Florida Department of
TRANSPORTATION

Final
Preliminary Engineering Report

CR-510 from CR-512 to 58th Avenue
Project Development and Environment (PD&E) Study
Indian River County, Florida

Financial Management Number: 405606-2-22-02
ETDM Number: 14233

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016, and executed by FHWA and FDOT.

Florida Department of Transportation
District Four

February 2019

Florida Department of
TRANSPORTATION

CR-510
from CR-512 to 58th Avenue
Project Development and Environment (PD&E) Study

Final Preliminary Engineering Report

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016, and executed by FHWA and FDOT.

FDOT Office
Environmental Management
District Four

Author
Metric Engineering, Inc.

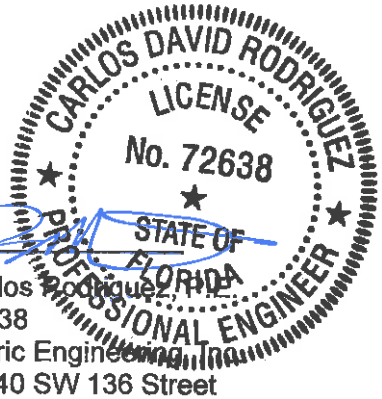
Date of Publication
February 2019

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Metric Engineering, Inc., authorized under the provisions of Section 471.023, Florida Statutes, to offer engineering services to the public through a Professional Engineer, duly licensed under Chapter 471, Florida Statutes, Certificate of Authorization (CA) No. 2294, by the State of Florida Department of Professional Regulation, Board of Professional Engineers, and that I have prepared or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for:

Financial Project ID:	**405606-2-22-02**
ETDM NO.:	**14233**
Project:	**County Road (CR) 510 Project Development and Environment Study from CR 512 to 58th Avenue**
County:	**Indian River County**
FDOT Project Manager:	**Maria Formoso, P.E., P.M.P.**

I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.



SIGNATURE: _____

Name: Carlos Rodriguez, P.E.
P.E. No.: 72638
Firm: Metric Engineering, Inc.
13940 SW 136 Street
Suite 200
Miami, FL 33186
Date: February 25, 2019

Table of Contents

SECTION **PAGE NO.**

1. PROJECT SUMMARY 1-1
1.1 Project Description 1-1
1.2 Purpose and Need 1-3
1.2.1 Project Purpose 1-4
1.2.2 Project Need 1-4
1.3 Commitments and Recommendations 1-9
1.3.1 Commitments 1-9
1.3.2 Recommendations 1-10

2. EXISTING CONDITIONS & EVALUATION 2-1
2.1 Phase I – Data Gathering Phase 2-2
2.1.1 Roadway Characteristics 2-2
2.1.1.1 Typical Sections and Functional Classifications 2-2
2.1.1.2 Posted Speed 2-4
2.1.1.3 Right-of-Way 2-5
2.1.1.4 Intersections and Signalization 2-5
2.1.1.5 Horizontal and Vertical Alignment 2-7
2.1.1.6 Lighting 2-7
2.1.2 Bridges/Structures 2-8
2.1.3 Pedestrian, Bicycle and Transit Facilities 2-8
2.1.4 Utilities 2-12
2.1.5 Soils 2-14
2.1.6 Groundwater Table 2-16
2.1.7 Drainage 2-16
2.1.8 Environmental Characteristics 2-20
2.1.8.1 Land Use 2-20
2.1.8.2 Cultural Features and Community Services 2-20
2.1.8.3 Potential Section 4(f) Resources 2-22
2.1.8.4 Aesthetics 2-22
2.1.8.5 Archaeological and Historical Resources 2-23
2.1.8.6 Natural and Biological Features 2-23
2.1.8.6.1 Floodplains and Elevation 2-23
2.1.8.6.2 Aquatic Preserves & Outstanding Florida Waters 2-25
2.1.8.6.3 Wetland and Surface Waters 2-25
2.1.8.6.4 Wildlife and Habitat 2-27
2.1.8.7 Physical Features 2-28
2.1.8.7.1 Air Quality 2-28
2.1.8.7.2 Noise 2-28
2.1.8.7.3 Contamination 2-28
2.1.9 Existing Traffic Conditions 2-30
2.1.9.1 Field Observations Summary 2-30
2.1.9.2 Data Collection 2-32

Table of Contents (continued)

SECTION **PAGE NO.**

2.1.9.3 Traffic Factors 2-33
2.1.9.4 Existing Traffic Volumes 2-36
2.1.9.4.1 Average Annual Daily Traffic 2-36
2.1.9.4.2 Peak Hour Intersection Volumes 2-37
2.1.9.5 Safety 2-40
2.2 Phase II – Data Analysis Phase 2-42
2.2.1 Project Segmentation 2-42
2.2.2 Roadway Characteristics Evaluation 2-44
2.2.2.1 Cross Section 2-46
2.2.2.2 Horizontal Alignment 2-46
2.2.2.3 Vertical Alignment 2-46
2.2.2.4 Stopping Sight Distance 2-46
2.2.2.5 Intersection Sight Distance 2-47
2.2.2.6 Pavement Condition 2-47
2.2.3 Traffic/Operational Characteristics Evaluation 2-47
2.2.3.1 Level of Service 2-47
2.2.3.2 Access Management 2-50
2.2.3.3 Signing and Marking 2-50
2.2.3.4 Safety 2-52
2.3 Phase III – Conclusions and Recommendations 2-52

3. DESIGN CONTROLS & STANDARDS 3-1
3.1 Roadway Characteristics 3-1
3.2 Geometric Design Criteria 3-1
3.3 Drainage Criteria 3-3
3.3.1 Water Quality Criteria 3-5
3.3.2 Water Quantity Criteria 3-5
3.3.2.1 SJRWMD 3-5
3.3.2.2 SRID 3-6
3.3.2.3 IRFWCD 3-6

4. ALTERNATIVES CONSIDERED 4-1
4.1 Phase One: Conceptual Design Analysis 4-1
4.1.1 No Build Alternative 4-1
4.1.2 Transportation Systems Management & Operations (TSM&O) Alternatives 4-3
4.1.3 Major Alternatives 4-4
4.1.3.1 Alternative Corridor Analysis 4-4
4.2 Phase Two: Preliminary Typical Section/Segmental Evaluation 4-5
4.3 Phase Three: Alternative Alignment Criteria Evaluation 4-11
4.4 Phase Four: Segmental Alternative Typical Section/Alignment Evaluation 4-14

Table of Contents (continued)

SECTION **PAGE NO.**

5. RECOMMENDED ALTERNATIVE 5-1
5.1 Preliminary Roadway Design 5-6
5.1.1 Proposed Typical Sections 5-6
5.1.2 Horizontal Alignment 5-6
5.1.3 Vertical Alignment 5-8
5.1.4 Bicycle and Pedestrian Accommodations 5-8
5.1.5 Access Management 5-9
5.1.6 Potential Design Exceptions and Variations 5-12
5.1.7 Lighting 5-12
5.2 Traffic Analysis 5-13
5.2.1 Other Projects 5-13
5.2.2 Development of Future Traffic Projections 5-13
5.2.2.1 Design Period 5-13
5.2.2.2 Future Travel Demand 5-13
5.2.2.3 No Build Directional Design Hour and Intersection Volumes 5-16
5.2.2.4 Build Directional Design Hour and Intersection Volumes 5-16
5.2.3 Future Traffic Operational Analysis 5-21
5.2.3.1 No Build Analysis 5-21
5.2.3.1.1 No Build Roadway Segment Analysis 5-21
5.2.3.1.2 No Build Intersection Analysis 5-22
5.2.3.2 Build Analysis 5-25
5.2.3.2.1 Build Roadway Segment Analysis 5-25
5.2.3.2.2 Build Intersection Analysis 5-27
5.2.4 Roundabout Screening 5-29
5.3 Safety Improvements 5-31
5.4 Structural Analysis 5-31
5.4.1 CR 510 over Lateral D Canal 5-32
5.4.2 CR 510 over Lateral C Canal 5-35
5.4.3 CR 510 over Lateral L Canal 5-37
5.4.4 CR 510 over Slough 5-40
5.4.5 Temporary Traffic Control 5-42
5.5 Utility Impact Potential 5-44
5.6 Drainage 5-45
5.6.1 Pond Siting Team 5-51
5.6.2 Permit Agency Coordination 5-52
5.7 Right-of-Way Impacts 5-53
5.8 Construction Cost Estimate 5-54
5.9 Traffic Control Plan 5-54
5.10 Environmental Impacts 5-59
5.10.1 Relocation Potential 5-59
5.10.2 Farmlands 5-59
5.10.3 Section 4(f) 5-60

Table of Contents (continued)

SECTION **PAGE NO.**

5.10.4 Wetlands and Other Surface Waters 5-61
5.10.5 Floodplains 5-62
5.10.6 Wildlife and Habitat 5-64
5.10.7 Noise 5-67
5.10.8 Contamination 5-67

6. SUMMARY OF PUBLIC INVOLVEMENT ACTIVITIES 6-1

List of Figures

FIGURE NO. **PAGE NO.**

1-1 Project Location Map 1-2
1-2 Project Segmentation 1-11
1-3 Recommended Alternative – Segment 1 1-12
1-4 Recommended Alternative – Segment 2 1-13
1-5 Recommended Alternative – Segment 3 1-14
1-6 Recommended Alternative – Segment 4 1-15
1-7 Proposed Typical Sections 1-16
1-8 Potential Pond Sites 1-19
2-1 Existing Conditions and Evaluation Analysis Flowchart 2-1
2-2 Existing Typical Sections 2-3
2-3 Existing Posted Speed Limits 2-4
2-4 Intersection Lane Configurations 2-6
2-5 Existing Horizontal Alignment 2-7
2-6 Existing Bridge Characteristics 2-9
2-7 Existing Transit Routes 2-11
2-8 Existing Soils Map 2-15
2-9 Drainage Map 2-16
2-10 Existing Land Use 2-21
2-11 Existing Elevation Features 2-24
2-12 Existing Hydrologic Features 2-26
2-13 Field Observations and Key Findings 2-31
2-14 Data Collection Locations 2-32
2-15 Historical Traffic Information Along CR 510 2-35
2-16 Existing Peak Hour Volumes 2-38
2-17 Intersection Lane Configuration 2-39
2-18 Project Segmentation 2-43
2-19 Existing Facility Evaluation Summary 2-45
2-20 Existing Driveway Connections Evaluation 2-51
4-1 Alternative Selection Process 4-2
4-2 Corridor Considerations 4-5

4-3 Preliminary Typical Sections 4-7
4-4 Potential Alignment Options 4-13
5-1 Modified Typical Sections 5-1
5-2 Recommended Alternative – Segment 1 5-2
5-3 Recommended Alternative – Segment 2 5-3
5-4 Recommended Alternative – Segment 3 5-4
5-5 Recommended Alternative – Segment 4 5-5
5-6 Proposed Typical Sections 5-7
5-7 No Build and Build AADTs 5-15
5-8 No Build Turning Movement Volumes 5-17
5-9 Build Turning Movement Volumes 5-18
5-10 No Build Lane Configuration 5-19
5-11 Build Lane Configuration 5-20
5-12 Proposed Structure Locations 5-32
5-13 Proposed CR 510 over Lateral D Canal Culvert Characteristics 5-34
5-14 Proposed CR 510 over Lateral C Canal Bridge Characteristics 5-36
5-15 Proposed CR 510 over Lateral L Canal Bridge Characteristics 5-39
5-16 Proposed CR 510 over Slough Bridge Characteristics 5-41
5-17 Temporary Traffic Control Plan 5-43
5-18 Potential Pond Sites 5-47
5-19 Future Construction Projects 5-55
5-20 Construction Project FM#: 405606-4 Conceptual MOT 5-56
5-21 Construction Project FM#: 405606-3 Conceptual MOT 5-57
5-22 Potentially Contaminated Site Locations 5-69

List of Tables

TABLE NO. **PAGE NO.**

1-1 Existing (2015) Conditions 1-5
1-2 Future (2040) Conditions 1-6
2-1 Existing Right-of-Way Features 2-5
2-2 Existing Utilities 2-12
2-3 General Soil Conditions 2-14
2-4 Listed Species with Potential to Occur in Project Area 2-27
2-5 Contamination Sites Summary 2-29
2-6 CR 510 Recommended D-Factors 2-33
2-7 Recommended Non-Standard K-Factors 2-34
2-8 Existing (2015) Average Annual Daily Traffic 2-36
2-9 Crash Summary 2-40
2-10 Crash Severity Summary 2-41
2-11 Existing Volume to Capacity Ratios (AADT) 2-48
2-12 Existing Volume to Capacity Ratios (DDHV) 2-48
2-13 Existing Intersection LOS 2-49
2-14 Arterial Access Management Classifications and Standards 2-50
3-1 Roadway Design Criteria 3-2

3-2 Drainage Design Criteria 3-3
4-1 Evaluation of TSM&O Alternatives 4-3
4-2 Preliminary Suburban Typical Sections Evaluation 4-8
4-3 Preliminary Urban Typical Sections Evaluation 4-9
4-4 Preliminary Alternative Typical Section Elimination Process 4-11
4-5 Summary of Segmental Typical Section/Alignment Options 4-14
4-6 Segment 1 Typical Section/Alignment Evaluation 4-15
4-7 Segment 2 Typical Section/Alignment Evaluation 4-15
4-8 Segment 3 Typical Section/Alignment Evaluation 4-16
4-9 Segment 4 Typical Section/Alignment Evaluation 4-17
5-1 Proposed Horizontal Curves along CR 510 5-8
5-2 Proposed Vertical Curves along CR 510 5-8
5-3 Signal Connection Spacing 5-9
5-4 Median Opening Spacing 5-10
5-5 Driveway Connection Spacing (Southbound/Eastbound) 5-11
5-6 No Build and Build Growth Rates 5-14
5-7 No Build Volume to Capacity Ratios (AADT) 5-21
5-8 No Build Volume to Capacity Ratios (DDHV) 5-21
5-9 No Build Intersection LOS (AM Peak Hour) 5-23
5-10 No Build Intersection LOS (PM Peak Hour) 5-24
5-11 Build Volume to Capacity Ratios (AADT) 5-26
5-12 Build Volume to Capacity Ratios (DDHV) 5-26
5-13 Build Intersection LOS (AM Peak Hour) 5-27
5-14 Build Intersection LOS (PM Peak Hour) 5-28
5-15 Roundabout Screening Summary 5-30
5-16 Water Quality Summary 5-51
5-17 Pond Siting Scores and Rank 5-52
5-18 Construction Cost Estimate 5-54
5-19 Listed Species Effect Determinations 5-66
5-20 Contamination Site Summary 5-68

List of Appendices

Appendix A: Reference Documents
Appendix B: FEMA Firm Maps
Appendix C: Existing Conditions Evaluations
Appendix D: Special Concern Areas Analysis and Evaluation
Appendix E: Concept Plans
Appendix F: Roundabout Screening Analysis
Appendix G: Safety Analysis
Appendix H: Right of Way Impacts
Appendix I: Construction Cost Estimates
Appendix J: Public Involvement

1 PROJECT SUMMARY

The Florida Department of Transportation (FDOT) in conjunction with Indian River County (IRC) is planning to upgrade a segment of County Road (CR) 510, an urban principal arterial facility located just south and west of Sebastian, Florida. As part of the planning process, a Project Development and Environment (PD&E) Study was initiated and the engineering documentation is included in this report.

The purpose of this Preliminary Engineering Report is to document all existing condition information of the facility, focusing on the engineering/geometric characteristics, operational elements and the socio-economic/environmental features within the project area. In addition, the report documents the development and evaluation of potential project alternatives, which address the various deficiencies and minimize impacts. In summary, this report identifies all major project elements and provides engineering solutions and recommendations.

1.1 Project Description

The subject project is located just west and south of Sebastian, a city in Indian River County, Florida. This area is within the northern part of Florida's Treasure Coast, so named after the discovery of treasure from the 1715 Spanish Treasure Fleet, lost in a hurricane near the Sebastian Inlet.

The project entails the investigation of a potential widening from two to four lanes of CR 510, a principal arterial facility also known as Wabasso Road just west and south of Sebastian, Florida in northern Indian River County. The project limits extend for approximately 5.27 miles from CR 512 (Sebastian Boulevard) to 58th Avenue at the western limit of the Wabasso community (see **Figure 1-1**). CR 510 is the main connector facility from CR 512 to SR A1A on the barrier island and provides additional linkage between I-95 on the west and US-1 on the east. The project corridor is generally rural in nature and includes a mixture of agricultural, educational, commercial, industrial and residential facilities.



Project Location Map **Figure 1-1**

CR 510 is owned and maintained by Indian River County and is functionally classified as an urban principal arterial. The proposed project will provide additional capacity to meet the future traffic needs resulting from projected population and employment growth within the projected area expected as a result of various residential developments. The Indian River County Metropolitan Planning Organization (MPO) has identified C.R. 510 in their 2040 Long Range Transportation Plan (LRTP) initial roadway needs plan alternative projects, cost feasible plan as a “Core Project” and in their Transportation Improvement Program (TIP).

1.2 Purpose and Need

The overall study was initiated with a detailed, comprehensive analysis of existing substandard conditions. In general terms, some of the most critical existing deficiencies include:

- **Linkage Deficiencies:** Because of its important linkage function, the need to optimize vehicular mobility within the project limits is critical, this includes additional link capacity, and intersection improvements.
- **Operational Deficiencies:** Resulting from substandard horizontal geometry, insufficient capacity at major signalized intersections and deficient signage.
- **Safety Deficiencies:** Consisting of high crash and injury rates at selected project locations.
- **Multimodal Deficiencies:** Due to lack of safe access features for all roadway users (pedestrians, bicyclists, transit riders, etc.).

The need for improvement was established based on these findings/deficiencies. The types of improvements warranted include:

- Provide adequate capacity to meet future traffic demand
- Provide adequate intersection and horizontal geometry
- Provide safety improvements
- Provide operational improvements at key project locations
- Provide pedestrian and bicycle enhancements
- Provide aesthetically pleasing solutions that promote mobility and accessibility

A comprehensive alternative selection process was utilized for assessing project alternatives. Alternatives strive to emphasize engineering, environmental and economic aspects while adhering to sound aesthetic design principles. Other elements included geometric, operational and safety issues, drainage, utilities, soils and geotechnical issues, social and environmental impacts, costs, etc.

Although several alternate corridor locations were considered during the course of this study, it was concluded that the existing corridor location offered the only feasible choice for the fulfillment of the project need.

1.2.1 Project Purpose

The purpose of the project is to improve operational capacity on CR 510 from CR 512 to 58th Avenue, in IRC, Florida, in order to achieve an acceptable Level of Service (LOS) on the facility in the future condition.

1.2.2 Project Need

CR 510 is deemed deficient in the Indian River County 2040 LRTP based on the projected 2035 Average Annual Daily Traffic (AADT) volumes derived from the Greater Treasure Coast Regional Planning Model for the Grid Densification Roadway Needs Plan Alternative. Overall, the proposed improvement is anticipated to allow CR 510 to continue to serve as a critical arterial in facilitating the west-east movement of local and regional traffic (including truck traffic) as it traverses Indian River County connecting CR 512 to SR A1A on the barrier island.

While CR 510 generally operates at an acceptable LOS (LOS D or better), conditions will deteriorate below acceptable standards if no improvement occurs by 2040, as the roadway will have insufficient capacity to accommodate the project travel demand. The increased capacity on CR 510 is intended to improve traffic operations along the corridor and enhance access to targeted areas of growth within the county.

As the Indian River County 2040 LRTP Infill Alternative Land Use scenario matures along the CR 510 corridor encouraging higher densities and mixed-use development, premium transit service will be considered on CR 510 to serve and connect the transit-supportive land uses. Sidewalks and bicycle lanes as part of the project to provide for adequate multi-modal facilities.

Primary Criteria

CAPACITY/TRANSPORTATION DEMAND: Improve Traffic Operations (LOS and Volume to Capacity Ratio)

This project is anticipated to improve traffic operations along CR 510 by increasing operational capacity to meet the future travel demand projected as a result of Indian River County population and employment growth. The existing and future traffic conditions for the project corridor are as follows (**Tables 1-1** and **1-2**). The Service Volume (SV) refers to the maximum number of vehicles which can be accommodated by the facility under the level of service given conditions.

Table 1-1 Existing (2015) Conditions

Limits		# of Lanes	LOS D	AADT Existing	
From	To	(speed limit)	SV	2015	V/C
CR 512	Mako Way	3 Lanes Divided (>40 MPH)	26,280	13,000	0.49
Mako Way	800' West of Treasure Coast Elementary	2 Lanes Divided (>40 MPH) with LT lanes	16,730	12,800	0.77
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2 Lane Undivided (<35 MPH) with LT lanes	13,320	12,000	0.90
500' East of Treasure Coast Elementary	66th Avenue	2 Lane Undivided (>40 MPH)	12,740	13,000	1.02
66th Avenue	58th Avenue	2 Lane Undivided (<35 MPH) with LT lanes	13,320	11,000	0.83

(This space was left blank intentionally)

Table 1-2 Future (2040) Conditions

Limits		# of Lanes	LOS D	AADT NO BUILD		# of Lanes	LOS D	AADT BUILD	
From	To	(speed limit)	SV	2040	V/C	(speed limit)	SV	2040	V/C
CR 512	Mako Way	3 Lanes Divided (>40 MPH)	26,280	16,500	0.63	4 Lanes Divided (>40 MPH)	35,820	18,500	0.52
Mako Way	800' West Of Treasure Coast Elementary	2 Lanes Divided (>40 MPH) with LT lanes	16,730	17,400	1.04	4 Lanes Divided (>40 MPH)	35,820	19,200	0.54
800' West of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	2 Lanes Undivided (<35 MPH) with LT lanes	13,320	18,000	1.35	4 Lanes Divided (<35 MPH)	29,160	19,000	0.65
500' East of Treasure Coast Elementary	66th Avenue	2 Lanes Undivided (>40 MPH)	12,740	21,000	1.65	4 Lanes Divided (>40 MPH)	35,820	23,250	0.65
66th Avenue	58th Avenue	2 Lanes Undivided (<35 MPH) with LT lanes	13,320	17,000	1.28	4 Lanes Divided (<35 MPH)	29,160	21,000	0.72

The results of the analysis revealed that portions of the project segment are expected to have volume to capacity ratio (V/C) of 0.63 – 1.65. Roadways are deemed deficient if the V/C ratio exceeds 0.9. As such, this segment of CR 510 will experience congestion by 2040 if additional improvements are not made.

Overall, the proposed improvement is anticipated to allow CR 510 to continue to serve as a critical arterial in facilitating the west-east movement of local and regional traffic (including truck traffic) as it traverses Indian River County connecting CR 512 to SR A1A on the barrier island. The increased capacity on CR 510 is intended to improve traffic operations along the corridor and enhance access to targeted areas of growth within the county.

Secondary Criteria

MODAL INTERRELATIONSHIPS: Enhance Transit, Pedestrian, and Bicycle Access

As the Indian River County 2040 LRTP Infill Alternative Land Use scenario matures along the CR 510 corridor encouraging higher densities and mixed-use development, premium transit service will be considered on CR 510 to serve and connect the transit-supportive land uses. Sidewalks and bicycle lanes are additionally anticipated as part of the widening as the corridor is intended to provide for adequate multi-modal facilities. While paved shoulders are currently present, they are also anticipated to be maintained

as part of the project. Overall, the project is expected to accommodate multi-modal facilities and enhance corridor access for transit users, bicyclists, and pedestrians.

Transportation Demand

The population of Indian River County is projected to increase from 138,028 in year 2010 to 202,295 in year 2040, with a 47% 30-year growth rate (Source: Indian River County 2040 LRTP). As the population of the county increases, developments in the county will continue to grow thereby increasing the amount of traffic on the roads.

Employment is projected to grow from 65,244 in 2010 to 90,968 in 2040. Based on the socioeconomic characteristics of the Indian River County 2040 LRTP Infill Alternative Land Use scenario,

- Population within the proximate Traffic Analysis Zones (TAZs) 2-mile buffer is projected to grow from 21,096 in 2010 to 34,434 in 2040 (1.65% annual growth rate).
- Employment within the proximate TAZs 2-mile buffer is projected to increase from 3,421 in 2010 to 5,588 in 2040 (1.65% annual growth rate).

Further, 2 Planned Unit Developments and 0 approved Developments of Regional Impact are present along the corridor.

System Linkage

The proposed capacity improvements to CR 510 will help improve connectivity within the roadway network by enhancing mobility to the CR 510 corridor. Enhancing mobility in this area will provide an additional route and improve the movement of people, goods and services to and from Indian River County.

Plan Consistency

CR 510 from CR 512/85th Street to 58th Avenue is identified as a cost-feasible project, not currently funded for construction in the Indian River County 2040 LRTP. The project is also identified within the IRC MPO's FY 2016/2017-FY 2020/2021 TIP. It should additionally be noted that $4,433,546 is programmed for the PD&E Study and $4,207,416 is programmed for the Right of Way phase in 2020 within the FY 2016/2017- FY2020/2021 Indian River County MPO TIP.

Social Demands & Economic Development

Enhance Emergency Evacuation and Response Times

CR 510 is designated as an emergency evacuation route by both the Florida Division of Emergency Management and Indian River County. By increasing capacity, the improvement on CR 510 is anticipated to enhance emergency evacuation and response times by:

- Improving access to other emergency evacuation routes designated by the Florida Division of Emergency Management (CR 510, CR 512, and I-95); and
- Increasing the number of residents from the coastal communities of eastern Indian River County that can be evacuated during an emergency event.

In summary, as previously stated, as the population of the area increases, the traffic demand will also increase, creating added pressure for more efficient emergency evacuation.

Economic Development: Currently, the land around the proposed project is mainly agricultural, industrial, commercial and low density residential land use. This project is anticipated to support the economic vitality of several planned developments in the area.

(This space was left blank intentionally)

1.3 Commitments and Recommendations

The FDOT has made a series of commitments and recommendations during the course of this PD&E study. The following sections summarize the commitments and recommendations that will be adhered to during future transportation phases.

1.3.1 Commitments

- FDOT will mitigate for impacts to wood stork Suitable Foraging Habitat in accordance with the most recent USFWS requirements.
- Prior to construction, FDOT will conduct a gopher tortoise burrow survey of potential gopher tortoise habitat in the impact area in accordance with Florida Fish and Wildlife Conservation Commission (FWC) guidelines.
- FDOT will place restrictions on construction near the Wabasso Scrub Conservation Area (WSCA) during the scrub-jay breeding season (March 1 through June 30) every year until the Project is completed.
- FDOT will provide off-site mitigation near the WSCA for the unavoidable adverse effects to the Florida scrub jays
- Signage indicating "No Food Trash" will be installed at any construction dumpsters between 61 Drive and 58 Avenue (Stations 348+67.07 to 373+80.08).
- No staging of equipment or materials will occur in scrub habitat to avoid potential impacts to Florida scrub-jays.
- Signs will be installed near the Wabasso Scrub Conservation Area warning motorists of the presence of sensitive wildlife.
- No palms or oaks will be planted in the vicinity of the Wabasso Scrub Conservation Area.
- The project will provide sufficient lateral and vertical clearance under the Lateral L Canal bridge for a future pedestrian trail that will be constructed by a separate project.
- The project will provide a new swale for collection and treatment of offsite runoff that currently drains into an existing swale along CR 510.
- The existing culvert at the South Prong of the Saint Sebastian River will be replaced by a bridge.

- The project will provide signage, landscape and/or streetscape within the Wabasso community that is consistent with the history of the community and enhances the "main street feel" of the community.
- Minimization of impacts to Essential Fish Habitat will be considered during final design including use of retaining walls or similar.
- After Location Design and Concept Acceptance (LDCA) is granted for this project, the Department will ensure that the properties previously purchased by Indian River County will comply with title 49, Code of Federal Regulations, Part 24.

1.3.2 Recommendations

The alternatives considered include the No Build Alternative, Transportation Systems Management and Operations Alternatives (TSM&O), and Build Alternatives. A multi-phase alternative development, evaluation and selection process was employed to properly assess all Alternatives considered for the proposed improvements of CR 510 within the project limits.

Prior to initiating the development of alternatives, the project was broken down into four (4) distinct analysis segments. Each segment has rather unique characteristics as well as potential differences in right-of-way, operational, geometric and environmental features and are shown on **Figure 1-2.** The segmental breakdown methodology ensures that the generated alternatives are more responsive to the needs of each segment rather than to the generalized project's needs.

After a comprehensive alternative generation and evaluation process which includes more than twelve (12) typical section/alignment combinations, one (1) alternative was selected as being the most effective option within each segment. **Figures 1-3 through 1-6** depict the Recommended Alternative Features per segment, and **Figure 1-7** depicts the typical section details.

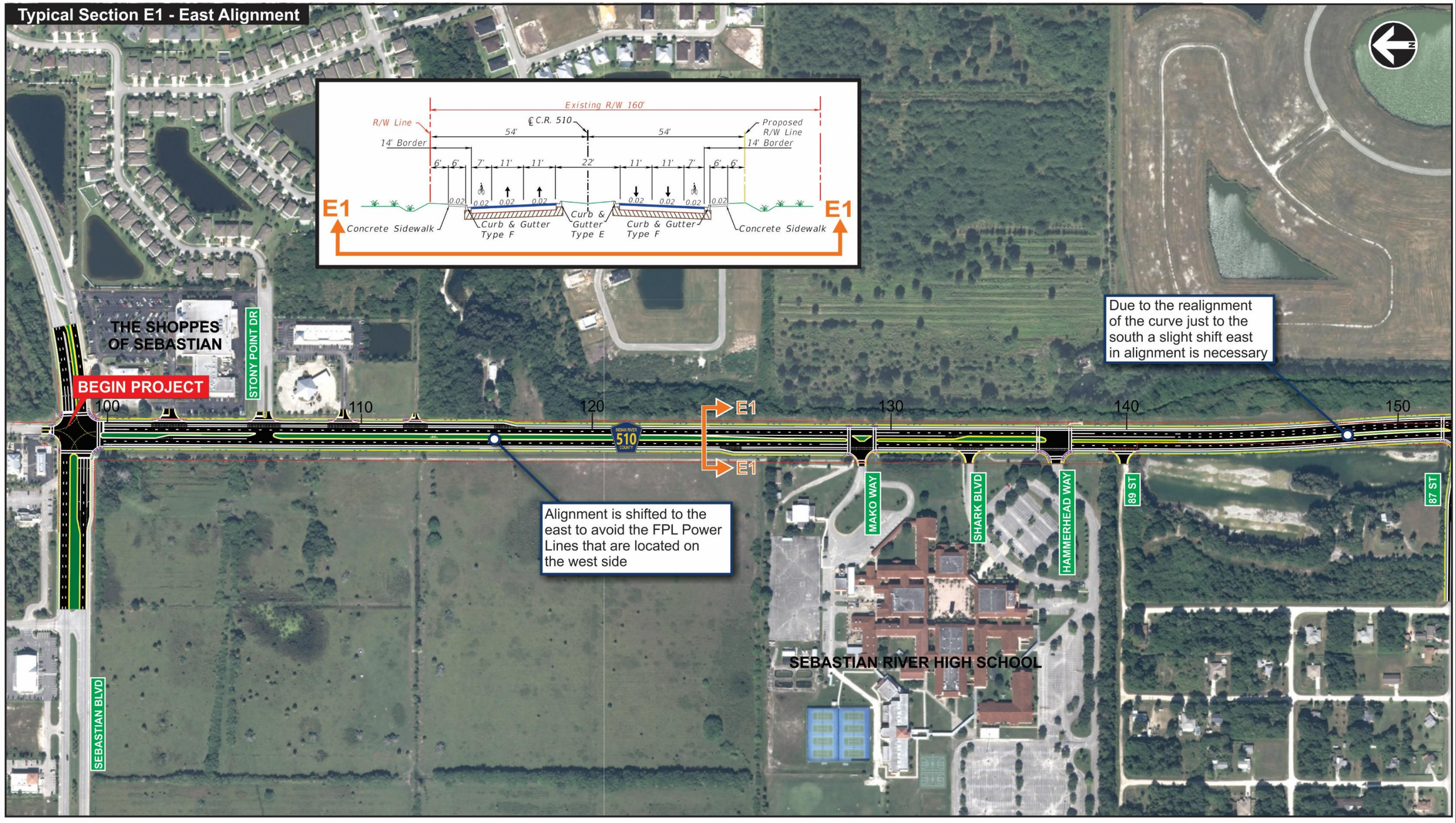


SEGMENT	DESCRIPTION	LENGTH	EXIST R/W WIDTH	EXIST AADT	SAFETY*
1 From CR 510/CR 512 Intersection to 87 Street	• Mainly multilane divided tangent segment generally serving institutional (Sebastian River High School) and residential (Vero Lake Estates) abutting land uses along the west side. • The Lateral D Canal of the Sebastian River Drainage District generally abuts most of the east side of this segment. • 45 mph posted speed limit	0.72 miles	Varies 80' Min 160' Max	10,300	35 crashes including intersections within segment. 0 fatal crashes 22 injury crashes 13 PDO crashes
2 From 87 Street to just west of 86 Avenue	• Undivided two lane 90° curved segment with substandard bridge over the Lateral D Canal. • 40 MPH posted speed limit from 87 ST to 86 ST, 20 MPH along curve & 35 MPH along 85 ST up to 86 Avenue.	1.00 miles	100'	10,100	13 crashes including intersections within segment. 1 fatal crashes 7 injury crashes 5 PDO crashes
3 From just west of 86 Avenue to 66 Avenue	• Mainly undivided two lane segment on tangent with substandard bridges over the Lateral C and Lateral L Canals. • The South Prong Slough Conservation area and the St. Sebastian Greenway corridor abut this segment along the north side. • The RCMA Day Care Center is just west of the 75 CT intersection. • 55 MPH posted speed limit within most of the segment except at the western and eastern segment termini.	2.53 miles	80'	9,800 (2014)	24 crashes including intersections within segment. 0 fatal crashes 17 injury crashes 7 PDO crashes
4 From 66 Avenue to 58 Avenue	• Undivided two lane segment on tangent • The Wabasso Scrub Jay Conservation area is located along the north side east of 61 Drive • Potential environmental justice access issues involving several properties along the south side just west of the 58 Ave. intersection. • 35 mph posted speed limit	1.01 miles	80'	8,100	32 crashes including intersections within segment. 0 fatal crashes 24 injury crashes 8 PDO crashes

*Based on 2010-2014 Crash Data

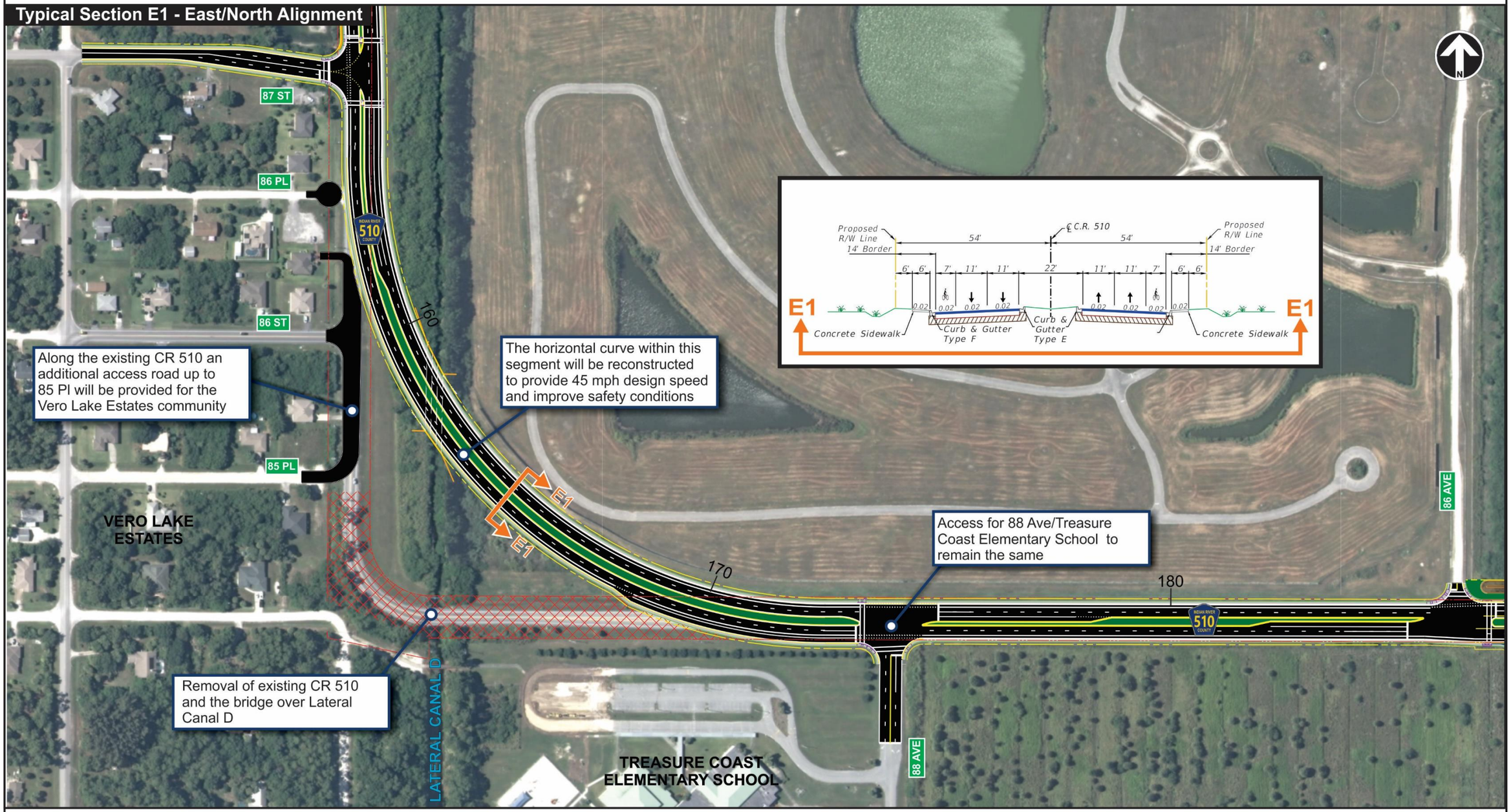
Project Segmentation **Figure 1-2**

Typical Section E1 - East Alignment

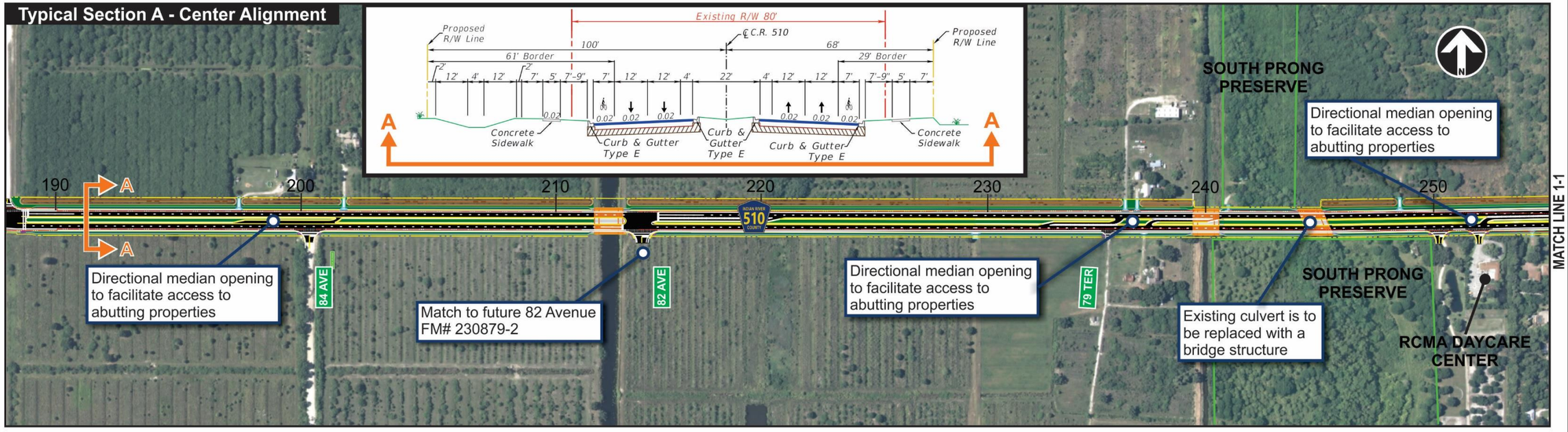


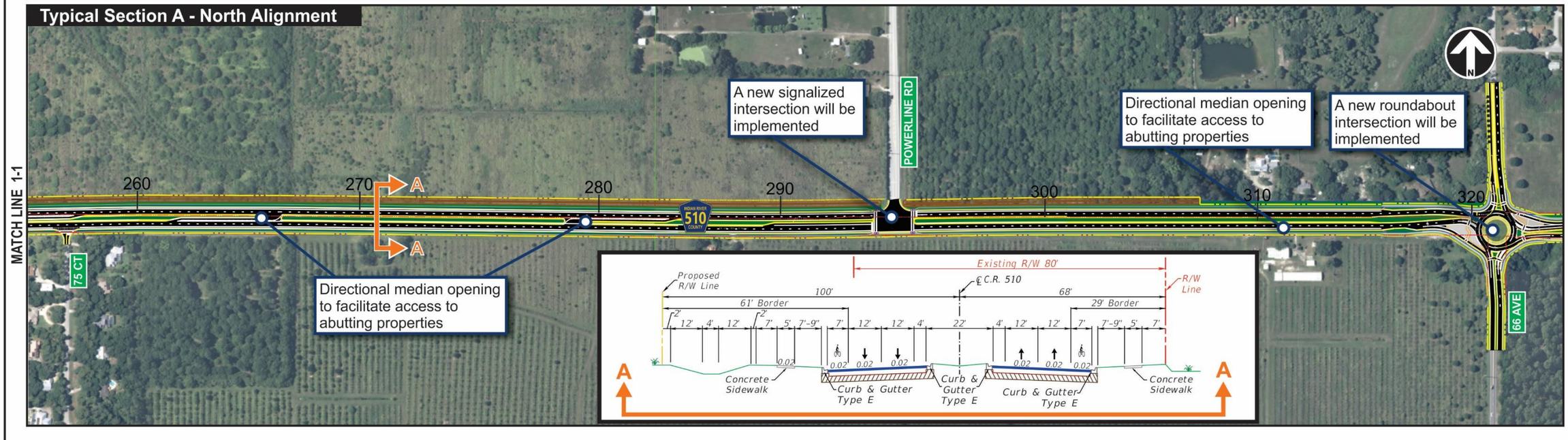
Recommended Alternative - Segment 1 | Figure 1-3

Typical Section E1 - East/North Alignment



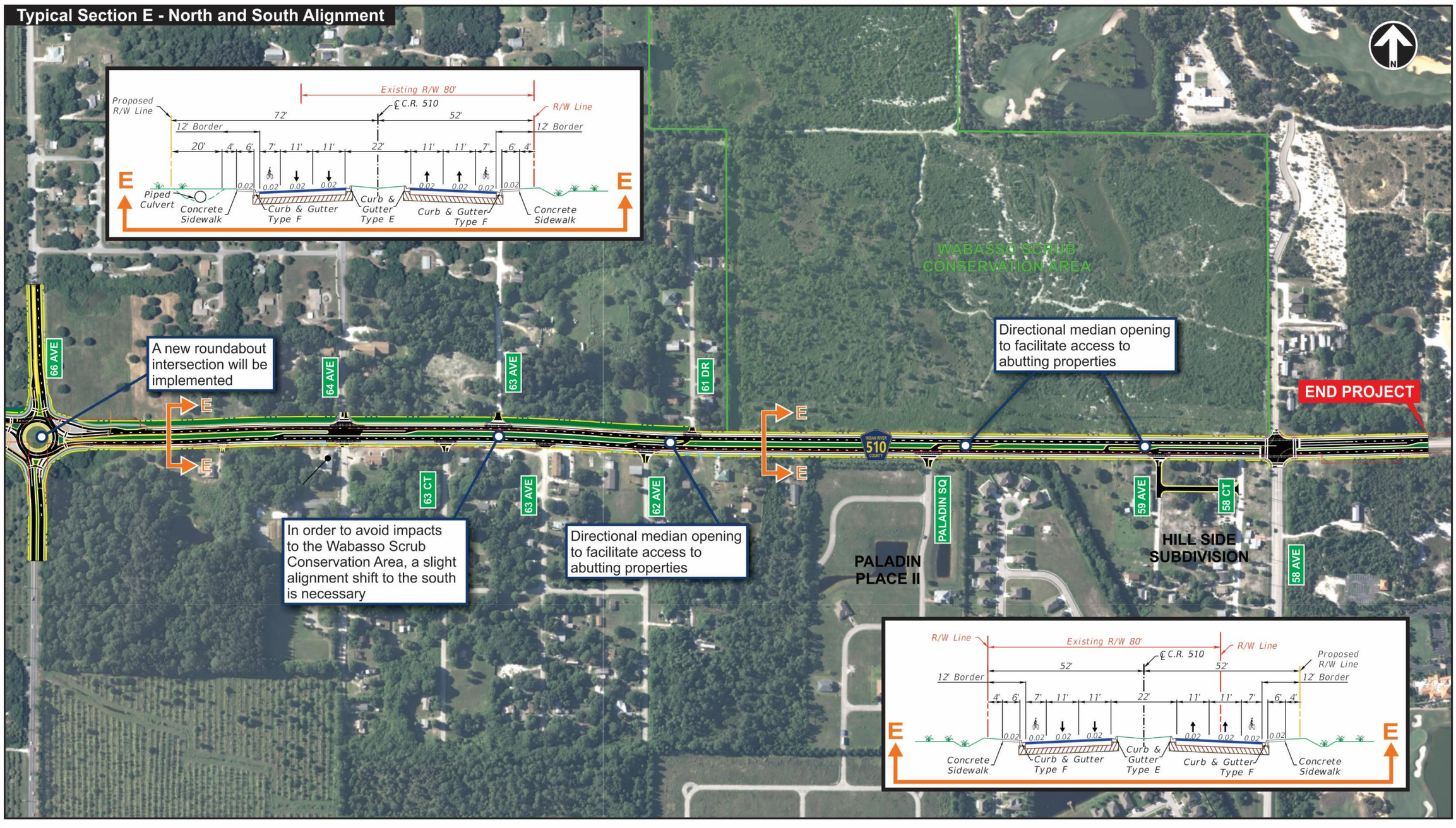
Recommended Alternative - Segment 2 **Figure 1-4**





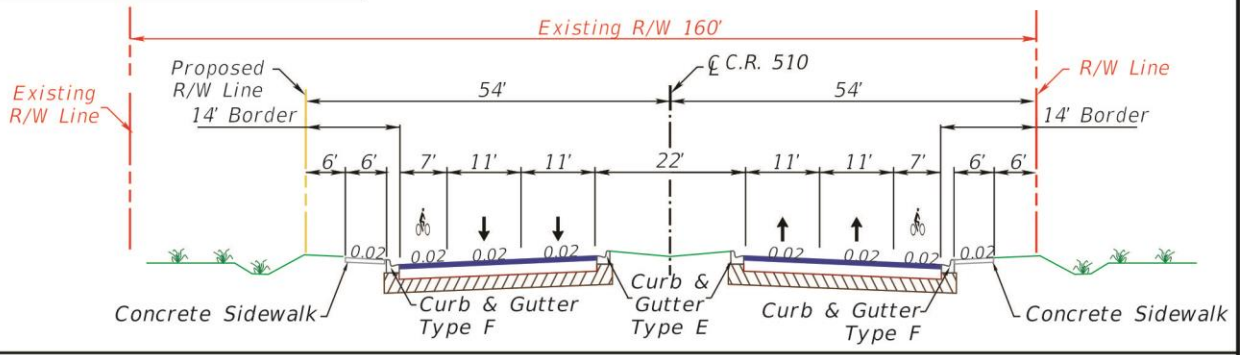
Recommended Alternative - Segment 3 **Figure 1-5**

Typical Section E - North and South Alignment

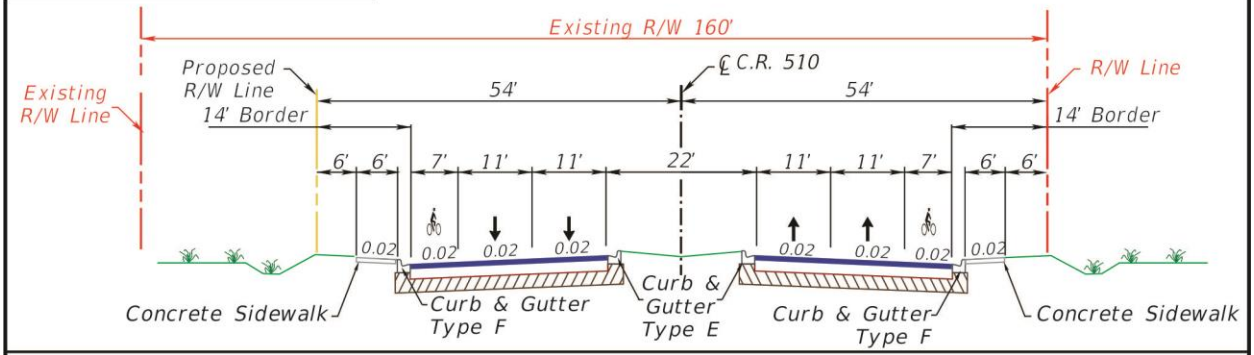


Recommended Alternative - Segment 4 **Figure 1-6**

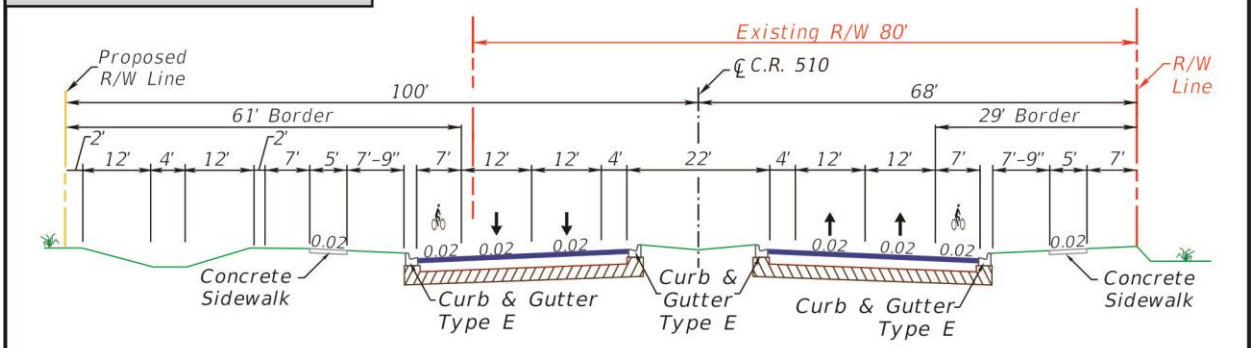
TYPICAL SECTION E1 SEGMENT 1



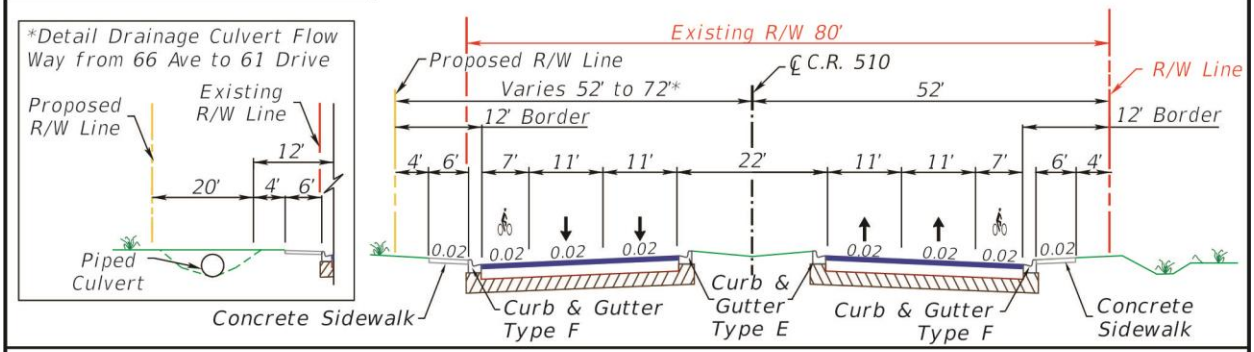
TYPICAL SECTION E1 SEGMENT 2



TYPICAL SECTION A SEGMENT 3



TYPICAL SECTION E SEGMENT 4



Proposed Typical Sections **Figure 1-7**

A brief description of the recommended alternative per segment follows:

Segment 1

Typical Section E1 with East Alignment is a 4-lane urban typical sections with a Design Speed of 45 mph. The total proposed right-of-way for this section is 108-feet. This typical section features 11-foot travel lanes, 7-foot bicycle lanes, a 22-foot median, and 6-foot sidewalks with a 6-foot utility strip behind the 6-foot sidewalks. **Figure 1-3** shows some of the most distinctive features of this option, including the proposed median openings.

Segment 2

Typical Section E1 with East/North Alignment is a 4-lane urban typical sections with a Design Speed of 45 mph. The total proposed right-of-way for this section is 108-feet. This typical section features 11-foot travel lanes, 7-foot bicycle lanes, a 22-foot median, and a 6-foot utility strip behind the 6-foot sidewalks. The horizontal curve within this segment will be reconstructed to provide 45 mph design speed and improve safety conditions. The CR 510 access provided for the Vero Lake Estates community has been limited to 87 Street and 86 Street and 86 Place will no longer directly access CR 510. After coordination with Indian River County Public Works and Indian River County MPO, it was decided to remove the existing bridge over Lateral D. **Figure 1-4** illustrates some of the most distinctive features of this option within Segment 2.

Segment 3

Typical Section A with Center Alignment is a 4-lane sub-urban typical section with a design speed of 50 mph. The total proposed right-of-way for this section is 168 feet. This typical section features 12-foot travel lanes, 7-foot bicycle lanes, 4-foot inside shoulders, curb and gutter on both sides and 5-foot sidewalks with a 7-9-foot wide buffer between the roadway and the sidewalks. Additionally, there is a 32-foot drainage easement along the north side of the roadway to treat offsite drainage impacted by the project. Median openings have been provided throughout the segment to allow access for the various stakeholders/property owners along the segment. **Figure 1-5** illustrates some of the most distinctive features of this option within Segment 3.

Segment 4

Typical Section E with North Alignment from 66 Avenue to 61 Drive and South Alignment from 61 Drive to 58 Avenue is a 4-lane urban typical section with a Design Speed of 45 mph. The total proposed right-of-way for this section is 104-feet. This typical section features 11-foot travel lanes, 7-foot bicycle lanes, 6-foot sidewalks against the curb and a 22 -foot median. **Figure 1-6** illustrates some of the salient characteristics of this alternative within this segment including the various partial median openings to facilitate local access along this segment.

Stormwater Ponds

For stormwater treatment and attenuation design the project was divided into 10 separate stormwater management basins. Four (4) potential pond locations per basin were evaluated as per the Pond Siting Report prepared as part of this PD&E study (**Figure 1-8**). During final design, only one recommended pond will be selected per basin for water quality treatment and storage capacity. Based on a Desktop Analysis and Field Review, existing offsite properties are draining into the County's right-of-way for basins 1, 2, 3, 5, 6, 7, 8, and 9. The proposed improvements will impact the swale in basins 5-9 and thus a new offsite drainage system is proposed. To prevent commingling of offsite runoff with onsite runoff, a secondary swale or offsite drainage system is proposed. Two different types of offsite drainage systems are proposed. For basins 5, 6, 7 and a portion of 8, existing homes are not close to the Right of Way line. As such, an Open Swale Offsite Drainage System with a 4 feet bottom width, 1V:4H side slopes, located in a 32 feet wide easement is proposed for these areas. For basins 9 and a portion of 8, there are existing homes near the proposed CR-510 right-of-way. As such, a 48 inch-wide Trunkline Offsite Drainage System, located in a 20 feet easement, is proposed for these areas. Details of these drainage systems can be seen in the Typical Section Package in **Appendix E**.

LEGEND
32' Swale
20' Pipe Easement
Potential Pond Sites
Basin 1 Basin Number

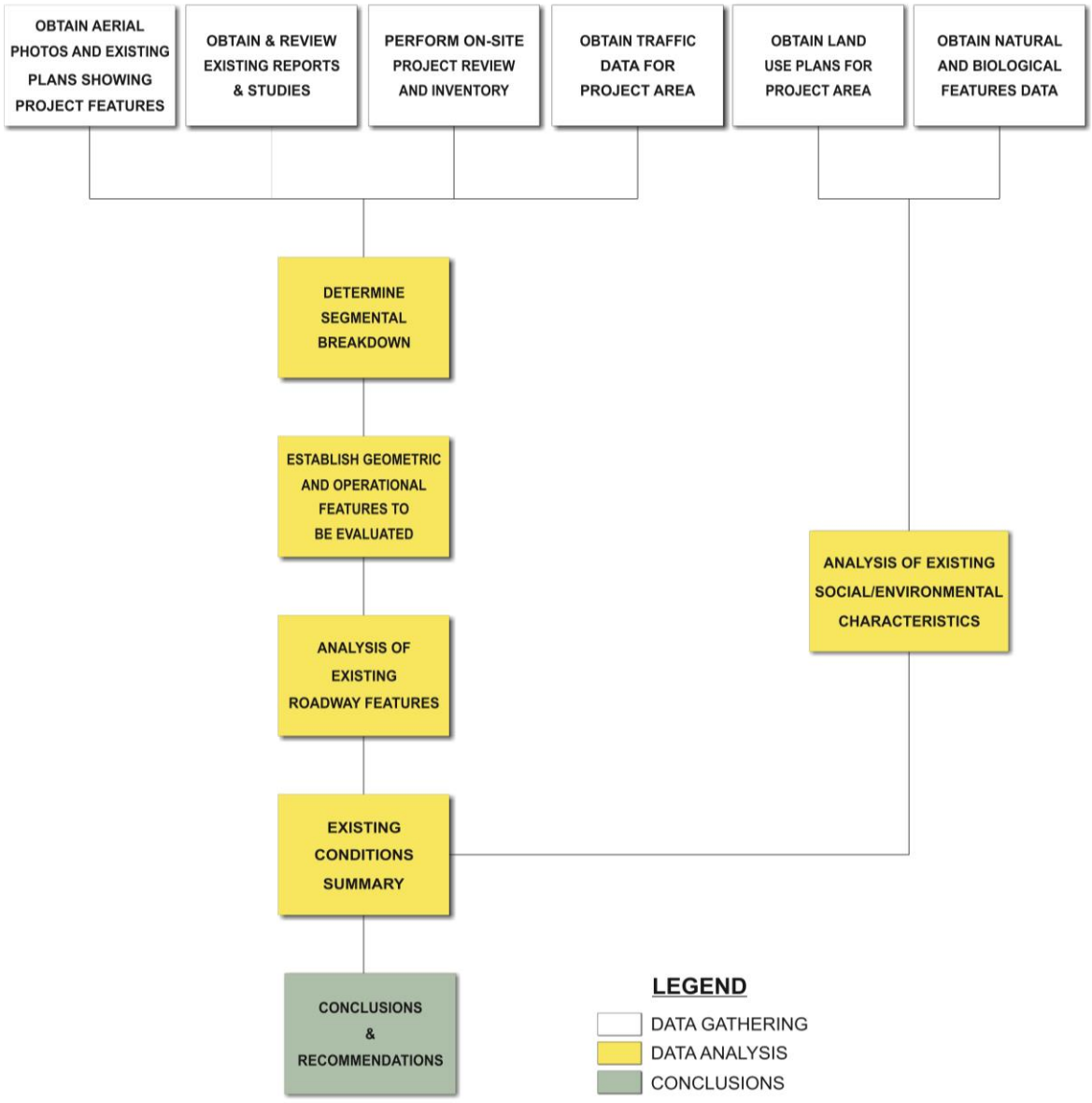
BEGIN PROJECT
END PROJECT
INDIAN RIVER 512 COUNTY
INDIAN RIVER 510 COUNTY
SEBASTIAN
WABASSO
Pond D
SEBASTIAN RIVER LANDING
SEBASTIAN RIVER HIGH SCHOOL
Sebastian River
90 AVE
89 ST
87 ST
85 PL
85 ST
86 AVE
84 AVE
66 AVE
58 AVE
BARBER ST
POWERLINE RD
Lake A
Lake 5
Lake 6
SOUTH PRONG PRESERVE
WABASSO SCRUB CONSERVATION AREA
VERO LAKE ESTATES
Lateral Canal D
Lateral Canal C
Lateral Canal L
Treasure Coast Elementary School
RCMA DAY CARE CENTER
PALADIN PLACE II
THE LAKES AT SANDRIDGE
HILL SIDE SUBDIVISION
1
2
3
4
5
6
7
8
9
10
2-1
2-2
2-3
2-4
5-1
5-2
5-3
5-4
6-1
6-2
6-3
6-4
7-1
7-2
7-3
7-4
8-1
8-2
8-3
8-4
9-1
9-2
9-3
9-4
10-1
10-3

Potential Pond Sites | Figure 1-8

2 EXISTING CONDITIONS & EVALUATION

The methodology employed for the existing conditions and evaluation performed for the CR 510 facility consisted of three basic phases. **Figure 2-1** contains a flowchart detailing the process utilized for this project. The phase descriptions are as follows:

Figure 2-1 Existing Conditions and Evaluation Analysis Flowchart



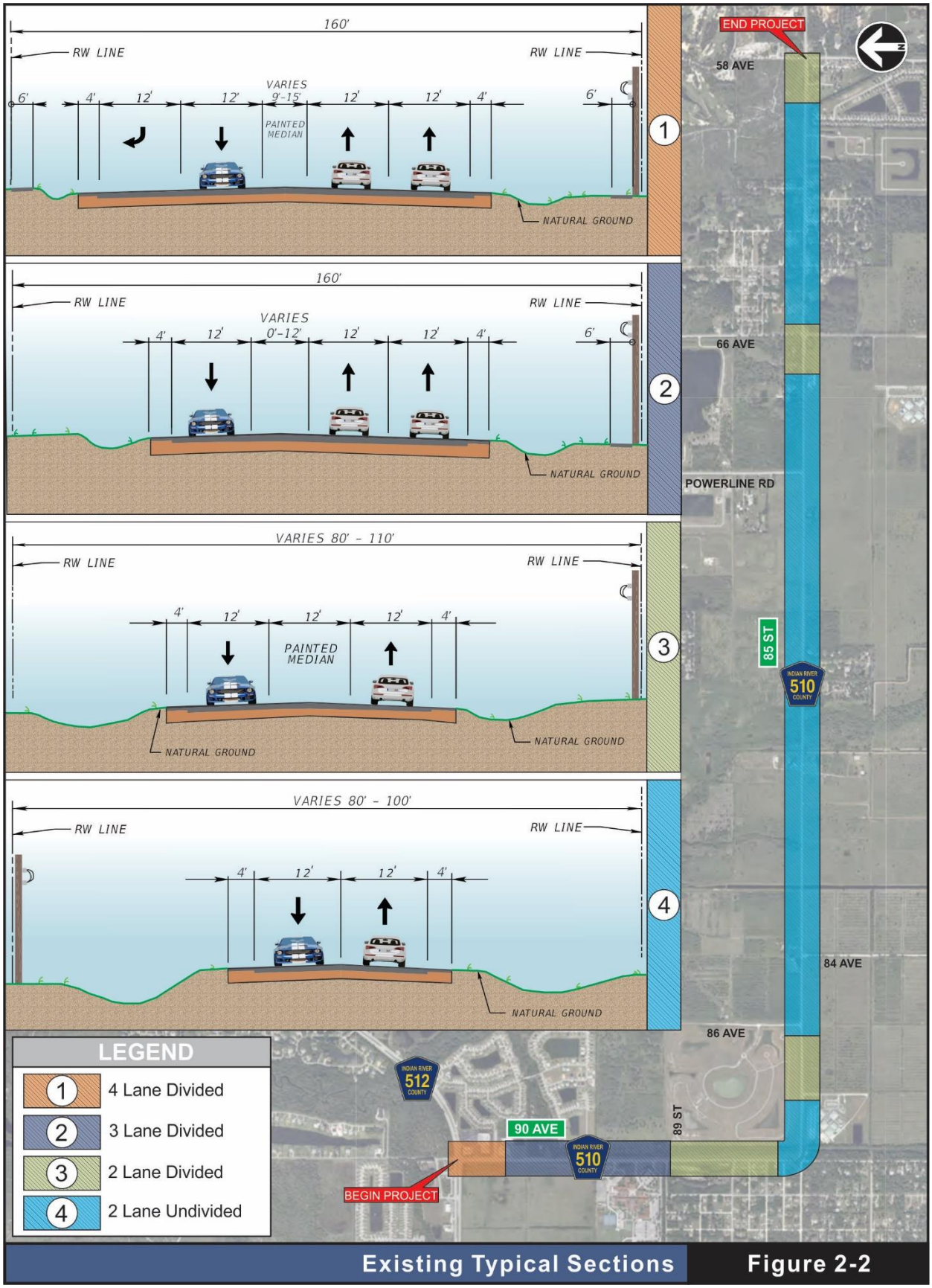
2.1 Phase I – Data Gathering Phase

This first phase included the collection and review of all data pertaining to the existing facility. The task involved an on-site inventory and verification of current existing conditions as well as the collection of all pertinent data that would serve as the basis for evaluation. Other important project features along the CR 510 facility such as traffic, safety as well as the existing social/environmental characteristics were reviewed and summarized. **Appendix A** of this report contains a list of references of previous study reports and other pertinent documents that were consulted during this task.

2.1.1 Roadway Characteristics

2.1.1.1 Typical Sections & Functional Classifications

As previously stated, CR 510 is owned and maintained by Indian River County and is functionally classified as an urban principal arterial facility. As shown on **Figure 2-2**, the existing CR 510 facility features four distinct typical sections as follows: **Four-lane divided section**: From the begin project (at the CR 510/CR 512 intersection) to just south of Stony Point Drive generally provides two southbound and two northbound directional lanes varying in width from 11 feet to 12 feet with a divided painted median and 4' wide paved shoulders and swales within an existing 160 feet of right-of-way. The median area generally serves the turning needs associated with the CR 510/CR 512 intersection as well as several commercial entities (e.g., The Shoppes of Sebastian) abutting the east side of the CR 510 facility. It should be noted that the existing centerline of the facility is offset to the east (50 feet to the existing right-of-way) and that a Distribution and Transmission line is located just inside of the west right-of-way line. **Three-lane divided section**: This section generally extends from just south of Stony Point Drive to Shark Boulevard and features two southbound directional lanes, one northbound lane and a painted divided median which varies between 0 and 12 feet and generally serves the needs of Sebastian River High School abutting the facility along the west side. As was the case with the previous sections, the Distribution and Transmission line is located along the western right-of-way. **Two-lane divided section**: This section provides one directional lane varying in width from 0 to 12 feet with a divided painted median and is present along four distinct project's segments as follows: (a) from just south of Shark Boulevard to 85th Place, (b) from just east of an existing 90 degree curve (just west of

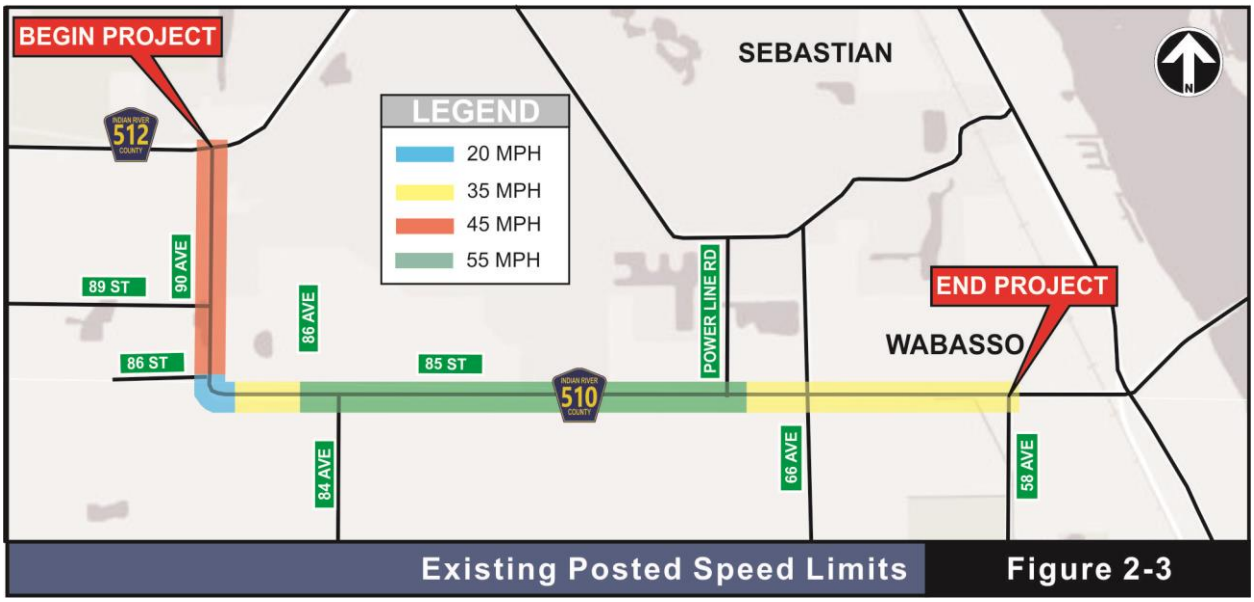


Existing Typical Sections **Figure 2-2**

of the Treasure Coast Elementary School) to just west of the 86th Avenue intersection, (c) at the eastbound and westbound approaches of the 66th Avenue/Schumann Drive, and (d) 58th Avenue/Kings Highway intersection approaches. The painted median area generally features left turn lanes to serve the access needs of the Treasure Coast Elementary School and the 66th Avenue and 58th Avenue signalized intersections. The existing right-of-way that is associated with this typical varies from 80 feet to 100 feet. **Two-lane undivided section**: This typical section lacks the median feature but is otherwise generally similar to the previously described section. The existing right-of-way associated with this typical section is 80 feet.

2.1.1.2 Posted Speed

The posted speed limits along the CR 510 facility are illustrated on **Figure 2-3**. Generally speaking, a 45 mph speed limit is prevalent along 90th Avenue (the north-south portion of CR 510). Along 85th Street (the east-west CR 510 segment) the speed limit is 55 mph within the central portion of the corridor (from just west of 86th Avenue to just west of 66th Avenue) and 35 mph for the remainder. It should be noted that the substandard existing horizontal geometry associated with the curved connection between 90th Avenue and 85th Street requires a restrictive speed limit of 20 mph.



Existing Posted Speed Limits Figure 2-3

2.1.1.3 Right-of-Way

The existing right-of-way associated with all major roadway facilities within the project limits is included in **Table 2-1**.

Table 2-1 Existing Right-of-Way Features

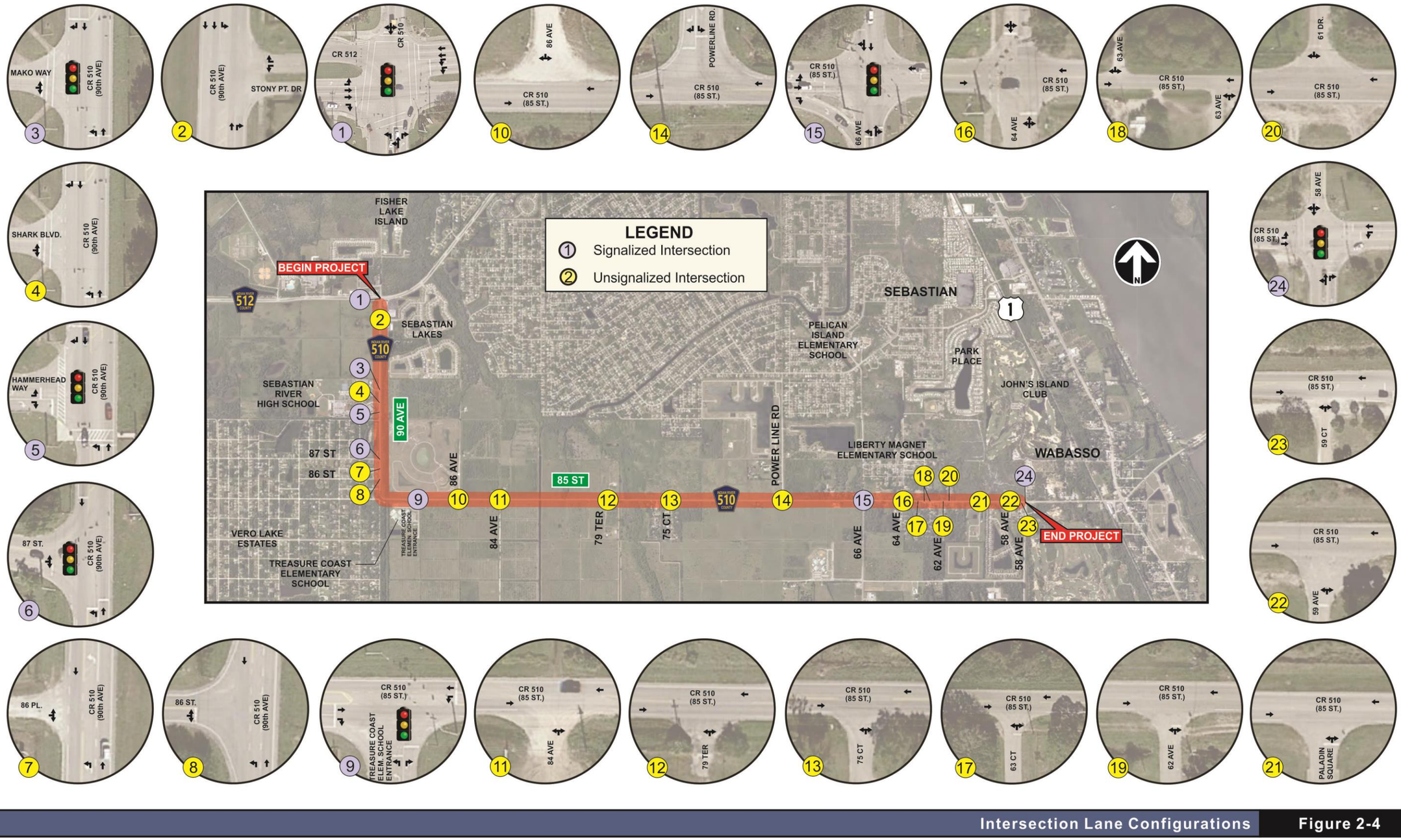
Facility	From	To	R/W (ft)
CR 510 Wabasso Road	Begin Project (CR 512 intersection)	89th Street intersection	160
	89th Street intersection	87th Street	80
	87th Street	Just east of 66th Avenue	100
	Just east of 66th Avenue	Just west of 64th Avenue	Varies 104.27 min. – 110 max.
	Just west of 64th Avenue	End project (58th Avenue intersection)	80

2.1.1.4 Intersections and Signalization

There are seven (7) signalized intersections and approximately 17 un-signalized intersections along CR 510 within the limits of the project. **Figure 2-4** provides the lane configuration at each major project intersection. It should be noted that the vicinity of the two terminal areas of the project exhibit the highest concentration of intersections. For example, 33% of all project intersections are located within the 90th Avenue (north-south) portion of the study area and 38% are located east of 66th Avenue near the eastern project terminus. Conversely the central portion of the study area is more rural in nature with relatively fewer intersections and higher speed limits.



The 66th Avenue signalized intersection is located just west of the eastern project terminus



Intersection Lane Configurations | Figure 2-4

2.1.1.5 Horizontal and Vertical Alignment

In terms of horizontal alignment, the existing facility is generally tangent except for a sharp 90º horizontal curve (with a 191' radius) which ties the north-south portion of the project (90th Avenue) to the east-west segment (85th Street). **Figure 2-5** illustrates the existing horizontal alignment. As far as the vertical alignment is concerned, the existing facility exhibits a series of very long flat grades with no existing vertical curves.



Curve	Location	PC STA	PI STA	PT STA	D	Delta	L (ft)	R (ft)
1	South of 86th St and West of Treasure Coast Elementary School	94+41.28	96+32.21	97+41.22	29°59'58"	89°58'51" (LT)	299.94	190.99

Existing Horizontal Alignment — Figure 2-5

2.1.1.6 Lighting

There is no existing roadway lighting along the subject project with the exception of small sections associated with the intersections at CR 512, Hammerhead Way, 87th Street, 86th Street, Treasure Coast Elementary School, 66th Avenue, 64th Avenue and 58th Avenue.

2.1.2 Bridges/Structures

There are three (3) existing bridges and five (5) culverts within the project's limits. **Figure 2-6** provides a summary of the condition of the existing bridges. The three bridges (Numbers: 880047, 880063 and 880044) are between 52 and 64 years old which exceed the design service life and are all functionally obsolete, thus they will be recommended for replacement. The inventory load ratings are on average 23% deficient with an average sufficiency rating of 66. The existing structures are 15 feet span flat slab, superstructures founded on pile bents, which enable phased construction with partial demolition. One major culvert is a 106-inch by 60-inch culvert that is located at the South Prong Slough that is east of the Lateral L Canal. This culvert is used to connect the Lateral L canal to the Sebastian River Watersheds. For more culvert details, see the Pond Siting Report, a supplemental document to this report.

2.1.3 Pedestrian, Bicycle and Transit Facilities

There are no bicycle facilities present along CR 510 within the study limits. However, since there are three schools (Sebastian River High School, Treasure Coast Elementary School and Redlands Christian Migrant Association Children's House) abutting the facility, the likelihood of bicyclists use is high especially during school arrival and dismissal periods. The only existing continuous sidewalk facility within the project area is generally located along the west right-of-way line and extends from the CR 512 intersection (at the beginning of the project) to the Sebastian River High School southern property limits near Hammerhead Way or a total distance of approximately 0.7 miles. There are also some discontinuous sidewalk segments along the east right-of-way line extending from just south of the CR 512 intersection to just south of Stony Point Drive. In addition, there is a pedestrian bridge across Lateral D Canal just south of CR 510 that connects the Treasure Coast Elementary School to the Vero Lake Estates community.



The Sebastian River High School is a principal source of pedestrian and bike activity.

EXISTING BRIDGE CHARACTERISTICS

Location					Structure Type		Geometrics						Condition						
No.	Bridge ID No.	Bridge Name	Direction	Facility Crossed	Super Structure Type	Sub-Structure Type	Bridge Width	Bridge Length	No. of Spans	Span Lengths	Min. Vertical Clearance OWSE/DWSE	Min. Horizontal Clearance	Year Built / Reconstructed	Sufficiency Rating	Health Index	Inspection Date	Bridge Load Rating		Historical Significance
							ft	ft		ft	ft	ft					IR	OR	
1	880047	CR 510 Over Lateral D Canal	E/W	Lateral D Canal	Cast in Place Reinforced Concrete Deck Slab	Prestressed Concrete Columns & Reinforced Concrete Abutments	42.3’	60.0’	4	4 @ 15’	N/A	N/A	1951/ 1968	82.00	80.19	10/13	21 MT	35 MT	NO
2	880063	CR 510 Over Lateral C Canal	E/W	Lateral C Canal	Precast Concrete Panel Deck Slabs	Timber and Steel Columns & Reinforced Concrete Abutments	25.6’	75.0’	5	5 @ 15’	N/A	N/A	1958	53.90	76.55	2/15	22.6 MT	37.6 MT	NO
3	880044	CR 510 Over Lateral L Canal	E/W	Lateral L Canal	Precast Concrete Panel Deck Slabs	Timber and Reinforced Concrete Caps	35.5’	45.0’	3	3 @ 15’	N/A	N/A	1963	63.80	73.19	10/15	22.2 MT	37.1 MT	NO



The CR 510 bridge over the Lateral C Canal was built in 1958 and its deck geometry requires high priority of replacement.

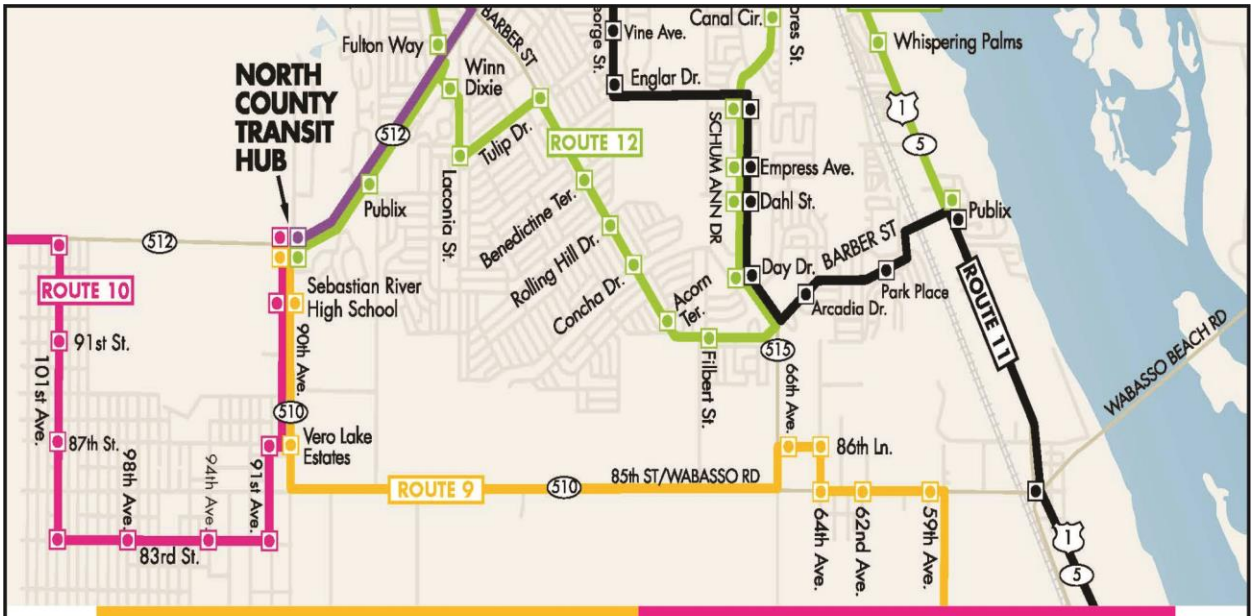
The CR 510 bridge over the Lateral D Canal is located just west of the Treasure Coast Elementary School entrance. Canal control devices and embankment protection have widespread minor damage.

The existing bridge over the Lateral L Canal requires replacement of the bridge deck and railings.

Existing Project Bridges — Figure 2-6

With the expected increase in future population growth, additional conflicts between vehicles and pedestrian and/or bicyclists sharing the use roadway facilities is likely. In this context, the proposed improvements along CR 510 must comply with the Complete Streets policy.

GoLine is the Indian River County public transportation system with bus service on 15 fixed routes throughout the County. Bus service operates weekdays from 6:00 a.m. through 7:00 p.m. and Saturdays from 9:00 a.m. until 3:00 p.m. **Figure 2-7** illustrates the two routes that serve the project vicinity. Route 9 generally traverses most of the CR 510 project corridor providing one hour headways and bus stops at the CR 512 intersection, Sebastian River High School, Vero Lake Estates (87th Street), 64th Avenue, 62nd Avenue and 59th Avenue. Route 10 traverses the northern part of the project area from the CR 512 intersection to Sebastian River High School and 87th Street before turning west towards Fellsmere.



9 North County Transit Hub to Indian River Mall

- Saturday hours of operation 8:00 a.m. – 5:00 p.m.
- Holiday hours of operation follow regular schedule.

North County Transit Hub to Indian River Mall

Sonrise Apartments	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30
Lincoln Rd & Willow St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CR 510 & Vero Lake Estates	*	*	*	*	*	*	*	*	*	*	*	*	*	*
86 Lane & 66 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	*
86 Lane & 64 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	*
64 Ave & 85 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
85 St & 62 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	*
85 St & 59 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 81 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 77 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & Syngenta	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 69 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 65 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 57 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 49 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 45 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 41 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 37 St	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Indian River Mall to North County Transit Hub

Indian River Mall	6:00	7:00	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00
58 Ave & 37 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 41 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 45 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 49 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 57 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 65 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 69 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & Syngenta	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 77 St	*	*	*	*	*	*	*	*	*	*	*	*	*
58 Ave & 81 St	*	*	*	*	*	*	*	*	*	*	*	*	*
85 St & 59 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*
85 St & 62 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*
64 Ave & 85 St	*	*	*	*	*	*	*	*	*	*	*	*	*
86 Lane & 64 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*
86 Lane & 66 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*
CR 510 & Vero Lake Estates	*	*	*	*	*	*	*	*	*	*	*	*	*
Sebastian River High School	*	*	*	*	*	*	*	*	*	*	*	*	*
North County Transit Hub	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:3

10 Fellsmere to North County Transit Hub

- Saturday hours of operation 8:00 a.m. – 5:00 p.m.
- Holiday hours of operation follow regular schedule.

Sonrise Apartments to North County Transit Hub

Sonrise Apartments	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50
Lincoln Rd & Willow St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
W Grant Ave & State St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Booker St & Grant Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Booker St & Willow St	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Whispering Pines Apts	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Grace Ave & Meadow	*	*	*	*	*	*	*	*	*	*	*	*	*	*
N Willow St & New York A	*	*	*	*	*	*	*	*	*	*	*	*	*	*
New York Ave & N Lime	*	*	*	*	*	*	*	*	*	*	*	*	*	*
New York Ave & N Elm	*	*	*	*	*	*	*	*	*	*	*	*	*	*
New York Ave & Hickory	*	*	*	*	*	*	*	*	*	*	*	*	*	*
New York Ave & Broadway St	6:00	7:00	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00	
Broadway St & CR 512	*	*	*	*	*	*	*	*	*	*	*	*	*	
Cypress St & CR 512	*	*	*	*	*	*	*	*	*	*	*	*	*	
S Oleaner St & CR 512	*	*	*	*	*	*	*	*	*	*	*	*	*	
S Oleaner St & Virginia Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
Oleander St & Massachusetts Ave	*	*	*	*	*	*	*	*	*	*	*	*		
Broadway St & Massachusetts Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
S Elm St & Massachusetts Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
S Elm St & Tennessee A	*	*	*	*	*	*	*	*	*	*	*	*	*	
S Elm St & CR 512	*	*	*	*	*	*	*	*	*	*	*	*	*	
S Willow St & CR 512	*	*	*	*	*	*	*	*	*	*	*	*	*	
CR 512 & 128 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
CR 512 & 125 Dr	*	*	*	*	*	*	*	*	*	*	*	*	*	
Project Hope/Tr Coast Clinic	*	*	*	*	*	*	*	*	*	*	*	*	*	
I-95 Interchange	*	*	*	*	*	*	*	*	*	*	*	*	*	
CR 512 & 101 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
101 Ave & 91 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
101 Ave & 87 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
101 Ave & 83 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
83 St & 98 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
83 St & 94 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
83 St & 91 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
91 Ave & 87 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
Sebastian River High School	*	*	*	*	*	*	*	*	*	*	*	*	*	

North County Transit Hub to Sonrise Apartments

North County Transit Hub	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	
Sebastian River High School	*	*	*	*	*	*	*	*	*	*	*	*	*	
91 Ave & 87 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
91 Ave & 83 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
83 St & 94 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
83 St & 98 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
83 St & 101 Ave	*	*	*	*	*	*	*	*	*	*	*	*	*	
101 Ave & 87 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
101 Ave & 91 St	*	*	*	*	*	*	*	*	*	*	*	*	*	
101 Ave & CR 512	*	*	*	*	*	*	*	*	*	*	*	*	*	
I-95 Interchange	*	*	*	*	*	*	*	*	*	*	*	*	*	
Project Hope/Tr Coast Clinic	*	*	*	*	*	*	*	*	*	*	*	*	*	
CR 512 & 125 Dr	*	*	*	*	*	*	*	*	*	*	*	*	*	
CR 512 at Dollar General	*	*	*	*	*	*	*	*	*	*	*	*	*	

Existing Transit Routes **Figure 2-7**

2.1.4 Utilities

Utility companies with known facilities within the proposed project limits were contacted and requested to submit as-built plans with the existing utilities within the project limits. **Table 2-2** presents a list of utilities with a summary of the utility responses that were received. For more detailed utility information, see the utility assessment package, a companion document to this study.

Table 2-2 Existing Utilities

Utility Company	Facility Type	Remarks
Comcast Cable Mr. Tony Springsteel 1495 NW Britt Rd Stuart, FL 34944	CATV & Fiber	Overhead Facilities CR 510: ° Runs on the south east of 79th Terrace (STA 171 to STA 228) to 70th Avenue ° Runs on the north from 1400 feet west of 66th Avenue to end of project limit (STA 240 to STA 308) ° Crosses at STA 171, STA 268, STA 275, STA 277, STA 281, STA 303, STA 305, STA 308 Underground Facilities CR 510: ° Runs on the south from 70th Avenue to 700 feet west of 66th Avenue (STA 228 to STA 248) ° Runs on the north from 700 feet west of 66th Avenue to 66th Avenue (STA 248 to STA 255) ° Crosses at STA 248
City Gas Company of Florida Mr. Ron Muller 4180 S US Hwy 1 Rockledge, FL 32955	Gas 6” PE Gas	Underground Facilities CR 512: ° Runs on the south from 400’ west of CR 510 to CR 510 ° Crosses at STA 272 CR 510: ° Runs on the west from CR 512 to 400’ south of CR 512 (STA 30 to STA 34) ° Crosses at STA 31
	Gas 2” PE Gas	Underground Facilities CR 510: ° Runs on the west from 400’ south of CR 512 to Stony Point Drive (STA 34 to STA 37) ° Crosses at STA 36
Florida Public Utilities Mr. Dale M Butcher 209 N Sapodilla Avenue West Palm Beach, FL 33401	Gas	Underground Facilities CR 510: ° Runs on the west from CR 512 to Curve south of 87th Street ° Runs south from curve to 62nd Avenue ° Runs on the north from 62nd Avenue to 58th Avenue ° Crosses at 62nd Avenue and 58th Avenue
Florida Power & Light Transmission Mr. George J Beck, P.E. 15430 Endeavor Drive Jupiter, FL 33408	Electric - Transmission Line/ 138K TX Line	Overhead Facilities CR 510: ° Runs south from 70th Avenue to 66th Avenue (STA 228 to STA 255)

Table 2-2 Existing Utilities (continued)

Utility Company	Facility Type	Remarks
Florida Power & Light Mr. Rob Morris 4406 SW Cargo Way Palm City FL 34990	Electric	Overhead Facilities CR 510: ° Runs on the west from CR 512 to Curve south of 87th Street ° Runs south from Curve to 66th Avenue ° Runs along the north from 66th Avenue to end of project limits ° Crosses at CR 512, Stony Point Drive, 89th Street, 86th Avenue, 84th Avenue, 500' east of 79th Terrace, 800' east of 66th Avenue, 64th Avenue 63rd Court, 63rd Avenue, 62nd Avenue, Paladin Square, 59th Avenue, 58th Court, and 58th Avenue ° Runs south along 88th Avenue ° Runs north and south along 84th Avenue ° Runs south along 79th Terrace ° Runs north and south along 64th Avenue Underground Facilities CR 510: ° Runs north and south along 66th Avenue ° Runs along the south from 58th Avenue to end of project limit ° Crosses at Paladin Square and 58th Avenue ° Runs south on the west and east side of Paladin Square
Indian River County Water and Sewer Mr. Kevin Osthus 1801 27th Street Vero Beach, FL 32960	Water	Underground Facilities CR 510: ° Runs along the east/north from CR 510 to east of 75th Court ° Runs along the south from east of 75th Ct to end of project limit ° Crosses south of Hammerhead Way, 87th St, 86th St, 85th St, Treasure Coast Elementary School, 70th Avenue, 66th Avenue, 64th Avenue, 63rd Avenue, 61st Drive, and 58th Avenue
Indian River County Public Works Traffic Engineering Mr. Marc Webb 1801 27th Street Vero Beach, FL 32960	Traffic Signalization - Fiber optic/2" conduit with fiber optic cable	Underground Facilities CR 510: ° Runs along the west from CR 512 to Shark Boulevard ° Runs along the east from Mako Way to Curve south of 87th Street to east of Treasure Coast Elementary ° Runs along the north and south from 66th Avenue to end of project limits ° Crosses at Mako Way, east of curve south of 87th Street, 66th Avenue CR 512: ° Runs along the south of CR 512
Johns Island Water Management Mr. Sam Nelson 1 Turtle Beach Road, Vero Beach, FL 32963	Water	No facilities located within the project area
AT&T/Distribution Mr. Mark Gutierrez 330 Okeechobee Road Fort Pierce, FL 34947	Telephone/ Fiber Cable	Overhead Facilities CR 510: ° Runs along the west/south from CR 512 to approximately 100' west of 70th Avenue (STA 30 to STA 227) ° Runs along the north from 66th Avenue to end of project (STA 259 to STA 315) ° Crosses at Stony Point Drive, STA 47, STA 48, 84th Avenue, 70th Avenue, approximately 500' east of 66th Avenue (STA 259) Underground Facilities CR 510: ° Runs along the south from approximately 100' east of 70th Avenue to approximately 500' east of 66th Avenue (STA 227 to STA 259) ° Crosses at 70th Avenue

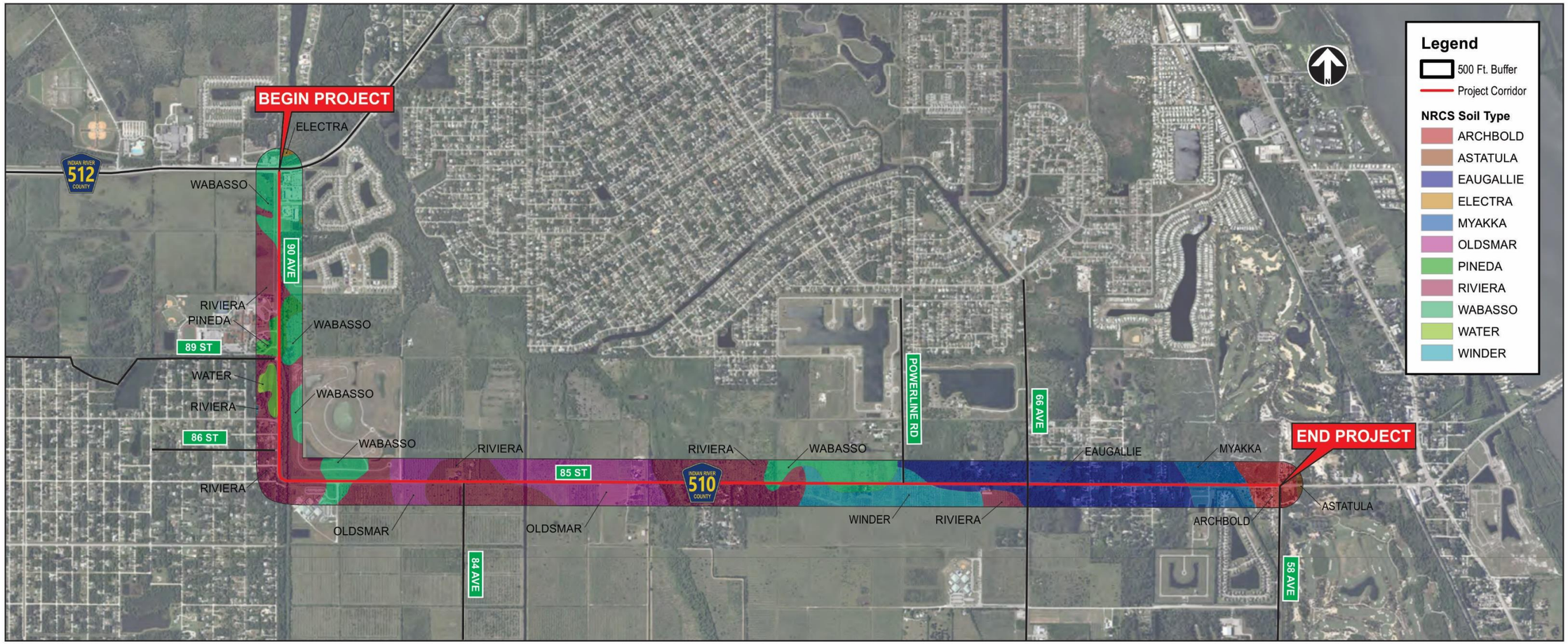
2.1.5 Soils

The Natural Resources Conservation Service (NRCS) (2014) indicates ten soil types occur in the study area (**Figure 2-8**). The soil types in the project area are listed in **Table 2-3** below along with descriptions and ratings from NRCS. Three hydric soils, a soil which is permanently or seasonally saturated by water, that are known to occur in the project area: Pineda fine sand, Winder fine sand, and Riviera Fine Sand. No prime farmland soils occur in Indian River County. EauGallie fine sand, Wabasso fine sand, Winder fine sand, Oldsmar fine sand, Pineda fine sand, and Riviera Fine Sand are considered farmland soils of unique importance.

It should be noted that a Geotechnical Report, a companion document to this Preliminary Engineering Report, was prepared based on the existing geotechnical information available along the project corridor. **Table 2-3** summarizes the findings of the previous soil investigations.

Table 2-3 General Soil Condition

Stratum Number	Typical Soil Description	AASHTO Classification	FDOT Soil Designation
1	Brown to dark brown sand with silt, organic stained, sometimes with some limestone gravel and grass roots	A-8	Satisfactory
2	Gray to brown sand with silt, sometimes with some organic stain, shell fragments and fine gravel	A3	Satisfactory
3	Brown to gray silty sand, slightly clayey, sometimes with organic stain, few shell fragments and limerock gravel	A-2-4	To be monitored
4	Gray clayey sand	A-2-6	Remove and Replace
5	Black sand and organics, sometimes silty	A-8	Remove and Replace
6	Brown to gray clay, sandy	A-4/A-6	Remove and Replace
7	Light gray cemented sand and limestone	A-1-b	Satisfactory



Existing Soils in Project Area

Soil Type	Environmental Association	Approximate Percent of Project Area
Archbold	This soil type consists of nearly level to sloping soils on the Atlantic Coastal Ridge and other elevated knolls on the flatwoods. **This is not a hydric soil.**	3.6%
Astatula	This soil type consists of excessively drained, very rapidly permeable soils that formed in thin deposits of marine or eolian sand. These nearly level to gently sloping soils are on the Atlantic Coastal Ridge. **This is not a hydric soil.**	2.3%
EauGallie fine sand	This soil type consists of nearly level sandy soils in the flatwoods. These soils are mainly on broad, low ridges. Permeability is rapid to moderately rapid in soils formed in beds of loamy marine sediments. Typical natural vegetation consists of slash pine, saw palmetto, cabbage palm, wax myrtle, wiregrass, bluestems, and panicums. This is rated as a farmland soil of unique importance. **This is not a hydric soil.**	1.7%
Electra	This soil type consists of deep, somewhat poorly drained, slowly permeable or very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment, These nearly level to gently sloping soils are on knolls on the flatwoods and in adjacent drainageways. **This is not a hydric soil.**	1.3%
Oldsmar fine sand	This soil type consists of nearly level, sandy soils on low ridges in the flatwoods and on low knolls on the flood plains. Permeability is rapid to moderately rapid. Typical natural vegetation includes slash pine, saw palmetto, inkberry, rusty lyonia, blackroot, pennyroyal, pineland threeawn, chalky bluestem, and panicums. **This is not hydric soil**.	13.0%
Water	-	9.9%
Pineda fine sand	This soil type consists of soils that formed beds of sandy and loamy sediments influenced by underlying alkaline material. There soils are on broad low flats and in low areas bordering swamps and lakes. Permeability is slow to very slow. Typical natural vegetation is scattered slash pine, cabbage palm, wax myrtle, saw palmetto, blue maidencane, pineland threeawn, and panicums. **This is a hydric soil.**	1.9%
Wabasso fine sand	This soil type consists of nearly level sandy soils formed in sandy and loamy marine sediments. These soils are on broad flatlands. Permeability is rapid to moderately rapid. Typical natural vegetation consists of slash pine, cabbage palm, saw palmetto, wax myrtle, fetterbush, inkberry, pineland threeawn, bluestems, and panicums. **This is not hydric soil.**	25.3%
Winder fine sand	This soil type consists of nearly level soils formed in unconsolidated marine sands and clays that are influenced by underlying alkaline material. Soils are located on low hammocks and in poorly defined drainageways. Permeability is slow to very slow. Typical natural vegetation includes cabbage palm, laurel oak, slash pine, wax myrtle, blue maidencane, chalky bluestem, sand cordgrass, sawgrass, sedges, and water tolerant grasses. **This is a hydric soil.**	6.5%
Myakka	This soil type consists of poorly drained, moderately permeable to moderately rapidly permeable soils that formed in beds of sandy marine sediment. These nearly level soils are on broad flatwoods and in depressions. **This is not a hydric soil.**	4.3%
Riviera fine sand	This soil type consists of nearly level soil and is poorly drained. Typical natural vegetation consists of blue maidencane, pineland threeawn, cabbage palmetto, sand cordgrass, toothache grass, broomsedge bluestem, creeping bluestem, Florida paspalum, and saw palmetto. Permeability is moderate low to moderately high. **This is a hydric soil.**	30.2%

Source: NRCS 2014; *USDA 1987: 22–23, 25, 28, 31–34, 36, 45, 55*

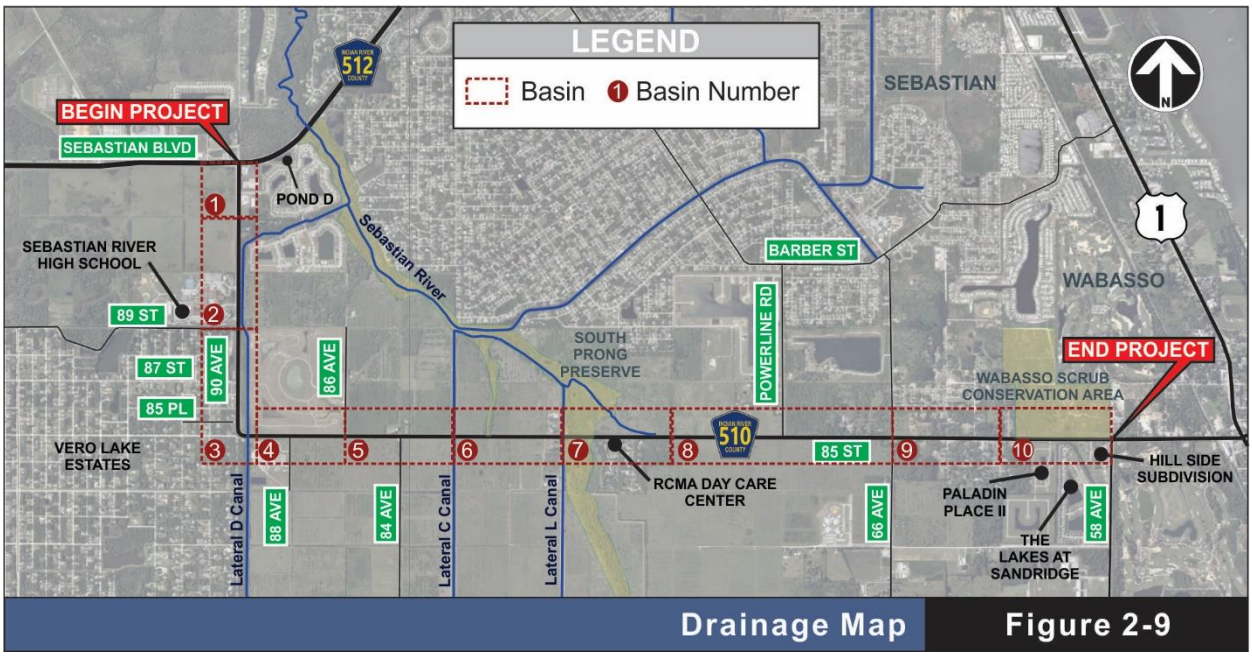
Existing Soils Map **Figure 2-8**

2.1.6 Groundwater Table

The Average October Ground Water Level from the beginning of the project to roughly 400 ft. west of Powerline Road is approximately 16.00 ft North Atlantic Vertical Datum (NAVD) (17.50 ft.-NGVD), and gradually increases to an estimated seasonal high groundwater table elevation of approximately 19.00 ft. NAVD (20.50 ft. National Geodetic Vertical Datum (NGVD)) to the end of the project corridor. It should be noted that this information was based on data from previous studies and should be confirmed during the design phase.

2.1.7 Drainage

The study area lies within the jurisdictions of St. John's River Water Management District (SJRWMD). It is specifically within the Sebastian River Improvement District (SRID) and Indian River Farms Water Control District (IRFWCD). The existing CR 510 corridor is composed of roadside ditches and swales on both sides of the road to collect, treat and transport runoff. The CR 510 corridor was divided into ten (10) main drainage systems (i.e. Basin 1 to 10), as shown in **Figure 2-9**. The following paragraphs describe each drainage basin:



Drainage Map Figure 2-9

Basin 1: covers CR 510 from CR 512 to 600-ft. south of Stone Point Drive. The drainage area is approximately 3.17 Acres in size. A review of previous drainage plans and existing permit documentation shows that runoff is being conveyed towards the north via roadside swales, pipes and culverts, and outfalls to Pond D. There are two permits that apply to this basin, Permit Nos. 56415 and 93656-1.

According to Permit No. 56415, Pond D provides treatment for CR 512 from the intersection of CR 512 and CR 510 to the bridges over the South Prong of the Sebastian River. The permit shows that existing treatment volume required and provided for CR 512 are 1.29 and 4.23 ac-ft., respectively. As such, according to the permit, Pond D has a surplus capacity of 2.94 ac-ft. (Provided treatment of 4.23 ac-ft. – Required Treatment of 1.29 ac-ft.).

Permit No. 93656-1 states that the west swale of CR 510 (from CR 512 to Shark Boulevard or Basins 1 and 2) is used to drain offsite properties located west of the project area. Based on a desktop analysis and field review, approximately 73.50 Acres of offsite properties are draining into the west swale of CR 510. The existing treatment volume provided by the swale within the permitted section of CR 510 (from CR 512 to Shark Boulevard or Basins 1 and 2) is 0.17 ac-ft.

Basin 2: covers CR 510 from 600-ft. south of Stone Point Drive to 89th Street. The drainage area is approximately 6.58 Acres in size. The total impervious area is approximately 3.41 Acres. A review of previous drainage plans and existing permit documentation shows that runoff from the north and south portion (with respect to 400-ft. north of Mako Way) of the basin is being conveyed by roadside swales, pipes and culverts and ultimately discharges into Lateral D Canal. In addition, runoff from the southwest portion of the basin discharges into Lake A. As previously stated, Permit No. 93656-1, states that the west swale of CR 510 (from CR 512 to Shark Boulevard or Basins 1 and 2) is used to drain offsite properties located west of the project area. The total area of the offsite properties is approximately 158.4 Acres. The existing treatment volume provided by the swale within the permitted section of CR 510 (from CR 512 to Shark Boulevard or Basins 1 and 2) is 0.17 ac-ft.

Basin 3: covers CR 510 from 89th Street to 85th Street. The drainage area is approximately 7.65 Acres in size. The total impervious area is approximately 3.12 Acres. A review of the previous drainage plans and existing permit documentation shows that runoff from the left side of the north portion of this basin (with respect to 86th Street) is being conveyed to Lake A via roadside swales and sheet flow. Runoff from all other areas within this basin, is conveyed towards the south and ultimately discharges into Lateral D Canal. According to Permit No. 18847, Lake A provides water quality treatment and attenuation for the Vero Lakes Estate as well as CR 510. Based on a desktop analysis and field review, approximately 184.2 Acres of offsite properties are draining into the west swale of CR 510 through existing pipes.

Basin 4: covers CR 510 from Lateral D Canal to 86th Avenue. The drainage area is approximately 6.69 acres in size. The total impervious area is approximately 2.73 acres. A review of the previous drainage plans and permit documentation shows that runoff from this basin is being conveyed toward the west by roadside swales, pipes and culverts and ultimately discharges into Lateral D Canal. Currently, there are existing connections to two wet detention ponds of Bluewater Bay Planned Unit Development (PUD) for treatment before discharging into the South Prong of the Sebastian River. According to Permit No. 95794, the Bluewater Bay development provides 4" of discharge per 24 hours for CR 510.

Basin 5: covers CR 510 from 86th Avenue to Lateral C Canal. The drainage area is approximately 10.14 acres in size. The total impervious area is approximately 1.93 acres. A review of the previous drainage plans shows that runoff from this basin is being conveyed toward the east by roadside swales, pipes and culverts and discharges directly into Lateral C Canal. Based on a desktop analysis and field review, approximately 54.30 Acres of offsite properties are draining into the CR 510's right-of-way.

Basin 6: covers CR 510 from Lateral C Canal to Lateral L Canal. The drainage area is approximately 10.03 acres in size. The total impervious area is approximately 1.91 acres. A review of the previous drainage plans shows that runoff from this basin is being conveyed toward the west and east by roadside swales, pipes and culverts. Runoff from the west portion of the basin (with respect to 900 ft. west of 79th Terrace) discharges directly into Lateral C Canal and runoff from the east portion of the basin discharges

directly into Lateral L Canal. Based on a desktop analysis and field review, approximately 53.70 acres of offsite properties are draining into CR 510's right-of-way.

Basin 7: covers CR 510 from Lateral L Canal to approximately 2,500-ft. west of 70th Avenue. The drainage area is approximately 10.22 acres in size. The total impervious area is approximately 1.95 acres. A review of the previous drainage plans shows that runoff from this basin is being conveyed toward the west by roadside swales, pipes and culverts and discharges directly into Lateral L Canal. A 72 inch CMP equalizer cross drain is located less than 500-ft. to the east of Lateral L Canal. Based on a desktop analysis and field review, approximately 54.80 acres of offsite properties are draining into the CR 510's right-of-way.

Basin 8: covers CR 510 from approximately 2,500-ft. west of 70th Avenue to 66th Avenue. The drainage area is approximately 20.63 acres in size. The total impervious area is approximately 3.93 acres. Runoff from this basin is being conveyed toward the west by roadside swales, pipes and culverts and ultimately discharges into Lateral L Canal. A 100" x 60" cross drain is located approximately 2,500-ft. to the west of 70th Avenue. Based on a desktop analysis and field review, approximately 110.5 acres of offsite properties are draining into CR 510's right-of-way.

Basin 9: covers CR 510 from 66th Avenue to 62nd Avenue. The drainage area is approximately 6.30 Acres in size. The total impervious area is approximately 1.94 acres. Runoff from this basin is being conveyed toward the west by roadside swales, pipes and culverts and ultimately discharges into Lateral L Canal. Based on a desktop analysis and field review, approximately 54.5 acres of offsite properties are draining into CR 510's right-of-way.

Basin 10: covers CR 510 from 62th Avenue to 58th Avenue. The drainage area is approximately 6.47 acres in size. The total impervious area is approximately 2.49 acres. Runoff from this basin is being conveyed by roadside swales, pipes and culverts and discharges into Sub-Lateral G-S canal. Based on a desktop analysis and field review, approximately 18.7 acres of offsite properties are draining into the CR 510's right-of-way.

2.1.8 Environmental Characteristics

2.1.8.1 Land Use

Land use cover descriptions provided for both uplands and wetlands are classified utilizing the *Florida Land Use Cover and Forms Classifications System* (FLUCCS) designations. Existing land use in the project area was initially determined utilizing the US Geological Survey (USGS) maps, historical images, aerial photographs, and land use mapping from the St. Johns River Water Management District (SJRWMD) (2009-2012). Land use categories reported by SJRWMD were verified in the field. Field reviews generally confirmed the SJRWMD land use mapping, with minor updates that are described below. Land use categories mapped by SJRWMD are shown in **Figure 2-10**.

2.1.8.2 Cultural Features and Community Services

Community service facilities provide a gathering place for community members as well as serve the needs of people from surrounding areas. For the purpose of this study, community facilities include parks and recreational facilities, public and private schools, churches and other religious institutions, and public buildings and facilities such as fire stations, libraries, medical centers, and cemeteries. The community service facilities that are located within the study area are discussed below.

Parks and Recreational Facilities

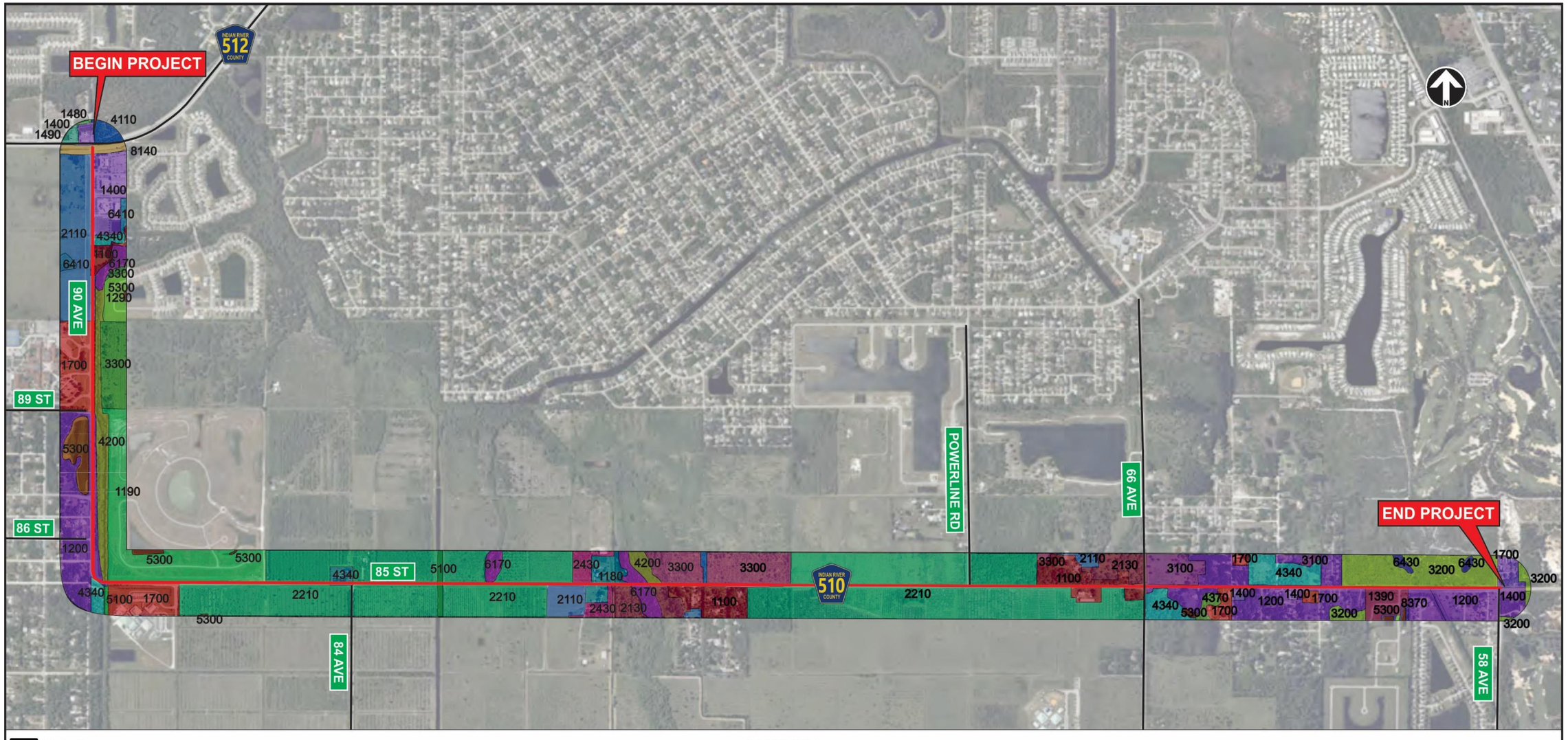
There are five parks or other recreational facilities within the study area. The Wabasso Scrub Conservation Area, the South Prong Preserve/Saint Sebastian River Greenway, and the Ansin Tract are all adjacent to the project. North County Regional Park and St. Sebastian River Preserve State Park are approximately one half mile from the projects western terminus. No direct impacts are anticipated for the Ansin Tract, the Wabasso Scrub Conservation Area, North County Regional Park, or St. Sebastian River State Park.

Schools

Schools that are within the community services study area consist of:

- Sebastian High School (9001 Shark Boulevard, Sebastian, FL 32958)
- Treasure Coast Elementary School (8955 85th Street, Sebastian, FL 32958)

A daycare for children of migrant farm workers and rural, low-income families is also located in the study area, RCMA Children's House CDC (7625 85th Street).



LEGEND

500 Ft. Buffer
Project Corridor

SJRWMD FLUCCS

- 1100: RESIDENTIAL, LOW DENSITY
- 1180: RESIDENTIAL, RURAL
- 1190: LOW DENSITY UNDER CONSTRUCTION
- 1200: RESIDENTIAL, MEDIUM DENSITY
- 1290: MEDIUM DENSITY UNDER CONSTRUCTION
- 1390: HIGH DENSITY UNDER CONSTRUCTION
- 1400: COMMERCIAL AND SERVICES
- 1480: CEMETERIES
- 1490: COMMERCIAL & SERVICES UNDER CONSTRUCTION
- 1700: INSTITUTIONAL
- 2110: IMPROVED PASTURES
- 2130: WOODLAND PASTURES
- 2210: CITRUS GROVES
- 2430: ORNAMENTALS
- 2600: OTHER OPEN LANDS - RURAL
- 3100: HERBACEOUS UPLAND NONFORESTED
- 3200: SHRUB AND BRUSHLAND
- 3300: MIXED UPLAND NONFORESTED
- 4110: PINE FLATWOODS
- 4200: UPLAND HARDWOOD FORESTS
- 4340: UPLAND MIXED CONIFEROUS/HARDWOOD
- 4370: AUSTRALIAN PINE
- 5100: STREAMS AND WATERWAYS
- 5300: RESERVOIRS - PITS, RETENTION PONDS, DAMS
- 6170: MIXED WETLAND HARDWOODS
- 6410: FRESHWATER MARSHES
- 6430: WET PRAIRIES
- 8140: ROADS AND HIGHWAYS (DIVIDED 4-LANES WITH MEDIANS)
- 8370: SURFACE WATER COLLECTION BASINS

Existing Land Use **Figure 2-10**

Churches and Religious Institutions

Churches/religious institutions within the community services study area consist of:

- Allen Chapel African Methodist Church (6425 875th Street, Wabasso, FL 32970)

Fire and Police

There are no Fire and Police facilities located within the community services study area.

Medical and Emergency Operation Facilities

There are no major medical or emergency operation facilities located within the community services study area.

Other Public Buildings and Facilities

There are no known public buildings, such as post offices, congressional offices, state, county, or city buildings or other government facilities.

Evacuation Routes and Emergency Services Facilities

The Treasure Coast Region has been identified by the National Oceanic and Atmospheric Administration (NOAA) as a high hurricane vulnerable area within the United States. CR 510 is designated as an emergency route by both the Florida Division of Emergency Management and Indian River County.

2.1.8.3 Potential Section 4(f) Resources

A review of potential historic and recreational Section 4(f) resources was conducted during the development of the Cultural Resources Assessment Survey (CRAS) and the Section 4(f) Determination of Applicability. No historic resources that are eligible for protection under Section 4(f) were identified. The Ansin Tract, South Prong Preserve and the Wabasso Scrub Conservation Area are considered eligible recreational Section 4(f) resources and are located in the project area.

2.1.8.4 Aesthetics

No community features associated with aesthetic effects were identified within the 200-foot project buffer.

2.1.8.5 Archaeological and Historical Resources

No newly recorded archaeological sites were identified during the preparation of the CRAS, a companion document to this Preliminary Engineering Report, and no cultural material was recovered during field investigations. Three previously recorded archaeological sites: 8IR1142, 8IR1143, and 8IR1164 are located within the Area of Potential Effect (APE). 8IR1142 and 8IR1143 were determined to be National Register–ineligible in 2005 and 8IR1164 was determined to be National Register- ineligible in 2006.

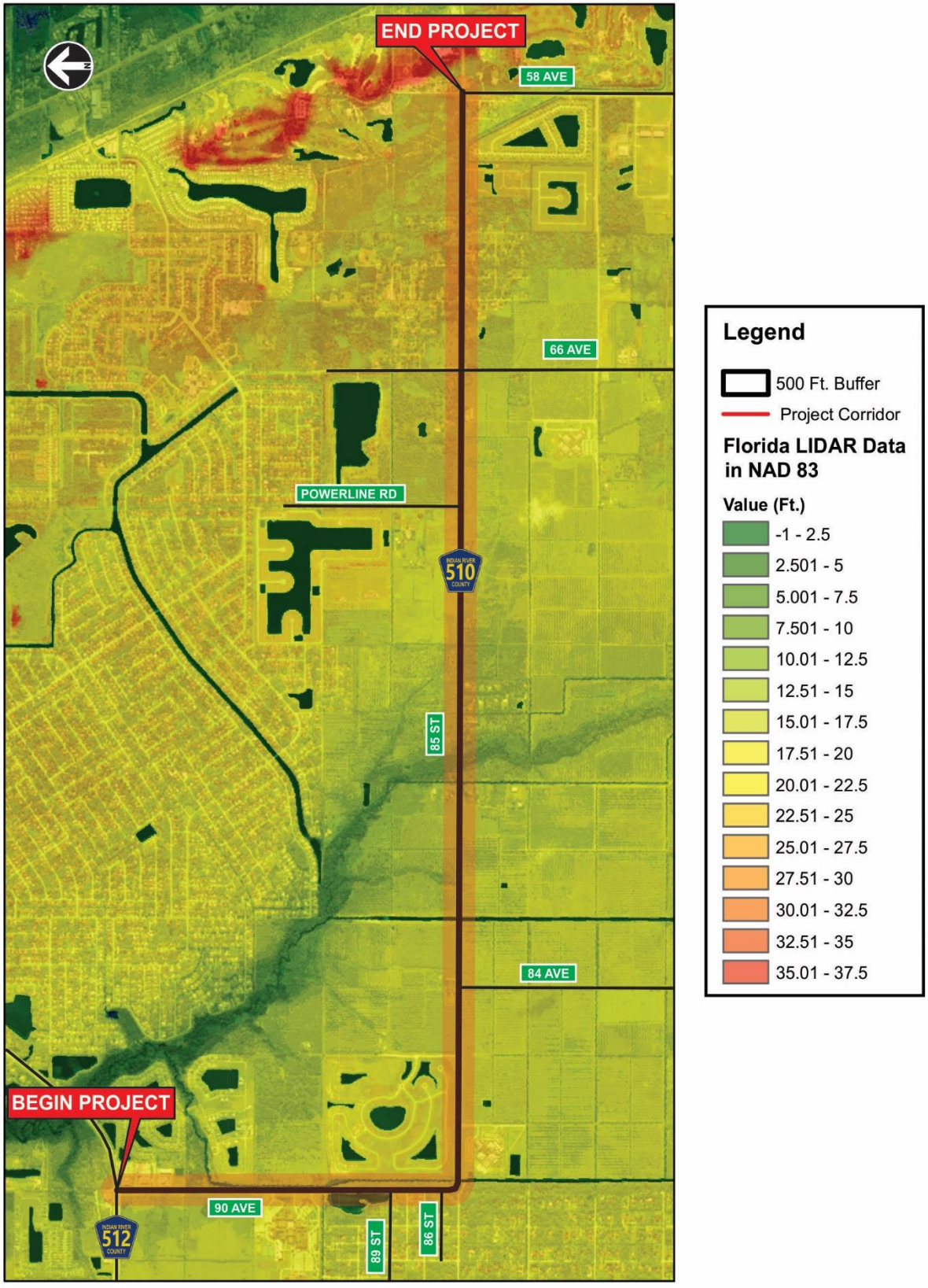
2.1.8.6 Natural and Biological Features

2.1.8.6.1 Floodplains and Elevation

A review of the Flood Insurance Rate Map published by Federal Emergency Management Agency (FEMA), indicates that a portion of the study area is located in Special Flood Zones A, AE, X and X-500 (see **Appendix B**). The portion of the study area located in Zone A has a 1% annual chance of being flooded by the base flood (100-year storm) with no base flood elevation determined. Areas located in Zone AE also has a 1% annual chance of being flooded by the 100-year storm with base flood elevations determined. Areas identified in Zone X or Zone X-500 are estimated to have less than one foot or no flooding at all during the Base Flood (see **Appendix B**).

Elevation and Hydrology

The project area is located on relatively flat land with a ground elevation ranging between approximately sea level and 35 feet. There is a light rise in elevation from west to east with the most significant rise in elevation near the easternmost portion of the project area. The National Resources Conservation Service (NRCS) reports the depth to water table in the project area is between 0 and 18 inches. **Figure 2-11** shows an elevation map created with data collected by the National Oceanic and Atmospheric Administration and the U.S. Department of Commerce in 2007 using Light Detection and Ranging (LIDAR) in North American Datum 1983 (NAD 83).



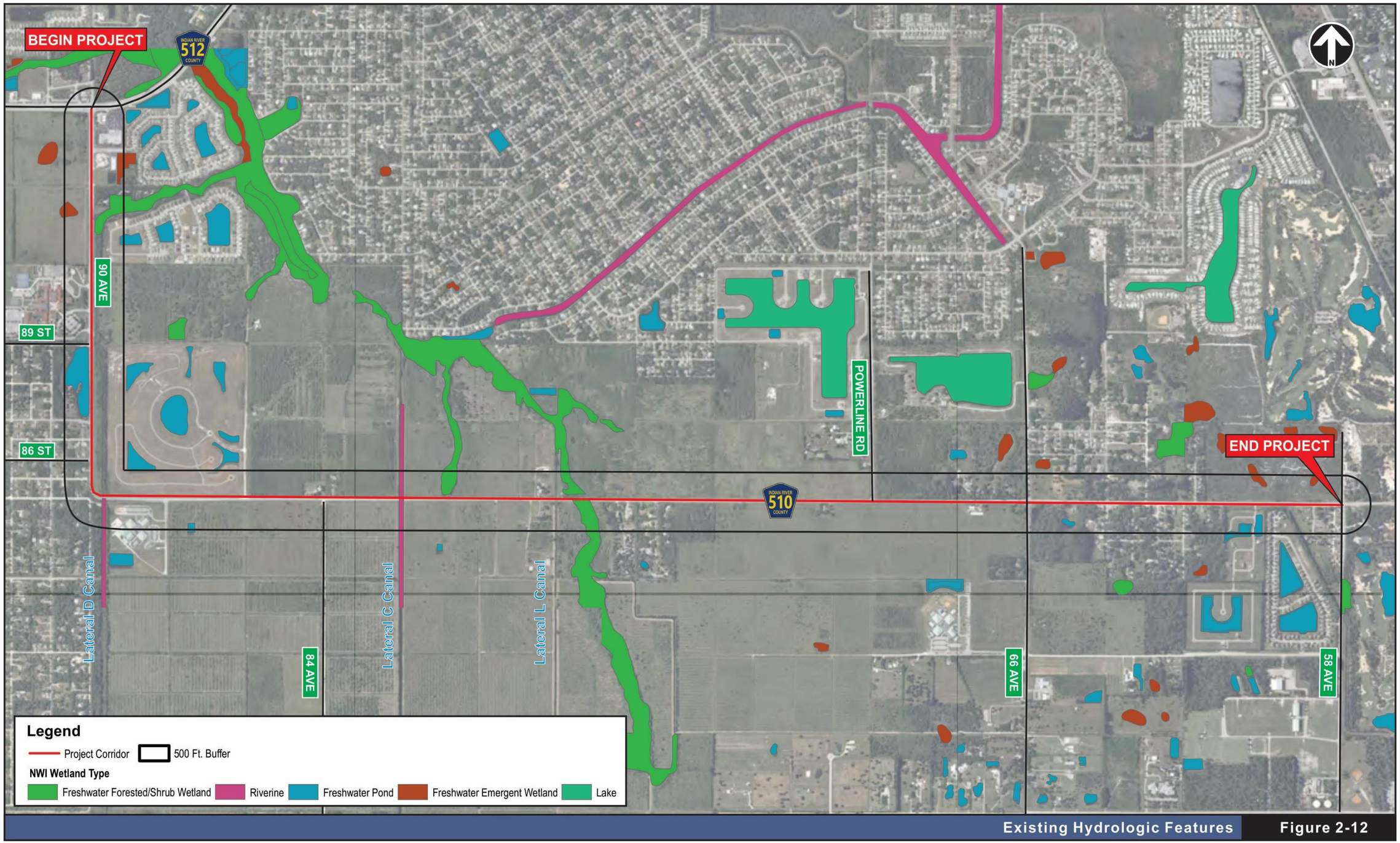
Existing Elevation Features **Figure 2-11**

2.1.8.6.2 Aquatic Preserves and Outstanding Florida Waters

In accordance with Chapter 18-20, Florida Administrative Code, and the FDOT PD&E Manual, Part 2, Chapter 10 – Aquatic Preserves and Outstanding Florida Waters (dated June 14, 2017), the project corridor was evaluated for the potential presence of aquatic preserves. No aquatic preserves are located within the project area.

2.1.8.6.3 Wetland and Surface Waters

A Natural Resources Evaluation was completed for this project and describes potential impacts to wetlands and Other Surface Waters (OSW) (see **Figure 2-12)**. Five types of wetlands or OSWs are mapped by Saint Johns River Water Management District in the project area and were confirmed during field investigations. They are Streams and Waterways (Florida Land Use Cover and Forms Classification System [FLUCCS] 5100), Reservoirs (FLUCCS 5300), Mixed Wetland Hardwoods (FLUCCS 6170), Freshwater Marshes (FLUCCS 6410), and Wet Prairies (FLUCCS 6430). Roadside ditches and swales occur along CR 510 and adjacent lands and are classified as OSWs. Three major canals (Lateral D Canal, Lateral C Canal, and Lateral L Canal) drain the project area and are also considered OSWs.



Existing Hydrologic Features **Figure 2-12**

2.1.8.6.4 Wildlife and Habitat

A Natural Resources Evaluation Report that describes habitats and potential impacts to wildlife was prepared as part of this PD&E study. Two federally listed species, Audubon's crested caracara (Polyborus plancus audubonii)(caracara) and wood stork (Mycteria americana) were observed in the project area. The state-listed Florida sandhill crane (Grus canadensis pratensis) and gopher tortoise (Gopherus polyphemus) (also a candidate for Federal listing) were observed during field surveys of the project area. Florida scrub-jay (Aphelocoma coerulescens) and gopher tortoise are documented to inhabit the Wabasso Scrub Conservation Area, at the eastern terminus of the project.

Nest surveys for Audubon's crested caracara were conducted by FDOT in part of the project area in 2016. As part of this PD&E study, nest surveys following US Fish and Wildlife Service (USFWS) protocols were conducted in 2017 covering potential caracara nesting habitat throughout the project area.

Table 2-4 Listed Species with Potential to Occur in Project Area

Common Name	Scientific Name	Effect Determination
Federally Listed Species		
Audubon's crested caracara	*Polyborus plancus audubonii*	MANLAA
Eastern diamondback rattlesnake	*Crotalus adamanteus*	MANLAA
Eastern indigo snake	*Drymarchon corais couperi*	MANLAA
Florida scrub-Jay	*Aphelocoma coerulescens*	MANLAA
Gopher tortoise	*Gopherus polyphemus*	MANLAA
Wood stork	*Mycteria americana*	MANLAA
State Listed Species		
Burrowing owl	*Athene cunicularia*	MANLAA
Florida pine snake	*Pituophis melanoleucus mugitus*	MANLAA
Florida sandhill crane	*Grus canadensis pratensis*	MANLAA
Little blue heron	*Egretta caerulea*	MANLAA
Roseate spoonbill	*Platalea ajaja*	MANLAA
Sherman's fox squirrel	*Sciurus niger shermani*	MANLAA
Southeastern American kestrel	*Falco sparverius paulus*	MANLAA
Tricolored heron	*Egretta tricolor*	MANLAA

MANLAA= May affect, not likely to adversely affect

2.1.8.7 Physical Features

2.1.8.7.1 Air Quality

The project was assessed for potential air quality impacts at the project level using the FDOT's Carbon Monoxide (CO) Florida 2012 screening model. The results of the CO screening analysis indicate the proposed project is not expected to cause any exceedances of the one-hour or eight-hour National Ambient Air Quality Standard (NAAQS) for CO. Thus, the project passes the CO screening analysis, and air quality impacts resulting from the proposed project are not expected.

2.1.8.7.2 Noise

A Noise Study Report (NSR) has been prepared as part of this PD&E study and provides further detail. The developed lands along the project corridor were evaluated to identify the noise sensitive receptor sites that may be impacted by traffic noise associated with the proposed improvements. Noise sensitive receptor sites most often represent properties where frequent exterior human use occurs and where a lowered noise level would be of benefit. This includes residential units and parks. Based on field observations, noise sensitive sites along this project corridor also included the interior of places of worship since no exterior activities occur elsewhere on the properties that are more likely to be impacted. The retail shopping centers, office buildings, commercial enterprises, industrial complexes and transportation land use areas are not considered to be noise sensitive.

2.1.8.7.3 Contamination

A Contamination Screening Evaluation Report (CSER) was developed to evaluate the potential presence of contaminated sites occurring in the contamination study area, which is comprised of the project corridor, proposed stormwater pond locations, and any properties that abut them. Known or potential contamination sources identified during this study are presented in **Table 2-5**. No Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), National Priorities List (NPL) sites, or landfills were identified within one half mile of the project corridor. Most of the project area was previously used for agricultural and that causes some potential risk of contamination.

Table 2-5 Contamination Sites Summary

Site #	Facility Name	Address	Facility ID (FDEP/RCRA)	Databases	Concern	Distance of Contamination from Project Corridor	Risk Rating
1	Sunoco #0613-2641	9020 CR 512	8509326	FDEP OCULUS	Petroleum products	Adjacent	Medium
2	Shark Mart Mobil	9490 90th Avenue	9602448	FDEP OCULUS	Petroleum products	Adjacent	Medium
3	Publix Super Market #1035	1451 Sebastian Boulevard #200	9810584	FDEP OCULUS	Fuel	Adjacent	Low
4	Sebastian River High School	9001 90th Avenue	110006393125	RCRA	Biomedical Waste	Adjacent	Low
5	Yukon Land Corporation	8790 85th Street	None	None	Above Ground Storage Tanks	Co-located	Low
6	Treasure Coast Elementary	8955 85th Street	110064754573	RCRA	Biomedical Waste	Adjacent	Low
7	Slough's Grove Service	7675 85th Street	8520277	FDEP OCULUS	Gasoline	Adjacent	Low
8	Ryall Groves Inc.	6815 85th Street	None	None	Above Ground Storage Tanks	Adjacent	Medium
9	Bethel Service Station	6375 85th Street	9100095	FDEP OCULUS	Petroleum products	Adjacent	Medium
10	Former or Current Agricultural Areas	No discreet address	None	None	Herbicide, Pesticide	Co-located and Adjacent	Medium

2.1.9 Existing Traffic Conditions

2.1.9.1 Field Observations Summary

Field observations were made by qualified personnel covering weekdays during the morning hours of 6 AM to 9 AM and during the afternoon from 4 PM to 7 PM. Traffic in the southbound and eastbound direction is higher during the AM peak hour, especially along the 85th Street (east-west) portion of the project. This is partly due to the high number of work related trips destined south and east of the project area originating in the residential areas west of CR 510 and entering CR 510 at 87th Street. During the afternoon peak the directional traffic trend is reversed with the northbound/westbound being the predominant direction. This is likely due to the fact that a significant number of work trips are returning home during the peak hour. The queue for the Sebastian River High School, especially during drop off creates significant delay as shown on the photo to the right. **Figure 2-13** provides additional key findings concerning traffic and multimodal issues.



(this space intentionally left blank)



The North County Transit Hub of GoLine, the Indian River County Public Transportation system is located at Dryden Avenue, just north of the Begin Project and services 4 bus routes, two of which traverse the project area.



Lack of continuous pedestrian and bike facilities is a major linkage and safety concern.





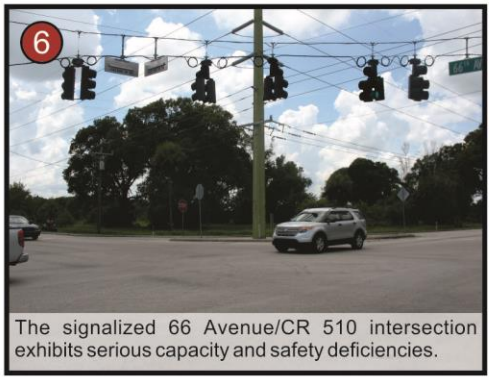
Heavy directional traffic is evident during arrival and dismissal periods along CR 510 in front of the Sebastian River High School.



This pedestrian bridge just south of CR 510 provides effective pedestrian and bike access to the Treasure Coast Elementary School from the residential area to the west.



Substandard existing horizontal curvature and limited sight distance create dangerous conditions just west of the Treasure Coast Elementary School entrance.

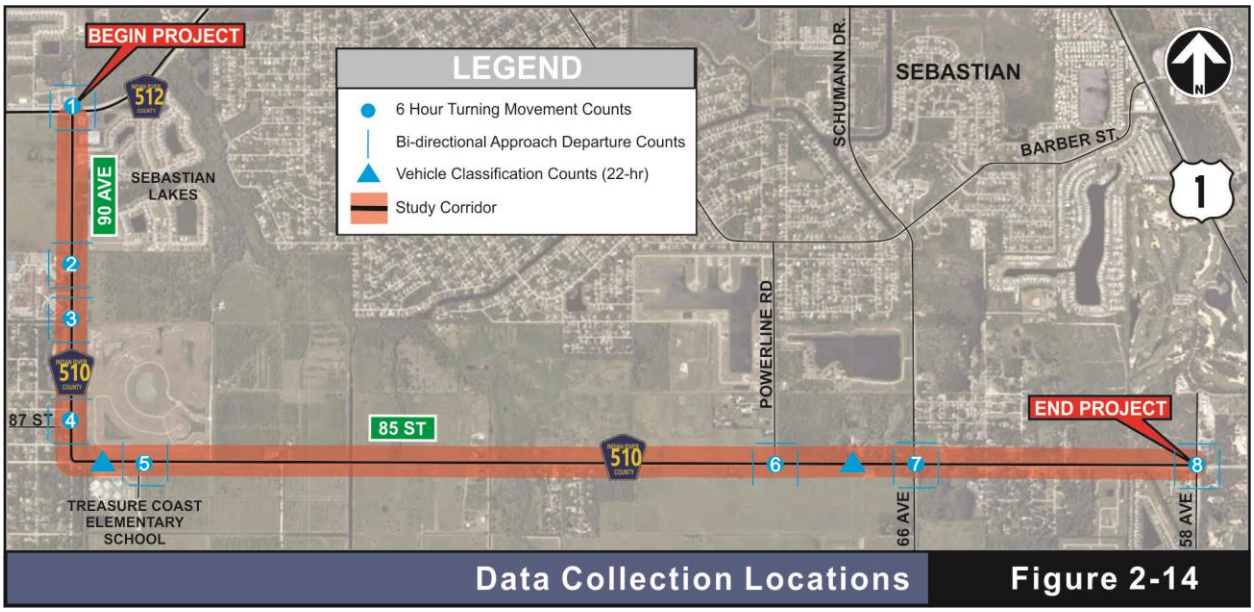


The signalized 66 Avenue/CR 510 intersection exhibits serious capacity and safety deficiencies.

Field Observations and Key Findings **Figure 2-13**

2.1.9.2 Data Collection

The Florida Department of Transportation has provided the *Traffic Data Collection and Traffic Projections*, *February 2016 (Pre-PD&E Study)* as a basis for the existing traffic conditions analysis. Documentation and data for the study area have been incorporated into this section of the report to facilitate continuity. The data collection effort included turning movement counts, approach/departure counts and the vehicle classification counts. Data collection locations are illustrated in **Figure 2-14.**



Three-day intersection data collection (3-hour AM Peak turning movement counts from 6:00 AM to 9:00 AM, 3-hour PM Peak turning movement counts from 4:00 PM to 7:00 PM, and 24-hour approach/departure counts), were collected at the following intersections:

1. CR 510 at CR 512 (signalized)
2. CR 510 at Mako Way (signalized)
3. CR 510 at Hammerhead Way (signalized)
4. CR 510 at 87th Street (signalized)
5. CR 510 at Treasure Coast Elementary School (signalized)
6. CR 510 at Powerline Road/70th Avenue (un-signalized)
7. CR 510 at 66th Avenue (signalized)
8. CR 510 at 58th Avenue (signalized)

The intersection data collection included passenger car, pedestrian, bicyclist and truck counts. Vehicle classification counts were collected on CR 510 east of Powerline Road and west of Treasure Coast Elementary School. The traffic counts were collected from December 1st thru 3rd, 2015. The turning movement counts and approach/departure counts are documented within the *Pre-PD&E Study* provided in the Design Traffic Technical Memorandum, a companion document to this Preliminary Engineering Report.

2.1.9.3 Traffic Factors

Design Traffic Factors were obtained from the 2014 Florida Traffic Information DVD (2014 FTI), published by the FDOT. The factors were used to adjust the raw field count data.

Seasonal Factors (SF) were applied to daily and peak hour volumes used in the operational analysis of existing conditions.

Axle Factors were applied to the traffic count data as appropriate.

Directional Distribution Factors (D-factor) were determined for each location using the traffic count data in combination with thresholds established in the FDOT Project Traffic Forecasting Handbook, 2014. When the resultant D-factor based on actual counts is not within the FDOT acceptable range for this facility 50.8 to 67.1, the recommended factor is used. The north/south segment from CR 512 to north of 87th Street the AM peak direction is southbound with corresponding PM peak direction northbound. The east/west segment from south of 87th Street to east of 58th Street, the AM peak direction is eastbound with corresponding PM peak westbound. The D-factors were set at the maximum acceptable value of 67.1 The recommended D-factors for CR 510 are summarized in **Table 2-6**.

Table 2-6 CR 510 Recommended D-factors

Roadway	Segment		D-factor (direction)	
	From	To	AM	PM
CR 510	CR 512	Mako Way	62.0 (SB)	54.6 (NB)
	Mako Way	Hammerhead Way	62.0 (SB)	53.7 (NB)
	Hammerhead Way	87th Street	54.0 (SB)	56.6 (NB)
	87th Street	Treasure Coast Elementary	65.9 (EB)	67.1(WB)
	Treasure Coast Elementary	58th Avenue	67.1 (EB)	67.1 (WB)

Design Hour Factors (K-factor) were determined using the Standard K Factors established by FDOT. However, several locations do not generate typical peak hour distribution of traffic due to land uses such as schools (existing K-factors are approximately 0.20) or volumes are very low; therefore, the few vehicles during peak hour result in a higher K-factor. For these instances the existing calculated K-factor was used for the design factor. The recommended non-standard K-factors are summarized in **Table 2-7**.

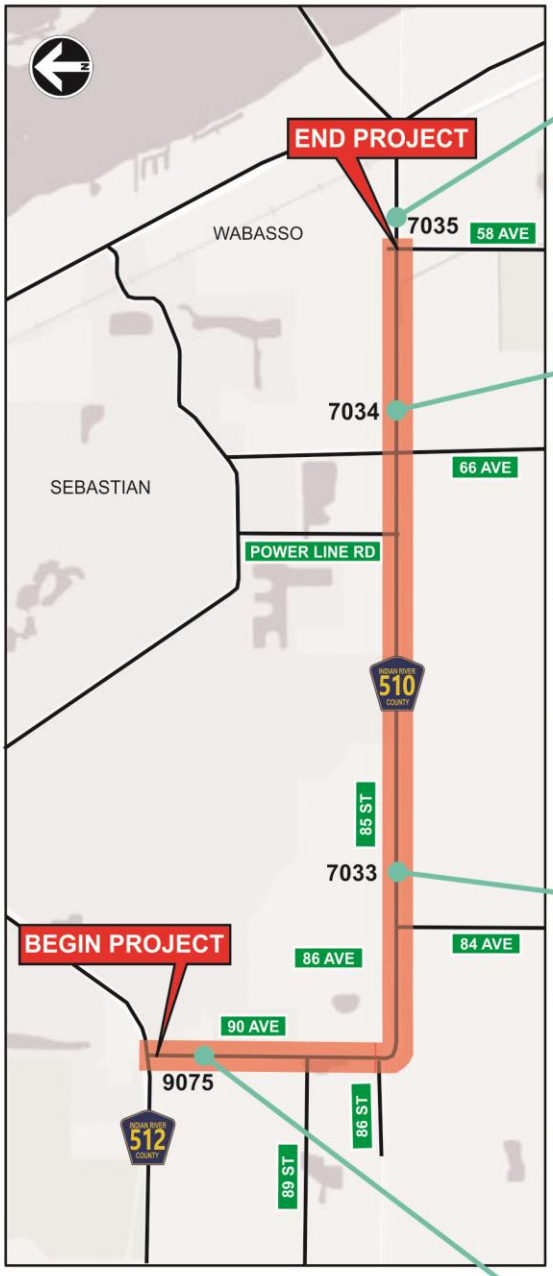
Table 2-7 Recommended Non-Standard K-factors

Location	K-Factor	
	AM	PM
CR 510 North of CR 512	***20.7***	***29.3***
Hammerhead Way West of CR 510	***27.5***	***11.3***
Treasure Coast Elementary School South of CR 510	***32.5***	9.0

Truck Factors (T) Daily (T_{24}) and Peak Hour (T_{peak}) truck factors were determined based on 2015 classification counts and 5-year FTI data. A T_{24} of 5.4% and T_{peak} of 2.7% were established for the project area.

The AADT, K, D and T factors obtained from the 2014 FTI DVD are shown in **Figure 2-15.**

(this space intentionally left blank)



Florida Department of Transportation
Transportation Statistics Office
2015 Historical AADT Report

County: 88 - INDIAN RIVER

Site: 7035 - CR 510/85 ST E OF 58 AVE (COUNTY LINK: 1830)

Year	AADT	Direction 1	Direction 2	*K Factor	D Factor	T Factor
2015	12200 F	W 6000	E 6200	9.00	51.80	3.90
2014	12200 C	W 6000	E 6200	9.00	51.70	5.30
2013	11900 C	W 5800	E 6100	9.00	50.80	3.00
2012	11400 C	W 5700	E 5700	9.00	55.20	4.00
2011	12600 C	W 6400	E 6200	9.00	55.70	6.40
2010	13000 C	W 6300	E 6700	10.00	54.79	4.00
2009	12400 C	W 6100	E 6300	9.97	55.49	6.40
2008	6000 C	E 6000	0	10.08	99.99	4.70

Florida Department of Transportation
Transportation Statistics Office
2015 Historical AADT Report

County: 88 - INDIAN RIVER

Site: 7034 - CR 510/85 ST E OF 66TH AVE (COUNTY LINK: 1820)

Year	AADT	Direction 1	Direction 2	*K Factor	D Factor	T Factor
2015	11400 F	E 5700	W 5700	9.00	51.80	3.90
2014	11400 C	E 5700	W 5700	9.00	51.70	5.30
2013	10200 C	E 5200	W 5000	9.00	50.80	3.00
2012	10000 C	E 5000	W 5000	9.00	55.20	4.00
2011	14000 C	E 5300	W 8700	9.00	55.70	6.40
2010	11200 C	E 5600	W 5600	10.00	54.79	4.00
2009	10400 C	E 5300	W 5100	9.97	55.49	6.40
2008	9900 C	E 5000	W 4900	10.08	55.82	4.70

Florida Department of Transportation
Transportation Statistics Office
2015 Historical AADT Report

County: 88 - INDIAN RIVER

Site: 7033 - CR 510/85 ST E SR 609/82 AVE (COUNTY LINK: 1810)

Year	AADT	Direction 1	Direction 2	*K Factor	D Factor	T Factor
2015	9800 F	E 4900	W 4900	9.00	51.80	3.90
2014	9800 C	E 4900	W 4900	9.00	51.70	5.30
2013	11300 C	E 5300	W 6000	9.00	50.80	3.00
2012	9800 C	E 4900	W 4900	9.00	55.20	4.00
2011	9900 C	E 5000	W 4900	9.00	55.70	6.40
2010	11400 C	E 5700	W 5700	10.00	54.79	4.00
2009	10500 C	E 5100	W 5400	9.97	55.49	6.40
2008	9100 C	E 4500	W 4600	10.08	55.82	4.70

Florida Department of Transportation
Transportation Statistics Office
2015 Historical AADT Report

County: 88 - INDIAN RIVER

Site: 9075 - ON CR. 510 FROM CR. 512 TO 87TH STREET (COUNTY LINK : 9075)

Year	AADT	Direction 1	Direction 2	*K Factor	D Factor	T Factor
2015	10300 F	N 5200	S 5100	9.00	51.80	3.90
2014	10300 C	N 5200	S 5100	9.00	51.70	5.30
2013	10100 F	N 5100	S 5000	9.00	50.80	3.00
2012	10100 C	N 5100	S 5000	9.00	55.20	4.00
2011	10700 C	N 5400	S 5300	9.00	55.70	6.40
2010	10100 F	N 5200	S 4900	10.00	54.79	4.00
2009	10300 C	N 5300	S 5000	9.97	55.49	6.40
2008	9500 C	N 4900	S 4600	10.08	55.82	4.70

LEGEND

9075 — FDOT TRAFFIC STATION SITE AND NUMBER

HISTORICAL TRAFFIC INFORMATION ALONG CR 510

Historical Traffic Information Along CR 510 **Figure 2-15**

2.1.9.4 Existing Traffic Volumes

2.1.9.4.1 Average Annual Daily Traffic

The raw 72-hour approach counts are summarized in **Table 2-8** along with corresponding traffic factors used to determine the Average Annual Daily Traffic (AADT).

Table 2-8 Existing (2015) Average Annual Daily Traffic

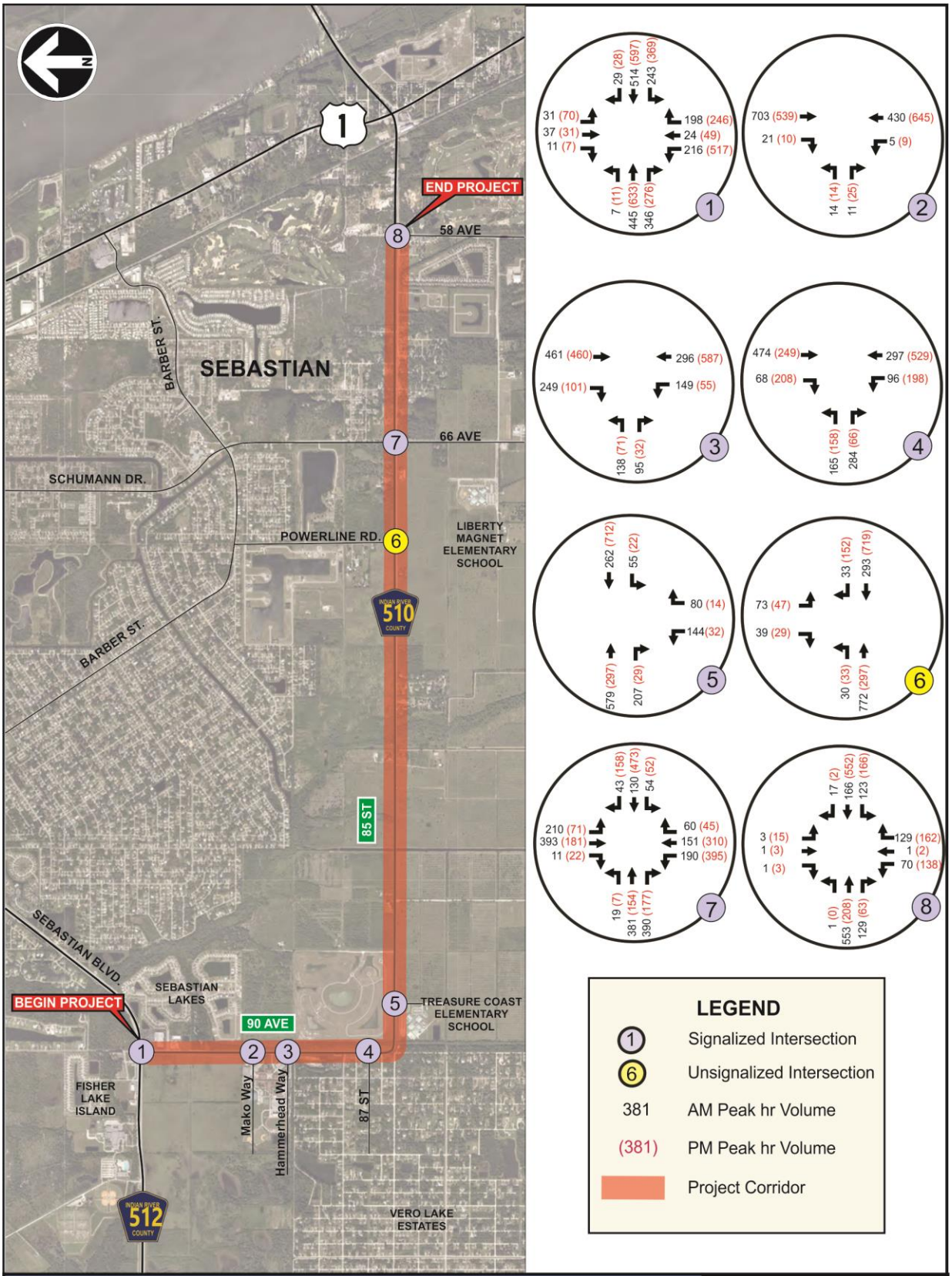
Number	Intersection	Location	Count				Axle Correction Factor	Seasonal Factor	2015 AADT
			Day 1	Day 2	Day 3	Average			
1	***CR-512***	CR 510 North of CR 512	717	654	691	687	0.98	1.0	670
		CR 510 South of CR 512	13,725	13,426	13,549	13,567	0.98	1.0	13,000
		CR 512 East of CR 510	17,536	17,204	17,407	17,382	0.98	1.0	17,000
		CR 512 West of CR 510	18,921	17,728	18,284	18,311	0.98	1.0	18,000
2	***Mako Way***	CR 510 North of Mako Way	13,669	13,457	13,586	13,571	0.98	1.0	13,000
		CR 510 South of Mako Way	13,999	13,693	13,847	13,846	0.98	1.0	14,000
		Mako Way West of CR 510	1,005	1,182	1,094	1,094	0.98	1.0	1,100
3	***Hammerhead Way***	CR 510 North of Hammerhead Way	13,841	13,532	13,519	13,631	0.98	1.0	13,000
		CR 510 South of Hammerhead Way	12,956	12,692	12,873	12,840	0.98	1.0	13,000
		Hammerhead Way West of CR 510	2,574	2,172	2,272	2,339	0.98	1.0	2,300
4	***87th Street***	CR 510 North of 87th Street	13,275	13,133	13,241	13,216	0.98	1.0	13,000
		CR 510 South of 87th Street	11,617	11,331	11,272	11,407	0.98	1.0	11,000
		87th Street West of CR 510	7,156	6,973	7,049	7,059	0.98	1.0	6,900
5	***Treasure Coast Elementary***	CR 510 East of Treasure Coast Elementary School	13,867	14,010	12,731	13,536	0.98	1.0	13,000
		CR 510 West of Treasure Coast Elementary School	12,208	11,907	12,208	12,108	0.98	1.0	12,000
		Treasure Coast Elementary School South of CR 510	1,452	1,522	1,492	1,489	0.98	1.0	1,500
6	***Power line Road***	CR 510 East of Powerline Road	14,147	13,922	14,096	14,055	0.98	1.0	14,000
		CR 510 West of Powerline Road	12,098	11,903	11,816	11,939	0.98	1.0	12,000
		Powerline Road North of CR 510	2,652	2,980	2,631	2,754	0.98	1.0	2,700
7	***66th Avenue***	66th Avenue North of CR 510	7,787	7,732	7,721	7,747	0.98	1.0	7,600
		66th Avenue South of CR 510	12,313	12,774	12,589	12,559	0.98	1.0	12,000
		CR 510 East of 66th Avenue	10,822	10,911	10,520	10,751	0.98	1.0	11,000
		CR 510 West of 66th Avenue	13,777	13,615	13,382	13,591	0.98	1.0	13,000
8	***58th Avenue***	58th Avenue North of CR 510	478	517	417	471	0.98	1.0	460
		58th Avenue South of CR 510	6,763	7,208	6,583	6,851	0.98	1.0	6,700
		CR 510 East of 58th Avenue	13,637	13,442	12,999	13,359	0.98	1.0	13,000
		CR 510 West of 58th Avenue	11,562	11,780	11,389	11,577	0.98	1.0	11,000

Source: Traffic Data Collection and Traffic Projections CR 510 from CR 512 to 58th Avenue, February 2016

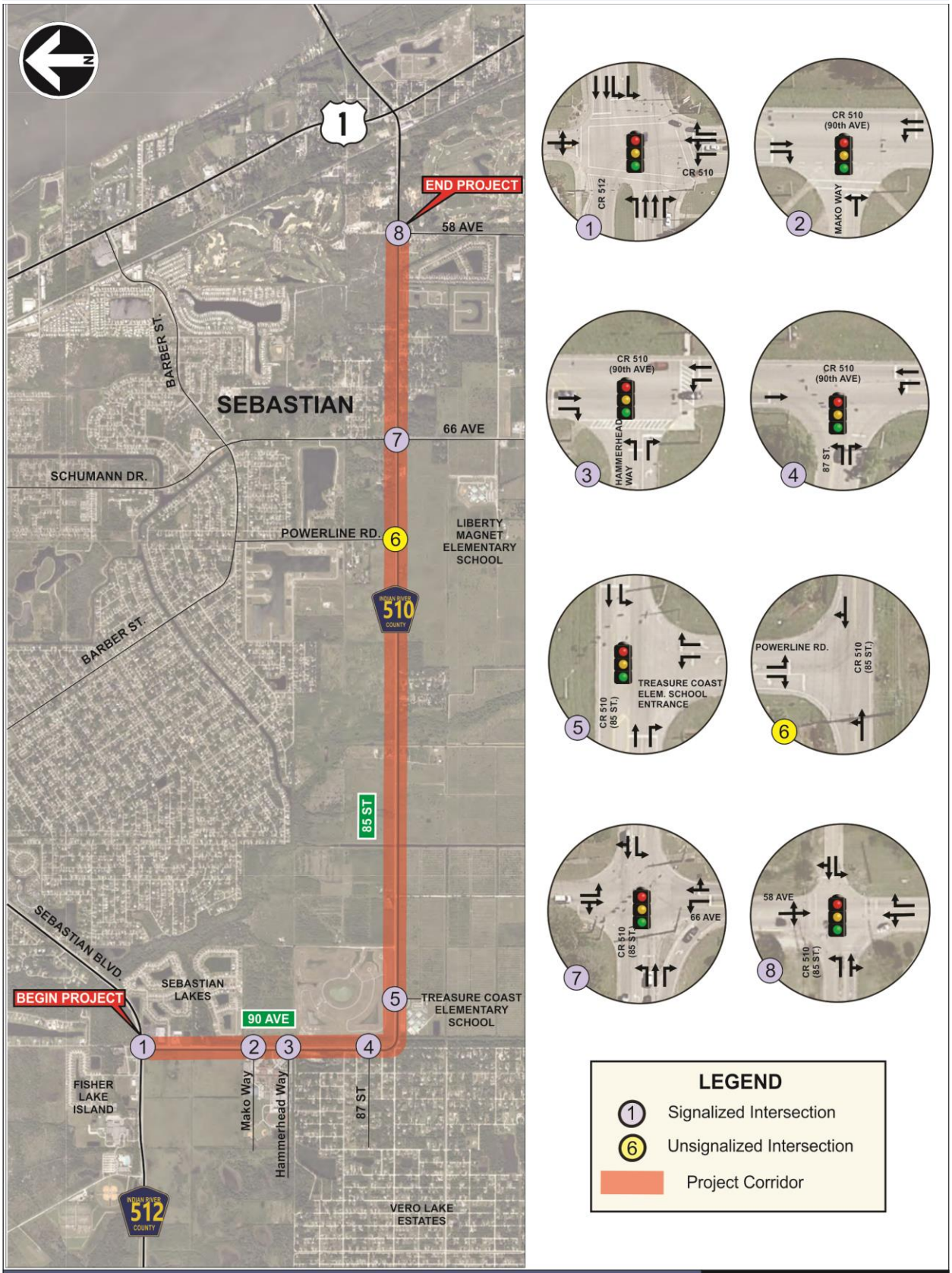
2.1.9.4.2 Peak Hour Intersection Volumes

Based on the Pre-PD&E Study, three-day TMCs were collected from 12/1/2015 to 12/3/2015. In order to conduct a conservative intersection analysis, a left turn volume assessment was conducted for each intersection in the study area. The highest left turn volumes occurred on 12/1/2015; therefore, corresponding intersection volumes were selected for the analysis. The intersection peak hour volumes used in the analysis are provided in **Figure 2-16** and intersection lane geometry is provided in **Figure 2-17.**

(this space intentionally left blank)



Existing Peak Hour Volumes **Figure 2-16**



Intersection Lane Configuration **Figure 2-17**

2.1.9.5 Safety

Vehicular crash data was obtained for CR 510 within the study area covering the years 2011-2015. The crash data was summarized for the latest available five years to include type of collision, lighting conditions, and road surface, among others. **Table 2-9** reflects this information. Data regarding fatal crashes has been summarized in **Table 2-10**. The crash data along with the pertinent analysis will assist in the identification of safety concerns and consequently in the development of potential improvements.

Table 2-9 Crash Summary

CRASH TYPE	2011	2012	2013	2014	2015	TOTAL	PERCENT
REAR-END	1	11	13	15	27	67	31.75%
HEAD-ON	0	4	10	12	1	27	12.80%
ANGLE	2	0	0	5	2	9	04.27%
LEFT-TURN	0	5	3	6	7	21	09.95%
RIGHT-TURN	0	0	0	0	1	1	00.47%
SIDE-SWIPE	0	2	1	3	6	12	05.69%
COLL W PED/BIKE	0	1	1	1	0	3	01.42%
COLL W PARKED CAR	0	0	0	0	0	0	00.00%
COLL W FIXED OBJECT	0	1	0	2	0	3	01.42%
OUT OF CONTROL/OFF ROAD	0	2	10	6	3	21	09.95%
ALL OTHER	11	4	8	9	15	47	22.27%
TOTAL	**14**	**30**	**46**	**59**	**62**	**211**	**100.00%**
LIGHT CONDITIONS							
DAYLIGHT	12	20	12	46	49	139	65.88%
NIGHT	2	10	34	13	13	72	34.12%
TOTAL	**14**	**30**	**46**	**59**	**62**	**211**	**100.00%**
SURFACE CONDITIONS							
DRY	13	22	24	40	36	135	63.98%
WET	1	3	8	6	14	32	15.17%
ALL OTHER	0	5	14	13	12	44	20.85%
TOTAL	**14**	**30**	**46**	**59**	**62**	**211**	**100.00%**

Table 2-10 Crash Severity Summary

	2011			2012			2013			2014			2015			Total Crashes
	PDO	INJ	FTL	PDO	INJ	FTL	PDO	INJ	FTL	PDO	INJ	FTL	PDO	INJ	FTL	
Total Crashes/ Year/ Severity	1	13	0	16	14	0	33	13	0	15	44	0	45	17	0	Total Project Crashes
Total Crashes per Year	**14**			**30**			**46**			**59**			**62**			**211**

(this space intentionally left blank)

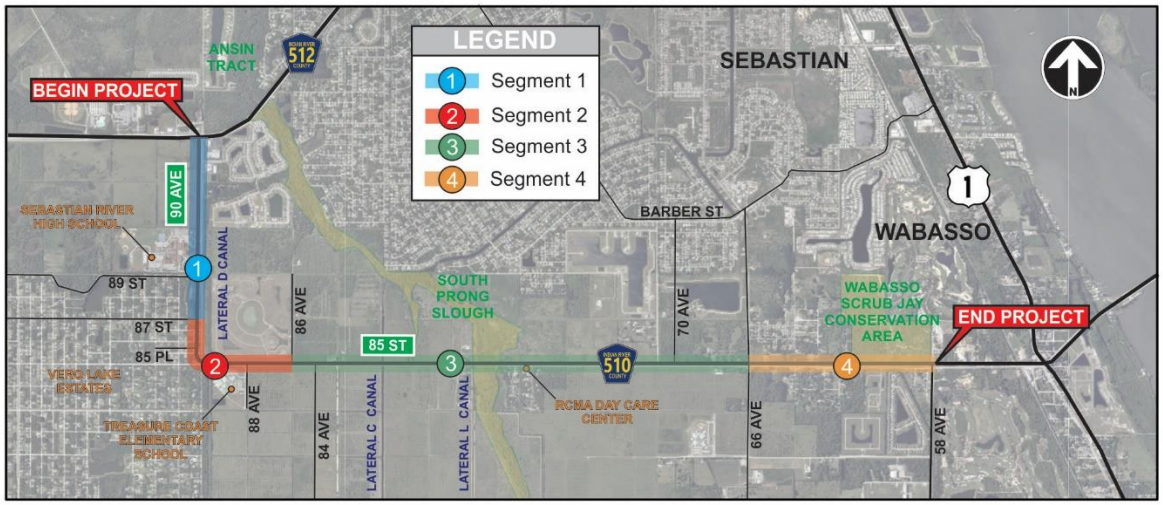
2.2 Phase II – Data Analysis Phase

The second phase included the segmentation of the project and the analysis of the existing roadway and traffic/operational characteristics. Initially, it involved the establishment of all pertinent parameters which served as the criteria for evaluating the existing facility. These parameters (or features) represent integral components of the facility which might affect operations, capacity and safety. In total, ten (10) overall performance parameters dealing with the geometric and operational features of the existing project corridor were selected and evaluated according to current FDOT and AASHTO minimum design standards. Most of these parameters were evaluated based on the design speed. The design speed is defined as the "maximum safe speed that can be maintained over a given section of highway when weather, light and traffic conditions are such that the design features of the highway govern." The basic purpose in using the design speed concept is to achieve consistency with the various design elements that influence vehicle operations.

2.2.1 Project Segmentation

Prior to initiating the analysis of existing conditions, the project was broken down into four (4) distinct segments (see **Figure 2-18**). Each segment has rather unique characteristics as well as potential differences in right-of-way, operational, geometric and environmental features. In general terms, **Segment 1** exhibits a multilane suburban typical section and slightly higher traffic demand than segments 2 and 3. In addition, this segment is characterized by the presence of Sebastian River High School and Vero Lakes Estates abutting the west side. **Segment 2** features a sharp 90^{o} curve alignment with a substandard bridge over the lateral D Canal. **Segment 3** features an undivided two lane typical section bordered by the St. Sebastian Greenway Corridor and the South Prong Slough Conservation area along the north side. The posted speed limit along this segment is 55 mph. **Segment 4** features an undivided two lane typical section with a 35 mph posted speed limit. The Wabasso Scrub Jay conservation area is located along the north side east of 61st Drive. The segmental breakdown methodology allows for site specific existing condition assessment with a microscopic analysis of geometric and operational features.

.



SEGMENT	DESCRIPTION	LENGTH	EXIST R/W WIDTH	EXIST AADT	SAFETY*
1 From CR 510/CR 512 Intersection to 87 Street	• Mainly multilane divided tangent segment generally serving institutional (Sebastian River High School) and residential (Vero Lake Estates) abutting land uses along the west side. • The Lateral D Canal of the Sebastian River Drainage District generally abuts most of the east side of this segment. • 45 mph posted speed limit	0.72 miles	Varies 80' Min 160' Max	10,300	35 crashes including intersections within segment. 0 fatal crashes 22 injury crashes 13 PDO crashes
2 From 87 Street to just west of 86 Avenue	• Undivided two lane 90° curved segment with substandard bridge over the Lateral D Canal. • 40 MPH posted speed limit from 87 ST to 86 ST, 20 MPH along curve & 35 MPH along 85 ST up to 86 Avenue.	1.00 miles	100'	10,100	13 crashes including intersections within segment. 1 fatal crashes 7 injury crashes 5 PDO crashes
3 From just west of 86 Avenue to 66 Avenue	• Mainly undivided two lane segment on tangent with substandard bridges over the Lateral C and Lateral L Canals. • The South Prong Slough Conservation area and the St. Sebastian Greenway corridor abut this segment along the north side. • The RCMA Day Care Center is just west of the 75 CT intersection. • 55 MPH posted speed limit within most of the segment except at the western and eastern segment termini.	2.53 miles	80'	9,800 (2014)	24 crashes including intersections within segment. 0 fatal crashes 17 injury crashes 7 PDO crashes
4 From 66 Avenue to 58 Avenue	• Undivided two lane segment on tangent • The Wabasso Scrub Jay Conservation area is located along the north side east of 61 Drive • Potential environmental justice access issues involving several properties along the south side just west of the 58 Ave. intersection. • 35 mph posted speed limit	1.01 miles	80'	8,100	32 crashes including intersections within segment. 0 fatal crashes 24 injury crashes 8 PDO crashes

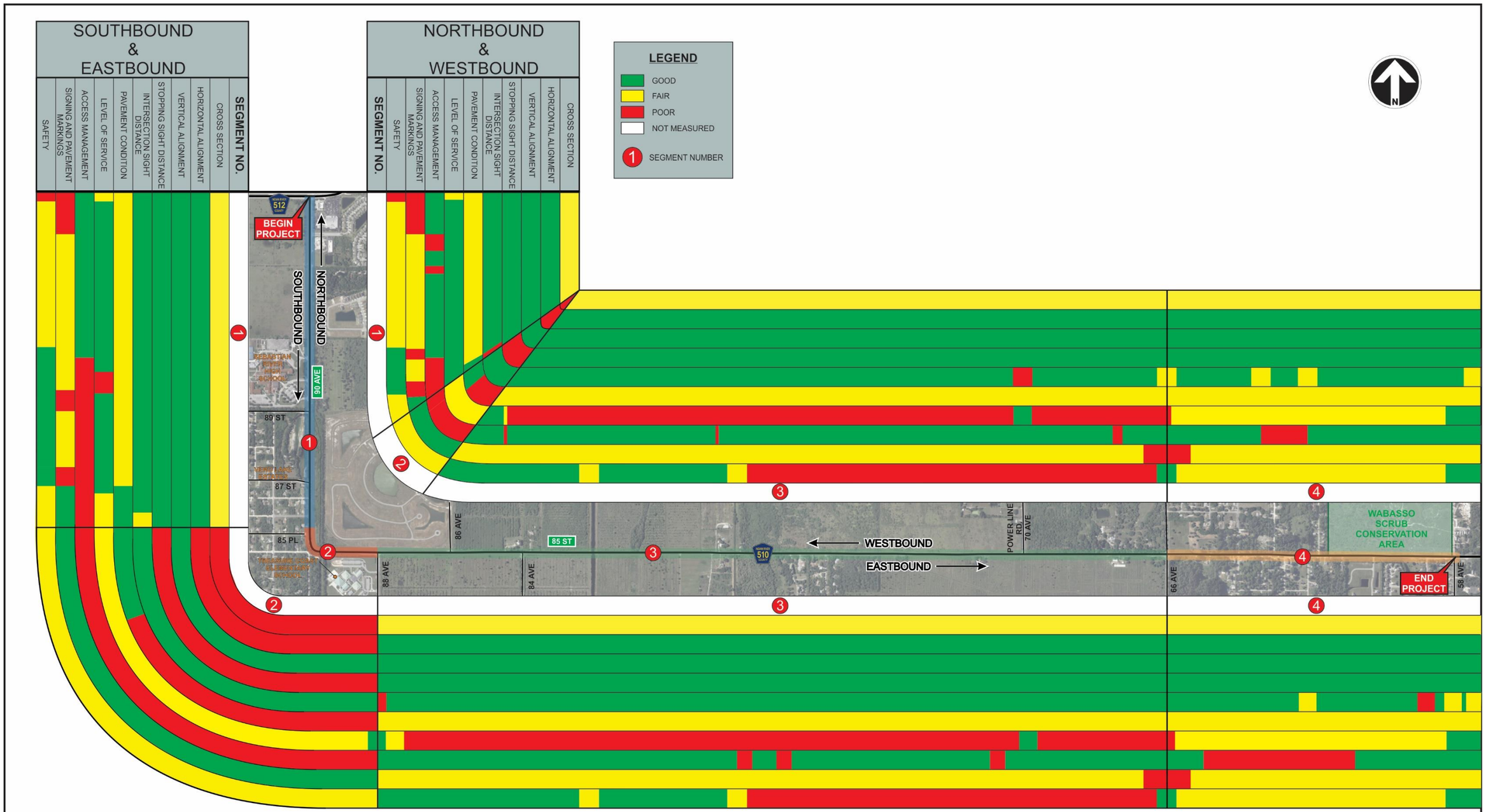
*Based on 2010-2014 Crash Data

Project Segmentation **Figure 2-18**

2.2.2 Roadway Characteristics Evaluation

Figure 2-19 shows the existing conditions evaluation summary for the facility on a segment by segment basis illustrating the results of this task. Initially, this task involved the establishment of all pertinent parameters that served as the criteria for evaluating the existing facility. These parameters (or features) represent integral component of the facility which might affect operations, capacity and safety. A total of ten overall performance parameters dealing with the geometric and operational features of the facility were selected and evaluated according to current FDOT and AASHTO minimum standards. Most of these parameters were evaluated based on the design speed. Most of the evaluation parameters utilized a three (3) category scale for rating consisting of "Good", "Fair" and "Poor." A brief description of each evaluation parameter follows and a more complete description of the evaluation criteria used in their analyses are included in **Appendix C** of this Document.

(this space intentionally left blank)



Existing Facility Evaluation Summary — Figure 2-19

2.2.2.1 Cross Section

This parameter relates to the adequacy and safety of such cross sectional elements as width of traffic lanes and shoulders clear zone and lateral clearances to roadside obstacles, guardrail treatment and location of embankment side slopes. Based on these characteristics the existing roadway section was generally rated as “Fair” except for Segment 2 which was rated as “Poor.” It should be noted that in order for a roadway section to be rated as “Good” or “Fair” it must meet or exceed all the requirements included in **Appendix C**.

2.2.2.2 Horizontal Alignment

This geometric parameter is concerned with the degree of horizontal curvature, lengths of tangents and lane transitions as well as the coordination with the profile. In general terms, the project horizontal alignment is adequate and generally composed of a series of tangent sections with relatively small deflection angles or relatively flat curves. However, the existing horizontal curve in Segment 2 (see **Figure 2-19**) was rated as “Poor” since its features correspond to a much lower design speed (20 mph) than the desirable 45 mph.

2.2.2.3 Vertical Alignment

This geometric parameter deals with the vertical profile of the facility considering such elements as maximum grades, maximum change in grades, critical length of grade and coordination with horizontal alignment. No vertical curves are present within the project limits. In general terms, the existing facility exhibits a series of very long flat grades with no vertical curves. Therefore, this parameter was rated “Good” along the facility.

2.2.2.4 Stopping Sight Distance

Stopping sight distance is the length of roadway required for a driver to spot an object and negotiate a complete stop. This parameter is usually impaired by severe crests (or sags) in vertical alignment, poor horizontal alignment and/or roadside obstructions. Since these detrimental conditions are not present along most of the existing facility, this parameter was rated as “Good” except within Segment 2 which was rated as “Poor”.

2.2.2.5 Intersection Sight Distance

This parameter relates to the provision of proper sight distances for a vehicle approaching an at-grade intersection. The sight distance considered safe under various assumptions of physical conditions and driver behavior is directly related to vehicle speeds and the resultant distances traversed during perception and reaction time and breaking.

Most project intersections within Segments 1 and 2 received ratings of "Good" except for 86th Street which is rated as fair. Within Segment 3 the Powerline Road intersection was rated “Poor.” Within Segment 4 several intersections are rated as “Fair.”

2.2.2.6 Pavement Condition

This parameter was based on the pavement condition survey which only included information for the eastbound direction, thus the westbound was determined based on visual examination. Existing visible cracking and the riding quality of the pavement was considered. In general terms, the pavement area was judged to be in either “Good” or "Fair" condition except along Segment 2 which was rated as “Poor.”

2.2.3 Traffic/Operational Characteristics Evaluation

2.2.3.1 Level of Service

For signalized project intersections, this parameter was determined based on a capacity analysis utilizing Synchro 8 that implements *Highway Capacity Manual 2010 edition* (HCM 2010) procedures and Synchro 8 with SimTraffic. The analysis was performed for typical weekday traffic during the AM and PM peak period for the existing year (2013). The LOS Standard was established using the FDOT Level of Service Standards for the State Highway System (Procedure No.: 525-000-006). The adopted Standard for CR 510 from CR 512 to 58th Avenue is LOS D. The FDOT Generalized Service Volume Tables were used to establish the LOS threshold for each segment (**Tables 2-11** and **2-12**) by applying the non-state roadway and appropriate characteristic adjustment factors.

Table 2-11 Existing Volume to Capacity Ratios (AADT)

Limits		# of Lanes	LOS D	EXISTING AADT	
From	To	(speed limit)	SV	2015	V/C
CR 512	Mako Way	3LD (>40 MPH)	26,280	13,000	0.49
Mako Way	800' West of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	16,730	12,800	0.77
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	13,320	12,000	0.90
500' East of Treasure Coast Elementary	66th Avenue	2LU (>40 MPH)	12,740	13,000	1.02
66th Avenue	58th Avenue	2LU (<35 MPH) with LT lanes	13,320	11,000	0.83

Table 2-12 Existing Volume to Capacity Ratios (DDHV)

Limits		# of Lanes	LOS D	EXISTING DDHV	
From	To	(speed limit)	SV	2015	V/C
CR 512	Mako Way	3LD (>40 MPH)	830	690	0.83
Mako Way	800' West of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	830	680	0.82
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	680	725	1.07
500' East of Treasure Coast Elementary	66th Avenue	2LU (>40 MPH)	630	785	1.25
66th Avenue	58th Avenue	2LU (<35 MPH) with LT lanes	680	664	0.98

Existing operations were analyzed to serve as the base for future condition analyses. **Table 2-13** presents the existing intersection LOS results for both AM and PM peak hours. Results show that the overall LOS at all intersections meet or exceed the adopted LOS except for the intersections of CR 510 at Mako Way and at 66th Avenue. Although LOS for the remaining intersections meet the adopted standard, there are several approaches below the standard in both AM and PM peak hours.

Table 2-13 Existing Intersection LOS

Number	Intersection	MVMT	2015							
			AM PK				PM PK			
			Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	***CR 512***	EB	33.7	C	53.9	D	41.4	D	47.7	D
		WB	70.2	E			42.5	D		
		NB	51.1	D			58.5	E		
		SB	59.9	E			71.4	E		
2	***Mako Way*****	EB	48.9	D	53.5	D	50.9	D	77.7	E
		NB	79.8	E			126.1	F		
		SB	40.6	D			22.5	C		
3	***Hammerhead Way*****	EB	132.9	F	53.0	D	63.3	E	22.9	C
		NB	13.6	B			13.4	B		
		SB	45.6	D			23.0	C		
4	***87th Street***	EB	35.3	D	23.3	C	25.4	C	13.0	B
		NB	10.4	B			7.3	A		
		SB	23.2	C			14.9	B		
5	***Treasure Coast Elementary***	EB	18.5	B	20.0	C	5.4	A	5.3	A
		WB	7.5	A			4.3	A		
		NB	37.4	D			15.6	B		
6	****Powerline Road***	SB	31.7	D	3.9	A	25.4	D	2.2	A
		EB	0.3	A			1.2	A		
		WB	0.0	A			0.0	A		
7	***66th Avenue***	EB	39.8	D	52.1	D	25.7	C	105.2	F
		WB	30.0	C			48.5	D		
		NB	55.8	E			181.5	F		
		SB	66.8	E			78.4	E		
8	***58th Avenue***	EB	28.3	C	28.1	C	14.2	B	28.3	C
		WB	15.3	B			10.8	B		
		NB	47.8	D			72.9	E		
		SB	63.6	E			91.3	F		

****Stop controlled intersection; **Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); XX LOS does not meet adopted standard LOS D***

The results indicate that the level of service for most intersections and segments along the southbound/eastbound fall within the “Good” to “Fair” range. Segment 2 provides a V/C ratio above 1 and is thus rated as “Poor” and along Segment 3 the V/C ratio falls between 0.75 to 1 and is thus rated as “Fair.” Both Mako Way and 66th Avenue were also given a rating of “Poor” as they provide a LOS E and F, respectively.

2.2.3.2 Access Management

Since the existing facility is not part of the state highway system but rather county owned and maintained, it has not been previously assigned an “official” access management classification. However Indian River County generally follows FDOT’s Access Management Standards. After close coordination with county planning officials, it was decided that in general terms CR 510 within the project limits would likely be classified as an Access Class 5 facility. This class is generally used where existing land use and roadway sections have been built out to a greater extent than those roadway segments with an even higher mobility function (classes 2, 3 and 4) but they still exhibit either existing or planned restrictive medians. CR 510 does not currently have a restrictive median. **Table 2-14** illustrates the FDOT’s Access Management Classification and Standards. **Figure 2-20** illustrates the Existing Driveway Connections Evaluation.

Table 2-14 Arterial Access Management Classifications & Standards

Access Class	Median Type	Connection Spacing (feet)		Median Opening Spacing (feet)		Signal Spacing (feet)
		>45 mph	≤ 45 mph	Directional	Full	
2	Restrictive w/Service Roads	1,320	660	1,320	2,640	2,640
3	Restrictive	660	440	1,320	2,640	2,640
4	Non Restrictive	660	440	-----	-----	2,640
5	Restrictive	440	245	660	2,640/1,320*	2,640/1,320*
6	Non-Restrictive	440	245	-----	-----	1,320
7	Both Median Types	125		330	660	1,320

* 2,640 for > 45 mph; 1,320 for ≤ 45 mph

2.2.3.3 Signing and Marking

This parameter is concerned with the adequate and proper use of signing and markings along the facility. A visual inspection of the project corridor revealed that the existing signing and pavement markings at most intersections are generally rated "Fair” or “Poor."

EAST & NORTH SIDE

Driveway Compliance Standards																																	
Connection Spacing	Desirable (Minimum)	440' (245')		281'	198'	116'		316'	145'	1115'	136'	614'	655'	948'	59'	263'	137'	746'		333'	116'	237'	356'		351'								
Corner Clearance: Approaching Int.	Full Access	230'	373'					1027'												1359'					459'		214'		260'				
Corner Clearance: Departing Int.	Full Access	230'		304'														4518'					289'		510'	453'		2258'				
General Characteristics			Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Circular driveways 41 Ingress 43 Egress		Single connection Provides Ingress & egress				
SERVING			Shopping Center	Shopping Center	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	SRWID Access Driveway	SRWID Access Driveway	Residential	Farmland	Residential Land Use	Residential Land Use	SRWID Access Driveway	SRWID Access Driveway	Non-Agricultural Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use		Residential Land Use				
DRIVEWAY NUMBER			1	2	3	4	5	8	9	10	11	13	14	15	17	18	20	21	22	28	29	31	32	33	34	36	41	43	52				



WEST & SOUTH SIDE

Driveway Compliance Standards																																	
Connection Spacing	Desirable (Minimum)	440' (245')						1315'	174'	246'		649'	2433'		186'	96'		141'		209'		55'	83'	109'	219'								
Corner Clearance: Approaching Int.	Full Access	230'	147'	189'	1267'	1547'	154'				2376'			797'					105'	125'	92'		175'						211'				
Corner Clearance: Departing Int.	Full Access	230'	187'	147'	135'	589'					247'			896'			88'		282'	120'		129'					585'	133'				
General Characteristics			Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Circular driveways 37 Ingress 38 Egress		Circular driveways 39 Ingress 40 Egress		Circular driveways both Ingress & egress	Circular driveways 45 Ingress 46 Egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress	Single connection Provides Ingress & egress				
SERVING			Residential Land Use	Residential Land Use	SRWID Access Driveway	Farmland	Residential Land Use	Residential Land Use	RCMA School	Residential Land Use	Farmland	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use		Allen Chapel AME		Wabasso Foods	Store & Resindential	Oasis Lounge Restaurant	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use	Residential Land Use				
DRIVEWAY NUMBER			6	7	12	16	19	23	24	25	26	27	30	35	37	38	39	40	42	44	45	46	47	48	49	50	51	53	54	55			

Existing Driveway Connections Evaluation **Figure 2-20**

2.2.3.4 Safety

A Safety Analysis was conducted in accordance with the Highway Safety Manual (HSM). The results indicated that from Mako Way to 87th Street, and Treasure Coast Elementary School to east of 79th Terrace a rating of "Good" was given. From CR 512 to Mako Way, 87th Street to Treasure Coast Elementary School, and east of 66th Avenue to 58th Avenue a rating of "Fair" was given. Lastly, the intersection of CR 512 and from east of South Prong Preserve to west of 66th Avenue a rating of "Poor" was given.

2.3 Phase III – Conclusions and Recommendations

The final phase of the existing conditions and evaluation study entailed reaching conclusions and recommendations for the proposed project improvements. The evaluation of the existing facility has identified certain geometric, operational, structural and safety deficiencies along the project limits as well as socio-economic/environmental concerns. Anticipated future conditions in the study area are expected to further degrade the existing deficiencies of the facility, thus requiring the implementation of major improvements. The primary objective of any proposed alternatives along the facility will involve the consideration of the following issues:

- Provide safety improvements.
- Provide operational improvements at key project intersections.
- Provide pedestrian and bicycle enhancements.
- Provide adequate capacity to meet future traffic demand.
- Provide adequate intersection geometry to allow sufficient room for large trucks to perform turning maneuvers.
- Provide aesthetically pleasing solutions that promote mobility and accessibility.

3 DESIGN CONTROLS & STANDARDS

Design controls and standards must be established prior to the formulation of design alternatives to ensure an adequate, safe, functional and operational roadway. These criteria are needed to develop typical sections, horizontal and vertical alignments, and other design features such as drainage, aesthetics, landscaping, and multimodal facilities. The controls and standards are those specified by the Florida Department of Transportation (FDOT) for state roadways.

3.1 Roadway Characteristics

As previously stated, CR 510 is owned and maintained by Indian River County and is functionally classified as an urban principal arterial within the project limits. From the project beginning at the CR 512 intersection to 85th Place the existing facility follows a north-south alignment and is locally known as 90th Avenue. It generally features a divided multi-lane typical section with either one or two directional lanes and grassed shoulders and swales. The existing alignment then features a sharp 90º curve and extends in an east-west direction until the project terminus at 58th Avenue. This project segment is locally known as 85th Street and generally features an undivided typical section with one 12 foot directional lane and a painted 12 foot wide median at the approaches of several intersections (e.g., 88th Avenue (Treasure Coast Elementary School entrance), 66th Avenue, 58th Avenue). It should be noted that generally there are no existing multimodal features for pedestrian and bicyclists (e.g., sidewalks, bike lanes, etc.) and no street lighting is provided along most of the study corridor.

3.2 Geometric Design Criteria

Geometric criteria pertaining to the proposed improvements are documented in several FDOT manuals, including the FDOT Plans Preparation Manual (PPM), Federal Highway Administration publications, and in publications of the American Association of State Highway and Transportation Officials (AASHTO). Based on coordination with Indian River County, this project will follow FDOT Criteria and standards. The design criteria used in this project are based on these publications. **Table 3-1** shows the roadway design criteria for CR 510.

Table 3-1 Roadway Design Criteria

Design Criteria (PPM)		CR 510 Wabasso Road From CR 512 to 58th Avenue					
Design Control (Existing)	Functional Classification	Urban Principal Arterial					
	Posted Speed	40 – 45 mph					
	Design Speed	45 and 55 mph					
	Design Vehicle	WB-62 FL					
	Access Class	5					
	Adopted LOS (Indian River County)	C					
Proposed Improvements		**Widen to 4 Lanes; Raised Median; Multimodal Features; Directional Median Openings; Curb and Gutter or Flush Shoulders**					
Design Control	Roadway Classification	Rural (4 Lanes)			Suburban (4 Lanes)		Urban (4 Lanes)
	Design Speed	50 mph	55 mph	60 mph	50 mph	55 mph	45 mph
Cross Section Features	Border Width	40 ft	40 ft	40 ft	29 ft	35 ft	12 ft[2]
	Lane Width, Through	12 ft	12 ft	12 ft	12 ft	12 ft	12 ft
	Lane Width, Turning	12 ft	12 ft	12 ft	12 ft	12 ft	12 ft
	Median Widths	40 ft	40 ft	40 ft	30 ft	30 ft	22 ft
	Inside Shoulder	8 ft	8 ft	8 ft	4 ft	4 ft	N/A
	Outside Shoulder	12 ft	12 ft	12 ft	6.5 ft	6.5 ft	-
	Pavement Cross Slope	0.02	0.02	0.02	0.02	0.02	0.02
Horizontal Alignment	Max. Deflection w/o Curves	45’00”	45’00”	45’00”	1°00'00"	1°00'00"	1°00'00"
	Max. Deflection for Through Lanes through intersection	3°00'00"	3°00'00"	3°00'00"	3°00'00"	3°00'00"	3°00'00"
	Min. Length of Curves (15V)	750 ft	825 ft	900 ft	750 ft	825 ft	675 ft
	Min. Curvature, radius w/ super	N/A	N/A	N/A	N/A	N/A	N/A
	Min. Curvature, radius w/o super	8337 ft (emax=0.10)	9949 ft (emax=0.10)	11709 ft (emax=0.10)	8337 ft (emax=0.10)	9949 ft (emax=0.10)	2083 ft (emax=0.05)
	Min. Stopping Sight Distance	425 ft	495 ft	570 ft	425 ft	495 ft	360 ft
	Min. Intersection Sight Distance	540 ft[1] (LT) 600 ft[1] (RT)	600 ft[1] (LT) 660 ft[1] (RT)	650 ft[1] (LT) 720 ft[1] (RT)	790 ft[1] (LT) 17 ft[1] (RT)	860 ft[1] (LT) 190 ft[1] (RT)	660 ft[1] (LT) 180 ft[1] (RT)
Clear Zone	Clear Zone/Recoverable Terrain	24 ft	30 ft	36 ft	24 ft	30 ft	18 ft
	Canal Hazard	60 ft	60 ft	60 ft	60 ft	60 ft	40 ft

1) Sight distance needed from minor street to major street
2) 12 ft if bicycle lanes or other auxiliary lanes.

3.3 Drainage Criteria

The FDOT Drainage Manual gives standards for the design of state roadway drainage. The drainage design and construction criteria for the proposed improvements will adhere to FDOT Standards and will comply with the best management practices as shown in **Table 3-2**. Also, both the St. Johns River Water Management District (SJRWMD) and the Indian River Farms Water Control District (IRFWCD) have specific criteria and requirements which will govern the stormwater management systems and are described in the following sections.

Table 3-2: Drainage Design Criteria

Design Element	Criteria	Source
Design Frequency		
Storm Drains	- 10-year design frequency standard (1, 8, 24-hour) - Check 100-year storm (1, 8, 24-hour) - 50-year design frequency for interstate facility sag vertical curves which have no outlet other than a storm drain system	D.M. Section 3.3
Cross Drains	- 50-year design frequency	D.M. Section 4.3
Design Tailwater		
All Conditions	- Conditions vary with outfall type	D.M. Section 3.4
Time Of Concentration (TOC)	- Minimum TOC of 10 Minutes - Other TOC calculations to follow NRCS TR-55	D.M. Section 3.5.1
Pipe Slopes		
Minimum	- Min. slope to produce v=2.5 ft./sec flowing full	D.M. Section 3.6.1
Manning's "n" Coefficient		
Pipes	- 0.012 (smooth pipes) 0.024 (corrugated pipe)	D.M. Section 3.6.4
Asphalt (rough texture)	- 0.016 Asphalt Pavement	D.D.G Appendix B
Grades		
Longitudinal Gutter Grade	- minimum longitudinal gutter grade is 0.3%	D.M. Section 3.8.1
Spread Standards		
Design Speed ≤ 45	- Keep ½ lane clear	D.M. Section 3.9
45 < Design Speed ≤ 55	- Keep 8-ft. of lane clear	
Design Speed > 55	- No encroachment	
Pipe Size And Length		
Trunk Line	- 18-in Minimum Diameter.	D.M. Section 3.10.1
Length Between Structure	- 18-in Pipe=300-ft. - 24-in to 36-in=400-ft. - >42-in=500-ft.	D.M. Section 3.10.1

Table 3-2: Drainage Design Criteria (continued)

Design Element	Criteria	Source
Exfiltration Trench		
Pipe Diameter	- 24-in minimum	D.M. Section 3.10.1
Pipe Lengths	- Access through both ends: 300-ft. 24-in to 30-in pipes; 400-ft. for 36-in and larger pipes. - Access through only one end: 150-ft. 24-in to 30-in pipes; 200-ft. 36-in and larger pipes	D.M. Section 3.10.1
Skimmers/Baffles	- Required at each entrance to exfiltration trench	
Trench Width	- Minimum 4-ft., maximum 8-ft.	
Trench Depth	- Maximum of 20-ft.	
Drainage Structures	- 2-ft. sediment sump for inlets and catch basins	
Freeboard		
Storm Drain	- Hydraulic Gradeline Minimum 1-ft. below theoretical gutter elevation - 1.13-ft. below E.O.P. for Types E & F curb and gutter	D.D.G Section 6.5
Ponds	- Minimum 1-ft. above peak design stage, measured from the inside edge of the maintenance berm.	D.M. Section 5.3.4.2
Permanent Pool Pond Depth		
Wet Detention	- 5-ft. minimum depth, 8-ft. maximum depth	D.D.G. Section 9.2.1.1
Culvert		
Design	- 18-in minimum size, concrete only	SRID Meeting 1/19/2017
Stormwater Management System		
Water Quality	- Water quality standards, as set forth in Chapter 62-302, Florida Administrative Code.	V - II Section 4.1
Discharge Limitations	- Historic Discharges, Post <= Pre	V - II Section 3.2.1
Bridge Clearances		
Vertical	- 2 ft. minimum clearance between design flood stage and the low member of bridge to allow for debris passage. 6 ft. above Normal High Water for controlled canals	P.P.M. 2.10.1

Abbreviations

- D.M. - FDOT Drainage Manual; January 2017
- D.D.G - Drainage Design Guide; January 2017
- P.P.M. - Plans Preparation Manual Volume 1, January 2017
- V-II - SJRWMD Permit Information Manual Volume II; 2013

3.3.1 Water Quality Criteria

The project will require providing treatment of runoff volume specified in the SJRWMD water quality criteria (set forth in Chapter 62-302, Florida Administrative Code (FAC)) before discharging to the state water body. According to the SJRWMD Permit Information Manual Volume II:

1. Offline Retention Systems discharging to an Outstanding Florida Waterbody (OFW, in this case Indian River Lagoon) must provide for an additional 50% of the treatment volume specified for Offline retention. Offline retention must provide for the greater of, 0.5 inches of runoff over the total area or 1.25 inches of runoff from the impervious area. It was assumed that the entire project area is discharging to OFW to be conservative since it is not clear which areas are discharging to OFW. This approach should be revisited during final design to adjust the proposed drainage systems.

2. Wet Detention Systems discharging to OFWs (Indian River Lagoon) must provide for an additional 50% of the treatment volume specified for Wet Detention System. Wet Detention Systems must provide for the greater of, 1 inch of runoff over the total area or 2.5 inches of runoff from the impervious area.

3.3.2 Water Quantity Criteria

3.3.2.1 SJRWMD

According to the SJRWMD Environmental Resource Applicant's Handbook Volume II, Section 3.2.1:

1. The post-development peak discharge rate must not exceed the pre-development peak rate of discharge for the mean annual 24-hour storm.

2. The post-development peak rate of discharge must not exceed the pre-development peak rate of discharge for the 25-year frequency, 24-hour duration storm for all the areas in the District.

3. The post-development volume of direct runoff must not exceed the pre-development volume of direct runoff for the 25-year frequency, 96-hour duration storm for systems discharging to landlocked lakes which are adjacent to properties of more than one ownership.

The approach to satisfy all three requirements above is to provide for the storm with the greater pre-post peak discharge rate.

3.3.2.2 SRID

According to the Sebastian River Improvement District (SRID)

1. Proposed project drainage calculations shall address the 2 inches per day maximum allowable discharge volume requirement for any 24 hour period during a 25 year – 24 hour event.

3.3.2.3 IRFWCD

According to the Indian River Farms Water Control District (IRFWCD)

a. Peak Discharge: Post-development peak rate of discharge must not exceed pre-development peak rate of discharge for a 24-hour duration storm with certain storm frequencies.
    1. No discharge requirement: Those systems which discharge directly into certain tidal and coastal areas.
    2. 25-year frequency: Those system located elsewhere in the District except in the Upper St. Johns River Hydrologic Basin and the Oklawaha River Hydrologic Basin.
b. Volume: Post-development volume of direct runoff must not exceed the pre-development volume of direct runoff for a 4-day design storm with storm frequencies as specified under Peak Discharge.

4 ALTERNATIVES CONSIDERED

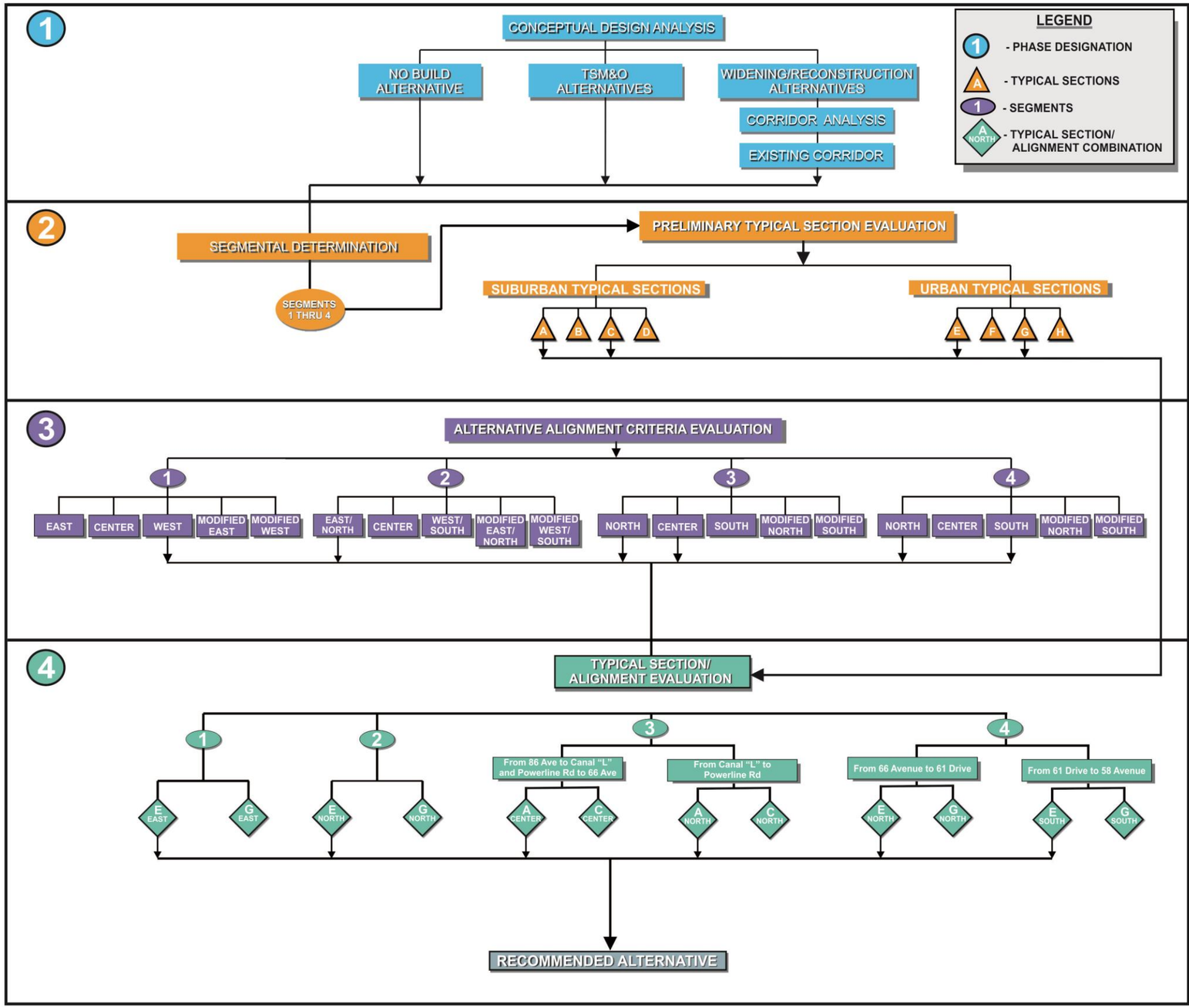
Previous sections of this report thoroughly documented the project area's existing deficiencies, needs and future conditions. Based on these factors and also public/agency input, a comprehensive alternative development and evaluation process was initiated and conducted for the proposed project improvements as documented herein. It should be noted that during the course of the study as a result of extensive coordination, several areas of "special concern" were identified. These areas exhibited various geometric, operational or access issues that required additional detailed analysis and coordination. Pertinent information regarding these areas are included in **Appendix D**.

As illustrated on **Figure 4-1**, a multi-phase alternative development, evaluation and selection process was employed to properly assess all alternatives considered for the proposed improvements of CR 510 within the project limits. Essentially, four (4) different phases comprised the alternative selection process for the proposed project as illustrated in the figure. Those alternative options found most feasible, which merited further development and evaluation, are shown in yellow in the various evaluation tables. A discussion of each of the different phases follows:

4.1 Phase One: Conceptual Design Analysis

4.1.1 No Build Alternative

The "No Build" alternative is an alternative solution frequently used in PD&E studies that assumes the retainment of existing conditions. It is mostly used as a benchmark condition in order to compare the costs and benefits of implementing the proposed improvements to those incurred by continuing to use the existing facility. In this case, the "No Build" alternative would entail the retainage of the existing conditions within the project limits with its present geometric, operational and access deficiencies. The existing facility within the project confines is inadequate in terms of future capacity. It is evident that because of the reasons previously discussed in this document, adoption of this alternative would not solve any of the existing needs associated with the project. However, the "No Build" alternative will be maintained as a viable option providing an effective yardstick or baseline condition by which other project alternatives will be compared throughout the project alternative selection process.



PHASE DESIGNATION	PURPOSE
CONCEPTUAL DESIGN ANALYSIS	CONCEPTUAL CONSIDERATION OF MINOR AND MAJOR OPTIONS INCLUDING THE ANALYSIS OF ALTERNATIVE CORRIDOR OPTIONS **(See Page 4-1)**
PRELIMINARY SEGMENTAL / TYPICAL SECTION EVALUATION	GENERATION OF ALTERNATIVE TYPICAL SECTIONS WITHIN THE CHOSEN CORRIDOR AND SELECTION OF VIABLE TYPICAL SECTIONS OPTIONSTO BE FURTHER EVALUATED **(See Page 4-5)**
ALTERNATIVE ALIGNMENT CRITERIA EVALUATION	PRELIMINARY ALTERNATIVE ALIGNMENT EVALUATION GEARED TO ELIMINATE INFERIOR OPTIONS **(See Page 4-11)**
SEGMENTAL TYPICAL SECTION/ ALIGNMENT EVALUATION	DETERMINATION OF THE OPTIMUM TYPICAL SECTION/ALIGNMENT ALTERNATIVE FOR EACH SEGMENT **(See Page 4-14)**

Alternative Selection Process **Figure 4-1**

4.1.2 Transportation Systems Management & Operations (TSM&O) Alternatives

The Transportation Systems Management and Operations (TSM&O) alternatives are comprised of minor improvements options that are usually generated to alleviate specific traffic congestion/safety problems, or to obtain maximum utilization out of the existing facility by improving operational efficiency. These alternatives do not serve as a benchmark function but rather they insure that a wide range of realistic alternatives are considered by decision makers. The various TSM&O alternatives that were investigated include the upgrade of the existing facility by means of intersection widening and turning lane storage enhancements, improved/modified signalization, improved signing, markings and delineation.

Table 4-1 provides a preliminary evaluation conducted for the various potential TSM&O strategies considered along the project limits. As indicated in the table, it is expected that these TSM&O improvements alone will not alleviate all of the existing corridor deficiencies nor would they suffice to meet future travel demand.

Table 4-1 Evaluation of TSM&O Alternatives

TSM&O Alternatives	Consequences of Implementation
Intersection widening and turning lane storage enhancements	▪ Will provide only short term benefits at selected intersection locations. ▪ Project corridor will remain restricted to one directional through lane.
Improved/ Modified signalization	▪ Some improvements attainable through signal system retiming. ▪ Will not provide sufficient increases in capacity to accommodate future travel demand.
Improved signing, markings and delineation	▪ Only slight improvements in guidance and possibly safety. ▪ Will not alleviate any of the major existing deficiencies.

It should be noted that the effectiveness of providing intersection widening and turning lane storage enhancements along with signalization was considered to merit further investigation.

In summary, even though some beneficial effects can be obtained through the use of low cost improvements, the overall capacity restriction of maintaining the existing roadway section precludes the attainment of any significant improvement in the overall project level of service. It is because of this fact that these alternatives were considered to have minimum value. Therefore, it is recommended that the TSM&O alternatives

alone be rejected and only the major reconstruction options be considered for further study. As stated, several of the proposed intersection improvements previously identified will be incorporated into the design of the major project alternatives.

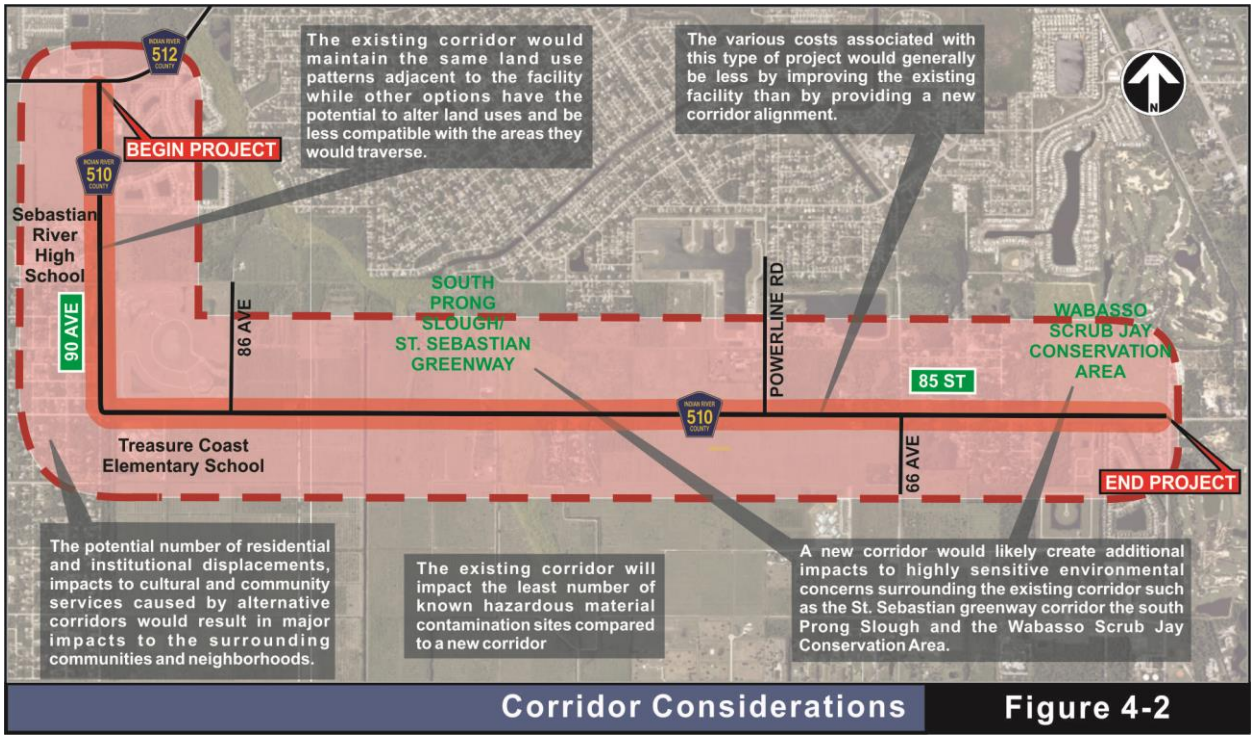
4.1.3 Major Alternatives

An important initial component of the major alternatives is the consideration of alternative corridor options for the proposed project. A brief description of this task follows:

4.1.3.1 Alternative Corridor Analysis

As previously stated, the project area is generally rural and suburban in nature with mostly agricultural, residential and industrial land uses abutting the existing facility. **Figure 4-2** illustrates some key landmarks along the existing corridor and provides important considerations in the selection of a preferred corridor. Some of the key differences between the retention of the existing corridor and the provision of a new one are as follows:

1. In general terms the existing corridor would basically maintain the same land use patterns adjacent to the facility while other options have the potential to alter land uses and to be less compatible with the areas they would traverse.
2. The potential number and types of residential and business displacements, impacts to cultural and community services and community cohesion problems associated with alternate corridors would result in major impacts to the surrounding communities and neighborhoods, potentially including Sebastian River High School and Treasure Coast Elementary School.
3. The development of a new corridor could also create additional impacts to highly sensitive environmental concerns surrounding the existing corridor such as the St. Sebastian Greenway Corridor, the South Prong Slough and the Wabasso Scrub interchange.
4. The existing corridor will impact the least number of known hazardous material contamination sites compared to a new corridor, which would have more significant impacts.



Corridor Considerations **Figure 4-2**

5. The various costs associated with this type of project would generally be less by improving the existing facility than by providing a new corridor alignment. The greater the amount of new construction and right-of-way required, the greater the overall costs.

In conclusion, an investigation of the area surrounding the existing facility has determined that the existing corridor location offers the best potential for the fulfillment of the project's needs. The consideration for developing any major highway at a new location is severely limited by physical, environmental, and economic constraints. The use of a majority of the existing facility's right-of-way makes the proposed improvements on the existing corridor the most reasonable choice.

The next step involves the generation of various alternatives within the existing corridor which strive to mitigate or remove the existing and projected deficiencies. The following sections describe the generation and evaluation associated with these alternatives.

4.2 Phase Two: Preliminary Typical Section/Segmental Evaluation

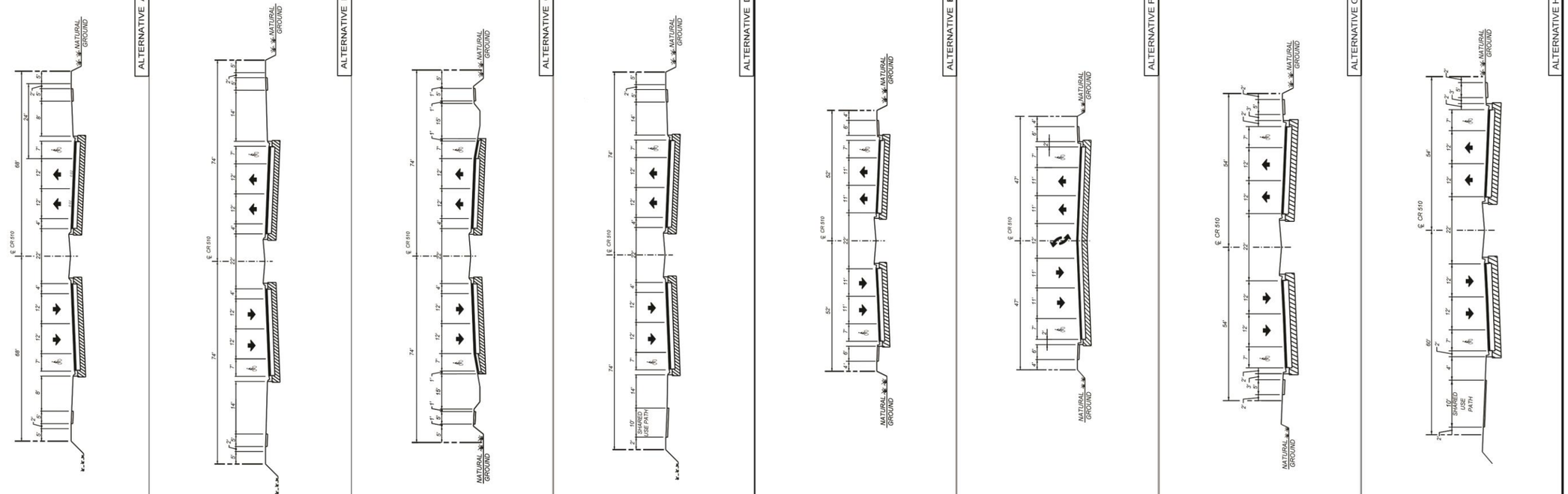
This phase involved the generation of various potential typical sections and the selection of all viable typical sections to be further evaluated along all project segments

within the study corridor. Within all project segments, potential typical sections ranged in design from the most ample suburban sections to the more restrictive urban sections. The various components that were considered included design speed, lane widths, median type and width, multimodal considerations (sidewalks and bicycle features), border and shoulder widths, curb and gutter, etc.

On a preliminary basis, eight (8) typical roadway sections were developed ranging in total width from 94 feet to 148 feet. **Figure 4-3** illustrates and describes the features of the eight typical sections and their segmental applicability. It is clear that certain alternative typical sections are much more applicable to some segments than others, and the reasons why some alternatives were deemed to be not practical (or not applicable) to a particular segment are listed under the “remarks” column in the figure.

Tables 4-2 and **4-3** are numerical/descriptive matrices, which illustrate, describe and evaluate the features of all generated typical section alternatives. It is important to note that the main purpose of this evaluation is not necessarily to determine the best option, but rather to identify which alternative(s) are clearly inferior so that they can be eliminated before even more stringent evaluation criteria and procedures are used during the next evaluation phase. The evaluation used involved the generation of a weighting scheme for each of the evaluation parameters. Twelve (12) different evaluation parameters including engineering, social & economic, environmental and cost factors were used. Each parameter was assigned a value ranging from six (6) to twelve (12) depending on its degree of importance. These parameter weightings were developed from the average of individual weighting sets prepared by members of the consultant’s team reflecting a broad range of professional backgrounds. In addition, the alternative performance with respect to each parameter was compared using two criteria; (1) the overall effect on the specified parameter, and/or (2) the relative effect between the competing typical section alternatives. The overall effect received one of the five judgmental values (++ = 1.00, + = 0.80, o = 0.60, - = 0.40, -- = 0.20). If, however any of the alternatives had an overall negative effect, then the worst alternative received a (- -) and the relatively better alternative received a higher score (-). If any two values were approximately equal then they both received the relatively lowest score. If the alternatives had an overall positive effect then the best alternative received a (++) and

Alternatives	Border Width	Multimodal Features	Lane Width	Median	Design Speed (mph)	R/W Required	Applicable Segments 1	2	3	4	Remarks
SUBURBAN											
ALTERNATIVE A	29'	7' Bike Lane / 5' SDWK	12'	22'	50	136'			✓		Suburban sections are not applicable to segments 1, 2 and 4 since they generally exhibit urbanized conditions require lower design speeds
ALTERNATIVE B	35'	7' Bike Lane / 5' SDWK	12'	22'	55	148'			✓		
ALTERNATIVE C	35'	7' Bike Lane / 5' SDWK	12'	22'	55	148'			✓		
ALTERNATIVE D	35'	7' Bike Lane / 10' Shared Use Path / 5' SDWK	12'	22'	55	148'			✓		
URBAN											
ALTERNATIVE E	12'	7' Bike Lane / 6' SDWK	11'	22'	45	104'	✓	✓	✓		Generally alternative H features a wider footprint that is not entirely compatible with the restrictive conditions within segment 4
ALTERNATIVE F	12'	7' Bike Lane / 6' SDWK	11'	12'	45	94'			✓		
ALTERNATIVE G	12'	7' Bike Lane / 5' SDWK	12'	22'	45	108'	✓	✓	✓		
ALTERNATIVE H	18' West / 12' East	7' Bike Lane / 10' Shared Use Path / 5' SDWK	12'	22'	45	114'	✓	✓	✓		

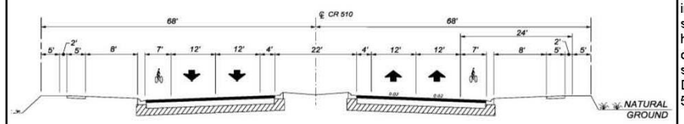
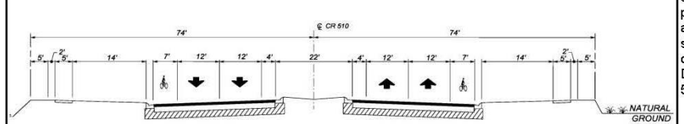
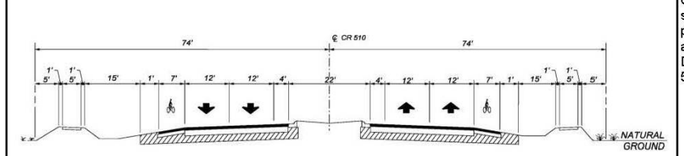
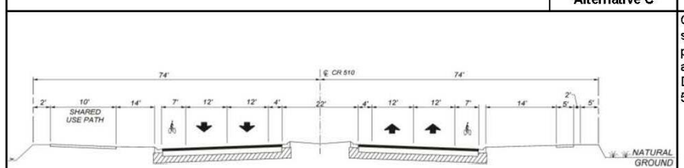


Preliminary Typical Sections **Figure 4-3**

LEGEND		
++	SUBSTANTIALLY POSITIVE EFFECT OR BEST ALTERNATIVE	1.0
+	GENERALLY POSITIVE EFFECT OR GOOD ALTERNATIVE	0.8
o	GENERALLY NO EFFECT OR MODERATE ALTERNATIVE	0.6
-	GENERALLY NEGATIVE EFFECT OR INFERIOR ALTERNATIVE	0.4
--	GENERALLY NEGATIVE EFFECT OR WORST ALTERNATIVE	0.2

PRELIMINARY SUBURBAN TYPICAL SECTIONS EVALUATION

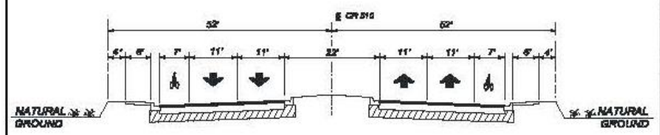
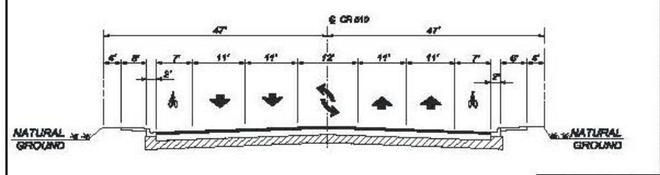
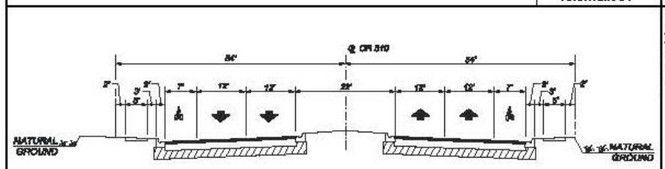
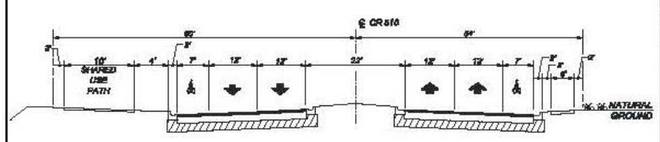
TABLE 4-2

FEATURES / PARAMETERS / ALTERNATIVES	ENGINEERING (40)				ENVIRONMENTAL (25)			SOCIO-ECONOMIC (23)			COST (12)		RANK (TOTAL SCORE)
	TRAFFIC SERVICE (10)	SAFETY (12)	ACCESS ISSUES (9)	MULTIMODAL ISSUES (9)	POTENTIAL WETLANDS AND WILDLIFE HABITAT IMPACTS (8)	WATER QUALITY / DRAINAGE (9)	VISUAL/AESTHETIC IMPACTS (8)	HURRICANE EVACUATION / EMERGENCY (9)	TRANSPORTATION PLANS COMPATIBILITY (7)	CONTROVERSY POTENTIAL (7)	CONSTRUCTION (6)	RIGHT-OF-WAY (6)	
 **Alternative A**	Divided 4 lane section provides improved traffic service with high vehicular operating speeds Design Speed = 50 MPH **+** **8.0**	Generally safe alternative for vehicles, bicyclists and pedestrians **+** **9.6**	Although divided median generally restricts access, adequate median width provides opportunity for effective median openings **o** **5.4**	Section provides 7' bike lanes and 5' sidewalks along both sides **+** **7.2**	Smallest area of potential wetland and habitat impacts **o** **4.8**	Smallest area of impervious cover requires least amount of stormwater treatment, Similar to Alternative "B" **o** **5.4**	Affords smallest area for landscaping of suburban sections **o** **4.8**	Additional capacity and high design speed facilitates emergency response and hurricane evacuation **+** **7.2**	Alternative features are compatible with adopted transportation plans **+** **5.6**	Potential environmental impacts to adjacent land uses could likely generate some opposition to the project **o** **4.2**	Modest cost due to the ample roadway, sidewalks, bicycle lanes and curb and gutter **o** **3.6**	Would require the least amount of right-of-way of all suburban options **o** **3.6**	**1** **69.4**
 **Alternative B**	Generally similar to previous alternative with slightly higher design speed Design Speed = 55 MPH **+** **8.0**	Generally similar to previous alternative **+** **9.6**	Generally similar to previous alternative **o** **5.4**	Similar to previous alternative but provides additional space between roadway and sidewalks **+** **7.2**	Slightly more potential impacts than Alternative "A", similar potential impacts as Alternatives "C" and "D" **-** **3.2**	Smallest area of impervious cover requires least amount of stormwater treatment, Similar to Alternative "A" **o** **5.4**	Similar to Alternative "A" but with slightly larger area for landscaping **+** **6.4**	Generally similar to previous alternative **+** **7.2**	Generally similar to previous alternative **+** **5.6**	Wider footprint will likely generate higher opposition due to its larger potential environmental impact **-** **2.8**	Similar to previous alternative **o** **3.6**	Requires even more r/w than previous alternative within segments 2 and 3 **-** **2.4**	**3** **66.8**
 **Alternative C**	Generally similar to previous alternative Design Speed = 55 MPH **+** **8.0**	Generally similar to previous two alternatives **+** **9.6**	Genrally similar to previous two alternatives but flushed shoulders allow slightly better U-turn movement for trucks **o** **5.4**	Generally similar to previous alternative **+** **7.2**	Similar potential impacts as Alternative "B" and Alternative "D" **-** **3.2**	Slightly greater area of impervious cover and stormwater treatment than Alternative "A" or Alternative "B" **o** **5.4**	Similar to Alternative "A" but with slightly larger area for landscaping **+** **6.4**	Generally similar to previous two alternatives **+** **7.2**	Generally similar to previous two alternatives **+** **5.6**	Similar to previous alternative **-** **2.8**	Similar to previous alternative but without the outside curb and gutter, the alternative provides ample paved shoulders and is less costly **+** **4.8**	Generally similar to previous alternative **-** **2.4**	**2** **68.0**
 **Alternative D**	Generally similar to previous two alternatives Design Speed = 55 MPH **+** **8.0**	Generally similar to previous three alternatives **+** **9.6**	Generally similar to previous three alternatives **o** **5.4**	Provides adequate features for bicyclists and pedestrians **+** **7.2**	Similar potential impacts as Alternatives "B" and "C" **-** **3.2**	Greatest area of impervious area requires most amount of treatment **-** **3.6**	Affords moderate sized area for landscaping along the median and buffer strips beside the sidewalk and shared use path **+** **6.4**	Generally similar to previous alternatives **+** **7.2**	Generally similar to previous alternatives **+** **5.6**	Similar to previous two alternatives **-** **2.8**	Similar to Alternative "A" but higher construction cost due to the shared use path **-** **2.4**	Generally similar to previous two alternatives **-** **2.4**	**4** **63.8**

LEGEND		
++	SUBSTANTIALLY POSITIVE EFFECT OR BEST ALTERNATIVE	1.0
+	GENERALLY POSITIVE EFFECT OR GOOD ALTERNATIVE	0.8
o	GENERALLY NO EFFECT OR MODERATE ALTERNATIVE	0.6
-	GENERALLY NEGATIVE EFFECT OR INFERIOR ALTERNATIVE	0.4
--	GENERALLY NEGATIVE EFFECT OR WORST ALTERNATIVE	0.2

PRELIMINARY URBAN TYPICAL SECTIONS EVALUATION

TABLE 4-3

ALTERNATIVES / FEATURES / PARAMETERS	ENGINEERING (40)				ENVIRONMENTAL (25)			SOCIO-ECONOMIC (23)			COST (12)		RANK (TOTAL SCORE)
	TRAFFIC SERVICE (10)	SAFETY (12)	ACCESS ISSUES (9)	MULTIMODAL ISSUES (9)	POTENTIAL WETLANDS AND WILDLIFE HABITAT IMPACTS (8)	WATER QUALITY / DRAINAGE (9)	VISUAL / AESTHETIC IMPACTS (8)	HURRICANE EVACUATION / EMERGENCY RESPONSE (9)	TRANSPORTATION PLANS COMPATIBILITY (7)	CONTROVERSY POTENTIAL (7)	CONSTRUCTION (6)	RIGHT-OF-WAY (6)	
 Alternative E	Divided 4 lane urban section provides improved traffic service and slightly narrower traffic lanes (11') are still adequate Design Speed = 45 MPH + 8.0	Generally safe urban section + 9.6	Although divided median generally restricts access, adequate median width provides opportunity for effective median openings o 5.4	Urban section with 7' bike lanes and 6' sidewalks along both sides + 7.2	Moderate potential impacts to wetlands and habitats o 4.8	Smallest area of impervious cover requires least amount of stormwater treatment + 7.2	Affords landscaping opportunities along both the median and behind sidewalks + 6.4	Adequate section in terms of evacuation and emergency response + 7.2	Although this urban alternative features a lower design speed, it's generally compatible with adopted transportation plans + 5.6	Minimum controversy potential + 5.6	Generally modest cost o 3.6	Only modest amount of r/w required o 3.6	1 74.2
 Alternative F	Divided 4 lane urban section provides improved traffic service but narrow median is a minor concern that will partially affect the turning operation of large trucks at intersections Design Speed = 45 MPH o 6.0	Generally safe urban section but narrow median will partially affect the turning operation of large trucks at intersections o 7.2	Undivided median maximizes access to adjoining properties + 7.2	Similar to previous alternative but painted median offers no effective refuge for crossing pedestrians and bicyclists o 5.4	Least potential impacts to wetlands and habitats of all urban alternatives + 6.4	Greatest amount of impervious cover requires most stormwater treatment - 3.6	Affords only landscaping opportunities along the buffer strip behind the sidewalks o 4.8	Lack of divided median provides greater opportunity for additional directional capacity in case of evacuation + 7.2	Mostly compatible with adopted plans but lack of raised median is not compatible o 4.2	Generally similar to previous alternative + 5.6	Modest cost due to the paved/painted median o 3.6	Generally minimum r/w required + 4.8	4 66.0
 Alternative G	Generally similar to Alternative "E" but with slightly wider (12') traffic lanes Design Speed = 45 MPH + 8.0	Generally safe urban section + 9.6	Similar to Alternative "E" o 5.4	Similar to Alternative "E" + 7.2	Generally similar to Alternative "E" but with slightly smaller impact area o 4.8	Generally similar to Alternative "E" + 7.2	Similar to Alternative "E" + 6.4	Similar to Alternative "E" + 7.2	Generally similar to Alternative "E" + 5.6	Minimum controversy potential + 5.6	Generally modest cost o 3.6	Generally similar to Alternative "E" o 3.6	1 74.2
 Alternative H	Generally similar to previous alternative but with a shared-use path Design Speed = 45 MPH + 8.0	Similar to previous section but multiple driveways are a concern with a shared-use path + 9.6	Generally similar to Alternatives "E" and "G" o 5.4	Generally similar to previous alternative but with the provision of a shared-use path and a buffer strip behind the curb and gutter + 7.2	Greatest potential impacts of all urban alternatives - 3.2	Moderate amount of impervious cover and stormwater treatment o 5.4	Affords landscaping opportunities along the median and buffer strips + 6.4	Similar to Alternatives "E" and "G" + 7.2	Generally similar to Alternatives "E" and "G" + 5.6	Generally similar to previous alternative + 5.6	Similar to previous alternative but slightly higher cost due to the shared-use path - 2.4	Highest amount of required r/w of all urban alternatives - 2.4	3 68.4

the relatively worse alternative received a lower score (+). A common value, therefore, signifies an equal overall and relative effect.

This evaluation involves a combination of both qualitative and quantitative values resulting in an overall score. Each score indicated on the table is the result of multiplying the judgmental analysis rating times the relative weight for that parameter. For example, in **Table 4-2** Alternative C under the "construction cost" parameter was given a (+) designation (judgmental value = 0.8) since its relative construction cost is the least among all competing alternatives. This judgment value of 0.8 was then multiplied by the relative weight of the "construction cost" parameter (6.0) resulting in an overall score of 4.8.

The summary of the results shown on **Table 4-4** show that Suburban Alternatives A and B and Urban Alternatives E and G were selected for further evaluation based on the criteria that they are the only ones that exceed their corresponding group median values (67.4 and 71.3). As previously noted, the objective of this phase is not necessarily to determine which options are the best but rather to identify which alternative(s) are clearly inferior so that they can be eliminated before even more stringent evaluation criteria and procedures are used during the next evaluation phase.

(This space intentionally left blank)

Table 4-4 Preliminary Alternative Typical Section Elimination Process

Alternatives		Score	Median	Standard Deviation	Reason for Elimination
SUBURBAN	A	69.4	*67.4*	*2.06*	Remains Viable
	B	66.8			Failed Criterion #1
	C	68.0			Remains Viable
	D	63.8			Failed Criterion #1
URBAN	E	74.2	*71.3*	*3.60*	Remains Viable
	F	66.0			Failed Criterion #1
	G	74.2			Remains Viable
	H	68.4			Failed Criterion #1

Selection Criteria

#1 – All alternatives with lower scores than the median value for the group will be eliminated.
#2 – The maximum gap between the last selected alternative and the next must not be greater than one standard deviation.

4.3 Phase Three: Alternative Alignment Criteria Evaluation

In order to further evaluate all remaining alternative roadway concepts, it is also necessary to take into account their alignment or relative position within the existing corridor. As shown on **Figure 4-4**, the following five possible alignment choices were investigated:

1) East (or North) alignment would avoid any future additional impacts to the west along 90th Avenue and to the south along 85th Street. In other words, all potential right-of-way impacts would take place to the east and north of the existing facility.

2) Center alignment would place the proposed centerline of the new facility at the centerline of the existing right-of-way, thus generally impacting equally both sides of the existing facility.

3) West (or South) alignment would avoid future additional impacts to the east along 90th Avenue and to the north along 85th Street. In other words, all right-of-way impacts would take place to the west and south of the existing facility.

4) Modified East (or North) alignment: This option is predicated on the maximum utilization of the existing base area by centering the new southbound (or eastbound) lanes over the existing two lane facility and shifting the rest of the proposed section to the east (or north).

5) Modified West (or South) alignment: This alternative is just the opposite of the previous one, and places the new northbound (or westbound) lanes over the existing two lane facility and shifting the rest of the proposed section to the west (or south).

Figure 4-4 also illustrates the advantages and disadvantages of each alignment within the four project segments. In this context according to the figure, existing residential, institutional and conservation features abutting all four segments potentially eliminate most alignment options. It should be noted that along Segments 1 and 2, only the East (or North) alignment was found viable. Although the existing right-of way is generally more ample between the begin project and 89th Street, the center, west and both modified alignments would still be less desirable than the east alignment because they would place the proposed project closer to the Sebastian River High School. South of 89th Street, the existing right-of-way is much more constricted and only the east alignment would avoid impacting Vero Lake and the Vero Lake Estates Residential Community. In Segment 3 the center alignment is viable from 86th Avenue to just east of Lateral L Canal and the north alignment is viable from just east of Lateral L Canal to 66th Avenue. Additionally, in Segment 4 the north alignment is only viable from 66th Avenue to 61st Drive and the south alignment only from 61st Drive to 58th Avenue. It should be noted that the main purpose of this evaluation is not necessarily to identify the best alternative alignment per segment but rather to identify which alternative(s) are clearly inferior so that they can be eliminated.

(This space intentionally left blank)

*NOTE: 4 LANE SECTION SHOWN ABOVE IS FOR REPRESENTATIVE PURPOSES ONLY



ALIGNMENT EVALUATION

ALIGNMENT/ OPTIONS	Controlling Factor	Potential Advantages	Potential Disadvantages	Reason(s) for Elimination			
				Segment 1	Segment 2	Segment 3	Segment 4
EAST OR NORTH	Existing West or South R/W Line	Avoids impacts to land uses abutting the West or South sides.	Potential major impacts to sensitive land uses East or North of the existing CR 510 facility.	Remains Viable	Remains Viable	Remains Viable from just east of Lateral Canal "L" to 66 Avenue	Remains Viable from 66 Avenue to 61 Drive. Has detrimental impacts to Wabasso Scrub Conservation Area from 61 Drive to 58 Avenue.
CENTER	℄ of Existing and Proposed R/W	Reduces major R/W impacts to critical land uses abutting CR 510 facility along both sides of the road.	Depending on the section used, it could impact a greater number of properties than most other alignment options.	Less desirable than the East alignment since it would place the proposed facility closer to the Sebastian River High School and impact Vero Lake and the Vero Lake Estates Residential Community.	This alignment would directly impact a portion of the Vero Lake Estates Residential Community and the Treasure Coast Elementary School.	Remains Viable from 86 Avenue to just east of Lateral Canal "L"	Potential impact to the Allen Chapel, AME Church, the Wabasso Scrub Conservation Area and Hill Side Subdivision.
WEST OR SOUTH	Existing East or North R/W Line	Avoids impacts to land uses abutting the East or North of the existing CR 510 facility.	Potential Major Impacts to land uses abutting the West and South of the existing CR 510 facility.	This alignment would impact a portion of the Vero Lake Estates Residential Community and could directly impact the FPL transmission powerline.	This alignment would directly impact a portion of the Vero Lake Estates Residential Community and the Treasure Coast Elementary School.	Along the south side this alignment is limited by the presence of the Treasure Coast Elementary School at the western end of the segment, the St Sebastian Greenway Corridor within the middle portion of the segment and the RCMA and various residential land uses east of 79 Ter.	Remains Viable from 61 Drive to 58 Avenue. Has detrimental impacts to the Allen Chapel, AME Church west of 64 Avenue.
MODIFIED EAST OR NORTH	Proposed southbound / eastbound lanes closely matching existing two lane facility.	Maximum utilization of existing pavement/base area.	Depending on the section used it could impact a significant number of properties.	Less desirable than the East alignment since it could place the proposed facility closer to the Sebastian River High School and impact Vero Lake and the Vero Lake Estates Residential Community.	This alignment would directly impact a portion of the Vero Lake Estates Residential Community and the Treasure Coast Elementary School.	Less desirable than the center alignment and the north alignment in terms of impact avoidance	Potential impacts to the Allen Chapel AME Church, the Wabasso Scrub Conservation Area and Hillside Subdivision.
MODIFIED WEST OR SOUTH	Proposed northbound / westbound lanes closely matching existing two lane facility.	Maximum utilization of existing pavement/base area.	Depending on the section used it could impact a significant number of properties.	Less desirable than the East alignment since it could place the proposed facility closer to the Sebastian River High School and impact Vero Lake and the Vero Lake Estates Residential Community.	This alignment would directly impact a portion of the Vero Lake Estates Residential Community and the Treasure Coast Elementary School.	This alignment is limited by the presence of the Treasure Coast Elementary School at the western end of the segment, the St Sebastian Greenway Corridor within the middle portion of the segment & the RCMA & various residential land uses east of 79 Ter.	Potential impacts to the Allen Chapel AME Church, the Wabasso Scrub Conservation Area and Hillside Subdivision.

Potential Alignment Options **Figure 4-4**

4.4 Phase Four: Segmental Alternative Typical Section/Alignment Evaluation

The purpose of this phase was to determine the optimum alternative typical section/alignment option for each project segment. According to the previous discussion, there still remain twelve (12) alternatives (see **Table 4-5**) that need to be compared further in order to arrive at an optimum solution.

Table 4-5 Summary of Segmental Typical Section/Alignment Options

SEGMENT	ALIGNMENT	TYPICAL SECTION OPTIONS			
		"A"	"C"	"E"	"G"
1	East	-	-	✓	✓
	Center	-	-	-	-
	West	-	-	-	-
	Modified East	-	-	-	-
	Modified West	-	-	-	-
2	East/North	-	-	✓	✓
	Center	-	-	-	-
	West/South	-	-	-	-
	Modified East/North	-	-	-	-
	Modified West/South	-	-	-	-
3	North	✓	✓	-	-
	Center	✓	✓	-	-
	South	-	-	-	-
	Modified North	-	-	-	-
	Modified South	-	-	-	-
4	North	-	-	✓	✓
	Center	-	-	-	-
	South	-	-	✓	✓
	Modified North	-	-	-	-
	Modified South	-	-	-	-

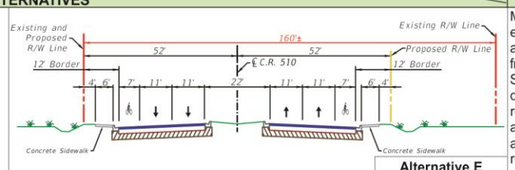
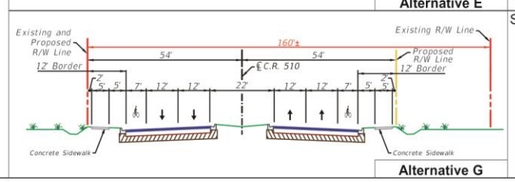
Legend
✓ Superior option

All factors relating to the design and location of the facility as well as information and issues relevant to the project decision were considered including transportation improvements, socio-economic and environmental features, operational factors, and engineering considerations. After a comprehensive evaluation process the remaining alternatives have been combined with the corresponding alignments for each segment as illustrated in **Tables 4-6** through **4-9**. It should be noted that due to previous public opposition and significant public concerns in the Wabasso community, an extensive outreach program was undertaken with the community

LEGEND		
++	Substantially Positive Effect or Best Alternate	1.00
+	Generally Positive Effect or Good Alternate	0.80
o	Generally No Effect or Moderate Alternate	0.60
-	Generally Negative Effect or Inferior Alternate	0.40
--	Substantially Negative Effect or Worst Alternate	0.20

SEGMENT 1 TYPICAL SECTION/ALIGNMENT EVALUATION

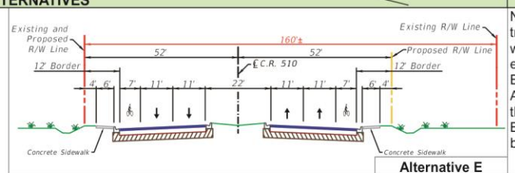
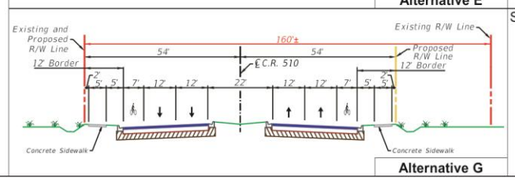
TABLE 4-6

CRITERIA / ALTERNATIVES	ENGINEERING 36			ENVIRONMENTAL 24			SOCIO-ECONOMIC 24		COST 16		RANK (TOTAL SCORE)
	UTILITY IMPACTS 12	MAINTENANCE OF TRAFFIC 12	ACCESS IMPLICATIONS 12	THREATENED & ENDANGERED SPECIES / WILDLIFE IMPACTS 8	WATER QUALITY / HYDROLOGICAL IMPACTS 8	WETLANDS IMPACTS 8	RELOCATION IMPACTS 12	CONTROVERSY POTENTIAL 12	CONSTRUCTION 8	RIGHT-OF-WAY 8	
EAST — Alternative E 	Minimum or no disruption to existing distribution poles along the west side of the road from the begin project to 89 St. South of 89 St. the existing distribution poles need to be relocated. Existing signal poles at Mako Dr., Hammerhead Dr. and 87 St. need to be replaced. o 7.2	No significant MOT problems anticipated during construction. o 7.2	Only temporary minor disruptions during construction. No permanent access disruptions expected. o 7.2	Minimal impacts anticipated (0.36 acres) o 4.8	Moderately high impervious area with ultimate discharge to OFW will require more treatment. Some turbidity will be present in the vicinity of Lateral "D" Canal during construction with 1.19 ac-ft of impacts. o 4.8	Some minor potential wetland impacts along the east side of CR 510 just north of Mako Way with 0.36 Acres of impact. o 4.8	No residential or business relocations. Bus stop shelter along east side of CR 510 in front of the Sebastian River High School will be impacted. o 7.2	No significant public controversy potential and County have expressed their preference for this option. + 9.6	Generally modest construction cost with approximate cost of $11.58M o 4.8	No significant additional right-of-way will be required (2 Parcel Impacts). o 4.8	1 (62.4)
Alternative G 	Same as previous alternative. o 7.2	Same as previous alternative. o 7.2	Same as previous alternative. o 7.2	Same as previous alternative with 0.40 acres of impact o 4.8	Generally similar to alternative "E" with 1.22 ac-ft of impact o 4.8	Generally similar to alternative "E" with 0.40 acres of impact. o 4.8	Same as previous alternative. o 7.2	No significant controversy potential o 7.2	Similar to alternative "E" with slightly higher cost of approximately $11.61M o 4.8	Similar to alternative "E" with 2 Parcel Impacts. o 4.8	2 (60.0)

LEGEND		
++	Substantially Positive Effect or Best Alternate	1.00
+	Generally Positive Effect or Good Alternate	0.80
o	Generally No Effect or Moderate Alternate	0.60
-	Generally Negative Effect or Inferior Alternate	0.40
--	Substantially Negative Effect or Worst Alternate	0.20

SEGMENT 2 TYPICAL SECTION/ALIGNMENT EVALUATION

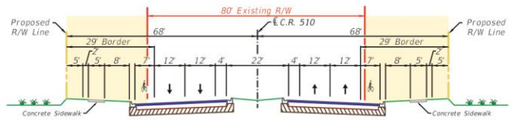
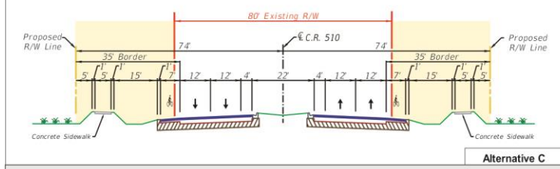
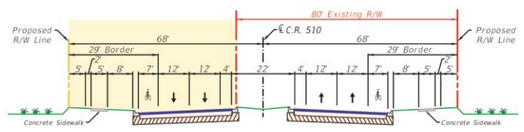
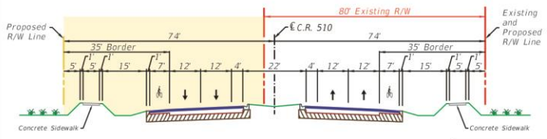
TABLE 4-7

CRITERIA / ALTERNATIVES	ENGINEERING 36			ENVIRONMENTAL 24			SOCIO-ECONOMIC 24		COST 16		RANK (TOTAL SCORE)
	UTILITY IMPACTS 12	MAINTENANCE OF TRAFFIC 12	ACCESS IMPLICATIONS 12	THREATENED & ENDANGERED SPECIES / WILDLIFE IMPACTS 8	WATER QUALITY / HYDROLOGICAL IMPACTS 8	WETLANDS IMPACTS 8	RELOCATION IMPACTS 12	CONTROVERSY POTENTIAL 12	CONSTRUCTION 8	RIGHT-OF-WAY 8	
EAST/NORTH — Alternative E 	No disruption to existing transmission poles along the west and south sides of the existing CR 510 facility. Existing signal poles at the 88 Ave. intersection (entrance to the Treasure Coast Elementary School) needs to be replaced. o 7.2	No significant MOT problems anticipated during construction. o 7.2	Access to 86 Place, 86 Street and 85 Place eliminated due to flatter curve. Only temporary disruptions along existing CR 510 during construction. o 7.2	No anticipated impacts o 4.8	Moderately high impervious area with ultimate discharge to OFW will require more treatment. Some turbidity will be present in the vicinity of Lateral "D" Canal during construction with 2.48 ac-ft of impact. o 4.8	No anticipated impacts o 4.8	No residential or business relocations. o 7.2	No significant public controversy potential is anticipated and County officials have expressed their preference for this option. + 9.6	Generally modest construction cost (approximately $9.63 M) o 4.8	No significant additional right-of-way will be required with 2 Parcel Impacts. o 4.8	1 (62.4)
Alternative G 	Same as previous alternative. o 7.2	Same as previous alternative. o 7.2	Generally similar to previous alternative. o 7.2	No anticipated impacts o 4.8	Generally similar to previous alternative with 2.66 ac-ft of impacts. o 4.8	No anticipated impacts o 4.8	Same as previous alternative. o 7.2	No significant controversy potential. o 7.2	Similar to previous alternative with approximate cost of $9.73 M o 4.8	Similar to previous alternative but has slightly higher impacts with 3 Parcel Impacts. - 3.2	2 (58.4)

LEGEND		
++	Substantially Positive Effect or Best Alternate	1.00
+	Generally Positive Effect or Good Alternate	0.80
o	Generally No Effect or Moderate Alternate	0.60
-	Generally Negative Effect or Inferior Alternate	0.40
--	Substantially Negative Effect or Worst Alternate	0.20

SEGMENT 3 TYPICAL SECTION/ALIGNMENT EVALUATION

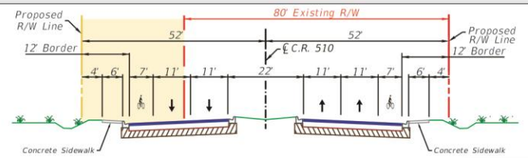
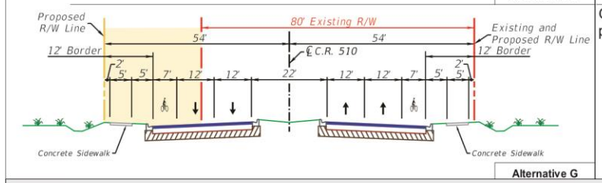
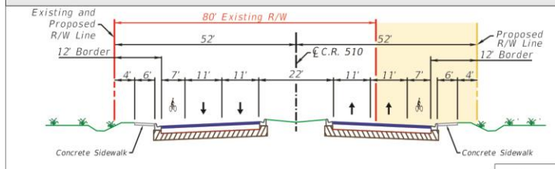
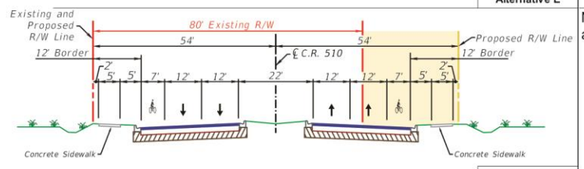
TABLE 4-8

CRITERIA / ALTERNATIVES	ENGINEERING (31)			ENVIRONMENTAL (32)				SOCIO-ECONOMIC (20)		COST (17)		RANK (TOTAL SCORE)
	UTILITY IMPACTS (10)	MAINTENANCE OF TRAFFIC (10)	ACCESS IMPLICATIONS (11)	THREATENED & ENDANGERED SPECIES / WILDLIFE IMPACTS (7)	WATER QUALITY / HYDROLOGICAL IMPACTS (7)	WETLANDS IMPACTS (8)	SECTION 4(F) POTENTIAL (10)	RELOCATION IMPACTS (10)	CONTROVERSY POTENTIAL (10)	CONSTRUCTION (8)	RIGHT-OF-WAY (9)	
CENTER ALIGNMENT - FROM 86 AVENUE TO JUST EAST OF CANAL " L" AND FROM JUST EAST OF POWERLINE ROAD TO 66 AVENUE												
 Alternative A	Existing transmission poles along the south side of the road could be disrupted. Impacts to utilities on bridges due to replacement. - 4.0	No significant MOT problems anticipated during construction. o 6.0	Only temporary minor disruptions during construction. No permanent access disruptions expected. o 6.6	Minimal impacts anticipated (0.78 acres of impact) o 4.2	Relatively high impervious area with ultimate discharge to OFW will require more treatment. Some turbidity will be present in the vicinity of Lateral "L" Canal during construction with 11.15 ac-ft of impacts. o 4.2	Some wetland impacts in the vicinity of the Lateral "L" Canal crossing area slightly more impact than the "A North" alternative with 0.56 acres of impact. o 4.8	No anticipated impacts o 6.0	No residential or business relocations are required. Impacts entrance sign to the RCMA Day Care Center. o 6.0	Only slightly controversial due to perceived internal circulation impacts to the RCMA Day Care Center. o 6.0	Generally modest construction cost (approximately $20.80 M). o 4.8	Requires modest right-of-way acquisition with 24 parcel impacts. o 5.4	**1 (58.0)**
 Alternative C	Generally similar to alternative "A". - 4.0	No significant MOT problems anticipated during construction. o 6.0	Same as previous alternative. o 6.6	Same as previous alternative with 0.92 acres of impact. o 4.2	Generally similar to alternative "A" center with 10.88 ac-ft of impacts. o 4.2	Generally similar to the previous alternative with only slightly higher impact due to the wider footprint with 0.69 acres of impact. o 4.8	No anticipated impacts o 6.0	Same as previous alternative. o 6.0	Generally similar to previous alternative but with slightly higher infringement due to wider footprint. o 6.0	Generally similar to alternative "A" with slightly higher cost (approximately $23.91M). - 3.2	Although the total right-of-way take is relatively modest, similar to alternative "A" with 24 parcel impacts o 5.4	**2 (56.4)**
NORTH ALIGNMENT - FROM JUST EAST OF CANAL "L" TO JUST WEST OF POWERLINE ROAD												
 Alternative A	Several potential utility conflicts especially to FP&L distribution lines and other overhead utilities. Impacts to utilities on bridges due to replacement. - 4.0	No significant MOT problems anticipated during construction. o 6.0	Only temporary, minor disruptions during construction. No permanent access disruptions expected. o 6.6	Minimal impacts of 0.05 acres o 4.2	Relatively high impervious area with ultimate discharge to OFW will require more treatment. Some turbidity will be present in the vicinity of Lateral "L" Canal during construction with 2.84 ac-ft of impacts. o 4.2	No anticipated impacts o 4.8	Narrower footprint minimizes impacts to the South Prong Preserve. + 8.0	No residential or business relocations are required. o 6.0	No significant controversy potential expected. Narrower footprint minimizes infringement on the RCMA Day Care Center and adjoining residential area. o 6.0	Generally modest construction cost (approximately $8.43 M) o 4.8	Requires less right-of-way acquisition with 4 parcel impacts. o 5.4	**1 (60.0)**
 Alternative C	Generally similar to alternative "A". - 4.0	No significant MOT problems anticipated during construction. o 6.0	Same as previous alternative. o 6.6	Same as previous alternative with 0.05 acres of impact o 4.2	Generally similar to alternative "A" with 2.78 ac-ft of impacts. o 4.2	No anticipated impacts o 4.8	Wider footprint has greater impacts on the South Prong Preserve and could impact the access and care take house. - 4.0	Same as previous alternative. o 6.0	Same as previous alternative but slightly higher infringement due to wider footprint. o 6.0	Similar to alternative "A" with slightly higher costs (approximately $9.69M) o 4.8	Although the total right-of-way take is relatively modest, with slightly higher than alternative "A" with 5 parcel impacts. - 3.6	**2 (54.2)**

LEGEND		
++	Substantially Positive Effect or Best Alternate	1.00
+	Generally Positive Effect or Good Alternate	0.80
o	Generally No Effect or Moderate Alternate	0.60
-	Generally Negative Effect or Inferior Alternate	0.40
--	Substantially Negative Effect or Worst Alternate	0.20

SEGMENT 4 TYPICAL SECTION/ALIGNMENT EVALUATION

TABLE 4-9

CRITERIA / ALTERNATIVES	ENGINEERING (33)			ENVIRONMENTAL (30)				SOCIO-ECONOMIC (20)		COST (17)		RANK (TOTAL SCORE)
	UTILITY IMPACTS (11)	MAINTENANCE OF TRAFFIC (11)	ACCESS IMPLICATIONS (11)	THREATENED & ENDANGERED SPECIES / WILDLIFE IMPACTS (7)	WATER QUALITY / HYDROLOGICAL IMPACTS (7)	WETLANDS IMPACTS (8)	SECTION 4(F) POTENTIAL (8)	RELOCATION IMPACTS (10)	CONTROVERSY POTENTIAL (10)	CONSTRUCTION (8)	RIGHT-OF-WAY (9)	
NORTH ALIGNMENT - FROM 66 AVENUE TO 61 DRIVE												
 Alternative E	Will require the relocation or replacement of several distribution poles along the north side of the existing CR 510 facility. Existing signal poles at 66 Ave. need to be replaced. o 6.6	No significant MOT problems anticipated during construction. o 6.6	Only temporary, minor disruptions during construction. No permanent access disruptions expected. o 6.6	No significant impacts (0.04 acres of impact) o 4.2	Moderate amount of impervious area with ultimate discharge to OFW in terms of required water treatment with 1.71 ac-ft of impacts. o 4.2	No anticipated impacts o 4.8	No impacts are anticipated. o 4.8	No residential or business relocations are required. o 6.0	No significant public controversy is expected. o 6.0	Generally modest construction cost (approximately $4.09 M). o 4.8	Requires less right-of-way acquisition within a rather constructed area but has 26 parcel impacts. o 5.4	**1 (60.0)**
 Alternative G	Generally similar to previous alternative. o 6.6	Generally similar to previous alternative. o 6.6	Generally similar to previous alternative. o 6.6	Same as previous alternative (0.04 acres of impact) o 4.2	Generally similar to previous alternative with 1.76 ac-ft of impacts. o 4.2	No anticipated impacts o 4.8	Same as previous alternative. o 4.8	Same as previous alternative. o 6.0	No significant public controversy is expected but since this option requires higher right-of-way impacts, the controversy potential is higher. - 4.0	Similar to alternative "E" with approximate construction cost of $4.70 M). o 4.8	Although the total right-of-way take is relatively modest, it's still higher than option "E" and has 28 parcel impacts. - 3.6	**2 (56.2)**
SOUTH ALIGNMENT FROM 61 DRIVE TO 58 AVENUE												
 Alternative E	No impacts are anticipated o 6.6	No significant MOT problems anticipated during construction. o 6.6	Only temporary minor disruptions during construction. o 6.6	No significant impacts (0.05 acres of impact) o 4.2	Moderate amount of impervious area with ultimate discharge to OFW in terms of required water treatment with 1.78 ac-ft of impact. o 4.2	No anticipated impacts o 4.8	This option avoids impacts to the Wabasso Scrub Conservation Area, a 4(f) property. o 4.8	1 residential relocation is required. - 4.0	Generates less controversy since the impacts are less. o 6.0	Generally modest construction cost (approximately $4.61 M). o 4.8	Requires less right-of-way acquisition within a rather constructed area but has 19 parcel impacts. o 5.4	**1 (60.0)**
 Alternative G	No impacts are anticipated o 6.6	Generally similar to previous alternative. o 6.6	Same as previous alternative. o 6.6	Same as previous alternative with 0.05 acres of impact. o 4.2	Generally similar to previous alternative with 1.82 ac-ft of impacts. o 4.2	No anticipated impacts o 4.8	Same as previous alternative. o 4.8	2 residential relocations are required. - - 2.0	Some potential controversy due to Hillside subdivision impact. - 4.0	Similar to alternative "E" with construction cost of $5.30 M). o 4.8	Although the total right-of-way take is relatively modest, it's still higher than option "E" with 21 parcel impacts. - 3.6	**2 (56.2)**

including the West Wabasso Progressive Civic Club. As previously mentioned, due to the presence of the Wabasso Scrub Conservation Area, only the south alignment is viable east of 61st Drive. Thus, several minimization options were presented to the community and are summarized in **Appendix D**. The community did not want a sub-standard roadway through their agreed that implementation of Typical Section E was acceptable to their community.

The segmental evaluation results that were obtained from **Tables 4-6** to **4-9** are summarized below:

Segment 1: Typical Section E with east alignment which is comprised of an urban 108 foot footprint with each direction features two (2) 11-foot travel lanes each way, a 7-foot bicycle lane, a 6-foot sidewalk and a 4-foot utility strip behind the sidewalk is the recommended alternative (see **Table 4-6** for more details).

Segment 2: Similar to segment 1 Typical Section E with east Alignment is the higher ranking alternative. This urban typical section features are the same as the previous segment (see **Table 4-7** for more details).

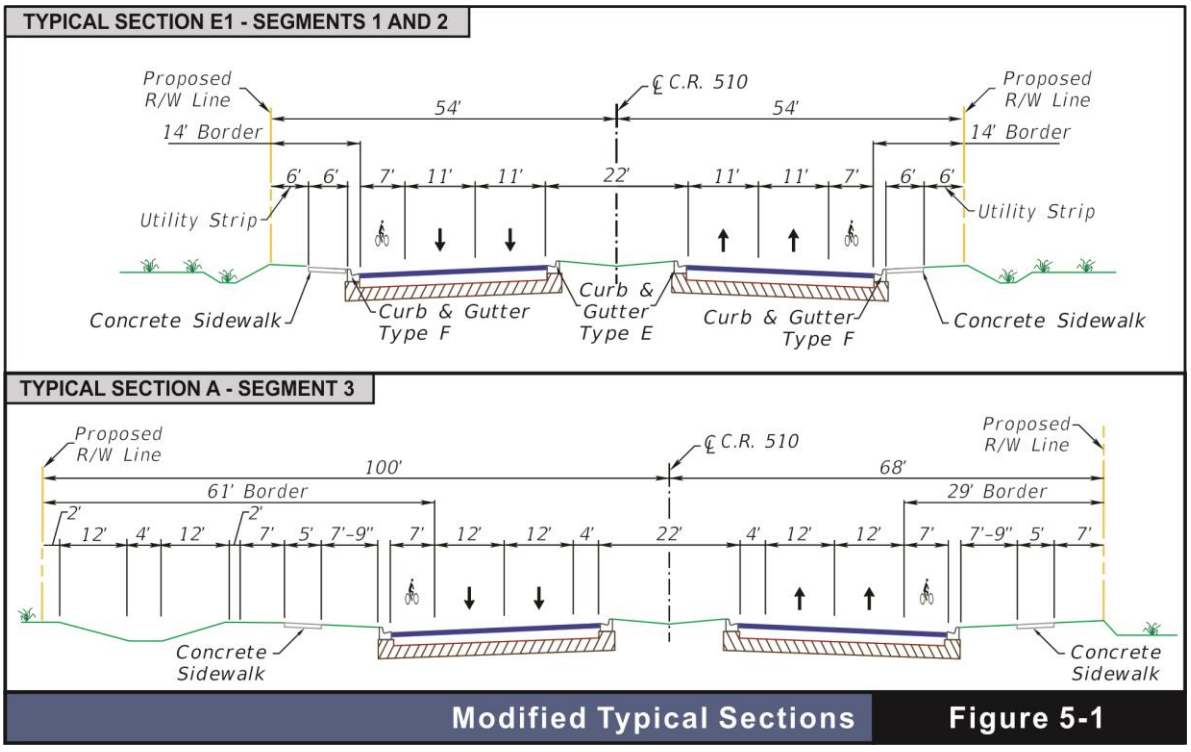
Segment 3: From 86th Avenue to just east of Lateral L Canal Typical Section A/Center alignment, from just east of Lateral L Canal to just west of Powerline Road Typical Section A/North Alignment, and from 86th Avenue to just east of Lateral L Canal and from just east of Powerline Road to 66th Avenue Typical Section A/Center alignment are the higher ranking alternatives. This high speed sub-urban typical section has two (2) 12-foot travel lanes each direction, (2) 7-foot bicycle lane, and has a 29 -foot border width (see **Table 4-8** for more details).

Segment 4: The recommended alternative from Powerline Road/66th Avenue to 61st Drive is Typical Section E with a north alignment and from 61st Drive to 58th Avenue is Typical Section E with a south alignment. This urban typical section features a 104-foot footprint with each direction providing two (2) 11-foot travel lanes each way, a 7-foot bicycle lane, a 6-foot sidewalk and a four (4) foot utility strip behind the sidewalk (see **Table 4-9** for more details).

5. RECOMMENDED ALTERNATIVE

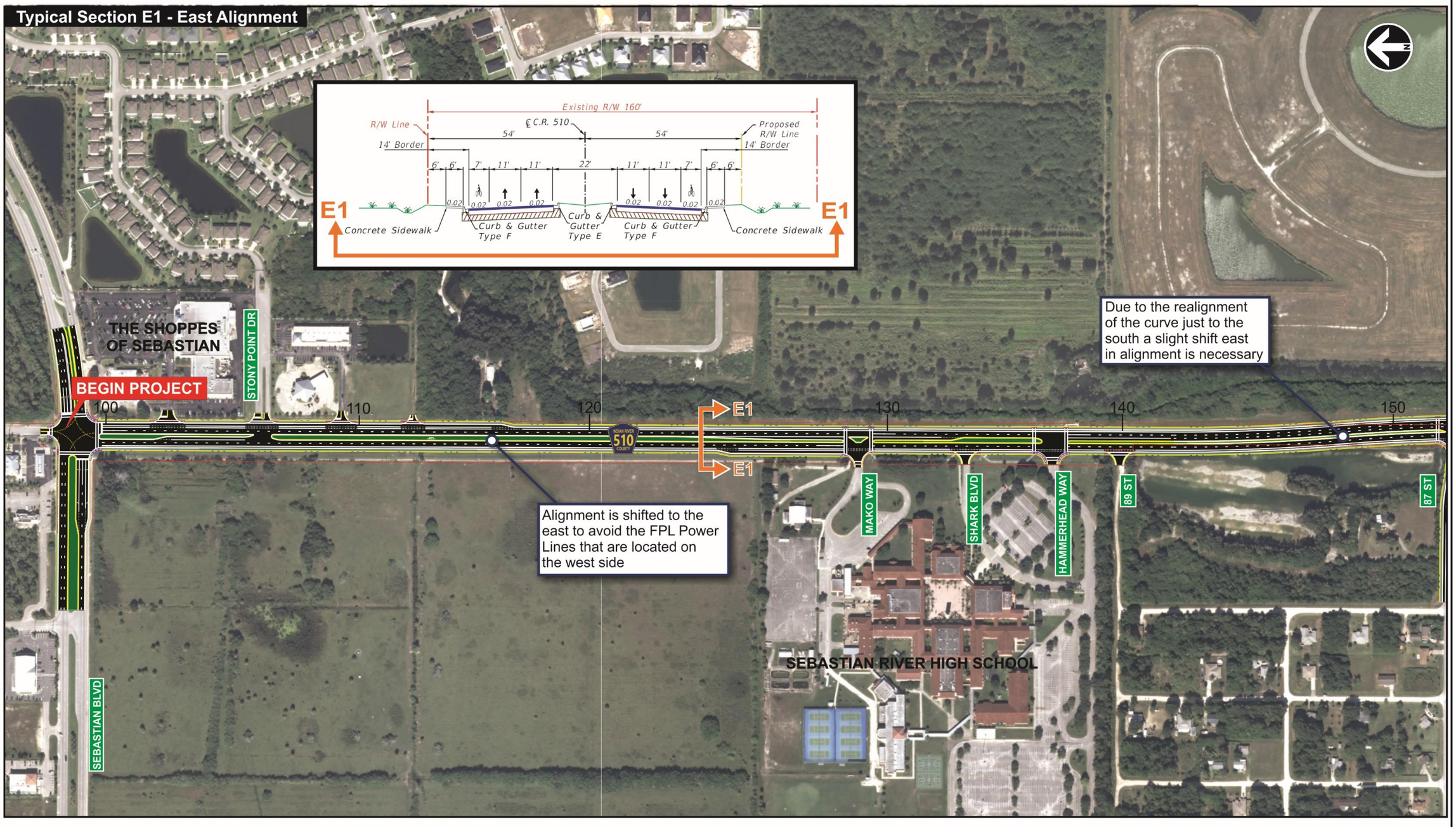
As previously stated, the results obtained indicate the recommended alternative is as follows: Segment 1 Typical Section E with east alignment; Segment 2 Typical Section E with east/north alignment; Segment 3 Typical Section A with center and north alignment and Segment 4 Typical Section E with north and south alignment.

Following further coordination with Indian River County, a six (6) foot utility strip behind the sidewalk was requested for Typical Section E and a seven (7) foot utility strip for Typical Section A (see **Figure 5-1**). This modification of Typical Section A has been provided for segment 3. For Segments 1 and 2 this modified Typical Section E1 is recommended. However, along Segment 4 due to the extremely tight right-of-way constraints caused by the Wabasso Scrub Conservation Area and the Hill Side Subdivision, Typical Section E1 is not recommended and Typical Section E will remain. It should be noted that these modifications would need to be applied to all typical sections previously evaluated in Section 5 of this report and thus do not change the validity of the previous analysis. The following sections describe and highlight the different design elements associated with the recommended alternative (see **Figures 5-2** to **5-5**). For more details please see the concept plans in **Appendix E**.



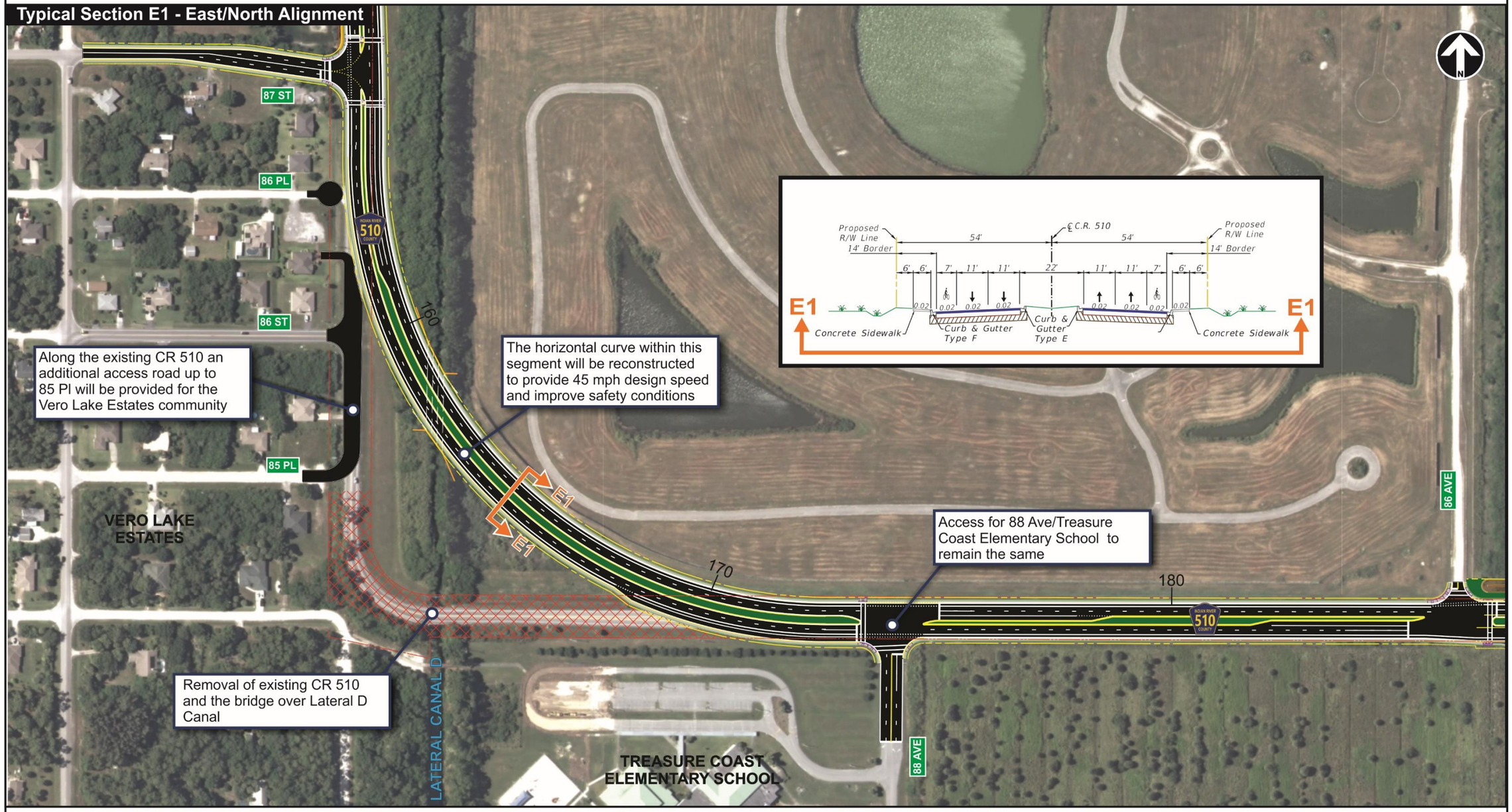
Modified Typical Sections **Figure 5-1**

Typical Section E1 - East Alignment



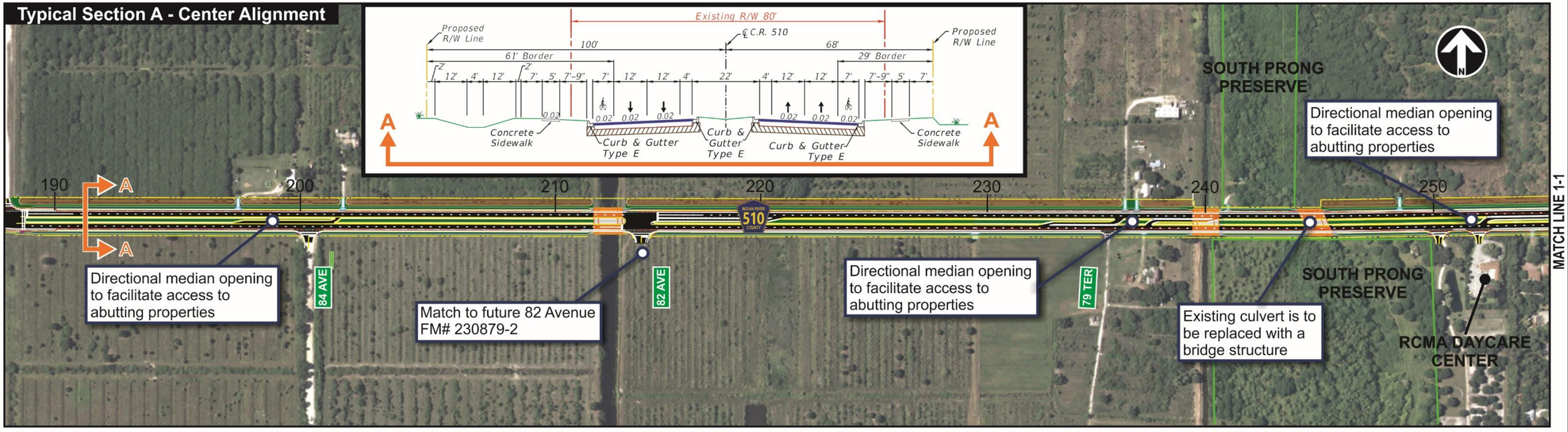
Recommended Alternative - Segment 1 **Figure 5-2**

Typical Section E1 - East/North Alignment

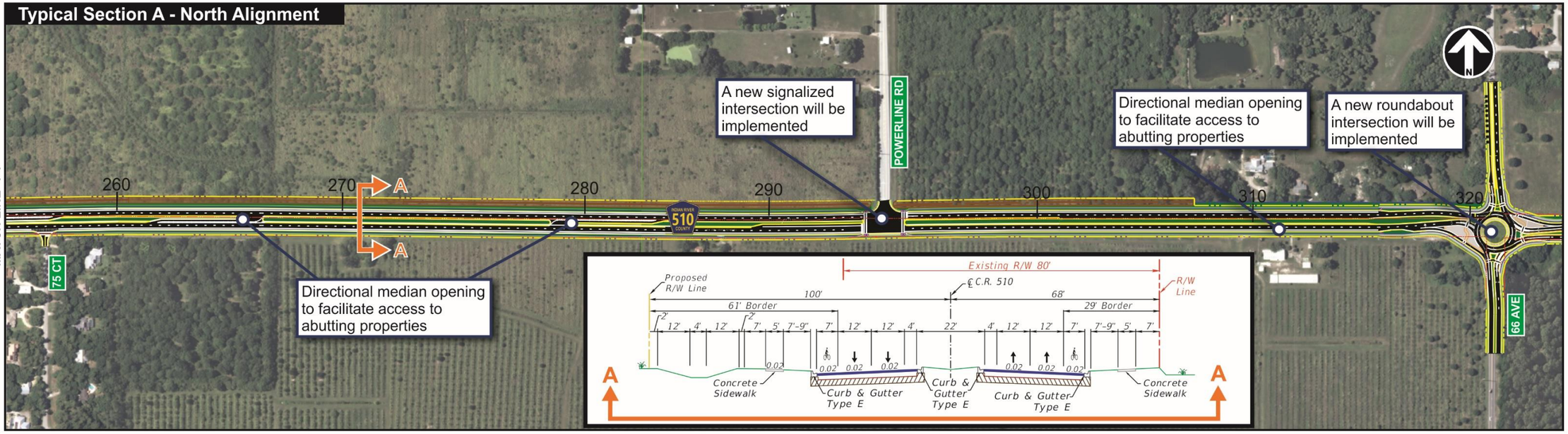


Recommended Alternative - Segment 2 **Figure 5-3**

Typical Section A - Center Alignment

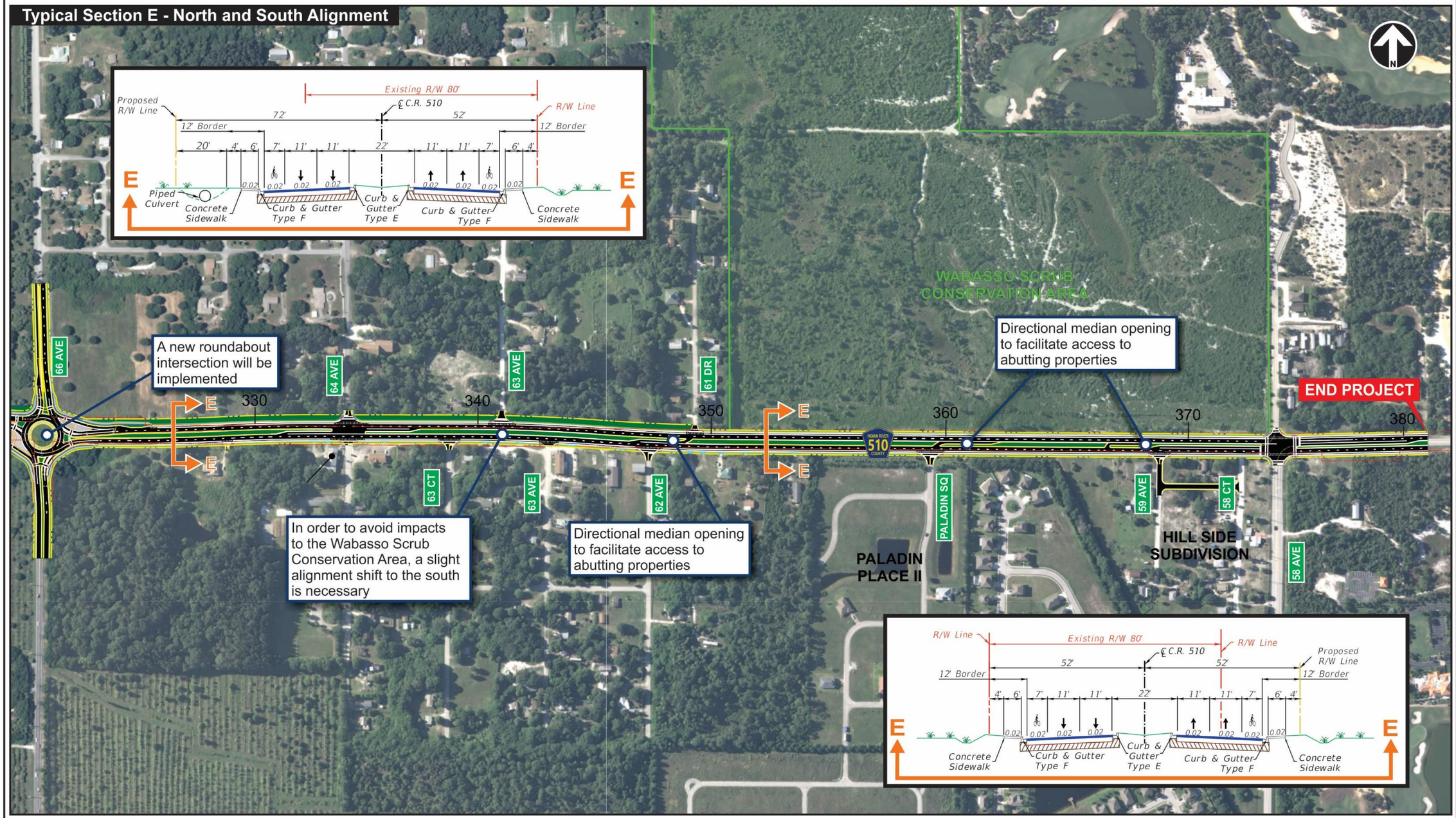


Typical Section A - North Alignment



Recommended Alternative - Segment 3 **Figure 5-4**

Typical Section E - North and South Alignment



Recommended Alternative - Segment 4 **Figure 5-5**

5.1 Preliminary Roadway Design

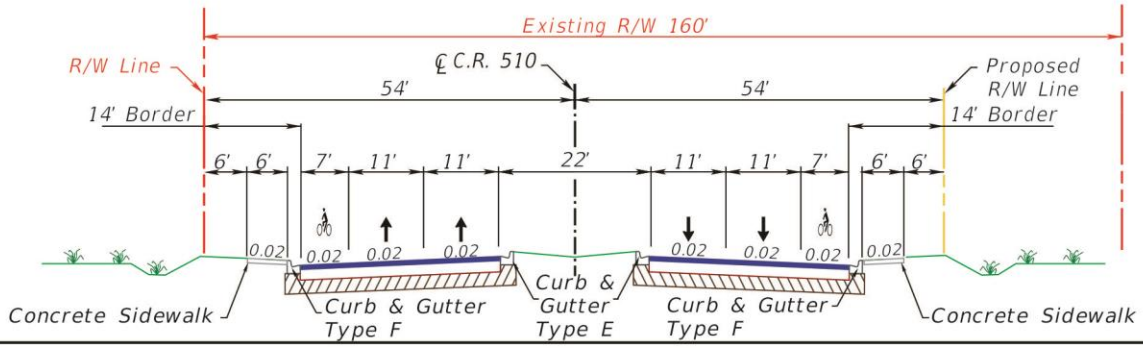
5.1.1 Proposed Typical Sections

As was previously mentioned, the recommended alternative features a four lane divided urban typical section with a 45 MPH design speed within Segments 1, 2 and 4 and a four lane suburban divided typical section with a 50 MPH design speed along Segment 3. However, Indian River County has requested that a 45 MPH speed limit be posted throughout the entire project length. All typicals provide multimodal features (see Section 5.1.4) throughout and are illustrated in **Figure 5-6** and in the approved Typical Section Package in (**Appendix E**).

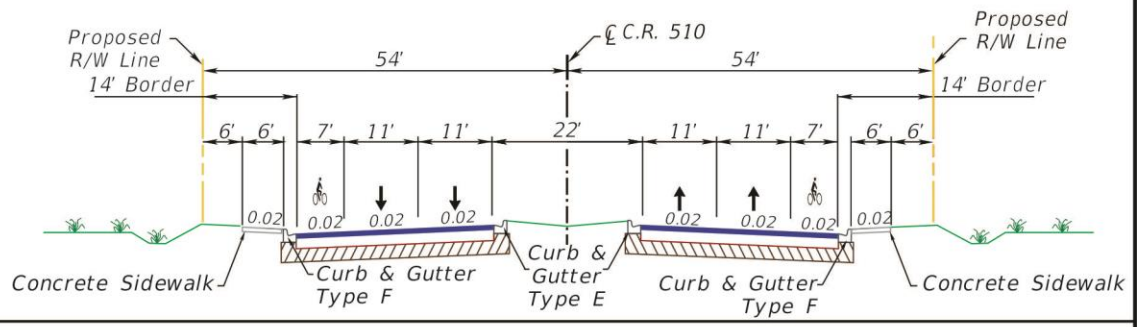
5.1.2 Horizontal Alignment

Table 5-1 summarizes the horizontal curve data proposed for the recommended alternative (curve data is displayed on the concept plans). Most notably is the flattening of the curve south of 87 Street to correct an existing substandard curve. The right-of-way for the curve was previously dedicated to the County by the owner of the property on the northwest quadrant of the curve at the time of the original permit application (since expired). Thus, no right-of-way acquisition is required as a result of the new alignment for the curve. Additionally, several curves and alignment shifts were implemented in order to minimize impacts and avoid potential relocations. This includes a shift to the north east of the South Prong Preserve (near STA 245+00) to minimize impacts to the residences and day care on the south side of CR 510. Additionally, a shift to the north east of 66th Avenue avoids impacts to the Allen Chapel Church as well as other establishments south of CR 510.

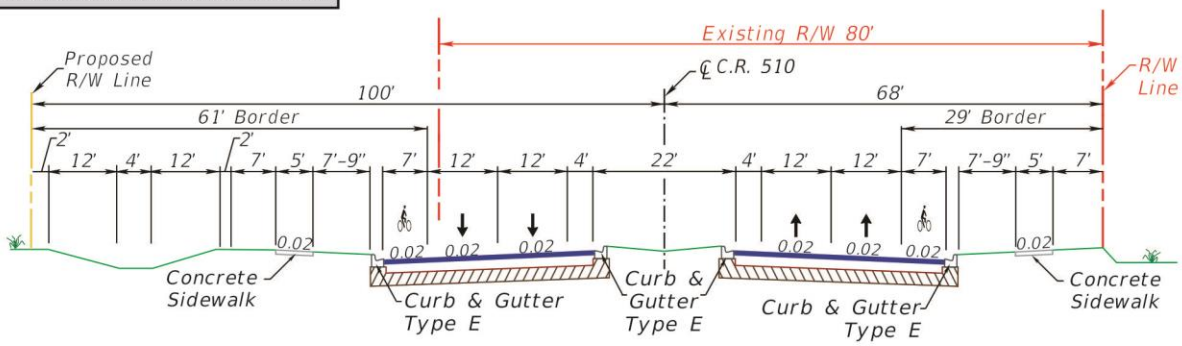
TYPICAL SECTION E1 SEGMENT 1



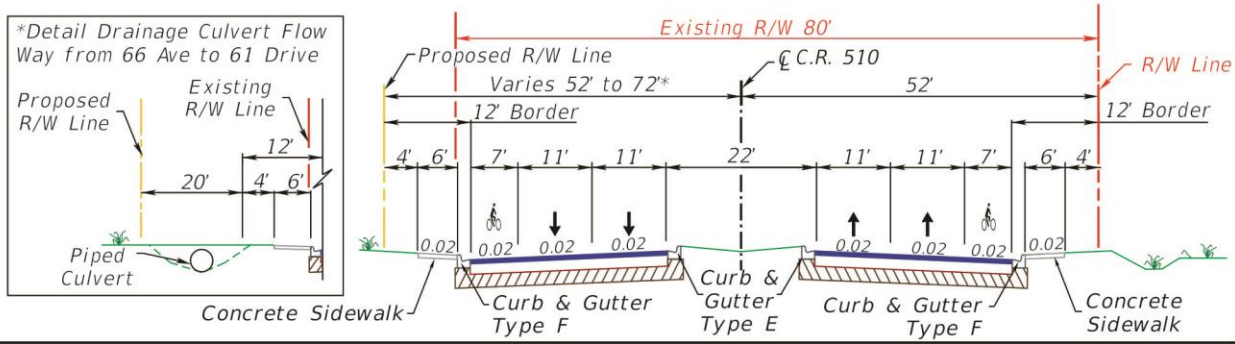
TYPICAL SECTION E1 SEGMENT 2



TYPICAL SECTION A SEGMENT 3



TYPICAL SECTION E SEGMENT 4



Proposed Typical Sections **Figure 5-6**

Table 5-1 – Proposed Horizontal Curves along CR 510

Location	Curve No.	PI STA	Delta	D	T	L	R	PC STA	PT STA
CR 512 east of CR 510	BL5121	285+23.10	52°1' 24"	2°51'53"	975.96	1815.95	2000.00	276+07.14	294+23.11
South of 89th St	CLB1	145+05.40	4°45'43"	0º44'60"	317.67	634.98	7640.00	141+87.73	148+22.71
North of 87th St	CLB2	151+40.39	4°45'43"	0º44'60"	317.67	634.98	7640.00	148+22.71	154+57.70
South of 87th St	CLB3	165+79.44	90º08'34"	5º15'06"	1093.72	1716.46	1091.00	154+84.72	172+02.18
West of Powerline Rd	C72	289+03.76	1º48'51"	0º13'29"	403.76	807.46	25500.00	285+00.00	293+07.46
East of Powerline Rd	C73	297+21.45	1°11'09"	0°08'36"	413.99	827.95	40000.00	293+07.46	301+35.41
East of 66th Ave	CLB6	326+69.09	2°51'54"	0°42'58"	200.06	400.04	8000.00	324+69.03	328+69.07
West of 64th Ave	CLB7	330+69.13	2°51'54"	0°42'58"	200.06	400.04	8000.00	328+69.07	332+69.11
East of 63rd Ave	CLB8	342+04.68	4°04'36"	0°40'27"	302.52	604.78	8500.00	339+02.16	345+06.94
West of 61st Dr	CLB9	347+82.52	3°42'50"	0°40'27"	275.59	550.98	8500.00	345+06.94	350+57.92
87th St	C77	26+20.65	8°09'30"	1°56'32"	210.38	420.05	2950.00	24+10.27	28+30.32

5.1.3 Vertical Alignment

Table 5-2 summarizes the vertical curve data proposed for the recommended alternative.

Table 5-2 – Proposed Vertical Curves along CR 510

Approximate Location	Type of Curve	VPI Station	VPI Elevation	Grade (Back) %	Grade (Ahead) %	Length of Curve (ft)	K
North of Mako Way	Crest	124+75.00	19.50	0.300	-0.300	59	98
South of Shark Blvd	Sag	134+95.00	19.56	0.300	0.637	30	89
North of Hammerhead Way	Crest	137+18.00	20.98	0.637	-0.345	111	113
North of 87th Avenue	Crest	146+85.00	20.51	0.301	-0.514	80	98
North of 87th Avenue	Sag	150+55.00	18.61	-0.514	0.305	70	85
West of Lateral D Canal	Sag	158+12.00	20.92	0.305	1.620	135	103
Over Lateral D Canal	Crest	160+75.48	25.19	1.620	-1.150	304	110
West of Lateral C Canal	Sag	209+45.00	18.52	-0.300	0.970	142	112
Over Lateral C Canal	Crest	213+53.00	22.48	0.970	-0.551	201	132
East of Lateral C Canal	Sag	219+75.00	19.05	-0.551	0.300	165	194
East of 79 Terrace	Sag	235+59.00	18.58	-0.300	1.007	130	99
East of Lateral L Canal	Crest	242+95.29	26.00	1.007	-1.287	556	242
East of South Prong Preserve	Sag	248+03.85	19.46	-1.287	-0.300	100	101
West of 66 Avenue	Sag	317+62.23	21.31	0.300	0.866	60	106
West of 66 Avenue	Crest	320+25.00	23.58	0.866	-1.008	208	111
East of 66 Avenue	Sag	322+20.00	21.61	-1.008	0.298	103	79
West of 64 Ave	Sag	332+20.00	21.61	-0.300	0.585	80	90
West of 64 Ave	Crest	333+70.80	22.49	0.585	-0.625	140	116
East of 64 Ave	Sag	334+92.23	21.73	-0.625	0.299	75	81
East of 58 Ave	Sag	378+80.89	25.21	-0.300	2.487	225	81

5.1.4 Bicycle and Pedestrian Accommodations

The need to provide bicycle and pedestrian facility improvements along the subject project is identified in the Indian River County 2040 Long Range Transportation Plan

Update. Because of this fact, they have been incorporated as part of the recommended alternative. Seven (7) foot buffered bicycle lanes have been proposed along the entire length of the project corridor. Sidewalks are also being provided along both sides throughout the entire corridor. Additionally, proper pedestrian crossings will be provided across all signalized intersections and proper pedestrian connectivity at all existing bus stops.

It should be noted that the proposed design of the CR 510 bridge over Lateral Canal L (see section 5.4.3) provides for the accommodation of a planned multi-use recreational trail below the east bridge approach to be implemented by Indian River County as part of the Saint Sebastian River Greenway.

5.1.5 Access Management

As previously stated, CR 510 is currently a non-restricted arterial with a planned improvement for a restrictive median. The recommended alternative provides a 22 foot median with a series of directional as well as full median openings. Details of the median openings can be seen in the conceptual plans in **Appendix E**. After close coordination with Indian River County planning officials, it was decided that in general terms CR 510 would likely be classified as an Access Class 5 facility. **Tables 5-3** thru **5-5** illustrate the access management compliances results for the recommended alternative in terms of signal spacing, median opening spacing and connection spacing. It should be noted that a future signal at approximate sta. 215+00 is proposed as part of the 82 Avenue Extension project. This signal will be approximately 4,125' east of the signal at the Treasure Coast Elementary School Entrance and would thus meet the signal spacing standards.

Table 5-3 – Signal Connection Spacing

From	To	Signal Spacing (ft)	Std. Compliance 1320' ≤ 45 mph	Deviation from Std.
Sebastian Boulevard	Mako Way	3,030	Meets	-
Mako Way	Hammerhead Way	750	No	43.18%
Hammerhead Way	87th Street	1,560	Meets	-
87th Street	Treasure Coast Elementary School Entrance	3,030	Meets	-
Treasure Coast Elementary School Entrance	66th Avenue	13,350	Meets	-
66th Avenue	58th Avenue	5,350	Meets	-

Table 5-4 – Median Opening Spacing

Spacing #	Existing Opening	Side	Recommended Median Opening	Prop Spacing	Standards (45 mph) Full: 1320' Directional: 660'	Meets Std. Compliance	Dev. from Std. (%)
1	CR 512 / Sebastian Blvd.	East & West	Full	-	-	-	-
2	Shoppes of Sebastian	East	Closed	-	-	-	-
3	Stony Pt. Drive	East	Full	686'	1320'	No	48.03%
4	Space Coast Entrance	East	Closed	-	-	-	-
5	Mako Way	West	Full	2339'	1320'	Yes	-
6	Shark Blvd.	West	Closed	-	-	-	-
7	Hammerhead Way	West	Full	718'	1320'	No	45.61%
8	89 St.	West	Closed	-	-	-	-
9	87 St.	West	Full	1605'	1320'	Yes	-
10	88 Ave. (Treasure Coast Elem. Ent.)	South	Full	3380'	1320'	Yes	-
11	86 Avenue	North	Full	2324'	1320'	Yes	-
12	W of 84 Avenue	North	Closed	-	-	-	-
13	84 Avenue	South	Closed	-	-	-	-
14	E of 84 Avenue	North	Directional	1225'	660'	Yes	-
15	82 Avenue	South	Full	1170'	1320'	No	11.36%
16	79 Terr.	South	Closed	-	-	-	-
17	E of 79 Terr.	North & South	Directional	1887'	660'	Yes	-
18	W of 75 Ct.	South	Directional	1338'	660'	Yes	-
19	75 Ct.	South	Closed	-	-	-	-
20	E of 75 Ct.	North	Directional	1170'	660'	Yes	-
21	W of Powerline Rd.	South	Directional	1268'	660'	Yes	-
22	Powerline Rd.	North	Full	1200'	1320'	No	9.09%
23	Michael Ln.	South	Closed	-	-	-	-
24	W of 66 Avenue	North & South	Directional	1742'	660'	Yes	-
25	66 Avenue	North & South	Full	950'	1320'	No	28.03%
26	64 Avenue	North & South	Full	1336'	1320'	Yes	-
27	63 Ct.	South	Closed	-	-	-	-
28	63 Avenue	North	Closed	-	-	-	-
29	63 Avenue	South	Closed	-	-	-	-
30	63 Avenue	South	Closed	-	-	-	-
31	61 Dr.	North	Directional	1505'	660'	Yes	-
32	Paladin Square	South	Directional	1051'	660'	Yes	-
33	W of 59 Avenue	South	Directional	745'	660'	Yes	-
34	59 Avenue	South	Closed	-	-	-	-
35	58 Ct.	South	Closed	-	-	-	-
36	58 Avenue	North & South	Full	713'	1320'	No	46.00%

Table 5-5 – Driveway Connection Spacing (Southbound/Eastbound)

Side	From	To	Connection Spacing (ft)	Standard Compliance Greater than or equal to 245'	Deviation from Std.
SOUTHBOUND/EASTBOUND	Sebastian Boulevard	Mako Way	2950	Meets	-
	Mako Way	Shark Boulevard	380	Meets	-
	Shark Boulevard	Hammerhead Way	305	Meets	-
	Hammerhead Way	89 Street	230	No	6.12%
	89 Street	87 Street	1250	Meets	-
	87 Street	86 Avenue	3020	Meets	-
	86 Avenue	84 Avenue	1295	Meets	-
	84 Avenue	82 Avenue	1420	Meets	-
	82 Avenue	W of 79 Terrace	1440	Meets	-
	W of 79 Terrace	79 Terrace	550	Meets	-
	79 Terrace	E of 79 Terrace	135	No	44.90%
	E of 79 Terrace	650' W of 75 Court	1285	Meets	-
	650' W of 75 Court	450' W of 75 Court	150	No	38.78%
	450' W of 75 Court	245' W of 75 Court	215	No	12.24%
	245' W of 75 Court	75 Court	225	No	8.16%
	75 Court	700' W of Powerline	2945	Meets	-
	700' W of Powerline	1080' W of 66 Avenue	2295	Meets	-
	1080' W of 66 Avenue	880' W of 66 Avenue	185	No	24.49%
	880' W of 66 Avenue	66 Avenue	860	Meets	-
	66 Avenue	64 Avenue	1260	Meets	-
	64 Avenue	515' W of 64 Avenue	760	Meets	-
	515' W of 64 Avenue	145' W of 64 Avenue	365	Meets	-
	145' W of 64 Avenue	88' W of 64 Avenue	45	No	81.63%
	88' W of 64 Avenue	64 Avenue	65	No	73.47%
	64 Avenue	110' E of 64 Avenue	90	No	63.27%
	110' E of 64 Avenue	160' E of 64 Avenue	40	No	83.67%
	160' E of 64 Avenue	63 Court	260	Meets	-
	63 Court	165' E of 63 Court	135	No	44.90%
	165' E of 63 Court	125' W of 63 Avenue	130	No	46.94%
	125' W of 63 Avenue	63 Avenue	100	No	59.18%
	63 Avenue	100' E of 63 Avenue	75	No	69.39%
	100' E of 63 Avenue	125' W of 62 Avenue	190	No	22.45%
	125' W of 62 Avenue	62 Avenue	100	No	59.18%
	62 Avenue	180' E of 62 Avenue	160	No	34.69%
	180' E of 62 Avenue	235' E of 62 Avenue	45	No	81.63%
	235' E of 62 Avenue	310' E of 62 Avenue	70	No	71.43%
	310' E of 62 Avenue	420' E of 62 Avenue	95	No	61.22%
	420' E of 62 Avenue	585' W of Paladin Square	200	No	18.37%
	585' W of Paladin Square	Paladin Square	565	Meets	-
	Paladin Square	59 Avenue	960	Meets	-
	59 Avenue	215' E of 59 Avenue	200	No	18.37%
	215' E of 59 Avenue	58 Court	125	No	48.98%
WESTBOUND/NORTHBOUND	58 Avenue/CR 505A	61 Drive	2485	Meets	-
	61 Drive	63 Drive	820	Meets	-
	63 Drive	64 Avenue	650	Meets	-
	64 Avenue	66 Avenue	1300	Meets	-
	66 Avenue	875' W of Powerline Road	845	Meets	-
	875' W of Powerline Road	980' W of Powerline Road	100	No	59.18%
	980' W of Powerline Road	1300' W of Powerline Road	320	Meets	-
	1300' W of Powerline Road	Powerline Road	1310	Meets	-
	Powerline Road	830' W of 75 Court	4480	Meets	-
	830' W of 75 Court	540' E of 79 Terrace	745	Meets	-
	540' E of 79 Terrace	130' E of 79 Terrace	390	Meets	-
	130' E of 79 Terrace	75' E of 79 Terrace	42	No	82.86%
	75' E of 79 Terrace	82 Avenue	2110	Meets	-
	82 Avenue	150' E of 84 Avenue	1280	Meets	-
	150' E of 84 Avenue	300' W of 84 Avenue	440	Meets	-
	300' W of 84 Avenue	86 Avenue	1020	Meets	-
	86 Avenue	570' S of Stony Point Drive	6970	Meets	-
	570' S of Stony Point Drive	300' of Stony Point Drive	250	Meets	-
	300' of Stony Point Drive	Stony Point Drive	265	Meets	-
	Stony Point Drive	370' N of Stony Point Drive	315	Meets	-
	370' N of Stony Point Drive	Sebastian Boulevard	300	Meets	-

Additionally, as was discussed in **Section 4** of this report and detailed in **Appendix D**, two areas of special concern regarding access were evaluated in more detail. The first area is concerning access for Vero Lake Estates and Treasure Coast Elementary School near the existing curve. Six (6) different options were evaluated. The curve improvements will result in the closure of access to/from 86th Place, 86th Street and 85th Place. All access to Vero Lake Estates will be through the signal at 87th Street. Existing CR 510 will be maintained between 86th Street and 85th Place in order to maintain access to the residences directly abutting CR 510. See Concept Plans in **Appendix E**, sheets 9 and 10 for more details.

The second special area of concern is between 61st Drive and 58th Avenue. The proposed raised median along this section of the project area will restrict ingress from the east and egress to the west from the Hill Side neighborhood along the south side of CR 510. Four (4) distinct accessibility options were investigated, presented and discussed with Indian River County officials as well as residents of the Hill Side neighborhood. The recommended alternative proposed to close 58th Court and provide a new connection between 58th Court and 59th Avenue through an existing roadway easement. See Concept Plans in **Appendix E**, sheet 24 for more details.

It should also be noted that in some areas the proposed profile will be several feet higher than the existing roadway as a result of the bridge replacements (see Section 6.4). Thus, existing adjacent driveway connections need to be further evaluated in final design for proper connection and to ensure access is maintained to the abutting properties.

5.1.6 Potential Design Exceptions and Variations

No design exceptions or variations are anticipated at this time.

5.1.7 Lighting

As previously stated, no street lighting is presently provided along the study corridor with the exception of lighting at the intersections of CR 512, Shark Boulevard, 87th Street, 88th Avenue, 66th Avenue, 64th Avenue and 58th Avenue. Therefore, the retainment of lighting is recommended for the previously stated intersections. Since a Lighting Justification Study was not conducted as part of the PD&E effort, the potential need for installation of

continuous roadway lighting along the study corridor cannot be ascertained at this time. This task remains as part of the final design phase.

5.2 Traffic Analysis

A Design Traffic Technical Memorandum (DTTM) was prepared for this project and provides further details on the traffic operations. Future traffic projections for the analysis locations within the study area for both the No Build and Build scenarios were performed in a Pre-PD&E Study and were provided by the Department.

5.2.1 Other Projects

There are two other proposed County projects within the study segment; (1) the extension of 82nd Avenue from 69th Street (just south of the project) to CR 510, which creates a new intersection at CR 510 at 82nd Avenue; and (2) the widening of 66th Avenue from 2-lanes to 4-lanes. These projects are reflected in the No Build condition. For more detailed traffic information, please refer to the DTTM, a companion document to this Preliminary Engineering Report.

5.2.2 Development of Future Traffic Projections

5.2.2.1 Design Period

Through coordination with the Department, the future analysis years of the project were established as:

- Opening Year 2020
- Interim Year 2030
- Design Year 2040

5.2.2.2 Future Travel Demand

Various traffic forecasting methodologies were evaluated and summarized as part of this work. The purpose was to identify the most reasonable forecasting method which can be used to estimate the growth rates for all the study intersection link approaches. Based on the comparison and discussions with FDOT Traffic Modeling Coordinator, growth rates obtained from the model to model projections methodology was used to develop the

future year AADTs. The 2015 AADT obtained from field counts for each approach, was grown based on the corresponding growth rates to obtain the 2040 No Build and Build forecasted AADT. Then the 2020 and 2030 AADT was estimated by interpolating the 2015 AADT and the 2040 forecasted AADT.

The recommended growth rates obtained from the Pre-PD&E Study are summarized in **Table 5-6**.

Table 5-6 No-Build and Build Growth Rates

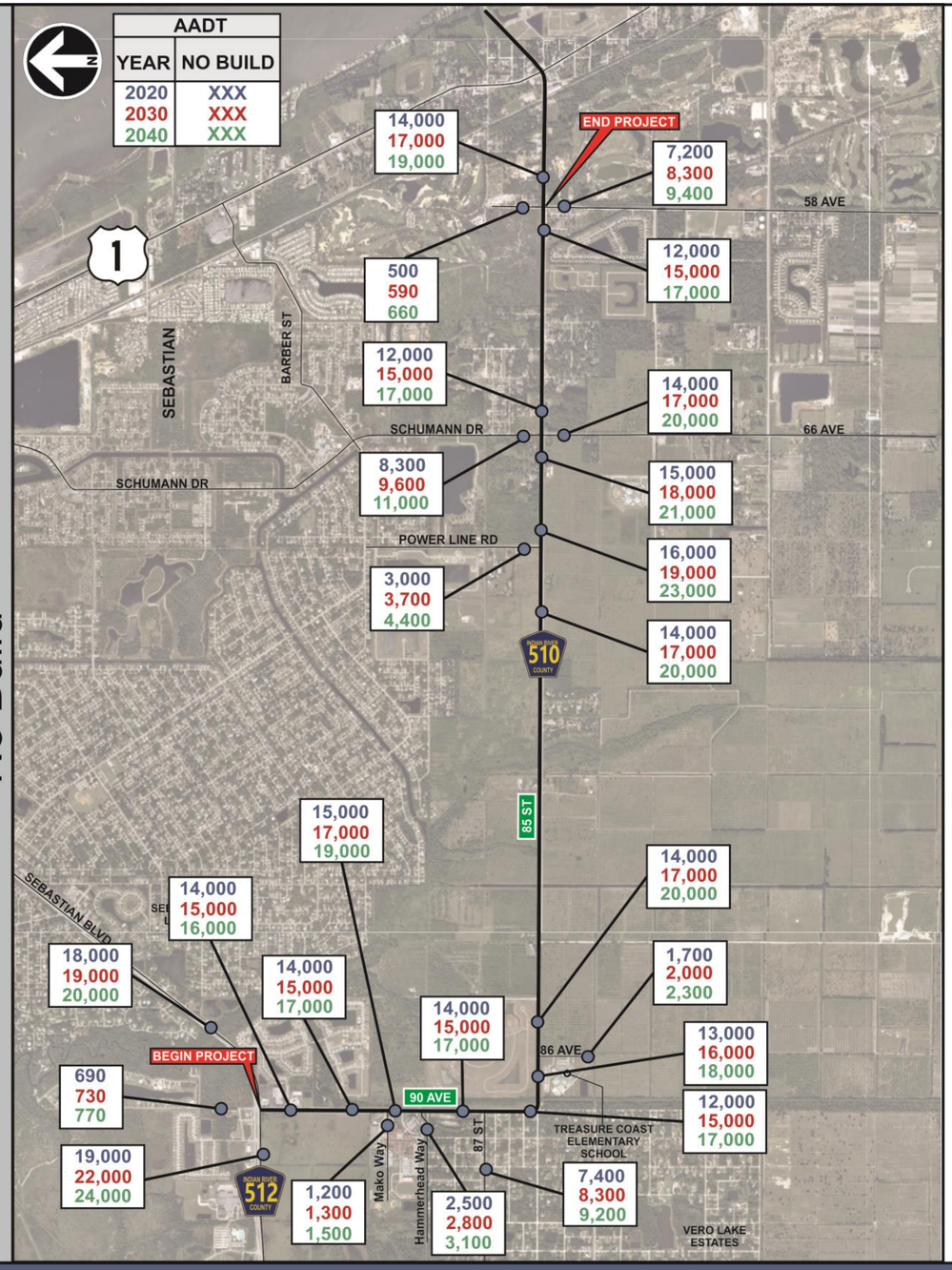
Number	Intersection	Location	No Build (2-Lane)	Build (4-Lane)
1	***CR 512***	CR 510 North of CR 512	0.56%	0.54%
		CR 510 South of CR 512	0.89%	1.32%
		CR 512 East of CR 510	0.56%	0.54%
		CR 512 West of CR 510	1.04%	1.14%
2	***Mako Way***	CR 510 North of Mako Way	1.15%	1.60%
		CR 510 South of Mako Way	1.15%	1.60%
		Mako Way West of CR 510	1.15%	1.60%
3	***Hammerhead Way***	CR 510 North of Hammerhead Way	1.15%	1.60%
		CR 510 South of Hammerhead Way	1.15%	1.60%
		Hammerhead Way West of CR 510	1.15%	1.60%
4	***87th Street***	CR 510 North of 87th Street	1.15%	1.60%
		CR 510 South of 87th Street	1.64%	1.94%
		87th Street West of CR 510	1.15%	1.60%
5	***Treasure Coast Elementary School***	CR 510 East of Treasure Coast Elementary School	1.64%	1.94%
		CR 510 West of Treasure Coast Elementary School	1.64%	1.94%
		Treasure Coast Elementary School South of CR 510	1.64%	1.94%
6	***Powerline Road***	CR 510 East of Powerline Road	1.99%	2.49%
		CR 510 West of Powerline Road	1.99%	2.49%
		Powerline Road North of CR 510	1.99%	2.49%
7	***66th Avenue***	66th Avenue North of CR 510	1.34%	1.44%
		66th Avenue South of CR 510	1.99%	1.87%
		CR 510 East of 66th Avenue	1.75%	2.59%
		CR 510 West of 66th Avenue	1.99%	2.49%
8	***58th Avenue***	58th Avenue North of CR 510	1.59%	2.07%
		58th Avenue South of CR 510	1.34%	1.20%
		CR 510 East of 58th Avenue	1.59%	2.07%
		CR 510 West of 58th Avenue	1.76%	2.58%

Source: Traffic Data Collection and Traffic Projections CR-510 from CR-512 to 58th Avenue, February 2016

Future AADTs obtained from the Pre-PD&E Study for both No Build and Build scenarios are provided in **Figure 5-7.**

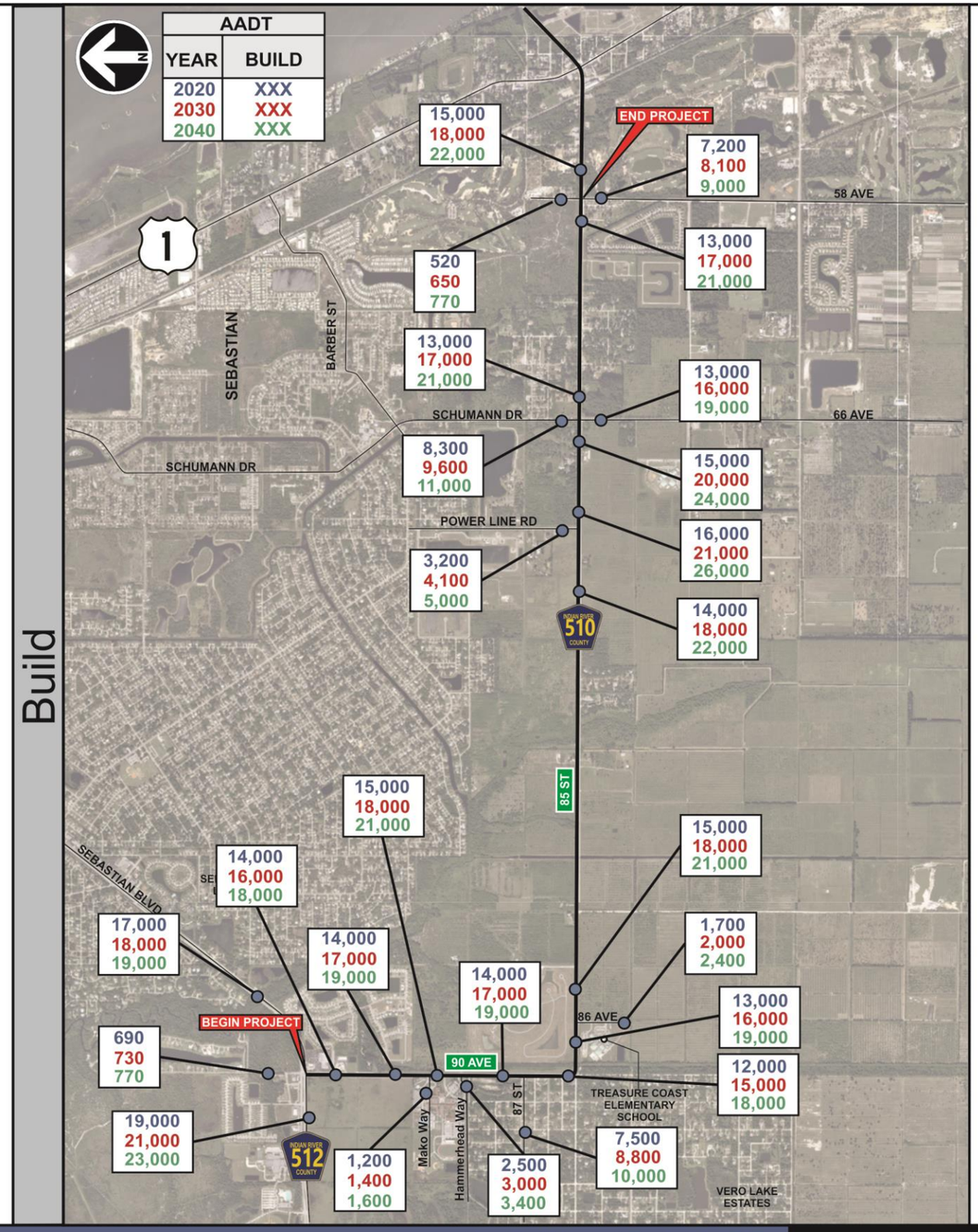
No Build

AADT	
YEAR	NO BUILD
2020	XXX
2030	XXX
2040	XXX



Build

AADT	
YEAR	BUILD
2020	XXX
2030	XXX
2040	XXX



No Build and Build AADTs **Figure 5-7**

5.2.2.3 No-Build Directional Design Hour and Intersection Volumes

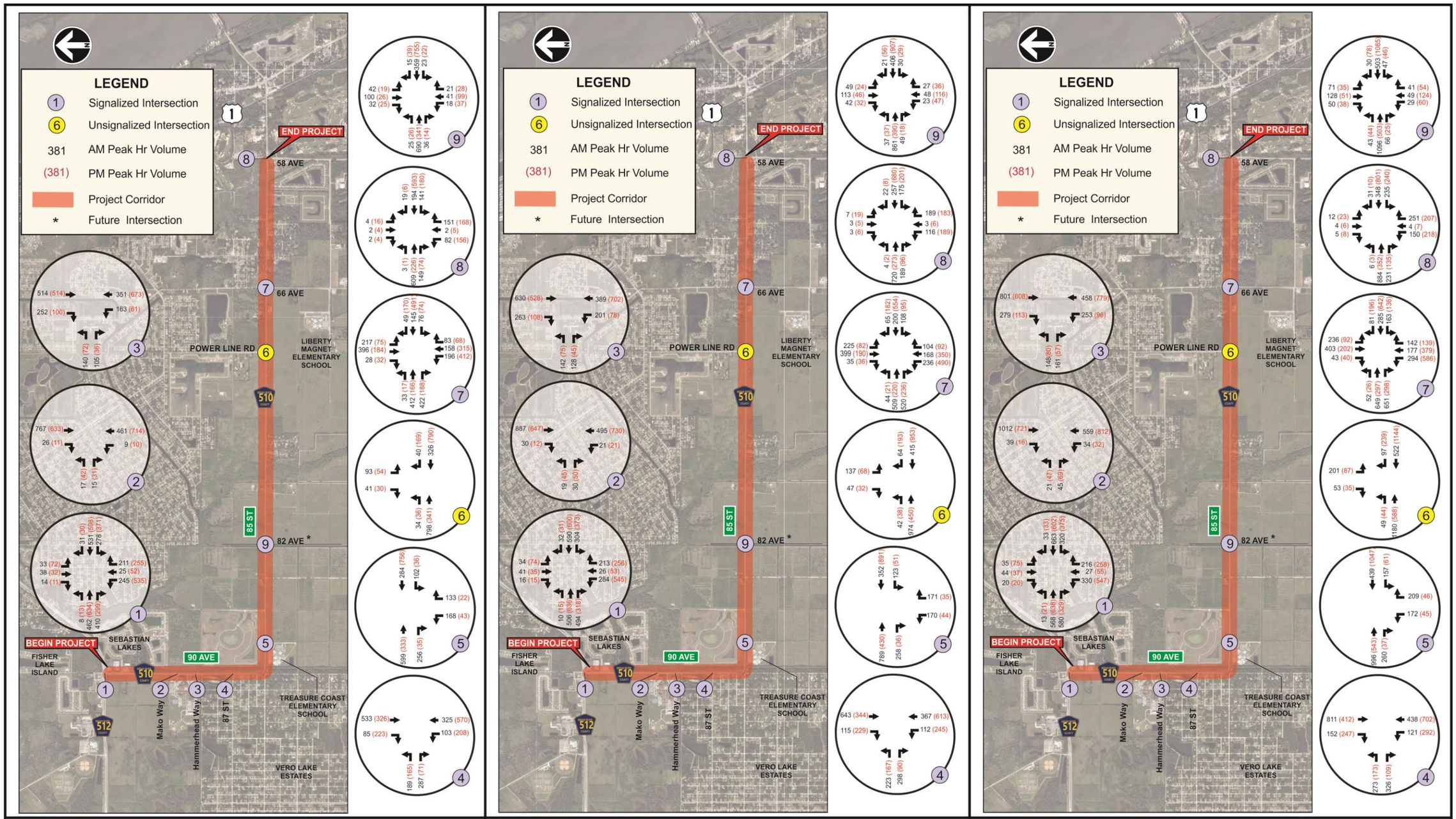
The AADTs for No-Build conditions established in the Pre-PD&E Study were used to determine the Directional Design Hour Volumes (DDHV). DDHVs were obtained by applying the Standard K and D- factors to the AADTs. The future intersection volumes were developed using TMTOOL. As discussed in the DTTM, K-factors for future traffic follow the established FDOT Standard K values. Truck Factors (T) Daily (T24) and Peak Hour (Tpeak) truck factors were determined based on 2015 classification counts and 5-year FTI data. A T24 of 5.4% and Tpeak of 2.7% were established for the project area.

The No-Build AM and PM peak hour intersection volumes are provided in **Figure 5-8**.

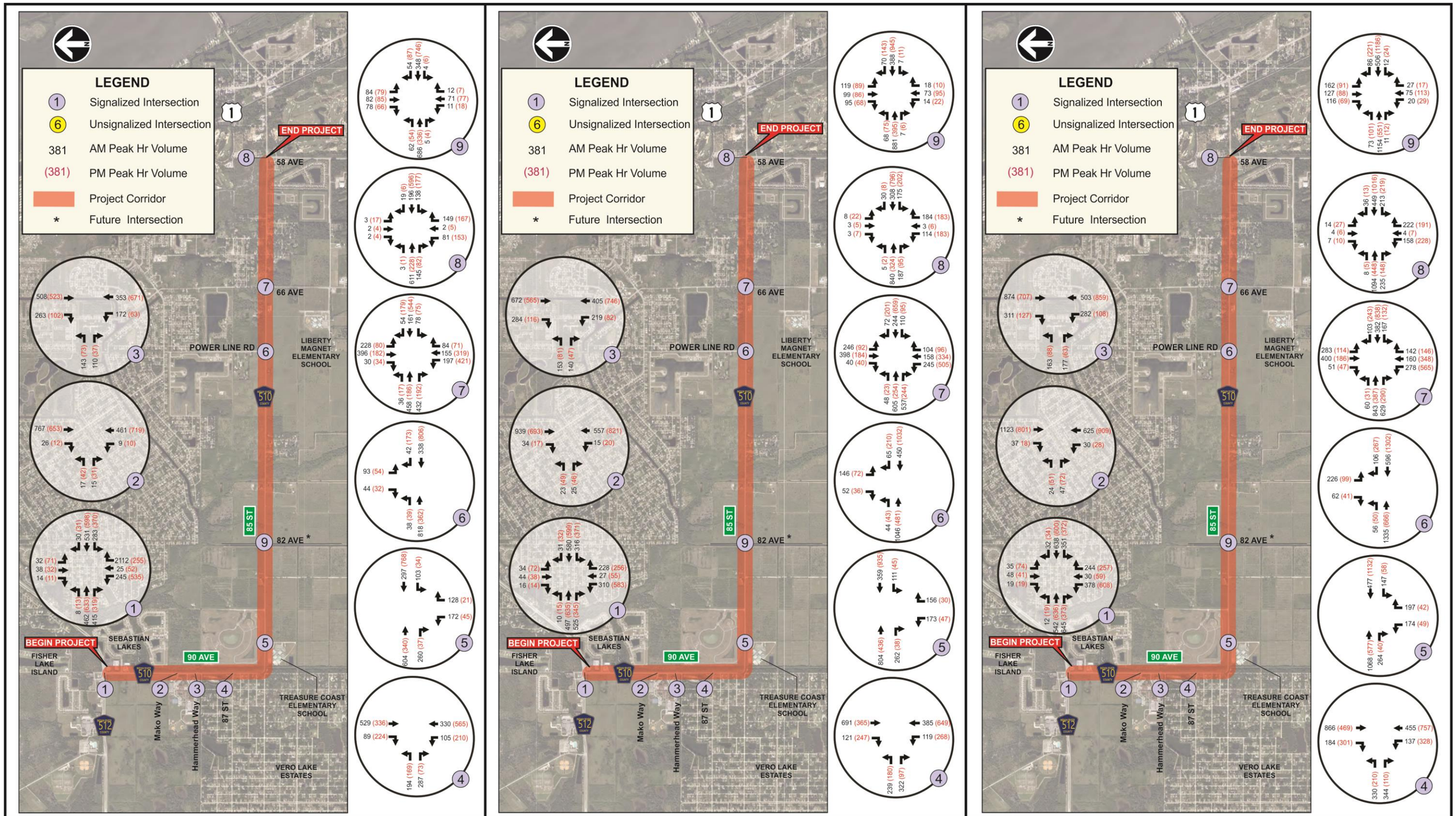
5.2.2.4 Build Directional Design Hour and Intersection Volumes

Following the same methodology used in the No-Build scenario, the future Build traffic demand for the 2020 (opening), 2030 (interim), and 2040 (design) years were determined. Per the 2040 TCRPM, volumes on the south leg of 82nd Avenue decrease under Build conditions. With the additional capacity on CR 510 the model shows traffic from 82nd Avenue is diverted; thus, reflecting lower volumes when compared to No Build conditions. As expected with the additional capacity on CR 510, corresponding AADTs will increase. The Build AM and PM peak hour intersection volumes are provided in **Figure 5-9**.

No Build and Build intersection lane assignments are provided in **Figures 5-10** and **5-11.**



No Build Turning Movement Volumes **Figure 5-8**



Build Turning Movement Volumes — Figure 5-9



No Build Lane Configuration — Figure 5-10



Build Lane Configuration Figure 5-11

5.2.3 Future Traffic Operational Analysis

5.2.3.1 No Build Analysis

5.2.3.1.1 No Build Roadway Segment Analysis

Based on the No Build AADTs and the corresponding DDHVs, the segment from just east of the Treasure Coast Elementary School to 66th Avenue has a volume to capacity (v/c) ratio greater than 1.0 and therefore exceeds the LOS D threshold by 2020; in 2030 the segment fronting the Treasure Coast Elementary School and the segment from 66th Avenue to 58th Avenue will exceed LOS D, as well as the segment from Mako Way to 800 feet west of the Treasure Coast Elementary School by 2040. **Table 5-7** summarizes the resultant v/c ratios for all analysis years for No-Build AADTs. The No-Build DDHV results are summarized in **Table 5-8**. All segments from 800 feet west of the Treasure Coast Elementary School to 58th Avenue fail in 2020, while all project segments fail by 2040.

Table 5-7 – No Build Volume to Capacity Ratios (AADT)

Segmental Limits		# of Lanes	LOS D	AADT NO BUILD					
From	To	(speed limit)	SV	2020	V/C	2030	V/C	2040	V/C
CR 512	Mako Way	3LD (>40 MPH)	26,280	14,000	0.53	15,000	0.57	16,500	0.63
Mako Way	800' West of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	16,730	13,800	0.82	15,200	0.91	17,400	1.04
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	13,320	13,000	0.98	15,000	1.13	18,000	1.35
500' East of Treasure Coast Elementary	66 Avenue	2LU (>40 MPH)	12,740	14,000	1.10	17,250	1.35	21,000	1.65
66 Avenue	58 Avenue	2LU (<35 MPH) with LT	13,320	12,000	0.90	14,000	1.05	17,000	1.28

Table 5-8 – No Build Volume to Capacity Ratios (DDHV)

Segmental Limits		# of Lanes	LOS D	DDHV NO BUILD					
From	To	(speed limit)	SV	2020	V/C	2030	V/C	2040	V/C
CR 512	Mako Way	3LD (>40 MPH)	830	743	0.90	797	0.96	876	1.06
Mako Way	800' West of Treasure Coast Elementary	2LD (>40 MPH) with LT lanes	830	733	0.88	807	0.97	924	1.11
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	2LU (<35 MPH) with LT lanes	680	785	1.15	906	1.33	1,087	1.60
500' East of Treasure Coast Elementary	66 Avenue	2LU (>40 MPH)	630	845	1.34	1,042	1.65	1,268	2.01
66 Avenue	58 Avenue	2LU (<35 MPH) with LT	680	725	1.07	845	1.24	1,027	1.51

5.2.3.1.2 No Build Intersection Analysis

The traffic operational analysis included the following intersections within the study corridor. It should be noted that the future signalized intersection at 82nd Avenue has also been included.

1. CR 510 at CR 512 (signalized)
2. CR 510 at Mako Way (signalized)
3. CR 510 at Hammerhead Way (signalized)
4. CR 510 at 87th Street (signalized)
5. CR 510 at Treasure Coast Elementary School (signalized)
6. CR 510 at Powerline Road/70th Avenue (un-signalized)
7. CR 510 at 66th Avenue (signalized)
8. CR 510 at 58th Avenue (signalized)
9. CR 510 at 82nd Avenue (future signalized intersection).

The study intersections were analyzed, as for existing conditions, using Synchro 8 and the Highway Capacity Manual 2010 Methodology. Existing truck percentages were maintained thru all analysis years. The analysis was performed to evaluate traffic operational conditions for the opening year 2020, interim year 2030, and design year 2040. **Tables 5-9** and **5-10** indicate the operating LOS for the study intersections.

(this space intentionally left blank)

Table 5-9 – No Build Intersection LOS (AM Peak Hour)

No.	Intersection	MVMT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	***CR 512***	EB	23.6	C	31.6	C	29.0	C	33.8	C	42.1	D	39.3	D
		WB	26.3	C			27.2	C			27.9	C		
		NB	50.0	D			49.6	D			49.8	D		
		SB	61.6	E			62.9	E			64.6	E		
2	***Mako Way[1]***	EB	46.5	D	44.8	D	47.7	D	62.9	E	48.4	D	104.8	F
		NB	71.4	E			90.2	F			118.6	F		
		SB	28.9	C			48.3	D			100.5	F		
3	***Hammerhead Way[1]***	EB	70.7	E	27.0	C	79.8	E	32.0	C	88.5	F	38.0	D
		NB	12.5	B			14.7	B			24.6	C		
		SB	22.8	C			29.0	C			32.5	C		
4	***87th Street***	EB	36.7	D	21.2	C	53.0	D	27.9	C	108.0	F	50.1	D
		NB	8.8	A			9.8	A			12.4	B		
		SB	18.0	B			21.9	C			35.9	D		
5	***Treasure Coast Elementary***	EB	15.0	B	15.5	B	16.1	B	18.6	B	24.6	C	30.4	C
		WB	6.2	A			7.3	A			12.4	B		
		NB	28.9	C			42.2	D			77.8	E		
6	***Powerline Road[2]***	SB	37.9	E	4.0	A	207.0	F	22.9	C	1062.2	F	128.6	F
		EB	0.3	A			0.4	A			0.4	A		
		WB	0.0	A			0.0	A			0.0	A		
7	***66th Avenue***	EB	24.9	C	27.6	C	29.0	C	34.0	C	40.6	D	47.0	D
		WB	17.8	B			19.8	B			25.8	C		
		NB	29.8	C			37.4	D			52.3	D		
		SB	32.2	C			43.5	D			65.1	E		
8	***58th Avenue***	EB	19.7	B	21.9	C	30.2	C	35.2	D	92.7	F	100.0	F
		WB	10.6	B			18.0	B			54.6	D		
		NB	45.0	D			73.7	E			189.9	F		
		SB	60.3	E			74.3	E			84.7	F		
9	***82nd Avenue***	EB	8.8	A	13.1	B	13.2	B	15.9	B	37.5	D	30.5	C
		WB	5.7	A			6.9	A			11.2	B		
		NB	42.7	D			43.0	D			43.6	D		
		SB	35.3	D			35.3	D			35.0	C		

[1]Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); [2]Stop controlled intersection;
XX LOS does not meet adopted standard LOS D

(This space intentionally left blank)

Table 5-10 – No Build Intersection LOS (PM Peak Hour)

No.	Intersection	MVMT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	***CR 512***	EB	31.1	C	40.4	D	32.5	C	41.1	D	33.4	C	41.8	D
		WB	35.8	D			36.3	D			36.9	D		
		NB	52.1	D			51.9	D			52.0	D		
		SB	72.7	E			74.6	E			76.3	E		
2	***Mako Way[1]***	EB	64.6	E	50.0	D	67.6	E	49.3	D	94.8	F	55.9	E
		NB	84.5	F			82.4	F			92.2	F		
		SB	9.5	A			9.1	A			8.2	A		
3	***Hammerhead Way[1]***	EB	32.8	C	39.3	D	32.0	C	43.4	D	30.4	C	64.5	E
		NB	44.3	D			50.7	D			81.2	F		
		SB	34.4	C			36.5	D			50.7	D		
4	***87th Street***	EB	27.5	C	12.3	B	29.3	C	13.0	B	34.3	C	15.1	B
		NB	6.5	A			7.0	A			8.5	A		
		SB	14.0	B			14.7	B			17.0	B		
5	***Treasure Coast Elementary***	EB	7.9	A	7.8	A	9.6	A	9.2	A	11.4	B	10.4	B
		WB	6.0	A			7.4	A			8.5	A		
		NB	29.2	C			28.7	C			28.5	C		
6	***Powerline Road[2]***	SB	32.8	D	2.2	A	80.8	F	4.9	A	278.2	F	21.9	C
		EB	1.0	A			0.9	A			0.0	A		
		WB	0.0	A			0.0	A			0.9	A		
7	***66th Avenue***	EB	25.1	C	39.2	D	30.5	C	53.4	D	34.2	C	77.8	E
		WB	38.9	D			59.4	E			97.1	F		
		NB	37.7	D			49.0	D			74.3	E		
		SB	53.1	D			68.0	E			75.3	E		
8	***58th Avenue***	EB	20.0	C	18.4	B	21.7	C	20.9	C	25.4	C	25.5	C
		WB	12.6	B			14.2	B			17.5	B		
		NB	29.0	C			33.9	C			42.6	D		
		SB	38.8	D			44.2	D			55.7	E		
9	***82nd Avenue***	EB	7.0	A	13.9	B	9.2	A	18.3	B	14.8	B	37.6	D
		WB	9.6	A			15.9	B			46.8	D		
		NB	43.6	D			44.0	D			48.1	D		
		SB	32.5	C			32.3	C			31.9	C		

[1]Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); [2]Stop controlled intersection; XX LOS does not meet adopted standard LOS D

(This space intentionally left blank)

As indicated in **Tables 5-9** and **5-10** for opening year 2020, overall intersection LOS operate within threshold at all locations during AM and PM peaks. However, several approaches do not operate within threshold in the interim and design years. The following intersections operate beyond the adopted LOS E standard in either the AM or PM peak hours:

Intersections beyond the acceptable threshold LOS by 2030

- Mako Way

Additional intersections beyond the acceptable threshold LOS by Year 2040

- Hammerhead Way
- Powerline Road
- 66th Avenue
- 58th Avenue

Based on the operational analysis it is anticipated that the intersection of CR 510 at Powerline Road/70th Avenue may require signalization. A preliminary signal warrant evaluation was performed using existing volumes; results show that Warrant 1 Eight-Hour Vehicular Volume and Warrant 2 Four-Hour Vehicular Volume meet the required thresholds. The remaining locations meet the adopted standard.

5.2.3.2 Build Analysis

5.2.3.2.1 Build Roadway Segment Analysis

Tables 5-11 and **5-12** summarize the resultant build condition v/c ratios for all analysis years for AADT and DDHV, respectively. It should be noted that all segments will operate within the LOS standard, having adequate capacity thru design year (2040).

Table 5-11 – Build Volume to Capacity Ratios (AADT)

Segmental Limits		# of Lanes	LOS D	AADT BUILD					
From	To	(speed limit)	SV	2020	V/C	2030	V/C	2040	V/C
CR 512	Mako Way	4LD (>40 MPH)	35,820	14,000	0.39	16,000	0.45	18,500	0.52
Mako Way	800' West of Treasure Coast Elementary	4LD (>40 MPH)	35,820	13,800	0.39	16,200	0.45	19,200	0.54
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	4LD (<35 MPH)	29,160	13,000	0.45	16,000	0.55	19,000	0.65
500' East of Treasure Coast Elementary	66 Avenue	4LD (>40 MPH)	35,820	14,750	0.41	18,250	0.51	23,250	0.65
66 Avenue	58 Avenue	4LD (<35 MPH)	29,160	12,500	0.43	16,000	0.55	21,000	0.72

Table 5-12 – Build Volume to Capacity Ratios (DDHV)

Segmental Limits		# of Lanes	LOS D	DDHV BUILD					
From	To	(speed limit)	SV	2020	V/C	2030	V/C	2040	V/C
CR 512	Mako Way	4LD (>40 MPH)	1,800	743	0.41	850	0.47	982	0.55
Mako Way	800' West of Treasure Coast Elementary	4LD (>40 MPH)	1,800	733	0.41	860	0.48	1,020	0.57
800' West of Treasure Coast Elementary	500' East of Treasure Coast Elementary	4LD (>35 MPH)	1,470	785	0.53	966	0.66	1,147	0.78
500' East of Treasure Coast Elementary	66 Avenue	4LD (>40 MPH)	1,800	891	0.49	1,102	0.61	1,404	0.78
66 Avenue	4LD (>40 MPH)	4LD (>35 MPH)	1,470	755	0.51	966	0.66	1,268	0.86

(this space intentionally left blank)

5.2.3.2.2 Build Intersection Analysis

Tables 5-13 and **5-14** summarize the delay and corresponding LOS at the study intersections for AM and PM peak hours under Build condition. This analysis reveals that low volume, minor approaches at intersections with CR 512, Hammerhead Way (AM), Mako Way (PM), and 58th Avenue are projected to operate at LOS E. For CR 510 at Powerline Road/70th Avenue, the intersection is signalized under the build condition since the preliminary signal warrant evaluation shows the required volume thresholds are met under existing conditions. However, all intersections operate within the adopted LOS D standard thru design year (2040).

Table 5-13 – Build Intersection LOS (AM Peak Hour)

No.	Intersection	MVMT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	*CR 512*	EB	21.9	C	30.0	C	25.2	C	32.0	C	29.7	C	34.6	C
		WB	26.7	C			28.6	C			30.3	C		
		NB	45.7	D			45.6	D			46.1	D		
		SB	60.4	E			60.5	E			62.1	E		
2	*Mako Way*[1]	EB	51.7	D	18.1	A	53.2	D	21.0	C	53.7	D	23.3	C
		NB	31.3	C			35.9	D			39.7	D		
		SB	8.9	A			10.6	B			12.2	B		
3	*Hammerhead Way*[1]	EB	52.5	D	27.1	C	55.2	E	24.9	C	57.2	E	26.1	C
		NB	11.1	B			13.8	B			19.8	B		
		SB	29.6	C			22.9	C			21.3	C		
4	*87th Street*	EB	22.5	C	16.0	B	26.8	C	18.5	B	34.7	C	23.4	C
		NB	8.1	A			9.2	A			10.6	B		
		SB	16.5	B			18.5	B			23.3	C		
5	*Treasure Coast Elementary*	EB	12.6	B	15.0	B	12.6	B	16.0	B	14.8	B	17.9	B
		WB	5.2	A			5.2	A			6.8	A		
		NB	34.9	C			42.3	D			48.0	D		
6	*Powerline Road*	EB	6.4	A	7.3	A	7.1	A	8.3	A	9.0	A	10.8	B
		WB	5.4	A			5.7	A			6.8	A		
		SB	18.4	B			22.0	C			29.5	C		
7	*66th Avenue*	EB	25.9	C	29.9	C	27.6	C	33.3	C	34.7	C	39.0	D
		WB	21.7	C			22.2	C			25.1	C		
		NB	35.6	D			42.1	D			51.5	D		
		SB	32.7	C			39.2	D			46.7	D		
8	*58th Avenue*	EB	17.9	B	17.7	B	20.5	C	21.3	D	29.7	C	30.1	C
		WB	9.0	A			10.7	B			17.0	B		
		NB	30.3	C			40.3	D			53.0	D		
		SB	47.0	D			54.5	D			68.3	E		
9	*82nd Avenue*	EB	11.3	B	13.6	B	12.8	B	14.9	B	14.8	B	17.4	B
		WB	15.2	B			15.9	B			16.7	B		
		NB	22.1	C			25.0	C			32.3	C		
		SB	14.8	B			16.6	B			21.9	C		

[1]Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); XX LOS does not meet adopted standard LOS D

Table 5-14 – Build Intersection LOS (PM Peak Hour)

No.	Intersection	MVMT	2020				2030				2040			
			Approach		Intersection		Approach		Intersection		Approach		Intersection	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	***CR 512***	EB	30.6	C	40.4	D	32.8	C	41.5	D	34.4	C	42.5	D
		WB	37.1	D			38.3	D			39.2	D		
		NB	51.0	D			50.0	D			49.7	D		
		SB	75.6	E			77.8	E			79.8	E		
2	***Mako Way***	EB	53.1	D	27.6	C	54.7	D	30.4	C	56.6	E	32.4	C
		NB	41.5	D			44.9	D			48.3	D		
		SB	9.6	A			10.0	A			10.7	B		
3	***Hammerhead Way***	EB	51.3	D	18.4	B	52.6	D	18.7	B	54.5	D	19.0	B
		NB	11.3	B			11.8	B			12.4	B		
		SB	20.9	C			20.9	C			20.1	C		
4	***87th Street***	EB	24.6	C	11.4	B	26.6	C	12.3	B	30.4	C	14.5	B
		NB	5.9	A			6.4	A			7.7	A		
		SB	13.4	B			14.7	B			17.3	B		
5	***Treasure Coast Elementary***	EB	9.0	A	7.2	A	10.0	A	7.9	A	11.3	B	8.9	A
		WB	4.9	A			5.5	A			6.3	A		
		NB	25.3	C			25.5	C			25.8	C		
6	***Powerline Road***	EB	4.7	A	6.4	A	4.3	A	6.6	A	4.5	A	7.6	A
		WB	5.8	A			5.7	A			6.3	A		
		SB	21.3	C			28.2	C			38.1	D		
7	***66th Avenue***	EB	22.3	C	30.1	C	23.8	C	33.8	C	26.1	C	39.0	D
		WB	25.5	C			27.9	C			33.8	C		
		NB	33.4	C			38.5	D			45.2	D		
		SB	38.8	D			46.1	D			54.3	D		
8	***58th Avenue***	EB	18.4	B	16.4	B	19.2	B	18.2	B	20.5	C	21.4	C
		WB	10.6	B			11.3	B			12.6	B		
		NB	27.1	C			33.5	C			45.3	D		
		SB	35.6	D			42.0	D			55.2	E		
9	***82nd Avenue***	EB	9.0	A	15.3	B	9.1	A	17.2	B	9.8	A	21.1	C
		WB	16.1	B			17.5	B			22.4	C		
		NB	26.5	C			33.3	C			41.5	D		
		SB	18.6	B			23.6	C			30.6	C		

[1]Based on HCM2000 Synchro Reports (HCM2010 does not support 1 controller for 2 intersections); XX LOS does not meet adopted standard LOS D

5.2.4 Roundabout Screening

In compliance with the Plans Preparation Manual (PPM), eight intersections along the study corridor were analyzed for the potential installation of roundabouts in lieu of traditional (signalized) intersections. The eight traditional locations that intersect CR 510 along the study corridor include CR 512, Mako Way, Hammerhead Way, 87th Street, Treasure Coast Elementary, Powerline Road, 66th Avenue, and 58th Avenue.

The primary benefits resulting from the installation of roundabouts are safety improvements, reduction in delay, speed reduction on the approach to congested areas, and community enhancements (although they are not intended to be constructed solely for this purpose). Another benefit that results from the installation of roundabouts is improved access management. The ability to easily maneuver u-turns at a roundabout provides access to properties on the opposite side of a restrictive median, thereby reducing the number of median openings that might otherwise be needed.

A roundabout evaluation was conducted in accordance with the Florida Intersection Design Guide to determine if a roundabout is the appropriate control measure for each proposed intersection. The recommended three step procedure was performed including (1) a physical examination of geometric, gross traffic, and historical characteristics; (2) a benefit/cost analysis; and (3) a detailed geometric and operational analysis. The 2010 Highway Capacity Software (HCS 2010) was used to provide the detailed traffic analyses of the roundabout option for comparison purposes with the signalized scenarios from the DTTM. Two specific years were modeled to correspond to the roadway design parameters; 2020 (opening year), and 2040 (design year). Further detailed analyses information is included in the Roundabout Screening Analysis Report, a companion document to this Preliminary Engineering Report.

As shown on **Table 5-15**, of the eight intersections under consideration, two passed the initial Step 1 Screening analyses. The two intersections at 87th Street and 66th Avenue were advanced to Step 2, and following favorable results, consequently advanced to Step 3 analyses. **Table 5-15** shows the results of the Roundabout Screening Analyses, and summarizes Delay and Level of Service for the roundabout option contrasted to a traditional signalized option. In addition, the table also documents that officials from the

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods. In summary, only the provision of a roundabout at the 66th Avenue intersection was found to be a viable option and is therefore recommended.

Table 5-15 – Roundabout Screening Summary

Intersection	Step 1	Step 2	Step 3							
			HCM 6th Edition Delay (LOS)							
			2020 AM		2020 PM		2040 AM		2040 PM	
	Pass	B/C	R'about	Signal	R'about	Signal	R'about	Signal	R'about	Signal
CR 512										
Mako Way										
Hammerhead Way										
87th Street	✓	3.6	7.6 (A)	16.0 (B)	6.2 (A)	11.4 (B)	34.0 (D)	22.8 (C)	8.6 (A)	14.7 (B)
87th Street w/RT By-Pass	✓	4.7	-	-	-	-	10.4 (B)	-	8.4 (A)	-
Treasure Coast Elementary										
Powerline Road										
66th Avenue	✓	4.5	12.8 (B)	29.4 (C)	11.4 (B)	29.3 (C)	89.3 (F)	38.4 (D)	51.8 (F)	38.9 (D)
66th Avenue w/RT By-pass	✓	12.4	-	-	-	-	21.2 (C)	-	24.5 (C)	-
58th Avenue	✓									

As can be seen from the summary in **Table 5-15**, the roundabout option is superior in safety and construction based on the benefit/cost ratio, as well as operations based on delay and Level of Service, with the exceptions during the 2040 AM Peak condition and 66th Avenue during the 2040 PM Peak condition. The 87th Street analysis also exhibited the lowest benefit/cost ratio of the Step 2 analyses, although it is still very favorable when the right-turn bypass lane is included.

The results of the roundabout operational analysis indicate that a westbound and an eastbound right turn bypass will be required in the design year (2040) in order to provide adequate LOS. These bypasses could be constructed at a later time when there is a traffic need. The construction of right-turn by-passes in 2040 would represent a much more cost effective restoration of operations than the comparative improvements that would be required to provide a similar restoration of operations for a signalized intersection (see **Appendix F** for more details).

5.3 Safety Improvements

The recommended alternative was analyzed to determine relative safety performance and societal costs in accordance with the Highway Safety Manual (AASHTO, 2010) (see **Appendix G**).

Based on a direct comparison of traffic volumes under existing conditions to those same volumes under proposed conditions, there is a marked decrease in crashes under the new cross section. Under existing conditions, the expected number of crashes is 66.43, while under proposed conditions, the number of expected crashes is 53.50, a decrease of 19.5%. Societal costs of crashes were reduced from $28,721,021 under existing conditions to $8,917,827 under the proposed conditions, for a net benefit of $19,803,194. Another analysis was conducted to gauge the potential safety benefits of installing a roundabout at 66th Avenue. By installing a roundabout at 66th Avenue, the expected number of crashes under proposed conditions drops from 53.50 to 48.30, a further decrease of 12%. This provides an additional benefit of $1,112,353. Safety and societal costs are anticipated to be greatly improved through the reconstruction of CR 510 from a two-lane undivided section to a four-lane divided section. In addition, the replacement of a signalized intersection at 66th Avenue with a roundabout will further contribute to safety performance and reductions in societal costs. Societal benefits will also include reduction in fuel consumption, minimized delay, and property access in lieu of median openings.

5.4 Structural Analysis

There are three new proposed bridge structures and one proposed culvert along CR 510 between CR 512 and 58th Avenue. As shown on **Figure 5-12**, from west to east, the first structure is the new crossing at Lateral D Canal at a more gradual curve and a 1,091-ft radius via three culverts and proposes to eliminate bridge No. 880047. The next two structures are the replacements of existing bridge No. 880063 over Lateral C Canal and bridge No. 880044 over Lateral L Canal. The last new structure is the replacement of the existing pipe culvert at the South Prong Slough with a new bridge. The following sections provide a brief synopsis of the structural considerations for the four bridges.

It should also be noted that sheet piling will be required just north of 87th Street due to encroachment into a County owned wetland located on the west side of CR 510.

The encroachment is necessary in order in avoid direct impacts and realignment of Lateral D Canal on the east side of CR 510. See concept plans in **Appendix E** for more detail.



5.4.1 CR 510 over Lateral D Canal

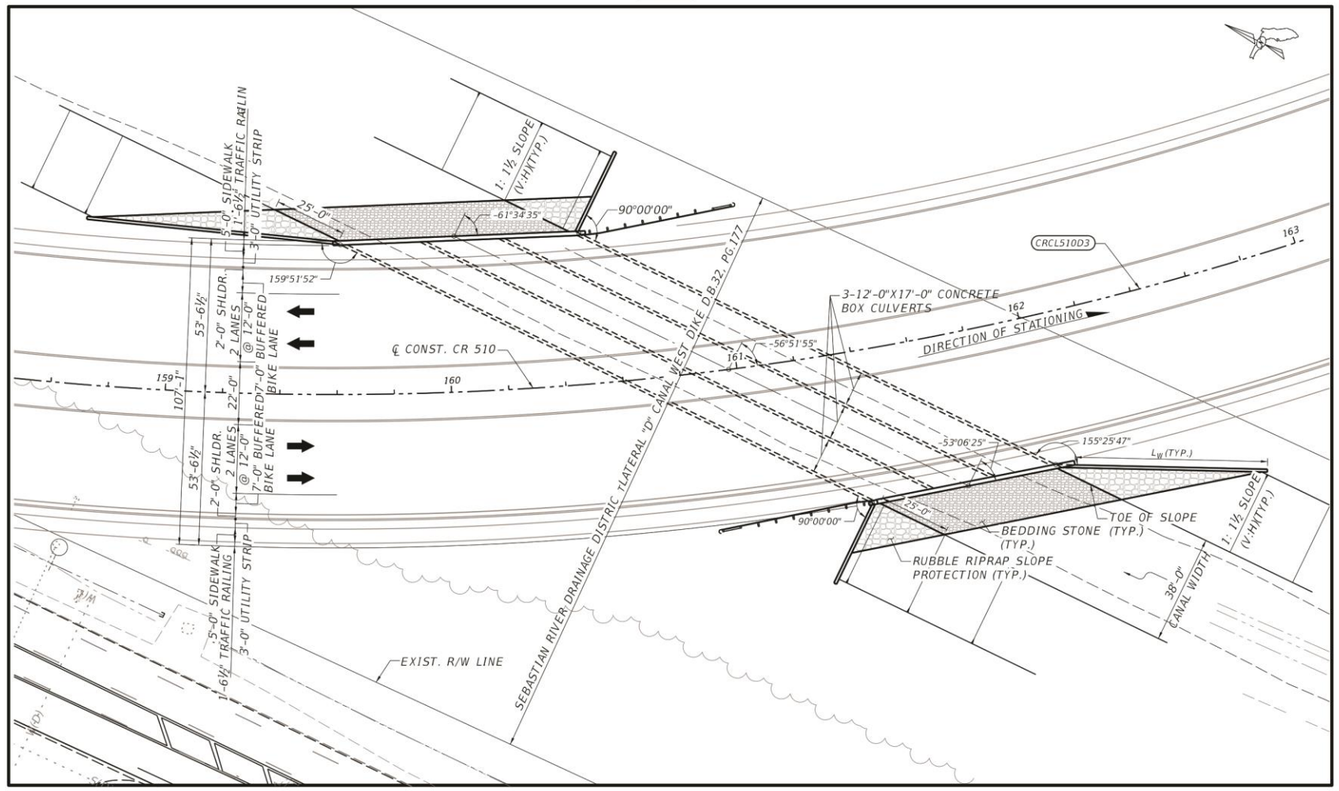
Alternatives

Initially, an alternative to rehabilitate and maintain the existing bridge to provide direct access to Treasure Coast Elementary School from the adjacent neighborhood was considered. However, concerns of potential flooding impacts upstream with two vehicular structures in proximity to one another resulted in the elimination of this alternative and prompted the removal of the existing structure.

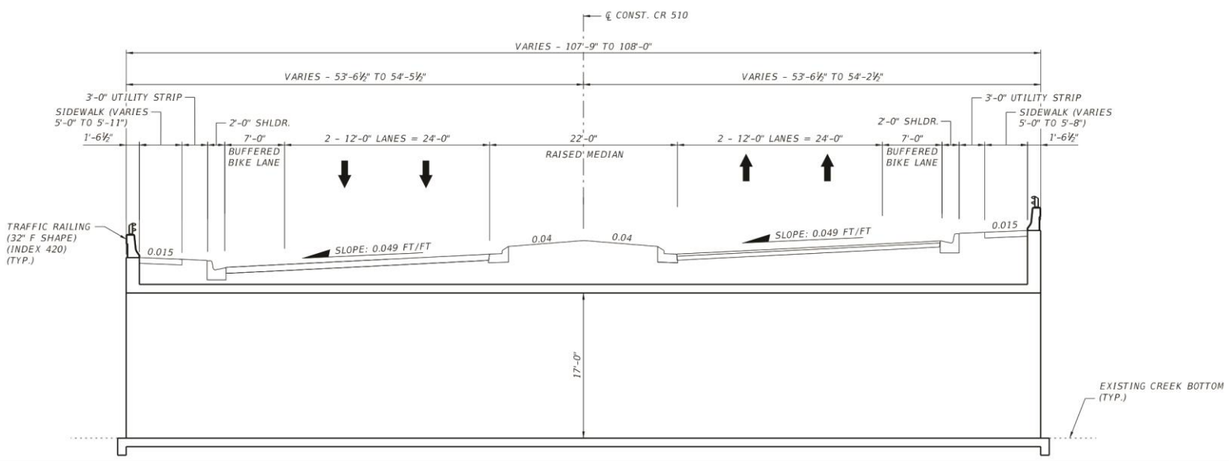
Three alternatives were evaluated for the replacement structure including: 1) a continuous multi-span cast-in-place (CIP) concrete flat slab, 2) a single span Florida I Beam (FIB), and 3) a multi-cell reinforced concrete box culvert option. Due to the highly skewed condition that is created by the radial alignment of the new roadway crossing the tangent north-south Lateral D Canal, the bridge options were very costly and geometrically challenged. These options yielded acute angle slab conditions which are unfavorable for reinforcing and detailing. The maximum skew allowed by the FDOT Structures Design Guidelines (SDG) Section 1.10 for supports is 60 degrees and is very difficult to achieve with a bridge at this location. Limitations on the span length for the CIP flat slab was constrained by a practical limit of 35 feet which required four intermediate supports along

the curve. The number of pile foundations required were numerous due to the bent supports being nearly 200 feet in length along the canal. The estimated cost of this option is $2.5M. The FIB option required less intermediate supports, however, it was offset by the high number of beams required and the need to overbuild the bridge to accommodate the radial geometry with tangent beam elements. The approximate construction cost of this option is $3M. Because of these facts, the preferred replacement structure option at this site is a 3 cell 12-ft (span) x 17-ft (depth) reinforced concrete box culvert. The selection of this option was driven by the radial geometry, constructability, and its reduced cost ($2.0M). The culvert more closely accommodates the roadway while providing a seamless crossing over the canal without approach slabs, expansion joints, and with a reduced structure depth. This option has been thoroughly coordinated with the Sebastian River Improvement District (SRID), Indian River County, FDOT, and local private stakeholders. A conceptual permit has also been prepared for approval to further gain acceptance. The non-standard culvert depth is governed by the existing canal bottom and by SRID's desire to provide a 1-ft drift clearance over the 100 year flood elevation, which is not usually a requirement for box culverts. Although the hydraulic demand only requires two cells, a third cell was proposed in order to alleviate resident's concerns of flooding upstream during an extreme event. The Bridge Hydraulic Report (BHR) prepared for this study shows that the proposed culvert is not anticipated to impact the canal. The SRID Permit Manual requires rubble riprap to be constructed from the top of bank to the toe of slope for 25 feet upstream and downstream. The side slopes for the culvert openings will be 1:1½ as permitted by FDOT Design Standard Index 289 and generally matches the existing canal bank slope. Whereas, the bridge options are required to provide 1:2 slopes which makes the bridge span over the canal longer. The culvert wing walls will be skewed to align with the canal and tie-in the side slopes. It should be noted that the constructability of the culvert will need to maintain conveyance through the canal during construction and will require an extensive water bypassing plan to avoid causing adverse impacts to the water levels and offsite properties. The cells will be required to be constructed in phases and precast elements would be advantageous to reduce construction time. These nonstandard size precast culverts are often shipped on site in two "clamshell" pieces, one each for the top and bottom. Please refer to **Figure 5-13** for a plan and elevation view of the preferred culvert option.

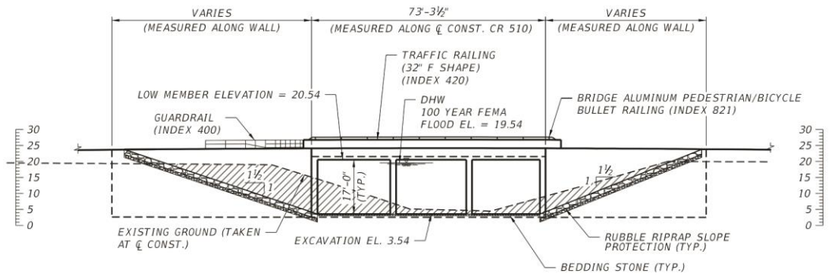
PLAN



TYPICAL SECTION

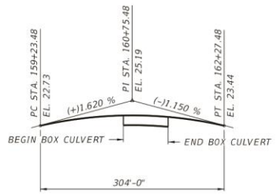


ELEVATION



VERTICAL CURVE DATA

(℄ CONST. CR 510)



HORIZONTAL CURVE DATA

CURVE CRCL510D3

PI STA. = 165+79.41
Δ = 90° 08' 34" (LT)
D = 5° 15' 06"
T = 1,093.72
L = 1,716.46
R = 1,091.00
PC STA. = 154+85.69
PT STA. = 172+02.15

TRAFFIC DATA

CURRENT YR. EST. - 2015 AADT = 14,000
OPENING YR. EST. - 2020 AADT = 16,000
DESIGN YR. EST. - 2040 AADT = 26,000
DESIGN SPEED = 50 MPH
K = 9%
D = 67.1%
T = 5.4% (24 HR)

LEGEND:

	LIMITS OF EXCAVATION
	GENERAL USE LANES
L.M.E.	LOW MEMBER ELEVATION
NHW	NORMAL WATER LINE
DHW	DESIGN WATER LINE
E	EXPANSION BEARING
EJ	EXPANSION JOINT

Proposed CR 510 over Lateral D Canal Culvert Characteristics **Figure 5-13**

Typical Section (see **Figure 5-13**, bottom left)

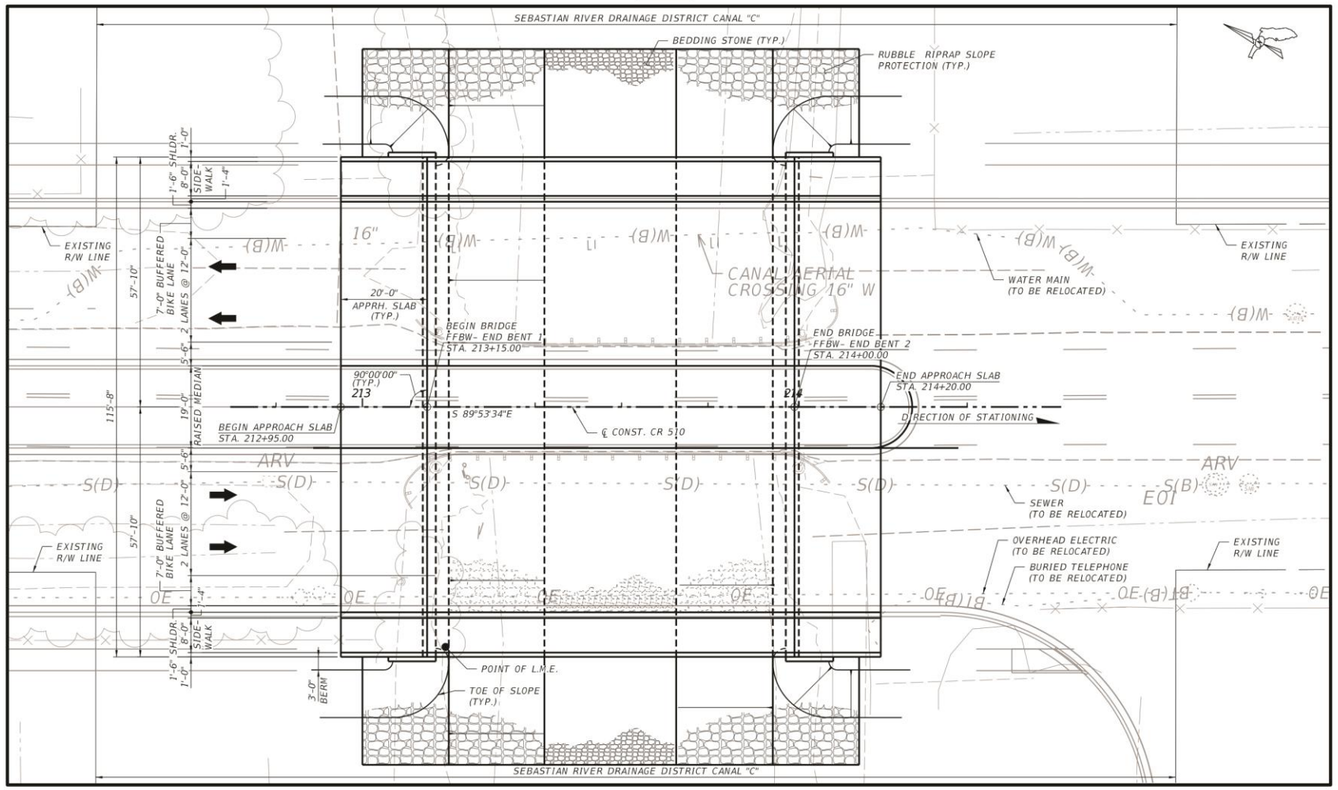
The culvert typical section includes two (2) 12 foot lanes in each direction separated by a 22 foot raised median with a 7 foot buffered bike lane, a 2 foot shoulder, a 3 foot utility strip, a 5 foot minimum width sidewalk, and a 32 inch F-Shape barrier mounted on the culvert headwalls on both sides of the roadway. The cross slope is 4.9% for this portion of roadway along the curve.

5.4.2 CR 510 over Lateral Canal C

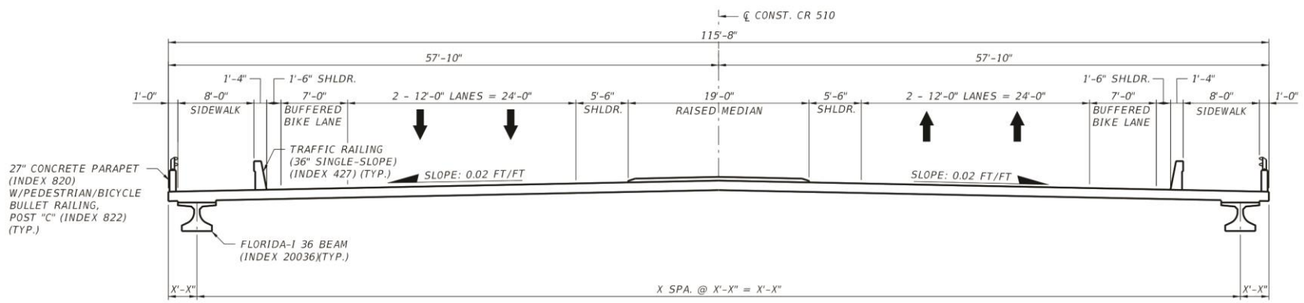
Alternatives

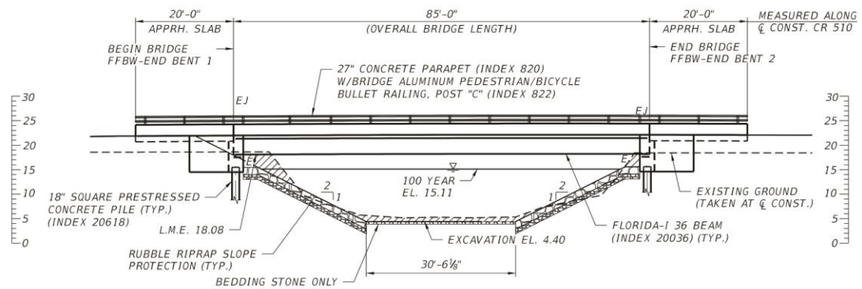
The proposed bridge is in a tangent section of CR 510 and three alternatives were evaluated for this structure including: 1) a continuous multi-span cast-in-place (CIP) concrete flat slab, 2) a multi-span Prestressed Florida Slab Beam (FSB), and 3) a single span FIB option. Due to the SRID Permit Manual requirement to provide a minimum 25 foot clear bent spacing in the middle of the canal, the flat slab options would require a 25 foot plus center span. The estimated cost of these options is approximately $2.25M for the (CIP) flat slab and $2.75M for the prestressed (FSB). The FIB option would not require intermediate supports and can clear span the canal with an 85 foot span length. Its estimated cost is approximately $2M. All of the evaluated alternatives would be founded on bent caps with 18-in square prestressed concrete pile foundations. Although the flat slab options provide a shallower superstructure depth, the cost of introducing two additional intermediate pile bent supports for the widths of the bridge outweighs the profile grade adjustment required for the FIB structure depth. Therefore, the preferred option is a single span FIB 36 option. A 1 foot drift clearance over the 100 year flood elevation is required by the SRID Permit Manual as well as rubble riprap from top of bank to toe of slope at a 1:2 slope for the entire width of the bridge and for 25 feet upstream and downstream. Furthermore, the bottom of the canal shall be lined with a bedding stone layer (FDOT No. 4 stone), for a 6 inch minimum thickness. The vertical profile is a 200-ft vertical curve with less than 1% entrance and exit grades. The bridge span arrangement and profile have also been confirmed by the BHR prepared for this project. Please refer to **Figure 5-14** for a plan and elevation view of the preferred simple span beam option.

PLAN

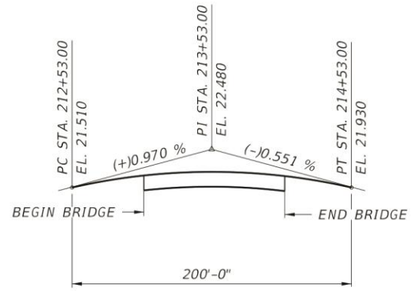


TYPICAL SECTION





ELEVATION



VERTICAL CURVE DATA

(℄ CONST. CR 510)

TRAFFIC DATA

CURRENT YR. EST. - 2015 AADT = 14,000
OPENING YR. EST. - 2020 AADT = 16,000
DESIGN YR. EST. - 2040 AADT = 26,000
DESIGN SPEED = 50 MPH
K = 9%
D = 67.1%
T = 5.4% (24 HR)

LEGEND:

	LIMITS OF EXCAVATION
	GENERAL USE LANES
L.M.E.	LOW MEMBER ELEVATION
NHW	NORMAL WATER LINE
DHW	DESIGN WATER LINE
E	EXPANSION BEARING
EJ	EXPANSION JOINT

Proposed CR 510 over Lateral C Canal Bridge Characteristics **Figure 5-14**

Utilities

Multiple aerial water mains and overhead electric and communication utilities will be impacted as a result of the new bridge footprint. An alternative to the aerial water main relocation outside the bridge footprint is jacking and boring them which would need to be closely coordinated with the permanent foundation locations.

Typical Section (see **Figure 5-14**, bottom left).

The bridge typical section includes two (2) 12-ft lanes in each direction separated by a 19-ft raised median with a 5.5-ft inside shoulder, a 7-ft buffered bike lane, a 1.5-ft outside shoulder, a single slope barrier, a 5-ft width sidewalk, and a 27-in parapet on each side. The typical section is crowned at 2%. The approach slabs can be 20-ft standard flexible approach slabs per FDOT Developmental Standard 20920 since the roadway meets off the state highway system criteria as well as the low average daily traffic (ADT) and low average daily truck traffic (ADTT) volume requirements.

Sight distance for the future 82nd Avenue on the southeast corner of the bridge site will need to be considered as it relates to the proposed traffic railing locations.

5.4.3 CR 510 over Lateral L Canal

Alternatives

This proposed bridge is also in a tangent section of CR 510 and the alternatives evaluated for this structure were again a multi-span CIP concrete flat slab (approximate cost $2M), a Prestressed Florida Slab Beam ($2.5M), and a single span FIB option ($1.75). AASHTO Type II beams were not considered due to the tight spacing that would be required for the bridge span length. The flat slab options would require a 25 foot plus center span. The FIB option would not require intermediate supports and can clear span the canal with a 74 foot span length. Therefore, the preferred option once again is a single span FIB 36 option. All of the evaluated alternatives would be founded on bent caps with 18 inch square prestressed concrete pile foundations. The same slope protection and drift clearance requirements for the Lateral C Canal bridge crossing will be necessary at this site and have been confirmed by the BHR prepared for this project. One special

consideration at this crossing is the accommodation of a planned multi-use recreational trail below the east approach to be implemented by Indian River County as part of the St. Sebastian River Greenway. The minimum vertical clearance (MVC) for a shared use path is required to be 8-ft for the entire walking surface per FDM section 224.8. A 9.5-ft clearance from the top of riprap to the bottom of beam was provided in order to allow for construction of a level walkway on top of the riprap above the normal high water elevation and still meet the MVC. The vertical profile for this bridge to accommodate the hydraulic and trail path requirements is partially within a tangent grade and a 550-ft vertical curve at a 1.007% grade. Please refer to **Figure 5-15** for a plan and elevation view of the preferred simple span beam option.

Utilities

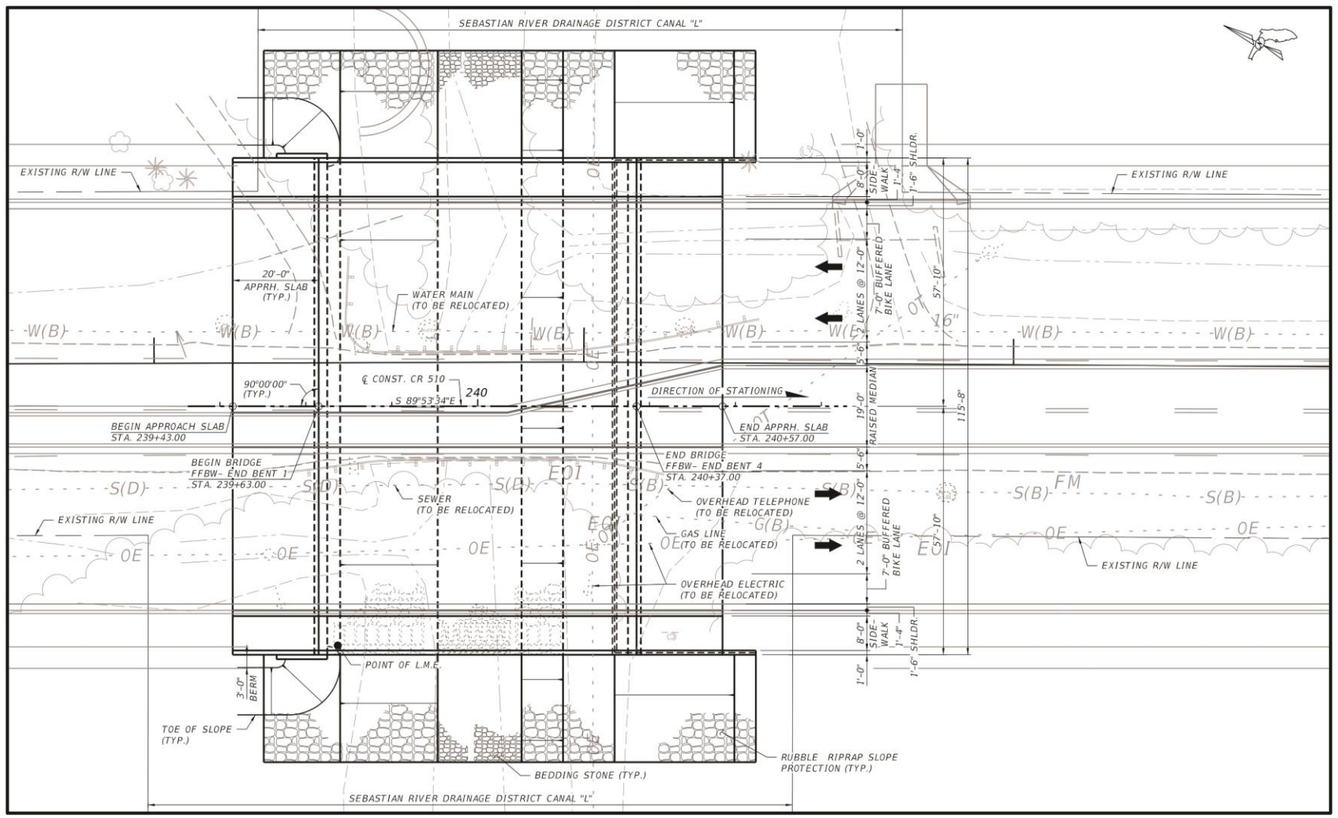
Utility impacts at this location due to the new bridge footprint include an aerial water main, a buried sewer main, a gas main, and overhead electric lines in the direction of stationing and transverse. The alternative to the aerial water main relocation is jacking and boring and can be coordinated with the permanent foundation locations. The foundation locations may also be strategically placed to avoid impacts to the buried utilities. However, special consideration will need to be given to the gas main on the east approach such as maintaining the proper clearance and pre-forming to a depth below the utility.

Typical Section (see **Figure 5-15,** bottom left)

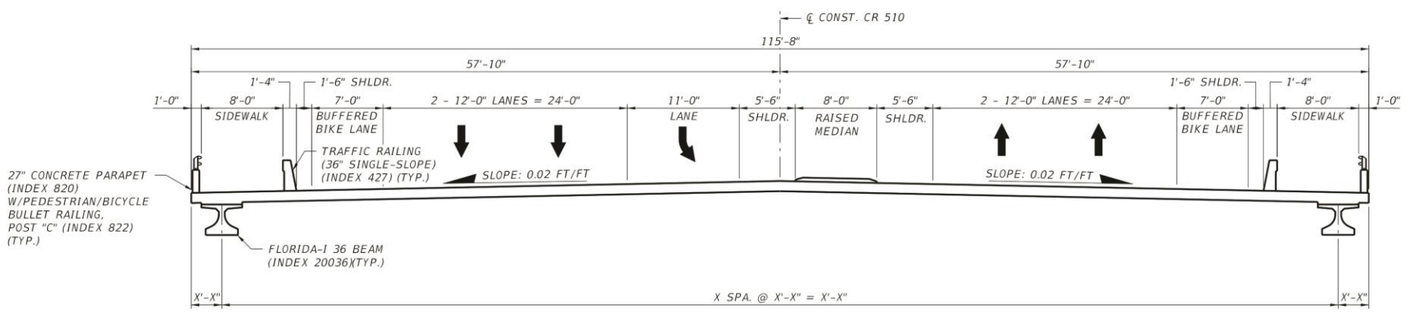
The bridge typical section includes two (2) 12-ft lanes in each direction with a dedicated left turn lane westbound separated by an 8-ft raised median with a 5.5-ft inside shoulder, a 7-ft buffered bike lane, a 1.5-ft outside shoulder, a single slope barrier, a 5-ft width sidewalk, and a 27-in parapet on each side. The typical section is crowned at 2%. The approach slabs at this location are also 20-ft standard flexible approach slabs.

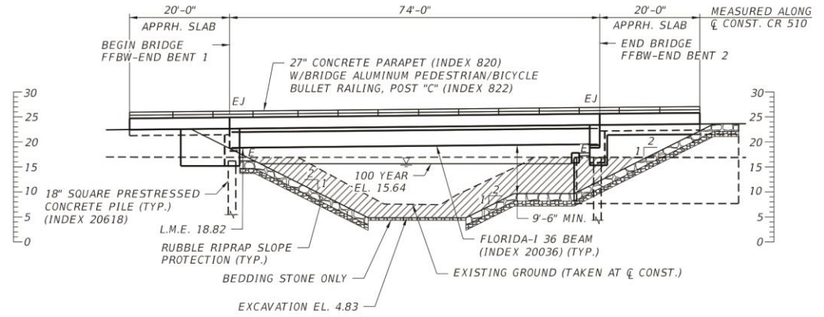
Sight distance will also need to be considered at this location for connecting driveways with respect to the proposed traffic barrier locations.

PLAN

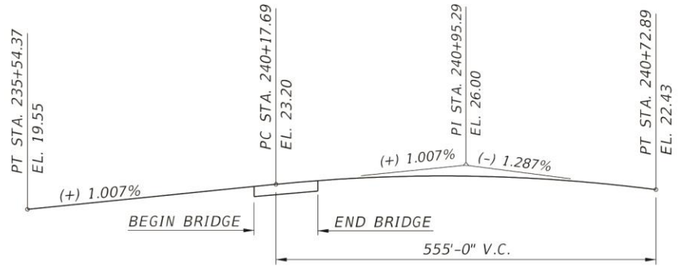


TYPICAL SECTION





ELEVATION



VERTICAL CURVE DATA

(℄ CONST. CR 510)

TRAFFIC DATA

CURRENT YR. EST. - 2015 AADT = 14,000
OPENING YR. EST. - 2020 AADT = 16,000
DESIGN YR. EST. - 2040 AADT = 26,000
DESIGN SPEED = 50 MPH
K = 9%
D = 67.1%
T = 5.4% (24 HR)

LEGEND:

	LIMITS OF EXCAVATION
➡	GENERAL USE LANES
L.M.E.	LOW MEMBER ELEVATION
NHW	NORMAL WATER LINE
DHW	DESIGN WATER LINE
E	EXPANSION BEARING
EJ	EXPANSION JOINT

Proposed CR 510 over Lateral L Canal Bridge Characteristics **Figure 5-15**

5.4.4 CR 510 over Slough

The bridge over the Slough will replace an existing pipe culvert that is oriented in the north-south direction with a skewed bridge that will run parallel with the Slough waterway. Reconstruction of the canal at this location will be necessary.

Alternatives

The alternatives evaluated for this structure were limited to two bridge beam options which include a single span FIB option and a single span AASHTO Type II beam option for the proposed 63 foot span length. A CIP concrete flat slab would require a main span greater than 25 feet and two (2) very short approach spans that would be impractical and similar to what is currently in place. The proposed span is also just outside the practical limit of a single span FSB, especially considering the skew. Both of the evaluated alternatives would be founded on bent caps with 18 inch square prestressed concrete pile foundations. The preferred option is a single span AASHTO Type II beam superstructure. The same slope protection and drift clearance requirements for Lateral C and L Canal crossings will be necessary at this site and have also been confirmed by the BHR prepared for this study. This bridge is within a 550-ft vertical curve on the exit grade of -1.287%. Please refer to **Figure 5-16** for a plan and elevation view of the simple span AASHTO Type II beam option.

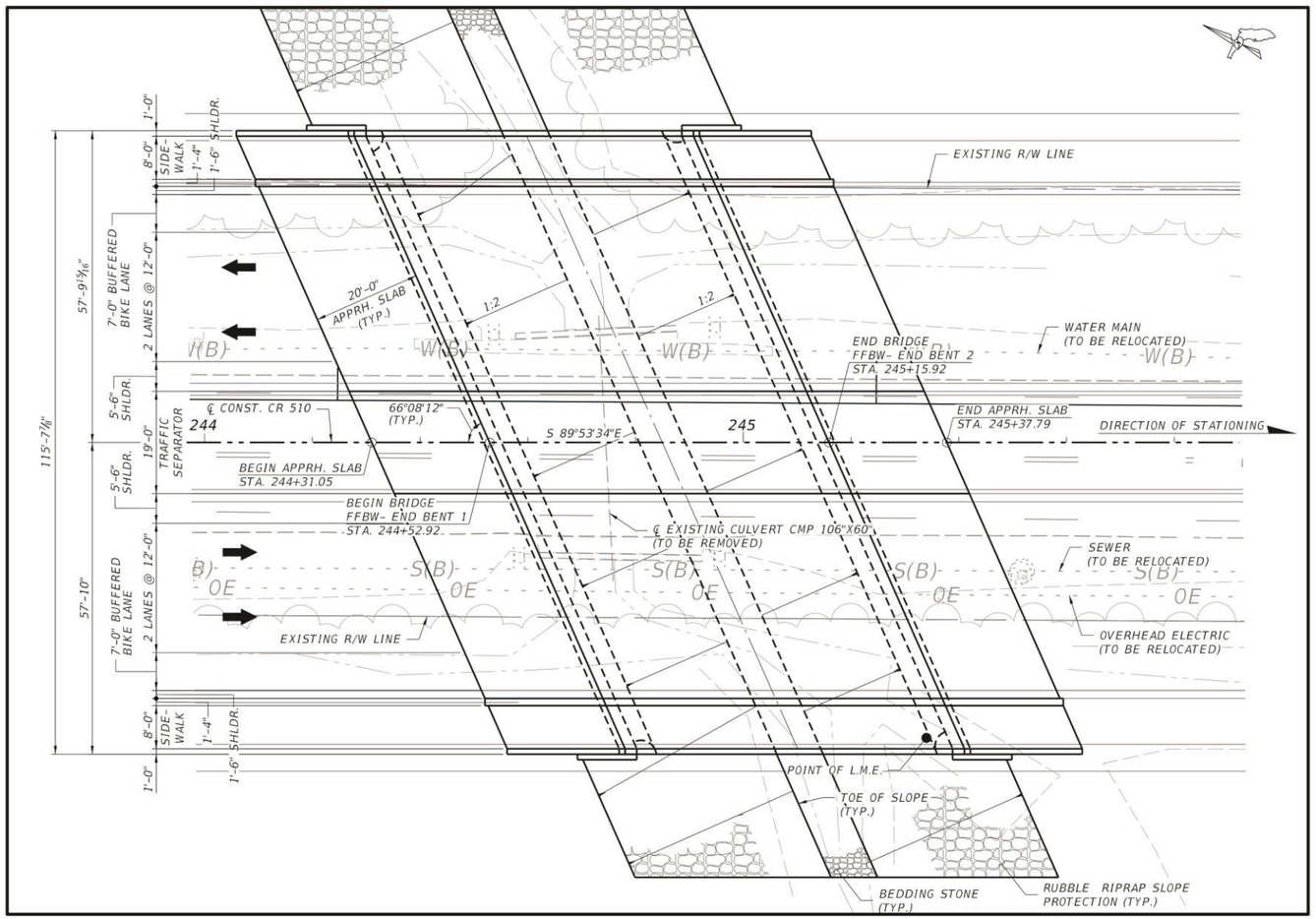
Utilities

Utility impacts will persist due to the new bridge footprint including an underground water main and sewer main, and overhead electric to the south. The buried structures have the potential to be located or straddled by the proposed foundations.

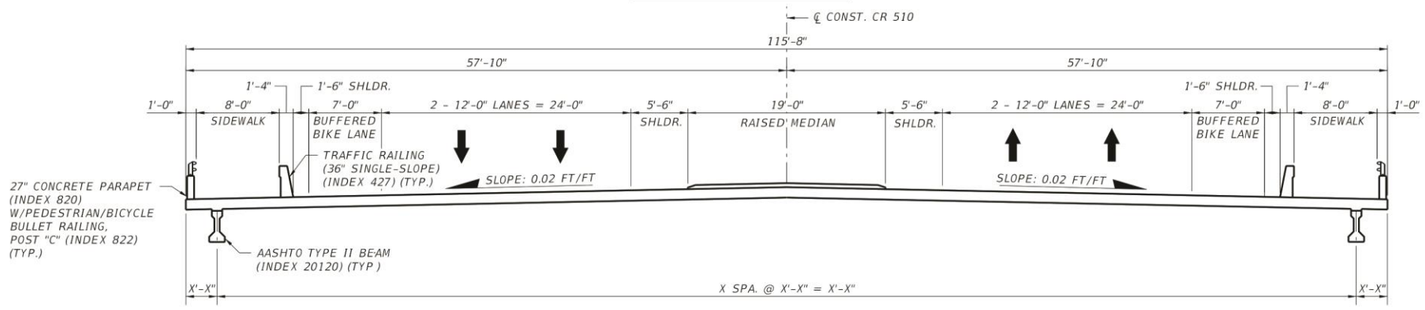
Typical Section

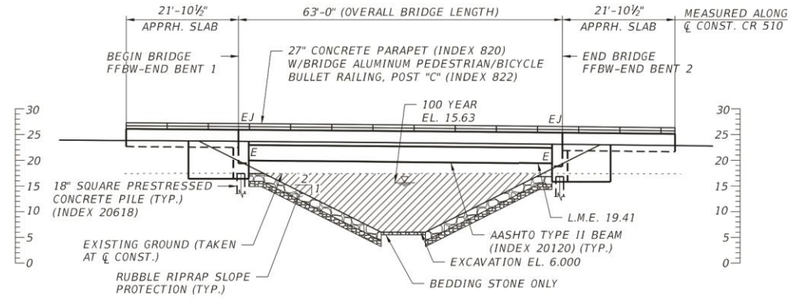
The bridge typical section includes two (2) 12-ft lanes in each direction separated by a 19-ft raised median with a 5.5-ft inside shoulder, a 7-ft buffered bike lane, a 1.5-ft outside shoulder, a single slope barrier, a 5-ft width sidewalk, and a 27-in parapet on each side. The typical section is crowned at 2%. The approach slabs are 20-ft minimum standard flexible approach slabs. Please refer to **Figure 5-16** for a bridge typical section.

PLAN

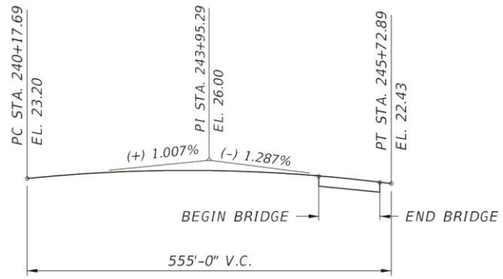


TYPICAL SECTION





ELEVATION



VERTICAL CURVE DATA

(℄ CONST. CR 510)

TRAFFIC DATA

CURRENT YR. EST. - 2015 AADT = 14,000
OPENING YR. EST. - 2020 AADT = 16,000
DESIGN YR. EST. - 2040 AADT = 26,000
DESIGN SPEED = 50 MPH
K = 9%
D = 67.1%
T = 5.4% (24 HR)

LEGEND:

	LIMITS OF EXCAVATION
	GENERAL USE LANES
L.M.E.	LOW MEMBER ELEVATION
NHW	NORMAL WATER LINE
DHW	DESIGN WATER LINE
E	EXPANSION BEARING
EJ	EXPANSION JOINT

Proposed CR 510 over Slough Bridge Characteristics **Figure 5-16**

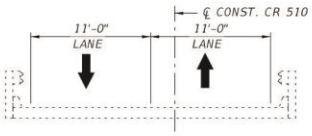
5.4.5 Temporary Traffic Control

The new bridge structure over Lateral D Canal can be constructed offline along the new alignment while traffic is maintained on the existing structure. There is ample staging area on both sides of the canal to deliver materials and construct the new structure from the existing banks.

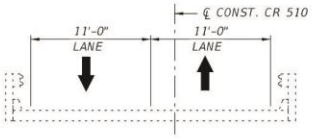
The replacement of bridge No. 880063 over Lateral C Canal requires phased construction in order to maintain traffic on the existing bridge while constructing portions of the new structure. Two construction phases are proposed (see **Figure 5-17**) which include building the portion south of the bridge in Phase 1 while two-way traffic is maintained on the existing bridge. The crane staging area will be from the bridge approaches while materials are delivered on the existing roadway. The Phase 1 width provides ample room for the 28-ft crane width and swing span as it is anticipated that two 150 ton cranes will be required to construct the bridge from the approaches. Phase 2 will shift two-way traffic onto the newly constructed Phase 1 structure, demolish the existing bridge and construct the remainder of the proposed structure.

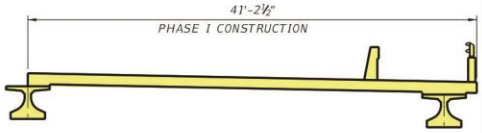
The replacement of bridge No. 880044 over Lateral L Canal requires phased construction as well, similar to the bridge replacement of Lateral C Canal (see **Figure 5-17**). However, over excavation of the canal will be necessary for the altered proposed bridge span limits which will require temporary critical walls between phases to retain the existing roadway.

The replacement bridge over Slough will again require a construction sequence similar to the Lateral C and Lateral L Canal bridge replacements (see **Figure 5-17**) with the use temporary critical walls between phases due to the canal work. A temporary work platform or cofferdam may also be necessary due to the steep side slopes and wetlands at this location. The proposed grade is substantially higher at this location and the proposed structure during Phase 1 can be constructed above portions of the existing culvert in order to provide the required travel lanes on the new structure during the construction of the second phase.



EXISTING





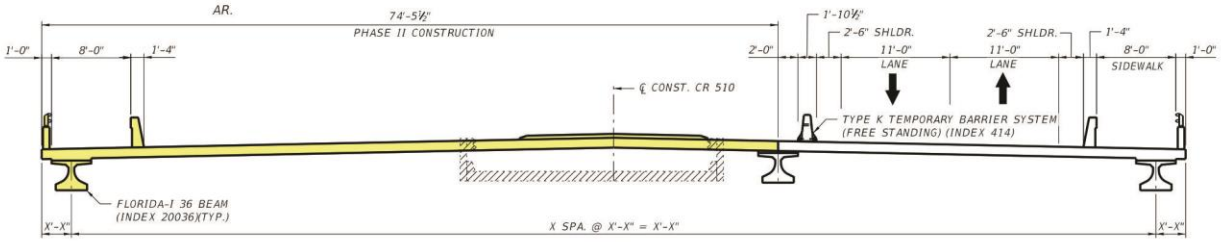
PHASE I

NOTES:

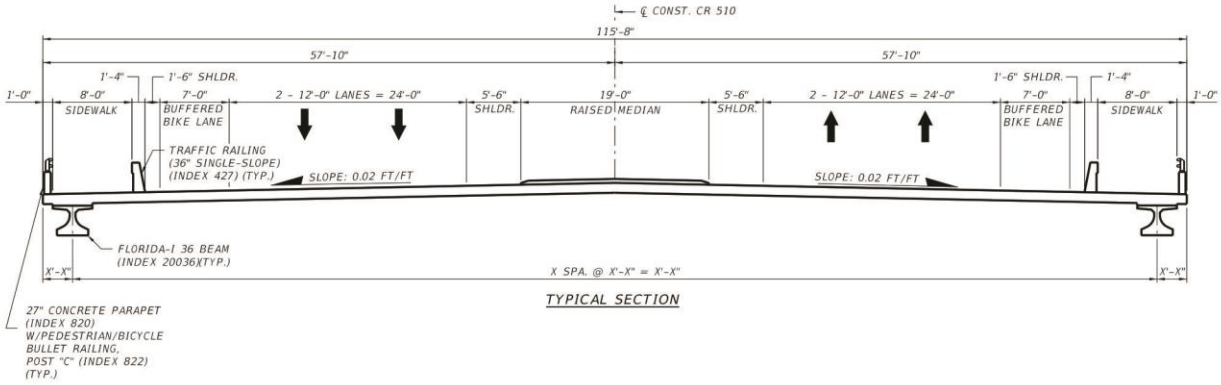
1. LATERIAL CANAL C SHOWN, LATERAL L AND SLOUGH CONSTRUCTION SEQUENCE SIMILAR

LEGEND:

PORTION OF EXISTING STRUCTURE TO BE REMOVED



PHASE II



TYPICAL SECTION

Temporary Traffic Control Plan **Figure 5-17**

5.5 Utility Impact Potential

Details of the utilities present and potentially impacted can be found in the Utility Assessment Package prepared for this study. To determine the extent of utility adjustments from project improvements, local utility companies with known facilities within the project limits were contacted and requested to submit the location of their existing and planned facilities. Refer to **Table 2-2** (page 2-12) for a list of utilities present within the project limits. It should be noted that this information is not to be used for construction activities. Please contact each utility company prior to digging.

There is an extensive amount of overhead utilities within the study area that may be impacted by the proposed improvements. Most overhead utilities that run along the south of CR 510 from the curve to 66th Avenue then shift north from 66th Avenue to 58th Avenue have a potential for conflict.

An FP&L transmission line is located within an easement along the south of CR 510 east of Powerline Road to 66th Avenue. Some poles have the potential to be impacted due to the alignment shift required to tie into the proposed roundabout intersection at 66th Avenue. Relocation of FPL Transmission facilities within their easements that are to be relocated or affected by the proposed construction must be reviewed and approved by Department for compensable interest. FPL Distribution is attached at various locations to FPL Transmission and has possible compensable interests at these locations.

As previously stated, there is a Florida City Gas line that runs along the south side of CR 512 and cross the CR 510 intersection that has the potential to be impacted by the proposed widening. The gas line then runs along the west of CR 510 from CR 512 to the curve then south after the curve to 62nd Avenue, afterwards the gas line shifts to the north side of CR 510 until 58th Avenue where it crosses and continues along the west side of 58th Avenue. This gas line may be impacted by the recommended alternative, further coordination is required to determine depth and exact location to determine potential conflicts.

There are various Indian River County utilities, including a 16 inch water main, 12” PVC line and an inch reuse water main line, these utilities have possible conflicts caused by

the recommended alternative. There are also various telephone and fiber optic utilities that have a high likelihood of impacted caused by the recommended alternative along CR 510 east of the curve to 58th Avenue.

As previously mentioned in Section 5.3, the proposed structures will impact multiple utilities. At Lateral C Canal, multiple aerial water mains and overhead electric and communication utilities. An alternative to the aerial water main relocation outside the bridge footprint is jacking and boring them which would need to be closely coordinated with the permanent foundation locations. At Lateral L Canal utility impacts include an aerial water main, a buried sewer main, a gas main, and overhead electric lines in the direction of stationing and transverse. The alternative to the aerial water main relocation is jacking and boring and can be coordinated with the permanent foundation locations. The foundation locations may also be strategically placed to avoid impacts to the buried utilities. However, special consideration will need to be given to the gas main on the east approach such as maintaining the proper clearance and pre-forming to a depth below the utility. At the South Prong Slough, utility impacts include an underground water main and sewer main, and overhead electric to the south. The buried structures have the potential to be located or straddled by the proposed foundations.

5.6 Drainage

Please refer to the Preliminary Drainage Report (PDR), a companion document to this PER for more details. Based on a Desktop Analysis and Field Review, existing offsite properties are draining into the County's right-of-way for Basins 1, 2, 3, 5, 6, 7, 8, and 9. The proposed improvements will impact the swale in Basins 5-9 and thus a new offsite drainage system is proposed. To prevent commingling of offsite runoff with onsite runoff, a secondary swale or offsite drainage system is proposed. During an agency meeting on January 23, 2017, FDOT and Indian River County (IRC) both agreed that a secondary swale should be constructed on county property outside of the roadway project. Two different types of offsite drainage systems are proposed. For Basins 5, 6, 7 and a portion of 8, existing homes are not close to the Right of Way line. As such, an Open Swale Offsite Drainage System with a 4 feet bottom width, 1V:4H side slopes, located in a 32 foot wide easement is proposed for these areas. For Basin 9 and a portion of 8, there are existing homes near the proposed CR 510 right-of-way. As such, a 48 inch-wide Trunkline

Offsite Drainage System, located in a 20 feet easement, is proposed for these areas. Details of these drainage systems can be seen in the Typical Section Package in **Appendix E**.

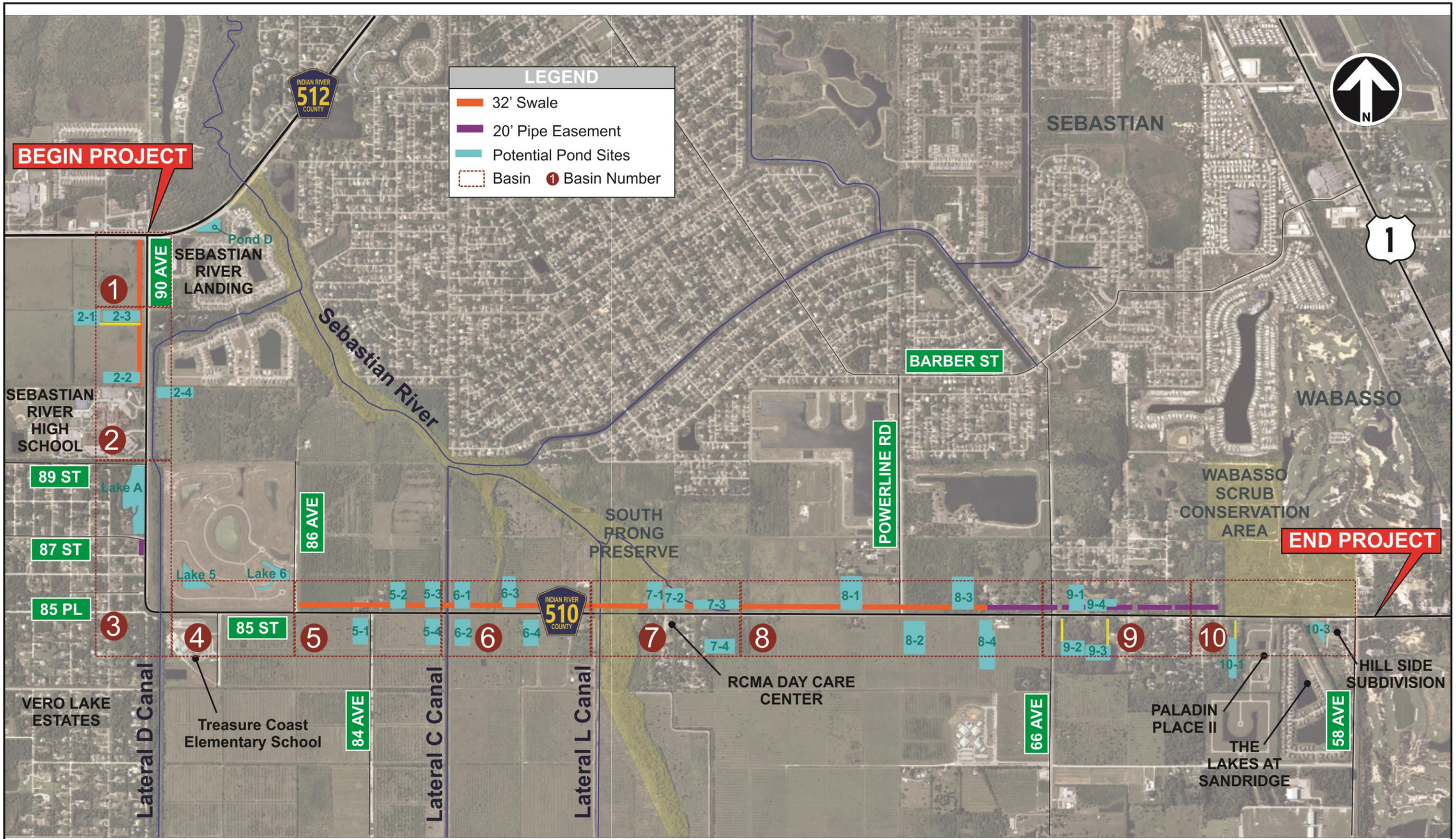
It should be noted that if proposed improvements were to impact the existing offsite drainage system in Basins 1, 2 and 3, a new offsite system (open swale in Basins 1 and 2 and trunkline in Basin 3) is recommended. See **Figure 5-18** for the location of the proposed offsite drainage.

Basin 1

To prevent commingling of offsite runoff with onsite runoff, the existing swale west of CR 510 will be reserved for an offsite drainage system. The proposed improvements, under the recommended alternative, will add 0.20 acres of impervious area to the drainage system. Therefore, the total impervious area will be 2.29 acres. Preliminary calculations indicate that 0.77 ac-ft. of treatment will be required to accommodate the onsite runoff for the recommended alternative. According to Permit No. 56415, existing Pond D has a surplus capacity of 2.94 ac-ft. (total lake volume of 4.23 ac-ft. – treatment volume of 1.29 ac-ft. provided for CR 512). This surplus capacity is sufficient accommodate the proposed roadway improvements under the recommended alternative. Runoff from Basin 1 will increase the water level of Pond D by approximately 6.00 inches.

Basin 2

The proposed roadway will be widened east of CR 510. To prevent commingling of offsite runoff with onsite runoff, the existing swale west of CR 510 will be reserved for an offsite drainage system. The proposed improvements, under the recommended alternative, will add 1.34 acres of impervious area to the drainage system. Therefore, the total impervious area will be 4.75 acres. Preliminary calculations indicate that 1.61 ac-ft. of treatment will be required to accommodate the onsite runoff for the recommended alternative. A wet detention pond is proposed to treat and attenuate 1.65 ac-ft. of runoff for onsite post-development conditions. Offsite runoff will not be treated by this pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One pond site will satisfy the requirements of the basin.



Potential Pond Sites **Figure 5-18**

Basin 3

The proposed improvements, under the recommended alternative, will add 2.41 acres of impervious area to the drainage system. Therefore, the total impervious area will be 5.53 acres. Preliminary calculations indicate that 1.73 ac-ft. of treatment will be required to accommodate the onsite runoff for the recommended alternative. The approach to meet water quality requirements in the basin is to raise the control structure of Lake A by 4 inches. This will provide 1.80 ac-ft. of treatment which is sufficient to accommodate the proposed roadway improvements. As such, no right-of-way acquisition is needed.

In the event that the existing swale on the west side of the existing CR 510 is to be removed, a secondary swale or offsite drainage system is proposed outside of the County's right-of-way. This is to ensure existing drainage patterns are maintained and to prevent commingling of offsite runoff with onsite runoff. Homes adjacent to the basin are located in close proximity to the proposed CR 510 right-of-way. As such, a 48 inch-wide Trunkline Offsite Drainage System, located in a 20 feet easement, is proposed for these areas.

Basin 4

The proposed improvements, under the recommended alternative, will add 2.11 acres of impervious area to the drainage system. Therefore, the total impervious area will be 4.83 acres. Preliminary calculations indicate that 1.51 ac-ft. of treatment will be required to accommodate the onsite runoff. According to Permit No. 95794, Lake 5 and Lake 6 of the Bluewater Bay PUD are providing 3.18 ac-ft. of treatment volume for CR 510. This is sufficient to accommodate the proposed roadway improvements under the recommended alternative.

Basin 5

The proposed improvements, under the recommended alternative, will add 3.38 acres of impervious area to the drainage system. Therefore, the total impervious area will be 5.31 acres. Preliminary calculations indicate that 1.66 ac-ft. of treatment will be required to accommodate the onsite runoff for the recommended alternative. A wet detention pond is proposed to treat and attenuate 1.70 ac-ft. runoff for onsite post-development

conditions. Approximately 2.70 acres of right-of-way will be needed to develop the pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One pond site will satisfy the requirements of the basin.

Basin 6

The proposed improvements, under the recommended alternative, will add 3.34 acres of impervious area to the drainage system. Therefore, the total impervious area will be 5.25 acres. Preliminary calculations indicate that 1.64 ac-ft. of treatment will be required to accommodate the onsite runoff. A wet detention pond is proposed to treat and attenuate 1.70 ac-ft. of runoff for onsite post-development conditions for the recommended alternative. Approximately 2.70 acres of right-of-way will be needed to develop the pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One pond site will satisfy the requirements of the basin.

Basin 7

The proposed improvements, under the recommended alternative, will add 3.40 acres of impervious area to the drainage system. Therefore, the total impervious area will be 5.35 acres. Preliminary calculations indicate that 1.67 ac-ft. of treatment will be required to accommodate the onsite runoff for the recommended alternative. A wet detention pond is proposed to treat and attenuate 1.70 ac-ft. of runoff for onsite post-development conditions. Approximately 2.70 acres of right-of-way will be needed to develop the pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One potential pond site will satisfy the requirements of the basin. There is a 4.85 acres parcel owned by Indian River County (IRC) which is located south of CR 510, between 75th Court and approximately 2,680 ft. to the west of Powerline Road. As such, a portion of the vacant parcel owned by IRC may be used for the roadway improvements.

Basin 8

The proposed improvements, under the recommended alternative, will add 6.88 acres of impervious area to the drainage system, respectively. Therefore, the total impervious area will be 10.81 acres. Preliminary calculations indicate that 3.38 ac-ft. of treatment will be required to accommodate the onsite runoff. A wet detention pond is proposed to treat and

attenuate 3.40 ac-ft. of runoff for onsite post-development conditions. Approximately 4.80 acres of right-of-way will be needed to develop the pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One pond site will satisfy the requirements of the basin.

Basin 9

The proposed improvements, under the recommended alternative, will add 2.79 acres of impervious area to the drainage system. Therefore, the total impervious area will be 4.73 acres. Preliminary calculations indicate that 1.03 ac-ft. of treatment will be required to accommodate the onsite runoff. A dry retention pond is proposed to treat and attenuate 1.05 ac-ft. of runoff for onsite post-development conditions. Approximately 1.90 acres of right-of-way will be needed to develop the pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One pond site will satisfy the requirements of the basin. There are three (3) parcels owned by Indian River County (IRC) which are located north of CR 510, between Schumann Drive and 64th Avenue.

Basin 10

The proposed improvements, under the recommended alternative, will add 2.36 acres of impervious area to the drainage system. Therefore, the total impervious area will be 4.85 acres. A dry retention pond is proposed to treat and attenuate 1.10 acre-foot. of runoff for onsite post-development conditions. Approximately 1.90 acres of right-of-way will be needed to develop the pond. Several potential pond sites were identified per basin to provide greater flexibility during final design. One pond site will satisfy the requirements of the basin. There is a 1.57 acres triangular-shaped parcel owned by Indian River County (IRC) which is located south of CR 510, between approximately 550 feet to the east of Paladin Square and 59th Avenue. It should be noted that two additional ponds (10-2 and 10-4) were evaluated in this basin but were deemed as fatally flawed due to their impacts to the Wabasso Scrub Conservation Area, a section 4(f) resource purchased with Florida Forever Funds.

Table 5-16 below provides a summary of the Water Quality and Attenuation requirements, and storage volume that each basin provides.

Table 5-16: Water Quality Summary

Wet Detention											
Basin	**Imp Area (Ac)**	**Perv Area (Ac)**	**Total Area (Ac)**	**1" of Total Area (Ac-ft)**	**2.5 of Imp Area (Ac-ft)**	**Greater Volume (Ac-ft)**	**Add 50% (OFW) (Ac-ft)**	**Offsite (Ac-ft)**	**Total Req'd Treat (Ac-ft)**	**Total Prov'd Treat (Ac-ft)**	**Surplus[1] Treat (Ac-ft)**
1	2.29	0.88	3.17	0.26	0.48	0.48	0.72	0.05	0.77	2.94	2.17
2	4.75	1.83	6.58	0.55	0.99	0.99	1.49	0.12	1.61	1.65	0.04
3	5.53	2.13	7.65	0.64	1.15	1.15	1.73	0.00	1.73	1.80	0.07
4	5.45	1.24	6.69	0.56	1.14	1.14	1.70	0.00	1.70	3.18	1.48
5	5.31	4.83	10.14	0.85	1.11	1.11	1.66	0.00	1.66	1.70	0.04
6	5.25	4.78	10.03	0.84	1.09	1.09	1.64	0.00	1.64	1.70	0.06
7	5.35	4.87	10.22	0.85	1.12	1.12	1.67	0.00	1.67	1.70	0.03
8	10.81	9.83	20.63	1.72	2.25	2.25	3.38	0.00	3.38	3.40	0.02
Dry Retention											
Basin	**Imp Area (Ac)**	**Perv Area (Ac)**	**Total Area (Ac)**	**1" of Total Area (Ac-ft)**	**2.5 of Imp Area (Ac-ft)**	**Greater Volume (Ac-ft)**	**Add 50% (OFW) (Ac-ft)**	**Offsite (Ac-ft)**	**Total Req'd Treat (Ac-ft)**	**Total Prov'd Treat (Ac-ft)**	**Surplus[1] Treat (Ac-ft)**
9	4.73	1.58	6.30	0.53	0.69	0.69	1.03	0.00	1.03	1.05	0.02
10	4.85	1.62	6.47	0.54	0.71	0.71	1.06	0.00	1.06	1.10	0.04

[1]Surplus Treat = (Total Prov'd Treat) – (Total Req'd Treat)

5.6.1 Pond Siting Team

A Pond Siting Team, comprised of representatives from various FDOT departments and consultant, was assembled by the FDOT Project Manager per FDOT District Four Pond Siting Procedures. The objective of the Pond Siting Team was to identify potential pond sites and score each site based on a weighted matrix. The selection of a preferred site for each drainage system will occur during final design.

Potential pond sites were scored and ranked in general conformance with FDOT's District Four Pond Siting Procedures. Higher scores were assigned to more desirable pond sites. **Table 5-17** contains the results of the final pond siting process.

Table 5-17: Pond Siting Scores and Rank

SYS.	POTENTIAL POND SITE			
	SCORE			
	RANK			
1	*Pond located within existing R/W*			
2	**2-1**	**2-2**	**2-3**	**2-4**
	769	896	708	706
	2	1	3	4
3	*Pond located within existing R/W*			
4	*Pond located within existing R/W*			
5	**5-1**	**5-2**	**5-3**	**5-4**
	742	754	903	919
	4	3	2	1
6	**6-1**	**6-2**	**6-3**	**6-4**
	853	876	759	829
	2	1	4	3
7	**7-1**	**7-2**	**7-3**	**7-4**
	765	736	692	794
	2	3	4	1
8	**8-1**	**8-2**	**8-3**	**8-4**
	822	853	765	672
	2	1	3	4
9	**9-1**	**9-2**	**9-3**	**9-4**
	635	758	796	695
	4	2	1	3
10	**10-1**	**10-2[1]**	**10-3**	**10-4[1]**
	696	693	889	621
	2	FATALLY FLAWED	1	FATALLY FLAWED

5.6.2 Permit Agency Coordination

The drainage approach is to meet the water quality permitting requirements for St. John's River Water Management District (SJRWMD) and meet the water quantity permitting requirements for Sebastian River Improvement District (SRID) and Indian River Farms Water Control District (IRFWCD).

St. John River Water Management District (SJRWMD)

- Permit Number 93656 should be modified to accommodate the CR 510 project since it is an existing permit along the corridor.

Sebastian River Improvement District (SRID)

- FDOT requested a right-of-way permit from SRID during the PD&E study phase of this project to replace the existing CR 510 bridge over Lateral D Canal with a triple-box culvert crossing. This permit was submitted to SRID in August 2017. Refer to **Appendix J** for the permit, meeting notes and correspondence.

Indian River Farms Water Control District (IRFWCD)

- Based on the proposed roadway improvements, IRFWCD recommended that FDOT acquire the following permits:
    - A use permit is required to construct a road on district property. The fee for the use permit is $100.
    - A connection permit is required to connect Lateral G Canal with the roadway drainage system. For maintenance purposes, the urban curb is required to have cuts and Lateral Canal G must have an asphalt perimeter berm with a minimum width of 15 feet. The fee for the connection permit is $100.
    - A discharge permit is required to discharge into Lateral G Canal. A fee of $1000 is charged for the discharge permit; which includes the consultant review.

5.7 Right-of-Way Impacts

The proposed project is anticipated to require one residential relocation and will impact 95 parcels (27 Agricultural, 7 Commercial, 38 Residential, and 23 unimproved) with a total of 29.61 acres (see **Appendix H**).

The preliminary cost estimates include the expenditures associated with right-of-way acquisition such as land costs, severance damage, court awards and settlement. The right-of-way cost estimate is currently $10,019,302.

5.8 Construction Cost Estimate

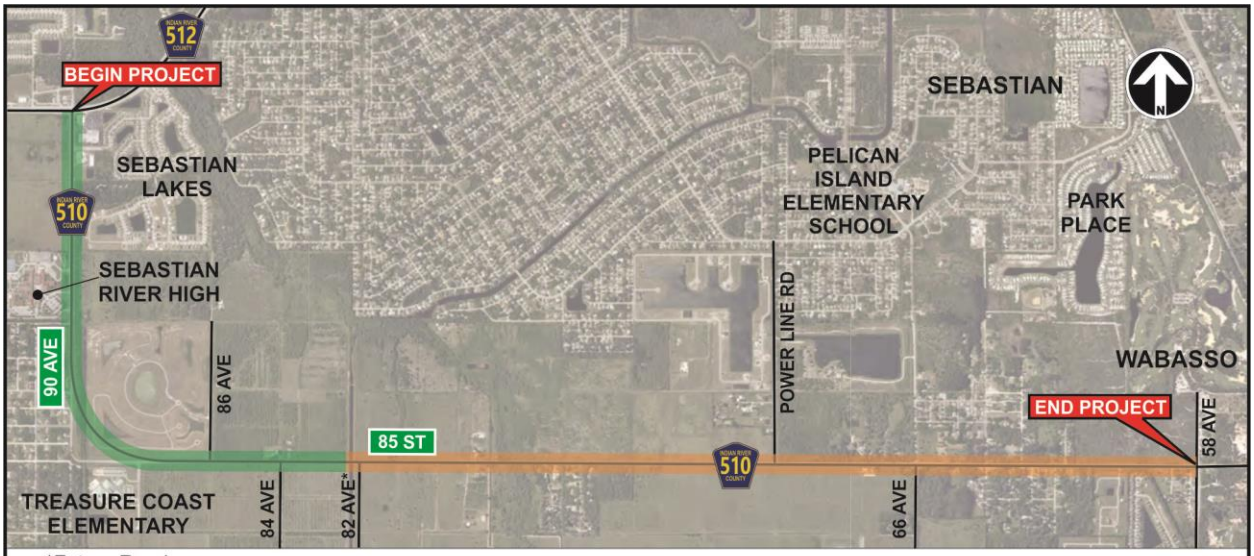
The construction cost estimate for this project was calculated utilizing the FDOT's Long Range Estimate (LRE). The project was divided into two separate design/construction projects: FM#: 405606-4-52-01 extending from CR 512 to approximately 1,000' west of 82nd Avenue and FM#: 405606-3-52-01 from 1,000' west of 82nd Avenue to 58th Avenue. **Table 5-18** provides a summary of the construction cost for each of the construction projects. The detailed LRE can be found in **Appendix I**.

Table 5-18 Construction Cost Estimate

Component	FM#: 405606-4-52-01 (from CR 512 to 1,000' west of 82 Ave)	FM#: 405606-3-52-01 (from 1,000' west of 82 Ave to 58 Ave)	Totals
Earthwork	$3,731,696	$4,443,406	$8,175,102
Roadway	$6,203,439	$8,746,343	$14,949,782
Drainage	$6,976,842	$8,711,634	$15,688,476
Signing	$97,959	$154,542	$252,501
Signalization	$917,830	$674,634	$1,592,464
Lighting	$643,645	$970,636	$1,614,281
Bridges	-	$4,081,969	$4,081,969
Retaining Walls	$1,102,116	-	$1,102,116
SUBTOTAL	**$19,673,526**	**$27,783,165**	**$47,456,691**
MOT	$1,967,353	$2,778,316	$4,745,669
Mobilization	$1,731,270	$2,444,918	$4,176,188
Other	$121,400	$162,600	$284,000
Right-of-Way	-	-	$10,019,302
TOTAL	**$23,493,549**	**$33,168,999**	**$66,681,850**

5.9 Traffic Control Plan

Maintenance of Traffic (MOT) construction plans are necessary in order to demonstrate the ability to properly and safely implement the proposed improvement while maintaining the facility open to traffic. This project has been divided into two separate design/construction jobs for implementation. **Figure 5-19**, illustrates the two construction projects and **Figures 5-20** and **5-21** depict conceptual construction sequence schemes along CR 510 for the recommended alternative.



*Future Roadway

Construction Project Financial Management Number	Segment Limits	Length (Miles)	Funding	For Details
FM # 405606-4	From CR 512 to 1000 feet west of 82nd Avenue	2.20	Design FY 2019	See Figure 6-20
FM # 405606-3	From 1000 feet west of 82nd Avenue to 58th Avenue	3.07	Design FY 2018	See Figure 6-21

NOTES

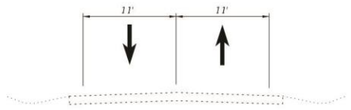
1) The main purpose of these preliminary traffic control plans is to ensure the adequate constructability of the proposed improvements, while avoiding any "fatal flaws". They are not intended to provide all the details (i.e. signage, MOT devices, Cost, Schedule information, etc.) generally associated with more detailed maintenance of traffic plans prepared during the final design phase.

2) For additional information regarding temporary traffic control during construction of the proposed bridge structures see Section 6.3.5 (see page 6-47).

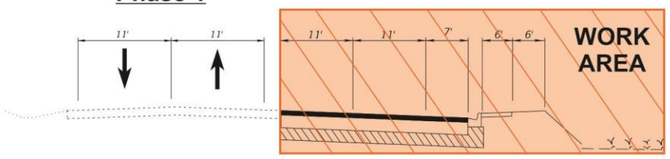
Future Construction Projects **Figure 5-19**

Construction Phase Typicals

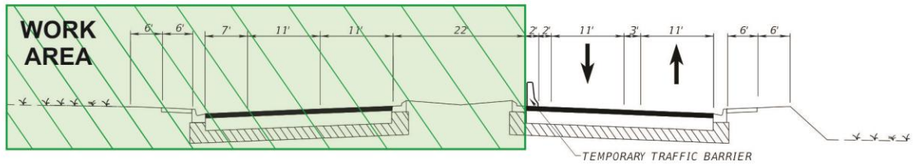
Existing Typical Section



Phase 1



Phase 2



Construction Phase Details

Phase 1

- Maintain existing traffic as is, construct temporary pavement where necessary
- Construct southbound roadway from STA 118+00± to STA 145+00±
- Construct northbound/westbound roadway from STA 152+00± to STA 205+00±
- Construct temporary connection from existing CR 510 to future southbound roadway from STA 100+00± to STA 118+00± and from future southbound roadway to existing CR 510 from STA 145+00± to STA 150+00±
- Construct temporary connection from future westbound roadway to existing CR 510 from STA 205+00± to STA 210+00±

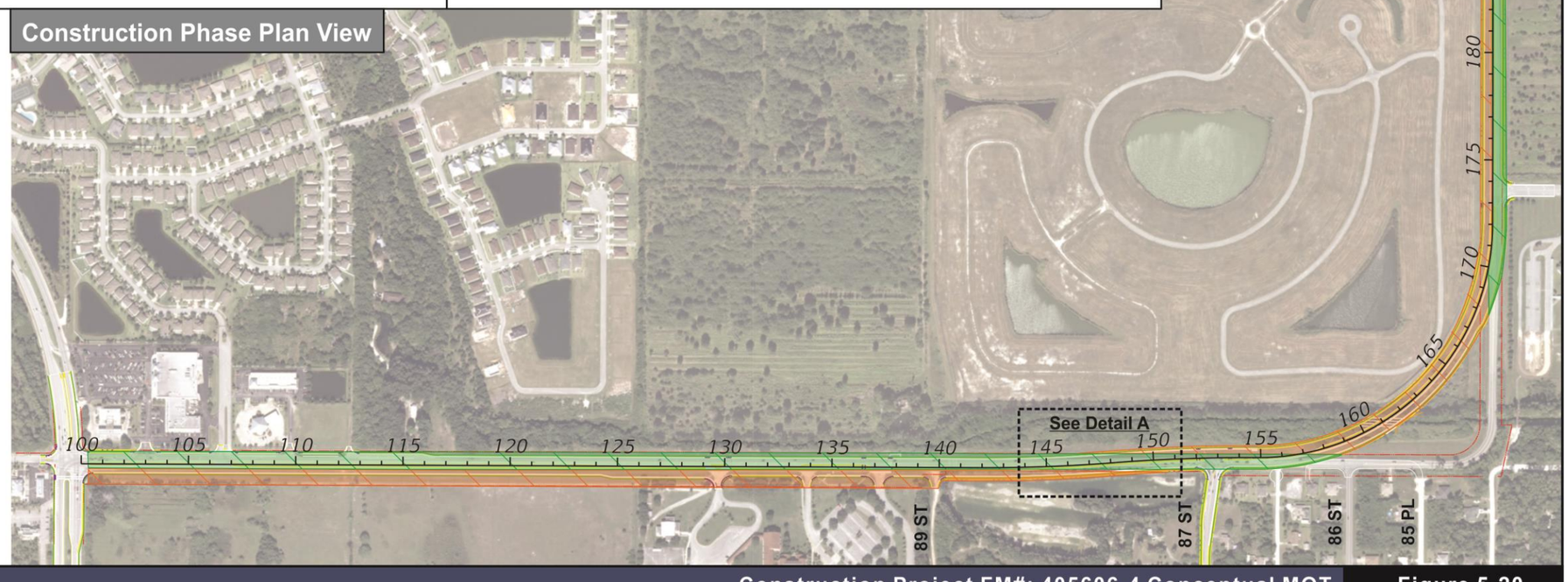
Phase 2

- Divert Existing CR 510 traffic via the new southbound roadway from STA 118+00± to STA 150+00±
- Construct northbound roadway from STA 118+00 to STA 150+00
- Construct eastbound roadway from STA 168+00 to STA 205+00

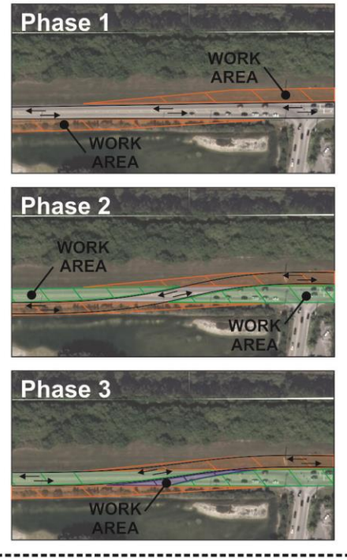
Phase 3

- Remove temporary markings from the existing pavement and temporary shoulder pavement
- Construct transitions
- Mark pavement markings and install warning devices
- Route existing CR 510 Traffic via the newly built sections from both previous phases

Construction Phase Plan View



Detail A



Construction Project FM#: 405606-4 Conceptual MOT

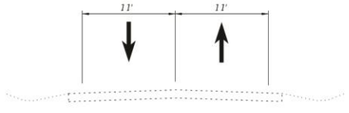
Figure 5-20

Construction Phase Plan View

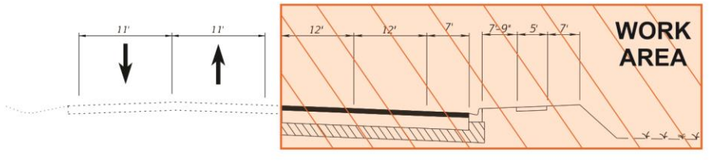


Construction Phase Typicals

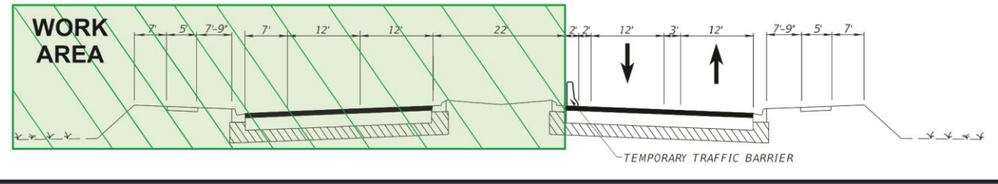
Existing Typical Section



Phase 1



Phase 2



Construction Phase Details

Phase 1

- Maintain existing traffic as is
- Construct eastbound roadway from STA 205+00± to Sta 248+00± (including the construction of the bridges), and from STA 348+50± to project terminus
- Construct westbound roadway from STA 248+00± to STA 348+50± and from STA 328+00± to STA 344+00±
- Construct temporary connections from future eastbound roadway to existing CR 510 from STA 241+00± to STA 248+00±; from 344+00± to 346+00± and from future westbound roadway to existing CR 510 from STA 303+00± to 305+00± and from 326+00± to 328.00±

Phase 2

- Divert existing CR 510 Traffic via the newly built sections in Phase 1 and construct

Phase 3

- Remove temporary markings from the existing pavement and temporary shoulder pavement
- Construct transitions, mark pavement markings and install warning devices
- Route CR 510 Traffic via the newly built sections from both previous phases

Construction Project FM#: 405606-3 Conceptual MOT **Figure 5-21**

MOT should generally follow FDOT Standard Plans Index 102-641 (Converting Two Lanes to Four Lanes Divided Rural). It should be noted that these figures are preliminary and coordination with Indian River County and other stakeholders is essential.

It is anticipated that extended closure of existing lanes will not be necessary and that no major construction easements will be required for maintenance of traffic purposes. Even though some interruption of vehicular flow is unavoidable, the appropriate use of lane markings, signs, flagmen and other commonly used construction work zone traffic control techniques will be employed to minimize inconvenience.

There are several areas that will require unique MOT considerations once more details are developed in Final Design, these areas include; (1) the proposed roundabout at 66th Avenue, (2) the CR 512 intersection, (3) construction during school and dismissal periods at both Treasure Coast Elementary School and Sebastian River High School, 4) construction over Lateral D, L, and C Canals and (5) construction at the Indian River County wetlands north of 87th Street.

Additionally, special consideration needs to be given to the area near 82nd Avenue. Due to the bridge requirements at Lateral C Canal, the roadway profile will be raised approximately 6 feet over the existing conditions. Coordination with 82nd Avenue extension project will be required.

Similarly, an increase in the proposed profile at Lateral L Canal could impact the existing access for the South Prong Preserve and maintenance access for the canal. The use of temporary driveway connections is likely necessary at these locations.

(this space was left intentionally blank)

5.10 Environmental Impacts

A Categorical Exclusion Type II, a companion document to this report, was prepared in accordance with the FDOT's PD&E Manual, Part 1, Chapter 5 (Type 2 Categorical Exclusion), updated June 14, 2017, and other chapters, which incorporate the requirements of the National Environmental Policy Act (NEPA), and related federal and state laws. Please refer to the Categorical Exclusion Type II for further details on the anticipated environmental impacts associated with the recommended alternative.

5.10.1 Relocation Potential

The Recommended Alternative would require the relocation of residents at 5845 85th Street. The proposed project, as presently conceived, will not displace any businesses within the community. There are multiple residential properties that are nearby and available, so it is anticipated that displaced persons would be able to relocate. The Florida Department of Transportation will carry out a Right of Way and Relocation Program in accordance with Florida Statute 339.09 and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646 as amended by Public Law 100-17). The brochures that describe in detail the FDOT's Relocation Assistance Program and Right of Way acquisition program are "Residential Relocation Under the Florida Relocation Assistance Program", "Relocation Assistance Business, Farms and Non-profit Organizations", "Sign Relocation Under the Florida Relocation Assistance Program", "Mobile Home Relocation Assistance", and "Relocation Assistance Program Personal Property Moves". All of these brochures are distributed at the public hearing and made available upon request to any interested persons. A public hearing was held on April 24, 2018. For these reasons, a determination of *Not Significant* is made regarding relocation impacts.

5.10.2 Farmlands

In accordance with the Farmland Protection Policy Act of 1984 and the FDOT PD&E Manual, Part 2, Chapter 6 – Farmland (dated June 14, 2017), this project was reviewed for involvement with farmlands. As noted in the Efficient Transportation Decision Making (ETDM) Summary Report, approximately 235.1 acres of Farmland of Unique Importance

were identified within the 200-foot project buffer, totaling 45 percent of the project footprint. Coordination regarding impacts to farmland soils was conducted with the Natural Resources Conservation Service (NRCS) and NRCS Form NRCS-CPA-106 was completed. Because a score of 79.3 was calculated, below the threshold of 160, no further action is required and a determination of *Not Significant* was made for impacts to farmlands.

5.10.3 Section 4(f)

A review of potential historic and recreational Section 4(f) resources was conducted during the development of the Cultural Resources Assessment Survey (CRAS) and the Section 4(f) Determination of Applicability. No historic resources that are eligible for protection under Section 4(f) were identified. The Ansin Tract, South Prong Preserve and the Wabasso Scrub Conservation Area are considered eligible recreational Section 4(f) resources and are located in the project area. There would be no impacts to the Ansin Tract or the Wabasso Scrub Conservation Area. De minimis impacts totaling 0.93 acres are anticipated for the South Prong Preserve to accommodate additional right-of-way. The only existing facilities on the South Prong Preserve that would be impacted are the entrance drives, which would be replaced. The proposed project would also replace an existing culvert with a bridge in the South Prong Preserve. The project would also install sidewalks and bike lanes along CR 510, enhancing accessibility. After preliminary coordination with the Florida Department of Environmental Protection (DEP), Office of Operations, DEP has determined that this project is consistent with the Management Plan and the project will have minimal impacts on the site while enhancing accessibility. Once the design has been advanced and prior to construction, DEP has requested that Indian River County submit a request to modify the Management Plan including modified text and a modified Master Site Plan showing the changes. It should be noted that due to the change in the proposed profile required for the new bridges at both Lateral L Canal and the South Prong Slough, the project may incur additional impacts to the preserve in order to provide maintenance access for the canal as well as to the existing driveways on the property. Further details will be evaluated during the design. For these reasons, a determination of *Not Significant* is made regarding Section 4(f) resources.

5.10.4 Wetlands and Other Surface Waters

A Natural Resources Evaluation (NRE) was completed for this project and describes potential impacts to wetlands and Other Surface Waters (OSW). Five types of wetlands or OSWs are mapped by St. Johns River Water Management District in the project area and were confirmed during field investigations. Roadside ditches and swales occur along CR 510 and adjacent lands and are classified as OSWs. Three major canals drain the project area and are also considered OSWs.

Impacts were avoided and minimized by locating the project on an existing transportation corridor. None of the proposed pond sites would impact wetlands. Under the recommended alternative 0.65 acres of direct impacts to Mixed Wetland Hardwoods (FLUCCS 6170) are anticipated. Potential long-term indirect wetland impacts include reduced cover of vegetation due to shading beneath the bridge at the south prong of the Saint Sebastian River and associated reduction of wetland functions for water quality and wildlife at that location.

Roadside ditches and swales occur along CR 510 and adjacent lands and are classified as OSW. Furrows occur in agricultural fields adjacent to CR 510. These furrows are not considered jurisdictional wetlands by the US Army Corps of Engineers (USACE) because their creation is classified as normal farming activity (Section 404(f)(1)(A)). The furrows are classified as OSW by the State of Florida (62-340.600 Florida Administrative Code [FAC]). Many of the OSWs that were cut into uplands contain exotic or invasive plant species and so are relatively low quality. Brazilian pepper is found throughout the project area and grows in dense stands in some areas, often adjacent to wetlands/OSW.

Direct wetland impacts occur in Segment 3, to two distinct wetland Assessment Areas (AAs), AA5 and AA7. There would be no direct impacts to jurisdictional wetlands in Segments 1, 2, or 4. AA5 was assigned a Uniform Mitigation Assessment Method (UMAM) score of 0.43. Direct impacts to AA5 under the Recommended Alternative are anticipated to be approximately 0.1 acre, with a UMAM functional loss score of -0.00129 for the impact assessment area. AA7 was assigned a UMAM score of 0.76. Direct impacts to AA7 under the Recommended Alternative are anticipated be approximately 0.55 acres, with a UMAM functional loss score of -0.0417 for the impact assessment area.

Impacts to wetlands were sequentially avoided and then minimized by following the existing CR 510 right-of-way as much as possible and by limiting the width of right-of-way along wetlands at the South Prong Slough. Minimization measures, which may include reductions in the typical section, use of retaining walls to minimize roadway embankments and similar measures will be considered during the project design phase. FDOT Standards Specifications for Road and Bridge Construction will be implemented to further minimize impacts. Because at least part of the project area drains into an Outstanding Florida Water (OFW), the Indian River Lagoon, the stormwater management system is being planned to achieve 50 percent greater treatment of water than under standard specifications, reducing impacts to downstream wetlands. Wetland impacts were also minimized by replacing the culverts at the south prong of the St. Sebastian River with a bridge. The bridge is anticipated to facilitate movement of water and wildlife and create more natural conditions that will be an improvement over existing conditions. Unavoidable impacts to wetlands will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and 33 U.S.C. §1344. Wetland mitigation will follow the UMAM to gauge the function and value of the impacted wetlands as well as mitigation properties. Mitigation could potentially be achieved through use of the Senate Bill program in cooperation with the Saint Johns River Water Management District (SJRWMD), or through use of a Mitigation Bank. The Basin 22 Mitigation Bank is located within the Central Indian River Lagoon drainage basin, its service area includes the proposed project, and the bank contains approximately 109.58 acres of freshwater herbaceous and freshwater forested state wetland mitigation credits. Federal wetland mitigation credits are available from the Mary A Ranch wetland mitigation bank. For these reasons, a determination of *Not Significant* is made regarding wetlands and surface waters.

5.10.5 Floodplains

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), most of the project area is located outside the 500-year floodplain (Zone X). The northbound/southbound portion of CR 510, between CR 512 and just north of 86th Street, is located in Zone AE with base elevations ranging from 18.5 to 20.0-feet North America Vertical Datum (NAVD) (20.0 to 21.5-feet National Geodetic Vertical Datum

[NGVD]). The eastbound/westbound portion of CR 510, located between 90th Avenue and 58th Avenue, is mainly located in Zone X. A negligible portion of the eastbound/westbound corridor is located in Zones A and AE. The portion of CR 510 located in Zone AE has a base flood elevation of 15.5-feet NAVD (17.0-feet NGVD).

The modifications to drainage structures included in this project will result in an insignificant change in their capacity to carry floodwater. This change will cause minimal increases in flood heights and flood limits. These minimal increases will not result in any significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. There will not be a significant change in the potential for interruption or termination of emergency service or emergency evacuation routes.

This project will affect several cross drains due to the widening of the CR 510 roadway. One culvert is recommended for extension and three culverts are recommended for replacement. All existing bridges are proposed to be replaced. Bridge No. 12-880047 at Lateral D Canal will be replaced with a culvert, bridges No. 12-880063 and 12-880044 will be replaced with new bridges. Additionally, an existing culvert at the South Prong of the Saint Sebastian River will be replaced with a bridge.

Water quality will be protected by providing stormwater ponds and achieving a 50 percent greater treatment threshold than under standard road conditions due to outfall into Outstanding Florida Waters.

Although this project involves work within the horizontal limits of the 100-year floodplain, no work is being performed below the 100-year flood elevation and, as a result, this project does not encroach upon the base floodplain.

Unavoidable impacts to wetlands will be mitigated. It is not anticipated that the proposed project will preclude designation as a Wild and Scenic River. Therefore, it has been determined that potential impacts to floodplains are *Not Significant*.

5.10.6 Wildlife and Habitat

A Natural Resources Evaluation Report that describes habitats and potential impacts to wildlife was prepared as part of this PD&E study. Two federally listed species, Audubon's crested caracara (*Polyborus plancus audubonii*)(caracara) and wood stork (*Mycteria americana*) were observed in the project area. The state-listed Florida sandhill crane (*Grus canadensis pratensis*) and gopher tortoise (*Gopherus polyphemus*) (also a candidate for Federal listing) were observed during field surveys of the project area. Florida scrub-jay (*Aphelocoma coerulescens*) and gopher tortoise are documented to inhabit the Wabasso Scrub Conservation Area, at the eastern terminus of the project.

Nest surveys for Audubon's crested caracara were conducted by FDOT in part of the project area in 2016. As part of this PD&E study, nest surveys following US Fish and Wildlife Service (USFWS) protocols were conducted in 2017 covering potential caracara nesting habitat throughout the project area. During 2016 and 2017, adult and juvenile caracaras were observed in Segments 1 and 2 and sightings clustered around the Publix shopping center (in the southeast corner of the intersection of CR 510 and CR 512) as well as around the northwest corner of Sebastian River High School. No caracara nests were located during surveys. Because no caracara nests were detected in two years of surveys, because direct impacts to the most likely potential core nesting territory are not anticipated, and because impacts to the potential breeding territory would be in previously disturbed areas and would be to such a small proportion of the potential available habitat, a determination of *may affect, not likely to adversely affect* is made for caracara.

In addition to caracara, Federally listed species that may be affected but would not be adversely affected by the proposed project include eastern diamondback rattlesnake (*Drymarchon corais couperi*)(candidate for Federal listing), eastern indigo snake (*Crotalus adamanteus)*, Florida scrub-jay, gopher tortoise, and wood stork. State listed species that may be affected but would not be adversely affected by the proposed project are burrowing owl (*Athene cunicularia*), Florida pine snake (*Pituophis melanoleucus mugitus*), Florida sandhill crane, little blue heron (*Egretta caerulea*), roseate spoonbill (*Platalea ajaja*), Sherman's fox squirrel (*Sciurus niger shermani*), Southeastern American kestrel (*Falco sparverius paulus*), and tricolored heron (*Egretta tricolor*). The *Eastern*

Indigo Snake Programmatic Effect Determination Key (USFWS 2013) and the *USFWS Wood Stork Effect Determination Key for South Florida* were followed in evaluating impacts to those species.

The Wabasso Scrub Conservation Area is known to contain Florida scrub-jays and part of it was previously used for mitigation for unavoidable impacts to Florida scrub-jay habitat from a previous project. According to data from Indian River County, one Florida scrub-jay territory borders CR 510 and Florida scrub-jays occasionally cross CR 510 to forage. The recommended alternative would avoid direct impacts to scrub habitat on the Wabasso Scrub Conservation Area. The recommended alternative is anticipated to indirectly impact up to three Florida scrub-jays per year from an increased chance of vehicle collisions on CR 510; therefore, a determination of likely to adversely affect Florida scrub-jays was made. Formal Section 7 with USFWS regarding impacts to Florida scrub-jays resulted in the issuance of a Biological Opinion.

Potential loss of wildlife habitat was minimized by locating the project on an existing corridor and avoiding impacts to canals, wetlands, and scrub habitat to the maximum extent practicable. Proposed stormwater pond sites were evaluated to minimize impacts to environmental resources to the maximum extent practicable, and all unavoidable impacts from pond sites will be mitigated. Water quality degradation as a result of stormwater runoff will be minimized by following standard BMPs for roadway design.

Under the recommended alternative 0.65 acres of direct impacts to Mixed Wetland Hardwoods (FLUCCS 6170) are anticipated. These Mixed Wetland Hardwoods are also considered to be EFH for white shrimp. Under the recommended alternative 2.983 acres of direct impacts to wood stork Suitable Foraging Habitat (SFH) are anticipated. The replacement of a culvert under CR 510 at the south prong of the St. Sebastian River with a bridge will improve existing conditions by enhancing the flow of water and movement of wildlife.

Potential long-term indirect wetland impacts include reduced cover of vegetation due to shading beneath the bridge at the south prong of the St. Sebastian River and associated reduction of wetland functions for water quality and wildlife at that location. Long-term indirect impacts can also occur from an increased chance of vehicles striking wildlife.

Impacts to wildlife are partially offset by the potential for improved movement of wildlife upstream of the culvert under CR 510 at the south prong of the St. Sebastian River. Additionally, runoff from the roadway will be treated before being discharged into canals or waterways and will receive 50 percent greater treatment due to outfall into the Indian River Lagoon, an Outstanding Florida Water. No significant cumulative impacts to wildlife, wetlands, or EFH are anticipated as a result of this project.

Table 5-19 presents effects determinations for listed species that have some potential to occur in the project corridor. Documentation of coordination and concurrence with USFWS is provided in **Appendix J** and concludes that the project and its cumulative effects will be neutral or possibly beneficial to the scrub jay.

Table 5-19 – Listed Species Effect Determinations

Common Name	Scientific Name	Effect Determination (Recommended Alternative)
Federally Listed Species		
Audubon's crested caracara	*Polyborus plancus audubonii*	MANLAA
Eastern diamondback rattlesnake	*Crotalus adamanteus*	MANLAA
Eastern indigo snake	*Drymarchon corais couperi*	MANLAA
Florida scrub-Jay	*Aphelocoma coerulescens*	LAA
Gopher tortoise	*Gopherus polyphemus*	MANLAA
Wood stork	*Mycteria americana*	MANLAA
State Listed Species		
Burrowing owl	*Athene cunicularia*	MANLAA
Florida pine snake	*Pituophis melanoleucus mugitus*	MANLAA
Florida sandhill crane	*Grus canadensis pratensis*	MANLAA
Little blue heron	*Egretta caerulea*	MANLAA
Roseate spoonbill	*Platalea ajaja*	MANLAA
Sherman's fox squirrel	*Sciurus niger shermani*	MANLAA
Southeastern American kestrel	*Falco sparverius paulus*	MANLAA
Tricolored heron	*Egretta tricolor*	MANLAA

MANLAA= May affect, not likely to adversely affect; LAA=Likely to Adversely Affect

5.10.7 Noise

As part of this PD&E Study, a Noise Study Report (NSR) was prepared and it was determined that noise levels under the recommended alternative at the modeled residences are expected to range from approximately 46.0 to 69.7 dB(A) during the project's design year. Traffic noise levels are predicted to approach or exceed the FDOT Noise Abatement Criteria (NAC) B [66 dB(A)] at six residences within the study area. These residences are represented in the Noise Study Report by SFH16, SFH19, SFH34,

SFH36, SFH60, and SFH68. In accordance with FHWA requirements, noise abatement was considered for all noise sensitive sites where design year traffic noise levels were predicted to approach or exceed the NAC.

Receptors SFH16, SFH19, SFH60 and SFH60 are discrete locations. No other residences are predicted to be impacted in the area of the five discrete receptors. Noise abatement was considered for the receptors SFH34 and SFH36 and analyzed as a common noise environment. These two impacted receptors are 275 feet apart and are separated by both 59th Avenue and a driveway for SFH36. That driveway is the only access point for the property represented by the SFH36 receptor. Since 59th Avenue and the driveway cannot be closed, three noise barrier segments were analyzed. Results from the barrier analysis show that none of the concepts meet FDOT reasonableness and feasibility criteria. In accordance with FDOT policy requiring that at least two (2) impacted receptors achieve a 5 dB(A) reduction or greater in order for a noise barrier to be considered feasible, there are no apparent solutions available to mitigate the noise impacts along this project corridor. A determination of *Not Significant* was made regarding impacts from noise.

5.10.8 Contamination

A Contamination Screening Evaluation Report (CSER) was developed to evaluate the potential presence of contaminated sites. Based on Florida Department of Environmental Protection (FDEP) database research, no National Priorities List (NPL) Superfund Sites were documented within one mile of the project corridor. A total of ten potentially contaminated sites (**Table 5-20, Figure 5-22**) were identified in the vicinity of the build alternatives and five of those sites were assigned a risk rating of “Low.” Five sites, Sunoco #0613-2641, Shark Mart Mobil, Ryall Groves Inc., the Bethel Service Station, and current or former agricultural areas were assigned a risk rating of “Medium.” Proposed pond 2-2 is adjacent to Site 4, Sebastian River High School, which has a risk rating of Low. All of the pond sites occur on former agricultural lands that are assigned a “Medium” risk rating. The sites with a “Medium” or “High” risk rating are recommended for additional assessment, such as possible soil and groundwater testing, if right-of-way acquisition or subsurface work (including construction of any structures or stormwater ponds) is

proposed on or adjacent to those sites. A determination of *Not Significant* was made regarding contamination.

Table 5-20 – Contamination Site Summary

Site #	Facility Name	Segment	Address	Facility ID (FDEP/RCRA)	Databases	Concern	Distance of Contamination from Project Corridor	Risk Rating
1	Sunoco #0613-2641	1	9020 C.R. 512	8509326	FDEP OCULUS	Petroleum products	Adjacent	Medium
2	Shark Mart Mobil	2	9490 90 Ave.	9602448	FDEP OCULUS	Petroleum products	Adjacent	Medium
3	Publix Super Market #1035	3	1451 Sebastian Blvd #200	9810584	FDEP OCULUS	Fuel	Adjacent	Low
4	Sebastian River High School	1	9001 90 Ave.	110006393125	RCRA	Biomedical Waste	Adjacent	Low
5	Yukon Land Corporation	2	8790 85 St.	None	None	Above Ground Storage Tanks	Co-located	Low
6	Treasure Coast Elementary	2	8955 85 St.	110064754573	RCRA	Biomedical Waste	Adjacent	Low
7	Slough's Grove Service	2	7675 85 Street	8520277	FDEP OCULUS	Gasoline	Adjacent	Low
8	Ryall Groves Inc.	3	6815 85 St.	None	None	Above Ground Storage Tanks	Adjacent	Medium
9	Bethel Service Station	4	6375 85 Street	9100095	FDEP OCULUS	Petroleum products	Adjacent	Medium
10	Former or Current Agricultural Areas	All	No discrete address	None	None	Herbicide, Pesticide	Co-located and Adjacent	Medium



Potentially Contaminated Site Locations — Figure 5-22

6 SUMMARY OF PUBLIC INVOLVEMENT ACTIVITIES

A public involvement program was developed and implemented for this CR 510 PD&E study. The program is documented in the Public Involvement Program (PIP) (see **Appendix J**), a companion document to this PD&E study. The purpose of the program is to outline the public involvement approach to be taken with the project, provide and share project information with persons living and working in the area, listen to ideas and concerns and to solicit and incorporate input received during the study process.

Public information meetings began in February 2016 and have continued throughout the study process. The project team held public information meetings throughout the life of the project. For a complete list of all public involvement activities and coordination meetings held see **Appendix J**. Exhibits and project information were provided for public review and comment at each meeting. All input received served as valuable information that was taken into consideration for the refinement of the alternatives and the development of the recommended alternative. Representatives from the FDOT were available at each meeting to discuss the project and answer questions. The public involvement effort for this project included not only the three (3) scheduled public meetings but also had meetings with communities along the project corridor that would be most affected by the PD&E study.

To date there has been various meetings with Indian River County, Indian River County Metropolitan Planning Organization, Wabasso Progressive Civic Club, Sebastian River High School, Vero Lake Estates HOA, US Fish and Wildlife Service, Sebastian River Improvement District, Indian River Farms Water Control District, St. Johns River Water Management District, and several individual property owners. **Appendix J** includes sign in sheets and meeting summaries from each of the meetings held to date.

<u>Public & Agency/Elected Official Kick-Off Meetings</u>

A Public Kick-off meeting for the CR 510 PD&E Study was held on Wednesday, June 8, 2016. The Indian River County Metropolitan Planning Organization (MPO) Board meeting served as the format for the Kick-Off Meeting. The purpose of this meeting was to present an overview of the needs that will be addressed to the public and to the elected officials. The study team was present if there were any questions that needed to

be addressed from the public and elected and agency officials. The sign-in sheet and meeting summary are included in **Appendix J**.

Alternatives Public Workshop

An Alternatives Public Workshop was held on Tuesday, October 11, 2016. The meeting presented the alternatives developed in an open house format in order to obtain public feedback. The workshop provided an opportunity for residents, businesses, stakeholders and other interested parties to view the project alternatives along the project corridor with a member of FDOT or the consultant team for them to get answers to questions and responses to their concerns. Thirty-eight (38) people attended the meeting and fourteen comment sheets were received. In general, the attendees were in favor of the proposed improvements. Most of the concerns raised were regarding impacts to the South Prong Preserve as well as access. The sign-in sheets and comment sheets are included in **Appendix J**.

Coordination with Indian River County and Indian River County MPO

Several meetings were held with Indian River County and MPO staff. They also participated in some regularly scheduled progress meetings and provided input. Indian River County staff were involved and informed of all project decisions throughout the study. Several presentations were made to the MPO Board as well as the subcommittees throughout the PD&E providing updates and project decisions and obtaining concurrence on the improvements. Below is a summary of some of the more pertinent project decisions made throughout this coordination.

A meeting was held on Thursday, June 25, 2016 with Indian River County representatives Mr. Richard Szpyrka and Phil Matson. Mr. Szpyrka requested that the project be designed to FDOT standards. Mr. Szpyrka and Mr. Matson agreed that they would not like to implement two-way-left-turn lanes. It was agreed that the design speed for Segments 1, 2 and 4 will be 45 mph. In Segment 3 the team will evaluate both a 50 and a 55 mph typical section. Mr. Szpyrka stated that they are not in favor of the typical section. Both men agreed on implementation of the 7-foot buffered bicycle lane.

A meeting was held on Thursday, September 8, 2016 with Indian River County representatives Mr. Richard Szpyrka and Mr. James Ennis. Mr. Szpyrka stated that on all future road improvements, landscaping and aesthetic features will be modeled after 66th Avenue. Landscaping along CR 510 will not be provided on the outside and only in the median. Mr. Szpyrka also confirmed that there is an existing 20-foot roadway easement south of CR 510 within the Hill Side Subdivision and stated that the county is open to using the easement to provide better access to the community, however a minimum of 50 feet is required to construct a roadway, with a possibility of reduction to 40 feet if a waiver is obtained. He stated that access to/from 58th Court as it is too close to 58th Avenue. Mr. Szpyrka also stated he is concerned about the future maintenance of the existing CR 510 Bridge if kept as a frontage road (see **Appendix J**).

A meeting was held on Wednesday, December 14, 2016 with Indian River County representatives Mr. Richard Szpyrka and Mr. Phil Matson. Mr. Szpyrka stated that there has been interest in the Blue Water Bay development property (the property located adjacent to the CR 510 curve on the east/north side). Ms. Maria Formoso inquired about the missing link on the 66th Avenue between the widening of 66th Avenue and the proposed improvements of this study at the intersection of CR 510 and 66th Avenue. Mr. Szpyrka stated that once the FDOT's team has determined the limits of the proposed PD&E improvements that they should inform him and the county will then move the widening up to meet that limit. Mr. Matson and Mr. Szpyrka inquired about the status of the roundabout at the 66th Avenue intersection. Mr. Rodriguez illustrated the designed roundabout alternative detail and stated he was currently looking at the traffic analysis to make sure the proper lane assignments are provided. Mr. Szpyrka said that once the proposed design is ready he would like to present to the MPO Board (see **Appendix J**).

Individual Meetings with West Wabasso Progressive Civic Club

A meeting was held on Tuesday, March 22, 2016 with the Wabasso Progressive Civic Club representatives Mr. Ardra Rigby, Mr. Bill Rigby, and Mr. Ervin Cartwright. The purpose of the meeting was to introduce the project team and to establish a working relationship with the local community. Mr. Cartwright and Mr. Bill Rigby provided the team with the history of the Wabasso community's relationship with Indian River County

and that the community had been promised this project for over twenty years. Mr. Cartwright emphasized that the community wants respect from the County, and that if homeowners need to be relocated they would like to be compensated with the fair market value of the property. Mr. Cartwright also stated that the community perceived that the fact they have not widened the road in the past as a racial issue due to previous projects consisting of improvements of CR 510 from CR 512 to 66th Avenue and then from 58th Avenue to US-1. Mr. Bill Rigby asked how the team planned on widening the roadway without his property being impacted. Ms. Maria Formoso explained how the team will be considering several different typical section options depending on the area of CR 510 they are working on, for example she mentioned that the team may consider a more narrow, urban typical section for the area east of 66th Street, and a wider, rural section for the area to the west of 66th Street (see **Appendix J**).

A meeting was held on September 6, 2016, with the West Wabasso Progressive Civil Club. The purpose of the meeting was to present and discuss preliminary typical sections and to discuss concerns regarding the WSCA. Ms. Garcia explained to the attendees the laws and issues currently constraining the project team from impacting the WSCA. The team presented the typical sections that are most applicable to this project as well five additional options that would narrow the typical section to further reduce impacts if the community chooses to. He explained the different sacrifices that would be required to minimize the footprint including, narrower bicycle lanes, narrower medina, removal of the north sidewalk, etc. The attendees all agreed that the narrower typical sections were all poor options and they would not agree to see those implemented. All agreed with implementation of typical section E, even if it requires the relocation of one home. Ms. Brisenbois was present to explain the FDOT R/W acquisition procedure and the compensation for relocations. The attendees requested landscaping features similar to what was implemented along 66th Avenue.

A meeting was held on Thursday, December 05, 2016, with the West Wabasso Progressive Civil Club. The purpose of the meeting was to present and discuss different alternatives of the CR 510 PD&E Study. Information was provided on the different typical sections that were considered in the study. The attendees requested installation of a sign welcoming drivers to the Wabasso Community. It also gave an opportunity for

members of the community that were unable to attend the Alternatives Public Workshop to ask questions (see **Appendix J**).

A meeting was held on Monday, May 5, 2017 with the Wabasso Progressive Civic Club Board with representatives Mr. Ardra Rigby and Mr. Bill Rigby. The purpose of the meeting was to present and discuss the most recent updates with the study. Mr. Carlos Rodriguez explained that the typical section remained the same while there was a slight shift in the alignment to avoid impacts to the Oasis Pool Hall and the Allen Chapel Church. He also explained different access enhancements that are possible within the Hill Side Subdivision. He also stated that the county has requested closure of 58th Court to CR 510 due to its close proximity to the CR 510/58th Avenue intersection (see **Appendix J**).

A meeting was held on Monday, June 5, 2017 with the Wabasso Progressive Civic Club. The purpose of the meeting was to present and discuss the most recent updates with the study. Information was provided on access in the Wabasso area especially to the Hill Side Subdivision community (see **Appendix J**).

Public Hearing

The Public Hearing was held on April 24, 2018 at North Indian River County Library. A formal presentation was conducted and a project fact sheet was available. The Hearing was advertised in the Indian River Press Journal on April 4, 2018 and on April 15, 2018. Copies of the following reports were on display at North Indian River County Library, City of Sebastian, and the Florida Department of Transportation District Four office twenty one (21) days before the Public Hearing: Preliminary Engineering Report, Design Traffic Technical Memorandum, Preliminary Drainage Report, Location Hydraulic Report, Bridge Hydraulic Report, Categorical Exclusion Type II, Air Quality Screening Test, Contamination Screening Evaluation Report, Conceptual Stage Relocation Plan, Section 4(f) De Minimus Finding, Mitigation Plan for Unavoidable Impacts to Essential Fish Habitat, Natural Resources Evaluation, Noise Study Report, Florida Scrub-Jay Habitat Mitigation Plan, and the Water Quality Impact Evaluation Checklist. Ninety five (95) residents, interested parties, elected and appointed officials, FDOT staff and consultants attended the Public Hearing. Seven (7) comment cards were submitted at

the public hearing and twelve (12) comments were submitted via email. All comments submitted and responses can be seen in **Appendix J**.

Ten (10) attendees spoke before the panel of the project team following a formal PowerPoint presentation. All comments from the public can be seen in the Certified Transcript in **Appendix J**.

APPENDIX A – REFERENCES

A. Reference Documents

1. Indian River County 2040 Long Range Transportation Plan (LRTP)
2. Indian River County Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP)
3. Florida Department of Transportation Plans Preparation Manual
4. AASHTO Geometric Design of Highways and Streets
5. Florida Department of Transportation Design Standards
6. Florida Design Manual

B. Companion Documents

1. Design Traffic Technical Memorandum Report
2. Contamination Screening Evaluation Report
3. Sociocultural Effects Evaluation Technical Memorandum
4. Natural Resources Evaluation
5. Culture Resource Assessment Survey
6. Conceptual Stage Relocation Plan
7. Section 4(f) De Minimis Finding Report
8. Air Quality Technical Memorandum
9. Noise Study Report
10. Location Hydraulics Report
11. Preliminary Drainage Report
12. Section 4(f) Determination of Applicability
13. Bridge Hydraulic Report
14. Section 4(f) Determination of Applicability
15. Categorical Exclusion Type II

APPENDIX B – FEMA FIRM MAPS

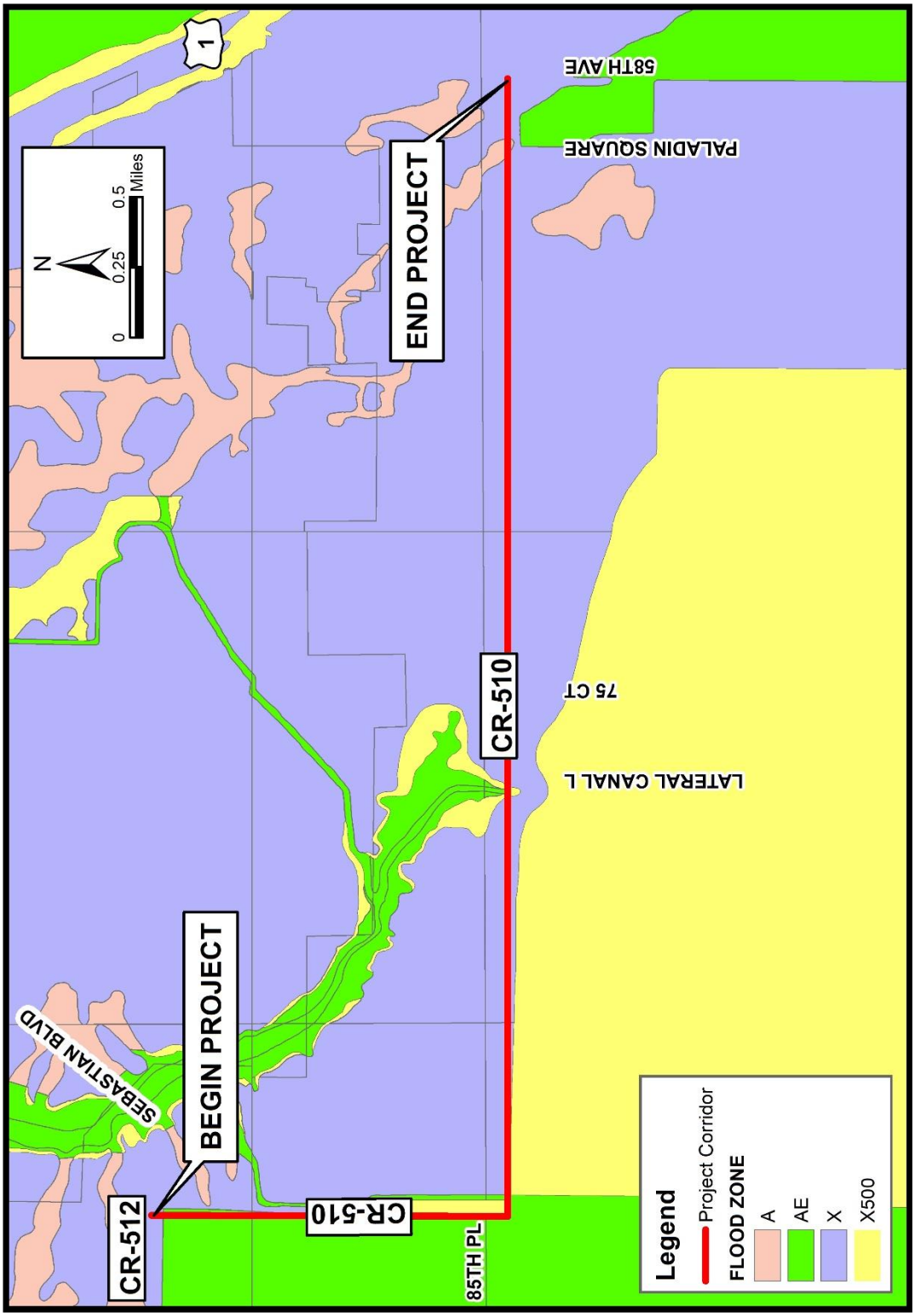
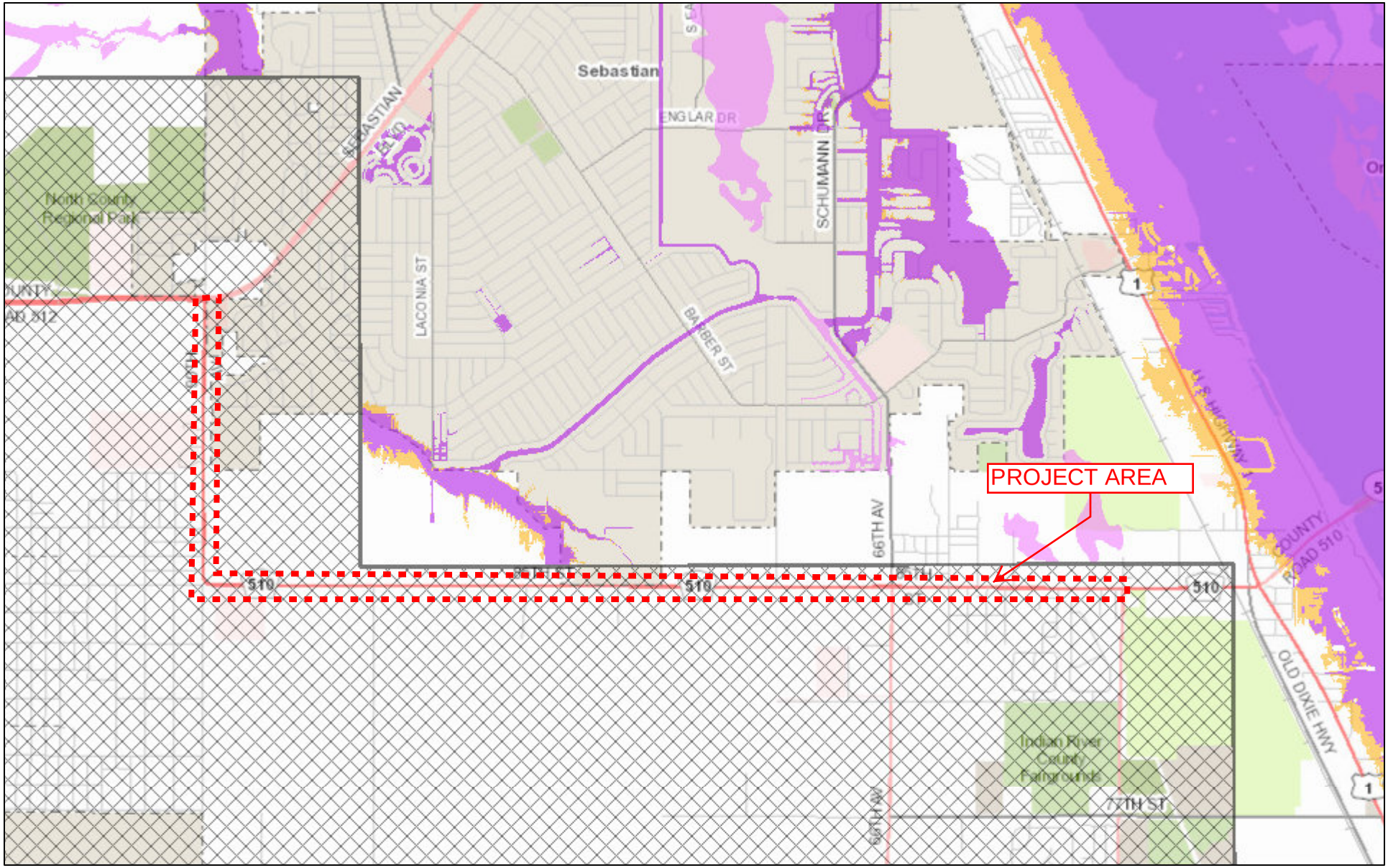


Figure 7-1: FEMA Flood Zone Map

FEMA Flood Zones for Indian River County, FL



October 12, 2016

FEMA Special Flood Hazard Areas

- Zone A
- Zone AE
- Zone AO
- Zone VE
- 0.2 PCT Chance Flood Area
- Zone X
- Area in Dispute

1:38,400

0 0.3 0.6 1.2 mi

0 0.375 0.75 1.5 km

IRCGIS, IRCPA
FEMA

IndianRiverCounty

APPENDIX C – EXISTING CONDITIONS EVALUATION PARAMETERS AND CRITERIA

Existing Conditions Evaluation Parameters & Criteria

Reading Characteristics: The following ten (10) parameters were evaluated:

- Cross Sectional Features

  This parameter relates to the adequacy and safety of the roadway cross sectional features, including lane and shoulder treatment, median treatment, guardrail treatment and location, clear zone, and roadside obstacles. Major cross sectional elements were visually inspected and a rating system established as shown on **Table C-1**.

TABLE C-1

CROSS SECTION EVALUATION

Rating	Element	Feature	Requirements		
			Urban Section (2 Lane UDIVD)	Urban Section (2 Lane UDIVD)	Urban Section (2 Lane UDIVD)
			35 MPH	45 MPH	55 MPH
Good	Pavement	Width	11’	≥ 12’	≥ 12’
	Shoulders	Width	≥ 8’	≥ 8’	≥ 8’
	Clear Zone	Distance	≥ 10’	≥ 12’	≥ 35’
	Median	Width	≥ 12’	≥ 12’	≥ 40’
	Roadside Obstacles	Location	No obstacles within shoulder area and all possible hazards are protected by guardrail	No obstacles within shoulder area and all possible hazards are protected by guardrails	No obstacles within shoulder area and all possible hazards are protected by guardrails
Fair	Pavement	Width	10’ < 11’	11’ ≤ 12’	11’ ≤ 12’
	Shoulders	Width	5’ ≤ 8’	5’ ≤ 8’	5’ ≤ 8’
	Clear Zone	Distance	6’ < 10’	8’ ≤ 12’	25’ ≤ 35’
	Median	Width	6’ ≤ 12’	6’ ≤ 12’	50’ ≤ 40’
	Roadside Obstacles	Location	Potential hazardous obstructions are protected by guardrail	Potential hazardous obstructions are protected by guardrail	Potential hazardous obstructions are protected by guardrail
Poor	Pavement	Width	< 11’	< 11’	< 11’
	Shoulders	Width	< 5’	< 5’	< 5’
	Clear Zone	Distance	< 6’	< 8’	< 25’
	Median	Width	< 6’	< 6’	< 50’
	Roadside Obstacles	Location	Potentially hazardous obstructions are not protected by guardrail	Potentially hazardous obstructions are not protected by guardrail	Potentially hazardous obstructions are not protected by guardrail

- Horizontal Alignment

  The horizontal alignment of a facility, which is usually comprised of tangents, circular curves and spiral transition curves, can have a critical impact on both operations and safety. This evaluation relates to design speed, horizontal curvature, lane transitions, and coordination with profile grades. **Table C-2** contains the basis for the horizontal alignment evaluation.

TABLE C-2
HORIZONTAL ALIGNMENT EVALUATION

RATING	DESIGN SPEED
GOOD	45 MPH AND ABOVE
FAIR	44 MPH TO 40 MPH
POOR	UNDER 40 MPH

- Vertical Alignment

  The vertical alignment of a facility, usually comprised of tangent grades and parabolic vertical curves, can also have a critical impact on operations and safety. This major geometric component deals primarily with elements such as maximum grade, maximum change in grade, critical lengths of grade, minimum length of curve and profile coordination with horizontal alignment. **Table C-3** contains the basis of the evaluation.

TABLE C-3
VERTICAL ALIGNMENT EVALUATION

RATING	DESIGN SPEED
GOOD	45 MPH AND ABOVE
FAIR	44 MPH TO 40 MPH
POOR	UNDER 40 MPH

- Stopping Sight Distance

  Stopping sight distance is simply defined as the sum of the distance traveled by a vehicle from the time a driver sights an object, to completion of a full stop. This important design feature is related to both horizontal and vertical alignments. Other factors that play an important role in the determination of adequate sight distance include roadside obstructions, including bridge piers, bridge railings, head-walls, retaining walls, embankments, utility poles, sign structures, trees, etc. Evaluation of this parameter was performed according to criteria established in Exhibit 3-1 of the 2010 edition of "A Policy on Geometric Design of Highways and Streets" (AASHTO's Green Book). **Table C-4** contains the basis of the evaluation.

TABLE C-4

STOPPING SIGHT DISTANCE (SSD) EVALUATION

RATING	APPROXIMATE CORRESPONDING DESIGN SPEED	STOP CONTROLLED	SIGNALIZED
GOOD	45 MPH AND ABOVE FOR MAJOR ROAD* & 25 MPH AND ABOVE FOR MINOR ROAD**	155' AND ABOVE **	460' AND ABOVE *
FAIR	BETWEEN 44 & 40 MPH FOR MAJOR ROAD*	N/A	460’ to 390’
POOR	UNDER 40 MPH FOR MAJOR ROAD* & UNDER 25 MPH FOR MINOR ROAD**	LESS THAN 155' **	LESS THAN 390' *

- Intersection Sight Distance

  This parameter relates to the provision of proper sight distances for a vehicle approaching an at-grade intersection. The operator of a vehicle should have an unobstructed view of the entire intersection and along the sufficient length of the intersecting facility to permit proper control of the vehicle and to avoid collisions. The sight distance considered safe under various assumptions of physical conditions and driver behavior is directly related to vehicle speeds and the resultant distances traversed during perception and reaction time and breaking. Evaluation of this parameter was performed according to the criteria set forth in FDOT Design Standards Index 546.

- Horizontal Clearance

  This parameter refers to the lateral clearance between the travel way and bridge piers, abutments or any other roadside obstacles. This parameter not only has a direct impact on safety but narrow shoulders and lateral obstructions can have a substantial impact to operations. Ideally, any facility should provide the minimum clear zone width and light poles, signs, utility poles, trees, etc., shall meet the requirements of FDOT Design Standards Index 700.

- Pavement Condition

The Florida Department of Transportation periodically performs a visual evaluation of both flexible (asphalt) and rigid (concrete) pavements which is referred to as a pavement condition survey. The purpose of the survey is to provide a good indication of the type and degree of distress (structural adequacy) and the riding quality of the pavement under consideration. The evaluation of the existing pavement condition utilized the criteria shown on **Table C-5**.

TABLE C-5

PAVEMENT CONDITION EVALUATION

RATING	PAVEMENT CONDITION SURVEY RIDE RATING AND/OR DEFECT RATING SCORE
GOOD	GOOD TO EXCELLENT RIDEABILITY AND MINOR TO NO VISUAL INDICATION OF PAVEMENT DISTRESS
FAIR	FAIR RIDEABILITY AND SIGNIFICANT VISUAL INDICATION OF PAVEMENT DISTRESS
POOR	POOR RIDEABILITY AND NUMEROUS VISUAL INDICATIONS OF PAVEMENT DISTRESS

- Traffic/Operational Parameters:

The following three (3) traffic operational parameters were evaluated:

  - Level of Service

This parameter is the basis for evaluation of capacity deficiencies. As defined in the 2010 edition of the "Highway Capacity Manual", level of service is a "quantitative stratification of a performance measure or measures that represent quality of service" in terms of such factors as "speed and travel time, maneuverability, traffic interruptions, comfort and convenience, safety, user cost, availability of facilities and services, facility aesthetics, and information availability." Although Synchro 8 implements HCM 2010 procedures, the module has limitations in application of these procedures. Due to the characteristics at many of the study intersections (closely spaced intersections, lane assignments, signal phasing, etc.) Synchro 8 analysis results were used in lieu of the HCM 2010 in order to establish consistency in reporting results for comparison. The evaluation of the existing Level of Service utilized the criteria shown on **Table C-6**.

TABLE C-6 INTERSECTION LEVEL OF SERVICE EVALUATION	
RATING	HCM LEVEL OF SERVICE
GOOD FAIR POOR	A, B, AND C D E AND F
SEGMENT LEVEL OF SERVICE EVALUATION	
GOOD	V/C RATIO < 0.75
FAIR	V/C RATIO ≥ 0.75
POOR	V/C RATIO ≥ 1.00

- Access Management

This parameter relates to the provision of the adequate amount of access control along a facility to enhance its primary function of mobility. This enhancement occurs by reducing the amount of crossroad interference or side friction with through traffic thus reducing accident potential and increasing capacity. Access management more specifically is defined as the control and regulation of the spacing and design of driveways, medians, median openings and traffic signals along an arterial facility. The goals of access management are to limit the number of conflict points that a vehicle experiences in its travel, to separate conflict points as much as possible when they cannot be completely eliminated, and to remove slower turning vehicles and queues, which result from vehicles requiring access to adjacent sites, from the traffic lanes of through vehicles. For the facility under study, the evaluation of access utilized FDOT's Access Management Classification System and Standards (Rule 14-97) for the following:

- Traffic Signal Spacing
- Median Opening Spacing
- Driveways Connection Spacing

In addition, the design and layout of each turnout/driveway/intersection was evaluated relative to current FDOT design standards based on the function of the connection as well as the volume of traffic (daily trips) being served. The evaluation of the existing Access Management utilized the criteria shown on **Table C-7**.

TABLE C-7

ACCESS MANAGEMENT EVALUATION

RATING	CRITERIA
GOOD	**CONNECTION SPACING** >45 MPH ≥440 ft ≤45 MPH ≥245 ft **MEDIAN OPENING** **Directional** >660 ft **Full** ≥2,640 for > 45 mph; ≥1,320 for ≤ 45 mph **SIGNAL SPACING** ≥2,640 for > 45 mph; ≥1,320 for ≤ 45 mph
POOR	**CONNECTION SPACING** >45 MPH <440 ft ≤45 MPH <245 ft **MEDIAN OPENING** **Directional** >660 ft **Full** <2,640 for > 45 mph; <1,320 for ≤ 45 mph **SIGNAL SPACING** <2,640 for > 45 mph; <1,320 for ≤ 45 mph

- Signing and Markings

  Signing can also have a definite impact on the operation and safety along any roadway facility. Signs serve to direct and assist drivers in the guidance and navigation tasks to traverse safely along any roadway facility. There are four functional classifications to which highway signs can pertain: regulatory, warning, guide and informational. Regulatory signs are used to inform the highway user of traffic laws or regulations and to indicate the required method of traffic movement. Warning signs are used to warn traffic of existing or potentially hazardous conditions on or adjacent to a facility. Guide signs are usually the most complex, showing route designations, destinations, directions and distances and are used to guide, inform and direct vehicle operators in the most simple and direct manner possible. Informational signs are used to provide motorists with information on points of interest, available services and other geographic recreational or cultural sights. The evaluation of existing signing included the application of seven basic criteria: Design; Composition and Message Units; Placement, Location or Orientation; Operation, Spacing and Succession; Maintenance; Uniformity of Application and

Consistency; and Sufficiency/Warrants.

- Safety

In order to facilitate analyses using HSM procedures, the corridor was subdivided as shown on **Table C-8**.

TABLE C-8

EXISTING HSM SEGMENTATION

Name	Limits		Length
Intersection 1	CR 510 at CR 512	MP 0.000 to MP 0.047	250' on each leg
Segment 1A	Between Intersections 1 and 2	MP 0.047 to MP 0.530	2,530'
Intersection 2	CR 510 at Mako Way	MP 0.530 to MP 0.643	250' on each leg*
Intersection 3	CR 510 at Hammerhead Way	MP 0.643 to MP 0.754	250' on each leg*
Segment 1B	Between intersections 3 and 4	MP 0.754 to MP 0.965	1,110'
Intersection 4	CR 510 at 87th Street	MP 0.965 to MP 1.060	250' on each leg
Segment 1C	Between intersections 4 and curve	MP 1.060 to MP 1.215	816'
Segment 2A	Curve	MP 1.215 to MP 1.286	375'
Segment 2B	Between curve and intersection 5	MP 1.286 to MP 1.403	620'
Intersection 5	CR 510 at Treasure Coast Elementary School Entrance	MP 1.403 to MP 1.600	500' on each leg
Segment 3A	Between intersection 5 and bridge 1	MP 1.600 to MP 2.237	3,363'
Segment 3B	Bridge #1	MP 2.237 to MP 2.256	100'
Segment 3C	Between bridges #1 and #2	MP 2.256 to MP 2.732	2,558'
Segment 3D	Bridge #2	MP 2.732 to MP 2.756	125'
Segment 3E	Between bridge #2 and intersection 6	MP 2.756 to MP 4.204	7,619'
Intersection 6	CR 510 a 66th Avenue	MP 4.204 to MP 4.337	250' on each leg
Segment 4A	Between intersections 6 and 7	MP 4.337 to MP 5.236	4,750'
Intersection 7	CR 510 at 58 Avenue	MP 5.236 to MP 5.283	250' on each leg

* Because of the proximity of these two intersections, the area of influence was divided between them
MP = Mile Post

The HSM's measure of safety is based on the number of crashes per year (N). The Safety Performance Function (SPF) for crashes on a two-lane rural roadway segment under base conditions is given as follows:

$$N_{SPF-rs} = AADT \times L \times 365 \times 10^{-6} \times e^{-0.312}$$

Where AADT = Annual Average Daily Traffic, and L = Length of the Segment

Crash Modification Factors (CMFs) are applied to account for the differences in the given segment from the base conditions on which the SPF is based. The applicable CMFs incorporate lane width (CMF1r), shoulder width and type (CMF2r), horizontal curvature (CMF3r), superelevation variance (CMF4r), grade (CMF5r), driveway density (CMF6r). A calibration factor Cr (if known) is applied to account for variations in driver characteristics. Because this application is a comparative before and after study, a calibration factor of 1.00 has been used. CMFs are applied o the analysis as follows:

$$N_{Predicted} = N_{SPF-rs} \times (CMF_{1r} \times CMF_{2r} \times \ldots \times CMF_n) \times C_r$$

The result of this calculation is the "Predicted" number of crashes for the given roadway segment.

There are no three-way or four-way stop controlled intersections within the project limits. Intersection crashes for a four-legged intersection under signalized control (Nspf 4SG) are calculated using the following equation:

$$N_{Predicted} = N_{SPF-rs} \times (CMF_{1r} \times CMF_{2r} \times \ldots \times CMF_n) \times C_r$$

If observed crashes are known for a particular intersection or segment of roadway, an Empirical Bayes (EB) analysis is conducted to account for regression to the mean. A weighting factor is applied to the predicted and observed crashes based on the over-dispersion parameter of the SPF. In essence, the more robust a given SPF is, the higher the weighting factor on predicted crashes. Thus, the expected number of crashes are calculated as follows:

$$N_{spf\ 4SG} = e^{[-5.13+0.60 x ln(AADT_{major})+0.20 x ln(AADT_{minor})]}$$

If observed crashes are known for a particular intersection or segment of roadway, an Empirical Bayes (EB) analysis is conducted to account for regression to the mean. A weighting factor is applied to the predicted and observed crashes based on the over-dispersion parameter of the SPF. In essence, the more robust a given SPF is, the higher the weighting factor on predicted crashes. Thus, the expected number of crashes are calculated as follows:

$$N_{expected} = w \times N_{predicted} + (1 - w) \times N_{observerd}$$

The weighting factor w is calculated based on the over-dispersion factor (k) given with the SPF:

$$w = \frac{1}{1 + k \times (\sum_{all\ study} N_{predicted}}$$

Where

$$k = \frac{0.236}{L}$$

Observed crashes were obtained from FDOT and are reflected on **Table C-9**.

Using the methodology in Part C, Chapter 10 of the HSM and as outlined above, the number of crashes predicted, observed and expected for the existing segments and intersections are listed in **Table C-9**.

TABLE C-9

EXISTING HSM SEGMENTATION

Name	Limits	Predicted Crashes	Observed Crashes	Expected Crashes	Rating
Intersection 1	MP 0.000 to MP 0.047	5.81	9	7.05	
Segment 1A	MP 0.047 to MP 0.530	0.89	1	0.93	
Intersection 2	MP 0.530 to MP 0.643	5.68	1	3.88	
Intersection 3	MP 0.643 to MP 0.754	4.49	1	3.34	
Segment 1B	MP 0.754 to MP 0.965	0.61	0	0.36	
Intersection 4	MP 0.965 to MP 1.060	5.57	0	3.45	
Segment 1C	MP 1.060 to MP 1.215	0.47	1	0.69	
Segment 2A	MP 1.215 to MP 1.286	1.04	0	0.23	
Segment 2B	MP 1.286 to MP 1.403	1.59	0	0.38	
Intersection 5	MP 1.403 to MP 1.600	4.03	1	3.10	
Segment 3A	MP 1.600 to MP 2.237	1.83	0	1.09	
Segment 3B	MP 2.237 to MP 2.256	0.09	0	0.04	
Segment 3C	MP 2.256 to MP 2.732	1.41	0	0.83	
Segment 3D	MP 2.732 to MP 2.756	0.11	0	0.05	
Segment 3E	MP 2.756 to MP 4.204	4.59	6	5.19	
Intersection 6	MP 4.204 to MP 4.337	4.13	3	3.78	
Segment 4A	MP 4.337 to MP 5.236	2.53	2	2.32	
Intersection 7	MP 5.236 to MP 5.283	5.32	2	4.10	
	Totals	**50.20**	**27**	**40.82**	

Legend

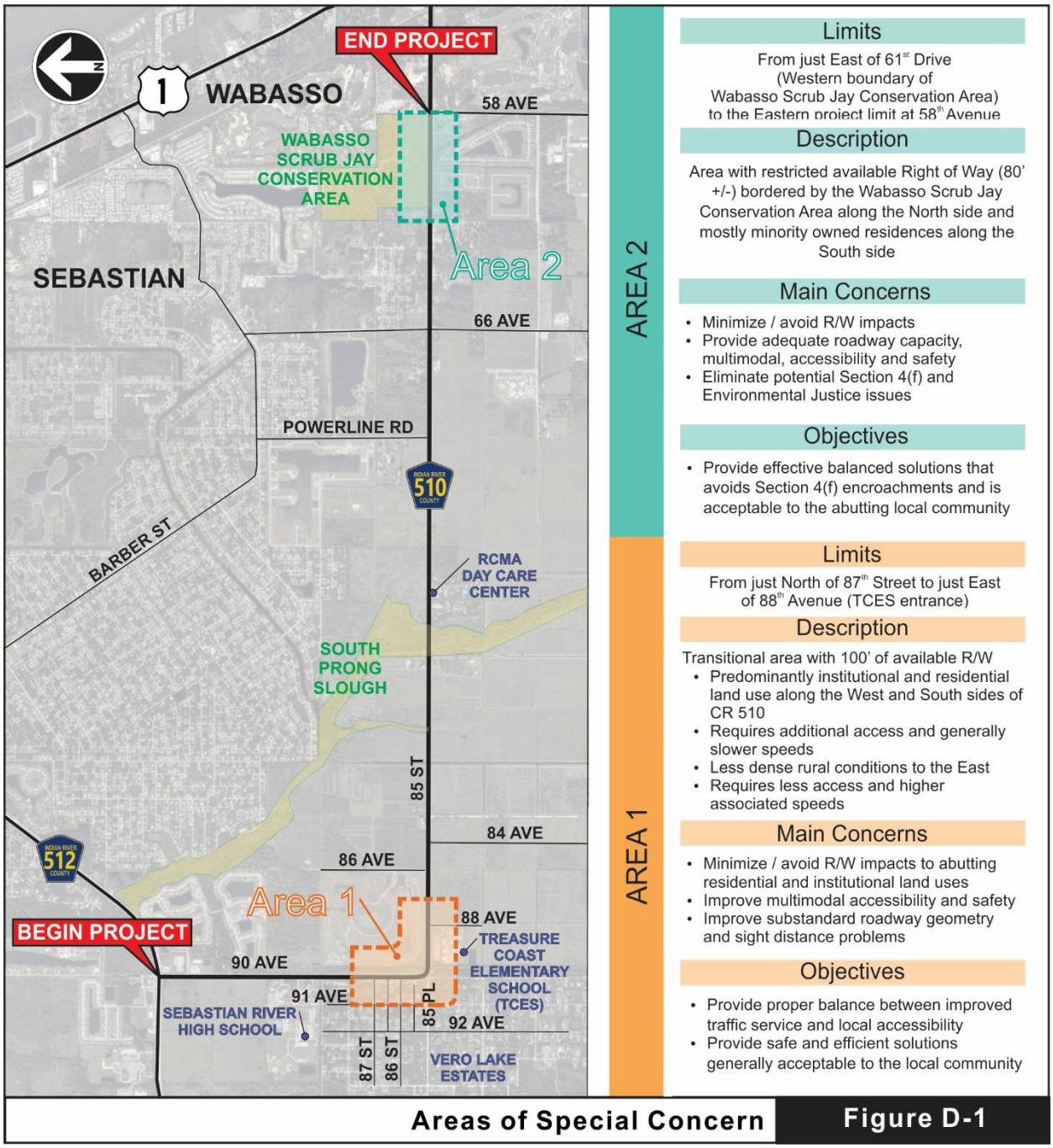
"Good"
"Fair"
"Poor"

In terms of the assigned safety "rating" if the observed crashes were greater than expected a "Poor" rating was assigned. If the number of observed crashes was equal or approximately equal to the expected crashes a "Fair" rating was assigned. If the observed crashes were less than the predicted a "Good" rating was used.

APPENDIX D – SPECIAL CONCERN AREAS ANALYSIS AND COORDINATION

Areas of Special Concern:

As previously stated various areas of “special concern” were identified. These areas required additional detailed analysis, and coordination to address their geometric operational and access issues. **Figure D-1** illustrates and describes these areas as well as their main concerns and objectives. Following is a brief summary of the obtained results.



Areas of Special Concern **Figure D-1**

Area 1 (replacement of Existing Substandard Horizontal Curve – Segment 2)

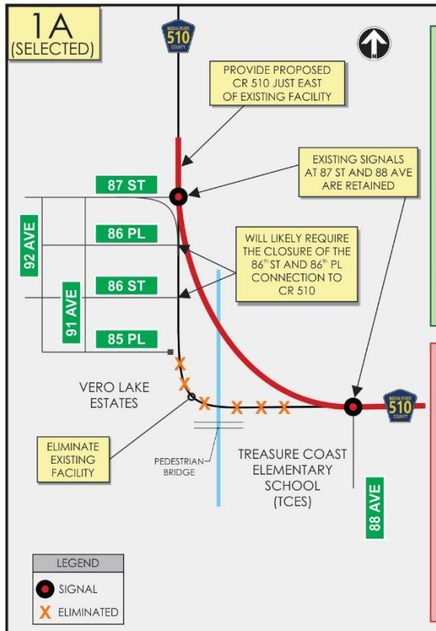
As shown on **Figure E-2** the main objective within this area is to provide a geometric solution that affords the proper balance between traffic service, local accessibility and safety. **Figure E-2** illustrates, six (6) preliminary alternative schemes with their advantages and disadvantages that were presented to various Indian River County and Treasure Coast Elementary School (TCES) officials as well as residents of the adjoining Vero Lake Estates. The minutes of the various meetings regarding this area are documented in **Appendix J**. The final recommended solution, 1A, is shown on **Figure E-2** as well as the main reasons for the selection.

Area 2 (Selection of Optimum Typical Section and local accessibility east of 61 Drive – Segment 4)

Typical Section

This project area offers the dual challenge of providing a constrained typical section that would avoid impacts to the Wabasso Scrub Jay Conservation Area (a Section 4(f) resource funded with Florida Forever Funds along the north side) and also minimize impacts to the Hill Side neighborhood along the south side. It should be noted that the Hill Side community is mostly composed of minority owned residences. As discussed in Section 5, Typical Section E South Alignment was selected and recommended for this segment (see **Figure E-3**). In effort to potentially minimize impacts to the Hill Side Community, a series of variations to Typical Section E were presented to the community. **Table E-1**, illustrates the six (6) modified typical sections that were presented to the Wabasso Progressive League and local residents of the Hill side neighborhood. The minutes of the various meetings regarding this issue are included in **Appendix J**. The final adopted solution is Alternative E shown on **Table E-1**. This alternative was agreed upon with members of the affected community and provides the best multimodal service, ample landscaping opportunities in the median area and is compatible with the adjoining typical sections.

1A (SELECTED)



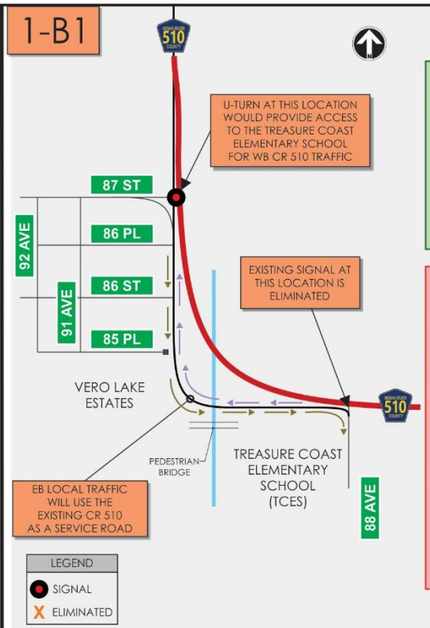
ADVANTAGES

- RETAINS MOST OF THE EXISTING ACCESS CONNECTIONS WITH WHICH LOCAL USERS ARE FAMILIAR
- MODERATE CONSTRUCTION COST AS COMPARED WITH SOME OTHER OPTIONS
- MINIMUM CONTROVERSIAL POTENTIAL

DISADVANTAGES

- OFFERS NO LOCAL TRAFFIC RELIEF TO 87th ST AND 88th AVE SIGNALIZED INTERSECTIONS
- REQUIRES ACCESS CLOSURE OF 86th ST AND 86th PL AND CONCENTRATES VERO LAKE ESTATES TRAFFIC AT 87th ST

1-B1



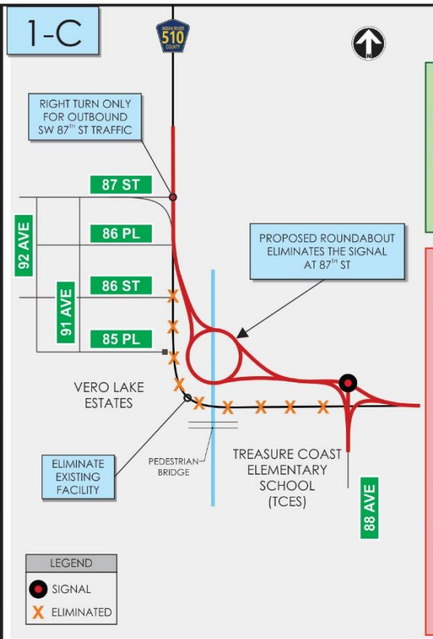
ADVANTAGES

- ELIMINATES THE TRAFFIC SIGNAL AT 88th AVE
- UTILIZES EXISTING CR 510 AS A SERVICE ROAD TO PROVIDE ACCESS TO TCES

DISADVANTAGES

- HIGHER CONSTRUCTION COST THAN OPTION 1-B
- MORE INDIRECT CONNECTION FOR WB CR 510 TRAFFIC DESTINED TO THE TCES AND FROM THE TCES TO NB CR 510
- POTENTIAL GEOMETRIC ISSUES ASSOCIATED WITH TURNING RADIUS FOR U-TURNS AT THE 87th ST / CR 510 INTERSECTION

1-C



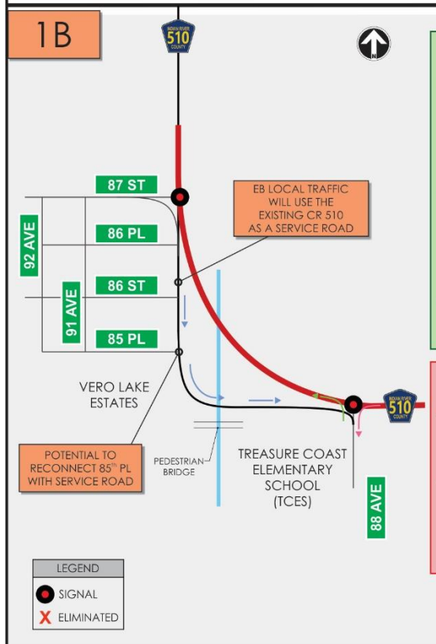
ADVANTAGES

- ELIMINATES SIGNAL AT 87th ST
- OFFERS ADDITIONAL LANDSCAPING OPPORTUNITIES

DISADVANTAGES

- INDIRECT CONNECTION FOR OUTBOUND 87th ST TRAFFIC DESIRING TO GO NB ON CR 510 MIGHT DIVERT ADDITIONAL TRAFFIC TO THE 89th ST/CR 510 INTERSECTION TO THE NORTH
- HIGHER CONSTRUCTION COST
- HIGHER R/W IMPACT
- ROUNDABOUT NOT WARRENTED DUE TO PRESENCE OF TRAFFIC IN ANY ONE DIRECTION

1B



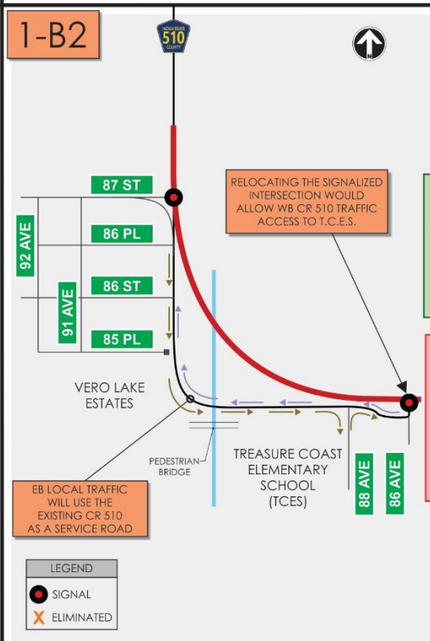
ADVANTAGES

- UTILIZES EXISTING CR 510 AS A SERVICE ROAD TO PROVIDE EB ACCESS TO TCES
- EB SERVICE ROAD OFFERS PARTIAL TRAFFIC RELIEF TO THE 87th ST AND 88th AVE SIGNALIZED INTERSECTIONS
- POTENTIAL TO RECONNECT 85th PL WITH SERVICE ROAD

DISADVANTAGES

- HIGHER CONSTRUCTION COST THAN OPTION 1-A
- ONE-WAY TRAFFIC ALONG SERVICE ROAD LIMITS ACCESSIBILITY AND TRAFFIC FLOW

1-B2



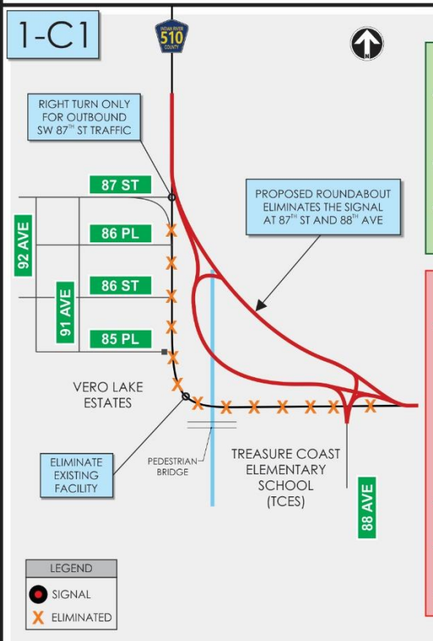
ADVANTAGES

- SERVICE ROAD OFFERS PARTIAL TRAFFIC RELIEF TO THE 87th ST AND 88th AVE SIGNALIZED INTERSECTIONS

DISADVANTAGES

- HIGHER CONSTRUCTION COST THAN OPTION 1-B
- REQUIRES ADDITIONAL R/W EAST OF 88th AVE

1-C1



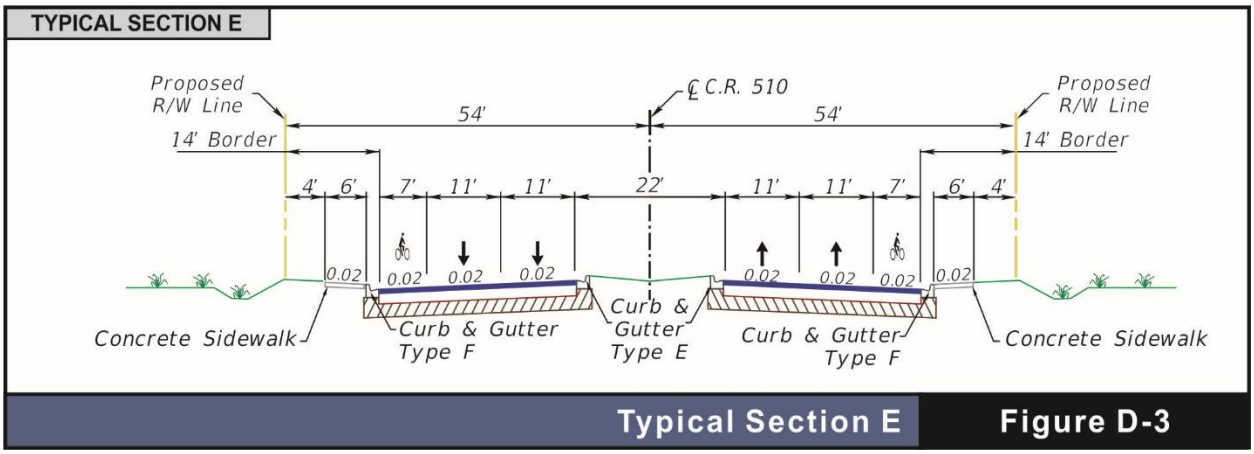
ADVANTAGES

- ELIMINATES THE TRAFFIC SIGNAL AT 87th ST
- POTENTIALLY SAFER OPTION
- OFFERS ADDITIONAL LANDSCAPING

DISADVANTAGES

- INDIRECT CONNECTION FOR OUTBOUND 87th ST TRAFFIC DESIRING TO GO NB ON CR 510 MIGHT DIVERT ADDITIONAL TRAFFIC TO THE 89th ST/CR 510 INTERSECTION TO THE NORTH
- HIGHER CONSTRUCTION COST
- COULD BE POTENTIALLY CONTROVERSIAL
- HIGHER R/W IMPACT

Area of Special Concern - Segment 2 **Figure D-2**

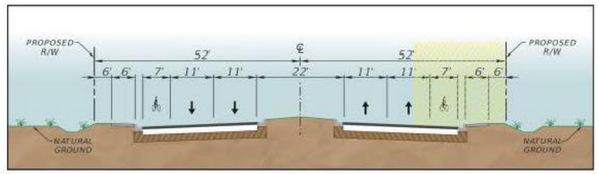
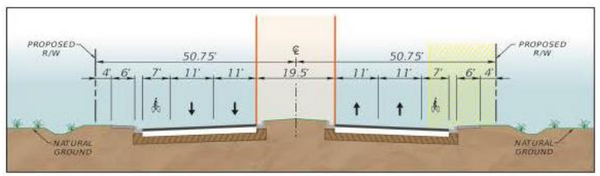
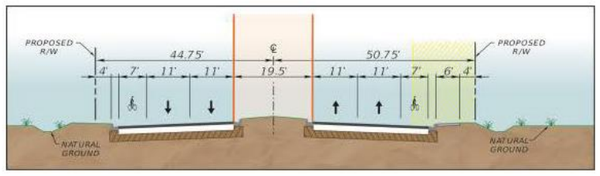
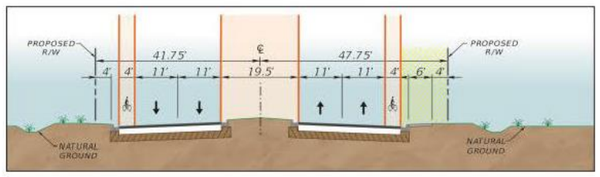
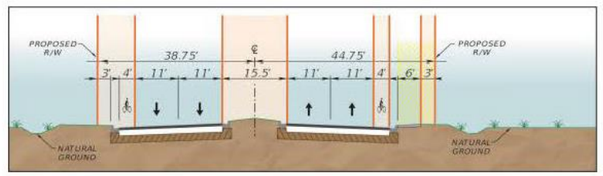
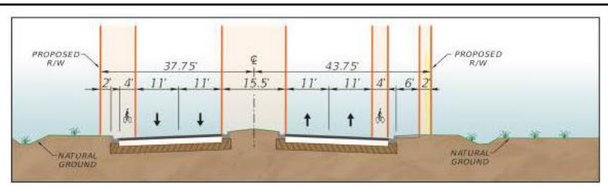


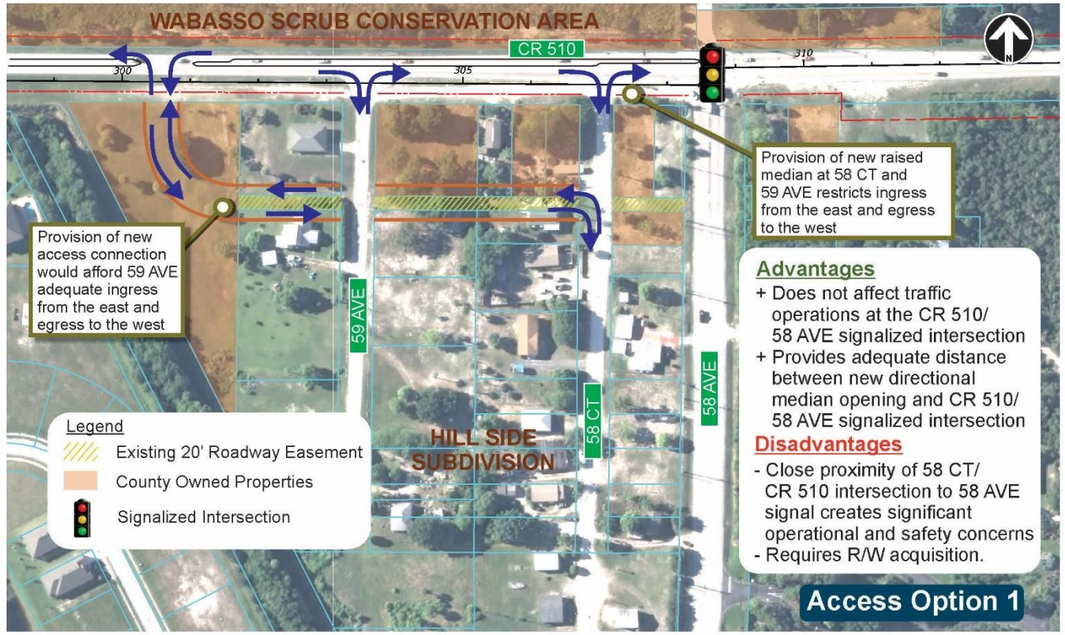
Accessibility Issues

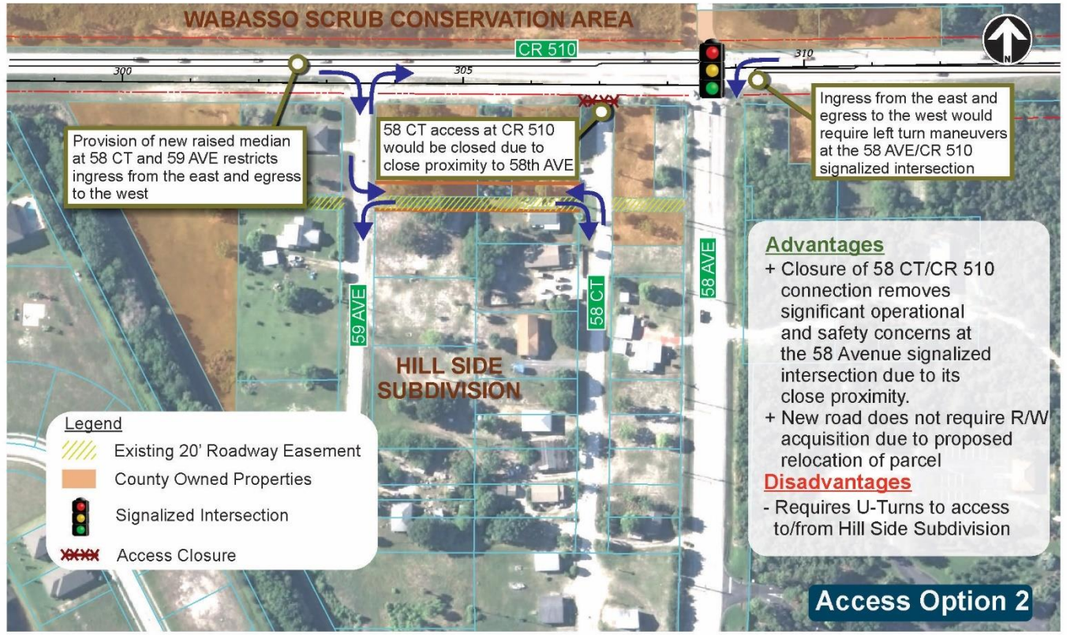
The proposed raised median along this section of the project area will restrict ingress from the east and egress to the west from the Hill Side neighborhood along the south side of CR 510. **Figure E-3** illustrates four (4) distinct accessibility options that were investigated, presented and discussed with Indian River County officials as well as residents of the Hill Side neighborhood. Minutes of these minutes are also included in **Appendix J**. Option 2 was selected for implementation due to its safety and access improvements as well as use of existing publicly owned land (including parcel which is proposed for relocation due to CR 510 improvements).

TABLE D-1 - POTENTIAL TYPICAL SECTION ALTERNATIVES WITHIN SEGMENT 4

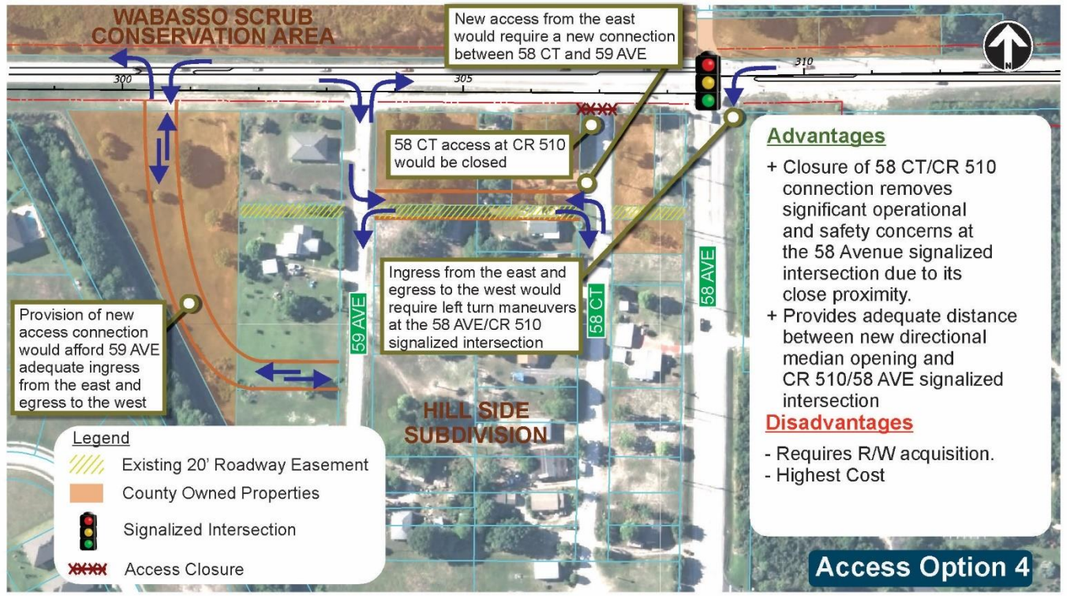
LEGEND: Reduced Feature | R/W Impacts

ALTERNATIVE	FEATURES								DESIGN SPEED (MPH)	REMARKS
	LANE WIDTH	MEDIAN WIDTH	MULTIMODAL		CURB AND GUTTER WIDTH	UTILITY STRIP WIDTH	TOTAL R/W REQUIRED	RESULTING R/W IMPACTS		
			BIKE LANE WIDTH	SIDEWALK WIDTH						
E1 	11'	22'	7'	6' (both sides)	4'	6'	104'	24'	45	- Standard typical section offers best service but causes greatest impact - Median width allows landscaping opportunities
E2 	11'	19.5'	7'	6' (both sides)	4'	4'	101.5'	21.5'	45	- Typical section offers best service but causes significant impact - Reduced median width still allows landscaping opportunities
E3 	11'	19.5'	7'	6' (south side) no sidewalk along north side	4'	4'	95.5'	15.5'	45	- Removal of sidewalk along the north side creates pedestrian discontinuity. However, this area has low pedestrian usage - Reduced median width still allows landscaping opportunities
E4 	11'	19.5'	4'	6' (south side) no sidewalk along north side	4'	4'	89.5'	9.5'	45	- Reduced bike lane width is a minor concern but would match future CR 510 section east of project limits - Removal of sidewalk along the north side creates pedestrian discontinuity. However, this area has low pedestrian usage - Reduced median width still allows landscaping oppurtunities
E5 	11'	15.5'	4'	6' (south side) no sidewalk along north side	4'	3'	83.5'	3.5'	40	- Removal of sidewalk along the north side creates pedestrian discontinuity. However, this area has low pedestrian usage - Reduced bike lane width is a minor concern but would match future CR 510 section east of project limits - Reduced median width restricts landscaping opportunities - Reduces utility strip
E6 	11'	15.5'	4'	6' (south side) no sidewalk along north side	4'	2'	81.5'	1.5'	40	- Removal of sidewalk along the north side creates pedestrian discontinuity but this area has low pedestrian usage - Reduced bike lane width is a minor concern but could potentially match future CR 510 section east of project limits - Reduced median width restricts landscaping opportunities - Reduced utility strip width is not desirable









Potential Alignment Options | Figure D-4



Recommended Access to Wabasso Community **Figure D-5**

APPENDIX E – CONCEPT PLANS

Typical Section Package

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

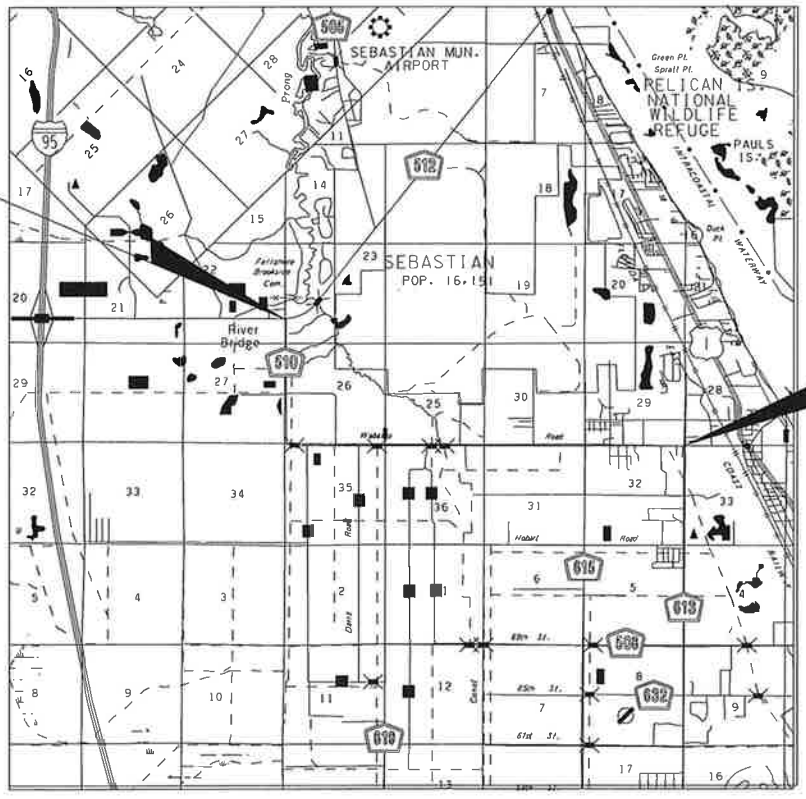
TYPICAL SECTION PACKAGE

FINANCIAL PROJECT ID 405606-2-22-02

INDIAN RIVER COUNTY (88)

COUNTY ROAD NO. 510
FROM CR 512 TO 58TH AVENUE

BEGIN PROJECT
STA. 100+00.00
℄ CONST.



END PROJECT
STA. 380+39.04
℄ CONST.

METRIC ENGINEERING, INC
13940 SW 136 ST
MIAMI, FL 33186
(305) 235-5098
CERTIFICATE OF AUTHORIZATION No.: 00002294
EOR, P.E. NO. 72638

SHEET NO.
1

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

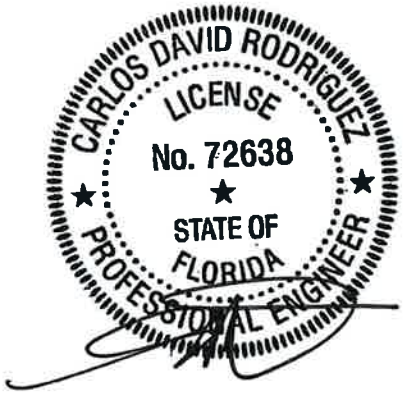
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 COUNTY (SECTION) INDIAN RIVER

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

SIGNATURE SHEET

APPROVED BY:



THIS DOCUMENT HAS BEEN DIGITALLY SIGNED AND SEALED BY:

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED. THE SIGNATURE MUST BE VERIFIED ON THE ELECTRONIC DOCUMENTS.

METRIC ENGINEERING, INC.
13940 SW 136 ST
MIAMI, FL 33186
(305) 235-5098
CERTIFICATE OF AUTHORIZATION No.: 00002294
EOR, P.E. NO. 72638

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

TYPICAL SECTION PACKAGE

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2	SIGNATURE SHEET
3	PROJECT CONTROL SHEET
4-9	TYPICAL SECTION NO. 1 - 6

FDOT CONCURRENCE

STEVEN C. BRAUN, P.E.
FDOT DISTRICT DESIGN ENGINEER

8/30/18
Date

RECOMMENDED BY

JAMES W. ENNIS, P.E.
INDIAN RIVER COUNTY ENGINEER

9/22/2017
Date

DESIGN SPEED APPROVAL

STEVEN C. BRAUN, P.E.
FDOT DISTRICT DESIGN ENGINEER

8/30/18
DATE

POSTED SPEED APPROVAL

JAMES W. ENNIS, P.E.
INDIAN RIVER COUNTY ENGINEER

9/20/2017
DATE

SHEET NO. 2

Paul.Carballo 8/15/2017 6:51:05 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\TYPICAL SECTION PACKAGE.DGN

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 COUNTY (SECTION) INDIAN RIVER

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROJECT CONTROLS

FUNCTIONAL CLASSIFICATION

( ) RURAL

(X) URBAN

( ) FREEWAY/EXPWY. ( ) MAJOR COLL.

(X) PRINCIPAL ART. ( ) MINOR COLL.

( ) MINOR ART. ( ) LOCAL

HIGHWAY SYSTEM

Yes	No	
( )	(X)	NATIONAL HIGHWAY SYSTEM
( )	(X)	STRATEGIC INTERMODAL SYSTEM
( )	(X)	STATE HIGHWAY SYSTEM
(X)	( )	OFF STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

( ) 1 - FREEWAY

( ) 2 - RESTRICTIVE w/Service Roads

( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing

( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing

(X) 5 - RESTRICTIVE w/440 ft. Connection Spacing

( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing

( ) 7 - BOTH MEDIAN TYPES

TRAFFIC

	YEAR	AADT
CURRENT	2015	14,000
OPENING	2020	16,000
DESIGN	2040	26,000

DESIGN SPEED 45 & 50 MPH

POSTED SPEED 40 - 45 MPH

DISTRIBUTION

K = 9%

D = 67.1%

T_{24} =5.4

CRITERIA

(X) NEW CONSTRUCTION / RECONSTRUCTION

( ) RRR INTERSTATE / FREEWAY

( ) RRR NON-INTERSTATE / FREEWAY

( ) TDLC / NEW CONSTRUCTION / RECONSTRUCTION

( ) TDLC / RRR

( ) MANUAL OF UNIFORM MINIMUM STANDARDS (FLORIDA GREENBOOK) (OFF-STATE HIGHWAY SYSTEM ONLY)

LIST ANY POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION ELEMENTS:

LIST MAJOR STRUCTURES LOCATION/DESCRIPTION - REQUIRING INDEPENDENT STRUCTURE DESIGN:

CULVERT OVER LATERAL D CANAL

CR 510 OVER LATERAL C CANAL

CR 510 OVER LATERAL L CANAL

CR 510 OVER SLOUGH

LIST MAJOR UTILITIES WITHIN PROJECT CORRIDOR:

AT&T

CITY GAS COMPANY OF FLORIDA

COMCAST CABLE

FLORIDA POWER & LIGHT INDIAN RIVER

FLORIDA PUBLIC UTILITIES

INDIAN RIVER COUNTY UTILITIES

INDIAN RIVER COUNTY PUBLIC WORKS

JOHNS ISLAND WATER MANAGEMENT

LIST OTHER INFORMATION PERTINENT TO DESIGN OF PROJECT:

SHEET NO. 3

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

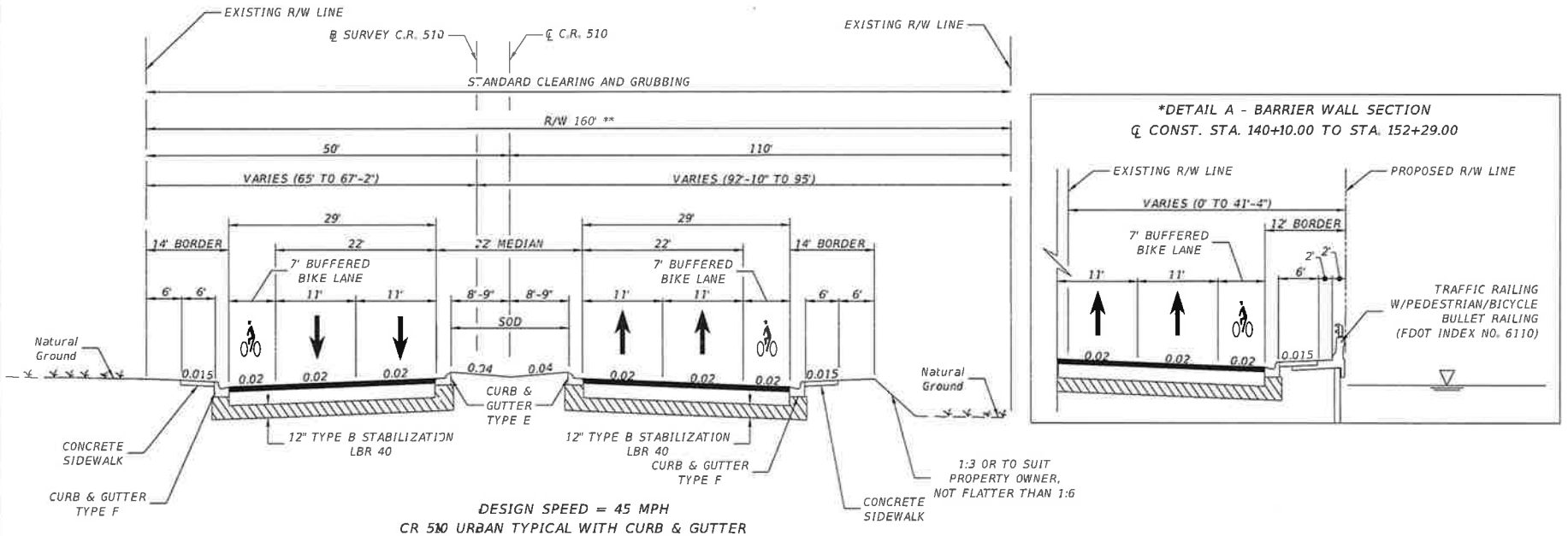
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 FEDERAL AID PROJECT NO. 4984-004-S COUNTY NAME INDIAN RIVER

SECTION NO. N/A ROAD DESIGNATION CR 510 LIMITS/MILEPOST CR 512 TO 58TH AVENUE

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROPOSED ROADWAY TYPICAL SECTION 1



*DETAIL A - BARRIER WALL SECTION
℄ CONST. STA. 140+10.00 TO STA. 152+29.00

DESIGN SPEED = 45 MPH
CR 510 URBAN TYPICAL WITH CURB & GUTTER
FROM CR 512 TO EAST OF 86TH AVE
℄ SURVEY STA. 30+00.00 TO STA. 121+01.94
℄ CONST. STA. 100+00.00 TO STA. 186+26.96

* TURF OR SOD

** R/W VARIES FROM ℄ STA. 70+93.49 TO STA. 121+01.94 & ℄ CONST. STA. 141+31.02 TO STA. 186+26.96
R/W DIMENSIONS ARE NOT REFLECTED. SEE CONCEPT PLANS FOR DETAILS.

SHEET NO. 4

Paul Carballo 10/13/2017 1:54:27 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\TYPICAL SECTION PACKAGE.DGN

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

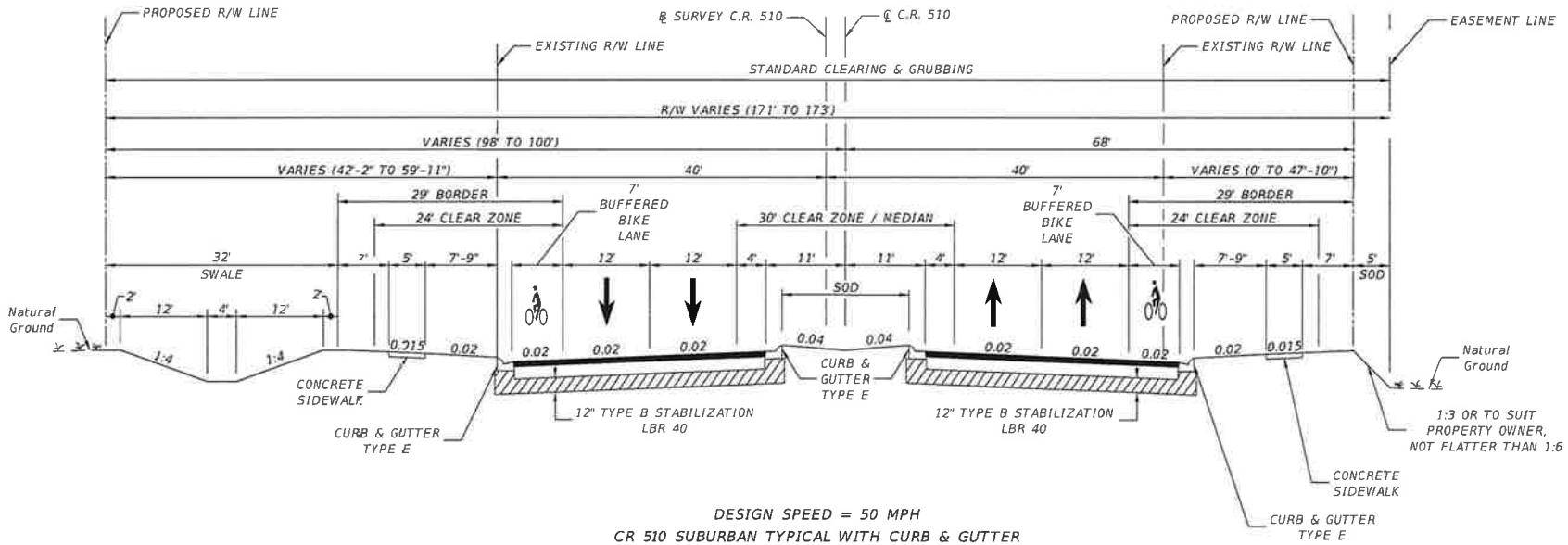
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 FEDERAL AID PROJECT NO. 4984-004-S COUNTY NAME INDIAN RIVER

SECTION NO. N/A ROAD DESIGNATION CR 510 LIMITS/MILEPOST CR 512 TO 58TH AVENUE

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROPOSED ROADWAY TYPICAL SECTION 2



DESIGN SPEED = 50 MPH

CR 510 SUBURBAN TYPICAL WITH CURB & GUTTER

FROM EAST OF 86TH AVE TO 66TH AVE

℄ SURVEY STA. 121+01.94 TO STA. 147+83.90 ℄ CONST. STA. 186+26.68 TO STA. 213+08.63

℄ SURVEY STA. 148+93.30 TO STA. 174+43.99 ℄ CONST. STA. 214+17.96 TO STA. 239+68.73

℄ SURVEY STA. 175+33.29 TO STA. 179+24.96 ℄ CONST. STA. 240+58.07 TO STA. 244+53.07

℄ SURVEY STA. 180+09.77 TO STA. 258+33.23 ℄ CONST. STA. 245+15.77 TO STA. 319+57.86

SHEET NO. 5

Paul.Carballo 10/13/2017 1:54:42 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\TYPICAL SECTION PACKAGE.DGN

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

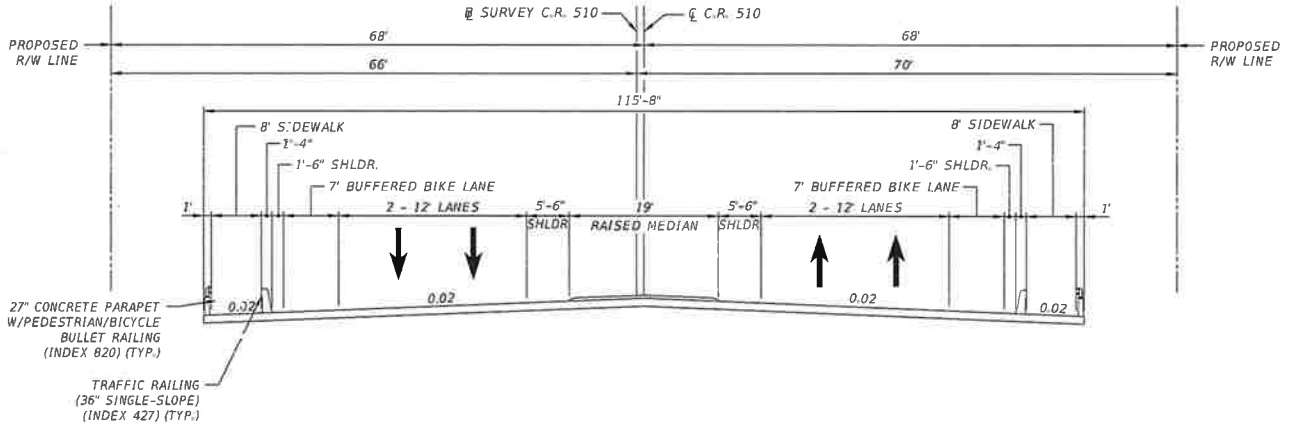
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 FEDERAL AID PROJECT NO. 4984-004-S COUNTY NAME INDIAN RIVER

SECTION NO. N/A ROAD DESIGNATION CR 510 LIMITS/MILEPOST CR 512 TO 58TH AVENUE

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROPOSED STRUCTURE TYPICAL SECTION 3



BRIDGE 88XXXX

CR 510 OVER LATERAL C CANAL

DESIGN SPEED = 50 MPH

℄ SURVEY STA. 147+83.90 TO STA. 148+93.30

℄ CONST. STA. 213+08.63 TO STA. 214+17.96

SHEET NO.
6

Paul Carballo 10/13/2017 1:54:57 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\TYPICAL SECTION PACKAGE.DGN

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

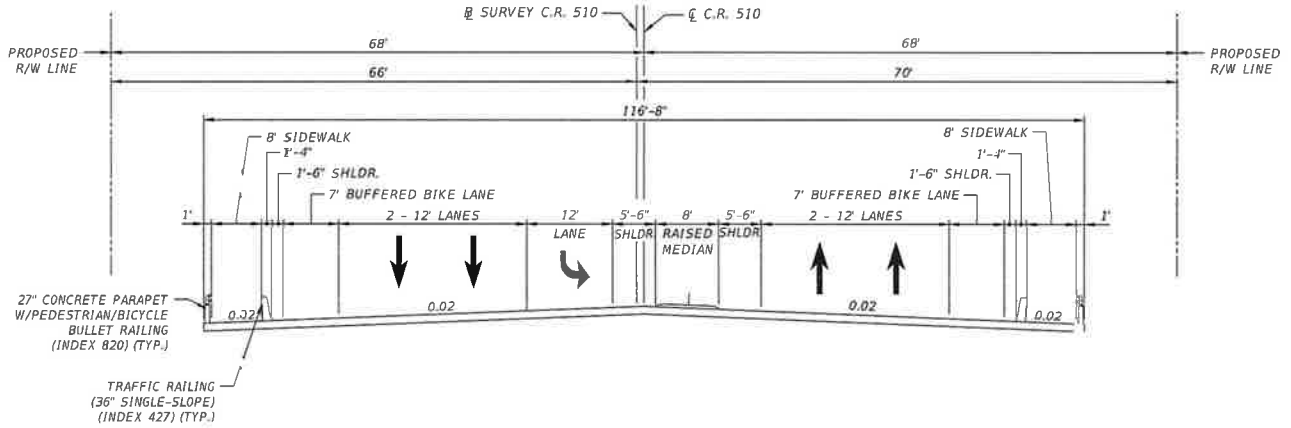
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 FEDERAL AID PROJECT NO. 4984-004-S COUNTY NAME INDIAN RIVER

SECTION NO. N/A ROAD DESIGNATION CR 510 LIMITS/MILEPOST CR 512 TO 58TH AVENUE

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROPOSED STRUCTURE TYPICAL SECTION 4



BRIDGE 88XXXX

CR 510 OVER LATERAL L CANAL

DESIGN SPEED = 50 MPH

℄ SURVEY STA. 174+43.99 TO STA. 175+33.29

℄ CONST. STA. 239+68.73 TO STA. 240+58.07

SHEET NO.
7

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

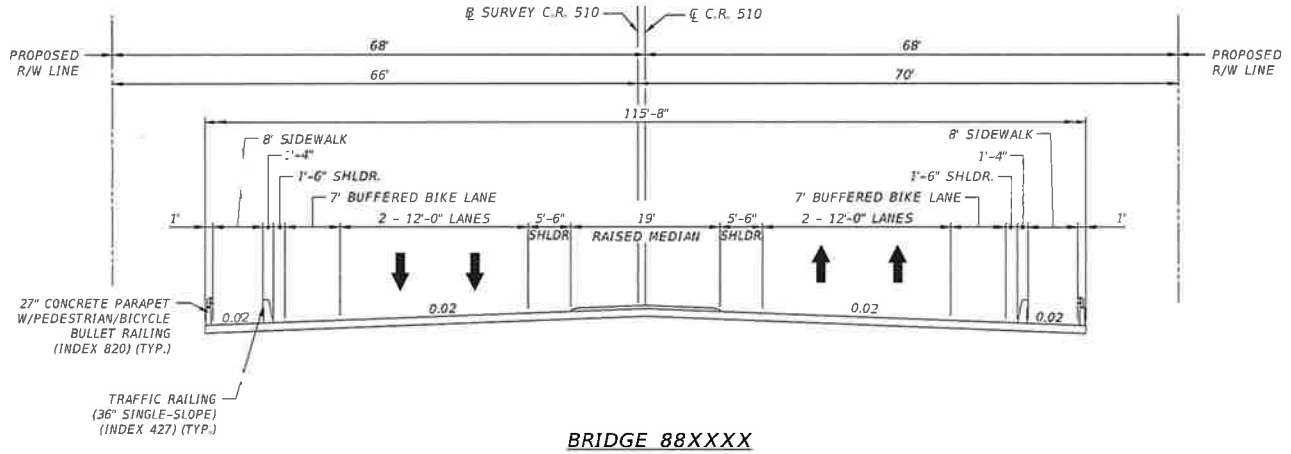
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 405606-2-22-02 FEDERAL AID PROJECT NO. 4984-004-S COUNTY NAME INDIAN RIVER

SECTION NO. N/A ROAD DESIGNATION CR 510 LIMITS/MILEPOST CR 512 TO 58TH AVENUE

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROPOSED STRUCTURE TYPICAL SECTION 5



BRIDGE 88XXXX

CR 510 OVER SLOUGH

DESIGN SPEED = 50 MPH

℄ SURVEY STA. 179+24.96 TO STA. 180+09.77

℄ CONST. STA. 244+53.07 TO STA. 245+15.77

SHEET NO.
8

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

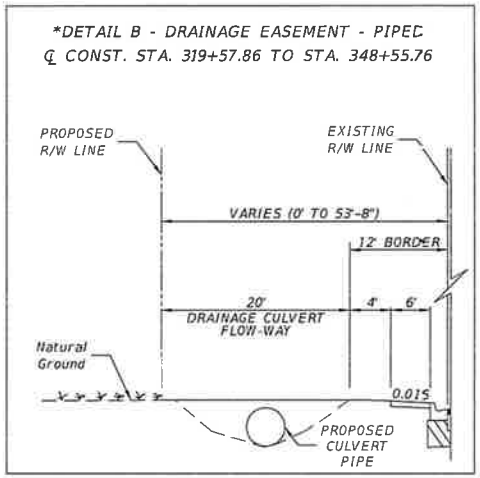
PROJECT IDENTIFICATION

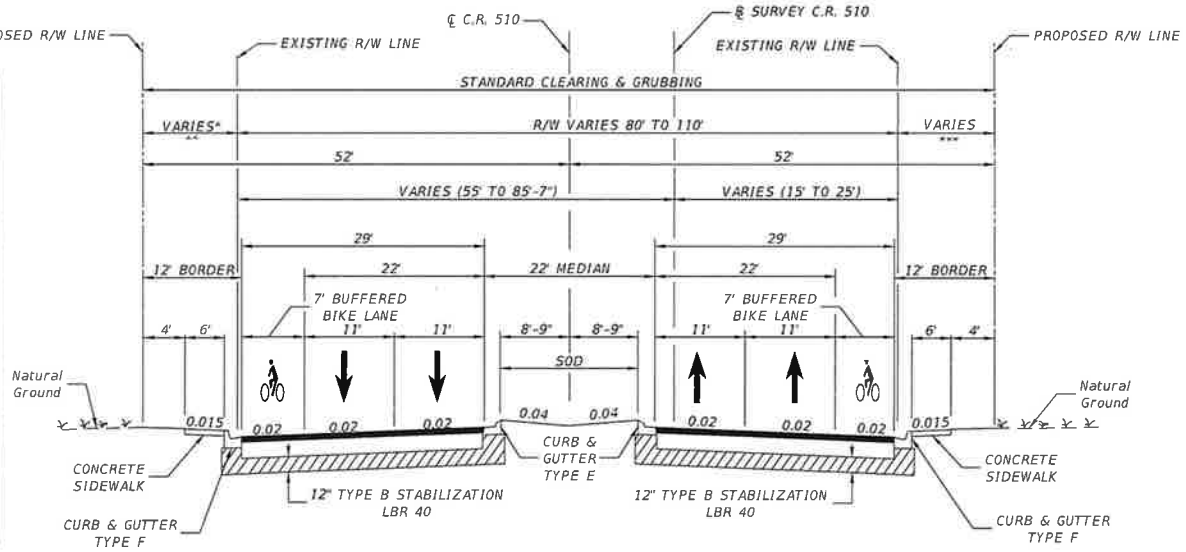
FINANCIAL PROJECT ID 405606-2-22-02 FEDERAL AID PROJECT NO. 4984-004-S COUNTY NAME INDIAN RIVER

SECTION NO. N/A ROAD DESIGNATION CR 510 LIMITS/MILEPOST CR 512 TO 58TH AVENUE

PROJECT DESCRIPTION CR 510 PD&E STUDY FROM CR 512 TO 58TH AVENUE

PROPOSED ROADWAY TYPICAL SECTION 6





** VARIES (0' TO 53'-8") FROM ℄ CONST. STA. 319+57.86 TO STA. 348+55.76

*** VARIES (0' TO 28') FROM ℄ CONST. STA. 343+15.10 TO STA. 380+39.04

DESIGN SPEED = 45 MPH

CR 510 URBAN TYPICAL WITH CURB & GUTTER FROM 66TH AVE TO 58TH AVE

℄ SURVEY STA. 258+33.23 TO STA. 315+12.28

℄ CONST. STA. 319+57.86 TO STA. 380+39.04

SHEET NO. 9

paul.carballo 10/16/2017 2:36:14 PM N:\JOB\PLANNING\1-2293 CR 510 PD&E\40560622202\roadway\TYPICAL SECTION PACKAGE.DGN

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Concept Plans

CONTRACT PLANS COMPONENTS

ROADWAY PLANS
STRUCTURE PLANS
POND MAP

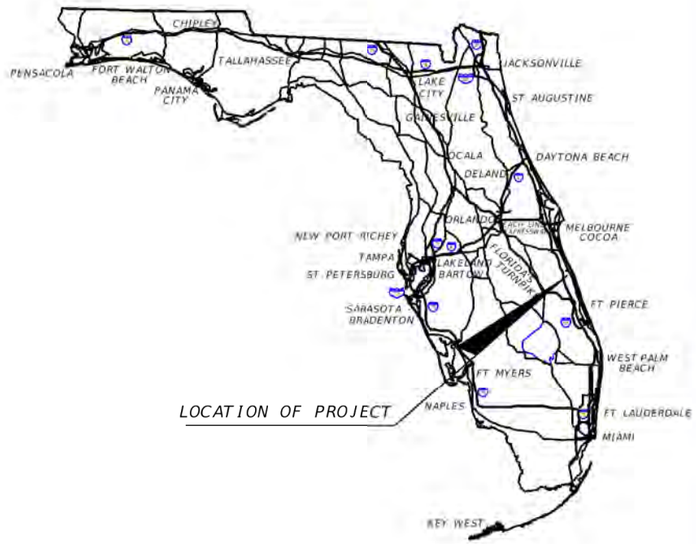
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

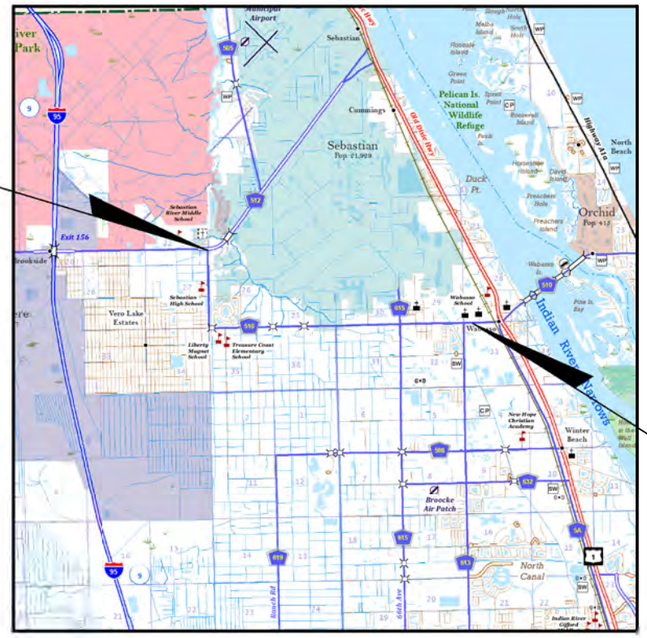
FINANCIAL PROJECT ID 405606-2-22-02

INDIAN RIVER COUNTY (88)

COUNTY ROAD NO. CR 510
FROM CR 512 TO 58 AVENUE



BEGIN PROJECT
STA. 100+00.00



END PROJECT
STA. 380+40.07

GOVERNING DESIGN STANDARDS:

Florida Department of Transportation, FY 2017 Design Standards eBook (DSeB) and applicable Design Standards Revisions (DSRs) at the following website:
http://www.fdot.gov/roadway/DesignStandards/Standards.shtm

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, 2017 Standard Specifications for Road and Bridge Construction at the following website:
http://www.fdot.gov/programmanagement/Implemented/SpecBooks

INDEX OF ROADWAY PLANS

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2 - 4	TYPICAL SECTION
5 - 25	ROADWAY PLANS
26 - 46	PROFILE

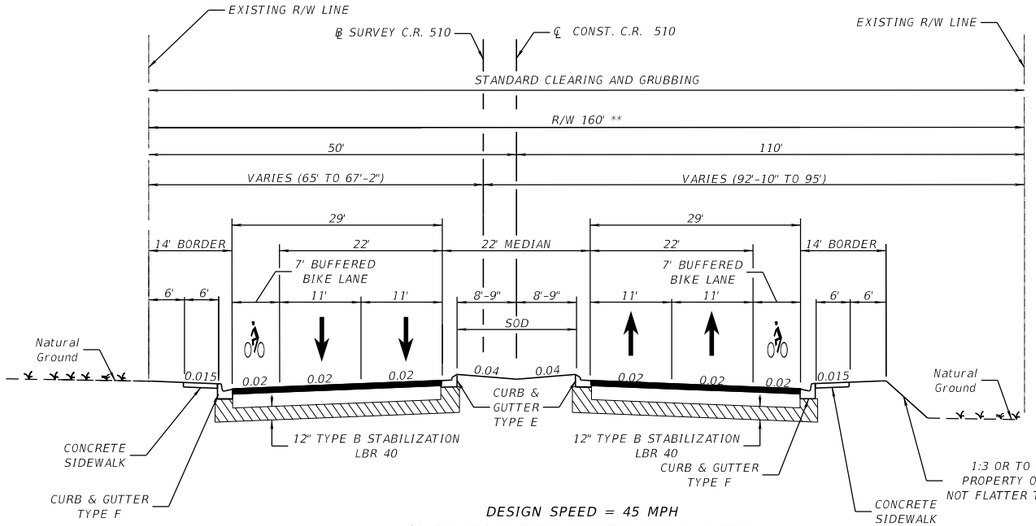
ROADWAY PLANS
ENGINEER OF RECORD:

CARLOS D. RODRIGUEZ, P.E.
P.E. LICENSE NUMBER 72638
METRIC ENGINEERING, INC.
13940 SW 136th STREET - SUITE 200
MIAMI, FLORIDA - 33186
CERTIFICATE OF AUTHORIZATION 00002294

FDOT PROJECT MANAGER:

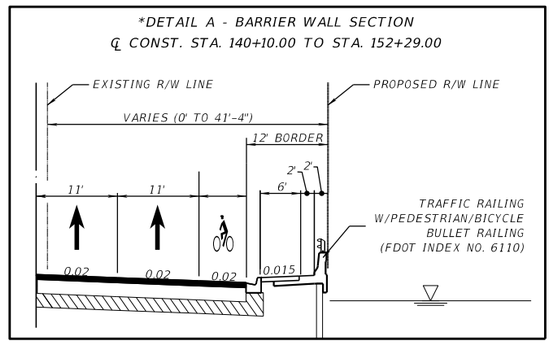
MARIA FORMOSO, P.E. , PMP

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
		1

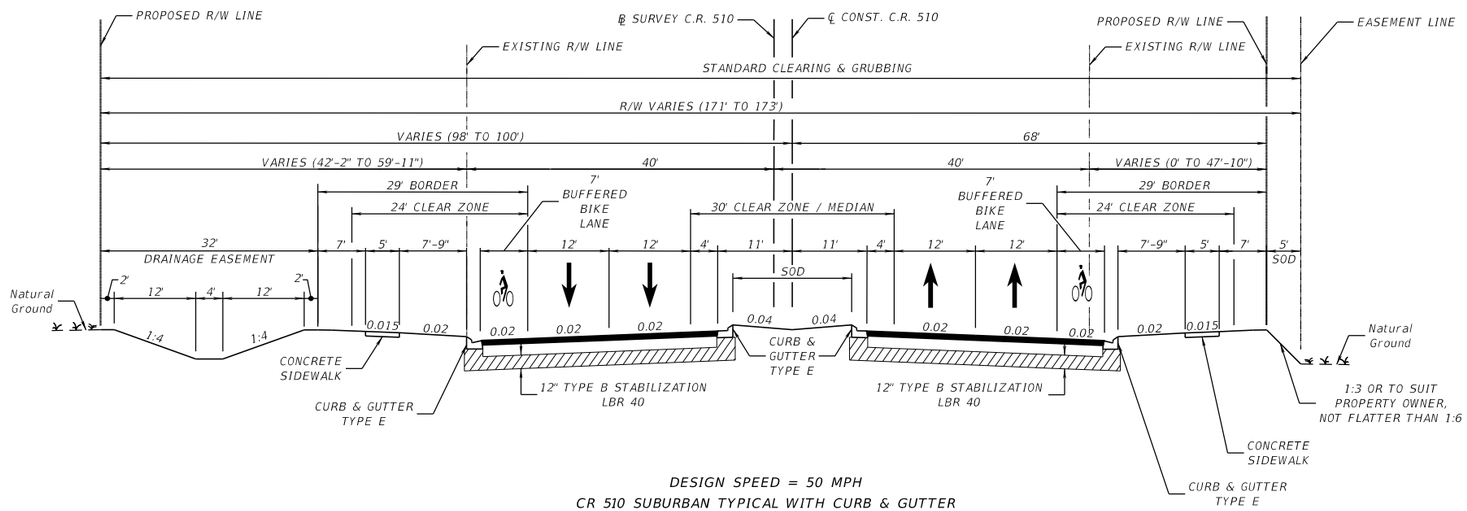


DESIGN SPEED = 45 MPH
CR 510 URBAN TYPICAL WITH CURB & GUTTER
FROM CR 512 TO EAST OF 86TH AVE
℄ SURVEY STA. 30+00.00 TO STA. 121+01.94
℄ CONST. STA. 100+00.00 TO STA. 186+26.96

*DETAIL A - BARRIER WALL SECTION
℄ CONST. STA. 140+10.00 TO STA. 152+29.00



* TURF OR SOD
** R/W VARIES FROM ℄ STA. 70+93.49 TO STA. 121+01.94 & ℄ CONST. STA. 141+31.02 TO STA. 186+26.96
R/W DIMENSIONS ARE NOT REFLECTED. SEE CONCEPT PLANS FOR DETAILS.



DESIGN SPEED = 50 MPH
CR 510 SUBURBAN TYPICAL WITH CURB & GUTTER
FROM EAST OF 86TH AVE TO 66TH AVE

℄ SURVEY STA. 121+01.94 TO STA. 147+83.90 ℄ CONST. STA. 186+26.68 TO STA. 213+08.63
℄ SURVEY STA. 148+93.30 TO STA. 174+43.99 ℄ CONST. STA. 214+17.96 TO STA. 239+68.73
℄ SURVEY STA. 175+33.29 TO STA. 179+24.96 ℄ CONST. STA. 240+58.07 TO STA. 244+53.07
℄ SURVEY STA. 180+09.77 TO STA. 258+33.23 ℄ CONST. STA. 245+15.77 TO STA. 319+57.86

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

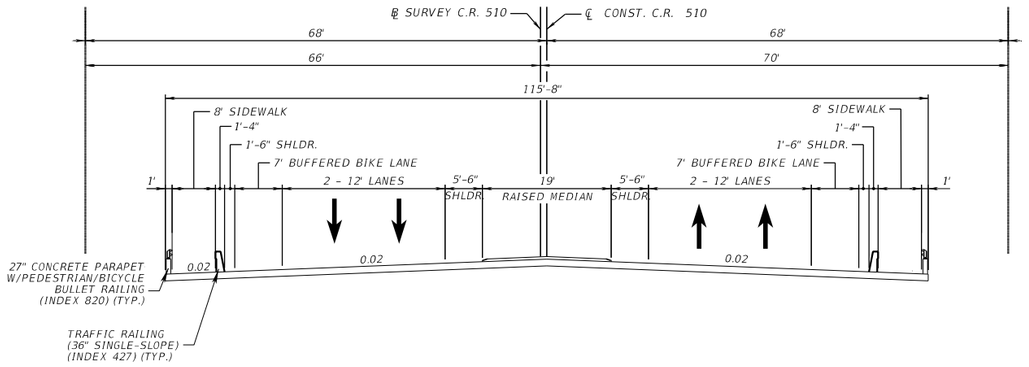
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

TYPICAL SECTION

SHEET NO. 2

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

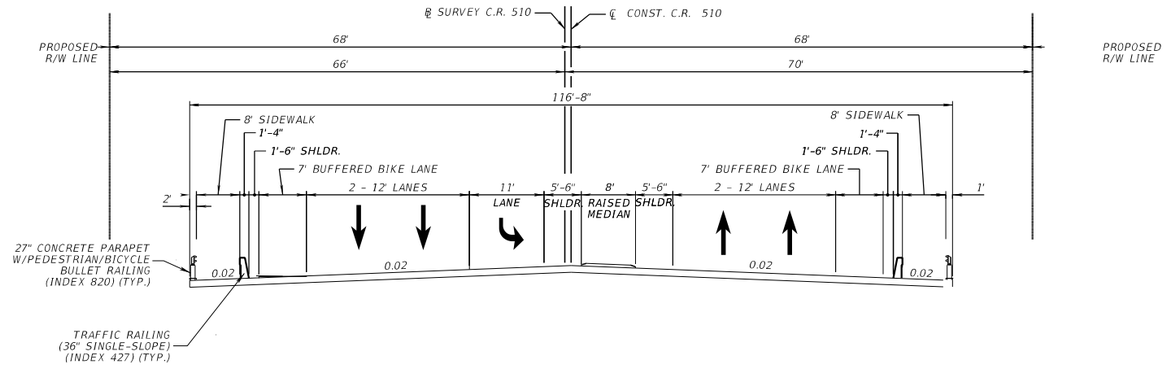


BRIDGE 88XXXX

CR 510 OVER LATERAL C CANAL

DESIGN SPEED = 50 MPH

℄ SURVEY STA. 147+83.90 TO STA. 148+93.30
℄ CONST. STA. 212+95.00 TO STA. 214+20.00

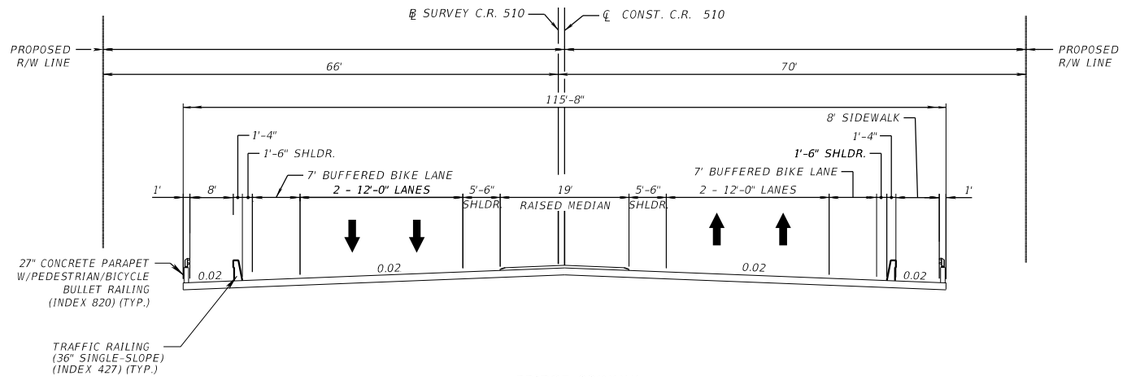


BRIDGE 88XXXX

CR 510 OVER LATERAL L CANAL

DESIGN SPEED = 50 MPH

℄ SURVEY STA. 174+43.99 TO STA. 175+33.29
℄ CONST. STA. 239+43.00TO STA. 240+57.00



BRIDGE 88XXXX

CR 510 OVER SLOUGH

DESIGN SPEED = 50 MPH

℄ SURVEY STA. 179+24.96 TO STA. 180+09.77
℄ CONST. STA. 244+31.05 TO STA. 245+37.79

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

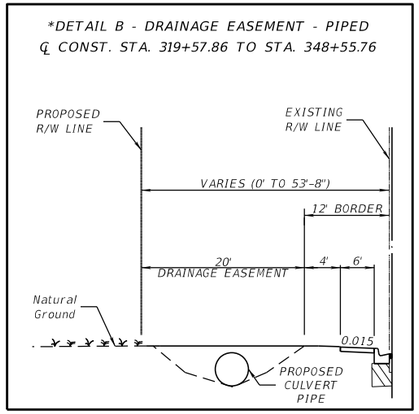
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

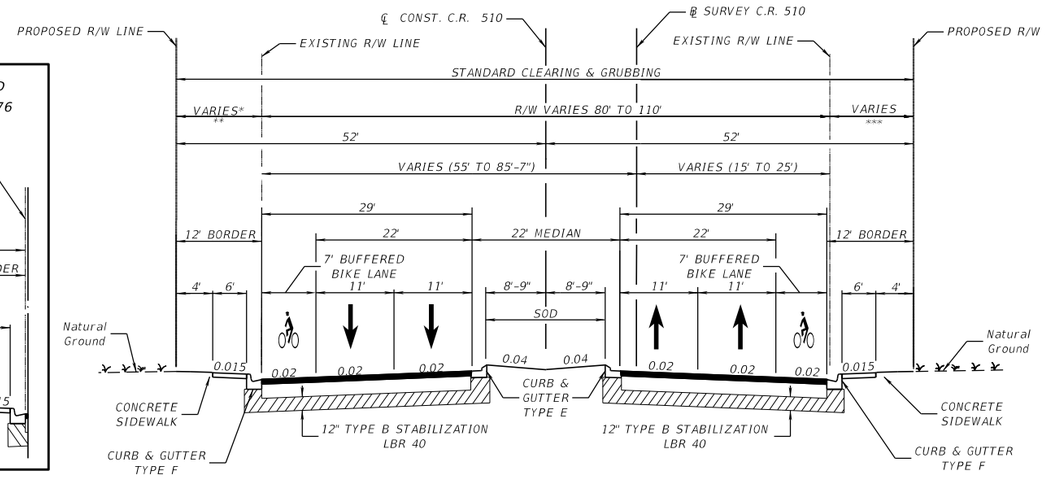
TYPICAL SECTION

SHEET NO. 3

Roberto.Marin 10/12/2017 3:02:35 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\TYPSRD01.DGN



*DETAIL B - DRAINAGE EASEMENT - PIPED
℄ CONST. STA. 319+57.86 TO STA. 348+55.76



** VARIES (0' TO 53'-8") FROM ℄ CONST. STA. 319+57.86 TO STA. 348+55.76

*** VARIES (0' TO 28') FROM ℄ CONST. STA. 343+15.10 TO STA. 380+39.04

DESIGN SPEED = 45 MPH

CR 510 URBAN TYPICAL WITH CURB & GUTTER
FROM 66TH AVE TO 58TH AVE
℄ SURVEY STA. 258+33.23 TO STA. 315+12.28
℄ CONST. STA. 319+57.86 TO STA. 380+39.04

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

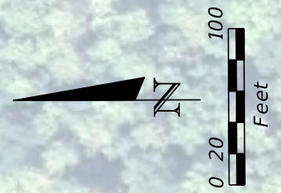
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

TYPICAL SECTION

SHEET NO. 4



CURVE DATA

CURVE NO.	LINE	P.C. STATION	P.I. STATION	P.T. STATION	Δ	D	T	L	R	e	DESIGN SPEED
BL5121	BL512	276+07.14	285+23.10	294+23.11	52° 1' 23.95"	2° 51' 53.24"	975.96	1815.95	2000.00	NC	45
CLB1	CL510	141+87.73	145+05.40	148+22.71	4º 45'43.26"	0º 44' 59.80"	317.6740	634.9823	7640.00	RC	45
CLB2	CL510	148+22.71	151+40.39	154+57.70	4º 45'43.26"	0º 44' 59.80"	317.6741	634.9825	7640.00	RC	45
CLB3	CL510	154+84.72	165+79.44	172+02.18	90º 08' 33.86"	5º 15' 06.03"	1093.7214	1716.4568	1091.00	RC	45
C72	CL510	285+00.00	289+03.76	293+07.46	1º 48' 51.38"	0º 13' 28.88"	403.7628	807.4580	25500.00	NC	50
C73	CL510	293+07.46	297+21.45	301+35.41	1° 11' 09.44"	0° 08' 35.66"	413.9916	827.9536	40000.00	NC	50
CLB6	CL510	324+69.03	326+69.09	328+69.07	2° 51' 54.31"	0° 42' 58.31"	200.0625	400.0417	8000.00	NC	45
CLB7	CL510	328+69.07	330+69.13	332+69.11	2° 51' 54.31"	0° 42' 58.31"	200.0625	400.0417	8000.00	NC	45
CLB8	CL510	339+02.16	342+04.68	345+06.94	4° 04' 35.79"	0° 40' 26.64"	302.5161	604.7770	8500.00	NC	45
CLB9	CL510	345+06.94	347+82.52	350+57.92	3° 42' 50.33"	0° 40' 26.64"	275.5865	550.9799	8500.00	NC	45
C77	NWE87ST	24+10.27	26+20.65	28+30.32	8° 09' 30.00"	1° 56' 32.00"	210.3800	420.0500	2950.00	NC	35

BEGIN PROJECT
BEGIN WIDDENING
MILLING & RESURFACING
STA.279+93.50

BL5121

PC STA. 276+07.14

PC STA. 30+00.00

PC STA. 99+47.43

WATERVLIET AVENUE

℄ Survey CR 510

℄ CR 510

BEGIN RECONSTRUCTION
STA.100+00.00

101+00.00

CR 512 (SEBASTIAN BOULEVARD)

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

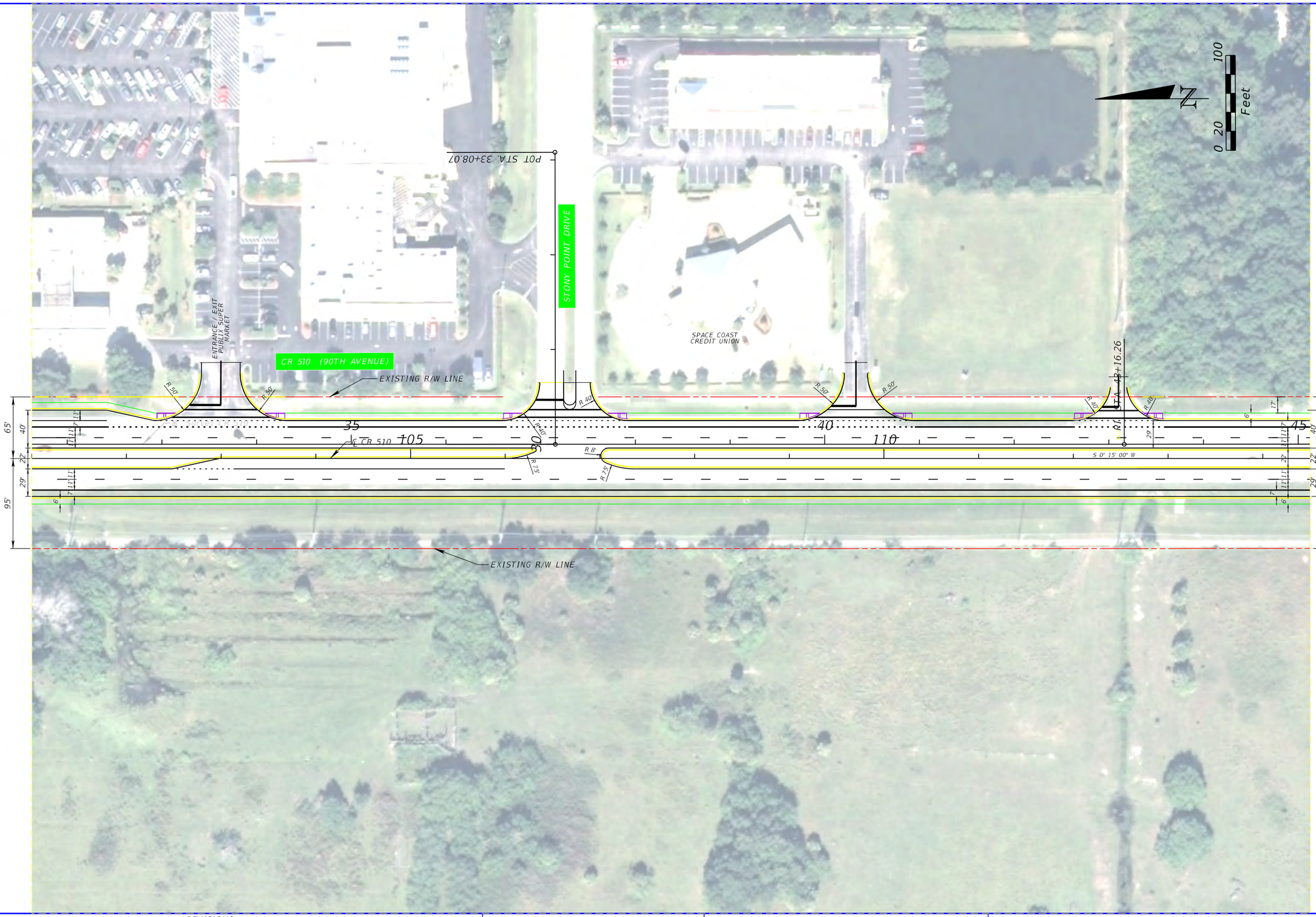
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 5



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

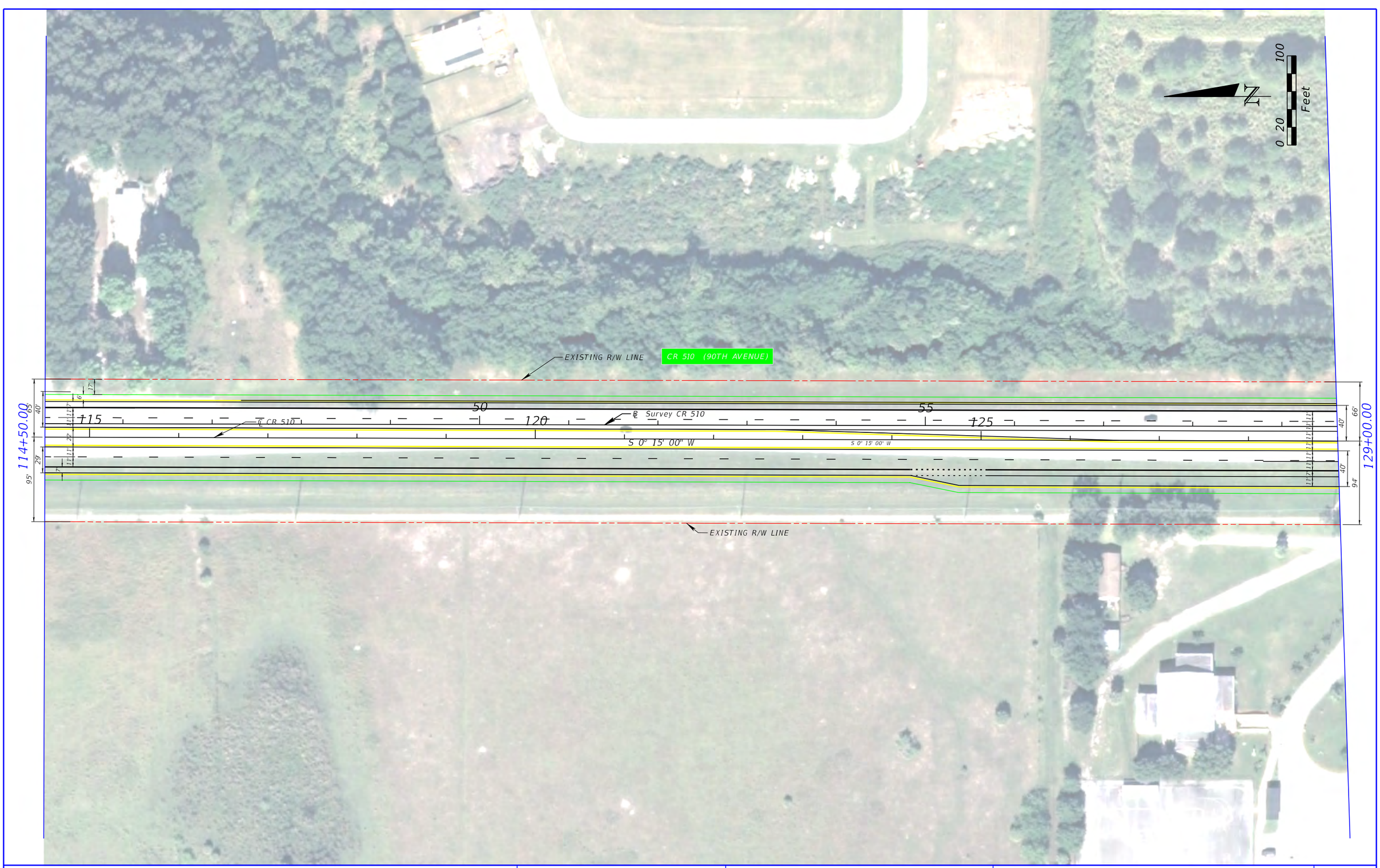
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 6



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

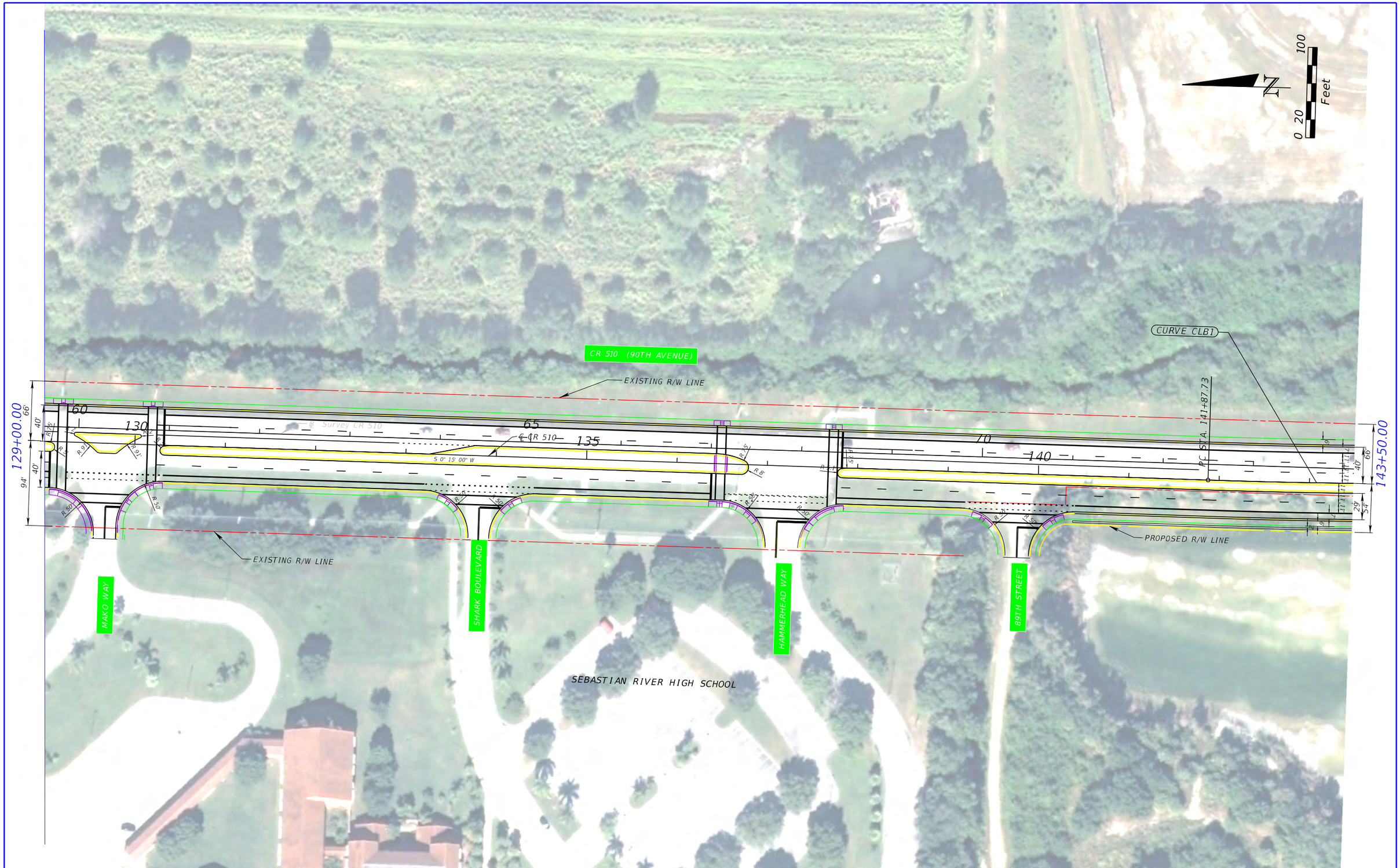
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 7



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

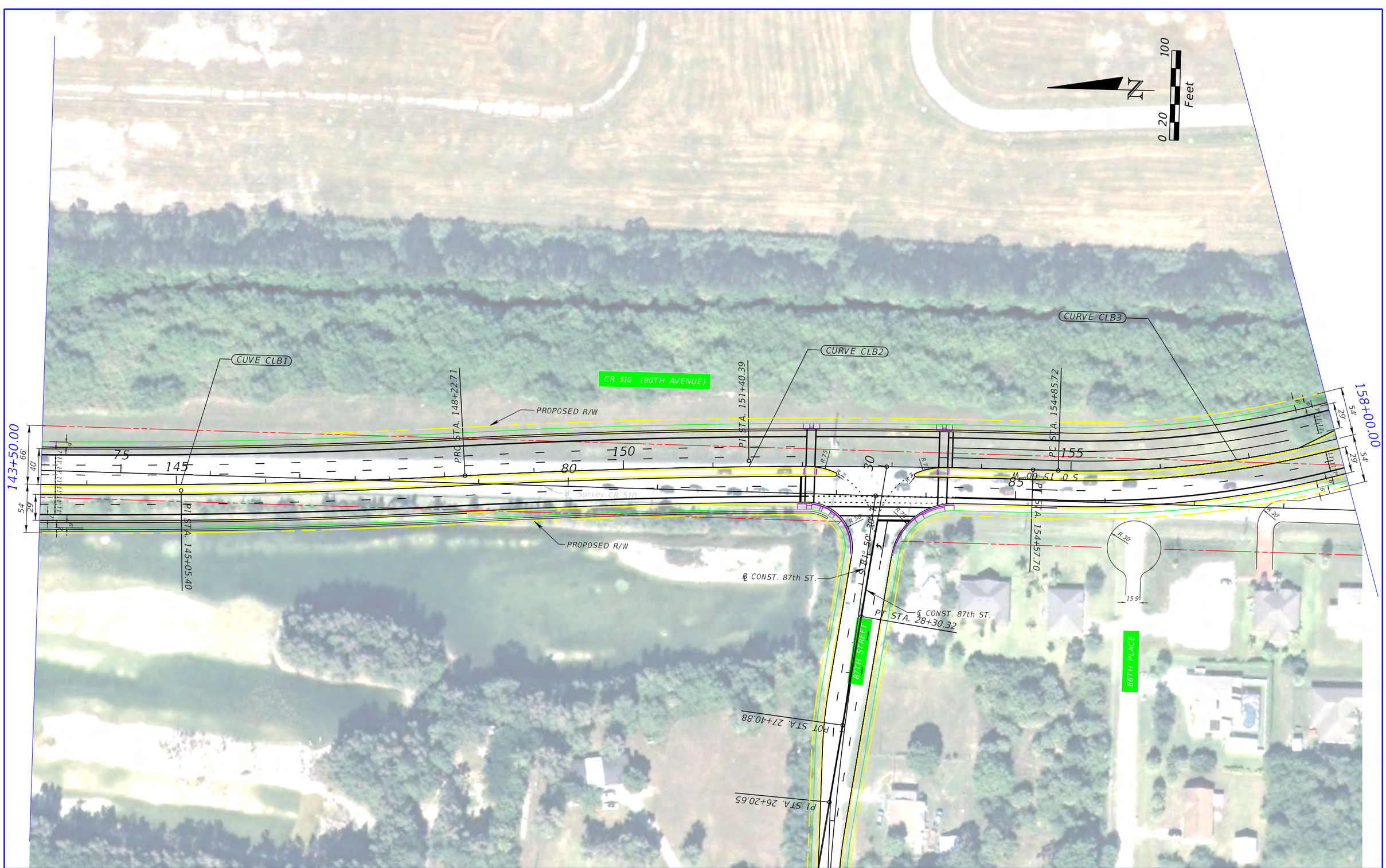
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 8

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/15/2017 8:44:46 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\planrd053.dgn



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 9

158+00.00

172+50.00

172+02.18

CURVE CLB3

PROPOSED R/W

℄ CR 510

165

166

170

105

100

90

95

PROPOSED R/W

CANAL D

PRPOSED CLOSURE OF EXISTING CR 510

PRPOSED CLOSURE OF EXISTING CR 510

PC STA. 94+41.28

PT STA. 97+41.22

PI STA.

TREASURE COAST ELEMENTARY SCHOOL

86TH PLACE

R 50'

R 75'

27.5'

R 40'

N

0 20 100

Feet

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 10



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

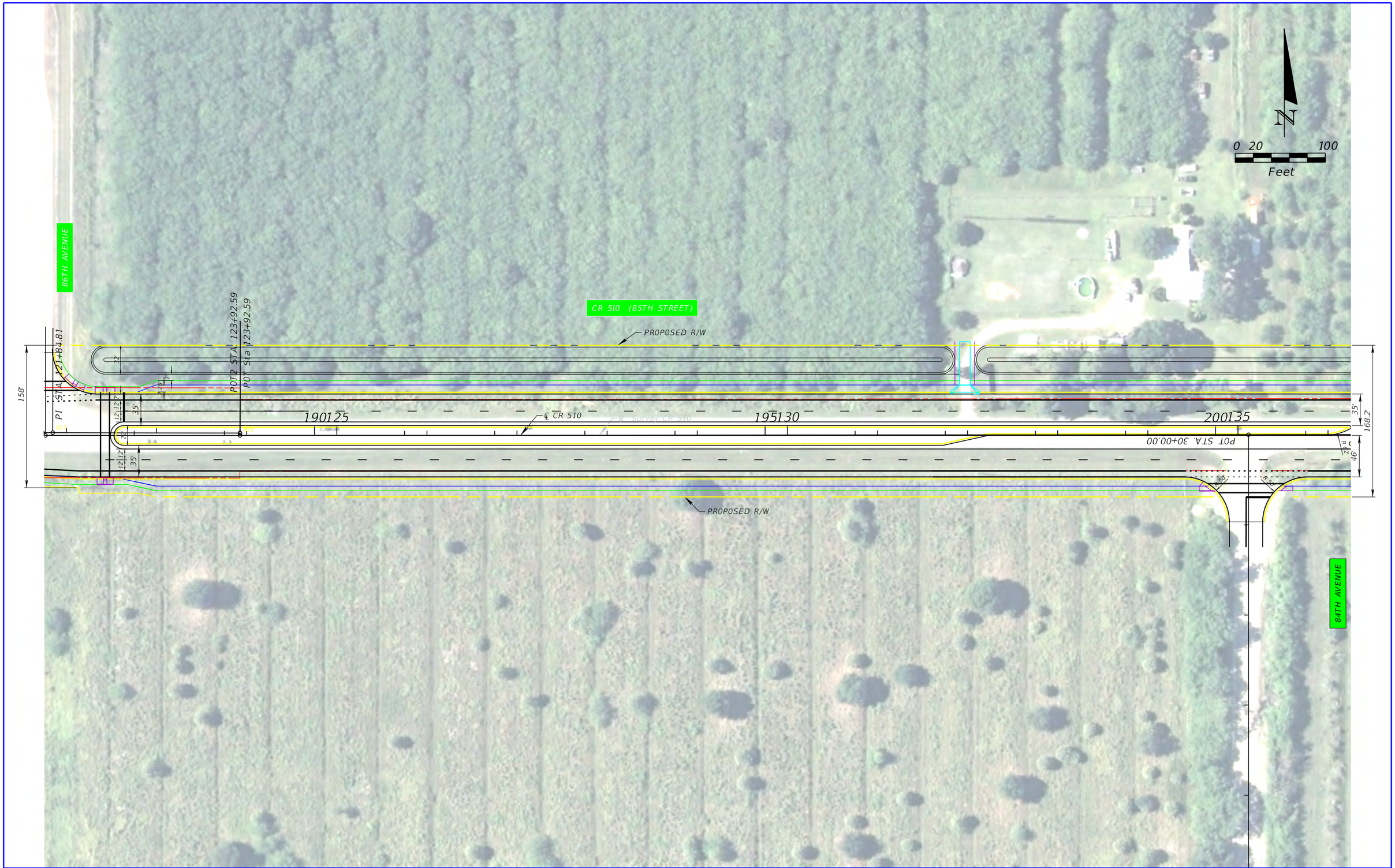
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 11



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 12

Roberto.Marin 11/15/2017 8:45:08 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\planrd057.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

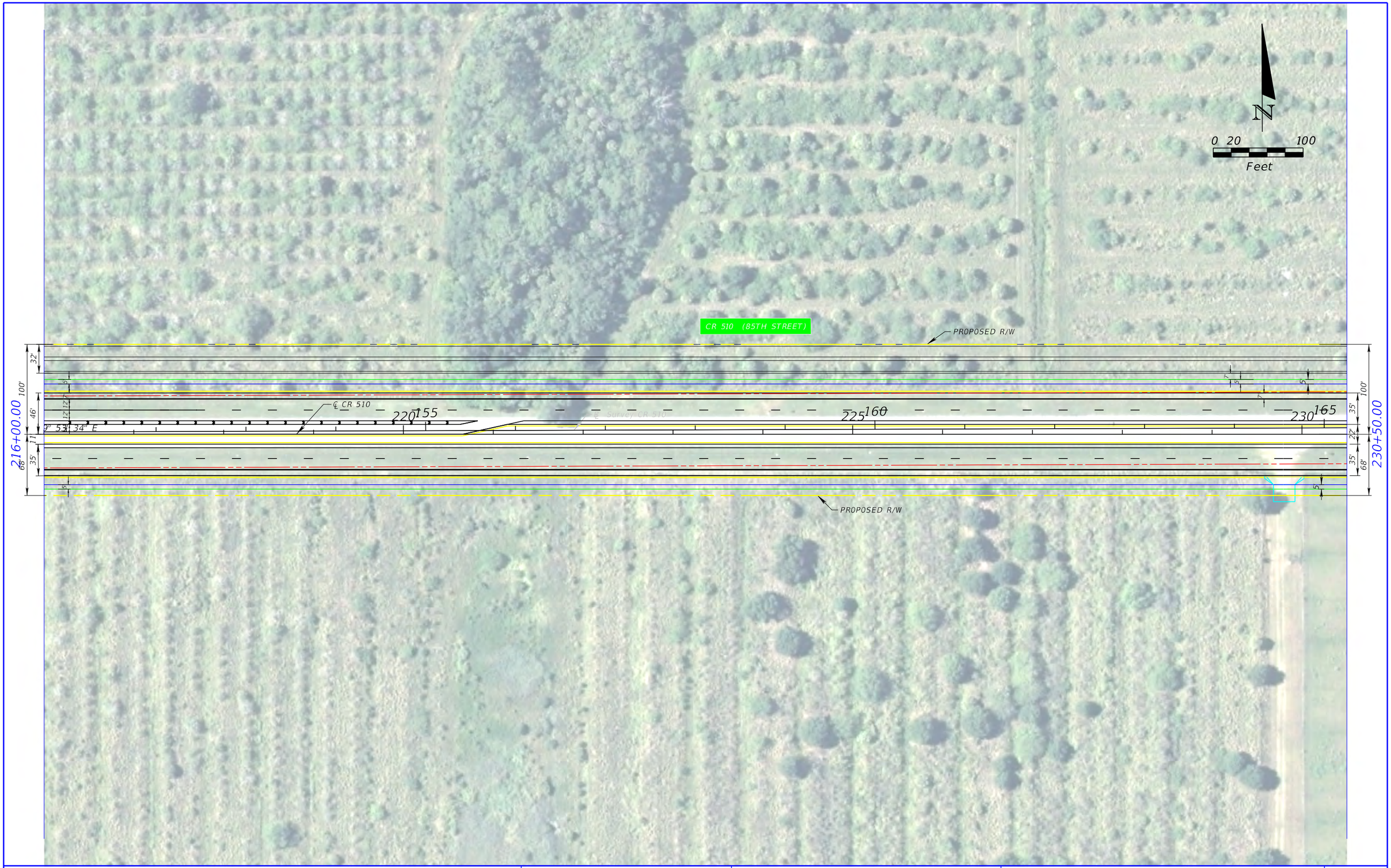
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 13

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

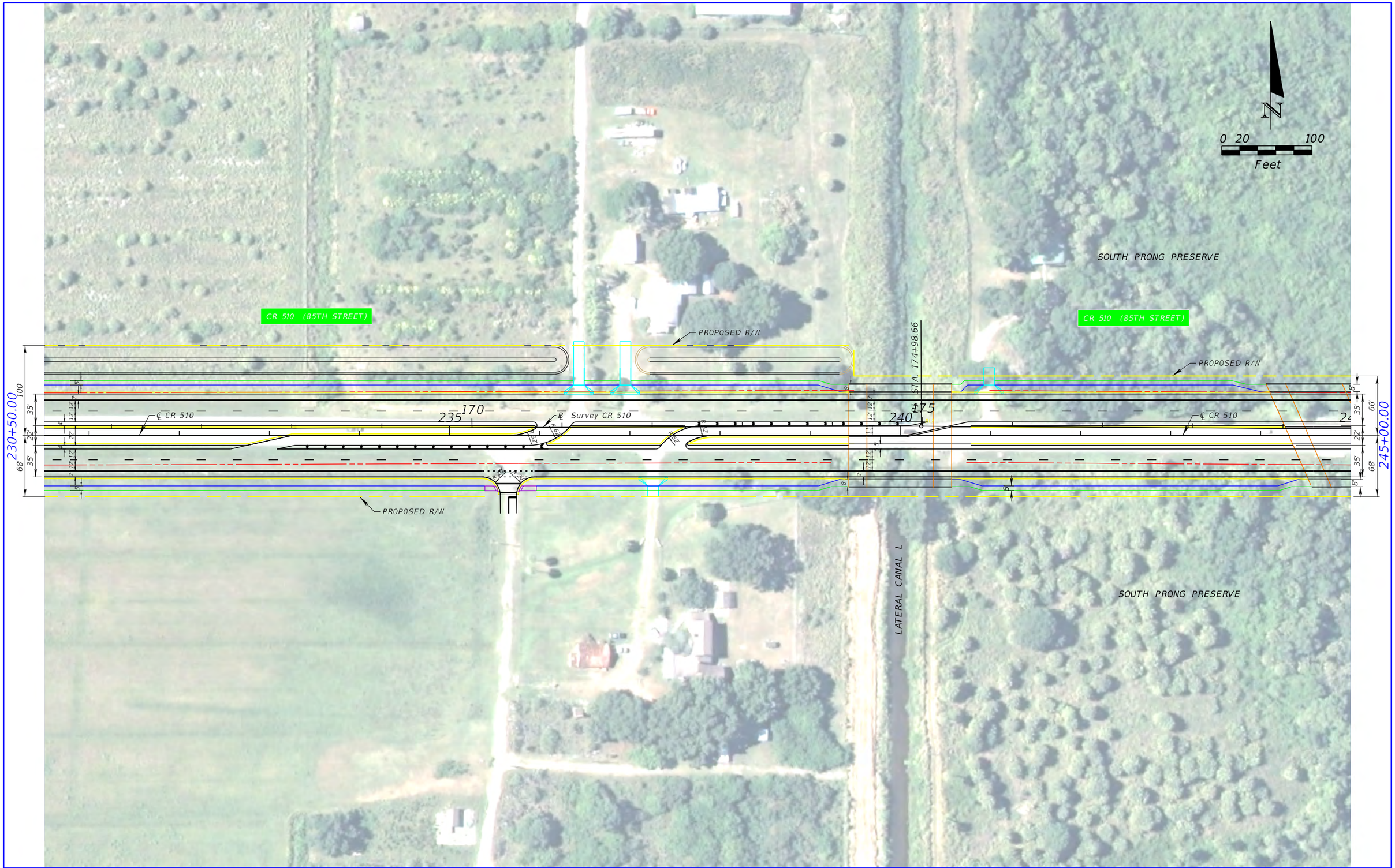
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 14



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

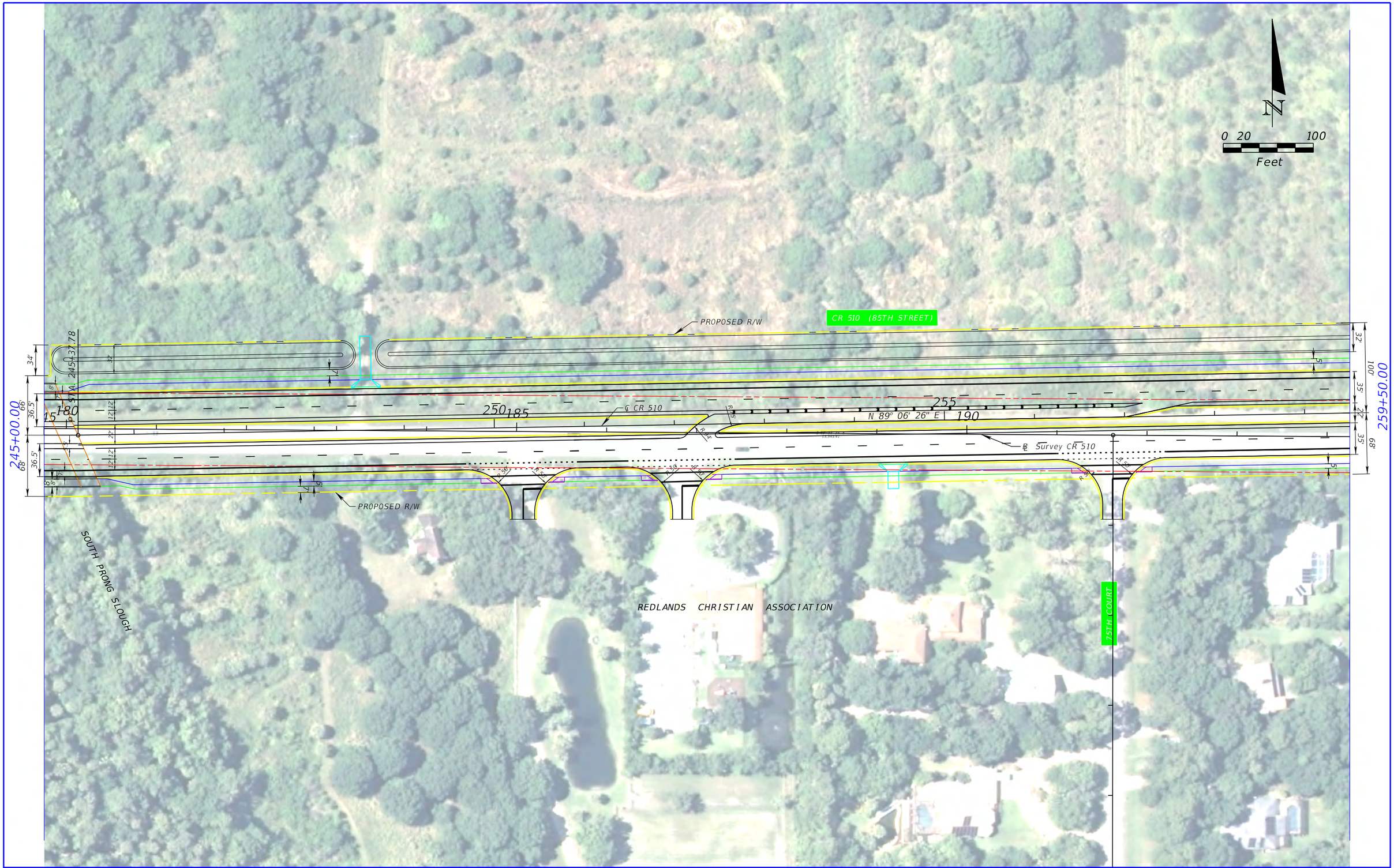
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 15



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 16



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 17



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

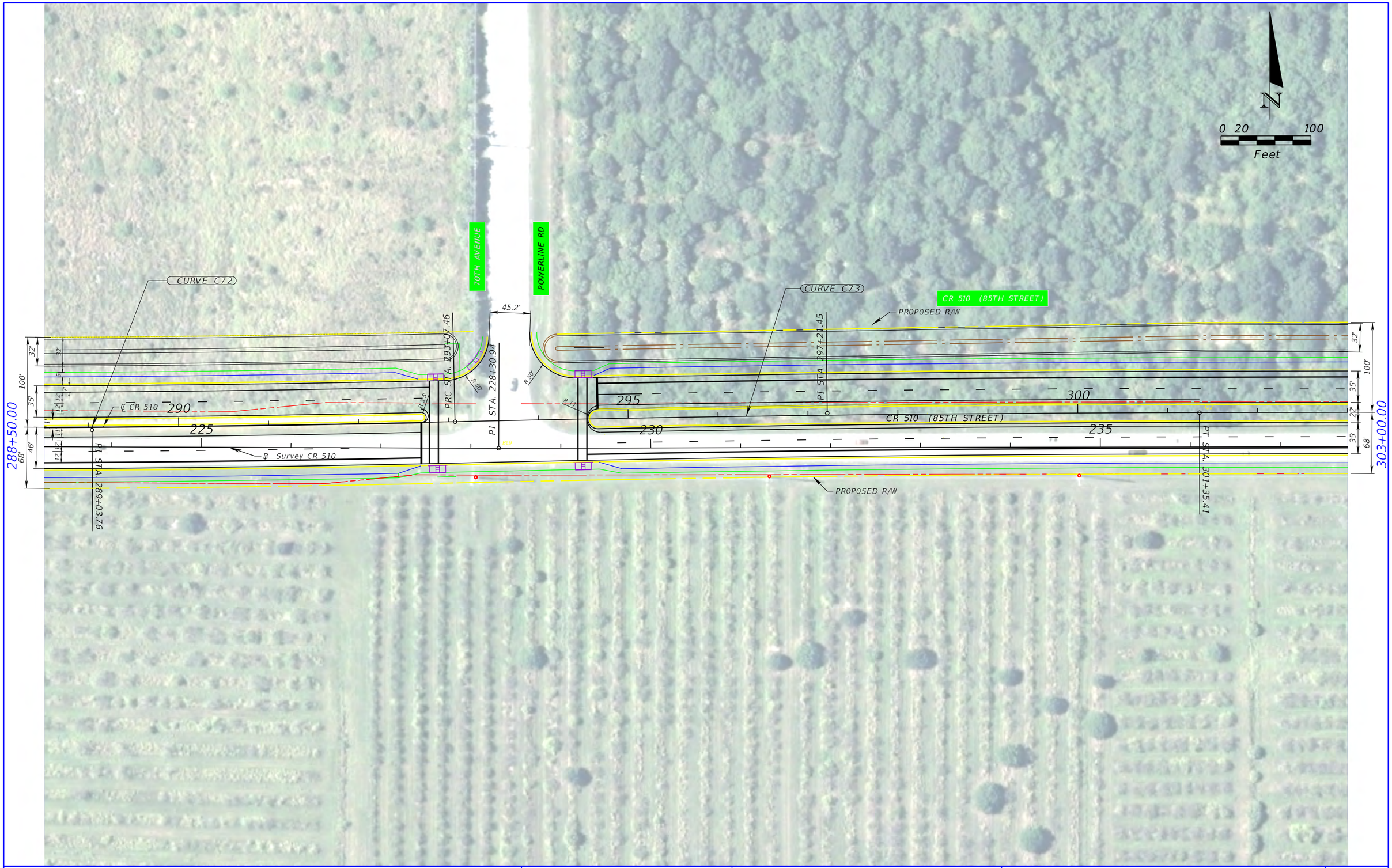
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 18

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

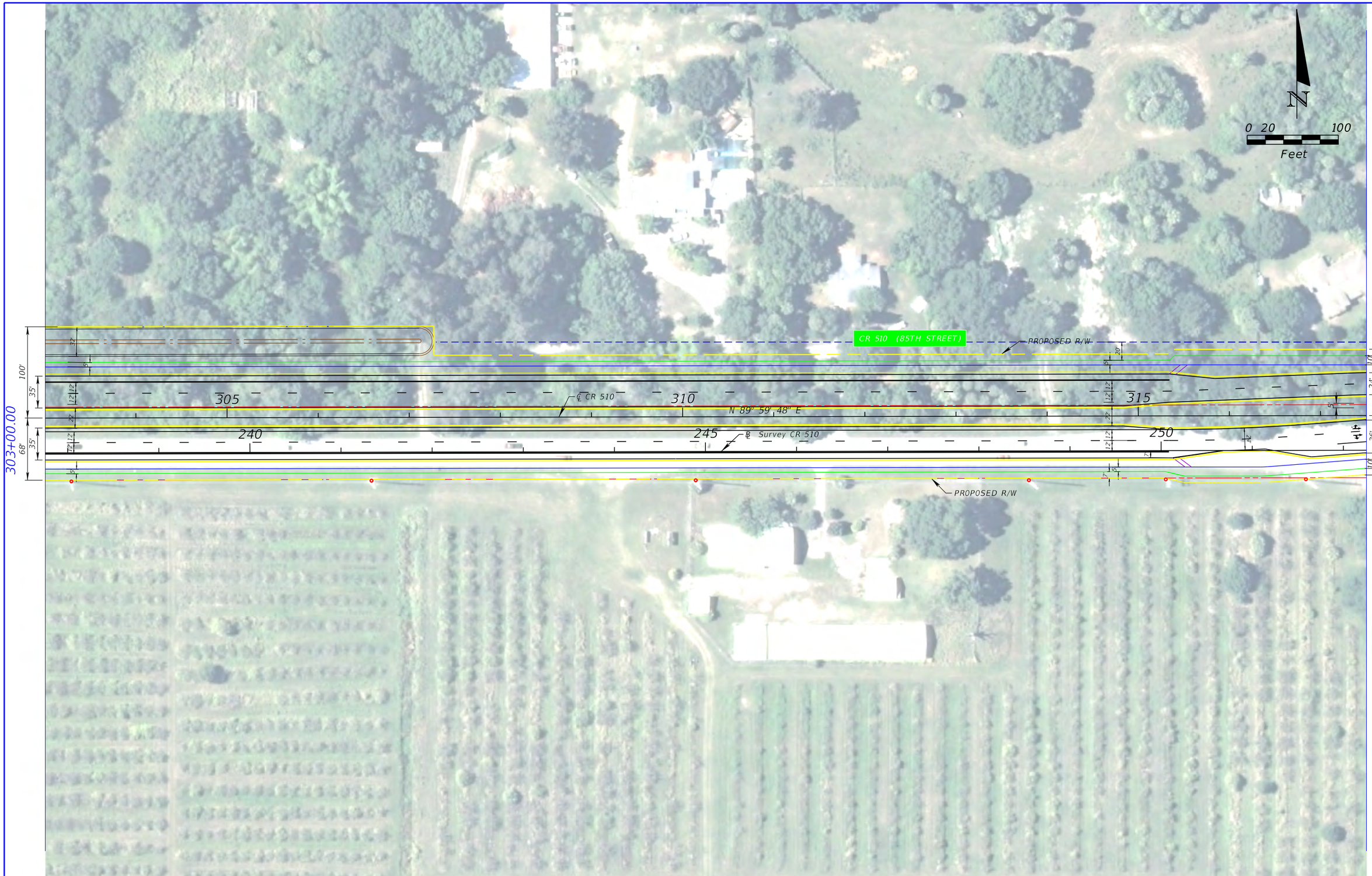
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 19



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

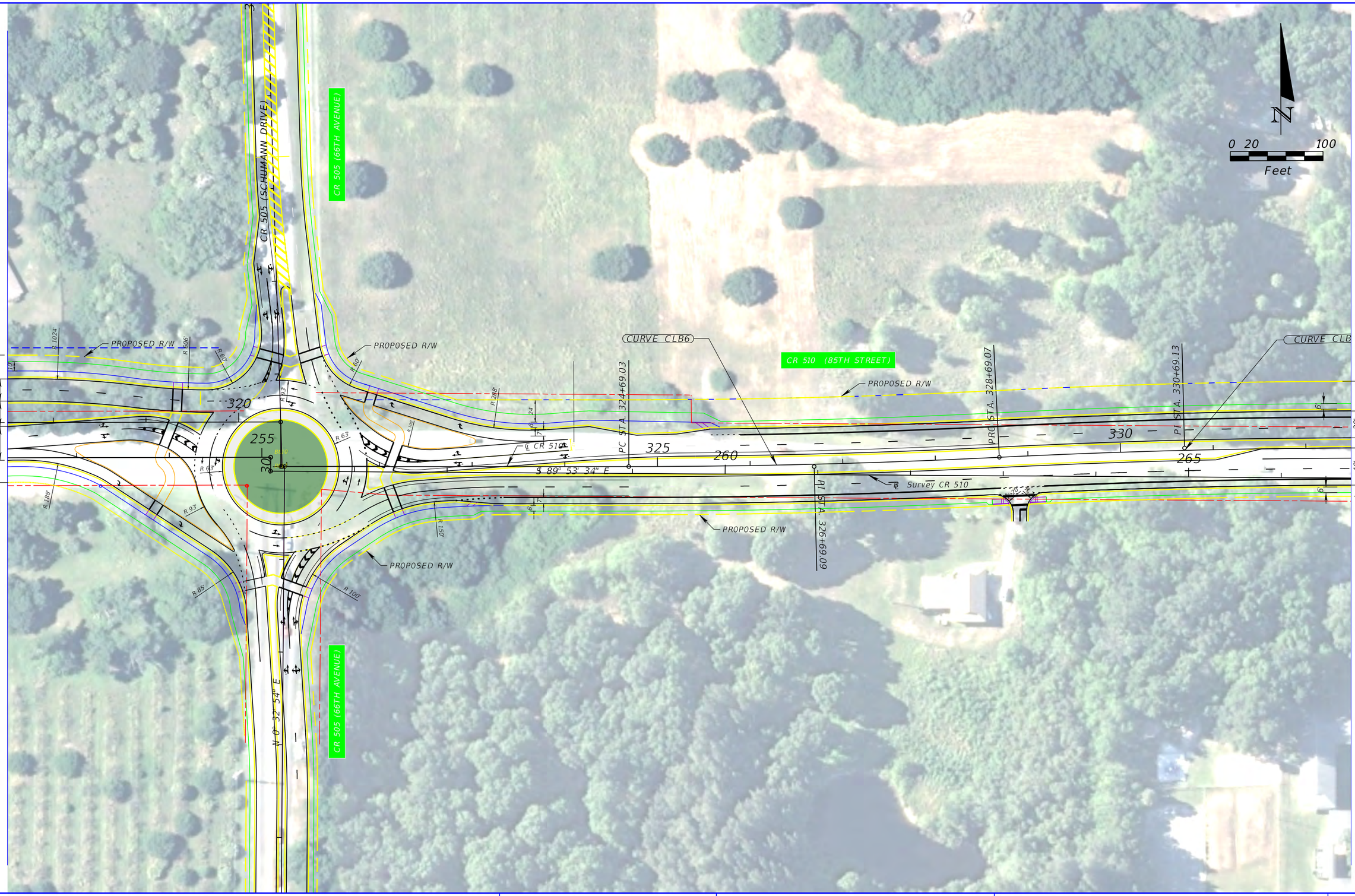
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 20

Roberto.Marin 11/16/2017 3:26:30 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\planrd065.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

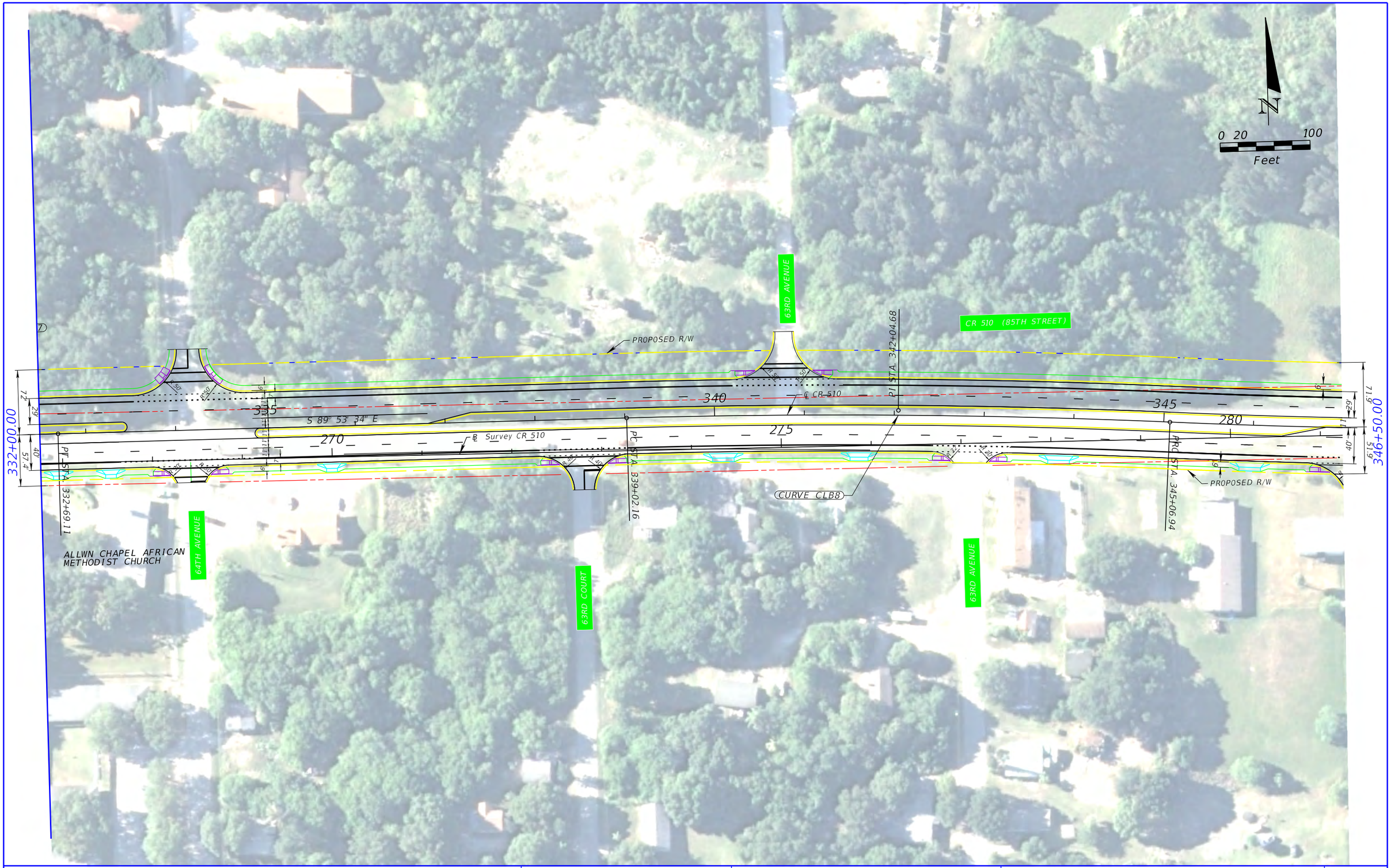
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 21

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 3:26:35 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\planrd066.dgn



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

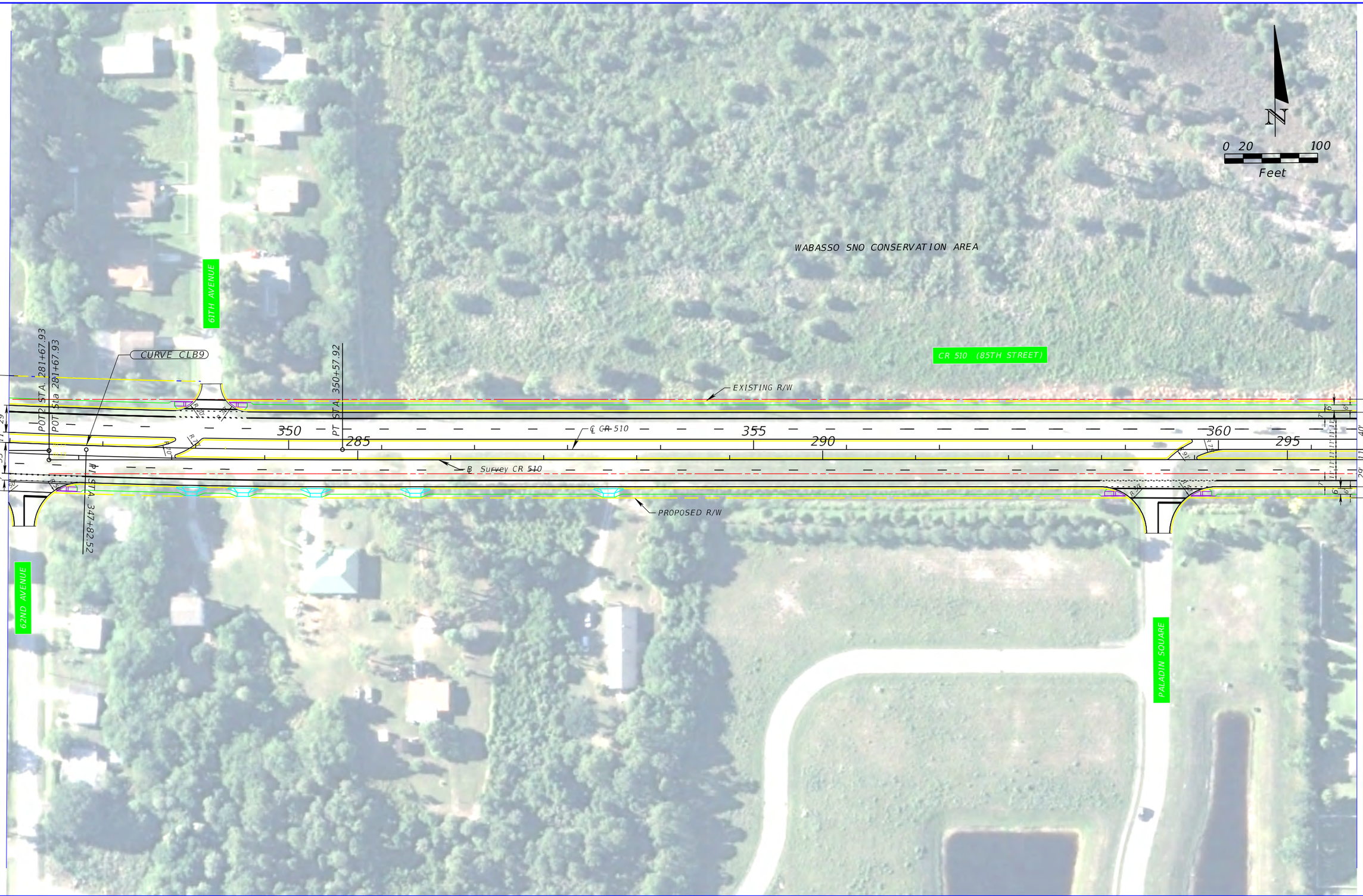
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 22



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

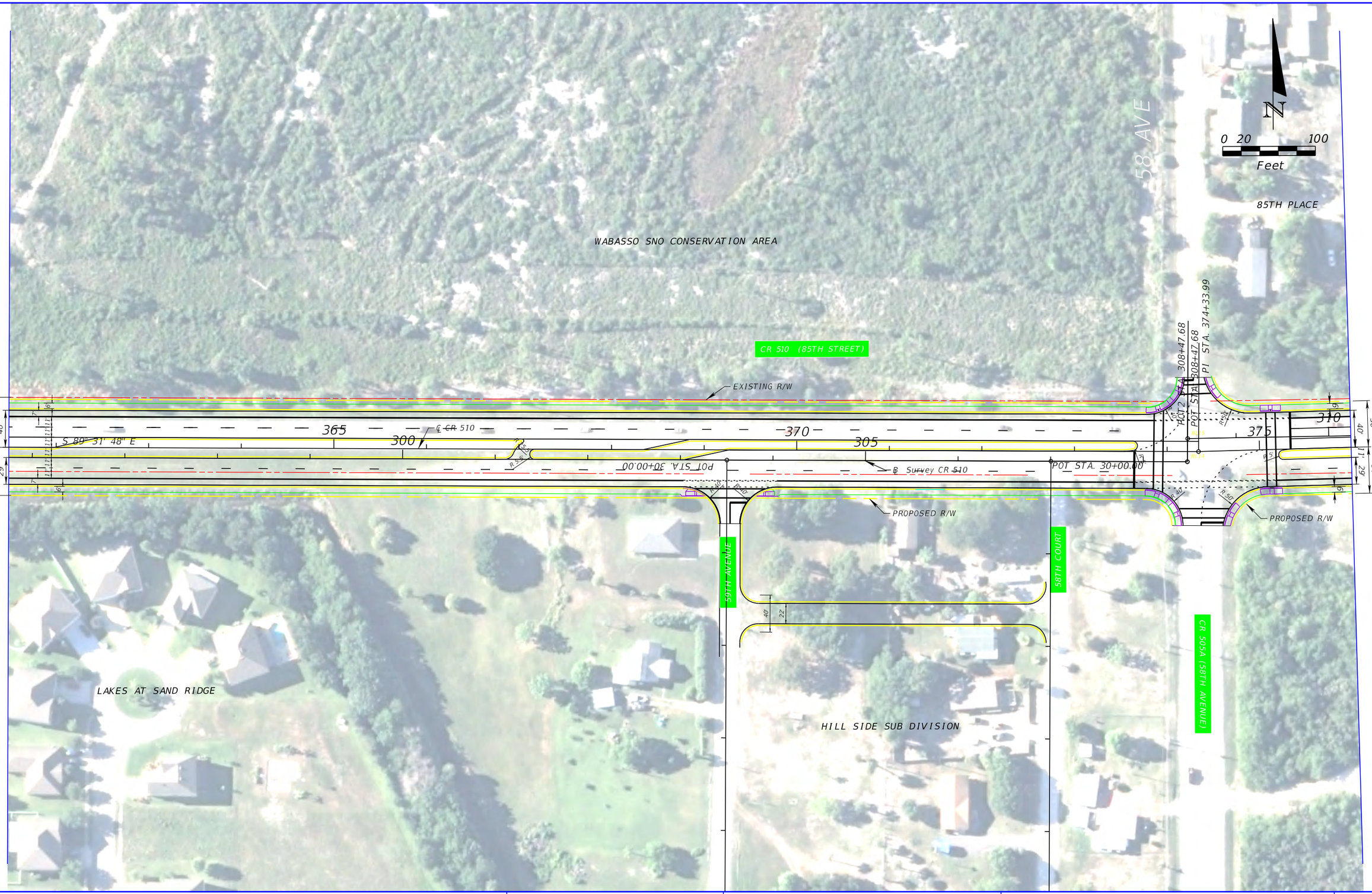
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 23



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 24

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

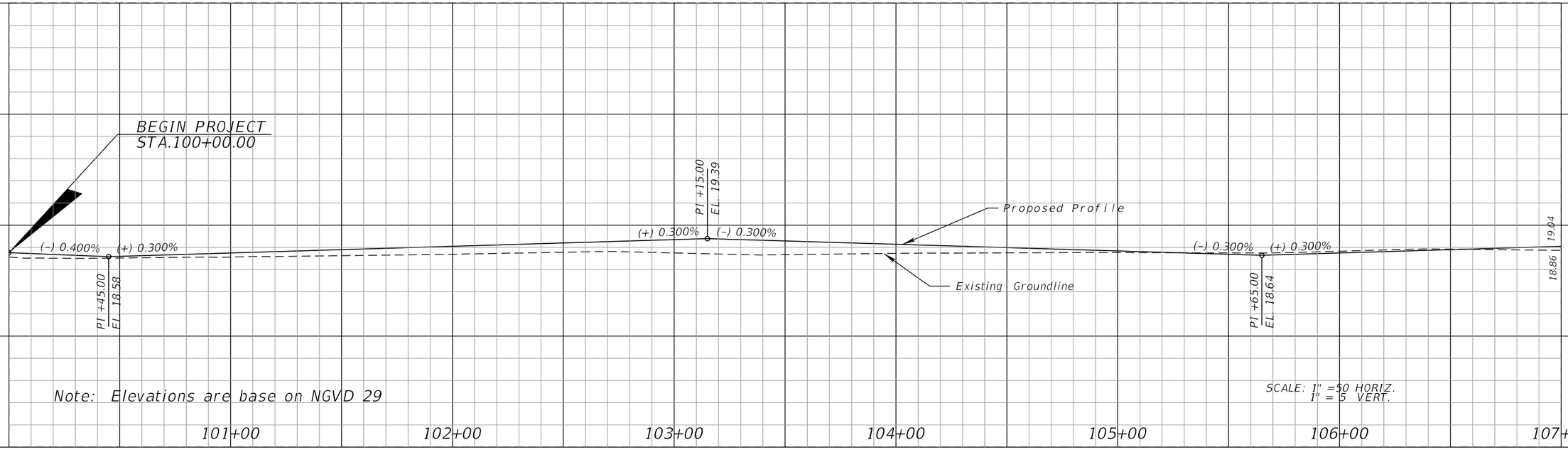
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

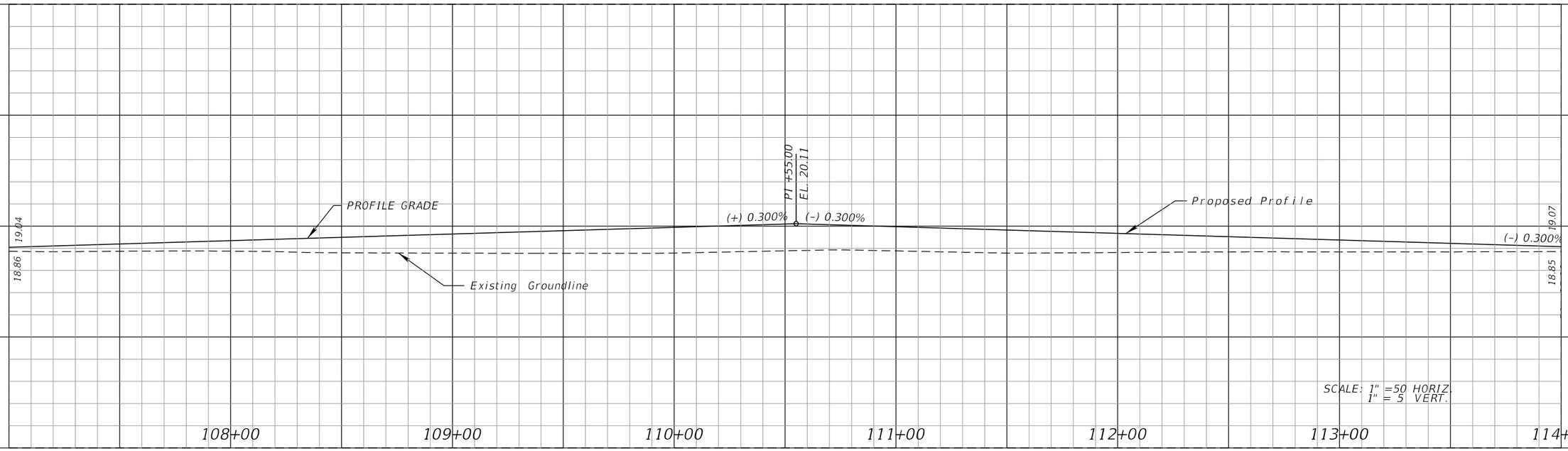
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ROADWAY PLANS

SHEET NO. 25





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

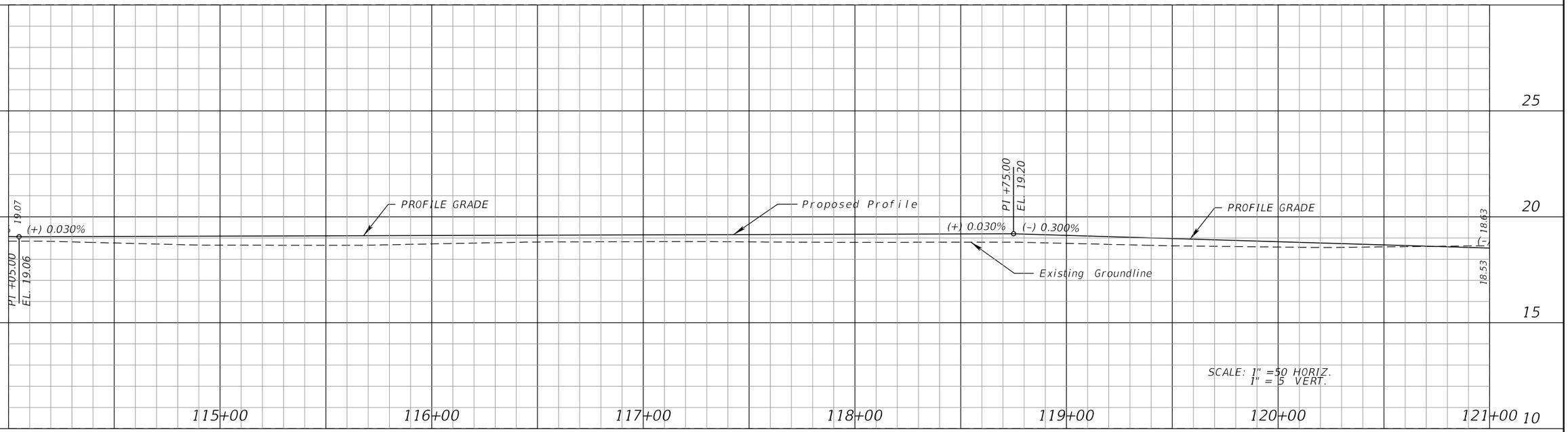
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

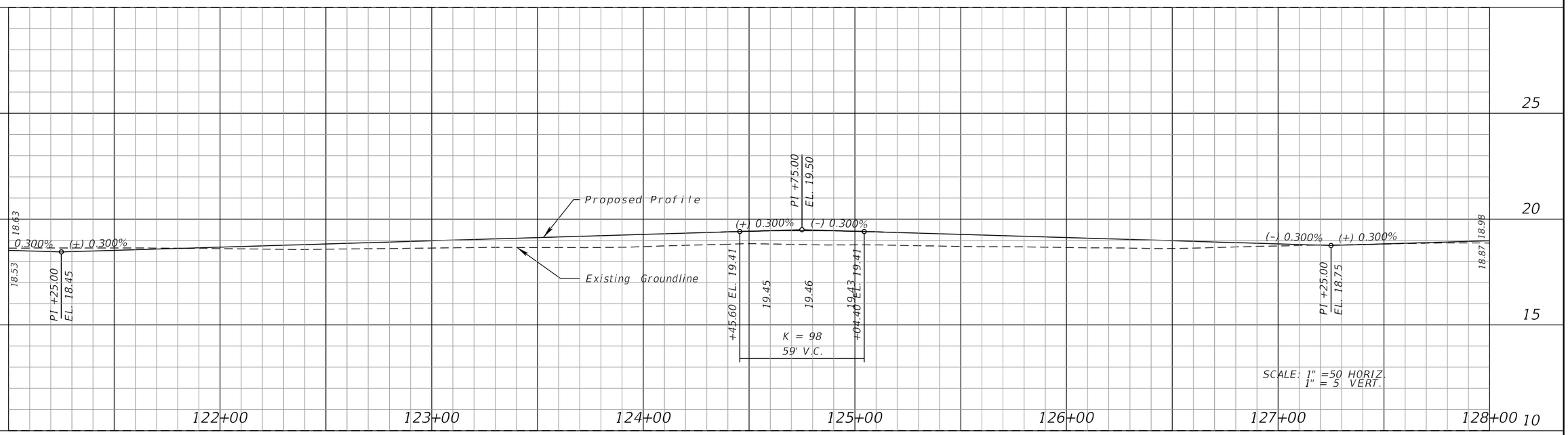
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 26

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

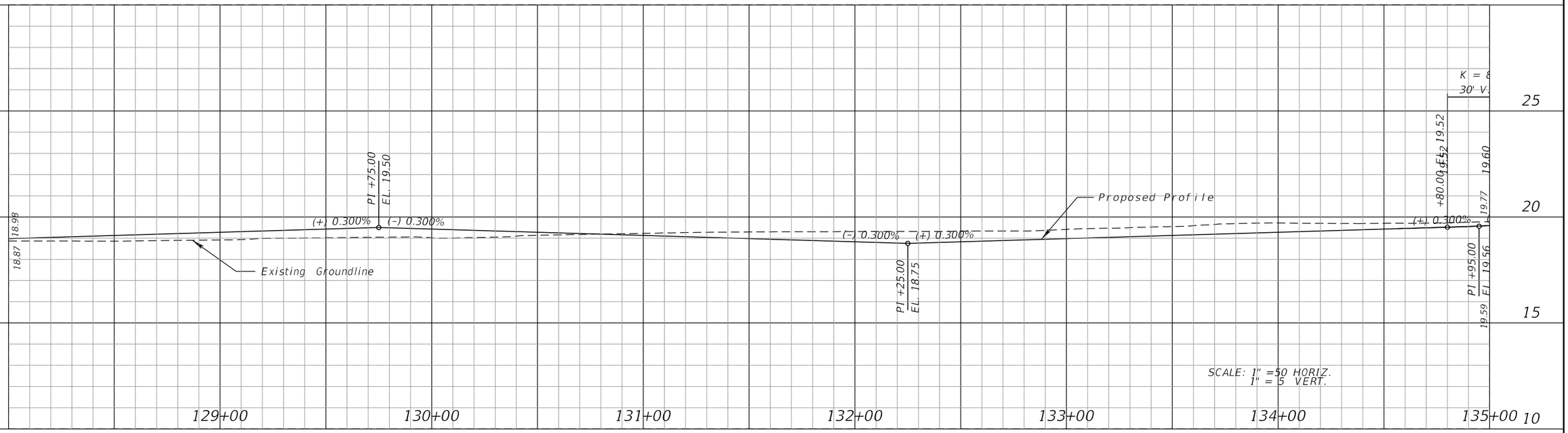
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

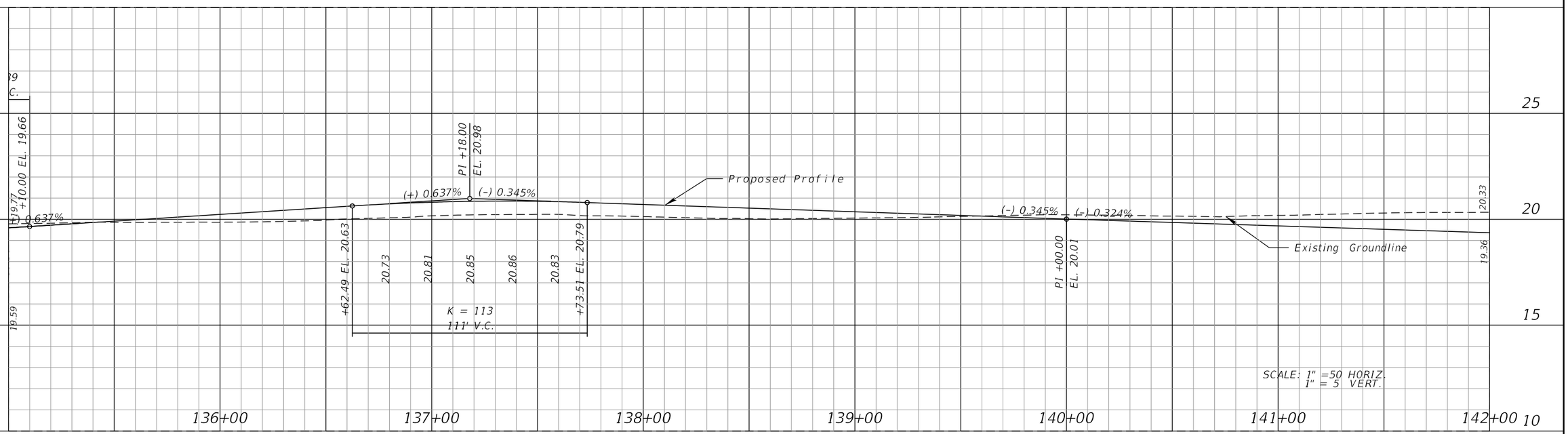
PROFILE

SHEET NO. 27

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:39 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd02.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

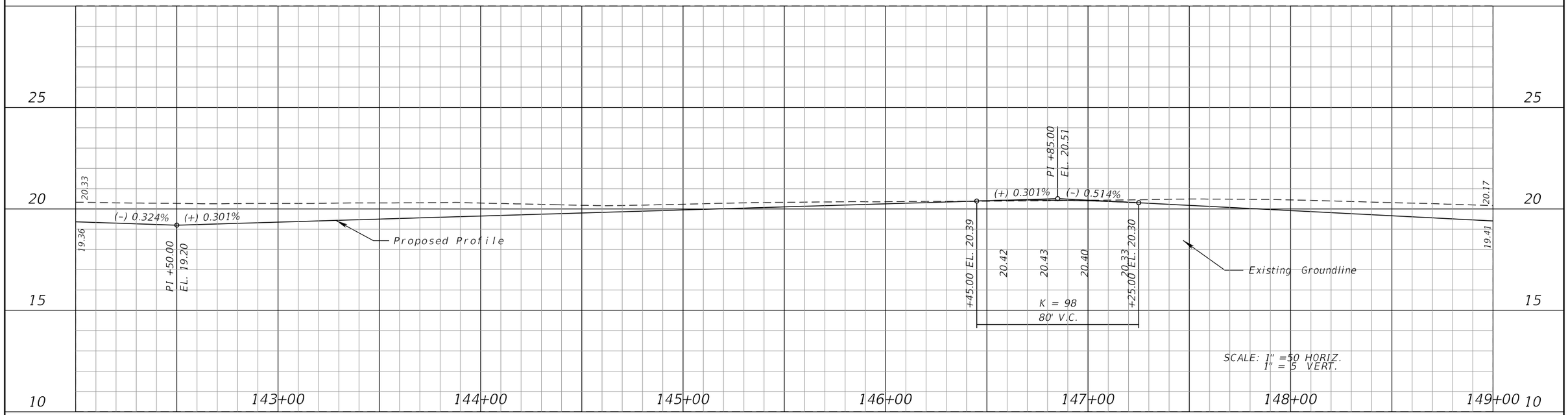
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

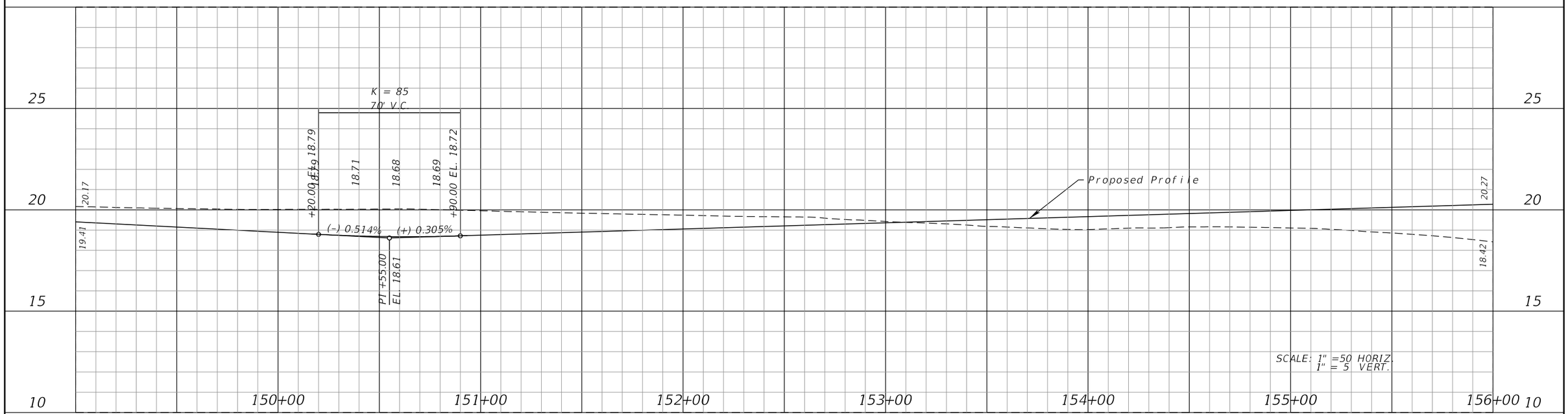
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 28

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

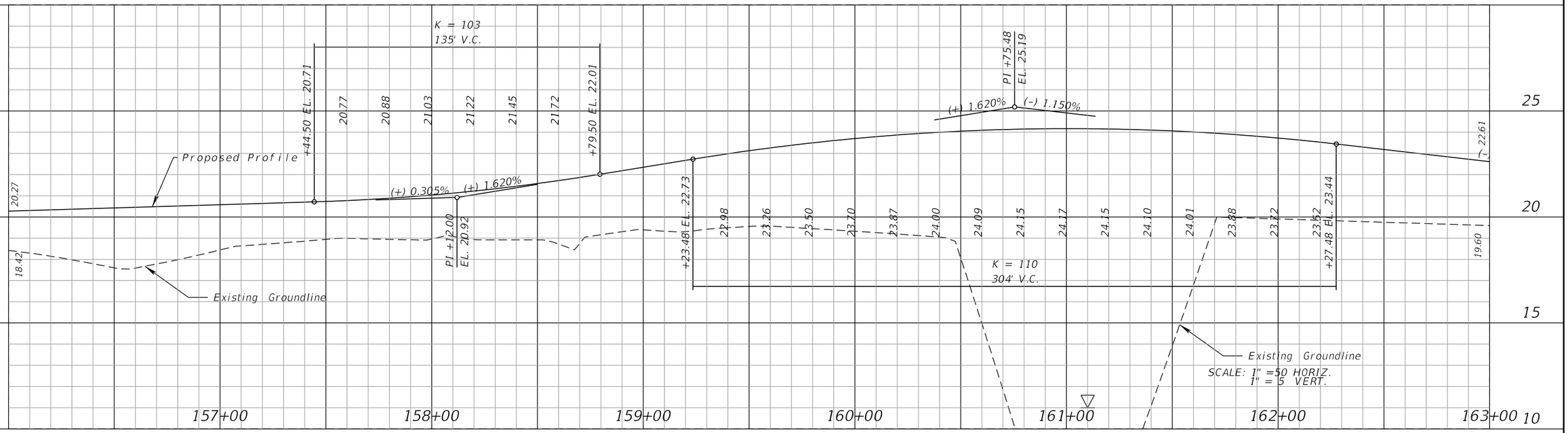
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

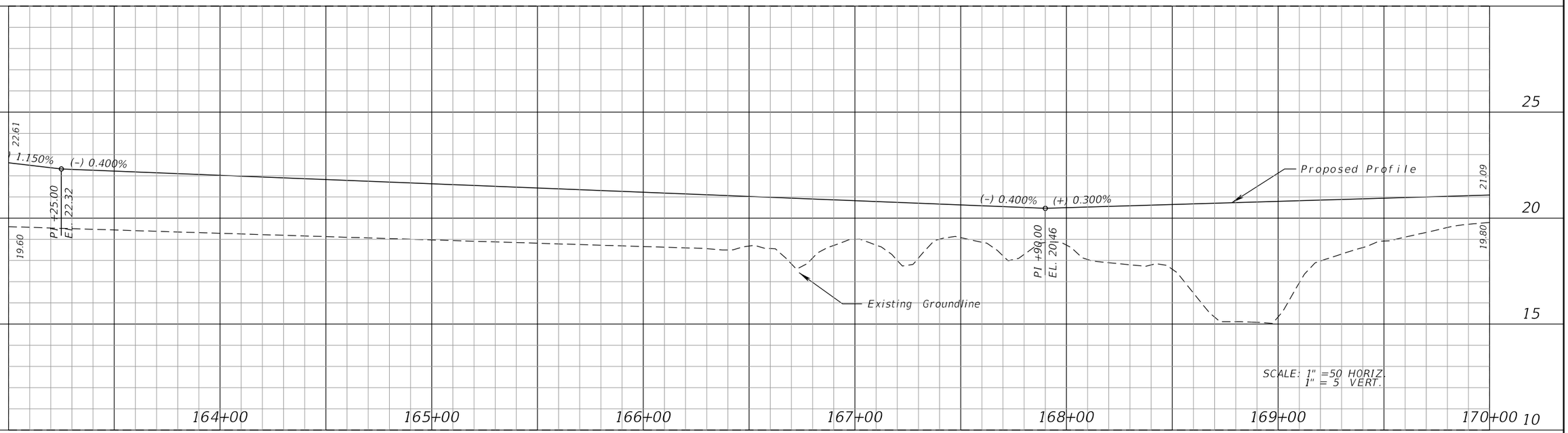
PROFILE

SHEET NO. 29

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:40 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd04.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

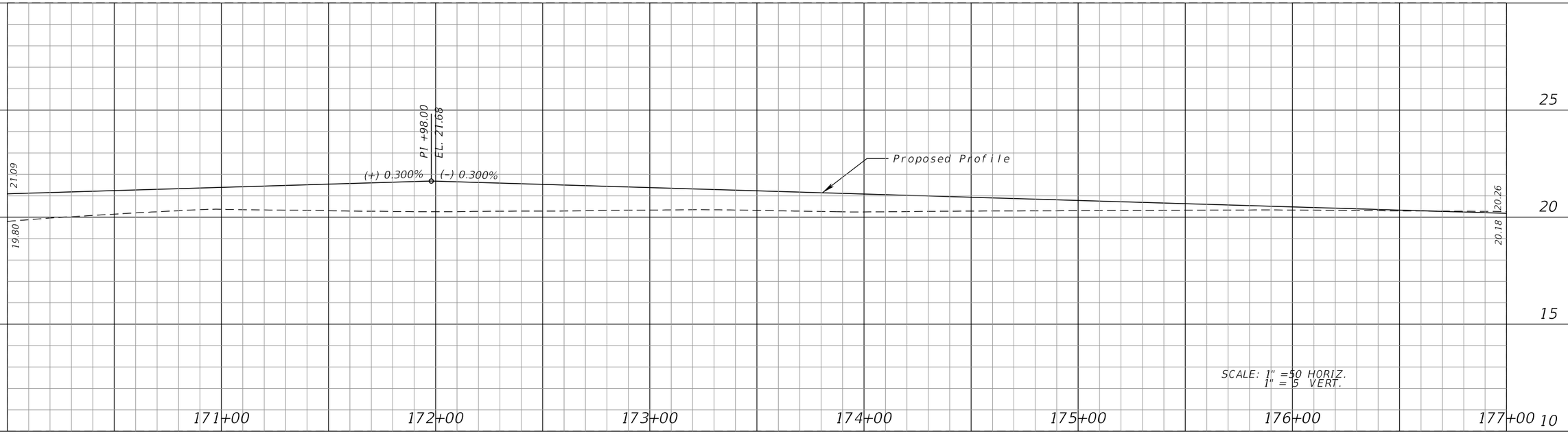
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

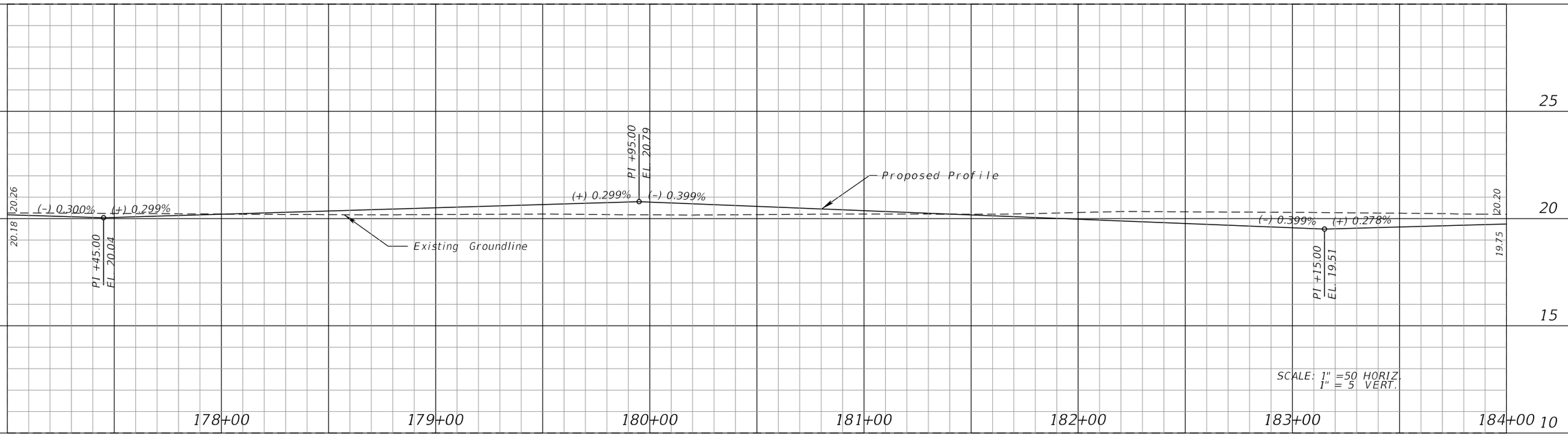
PROFILE

SHEET NO. 30

Roberto.Marin 11/16/2017 10:57:40 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd05.dgn

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

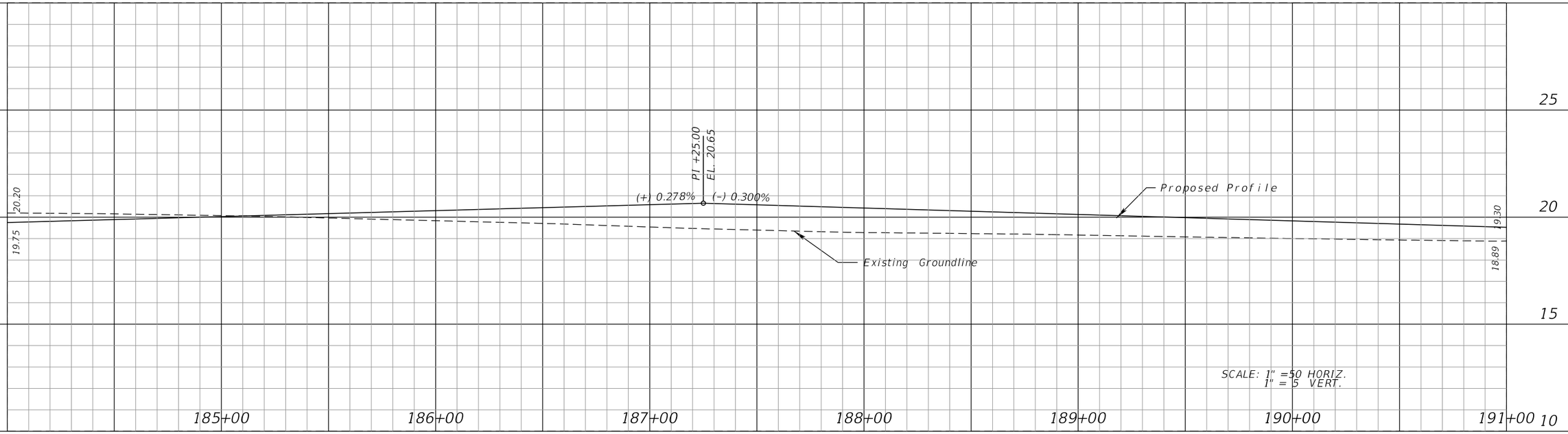
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

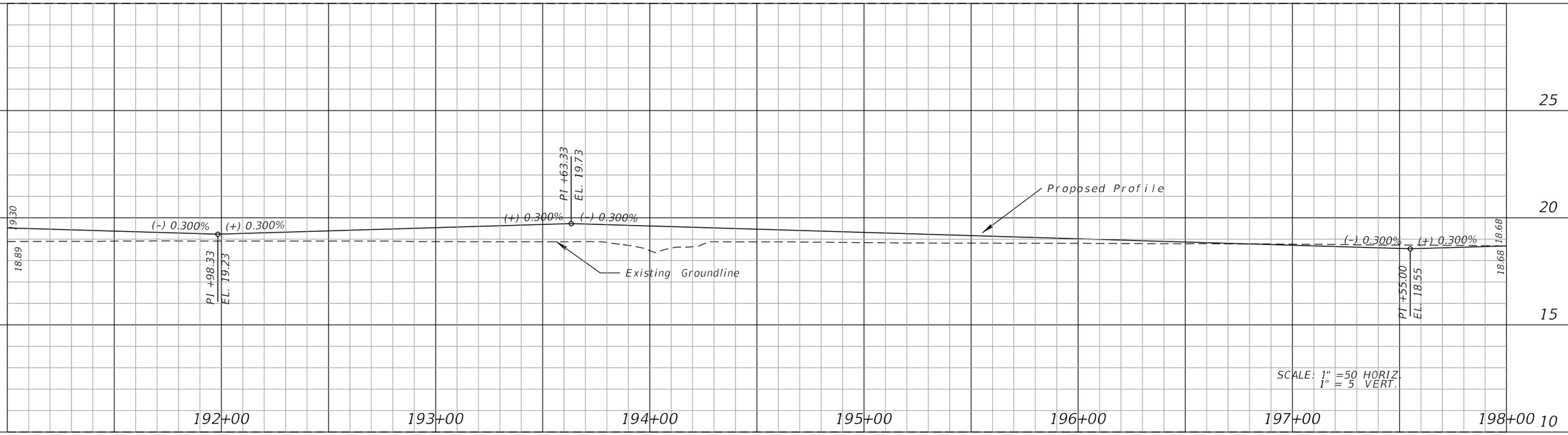
PROFILE

SHEET NO. 31

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:41 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd06.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

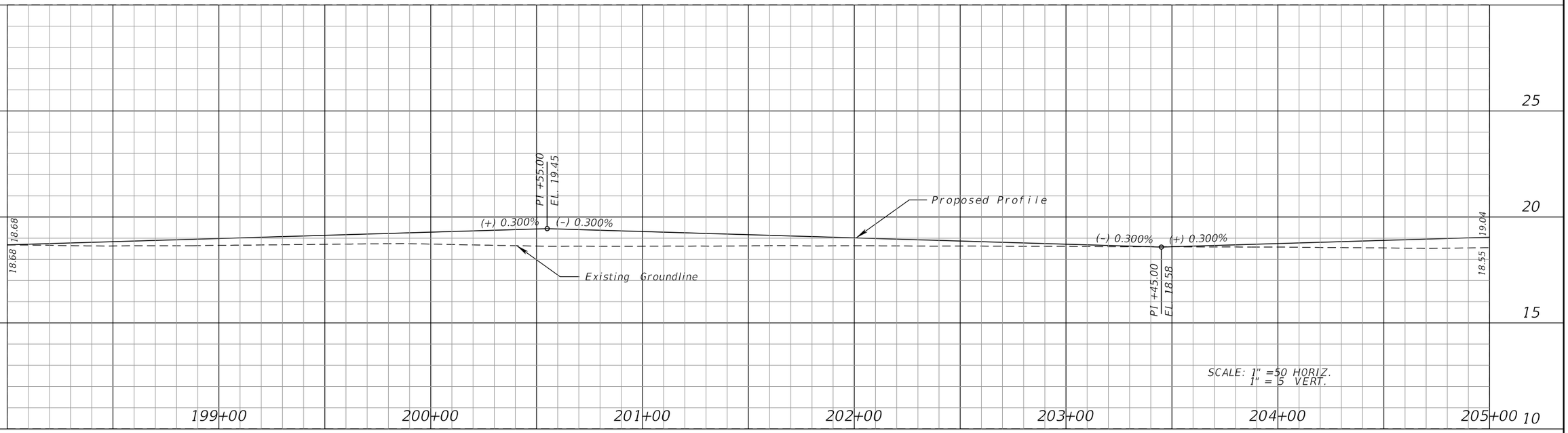
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

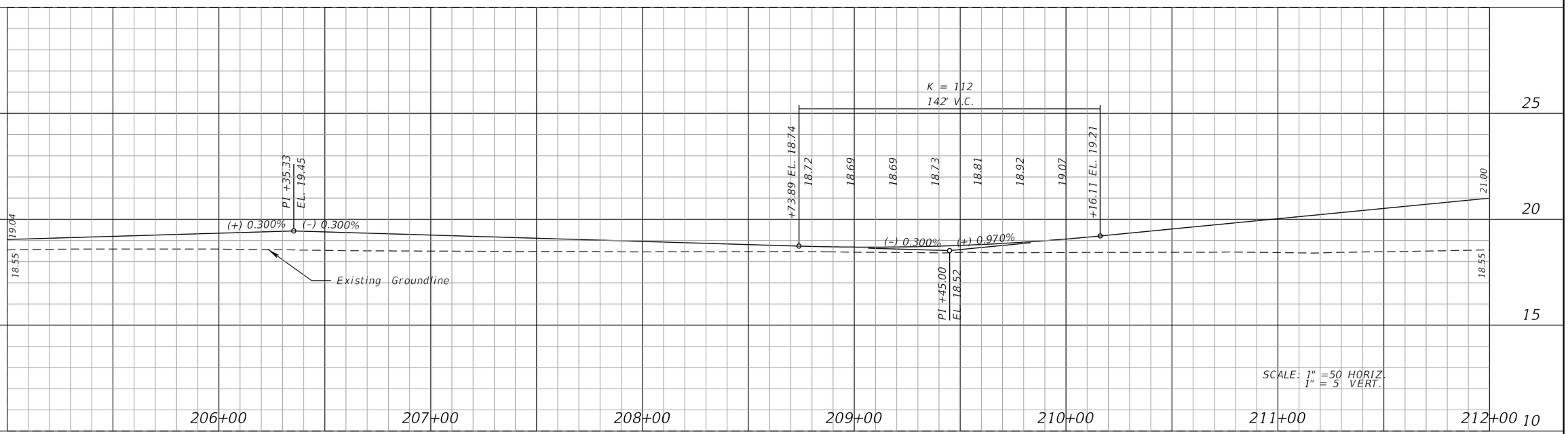
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 32

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

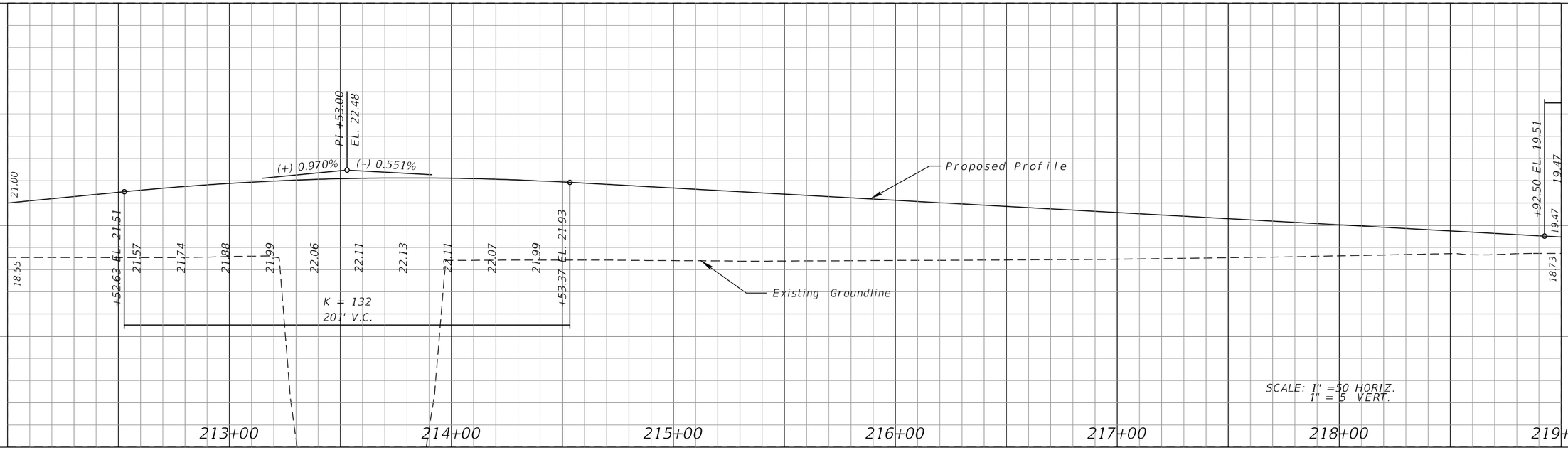
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

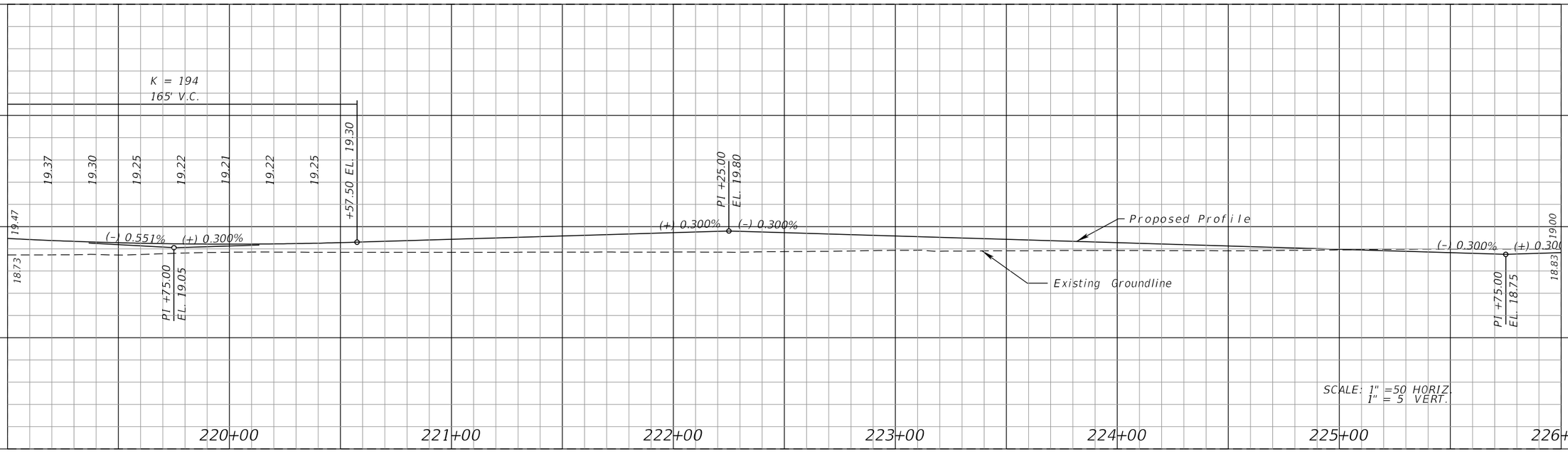
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 33

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

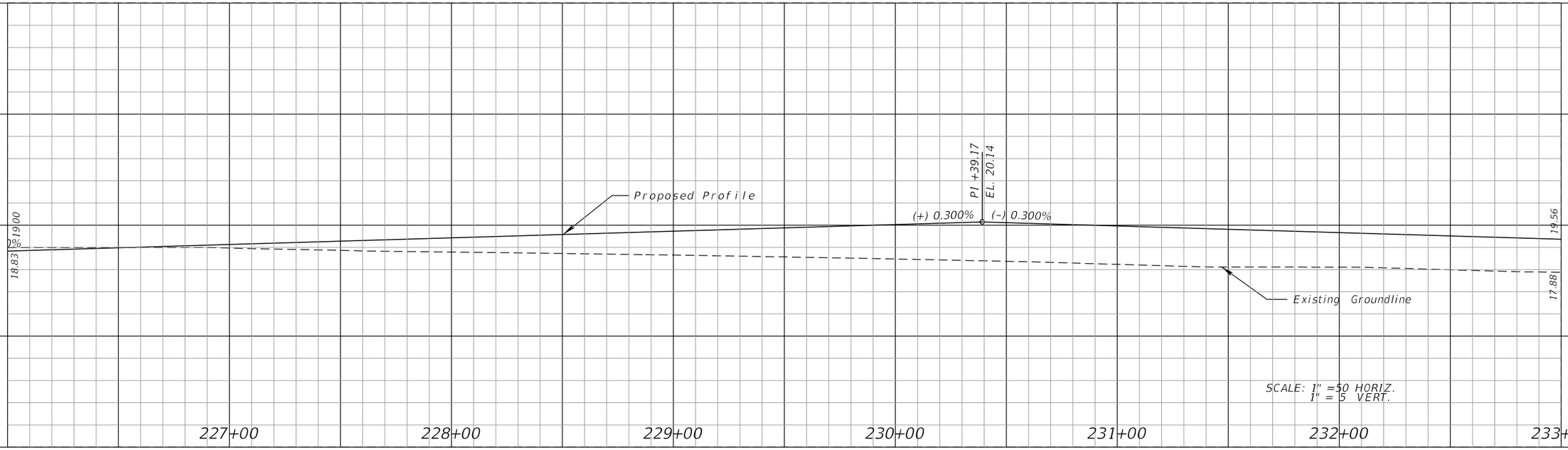
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

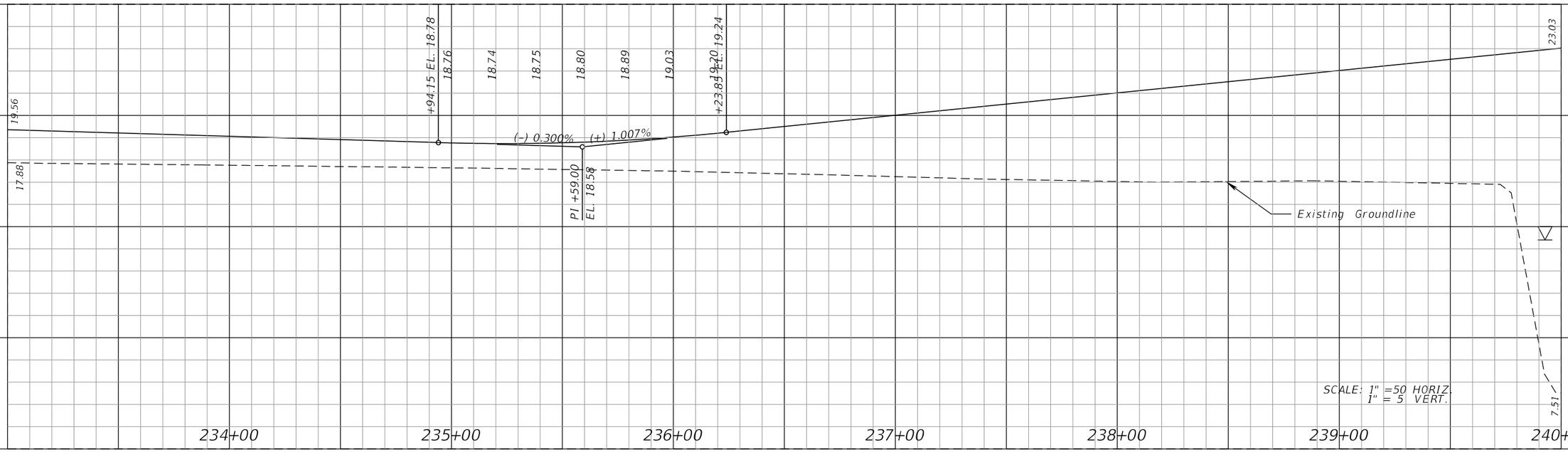
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 34

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

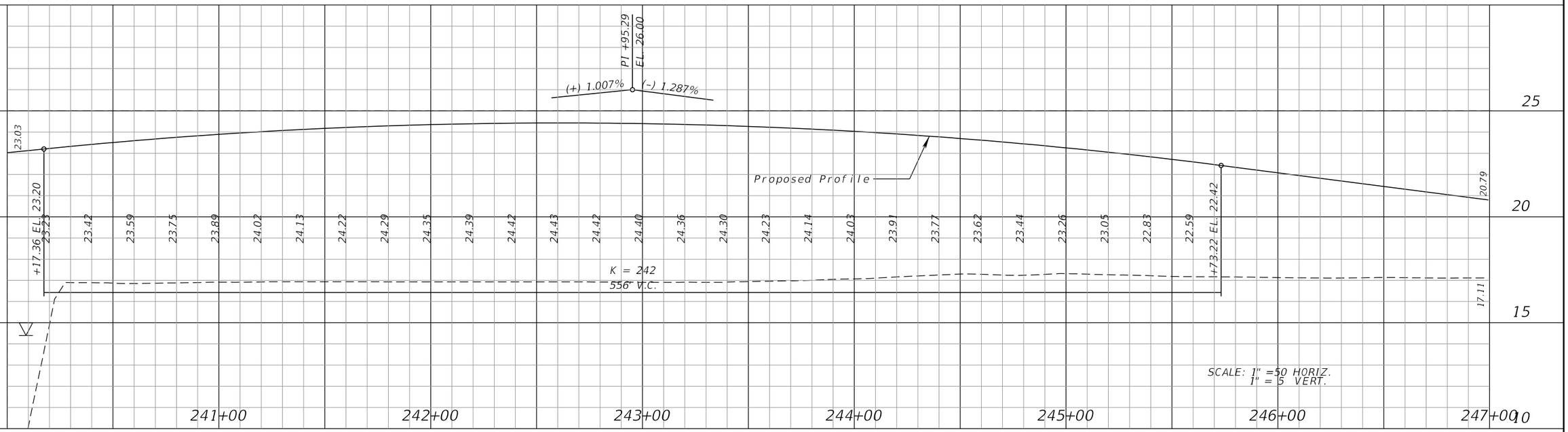
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

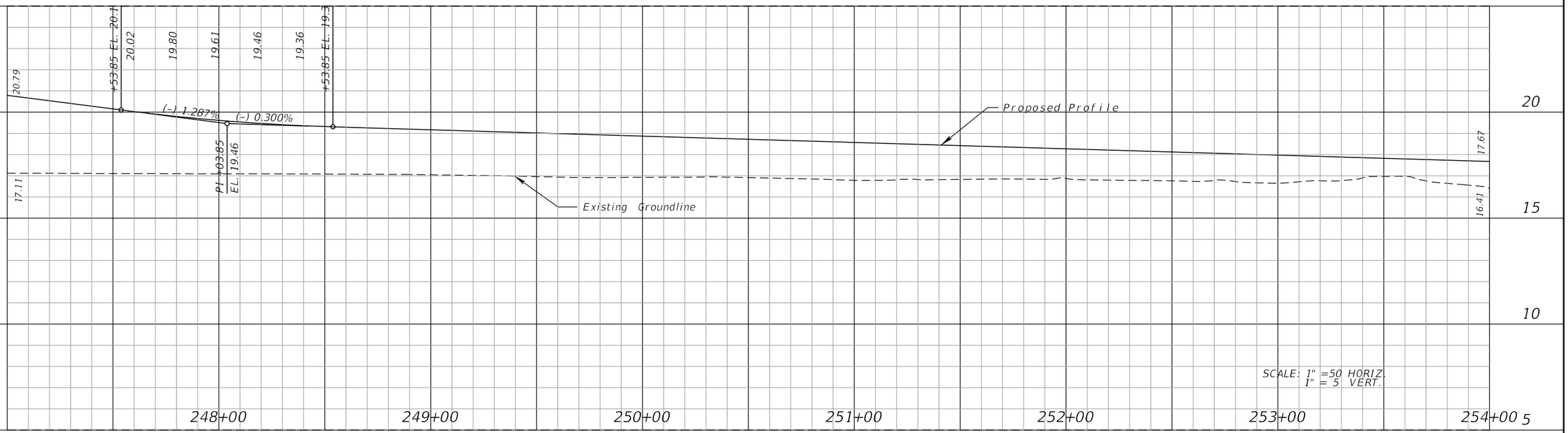
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 35





THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

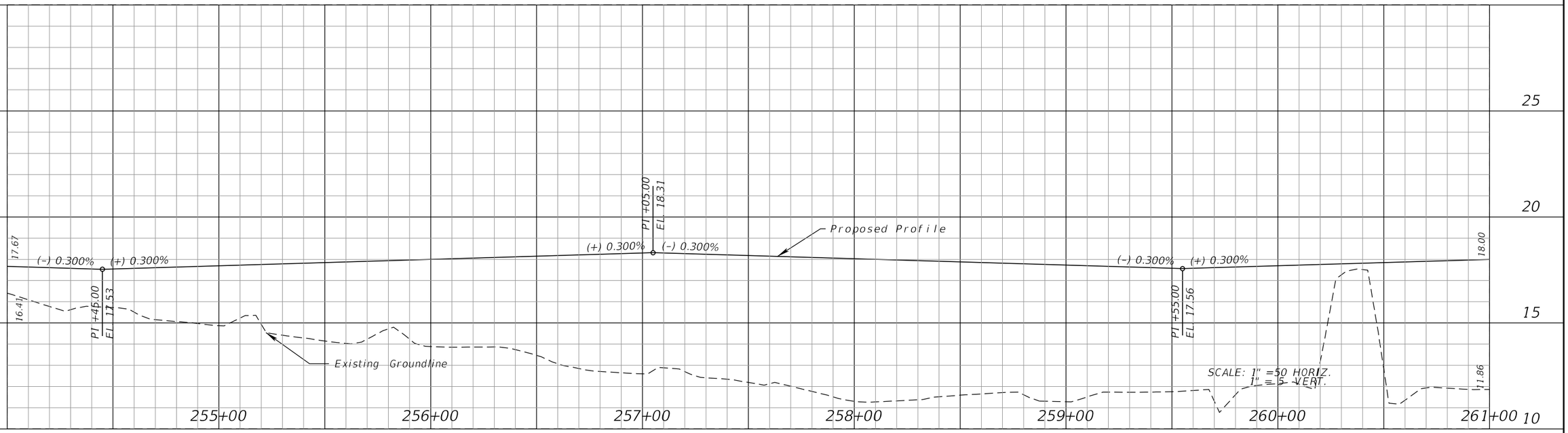
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

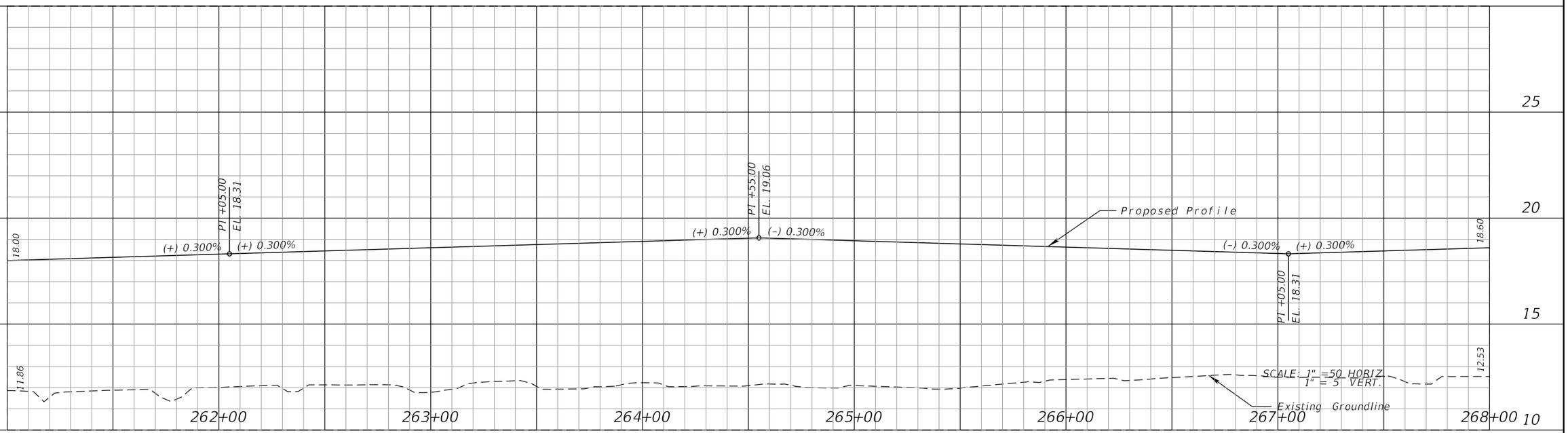
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 36

Roberto.Marin 11/16/2017 10:57:43 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd011.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

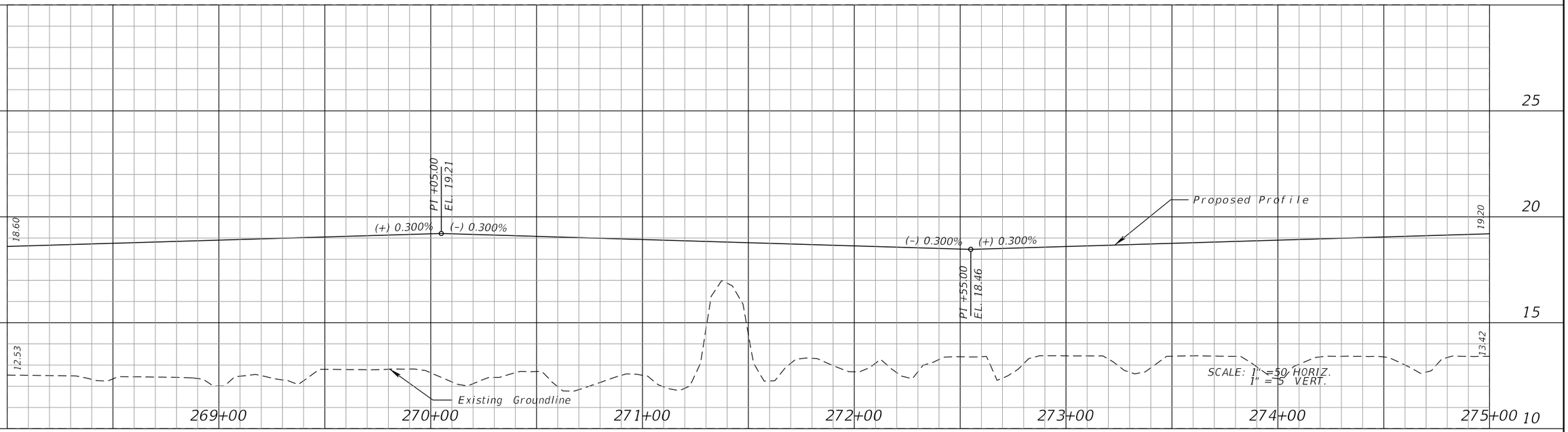
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

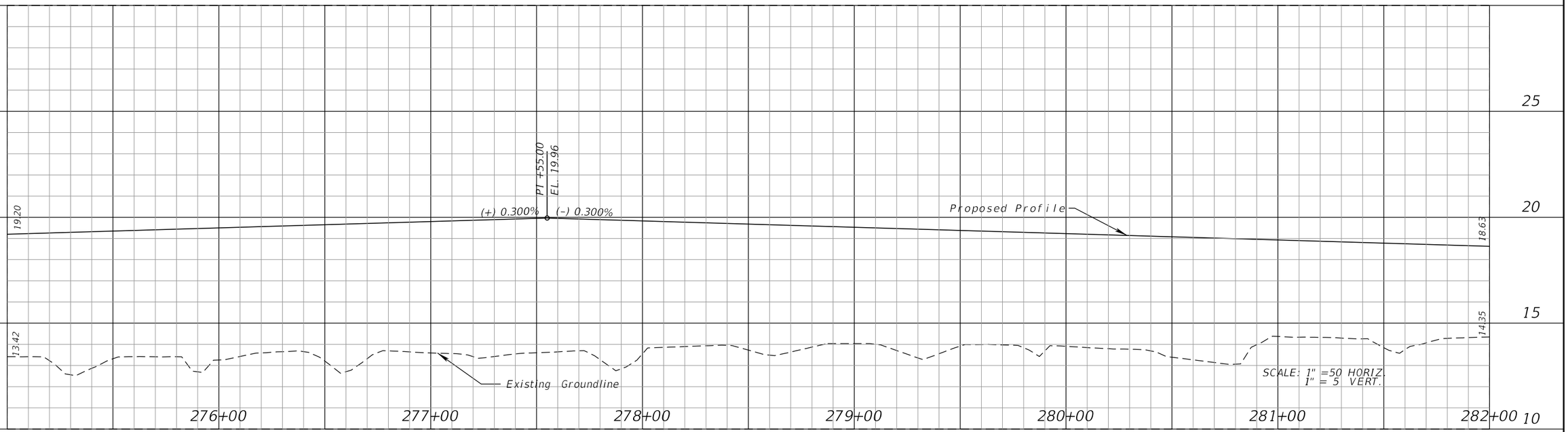
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 37

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

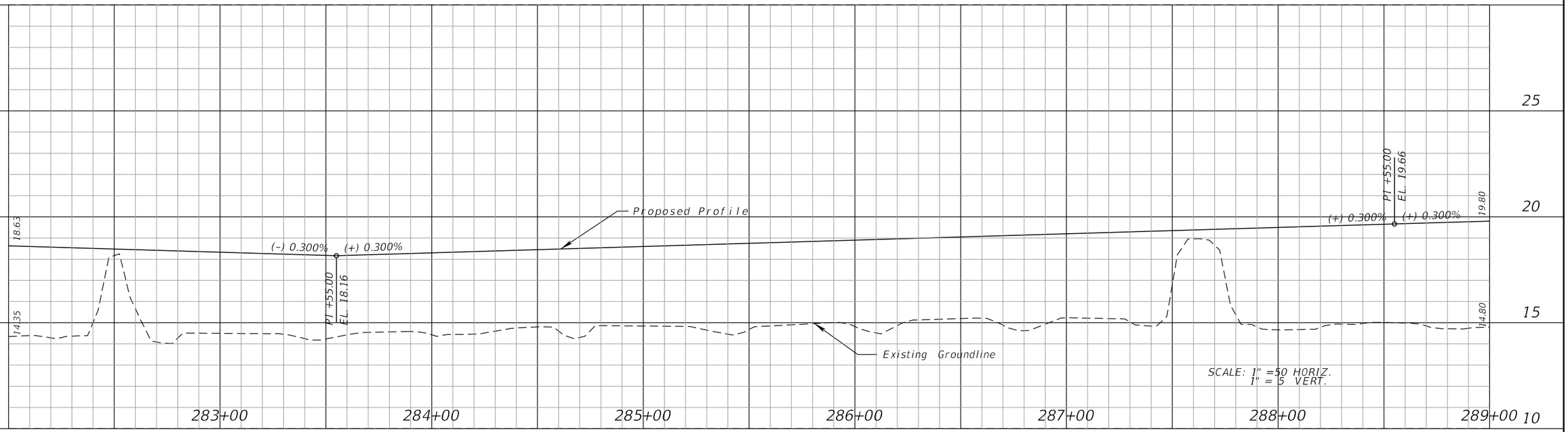
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

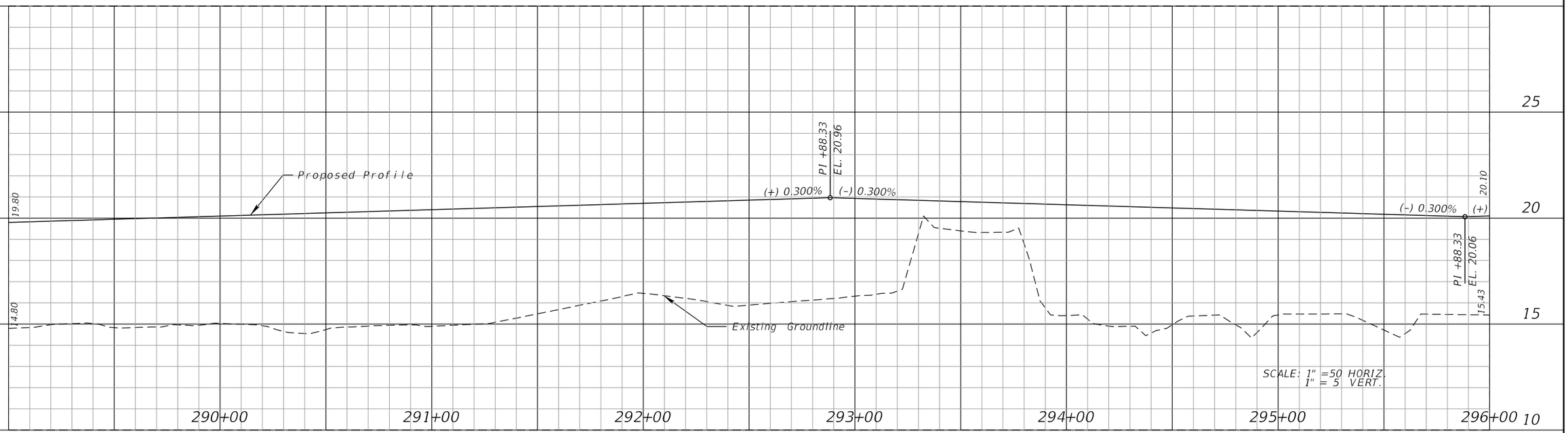
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 38

Roberto.Marin 11/16/2017 10:57:44 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd013.dgn





THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

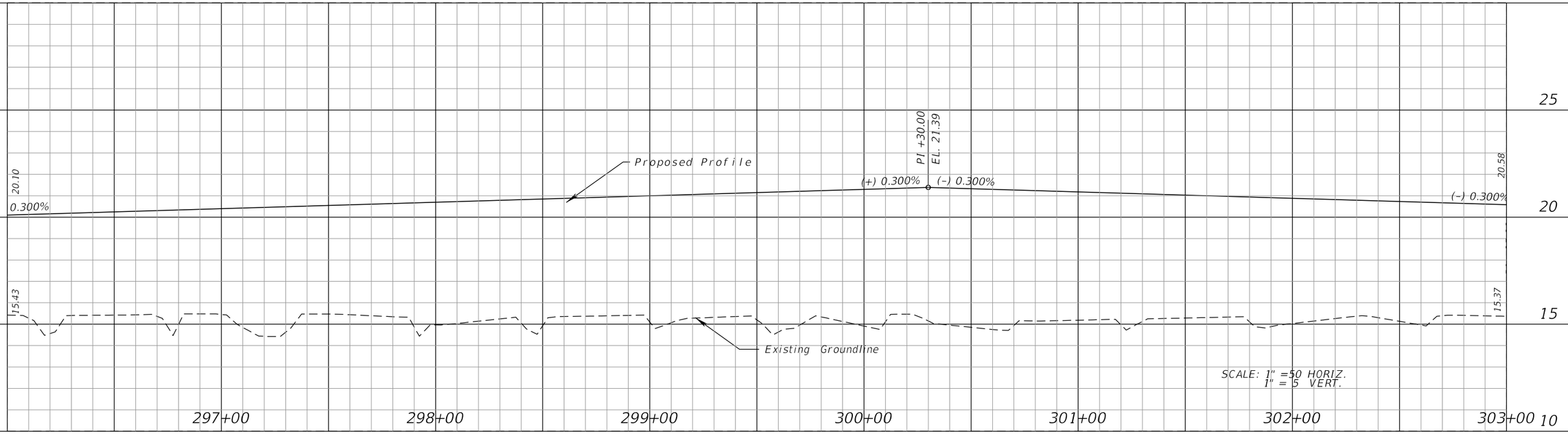
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

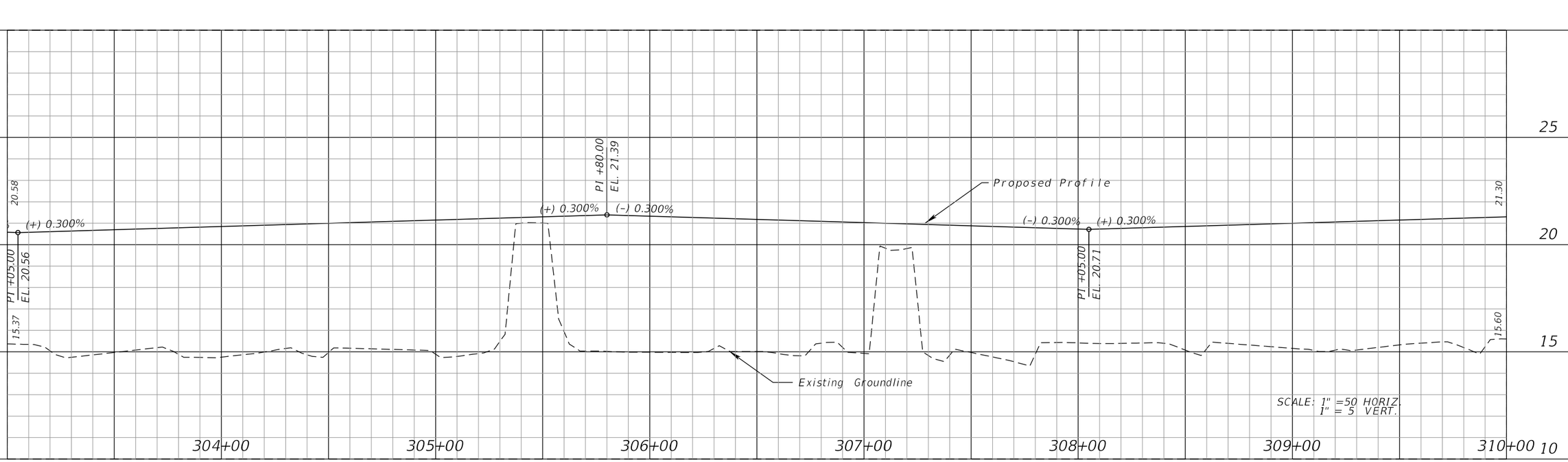
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 39

Roberto.Marin 11/16/2017 10:57:44 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd014.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

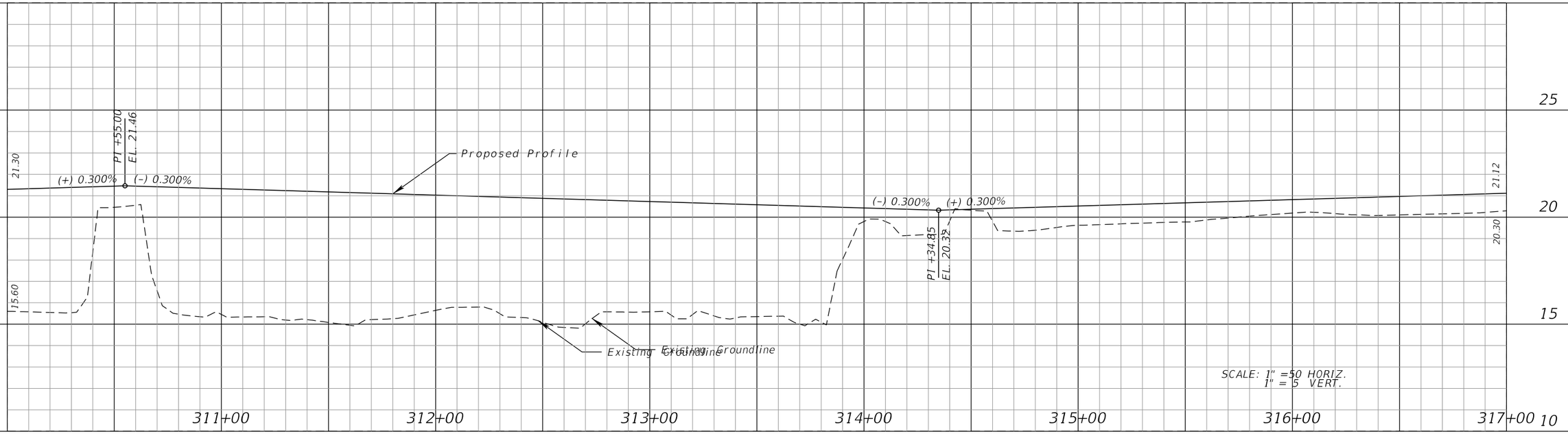
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

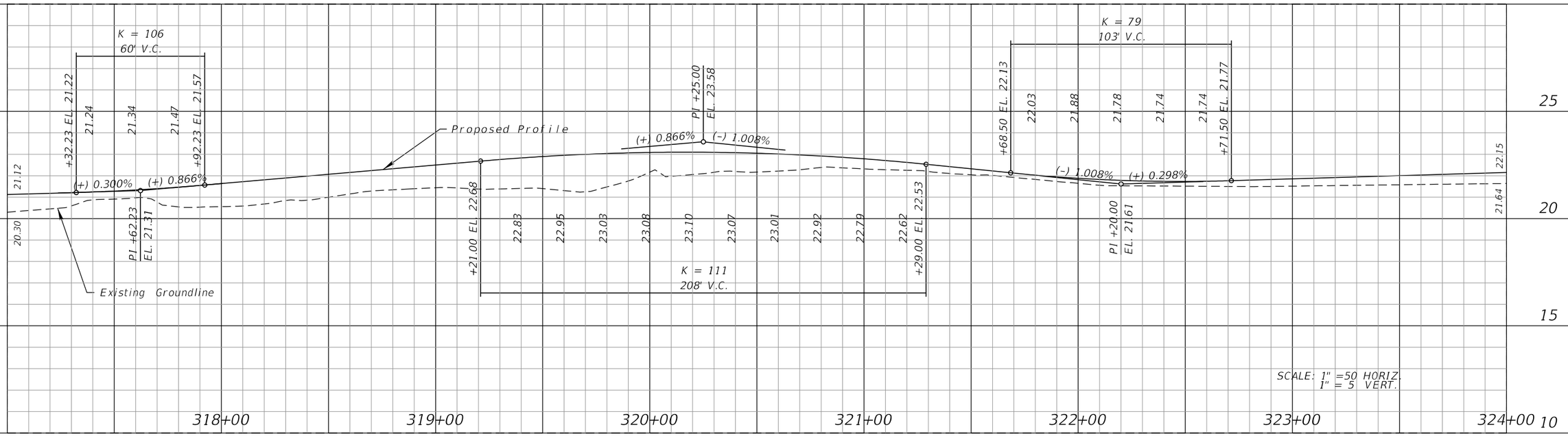
PROFILE

SHEET NO. 40

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:44 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd015.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

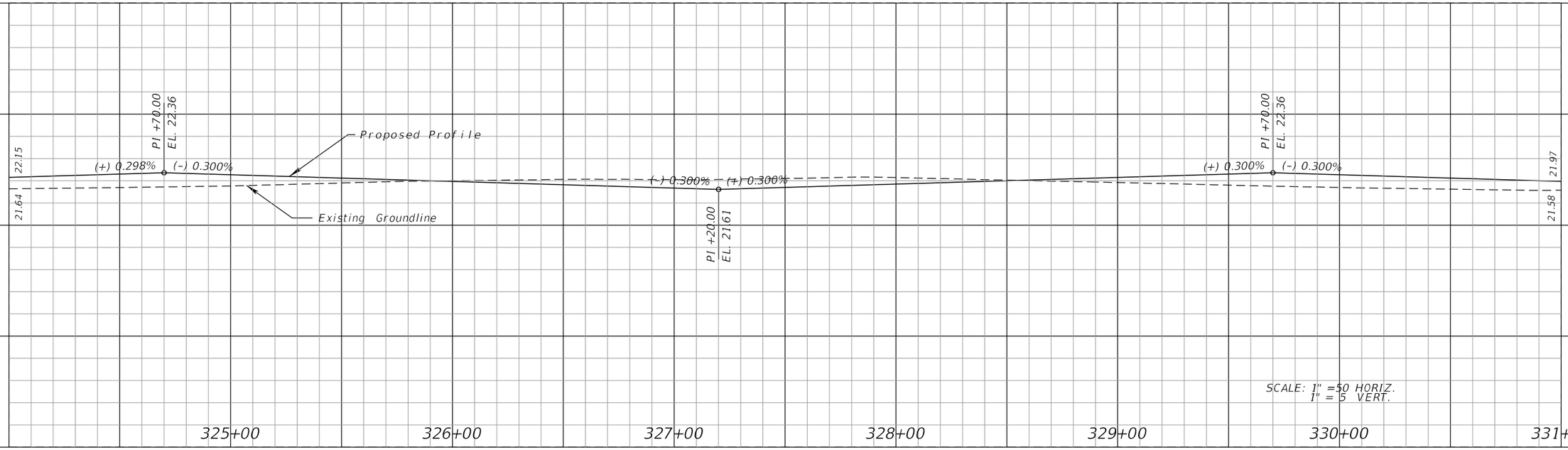
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

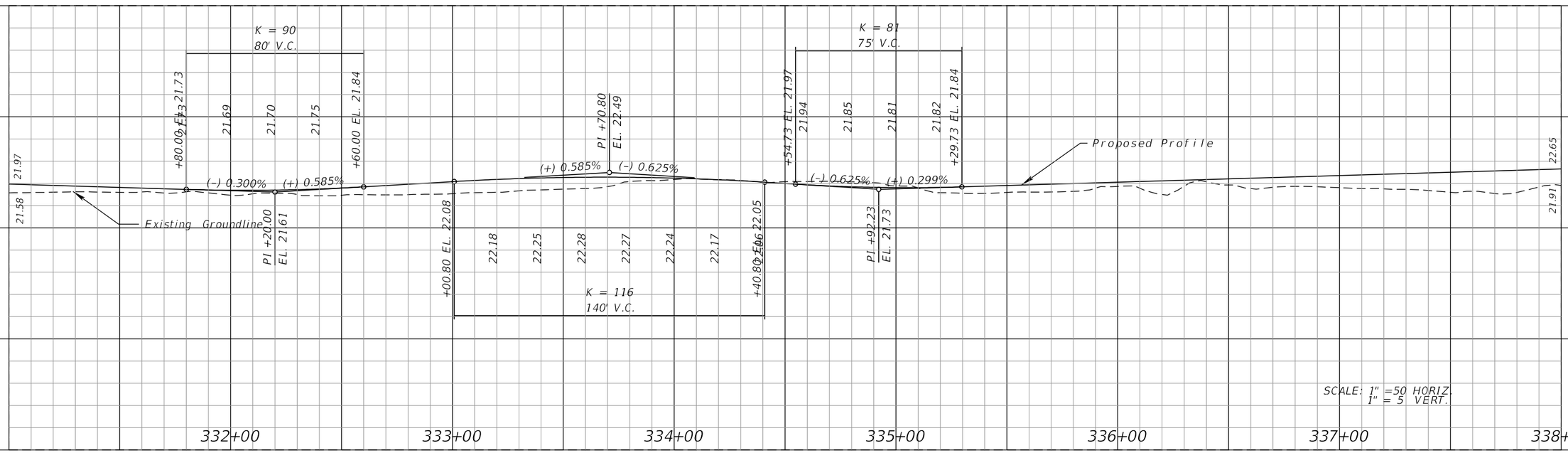
PROFILE

SHEET NO. 41

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:45 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd016.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

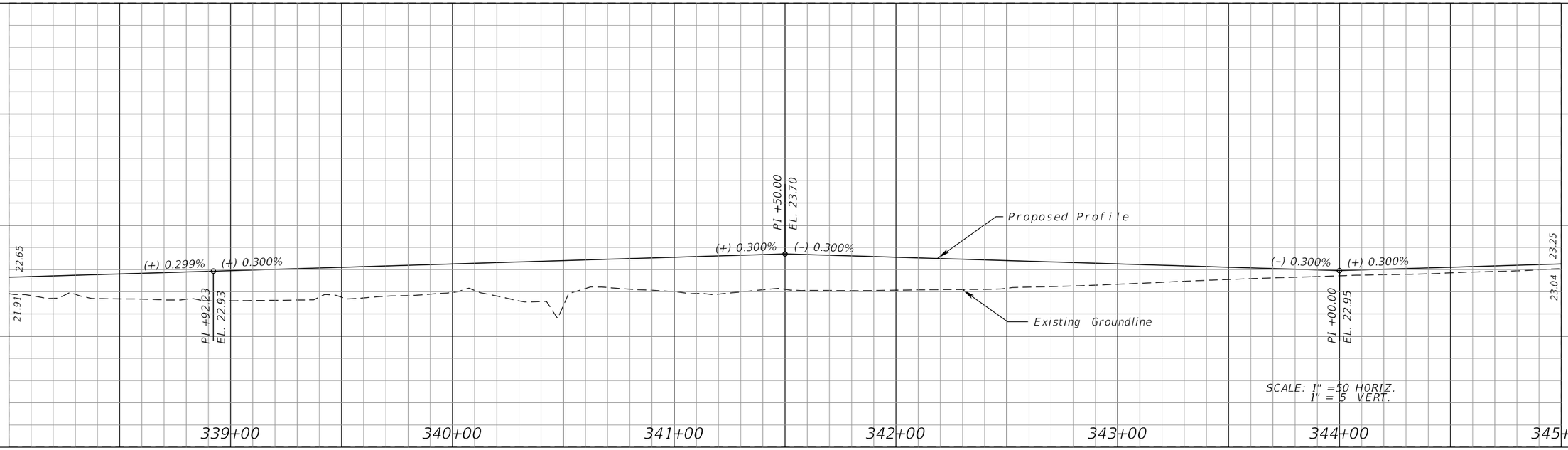
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

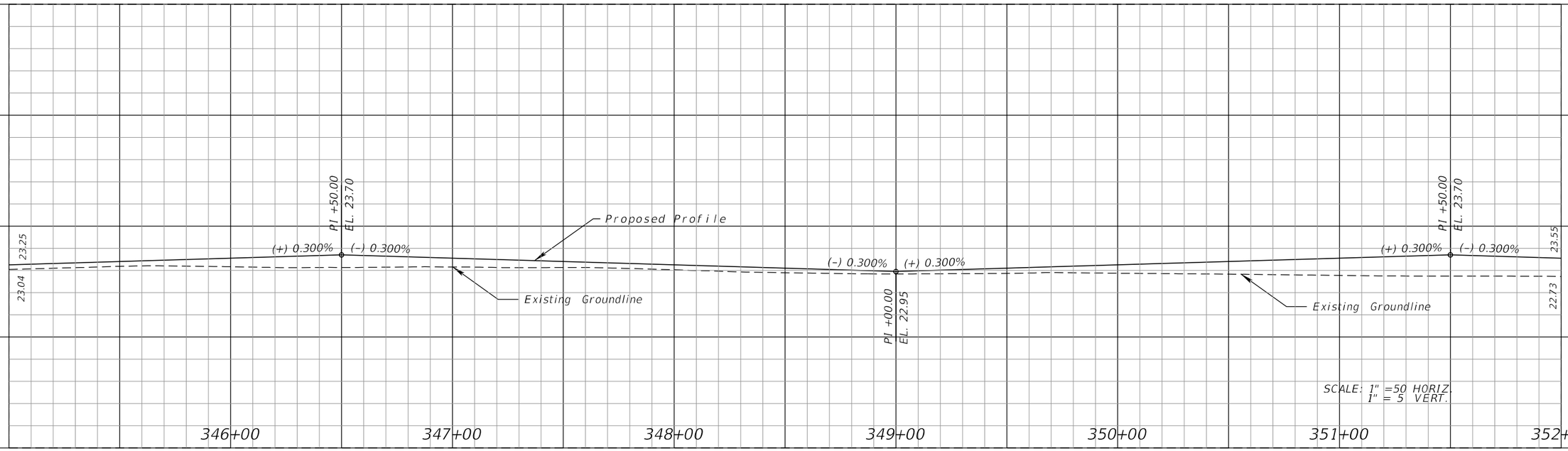
PROFILE

SHEET NO. 42

Roberto.Marin 11/16/2017 10:57:45 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd017.dgn

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

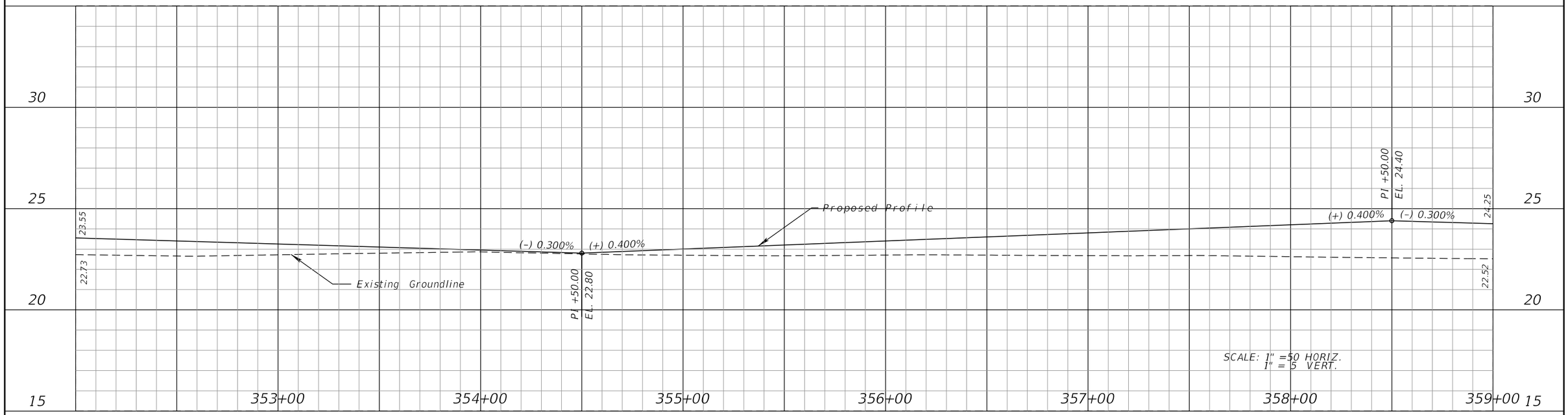
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

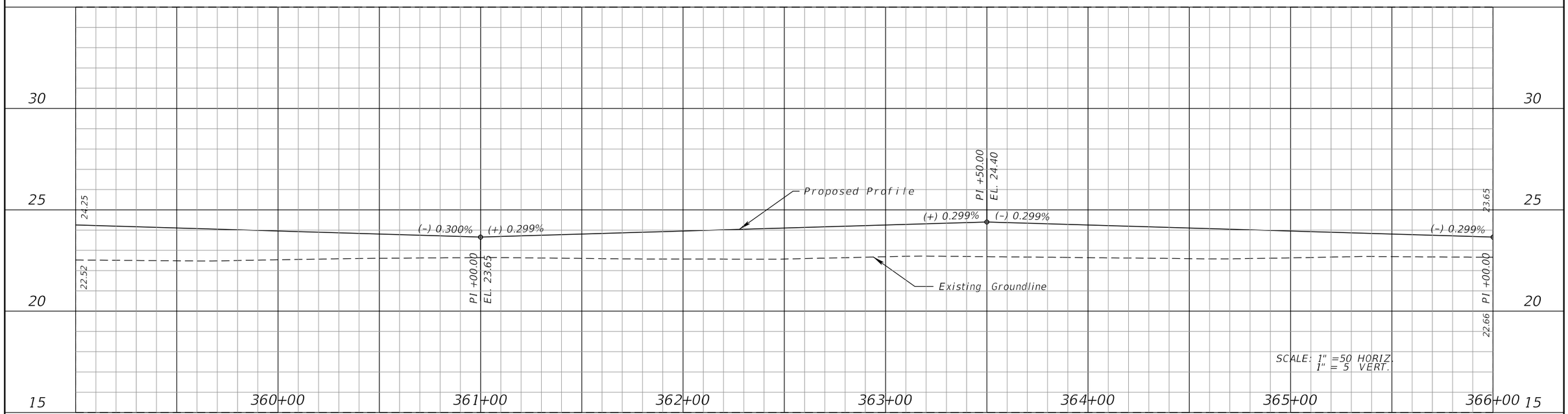
PROFILE

SHEET NO. 43

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:46 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd018.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

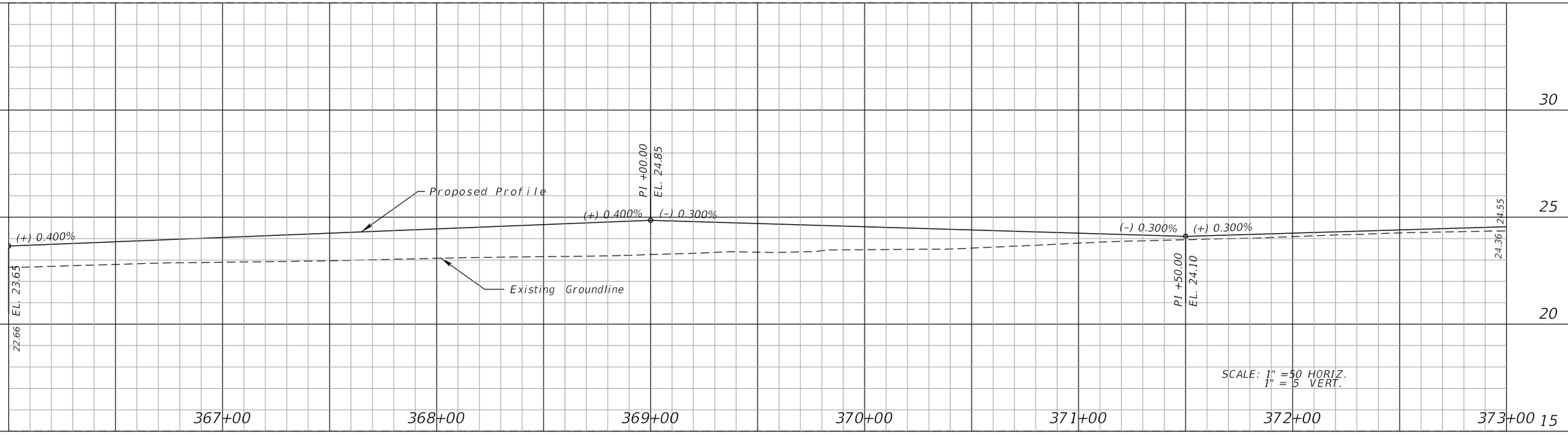
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

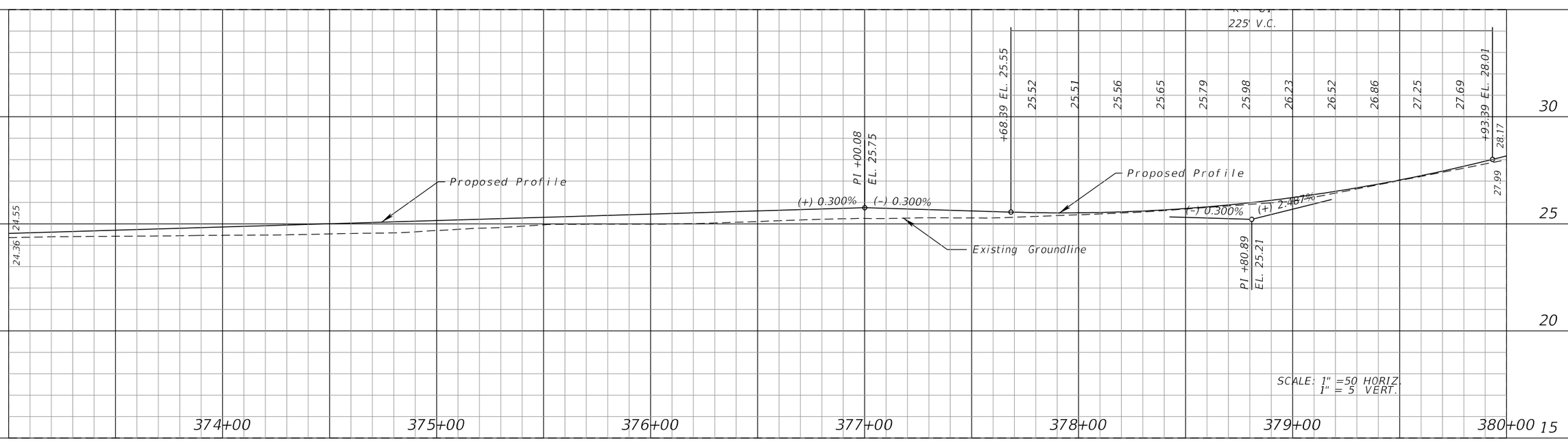
PROFILE

SHEET NO. 44

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:46 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd019.dgn





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

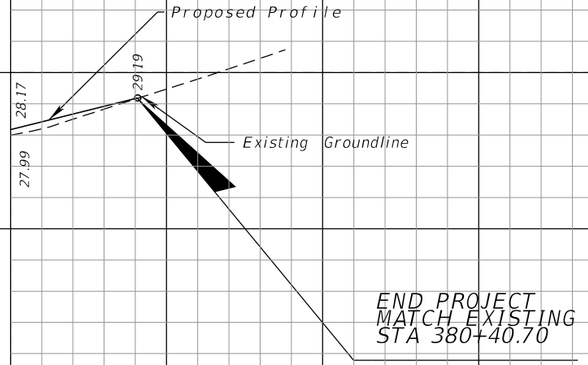
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 45

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

Roberto.Marin 11/16/2017 10:57:47 AM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\roadway\profrd020.dgn



30
25
20
15

381+00

SCALE: 1" =50 HORIZ.
1" = 5 VERT.

SCALE: 1" =50 HORIZ.
1" = 5 VERT.

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

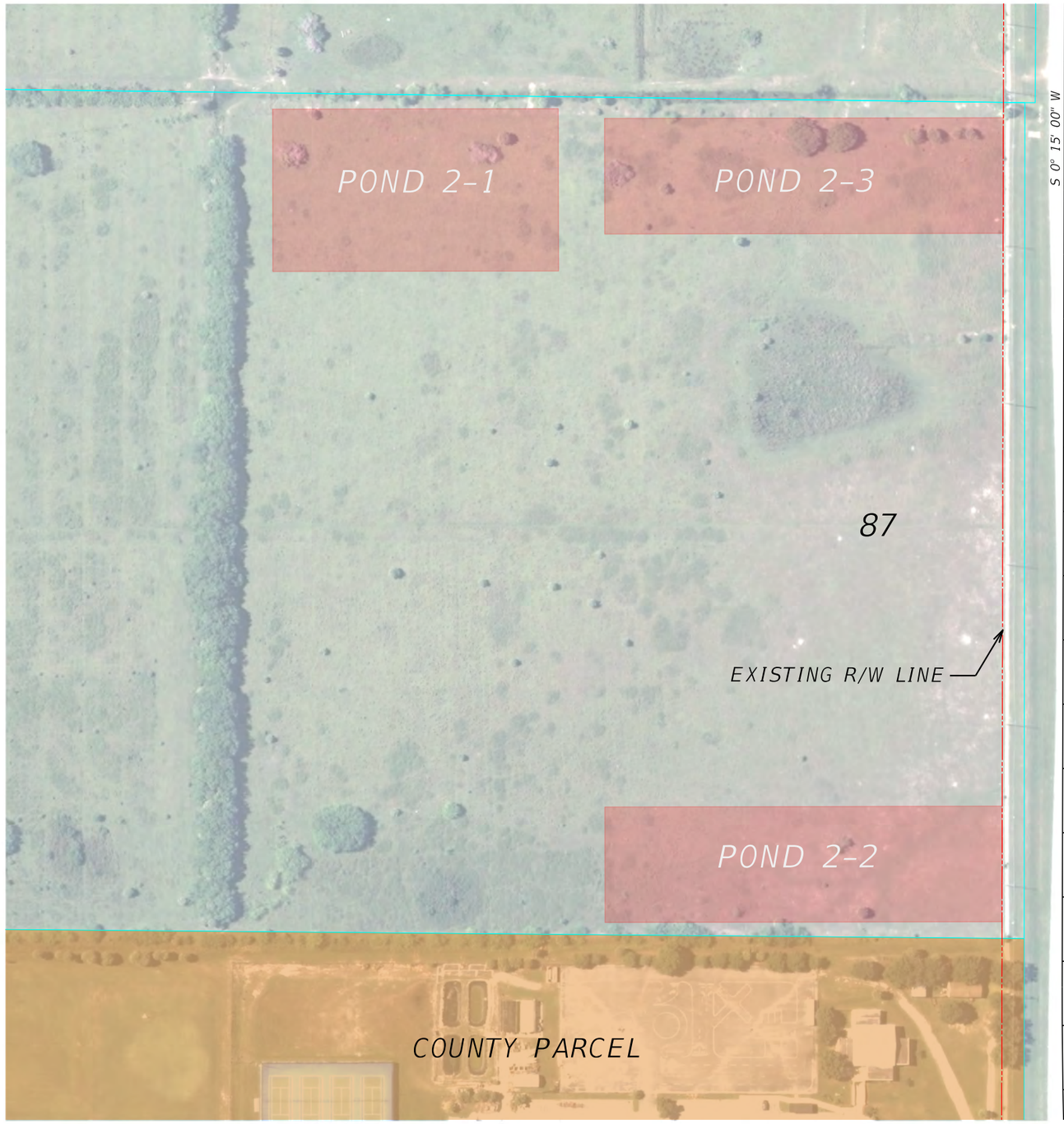
METRIC ENGINEERING, INC.
13940 S.W. 136 STREET
SUITE 200
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 235-5271
CERTIFICATE OF AUTHORIZATION 2294

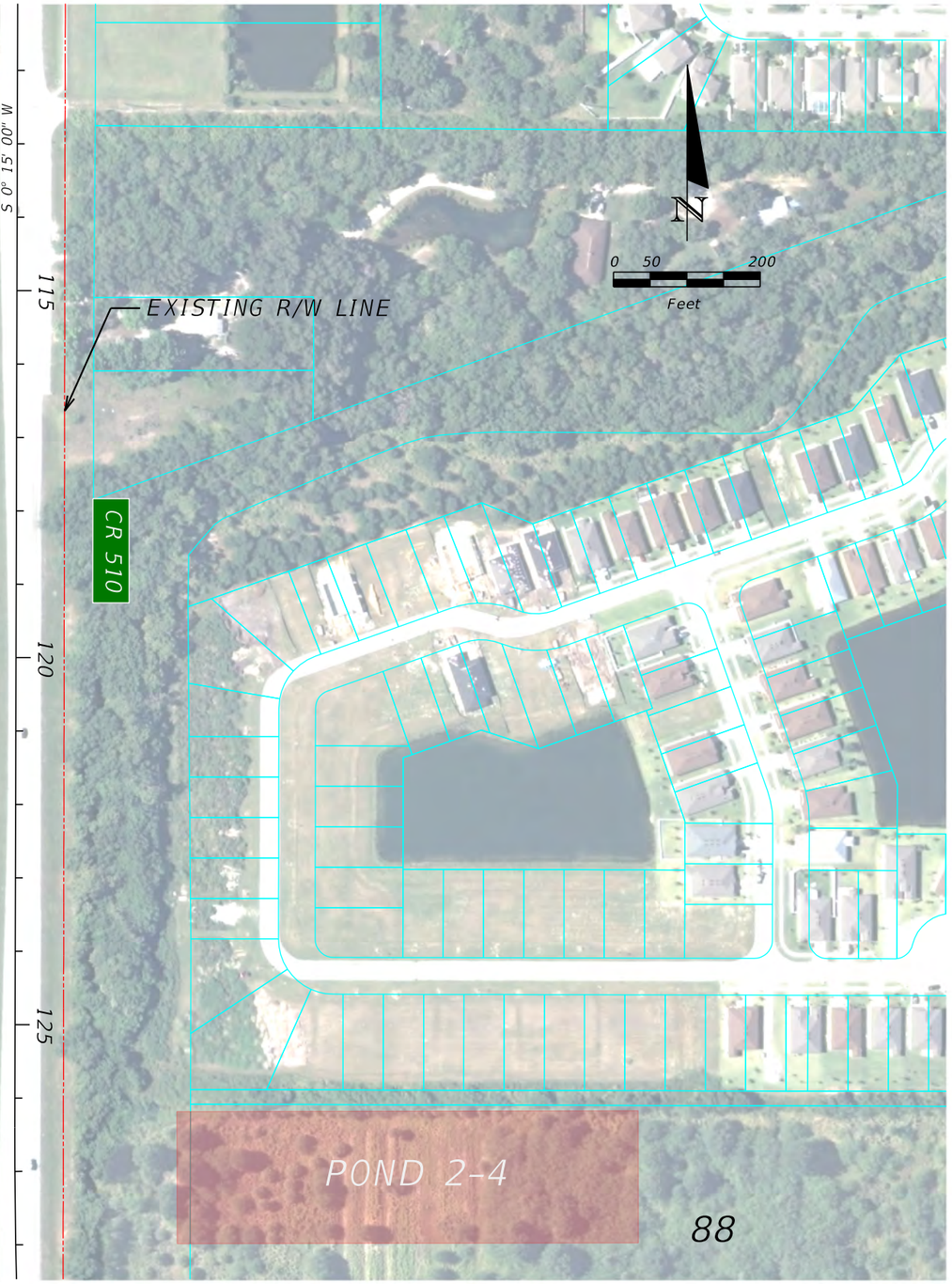
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

PROFILE

SHEET NO. 46





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

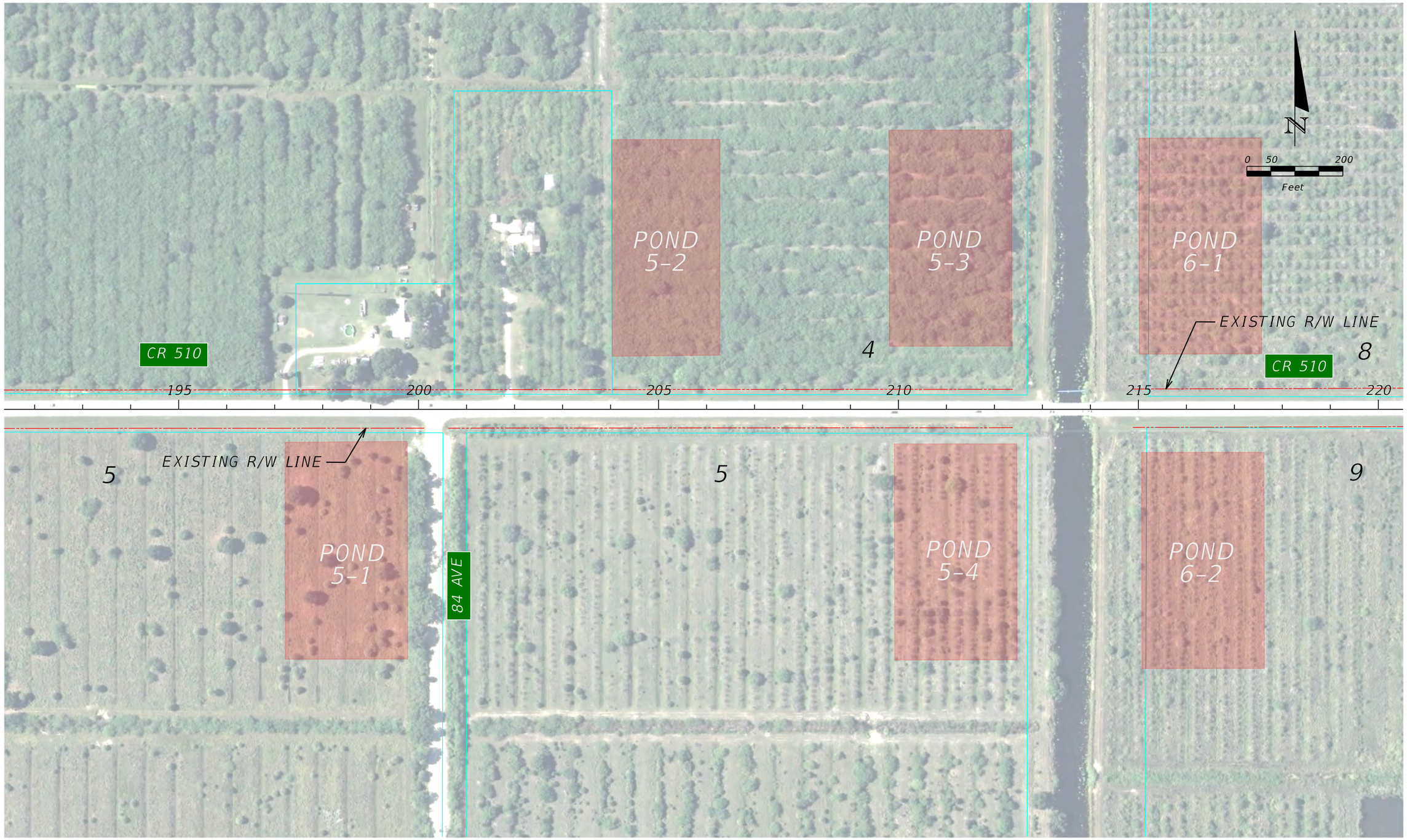
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 47

Roberto.Marin 9/1/2017 1:14:46 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\RWDTRD22.dgn



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

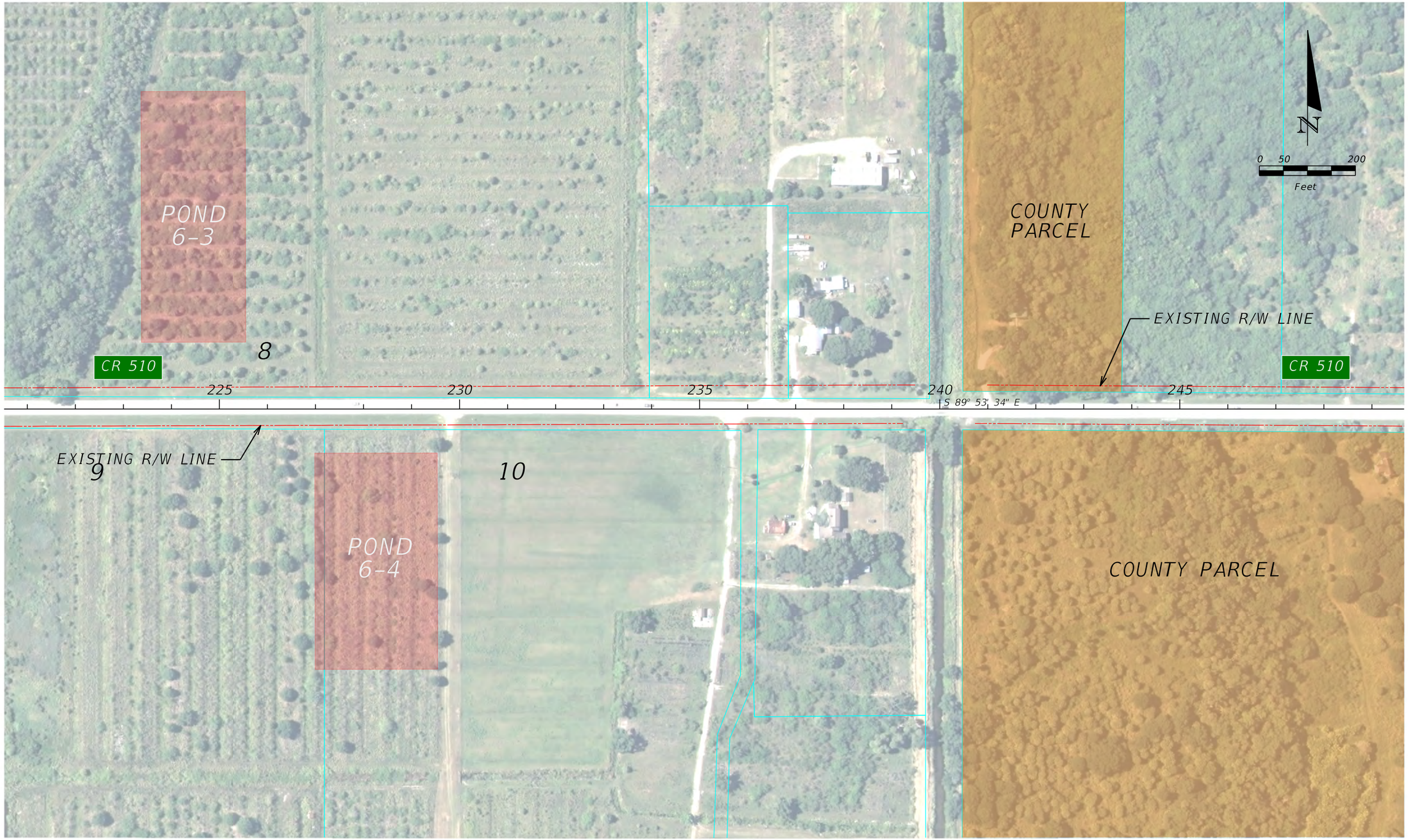
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 48



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 50

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

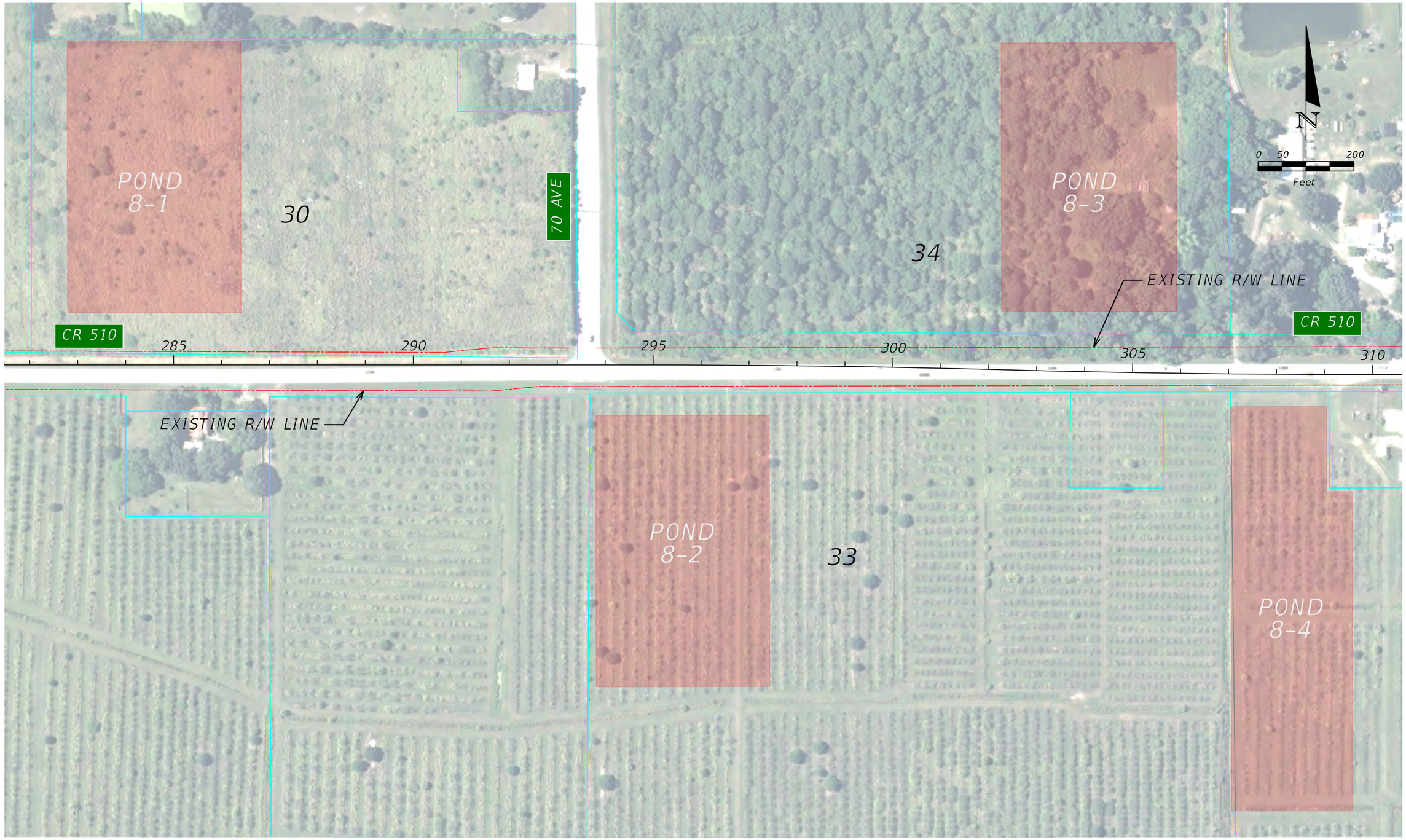
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 51



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

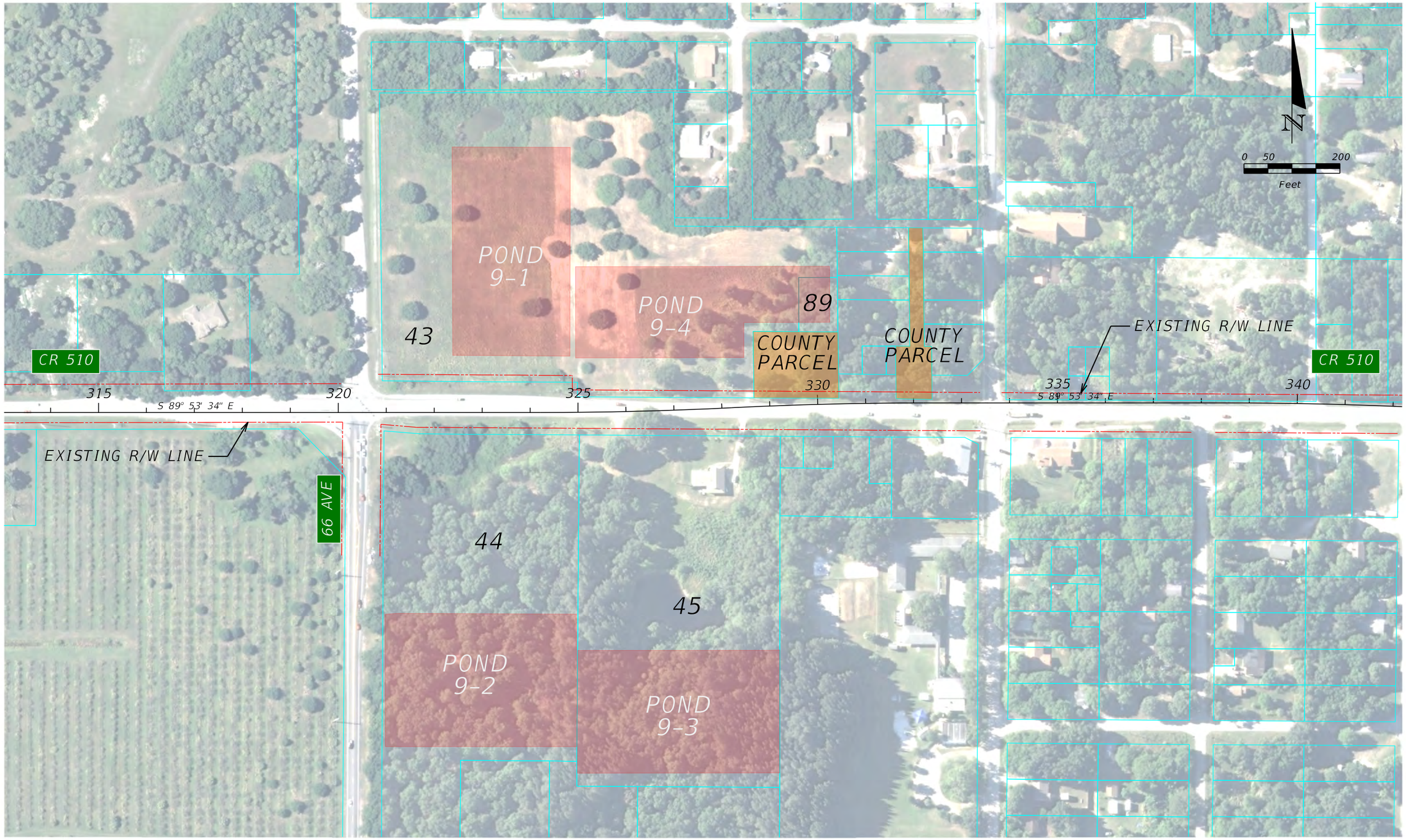
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 53

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

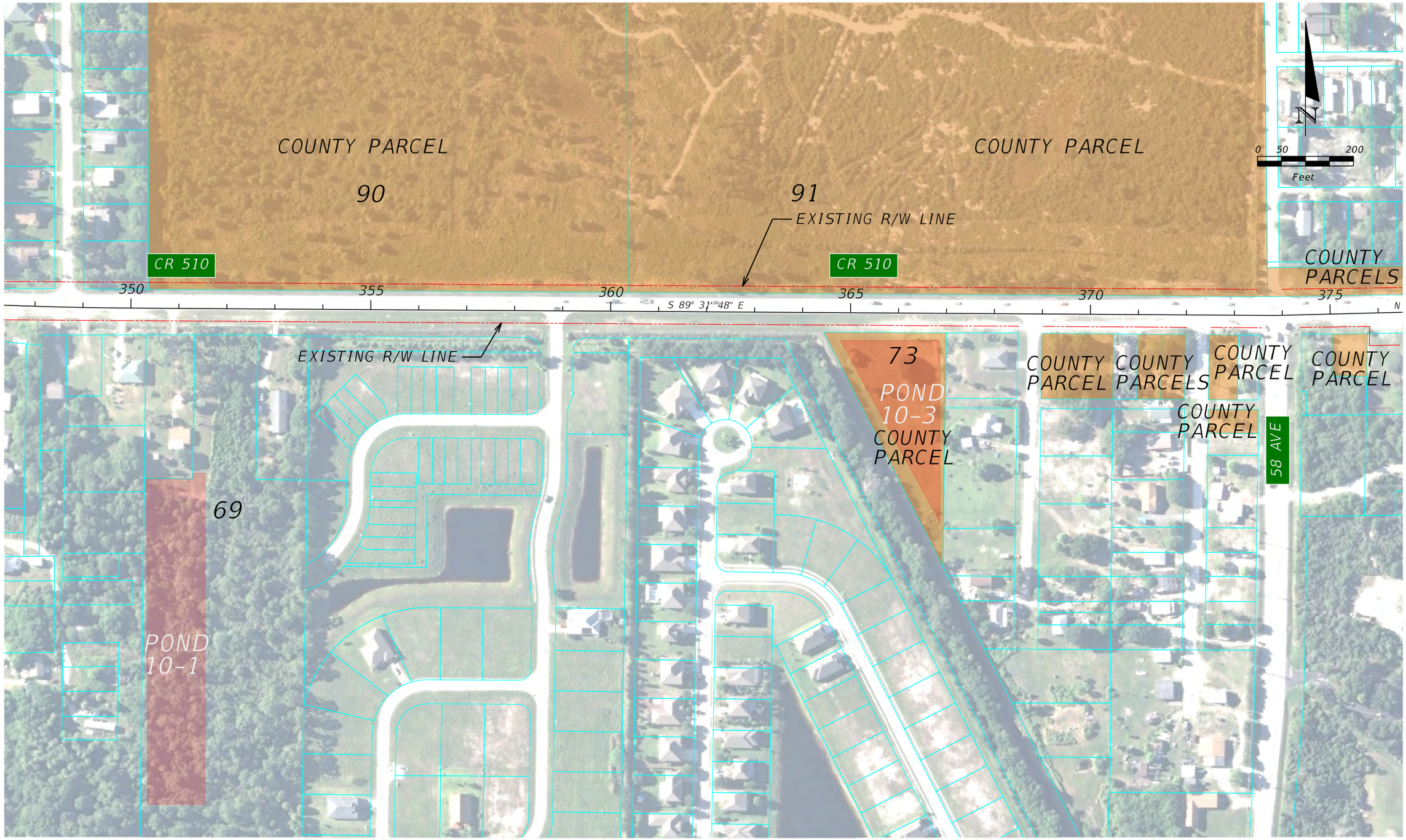
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 54



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 55

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

APPENDIX F – ROUNDABOUT SCREENING ANALYSIS

Roundabout Screening Analysis
for
CR 510 PD&E Study

From CR 512 to 58 Avenue

FM: 405606-2-22-02

November 2017

Table of Contents

List of Tables: 3
List of Appendices: 3
Introduction 4
Background 4
Analysis Procedures 4
Results 5
Conclusions 6

List of Tables:

Table 1 – Roundabout Screening Summary.....5
Table 2 – 66th Avenue Roundabout Sidra Analysis Summary 6

List of Appendices:

Appendix A – Roundabout Screening
Appendix B – Sidra Analysis

Introduction

The Florida Department of Transportation (FDOT) has commissioned a Project Development and Environmental (PD&E) Study for County Road 510 (CR-510) from County Road 512 to 58th Avenue in Indian River County, in the vicinity of the town of Wabasso, Florida. The Plans Preparation Manual (PPM), Volume 1, Section 2.13, Intersections, mandates "Evaluate a roundabout alternative on new construction and reconstruction projects." Eight intersections along the study corridor were analyzed for the potential installation of roundabouts in lieu of traditional (signalized) intersections. The eight traditional locations that intersect CR-510 along the study corridor include; CR-512, Mako Way, Hammerhead Way, 87th Street, Treasure Coast Elementary, Powerline Road, 66th Avenue, and 58th Avenue.

Background

CR-510 is classified as an Urban Principal Arterial, although the majority of the land use surrounding the corridor is rural in nature. The proposed typical section and existing functional classification are characteristic of an Urban/Suburban arterial roadway; employing curb & gutter, closed drainage, and seven foot buffered bicycle lanes. Three of the intersections have four approaches: CR-512, 66th Avenue, and 58th Avenue; the remaining five intersections have three approaches: Mako Way, Hammerhead Way, 87th Street, Treasure Coast Elementary, and Powerline Road.

The primary benefits resulting from the installation of roundabouts are safety improvements, reduction in delay, speed reduction on the approach to congested areas, and community enhancement (although they are not intended to be constructed solely for this purpose). Another benefit that results from the installation of roundabouts is improved access management. The ability to easily maneuver U-Turns at a roundabout provides access to properties on the opposite side of a restrictive median, thereby reducing the number of median openings that might otherwise be needed.

There is an approximate 1-mile segment of CR-510 between 66th Avenue and 58th Avenue with medium density residential development that generates significant internal trips. Historically, these internal trips have been made by driving in two directions along the southern shoulder. Field reviews have verified pronounced rutting from these trips. With the proposed widening of CR-510, this undesirable vehicle path will no longer be an option; further, due to the close proximity of access points, it is not practical to provide median openings for every cross street.

Analysis Procedures

CR-510 is to be widened from a two-lane undivided rural section to a four-lane divided urban/suburban arterial cross section. The eight intersections along the corridor were modeled under signal control with exclusive left- and right-turn lanes, and compared to two-lane approaches on the major street (CR-510), one-lane approaches on side streets, and two-lane roundabouts. A roundabout evaluation was conducted in accordance with the Florida Intersection Design Guide to determine if a roundabout is the appropriate control measure for each proposed intersection.

The recommended three-step procedure was performed including 1) a physical examination of geometric, gross traffic, and historical characteristics; 2) a benefit/cost analysis; and 3) a detailed geometric and operational analysis. Trafficware's Synchro 10 software and application of the Highway Capacity Manual 6th Edition (HCM 6th Ed.) methodology was used to provide the detailed traffic analyses of the roundabout option for comparison purposes with the signalized scenarios from the Design Traffic Technical

Memorandum (DTTM). Two specific years were modeled to correspond to the roadway design parameters; 2020 (opening year), and 2040 (design year). Roundabout screening worksheets and Synchro output reports are provided in **Appendix A**.

Results

Of the eight intersections under consideration, two passed the initial Step 1 Screening analyses. The two intersections at 87th Street and 66th Avenue were advanced to Step 2, and following favorable results, consequently advanced to Step 3 analyses. The remaining six intersections, CR-512, Mako Way, Hammerhead Way, Treasure Coast Elementary, Powerline Road, and 58th Avenue all failed one, two or three of the Step 1 warranting conditions, and were therefore not advanced for further screening. **Table 1** below shows the results of the Roundabout Screening Analyses, and summarizes Delay and Level of Service for the roundabout option contrasted to a traditional signalized option.

Table 1 – Roundabout Screening Summary

Intersection	Step 1	Step 2	Step 3							
			HCM 6th Edition Delay (LOS)							
			2020 AM		2020 PM		2040 AM		2040 PM	
	Pass	B/C	R'about	Signal	R'about	Signal	R'about	Signal	R'about	Signal
CR-512										
Mako Way										
Hammerhead Way										
87th Street	✓	3.6	7.6 (A)	16.0 (B)	6.2 (A)	11.4 (B)	34.0 (D)	22.8 (C)	8.6 (A)	14.7 (B)
87th Street w/RT By-Pass	✓	4.7	-	-	-	-	10.4 (B)	-	8.4 (A)	-
Treasure Coast Elementary										
Powerline Road										
66th Avenue	✓	4.5	12.8 (B)	29.4 (C)	11.4 (B)	29.3 (C)	89.3 (F)	38.4 (D)	51.8 (F)	38.9 (D)
66th Avenue w/RT By-pass	✓	12.4	-	-	-	-	21.2 (C)	-	24.5 (C)	-
58th Avenue										

As can be seen from the summary in **Table 1**, the roundabout option is superior in safety and construction based on the benefit/cost ratio, as well as operations based on delay and Level of Service, with the exceptions during the 2040 AM Peak condition and 66th Avenue during the 2040 PM Peak condition. The 87th Street analysis also exhibited the lowest benefit/cost ratio of the Step 2 analyses, although it is still very favorable when the right-turn by-pass lane is included.

All comparative analyses were conducted using the same proposed geometry for 2020 in the 2040 models, i.e., the future year volumes were applied to the same geometry as established for 2020. Based on the year 2040 results, right-turn by-pass lanes were added to the roundabouts, eastbound by-pass at 87th Street, and eastbound and westbound by-passes at 66 Avenue. It was found that the addition of these right-turn by-pass lanes would provide an acceptable LOS.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods. In summary, only the provision of a roundabout at the 66th Avenue intersection was found to be a viable option and is therefore recommended.

Since the 66th Avenue roundabout is the proposed traffic control for the intersection, the roundabout with right-turn by-passes was also analyzed using Sidra Intersection 7.0 software for a more in-depth roundabout analysis. **Table 2** summarizes the results using the Sidra Standard Model. Detailed reports are provided in **Appendix B**.

Table 2 – 66th Avenue Roundabout Sidra Analysis Summary

Int. Leg	Entry Lane	2020 AM		2020 PM		2040 AM		2040 PM	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
South (66 Ave)	Lane 1	8.8	A	7.8	A	22.6	C	14.4	C
	Lane 2	7.9	A	8.0	A	16.4	C	14.9	B
	Approach	8.3	A	7.8	A	19.4	C	14.6	B
East (CR 510)	Lane 1	4.4	A	8.3	A	6.7	A	18.4	C
	Lane 2	3.7	A	6.7	A	5.5	A	14.3	B
	Lane 3	2.8	A	3.9	A	3.1	A	4.6	A
	Approach	3.8	A	6.6	A	5.6	A	13.7	B
North (66 Ave)	Lane 1	8.9	A	11.2	B	17.4	C	26.8	D
	Lane 2	8.9	B	10.2	B	16.5	C	22.4	C
	Approach	8.9	B	10.6	B	17.0	C	24.4	C
West (CR 510)	Lane 1	7.7	A	4.6	A	13.9	B	5.6	A
	Lane 2	6.1	A	3.6	A	10.9	B	4.6	A
	Lane 3	5.7	A	3.5	A	9.7	A	4.4	A
	Approach	6.4	A	3.7	A	11.2	B	4.8	A
Intersection		**7.1**	**A**	**7.1**	**A**	**12.7**	**B**	**13.2**	**B**

Conclusions

The results of this analysis indicate construction of a roundabout at the intersections of CR-510 and 66th Avenue is justified and results in significant benefits from a safety, geometric and operational standpoint. Construction of right-turn by-pass lanes by design year 2040 for a roundabout scenario on CR-510 at 66th Avenue will be much less costly than alternate signalization or grade-separated options. Access management concerns will also be mitigated through the construction of roundabouts, and those residents closest to the corridor will appreciate the traffic calming and aesthetic effects as well.

Appendix A provides the results of the roundabout screening analysis. The exhibits contained therein must be approved by either the District Design Engineer or the District Traffic Operations Engineer.

Appendix A – Roundabout Screening

Roundabout Screening
CR-510 @ CR-512

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*3/31/2017*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-512*

EXISTING CONTROL/PROJECT CLASSIFICATION					
Control:	■ Signal	☐ All Way Stop	☐ 2 Way Stop	☐ Yield	☐ None
Classification:	■ Design.	☐ Traffic Operations	☐ Other		

SCREENING CRITERIA		
1. Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")*	☐ yes	■ no
2. Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")*	☐ yes	■ no
3. Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")*	☐ yes	■ no
4. Is the intersection located within a coordinated signal network? *(comment below if "yes")*	☐ yes	■ no
5. Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")*	☐ yes	■ no
6. Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")*	■ yes	☐ no

Proposed roundabout impacts the northeast property - Ansin Tract - a Florida Forever funded Section 4(f) property.

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation	☐ yes	■ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

Roundabout Screening
CR-510 @ Mako Way

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*09/22/2016*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*Mako Way*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ■ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1. Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")* ☐ yes ■ no

2. Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")* ■ yes ☐ no

97.7% of AADT on major roadway during AM Peak. 95.9% of AADT on major road during PM Peak.

3. Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")* ■ yes ☐ no

Sebastian River High School.

4. Is the intersection located within a coordinated signal network? *(comment below if "yes")* ☐ yes ■ no

5. Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")* ■ yes ☐ no

Hammerhead Boulevard within 350 feet.

6. Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")* ☐ yes ■ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ☐ yes ■ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

Roundabout Screening
CR-510 @ Hammerhead Way

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*09/22/2016*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*Hammerhead Way*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ■ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1. Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")* ☐ yes ■ no

2. Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")* ■ yes ☐ no

91.6% of AADT on major road during PM Peak.

3. Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")* ■ yes ☐ no

Sebastian River High School - Bus shelter across the major road

4. Is the intersection located within a coordinated signal network? *(comment below if "yes")* ☐ yes ■ no

5. Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")* ■ yes ☐ no

Mako Way within 350 feet.

6. Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")* ☐ yes ■ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ☐ yes ■ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

Roundabout Screening
CR-510 @ 87th Street

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*09/22/2016*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ■ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1.	Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")*	☐ yes	■ no
2.	Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")*	☐ yes	■ no
3.	Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")*	☐ yes	■ no
4.	Is the intersection located within a coordinated signal network? *(comment below if "yes")*	☐ yes	■ no
5.	Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")*	☐ yes	■ no
6.	Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")*	☐ yes	■ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ■ yes ☐ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 2 - b/c EVALUATION

Prepared by:	*MEI*	**Date Prepared:**	***11/10/2017***
Financial Project ID:	*405606-2-22-02*	**Project Name:**	***CR-510 PD&E Study***
FAP No.:	*N/A*	**State Road:**	***Off-System (CR-510)***
County:	*Indian River*	**Intersecting Rd:**	***87th Street***

ANNUAL COSTS		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 68,124	$ 212,581
Delay Cost	$ 74,887	$ 83,998
O & M Cost	$ 2,750	$ 5,517

Initial Capital Cost		
Preliminary Engineering	$ 85,000	$ 60,000
Right-of-way and Utilities	$ 200,000	$ 200,000
Construction	$ 1,000,000	$ 340,000

TOTAL DISCOUNTED LIFE CYCLE COSTS (OPENING YEAR)		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 1,013,511	$ 3,162,668
Delay Cost	$ 1,572,629	$ 1,763,956
O & M Cost	$ 40,913	$ 82,074
Initial Capital Cost	$ 1,285,000	$ 600,000
Total Life Cycle Costs	$ 3,912,054	$ 5,608,698

LIFECYCLE BENEFIT/COST RATIO	
Safety Benefit of a Roundabout	$ 2,149,156
Delay Reduction Benefit of a Roundabout	$ 191,327
Total Benefit	$ 2,340,483
Added O & M Costs of a Rondabout	$ (41,161)
Added Capital Costs of a Roundabout	$ 685,000
Total Cost	$ 643,839
Life Cycle Benefit/Cost Ratio	**3.6**

Advance to Level 3 Geometric and Operational Analysis: ☑ YES ☐ NO

Approved by: ☐ DDE or ☐ DTOE

Signature:_____ Date:_____

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 87th Street for the purposes of the PD&E Study. 2020 AM Peak Hour.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*87th Street*	*1*	*13.0*	*A*
NB	*CR-510*	*2*	*5.0*	*A*
SB	*CR-510*	*2*	*5.3*	*B*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Approach	EB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	506	458	651
Demand Flow Rate, veh/h	516	467	664
Vehicles Circulating, veh/h	568	208	113
Vehicles Exiting, veh/h	209	876	562
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	13.0	5.0	5.3
Approach LOS	B	A	A

Lane	Left	Left	Right	Left	Right
Designated Moves	LR	LT	TR	LT	TR
Assumed Moves	LR	LT	TR	LT	TR
RT Channelized					
Lane Util	1.000	0.469	0.531	0.470	0.530
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	516	219	248	312	352
Cap Entry Lane, veh/h	876	1115	1190	1217	1290
Entry HV Adj Factor	0.981	0.983	0.979	0.980	0.980
Flow Entry, veh/h	506	215	243	306	345
Cap Entry, veh/h	859	1096	1165	1193	1264
V/C Ratio	0.589	0.196	0.208	0.256	0.273
Control Delay, s/veh	13.0	5.1	4.9	5.3	5.3
LOS	B	A	A	A	A
95th %tile Queue, veh	4	1	1	1	1

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 87th Street for the purposes of the PD&E Study. 2020 PM Peak Hour.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*87th Street*	*1*	*5.9*	*A*
NB	*CR-510*	*2*	*6.6*	*A*
SB	*CR-510*	*2*	*5.7*	*B*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	6.2
Intersection LOS	A

Approach	EB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	255	816	590
Demand Flow Rate, veh/h	261	832	602
Vehicles Circulating, veh/h	361	182	225
Vehicles Exiting, veh/h	466	440	789
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	5.9	6.6	5.7
Approach LOS	A	A	A

Lane	Left	Left	Right	Left	Right
Designated Moves	LR	LT	TR	LT	TR
Assumed Moves	LR	LT	TR	LT	TR
RT Channelized					
Lane Util	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	261	391	441	283	319
Cap Entry Lane, veh/h	1045	1142	1217	1097	1173
Entry HV Adj Factor	0.977	0.981	0.981	0.980	0.980
Flow Entry, veh/h	255	384	433	277	313
Cap Entry, veh/h	1021	1120	1193	1075	1150
V/C Ratio	0.250	0.342	0.363	0.258	0.272
Control Delay, s/veh	5.9	6.6	6.5	5.8	5.7
LOS	A	A	A	A	A
95th %tile Queue, veh	1	2	2	1	1

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 87th Street for the purposes of the PD&E Study. 2040 AM Peak Hour.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*87th Street*	*1*	*98.6*	*F*
NB	*CR-510*	*2*	*6.8*	*A*
SB	*CR-510*	*2*	*7.9*	*A*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	34.0
Intersection LOS	D

Approach	EB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	709	623	1106
Demand Flow Rate, veh/h	723	636	1128
Vehicles Circulating, veh/h	930	354	147
Vehicles Exiting, veh/h	345	1299	843
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	98.6	6.8	7.9
Approach LOS	F	A	A

Lane	Left	Left	Right	Left	Right
Designated Moves	LR	LT	TR	LT	TR
Assumed Moves	LR	LT	TR	LT	TR
RT Channelized					
Lane Util	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	723	299	337	530	598
Cap Entry Lane, veh/h	644	975	1051	1179	1253
Entry HV Adj Factor	0.981	0.980	0.980	0.981	0.980
Flow Entry, veh/h	709	293	330	520	586
Cap Entry, veh/h	632	955	1030	1156	1228
V/C Ratio	1.122	0.307	0.321	0.449	0.477
Control Delay, s/veh	98.6	7.0	6.7	7.9	8.0
LOS	F	A	A	A	A
95th %tile Queue, veh	22	1	1	2	3

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 87th Street for the purposes of the PD&E Study. 2040 PM Peak Hour.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*87th Street*	*1*	*8.1*	*A*
NB	*CR-510*	*2*	*9.2*	*A*
SB	*CR-510*	*2*	*8.1*	*A*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Approach	EB	NB	SB
Entry Lanes	1	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	337	1142	811
Demand Flow Rate, veh/h	343	1165	827
Vehicles Circulating, veh/h	504	225	352
Vehicles Exiting, veh/h	675	622	1038
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.1	9.2	8.1
Approach LOS	A	A	A

Lane	Left	Left	Right	Left	Right
Designated Moves	LR	LT	TR	LT	TR
Assumed Moves	LR	LT	TR	LT	TR
RT Channelized					
Lane Util	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	343	548	617	389	438
Cap Entry Lane, veh/h	925	1097	1173	976	1053
Entry HV Adj Factor	0.983	0.980	0.981	0.980	0.981
Flow Entry, veh/h	337	537	605	381	430
Cap Entry, veh/h	909	1075	1151	957	1033
V/C Ratio	0.371	0.499	0.526	0.398	0.416
Control Delay, s/veh	8.1	9.1	9.2	8.2	8.0
LOS	A	A	A	A	A
95th %tile Queue, veh	2	3	3	2	2

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 2 - b/c EVALUATION

Prepared by:	*MEI*	**Date Prepared:**	***11/10/2017***
Financial Project ID:	*405606-2-22-02*	**Project Name:**	***CR-510 PD&E Study***
FAP No.:	*N/A*	**State Road:**	***Off-System (CR-510)***
County:	*Indian River*	**Intersecting Rd:**	***87th Street By Pass***

ANNUAL COSTS		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 68,124	$ 212,581
Delay Cost	$ 42,080	$ 83,998
O & M Cost	$ 2,750	$ 5,517

Initial Capital Cost		
Preliminary Engineering	$ 85,000	$ 60,000
Right-of-way and Utilities	$ 200,000	$ 200,000
Construction	$ 1,000,000	$ 340,000

TOTAL DISCOUNTED LIFE CYCLE COSTS (OPENING YEAR)		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 1,013,511	$ 3,162,668
Delay Cost	$ 883,687	$ 1,763,956
O & M Cost	$ 40,913	$ 82,074
Initial Capital Cost	$ 1,285,000	$ 600,000
Total Life Cycle Costs	$ 3,223,112	$ 5,608,698

LIFECYCLE BENEFIT/COST RATIO	
Safety Benefit of a Roundabout	$ 2,149,156
Delay Reduction Benefit of a Roundabout	$ 880,269
Total Benefit	$ 3,029,425
Added O & M Costs of a Rondabout	$ (41,161)
Added Capital Costs of a Roundabout	$ 685,000
Total Cost	$ 643,839
Life Cycle Benefit/Cost Ratio	**4.7**

Advance to Level 3 Geometric and Operational Analysis: ☑ YES ☐ NO

Approved by: ☐ DDE or ☐ DTOE

Signature:_____ Date:_____

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 87th Street for the purposes of the PD&E Study. 2040 AM Peak Hour. With By-Pass Lane EB.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*87th Street*	*2*	*17.5*	*C*
NB	*CR-510*	*2*	*6.8*	*A*
SB	*CR-510*	*2*	*7.9*	*A*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	709	623	1106
Demand Flow Rate, veh/h	723	636	1128
Vehicles Circulating, veh/h	930	354	147
Vehicles Exiting, veh/h	345	1299	843
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	17.5	6.8	7.9
Approach LOS	C	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	LT	TR
Assumed Moves	L	TR	LT	TR	LT	TR
RT Channelized						
Lane Util	0.490	0.510	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	354	369	299	337	530	598
Cap Entry Lane, veh/h	574	644	975	1051	1179	1253
Entry HV Adj Factor	0.980	0.981	0.980	0.980	0.981	0.980
Flow Entry, veh/h	347	362	293	330	520	586
Cap Entry, veh/h	562	632	955	1030	1156	1228
V/C Ratio	0.617	0.573	0.307	0.321	0.449	0.477
Control Delay, s/veh	19.2	15.9	7.0	6.7	7.9	8.0
LOS	C	C	A	A	A	A
95th %tile Queue, veh	4	4	1	1	2	3

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*87th Street*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 87th Street for the purposes of the PD&E Study. 2040 PM Peak Hour. With By-Pass Lane EB.

Indian River County MPO and Sebastian River High School opposed the installation of a roundabout at the 87th Street intersection. Their main concern is that the close proximity of the roundabout to the school might cause safety and operational problems, especially during the school's arrival and dismissal heavy traffic periods.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*87th Street*	*2*	*6.5*	*A*
NB	*CR-510*	*2*	*9.2*	*A*
SB	*CR-510*	*2*	*8.1*	*A*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Approach	EB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	337	1142	811
Demand Flow Rate, veh/h	343	1165	827
Vehicles Circulating, veh/h	504	225	352
Vehicles Exiting, veh/h	675	622	1038
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	6.5	9.2	8.1
Approach LOS	A	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	LT	TR
Assumed Moves	L	TR	LT	TR	LT	TR
RT Channelized						
Lane Util	0.656	0.344	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	225	118	548	617	389	438
Cap Entry Lane, veh/h	849	925	1097	1173	976	1053
Entry HV Adj Factor	0.982	0.983	0.980	0.981	0.980	0.981
Flow Entry, veh/h	221	116	537	605	381	430
Cap Entry, veh/h	834	910	1075	1151	957	1033
V/C Ratio	0.265	0.128	0.499	0.526	0.398	0.416
Control Delay, s/veh	7.2	5.2	9.1	9.2	8.2	8.0
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	3	3	2	2

Roundabout Screening
CR-510 @ Treasure Coast Elementary

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*09/22/2016*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*Treasure Coast Elementary*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ■ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1. Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")* ☐ yes ■ no

2. Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")* ■ yes ☐ no

92.9% of AADT on major road during PM Peak.

3. Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")* ■ yes ☐ no

Treasure Coast Elementary School.

4. Is the intersection located within a coordinated signal network? *(comment below if "yes")* ☐ yes ■ no

5. Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")* ☐ yes ■ no

6. Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")* ☐ yes ■ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ☐ yes ■ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

Roundabout Screening
CR-510 @ Powerline Road

FLORIDA DEPARTMENT OF TRANSPORTATION
STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*09/22/2016*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*Powerline Road*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ☐ Signal ☐ All Way Stop ■ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1.	Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")*	☐ yes	■ no
2.	Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")*	■ yes	☐ no
	93.9% of AADT on major road during PM Peak.		
3.	Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")*	☐ yes	■ no
4.	Is the intersection located within a coordinated signal network? *(comment below if "yes")*	☐ yes	■ no
5.	Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")*	☐ yes	■ no
6.	Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")*	☐ yes	■ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ☐ yes ■ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

Roundabout Screening
CR-510 @ 66th Avenue

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*09/22/2016*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-615/66th Avenue/CR-505/Schumann*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ■ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1.	Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")*	☐ yes	■ no
2.	Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")*	☐ yes	■ no
3.	Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")*	☐ yes	■ no
4.	Is the intersection located within a coordinated signal network? *(comment below if "yes")*	☐ yes	■ no
5.	Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")*	☐ yes	■ no
6.	Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")*	☐ yes	■ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ■ yes ☐ no

Approved by: ☐ DDE or ☐ DTOE

Signature: _____ Date: _____

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 2 - b/c EVALUATION

Prepared by:	*MEI*	**Date Prepared:**	***11/10/2017***
Financial Project ID:	*405606-2-22-02*	**Project Name:**	***CR-510 PD&E Study***
FAP No.:	*N/A*	**State Road:**	***Off-System (CR-510)***
County:	*Indian River*	**Intersecting Rd:**	***CR 615/66th Avenue***

ANNUAL COSTS		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 120,853	$ 376,517
Delay Cost	$ 329,704	$ 260,483
O & M Cost	$ 2,750	$ 5,517

Initial Capital Cost		
Preliminary Engineering	$ 60,000	$ 60,000
Right-of-way and Utilities	$ 100,000	$ 200,000
Construction	$ 1,000,000	$ 340,000

TOTAL DISCOUNTED LIFE CYCLE COSTS (OPENING YEAR)		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 1,797,982	$ 5,601,616
Delay Cost	$ 6,923,789	$ 5,470,142
O & M Cost	$ 40,913	$ 82,074
Initial Capital Cost	$ 1,160,000	$ 600,000
Total Life Cycle Costs	$ 9,922,684	$ 11,753,832

LIFECYCLE BENEFIT/COST RATIO	
Safety Benefit of a Roundabout	$ 3,803,633
Delay Reduction Benefit of a Roundabout	$ (1,453,647)
Total Benefit	$ 2,349,987
Added O & M Costs of a Rondabout	$ (41,161)
Added Capital Costs of a Roundabout	$ 560,000
Total Cost	$ 518,839
Life Cycle Benefit/Cost Ratio	**4.5**

Advance to Level 3 Geometric and Operational Analysis: ☑ YES ☐ NO

Approved by: ☐ DDE or ☐ DTOE

Signature:_____ Date:_____

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/66th Avenue*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 66th Avenue for the purposes of the PD&E Study. 2020 AM Peak Hour.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*CR-510*	*2*	*19.7*	*C*
WB	*CR-510*	*2*	*5.4*	*A*
NB	*66th Avenue*	*2*	*9.6*	*A*
SB	*66th Avenue*	*2*	*8.4*	*A*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ■ yes ☐ no

_____ and _____

District Traffic Operations Engineer District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	12.8
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	975	308	458	689
Demand Flow Rate, veh/h	995	314	467	703
Vehicles Circulating, veh/h	754	416	776	467
Vehicles Exiting, veh/h	416	827	973	263
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.7	5.4	9.6	8.4
Approach LOS	C	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	0.469	0.531	0.469	0.531
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	468	527	148	166	219	248	330	373
Cap Entry Lane, veh/h	675	748	921	997	661	734	878	955
Entry HV Adj Factor	0.980	0.981	0.977	0.982	0.982	0.978	0.981	0.979
Flow Entry, veh/h	458	517	145	163	215	243	324	365
Cap Entry, veh/h	661	734	899	979	649	718	862	934
V/C Ratio	0.694	0.704	0.161	0.166	0.331	0.338	0.376	0.391
Control Delay, s/veh	20.3	19.2	5.6	5.2	9.9	9.2	8.5	8.3
LOS	C	C	A	A	A	A	A	A
95th %tile Queue, veh	6	6	1	1	1	1	2	2

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/66th Avenue*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 66th Avenue for the purposes of the PD&E Study. 2020 PM Peak Hour.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*CR-510*	*2*	*5.7*	*A*
WB	*CR-510*	*2*	*17.6*	*C*
NB	*66th Avenue*	*2*	*8.0*	*A*
SB	*66th Avenue*	*2*	*11.8*	*B*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ■ yes ☐ no

_____ and _____

District Traffic Operations Engineer District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	416	840	854	312
Demand Flow Rate, veh/h	424	857	871	319
Vehicles Circulating, veh/h	363	813	304	1117
Vehicles Exiting, veh/h	1073	362	483	553
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.7	17.6	8.0	11.8
Approach LOS	A	C	A	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	L	TR	LT	TR
RT Channelized								
Lane Util	0.469	0.531	0.470	0.530	0.519	0.481	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	199	225	403	454	452	419	150	169
Cap Entry Lane, veh/h	967	1043	639	711	1021	1097	483	549
Entry HV Adj Factor	0.983	0.980	0.979	0.980	0.980	0.982	0.978	0.979
Flow Entry, veh/h	196	221	395	445	443	411	147	165
Cap Entry, veh/h	950	1022	626	697	1000	1076	473	538
V/C Ratio	0.206	0.216	0.631	0.638	0.443	0.382	0.310	0.308
Control Delay, s/veh	5.8	5.6	18.2	17.0	8.6	7.3	12.6	11.2
LOS	A	A	C	C	A	A	B	B
95th %tile Queue, veh	1	1	4	5	2	2	1	1

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/66th Avenue*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 66th Avenue for the purposes of the PD&E Study. 2040 AM Peak Hour.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*CR-510*	*2*	*180.6*	*F*
WB	*CR-510*	*2*	*9.1*	*A*
NB	*66th Avenue*	*2*	*28.1*	*D*
SB	*66th Avenue*	*2*	*18.1*	*C*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	89.3
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1613	686	610	773
Demand Flow Rate, veh/h	1645	700	622	788
Vehicles Circulating, veh/h	913	535	1274	889
Vehicles Exiting, veh/h	764	1361	1284	346
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	180.6	9.1	28.1	18.1
Approach LOS	F	A	D	C

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.469	0.531	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	773	872	329	371	292	330	370	418
Cap Entry Lane, veh/h	583	653	825	901	418	481	596	667
Entry HV Adj Factor	0.981	0.981	0.980	0.980	0.981	0.979	0.981	0.980
Flow Entry, veh/h	758	855	322	364	287	323	363	409
Cap Entry, veh/h	572	641	809	883	410	471	585	653
V/C Ratio	1.326	1.334	0.399	0.412	0.698	0.686	0.621	0.627
Control Delay, s/veh	180.4	180.9	9.4	9.0	30.2	26.2	18.8	17.4
LOS	F	F	A	A	D	D	C	C
95th %tile Queue, veh	32	36	2	2	5	5	4	4

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/66th Avenue*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 66th Avenue for the purposes of the PD&E Study. 2040 PM Peak Hour.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*CR-510*	*2*	*8.8*	*A*
WB	*CR-510*	*2*	*113.1*	*F*
NB	*66th Avenue*	*2*	*17.7*	*C*
SB	*66th Avenue*	*2*	*28.7*	*D*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ☐ yes ■ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	51.8
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	745	1277	1115	365
Demand Flow Rate, veh/h	760	1303	1137	372
Vehicles Circulating, veh/h	464	1014	571	1649
Vehicles Exiting, veh/h	1557	694	653	668
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.8	113.1	17.7	28.7
Approach LOS	A	F	C	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	L	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.534	0.466	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	357	403	612	691	607	530	175	197
Cap Entry Lane, veh/h	881	957	531	600	798	874	296	350
Entry HV Adj Factor	0.981	0.980	0.981	0.980	0.980	0.981	0.980	0.982
Flow Entry, veh/h	350	395	600	677	595	520	172	193
Cap Entry, veh/h	864	938	521	588	783	857	290	343
V/C Ratio	0.405	0.421	1.152	1.152	0.760	0.606	0.591	0.564
Control Delay, s/veh	9.0	8.7	115.1	111.3	21.4	13.5	31.8	26.0
LOS	A	A	F	F	C	B	D	D
95th %tile Queue, veh	2	2	21	22	7	4	4	3

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 2 - b/c EVALUATION

Prepared by:	*MEI*	**Date Prepared:**	***11/10/2017***
Financial Project ID:	*405606-2-22-02*	**Project Name:**	***CR-510 PD&E Study***
FAP No.:	*N/A*	**State Road:**	***Off-System (CR-510)***
County:	*Indian River*	**Intersecting Rd:**	***66th Avenue By Pass***

ANNUAL COSTS		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 120,853	$ 376,517
Delay Cost	$ 135,185	$ 260,483
O & M Cost	$ 2,750	$ 5,517

Initial Capital Cost		
Preliminary Engineering	$ 60,000	$ 60,000
Right-of-way and Utilities	$ 100,000	$ 200,000
Construction	$ 1,000,000	$ 340,000

TOTAL DISCOUNTED LIFE CYCLE COSTS (OPENING YEAR)		
	Roundabout	Traffic Signal
Safety Cost (Crashes)	$ 1,797,982	$ 5,601,616
Delay Cost	$ 2,838,882	$ 5,470,142
O & M Cost	$ 40,913	$ 82,074
Initial Capital Cost	$ 1,160,000	$ 600,000
Total Life Cycle Costs	$ 5,837,777	$ 11,753,832

LIFECYCLE BENEFIT/COST RATIO	
Safety Benefit of a Roundabout	$ 3,803,633
Delay Reduction Benefit of a Roundabout	$ 2,631,260
Total Benefit	$ 6,434,894
Added O & M Costs of a Rondabout	$ (41,161)
Added Capital Costs of a Roundabout	$ 560,000
Total Cost	$ 518,839
Life Cycle Benefit/Cost Ratio	**12.4**

Advance to Level 3 Geometric and Operational Analysis: ☑ YES ☐ NO

Approved by: ☐ DDE or ☐ DTOE

Signature:_____ Date:_____

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/66th Avenue*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 66th Avenue for the purposes of the PD&E Study. 2040 AM Peak Hour. With By-Pass Lanes E-W.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*CR-510*	*2*	*26.0*	*D*
WB	*CR-510*	*2*	*7.5*	*A*
NB	*66th Avenue*	*2*	*28.1*	*D*
SB	*66th Avenue*	*2*	*18.1*	*C*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ■ yes ☐ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	21.2
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1613	686	610	773
Demand Flow Rate, veh/h	1645	700	622	788
Vehicles Circulating, veh/h	913	535	1274	889
Vehicles Exiting, veh/h	764	1361	609	236
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	26.0	7.5	28.1	18.1
Approach LOS	D	A	D	C

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Yield			Yield				
Lane Util	0.470	0.530		0.469	0.531		0.469	0.531	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	675	4.645	4.328	110	4.645	4.328	4.645	4.328
Entry Flow, veh/h	456	514	846	277	313	1162	292	330	370	418
Cap Entry Lane, veh/h	583	653	0.980	825	901	0.980	418	481	596	667
Entry HV Adj Factor	0.980	0.981	662	0.981	0.979	108	0.981	0.979	0.981	0.980
Flow Entry, veh/h	447	504	830	272	306	1139	287	323	363	409
Cap Entry, veh/h	571	641	0.798	809	882	0.095	410	471	585	653
V/C Ratio	0.782	0.787	23.1	0.336	0.347	4.0	0.698	0.686	0.621	0.627
Control Delay, s/veh	29.2	27.1	C	8.4	8.0	A	30.2	26.2	18.8	17.4
LOS	D	D	8	A	A	0	D	D	C	C
95th %tile Queue, veh	7	8		1	2		5	5	4	4

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 3 ROUNDABOUT SUMMARY REPORT

Prepared by:	*MEI*	**Date Prepared:**	*11/10/2017*
Financial Project No:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/66th Avenue*

PURPOSE AND NEED

Evaluation of a roundabout at CR-510 and 66th Avenue for the purposes of the PD&E Study. 2040 PM Peak Hour. With By-Pass Lanes E-W.

OPERATIONAL ANALYSIS RESULTS

Direction	Street Name	No. Entry Lanes	Control Delay (s)	LOS
EB	*CR-510*	*2*	*4.686.4*	*A*
WB	*CR-510*	*2*	*39.8*	*E*
NB	*66th Avenue*	*2*	*17.7*	*C*
SB	*66th Avenue*	*2*	*28.7*	*D*

GEOMETRIC PERFORMANCE CHECK RESULTS

Swept Path of Design Vehicle Accommodated	■ yes	☐ no
Intersection Sight Distance Satisfied	■ yes	☐ no
Fastest Path Operating Speed between 20 and 25 mph	■ yes	☐ no

Advance Roundabout to Final Design ■ yes ☐ no

_____ and _____

District Traffic Operations Engineer — District Design Engineer

Date: _____ Date _____

Intersection	
Intersection Delay, s/veh	24.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	745	1277	1115	365
Demand Flow Rate, veh/h	760	1303	1137	372
Vehicles Circulating, veh/h	464	1014	571	1649
Vehicles Exiting, veh/h	1557	694	342	407
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.4	39.8	17.7	28.7
Approach LOS	A	E	C	D

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	L	TR	LT	TR
RT Channelized			Yield			Yield				
Lane Util	0.470	0.530		0.470	0.530		0.534	0.466	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	311	4.645	4.328	261	4.645	4.328	4.645	4.328
Entry Flow, veh/h	211	238	1062	490	552	1005	607	530	175	197
Cap Entry Lane, veh/h	881	957	0.980	531	600	0.980	798	874	296	350
Entry HV Adj Factor	0.980	0.980	305	0.980	0.981	256	0.980	0.981	0.980	0.982
Flow Entry, veh/h	207	233	1041	480	541	985	595	520	172	193
Cap Entry, veh/h	863	938	0.293	520	588	0.260	783	857	290	343
V/C Ratio	0.240	0.249	6.3	0.923	0.920	6.2	0.760	0.606	0.591	0.564
Control Delay, s/veh	6.7	6.3	A	50.5	46.3	A	21.4	13.5	31.8	26.0
LOS	A	A	1	F	E	1	C	B	D	D
95th %tile Queue, veh	1	1		11	12		7	4	4	3

Roundabout Screening
CR-510 @ 58th Avenue

FLORIDA DEPARTMENT OF TRANSPORTATION

STEP 1 - ROUNDABOUT SCREENING

Prepared by:	*FRA*	**Date Prepared:**	*11/10/2017*
Financial Project ID:	*405606-2-22-02*	**Project Name:**	*CR-510 PD&E Study*
FAP No.:	*N/A*	**State Road:**	*Off-System (CR-510)*
County:	*Indian River*	**Intersecting Road:**	*CR-505A/58th Avenue*

EXISTING CONTROL/PROJECT CLASSIFICATION

Control: ■ Signal ☐ All Way Stop ☐ 2 Way Stop ☐ Yield ☐ None

Classification: ■ Design. ☐ Traffic Operations ☐ Other

SCREENING CRITERIA

1.	Does the intersection have physical or geometric constraints that would limit visibility or complicate construction? *(comment below if "yes")*	☐ yes	■ no
2.	Does the major roadway AADT exceed 90% of the total intersection AADT? *(comment below if "yes")*	☐ yes	■ no
3.	Does the intersection have pedestrians with special needs that would have difficulty crossing the road? *(comment below if "yes")*	☐ yes	■ no
4.	Is the intersection located within a coordinated signal network? *(comment below if "yes")*	☐ yes	■ no
5.	Is there downstream traffic control or conditions that could cause queues to back up into the intersection? *(comment below if "yes")*	☐ yes	■ no
6.	Would the installation of a roundabout create impacts to historical, 4(f), or environmentally sensitive sites? Would the relocation of residences or businesses be required? *(comment below if "yes")*	■ yes	☐ no

Step 2 evaluation is required if no is checked for all criteria. Level 2 is optional if yes is checked for one or more of the criteria.

Advance Roundabout Alternative to step 2 Roundabout b/c Evaluation ☐ yes ■ no

Approved by: ☐ DDE or ☐ DTOE

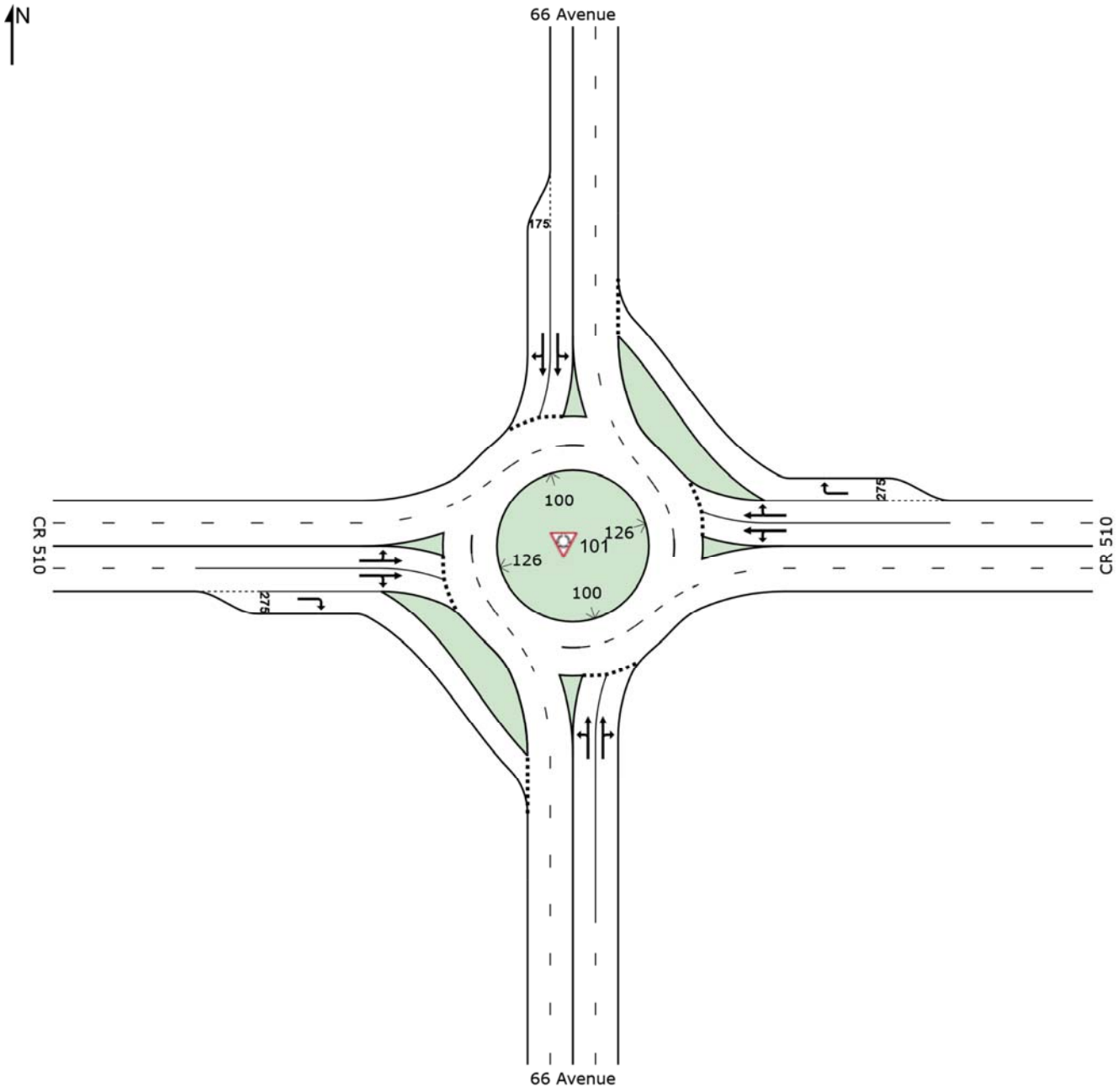
Signature: _____ Date: _____

Appendix B – Sidra Analysis

SITE LAYOUT

Site: 101 [2020 AM]

CR 510 at 66 Avenue
Roundabout



SIDRA INTERSECTION 7.0 | Copyright © 2000-2017 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: METRIC ENGINEERING, INC. | Created: Tuesday, November 14, 2017 7:24:42 PM
Project: N:\JOB\PLANNING\1.2293 CR 510 PD&E\roundabout screening\Roundabout Screening Report (Nov2017)\Sidra\CR510at66Ave Analysis.sip7

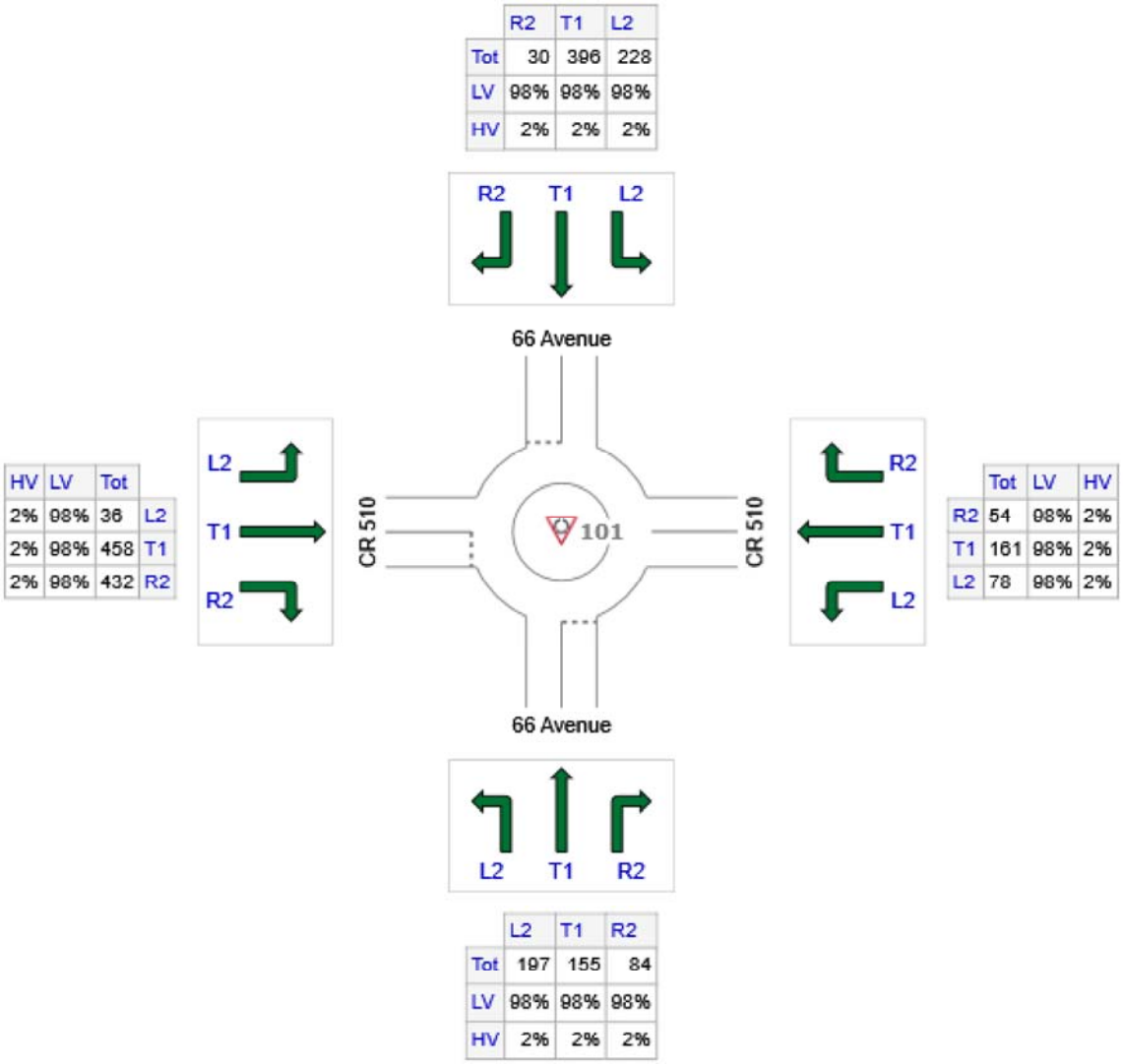
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [2020 AM]

CR 510 at 66 Avenue
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 66 Avenue	436	427	9
E: CR 510	293	287	6
N: 66 Avenue	654	641	13
W: CR 510	926	907	19
Total	2309	2263	46

LANE SUMMARY

Site: 101 [2020 AM]

CR 510 at 66 Avenue
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 66 Avenue													
Lane 1	222	2.0	717	0.309	100	8.8	LOS A	1.5	38.5	Full	1600	0.0	0.0
Lane 2[d]	252	2.0	817	0.309	100	7.9	LOS A	1.6	39.8	Full	1600	0.0	0.0
Approach	474	2.0		0.309		8.3	LOS A	1.6	39.8				
East: CR 510													
Lane 1	116	2.0	1051	0.110	100	4.4	LOS A	0.5	13.1	Full	1600	0.0	0.0
Lane 2[d]	144	2.0	1302	0.110	100	3.7	LOS A	0.5	13.7	Full	1600	0.0	0.0
Lane 3	59	2.0	1458	0.040	36[5]	2.8	LOS A	0.2	4.9	Short	275	0.0	NA
Approach	318	2.0		0.110		3.8	LOS A	0.5	13.7				
North: 66 Avenue													
Lane 1	355	2.0	875	0.406	100	8.9	LOS A	2.2	54.7	Full	1600	0.0	0.0
Lane 2[d]	356	2.0	875	0.406	100	8.9	LOS A	2.2	54.7	Short	175	0.0	NA
Approach	711	2.0		0.406		8.9	LOS A	2.2	54.7				
West: CR 510													
Lane 1	265	2.0	854	0.310	100	7.7	LOS A	1.6	39.9	Full	1600	0.0	0.0
Lane 2[d]	353	2.0	1136	0.310	100	6.1	LOS A	1.7	43.3	Full	1600	0.0	0.0
Lane 3	389	2.0	1254	0.310	100	5.7	LOS A	1.6	40.8	Short	275	0.0	NA
Approach	1007	2.0		0.310		6.4	LOS A	1.7	43.3				
Intersection	2510	2.0		0.406		7.1	LOS A	2.2	54.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

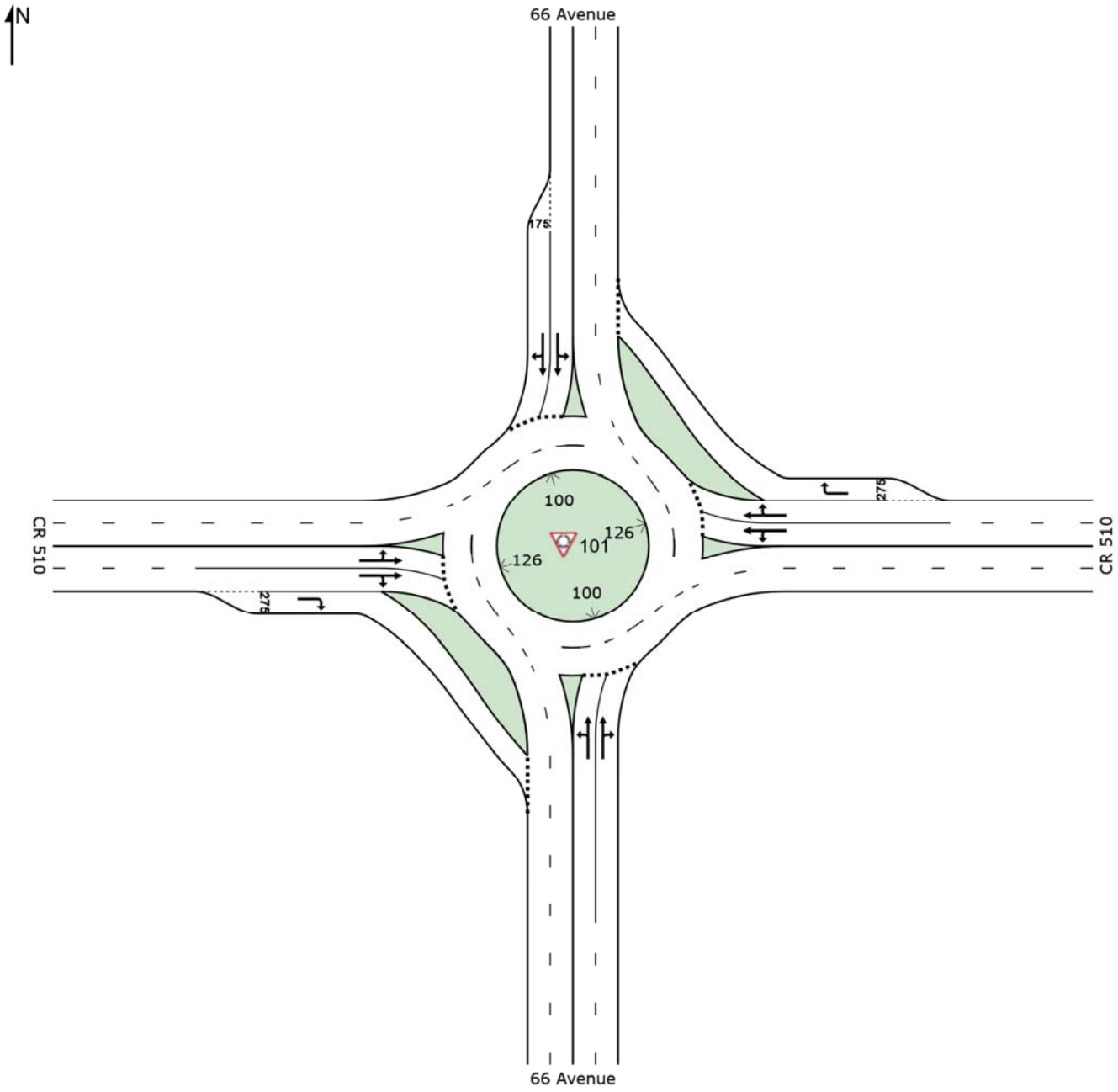
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

SIDRA INTERSECTION 7.0 | Copyright © 2000-2017 Akcelik and Associates Pty Ltd | sidrasolutions.com

SITE LAYOUT

Site: 101 [2020 PM]

CR 510 at 66 Avenue
Roundabout



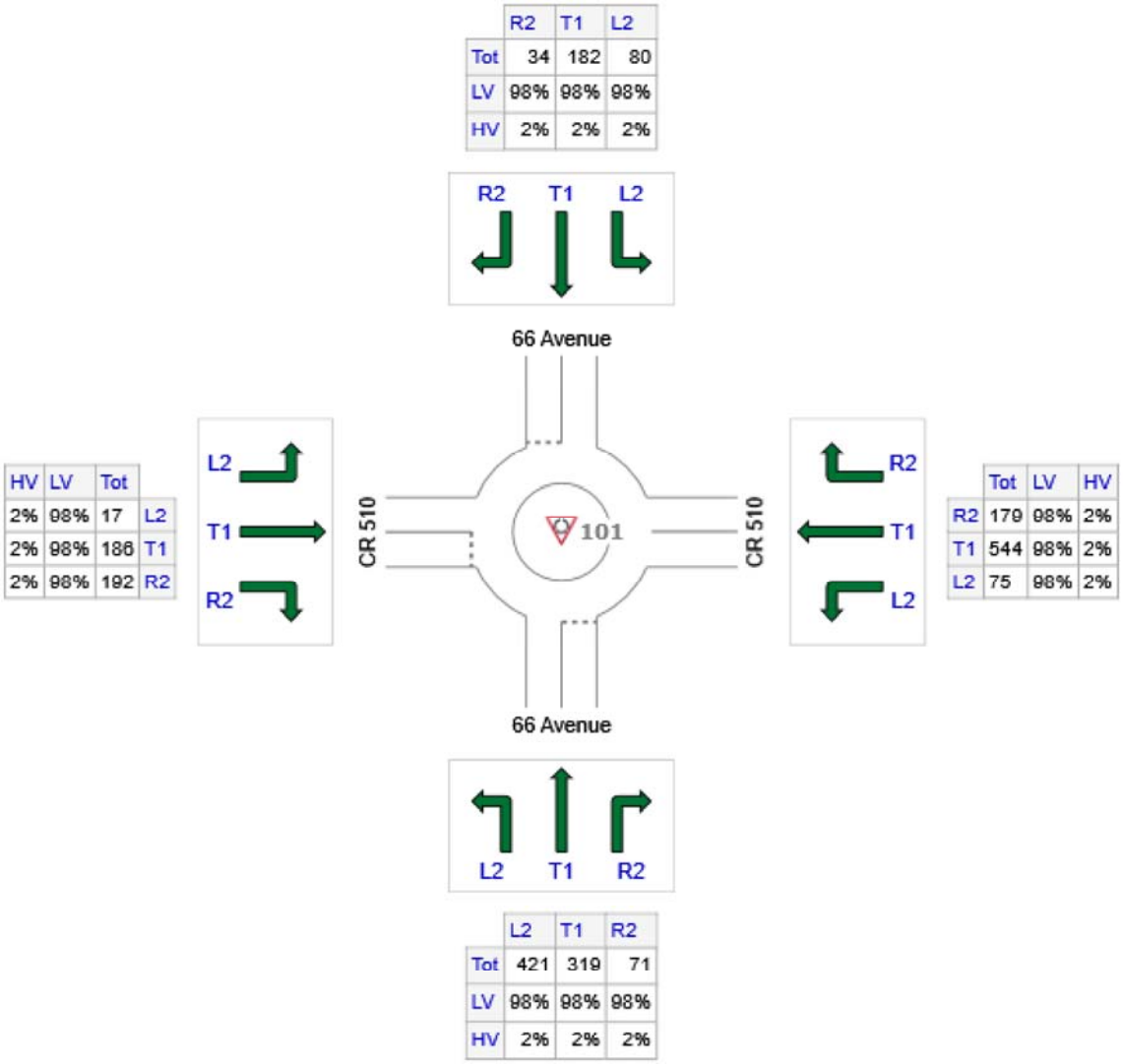
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [2020 PM]

CR 510 at 66 Avenue
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 66 Avenue	811	795	16
E: CR 510	798	782	16
N: 66 Avenue	296	290	6
W: CR 510	395	387	8
Total	2300	2254	46

LANE SUMMARY

Site: 101 [2020 PM]

CR 510 at 66 Avenue
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 66 Avenue													
Lane 1[d]	458	2.0	1092	0.419	100	7.8	LOS A	2.4	61.2	Full	1600	0.0	0.0
Lane 2	424	2.0	1032	0.411	98[5]	8.0	LOS A	2.3	58.9	Full	1600	0.0	0.0
Approach	882	2.0		0.419		7.8	LOS A	2.4	61.2				
East: CR 510													
Lane 1	287	2.0	830	0.346	100	8.3	LOS A	1.8	44.8	Full	1600	0.0	0.0
Lane 2[d]	386	2.0	1115	0.346	100	6.7	LOS A	1.9	48.8	Full	1600	0.0	0.0
Lane 3	195	2.0	1329	0.146	42[5]	3.9	LOS A	0.8	20.1	Short	275	0.0	NA
Approach	867	2.0		0.346		6.6	LOS A	1.9	48.8				
North: 66 Avenue													
Lane 1	152	2.0	523	0.292	100	11.2	LOS B	1.4	35.0	Full	1600	0.0	0.0
Lane 2[d]	169	2.0	580	0.292	100	10.2	LOS B	1.4	36.0	Short	175	0.0	NA
Approach	322	2.0		0.292		10.6	LOS B	1.4	36.0				
West: CR 510													
Lane 1	123	2.0	1097	0.112	100	4.3	LOS A	0.5	13.4	Full	1600	0.0	0.0
Lane 2[d]	151	2.0	1345	0.112	100	3.6	LOS A	0.5	14.0	Full	1600	0.0	0.0
Lane 3	156	2.0	1393	0.112	100	3.5	LOS A	0.5	13.1	Short	275	0.0	NA
Approach	429	2.0		0.112		3.7	LOS A	0.5	14.0				
Intersection	2500	2.0		0.419		7.1	LOS A	2.4	61.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

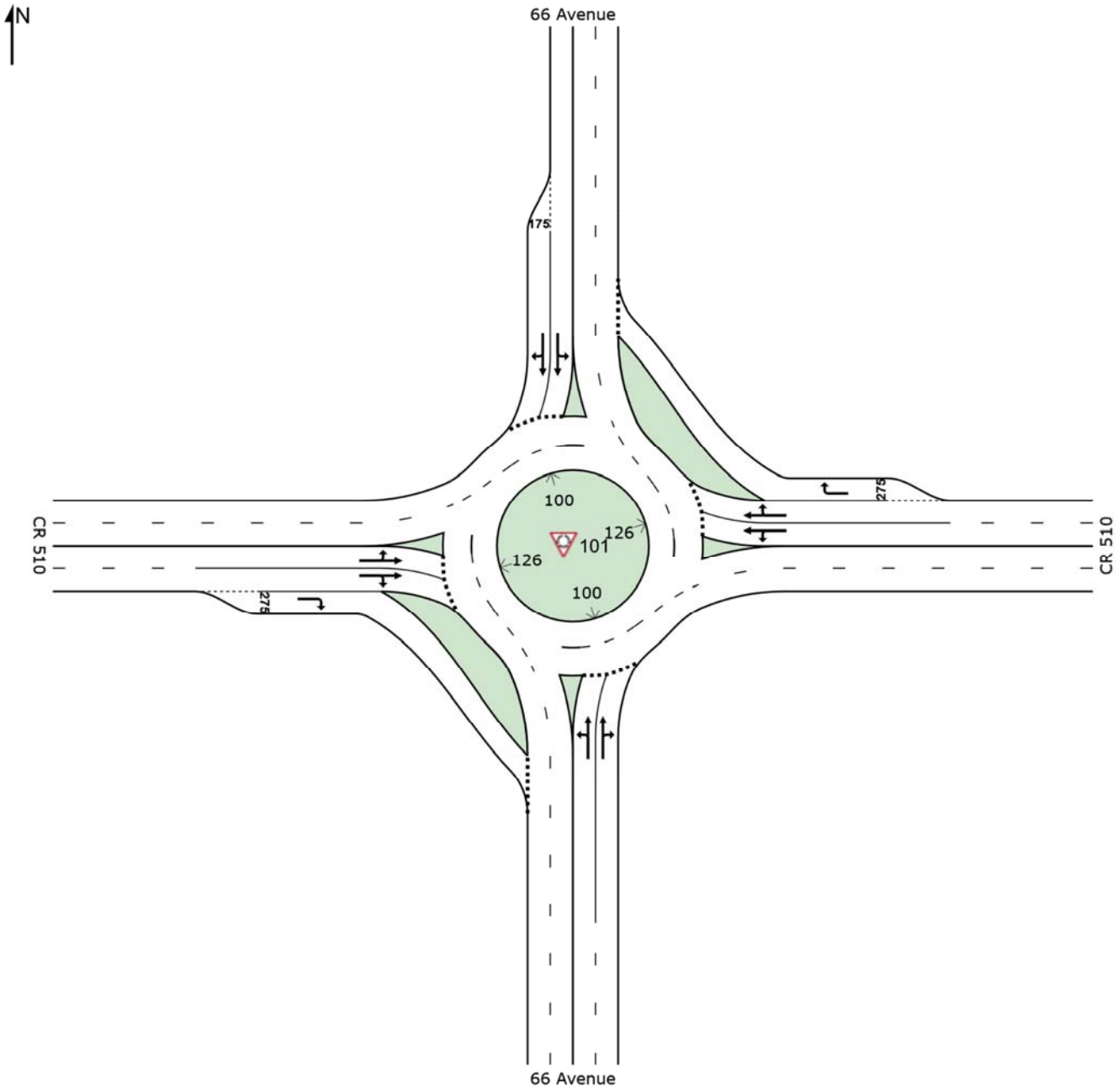
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

SIDRA INTERSECTION 7.0 | Copyright © 2000-2017 Akcelik and Associates Pty Ltd | sidrasolutions.com

SITE LAYOUT

Site: 101 [2040 AM]

CR 510 at 66 Avenue
Roundabout



SIDRA INTERSECTION 7.0 | Copyright © 2000-2017 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: METRIC ENGINEERING, INC. | Created: Tuesday, November 14, 2017 7:24:35 PM
Project: N:\JOB\PLANNING\1.2293 CR 510 PD&E\roundabout screening\Roundabout Screening Report (Nov2017)\Sidra\CR510at66Ave Analysis.sip7

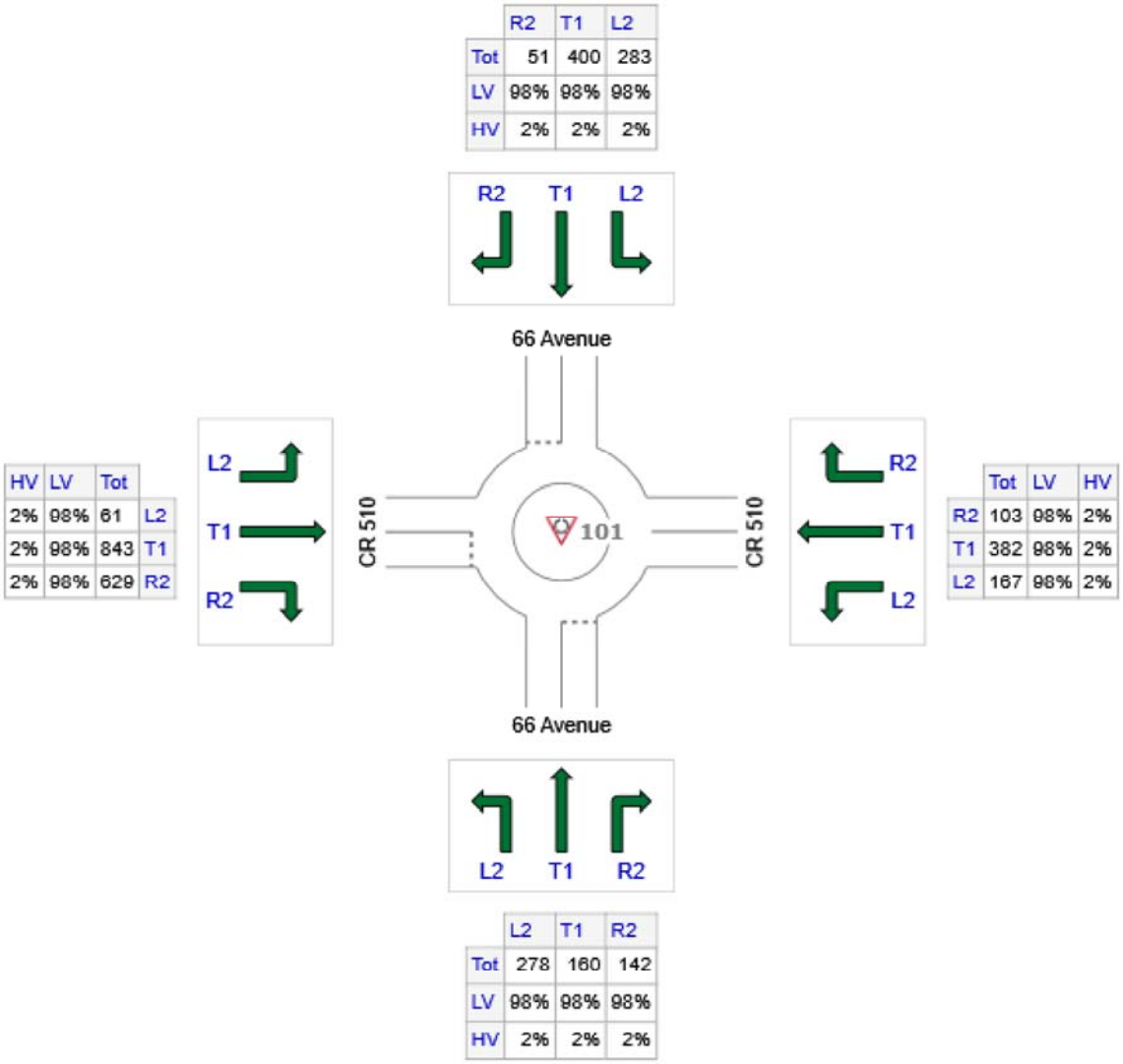
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [2040 AM]

CR 510 at 66 Avenue
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 66 Avenue	580	568	12
E: CR 510	652	639	13
N: 66 Avenue	734	719	15
W: CR 510	1533	1502	31
Total	3499	3429	70

LANE SUMMARY

Site: 101 [2040 AM]

CR 510 at 66 Avenue
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 66 Avenue													
Lane 1	302	2.0	480	0.630	100	22.6	LOS C	4.1	105.1	Full	1600	0.0	0.0
Lane 2[d]	328	2.0	588	0.558	89[5]	16.4	LOS C	3.7	93.1	Full	1600	0.0	0.0
Approach	630	2.0		0.630		19.4	LOS C	4.1	105.1				
East: CR 510													
Lane 1	263	2.0	945	0.278	100	6.7	LOS A	1.5	38.2	Full	1600	0.0	0.0
Lane 2[d]	334	2.0	1199	0.278	100	5.5	LOS A	1.6	41.0	Full	1600	0.0	0.0
Lane 3	112	2.0	1424	0.079	28[5]	3.1	LOS A	0.4	9.9	Short	275	0.0	NA
Approach	709	2.0		0.278		5.6	LOS A	1.6	41.0				
North: 66 Avenue													
Lane 1	386	2.0	630	0.613	100	17.4	LOS C	4.2	107.6	Full	1600	0.0	0.0
Lane 2[d]	412	2.0	672	0.613	100	16.5	LOS C	4.3	109.7	Short	175	0.0	NA
Approach	798	2.0		0.613		17.0	LOS C	4.3	109.7				
West: CR 510													
Lane 1	417	2.0	736	0.566	100	13.9	LOS B	4.0	101.0	Full	1600	0.0	0.0
Lane 2[d]	572	2.0	1009	0.566	100	10.9	LOS B	4.4	111.8	Full	1600	0.0	0.0
Lane 3	678	2.0	1197	0.566	100	9.7	LOS A	4.3	108.1	Short	275	0.0	NA
Approach	1666	2.0		0.566		11.2	LOS B	4.4	111.8				
Intersection	3803	2.0		0.630		12.7	LOS B	4.4	111.8				

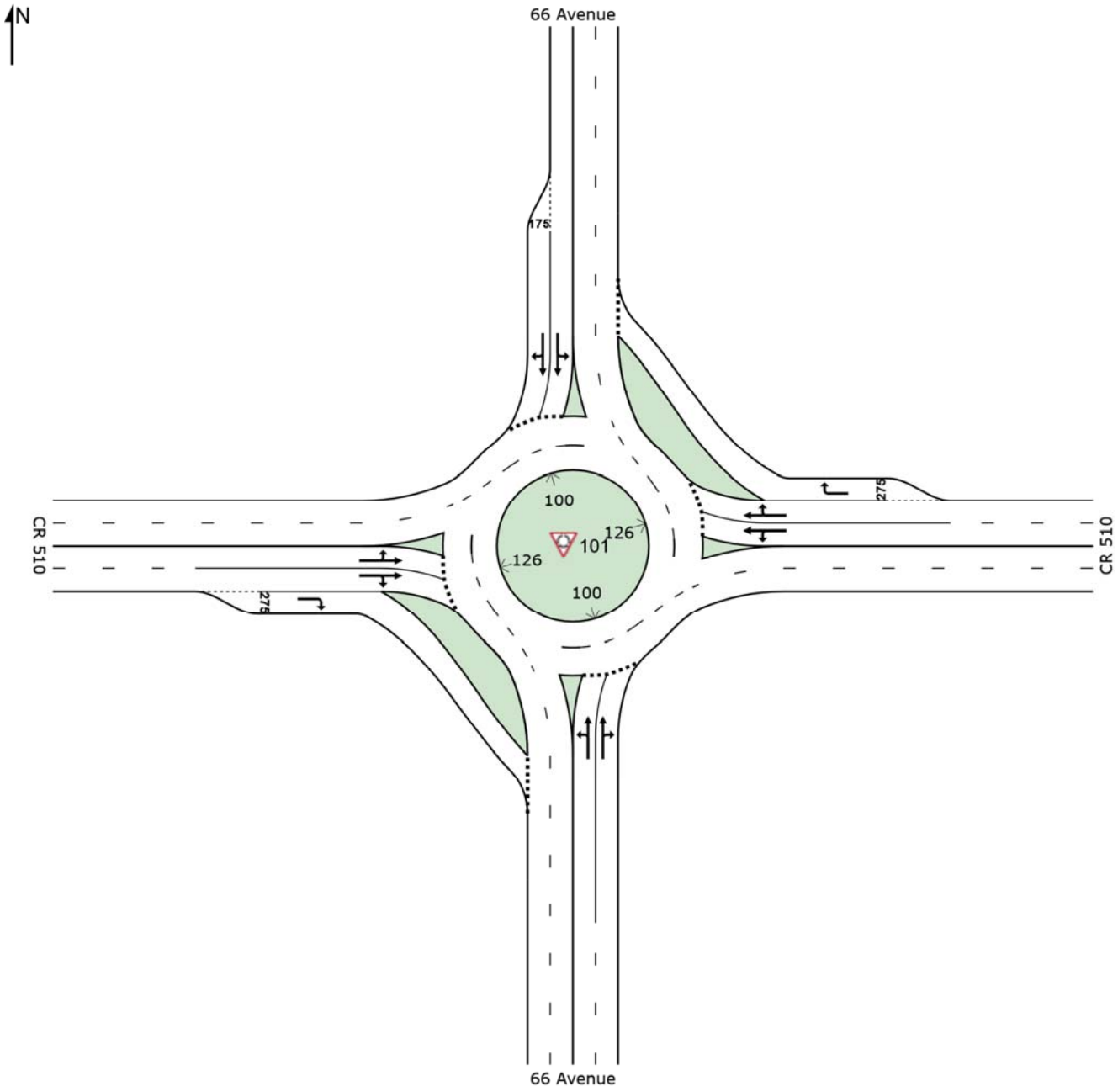
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

SITE LAYOUT

Site: 101 [2040 PM]

CR 510 at 66 Avenue
Roundabout



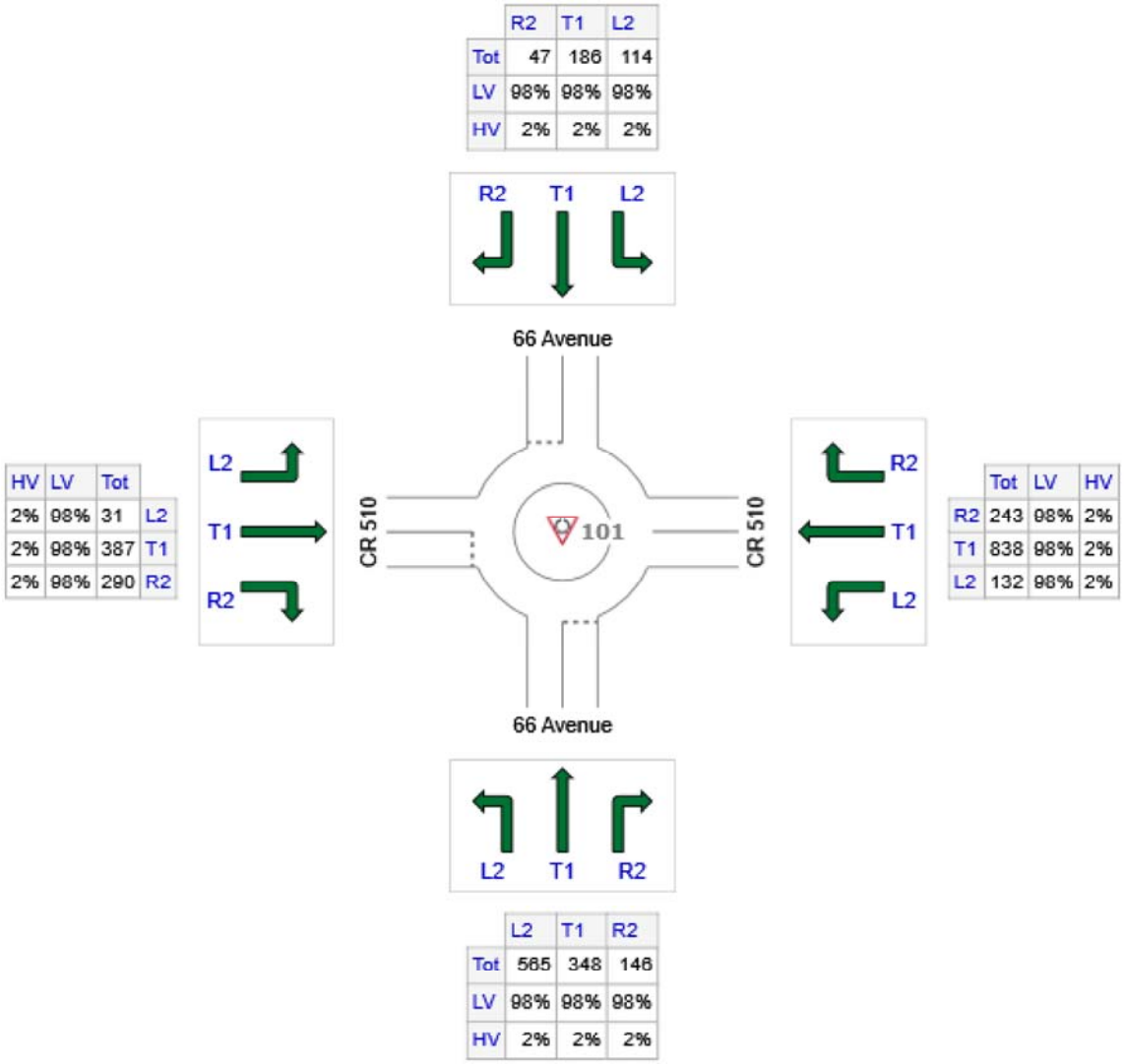
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [2040 PM]

CR 510 at 66 Avenue
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 66 Avenue	1059	1038	21
E: CR 510	1213	1189	24
N: 66 Avenue	347	340	7
W: CR 510	708	694	14
Total	3327	3260	67

LANE SUMMARY

Site: 101 [2040 PM]

CR 510 at 66 Avenue
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 66 Avenue													
Lane 1[d]	614	2.0	928	0.662	100	14.4	LOS B	5.5	139.9	Full	1600	0.0	0.0
Lane 2	537	2.0	837	0.641	97[5]	14.9	LOS B	5.0	127.9	Full	1600	0.0	0.0
Approach	1151	2.0		0.662		14.6	LOS B	5.5	139.9				
East: CR 510													
Lane 1	441	2.0	669	0.659	100	18.4	LOS C	5.2	131.7	Full	1600	0.0	0.0
Lane 2[d]	614	2.0	932	0.659	100	14.3	LOS B	5.9	149.5	Full	1600	0.0	0.0
Lane 3	264	2.0	1266	0.209	32[5]	4.6	LOS A	1.2	31.5	Short	275	0.0	NA
Approach	1318	2.0		0.659		13.7	LOS B	5.9	149.5				
North: 66 Avenue													
Lane 1	169	2.0	314	0.539	100	26.8	LOS D	3.1	79.2	Full	1600	0.0	0.0
Lane 2[d]	208	2.0	386	0.539	100	22.4	LOS C	3.4	85.7	Short	175	0.0	NA
Approach	377	2.0		0.539		24.4	LOS C	3.4	85.7				
West: CR 510													
Lane 1	214	2.0	1014	0.211	100	5.6	LOS A	1.1	27.2	Full	1600	0.0	0.0
Lane 2[d]	269	2.0	1271	0.211	100	4.6	LOS A	1.1	28.7	Full	1600	0.0	0.0
Lane 3	287	2.0	1357	0.211	100	4.4	LOS A	1.1	27.0	Short	275	0.0	NA
Approach	770	2.0		0.211		4.8	LOS A	1.1	28.7				
Intersection	3616	2.0		0.662		13.2	LOS B	5.9	149.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

APPENDIX G – SAFETY ANALYSIS

SAFETY ANALYSIS FOR

COUNTY ROAD 510

TABLE OF CONTENTS

1. INTRODUCTION 4
2.0 EXISTING CONDITIONS 5
2.1 Calculation of Predicted and Expected Crash Summary 7
2.2 Observed Crash Data Summary 8
2.3 FDOT's Crash Distribution & Costs (Existing Conditions) 11
3.0 FUTURE CONDITIONS 11
3.1 Future 2040-No-Build Scenario 11
3.2 Future 2040-Build Scenario 13
3.3 Future 2040- Build including Roundabout 19
4.0 CONCLUSION 21

LIST OF TABLES

Table 1 : HSM Segmentation- Existing 5

Table 2: 2015 Crash Data Summary 9

Table 3: HSM Crashes – Existing (2015) 10

Table 4: HSM Crash Cost Analysis- Existing 11

Table 5: HSM Crashes – No-Build (2040) 12

Table 6: HSM Crash Cost Analysis- No-Build (2040) 12

Table 7: HSM Segmentation- 2040-Build 13

Table 8: HSM Crashes -2040 Build 18

Table 9: HSM Crash Cost Analysis- 2040 Build 19

Table 10: HSM Crashes – 2040 Including Roundabout 20

Table 11: HSM Crash Cost Analysis 2040-Build including Roundabout 20

LIST OF EXHIBITS

Exhibit 1: HSM Analysis Segmentation Diagram -Existing 6

Exhibit 2: Proposed HSM Analysis Segmentation Diagram -Proposed 14

APPENDIX

APPENDIX 1: Five-year Crash History

APPENDIX 2: HSM Analyses -Existing Conditions

APPENDIX 3: HSM Analyses- 2040 Future No- Build Conditions

APPENDIX 4: HSM Analyses- 2040 Future Build Conditions

APPENDIX 5: HSM Analyses- 2040 Future Build with Roundabout conditions

APPENDIX 6: FDOT- HSM Crash Distribution for Florida 2011-2015

APPENDIX 7: FDOT- KABCO Crash

APPENDIX 8: Crash Modification Factor ID 224

1. INTRODUCTION

The Florida Department of Transportation (FDOT), District 4, has commissioned a Project Development and Environmental (PD&E) Study for County Road 510 from County Road 512 to 58th Avenue in Indian River County, in the vicinity of the town of Wabasso, Florida. As part of the PD&E Study, the Department has requested a Safety Analysis in accordance with the Highway Safety Manual (AASHTO, 2010).

The roadway segments and intersections comprising the project limits have been modeled to determine the societal impacts of crashes occurring under existing conditions. Various alternative roadway and intersection configurations and design features will be analyzed to determine relative safety performance and societal costs for such alternatives.

2.0 EXISTING CONDITIONS

A Safety Analysis and crash cost estimate was conducted in accordance with the Highway Safety Manual (HSM) for existing conditions on County Road 510 from County Road 512 to 58th Avenue in Indian River County. For the purposes of the PD&E Study, the corridor was divided into four distinct segments corresponding to points at which there are changes in traffic volumes. In order to facilitate analyses using HSM procedures, the corridor was further subdivided into eleven segments and seven signalized intersections, as shown in **Table 1**. (See details in Exhibit 1). Intersection limits were defined using estimated area of influence procedures. While functionally classified as an Urban Principal Arterial, the existing CR-510 is characterized as a two-lane undivided rural roadway covered under Part C, Chapter 10 of the HSM. Analyses were conducted using spreadsheets developed under the Transportation Research Board's National Cooperative Research Program (NCHRP) Project Number 17-38.

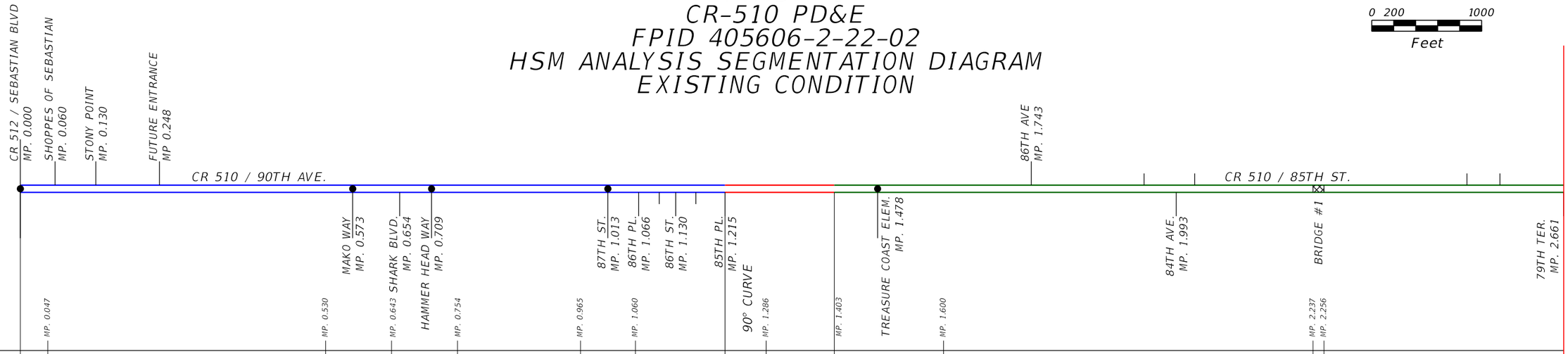
The PD&E Segments were subdivided from beginning to end of project as follows:

Name	Limits		Length
Intersection 1	CR-510 @ CR-512	MP 0.000 to MP 0.047	250' on each leg
Segment 1A	Between Intersection 1 and Intersection 2	MP 0.047 to MP 0.530	2,530'
Intersection 2	CR-510 @ Mako Way	MP 0.530 to MP 0.643	250' on each leg*
Intersection 3	CR-510 @ Hammerhead Way	MP 0.643 to MP 0.754	250' on each leg*
Segment 1B	Between Intersection 3 and Intersection 4	MP 0.754 to MP 0.965	1,110'
Intersection 4	CR-510 @ 87th Street	MP 0.965 to MP 1.060	250' on each leg
Segment 1C	Between Intersection 4 and 90° Curve	MP 1.060 to MP 1.215	816'
Segment 2A	90° curve	MP 1.215 to MP 1.286	375'
Segment 2B	Between 90° curve and Intersection 5	MP 1.286 to MP 1.403	620'
Intersection 5	CR-510 @ Treasure Coast Elementary School Entrance	MP 1.403 to MP 1.600	500' on each leg
Segment 3A	Between Intersection 5 and Bridge #1	MP 1.600 to MP 2.237	3,363'
Segment 3B	Bridge #1	MP 2.237 to MP 2.256	100'
Segment 3C	Between Bridge #1 and Bridge #2	MP 2.256 to MP 2.732	2,558'
Segment 3D	Bridge #2	MP 2.732 to MP 2.756	125'
Segment 3E	Between Bridge #2 and Intersection 6	MP 2.756 to MP 4.204	7,619'
Intersection 6	CR-510 @ 66th Avenue	MP 4.204 to MP 4.337	250' on each leg
Segment 4A	Between Intersection 6 and Intersection 7	MP 4.337 to MP 5.236	4,750'
Intersection 7	CR-510 @ 58th Avenue	MP 5.236 to MP 5.283	250' on each leg
* Because of the proximity of these two intersections, the area of influence was divided between them.			
MP = Mile Post			

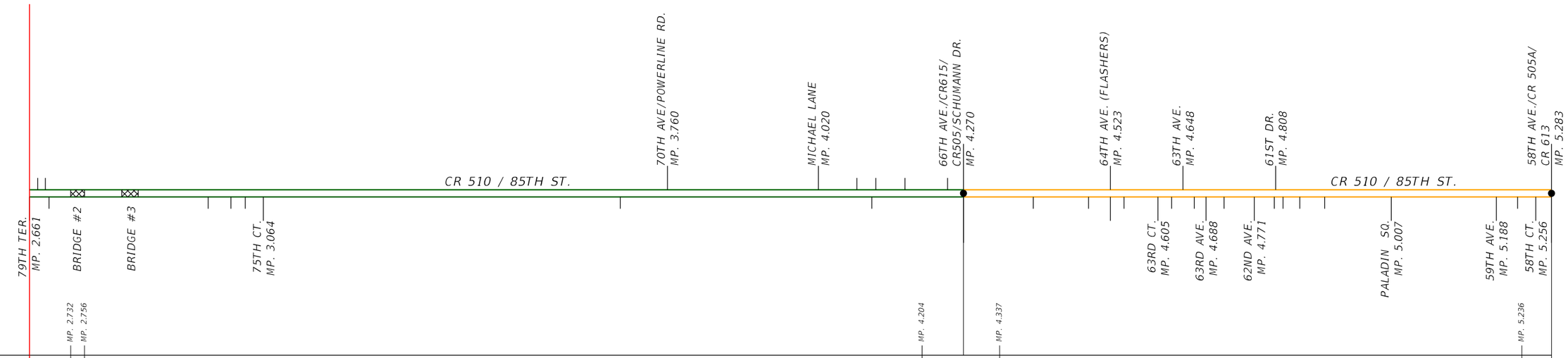
Table 1 : HSM Segmentation- Existing

EXHIBIT 1
CR-510 PD&E
FPID 405606-2-22-02
HSM ANALYSIS SEGMENTATION DIAGRAM
EXISTING CONDITION

0 200 1000
Feet



DRIVEWAY DENSITY		6		0		32	0	0		6	0	10
PASSING LANE		ONE		NONE		NONE	NONE	NONE		NONE	N	NONE
SHLDR TYPE	INT. #1	COMPOSITE	INT. #2	COMPOSITE	INT. #3	COMPOSITE	COMP.	COMP.	INT. #5	COMPOSITE	C	COMPOSITE
SHLDR WIDTH		7 FEET		7 FEET		7 FEET	7'	7 FEET		7 FEET	7'	7 FEET
LANE WIDTH		12 FEET		12 FEET		12 FEET	12'	12 FEET		12 FEET	12'	12 FEET
HSM SEGMENTS		2530'	600'	1120'	600'	816'	375'	620'	994'	3363'	100'	2558'
		1A		1B		1C	2A	2B		3A	3B	3C
PROJECT SEGMENTS		SEGMENT 1 AADT 10,300					SEGMENT 2 AADT 10,100			SEGMENT 3 AADT 9,800		



DRIVEWAY DENSITY	0	8		21	
PASSING LANE	N	NONE		NONE	
SHLDR TYPE	C	COMPOSITE	INT. #6	COMPOSITE	INT. #7
SHLDR WIDTH	7'	7 FEET		7 FEET	
LANE WIDTH	12'	12 FEET		12 FEET	
HSM SEGMENTS	125'	7619'	706'	4750'	
	3D	3E		4A	
PROJECT SEGMENTS		SEGMENT 3 AADT 9,800		SEGMENT 4 AADT 8,100	

2.1 Calculation of Predicted and Expected Crash Summary

The HSM's measure of safety is based on the number of crashes per year (*N*). The Safety Performance Function (SPF) for crashes on a two-lane rural roadway segment under base conditions is given as follows:

$$N_{SPF-rs} = AADT \times L \times 365 \times 10^{-6} \times e^{-0.312}$$

Where AADT = Annual Average Daily Traffic, and L = Length of the Segment

Crash Modification Factors (CMFs) are applied to account for the differences in the given segment from the base conditions on which the SPF is based. The applicable CMFs incorporate lane width (CMF_{1r}), shoulder width and type (CMF_{2r}), horizontal curvature (CMF_{3r}), super elevation variance (CMF_{4r}), grade (CMF_{5r}) and driveway density (CMF_{6r}). A calibration factor C_r (if known) is applied to account for variations in driver characteristics. Because this application is a comparative before and after study, a calibration factor of 1.00 has been used. CMFs are applied to the analysis as follows:

$$N_{predicted} = N_{SPF-rs} \times (CMF_{1r} \times CMF_{2r} \times \dots CMF_n) \times C_r$$

The result of this calculation is the "Predicted" number of crashes for the given roadway segment.

There are no three-way or four-way stop controlled intersections within the project limits. Intersection crashes for a four-legged intersection under signalized control ($N_{spf\ 4SG}$) are calculated using the following equation:

$$N_{spf\ 4SG} = e^{[-5.13+0.60\times\ln(AADT_{major})+0.20\times\ln(AADT_{minor})]}$$

If observed crashes are known for a particular intersection or segment of roadway, an Empirical Bayes (EB) analysis is conducted to account for regression to the mean. A weighting factor is applied to the predicted and observed crashes based on the over-dispersion parameter of the SPF. In essence, the more robust a given SPF is, the higher the weighting factor on predicted crashes. Thus, the expected number of crashes are calculated as follows:

$$N_{expected} = w \times N_{predicted} + (1 - w) \times N_{observed}$$

The weighting factor *w* is calculated based on the over-dispersion factor (*k*) given with the SPF:

$$w = \frac{1}{1 + k \times (\sum_{all\ study\ years} N_{predicted})}$$

Where

$$k = \frac{0.236}{L}$$

2.2 Observed Crash Data Summary

A five-year crash data summary was obtained from both Signal Four Analytics records and Crash Annual Report System (CARS) since the roadway is a county road. They were compiled, comparing both data sources to avoid duplicated data. Latest five-year period (2012 through 2016) were used. A summary of the observed crashes for each year is provided in **Appendix 1.**

The 2015 crash data summary was used for the existing safety analysis since all crash data for 2016 is not available yet. See Summary of crashes in **Table 2**

CRASH SUMMARY

SECTION: 88050000 STATE ROUTE: 510
INTERSECTING ROADWAY 90th Avenue M.P. 0.000 TO 5.283 ENGINEER: AC
STUDY PERIOD: FROM 1/ 2015 TO 12/ 2015 COUNTY: Indian River

Crash Number	No.	MILE POST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURIES	PROP DAM	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE (VEHICLE ONLY)
84717539	1	-	01/28/15	Wednesday	13:20	Sideswipe	0	0	1	Daylight	Dry	
86148676	2	-	11/08/15	Sunday	12:09	Left Turn	0	4	0	Daylight	Dry	
85826655	3	-	04/27/15	Monday	8:52	Sideswipe	0	0	1	Daylight	Dry	
86148097	4	-	09/09/15	Wednesday	17:27	Rear End	0	0	1	Daylight	Dry	
85827472	5	-	06/25/15	Thursday	10:30	Sideswipe	0	0	1	Unknown	Unknown	
86148905	6	-	11/30/15	Monday	15:29	Rear End	0	0	1	Dark - Lighted	Dry	
85826587	7	-	04/22/15	Wednesday	6:27	Other	0	0	1	Unknown	Unknown	
84717515	8	-	01/26/15	Monday	7:25	Rear End	0	1	0	Daylight	Wet	
85826417	9	-	04/04/15	Saturday	0:07	Other	0	1	0	Dark - Not Lighted	Dry	
85827356	10	-	06/12/15	Friday	4:36	Other	0	1	0	Dark - Not Lighted	Unknown	
86148182	11	-	09/16/15	Wednesday	9:08	Other	0	0	1	Dark - Lighted	Wet	
86147885	12	-	08/24/15	Monday	7:33	Rear End	0	0	1	Unknown	Unknown	
83811491	13	-	06/08/15	Monday	17:35	Other	0	0	1	Daylight	Dry	
82886633	14	-	05/17/15	Sunday	16:20	Other	0	6	0	Daylight	Dry	
85826509	15	-	04/14/15	Tuesday	17:53	Rear End	0	0	1	Daylight	Dry	
82048751	16	-	01/07/15	Wednesday	18:05	Out of control	0	1	0	Dark - Lighted	Dry	
86148794	17	-	11/21/15	Saturday	8:29	Sideswipe	0	0	1	Daylight	Wet	
86147731	18	-	08/05/15	Wednesday	9:40	Rear End	0	1	0	Daylight	Dry	
85827103	19	-	05/20/15	Wednesday	16:40	Rear End	0	0	1	Daylight	Dry	
86148991	20	-	12/08/15	Tuesday	18:16	Rear End	0	0	1	Dark - Lighted	Wet	
86147651	21	-	07/27/15	Monday	7:26	Other	0	0	1	Daylight	Dry	
86148031	22	-	09/04/15	Friday	7:36	Rear End	0	2	0	Daylight	Dry	
85826316	23	-	03/27/15	Friday	6:59	Rear End	0	0	1	Dawn	Wet	
86149046	24	-	12/14/15	Monday	7:14	Rear End	0	1	0	Daylight	Dry	
85827675	25	-	07/08/15	Wednesday	17:38	Rear End	0	0	1	Unknown	Unknown	
86148704	26	-	05/01/15	Friday	10:04	Unknown	0	0	1	Unknown	Unknown	
86148919	27	-	12/02/15	Wednesday	15:30	Sideswipe	0	0	1	Daylight	Wet	
86148763	28	-	11/16/15	Monday	21:48	Left Turn	0	0	1	Dark - Lighted	Wet	
85826406	29	-	03/28/15	Saturday	19:14	Rear End	0	0	1	Daylight	Dry	
86149218	30	-	12/31/15	Thursday	14:50	Sideswipe	0	1	0	Daylight	Dry	
86148566	31	-	10/29/15	Thursday	18:12	Rear End	0	0	1	Daylight	Dry	
86148071	32	-	09/07/15	Monday	16:20	Rear End	0	0	1	Daylight	Wet	
86148491	33	-	10/22/15	Thursday	19:02	Left Turn	0	0	1	Dusk	Dry	
86147605	34	-	07/23/15	Thursday	14:30	Left Turn	0	0	1	Daylight	Dry	
86149016	35	-	12/12/15	Saturday	7:49	Other	0	0	1	Unknown	Unknown	
86148546	36	-	10/27/15	Tuesday	8:01	Rear End	0	0	1	Daylight	Dry	
85140078	37	-	12/04/15	Friday	14:16	Rear End	0	0	1	Daylight	Wet	
83822211	38	-	04/01/15	Wednesday	18:12	Off Road	1	1	0	Daylight	Dry	
83779255	39	-	02/14/15	Saturday	1:00	Left Turn	0	2	0	Dark - Lighted	Dry	
83811489	40	-	05/22/15	Friday	9:05	Left Turn	0	1	0	Daylight	Dry	
86148560	41	-	10/28/15	Wednesday	15:28	Rear End	0	0	1	Daylight	Wet	
85826266	42	-	03/22/15	Sunday	13:44	Other	0	1	0	Unknown	Unknown	
85827142	43	-	05/20/15	Wednesday	8:03	Other	0	0	1	Daylight	Dry	
86148928	44	-	12/03/15	Thursday	9:56	Other	0	0	1	Unknown	Unknown	
84717322	45	-	01/08/15	Thursday	7:35	Rear End	0	0	1	Daylight	Dry	
85826483	46	-	04/12/15	Sunday	11:18	Other	0	0	1	Daylight	Dry	
86148689	47	-	11/10/15	Tuesday	13:31	Rear End	0	0	1	Daylight	Dry	
85826146	48	-	03/10/15	Tuesday	18:37	Right Turn	0	0	1	Daylight	Dry	
86147618	49	-	07/24/15	Friday	19:32	Left Turn	0	1	0	Daylight	Wet	
86149035	50	-	12/14/15	Monday	8:13	Rear End	0	0	1	Unknown	Unknown	
86148674	51	-	11/06/15	Friday	9:20	Angle	0	1	0	Daylight	Dry	
86149088	52	-	12/17/15	Thursday	14:51	Head On	0	0	1	Daylight	Dry	
86147783	53	-	08/08/15	Saturday	21:40	Out of control	0	1	0	Unknown	Unknown	
86148355	54	-	10/04/15	Sunday	19:14	Rear End	0	0	1	Dark - Lighted	Wet	
86149117	55	-	12/20/2015	Sunday	10:41	Angle	0	0	1	Daylight	Dry	
84717535	56	-	01/28/2015	Wednesday	8:00	Rear End	0	0	1	Daylight	Dry	
85826348	57	-	03/29/2015	Sunday	14:13	Unknown	0	0	1	Unknown	Unknown	
85827281	58	-	06/05/2015	Friday	21:29	Rear End	0	0	1	Dark - Lighted	Dry	
85826740	59	-	05/05/2015	Tuesday	18:29	Rear End	0	0	1	Daylight	Wet	
86148480	60	-	10/21/2015	Wednesday	12:15	Rear End	0	0	1	Daylight	Dry	
86149159	61	-	12/24/2015	Thursday	17:48	Other	0	0	1	Dusk	Dry	
86148768	62	-	11/18/2015	Wednesday	5:41	Rear End	0	0	1	Dark - Not Lighted	Wet	

	Total No.	-	Injury	PDO	Rear End	Head-On	Angle	Left-Turn	Right-Turn	Sideswipe	Backed Into	Ped/Bike	Parked Car	Fixed Object	Out of control/ Off Road	Other/Unknown
	62	**-**	**17**	**45**	**27**	**1**	**2**	**7**	**1**	**6**	**0**	**0**	**0**	**0**	**3**	**15**
	Percent	-	*27.42%*	*72.58%*	*43.55%*	*1.61%*	*3.23%*	*11.29%*	*1.61%*	*9.68%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*4.84%*	*24.19%*
	Contrib. Cause	-	Dark - Lighted	Wet	Dry	Careless Driving	FTYRW	Improper Turn	Ran Red Light	Exceeded Speed	Improper Passing	Followed too closely	Erratic/ Aggress	Ran off Road	DUI	Other
	Total	**-**	**13**	**14**	**36**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Percent	-	*20.97%*	*22.58%*	*58.06%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

Table 2: 2015 Crash Data Summary

Using the methodology in Part C, Chapter 10 of the HSM and as outlined above, the number of crashes predicted, observed and expected for the existing segments and intersections are listed in **Table 3.**

Name	Limits	Predicted Crashes	Observed Crashes	Expected Crashes
Intersection 1	MP 0.000 to MP 0.047	6.29	9	7.40
Segment 1A	MP 0.047 to MP 0.530	1.12	0	0.72
Intersection 2	MP 0.530 to MP 0.643	5.81	0	3.54
Intersection 3	MP 0.643 to MP 0.754	4.49	4	4.33
Segment 1B	MP 0.754 to MP 0.965	0.78	1	0.88
Intersection 4	MP 0.965 to MP 1.060	5.84	4	5.12
Segment 1C	MP 1.060 to MP 1.215	0.50	3	1.57
Segment 2A	MP 1.215 to MP 1.286	1.23	1	1.05
Segment 2B	MP 1.286 to MP 1.403	1.89	1	1.19
Intersection 5	MP 1.403 to MP 1.600	4.13	2	3.46
Segment 3A	MP 1.600 to MP 2.237	2.22	2	2.12
Segment 3B	MP 2.237 to MP 2.256	0.11	0	0.05
Segment 3C	MP 2.256 to MP 2.732	1.85	2	1.92
Segment 3D	MP 2.732 to MP 2.756	0.14	0	0.06
Segment 3E	MP 2.756 to MP 4.204	6.46	9	7.76
Intersection 6	MP 4.204 to MP 4.337	4.38	16	8.16
Segment 4A	MP 4.337 to MP 5.236	3.72	2	2.87
Intersection 7	MP 5.236 to MP 5.283	5.81	6	5.88
	Totals	**56.77**	**62**	**58.09**

Table 3: HSM Crashes – Existing (2015)

The full details of the individual segment and intersection calculations are provided in **Appendix 2**.

2.3 FDOT's Crash Distribution & Costs (Existing Conditions)

A HSM crash distribution for rural 2-lane roads, obtained from FDOT's latest HSM Crash Distribution for Florida 2011-2015 (**Appendix 6**), and current crash costs from Chapter 122 of the FDOT Design Manual (**Appendix 7**) were used to develop the following cost of expected crashes under existing conditions, note that differences from rounding may occur- See **Table 4** shown below:

Crashes	Distribution		Costs	Totals
58.09	**K**	0.03	$10,560,000	$18,403,128
	A	0.103	$599,040	$3,584,260
	B	0.19	$162,240	$1,790,680
	C	0.192	$100,800	$1,124,264
	O	0.485	$7,600	$214,122
			Grand Total	**$25,116,455**

Table 4: HSM Crash Cost Analysis- Existing

3.0 FUTURE CONDITIONS

Three Alternatives for future have been proposed for the analysis (2040-No-Build, 2040 Build & 2040 Build including the Roundabout)

3.1 Future 2040-No-Build Scenario

The corridor used for the analysis was the same used for the existing corridor where the four (04) PD&E segments were further subdivided into eleven segments and seven signalized intersections (see Exhibit 1) Forecasted Future 2040 AADT volumes taken from the CR 510 PD&E Study Report were applied to this safety analysis.

Using the methodology in Part C, Chapter 10 of the HSM and as outlined above, the number of crashes predicted, observed and expected for the existing segments and intersections are listed in **Table 5.**

Name	Limits	Predicted Crashes	Observed Crashes	Expected Crashes
Intersection 1	MP 0.000 to MP 0.047	5.86	9	7.09
Segment 1A	MP 0.047 to MP 0.530	1.46	0	0.85
Intersection 2	MP 0.530 to MP 0.643	7.42	0	4.09
Intersection 3	MP 0.643 to MP 0.754	5.99	4	5.20
Segment 1B	MP 0.754 to MP 0.965	1.01	1	1.01
Intersection 4	MP 0.965 to MP 1.060	7.27	4	5.82
Segment 1C	MP 1.060 to MP 1.215	0.67	3	1.85
Segment 2A	MP 1.215 to MP 1.286	1.74	1	1.11
Segment 2B	MP 1.286 to MP 1.403	2.81	1	1.27
Intersection 5	MP 1.403 to MP 1.600	6.33	2	4.55
Segment 3A	MP 1.600 to MP 2.237	3.24	2	2.56
Segment 3B	MP 2.237 to MP 2.256	0.15	0	0.05
Segment 3C	MP 2.256 to MP 2.732	2.50	2	2.22
Segment 3D	MP 2.732 to MP 2.756	0.19	0	0.07
Segment 3E	MP 2.756 to MP 4.204	8.13	9	8.63
Intersection 6	MP 4.204 to MP 4.337	5.89	16	9.87
Segment 4A	MP 4.337 to MP 5.236	4.76	2	3.23
Intersection 7	MP 5.236 to MP 5.283	7.80	6	6.97
	Totals	**73.24**	**62**	**66.43**

Table 5: HSM Crashes – No-Build (2040)

The full details of the individual segment and intersection calculations are provided in **Appendix 3**.

A HSM crash distribution for rural 2-lane roads, obtained from FDOT's latest HSM Crash Distribution for Florida 2011-2015 (**Appendix 6**), and current crash costs from Chapter 122 of the FDOT Design Manual **(Appendix 7**) were used to develop the following cost of expected crashes under existing conditions- See **Table 6** shown below:

Crashes	Distribution		Costs	Totals
66.43	**K**	0.03	$10,560,000	$21,044,237
	A	0.103	$599,040	$4,098,652
	B	0.19	$162,240	$2,047,668
	C	0.192	$100,800	$1,285,612
	O	0.485	$7,600	$244,852
			Grand Total	**$28,721,021**

Table 6: HSM Crash Cost Analysis- No-Build (2040)

3.2 Future 2040-Build Scenario

In order to facilitate analyses using HSM procedures, the four PD&E segments were further subdivided into seven segments and seven signalized intersections **(See details in Exhibit 2**).

The limits of the segments used in the HSM analysis of proposed conditions are given in **Table 7**:

Name	Limits		Length
Intersection 1	CR-510 @ CR-512	MP 0.000 to MP 0.047	250' on each leg
Segment 1A	Between Intersection 1 and Intersection 2	MP 0.047 to MP 0.530	2,530'
Intersection 2	CR-510 @ Mako Way	MP 0.530 to MP 0.643	250' on each leg*
Intersection 3	CR-510 @ Hammerhead Way	MP 0.643 to MP 0.754	250' on each leg*
Segment 1B	Between Intersection 3 and Intersection 4	MP 0.754 to MP 0.965	769'
Intersection 4	CR-510 @ 87th Street	MP 0.965 to MP 1.192	600' on each leg
Segment 1C	Between Intersection 4 and 90° Curve	MP 1.192 to MP 1.280	467'
Segment 2A	90° curve	MP 1.280 to MP 1.467	995'
Segment 3A	Between Segment 2A and Intersection 5	MP 1.467 to MP 1.473	372'
Intersection 5	CR 510 @ Treasure Coast Elementary School	MP 1.473 to MP 1.700	600' on each leg
Segment 3B	Between Intersection 5 and Intersection 6	MP 1.700 to MP 4.000	12,140'
Intersection 6	CR 510 @ 66th Avenue	MP 4.000 to MP 4.227	600' on each leg
Segment 4	Between Intersection 6 and Intersection 7	MP 4.227 to MP 5.080	4,480'
Intersection 7	CR-510 @ 58th Avenue	MP 5.080 to MP 5.127	250' on each leg
* Because of the proximity of these two intersections, the area of influence was divided between them.			
MP = Mile Post			

Table 7: HSM Segmentation- 2040-Build

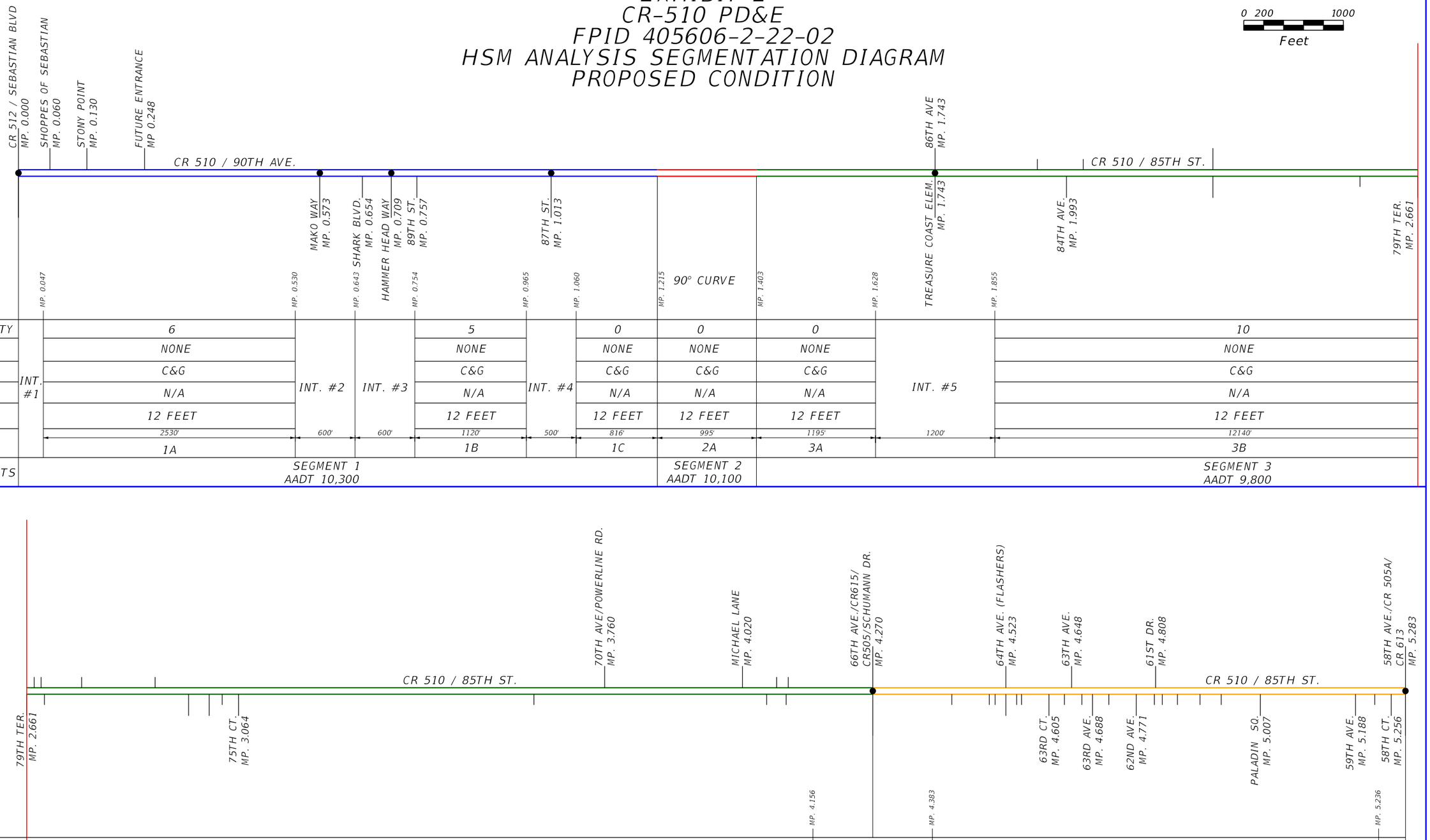
Based on the cross-sectional elements and function of the proposed alternatives, the analyses were performed using the "Urban and Suburban Arterials" procedures identified in Part C, Chapter 12 of the HSM. The specific segment model used in the analyses is the two-Lane Divided Arterial (2D).

Five types of segment crashes are included in the total crashes on an Urban/Suburban Arterial Segment:

- Multiple vehicle segment crashes,
- Multiple vehicle driveway crashes,
- Single vehicle segment crashes,
- Vehicle-pedestrian crashes, and
- Vehicle-bicycle crashes.

EXHIBIT 2
CR-510 PD&E
FPID 405606-2-22-02
HSM ANALYSIS SEGMENTATION DIAGRAM
PROPOSED CONDITION

0 200 1000
Feet



The SPF for calculating the predicted number of crashes on Urban and Suburban Arterials is characterized by the following equation:

$$N_{predicted} = \left(N_{spf\ rs} \times \left(CMF_{1x} \times CMF_{2x} \times \ldots \times CMF_{yx}\right) + N_{pedx} + N_{bikex}\right) \times C_x$$

Where $N_{spf\ rs} \times \left(CMF_{1x} \times CMF_{2x} \times \ldots \times CMF_{yx}\right)$ represents the motor vehicle component,

N_{pedx} represents the pedestrian component, and

N_{bikex} represents the bicycle component.

The motor vehicle component of the roadway segment model has three elements:

$$N_{spf\ rs} = N_{brmv} + N_{brsv} + N_{brdwy}$$

Wherein N_{brmv} represents multiple vehicle crashes,

N_{brsv} represents single vehicle crashes, and,

N_{brdwy} represents driveway-related crashes.

These components are determined as follows:

$$N_{brmv} = exp[a + b \times ln(AADT) + ln(L)]$$

$$N_{brsv} = exp[a + b \times ln(AADT) + ln(L)]$$

Coefficients a and b are taken from HSM Table 12-3 for N_{brmv} and HSM Table 12-5 for N_{brsv}.

$$N_{brdwy} = \sum_{\substack{all \\ driveway \\ types}} n_j \times N_j \times \left(\frac{AADT}{1500}\right)^t$$

Wherein n_j is the number of driveways within roadway segment of driveway type j including all driveways on both sides of the road,

N_j is the number of driveway related collision per driveway per year for driveways type *j* obtained from HSM Table 12-7, and, *t* is a coefficient for traffic volume adjustment also obtained from HSM Table 12-7

As with other models, intersection crashes are added to the segment crashes to provide overall predicted crashes. Each of the seven signalized intersections were analyzed under Chapter 12 HSM procedures.

There are four types of intersection crashes included in the total crashes at an Urban/Suburban Arterial:

- Multiple vehicle segment crashes,
- Single vehicle segment crashes,
- Vehicle-pedestrian crashes, and
- Vehicle-bicycle crashes.

The SPF for calculating the predicted number of crashes at an Urban/Suburban intersection is characterized by the following equation:

$$N_{predicted\ int} = C_i \times \left(N_{bi} + N_{pedi} + N_{bikei}\right)$$

Where C_i is the calibration factor,

N_{bi} are the number of crashes excluding vehicle-bicycle crashes,

N_{pedi} are the number of vehicle-pedestrian crashes,

and N_{bikei} are the number of vehicle-bicycle crashes.

N_{bi} is calculated as follows:

$$N_{bi} = N_{spf\ int} \times (CMF_{1i} \times CMF_{2i} \times \ldots \times CMF_{6i}) \text{ and,}$$

$$N_{spf\ int} = N_{bimv} + N_{bisv}$$

Where N_{bimv} are the number of multi-vehicle crashes, and

N_{bimv} is calculated using the following equation:

$$N_{bimv} = exp\left[a + b \times ln\left(AADT_{maj} + c \times ln(AADT_{min})\right)\right]$$

Where $AADT_{maj}$ and $AADT_{min}$ are the approach volumes on the major and minor streets, respectively, and coefficients a, b and c are obtained from HSM Table 12-10.

N_{bisv} is the number of single vehicle crashes and is calculated as follows:

$$N_{bisv} = exp\left[a + b \times ln\left(AADT_{maj} = c \times ln(AADT_{min})\right)\right]$$

Again, $AADT_{maj}$ and $AADT_{min}$ are the approach volumes on the major and minor streets, respectively, but coefficients a, b and c are obtained from HSM Table 12-12.

Using the methodology in Part C, Chapter 12 of the HSM and as outlined above, the number of crashes predicted, observed and expected for the existing segments and intersections are listed in **Table 8.**

Table 8 - HSM Crashes - 2040 Build w/o Roundabout				
Name	**Limits**	**Predicted Crashes**	**Observed Crashes**	**Expected Crashes**
Intersection 1	MP 0.000 to MP 0.047	4.73	9	6.55
Segment 1A	MP 0.047 to MP 0.530	1.49	0	0.80
Intersection 2	MP 0.530 to MP 0.643	1.94	0	1.27
Intersection 3	MP 0.643 to MP 0.754	1.93	4	2.75
Segment 1B	MP 0.754 to MP 0.965	0.69	1	0.90
Intersection 4	MP 0.965 to MP 1.192	3.49	5	4.50
Segment 1C	MP 1.192 to MP 1.280	0.30	3	0.70
Segment 2A	MP 1.280 to MP 1.467	0.63	2	1.20
Segment 3A	MP 1.467 to MP 1.473	0.24	1	0.40
Intersection 5	MP 1.473 to MP 1.700	3.58	2	2.99
Segment 3B	MP 1.700 to MP 4.000	10.84	11	9.60
Intersection 6	MP 4.000 to MP 4.227	7.40	16	14.02
Segment 4A	MP 4.227 to MP 5.080	3.07	2	2.70
Intersection 7	MP 5.080 to MP 5.127	4.50	6	5.11
	Totals	**44.83**	**62**	**53.50**

Table 8: HSM Crashes -2040 Build

The full details of the individual segment and intersection calculations are provided in **Appendix 4**.

FDOT's Crash Distribution & Costs for future conditions is also considered for distribution for 2-lane Divided Urban and Suburban Arterials (**Appendix 6**), and current crash costs from Chapter 122 of the FDOT Design Manual **(Appendix 7)** were used to develop the following cost of expected crashes under future condition conditions, note that differences from rounding may occur- **See Table 9** shown below:

Crashes	Distribution		Costs	Totals
53.50	**K**	0.008	$10,560,000	$4,519,657
	A	0.050	$599,040	$1,602,424
	B	0.150	$162,240	$1,301,969
	C	0.235	$100,800	$1,267,302
	O	0.557	$7,600	$226,475
			Grand Total	**$8,917,827**

Table 9: HSM Crash Cost Analysis- 2040 Build

3.3 Future 2040- Build including Roundabout

This analysis (Future 2040- Build including roundabout) was conducted to gauge the potential safety benefits of installing roundabout at 66th Avenue/CR615/CR 505/Schumann Drive. The Crash Modification Factors Clearinghouse was consulted for a CMF that applied to the installation of a roundabout in lieu of a traffic signal. CMF ID 224 (**see Appendix 8**) is based on the NCHRP Report 572, and has a four-star rating. The Crash Modification Factor is 0.33.

The simplest technique for determining the effects of the roundabouts is to use the model developed for the proposed conditions using the Urban and Suburban Arterials procedure, and applying the CMF for roundabout to Intersection 6 as a calibration factor.

The results of this analysis as outlined above, the number of crashes predicted, observed and expected for the proposed segments and intersections are listed in **Table 10.**

Table 10 - HSM Crashes - Proposed with Roundabouts (2040-Build)				
Name	**Limits**	**Predicted Crashes**	**Observed Crashes**	**Expected Crashes**
Intersection 1	MP 0.000 to MP 0.047	4.73	9	6.55
Segment 1A	MP 0.047 to MP 0.530	1.49	0	0.80
Intersection 2	MP 0.530 to MP 0.643	1.94	0	1.27
Intersection 3	MP 0.643 to MP 0.754	1.93	4	2.75
Segment 1B	MP 0.754 to MP 0.965	0.69	1	0.90
Intersection 4	MP 0.965 to MP 1.192	3.49	5	4.50
Segment 1C	MP 1.192 to MP 1.280	0.30	3	0.70
Segment 2A	MP 1.280 to MP 1.467	0.63	2	1.20
Segment 3A	MP 1.467 to MP 1.473	0.24	1	0.40
Intersection 5	MP 1.473 to MP 1.700	3.58	2	2.99
Segment 3B	MP 1.700 to MP 4.000	10.84	11	9.60
Intersection 6	MP 4.000 to MP 4.227	2.42	16	8.83
Segment 4A	MP 4.227 to MP 5.080	3.07	2	2.70
Intersection 7	MP 5.080 to MP 5.127	4.50	6	5.11
	Totals	**39.84**	**62**	**48.30**

Table 10: HSM Crashes – 2040 Including Roundabout

The full details of the individual segment and intersection calculations are provided in **Appendix 5**.

By installing roundabouts at 66th Avenue/CR 615/Schumann Drive, the expected number of crashes under proposed future conditions drops from 53.50 to 48.30, a further decrease of 9.7%.

FDOT's Crash Distribution & Costs for future conditions included the Roundabout for distribution is for 4-lane Divided Urban and Suburban Arterials **(Appendix 6),** and current crash costs from Chapter 122 of the FDOT Design Manual **(Appendix 7)** were used to develop the following cost of expected crashes under future condition conditions- **See Table 11** shown below:

Table 11 - HSM Crash Cost Analysis- 2040 Build inc Rndbt				
Crashes	**Distribution**		**Costs**	**Totals**
48.30	**K**	0.008	$10,230,000	$3,952,804
	A	0.050	$580,320	$1,401,449
	B	0.150	$157,170	$1,138,677
	C	0.235	$97,650	$1,108,357
	O	0.557	$7,600	$204,460
			Grand Total	**$7,805,747**

Table 11: HSM Crash Cost Analysis 2040-Build including Roundabout

4.0 CONCLUSION

Although this project is justified from a benefit cost ratio based on safety alone, safety and societal costs will be greatly improved through the reconstruction of CR-510 from a two-lane undivided section to a four-lane divided section. In addition, the replacement of signalized intersections at 66th Avenue with a roundabout will further contribute to safety performance and reductions in societal costs. Societal benefits will also include reduction in fuel consumption, minimized delay, and property access in lieu of median openings.

Societal costs of crashes were calculated as above and resulted in a decrease from $28,721,021 (2040 No-Build) to $8,917,827 (2040 Build) for a net benefit of $ 19,803,194; if the proposed roundabout is considered in 2040 Build, it resulted in a decrease to $8,613,556 for a net benefit of $20,107,465.

By installing a roundabout at 66th Avenue/CR 615/Schumann Drive, the expected number of crashes under proposed future conditions drops from 53.50 to 51.67, a further decrease of 3.5%.

Appendix 1- Five-year Crash History

State of Florida Department of Transportation
CRASH SUMMARY

SECTION: **88050000** STATE ROUTE: **510**

INTERSECTING ROADWAY **90th Avenue** M.P. **0.000** TO **5.283** ENGINEER: **AC**

STUDY PERIOD: FROM **1/ 2012** TO **12/ 2012** COUNTY: **Indian River**

Crash Number	No.	MILE POST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURIES	PROP DAM	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE (VEHICLE ONLY)
83177428	1	-	08/25/12	Saturday	17:30	Head On	0	4	0	Daylight	Dry	
83622474	2	-	10/19/12	Friday	10:08	Left Turn	0	1	0	Daylight	Dry	
91886668	3	-	05/02/12	Wednesday	8:44	Rear End	0	4	0	Daylight	Dry	
91886961	4	-	10/27/12	Saturday	1:31	Left Turn	0	0	1	Dark - Unknown Lightin	Wet	
91885547	5	-	07/12/12	Thursday	17:06	Rear End	0	1	0	Daylight	Dry	
91885813	6	-	08/03/12	Friday	15:19	Rear End	0	0	1	Dark - Lighted	Dry	
83622502	7	-	11/23/12	Friday	8:43	Unknown	0	0	1	Daylight	Dry	
83152391	8	-	10/08/12	Monday	18:55	Sideswipe	0	1	0	Dark - Not Lighted	Wet	
71632851	9	-	03/07/12	Wednesday	14:54	Other	0	0	1	Daylight	Dry	
82903511	10	-	11/27/12	Tuesday	17:35	Pedestrian	0	1	0	Daylight	Dry	
91886921	11	-	10/20/12	Saturday	10:39	Unknown	0	0	1	Unknown	Unknown	
83622878	12	-	12/20/12	Thursday	9:34	Rear End	0	0	1	Daylight	Dry	
81995219	13	-	01/25/12	Wednesday	20:46	Rear End	0	0	1	Dark - Not Lighted	Dry	
82849068	14	-	11/15/12	Thursday	7:15	Left Turn	0	0	1	Daylight	Dry	
82048632	15	-	02/02/12	Thursday	20:45	Rear End	0	2	0	Dark - Lighted	Dry	
83152393	16	-	10/23/12	Tuesday	7:32	Out of control	0	1	0	Dark - Lighted	Dry	
83622520	17	-	11/10/12	Saturday	18:00	Head On	0	0	1	Unknown	Unknown	
83622613	18	-	12/07/12	Friday	7:22	Rear End	0	0	1	Daylight	Dry	
83622609	19	-	11/24/12	Saturday	18:29	Rear End	0	0	1	Dark - Lighted	Dry	
82903505	20	-	11/03/12	Saturday	9:40	Rear End	0	2	0	Daylight	Dry	
82903482	21	-	04/17/12	Tuesday	12:39	Left Turn	0	4	0	Daylight	Dry	
82849062	22	-	09/30/12	Sunday	10:20	Other	0	2	0	Daylight	Dry	
83622403	23	-	11/03/12	Saturday	16:09	Head On	0	0	1	Unknown	Unknown	
83622704	24	-	12/18/12	Tuesday	14:30	Head On	0	0	1	Unknown	Unknown	
91886958	25	-	10/12/12	Friday	8:15	Sideswipe	0	0	1	Daylight	Dry	
81980474	26	-	06/28/12	Thursday	19:55	Off Road	0	1	0	Dusk	Dry	
83622620	27	-	12/10/12	Monday	5:40	Left Turn	0	1	0	Dark - Lighted	Wet	
91886583	28	-	04/03/12	Tuesday	7:45	Rear End	0	1	0	Daylight	Dry	
91886634	29	-	04/17/12	Tuesday	7:50	Rear End	0	1	0	Daylight	Dry	
91886676	30	-	06/21/12	Thursday	20:00	Fixed Object	0	2	0	Dark - Not Lighted	Unknown	

	Total No.	-	Injury	PDO	Rear End	Head-On	Angle	Left-Turn	Right-Turn	Sideswipe	Backed Into	Ped/Bike	Parked Car	Fixed Object	Out of control/ Off Road	Other/Unknown
	30	-	**16**	**14**	**11**	**4**	**0**	**5**	**0**	**2**	**0**	**1**	**0**	**1**	**2**	**4**
	Percent	-	*53.33%*	*46.67%*	*36.67%*	*13.33%*	*0.00%*	*16.67%*	*0.00%*	*6.67%*	*0.00%*	*3.33%*	*0.00%*	*3.33%*	*6.67%*	*13.33%*
	Contrib. Cause	-	Dark - Lighted	Wet	Dry	Careless Driving	FTYRW	Improper Turn	Ran Red Light	Exceeded Speed	Improper Passing	Followed too closely	Erratic/ Aggress	Ran off Road	DUI	Other
	Total	-	**10**	**3**	**22**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Percent	-	*33.33%*	*10.00%*	*73.33%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

State of Florida Department of Transportation
CRASH SUMMARY

SECTION: **88050000** STATE ROUTE: **510**

INTERSECTING ROADWAY **90th Avenue** M.P. **0.000** TO **5.283** ENGINEER: **AC**

STUDY PERIOD: FROM **1/ 2013** TO **12/ 2013** COUNTY: **Indian River**

Crash Number	No.	MILE POST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURIES	PROP DAM	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE (VEHICLE ONLY)
83846340	1	-	03/15/13	Friday	14:52	Rear End	0	1	0	Daylight	Dry	
83264191	2	-	09/06/13	Friday	7:55	Left Turn	0	2	0	Daylight	Dry	
84123035	3	-	09/22/13	Sunday	13:24	Head On	0	0	1	Unknown	Unknown	
71632956	4	-	01/13/13	Sunday	19:38	Off Road	0	0	1	Daylight	Dry	
84123363	5	-	10/25/13	Friday	14:13	Head On	0	0	1	Unknown	Unknown	
83894719	6	-	06/26/13	Wednesday	13:19	Rear End	0	0	1	Dark - Lighted	Wet	
84122835	7	-	08/30/13	Friday	8:46	Sideswipe	0	0	1	Daylight	Dry	
83894213	8	-	05/04/13	Saturday	16:45	Other	0	0	1	Unknown	Unknown	
84123395	9	-	10/28/13	Monday	8:02	Unknown	0	0	1	Unknown	Unknown	
84123439	10	-	11/03/13	Sunday	20:34	Head On	0	0	1	Unknown	Unknown	
84123007	11	-	09/19/13	Thursday	8:43	Head On	0	0	1	Unknown	Unknown	
84123438	12	-	11/03/13	Sunday	17:52	Rear End	0	1	0	Dusk	Dry	
84122034	13	-	07/18/13	Thursday	14:14	Rear End	0	0	1	Daylight	Dry	
83321890	14	-	07/23/13	Tuesday	21:20	Off Road	1	1	0	Dark - Not Lighte	Dry	
81980498	15	-	09/20/13	Friday	18:54	Rollover	0	2	0	Dawn	Dry	
83894010	16	-	04/08/13	Monday	6:20	Out of control	0	0	1	Dark - Lighted	Dry	
83846112	17	-	02/20/13	Wednesday	7:50	Rear End	0	0	1	Daylight	Dry	
83894351	18	-	05/20/13	Monday	10:37	Head On	0	0	1	Unknown	Unknown	
83894189	19	-	05/01/13	Wednesday	17:27	Rear End	0	2	0	Daylight	Wet	
83846263	20	-	03/16/13	Saturday	5:45	Head On	0	0	1	Unknown	Unknown	
83299051	21	-	04/26/13	Friday	12:38	Rear End	0	0	1	Daylight	Dry	
84122739	22	-	08/21/13	Wednesday	14:19	Rear End	0	0	1	Unknown	Unknown	
83622977	23	-	01/18/13	Friday	20:50	Other	0	0	1	Unknown	Unknown	
84122753	24	-	08/23/13	Friday	0:03	Off Road	0	0	1	Dark - Not Lighte	Dry	
83622773	25	-	01/05/13	Saturday	23:38	Rollover	0	0	1	Dark - Lighted	Wet	
84122789	26	-	08/27/13	Tuesday	15:33	Head On	0	0	1	Unknown	Unknown	
71633093	27	-	10/07/13	Monday	16:21	Other	0	0	1	Daylight	Wet	
83288854	28	-	07/01/13	Monday	19:30	Off Road	0	1	0	Dusk	Wet	
84123098	29	-	09/27/13	Friday	16:14	Head On	0	0	1	Unknown	Unknown	
83894348	30	-	05/18/13	Saturday	4:46	Off Road	0	1	0	Dark - Not Lighte	Dry	
83894699	31	-	06/25/13	Tuesday	4:41	Head On	0	0	1	Unknown	Unknown	
83894461	32	-	05/29/13	Wednesday	14:15	Rear End	0	1	0	Daylight	Dry	
83894302	33	-	05/14/13	Tuesday	21:54	Off Road	0	0	1	Dark - Lighted	Dry	
84123366	34	-	10/24/13	Thursday	7:27	Rear End	0	2	0	Daylight	Dry	
84122952	35	-	09/15/13	Sunday	20:06	Rear End	0	0	1	Dark - Not Lighte	Wet	
83846396	36	-	04/02/13	Tuesday	12:25	Rear End	0	0	1	Daylight	Dry	
82264893	37	-	02/24/13	Sunday	12:53	Off Road	0	1	0	Daylight	Dry	
71633035	38	-	07/08/13	Monday	19:25	Bicycle	0	1	0	Daylight	Dry	
71633461	39	-	12/31/13	Tuesday	12:26	Other	0	0	1	Daylight	Dry	
83894558	40	-	05/03/13	Friday	7:16	Left Turn	0	0	1	Daylight	Wet	
71633386	41	-	07/03/13	Wednesday	20:24	Other	0	0	1	Dark - Lighted	Dry	
84123191	42	-	10/07/13	Monday	13:29	Off Road	0	0	1	Daylight	Wet	
82888686	43	-	04/19/13	Friday	16:30	Left Turn	0	2	0	Daylight	Dry	
84123006	44	-	09/18/13	Wednesday	8:09	Head On	0	0	1	Unknown	Unknown	
83894989	45	-	08/01/13	Thursday	22:00	Ran into water	0	0	1	Dark - Lighted	Dry	
84122866	46	-	09/04/13	Wednesday	15:00	Rear End	0	0	1	Daylight	Dry	

	Total No.	-	Injury	PDO	Rear End	Head-On	Angle	Left-Turn	Right-Turn	Sideswipe	Backed Into	Ped/Bike	Parked Car	Fixed Object	Out of control/ Off Road	Other/Unknown
	46	**-**	**13**	**33**	**13**	**10**	**0**	**3**	**0**	**1**	**0**	**1**	**0**	**0**	**10**	**8**
	Percent	-	*28.26%*	*71.74%*	*28.26%*	*21.74%*	*0.00%*	*6.52%*	*0.00%*	*2.17%*	*0.00%*	*2.17%*	*0.00%*	*0.00%*	*21.74%*	*17.39%*
	Contrib. Cause	-	Dark - Lighted	Wet	Dry	Careless Driving	FTYRW	Improper Turn	Ran Red Light	Exceeded Speed	Improper Passing	Followed too closely	Erratic/ Aggress	Ran off Road	DUI	Other
	Total	**-**	**12**	**8**	**24**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Percent	-	*26.09%*	*17.39%*	*52.17%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

State of Florida Department of Transportation
CRASH SUMMARY

SECTION: **88050000** STATE ROUTE: **510**

INTERSECTING ROADWAY **90th Avenue** M.P. **0.000** TO **5.283** ENGINEER: **AC**

STUDY PERIOD: FROM **1/ 2014** TO **12/ 2014** COUNTY: **Indian River**

Crash Number	No.	MILE POST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURIES	PROP DAM	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE (VEHICLE ONLY)
85827032	1	-	08/07/14	Thursday	18:36	Rear End	0	0	1	Daylight	Dry	
84638331	2	-	09/06/14	Saturday	11:24	Other	0	0	1	Daylight	Dry	
85827071	3	-	08/21/14	Thursday	21:48	Off Road	0	0	1	Dark - Not Lighted	Dry	
84716933	4	-	12/04/14	Thursday	17:45	Sideswipe	0	0	1	Dark - Not Lighted	Dry	
83846327	5	-	08/20/14	Wednesday	8:37	Rear End	0	0	1	Daylight	Dry	
84204957	6	-	03/20/14	Thursday	19:03	Head On	0	0	1	Dark - Lighted	Unknown	
84716798	7	-	11/18/14	Tuesday	6:43	Rear End	0	0	1	Dawn	Wet	
84204841	8	-	03/11/14	Tuesday	16:43	Left Turn	0	0	1	Daylight	Dry	
84204842	9	-	03/11/14	Tuesday	17:40	Head On	0	0	1	Unknown	Unknown	
84204827	10	-	02/22/14	Saturday	13:42	Angle	0	0	1	Daylight	Dry	
84205756	11	-	06/16/14	Monday	17:14	Head On	0	0	1	Daylight	Dry	
84716972	12	-	12/08/14	Monday	3:38	Animal	0	0	1	Dark - Lighted	Dry	
84204602	13	-	01/30/14	Thursday	14:23	Rear End	0	0	1	Daylight	Wet	
85826913	14	-	08/02/14	Saturday	0:12	Rear End	0	1	0	Dark - Lighted	Dry	
83846957	15	-	10/23/14	Thursday	17:57	Unknown	0	0	1	Unknown	Unknown	
84205999	16	-	07/11/14	Friday	8:01	Out of control	0	0	1	Dark - Lighted	Dry	
85826859	17	-	08/18/14	Monday	3:16	Left Turn	0	2	0	Daylight	Dry	
83846904	18	-	10/20/14	Monday	20:02	Left Turn	0	0	1	Dark - Lighted	Dry	
83846916	19	-	10/22/14	Wednesday	21:18	Rear End	0	0	1	Unknown	Unknown	
84205531	20	-	05/16/14	Friday	15:37	Rear End	0	0	1	Daylight	Dry	
84205120	21	-	04/07/14	Monday	15:10	Other	0	1	0	Daylight	Dry	
84204696	22	-	02/25/14	Tuesday	7:33	Rear End	0	0	1	Daylight	Dry	
84716903	23	-	12/01/14	Monday	14:49	Sideswipe	0	0	1	Daylight	Dry	
84204704	24	-	02/26/14	Wednesday	5:35	Head On	0	0	1	Unknown	Unknown	
83846921	25	-	10/22/14	Wednesday	6:55	Head On	0	0	1	Unknown	Unknown	
83846653	26	-	09/24/14	Wednesday	16:42	Angle	0	1	0	Daylight	Wet	
84638221	27	-	06/01/14	Sunday	12:50	Other	0	0	1	Daylight	Dry	
84716924	28	-	12/03/14	Wednesday	14:40	Unknown	0	0	1	Unknown	Unknown	
84204862	29	-	03/13/14	Thursday	11:55	Rear End	0	1	0	Daylight	Dry	
84204353	30	-	01/24/14	Friday	22:14	Left Turn	0	1	0	Dark - Lighted	Dry	
84205331	31	-	05/01/14	Thursday	17:24	Head On	0	0	1	Unknown	Unknown	
83846285	32	-	06/25/14	Wednesday	17:22	Other	0	0	1	Daylight	Dry	
84717234	33	-	12/29/14	Monday	10:42	Left Turn	0	1	0	Daylight	Dry	
84204280	34	-	01/17/14	Friday	19:16	Head On	0	0	1	Unknown	Unknown	
84716997	35	-	12/08/14	Monday	14:27	Pedestrian	0	0	1	Daylight	Wet	
84205622	36	-	05/29/14	Thursday	14:18	Rear End	0	2	0	Daylight	Dry	
84529966	37	-	11/06/14	Thursday	1:23	Off Road	0	0	1	Dark - Not Lighted	Dry	
84205132	38	-	04/07/14	Monday	14:25	Sideswipe	0	1	0	Daylight	Dry	
84205553	39	-	05/24/14	Saturday	19:50	Head On	0	0	1	Dusk	Dry	
84638199	40	-	05/14/14	Wednesday	16:55	Other	0	0	1	Daylight	Dry	
83846983	41	-	10/15/14	Wednesday	14:22	Angle	0	0	1	Daylight	Dry	
85827104	42	-	11/07/14	Friday	7:35	Rear End	0	0	1	Daylight	Dry	
82836136	43	-	01/16/14	Thursday	13:15	Angle	0	1	0	Daylight	Dry	
83846792	44	-	10/07/14	Tuesday	7:54	Rear End	0	0	1	Daylight	Dry	
84204832	45	-	03/10/14	Monday	7:00	Head On	0	0	1	Unknown	Unknown	
83846294	46	-	08/14/14	Thursday	15:18	Left Turn	0	0	1	Daylight	Wet	
83769383	47	-	04/01/14	Tuesday	7:36	Angle	0	2	0	Daylight	Dry	
84205003	48	-	03/13/14	Thursday	15:17	Off Road	0	1	0	Daylight	Dry	
84204869	49	-	03/13/14	Thursday	16:23	Rear End	0	0	1	Unknown	Unknown	
84204194	50	-	01/13/14	Monday	7:44	Rear End	0	4	0	Daylight	Dry	
84717138	51	-	12/22/14	Monday	18:07	Off Road	0	0	1	Dark - Not Lighted	Dry	
84204421	52	-	02/03/14	Monday	8:42	Head On	0	0	1	Unknown	Unknown	
84716834	53	-	11/23/14	Sunday	0:45	Off Road	0	0	1	Dark - Lighted	Wet	
84204386	54	-	01/30/14	Thursday	2:28	Head On	0	0	1	Unknown	Unknown	
84638247	55	-	06/26/14	Thursday	12:55	Other	0	0	1	Daylight	Dry	
84205662	56	-	06/03/14	Tuesday	15:00	Head On	0	0	1	Daylight	Dry	
84717170	57	-	12/24/14	Wednesday	23:30	Other Fixed Object	0	0	1	Dark - Lighted	Dry	
84205170	58	-	04/13/14	Sunday	19:06	Other Fixed Object	0	1	0	Daylight	Dry	
83299080	59	-	04/03/14	Thursday	17:00	Rear End	0	1	0	Daylight	Dry	

	Total No.	-	Injury	PDO	Rear End	Head-On	Angle	Left-Turn	Right-Turn	Sideswipe	Backed Into	Ped/Bike	Parked Car	Fixed Object	Out of control/ Off Road	Other/Unknown
	59	-	**15**	**44**	**15**	**12**	**5**	**6**	**0**	**3**	**0**	**1**	**0**	**2**	**6**	**9**
	Percent	-	*25.42%*	*74.58%*	*25.42%*	*20.34%*	*8.47%*	*10.17%*	*0.00%*	*5.08%*	*0.00%*	*1.69%*	*0.00%*	*3.39%*	*10.17%*	*15.25%*
	Contrib. Cause	-	Dark - Lighted	Wet	Dry	Careless Driving	FTYRW	Improper Turn	Ran Red Light	Exceeded Speed	Improper Passing	Followed too closely	Erratic/ Aggress	Ran off Road	DUI	Other
	Total	-	**13**	**6**	**40**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Percent	-	*22.03%*	*10.17%*	*67.80%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

State of Florida Department of Transportation
CRASH SUMMARY

SECTION: **88050000** STATE ROUTE: **510**

INTERSECTING ROADWAY **90th Avenue** M.P. **0.000** TO **5.283** ENGINEER: **AC**

STUDY PERIOD: FROM **1/ 2015** TO **12/ 2015** COUNTY: **Indian River**

Crash Number	No.	MILE POST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURIES	PROP DAM	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE (VEHICLE ONLY)
84717539	1	-	01/28/15	Wednesday	13:20	Sideswipe	0	0	1	Daylight	Dry	
86148676	2	-	11/08/15	Sunday	12:09	Left Turn	0	4	0	Daylight	Dry	
85826655	3	-	04/27/15	Monday	8:52	Sideswipe	0	0	1	Daylight	Dry	
86148097	4	-	09/09/15	Wednesday	17:27	Rear End	0	0	1	Daylight	Dry	
85827472	5	-	06/25/15	Thursday	10:30	Sideswipe	0	0	1	Unknown	Unknown	
86148905	6	-	11/30/15	Monday	15:29	Rear End	0	0	1	Dark - Lighted	Dry	
85826587	7	-	04/22/15	Wednesday	6:27	Other	0	0	1	Unknown	Unknown	
84717515	8	-	01/26/15	Monday	7:25	Rear End	0	1	0	Daylight	Wet	
85826417	9	-	04/04/15	Saturday	0:07	Other	0	1	0	Dark - Not Lighted	Dry	
85827356	10	-	06/12/15	Friday	4:36	Other	0	1	0	Dark - Not Lighted	Unknown	
86148182	11	-	09/16/15	Wednesday	9:08	Other	0	0	1	Dark - Lighted	Wet	
86147885	12	-	08/24/15	Monday	7:33	Rear End	0	0	1	Unknown	Unknown	
83811491	13	-	06/08/15	Monday	17:35	Other	0	0	1	Daylight	Dry	
82886633	14	-	05/17/15	Sunday	16:20	Other	0	6	0	Daylight	Dry	
85826509	15	-	04/14/15	Tuesday	17:53	Rear End	0	0	1	Daylight	Dry	
82048751	16	-	01/07/15	Wednesday	18:05	Out of control	0	1	0	Dark - Lighted	Dry	
86148794	17	-	11/21/15	Saturday	8:29	Sideswipe	0	0	1	Daylight	Wet	
86147731	18	-	08/05/15	Wednesday	9:40	Rear End	0	1	0	Daylight	Dry	
85827103	19	-	05/20/15	Wednesday	16:40	Rear End	0	0	1	Daylight	Dry	
86148991	20	-	12/08/15	Tuesday	18:16	Rear End	0	0	1	Dark - Lighted	Wet	
86147651	21	-	07/27/15	Monday	7:26	Other	0	0	1	Daylight	Dry	
86148031	22	-	09/04/15	Friday	7:36	Rear End	0	2	0	Daylight	Dry	
85826316	23	-	03/27/15	Friday	6:59	Rear End	0	0	1	Dawn	Wet	
86149046	24	-	12/14/15	Monday	7:14	Rear End	0	1	0	Daylight	Dry	
85827675	25	-	07/08/15	Wednesday	17:38	Rear End	0	0	1	Unknown	Unknown	
86148704	26	-	05/01/15	Friday	10:04	Unknown	0	0	1	Unknown	Unknown	
86148919	27	-	12/02/15	Wednesday	15:30	Sideswipe	0	0	1	Daylight	Wet	
86148763	28	-	11/16/15	Monday	21:48	Left Turn	0	0	1	Dark - Lighted	Wet	
85826406	29	-	03/28/15	Saturday	19:14	Rear End	0	0	1	Daylight	Dry	
86149218	30	-	12/31/15	Thursday	14:50	Sideswipe	0	1	0	Daylight	Dry	
86148566	31	-	10/29/15	Thursday	18:12	Rear End	0	0	1	Daylight	Dry	
86148071	32	-	09/07/15	Monday	16:20	Rear End	0	0	1	Daylight	Wet	
86148491	33	-	10/22/15	Thursday	19:02	Left Turn	0	0	1	Dusk	Dry	
86147605	34	-	07/23/15	Thursday	14:30	Left Turn	0	0	1	Daylight	Dry	
86149016	35	-	12/12/15	Saturday	7:49	Other	0	0	1	Unknown	Unknown	
86148546	36	-	10/27/15	Tuesday	8:01	Rear End	0	0	1	Daylight	Dry	
85140078	37	-	12/04/15	Friday	14:16	Rear End	0	0	1	Daylight	Wet	
83822211	38	-	04/01/15	Wednesday	18:12	Off Road	1	1	0	Daylight	Dry	
83779255	39	-	02/14/15	Saturday	1:00	Left Turn	0	2	0	Dark - Lighted	Dry	
83811489	40	-	05/22/15	Friday	9:05	Left Turn	0	1	0	Daylight	Dry	
86148560	41	-	10/28/15	Wednesday	15:28	Rear End	0	0	1	Daylight	Wet	
85826266	42	-	03/22/15	Sunday	13:44	Other	0	1	0	Unknown	Unknown	
85827142	43	-	05/20/15	Wednesday	8:03	Other	0	0	1	Daylight	Dry	
86148928	44	-	12/03/15	Thursday	9:56	Other	0	0	1	Unknown	Unknown	
84717322	45	-	01/08/15	Thursday	7:35	Rear End	0	0	1	Daylight	Dry	
85826483	46	-	04/12/15	Sunday	11:18	Other	0	0	1	Daylight	Dry	
86148689	47	-	11/10/15	Tuesday	13:31	Rear End	0	0	1	Daylight	Dry	
85826146	48	-	03/10/15	Tuesday	18:37	Right Turn	0	0	1	Daylight	Dry	
86147618	49	-	07/24/15	Friday	19:32	Left Turn	0	1	0	Daylight	Wet	
86149035	50	-	12/14/15	Monday	8:13	Rear End	0	0	1	Unknown	Unknown	
86148674	51	-	11/06/15	Friday	9:20	Angle	0	1	0	Daylight	Dry	
86149088	52	-	12/17/15	Thursday	14:51	Head On	0	0	1	Daylight	Dry	
86147783	53	-	08/08/15	Saturday	21:40	Out of control	0	1	0	Unknown	Unknown	
86148355	54	-	10/04/15	Sunday	19:14	Rear End	0	0	1	Dark - Lighted	Wet	
86149117	55	-	12/20/2015	Sunday	10:41	Angle	0	0	1	Daylight	Dry	
84717535	56	-	01/28/2015	Wednesday	8:00	Rear End	0	0	1	Daylight	Dry	
85826348	57	-	03/29/2015	Sunday	14:13	Unknown	0	0	1	Unknown	Unknown	
85827281	58	-	06/05/2015	Friday	21:29	Rear End	0	0	1	Dark - Lighted	Dry	
85826740	59	-	05/05/2015	Tuesday	18:29	Rear End	0	0	1	Daylight	Wet	
86148480	60	-	10/21/2015	Wednesday	12:15	Rear End	0	0	1	Daylight	Dry	
86149159	61	-	12/24/2015	Thursday	17:48	Other	0	0	1	Dusk	Dry	
86148768	62	-	11/18/2015	Wednesday	5:41	Rear End	0	0	1	Dark - Not Lighted	Wet	

	Total No.	-	Injury	PDO	Rear End	Head-On	Angle	Left-Turn	Right-Turn	Sideswipe	Backed Into	Ped/Bike	Parked Car	Fixed Object	Out of control/ Off Road	Other/Unknown
	62	**-**	**17**	**45**	**27**	**1**	**2**	**7**	**1**	**6**	**0**	**0**	**0**	**0**	**3**	**15**
	Percent	-	*27.42%*	*72.58%*	*43.55%*	*1.61%*	*3.23%*	*11.29%*	*1.61%*	*9.68%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*4.84%*	*24.19%*
	Contrib. Cause	-	Dark - Lighted	Wet	Dry	Careless Driving	FTYRW	Improper Turn	Ran Red Light	Exceeded Speed	Improper Passing	Followed too closely	Erratic/ Aggress	Ran off Road	DUI	Other
	Total	**-**	**13**	**14**	**36**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Percent	-	*20.97%*	*22.58%*	*58.06%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

Appendix 2 – HSM Analyses-Existing Conditions

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 1 - EXISTING
Agency or Company	FDOT	Intersection	MP 0.000 to MP 0.047
Date Performed	07/22/16	Jurisdiction	CR 510 @ CR 512
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	18,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	12,500			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]		No		0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	3			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	2			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.55	0.92	0.89	0.45

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	13.951	0.11	1.000	13.951	0.45	1.00	6.292
Fatal and Injury (FI)	--	--	0.340	4.743	0.45	1.00	2.139
Property Damage Only (PDO)	--	--	0.660	9.208	0.45	1.00	4.153

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C; $(2)x(3)_{TOTAL}$	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C; $(4)x(5)_{FI}$	(6) Proportion of $Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C; $(6)x(7)_{PDO}$
Total	1.000	6.292	1.000	2.139	1.000	4.153
SINGLE-VEHICLE						
Collision with animal	0.002	0.013	0.000	0.000	0.003	0.012
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.019	0.003	0.006	0.003	0.012
Ran off road	0.064	0.403	0.032	0.068	0.081	0.336
Other single-vehicle collision	0.005	0.031	0.003	0.006	0.018	0.075
Total single-vehicle crashes	0.076	0.478	0.040	0.086	0.107	0.444
MULTIPLE-VEHICLE						
Angle collision	0.274	1.724	0.336	0.719	0.242	1.005
Head-on collision	0.054	0.340	0.080	0.171	0.040	0.166
Rear-end collision	0.426	2.680	0.403	0.862	0.438	1.819
Sideswipe collision	0.118	0.742	0.051	0.109	0.153	0.635
Other multiple-vehicle collision	0.052	0.327	0.090	0.193	0.020	0.083
Total multiple-vehicle crashes	0.924	5.814	0.960	2.054	0.893	3.708

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	6.3
Fatal and Injury (FI)	0.340	2.1
Property Damage Only (PDO)	0.660	4.2

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1A - EXISTING
Agency or Company	FDOT	Roadway Section	MP 0.047 to MP 0.530
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.479166667			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	13,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	8	Left Shld:	8
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	6			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Present (1 lane)			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	2			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcemen	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.96	1.00	1.00	1.00	1.01	1.00	0.75	1.00	0.94	1.00	1.00	0.675

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	1.664	0.49	1.000	1.664	0.68	1.00	1.124
Fatal and Injury (FI)	--	--	0.321	0.534	0.68	1.00	0.361
Property Damage Only (PDO)	--	--	0.679	1.130	0.68	1.00	0.763

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.124	1.000	0.361	1.000	0.763
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.136	0.038	0.014	0.184	0.140
Collision with bicycle	0.002	0.002	0.004	0.001	0.001	0.001
Collision with pedestrian	0.003	0.003	0.007	0.003	0.001	0.001
Overturned	0.025	0.028	0.037	0.013	0.015	0.011
Ran off road	0.521	0.586	0.545	0.197	0.505	0.385
Other single-vehicle collision	0.021	0.024	0.007	0.003	0.029	0.022
Total single-vehicle crashes	0.693	0.779	0.638	0.230	0.735	0.561
MULTIPLE-VEHICLE						
Angle collision	0.085	0.096	0.100	0.036	0.072	0.055
Head-on collision	0.016	0.018	0.034	0.012	0.003	0.002
Rear-end collision	0.142	0.160	0.164	0.059	0.122	0.093
Sideswipe collision	0.037	0.042	0.038	0.014	0.038	0.029
Other multiple-vehicle collision	0.027	0.030	0.026	0.009	0.030	0.023
Total multiple-vehicle crashes	0.307	0.345	0.362	0.131	0.265	0.202

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.1	0.479166667	2.3
Fatal and Injury (FI)	0.321	0.4	0.479166667	0.8
Property Damage Only (PDO)	0.679	0.8	0.479166667	1.6

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 2 - EXISTING
Agency or Company	FDOT	Intersection	MP 0.530 to MP 0.643
Date Performed	07/22/16	Jurisdiction	CR 510 @ MAKO WAY
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	14,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	1,100			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	1			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Not Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.82	0.96	1.00	0.79

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	7.379	0.11	1.000	7.379	0.79	1.00	5.809
Fatal and Injury (FI)	--	--	0.340	2.509	0.79	1.00	1.975
Property Damage Only (PDO)	--	--	0.660	4.870	0.79	1.00	3.834

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision Type(TOTAL) from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C; $(2)x(3)_{TOTAL}$	(4) Proportion of Collision Type(FI) from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C; $(4)x(5)_{FI}$	(6) Proportion of Collision Type(PDO) from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C; $(6)x(7)_{PDO}$
Total	1.000	5.809	1.000	1.975	1.000	3.834
SINGLE-VEHICLE						
Collision with animal	0.002	0.012	0.000	0.000	0.003	0.012
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.017	0.003	0.006	0.003	0.012
Ran off road	0.064	0.372	0.032	0.063	0.081	0.311
Other single-vehicle collision	0.005	0.029	0.003	0.006	0.018	0.069
Total single-vehicle crashes	0.076	0.441	0.040	0.079	0.107	0.410
MULTIPLE-VEHICLE						
Angle collision	0.274	1.592	0.336	0.664	0.242	0.928
Head-on collision	0.054	0.314	0.080	0.158	0.040	0.153
Rear-end collision	0.426	2.475	0.403	0.796	0.438	1.679
Sideswipe collision	0.118	0.685	0.051	0.101	0.153	0.587
Other multiple-vehicle collision	0.052	0.302	0.090	0.178	0.020	0.077
Total multiple-vehicle crashes	0.924	5.368	0.960	1.896	0.893	3.424

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	5.8
Fatal and Injury (FI)	0.340	2.0
Property Damage Only (PDO)	0.660	3.8

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 3 - EXISTING
Agency or Company	FDOT	Intersection	MP 0.643 to MP 0.754
Date Performed	07/22/16	Jurisdiction	CR 510 @ HAMMERHEAD WAY
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	13,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	2,300			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	2			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.92	0.89	0.55

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	8.181	0.11	1.000	8.181	0.55	1.00	4.494
Fatal and Injury (FI)	--	--	0.340	2.781	0.55	1.00	1.528
Property Damage Only (PDO)	--	--	0.660	5.399	0.55	1.00	2.966

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision Type(TOTAL) from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) (8)TOTAL from Worksheet 2C; (2)x(3)TOTAL	(4) Proportion of Collision Type(FI) from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) (8)FI from Worksheet 2C; (4)x(5)FI	(6) Proportion of Collision Type(PDO) from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) (8)PDO from Worksheet 2C; (6)x(7)PDO
Total	1.000	4.494	1.000	1.528	1.000	2.966
SINGLE-VEHICLE						
Collision with animal	0.002	0.009	0.000	0.000	0.003	0.009
Collision with bicycle	0.001	0.004	0.001	0.002	0.001	0.003
Collision with pedestrian	0.001	0.004	0.001	0.002	0.001	0.003
Overturned	0.003	0.013	0.003	0.005	0.003	0.009
Ran off road	0.064	0.288	0.032	0.049	0.081	0.240
Other single-vehicle collision	0.005	0.022	0.003	0.005	0.018	0.053
Total single-vehicle crashes	0.076	0.342	0.040	0.061	0.107	0.317
MULTIPLE-VEHICLE						
Angle collision	0.274	1.231	0.336	0.513	0.242	0.718
Head-on collision	0.054	0.243	0.080	0.122	0.040	0.119
Rear-end collision	0.426	1.915	0.403	0.616	0.438	1.299
Sideswipe collision	0.118	0.530	0.051	0.078	0.153	0.454
Other multiple-vehicle collision	0.052	0.234	0.090	0.138	0.020	0.059
Total multiple-vehicle crashes	0.924	4.153	0.960	1.467	0.893	2.649

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	4.5
Fatal and Injury (FI)	0.340	1.5
Property Damage Only (PDO)	0.660	3.0

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1B - EXISTING
Agency or Company	FDOT	Roadway Section	MP 0.754 to MP 0.965
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.211			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	13,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	0			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	1.058

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.733	1.12	1.000	0.733	1.06	1.00	0.775
Fatal and Injury (FI)	--	--	0.321	0.235	1.06	1.00	0.249
Property Damage Only (PDO)	--	--	0.679	0.498	1.06	1.00	0.526

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.775	1.000	0.249	1.000	0.526
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.094	0.038	0.009	0.184	0.097
Collision with bicycle	0.002	0.002	0.004	0.001	0.001	0.001
Collision with pedestrian	0.003	0.002	0.007	0.002	0.001	0.001
Overturned	0.025	0.019	0.037	0.009	0.015	0.008
Ran off road	0.521	0.404	0.545	0.136	0.505	0.266
Other single-vehicle collision	0.021	0.016	0.007	0.002	0.029	0.015
Total single-vehicle crashes	0.693	0.537	0.638	0.159	0.735	0.387
MULTIPLE-VEHICLE						
Angle collision	0.085	0.066	0.100	0.025	0.072	0.038
Head-on collision	0.016	0.012	0.034	0.008	0.003	0.002
Rear-end collision	0.142	0.110	0.164	0.041	0.122	0.064
Sideswipe collision	0.037	0.029	0.038	0.009	0.038	0.020
Other multiple-vehicle collision	0.027	0.021	0.026	0.006	0.030	0.016
Total multiple-vehicle crashes	0.307	0.238	0.362	0.090	0.265	0.139

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.8	0.211	3.7
Fatal and Injury (FI)	0.321	0.2	0.211	1.2
Property Damage Only (PDO)	0.679	0.5	0.211	2.5

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 4 - EXISTING
Agency or Company	FDOT	Intersection	MP 0.965 to MP 1.060
Date Performed	07/22/16	Jurisdiction	CR 510 @ 87TH ST
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	13,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	6,900			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.96	0.89	0.57

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	10.191	0.11	1.000	10.191	0.57	1.00	5.842
Fatal and Injury (FI)	--	--	0.340	3.465	0.57	1.00	1.986
Property Damage Only (PDO)	--	--	0.660	6.726	0.57	1.00	3.856

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision Type(TOTAL) from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C; $(2)x(3)_{TOTAL}$	(4) Proportion of Collision Type(FI) from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C; $(4)x(5)_{FI}$	(6) Proportion of Collision Type(PDO) from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C; $(6)x(7)_{PDO}$
Total	1.000	5.842	1.000	1.986	1.000	3.856
SINGLE-VEHICLE						
Collision with animal	0.002	0.012	0.000	0.000	0.003	0.012
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.018	0.003	0.006	0.003	0.012
Ran off road	0.064	0.374	0.032	0.064	0.081	0.312
Other single-vehicle collision	0.005	0.029	0.003	0.006	0.018	0.069
Total single-vehicle crashes	0.076	0.444	0.040	0.079	0.107	0.413
MULTIPLE-VEHICLE						
Angle collision	0.274	1.601	0.336	0.667	0.242	0.933
Head-on collision	0.054	0.315	0.080	0.159	0.040	0.154
Rear-end collision	0.426	2.489	0.403	0.801	0.438	1.689
Sideswipe collision	0.118	0.689	0.051	0.101	0.153	0.590
Other multiple-vehicle collision	0.052	0.304	0.090	0.179	0.020	0.077
Total multiple-vehicle crashes	0.924	5.398	0.960	1.907	0.893	3.443

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	5.8
Fatal and Injury (FI)	0.340	2.0
Property Damage Only (PDO)	0.660	3.9

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1C - EXISTING
Agency or Company	FDOT	Roadway Section	MP 1.060 to MP 1.215
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data	Base Conditions	Site Conditions
Length of segment, L (mi)	--	0.155
AADT (veh/day) ($AADT_{MAX}$ = 17,800 (veh/day))	--	11,000
Lane width (ft)	12	12
Shoulder width (ft)	6	Right Shld: 7 / Left Shld: 7
Shoulder type	Paved	Right Shld: Composite / Left Shld: Composite
Length of horizontal curve (mi)	0	0.0
Radius of curvature (ft)	0	0
Spiral transition curve (present/not present)	Not Present	Not Present
Superelevation variance (ft/ft)	< 0.01	0
Grade (%)	0	3
Driveway density (driveways/mile)	5	30
Centerline rumble strips (present/not present)	Not Present	Not Present
Passing lanes [present (1 lane) /present (2 lane) / not present)]	Not Present	Not Present
Two-way left-turn lane (present/not present)	Not Present	Not Present
Roadside hazard rating (1-7 scale)	3	1
Segment lighting (present/not present)	Not Present	Not Present
Auto speed enforcement (present/not present)	Not Present	Not Present
Calibration Factor, Cr	1	1.00

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.26	1.00	1.00	1.00	0.87	1.00	1.00	1.087

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.456	1.52	1.000	0.456	1.09	1.00	0.495
Fatal and Injury (FI)	--	--	0.321	0.146	1.09	1.00	0.159
Property Damage Only (PDO)	--	--	0.679	0.309	1.09	1.00	0.336

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.495	1.000	0.159	1.000	0.336
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.060	0.038	0.006	0.184	0.062
Collision with bicycle	0.002	0.001	0.004	0.001	0.001	0.000
Collision with pedestrian	0.003	0.001	0.007	0.001	0.001	0.000
Overturned	0.025	0.012	0.037	0.006	0.015	0.005
Ran off road	0.521	0.258	0.545	0.087	0.505	0.170
Other single-vehicle collision	0.021	0.010	0.007	0.001	0.029	0.010
Total single-vehicle crashes	0.693	0.343	0.638	0.101	0.735	0.247
MULTIPLE-VEHICLE						
Angle collision	0.085	0.042	0.100	0.016	0.072	0.024
Head-on collision	0.016	0.008	0.034	0.005	0.003	0.001
Rear-end collision	0.142	0.070	0.164	0.026	0.122	0.041
Sideswipe collision	0.037	0.018	0.038	0.006	0.038	0.013
Other multiple-vehicle collision	0.027	0.013	0.026	0.004	0.030	0.010
Total multiple-vehicle crashes	0.307	0.152	0.362	0.058	0.265	0.089

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.5	0.155	3.2
Fatal and Injury (FI)	0.321	0.2	0.155	1.0
Property Damage Only (PDO)	0.679	0.3	0.155	2.2

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 2A - EXISTING
Agency or Company	FDOT	Roadway Section	MP 1.215 to MP 1.286
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data	Base Conditions	Site Conditions			
Length of segment, L (mi)	--	0.071022727			
AADT (veh/day) ($AADT_{MAX}$ = 17,800 (veh/day))	--	12,000			
Lane width (ft)	12	12			
Shoulder width (ft)	6	Right Shld:	6	Left Shld:	6
Shoulder type	Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)	0	0.1			
Radius of curvature (ft)	0	180			
Spiral transition curve (present/not present)	Not Present	Not Present			
Superelevation variance (ft/ft)	< 0.01	0			
Grade (%)	0	3			
Driveway density (driveways/mile)	5	0			
Centerline rumble strips (present/not present)	Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]	Not Present	Not Present			
Two-way left-turn lane (present/not present)	Not Present	Not Present			
Roadside hazard rating (1-7 scale)	3	4			
Segment lighting (present/not present)	Not Present	Not Present			
Auto speed enforcement (present/not present)	Not Present	Not Present			
Calibration Factor, Cr	1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.02	4.94	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	5.405

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.228	3.32	1.000	0.228	5.40	1.00	1.231
Fatal and Injury (FI)	--	--	0.321	0.073	5.40	1.00	0.395
Property Damage Only (PDO)	--	--	0.679	0.155	5.40	1.00	0.836

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.231	1.000	0.395	1.000	0.836
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.149	0.038	0.015	0.184	0.154
Collision with bicycle	0.002	0.002	0.004	0.002	0.001	0.001
Collision with pedestrian	0.003	0.004	0.007	0.003	0.001	0.001
Overturned	0.025	0.031	0.037	0.015	0.015	0.013
Ran off road	0.521	0.641	0.545	0.215	0.505	0.422
Other single-vehicle collision	0.021	0.026	0.007	0.003	0.029	0.024
Total single-vehicle crashes	0.693	0.853	0.638	0.252	0.735	0.614
MULTIPLE-VEHICLE						
Angle collision	0.085	0.105	0.100	0.040	0.072	0.060
Head-on collision	0.016	0.020	0.034	0.013	0.003	0.003
Rear-end collision	0.142	0.175	0.164	0.065	0.122	0.102
Sideswipe collision	0.037	0.046	0.038	0.015	0.038	0.032
Other multiple-vehicle collision	0.027	0.033	0.026	0.010	0.030	0.025
Total multiple-vehicle crashes	0.307	0.378	0.362	0.143	0.265	0.221

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.2	0.071022727	17.3
Fatal and Injury (FI)	0.321	0.4	0.071022727	5.6
Property Damage Only (PDO)	0.679	0.8	0.071022727	11.8

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 2B - EXISTING
Agency or Company	FDOT	Roadway Section	MP 1.286 to MP 1.403
Date Performed	06/29/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data	Base Conditions	Site Conditions			
Length of segment, L (mi)	--	0.117			
AADT (veh/day)	--	12,000			
$AADT_{MAX}$ = 17,800 (veh/day)					
Lane width (ft)	12	12			
Shoulder width (ft)	6	Right Shld:	8	Left Shld:	8
Shoulder type	Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)	0	0.1			
Radius of curvature (ft)	0	180			
Spiral transition curve (present/not present)	Not Present	Not Present			
Superelevation variance (ft/ft)	< 0.01	0			
Grade (%)	0	3			
Driveway density (driveways/mile)	5	0			
Centerline rumble strips (present/not present)	Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]	Not Present	Not Present			
Two-way left-turn lane (present/not present)	Not Present	Not Present			
Roadside hazard rating (1-7 scale)	3	4			
Segment lighting (present/not present)	Not Present	Not Present			
Auto speed enforcement (present/not present)	Not Present	Not Present			
Calibration Factor, Cr	1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.96	4.94	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	5.048

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.375	2.02	1.000	0.375	5.05	1.00	1.893
Fatal and Injury (FI)	--	--	0.321	0.120	5.05	1.00	0.608
Property Damage Only (PDO)	--	--	0.679	0.255	5.05	1.00	1.286

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.893	1.000	0.608	1.000	1.286
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.229	0.038	0.023	0.184	0.237
Collision with bicycle	0.002	0.004	0.004	0.002	0.001	0.001
Collision with pedestrian	0.003	0.006	0.007	0.004	0.001	0.001
Overturned	0.025	0.047	0.037	0.022	0.015	0.019
Ran off road	0.521	0.986	0.545	0.331	0.505	0.649
Other single-vehicle collision	0.021	0.040	0.007	0.004	0.029	0.037
Total single-vehicle crashes	0.693	1.312	0.638	0.388	0.735	0.945
MULTIPLE-VEHICLE						
Angle collision	0.085	0.161	0.100	0.061	0.072	0.093
Head-on collision	0.016	0.030	0.034	0.021	0.003	0.004
Rear-end collision	0.142	0.269	0.164	0.100	0.122	0.157
Sideswipe collision	0.037	0.070	0.038	0.023	0.038	0.049
Other multiple-vehicle collision	0.027	0.051	0.026	0.016	0.030	0.039
Total multiple-vehicle crashes	0.307	0.581	0.362	0.220	0.265	0.341

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.9	0.117	16.2
Fatal and Injury (FI)	0.321	0.6	0.117	5.2
Property Damage Only (PDO)	0.679	1.3	0.117	11.0

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 5 - EXISTING
Agency or Company	FDOT	Intersection	MP 1.403 to MP 1.600
Date Performed	07/22/16	Jurisdiction	CR 510 @ TREASURE COAST ELEM. SCHOOL
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	13,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	1,500			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	2			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.92	0.89	0.55

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	7.510	0.11	1.000	7.510	0.55	1.00	4.126
Fatal and Injury (FI)	--	--	0.340	2.553	0.55	1.00	1.403
Property Damage Only (PDO)	--	--	0.660	4.957	0.55	1.00	2.723

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of $Collision\ Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	4.126	1.000	1.403	1.000	2.723
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.008	0.000	0.000	0.003	0.008
Collision with bicycle	0.001	0.004	0.001	0.001	0.001	0.003
Collision with pedestrian	0.001	0.004	0.001	0.001	0.001	0.003
Overturned	0.003	0.012	0.003	0.004	0.003	0.008
Ran off road	0.064	0.264	0.032	0.045	0.081	0.221
Other single-vehicle collision	0.005	0.021	0.003	0.004	0.018	0.049
Total single-vehicle crashes	0.076	0.314	0.040	0.056	0.107	0.291
MULTIPLE-VEHICLE						
Angle collision	0.274	1.131	0.336	0.471	0.242	0.659
Head-on collision	0.054	0.223	0.080	0.112	0.040	0.109
Rear-end collision	0.426	1.758	0.403	0.565	0.438	1.193
Sideswipe collision	0.118	0.487	0.051	0.072	0.153	0.417
Other multiple-vehicle collision	0.052	0.215	0.090	0.126	0.020	0.054
Total multiple-vehicle crashes	0.924	3.813	0.960	1.347	0.893	2.432

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	4.1
Fatal and Injury (FI)	0.340	1.4
Property Damage Only (PDO)	0.660	2.7

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3A - EXISTING
Agency or Company	FDOT	Roadway Section	MP 1.600 to MP 2.237
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.637			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	12,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.03	1.00	1.00	1.00	1.07	1.00	1.00	1.086

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	2.042	0.37	1.000	2.042	1.09	1.00	2.219
Fatal and Injury (FI)	--	--	0.321	0.656	1.09	1.00	0.712
Property Damage Only (PDO)	--	--	0.679	1.387	1.09	1.00	1.507

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	2.219	1.000	0.712	1.000	1.507
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.268	0.038	0.027	0.184	0.277
Collision with bicycle	0.002	0.004	0.004	0.003	0.001	0.002
Collision with pedestrian	0.003	0.007	0.007	0.005	0.001	0.002
Overturned	0.025	0.055	0.037	0.026	0.015	0.023
Ran off road	0.521	1.156	0.545	0.388	0.505	0.761
Other single-vehicle collision	0.021	0.047	0.007	0.005	0.029	0.044
Total single-vehicle crashes	0.693	1.538	0.638	0.454	0.735	1.107
MULTIPLE-VEHICLE						
Angle collision	0.085	0.189	0.100	0.071	0.072	0.108
Head-on collision	0.016	0.036	0.034	0.024	0.003	0.005
Rear-end collision	0.142	0.315	0.164	0.117	0.122	0.184
Sideswipe collision	0.037	0.082	0.038	0.027	0.038	0.057
Other multiple-vehicle collision	0.027	0.060	0.026	0.019	0.030	0.045
Total multiple-vehicle crashes	0.307	0.681	0.362	0.258	0.265	0.399

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	2.2	0.637	3.5
Fatal and Injury (FI)	0.321	0.7	0.637	1.1
Property Damage Only (PDO)	0.679	1.5	0.637	2.4

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3B - EXISTING
Agency or Company	FDOT	Roadway Section	MP 2.237 to MP 2.256
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.019			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	12,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	0	Left Shld:	0
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	7			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.29	1.00	1.00	1.00	1.03	1.00	1.00	1.00	1.31	1.00	1.00	1.727

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.061	12.42	1.000	0.061	1.73	1.00	0.105
Fatal and Injury (FI)	--	--	0.321	0.020	1.73	1.00	0.034
Property Damage Only (PDO)	--	--	0.679	0.041	1.73	1.00	0.071

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.105	1.000	0.034	1.000	0.071
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.013	0.038	0.001	0.184	0.013
Collision with bicycle	0.002	0.000	0.004	0.000	0.001	0.000
Collision with pedestrian	0.003	0.000	0.007	0.000	0.001	0.000
Overturned	0.025	0.003	0.037	0.001	0.015	0.001
Ran off road	0.521	0.055	0.545	0.018	0.505	0.036
Other single-vehicle collision	0.021	0.002	0.007	0.000	0.029	0.002
Total single-vehicle crashes	0.693	0.073	0.638	0.022	0.735	0.052
MULTIPLE-VEHICLE						
Angle collision	0.085	0.009	0.100	0.003	0.072	0.005
Head-on collision	0.016	0.002	0.034	0.001	0.003	0.000
Rear-end collision	0.142	0.015	0.164	0.006	0.122	0.009
Sideswipe collision	0.037	0.004	0.038	0.001	0.038	0.003
Other multiple-vehicle collision	0.027	0.003	0.026	0.001	0.030	0.002
Total multiple-vehicle crashes	0.307	0.032	0.362	0.012	0.265	0.019

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.1	0.019	5.5
Fatal and Injury (FI)	0.321	0.0	0.019	1.8
Property Damage Only (PDO)	0.679	0.1	0.019	3.8

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3C - EXISTING
Agency or Company	FDOT	Roadway Section	MP 2.256 to MP 2.732
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.476			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	13,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	6	Left Shld:	6
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.02	1.00	1.00	1.00	1.02	1.00	1.00	1.00	1.07	1.00	1.00	1.119

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	1.653	0.50	1.000	1.653	1.12	1.00	1.851
Fatal and Injury (FI)	--	--	0.321	0.531	1.12	1.00	0.594
Property Damage Only (PDO)	--	--	0.679	1.123	1.12	1.00	1.257

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.851	1.000	0.594	1.000	1.257
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.224	0.038	0.023	0.184	0.231
Collision with bicycle	0.002	0.004	0.004	0.002	0.001	0.001
Collision with pedestrian	0.003	0.006	0.007	0.004	0.001	0.001
Overturned	0.025	0.046	0.037	0.022	0.015	0.019
Ran off road	0.521	0.964	0.545	0.324	0.505	0.635
Other single-vehicle collision	0.021	0.039	0.007	0.004	0.029	0.036
Total single-vehicle crashes	0.693	1.283	0.638	0.379	0.735	0.924
MULTIPLE-VEHICLE						
Angle collision	0.085	0.157	0.100	0.059	0.072	0.090
Head-on collision	0.016	0.030	0.034	0.020	0.003	0.004
Rear-end collision	0.142	0.263	0.164	0.097	0.122	0.153
Sideswipe collision	0.037	0.068	0.038	0.023	0.038	0.048
Other multiple-vehicle collision	0.027	0.050	0.026	0.015	0.030	0.038
Total multiple-vehicle crashes	0.307	0.568	0.362	0.215	0.265	0.333

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.9	0.476	3.9
Fatal and Injury (FI)	0.321	0.6	0.476	1.2
Property Damage Only (PDO)	0.679	1.3	0.476	2.6

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3D - EXISTING
Agency or Company	FDOT	Roadway Section	MP 2.732 to MP 2.756
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.024			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	13,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	0	Left Shld:	0
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	7			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.29	1.00	1.00	1.00	1.02	1.00	1.00	1.00	1.31	1.00	1.00	1.721

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.083	9.83	1.000	0.083	1.72	1.00	0.143
Fatal and Injury (FI)	--	--	0.321	0.027	1.72	1.00	0.046
Property Damage Only (PDO)	--	--	0.679	0.057	1.72	1.00	0.097

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.143	1.000	0.046	1.000	0.097
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.017	0.038	0.002	0.184	0.018
Collision with bicycle	0.002	0.000	0.004	0.000	0.001	0.000
Collision with pedestrian	0.003	0.000	0.007	0.000	0.001	0.000
Overturned	0.025	0.004	0.037	0.002	0.015	0.001
Ran off road	0.521	0.075	0.545	0.025	0.505	0.049
Other single-vehicle collision	0.021	0.003	0.007	0.000	0.029	0.003
Total single-vehicle crashes	0.693	0.099	0.638	0.029	0.735	0.072
MULTIPLE-VEHICLE						
Angle collision	0.085	0.012	0.100	0.005	0.072	0.007
Head-on collision	0.016	0.002	0.034	0.002	0.003	0.000
Rear-end collision	0.142	0.020	0.164	0.008	0.122	0.012
Sideswipe collision	0.037	0.005	0.038	0.002	0.038	0.004
Other multiple-vehicle collision	0.027	0.004	0.026	0.001	0.030	0.003
Total multiple-vehicle crashes	0.307	0.044	0.362	0.017	0.265	0.026

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.1	0.024	6.0
Fatal and Injury (FI)	0.321	0.0	0.024	1.9
Property Damage Only (PDO)	0.679	0.1	0.024	4.1

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3E - EXISTING
Agency or Company	FDOT	Roadway Section	MP 2.756 to MP 4.204
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data	Base Conditions	Site Conditions
Length of segment, L (mi)	--	1.448
AADT (veh/day) ($AADT_{MAX}$ = 17,800 (veh/day))	--	14,000
Lane width (ft)	12	12
Shoulder width (ft)	6	Right Shld: 6 / Left Shld: 6
Shoulder type	Paved	Right Shld: Composite / Left Shld: Composite
Length of horizontal curve (mi)	0	0.0
Radius of curvature (ft)	0	0
Spiral transition curve (present/not present)	Not Present	Not Present
Superelevation variance (ft/ft)	< 0.01	0
Grade (%)	0	3
Driveway density (driveways/mile)	5	8
Centerline rumble strips (present/not present)	Not Present	Not Present
Passing lanes [present (1 lane) /present (2 lane) / not present)]	Not Present	Not Present
Two-way left-turn lane (present/not present)	Not Present	Not Present
Roadside hazard rating (1-7 scale)	3	5
Segment lighting (present/not present)	Not Present	Not Present
Auto speed enforcement (present/not present)	Not Present	Not Present
Calibration Factor, Cr	1	1.00

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.02	1.00	1.00	1.00	1.02	1.00	1.00	1.00	1.14	1.00	1.00	1.193

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	5.416	0.16	1.000	5.416	1.19	1.00	6.462
Fatal and Injury (FI)	--	--	0.321	1.739	1.19	1.00	2.074
Property Damage Only (PDO)	--	--	0.679	3.678	1.19	1.00	4.387

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	6.462	1.000	2.074	1.000	4.387
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.782	0.038	0.079	0.184	0.807
Collision with bicycle	0.002	0.013	0.004	0.008	0.001	0.004
Collision with pedestrian	0.003	0.019	0.007	0.015	0.001	0.004
Overturned	0.025	0.162	0.037	0.077	0.015	0.066
Ran off road	0.521	3.366	0.545	1.130	0.505	2.216
Other single-vehicle collision	0.021	0.136	0.007	0.015	0.029	0.127
Total single-vehicle crashes	0.693	4.478	0.638	1.323	0.735	3.225
MULTIPLE-VEHICLE						
Angle collision	0.085	0.549	0.100	0.207	0.072	0.316
Head-on collision	0.016	0.103	0.034	0.071	0.003	0.013
Rear-end collision	0.142	0.918	0.164	0.340	0.122	0.535
Sideswipe collision	0.037	0.239	0.038	0.079	0.038	0.167
Other multiple-vehicle collision	0.027	0.174	0.026	0.054	0.030	0.132
Total multiple-vehicle crashes	0.307	1.984	0.362	0.751	0.265	1.163

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	6.5	1.448	4.5
Fatal and Injury (FI)	0.321	2.1	1.448	1.4
Property Damage Only (PDO)	0.679	4.4	1.448	3.0

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 6 - EXISTING
Agency or Company	FDOT	Intersection	MP 4.204 to MP 4.337
Date Performed	07/22/16	Jurisdiction	CR 510 @ 66TH AVE
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	13,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	12,000			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	4			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.45	0.96	0.89	0.39

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	11.383	0.11	1.000	11.383	0.39	1.00	4.383
Fatal and Injury (FI)	--	--	0.340	3.870	0.39	1.00	1.490
Property Damage Only (PDO)	--	--	0.660	7.513	0.39	1.00	2.893

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of $Collision\ Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	4.383	1.000	1.490	1.000	2.893
		$(2)x(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)x(7)_{PDO}$
SINGLE-VEHICLE						
Collision with animal	0.002	0.009	0.000	0.000	0.003	0.009
Collision with bicycle	0.001	0.004	0.001	0.001	0.001	0.003
Collision with pedestrian	0.001	0.004	0.001	0.001	0.001	0.003
Overturned	0.003	0.013	0.003	0.004	0.003	0.009
Ran off road	0.064	0.281	0.032	0.048	0.081	0.234
Other single-vehicle collision	0.005	0.022	0.003	0.004	0.018	0.052
Total single-vehicle crashes	0.076	0.333	0.040	0.060	0.107	0.310
MULTIPLE-VEHICLE						
Angle collision	0.274	1.201	0.336	0.501	0.242	0.700
Head-on collision	0.054	0.237	0.080	0.119	0.040	0.116
Rear-end collision	0.426	1.867	0.403	0.601	0.438	1.267
Sideswipe collision	0.118	0.517	0.051	0.076	0.153	0.443
Other multiple-vehicle collision	0.052	0.228	0.090	0.134	0.020	0.058
Total multiple-vehicle crashes	0.924	4.050	0.960	1.431	0.893	2.583

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	4.4
Fatal and Injury (FI)	0.340	1.5
Property Damage Only (PDO)	0.660	2.9

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 4A - EXISTING
Agency or Company	FDOT	Roadway Section	MP 4.337 to MP 5.236
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2015

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.899			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	13,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	21			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.13	1.00	1.00	1.00	1.07	1.00	1.00	1.191

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	3.122	0.26	1.000	3.122	1.19	1.00	3.719
Fatal and Injury (FI)	--	--	0.321	1.002	1.19	1.00	1.194
Property Damage Only (PDO)	--	--	0.679	2.120	1.19	1.00	2.525

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	3.719	1.000	1.194	1.000	2.525
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.450	0.038	0.045	0.184	0.465
Collision with bicycle	0.002	0.007	0.004	0.005	0.001	0.003
Collision with pedestrian	0.003	0.011	0.007	0.008	0.001	0.003
Overturned	0.025	0.093	0.037	0.044	0.015	0.038
Ran off road	0.521	1.938	0.545	0.651	0.505	1.275
Other single-vehicle collision	0.021	0.078	0.007	0.008	0.029	0.073
Total single-vehicle crashes	0.693	2.577	0.638	0.762	0.735	1.856
MULTIPLE-VEHICLE						
Angle collision	0.085	0.316	0.100	0.119	0.072	0.182
Head-on collision	0.016	0.060	0.034	0.041	0.003	0.008
Rear-end collision	0.142	0.528	0.164	0.196	0.122	0.308
Sideswipe collision	0.037	0.138	0.038	0.045	0.038	0.096
Other multiple-vehicle collision	0.027	0.100	0.026	0.031	0.030	0.076
Total multiple-vehicle crashes	0.307	1.142	0.362	0.432	0.265	0.669

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	3.7	0.899	4.1
Fatal and Injury (FI)	0.321	1.2	0.899	1.3
Property Damage Only (PDO)	0.679	2.5	0.899	2.8

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 7 - EXISTING
Agency or Company	FDOT	Intersection	MP 5.237 to MP 5.283
Date Performed	07/22/16	Jurisdiction	CR 510 @ 58TH AVE
		Analysis Year	2015

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	13,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	6,700			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.96	0.89	0.57

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	10.131	0.11	1.000	10.131	0.57	1.00	5.808
Fatal and Injury (FI)	--	--	0.340	3.445	0.57	1.00	1.975
Property Damage Only (PDO)	--	--	0.660	6.686	0.57	1.00	3.833

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of $Collision\ Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	5.808	1.000	1.975	1.000	3.833
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.012	0.000	0.000	0.003	0.011
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.017	0.003	0.006	0.003	0.011
Ran off road	0.064	0.372	0.032	0.063	0.081	0.310
Other single-vehicle collision	0.005	0.029	0.003	0.006	0.018	0.069
Total single-vehicle crashes	0.076	0.441	0.040	0.079	0.107	0.410
MULTIPLE-VEHICLE						
Angle collision	0.274	1.591	0.336	0.664	0.242	0.928
Head-on collision	0.054	0.314	0.080	0.158	0.040	0.153
Rear-end collision	0.426	2.474	0.403	0.796	0.438	1.679
Sideswipe collision	0.118	0.685	0.051	0.101	0.153	0.586
Other multiple-vehicle collision	0.052	0.302	0.090	0.178	0.020	0.077
Total multiple-vehicle crashes	0.924	5.367	0.960	1.896	0.893	3.423

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	5.8
Fatal and Injury (FI)	0.340	2.0
Property Damage Only (PDO)	0.660	3.8

CR-510 EXISTING

Worksheet 3A -- Predicted and Observed Crashes by Severity and Site Type Using the Site-Specific EB Method

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes,** $N_{observed}$ (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w** Equation A-5 from Part C Appendix	**Expected average crash frequency,** Equation A-4 from Part C Appendix
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)				
ROADWAY SEGMENTS							
Segment 1A	1.124	0.361	0.763	0	0.493	0.644	0.724
Segment 1B	0.775	0.249	0.526	1	1.118	0.536	0.880
Segment 1C	0.495	0.159	0.336	3	1.523	0.570	1.572
Segment 2A	1.231	0.395	0.836	1	3.323	0.196	1.045
Segment 2B	1.893	0.608	1.286	1	2.017	0.208	1.185
Segment 3A	2.219	0.712	1.507	2	0.370	0.549	2.120
Segment 3B	0.105	0.034	0.071	0	12.421	0.434	0.046
Segment 3C	1.851	0.594	1.257	2	0.496	0.521	1.922
Segment 3D	0.143	0.046	0.097	0	9.833	0.415	0.060
Segment 3E	6.462	2.074	4.387	9	0.163	0.487	7.764
Segment 4A	3.719	1.194	2.525	2	0.263	0.506	2.870
INTERSECTIONS							
Intersection 1	6.292	2.139	4.153	9	0.110	0.591	7.400
Intersection 2	5.809	1.975	3.834	0	0.110	0.610	3.544
Intersection 3	4.494	1.528	2.966	4	0.110	0.669	4.331
Intersection 4	5.842	1.986	3.856	4	0.110	0.609	5.122
Intersection 5	4.126	1.403	2.723	2	0.110	0.688	3.462
Intersection 6	4.383	1.490	2.893	16	0.110	0.675	8.162
Intersection 7	5.808	1.975	3.833	6	0.110	0.610	5.883
COMBINED (sum of column)	**56.773**	18.922	37.851	**62**	--	--	**58.091**

Worksheet 3B -- Site-Specific EB Method Summary Results

(1)	(2)	(3)
Crash severity level	$N_{predicted}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(8)_{COMB}$ from Worksheet 3A
	56.773	58.1
Fatal and Injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$
	18.922	19.4
Property Damage Only (PDO)	$(4)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$
	37.851	38.7

Appendix 3– HSM Analyses- 2040 Future (No-Build Conditions)

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 1 - NO-BUILD
Agency or Company	FDOT	Intersection	MP 0.000 to MP 0.047
Date Performed	07/22/16	Jurisdiction	CR 510 @ CR 512
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	16,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	12,500			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	3			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	2			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.55	0.92	0.89	0.45

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	12.999	0.11	1.000	12.999	0.45	1.00	5.863
Fatal and Injury (FI)	--	--	0.340	4.420	0.45	1.00	1.993
Property Damage Only (PDO)	--	--	0.660	8.580	0.45	1.00	3.869

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) **Collision Type**	(2) **Proportion of Collision Type**$_{(TOTAL)}$ from Table 10-6	(3) **$N_{predicted\ int}$ (TOTAL) (crashes/year)** $(8)_{TOTAL}$ from Worksheet 2C; $(2)x(3)_{TOTAL}$	(4) **Proportion of Collision Type**$_{(FI)}$ from Table 10-6	(5) **$N_{predicted\ int}$ (FI) (crashes/year)** $(8)_{FI}$ from Worksheet 2C; $(4)x(5)_{FI}$	(6) **Proportion of Collision Type**$_{(PDO)}$ from Table 10-6	(7) **$N_{predicted\ int}$ (PDO) (crashes/year)** $(8)_{PDO}$ from Worksheet 2C; $(6)x(7)_{PDO}$
Total	1.000	5.863	1.000	1.993	1.000	3.869
SINGLE-VEHICLE						
Collision with animal	0.002	0.012	0.000	0.000	0.003	0.012
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.018	0.003	0.006	0.003	0.012
Ran off road	0.064	0.375	0.032	0.064	0.081	0.313
Other single-vehicle collision	0.005	0.029	0.003	0.006	0.018	0.070
Total single-vehicle crashes	0.076	0.446	0.040	0.080	0.107	0.414
MULTIPLE-VEHICLE						
Angle collision	0.274	1.606	0.336	0.670	0.242	0.936
Head-on collision	0.054	0.317	0.080	0.159	0.040	0.155
Rear-end collision	0.426	2.498	0.403	0.803	0.438	1.695
Sideswipe collision	0.118	0.692	0.051	0.102	0.153	0.592
Other multiple-vehicle collision	0.052	0.305	0.090	0.179	0.020	0.077
Total multiple-vehicle crashes	0.924	5.417	0.960	1.914	0.893	3.455

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) **Crash severity level**	(2) **Crash Severity Distribution** (proportion) (4) from Worksheet 2C	(3) **Predicted average crash frequency (crashes / year)** (8) from Worksheet 2C
Total	1.000	5.9
Fatal and Injury (FI)	0.340	2.0
Property Damage Only (PDO)	0.660	3.9

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1A - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 0.047 to MP 0.530
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.479166667			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	8	Left Shld:	8
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	6			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Present (1 lane)			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	2			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.94	1.00	1.00	0.673

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	2.176	0.49	1.000	2.176	0.67	1.00	1.464
Fatal and Injury (FI)	--	--	0.321	0.699	0.67	1.00	0.470
Property Damage Only (PDO)	--	--	0.679	1.478	0.67	1.00	0.994

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.464	1.000	0.470	1.000	0.994
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.177	0.038	0.018	0.184	0.183
Collision with bicycle	0.002	0.003	0.004	0.002	0.001	0.001
Collision with pedestrian	0.003	0.004	0.007	0.003	0.001	0.001
Overturned	0.025	0.037	0.037	0.017	0.015	0.015
Ran off road	0.521	0.763	0.545	0.256	0.505	0.502
Other single-vehicle collision	0.021	0.031	0.007	0.003	0.029	0.029
Total single-vehicle crashes	0.693	1.015	0.638	0.300	0.735	0.731
MULTIPLE-VEHICLE						
Angle collision	0.085	0.124	0.100	0.047	0.072	0.072
Head-on collision	0.016	0.023	0.034	0.016	0.003	0.003
Rear-end collision	0.142	0.208	0.164	0.077	0.122	0.121
Sideswipe collision	0.037	0.054	0.038	0.018	0.038	0.038
Other multiple-vehicle collision	0.027	0.040	0.026	0.012	0.030	0.030
Total multiple-vehicle crashes	0.307	0.450	0.362	0.170	0.265	0.263

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.5	0.479166667	3.1
Fatal and Injury (FI)	0.321	0.5	0.479166667	1.0
Property Damage Only (PDO)	0.679	1.0	0.479166667	2.1

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 2 - NO-BUILD
Agency or Company	FDOT	Intersection	MP 0.530 to MP 0.643
Date Performed	07/22/16	Jurisdiction	CR 510 @ MAKO WAY
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	19,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	1,500			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	1			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Not Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.82	0.96	1.00	0.79

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	9.431	0.11	1.000	9.431	0.79	1.00	7.424
Fatal and Injury (FI)	--	--	0.340	3.206	0.79	1.00	2.524
Property Damage Only (PDO)	--	--	0.660	6.224	0.79	1.00	4.900

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision Type(TOTAL) from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision Type(FI) from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of Collision Type(PDO) from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	7.424	1.000	2.524	1.000	4.900
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.015	0.000	0.000	0.003	0.015
Collision with bicycle	0.001	0.007	0.001	0.003	0.001	0.005
Collision with pedestrian	0.001	0.007	0.001	0.003	0.001	0.005
Overturned	0.003	0.022	0.003	0.008	0.003	0.015
Ran off road	0.064	0.475	0.032	0.081	0.081	0.397
Other single-vehicle collision	0.005	0.037	0.003	0.008	0.018	0.088
Total single-vehicle crashes	0.076	0.564	0.040	0.101	0.107	0.524
MULTIPLE-VEHICLE						
Angle collision	0.274	2.034	0.336	0.848	0.242	1.186
Head-on collision	0.054	0.401	0.080	0.202	0.040	0.196
Rear-end collision	0.426	3.163	0.403	1.017	0.438	2.146
Sideswipe collision	0.118	0.876	0.051	0.129	0.153	0.750
Other multiple-vehicle collision	0.052	0.386	0.090	0.227	0.020	0.098
Total multiple-vehicle crashes	0.924	6.860	0.960	2.423	0.893	4.375

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	7.4
Fatal and Injury (FI)	0.340	2.5
Property Damage Only (PDO)	0.660	4.9

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 3 - NO-BUILD
Agency or Company	FDOT	Intersection	MP 0.643 to MP 0.754
Date Performed	07/22/16	Jurisdiction	CR 510 @ HAMMERHEAD WAY
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	19,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	3,100			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	2			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.92	0.89	0.55

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	10.904	0.11	1.000	10.904	0.55	1.00	5.991
Fatal and Injury (FI)	--	--	0.340	3.707	0.55	1.00	2.037
Property Damage Only (PDO)	--	--	0.660	7.197	0.55	1.00	3.954

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision Type(TOTAL) from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision Type(FI) from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of Collision Type(PDO) from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	5.991	1.000	2.037	1.000	3.954
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.012	0.000	0.000	0.003	0.012
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.018	0.003	0.006	0.003	0.012
Ran off road	0.064	0.383	0.032	0.065	0.081	0.320
Other single-vehicle collision	0.005	0.030	0.003	0.006	0.018	0.071
Total single-vehicle crashes	0.076	0.455	0.040	0.081	0.107	0.423
MULTIPLE-VEHICLE						
Angle collision	0.274	1.641	0.336	0.684	0.242	0.957
Head-on collision	0.054	0.324	0.080	0.163	0.040	0.158
Rear-end collision	0.426	2.552	0.403	0.821	0.438	1.732
Sideswipe collision	0.118	0.707	0.051	0.104	0.153	0.605
Other multiple-vehicle collision	0.052	0.312	0.090	0.183	0.020	0.079
Total multiple-vehicle crashes	0.924	5.536	0.960	1.955	0.893	3.531

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	6.0
Fatal and Injury (FI)	0.340	2.0
Property Damage Only (PDO)	0.660	4.0

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1B - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 0.754 to MP 0.965
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.211			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	0			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	1.058

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.958	1.12	1.000	0.958	1.06	1.00	1.014
Fatal and Injury (FI)	--	--	0.321	0.308	1.06	1.00	0.325
Property Damage Only (PDO)	--	--	0.679	0.651	1.06	1.00	0.688

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.014	1.000	0.325	1.000	0.688
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.123	0.038	0.012	0.184	0.127
Collision with bicycle	0.002	0.002	0.004	0.001	0.001	0.001
Collision with pedestrian	0.003	0.003	0.007	0.002	0.001	0.001
Overturned	0.025	0.025	0.037	0.012	0.015	0.010
Ran off road	0.521	0.528	0.545	0.177	0.505	0.348
Other single-vehicle collision	0.021	0.021	0.007	0.002	0.029	0.020
Total single-vehicle crashes	0.693	0.703	0.638	0.208	0.735	0.506
MULTIPLE-VEHICLE						
Angle collision	0.085	0.086	0.100	0.033	0.072	0.050
Head-on collision	0.016	0.016	0.034	0.011	0.003	0.002
Rear-end collision	0.142	0.144	0.164	0.053	0.122	0.084
Sideswipe collision	0.037	0.038	0.038	0.012	0.038	0.026
Other multiple-vehicle collision	0.027	0.027	0.026	0.008	0.030	0.021
Total multiple-vehicle crashes	0.307	0.311	0.362	0.118	0.265	0.182

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.0	0.211	4.8
Fatal and Injury (FI)	0.321	0.3	0.211	1.5
Property Damage Only (PDO)	0.679	0.7	0.211	3.3

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 4 - NO BUILD
Agency or Company	FDOT	Intersection	MP 0.965 to MP 1.060
Date Performed	07/22/16	Jurisdiction	CR 510 @ 87TH ST
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	17,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	9,200			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.96	0.89	0.57

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	12.679	0.11	1.000	12.679	0.57	1.00	7.269
Fatal and Injury (FI)	--	--	0.340	4.311	0.57	1.00	2.471
Property Damage Only (PDO)	--	--	0.660	8.368	0.57	1.00	4.798

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of $Collision\ Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	7.269	1.000	2.471	1.000	4.798
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.015	0.000	0.000	0.003	0.014
Collision with bicycle	0.001	0.007	0.001	0.002	0.001	0.005
Collision with pedestrian	0.001	0.007	0.001	0.002	0.001	0.005
Overturned	0.003	0.022	0.003	0.007	0.003	0.014
Ran off road	0.064	0.465	0.032	0.079	0.081	0.389
Other single-vehicle collision	0.005	0.036	0.003	0.007	0.018	0.086
Total single-vehicle crashes	0.076	0.552	0.040	0.099	0.107	0.513
MULTIPLE-VEHICLE						
Angle collision	0.274	1.992	0.336	0.830	0.242	1.161
Head-on collision	0.054	0.393	0.080	0.198	0.040	0.192
Rear-end collision	0.426	3.097	0.403	0.996	0.438	2.101
Sideswipe collision	0.118	0.858	0.051	0.126	0.153	0.734
Other multiple-vehicle collision	0.052	0.378	0.090	0.222	0.020	0.096
Total multiple-vehicle crashes	0.924	6.717	0.960	2.373	0.893	4.284

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	7.3
Fatal and Injury (FI)	0.340	2.5
Property Damage Only (PDO)	0.660	4.8

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1C - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 1.060 to MP 1.215
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.155			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	30			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	1			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.10	1.00	1.00	1.00	0.87	1.00	1.00	0.951

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.704	1.52	1.000	0.704	0.95	1.00	0.670
Fatal and Injury (FI)	--	--	0.321	0.226	0.95	1.00	0.215
Property Damage Only (PDO)	--	--	0.679	0.478	0.95	1.00	0.455

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.670	1.000	0.215	1.000	0.455
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.081	0.038	0.008	0.184	0.084
Collision with bicycle	0.002	0.001	0.004	0.001	0.001	0.000
Collision with pedestrian	0.003	0.002	0.007	0.002	0.001	0.000
Overturned	0.025	0.017	0.037	0.008	0.015	0.007
Ran off road	0.521	0.349	0.545	0.117	0.505	0.230
Other single-vehicle collision	0.021	0.014	0.007	0.002	0.029	0.013
Total single-vehicle crashes	0.693	0.464	0.638	0.137	0.735	0.334
MULTIPLE-VEHICLE						
Angle collision	0.085	0.057	0.100	0.021	0.072	0.033
Head-on collision	0.016	0.011	0.034	0.007	0.003	0.001
Rear-end collision	0.142	0.095	0.164	0.035	0.122	0.055
Sideswipe collision	0.037	0.025	0.038	0.008	0.038	0.017
Other multiple-vehicle collision	0.027	0.018	0.026	0.006	0.030	0.014
Total multiple-vehicle crashes	0.307	0.206	0.362	0.078	0.265	0.120

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.7	0.155	4.3
Fatal and Injury (FI)	0.321	0.2	0.155	1.4
Property Damage Only (PDO)	0.679	0.5	0.155	2.9

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 2A - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 1.215 to MP 1.286
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.071022727			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,000			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	6	Left Shld:	6
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.1			
Radius of curvature (ft)		0	180			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	0			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.02	4.94	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	5.405

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.323	3.32	1.000	0.323	5.40	1.00	1.744
Fatal and Injury (FI)	--	--	0.321	0.104	5.40	1.00	0.560
Property Damage Only (PDO)	--	--	0.679	0.219	5.40	1.00	1.184

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.744	1.000	0.560	1.000	1.184
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.211	0.038	0.021	0.184	0.218
Collision with bicycle	0.002	0.003	0.004	0.002	0.001	0.001
Collision with pedestrian	0.003	0.005	0.007	0.004	0.001	0.001
Overturned	0.025	0.044	0.037	0.021	0.015	0.018
Ran off road	0.521	0.908	0.545	0.305	0.505	0.598
Other single-vehicle collision	0.021	0.037	0.007	0.004	0.029	0.034
Total single-vehicle crashes	0.693	1.208	0.638	0.357	0.735	0.870
MULTIPLE-VEHICLE						
Angle collision	0.085	0.148	0.100	0.056	0.072	0.085
Head-on collision	0.016	0.028	0.034	0.019	0.003	0.004
Rear-end collision	0.142	0.248	0.164	0.092	0.122	0.144
Sideswipe collision	0.037	0.065	0.038	0.021	0.038	0.045
Other multiple-vehicle collision	0.027	0.047	0.026	0.015	0.030	0.036
Total multiple-vehicle crashes	0.307	0.535	0.362	0.203	0.265	0.314

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.7	0.071022727	24.5
Fatal and Injury (FI)	0.321	0.6	0.071022727	7.9
Property Damage Only (PDO)	0.679	1.2	0.071022727	16.7

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 2B - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 1.286 to MP 1.403
Date Performed	06/29/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.117			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,800			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	8	Left Shld:	8
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.1			
Radius of curvature (ft)		0	180			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	0			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.96	4.94	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	5.048

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.556	2.02	1.000	0.556	5.05	1.00	2.809
Fatal and Injury (FI)	--	--	0.321	0.179	5.05	1.00	0.902
Property Damage Only (PDO)	--	--	0.679	0.378	5.05	1.00	1.907

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	2.809	1.000	0.902	1.000	1.907
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.340	0.038	0.034	0.184	0.351
Collision with bicycle	0.002	0.006	0.004	0.004	0.001	0.002
Collision with pedestrian	0.003	0.008	0.007	0.006	0.001	0.002
Overturned	0.025	0.070	0.037	0.033	0.015	0.029
Ran off road	0.521	1.463	0.545	0.491	0.505	0.963
Other single-vehicle collision	0.021	0.059	0.007	0.006	0.029	0.055
Total single-vehicle crashes	0.693	1.946	0.638	0.575	0.735	1.402
MULTIPLE-VEHICLE						
Angle collision	0.085	0.239	0.100	0.090	0.072	0.137
Head-on collision	0.016	0.045	0.034	0.031	0.003	0.006
Rear-end collision	0.142	0.399	0.164	0.148	0.122	0.233
Sideswipe collision	0.037	0.104	0.038	0.034	0.038	0.072
Other multiple-vehicle collision	0.027	0.076	0.026	0.023	0.030	0.057
Total multiple-vehicle crashes	0.307	0.862	0.362	0.326	0.265	0.505

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	2.8	0.117	24.0
Fatal and Injury (FI)	0.321	0.9	0.117	7.7
Property Damage Only (PDO)	0.679	1.9	0.117	16.3

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 5 - NO-BUILD
Agency or Company	FDOT	Intersection	MP 1.403 to MP 1.600
Date Performed	07/22/16	Jurisdiction	CR 510 @ TREASURE COAST ELEM. SCHOOL
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	23,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	2,300			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	2			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.92	0.89	0.55

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	11.520	0.11	1.000	11.520	0.55	1.00	6.329
Fatal and Injury (FI)	--	--	0.340	3.917	0.55	1.00	2.152
Property Damage Only (PDO)	--	--	0.660	7.603	0.55	1.00	4.177

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of $Collision\ Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	6.329	1.000	2.152	1.000	4.177
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.013	0.000	0.000	0.003	0.013
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.019	0.003	0.006	0.003	0.013
Ran off road	0.064	0.405	0.032	0.069	0.081	0.338
Other single-vehicle collision	0.005	0.032	0.003	0.006	0.018	0.075
Total single-vehicle crashes	0.076	0.481	0.040	0.086	0.107	0.447
MULTIPLE-VEHICLE						
Angle collision	0.274	1.734	0.336	0.723	0.242	1.011
Head-on collision	0.054	0.342	0.080	0.172	0.040	0.167
Rear-end collision	0.426	2.696	0.403	0.867	0.438	1.830
Sideswipe collision	0.118	0.747	0.051	0.110	0.153	0.639
Other multiple-vehicle collision	0.052	0.329	0.090	0.194	0.020	0.084
Total multiple-vehicle crashes	0.924	5.848	0.960	2.066	0.893	3.730

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	6.3
Fatal and Injury (FI)	0.340	2.2
Property Damage Only (PDO)	0.660	4.2

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3A - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 1.600 to MP 2.237
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.637			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,800			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.07	1.00	1.00	1.068

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	3.029	0.37	1.000	3.029	1.07	1.00	3.236
Fatal and Injury (FI)	--	--	0.321	0.972	1.07	1.00	1.039
Property Damage Only (PDO)	--	--	0.679	2.057	1.07	1.00	2.197

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	3.236	1.000	1.039	1.000	2.197
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.392	0.038	0.039	0.184	0.404
Collision with bicycle	0.002	0.006	0.004	0.004	0.001	0.002
Collision with pedestrian	0.003	0.010	0.007	0.007	0.001	0.002
Overturned	0.025	0.081	0.037	0.038	0.015	0.033
Ran off road	0.521	1.686	0.545	0.566	0.505	1.110
Other single-vehicle collision	0.021	0.068	0.007	0.007	0.029	0.064
Total single-vehicle crashes	0.693	2.243	0.638	0.663	0.735	1.615
MULTIPLE-VEHICLE						
Angle collision	0.085	0.275	0.100	0.104	0.072	0.158
Head-on collision	0.016	0.052	0.034	0.035	0.003	0.007
Rear-end collision	0.142	0.460	0.164	0.170	0.122	0.268
Sideswipe collision	0.037	0.120	0.038	0.039	0.038	0.083
Other multiple-vehicle collision	0.027	0.087	0.026	0.027	0.030	0.066
Total multiple-vehicle crashes	0.307	0.993	0.362	0.376	0.265	0.582

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	3.2	0.637	5.1
Fatal and Injury (FI)	0.321	1.0	0.637	1.6
Property Damage Only (PDO)	0.679	2.2	0.637	3.4

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3B - N0-BUILD
Agency or Company	FDOT	Roadway Section	MP 2.237 to MP 2.256
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.019			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,800			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	0	Left Shld:	0
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	7			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.29	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.31	1.00	1.00	1.698

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.090	12.42	1.000	0.090	1.70	1.00	0.153
Fatal and Injury (FI)	--	--	0.321	0.029	1.70	1.00	0.049
Property Damage Only (PDO)	--	--	0.679	0.061	1.70	1.00	0.104

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.153	1.000	0.049	1.000	0.104
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.019	0.038	0.002	0.184	0.019
Collision with bicycle	0.002	0.000	0.004	0.000	0.001	0.000
Collision with pedestrian	0.003	0.000	0.007	0.000	0.001	0.000
Overturned	0.025	0.004	0.037	0.002	0.015	0.002
Ran off road	0.521	0.080	0.545	0.027	0.505	0.053
Other single-vehicle collision	0.021	0.003	0.007	0.000	0.029	0.003
Total single-vehicle crashes	0.693	0.106	0.638	0.031	0.735	0.077
MULTIPLE-VEHICLE						
Angle collision	0.085	0.013	0.100	0.005	0.072	0.007
Head-on collision	0.016	0.002	0.034	0.002	0.003	0.000
Rear-end collision	0.142	0.022	0.164	0.008	0.122	0.013
Sideswipe collision	0.037	0.006	0.038	0.002	0.038	0.004
Other multiple-vehicle collision	0.027	0.004	0.026	0.001	0.030	0.003
Total multiple-vehicle crashes	0.307	0.047	0.362	0.018	0.265	0.028

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.2	0.019	8.1
Fatal and Injury (FI)	0.321	0.0	0.019	2.6
Property Damage Only (PDO)	0.679	0.1	0.019	5.5

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3C - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 2.256 to MP 2.732
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data	Base Conditions	Site Conditions			
Length of segment, L (mi)	--	0.476			
AADT (veh/day) ($AADT_{MAX}$ = 17,800 (veh/day))	--	17,800			
Lane width (ft)	12	12			
Shoulder width (ft)	6	Right Shld:	6	Left Shld:	6
Shoulder type	Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)	0	0.0			
Radius of curvature (ft)	0	0			
Spiral transition curve (present/not present)	Not Present	Not Present			
Superelevation variance (ft/ft)	< 0.01	0			
Grade (%)	0	3			
Driveway density (driveways/mile)	5	8			
Centerline rumble strips (present/not present)	Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]	Not Present	Not Present			
Two-way left-turn lane (present/not present)	Not Present	Not Present			
Roadside hazard rating (1-7 scale)	3	4			
Segment lighting (present/not present)	Not Present	Not Present			
Auto speed enforcement (present/not present)	Not Present	Not Present			
Calibration Factor, Cr	1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.02	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.07	1.00	1.00	1.104

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	2.264	0.50	1.000	2.264	1.10	1.00	2.500
Fatal and Injury (FI)	--	--	0.321	0.727	1.10	1.00	0.802
Property Damage Only (PDO)	--	--	0.679	1.537	1.10	1.00	1.697

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	2.500	1.000	0.802	1.000	1.697
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.302	0.038	0.030	0.184	0.312
Collision with bicycle	0.002	0.005	0.004	0.003	0.001	0.002
Collision with pedestrian	0.003	0.007	0.007	0.006	0.001	0.002
Overturned	0.025	0.062	0.037	0.030	0.015	0.025
Ran off road	0.521	1.302	0.545	0.437	0.505	0.857
Other single-vehicle collision	0.021	0.052	0.007	0.006	0.029	0.049
Total single-vehicle crashes	0.693	1.732	0.638	0.512	0.735	1.248
MULTIPLE-VEHICLE						
Angle collision	0.085	0.212	0.100	0.080	0.072	0.122
Head-on collision	0.016	0.040	0.034	0.027	0.003	0.005
Rear-end collision	0.142	0.355	0.164	0.132	0.122	0.207
Sideswipe collision	0.037	0.092	0.038	0.030	0.038	0.065
Other multiple-vehicle collision	0.027	0.067	0.026	0.021	0.030	0.051
Total multiple-vehicle crashes	0.307	0.767	0.362	0.290	0.265	0.450

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	2.5	0.476	5.3
Fatal and Injury (FI)	0.321	0.8	0.476	1.7
Property Damage Only (PDO)	0.679	1.7	0.476	3.6

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3D - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 2.732 to MP 2.756
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.024			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,800			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	0	Left Shld:	0
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	7			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.29	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.31	1.00	1.00	1.698

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.114	9.83	1.000	0.114	1.70	1.00	0.194
Fatal and Injury (FI)	--	--	0.321	0.037	1.70	1.00	0.062
Property Damage Only (PDO)	--	--	0.679	0.077	1.70	1.00	0.132

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	0.194	1.000	0.062	1.000	0.132
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.023	0.038	0.002	0.184	0.024
Collision with bicycle	0.002	0.000	0.004	0.000	0.001	0.000
Collision with pedestrian	0.003	0.001	0.007	0.000	0.001	0.000
Overturned	0.025	0.005	0.037	0.002	0.015	0.002
Ran off road	0.521	0.101	0.545	0.034	0.505	0.066
Other single-vehicle collision	0.021	0.004	0.007	0.000	0.029	0.004
Total single-vehicle crashes	0.693	0.134	0.638	0.040	0.735	0.097
MULTIPLE-VEHICLE						
Angle collision	0.085	0.016	0.100	0.006	0.072	0.009
Head-on collision	0.016	0.003	0.034	0.002	0.003	0.000
Rear-end collision	0.142	0.028	0.164	0.010	0.122	0.016
Sideswipe collision	0.037	0.007	0.038	0.002	0.038	0.005
Other multiple-vehicle collision	0.027	0.005	0.026	0.002	0.030	0.004
Total multiple-vehicle crashes	0.307	0.059	0.362	0.023	0.265	0.035

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	0.2	0.024	8.1
Fatal and Injury (FI)	0.321	0.1	0.024	2.6
Property Damage Only (PDO)	0.679	0.1	0.024	5.5

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3E - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 2.756 to MP 4.204
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	1.448			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,800			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	6	Left Shld:	6
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	8			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	5			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.02	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.14	1.00	1.00	1.181

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	6.886	0.16	1.000	6.886	1.18	1.00	8.130
Fatal and Injury (FI)	--	--	0.321	2.210	1.18	1.00	2.610
Property Damage Only (PDO)	--	--	0.679	4.676	1.18	1.00	5.520

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	8.130	1.000	2.610	1.000	5.520
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.984	0.038	0.099	0.184	1.016
Collision with bicycle	0.002	0.016	0.004	0.010	0.001	0.006
Collision with pedestrian	0.003	0.024	0.007	0.018	0.001	0.006
Overturned	0.025	0.203	0.037	0.097	0.015	0.083
Ran off road	0.521	4.236	0.545	1.422	0.505	2.788
Other single-vehicle collision	0.021	0.171	0.007	0.018	0.029	0.160
Total single-vehicle crashes	0.693	5.634	0.638	1.665	0.735	4.057
MULTIPLE-VEHICLE						
Angle collision	0.085	0.691	0.100	0.261	0.072	0.397
Head-on collision	0.016	0.130	0.034	0.089	0.003	0.017
Rear-end collision	0.142	1.154	0.164	0.428	0.122	0.673
Sideswipe collision	0.037	0.301	0.038	0.099	0.038	0.210
Other multiple-vehicle collision	0.027	0.220	0.026	0.068	0.030	0.166
Total multiple-vehicle crashes	0.307	2.496	0.362	0.945	0.265	1.463

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	8.1	1.448	5.6
Fatal and Injury (FI)	0.321	2.6	1.448	1.8
Property Damage Only (PDO)	0.679	5.5	1.448	3.8

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 6 - NO-BUILD
Agency or Company	FDOT	Intersection	MP 4.204 to MP 4.337
Date Performed	07/22/16	Jurisdiction	CR 510 @ 66TH AVE
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	21,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	12,500			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	4			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.45	0.96	0.89	0.39

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	15.303	0.11	1.000	15.303	0.39	1.00	5.893
Fatal and Injury (FI)	--	--	0.340	5.203	0.39	1.00	2.003
Property Damage Only (PDO)	--	--	0.660	10.100	0.39	1.00	3.889

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision Type(TOTAL) from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision Type(FI) from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of Collision Type(PDO) from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	5.893	1.000	2.003	1.000	3.889
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.002	0.012	0.000	0.000	0.003	0.012
Collision with bicycle	0.001	0.006	0.001	0.002	0.001	0.004
Collision with pedestrian	0.001	0.006	0.001	0.002	0.001	0.004
Overturned	0.003	0.018	0.003	0.006	0.003	0.012
Ran off road	0.064	0.377	0.032	0.064	0.081	0.315
Other single-vehicle collision	0.005	0.029	0.003	0.006	0.018	0.070
Total single-vehicle crashes	0.076	0.448	0.040	0.080	0.107	0.416
MULTIPLE-VEHICLE						
Angle collision	0.274	1.615	0.336	0.673	0.242	0.941
Head-on collision	0.054	0.318	0.080	0.160	0.040	0.156
Rear-end collision	0.426	2.510	0.403	0.807	0.438	1.703
Sideswipe collision	0.118	0.695	0.051	0.102	0.153	0.595
Other multiple-vehicle collision	0.052	0.306	0.090	0.180	0.020	0.078
Total multiple-vehicle crashes	0.924	5.445	0.960	1.923	0.893	3.473

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) Crash severity level	(2) Crash Severity Distribution (proportion) (4) from Worksheet 2C	(3) Predicted average crash frequency (crashes / year) (8) from Worksheet 2C
Total	1.000	5.9
Fatal and Injury (FI)	0.340	2.0
Property Damage Only (PDO)	0.660	3.9

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 4A - NO-BUILD
Agency or Company	FDOT	Roadway Section	MP 4.337 to MP 5.236
Date Performed	07/22/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.899			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	17,800			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Composite	Left Shld:	Composite
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	3			
Driveway density (driveways/mile)		5	21			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	4			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.99	1.00	1.00	1.00	1.05	1.00	1.00	1.00	1.07	1.00	1.00	1.113

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	4.275	0.26	1.000	4.275	1.11	1.00	4.758
Fatal and Injury (FI)	--	--	0.321	1.372	1.11	1.00	1.527
Property Damage Only (PDO)	--	--	0.679	2.903	1.11	1.00	3.231

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	4.758	1.000	1.527	1.000	3.231
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.576	0.038	0.058	0.184	0.594
Collision with bicycle	0.002	0.010	0.004	0.006	0.001	0.003
Collision with pedestrian	0.003	0.014	0.007	0.011	0.001	0.003
Overturned	0.025	0.119	0.037	0.057	0.015	0.048
Ran off road	0.521	2.479	0.545	0.832	0.505	1.632
Other single-vehicle collision	0.021	0.100	0.007	0.011	0.029	0.094
Total single-vehicle crashes	0.693	3.298	0.638	0.974	0.735	2.375
MULTIPLE-VEHICLE						
Angle collision	0.085	0.404	0.100	0.153	0.072	0.233
Head-on collision	0.016	0.076	0.034	0.052	0.003	0.010
Rear-end collision	0.142	0.676	0.164	0.250	0.122	0.394
Sideswipe collision	0.037	0.176	0.038	0.058	0.038	0.123
Other multiple-vehicle collision	0.027	0.128	0.026	0.040	0.030	0.097
Total multiple-vehicle crashes	0.307	1.461	0.362	0.553	0.265	0.856

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	4.8	0.899	5.3
Fatal and Injury (FI)	0.321	1.5	0.899	1.7
Property Damage Only (PDO)	0.679	3.2	0.899	3.6

Worksheet 2A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 7 - NO-BUILD
Agency or Company	FDOT	Intersection	MP 5.237 to MP 5.283
Date Performed	07/22/16	Jurisdiction	CR 510 @ 58TH AVE
		Analysis Year	2040

Input Data				Base Conditions	Site Conditions			
Intersection type (3ST, 4ST, 4SG)				--	4SG			
$AADT_{major}$ (veh/day)	$AADT_{MAX}$ =	25,200	(veh/day)	--	19,000			
$AADT_{minor}$ (veh/day)	$AADT_{MAX}$ =	12,500	(veh/day)	--	9,400			
Intersection skew angle (degrees) [If 4ST, does skew differ for minor legs?]			No	0	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0
Number of signalized or uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)				0	2			
Number of signalized or uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)				0	1			
Intersection lighting (present/not present)				Not Present	Present			
Calibration Factor, C_i				1.00	1.00			

Worksheet 2B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Intersections

(1) CMF for Intersection Skew Angle CMF_{1i} from Equations 10-22 or 10-23	(2) CMF for Left-Turn Lanes CMF_{2i} from Table 10-13	(3) CMF for Right-Turn Lanes CMF_{3i} from Table 10-14	(4) CMF for Lighting CMF_{4i} from Equation 10-24	(5) Combined CMF CMF_{COMB} (1)*(2)*(3)*(4)
1.00	0.67	0.96	0.89	0.57

Worksheet 2C -- Intersection Crashes for Rural Two-Lane Two-Way Roadway Intersections

(1) Crash Severity Level	(2) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ from Equations 10-8, 10-9, or 10-10	(3) Overdispersion Parameter, k from Section 10.6.2	(4) Crash Severity Distribution from Table 10-5	(5) $N_{spf\ 3ST,\ 4ST\ or\ 4SG}$ by Severity Distribution $(2)_{TOTAL}$ * (4)	(6) Combined CMFs from (5) of Worksheet 2B	(7) Calibration Factor, C_i	(8) Predicted average crash frequency, $N_{predicted\ int}$ (5)*(6)*(7)
Total	13.613	0.11	1.000	13.613	0.57	1.00	7.804
Fatal and Injury (FI)	--	--	0.340	4.628	0.57	1.00	2.653
Property Damage Only (PDO)	--	--	0.660	8.984	0.57	1.00	5.151

Worksheet 2D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Road Intersections

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$ from Table 10-6	(3) $N_{predicted\ int\ (TOTAL)}$ (crashes/year) $(8)_{TOTAL}$ from Worksheet 2C	(4) Proportion of Collision $Type_{(FI)}$ from Table 10-6	(5) $N_{predicted\ int\ (FI)}$ (crashes/year) $(8)_{FI}$ from Worksheet 2C	(6) Proportion of $Collision\ Type_{(PDO)}$ from Table 10-6	(7) $N_{predicted\ int\ (PDO)}$ (crashes/year) $(8)_{PDO}$ from Worksheet 2C
Total	1.000	7.804	1.000	2.653	1.000	5.151
		$(2)x(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)x(7)_{PDO}$
SINGLE-VEHICLE						
Collision with animal	0.002	0.016	0.000	0.000	0.003	0.015
Collision with bicycle	0.001	0.008	0.001	0.003	0.001	0.005
Collision with pedestrian	0.001	0.008	0.001	0.003	0.001	0.005
Overturned	0.003	0.023	0.003	0.008	0.003	0.015
Ran off road	0.064	0.499	0.032	0.085	0.081	0.417
Other single-vehicle collision	0.005	0.039	0.003	0.008	0.018	0.093
Total single-vehicle crashes	0.076	0.593	0.040	0.106	0.107	0.551
MULTIPLE-VEHICLE						
Angle collision	0.274	2.138	0.336	0.892	0.242	1.246
Head-on collision	0.054	0.421	0.080	0.212	0.040	0.206
Rear-end collision	0.426	3.325	0.403	1.069	0.438	2.256
Sideswipe collision	0.118	0.921	0.051	0.135	0.153	0.788
Other multiple-vehicle collision	0.052	0.406	0.090	0.239	0.020	0.103
Total multiple-vehicle crashes	0.924	7.211	0.960	2.547	0.893	4.600

Worksheet 2E -- Summary Results for Rural Two-Lane Two-Way Road Intersections

(1) **Crash severity level**	(2) **Crash Severity Distribution** (proportion) (4) from Worksheet 2C	(3) **Predicted average crash frequency (crashes / year)** (8) from Worksheet 2C
Total	1.000	7.8
Fatal and Injury (FI)	0.340	2.7
Property Damage Only (PDO)	0.660	5.2

CR-510- NO-BUILD (2040)

Worksheet 3A -- Predicted and Observed Crashes by Severity and Site Type Using the Site-Specific EB Method

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes,** $N_{observed}$ (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w** Equation A-5 from Part C Appendix	**Expected average crash frequency,** Equation A-4 from Part C Appendix
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)				
ROADWAY SEGMENTS							
Segment 1A	1.464	0.470	0.994	0	0.493	0.581	0.851
Segment 1B	1.014	0.325	0.688	1	1.118	0.469	1.006
Segment 1C	0.670	0.215	0.455	3	1.523	0.495	1.846
Segment 2A	1.744	0.560	1.184	1	3.323	0.147	1.109
Segment 2B	2.809	0.902	1.907	1	2.017	0.150	1.271
Segment 3A	3.236	1.039	2.197	2	0.370	0.455	2.562
Segment 3B	0.153	0.049	0.104	0	12.421	0.344	0.053
Segment 3C	2.500	0.802	1.697	2	0.496	0.447	2.223
Segment 3D	0.194	0.062	0.132	0	9.833	0.344	0.067
Segment 3E	8.130	2.610	5.520	9	0.163	0.430	8.626
Segment 4A	4.758	1.527	3.231	2	0.263	0.445	3.226
INTERSECTIONS							
Intersection 1	5.863	1.993	3.869	9	0.110	0.608	7.093
Intersection 2	7.424	2.524	4.900	0	0.110	0.550	4.087
Intersection 3	5.991	2.037	3.954	4	0.110	0.603	5.200
Intersection 4	7.269	2.471	4.798	4	0.110	0.556	5.817
Intersection 5	6.329	2.152	4.177	2	0.110	0.590	4.552
Intersection 6	5.893	2.003	3.889	16	0.110	0.607	9.867
Intersection 7	7.804	2.653	5.151	6	0.110	0.538	6.971
COMBINED (sum of column)	**73.243**	24.396	48.847	**62**	--	--	**66.428**

Worksheet 3B -- Site-Specific EB Method Summary Results

(1)	(2)	(3)
Crash severity level	$N_{predicted}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(8)_{COMB}$ from Worksheet 3A
	73.243	66.4
Fatal and Injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$
	24.396	22.1
Property Damage Only (PDO)	$(4)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$
	48.847	44.3

Appendix 4- HSM Analysis- 2040 Future (Build Conditions)

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 1 -BUILD
Agency or Company	FDOT	Intersection	MP 0.000 to MP 0.047
Date Performed	10/04/16	Jurisdiction	CR 510 @ CR 512
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	23,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	16,000
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2		--	Protected
Type of left-turn signal phasing for Leg #3		--	Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Permissive
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	7
Number of bus stops within 300 m (1,000 ft) of the intersection		0	0
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	2

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.88	0.92	1.00	0.91	1.00	0.60

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.263	1.000	7.263	0.60	1.00	4.363
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.318	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.330	2.399	0.60	1.00	1.441
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.699	$(5)_{TOTAL}-(5)_{FI}$ = 0.670	4.864	0.60	1.00	2.922

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.441	1.000	2.922	4.363
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.649	0.483	1.411	2.060
Head-on collision	0.049	0.071	0.030	0.088	0.158
Angle collision	0.347	0.500	0.244	0.713	1.213
Sideswipe	0.099	0.143	0.032	0.093	0.236
Other multiple-vehicle collision	0.055	0.079	0.211	0.616	0.696

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.464	1.000	0.464	0.60	1.00	0.279
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.120	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.262	0.121	0.60	1.00	0.073
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.338	$(5)_{TOTAL}-(5)_{FI}$ = 0.738	0.343	0.60	1.00	0.206

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.073	1.000	0.206	0.279
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.054	0.870	0.179	0.234
Collision with other object	0.072	0.005	0.070	0.014	0.020
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.008
Single-vehicle noncollision	0.141	0.010	0.034	0.007	0.017

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
1.00	1.00	1.12	1.12

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.017	1.12	1.00	0.019
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.019

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.363	0.279	4.642	0.015	1.00	0.070
Fatal and injury (FI)	--	--	--	--	1.00	0.070

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.649	1.411	2.060
Head-on collisions (from Worksheet 2D)	0.071	0.088	0.158
Angle collisions (from Worksheet 2D)	0.500	0.713	1.213
Sideswipe (from Worksheet 2D)	0.143	0.093	0.236
Other multiple-vehicle collision (from Worksheet 2D)	0.079	0.616	0.696
Subtotal	1.441	2.922	4.363
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.054	0.179	0.234
Collision with other object (from Worksheet 2F)	0.005	0.014	0.020
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.010	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.019	0.000	0.019
Collision with bicycle (from Worksheet 2J)	0.070	0.000	0.070
Subtotal	0.162	0.206	0.368
Total	1.603	3.128	4.730

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1A - BUIILD
Agency or Company	FDOT	Roadway Section	MP 0.047 to MP 0.530
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.479
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	3
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	1
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	0.91	1.00	0.90

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	1.188	1.000	1.188	0.90	1.00	1.075
Fatal and Injury (FI)	-12.76	1.28	1.31	0.358	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.337	0.90	1.00	0.305
Property Damage Only (PDO)	-12.81	1.38	1.34	0.902	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.850	0.90	1.00	0.769

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.305	1.000	0.769	1.075
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.254	0.662	0.509	0.763
Head-on collision	0.020	0.006	0.007	0.005	0.011
Angle collision	0.040	0.012	0.036	0.028	0.040
Sideswipe, same direction	0.050	0.015	0.223	0.172	0.187
Sideswipe, opposite direction	0.010	0.003	0.001	0.001	0.004
Other multiple-vehicle collision	0.048	0.015	0.071	0.055	0.069

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.299	1.000	0.299	0.90	1.00	0.270
Fatal and Injury (FI)	-8.71	0.66	0.28	0.049	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.049	0.90	1.00	0.045
Property Damage Only (PDO)	-5.04	0.45	1.06	0.249	$(5)_{TOTAL}-(5)_{FI}$ = 0.835	0.250	0.90	1.00	0.226

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.045	1.000	0.226	0.270
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.014	0.014
Collision with fixed object	0.500	0.022	0.813	0.184	0.206
Collision with other object	0.028	0.001	0.016	0.004	0.005
Other single-vehicle collision	0.471	0.021	0.108	0.024	0.045

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	3	0.033	1.106	0.114	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	0	0.018	1.106	0.000	
Minor residential	1	0.003	1.106	0.003	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.117	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.117	1.000	0.117	0.90	1.00	0.106
Fatal and injury (FI)	--	0.284	0.033	0.90	1.00	0.030
Property damage only (PDO)	--	0.716	0.084	0.90	1.00	0.076

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.075	0.270	0.106	1.451	0.019	1.00	0.028
Fatal and injury (FI)	--	--	--	--	--	1.00	0.028

Change calibration to 1.00 (applied twice by sp

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.075	0.270	0.106	1.451	0.005	1.00	0.007
Fatal and injury (FI)	--	--	--	--	--	1.00	0.007

Change calibration to 1.00 (applied twice by sp

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.254	0.509	0.763
Head-on collisions (from Worksheet 1D)	0.006	0.005	0.011
Angle collisions (from Worksheet 1D)	0.012	0.028	0.040
Sideswipe, same direction (from Worksheet 1D)	0.015	0.172	0.187
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.001	0.004
Driveway-related collisions (from Worksheet 1H)	0.030	0.076	0.106
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.055	0.069
Subtotal	0.335	0.845	1.181
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.014	0.014
Collision with fixed object (from Worksheet 1F)	0.022	0.184	0.206
Collision with other object (from Worksheet 1F)	0.001	0.004	0.005
Other single-vehicle collision (from Worksheet 1F)	0.021	0.024	0.045
Collision with pedestrian (from Worksheet 1I)	0.028	0.000	0.028
Collision with bicycle (from Worksheet 1J)	0.007	0.000	0.007
Subtotal	0.079	0.226	0.305
Total	0.415	1.071	1.486

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	1.5	0.48	3.1
Fatal and injury (FI)	0.4	0.48	0.9
Property damage only (PDO)	1.1	0.48	2.2

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 2 -BUILD
Agency or Company	FDOT	Intersection	MP 0.530 to MP 0.643
Date Performed	10/04/16	Jurisdiction	CR 510 @ MAKO WAY
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 58,100 (veh/day)	--	19,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 16,400 (veh/day)	--	1,500
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	1
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	1
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	2
Number of bus stops within 300 m (1,000 ft) of the intersection		0	0
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.93	0.99	0.96	1.00	1.00	1.00	0.88

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	2.029	1.000	2.029	0.88	1.00	1.793
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	0.750	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.384	0.779	0.88	1.00	0.688
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	1.204	$(5)_{TOTAL}-(5)_{FI}$ = 0.616	1.250	0.88	1.00	1.105

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.688	1.000	1.105	1.793
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.549	0.378	0.546	0.603	0.981
Head-on collision	0.038	0.026	0.020	0.022	0.048
Angle collision	0.280	0.193	0.204	0.225	0.418
Sideswipe	0.076	0.052	0.032	0.035	0.088
Other multiple-vehicle collision	0.057	0.039	0.198	0.219	0.258

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.141	1.000	0.141	0.88	1.00	0.125
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.035	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.245	0.035	0.88	1.00	0.031
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.107	$(5)_{TOTAL}-(5)_{FI}$ = 0.755	0.107	0.88	1.00	0.094

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.031	1.000	0.094	0.125
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.000
Collision with fixed object	0.653	0.020	0.895	0.084	0.104
Collision with other object	0.091	0.003	0.069	0.007	0.009
Other single-vehicle collision	0.045	0.001	0.018	0.002	0.003
Single-vehicle noncollision	0.209	0.006	0.014	0.001	0.008

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
1.00	1.35	1.00	1.35

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.004	1.35	1.00	0.005
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.005

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	1.793	0.125	1.918	0.011	1.00	0.021
Fatal and injury (FI)	--	--	--	--	1.00	0.021

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.378	0.603	0.981
Head-on collisions (from Worksheet 2D)	0.026	0.022	0.048
Angle collisions (from Worksheet 2D)	0.193	0.225	0.418
Sideswipe (from Worksheet 2D)	0.052	0.035	0.088
Other multiple-vehicle collision (from Worksheet 2D)	0.039	0.219	0.258
Subtotal	0.688	1.105	1.793
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.020	0.084	0.104
Collision with other object (from Worksheet 2F)	0.003	0.007	0.009
Other single-vehicle collision (from Worksheet 2F)	0.001	0.002	0.003
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.001	0.008
Collision with pedestrian (from Worksheet 2G or 2I)	0.005	0.000	0.005
Collision with bicycle (from Worksheet 2J)	0.021	0.000	0.021
Subtotal	0.057	0.094	0.151
Total	0.745	1.199	1.944

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	1.9
Fatal and injury (FI)	0.7
Property damage only (PDO)	1.2

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 3 -BUILD
Agency or Company	FDOT	Intersection	MP 0.643 to MP 0.754
Date Performed	10/04/16	Jurisdiction	CR 510 @ HAMMERHEAD WAY
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 58,100 (veh/day)	--	17,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 16,400 (veh/day)	--	3,100
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	1
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.93	0.99	0.96	1.00	0.91	1.00	0.80

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	2.166	1.000	2.166	0.80	1.00	1.743
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	0.758	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.365	0.790	0.80	1.00	0.636
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	1.318	$(5)_{TOTAL}-(5)_{FI}$ = 0.635	1.375	0.80	1.00	1.107

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.636	1.000	1.107	1.743
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.549	0.349	0.546	0.604	0.954
Head-on collision	0.038	0.024	0.020	0.022	0.046
Angle collision	0.280	0.178	0.204	0.226	0.404
Sideswipe	0.076	0.048	0.032	0.035	0.084
Other multiple-vehicle collision	0.057	0.036	0.198	0.219	0.255

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.180	1.000	0.180	0.80	1.00	0.145
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.049	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.274	0.049	0.80	1.00	0.040
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.130	$(5)_{TOTAL}-(5)_{FI}$ = 0.726	0.131	0.80	1.00	0.105

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.040	1.000	0.105	0.145
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.000
Collision with fixed object	0.653	0.026	0.895	0.094	0.120
Collision with other object	0.091	0.004	0.069	0.007	0.011
Other single-vehicle collision	0.045	0.002	0.018	0.002	0.004
Single-vehicle noncollision	0.209	0.008	0.014	0.001	0.010

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.35	1.00	3.75

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 12-14					**Overdispersion Parameter, k**	**$N_{pedbase}$** from Equation 12-29	**Combined CMF** (4) from Worksheet 2H	**Calibration factor, C_i**	**Predicted N_{pedi}** (4)*(5)*(6)
	a	b	c	d	e					
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.006	3.75	1.00	0.022
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.022

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}** (9) from Worksheet 2C	**Predicted N_{bisv}** (9) from Worksheet 2E	**Predicted N_{bi}** (2) + (3)	**f_{bikei}** from Table 12-17	**Calibration factor, C_i**	**Predicted N_{bikei}** (4)*(5)*(6)
Total	1.743	0.145	1.888	0.011	1.00	0.021
Fatal and injury (FI)	--	--	--	--	1.00	0.021

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	**Property damage only (PDO)** (5) from Worksheet 2D and 2F	**Total** (6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.349	0.604	0.954
Head-on collisions (from Worksheet 2D)	0.024	0.022	0.046
Angle collisions (from Worksheet 2D)	0.178	0.226	0.404
Sideswipe (from Worksheet 2D)	0.048	0.035	0.084
Other multiple-vehicle collision (from Worksheet 2D)	0.036	0.219	0.255
Subtotal	0.636	1.107	1.743
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.026	0.094	0.120
Collision with other object (from Worksheet 2F)	0.004	0.007	0.011
Other single-vehicle collision (from Worksheet 2F)	0.002	0.002	0.004
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.001	0.010
Collision with pedestrian (from Worksheet 2G or 2I)	0.022	0.000	0.022
Collision with bicycle (from Worksheet 2J)	0.021	0.000	0.021
Subtotal	0.083	0.105	0.188
Total	0.719	1.212	1.931

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)** (Total) from Worksheet 2K
Total	1.9
Fatal and injury (FI)	0.7
Property damage only (PDO)	1.2

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1B -BUILD
Agency or Company	FDOT	Roadway Section	MP 0.754 to MP 0.965
Date Performed	10/07/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.212
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	1
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.526	1.000	0.526	0.99	1.00	0.521
Fatal and Injury (FI)	-12.76	1.28	1.31	0.158	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.149	0.99	1.00	0.148
Property Damage Only (PDO)	-12.81	1.38	1.34	0.399	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.376	0.99	1.00	0.373

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.148	1.000	0.373	0.521
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.123	0.662	0.247	0.370
Head-on collision	0.020	0.003	0.007	0.003	0.006
Angle collision	0.040	0.006	0.036	0.013	0.019
Sideswipe, same direction	0.050	0.007	0.223	0.083	0.090
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.002
Other multiple-vehicle collision	0.048	0.007	0.071	0.026	0.034

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.132	1.000	0.132	0.99	1.00	0.131
Fatal and Injury (FI)	-8.71	0.66	0.28	0.022	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.022	0.99	1.00	0.022
Property Damage Only (PDO)	-5.04	0.45	1.06	0.110	$(5)_{TOTAL}-(5)_{FI}$ = 0.835	0.111	0.99	1.00	0.109

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.022	1.000	0.109	0.131
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.007	0.007
Collision with fixed object	0.500	0.011	0.813	0.089	0.100
Collision with other object	0.028	0.001	0.016	0.002	0.002
Other single-vehicle collision	0.471	0.010	0.108	0.012	0.022

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	1	0.018	1.106	0.021	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.021	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.021	1.000	0.021	0.99	1.00	0.020
Fatal and injury (FI)	--	0.284	0.006	0.99	1.00	0.006
Property damage only (PDO)	--	0.716	0.015	0.99	1.00	0.015

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.521	0.131	0.020	0.672	0.019	1.00	0.013
Fatal and injury (FI)	--	--	--	--	--	1.00	0.013

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.521	0.131	0.020	0.672	0.005	1.00	0.003
Fatal and injury (FI)	--	--	--	--	--	1.00	0.003

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.123	0.247	0.370
Head-on collisions (from Worksheet 1D)	0.003	0.003	0.006
Angle collisions (from Worksheet 1D)	0.006	0.013	0.019
Sideswipe, same direction (from Worksheet 1D)	0.007	0.083	0.090
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.002
Driveway-related collisions (from Worksheet 1H)	0.006	0.015	0.020
Other multiple-vehicle collision (from Worksheet 1D)	0.007	0.026	0.034
Subtotal	0.154	0.387	0.541
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.007	0.007
Collision with fixed object (from Worksheet 1F)	0.011	0.089	0.100
Collision with other object (from Worksheet 1F)	0.001	0.002	0.002
Other single-vehicle collision (from Worksheet 1F)	0.010	0.012	0.022
Collision with pedestrian (from Worksheet 1I)	0.013	0.000	0.013
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.038	0.109	0.147
Total	0.191	0.497	0.688

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.7	0.21	3.2
Fatal and injury (FI)	0.2	0.21	0.9
Property damage only (PDO)	0.5	0.21	2.3

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 4 -BUILD
Agency or Company	FDOT	Intersection	MP 0.965 to MP 1.192
Date Performed	10/04/16	Jurisdiction	CR 510 @ 87TH ST
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	17,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,200
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	1
Number of major-road approaches with right-turn lanes (0,1,2)		0	1
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Protected / Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	6
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.97	0.96	1.00	0.91	1.00	0.69

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.628	1.000	4.628	0.69	1.00	3.180
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.437	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.322	1.491	0.69	1.00	1.024
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.023	$(5)_{TOTAL}-(5)_{FI}$ / 0.678	3.137	0.69	1.00	2.155

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.024	1.000	2.155	3.180
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.461	0.483	1.041	1.502
Head-on collision	0.049	0.050	0.030	0.065	0.115
Angle collision	0.347	0.355	0.244	0.526	0.881
Sideswipe	0.099	0.101	0.032	0.069	0.170
Other multiple-vehicle collision	0.055	0.056	0.211	0.455	0.511

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.326	1.000	0.326	0.69	1.00	0.224
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.089	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.278	0.091	0.69	1.00	0.062
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.232	$(5)_{TOTAL}-(5)_{FI}$ / 0.722	0.235	0.69	1.00	0.162

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.062	1.000	0.162	0.224
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.046	0.870	0.141	0.187
Collision with other object	0.072	0.004	0.070	0.011	0.016
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.009	0.034	0.005	0.014

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 12-14					**Overdispersion Parameter, k**	**$N_{pedbase}$** from Equation 12-29	**Combined CMF** (4) from Worksheet 2H	**Calibration factor, C_i**	**Predicted N_{pedi}** (4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.013	2.78	1.00	0.036
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.036

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}** (9) from Worksheet 2C	**Predicted N_{bisv}** (9) from Worksheet 2E	**Predicted N_{bi}** (2) + (3)	**f_{bikei}** from Table 12-17	**Calibration factor, C_i**	**Predicted N_{bikei}** (4)*(5)*(6)
Total	3.180	0.224	3.404	0.015	1.00	0.051
Fatal and injury (FI)	--	--	--	--	1.00	0.051

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	**Property damage only (PDO)** (5) from Worksheet 2D and 2F	**Total** (6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.461	1.041	1.502
Head-on collisions (from Worksheet 2D)	0.050	0.065	0.115
Angle collisions (from Worksheet 2D)	0.355	0.526	0.881
Sideswipe (from Worksheet 2D)	0.101	0.069	0.170
Other multiple-vehicle collision (from Worksheet 2D)	0.056	0.455	0.511
Subtotal	1.024	2.155	3.180
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.046	0.141	0.187
Collision with other object (from Worksheet 2F)	0.004	0.011	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.005	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.036	0.000	0.036
Collision with bicycle (from Worksheet 2J)	0.051	0.000	0.051
Subtotal	0.149	0.162	0.311
Total	1.174	2.317	3.491

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections	
(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	3.5
Fatal and injury (FI)	1.2
Property damage only (PDO)	2.3

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1C -BUILD
Agency or Company	FDOT	Roadway Section	MP 1.192 to MP 1.280
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.088
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	1
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.219	1.000	0.219	0.99	1.00	0.217
Fatal and Injury (FI)	-12.76	1.28	1.31	0.066	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.062	0.99	1.00	0.062
Property Damage Only (PDO)	-12.81	1.38	1.34	0.166	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.157	0.99	1.00	0.155

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.062	1.000	0.155	0.217
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.051	0.662	0.103	0.154
Head-on collision	0.020	0.001	0.007	0.001	0.002
Angle collision	0.040	0.002	0.036	0.006	0.008
Sideswipe, same direction	0.050	0.003	0.223	0.035	0.038
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.003	0.071	0.011	0.014

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.055	1.000	0.055	0.99	1.00	0.055
Fatal and Injury (FI)	-8.71	0.66	0.28	0.009	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.009	0.99	1.00	0.009
Property Damage Only (PDO)	-5.04	0.45	1.06	0.046	$(5)_{TOTAL}-(5)_{FI}$ = 0.835	0.046	0.99	1.00	0.046

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.009	1.000	0.046	0.055
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.003	0.003
Collision with fixed object	0.500	0.004	0.813	0.037	0.042
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.004	0.108	0.005	0.009

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
	from Table 12-7	from Table 12-7		Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	1	0.018	1.106	0.021	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.021	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.021	1.000	0.021	0.99	1.00	0.020
Fatal and injury (FI)	--	0.284	0.006	0.99	1.00	0.006
Property damage only (PDO)	--	0.716	0.015	0.99	1.00	0.015

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}** (9) from Worksheet 1C	**Predicted N_{brsv}** (9) from Worksheet 1E	**Predicted N_{brdwy}** (7) from Worksheet 1H	**Predicted N_{br}** (2)+(3)+(4)	**f_{pedr}** from Table 12-8	**Calibration factor, C_r**	**Predicted N_{pedr}** (5)*(6)*(7)
Total	0.217	0.055	0.020	0.292	0.019	1.00	0.006
Fatal and injury (FI)	--	--	--	--	--	1.00	0.006

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}** (9) from Worksheet 1C	**Predicted N_{brsv}** (9) from Worksheet 1E	**Predicted N_{brdwy}** (7) from Worksheet 1H	**Predicted N_{br}** (2)+(3)+(4)	**f_{biker}** from Table 12-9	**Calibration factor, C_r**	**Predicted N_{biker}** (5)*(6)*(7)
Total	0.217	0.055	0.020	0.292	0.005	1.00	0.001
Fatal and injury (FI)	--	--	--	--	--	1.00	0.001

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.051	0.103	0.154
Head-on collisions (from Worksheet 1D)	0.001	0.001	0.002
Angle collisions (from Worksheet 1D)	0.002	0.006	0.008
Sideswipe, same direction (from Worksheet 1D)	0.003	0.035	0.038
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Driveway-related collisions (from Worksheet 1H)	0.006	0.015	0.020
Other multiple-vehicle collision (from Worksheet 1D)	0.003	0.011	0.014
Subtotal	0.067	0.170	0.238
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.003	0.003
Collision with fixed object (from Worksheet 1F)	0.004	0.037	0.042
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.004	0.005	0.009
Collision with pedestrian (from Worksheet 1I)	0.006	0.000	0.006
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.016	0.046	0.062
Total	0.083	0.216	0.299

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.3	0.09	3.4
Fatal and injury (FI)	0.1	0.09	0.9
Property damage only (PDO)	0.2	0.09	2.4

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 2A - BUILD
Agency or Company	FDOT	Roadway Section	MP 1.280 to MP 1.467
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.188
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	18,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.505	1.000	0.505	0.99	1.00	0.500
Fatal and Injury (FI)	-12.76	1.28	1.31	0.151	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.283	0.143	0.99	1.00	0.141
Property Damage Only (PDO)	-12.81	1.38	1.34	0.384	$(5)_{TOTAL}-(5)_{FI}$ = 0.717	0.362	0.99	1.00	0.358

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.141	1.000	0.358	0.500
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.118	0.662	0.237	0.355
Head-on collision	0.020	0.003	0.007	0.003	0.005
Angle collision	0.040	0.006	0.036	0.013	0.019
Sideswipe, same direction	0.050	0.007	0.223	0.080	0.087
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.002
Other multiple-vehicle collision	0.048	0.007	0.071	0.025	0.032

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.121	1.000	0.121	0.99	1.00	0.120
Fatal and Injury (FI)	-8.71	0.66	0.28	0.020	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.166	0.020	0.99	1.00	0.020
Property Damage Only (PDO)	-5.04	0.45	1.06	0.100	$(5)_{TOTAL}-(5)_{FI}$ = 0.834	0.101	0.99	1.00	0.100

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.020	1.000	0.100	0.120
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.006	0.006
Collision with fixed object	0.500	0.010	0.813	0.081	0.091
Collision with other object	0.028	0.001	0.016	0.002	0.002
Other single-vehicle collision	0.471	0.009	0.108	0.011	0.020

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.000	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.000	1.000	0.000	0.99	1.00	0.000
Fatal and injury (FI)	--	0.284	0.000	0.99	1.00	0.000
Property damage only (PDO)	--	0.716	0.000	0.99	1.00	0.000

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.500	0.120	0.000	0.619	0.019	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.500	0.120	0.000	0.619	0.005	1.00	0.003
Fatal and injury (FI)	--	--	--	--	--	1.00	0.003

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.118	0.237	0.355
Head-on collisions (from Worksheet 1D)	0.003	0.003	0.005
Angle collisions (from Worksheet 1D)	0.006	0.013	0.019
Sideswipe, same direction (from Worksheet 1D)	0.007	0.080	0.087
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.002
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.007	0.025	0.032
Subtotal	0.141	0.358	0.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.006	0.006
Collision with fixed object (from Worksheet 1F)	0.010	0.081	0.091
Collision with other object (from Worksheet 1F)	0.001	0.002	0.002
Other single-vehicle collision (from Worksheet 1F)	0.009	0.011	0.020
Collision with pedestrian (from Worksheet 1I)	0.012	0.000	0.012
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.035	0.100	0.134
Total	0.176	0.458	0.634

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.6	0.19	3.4
Fatal and injury (FI)	0.2	0.19	0.9
Property damage only (PDO)	0.5	0.19	2.4

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3A - BUILD
Agency or Company	FDOT	Roadway Section	MP 1.467 to MP 1.473
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.070
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	18,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.189	1.000	0.189	0.99	1.00	0.187
Fatal and Injury (FI)	-12.76	1.28	1.31	0.057	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.283	0.053	0.99	1.00	0.053
Property Damage Only (PDO)	-12.81	1.38	1.34	0.144	$(5)_{TOTAL}-(5)_{FI}$ / 0.717	0.135	0.99	1.00	0.134

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.053	1.000	0.134	0.187
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.044	0.662	0.089	0.133
Head-on collision	0.020	0.001	0.007	0.001	0.002
Angle collision	0.040	0.002	0.036	0.005	0.007
Sideswipe, same direction	0.050	0.003	0.223	0.030	0.033
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.003	0.071	0.010	0.012

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.045	1.000	0.045	0.99	1.00	0.045
Fatal and Injury (FI)	-8.71	0.66	0.28	0.007	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.166	0.008	0.99	1.00	0.007
Property Damage Only (PDO)	-5.04	0.45	1.06	0.037	$(5)_{TOTAL}-(5)_{FI}$ / 0.834	0.038	0.99	1.00	0.037

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.007	1.000	0.037	0.045
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.002	0.002
Collision with fixed object	0.500	0.004	0.813	0.030	0.034
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.004	0.108	0.004	0.008

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.000	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.000	1.000	0.000	0.99	1.00	0.000
Fatal and injury (FI)	--	0.284	0.000	0.99	1.00	0.000
Property damage only (PDO)	--	0.716	0.000	0.99	1.00	0.000

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.187	0.045	0.000	0.232	0.019	1.00	0.004
Fatal and injury (FI)	--	--	--	--	--	1.00	0.004

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.187	0.045	0.000	0.232	0.005	1.00	0.001
Fatal and injury (FI)	--	--	--	--	--	1.00	0.001

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.044	0.089	0.133
Head-on collisions (from Worksheet 1D)	0.001	0.001	0.002
Angle collisions (from Worksheet 1D)	0.002	0.005	0.007
Sideswipe, same direction (from Worksheet 1D)	0.003	0.030	0.033
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.003	0.010	0.012
Subtotal	0.053	0.134	0.187
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 1F)	0.004	0.030	0.034
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.004	0.004	0.008
Collision with pedestrian (from Worksheet 1I)	0.004	0.000	0.004
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.013	0.037	0.050
Total	0.066	0.171	0.237

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.2	0.07	3.4
Fatal and injury (FI)	0.1	0.07	0.9
Property damage only (PDO)	0.2	0.07	2.4

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 5 - BUILD
Agency or Company	FDOT	Intersection	MP 1.473 to MP 1.700
Date Performed	10/04/16	Jurisdiction	CR 510 @ TREASURE COAST ELEM. SCHOOL
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	23,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	2,300
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Protected / Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			1,500
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.97	0.92	1.00	0.91	1.00	0.66

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.649	1.000	4.649	0.66	1.00	3.067
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.513	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.339	1.576	0.66	1.00	1.039
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	2.950	$(5)_{TOTAL}-(5)_{FI}$ = 0.661	3.073	0.66	1.00	2.027

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type (PDO)**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.039	1.000	2.027	3.067
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.468	0.483	0.979	1.447
Head-on collision	0.049	0.051	0.030	0.061	0.112
Angle collision	0.347	0.361	0.244	0.495	0.855
Sideswipe	0.099	0.103	0.032	0.065	0.168
Other multiple-vehicle collision	0.055	0.057	0.211	0.428	0.485

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.275	1.000	0.275	0.66	1.00	0.181
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.068	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.247	0.068	0.66	1.00	0.045
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.208	$(5)_{TOTAL}-(5)_{FI}$ = 0.753	0.207	0.66	1.00	0.137

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.045	1.000	0.137	0.181
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.033	0.870	0.119	0.152
Collision with other object	0.072	0.003	0.070	0.010	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.005	0.011

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.35	1.00	3.75

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 12-14					**Overdispersion Parameter, k**	**$N_{pedbase}$** from Equation 12-29	**Combined CMF** (4) from Worksheet 2H	**Calibration factor, C_i**	**Predicted N_{pedi}** (4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.076	3.75	1.00	0.284
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.284

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}** (9) from Worksheet 2C	**Predicted N_{bisv}** (9) from Worksheet 2E	**Predicted N_{bi}** (2) + (3)	**f_{bikei}** from Table 12-17	**Calibration factor, C_i**	**Predicted N_{bikei}** (4)*(5)*(6)
Total	3.067	0.181	3.248	0.015	1.00	0.049
Fatal and injury (FI)	--	--	--	--	1.00	0.049

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	**Property damage only (PDO)** (5) from Worksheet 2D and 2F	**Total** (6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.468	0.979	1.447
Head-on collisions (from Worksheet 2D)	0.051	0.061	0.112
Angle collisions (from Worksheet 2D)	0.361	0.495	0.855
Sideswipe (from Worksheet 2D)	0.103	0.065	0.168
Other multiple-vehicle collision (from Worksheet 2D)	0.057	0.428	0.485
Subtotal	1.039	2.027	3.067
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.033	0.119	0.152
Collision with other object (from Worksheet 2F)	0.003	0.010	0.013
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.005	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.284	0.000	0.284
Collision with bicycle (from Worksheet 2J)	0.049	0.000	0.049
Subtotal	0.377	0.137	0.514
Total	1.417	2.164	3.581

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)** (Total) from Worksheet 2K
Total	3.6
Fatal and injury (FI)	1.4
Property damage only (PDO)	2.2

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3B - BUILD
Agency or Company	FDOT	Roadway Section	MP 1.700 to MP 4.000
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	2.299
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	23,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	7
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	15
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	8.597	1.000	8.597	0.99	1.00	8.511
Fatal and Injury (FI)	-12.76	1.28	1.31	2.529	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.278	2.390	0.99	1.00	2.366
Property Damage Only (PDO)	-12.81	1.38	1.34	6.568	$(5)_{TOTAL}-(5)_{FI}$ 0.722	6.207	0.99	1.00	6.145

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type(FI)**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type (PDO)**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	2.366	1.000	6.145	8.511
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	1.969	0.662	4.068	6.036
Head-on collision	0.020	0.047	0.007	0.043	0.090
Angle collision	0.040	0.095	0.036	0.221	0.316
Sideswipe, same direction	0.050	0.118	0.223	1.370	1.489
Sideswipe, opposite direction	0.010	0.024	0.001	0.006	0.030
Other multiple-vehicle collision	0.048	0.114	0.071	0.436	0.550

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	1.654	1.000	1.654	0.99	1.00	1.637
Fatal and Injury (FI)	-8.71	0.66	0.28	0.287	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.174	0.287	0.99	1.00	0.284
Property Damage Only (PDO)	-5.04	0.45	1.06	1.366	$(5)_{TOTAL}-(5)_{FI}$ 0.826	1.367	0.99	1.00	1.353

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.284	1.000	1.353	1.637
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.085	0.086
Collision with fixed object	0.500	0.142	0.813	1.100	1.242
Collision with other object	0.028	0.008	0.016	0.022	0.030
Other single-vehicle collision	0.471	0.134	0.108	0.146	0.280

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	7	0.033	1.106	0.371	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	0	0.018	1.106	0.000	
Minor residential	15	0.003	1.106	0.072	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.443	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.443	1.000	0.443	0.99	1.00	0.438
Fatal and injury (FI)	--	0.284	0.126	0.99	1.00	0.125
Property damage only (PDO)	--	0.716	0.317	0.99	1.00	0.314

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	8.511	1.637	0.438	10.586	0.019	1.00	0.201
Fatal and injury (FI)	--	--	--	--	--	1.00	0.201

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	8.511	1.637	0.438	10.586	0.005	1.00	0.053
Fatal and injury (FI)	--	--	--	--	--	1.00	0.053

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	1.969	4.068	6.036
Head-on collisions (from Worksheet 1D)	0.047	0.043	0.090
Angle collisions (from Worksheet 1D)	0.095	0.221	0.316
Sideswipe, same direction (from Worksheet 1D)	0.118	1.370	1.489
Sideswipe, opposite direction (from Worksheet 1D)	0.024	0.006	0.030
Driveway-related collisions (from Worksheet 1H)	0.125	0.314	0.438
Other multiple-vehicle collision (from Worksheet 1D)	0.114	0.436	0.550
Subtotal	2.491	6.459	8.949
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.085	0.086
Collision with fixed object (from Worksheet 1F)	0.142	1.100	1.242
Collision with other object (from Worksheet 1F)	0.008	0.022	0.030
Other single-vehicle collision (from Worksheet 1F)	0.134	0.146	0.280
Collision with pedestrian (from Worksheet 1I)	0.201	0.000	0.201
Collision with bicycle (from Worksheet 1J)	0.053	0.000	0.053
Subtotal	0.538	1.353	1.891
Total	3.029	7.812	10.840

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	10.8	2.30	4.7
Fatal and injury (FI)	3.0	2.30	1.3
Property damage only (PDO)	7.8	2.30	3.4

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 6 -BUILD
Agency or Company	FDOT	Intersection	MP 4.000 to MP 4.227
Date Performed	10/04/16	Jurisdiction	CR 510 @ 66TH AVE
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	21,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	19,000
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	0
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	2
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.00	0.99	1.00	1.00	1.00	1.00	0.99

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.855	1.000	6.855	0.99	1.00	6.786
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.162	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.326	2.237	0.99	1.00	2.215
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.463	$(5)_{TOTAL}-(5)_{FI}$ = 0.674	4.618	0.99	1.00	4.571

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	2.215	1.000	4.571	6.786
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.997	0.483	2.208	3.205
Head-on collision	0.049	0.109	0.030	0.137	0.246
Angle collision	0.347	0.769	0.244	1.115	1.884
Sideswipe	0.099	0.219	0.032	0.146	0.366
Other multiple-vehicle collision	0.055	0.122	0.211	0.965	1.086

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.457	1.000	0.457	0.99	1.00	0.453
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.121	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.269	0.123	0.99	1.00	0.122
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.328	$(5)_{TOTAL}-(5)_{FI}$ = 0.731	0.334	0.99	1.00	0.331

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.122	1.000	0.331	0.453
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.001	0.001
Collision with fixed object	0.744	0.091	0.870	0.288	0.379
Collision with other object	0.072	0.009	0.070	0.023	0.032
Other single-vehicle collision	0.040	0.005	0.023	0.008	0.012
Single-vehicle noncollision	0.141	0.017	0.034	0.011	0.028

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.35	1.00	3.75

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.015	3.75	1.00	0.056
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.056

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	6.786	0.453	7.239	0.015	1.00	0.109
Fatal and injury (FI)	--	--	--	--	1.00	0.109

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.997	2.208	3.205
Head-on collisions (from Worksheet 2D)	0.109	0.137	0.246
Angle collisions (from Worksheet 2D)	0.769	1.115	1.884
Sideswipe (from Worksheet 2D)	0.219	0.146	0.366
Other multiple-vehicle collision (from Worksheet 2D)	0.122	0.965	1.086
Subtotal	2.215	4.571	6.786
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.091	0.288	0.379
Collision with other object (from Worksheet 2F)	0.009	0.023	0.032
Other single-vehicle collision (from Worksheet 2F)	0.005	0.008	0.012
Single-vehicle noncollision (from Worksheet 2F)	0.017	0.011	0.028
Collision with pedestrian (from Worksheet 2G or 2I)	0.056	0.000	0.056
Collision with bicycle (from Worksheet 2J)	0.109	0.000	0.109
Subtotal	0.287	0.331	0.618
Total	2.501	4.902	7.404

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	7.4
Fatal and injury (FI)	2.5
Property damage only (PDO)	4.9

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 4A - BUILD
Agency or Company	FDOT	Roadway Section	MP 4.227 to MP 5.080
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.848
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	9
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	15
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	2.103	1.000	2.103	0.99	1.00	2.082
Fatal and Injury (FI)	-12.76	1.28	1.31	0.634	$\frac{(4)_{FI}/((4)_{FI}+(4)_{PDO})}{0.284}$	0.598	0.99	1.00	0.592
Property Damage Only (PDO)	-12.81	1.38	1.34	1.597	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.716}$	1.506	0.99	1.00	1.491

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.592	1.000	1.491	2.082
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.492	0.662	0.987	1.479
Head-on collision	0.020	0.012	0.007	0.010	0.022
Angle collision	0.040	0.024	0.036	0.054	0.077
Sideswipe, same direction	0.050	0.030	0.223	0.332	0.362
Sideswipe, opposite direction	0.010	0.006	0.001	0.001	0.007
Other multiple-vehicle collision	0.048	0.028	0.071	0.106	0.134

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.529	1.000	0.529	0.99	1.00	0.524
Fatal and Injury (FI)	-8.71	0.66	0.28	0.087	$\frac{(4)_{FI}/((4)_{FI}+(4)_{PDO})}{0.165}$	0.087	0.99	1.00	0.086
Property Damage Only (PDO)	-5.04	0.45	1.06	0.440	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.835}$	0.442	0.99	1.00	0.438

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.086	1.000	0.438	0.524
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.028	0.028
Collision with fixed object	0.500	0.043	0.813	0.356	0.399
Collision with other object	0.028	0.002	0.016	0.007	0.009
Other single-vehicle collision	0.471	0.041	0.108	0.047	0.088

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	9	0.033	1.106	0.341	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	0	0.018	1.106	0.000	
Minor residential	15	0.003	1.106	0.052	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.393	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.393	1.000	0.393	0.99	1.00	0.389
Fatal and injury (FI)	--	0.284	0.112	0.99	1.00	0.110
Property damage only (PDO)	--	0.716	0.281	0.99	1.00	0.278

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	2.082	0.524	0.389	2.995	0.019	1.00	0.057
Fatal and injury (FI)	--	--	--	--	--	1.00	0.057

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	2.082	0.524	0.389	2.995	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.492	0.987	1.479
Head-on collisions (from Worksheet 1D)	0.012	0.010	0.022
Angle collisions (from Worksheet 1D)	0.024	0.054	0.077
Sideswipe, same direction (from Worksheet 1D)	0.030	0.332	0.362
Sideswipe, opposite direction (from Worksheet 1D)	0.006	0.001	0.007
Driveway-related collisions (from Worksheet 1H)	0.110	0.278	0.389
Other multiple-vehicle collision (from Worksheet 1D)	0.028	0.106	0.134
Subtotal	0.702	1.769	2.471
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.028	0.028
Collision with fixed object (from Worksheet 1F)	0.043	0.356	0.399
Collision with other object (from Worksheet 1F)	0.002	0.007	0.009
Other single-vehicle collision (from Worksheet 1F)	0.041	0.047	0.088
Collision with pedestrian (from Worksheet 1I)	0.057	0.000	0.057
Collision with bicycle (from Worksheet 1J)	0.015	0.000	0.015
Subtotal	0.158	0.438	0.596
Total	0.860	2.207	3.067

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	3.1	0.85	3.6
Fatal and injury (FI)	0.9	0.85	1.0
Property damage only (PDO)	2.2	0.85	2.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 7 -BUILD
Agency or Company	FDOT	Intersection	MP 5.080 to MP 5.127
Date Performed	10/04/16	Jurisdiction	CR 510 @ 58TH AVE
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	19,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,400
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Protected / Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.97	1.00	1.00	1.00	1.00	0.79

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	5.238	1.000	5.238	0.79	1.00	4.117
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.646	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.326	1.707	0.79	1.00	1.342
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.404	$(5)_{TOTAL}-(5)_{FI}$ / 0.674	3.531	0.79	1.00	2.775

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type$_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.342	1.000	2.775	4.117
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.604	0.483	1.340	1.944
Head-on collision	0.049	0.066	0.030	0.083	0.149
Angle collision	0.347	0.466	0.244	0.677	1.143
Sideswipe	0.099	0.133	0.032	0.089	0.222
Other multiple-vehicle collision	0.055	0.074	0.211	0.586	0.659

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.353	1.000	0.353	0.79	1.00	0.278
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.094	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.270	0.096	0.79	1.00	0.075
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.255	$(5)_{TOTAL}-(5)_{FI}$ / 0.730	0.258	0.79	1.00	0.203

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.075	1.000	0.203	0.278
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.056	0.870	0.176	0.232
Collision with other object	0.072	0.005	0.070	0.014	0.020
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.008
Single-vehicle noncollision	0.141	0.011	0.034	0.007	0.017

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.013	2.78	1.00	0.035
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.035

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.117	0.278	4.395	0.015	1.00	0.066
Fatal and injury (FI)	--	--	--	--	1.00	0.066

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.604	1.340	1.944
Head-on collisions (from Worksheet 2D)	0.066	0.083	0.149
Angle collisions (from Worksheet 2D)	0.466	0.677	1.143
Sideswipe (from Worksheet 2D)	0.133	0.089	0.222
Other multiple-vehicle collision (from Worksheet 2D)	0.074	0.586	0.659
Subtotal	1.342	2.775	4.117
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.056	0.176	0.232
Collision with other object (from Worksheet 2F)	0.005	0.014	0.020
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.035	0.000	0.035
Collision with bicycle (from Worksheet 2J)	0.066	0.000	0.066
Subtotal	0.176	0.203	0.379
Total	1.518	2.978	4.496

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	4.5
Fatal and injury (FI)	1.5
Property damage only (PDO)	3.0

Worksheet 3A -- Predicted Crashes by Severity and Site Type and Observed Crashes Using the Site-Specific EB Method for Urban and Suburban Arterials

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Collision type / Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes,** $N_{observed}$ (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w**	**Expected average crash frequency,**
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)			Equation A-5 from Part C Appendix	Equation A-4 from Part C Appendix
ROADWAY SEGMENTS							
Multiple-vehicle non driveway							
Segment 1A - 0.047 - 0.530	1.075	0.305	0.769		1.320	0.413	0.444
Segment 1B - 0.754 - 0.965	0.521	0.148	0.373	1	1.320	0.593	0.716
Segment 1C - 1.192 - 1.280	0.217	0.062	0.155	2	1.320	0.777	0.614
Segment 2A - 1.280 - 1.467	0.500	0.141	0.358	2	1.320	0.603	1.096
Segment 3A - 1.467 - 1.473	0.187	0.053	0.134	1	1.320	0.802	0.348
Segment 3B - 1.700 - 4.000	8.511	2.366	6.145	5	1.320	0.082	5.287
Segment 4A - 4.227 - 5.080	2.082	0.592	1.491	2	1.320	0.267	2.022
Single-vehicle							
Segment 1A	0.270	0.045	0.226		0.860	0.811	0.219
Segment 1B	0.131	0.022	0.109		0.860	0.899	0.118
Segment 1C	0.055	0.009	0.046	1	0.860	0.955	0.097
Segment 2A	0.120	0.020	0.100		0.860	0.907	0.108
Segment 3A	0.045	0.007	0.037		0.860	0.963	0.043
Segment 3B	1.637	0.284	1.353	4	0.860	0.415	3.019
Segment 4A	0.524	0.086	0.438		0.860	0.689	0.361
Multiple-vehicle driveway-related							
Segment 1A	0.106	0.030	0.076		1.390	0.872	0.092
Segment 1B	0.020	0.006	0.015		1.390	0.972	0.020
Segment 1C	0.020	0.006	0.015		1.390	0.972	0.020
Segment 2A	0.000	0.000	0.000		1.390	1.000	0.000
Segment 3A	0.000	0.000	0.000		1.390	1.000	0.000
Segment 3B	0.438	0.125	0.314	2	1.390	0.621	1.030
Segment 4A	0.389	0.110	0.278		1.390	0.649	0.252
INTERSECTIONS							
Multiple-vehicle							
Intersection 1 - 0.000 - 0.047	4.363	1.441	2.922	7	0.390	0.370	6.024
Intersection 2 - 0.530 - 0.643	1.793	0.688	1.105	0	0.330	0.628	1.127
Intersection 3 - 0.643 - 0.754	1.743	0.636	1.107	4	0.330	0.635	2.567
Intersection 4 - 0.965 - 1.192	3.180	1.024	2.155	5	0.390	0.446	4.187
Intersection 5 - 1.473 - 1.700	3.067	1.039	2.027	2	0.390	0.455	2.486
Intersection 6 - 4.000 - 4.227	6.786	2.215	4.571	16	0.390	0.274	13.473
Intersection 7 - 5.080 - 5.127	4.117	1.342	2.775	5	0.390	0.384	4.661
Single-vehicle							
Intersection 1	0.279	0.073	0.206	2	0.360	0.909	0.436
Intersection 2	0.125	0.031	0.094		0.360	0.957	0.120
Intersection 3	0.145	0.040	0.105		0.360	0.950	0.138
Intersection 4	0.224	0.062	0.162		0.000	1.000	0.224
Intersection 5	0.181	0.045	0.137		0.360	0.939	0.170
Intersection 6	0.453	0.122	0.331		0.360	0.860	0.389
Intersection 7	0.278	0.075	0.203	1	0.360	0.909	0.343
COMBINED (sum of column)	43.581	13.250	30.331	**62**	--	--	52.252

Worksheet 3B -- Predicted Pedestrian and Bicycle Crashes for Urban and Suburban Arterials

(1)	(2)	(3)
Site Type	**N_{ped}**	**N_{bike}**
ROADWAY SEGMENTS		
Segment 1A	0.028	0.007
Segment 1B	0.013	0.003
Segment 1C	0.006	0.001
Segment 2A	0.012	0.003
Segment 3A	0.004	0.001
Segment 3B	0.201	0.053
Segment 4A	0.057	0.015
INTERSECTIONS		
Intersection 1	0.019	0.070
Intersection 2	0.005	0.021
Intersection 3	0.022	0.021
Intersection 4	0.036	0.051
Intersection 5	0.284	0.049
Intersection 6	0.056	0.109
Intersection 7	0.035	0.066
COMBINED (sum of column)	0.778	0.470

Worksheet 3C -- Site-Specific EB Method Summary Results for Urban and Suburban Arterials

(1)	(2)	(3)	(4)	(5)	(6)
Crash severity level	**$N_{predicted}$**	**N_{ped}**	**N_{bike}**	$N_{expected\ (VEHICLE)}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(2)_{COMB}$ from Worksheet 3B	$(3)_{COMB}$ from Worksheet 3B	$(8)_{COMB}$ Worksheet 3A	(3)+(4)+(5)
	43.6	0.8	0.5	52.3	**53.50**
Fatal and injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(2)_{COMB}$ from Worksheet 3B	$(3)_{COMB}$ from Worksheet 3B	$(5)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$	(3)+(4)+(5)
	13.2	0.8	0.5	15.9	17.1
Property damage only (PDO)	$(4)_{COMB}$ from Worksheet 3A	--	--	$(5)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$	(3)+(4)+(5)
	30.3	0.0	0.0	36.4	36.4

Appendix 5- HSM Analysis- 2040 Future (Build Conditions with Roundabout)

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 1 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 0.000 to MP 0.047
Date Performed	10/04/16	Jurisdiction	CR 510 @ CR 512
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	23,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	16,000
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2		--	Protected
Type of left-turn signal phasing for Leg #3		--	Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Permissive
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	7
Number of bus stops within 300 m (1,000 ft) of the intersection		0	0
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	2

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.88	0.92	1.00	0.91	1.00	0.60

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.263	1.000	7.263	0.60	1.00	4.363
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.318	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.330	2.399	0.60	1.00	1.441
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.699	$(5)_{TOTAL}-(5)_{FI}$ = 0.670	4.864	0.60	1.00	2.922

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.441	1.000	2.922	4.363
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.649	0.483	1.411	2.060
Head-on collision	0.049	0.071	0.030	0.088	0.158
Angle collision	0.347	0.500	0.244	0.713	1.213
Sideswipe	0.099	0.143	0.032	0.093	0.236
Other multiple-vehicle collision	0.055	0.079	0.211	0.616	0.696

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.464	1.000	0.464	0.60	1.00	0.279
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.120	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.262	0.121	0.60	1.00	0.073
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.338	$(5)_{TOTAL}-(5)_{FI}$ = 0.738	0.343	0.60	1.00	0.206

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.073	1.000	0.206	0.279
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.054	0.870	0.179	0.234
Collision with other object	0.072	0.005	0.070	0.014	0.020
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.008
Single-vehicle noncollision	0.141	0.010	0.034	0.007	0.017

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
1.00	1.00	1.12	1.12

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.017	1.12	1.00	0.019
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.019

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.363	0.279	4.642	0.015	1.00	0.070
Fatal and injury (FI)	--	--	--	--	1.00	0.070

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.649	1.411	2.060
Head-on collisions (from Worksheet 2D)	0.071	0.088	0.158
Angle collisions (from Worksheet 2D)	0.500	0.713	1.213
Sideswipe (from Worksheet 2D)	0.143	0.093	0.236
Other multiple-vehicle collision (from Worksheet 2D)	0.079	0.616	0.696
Subtotal	1.441	2.922	4.363
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.054	0.179	0.234
Collision with other object (from Worksheet 2F)	0.005	0.014	0.020
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.010	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.019	0.000	0.019
Collision with bicycle (from Worksheet 2J)	0.070	0.000	0.070
Subtotal	0.162	0.206	0.368
Total	1.603	3.128	4.730

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1A - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 0.047 to MP 0.530
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.479
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	3
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	1
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	0.91	1.00	0.90

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	1.188	1.000	1.188	0.90	1.00	1.075
Fatal and Injury (FI)	-12.76	1.28	1.31	0.358	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.337	0.90	1.00	0.305
Property Damage Only (PDO)	-12.81	1.38	1.34	0.902	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.850	0.90	1.00	0.769

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.305	1.000	0.769	1.075
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.254	0.662	0.509	0.763
Head-on collision	0.020	0.006	0.007	0.005	0.011
Angle collision	0.040	0.012	0.036	0.028	0.040
Sideswipe, same direction	0.050	0.015	0.223	0.172	0.187
Sideswipe, opposite direction	0.010	0.003	0.001	0.001	0.004
Other multiple-vehicle collision	0.048	0.015	0.071	0.055	0.069

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.299	1.000	0.299	0.90	1.00	0.270
Fatal and Injury (FI)	-8.71	0.66	0.28	0.049	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.049	0.90	1.00	0.045
Property Damage Only (PDO)	-5.04	0.45	1.06	0.249	$(5)_{TOTAL}-(5)_{FI}$ = 0.835	0.250	0.90	1.00	0.226

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.045	1.000	0.226	0.270
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.014	0.014
Collision with fixed object	0.500	0.022	0.813	0.184	0.206
Collision with other object	0.028	0.001	0.016	0.004	0.005
Other single-vehicle collision	0.471	0.021	0.108	0.024	0.045

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	3	0.033	1.106	0.114	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	0	0.018	1.106	0.000	
Minor residential	1	0.003	1.106	0.003	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.117	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.117	1.000	0.117	0.90	1.00	0.106
Fatal and injury (FI)	--	0.284	0.033	0.90	1.00	0.030
Property damage only (PDO)	--	0.716	0.084	0.90	1.00	0.076

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.075	0.270	0.106	1.451	0.019	1.00	0.028
Fatal and injury (FI)	--	--	--	--	--	1.00	0.028

Change calibration to 1.00 (applied twice by sp

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.075	0.270	0.106	1.451	0.005	1.00	0.007
Fatal and injury (FI)	--	--	--	--	--	1.00	0.007

Change calibration to 1.00 (applied twice by sp

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.254	0.509	0.763
Head-on collisions (from Worksheet 1D)	0.006	0.005	0.011
Angle collisions (from Worksheet 1D)	0.012	0.028	0.040
Sideswipe, same direction (from Worksheet 1D)	0.015	0.172	0.187
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.001	0.004
Driveway-related collisions (from Worksheet 1H)	0.030	0.076	0.106
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.055	0.069
Subtotal	0.335	0.845	1.181
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.014	0.014
Collision with fixed object (from Worksheet 1F)	0.022	0.184	0.206
Collision with other object (from Worksheet 1F)	0.001	0.004	0.005
Other single-vehicle collision (from Worksheet 1F)	0.021	0.024	0.045
Collision with pedestrian (from Worksheet 1I)	0.028	0.000	0.028
Collision with bicycle (from Worksheet 1J)	0.007	0.000	0.007
Subtotal	0.079	0.226	0.305
Total	0.415	1.071	1.486

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	1.5	0.48	3.1
Fatal and injury (FI)	0.4	0.48	0.9
Property damage only (PDO)	1.1	0.48	2.2

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 2 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 0.530 to MP 0.643
Date Performed	10/04/16	Jurisdiction	CR 510 @ MAKO WAY
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 58,100 (veh/day)	--	19,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 16,400 (veh/day)	--	1,500
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	1
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	1
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	2
Number of bus stops within 300 m (1,000 ft) of the intersection		0	0
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.93	0.99	0.96	1.00	1.00	1.00	0.88

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	2.029	1.000	2.029	0.88	1.00	1.793
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	0.750	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.384	0.779	0.88	1.00	0.688
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	1.204	$(5)_{TOTAL}-(5)_{FI}$ = 0.616	1.250	0.88	1.00	1.105

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type (PDO)**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.688	1.000	1.105	1.793
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.549	0.378	0.546	0.603	0.981
Head-on collision	0.038	0.026	0.020	0.022	0.048
Angle collision	0.280	0.193	0.204	0.225	0.418
Sideswipe	0.076	0.052	0.032	0.035	0.088
Other multiple-vehicle collision	0.057	0.039	0.198	0.219	0.258

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.141	1.000	0.141	0.88	1.00	0.125
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.035	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.245	0.035	0.88	1.00	0.031
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.107	$(5)_{TOTAL}-(5)_{FI}$ = 0.755	0.107	0.88	1.00	0.094

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.031	1.000	0.094	0.125
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.000
Collision with fixed object	0.653	0.020	0.895	0.084	0.104
Collision with other object	0.091	0.003	0.069	0.007	0.009
Other single-vehicle collision	0.045	0.001	0.018	0.002	0.003
Single-vehicle noncollision	0.209	0.006	0.014	0.001	0.008

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
1.00	1.35	1.00	1.35

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.004	1.35	1.00	0.005
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.005

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	1.793	0.125	1.918	0.011	1.00	0.021
Fatal and injury (FI)	--	--	--	--	1.00	0.021

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.378	0.603	0.981
Head-on collisions (from Worksheet 2D)	0.026	0.022	0.048
Angle collisions (from Worksheet 2D)	0.193	0.225	0.418
Sideswipe (from Worksheet 2D)	0.052	0.035	0.088
Other multiple-vehicle collision (from Worksheet 2D)	0.039	0.219	0.258
Subtotal	0.688	1.105	1.793
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.020	0.084	0.104
Collision with other object (from Worksheet 2F)	0.003	0.007	0.009
Other single-vehicle collision (from Worksheet 2F)	0.001	0.002	0.003
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.001	0.008
Collision with pedestrian (from Worksheet 2G or 2I)	0.005	0.000	0.005
Collision with bicycle (from Worksheet 2J)	0.021	0.000	0.021
Subtotal	0.057	0.094	0.151
Total	0.745	1.199	1.944

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	1.9
Fatal and injury (FI)	0.7
Property damage only (PDO)	1.2

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 3 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 0.643 to MP 0.754
Date Performed	10/04/16	Jurisdiction	CR 510 @ HAMMERHEAD WAY
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 58,100 (veh/day)	--	17,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 16,400 (veh/day)	--	3,100
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	1
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.93	0.99	0.96	1.00	0.91	1.00	0.80

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	2.166	1.000	2.166	0.80	1.00	1.743
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	0.758	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.365	0.790	0.80	1.00	0.636
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	1.318	$(5)_{TOTAL}-(5)_{FI}$ = 0.635	1.375	0.80	1.00	1.107

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.636	1.000	1.107	1.743
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.549	0.349	0.546	0.604	0.954
Head-on collision	0.038	0.024	0.020	0.022	0.046
Angle collision	0.280	0.178	0.204	0.226	0.404
Sideswipe	0.076	0.048	0.032	0.035	0.084
Other multiple-vehicle collision	0.057	0.036	0.198	0.219	0.255

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.180	1.000	0.180	0.80	1.00	0.145
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.049	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.274	0.049	0.80	1.00	0.040
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.130	$(5)_{TOTAL}-(5)_{FI}$ = 0.726	0.131	0.80	1.00	0.105

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.040	1.000	0.105	0.145
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.000
Collision with fixed object	0.653	0.026	0.895	0.094	0.120
Collision with other object	0.091	0.004	0.069	0.007	0.011
Other single-vehicle collision	0.045	0.002	0.018	0.002	0.004
Single-vehicle noncollision	0.209	0.008	0.014	0.001	0.010

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.35	1.00	3.75

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 12-14					**Overdispersion Parameter, k**	**$N_{pedbase}$** from Equation 12-29	**Combined CMF** (4) from Worksheet 2H	**Calibration factor, C_i**	**Predicted N_{pedi}** (4)*(5)*(6)
	a	b	c	d	e					
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.006	3.75	1.00	0.022
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.022

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}** (9) from Worksheet 2C	**Predicted N_{bisv}** (9) from Worksheet 2E	**Predicted N_{bi}** (2) + (3)	**f_{bikei}** from Table 12-17	**Calibration factor, C_i**	**Predicted N_{bikei}** (4)*(5)*(6)
Total	1.743	0.145	1.888	0.011	1.00	0.021
Fatal and injury (FI)	--	--	--	--	1.00	0.021

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	**Property damage only (PDO)** (5) from Worksheet 2D and 2F	**Total** (6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.349	0.604	0.954
Head-on collisions (from Worksheet 2D)	0.024	0.022	0.046
Angle collisions (from Worksheet 2D)	0.178	0.226	0.404
Sideswipe (from Worksheet 2D)	0.048	0.035	0.084
Other multiple-vehicle collision (from Worksheet 2D)	0.036	0.219	0.255
Subtotal	0.636	1.107	1.743
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.026	0.094	0.120
Collision with other object (from Worksheet 2F)	0.004	0.007	0.011
Other single-vehicle collision (from Worksheet 2F)	0.002	0.002	0.004
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.001	0.010
Collision with pedestrian (from Worksheet 2G or 2I)	0.022	0.000	0.022
Collision with bicycle (from Worksheet 2J)	0.021	0.000	0.021
Subtotal	0.083	0.105	0.188
Total	0.719	1.212	1.931

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)** (Total) from Worksheet 2K
Total	1.9
Fatal and injury (FI)	0.7
Property damage only (PDO)	1.2

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1B - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 0.754 to MP 0.965
Date Performed	10/07/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.212
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	1
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.526	1.000	0.526	0.99	1.00	0.521
Fatal and Injury (FI)	-12.76	1.28	1.31	0.158	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.149	0.99	1.00	0.148
Property Damage Only (PDO)	-12.81	1.38	1.34	0.399	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.376	0.99	1.00	0.373

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.148	1.000	0.373	0.521
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.123	0.662	0.247	0.370
Head-on collision	0.020	0.003	0.007	0.003	0.006
Angle collision	0.040	0.006	0.036	0.013	0.019
Sideswipe, same direction	0.050	0.007	0.223	0.083	0.090
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.002
Other multiple-vehicle collision	0.048	0.007	0.071	0.026	0.034

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.132	1.000	0.132	0.99	1.00	0.131
Fatal and Injury (FI)	-8.71	0.66	0.28	0.022	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.022	0.99	1.00	0.022
Property Damage Only (PDO)	-5.04	0.45	1.06	0.110	$(5)_{TOTAL}-(5)_{FI}$ = 0.835	0.111	0.99	1.00	0.109

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.022	1.000	0.109	0.131
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.007	0.007
Collision with fixed object	0.500	0.011	0.813	0.089	0.100
Collision with other object	0.028	0.001	0.016	0.002	0.002
Other single-vehicle collision	0.471	0.010	0.108	0.012	0.022

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15{,}000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	--
Major residential	1	0.018	1.106	0.021	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.021	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL} * (3)$	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.021	1.000	0.021	0.99	1.00	0.020
Fatal and injury (FI)	--	0.284	0.006	0.99	1.00	0.006
Property damage only (PDO)	--	0.716	0.015	0.99	1.00	0.015

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.521	0.131	0.020	0.672	0.019	1.00	0.013
Fatal and injury (FI)	--	--	--	--	--	1.00	0.013

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.521	0.131	0.020	0.672	0.005	1.00	0.003
Fatal and injury (FI)	--	--	--	--	--	1.00	0.003

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.123	0.247	0.370
Head-on collisions (from Worksheet 1D)	0.003	0.003	0.006
Angle collisions (from Worksheet 1D)	0.006	0.013	0.019
Sideswipe, same direction (from Worksheet 1D)	0.007	0.083	0.090
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.002
Driveway-related collisions (from Worksheet 1H)	0.006	0.015	0.020
Other multiple-vehicle collision (from Worksheet 1D)	0.007	0.026	0.034
Subtotal	0.154	0.387	0.541
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.007	0.007
Collision with fixed object (from Worksheet 1F)	0.011	0.089	0.100
Collision with other object (from Worksheet 1F)	0.001	0.002	0.002
Other single-vehicle collision (from Worksheet 1F)	0.010	0.012	0.022
Collision with pedestrian (from Worksheet 1I)	0.013	0.000	0.013
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.038	0.109	0.147
Total	0.191	0.497	0.688

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.7	0.21	3.2
Fatal and injury (FI)	0.2	0.21	0.9
Property damage only (PDO)	0.5	0.21	2.3

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 4 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 0.965 to MP 1.060
Date Performed	10/04/16	Jurisdiction	CR 510 @ 87TH ST
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	17,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,200
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	1
Number of major-road approaches with right-turn lanes (0,1,2)		0	1
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Protected / Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	6
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.97	0.96	1.00	0.91	1.00	0.69

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.628	1.000	4.628	0.69	1.00	3.180
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.437	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.322	1.491	0.69	1.00	1.024
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.023	$(5)_{TOTAL}-(5)_{FI}$ = 0.678	3.137	0.69	1.00	2.155

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.024	1.000	2.155	3.180
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.461	0.483	1.041	1.502
Head-on collision	0.049	0.050	0.030	0.065	0.115
Angle collision	0.347	0.355	0.244	0.526	0.881
Sideswipe	0.099	0.101	0.032	0.069	0.170
Other multiple-vehicle collision	0.055	0.056	0.211	0.455	0.511

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.326	1.000	0.326	0.69	1.00	0.224
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.089	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.278	0.091	0.69	1.00	0.062
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.232	$(5)_{TOTAL}-(5)_{FI}$ = 0.722	0.235	0.69	1.00	0.162

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.062	1.000	0.162	0.224
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.046	0.870	0.141	0.187
Collision with other object	0.072	0.004	0.070	0.011	0.016
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.009	0.034	0.005	0.014

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients** from Table 12-14					**Overdispersion Parameter, k**	**$N_{pedbase}$** from Equation 12-29	**Combined CMF** (4) from Worksheet 2H	**Calibration factor, C_i**	**Predicted N_{pedi}** (4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.013	2.78	1.00	0.036
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.036

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}** (9) from Worksheet 2C	**Predicted N_{bisv}** (9) from Worksheet 2E	**Predicted N_{bi}** (2) + (3)	**f_{bikei}** from Table 12-17	**Calibration factor, C_i**	**Predicted N_{bikei}** (4)*(5)*(6)
Total	3.180	0.224	3.404	0.015	1.00	0.051
Fatal and injury (FI)	--	--	--	--	1.00	0.051

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	**Property damage only (PDO)** (5) from Worksheet 2D and 2F	**Total** (6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.461	1.041	1.502
Head-on collisions (from Worksheet 2D)	0.050	0.065	0.115
Angle collisions (from Worksheet 2D)	0.355	0.526	0.881
Sideswipe (from Worksheet 2D)	0.101	0.069	0.170
Other multiple-vehicle collision (from Worksheet 2D)	0.056	0.455	0.511
Subtotal	1.024	2.155	3.180
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.046	0.141	0.187
Collision with other object (from Worksheet 2F)	0.004	0.011	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.005	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.036	0.000	0.036
Collision with bicycle (from Worksheet 2J)	0.051	0.000	0.051
Subtotal	0.149	0.162	0.311
Total	1.174	2.317	3.491

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections	
(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	3.5
Fatal and injury (FI)	1.2
Property damage only (PDO)	2.3

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 1C - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 1.060 to MP 1.215
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.088
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	1
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.219	1.000	0.219	0.99	1.00	0.217
Fatal and Injury (FI)	-12.76	1.28	1.31	0.066	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.284	0.062	0.99	1.00	0.062
Property Damage Only (PDO)	-12.81	1.38	1.34	0.166	$(5)_{TOTAL}-(5)_{FI}$ / 0.716	0.157	0.99	1.00	0.155

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.062	1.000	0.155	0.217
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.051	0.662	0.103	0.154
Head-on collision	0.020	0.001	0.007	0.001	0.002
Angle collision	0.040	0.002	0.036	0.006	0.008
Sideswipe, same direction	0.050	0.003	0.223	0.035	0.038
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.003	0.071	0.011	0.014

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.055	1.000	0.055	0.99	1.00	0.055
Fatal and Injury (FI)	-8.71	0.66	0.28	0.009	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.165	0.009	0.99	1.00	0.009
Property Damage Only (PDO)	-5.04	0.45	1.06	0.046	$(5)_{TOTAL}-(5)_{FI}$ / 0.835	0.046	0.99	1.00	0.046

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.009	1.000	0.046	0.055
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.003	0.003
Collision with fixed object	0.500	0.004	0.813	0.037	0.042
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.004	0.108	0.005	0.009

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	--
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	1	0.018	1.106	0.021	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.021	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.021	1.000	0.021	0.99	1.00	0.020
Fatal and injury (FI)	--	0.284	0.006	0.99	1.00	0.006
Property damage only (PDO)	--	0.716	0.015	0.99	1.00	0.015

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.217	0.055	0.020	0.292	0.019	1.00	0.006
Fatal and injury (FI)	--	--	--	--	--	1.00	0.006

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.217	0.055	0.020	0.292	0.005	1.00	0.001
Fatal and injury (FI)	--	--	--	--	--	1.00	0.001

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.051	0.103	0.154
Head-on collisions (from Worksheet 1D)	0.001	0.001	0.002
Angle collisions (from Worksheet 1D)	0.002	0.006	0.008
Sideswipe, same direction (from Worksheet 1D)	0.003	0.035	0.038
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Driveway-related collisions (from Worksheet 1H)	0.006	0.015	0.020
Other multiple-vehicle collision (from Worksheet 1D)	0.003	0.011	0.014
Subtotal	0.067	0.170	0.238
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.003	0.003
Collision with fixed object (from Worksheet 1F)	0.004	0.037	0.042
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.004	0.005	0.009
Collision with pedestrian (from Worksheet 1I)	0.006	0.000	0.006
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.016	0.046	0.062
Total	0.083	0.216	0.299

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.3	0.09	3.4
Fatal and injury (FI)	0.1	0.09	0.9
Property damage only (PDO)	0.2	0.09	2.4

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 2A - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 1.215 to MP 1.403
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.188
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	18,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.505	1.000	0.505	0.99	1.00	0.500
Fatal and Injury (FI)	-12.76	1.28	1.31	0.151	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.283	0.143	0.99	1.00	0.141
Property Damage Only (PDO)	-12.81	1.38	1.34	0.384	$(5)_{TOTAL}-(5)_{FI}$ / 0.717	0.362	0.99	1.00	0.358

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.141	1.000	0.358	0.500
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.118	0.662	0.237	0.355
Head-on collision	0.020	0.003	0.007	0.003	0.005
Angle collision	0.040	0.006	0.036	0.013	0.019
Sideswipe, same direction	0.050	0.007	0.223	0.080	0.087
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.002
Other multiple-vehicle collision	0.048	0.007	0.071	0.025	0.032

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.121	1.000	0.121	0.99	1.00	0.120
Fatal and Injury (FI)	-8.71	0.66	0.28	0.020	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.166	0.020	0.99	1.00	0.020
Property Damage Only (PDO)	-5.04	0.45	1.06	0.100	$(5)_{TOTAL}-(5)_{FI}$ / 0.834	0.101	0.99	1.00	0.100

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments					
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.020	1.000	0.100	0.120
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.006	0.006
Collision with fixed object	0.500	0.010	0.813	0.081	0.091
Collision with other object	0.028	0.001	0.016	0.002	0.002
Other single-vehicle collision	0.471	0.009	0.108	0.011	0.020

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	--
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.000	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.000	1.000	0.000	0.99	1.00	0.000
Fatal and injury (FI)	--	0.284	0.000	0.99	1.00	0.000
Property damage only (PDO)	--	0.716	0.000	0.99	1.00	0.000

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.500	0.120	0.000	0.619	0.019	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.500	0.120	0.000	0.619	0.005	1.00	0.003
Fatal and injury (FI)	--	--	--	--	--	1.00	0.003

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.118	0.237	0.355
Head-on collisions (from Worksheet 1D)	0.003	0.003	0.005
Angle collisions (from Worksheet 1D)	0.006	0.013	0.019
Sideswipe, same direction (from Worksheet 1D)	0.007	0.080	0.087
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.002
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.007	0.025	0.032
Subtotal	0.141	0.358	0.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.006	0.006
Collision with fixed object (from Worksheet 1F)	0.010	0.081	0.091
Collision with other object (from Worksheet 1F)	0.001	0.002	0.002
Other single-vehicle collision (from Worksheet 1F)	0.009	0.011	0.020
Collision with pedestrian (from Worksheet 1I)	0.012	0.000	0.012
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.035	0.100	0.134
Total	0.176	0.458	0.634

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.6	0.19	3.4
Fatal and injury (FI)	0.2	0.19	0.9
Property damage only (PDO)	0.5	0.19	2.4

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3A - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 1.403 to MP 1.628
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.070
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	18,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.189	1.000	0.189	0.99	1.00	0.187
Fatal and Injury (FI)	-12.76	1.28	1.31	0.057	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.283	0.053	0.99	1.00	0.053
Property Damage Only (PDO)	-12.81	1.38	1.34	0.144	$(5)_{TOTAL}-(5)_{FI}$ = 0.717	0.135	0.99	1.00	0.134

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.053	1.000	0.134	0.187
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.044	0.662	0.089	0.133
Head-on collision	0.020	0.001	0.007	0.001	0.002
Angle collision	0.040	0.002	0.036	0.005	0.007
Sideswipe, same direction	0.050	0.003	0.223	0.030	0.033
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.003	0.071	0.010	0.012

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.045	1.000	0.045	0.99	1.00	0.045
Fatal and Injury (FI)	-8.71	0.66	0.28	0.007	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.166	0.008	0.99	1.00	0.007
Property Damage Only (PDO)	-5.04	0.45	1.06	0.037	$(5)_{TOTAL}-(5)_{FI}$ = 0.834	0.038	0.99	1.00	0.037

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments					
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.007	1.000	0.037	0.045
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.002	0.002
Collision with fixed object	0.500	0.004	0.813	0.030	0.034
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.004	0.108	0.004	0.008

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.033	1.106	0.000	--
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.000	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.000	1.000	0.000	0.99	1.00	0.000
Fatal and injury (FI)	--	0.284	0.000	0.99	1.00	0.000
Property damage only (PDO)	--	0.716	0.000	0.99	1.00	0.000

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.187	0.045	0.000	0.232	0.019	1.00	0.004
Fatal and injury (FI)	--	--	--	--	--	1.00	0.004

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.187	0.045	0.000	0.232	0.005	1.00	0.001
Fatal and injury (FI)	--	--	--	--	--	1.00	0.001

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.044	0.089	0.133
Head-on collisions (from Worksheet 1D)	0.001	0.001	0.002
Angle collisions (from Worksheet 1D)	0.002	0.005	0.007
Sideswipe, same direction (from Worksheet 1D)	0.003	0.030	0.033
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.003	0.010	0.012
Subtotal	0.053	0.134	0.187
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 1F)	0.004	0.030	0.034
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.004	0.004	0.008
Collision with pedestrian (from Worksheet 1I)	0.004	0.000	0.004
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.013	0.037	0.050
Total	0.066	0.171	0.237

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)** (Total) from Worksheet 1K	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)** (2) / (3)
Total	0.2	0.07	3.4
Fatal and injury (FI)	0.1	0.07	0.9
Property damage only (PDO)	0.2	0.07	2.4

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 5 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 0.965 to MP 1.060
Date Performed	10/04/16	Jurisdiction	CR 510 @ TREASURE COAST ELEM. SCHOOL
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	23,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	2,300
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Protected / Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			1,500
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.97	0.92	1.00	0.91	1.00	0.66

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.649	1.000	4.649	0.66	1.00	3.067
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.513	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.339	1.576	0.66	1.00	1.039
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	2.950	$(5)_{TOTAL}-(5)_{FI}$ / 0.661	3.073	0.66	1.00	2.027

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type (PDO)**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.039	1.000	2.027	3.067
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.468	0.483	0.979	1.447
Head-on collision	0.049	0.051	0.030	0.061	0.112
Angle collision	0.347	0.361	0.244	0.495	0.855
Sideswipe	0.099	0.103	0.032	0.065	0.168
Other multiple-vehicle collision	0.055	0.057	0.211	0.428	0.485

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.275	1.000	0.275	0.66	1.00	0.181
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.068	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.247	0.068	0.66	1.00	0.045
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.208	$(5)_{TOTAL}-(5)_{FI}$ / 0.753	0.207	0.66	1.00	0.137

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.045	1.000	0.137	0.181
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.033	0.870	0.119	0.152
Collision with other object	0.072	0.003	0.070	0.010	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.005	0.011

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.35	1.00	3.75

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.076	3.75	1.00	0.284
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.284

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	3.067	0.181	3.248	0.015	1.00	0.049
Fatal and injury (FI)	--	--	--	--	1.00	0.049

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.468	0.979	1.447
Head-on collisions (from Worksheet 2D)	0.051	0.061	0.112
Angle collisions (from Worksheet 2D)	0.361	0.495	0.855
Sideswipe (from Worksheet 2D)	0.103	0.065	0.168
Other multiple-vehicle collision (from Worksheet 2D)	0.057	0.428	0.485
Subtotal	1.039	2.027	3.067
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.033	0.119	0.152
Collision with other object (from Worksheet 2F)	0.003	0.010	0.013
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.005	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.284	0.000	0.284
Collision with bicycle (from Worksheet 2J)	0.049	0.000	0.049
Subtotal	0.377	0.137	0.514
Total	1.417	2.164	3.581

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	3.6
Fatal and injury (FI)	1.4
Property damage only (PDO)	2.2

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 3B - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 1.855 to MP 4.156
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	2.299
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	23,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	7
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	15
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	8.597	1.000	8.597	0.99	1.00	8.511
Fatal and Injury (FI)	-12.76	1.28	1.31	2.529	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.278	2.390	0.99	1.00	2.366
Property Damage Only (PDO)	-12.81	1.38	1.34	6.568	$(5)_{TOTAL}-(5)_{FI}$ = 0.722	6.207	0.99	1.00	6.145

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	2.366	1.000	6.145	8.511
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	1.969	0.662	4.068	6.036
Head-on collision	0.020	0.047	0.007	0.043	0.090
Angle collision	0.040	0.095	0.036	0.221	0.316
Sideswipe, same direction	0.050	0.118	0.223	1.370	1.489
Sideswipe, opposite direction	0.010	0.024	0.001	0.006	0.030
Other multiple-vehicle collision	0.048	0.114	0.071	0.436	0.550

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	1.654	1.000	1.654	0.99	1.00	1.637
Fatal and Injury (FI)	-8.71	0.66	0.28	0.287	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.174	0.287	0.99	1.00	0.284
Property Damage Only (PDO)	-5.04	0.45	1.06	1.366	$(5)_{TOTAL}-(5)_{FI}$ = 0.826	1.367	0.99	1.00	1.353

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.284	1.000	1.353	1.637
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.085	0.086
Collision with fixed object	0.500	0.142	0.813	1.100	1.242
Collision with other object	0.028	0.008	0.016	0.022	0.030
Other single-vehicle collision	0.471	0.134	0.108	0.146	0.280

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	7	0.033	1.106	0.371	--
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	15	0.003	1.106	0.072	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.443	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.443	1.000	0.443	0.99	1.00	0.438
Fatal and injury (FI)	--	0.284	0.126	0.99	1.00	0.125
Property damage only (PDO)	--	0.716	0.317	0.99	1.00	0.314

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	8.511	1.637	0.438	10.586	0.019	1.00	0.201
Fatal and injury (FI)	--	--	--	--	--	1.00	0.201

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	8.511	1.637	0.438	10.586	0.005	1.00	0.053
Fatal and injury (FI)	--	--	--	--	--	1.00	0.053

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	1.969	4.068	6.036
Head-on collisions (from Worksheet 1D)	0.047	0.043	0.090
Angle collisions (from Worksheet 1D)	0.095	0.221	0.316
Sideswipe, same direction (from Worksheet 1D)	0.118	1.370	1.489
Sideswipe, opposite direction (from Worksheet 1D)	0.024	0.006	0.030
Driveway-related collisions (from Worksheet 1H)	0.125	0.314	0.438
Other multiple-vehicle collision (from Worksheet 1D)	0.114	0.436	0.550
Subtotal	2.491	6.459	8.949
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.085	0.086
Collision with fixed object (from Worksheet 1F)	0.142	1.100	1.242
Collision with other object (from Worksheet 1F)	0.008	0.022	0.030
Other single-vehicle collision (from Worksheet 1F)	0.134	0.146	0.280
Collision with pedestrian (from Worksheet 1I)	0.201	0.000	0.201
Collision with bicycle (from Worksheet 1J)	0.053	0.000	0.053
Subtotal	0.538	1.353	1.891
Total	3.029	7.812	10.840

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	10.8	2.30	4.7
Fatal and injury (FI)	3.0	2.30	1.3
Property damage only (PDO)	7.8	2.30	3.4

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 6 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 4.156 to MP 4.383
Date Performed	10/04/16	Jurisdiction	CR 510 @ 66TH AVE
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	21,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	19,000
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C_i		1.00	0.33
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	0
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	2
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.00	0.99	1.00	1.00	1.00	1.00	0.99

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.855	1.000	6.855	0.99	0.33	2.239
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.162	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.326	2.237	0.99	0.33	0.731
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.463	$(5)_{TOTAL}-(5)_{FI}$ / 0.674	4.618	0.99	0.33	1.509

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.731	1.000	1.509	2.239
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.329	0.483	0.729	1.058
Head-on collision	0.049	0.036	0.030	0.045	0.081
Angle collision	0.347	0.254	0.244	0.368	0.622
Sideswipe	0.099	0.072	0.032	0.048	0.121
Other multiple-vehicle collision	0.055	0.040	0.211	0.318	0.359

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.457	1.000	0.457	0.99	0.33	0.149
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.121	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.269	0.123	0.99	0.33	0.040
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.328	$(5)_{TOTAL}-(5)_{FI}$ / 0.731	0.334	0.99	0.33	0.109

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.040	1.000	0.109	0.149
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.030	0.870	0.095	0.125
Collision with other object	0.072	0.003	0.070	0.008	0.011
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.004
Single-vehicle noncollision	0.141	0.006	0.034	0.004	0.009

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	0.33	--
Fatal and injury (FI)	--	--	--	--	0.33	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.35	1.00	3.75

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.015	3.75	0.33	0.019
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	0.33	0.019

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	2.239	0.149	2.389	0.015	0.33	0.012
Fatal and injury (FI)	--	--	--	--	0.33	0.012

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.329	0.729	1.058
Head-on collisions (from Worksheet 2D)	0.036	0.045	0.081
Angle collisions (from Worksheet 2D)	0.254	0.368	0.622
Sideswipe (from Worksheet 2D)	0.072	0.048	0.121
Other multiple-vehicle collision (from Worksheet 2D)	0.040	0.318	0.359
Subtotal	0.731	1.509	2.239
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.030	0.095	0.125
Collision with other object (from Worksheet 2F)	0.003	0.008	0.011
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.004
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.004	0.009
Collision with pedestrian (from Worksheet 2G or 2I)	0.019	0.000	0.019
Collision with bicycle (from Worksheet 2J)	0.012	0.000	0.012
Subtotal	0.071	0.109	0.180
Total	0.801	1.618	2.419

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	2.4
Fatal and injury (FI)	0.8
Property damage only (PDO)	1.6

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	FRA	Roadway	Segment 4A - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Roadway Section	MP 4.383 to MP 5.236
Date Performed	10/04/16	Jurisdiction	CR 510
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	4D
Length of segment, L (mi)		--	0.848
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/day)	--	17,000
Type of on-street parking (none/parallel/angle)		None	None
Proportion of curb length with on-street parking		--	0
Median width (ft) - for divided only		15	20
Lighting (present / not present)		Not Present	Not Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	9
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	15
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	30
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	2.103	1.000	2.103	0.99	1.00	2.082
Fatal and Injury (FI)	-12.76	1.28	1.31	0.634	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.598	0.99	1.00	0.592
Property Damage Only (PDO)	-12.81	1.38	1.34	1.597	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	1.506	0.99	1.00	1.491

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *brmv* (FI) (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N *brmv* (PDO) (crashes/year)**	**Predicted N *brmv* (TOTAL) (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.592	1.000	1.491	2.082
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.832	0.492	0.662	0.987	1.479
Head-on collision	0.020	0.012	0.007	0.010	0.022
Angle collision	0.040	0.024	0.036	0.054	0.077
Sideswipe, same direction	0.050	0.030	0.223	0.332	0.362
Sideswipe, opposite direction	0.010	0.006	0.001	0.001	0.007
Other multiple-vehicle collision	0.048	0.028	0.071	0.106	0.134

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.529	1.000	0.529	0.99	1.00	0.524
Fatal and Injury (FI)	-8.71	0.66	0.28	0.087	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.087	0.99	1.00	0.086
Property Damage Only (PDO)	-5.04	0.45	1.06	0.440	$(5)_{TOTAL}-(5)_{FI}$	0.442	0.99	1.00	0.438

Property Damage Only (PDO)	0.64	0.45	1.00	0.440	0.835	0.442	0.99	1.00	0.438

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type(FI)**	**Predicted N *brsv* (FI) (crashes/year)**	**Proportion of Collision Type (PDO)**	**Predicted N *brsv* (PDO) (crashes/year)**	**Predicted N *brsv* (TOTAL) (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.086	1.000	0.438	0.524
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.028	0.028
Collision with fixed object	0.500	0.043	0.813	0.356	0.399
Collision with other object	0.028	0.002	0.016	0.007	0.009
Other single-vehicle collision	0.471	0.041	0.108	0.047	0.088

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	9	0.033	1.106	0.341	--
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	15	0.003	1.106	0.052	
Other	0	0.005	1.106	0.000	
Total	--	--	--	0.393	1.39

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.393	1.000	0.393	0.99	1.00	0.389
Fatal and injury (FI)	--	0.284	0.112	0.99	1.00	0.110
Property damage only (PDO)	--	0.716	0.281	0.99	1.00	0.278

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	2.082	0.524	0.389	2.995	0.019	1.00	0.057
Fatal and injury (FI)	--	--	--	--	--	1.00	0.057

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	2.082	0.524	0.389	2.995	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.492	0.987	1.479
Head-on collisions (from Worksheet 1D)	0.012	0.010	0.022
Angle collisions (from Worksheet 1D)	0.024	0.054	0.077
Sideswipe, same direction (from Worksheet 1D)	0.030	0.332	0.362
Sideswipe, opposite direction (from Worksheet 1D)	0.006	0.001	0.007
Driveway-related collisions (from Worksheet 1H)	0.110	0.278	0.389
Other multiple-vehicle collision (from Worksheet 1D)	0.028	0.106	0.134
Subtotal	0.702	1.769	2.471
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.028	0.028
Collision with fixed object (from Worksheet 1F)	0.043	0.356	0.399
Collision with other object (from Worksheet 1F)	0.002	0.007	0.009
Other single-vehicle collision (from Worksheet 1F)	0.041	0.047	0.088
Collision with pedestrian (from Worksheet 1I)	0.057	0.000	0.057
Collision with bicycle (from Worksheet 1J)	0.015	0.000	0.015
Subtotal	0.158	0.438	0.596
Total	0.860	2.207	3.067

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	3.1	0.85	3.6
Fatal and injury (FI)	0.9	0.85	1.0
Property damage only (PDO)	2.2	0.85	2.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	FRA	Roadway	Intersection 7 - BUILD (Inc.Roundabout)
Agency or Company	FDOT	Intersection	MP 5.236 to MP 5.283
Date Performed	10/04/16	Jurisdiction	CR 510 @ 58TH AVE
		Analysis Year	2040

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	19,000
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,400
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Protected / Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			10
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.97	1.00	1.00	1.00	1.00	0.79

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	5.238	1.000	5.238	0.79	1.00	4.117
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.646	$\frac{(4)_{FI}/((4)_{FI}+(4)_{PDO})}{0.326}$	1.707	0.79	1.00	1.342
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.404	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.674}$	3.531	0.79	1.00	2.775

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N *bimv* (FI) (crashes/year)**	**Proportion of Collision Type$_{(PDO)}$**	**Predicted N *bimv* (PDO) (crashes/year)**	**Predicted N *bimv* (TOTAL) (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.342	1.000	2.775	4.117
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.604	0.483	1.340	1.944
Head-on collision	0.049	0.066	0.030	0.083	0.149
Angle collision	0.347	0.466	0.244	0.677	1.143
Sideswipe	0.099	0.133	0.032	0.089	0.222
Other multiple-vehicle collision	0.055	0.074	0.211	0.586	0.659

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.353	1.000	0.353	0.79	1.00	0.278
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.094	$\frac{(4)_{FI}/((4)_{FI}+(4)_{PDO})}{0.270}$	0.096	0.79	1.00	0.075
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.255	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.730}$	0.258	0.79	1.00	0.203

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.075	1.000	0.203	0.278
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.056	0.870	0.176	0.232
Collision with other object	0.072	0.005	0.070	0.014	0.020
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.008
Single-vehicle noncollision	0.141	0.011	0.034	0.007	0.017

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.013	2.78	1.00	0.035
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.035

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.117	0.278	4.395	0.015	1.00	0.066
Fatal and injury (FI)	--	--	--	--	1.00	0.066

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.604	1.340	1.944
Head-on collisions (from Worksheet 2D)	0.066	0.083	0.149
Angle collisions (from Worksheet 2D)	0.466	0.677	1.143
Sideswipe (from Worksheet 2D)	0.133	0.089	0.222
Other multiple-vehicle collision (from Worksheet 2D)	0.074	0.586	0.659
Subtotal	1.342	2.775	4.117
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.056	0.176	0.232
Collision with other object (from Worksheet 2F)	0.005	0.014	0.020
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.035	0.000	0.035
Collision with bicycle (from Worksheet 2J)	0.066	0.000	0.066
Subtotal	0.176	0.203	0.379
Total	1.518	2.978	4.496

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	4.5
Fatal and injury (FI)	1.5
Property damage only (PDO)	3.0

Worksheet 3A -- Predicted Crashes by Severity and Site Type and Observed Crashes Using the Site-Specific EB Method for Urban and Suburban Arterials

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Collision type / Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes, $N_{observed}$** (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w**	**Expected average crash frequency, $N_{expected}$**
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)			Equation A-5 from Part C Appendix	Equation A-4 from Part C Appendix
ROADWAY SEGMENTS							
Multiple-vehicle non driveway							
Segment 1A - 0.047 - 0.530	1.075	0.305	0.769		1.320	0.413	0.444
Segment 1B - 0.754 - 0.965	0.521	0.148	0.373	1	1.320	0.593	0.716
Segment 1C - 1.060 - 1.215	0.217	0.062	0.155	2	1.320	0.777	0.614
Segment 2A - 1.215 - 1.403	0.500	0.141	0.358	2	1.320	0.603	1.096
Segment 3A - 1.403 - 1.628	0.187	0.053	0.134	1	1.320	0.802	0.348
Segment 3B - 1.855 - 4.156	8.511	2.366	6.145	5	1.320	0.082	5.287
Segment 4A - 4.383 - 5.236	2.082	0.592	1.491	2	1.320	0.267	2.022
Single-vehicle							
Segment 1A	0.270	0.045	0.226		0.860	0.811	0.219
Segment 1B	0.131	0.022	0.109		0.860	0.899	0.118
Segment 1C	0.055	0.009	0.046	1	0.860	0.955	0.097
Segment 2A	0.120	0.020	0.100		0.860	0.907	0.108
Segment 3A	0.045	0.007	0.037		0.860	0.963	0.043
Segment 3B	1.637	0.284	1.353	4	0.860	0.415	3.019
Segment 4A	0.524	0.086	0.438		0.860	0.689	0.361
Multiple-vehicle driveway-related							
Segment 1A	0.106	0.030	0.076		1.390	0.872	0.092
Segment 1B	0.020	0.006	0.015		1.390	0.972	0.020
Segment 1C	0.020	0.006	0.015		1.390	0.972	0.020
Segment 2A	0.000	0.000	0.000		1.390	1.000	0.000
Segment 3A	0.000	0.000	0.000		1.390	1.000	0.000
Segment 3B	0.438	0.125	0.314	2	1.390	0.621	1.030
Segment 4A	0.389	0.110	0.278		1.390	0.649	0.252
INTERSECTIONS							
Multiple-vehicle							
Intersection 1 - 0.000 - 0.047	4.363	1.441	2.922	7	0.390	0.370	6.024
Intersection 2 - 0.530 - 0.643	1.793	0.688	1.105	0	0.330	0.628	1.127
Intersection 3 - 0.643 - 0.7554	1.743	0.636	1.107	4	0.330	0.635	2.567
Intersection 4 - 0.965 - 1.060	3.180	1.024	2.155	5	0.390	0.446	4.187
Intersection 5 - 1.628 - 1.855	3.067	1.039	2.027	2	0.390	0.455	2.486
Intersection 6 - 4.156 - 4.383	2.239	0.731	1.509	16	0.390	0.534	8.655
Intersection 7 - 5.236 - 5.283	4.117	1.342	2.775	5	0.390	0.384	4.661
Single-vehicle							
Intersection 1	0.279	0.073	0.206	2	0.360	0.909	0.436
Intersection 2	0.125	0.031	0.094		0.360	0.957	0.120
Intersection 3	0.145	0.040	0.105		0.360	0.950	0.138
Intersection 4	0.224	0.062	0.162		0.000	1.000	0.224
Intersection 5	0.181	0.045	0.137		0.360	0.939	0.170
Intersection 6	0.149	0.040	0.109		0.360	0.949	0.142
Intersection 7	0.278	0.075	0.203	1	0.360	0.909	0.343
COMBINED (sum of column)	38.730	11.684	27.046	62	--	--	47.186

Worksheet 3B -- Predicted Pedestrian and Bicycle Crashes for Urban and Suburban Arterials

(1)	(2)	(3)
Site Type	**N_{ped}**	**N_{bike}**
ROADWAY SEGMENTS		
Segment 1A	0.028	0.007
Segment 1B	0.013	0.003
Segment 1C	0.006	0.001
Segment 2A	0.012	0.003
Segment 3A	0.004	0.001
Segment 3B	0.201	0.053
Segment 4A	0.057	0.015
INTERSECTIONS		
Intersection 1	0.019	0.070
Intersection 2	0.005	0.021
Intersection 3	0.022	0.021
Intersection 4	0.036	0.051
Intersection 5	0.284	0.049
Intersection 6	0.019	0.012
Intersection 7	0.035	0.066
COMBINED (sum of column)	0.740	0.373

Worksheet 3C -- Site-Specific EB Method Summary Results for Urban and Suburban Arterials

(1)	(2)	(3)	(4)	(5)	(6)
Crash severity level	**$N_{predicted}$**	**N_{ped}**	**N_{bike}**	$N_{expected\ (VEHICLE)}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(2)_{COMB}$ from Worksheet 3B	$(3)_{COMB}$ from Worksheet 3B	$(8)_{COMB}$ Worksheet 3A	(3)+(4)+(5)
	38.7	0.7	0.4	47.2	**48.30**
Fatal and injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(2)_{COMB}$ from Worksheet 3B	$(3)_{COMB}$ from Worksheet 3B	$(5)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$	(3)+(4)+(5)
	11.7	0.7	0.4	14.2	15.3
Property damage only (PDO)	$(4)_{COMB}$ from Worksheet 3A	--	--	$(5)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$	(3)+(4)+(5)
	27.0	0.0	0.0	33.0	33.0

Appendix 6- FDOT- HSM Crash Distribution

2011-2015 HSM Crash Distribution for Florida

		Rural Roadways			Urban & Suburban Arterials					Freeways			All
		2-lane	4-lane Undivided[1,3]	4-lane divided	2-lane Undivided	3-lane TWLTL[2]	4-lane Undivided[3]	4-lane Divided	5-lane TWLTL[2]	Rural Freeways	Urban Freeways	Ramps	All Roadways & Ramps
Fatal	**K**	0.030	0.027	0.029	0.009	N/A	0.005	0.008	N/A	0.018	0.006	0.004	0.007
Incapacitating Injury	**A**	0.103	0.116	0.103	0.056	N/A	0.035	0.050	N/A	0.072	0.038	0.035	0.045
Non-incapacitating Injury	**B**	0.190	0.184	0.200	0.157	N/A	0.118	0.150	N/A	0.155	0.123	0.116	0.133
Possible (or minor) Injury	**C**	0.192	0.202	0.196	0.224	N/A	0.206	0.235	N/A	0.168	0.207	0.214	0.219
Property Damage Only[4]	**O**	0.485	0.471	0.472	0.554	N/A	0.637	0.557	N/A	0.587	0.626	0.631	0.596

Data Source: Florida Department of Transportation, State Safety Office's Crash Analysis Reporting (CAR) database as of March 14, 2017

1 - Caution: Small Sample Size
2 - Currently no data for two-way left-turn lanes (TWLTL)
3 - Includes Paved (Painted) Medians
4 - Limited Data

Appendix 7- FDOT KABCO Crash Costs

When utilizing predictive methods or crash severity distributions for analysis, the following crash severity level costs should be used:

Table 122.6.2 FDOT KABCO Crash Costs

Crash Severity	Comprehensive Crash Cost
Fatal (K)	$10,560,000
Severe Injury (A)	$599,040
Moderate Injury (B)	$162,240
Minor Injury (C)	$100,800
Property Damage Only (O)	$7,600

Note:
(1) Source: Florida Department of Transportation State Safety Office's Crash Analysis Reporting (CAR) System, analysis years 2011 through 2015.

Appendix 8- Crash Modification Factor
ID 224

CMF / CRF Details

CMF ID: 224

Convert signalized intersection to modern roundabout

Description:

Prior Condition: ***No Prior Condition(s)***

Category: Intersection geometry

Study: ***NCHRP Report 572: Applying Roundabouts in the United States,*** **Rodegerdts et al., 2007**

Star Quality Rating:	★★★★☆

Crash Modification Factor (CMF)	
Value:	0.33
Adjusted Standard Error:	0.05
Unadjusted Standard Error:	0.04

Crash Reduction Factor (CRF)

Value:	67 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	5
Unadjusted Standard Error:	4

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not Specified
Number of Lanes:	2
Road Division Type:	
Speed Limit:	
Area Type:	Suburban
Traffic Volume:	
Time of Day:	

If countermeasure is intersection-based

Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	Not Specified
Traffic Control:	Signalized
Major Road Traffic Volume:	

Minor Road Traffic Volume:	

Development Details

Date Range of Data Used:	
Municipality:	
State:	
Country:	
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	

Other Details

Included in Highway Safety Manual?	Yes. HSM lists this CMF in **bold** font to indicate that it has the highest reliability since it has an adjusted standard error of 0.1 or less.
Date Added to Clearinghouse:	
Comments:	Countermeasure name changed to match HSM

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the

use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.

APPENDIX H – RIGHT OF WAY IMPACTS

CR 510 ALTERNATIVE 1 ROADWAY IMPACTS

District 4 - Cost Estimate (CE) Worksheet

Completed by: Gabriela Garcia, P.E.

FM # 405606-2-22-02 **County:** Indian River **Date:** 6/7/2017

Total Take Area: 29.61 Acres

ROW C.E. PARCEL NUMBER/POND #	Property Owner	Land Use	Parent Tract Size	Select Acres or Sq. Ft.	Take Area	Select Acres or Sq. Ft.	Proposed Use	County Tax Parcel ID # or Alt Key #	ROW Parcel Number Assigned by DOT
1	INDIAN RIVER COUNTY SCHOOL BOARD	School	34.87	Acres	0.1792	Acres	Transportation	31383500000300000001.1	
2	G M LAWRENCE & CO	Vacant Residential/Multi-Family	79.33	Acres	0.0034	Acres	Transportation	31382600000500000001.2	
3	GRAVES BROTHERS COMPANY	Agricultural	34.87	Acres	0.2302	Acres	Transportation	31383500000300000001.0	
4	SEBASTIAN RANCH LLC	Agricultural	144.59	Acres	2.4591	Acres	Transportation	31382500000500000001.0	
5	GRAVES BROTHERS COMPANY	Agricultural	74.18	Acres	1.6028	Acres	Transportation	31383500000100000001.0	
6	LYNN, EVERETT EUGENE (ADR)&	Residential	1.74	Acres	0.4479	Acres	Transportation	31382600000700000002.0	
7	SEBASTIAN RANCH LLC	Agricultural	4.78	Acres	0.4461	Acres	Transportation	31382600000700000003.0	
8	GRAVES BROTHERS COMPANY	Agricultural	75.59	Acres	2.3529	Acres	Transportation	31382500000500000001.0	
9	GRAVES BROTHERS COMPANY	Agricultural	36.67	Acres	0.8892	Acres	Transportation	31383600000300000003.0	
10	GRAVES BROTHERS COMPANY	Agricultural	30.65	Acres	0.7111	Acres	Transportation	31383600000300000002.0	
11	BARBARITO, GERALD M (BISHOP) AND DIOCESE OF PALM BEACH	Agricultural	2.66	Acres	0.3403	Acres	Transportation	31382500000500000002.0	
12	GRAVES BROTHERS COMPANY	Agricultural	5.00	Acres	0.3030	Acres	Transportation	31383600000300000001.0	
13	VLANGAS, CHRISTOPHER L AND AMBER FAITH	Residential	2.61	Acres	0.3163	Acres	Transportation	31382500000500000002.2	
14	INDIAN RIVER COUNTY	County	10.13	Acres	0.1283	Acres	Transportation	31382500000700000004.0	
15	INDIAN RIVER COUNTY	County	29.09	Acres	0.7483	Acres	Transportation	31383600000100000004.0	
16	CHANCE HOLDINGS LLC (1/2) &	Agricultural	30.54	Acres	0.3093	Acres	Transportation	31382500000700000004.1	
17	CHANCE HOLDINGS LLC (1/2) &	Agricultural	39.09	Acres	0.9866	Acres	Transportation	31382500000700000003.0	
18	ST MARTIN MARIO (TR) (TOK)	Agricultural	8.04	Acres	0.0636	Acres	Transportation	31383600000100000005.0	
19	REDLANDS CHRISTIAN MIGRANT ASSOCIATION	School	1.53	Acres	0.0857	Acres	Transportation	31383600000100000006.0	
20	CHANCE HOLDINGS LLC (1/2) &	Agricultural	60.74	Acres	2.5930	Acres	Transportation	31382500000700000002.0	
21	TASSINARI RONALD & INES	Agricultural	1.87	Acres	0.0822	Acres	Transportation	31383600000100000003.1	
22	BEACH, THIM AND JAN	Agricultural	1.12	Acres	0.0221	Acres	Transportation	31383600001000000001.0	
23	BEACH, THIM AND JAN	Commercial/Ornamental Nursery	4.73	Acres	0.0000	Acres	Transportation	31383600000100000001.0	
24	INDIAN RIVER COUNTY	County	4.67	Acres	0.0000	Acres	Transportation	31383600000100000001.2	
25	PETE BEATY GROVE LLC	Agricultural	14.30	Acres	1.0380	Acres	Transportation	31393000000500000005.0	
26	RYALL DEVELOPMENT GROUP LLC	Agricultural	13.73	Acres	0.0000	Acres	Transportation	31393100000300000003.0	
27	JONES, HOWARD (LE) (853/1804)	Agricultural	0.53	Acres	0.0000	Acres	Transportation	31393100000300000003.1	
28	PETE BEATY GROVE LLC	Agricultural	28.82	Acres	1.9641	Acres	Transportation	31393000000500000006.0	
29	RYALL DEVELOPMENT GROUP LLC	Agricultural	41.12	Acres	0.0824	Acres	Transportation	31393100000300000002.0	
30	PETE BEATY GROVE LLC	Agricultural	15.76	Acres	2.1157	Acres	Transportation	31393000000500000007.0	
31	SNYDER, TAMMY L	Residential	1.51	Acres	0.0497	Acres	Transportation	31393100000300000001.0	
32	RYALL DEVELOPMENT GROUP LLC	Agricultural	19.16	Acres	0.0921	Acres	Transportation	31393100000300000005.0	
33	RYALL DEVELOPMENT GROUP LLC	Agricultural	36.90	Acres	0.0420	Acres	Transportation	31393100000100000001.0	
34	WILCOX, CHESTER E JR (CO-TR) AND LYNN R (CO-TR)	Residential	35.26	Acres	2.4946	Acres	Transportation	31393000000700000002.0	
35	RYALL DEVELOPMENT GROUP LLC	Agricultural	1.03	Acres	0.0000	Acres	Transportation	31393100000100000006.0	
36	RYALL DEVELOPMENT GROUP LLC	Agricultural	30.49	Acres	0.1672	Acres	Transportation	31393100000100000007.0	
37	ABT, MICHAEL C AND TAFFI	Residential	29.97	Acres	0.5242	Acres	Transportation	31393000001000000003.0	
38	RYALL DEVELOPMENT GROUP LLC	Agricultural	1.19	Acres	0.0000	Acres	Transportation	31393100000100000004.0	
39	ABT, MICHAEL C AND TAFFI	Residential	0.83	Acres	0.2312	Acres	Transportation	31393000000700000001.1	
40	ABT, MICHAEL C AND TAFFI	Vacant	0.83	Acres	0.2312	Acres	Transportation	31393000001000000001.0	
41	ABT, MICHAEL C AND TAFFI	Vacant	0.83	Acres	0.2425	Acres	Transportation	31393000001000000002.0	
42	CONFIDENTIAL	Confidential	1.00	Acres	0.2500	Acres	Transportation	31393000000700000001.2	
43	VERO ESTATES LLC	Multi-Family	10.21	Acres	0.0785	Acres	Transportation	31392900000500000080.0	
44	RYALL DEVELOPMENT GROUP LLC	Agricultural	7.48	Acres	0.3016	Acres	Transportation	31393200000300000008.0	
45	WHITFIELD-HART, LETITIA	Residential	7.35	Acres	0.1132	Acres	Transportation	31393200000300000007.0	
46	INDIAN RIVER COUNTY	County	0.53	Acres	0.1754	Acres	Transportation	31392900000500000083.1	
47	BRADLEY, JAMES JR	Residential	0.40	Acres	0.0537	Acres	Transportation	31392900000500000087.0	
48	HAYES, ALTAMEASE MARTIN (1/2) &	Residential	0.07	Acres	0.0554	Acres	Transportation	31392900000500000090.0	

CR 510 ALTERNATIVE 1 ROADWAY IMPACTS

District 4 - Cost Estimate (CE) Worksheet

Completed by: Gabriela Garcia, P.E.

FM # 405606-2-22-02 **County:** Indian River **Date:** 6/7/2017

Total Take Area: 29.61 Acres

ROW C.E. PARCEL NUMBER/POND #	Property Owner	Land Use	Parent Tract Size	Select Acres or Sq. Ft.	Take Area	Select Acres or Sq. Ft.	Proposed Use	County Tax Parcel ID # or Alt Key #	ROW Parcel Number Assigned by DOT
49	HAYES, ALTAMEASE MARTIN (1/2) &	Residential	0.03	Acres	0.0224	Acres	Transportation	3139290000050000091.0	
50	INDIAN RIVER COUNTY	County	0.39	Acres	0.0849	Acres	Transportation	3139290000050000092.0	
51	HEMMINGS, GEORGE SR AND LORENZO C	Residential	0.29	Acres	0.1093	Acres	Transportation	3139290000050000092.1	
52	SANDS, QWONTRAE N	Residential	1.71	Acres	0.3718	Acres	Transportation	3139290000050000136.0	
53	CARTWRIGHT, ERVIN A AND LENORE	Residential	2.50	Acres	0.4068	Acres	Transportation	3139290000050000139.0	
54	MARTIN, NAOMIE	Residential	0.17	Acres	0.0893	Acres	Transportation	3139290000050000141.0	
55	DUDLEY, ANTHONY J &	Residential	0.71	Acres	0.0862	Acres	Transportation	3139290000050000143.0	
56	DUDLEY, ANTHONY J &	Residential	3.00	Acres	0.3579	Acres	Transportation	3139290000050000144.0	
57	JOHNSON, QUEEN	Commercial	0.15	Acres	0.0011	Acres	Transportation	3139320001001000004.0	
58	ANDERSON, PEARLIE MAE	Vacant Commerical	0.29	Acres	0.0104	Acres	Transportation	3139320001001000003.0	
59	JONES, ROMANCE	Commercial	0.29	Acres	0.0238	Acres	Transportation	3139320001001000002.0	
60	WABASSO FRIENDLY LODGE F & A M	Commercial	0.31	Acres	0.0358	Acres	Transportation	3139320001001000001.0	
61	JONES, ARTHUR LEE	Vacant	0.76	Acres	0.0746	Acres	Transportation	3139290000050000145.0	
62	STONOM MARY ALICE (LE)	Residential	0.31	Acres	0.0666	Acres	Transportation	3139290002000000032.0	
63	BROXTON, LYDIA K	Residential	5.00	Acres	0.0428	Acres	Transportation	3139320000100000018.0	
64	BROXTON, LYDIA K	Residential	0.30	Acres	0.0170	Acres	Transportation	3139320000100000017.0	
65	LOPRESTO NATHAN S & CINDY L	Residential	0.28	Acres	0.0297	Acres	Transportation	3139320000100000016.0	
66	JEFFERSON, DEBORAH	Residential	0.19	Acres	0.0424	Acres	Transportation	3139320000100000015.0	
67	JEFFERSON, VALERIA	Residential	0.50	Acres	0.0546	Acres	Transportation	3139320000100000013.0	
68	WOULARD, HENRY P AND PEARLIE MAE	Residential	0.69	Acres	0.0606	Acres	Transportation	3139320000100000012.0	
69	SERENITY HAMMOCKS LLC	Residential/Multi-Family	8.24	Acres	0.0786	Acres	Transportation	3139320000100000011.0	
70	ROSS, RUTHIE &	Residential	0.69	Acres	0.0637	Acres	Transportation	3139320000100000010.0	
71	PALADIAN PLACE II HOMEOWNERS ASSOCIATION INC	Residential/Multi-Family	5.41	Acres	0.3547	Acres	Transportation	3139320007000000000.2	
72	LAKES AT SANDRIDGE (THE) PH II PD HOMEOWNERS ASSOCIATION	Residential/Multi-Family	2.85	Acres	0.1937	Acres	Transportation	3139320006000000000.2	
73	INDIAN RIVER COUNTY	County	1.92	Acres	0.1489	Acres	Transportation	3139320000100000006.0	
74	WILSON, ELIZABETH	Residential	0.46	Acres	0.0894	Acres	Transportation	3139320000200300003.0	
75	INDIAN RIVER COUNTY	County	0.46	Acres	0.0894	Acres	Transportation	3139320000200200001.0	
76*	CLARK JETHROW & JESSIE PEARL	Residential	0.15	Acres	0.0300	Acres	Transportation	3139320000200200004.0	
77	INDIAN RIVER COUNTY	County	0.15	Acres	0.0296	Acres	Transportation	3139320000200200005.0	
78	INDIAN RIVER COUNTY	County	0.15	Acres	0.0297	Acres	Transportation	3139320000200200006.0	
79	INDIAN RIVER COUNTY	County	0.19	Acres	0.0356	Acres	Transportation	3139320000200100001.0	
80	WABASSO HILLSIDE LLC	Residential	0.14	Acres	0.0293	Acres	Transportation	3139320000200100002.0	
81	JOHNSON, LILLIE JEAN	Residential	0.41	Acres	0.0351	Acres	Transportation	3139330000030000007.0	
82	INDIAN RIVER COUNTY	County	0.15	Acres	0.0385	Acres	Transportation	3139330000030000006.0	
83	RED STICK GOLF GOLF CLUB INC	Commercial/Golf Course	309.08	Acres	0.0022	Acres	Transportation	3139330000600000001.0	
84	JOHNS ISLAND WATER SYSTEMS INC	Residential	4.90	Acres	0.0066	Acres	Transportation	3139280000050000032.0	
85	RED STICK GOLF GOLF CLUB INC	Commercial/Golf Course	10.54	Acres	0.0044	Acres	Transportation	3139330000030000004.0	
86	WABASSO HILLSIDE LLC	Vacant Lot	0.82	Acres	0.0464	Acres	Transportation	3139330000030000005.0	
92	MIAMI GARDENS INC	Residential	10.50	Acres	0.0433	Acres	Transportation	3138270000070000002.0	
93	INDIAN RIVER COUNTY	County	8.45	Acres	0.6569	Acres	Transportation	3138270000070000002.1	
94	WAKELAND, JAMES T	Vacant Residential	0.33	Acres	0.0056	Acres	Transportation	3138270000300100002.0	
95	SOLDANO, MARK J	Residential	0.42	Acres	0.0099	Acres	Transportation	3138270000300100010.0	

*Note: Residential Relocation

CR 510 ALTERNATIVE 1 DRAINAGE IMPACTS

District 4 - Cost Estimate (CE) Worksheet

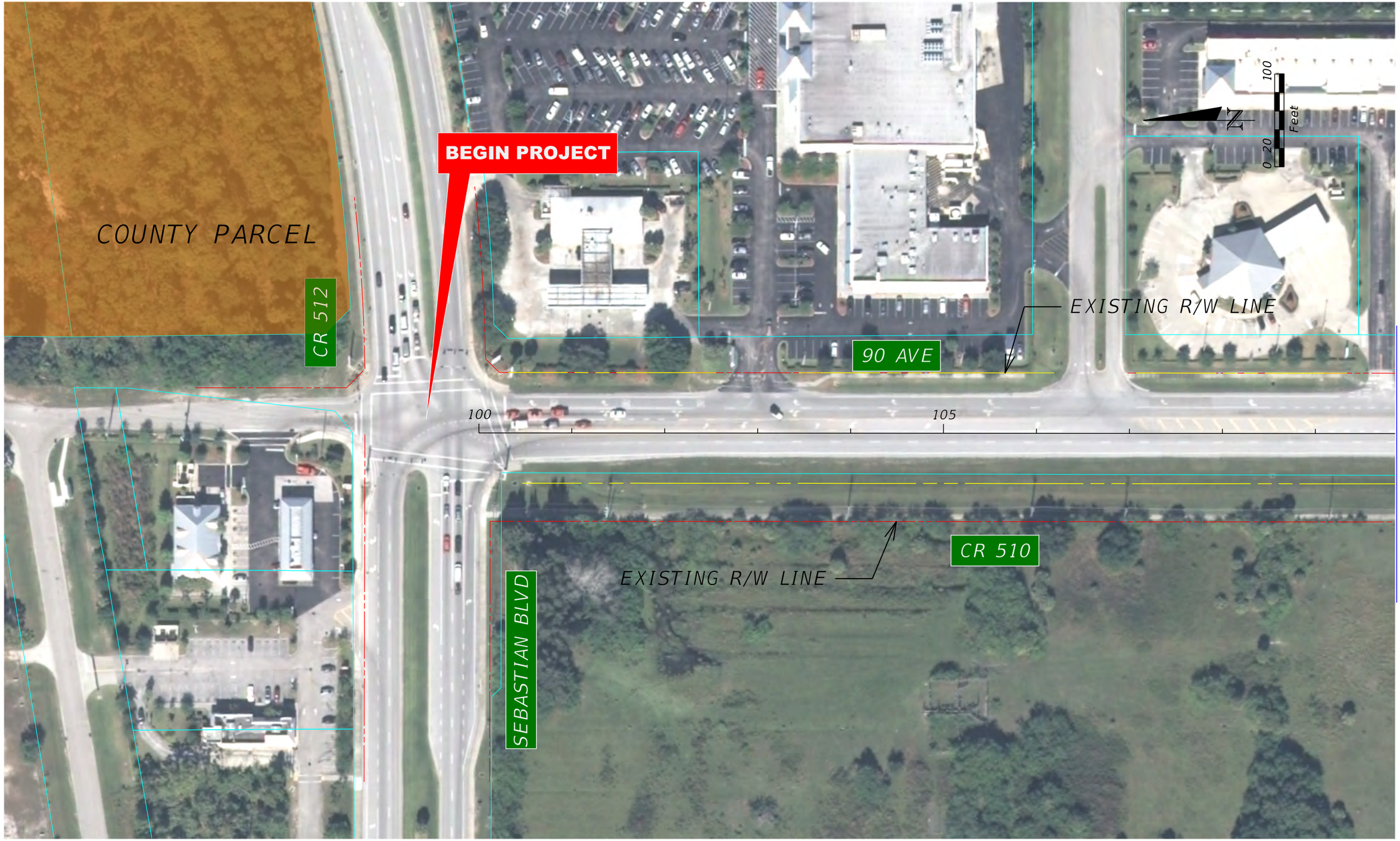
Completed by: Gabriela Garcia, P.E.

FM # 405606-2-22-02 **County:** Indian River **Date:** 5/1/2017

Total Take Area: 76 Acres

BASIN	POND	ROW C.E. PARCEL NUMBER/ POND #	Property Owner	Land Use	Parent Tract Size	Select Acres or Sq. Ft.	Take Area	Select Acres or Sq. Ft.	Proposed Use	County Tax Parcel ID # or Alt Key #	ROW Parcel Number Assigned by DOT
2	2-1	87	TRUST NO 2 LLC	Vacant Land	205.67	Acres	2.5846	Acres	Drainage	31382700000100000001.0	
2	2-2	87	TRUST NO 2 LLC	Vacant Land	205.67	Acres	2.5563	Acres	Drainage	31382700000100000001.0	
2	2-3	87	TRUST NO 2 LLC	Vacant Land	205.67	Acres	2.5560	Acres	Drainage	31382700000100000001.0	
2	2-4	88	SPENCER, DANIEL N	Vacant Land	38.02	Acres	2.5238	Acres	Drainage	31382600000300000007.0	
5	5-1	5*	GRAVES BROTHERS COMPANY	Agricultural	74.18	Acres	2.6475	Acres	Drainage	31383500000100000001.0	
5	5-2	4*	SEBASTIAN RANCH LLC	Agricultural	144.59	Acres	2.3211	Acres	Drainage	31382500000500000001.0	
5	5-3	4*	SEBASTIAN RANCH LLC	Agricultural	144.59	Acres	2.6343	Acres	Drainage	31382500000500000001.0	
5	5-4	5*	GRAVES BROTHERS COMPANY	Agricultural	74.18	Acres	2.6343	Acres	Drainage	31383500000100000001.0	
6	6-1	8*	GRAVES BROTHERS COMPANY	Agricultural	75.59	Acres	2.4248	Acres	Drainage	31382500000500000001.0	
6	6-2	9*	GRAVES BROTHERS COMPANY	Agricultural	36.67	Acres	2.5400	Acres	Drainage	31383600000300000003.0	
6	6-3	8*	GRAVES BROTHERS COMPANY	Agricultural	75.59	Acres	2.6004	Acres	Drainage	31382500000500000001.0	
6	6-4	9*	GRAVES BROTHERS COMPANY	Agricultural	36.67	Acres	0.2025	Acres	Drainage	31383600000300000003.0	
6	6-4	10*	GRAVES BROTHERS COMPANY	Agricultural	30.65	Acres	2.4318	Acres	Drainage	31383600000300000002.0	
7	7-1	17*	CHANCE HOLDINGS LLC (1/2) &	Agricultural	39.09	Acres	2.5249	Acres	Drainage	31382500000700000003.0	
7	7-2	17*	CHANCE HOLDINGS LLC (1/2) &	Agricultural	39.09	Acres	0.0922	Acres	Drainage	31382500000700000003.0	
7	7-2	20*	CHANCE HOLDINGS LLC (1/2) &	Agricultural	60.74	Acres	2.5190	Acres	Drainage	31382500000700000002.0	
7	7-3	20*	CHANCE HOLDINGS LLC (1/2) &	Agricultural	60.74	Acres	2.5668	Acres	Drainage	31382500000700000002.0	
7	7-4	24*	INDIAN RIVER COUNTY	County	4.67	Acres	2.8289	Acres	Drainage	31383600000100000001.2	
8	8-1	30*	PETE BEATY GROVE LLC	Agricultural	15.76	Acres	4.6954	Acres	Drainage	31393000000500000007.0	
8	8-2	33*	RYALL DEVELOPMENT GROUP LLC	Agricultural	36.90	Acres	4.6954	Acres	Drainage	31393100000100000001.0	
8	8-3	34*	WILCOX, CHESTER E JR (CO-TR) AND LYNN R (CO-TR)	Residential	35.26	Acres	4.6924	Acres	Drainage	31393000000700000002.0	
8	8-4	36*	RYALL DEVELOPMENT GROUP LLC	Agricultural	30.49	Acres	4.5977	Acres	Drainage	31393100000100000007.0	
9	9-1	43*	VERO ESTATES LLC	Multi-Family	10.21	Acres	2.4503	Acres	Drainage	31392900000500000080.0	
9	9-2	44*	RYALL DEVELOPMENT GROUP LLC	Agricultural	7.48	Acres	2.5362	Acres	Drainage	31393200000300000008.0	
9	9-3	45*	WHITFIELD-HART, LETITIA	Residential	7.35	Acres	2.4791	Acres	Drainage	31393200000300000007.0	
9	9-4	43*	VERO ESTATES LLC	Multi-Family	10.21	Acres	1.8727	Acres	Drainage	31392900000500000080.0	
9	9-4	89	VERO ESTATES LLC	Multi-Family	0.22	Acres	0.1388	Acres	Drainage	31392900000500000083.0	
10	10-1	69*	SERENITY HAMMOCKS LLC	Residential/Multi-Family	8.24	Acres	1.8918	Acres	Drainage	31393200000100000011.0	
10	10-2	90	INDIAN RIVER COUNTY	County	29.52	Acres	1.8701	Acres	Drainage	31392900000700000004.0	
10	10-3	91	INDIAN RIVER COUNTY	County	39.39	Acres	0.9029	Acres	Drainage	31392900000700000001.1	
10	10-4	73*	INDIAN RIVER COUNTY	County	1.92	Acres	1.9843	Acres	Drainage	31393200000100000006.0	

*Impacts same parcels as roadway right of way impacts



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 1



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 2



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

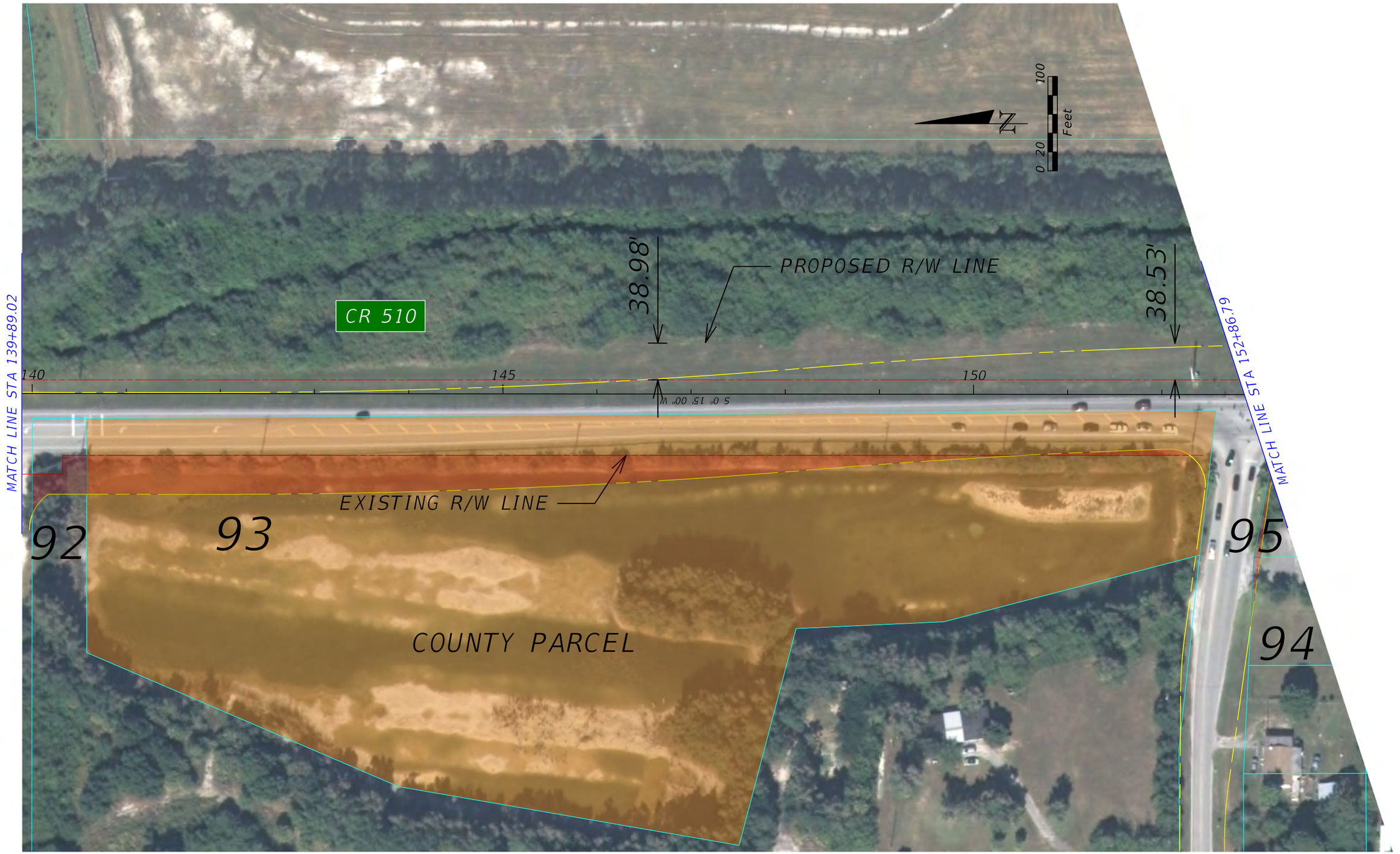
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 3



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

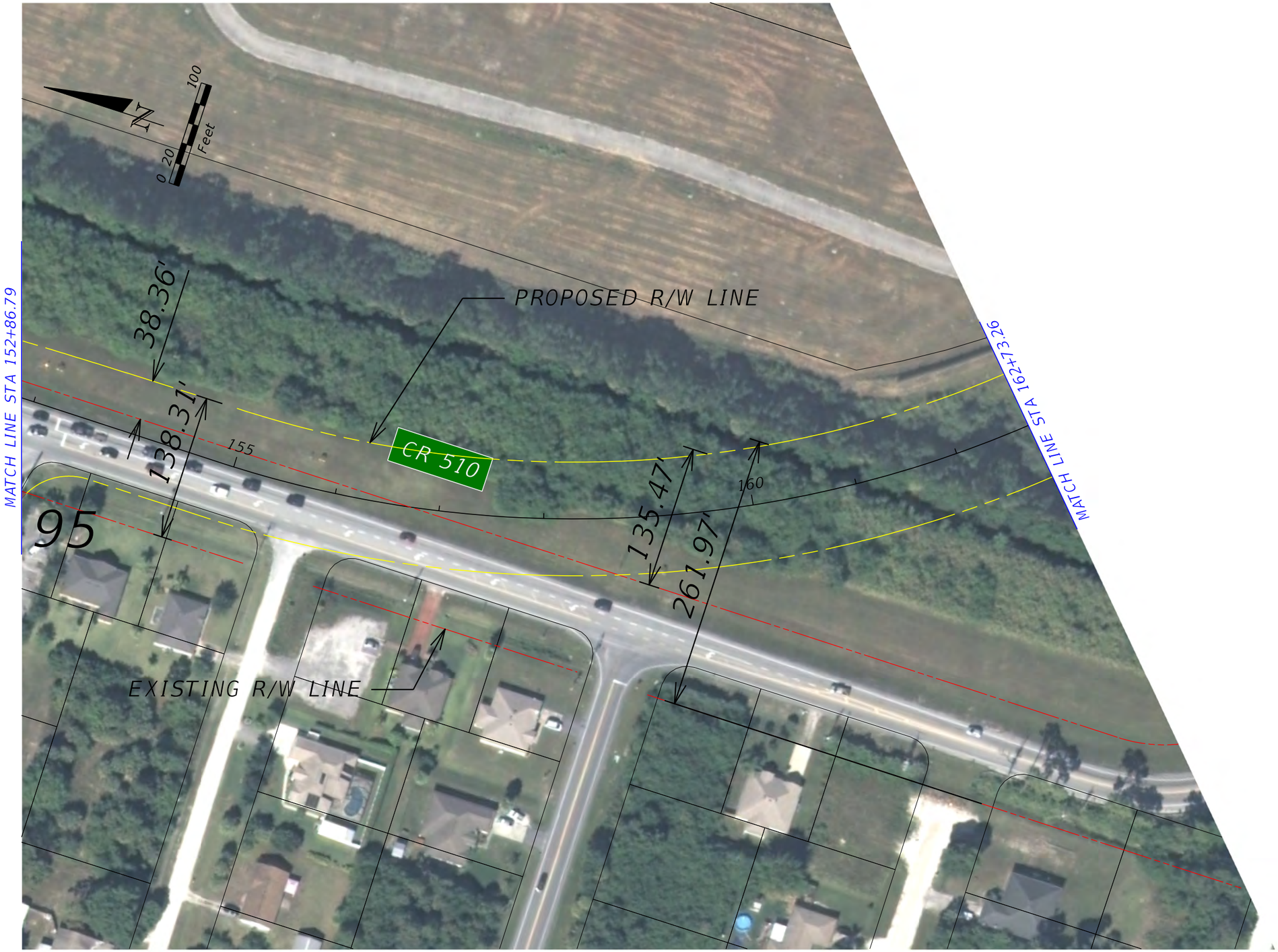
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 4



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 5

MATCH LINE STA 162+73.26

396.34'

560.82'

165

EXISTING R/W LINE

EXISTING R/W LINE

COUNTY PARCEL

PROPOSED R/W LINE

170

1

21.57'

MATCH LINE STA 172+29.28

0 20 100
Feet

N

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

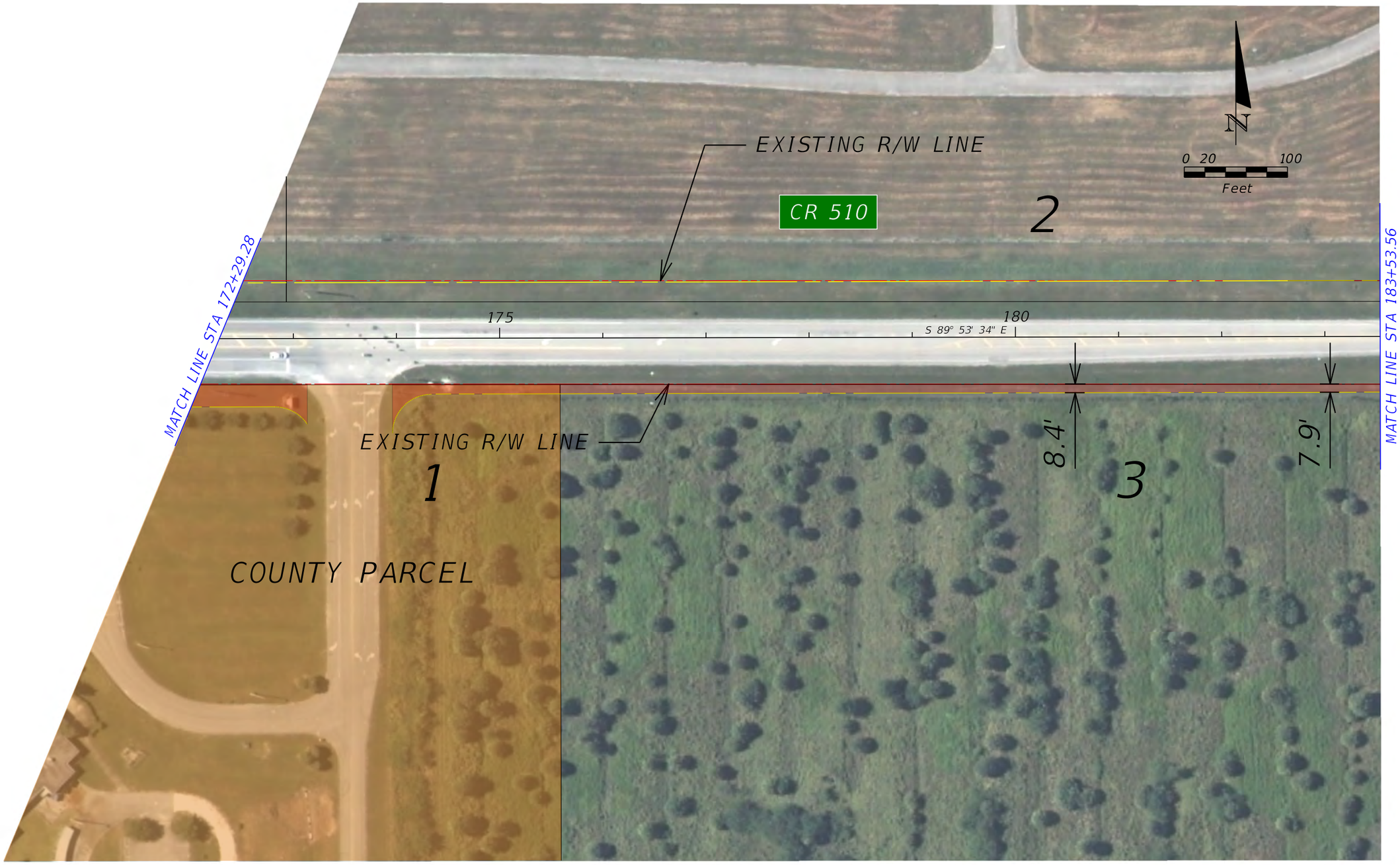
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 6

Paul.Carballo 5/10/2017 3:52:59 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD06.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

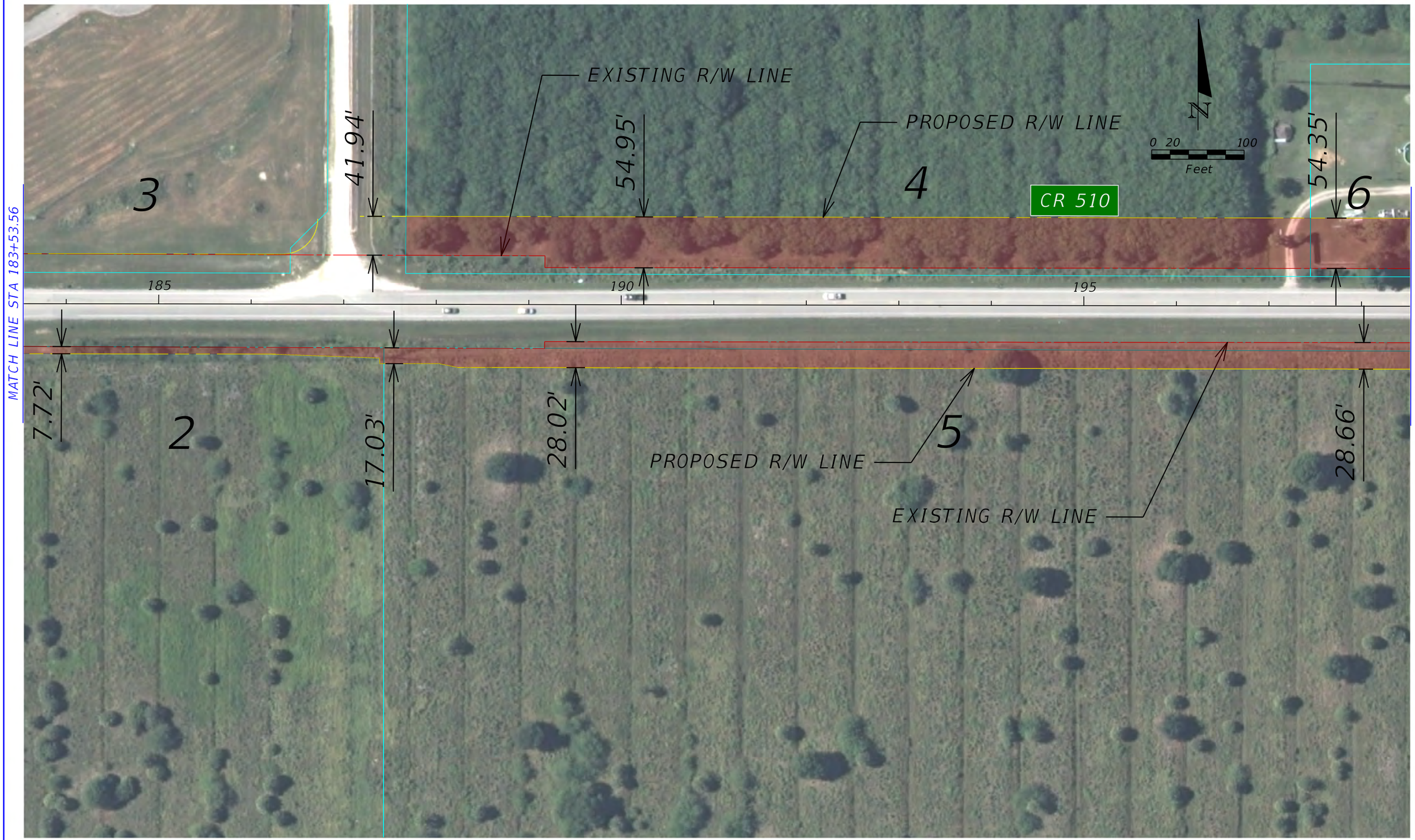
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 7



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 8

MATCH LINE STA 198+53.56

MATCH LINE STA 213+53.56

N

0 20 100

Feet

54.2'

6

EXISTING R/W LINE

7

CR 510

PROPOSED R/W LINE

4

53.3'

200

205

210

28.77'

5

5

EXISTING R/W LINE

PROPOSED R/W LINE

29.75'

84 AVE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 9

Paul.Carballo 5/10/2017 3:53:09 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD09.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 10



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 11

Paul.Carballo 5/10/2017 3:53:18 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD11.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

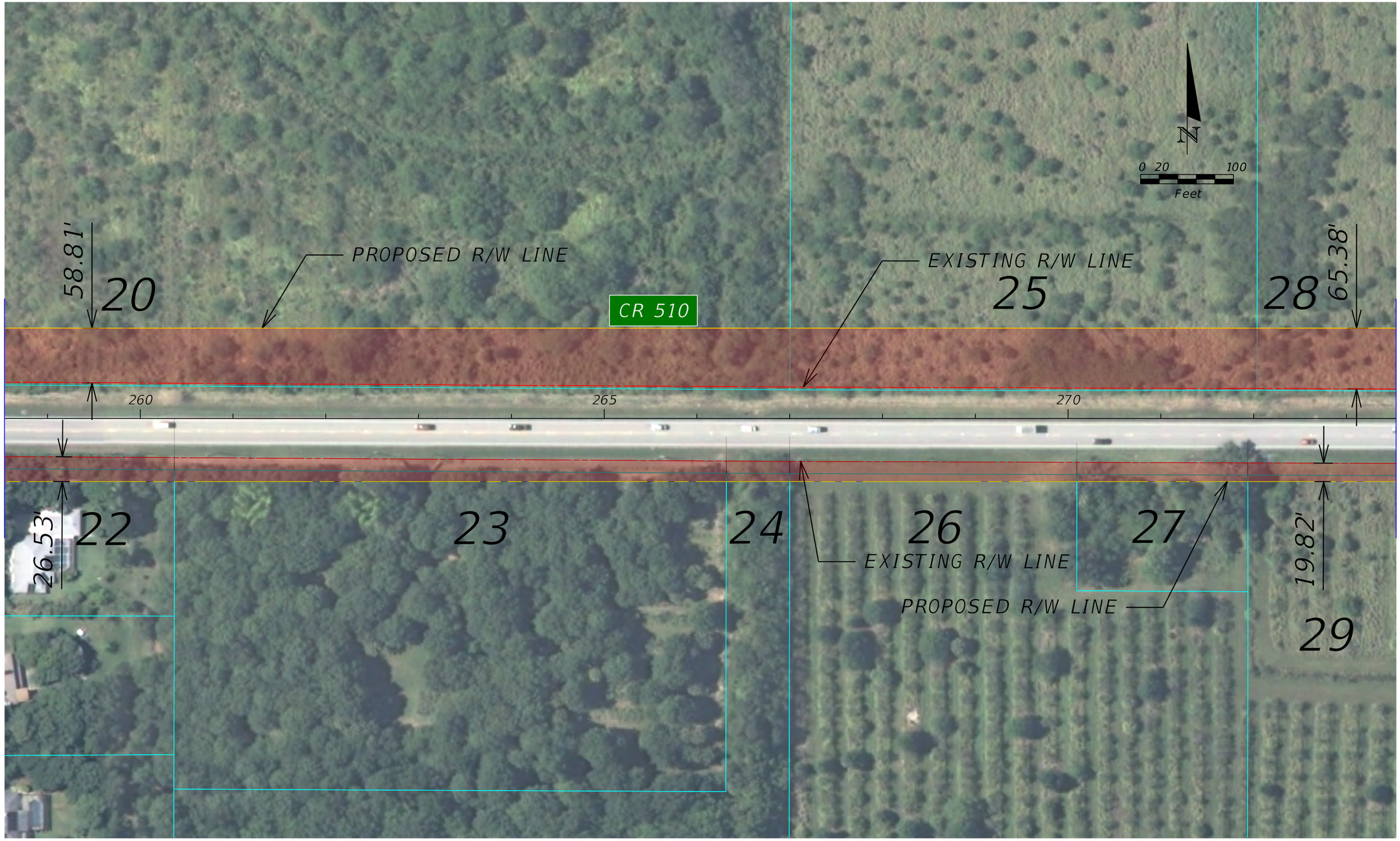
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 12



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 13

Paul.Carballo 5/10/2017 3:53:27 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD13.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 14



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 15



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 16



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 17



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 18

Paul.Carballo 5/10/2017 3:53:48 PM N:\JOB\PLANNING\12293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD18.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

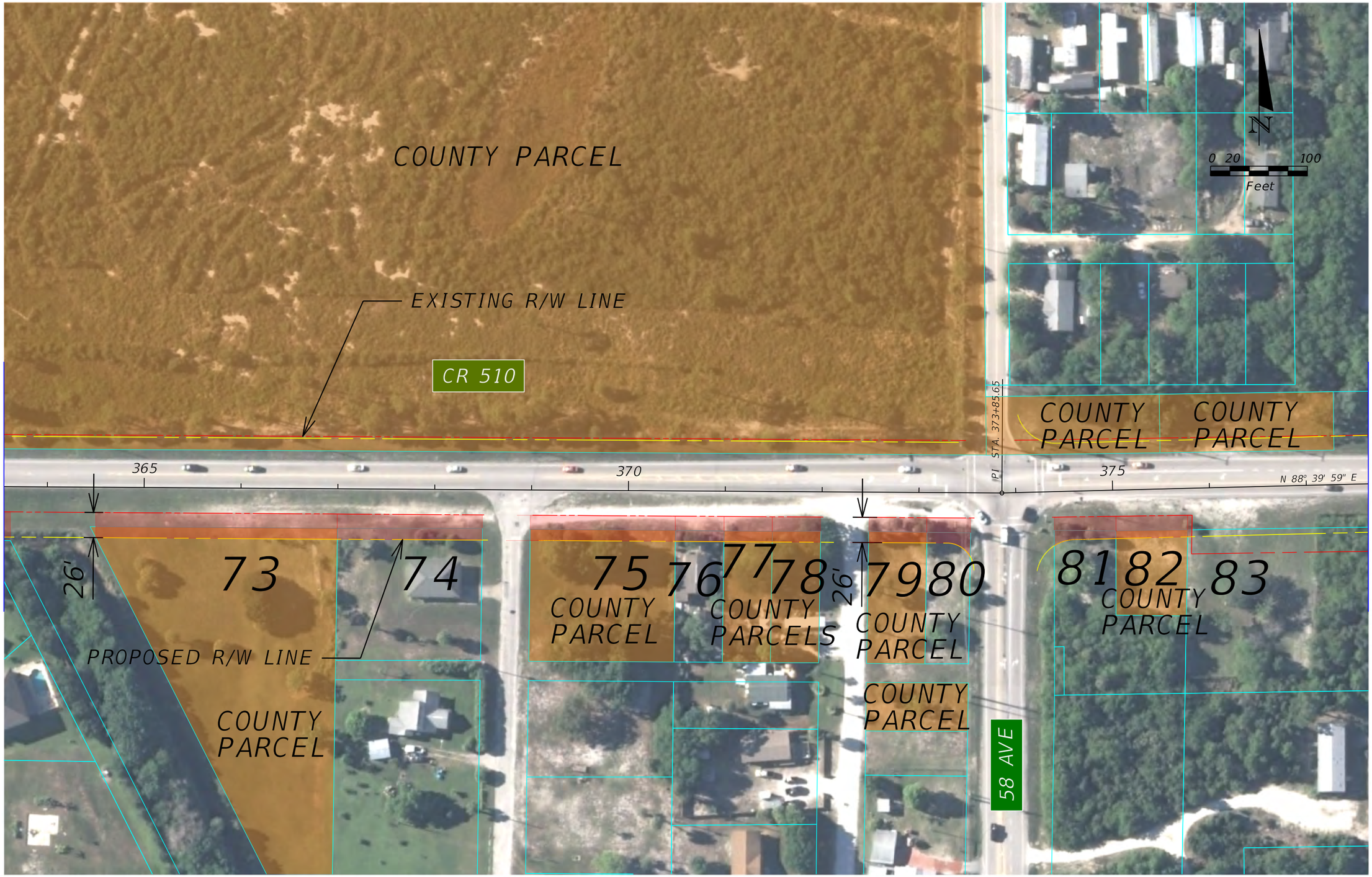
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 19

Paul.Carballo 5/10/2017 3:53:53 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD19.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 20



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
	20		

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - ROADWAY RIGHT OF WAY IMPACTS

SHEET NO. 21

POND 2-1

POND 2-3

87

EXISTING R/W LINE

POND 2-2

COUNTY PARCEL

S 0° 15' 00" W

115

120

125

CR 510

EXISTING R/W LINE

0 50 200

Feet

POND 2-4

88

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 22



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

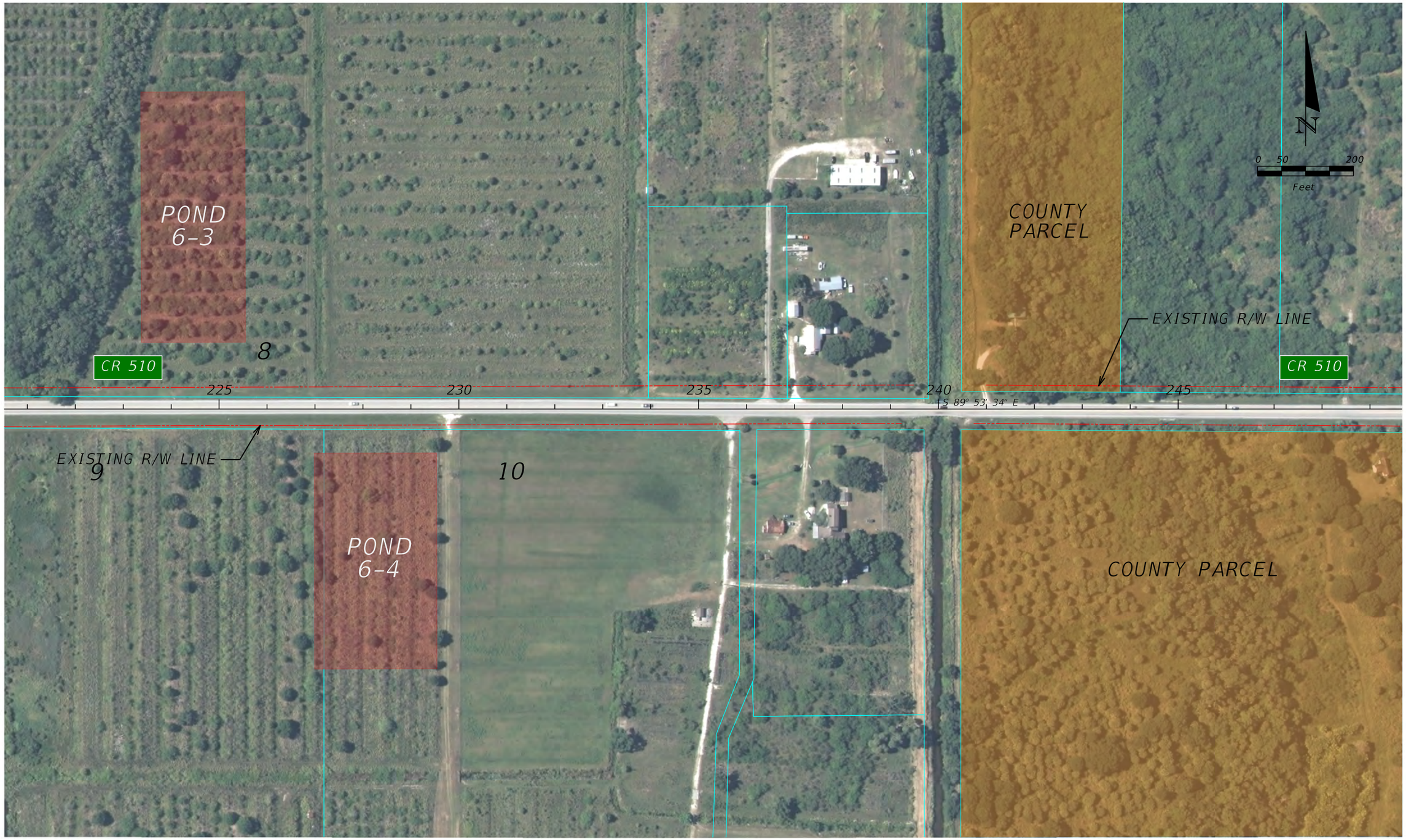
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 23

Paul.Carballo 5/10/2017 3:54:17 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD23.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 24

Paul.Carballo 5/10/2017 3:54:22 PM N:\JOB\PLANNING\1.2293 CR 510 PD&E\40560622202\rwmap\ROW REQ\RWDTRD24.dgn



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 25



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

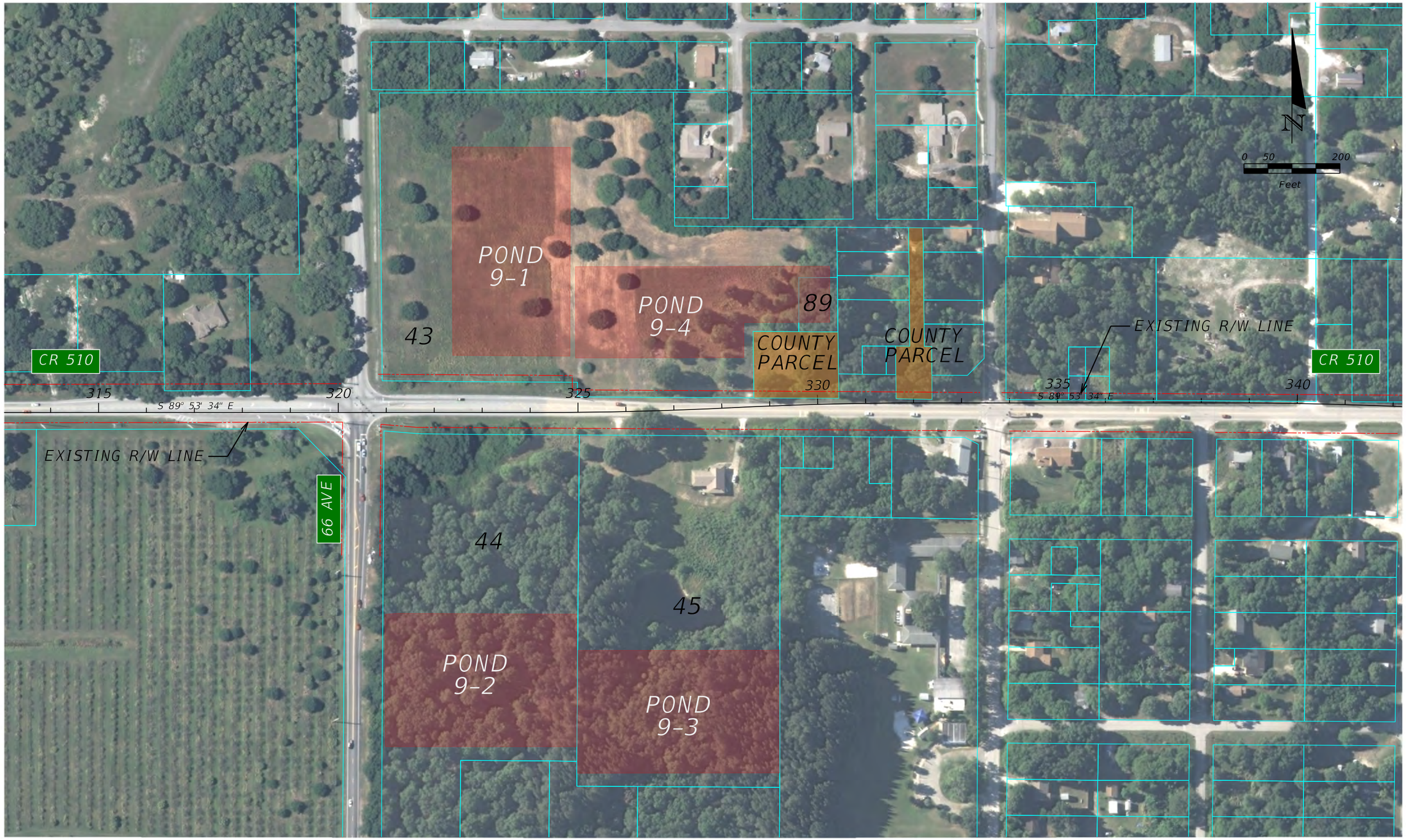
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 26



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

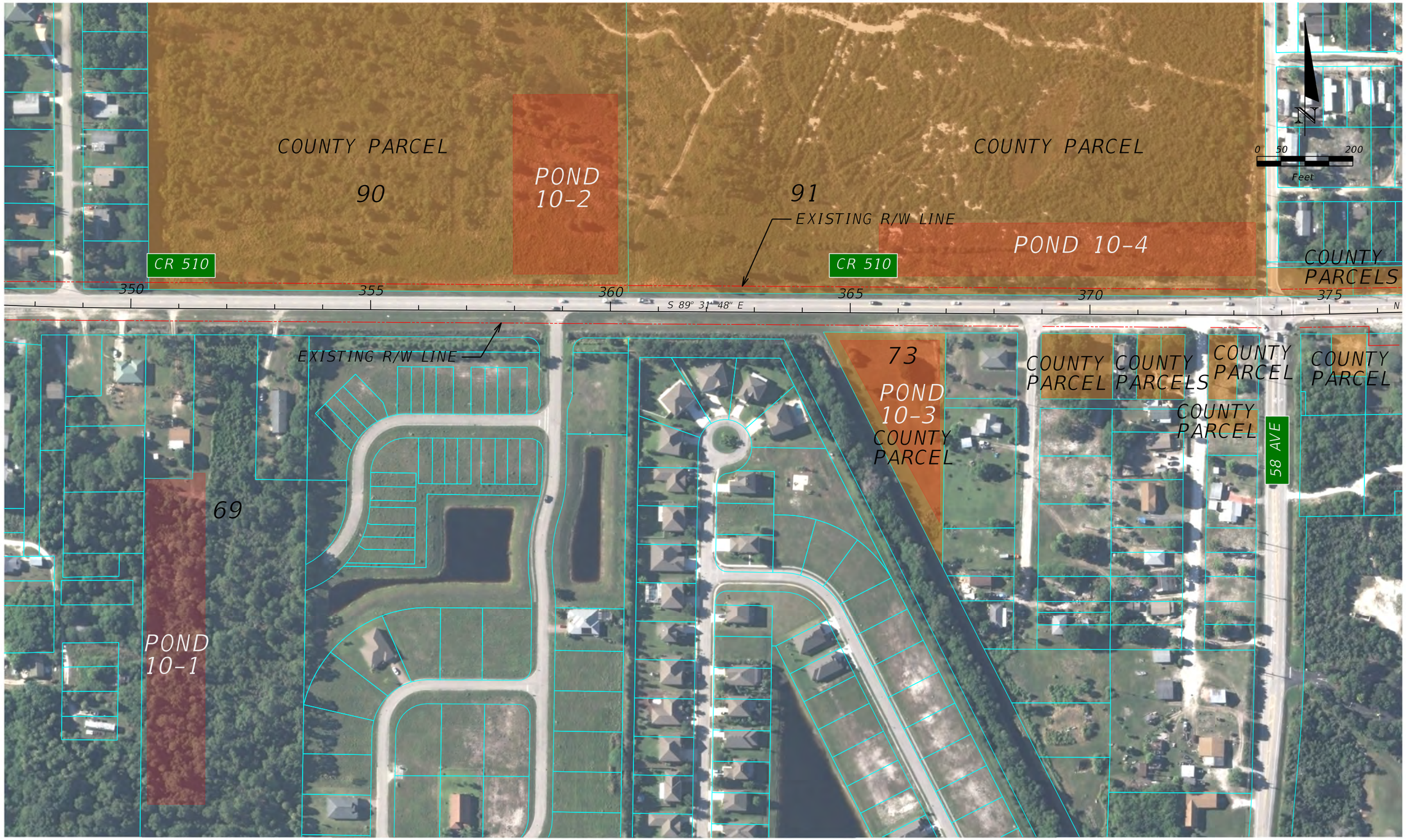
METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 27



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

METRIC ENGINEERING, INC.
13940 SW 136 STREET
MIAMI, FLORIDA 33186
TEL. (305) 235-5098
FAX. (305) 251-5894
CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-2-22-02

ALTERNATIVE 1 - DRAINAGE RIGHT OF WAY IMPACTS

SHEET NO. 28

APPENDIX I – CONSTRUCTION COST ESTIMATES

Construction Project FM# 405606-3

Date: 3/17/2019 6:37:34 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 405606-3-52-01 **Letting Date:** 01/2099

Description: CR-510/85TH ST FROM 82ND AVE TO 58TH AVE

District: 04 **County:** 88 INDIAN RIVER **Market Area:** 11 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 3.070 MI

Project Manager: FORMOSO

Version 3-P Project Grand Total **$33,168,999.52**
Description: CR 510 From 1000' west of 82 Avenue to 58 Avenue

Sequence: 2 NDU - New Construction, Divided, Urban **Net Length:** 1.060 MI
5,597 LF

Description: From 66th AVE TO 58th AVE

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	55.00 / 55.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	1.060
Top of Structural Course For Begin Section	105.00
Top of Structural Course For End Section	105.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	6 to 1 / 6 to 1
Median Shoulder Cross Slope L/R	4.00 % / 4.00 %
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	14.13 AC	$15,000.00	$211,950.00
120-6	EMBANKMENT	125,136.16 CY	$8.00	$1,001,089.28

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	5,867.00 CY	$8.00	$46,936.00
	Comment: 2,400' of 3' deep Swale			
	Earthwork Component Total			$1,259,975.28

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	4
Roadway Pavement Width L/R	29.00 / 29.00

Structural Spread Rate	330
Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	42,485.93	SY	$5.25	$223,051.13
285-709	OPTIONAL BASE,BASE GROUP 09	36,068.27	SY	$15.00	$541,024.05
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	5,951.26	TN	$100.00	$595,126.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	1,442.73	TN	$120.00	$173,127.60

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	297.56	TN	$100.00	$29,756.00
	Comment: 5% Contingency				
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	72.14	TN	$120.00	$8,656.80
	Comment: 5% Contingency				
710-11-170	PAINTED PAVT MARK,STD,WHITE, ARROWS	16.00	EA	$29.15	$466.40
711-11-170	THERMOPLASTIC, STD, WHITE, ARROW	16.00	EA	$71.30	$1,140.80

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	429.00	EA	$3.25	$1,394.25
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	8.48	GM	$950.00	$8,056.00
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	4.24	GM	$297.50	$1,261.40
	Roadway Component Total				$1,583,060.43

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	12.25 / 12.25
Total Outside Shoulder Perf. Turf Width L/R	5.00 / 5.00
Sidewalk Width L/R	5.00 / 5.00

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-10	CONCRETE CURB & GUTTER, TYPE F	5,596.80	LF	$20.00	$111,936.00
520-1-10	CONCRETE CURB & GUTTER, TYPE F	5,596.80	LF	$20.00	$111,936.00
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	6,218.67	SY	$40.00	$248,746.80
570-1-1	PERFORMANCE TURF	6,218.67	SY	$1.50	$9,328.01

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	11,193.60	LF	$1.50	$16,790.40
104-11	FLOATING TURBIDITY BARRIER	265.00	LF	$15.00	$3,975.00
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	265.00	LF	$6.75	$1,788.75
104-15	SOIL TRACKING PREVENTION DEVICE	2.00	EA	$2,000.00	$4,000.00
104-18	INLET PROTECTION SYSTEM	55.00	EA	$95.00	$5,225.00
	Shoulder Component Total				$513,725.96

MEDIAN COMPONENT

User Input Data

Description	Value
Total Median Width	22.00
Performance Turf Width	12.63

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	11,193.60	LF	$20.00	$223,872.00
570-1-1	PERFORMANCE TURF	7,854.18	SY	$1.50	$11,781.27
	Median Component Total				$235,653.27

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	19.08	CY	$1,450.00	$27,666.00
425-1-351	INLETS, CURB, TYPE P-5, <10'	39.00	EA	$5,050.00	$196,950.00
425-1-451	INLETS, CURB, TYPE J-5, <10'	11.00	EA	$7,680.00	$84,480.00
425-1-521	INLETS, DT BOT, TYPE C, <10'	6.00	EA	$3,000.00	$18,000.00
425-2-41	MANHOLES, P-7, <10'	6.00	EA	$3,866.42	$23,198.52
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	2,808.00	LF	$70.00	$196,560.00
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	256.00	LF	$120.00	$30,720.00
430-175-148	PIPE CULV, OPT MATL, ROUND, 48"S/CD	5,304.00	LF	$185.00	$981,240.00
570-1-1	PERFORMANCE TURF	322.24	SY	$1.50	$483.36

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
570-1-1	PERFORMANCE TURF	8,000.00	SY	$1.50	$12,000.00
	Comment: Swale				

Retention Basin 1

Description	Value
Size	1.5 AC
Multiplier	1
Depth	15.00
Description	Pond 9

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.50	AC	$15,000.00	$22,500.00
120-1	REGULAR EXCAVATION	36,300.00	CY	$8.00	$290,400.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,450.00	$26,100.00
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,114.16	$4,114.16
425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$150.00	$8,400.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$250.00	$50,000.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	1,025.00	LF	$15.00	$15,375.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	7,260.00	SY	$1.50	$10,890.00

Retention Basin 2

Description	Value
Size	1 AC
Multiplier	1
Depth	15.00
Description	Pond 10

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.00	AC	$15,000.00	$15,000.00
120-1	REGULAR EXCAVATION	24,200.00	CY	$8.00	$193,600.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,450.00	$26,100.00
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,114.16	$4,114.16
425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$150.00	$8,400.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$250.00	$50,000.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	840.00	LF	$15.00	$12,600.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	4,840.00	SY	$1.50	$7,260.00

Drainage Component Total	$2,339,375.54

INTERSECTIONS COMPONENT

Intersection 1

Description	Value
Mainline No. of Left Turn Lanes	0
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	3
Cross Street No. of Left Turn Lanes	0
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	40
T-Intersection?	N
Multiplier	1
Description	66th Avenue (roundabout)

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.49	AC	$15,000.00	$22,350.00
120-1	REGULAR EXCAVATION	841.27	CY	$8.00	$6,730.16
160-4	TYPE B STABILIZATION	2,154.03	SY	$5.25	$11,308.66
160-4	TYPE B STABILIZATION	353.22	SY	$5.25	$1,854.41
285-709	OPTIONAL BASE,BASE GROUP 09	353.22	SY	$15.00	$5,298.30
285-709	OPTIONAL BASE,BASE GROUP 09	2,154.03	SY	$15.00	$32,310.45
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	58.28	TN	$100.00	$5,828.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	355.41	TN	$100.00	$35,541.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	14.13	TN	$120.00	$1,695.60
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	86.16	TN	$148.35	$12,781.84
520-1-7	CONCRETE CURB & GUTTER, TYPE E	202.84	LF	$20.00	$4,056.80
520-1-10	CONCRETE CURB & GUTTER, TYPE F	586.00	LF	$20.00	$11,720.00
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	325.56	SY	$40.00	$13,022.40
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	173.89	SY	$55.89	$9,718.71
570-1-1	PERFORMANCE TURF	325.56	SY	$1.50	$488.34

Intersection 2

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	0
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	N
Multiplier	1
Description	64th Avenue

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.40	AC	$15,000.00	$21,000.00
120-1	REGULAR EXCAVATION	634.88	CY	$8.00	$5,079.04
160-4	TYPE B STABILIZATION	833.22	SY	$5.25	$4,374.41
160-4	TYPE B STABILIZATION	1,625.58	SY	$5.25	$8,534.30
285-709	OPTIONAL BASE,BASE GROUP 09	1,625.58	SY	$15.00	$24,383.70
285-709	OPTIONAL BASE,BASE GROUP 09	833.22	SY	$15.00	$12,498.30
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	137.48	TN	$100.00	$13,748.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	268.22	TN	$100.00	$26,822.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	33.33	TN	$120.00	$3,999.60
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	65.02	TN	$148.35	$9,645.72
520-1-7	CONCRETE CURB & GUTTER, TYPE E	202.84	LF	$20.00	$4,056.80
520-1-10	CONCRETE CURB & GUTTER, TYPE F	546.00	LF	$20.00	$10,920.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	303.33	SY	$40.00	$12,133.20
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	173.89	SY	$55.89	$9,718.71
570-1-1	PERFORMANCE TURF	303.33	SY	$1.50	$455.00

Intersection 3

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	0
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	61st Drive

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.70	AC	$15,000.00	$10,500.00
120-1	REGULAR EXCAVATION	317.44	CY	$8.00	$2,539.52
160-4	TYPE B STABILIZATION	833.22	SY	$5.25	$4,374.41
160-4	TYPE B STABILIZATION	812.79	SY	$5.25	$4,267.15
285-709	OPTIONAL BASE,BASE GROUP 09	833.22	SY	$15.00	$12,498.30
285-709	OPTIONAL BASE,BASE GROUP 09	812.79	SY	$15.00	$12,191.85
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	134.11	TN	$100.00	$13,411.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	137.48	TN	$100.00	$13,748.00
337-7-43		33.33	TN	$120.00	$3,999.60

	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22			
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	32.51 TN	$148.35	$4,822.86
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42 LF	$20.00	$2,028.40
520-1-10	CONCRETE CURB & GUTTER, TYPE F	273.00 LF	$20.00	$5,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00 LF	$38.97	$13,054.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	151.67 SY	$40.00	$6,066.80
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94 SY	$55.89	$4,859.08
570-1-1	PERFORMANCE TURF	151.67 SY	$1.50	$227.51

Intersection 4

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	0
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	Paladin Square

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.70	AC	$15,000.00	$10,500.00
120-1	REGULAR EXCAVATION	317.44	CY	$8.00	$2,539.52
160-4	TYPE B STABILIZATION	833.22	SY	$5.25	$4,374.41
160-4	TYPE B STABILIZATION	812.79	SY	$5.25	$4,267.15
285-709	OPTIONAL BASE,BASE GROUP 09	812.79	SY	$15.00	$12,191.85
285-709	OPTIONAL BASE,BASE GROUP 09	833.22	SY	$15.00	$12,498.30
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	137.48	TN	$100.00	$13,748.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	134.11	TN	$100.00	$13,411.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	33.33	TN	$120.00	$3,999.60
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	32.51	TN	$148.35	$4,822.86
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$20.00	$2,028.40
520-1-10	CONCRETE CURB & GUTTER, TYPE F	273.00	LF	$20.00	$5,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	151.67	SY	$40.00	$6,066.80
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94	SY	$55.89	$4,859.08
570-1-1	PERFORMANCE TURF	151.67	SY	$1.50	$227.51

Intersection 5

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	3
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	N
Multiplier	1
Description	58th Avenue

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.36	AC	$15,000.00	$35,400.00
120-1	REGULAR EXCAVATION	1,342.74	CY	$8.00	$10,741.92
160-4	TYPE B STABILIZATION	862.56	SY	$5.25	$4,528.44
160-4	TYPE B STABILIZATION	3,438.03	SY	$5.25	$18,049.66
285-709	OPTIONAL BASE,BASE GROUP 09	862.56	SY	$15.00	$12,938.40
285-709	OPTIONAL BASE,BASE GROUP 09	3,438.03	SY	$15.00	$51,570.45
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	567.27	TN	$100.00	$56,727.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	142.32	TN	$100.00	$14,232.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	34.50	TN	$120.00	$4,140.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	137.52	TN	$148.35	$20,401.09
520-1-7	CONCRETE CURB & GUTTER, TYPE E	202.84	LF	$20.00	$4,056.80
520-1-10	CONCRETE CURB & GUTTER, TYPE F	946.00	LF	$20.00	$18,920.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00	LF	$38.97	$7,599.15
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	525.56	SY	$40.00	$21,022.40
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	173.89	SY	$55.89	$9,718.71
570-1-1	PERFORMANCE TURF	525.56	SY	$1.50	$788.34
	Intersections Component Total				$887,116.57

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	26.00	AS	$350.00	$9,100.00
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	3.00	AS	$1,160.31	$3,480.93
700-2-15	MULTI- POST SIGN, F&I GM, 51-100 SF	3.00	AS	$5,800.00	$17,400.00
700-2-16	MULTI- POST SIGN, F&I GM, 101-200 SF	3.00	AS	$8,901.23	$26,703.69

Signing Component Total $56,684.62

SIGNALIZATIONS COMPONENT

Signalization 1

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	58th Ave

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00	LF	$6.85	$5,137.50
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00	LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,100.00	$5,100.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	16.00	EA	$625.00	$10,000.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$6.49	$389.40
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00	EA	$1,038.67	$1,038.67
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00	EA	$35,000.00	$140,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	12.00	AS	$1,150.00	$13,800.00
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00	AS	$646.49	$5,171.92
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00	EA	$175.00	$1,400.00
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00	EA	$259.47	$1,037.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	4.00	EA	$2,500.00	$10,000.00

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	1.00	EA	$8,039.24	$8,039.24
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00	EA	$5,923.11	$23,692.44
670-5-140	TRAF CNTL ASSEM, F&I, MODEL 2070	1.00	AS	$28,749.22	$28,749.22

Signalizations Component Total $260,003.19

LIGHTING COMPONENT

Conventional Lighting Subcomponent

Description	Value
Spacing	MIN

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	5,596.80	LF	$6.85	$38,338.08

630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	1,110.88 LF	$18.00	$19,995.84
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	38.00 EA	$625.00	$23,750.00
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	20,441.04 LF	$2.16	$44,152.65
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	38.00 EA	$4,500.00	$171,000.00
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	38.00 EA	$575.00	$21,850.00
	Subcomponent Total			$319,086.57
	Lighting Component Total			$319,086.57
Sequence 2 Total				$7,454,681.43

Sequence: 3 NDU - New Construction, Divided, Urban **Net Length:** 2.199 MI
11,613 LF

Description: From 1000' west of 82 Ave to 66 Avenue

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	100.00 / 75.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	2.199
Top of Structural Course For Begin Section	105.00
Top of Structural Course For End Section	105.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	6 to 1 / 6 to 1
Median Shoulder Cross Slope L/R	4.00 % / 4.00 %
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	46.65	AC	$15,000.00	$699,750.00
120-6	EMBANKMENT	286,260.15	CY	$8.00	$2,290,081.20

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	24,200.00	CY	$8.00	$193,600.00
	Comment: 9,900' of 3' deep swale				
	Earthwork Component Total				$3,183,431.20

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	4
Roadway Pavement Width L/R	28.00 / 28.00
Structural Spread Rate	330
Friction Course Spread Rate	110

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	85,573.67	SY	$5.25	$449,261.77
285-709	OPTIONAL BASE,BASE GROUP 09	72,257.62	SY	$15.00	$1,083,864.30
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	11,922.51	TN	$100.00	$1,192,251.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	3,974.17	TN	$120.00	$476,900.40

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	596.00	TN	$100.00	$59,600.00

	Comment: 5% contingency			
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	199.00 TN	$120.00	$23,880.00
536-1-0	GUARDRAIL- ROADWAY, GEN/LS TL-2	400.00 LF	$20.99	$8,396.00
536-73	GUARDRAIL REMOVAL	150.00 LF	$2.83	$424.50
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	6.00 EA	$2,592.60	$15,555.60
710-11-170	PAINTED PAVT MARK,STD,WHITE, ARROWS	20.00 EA	$29.15	$583.00
711-11-160	THERMOPLASTIC, STD, WHITE, MESSAGE	60.00 EA	$117.47	$7,048.20

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	2

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	891.00 EA	$3.25	$2,895.75
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	17.60 GM	$950.00	$16,720.00
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	8.80 GM	$297.50	$2,618.00
	Roadway Component Total			$3,339,998.52

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	18.00 / 18.00
Total Outside Shoulder Perf. Turf Width L/R	9.75 / 9.75
Sidewalk Width L/R	6.00 / 6.00

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	11,612.83 LF	$20.00	$232,256.60
520-1-7	CONCRETE CURB & GUTTER, TYPE E	11,612.83 LF	$20.00	$232,256.60
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	15,483.78 SY	$40.00	$619,351.20
570-1-1	PERFORMANCE TURF	25,161.14 SY	$1.50	$37,741.71

Erosion Control

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	23,225.66 LF	$1.50	$34,838.49

104-11	FLOATING TURBIDITY BARRIER	549.85 LF	$15.00	$8,247.75
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	549.85 LF	$6.75	$3,711.49
104-15	SOIL TRACKING PREVENTION DEVICE	3.00 EA	$2,000.00	$6,000.00
104-18	INLET PROTECTION SYSTEM	113.00 EA	$95.00	$10,735.00
	Shoulder Component Total			$1,185,138.84

MEDIAN COMPONENT

User Input Data

Description	Value
Total Median Width	22.00
Performance Turf Width	5.34

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	23,225.66	LF	$20.00	$464,513.20
570-1-1	PERFORMANCE TURF	6,890.28	SY	$1.50	$10,335.42
	Median Component Total				$474,848.62

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	39.59	CY	$1,450.00	$57,405.50
425-1-351	INLETS, CURB, TYPE P-5, <10'	80.00	EA	$5,050.00	$404,000.00
425-1-451	INLETS, CURB, TYPE J-5, <10'	22.00	EA	$7,680.00	$168,960.00
425-1-521	INLETS, DT BOT, TYPE C, <10'	11.00	EA	$3,000.00	$33,000.00
425-2-41	MANHOLES, P-7, <10'	11.00	EA	$3,866.42	$42,530.62
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	5,824.00	LF	$70.00	$407,680.00
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	520.00	LF	$120.00	$62,400.00
430-175-148	PIPE CULV, OPT MATL, ROUND, 48"S/CD	11,000.00	LF	$185.00	$2,035,000.00
570-1-1	PERFORMANCE TURF	668.62	SY	$1.50	$1,002.93

Retention Basin 1

Description	Value
Size	2.5 AC
Multiplier	1
Depth	15.00
Description	Pond 6

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.50	AC	$15,000.00	$37,500.00
120-1	REGULAR EXCAVATION	60,500.00	CY	$8.00	$484,000.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,450.00	$26,100.00
425-1-361	INLETS, CURB, TYPE P-6, <10'	1.00	EA	$6,310.00	$6,310.00

425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$150.00	$8,400.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$250.00	$50,000.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	1,335.00	LF	$15.00	$20,025.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	12,100.00	SY	$1.50	$18,150.00

Retention Basin 2

Description	Value
Size	2.5 AC
Multiplier	1
Depth	15.00
Description	Pond 7

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.50	AC	$15,000.00	$37,500.00
120-1	REGULAR EXCAVATION	60,500.00	CY	$8.00	$484,000.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,450.00	$26,100.00
425-1-361	INLETS, CURB, TYPE P-6, <10'	1.00	EA	$6,310.00	$6,310.00
425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$150.00	$8,400.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$250.00	$50,000.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	1,335.00	LF	$15.00	$20,025.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	12,100.00	SY	$1.50	$18,150.00

Retention Basin 3

Description	Value
Size	5 AC
Multiplier	1
Depth	15.00
Description	Pond 8

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	5.00	AC	$15,000.00	$75,000.00
120-1	REGULAR EXCAVATION	121,000.00	CY	$8.00	$968,000.00
400-2-2	CONC CLASS II, ENDWALLS	30.00	CY	$1,450.00	$43,500.00
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,114.16	$4,114.16
425-2-71	MANHOLES, J-7, <10'	2.00	EA	$9,512.41	$19,024.82
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$150.00	$8,400.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	400.00	LF	$250.00	$100,000.00
550-10-220		1,860.00	LF	$15.00	$27,900.00

	FENCING, TYPE B, 5.1-6.0', STANDARD				
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	2.00	EA	$2,099.76	$4,199.52
570-1-1	PERFORMANCE TURF	24,200.00	SY	$1.50	$36,300.00

Retention Basin 4

Description	Value
Size	2 AC
Multiplier	1
Depth	15.00
Description	pond 9

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.00	AC	$15,000.00	$30,000.00
120-1	REGULAR EXCAVATION	48,400.00	CY	$8.00	$387,200.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,450.00	$26,100.00
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,114.16	$4,114.16
425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$150.00	$8,400.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$250.00	$50,000.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	1,180.00	LF	$15.00	$17,700.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	9,680.00	SY	$1.50	$14,520.00

Drainage Component Total $6,372,258.22

INTERSECTIONS COMPONENT

Intersection 1

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	50
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	45
T-Intersection?	N
Multiplier	1
Description	82nd AVE

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.75	AC	$15,000.00	$41,250.00
120-1	REGULAR EXCAVATION	1,275.00	CY	$8.00	$10,200.00
160-4	TYPE B STABILIZATION	935.89	SY	$5.25	$4,913.42
160-4	TYPE B STABILIZATION	3,078.47	SY	$5.25	$16,161.97

285-709	OPTIONAL BASE,BASE GROUP 09	935.89 SY	$15.00	$14,038.35
285-709	OPTIONAL BASE,BASE GROUP 09	3,078.47 SY	$15.00	$46,177.05
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	154.42 TN	$100.00	$15,442.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	507.95 TN	$100.00	$50,795.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	253.97 TN	$148.35	$37,676.45
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	77.21 TN	$148.35	$11,454.10
520-1-7	CONCRETE CURB & GUTTER, TYPE E	202.84 LF	$20.00	$4,056.80
520-1-10	CONCRETE CURB & GUTTER, TYPE F	1,106.00 LF	$20.00	$22,120.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	390.00 LF	$38.97	$15,198.30
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	235.00 LF	$38.97	$9,157.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	614.44 SY	$40.00	$24,577.60
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	173.89 SY	$55.89	$9,718.71
570-1-1	PERFORMANCE TURF	614.44 SY	$1.50	$921.66

Intersection 2

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	50
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	POWERLINE

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.18	AC	$15,000.00	$17,700.00
120-1	REGULAR EXCAVATION	628.29	CY	$8.00	$5,026.32
160-4	TYPE B STABILIZATION	935.89	SY	$5.25	$4,913.42
160-4	TYPE B STABILIZATION	1,517.01	SY	$5.25	$7,964.30
285-709	OPTIONAL BASE,BASE GROUP 09	935.89	SY	$15.00	$14,038.35
285-709	OPTIONAL BASE,BASE GROUP 09	1,517.01	SY	$15.00	$22,755.15
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	154.42	TN	$100.00	$15,442.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	250.31	TN	$100.00	$25,031.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	77.21	TN	$148.35	$11,454.10
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	125.15	TN	$148.35	$18,566.00
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$20.00	$2,028.40
520-1-10	CONCRETE CURB & GUTTER, TYPE F	473.00	LF	$20.00	$9,460.00

520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	390.00 LF	$38.97	$15,198.30
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00 LF	$38.97	$7,599.15
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	262.78 SY	$40.00	$10,511.20
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94 SY	$55.89	$4,859.08
570-1-1	PERFORMANCE TURF	262.78 SY	$1.50	$394.17
	Intersections Component Total			$526,800.30

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	53.00 AS	$350.00	$18,550.00
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	5.00 AS	$1,160.31	$5,801.55
700-2-15	MULTI- POST SIGN, F&I GM, 51-100 SF	5.00 AS	$5,800.00	$29,000.00
700-2-16	MULTI- POST SIGN, F&I GM, 101-200 SF	5.00 AS	$8,901.23	$44,506.15
	Signing Component Total			$97,857.70

SIGNALIZATIONS COMPONENT

Signalization 1

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	82ND AVE

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00 LF	$6.85	$5,137.50
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00 LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00 PI	$5,100.00	$5,100.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	16.00 EA	$625.00	$10,000.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00 AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00 LF	$6.49	$389.40
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00 EA	$35,000.00	$140,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	12.00 AS	$1,150.00	$13,800.00
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00 AS	$646.49	$5,171.92
660-1-102	LOOP DETECTOR INDUCTIVE, F&I, TYPE 2	12.00 EA	$247.55	$2,970.60
660-2-106	LOOP ASSEMBLY, F&I, TYPE F	12.00 AS	$1,074.60	$12,895.20
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00 EA	$175.00	$1,400.00
670-5-111		1.00 AS	$22,667.20	$22,667.20

	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT				
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00	EA	$259.47	$1,037.88

Signalization 2

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	POWERLINE

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00	LF	$6.85	$5,137.50
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00	LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,100.00	$5,100.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	12.00	EA	$625.00	$7,500.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$6.49	$389.40
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	3.00	EA	$35,000.00	$105,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	12.00	AS	$1,150.00	$13,800.00
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	6.00	AS	$646.49	$3,878.94
660-1-102	LOOP DETECTOR INDUCTIVE, F&I, TYPE 2	12.00	EA	$247.55	$2,970.60
660-2-106	LOOP ASSEMBLY, F&I, TYPE F	12.00	AS	$1,074.60	$12,895.20
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	6.00	EA	$175.00	$1,050.00
670-5-111	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT	1.00	AS	$22,667.20	$22,667.20
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	3.00	EA	$259.47	$778.41
	Signalizations Component Total				$414,630.79

LIGHTING COMPONENT

Conventional Lighting Subcomponent

Description	Value
Spacing	MIN

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	11,612.83	LF	$6.85	$79,547.89
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	2,304.97	LF	$18.00	$41,489.46
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	77.00	EA	$625.00	$48,125.00
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	42,413.23	LF	$2.16	$91,612.58
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	77.00	EA	$4,500.00	$346,500.00

715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	77.00	EA	$575.00	$44,275.00
	Subcomponent Total				$651,549.92
	Lighting Component Total				$651,549.93

BRIDGES COMPONENT

Bridge C

Description	**Value**
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	85.00
Width (LF)	116.00
Type	Low Level
Cost Factor	1.10
Structure No.	111111
Removal of Existing Structures area	4,000.00
Default Cost per SF	$120.00
Factored Cost per SF	$132.00
Final Cost per SF	**$151.98**
Basic Bridge Cost	**$1,301,520.00**
Description	CANAL C

Bridge Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	4,000.00	SF	$17.67	$70,680.00
400-2-10	CONC CLASS II, APPROACH SLABS	257.78	CY	$610.34	$157,333.45
415-1-9	REINF STEEL- APPROACH SLABS	45,111.50	LB	$0.88	$39,698.12
	Bridge C Total				$1,569,231.57

Bridge L

Description	**Value**
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	74.00
Width (LF)	115.00
Type	Low Level
Cost Factor	1.10
Structure No.	222222
Removal of Existing Structures area	1,400.00
Default Cost per SF	$120.00
Factored Cost per SF	$132.00
Final Cost per SF	**$154.95**
Basic Bridge Cost	**$1,123,320.00**
Description	L

Bridge Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	1,400.00	SF	$17.67	$24,738.00
400-2-10		255.56	CY	$610.34	$155,978.49

	CONC CLASS II, APPROACH SLABS			
415-1-9	REINF STEEL- APPROACH SLABS	44,723.00 LB	$0.88	$39,356.24
	Bridge L Total			$1,343,392.73

Bridge SLOUGH

Description	**Value**
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	63.00
Width (LF)	115.00
Type	Low Level
Cost Factor	1.10
Structure No.	333333
Removal of Existing Structures area	1,000.00
Default Cost per SF	$120.00
Factored Cost per SF	$132.00
Final Cost per SF	**$158.96**
Basic Bridge Cost	**$956,340.00**
Description SLOUGH	

Bridge Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	1,000.00	SF	$17.67	$17,670.00
400-2-10	CONC CLASS II, APPROACH SLABS	255.56	CY	$610.34	$155,978.49
415-1-9	REINF STEEL- APPROACH SLABS	44,723.00	LB	$0.88	$39,356.24
	Bridge SLOUGH Total				$1,169,344.73
	Bridges Component Total				$4,081,969.03
Sequence 3 Total					$20,328,483.15

Date: 3/17/2019 6:37:35 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 405606-3-52-01 **Letting Date:** 01/2099

Description: CR-510/85TH ST FROM 82ND AVE TO 58TH AVE

District: 04 **County:** 88 INDIAN RIVER **Market Area:** 11 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 3.070 MI

Project Manager: FORMOSO

Version 3-P Project Grand Total **$33,168,999.52**
Description: CR 510 From 1000' west of 82 Avenue to 58 Avenue

---

Project Sequences Subtotal			**$27,783,164.58**
102-1	Maintenance of Traffic	10.00 %	$2,778,316.46
101-1	Mobilization	8.00 %	$2,444,918.48
Project Sequences Total			**$33,006,399.52**
Project Unknowns		0.00 %	$0.00
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-16	PARTNERING (DO NOT BID)	2.00	LS	$3,000.00	$6,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$150,000.00	$150,000.00
999-20	DISPUTES REVIEW BOARD (DO NOT BID)	2	DA	$3,300.00	$6,600.00
Project Non-Bid Subtotal					**$162,600.00**
Version 3-P Project Grand Total					**$33,168,999.52**

Construction Project FM#: 405606-4

Date: 12/28/2018 9:33:11 AM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 405606-4-52-01 **Letting Date:** 01/2099

Description: CR-510/85TH ST FROM CR-512 TO 82ND AVE

District: 04 **County:** 88 INDIAN RIVER **Market Area:** 11 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 2.200 MI

Project Manager: FORMOSO

Version 2 Project Grand Total **$23,493,548.70**
Description: CR 510 from CR 512 to 1000' west of 82 Avenue

Sequence: 1 NDU - New Construction, Divided, Urban **Net Length:** 1.648 MI 8,700 LF

Description: FROM CR-512 to 86 AVE

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	65.00 / 95.00
Incidental Clearing and Grubbing Area	1.25
Alignment Number	1
Distance	1.700
Top of Structural Course For Begin Section	105.00
Top of Structural Course For End Section	105.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	6 to 1 / 6 to 1
Median Shoulder Cross Slope L/R	4.00 % / 4.00 %
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	31.96	AC	$18,500.00	$591,260.00
110-1-1	CLEARING & GRUBBING	1.25	AC	$18,500.00	$23,125.00
120-6	EMBANKMENT	200,690.06	CY	$11.00	$2,207,590.66
	Earthwork Component Total				$2,821,975.66

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	4
Roadway Pavement Width L/R	29.00 / 29.00
Structural Spread Rate	330
Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	66,041.57	SY	$5.25	$346,718.24

285-709	OPTIONAL BASE,BASE GROUP 09	56,065.74	SY	$20.00	$1,121,314.80
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	9,250.85	TN	$100.00	$925,085.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	2,242.63	TN	$120.00	$269,115.60

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	494.44	TN	$100.00	$49,444.00
	Comment: 5% Contingency				
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	119.86	TN	$120.00	$14,383.20
	Comment: 5% Contingency				
536-1-0	GUARDRAIL- ROADWAY, GEN/LS TL-2	100.00	LF	$18.00	$1,800.00
536-73	GUARDRAIL REMOVAL	120.00	LF	$2.83	$339.60
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	2.00	EA	$2,932.89	$5,865.78
710-11-170	PAINTED PAVT MARK,STD,WHITE, ARROWS	52.00	EA	$29.02	$1,509.04
711-11-170	THERMOPLASTIC, STD, WHITE, ARROW	52.00	EA	$71.30	$3,707.60

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	667.00	EA	$3.25	$2,167.75
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	13.18	GM	$950.00	$12,521.00
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	6.59	GM	$385.34	$2,539.39

Roadway Component Total $2,756,511.00

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	12.25 / 12.25
Total Outside Shoulder Perf. Turf Width L/R	5.00 / 5.00
Sidewalk Width L/R	5.00 / 5.00

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-10	CONCRETE CURB & GUTTER, TYPE F	8,699.86	LF	$20.00	$173,997.20
520-1-10	CONCRETE CURB & GUTTER, TYPE F	8,699.86	LF	$20.00	$173,997.20

522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	9,666.51	SY	$40.00	$386,660.40
570-1-1	PERFORMANCE TURF	9,666.51	SY	$3.25	$31,416.16

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	17,399.71	LF	$1.45	$25,229.58
104-11	FLOATING TURBIDITY BARRIER	411.92	LF	$15.00	$6,178.80
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	411.92	LF	$6.50	$2,677.48
104-15	SOIL TRACKING PREVENTION DEVICE	2.00	EA	$2,500.00	$5,000.00
104-18	INLET PROTECTION SYSTEM	85.00	EA	$95.00	$8,075.00
	Shoulder Component Total				$813,231.82

MEDIAN COMPONENT

User Input Data

Description	Value
Total Median Width	22.00
Performance Turf Width	10.81

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	17,399.71	LF	$17.00	$295,795.07
570-1-1	PERFORMANCE TURF	10,449.49	SY	$3.25	$33,960.84
	Median Component Total				$329,755.91

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	29.66	CY	$1,898.93	$56,322.26
425-1-351	INLETS, CURB, TYPE P-5, <10'	60.00	EA	$5,327.57	$319,654.20
425-1-451	INLETS, CURB, TYPE J-5, <10'	17.00	EA	$7,680.00	$130,560.00
425-1-521	INLETS, DT BOT, TYPE C, <10'	9.00	EA	$3,919.96	$35,279.64
425-2-41	MANHOLES, P-7, <10'	9.00	EA	$3,755.26	$33,797.34
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	4,360.00	LF	$70.00	$305,200.00
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	392.00	LF	$120.00	$47,040.00
430-175-148	PIPE CULV, OPT MATL, ROUND, 48"S/CD	8,240.00	LF	$185.00	$1,524,400.00
570-1-1	PERFORMANCE TURF	500.90	SY	$3.25	$1,627.93

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
550-10-120	FENCING, TYPE A, 5.1-6.0, STANDARD	1,720.00	LF	$15.00	$25,800.00
	Comment: Pond fence				
550-60-222	FENCE GATE,TYP B, DBL, 6.1-12.0' OPENING	1.00	EA	$1,339.32	$1,339.32

Comment: Pond gate

Box Culvert 1

Description	Value
Size	Dbl. 12 x 12
Length	235.00
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-4-1	CONC CLASS IV, CULVERTS	853.15	CY	$2,000.00	$1,706,300.00
415-1-1	REINF STEEL- ROADWAY	126,064.00	LB	$0.90	$113,457.60

Box Culvert 2

Description	Value
Size	12 x 12
Length	235.00
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-4-1	CONC CLASS IV, CULVERTS	523.90	CY	$2,000.00	$1,047,800.00
415-1-1	REINF STEEL- ROADWAY	58,285.00	LB	$0.90	$52,456.50

Retention Basin 1

Description	Value
Size	1.5 AC
Multiplier	1
Depth	15.00
Description	Pond 2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.50	AC	$18,500.00	$27,750.00
120-1	REGULAR EXCAVATION	36,300.00	CY	$11.00	$399,300.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,898.93	$34,180.74
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,114.16	$4,114.16
425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$155.00	$8,680.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$297.35	$59,470.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	1,025.00	LF	$15.00	$15,375.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	7,260.00	SY	$3.25	$23,595.00

Drainage Component Total $5,985,111.86

INTERSECTIONS COMPONENT

Intersection 1

Description	Value
Mainline No. of Left Turn Lanes	1

Mainline No. of Right Turn Lanes		1
Mainline Design Speed		45
Cross Street Thru Lanes		3
Cross Street No. of Left Turn Lanes		1
Cross Street No. of Right Turn Lanes		0
Cross Street Design Speed		35
T-Intersection?		Y
Multiplier		1
Description	Stony Point Dr	

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.18	AC	$18,500.00	$21,830.00
120-1	REGULAR EXCAVATION	728.65	CY	$11.00	$8,015.15
160-4	TYPE B STABILIZATION	1,209.22	SY	$5.25	$6,348.41
160-4	TYPE B STABILIZATION	1,865.68	SY	$5.25	$9,794.82
285-709	OPTIONAL BASE,BASE GROUP 09	1,865.68	SY	$20.00	$37,313.60
285-709	OPTIONAL BASE,BASE GROUP 09	1,209.22	SY	$20.00	$24,184.40
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	307.84	TN	$100.00	$30,784.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	199.52	TN	$100.00	$19,952.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	48.37	TN	$120.00	$5,804.40
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	74.63	TN	$148.35	$11,071.36
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$17.00	$1,724.14
520-1-10	CONCRETE CURB & GUTTER, TYPE F	473.00	LF	$20.00	$9,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00	LF	$38.97	$7,599.15
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	262.78	SY	$40.00	$10,511.20
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94	SY	$50.00	$4,347.00
570-1-1	PERFORMANCE TURF	262.78	SY	$3.25	$854.04

Intersection 2

Description		Value
Mainline No. of Left Turn Lanes		1
Mainline No. of Right Turn Lanes		1
Mainline Design Speed		45
Cross Street Thru Lanes		2
Cross Street No. of Left Turn Lanes		0
Cross Street No. of Right Turn Lanes		0
Cross Street Design Speed		35
T-Intersection?		Y
Multiplier		1
Description	Mako Way	

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.70	AC	$18,500.00	$12,950.00
120-1	REGULAR EXCAVATION	317.44	CY	$11.00	$3,491.84
160-4	TYPE B STABILIZATION	1,179.89	SY	$5.25	$6,194.42
160-4	TYPE B STABILIZATION	812.79	SY	$5.25	$4,267.15
285-709	OPTIONAL BASE,BASE GROUP 09	812.79	SY	$20.00	$16,255.80

285-709	OPTIONAL BASE,BASE GROUP 09	1,179.89	SY	$20.00	$23,597.80
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	194.68	TN	$100.00	$19,468.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	134.11	TN	$100.00	$13,411.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	47.20	TN	$120.00	$5,664.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	32.51	TN	$148.35	$4,822.86
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$17.00	$1,724.14
520-1-10	CONCRETE CURB & GUTTER, TYPE F	273.00	LF	$20.00	$5,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	151.67	SY	$40.00	$6,066.80
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94	SY	$50.00	$4,347.00
570-1-1	PERFORMANCE TURF	151.67	SY	$3.25	$492.93

Intersection 3

Description	Value
Mainline No. of Left Turn Lanes	0
Mainline No. of Right Turn Lanes	1
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	0
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	Shark Blvd N

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.70	AC	$18,500.00	$12,950.00
120-1	REGULAR EXCAVATION	317.44	CY	$11.00	$3,491.84
160-4	TYPE B STABILIZATION	699.89	SY	$5.25	$3,674.42
160-4	TYPE B STABILIZATION	812.79	SY	$5.25	$4,267.15
285-709	OPTIONAL BASE,BASE GROUP 09	699.89	SY	$20.00	$13,997.80
285-709	OPTIONAL BASE,BASE GROUP 09	812.79	SY	$20.00	$16,255.80
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	115.48	TN	$100.00	$11,548.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	134.11	TN	$100.00	$13,411.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	28.00	TN	$120.00	$3,360.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	32.51	TN	$148.35	$4,822.86
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$17.00	$1,724.14
520-1-10	CONCRETE CURB & GUTTER, TYPE F	273.00	LF	$20.00	$5,460.00
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	151.67	SY	$40.00	$6,066.80
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94	SY	$50.00	$4,347.00
570-1-1	PERFORMANCE TURF	151.67	SY	$3.25	$492.93

Intersection 4

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	1
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	Shark Blvd S

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.18	AC	$18,500.00	$21,830.00
120-1	REGULAR EXCAVATION	592.48	CY	$11.00	$6,517.28
160-4	TYPE B STABILIZATION	1,209.22	SY	$5.25	$6,348.41
160-4	TYPE B STABILIZATION	1,517.01	SY	$5.25	$7,964.30
285-709	OPTIONAL BASE,BASE GROUP 09	1,209.22	SY	$20.00	$24,184.40
285-709	OPTIONAL BASE,BASE GROUP 09	1,517.01	SY	$20.00	$30,340.20
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	199.52	TN	$100.00	$19,952.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	250.31	TN	$100.00	$25,031.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	48.37	TN	$120.00	$5,804.40
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	60.68	TN	$148.35	$9,001.88
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$17.00	$1,724.14
520-1-10	CONCRETE CURB & GUTTER, TYPE F	473.00	LF	$20.00	$9,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00	LF	$38.97	$7,599.15
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	262.78	SY	$40.00	$10,511.20
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94	SY	$50.00	$4,347.00
570-1-1	PERFORMANCE TURF	262.78	SY	$3.25	$854.04

Intersection 5

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	87th Street

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.18	AC	$18,500.00	$21,830.00
120-1	REGULAR EXCAVATION	592.48	CY	$11.00	$6,517.28

160-4	TYPE B STABILIZATION	862.56	SY	$5.25	$4,528.44
160-4	TYPE B STABILIZATION	1,517.01	SY	$5.25	$7,964.30
285-709	OPTIONAL BASE,BASE GROUP 09	862.56	SY	$20.00	$17,251.20
285-709	OPTIONAL BASE,BASE GROUP 09	1,517.01	SY	$20.00	$30,340.20
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	142.32	TN	$100.00	$14,232.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	250.31	TN	$100.00	$25,031.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	34.50	TN	$120.00	$4,140.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	60.68	TN	$148.35	$9,001.88
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$17.00	$1,724.14
520-1-10	CONCRETE CURB & GUTTER, TYPE F	473.00	LF	$20.00	$9,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00	LF	$38.97	$7,599.15
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	262.78	SY	$40.00	$10,511.20
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94	SY	$50.00	$4,347.00
570-1-1	PERFORMANCE TURF	262.78	SY	$3.25	$854.04

Intersection 6

Description	Value
Mainline No. of Left Turn Lanes	1
Mainline No. of Right Turn Lanes	1
Mainline Design Speed	45
Cross Street Thru Lanes	4
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	1
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	Elem School

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.18	AC	$18,500.00	$21,830.00
120-1	REGULAR EXCAVATION	1,001.00	CY	$11.00	$11,011.00
160-4	TYPE B STABILIZATION	1,209.22	SY	$5.25	$6,348.41
160-4	TYPE B STABILIZATION	2,563.01	SY	$5.25	$13,455.80
285-709	OPTIONAL BASE,BASE GROUP 09	1,209.22	SY	$20.00	$24,184.40
285-709	OPTIONAL BASE,BASE GROUP 09	2,563.01	SY	$20.00	$51,260.20
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	199.52	TN	$100.00	$19,952.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	422.90	TN	$100.00	$42,290.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	48.37	TN	$120.00	$5,804.40
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	102.52	TN	$148.35	$15,208.84
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$17.00	$1,724.14
520-1-10	CONCRETE CURB & GUTTER, TYPE F	473.00	LF	$20.00	$9,460.00
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	335.00	LF	$38.97	$13,054.95

520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00 LF	$38.97	$7,599.15
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	262.78 SY	$40.00	$10,511.20
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94 SY	$50.00	$4,347.00
570-1-1	PERFORMANCE TURF	262.78 SY	$3.25	$854.04
	Intersections Component Total			$1,121,593.71

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	40.00	AS	$350.00	$14,000.00
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	4.00	AS	$1,160.31	$4,641.24
700-2-15	MULTI- POST SIGN, F&I GM, 51-100 SF	4.00	AS	$6,000.00	$24,000.00
700-2-16	MULTI- POST SIGN, F&I GM, 101-200 SF	4.00	AS	$8,901.23	$35,604.92
	Signing Component Total				$78,246.16

SIGNALIZATIONS COMPONENT

Signalization 1

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	CR 512 - Replaced due to impacts to SE and SW existing strain poles.

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00	LF	$7.00	$5,250.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00	LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,002.95	$5,002.95
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	16.00	EA	$600.00	$9,600.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$6.74	$404.40
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00	EA	$1,038.67	$1,038.67
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00	EA	$35,000.00	$140,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	12.00	AS	$980.90	$11,770.80
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00	AS	$646.49	$5,171.92
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00	EA	$215.92	$1,727.36
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00	EA	$259.47	$1,037.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM,	4.00	EA	$2,500.00	$10,000.00

UP TO 12 SF

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	1.00	EA	$8,039.24	$8,039.24
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00	EA	$6,000.00	$24,000.00
670-5-140	TRAF CNTL ASSEM, F&I, MODEL 2070	1.00	AS	$28,749.22	$28,749.22

Signalization 2

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	Hammerhead

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00	LF	$7.00	$5,250.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00	LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,002.95	$5,002.95
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	16.00	EA	$600.00	$9,600.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$6.74	$404.40
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00	EA	$1,038.67	$1,038.67
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	3.00	EA	$35,000.00	$105,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	7.00	AS	$980.90	$6,866.30
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	6.00	AS	$646.49	$3,878.94
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	6.00	EA	$215.92	$1,295.52
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00	EA	$259.47	$1,037.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	3.00	EA	$2,500.00	$7,500.00

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	1.00	EA	$8,039.24	$8,039.24
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	3.00	EA	$6,000.00	$18,000.00
670-5-140	TRAF CNTL ASSEM, F&I, MODEL 2070	1.00	AS	$28,749.22	$28,749.22

Signalization 3

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	87th Street

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00	LF	$7.00	$5,250.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00	LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,002.95	$5,002.95
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	16.00	EA	$600.00	$9,600.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$6.74	$404.40
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00	EA	$1,038.67	$1,038.67
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	3.00	EA	$35,000.00	$105,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	7.00	AS	$980.90	$6,866.30
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	6.00	AS	$646.49	$3,878.94
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	6.00	EA	$215.92	$1,295.52
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00	EA	$259.47	$1,037.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	3.00	EA	$2,500.00	$7,500.00

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	1.00	EA	$8,039.24	$8,039.24
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	3.00	EA	$6,000.00	$18,000.00
670-5-140	TRAF CNTL ASSEM, F&I, MODEL 2070	1.00	AS	$28,749.22	$28,749.22

Signalization 4

Description	Value
Type	4 Lane Mast Arm
Multiplier	1
Description	Elem School

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	750.00	LF	$7.00	$5,250.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	250.00	LF	$18.00	$4,500.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,002.95	$5,002.95
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	16.00	EA	$600.00	$9,600.00
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$1,946.92	$1,946.92
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$6.74	$404.40
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00	EA	$1,038.67	$1,038.67
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	3.00	EA	$35,000.00	$105,000.00
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	7.00	AS	$980.90	$6,866.30
653-1-11	PEDESTRIAN SIGNAL, F&I LED	6.00	AS	$646.49	$3,878.94

	COUNT, 1 WAY				
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	6.00	EA	$215.92	$1,295.52
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00	EA	$259.47	$1,037.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	3.00	EA	$2,500.00	$7,500.00

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	1.00	EA	$8,039.24	$8,039.24
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	3.00	EA	$6,000.00	$18,000.00
670-5-140	TRAF CNTL ASSEM, F&I, MODEL 2070	1.00	AS	$28,749.22	$28,749.22

Traffic Monitoring 1

Description	Value
Lanes	4
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	150.00	LF	$7.00	$1,050.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	40.00	LF	$18.00	$720.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	3.00	EA	$600.00	$1,800.00
741-1-11	TMS VEH SNSR-NON-WEIGHT, F&I, TYPE 1 IN	4.00	EA	$1,207.05	$4,828.20
745-70-12	TMS INDUCTIVE LOOP ASM, F&I, 2 LOOPS/LN	4.00	AS	$1,129.88	$4,519.52
746-71-122	TMS CAB, F&I,TYP III, POLE MOUNT, 2 BACK	1.00	EA	$3,223.96	$3,223.96
747-70-11	TMS MODEM, F&I	1.00	EA	$1,488.51	$1,488.51
	Signalizations Component Total				$900,199.67

LIGHTING COMPONENT

Conventional Lighting Subcomponent

Description	Value
Spacing	MIN

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	8,699.86	LF	$7.00	$60,899.02
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	1,726.79	LF	$18.00	$31,082.22
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	58.00	EA	$600.00	$34,800.00
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	31,774.25	LF	$2.00	$63,548.50
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	58.00	EA	$4,500.00	$261,000.00
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	58.00	EA	$1,240.46	$71,946.68
	Subcomponent Total				$523,276.42
	Lighting Component Total				$523,276.42

RETAINING WALLS COMPONENT

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
455-133-3	SHEET PILING STEEL, F&I PERMANENT	30,000.00	SF	$25.21	$756,300.00
	Comment: sheet piling along wetland				
521-8-2	CONC TRAF RAIL BAR,JCT SLAB,42"F SHAPE	1,200.00	LF	$288.18	$345,816.00
	Retaining Walls Component Total				$1,102,116.00

Sequence 1 Total $16,432,018.21

Sequence: 2 NDU - New Construction, Divided, Urban **Net Length:** 0.341 MI 1,800 LF

Description: FROM 86 AVE TO 82 AVE

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	100.00 / 70.00
Incidental Clearing and Grubbing Area	1.25
Alignment Number	1
Distance	0.530
Top of Structural Course For Begin Section	105.00
Top of Structural Course For End Section	105.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	6 to 1 / 6 to 1
Median Shoulder Cross Slope L/R	4.00 % / 4.00 %
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	7.03	AC	$18,500.00	$130,055.00
110-1-1	CLEARING & GRUBBING	1.25	AC	$18,500.00	$23,125.00
120-6	EMBANKMENT	68,776.38	CY	$11.00	$756,540.18
	Earthwork Component Total				$909,720.18

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	4
Roadway Pavement Width L/R	35.00 / 35.00
Structural Spread Rate	330
Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount

160-4	TYPE B STABILIZATION	16,063.57	SY	$5.25	$84,333.74
285-709	OPTIONAL BASE,BASE GROUP 09	13,999.63	SY	$20.00	$279,992.60
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	2,309.94	TN	$100.00	$230,994.00
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	559.99	TN	$120.00	$67,198.80

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	179.67	TN	$100.00	$17,967.00
	Comment: 5% contingency				
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	43.56	TN	$120.00	$5,227.20
	Comment: 5% contingency				
710-11-170	PAINTED PAVT MARK,STD,WHITE, ARROWS	3.00	EA	$29.02	$87.06
711-11-170	THERMOPLASTIC, STD, WHITE, ARROW	3.00	EA	$71.30	$213.90

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	138.00	EA	$3.25	$448.50
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	2.73	GM	$950.00	$2,593.50
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	1.36	GM	$385.34	$524.06
	Roadway Component Total				$689,580.36

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	15.00 / 15.00
Total Outside Shoulder Perf. Turf Width L/R	7.75 / 7.75
Sidewalk Width L/R	5.00 / 5.00

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	1,799.95	LF	$17.00	$30,599.15
520-1-7	CONCRETE CURB & GUTTER, TYPE E	1,799.95	LF	$17.00	$30,599.15
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	1,999.95	SY	$40.00	$79,998.00
570-1-1	PERFORMANCE TURF	3,099.92	SY	$3.25	$10,074.74

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
570-1-2	PERFORMANCE TURF, SOD	2,800.00	SY	$4.27	$11,956.00
	Comment: Area behind sidewalk on LT and RT				

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	3,599.90	LF	$1.01	$3,635.90
104-11	FLOATING TURBIDITY BARRIER	85.22	LF	$8.61	$733.74
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	85.22	LF	$3.51	$299.12
104-15	SOIL TRACKING PREVENTION DEVICE	1.00	EA	$2,564.03	$2,564.03
104-18	INLET PROTECTION SYSTEM	18.00	EA	$126.28	$2,273.04
107-1	LITTER REMOVAL	8.68	AC	$112.98	$980.67
107-2	MOWING	8.68	AC	$167.26	$1,451.82
	Shoulder Component Total				$175,165.36

MEDIAN COMPONENT

User Input Data

Description	Value
Total Median Width	22.00
Performance Turf Width	10.81

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	3,599.90	LF	$17.00	$61,198.30
570-1-1	PERFORMANCE TURF	2,161.94	SY	$3.25	$7,026.30
	Median Component Total				$68,224.60

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	6.14	CY	$1,898.93	$11,659.43
425-1-351	INLETS, CURB, TYPE P-5, <10'	13.00	EA	$5,327.57	$69,258.41
425-1-451	INLETS, CURB, TYPE J-5, <10'	4.00	EA	$7,680.00	$30,720.00
425-1-521	INLETS, DT BOT, TYPE C, <10'	2.00	EA	$3,919.96	$7,839.92
425-2-41	MANHOLES, P-7, <10'	2.00	EA	$3,755.26	$7,510.52
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	904.00	LF	$74.48	$67,329.92
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	88.00	LF	$182.35	$16,046.80
430-175-148	PIPE CULV, OPT MATL, ROUND, 48"S/CD	1,712.00	LF	$212.50	$363,800.00
570-1-1	PERFORMANCE TURF	103.63	SY	$3.74	$387.58

Retention Basin 1

Description	Value
Size	2 AC
Multiplier	1

Depth		6.00
Description	Pond 5	

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.00	AC	$18,500.00	$37,000.00
120-1	REGULAR EXCAVATION	19,360.00	CY	$11.00	$212,960.00
400-2-2	CONC CLASS II, ENDWALLS	18.00	CY	$1,898.93	$34,180.74
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,114.16	$4,114.16
425-2-71	MANHOLES, J-7, <10'	1.00	EA	$9,512.41	$9,512.41
430-175-142	PIPE CULV, OPT MATL, ROUND, 42"S/CD	56.00	LF	$155.00	$8,680.00
430-175-160	PIPE CULV, OPT MATL, ROUND, 60"S/CD	200.00	LF	$297.35	$59,470.00
550-10-220	FENCING, TYPE B, 5.1-6.0', STANDARD	1,180.00	LF	$15.00	$17,700.00
550-60-234	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN	1.00	EA	$2,099.76	$2,099.76
570-1-1	PERFORMANCE TURF	9,680.00	SY	$3.25	$31,460.00
	Drainage Component Total				$991,729.65

INTERSECTIONS COMPONENT

Intersection 1

Description	Value
Mainline No. of Left Turn Lanes	0
Mainline No. of Right Turn Lanes	0
Mainline Design Speed	45
Cross Street Thru Lanes	2
Cross Street No. of Left Turn Lanes	1
Cross Street No. of Right Turn Lanes	0
Cross Street Design Speed	35
T-Intersection?	Y
Multiplier	1
Description	86 ave

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.18	AC	$20,786.15	$24,527.66
120-1	REGULAR EXCAVATION	628.29	CY	$9.81	$6,163.52
160-4	TYPE B STABILIZATION	382.56	SY	$6.65	$2,544.02
160-4	TYPE B STABILIZATION	1,517.01	SY	$6.65	$10,088.12
285-709	OPTIONAL BASE,BASE GROUP 09	382.56	SY	$57.60	$22,035.46
285-709	OPTIONAL BASE,BASE GROUP 09	1,517.01	SY	$57.60	$87,379.78
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	63.12	TN	$93.00	$5,870.16
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	250.31	TN	$93.00	$23,278.83
337-7-43	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	15.30	TN	$113.28	$1,733.18
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	125.15	TN	$122.25	$15,299.59
520-1-7	CONCRETE CURB & GUTTER, TYPE E	101.42	LF	$28.95	$2,936.11
520-1-10	CONCRETE CURB & GUTTER,	473.00	LF	$45.14	$21,351.22

	TYPE F			
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	195.00 LF	$40.01	$7,801.95
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	262.78 SY	$47.45	$12,468.91
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	86.94 SY	$56.53	$4,914.72
570-1-1	PERFORMANCE TURF	262.78 SY	$3.74	$982.80
	Intersections Component Total			$249,376.03

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	9.00	AS	$430.20	$3,871.80
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	1.00	AS	$1,160.31	$1,160.31
700-2-15	MULTI- POST SIGN, F&I GM, 51-100 SF	1.00	AS	$5,776.33	$5,776.33
700-2-16	MULTI- POST SIGN, F&I GM, 101-200 SF	1.00	AS	$8,904.15	$8,904.15
	Signing Component Total				$19,712.59

SIGNALIZATIONS COMPONENT

Traffic Monitoring 1

Description	Value
Lanes	4
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	150.00	LF	$7.00	$1,050.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	40.00	LF	$18.00	$720.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	3.00	EA	$600.00	$1,800.00
741-1-11	TMS VEH SNSR-NON-WEIGHT, F&I, TYPE 1 IN	4.00	EA	$1,207.05	$4,828.20
745-70-12	TMS INDUCTIVE LOOP ASM, F&I, 2 LOOPS/LN	4.00	AS	$1,129.88	$4,519.52
746-71-122	TMS CAB, F&I,TYP III, POLE MOUNT, 2 BACK	1.00	EA	$3,223.96	$3,223.96
747-70-11	TMS MODEM, F&I	1.00	EA	$1,488.51	$1,488.51
	Signalizations Component Total				$17,630.19

LIGHTING COMPONENT

Conventional Lighting Subcomponent

Description	Value
Spacing	MIN

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	1,799.95	LF	$6.85	$12,329.66
630-2-12	CONDUIT, F& I, DIRECTIONAL	357.26	LF	$17.41	$6,219.90

	BORE			
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	12.00 EA	$653.50	$7,842.00
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	6,573.92 LF	$1.69	$11,109.92
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	12.00 EA	$5,665.14	$67,981.68
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	12.00 EA	$1,240.46	$14,885.52
	Subcomponent Total			$120,368.68
	Lighting Component Total			$120,368.68

Sequence 2 Total $3,241,507.64

Date: 12/28/2018 9:33:12 AM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 405606-4-52-01 **Letting Date:** 01/2099

Description: CR-510/85TH ST FROM CR-512 TO 82ND AVE

District: 04 **County:** 88 INDIAN RIVER **Market Area:** 11 **Units:** English

Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 2.200 MI

Project Manager: FORMOSO

Version 2 Project Grand Total **$23,493,548.70**

Description: CR 510 from CR 512 to 1000' west of 82 Avenue

Project Sequences Subtotal			**$19,673,525.85**
102-1	Maintenance of Traffic *	10.00 %	$1,967,352.58
101-1	Mobilization *	8.00 %	$1,731,270.27
Project Sequences Total			**$23,372,148.70**
Project Unknowns		0.00 %	$0.00
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-16	PARTNERING (DO NOT BID)	2.00	LS	$6,000.00	$12,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$50,000.00	$50,000.00
999-20	DISPUTES REVIEW BOARD (DO NOT BID)	18	DA	$3,300.00	$59,400.00
Project Non-Bid Subtotal					**$121,400.00**
Version 2 Project Grand Total					**$23,493,548.70**

*Note: Additional Maintenance of Traffic and Mobilization to reflect Canal Impacts

APPENDIX J – PUBLIC INVOLVEMENT

Public Involvement Plan

PUBLIC INVOLVEMENT PROGRAM

Project Name: County Road (C.R.) 510 Project Development and Environment (PD&E) Study

Project Limits: From C.R. 512 to 58th Avenue

County/State: Indian River County, Florida

Financial Project Number: 405606-2-22-02

Federal Aid Project Number: N/A

ETDM Number: 14233

In accordance with Part 1, Chapter 11 of the **Project Development and Environment (PD&E) Manual**, this Public Involvement Program is submitted to the District Planning and Environmental Management Office for review and approval.

Submitted by: Carlos Rodriguez, PE
Project Manager

Metric Engineering

Date: April 2016

Approved by: Gaspar Padron
FDOT District Four Public Involvement Coordinator

Date: 4/20/16

TABLE OF CONTENTS

INTRODUCTION 1

I. DESCRIPTION OF PROPOSED IMPROVEMENT 1

II. PROJECT BACKGROUND 3

III. PROJECT OBJECTIVE 3

IV. PROJECT NEED 4

V. IDENTIFICATION OF AGENCIES AND AFFECTED PUBLIC 7

FEDERAL, STATE, REGIONAL AND LOCAL AGENCIES 8

FEDERALLY RECOGNIZED NATIVE AMERICAN TRIBES 9

ETAT PRIMARY CONTACT LIST 9

LOCAL ELECTED AND APPOINTED OFFICIALS 11

VI. OUTREACH ACTIVITIES 15

NEWSPAPERS 15

ONLINE NEWS 15

TELEVISION 15

ONLINE COMMUNITY RESOURCES 15

SOCIAL MEDIA 15

OTHER METHODS 16

VII. COORDINATION WITH INDIAN RIVER COUNTY 19

VIII. ANALYSIS AND SUMMARY OF PUBLIC COMMENTS 19

IX. PUBLIC HEARING 19

PUBLIC HEARING SITE 19

PUBLIC ADVERTISEMENT 19

LETTERS OF INVITATION 20

HEARING PREPARATION 20

TRANSCRIPT 20

DOCUMENTS FOR PUBLIC REVIEW 21

TITLE VI AND RELATED STATUTES 21

ADA COMPLIANCE 21

X. PUBLIC HEARING FOLLOW-UP 21

XI. EVALUATION OF THE PUBLIC INVOLVEMENT PROGRAM 22

PUBLIC INVOLVEMENT PROGRAM

County Road (C.R.) 510
Project Development and Environment (PD&E) Study
From the intersection of C.R. 510 and C.R. 512 to C.R. 510 and 58th Avenue
Indian River County, Florida

This Public Involvement Program (PIP) is a living document. The comments and contact lists provided will be continuously updated during the Project Development and Environment (PD&E) Study. In accordance with Part 1, Chapter 11 (updated 12/29/2015) of the Florida Department of Transportation's Project Development and Environment (PD&E) Manual, this Public Involvement Program reflects the most recent updates and is submitted to the Florida Department of Transportation, Environmental Management Office (EMO) for review and approval.

I. DESCRIPTION OF PROPOSED IMPROVEMENT

Financial Project Number:	40566-2-22-02
Federal Aid Project Number:	N/A
Project Limits:	From C.R. 512 to 58th Avenue
Proposed Activity:	Project Development and Environment (PD&E) Study
Class of Action:	Type 2 Categorical Exclusion (CE)
ETDM Number:	14233

FIGURE 1- LOCATION MAP



Project Development and Environment (PD&E) Study
County Road (C.R.) 510
From the intersection of C.R. 510 and C.R. 512 to C.R. 510 and 58th Avenue
Public Involvement Program

Project Contact Information

For additional information regarding this project contact:

Maria Formoso, PE
Project Manager
Florida Department of Transportation
District Four
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309
(954) 777-4677
maria.formoso@dot.state.fl.us

Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering
13940 SW 136 Street
Miami, FL 33186
(305) 235-5098
crodriguez@metriceng.com

II. PROJECT BACKGROUND

The subject project is located just west and south of Sebastian, a city in Indian River County, Florida. This area is within the northern part of Florida's Treasure Coast, so named after the discovery of treasure from the 1715 Spanish Treasure Fleet, lost in a hurricane near the Sebastian Inlet.

The project entails the investigation of widening a segment of County Road (C.R.) 510 from two to four lanes extending from C.R. 512 (Sebastian Boulevard) to 58th Avenue for a total distance of 5.3 miles. C.R. 510 links the local community of Wabasso to C.R. 512 (Sebastian Boulevard), the main east-west arterial serving Sebastian. The project corridor is generally rural in nature and includes a mixture of agricultural, educational, commercial, industrial and residential facilities.

C.R. 510 is owned and maintained by Indian River County and is functionally classified as an urban principal arterial. The proposed project will provide additional capacity to meet the future traffic needs resulting from projected population and employment growth within the projected area expected as a result of various residential development. The Indian River County Metropolitan Planning Organization (MPO) has identified C.R. 510 in their 2035 Long Range Transportation Plan (LRTP) initial roadway needs plan alternative projects, cost feasible plan as a "Core Project" and in their Transportation Improvement Program (TIP).

III. PROJECT OBJECTIVE

This project consists improving capacity on C.R. 510 from C.R. 512 to 58th Avenue, in Indian River County (IRC), Florida, in order to achieve an acceptable Level of Service (LOS) on the facility in the future condition. While the roadway currently operates at an acceptable LOS, conditions will deteriorate below

acceptable standards if no improvement occurs by 2035, as the roadway will have insufficient capacity to accommodate the project travel demand.

IV. PROJECT NEED

It is important to note that this roadway is deemed deficient in the Indian River County 2035 Long Range Transportation Plan (LRTP) based on the projected 2035 AADT volumes derived from the Greater Treasure Coast Regional Planning Model for the Grid Densification Roadway Needs Plan Alternative. The results of the analysis revealed that portions of the project segment are expected to have volume to capacity ratio (V/C) rations of 1.0 - 1.2 and above 1.2. Roadways are deemed deficient if the volume to capacity (V/C) ratio exceeds 0.9. As such, this segment of C.R. 510 will experience congestion by 2035 if additional improvements are not made. Overall, the proposed improvement is anticipated to allow C.R. 510 to continue to serve as a critical arterial in facilitating the west-east movement of local and regional traffic (including truck traffic) as it traverses Indian River County connecting C.R. 512 to S.R. A1A on the barrier island. The increased capacity on C.R. 510 is intended to improve traffic operations along the corridor and enhance access to targeted areas of growth within the county.

There are three bridge structures (880047, 880063, 880044), one at M.P. 1.276 - 1.284, one at M.P. 2.226 - M.P. 2.240, one at M.P. 2.726 - M.P. 2.735. The project is 4.270 miles in length and the acquisition of some right-of-way is anticipated. C.R. 510 is owned and maintained by Indian River County. According to the adopted Indian River County Comprehensive Plan, C.R. 510 is classified as an Urban Principal Arterial and is critical in facilitating the west-east movement of traffic in Indian River County. It connects Interstate 95 (I-95) to S.R. A1A. This roadway additionally provides access to commercial, educational, residential and agricultural uses. According to the Indian River County 2035 Long Range Transportation Plan (LRTP), the project is anticipated to cost $29,068,307, of which the great majority will be Federally-funded dollars. C.R. 510 from C.R. 512/85th St. to 58th Ave. is identified as a cost-feasible project in the Indian River County 2035 LRTP. The project is identified within the Indian River County Metropolitan Planning Organization's (MPO) FY2015/2016 - FY2019/2020 Draft Transportation Improvement Program (TIP).

C.R. 510 is designated as an emergency evacuation route by both the Florida Division of Emergency Management and Indian River County. By increasing capacity, the improvement on C.R. 510 is anticipated to enhance emergency evacuation and response times by:
- Improving access to other emergency evacuation routes designated by the Florida Division of Emergency Management (C.R. 510, C.R. 512, and I-95); and
- Increasing the number of residents from the coastal communities of eastern Indian River County that can be evacuated during an emergency event.

The project is also identified within the Indian River County Metropolitan Planning Organization's (MPO) FY 2015/2016 -FY 2019/20 Transportation Improvement Program (TIP). It should additionally be noted that $2,092,063 is programmed for the Project Development and Environment (PD&E) Study in 2016 and $2,211,838 is programmed for the Preliminary Engineering phase in 2019 within the 2016-2020 FDOT Work Program.

As the Indian River County 2035 LRTP Infill Alternative Land Use scenario matures along the C.R. 510 corridor encouraging higher densities and mixed-use development, premium transit service will be

considered on C.R. 510 to serve and connect the transit-supportive land uses. Sidewalks are additionally anticipated as part of the widening as the corridor is intended to provide for adequate multi-modal facilities. While paved shoulders are currently present, they are also anticipated to be maintained as part of the project. Overall, the project is expected to accommodate multi-modal facilities and enhance corridor access for transit users, bicyclists, and pedestrians.

The logical termini begin at the signalized intersection of C.R. 512/85th St. and terminate at the signalized intersection of 58th Avenue. C.R. 510 is designated as an emergency evacuation route by both the Florida Division of Emergency Management and Indian River County. By increasing capacity, the improvement on C.R. 510 is anticipated to enhance emergency evacuation and response times.

The primary need for additional capacity on of C.R. 510 from C.R. 512/85th St. to 58th Avenue is in order to achieve an acceptable Level of Service (LOS) on the facility in the future condition. While the roadway currently operates at an acceptable LOS, conditions will deteriorate below acceptable standards if no improvement occurs by 2035, as the roadway will have insufficient capacity to accommodate the project travel demand. The need for the project is based on the following primary and secondary criteria.

PRIMARY CRITERIA

CAPACITY/TRANSPORTATION DEMAND: Improve Traffic Operations (LOS and Volume to Capacity Ratio)
This project is anticipated to improve traffic operations along C.R. 510 by increasing operational capacity to meet the future travel demand projected as a result of Indian River County population and employment growth. The existing and future traffic conditions for the project corridor are as follows:

Existing Conditions
2014 AADT: 9,800
2014 Truck AADT: 5.3% (520 trucks per day)
LOS (2 Lanes): C or better

Future Conditions
-No Build-
2034 AADT: 20,000
2034 Truck AADT: 5.3% (1060 trucks per day)
LOS (2 Lanes): F

-4 Lanes-
2034 AADT: 20,000
2034 Truck AADT: 5.3% (1060 trucks per day)
LOS (4 Lanes): B

It is important to note that this roadway is deemed deficient in the Indian River County 2035 Long Range Transportation Plan (LRTP) based on the projected 2035 AADT volumes derived from the Greater Treasure Coast Regional Planning Model for the Grid Densification Roadway Needs Plan Alternative. The results of the analysis revealed that portions of the project segment are expected to have volume to capacity ratio (V/C) rations of 1.0 - 1.2 and above 1.2. Roadways are deemed deficient if the volume to

capacity (V/C) ratio exceeds 0.9. As such, this segment of C.R. 510 will experience congestion by 2035 if additional improvements are not made.

Overall, the proposed improvement is anticipated to allow C.R. 510 to continue to serve as a critical arterial in facilitating the west-east movement of local and regional traffic (including truck traffic) as it traverses Indian River County connecting C.R. 512 to S.R. A1A on the barrier island. The increased capacity on C.R. 510 is intended to improve traffic operations along the corridor and enhance access to targeted areas of growth within the county.

SECONDARY CRITERIA

MODAL INTERRELATIONSHIPS: Enhance Transit, Pedestrian, and Bicycle Access

As the Indian River County 2034 LRTP Infill Alternative Land Use scenario matures along the C.R. 510 corridor encouraging higher densities and mixed-use development, premium transit service will be considered on C.R. 510 to serve and connect the transit-supportive land uses. Sidewalks are additionally anticipated as part of the widening as the corridor is intended to provide for adequate multi-modal facilities. While paved shoulders are currently present, they are also anticipated to be maintained as part of the project. Overall, the project is expected to accommodate multi-modal facilities and enhance corridor access for transit users, bicyclists, and pedestrians.

Transportation Demand

The population of Indian River County is projected to increase from 155,000 in year 2004 to 209,000 in year 2034, with a steady 1.72% annual growth rate (Source: Bureau of Economic and Business Research.) As the population of the county increases, developments in the county will continue to grow thereby increasing the amount of traffic on the roads.

Employment is projected to grow from 54,429 in 2005 to 69,508 in 2034. Based on the socioeconomic characteristics of the Indian River County 2034 LRTP Infill Alternative Land Use scenario,

- Population within the proximate Traffic Analysis Zones (TAZs) is projected to grow from 88,520 in 2014 to 137,753 in 2034 (1.49% annual growth rate).
- Employment within the proximate TAZs is projected to increase from 41,507 in 2005 to 61,941 in 2034 (1.34% annual growth rate).

Further, 2 Planned Unit Developments and 0 approved Developments of Regional Impact are present along the corridor.

System Linkage

The proposed capacity improvements to C.R. 510 will help improve connectivity within the roadway network by enhancing mobility to the C.R. 510 corridor. Enhancing mobility in this area will provide an additional route and improve the movement of people, goods and services to and from Indian River County.

Plan Consistency

C.R. 510 from C.R. 512/85th St. to 58th Ave. is identified as a cost-feasible project, not currently funded for construction in the Indian River County 2035 LRTP. The project is also identified within the Indian River County Metropolitan Planning Organization's (MPO) Transportation Improvement Program (TIP). It

should additionally be noted that $2,092,063 is programmed for the Project Development and Environment (PD&E) Study in 2016 and $2,211,838 is programmed for the Preliminary Engineering phase in 2017 within the FDOT Work Program.

Social Demands & Economic Development

Enhance Emergency Evacuation and Response Times

C.R. 510 is designated as an emergency evacuation route by both the Florida Division of Emergency Management and Indian River County. By increasing capacity, the improvement on C.R. 510 is anticipated to enhance emergency evacuation and response times by:

- Improving access to other emergency evacuation routes designated by the Florida Division of Emergency Management (C.R. 510, C.R. 512, and I-95); and
- Increasing the number of residents from the coastal communities of eastern Indian River County that can be evacuated during an emergency event.

The population of Indian River County is projected to increase from 155,000 in year 2004 to 209,000 in year 2034, with a steady 1.72% annual growth rate (Source: Bureau of Economic and Business Research.) As the population of the county increases, developments in the county will continue to grow thereby increasing the amount of traffic on the roads.

Employment is projected to grow from 54,429 in 2005 to 69,508 in 2034.

Economic Development: Currently, the land around the proposed project is mainly agricultural and industrial. A review on satellite view illustrated green space and undisturbed land with a low density residential land use area in the northern part of the proposed project. Within the proposed project are two major employers; i.e., a Publix Supermarket and a Winn-Dixie. There are also two churches and five (5) parks. The North Indian River County Library is identified as a cultural facility. The median household income of the Sebastian South community is $53,750, above the countywide median household income of $47,341.

The 2035 Indian River County LRTP Public Process and Land Use Vision Plan identified land uses centered on an "infill and clustered" development pattern. The future land use plan included the following focus growth areas:

- Downtown districts
- Neighborhood commercial districts
- Neighborhood infill development districts
- US 1 development corridor
- Regional workplace districts
- Airport workplace districts
- Fellsmere Annex

V. IDENTIFICATION OF AGENCIES AND AFFECTED PUBLIC

The following local, regional, state, and federal agencies having a concern in this project due to jurisdictional review or expressed interest have been identified and will be contacted directly by FDOT through the Advance Notification (AN) process at the outset of the project in accordance with the PD&E

Manual, Part 1, Chapter 3, Advance Notification. As other concerned public agencies are identified throughout the study, they also will be listed and contacted.

**Receive hardcopy notification*

State:

Florida Department of Agriculture and Consumer Services –
Mr. Steve Bohl
Florida Department of Environmental Protection –
Mr. Chris Stahl, Clearinghouse Coordinator
Ms. Suzanne E. Ray
Florida Department of State, State Historic Preservation
Ms. Alyssa McManus, Architectural Historian
Mr. Daniel McClarnon, Archaeologist
Ms. Ginny Leigh Jones, Architectural Historian
Mr. Timothy Parsons, Division Director
Florida Fish and Wildlife Conservation Commission –
Ms. Jennifer Goff
Mr. Scott Sanders
Florida Department of Transportation –
Ms. Ann Broadwell, District Four
Mr. Ken Morefield, Manager, State Environmental Management Office
Mr. Peter McGilvray, Project Screening and Technologies Administrator
Florida Department of Economic Opportunity
Mr. Adam Biblo
Mr. Matt Preston

Federal:

Federal Highway Administration –
Mr. Buddy Cunill, Native American Coordinator
Ms. Cathy Kendall, Senior Environmental Specialist
Mr. Joseph Sullivan, Environmental Specialist
Mr. Luis D. Lopez, P.E., Senior Environmental Specialist
U.S. Army Corps of Engineers – Field Office
Mr. Andrew Kizlauskas
Ms. Deborah L. Wegmann
Mr. Michael Ornella
Mr. Randy Turner
Ms. Tarrie Ostrofsky
Mr. Robert B. Barron
U.S. Department of Commerce – NOAA National Marine Fisheries,
Mr. Brandon Howard, Fishery Biologist
U.S. Environmental Protection Agency –
Ms. Kim Gates
Ms. Amanetta Somerville
Ms. Beth Walls
Ms. Madolyn Sanchez
U.S. Department of the Interior – U.S. Fish and Wildlife Service,

Mr. John Wrublik
U.S. Department of the Interior – National Park Service
Ms. Ellen Rankin, Historian
U.S. Coast Guard
Mr. Darayl Tompkins
Mr. Randall D. Overton

Regional:
Indian River Chamber of Commerce
Ms. Penny Chandler
Treasure Coast Regional Planning Council
Mr. Michael J. Busha, Executive Director
Ms. Stephanie Heidt, Intergovernmental/Brownfields Coordinator
Indian River County Metropolitan Planning Organization – MPO Chairman
Mr. Phil Matson, Director
St. Johns River Water Management District
Mr. John Juilianna, Regulatory Coordinator
Mr. Eric Muldowney, Senior Regulatory Scientist
Mr. Nathan Ottoson, Professional Engineer

Native American Tribes:
Poarch Band of Creek Indians –
The Honorable Ms. Stephanie A. Bryan, Tribal Chair*
Mr. Robert Thrower, Acting Tribal Historic Preservation Officer
Muscogee (Creek) Nation –
The Honorable Mr. James Floyd, Chief Elect*
Historic and Cultural Preservation Department (notification to be sent via email)
Seminole Tribe of Florida –
The Honorable Mr. James E. Billie, Chairman*
Mr. Paul N. Backhouse, Ph.D, Tribal Historic Preservation Officer*
Ms. Anne H. Mullins, MCRP, Compliance Review Supervisor*
Miccosukee Tribe of Indians of Florida –
The Honorable Mr. Billy Cypress, Chairman*
Mr. Fred Dayhoff, Section 106 & NAGPRA Coordinator*
Seminole Nation of Oklahoma –
The Honorable Mr. Leonard Harjo, Principal Chief*
Ms. Natalie Harjo, Tribal Historic Preservation Officer*

ETAT Primary Contact List:

Seminole Tribe of Florida
Ms. Alison Swing
Mr. Paul N. Backhouse
Florida Department of State
Ms. Alyssa McManus
Mr. Daniel McClarnon

Ms. Ginny Leigh Jones
Mr. Timothy Parsons

Federal Transit Administration
Mr. Andres Ramirez
Ms. Jennifer Hibbert
Mr. Stan Mitchell

US Army Corps of Engineers
Mr. Andrew Kizlauskas
Ms. Deborah L. Wegmann
Mr. Michael Ornella
Mr. Randy Turner
Ms. Tarrie Ostrofsky
Mr. Robert B. Barron

National Park Service
Ms. Anita Barnett

Federal Highway Administration
Mr. Buddy Cunill
Ms. Cathy Kendall
Mr. Joseph Sullivan
Mr. Luis D. Lopez, P.E.

National Marine Fisheries Service
Mr. Brandon Howard

US Environmental Protection Agency
Ms. Kim Gates
Ms. Amanetta Somerville
Ms. Beth Walls
Ms. Madolyn Sanchez

Florida Department of Environmental Protection
Mr. Chris Stahl
Ms. Suzanne E. Ray

Florida Department of Economic Opportunity
Mr. Adam Biblo
Mr. Matt Preston

US Coast Guard
Mr. Darayl Tompkins
Mr. Randall D. Overton

Saint Johns River Water Management District
Mr. Eric Muldowney
Mr. John Juilianna
Mr. Nathan Ottoson

Florida Fish and Wildlife Conservation Commission
Ms. Jennifer Goff
Mr. Scott Sanders

US Fish and Wildlife Service
Mr. John Wrublik

Natural Resources Conservation Service

Mr. Rick Allen Robbins
Florida Department of Agriculture and Consumer Services
Mr. Steve Bohl
Florida Department of Transportation
Mr. Peter McGilvray

Local Elected and Appointed Officials:

Federal Delegation:

The Honorable Bill Nelson	U. S. Senator
The Honorable Marco Rubio	U. S. Senator
The Honorable Bill Posey	U.S. Representative, District 8

State Delegation:

Florida State Senators for Local Districts:

The Honorable Joe Negron	District 32
The Honorable Thad Altman	District 16

Florida State Representatives for Local Districts:

The Honorable Debbie Mayfield	District 54

Indian River County:

Mr. Joseph A. Baird	County Administrator
Mr. Wesley S. Davis	Commissioner, District 1
Mr. Joseph Flescher	Vice-Chairman, District 2
Mr. Jeffrey R. Smith	Clerk of the Circuit Court
Mr. Vincent Burke	Utilities Director
Mr. Chris Mora	Public Works Director
Mr. Richard Szpyrka	Interim County Engineer
Ms. Kimberly Graham	County Traffic Engineer
Mr. Deryl Loar	County Sheriff
Mr. William Michel	Fire Rescue Battalion Chief A Shift 1
Mr. Mark Daniels	Fire Rescue Battalion Chief B Shift 1
Mr. Lonn Benham	Fire Rescue Battalion Chief C Shift 1
Dr. Mark J. Rendell	County Superintendent of Schools

City of Sebastian:

Mr. Joe Griffin	City Manager
Mr. Bob McPartlan	Mayor
Mr. Jerome Adams	Vice Mayor
Ms. Andrea B. Coy	Councilmember
Mr. Jim Hill	Councilmember
Mr. Richard H. Gillmor	Councilmember
Ms. Michelle Morris	Chief of Police
Mr. Frank Watanabe	Public Works Director/City Engineer
Ms. Marissa Moore, AICP	Community Development Director

The following local, state, and national public interest groups, organizations, and roadways having a direct or expressed interest in or relation to the project study have been identified and will be contacted by FDOT.

Historical:	Indian River County Historical Society
Cultural:	Nature Conservancy Sierra Club, Florida Chapter
Government/ Businesses:	Wabasso Foods RCMA Childrens House CDC
Agriculture:	Indian River Citrus League Indian River County Farm Bureau—Ms. Pauline Washington Indian River County Extension Office—Ms. Christine Kelly-Begazo
Airports:	Sebastian Municipal Airport Broocke Air Patch
Homeowner Associations/ Civic Groups:	West Wabasso Progressive Civic Club Vero Lake Estates Property Owners Sebastian River Landing Paladin Place II Homeowners Association Indian River Chamber of Commerce
Affected Communities:	Wabasso Vero Lake Estates

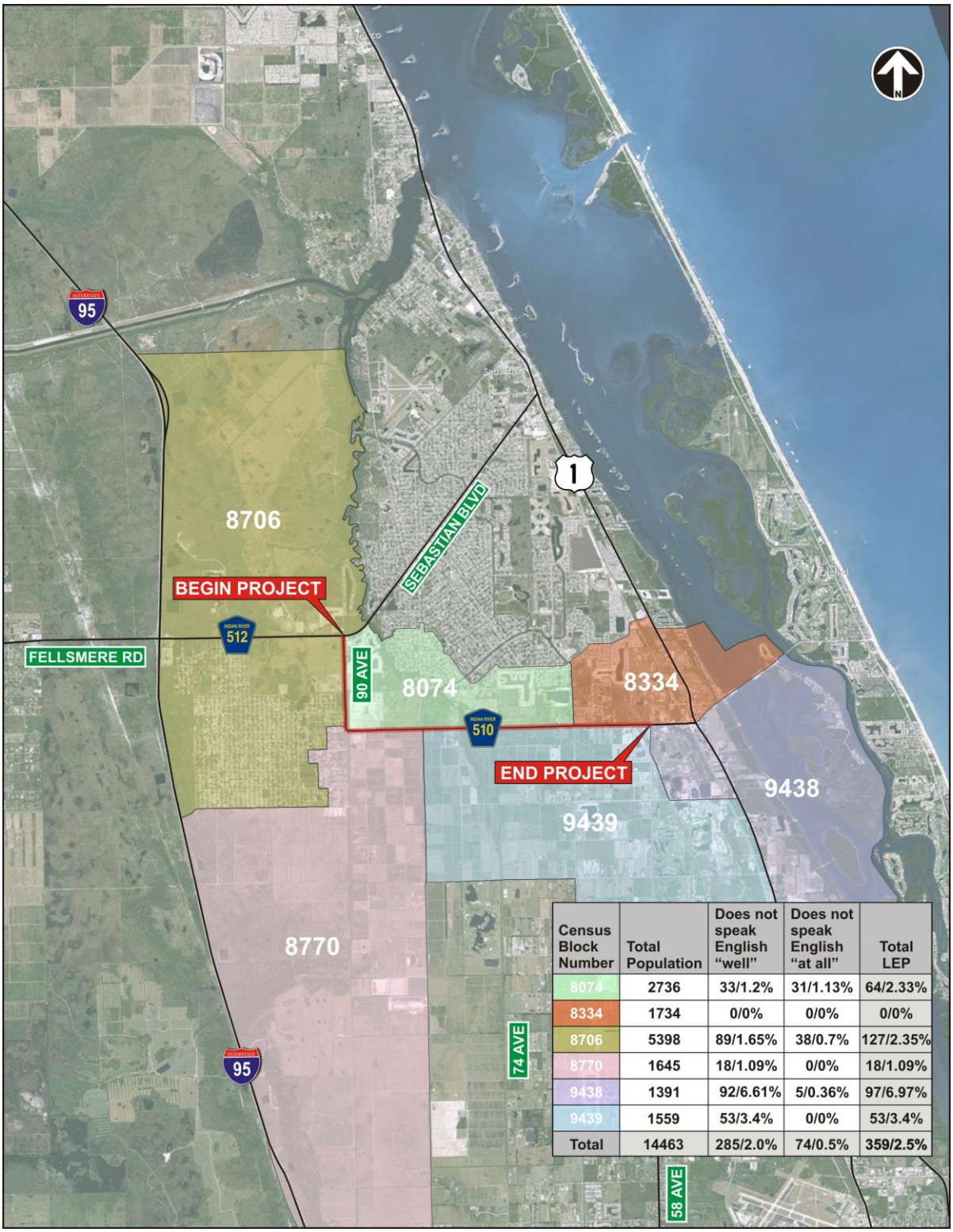
TITLE VI CIVIL RIGHTS ACTS

To ensure compliance with Title VI of the U.S. Civil Rights Act of 1964, and other related statutes, minority groups will be identified as an element of the concerned public. Figure 2 shows the census block groups within the study area with Limited English Proficiency (LEP) obtained from the 2010 census data. The LEP designation refers to the census block groups where more than five percent of the population has been identified as speaking English "not well" or "not at all." It identifies areas in the corridor that must be reached out to in Spanish prior to all public meetings and distribution of materials.

LIMITED ENGLISH PROFICIENCY

Informational materials, such as newsletters and fact sheets, will also be developed in English as well as advertisements of public meetings upon the Department's approval. An effort will be made to disseminate material to the community in accordance with the LEP guidelines as specified in Chapter 11 of the PD&E Manual to ultimately encourage and retrieve feedback on the project. Figure 2 shows the census block groups within the study area with Limited English Proficiency (LEP) obtained from the United States Census Bureau's American Community Survey (ACS) from 2007-2011. The LEP designation refers to the census block groups with more than five percent of the population has been identified as speaking English "not well" or "not at all." It identifies areas in the corridor that must be reached out to in Spanish prior to all public meetings and distribution of materials. There are six census Group Blocks that are near the project area. Of these six census blocks, only Group Block 9438 has an LEP of greater than 5% (see Figure 2 for more information). However, Group Block 9438 does not directly cover the project area as it is just southeast of the project limits. As shown in Figure 2, none of the census blocks along the project corridor have an LEP of greater than 5%. Therefore, LEP criteria are not applicable to this project.

FIGURE 2- LIMITED ENGLISH PROFICIENCY (LEP) MAP BY CENSUS BLOCK GROUP



Census Block Number	Total Population	Does not speak English "well"	Does not speak English "at all"	Total LEP
8074	2736	33/1.2%	31/1.13%	64/2.33%
8334	1734	0/0%	0/0%	0/0%
8706	5398	89/1.65%	38/0.7%	127/2.35%
8770	1645	18/1.09%	0/0%	18/1.09%
9438	1391	92/6.61%	5/0.36%	97/6.97%
9439	1559	53/3.4%	0/0%	53/3.4%
Total	14463	285/2.0%	74/0.5%	359/2.5%

VI. OUTREACH ACTIVITIES

The following techniques will be used to notify the public of the proposed improvement and to solicit public input into the project development process.

Newspaper:

- *Vero Beach Press Journal (Indian River Press Journal)*
  1801 US 1
  Vero Beach, FL 32963
  772-562-2315
  Scripps Treasure Coast Newspapers

Online News:

- *VeroNews.com*
  4855 North A1A
  Vero Beach, FL 32963
  772-492-9024
  info@veronews.com

- *Tcpalm.com*
  1939 S. Federal Highway
  P.O. Box 9009
  Stuart, FL 34994
  772-562-2315
  Scripps Interactive Newspaper Group

Optional, cost-effective outreach resources include:

Television:

- *WPTV Channel 5*
  1500 SE Monterey Road
  Stuart, FL 34996
  (772) 463-283-6080
  www.wptv.com

Social Media:

- FDOT District 4 Twitter, YouTube

Online Community Resources:

- *Indian River Chamber of Commerce Website*
  www.indianriverchamber.com
- *Indian River County Website*
  www.ircgov.com

- *City of Sebastian*
  www.cityofsebastian.org
- *Indian River County MPO*
  www.irmpo.com
- *West Wabasso Progressive Civic Club*
  https://www.facebook.com/W-Wabasso-Community-Center-1549600408698624/

In addition to working with the media, a number of different notification techniques will be used throughout the project development process. Aside from formal advertisements placed in *Vero Beach Press Journal* prior to any public meeting, press releases and other project notices may be sent to these publications to be included at the discretion of their editorial staffs. Additionally, project information will also be published on the websites of the Indian River MPO, Indian River Chamber of Commerce, and City of Sebastian to inform the public of the status of the study.

A brief description of all notification techniques is listed below.

Briefings with Local Officials: The project team will be available to hold briefings upon request with local elected officials who represent areas to be affected by this study, including Indian River County Administrator Joseph A. Baird and City of Sebastian City Manager Joe Griffin and Mayor Bob McPartlan to ensure a proper flow of information to constituents. Elected officials will be notified of all public meetings.

Letters/Newsletters: Invitational and informational letters and newsletters will be distributed to elected and appointed officials, property owners/tenants, business owners/operators, and interested parties prior to public meetings. It is anticipated that one (1) fact sheet and two (2) editions of a multicolor newsletter will be distributed for this study. A copy of the fact sheet will be distributed inviting residents and stakeholders to the Indian River County MPO Meeting, which will serve as the Elected and Appointed Official and Public Kick-Off Meeting for this project. Project newsletters will be distributed 21 days prior to the Alternatives Public Workshop and the Public Hearing. Notices may be hand-delivered to residences and businesses located directly along the project corridor as deemed necessary by FDOT. The West Wabasso Progressive Civic Club will also assist with the distribution of project information at churches and community events.

News/Press Releases: News/press releases will be submitted to the FDOT seven days prior to each public meeting and the Public Hearing.

Project Website: This project's website will be maintained by Metric Engineering upon review and approval by FDOT. The website will provide general and specific information on the project purpose, location, overview, schedule, meetings, documents and contact information. The project team will prepare information regularly for the website. The website address will be included in all public involvement materials. The public involvement manager may also utilize existing websites of local community organizations, including those mentioned above, and municipalities affected by the project and request that project information be added to their sites. This will serve as an additional resource of information for the community.

Public Notices/ Legal Display Ads: Public advertisement will consist of a legal display advertisement published in *Vero Beach Press Journal* once prior to the public meetings, twice prior to the Public Hearing, and once to announce Federal Location and Design Concept Acceptance (LDCA) at the end of the study. All public advertisements will include a translated statement directing interested persons to the designated Spanish-speaking contact. Proof of publication (electronic tearsheet and Affidavit of Publishing) will be obtained from the *Vero Beach Press Journal* and included in the project record. Additionally, an announcement of the public meeting will be published in the *Florida Administrative Register* at least 7 days prior to all public meetings, and will be posted on the FDOT Public Notices website.

Public Announcements: In order to distribute PD&E Study information, fliers will be made available to organizations including neighborhood/civic groups, FDOT and Indian River County to publish in existing newsletters and websites at the team's discretion. Any such correspondence will be coordinated with the District Public Information Office's approval.

Direct Mail List For Public Meetings: The following will be contacted by direct mail in order to obtain input throughout the project development process and/or in order to provide project information:

- Those whose property lies, in whole or part, within at least 300 feet on either side of the centerline of each project

alternative (Section 339.155 FS), as well as other local citizens who may be impacted by the construction of this project. This portion of the mailing list will be based on the Indian River County Property Appraiser's tax rolls.

- Local elected and appointed public officials or individuals who request to be placed on the mailing list for this project.

- Public and private groups, organizations, agencies, or businesses that request to be placed on the mailing list for this project.

Presentations to Local Officials:

Presentations will be given to local officials and agencies, including the Indian River County MPO, prior to public information meeting(s) and the Public Hearing to apprise local officials of the project status, specific location and design concepts, and to receive their comments. The project team will present the project to the Indian River County MPO and the public in lieu of the project Kick-Off meetings.

Public Information Meeting:

One Alternatives Public Workshop will be conducted, as required by the NEPA process, to present the project and conceptual alternatives being considered as well as to obtain comments from the general public. A news/press release will be submitted to the FDOT for distribution seven days prior to the Alternatives Public Workshop. Additionally, an announcement of the meeting will be published in the Florida Administrative Register at least 7 days prior to the Alternatives Public Workshop, and will be posted on the FDOT Public Notices website.

Public Hearing:

A formal Public Hearing, as required by Federal Regulations and State Law, will be held. A Spanish interpreter will be present at the Public Hearing if needed. A news/press release will be submitted to the FDOT seven days prior to the Alternatives Public Workshop. An announcement of the public meeting will be published in the Florida Administrative Register at least 7 days prior to the Public Hearing, and will be posted on the FDOT Public Notices website. Two ads will be placed and other NEPA Chapter 11 guidelines will be followed. For more details, please read *Section IX* of this plan.

Informal Meetings: In addition to the scheduled public meetings, there will be approximately six (6) unscheduled meetings with the public, elected and appointed officials, public agencies, or civic groups. The purpose of these meetings will be to apprise the attendees of the project status and specific location and design concepts as well as to receive input.

Public Outreach Activity Schedule:

VII. COORDINATION WITH INDIAN RIVER COUNTY

Copies of aerial maps depicting all alignment and design concepts under consideration, along with draft copies of engineering and environmental study documentation, will be furnished to the County Engineering staff for their review. Updated information will also be forwarded to the County prior to the scheduled Public Hearing for review and comment.

VIII. ANALYSIS AND SUMMARY OF PUBLIC COMMENTS

A Comments and Coordination Report will be developed to summarize the public meeting/workshop results and recommendations. The report also will contain the overall input provided through the other public involvement techniques utilized in the project development process. This report will be forwarded to the District Environmental Management Engineer.

All public involvement activities, meetings, minutes and correspondence will be documented in a timely manner, and this documentation will be maintained in the public involvement project binder. This binder will contain sections for elected/appointed officials, stakeholders, specific workshops, media coverage, and public comment, among others. It will be updated throughout the life of the project and duplicated as needed and determined by the Project Manager. At the conclusion of the study, an electronic version of the binder will be created in addition to all hard copies.

IX. PUBLIC HEARING

In compliance with the "Project Development and Environment Manual," 23 CFR 771 and Section 339.155, FS, a Public Hearing will be held.

Public Hearing Site: The Public Hearing will be held at an appropriate facility convenient to the study area.

Public Advertisement: A legal display advertisement will appear in the *Vero Beach Press Journal* twice (at least 21-30 days prior, with a second run 7-10 days prior to Public Hearing) as determined by the project team. This ad will feature a translated statement directing interested persons to the designated Spanish-speaking contact. Press releases and other project

notices may also be sent to these publications for inclusion at the discretion of their editorial staffs. Additionally, notices may be sent to the following websites: *Indian River Chamber of Commerce, Indian River County, City of Vero Beach and Indian River MPO* for potential distribution at the team's discretion.

Vero Beach Press Journal (Indian River Press Journal)
1801 US 1
Vero Beach, FL
772-562-2315

Indian River Chamber of Commerce Website
www.indianriverchamber.com

Indian River County Website
www.ircgov.com

City of Vero Beach
www.covb.com

Indian River MPO
www.irmpo.com

All advertisements to local newspapers will be sent via e-mail, return receipt requested.

In addition, an announcement of the Public Hearing will be published in the *Florida Administrative Register* at least 7 days prior to the Public Hearing, and will be posted on the FDOT Public Notices website.

Letters of Invitation: Letters will be mailed to all property owners as required by Section 339.155, FS and to local elected and appointed government officials notifying them of the upcoming Public Hearing. Notices may also be hand-delivered to residences and businesses located directly along the project corridor as deemed necessary by FDOT.

Hearing Preparation: A narrated PowerPoint or video presentation, conceptual design plans on aerial base mapping, display graphics and handouts will be prepared to supplement the oral Public Hearing presentation.

Transcript: A verbatim transcript of the Public Hearing will be compiled to include written comments received at the Hearing and written comments received within the established comment period after the Hearing. All Public Hearing documentation (handouts, presentation, graphics, etc.) will be included with the transcript.

Documents for Public Review:

Environmental and engineering reports to support PD&E study's evaluation will be available for public review at least 21 calendar days prior to the Public Hearing date at the North Indian River County Library and the Indian River County Administration Building.

Locations of Documents for Public Review:

A public notice will be provided in the Public Hearing advertisement and mailed along with invitational letters advising as to where the study documents will be located for public review. Documents include the Preliminary Engineering Report and other reports providing information regarding the alternatives analysis.

Suggested public review sites:

- North Indian River County Library
  1001 Sebastian Boulevard
  Sebastian, FL 32958
- Indian River County Administration Building
  1801 27th Street
  Vero Beach, FL 32960

Title VI and Related Statutes:

Information on the Title VI Program and the Relocation Assistance Program, which complies with Title VIII, will be provided during the Public Hearing in the presentation, by handout, signage and through available personnel.

Americans with Disabilities Act Compliance:

Notification of the Department's intent to comply with the Americans with Disabilities Act (ADA) will be provided in public advertisements for the Public Hearing, in invitational letters to property owners/tenants and local officials, in handouts and by the selection of a Public Hearing site that meets all requirements.

X. PUBLIC HEARING FOLLOW-UP

The following procedures will occur after the Public Hearing.

Responses:

Responses to all letters received as a result of the Hearing and questions and comments received at the Public Hearing will be made in writing.

Recommendation Notice:

A legal notice announcing the Federal Highway Administration's (FHWA's) approval of the final document and recommendations will be published in *The Vero Beach Press Journal*. In addition, news items

detailing the Department's recommendation(s) to FHWA will be provided to local media.

Public Hearing Transcript Package: A Transcript Package will be produced and submitted following the Public Hearing. The Transcript Package will include a verbatim Hearing transcript prepared by an approved court reporter, an errata sheet detailing any transcript discrepancies, a copy of all correspondence received by the Department as part of the Public Hearing record, and affidavits of publication for newspaper ads advertising the Hearing.

Public Involvement Summary Report: A *Public Involvement Summary Report* will be produced and submitted at the conclusion of the study in a bound booklet with a cover, containing, at a minimum, all documentation regarding public participation performed throughout the study period. This report shall include all comments and responses received from the public as well as Advance Notification, coordination with local officials and agencies, and public meetings, etc., the verbatim transcript from the Public Hearing, proof of publication of legal ads, sign-in sheets, Public Hearing certification, and all public correspondence. A summary of the *Public Involvement Summary Report* shall be included with the final engineering and environmental documents.

XI. EVALUATION OF THE PUBLIC INVOLVEMENT PROGRAM

A public involvement evaluation process will be developed to assess the effectiveness of the public involvement efforts utilized throughout the PD&E Study. This process will include identification of the public involvement tools, establishment of performance measures, performance evaluations, and identification of improvement strategies.

Minutes and Coordination

Summary of Meetings Held

Meeting	Date	Location
FDOT Team Kick Off	2/29/2016	FDOT District 4 - 3400 W Commercial Blvd, Ft. Lauderdale, FL 33309
West Wabasso Progressive Civic Club	3/22/2016	Daise Hope Center, 8445 64th Avenue, Vero Beach, FL 32967
West Wabasso Progressive Civic Club	4/4/2016	Daise Hope Center, 8445 64th Avenue, Vero Beach, FL 32967
Indian River County	4/18/2016	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Indian River County Typical Section	6/20/2016	Indian River county, 1801 27th Street, Vero Beach, FL 32960
FDOT Preliminary Alternatives	8/31/2016	FDOT District 4 - 3400 W Commercial Blvd, Ft. Lauderdale, FL 33309
Sebastian High School Typical Section	9/6/2016	9001 90th Ave, Sebastian FL 32958
Vero Lake Estate HOA Typical Section	9/6/2016	North IRC Library, 1001 Sebastian Boulevard, Sebastian FL 32958
West Wabasso Progressive Civic Club	9/6/2016	8586 64th Drive, Sebastian, FL 32967
Indian River County Alternatives	9/8/2016	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Alternatives Public Workshop	11/11/2016	North IRC Library, 1001 Sebastian Boulevard, Sebastian FL 32958
West Wabasso Progressive Civic Club	12/5/2016	Daise Hope Center, 8445 64th Avenue, Vero Beach, FL 32967
West Wabasso Progressive Civic Club	12/7/2016	Daise Hope Center, 8445 64th Avenue, Vero Beach, FL 32967
Indian River County	12/29/2016	Conference Call
Metropolitan Planning Organization	12/14/2016	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Indian River County	12/14/2016	Indian River county, 1801 27th Street, Vero Beach, FL 32960
IRC Typical Section Evaluation Meeting/Drainage	1/23/2017	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Pond Siting Meeting	1/30/2017	FDOT District 4 - 3400 W Commercial Blvd, Ft. Lauderdale, FL 33309
Indian River County Conservation Lands	2/23/2017	Indian River county, 1801 27th Street, Vero Beach, FL 32960
US Fish and Wildlife Service	2/23/2017	USFWS Vero Beach Headquarters
US Fish and Wildlife Service Conference Call	3/6/2017	Conference Call
US Fish and Wildlife Service Conference Call	3/15/2017	Conference Call
Metropolitan Planning Organization	3/24/2017	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Metropolitan Planning Organization	4/12/2017	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Sebastian River Improvement District	4/12/2017	1555 Indian River Drive, Suite B-125, Vero Beach, FL 32960
US Fish and Wildlife Service Scrub Jay	4/28/2017	Conference Call
West Wabasso Progressive Civic Club	5/18/2017	8586 64th Drive, Sebastian, FL 32967
Meeting with Thim and Jan Beach	5/18/2017	8496 75 Ct, Vero Beach, FL
US Fish and Wildlife Service Scrub Jay	5/19/2017	Conference Call
West Wabasso Progressive Civic Club	6/5/2017	Daise Hope Center, 8445 64th Avenue, Vero Beach, FL 32967
FDOT Review of Alternatives	6/19/2017	FDOT District 4 - 3400 W Commercial Blvd, Ft. Lauderdale, FL 33309
FDOT Review of Typical Section Package	7/28/2017	FDOT District 4 - 3400 W Commercial Blvd, Ft. Lauderdale, FL 33309
Metropolitan Planning Organization - TAC	9/29/2017	Indian River county, 1801 27th Street, Vero Beach, FL 32960
West Wabasso Progressive Civic Club	10/2/2017	8586 64th Drive, Sebastian, FL 32967
Vero Lake Estate HOA	10/2/2017	8446 93rd Avenue, Vero Beach, FL 32967
Metropolitan Planning Organization	10/11/2017	Indian River county, 1801 27th Street, Vero Beach, FL 32960
Public Hearing	TBD	TBD

Subject: Stakeholder Meeting with West Wabasso Progressive Civic Club
Client: Metric Engineering
Project: County Road (CR) 510 PD&E Study
Meeting Date: 3/ 22/ 16 Meeting Location: 8586 64th Drive, Sebastian, Florida - Wabasso Community

The following table identifies the meeting participants.

Name	Company/ Agency	Email
Ardra Rigby	West Wabasso Progressive Civic Club	Rigbyardra@gmail.com
Bill Rigby	West Wabasso Progressive Civic Club	Rigbybill12@gmail.com
Ervin Cartwright	West Wabasso Progressive Civic Club	ervncartwr@gmail.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Jorge Padron	FDOT District Four	Gaspar.Padron@dot.state.fl.us
Maria Formoso	FDOT District Four	Maria.Formoso@dot.state.fl.us
Alexandra Medina	MRG	amedina@mrgmiami.com

The purpose of this meeting was to introduce the CR 510 PD&E Study project team to the West Wabasso Progressive Civic Club, and to discuss the project background, community issues and planned approach.

- The meeting began with Carlos Rodriguez introducing the project team and emphasizing that the team wanted to meet with the West Wabasso Progressive Civic Club first to discuss the history of this project and to establish a working relationship with the local community.
- Mr. Ardra Rigby thanked the project team for coming to meet with them, and invited the team to participate in the West Wabasso Progressive Civic Club's monthly community meetings, which are held the first Monday of every month at 6:00 p.m.
- Mr. Ervin Cartwright and Mr. Bill Rigby provided the team with a history of the Wabasso community's relationship with Indian River County, and added that the community had been promised this road for over twenty years.
- Mr. Cartwright emphasized that the community wants respect from the County, and if homeowners need to surrender their homes, they want to be compensated with the fair market value of the property. He also asked that the project be completed at one time, and not by piece meal. Mr. Cartwright added that people in the community perceive the fact that they have not widened the road in the past as a racial issue. He explained that the previous project consisted of improvements from CR 512 to 66th Avenue, and from 58th Avenue to US-1 – completely bypassing the Wabasso community. He added that the community is concerned about the need for relief and do not want to wait another 10-15 years for this project to begin. They understand that the road widening is coming and they are in support as long as they are involved in the

decisions in the segment between 66th Avenue and 58th Avenue and they want fair market value for any land purchased. They want the community needs to be taken into consideration. They want to improve the community and not be negatively impacted by the road.
    - Mr. Ardra Rigby asked if the project will be built comprehensively. Mr. Rodriguez responded that the PD&E study looks at everything, including structures, roadway, drainage, and environmental issues, but stated that the project may be segmented for funding purposes in the future. He also explained that the traffic analysts forecast travel data up to the year 2040, in order to incorporate all projected future travel data into the roadway design.
- Mr. Bill Rigby said that the community had met with the Indian River County MPO in the past, and the MPO said that they would turn over the project to the State. Mr. Rodriguez clarified that the roadway will continue to be maintained by the County, but FDOT is conducting the study for the County and following the federal NEPA process to be able to receive funds to build the project. Mr. Rigby asked if the community can reach out to the federal government to express their needs and desires to get this road built. Mr. Rodriguez said that they absolutely could go to the federal government if they desired, but emphasized that all documents developed through this PD&E Study (including meeting minutes) will be sent to the federal government for review. The team encouraged the community to participate in the PD&E process and to record their concerns/desires in the project record.
- Mr. Cartwright brought up the fact that All Aboard Florida will be running trains along the railroad tracks near the community, and asked how the project team will be incorporating those plans into this project. Mr. Bill Rigby added that the present train schedule backs up traffic significantly, and that if more trains were scheduled to pass through, traffic could be a serious problem. Mr. Rodriguez said that the team is planning on meeting with the County, and will coordinate with them to make sure they take future travel demands into account.
    - Mr. Ardra Rigby noted that there are several safety concerns in regards to the railroad crossing, and asked if there is anything that could be done to improve safety at the railroad track. Mr. Rodriguez said that the County has a separate project east of 58th Street, which includes the railroad tracks.
- Mr. Bill Rigby asked how the team planned on widening the roadway without impacting his property. Maria Formoso visually showed him how the team will be considering several different typical section options depending on the area of CR 510 they are working on; for example, she mentioned that the team may consider a more narrow, urban typical section for the area east of 66th Street, and a wider, rural typical section for the area to the west of 66th Street. Mr. Rigby asked if the properties which were previously bought by the County could be used by this project. Ms. Formoso said that any properties that were purchased by the County will not be touched, since the County purchased those properties without following the federal guidelines. She explained that in order for the project to receive federal funds, they need to follow federal NEPA guidelines. She explained that the project currently ends at 58th Street because the properties to the east of that road were purchased by the County outside of the federal guidelines. The team stated that they will confirm what can and cannot be done with the properties previously acquired by the county.
- Mr. Rigby stated that they want to make sure that what is proposed by the PD&E is what is in fact constructed. He also asked that access management criteria be provided to them in writing.

Once access management decisions are made, they want to see the justifications in writing. He also asked if the future developments are included in their considerations.

- Mr. Rodriguez explained that the team looks at future volumes that take into consideration any approved development. If the developments have not been approved they cannot be considered. Metric will confirm which developments were included in the model.
- Mr. Cartwright mentioned that they have concerns with the turn lanes at 58th Avenue and want that to be carefully considered.
- Mr. Rodriguez emphasized that the team will be meeting with the County separately at a later date, and eventually would like to coordinate a joint sit-down meeting with both groups to further discuss the project. He reminded the group that this is the very first meeting for this project, and that there will be several public meetings throughout the PD&E process which they will have the opportunity to participate in. Gabriela Garcia noted that the team will be holding the project kickoff meeting at the upcoming MPO meeting on May 11, and invited the group to come and give their comments supporting the project since it is a public forum.
- Mr. Rigby asked about the scrub habitat north of CR 510. He stated that he doesn't believe there are any scrub jays in the area any more. Can the project impact the habitat instead of the community. Mr. Rodriguez explained that these considerations will be part of the study. Ms. Formoso asked Jorge Padron what the best public information strategies would be upon leaving the meeting, with regards to dissemination of information to the community. Mr. Padron said that developing a project fact sheet would be a good way to disseminate information locally. Mr. Ardra Rigby added that he could help disseminate the fact sheet to the community and on the West Wabasso Progressive Civic Club's website as well as distribution to the local churches. Mr. Padron also emphasized that it is important for the group to attend the upcoming MPO meeting to show their support for this project. He also mentioned that the West Wabasso Progressive Civic Club can provide a link on their website to the FDOT project website that will be developed.
- Mr. Rodriguez thanked the gentlemen once again for their time and emphasized that it is important that what gets built is what was shown and promised.

Action Items:

- Alexandra Medina to add West Wabasso Progressive Civic Club email addresses to project mailing list
- MRG/Metric to develop project fact sheet to disseminate throughout the community
- CR 510 project team to participate in West Wabasso Progressive Civic Club's April meeting, which will be held April 4 at 6:00 p.m.
- Maria Formoso to provide the gentlemen with contact information for All Aboard Florida
- Metric will confirm which developments were included in the model.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

MEETING SIGN-IN SHEET

FM NUMBER# 405606-2-22-01

Project:
CR 510 PD&E Study

Location: 8586 64th Drive, Sebastian, Florida

Meeting Date: March 22, 2016

Name	Company	Phone	E-Mail

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Presentation to West Wabasso Progressive Civic Club
Meeting Date: 04/04/16
Location: Daise Hope Center (8445 64th Ave, Vero Beach, FL 32967)

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Gaspar J. Padron	FDOT D4 PLEMO	Gaspar.padron@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Wabasso Civic Club Attendees	N/A	N/A

The purpose of this meeting was to present and discuss the CR 510 PD&E Study from CR 512 to 58th Avenue (FM#405606-2-22-02) to the West Wabasso Progressive Civic Club. The following provides a brief summary of the community concerns:

- Ms. Maria Formoso briefly explained the project scope and details. She explained that much of the work has been started already including the survey, aerial photography and traffic projections. Ms. Formoso introduced team members Mr. George Padron and Mr. Carlos Rodriguez.
- Mr. Rodriguez explained what PD&E stands for and what the team will be evaluating as part of the study. He then provided a brief project overview of some of the goals and objectives of the study.
- The floor was then open for questions from the community to better understand some of their issues. The following is a brief summary of these issues:
    - Federalization of R/W. Apparently, several frontage properties that have been purchased by IRC for the original PD&E Study and Design project did not follow federal guidelines when purchased. We agreed to get back to them on our findings.
    - There was a complaint about sight distance issues at CR510 and 66th St. We agree to drive the intersection to better understand their concern.
    - There was a general request for isolated right-turn lanes to improve traffic while they wait for the construction of the 4-laning of CR510.
    - There was a comment about the previous PD&E Study proposing a wall to separate the Wabasso Community from CR510. Mr. Rodriguez explained what the federal requirements were for a noise wall, and Mr. Padron explained the process for public input for or against a noise wall.
    - There was a request for the new team to thoroughly research the original IRC-managed PD&E Study. The Team agreed to do so.
    - A request was made for operational improvements with regards to CR510 at both 64 St and 66 St. The community expressed that they requested another signal at CR510 and 64th St. and IRC declined the requested based on the close proximity between intersections, as this pertains to Access Management criteria. Mr. Rodriguez

explained that there are spacing limitations, but that this would be looked at and discussed at the upcoming meeting with IRC.

- There was a request for FDOT to enter progress notes on the Wabasso Progressive League Facebook site. Mr. Padron said that this would need to be discussed with Ms. Barbara Kelleher who is FDOT's Public Involvement Officer.
- There was an inquiry about the stretch of CR510 from 55th St. and 58th St. Apparently this stretch is not part of any on-going projects from either FDOT or the County. We explained that we will be having a meeting with the County to understand the "missing link".

- After the questions & answers session, Ms. Formoso explained the anticipated 19 month duration of this project, and followed up with an explanation as to the duration associated with the design and R/W acquisition process.
- Ms. Formoso encouraged everyone to contact Carlos, George or herself if they have concerns or questions about the project. Business cards were handed out.
- Mr. Rodriguez added explained that the team would be returning for the Wabasso monthly meeting in June.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

West Wabasso Progressive Civic Club
Community Meeting
4-4-16 WABASSO Meeting
Martha Bradley
Bishop Bradley
James Hagans Jr
Audrey Rigby
Pastor: CARL O. WALLACE
Clancy Williams
Leroy Smith
Ervin Cartwright
Virus Limorin
Byron Wright
Janelle Jefferson
Loremo Jefferson
Sidiane Price
D/S Teddy Floyd IRCSO
Clyde Brinson
Janet Hass
GASPAR PADRÓN
MARIA FORMOSO
Carlos Rodriguez
Mary Rue
Ronnie Jones
LT. KENT CAMPBELL IRCSO
Alice Jones
Sandra Jones
Lee Jones
Rev. Myra Ferguson

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with Indian River County
Meeting Date: 04/18/16
Location: Indian River County

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Phil Matson	Indian River County (IRC) MPO Director	pmatson@ircgov.com
Richard Szpyrka	IRC Assistant Public Works Director	rszpyrka@ircgov.com

The purpose of this meeting was to initiate coordination with Indian River County (IRC). The following provides a brief summary:

- Ms. Carlos Rodriguez summarized the meetings and coordination that have already taken place with the Wabasso Progressive Civic Club. He asked them to explain the history with the project.
- Mr. Richard Szpyrka explained that maintaining LOS C concurrency was very strict until recent changes to the Comprehensive Plan. The original widening project was an FDOT project. During the economic boom, the County decided to take the project over in order to maintain the LOS they were seeking. During this time, the County began to acquire some properties for the project. FDOT was not involved in the project at the time. The county prepared up to 90% plans. The project was canceled when the economy took a downturn. The County no longer has the funds to construct the project, thus FDOT has began the project once again.
- Mr. Szpyrka explained that the County is not required to follow the Uniform Act when acquiring property. It is only required to follow the Uniform Act when federal fund will be utilized. He explained that based on his understanding of the law, if properties were acquired prior to FDOT and federal involvement, the FDOT is allowed to use the properties.
- Ms. Maria Formoso explained that FDOT will undergo federalizing the property acquisition in order to utilize the properties.
- Mr. Rodriguez requested information on how each of the properties along the project were acquired. Mr. Szpyrka requested a map with the County owned properties called out. The county will gather the information on the process that was taken for the acquisition of the properties.
- CR 510 is a very important roadway for the County as it connection to the causeway. Because the next causeway crossing to the north is in Melbourne, CR 510 evacuates more than 35,000 people.
- Mr. Carlos Rodriguez asked about the limits of the County's CR 510 project just to the east. Mr. Szpyrka stated that the County will extend their limits to match the eastern limit of the PD&E Study improvements. Similarly, the County has an on-going project along 66th Avenue which will connect to the intersection improvements associated with this project.
- The 66th Avenue project has 60% plans. The County will provide.
- Mr. Matson requested that the team should evaluate left turn lanes to the north as there are many residential subdivisions.

- Mr. Matson and Mr. Szpyrka both stated they would like consideration of a wider median to accommodate 6 lanes in the future to maintain the LOS C Standard.
- Mr. Rodriguez stated that there are concerns of such a wide section in both Wabasso and at the South Prong Slough. Mr. Matson stated that DEP will likely be open to an increased footprint if the FDOT proposes to bridge the entire slough and elevate the roadway to accommodate a future trail under the bridge.
- Mr. Matson suggested that FDOT consider creating a few 3D rendering to show at public meetings. He mentioned it may be beneficial in the Wabasso area.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with Indian River County
Meeting Date: 6/20/16
Location: Indian River County

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Phil Matson	Indian River County (IRC) MPO Director	pmatson@ircgov.com
Richard Szpyrka	IRC Assistant Public Works Director	rszpyrka@ircgov.com

The purpose of this meeting was to initiate coordination with Indian River County (IRC). The following provides a brief summary:

- Mr. Carlos Rodriguez explained the project segmentation for the corridor. Both Mr. Szpyrka and Mr. Matson agreed with the proposed segments.
- Mr. Szpyrka stated that CR 510 is the most likely candidate for a future 6 lane within the county. He explained there is no other east-west roadway in the area that connects both I-95 and US-1. Also, the causeway serves as a critical evacuation route. The County is also considering to transfer the road to FDOT. Thus, they would like to design the road to PPM standards with variations where necessary.
- Ms. Formoso stated that if any exceptions or variances are required, the county will be required to sign them.
- Ms. Garcia stated that this project will include improvements through the intersection of 58th Avenue. Mr. Szpyrka added that the County's project will tie to where this project ends east of the intersection.
- Mr. Szpyrka will provide 100% plans from March of this year for their project along CR 510 east of 58th Avenue. He explained that they are providing 5 foot bike lanes as that is their standard and they would like a minimum of 5 foot bicycle lanes along CR 510.
- Both Mr. Matson and Mr. Szpyrka stated that the county does not like to implement two-way left-turn lanes.
- The design speeds were discussed. It was agreed that the design speed for segments 1, 2 and 4 will be 45 mph. Segment 3 will be either 50 or 55 mph; this will be part of the analysis.
- IRC prefers to maintain the typical sections rural where possible with flush shoulders and open swales, especially in segment 3.
- Mr. Matson stated that the existing trail through the Ansin tract north of CR 512 will eventually extend westward for 17 miles.
- There are a number of approved subdivisions just north of CR 510. However, Mr. Matson believes none of them will likely be built as their applications are soon to expire. He provided a map showing these subdivisions.

- The County stated that they are not in favor of the typical sections with a multi-use path. They prefer use of 6 foot sidewalks so that two people or two wheel chairs can comfortably fit side by side. He added that they are no longer implementing 5 foot sidewalks in the county. Ms. Formoso stated that this can be one of the study commitments.
- Mr. Matson and Mr. Szpyrka believe that 66th Avenue is a good candidate for a roundabout design. It can serve as a transition between the higher speeds in segment 3 and lower speeds in segment 4. However, the EB is a peak direction. The roundabout may need to be two lanes with an EB to SB bypass.
- Mr. Szpyrka stated that the County does not know yet where they will re-locate the transit hub. Thus, this study will not need to coordinate regarding this issue at this time. The county will inform the team if this information changes during the study.
- Some lessons learned that they shared include provision of wider bicycle lanes is desired by the residents, stop controlled intersections on high speed roads have been a cause of major accidents in the County, and the lagoon water quality is an important issue to consider.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Design Criteria Coordination
Meeting Date: 05/19/16
Location: FDOT D4

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
John Olson	FDOT D4	John.Olson@dot.state.fl.us
Steve Braun	FDOT D4	Steve.Braun@dot.state.fl.us
Ann Broadwell	FDOT D4	Ann.Broadwell@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com

The purpose of this meeting was to discuss the proposed design criteria. The following provides a brief summary:

- Ms. Carlos Rodriguez summarized the project including the proposed segmentation for the corridor, the coordination that has already taken place with the County and the MPO, the typical sections that will be evaluated, and the typical sections previously prepared by the County. Mr. Rodriguez explained that the County wants the typical section to be wide enough to eventually accommodate 6 lanes. However, the 6 lane typical section is not included in the County's LRTP and the traffic does not justify it.
- Mr. John Olson asked what is an appropriate design speed for the corridor. He stated that we should first coordinate that with the County. Mr. Rodriguez explained that preliminary analysis shows that 45 mph is appropriate within segments 1, 2 and 4 (From CR 512 to east of the curve, and from 66 Avenue to 58 Avenue), and that a 50 or 55 mph design speed is more appropriate along segment 3 (east of the curve to 66 Avenue). These options will be coordinated with the County to reach an agreement. Mr. Rodriguez mentioned that the County prefers a 55 mph design speed in segments 1 to 3 in order to allow for a future 6 lane. Mr. Braun stated that if the County wants a wider typical section they need to consider the fact that they will require additional R/W funds, thus delaying the prioritization process with the MPO.
- Mr. Rodriguez also asked if the FDOT has a preference to designing according to PPM standards or Florida Greenbook since CR 510 is a local, non FDOT facility. Mr. Olson stated that FDOT does not have a preference for either criteria since it is not a state road. The two options and their associated pros and cons should be presented to the County for them to decide. He stated that the County will have to sign off on the Typical Section Package.
- Mr. Rodriguez explained some of the constraints along the corridor including the South Prong Slough and the Wabasso Scrub Jay Conservation Area. The South Prong Slough has a few planned facilities for pedestrians along CR 510. He stated that perhaps there is an opportunity to mitigate impacts by providing some of these improvements for them. Ms. Broadwell stated that recently joint planning use efforts have not been permitted and would likely not be feasible at the Slough. Ms. Garcia stated that a meeting with Mr. John Wrublik from USFWS is being planned to coordinate these issues.

- Mr. Olson asked about the typical section with the two-way-left-turn-lane. He stated that unless the locals have no other choice, FDOT prefers to not implement the two-way-left-turn-lanes. Mr. Rodriguez stated that it is being evaluated since access management is an issue within Wabasso.
- Mr. Olson stated that with a 15.5-foot median, left outs should not be allowed since there is not enough room for a vehicle to stop in the median to wait for a gap.
- Mr. Rodriguez explained that the packet provided contained the typical sections that were previously proposed for the project when the County prepared 90% plans. During that time the County purchased several properties. The uniform act was not utilized and the team is currently coordinating this issue. The R/W purchases would likely need to be federalized. The team has made initial contact with FDOT R/W department.
- One potential idea to provide the county is to design the roadway as a 50 mph 4 lane PPM sub-urban section. This footprint can accommodate a 6 lane urban section within the same R/W.
- Mr. Braun also suggested that the County could require future developments to donate land along CR 510 for a future widening. The team will consult with the County to discuss these issues.
- In the MPO LRTP, CR 512 from I-95 to CR 510 is planned to be widened to 6 lanes.
- The MPO may be able to include in their comprehensive plan the need to widen CR 510 to 6 lanes due to regional connectivity, hurricane evacuation, linkage, or other.
- Mr. Olson stated that CR 510 should not be designed to two different criteria. Potential ideas include designing to Greenbook standards and where possible implementing features to PPM standards; or designing to PPM standards and where required reducing elements to Greenbook standards.

Action Items

- Meet with County to discuss appropriate design speed and typical sections

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

FDOT

MEETING SIGN-IN SHEET

FM NUMBER# 405606-2-22-01

Project:
CR 510 PD&E Study

Location: Indian River County

Meeting Date: April 18, 2016

Name	Company	Phone	E-Mail
Carlos Rodriguez	METRIC	305-2355018	cdr@metricengg.com
Gabriela Garcia	metric	"	ggarcia@metricengg.com
MARIA FORMOSO	FDOT	954 777 4677	maria.formoso@dot.state.fl.us
Rich Szpyrka	IRC PW	772-226-1221	rszpyrka@IRCGOV.COM
Phil Matson	IRC MPO	772 226 1455	pmatson@ircgov.com

Meeting Notes

Subject: Stakeholder Meeting with Sebastian River High School	
Project: County Road (CR) 510 PD&E Study	
Meeting Date: September 6, 2016 at 12:45 p.m.	**Meeting Location: 9001 90th Avenue, Sebastian, FL 32958**
Notes by: Alexandra Medina, Media Relations Group (MRG)	

The following table identifies the meeting participants.

Name	Company/Agency	Email
Beth Wargo	Sebastian River High School	Beth.Wargo@indianriverschools.org
Mark Howder	Indian River County Sheriff's Office	mhowder@ircsheriff.org
Kelly Ward	Sebastian River High School	Kelly.Ward@indianrivershools.org
Eric Sesack	Indian River County Sheriff's Office	esesack@ircsheriff.org
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Maria Formoso	FDOT District Four	Maria.Formoso@dot.state.fl.us
Alexandra Medina	MRG	amedina@mrgmiami.com

The purpose of this meeting was to obtain input from the Sebastian River High School administration on several preliminary project alternatives.

- Alexandra Medina led group introductions and explained that the project team wanted to meet with SRHS staff to discuss proposed improvements near the school and so that administration could provide feedback and input on the preliminary designs that the team has come up with.
- Carlos Rodriguez explained the project purpose and outlined the project limits. He explained that the team segmented the corridor based on the different roadway characteristics, and came up with several different alternatives for the curve at CR 510. He explained that the team came to obtain input from the administration on a few of the preliminary alternatives the team has come up with. Mr. Rodriguez proceeded to show the options for improving the curve and utilizing the existing roadway as a frontage road for local traffic to access Treasure Coast Elementary School. The group liked this option since it provided a safer way for parents and students to access the school.
- Deputy Mark Howder said that most of the school's traffic comes from the north. He added that the middle entrance to the school is the biggest traffic issue in the morning. The two signals are located on the northern and southern entrances. The middle entrance is only for staff, however parents use the entrance to avoid traffic at the southern entrance. There is a safety hazard when they exit to make a left and go north. Mr. Rodriguez said that this was great input for the team, so that they can work to potentially address that issue for the school. He added that the team can

work on extending the length of the turning lane if that will help with the backup. Deputy Howder said that the school typically opens the back gate for students who live in Vero Lakes Estates to be able to access the property directly, however there are several residents in the area who are not pleased with student traffic in the mornings.

- Deputy Howder added that the bus stop on the northbound side of CR 510 is located right at the intersection of CR 510 and Hammerhead Way. Gabriela Garcia explained that pedestrian safety features such as crosswalks, pedestrian signals and school zone signals will be provided as part of the project. Deputy Howder said that the school does not have a traditional school zone.
- Deputy Eric Sesack expressed concern about the curve being aligned, since the present 90-degree curve forces traffic to slow down, but providing a wider curve gives the opportunity for students to speed through the curve, which could potentially be more dangerous. Mr. Rodriguez pointed out that the alternative provides signals at either side of the curve, which should help with speeding. He did agree that this was a valid concern, but pointed out that the curve would be significantly safer for vehicles than it currently is.
- Mr. Rodriguez invited the group to the Alternatives Public Workshop on October 11, and explained that the team will continue to meet with the school and other key stakeholders to obtain needed input on the alternatives as they are developed.

Action Items:

There were no action items at this meeting.

FDOT

MEETING SIGN-IN SHEET

Project: CR510 PD&E

Location: Sebastian High School

Meeting Date: 9/6/16

Name	Company	Phone	E-Mail
MARK HOWDEN	IRCSO	772-564-4336	mhowden@ircsheriff.org
Kelly Ward	SDIRC	772-564-4385	kelly.ward@indianriverschools.org
ERIC SESACK	IRCSO	772-564-4199	esesack@ircsheriff.org
Beth Wargo	SDIRC	772-564-4385	beth-wargo@indianriverschools.org

FDOT

MEETING SIGN-IN SHEET

Project: CR 510 PD&E Study with Verclare Estates HOA

Location: Library

Meeting Date: 9/6/16

Name	Company	Phone	E-Mail
Gabriela Garcia	Metric	305-235-5098	GGarcia@metricengr.com
Sue Kramer	VLEPO	772-538 8584	pskran@bellsouth.net
Mary Ann Smith	VLEPO	954-557-9503	maryasmith29@gmail.com
TREVA BISHOP	VLEPO	407-739-1144	WOODFCYA@AOL.COM
ANN Tetreault	VLEPO	772-321-1465	anntetreault@hotmail.com
AL Tetreault	VLEPO	772-321-1386	artetreault@hotmail.com
CARMEN NEGREIRA	VLEPO	954-253-8776	cnegreira@aol.com
Alexandra Medina	MRG	786 609 3002	amedina@mrgmiami.com.
MARIA FORMOSO	FDOT	954 777 4677	maria.formoso@dot.state.fl.us

Meeting Notes

Subject: Stakeholder Meeting with Vero Lakes Estates Property Owners (VLEPO)	
Project: County Road (CR) 510 PD&E Study	
Meeting Date: September 6, 2016 at 2:00 p.m.	**Meeting Location: North IRC Library, 1001 Sebastian Boulevard, Sebastian, FL 32958**
Notes by: Alexandra Medina, Media Relations Group (MRG)	

The following table identifies the meeting participants.

Name	Company/Agency	Email
Sue Kranenburg	VLEPO	pskran@bellsouth.net
Mary Ann Smith	VLEPO	Maryasmith29@gmail.com
Treva Bishop	VLEPO	Wooofcya@aol.com
Ann Tetreault	VLEPO	anntetreault@hotmail.com
Art Tetreault	VLEPO	artetreault@hotmail.com
Carmen Negreira	VLEPO	cnegreira@aol.com
Wesley Davis	VLEPO/Indian River County	N/A
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Maria Formoso	FDOT District Four	Maria.Formoso@dot.state.fl.us
Alexandra Medina	MRG	amedina@mrgmiami.com

The purpose of this meeting was to obtain input from the Vero Lakes Estates Property Owners on several preliminary project alternatives.

- Alexandra Medina led group introductions and explained that the project team wanted to meet with VLEPO to discuss proposed improvements near the school and so that administration could provide feedback and input on the preliminary designs that the team has come up with.
- Carlos Rodriguez explained the project purpose and outlined the project limits. He explained that the team segmented the corridor based on the different roadway characteristics, and came up with several different alternatives for the curve at CR 510. He explained that one of the concerns which was brought to the project team's attention was speed and safety along CR 510. Because of this, the team looked at some different types of provisions they could include in the new design for the roadway. Mr. Rodriguez pointed out that in the original plan, the curve was designed for 45 mph. He proceeded to present some of the preliminary improvements, and emphasized that the team would be meeting with the County on Thursday, September 8 to discuss the feasibility of each of these options.
- Carmen Negreira pointed out that 70th Avenue is a hazard due to speeding and traffic. She asked if a traffic light would be installed at that location as part of the project. Mr. Rodriguez explained

that the study takes all elements of roadway design and safety into consideration, and said that the team would determine where traffic lights are warranted.

- Mr. Davis expressed a desire to get rid of the light on 87th Street and at the school entrance, and provide a signalized, four-legged intersection at 89th Street which would cut across the presently-defunct development to the east of CR 510. He added that he wanted to have 89th Street open up to the back gate of the high school, which would provide another route for students, parents and teachers to access the school.
    - Ms. Negreira expressed concern that Vero Lakes Estates residents who live further south would need to use 89th Street to go north or south on CR 510 if access to 87th Street is eliminated. She pointed out that she lives further south and currently many residents use 87th Street to exit the development. She stated that the residents that live off of 89th Street do not want the school traffic to cut through the neighborhood and are not in support of this. Mr. Rodriguez pointed out that if there is a full median opening at 89th Street, the team would not be able to provide one at 87th Street since they are too close to each other. He said the team would discuss this further with the County, since the team needs both the County's and high school's buy-in as well.
- Mr. Rodriguez pointed out that one of the proposed improvements to the curve included utilizing the existing road as a local frontage road to access Treasure Coast Elementary School. He asked for general input on this proposal.
    - Ms. Negreira said that a main concern is traffic from the high school. She said that about 82% of the students at Treasure Coast Elementary School who live in Vero Lakes Estates. She said the frontage road would remove a lot of traffic from CR 510.
- Ann Tetreault asked what the speed limit would be along the proposed frontage road for the school. Mr. Rodriguez replied that it will be 20-35 mph.
- Ms. Negreira pointed out that Treasure Coast Elementary School is a special-needs shelter.
- Ms. Negreira asked if the large power pole and turn lane at 66th Avenue and CR 510 will be removed. Mr. Rodriguez explained that the project consists of a full reconstruction of CR 510, so anything that does not need to be included as part of the project will be removed.
- Ms. Medina invited the group to attend the upcoming Alternatives Public Workshop on October 11. She explained that the entire PD&E process is an opportunity for the public to provide input to the Department and project team on the project.

Action Items:

There were no action items at this meeting.

Meeting Notes

Subject: Stakeholder Meeting with West Wabasso Progressive Civic Club	
Project: County Road (CR) 510 PD&E Study	
Meeting Date: September 6, 2016	**Meeting Location: 8586 64th Drive, Sebastian, Florida - Wabasso Community**
Notes by: Alexandra Medina, Media Relations Group (MRG)	

The following table identifies the meeting participants.

Name	Company/Agency	Email
Ardra Rigby	Wabasso Progressive Civic Club	Rigbyardra@gmail.com
Vernon Reason	Wabasso Progressive Civic Club	N/A
Marvin White	Wabasso Progressive Civic Club	N/A
Ervin Cartwright	Wabasso Progressive Civic Club	ervncartwr@gmail.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Maria Formoso	FDOT District Four	Maria.Formoso@dot.state.fl.us
Robin Brisebois	FDOT District Four Right-of-Way	Robin.Brisebois@dot.state.fl.us
Alexandra Medina	MRG	amedina@mrgmiami.com

The purpose of this meeting was to get input from the West Wabasso Progressive Civic Club on several preliminary project alternatives, as well as to answer some questions the group had regarding the Wabasso Scrub Conservation Area and access at 58 Avenue.

- Carlos Rodriguez thanked the group for meeting with FDOT again and reminded them that the PD&E process is a very dynamic one. He noted that most of their questions in the past have been regarding the conservation area and access at 58 Avenue, and the team would try to answer those questions and show some of the different options that they have come up with so far.
- Mr. Rodriguez introduced Gabriela Garcia to explain some of the laws and issues currently constraining the project team from impacting the Wabasso Scrub Conservation Area.
    - Ms. Garcia explained that there are two federal laws and one state law that currently protect the Wabasso Scrub Conservation Area. The first state law is the Florida Community Trust Act; she explained that the land was purchased with grant money from the Florida Forever Protection Act. Ervin Cartwright asked when the land was purchased; Ms. Garcia replied that part of the land was purchased as mitigation for impacts to scrub jay habitat as a result of improvements to CR 512. She would confirm the date and send

the information. She explained that as part of a mitigation plan the County received grant money through this program to purchase the property.
Ms. Garcia later sent a follow up stating the land was purchased in 1995.

- Mr. Cartwright said that the group feels ignored and overlooked by the County, since he noted that the group had tried to purchase the land to build a community center in the mid-90's, but never received the approval. Mr. Rodriguez noted their frustrations, but explained that the goal of this meeting is to move forward with the existing project given the existing constraints.
- Ms. Garcia continued, explaining that the issue the project team faces with the Florida Forever grant is that the team would need to prove that the habitat is no longer needed for conservation and there are no other feasible alternatives to impacting the property. She added that it would require a two-thirds vote on pulling the habitat out of conservation.
- Ms. Garcia explained that in addition, since the scrub jay habitat property is accessible to the public for recreation, and since the land provides several trails, kiosks, etc. for public use, the land is protected under the US DOT Act of 1966 as a Section 4(f) resource. Ms. Garcia explained that under this law, any resource that is accessible to the public cannot be disrupted by a roadway. In order to impact a Section 4(f) resource, you would need to prove that there is no feasible or prudent alternative to impacting the resource. She explained that based on their experience, there exist feasible and prudent alternatives that would not impact the property or require relocation in the Wabasso Community. However, those alternatives could come at a cost to the community (i.e. those alternatives may not offer adequate pedestrian, bicycle and landscaping features that the community is looking for). She explained that they would be showing the group the alternatives that they have developed.
- Ms. Garcia also noted that another federal law, the Endangered Species Act, protects the scrub-jay (a federally threatened species), and gopher tortoise (state listed and candidate for federal listing) living in the habitat.

- Mr. Rodriguez explained that due to these constraints, the team has developed several preliminary designs for the roadway, which he proceeded to present to the group.
- Mr. Rodriguez showed the group the 4 typical sections that are applicable to this segment of the project. He explained that Alternative E (E1) provides all of the amenities with the narrowest footprint. However, Alternative E, does require 24 feet of right-of-way acquisition. Although it does not physically impact the house located at 5845 85th Street, it would likely require relocation since the roadway would come too close to the house and would not provide the adequate land development setbacks. Mr. Rodriguez presented five additional options that would further narrow the footprint of Alternative E if the community chooses to do so:
  - **Option E-2** would narrow the median from 22 feet to 19.5 feet, reducing the total right-of-way footprint to 21.5'.
  - **Option E-3** would remove the sidewalk from the north end of the road closest to the scrub-jay habitat. This option reduces the right-of-way footprint to 15.5'.
  - **Option E-4** would reduce the bike lanes from 7 feet to 4 feet. Mr. Rodriguez noted that option E-4 would be the best option if the group wanted to provide the opportunity for landscaping, include bicycle lanes, and overall make the community look better, without impacting the two homes close to the roadway.

- **Options E-5 and E-6** provide an even further reduction on total right-of-way impacts by reducing the median to 15.5 feet and reducing the buffer widths behind the sidewalks. Ms. Garcia noted that the 15.5' includes curb and gutter, so this option would result in a very narrow median and minimize opportunities for landscaping.
    - Vernon Reason expressed frustration that the team presented E-5 and E-6 as an option. He expressed that he does not feel these options are a feasible solution because he does not feel the community should restrict themselves with a tighter typical section. He stated that CR 510 will become a major traffic corridor and thought a wider section would be safer and more aesthetic than a restricted typical section. Ardra Rigby responded that he had requested that the team bring them all possible options for them to make their decision. Maria Formoso added that the team wanted to explain the reasons they came up with each particular option. Mr. Rodriguez emphasized that this is still a very preliminary design, but wanted the group to weed out the bad options so that the project team could proceed with a design the group is happy with.
    - Mr. Reason noted that the option he prefers may negatively affect the homes along CR 510. Mr. Rodriguez responded that Mr. Rigby had expressed concern with affecting the two homes along CR 510 when the team first met with the group.

- Robin Brisebois explained the federal process for purchasing right-of-way. She explained that FDOT impacts someone's property to the point they need to move, the Department will appraise the property and make an offer to purchase. If the occupants are displaced from their home, the Department will search for comparable homes to ensure availability of decent and affordable housing within the community. Once the offer is presented, the homeowner can search for a replacement home in or around their community and choose a home that they like within the value allotted. She also explained that FDOT pays for reasonable legal fees if the homeowner so chooses.
- Ms. Brisebois explained that the lands the County purchased were not done so following the federal guidelines, as they are not required to do so. FDOT is looking at County land purchases since the date that the County requested state or federal funding. If the amount provided to the homeowner was not in accordance with federal guidelines, FDOT can retroactively work with the homeowners to pay what they are due. She explained that this is only for properties purchased after the request for federal funding.
- Mr. Reason noted that he preferred Option E-1, and the group said they felt better knowing that the two homeowners close to CR 510 would be appropriately compensated for their homes, but they could not speak on their behalf.
- Mr. Reason asked if there was a possibility to include a noise wall along the road. Mr. Rodriguez responded that the team is required to study a variety of things, including noise and air quality.
- The group stated that they would like to see landscaping implemented similar to what the county did on 66th Avenue and 53rd Street.
- Mr. Rigby noted that when he previously met with the County, they mentioned that they want to widen the roadway to six lanes. He provided the team with a Wabasso Corridor Plan from 2000 which was provided to him at the County. Mr. Rodriguez stated that he was not aware of the plan and the team will discuss with County staff at their upcoming meeting on Thursday,

September 8. Mr. Cartwright added that County staff will be presenting this plan to the Wabasso Progressive Civic Club at their upcoming meeting on October 3. The team said they plan on attending the meeting.

- Mr. Rodriguez asked about a strip of land parallel to CR 510 that seems to be a road easement. Mr. Rigby confirmed the roadway easement. Mr. Rodriguez stated that the team had thought about providing an access road in this easement to have better access to their neighborhood from CR 510. He asked if the group would like the team to investigate this as a possible option for improved access to the neighborhood. The group liked the idea. Mr. Rodriguez explained that the team will be discussing the feasibility of this with the County.
- The group stated that their neighborhood is called the Hill Side Subdivision and would like to see it labeled on the maps.
- Mr. Rodriguez mentioned that the project's Alternatives Public Workshop will be held on Tuesday, October 11 from 5:30 p.m. – 7:30 p.m. at the North Indian River County Library on CR 512, and urged the group to attend.

Action Items:

- Gabriela Garcia to send specific environmental laws and statutes regarding the Wabasso Scrub Conservation Area as well as its date of purchase to Mr. Rigby
    - Information was sent 9/13/16
- CR 510 project team to participate in WPCC's October meeting, which will be held October 3 at 6:00 p.m.

FDOT

MEETING SIGN-IN SHEET

Wabasso

Project: CR510

Location: 9/6/16

Meeting Date:

Name	Company	Phone	E-Mail
Gabriela Garcia	metric	305-235-5048	ggarcia@metricengr.com
Carlos Rodriguez	"	"	crodriguez@metricengr.com
Ervin Cartwright		9728412685	Ervn cartwr @ gmail
Andra Rigby		772-501-4749	rigbyandra@gmail.com
Robin Brisebois	FDOT	954-777-4249	robin.brisebois@dot.state.fl.us
MARIA FORMOSO	FDOT	9547774677	mariaformoso@dot.state.fl.us
Alexandra Medina	MRG	7866073002	amedina@mrgmiami.com
Marvin White	School Board	561-502-9996	
Vernon Reason			

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with Indian River County
Meeting Date: 9/8/16
Location: Indian River County

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Richard Szpyrka	IRC Public Works Director	rszpyrka@ircgov.com
James Ennis	County Engineer	jennis@ircgov.com

The purpose of this meeting was to initiate coordination with Indian River County (IRC). The following provides a brief summary:

- Mr. Szpyrka stated that he only recently became aware of the Wabasso Corridor Plan. He explained that even though there is a section on transportation, it should not impact our project as it mostly relates to land use and development. The plan will be presented and approved early 2017. The team will review the plan and provide the County with our interpretation, any potential changes to our study and how we plan on moving forward.
- Mr. Szpyrka stated that on all future road improvements, landscaping and aesthetic features will be modeled after 66th Avenue. Landscaping along CR 510 will not be provided on the outside, only in the median.
- Mr. Szpyrka confirmed that there is an existing roadway easement south of CR 510 within the Hill Side Subdivision. Mr. Rodriguez stated it is 20 feet wide. Mr. Szpyrka stated the County is open to using the easement to provide better access to the community, however a minimum of 50 feet is required to construct a roadway. There is a potential to reduce that to 40 feet if a waiver is obtained.
- Mr. Szpyrka stated that the County owned parcels can be used for drainage.
- Mr. Szpyrka stated that the County is going to purchase the lot on the southwest quadrant of the 58th Avenue intersection. He stated that they will be following the federal process.
- Mr. Rodriguez asked if the County will be willing to construct a park in one of the parcels that they have purchased in order to enhance the community. Mr. Szpyrka stated that there may be a possibility of that; he will ask the planning department.
- Mr. Szpyrka stated that to enhance access, the County can purchase one of the properties along 58th Avenue that the community currently drives through to access 58th Avenue and CR 510 to build a connecting road. If this road is build, the County will like to close access completely to CR 510 from 58th Court as it is too close to the intersection.
- Another access improvement would be to construct a road in the easement and through the county owned "triangle" property west of 59th Avenue. A full median opening can potentially be provided at this location.
- These access issues will be decided by Indian River County.
- The County confirmed that Blue Water Bay development is in foreclosure and their permits expired in 2014. Re-approval by IRC staff would be required to develop the property.

- Mr. Rodriguez explained that Commissioner Davis stated at a previous meeting that he wants to move the high school's signal to 89th Street and develop 89th Street. Mr. Szpyrka stated that the County discussed that option previously and determined that they would not implement that. They are not in favor and do not support that option.
- Mr. Szpyrka stated he is concerned about future maintenance of the bridge if the existing CR 510 is kept as a frontage road. Mr. Rodriguez stated that the team will look at potentially rehabilitating the bridge as part of this project.
- Mr. Szpyrka gave the team several reports that were completed by the County for the previous PD&E.
- Mr. Szpyrka requested that the team send him the flyer once it has been approved so that he can present it as an informational item at the September 20 MPO meeting.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Presentation to West Wabasso Progressive Civic Club
Meeting Date: 12/05/16
Location: Daise Hope Center (8445 64th Ave, Vero Beach, FL 32967)

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Robin Brisebois	FDOT D4	Robin.brisebois@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	Crodriguez@metriceng.com
Paul Carballo	Metric Engineering	Paul.carballo@metriceng.com
Wabasso Civic Club Attendees	N/A	N/A

The purpose of this meeting was to present and discuss different alternatives of the above referenced project to the West Wabasso Progressive Civic Club. The following provides a brief summary of the community concerns:

- Mr. Rodriguez explained what PD&E stands for and what the team has been evaluating as part of the study. He then provided a brief project overview of some of the goals and objectives of the study. He briefly explained the engineering analysis of the current two typical section alternatives that are being evaluated in segment 4 (from 66th Avenue to 58th Avenue. He mentioned that this information was also provided in the Alternatives Public Workshop meeting.
- Ms. Formoso asked how many people were not able to attend the Alternatives Public Workshop meeting, and around 5 people raised their hands.
- The floor was then open for questions from the community. The following is a brief summary of these issues:
    - There was a comment that ponding problems are still prevelent at various properties in the Wabasso Area.
    - A question regarding the ditches along CR 510 arose. Will the ditches be maintained, remain the same (if so will they have a railing), or will they be filled?
    - There was concern about widening of the road and if it would impact the businesses. It was brought up the proposed roadway evaluation of different typical sections and alignments would minimize impacts to buildings/businesses.
    - There was some feedback about how the community is being informed about this study. It was mentioned by the Club leaders that not only was this information on the West Wabasso Progressive Civic Club website, they have also been going door to door with the meeting flyer. One community member suggested using social media to inform them with updates to the study.
    - There was an inquiry on how the domain is acquired. The project team stated that this is an FDOT project and they will follow the Federal Uniform Relocation Assistance and Real Property Acquisition Act. The project team also gave various scenarios of

how relocating a property would occur (e.g. when the owner is disabled, not able to afford a property in the area, etc.).
    - A question about the difference in the two typical section alternatives was brought up. The project team discussed how the wider the typical section footprint is, the more landscaping and multimodal features it can provide.
    - There was a suggestion to having a Welcome to Wabasso sign as part of the study.
    - A concern about aesthetics of the new project and how it would look in the Wabasso Community, the project team mentioned that this is a new construction project. It is going to have new pavement, sidewalks, curb and gutter, landscaping, etc.
    - A concern about the posted speed of segment 3 having 55 mph in the area is too fast. Also it was mentioned that segment 4 will have a design speed of 45 mph while potentially having a posted speed of 40. The concern about these higher posted speeds is safety.
- Ms. Formoso discussed the procedures of a PD&E Study and how all comments at these meetings are written into the preliminary engineering report and are part of the PD&E study.
- Ms. Formoso also encouraged everyone to contact Carlos, Robin or herself if they have concerns or questions about the project. Business cards were handed out.
- Mr. Rodriguez explained that the team would be returning for the Wabasso monthly meeting early in the coming year to discuss more details.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County

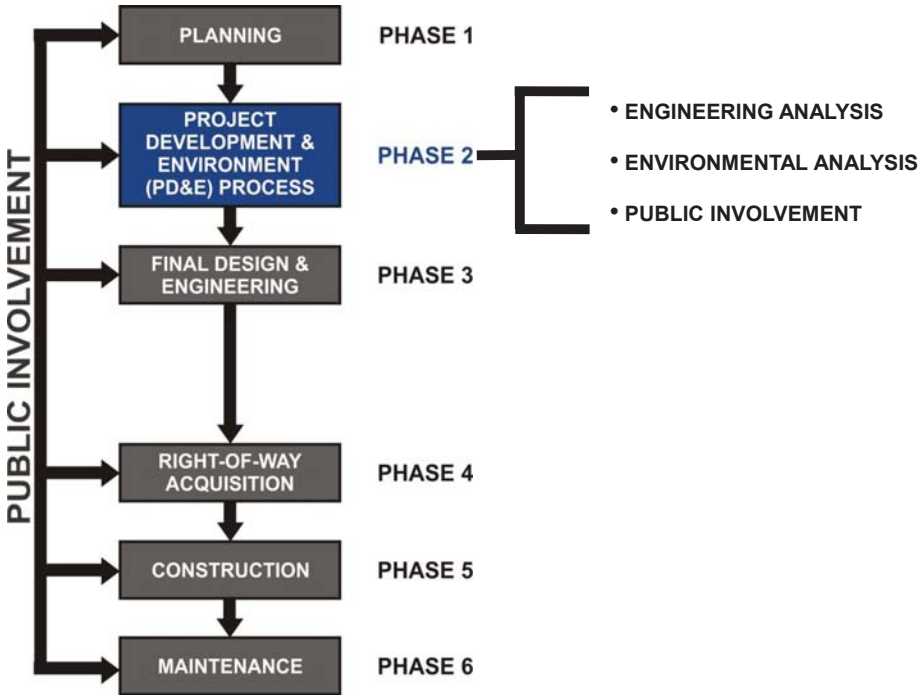


Metropolitan Planning Organization Presentation

Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: December 14, 2016

County Road 510 PD&E Study

Project Process



County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

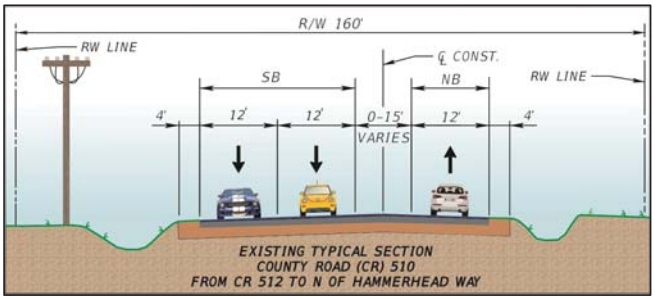


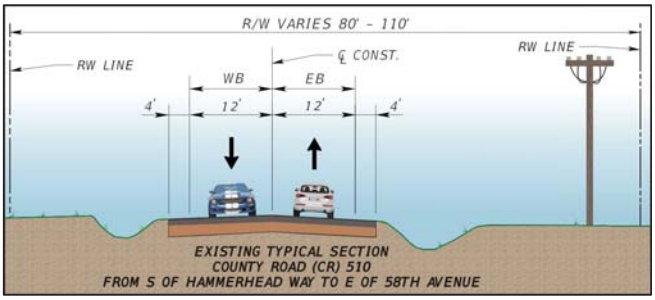
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- T% (daily): 5.3%
- Safety:
  - Total of 104 crashes during 2010-2014
  - Locations with highest number of crashes
    - CR 512: 22 crashes
    - 70th Avenue/Powerline Road: 15 crashes
    - 66th Avenue/CR 615/Schumann Dr.: 14 crashes





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - o Improve Traffic operations
  - o Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - o CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - o Identified as a core project in the Indian River County 2035 LRTP
  - o Identified as a priority project in the Indian River County TIP



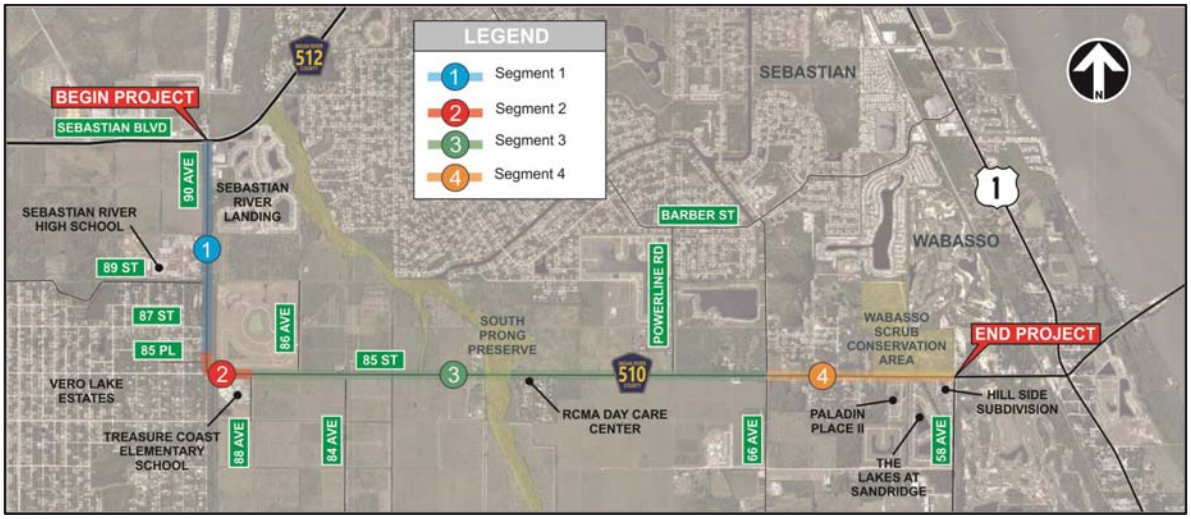


County Road 510 PD&E Study

Engineering Analysis

Segmental Determination

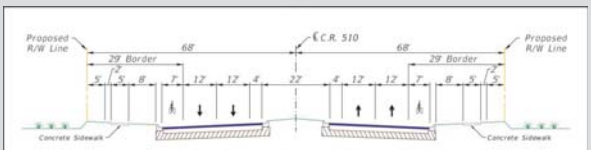
- **Segment 1:** From CR 510/512 intersection to 85th Place
- **Segment 2:** From 85th Place to just west of 88th Avenue
- **Segment 3:** From just west of 88th Avenue to 66th Avenue
- **Segment 4:** From 66th Avenue to 58th Avenue



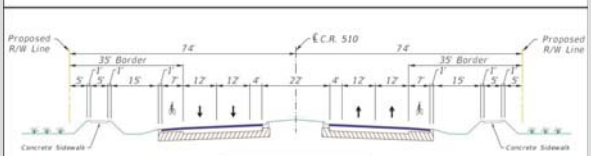
County Road 510 PD&E Study

Engineering Analysis

Suburban Typical Sections

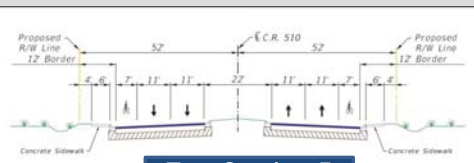


Typ. Section A

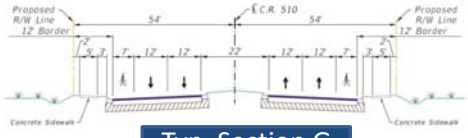


Typ. Section C

Urban Typical Sections



Typ. Section E



Typ. Section G

ALTERNATIVES

ALTERNATIVES \ CRITERIA	UTILITY IMPACTS	MAINTENANCE OF TRAFFIC	GEOTECHNICAL CONSIDERATIONS	ACCESS IMPLICATIONS	WATER QUALITY / HYDROLOGICAL IMPACTS	WETLANDS IMPACTS	RELOCATION IMPACTS	COMMUNITY SERVICES	RIGHT-OF-WAY IMPACTS	CONSTRUCTION COST
ALTERNATIVE 1 Typ. Section E - East/North and South Alignments Typ. Section A - South Alignment	Several Utility Impacts anticipated to existing electrical, water, sewer, signals, and fiber optic facilities.	No significant Maintenance of Traffic problems anticipated during construction.	Some hydric soils (unsuitable) are likely to be encountered along the west side of the road just north of the Sebastian River High School and along both the east and west sides south of 87 Street. Significant amounts of hydric soils are also present east of the Treasure Coast Elementary to approximately 66 Avenue.	Generally would cause only temporary minor disruptions during construction and no permanent access disruptions. However, it would impact internal circulation access of a potential future residential development abutting CR 510 across from the Treasure Coast Elementary School.	Generally features a modest amount of impervious area except in the area east of the Treasure Coast Elementary School to 66 Avenue. Some turbidity might be present in the vicinity of the Lateral "D" and Lateral "L" Canals during construction, however, these impacts will be temporary. In general, this project will be an improvement since currently there is no treatment and the replacement of existing culverts to bridges will provide an additional benefit.	Minor potential wetland impacts along the east side of CR 510 and north of Make Way. It will also impact an existing freshwater pond across from the Treasure Coast Elementary School. In addition, this alternative would impact some wetlands in the vicinity of the Lateral "L" Canal crossing area and the South Prong Slough.	One potential residential relocation within the Hill Side Subdivision.	Generally no major impacts are anticipated, however one recently constructed bus stop shelter in front of the Sebastian River High School would need to be replaced.	Right-of-way impacts estimated at approximately 50.52 acres.	Construction cost estimated at approximately $103 million.
ALTERNATIVE 2 Typ. Section G - East/North and South Alignments Typ. Section C - Center Alignment	Generally similar to Alternative 1 but with potentially greater impacts to existing transmission poles along the south side of CR 510 east of the Treasure Coast Elementary School to 66 Ave.	Generally similar to Alternative 1.	Generally similar to Alternative 1 but higher impacts within the area east of the Treasure Coast Elementary School to 66 Avenue due to the wider typical section footprint within this area.	Generally similar to Alternative 1.	Generally similar to Alternative 1 but with slightly higher impervious area.	Generally similar to Alternative 1 but with slightly higher impervious area within the project segment east of the Treasure Coast Elementary School to 66 Avenue.	Two potential residential relocations within the Hill Side Subdivision and one potential business relocation.	Generally similar to Alternative 1 but slightly greater impact to the internal circulation of the RCMA Day Care Center.	Right-of-way impacts are estimated at approximately 54.24 acres with a greater number of parcels impacted.	Construction cost estimated at approximately $95 million.

County Road 510 PD&E Study

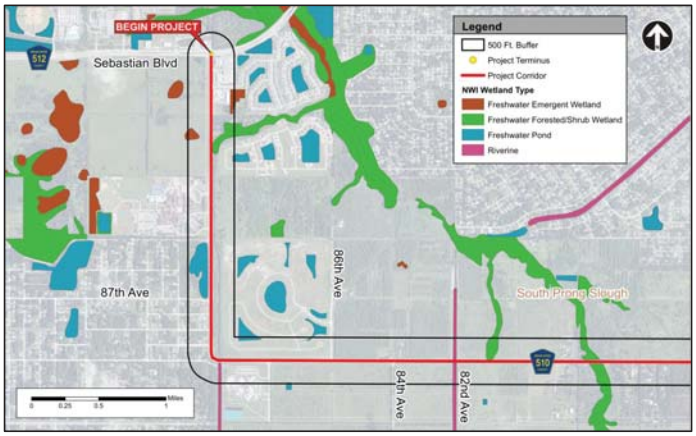
Engineering Analysis



County Road 510 PD&E Study

Environmental Analysis

- Wetlands occur in multiple areas
  - Especially along St. Sebastian River tributaries
  - Impacts must be avoided and minimized
- Threatened and Endangered Species
  - Scrub Jay, Gopher Tortoise, Sandhill Crane, Wood Stork, Caracara all confirmed near project
  - Caracara nest surveys planned 2017
- Cultural and Historic Resources
  - Stough Homestead (1920) on South Prong Preserve
- Will also assess contamination, noise, land use changes, aesthetics, farmland impacts





County Road 510 PD&E Study

Environmental Analysis

- Section 4(f) Resources
  - Ansin Tract, South Prong Preserve, Wabasso Scrub Conservation Area
  - All purchased with P2000/Florida Forever Funds
  - All contain habitat for listed species
  - Wabasso Scrub Preserve previously used for Scrub Jay mitigation
  - Impacts to South Prong Preserve may be unavoidable



County Road 510 PD&E Study

Public Involvement

- **Public Meetings**
  - June 8, 2016 - Public Kick-Off at MPO Board Meeting
  - October 11, 2016 - Alternatives Public Workshop
  - Public Hearing anticipated for Fall 2017
- **Major Stakeholders**
  - Indian River County
  - Property Owners
  - Elected officials
  - St. John's River Water Management District
  - Sebastian River Improvement District
  - Sebastian River High School
  - Treasure Coast Elementary School
  - Liberty Magnet Elementary School
  - Hill Side Subdivision
  - Allen Chapel A.M.E Church
  - Wabasso Progressive Civic Club
  - Vero Lake Estates
  - Sebastian River Landing

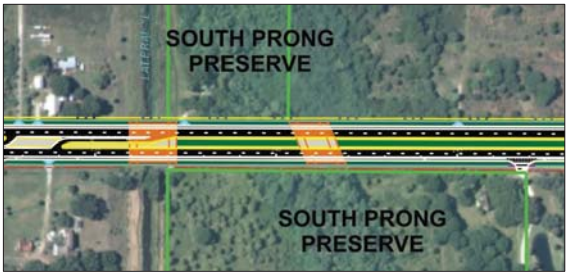


County Road 510 PD&E Study

Public Involvement

- **General Comments Received**
  - *Improve roadway alignment along the 90 degree bend in order to improve safety*
  - *In favor of keeping the existing CR 510 Roadway at bend to provide additional access to the Treasure Coast Elementary School*
  - *Provide an arched bridge over CR 510 to restore the natural flow of the South Prong of St. Sebastian River*
  - *Two lane divided typical section is favored*
  - *Improve traffic flow at 66 Avenue to reduce stacking issues*
  - *We support the important regionally significant improvements. This route is a critical hurricane evacuation route for Vero Beach and the barrier islands*

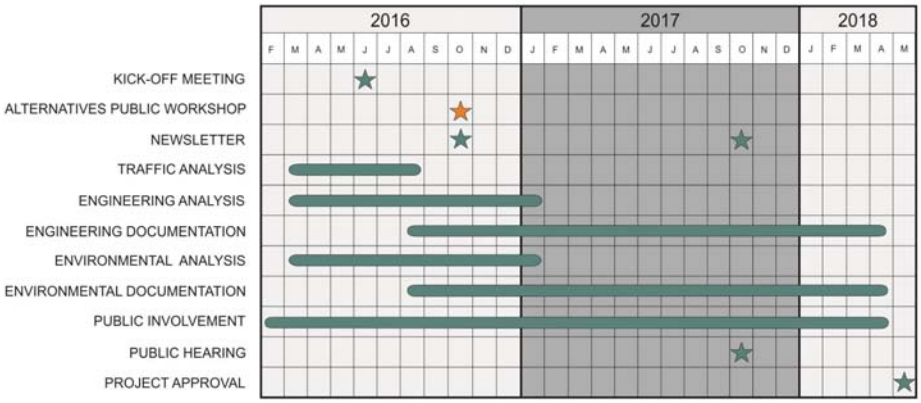




Project Schedule

- Key Dates
  - Public Hearing- Fall 2017
  - Location Design Concept Acceptance- Spring 2018

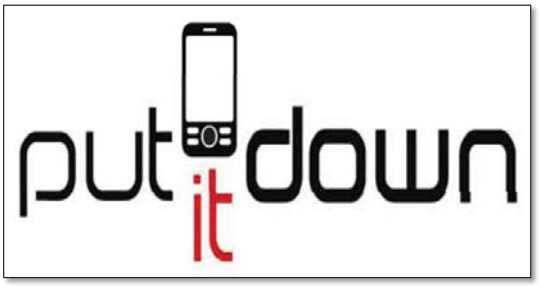
CR 510 PD&E Study Schedule



Thank You!!







Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Presentation to Indian River County MPO
Meeting Date: 12/14/16
Location: Indian River County (1800 27th Street, Conference Room B-1501, Vero Beach, FL 32960)

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Robin Brisebois	FDOT D4	Robin.brisebois@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	Crodriguez@metriceng.com
Paul Carballo	Metric Engineering	Paul.carballo@metriceng.com
Alexandra Medina	Media Relations Group	Amedina@mrgmiami.com

The following notes represent the key topics, action items and questions identified throughout the presentation to the Indian River County MPO.

1. MPO Director Phil Matson introduced the project team and Maria Formoso provided a brief overview of the PD&E process, existing corridor conditions, the purpose and need of the project, and the engineering analysis. Carlos Rodriguez provided an update on the engineering, environmental analysis, and the public involvement that has been done to date, as well as a summary of the Alternatives Public Workshop held in October 2016.
    a. Commissioner Tim Zorc expressed concern about the curve being pushed out into the Blue Water Bay development property, which is currently bank-owned. He asked if this curve was designed for a posted speed of 45 mph. Ms. Formoso explained that the team looked at the possibility of keeping the curve along the same alignment from the original PD&E Study completed in 2006, but the required curve superelevation would be steeper. Mr. Rodriguez explained that the team met with numerous stakeholders near the property, who agreed that this was a more desirable and safer than a steep curve which would be more dangerous.
2. Commissioner Susan Adams noted that the side roads coming out of Vero Lakes Estates would not be able to access CR 510 unless they go north to 87 Street. She asked if the footpath bridge for students to access Treasure Coast Elementary would remain. Mr. Rodriguez responded that it would. Regarding the curve, she noted that most crashes in that area are due to speed, and said that although this proposed curve is safer, she is concerned about the project cost being increased. She further suggested as a cost saving alternative, the provision of a reduced curve radius in conjunction with increased enforcement at the curve site.
3. Councilman Dick Haverland of Indian River Shores asked when the roadway is scheduled to be completed. Ms. Formoso said that Segment 4 of the corridor would be advertised first, in April 2017. Design is scheduled for 2019 and Right of Way Acquisition is funded for 2021. She noted that other segments will be advertised in August 2017, but overall it would be about 8-10 years before the roadway is completed.
4. Commissioner Joseph Flescher inquired whether FDOT could still complete the project within the scheduled 10 years in view of the fact that many changes have occurred since the completion of the original PD&E study. Ms. Formoso replied that this is the process that FDOT must adhere to. Mr. Rodriguez noted that the previous alignment had some impacts to the Wabasso community that the team was trying to minimize, so there have been changes to the alignment on this project

because of that. Commissioner Flescher asked if the cost has elevated significantly. Mr. Rodriguez responded yes, and said that the current construction estimate for this project is $100 million. Ms. Formoso reminded the attendees that this project involves a total reconstruction of CR 510, along five miles.

5. Irvin Cartwright asked if the Wabasso community would be getting any relief along 58 Avenue with a turning lane from CR 510 onto southbound 58 Avenue. Mr. Richard Szpyrka responded that the County does not currently own the corner piece in question. He added that the County has been in discussions with the property owner for that parcel, and once they acquire the piece of property from the owner the County can provide a right turn lane to alleviate traffic. He was hopeful to have something completed by summer of 2017.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with Indian River County
Meeting Date: 12/14/16
Location: Indian River County

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Robin Brisebois	FDOT D4	Robin.brisebois@dot.state.fl.us
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Paul Carballo	Metric Engineering	paul.carballo@metriceng.com
Alexandra Medina	MRG	amedina@mrgmiami.com
Phil Matson	Indian River County (IRC) MPO Director	pmatson@ircgov.com
Richard Szpyrka	IRC Assistant Public Works Director	rszpyrka@ircgov.com

The purpose of this meeting was to initiate coordination with Indian River County (IRC). The following provides a brief summary:

- Mr. Richard Szpyrka explained the concern of the MPO board members regarding the curve taking too much right-of-way of the foreclosed Blue Water Bay development property. Although he agrees with the curve following FDOT Plans Preparation Manual standards, he suggested that it be realigned based on decreasing the design speed.
- Mr. Szpyrka also stated that there has been interest in acquiring the foreclosed Blue Water Bay development property. He mentioned that Scott Glaubitz from B.S.E. Consultants, Inc has been inquiring about the property.
- Mr. Carlos Rodriguez asked if there can be an agreement with the County about the right-of-way take with the new proposed 45 mph design speed curve.
- Mr. Szpyrka stated that the County's legal department will not allow an agreement to obstruct future development.
- Ms. Maria Formoso inquired about the missing link on 66th Avenue between the widening of 66th Ave (FM#: 436379-1) and this project's proposed improvements of the intersection of CR 510 at 66 Avenue.
- Mr. Szpyrka stated that once the FDOT's team has determined the limits of the proposed PD&E improvements, they should inform him. The County will then move the widening up to meet that limit. This also applies for the end project limit of CR 510 and 58 Avenue.
- Mr. Sypzrka looked at the alternative roll plots and stated that he was in favor of providing access to Vero Lake Estates via the existing CR 510, and that the only concern he has is looking at different connections between 86 Avenue and Treasure Coast Elementary. He suggested looking at either a traffic circle or a T intersection as an alternative.
- Mr. Rodriguez stated that this design was still looking at different alternatives to provide the access, and will look into providing a traffic circle or a T intersection.

- Mr. Sypzrka brought up some drainage issues along the project. He stated that at some areas there are off-site contributions that are is causing puddling. He asked where the proposed pond sites are.
- Mr. Rodriguez stated that the drainage team was going to schedule a meeting to discuss the different basins and pond sites that they are proposing and the concerns they have. The meeting is scheduled for January.
- Mr. Phil Matson and Mr. Szpyrka inquired about the status of a roundabout at 66 Avenue.
- Mr. Rodriguez illustrated the designed roundabout alternative detail and stated that he was currently looking at the traffic analysis to make sure the proper lane assignments are provided.
- Mr. Szpyrka said that once the proposed design is ready he would like to present it to the MPO board.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

FDOT

MEETING SIGN-IN SHEET

FM NUMBER: 405606-2-22-02

Project:
CR 510 PD&E Study

Location: IRC

Meeting Date: 12-14-16

Name	Initials	Company	Phone	E-Mail	Via Phone
Carlos Rodriguez	CR	METRIC	3/259-9643	cd-r@metriceng.com	
MARIA FORMOSO		FDOT	777 4677	maria.formoso@dot.state.fl.us	
Robin Brisebois		FDOT - R/W	777-4249	robin.brisebois@dot.state.fi.us	
Rich Szpyrka		IRCPW	772-226-1234	rszpyrka@IRCGOV.com	
Alexandra Medina		MRG	786 693 3002	amedina@mrgmiami.com	
Phil matson		IR MPO	772 226 1455	pmatson@ircgov.com	
Paul Carballo		Metric	305 235 5098	paul.carballo@metriceng.com	

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with USFWS
Meeting Date: 2/23/2017
Location: USFWS Vero Beach Headquarters

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Fernando Ascanio	FDOT D4	Fernando.acanio@dot.state.fl.us
Scott Clark	FDOT D4	Scott.clark@dot.state.fl.us
John Tupy	USFWS	John_tupy@fws.gov
Elizabeth Landrum	USFWS	Elizabeth_landrum@fws.gov
Rob Myers	Metric Engineering	Rob.Myers@metriceng.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	Ggarcia@metriceng.com
Michael McCoy (phone)	Metric Engineering	Mmccoy@metriceng.com

The purpose of this meeting was to coordinate with USFWS regarding the South Prong Preserve and the Wabasso Scrub Conservation Area. The following provides a brief summary:

- Mr. Rodriguez explained the limits of the project and the proposed typical sections. He explained that R/W will be required from the South Prong Preserve parcels. Mr. Myers explained that the existing culvert at the south prong of the Saint Sebastian River will be replaced with a bridge. There is a potential to provide a pedestrian crossing underneath the bridge.
- Mr. Myers summarized the results of the caracara surveys to date. He explained where the survey stations are located, the birds are often seen in the group of trees behind the baseball fields. The survey stations are too far to determine which tree is a potential nest location. They have been seen foraging in the dumpsters behind the strip mall/Publix several times. He suggested moving the survey station closer to the potential nest site if the nest is needed to be located. Mr. Tupy stated that isn't advisable, in order to avoid disturbing the nest.
- Mr. Myers asked what other information USFWS will like to see in order to make their determination and provide concurrence.
- Mr. Tupy recommended that a circle be drawn around the potential area where a nest could be located. From there a 985' radius will indicate the core territory, a 5,000' radius will indicate the nesting territory. He would like to know how many acres of the habitat are being developed for the road (how much of the habitat is being paved). He stated he does not anticipate formal consultation will be required unless future surveys produce significantly different results.
- Mr. Rodriguez showed them the extent of the widening of the road. Mr. Tupy agreed that the widening is minor nearest to where the nest is located. He indicated it is clear that a nest will not be taken for this project.
- Ms. Landrum stated her concern at the Wabasso Scrub Conservation Area is increased speeds and vehicle strikes.

- Mr. Rodriguez explained that a roundabout is being proposed at 66 Avenue to reduce speeds.
- Mr. Myers stated the team is assuming presence and does not think that scrub jay surveys are necessary. Ms. Landrum agreed. Mr. Myers stated that he has not found guidance on how to calculate take for the potential increase in vehicle strikes.
- Mr. Myers asked what information will be required for them to make their determination. Mr. Tupy would like to know the increase in traffic between the future build and no build scenarios. Mr. Tupy suggested Metric include a traffic summary of the increase in traffic in the recent past compared to the future increase and describe all of the minimization efforts to reduce future mortality.
- Ms. Landrum and Mr. Tupy stated that they need to do more research on how to determine the level of take and impacts that may result because of the project.
- Ms. Landrum stated that eastern indigo snake will not likely be a problem due to extensive potential habitat and limited destruction of potential habitat occurring along a roadway corridor. Mr. Tupy stated that research has shown that eastern indigo snakes in South Florida are not necessarily tied to gopher tortoise burrows.
- FDOT will set up a follow up phone call with USFWS to discuss the results of their research for scrub jay determinations. This will also help determine if formal consultation will be required.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with USFWS
Meeting Date: 3/7/2017
Location: Conference Call

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
John Tupy	USFWS	john_tupy@fws.gov
Fernando Ascanio	FDOT D4	Fernando.Ascanio@dot.state.fl.us
Rob Myers	Metric Engineering	Rob.Myers@metriceng.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	Ggarcia@metriceng.com

The purpose of this meeting was to discuss potential impacts to scrub jays from the CR 510 PD&E project and determine the degree of consultation that will likely be required.

- Mr. Myers provided a brief summary of discussions from the previous meeting with USFWS and described the sample Biological Opinion provided by Mr. Tupy. Mr. Myers suggested following the sample Biological Opinion and making a determination of May Affect Not Likely to Adversely Affect for the Florida scrub jay.
- Mr. Tupy was in agreement but noted some minor differences with the sample Biological Opinion, namely that the oaks were in the median and were used as a stopover point by scrub jays.
- Mr. Tupy stated they do not recommend planting trees in the median of C.R. 510.
- Mr. Myers suggested that minimization measures from the sample Biological Opinion might be applied to this project. Namely restrictions on construction in front of the Wabasso Scrub Conservation Area during scrub jay nesting season (March 1 through June 30), no staging of equipment or materials in scrub habitat, and installation of signs warning motorists of wildlife.
- Mr. Myers noted that in the previous meeting it was determined that “no feeding” signs were likely not necessary.
- Mr. Myers described projected traffic levels in front of the Wabasso Scrub Conservation Area, which are shown in the table below:

Scenario	Limits		AADT		
	From	To	2020	2030	2040
No Build	66 Avenue	58 Avenue	12433	14788	17590
Build	66 Avenue	58 Avenue	12952	16717	21578
		Difference	519	1929	3988
		Percent change	4%	13%	23%

- Mr. Tupy suggested other minimization/mitigation measures, including banding/tracking studies, speed controls, and no litter/trash signs near the Wabasso Scrub Conservation Area during construction.
- Mr. Rodriguez discussed options for reducing vehicle speeds, including a roundabout at 66th Avenue and a median in front of the Wabasso Scrub Conservation Area. He noted that the speed limit will be discussed with the county because C.R. 510 is a county road but that it can likely be posted between 40 and 45 mph.
- Mr. Tupy stated that to gauge the level of take would require additional research and discussion on his part and Mr. Myers suggested they reconvene at a later date.
- The group determined that they would hold another conference call on March 15 to discuss the anticipated levels of take and potential mitigation/minimization measures.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Coordination with USFWS
Meeting Date: 3/15/2017
Location: Conference Call

The following table identifies the meeting participants.

Name	Company/Agency	Email
John Tupy	USFWS	john_tupy@fws.gov
Ann Broadwell	FDOT D4	Ann.Broadwell@dot.state.fl.us
Rob Myers	Metric Engineering	Rob.Myers@metriceng.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	Ggarcia@metriceng.com

The purpose of this meeting was to discuss potential impacts to scrub jays from the CR 510 PD&E project and determine the degree of consultation that will likely be required.

- Mr. Myers summarized the previous two meetings and noted that this meeting was scheduled to occur after Mr. Tupy had the opportunity to gather additional information regarding scrub jay impacts.
- Mr. Tupy noted that scrub jays cross CR 510 to forage and that widening CR 510 will result in an increase in traffic and increased likelihood of vehicle strikes with scrub jays. He suggested that additional coordination with Beth Powell, land manager for Indian River County and the Wabasso Scrub Conservation Area, regarding impacts was desired.
- Mr. Tupy identified potential take of dispersing scrub jays as well as potential take of resident birds crossing CR 510 to forage.
- Mrs. Broadwell asked if this take was likely to necessitate formal consultation and Mr. Tupy replied that formal consultation is likely.
- Mrs. Broadwell asked what information USFWS will need and Mr. Tupy replied that he will need to coordinate with Beth Powell and obtain existing data on scrub jays in the Wabasso Scrub Conservation Area.
- Mr. Myers suggested FDOT provide a draft NRE that would later be updated with the results of 2017 caracara surveys in order to facilitate faster processing of a Biological Opinion. Mr. Tupy agreed that would work if the results of caracara surveys do not reveal anything unexpected.
- Mrs. Broadwell stated that an internal meeting would be held and she would begin putting together documentation for formal consultation.
- Mr. Tupy agreed to coordinate with Beth Powell and begin gathering requisite data.
- All agreed that further coordination would occur.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

METROPOLITAN PLANNING ORGANIZATION
TECHNICAL ADVISORY COMMITTEE

A meeting of the Indian River County (IRC) Metropolitan Planning Organization Technical Advisory Committee (MPOTAC) was held at 10:00 AM on Friday, March 24, 2017 in Conference Room B1-501, Building B, of the County Administration Complex, 1800 27th Street, Vero Beach, Florida.

Note: Audio and video recordings of the meeting can be found at
http://www.ircgov.com/Boards/TAC/2017.htm

MPOTAC members present were: **Chairman Jason Nunemaker**, City Manager, City of Fellsmere; **Eric Menger**, City of Vero Beach Airport Director; **Karen Deigl**, Senior Resource Association, **Monte Falls**, City of Vero Beach Public Works Director; **Tim McGarry**, City of Vero Beach, Planning Department; **Scott Baker**, City of Sebastian Airport Director; **Frank Watanabe**, City of Sebastian Engineering; **Rich Szpyrka**, IRC Public Works; **Kimberly Graham**, IRC Traffic Engineer; **Roland DeBlois** (alternate), IRC Community Development Director; **Deputy Douglas MacKenzie,** (alternate) IRC Sheriff's Office; and **Lisa Dykstra**, FDOT (non-voting advisor).

MPOTAC members absent were: **Noah Powers**, Town of Orchid Town Manager; **Stan Boling**, IRC Community Development Director; **Jennifer Idlette,** IRC School Board Transportation Director; **Sgt. Kip Benham**, Town of Indian River Shores; **Lt. Thomas Raulen**, IRC Sheriff's Office; and **Michael Smykowski,** IRC Budget.

Also present were IRC Staff: **Phil Matson**, MPO Staff Director; **Brian Freeman**, MPO Senior Planner; **Andy Sobczak**, MPO Senior Planner; **Sharon Schalm**, MPO Staff Assistant and Recording Secretary.

Others Present included: **Stewart Robertson**, Kimley-Horn; **Chris Stephenson**, Senior Resource Association, **Maria Formosa**, FDOT; **Ken Ludwa**, BSE Consultants; **Carlos Rodriguez**, **Gabriela Garcia**, Metric Engineering; **Victoria Williams,** FDOT Turnpike MPO Liaison; **Beth Beltan**, Martin County MPO Director.

Call to Order

Chairman Nunemaker called the meeting to order at 10:02 AM at which time it was noted that a quorum was present.

Approval of Minutes of the MPOTAC Meeting of January 27, 2017.

Chairman Nunemaker asked if there were any additions or corrections to the MPOTAC minutes of January 27, 2017. There were none.

ON MOTION by Ms. Deigl, SECONDED by Mr. Watanabe, the TAC

members voted (10-0) to approve the minutes of the Metropolitan Planning Organization Technical Advisory Committee of January 27, 2017.

Ms. Graham arrived at 10:04AM; Mr. Szpyrka arrived at 10:05 AM

Presentation of the North County Transit Hub Final Report
No Action Required

Mr. Matson introduced Mr. Freeman who gave a Power Point presentation, a copy of which is on file in the MPO office. Mr. Freeman noted that MPO staff had been directed by the MPO Board to look for improvements to the North County Hub. He noted that the MPO contracted with their General Planning Consultant, Tindale Oliver, to look at the site and do an assessment of the current site which has four buses that meet on Dryden Avenue one time each hour to transfer passengers.

Mr. Freeman explained that Tindale Oliver's study area covered a mile radius from the current site, and from that study 9 candidate sites emerged. He noted that the top rated site according to the Tindale Oliver study and recommended by Tindale, was site "G", the Ansin Conservation site. Mr. Freeman also explained that the assessment plan noted the possibility of dual use of the site, as a trailhead.

Chairman Nunemaker asked if there was a management plan for that site. Mr. DeBlois, Indian River County Chief of Environmental Planning explained that the County had acquired the Ansin property 10 years previous and there was a Covenant of Restrictions with the Florida Community Trust. He noted that one of the Recorded Covenant's allowed for recreation and would be compatible with dual purpose. He explained that he had requested that the State of Florida formally look at the possibility of dual purpose and was waiting for their response.

Mr. Watanabe noted that the current site on Dryden was being upgraded with sidewalks. He also noted that the Sebastian City Council preferred site G but would like a study of the intersection of CR510 and CR512. Mr. Matson assured Mr. Watanabe that the intersection would be looked at.

Chairman Nunemaker noted that Fellsmere also was in support of site G. Mr. Baker inquired about the pedestrian crossings. Ms. Graham explained about the crosswalks and pedestrian crossings.

ON MOTION BY Mr. Watanabe, SECONDED BY Mr. McGarry, the members voted (12-0) to recommend that the Metropolitan Planning Organization approve the North County Transit Hub Final Report, as presented.

Consideration of the 2040 Regional Long Range Transportation Plan (RLRTP)
No Action Required

Mr. Matson introduced Stewart Robertson of Kimley-Horn and Associates, who gave a Power Point presentation, a copy of which is on file in the MPO office. He explained that, undertaking the Regional Long Range Plan, qualifies the MPO to receive TRIP funds, a program which has yielded approximately $15 Million for regional road projects in Indian River County (including the widening of Oslo Road, CR 512, and 66th Avenue).

Mr. Robertson noted that, on February 3, 2016, the Indian River MPO entered into a Memorandum of Understanding (MOU) with the St. Lucie and Martin MPOs for development of a 2040 Regional Long Range Transportation Plan Update. Mr. Robertson then went on to present the draft of that plan through a power point presentation, a copy of which is on file in the MPO office. He presented background data, growth projections, the regional network, alternative modes, and Goals, Objectives and Policies of that draft plan.

Consideration of the CR 510 Widening Project Study Report
No Action Required

Mr. Matson noted that the widening of CR 510 (CR 512 – 58th Avenue) is a key element of the MPO's 2040 Long Range Transportation Plan and is currently the top highway priority project. Mr. Matson introduced Ms. Garcia of Metric Engineering who gave a Power Point presentation concerning the project schedule, design, and environmental study. Discussion took place about the round-a-bouts in several locations on CR510 but no decision has been made. Mr. Matson noted that by the end of 2018 there should be 15% of the final design completed and how much funding will be needed.

Presentation of the FDOT Strategic Intermodal System 2045 Multimodal Unfunded Needs Plan
No Action Required

Mr. Matson introduced Ms. Dykstra from District 4 FDOT who gave a Power Point presentation, a copy of which is on file in the MPO office. She explained that the Strategic Intermodal System (SIS) Multimodal Unfunded Needs Plan (MMUNP) identifies capacity projects needed on the SIS, Florida's statewide network of high priority transportation facilities including airports, highways, railroads, seaports, spaceports, and transit.

Ms. Dykstra noted that the Florida Department of Transportation (FDOT) has initiated an update to the current (2040) MMUNP to the year 2045. Discussion took place regarding the SIS project for Tri-Rail from West Palm Beach to Fort Pierce. Mr. Matson thanked FDOT for their

support for the Oslo Road Interchange.

Status Report of Other MPO Advisory Committees

Mr. Matson reviewed his memorandum, dated March 10, 2017, included in the agenda packet and on file in the MPO Office.

Other Business

Ms. Dykstra handed out Household Travel Surveys being distributed by FDOT.

Comments from the Public

There were none.

Adjournment

There being no further business, the meeting adjourned at 11:25 AM.

County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County



Metropolitan Planning Organization Presentation

Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: March 24, 2017

County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

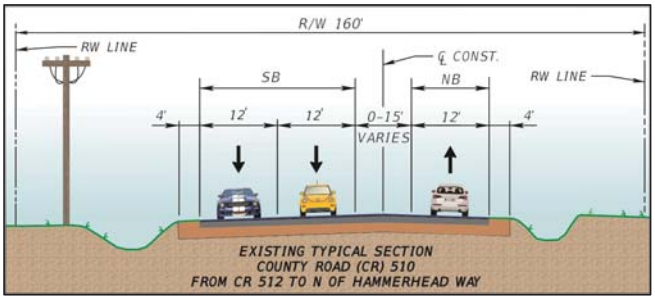


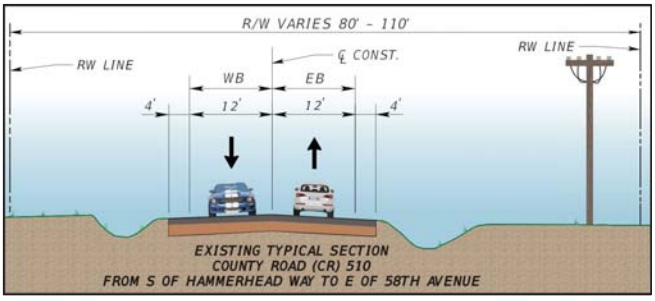
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- T% (daily): 5.3%





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - Improve Traffic operations
  - Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - Identified as a core project in the Indian River County 2035 LRTP
  - Identified as a priority project in the Indian River County TIP



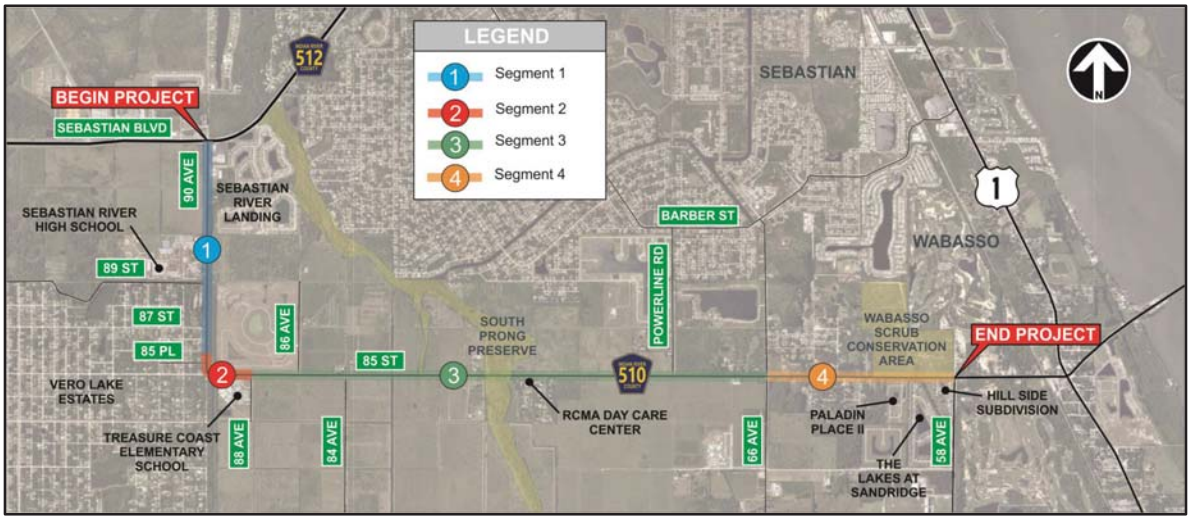


County Road 510 PD&E Study

Engineering Analysis

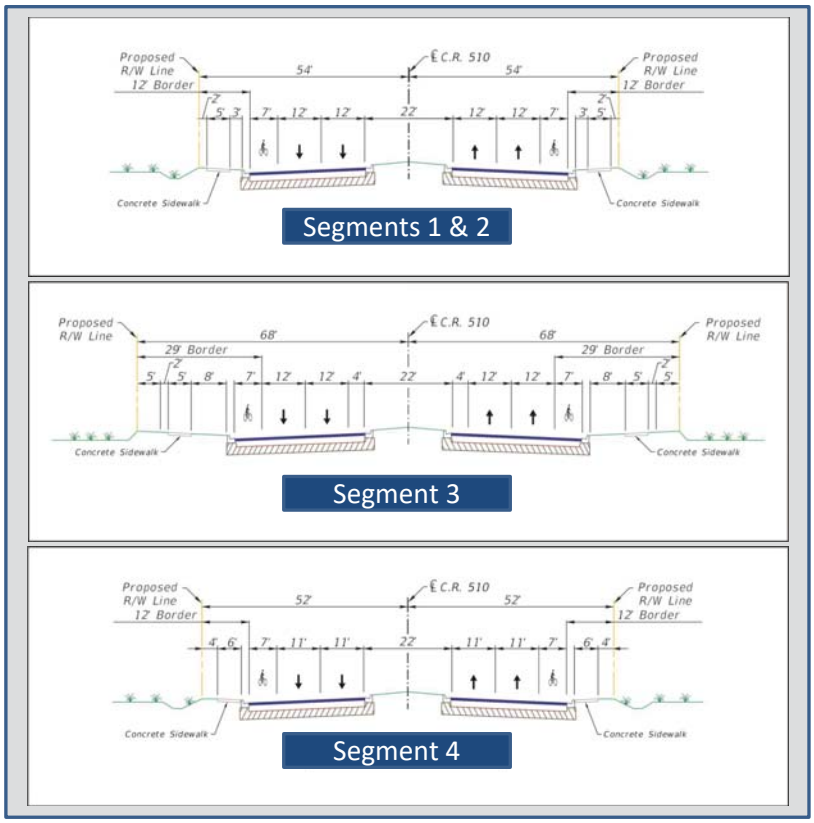
Segmental Determination

- **Segment 1:** From CR 510/512 intersection to 85th Place
- **Segment 2:** From 85th Place to just west of 88th Avenue
- **Segment 3:** From just west of 88th Avenue to 66th Avenue
- **Segment 4:** From 66th Avenue to 58th Avenue



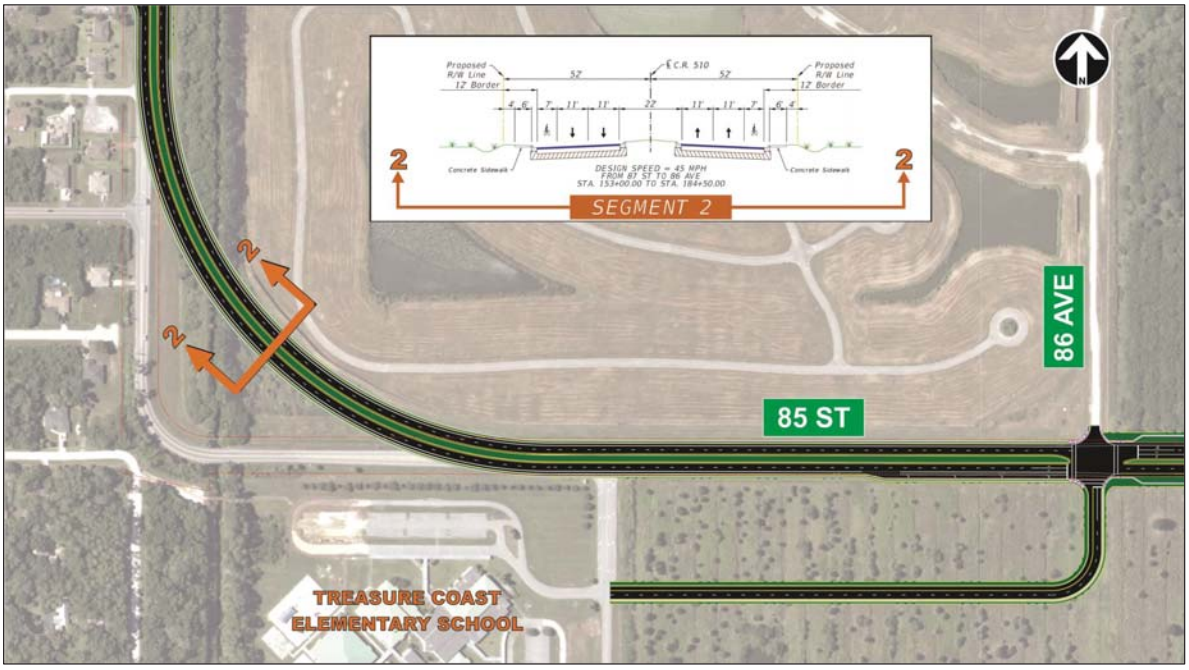
County Road 510 PD&E Study

Proposed Typical Sections



County Road 510 PD&E Study

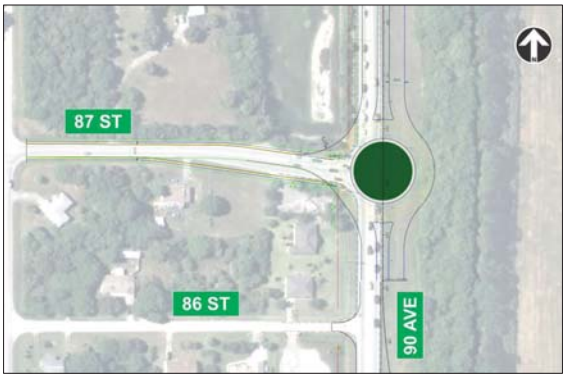
Horizontal Curve Realignment

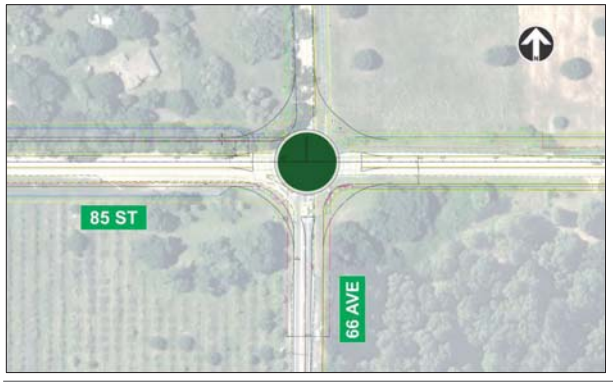


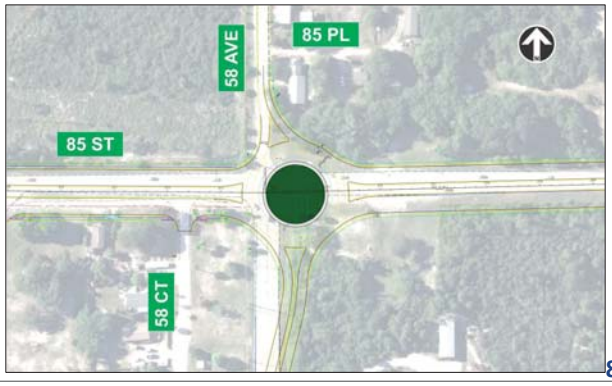
County Road 510 PD&E Study

Roundabout Analysis

- Roundabouts found to be feasible at three locations:
  - 87th Street and 90th Avenue
  - 66th Avenue and 85th Street
  - 58th Avenue and 85th Street (not recommended)
    - Requires realignment of 58 Avenue to avoid the Wabasso Scrub Conservation
    - Requires additional R/W impacts







County Road 510 PD&E Study

Drainage

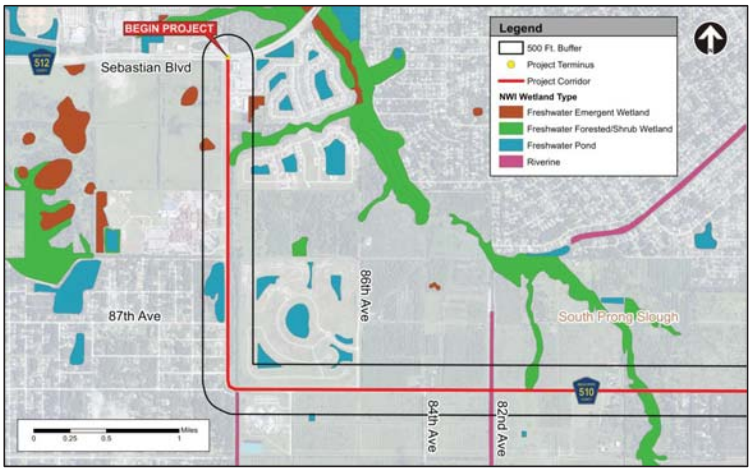
- Offsite swale will be required
  - Properties to the north currently drain to the roadside ditch that will be impacted by the project
  - New ditch or pipe system will be constructed to the north



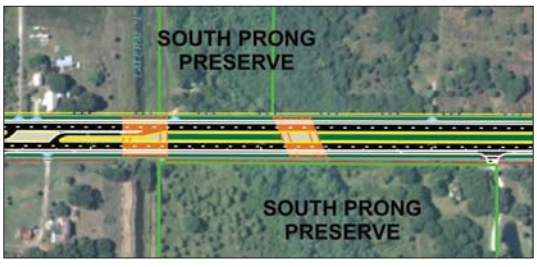
County Road 510 PD&E Study

Environmental Analysis

- Section 4(f) Resources
  - All purchased with P2000/Florida Forever Funds
  - Impacts to South Prong Preserve are un-avoidable
- Threatened and Endangered Species
  - Scrub Jay, Gopher Tortoise, Sandhill Crane, Wood Stork, Caracara all confirmed near project
  - Caracara nest surveys ongoing
  - USFWS Consultation
- Cultural and Historic Resources
  - CRAS submitted and SHPO for review
- Wetlands occur in multiple areas
  - Especially along St. Sebastian River tributaries
  - Essential Fish Habitat



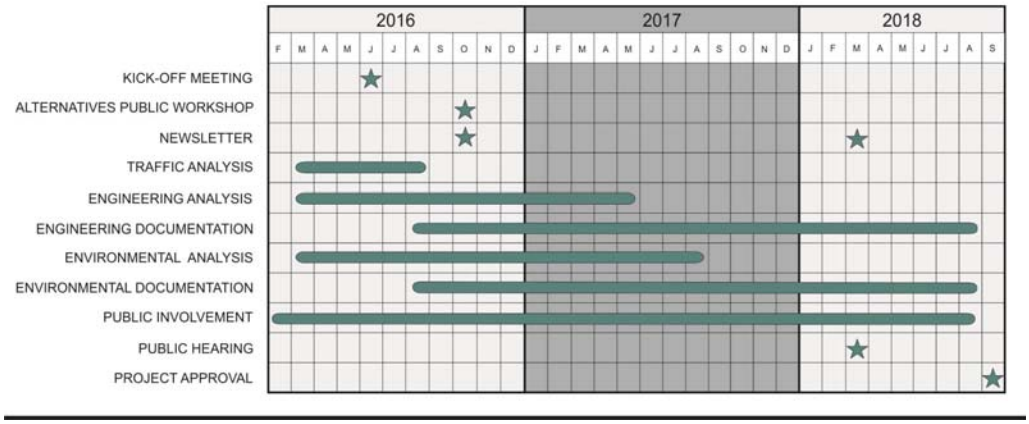




Project Schedule

- Key Dates
  - Public Hearing- Spring 2018
  - Location Design Concept Acceptance- Fall 2018

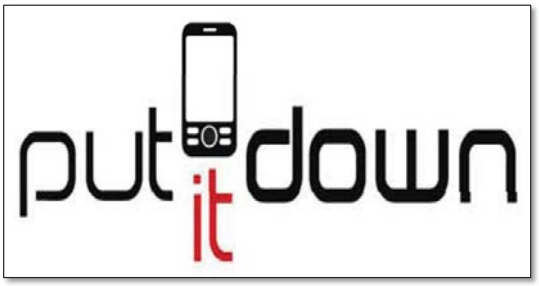
CR 510 PD&E Study Schedule



Thank You!!







METROPOLITAN PLANNING ORGANIZATION

A meeting of the Indian River County (IRC) Metropolitan Planning Organization (MPO) was held at 10:00 AM on Wednesday, April 12, 2017, in the County Administration Building "B", Room B1-501, 1800 27th Street, Vero Beach, Florida.

Note: Audio and video recordings of the meeting can be found at http://www.ircgov.com/Boards/MPO/2017.htm

MPO members present were: IRC Commissioners: **Commissioner Susan Adams**, District 1; **Commissioner Joseph Flescher**, District 2; **Commissioner Tim Zorc**, District 3; **Laura Moss,** Mayor, City of Vero Beach; **Shawn Frost,** IRC School Board; **Andrea Coy**, Vice-Mayor, City of Sebastian; **Chairman Bob McPartlan,** Mayor, City of Sebastian; **Sara Savage**, Vice-Mayor, City of Fellsmere; **Dick Haverland**, Council Member, Town of Indian River Shores; and **Mira Skoroden**, FDOT (non-voting advisor).

Absent was: **Commissioner Peter O'Bryan**, District 4; **Commissioner Bob Solari**, District 5; **Lange Sykes**, Council Member, City of Vero Beach; **Hal Ofstie**, Town of Orchid (non-voting member).

IRC staff present were: **Jason Brown**, IRC Administrator; **Stan Boling**, IRC Community Development Department Director; **Rich Szpyrka**, IRC Public Works Director; **Phil Matson**, IRC MPO Director; **Brian Freeman,** MPO Senior Planner; **Andy Sobczak,** MPO Senior Planner; and **Sharon Schalm**, MPO Staff Assistant 3 /Recording Secretary.

Also present were: **Jason Nunemaker**, City Manager, City of Fellsmere; **Stewart Robertson**, Kimley-Horn; **Beth Beltan**, **Ricardo Vazquez**, Martin County MPO; **Karen Deigl**, Senior Resource Association (SRA); **Mayur Patel, Lois Bush,** FDOT District 4; **Carlos Rodriquez,** Metric Engineering**; Richard Dreyer,** Tindale Oliver; **Amy Banov, Hugh and Laura Aaron**, **Mike Matyniak**, Bike Walk Indian River County; **Frank Watanabe,** City of Sebastian Engineering; **Dorri Bosworth,** City of Sebastian; **Chief Michelle Morris,** Sebastian Police Department; **Ervin Cartwright,** Wabasso; **Julianne Price**, Indian River Department of Health; **Richard Baker**, Audubon; **Mark Bondy,** Friends of the Sebastian River**; Bryan Corrigan,** Corrigan Ranch; **Andrew Kennedy, Leslie Milligan, Othur and Joan Meadors, Shirley Whitmore, Rex Luther, Myra and Virtor Caron, Phyllis and Patricia Walsh, Gina Biro, Rafael Vazquez, Ruth and Chuck Hemp, Ron and Chris Berti, Michael and Melinda Getz, Bernadine and Lee Ferraro, Sara Johnston, Michael Venazio, Claire Hauser, Irene Edes, Dorothy and Jack Pimethal, Claudia Martino, Eileen Clancy, John Walker, John Davis, Mary Sheil, Tom Davis, Harold Richards, Gina Howland, Craig Stanford, Robert Riley, Albert Brown, Martin Skygar, Brodie Gantt, Jeri Harris, Dave and Heather Stein, Jennifer Swanson, Jack Maitner**, **Ronald Wilkinson**, **Maria Branco**, **Lawrence and Linda Ferguson**, **Anthony Tonioli**, **Steve Vance**, **Amanda King**, **Eric Fischer**, **Debra and Frank Casiglia**, **Carol Malicki**, **Diana and Harold Richards, Anna Howland**; **Steve Massey**, **Craig Stanford**, **Pat Pobrits**; Concerned Citizens.

Call to Order

Chairman McPartlan called the meeting to order at 10:04 AM.

Approval of Minutes of the MPO Meeting of February 8, 2017
Action Required

Chairman McPartlan asked if there were any additions or corrections to the MPO minutes of February 8, 2017. There were none.

> **ON MOTION BY, Commissioner Flescher, SECONDED by Mr. Frost, the members voted (8–0) to approve the minutes of the Metropolitan Planning Organization of February 8, 2017, as presented.**

Status Report of Other MPO Advisory Committees
No Action Required

Mr. Matson reviewed his memorandum, dated April 3, 2017, included in the agenda packet and on file in the MPO Office.

Review of Progress Report and Reimbursement Invoice #2 for the FY 2016/17 Transportation Disadvantaged (TD) Planning Grant
Action Required

Mr. Matson referred to his memorandum dated March 30, 2017, a copy of which is included in the agenda packet and on file in the MPO Office.

> **ON MOTION BY Vice-Mayor Coy, SECONDED BY Commissioner Adams, the members voted (8–0) to approve the Progress Report and Reimbursement Invoice #2 for the 2016/17 Transportation Disadvantaged (TD) Planning Grant as presented.**

Commissioner Zorc arrived at 10:16 AM

Discussion of the North County Transit Hub
Action Required

Mr. Matson introduced Richard Dreyer of Tindale and Associates who gave a Power Point presentation, a copy of which is on file in the MPO office. Mr. Dreyer gave a brief summary concerning the preliminary report noting that the current site on Dryden had operational and safety issues and complaints from the nearby neighborhoods. Mr. Dreyer noted that some sites in the report had been added, and some eliminated from the 10 potential

hub locations. He noted that those locations had been ranked based on criteria such as site suitability, cost, and location. He noted safety concerns, size, location, site access, impacts on transit system service, potential site constraints, and noted that five sites had been ranked with the greatest potential and site D ("Vacant Land at 9455 CR 512/Sebastian Boulevard") emerged as the one with the highest ranking. He noted that this site will be ADA compliant, with shelters, sidewalks, and located 500-600 feet from the CR512/CR510 intersection, on the same side of the road as the Sebastian River High School. He explained that this site will be an interim site until CR 510 is widened. He noted that the next step would be for the MPO to work with its local and state partners to develop the short-term North County Transit Hub, coordinate with FDOT and the County, and begin community engagement.

Discussion ensued. Several residents of the nearby communities spoke. The overwhelming majority of comments concerned crime and the behavior of students, environmental concerns, traffic congestion and safety issues. A smaller number of residents commented on their reliance on transit and their desire to keep the bus hub in its current location on Dryden Ave. The MPO Chairman thanked them for their input.

All Board members were in agreement with the need for safety upgrades such as lighting and cameras. Mayor Moss was for improving the existing site. Vice-Mayor Coy suggested upgrading the current site and not moving the hub, Commissioner Adams was in favor of site D, Commissioner Zorc gave a brief history of the Main Transit Hub in Vero and the problems encountered over the years. School Board Member Frost noted that the safety and concern for students were a huge consideration and lighting, cameras and security of riders were important. He noted site D was a thoughtful location. Chairman McPartlan noted that most of the resident's comments had to do with teens and nothing to do with the buses. He reminded the residents that if they see something, say something and to report misconduct to the police. Commissioner Flescher noted that traffic calming devices needed to be included as part of site D and expressed that the cost is a small price to pay because so many people depend on transit.

Mayor Moss left the meeting at 11:00 AM, changing the quorum from 9 to 8

Chairman McPartlan called for a roll-call vote on the motion.

ON MOTION BY, Commissioner Adams, SECONDED by Mr. Frost,
MPO members voted (7–1) with Vice-Mayor Coy opposed, to accept
The North County Transit Hub Site Assessment Final Report, as presented.

ON MOTION BY, Vice Mayor Coy, SECONDED by Commissioner Adams,
MPO members voted (8-0), to look into keeping a bus stop in the vicinity of the current North County Bus Hub.

Update on Bike Walk Indian River County
No Action Required

Mr. Matson introduced Hugh and Laura Aaron, and Amy Banov, Board members of Bike Walk Indian River County, Inc. Mr. Matson gave high praises to the Aarons concerning their efforts to promote and advance safe cycling in Indian River County. Ms. Banov gave a Power Point presentation, a copy of which is on file in the MPO office.

Ms. Banov gave a brief overview concerning Vero Cycling, a bicycling recreation club and Bike Walk Indian River County, a bicycle advocacy group, special events, priorities of Bike Walk Indian River County, the Bike Rehab Program, infrastructure and education safety, and results. Mr. Sobczak provide a list of improvements completed so far this year. Commissioner Coy noted the need for Bicycle education in the North County area.

Consideration of the CR510 Widening Project Study Report

No Action Required

Mr. Matson noted that the widening of CR 510 (CR 512 – 58th Avenue) is currently the top highway priority project. Mr. Matson introduced Ms. Garcia of Metric Engineering who gave a Power Point presentation concerning the project schedule, design, and environmental study. Mr. Garcia discussed the four segments, proposed typical sections, the horizontal curve realignment, roundabout analysis, drainage, environmental analysis and the project schedule.

Presentation of the FDOT Strategic Intermodal System 2045 Multimodal Unfunded Needs Plan

No Action Required

Mr. Matson introduced Ms. Lois Bush from District 4 FDOT who gave a Power Point presentation, a copy of which is on file in the MPO office. She explained that the Strategic Intermodal System (SIS) Multimodal Unfunded Needs Plan (MMUNP) identifies capacity projects needed on the SIS, Florida's statewide network of high priority transportation facilities including airports, highways, railroads, seaports, spaceports, and transit.

Ms. Bush noted that the Florida Department of Transportation (FDOT) has initiated an update to the current (2040) MMUNP to the year 2045. Ms. Bush mentioned the aspirational interchange at 53rd. Commissioner Zorc inquired about the possibility of moving this item forward and if a board action would help. Mr. Matson noted that it could be on a future agenda with an option to make a motion. Commissioner Zorc also asked how SIS funding was determined. Ms. Bush noted that it was a statewide level process.

Consideration of the 2040 Regional Long Range Transportation Plan (RLRTP)

No Action Required

Mr. Matson introduced Stewart Robertson of Kimley-Horn and Associates, who gave a Power Point presentation, a copy of which is on file in the MPO office. He explained that, undertaking the Regional Long Range Plan, qualifies the MPO to receive TRIP funds, a program

which has yielded approximately $15 Million for regional road projects in Indian River County (including the widening of Oslo Road, CR 512, and 66th Avenue). Mr. Robertson noted that the project team developed an informational Public Brochure to provide background and context regarding the development of the overall 2040 RLRTP project. He also discussed, data collection, trends and conditions, and community surveys, used to gather information to help identify needs for the development of the Regional Needs Plan.

Quarterly Progress Report

No Action Required

Mr. Matson summarized the Quarterly Status Report of MPO Staff Activities from October 1, 2016 through December 31, 2016, a copy of which is on file in the MPO Office.

Other Business

- **Upcoming FDOT Surveys**
  Mr. Matson mentioned the Household Travel Surveys being distributed by FDOT.

- **All Aboard Florida**
  Mr. Matson noted that there was no new information to report on All Aboard Florida. Mr. Patel of FDOT mentioned that plans are available and he can provide information.

Comments from the Public

There were none.

Adjournment

There being no further business, the meeting adjourned at 12:42 PM.

County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County



Metropolitan Planning Organization Presentation

Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: April 12, 2017

County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

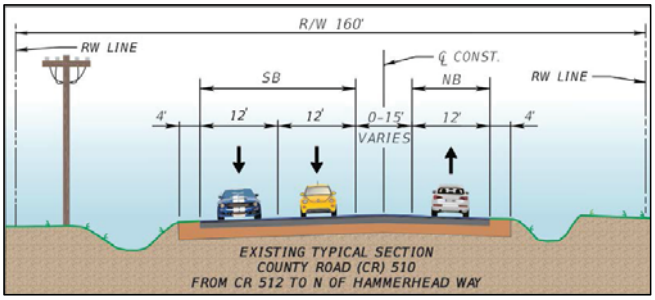


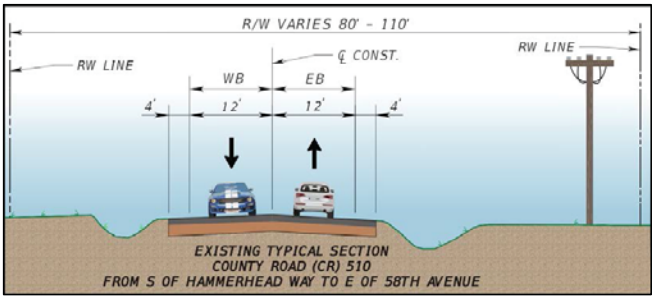
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- Truck (T%) : 5.3% (daily)





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - Improve Traffic operations
  - Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - Identified as a core project in the Indian River County 2035 LRTP
  - Identified as a priority project in the Indian River County TIP



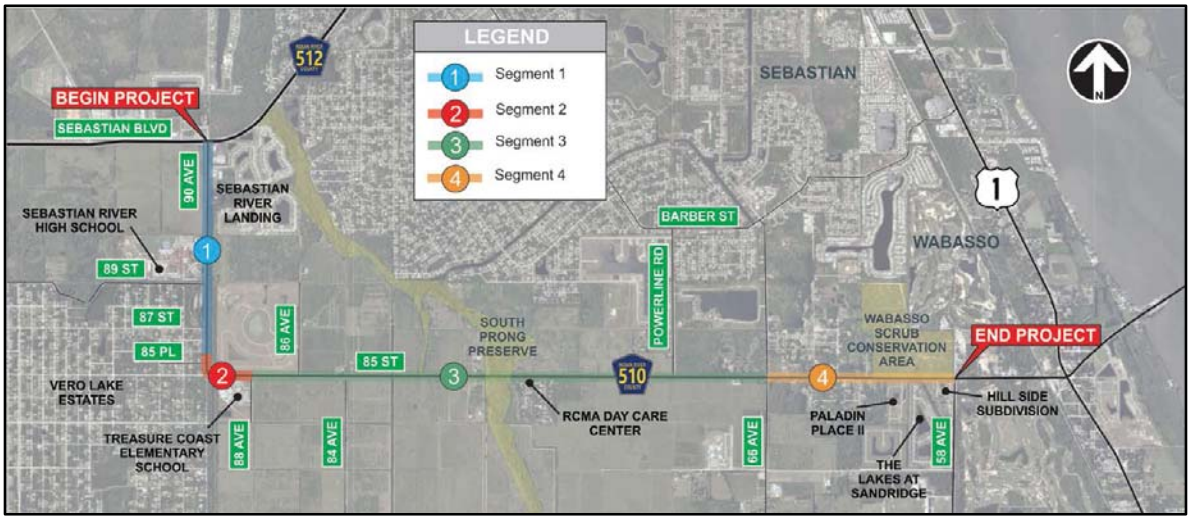


County Road 510 PD&E Study

Engineering Analysis

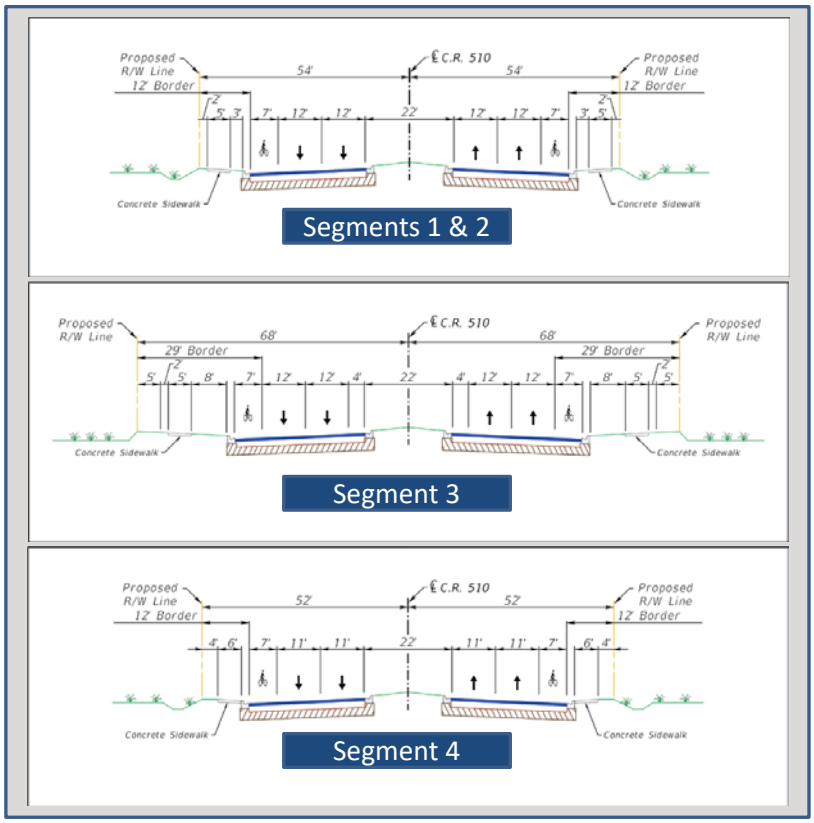
Segmental Determination

- **Segment 1:** From CR 510/512 intersection to 85th Place
- **Segment 2:** From 85th Place to just west of 88th Avenue
- **Segment 3:** From just west of 88th Avenue to 66th Avenue
- **Segment 4:** From 66th Avenue to 58th Avenue



County Road 510 PD&E Study

Proposed Typical Sections



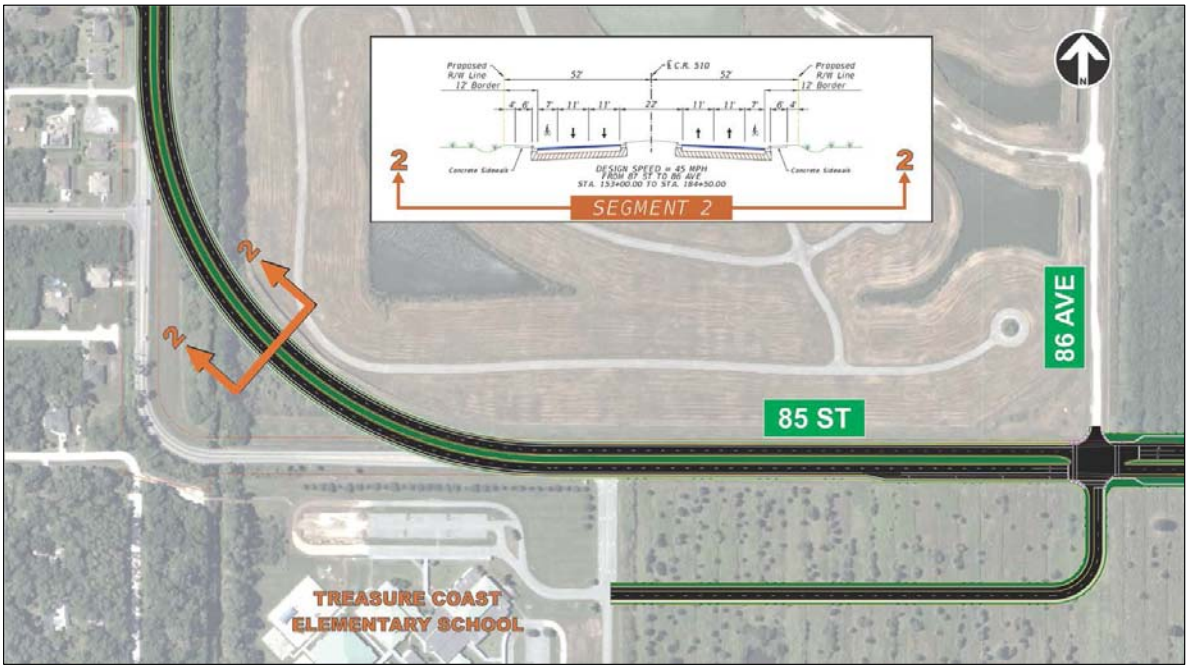
County Road 510 PD&E Study

Project Updates

- Engineering
  - o Revised Horizontal Curve Realignment
  - o Roundabout analysis and recommendations
  - o Off Site Drainage Requirements
- Environmental
  - o USFWS Formal Consultation on Scrub Jays
  - o Section 4(f) Evaluation for impacts to the South Prong Preserve

County Road 510 PD&E Study

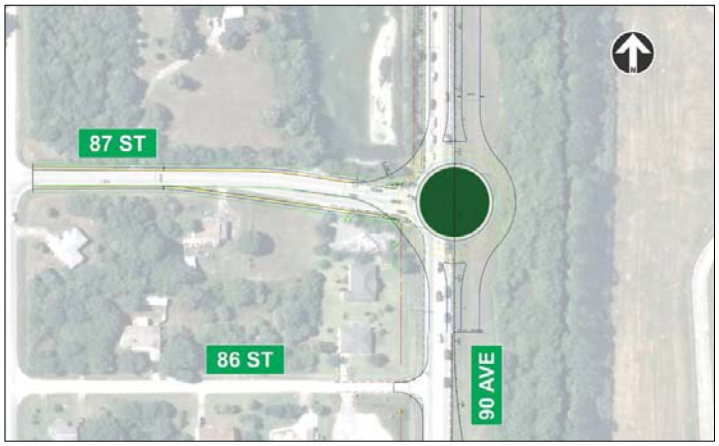
Horizontal Curve Realignment



County Road 510 PD&E Study

Roundabout Analysis

- CR 510/90th Avenue and 87th Street
  - Life Cycle Benefit/ Cost Ratio **1.9**
    - With southbound right turn by-pass **3.2**
  - Reduction in crashes anticipated
  - Traffic during events at high school could back up to the roundabout

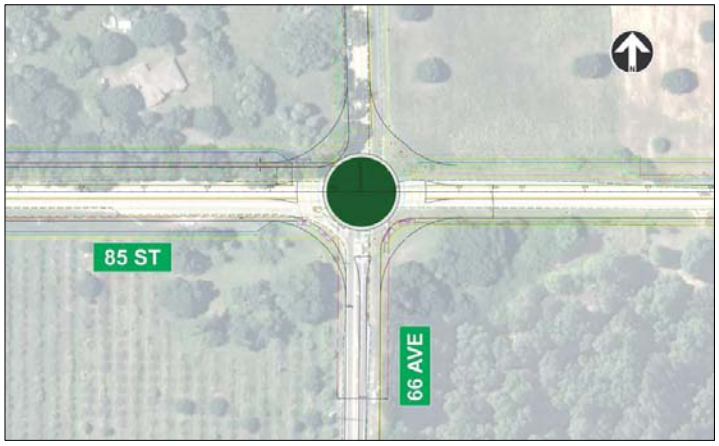


Delay (LOS)				
Year		Roundabout	Roundabout with SB RT By-Pass	Signal
2040	AM	51.89 F	22.87 C	24.40 C
	PM	23.34 C	------	14.50 B

County Road 510 PD&E Study

Roundabout Analysis

- CR 510/85th Street and 66th Avenue
  - Life Cycle Benefit/Cost Ratio **6.7**
    - With eastbound right turn by-pass **9.7**
  - Significant reduction in crashes anticipated
  - Also serves as transition between higher speed suburban corridor into lower speed urban community

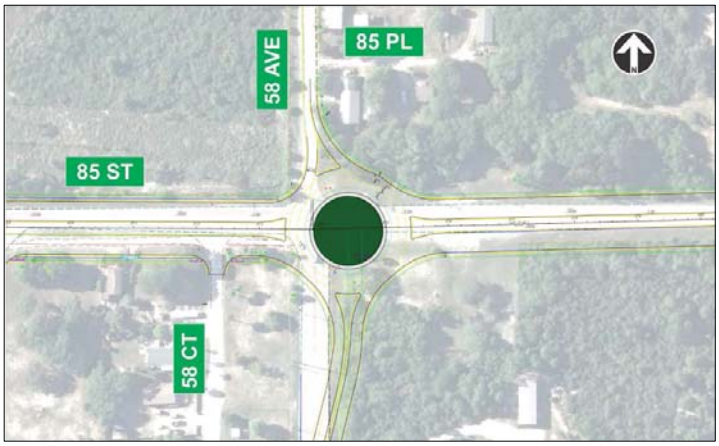


Delay (LOS)				
Year		Roundabout	Roundabout with EB RT By-Pass	Signal
2040	AM	43.30 E	---	39.00 D
	PM	72.35 F	33.79 D	39.00 D

County Road 510 PD&E Study

Roundabout Analysis

- CR 510/85th Street and 58th Avenue
  - Life Cycle Benefit/Cost Ratio **7.4**
  - Requires realignment of 58th Avenue to avoid the Wabasso Scrub Conservation
  - Requires additional R/W impacts
  - Reduction in crashes anticipated



Delay (LOS)			
Year		Roundabout	Signal
2040	AM	16.75 C	30.1 C
	PM	30.10 C	21.4 C

County Road 510 PD&E Study

Drainage

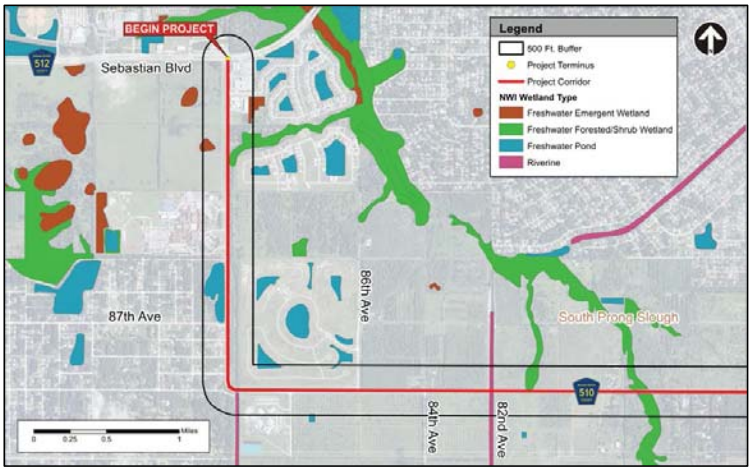
- Offsite swale will be required
  - Properties to the north currently drain to the roadside ditch that will be impacted by the project
  - New ditch or pipe system will be constructed to the north



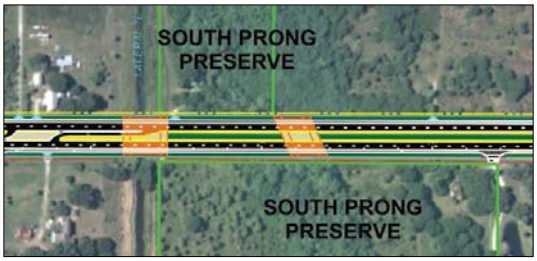
County Road 510 PD&E Study

Environmental Analysis

- Section 4(f) Resources
  - All purchased with P2000/Florida Forever Funds
  - Impacts to South Prong Preserve are un-avoidable
- Threatened and Endangered Species
  - Scrub Jay, Gopher Tortoise, Sandhill Crane, Wood Stork, Caracara all confirmed near project
  - Caracara nest surveys ongoing
  - USFWS Consultation
- Cultural and Historic Resources
  - CRAS submitted and SHPO for review
- Wetlands occur in multiple areas
  - Especially along St. Sebastian River tributaries
  - Essential Fish Habitat





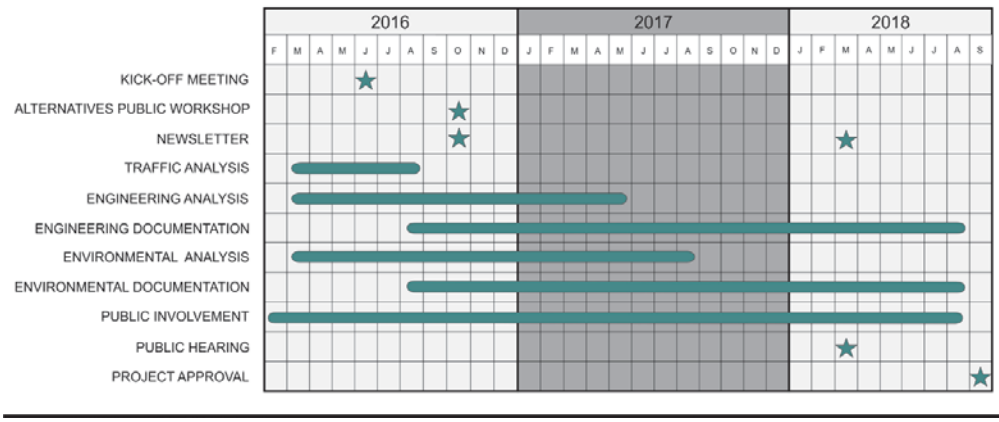


County Road 510 PD&E Study

Project Schedule

- Key Dates
  - Public Hearing- Spring 2018
  - Location Design Concept Acceptance- Fall 2018

CR 510 PD&E Study Schedule



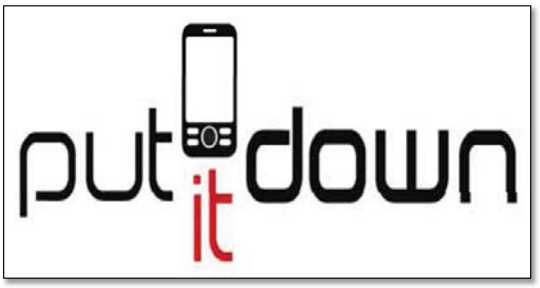
Thank You!!

For more information please contact:

Maria Formoso, PE, PMP – Project Manager
Florida Department of Transportation - District 4
3400 Commercial Blvd.
Ft. Lauderdale, FL., 33309
(954) 777-4677
Email: Maria.Formoso@dot.state.fl.us







Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Section 7 Consultation with USFWS regarding scrub-jay
Meeting Date: 4/28/2017
Location: Conference Call

The following table identifies the meeting participants.

Name	Company/Agency	Email
John Tupy	USFWS	john_tupy@fws.gov
Ann Broadwell	FDOT D4	Ann.Broadwell@dot.state.fl.us
Rob Myers	Metric Engineering	Rob.Myers@metriceng.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Gabriela Garcia	Metric Engineering	Ggarcia@metriceng.com
Millie Radzikhovsky	BMA Consulting	mradzikhovsky@bma-ce.com
Beth Powell	Indian River County	bpowell@ircgov.com
Roland Deblois	Indian River County	rdeblois@ircgov.com

The purpose of this meeting was to discuss potential impacts to scrub jays from the CR 510 PD&E project as well as possible minimization/mitigation measures.

- Mr. Myers described the proposed alternative in the vicinity of the Wabasso Scrub Conservation Area (WSCA), including the width of proposed right-of-way, travel and bike lanes, and sidewalks. He stated that no scrub habitat would be impacted and that C.R. 510 would be expanded to the south, away from WSCA.
- Mr. Myers noted that Metric has scrub jay territory maps from Indian River County (IRC) for years 2011-2014. Ms. Powell stated that more recent territory maps are not available at this time.
- Ms. Powell noted that IRC only performs surveys from within county-owned lands, including the WSCA. She further clarified that scrub-jay surveys at the WSCA do not follow the standard USFWS scrub-jay survey protocol because they do not play taped calls. Surveys are conducted in compliance with the regional Habitat Conservation Plan.
- Ms. Powell stated that they believe the total population of scrub-jays on the WSCA is 29 individuals across 10 families. She also stated that the southernmost territory on the WSCA (the scrub-jay territory that borders C.R. 510) is believed to be occupied by two individuals forming one family.
- Mr. Myers described published research papers that investigate impacts from traffic and roadways (Mumme et al. 2000) as well as papers that measure scrub-jay movements (Breininger 1999, Stith et al. 1996, Thaxton and Hingtongen 1996).
- Ms. Powell stated they have data of banded scrub-jays immigrating from the WSCA to other lands, particularly the St. Sebastian River State Park.
- Citing Mumme et al. (2000), Mr. Myers stated that he believes the majority of the impacts to resident scrub jays (those not dispersing to/from the WSCA) would be to birds with a territory adjacent to C.R. 510. Mr. Myers described the potential impacts to dispersing scrub-jays as being to individuals who disperse to or from the WSCA across C.R. 510.

- Ms. Powell stated they do not have data on the total number of scrub jays dispersing to or from the WSCA across C.R. 510. She stated they do have data on the number of scrub jays that have dispersed to/from the WSCA and were detected on other county-owned lands to the north.
- Mr. Myers suggested that, if Ms. Powell could provide useful data, the team can adopt scrub-jay dispersal rates to the north as a proxy for dispersal rates to the south. The group agreed to this approach and Ms. Powell agreed to provide banding/survey data for analysis.
- Mr. Myers described potential minimization/mitigation measures, including: restrictions on construction during the breeding season, installation of "no food trash" signs during construction, prohibition on staging equipment or materials in scrub habitat, installation of permanent signs warning motorists of sensitive wildlife, possible reduction of permitted speeds and designs (raised median, roundabouts) that help reduce speeds, prohibition on planting palms or oaks near the WSCA to discourage use by scrub-jays.
- Ms. Powell stated multiple concerns about any installation of vegetation along the WSCA, along the north side of the C.R. 510 right-of-way. Such vegetation could attract scrub-jays nearer the roadway and off of protected lands, attract predators, and make it more difficult to conduct controlled burns on the WSCA.
- Mr. Tupy expressed an interest in monitoring to ensure that any exempted level of take is not exceeded.
- Mr. Tupy stated that there is no existing fund, conservation bank, or other existing option that USFWS prefer be used for mitigation for impacts to scrub-jays. He suggested assistance with management/habitat restoration or protection of additional scrub habitat be explored.
- Ms. Powell pointed out that county-owned scrub habitats are already being managed for scrub-jays. She stated that there are multiple parcels she would be interested in incorporating into the IRC preserve system. She stated that many of these parcels are identified in long-term acquisition plans and agreed to provide a list of potential parcels that might be agreeable as mitigation lands.
- Mr. Myers clarified that no scrub jay habitat would be destroyed as a result of the project, and that the effects would be an incremental increase in the probability of vehicle collisions and further degradation of habitat along C.R. 510 that is already degraded because of the existing roadway. Mr. Myers stated concern that impacts of this magnitude may not warrant establishment of an entirely new preserve or purchase of enough land to be suitable for scrub-jays over the long term.
- Ms. Broadwell suggested FDOT establish a regional scrub-jay conservation bank that could serve the interests of multiple FDOT projects. The team agreed this approach is generally the most advantageous for conservation. However, Mr. Myers expressed concern about the project schedule not accommodating the time needed to establish a new conservation bank. Mr. Tupy stated that Section 7 consultation could be concluded with describing the levels of take and amount of mitigation required but that how that mitigation would be accomplished did not need to be finalized.
- Mr. Myers told the group he would provide a document describing the potential impacts to scrub-jays (focusing on the residents with territories adjacent to C.R. 510 and birds that

disperse across C.R. 510). It will also include relevant research and list proposed minimization measures.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Project Update for West Wabasso Progressive Civic Club
Meeting Date: 05/15/17
Location: 8586 64 Drive, Sebastian, FL

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Robin Brisebois	FDOT District Four Right-of-Way	Robin.Brisebois@dot.state.fl.us
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Ardra Rigby	Wabasso Progressive Civic Club	Rigbyardra@gmail.com
Bill Rigby	West Wabasso Progressive Civic Club	Rigbybill12@gmail.com

The purpose of this meeting was to present and discuss the most recent updates to the CR 510 PD&E Study from CR 512 to 58th Avenue (FM#405606-2-22-02) to the West Wabasso Progressive Civic Club. The following provides a brief summary of the meeting:

- Mr. Rodriguez explained that the typical section has remained the same as what was previously shown to them. He explained that a slight modification to the alignment was done in order to avoid impacts to The Oasis poolhall and the Allen Chapel Church.
- Mr. Bill Rigby expressed his concerns about drainage and flooding to the adjacent properties due to the proposed roadway. More specifically he stated that 61st Drive currently ponds north of CR 510. Mr. Rodriguez explained that all of the roadway runoff will be collected by the curb and gutter and treated at offsite ponds. Although the project will not address any existing drainage issues at each of the properties south of the road, this project will likely improve the flooding issues since all of the water from the roadway will be collected. Mr. Rodriguez explained that the proposed roadway will maintain a similar elevation to what is currently there.
- Mr. Rodriguez also explained that a drainage easement will be located north of CR 510 from 61st Drive to the west. This will address drainage concerns for off-site runoff north of CR 510.
- Mr. Rigby stated that if any offsite ponds are located within their community, that they would like them to be fenced in as they have many kids living in the community.
- Mr. Rodriguez explained that a roundabout is proposed at the intersection of 66 Avenue. The results indicated that it will perform better than a signal and will be safer for the community. This is also expected to serve as a good break between the 50 mph section west of 66 Avenue and the 45 mph section east of 66 Avenue. Mr. Rigby expressed concerns due to the heavy traffic at that location. Mr. Rodriguez explained that the analysis was performed comparing both intersection types to confirm that the roundabout is an improvement.
- Mr. Rodriguez explained different access enhancements that are possible within the Hill Side Subdivision. The county currently owns a 20 foot roadway right-of-way south of the first row of properties. In order to build a two-way street, a minimum of 40 feet is required. A road can be provided between 59 Avenue and 58 Court to provide connectivity within the

community. Additionally, a new road can be provided from 58 Court to 58 Avenue through one of the vacant parcels currently along 58 Avenue, as long as they are a willing seller. An additional connection can be made from 59 Avenue north west to CR 510 through the County-owned "triangle" property, however that would impact Mr. Rigby's property. Mr. Rigby stated he is not willing to impact 20 feet of his property on the northern limit of the property as the road would directly abut his house. However, he is willing to consider selling 40 feet of the southern boundary of his property for the same purpose. FDOT agreed to stake out the 40 feet to visually show Mr. Rigby how much of his property would be required.

- Additionally, the County has requested closure of 58 Court to CR 510 as it is dangerously close to the CR 510/58 Avenue intersection. Both Mr. Bill and Ardra Rigby agreed.
- Mr. Rigby invited the team to present these updates to the Wabasso Civic Club at the June 5, 2017 meeting.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE
Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

Project: CR 510 PD&E Study (FM#405606-2-22-02)
Subject: Project Update for West Wabasso Progressive Civic Club
Meeting Date: 05/15/17
Location: 8496 75 Ct, Vero Beach, FL

The following table identifies the meeting participants.

Name	Company/Agency	Email
Maria Formoso	FDOT D4	Maria.formoso@dot.state.fl.us
Robin Brisebois	FDOT 4 Right-of-Way	Robin.Brisebois@dot.state.fl.us
Gabriela Garcia	Metric Engineering	ggarcia@metriceng.com
Carlos Rodriguez	Metric Engineering	crodriguez@metriceng.com
Thim Beach	Property Owner	
Jan Beach	Property Owner	
David Holloway	Representing Property Owner	

At the request of the property owners, Mr. and Mrs. Thim Beach, the purpose of this meeting was to meet at the property of Mr. Thim Beach and discuss the potential impacts to his property due to the CR 510 PD&E Study from CR 512 to 58th Avenue (FM#405606-2-22-02). The following provides a brief summary of the meeting:

- Mr. Beach explained that the properties to the north of CR 510 are vacant properties and asked why the roadway could not be aligned to the north instead of impacting his property and his neighbors. Mr. Rodriguez explained the proposed alignment could not be completely shifted to the north because the constraint points are the bridges crossing the South Prong Preserve and Lateral Canal L.
- Ms. Garcia explained that the current alignment requires approximately 26 feet from the Beach property.
- Mr. Beach invited us to walk around the property to show what the impacts to his property are. If 26 feet is acquired from his property, his driveway will be completely impacted and access to one of the residential garages will not be possible, as well as access to their nursery business.
- Ms. Beach also requested that a median opening into their nursery be investigated.
- The team will consider other solutions to see how the impacts to this property could be minimized.
- Ms. Beach requested that a PDF of the design near their property be emailed to them.

Metric Engineering will rely on these notes as the approved record of matters discussed and conclusions reached during this meeting unless you send the author written notice to the contrary within seven calendar days of receipt date of this meeting record.

Submitted by: Carlos Rodriguez, PE, Consultant Project Manager
Metric Engineering, Inc.

CC: All attendees

County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County



Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: June 5, 2017

County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

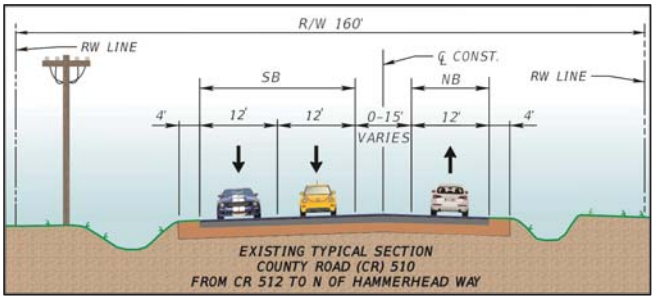


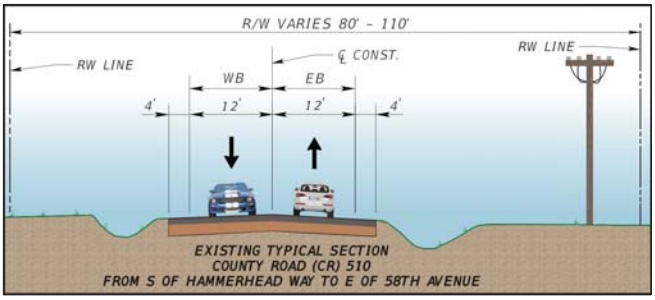
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- Truck (T%) : 5.3% (daily)





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - Improve Traffic operations
  - Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - Identified as a core project in the Indian River County 2035 LRTP
  - Identified as a priority project in the Indian River County TIP



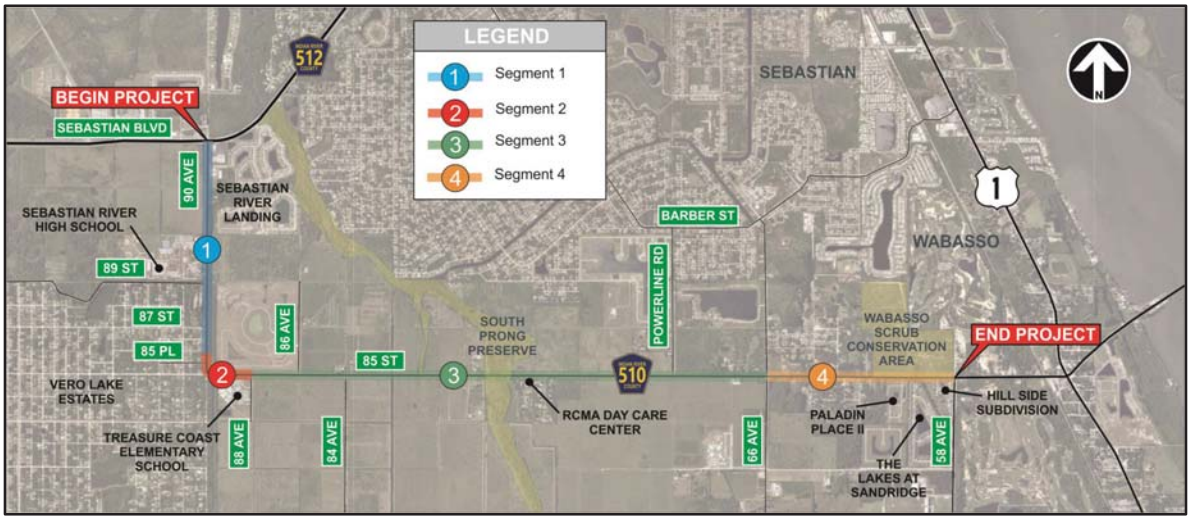


County Road 510 PD&E Study

Engineering Analysis

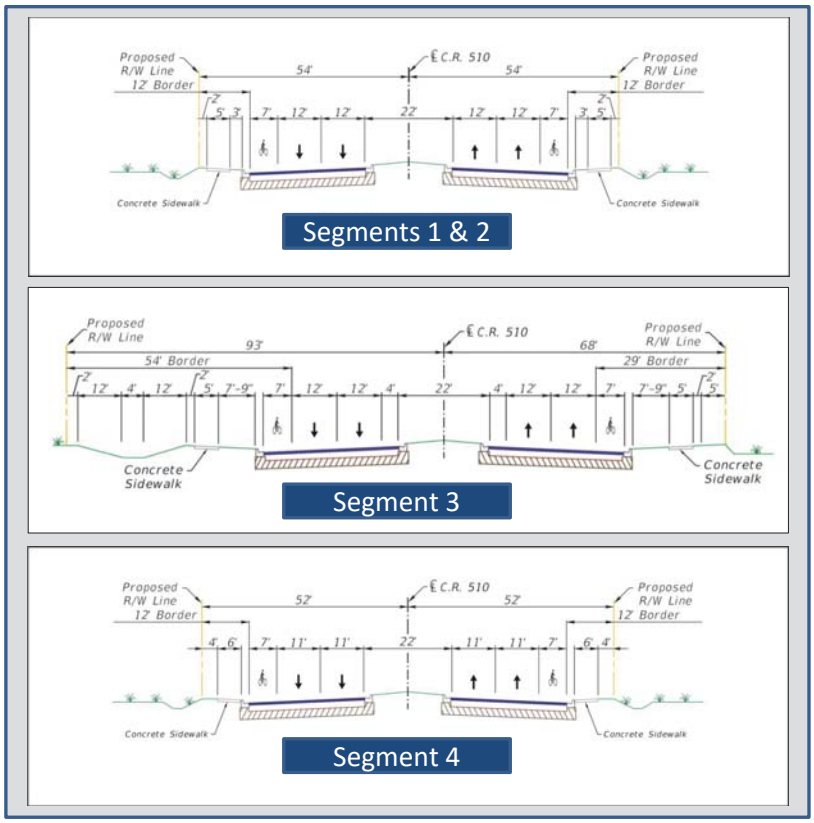
Segmental Determination

- **Segment 1:** From CR 510/512 intersection to 85th Place
- **Segment 2:** From 85th Place to just west of 88th Avenue
- **Segment 3:** From just west of 88th Avenue to 66th Avenue
- **Segment 4:** From 66th Avenue to 58th Avenue



County Road 510 PD&E Study

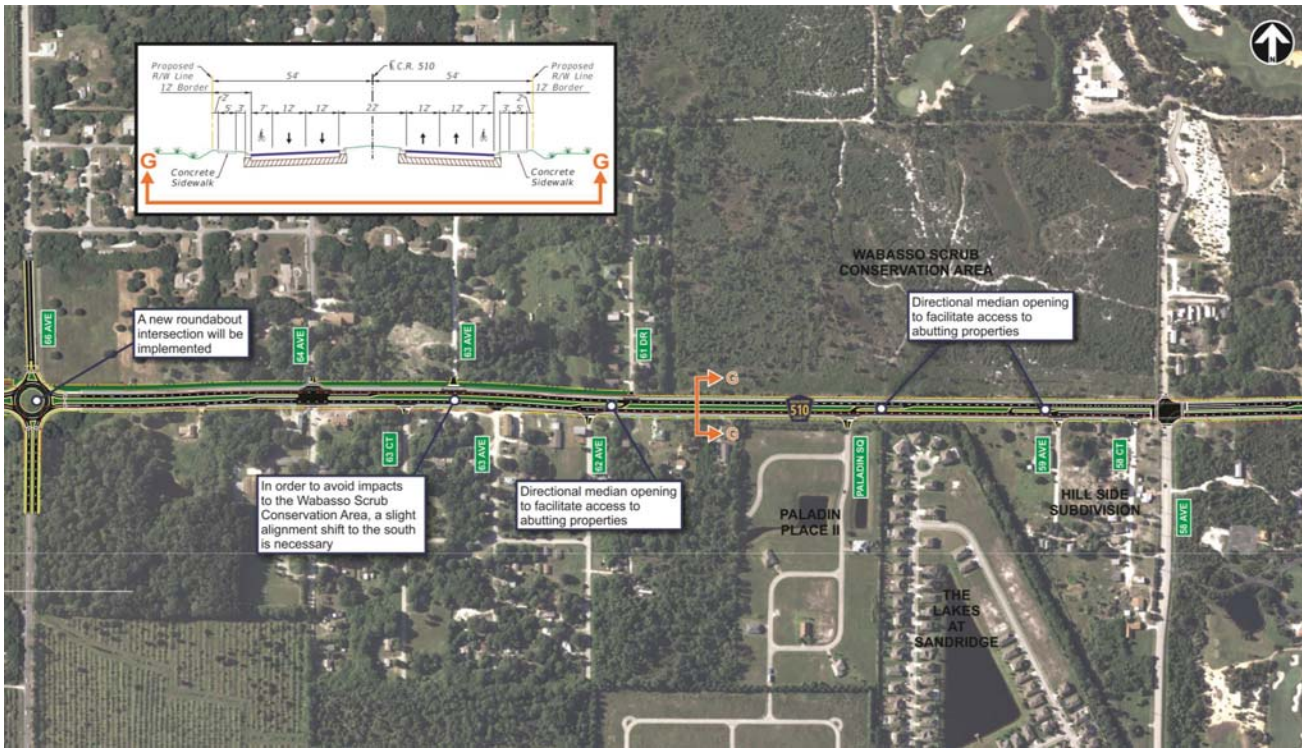
Proposed Typical Sections



County Road 510 PD&E Study

Engineering Analysis – Segment 4

- From 66 Avenue to 58 Avenue



County Road 510 PD&E Study

Roundabout Analysis

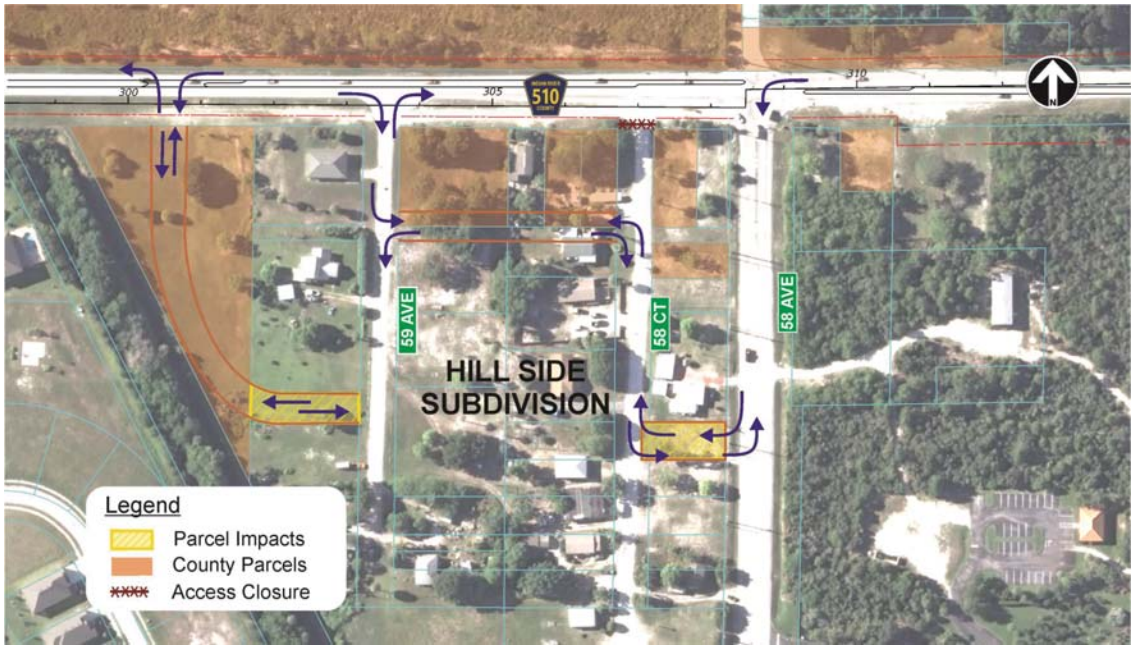
- CR 510/85th Street and 66th Avenue
  - Significant reduction in crashes anticipated
  - Also serves as transition between higher speed suburban corridor into lower speed urban community



County Road 510 PD&E Study

Access Management

- Access options from 59 Avenue to 58 Avenue
  - To improve access to Hill Side Subdivision, minor parcel impacts are required



County Road 510 PD&E Study

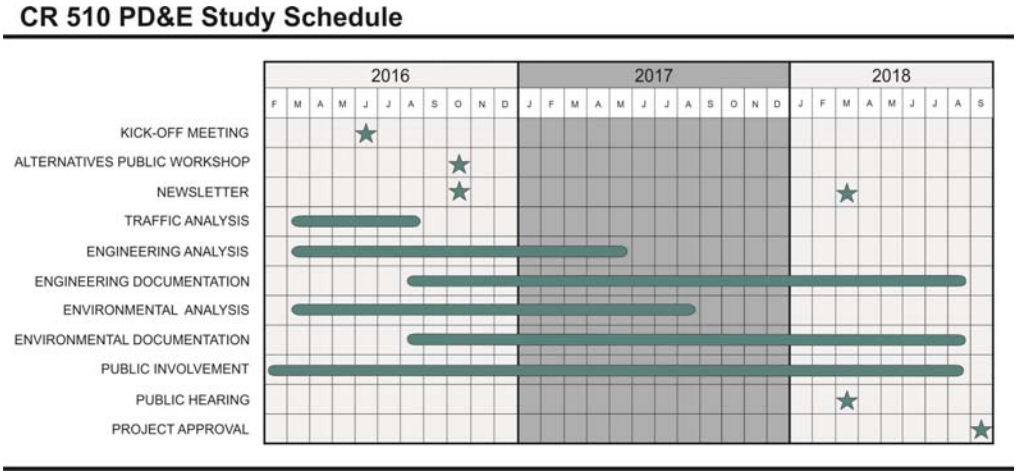
Drainage

- Offsite swale will be required
  - Properties to the north currently drain to the roadside ditch that will be impacted by the project
  - New ditch or pipe system will be constructed to the north



Project Schedule

- Key Dates
  - Public Hearing- Spring 2018
  - Location Design Concept Acceptance- Fall 2018



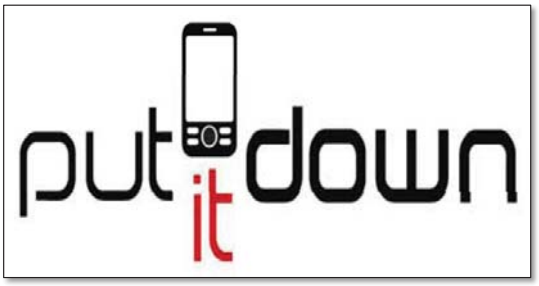
Thank You!!

For more information please contact:

Maria Formoso, PE, PMP – Project Manager
Florida Department of Transportation - District 4
3400 Commercial Blvd.
Ft. Lauderdale, FL., 33309
(954) 777-4677
Email: Maria.Formoso@dot.state.fl.us

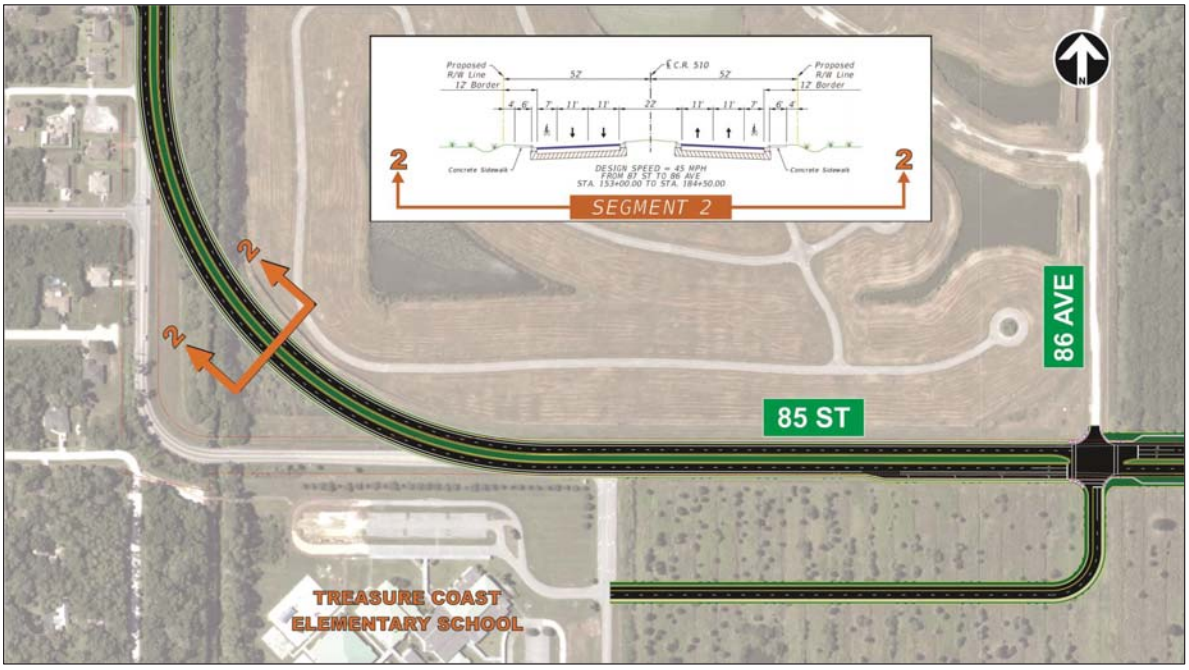






County Road 510 PD&E Study

Horizontal Curve Realignment



County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County



Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: September 29, 2017

County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

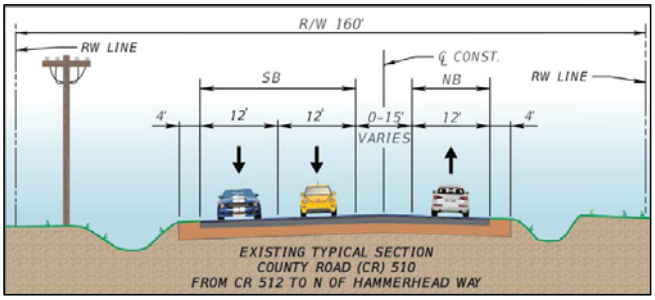


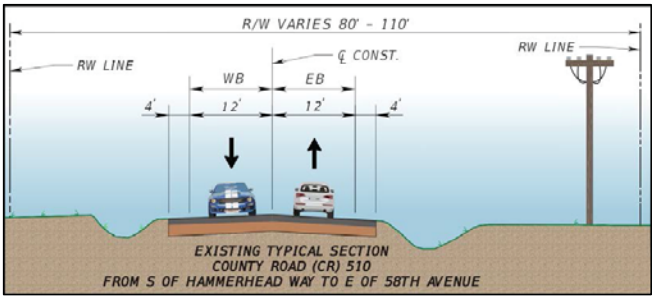
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- Truck (T%) : 5.3% (daily)





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - Improve Traffic operations
  - Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - Identified as a core project in the Indian River County 2035 LRTP
  - Identified as a priority project in the Indian River County TIP



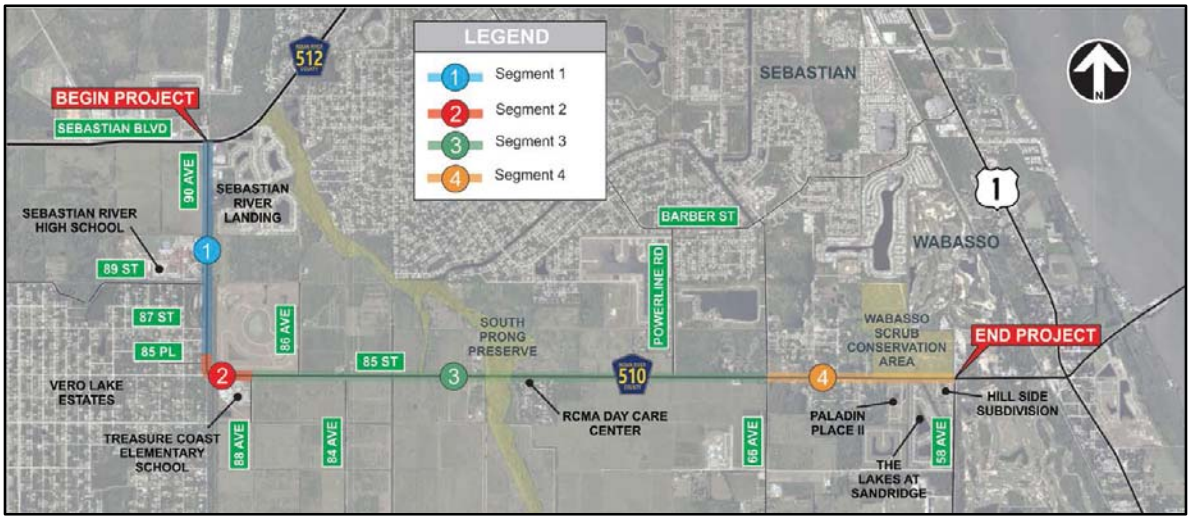


County Road 510 PD&E Study

Engineering Analysis

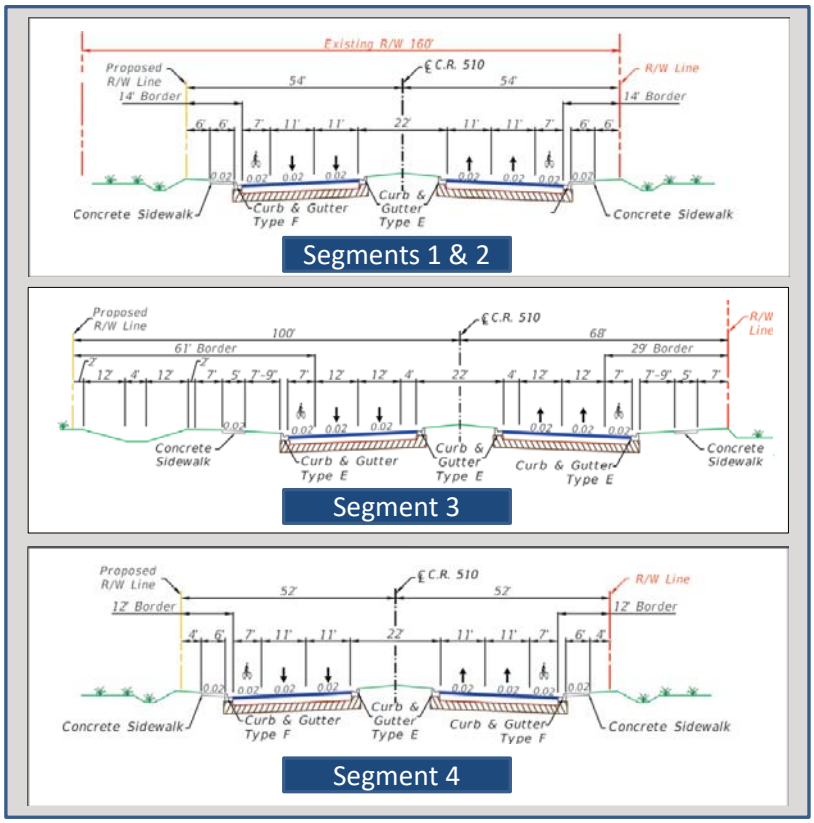
Segmental Determination

- **Segment 1:** From CR 510/512 intersection to 85th Place
- **Segment 2:** From 85th Place to just west of 88th Avenue
- **Segment 3:** From just west of 88th Avenue to 66th Avenue
- **Segment 4:** From 66th Avenue to 58th Avenue



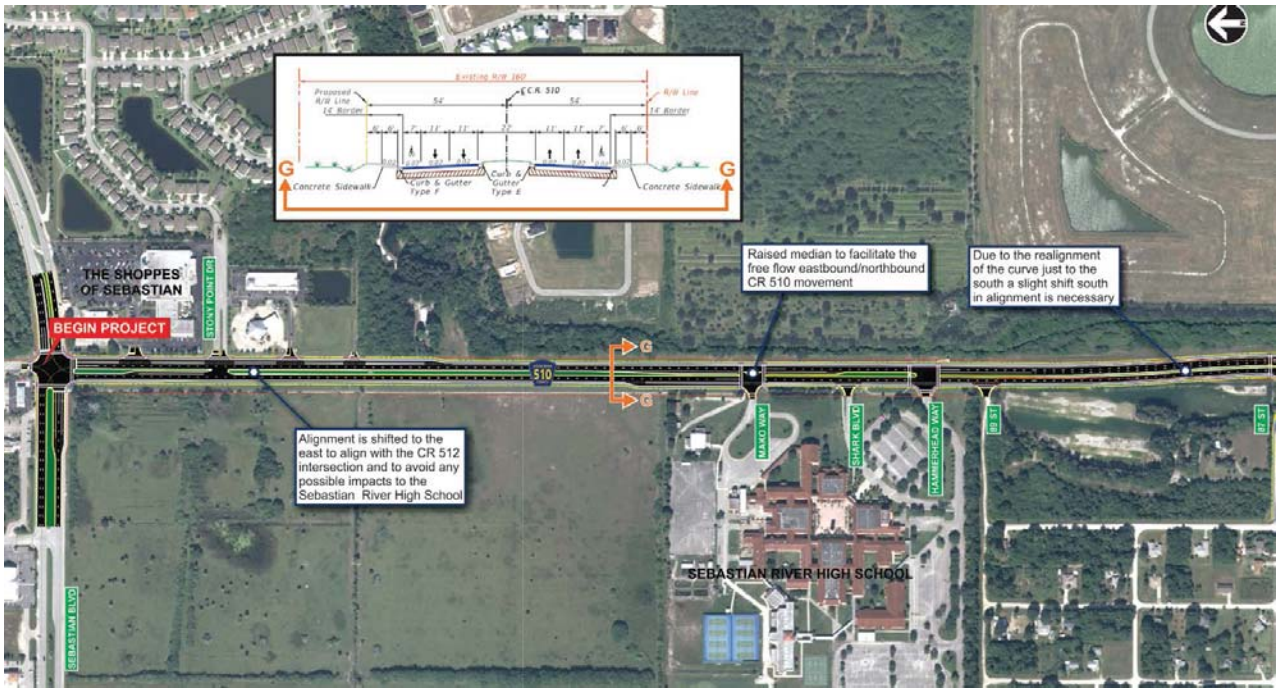
County Road 510 PD&E Study

Proposed Typical Sections



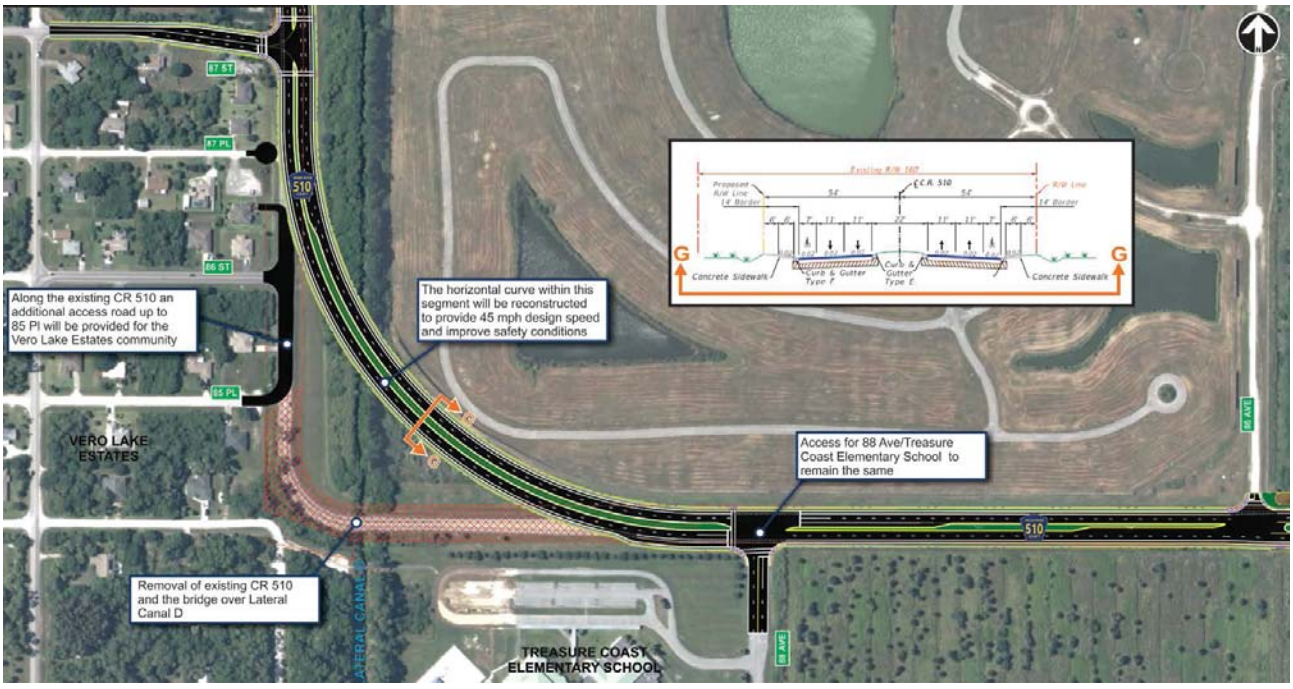
County Road 510 PD&E Study

Segment 1



County Road 510 PD&E Study

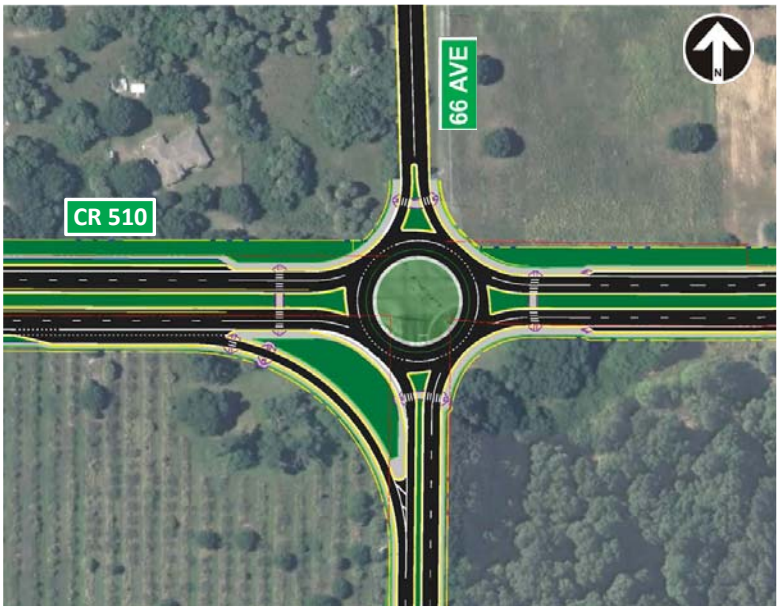
Segment 2 - Horizontal Curve Realignment



County Road 510 PD&E Study

Roundabout Analysis

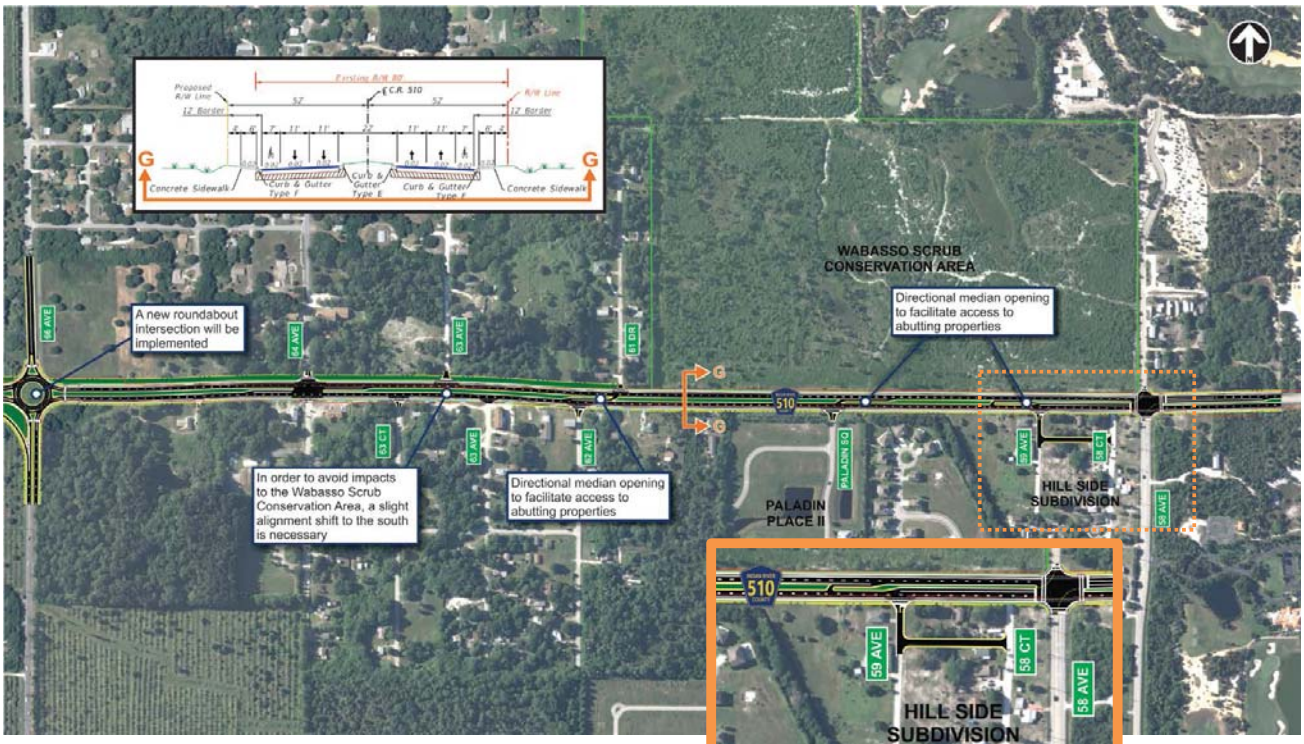
- CR 510/85th Street and 66th Avenue
  - Significant reduction in crashes anticipated
  - Also serves as transition between higher speed suburban corridor into lower speed urban community



County Road 510 PD&E Study

Segment 4

- From 66 Avenue to 58 Avenue



County Road 510 PD&E Study

Drainage

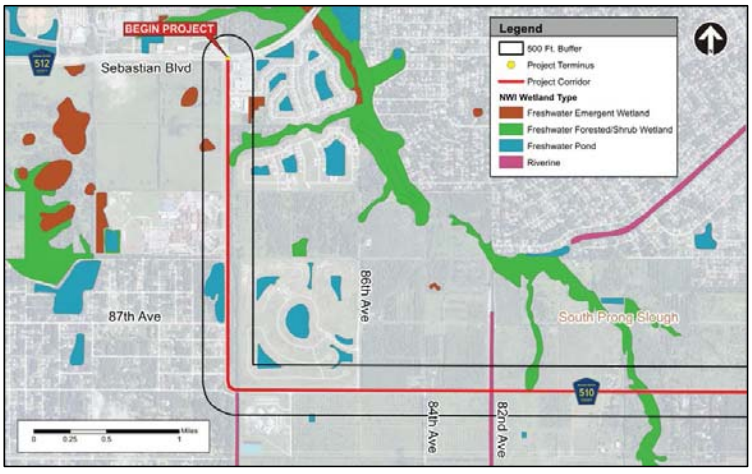
- Offsite swale will be required
  - Properties to the north currently drain to the roadside ditch that will be impacted by the project
  - New ditch or pipe system will be constructed to the north



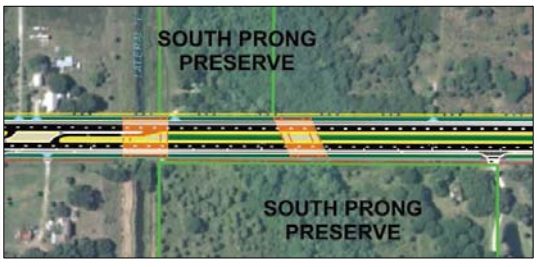
County Road 510 PD&E Study

Environmental Analysis

- Section 4(f) Resources
  - All purchased with P2000/Florida Forever Funds
  - Impacts to South Prong Preserve are un-avoidable
- Threatened and Endangered Species
  - Scrub Jay, Gopher Tortoise, Sandhill Crane, Wood Stork, Caracara all confirmed near project
  - Caracara nest surveys performed
  - USFWS Consultation
- Cultural and Historic Resources
  - CRAS submitted and SHPO for review
- Wetlands occur in multiple areas
  - Especially along St. Sebastian River tributaries
  - Essential Fish Habitat



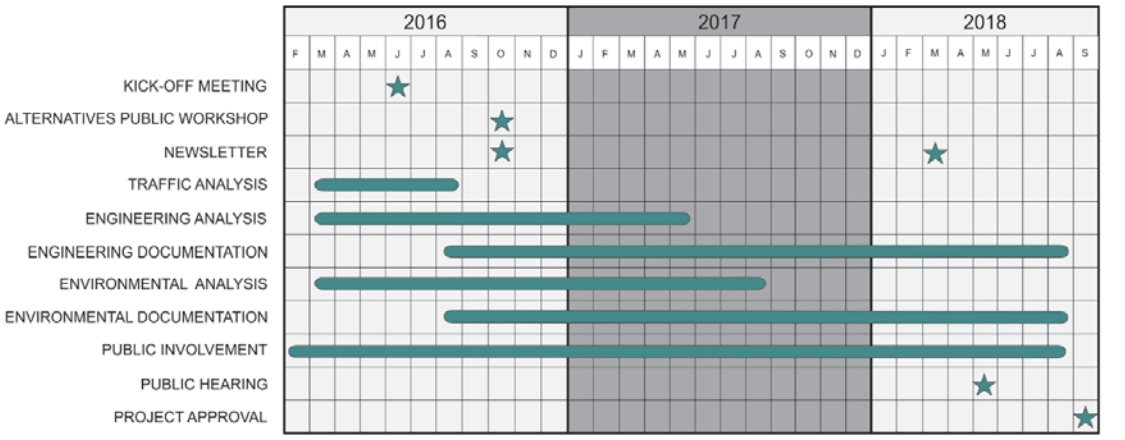




Project Schedule

- Key Dates
  - Public Hearing- Spring 2018
  - Location Design Concept Acceptance- Fall 2018

CR 510 PD&E Study Schedule

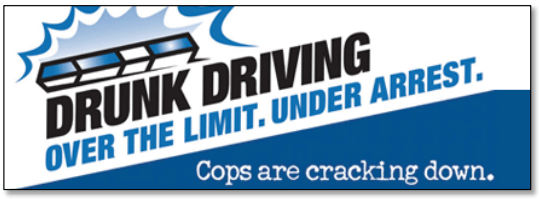


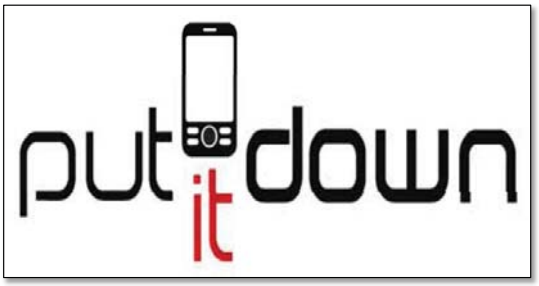
Thank You!!

For more information please contact:

Maria Formoso, PE, PMP – Project Manager
Florida Department of Transportation - District 4
3400 Commercial Blvd.
Ft. Lauderdale, FL., 33309
(954) 777-4677
Email: Maria.Formoso@dot.state.fl.us







County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County



Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: October 11, 2017

County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

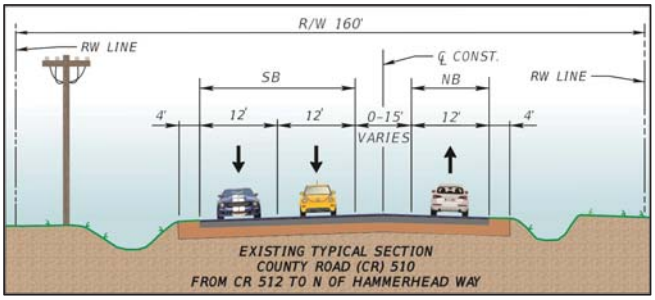


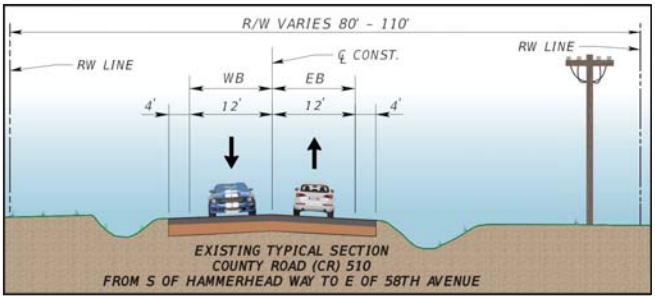
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- Truck (T%) : 5.3% (daily)





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - Improve Traffic operations
  - Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - Identified as a core project in the Indian River County 2035 LRTP
  - Identified as a priority project in the Indian River County TIP



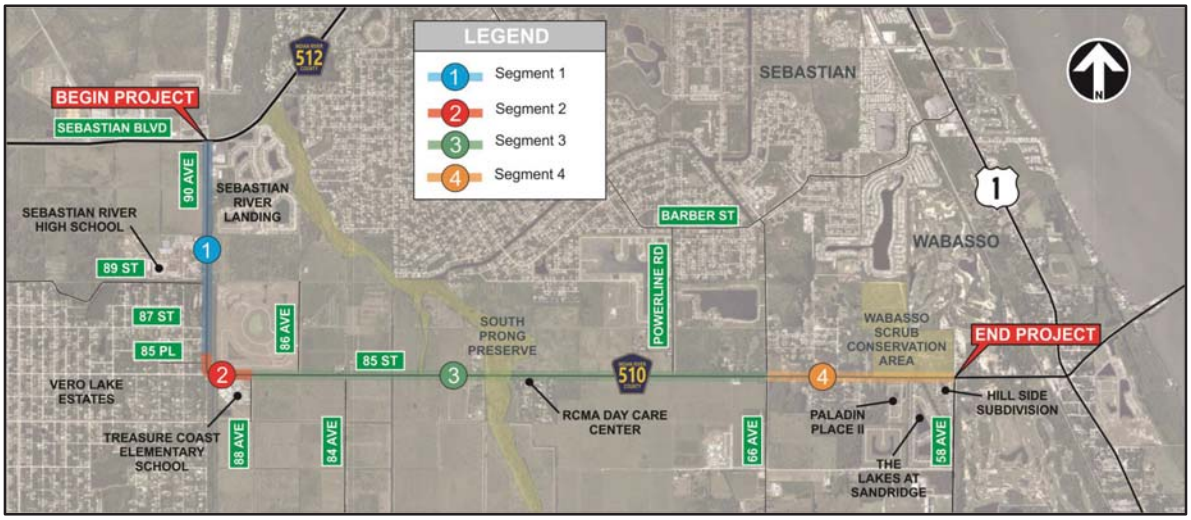


County Road 510 PD&E Study

Engineering Analysis

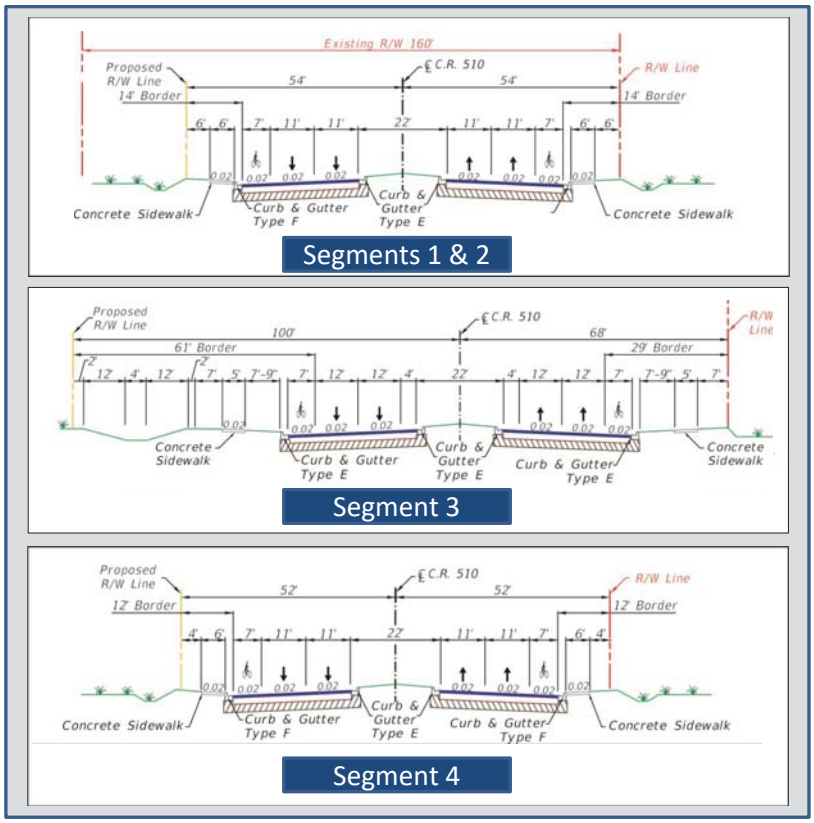
Segmental Determination

- **Segment 1:** From CR 510/512 intersection to 85th Place
- **Segment 2:** From 85th Place to just west of 88th Avenue
- **Segment 3:** From just west of 88th Avenue to 66th Avenue
- **Segment 4:** From 66th Avenue to 58th Avenue



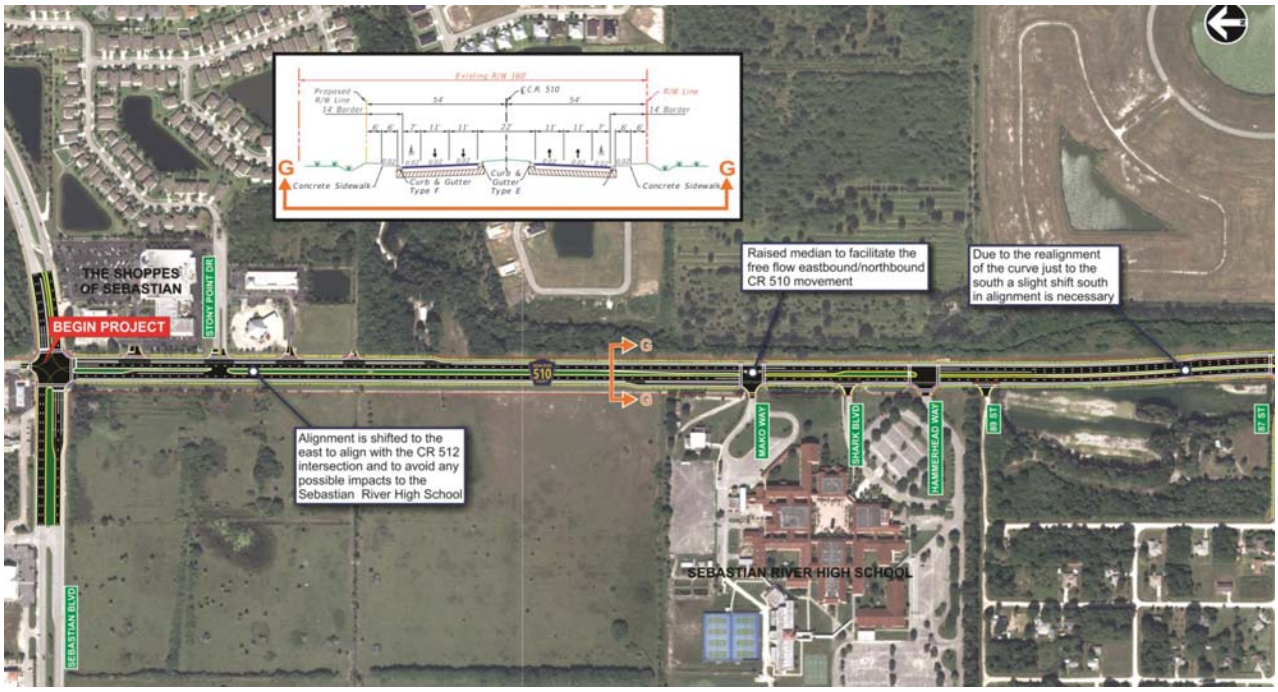
County Road 510 PD&E Study

Proposed Typical Sections



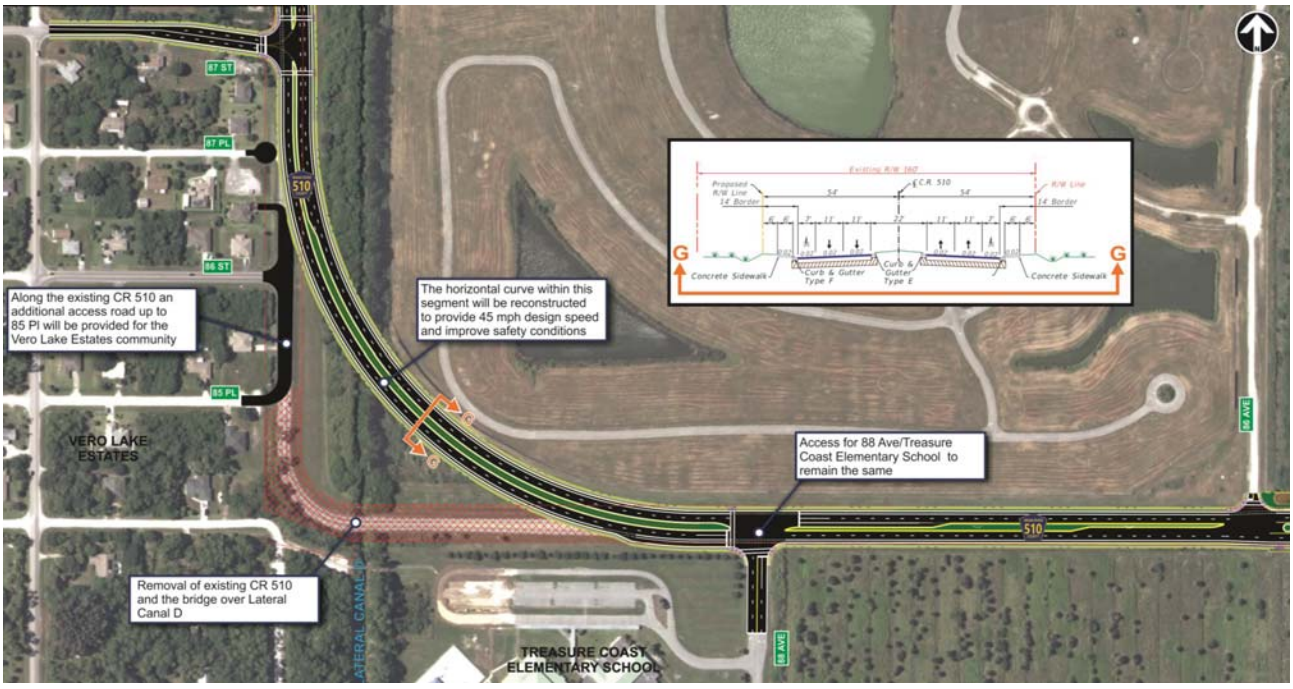
County Road 510 PD&E Study

Segment 1



County Road 510 PD&E Study

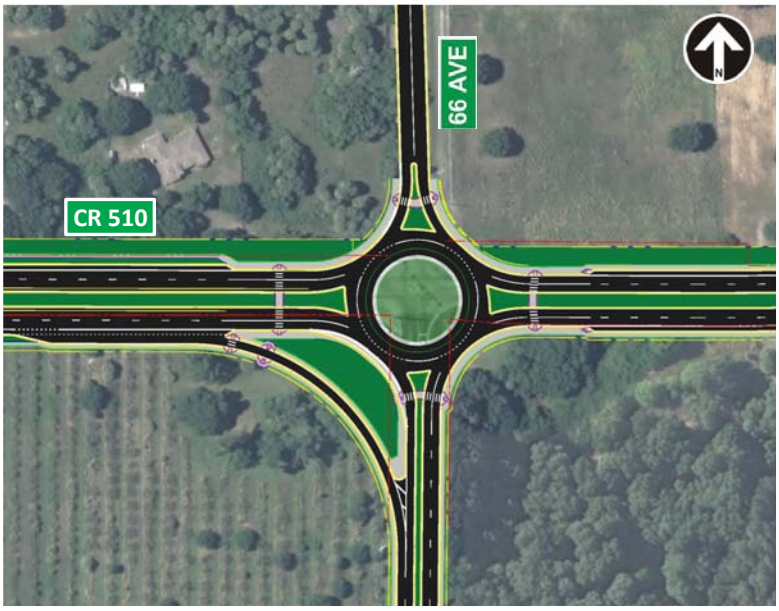
Segment 2 - Horizontal Curve Realignment



County Road 510 PD&E Study

Roundabout Analysis

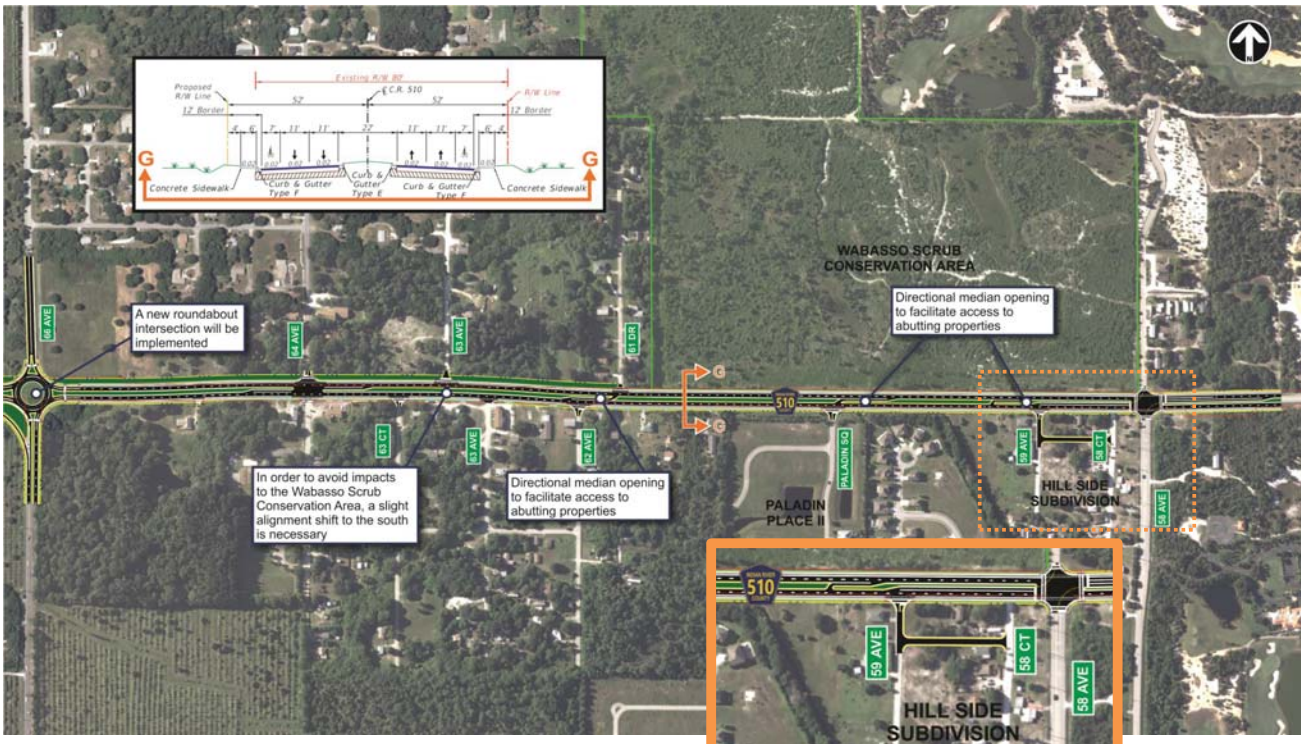
- CR 510/85th Street and 66th Avenue
  - Significant reduction in crashes anticipated
  - Also serves as transition between higher speed suburban corridor into lower speed urban community



County Road 510 PD&E Study

Segment 4

- From 66 Avenue to 58 Avenue



County Road 510 PD&E Study

Drainage

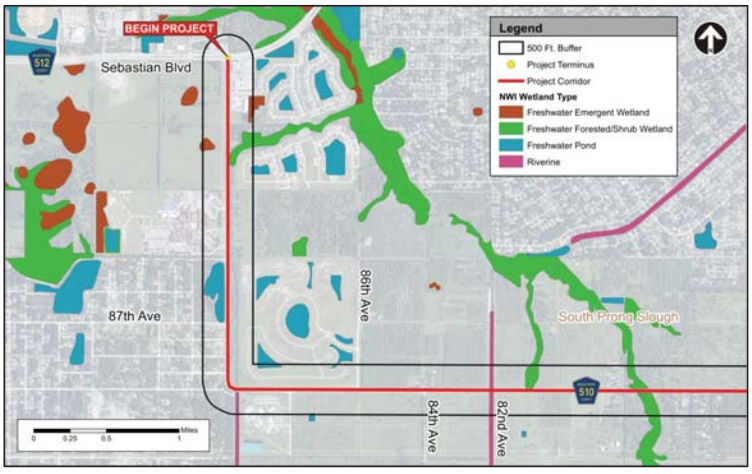
- Offsite swale will be required
  - Properties to the north currently drain to the roadside ditch that will be impacted by the project
  - New ditch or pipe system will be constructed to the north



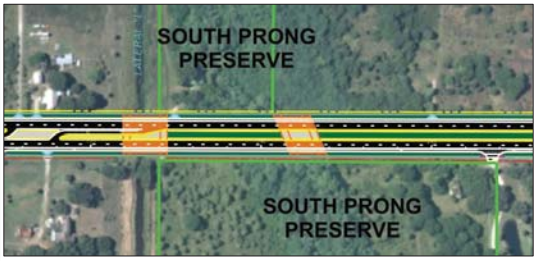
County Road 510 PD&E Study

Environmental Analysis

- Section 4(f) Resources
  - All purchased with P2000/Florida Forever Funds
  - Impacts to South Prong Preserve are un-avoidable
- Threatened and Endangered Species
  - Scrub Jay, Gopher Tortoise, Sandhill Crane, Wood Stork, Caracara all confirmed near project
  - Caracara nest surveys performed
  - USFWS Consultation
- Cultural and Historic Resources
  - CRAS submitted and SHPO for review
- Wetlands occur in multiple areas
  - Especially along St. Sebastian River tributaries
  - Essential Fish Habitat



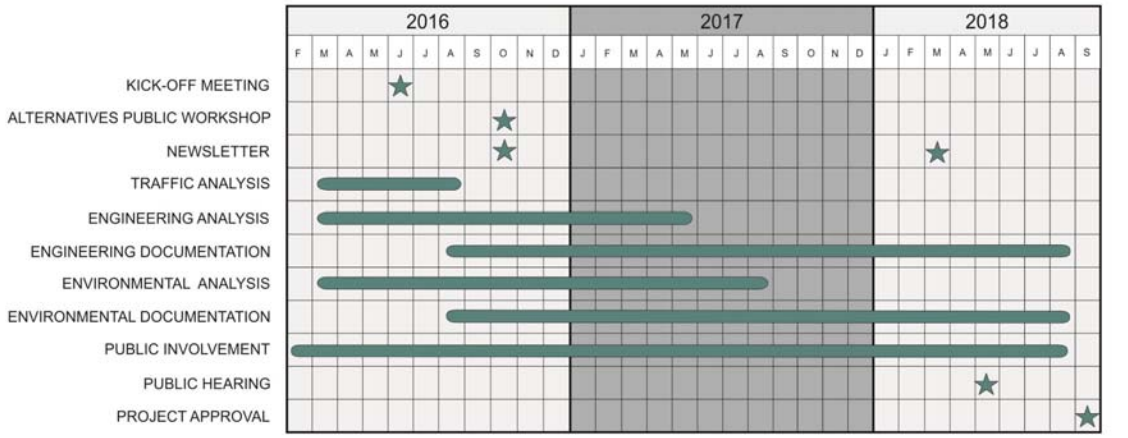




Project Schedule

- Key Dates
  - Public Hearing- Spring 2018
  - Location Design Concept Acceptance- Fall 2018

CR 510 PD&E Study Schedule



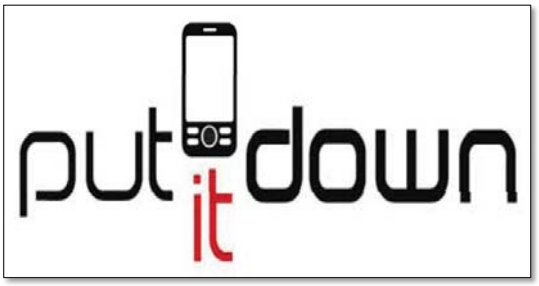
Thank You!!

For more information please contact:

Maria Formoso, PE, PMP – Project Manager
Florida Department of Transportation - District 4
3400 Commercial Blvd.
Ft. Lauderdale, FL., 33309
(954) 777-4677
Email: Maria.Formoso@dot.state.fl.us







Drainage Coordination

MEETING NOTES **12/15/2016**

Subject: CR 510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

District 4 Attendees:
Olivia Bonilla, Drainage Engineer
Wilord Metellus, Drainage Engineer
Shandra Davis, PLEMO

Metric Attendees:
Carlos Rodriguez, PE, Consultant Project Manager

Snubbs Consulting Attendees:
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer
Shaq Samuel, EI, Drainage Engineer

Location: Conference Room 1 (3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309)

Time: 9:00 AM

Background:

- A meeting was scheduled between FDOT, Metric and Snubbs to discuss the Drainage Approach, 30% Draft of the Preliminary Drainage Report, Pond Siting Schedule & Process, and Permitting Strategy.

Discussion:

30% Preliminary Drainage Report

1. Snubbs presented a 30% Draft of the Preliminary Drainage Report to FDOT. Ten (10) drainage systems/basins were identified within the project limits. Based on a preliminary drainage analysis, all 10 basins will require offsite ponds. Five (5) of these ponds can be accommodated by county-owned properties while the other 5 will require R/W acquisition.

2. Metric mentioned that GCME (Geotechnical consultants) will be providing a geotechnical report for this project in a month or later.

3. FDOT Drainage requested an electronic copy of the 30% Draft of the Preliminary Drainage Report.

Pond Siting Schedule & Process

1. Snubbs presented the Pond Siting Schedule and Process to FDOT.
2. FDOT approved the Pond Siting Schedule and Process in concept.
3. Metric requested that Snubbs suggest names of individuals to be on the Pond Siting team based on previous experiences.
4. Metric mentioned that the earliest date that Indian River County (IRC) can meet is **Jan-26-2017**.

Permitting Strategy

1. The approach is to permit through St. John's River Water Management District (SJRWMD) to satisfy both Sebastian River and Indian River Farms Water Control Districts discharge requirements. If a separate permit is required for the Water Control Districts, then the approach to meet the discharge requirements is to limit the post-development discharge to less than or equal to pre-development discharge.
2. FDOT Drainage would like to participate in the drainage permitting meetings.

Action Items:

- Snubbs will schedule meetings with IRC, SJRWMD and the Water Control Districts by **Dec-22-2016**.
- Snubbs will proposed a list of individuals to be on the Pond Siting team by **Dec-22-2016**.
- FDOT will send Hui Shi's, Permit Coordinator, contact information to Metric and Snubbs by **Dec-22-2016**.

SIGN-IN SHEET

Project Title: CR-510 PD&E from CR-512 to 58th Ave

Date: 12/15/2016

FPID: 405606-2-22-02

NAME	DEPT./COMPANY	TITLE/POSITION	EMAIL	PHONE
Tommy Ruiz, PE, CFM, LEEP AP	Snubbs Consulting	Drainage Eng.	Tommy.Ruiz@snubbs.com	305.885.6400 ext. 201
Shaquon Samuel, EI	Snubbs Consulting	Drainage Eng.	Shaquon.Samuel@snubbs.com	305.885.6400 ext. 205
Carlos Rodriguez	METRIC Engineering	PM	crodriguez@metriceng.com	305-235-5098
Oliva bonilla	FDOT	Drainage	oliva.bonilla@dot.state.fl.us	954-777-4134
Wilord Metellus	FDOT	Drainage	Wilord.metellus@dot.state.fl.us	954-777-4467
SHANDRA DAVIS	FDOT	PLEM	shandra.davis@dot.state.fl.us	954-777-7896

MEETING NOTES **1/10/2017**

Subject: CR-510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

SJRWMD Attendees:
Fariborz Zanganeh, Engineer
Nanette Church, Senior Regulatory Scientist

District 4 Attendees:
Maria Formoso, P.E., P.M.P., Project Manager (teleconference)
Olivia Bonilla, Drainage Engineer
Wilord Metellus, Drainage Engineer
Hui Shi, Drainage Engineer
Shandra Davis, PLEMO (teleconference)

Metric Attendees:
Carlos Rodriguez, PE, Consultant Project Manager (teleconference)
Juan Venezula, Bridge Engineer (teleconference)
Rob Myers, Senior Wildlife and NEPA Specialist (teleconference)

Snubbs Consulting Attendees:
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer
Kathy Tabuteau, EI, Drainage Engineer

Location: Conference Room - PBSC - St. Johns (Community College Pkwy SE, Palm Bay, FL 32909)

Time: 1:30 PM

Background:

- FDOT is preparing a Project Development and Environment (PD&E) Study for CR-510 from CR-512 To 58th Avenue.
- The scope of the project includes reconstruction of CR-510 from an existing two lane roadway facility to one with four lanes. The proposed typical sections will include both urban and sub-urban sections. Also, the scope of the project involves the replacement of three (3) bridges and two (2) culverts.

Discussion:

Permitting requirements

- FDOT explained that the proposed roadway will increase the turning radius of the existing sharp turn along the CR-510 roadway, from 90th Avenue to 85th Street. To accommodate the new roadway, the existing bridge will be replaced with a culvert or Lateral Canal D will need to be realigned. A bridge may not be possible at this location due to the skew that would be needed from the bridge to accommodate the larger radius of the roadway.

- SJRWMD mentioned that replacing the bridge with a culvert should not be a problem but the hydraulic report needs to show similar hydraulic performance. Also, Sebastian River Improvement District (SRID) will need to be consulted.

- SJRWMD mentioned that realigning lateral canal D will cause some surface water impact, thus pre-developmental and post-developmental impact calculations must be provided and must meet the ultimate design of the canal.

- A regional drainage ditch located west of 66th Avenue, which extends to Lateral Canal L, is providing treatment for offsite runoff.

- Water quality calculations will need to consider the complete roadway including existing pavement since the corridor has existing swales that provide some level of water quality and attenuation.

OFW status

- The Outstanding Florida Water (OFW) areas begin north of the bridge, located on CR-512, and includes all areas that directly discharges into the Sebastian River. Each drainage basin will need to be evaluated to see if it qualifies as a direct discharge. 50% additional treatment will be needed.

Nutrient Loading

- The calculations for nutrient loading will not be required if a comparison of nutrient loading for pre and post conditions show that there is less than 64.5% of nutrient removal. Otherwise, treatment must be provided for the greater of the two:
    a.) An additional 50% of the treatment volume for OFW basins
    b.) The nutrient loading volume

- Wet detention systems should include a device, that contains a filtered media, at the bottom to meet the requirements of the nutrients loading.

Restrictions on treatment methods

- SJRWMD mentioned that dry detention is the least preferred treatment method to treat runoff. This is because dry detention systems must treat a greater volume of stormwater than the other treatment practices, such as dry retention and wet detention, to achieve an equivalent level of pollutant removal.

- SJRWMD mentioned that impacts to the South Prong of the Sebastian River, such as wetlands, must have a buffer minimum of 15 feet or an average of 25 feet.

Discharge requirements

- The post-development peak discharge should be limited to the pre-development mean annual and the 25 year 24-hour storm events.

Permit modification or new application

- Permit number 93656 should be modified to accommodate the CR 510 project since it is an existing permit.

- The estimated construction permitting fee is approximately $5,610, however the price is subject to change after one year. The completed construction plans are required to purchase the construction permit.

- A conceptual permit is an option that can be considered since the construction plans are projected to be completed in 3-4 years. The conceptual permit will allow modifications to be made throughout the duration of the project with no change to the construction permitting fee. The fee for the conceptual plan is estimated to be $11,960 plus the construction permitting fee ($5,610).

Is separate permit from SRID required?

- Environmental Permits related to water quality and water quantity should be requested from SJRWMD.

- Right-of-Way Permits related to canals, such as stages, control level, or water level should be requested from the Water Control District.

SIGN-IN SHEET

Project Title: CR-510 PD&E from CR-512 to 58th Ave

Date: 1/10/2017

FPID: 405606-2-22-02

NAME	DEPT./COMPANY	TITLE/POSITION	EMAIL	PHONE
Tommy Ruiz, PE, CFM, LEEP AP	Snubbs Consulting	Drainage Eng.	Tommy.Ruiz@snubbs.com	305.885.6400 ext. 201
Kathy Tabuteau, EI	Snubbs Consulting	Drainage Eng.	Kathy.tabuteau@snubbs.com	305.885.6400 ext. 206
Olivia Bonilla	FDOT D4	Drainage	olivia.bonilla@dot.state.fl.us	954-777-4134
Wilord Metellus	FDOT	Drainage	Wilord.metellus@dot.state.fl.us	954-777-4467
Hui Shi	FDOT D4	Drainage	Hui.shi@dot.state.fl.us	954-777-4557
Nanette Church	SJRWMD	RS	nchurch@sjrwmd.com	321-984-4902
Fariborz Zanganeh	SJRWMD	Engineer	fzanganeh@sjrwmd.com	321-676-6630
Rob Myers				
Chandra R.				
Juan Vanegas				

TdK

MEETING NOTES **1/19/2017**

Subject: CR-510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

SRID Attendees:
George Simmons, PE
Todd Wodraska, SRID Administration

District 4 Attendees:
Maria Formoso, P.E., P.M.P., Project Manager (teleconference)
Olivia Bonilla, Drainage Engineer (teleconference)
Wilord Metellus, Drainage Engineer (teleconference)

Metric Attendees:
Juan Venezula, Bridge Engineer (teleconference)
Rob Myers, Senior Wildlife and NEPA Specialist (teleconference)
Shandra Raman, Engineer

Snubbs Consulting Attendees:
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer
Kathy Tabuteau, EI, Drainage Engineer
Shaquon Samuel, EI, Drainage Engineer (teleconference)

Location: Carter Associates, Inc. Conference Room (1708 21st Street Vero Beach, FL 32960)

Time: 10:30 AM

Background:

- FDOT is preparing a Project Development and Environment (PD&E) Study for CR-510 from CR-512 to 58th Avenue.
- The scope of the project includes reconstruction of CR-510 from an existing two lane roadway facility to one with four lanes. The proposed typical sections will include both urban and sub-urban sections. Also, the scope of the project involves the replacement of three (3) bridges and two (2) culverts.

Discussion:

Lateral Canal D

- Snubbs explained that the proposed roadway will increase the turning radius of the existing sharp turn along the CR-510 roadway, from 90th Avenue to 85th Street. A

bridge may not be possible at this location due to the skew that would be needed from the bridge to accommodate the larger radius of the roadway. As a result, FDOT needs a right-of-way permit to acquire the corner area on the bend of CR-510 to convert the existing bridge with a culvert or realign Lateral Canal D.

- Sebastian River Improvement District (SRID) mentioned that there are some legal dispute about who regulates and maintain Lateral Canal D. SRID mentioned that landowners to the west of the canal may have legal rights. As such, there are uncertainties about future discharges into the canal.
- SRID believes Lateral Canal D canal has a minimum depth of 15 feet, thus a culvert may not be feasible at this location.

FEMA Map

- Snubbs mentioned that a review of the Flood Insurance Rate Map published by Federal Emergency Management Agency (FEMA), indicates that a portion of the study area is located in Special Flood Zones A, AE, VE, X and X-500. The northbound/southbound portion of CR-510, between CR-512 and 85th Place, is located in flood zone AE. The eastbound/westbound portion of CR-510, located between 90th Avenue and 58th Avenue, is mainly located in flood zone X.

- SRID mentioned that the FEMA map will be updated within 6-10 months. Also, SRID mentioned that the FEMA map took into account that Lateral Canal D was made as a flooding berm to collect runoff coming from the west. This caused the property to the east to have less flooding; even though there will be pockets of flooding areas to the east but not as deep as if the beam did not exist.

- Metric asked if the lateral canals have tidal influence. SRID informed Metric that the lateral canals are not tidally influence and FEMA has taken storm surges into account when preparing the FEMA maps.

Water Quantity

- SRID stated that stormwater system should be designed for the 25-year frequency, 24-hour duration storm and should maintain no more than 2 inches of discharge per day.
- In addition to analyzing the Pre-Post conditions, SRID requires that FDOT take into account the cut and fill that will occur in the floodplain.
- SRID stated that FDOT should acquire the Right-of-Way needed to comply with the District's discharge criteria. If FDOT has issues acquiring the land needed to meet the District's criteria, they will provide sufficient documentation to claim hardship.

Water Crossing Improvements

- Snubbs mentioned that all the existing culverts used as cross drains will be extended and the existing bridges will be replaced to accommodate the proposed roadway improvements.
- SRID requested that FDOT relocate the water main to attach it to the bridge and remove pile from the canal. However, Snubbs mentioned that FDOT does not replace utilities unless there is a conflict. As such, an evaluation to relocate the water main must be conducted before any commitments are made.
- Snubbs mentioned that FDOT will convert the existing culvert, located approximately 0.15 miles east of 79th Terrace, to a bridge to allow wildlife crossing.

Permit

- SRID advised FDOT to contact Indian River County (IRC) to request information for the existing permits.
- SRID needs FDOT to verify if the proposed roadway will encroach into an existing easement. The easement is located approximately 0.25 miles east of 75th Court and extends to Lateral Canal L.
- Snubbs is concerned about the regional drainage ditch, located west of 66th Avenue and extends to Lateral Canal L, because it is providing treatment for the road and offsite properties. The water control district may be held responsible for offsite properties being flooding. As such, Snubbs recommends that a bypass swale be constructed to separate the roadway runoff from the properties runoff. SRID stated that the ditch is maintained by the county.
- Snubbs asked if it is possible to acquire a conceptual permit for the culvert replacement during the PD&E phase of the project. Acquiring a conceptual permit will allow FDOT to receive comments regarding what the SRID will permit before the design phase begins. This will limit impact to the construction schedule during the design phase.
- SRID mentioned that the board will have to decide if a conceptual permit for the culvert replacement can be issued. SRID stated in order to present this case to the board they will require details such as full hydraulics and concept sketch including length, width and guardrails; parameters for the canal; and a formal request explaining the reason for this permit. The fee for the conceptual permit depends on the duration of the consultant review. The cost varies from $1,000-$5,000.
- SRID mentioned that the Board meeting will be held on March 1st. Furthermore, SRID requested that all documents regarding the conceptual permit be submitted a minimum of 10 days before the Board meeting to allow adequate time to review.

Action Items:

- SRID to provide a design flow model of the canals by **Feb-3-2017**.
- SRID to provide drawing to show encroachment into easements by **Feb-3-2017**.
- The conceptual permit request should be submitted to SRID by **Feb-15-2017**

SIGN-IN SHEET

Project Title: CR-510 PD&E from CR-512 to 58th Ave SRID

Date: 1/19/2017

FPID: 405606-2-22-02

NAME	DEPT./COMPANY	TITLE/POSITION	EMAIL	PHONE
Tommy Ruiz, PE, CFM, LEEP AP	Snubbs Consulting	Drainage Eng.	Tommy.Ruiz@snubbs.com	305.885.6400 ext. 201
Kathy Tabuteau, EI	Snubbs Consulting	Drainage Eng.	Kathy.tabuteau@snubbs.com	305.885.6400 ext. 206
GEORGE SIMONS	CARTER ASSOC.	PRINCIPAL/PE	GEORGES@CARTERASSOC.COM	(772) 562-4191
Todd Wodraska	Special District Servic	SRID Administrato	twodraska@sdsinc.org	561.630.4922
Chandra Raman	Metric Eng	Drainage Ers	chandra.raman@metriceng.com	561-713 8977
Rob Myers (Phone)	Metric	senior wildlife	Rob.Myers@metrieng.com	
shaq samuel (Phone)	Snubbs	Drainage Eng	shaquon.samuel@snubbs.com	305 885 6400 ext 205
olivia (Phone)	FDOT	Drainage Eng	olivia.Bonilla@dot.state.fl.us	
willard (Phone)	FDOT	Drainage Eng	willard.Metellus@dot.state.fl.us	
Juan Venesvla (Phone)	Metric	Bridge Eng		

MEETING NOTES **1/19/2017**

Subject: CR-510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

IRFWCD Attendees:
David Gunter, Superintendent

District 4 Attendees:
Maria Formoso, P.E., P.M.P., Project Manager (teleconference)
Olivia Bonilla, Drainage Engineer (teleconference)

Metric Attendees:
Carlos Rodriguez, PE, Consultant Project Manager (teleconference)
Juan Venezula, Bridge Engineer (teleconference)
Rob Myers, Senior Wildlife and NEPA Specialist (teleconference)
Shandra Raman, Engineer

Snubbs Consulting Attendees:
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer
Kathy Tabuteau, EI, Drainage Engineer
Shaquon Samuel, EI, Drainage Engineer (teleconference)

Location: IRFWCD Office (7305 4th Street, Vero Beach, FL 32968)

Time: 2:00 PM

Background:

- FDOT is preparing a Project Development and Environment (PD&E) Study for CR-510 from CR-512 to 58th Avenue.
- The scope of the project includes reconstruction of CR-510 from an existing two lane roadway facility to one with four lanes. The proposed typical sections will include both urban and sub-urban sections. Also, the scope of the project involves the replacement of three (3) bridges and two (2) culverts.

Discussion:

Water Quantity

- Indian River Farms Water Control District (IRFWCD) informed FDOT that the south edge of pavement for CR-510 falls within their water control district. IRFWCD agreed to allow runoff from CR-510 Basin 10 to outfall to Lateral Canal G. However, no discharge north of the roadway is prohibited to enter the water control district.
- Snubbs mentioned that there is an existing culvert north of CR-510 that transfers runoff from the north into Lateral Canal G. IRFWCD stated that the culvert is not acceptable, as such the function of the culvert is not to be remained.
- Snubbs mentioned that the alignment of the new roadway (urban typical section) will extend towards the south. As such, FDOT will construct offsite ponds to attenuate and treat runoff from the roadway before discharging into Lateral Canal G.
- IRFWCD mentioned that all projects located in the jurisdiction of IRFWCD are required to meet the design criteria listed below:
    - Offsite discharge to the IRFWCD shall be limited to the 2 inches of runoff over the project area in a 24-hour period.
    - Post-development peak rate of discharge must not exceed pre-development peak rate of discharge for the 25-year frequency, 24-hour duration storm for systems in the District that do not discharge directly into certain tidal and coastal areas and are not located in the Upper St. Johns River Hydrologic Basin and the Oklawaha River Hydrologic Basin.

Permit

- Based on the proposed roadway improvements, IRFWCD recommended that FDOT acquire the following permits:
    - A use permit is required to construct a road on district property. The fee for the use permit is $100.
    - A connection permit is required to connect Lateral Canal G with the roadway drainage system. For maintenance purposes, the urban curb is required to have cuts and Lateral Canal G must have an asphalt perimeter berm with a minimum width of 15 feet. The fee for the connection permit is $100.

  - A discharge permit is required to discharge into Lateral Canal G. A fee of $1000 is charged for the discharge permit; which includes the consultant review.

- All permits are available on the IRFWCD website and must be signed by Indian River County (IRC)
- Snubbs asked if it is possible to acquire a conceptual permit during the PD&E phase of the project. Acquiring a conceptual permit will give FDOT an idea of what IRFWCD will allow before the design phase begins. This will limit impact to the schedule during the design phase.
- IRFWCD mentioned that the board will have to decide if a conceptual permit can be issued. IRFWCD stated in order to present this case to the board they will require details such as road cross section and footprint; and a formal request explaining the reason for this permit.

Action Items:

- The conceptual permit request should be submitted to IRFWCD by **Feb-15-2017**

SIGN-IN SHEET

Project Title: CR-510 PD&E from CR-512 to 58th Ave IRFWCD

Date: 1/19/2017

FPID: 405606-2-22-02

NAME	DEPT./COMPANY	TITLE/POSITION	EMAIL	PHONE	
Tommy Ruiz, PE, CFM, LEEP AP	Snubbs Consulting	Drainage Eng.	Tommy.Ruiz@snubbs.com	305.885.6400 ext. 201	
Kathy Tabuteau, EI	Snubbs Consulting	Drainage Eng.	Kathy.tabuteau@snubbs.com	305.885.6400 ext. 206	
DAVID E. GUNTER	IRFWCD	SUPERINTENDENT	dgunter@flbb.net	772-562-2141	
Chandra Raman	Metric Eng	Drainage Engr	Chandra.raman@metriceng.com	561-713 8977	
Shaquon Samuel	Snubbs	Drainage Eng	shaquonsamuel@snubbs.com	305 885 6400 ext 206	teleconferen
Carlos Rodriguez	Metric	Project Eng	c.rodriguez@metrieng.com		teleconfer
Mariah Formoso	FDOT	Project Eng	Maria.Formoso@Dot.State.fl.us		teleconferen
Juan Venezula	Metric	Bridge Eng			teleconferen
Olivia Bonilla	FDOT	Draing Eng	Olivia.Bonilla@dot.state.fl.us		teleconferen
Rob Myers	Metric	senior wildlife	Rob.Myers@metrieng.com		teleconferen

MEETING NOTES **1/23/2017**

Subject: CR-510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

IRC Attendees:
Rich Szpyrka, Public Works Director
Andrew Sobczak, Senior Planner
Phil Matson, MPO Staff Director

District 4 Attendees:
Maria Formoso, P.E., P.M.P., Project Manager
Wilord Metellus, Drainage Engineer
Olivia Bonilla, Drainage Engineer

Metric Attendees:
Carlos Rodriguez, PE, Consultant Project Manager

Snubbs Consulting Attendees:
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer
Kathy Tabuteau, EI, Drainage Engineer
Shaquon Samuel, EI, Drainage Engineer (teleconference)

Location: IRD Office (1801 27th St, Vero Beach, FL 32960)

Time: 3:00 PM

Background:

- FDOT is preparing a Project Development and Environment (PD&E) Study for CR-510 from CR-512 to 58th Avenue.
- The scope of the project includes reconstruction of CR-510 from an existing two lane roadway facility to one with four lanes. The proposed typical sections will include both urban and sub-urban sections. Also, the scope of the project involves the replacement of three (3) bridges and two (2) culverts.

Discussion:

Design Criteria

- Snubbs explained the drainage approach is to meet the water quality permitting requirements for St. John's River Water Management District (SJRWMD) and meet the water quantity permitting requirements for Sebastian River Improvement District (SRID) and Indian River Farms Water Control District (IRFWCD).

- The Indian River County (IRC) design standards require all culverts to be made of concrete and have a minimum width of 18 inches.

Regional Drainage Ditch

- Snubbs explained that there is a concern with the existing Regional Drainage Ditch, located west of 66th Avenue and extends to Lateral Canal L, because it is providing treatment for both CR-510 and offsite properties. Since the roadway is providing drainage for the offsite properties, the county may be held responsible for offsite properties being flooding. Snubbs provided three recommendations, listed below, to resolve this issue:

  Option 1: The proposed roadway drainage system will take into account the roadway improvements and all the outside Right-of-Way. This will cause the proposed drainage system to be costly. Also, this would cause the County to become a water control district.

  Option 2: FDOT will build the new roadway and inform all properties along the corridor to provide drainage for their own property. This option may result in a lot of conflict with the property owners since they are currently draining into the road swale.

  Option 3: FDOT will construct a bypass (secondary) swale for private properties to drain. The private owners will be responsible to maintain the swale. (**FDOT preferred option)**

- IRC recommended that the county acquire Right-of-Way and construct the bypass swale on county property outside of the roadway project. In this case, the county will maintain the swale. IRC believes the third option, mentioned above, could cause some problems since the property owners will expect compensation for the swale since it will be collecting runoff from other properties.

- FDOT mentioned that the pond siting team will discuss the concern with the regional drainage ditch during the pond siting meeting to decide which option will be implemented.

Pond Siting

- Snubbs conducted a cursory review of the initial pond locations. The first approach is to use as many county-owned lands as possible to limit the amount of R/W acquisition. During the review, the following topics were discussed:

  Existing permits:
  There is an existing permit (Permit No. 93656) that will accommodate the CR-510 runoff in Basin 1 (from CR-512 to Shark Boulevard).

  Permit No. 95794 states that there are two ponds in Basin 4, located on the northwest corner on the intersection of 90th Ave and 85th Ave, that will provide treatment for CR-510.

  County Owned Parcels:
  There is a county-owned parcel located east of 75th Ct. that Snubbs is proposing to use to construct a pond for Basin 7.

  FDOT mentioned that the county-owned parcel, located approximately 150 feet west of 64th Ave, is near existing houses. Therefore, no ponds in Basin 9 should be place in that parcel. Also, IRC mentioned that properties northeast of Basin 9 may have discharge rights into the roadway.

  Metric informed the attendees that no ponds, in Basin 10, should be placed in the county-owned parcels, located north of CR-510 between 61st Dr. and 58th Ave, since this area is a Wabasso habitat preserve.

  The proposed typical section, from 66th Ave to 58th Ave, contains a median. As such, a roadway will be constructed to provide access from 58th Ave to the CR-510 westbound. This will require vacating the IRC owned parcels, which are located south of CR-510 between 59th Ave and 58th Ct. There are a few properties that are located within the IRC owned parcels that will be affected. This may cause complications since this area has some environmental justice issues. Also, the drainage team is proposing to use these parcels to construct a pond for Basin 10.

Water Crossing Improvements

- Snubbs mentioned that all existing culverts used as cross drains will be extended and the existing bridges will be replaced to accommodate the proposed roadway improvements.
- Snubbs explained that the proposed roadway will increase the turning radius of the existing sharp turn along the CR-510 roadway, from 90th Avenue to 85th

Street. A bridge may not be possible at this location due to the skew that would be needed from the bridge to accommodate the larger radius of the roadway. As a result, FDOT will need a Right-of-Way permit from Sebastian River Improvement District (SRID) to install a culvert instead of a bridge or realign Lateral Canal D. These options will prevent pile installation in the center of the canal to support the bridge. However, there are some legal dispute about who regulates and maintain Lateral Canal D. There are landowners to the west of the canal that may have legal rights.

- IRC believes that a culvert may not work at the bend of CR-510 because there is a large amount of volume traveling through the Lateral Canal D. The proposed culvert would have to be big enough to accommodate the cross section of the canal without expanding the canal.

- FDOT mentioned that they will investigate the size of the culvert that will be needed for this canal.

Right-of-Way Requirements

- The end of the project area, located between 64th Ave and 58th Ave, is just north of Indian River Farms Water Control District (IRFWCD). IRFWCD agreed to receive drainage from CR-510, but will not accept any runoff north of the roadway. As such, the drainage system must ensure no runoff enter IRFWCD from the north of CR-510.

- Snubbs informed IRC that FDOT is in the process of acquiring a conceptual right of way permit from SRID for the installation of the culvert and a right of way permit from IRFWCD to connect the roadway drainage to their water control district.

Action Items:

- IRC to provide FDOT with easement document to show that properties north east of Basin 9 may have discharge rights into the roadway

SIGN-IN SHEET

Project Title: CR-510 PD&E from CR-512 to 58th Ave IRC

Date: 1/23/2017

FPID: 405606-2-22-02

NAME	DEPT./COMPANY	TITLE/POSITION	EMAIL	PHONE
Tommy Ruiz, PE, CFM, LEEP AP	Snubbs Consulting	Drainage Eng.	Tommy.Ruiz@snubbs.com	305.885.6400 ext. 201
Kathy Tabuteau, EI	Snubbs Consulting	Drainage Eng.	Kathy.tabuteau@snubbs.com	305.885.6400 ext. 206
Olivia Bonilla	FDOT Drainage		olivia.bonilla@dot.state.fl.us	954 777 4134
Wilord Metellus	FDOT Drainage	Drainage	Wilord.metellus@dot.state.fl.us	954-777-4467
Maria FORMOSO	FDOT	P.M.	mariaformoso@dot.state.fl.us	954 777 4677
Carlos Rodriguez	METRIC	Consultant PM	cdr@metriceng.com	305-235-5088
Rich Szpyrka	IRC	PW Director	rszpyrka@IRCGOV.com	772-226-1379
Amy Saeed	IRC MPO	Transportation plan	ASOBCZAK@IRCGOV.com	772-226-1519
[illegible]	IRC MPO	IRC MPO	pmatos@ircgov.com	772 226-1450
Shaq Samuel	Snubbs	Drainage	Shaquon.samuel@snubbs.com	305 885 6400 ext. 205

MEETING NOTES **3/01/2017**

Subject: CR-510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

SRID Board Attendees:
Sean Sexton, Board Supervisor
Jeff Bass, Board Supervisor
Tom Hammond, Board Supervisor
Samuel Block, Staff member
George Simmons, PE
Todd Wodraska, SRID Administration

District 4 Attendees:
Maria Formoso, PE, PMP, FDOT Project Manager (teleconference)
Olivia Bonilla, Drainage Engineer (teleconference)
Wilord Metellus, Drainage Engineer (teleconference)

Metric Attendees:
Carlos Rodriguez, PE, Consultant Project Manager (teleconference)
Juan Venezula, Bridge Engineer (teleconference)
Rob Myers, Senior Wildlife and NEPA Specialist (teleconference)

Snubbs Consulting Attendees:
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer
Kathy Tabuteau, EI, Drainage Engineer (teleconference)
Shaquon Samuel, EI, Drainage Engineer (teleconference)

Location: 1555 Indian River Drive, Suite B-125, Vero Beach, FL 32960

Time: 10:00 AM

Background:

- During an agency meeting between Florida Department of Transportation (FDOT) and Sebastian River Improvement District (SRID) on 01/19/2017, FDOT requested a conceptual permit from SRID to replace an existing bridge in Lateral Canal D with a culvert.

- SRID mentioned that FDOT's conceptual permit request must be taken to the SRID Board to be reviewed in the **Mar-01-2017** SRID Board Meeting.

Discussion:

Permit Request Letter Overview

- Snubbs summarized the Permit Request letter submitted to SRID. The summary may include the following:
    - **Problem**: The proposed roadway near Treasure Coast Elementary School will cross Lateral Canal D at such a skew that a bridge crossing would not be feasible.
    - **Solution**: FDOT has proposed 2 alternative solutions. Alternative A is to replace the bridge with a culvert of similar hydraulic capacity. Alternative B is to realign the canal to flow under the bridge at a perpendicular angle.

Alternative A

- Snubbs mentioned that one of the major benefits of replacing the bridge with a culvert is the elimination of intermediate supports in the canal that will be needed for the skewed bridge.
- SRID mentioned that there is a lot of undeveloped land in the basin for Lateral Canal D and they are concerned with the accumulation of debris in the culvert will cause head loss in the canal. SRID asked if an emergency blowout can be provided for the culvert.
- Florida Bridge mentioned that 3 cells/barrels can be provided, instead of 2, to account for the accumulation of debris.
- SRID mentioned that the culvert must be designed with the same hydraulic capacity as the existing bridge and should be able to handle flow from the 100-year storm.
- Snubbs mentioned that the culvert will be designed for 1 feet above the peak stage for the 100-year storm.

Alternative B

- Alternative B was not considered since realigning the canal may require R/W acquisition, impact future developments and require substantial adjustments to the roadway profile.

Bridge Option

- SRID asked Florida Bridge and Transportation Inc (Florida Bridge) if overhead support for the bridge was considered.

- Florida Bridge mentioned that overhead support was not considered, however, it would not be meet standard requirements and may not be approved by FDOT.

- SRID inquired about the number of piles that will be needed to support the skewed bridge.

- Florida Bridge mentioned that the bridge will require 4 – 5 intermediate supports approximately 30 ft apart longitudinally and 12 – 15 ft apart from a cross sectional view point.

- SRID asked Florida Bridge for a schematic drawing of the structural supports needed for the skewed bridge.

- Florida Bridge agreed to send SRID a schematic drawing of the structural supports needed for the skewed bridge.

- Florida Bridge mentioned that there were many possible solutions to support the skewed nature of the bridge but they are not practical.

Public Workshop

SRID mentioned that more information will be needed in order for the Board to make a final decision about the culvert alternative. SRID decided that a Public Workshop should be held on **Apr-12-2017** at **10 AM** to demonstrate that the culvert will be able to handle flow from the 100-year storm and will not cause adverse impacts to the canal.

Action Items:

- Florida Bridge to send SRID a schematic drawing of the structural supports needed for the skewed bridge by **Mar-20-2017**.
- Snubbs to submit Workshop package to SRID by **Mar-20-2017**.
- Public Workshop to be held on **Apr-12-2017** at **10 AM** at the Law office of Samuel A. Block.

Florida Department of Transportation

RICK SCOTT
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

RACHEL D. CONE
INTERIM SECRETARY

March 16th, 2017

Sebastian River Improvement District (SRID)
The Oaks Center
2501A Burns Rd.
Palm Beach Gardens, FL

Attn: SRID Board Members
RE: **CR 510 Crossing of Lateral Canal D**

Dear Board Members:

FDOT is proposing to replace the existing CR 510 bridge over Lateral Canal D with a culvert. Your input, during this phase of the project, is essential in determining critical design elements for CR 510.

Background

FDOT is currently conducting a Project Development and Environment (PD&E) Study for County Road CR-510 to investigate widening the roadway from two to four lanes for the 5.27 miles segment between CR-512 and 58th Avenue. The PD&E phase began in Feb 2016 and is estimated to end in May 2018. FDOT will be advertising the design phase of the project as soon as May 2017. The design phase will be completed within the next two (2) years. Lastly, the construction phase of this project will begin approximately 3 to 4 years from now.

Crossing of Lateral Canal D

The radius of the horizontal curve for CR-510, near Treasure Coast Elementary school, will be made flatter to enhance safety as part of the proposed improvements. Preliminary structural analysis indicates that the flatter curve will cause the roadway to cross Lateral Canal D at a significant skewed angle. A bridge will be unfeasible at this location without supporting

piles in the center of the canal. FDOT understands that placing piles in the center of Lateral Canal D is not desired by Sebastian River Improvement District (SRID) as it may impede the free flow of water under the bridge and may increase the frequency of needed maintenance to clear debris from the crossing. As such, FDOT is considering the following 2 alternatives.

> **Alternative A**: Replaces the bridge with a culvert of similar hydraulic capacity. This alternative can be accommodated within the existing Right-of-Way (R/W). Nominal adjustments to the vertical roadway profile would be needed.
>
> **Alternative B:** Realigns Lateral Canal D so that it can cross under CR 510 at a near perpendicular angle and provides a bridge with no supporting piles in the center of the canal. This alternative will require acquisition of Right-of-Way (R/W) and may impact the development potential of adjacent properties. Substantial adjustments to the vertical roadway profile would also be needed.

After considering the pros and cons of each alternative, FDOT is in favor of Alternative A, which replaces the existing CR 510 bridge over Lateral Canal D with a culvert. This alternative is anticipated to have less impacts on the surrounding community and provide similar hydraulic performance to the existing bridge. See attached exhibit.

Board Request

FDOT is requesting that the Sebastian River Improvement District Board provide comments on whether they will support Alternative A, which replaces the existing CR 510 bridge over Lateral Canal D with a culvert.

R/W Permit Approach

In an effort to reduce the potential for delays during design and construction of roadway projects, FDOT is placing an emphasis on identifying unique permitting situations and securing advance permits for those situations during the PD&E study, where possible. As such, the Department would like to obtain a R/W permit, from SRID, for the replacement of the CR 510 bridge over Lateral Canal D with a culvert as shown in the attached exhibit. Since the R/W permit for this crossing will be sought during the PD&E study, full construction plans will not be available when the application is submitted. The Department asks that SRID accept a permit sketch of the culvert showing basic elements such as culvert dimensions and maintenance

access points in lieu of full construction plans. The submittal would include a preliminary hydraulic model to demonstrate that the proposed culvert provides similar hydraulic performance to the existing bridge. SRID would have the option of placing a special condition on the permit requiring FDOT to submit final construction plans for approval prior to beginning construction to ensure that the culvert is constructed in substantial compliance with the approved R/W permit. Submittal of the R/W permit is anticipated to occur in April 2017.

Summary

FDOT is requesting that the Sebastian River Improvement District Board provide comments on whether they will support Alternative A, which replaces the existing CR 510 bridge over Lateral Canal D with a culvert. See attached exhibit. The Department would like to obtain a R/W permit, from SRID, during the PD&E study phase of this project. FDOT asks that SRID accept a permit sketch of the culvert showing basic elements such as culvert dimensions and maintenance access points in lieu of full construction plans. SRID would have the option of placing a special condition on the permit requiring FDOT to submit final construction plans for approval prior to beginning construction to ensure that the culvert is constructed in substantial compliance with the approved R/W permit. Submittal of the R/W permit is anticipated to occur in April 2017.

I look forward to hearing from you. Thank you very much for your assistance.

Sincerely,

Olivia Bonilla
Drainage Designer
FDOT – District 4
3400 Commercial Blvd
Fort Lauderdale, FL 33309
(954) 777-4134
wilord.metellus@dot.state.fl.us

Attachments:
Exhibit 1: CR 510 Proposed Culvert Location

MEETING NOTES **4/12/2017**

Subject: CR-510 PD&E from CR-512 to 58th Ave

FPID: 405606-2-22-02

SRID Attendees:
Sean Sexton, Board Supervisor
Jeff Bass, Board Supervisor
Todd Wodraska, SRID Administration
Len Lindahl, SRID Administration
George Simmons, PE, District Engineer
Samuel Block, Attorney

FDOT District 4 Attendees:
Maria Formoso, PE, PMP, FDOT Project Manager
Olivia Bonilla, EI Drainage Engineer
Carlos Rodriguez, PE, Consultant Project Manager (Metric)
Gabriela Garcia, PE, Roadway Engineer (Metric)
Chandra Raman, PE, Drainage Engineer (Metric)
Tommy Ruiz, PE, CFM, LEED AP, Drainage Engineer (Snubbs)

Public Attendees:
Dan "Hugh" Corrigan (Corrigan Family)
Lisa Chivian (Corrigan Family)
Edward de la Porte (Corrigan Family Attorney)
Bob Sprinkle, PE (Corrigan Family Engineer)

Location: 1555 Indian River Drive, Suite B-125, Vero Beach, FL 32960

Time: 10:00 AM

Background:

FDOT is currently conducting a Project Development and Environment (PD&E) Study to evaluate widening CR 510 from CR 512 to 58th Avenue. One of the safety improvements being evaluated is to flatten the horizontal curve for CR-510, near Treasure Coast Elementary school. Preliminary structural analysis indicates that the flatter curve will cause the roadway to cross Lateral Canal D at a significant skewed angle, which will require an atypical and inefficient structural design if a bridge is selected to span Lateral Canal D. When the Bridge Development Report is prepared for Lateral Canal D as part of the final design, it is anticipated that the bridge crossing option will be identified as cost prohibitive when compared to the culvert crossing option.

In an effort to reduce the potential for delays during design and construction of roadway projects, FDOT is placing an emphasis on identifying unique permitting situations and securing advance permits or advance approval for those situations during the PD&E study. FDOT attended the March 1, 2017 SRID Board Meeting to discuss the feasibility of replacing the Lateral Canal D bridge with a culvert crossing. SRID and members of the public raised concerns with the hydraulic capacity of the culvert and its potential of clogging during major rain events due to the large amount of undeveloped land that drains through Lateral Canal D. SRID requested that FDOT participate in a topic specific workshop, hosted by SRID on April 12th, 2017, to further discuss the option of replacing the Lateral Canal D bridge with a culvert crossing. Notes of the April 12th, 2017 workshop follow.

Discussion:

FDOT provided project background information as summarized above. One item of clarification is that the existing CR 510 bridge may remain, depending on local preference, after the new CR 510 crossing is installed.

FDOT distributed a packet containing the preliminary hydraulic analysis conducted to evaluate placing a culvert crossing in Lateral Canal D for CR 510. A page-turn review of the packet was conducted. Options reviewed are summarized below.

- **Alternative-1**: Existing Bridge to remain with no new structure (No-build Alternative)
- **Alternative-2**: Existing Bridge to remain with new bridge with 4 piers at the proposed roadway crossing.
- **Alternative-3**: Existing Bridge to remain with 3-12'x15' box culvert cells at the proposed crossing.
- **Alternative-4**: Existing Bridge to remain with 2-12'x15' box culvert cells at the proposed crossing.

FDOT stated that a conservative approach was employed in the analysis by using both flow rate and peak stages as the tailwater condition for various design storms. Typically, only the flow rate is used as the boundary condition. By using a more conservative approach, the analysis has an inherent safety factor. The analysis demonstrates that a triple box culvert (Alternative-3) and bridge option (Alternative-2) provide similar hydraulic flow capacity since the peak stages for both alternatives are the same. Although a double box culvert (Alternative 4) would provide the required hydraulic capacity with the allowable backwater increment of 0.1', a triple box culvert (Alternative-3) is being proposed to address potential clogging and maintenance concerns. In addition, the 100-year peak stages of the four alternatives are below the 100-year FEMA elevations at the proposed bridge location. All options evaluated provide a minimum drift clearance of 1 foot above the 100-Year FEMA elevation. Based on this analysis, FDOT feels that a triple box culvert (Alternative-3) meets flow capacity and clogging concerns raised by SRID and the public during the SRID Board Meeting held on March 1, 2017 SRID.

SRID requested clarification on how/why the triple box culvert (Alternative-3) was performing similar to the bridge option (Alternative-2).

FDOT responded that the similar performance was primarily due to the following two points.

1. The culvert option will require the channel to be widened so that a rectangular cross-sectional area is provided rather than a trapezoidal cross-sectional area as needed with a bridge.

2. The culvert option will have less friction along the wetted perimeter because it will have concrete sides rather than the heavily vegetated sided typical of the bridge option.

SRID asked why the culvert inverts were not being proposed at the channel bottom and if it would create any hydraulic impacts upstream. A request was made to lower the culvert inverts to match the channel bottom.

FDOT stated that the difference between culvert invert and channel bottom are negligible when compared to the channel depth and average flow. As such, upstream impacts are not anticipated due to this difference. Per SRID's request, FDOT will adjust the culvert design so that the invert matches the channel bottom.

SRID stated that flow capacity in the canal needed to be maintained and asked if the culverts were able to be constructed while meeting this requirement.

FDOT stated that one way to maintain canal flow is by constructing the culverts in phases while maintaining a diversion channel. The minimum flow capacity would need to be specified by SRID, in the Right of Way (R/W) permit, for the dry and wet season. FDOT will require its contractor to develop a construction sequence that maintains minimum flow requirements as specified by the SRID R/W permit.

FDOT asked if SRID has a minimum spacing distance between bridges and if this would require the existing CR 510 bridge to be removed after the proposed culvert crossing is installed. The County's preference is to remove the existing bridge once the proposed crossing is installed but local residents and Treasure Coast Elementary school may request that the existing bridge remain.

SRID stated that while they have a minimum bridge spacing requirement, they would consider a variation, if needed, to allow the existing bridge to remain if the County makes the request.

SRID asked public attendees if they had questions or comments concerning the triple culvert crossing being proposed by FDOT.

Corrigan Family stated that their engineer had reviewed submitted documentation and that their concerns with flow and clogging were adequately addressed. They reiterated the need to maintain flow capacity during construction to avoid flooding their property, which lies upstream of the crossing. No further concerns were identified by the Corrigan Family.

FDOT stated that they would be requesting a formal determination on whether or not a culvert crossing would be allowed at this location and that SRID's response would be included as a PD&E commitment and it would be followed during the design phase of the project.

SRID stated that sufficient information was provided in the workshop for them to feel comfortable with providing FDOT with a formal response. A suggestion was made to outline the request in a letter in time for the next SRID Board meeting, which is scheduled for Wednesday June 7th, 2017, at the Northern Trust Bank Community Room located on Beachland Boulevard in Vero Beach.

Action Items:

- FDOT to submit a request, by **May 24th 2017,** for formal determination on whether or not a culvert crossing would be allowed at this location.

Florida Department of Transportation

RICK SCOTT
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

RACHEL D. CONE
INTERIM SECRETARY

May 19th, 2017

Sebastian River Improvement District (SRID)
The Oaks Center
2501A Burns Rd.
Palm Beach Gardens, FL

Attn: SRID Board Members
RE: **CR 510 Crossing of Lateral Canal D**

Dear Board Members:

FDOT is proposing a new culvert crossing of Lateral Canal D at CR 510. Your input, during this phase of the project, is essential in determining critical design elements for CR 510.

Background

FDOT is currently conducting a Project Development and Environment (PD&E) Study for CR 510 to investigate widening the roadway from two to four lanes for the 5.27 miles segment between CR-512 and 58th Avenue. The PD&E phase began in Feb 2016 and is scheduled to end in May 2018. FDOT will be advertising the design phase of the project in October 2017. The design phase will be completed within the next 4 years, with 2-3 years for right-of-way acquisition. Lastly, the construction phase of this project will begin once the right-of-way acquisition has been completed.

One of the safety improvements being evaluated is to flatten the existing horizontal curve for CR-510 near Treasure Coast Elementary school. Preliminary structural analysis indicates that the flatter curve will cause the roadway to cross Lateral Canal D at a significant skewed angle, which will require an atypical and inefficient structural design if a bridge is selected to span Lateral Canal D. When the Bridge Development Report is prepared for Lateral Canal D as part of the final design, it is anticipated that the bridge

crossing option will be identified as cost prohibitive when compared to the culvert crossing option.

FDOT attended the March 1, 2017 SRID Board Meeting to discuss the feasibility of constructing a new culvert crossing of Lateral Canal D at CR 510. SRID and members of the public raised concerns with the hydraulic capacity of the culvert and its potential of clogging during major rain events due to the large amount of undeveloped land that drains through Lateral Canal D. SRID requested that FDOT participate in a topic specific workshop, hosted by SRID on April 12th, 2017, to further discuss the culvert crossing.

During the April 12th SRID workshop, FDOT presented results of the preliminary hydraulic modeling conducted to evaluate potential crossing alternatives. All alternatives conservatively assumed that the existing bridge will remain because the County has not made the final determination on whether or not the existing bridge will be needed after CR 510 is improved. A summary of the alternatives follows.

- Alternative-1: Existing Bridge to remain with no new structure (No-build Alternative)
- Alternative-2: Existing Bridge to remain with new bridge with 4 piers at the proposed roadway crossing.
- Alternative-3: Existing Bridge to remain with 3-12'x15' box culvert cells at the proposed crossing.
- Alternative-4: Existing Bridge to remain with 2-12'x15' box culvert cells at the proposed crossing.

The alternatives presented at the workshop were evaluated by employing a conservative approach in the analysis by using both flow rate and peak stages as the tailwater condition for various design storms. Typically, only the flow rate is used as the boundary condition. By using a more conservative approach, the analysis has an inherent safety factor. The analysis demonstrated that a triple box culvert (Alternative-3) and bridge option (Alternative-2) provide similar hydraulic flow capacity since the peak stages for both alternatives are the same. Although a double box culvert (Alternative 4) would provide the required hydraulic capacity with the allowable backwater increment of 0.1', a triple box culvert (Alternative-3) is being proposed to address potential clogging and maintenance concerns. In

addition, the 100-year peak stages of the four alternatives are below the 100-year FEMA elevations at the proposed bridge location. All options evaluated provide a minimum drift clearance of 1 foot above the 100-Year FEMA elevation.

SRID stated that sufficient information was provided in the workshop for them to feel comfortable with providing FDOT with a formal response regarding the proposed culvert crossing at CR 510 and provided the following Right of Way (R/W) permit requirements.

- Lower the invert of the center culvert barrel to match the canal bottom
- Flow capacity in the canal will need to be maintained during construction

Based on the analysis presented at the workshop and feedback provided by SRID, FDOT feels that a triple box culvert (Alternative-3) meets flow capacity, clogging concerns, and R/W permit requirements.

Crossing of Lateral Canal D

FDOT is proposing a new triple box culvert crossing of Lateral Canal D at CR 510. Preliminary hydraulic modeling shows that a double box culvert is capable of conveying the necessary flows. As such, the proposed triple box culvert has excess capacity with one spare culvert in case one culvert becomes clogged. Inverts for each of the three barrels will be placed at the canal bottom. Culvert barrels will have a width of 12-ft, height of 17-ft and approximate length of 185-ft. A minimum drift clearance of 1 foot above the 100-Year FEMA elevation is provided by this crossing. The triple box culvert configuration is such that it can be constructed in phases, while maintaining a bypass channel if needed, to ensure minimal flows are maintained for dry and wet seasons as specified by SRID.

Board Request

FDOT is requesting that the SRID Board provide a formal determination on whether or not a new triple box culvert crossing of Lateral Canal D at CR 510 will be allowed. SRID's response will be included as a PD&E commitment and it will be followed during the design phase of the project.

R/W Permit Approach

In an effort to reduce the potential for delays during design and construction of roadway projects, FDOT is placing an emphasis on identifying unique permitting situations and securing advance permits for those situations during the PD&E study, where possible. As such, the Department would like to obtain a R/W permit, from SRID, for the replacement of the CR 510 bridge over Lateral Canal D with a culvert as shown in the attached exhibit. Since the R/W permit for this crossing will be sought during the PD&E study, full construction plans will not be available when the application is submitted. The Department asks that SRID accept a permit sketch of the culvert showing basic elements such as culvert dimensions and maintenance access points in lieu of full construction plans. The submittal would include a preliminary hydraulic model to demonstrate that the proposed culvert provides similar hydraulic performance to the existing bridge. SRID would have the option of placing a special condition on the permit requiring FDOT to submit final construction plans for approval prior to beginning construction to ensure that the culvert is constructed in substantial compliance with the approved R/W permit. Submittal of the R/W permit is anticipated to occur in July 2017.

Summary

FDOT is requesting that the SRID Board provide a formal determination on whether or not a new triple box culvert crossing of Lateral Canal D at CR 510 will be allowed. See attached exhibit. The Department would like to obtain a R/W permit, from SRID, during the PD&E study phase of this project. FDOT asks that SRID accept a permit sketch of the culvert showing basic elements such as culvert dimensions and maintenance access points in lieu of full construction plans. SRID would have the option of placing a special condition on the permit requiring FDOT to submit final construction plans for approval prior to beginning construction to ensure that the culvert is constructed in substantial compliance with the approved R/W permit. Submittal of the R/W permit is anticipated to occur in July 2017.

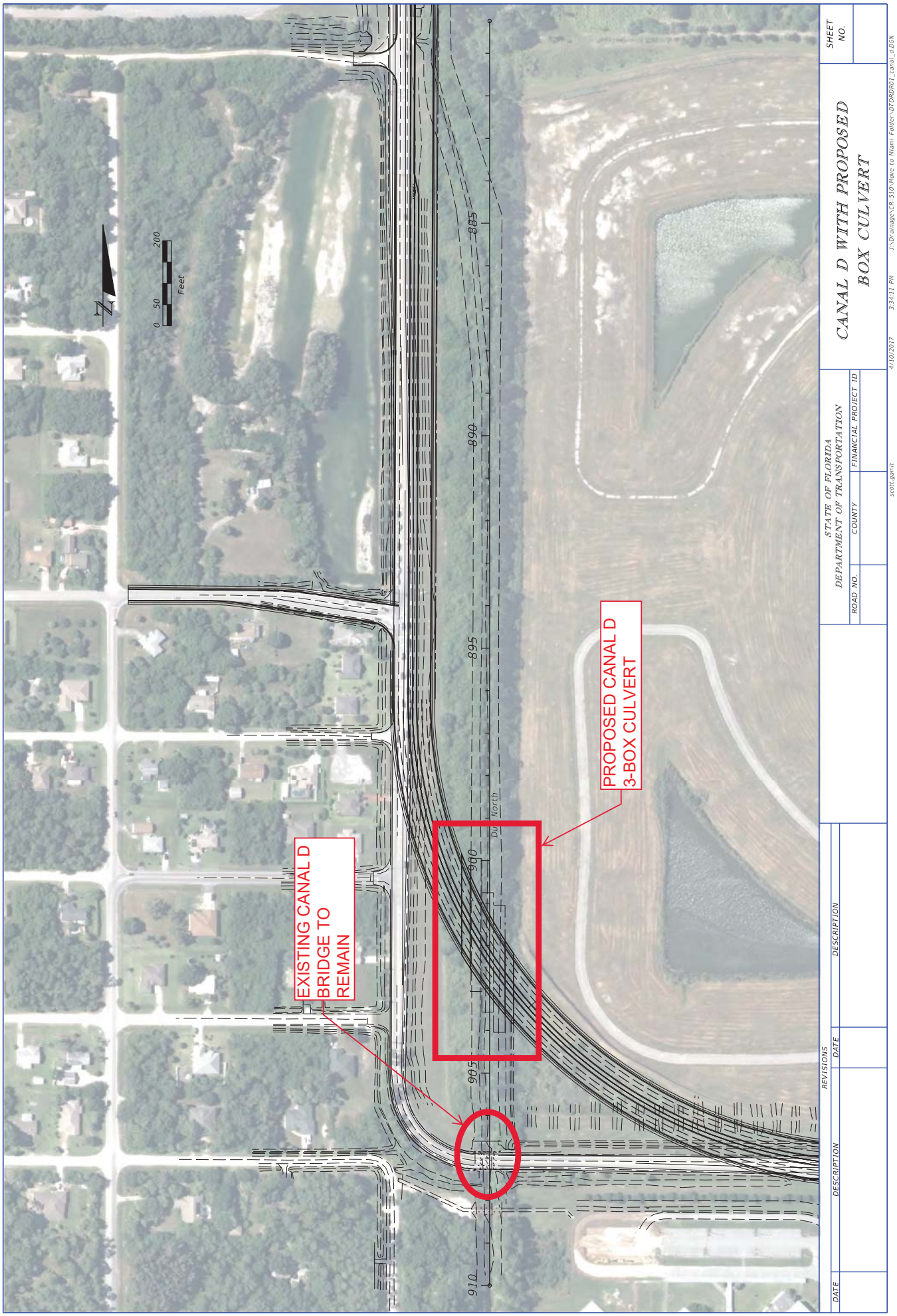
I look forward to hearing from you. Thank you very much for your assistance.

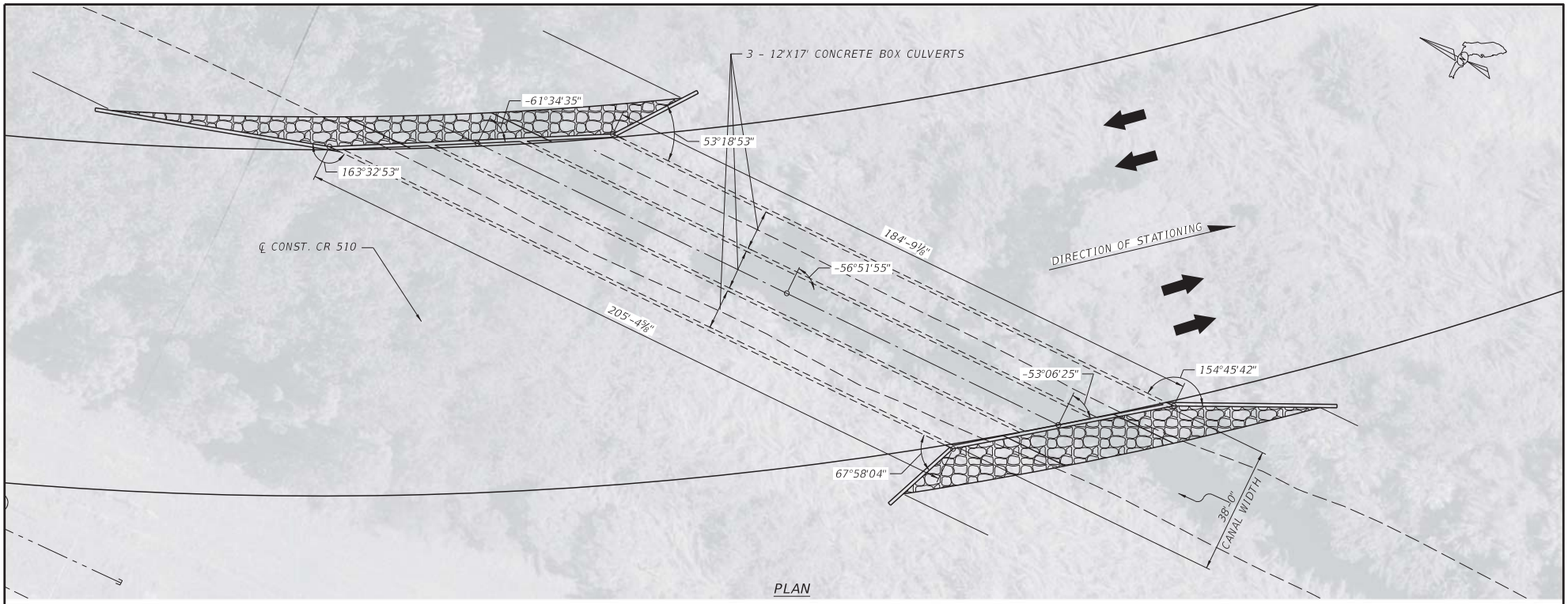
Sincerely,



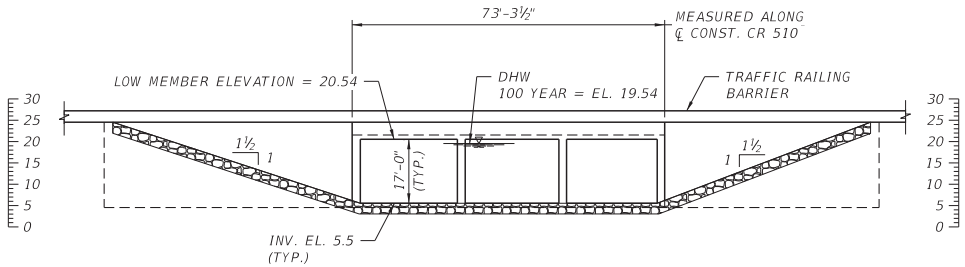
Maria Formoso, P.E., P.M.P., Project Manager
Florida Department of Transportation - District 4 Design
3400 Commercial Blvd.
Ft. Lauderdale, FL., 33309
(954) 777-4677 Office (561) 452-8026 Cell
Email: Maria.Formoso@dot.state.fl.us

Attachments:
Exhibit 1: CR 510 Proposed Culvert Location


PROPOSED CANAL D
3-BOX CULVERT
EXISTING CANAL D
BRIDGE TO
REMAIN
885
890
895
900
905
910
0 50 200
Feet
CANAL D WITH PROPOSED
BOX CULVERT
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ROAD NO.
COUNTY
FINANCIAL PROJECT ID
SHEET NO.
REVISIONS
DESCRIPTION
DATE
4/10/2017
3:34:11 PM
scott.gamit
J:\Drainage\CR-510\Move to Miami Folder\DTDRDR01_canal_g.DGN



PLAN



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

JUAN A. VALENZUELA, PE
P.E. LICENSE NUMBER 68208
FBT-FLORIDA BRIDGE AND TRANSPORTATION, INC.
633 DARTMOUTH STREET
ORLANDO, FL 32804
(407) 513-9709
CERTIFICATE OF AUTHORIZATION 26379

DRAWN BY: CEM
CHECKED BY: JAV
DESIGNED BY: SD
CHECKED BY: JAV

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
CR 510	INDIAN RIVER	405606-1-22-02

SHEET TITLE: PLAN AND ELEVATION
CONCRETE BOX CULVERT OPTION

REF. DWG. NO.

PROJECT NAME: CR 510/WABASSO ROAD FROM CR 512
TO 58TH AVENUE OVER LATERAL D CANAL

SHEET NO. C37

BWilliams 5/19/2017 8:34:19 AM P:\2015\15-91 CR 510 PD&E - Metric\40560612200\struct\PlanElev_Culvert.dgn

Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

August 20, 2018

Ann Broadwell
Florida Department of Transportation
District Four
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309-3421

Service Consultation Code:	04EF2000-2016-F-0132
Date Received:	September 18, 2017
Consultation Initiation Date:	May 10, 2018
Applicant:	Florida Department of Transportation
Project:	Expansion of County Road 510/85 Street from County Road 512 to 58 Avenue
County:	Indian River

Dear Ann Broadwell:

The U.S. Fish and Wildlife Service (Service) received the Florida Department of Transportation's (FDOT) request, on behalf of the Federal Highway Administration, for consultation dated September 18, 2017, for their proposed project to expand County Road 510/85 Street (C.R. 510) from C.R. 512 to 58 Avenue (Ave) (Project). This document transmits the Service's biological opinion based on our review of the Project located in Indian River County, Florida, and its effects on the threatened Florida scrub-jay (*Aphelocoma coerulescens*; scrub-jay). It also includes and summarizes our concurrence for FDOT's determination for the federally threatened Audubon's crested caracara (*Polyborus plancus*, caracara), eastern indigo snake (*Drymarchon corias couperi*; indigo snake) and wood stork (*Mycteria americana*). This document is submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

This biological opinion is based on the August 2017 Natural Resources Evaluation and Supplemental Information on Florida Scrub-Jay submitted to the Service by Metric Engineering (FDOT's Consultant), field investigations, correspondence, telephone conversations, emails, and other sources of information. A complete record of this consultation is on file at the South Florida Ecological Services Office in Vero Beach, Florida.

Consultation history

On September 18, 2017, the Service received a biological assessment from FDOT determining the proposed Project may affect, but is not likely to adversely affect caracara, indigo snake, scrub-jay, and wood stork.

On October 4, 2017, the Service recommended to the FDOT that they change their determination to "may affect, likely to adversely affect" scrub-jays and request initiation of formal consultation.

On October 5, 2017, the FDOT agreed to change their effect determination for scrub-jay to "may affect, likely to adversely affect", and confirmed that they were requesting initiation of formal consultation on the proposed Project.

On January 8, 2018, the FDOT indicated they intended to mitigate for unavoidable adverse impacts to the scrub-jay, and on January 11, 2018, the Service requested from the FDOT a mitigation plan consistent with the requirements outlined in the Service's Interim Guidance on Implementing the Final Endangered Species Act Compensatory Mitigation Policy (Service 2017).

On March 9, 2018, the Service received the FDOT's draft mitigation plan for scrub-jays, which included four different options. On March 29, 2018, the Service and the FDOT agreed that option #1: "Property 1 WSCA (Indian River County Wabasso Scrub Conservation Area) Proximate", was the most appropriate to off-set the adverse effects of the proposed Project, and the Service requested a final mitigation plan focused on the selected property.

As of May 10, 2018, the Service has received all the information necessary for initiation of formal consultation on scrub-jays for this Project as required in the regulations governing interagency consultations (50 CFR § 402.14).

BIOLOGICAL OPINION

This Biological Opinion provides the Service's opinion as to whether the proposed Project is likely to jeopardize the continued existence of the scrub-jay. There is no designated critical habitat for scrub-jay; therefore, this Biological Opinion will not address destruction or adverse modification of critical habitat.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION

Jeopardy determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and

recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this Biological Opinion relies on four components: (1) the Status of the Species, which describes the range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the Cumulative Effects, which evaluate the effects of future, non-federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

DESCRIPTION OF PROPOSED ACTION

The FDOT is proposing to widen C.R. 510 from two to four lanes extending from the C.R. 512 intersection to the 58 Ave intersection for a total distance of 5.27 miles (mi.). The purpose of the Project is to provide additional capacity to meet future traffic needs based on expected population and employment growth within the area, and the Project is designed to accommodate a speed limit of 45 miles per hour (mph). Currently, C.R. 510 is primarily a two-lane roadway that is functionally classified as an urban principal arterial for east-west traffic movements. The Project is located just west and south of Sebastian, Indian River County, Florida (Figure 1). C.R. 510 is owned and maintained by Indian River County.

Increased residential development is encroaching on the Project area from the city of Sebastian to the north and from Vero Lake Estates, a housing development that borders the Project to the west. A shopping center and two gas stations are located at the intersection of C.R. 510 and C.R. 512 at the Project's western terminus. Approximately 0.5 mi south of that intersection and immediately west of C.R. 510 is Sebastian River High School. Treasure Coast Elementary School occurs south of C.R. 510, just east of the 90 degree bend in C.R. 510. Immediately northeast of that bend is a large area that was cleared for residential development. Streets and utilities were installed but no construction of houses has begun. The Indian River County Wabasso Scrub Conservation Area (WSCA) is located immediately north of C.R. 510 between 61st Drive and 58th Ave and consists of occupied scrub-jay habitat.

By the year 2040, the proposed widening of C.R. 510 is anticipated to cause an approximately 23% increase in traffic along C.R. 510. The population of Indian River County is projected to increase from 155,000 in year 2004 to 209,000 in year 2034, with a steady 1.72% annual growth

rate. As the population of the County increases, developments in the County will continue to grow thereby increasing the amount of motor vehicle traffic on the roads.

Following construction the total width of the proposed widened road ranges from 104 feet (ft.) to 168 ft. along the Project corridor. Currently, the existing width of the road ranges from 80 ft. to 160 ft. Medians, utility strips, sidewalks and bicycle lanes would be included within the right-of-way. A 32 ft. drainage easement would be constructed along the north side of the roadway outside of the right-of-way to treat offsite drainage in the area between just west of 88 Ave to 66 Ave.

Currently C.R. 510 makes a 90 degree bend approximately 1.25 mi. from the Project's western terminus so that the westernmost part of C.R. 510 runs north-south and the more eastern section runs east-west. The Project proposes to reconstruct the 90 degree bend to improve safety conditions (Figure 2). These improvements will likely allow vehicles to travel at faster speeds.

Minimization and Conservation Measures

Florida scrub-jay

FDOT proposes to minimize impacts to scrub-jays and their suitable habitat by following the existing C.R. 510 right-of-way as much as possible and by limiting the width of right-of-way in sensitive areas, such as the WSCA. Scrub-jays have been documented throughout the WSCA since 2011. Direct impacts to suitable scrub-jay habitat in the WSCA would be avoided by expanding the right-of-way on the south side of C.R. 510, away from the WSCA. FDOT will place restrictions on construction near the WSCA during the scrub-jay breeding season (March 1 through June 30) every year until the Project is completed. Staging of equipment or materials in scrub habitat and wetlands would also be prohibited.

Signage indicating "No Food Trash" would be installed near dumpsters between 61 Drive and 58 Ave. Staging of equipment or materials would be prohibited and signs warning motorists of sensitive wildlife would be installed along the north side of C.R. 510 where the WSCA boundary occurs. Planting of palms or oaks along the road way near the WSCA would be prohibited near the WSCA to avoid attracting scrub-jays in search of nesting material close to the road.

The FDOT will install signs along C.R. 510 warning motorists of sensitive wildlife along the WSCA corridor. In addition, the FDOT will restrict the planting of palms and oaks and any other trees near the WSCA because they may attract scrub-jays in search of nesting material, forage, or serve as a vantage perch for predatory bird species.

The FDOT proposes to provide off-site mitigation for the unavoidable adverse effects by acquiring 25 ac. of land near the WSCA and restoring it to suitable scrub-jay habitat (Property 1 WSCA Proximate). The FDOT has finalized a mitigation plan (Enclosure A), in accordance with the Service's *Interim Guidance on Implementing the Final Endangered Species Act Compensatory Mitigation Policy* (2017). The FDOT provided the Service with documentation that they have secured funding for the acquisition of the mitigation property, and that they will work to obtain it before beginning any of the proposed Project actions.

The FDOT will coordinate with the Indian River County Conservation Lands Program to ensure staff is able to conduct ongoing scrub-jay population surveys within the WSCA and also conduct surveys in the acquired lands, Property 1 WSCA Proximate. The FDOT will review survey results with the Service and Indian River County staff each year for at least 10 years after the completion of the Project to monitor the effects of the road widening and the benefits of the acquisition.

Eastern indigo snake

The Service's *Standard Protection Measures for the Eastern Indigo Snake* (2013) would be implemented during all proposed Project activities.

Wood stork

Impacts to suitable foraging habitat (SFH) are anticipated to total between 0.5 ac and 5 ac. Multiple wood stork nesting colonies (n = 6) occur within 18.6 mi of the impacts. A mitigation plan for adverse effects to wood storks due to loss of SFH will be prepared during the design phase of the Project and executed before the start of any Project activities. Because the impacts to SFH would total less than 5 ac, an analysis of foraging prey base losses to support mitigation is not required. FDOT is considering off-setting impacts to SFH through wetland mitigation banks, including the use of the Senate Bill program in cooperation with the Saint John's Water Management District (SJRWMD). The SJRWMD Basin 22 Mitigation Bank is located within the Central Indian River Lagoon drainage basin, its service area includes the proposed Project as well all six of the wood colonies that have a core foraging area that includes the Project. On-site replacement of swales "in-kind" could also serve to adequately replace lost wood stork habitat, without the need for off-site mitigation. Proof of completed mitigation will be provided to the Service before the start of any Project activities. FDOT will consult with the Army Corps of Engineers, as appropriate, for wetland impacts from the proposed Project.

Action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action. For this Project, the Service has identified the action area as all lands within the 5.27 mi section of the C.R. 510 roadway and right-of-way footprint and all land within 500 ft. of the centerline of C.R. 510 (Figures 3 and 4). This additional 500 ft. was included in the action area to account for noise and human activity that are anticipated to affect listed species in this area. Past 500 ft. we expect these disturbances would be discountable. This distance is supported by Mumme *et al.* (2000), which documented significant effects on scrub-jay territories up to 500 ft. away from a road.

The FDOT will coordinate with the Indian River County Conservation Lands Program to ensure staff is able to conduct ongoing scrub-jay population surveys within the WSCA and also conduct surveys in the acquired lands, Property 1 WSCA Proximate. The FDOT will review survey results with the Service and Indian River County staff each year for at least 10 years after the completion of the Project to monitor the effects of the road widening and the benefits of the acquisition.

Eastern indigo snake

The Service's *Standard Protection Measures for the Eastern Indigo Snake* (2013) would be implemented during all proposed Project activities.

Wood stork

Impacts to suitable foraging habitat (SFH) are anticipated to total between 0.5 ac and 5 ac. Multiple wood stork nesting colonies (n = 6) occur within 18.6 mi of the impacts. A mitigation plan for adverse effects to wood storks due to loss of SFH will be prepared during the design phase of the Project and executed before the start of any Project activities. Because the impacts to SFH would total less than 5 ac, an analysis of foraging prey base losses to support mitigation is not required. FDOT is considering off-setting impacts to SFH through wetland mitigation banks, including the use of the Senate Bill program in cooperation with the Saint John's Water Management District (SJRWMD). The SJRWMD Basin 22 Mitigation Bank is located within the Central Indian River Lagoon drainage basin, its service area includes the proposed Project as well all six of the wood colonies that have a core foraging area that includes the Project. On-site replacement of swales "in-kind" could also serve to adequately replace lost wood stork habitat, without the need for off-site mitigation. Proof of completed mitigation will be provided to the Service before the start of any Project activities. FDOT will consult with the Army Corps of Engineers, as appropriate, for wetland impacts from the proposed Project.

Action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action. For this Project, the Service has identified the action area as all lands within the 5.27 mi section of the C.R. 510 roadway and right-of-way footprint and all land within 500 ft. of the centerline of C.R. 510 (Figures 3 and 4). This additional 500 ft. was included in the action area to account for noise and human activity that are anticipated to affect listed species in this area. Past 500 ft. we expect these disturbances would be discountable. This distance is supported by Mumme *et al.* (2000), which documented significant effects on scrub-jay territories up to 500 ft. away from a road.

SPECIES NOT LIKELY TO BE ADVERSELY AFFECTED BY THE PROPOSED ACTION

Audubon's crested caracara

During 2017, caracaras were observed flying over the action area in Segments 1 and 2. Activity was focused around the Publix shopping center (in the southeast corner of the 38 intersection of C.R. 510 and C.R. 512) as well as around the northwest corner of Sebastian River High School (Figure 5) which are outside of the action area. No caracara nests were located within the action area during surveys following the Service's caracara survey guidelines (Morrison 2001, Service 2016). Suitable habitat occurs within the Project area, however, because no nests were detected, this habitat likely only serves as foraging habitat for the individuals observed in and/or near Segments 1 and 2. Based on the Consultant's survey results, the most likely area a nest would occur was in the northwest corner of Sebastian River High School. Assuming that there is an active nest in this area, the proposed Project would not occur within the nesting pair's primary nesting territory [(~70 ac / 300 meter radius; based on the Service's *Draft Species Conservation Measures for Audubon's Crested Caracara* (2004)]. Therefore, we do not expect the proposed Project to disrupt nesting activities. Because we do not have specific information about the territory of this pair, we will use the average territory size for caracaras (3,000 ac) to further evaluate potential effects to the pair. Given an average territory size, the proposed Project would remove 8.93 ac of foraging habitat, or 0.3 percent of the average caracara territory. We do not expect that this small incremental loss of foraging habitat would impair the pair's ability to feed, breed, or shelter.

Therefore, based on the evidence that there are no active nests within the proposed Project, and the Project would be expected to only remove a fraction (0.3 percent) of foraging habitat from the territory, the Service concurs with FDOT's determination that the proposed Project may affect, but is not likely to adversely affect caracaras.

Eastern indigo snake

To minimize adverse effects to indigo snakes the FDOT would implement the Service's *Standard Protection Measures for the Eastern Indigo Snake* (2013) during site preparation and construction. The linear nature of the Project makes it unlikely that Project construction would remove a large enough portion of any indigo snake territory (females 46 ac, males 184 ac; Layne and Steiner 1996) to adversely affect an individual. In addition, impacts to potential habitat would occur in disturbed areas that are either adjacent to a roadway, canals or were previously cleared and graded for residential or agricultural use, reducing the value of this habitat to any indigo snake. By using the Service's *Eastern Indigo Snake Programmatic Effect Determination Key* (Service 2013) the FDOT came to a determination of may affect, not likely to adversely affect and received programmatic concurrence. This determination is also supported by the Service's *Consultation Key for the Eastern Indigo Snake* – Revised (Service 2017).

Wood stork

The Service's Wood Stork Active Florida Colonies map data identified six active wood stork colonies (Wabasso, Pelican Island, Micco North, Micco South, Grange Island and Grant Farm Island colonies) within 18.6 mi of the Project corridor. Delineations of wood stork SFH follow the definitions described in the USFWS *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Service 1990). The Service's *South Florida Programmatic Concurrence, Wood Stork* (Key) (Service 2010) was used to evaluate the potential effects of the Project on wood storks. The proposed Project is predicted to directly impact 2.983 ac of wood stork SFH, which occur where furrows in agricultural fields may form SFH during high water. A mitigation plan for impacts to wood storks will be prepared during the design phase of the Project and will be executed before the start of any Project activities. Because the impacts to SFH will total less than 5 ac, an analysis of foraging prey base losses to support mitigation is not required pursuant to the Key. As discussed above, FDOT has considered several options to off-set impacts to wood stork SFH. FDOT will further explore these options in the design phase of the Project. The FDOT determined the proposed Project may affect, but is not likely to adversely affect wood storks by committing to mitigate and/or maintain wood stork SFH. The FDOT has programmatic concurrence for their determination through use of the Service's Key.

STATUS OF THE SPECIES

Please see http://www.fws.gov/verobeach/ for the current Status of the Species for the Florida scrub-jay (October 2015).

Summary of threats to the species

Scrub-jays generally inhabit sandpine scrub, scrubby flatwoods, oak scrub, and coastal scrub habitats of peninsular Florida where the canopy is less than 10 ft tall; defined by Florida Land Use Cover and Forms Classification System (FLUCCS) as code 3200, described as shrub and brushland. These habitat types require well-drained sandy soils and occur along the coastlines, ridges, and dry portions of the central Florida peninsula. Scrub-jay populations continue to show decreasing trends, predominantly due to habitat loss from development and habitat degradation through fire suppression (Service 2015).

ENVIRONMENTAL BASELINE

Status of the species within the action area

Occupied scrub-jay habitat exists on the WSCA, immediately north of C.R. 510. Most of the WSCA is categorized as shrub and bushland (FLUCCS 3200). Portions of the WSCA were previously used as mitigation for unavoidable impacts to scrub-jay habitat elsewhere during previous expansions of C.R. 512. The remainder of the WSCA is part of the City of Sebastian Area-Wide Habitat Conservation Plan (Service Code: 41420-2007-FA-1375) and is part of area's metapopulation.

On-going management of vegetation in the WSCA has enabled the area to support a robust population of scrub-jays. Up to ten (10) family groups and twenty-nine (29) individuals have been documented during annual surveys conducted for more than 10 years. The land manager of the WSCA, Beth Powell, has reported that scrub-jays have been observed throughout the portions of the WSCA that abut C.R. 510. Through observational mapping of the banded scrub-jays, Indian River County Conservation Lands Program has estimated the locations of the 10 family groups within WSCA (Figure 6). One scrub-jay territory overlaps C.R. 510 and is within the action area. This family group typically is composed of the breeding pair and any young of the year and does not have "helpers". Numerous observations of scrub-jays flying over C.R. 510 adjacent to WSCA have been reported and compiled by the Indian River County Conservation Lands Program (Powell 2017b). It is thought that mature oak trees located across C.R. 510, south of the WSCA, could be attracting scrub-jays across C.R. 510 to forage and collect nest building material. Scrub-jays may also use C.R. 510 as a dispersal corridor to move between WSCA and other suitable habitats in the region.

There are not any documented occurrences of vehicles strikes of scrub-jays along this portion of C.R. 510; however, it is commonly believed to occur. No monitoring is currently in place that would detect mortality and scavenging would likely remove any carcasses prior to opportunistic observations. In addition, Mumme *et al.* (2000) noted that occasionally road-killed scrub-jays become lodged in the vehicle and transported far from the scene. The demographic information collected annually on the scrub-jays at WSCA shows a stable population, indicating that ongoing mortality (caused by vehicle strikes and/or other causes) is not overwhelming reproduction and /or immigration.

Mumme *et al.* (2000) found breeding scrub-jays with territories along a lightly traveled State Road with a speed 55 mph had an annual mortality of 0.38, significantly higher than the rate of 0.23 for breeders on non-road territories. Mortality was significantly higher in juvenile scrub-jays living near roadways as well as immigrating adults when recruited to a roadside territory. The increased mortality of scrub-jays was attributed chiefly to vehicle strikes. This study suggests that the scrub-jay territory overlapping C.R. 510 likely face higher mortality than the non-road territories in WSCA. Although given the designation of the road as an "urban principal arterial", with a speed of 35 mph, we expect the current mortality rate for this family group is more similar to non-road territories than road territories studied in Mumme *et al.* (2000).

In addition to the WSCA, four small patches in the action area were identified as shrub and bushland (FLUCCS 3200). One is south of C.R. 510, immediately east of 62 Ave; however, this relatively small patch of habitat is dominated by pine trees and has a taller and more well developed tree canopy than typical scrub-jay habitat. Another area of shrub and bushland (FLUCCS 3200) is located approximately 350 ft south of C.R. 510, immediately east of 58 Ave. This habitat forms a linear strip of shrubby vegetation stretching southwards beside 58 Ave. Two patches of shrub and bushland (FLUCCS 3200) occur at the far eastern end of the Project area, east of the Project limits. Scrub-jays have not been documented at these areas and they are not managed to maintain habitat suitable for scrub-jays.

Climate change

Our analyses under the Act include consideration of observed or likely environmental effects related to ongoing and projected changes in climate. As defined by the Intergovernmental Panel on Climate Change (IPCC), "climate" refers to average weather, typically measured in terms of the mean and variability of temperature, precipitation, or other relevant properties over time; thus "climate change" refers to a change in such a measure which persists for an extended period, typically decades or longer, due to natural conditions (*e.g.*, solar cycles) or human-caused changes in the composition of the atmosphere or in land use (IPCC 2013, p. 1450). Detailed explanations of global climate change and examples of various observed and projected changes and associated effects and risks at the global level are provided in reports issued by the IPCC (2014 and citations therein). Information for the United States at national and regional levels is summarized in the National Climate Assessment (Melillo *et al.* 2014 entire and citations therein; see Melillo *et al.* 2014, pp.28-45 for an overview). Because observed and projected changes in climate at regional and local levels vary from global average conditions, rather than using global scale projections, we use "downscaled" projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species and the conditions influencing it (See Melillo *et al.* 2014, Appendix 3, pp. 760-763 for a discussion of climate modeling, including downscaling). In our analysis, we use our expert judgment to weigh the best scientific and commercial data available in our consideration of relevant aspects of climate change and related effects.

Climate change may result in an increase in the intensity or frequency of tropical storms and hurricanes in Florida. The Atlantic Multi-decadal Oscillation (AMO) also influences rain patterns in Florida. We are currently in an AMO wet phase that is predicted to persist through 2020 (Miller 2010). The increased rainfall associated with both of these factors could reduce our ability to effectively use prescribed burning to manage habitat in optimal conditions for scrub-jay. Increased rainfall could also reduce breeding success depending on the timing and intensity of rain during vulnerable periods for young scrub-jays.

It is difficult to estimate, with any degree of precision, if a species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006).

EFFECTS OF THE ACTION

Analysis for effects of the action

Construction activities

Constructions actions have the potential to harass scrub-jays through noise and an ongoing presence of humans and heavy equipment that could cause birds to avoid the action area resulting in a loss of foraging opportunities. This harassment would directly affect scrub-jays that forage within 500 ft of the construction activities and/or any individual that may cross C.R.

510 to access the mature oaks for foraging. Lost foraging opportunities would in turn be expected to affect breeding success if these individuals have reduced fitness entering breeding season. Construction activities could also directly affect breeding success if the disturbance kept the adults from properly tending their eggs or young. The birds that currently live adjacent to C.R. 510 are already acclimated to noise and disturbance from the roadway, thus we expect the construction activities would not substantially increase any avoidance behavior. To minimize the likelihood of disturbance during breeding season, FDOT will place restrictions on staging locations and construction during the breeding season. Furthermore, considering the territory mapping for the family group adjacent to C.R. 510, we expect these scrub-jays have ample additional foraging opportunities. Thus, if there is any avoidance behavior it is not expected to reduce fitness for breeding and survival of these birds.

Avoidance of construction activities and noise could also discourage dispersal or immigration of scrub-jays at WSCA. We anticipate that it would be most likely that any immigrating or dispersing birds would chose an alternative path but would not ultimately be discouraged from dispersal or immigration altogether.

FDOT has designed the Project so that no suitable habitat in the WSCA will be impacted or lost. However, as described above (*Status of the species within the action* area) there are four small patches of scrub-jay habitat outside of WSCA that will be removed during Project construction and development. Scrub-jays have not been documented at these areas and they are not managed to maintain habitat suitable for scrub-jays. Therefore, the loss of these areas is not expected to have an adverse effect to scrub-jays.

Human activity

The proposed action has the potential to increase trash, which would attract predators to the area, increasing the likelihood that a scrub-jay will be predated. To minimize this potential effect, FDOT has committed to using closed trash receptacles and signage indicating "No Food Trash" installed near receptacles between 61 Drive and 58 Avenue (Stations 348+67.07 to 373+80.08; nearest to WSCA). FDOT or their consultant will educate contractors and construction crews on the requirement not to feed scrub-jays or other wild animals, and that all garbage and waste are to be deposited in closed trash containers at all times. Based on these minimization measures the proposed Project is not expected to increase the abundance of predators during Project activities and consequently increase the predation of scrub-jays.

Motor vehicles

The proposed action of increasing the roadway width is expected to result in a subsequent increase in the volume of motor vehicles and increased speeds at which vehicles will travel along C.R. 510. As identified in the Project description, FDOT estimates the widening of the road to increase motor vehicle traffic by 23 percent. A greater volume of vehicles traveling at higher speeds is anticipated to increase the likelihood and frequency of vehicles striking and injuring or killing scrub-jays. In addition, widening of the road will make it more difficult for a scrub-jay to cross safely without injury or mortality through lengthening the exposure time the bird is at risk of a vehicle strike. We rely on Mumme *et al.* (2000), who studied the effects of roadways on scrub-jays to evaluate the effects of vehicles on scrub-jays in the action area.

Mumme *et al.* (2000) found the annual mortality rate for road-side territories was greater than non-road territories (0.38 and 0.23 annual mortality, respectfully). Because C.R. 510 is an existing road, we expect that the family group with the territory adjacent to/overlapping the road already experiences an increased rate of mortality over the birds with non-road territories. However, the proposed widening is expected to increase the threat of the road for the reasons stated above, thus we expect the rate of mortality to increase above current baseline levels. We expect the rate of mortality would increase for the adults as well as their young. Juvenile scrub-jays on road territories were most vulnerable to road mortality between the ages of 30 and 90 days. However, road exposure had no effect on nesting success beyond indirect effects from adult mortality (Mumme *et al.* 2000).

Mumme *et al.* 2000 found that mortality rates on road territories actually declined over time, and the risk of road mortality is greatest for naïve birds (immigrants) in the first 2 years of living on the road. Similar to the breeders and juveniles, since we expect this elevated mortality is already occurring for immigrants, we would only expect a slight increase in mortality for immigrants above what is currently occurring to adjust for the increased threat of the widened road, with more traffic at higher speeds.

Mumme *et al.* (2000) concluded that roadside territories function as sinks, with mortality of breeding adults being higher, reproductive output being less reliable and in turn contributing less to overall population stability. Thus, the family group adjacent to C.R. 510 is likely already functioning as a sink for the local population in WSCA in some years. However, data indicates that the roadside territory on WSCA does provide reproductive recruitment occasionally to the population and WSCA provides recruitment to other populations throughout Sebastian (Powell 2018a). As described above, we expect the mortality rates to increase because of the increased threats of the road. Increased mortality of adult scrub-jays would lead to less breeding attempts and loss of breeding output. Increased mortality of juvenile scrub-jays would lead to less recruitment into the adult breeder population. The increased rate of annual mortality would adversely affect the local population if the increased rate of mortality in the road-side territories increases above what is produced by the adjacent non-road territories and/or immigrates into the area. We acknowledge that this could be possible; however given that WSCA has historically contributed to juvenile and adult recruitment of other breeding families throughout the Sebastian scrub-jay metapopulation (Powell 2017a); we anticipate it is more likely that the WSCA population will absorb this increased mortality and will continue to contribute to the metapopulation, albeit at a lower rate.

We do not know how many birds (adults and juveniles) are currently killed by vehicles along C.R. 510; however, we expect the rate of morality to be less than 0.38 because the current speed limit is slower than the road in the study. Therefore, we estimate that currently the annual rate of mortality is 0.25, greater than the non-road mortality, but less than the road with 55 mph speed limit. Following Project implementation, we expect the rate of mortality to increase to a similar level to the Mumme *et al.* (2000) study. Although the posted speed will be less than 55 mph, when combined with the increased volume we expect the threat/risk will be similar. Based on these estimates, the roadside territory in the action area (2 breeding adults) currently experiences the loss of 1 adult every 4 years. Following Project implementation this territory will experience the loss of 1 adult approximately every 2.5 years. For the purposes of this analysis we will

simplify this to be a net increase in 1 adult every 4 years. In other words, following Project implementation we expect the mortality to increase by one over current conditions; 2 adult scrub-jays every 4 years. Juvenile birds would also be expected to have an increased level or risk following Project implementation. Mumme *et al.* (2000) did not provide estimates on annual mortality for young; however, we know that survival of scrub-jay fledglings to yearling age class averages about 35 percent in optimal scrub. Given a typical clutch size of 3 to 4 individuals, we would expect approximately 1 young to survive annually. We know the road-side territory has successfully recruited individuals (Powell 2017a) in the past, and estimate it contributes 3 individuals every 4 years to the local population, slightly less than optimal conditions. Following Project implementation, we estimate this will decline and the territory will contribute 1 individual every other year or 2 individuals every 4 years.

Land Acquisition and Management

The FDOT has committed to acquire land, Property 1 WSCA Proximate, which is currently degraded but was historically used by scrub-jays. The FDOT will restore this 25 ac. of land adjacent to the WSCA through a series of actions outlined in the attached mitigation plan (Enclosure A). The ownership of the land will subsequently be given to Indian River County to allow ongoing management in-line with actions conducted in the WSCA. The effect of this acquisition and management is expected to increase the habitat available to the local scrub-jay population at the WSCA, and subsequently provide the opportunity to increase this population, supporting additional family groups. This land acquisition therefore, has the potential to off-set the expected increased mortality from the vehicles discussed above. Furthermore, once restored, the acquisition land should also provide a good dispersal corridor for scrub-jays moving between the WSCA and other occupied properties in the greater Sebastian metapopulation.

Ongoing management of Property 1 WSCA Proximate has the potential to adversely affect scrub-jays, although temporarily, once it becomes occupied. We consider the effects of this land management, if any, to be covered under the Sebastian Area-Wide Habitat Conservation Plan (41420-2007-FA-1375) and Incidental Take Permit (TE026007-0).

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. The action area is area as all lands within the 5.27 mi section of the C.R. 510 roadway and right-of-way footprint and all land within 500 ft of the centerline of C.R. 510. The ongoing management of the WSCA that overlaps with the action area is addressed under the Sebastian Area-Wide Habitat Conservation Plan (41420-2007-FA-1375) and Incidental Take Permit (TE026007-0). No other cumulative effects to scrub-jay are expected to occur within the action area beyond the covered management.

CONCLUSION

After reviewing the current status of the scrub-jay, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the Project, as proposed, is not likely to jeopardize the continued existence of the scrub-jay. We have reached this conclusion because: Although we expect mortality of individuals at roadside territories, we expect this number to be small, estimated to be 2 scrub-jays every 4 years (1 adult, 1 juvenile). This will decrease the local population slightly. However, the FDOT will acquire and restore land to be managed by Indian River County and overtime, this is anticipated to provide new habitat to support more family groups. Consequently, we anticipate that the cumulative effect of the proposed action to the local population will be neutral or possibly beneficial. Other components of the action (construction activities, human actions) are not expected to impair feeding, breeding or sheltering of scrub-jays.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to Section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." "Harm" is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking, that is incidental to and not intended as part of the agency action, is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary and must be undertaken by FDOT so that they become binding conditions of any grant or permit issued to the Project, as appropriate, for the exemption in Section 7(o)(2) to apply. FDOT has a continuing duty to regulate the activity covered by this incidental take statement. If the FDOT (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protection coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FDOT must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Project is expected to result in incidental take of one (1) adult and one (1) juvenile scrub-jay per 4 years due to increased chances of motor vehicle collisions associated with widening C.R.

510 once the Project is completed. The incidental take is expected to be in the form of harm from injury or mortality. Incidental take of dead or injured scrub-jays would be difficult to detect because carcasses are hard to recover due to the birds small body size, scavenging animals, and the potential for the vehicle that struck the individual to actually transport the carcass away inadvertently. We anticipate that the amount of take associated with the proposed action will not adversely affect the local population and result in any overall population declines in the WSCA. Therefore, we will use population trend data collected annually at the WSCA as a surrogate to monitor take. Any decline in the WSCA population sustained for more than three (3) consecutive years would indicate take has been exceeded and the Project's effects are more than anticipated. If this amount of take is exceeded during the course of this action, such take would represent new information requiring review of reasonable and prudent measures. Consequently, a decline in the WSCA population sustained for more than three (3) consecutive years will be considered exceedance of the amount of incidental take authorized in this Biological Opinion and will require review and re-initiation of consultation under the Act.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined this level of anticipated take is not likely to result in jeopardy to Florida scrub-jay.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The FDOT has incorporated the appropriate avoidance and minimization measures into the proposed action and will acquire and restore land to support and potentially increase the local scrub-jay population. Consequently, the Service has not identified any additional reasonable and prudent measures to reduce take and to minimize the direct and indirect effects of the proposed Project.

Monitoring and Reporting Requirements

Pursuant to 50 402.14(i)(3), the FDOT must provide adequate monitoring and reporting to determine if the amount or extent of take is approached or exceeded. The FDOT must coordinate with the Indian River County Conservation Lands Program to ensure staff is able to conduct ongoing scrub-jay population surveys within the WSCA and within the Mitigation Property 1 WSCA Proximate. The FDOT will review survey results and assess the population status with the Service and staff of the Indian River County Conservation Lands Program each year for at least ten (10) years after the completion of the Project. A Project status report (electronic is sufficient) must be submitted to the SFESO within sixty (60) days of Project construction completion for each phase.

REPORTING REQUIREMENTS AND DISPOSITION OF DEAD OR INJURED SPECIMENS

Upon locating a dead, injured, or sick threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office: 20501 Independence Blvd., Groveland, Florida 34736; 352-429-1037 as well as the biologist identified below at the South Florida Ecological Service Office, 772-562-3909. Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission: (South Region; 3900 Drane Field Road; Lakeland, Florida; 33811-1299; 1-800-282-8002). Care should be taken in handling sick or injured specimens to ensure effective treatment and in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured specimens, or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. In order to help reduce vehicle and wildlife collisions, the Service recommends that the posted speed limit for the completed road in the vicinity of WSCA be no greater than 35 mph and any opportunity to install a wildlife underpass be identified and pursued.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the Project consultation request. As written in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary FDOT involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded [scrub-jay population has declined for three (3) consecutive years within the WSCA]; 2) new information reveals effects of the FDOT action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the FDOT action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease until reinitiation.

Thank you for your cooperation in the effort to protect federally listed species and fish and wildlife resources. If you have any questions regarding this Project, please contact John Tupy at 772-469-4292.

Sincerely yours,



Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Office

cc: electronic only
FDOT, District Four, Fort Lauderdale, Florida (Ann Broadwell, Maria Formosa, Fernando Ascanio)
FWC, Tallahassee, Florida (FWS-CPS)
U.S. Army Corps of Engineers, Jacksonville, Florida (Randy Turner)
Indian River County Department of Natural Resources (Beth Powell)

LITERATURE CITED

Breininger, D.R., V.L. Larson, D.M. Oddy, R.B. Smith, and M. Barkaszi. 1996. Florida scrub jay demography in different landscapes. The Auk 11 3(3):6 17-625.

Fitzpatrick, J.W., G.E. Woolfenden, and M.T. Kopeny. 1991. Ecology and development-related habitat requirements of the Florida scrub-jay (Aphelocoma coerulescens coerulescens). Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program Technical Report Number 8. Tallahassee, Florida.

Florida Department of Transportation (FDOT). 2017. Standard Specifications for Road and Bridge Construction. Central Office, 605 Suwannee Street, Tallahassee, Florida 32399-0450.

Florida Fish and Wildlife Conservation Commission (FWC). 2013. Gopher Tortoise Permitting Guidelines (*Gopherus Polyphemus*). Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

International Panel on Climate Change. 2013. Annex III: Glossary [Planton, S. (ed.)]. Pp. 1147-1465 In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, New York, USA. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_AnnexIII_FINAL.pdf

International Panel on Climate. 2014. *Climate Change 2014 Synthesis Report*. [Pachauri, R.K. *et al.*] 133 pp. http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

Lawler, H.E. 1977. The status of *Drymarchon corais couperi*, the eastern indigo snake, in the southeastern United States. Herpetological Review 8 (3):76-79.

Layne, J.N., and T.M. Steiner. 1996. Eastern indigo snake (*Drymarchon corais couperi*): summary of research conducted on Archbold Biological Station. Report prepared under Order 43910-6-0134 to the U.S. Fish and Wildlife Service; Jackson, Mississippi.

Melillo J. M., T.C. Richmond, and G. W. Yohe, Eds. 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program. http://nca2014.globalchange.gov/downloads.

Miller, L. 2010. Climate of South Florida; Everglades Restoration Transition Plan Phase I Biological Opinion. Vero Beach, Florida: U.S. Fish and Wildlife Service.

Moler, P.E. 1985. Distribution of the eastern indigo snake, *Drymarchon corais couperi*, in Florida. Herpetological Review 16(2):37-38.

Morrison, Joan, L. 2001. Recommended Management Practices and Survey Protocols for Audubon's Crested Caracara (*Caracara cheriway audubonii*) in Florida. Technical Report No. 18. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

Mumme, R.L., Schoech, S.J., Woolfenden, G.E. and Fitzpatrick, J.W. 2000. Life and death in the fast lane: demographic consequences of road mortality in the Florida scrub-jay. Conservation Biology 14 (2): 501-512.

Powell, B. 2017a. Personal communication. Email from B. Powell, biologist, to J. Tupy, Service. Subject: Scrub-jay recruitment from WSCA to other properties. April 19, 2017.

Powell, B. 2017b. Personal communication. Email from B. Powell, biologist, to J. Tupy, Service. Subject: Scrub-jays crossing C.R. 510. August 14, 2017.

U.S. Fish and Wildlife Service (Service). 1999. South Florida multi-species recovery plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.

U.S. Fish and Wildlife Service (Service). 2006. Strategic Habitat Conservation. Final Report of the National Ecological Assessment Team to the U.S. Fish and Wildlife Service and U.S. Geologic Survey.

U.S. Fish and Wildlife Service (Service). 2004. Draft Species Conservation Guidelines, Audubon's Crested Caracara. South Florida Ecological Services Office; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service). 2010. South Florida Programmatic Concurrence Wood Stork. Service Consultation Code 41420-2007-1-0964. May 18, 2010. South Florida Ecological Services Office; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service). 2013. Standard Protection Measures for the Eastern Indigo Snake. South Florida Ecological Services Office; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service). 2015. Status of the Species: Florida scrub-jay. South Florida Ecological Services Office; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service) 2016. USFWS Crested Caracara Draft Survey Protocol – Additional Guidance (2016-2017 Breeding Season). South Florida Ecological Services Office; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service). 2017. Consultation Key for the eastern indigo snake – revised. Service consultation code 41420-2009-I-0467-R001. August 1, 2017. South Florida Ecological Services Office; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service). 2017. Interim guidance on implementing the final endangered species act compensatory mitigation policy. United States Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Woolfenden, G.E. and J.W. Fitzpatrick. 1996. Florida scrub-jay. Pages 1-27 in A. Poole and F. Gill, editors. The birds of North America, Number 228. The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union; Washington, D.C.

Zwick, P.D., and M.H. Carr. 2006. Florida 2060. A population distribution scenario for the State of Florida. A research Project prepared for 1000 Friends of Florida. Prepared by the Geoplan Center at the University of Florida, Gainesville, Florida.



Figure 1: The Project action area in Indian River County, Florida. FDOT is proposing to widen County Road (C.R.) 510 from two to four lanes extending from the C.R. 512 intersection to the 58 Avenue intersection for a total distance of 5.27 miles. Insert image is approximate Project location indicated by yellow "push pin" marker projected on Google Earth aerial image (2018).



Figure 2. The location of the 90 degree bend in Count Road 510, where Florida Department of Transportation proposes to reconstruct the road to improve safety conditions. This is one of several improvements that will likely allow motor vehicles to travel at faster speeds on the road.

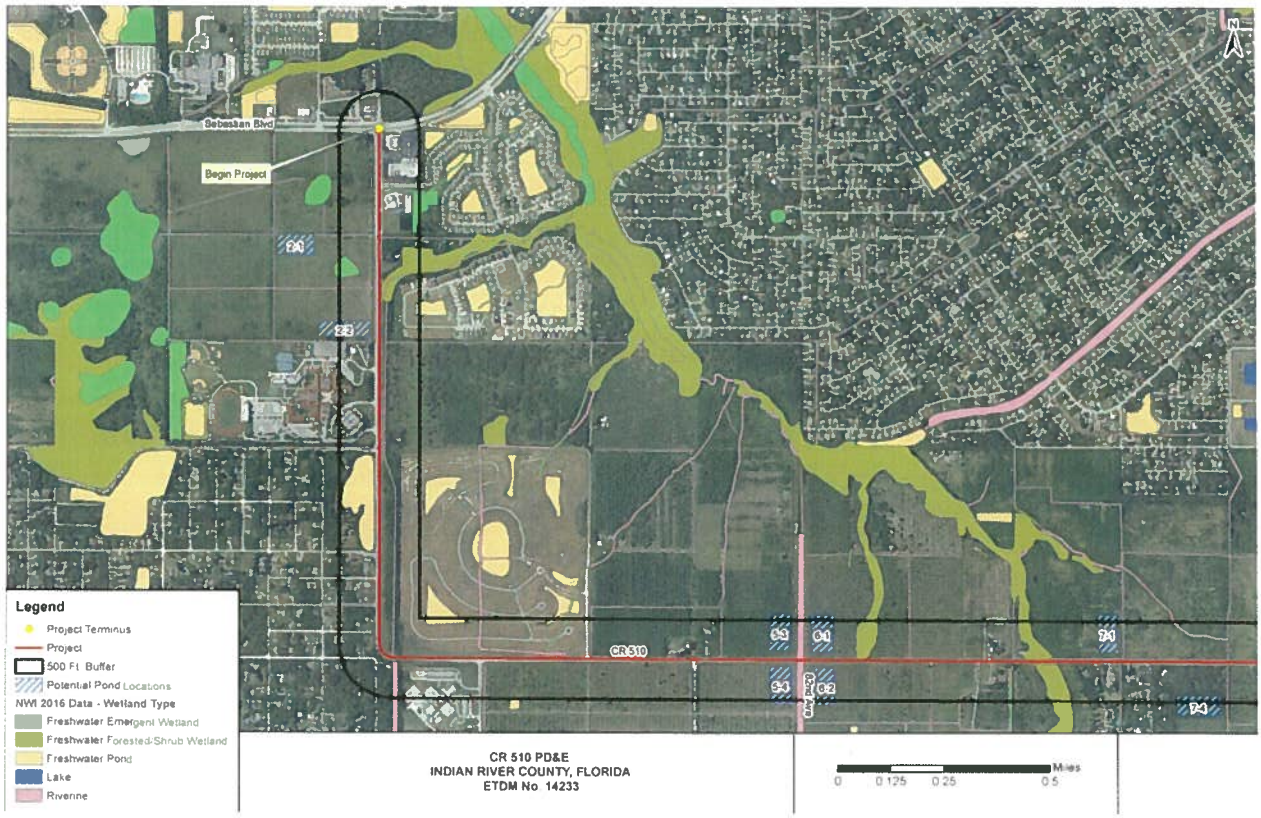


Figure 3. The action area of the western section of the proposed Project. A 500 foot buffer area has been drawn around County Road 510 to illustrate the extent of the Biological Opinion's action area.

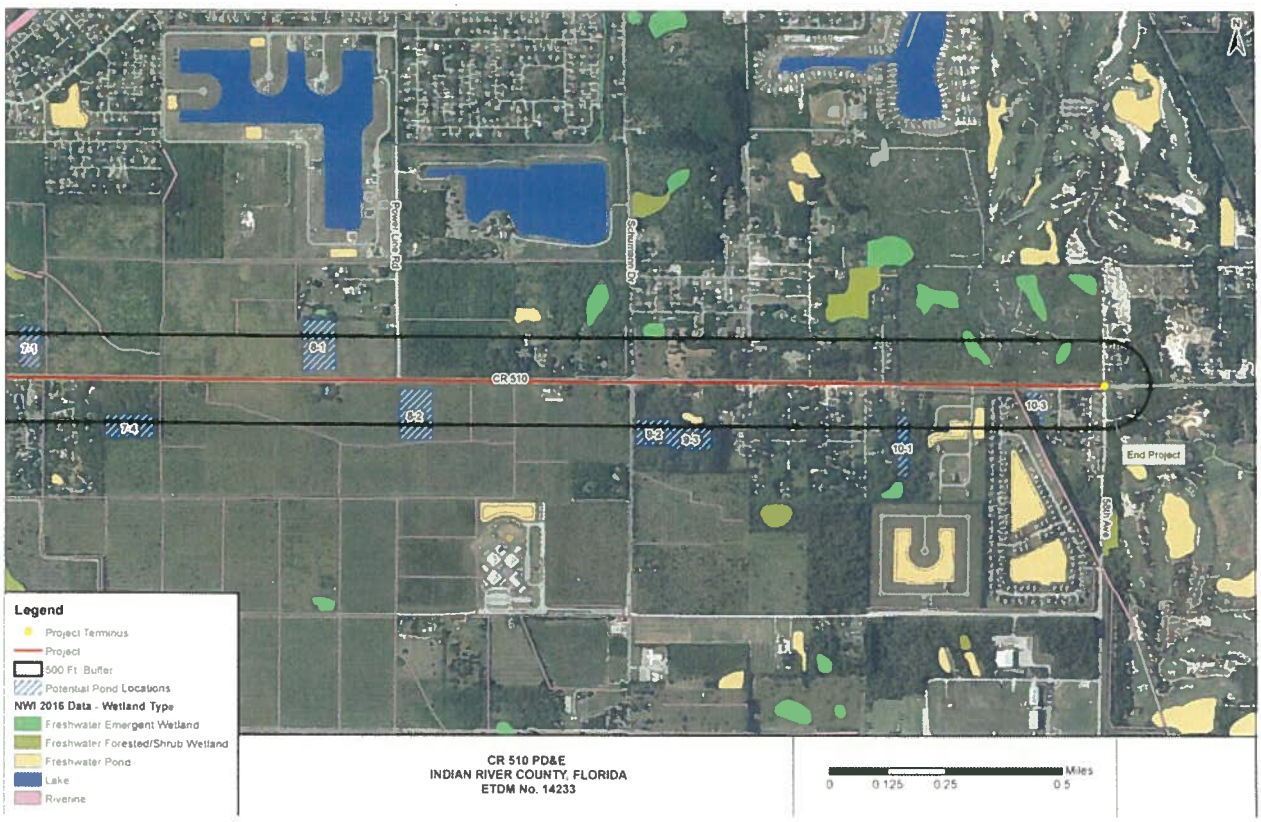


Figure 4. The action area of the eastern section of the proposed Project. A 500 foot buffer area has been drawn around C.R. 510. to illustrate the extent of the Biological Opinion's action area around the proposed roadway widening.

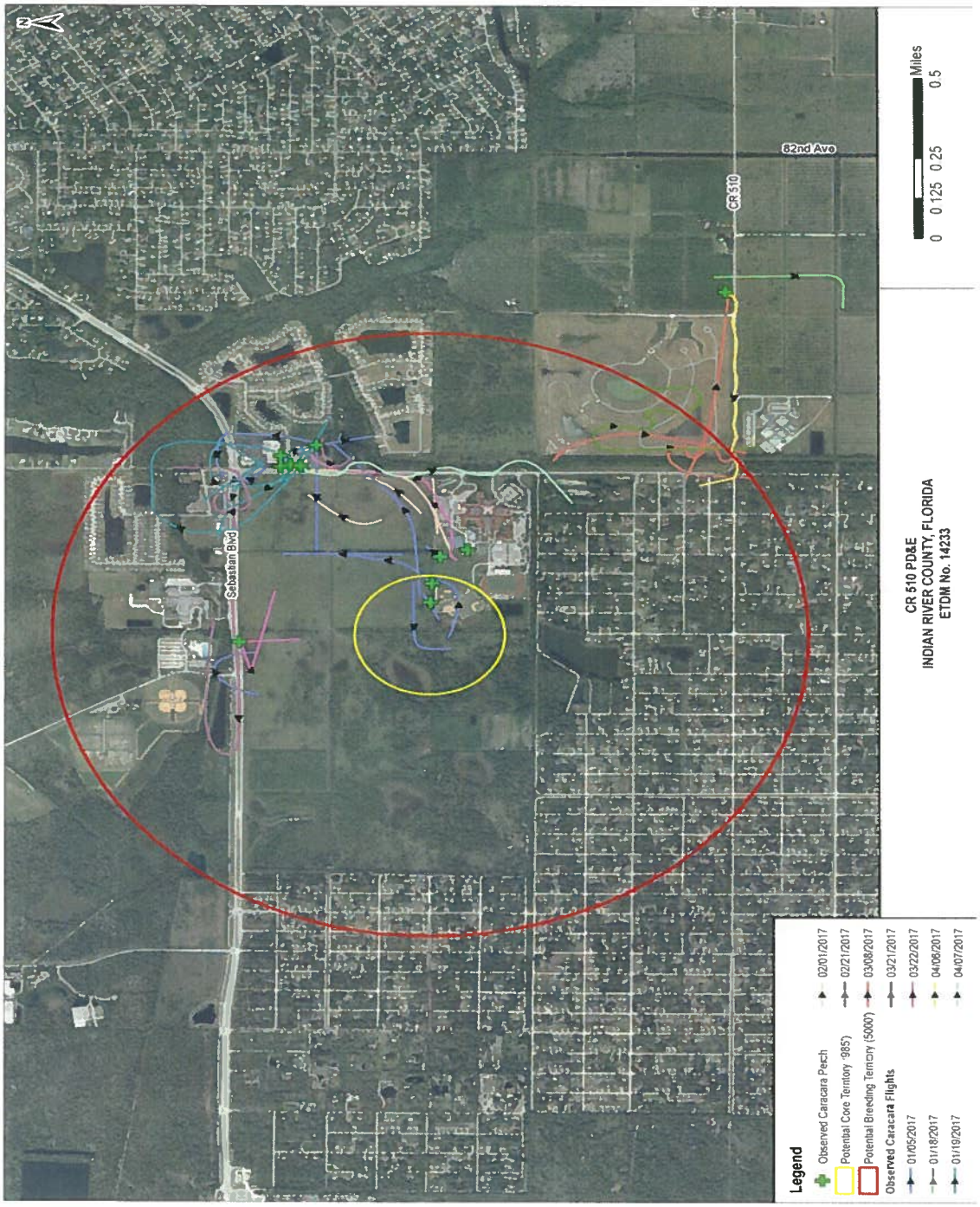


Figure 5. Observations of Audubon's crested caracara (caracara). During both 2016 and 2017 caracaras were observed in Segments 1 and 2 and sightings clustered around the Publix shopping center (in the southeast corner of the intersection of C.R. 510 and C.R. 512) as well as around the northwest corner of Sebastian River High School. No caracara nests were located within the action area during surveys following the Service's caracara survey guidelines (Morrison 2001, Service 2016) in 2017 or during surveys conducted by FDOT in 2016.

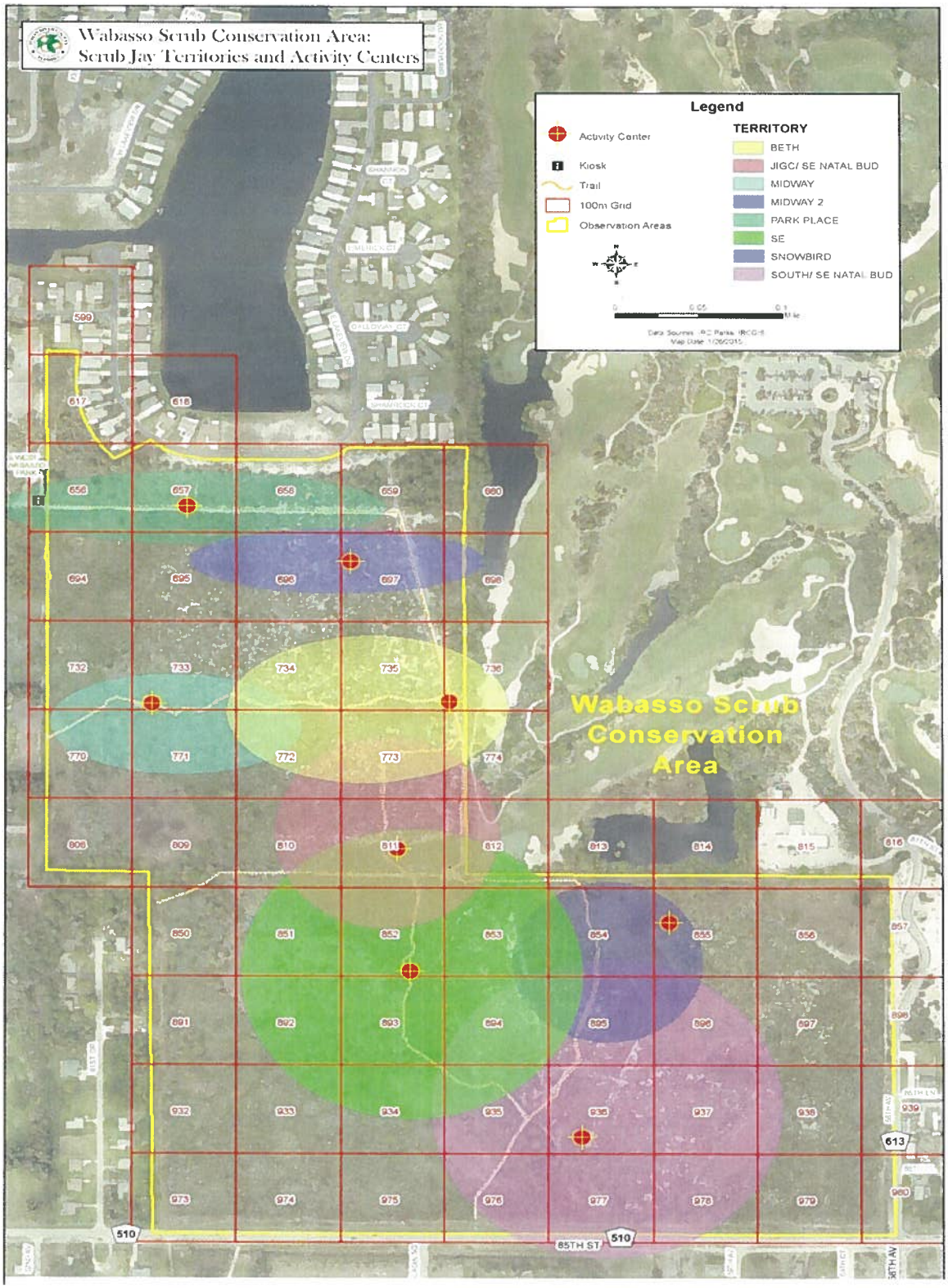


Figure 6. Estimated Florida scrub-jay territories at the Wabasso Scrub Conservation Area in Indian River County, Florida. Demonstrating the overlap of the southernmost territory with County Road 510. Courtesy of the Indian River County Conservation Lands Program.

Kick-off Meeting

County Road (C.R.) 510 from C.R. 512 to 58th Avenue
Project Kick-Off Presentation to Indian River County MPO
Meeting Minutes

Project Name
C.R. 510 from C.R. 512 to 58th Avenue

Meeting Date and Time
Wednesday, June 8, 2016 at 10:00 a.m.

Purpose of Meeting
Project Kick-Off Presentation to Indian River County MPO

Location
1800 27th Street, Conference Room B-1501
Vero Beach, FL 32960

In Attendance:

- Maria Formoso, P.E., P.M.P., FDOT Project Manager
- Carlos Rodriguez, P.E., Consultant Project Manager, Metric Engineering
- Gabriela Garcia, P.E., Metric Engineering
- Alexandra Medina, Media Relations Group
- Jorge Padron, FDOT District Four
- Arlene Tanis, FDOT District Four

The following notes represent the key topics, action items and questions identified throughout the presentation to the Indian River County MPO.

1. MPO Director Phil Matson introduced the project team for the MPO presentation. Maria Formoso introduced the FDOT Staff members and then the team. Carlos Rodriguez provided general information and an overview on the project and PD&E Study process.
    a. During the presentation, Mr. Rodriguez noted that the C.R. 510 corridor sees an average of 10,000 vehicles per day; of that amount, 5 percent is truck traffic. Commissioner Tim Zorc asked if this means that C.R. 510 is considered a truck route. Mr. Rodriguez clarified that C.R. 510 is considered a primary truck route from C.R. 512 to 82nd Avenue, and is considered a secondary truck route from 82nd Avenue to 58th Avenue.
2. Commissioner Zorc noted that a high-pressure natural gas pipeline was built along the C.R. 510 corridor two years ago, which may be impacted by this project. Mr. Rodriguez noted that as part of the PD&E Study, the project team sends base plans to utility agencies for coordination, and try to design around that as much as possible. The team is still waiting on some of these plans from utilities. Ms. Formoso added that cost is a major factor when considering possible relocation of a utility, and will be evaluated as part of the alternative analysis for this project.
    a. Commissioner Wesley Davis asked who would be responsible to pay for relocation of the pipeline if that is required. Ms. Formoso said it would depend on whether the utility is in place by permit or by easement. If the utility is in place by permit, the utility company would relocate at their own cost, but if they are in place by easement, they are entitled to be compensated. She emphasized that this has not been determined yet.
3. Commissioner Zorc noted that the FDOT District Secretary from District One recently visited the MPO and mentioned that when FDOT designs new roads when using state funds, you have to show why a roundabout is not the best solution. He asked if the project team would have to do this for this project. Mr. Rodriguez explained that as part of the PD&E process, the team has to look at multiple configurations and designs during the study. He added that in the past year, it has been mandated that PD&E studies look at different roundabout solutions and determine whether or not they address the needs of the project.
4. Commissioner Zorc referenced a previous project along US 1 from 53rd Street to C.R. 510, which had significant right of way issues. Mr. Rodriguez emphasized that the team's approach to this

project is to make sure that everyone (FDOT, County, MPO) is at the table early on to get an idea of what the project will entail. He added that meetings with the County and local stakeholders have already taken place to clearly understand the background and history in order to avoid changes down the road.

5. Pastor Carl Wallace of Allen Chapel Community Church asked what the team's definition of a stakeholder is. He noted that he did not see Allen Chapel listed as a key stakeholder in Mr. Rodriguez's presentation. Mr. Rodriguez clarified that a stakeholder is anyone with any presence along a particular roadway. Pastor Wallace asked that the team to include them in the future. Maria confirmed that Allen Chapel Community Church would be added to the list of stakeholders from then on.
6. Commissioner Davis asked if there is any way that the project team can include the state-owned portion of the Wabasso Causeway so that the project could include upgrading the catwalks that are currently located along the bridge. Ms. Formoso responded that it is currently not possible to extend the limits of this project since FDOT needs to follow the NEPA guidelines, but suggested that the County pursue Local Agency Program (LAP) funding to fund this proposed improvement. Carlos added that per NEPA, the begin and end of the project needs to follow "logical termini".
7. Commissioner Davis mentioned that in the area of the corridor near the South Prong Slough, the County had previously discussed building a wildlife corridor along the roadway to keep animals in the conservation areas to the north and south. Ms. Formoso responded that the project team is working with US Fish and Wildlife and other environmental agencies to determine the best, and least impactful, alternative for this part of the corridor.
8. Commissioner Davis asked that since the corridor is considered a truck route, if special accommodations will be made to the intersection of 82nd Avenue due to the constraints of the canal at that location, and large numbers of traffic making a right turn to travel southbound on the future extension of 82nd Avenue. He noted that 82nd Avenue will serve as a primary north-south detour route for the area whenever there is an accident on I-95. Ms. Formoso emphasized that the team is still in the very preliminary stages of the project, but will be analyzing traffic patterns and alternatives as part of the PD&E Study.
9. Commissioner Davis mentioned that the County has provided information to the State regarding the preferred alignment of the curve on C.R. 510. He also noted that the County had previously discussed doing away with the traffic light at 87th Street and C.R. 510, and relocating the light to a new intersection at 89th Street. He noted that consolidating the traffic lights at 89th Street and C.R. 510 would help increase connectivity in the area, and added that in the future the County would like to open up 89th Street eastbound to 86th Avenue. Ms. Formoso emphasized that as part of the PD&E Study, the team will consider traffic and engineering data, as well as public input, to determine a preferred alternative. She noted that there was public right of way purchased by the County near the curve that a lot of these right of way acquisitions would need to be federalized because when originally purchased did not follow the NEPA process, which mandates federal guidelines for right of way acquisition. She emphasized that this is not necessarily a bad thing, but is an extra step for the team to consider in moving forward with this project.
10. Commissioner Davis noted the traffic safety issue at the North County Transit Hub, particularly when five buses wait in the street for transfers, causing drivers to have to drive opposing traffic to access the traffic signal at C.R. 510 and C.R. 512. He mentioned that he thinks it would be a good idea to find a new location for the hub on County property as opposed to having buses utilize public right of way. Mr. Rodriguez said that the team is very familiar with the hub, and said that if

there is currently a plan in place by the County as far as where to move the hub, FDOT would take that into consideration as part of the PD&E Study. However, currently this study will not be investigating potential locations for the hub, this needs to be provided by the County.

11. Mr. Ervin Cartwright asked who gave the gas company the right to place the gas line along the C.R. 510 corridor, only for it to possibly be moved again. Richard Szpyrka of Indian River County Public Works said he would need to look at the permit itself, but noted that the existing right of way is all that the County owns. Because the gas company is permitted in County right of way, the company would be responsible to move the line if needed.
12. Mr. Cartwright mentioned traffic issues along C.R. 510 at 58th Avenue, including drivers making illegal right turns and driving on private property to get off of C.R. 510 onto southbound 58th Avenue. Mr. Szpyrka mentioned that the County is looking at the traffic issues at the intersection of 58th Avenue and C.R. 510; he mentioned that as far as he was aware, the County does not own the southeast corner of that intersection.
13. Mr. Bill Rigby asked about the intersection of C.R. 510 at 58th Avenue. He echoed Mr. Cartwright's concerns about traffic congestion in the area and asked the County to please provide some relief for drivers and residents of the area. Mr. Matson said he would try to get his staff at the MPO to look into the issue with the County and would get back to Mr. Rigby after that meeting with the County.

Project Development and Environment Study (PD&E) for County Road (CR) 510 from CR 512 to 58 Avenue

Indian River County, Florida

Federal Project Identification (FPID) No.: 405606-2-22-02

Efficient Transportation Decision Making (ETDM) No.: 14233

May 2016

The Florida Department of Transportation (FDOT) District Four has started a Project Development and Environment (PD&E) Study for County Road (CR) 510 in Indian River County from CR 512 to 58 Avenue.

Project Objective

CR 510 is critical in providing the west-east movement of traffic in Indian River County as it connects Interstate 95 (I-95) to State Road (SR) A1A. The PD&E Study is evaluating preliminary engineering and environmentally feasible solutions, such as widening CR 510 from two to four lanes, in order to address the future capacity, operational and safety needs of the roadway.

Project Purpose & Need

The primary need for additional capacity on CR 510 from CR 512 to 58th Avenue is to achieve an acceptable Level of Service (LOS) on the facility in the future. While the roadway traffic is currently acceptable, conditions will deteriorate below acceptable standards if no improvement occurs by 2035, as the roadway will have insufficient capacity to accommodate the project travel demand. Additional needs for the project include:

- Transportation Demand,
- System Linkage and
- Emergency Evacuation

CR 510 PROJECT PRESENTATION

FDOT will be presenting the start of this study to the Indian River County Metropolitan Planning Organization (MPO):

Wednesday, June 8, 2016, 10:00 a.m.
County Administration Building B
Conference Room B1-501
1800 27 Street, Vero Beach, FL 32960



PUBLIC INVOLVEMENT PROCESS

The Florida Department of Transportation (FDOT) has embarked on a public involvement program as a part of this Project Development and Environment Study (PD&E) Study. Public involvement began in March 2016 and will continue throughout the life of the project. This process is designed to ensure public input in the development of alternatives by actively encouraging and facilitating the participation of the general public, citizen groups, interest groups, elected and appointed officials, environmental resource agencies, and other stakeholders. Opportunities to comment include communication with project staff and attending public meetings and hearings.

Public participation is solicited without regard to race, color, national origin, sex, religion, disability or family status. For more information, please call, email or write to:

Maria Formoso, P.E., P.M.P.
Project Manager
Florida Department of Transportation, District 4
3400 West Commercial Boulevard
Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677
Maria.Formoso@dot.state.fl.us

If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800) 955-8771 (TDD) or 1 (800) 955-8770 (Voice). Any persons who require translation services (free of charge) should also contact Maria Formoso, P.E., P.M.P. at least seven (7) days before the meeting.

Project information to be presented at Indian River County MPO Meeting

Wednesday, June 8, 2016
10:00 a.m.
County Administration Building B
Conference Room B1-501
1800 27 Street
Vero Beach, FL 32960

CR 510 PROJECT PRESENTATION

Project Development and Environment Study (PD&E) for County Road (CR) 510 from CR 512 to 58 Avenue

Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Maria Formoso, P.E., P.M.P.
Florida Department of Transportation, District Four
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County

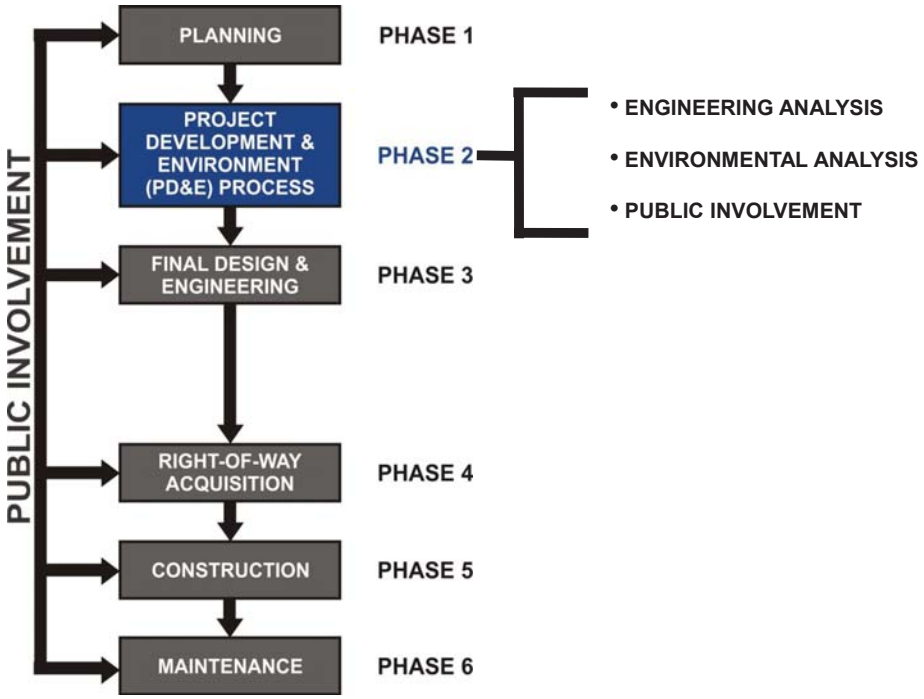


Project Kick-off Presentation

Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: June 8, 2016

County Road 510 PD&E Study

Project Process



County Road 510 PD&E Study

What is a PD&E Study?

- Develop and evaluate engineering and environmentally feasible alternative solutions that meet the need determined in the Planning Phase.
- Evaluate potential impacts to the social, natural, and physical environments; as well as determine ways to avoid or minimize impacts.
- Inform and involve the public in the development of the project.
- This process is mandated by the **National Environmental Policy Act (NEPA)** and state law. It represents a combined effort by technical professionals who analyze information and document the best alternative for a community's transportation needs.

County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)



County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - Improve Traffic operations
  - Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - Identified as a core project in the Indian River County 2035 LRTP
  - Identified as a priority project in the Indian River County TIP





County Road 510 PD&E Study

Project Objective

- Improving capacity on CR 510 in order to achieve an acceptable Level of Service (LOS) on the facility in the future condition
- Upgrade CR 510 from a two lane facility to a four lane divided facility
- Provide intersection modifications to reduce overall delay along CR 510
- Improve Safety
- Implement Context Sensitive Solutions
  - Bicycle and Pedestrian features
  - Landscaping
  - Minimize impacts to environmental resources
  - Improve aesthetics



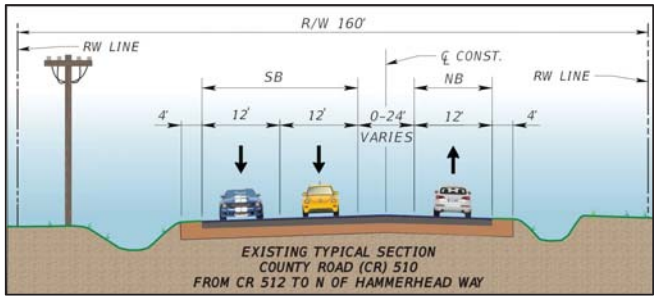


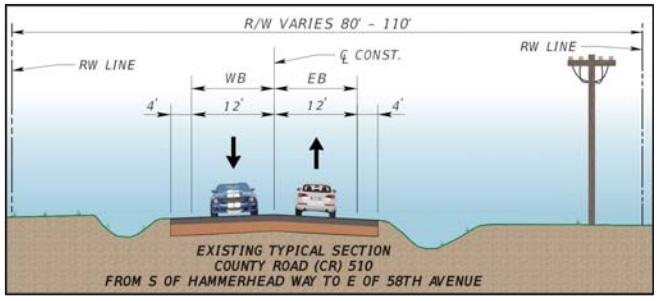
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - o Three lane undivided
  - o Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- T% (daily): 5.3%





County Road 510 PD&E Study

Design Considerations

- Improve connectivity within the roadway network by enhancing mobility
- Minimization of impacts to natural environment and wildlife
- Minimize impacts to community
- Existing right-of-way varies from 80’ to 160’
- Drainage
  - o May require expansion of drainage retention areas and storm-water treatment areas
- Upgrade or replace deficient structures
- Improve substandard horizontal curve
- Access management

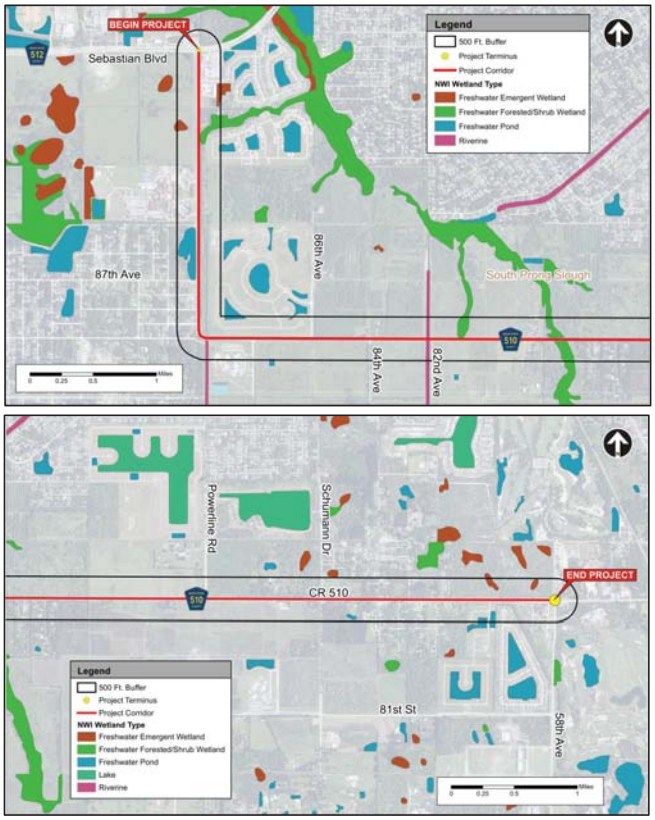




County Road 510 PD&E Study

Environmental Analysis

- **Natural Resources**
  - Wetlands
    - Freshwater Forested/Shrub wetlands
    - A section of CR 510 east of 82nd Avenue is adjacent to the South Prong Slough.
    - Wetland Evaluation Report (WER) will be conducted to evaluate potential impacts. The Department commits to avoiding and minimizing impacts; if impacts are unavoidable the Department commits to mitigation.
  - Water Quality
    - Existing swales and culverts along CR 510 that collect the runoff
    - Drainage Analysis and Water Quality Impact Evaluation will be performed



County Road 510 PD&E Study

Environmental Analysis

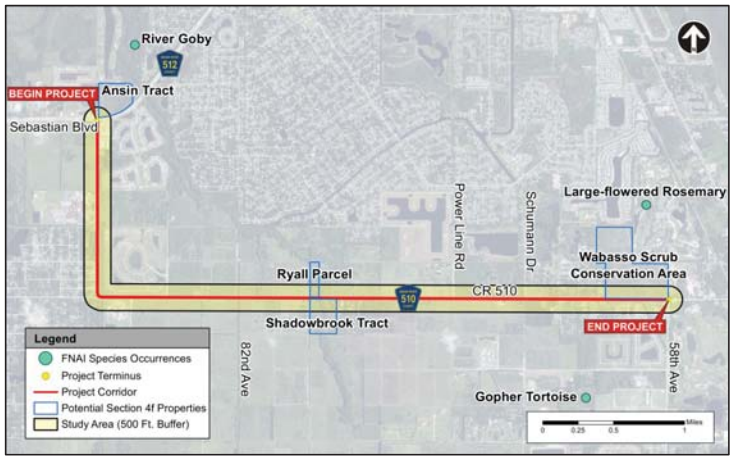
- **Natural Resources**
  - Wildlife and Endangered Species
    - The project lies near Scrub Jay habitat
      - USFWS Wabasso Scrub Conservation Area
        - Federal conservation easement
        - Recreational resource
        - Occupied habitat
    - Near potential caracara nesting habitat
    - Project is near other wading bird (wood stork) foraging habitat
    - Impact to species will be avoided, minimized and/or mitigated
    - An Endangered Species Biological Assessment (ESBA) will be conducted to determine potential impacts



County Road 510 PD&E Study

Environmental Analysis

- **Cultural and Historical Resources**
  - Several Recreational Section 4(f) Properties
    - Ansin Tract
    - Ryall Parcel and Shadowbrook Tract (Part of South Prong Slough)
    - Wabasso Scrub Conservation Area
    - Impacts to recreational resources will be evaluated
  - A Cultural Resources Assessment Survey (CRAS) will be performed to determine any historic or archeological resources and potential impacts



- **Other Important Issues that will be evaluated include:**
  - Farmlands
  - Noise
  - Contamination
  - Land use and Economic Impacts
  - Aesthetics

County Road 510 PD&E Study

Public Involvement

- **Public Meetings**
  - o June 8, 2016 Public Kick-Off at MPO Board Meeting
  - o Alternatives Workshop anticipated for fall 2016
  - o Public Hearing anticipated for summer 2017
- **Major Stakeholders**
  - o Indian River County
  - o Property Owners
  - o Elected officials
  - o St. John's River Water Management District
  - o Sebastian River Improvement District
  - o Sebastian River High School
  - o Treasure Coast Elementary School
  - o Liberty Magnet Elementary School
  - o Wabasso Progressive Civic Club
  - o Vero Lake Estates
  - o Sebastian River Landing


Project Development and Environment Study (PD&E)
for County Road (CR) 510 from CR 512 to 58 Avenue
Indian River County, Florida
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233
May 2016

The Florida Department of Transportation (FDOT) District Four has started a Project Development and Environment (PD&E) Study for County Road (CR) 510 in Indian River County from CR 512 to 58 Avenue.

Project Objective
CR 510 is critical in providing the west-east movement of traffic in Indian River County as it connects Interstate 95 (I-95) to State Road (SR) A1A. The PD&E Study is evaluating preliminary engineering and environmentally feasible solutions, such as widening CR 510 from two to four lanes, in order to address the future capacity, operational and safety needs of the roadway.

Project Purpose & Need
The primary need for additional capacity on CR 510 from CR 512 to 58th Avenue is to achieve an acceptable Level of Service (LOS) on the facility in the future. While the roadway traffic is currently acceptable, conditions will deteriorate below acceptable standards if no improvement occurs by 2035, as the roadway will have insufficient capacity to accommodate the project travel demand. Additional needs for the project include:
- Transportation Demand,
- System Linkage and
- Emergency Evacuation

CR 510 PROJECT PRESENTATION

FDOT will be presenting the start of this study to the Indian River County Metropolitan Planning Organization (MPO):

Wednesday, June 8, 2016, 10:00 a.m.
County Administration Building B
Conference Room B1-501
1800 27 Street, Vero Beach, FL 32960

Project Schedule

- Key Dates
  - Project Kick-Off June 8, 2016
  - Alternatives Meeting- Fall 2016
  - Public Hearing- Summer 2017
  - Location Design Concept Acceptance- Fall 2017

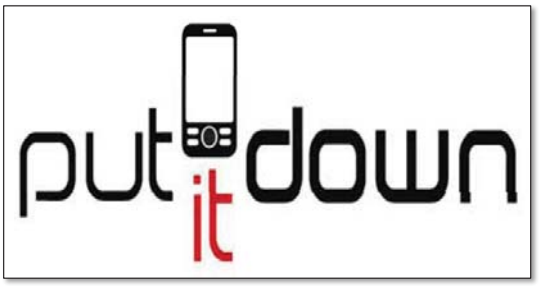
To submit comments or for more information regarding the CR 510 PD&E Study Please Contact:

Maria Formoso P.E., P.M.P. - FDOT Project Manager
Florida Department of Transportation, District Four
3400 West Commercial Boulevard, Ft. Lauderdale, FL 33309
Phone: (954) 777-4677
Toll Free: (866) 336-8435
E-mail: maria.formoso@dot.state.fl.us

Thank You!!


CLICK IT
OR TICKET
FLORIDA


DRUNK DRIVING
OVER THE LIMIT. UNDER ARREST.
Cops are cracking down.


put it down

PUBLIC KICK-OFF MEETING

PROJECT DEVELOPMENT & ENVIRONMENT (PD&E) STUDY
County Road (CR) 510
from CR 512 to 58th Avenue
Indian River County, Florida
Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

On behalf of the Florida Department of Transportation (FDOT), District Four, you are invited to a Project Kick-Off Presentation at the Indian River County Metropolitan Planning Organization (MPO) to learn about the Project Development and Environment (PD&E) Study for the above referenced project. The purpose of the PD&E Study is to evaluate preliminary engineering and environmentally feasible solutions, such as widening CR 510 from two to four lanes, in order to address the future capacity, operational and safety needs of the roadway.

The FDOT will be presenting the start of this study to the Indian River County Metropolitan Planning Organization (MPO) on **Wednesday, June 8, 2016, at 10:00 a.m. at the Indian River County Administration Building B, Conference Room B-1 501, 1800 27 Street, Vero Beach, FL 32960.** The project team presentation to the Indian River County MPO will serve as the Project Kick-Off for this project.

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status.



Persons who require special accommodations under the Americans with Disabilities Act (ADA) or persons who require translation services (free of charge) should contact Ms. Maria Formoso, P.E., Project Manager at least seven (7) days prior to the Public Kick-off Meeting.

For more information, please visit our website at www.CR510Project.com.

Alternatives Public Workshop

County Road 510 PD&E STUDY

from CR 512 to 58th Avenue
Indian River County

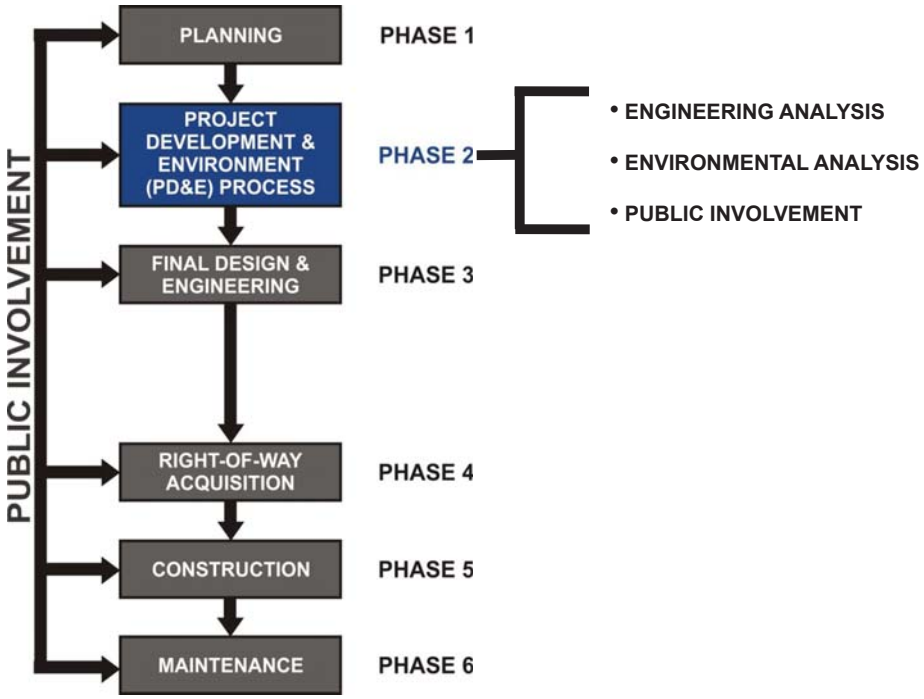


Alternatives Public Workshop Presentation

Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making Number: 14233
Date: October 11, 2016

County Road 510 PD&E Study

Project Process



County Road 510 PD&E Study

Project Description

- CR 510 from CR 512 to 58th Avenue (5.3 miles)

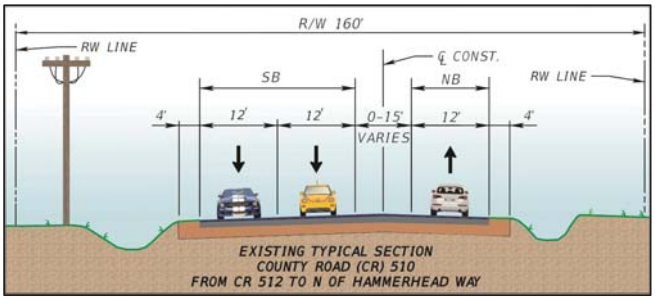


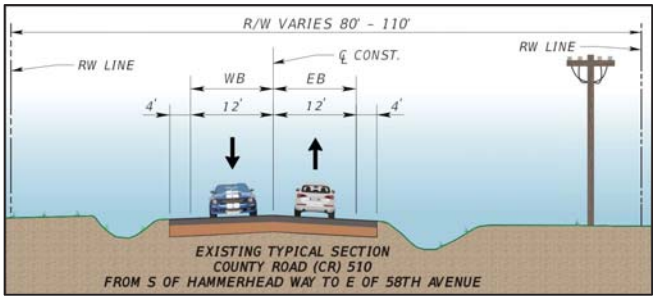
County Road 510 PD&E Study

Project Description & Existing Conditions

CR 510 Existing Conditions

- Urban principal arterial
- Two distinct typical sections
  - Three lane undivided
  - Two lane undivided
- Existing thru lanes are 12-ft
- Posted speed varies: 20 mph to 55 mph
- Existing R/W varies: 80’ to 160’
- AADT: 9,800
- T% (daily): 5.3%
- Safety:
  - Total of 104 crashes during 2010-2014
  - Locations with highest number of crashes
    - CR 512: 22 crashes
    - 70th Avenue/Powerline Road: 15 crashes
    - 66th Avenue/CR 615/Schumann Dr.: 14 crashes





County Road 510 PD&E Study

Project Purpose & Need

- Capacity/Transportation Demand
  - o Improve Traffic operations
  - o Existing CR 510 has insufficient capacity to meet projected 2035 AADT (Greater Treasure Coast Regional Planning Model)
- Maintain Level of Service (LOS) D as per County Comprehensive Plan Standards
- CR 510 is a primary truck route from CR 512 to 82nd Avenue
  - o CR 510 is a secondary truck route from 82nd Avenue to 58th Avenue
- CR 510 is designated as an emergency route
- Planning Consistency
  - o Identified as a core project in the Indian River County 2035 LRTP
  - o Identified as a priority project in the Indian River County TIP

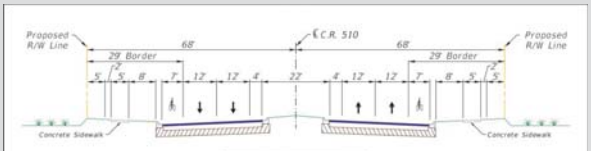




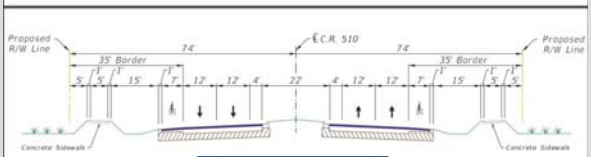
County Road 510 PD&E Study

Engineering Analysis

Suburban Typical Sections

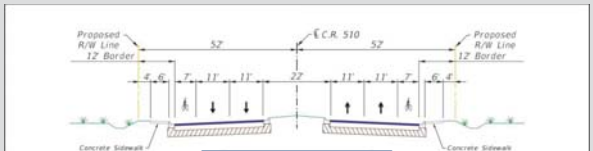


Alternative A

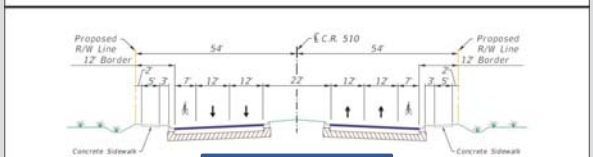


Alternative C

Urban Typical Sections



Alternative E

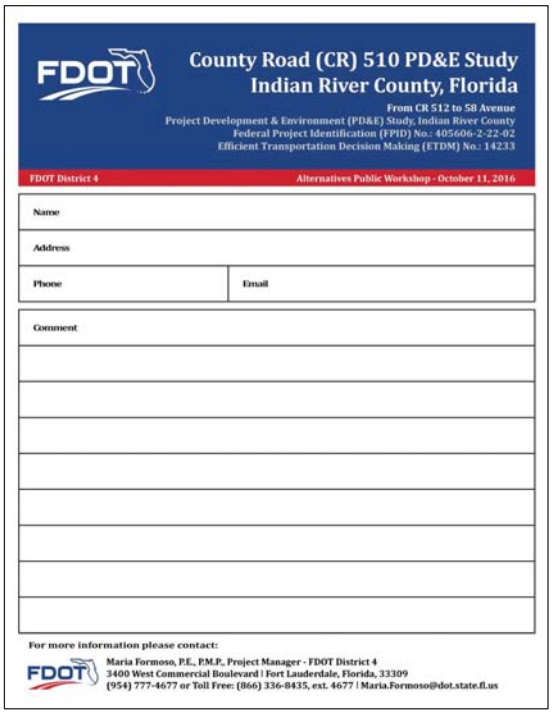


Alternative G

ALTERNATIVES	CRITERIA	UTILITY IMPACTS	MAINTENANCE OF TRAFFIC	GEOTECHNICAL CONSIDERATIONS	ACCESS IMPLICATIONS	WATER QUALITY / HYDROLOGICAL IMPACTS	WETLANDS IMPACTS	RELOCATION IMPACTS	COMMUNITY SERVICES	RIGHT-OF-WAY IMPACTS	CONSTRUCTION COST
ALTERNATIVES	ALTERNATIVE 1	Several Utility impacts anticipated to existing electrical, water, sewer, signals, and fiber optic facilities.	No significant Maintenance of Traffic problems anticipated during construction.	Some hydric soils (unsuitable) are likely to be encountered along the west side of the road just north of the Sebastian River High School and along both the east and west sides south of 87 Street. Significant amounts of hydric soils are also present east of the Treasure Coast Elementary to approximately 66 Avenue.	Generally would cause only temporary minor disruptions during construction and no permanent access disruptions. However, it would impact internal circulation access of a potential future residential development abutting CR 510 across from the Treasure Coast Elementary School.	Generally features a modest amount of impervious area except in the area east of the Treasure Coast Elementary School to 66 Avenue. Some turbidity might be present in the vicinity of the Lateral "D" and Lateral "L" Canals during construction, however, these impacts will be temporary. In general, this project will be an improvement since currently there is no treatment and the replacement of existing culverts to bridges will provide an additional benefit.	Minor potential wetland impacts along the east side of CR 510 and north of Make Way. It will also impact an existing freshwater pond across from the Treasure Coast Elementary School. In addition, this alternative would impact some wetlands in the vicinity of the Lateral "L" Canal crossing area and the South Prong Slough.	One potential residential relocation within the Hill Side Subdivision.	Generally no major impacts are anticipated, however one recently constructed bus stop shelter in front of the Sebastian River High School would need to be replaced.	Right-of-way impacts estimated at approximately 50.52 acres.	Construction cost estimated at approximately $103 million.
	ALTERNATIVE 2	Generally similar to Alternative 1 but with potentially greater impacts to existing transmission poles along the south side of CR 510 east of the Treasure Coast Elementary School to 66 Ave.	Generally similar to Alternative 1.	Generally similar to Alternative 1 but higher impacts within the area east of the Treasure Coast Elementary School to 66 Avenue due to the wider typical section footprint within this area.	Generally similar to Alternative 1.	Generally similar to Alternative 1 but with slightly higher impervious area.	Generally similar to Alternative 1 but with slightly higher impervious area within the project segment east of the Treasure Coast Elementary School to 66 Avenue.	Two potential residential relocations within the Hill Side Subdivision and one potential business relocation.	Generally similar to Alternative 1 but slightly greater impact to the internal circulation of the RCMA Day Care Center	Right-of-way impacts are estimated at approximately 54.24 acres with a greater number of parcels impacted.	Construction cost estimated at approximately $95 million.

County Road 510 PD&E Study

To submit comments or for more information regarding the CR 510 PD&E Study Please Contact:



County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to SR A1A
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 — Alternatives Public Workshop - October 11, 2016

Name
Address
Phone | Email
Comment

For more information please contact:
Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

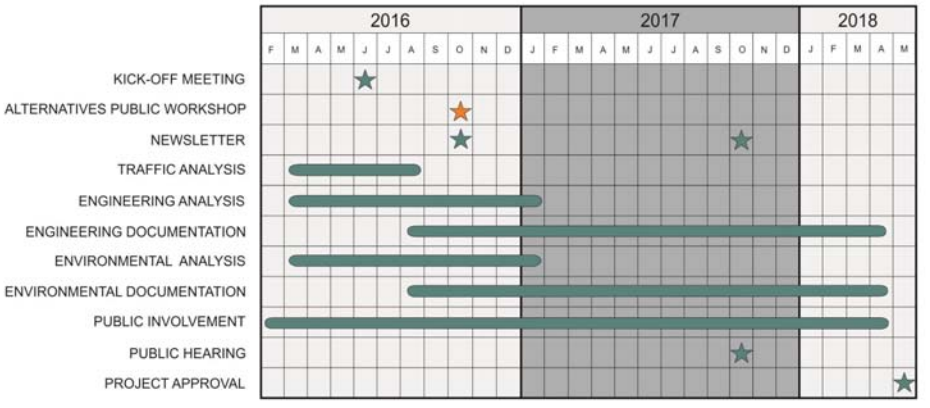
Maria Formoso P.E., P.M.P. - FDOT Project Manager
Florida Department of Transportation, District Four
3400 West Commercial Boulevard,
Ft. Lauderdale, FL 33309
Phone: (954) 777-4677
Toll Free: (866) 336-8435, X4677
E-mail: maria.formoso@dot.state.fl.us

County Road 510 PD&E Study

Project Schedule

- Key Dates
  - Public Hearing- Fall 2017
  - Location Design Concept Acceptance- Spring 2018

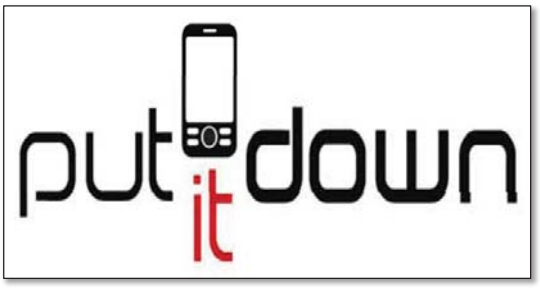
CR 510 PD&E Study Schedule



Thank You!!


CLICK IT
OR TICKET
FLORIDA


DRUNK DRIVING
OVER THE LIMIT. UNDER ARREST.
Cops are cracking down.


put it down

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Lisa Hill	NA	8720 97th Ave	772-571-6686	lrhill0805@gmail.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Mary Ann Smith	VLEPD Board	8546 E. 98th Ave. Vero Bch.	954-557-9503	maryasmith29@gmail.com
Bill Brennan	Friends of St. Sebastian River	589 Redwood Ct	772-581-0236	brennan_william@bellsouth.net
Heather Pope Hill	—	8720 97th Ave	772 571 6686	hpope1125@gmail.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
ROB MYERS	METRIC ENGINEERING	2606 JENKS AVE PANAMA CITY FL	512 512 5121	Rob.Myers@metriceng.com
Paul Carballo	Metric engineering	13440 SW 136 St, Miami, FL 33186	305-235-5098	Paul.ccarballo@metriceng.com
Gabriela Garcia	"	"	"	ggarcia@metriceng.com
Carlos Rodriguez	"	"	"	CRodriguez@metriceng.com
Tammy Vogel		7375 85th St.	772-532-0403	
Mike Ray	Graves Brothers Co.	2770 Indian River Blvd Suite 201, V.B 32960	772-562-3886 x103	MRay@GravesBrothersCompany.com
Leonard Kaczynski		6036 Ridge Lake Circle VB, 32967	561-254-0419	LeonardKaczynski@comcast.net
DAVID COX	IR Soil & Water Cons. District Audubon Florida (BOARD)	9495 Periwinkle Drive Vero Beach, FL 32963	772-766-2074	coxecology@gmail.com
Tim Glover	Friends of St. Sebastian River	9446 Fleming Grant Rd. Micco, FL 32976	772-589-0636	info@fssr.org
Lolita McMiller	Allen Chapel AME	6385 Blatt Lane Wabasso, Fla 32967	772-480-3822	idmcmiller60@gmail.com
Gerald Hart Sr.	Home Owner	6525 85th Street Wabasso. FL. 32970	772-480-6582	mikeonite68@Aol.com
EUNICE ANDERSON		6596 86th ST VERO Beach FL 32967	772-713-7206	bbxx2001@bellsouth.NET

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
GASPAR J. PADRON	FDOT	3400 W COMMERCIAL BLVD.	954 777 4320	gaspar.padron@dot.state.fl.us
Georgi Celusnek	FDOT	georgi celusnek	-4368	georgi.celusnek@dot.
Ann Broadwell	FDOT	" "	- 4325	
Alexandra Medina	MRG	18001 Old Cutler Rd PBFL 33157	786 607 3002	amedina@mrgmiami.com
Eunice Sanders	MRG	" "	305 254 8398	esanders@mrgmiami.com
Alexander Gorgas	Metric	13140 SW 136 St. Miami FL 33186	786-205-7024	alexander.gorgas@metric.eng
Ann Tetreault	VLE	8036 100 Ct VB, FL 32967	772-321-1465	anntetreault@Hotmail.com
David Bennett	VLE	8726-100th Ave	585-610-6911	dwbennet49@gmail.com
Carmen Negreira	VLE	7746 100 Ave.	954-253-8776	cnegreira@aol.com
Tommy Ruiz	Stubbs Consulting	12895 SW 132nd St Miami FL	305.255.6400	Tommy.Ruiz@stubbs.com
MARK J. SLOANE	VLE	8675 90th	(847) 671-2500	MJS2061@[illegible]
Robin Brisebois	FDOT - R/W	3400 W. Commercial Blvd.	(954) 777-4249	robin.brisebois@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
William Fennell	North Beach Civic Assoc	12596 N HWY A1A Vero Beach FL	772 589 1552	tcfennell@gmail.com
Cathy Fennell	" "	"	"	"
KEN LUDWA	BSE CONSULTANTS	312 S. HARBOR CITY BLVD MELBOURNE FL 32901	321-725-3674	kludwa@bseconsult.com
Ervin CArtwright		4006 Tropical Ln E Rowlett TX 75088	972 841 2685	ERVNCArtw@gMAIL
ANDY SOBCZAK	IRC MPO	1801 27th ST Vero Beach FL	772-226-1518	ASOBCZAK@IRCGOV.com
JAMES ENNIS	IRC-PW	" "	772 226-1224	jennis@ircgov.com
Andrew Kennedy	Proctor Construction	2058 US HWY 1 STE 200	772.633.6509	Akennedy@proctorcc.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Mary Rue		P.O. Box 134 Wabasso, Fla. 32970	772-589-7679	
Ed & Dorothy Kalinke		146 Port Royal Ct Seb	———	
Thim & Jan Beach		9496 - 75th ct	7725891565	
Sylvia Breack		65336 86 Ln	772 589-1809	Hagliannmcdew@yahoo.com
Jane Schnee		1022 Foster Rd. Sebastian 32958	772-589-3201	SUNNYRENT@aol.com
Bruce Zingman		600 Cottonwood Rd. Sebastian, FL 32958	772. 228.9938	
Pastor Carl O. Wallace		2564 510 Wabasso, Fla. 32970	321-795-7787	redNewhome@Earthlink.net
Pamela M Anderson		6570 86 St Vero Bch FL 32967	772-882-3002	Jeep1468@BellSouth.net

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Tony Dudley	N/A	P.O. Bx 700204, Wabasso FL 32970	772 473 7875	DUDLEYAJ1@AOL
Byron Smith	VLE PO	8546 E 98th Ave VB	954 817 5306	dsmyh1125@hotmail.com
Lupe Negrete	VLE	7916 103 Ave.	772-202-7741	44lupe44@gmail.com.
Carol Pinder	N/A Community	8445-64th Ave. Wabasso	772-643-5986	pinfour@comcast.net
Tom Scanlon		705 NW Fischer Cir Seb.	207-892-7781	scanbar1@msn.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Tuesday, October 11, 2016
5:30 p.m. to 7:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Andrea Rigsby	WWPCC	P.O. Box 453 Sharpes FL 32959	772-501-4749	rigsbyandrea@gmail.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name	David Bennett
Address	8726 100th Ave, Vero Beach, FL 32967
Phone	585-610-6911
Email	dwbennet49@gmail.com

Comment

After reviewing the two Alternatives showcased at the work shop I am highly in favor of Alternitive #2. This Alternitive would make it the most convienent for homes located along 90th giving them 2 directions which they can leave thier homes. It would also give a second option for leaving VLE to Rt 510. As the community grows having one exit to 510 will greatly increase the traffic at 510 and 87th. The bike lanes and side walk on the both proposals are great

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name MARK J. SOLDANO

Address 8690 90TH ST.

Phone (847) 471-2500

Email MJS2001@EARTHLINK.NET

Comment NEED TO MAINTAIN ACCES FROM GARAGE AND SECOND LOT TO CR510

PLEASE CONTACT ME ABOUT FENCE.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name	Cathy Ferrell
Address	12546 Hwy A1A
Phone 772-589-1552	**Email** cathyferrell.com

Comment

We want the bridge for the wildlife corridor in the Commissioners FDOT than Audubon + many other groups can support you wholeheartedly than.

Cathy Ferrell
North Beach Civic Association
Pelican Island Audubon

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name	Tim Glover
Address	9446 Fleming Grant Rd., Micco, FL 32976
Phone	772-589-0636
Email	info@fssr.org

Comment I am a representative of the Friends of ~~the~~ St. Sebastian River and our concerns are for the crossing of the natural South Prong of the river. I understand a bridge is currently the preferred crossing of the river. We would be pleased to see this structure as it would presumedly allow for restoration of the natural streambed, provide a wildlife and perhaps even a pedestrian crossing. The local Indian River Land Trust has developed a conceptual plan for the St. Sebastian River Greenway which includes conserved properties ~~etc~~ on the south side of CR510. (over)

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

There is also documented fish habitat in the South Prong for some rare and endangered endemic fish species. Dr. Grant Gilmore has researched and documented these fish over many years.

We hope the FDOT will follow through with the preferred crossing of the A1A Sebastian South Prong, and commit to building a bridge over the river, to allow for restoration of the natural streambed.

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name	CATHY FERRELL
Address	12546 Hwy AIA
Phone Vero Beach	**Email** cathyferrell@me.com

Comment

Wonderful plan, especially the curve improvement —

Would be wonderful to have it done in the next very few (3) years!

Much needed.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 — Alternatives Public Workshop - October 11, 2016

Name WILLIAM P. BRENNAN

Address 589 REDWOOD CT, SEBASTIAN, FL. 32958

Phone 772-581-0236 **Email** brennan_william@bellsouth.net

Comment

MY MAIN CONCERN IS PROTECTING THE HEALTH & BEAUTY OF THE ST. SEBASTIAN RIVER SOUTH PRONG. THE AREA WITH A NEW ROAD, IS RIPE FOR DEVELOPMENT AND SERIOUS ENCROACHMENT ON THE SOUTH PRONG AND HEADWATERS. PRESERVING RIVER BED FOR FISH TRANSIT SEEMS TO INDICATE NEED FOR BRIDGE, NOT CULVERT. WILDLIFE TRANSIT THRU THE RIVER CORRIDOR ALSO INDICATES NEED FOR BRIDGE. FRIENDS OF ST. SEBASTIAN RIVER IS WORKING ON PROJECT TO IMPROVE WALKING TRAILS ON RIVER CORRIDOR, AND SEES NEED FOR HUMANS TO ALSO BE ABLE TO TRANSIT RIVER CORRIDOR WITHOUT BRAVING A WIDE ROAD CROSSING. ALSO THINK PROJECT MANAGER

(OVER →)

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

SHOULD BE AGGRESSIVE IN ALERTING OTHER AGENCIES ABOUT PROJECT, AND FEEDING INFO AS IT BECOMES AVAILABLE

FOR PRACTICAL PURPOSES, THERE IS A RACE ON TO PROTECT THIS GREAT PATCH OF WATER AND LAND FROM THE INEVITABLE DEVELOPMENT THAT WILL OCCUR ANYWAY, BUT ACCELERATES WITH PROSPECTS FOR SUCH A FINE ROAD. AS ROB MYERS EXPLAINED, ANY WORTHY MITIGATION WILL PROBABLY NOT OCCUR ON THE ST. SEBASTIAN RIVER CORRIDOR. SO HOW DO WE PROTECT IT AS WISELY AS POSSIBLE. IS THE ALTERNATIVE TO DESTROY THE HEALTH AND BEAUTY OF THE SOUTH PRONG BECAUSE WE COULD NOT THINK OF EFFECTIVE WAYS TO KEEP THE RIVER CLEAN AND HEALTHY?

THINK HARDER. THERE ARE GOOD MINDS AVAILABLE TO MAKE SENSE OF THIS USEFUL ROAD IMPROVEMENT, AND PRESERVE THE RIVER, ITS DENIZENS, AND THE FUTURE POTENTIAL HOMEOWNERS OWN ENJOYMENT ~~OF THEIR M~~ OF THIS TREASURE OF RIVER AND WILDLIFE THAT WILL BE IN THEIR MIDST.

A BRIDGE OVER THE RIVER IS A SENSIBLE, ALBEIT MORE EXPENSIVE PIECE OF THIS PUZZLE.

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name	Mary E Rue
Address	
Phone	Home 772-589-7629 Cell " 532-5864
Email	Rue3953@yahoo.com

Comment

My concern is the turning lane on 62nd Ave. where I can only make a right turn and no left turn. It's the same on 510 and old dixie. This is of some concern that need to be addressed Please call me or e-mail me to do so.

Thank you

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name WILLIAM B. (TUCK) FERNELL

Address 12546 N HWAY A1A VERO BEACH FL 32963

Phone 772 589-1552

Email TCFERNELL2@GMAIL.COM

Comment

We support The IMPORTANT Regionally significant improvements. THIS ROUTE IS CRITICAL hurricane evacuation route for Vero Beach and The barrier Islands.

(PRIORITY)

You need To acquire CRITICAL corridor R/W especially from The defunct subdivision on The curved near extended canal west of 58 Ave.

WILLIAM B FERNELL, President north Beach CIVIC ASSOCIATION

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name Lisa Hill

Address 8720 97th Ave. Vero Beach FL 32967

Phone 772-571-6686 **Email** lrhill0805@gmail.com

Comment

Likes - ① Softening curve near Treasure Coast Elem
② better signal at 87th + 510
③ 2 lanes with divide
④ traffic circle

Concerns - ① Alt. 2 access thru Treasure Coast Elem seems a safety hazard - Vero Lake Estate residents may use as a cut thru to bypass light at 87th

Existing intersection w/ 66th causes a lot of stacking issues. AM Peak traffic backs past Powerline(70) and stop for right turn south on 66th causes a flow problem. PM Peak traffic heading back toward Sebastian can easily back up to traffic signal at Liberty Magnet.

If done with signage and proper education, can see benefit to traffic circle.

Need to improve flow as much as anything for safety.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name	Carmen Negreira
Address	7746 100 Ave.
Phone 954-253-8776	**Email** cnegreira@aol.com

Comment alternative 2 provides better access to and from VLE to Treasure Coast Elementary without having to get on the mainstream of 510.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name Ann Petreault

Address 8036 100 Ct, Vero Beach, FL 32967

Phone 772. 321-1465 **Email** annpetreault@hotmail.com

Comment My thoughts are that Alternative 2 will help traffic flow out of VLE & along 510 by providing a direct link to the Treasure Coast Elementary School.

Thank you for all your work on this project.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name Jane Schnee

Address 1022 Foster Rd - Apt. A, Sebastian, FL 32958

Phone 772-589-3201 | **Email** SUNWRENT@aol.com

Comment The south prong of the St. Sebastian River needs to have an arched bridge ~~over~~ over the 510 road to restore the natural flow of the river, to give fish particularly rare fish such as gobies to be able to get upriver to spawn & to allow wildlife to cross under the road + not get killed on the road, etc. Also Wabasso Scrub has Scrub-jays that cross CR 510 for food + dispersal. Widening CR 510 will cause more to be killed on the road, more noise, disturbance, etc. Also gopher tortoises cross 510. Crested caracaras live along CR 510!

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | Alternatives Public Workshop - October 11, 2016

Name MARK J. SOLDANO

Address 8675 90TH AVE

Phone (847) 671-2500

Email MJS2001@EARTHLINK.NET

Comment NEED TO HAVE ACCESS FROM GARAGE TO 90TH AVE (S/O) WITHOUT HAVING TO GO AROUND BLOCK. PAVING LOT IS SEPARATE LOT. REDUCED ACCESS WILL REDUCE MY PROPERTY VALUE AND THE UTILITY OF MY PROPERTY.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

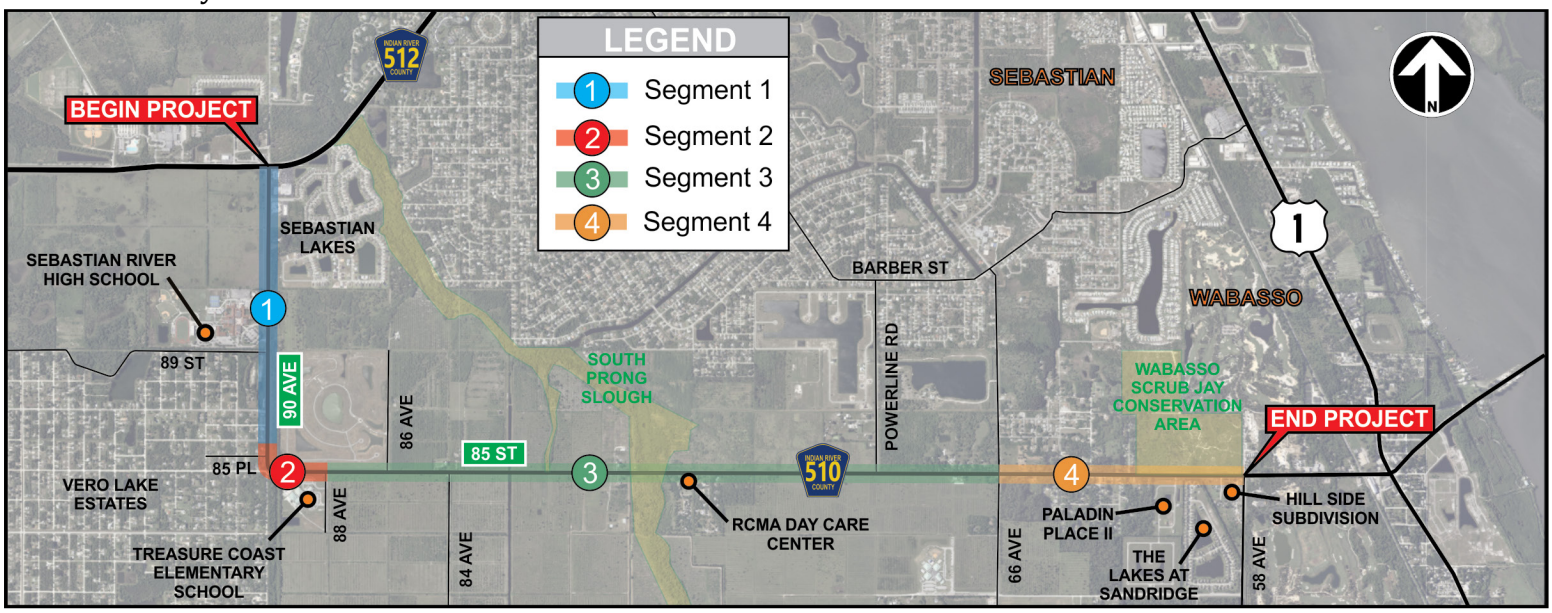
From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **www.cr510project.com** | **September 2016**

Alternatives Public Workshop

Date: Tuesday, October 11, 2016
Time: 5:30 p.m. to 7:30 p.m.
Location: North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

The CR 510 PD&E Study is evaluating the feasibility of widening CR 510 from two to four lanes from CR 512 to 58th Avenue as well as improvements to the existing curve and signalized intersections. Comments received at this workshop or electronically will be taken into consideration in the selection and refinement of the recommended alternative.



Project Objective

CR 510 is critical in providing the west-east movement of traffic in Indian River County as it connects Interstate 95 (I-95) to State Road (SR) A1A. The PD&E Study is evaluating preliminary engineering and environmentally feasible solutions, such as widening CR 510 from two to four lanes, in order to address the future capacity, operational and safety needs of the roadway.

Project Purpose & Need

The primary need for additional capacity on CR 510 from CR 512 to 58th Avenue is to achieve an acceptable Level of Service (LOS) on the facility in the future. While the roadway traffic is currently acceptable, conditions will deteriorate below acceptable standards if no improvement occurs by 2035, as the roadway will have insufficient capacity to accommodate the project travel demand. Additional needs for the project include:

- Transportation Demand
- System Linkage and
- Emergency Evacuation

Public Comments

We encourage you to participate in the CR 510 PD&E Study. You may submit your comments regarding the proposed improvements in one of the following ways: complete one of the available comment cards, mail your written comments to the address below, or submit comments on the study website (www.cr510project.com). All information presented at this meeting will also be available on the study website.

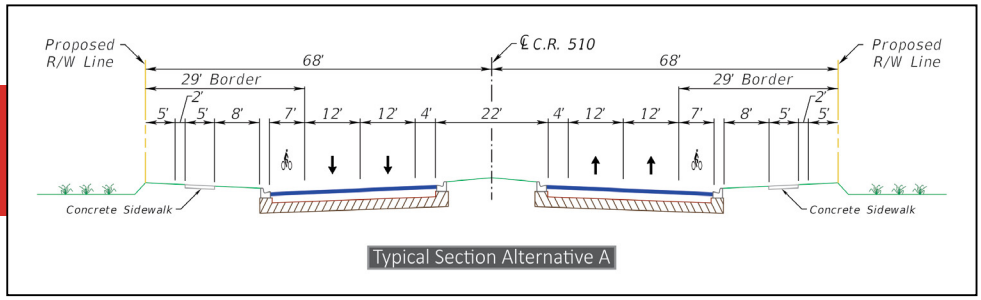
Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

Alternatives

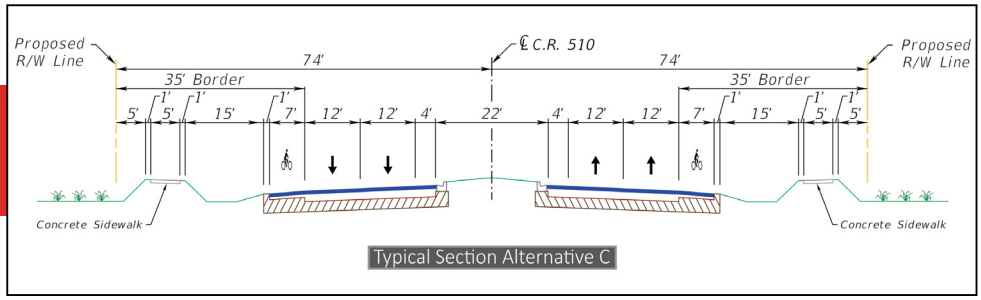
The team has developed four distinct typical sections with different design speeds and multimodal features. The typical sections are being evaluated in terms of their impacts to the natural, physical and social environments, cost, safety and other factors. The typical sections currently under consideration are shown to the right.

Alternative A and **Alternative C** are 4-lane sub-urban typical sections with Design Speeds of 50 and 55 mph, respectively. These typical sections feature 7-foot bicycle lanes, 4-foot inside shoulders, and 5-foot sidewalks with a wide buffer between the roadway and the sidewalks.

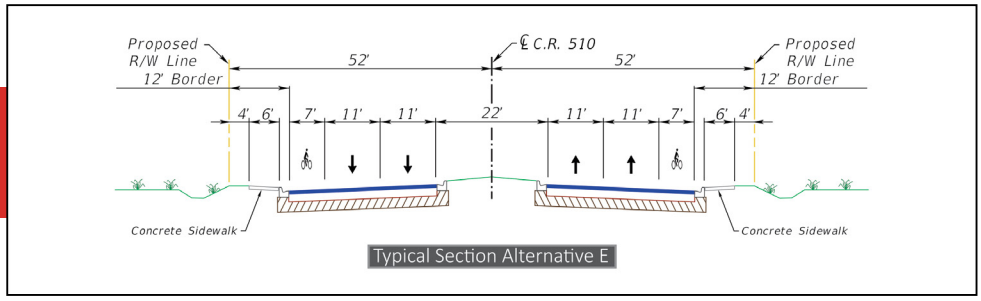
Alternative E and **Alternative G** are 4-lane urban typical sections with a Design Speed of 45 mph. These typical sections feature 7-foot bicycle lanes, sidewalks and a 22-foot median.



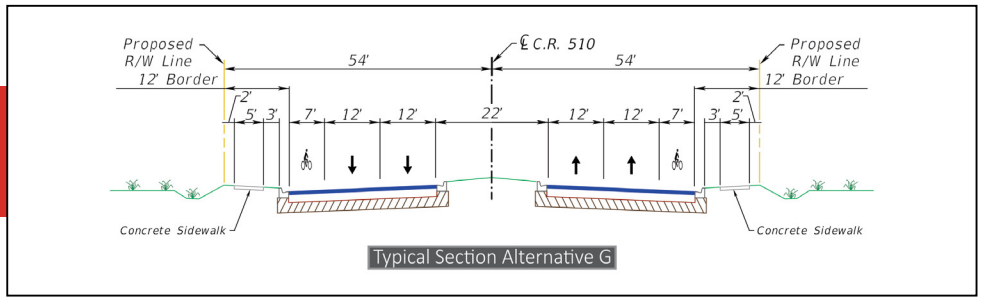
Typical Section Alternative A



Typical Section Alternative C



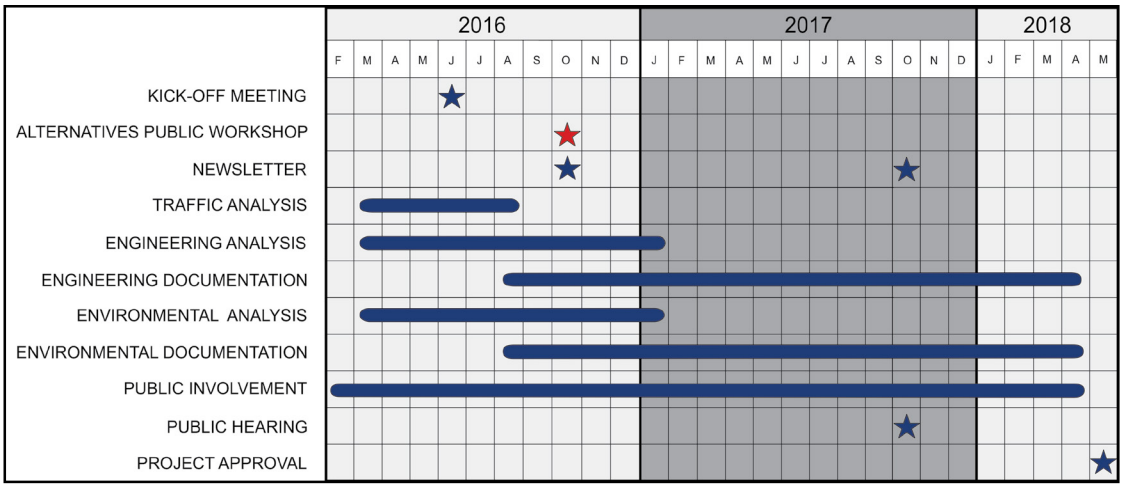
Typical Section Alternative E



Typical Section Alternative G

Public Involvement

FDOT has embarked on a public involvement program as part of this PD&E Study. The public has an important role in the project development and decision making of the study. A Project Kick-Off presentation to the Indian River County Metropolitan Planning Organization (MPO) served as the Project Kick-Off and was held on June 8th, 2016, an Alternatives Public Workshop is being held on October 11th, 2016, and a Public Hearing is currently scheduled for October 2017. In addition, presentations have been made to county officials, MPO committee, and neighborhood organizations along the study area.



Public participation is solicited without regard to race, color, national origin, sex, religion, disability or family status. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800) 955-8771 (TDD) or 1(800) 955-8770 (Voice). Any persons who require translation services (free of charge) should also contact Maria Formoso, P.E., P.M.P. at least seven (7) days before the meeting.

Notice of Meeting/Workshop Hearing

THE Florida Department of Transportation (FDOT), District Four, ANNOUNCES an Alternatives Public Workshop TO WHICH ALL PERSONS ARE INVITED.

DATE AND TIME: Tuesday, October 11, 2016 at 5:30 p.m.

In the event that the Alternatives Public Workshop cannot be held on October 11, 2016 due to severe weather or other unforeseen conditions, it will be held on the alternate date of December 12, 2016 at the same time and place.

PLACE: North Indian River County Library, 1001 Sebastian Boulevard, Sebastian, FL 32958

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Florida Department of Transportation (FDOT) District Four will be hosting an Alternatives Public Workshop for the County Road (CR) 510 Project Development and Environment (PD&E) Study from CR 512 to 58th Avenue, in Indian River County, Florida. The workshop will begin as an open house at 5:30 p.m. with a short presentation at 6 p.m., followed by a comment period. The purpose of this workshop is to give interested persons an opportunity to comment and provide input on the transportation improvement alternatives the Department has developed at this point in the study. Financial Management Number: 405606-2-22-02; ETDM Number 14233.

A COPY OF THE AGENDA MAY BE OBTAINED BY CONTACTING:

Maria Formoso, P.E., P.M.P., Project Manager, Florida Department of Transportation, District Four, 3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309, (954) 777-4677 (Telephone), or toll free at (800) 336-8435 ext: 4677 or via email at Maria.Formoso@dot.state.fl.us.

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status.

PURSUANT TO THE PROVISIONS OF THE AMERICANS WITH DISABILITIES ACT OF 1990, ANY PERSONS REQUIRING SPECIAL ACCOMODATIONS TO PARTICIPATE IN THE Public Workshop IS ASKED TO ADVISE THE AGENCY AT LEAST

Seven (7) days

BEFORE THE ALTERNATIVES PUBLIC WORKSHOP BY CONTACTING:

Maria Formoso, P.E., P.M.P., at (954) 777 4677, or toll free at (800) 336-8435 ext: 4677 or in writing to Florida Department of Transportation, District Four, 3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309, or via email at Maria.Formoso@dot.state.fl.us. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800) 955-8771 (TDD) or 1(800) 955-8770 (Voice). Any persons who require translation services (free of charge) should also contact Maria Formoso, P.E. at least seven (7) days before the meeting.

FOR MORE INFORMATION, YOU MAY CONTACT:

Maria Formoso, P.E., P.M.P., Project Manager, Florida Department of Transportation, District Four, 3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309, (954) 777-4677 (Telephone), or toll free at (800) 336-8435 ext: 4677 or via email at Maria.Formoso@dot.state.fl.us.

NATION

More than 800 receive citizenship by mistake

ALICIA A. CALDWELL
ASSOCIATED PRESS

WASHINGTON - The U.S. government has mistakenly granted citizenship to at least 858 immigrants from countries of concern to national security or with high rates of immigration fraud who had pending deportation orders, according to an internal Homeland Security audit released Monday.

The Homeland Security Department's inspector general found that the immigrants used different names or birthdates to apply for citizenship with U.S. Citizenship and Immigration Services and such discrepancies weren't caught because their fingerprints were missing from government databases.

DHS said in an emailed statement that an initial review of these cases suggest that some of the individuals may have ultimately qualified for citizenship, and that the lack of digital fingerprint records does not necessarily mean they committed fraud.

The report does not identify any of the immigrants by name, but Inspector General John Roth's auditors said they were all from "special interest countries" — those that present a national security concern for the United States — or neighboring countries with high rates of immigration fraud. The report did not identify those countries.

DHS said the findings reflect what has long been a problem for immigration officials — old paper-based records containing fingerprint information that can't be searched electronically. DHS says immigration officials are in the process of uploading these files and that officials will review "every file" identified as a case of possible fraud.

Roth's report said fingerprints are missing from federal databases for as many as 315,000 immigrants with final deportation orders or who are fugitive criminals. Immigration and Customs Enforcement has not reviewed about 148,000 of those immigrants' files to add fingerprints to the digital record.

The gap was created because older, paper records were never added to fingerprint databases created by both the now-defunct Immigration and Naturalization Service and the FBI in the 1990s. ICE, the DHS agency responsible for finding and deporting immigrants living in the country illegally, didn't consistently add digital fingerprint records of immigrants whom agents encountered until 2010.

Roth's report said federal prosecutors have accepted two criminal cases that led to the immigrants being stripped of their citizenship. But prosecutors declined another 26 cases. ICE is investigating 32 other cases after closing 90 investigations.

ICE officials told auditors that the agency hadn't pursued many of these cases in the past because federal prosecutors "generally did not accept immigration benefits fraud cases." ICE said the Justice Department has now agreed to focus on cases involving people who have acquired security clearances, jobs of public trust or other security credentials.

Mistakenly awarding citizenship to someone ordered deported can have serious consequences because U.S. citizens can typically apply for and receive security clearances or take security-sensitive jobs.

At least three of the immigrants-turned-citizens were able to acquire aviation or transportation worker credentials, granting them access to secure areas in airports or maritime facilities and vessels. Their credentials were revoked after they were identified as having been granted citizenship improperly, Roth said in his report.

A fourth person is now a law enforcement officer.

Dear Valued Patient

We are writing to you today to inform you that

Dr. Gerald Molloy

will no longer be practicing at Lawnwood Neurosurgery.

Your health and wellness has always been a priority to us. Lawnwood Neurosurgery will be closing effective **October 5, 2016.**

To obtain your medical records call the practice at **772-466-1113.**

Sincerely, Lawnwood Neurosurgery | 772-466-1113

TR-1274689

ALTERNATIVES PUBLIC WORKSHOP

PROJECT DEVELOPMENT & ENVIRONMENT (PD&E) STUDY
County Road (CR) 510
from CR 512 to 58th Avenue
Indian River County, Florida
Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

The Florida Department of Transportation (FDOT), District Four, will conduct an Alternatives Public Workshop regarding the Project Development and Environment (PD&E) Study of CR 510 from CR 512 to 58th Avenue, in Indian River County, Florida. The Alternatives Public Workshop will be held on **Tuesday, October 11, 2016, from 5:30 p.m. to 7:30 p.m. at the North Indian River County Library, located at 1001 Sebastian Boulevard, Sebastian, FL 32958.** In the event that the Alternatives Public Workshop cannot be held on October 11, 2016 due to severe weather or unforseen conditions, it will be held on the **alternate date of December 12, 2016** at the same time and place.

The Alternatives Public Workshop will be conducted as an informal open house, with a formal presentation starting at 6:00 p.m. Drawings and other pertinent information will be available for public review.

The purpose of this PD&E Study is to evaluate preliminary engineering and environmentally feasible solutions, such as widening CR 510 from two to four lanes, in order to address the future capacity, operational and safety needs of the roadway. Project representatives will be available during the Alternatives Public Workshop to discuss the project and answer questions.

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status.

Persons who require special accommodations under the Americans with Disabilities Act (ADA) or persons who require translation services (free of charge) should contact Ms. Maria Formoso, P.E., P.M.P., Project Manager, at least seven (7) days prior to the Alternatives Public Workshop.

Contact information:
Maria Formoso, P.E., P.M.P., FDOT Project Manager
3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309
Telephone: (954) 777-4677 or toll free at (866) 336-8435, ext. 4677
Email: Maria.Formoso@dot.state.fl.us.



Project Website: www.cr510project.com

ALTERNATIVES PUBLIC WORKSHOP

FDOT

DATE: Tuesday, October 11, 2016
TIME: 5:30 p.m. to 7:30 p.m.
PLACE: North Indian River County Library
1001 Sebastian Boulevard
Sebastian, Florida 32958

FLORIDA DEPARTMENT OF TRANSPORTATION

TR-1270999

Adopt-A-Class

Foster the next generation of readers!

The next generation of readers has to be able to thrive in an increasingly competitive world. Local teachers know that newspapers can be a valuable tool in their students' preparedness, and they use Treasure Coast Newspapers as a teaching tool. All area schools are able to access our newspaper publications online, in an exact replica of all TCN editions – 24/7.

Individuals and local business partners provide the online newspaper at no cost to teachers or schools. Through Newspapers in Education, you can help too by "adopting" a class in the local school of your choice or making a donation in any amount.



Adopt-A-Class in a local school or make a donation of any amount.

Your donation will be announced in newspaper Adopt-A-Class advertisements.

Name_____
Address_____
City_____State_____Zip Code_____
Phone_____Email_____

☐ I would like my adoption to be (Circle one) *in honor of* **or** *in memory of:*
Name:_____

Amount enclosed with form: ☐ $100 to adopt one class. ☐ Any other amount _____
No amount is too small.

☐ Please charge my credit card.
CC#:_____Exp._____
_____
Signature *required for credit card donation.*

☐ *I want my donation to be anonymous.*

AAC/NPT

Checks payable to: TCN/NIE

Mail form to: **Treasure Coast Newspapers/NIE, P.O. Box 9009, Stuart, FL 34995-9009**

NIE
Treasure Coast Newspapers
Newspapers in Education

Public Hearing

Florida Department of Transportation

RICK SCOTT
GOVERNOR

3400 West Commercial Blvd.
Fort Lauderdale, FL 33309

MIKE DEW
SECRETARY

County Road 510 PD&E Study
Public Hearing Summary

The County Road 510 Project Development and Environment (PD&E) Study Public Hearing was held on Tuesday, April 24, 2018, at the North Indian River County Library, 1001 Sebastian Boulevard, Florida 32958. The Public Hearing began as an open house at 5:30 p.m., with a formal presentation at 6:00 p.m., followed by a public comment period.

The purpose of this Public Hearing was to provide elected and appointed officials, property owners and other interested parties an opportunity to review proposed improvements to CR 510, to ask questions and to provide comments on the proposed improvements.

The display boards included the proposed improvements shown with an aerial of the project study area, a location map of environmental concerns, an alternatives evaluation matrix, a schematic of the roundabout, a display of existing and future traffic conditions, an aerial indicating right of way impacts, an explanation of the the purpose and need and an explanation of what is a PD&E study. Individuals were able to discuss the proposed improvements one on one with the FDOT Project Manager as well as other FDOT and Project Consultant staff during the open house. The formal presentation was followed by a public comment period during which 10 individuals spoke. The attendees were encouraged to submit comments in writing on the comment sheets provided, email the Project Manager, or directly to the court reporter. Attendees were provided a hand-out on the CR 510 PD&E Study.

The Public Hearing was attended by approximately 95 residents, interested parties, elected and appointed officials, FDOT staff and consultants. Attendees included interested parties who were sent invitational notices to the CR 510 PD&E Public Hearing. Also present were Edward Barenborg, Legislative Aide to Representative Erin Grall, Indian River County Commissioner Joe Flesher, Indian River County Administrator Jason Brown, Indian River County Director of Public Works Rich Szpyrka, Indian River County MPO Executive Director Phil Matson, and City of Sebastian Director of Community Development Lisa Fraizer.

The Public Hearing announcement was published in the *Indian River Press Journal* on April 4 and 15, 2018, on the FDOT public notices website, in the Florida Administrative Register, and on the Project's website. A mailing was sent to property owners within 300 feet of the center of the project corridor. Emails were sent to elected and appointed officials, ETAT members, Native American contacts, agencies, residents, businesses and other interested parties.

Attachments:
A. Sign-in Sheets
B. Written Comments matrix
C. Project Hand-out
D. Public Workshop photos
E. Public Hearing Transcript

Presentation & Display Boards posted: www.CR510project.com

Submitted by Laila A, Haddad – MRG, LLC on 5/17/2018

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
[illegible]	VLEPO	8446 93rd Ave	772 589 7674	[illegible]
Peter Dubec		Vero	772-766-2569	Cobalt357@GMail.Com
MARK Bondy	FSSR, IRNA	997 George	586-907-9715	Cbyx4me@aol.com
LISA Frazier	City of Sebastian		772-388-8	Lfrazier@cityofsebastian.org
Josh Baker	FDOT	Winter beach	772-429-4900	Joshua.Baker@dot.State.FL.US
Tim Glover	Friends of St. Sebastian River	Micco, FL	772-589-0636	info@fssr.org
Ed BARENBERG	Rep ERIN GRALL	1810 27TH ST B2-203 32960	772 778 5015	EDWARD.BARENBERG@MYFLORIDAHOUSE.GOV
Archie Rigby	West Wabasso Progressive Civic Club	8586 W. Sebastian, FL 32976	772-581-4749	rigbyarchie@gmail.com
JOSEPH SCHULKE	SCHULKE, BITTLE & STODDARD LLC	1717 INDIAN RIVER BLVD SUITE 201 VERO BEACH FL 32960	772 770 9022	Jschulke@sbsengineers.com
Qwantrae Sands		8540 64th Ave	772-538-3447	qnsands@aol.com
Jaspar Jorge Padron	FDOT	3400 W Commercial Blvd.	(954) 777-4320	qaspar.padron@dot.state.fl.us
Eunice ANDERSON		6546 86th ST	772-646-1242	

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Al Roth	Stanley Consultants		561-718-1961	rothalfred@stanleygroup.com
Pam Kline	Sebastian River Landing	184 Port Royal Ct	263-967-8880	dpkline44@comcast.net
MIKE & DEBBIE GARDNER		9156 103rd Ave. VERO BEACH	518-935-3760	meggwatt0310@gmail.com
MARK & JOANN OWEN		561 SCOTIA PLACE ORLANDO 32806	407-451-0454	M.OWEN@GAICONSULTANTS.COM
Tim & Jan Beach		8496 75th Ct Vero Bch FL	772 589 1565	FLBeachs@Comcast.net
Kent Casey		375 Sebastian Crossings Sebastian BLVD	772-783-0955	
JOE A. DUDLEY			772 413 8547	JOEADUDLEY@GMAIL.COM
Yamila Hernandez			305-514-3159	yamila.hernandez@jacobs.com
Melvin Abt		6780 85th St	772-473-6350	Abtm2015@gmail.com
Russell Herrmann	Friends of St Sebastian River	586 Redwood ct S	772-589-8511	capepond11@aol.com
Deborah Perry		1664 Stonecrop St	581-1046	
THERESA HENRY		158 Port Royal ct.	772-783-6952	

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Donna Schuler		192 Port Royal Ct, Sebastian	908-850-8272	dmschuler@comcast.net
Robin Brisebois	FDOT		(954) 777-4249	robin.brisebois@dot.state.fl.us
KEEGAN LARSON	WGI	111 HARBOURSIDE DRIVE JUPITER, FL	561-420-9945	Keegan.Larson@wginc.com
DAVID Bennett		8726 100th Ave VB FL 32967	585-610-6911	dwbennett49@gmail.com
Lucille Shuren				
Kerry & Tom Gorr		8145 92nd Ave VB FL 32967	772 633-8508	freckles0210@att.net
KEN LUDWA	BSE Consultants	312 S. HARBOR CITY BLVD MELBOURNE FL 32901	321-725-3674	kludwa@bseconsult.com
Michael Abt		6780-85th St VB 32967	772-473-8534	MCSTUNTS@COMCAST.Net
Ronald Sanchez	Hardesty & Hanover, LLP	1000 Sawgrass Corp. Pkwy Sunrise, FL 33323	954-368-6366	rsanchez@hardestyhanover.com
TONY DUDLEY	N/A	P.O BX 700204 WABASSO, FL 32970	7724737879	DUDLEYAJ1@AOL
Ervin Eastwright			9725412685	
Frank Hickson	IEI	1069 Main St Sebastian	7723881661	fhickson@go-iei.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
CAITLIN HILL	METRIC	13940 SW 136 MIAMI	305-235-5098	Caitlin.Hill@metriceng.com
LAILA HADDAD	MRG, LLC	Palmetto Bay	786-837-4881	lhaddad@mrgmiami.com
MARIA FORMOSO	FDOT	3400 Commercial Blvd.	954 777 4677	
ERIE LANG				CHEVYBOY71.EL@GMAIL.COM
K A Buckley		Vero Beach		
DENNIS & Alana Connolly		154 Port Royal G	362-465-2991	
MIKE RAY	GRAVES BROTHERS	2770 I.R. Blvd Suite 201	772-562-3886	
Scott Clark	FDOT	3400 Commercial Blvd	954-777-4342	Scott.clark@dot.state.fl.us
Donna Phillips		8736 99th Ave VB 32967	772-360-9247	donnaphillips15@aol.com
Joe Idlette	PCL	4570-57th Ave VB 32967	772-778-4523	
Everett Lynn		8470 85th St		
Keith Krieger	Stanley Consultants		561 389 1075	kriegerkeith@stanleygroup.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Jason Brown	Indian River County	1801 27th St. VB 32960	772-226-1408	jbrown@ircgov.com
Gabriela Garcia	Metric Engineering	13940 SW 136 St, 33186	305-235-5098	ggarcia@metriceng.com
Paul Carballo	Metric engineering	13940 SW 136 St, 33186	305-235-5098	paul.carballo@metriceng.com
Phil Matson	IRC- MPO	1801 27th St VBK	772 226-1455	pmatson@ircgov.com
Henry Schroeder		152 Port Royal Ct.	772-5198219	
MAGGIE FLEMING		8655 99th Avenue 32967	732-575 2841	margaret.fleming48@gmail.com
Carlos Rodriguez	METRIC	17080 SW 90 WAY	305-968-2546	cdr@metriceng.com
ROCKY LEE	COLDWELL BANKER	5260 PALMETTO PL MELBOURNE FL 32951	321-317-0268	Rocky.lee@coldwellbanker.com
Marilou Keen		8325 16th Avenue	772-563-7141	quilting2125@aol.com
Patricia Busby		8415 104 AVE	772-202-7207	patricia.busby@att.net
Mary Lou Ciambriello	VLE	8256 105th Court	561-305-7159	ciambriello@bellsouth.net

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Tommy Ruiz	FDOT CONSULTANT SNUBBS CONSULTING	Miami	305-595-6400	Tommy.Ruiz@snubbs.com
Stefan Escanes	Metric Engineering	13940 SW136 St, Miami, FL, 33186	305-235-5098	stefan-escanes@metriceng.com
Fernando Ascanio	FDOT	S4	954-7774665	fernando.ascanio@dot.state.fl.us
WENDY KIRBY-BARNES	—	721 YEARLING TRAIL SEBASTIAN, 32958	443-544-7300	WBARNES1M@VERIZON.NET
TIM BARNES	—	721 YEARLING TRAIL SEBASTIAN, FL. 32958	443-271-2943	TBARNES1131@VERIZON.NET
Pat Hahn		215 Delamy Ave Sebastian 32958	772 581-8667	Patehorma@yahoo
Debbie Chorma		8000 91st Ave Vero Beach, FL 32967	772-532-5362	debchorma@gmail.com
Bill Haylurst	S.R.L.	105 Morgan Cir Sb.	772-569-6680	Haylurstw@aol
GRAHAM COX	Pelican Island Audubon Soc	1213 REQUEST SEBASTIAN FL	772-388-5396	grahamkennedcox@gmail.com
T.P. Kennedy	Chauca Holdings llc	3017 Golfview Dr Vero Beach, FL. 32960	772-473-2521	TPK@kennedyholdingsllc.com
A.K. Malinowski	citizen	1022 Croquet Lane Sebastian. fl 32958	772-643-5379	

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
RENARD OLIVIER	STANLEY CONSULTANTS	1641 WORTHINGTON ROAD W.P.B. FL 33409	561 689 7444	olivierrenard@stanleygroup.com
Atasia smith			7723885411	
Jack Edd Eglehoff	Johnny Cartwright		7723885446	
Ann Broadwell	FDOT	3400 West Commercial Blvd	954-777-4325	
PEARLIE ANDERSON		6570 86th ST	772 882 7006	
RONALD MASON				
BRYAN CORRIGAN		1051 INDIAN MOUND TRAIL 32963	(214) 356-6689	BC@AciiiFLP.com
Andrew Kennedy		2050 US Hwy 1	772.234.5164	AKennedy@colliercountyfl.gov
CARLOS BALBE	OWNER	P.O. Box 704788 FORT LAUDERDALE FL 33308		
Amy Cosner		498 Copley Terr SEB 32958	772 589-7132	cccosner@comcast.net
Chris Cosner		498 Copley Terr SEB 32958	772 589-7132	cccosner@comcast.net

County Road (CR) 510 PD&E Study
Indian River County, Florida

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Rich Szpyrka	IRC PW		772-226-1379	RSzpyrka@IRCGOV.com
MARK J SOLDANO	SELF / Home owner	9015 87TH ST. 8675 90TH AVE	(847) 671-2500	MJS2001@EARTHLINK.NET
John Walker	Home owner	8586 61st Drive	912-398-2288	Boomerang883@bellsouth.com
Dhumavati Jaya	Self/owner	11239 Ganesh Way Sebastian	772 532 5327	sdvjaya@gmail.com
Diane Shampine	Resident	Barbara Street Sebastian		shampinc@bellsouth.net
JULIO DELGADO	SCALAR CONSULTING	4152 W. BLUE HERON BLVD STE 119, RIVIERA BEACH 33404	(954)415-8632	JDELGADO@SCALARINC.NET

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

Public Hearing
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library
1001 Sebastian Boulevard, Sebastian, FL 32958

FDOT

SIGN-IN SHEET

NAME	ORGANIZATION	ADDRESS	PHONE	EMAIL
Pat Moon	Animal Medical	8496 N US 1	772-589-8990	DocMoon@bell
Dave Moon	Clinic	Wabasso	"	south.net
Rich Votapka	N/A	8405 75th Ct. Vero Beach	772-589-8611	RBVotapka@gmail.com
J.D. Whitaker	Scalar Consulting Group	4152 W. Blue Heron Blvd. Riviera Bch, Suite 119	561 429 5065	Jdwhitaker@scalarinc.net
Rob Myers	Metric Eng	2616 Jenks Ave Panama City	512 517-5121	rob.myers@metriceng.com
Joe Flescher	County Commissioner			

CR 510 PD&E Study
Public Hearing Comments & Response Matrix

Name	Address	Phone	Email	Comment Received	Comment	FDOT Response	Notes
Ballbe, Carlos	2737 N.E. 30th Place Fort Lauderdale, Florida 33306	954-491-7811 x 1000 cell: 954-444-8529	carlos@baeng.us	May 3, 2018 email to Maria Formoso	Mrs. Formoso: I am the owner of two parcels adjacent to CR510 (Parcels ID# 31382600000700000003.0 / 31382600000700000001.0 / 149.37 acres), and I attended the public hearing referenced above. Please incorporate my comments listed below in the public hearing records: • Parcel 31382600000700000001.0 has received zoning approval by Indian River County for a Planned Development (400 single family homes, see attached P.D Plan). • I object to the proposed road section in front of my property, following are some of the issues with it: o Drainage easement/swale not required o FDOT Urban Typical Section to be used fronting property o Proposed R/W dedication location shown in urban section will not be allowed • I object to the possibility of having ponds to handle the road drainage requirements in my property; a more suitable location the ponds of needed would be in the farm land south of CR510 (thousands of acres land use and zoned agricultural with not development approvals, and outside of the urban development boundary). If you are going to acquire/condemn property, this is where you should do it. • Please notify me of any pond committed meetings to make sure I attend and address my concerns. • Please schedule a meeting with FDOT representatives/design consultants handling the road section design and the drainage design to go over my comments.	Thank you for your concerns and comments on this project. We will continue to coordinate in regards to the drainage easements/swales as the project moves into the final design phase to further evaluate the drainage requirements. Currently four pond alternatives are being considered per basin including on county owned parcels where available. Recommended ponds will be selected during the design phase. We will notify you as requested when the pond siting meeting gets scheduled as part of the final design effort expected to commence in Fall 2018.	
Beach, Thim and Jan	8496 75 Court, Vero Beach, FL 32967	772-589-1565	Flbeachs@comcast.net	May 3, 2018 email to Maria Formoso	Ob sheet # 17. The east side of our 5-acre nursery. Has 8 -6" V.C.P. drain line going east across the county easement. To big ditch. There will be conflicts the retention pond 7-4 when installing storm drain pipes. Please take note of how to proceed. Storm Drainage Engineer Tommy Ruiz suggested going over our 6: drain pipe being that they are V.C.P.. Please replace with 6" PVC. Our 5 acre nursery needs an entrance off of East Bound lane for access, as one does exist now. Also, who will maintain the retention pond? Comments : Shifting the CR510 road expansion to North vacant land eliminates the impact to our property home and business. 1. De-value of property - loss of circular driveway - second garage (no access) - loss of plant/tree/scrub hedge/fence for privacy. 2 . Undesirable resell property - highway encroaches on privacy - noise factor - fear of safety with increased property access - property function and esthetics loss. 3. Physical invasion of private property due to loss of fence. 4. Physical harm to our animals due to damaged or loss of fencing to contain our animals. 5. Drainage issues - eliminate any access to our land for maintenance. 6. Taking or use of any of our property for easement or sidewalk which would have no economical value later. For resolution: 1. Loss of some or all access to our home property and/or adjoining plant nursery - separating land or access off CR-510 reduces the access & value of both properties. 2 . Regular access to our business for maintenance & business which has an access point now.3. Drainage & flooding issues to our adjoining plant nursery created by project (Placing storm drainage under our 6" drainage pipe as suggested by Eng Tommy Ruiz). 4. Taking or use of any of our property for easement or sidewalk which would have no economical value later. 5. Properly maintain retention pond for un-environmental conditions & mosquito control. 6. Rather than have any of the above happen - buy ALL	Thank you for your comments on this project. Indian River County will be maintaining the retention ponds. Currently four pond alternatives are currently being considered per basin and the recommended ponds will be selected during the final design phase. We will continue to coordinate in regards to the access as the project moves onto the final design phase.	
Bess, Tara			tarambess@gmail.com	May 3, 2018 emailed to Jacqueline Paramore	I am writing to express my concern about the proposed round about at 66th St and 510 in Vero Beach. This is too busy of a corner for a round about. Please consider the safety and concerns of the residents of Indian River County when determining how to proceed.	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	

CR 510 PD&E Study Public Hearing Comments & Response Matrix							
Name	**Address**	**Phone**	**Email**	**Comment Received**	**Comment**	**FDOT Response**	**Notes**
Campbell, Linda			camlin21@aol.com	May 3, 2018 emailed to Jacqueline Paramore	I am from Massachusetts where round about's are at many intersections in the state. They can calm traffic but also cause confusion at the wrong places and one at 510 and 66th would not be advantageous. The truck traffic on a round about at this point of the road would add to accidents and confusion.	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	
Coleman, Leah			Leahcoleman44@gmail.com	May 2, 2018 emailed to Jacqueline Paramore	I thank 510 should be wide or a from 510 always to read 60 that was in the plan way back	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	
Hubbard, Al	8325 66 Avenue	not provided	AlF4u52@live.com	4/24/2018 Public Hearing	1. Fire service plan a department on 510 and 66 Ave. With a roundabout it will be hard for EMS to respond going west and south. Need a light there. 2. This is not taking effect (considering) that when 95 is closed between Exit 156 and 147, they (traffic) are moved to 66 Ave to 510. This is moving hazard material through school zone and malls.	Thank you for your concerns and comments on this project. The roundabout is designed to allow large trucks (including emergency vehicles) to be able to maneuver and make proper turns. A mountable curb is provided on the inner circle to allow for comfortable turning of these large trucks. The design and recommendation of the roundabout will continue to be coordinated with Indian River County and the MPO during the design phase.	
Jandreau, Lucia			loumarjan@yahoo.com	email 5/1/2018 to Jacqueline Paramore	NO NO NO TO ROUNDABOUT	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	
Kennedy, Andrew	2050 US Highway 1, Suite 200, Vero Beach, FL 32960	772 -633-6509	Akennedy@collierscrawford.com	May 1, 2018 via email to Maria Formoso	I represent the ownershp of Ryall Development, LLC wich is impacted by segment #3. I would like to be notified of the pond selection meetings. There are multiplee locations proposed on the Ryall property. We have conceptional approval for a traditional neighborhood designed community that addresses drainage. Ideally I would like to coordinate with FDOT re drainage and ROW.	Thank you for your comments on this project. We will continue to coordinate in regards to the pond selection as the project moves into the Final Design Phase. Recommended ponds will be selected during the Final Design Phase. We will notify you as requested when the pond siting meeting gets scheduled as part of the Final Design effort expected to commence in Fall 2018.	
Kennedy, Thomas Chance Holdings, LLC	3017 Golfview view Dr, Vero Beach, FL 32960	772-473-2527 (or 2521)	TPK@Kennedyholdingsllc.com	4/24/2018 Public Hearing	I represent the land owner Chance Holdings, LLC and they prefer the 7.4 drainage pond as 7.1-7.3 impacts their development greatly.	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	

CR 510 PD&E Study Public Hearing Comments & Response Matrix							
Name	**Address**	**Phone**	**Email**	**Comment Received**	**Comment**	**FDOT Response**	**Notes**
Kirby-Barnes, Wendy	721 Yearling Trail, Sebastian, FL 32958	772-202-7378	WBarnes114@verizon.net	4/24/2018 Public Hearing	A.K. Malinowski (Adriana)	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	
Luczak, Laura			roaring.run@hotmail.com	May 1, 2018 emailed to Jacqueline Paramore	Dear FDOT (Federal Dept. of Transportation) regarding the reconfiguring and expansion of 510 including a Roundabout at 66th Ave. My opinion and concerns to the FDOT would be to please don't put a roundabout there. Widen 510, put in two lanes. But please don't put in a roundabout. I have seen what chaos roundabouts create and the average drivers in this area are older people who have difficulty driving in a straight line. My husband has had three major accidents in the area all caused by elderly drivers.	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	
Ludwa, Ken	B.S.E. Consultants, Inc.	321-725-3674	kludwa@bseconsult.com	emailed May 4, 2018 to Maria Formoso	Please accept the following comment on the CR510 PD&E Study, submitted by BSE Consultants on behalf of the owner/developer of the proposed Bluewater Bay subdivision located west of 86th Avenue on the north side of CR510. The CR510 Draft Concept Plans, dated January 2018, show an eastbound left turn to 86th Avenue, but no westbound right turn. The construction of the Bluewater Bay subdivision (and other likely development on adjacent properties) will warrant the eastbound left turn, the westbound right turn, and possibly a signal at 86th Avenue. The proposed Bluewater Bay subdivision is 376 units. All access to the subdivision will be via 86th Avenue. Construction is expected to commence in the third quarter of 2018. Thank you for the opportunity to provide input. Please contact Ken Ludwa (KLudwa@bseconsult.com) and Scott Glaubitz (SGlaubitz@bseconsult.com) at our office if you have any questions.	Thank you for your concerns and comments on this project. We will continue to coordinate in regards to the access as the project moves into the final design phase.	
Malinowski, A.K. (Adriana)	1022 Croquet Lane	772-643-5379		4/24/2018 Public Hearing	Would have like to know have printed names of all "official personnel" Gov and citizens in attendance		5/14/18 L Haddad spoke with Ms. Malnowski who said she did not want a list of attendees sent to her. She wished that the introduction of elected and appointed officials and City and County staff was lonmger than "13 seconds". She would have like to know who was there with an explanation of their role.
McCaslin, Deidra			pugslypuggles@gmail.com	May 1, 2018 emailed to Jacqueline Paramore	As a property owner in VLE, please be advised that I am AGAINST a roundabout. After many years of living in the Stuart area with multiple roundabouts, I can assure you they are not practical or safe, especially given our high senior and tourist population.	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	

CR 510 PD&E Study
Public Hearing Comments & Response Matrix

Name	Address	Phone	Email	Comment Received	Comment	FDOT Response	Notes
Meeks, Elizabeth		732-674-0458	brettliz24@hotmail.com	April 26, 2018 via email to Maria Formoso	Good afternoon Ms. Formoso, I'm writing you to state my concerns with the design of the roundabout for the CR510 and 66th Ave intersection. I'm not opposed to the roundabout design itself, however, I think that there could be revisions to make it better. My main concern is the fly outs or hot rights along CR510. They do not have a dedicated lane to merge onto 66th Ave with the other traffic. We have issues with accidents at the current right turn lane with people not stopping at the stop sign. You are proposing the same condition with the new design, and that does not work. It seems that the only way to make this better would be to give them a dedicated third lane that merges into 66th Ave. Also, are the areas in between the fly outs an the roundabout going to be concrete? I hope not - that area should be at least grass to keep some green area now that so much pavement is proposed. Some low groundcover or ornamental peanut would be nicer than just the concrete. Thank you for taking the time to read my email, Liz Meeks (732) 674-0458 brettliz24@hotmail.com	Thank you for your involvement and comment on this project. The final design of CR 510 from west of 82 Avenue to 58 Avenue is anticipated to begin May 2018. Details regarding the landscaping, pavement markings as well as the final layout of the laneage will be finalized in the design phase. Your comments have been forwarded for further consideration and evaluation.	
Munoz, Nancy			sactreasurer04@yahoo.com	May 3, 2018 emailed to Jacqueline Paramore	Bad idea, too much traffic and hostile drivers. No to roundabout at 510 and 66th!	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	
Perry, Deborah	1664 Stonecrop Street, Sebastian, FL 32958	581-1046		4/24/2018 Public Hearing	This project is a GREAT EXAMPLE of how to promote URBAN SPRAWL for all the rich developers that are ruining this county, and want to ruin the small town atmosphere people move here for!!! As far as Environmental Studies, I use to have "pet" Bobcats on my street until Sebastian annexed Sebastian River Landings. And the noise will continue to surround everyone. We have US1 and CR 512 for traffic. NO TO THIS PROJECT.	Thank you for providing your comments. Your input in this project is very valuable and will become part of the official record. As we finalize our recommended alternative, we will work to address this feedback, as well as those concerns expressed by other stakeholders in the community. Our goal is to provide a transportation improvement that will benefit and support the community as a whole, while avoiding and minimizing impacts to the natural and physical environment.	5/14/18 L. Haddad spoke to resident. Ms. Perry stated that she does not have a computer. She was surprised that FDOT was going to bother to send her a response. L. Haddad told her she would mail it.
Ray, Mike	2770 Indian River Blvd, Suite 201, Vero Beach, FL 32960	772-562-3886 x 103	Mray@GravesBrothersCompany.com	4/24/2018 Public Hearing	Our questions deal mostly with the proposed drainage ponds located on the PD&E maps. Why is it necessary to use ponds instead of swales? Why are the ponds on private property when there is ample County property to accommodate drainage? FDOT standards for road show curb & gutter - which inhibits or eliminates being able to do swales instead of ponds. Can this be modified? Highway 60 west of I-95 has swales, not ponds.	Thank you for your concerns and comments on this project. Typical sections that provide swales instead of curb and gutter were considered however they were eliminated for various reasons, mostly due to additional impacts, including several relocations, as well as impacts to the South Prong Preserve. Due to the existing canals and topography, the project was divided into 10 basins. Currently four pond alternatives are being considered per basin including on county owned parcels where available. Recommended ponds will be selected during the design phase.	This response was combined with response below with more detail.

CR 510 PD&E Study
Public Hearing Comments & Response Matrix

Name	Address	Phone	Email	Comment Received	Comment	FDOT Response	Notes
Ray, Mike	Graves Brothers Company 2770 Indian River Blvd, Suite 201 Vero Beach, Fl. 32960	772-562-3886 ext 103	mray@gravesbrotherscompany.com	May 3, 2018 email to Maria Formoso	Good afternoon Ms. Formoso I attended the meeting on April 24, 2018 at the north branch of the Indian River County Library on behalf of the Graves Brothers Company, and have some items that we believe are pertinent to the project. We would like these comments on the record and have responses back. I have included the formal FDOT meeting comment sheet as well as a file of the intersections referred to below, as provided by our engineer on this project. 1. We understand that all improvements are based on probable future traffic demand on that section of road in the current study. 2. The road design, curb and gutter, pedestrian traffic, drainage, etc is for a typical roadway section for urban use, instead of a rural section design. 3. Accordingly, this urban type design apparently requires less ROW width, but drainage ponding to manage the water runoff. 4. Why can this not be a rural roadway design and eliminate the ponds/curbing/gutters and use swales to manage the water instead. Should be less expensive than trying to acquire 10 different ponds from 10 different owners. 5. Eliminating the curb and gutter would save construction money on the project as well. 6. Indian River County already owns several large tracts of land in this area, why can't all the water be captured on the lands the County already owns, if a pond system is ultimately required? 7. From Graves Brothers standpoint, we would not want any of the ponds to be placed on our property. 8. We would like to know how/why the design median cuts are shown where they are on the drawings. 9. The design needs to show an intersection, median cut and north and south leg at 80th Ave. 10. The design indicates an intersection and median cut at 82nd Ave. There also needs to be a north leg added. 11. At 84th Ave, there is an intersection but the median cut does not line up with that intersection, it is shown to the east of the intersection benefitting only one house. There are several houses/people living south on 84th who will benefit from a median cut at the intersection itself. There also needs to be a south leg. 12. At 86th Ave, there is an intersection with a median cut, but it also needs a south leg. 13. All 4 of these roads are part of the County grid system and will be major thoroughfares in the future when this area is developed and more people are living there. I believe that is why this project is moving along, so as to accommodate all of the future traffic that will be generated from that growth. 14. We understand that there will be pond siting meetings that are open to the public to discuss the aspects of this project, and in particular, the drainage/pond design. We request to be notified on a timely basis so that we can plan to attend those meetings. Thank you for your consideration on this. Please confirm that these comments are included as part of the public record and confirm receipt by May 3, 2018. I look forward to hearing back from you on these. (Attached, aerial of 86 Ave, 84 Ave, 82 Ave and 80 Ave intersection with 85 Street)	Thank you for your concerns and comments on this project. Typical sections that provide swales instead of curb and gutter were considered however they were eliminated for various reasons, mostly due to additional impacts, including several relocations, as well as impacts to the South Prong Preserve. Due to the existing canals and topography, the project was divided into 10 basins. Currently four Pond alternatives are being considered per basin including on county owned parcels where available. Recommended ponds will be selected during the design phase. The recommended alternative follows Florida Department of Transportation's Access Management Standards. The project has been classified as an Access Class 5 facility. This determines the amount of spacing that is required between median openings and connection spacing. Access management recommendations as well as potential improvements to 80th Avenue, 82nd Avenue, 84th Avenue, and 86th Avenue intersections will continue to be coordinated as the project moves into the final design phase.	
Soldano, Mark J.	8675 90 Ave and 9015 87 Street	847-671-2500	MJS2001@earthlink.net	4/24/2018 Public Hearing	Both addresses need access to public roads. 9015 87 St is a separate lot from 867590 Ave. 8675 90 Ave will be getting a driveway to CR 510. Each property needs access to roads separately. Both directions may become issue.	Thank you for your concerns and comments on this project. Final design of CR 510 from CR 512 to west of 82 Avenue is anticipated to begin late 2018. Coordination and public involvement will continue through the design phase to ensure proper access is provided.	

Laila Haddad

Subject: FW: FDOT CR 510 PD&E STUDY - PUBLIC HEARING DATE 4-24-2018 - COMMENTS

From: Carlos Ballbe [mailto:carlos@baeng.us]
Sent: Thursday, May 03, 2018 6:41 AM
To: Formoso, Maria <Maria.Formoso@dot.state.fl.us>
Subject: FDOT CR 510 PD&E STUDY - PUBLIC HEARING DATE 4-24-2018 - COMMENTS

Mrs. Formoso:

I am the owner of two parcels adjacent to CR510 (Parcels ID# 31382600000700000003.0 / 31382600000700000001.0 / 149.37 acres), and I attended the public hearing referenced above. Please incorporate my comments listed below in the public hearing records:

- Parcel 31382600000700000001.0 has received zoning approval by Indian River County for a Planned Development (400 single family homes, see attached P.D Plan).
- I object to the proposed road section in front of my property, following are some of the issues with it:
    - Drainage easement/swale not required
    - FDOT Urban Typical Section to be used fronting property
    - Proposed R/W dedication location shown in urban section will not be allowed
- I object to the possibility of having ponds to handle the road drainage requirements in my property; a more suitable location the ponds of needed would be in the farm land south of CR510 (thousands of acres land use and zoned agricultural with not development approvals, and outside of the urban development boundary). If you are going to acquire/condemn property, this is where you should do it.
- Please notify me of any pond committed meetings to make sure I attend and address my concerns.
- Please schedule a meeting with FDOT representatives/design consultants handling the road section design and the drainage design to go over my comments.

Sincerely,

Carlos J. Ballbé
2737 N.E. 30th Place
Fort Lauderdale, Florida 33306
(954) 491-7811 Office (Ext. 1000)
(954) 444-8529 Mobile
carlos@baeng.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name Thim + Jan Beach

Address 8496-25th court, Vero Beach, Fl. 32967

Phone 772-589-1565 | **Email** Flbeachs@Comcast.Net

Comment

on sheet #17,

The East side of our 5-Acre Nursery. Has 8-6" V.C.P. Drain lines going East Across The county Easement. To Big clitch. There will be a conflict as The Retenion Pond 7-4 when Installig storm Drain pipes. Please Take note of how To proceed. Storm Drain Egineer Tommy Ruiz. suggested going unoer our 6" Drain Pipe. being That They are V.C.P. Pleare Replace with 6" PVC. Thus. Thim Bed

4-29-2018

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name Tim + Jan Beach

Address 8496-75th court, Vero Beach, Fl. 32967

Phone 772-589-1565

Email Flbeachs@Comcast.net

Comment

Our 5 Acre Nursery Needs an Entrance off of East Bound lane For Acess. as one does Exist now.

Also who will maintain The retention Ponds

Thx. Tim Beach

4-29-2018

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 — Public Hearing - April 24, 2018

Name Jan & Tim Beach	
Address 8496 75th Court, Vero Beach, Florida 32967	
Phone 772-589-1565	**Email** FLBEACHS@COMCAST.NET

Comments
Shifting the CR510 road expansion to North vacant land eliminates the impact to our property home and business.

1. De-value of property - loss of circular driveway - second garage (no access) - loss of plant/tree/scrub hedge/fence for privacy
2. Undesirable resell property - highway encroaches on privacy - noise factor - fear of safety with increased property access - property function and esthetics loss
3. Physical invasion of private property due to loss of fence
4. Physical harm to our animals due to damaged or loss of fencing to contain our animals.
5. Drainage issues - eliminate any access to our land for maintenance
6. Taking or use of any of our property for easement or sidewalk which would have no economical value later

For resolution:
1. Loss of some or all access to our home property and/or adjoining plant nursery - separating land or access off CR-510 reduces the access & value of both properties.
2. Regular access to our business for maintenance&business which has an access point now
3. Drainage & flooding issues to our adjoining plant nursery created by project (Placing storm drainage under our 6" drainage pipe as suggested by Eng Tommy Ruiz)
4. Taking or use of any of our property for easement or sidewalk which would have no economical value later
5. Properly maintain retention pond for un-environmental conditions & mosquito control
6. Rather than have any of the above happen - buy ALL

Jan Beach 5-2-2018

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

Laila Haddad

Subject: FW: Proposed Round About in Vero Beach

-----Original Message-----
From: Tara Bess [mailto:tarambess@gmail.com]
Sent: Thursday, May 3, 2018 9:54 AM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: Proposed Round About in Vero Beach

Hello,
I am writing to express my concern about the proposed round about at 66th St and 510 in Vero Beach. This is too busy of a corner for a round about. Please consider the safety and concerns of the residents of Indian River County when determining how to proceed.
Thank you,
Tara Bess

Sent from my iPhone

Laila Haddad

Subject: FW: round about 510 and 66th

From: Linda Campbell <camlin21@aol.com>
Sent: Thursday, May 03, 2018 8:05 AM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: round about 510 and 66th

I am from Massachusetts where round about's are at many intersections in the state. They can calm traffic but also cause confusion at the wrong places and one at 510 and 66th would not be advantageous. The truck traffic on a round about at this point of the road would add to accidents and confusion.

Linda Campbell
32963

Laila Haddad

Subject: FW: I thank 510 should be wide or a from 510 always to read 60 that was in the plan way back

---

From: leahcoleman44 <leahcoleman44@gmail.com>
Sent: Wednesday, May 02, 2018 1:36 PM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: I thank 510 should be wide or a from 510 always to read 60 that was in the plan way back

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name	Al Hubbard
Address	8325 66th
Phone	**Email** AlF4452@Live.Com

Comment

1) Fire Service Plan A Deptment on 510 & 66th with Round-A-bout It will Be Hard for EMS to Respound goin west & South need light There.

2) This is not Taking Effect That when 95 is Closed Between Ext 156 & 147, They are moved to 66 Ave to 510 This is moving Hazard material Thougt School zones and malls.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

Laila Haddad

Subject: FW: SR 510

From: Lucia Jandreau [mailto:loumarjan@yahoo.com]
Sent: Tuesday, May 1, 2018 4:08 PM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: SR 510

NO NO NO TO ROUNDABOUT

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name	Andrew Kennedy
Address	2050 US Highway 1 Suite 250 Vero Beach, FL 32960
Phone	772 633 6509
Email	AKennedy@colliercrawford.com

Comment I represent the ownership of Ryall Development, LLC. which is impacted by segment #3. I would like to be notified of the pond selection meetings. There are multiple locations proposed on the Ryall property. We have conceptual approval for a traditional neighborhood designed community that addresses drainage. Ideally, I would like to coordinate with FDOT re: drainage and ROW.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name	Thomas Kennedy Chance Holdings LLC
Address	3017 Golfview Dr. Vero Beach FL. 32960
Phone	772-473-2521
Email	TPK@Kennedyholdingsllc.com

Comment

I represent the land owner chance holdings llc. and they prefer the 7.4 Drainage ponds as 7.1-7.3 impact their Development greatly

Thomas Kennedy

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4

Public Hearing - April 24, 2018

Name	WENDY KIRBY-BARNES
Address	721 YEARLING TRAIL, SEBASTIAN, FL 32958
Phone 772.202.7378	**Email** WBARNES114@VERIZON.NET

Comment

Bike lanes into roundabout & go to sidewalks. Bikes don't normally obey traffic laws. Bike lanes are dangerous. Keep them on the sidewalks & enlarge sidewalks all the way through the project. Safer for all. As for the roundabout - hard for trucks & emergency vehicles to get around. Keep traffic signal @ 66th and enlarge right turn lanes with appropriate signal controls.

Traffic signal will be needed at Riverline Road.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

Laila Haddad

Subject: FW: State Road 510 and 66th Avenue Vero Beach Florida

From: Laura Luczak [mailto:roaring.run@hotmail.com]
Sent: Tuesday, May 1, 2018 4:36 PM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: State Road 510 and 66th Avenue Vero Beach Florida

Dear FDOT (Federal Dept. of Transportation) regarding the reconfiguring and expansion of 510 including a Roundabout at 66th Ave. My opinion and concerns to the FDOT would be to please don't put a roundabout there. Widen 510, put in two lanes
But please don't put in a roundabout. I have seen what chaos roundabouts create and the average drivers in this area are older people who have difficulty driving in a straight line.
My husband has had three major accidents in the area all caused by elderly drivers.

Laila Haddad

Subject: FW: Comment on CR510 - Turn Lanes/Signal at 86th Avenue - Bluewater Bay Subdivision

---

From: Ken Ludwa [mailto:KLudwa@bseconsult.com]
Sent: Friday, May 04, 2018 4:36 PM
To: Formoso, Maria <Maria.Formoso@dot.state.fl.us>
Cc: Scott Glaubitz <SGlaubitz@bseconsult.com>; Sheila Armstrong <sarmstrong@bseconsult.com>; Ken Ludwa <KLudwa@bseconsult.com>
Subject: Comment on CR510 - Turn Lanes/Signal at 86th Avenue - Bluewater Bay Subdivision

Please accept the following comment on the CR510 PD&E Study, submitted by BSE Consultants on behalf of the owner/developer of the proposed Bluewater Bay subdivision located west of 86th Avenue on the north side of CR510.

The CR510 Draft Concept Plans, dated January 2018, show an eastbound left turn to 86th Avenue, but no westbound right turn. The construction of the Bluewater Bay subdivision (and other likely development on adjacent properties) will warrant the eastbound left turn, the westbound right turn, and possibly a signal at 86th Avenue. The proposed Bluewater Bay subdivision is 376 units. All access to the subdivision will be via 86th Avenue. Construction is expected to commence in the third quarter of 2018.

Thank you for the opportunity to provide input. Please contact Ken Ludwa (KLudwa@bseconsult.com) and Scott Glaubitz (SGlaubitz@bseconsult.com) at our office if you have any questions.

Ken Ludwa, P.E.
Project Engineer
B.S.E. Consultants, Inc.
Phone (321) 725-3674
Fax (321) 723-1159
kludwa@bseconsult.com
www.bseconsult.com

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name	A.K. Malinowski
Address	1022 Croquet Lane
Phone 772-643-5379	**Email**

Comment

would have like to know have
painted names of all
"offical "personnel" G.U.V. And citizen
in Attendance

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

Laila Haddad

Subject: FW: 510 expansion - Citizen Comment

From: Pugsly McCaslin [mailto:pugslypuggles@gmail.com]
Sent: Tuesday, May 1, 2018 5:07 PM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: 510 expansion

Greetings,

As a property owner in VLE, please be advised that I am AGAINST a roundabout. After many years of living in the Stuart area with multiple roundabouts, I can assure you they are not practical or safe, especially given our high senior and tourist population.

Sincerely,

Deidra McCaslin

Laila Haddad

Subject: FW: CR 510 & 66th Ave Roundabout Project

From: Elizabeth Meeks [mailto:brettliz24@hotmail.com]
Sent: Thursday, April 26, 2018 2:01 PM
To: Formoso, Maria <Maria.Formoso@dot.state.fl.us>
Subject: CR 510 & 66th Ave Roundabout Project

Good afternoon Ms. Formoso,

I'm writing you to state my concerns with the design of the roundabout for the CR510 and 66th Ave intersection. I'm not opposed to the roundabout design itself, however, I think that there could be revisions to make it better. My main concern is the fly outs or hot rights along CR510. They do not have a dedicated lane to merge onto 66th Ave with the other traffic. We have issues with accidents at the current right turn lane with people not stopping at the stop sign. You are proposing the same condition with the new design, and that does not work. It seems that the only way to make this better would be to give them a dedicated third lane that merges into 66th Ave. Also, are the areas in between the fly outs an the roundabout going to be concrete? I hope not - that area should be at least grass to keep some green area now that so much pavement is proposed. Some low groundcover or ornamental peanut would be nicer than just the concrete.

Thank you for taking the time to read my email,
Liz Meeks
(732) 674-0458
brettliz24@hotmail.com

Laila Haddad

Subject: FW: 510 and 66th roundabouts

-----Original Message-----
From: Nancy Chiappinelli Munoz <sactreasurer04@yahoo.com>
Sent: Thursday, May 03, 2018 8:19 AM
To: Paramore, Jacqueline <Jacqueline.Paramore@dot.state.fl.us>
Subject: 510 and 66th roundabouts

Bad idea, too much traffic and hostile drivers. No to roundabout at 510 and 66th!
Nancy Munoz
Sebastian FL

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name	Deborah Perry
Address	1664 Stonecrop St
Phone 581-1046	**Email**

Comment This project is a GREAT EXAMPLE of how to promote URBAN SPRAWL for all the rich Developers that are ruining this County, and want to ruin the small town atmosphere people move here for!!! As far as Environmental Studies, I used to have "pet" Bobcats on my street until Sebastian annexed Sebastian River Landings. And the noise will continue to surround everyone! NO TO THIS PROJECT We have US 1 and 512 (CR) for traffic.

For more information please contact:
Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name Mike Ray

Address 2770 Indian River Blvd Suite 201 V.B FL 32960

Phone 772-562-3886 x 103

Email MRay@GravesBrothersCompany.Com

Comment

Our Questions Deals Mostly with Proposed Drainage Ponds Located on PD&E Maps. Why is it Necessary To use Ponds Instead of Swales? Why Are The Ponds on Private Property When There is Ample County Property To Accomodate Drainage? FDOT Stds For Road Show Curb & Gutter - which inhibits or eliminates being able to Do Swales instead of Ponds. Can This Be Modified? Hwy 60 West of I-95 has Swales - Not Ponds.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

Laila Haddad

Subject: FW: County Road (CR) 510 PD&E Study
Attachments: GRAVES BROS - INTERSECTIONS Schulke Doc.pdf; County Road (CR) 510 PD&E Study Comment Request 05032018.pdf

---

From: Mike Ray [mailto:mray@gravesbrotherscompany.com]
Sent: Thursday, May 03, 2018 5:36 PM
To: Formoso, Maria <Maria.Formoso@dot.state.fl.us>
Cc: Joseph W. Schulke, P.E. <jschulke@sbsengineers.com>
Subject: County Road (CR) 510 PD&E Study

Good afternoon Ms. Formoso

I attended the meeting on April 24, 2018 at the north branch of the Indian River County Library on behalf of the Graves Brothers Company, and have some items that we believe are pertinent to the project. We would like these comments on the record and have responses back. I have included the formal FDOT meeting comment sheet as well as a file of the intersections referred to below, as provided by our engineer on this project.

1. We understand that all improvements are based on probable future traffic demand on that section of road in the current study.
2. The road design, curb and gutter, pedestrian traffic, drainage, etc is for a typical roadway section for urban use, instead of a rural section design.
3. Accordingly, this urban type design apparently requires less ROW width, but drainage ponding to manage the water runoff.
4. Why can this not be a rural roadway design and eliminate the ponds/curbing/gutters and use swales to manage the water instead. Should be less expensive than trying to acquire 10 different ponds from 10 different owners.
5. Eliminating the curb and gutter would save construction money on the project as well.
6. Indian River County already owns several large tracts of land in this area, why can't all the water be captured on the lands the County already owns, if a pond system is ultimately required?
7. From Graves Brothers standpoint, we would not want any of the ponds to be placed on our property.
8. We would like to know how/why the design median cuts are shown where they are on the drawings.
9. The design needs to show an intersection, median cut and north and south leg at 80th Ave.
10. The design indicates an intersection and median cut at 82nd Ave. There also needs to be a north leg added.
11. At 84th Ave, there is an intersection but the median cut does not line up with that intersection, it is shown to the east of the intersection benefitting only one house. There are several houses/people living south on 84th who will benefit from a median cut at the intersection itself. There also needs to be a south leg.
12. At 86th Ave, there is an intersection with a median cut, but it also needs a south leg.
13. All 4 of these roads are part of the County grid system and will be major thoroughfares in the future when this area is developed and more people are living there. I believe that is why this project is moving along, so as to accommodate all of the future traffic that will be generated from that growth.
14. We understand that there will be pond siting meetings that are open to the public to discuss the aspects of this project, and in particular, the drainage/pond design. We request to be notified on a timely basis so that we can plan to attend those meetings.

Thank you for your consideration on this. Please confirm that these comments are included as part of the public record and confirm receipt by May 3, 2018. I look forward to hearing back from you on these.

Mike Ray
Graves Brothers Company
2770 Indian River Blvd, Suite 201
Vero Beach, Fl. 32960
772-562-3886 ext 103
772-562-3565 (f)

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233

FDOT District 4 | **Public Hearing - April 24, 2018**

Name MARK J. SOLDANO	
Address 8675 90TH AVE 9015 87TH ST	
Phone (847) 671-2500	**Email** MJS2001@EARTHLINK.NET

Comment

BOTH ADDRESSES NEED ACCESS TO PUBLIC ROADS 9015 87TH ST IS SEPARATE LOT FROM 8675 90TH AVE 8675 90TH AV. WILL BE GETTING DRIVEWAY TO 510.

EACH PROPERTY NEEDS ACCESS TO ROADS SEPARATELY. BOTH DIRECTIONS MAY BECOME ISSUE.

For more information please contact:

Maria Formoso, P.E., P.M.P., Project Manager - FDOT District 4
3400 West Commercial Boulevard | Fort Lauderdale, Florida, 33309
(954) 777-4677 or Toll Free: (866) 336-8435, ext. 4677 | Maria.Formoso@dot.state.fl.us

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: John Walker

Address: 4536 61st Drive

Representing: Residents Replace Sewer Systems

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: Diane Stampine

Address: Barber Street

Representing:

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: TONY DUDLEY

Address: P. O. BX 700204 WABASSO, FL 32970

Representing: N/A

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: Johnny Earl Cartwright

Address: 8665 64 TH CT

Representing:

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: Ardra Rigby

Address: 8465 59th Avenue

Representing: West Wabasso Progressive Civic Club

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: RICH VOTAPKA

Address: 8405 75TH COURT, VERO BEACH, FL

Representing: SELF

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: Michael Abt

Address: 6780-85th St Vero Beach, FL. 32967

Representing:

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: Joseph Schulte

Address: 1717 Indian River Blvd Suite 201
Vero Beach FL 32960

Representing: Gannett Bros

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: GRAHAM COX

Address: 1213 GEORGE ST SEBASTIAN 772-388-5316

Representing: Self

SPEAKER CARD

FDOT

COUNTY ROAD (CR) 510 PD&E STUDY FROM CR 512 TO 58 AVENUE

Indian River County, Florida
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02; Efficient Transportation Decision Making (ETDM) No.: 14233

PUBLIC HEARING
Tuesday, April 24, 2018, 5:30 p.m.
North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

No.:

Name: CARLOS BALBE

Address: P.O. Box 70488, FORT LAUD. FL 33307

Representing: SELF

Public Involvement

FDOT has embarked on a public involvement program as part of this PD&E Study. The public has an important role in the project development and decision making of the study. A Project Kick-Off presentation to the Indian River County Metropolitan Planning Organization (MPO) served as the Project Kick-Off and was held on June 8, 2016, an Alternatives Public Workshop was held on October 11, 2016, and the Public Hearing is being held tonight, on April 24, 2018. In addition, presentations have been made to county officials, MPO committees, and neighborhood organizations along the study area.



WE VALUE YOUR INPUT!

We encourage you to participate in the CR 510 PD&E study and invite your questions and comments. You may submit your comments regarding the proposed improvements in one of the following ways:

- **Complete a "Speaker Card," available at the sign-in table, and make an oral statement during the public comment period of the Public Hearing**
- **Make an oral statement to the court reporter**
- **Complete a comment form and drop it in the comment box provided**
- **Mail your written comments to the address below**
- **Submit your comments on the study website (www.cr510project.com)**

All comments must be received or postmarked no later than May 4, 2018, to become part of the public hearing record.

Maria Formoso, P.E., P.M.P.
Project Manager
FDOT District 4
3400 West Commercial Blvd.
Fort Lauderdale, Florida 33309
(954) 777-4677 or Toll Free:
(866) 336-8435, ext. 4677
Maria.Formoso@dot.state.fl.us

FDOT is required to comply with various Non-discrimination laws and regulations, including Title VI of the Civil Rights Act of 1964

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status. Persons wishing to express their concerns about Title VI may do so by contacting either:

FDOT District Four Title VI Coordinator
Deb Ihsan
Title VI Program Office
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309-3421
(954) 777-4387
Deborah.Ihsan@dot.state.fl.us

FDOT Statewide Title VI Coordinator
Jacqueline Paramore
Equal Opportunity Office
605 Suwannee Street, MS 65
Tallahassee, Florida 32399-0450
(850) 414-4753
Jacqueline.Paramore@dot.state.fl.us

National Environmental Policy Act Assignment

"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 dated December 14, 2016 and executed by the Federal Highway Administration and FDOT."

Project Schedule

PROJECT DEVELOPMENT & ENVIRONMENT (PD&E) STUDY
On-going (Anticipated completion Fall 2018)

↓

DESIGN
2018-2019

↓

RIGHT OF WAY ACQUISITION
Funded 2021-2023

↓

CONSTRUCTION
Currently unfunded

County Road (CR) 510 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study, Indian River County
Federal Project Identification (FPID) No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233



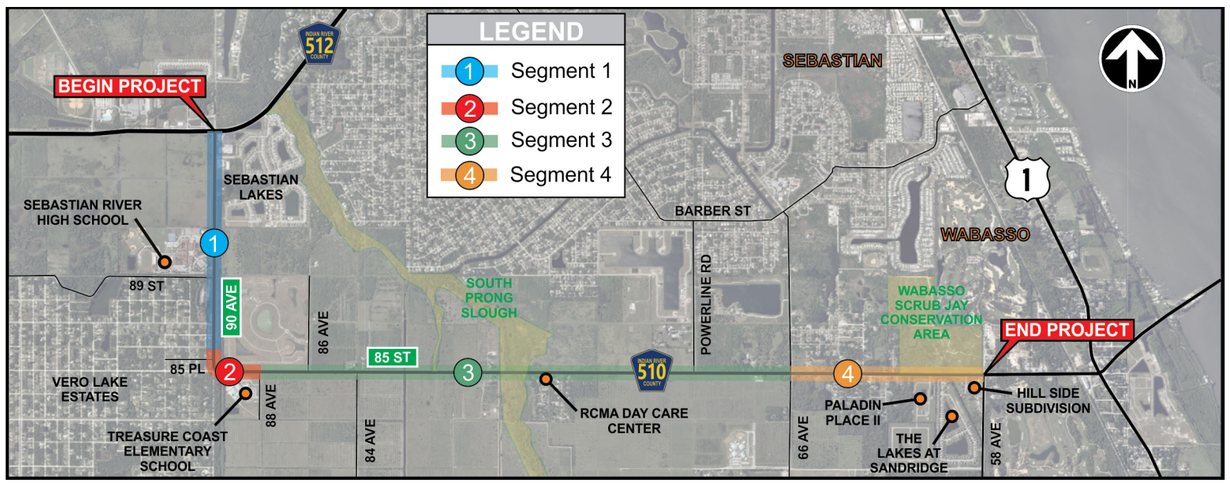
Florida Department of Transportation (FDOT) District Four **www.cr510project.com** **April 2018**

Public Hearing Handout

Date: Tuesday, April 24, 2018
Time: 5:30 p.m., Presentation at 6:00 p.m.
Location: North Indian River County Library - 1001 Sebastian Boulevard, Sebastian, FL 32958

The purpose of this public hearing is to give interested persons an opportunity to express their views concerning the location, conceptual design, and social, economic, and environmental effects of the proposed improvements for CR 510. The project consists of widening CR 510 from a 2-lane undivided roadway to a 4-lane divided roadway, improving geometry and incorporating multimodal features (sidewalks, bike lanes, etc.) along the CR 510 project corridor. The project is needed in order to accommodate the anticipated future traffic demand and maintain acceptable operating conditions, enhance regional mobility, improve safety and emergency evacuation times. Attendees may review study information and discuss the conceptual design alternatives with the study team.

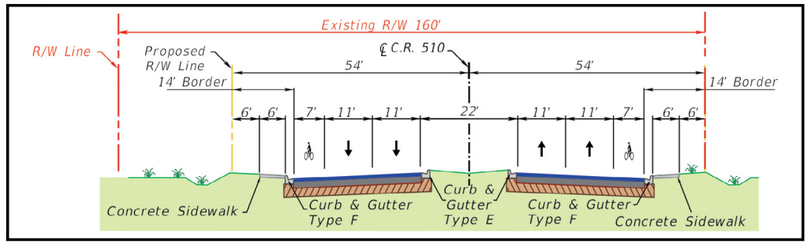
The hearing will begin as an open house at 5:30 p.m. followed by a formal presentation at 6 p.m., then a public comment period. Your comments and questions can also be received by mail, telephone and email using the contact information inside this publication. All formal comments received by May 4, 2018, become part of the public record.



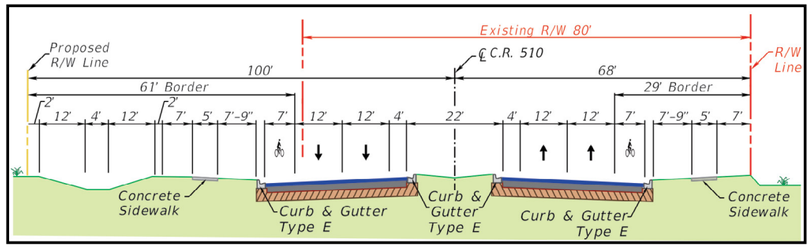
Recommended Alternative

A multi-phase alternative development, evaluation and selection process was employed to properly assess all alternatives considered for the proposed improvements of CR 510 within the project limits. This included the generation and evaluation of more than 12 typical section/alignment combinations. Important considerations such as traffic operations, right of way impacts, cost as well as impacts to the social, physical, and natural environment were carefully considered. Below is a description of the recommended alternative that resulted from the analysis.

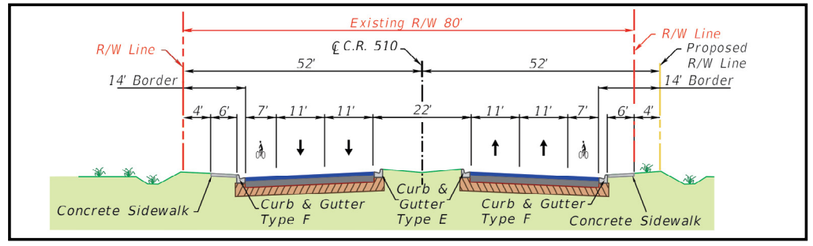
Segments 1 &2 from the CR 510/512 intersection to 88 Ave.



Segment 3 from 88 Ave. to 66 Ave.



Segment 4 from 66 Ave. to 58 Ave.



Segments 1 and 2: The recommended typical section features 11-foot travel lanes, 7-foot bicycle lanes, a 22-foot median, and 6-foot sidewalks.

Segment 3: The recommended typical section is a 4-lane sub-urban typical section with a design speed of 50 mph and a proposed right-of-way of 168 feet. This typical section features 12-foot travel lanes, 7-foot bicycle lanes, 4-foot inside shoulders and 5-foot sidewalks. Additionally, there is a 32-foot drainage easement along the north side of the roadway to treat offsite drainage impacted by the project. To minimize residential impacts and impacts to the South Prong Preserve, there are several shifts in the alignment of the proposed roadway.

Segment 4: The recommended typical section is a 4-lane urban typical section with a design speed of 45 mph and a proposed right-of-way of 104-feet.



The horizontal curve within segment 2 will be reconstructed to a 45-mph design speed to improve the roadway alignment and safety conditions.



Replacement of the traffic signal at the intersection of CR 510 and 66 Avenue with a roundabout. The roundabout conversion is anticipated to reduce delay by almost 50 percent and reduce crashes by more than 30 percent, as compared to a traffic signal.

Please visit the study website!

Information presented at the all public meetings held throughout the study is available on the study website. Official comments can also be submitted through the study website:

www.cr510project.com

Environmental Evaluations

The recommended alternative was evaluated in terms of its potential impacts to the natural, physical, cultural and social environments. No significant environmental impacts are anticipated. A Categorical Exclusion Type II Report, which summarizes the environmental impacts associated with the recommended alternative, was prepared and is available for review.

Natural Resources

- No adverse impacts to threatened/endangered species
  - Indirect impacts for the Florida Scrub-Jay. Proposed mitigation to be finalized in design.
- Minimal direct impacts anticipated to white shrimp essential fish habitat. Enhancements are proposed to habitat connectivity.
- Minimal impacts to potentially contaminated sites
- Floodplain encroachment is minimal
- Minimal impacts to prime or unique farmlands
- Minimal potential impacts to water quality



Cultural Resources

- No adverse impacts to archaeological or historical sites
- Enhancements proposed for the South Prong Preserve.

Socioeconomic

- Minimal socioeconomic impacts

Air Quality

- Air quality impacts are not expected to occur

Noise

- Minimal noise impacts
- Noise abatement is not anticipated to reduce noise impacts thus noise walls are not recommended


COUNTY ROAD 510 PD&E STUDY
WELCOME
TO THE
PUBLIC HEARING
FDOT


EXIT


B.Y.O.B.






COUNTY ROAD 510 PD&E STUDY



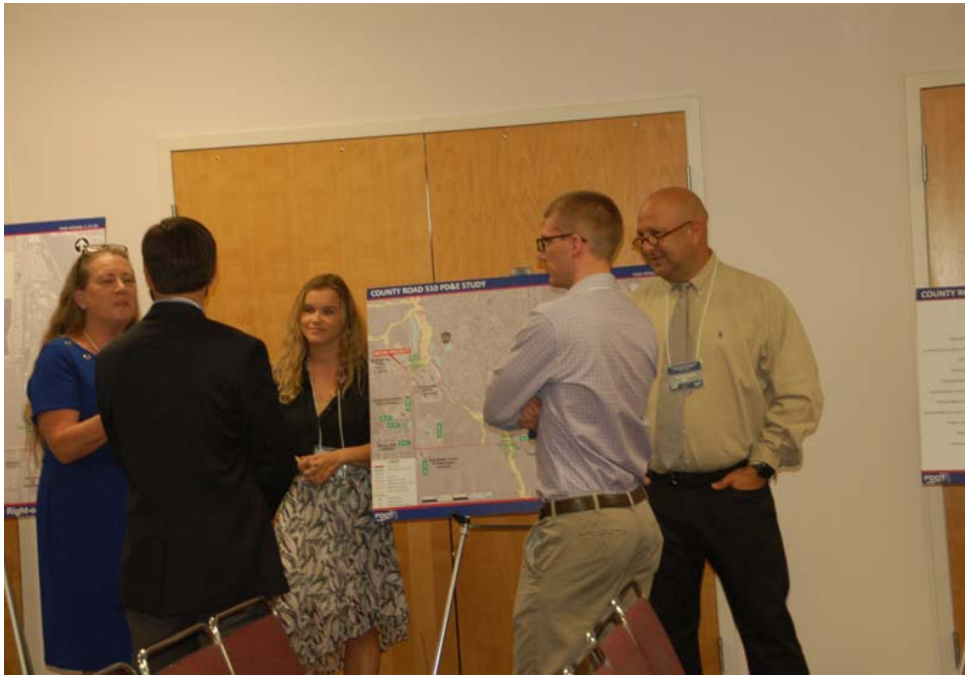



COMMENTS


COUNTY ROAD 510 PD&E STUDY


772-569-6680


EXIT


COUNTY ROAD 510 PD&E STUDY






District 4
Open House


FDOT
CR 510 PD&E Study
District 4
Presentation
Explain the project purpose and need
Study alternatives
Potential impacts (beneficial and adverse)
Proposed methods to mitigate adverse project impacts









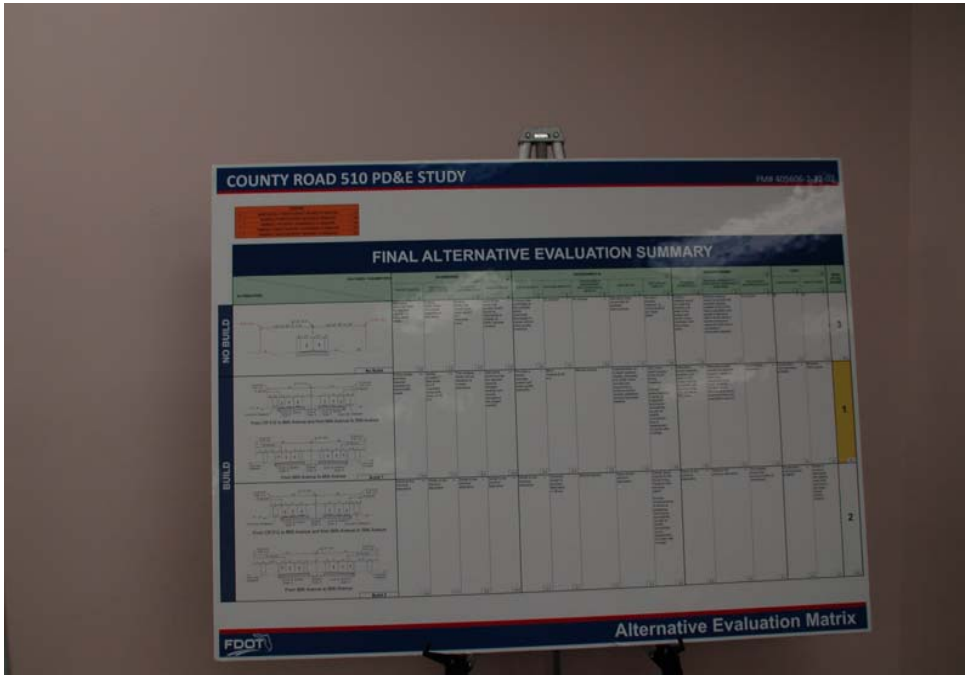




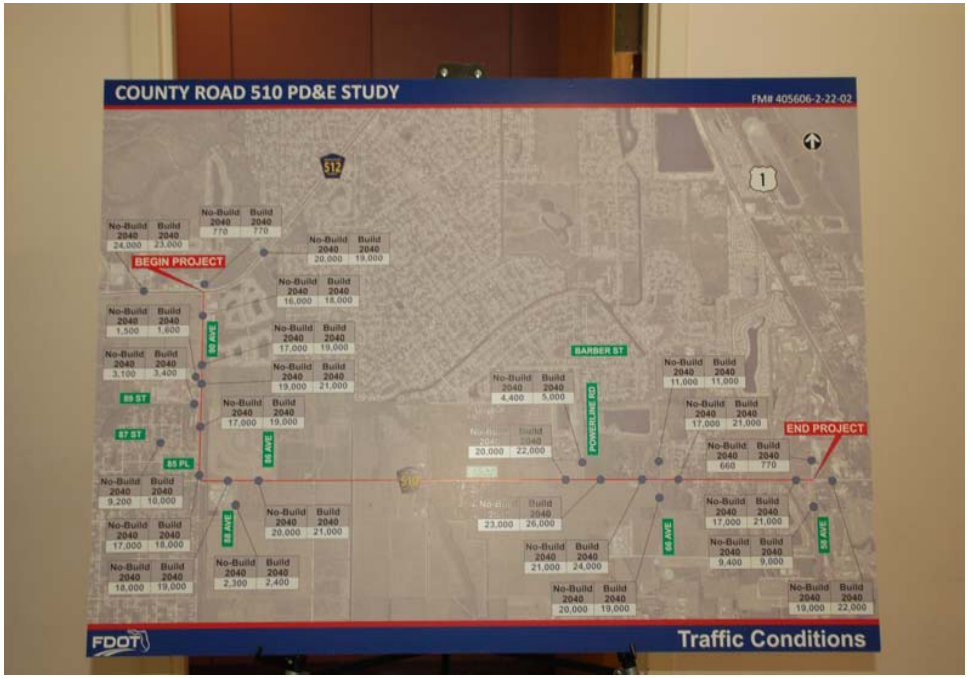





COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
SEBASTIAN
PELICAN ISLAND ELEMENTARY SCHOOL
PARK PLACE
INDIAN RIVER LAGOON
WABASSO
JOHN'S ISLAND CLUB
WABASSO CAUSEWAY
BEGIN PROJECT
END PROJECT
RCMA DAY CARE CENTER
LIBERTY MAGNET ELEMENTARY SCHOOL
ALLEN CHAPEL A.M.E. CHURCH
PALADIN PLACE II
HILL SIDE SUBDIVISION
THE LAKES AT SANDRIDGE
RED STICK GOLF CLUB
Project Location Map


COUNTY ROAD 510 PD&E STUDY
FINAL ALTERNATIVE EVALUATION SUMMARY
NO BUILD
BUILD
FDOT
Alternative Evaluation Matrix


COUNTY ROAD 510 PD&E STUDY
BEGIN PROJECT
SEBASTIAN RIVER MIDDLE SCHOOL
SEBASTIAN RIVER HIGH SCHOOL
SEBASTIAN RIVER LANDING
VERO LAKE ESTATES
TREASURE COAST ELEMENTARY SCHOOL
FDOT
Need

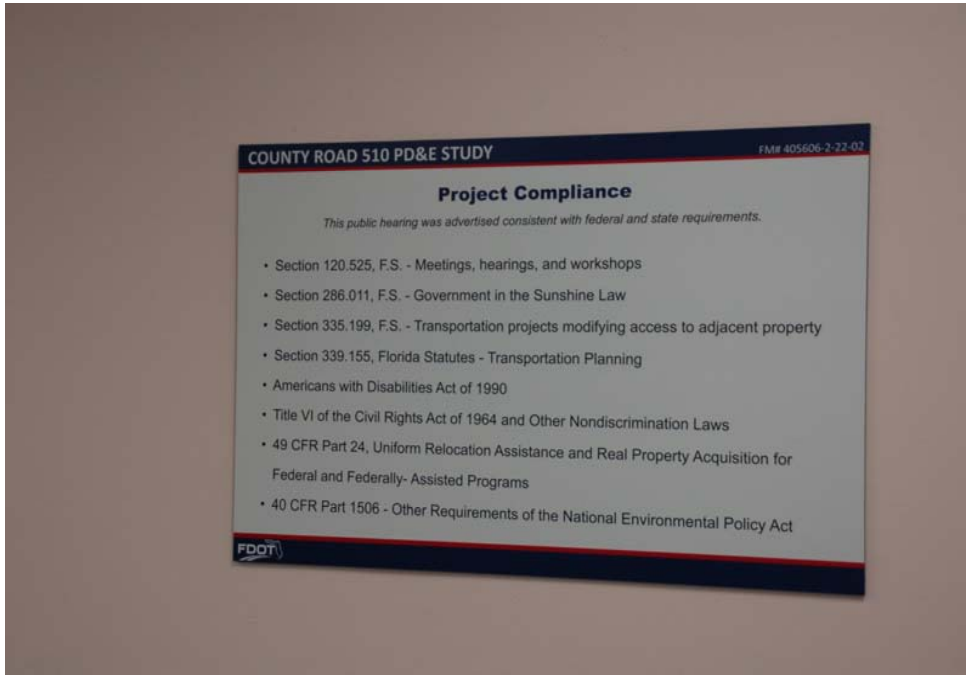

COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
BEGIN PROJECT
END PROJECT
BARBER ST
89 ST
87 ST
85 PL
POWERLINE RD
FDOT
Traffic Conditions


CR 510
66 AVE

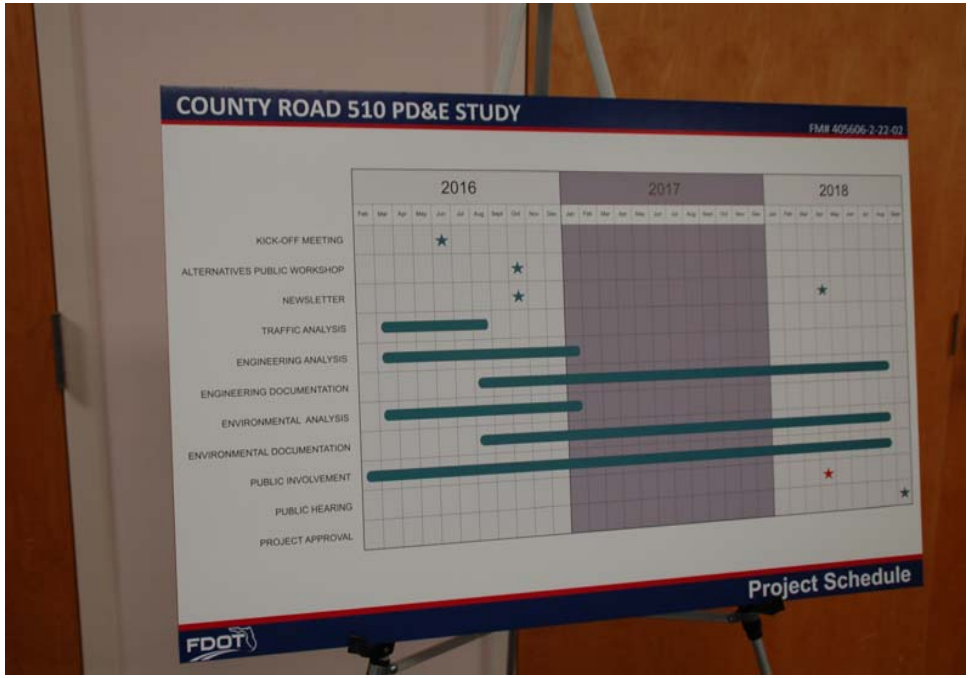

COUNTY ROAD 510 PD&E STUDY
BEGIN PROJECT
END PROJECT
SEBASTIAN
WABASSO
Environmental Concerns
FDOT

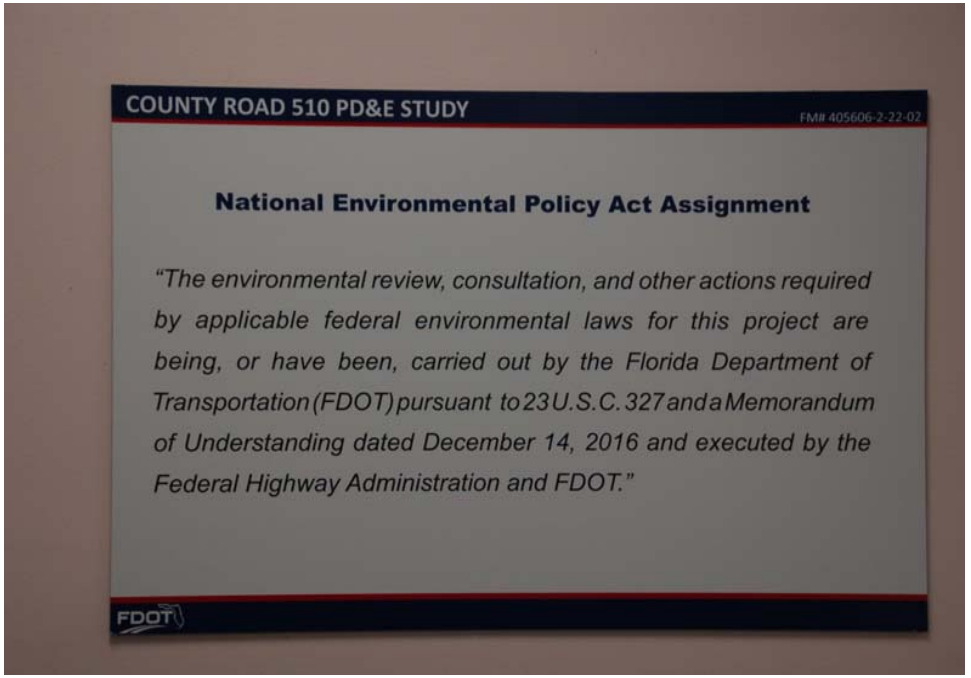



COUNTY ROAD 510 PD&E STUDY
BEGIN PROJECT
FDOT

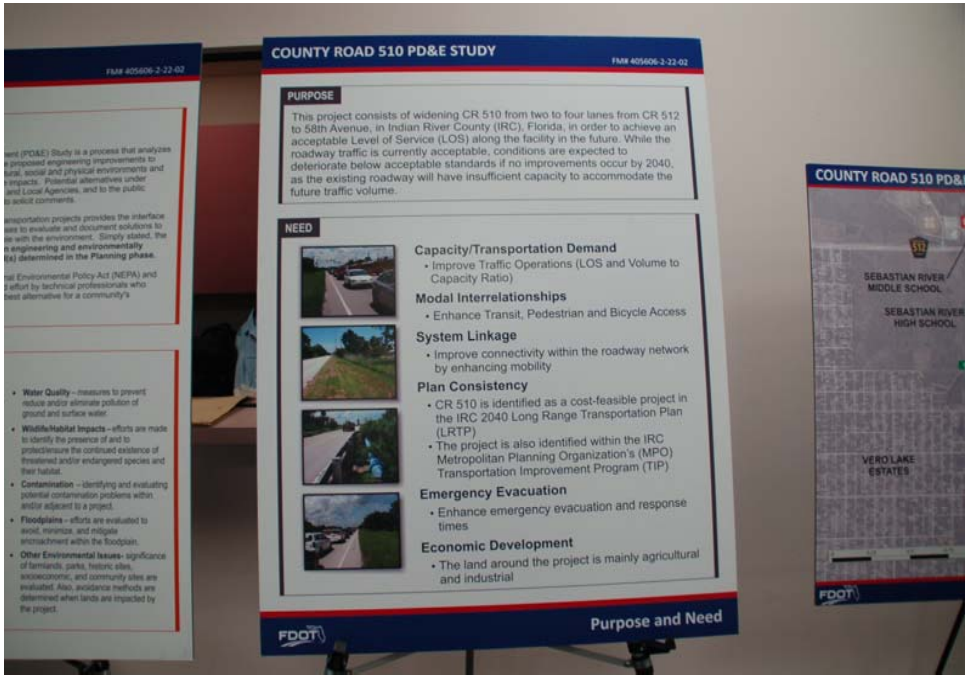

COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
Project Compliance
This public hearing was advertised consistent with federal and state requirements.
• Section 120.525, F.S. - Meetings, hearings, and workshops
• Section 286.011, F.S. - Government in the Sunshine Law
• Section 335.199, F.S. - Transportation projects modifying access to adjacent property
• Section 339.155, Florida Statutes - Transportation Planning
• Americans with Disabilities Act of 1990
• Title VI of the Civil Rights Act of 1964 and Other Nondiscrimination Laws
• 49 CFR Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally- Assisted Programs
• 40 CFR Part 1506 - Other Requirements of the National Environmental Policy Act
FDOT



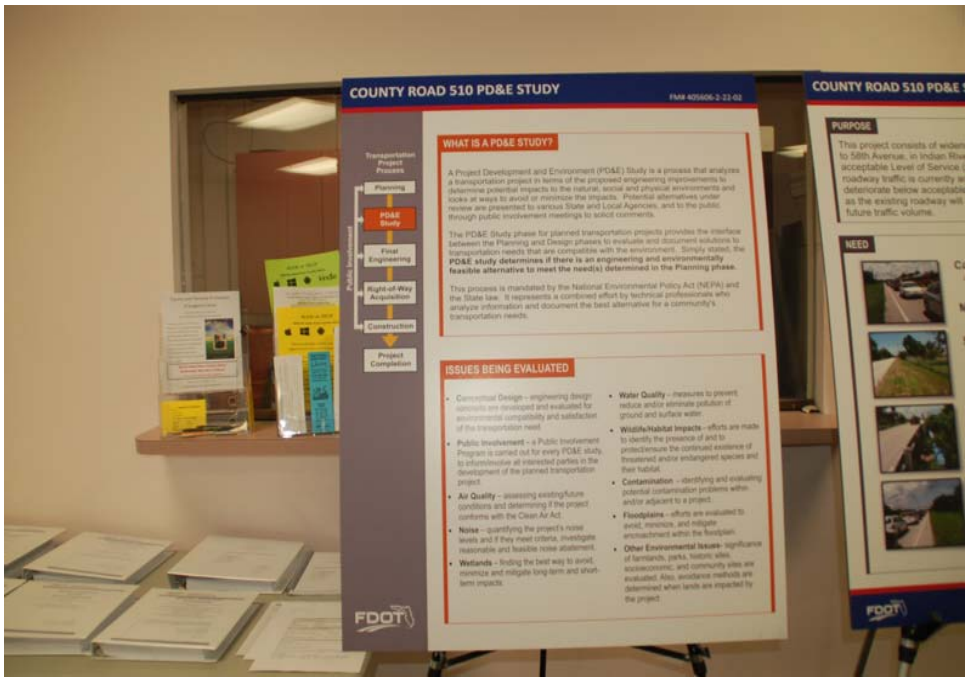

COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
2016
2017
2018
KICK-OFF MEETING
ALTERNATIVES PUBLIC WORKSHOP
NEWSLETTER
TRAFFIC ANALYSIS
ENGINEERING ANALYSIS
ENGINEERING DOCUMENTATION
ENVIRONMENTAL ANALYSIS
ENVIRONMENTAL DOCUMENTATION
PUBLIC INVOLVEMENT
PUBLIC HEARING
PROJECT APPROVAL
Project Schedule
FDOT


COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
National Environmental Policy Act Assignment
"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 dated December 14, 2016 and executed by the Federal Highway Administration and FDOT."
FDOT




COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
PURPOSE
This project consists of widening CR 510 from two to four lanes from CR 512 to 58th Avenue, in Indian River County (IRC), Florida, in order to achieve an acceptable Level of Service (LOS) along the facility in the future. While the roadway traffic is currently acceptable, conditions are expected to deteriorate below acceptable standards if no improvements occur by 2040, as the existing roadway will have insufficient capacity to accommodate the future traffic volume.
NEED
Capacity/Transportation Demand
• Improve Traffic Operations (LOS and Volume to Capacity Ratio)
Modal Interrelationships
• Enhance Transit, Pedestrian and Bicycle Access
System Linkage
• Improve connectivity within the roadway network by enhancing mobility
Plan Consistency
• CR 510 is identified as a cost-feasible project in the IRC 2040 Long Range Transportation Plan (LRTP)
• The project is also identified within the IRC Metropolitan Planning Organization's (MPO) Transportation Improvement Program (TIP)
Emergency Evacuation
• Enhance emergency evacuation and response times
Economic Development
• The land around the project is mainly agricultural and industrial
FDOT
Purpose and Need
COUNTY ROAD 510 PD&E
SEBASTIAN RIVER MIDDLE SCHOOL
SEBASTIAN RIVER HIGH SCHOOL
VERO LAKE ESTATES
FDOT


COUNTY ROAD 510 PD&E STUDY
National Environmental Policy Act Assignment
"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 dated December 14, 2016 and executed by the Federal Highway Administration and FDOT."
FDOT
COMMENTS


COUNTY ROAD 510 PD&E STUDY
FM# 405606-2-22-02
WHAT IS A PD&E STUDY?
Transportation Project Process
Planning
PD&E Study
Final Engineering
Right-of-Way Acquisition
Construction
Project Completion
Public Involvement
A Project Development and Environment (PD&E) Study is a process that analyzes a transportation project in terms of the proposed engineering improvements to determine potential impacts to the natural, social and physical environments and looks at ways to avoid or minimize the impacts. Potential alternatives under review are presented to various State and Local Agencies, and to the public through public involvement meetings to solicit comments.
The PD&E Study phase for planned transportation projects provides the interface between the Planning and Design phases to evaluate and document solutions to transportation needs that are compatible with the environment. Simply stated, the PD&E study determines if there is an engineering and environmentally feasible alternative to meet the need(s) determined in the Planning phase.
This process is mandated by the National Environmental Policy Act (NEPA) and the State law. It represents a combined effort by technical professionals who analyze information and document the best alternative for a community's transportation needs.
ISSUES BEING EVALUATED
Water Quality – measures to prevent reduce and/or eliminate pollution of ground and surface water.
Wildlife/Habitat Impacts – efforts are made to identify the presence of and to protect/ensure the continued existence of threatened and/or endangered species and their habitat.
Contamination – identifying and evaluating potential contamination problems within and/or adjacent to a project.
Floodplains – efforts are evaluated to avoid, minimize, and mitigate encroachment within the floodplain.
Other Environmental Issues- significance of farmlands, parks, historic sites, socioeconomic, and community sites are evaluated. Also, avoidance methods are determined when lands are impacted by the project.
FDOT
COUNTY ROAD 510 PD&E
PURPOSE
NEED
FDOT

Paid Advertisement

Simple 10-Second Fix Ends Snoring Forever

New low-cost device is clinically proven, painless and simple to use; gets FDA clearance for "reducing the incidence of snoring and treating obstructive sleep apnea"

By: L.M. Flick
Health News Syndicate

HNS – Imagine being able to sleep through the whole night in the same bed as your spouse...*without suffering through loud snoring!*

And what if the extra bedroom wasn't the only place you or your spouse could get real, uninterrupted sleep?

For millions of Americans who suffer from snoring, these seemingly small things haven't happened in years.

Until now that is...

A new device designed to end snoring and treat sleep apnea was recently released to the public. It's called the Snoring Reduction Device - Professional or "SRD-Pro".

Sales have skyrocketed as snorers (and/or their spouses) learn how quickly and easily they can solve this problem that's been plaguing them for years.

According the company's head of R&D, Micah Brown, "We discovered a way to stop snoring by finding a new method of keeping the airway open. The solution is beautifully simple, painless and easy to use. People get amazing results the first night they use the SRD-Pro."

He adds, "Snorers often try everything from head gear and mouth guards to expensive machines and surgery. The SRD-Pro is a monumental upgrade over those solutions that can be expensive, awkward and even painful."



Popular New Device Ends Snoring: The device is pictured above - it is low-cost, simple to use and has no negative side effects. Sales are soaring after Americans across the country discover how to quickly and easily end their snoring without surgery, machines or odd contraptions that rarely work. Clinical trials prove its effective for those who suffer from snoring and sleep apnea.

Simple Discovery Completely Transforms The Lives Of People Who Snore

Doctors have known for years that snoring is caused by an obstructed airway.

In fact, nearly all of the devices and remedies designed to stop snoring aim to open the airway in some form or fashion because this solves the problem.

However, researchers recently discovered a much easier way to keep the airway open - move the tongue forward.

Brown explains, "Sleep apnea and snoring are often the result of the airway being blocked by the tongue. It actually relaxes and falls backwards during sleep, which completely obstructs the airway, or blocks it enough to cause the noise we know as snoring."

He continued, "The SRD-Pro is a major breakthrough because it's the first device that can safely, comfortably and easily keep the tongue from falling backwards during sleep!"

His Wife Thought He Was Dead!

The first time Dave M. used the device, he didn't tell his wife. He describes it this way: "I stealthily slipped the device onto my tongue, and in only a few minutes I was asleep. I woke up the next morning surprisingly refreshed. It has been years since I felt this good. However, my wife said she didn't sleep very well because she thought either I wasn't sleeping so my snoring wouldn't keep her awake, *or I was dead!*"

Jaw-Dropping Clinical Proof That You Can Permanently End Your Snoring Problem

People underestimate how detrimental snoring can be to their health.

In fact, many of the health issues caused by snoring are the same as those associated with lack of sleep.

For example, sleep apnea alone has been shown to contribute to health issues ranging from impotence, memory loss and stroke...to diabetes, obesity and hypertension!

With stakes this high, it is vital to know your solution has been tested by experts and verified to work in a clinical environment.

The SRD-Pro meets this requirement. In fact, its performance has been verified through multiple clinical trials!

One study was conducted by top medical doctors and the results were published in the prestigious *Journal of Clinical Sleep Medicine*.

These doctors studied 84 patients who suffered from Obstructive Sleep Apnea. For those who used the device, sleep apnea symptoms were cut in half, and that the intensity of snoring decreased by an average of 70%!

Brown says, "The trials confirmed what we already knew - it's simple, and it works. That's why it's transforming people's lives and providing breakthroughs in their health and relationships!"

The Simple Way To Use It For Powerful Results

The device has been professionally designed to work for everyone.

You simply slide your tongue inside of it and lightly squeeze down. This creates a gentle seal, which holds your tongue forward while you sleep.

As a result, your tongue can't collapse back into your throat, which means there's no obstructed airway. When the airway is open, the throat and mouth tissues can't vibrate together to make the snoring sound.

The quality of the device is evident the first time you touch it. It's made of medical grade, BPA-free silicone. The "one size fits all" design does not require molding or cause jaw pain.

The SRD-Pro also works great for people who have dentures, partials or implants.

Even Top Doctors & Dentists Are Endorsing The SRD-Pro

The new device has caught the attention of the medical community, and doctors and dentists across the country are now recommending the SRD-Pro to patients.

Top Boston physician, Dr. Sunny Kumar, says, "People are always asking me if there is anything that can help them stop snoring. Until now, there wasn't a solution I could confidently recommend. The SRD-Pro is a breakthrough...beautifully simple and effective."

Dr. Joshua Bevans, DDS, says, "Before people spend $1,000's of dollars on sleep studies, machines or odd contraptions, I strongly recommend they try the SRD-Pro. It's safe, easy to use and very effective."

"Snoring can cause major relationship and intimacy challenges. The SRD-Pro can be the breakthrough couples need to peacefully sleep in the same bed. I'm all for it!" added Dr. J. Moss.

How To Get The SRD-Pro Anti-Snoring Device

Today marks the official nationwide release of the SRD-Pro to the public. As such, the company is offering a special discounted supply to everyone who calls within the next 48 hours.

A Regional Order Hotline has been set up for local readers to call. This gives everyone an equal chance to try the SRD-Pro.

Starting at 6:00 am today the order hotline will be open for 48 hours. All you have to do is call **TOLL FREE 1-888-706-6681** and provide the operator with the special discount approval code: SRD18. The company will do the rest.

Important: Due to SRD-Pro's substantial media attention, phone lines will be very busy. If you call and do not immediately get through, please be patient and call back. Those who miss the 48-hour deadline may have to pay full price for the SRD-Pro.

10-Second Snore Test Shows How The SRD-Pro Stops Snoring

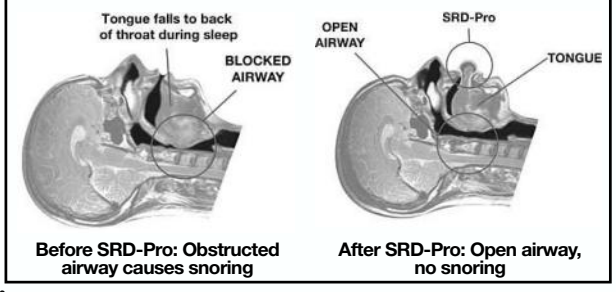
Take a few seconds to do the following at-home exercise:

Step 1. Make a snoring noise by breathing forcefully in through your nose (even non-snorers can do this).

Step 2. Stick out your tongue as far as it will go and try to make the same noise.

Result: You can't do it! It's impossible for 99% of the population to make the snoring noise with their tongue sticking out.

The MRI images below show exactly how the SRD Pro works - it comfortably positions the tongue just forward enough to keep the airway open so you can't snore.



Before SRD-Pro: Obstructed airway causes snoring

After SRD-Pro: Open airway, no snoring

THESE STATEMENTS HAVE NOT BEEN EVALUATED BY THE FOOD AND DRUG ADMINISTRATION. THIS PRODUCT IS NOT INTENDED TO DIAGNOSE, TREAT, CURE OR PREVENT ANY DISEASE. ALL DOCTORS MENTIONED ARE REMUNERATED FOR THEIR SERVICES. ALL CLINICAL STUDIES ON THE SRD-PRO DEVICE WERE INDEPENDENTLY CONDUCTED AND WERE NOT SPONSORED BY THE MAKERS OF THE SRD-PRO.

TR-1965806

Christian Science Church to host question and answer forum

As a result of so many inquiries, the Christian Science Church will hold a free, open forum to answer questions about Christian Science in our Reading Room on Saturday, April 7th from 10-11 a.m.

Are you struggling with unresolved questions about life? Are you looking for a spiritual viewpoint? Are you at a standstill of depression and lost hope? Are you curious about Christian Science treatment? Then plan to attend this casual, informal forum. Hosting the forum will be Martha Lemasters, writer on behalf of the church for the Newsweekly Community Forum column. Also on hand will be John Q. Adams, a teacher and former lecturer and his wife, Marivic, director of High Ridge House, a Christian Science nursing facility.

Location: First Church of Christ, Scientist, 1602 23rd Street, Vero Beach 32960. To register, call 567-3656, or 562-3502. Refreshments will be served.

TR-SCN0002914-01

PUBLIC HEARING

PROJECT DEVELOPMENT & ENVIRONMENT (PD&E) STUDY
Country Road (CR) 510
From CR 512 to 58th Avenue
Indian River County, Florida
Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No: 14233

The Florida Department of Transportation (FDOT), District Four, will conduct a Public Hearing regarding the Project Development and Environment (PD&E) Study of CR 510 in Indian River County, Florida. **The Public Hearing will be held on Tuesday, April 24, 2018, starting with an open house at 5:30 p.m.**, at the **North Indian River County Library, 1001 Sebastian Boulevard, Sebastian, Florida 32958. A formal presentation will begin at 6:00 p.m., followed by a comment period.**

The Public Hearing is being conducted to give interested persons an opportunity to express their views concerning the location, conceptual design, and social, economic, and environmental effect of the proposed improvements.

Draft project documents will be available for public review from Tuesday, April 3, 2018 to Friday, May 4, 2018 at the following locations:



- Sebastian City Hall
  1225 Main Street
  Sebastian, Florida 32958
  Tel: (772)-589-5330
  Monday – Friday
  8:00 a.m. to 4:30 p.m.

- North Indian River County Library
  1001 Sebastian Boulevard
  Sebastian, Florida 32958
  Tel: (772) 589-1355
  Monday – Wednesday
  10:00 a.m. to 8:00 p.m.
  Thursday and Friday
  10:00 a.m. to 5:00 p.m.
  Saturday
  10:00 a.m. to 4:00 p.m.

Draft documents will also be available on the project's website www.cr510project.com and on display at the Public Hearing. Persons wishing to submit written statements or other exhibits, in place of or in addition to oral statements, may do so at the hearing or by sending them to Maria Formoso, P.E., P.M.P., at the contact information below. All exhibits or statements postmarked on or before May 4, 2018, will become part of the public hearing record.

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 FDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 14, 2016 and executed by the Federal Highway Administration (FHWA) and FDOT.

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status. Persons who require special accommodations under the Americans with Disabilities Act (ADA) or who require translation services (free of charge) should contact Maria Formoso, PE, P.M.P., Project Manager, at least seven (7) days prior to the Public Hearing.

Contact information:
Maria Formoso, P.E., P.M.P., FDOT Project Manager
3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309
Telephone: (954) 777-4677 or toll free at (866) 336-8435, ext. 4677
E-mail: Maria.Formoso@dot.state.fl.us.
Project Website:
www.cr510project.com

PUBLIC HEARING

FDOT

DATE: Tuesday, April 24, 2018
TIME: Open House 5:30 p.m., Presentation 6:00 p.m.
PLACE: North Indian River County Library
1001 Sebastian Boulevard
Sebastian, Florida 32958

FLORIDA DEPARTMENT OF TRANSPORTATION

April 4 & 15, 2018 TCN-1972285

Deported veteran becomes US citizen after Calif. pardon

Former soldier formed advocacy group in Mexico

Elliot Spagat
ASSOCIATED PRESS

SAN DIEGO – A decorated former U.S. Army paratrooper whose work on behalf of deported veterans drew widespread attention to his cause became a U.S. citizen Friday, giving immigration advocates a rare reason to celebrate.

Hector Barajas, who was deported to Mexico in 2010, beamed after taking his citizenship oath in a small, private ceremony at a government office in San Diego in full military uniform.

"I get to live the American Dream for a second time," he said, holding a small American flag at a jubilant news conference.

Barajas founded the Deported Veterans Support Home in the Mexican border city of Tijuana, providing shelter and other services. Extensive media coverage, support from members of Congress and the American Civil Liberties Union's involvement raised his profile.

Barajas got his break last year when California Gov. Jerry Brown pardoned a 2002 conviction for shooting at an occupied vehicle. Brown cited Barajas' military service and advocacy work.

U.S. Citizenship and Immigration Services told him in March that he was granted citizenship.

Hours before Barajas took his oath President Donald Trump tweeted about plans for a border wall with Mexico and a crackdown on so-called sanctuary cities. A surge of deportation arrests and sweeping policy changes have stung advocates of more open immigration policies.

Nathan Fletcher, a Marine combat veteran and chairman of the advocacy group Honorably Discharged, Dishonorably Discarded, said Trump's tweet started the day with "division and conflict and tearing families apart" and ended with Barajas taking his oath.

"It's a tremendous contrast of what can happen and what should happen and it shows that injustice can be overcome," Fletcher said alongside Barajas.

Barajas came to the United States from Mexico when he was 7 years old and obtained a green card through family ties. After graduating from high school, he served in the U.S. Army from 1995 to 2001, when he was honorably discharged, according to his federal lawsuit filed in December seeking citizenship.

He was a member of the 82nd Airborne Division and received several military accolades.

After serving prison time for his felony conviction, he was deported in 2004 to Mexico, lacking fluency in Spanish and struggling to find work, according to the lawsuit. He returned to the United States and was deported again in 2010 after police stopped him for a traffic infraction.

Green card holders who serve honorably in the military are eligible for citizenship, if they don't commit crime and meet other requirements. James Erselius, Barajas' attorney, said getting deported for a crime is typically a bar on citizenship.

Barajas, who served two years in prison, said he regretted his actions but that he "was no less of an American because of the mistakes that I've made."

He said he planned to stay at the Tijuana shelter for a year before returning to Los Angeles to find a job and maybe go to school.

The ACLU said Barajas is the second deported veteran pardoned by Brown to be allowed to return to the United States. It estimates there are hundreds, perhaps thousands, of other veterans who were deported from the U.S.



Hector Barajas speaks to the media after becoming a U.S. citizen Friday in San Diego. ALEJANDRO TAMAYO/THE SAN DIEGO UNION-TRIBUNE VIA AP

Cromer & Cairns
DENTAL

Family owned and operated for over 25 years.

Cosmetic Dentistry · Dental Implants · Walk-Ins Welcome
General Dentistry · Gum Surgery · Financing Available

DENTAL LAB ON PREMISES

$79 NEW PATIENT SPECIAL
*Cleaning, Comprehensive Exam & X-rays
*Not to be used with other offers or reduced fee plans. X-rays non-transferable. (D0150) (D1110) (D0210) (D0330)



Call 772-562-5051
CromerAndCairnsDental.com

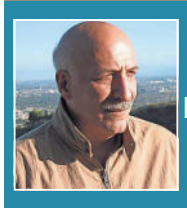
The patient and any other person responsible for payment has a right to refuse to pay, cancel payment, or be reimbursed for payment for any other service, examination, or treatment that is performed as a result of and within 72 hours of responding to the advertisement for the free, discounted fee, or reduced fee service, examination, or treatment.



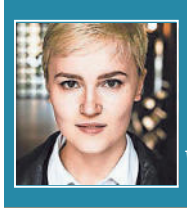
Julie A.Cromer, DDS · John S.Cairns, DDS

1225 US Highway 1 • Vero Beach, Florida 32960 • Next to Publix/Stein Mart

VERO BEACH **BOOK CENTER**



MONDAY, APRIL 16TH AT 11 AM
PETER GOLDEN *presents* **NOTHING IS FORGOTTEN**
A Novel *Atria Books/Simon and Schuster*



THURSDAY, APRIL 19TH AT 7 PM
OWN YOUR FATE *Tour with* **VERONICA ROTH**
Purchase of **THE FATES DIVIDE** *serves as admission to the event!*
Veronica Roth tickets are available at our check-out counter or 772.569.2050



MONDAY, APRIL 23RD AT 6 PM
DAVID BALDACCI *presents* **THE FALLEN**
An Amos Decker Novel *Grand Central Publishing*
(autograph line tickets with book purchase)

Vero Beach Book Center
392 21st Street (Miracle Mile)
772-569-2050
www.verobeachbookcenter.com

Thank You For Being Part Of Our Story

VERO RENAL
Serving Vero Beach Area Since 2004



Richard Handler, M.D.
Ana Taveras, M.D.
Cristina Badescu, M.D.

Specializing in
HYPERTENSION AND KIDNEY DISEASE.

BOARD CERTIFIED NEPHROLOGISTS

777 37th Street, Ste. C-107, Vero Beach, FL 32960
772-562-3234 verorenal.com

TR-SCN0002244-02

PUBLIC HEARING

PROJECT DEVELOPMENT & ENVIRONMENT (PD&E) STUDY
Country Road (CR) 510
From CR 512 to 58th Avenue
Indian River County, Florida
Financial Management Number: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No: 14233

The Florida Department of Transportation (FDOT), District Four, will conduct a Public Hearing regarding the Project Development and Environment (PD&E) Study of CR 510 in Indian River County, Florida. **The Public Hearing will be held on Tuesday, April 24, 2018, starting with an open house at 5:30 p.m.**, at the **North Indian River County Library, 1001 Sebastian Boulevard, Sebastian, Florida 32958. A formal presentation will begin at 6:00 p.m., followed by a comment period.**

The Public Hearing is being conducted to give interested persons an opportunity to express their views concerning the location, conceptual design, and social, economic, and environmental effect of the proposed improvements.

Draft project documents will be available for public review from Tuesday, April 3, 2018 to Friday, May 4, 2018 at the following locations:



- Sebastian City Hall
  1225 Main Street
  Sebastian, Florida 32958
  Tel: (772)-589-5330
  Monday – Friday
  8:00 a.m. to 4:30 p.m.
- North Indian River County Library
  1001 Sebastian Boulevard
  Sebastian, Florida 32958
  Tel: (772) 589-1355
  Monday – Wednesday
  10:00 a.m. to 8:00 p.m.
  Thursday and Friday
  10:00 a.m. to 5:00 p.m.
  Saturday
  10:00 a.m. to 4:00 p.m.

Draft documents will also be available on the project's website www.cr510project.com and on display at the Public Hearing. Persons wishing to submit written statements or other exhibits, in place of or in addition to oral statements, may do so at the hearing or by sending them to Maria Formoso, P.E., P.M.P., at the contact information below. All exhibits or statements postmarked on or before May 4, 2018, will become part of the public hearing record.

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 FDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 14, 2016 and executed by the Federal Highway Administration (FHWA) and FDOT.

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status. Persons who require special accommodations under the Americans with Disabilities Act (ADA) or who require translation services (free of charge) should contact Maria Formoso, PE, P.M.P., Project Manager, at least seven (7) days prior to the Public Hearing.

Contact information:
Maria Formoso, P.E., P.M.P., FDOT Project Manager
3400 West Commercial Boulevard, Fort Lauderdale, Florida 33309
Telephone: (954) 777-4677 or toll free at (866) 336-8435, ext. 4677
E-mail: Maria.Formoso@dot.state.fl.us.
Project Website:
www.cr510project.com

FDOT

PUBLIC HEARING

DATE: Tuesday, April 24, 2018
TIME: Open House 5:30 p.m., Presentation 6:00 p.m.
PLACE: North Indian River County Library
1001 Sebastian Boulevard
Sebastian, Florida 32958

FLORIDA DEPARTMENT OF TRANSPORTATION

April 4 & 15, 2018 TCN-1972285

County Road (CR) 15 PD&E Study
Indian River County, Florida

From CR 512 to 58 Avenue
Project Development & Environment (PD&E) Study
Indian River County

Federal Project Identification (FPID)
No.: 405606-2-22-02

Efficient Transportation Decision Making (ETDM)
No.: 14233

DATE: Tuesday, April 24, 2018

TIME: 5:30 p.m.

LOCATION: North Indian River County Library
1001 Sebastian Boulevard,
Sebastian, Florida 32958

PRESENT FOR FDOT:

Ann Broadwell, Environmental Administrator
Maria Formoso, P.E., P.M.P., Project Manager
FDOT District 4
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309
(954) 777-4677

PRESENT FOR METRIC ENGINEERING:

Carlos D. Rodriguez, P.E.
Transportation Planning Manager
13940 Southwest 136 Street, Suite 200
Miami, Florida 33186
(305) 235-5098

COURT REPORTER:

Tami Moore, Professional Court Reporter
Atlantic Reporting/Litigation Services
55 Southeast Osceola Street, Suite 201
Stuart, Florida 34994
800-336-0050

0ef1ef4d-251d-4da6-9456-ff0a477d478c

* * * * *

MS. BROADWELL: Good evening. We're getting our electronics all worked out here.

Thank you for joining us tonight. This is the Florida Department of Transportation Public Hearing for the County Road 510 Project Development and Environment Study. It goes from County Road 512 to 58th Avenue here in Indian River County.

My name is Ann Broadwell. I'm the Environmental Administrator for District 4, Florida Department of Transportation.

The proposed improvement involves adding two lanes to the existing two-lane roadway and also including bike lanes and sidewalks. This hearing is being held to provide you with the opportunity to comment on this project.

Here with me tonight is Maria Formosa. She's the Florida Department of Transportation Project Manager, and she will be the project manager for the portion that's going into the design phase.

And this is Carlos Rodriguez. He is the Consultant Project Manager from Metric Engineering who spends a lot time up here in Indian River County with the community and with Maria and developed the documents and the engineering plans

0ef1ef4d-251d-4da6-9456-ff0a477d478c

that you see on the back wall tonight.

At this time we would like to recognize any federal, state, county, or city officials who may be present. I have a list of a few of you. We have Rich Szpyrka, the Public Works Directer for Indian River County, here in the back room. We have Phil Matson, the MPO Director, in the back of the room; Joe Flescher, County Commissioner, was here -- is still here, in the back of the room. We also have Lisa Frazier, the City of Sebastian Community Development. Okay, Director. I didn't get that written there. Thank you. And we also have a Legislative Aide for Representative Aaron Bruhl, Edward Barenborg, is here in the back of the room.

So we will now begin the presentation.

(Whereupon, the video and audio presentation was played as follows:)

This public hearing is for Financial Management Project Number 405606-2-22-02 and Efficient Transportation Decision Making (ETDM) Number 14233. This environmental study has been conducted by FDOT District 4 in compliance with all applicable federal environment laws and pursuant to 23 U.S. Code 327 and the implementing MOU between

0ef1ef4d-251d-4da6-9456-ff0a477d478c

FDOT and FHWA signed on December 14, 2016; the FDOT Office of Environmental Management in Tallahassee is the approving authority.

The purpose of this public hearing is to share information with the general public about the proposed improvement; it's conceptual design; all alternatives under study; and the potential beneficial and adverse social, economic, and environment impacts upon the community. The public hearing also serves as an official forum providing an opportunity for members of the public to express their opinions regarding the project. Public participation at this hearing is encouraged and solicited without regard to race, color, national origin, age, sex, religion, disability, or family status.

This public hearing was advertised consistent with federal and state requirements on display at this hearing. Persons wishing to express their concerns about Title VI may do so by contacting either the Florida Department of Transportation, District 4 Office, or the Tallahassee office of the Florida Department of Transportation. This contact information is also provided in the project brochure and on a sign displayed at this hearing.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

There are three primary components to tonight's hearing: First, the open house, which occurred prior to this presentation, where you were invited to view the project displays and to speak directly with the project team and provide your comments in writing or to the court reporter; second, this presentation, which will explain the project purpose and need, study alternatives, potential impacts, both beneficial and adverse, and proposed methods to mitigate adverse project impacts; and third, a formal comment period following this presentation, where you will have the opportunity to provide oral statements at the microphone or you may provide your comments directly to the court reporter or in writing.

A Project Development and Environment Study, or PD&E, determines if there is an engineering and environmentally feasible alternative to meet the transportation needs of the corridor.

This process is mandated by the National Environmental Policy Act (or Nee-Pah), Federal and State law. It represents a combined effort by technical professionals who analyze information and document the best alternative for a community's transportation needs.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

A PD&E study has three main components: An Engineering component which entails the identification and analysis of potential design solutions; an Environmental component to evaluate potential impacts to the natural, social, and physical environments; and a Public involvement component to inform and involve all interested parties in the development of the planned transportation project.

The project extends approximately 5.27 miles from County Road 512 (Sebastian Boulevard) to 58th Avenue in the Wabasso Community. County Road 510 is the main connector facility from County Road 512 to State Road A1A on the barrier island and provides additional linkage between I-95 on the west and US-1 on the east.

The project is consistent with local and regional plans, including the Indian River County Metropolitan Planning Organization (MPO), Transportation Improvement Program, and Long Range Transportation Plan as well as the FDOT State Transportation Improvement Program.

This project was identified as one of the highest priority projects in the MPO 2017 Priority Projects Report. The MPO works with the FDOT and

0ef1ef4d-251d-4da6-9456-ff0a477d478c

local governments to fund and implement critical projects.

Widening of the project corridor is needed in order to accommodate the anticipated future traffic demand and maintain acceptable operating conditions. County Road 510 is designated as a primary truck route and as an emergency evacuation route. The project will increase the number of residents from the coastal communities of eastern Indian River County that can be evacuated during an emergency event.

Within the limits of the study, County Road 510 is generally classified as an undivided urban principal arterial. The existing facility features two 12-foot lanes with a posted speed varying from 20 to 55 miles per hour. The existing right-of-way varies from 80 feet to 160 feet.

The engineering analysis included a traffic and safety analysis, analysis of the existing roadway, and alternative development and evaluation. A "No Build" alternative, several Transportation System Management & Operations, or TSM&O, Improvements, and multiple distinct build alternatives were developed. Neither the "No Build" option, which maintains the existing

0ef1ef4d-251d-4da6-9456-ff0a477d478c

facilities "as is" or the TSM&O alternatives, which entail minor improvements, such as improving signage and/or providing operational improvements, would effectively address safety and capacity needs associated with the corridor.

A comprehensive traffic analysis was performed in order to develop design alternatives that would efficiently accommodate traffic volumes that are projected to occur in 2040, the design year.

The results of the future traffic analysis indicate that in order for County Road 510 to properly accommodate projected 2040 traffic volumes, the existing two-lane facility would have to be widened to four lanes.

In order to perform a comprehensive analysis, the project was divided into four distinct segments. Each segment has rather unique characteristics as well as potential differences in right-of-way, operational, and geometric features. This allowed for the development of alternatives unique to each segment.

Eight typical section options ranging in design from the most ample suburban sections to the most restrictive urban sections were initially developed and evaluated. The results indicate that

0ef1ef4d-251d-4da6-9456-ff0a477d478c

one divided suburban typical section with design speed of 50 miles per hour and one divided urban typical section with design speed of 45 miles per hour are the most suitable options.

In order to determine the alternative that will most adequately meet the needs of the project, a comprehensive typical section and alignment evaluation utilizing numerical/descriptive matrix approach was used. Important considerations such as traffic service, right-of-way impacts, cost, as well as impacts to the social, physical, and natural environment were carefully considered. The results indicate that the following alternative within each segment offers the best potential to address the project's purpose and need while minimizing right-of-way impacts.

Within Segment 1, from the County Road 510/512 intersection to 87th Street, the recommended typical section is Typical Section E with east alignment, which is comprised of an urban 108-foot footprint with a 22-foot median, two 11-foot travel lanes each way, 7-foot bicycle lanes, and 6-foot sidewalks

Similar to Segment 1, the recommended typical section within Segment 2, from 87th Street to just

0ef1ef4d-251d-4da6-9456-ff0a477d478c

west of 86th Avenue, is Typical Section E with east alignment. This urban typical section features are the same as the previous segment.

Additionally, the recommended alternative includes realignment of the existing 20-mile-per-hour curve to provide a 45-mile-per-hour design speed and improve safety conditions. After coordination with local governments, it has been recommended to remove the existing County Road 510 and the existing bridge over Lateral Canal D.

All access to Vero Lake Estates will be through the signal at 87th Street. Existing County Road 510 will be maintained between 86th Street and 85th Place in order to maintain access to the residences directly abutting County Road 510.

The Right-Of-Way for the curve was previously dedicated to the County by the owner of the property on the northwest quadrant. Thus, no right-of-way acquisition is required as a result of the new alignment for the curve.

Within Segment 3, from just west of 88th Avenue to 66th Avenue, the recommended typical section is Typical Section A with a center alignment from 82nd Avenue to the South Prong

0ef1ef4d-251d-4da6-9456-ff0a477d478c

Preserve, and Typical Section A with a north alignment from the South Prong Preserve to 66th Avenue. This high-speed sub-urban typical section features a 22-foot median, two 12-foot travel lanes in each direction, 7-foot bicycle lanes, and a 29-foot border width.

As part of this PD&E study, a roundabout screening analysis was performed for all intersections along the County Road 510 project corridor. The results of the analysis indicate a roundabout at the intersection of County Road 510 and 66th Avenue is recommended and results in significant benefits from a safety, geometric, and operational standpoint.

Finally, along Segment 4, the recommended alternative is Typical Section E with a north alignment in order to avoid impacts to businesses from Powerline Road/66th Avenue to 61st Drive and Typical Section E with a south alignment in order to avoid impacts to the Wabasso Scrub Conservation Area from 61st Drive to 58th Avenue. This urban typical section has a 104-foot footprint with a 22-foot median, two 11-foot travel lanes in each direction, 7-foot bicycle lanes, and 6-foot sidewalks.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

Access Management is the practice of managing the location, number, and spacing of driveway connections, median openings, and traffic signals. The evaluation and implementation of proper access management techniques can result in improved movement of traffic, fewer vehicle conflicts, and reduced crashes. After a comprehensive analysis, it was determined that the most effective typical section includes the provision of a 22-foot raised median along County Road 510. With a raised median, full and directional median openings are recommended at different locations along the corridor. All proposed median openings are displayed on the aerials available here tonight and follow the access management standards for an access Class 5 facility.

A Preliminary Drainage analysis was prepared to determine the type and potential locations for the proposed ponds that will manage the stormwater runoff from the proposed improvements. County Road 510 was divided into ten distinct drainage basins. The analysis identified various potential pond alternatives that will be further analyzed during the design phase to select one recommended pond per basin. Additionally, an offsite ditch or pipe

0ef1ef4d-251d-4da6-9456-ff0a477d478c

system will be required to the north of County Road 510 to replace the existing ditch that will be impacted by the project.

The recommended alternative was evaluated in terms of its impacts to the social, natural, and physical environments. A Categorical Exclusion Type II Report, which summarizes the environmental impacts associated with the recommended alternative, was prepared and is available for review. No significant impacts are anticipated to any environmental resources.

Section 4(f) protects historic resources as well as publicly-owned recreation lands from development for transportation uses. Desktop and field investigations for historic and recreational resources in the area revealed that the Ansin Tract, the South Prong Preserve, and the Wabasso Scrub Conservation Area are all eligible recreation Section 4(f) resources. No historic resources eligible for protection as Section 4(f) resources were found. No direct impacts to the Ansin Tract or the Wabasso Scrub Conservation Area are anticipated. However, direct impacts to the South Prong Preserve are likely unavoidable. Extensive coordination occurred with Indian River County,

0ef1ef4d-251d-4da6-9456-ff0a477d478c

which owns and manages the land, as well as the Florida Department of Environmental Protection. It was determined that the proposed project will enhance the South Prong Preserve by improving accessibility with the provision of sidewalks and bicycle lanes along County Road 510 as well as wildlife connectivity by replacing the existing pipe culvert with a bridge. Additionally, the project allows for future implementation of a trail underneath the bridge. Thus, impacts to the South Prong Preserve are determined to be de-minimus.

To address potential impacts to listed species, biologists performed general wildlife surveys as well as more detailed caracara nest surveys. Caracara, Florida scrub jay, gopher tortoise, wood stork, and sandhill cranes were detected in the project area. No caracara nest was located during surveys, though two adults and a juvenile were regularly observed. Gopher tortoise are known to inhabit the Wabasso Scrub Conservation Area and were also detected on the Ansin Tract. Florida scrub jays are known to inhabit the Wabasso Scrub Conservation Area. The proposed project is not expected to cause any direct impact to the Wabasso Scrub Conservation Area or Florida scrub

0ef1ef4d-251d-4da6-9456-ff0a477d478c

jay habitat. Section 7 consultation with U.S. Fish and Wildlife Service regarding mitigation for indirect impacts to scrub jays is ongoing. No adverse impacts to listed species are anticipated.

We identified Essential Fish Habitat for white shrimp in two locations in the project area. Coordination with the National Marine Fisheries Service occurred and resulted in commitments to secure mitigation for white shrimp Essential Fish Habitat.

Evaluating impacts to cultural and historic resources began with desktop research and file reviews. Field surveys were then conducted that included subsurface testing where soil is excavated and sifted for cultural artifact. The field surveys also included inspections and evaluations of existing structures and architectural elements. These investigations and their findings were documented in a Cultural Resources Assessment Survey. A copy of the CRAS was evaluated by the State Historic Preservation Officer who concurred there are no resources in the area that are eligible for the National Register of Historic Places. No adverse impacts to cultural or historic resources are anticipated.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

Wetlands and Other Surface Waters, including three canals, occur in the project area. Field reviews were conducted to map wetlands in the project area. Mapping the wetlands and communicating that information to the design team allowed impacts to be avoided and minimized as much as possible. A total of 0.65 acres of direct impacts are anticipated. Impacts to wetlands will be mitigated following St. Johns River Water Management District and U.S. Army Corps of Engineers guidelines.

A comprehensive noise analysis on the recommended alternative was conducted. Traffic noise levels are predicted to approach or exceed the FDOT noise abatement criteria at six residences within the project limits. Noise abatement was considered for all noise-sensitive sites and will be re-evaluated in design. Assessments for impacts to potentially-contaminated sites was performed and each site was assigned a risk rating.

There were five low-risk and five medium-risk sites identified in the vicinity of this project. The medium-risk sites are recommended for further investigation, including potential soil or groundwater testing, during final design.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

Public information meetings began in February, 2016, and have continued throughout the study process. All input received served as valuable information that was taken into consideration for refinement of the alternatives and the development of the recommended alternative. Representatives from the FDOT were available at each meeting to discuss the project and answer questions. The public involvement effort for this project included not only three scheduled public meetings (including tonight's public hearing) but also several meetings with communities along the project corridor that would be affected by the project.

In conclusion, the recommended alternative consists of widening the existing two-lane roadway to a divided four-lane roadway with 6-foot sidewalks, 7-foot bicycle lanes, and curb and gutter. The recommended alternative also consists of realigning the existing curve with a flatter, safer curve and a roundabout at the intersection with 66th Avenue.

30 acres require partial acquisition in order to implement the recommended improvements. One residence and no businesses would require relocation. The right-of-way acquisition cost is

0ef1ef4d-251d-4da6-9456-ff0a477d478c

estimated to be approximately $10 million, and the construction costs for this project is estimated at $58.24 million.

One of the unavoidable consequences on a project such as this is the necessary relocation of family or businesses. On this project, we anticipate the relocation of one family and no businesses. All right-of-way acquisition will be conducted in accordance with Florida Statute 339.09 and the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, commonly known as the Uniform Act.

If you are required to make any type of move as a result of a Department of Transportation project, you can expect to be treated in a fair and helpful manner and in compliance with the Uniform Relocation Assistance Act. If a move is required, you will be contacted by an appraiser who will inspect your property. We encourage you to be present during the inspection and provide information about the value of your property.

You may also be eligible for relocation advisory services and payment benefits. If you are being moved and you are unsatisfied with the Department's determination of your eligibility for

0ef1ef4d-251d-4da6-9456-ff0a477d478c

payment or the amount of that payment, you may appeal that determination. You will be promptly furnished necessary forms and notified of the procedures to be followed in making that appeal.

A special word of caution. If you move before you receive notification of the relocation benefits that you might be entitled to, your benefits may be jeopardized.

The relocation specialists who are supervising this program are here this evening. They will be happy to answer your questions and will also furnish you with copies of relocation assistance brochures.

This project is currently in the Project Development and Environment (PD&E) phase and is anticipated to obtain location design and concept acceptance, or approval, by the end of 2018. The design has been divided into two separate projects. The County Road 510 project from County Road 512 to west of 82nd Avenue has been programmed to commence in 2019 and right-of-way acquisition in 2021. The County Road 510 project from west of 82nd Avenue to 58th Avenue has been programmed to commence in 2018 with right-of-way acquisition in 2021.

The proposed improvements were documented in

0ef1ef4d-251d-4da6-9456-ff0a477d478c

the engineering and environmental studies conducted for this project. These documents and preliminary plans showing the proposed improvements are available here tonight for anyone who wishes to examine them. Project information will also be available for review on the study website, www.CR510project.com.

There have been various opportunities for the public to provide input on this project. Several public meetings have been held, dating from February, 2016, until tonight. We welcome your oral or written comments that will help us make this important decision. At the conclusion of this presentation, our personnel will distribute speaker cards to those in the audience who have not received one and would like to make a statement. A court reporter will record your statement and a verbatim transcript will be made of all oral proceedings of this hearing. If you do not wish to speak at the microphone, you may present your comments in writing or directly to the court reporter at the comments table. Every comment method carries equal weight.

Written comments received or postmarked no later than 10 days following the date of this

0ef1ef4d-251d-4da6-9456-ff0a477d478c

public hearing will become a part of public record for this hearing. All written comments should be mailed to the address shown on the slide or in your handout.

The next step is to incorporate your input on this public hearing into our decision-making process. After the comment period closes and your input has been considered, a decision will be made and the Final PD&E document will be sent to the FDOT Office of Environment Management which based on the MOU signed with FHWA on December 14, 2016, has approval authority on this project granting the location and the design concept acceptance. This project has and will continue to comply with all applicable state and federal rules and regulations.

This concludes our presentation. We now offer you the opportunity to make a statement.

(Video and audio presentation concludes, after which the following conversation was had:)

MS. BROADWELL: Okay. So if there is anyone desiring to make a statement or present written views regarding the location, conceptual design, social, economic, or environmental effect of the improvement will now have an opportunity to do so. If you are holding a speaker card, please give it

0ef1ef4d-251d-4da6-9456-ff0a477d478c

to a member of the project team, Laila. Anyone wearing a name tag can help you out. And we'll go ahead and start.

Okay. Written statements may be presented in lieu of or in addition to oral statements. All written material received at this public hearing and at the DOT District Office at 3400 West Commercial Boulevard, Fort Lauderdale, postmarked no later than May 4th, 2018, will become a part of the public record for the hearing. All written comments should be addressed to Maria Formoso, P.E., P.M.P.

Your contact information is on the handout?

MS. FORMOSO: Yes.

MS. BROADWELL: Okay. So grab one of those on your way out.

We will now call upon those who have turned in speaker cards. When you come forward, please state your name or address. Or I guess, Laila, you're going to walk through the audience with the microphone? Okay, so she's going to come to you so you don't have to trip over the rugs and everything.

So if you represent an organization, municipality or other public body, please provide

0ef1ef4d-251d-4da6-9456-ff0a477d478c

that information as well. We ask that you limit your input to two minutes. If you have additional comments, we will let you come up and speak after everyone has provided their comments.

So Carlos is going to be the timekeeper. So let's get started.

The first name is Graham Cox. Graham, are you here?

MR. COX: Right here. I guess timing is everything.

My name is Graham Cox. I live at 1213 George Street in Sebastian. I'm representing myself in this. I've done a little work with the West Wabasso --

MS. FORMOSA: Go ahead. I'm sorry, sir. I didn't know it was me.

MR. COX: I've done a little work with the West Wabasso community, and I know that they have some significant environment and social concerns down in West Wabasso that include drainage, storm water, problems with septic systems, problems with sidewalks, lighting, and whatever.

I'm hoping that as part of your thing, and the list of things you had up there, you look like you talked to the Progressive Civic League. But I'm

0ef1ef4d-251d-4da6-9456-ff0a477d478c

hoping that you've listened to them and can find some way to make sure that all their concerns dealing with all of the things I just listed, drainage, sewer, septic, sidewalks, traffic lights, that you're taking -- you're building a major piece of highway through there. And I hate to see a community disrupted or walled off without real considerations of what their concerns are. And I think it should be a smaller scale.

So that's it. I will give you some comments in writing. But I just wanted to make sure that you're aware that these folks are going to be very heavily impacted.

MS. BROADWELL: Thank you for participating.

The next one is Michael Abt. Michael is over on the other side of the room.

MR. ABT: I'm Michael Abt. I'm at 6780 85th Street, the northwest corner of 510 and 66th Avenue.

And I understand progress and I'm for widening the road. I don't think a roundabout is the answer for that intersection. I can't get out of my driveway to go east or west as it is. I think with the roundabout it's going to be even harder, not only for me, but for my neighbors. And you're

0ef1ef4d-251d-4da6-9456-ff0a477d478c

planning a bicycle lane? How are bicyclist going to be dealing with that roundabout, for one? And pedestrians trying to cross that street. It's going to be a nonstop flow of traffic. Yeah, it might ease the traffic flow, but it's not going to ease it for the residents. It's going to make it much worse.

I've seen your plan with the roundabout. Do you have a plan on a typical intersection? I haven't seen one of those. But I do see your pictures of a roundabout. I don't think it's a good idea. I think a lot of people are going to be confused. And you will have -- maybe there will be bumper accidents, as I've heard. But there's going to be more accidents.

That's all I've got to say. I'm against it. And do a regular intersection. I'll be able to get out of my driveway a little easier, I think.

MS. BROADWELL: Thank you for your comments.

Next up is Carlos Ballbe. Did I say that right?

MR. BALLBE: Carlos Ballbe. I own -- I have 75 acres north of 510 and east of 86. And I fully support the project. I think it's going to be a great improvement. Very much needed. Really tough

0ef1ef4d-251d-4da6-9456-ff0a477d478c

to maneuver right now with all the traffic and the swales; it's kind of dangerous.

Obviously I don't support any right-of-way taken from my property for the purpose of the use of the road. I want to register that for the record. Or to use any of my property for a drainage, storage, or a pond.

I don't know if you guys knew that my project was approved for 400 units. I have an improved PUD that was taken into consideration when you guys reviewed the PD&E analysis. But I would like you to look at that, if you don't mind. I kind of see the access that was already approved by the county for my property and the layout of the project and, you know, the ponds and all that.

I'm an engineer. So I would like to set up a meeting with you guys, a follow-up meeting, come by your office, and maybe brainstorm how we can help each other get this project developed. But I think you probably want to take a look at that plan and then see how we can work this out together.

Thank you.

MS. BROADWELL: Thank you.

Rich Votapka.

You're getting your workout in.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

MS. HADDAD: That's good.

MR.VOTAPKA: First of all, I'd like to say two minutes is very limiting. We had a lot more time at the hearing in Wabasso.

As I mentioned at the February 5th meeting in Wabasso, the most controversial intersection in Brevard County is the two-lane roundabout at the intersection of North Wickham Road and Lake Andrew Drive in Viera.

Bob Kamm, Executive Director of the Space Coast Transportation Planning Organization, is on record stating that motorists go through the two-lane roundabout much too fast. They don't stay in their lanes, they are unpredictable, they don't know how to negotiate the roundabout. Drivers need to slow down, show patience, show respect, use courtesy, exhibit a safe defensive behavior, and pay attention. Drivers are hesitant to enter the roundabout to safely merge into the traffic flow.

By all indications, it is not the geometric design of the roundabout that is causing the problems with drivability, but the behavior of the motorists who negotiate the roundabout. Good engineering practices will not change poor behavioral patterns. Consequently, the more

0ef1ef4d-251d-4da6-9456-ff0a477d478c

vehicles that flow through the roundabout will create more crashes at conflict points during the a.m. and p.m. peak traffic periods, in keeping with what Bob Kamm said about motorists.

Over the years since the roundabout in Viera was constructed prior to 2005, traffic volume has steadily increased. In 2016, there were 200 reported crashes, which equates to one crash every 1.83 days. My personal experience in driving around the Viera roundabout every workday for slightly more than two years was absolutely dreadful. I felt extremely fortunate that I was not involved in a crash, because I became keenly aware that motorists did not know how to properly drive within a two-lane roundabout.

I think the principle reason why roundabouts are considered is that they eliminate the right-angle, left turns, and head-on collisions which typically are the most dangerous types of intersection crashes. However, two-lane roundabouts are inherently more complicated than single-lane roundabouts and create confusion in the minds of drivers when navigating them, sometimes causing more crashes than the four-way intersections.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

In lieu of the two-lane roundabout, there are two alternative intersection designs that could be considered. The median U-turns where no left turns are allowed at the main signalized intersection, only through movements and right turns are allowed and restricted signalized crossing with median U-turns.

Both signalized alternative intersections allow for safe movements of pedestrian and bicycle movement. By comparison, constant flow of traffic around a roundabout always puts pedestrians and bicyclists at risk during peak traffic periods because vehicular movement into the intersection is based on a yield condition, not a stop condition.

So I want to know, has the Florida Department of Transportation or Metric Engineering considered the two alternative intersection designs?

The CR 510 and 66th Avenue intersection has a multitude of various drivers and vehicular classifications; young teenage drivers going to and from Sebastian River High School in the mornings and afternoons; young parents taking children to and from daycare centers and school; school buses serving Pelican Island, Liberty Magnet, and Treasure Coast Elementary Schools, and Sebastian

0ef1ef4d-251d-4da6-9456-ff0a477d478c

River Middle School and Sebastian River High school; young, middle-aged, and older drivers commuting to and from work from Sebastian Highlands and Vero Lake Estates; tourists driving from I-95 to the beaches; trucks to and from I-95 going to and from U.S. Highway One. You have motorcyclists going to and from I-95, senior citizens going to Sebastian Highlands; emergency vehicles; bicyclists.

Considering the age, type of vehicles, and different behaviors of the type of drivers all trying to negotiate a two-lane roundabout, many crashes my result during morning and afternoon peak-hour traffic periods.

I would recommend to the engineering consultant, the FDOT, and the MPO that they reconsider using a standard or alternative type signalized intersection in lieu of a roundabout at that County Road 510/66th Avenue intersection. The north county does not need a Viera-type roundabout.

MS. BROADWELL: Thank you.

Ardra -- Carlos is going to help me out.

MR. RIGBY: Yes, my name is Ardra, West Wabasso Civic Club.

I do want to go on record as saying they have

0ef1ef4d-251d-4da6-9456-ff0a477d478c

addressed our needs quite well for the last two-and-a-half years. We have a great working relationship with them.

But I have some concerns. On 64th Street we have a school and a grocery store. Could you please address that, on how the kids will be able to get across?

Like Mr. Graham said earlier, we have some drainage issues. I don't want you just getting water off the road and putting water back on the people that's living there. We'd like to be able to have a more comprehensive approach.

And No. three, is there going to be a median? I didn't see that in the presentation.

MS. BROADWELL: Thank you.

Next up is Johnny Earl Cartwright.

MR. CARTWRIGHT: My name is Johnny Earl Cartwright from Wabasso. I've been staying here all my life. And I don't like the roundabout, because I stay in Florida. One thing about Florida, when the sun sets it would shine very bright. And we feel rich in Indian River County. It's rich. All the people retire here. And they're having problems already with the red lights, so a roundabout would be a problem here.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

And I live in Wabasso. The county already messing with us. We have a problem there already from 66 to 58 due to the Wabasso citizen, migrant worker. We have a problem with the county already trying to take our property in the area.

We're having problems already with drainage already. We already swampland already. Y'all talking about let's put pumps in there to help us out. Ponds is not going to help us. It only sit in the pipes and nowhere for the water to flow.

Then we got to deal with mosquitoes. They don't spray all the way in Wabasso. And we don't want that virus. No one want that. Mosquitoes bad already.

So I hope y'all make the right decision. We live here. They done push all the bushes down. We from the ocean to the gulf. The wind, check the wind pressure now since they move all the scrubs, the trees. It's very strong right now in Indian River County. Then you going to build houses.

Think about Mother Nature. We going back to 150 years now. It's snowing in places very hard. The weather done change. Think about the humans. All the animals that come to Wabasso. We got raccoons, we got armadillos, we got snakes, we got

0ef1ef4d-251d-4da6-9456-ff0a477d478c

gators, we got foxes. It's all in the Wabasso area. We got coyotes, we got bobcats in our backyard now. You're pushing everything to the bird sanctuary. Think about the humans. Move it over.

I said all the county in there, they push down all the bushes. You're running animals here. An animal don't know how to get around no roundabout. But humans very hardly going to get through it, too. Think about the humans. Put it straight.

512 right on the corner up there. When they get full and flood this whole area right here when Mother Nature take place. Think about that. I come down these roads when it rains. We need a boat to get in here.

And these people build these nice homes. You're building your homes on dry season. Don't forget it going to get rainy. We can't drive now. We don't need the water taking the roads. That's what they're doing here in Indian River County. And Wabasso, we flood with the little rain. They ain't fixing that now and they ain't going to fix that later. We need the government; we need whoever help we possibly get. But we don't need it like this. We going to live with it, but do it the

0ef1ef4d-251d-4da6-9456-ff0a477d478c

right way. Don't push us out.

Then come we migrant workers. We migrant workers. We own our home. The rich coming in, retired, coming in. Let them come in for a reason. Don't bait them here. Think about it. If they want to retire here, let them retire here as something good. But don't push us out of here who are here. That's what y'all are doing. The county didn't give us nothing.

I love the county. I want to work with the county. Come in my neighborhood, I'll tell you everything, detour, where things at. I carry you everywhere.

The fairground good. But that was our landfill, that dump. The dump. And it made it a fairground. They got several pumps on there. If you going to come in Wabasso, put a pump to pump the water.

That Saint Johns ain't helping us. We getting eat up by mosquitoes. We want our loved ones to spend in a home with us, not in a nursing home. We love our loved one.

It's a rich area. We know that. But tell people the truth. Tell them the truth.

Widening, we don't need a buffer in no road.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

For sidewalks, we don't need no buffer. Put a buffer in front of your front door, not ours. We don't need this roundabout.

Thank you. May God bless you and God bless me.

MS. BROADWELL: Thank you.

Our final speaker for this evening is Tony Dudley, unless anybody has filled out another card or wants to come up and say anything else.

MR. DUDLEY: Thank you and good evening. My name is Tony Dudley. My address is Post Office Box 700204 in Wabasso. I list that address because my physical address is confident and for good reason.

We have two properties, my family and I, that are directly on 510. One of our main concerns is the roundabout, turnabout, turning circle, chaos, whatever you want to call it.

I heard this gentleman over here give some interesting statistics. I'm sure you all have done what we consider -- what you consider to be an adequate study that shows it's going to decrease the layout, I think you quoted, by 50 percent.

One of our issues, as well as my neighbors, is that even though it decreases the delay by 50 percent, it's going to make an increase in the

0ef1ef4d-251d-4da6-9456-ff0a477d478c

flow of traffic. You're taking away, basically, a traffic control device which stops traffic for giving time and direction; and you're basically just opening the gates.

So not -- this is not selfish. This is not out of selfishness. My concern is that, not only for myself and for my neighbors, my immediate neighbors, but for the people in Wabasso. What's going to happen, at least what in my perception, what I perceive as happening, is that anyone that has to access to 510, now you getting a little bit of a break. When the traffic light stops, you get a little bit a break.

If you got people constantly flowing here, making left turns, making right turns, going straight, whatever way they're navigating that traffic circle or runabout or turnabout, whatever you're calling it, now you have no time -- you're down the road, you have no time to access 510.

So I will grant you that you're going to have fewer -- you say you're going to have fewer high-impact accidents and fewer injuries. I will give you that. Because people are going through there at 30, 35 miles per hour. Instead of a -- is my time up? I'm sorry.

0ef1ef4d-251d-4da6-9456-ff0a477d478c

MS. BROADWELL: That's okay. Go ahead.

MR. DUDLEY: Instead of going through a T intersection and having major crashes. I can tell you from my own experience -- and I'll end this -- one of the worst things that can happen as far as traffic flow at the turnabout, turning circle, again, I don't know what the misnomer is here. But one of the worst things that can happen is that an emergency vehicle goes through here. Because now you're relying on the courtesy of everybody else to say, "I was next to go through." And that's when -- I've seen it with my own eyes -- you have chaos.

So I wish -- I'm not against progress. I know we've got to do something because of the traffic. But I'm totally against the turning circle. And that's all I have to say. And God bless you, like my friend said.

MS. BROADWELL: Thank you.

Does anyone else have a desire to speak?

MR. WALKER: Yes.

MS. BROADWELL: Hold on for the microphone.

We have two folks.

Please state your name for the record.

MR. WALKER: My name is John Walker. My

0ef1ef4d-251d-4da6-9456-ff0a477d478c

residence is 4536 61st Drive.

We have antiquated sewer systems on 61st Drive. Wouldn't it be smart to upgrade the sewer system, give us a good sewer system before you even work on the road? That needs to be taken care of first. We still got our sewage running into a little pit in the backyard. We need a proper sewer system in that neighborhood before you even start building a road.

I called a couple months ago and they said they didn't have the money, to do it later. But wouldn't it be smart to do it now? Fix the sewer system now before you start working on the road?

Thank you.

MS. BROADWELL: Thank you.

Gentleman here in the front row, Laila.

MR. SCHULTE: Hi. My name is Joseph Schulte. I'm here on behalf of Jeff Bass and Graves Brothers.

Graves Brothers owns probably about 2,000 acres, more or less, mostly the south side of 510. So they're seeing a pretty big impact as far as some of your plans as far as right-of-way acquisition, storm pond location, and even planning meeting cuts. To note, it looks like we may be

0ef1ef4d-251d-4da6-9456-ff0a477d478c

missing a meeting cut at 84th Avenue and 80th Avenue.

We have some concerns. We're going to put that in writing. But we want to make that of record. And hopefully we will have an opportunity to meet with the DOT. Because this project, as well as the Second Avenue project you're working on, both impact this property significantly.

Thank you.

MS. BROADWELL: Thank you.

We have Diane Shampine.

MS. SHAMPINE: Hi. Good evening. My name is Diane Shampine. I live in the 1500 block of Barber Street here in Sebastian.

I just basically have two questions with the roundabout. I am a South Jersey transplant, and I wanted to find out if you had conducted any research with the Jersey DOT. Because they are removing a lot of their roundabouts now from the state.

And also, with the roundabout, I see that it's going to be continuous more traffic. But have you also considered the Pelican Island Elementary School? If that traffic is continuing, people coming down off of Schumann to the elementary

0ef1ef4d-251d-4da6-9456-ff0a477d478c

school, is that not going to back up traffic at that intersection? Has anybody, you know, done any research on that? Because if it's constantly going around -- you know, right now there's a traffic light, so it stops traffic at that elementary school.

MS. BROADWELL: Thank you for your comment.

Anyone else?

MR. RIGBY: I can talk loud enough.

If there's any work being done, can you really pull from the local people that's there? Please make that a priority. Economic opportunity. Any job opportunity; digging a hole, holding a sign, I don't care what it is, pull from the local people for the economic opportunity.

Thank you.

MS. BROADWELL: State your name, please.

MR. RIGBY: Oh, I'm sorry. Ardra Rigby.

MS. BROADWELL: Thank you for attending this public hearing and for providing your input in this project. It is now -- Carlos is going to show me -- 6:50. I hereby officially close the public hearing for the County Road 510 PD&E study. Thank you, again, and have a good evening.

(PUBLIC HEARING CONCLUDED AT 6:50 P.M.)

0ef1ef4d-251d-4da6-9456-ff0a477d478c

* * * * *

(The following is on the record with the court reporter after the conclusion of the public hearing:)

MS. CIAMBRIELLO: I just wanted to say that my name is MaryLou Ciambriello, and I'm totally against the roundabout. Do you need my address? 8256 105th Court. And I'm currently the president of Vero Lake Estates. And I just spoke with some of our constituents and they're also against it.

* * * * *

0ef1ef4d-251d-4da6-9456-ff0a477d478c

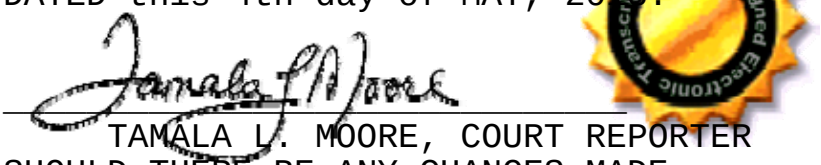
STATE OF FLORIDA)
: SS
COUNTY OF MARTIN)

CERTIFICATE OF REPORTER

I, TAMALA L. MOORE, Court Reporter, a Machine Shorthand Reporter and Notary Public of the State of Florida at Large, certify that the foregoing public hearing in regards to the matter of the County Road (CR)510 PD&E Study, Indian River County, Florida, was stenographically reported by me and is a true and accurate transcription of that public hearing.

I certify further I am neither attorney nor counsel for, nor related to, nor employed by any of the parties to the action and, further, that I am not a relative or an employee of any attorney or counsel or party employed in this case, nor am I financially interested in the outcome of this action.

DATED this 4th day of MAY, 2016.



TAMALA L. MOORE, COURT REPORTER
SHOULD THERE BE ANY CHANGES MADE
THE SIGNATURE WILL DISAPPEAR

0ef1ef4d-251d-4da6-9456-ff0a477d478c

A

a.m 28:3
A1A 6:14
Aaron 3:13
abatement 16:15,16
able 25:17 31:6 31:11
absolutely 28:11
Abt 24:15,17,17
abutting 10:16
acceptable 7:5
acceptance 19:17 21:13
access 10:12,15 12:1,4,15,16 26:13 36:11,19
accessibility 14:5
accidents 25:14 25:15 36:22
accommodate 7:4 8:8,12
accurate 42:13
acquisition 10:20 17:22,25 18:8,11 19:21 19:24 38:24
acres 16:7 17:22 25:23 38:21
Act 5:21 18:11 18:12,17
action 42:17,20
adding 2:12
addition 22:5
additional 6:15 23:2
Additionally 10:4 12:25 14:8
address 8:4 9:15 14:12 21:3 22:19 31:6 35:11,12,13 41:7
addressed 22:11 31:1
adequate 35:21
adequately 9:6
Administrator 1:13 2:10
adults 14:18
adverse 4:8 5:9 5:10 15:4,24
advertised 4:17
advisory 18:23
aerials 12:14
afternoon 30:13
afternoons 29:22
age 4:15 30:10
ago 38:10
ahead 22:3 23:15 37:1
Aide 3:13
ain't 33:22,22 34:19
alignment 9:7 9:20 10:2,21 10:25 11:2,17 11:19
allow 29:9
allowed 8:20 16:6 29:4,5
allows 14:9
alternative 5:18 5:24 7:20,21 9:5,13 10:4 11:16 13:4,9 16:13 17:6,14 17:18 29:2,8 29:17 30:17
alternatives 4:7 5:8 7:24 8:1,7 8:20 12:23 17:5
amount 19:1
ample 8:23
analysis 6:3 7:18 7:19,19 8:6,10 8:15 11:8,10 12:7,17,22 16:12 26:11
analyze 5:23
analyzed 12:23
and/or 8:3
Andrew 27:8
animal 33:8
animals 32:24 33:7
Ann 1:13 2:9
Ansin 13:16,21 14:21
answer 17:8 19:11 24:21
anticipate 18:7
anticipated 7:4 13:10,23 15:4 15:25 16:8 19:16
antiquated 38:2
anybody 35:8 40:2
appeal 19:2,4
applicable 3:24 21:15
appraiser 18:18
approach 9:9 16:14 31:12
approval 19:17 21:12
approved 26:9 26:13
approving 4:3
approximately 6:10 18:1
April 1:8
architectural 15:17
Ardra 30:22,23 40:18
area 11:21 13:16 13:18,22 14:17 14:21,23,25 15:6,22 16:2,4 32:5 33:2,12 34:23
armadillos 32:25
Army 16:10
arterial 7:14
artifact 15:15
Assessment 15:19
Assessments 16:18
assigned 16:20
assistance 18:10 18:17 19:12
associated 8:5 13:8
Atlantic 1:23
attending 40:19
attention 27:18
attorney 42:15 42:18
audience 20:15 22:20
audio 3:17 21:18
authority 4:3 21:12
available 12:14 13:9 17:7 20:4 20:6
Avenue 1:2 2:8 6:12 10:1,23 10:23,25 11:3 11:12,18,21 17:21 19:20,22 19:23 24:19 29:18 30:19 39:1,2,7
avoid 11:17,20
avoided 16:6
aware 24:12 28:14

B

back 3:1,6,7,9 3:14 31:10 32:21 40:1
backyard 33:3 38:7
bad 32:13
bait 34:5
Ballbe 25:20,22 25:22
Barber 39:13
Barenborg 3:14
barrier 6:14
based 21:10 29:14
basically 36:1,3 39:15
basin 12:25
basins 12:21
Bass 38:18
beaches 30:5
began 15:12 17:1
behalf 38:18
behavior 27:17 27:22
behavioral 27:25
behaviors 30:11
beneficial 4:8 5:9
benefits 11:13 18:23 19:6,7
best 5:24 9:14
bicycle 9:22 11:5 11:24 14:6 17:17 25:1 29:9
bicyclist 25:1
bicyclists 29:12 30:9
big 38:22
bike 2:14
biologists 14:13
bird 33:4
bit 36:11,13
bless 35:4,4 37:17
block 39:13
boat 33:15
Bob 27:10 28:4
bobcats 33:2
body 22:25
border 11:6
Boulevard 1:10 1:14 6:11 22:8
Box 35:11
brainstorm 26:18

break 36:12,13
Brevard 27:7
bridge 10:10 14:8,10
bright 31:22
Broadwell 1:13 2:2,9 21:20 22:15 24:14 25:19 26:23 30:21 31:15 35:6 37:1,19 37:22 38:15 39:10 40:7,17 40:19
brochure 4:25
brochures 19:13
Brothers 38:19 38:20
Bruhl 3:14
buffer 34:25 35:1,2
build 7:21,23,25 32:20 33:16
building 24:5 33:17 38:9
bumper 25:14
buses 29:23
bushes 32:16 33:7
businesses 11:17 17:24 18:6,8

C

call 22:17 35:17
called 38:10
calling 36:18
Canal 10:11
canals 16:2
capacity 8:4
caracara 14:14 14:15,17
card 21:25 35:8
cards 20:15 22:18
care 38:5 40:14
carefully 9:12
Carlos 1:18 2:21 23:5 25:20,22 30:22 40:21
carries 20:23
carry 34:12
Cartwright 31:16,17,18
case 42:19
Categorical 13:6
cause 14:24
causing 27:21 28:24
caution 19:5
center 10:24
centers 29:23
CERTIFICATE 42:5
certify 42:9,15
change 27:24 32:23
CHANGES 42:23
chaos 35:16 37:13
characteristics 8:18
check 32:17
children 29:22
Ciambriello 41:5,6
circle 35:16 36:17 37:6,16
citizen 32:3
citizens 30:7
city 3:3,10
Civic 23:25 30:24
Class 12:16
classifications 29:20
classified 7:13
close 40:22
closes 21:7
Club 30:24
Coast 27:11 29:25
coastal 7:9
Code 3:25
collisions 28:18
color 4:14
combined 5:22
come 22:18,21 23:3 26:17 32:24 33:14 34:2,4,11,17 35:9
coming 34:3,4 39:25
commence 19:20,23
comment 2:16 5:11 20:22 21:7 40:7
comments 5:6 5:14 20:12,21 20:22,24 21:2 22:11 23:3,4 24:10 25:19
Commercial 1:14 22:8
Commissioner 3:8
commitments 15:8
commonly 18:12
communicating 16:5
communities 7:9 17:12
community 2:24 3:11 4:9 6:12 23:18 24:7
community's 5:24
commuting 30:3
comparison 29:10
compliance 3:23 18:16
complicated 28:21
comply 21:14
component 6:2,4 6:7
components 5:1 6:1
comprehensive 8:6,15 9:7 12:7 16:12 31:12
comprised 9:20
concept 19:16 21:13
conceptual 4:6 21:22
concern 36:6
concerns 4:20 23:19 24:2,8 31:4 35:15 39:3
CONCLUDED 40:25
concludes 21:16 21:18
conclusion 17:14 20:13 41:3
concurred 15:21
condition 29:14 29:14
conditions 7:6 10:8
conducted 3:23 15:13 16:3,13 18:9 20:1 39:17
confident 35:13
conflict 28:2
conflicts 12:6
confused 25:13
confusion 28:22
connections 12:3
connectivity 14:7
connector 6:13
consequences 18:4
Consequently 27:25
Conservation 11:20 13:18,22 14:20,23,25
consider 35:20 35:20
consideration 17:4 26:10
considerations 9:9 24:8
considered 9:12 16:17 21:8 28:17 29:3,16 39:23
Considering 30:10
consistent 4:17 6:17
consists 17:15 17:18
constant 29:10
constantly 36:14 40:3
constituents 41:10
constructed 28:6
construction 18:2
consultant 2:22 30:16
consultation 15:1
contact 4:23 22:13
contacted 18:18
contacting 4:20
continue 21:14
continued 17:2
continuing 39:24
continuous 39:22
control 36:2
controversial 27:6
conversation 21:19
coordination 10:8 13:25 15:7
copies 19:12

copy 15:20
corner 24:18 33:11
Corps 16:10
corridor 5:19 7:3 8:5 11:10 12:13 17:12
cost 9:10 17:25
costs 18:2
counsel 42:15,18
county 1:1,1,3 1:10 2:6,7,8,24 3:3,6,8 6:11,12 6:13,18 7:6,10 7:12 8:11 9:17 10:10,13,16,18 11:9,11 12:10 12:20 13:1,25 14:6 19:19,19 19:22 26:13 27:7 30:19,20 31:22 32:1,4 32:20 33:6,20 34:8,10,11 40:23 42:2,10 42:11
couple 38:10
court 1:21,22 5:6,15 20:17 20:21 41:2,8 42:7,23
courtesy 27:17 37:10
Cox 23:7,9,11,17
coyotes 33:2
CR 1:1,2 29:18
CR)510 42:11
cranes 14:16
CRAS 15:20
crash 28:8,13
crashes 12:7 28:2,8,20,24 30:13 37:3
create 28:2,22
criteria 16:15
critical 7:1
cross 25:3
crossing 29:6
cultural 15:11 15:15,19,24
culvert 14:8
curb 17:17
currently 19:14 41:8
curve 10:6,17,21 17:19,20
cut 39:1
cuts 38:25

D

D 1:18 10:11
dangerous 26:2 28:19
date 1:8 20:25
DATED 42:21
dating 20:10
day 42:21
daycare 29:23
days 20:25 28:9
de-minimus 14:11
deal 32:11
dealing 24:3 25:2
December 4:1 21:11
decision 1:6 3:21 20:13 21:8 32:15
decision-maki... 21:6
decrease 35:21
decreases 35:24
dedicated 10:18
defensive 27:17
delay 35:24
demand 7:5
Department 2:5 2:11,18 4:21 4:23 14:2 18:14 29:15
Department's 18:25
design 2:20 4:6 6:3 8:7,9,23 9:1,3 10:7 12:24 16:5,18 16:25 19:16,18 21:13,22 27:21
designated 7:6
designs 29:2,17
desire 37:20
desiring 21:21
desktop 13:14 15:12
detailed 14:14
detected 14:17 14:21
determination 18:25 19:2
determine 9:5 12:18
determined 12:8 14:3,11
determines 5:17
detour 34:12
develop 8:7
developed 2:25 7:24 8:25 26:19
development 1:3 2:6 3:11 5:16 6:8 7:20 8:20 13:14 17:5 19:15
device 36:2
Diane 39:11,13
differences 8:18
different 12:12 30:11
digging 40:13
direct 13:21,23 14:24 16:7
Directer 3:5
direction 11:5 11:24 36:3
directional 12:11
directly 5:5,15 10:16 20:21 35:15
Director 3:7,11 27:10
disability 4:15
DISAPPEAR 42:24
discuss 17:8
display 4:18
displayed 4:25 12:14
displays 5:4
disrupted 24:7
distinct 7:23 8:16 12:21
distribute 20:14
District 1:14 2:10 3:23 4:22 16:10 22:7
ditch 12:25 13:2
divided 8:16 9:1 9:2 12:21 17:16 19:18
document 5:24 21:9
documented 15:19 19:25
documents 2:25 20:2
doing 33:20 34:8
door 35:2
DOT 22:7 39:6 39:18
drainage 12:17 12:21 23:20 24:4 26:7 31:9 32:6
dreadful 28:12
drivability 27:22
drive 11:18,21 27:9 28:15 33:18 38:1,3
drivers 27:15,18 28:23 29:19,20 30:2,11
driveway 12:2 24:23 25:18
driving 28:9 30:4
dry 33:17
Dudley 35:8,10 35:11 37:2
due 32:3
dump 34:15,15

E

E 9:19 10:1 11:16,19
Earl 31:16,17
earlier 31:8
ease 25:5,6
easier 25:18
east 6:16 9:19 10:1 24:23 25:23
eastern 7:9
eat 34:20
economic 4:8 21:23 40:12,15
Edward 3:14
effect 21:23
effective 12:8
effectively 8:4
Efficient 1:6 3:21
efficiently 8:8
effort 5:22 17:9
Eight 8:22
either 4:21
electronics 2:3
elementary 29:25 39:23,25 40:5
elements 15:17
eligibility 18:25
eligible 13:18,20 15:23 18:22
eliminate 28:17
emergency 7:7 7:11 30:8 37:9
employed 42:16 42:18
employee 42:18
encourage 18:19
encouraged 4:13
engineer 26:16
engineering

1:17 2:22,25 5:17 6:2 7:18 20:1 27:24 29:16 30:15
Engineers 16:11
enhance 14:4
entail 8:2
entails 6:2
enter 27:18
entitled 19:7
environment 1:3 2:7 3:24 4:9 5:16 9:12 19:15 21:10 23:19
environmental 1:13 2:10 3:22 4:2 5:21 6:4 13:7,11 14:2 20:1 21:23
environmenta... 5:18
environments 6:6 13:6
equal 20:23
equates 28:8
Essential 15:5,9
Estates 10:12 30:4 41:9
estimated 18:1,2
ETDM 1:6 3:21
evacuated 7:10
evacuation 7:7
evaluate 6:4
evaluated 8:25 13:4 15:20
Evaluating 15:11
evaluation 7:21 9:8 12:4
evaluations 15:16
evening 2:2 19:10 35:7,10 39:12 40:24
event 7:11
everybody 37:10
examine 20:5
excavated 15:14
exceed 16:14
Exclusion 13:6
Executive 27:10
exhibit 27:17
existing 2:13 7:14,16,19,25 8:13 10:5,10 10:10,13 13:2 14:7 15:17 17:15,19
expect 18:15
expected 14:24
experience 28:9 37:4
explain 5:7
express 4:11,19
extends 6:10
Extensive 13:24
extremely 28:12
eyes 37:12

F

facilities 8:1
facility 6:13 7:14 8:13 12:16
fair 18:15
fairground 34:14,16
family 4:15 18:6 18:7 35:14
far 37:5 38:22 38:23
fast 27:13
FDOT 1:12,14 3:23 4:1,1 6:21 6:25 16:15 17:7 21:10 30:16
feasible 5:18
features 7:14 8:19 10:2 11:4
February 17:1 20:11 27:5
federal 1:4 3:3 3:24 4:18 5:21 18:10 21:15
feel 31:22
feet 7:17,17
felt 28:12
fewer 12:6 36:21 36:21,22
FHWA 4:1 21:11
field 13:15 15:13 15:15 16:2
file 15:12
filled 35:8
final 16:25 21:9 35:7
Finally 11:15
Financial 3:19
financially 42:19
find 24:1 39:17
findings 15:18
first 5:2 23:7 27:2 38:6
Fish 15:1,5,9
Fisheries 15:7
five 16:21,21
fix 33:22 38:12
fixing 33:22
flatter 17:19
Flescher 3:8
flood 33:12,21
Florida 1:1,11 1:15,19,24 2:5 2:10,18 4:21 4:23 14:2,15 14:22,25 18:9 29:15 31:20,21 42:1,9,11
flow 25:4,5 27:19 28:1 29:10 32:10 36:1 37:6
flowing 36:14
folks 24:12 37:23
follow 12:15
follow-up 26:17
followed 19:4
following 5:12 9:13 16:9 20:25 21:19 41:2
follows 3:18
footprint 9:21 11:22
foregoing 42:9
forget 33:18
formal 5:11
Formosa 2:17 23:15
Formoso 1:13 22:11,14
forms 19:3
Fort 1:15 22:8
fortunate 28:12
forum 4:10
forward 22:18
found 13:21
four 8:14,16
four-lane 17:16
four-way 28:24
foxes 33:1
FPID 1:4
Frazier 3:10
friend 37:18
front 35:2,2 38:16
full 12:11 33:12
fully 25:23
fund 7:1
furnish 19:12
furnished 19:3
further 12:23 16:23 42:15,17
future 7:4 8:10 14:9

G

gates 36:4
gators 33:1
general 4:5 14:13
generally 7:13
gentleman 35:18 38:16
geometric 8:19 11:13 27:20
George 23:11
getting 2:2 26:25 31:9 34:19 36:11
give 21:25 24:10 34:9 35:18 36:23 38:4
giving 36:3
go 22:2 23:15 24:23 27:12 30:25 37:1,11
God 35:4,4 37:17
goes 2:7 37:9
going 2:20 22:20 22:21 23:5 24:12,24 25:1 25:4,5,6,12,14 25:24 29:20 30:5,7,7,22 31:13 32:9,20 32:21 33:9,18 33:22,25 34:17 35:21,25 36:9 36:15,20,21,23 37:2 39:3,22 40:1,3,21
good 2:2 25:12 27:1,23 34:7 34:14 35:10,13 38:4 39:12 40:24
gopher 14:15,19
government 33:23
governments 7:1 10:9
grab 22:15
Graham 23:7,7 23:11 31:8
grant 36:20
granting 21:12
Graves 38:18,20
great 25:25 31:2
grocery 31:5
groundwater 16:25

guess 22:19 23:9
guidelines 16:11
gulf 32:17
gutter 17:18
guys 26:8,10,17

H

habitat 15:1,5 15:10
HADDAD 27:1
handout 21:4 22:13
happen 36:9 37:5,8
happening 36:10
happy 19:11
hard 32:22
harder 24:24
hate 24:6
head-on 28:18
heard 25:14 35:18
hearing 2:5,14 3:19 4:4,10,13 4:17,19,25 5:2 17:11 20:19 21:1,2,6 22:6 22:10 27:4 40:20,23,25 41:4 42:10,13
heavily 24:13
held 2:15 20:10
help 20:12 22:2 26:18 30:22 32:8,9 33:24
helpful 18:16
helping 34:19
hesitant 27:18
Hi 38:17 39:12
High 29:21 30:1
high-impact 36:22
high-speed 11:3
highest 6:24
Highlands 30:3 30:8
highway 24:6 30:6
historic 13:12,15 13:19 15:11,21 15:23,24
Hold 37:22
holding 21:25 40:13
hole 40:13
home 34:3,21,21
homes 33:16,17
hope 32:15
hopefully 39:5
hoping 23:23 24:1
hour 7:16 9:2,4 36:24
house 5:2
houses 32:20
humans 32:23 33:4,9,10

I

I-95 6:15 30:4,5 30:7
idea 25:12
identification 1:4 6:3
identified 6:23 12:22 15:5 16:22
II 13:7
immediate 36:7
impact 14:24 38:22 39:8
impacted 13:3 24:13
impacts 4:9 5:9 5:11 6:5 9:10 9:11,16 11:17 11:20 13:5,8 13:10,21,23 14:10,12 15:3 15:4,11,24 16:6,8,8,18
implement 7:1 17:23
implementation 12:4 14:9
implementing 3:25
important 9:9 20:13
improve 10:7
improved 12:5 26:9
improvement 2:12 4:6 6:20 6:22 21:24 25:25
improvements 7:23 8:2,3 12:20 17:23 19:25 20:3
improving 8:2 14:4
include 23:20
included 7:18 15:14,16 17:9
includes 10:5 12:9
including 2:14 6:18 16:1,24 17:10
incorporate 21:5
increase 7:8 35:25
increased 28:7
Indian 1:1,3,10 2:8,23 3:6 6:18 7:10 13:25 31:22 32:19 33:20 42:11
indicate 8:11,25 9:13 11:10
indications 27:20
indirect 15:3
inform 6:7
information 4:5 4:24 5:23 16:5 17:1,4 18:21 20:5 22:13 23:1
inhabit 14:20,22
inherently 28:21
initially 8:24
injuries 36:22
input 17:3 20:9 21:5,8 23:2 40:20
inspect 18:19
inspection 18:20
inspections 15:16
interested 6:7 42:19
interesting 35:19
intersection 9:18 11:11 17:20 24:22 25:9,17 27:6,8 28:20 29:2,4 29:13,17,18 30:18,19 37:3 40:2
intersections 11:9 28:25 29:8
investigation 16:24
investigations 13:15 15:18
invited 5:4
involve 6:7
involved 28:13
involvement 6:6 17:9
involves 2:12
island 6:14 29:24 39:23
issues 31:9 35:23

J

jay 14:15 15:1
jays 14:22 15:3
Jeff 38:18
jeopardized 19:8
Jersey 39:16,18
job 40:13
Joe 3:8
John 37:25
Johnny 31:16,17
Johns 16:9 34:19
joining 2:4
Joseph 38:17
juvenile 14:19

K

Kamm 27:10 28:4
keenly 28:13
keeping 28:3
kids 31:6
kind 26:2,12
knew 26:8
know 23:16,18 26:8,15 27:15 28:14 29:15 33:8 34:23 37:7,14 40:2,4
known 14:20,22 18:12

L

L 42:7,23
Laila 22:1,19 38:16
Lake 10:12 27:8 30:4 41:9
land 14:1
landfill 34:15
lands 13:13
lane 25:1
lanes 2:13,14 7:15 8:14 9:22 9:22 11:4,5,23 11:24 14:6 17:17 27:14
Large 42:9
Lateral 10:11
Lauderdale 1:15 22:8
law 5:22
laws 3:24
layout 26:14 35:22
League 23:25

left 28:18 29:3 36:15
Legislative 3:13
let's 23:6 32:8
levels 16:14
Liberty 29:24
Library 1:10
lieu 22:5 29:1 30:18
life 31:19
light 36:12 40:5
lighting 23:22
lights 24:4 31:25
limit 23:1
limiting 27:3
limits 7:12 16:16
linkage 6:15
Lisa 3:10
list 3:4 23:24 35:12
listed 14:12 15:4 24:3
listened 24:1
little 23:13,17 25:18 33:21 36:11,13 38:7
live 23:11 32:1 32:16 33:25 39:13
living 31:11
local 6:17 7:1 10:8 40:11,14
located 14:18
location 1:10 12:2 19:16 21:13,22 38:24
locations 12:12 12:18 15:6
Long 6:20
look 23:24 26:12 26:20
looks 38:25
lot 2:23 25:12 27:3 39:19
loud 40:9
love 34:10,22
loved 34:20,22
low-risk 16:21

M

Machine 42:7
Magnet 29:24
mailed 21:3
main 6:1,13 29:4 35:15
maintain 7:5 10:15
maintained 10:14
maintains 7:25
major 24:5 37:3
making 1:6 3:21 19:4 36:15,15
manage 12:19
management 3:20 4:2 7:22 12:1,5,15 16:10 21:10
manager 1:13 1:18 2:19,19 2:22
manages 14:1
managing 12:1
mandated 5:20
maneuver 26:1
manner 18:16
map 16:3
Mapping 16:4
Maria 1:13 2:17 2:24 22:11
Marine 15:7
MARTIN 42:2
MaryLou 41:6
material 22:6
matrix 9:8
Matson 3:7
matter 42:10
median 9:21 11:4,23 12:3 12:10,11,11,13 29:3,6 31:13
medium-risk 16:21,23
meet 5:18 9:6 39:6
meeting 17:7 26:17,17 27:5 38:25 39:1
meetings 17:1 17:10,11 20:10
member 22:1
members 4:11
mentioned 27:5
merge 27:19
messing 32:2
method 20:23
methods 5:10
Metric 1:17 2:22 29:16
Metropolitan 6:19
Miami 1:19
Michael 24:15 24:15,17
microphone 5:14 20:20 22:21 37:22
Middle 30:1
middle-aged 30:2
migrant 32:3 34:2,2
miles 6:10 7:16 9:2,3 36:24
million 18:1,3
mind 26:12
minds 28:23
minimized 16:6
minimizing 9:16
minor 8:2
minutes 23:2 27:3
misnomer 37:7
missing 39:1
mitigate 5:10
mitigated 16:9
mitigation 15:2 15:9
money 38:11
months 38:10
Moore 1:22 42:7 42:23
morning 30:13
mornings 29:21
mosquitoes 32:11,13 34:20
Mother 32:21 33:13
motorcyclists 30:6
motorists 27:12 27:23 28:4,14
MOU 3:25 21:11
move 18:13,17 19:5 32:18 33:4
moved 18:24
movement 12:6 29:10,13
movements 29:5 29:9
MPO 3:7 6:19 6:24,25 30:16
MR.VOTAPKA 27:2
multiple 7:23
multitude 29:19
municipality 22:25

N

name 2:9 22:2 22:19 23:7,11 30:23 31:17 35:11 37:24,25 38:17 39:12 40:17 41:6
national 4:14 5:20 15:7,23
natural 6:5 9:12 13:5
Nature 32:21 33:13
navigating 28:23 36:16
necessary 18:5 19:3
Nee-Pah 5:21
need 5:8 9:15 27:15 30:20 33:14,19,23,23 33:24 34:25 35:1,3 38:7 41:7
needed 7:3 25:25
needs 5:19,25 8:4 9:6 31:1 38:5
negotiate 27:15 27:23 30:12
neighborhood 34:11 38:8
neighbors 24:25 35:23 36:7,8
neither 7:24 42:15
nest 14:14,17
new 10:21
nice 33:16
noise 16:12,14 16:15,16
noise-sensitive 16:17
nonstop 25:4
north 1:10 11:1 11:16 13:1 25:23 27:8 30:20
northwest 10:19 24:18
Notary 42:8
note 38:25
notification 19:6
notified 19:3
number 3:20,22 7:8 12:2
numerical/des... 9:8
nursing 34:21

O

observed 14:19
obtain 19:16
Obviously 26:3
occur 8:9 16:2
occurred 5:3 13:25 15:8

ocean 32:17
offer 21:16
offers 9:14
office 4:2,22,22 21:10 22:7 26:18 35:11
Officer 15:21
official 4:10
officially 40:22
officials 3:3
offsite 12:25
Oh 40:18
okay 3:11 21:20 22:4,15,21 37:1
older 30:2
ones 34:20
ongoing 15:3
open 5:2
opening 36:4
openings 12:3 12:11,13
operating 7:5
operational 8:3 8:19 11:14
Operations 7:22
opinions 4:12
opportunities 20:8
opportunity 2:15 4:11 5:13 21:17,24 39:5 40:12,13,15
option 7:25
options 8:22 9:4
oral 5:13 20:12 20:18 22:5
order 7:4 8:7,11 8:15 9:5 10:15 11:17,19 17:22
organization 6:19 22:24 27:11
origin 4:15
Osceola 1:23
outcome 42:20
owner 10:18
owns 14:1 38:20

P

P.E 1:13,18 22:12
p.m 1:9 28:3 40:25
P.M.P 1:13 22:12
parents 29:22
part 11:7 21:1 22:9 23:23
partial 17:22
participating 24:14
participation 4:13
parties 6:8 42:16
party 42:18
patience 27:16
patterns 27:25
pay 27:18
payment 18:23 19:1,1
PD&E 1:1,3 5:17 6:1 11:7 19:15 21:9 26:11 40:23 42:11
peak 28:3 29:12
peak-hour 30:14
pedestrian 29:9
pedestrians 25:3 29:11
Pelican 29:24 39:23
people 25:12 31:11,23 33:16 34:24 36:8,14 36:23 39:24 40:11,14
perceive 36:10
percent 35:22,25
perception 36:9
perform 8:15
performed 8:6 11:8 14:13 16:19
period 5:11 21:7
periods 28:3 29:12 30:14
personal 28:9
personnel 20:14
Persons 4:19
phase 2:20 12:24 19:15
Phil 3:7
physical 6:6 9:11 13:6 35:13
pictures 25:11
piece 24:5
pipe 12:25 14:8
pipes 32:10
pit 38:7
place 10:15 33:13
places 15:24 32:22
plan 6:21 25:8,9 26:20
planned 6:8
planning 1:18 6:19 25:1 27:11 38:24
plans 2:25 6:18 20:3 38:23
played 3:18
please 21:25 22:18,25 31:6 37:24 40:11,17
points 28:2
Policies 18:11
Policy 5:21
pond 12:22,24 26:7 38:24
ponds 12:19 26:15 32:9
poor 27:24
portion 2:20
possible 16:7
possibly 33:24
Post 35:11
posted 7:15
postmarked 20:24 22:8
potential 4:7 5:9 6:3,5 8:18 9:14 12:18,22 14:12 16:24
potentially-co... 16:19
Powerline 11:18
practice 12:1
practices 27:24
predicted 16:14
preliminary 12:17 20:2
prepared 12:17 13:9
present 1:12,17 3:4 18:20 20:20 21:21
presentation 3:16,17 5:3,7 5:12 20:14 21:16,18 31:14
presented 22:4
Preservation 15:21
Preserve 11:1,2 13:17,24 14:4 14:11
president 41:8
pressure 32:18
pretty 38:22
previous 10:3
previously 10:17
primary 5:1 7:7
principal 7:14
principle 28:16
prior 5:3 28:6
priority 6:24,24 40:12
probably 26:20 38:20
problem 31:25 32:2,4
problems 23:21 23:21 27:22 31:24 32:6
procedures 19:4
proceedings 20:19
process 5:20 17:3 21:7
Professional 1:22
professionals 5:23
program 6:20 6:22 19:10
programmed 19:20,23
progress 24:20 37:14
Progressive 23:25
project 1:3,4,13 2:6,16,18,19 2:22 3:20 4:12 4:24 5:4,5,8,10 5:16 6:9,10,17 6:23 7:3,8 8:16 9:6 11:9 13:3 14:3,9,17,23 15:6 16:2,4,16 16:22 17:8,9 17:12,13 18:2 18:5,6,15 19:14,14,19,22 20:2,5,9 21:12 21:14 22:1 25:24 26:8,14 26:19 39:6,7 40:21
project's 9:15
projected 8:9,12
projects 6:24,25 7:2 19:18
promptly 19:2
Prong 10:25 11:2 13:17,24 14:4,11
proper 12:4 38:7
properly 8:12 28:14
properties 35:14
property 10:19

18:11,19,21 26:4,6,14 32:5 39:8
proposed 2:12 4:6 5:10 12:13 12:19,20 14:3 14:23 19:25 20:3
protection 13:20 14:2
protects 13:12
provide 2:15 5:5 5:13,14 10:6 18:20 20:9 22:25
provided 4:24 23:4
provides 6:15
providing 4:10 8:3 40:20
provision 12:9 14:5
public 2:5 3:5,19 4:4,5,9,11,12 4:17 6:6 17:1,9 17:10,11 20:9 20:10 21:1,1,6 22:6,10,25 40:20,22,25 41:3 42:8,9,13
publicly-owned 13:13
PUD 26:9
pull 40:11,14
pump 34:17,17
pumps 32:8 34:16
purpose 4:4 5:8 9:15 26:4
pursuant 3:24
push 32:16 33:6 34:1,7
pushing 33:3
put 32:8 33:10 34:17 35:1 39:3
puts 29:11
putting 31:10

Q

quadrant 10:19
questions 17:8 19:11 39:15
quite 31:1
quoted 35:22

R

raccoons 32:25
race 4:14
rain 33:21
rains 33:14
rainy 33:18
raised 12:9,10
Range 6:20
ranging 8:22
rating 16:20
re-evaluated 16:18
real 18:11 24:7
realigning 17:19
realignment 10:5
really 25:25 40:10
reason 28:16 34:4 35:13
receive 19:6
received 17:3 20:16,24 22:6
recognize 3:2
recommend 30:15
recommended 9:18,24 10:4,9 10:23 11:12,15 12:12,24 13:4 13:8 16:13,23 17:6,14,18,23
reconsider 30:17
record 20:17 21:1 22:10 26:6 27:12 30:25 37:24 39:5 41:2
recreation 13:13 13:18
recreational 13:15
red 31:24
reduced 12:7
refinement 17:5
regard 4:14
regarding 4:12 15:2 21:22
regards 42:10
regional 6:18
register 15:23 26:5
regular 25:17
regularly 14:19
regulations 21:15
related 42:16
relationship 31:3
relative 42:17
religion 4:15
relocation 17:25 18:5,7,10,17 18:22 19:6,9 19:12
relying 37:10
remove 10:9
removing 39:19
replace 13:2
replacing 14:7
Report 6:25 13:7
reported 28:8 42:12
reporter 1:21,22 5:6,15 20:17 20:22 41:3 42:5,7,8,23
Reporting/Liti... 1:23
represent 22:24
Representative 3:13
Representatives 17:6
representing 23:12
represents 5:22
require 17:22,24
required 10:20 13:1 18:13,17
requirements 4:18
research 15:12 39:18 40:3
residence 17:24 38:1
residences 10:16 16:15
residents 7:9 25:6
resources 13:11 13:12,16,19,19 13:20 15:12,19 15:22,25
respect 27:16
restricted 29:6
restrictive 8:24
result 10:20 12:5 18:14 30:13
resulted 15:8
results 8:10,25 9:13 11:10,12
retire 31:23 34:6 34:6
retired 34:4
revealed 13:16
review 13:10 20:6
reviewed 26:11
reviews 15:13 16:3
rich 3:5 26:24 31:22,23 34:3 34:23
Rigby 30:23 40:9,18,18
right 23:9 25:21 26:1 29:5 32:15,19 33:11 33:12 34:1 36:15 40:4
right-angle 28:18
right-of-way 7:16 8:19 9:10 9:16 10:17,20 17:25 18:8 19:21,24 26:3 38:23
risk 16:20 29:12
River 1:1,3,10 2:8,23 3:6 6:18 7:10 13:25 16:9 29:21 30:1,1 31:22 32:20 33:20 42:11
road 1:1 2:6,7 6:11,12,13,14 7:6,12 8:11 9:17 10:10,14 10:16 11:9,11 12:10,20 13:1 14:6 19:19,19 19:22 24:21 26:5 27:8 30:19 31:10 34:25 36:19 38:5,9,13 40:23 42:10
Road/66th 11:18
roads 33:14,19
roadway 2:13 7:20 17:15,16
Rodriguez 1:18 2:21
room 3:6,8,9,15 24:16
roundabout 11:7,11 17:20 24:21,24 25:2 25:8,11 27:7 27:13,15,19,21 27:23 28:1,5 28:10,15 29:1 29:11 30:12,18 30:20 31:19,25 33:8 35:3,16

39:16,21 41:7
roundabouts 28:16,21,22 39:19
route 7:7,8
row 38:16
rugs 22:22
rules 21:15
runabout 36:17
running 33:7 38:6
runoff 12:20

S

safe 27:17 29:9
safely 27:19
safer 17:20
safety 7:19 8:4 10:7 11:13
Saint 34:19
sanctuary 33:4
sandhill 14:16
saying 30:25
scale 24:9
scheduled 17:10
school 29:21,23 29:23 30:1,2 31:5 39:24 40:1,6
Schools 29:25
Schulte 38:17,17
Schumann 39:25
screening 11:8
scrub 11:20 13:18,22 14:15 14:20,22,23,25 14:25 15:3
scrubs 32:18
season 33:17
Sebastian 1:10 1:11 3:10 6:11 23:12 29:21,25 30:1,3,8 39:14
second 5:7 39:7
section 8:22 9:1 9:3,7,19,19,25 10:1,2,24,24 11:1,3,16,19 11:22 12:9 13:12,19,20 15:1
sections 8:23,24
secure 15:9
see 3:1 24:6 25:10 26:12,21 31:14 39:21
seeing 38:22
seen 25:8,10 37:12
segment 8:17,21 9:14,17,24,25 10:3,22 11:15
segments 8:17
select 12:24
selfish 36:5
selfishness 36:6
senior 30:7
sent 21:9
separate 19:18
septic 23:21 24:4
served 17:3
serves 4:10
service 9:10 15:2 15:8
services 1:23 18:23
serving 29:24
set 26:16
sets 31:21
sewage 38:6
sewer 24:4 38:2 38:3,4,7,12
sex 4:15
Shampine 39:11 39:12,13
share 4:4
shine 31:21
Shorthand 42:8
show 27:16,16 40:21
showing 20:3
shown 21:3
shows 35:21
shrimp 15:6,9
side 24:16 38:21
sidewalks 2:14 9:23 11:25 14:5 17:17 23:22 24:4 35:1
sifted 15:15
sign 4:25 40:13
signage 8:3
signal 10:13
signalized 29:4,6 29:8 30:18
signals 12:3
SIGNATURE 42:24
signed 4:1 21:11
significant 11:13 13:10 23:19
significantly 39:8
Similar 9:24
single-lane 28:22
sir 23:15
sit 32:9
site 16:20
sites 16:17,19,22 16:23
six 16:15
slide 21:3
slightly 28:11
slow 27:16
smaller 24:9
smart 38:3,12
snakes 32:25
snowing 32:22
social 4:8 6:5 9:11 13:5 21:23 23:19
soil 15:14 16:24
solicited 4:14
solutions 6:4
sorry 23:15 36:25 40:18
south 10:25 11:2 11:19 13:17,23 14:4,10 38:21 39:16
Southeast 1:23
Southwest 1:19
Space 27:10
spacing 12:2
speak 5:4 20:20 23:3 37:20
speaker 20:14 21:25 22:18 35:7
special 19:5
specialists 19:9
species 14:13 15:4
speed 7:15 9:2,3 10:7
spend 34:21
spends 2:23
spoke 41:9
spray 32:12
SS 42:1
St 16:9
standard 30:17
standards 12:15
standpoint 11:14
start 22:3 38:8 38:13
started 23:6
state 3:3 4:18 5:22 6:14,21 15:21 21:15 22:18 37:24 39:20 40:17 42:1,8
statement 20:16 20:17 21:17,21
statements 5:13 22:4,5
stating 27:12
statistics 35:19
status 4:16
Statute 18:9
stay 27:13 31:20
staying 31:18
steadily 28:7
stenographica... 42:12
step 21:5
stop 29:14
stops 36:2,12 40:5
storage 26:7
store 31:5
stork 14:16
storm 23:20 38:24
stormwater 12:19
straight 33:10 36:16
street 1:19,23 9:18,25 10:13 10:14 23:12 24:18 25:3 31:4 39:14
strong 32:19
structures 15:17
Stuart 1:24
studies 20:1
study 1:1,3 2:7 3:22 4:7 5:8,16 6:1 7:12 11:7 17:2 20:6 35:21 40:23 42:11
sub-urban 11:3
subsurface 15:14
suburban 8:23 9:1
suitable 9:4
Suite 1:19,23
summarizes 13:7
sun 31:21
supervising 19:9
support 25:24 26:3
sure 24:2,11 35:19
Surface 16:1
Survey 15:20
surveys 14:14,15

14:18 15:13,16
swales 26:2
swampland 32:7
system 7:22 13:1 38:4,4,8,13
systems 23:21 38:2
Szpyrka 3:5

T

T 37:2
table 20:22
tag 22:2
take 26:20 32:5 33:13
taken 17:4 26:4 26:10 38:5
talk 40:9
talked 23:25
talking 32:8
Tallahassee 4:2 4:22
TAMALA 42:7 42:23
Tami 1:22
team 5:5 16:5 22:1
technical 5:23
techniques 12:5
teenage 29:20
tell 34:11,23,24 37:3
ten 12:21
terms 13:5
testing 15:14 16:25
Thank 2:4 3:12 24:14 25:19 26:22,23 30:21 31:15 35:4,6 35:10 37:19 38:14,15 39:9 39:10 40:7,16 40:19,23
thing 23:23 31:20
things 23:24 24:3 34:12 37:5,8
think 24:9,21,23 25:11,12,18,24 26:19 28:16 32:21,23 33:4 33:10,13 34:5 35:22
third 5:11
three 5:1 6:1 16:2 17:10 31:13
time 1:9 2:23 3:2 27:3 36:3,18 36:19,25
timekeeper 23:5
timing 23:9
Title 4:20
tonight 2:4,17 3:1 12:14 20:4 20:11
tonight's 5:2 17:11
Tony 35:7,11
tortoise 14:16,19
total 16:7
totally 37:16 41:6
tough 25:25
tourists 30:4
Tract 13:17,21 14:21
traffic 7:4,18 8:6 8:8,10,12 9:10 12:3,6 16:13 24:4 25:4,5 26:1 27:19 28:3,6 29:10 29:12 30:14 36:1,2,2,12,17 37:6,15 39:22 39:24 40:1,4,5
trail 14:9
transcript 20:18
transcription 42:13
transplant 39:16
transportation 1:6,18 2:5,11 2:18 3:21 4:21 4:23 5:19,25 6:9,20,21,22 7:22 13:14 18:14 27:11 29:16
travel 9:21 11:4 11:23
Treasure 29:25
treated 18:15
trees 32:19
trip 22:22
truck 7:7
trucks 30:5
true 42:12
truth 34:24,24
trying 25:3 30:12 32:5
TSM&O 7:23 8:1
Tuesday 1:8
turnabout 35:16 36:17 37:6
turned 22:17
turning 35:16 37:6,16
turns 28:18 29:3 29:5 36:15,15
two 2:12 7:15 9:21 11:4,23 14:18 15:6 19:18 23:2 27:2 28:11 29:2,17 35:14 37:23 39:15
two-and-a-half 31:2
two-lane 2:13 8:13 17:15 27:7,13 28:15 28:20 29:1 30:12
type 12:18 13:7 18:13 30:10,11 30:17
types 28:19
typical 8:22 9:1 9:3,7,19,19,24 10:1,2,23,24 11:1,3,16,19 11:22 12:8 25:9
typically 28:19

U

U-turns 29:3,7
U.S 3:25 15:1 16:10 30:6
unavoidable 13:24 18:4
underneath 14:10
understand 24:20
undivided 7:13
Uniform 18:10 18:12,16
unique 8:17,21
units 26:9
unpredictable 27:14
unsatisfied 18:24
upgrade 38:3
urban 7:13 8:24 9:2,20 10:2 11:21
US-1 6:16
use 26:4,6 27:16
uses 13:14
utilizing 9:8

V

valuable 17:3
value 18:21
varies 7:17
various 12:22 20:8 29:19
varying 7:15
vehicle 12:6 37:9
vehicles 28:1 30:8,10
vehicular 29:13 29:19
verbatim 20:18
Vero 10:12 30:4 41:9
VI 4:20
vicinity 16:22
video 3:17 21:18
Viera 27:9 28:5 28:10
Viera-type 30:20
view 5:4
views 21:22
virus 32:13
volume 28:6
volumes 8:8,13
Votapka 26:24

W

Wabasso 6:12 11:20 13:17,22 14:20,22,25 23:14,18,20 27:4,6 30:24 31:18 32:1,3 32:12,24 33:1 33:21 34:17 35:12 36:8
walk 22:20
Walker 37:21,25 37:25
wall 3:1
walled 24:7
want 26:5,20 29:15 30:25 31:9 32:13,13 34:6,10,20 35:17 39:4
wanted 24:11 39:17 41:5
wants 35:9
water 16:9 23:21 31:10,10 32:10 33:19 34:18
Waters 16:1
way 9:22 22:16 24:2 32:12 34:1 36:16
we'll 22:2

We're 2:2 32:6 39:3
we've 37:15
wearing 22:2
weather 32:23
website 20:6
weight 20:23
welcome 20:11
west 1:14 6:16 10:1,22 19:20 19:22 22:7 23:13,18,20 24:23 30:23
wetlands 16:1,3 16:4,8
white 15:5,9
Wickham 27:8
widened 8:14
widening 7:3 17:15 24:20 34:25
width 11:6
wildlife 14:7,13 15:2
wind 32:17,18
wish 20:19 37:14
wishes 20:4
wishing 4:19
wood 14:16
word 19:5
work 23:13,17 26:21 30:3 34:10 38:5 40:10
workday 28:10
worked 2:3
worker 32:4
workers 34:2,3
working 31:2 38:13 39:7
workout 26:25
works 3:5 6:25
worse 25:7
worst 37:5,8
wouldn't 38:3 38:12
writing 5:6,15 20:21 24:11 39:4
written 3:12 20:12,24 21:2 21:21 22:4,6 22:10
www.CR510p... 20:7

X

Y

y'all 32:7,15 34:8
Yeah 25:4
year 8:9
years 28:5,11 31:2 32:22
yield 29:14
young 29:20,22 30:2

Z

0

0.65 16:7

1

1 9:17,24
1.83 28:9
10 18:1 20:25
1001 1:10
104-foot 11:22
105th 41:8
108-foot 9:20
11-foot 9:21 11:23
12-foot 7:15 11:4
1213 23:11
136 1:19
13940 1:19
14 4:1 21:11
14233 1:6 3:22
15 1:1
150 32:22
1500 39:13
160 7:17
1970 18:11

2

2 9:25
2,000 38:20
20 7:16
20-mile-per-h... 10:6
200 1:19 28:7
2005 28:6
201 1:23
2016 4:1 17:2 20:11 21:11 28:7
2017 6:24
2018 1:8 19:17 19:23 22:9 42:21
2019 19:21
2021 19:21,24
2040 8:9,12
22-foot 9:21 11:4,23 12:9
23 3:25
235-5098 1:20
24 1:8
29-foot 11:6

3

3 10:22
30 17:22 36:24
305 1:20
327 3:25
32958 1:11
33186 1:19
33309 1:15
339.09 18:9
3400 1:14 22:7
34994 1:24
35 36:24

4

4 1:14 2:10 3:23 4:22 11:15
4(f) 13:12,19,20
400 26:9
405606-2-22-02 1:5 3:20
45 9:3
45-mile-per-h... 10:7
4536 38:1
4th 22:9 42:21

5

5 12:16
5.27 6:10
5:30 1:9
50 9:2 35:22,25
510 2:6 6:12 7:6 7:13 8:11 10:10,14,16 11:9,11 12:10 12:21 13:2 14:6 19:19,22 24:18 25:23 29:18 35:15 36:11,19 38:21 40:23
510/512 9:17
510/66th 30:19
512 1:2 2:7 6:11 6:13 19:19 33:11
55 1:23 7:16
58 1:2 32:3
58.24 18:3
58th 2:8 6:11 11:21 19:23
5th 27:5

6

6-foot 9:22 11:24 17:16
6:50 40:22,25
61st 11:18,21 38:1,2
64th 31:4
66 32:3
66th 10:23 11:2 11:12 17:21 24:18 29:18
6780 24:17

7

7 15:1
7-foot 9:22 11:5 11:24 17:17
700204 35:12
75 25:23
777-4677 1:15

8

80 7:17
800-336-0050 1:24
80th 39:1
8256 41:8
82nd 10:25 19:20,22
84th 39:1
85th 10:15 24:17
86 25:23
86th 10:1,14
87th 9:18,25 10:13
88th 10:22

9

954 1:15



Indian River County Fire Rescue personnel work at the scene where a boat exploded and caught fire March 15 on a lot adjacent to a home on Manly Avenue in Sebastian. Nobody was hurt in the incident, which was "suspicious," Indian River County fire officials said. XAVIER MASCAREÑAS/TCPALM

Boy, 11, faces 2 charges of arson after Sebastian fires

Eric Rogers
Treasure Coast Newspapers
USA TODAY NETWORK — FLORIDA

INDIAN RIVER COUNTY – An 11-year-old boy faces two felony counts of arson after deputies said he and a friend set fire to a trailer and boat on a lot behind a Sebastian neighborhood.

The boat fire, reported at the end of Essex Lane off Schumman Drive, caused a small explosion March 15 when flames caught on 50 gallons of fuel left aboard, sending up thick plumes of smoke to the surrounding area.

No injuries were reported in that blaze, nor when a small metal trailer on the same lot burned to the ground a month earlier.

Investigators with the Bureau of Fire, Arson and Explosives Investigations determined the fires were intentionally set and interviewed the boy after he was named in an anonymous tip, the warrant said.

The boy denied starting the fires but was named by two friends, who told police he had caused the boat fire by torching the seat cushions with a lighter and used lantern fuel and matches to burn the trailer.

He was arrested Friday and taken to the Department of Juvenile Justice in Fort Pierce.

Investigators also implicated one of the friends, who was present for or participated in starting the fires, according to the warrant. Sebastian police Lt. Timothy Wood said the state attorney's office is determining whether charges will be filed.

The total value of the burned property was about $7,000, investigators said.

Indian River County Fire officials originally told reporters no actions would be taken after the boat fire, despite suspicions of arson, because the boat had little or no monetary value.

Sebastian police officials also said they would not investigate but later contacted Bureau investigators after detectives determined a series of fires in the area were likely connected.

Contact Rogers at 772-978-2224 or eric.rogers@tcpalm.com. Follow him on Twitter @EricRogersFT.

Strip clubs

Continued from Page 1A

"Strip clubs have been a place where traffickers have hidden victims, and underage victims, for years," she said. "This (bill) is going to have to require them to give reports, that will be looked at, and they can be investigated for not supplying correct information and there will be a lot more accountability, so it really could help protect victims."

The bill calls for educating people about the signs of human trafficking, particularly those who work in massage parlors, the hotel industry, and law enforcement. The bill also addresses reporting suspicious activity to the National Human Trafficking Hotline.

Workers also will be trained on how traffickers typically work and act, Barletta said.

"Traffickers mirror terrorist methods," she said. "They use expert techniques on fooling children and getting them to step into traps, getting them to meet them, convincing them of a modeling job, or any number of dream offers to them that they think a child would respond to."

"Traffickers mirror terrorist methods. They use expert techniques on fooling children and getting them to step into traps, getting them to meet them, convincing them of a modeling job, or any number of dream offers to them that they think a child would respond to."

Lynne Barletta
Catch the Wave of Hope founder

In the United States, Florida had the third-highest number of human trafficking cases in 2018, with 367, according to the hotline. California and Texas, respectively, had 760 cases and 455 cases.



Bob Anderson, WMS
President/Financial Advisor (HFS)

ANDERSON WEALTH MANAGEMENT
1515 Indian River Blvd., Suite A243
Vero Beach, FL 32960

Securities offered through Harbor Financial Services, LLC: Member FINRA/SIPC

TR-SCN0005171-01

Personalized Investment Advice

Stock • Bonds
Mutual Funds • CD's
IRA's • Life Insurance

772-978-0404

Serving Indian River County since 1998

www.AndersonWM.com

TCN2886124

PUBLIC NOTICES PUBLIC NOTICES

2018 DELINQUENT TANGIBLE PERSONAL PROPERTY TAXES

NOTICE IS HEREBY GIVEN THAT THE FOLLOWING 2018 TANGIBLE PERSONAL PROPERTY TAXES ARE DELINQUENT AS OF APRIL 1ST AND DRAWING INTEREST AT THE RATE OF 18% PER YEAR (1½% PER MONTH) AND UNLESS SAID DELINQUENT TANGIBLE PERSONAL PROPERTY TAXES ARE PAID, WARRANTS WILL BE ISSUED THEREON PURSUANT TO F. S. 197.413 AND THE TAX COLLECTOR WILL APPLY TO THE CIRCUIT COURT FOR AN ORDER DIRECTING LEVY UPON AND SEIZURE OF THE PERSONAL PROPERTY OF THE TAXPAYER FOR UNPAID TAXES.

COMPILATION OF THIS LIST IS BASED ON PAYMENTS RECEIVED AND PROCESSED AS OF TUESDAY, APRIL 30, 2019.

Property owners' names on this list reflect the names on the Certified Tax Roll received from the Property Appraiser in October, 2018.

CAROLE JEAN JORDAN, CFC, TAX COLLECTOR - INDIAN RIVER COUNTY, P.O. BOX 1509, VERO BEACH, FL 32961-1509 - (772) 226-1343.

May 8, 2019

PARCEL #	OWNER	BUSINESS	AMOUNT
0188940 0000	BUCAJ ALFONS		836.47
0190050 0000	KATSIARYNA BAILOR	VERO FACIAL COSMETIC & MEDISPA	3,107.57
0191998 0000	RUSSELL PAYNE INC		295.90
0194225 0000	HALL & SONS INC		1,717.51
0194556 0000	SEBASTIAN CHIROPRACTIC PA INC		1,258.11
0195539 0000	STASKI ENTERPRISES INC	ATTN: MICHAEL STASZEWSKI	2,045.03
0201856 0000	INDIAN RIVER MALL	C/O KOHAN RETAIL INVESTMENT GROUP	4,776.56
0201990 0000	GOMEZ JEFFREY J	COAST TO COAST LANDSCAPING	3,856.74
0205705 0000	EXPERT PAINT & BODY INC		626.83
0206266 0000	COAST DENTAL SERVICES LLC		1,037.09
0206956 0000	MIYURI INC	SIAM ORCHID RESTAURANT	611.96
0208164 0000	COMMUNITY ASPHALT CORP		26,229.07
0209091 0000	BEACHLAND MILLWORK INC		691.77
0212718 0000	MR MULCH INC		16,134.28
0212804 0000	PARADIGM PLASTIC SURGERY CENTER LLC	DR JOHN M SARBACK	2,420.37
0217145 0000	R & R LAND CLEARING INC		537.85
0218702 0000	CATERPILLAR FINANCIAL SVCS	ATTN: TAX DEPT	781.14
0218703 0000	CATERPILLAR FINANCIAL SVCS	ATTN: TAX DEPT	1,027.89
0219214 0000	CAPA'S HOLDINGS INC	CUNNINGHAM'S POOL & DARTS	976.50
0219467 0000	43RD AVENUE INVESTMENT INC	CITGO GAS	786.00
0219470 0000	CHECKER'S DRIVE IN RESTAURANTS INC	CHECKER'S #6271	717.48
0220154 0000	CAPCAN II	MAISON MARTINIQUE	3,258.63
0220484 0000	COMFORT DISTRIBUTING LLC	DWELLINGS	943.48
0220869 0000	FROSTING LLC		857.90
0220983 0000	ROCKET 5 CORP	HENRY IZQUIERDO	1,009.04
0220998 0000	RUD AERO LLC	ATTN: TARAS RUD	3,118.80
0221479 0000	BRAIN FREEZE FROZEN YOGURT LLC		1,247.55
0221620 0000	THE CONTINENTAL GROUP INC		1,415.93
0222153 0000	BERRY BON BON LLC	DANIEL & JUNE WEINER	654.59
0222245 0000	STROME NETWORKS (FKA ALLIED FIBER)	C/O SILVER OAK ADVISORS	4,874.53
0222246 0000	STROME NETWORKS (FKA ALLIED FIBER)	C/O SILVER OAK ADVISORS	2,973.78
0222247 0000	STROME NETWORKS (FKA ALLIED FIBER)	C/O SILVER OAK ADVISORS	1,259.36
0222248 0000	STROME NETWORKS (FKA ALLIED FIBER)	C/O SILVER OAK ADVISORS	1,239.23
0222465 0000	VERO HYDRAULICS LLC		557.85
0222471 0000	OFF THE RAIL DOWNTOWN LLC		540.39
0222802 0000	DIVOSTA HOMES LP		148.58
0222803 0000	TMS THERAPEUTIC SERVICES LLC	DR. ERWIN RAMOS	1,526.96
0222810 0000	DIVOSTA HOMES LP		148.58
0222811 0000	DIVOSTA HOMES LP		521.56
0222900 0000	FERNANDO MIRANDA MD PA		1,254.78
0223025 0000	COMPASS GROUP USA INC	C/O CTMI LLC	78.16
0223034 0000	NS FOA LLC		14,208.54

TR-2242927

FDOT

ANNOUNCEMENT OF LOCATION AND DESIGN CONCEPT ACCEPTANCE

On April 26, 2019, the Florida Department of Transportation (FDOT), pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016, and executed by FHWA and FDOT, granted Location and Design Concept Acceptance (LDCA) for the County Road 510 Project Development and Environment (PD&E) Study from CR 512 to 58 Avenue in Indian River County, Florida:

Financial Project ID No.: 405606-2-22-02
Efficient Transportation Decision Making (ETDM) No.: 14233
Project Limits: County Road 510 from Country Road 512 to 58 Avenue

Project Description: The project consists of the widening of County Road 510 from two to four lanes from County Road 512 to 58th Avenue. This project will now proceed to the next phase of development.

For information please contact:

Maria Formoso, P.E., P.M.P.
Project Manager
District Four
Consultant Management
Florida Department of Transportation
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309-3421
(954) 777-4677
Toll Free: 1-866-336-8435 ext. 4677
maria.formoso@dot.state.fl.us

Public participation is solicited without regard to race, color, national origin, age, sex, religion, disability or family status.