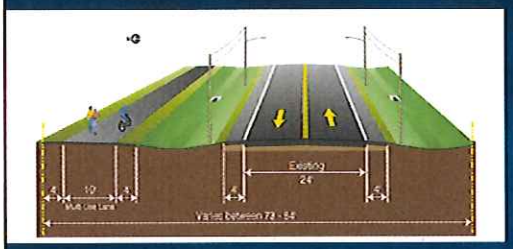
- **VE Alternative No. 1:** Taper down from the proposed 4-lane rural typical section to the existing 2-lane rural typical section (no-build) until the railroad crossing at station 284+00. Eastbound beyond the railroad to US 1, the typical would be a 3-lane urban typical with 4-ft. bike lanes and 6-ft sidewalks.

2-lane typical section between Corey Road and the RR tracks

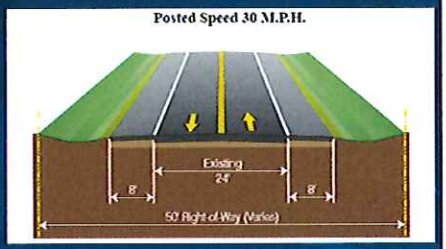


2-lane typical section between Corey Road and the RR tracks

Corey Rd. to Marie St.



Marie St. to FEC RR



2-lane typical section between Corey Road and the RR tracks

- **Advantages:**
  - Less right of way
  - Less MOT
  - Minimizes Section 4(f) properties
- **Disadvantages:**
  - May affect LOS
  - No sidewalks at the east end
- **Potential Cost Savings: $5,144,000**

Transition from 4-lane to a 2-lane existing west of Corey Road

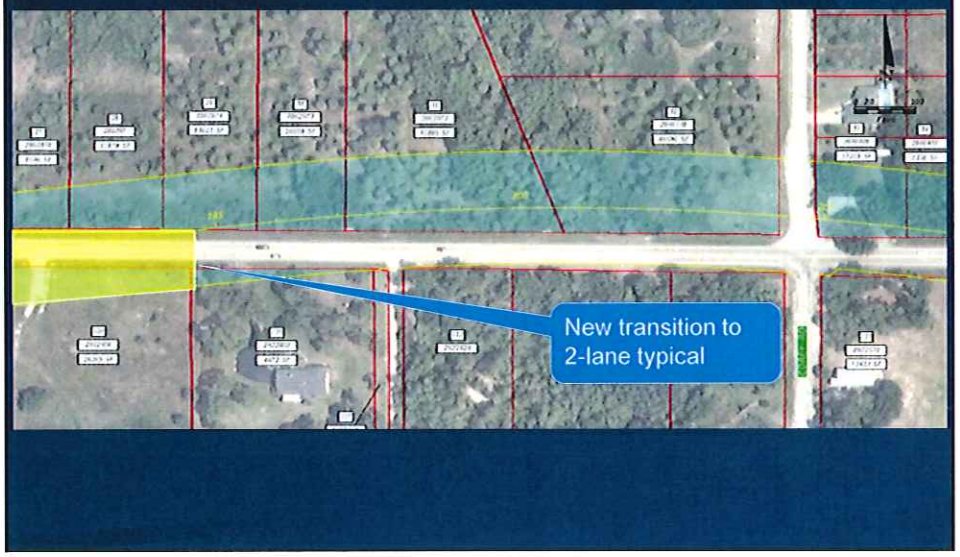
- **PD&E Alternative:** The PD&E Documents show a transition on the east side of Corey Rd. from a 4-lane to a 2-lane roadway. The transition is made to avoid the Section 4(f) Fern Creek Crossing Park in the southwest quadrant of the intersection of SR 517 and Corey Road.

Transition from 4-lane to a 2-lane existing west of Corey Road

- **VE Alternative No. 5:** Construct a transition on the west side of Corey Rd. to the existing 2-lane roadway that will allow the project to remain within the existing right of way and still avoid Fern Creek Crossing Park and the Post Office property that is east of Corey Road and is intended for a partial take.

Transition from 4-lane to a 2-lane existing west of Corey Road

Transition from 4-lane to a 2-lane existing west of Corey Road



Transition from 4-lane to a 2-lane existing west of Corey Road

- **Advantages:**
  - Less cost
  - Less right of way
  - Avoids Post Office
- **Disadvantages:**
  - LOS may suffer
- **Potential Cost Savings: $1,628,000**

Maintain the 2-lane typical between Corey Rd. and US 1

- **PD&E Alternative:** The PD&E Documents show from Corey Rd. to US 1 mainly as a widening of existing two lanes to a 3-lane typical with a bi-directional center lane. There is a transition from a 4-lane suburban typical to existing 2-lane roadway that begins west of Corey Rd. and it ends approximately 1,500 feet east of Corey Road.

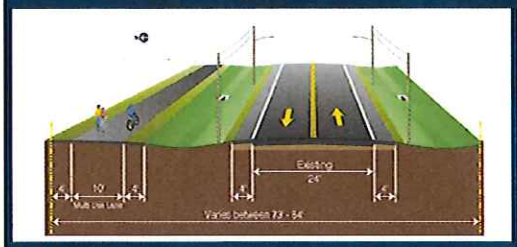
Maintain the 2-lane typical between Corey Rd. and US 1

- **VE Alternative No. 6:** Construct a transition on the west side of Corey Rd. to the existing 2-lane roadway that will allow the project to remain within the existing right of way and still avoid Fern Creek Crossing Park and the Post Office property that is east of Corey Road and is intended for a partial acquisition.

Maintain the 2-lane typical between Corey Rd. and US 1

Maintain the 2-lane typical between Corey Rd. and US 1

Corey Rd. to Marie St.



Marie St. to FEC RR

Maintain the 2-lane typical between Corey Rd. and US 1

- Advantages:
  - Less cost
  - Less right of way
  - Less environmental impacts
- Disadvantages:
  - Decreased LOS
  - Perception of no change in the east portion
  - Doesn't accommodate future multi-modal
- Potential Cost Savings: $5,895,000

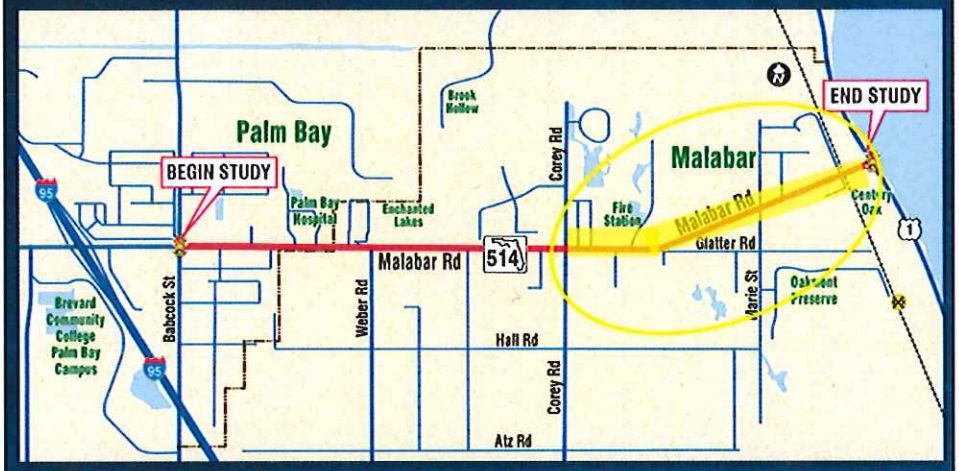
2-lane typical section with turn lanes at the intersection at US 1

- **PD&E Alternative:** The PD&E Documents show a 4-lane suburban typical section transitioning to the existing 2-lane rural section east of Corey Road to Shifflett Lane. A 10-foot multi-use path constructed on the north side from east of Corey Rd. to Marie St. connecting to the future Malabar Trailway. A 3-lane urban typical section will be from east of Marie Street to US 1.

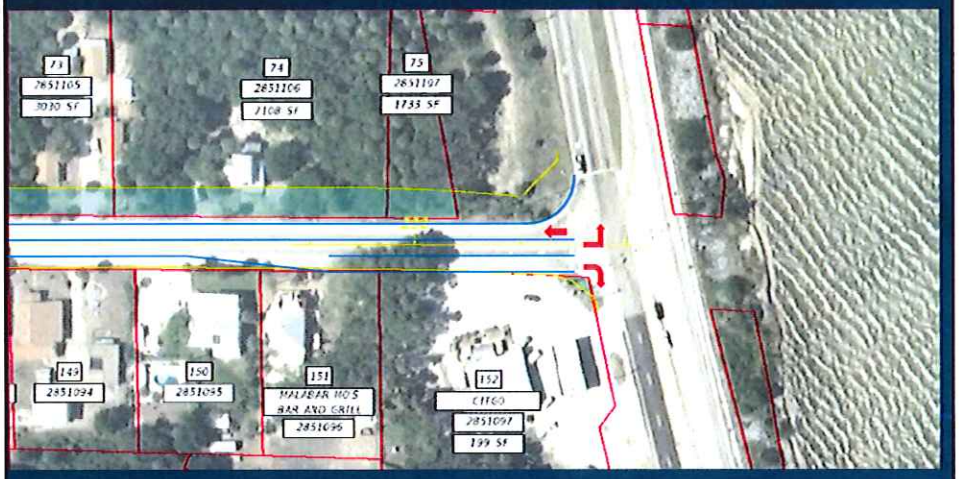
2-lane typical section with turn lanes at the intersection at US 1

- **VE Alternative No. 7:** Maintain the existing two-lane section from Corey Road east to US 1 and make turn lane improvements at the intersection of US 1 and Malabar Road. The multi-use path would still be constructed as shown in the PD&E document.

2-lane typical section with turn lanes at the intersection at US 1



2-lane typical section with turn lanes at the intersection at US 1



2-lane typical section with turn lanes at the intersection at US 1

- **Advantages:**
  - Less cost
  - Less right of way
  - Less environmental impacts
- **Disadvantages:**
  - Doesn't improve multi-modal transportation
- **Potential Cost Savings: $5,851,000**

Treat the no-build section for compensatory treatment

- **PD&E Alternative:** The PD&E Documents show Maintain the existing two-lane section from Corey Road east to US 1 and make turn lane improvements at the intersection of US 1 and Malabar Road. The multi-use path would still be constructed as shown in the PD&E document.

Treat the no-build section for compensatory treatment

- **VE Alternative No. 11:** Provide compensatory treatment in Basin 7 with recommended pond alternative Pond O site that discharges east to existing ditch systems located east of Marie Street and ultimately to the FDOT outfall and drainage easement that is located 1,000 feet south of SR 514 and ultimately discharges to the Indian River Lagoon.

Treat the no-build section for compensatory treatment

Treat the no-build section for compensatory treatment

Treat the no-build section for compensatory treatment

- **Advantages:**
  - Indian River Lagoon benefits
  - Less potential cultural resource impacts
  - Drainage alternative for Pond U
- **Disadvantages:**
  - Adds cost
  - Potential protected species impacts
  - May need to show necessity
- **Potential Value Added: ($1,004,000)**

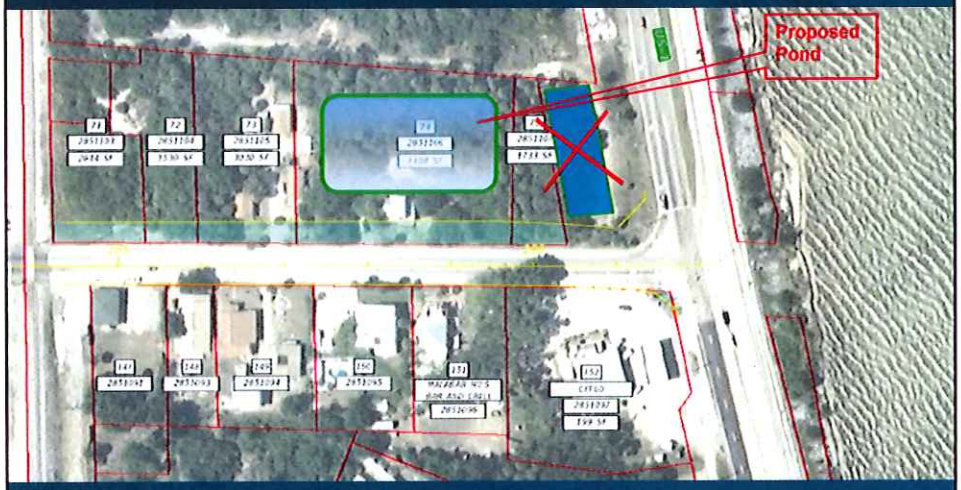
A pond on the properties on the north side of Malabar at US 1

- **PD&E Alternative:** The PD&E Documents show Maintain the existing two-lane section from Corey Road east to US 1 and make turn lane improvements at the intersection of US 1 and Malabar Road. The multi-use path would still be constructed as shown in the PD&E document.

A pond on the properties on the north side of Malabar at US 1

- **VE Alternative No. 12:** Use parcel No. 74 for stormwater management that is located on the north side of SR 514 between the Florida East Coast Railroad and US 1 that is partially being impacted by the SR 514 roadway improvements. This stormwater alternative will require full parcel acquisition for Basin 9 stormwater requirements in lieu of recommended alternative Pond U site.

A pond on the properties on the north side of Malabar at US 1



A pond on the properties on the north side of Malabar at US 1

- **Advantages:**
  - Indian River Lagoon benefits
  - Less potential cultural resource impacts
  - drainage alternative for Pond U
- **Disadvantages:**
  - Adds cost
- **Potential Value Added: ($50,000)**

Shift alignment south to avoid the taking of Hospital parking

- **PD&E Alternative:** The PD&E Documents show Segment 1 right of way varies (112 feet min.); the alignment is affecting the parking lot of the Palm Bay Hospital on the north side of the road. The alignment shifts to the north from Babcock Street to west of Weber Rd. to avoid concrete Florida Power & Light transmission poles on the south side of the road.

Shift alignment south to avoid the taking of Hospital parking

- **VE Alternative No. 17:** Shift the recommended alternative, segment 1, to the south approximately 30 feet to avoid the taking of the Hospital parking lot. In order to accommodate 45 MPH speed and to achieve smooth transition, a horizontal distance of almost 1,500 feet is needed.

Shift alignment south to avoid the taking of Hospital parking

Shift alignment south to avoid the taking of Hospital parking

Shift alignment south to avoid the taking of Hospital parking

- Advantages:
  - Less cost
  - Easier construction
  - Avoids business damages
- Disadvantages:
  - Slight increase in MOT
  - Possible impact to C-78 Canal
- Potential Cost Savings: $1,027,000

Savings Summary

Recommendation	Savings	Maximum Savings
2-lane typical section between Corey Road and the RR tracks	$5,144,000	
Transition from 4-lane to a 2-lane existing west of Corey Road	$1,628,000	$1,628,000
2-lane typical section with turn lanes at the intersection at US 1	$5,851,000	
Maintain the 2-lane typical between Corey Rd. and US 1	$5,895,000	$5,895,000
Treat the no-build section for compensatory treatment	($1,004,000)	
A pond on the properties on the north side of Malabar at US 1	($50,000)	
Shift alignment south to avoid the taking of Hospital parking	$1,027,000	$1,027,000
		$8,550,000

Action Plan

- Receive Draft VE Report 9/5/14
- Draft Report Routed for Comments
- Receive and Incorporate D5 Comments and Revisions 9/26/14
- Resolution Meeting
- Issue Final VE Report 10/10/14


Questions