



To: Staci Nester
Richard L. Johnson, PE

From: Luis Diaz, PE
Robert Denney, PE

Date: May 19, 2015

Subject: Interstate 4 from West of State Road 528 (Beachline) to West of State Road 435 (Kirkman Road) Value Engineering Study Recommendation Dispositions

FM: 242484-7

Dear Mr. Johnson,

Please see below for our management action dispositions for the I-4 from West of SR 528 to West of SR 435 Value Engineering Study Report recommendations found on Table 1.4-1.

Recommendation 1: Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B.

Accepted. The FDOT property leased to OCCC will be converted to a proposed pond, which will result in either the elimination or minimization of Pond 200B.

Recommendation 2: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County.

Not accepted. Combining Pond 205D with the Orange County pond would lead to additional coordination with the county and only a very small amount of storage would be gained. The county pond is not designed to FDOT standards; therefore, the amount of storage that could be gained would be very small.

Recommendation 3: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond.

Accepted. A new Pond 205-D will be added on the residential lots south of WalMart and Pond 205-A will be shifted and renamed Pond 205-C to be used in conjunction with Pond 205-D. Pond 205-C will be located north of Pond 205-A and will only impact one property owner instead of two.

Recommendation 5: Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528.

Accepted. Alternative 4 at SR 528 will be the preferred alternative in order to eliminate impacts to properties on the east side.

Recommendation 8: Consider a Single Point Urban Interchange at Sand Lake Road.

Accepted. A single point interchange was considered at Sand Lake Road and from an operational standpoint, the Diverging Diamond interchange outperformed the Single Point.

Recommendation 10: Eliminate the ramps to and from Central Florida Parkway.

Not accepted. Additional research revealed previous coordination with FHWA. The memos retrieved require that ramps to and from the east be added to the Central Florida Parkway interchange.

Recommendation 11: Combine ramps similar to SR 528 Alternate 2.

Accepted. Ramps will be combined similar to the SR 528 Alternate 2.

In summary, the design team accepts 5 recommendations and does not accept 2 recommendations.

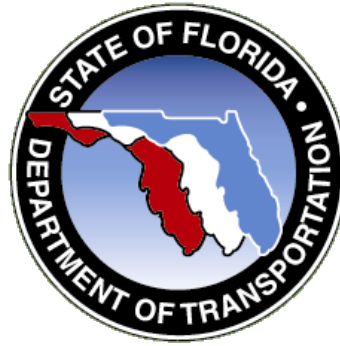
Thank You,

A handwritten signature in blue ink, appearing to be 'Luis Diaz', with a stylized flourish at the end.

Luis Diaz, P.E.
Project Manager

Value Engineering For Transportation Improvements

Interstate 4 from West of State Road 528 (Beachline) to West of State Road 435 (Kirkman Road)



Value Engineering Study **Draft** Report

FM Number: 242484-7

Fed. Aid Project: Yes

Project Description: I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

Study Dates: February 10 – 14, 2014

Project Development Phase				Study Identification Number						
PD&E	Design	Other				VE Item No.				
HNTB, Inc.								Yr.	Dist.	No.
								14	005	07

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

Richard L. Johnson, CVS No. 20030201, PE No. 38681

Date: February 28, 2014

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EXECUTIVE SUMMARY

1.1 INTRODUCTION

A Value Engineering (VE) Study was held, during February 10 – 14, 2014 using the VE methodology to improve the I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road) project. The VE study analyzed value improvements for improving the interchanges, and improving mobility within the region. I-4 serves as the primary corridor in the movement of people and freight between major population, employment and activity centers in the Central Florida region. When the entire Interstate was fully opened in the early 1960's, it was designed to serve intrastate and interstate travel by providing a critical link between the east and west coasts of Central Florida. Although this role continues to be a crucial transportation function of I-4, the highway also serves large volumes of local and commuter traffic with shorter trip distances. The highway serves as the primary link between hotel/resort complexes and tourist attractions like Walt Disney World, Universal Studios, Sea World, the International Drive Resort Area and downtown Orlando. I-4 is the only north-south limited access facility that is centrally located between the predominant employment centers and the major suburbs to the north. It has become the primary commuting corridor in the Central Florida metropolitan area.

FDOT is proposing to reconstruct and widen I-4 as part of the I-4 Ultimate concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole, and Volusia Counties. The concept design proposes the addition of two (2) new express lanes in each direction, resulting in a total of ten (10) dedicated lanes. The study area in this section from west of SR 528 to SR 435 (Kirkman Road) includes the interchanges at SR 528, Sand Lake Road, and Universal Boulevard, and provides for the required stormwater treatment with fourteen (14) pond sites along the corridor. The typical section will ensure that the design will be contained within the existing right of way with the exception of the pond sites and at the SR 528 interchange.

The project limits are within a 3.6-mile segment of I-4 which extends from west of SR 528 (MP 5.650) to west of Kirkman Road (MP 9.249) in Orange County (herein referred to as I-4, Segment 2). Although, the interstate is a designated east-west corridor, the alignment follows a north/south orientation through the majority of Segment 2. The proposed improvements to I-4 include widening the existing six lane divided urban interstate to a ten lane divided highway. The existing roadway typical section generally has three 12-foot travel lanes with a 10-foot paved outside shoulder, and a 10-foot paved inside shoulder in each direction separated by a 64' median. The existing right of way (ROW) width varies, but is typically 300 feet. The typical section in the proposed condition will be three 12-foot travel lanes, two 12-foot express lanes, 4-foot inside shoulder, 10-foot outside shoulders with a barrier wall separating the express lanes from the travel lanes and 12-foot outside shoulders. The proposed right of way width is 300 feet minimum.

The project location may be found on the **Figure 1.1 - 1 Project Location Map**. The typical sections and segment drawings for the roadway alternatives were shown on the concept drawings included in the PD&E documents. By building this project, the FDOT will improve mobility in the region and the level of service for the ultimate I-4 Express Lanes design throughout the corridor. The project will provide improved Level of Service and operations in the area.

Table 1.1-1 Preliminary Cost Estimate on page 3 shows the preliminary estimated construction costs for the improvements for the alternative being studied. The proposed improvements are to enhance regional mobility 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 PD&E concepts.

Although several issues and pre-existing conditions were stated during the initial briefing at the beginning of the VE study, the VE team had three major project constraints:

1. Must keep the High Speed Rail corridor
2. Must keep the barrier walls
3. Commitments to Sand Lake Road pedestrians and bikes

Figure 1.1 – 1
Project Location Map



Table 1.1 – 1
Preliminary Cost Estimate
PD&E Alternate 1

Item	Description	
0110 1 1	Clearing & Grubbing	\$2,202,404
0110 3	Removal of Existing Structure	\$1,506,874
160 4	Stabilization Type B LBR 40	\$1,906,872
285 706	Base optional (base group 6) ML	\$2,764,037
285 712	Base optional (base group 12) ML	\$6,388,065
334 1 12	Superpave asphaltic concrete (Traff B)	\$1,938,392
334 1 14	Superpave asphaltic concrete (Traff D)	\$6,556,523
334 1 24	Superpave asphaltic concrete (Traff D-PG 76-22)	\$4,492,808
337 7 22	Asphaltic Conc friction course (FC-5) (PG 76-22)	\$2,202,769
521 72 10	Barrier Wall	\$30,210,454
	Thermoplastic, White, Striping	\$291,814
	Vehicle Impact Attenuator	\$201,609
	Fencing	\$528,790
	Embankment	\$3,426,473
	MSE wall	\$15,760,426
	New Bridges	\$47,725,355
	Subtotal Cost	\$128,103,461
	Compensable Utility Relocation	\$6,405,173
	Mobilization	\$12,810,346
	Maintenance of Traffic (MOT)	\$25,620,692
	Lighting	\$6,405,173
	Signage	\$6,405,173
	Drainage	\$25,620,692
	ITS	\$6,405,173
	Erosion Control	\$1,281,035
	Construction Subtotal	\$219,056,917
	Contingency	\$35,005,898
	Grand Total	\$254,062,815

Reference: Preliminary Cost Estimate prepared by HNTB, dated February 6, 2014

The basic project functions are to reconstruct the interchange, improve connectivity and improve traffic operations within 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 12 ideas and one was determined to be a design suggestion 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 concept and the individual creative ideas. During this process it was agreed that we had various ideas, but 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 nine ideas as recommendations for the designers 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 connectivity issues, aesthetics and drainage. 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.

The design suggestions identified by the VE team are shown in **Section 6**. The VE team presents design suggestions for FDOT's consideration. 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 FDOT.

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, operation and maintenance cost, future cost and Life Cycle Cost (costs shown indicate initial capital costs as the LCC are similar to the original design) of the proposed recommendations. The Present Worth (PW) Life Cycle Cost also includes the initial cost, and the other above mentioned costs over the anticipated useful life of the facility. Acceptance of these recommendations would 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. All of the recommendations can be taken with others, there are no 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 partially.

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 insure 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	Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B			\$1,800,000
2	North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County			\$2,100,000
3	North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond			\$2,100,000
5	Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528			(\$1,139,000)
8	Consider a Single Point Urban Interchange at Sand Lake Road			(\$7,000,000)
10	Eliminate the ramps to and from Central Florida Parkway			\$49,400,000
11	Combine ramps similar to SR 528 Alternate 2			\$15,782,000

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

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. It 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 Design 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 Preliminary 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 (F.A.S.T.) 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.

The 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, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed ideas. 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 – Recommendations**.

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 Planning and Environmental Management 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. Please do not hesitate to call on us for clarification or further information for considerations to implement any of the presented ideas.

2.4.1 Presentation and Reporting Phase

The final phase of the VE Study began with the presentation of the ideas on the last day of the VE Study. The VE team screened the VE ideas before draft copies of the report were prepared. The initial VE ideas were arranged in the order indicated to facilitate cross-referencing to the final recommendations for revision to the Contract Documents.

2.4.2 Final Report

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

3.1 PARTICIPANTS

On February 10, 2014, representatives from HNTB Corporation (HNTB) and the FDOT Project Manager presented an overview of the project in the PD&E Documents for Interstate 4 from Beachline to Kirkman Road. The purpose of this meeting was to acquaint the study team with the overall project and what 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
Gary Foster, PE	Roadway Design	URS Corp
Michael Dollery	Right of Way	FDOT, District 5
Jim Stroz,	Traffic Operations	FDOT, District 5
Stan Gainey,	Maintenance	FDOT, District 5
Carol Hatfield, PE	Drainage	FDOT, District 5
Chris Dabson, PE	Structures	FDOT, District 5
Trevor Williams	Construction	FDOT, District 5
Tharwat (Sam) Hannadawod	Geotechnical	FDOT, District 5
Marlon Bates	Utilities	FDOT, District 5
Jack Crahan, MAI	Right of Way	FPC-Group
Ty Garner	District VE Coordinator	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 February 10, 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.

3.3 LIST OF VE STUDY MATERIAL REVIEWED

1. Preliminary Engineering Report, Segment 2: West of SR 528 (Beachline Expressway) to West of SR 435 (Kirkman Road) – Orange County, FL, prepared by HNTB Corporation, dated January 30, 2014
2. Air Quality Analysis Technical Memorandum, Segment 2: SR 528 to SR 435 (Kirkman Road), prepared by Stantec, dated January, 2014
3. Pond Siting Report, Segment 2: SR 528 to SR 435 (Kirkman Road), prepared by HNTB Corporation, dated January, 2014
4. Report of Preliminary Geotechnical Engineering Investigation for Ponds – Segment 2 , prepared by Geotechnical and Environmental Consultants, Inc., dated September 16, 2013
5. Wetland Evaluation Report (WER), Segment 2: SR 528 to SR 435 (Kirkman Road), prepared by 3E Consultants. Inc., dated January, 2014
6. Preliminary Cost Estimate, prepared by HNTB Corporation, provided February 6, 2014

7. Technical Memorandum: Cultural Resource assessment Survey of Proposed Improvements to Interstate 4 from State Road 528 (Segment 2) in Orange County, FL, prepared by Southeastern Archaeological Research, Inc., dated January, 2014
8. Location Hydraulic Report, Segment 2: SR 528 to SR 435 (Kirkman Road), prepared by HNTB Corporation, dated September , 2013
9. Contamination Screening Evaluation Report, Segment 2: SR 528 to SR 435 (Kirkman Road), prepared by Stantec, dated January, 2014
10. Aerial Plan Board of Segment 2 Improvements, prepared by HNTB Corporation, undated
11. Aerial Plan Board of SR-400 (I-4) Segment 2, SR-528 Alternative 1, prepared by HNTB Corporation, undated
12. Aerial Plan Board of SR-400 (I-4) Segment 2, SR-528 Alternative 2, prepared by HNTB Corporation, undated
13. Aerial Plan Board of SR-400 (I-4) Segment 2, SR-528 Alternative 3, prepared by HNTB Corporation, undated
14. Aerial Plan Board of SR-400 (I-4) Segment 2, SR-528 Alternative 4, prepared by HNTB Corporation, undated
15. Aerial Plan Board of SR-400 (I-4) Segment 2, Sand Lake Road Alternative 1, prepared by HNTB Corporation, undated
16. Aerial Plan Board of SR-400 (I-4) Segment 2, Sand Lake Road Alternative 2, prepared by HNTB Corporation, undated

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 the 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. Reconstruct Traffic | 16. Inform Motorists |
| 2. Connect Roadways | 17. Meet Criteria |
| 3. Add Overpass | 18. Design Project |
| 4. Build Project | 19. Minimize Maintenance |
| 5. Establish Elevation | 20. Collect Data |
| 6. Maintain Traffic | 21. Review Plans |
| 7. Span Obstacle | 22. Estimate Costs |
| 8. Acquire Right of Way | 23. Calculate Quantities |
| 9. Provide Land | 24. Recommend Solutions |
| 10. Replace Impacts | 25. Study Alternatives |
| 11. Permit Project | 26. Determine Needs |
| 12. Manage Water | 27. Ease Maintenance |
| 13. Accommodate Pedestrians | 28. Analyze Data |
| 14. Separate Traffic | 29. Treat Stormwater |
| 15. Control Traffic | 30. Accommodate Utilities |

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 or must not do)

1. The project shall meet economic, engineering design, environmental and social/cultural criteria requirements
2. Meet the goals of the Long Range Transportation Plans for future developments

3.4.3 General Project Constraints: (unchangeable project restrictions)

1. Must keep the High Speed Rail corridor
2. Must keep the barrier walls
3. Commitments to Sand Lake Road pedestrians and bikes

3.4.4 General Project Conditions & Considerations:

1. Refer to the PD&E documents and backup documentation prepared by HNTB.

3.4.5 Site Review Comments and other observations:

1. It would be best to avoid the Sheriff's Complex, apartments and office buildings in the southeast portion of I-4 and SR 528.
2. There doesn't appear to be enough space for the diverging diamond interchange at Sand Lake Road.
3. The intersection of Turkey Lake and Sand Lake Road is very tight and separating grade would impact lots of commercial real estate.
4. The intersection of International Drive and Sand Lake Road is very tight and separating grade would impact lots of commercial real estate.

4.1 ECONOMIC DATA

The study team developed economic criteria used for evaluation with information gathered from the HNTB PD&E documents. To express costs in a meaningful manner, the cost comparisons associated with alternatives are presented on the basis of total Life Cycle Cost and discounted present worth. Project period interest rates are based on the following parameters:

Year of Analysis:	2014
Economic Planning Life:	20 years starting in 2016
Discount Rate/Interest:	5.00%
Inflation/Escalation Rate:	3.00%

The Preliminary PD&E Cost Estimate was used by the team for the major construction elements and right of way costs were developed by HNTB and the FDOT Right of Way Estimating team. The VE team had costs for the mainline improvements and alternative interchanges at SR 528 and at Sand Lake Road provided by HNTB. The cost for the roadway and interchange improvements is based on Alternative 1 were a combined \$254,062,415. The estimated cost to acquire all right of way for the proposed Alternative 1 concept is \$50,388,500.

Table 4.1 – 1
Preliminary Cost Estimate
PD&E Alternate 1

Item	Description		Function
0110 1 1	Clearing & Grubbing	\$2,202,404	Prepare Site
0110 3	Removal of Existing Structure	\$1,506,874	Remove Obstacles
160 4	Stabilization Type B LBR 40	\$1,906,872	Prepare Pavement Foundation
285 706	Base optional (base group 6) ML	\$2,764,037	Prepare Pavement Foundation
285 712	Base optional (base group 12) ML	\$6,388,065	Support Traffic
334 1 12	Superpave asphaltic concrete (Traff B)	\$1,938,392	Support Traffic
334 1 14	Superpave asphaltic concrete (Traff D)	\$6,556,523	Support Traffic
334 1 24	Superpave asphaltic concrete (Traff D-PG 76-22)	\$4,492,808	Support Traffic
337 7 22	Asphaltic Conc friction course (FC-5) (PG 76-22)	\$2,202,769	Enhance Traction
521 72 10	Barrier Wall	\$30,210,454	Shield Obstacles
	Thermoplastic, White, Striping	\$291,814	Channelize Traffic
	Vehicle Impact Attenuator	\$201,609	Protect Motorists
	Fencing	\$528,790	Restrict Access
	Embankment	\$3,426,473	Set Grade
	MSE wall	\$15,760,426	Reduce Footprint
	New Bridges	\$47,725,355	Span Obstacles
	Subtotal Cost	\$128,103,461	
	Compensable Utility Relocation	\$6,405,173	Remove Conflicts
	Mobilization	\$12,810,346	Start Project
	Maintenance of Traffic (MOT)	\$25,620,692	Maintain Traffic
	Lighting	\$6,405,173	Illuminate Area
	Signage	\$6,405,173	Convey Information
	Drainage	\$25,620,692	Manage Water
	ITS	\$6,405,173	Distribute Information
	Erosion Control	\$1,281,035	Control Erosion
	Construction Subtotal	\$219,056,917	
	Contingency	\$35,005,898	Address Unforeseen
	Grand Total	\$254,062,815	

Reference: Preliminary Cost Estimate, prepared by HNTB, provided February 6, 2014

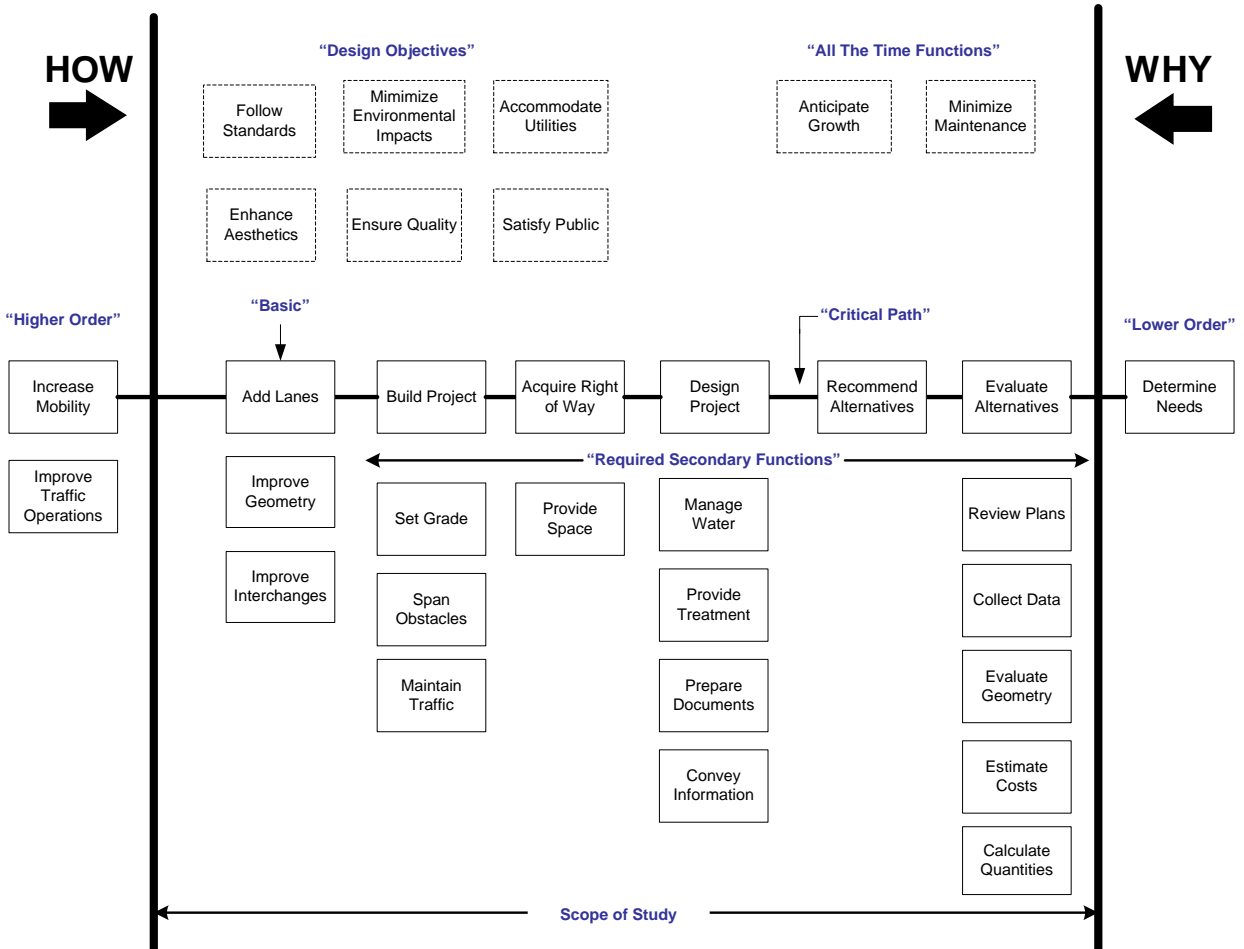
This project's Function Analysis was reviewed and developed by the team to define the requirements for the overall project (and each project element, if required) and to ensure that the VE team had a complete and thorough understanding of the functions (basic and others) needed to satisfy the project requirements. The primary Function Analysis System Technique (FAST) 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 process, or if there are disproportionate amounts of money being proposed to be spent for support functions. These elements add cost to the final product, 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

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)



EVALUATION

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, Maintenance of Traffic Mobility Enhancement, Utility Impacts, Future Maintenance and Constructability. 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 a total of 12 creative ideas and 10 that were evaluated and scored. The VE team discussed each of the evaluated ideas with the PD&E Project Manager during a mid-point review meeting on Wednesday, February 12, 2014. The VE team and the Consultant Project Manager discussed each idea before developing the final group of ideas for final development and analysis.

The write-ups for the developed ideas are in **Section 7**. The tables that follow show the original 12 ideas, 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 redefined some of the creative ideas as questions for the designers or design suggestions. 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 listed below:

DS-1 Reclaim some of the right of way being used by the OCCC for parking to use for ramps

The VE team presents design suggestions for the design consultant and FDOT’s consideration. 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.	I d e a s	Capital Costs	R/W Impacts	LOS	Maintenance of Traffic	Mobility Enhancement	Utility Impacts	Future Maintenance	Constructability
Original Concept									
	PD&E Documents for I-4 from Beachline to Kirkman Road	3	3	3	3	3	3	3	3
Drainage									
1	Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B	2.5	5	3	3	3	3	2	3
2	North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County	3	4	3	3	3	3	2.5	3
3	North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond	3	4	3	3	3	3	3	3
Ramps									
4	Add a ramp from I-4 westbound to exit onto Turkey Lake Road north of the Sand Lake Interchange	2.5	2	2.75	2.5	3.5	2.75	2	2.5
Right of Way									
5	Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528	3	4.5	3	3	3	2.75	3	3.5
DS-1	Reclaim some of the right of way being used by the OCCC for parking to use for ramps								
7	Have the utilities remain in the right of way along Turkey Lake Road (Combined with Idea No. 10)	3	3.5	3	3	3	3	3	3
Sand Lake Road Interchange									
8	Consider a Single Point Urban Interchange at Sand Lake Road	2	3	4	2	4.25	3	2.75	2.5
9	Roundabouts at Turkey Lake, International Drive, and Sand Lake Road								
SR 528 Interchange									
10	Eliminate the ramps to and from Central Florida Parkway	5	4.5	2.5	3.5	3	3.25	3.5	3.5
11	Combine ramps similar to SR 528 Alternate 2	4	3	3	3.5	3	3	3.5	4
Other									
12	The Express lane pavement design can be adjusted because heavy trucks are not allowed access so structural base can be less than the General Use Lanes								

TABLE 6.1 –2
Value Engineering Study Weighted Values

Capital Costs	R/W Impacts	LOS	Maintenance of Traffic	Mobility Enhancement	Utility Impacts	Future Maintenance	Constructability
7	4	8	3	5	1	6	2

TABLE 6.1 –3
Value Engineering Study Evaluation Scores

Idea No.	Ideas	Capital Costs	R/W Impacts	LOS	Maintenance of Traffic	Mobility Enhancement	Utility Impacts	Future Maintenance	Constructability	TOTAL	FHWA CATEGORIES				
											Safety	Construction	Operations	Environment	Other
Original Concept															
	PD&E Documents for I-4 from Beachline to Kirkman Road	21	12	24	9	15	3	18	3	105					
Drainage															
1	Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B	17.5	20	24	9	15	3	12	3	103.5		X			
2	North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County	21	16	24	9	15	3	15	3	106					
3	North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond	21	16	24	9	15	3	18	3	109		X			
Ramps															
4	Add a ramp from I-4 westbound to exit onto Turkey Lake Road north of the Sand Lake Interchange	17.5	8	22	7.5	17.5	2.75	12	2.5	89.75					
Right of Way															
5	Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528	21	18	24	9	15	2.75	18	3.5	111.3		X			
DS-1	Reclaim some of the right of way being used by the OCCC for parking to use for ramps	0	0	0	0	0	0	0	0	0					
7	Have the utilities remain in the right of way along Turkey Lake Road (Combined with Idea No. 10)	21	14	24	9	15	3	18	3	107					
Sand Lake Road Interchange															
8	Consider a Single Point Urban Interchange at Sand Lake Road	14	12	32	6	21.25	3	16.5	2.5	107.3	X		X		
9	Roundabouts at Turkey Lake, International Drive, and Sand Lake Road	0	0	0	0	0	0	0	0	0					
SR 528 Interchange															
10	Eliminate the ramps to and from Central Florida Parkway	35	18	20	10.5	15	3.25	21	3.5	126.3		X		X	
11	Combine ramps similar to SR 528 Alternate 2	28	12	24	10.5	15	3	21	4	117.5		X	X	X	
Other															
12	The Express lane pavement design can be adjusted because heavy trucks are not allowed access so structural base can be less than the General Use Lanes	0	0	0	0	0	0	0	0	0					

RECOMMENDATIONS

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 Statewide average costs and HNTB's preliminary cost estimates 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: Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B

Proposed Alternative:

The PD&E Documents show offsite Pond 200B on Parcel 80, at the beginning of Segment 2 and on the west side of I-4.

VE Alternative:

Reduce the size of Pond 200B by a third and provide the remainder of the needed stormwater storage in Pond 200D that is located within FDOT right-of-way in the northeast quadrant of the intersection of I-4 and SR 528. The land is currently being leased to the Orange County Convention Center and they are using it for parking.

Advantages :

- The property for proposed Pond 200D is already owned by FDOT
- Less right of way cost
- Less overall cost

Disadvantages:

- Construction of two ponds vs. one pond
- Long term maintenance of two ponds vs. one pond
- The property lease with Orange County would have to be terminated

FHWA CATEGORIES

Safety Operations Environment Construction Other

Potential Cost Savings: \$1,800,000

RECOMMENDATION No. 1: Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B

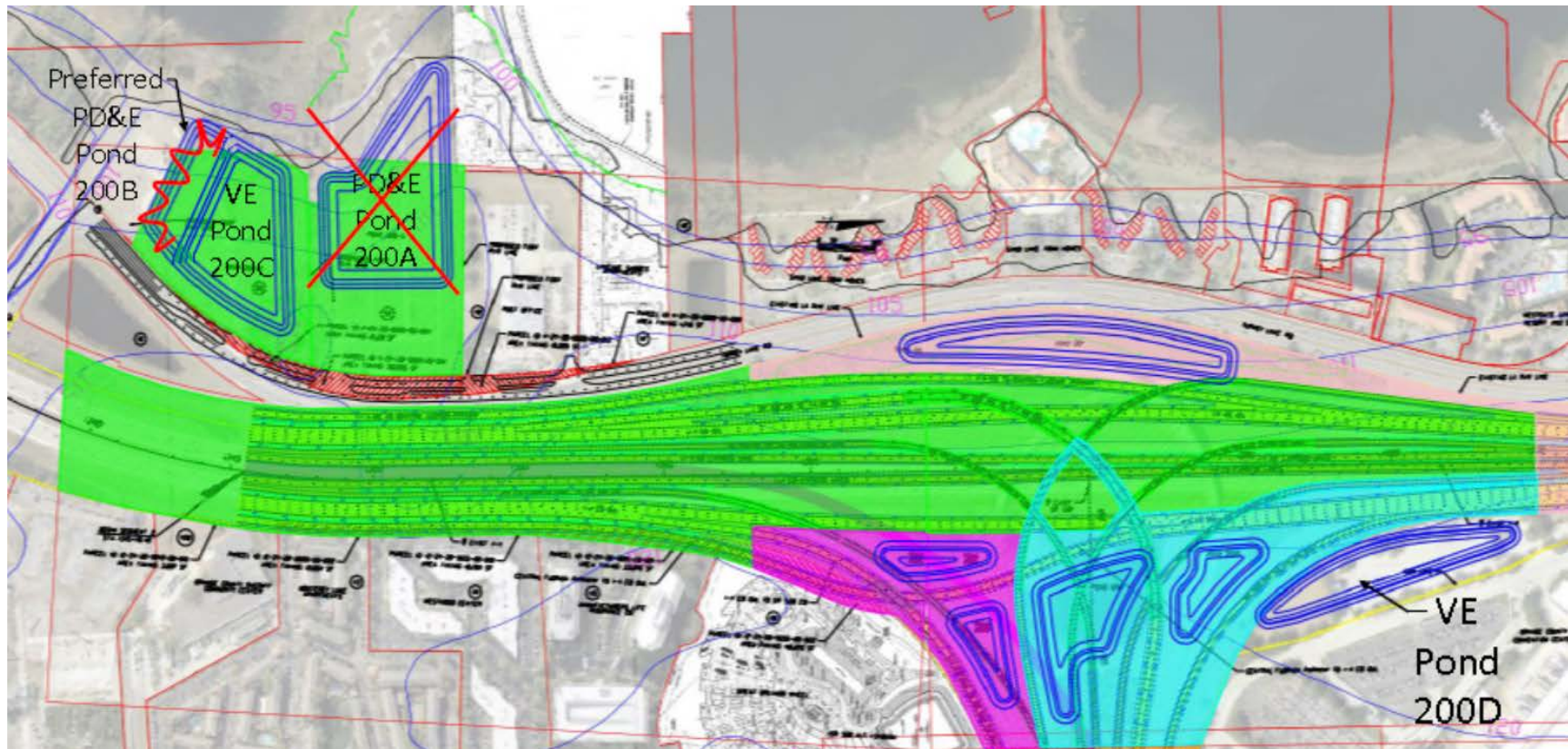
Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Clearing and Grubbing	1.25	AC	\$ 7,724	\$9,655
Excavation	65,674	CY	\$5.94	\$390,104
Guardrail	1,500	LF	\$18.00	\$27,000
Subtotal				\$426,759
Compensable Utility Relocation (5%)	1	LS		\$ 21,338
Mobilization (10%)	1	LS		\$ 42,676
Maintenance of Traffic (20%)	1	LS		\$ 85,352
Lighting (5%)	1	LS		\$ 21,338
Signage (5%)	1	LS		\$ 21,338
Drainage (20%)	1	LS		\$ 85,352
ITS (5%)	1	LS		\$ 21,338
Erosion Control (1%)	1	LS		\$ 4,268
Subtotal				\$729,757
Contingency (20%)		LS		\$145,951
		CONSTRUCTION TOTAL		\$875,709

Right-of-Way Cost Savings: \$ 2.7 M

Net Cost Savings: \$1.8 M

RECOMMENDATION No. 1: Use the FDOT property leased to OCCC for a pond to eliminate or minimize Pond 200B



RECOMMENDATION No. 2: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County

Proposed Alternative:

The PD&E Documents show the preferred Pond 205A on assigned Parcel Numbers 81 and 82. Parcel 82 (formerly known as Yogi Bear Campground property) is located on the west side of Turkey Lake Road south of WalMart.

VE Alternative:

Construct a new Pond 205C on the Yogi Bear Campground property in conjunction with Pond 205D on the residential lots south of WalMart. Combine Pond 205D with the existing Orange County pond. An FDOT easement for an outfall into Big Sand Lake already exists.

Advantages :

- Right of Way cost is less.
- FDOT and Orange County easements already in place to allow for discharge to the lake for combined Pond 205D.
- For Pond 205D a cross drain already exists across Turkey Lake Rd.
- A slight reduction in the size of Pond 205C can be achieved.

Disadvantages:

- The right of way take involves more parcels.
- Additional coordination with Orange County for a joint use pond.
- Maintenance of two ponds vs. one
- Potential relocation issue

FHWA CATEGORIES

___Safety ___Operations ___Environment ___Construction ___Other

Potential Cost Savings: \$2,100,000

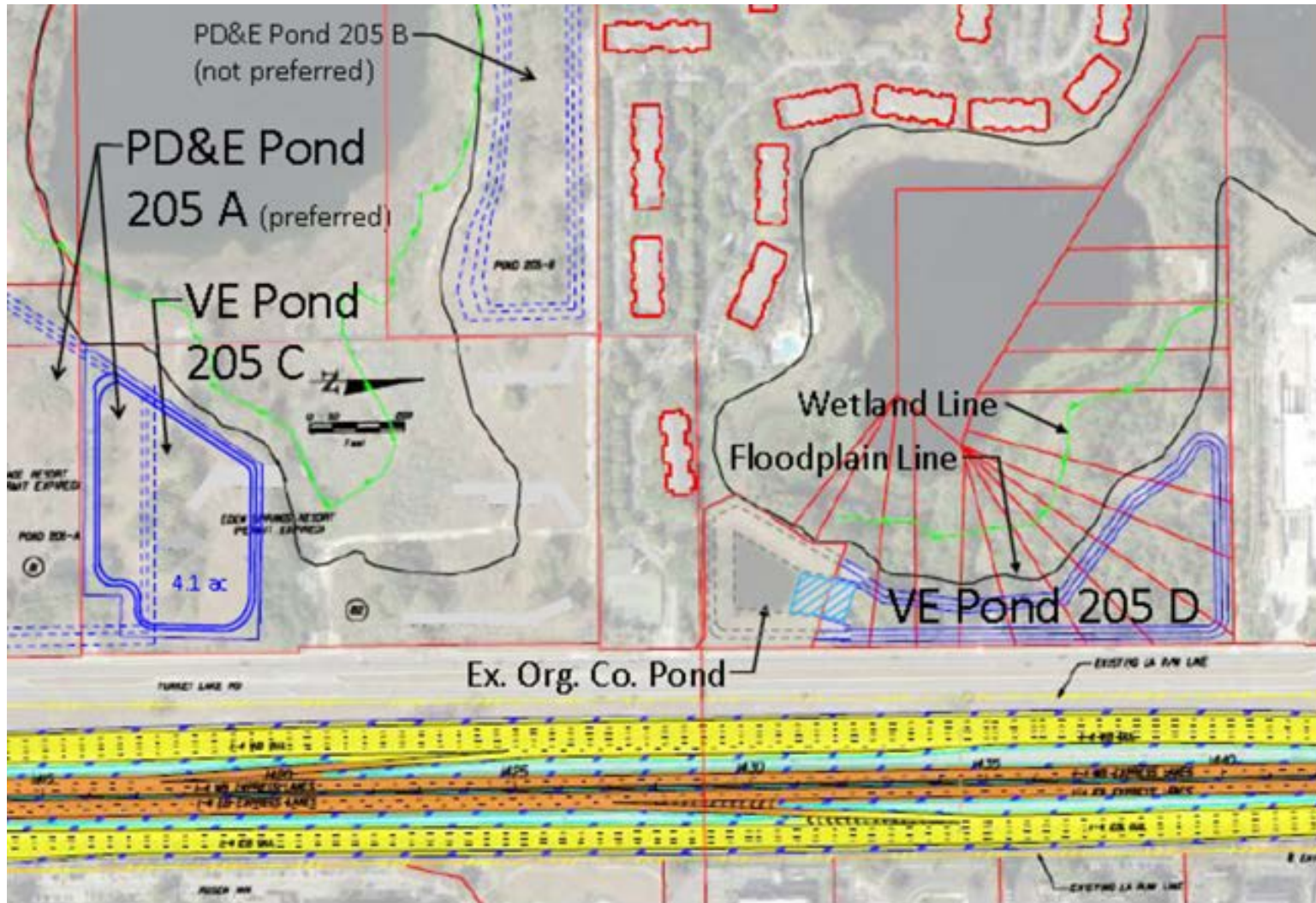
RECOMMENDATION No. 2: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County

Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Excavation	1,000	CY	\$5.94	\$5,940
Clear and Grubbing	1	AC	\$7,724.00	\$7,724
Fencing	1,000	LF	\$10.00	\$10,000
				\$0
Subtotal				\$23,664
Compensable Utility Relocation (5%)	1	LS		\$ 1,183
Mobilization (10%)	1	LS		\$ 2,366
Maintenance of Traffic (20%)	1	LS		\$ 4,733
Lighting (5%)	1	LS		\$ 1,183
Signage (5%)	1	LS		\$ 1,183
Drainage (20%)	1	LS		\$ 4,733
ITS (5%)	1	LS		\$ 1,183
Erosion Control (1%)	1	LS		\$ 237
Subtotal				\$40,465
Contingency (10%)		LS		\$8,093
			CONSTRUCTION TOTAL	\$48,559

Right-of-Way Cost Savings: \$2.1 M

RECOMMENDATION No. 2: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake and create a joint use pond with Orange County



RECOMMENDATION No. 3: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond

Proposed Alternative:

The PD&E Documents show preferred pond is Pond 205A on assigned Parcel Number 81 and 82. Parcel 82 (formerly known as Yogi Bear Campground property) located on the west side of the road south of WalMart.

VE Alternative:

Construct a new Pond 205C on the Yogi Bear Campground property in conjunction with Pond 205D on the residential lots south of WalMart. Construct stand-alone Pond 205D. An FDOT easement for an outfall into Big Sand Lake already exists.

Advantages :

- Right of way cost is less.
- An FDOT easement is already in place to allow for discharge to the lake for Pond 205D.
- For Pond 205D a cross drain already exists across Turkey Lake Rd.

Disadvantages:

- The right of way take involves more parcels.
- Maintenance of two ponds vs. one
- Potential relocation issue

FHWA CATEGORIES

Safety Operations Environment Construction Other

Potential Cost Savings: \$2,100,000

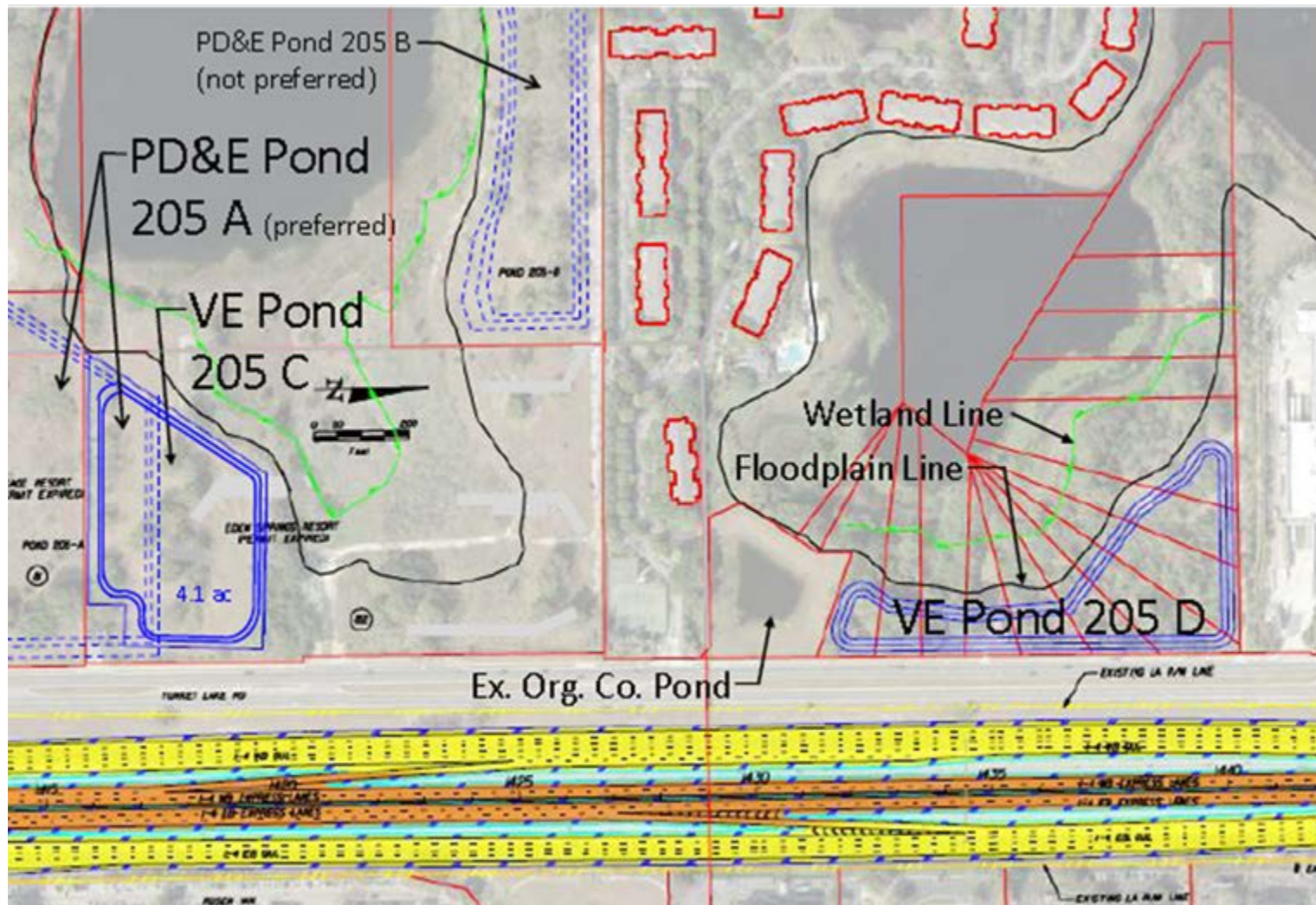
RECOMMENDATION No. 3: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond

Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Excavation	1,000	CY	\$5.94	\$5,940
Clear and Grubbing	1	AC	\$7,724.00	\$7,724
Fencing	1,000	LF	\$10.00	\$10,000
Subtotal				\$23,664
Compensable Utility Relocation (5%)	1	LS		\$ 1,183
Mobilization (10%)	1	LS		\$ 2,366
Maintenance of Traffic (20%)	1	LS		\$ 4,733
Lighting (5%)	1	LS		\$ 1,183
Signage (5%)	1	LS		\$ 1,183
Drainage (20%)	1	LS		\$ 4,733
ITS (5%)	1	LS		\$ 1,183
Erosion Control (1%)	1	LS		\$ 237
Subtotal				\$40,465
Contingency (10%)		LS		\$8,093
			CONSTRUCTION TOTAL	\$48,559

Right-of-Way Cost Savings: \$ 2.1 M

RECOMMENDATION No. 3: North of Yogi Bear Campground use the residential lots to wrap a pond around the existing lake as a stand-alone pond



RECOMMENDATION No. 5: Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528

Proposed Alternative:

The PD&E Documents shows for the SR 528 interchange Alternate 1, proposed right of way takes from five parcels located on the east side of I-4 and proposed right of way takes from four parcels located on the west side of I-4.

VE Alternative:

This recommendation is to realign the horizontal geometry of the SR 528 interchange pushing the overall footprint westward to eliminate all right of way takes on the east side of I-4 as shown in the SR 528 interchange Alternate 4 exhibit.

Advantages :

- Reducing the number of parcel impacts from 9 parcels to 4 parcels, which will result in reduced administration and legal costs.
- Improved public acceptance of project because eliminating right of way takes to properties on east side of I-4 will avoid the loss of over 130 parking spaces and the disruption of the parking lot circulation design for three of these properties. These property owners will be more in favor of the project with no impacts.
- Avoids a structural modification to the roof of the Orange County Sheriff Community Center.
- Although this recommendation is estimated to have a potential cost increase, it should be pursued because there are other parcels for sale along Turkey Lake road which may be less costly than the Pond 200-A parcel which was evaluated to be a total take for this study in order to provide a cure for the US Post Office right of way impacts.

Disadvantages:

- Increased risk of not obtaining right of way take from the US Post Office parcel located on the west side of I-4 due to the additional right of way take that would be required with this recommendation.
- Estimated increased Turkey Lake Road construction cost by additional amount of \$138,557.
- Increase in right of way take areas from the 4 parcels on the west side of I-4 will result in estimated additional right of way costs of \$1.0 million, which includes the cost for a complete cure and possible relocation of the US Post Office on the west side of Turkey Lake Road

FHWA CATEGORIES

Safety Operations Environment Construction Other

Potential Value Added: (\$1,139,000)

RECOMMENDATION No. 5: Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528

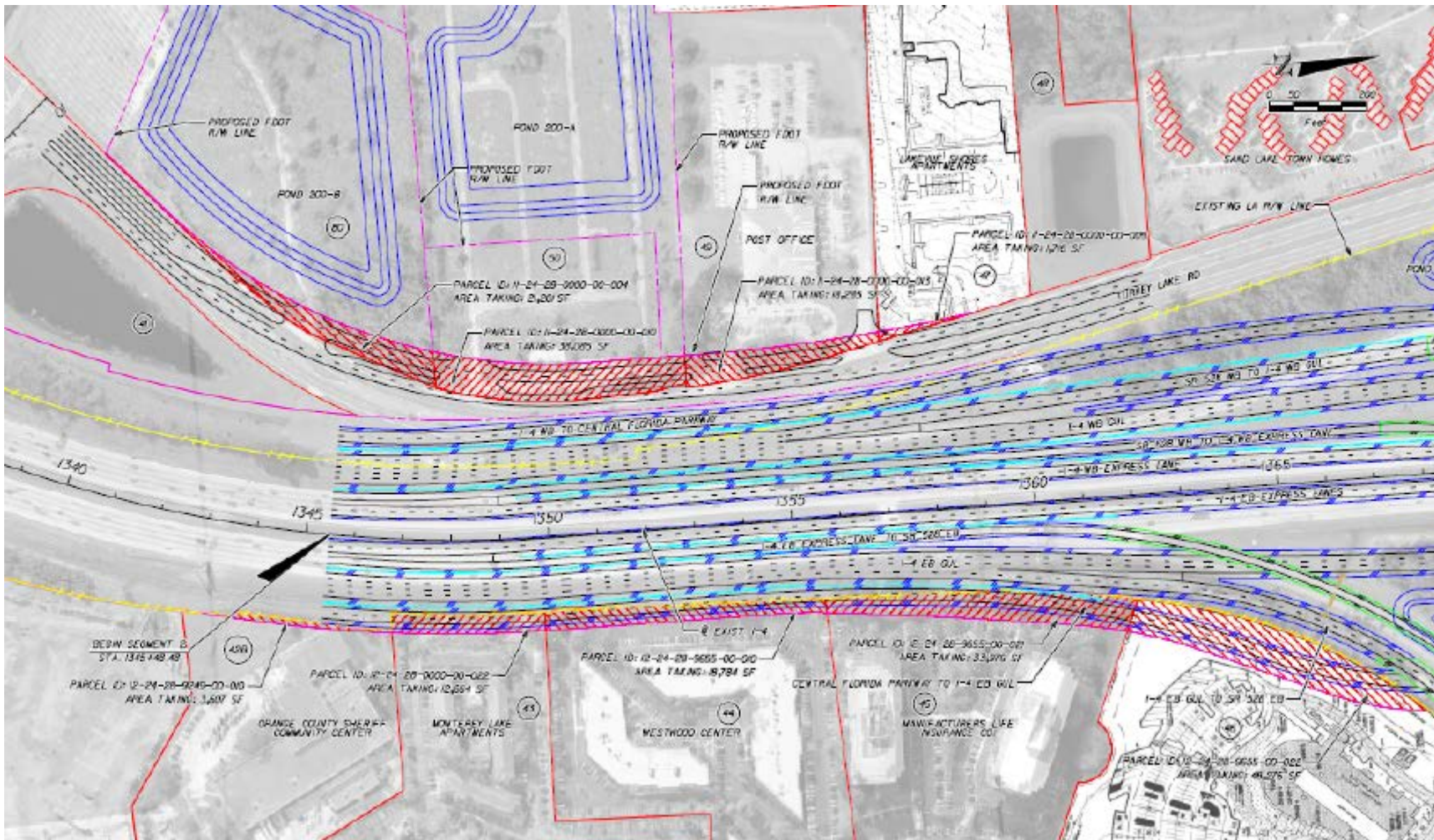
Calculations:

Description	Quantity	Unit	Unit Price	Extended Amount
Embankment	2,000	CY	\$5.94	\$11,880
Clearing & grubbing	5	AC	\$7,724.00	\$38,620
Stabilization Type B LBR 40	500	SY	\$2.90	\$1,450
Base Optional (base group 6)	500	SY	\$13.69	\$6,845
Superpave asphalt (Traffic B)	100	TN	\$87.28	\$8,728
Subtotal				\$67,523
Compensable Utility Relocation (5%)	1	LS		\$ 3,376
Mobilization (10%)	1	LS		\$ 6,752
Maintenance of Traffic (20%)	1	LS		\$ 13,505
Lighting (5%)	1	LS		\$ 3,376
Signage (5%)	1	LS		\$ 3,376
Drainage (20%)	1	LS		\$ 13,505
ITS (5%)	1	LS		\$ 3,376
Erosion Control (1%)	1	LS		\$ 675
Subtotal				\$115,464
Contingency (10%)		LS		\$23,093
			CONSTRUCTION TOTAL	\$138,557

Estimated Right of Way Cost Increase	\$1,000,000
Cost of Work	<u>\$ 138,557</u>
Total Value Added	\$1,138,557

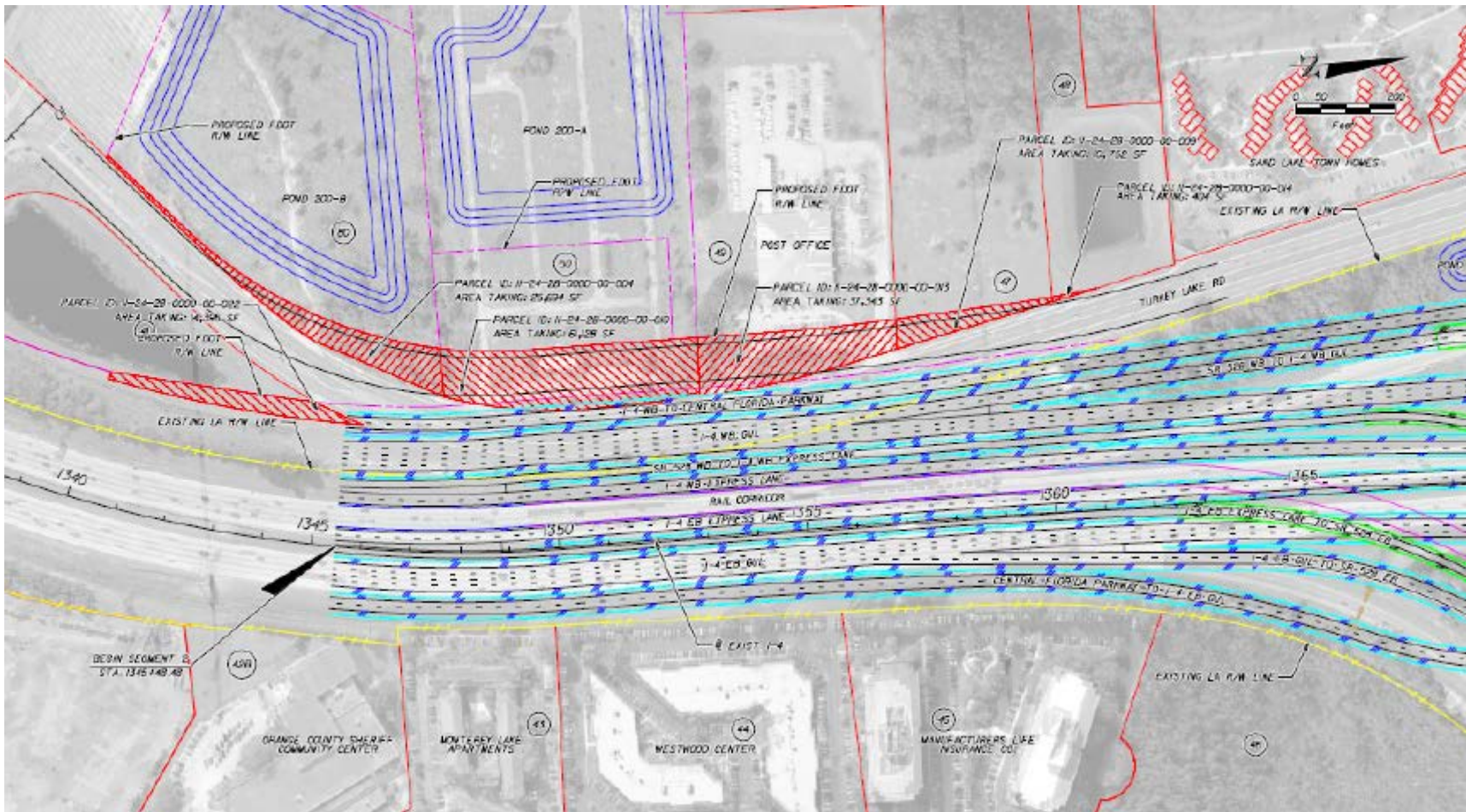
RECOMMENDATION No. 5: Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528

ALTERNATIVE 1 FOOTPRINT (SR 528)



RECOMMENDATION No. 5: Avoid the east side right of way impacts by using Alternate 4 footprint at SR 528

ALTERNATIVE 4 FOOTPRINT (SR 528)



RECOMMENDATION No. 8: Consider Single-Point Urban Interchange at SR 482 (Sand Lake Road)

Proposed Alternative:

The PD&E Documents show two alternatives. The first alternative is a combination diamond/partial clover-leaf interchange. The second alternative is a diverging-diamond interchange (DDI).

VE Alternative:

A third alternative, consisting of a single-point urban interchange, should be considered. The VE team recommends constructing a single-point urban interchange (SPUI). This concept will reduce the number of signalized ramp intersections from two to one and will improve operations of the system and is more user friendly for pedestrians and bikes through the corridor.

Advantages :

- Combine two signalized intersections into one signalized intersection.
- Reduces the number of un-signalized pedestrian crossings.
- More flexibility in signal phasing.
- Compared to DDI, higher operating speed on SR 482 (i.e., improved capacity).
- Improved access management (potential for U-turns on SR 482).

Disadvantages:

- Increased cost (i.e., ramp re-construction, longer bridge span)
- 500+ westbound right turn movements (per hour) on existing loop ramp are now left turn movements. (*Important to note the eastbound Sand Lake Road left turn movements are 700+ vph (per January 2013 turning movement count).*)

FHWA CATEGORIES

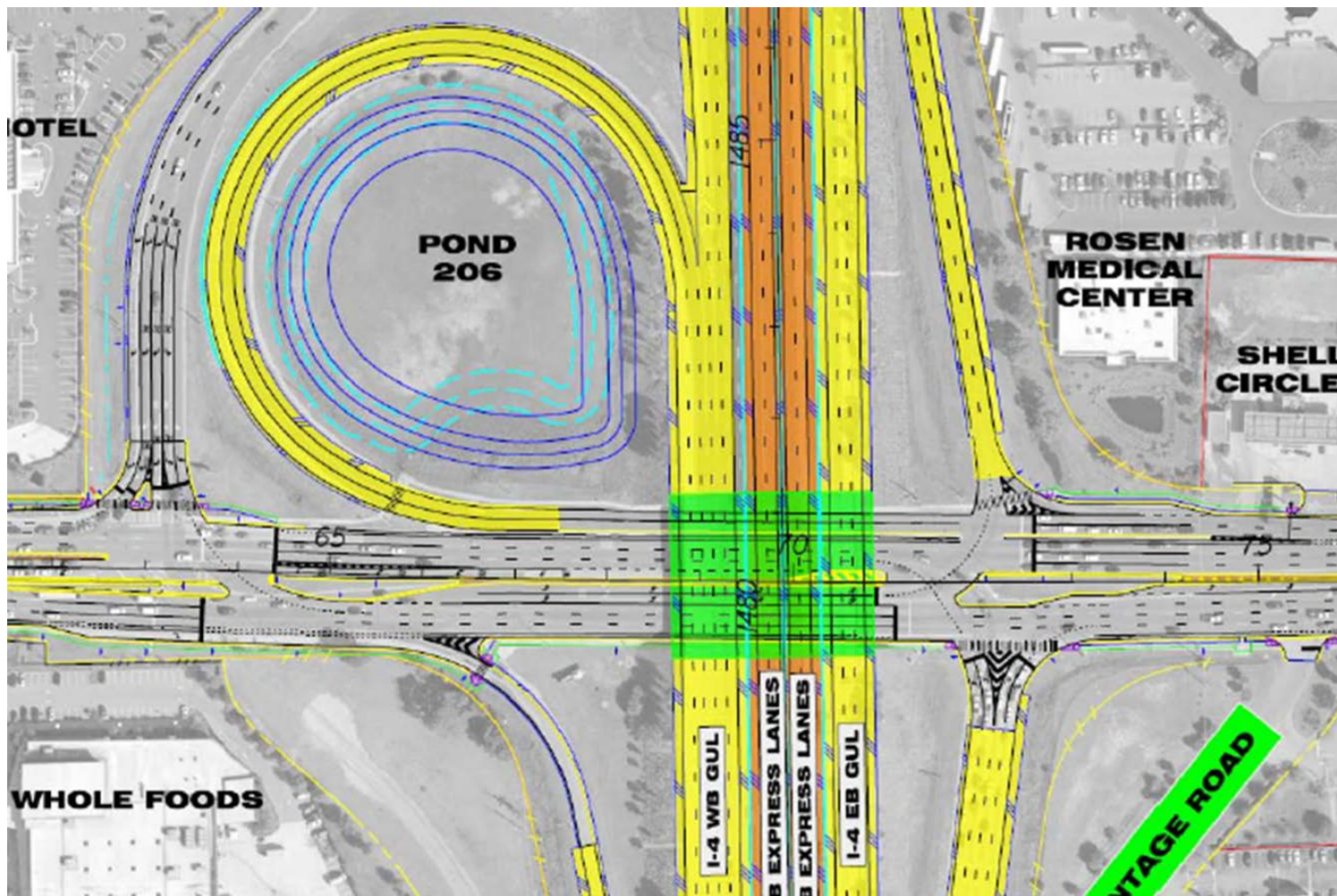
Safety Operations Environment Construction Other

Potential Value Added: (\$7,000,000) (SPUI option comparable to DDI option)

Additionally, further analysis should be performed by HDR to model the SPUI option and determine efficiency and other measure of effectiveness.

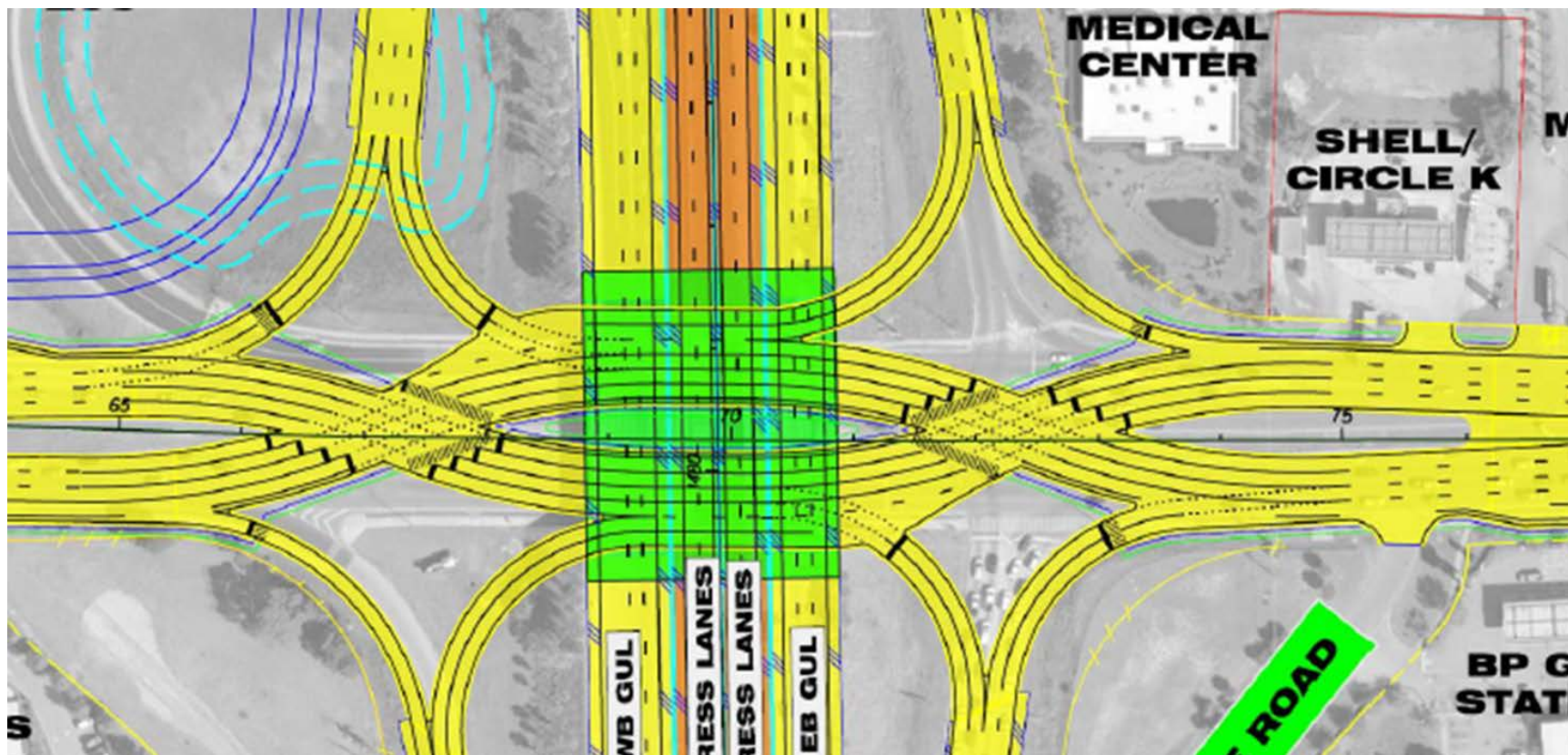
RECOMMENDATION No. 8: Consider Single-Point Urban Interchange at SR 482 (Sand Lake Road)

PARTIAL CLOVERLEAF/DIAMOND INTERCHANGE



RECOMMENDATION No. 8: Consider Single-Point Urban Interchange at SR 482 (Sand Lake Road)

DIVERGING DIAMOND INTERCHANGE



RECOMMENDATION No. 8: Consider Single-Point Urban Interchange at SR 482 (Sand Lake Road)

Calculations:

Sand Lake Road - Alt. 1
(Alignment I-4) STA. 1451+71.40 TO 1494+28.37

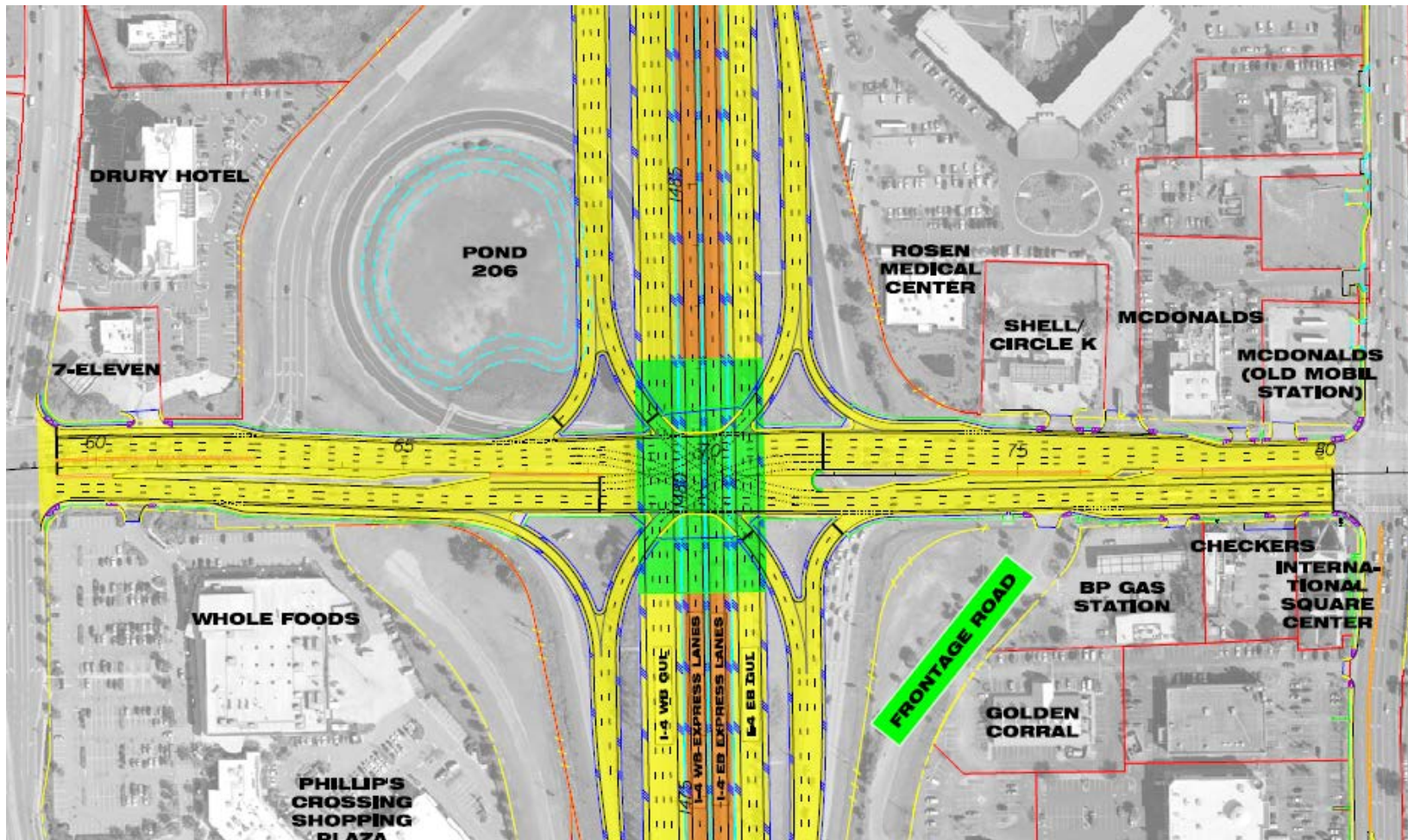
Item	Description	Unit	Unit Cost	Quantity	Total Cost	Remarks
0110 1 1	Clearing & Grubbing	AC	\$ 7,724	25	\$ 190,056	Total Area of mainline section - R/W to R/W
0110 3	Removal of Existing Structure	SF	\$ 24	24,595	\$ 579,458	Area of existing bridge - SR 528 over I-Drive
160 4	Stabilization Type B LBR 40	SY	\$ 2.90	119,095	\$ 345,377	Total Area of mainline section
285 706	Base optional (base group 6) ML	SY	\$ 13.69	36,726	\$ 502,761	Total Shldr area
285 712	Base optional (base group 12) ML	SY	\$ 14.02	82,369	\$ 1,154,817	Total Roadway area
334 1 12	Superpave asphaltic concrete (Traff B)	TN	\$ 87.28	4,040	\$ 352,600	Used 110 lb /sy*inch lift (2" thk) - Shoulder
334 1 14	Superpave asphaltic concrete (Traff D)	TN	\$ 87.21	13,591	\$ 1,185,265	Used 110 lb /sy*inch lift (3" thk) - Roadway
334 1 24	Superpave asphaltic concrete (Traff D-PG 76-22)	TN	\$ 89.64	9,061	\$ 812,194	Used 110 lb /sy*inch lift (2" thk) - Roadway
337 7 22	Asphaltic Conc friction course (FC-5) (PG 76-22)	TN	\$ 117.20	3,398	\$ 388,214	Used 110 lb /sy*inch lift (0.75" thk) - Roadway
521 72 10	Barrier Wall	LF	\$ 243	14,370	\$ 3,494,840	Concrete, Double face
	Thermoplastic, White, Striping	NM	\$ 3,178	14	\$ 43,589	EOP and lane lines
	Vehicle Impact Attenuator	EA	\$ 18,327.63	1	\$ 18,328	At gores
	Fencing	LF	\$ 10.00	8,520	\$ 85,200	LA R/W fence
	Embankment	CY	\$ 5.94	119,095	\$ 707,427	Assume 3' over entire roadway area
	MSE wall	SF	\$ 34.00	25,560	\$ 869,040	Roadway raised 3' x length of section x 2 sides
	SR 528 Bridge	SF	\$ 160	38,368	\$ 6,138,880	Concrete
	Subtotal Cost	LS			\$ 16,877,866	
	Compensable Utility Relocation	LS			\$ 843,893	Assume 5% of Construction Subtotal Cost
	Mobilization	LS			\$ 1,687,787	Assume 10% of Construction Subtotal Cost
	Maintenance of Traffic (MOT)	LS			\$ 3,375,573	Assume 20% of Construction Subtotal Cost
	Lighting	LS			\$ 843,893	Assume 5% of Construction Subtotal Cost
	Signage	LS			\$ 843,893	Assume 5% of Construction Subtotal Cost
	Drainage	LS			\$ 3,375,573	Assume 20% of Construction Subtotal Cost
	ITS	LS			\$ 843,893	Assume 5% of Construction Subtotal Cost
	Erosion Control	LS			\$ 168,779	Assume 1% of Construction Subtotal Cost
	Construction Subtotal	LS			\$ 28,861,151	
	Contingency	LS			\$ 4,329,173	Assume 15% of Construction Subtotal
	Grand Total				\$ 33,190,324	

Sand Lake Road - Alt. 2
(Alignment I-4) STA. 1451+71.40 TO 1494+28.37

Item	Description	Unit	Unit Cost	Quantity	Total Cost	Remarks
0110 1 1	Clearing & Grubbing	AC	\$ 7,724	33	\$ 251,640	Total Area of mainline section - R/W to R/W
0110 3	Removal of Existing Structure	SF	\$ 24	24,595	\$ 579,458	Area of existing bridge - SR 528 over I-Drive
160 4	Stabilization Type B LBR 40	SY	\$ 2.90	157,687	\$ 457,291	Total Area of mainline section
285 706	Base optional (base group 6) ML	SY	\$ 13.69	42,840	\$ 586,486	Total Shldr area
285 712	Base optional (base group 12) ML	SY	\$ 14.02	114,846	\$ 1,610,144	Total Roadway area
334 1 12	Superpave asphaltic concrete (Traff B)	TN	\$ 87.28	4,712	\$ 411,301	Used 110 lb /sy*inch lift (2" thk) - Shoulder
334 1 14	Superpave asphaltic concrete (Traff D)	TN	\$ 87.21	18,950	\$ 1,652,597	Used 110 lb /sy*inch lift (3" thk) - Roadway
334 1 24	Superpave asphaltic concrete (Traff D-PG 76-22)	TN	\$ 89.64	12,633	\$ 1,132,430	Used 110 lb /sy*inch lift (2" thk) - Roadway
337 7 22	Asphaltic Conc friction course (FC-5) (PG 76-22)	TN	\$ 117.20	4,737	\$ 555,224	Used 110 lb /sy*inch lift (0.75" thk) - Roadway
521 72 10	Barrier Wall	LF	\$ 243	13,471	\$ 3,276,012	Concrete, Double face
	Thermoplastic, White, Striping	NM	\$ 3,178	19	\$ 60,454	EOP and lane lines
	Vehicle Impact Attenuator	EA	\$ 18,327.63	1	\$ 18,328	At gores
	Fencing	LF	\$ 10.00	8,520	\$ 85,200	LA R/W fence
	Embankment	CY	\$ 5.94	120,615	\$ 716,453	Assume 3' over entire roadway area
	MSE wall	SF	\$ 34.00	25,560	\$ 869,040	Roadway raised 3' x length of section x 2 sides
0520 1 10	Concrete Curb & Gutter, Type F	LF	\$ 13.00	11,974	\$ 155,662	New DDI construction
0522 1	Sidewalk Conc (4" Thk)	SY	\$ 21.90	1,936	\$ 42,401	New construction
	SR 528 Bridge	SF	\$ 160	51,919	\$ 8,307,040	Concrete
	Subtotal Cost	LS			\$ 20,767,160	
	Compensable Utility Relocation	LS			\$ 1,038,358	Assume 5% of Construction Subtotal Cost
	Mobilization	LS			\$ 2,076,716	Assume 10% of Construction Subtotal Cost
	Maintenance of Traffic (MOT)	LS			\$ 4,153,432	Assume 20% of Construction Subtotal Cost
	Lighting	LS			\$ 1,038,358	Assume 5% of Construction Subtotal Cost
	Signage	LS			\$ 1,038,358	Assume 5% of Construction Subtotal Cost
	Drainage	LS			\$ 4,153,432	Assume 20% of Construction Subtotal Cost
	ITS	LS			\$ 1,038,358	Assume 5% of Construction Subtotal Cost
	Erosion Control	LS			\$ 207,672	Assume 1% of Construction Subtotal Cost
	Construction Subtotal	LS			\$ 35,511,843	
	Contingency	LS			\$ 5,326,777	Assume 15% of Construction Subtotal
	Grand Total				\$ 40,838,620	

RECOMMENDATION No. 8: Consider Single-Point Urban Interchange at SR 482 (Sand Lake Road)

SINGLE POINT URBAN INTERCHANGE (RECOMMENDED)



RECOMMENDATION No. 10: Eliminate the ramps to and from Central Florida Parkway

Proposed Alternative:

The PD&E Documents show a southbound off and northbound on ramp connecting the I-4 general use lanes to Central Florida Parkway.

VE Alternative:

Eliminate the ramps at this location.

Advantages :

- Less capital cost
- Less right of way
- Reduction in future maintenance costs
- Less utility impacts
- Less maintenance of traffic concerns
- Improved constructability

Disadvantages:

- Reduction in level of service
- Potential commitment that may exist

FHWA CATEGORIES

Safety Operations Environment Construction Other

Potential Cost Savings: \$49,400,000

RECOMMENDATION No. 10: Eliminate the ramps to and from Central Florida Parkway

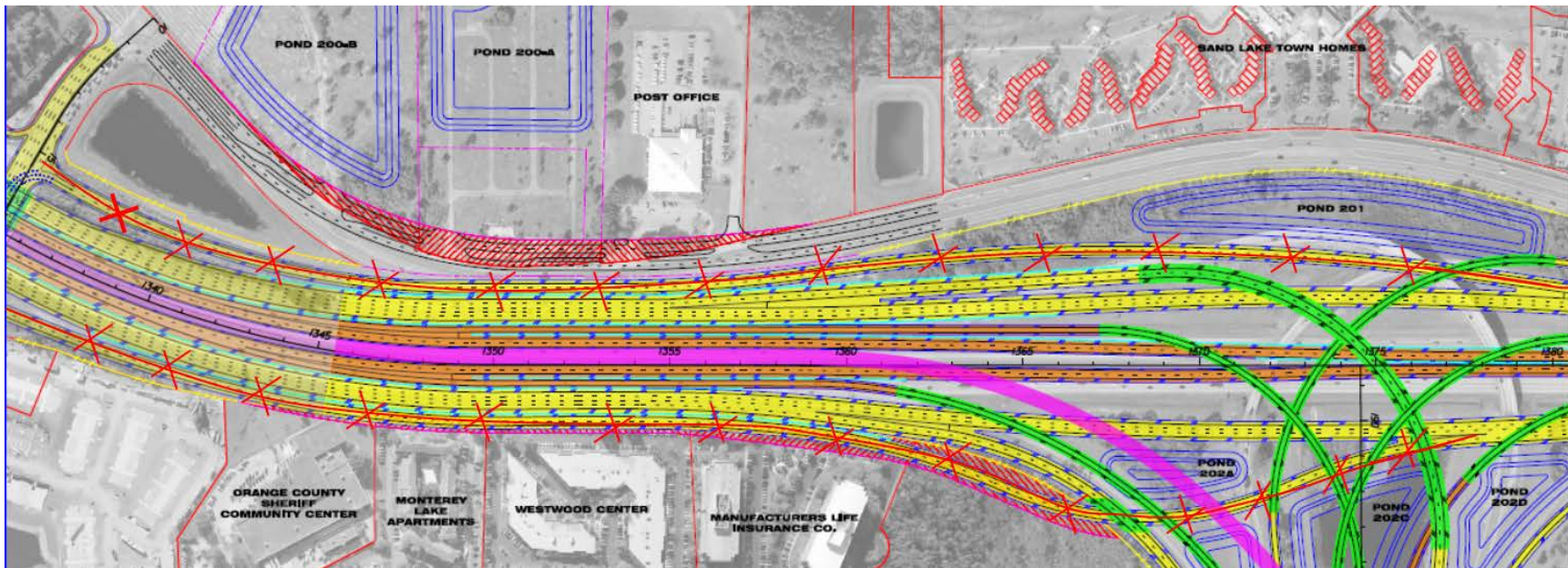
Calculations:

HNTB cost estimate for Compensable Utility Relocation from Sta. 1345+48.48 to Sta. 1420+57.88 is **\$4,305,514**

Description	Quantity	Unit	Unit Price	Extended Amount
Clearing & Grubbing	-14	AC	\$7,724.00	(\$108,136)
Stabilization	-45,467	SY	\$2.90	(\$131,854)
Base Optional (base group 6)	-14,467	SY	\$13.69	(\$198,053)
Base Optional (base group 12)	-25,420	SY	\$14.02	(\$356,388)
Superpave (Traff D-PG 76-22)	-1,932	TN	\$89.64	(\$173,211)
Friction Course (FC-5) (PG 76-22)	-1,438	TN	\$117.20	(\$168,522)
Thermoplastic, White Striping	-2	NM	\$3,178.00	(\$5,596)
Thermoplastic, Yellow Striping	-2	NM	\$3,178.00	(\$5,596)
Embankment	-57,867	CY	\$5.94	(\$343,730)
Bridges	-36,200	SF	\$160.00	(\$5,792,000)
Subtotal				(\$7,283,088)
Compensable Utility Relocation (5%)	1	LS		\$ (364,154)
Mobilization (10%)	1	LS		\$ (728,309)
Maintenance of Traffic (20%)	1	LS		\$ (1,456,618)
Lighting (5%)	1	LS		\$ (364,154)
Signage (5%)	1	LS		\$ (364,154)
Drainage (20%)	1	LS		\$ (1,456,618)
ITS (5%)	1	LS		\$ (364,154)
Erosion Control (1%)	1	LS		\$ (72,831)
Subtotal				(\$12,454,081)
Contingency (10%)		LS		(\$2,490,816)
		CONSTRUCTION TOTAL		(\$14,944,897)

Right of Way savings =	\$30,100,000
Construction savings =	\$14,944,897
Utilities savings =	\$ 4,305,514
TOTAL	\$49,350,411

RECOMMENDATION No. 10: Eliminate the ramps to and from Central Florida Parkway



RECOMMENDATION No. 11: Combine ramps similar to SR 528 Alternate 2

Proposed Alternative:

Alternative 1 is the baseline Alternative used by the VE team. The two mainline typical sections show that the majority of the roadway will be contained within the existing right of way (300 ft. minimum) with exception of the pond sites. The total length of bridges is 7,397 ft. with Construction Cost of **\$169,335,848**. Wetland impact is 4.27 acres {data taken from PER dated January 30, 2014 – Table 20}. Alternative 1 proposes several separate connector ramps with different elevations as follows:

**I-4 eastbound Express Lane to SR 528 eastbound
I-4 eastbound General Use Lanes (GUL) to SR 528 eastbound
SR 528 westbound to I-4 westbound Express Lane
SR 528 westbound to I-4 westbound GUL**

**I-4 westbound Express Lane to SR 528 eastbound
I-4 westbound GUL to SR 528 eastbound
SR 528 westbound to I-4 eastbound Express Lane
SR 528 westbound to I-4 eastbound GUL**

**Ponds: PONDS 202A & 202B & 202C & 202D and 201
Back & Front of Maintenance Berm Area is 18.91 acres**

VE Alternative:

Construct combined ramps at the interchange as in the configuration shown in SR 528 Alternative 2 as follows:

**I-4 eastbound (GUL & Express Lane) to SR 528 eastbound
I-4 westbound (GUL & Express Lane) to SR 528 eastbound
SR 528 westbound to I-4 westbound (GUL & Express Lane)
SR 528 westbound to I-4 eastbound (GUL & Express Lane)**

The total length of bridges is 4,893 ft. with construction cost of \$154,317,632. Wetland impact is 4.27 Acres.

**Ponds: 202A & 202C & 202D and 201
Back and front of maintenance berm area is 16.85 acres**

Advantages :

- Less Construction Cost {**\$154 M vs. \$169 M**}
- Less Tiers of Bridges - Vertical Elevations 4 to 3-level
- Less MOT
- Less maintenance
- Shorter construction time

Disadvantages:

- None apparent

RECOMMENDATION No. 11: Combine ramps similar to Alternate 2

FHWA CATEGORIES

Safety Operations Environment Construction Other

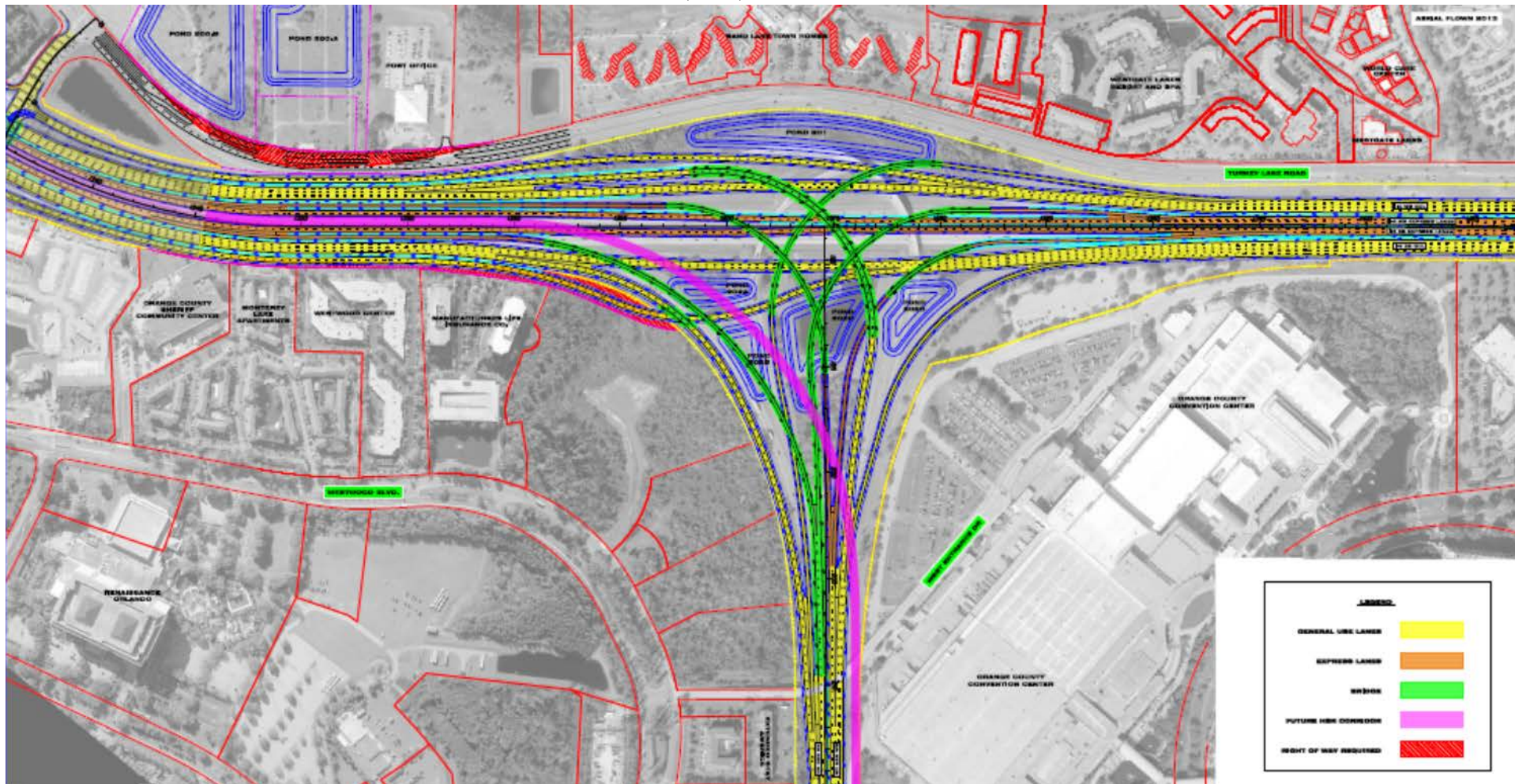
Potential Cost Savings: **\$15,782,000**

Calculations:

Embankment	-1	CY	\$189,642.00	(\$189,642)
MSE Wall	-1	SF	\$1,003,998.00	(\$1,003,998)
Barrier Wall	-1	CY	\$3,924,893.00	(\$3,924,893)
Stabilization Type B LBR 40	-1	SY	\$10,621.00	(\$10,621)
Base Group 12	-1	SY	\$973,776.00	(\$973,776)
Superpave Traffic Level D PG76-22	-1	TN	\$58,829.00	(\$58,829)
Superpave Traffic Level D	-1	TN	\$85,852.00	(\$85,852)
Asphalt Friction FC-5 PG76-22	-1	TN	\$28,843.00	(\$28,843)
Bridges	-1	SF	\$1,414,464.00	(\$1,414,464)
Subtotal				(\$7,690,918)
Compensable Utility Relocation (5%)	1	LS		\$ (384,546)
Mobilization (10%)	1	LS		\$ (769,092)
Maintenance of Traffic (20%)	1	LS		\$ (1,538,184)
Lighting (5%)	1	LS		\$ (384,546)
Signage (5%)	1	LS		\$ (384,546)
Drainage (20%)	1	LS		\$ (1,538,184)
ITS (5%)	1	LS		\$ (384,546)
Erosion Control (1%)	1	LS		\$ (76,909)
Subtotal				(\$13,151,470)
Contingency (15%)		LS		(\$2,630,294)
		CONSTRUCTION TOTAL		(\$15,781,764)

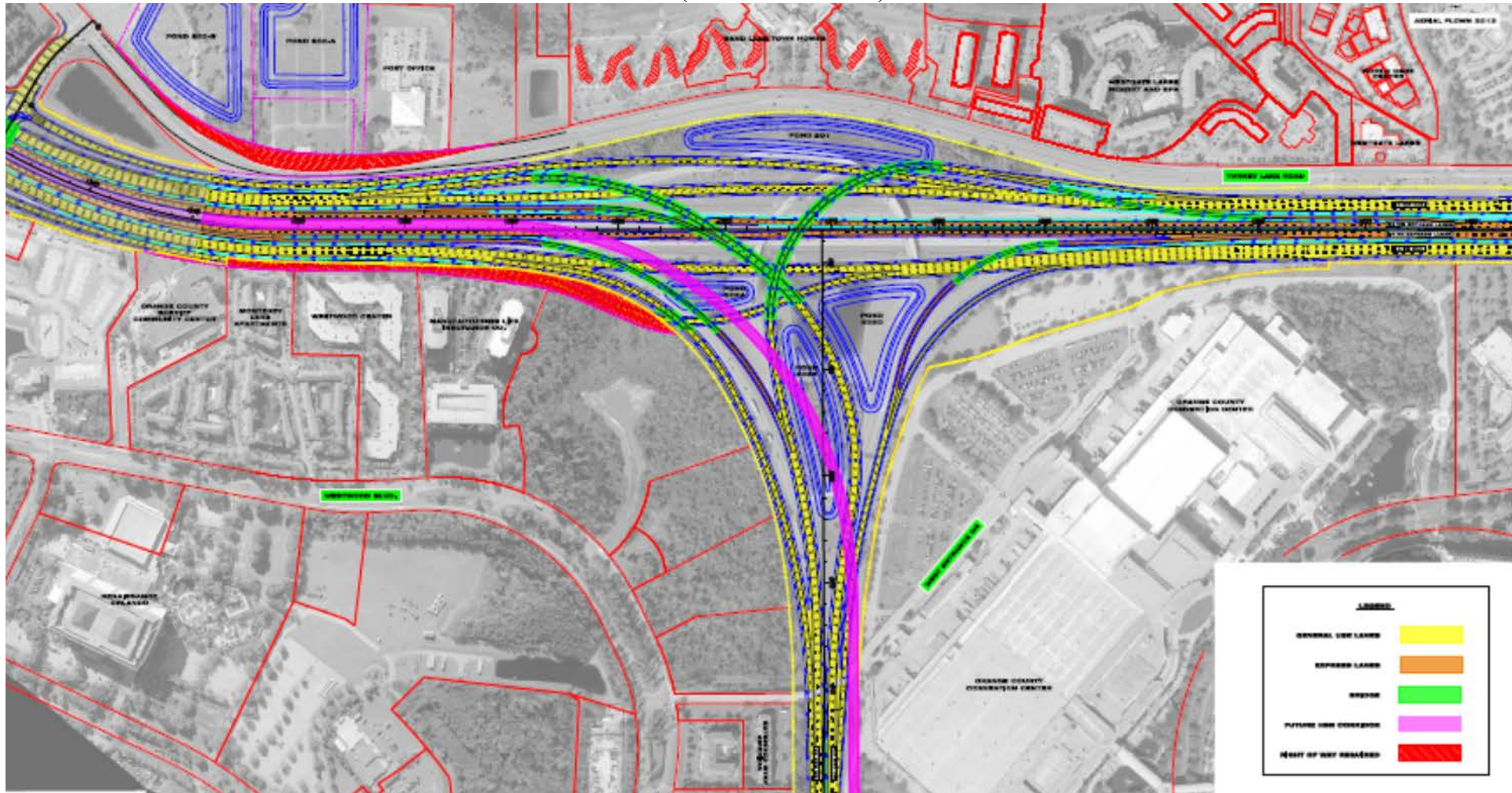
RECOMMENDATION No. 11: Combine ramps similar to Alternate 2

ALTERNATIVE 1



RECOMMENDATION No. 11: Combine ramps similar to Alternate 2

ALTERNATIVE 2 (RECOMMENDED)



APPENDICES

Agenda
Sign In Sheets
Presentation Slides

Agenda
February 10 – 14, 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 Lake Mary	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 – 10:15 am
	Creative Idea Listing/Function	10:15 am – 12:00 pm
	Lunch	12:00 pm – 1:00 pm
	Creative/Evaluation/Function	1:00 pm – 5:00 pm
Day Three	Evaluation Phase	8:00 am – 9:00 am
	Mid-point review and determine economic factors	9:00 am – 10:00 am
	Begin Development Phase	10:00 am – 12:00 pm
	Lunch	12:00 pm – 1:00 pm
	Continue Development	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 – 11:00 am
	Oral Presentation to FDOT/others	11:00 am – 12:00 pm
	Begin Draft Value Engineering Report	12:00 pm – 5:00 pm

FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING KICKOFF

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

February 10, 2014

SIGN IN SHEET

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Robert Denney	HUTB	407-805-0355	rdenney@hutb.com

call: 386-479-3217

FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING KICKOFF

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

February 10, 2014

SIGN IN SHEET

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FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING MID-POINT REVIEW

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

February 12, 2014

SIGN IN SHEET

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FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING MID-POINT REVIEW

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

February 12, 2014

SIGN IN SHEET

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FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING STUDY PRESENTATION

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

February 14, 2014

SIGN IN SHEET

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FLORIDA DEPARTMENT OF TRANSPORTATION

VALUE ENGINEERING STUDY PRESENTATION

I-4 from West of SR 528 (Beachline) to West of SR 435 (Kirkman Road)

February 14, 2014

SIGN IN SHEET

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NEIL KENIA	"	x5419	
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Jeff Gammlo	FDOT	5416	
Stefanie Philleps	FDOT	5141	
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SLIDE PRESENTATION