Florida Department of
TRANSPORTATION

FINAL
NOISE STUDY REPORT

PROJECT DEVELOPMENT AND ENVIRONMENT STUDY
COUNTY ROAD 510/85 STREET
From County Road 512 to 58 Avenue,
ETDM Number: 14233

Indian River County, Florida
Financial Management Number: 405606-2-22-02
Federal Aid Project No.: 4984-004-S

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.

Prepared for
Florida Department of Transportation
District Four
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309-3421

OCTOBER 2017

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Metric Engineering, Inc.
OCTOBER 2017

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to investigate widening a segment of County Road (C.R.) 510 from two to four lanes, extending from C.R. 512 (Sebastian Boulevard/85 Street) to 58 Avenue, in Indian River County, Florida. The project corridor stretches 5.27 miles, is generally rural in nature and includes a mixture of agricultural, educational, commercial, industrial and residential facilities.

This project consists of improving capacity on C.R. 510 from C.R. 512 to 58 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 2040, as the roadway will have insufficient capacity to accommodate the project travel demand.

As part of this PD&E Study, a traffic noise study was conducted in accordance with Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010) and the FDOT PD&E Manual, Chapter 18 – *Highway Traffic Noise* (dated June 14, 2017). The primary objectives of this noise study were to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for the No Build and Build Alternatives, and 4) evaluate abatement measures for those noise sensitive sites that, under the recommended Build Alternative, approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and Federal Highway Administration (FHWA) or are subjected to a "substantial increase" of 15 dB(A) or greater. Other objectives of this study include consideration of construction noise and vibration impacts and the development of noise level isopleths, which can be used in the future by local municipal and county government agencies to identify compatible land uses. The methods and results of the noise study performed for this project are summarized herein. The information within this report is also intended to provide the technical support for the findings presented in the Preliminary Engineering Report (PER) and the Type II Categorical Exclusion Report.

Based on the FHWA and FDOT methodologies used to evaluate traffic noise levels in this study, modifications proposed with this project were determined to generate noise impacts at noise sensitive sites within the project study area. Traffic noise levels were predicted for noise sensitive locations along the project corridor for the existing (2015) conditions and the design year (2040) No-Build and Recommended Alternative. The Recommended Alternative traffic noise levels 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 NAC B [66 dB(A)] at six residences. These residences are represented 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 SFH68 are discrete locations. No other residence is predicted to be impacted in the area of the four discrete receptors. FDOT policy requires 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.

Noise abatement was considered for the receptors SFH34 and SFH36, and analyzed as a common noise environment in order to meet FDOT policy requiring that at least two (2) impacted receptors achieve a 5 dB(A) reduction or greater. The two impacted residences are 275 feet apart and are separated by both 59 Avenue and a driveway for SFH36. The subject driveway onto CR 510 is the only access point for the property represented by the SFH36 receptor. Since 59 Avenue and the driveway cannot be closed, three noise barriers segments were analyzed. Results from the barrier analysis shows that none of the concepts meet FDOT reasonableness and feasibility criteria. The barrier concepts are unable to completely break the lines of sight between the impacted receptors and the roadway due to the barrier openings required for 59 Avenue and the SFH 36 driveway. As a result, the effectiveness of the barrier concepts to reduce noise levels are greatly affected.

Noise abatement is not considered reasonable and feasible for the six impacted residences. Therefore, based on the noise analysis performed to date, there are no apparent solutions available to mitigate the noise impacts along this project corridor.

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Acronyms

AADT	Annual Average Daily Traffic
ATRP	Abandoned Tank Restoration Program
C.R.	County Road
CSER	Contamination Screening Evaluation Report
EDI	Early Detective Incentive
ETDM	Efficient Transportation Decision Making
ERP	Environmental Resource Permit
EST	Environmental Screening Tool
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FGDL	Florida Geographic Data Library
FHWA	Federal Highway Administration
FLUCCS	Florida Land Use Cover and Forms Classification System
FY	Fiscal Year
GIS	Geographic Information Systems
ID	Identification
LIDAR	Light Detection and Ranging
LOS	Level of Service
LRTP	Long Range Transportation Plan
LSRAP	Limited Scope Remedial Action Plan
mph	Miles Per Hour
MPO	Metropolitan Planning Organization
MW	Monitoring Well
NPL	National Priorities List
NRCS	National Resources Conservation Service
OFW	Outstanding Florida Water
PD&E	Project Development and Environment
RCRA	Resource Conservation and Recovery Act
S.R.	State Road
SRCO	Site Rehabilitation Completion Order
SJRWMD	St. John's River Water Management District
SUPER	State Underground Petroleum Environmental Response Act
TIP	Transportation Improvement Program
TSAR	Template Site Assessment Report
TSM&O	Transportation Safety Management and Operations
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
V/C	Volume to Capacity
WSCA	Wabasso Scrub Conservation Area

1 INTRODUCTION

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate alternatives for mobility and safety improvements to County Road (C.R.) 510 in Indian River County, Florida. The project extends 5.27 miles along C.R. 510 from its intersection with C.R. 512/Sebastian Boulevard to 58 Avenue. A project location map is provided as **Figure 1-1**. C.R. 510 is primarily a two-lane roadway that is functionally classified as an Urban Principal Arterial for east-west traffic movements. There are three bridge structures along C.R. 510 and an open drainage system.

As part of this PD&E Study, a traffic noise study was conducted in accordance with Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010) and the FDOT PD&E Manual, Chapter 18 – *Highway Traffic Noise* (dated June 14, 2017). The primary objectives of this noise study were to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for the No Build and Build Alternatives, and 4) evaluate abatement measures for those noise sensitive sites that, under the recommended Build Alternative, approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and Federal Highway Administration (FHWA) or are subjected to a "substantial increase" of 15 dB(A) or greater. Other objectives of this study include consideration of construction noise and vibration impacts and the development of noise level isopleths, which can be used in the future by local municipal and county government agencies to identify compatible land uses. The methods and results of the noise study performed for this project are summarized herein. The information within this report is also intended to provide the technical support for the findings presented in the Preliminary Engineering Report (PER) and the Type II Categorical Exclusion Report.

1.1 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 5.27 miles (**Figure 1-1**). 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).

Figure 1-1 Project Location

2 PROJECT PURPOSE AND NEED

2.1 PROJECT OBJECTIVE

This project consists of improving capacity on C.R. 510 from C.R. 512 to 58 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 2040, as the roadway will have insufficient capacity to accommodate the project travel demand.

2.2 PROJECT NEED

It is important to note that this roadway is deemed deficient in the Indian River County 2040 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 (V/C) ratios of 0.63 – 1.35 and above 1.65. 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, and one at M.P. 2.726 - M.P. 2.735. The project is 5.27 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. Additionally this roadway provides access to commercial, educational, residential and agricultural uses. The project is anticipated to cost $100,000,000, of which the great majority will be Federally-funded dollars. C.R. 510 from C.R. 512/85 Street to 58 Avenue is identified as a cost-feasible project in the Indian River County 2040 LRTP.

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 2016/2017 -FY 2020/21 Transportation Improvement Program (TIP). It should additionally be noted that $4,433,546 is programmed for the Project Development and

Environment (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.

As the Indian River County 2040 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 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.

The logical termini begins at the signalized intersection of C.R. 512/85 Street and terminates at the signalized intersection of 58 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. 512/85 Street to 58 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 2040, 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 (**Tables 2-1** and **2-2**):

It is important to note that this roadway is deemed deficient in the Indian River County 2040 Long Range Transportation Plan (LRTP) based on the projected 2040 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) of 0.63 – 1.35 and above 1.65. 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 2040 if additional improvements are not made.

Table 2-1 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	66 Avenue	2 Lane Undivided (>40 MPH)	12,740	13,000	1.02
66 Avenue	58 Avenue	2 Lane Undivided (<35 MPH) with LT lanes	13,320	11,000	0.83

Table 2-2 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	66 Avenue	2 Lanes Undivided (>40 MPH)	12,740	21,000	1.65	4 Lanes Divided (>40 MPH)	35,820	23,250	0.65
66 Avenue	58 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

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 2040 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 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 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. 512/85 Street to 58 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 Indian River County Metropolitan Planning Organization's (MPO) FY 2016/2017 -FY 2020/21 Transportation Improvement Program (TIP). It should additionally be

noted that $4,433,546 is programmed for the Project Development and Environment (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

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 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.

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 2040 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

3 PROJECT ALTERNATIVES

The alternatives considered include the No Build Alternative, Transportation Systems Management and Operations Alternatives, 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 C.R. 510 within the project limits.

3.1 NO BUILD

The "No Build" alternative assumes the retainment of existing conditions. It is 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 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.

3.2 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.

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. As stated, several of the proposed intersection improvements previously identified will be incorporated into the design of the major project alternatives.

3.3 BUILD ALTERNATIVES

Prior to initiating the development of alternatives, the project was broken down into four (4) distinct 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 3-1**. 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 3-2** through **3-5** depict the Recommended Alternative Features per segment, and **Figure 3-6** depicts the typical section details.

A brief description of the build alternative per segment is as 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 sidewalks. An access class 5 is proposed for this segment. **Figure 3-2** shows some of the most distinctive features of this option within Segment 1, 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 sidewalks. The horizontal curve within this segment will be reconstructed to allow 45 mph design speed and improve safety conditions. The access provided for the Vero Lake Estate to C.R. 510 has been limited to 87 Street. Also, access to C.R. 510 from 86 Street and 86 Place has been eliminated. This alternative proposes to close the existing C.R. 510 and remove the existing bridge over Lateral Canal D. **Figure 3-3** illustrates some of the most distinctive features of this option within Segment 2.

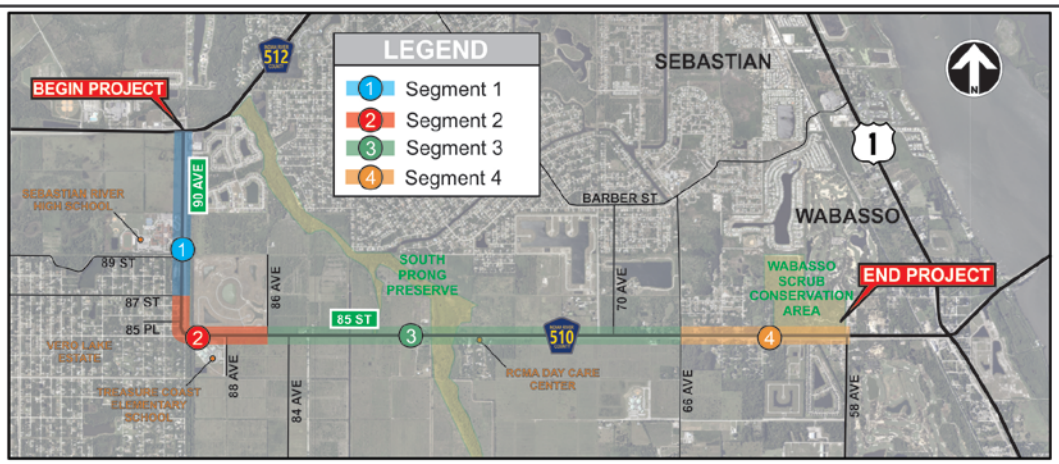
Segment 3

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 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 given throughout the segment to allow access for the various stakeholders/property owners along the segment. **Figure 3-4** 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 3-5** illustrates some of the salient characteristics of this alternative within this segment including

the various partial median openings that have been given to the communities along this segment.



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	1.00 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.	0.72 miles	100'	10,100	13 crashes including intersections within segment. 1 fatal crashes 7 injury crashes 5 PDO crashes
3 From just west of 88 Ave to 66 Ave	• Mainly undivided two lane segment on tangent with substandard bridges over the lateral "C" and lateral "I" canals. • The South Prong Slough Conservation area and the San 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	100'	9,800 (2014)	24 crashes including intersections within segment. 0 fatal crashes 17 injury crashes 7 PDO crashes
4 From 66 Ave to 58 Ave	• 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	Varies 80' Min 110' Max	8,100	32 crashes including intersections within segment. 0 fatal crashes 24 injury crashes 8 PDO crashes

*Based on 2010-2014 Crash Data

FDOT

CR 510 PD&E Study
FM No. 405606-2-22-01

Figure 3-1 Project Segmentation

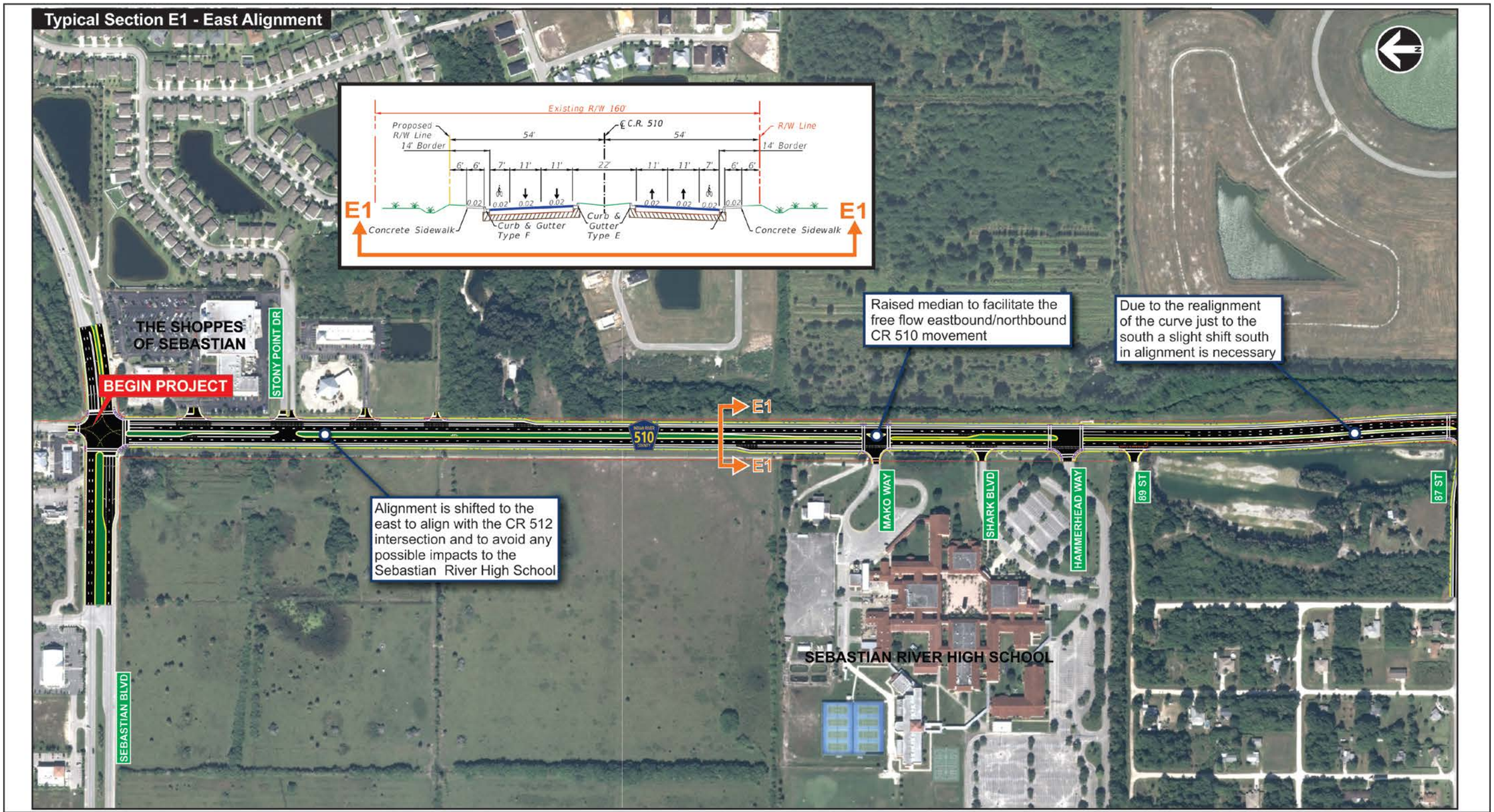


Figure 3-2 Segment 1 Typical Section with Alignment Features

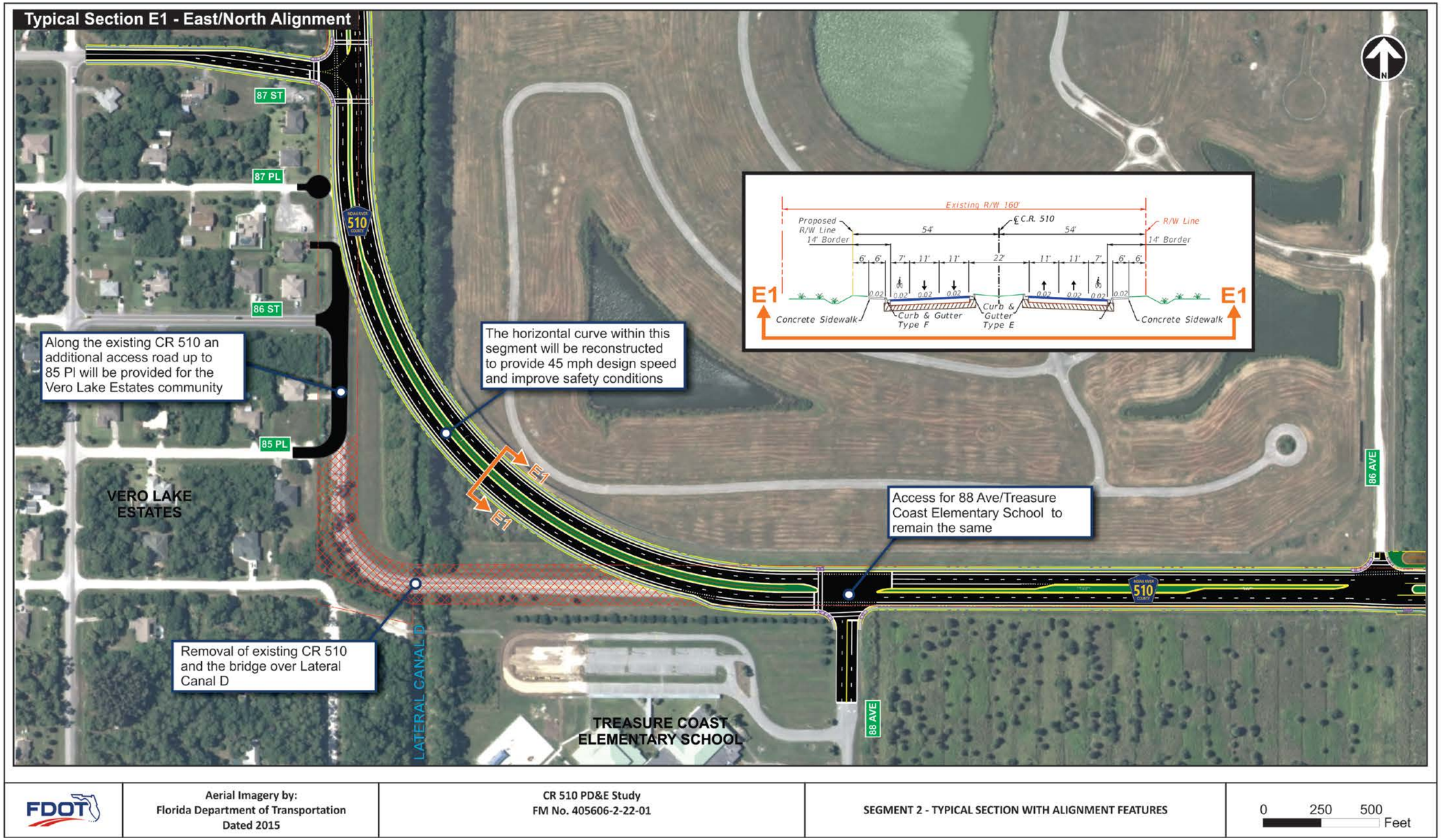


Figure 3-3 Segment 2 Typical Section with Alignment Features

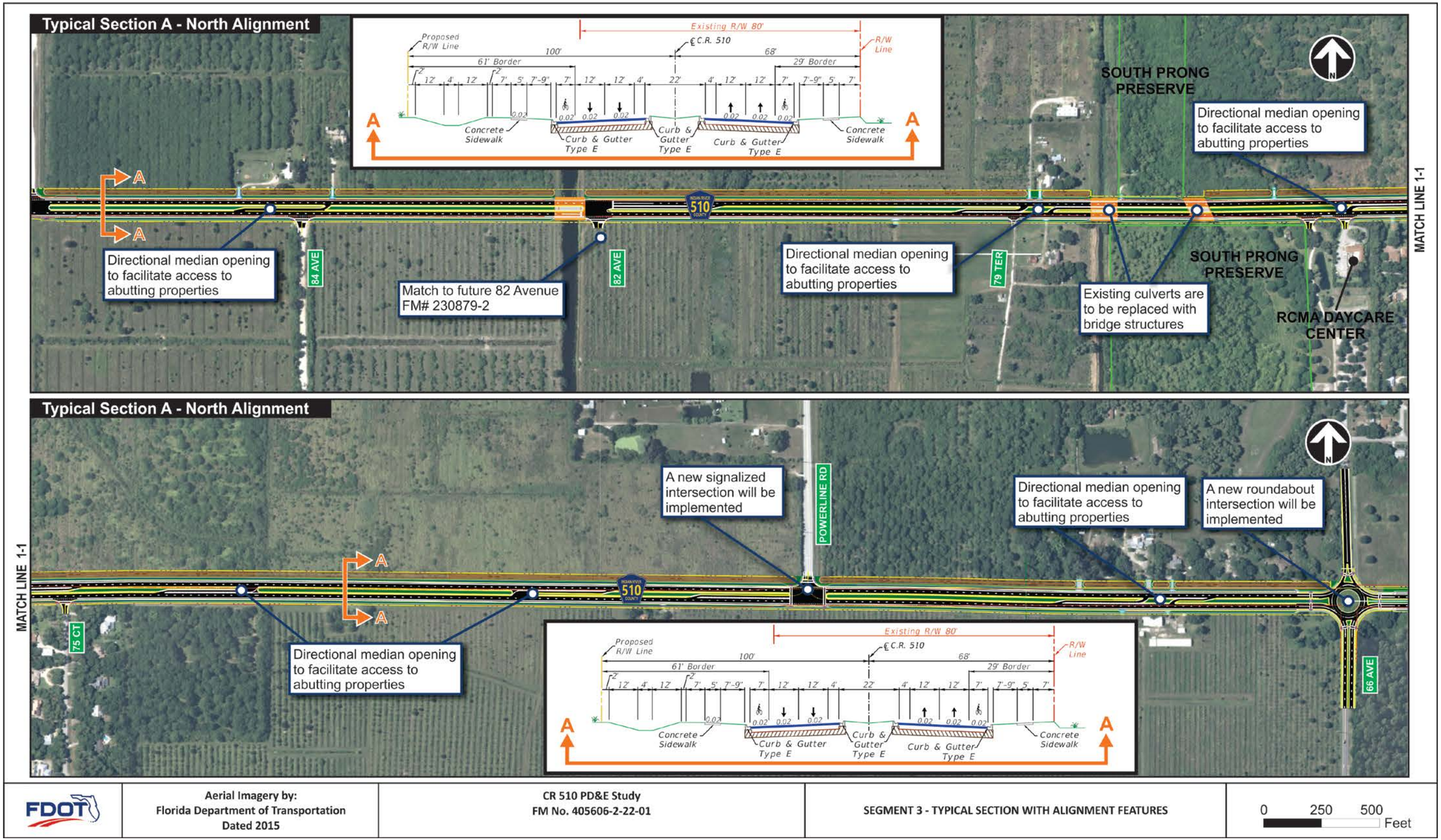


Figure 3-4 Segment 3 Typical Section with Alignment Features

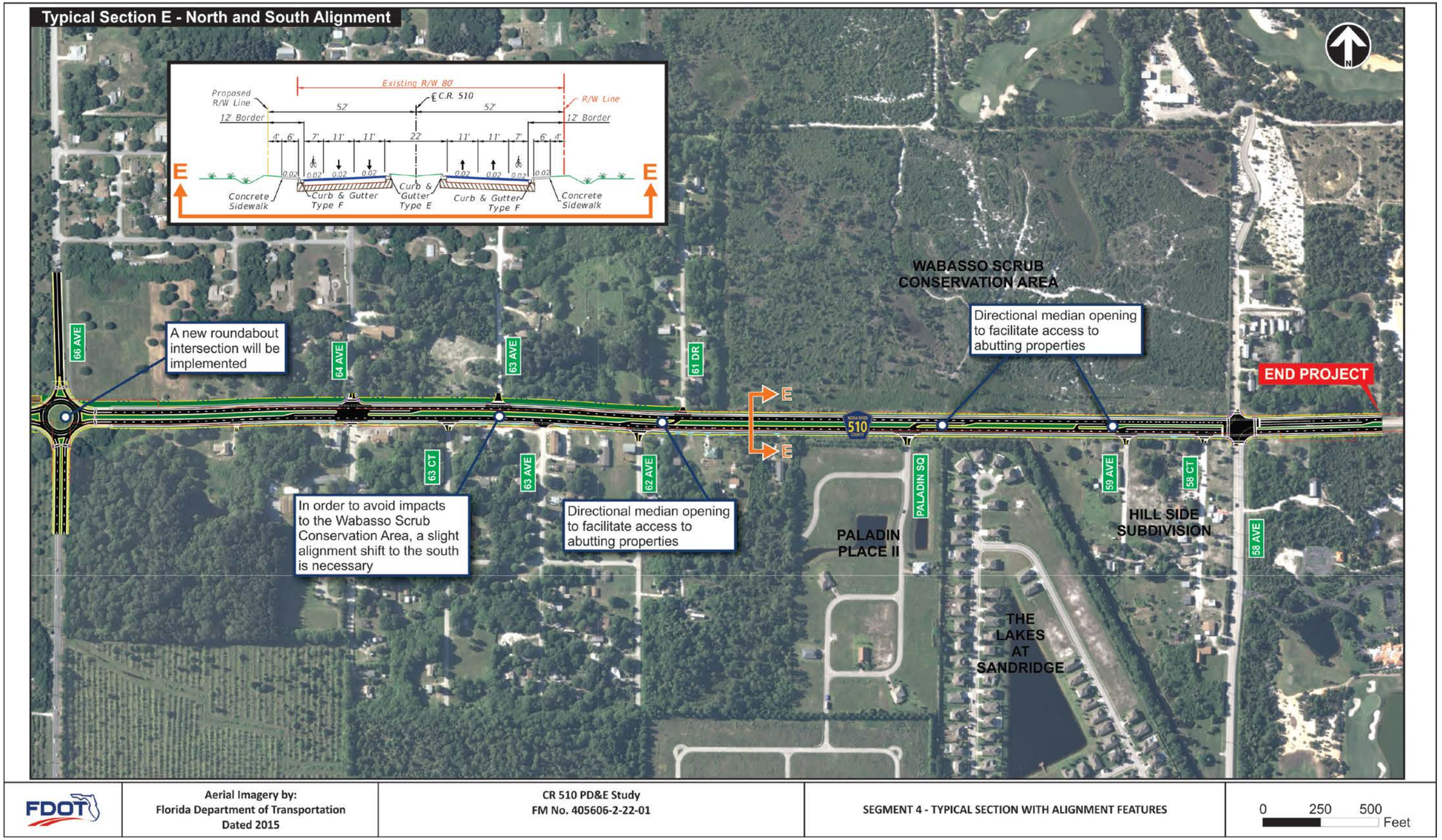


Figure 3-5 Segment 4 Typical Section with Alignment Features

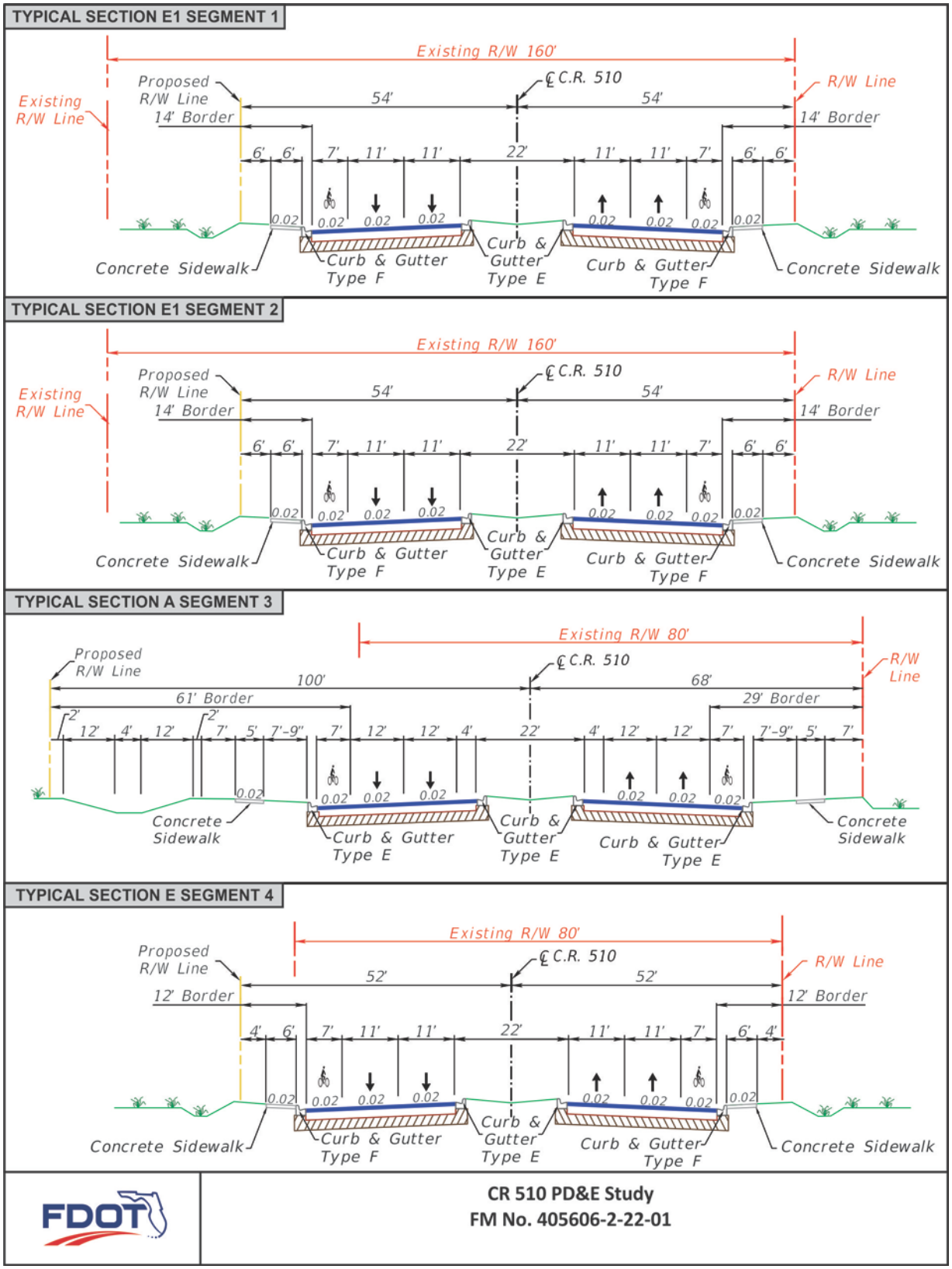


Figure 3-6 Typical Section Details

4 PROJECT AREA DESCRIPTION

The project occurs in Indian River County, southwest of the City of Sebastian. The term "project corridor" is used in this document to represent a smaller area that encompasses the existing C.R. 510 right-of-way and the recommended alternative. The term "project area" represents a larger expanse that encompasses the project corridor as well as all land within 500 feet of the centerline of C.R. 510.

The project area is primarily agricultural, with pastures, citrus groves, and home sites scattered throughout. However, increased residential development is encroaching from the City of Sebastian to the north and from Vero Lake Estates, a housing development that borders the project. 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 one half-mile south of that intersection and immediately west of C.R. 510 is Sebastian River High School. C.R. 510 makes a 90 degree bend approximately 1.25 miles 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. 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 initial development permit for this site expired and there are currently no known active permits for this or any other development.

The majority of the agricultural lands in the project area are abandoned citrus fields. Most of these fields contain standing dead citrus trees on raised rows with furrows between each row. Dead citrus trees in some fields have been cleared and additional clearing is ongoing. East of 66 Avenue residential land use becomes more common. Three canals cross the project corridor, each is oriented north-south.

Indian River County owns three notable conservation properties adjacent to this project. In the northeast quadrant of the intersection of C.R. 510 and C.R. 512 is the Ansin Tract, which contains forested land stretching from that intersection to the Saint Sebastian River. Near the middle of the project, the south prong of the Saint Sebastian River is surrounded by two tracts of land owned by Indian River County and managed as the South Prong Preserve. At the projects eastern terminus is the Wabasso Scrub Conservation Area (WSCA), which contains scrub habitats and has been used previously for mitigation for federally listed Florida scrub jays (*Aphelocoma coerulescens*).

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 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 in the project area 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 in the project area

as mapped by SJRWMD are shown in **Figures 4-1** and **4-2** and each land use category in the project area is described below along with its location.

Residential, Low Density (FLUCCS – 1100)

This category is reserved for low density residential areas that have from one half to two acres per dwelling unit. Residential, Low Density land uses are often located in newly established sections of large urban areas or on urban-rural fringe. This land use type occurs immediately east of the project corridor approximately 0.3 mile south of the intersection of C.R. 510 and C.R. 512 and also immediately east of the South Prong Preserve, south of C.R. 510. A third area of this land use type occurs south of C.R. 510 between Power Line Road and Schumann Drive.

Residential, Rural (FLUCCS - 1180)

This residential category is restricted to areas where the density is two to five acres per dwelling unit. It is used for areas with low dwelling unit densities, but not low enough to be put into a non-residential category, as with farmsteads. This class may contain a mosaic of small open areas, natural vegetation, or miscellaneous land covers/uses. This land class is found in one location in the project area, immediately west of the South Prong Preserve and east of 82 Avenue.

Low Density Under Construction (FLUCCS - 1190)

This category refers to low density residential areas that are in the process of construction. When completed they will fall into the 1100 class, with more than one half and less than two acres per dwelling unit. There is no time limit set on completion of the areas under construction. However, if the in-fill process is indefinitely stalled, the code 1920 is used instead. This class is found in one location in the project area, on the north and east side of the 90 degree bend in C.R. 510.

Residential, Medium Density (FLUCCS – 1200)

This category is reserved for medium density residential areas that have from two to five dwelling units per acre. Rural and recreational types of subdivisions will be included in the residential category since this land is almost entirely committed to residential use even though forest or open areas may be present also. This class is found in two locations in the project area, at the eastern terminus and at the western side of the project corridor near the 90 degree bend in C.R. 510.

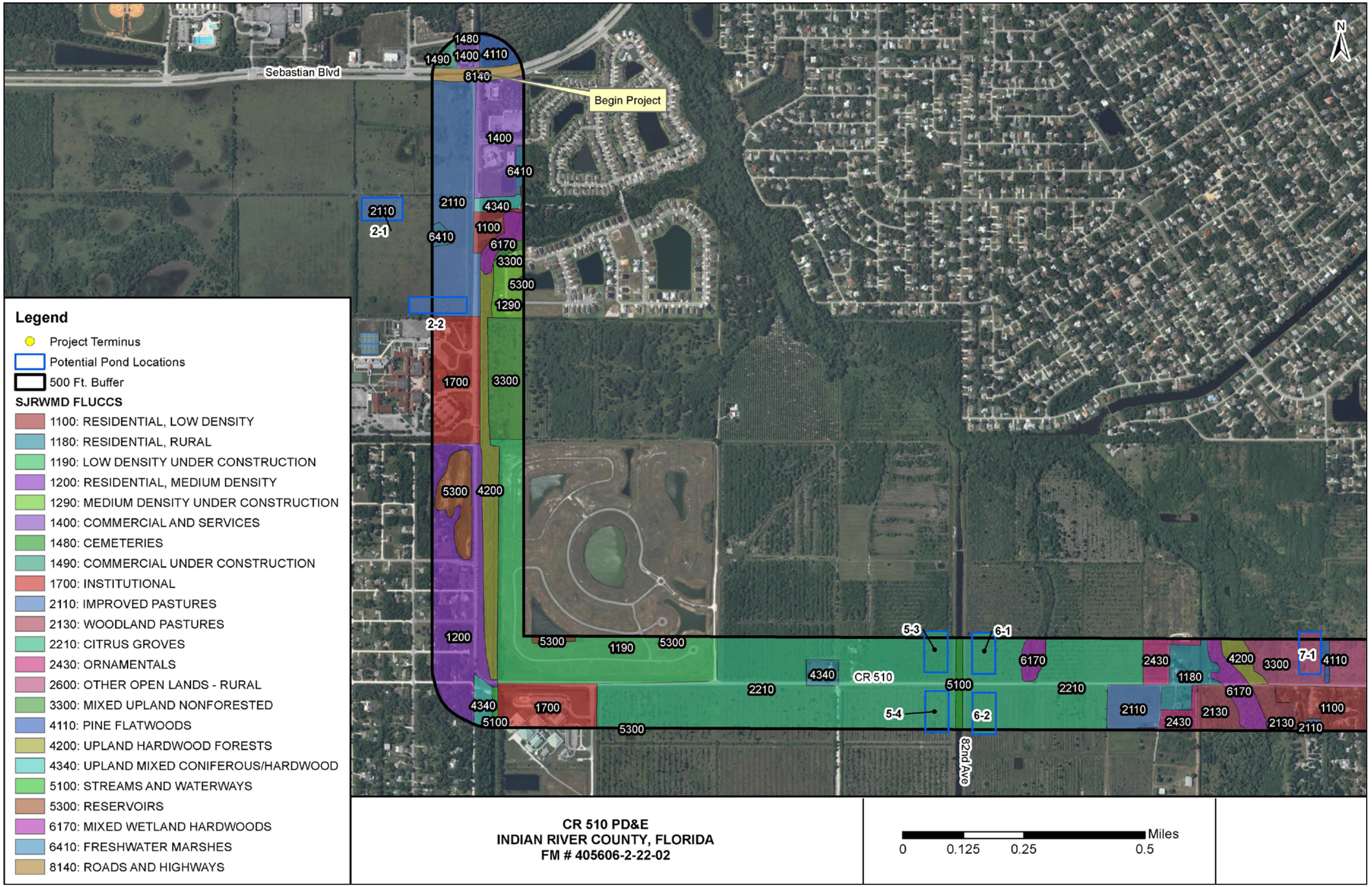


Figure 4-1 Land Use in Western Half of Project Area

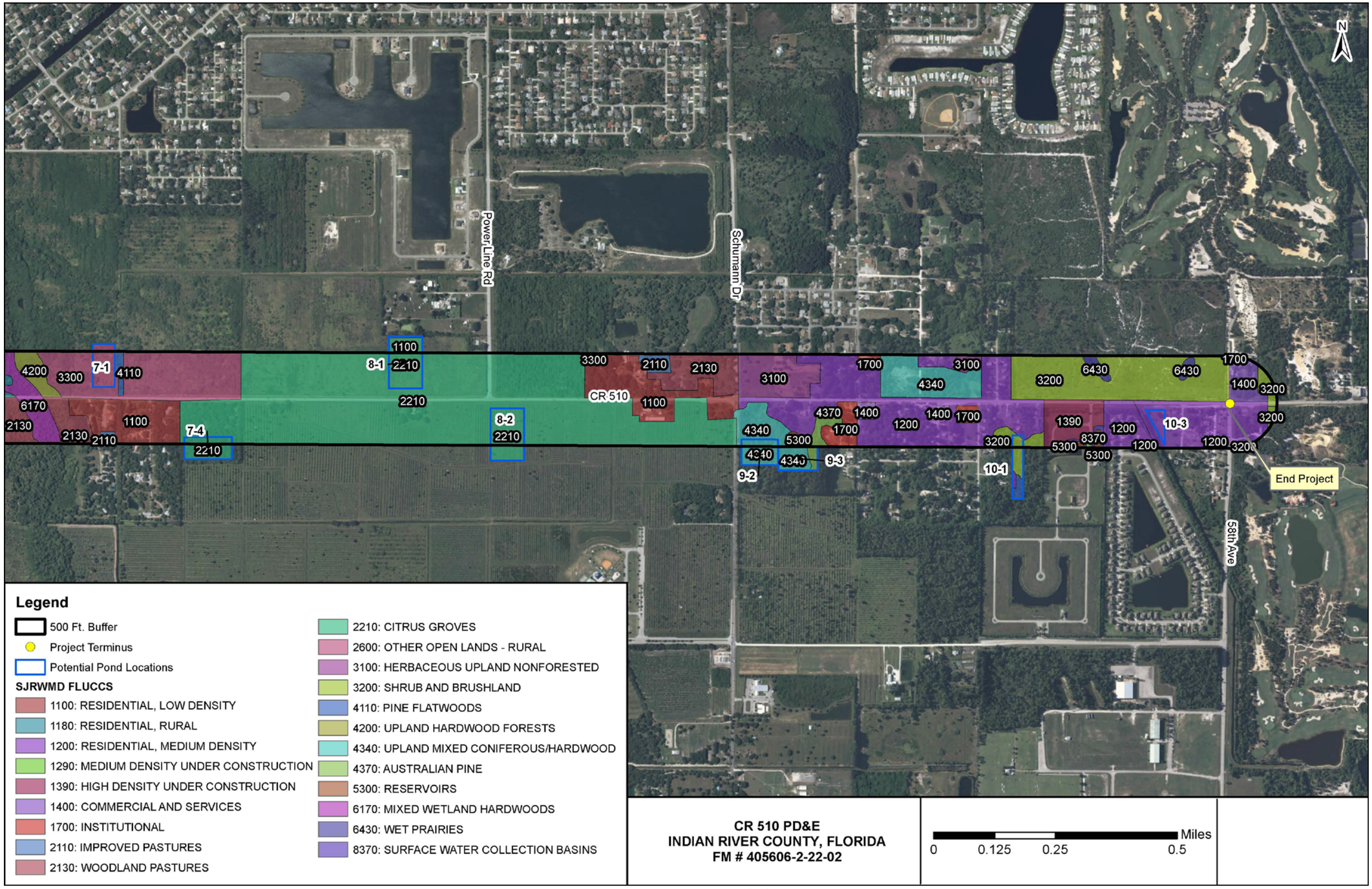


Figure 4-2 Land Use in Eastern Half of Project Area

Medium Density Under Construction (FLUCCS – 1290)

This category refers to medium density residential areas that are in the process of construction and will have between two and five dwelling units per acre when finished. If more than half of the area is constructed, and work is in progress, these areas should be coded as though complete, using 1200. There is no time limit set on completion of the areas under construction. However, if the in-fill process is indefinitely stalled, the code 1920 is used instead. This land use type is found in one location of the project area, east of C.R. 510 approximately 0.4 miles south of the projects' western terminus.

High Density Under Construction (FLUCCS – 1390)

This category refers to high density residential areas that are in the process of construction. If more than half of the area is constructed, and work is in progress, these areas should be coded 1300, as though complete. There is no time limit set on completion of the areas under construction. However, if the in-fill process is indefinitely stalled, the code 1920 is used instead. This category occurs in one location, on the south side of the corridor near the eastern terminus approximately 0.25 mile west of 58 avenue.

Commercial and Services (FLUCCS – 1400)

This is an active land use category that includes a broad range of uses and operations providing diverse products and services which often occur in complex mixtures. Subclasses include retail and wholesale, professional, cultural and entertainment, and tourist services, as well as others. The 1400 class includes shopping centers, commercial strip developments, warehouses, junk yards, campgrounds and amusement parks. These areas are usually located along main transportation routes or at the intersections of secondary transportation corridors. This land use category is found in five separate locations in the project area; two are at the intersection of C.R. 510 with C.R. 512, two more occur south of C.R. 510 between 64 Avenue and 62 Avenue, and one area of Commercial and Services land use occurs at the intersection of C.R. 510 and 58 Avenue.

Cemeteries (FLUCCS – 1480)

This category includes all burial grounds of any age and type. These are a diverse group, which includes both human and pet cemeteries; old, in-active cemeteries covered by dense canopy; brand new facilities with open expanses of lawn that are not yet "populated"; and all combinations in between. One cemetery is located near the western terminus of the project, approximately 400 feet north of the C.R. 510 intersection with C.R. 512.

Commercial and Services Under Construction (FLUCCS – 1490)

This class includes all 1400 classes that are in the process of construction. It includes cemeteries, oil and gas storage, and all other land uses in the 1400 group that are under construction. This class is found in one location in the project area, approximately 250 feet northwest of the C.R. 510 and C.R. 512 intersection at the western terminus of the project.

Institutional (FLUCCS – 1700)

The institutional class is an active, general land use class that includes a broad range of institutional uses which can be difficult to differentiate individually. It includes uses such as

educational, religious, medical and health care, governmental, correctional, commercial child care, and others. Educational institutions encompass all levels of public and private schools, colleges, universities, training centers, etc. The institutional class is found in six locations within the project area. Two schools are found along the corridor; Sebastian River High School, which is located 0.5 miles south of C.R. 512, and Treasure Coast Elementary School, which is located south of C.R. 510 just east of the 90 degree bend. Three locations of Institutional land use occur between Schumann Drive and 62 Avenue, both north and south of the project corridor. These include a church and pre-kindergarten facility as well as land the Indian River County Property Appraiser lists as '3300 – Night club/Bar/Lounge'. The last institutional area located within the project area is a church approximately 500 feet north of C.R. 510 on 58 Avenue.

Improved Pastures (FLUCCS – 2110)

Improved pastures are the most intensively managed of the pastureland classes. They are usually cleared, tilled, reseeded with specific grass types and periodically improved with brush control and fertilizer application. In most cases they show some direct evidence of cattle, such as watering ponds, feed bunkers, fencing, corrals, barns or cow trails. This land use category is present in the project area southwest of the intersection of C.R. 510 and C.R. 512. There are two other small areas of improved pasture, south of C.R. 510, 0.3 and 0.75 miles east of 82 Avenue, respectively.

Woodland Pastures (FLUCCS – 2130)

Pasturelands that have from 25 percent to 100 percent forest canopy are included in this category. It does not include open pasturelands with patches of tree canopy large enough to qualify as upland forest. Woodland pastures are generally unimproved. Evidence of grazing, if visible, may include cattle trails leading to feed bunkers, salt licks and watering areas. Woodland Pastures occur south of C.R. 510 on either side of riparian forest on the South Prong Preserve and north of C.R. 510 immediately west of Schumann Drive.

Citrus Groves (FLUCCS – 2210)

This class is for active citrus groves, such as oranges, grapefruits, and tangerines. Land use classified as Citrus Groves occurs in two large sections of the project area, north and south of C.R. 510 from 86 Avenue to approximately 0.1 mile west of 79 Terrace and north and south of C.R. 510 from 75 Court to 66 Avenue. These areas are not currently used for citrus production and anecdotal reports from landowners suggest that they began to be abandoned after infestation with pests and disease following a hurricane in 2004.

Ornamentals (FLUCCS – 2430)

This category is for facilities that raise ornamental plants for off-site use. This category does not include ornamental trees. There are two areas of Ornamental land use in the project area. They are located north and south of C.R. 510, approximately 0.35 mile east of 82 Avenue. During field inspections in 2016 it did not appear that these parcels were currently being used to raise ornamental plants.

Herbaceous Upland Nonforested (FLUCCS – 3100)

This is one of three land cover classes used for upland nonagricultural, non-forested lands which contain no evidence of cattle grazing. Specifically, 3100 is used for areas that have over

67 percent herbaceous cover, not counting any forested inclusions, which may be up to 25 percent of the area. Traditional rangelands for the 3100 cover class include prairie grasses which occur on the upland margins of the wetland zone and may be periodically inundated by water. Generally, it is the marginal area between marsh and upland forested areas. This land use type occurs in one place in the project area, northeast of the intersection of C.R. 510 and Schumann Drive.

Shrub and Brushland (Wax myrtle or Saw palmetto) (FLUCCS – 3200)

This is one of three land cover classes used for upland nonagricultural, non-forested lands which contain no evidence of cattle grazing. Specifically, 3200 is used for areas that have over 67 percent shrub cover and less than 33 percent herbaceous cover (this proportion ignores any forested patches, which may cover up to 25 percent of the total area). This cover class includes areas where tree species are regenerating naturally after clear cutting or fire, but are less than 20 feet tall. Most of the WSCA, northwest of the C.R. 510 and 58 Avenue intersection, is categorized as Shrub and Brushland. Another patch occurs south of C.R. 510 just east of 62 Avenue and three patches of Shrub and Brushland occur in the project area east of 58 Avenue.

Mixed Upland Non-Forested (FLUCCS – 3300)

This class is used for upland non-forested landscape in which neither herbaceous nor shrubs cover over two thirds of the area. This cover class may include areas where tree species are regenerating naturally after clear cutting or fire, but are less than 20 feet tall. These include native hardwood and coniferous species, but does not apply to plantations. In the project area this land use type occurs in three locations. One is east of C.R. 510, 0.5 mile south of C.R. 512 and the other two are north of C.R. 510, immediately east of the South Prong Preserve.

Pine Flatwoods (FLUCCS – 4110)

This class is for naturally generated pine flatwoods. The canopy closure must be 25 percent or more and the trees must average over 20 feet tall. The pine flatwoods class is dominated by either slash pine, longleaf pine, or both. Common understory species include saw palmetto, wax myrtle, gallberry and a wide variety of herbs and brush. Pine flatwoods are the most prevalent community in natural areas. Most pine flatwoods occur on broad, low, flat areas with seasonal high water tables but not on hydric soils. They transition into mesic flatwood and hardwood communities on higher ground and into hydric flatwoods, cypress and other wetlands on the lower edges. Pine flatwoods are found in two places in the project area. The Ansin Tract, northeast of the intersection of C.R. 510 and C.R. 512 is classified as Pine Flatwoods, and a small area north of C.R. 510, approximately 0.8 mile east of 82 Avenue, is also classified as Pine Flatwoods.

Upland Hardwood Forest (FLUCCS – 4200)

Upland Hardwood Forests may include forest communities such as oak-pine-hickory, Brazilian pepper, live oak, wax myrtle-willow, mixed temperate or tropical hardwoods, and beech-magnolia. Upland forests are naturally generated, and do not include hardwood plantations, or planted groves of citrus or pecans. However, almost all forests are subject to human influence and the composition of the forest is, to a degree, determined by management factors. The trees must average over 20 feet tall at the time of photography and up to one third of the canopy may be comprised of coniferous species. Upland Hardwood Forests in Florida are found

wherever hydrology, fire, and management practices permit their establishment and they may occur as inclusions in most other land cover types. Upland Hardwood Forest occurs in two locations in the project area. The largest area is a linear strip of land immediately east of C.R. 510 that extends from approximately 0.5 mile south of the intersection of C.R. 510 and C.R. 512 south to the 90 degree bend in C.R. 510. This narrow stand of Upland Hardwood Forest grows on either side of the canal. Another area of Upland Hardwood Forest is located north of C.R. 510, immediately east of wetlands on the South Prong Preserve.

Upland Mixed Coniferous/Hardwood (FLUCCS – 4340)

This category is used for those forested areas in which neither upland conifers nor hardwoods achieve 67 percent crown canopy dominance. It may include communities such as oak-pine-hickory, Brazilian pepper, live oak, wax myrtle-willow (not hydric), mixed temperate or tropical hardwoods, and beech-magnolia. Upland pine communities include slash, longleaf, and sand pines. Upland Mixed Coniferous/Hardwoods are found in four places in the project area. The first is located east of C.R. 510, approximately 0.25 mile south of the intersection of C.R. 510 and C.R. 512. The second is located south of C.R. 510, directly south of the 90 degree bend. The third area is located directly southeast of the intersection of C.R. 510 and Schumann Drive. The fourth area of Upland Mixed Coniferous/Hardwoods is located north of C.R. 510 approximately 0.35 mile east of Schumann Drive.

Australian Pine (FLUCCS – 4370)

This class is used for Australian Pine communities. The canopy closure is 25% or greater, with at least two thirds dominance by Australian pine trees that average at least 20 feet tall. One area of Australian Pine is located in the project area, south of C.R. 510, approximately 0.35 mile east of Schumann Drive. An additional area of Australian Pines that was not mapped by SJRWMD was found during field surveys. It occurs just east of C.R. 510 and approximately 0.3 miles south of the intersection of C.R. 510 and C.R. 512.

Streams and Waterways (FLUCCS – 5100)

This category includes rivers, creeks, canals and other linear water bodies that are 10 meters or greater in width. This class includes both natural and modified waterways, as well as man-made canals and channels. Two areas mapped as Streams and Waterways occur in the project area, both are man-made canals. The first is mapped south of C.R. 510 immediately east of the 90 degree bend in C.R. 510. Though this canal is only mapped by SJRWMD south of C.R. 510, the canal extends under CR 510 and parallels the roadway as it run north. The second canal mapped by SJRWMD under land use runs parallel to and immediately west of 82 Avenue. Another canal is located just west of the South Prong Preserve but was not mapped as a distinct land use type by SJRWMD. The South Prong Preserve contains the south prong of the St. Sebastian River, but is not mapped as Streams and Waterways by SJRWMD.

Reservoirs- Pits, Retention Ponds, Dams (FLUCCS – 5300)

Reservoirs are artificial impoundments of water, or water bodies that have been significantly modified from their natural state. They are used for irrigation, flood control, municipal and rural water supplies, stormwater treatment, recreation and hydro-electric power generation. One large Reservoir in the project area is located west of C.R. 510, approximately 0.75 mile south of the intersection of C.R. 510 and C.R. 512. Two Reservoirs associated with the stalled

development of a residential neighborhood immediately northeast of the 90 degree bend in C.R. 510 are in the project area, and an additional pond occurs in an abandoned citrus field just east of Treasure Coast Elementary School. Three small reservoirs are mapped south of C.R. 510 and east of Schumann Drive. One area that is mapped as Commercial and Services contains a stormwater pond. It is approximately 0.2 mile south of C.R. 512, east of C.R. 510.

Mixed Wetland Hardwoods (FLUCCS – 6170)

This class is reserved for those wetland hardwood communities which are composed of a large variety of hardwood species tolerant of hydric conditions yet exhibit an ill-defined mixture of species. This land use type is mapped in three locations in the project area. One of those locations is immediately east of C.R. 510, approximately 0.35 miles south of C.R. 512. Another is north of C.R. 510 just east of 82 Avenue. Another area of Mixed Wetland Hardwoods occurs in the South Prong Preserve where riparian forests follow the south prong of the Saint Sebastian River.

Freshwater Marshes (FLUCCS – 6410)

This class is used for wetland communities having a representative suite of plant species such as sawgrass, cattail, arrowhead, and the common reed. Freshwater marshes tend to be open expanses of grasses, sedges, rushes, and other types of herbaceous plants. Periods of inundation are intermediate between Deep Marshes (emergent 6440) and Wet Prairies (6430). Sites are usually covered with water at least two months of the year and undergo prolonged periods of soil saturation. Two areas of Freshwater Marshes are found in the project area. One is an isolated low lying section of cattle pasture located west of C.R. 510, approximately 0.3 mile south of the intersection of C.R. 510 and C.R. 512. The other is located east of C.R. 510, approximately 0.25 mile south of the intersection of C.R. 510 and C.R. 512, between a residential neighborhood and a commercial building. It may no longer meet the definition of Freshwater Marsh as it is now mostly forested.

Wet Prairies (FLUCCS – 6430)

This classification is composed of dominantly grassy vegetation on wet soils and is usually distinguished from marshes by having less water and shorter herbage. Wet Prairies occur in depressions in the landscape within flatwoods and pastures, and are also found at the edges of cypress domes and marshes. Conditions supporting wet prairies may also support forested depressions or wetland savannahs under other management and fire regimes.

Wet Prairies may also result from alterations of hydrology, such as former marshes that are drying out from artificial drainage or groundwater drawdowns; or former low flatwoods with a rising water table due to impoundment or precipitation. Two small areas of Wet Prairie occur in the project area. Both are on the WSCA, approximately 0.1 and 0.3 mile west of 58 Avenue.

Surface Water Collection Basins (FLUCCS – 8370)

This category is used for holding ponds, impoundments and infiltration ponds, utilized within residential subdivisions or communities and along freeway corridors, for temporary collection and holding of surface water runoff. Generally, these are open spaces excavated for temporary seasonal water collection within the urban context. It is not used for treatment ponds and other "reservoirs" that generally function as **permanent** water bodies. It is not used for holding

ponds in mining applications. Two Surface Water Collection Basins are mapped in the project area, south of C.R. 510 approximately 0.3 miles west of 58 Avenue.

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 slight rise in elevation from west to east with the most significant rise in elevation near the eastern-most 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 4-3** 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).

Major canals and hydrologic features in the vicinity of the project are shown in **Figure 4-4** and **4-5**. There are three unnamed man-made canals abutting the project corridor, all are oriented north-south. The south prong of the Saint Sebastian River crosses the project corridor at the South Prong Preserve.

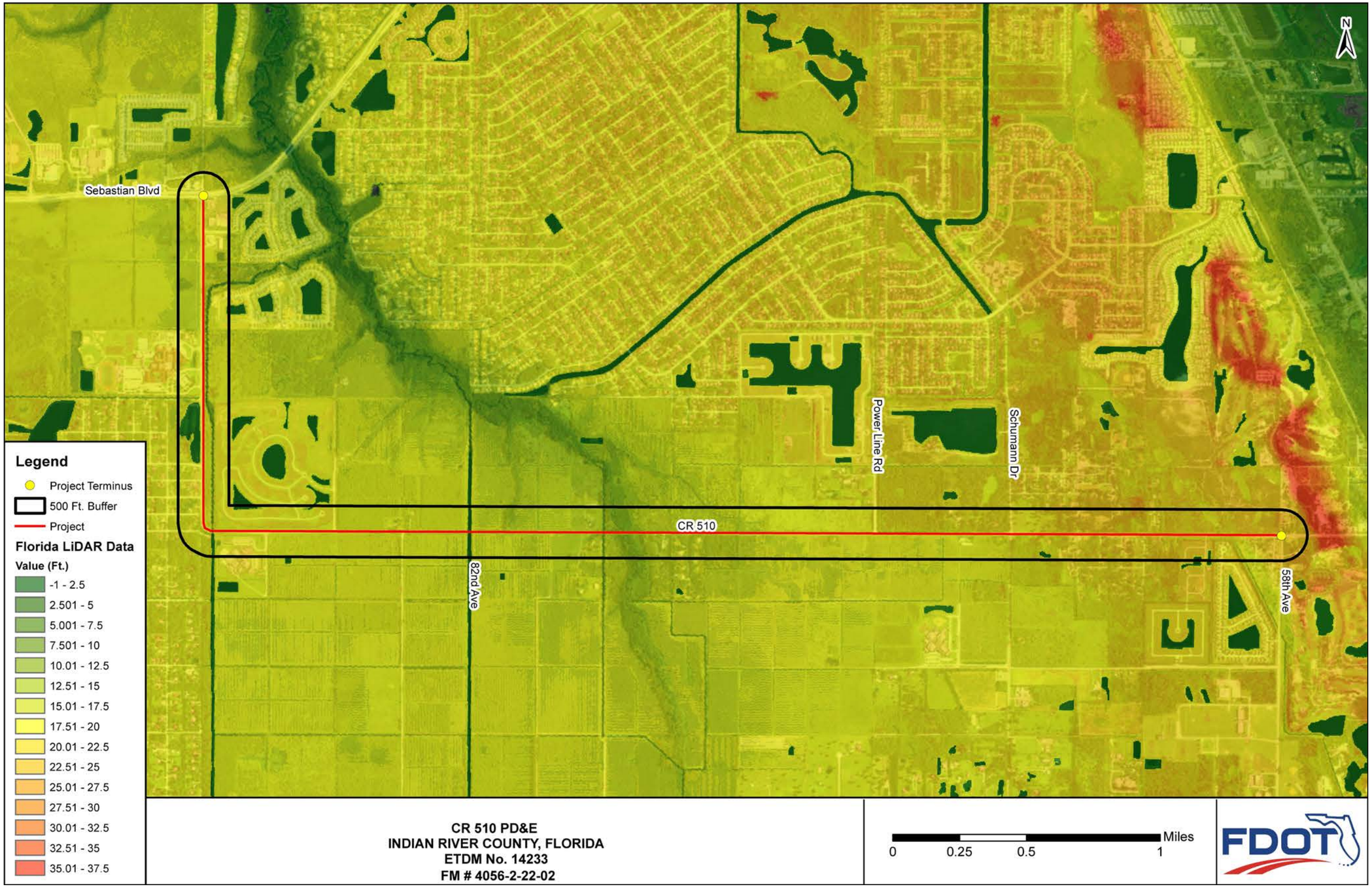


Figure 4-3 Elevation Map

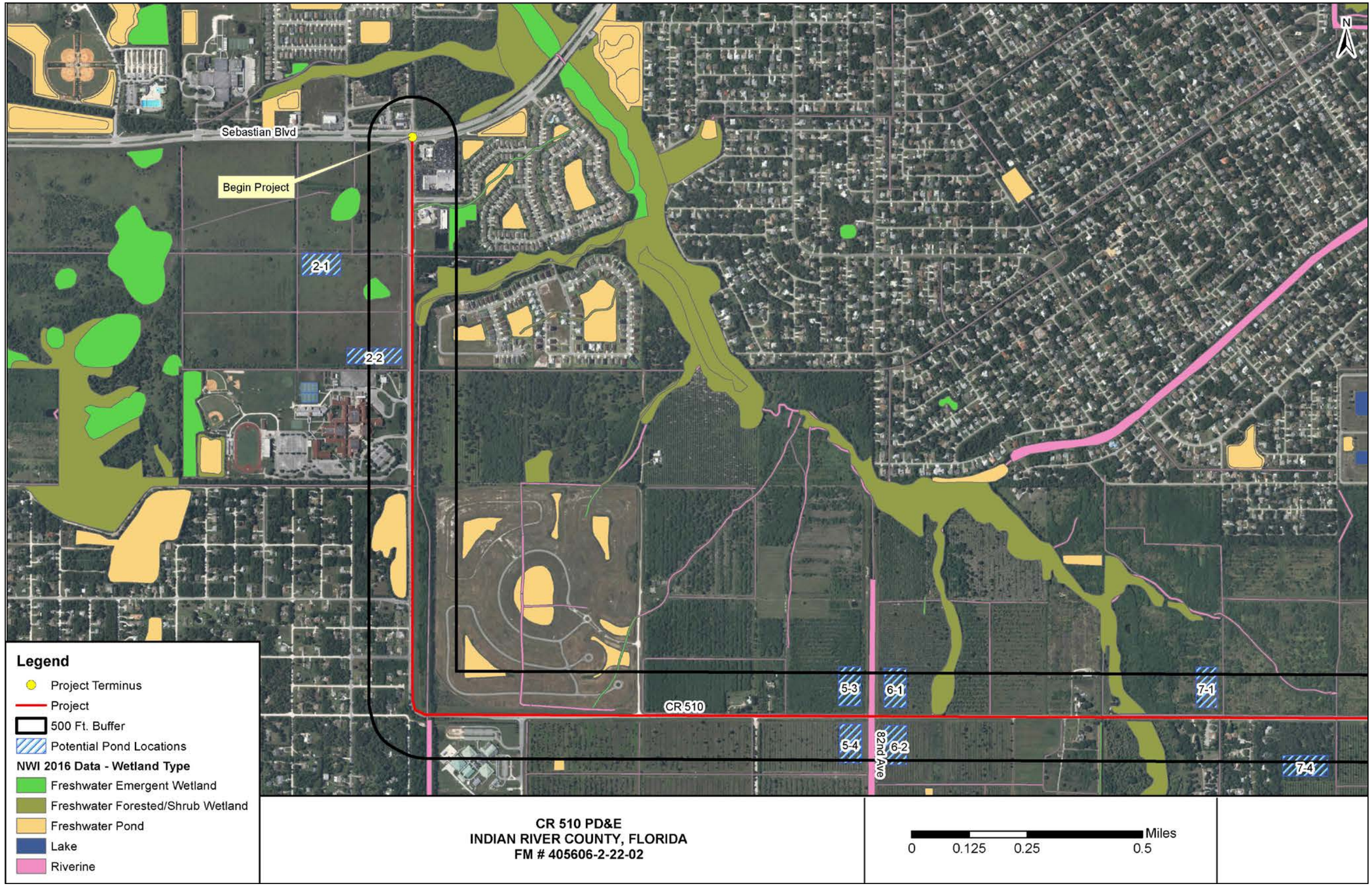


Figure 4-4 Surface Hydrology Western Half of Project Area

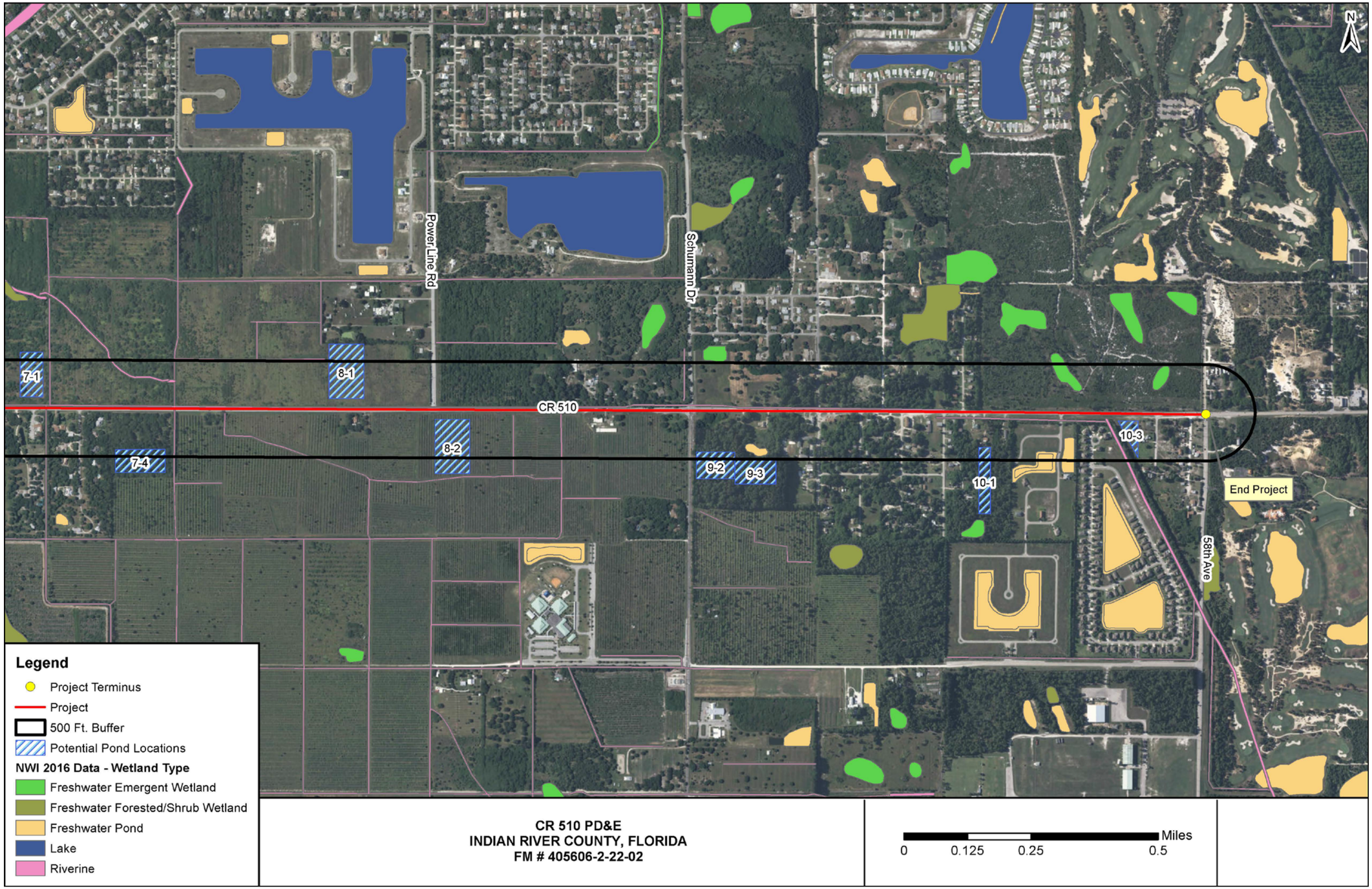


Figure 4-5 Surface Hydrology Eastern Half of Project Area

SOILS

The NRCS (2014) indicates 10 soil types occur in the project area, and nine soil types exist within the project corridor, where soil disturbance would occur under the proposed build alternative (**Figure 4-6**). The soil types in the project area are listed in **Table 4-1** along with descriptions and ratings from NRCS. Three hydric soils 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.

Table 4-1 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 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, 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 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 and on low knolls in floodplains. 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%
Pineda fine sand	This soil type consists of soils that formed beds of sandy and loamy sediments influenced by underlying alkaline material. These 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 consist 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 moderately low to moderately high. **This is a hydric soil.**	30.2%
Water	-	9.9%
	TOTAL	**100%**

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

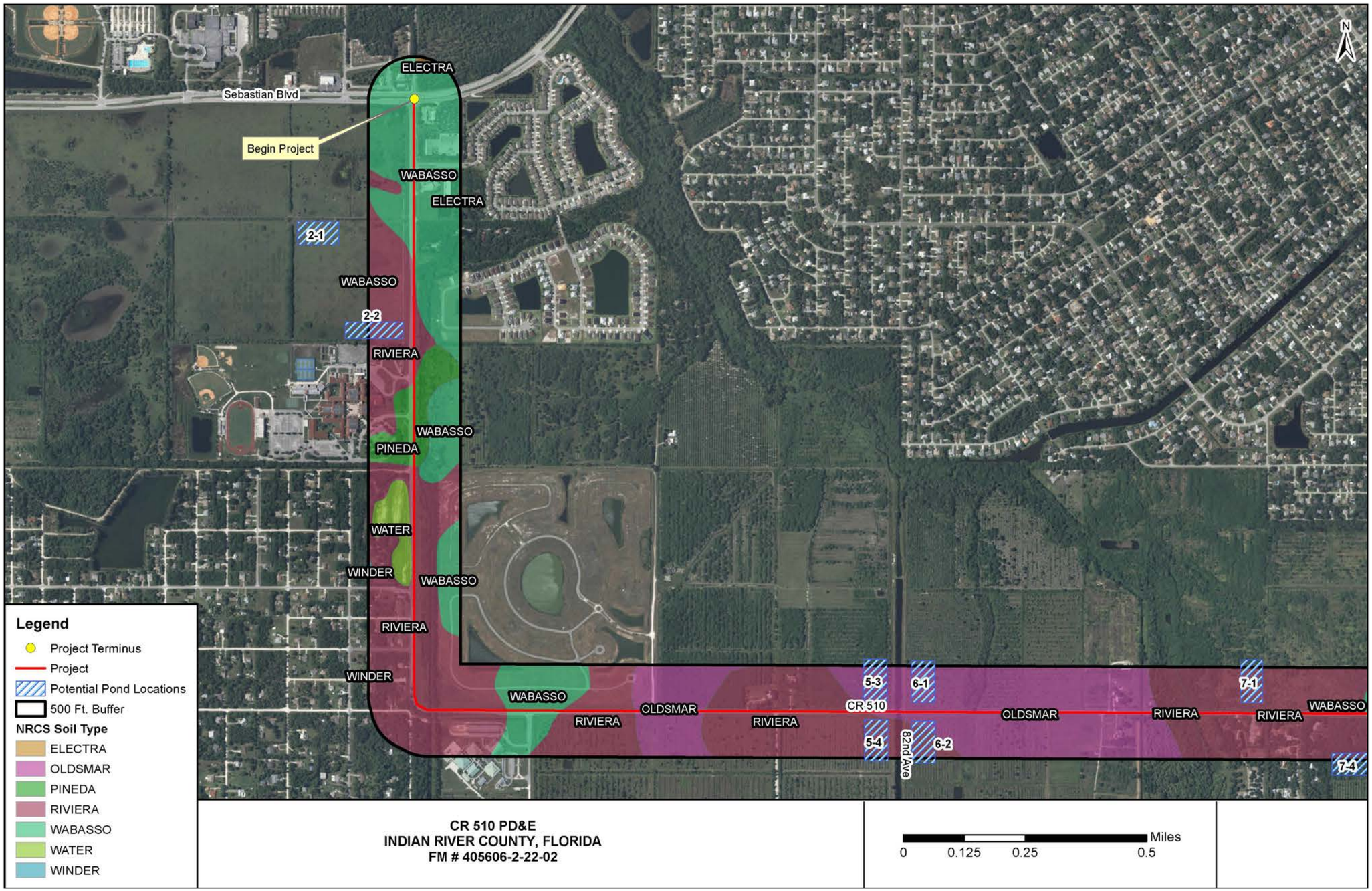


Figure 4-6 Soils Map Western Half of Project

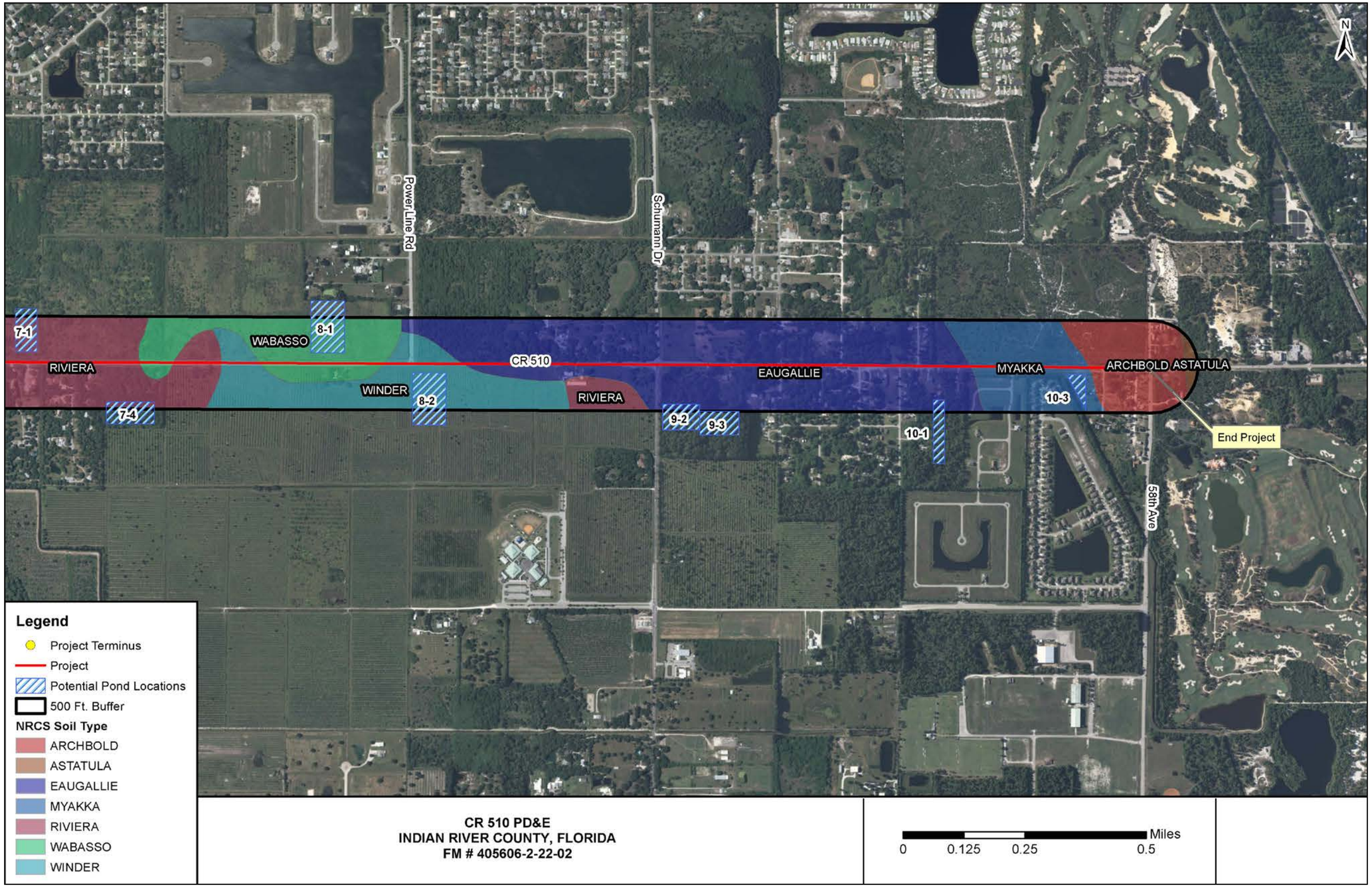


Figure 4-7 Soils Map Eastern Half of Project

5 TRAFFIC NOISE ANALYSIS

Prior to conducting a detailed noise analysis for the Existing, No Build and Recommended Alternative conditions, a desk-top review of the project was performed to determine if noise levels will likely increase as a result of the proposed improvements, if noise sensitive receptor sites are located within the project area, and if noise impacts are likely to occur. The desk-top review indicated that the proposed project improvements may cause design year (2040) traffic noise levels to approach or exceed the FHWA Noise Abatement Criteria (NAC) at noise sensitive sites within the project limits. Therefore, in accordance with Chapter 18 of the *FDOT PD&E Manual*, and the 2016 *FDOT Traffic Noise Modeling and Analysis Practitioners Handbook* a more detailed noise analysis was performed for the Existing, No Build and Recommended Alternative conditions. For the purpose of the noise analysis, the project corridor was broken down into the following four segments:

- **Segment 1** from CR 512 to 87 Street
- **Segment 2** from 87 Street to 86 Avenue
- **Segment 3** from 86 Avenue to 66 Avenue
- **Segment 4** from 66 Avenue to 58 Avenue

Table 5-1 describes the four main segments under each modeled scenario:

Table 5-1 Project Segments

SCENARIO	SEGMENT	SPEED LIMITS	TYPICAL SECTION
Existing	1	45	2-Ln divided painted
	2	25-35	2-Ln undivided
	3	55	2-Ln undivided
	4	35	2-Ln undivided
No Build	1	45	2-Ln divided painted
	2	25-35	2-Ln undivided
	3	55	2-Ln undivided
	4	35	2-Ln undivided
Recommended Alternative	1	45	4-Ln divided (Typical Section G-G **Figure 3-2**)
	2	45	4-Ln divided (Typical Section G-G **Figure 3-3**)
	3	55	4-Ln divided (Typical Section A-A **Figure 3-4**)
	4	45	4-Ln divided (Typical Section E-E **Figure 3-5**)

The methods and results of this traffic noise analysis are summarized within this section and involved the following procedures:

- Identification of noise sensitive receptor sites;
- Field measurement of noise levels and noise model validation;
- Prediction of existing and future noise levels;
- Assessment of traffic noise impacts; and,
- Consideration of noise abatement measures.

The FHWA Traffic Noise Model (TNM) Version 2.5 (February 2004) was used to predict traffic noise levels and the effectiveness of various noise barrier design concepts, as needed. This model estimates the acoustic intensity at a noise sensitive site (the receptor) from a series of roadway segments (the source). Model-predicted noise levels are influenced by several factors,

such as vehicle speed and distribution of vehicle types. Noise levels are also affected by characteristics of the source-to-receptor site path, including the effects of intervening barriers, obstructions (houses, trees, etc.), ground surface type (hard or soft) and topography.

Noise levels in this report represent the hourly equivalent sound level [Leq(h)]. The Leq(h) is the steady-state sound level that contains the same amount of acoustic energy as the actual time-varying sound level over a one-hour period. The Leq(h) is measured in A-weighted decibels [dB(A)], which closely approximate the range of frequencies a human ear can hear.

5.1 Noise Abatement Criteria

The FHWA has established NAC for seven land use activity categories. These criteria determine when an impact occurs and when consideration of noise abatement is required. Maximum noise level thresholds have been established for five of these activity categories. These maximum thresholds, or criteria levels, represent acceptable traffic noise level conditions. The 2010 NAC levels are presented in **Table 5-2**. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs. The FDOT defines "approach" as within one dB(A) of the FHWA criteria. A substantial noise increase is defined by FDOT as an increase of 15 dB(A) or greater over existing noise levels.

5.2 Noise Sensitive Receptor Sites

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 (Activity Category B) and parks (Activity Category C). 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 (Activity Category D). The retail shopping centers, office buildings, commercial enterprises, industrial complexes and transportation land use areas are not considered to be noise sensitive (i.e., Activity Category E with no exterior use and F).

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Table 5-2 Noise Abatement Criteria

ACTIVITY CATEGORY	ACTIVITY Leq(h)[1]		EVALUATION LOCATION	DESCRIPTION OF ACTIVITY CATEGORY
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	–	–	–	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–	–	–	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)
[Hourly A-Weighted Sound Level-Decibels (dB(A))]
[1] The Leq(h) Activity Criteria values are for impact determination only, and are not a design standard for noise abatement measures.
[2] Includes undeveloped lands permitted for this activity category.
Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

The project corridor is primarily bordered by vacant farmland. The most common noise sensitive sites along the corridor are the yards of single family homes. Commercial land with little to no exterior use and none that would be considered noise sensitive abuts the corridor near CR 512. On the north/south segments of CR 510, the corridor is abutted by the Sebastian River Landing neighborhood on the east side and the Sebastian River High School and Vero Lakes Estates on the west side. Treasure Coast Elementary school is located on the south side of CR 510 just east of the curve in which CR 510 transitions from a north/south to an east/west corridor. Noise sensitive sites east of the curve consists of primarily residential land uses, two places of worship and commercial properties with no exterior use that would be considered noise sensitive. There are currently no construction permits for the vacant parcels and no noise barriers within the limits of the project. The locations of the identified noise sensitive receptor sites are depicted on the figures found in **Appendix A**.

5.3 Field Measurement of Noise Levels and Model Validation

Measurements of sample existing noise levels along the project corridor were performed using procedures defined in the FHWA report *Measurement of Highway-Related Noise* (FHWA-PD-96-046) and the 2016 *FDOT Traffic Noise Modeling and Analysis Practitioners Handboo*k. Field measurements of existing noise levels were conducted on December 13, 2016. The locations of the field measurement sites are depicted on the figures found in **Appendix B** and described in the following section.

5.3.1 Field Measurement Sites

Due to the different characteristics (land use, speed limit, terrain, etc.) throughout the project corridor, readings were taken at four separate sites (FR1, FR2, FR3, and FR 4). FR1 is located on the east side of CR 510 near the residences of the Sebastian River Landing neighborhood. FR2 is located on the north side of CR 510, just east of Treasure Coast Elementary school were the speed limit transitions from 35 to 55 mph. This site is representative of many of the noise sensitive sites, single-family residences located along the corridor. FR3 is located in a field also on the north side of CR 510 near Powerline Road. Neighboring land uses include residential, CR 510 in this area has a 55 mph speed limit. FR 4 is located on the south side of CR 510 between 63 Avenue and 62 Avenue. This site is representative of many residential sites and two places of worship in the Wabasso community.

5.3.2 Field Measurement Data Collection

Three (3) repetitions of ten-minute readings were measured at these four sites to ensure reasonable results. Unusual noises at the monitoring sites were documented to facilitate identification of any atypical noise sources along the alignment. Casella CEL-246 Type-II integrating sound level meters were used to collect noise level data. Foam wind screens and adjustable tripods were also used. The sound level meters were calibrated to 94 dB at 1000 Hertz using a CEL-110/1 acoustical calibrator.

Traffic data were collected by the project team during each measurement period. Traffic speeds were measured using Decatur Electronics, Inc. – Genesis Handheld Directional radar speed measuring equipment. Traffic volumes, speed data and noise levels were collected during each sampling period. The ambient temperature during the measurement periods ranged from 81 degrees to 87 degrees Fahrenheit, and the winds were calm throughout the measurement periods. The relative humidity was ranged from 57 percent to 68 percent and the cloud cover was approximately 20 percent throughout the measurement periods. All roadway surfaces remained clean and dry during the measurements. The data collected were then input into the TNM. The dates, times, traffic data and the measured and TNM-predicted noise levels are presented in **Table 5-3**. The noise measurement data sheets have been provided in **Appendix B**.

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Table 5-3 Field Measurement Data

LOCATION	SAMPLE RUN	TIME/ DATE	MEASURED 10-MINUTE TRAFFIC VOLUME (Auto/MT/HT/B/Mcy)	DISTANCE FROM ROADWAY (Feet)	MEASURED TRAFFIC NOISE LEVEL [dB(A)]	MODELED TRAFFIC NOISE LEVEL [dB(A)]	DIFFERENCE (Measured - Modeled) [dB(A)]
FR 1	1	01:19 PM/ 12-13-2016	NB: 40/18/2/0/0 SB: 39/24/3/0/0	50	67.4	68.3	-0.9
				100	63.7	64.1	-0.4
	2	01:29 PM/ 12-13-2016	NB: 53/9/2/0/1 SB: 51/13/1/1/2	50	70.0	67.3	2.7
				100	64.3	63.1	1.2
	3	01:40 PM/ 12-13-2016	NB: 46/18/0/0/1 SB: 43/13/2/0/0	50	68.7	66.7	2
				100	62.8	62.2	0.6
FR 2	1	10:49 AM/ 12-13-2016	EB: 29/10/1/0/1 WB: 43/10/0/1/1	50	65.5	67.4	-1.9
				100	62.7	62.7	0.0
	2	11:01 AM/ 12-13-2016	EB: 29/12/1/0/0 WB: 35/20/2/0/0	50	67.6	68.4	-0.8
				100	63.9	63.7	0.2
	3	11:11 AM/ 12-13-2016	EB: 40/12/1/1/0 WB: 38/17/6/0/1	50	70.5	68.9	1.6
				100	64.2	64.3	-0.1
FR 3	1	03:10 PM/ 12-13-2016	EB: 46/23/3/3/0 WB: 70/31/4/2/0	50	74.3	71.4	2.9
				100	67.1	66.2	0.9
	2	03:21 PM/ 12-13-2016	EB: 64/24/2/2/1 WB: 66/35/2/1/1	50	72.4	71.8	0.6
				100	67.9	66.5	1.4
	3	03:31 PM/ 12-13-2016	EB: 67/16/1/2/0 WB: 77/28/6/2/2	50	69.3	71.9	-2.6
				100	67.9	66.7	1.2
FR 4	1	11:52 AM/ 12-13-2016	EB: 40/20/1/2/0 WB: 48/19/4/2/0	50	67.5	67.4	0.1
				100	64.6	62.9	1.7
	2	12:05 PM/ 12-13-2016	EB: 44/19/2/1/1 WB: 34/19/5/0/0	50	68.3	67.6	0.7
				100	63.8	62.9	0.9
	3	12:26 PM/ 12-13-2016	EB: 39/13/2/0/0 WB: 45/18/2/1/0	50	68.9	66.3	2.6
				100	64.1	61.7	2.4

FR: Field Receptor

5.4 Computer Noise Model Validation

Site conditions and traffic data gathered during the field measurements were used to develop inputs to the FHWA's TNM 2.5 for computer models representative of the field conditions. Additional geometric information necessary for these models was developed from aerial imagery and/or MicroStation files of the existing conditions in the project study area. Elevation data was obtained using GIS based LIDAR map. The TNM results were then compared to the noise level data collected during the field measurements (see **Table 5-3**). The model inputs for the field conditions were deemed to be within an acceptable level of accuracy since the predicted noise levels are within ±3.0 dB(A) of the measured noise levels in accordance with Chapter 18 of the *FDOT PD&E Manual*, and the 2016 *FDOT Traffic Noise Modeling and Analysis Practitioners Handbook*. Thus, further use of the TNM model on this project is supported.

5.5 Model Inputs

After verification of the prediction methodology, computer models were developed for the existing year (2015) conditions and the design year (2040) No Build Alternative and Recommended Alternative. The TNM models for the existing conditions and the design year No

Build Alternative were developed from current GIS data for the project corridor. The design year Recommended Alternative model was developed using additional geometric information from the project master plans. Traffic data used in the TNM models were derived from traffic data presented in the project's *Design Traffic Technical Memorandum* (DTTM) dated January 2017 and from data contained in the 2013 *FDOT Quality/Level of Service Handbook* tables. This data may be found in **Appendix B**. According to Chapter 18 of the *PD&E Manual*, "Maximum peak-hourly traffic representing LOS C will be used, unless traffic analysis shows that LOS C will not be reached. If LOS C will not be reached, demand volumes shall be used. If demand volumes are used in place of LOS C volumes, the directional peak traffic should be worst-case for receptors on each side of the roadway." Both LOS C volumes and demand volumes were used depending on the level of demand along all roadways.

Representative receptor sites were used in the TNM model inputs to estimate noise levels associated with existing and future conditions within the project study area. These sites were chosen based on noise sensitivity, roadway proximity, anticipated impacts from the proposed project, and homogeneity (i.e., the site is representative of other nearby sites). For single family residences, traffic noise levels were predicted at the edge of the dwelling unit closest to the nearest primary roadway. For other noise sensitive sites that may be impacted, traffic noise levels were predicted where the exterior activity occurs. Building noise reduction factors identified in Figure 18-3 of Chapter 18 of the *PD&E Manual* and window conditions were used to estimate the noise reduction for interior sites due to the physical structure. All receptor sites were modeled five feet above the local ground elevation. There are no multi-story buildings within the project corridor that would have receptors above the ground floor. Ninety (90) model receptor locations representative of 85 residential noise sensitive sites and five (5) noise sensitive non-residential special-use sites were input into the TNM model. These locations are described in the table in **Appendix C**.

5.6 Predicted Traffic Noise Levels

The TNM results for the worst-case traffic conditions for the existing (2015) conditions, the 2040 No Build and Recommended Alternative conditions are presented in the table in **Appendix C** and summarized below.

Most of the noise sensitive sites along the project corridor are Activity Category B (Residential) sites, labeled SFH (Single-Family Home), MH (Mobile Home) and MFH (Multi-Family Home). Existing modeling results indicate that the noise level for the Activity Category B sites range between 41.4 dB(A) and 68.8 dB(A). Predicted noise levels for the No Build and Recommended Alternative range from 41.9 to 68.3 dB(A) and 46.0 to 69.7 dB(A), respectively. The largest predicted noise level increase as result of the proposed improvements is 11.4 dB(A) at the residence represented by SFH61 which is located on the north side of CR 510 just west of 66 Avenue.

Three noise sensitive sites, Sebastian River High School, Treasure Coast Elementary School, and the Redlands Christian Migrant Association (RCMA) Day Care are located along the project corridor and are considered as Activity Category C based on Chapter 18 of the FDOT *PD&E*

Manual and the 2016 *FDOT Traffic Noise Modeling and Analysis Practitioners Handbook*. Existing predicted noise levels for these sites range from 50.2 to 57.6 dB(A). The No Build and Recommended Alternative predicted noise levels range from 50.2 to 57.8 dB(A) and from 54.1 to 56.6 dB(A), respectively.

Two of the noise sensitive sites are places of worship and considered as Activity Categories C and D based on Chapter 18 of the FDOT PD&E Manual and the 2016 *FDOT Traffic Noise Modeling and Analysis Practitioners Handbook*. The Allen Chapel African Methodist Church (NAC D), represented by CH01 is located on the south side of CR 510 at 64 Avenue approximately 40 feet south of the roadway. The St. Matthew Missionary Baptist Church (NAC C), represented by CH02 is located on the south side of CR 510 approximately 325 feet from the roadway. Existing traffic noise levels are predicted to be 42.7 dB(A) inside the Allen Chapel African Methodist Church and 47.1 dB(A) outside the St. Matthew Missionary Baptist Church. Predicted interior noise levels inside the Allen Chapel African Methodist Church under the No Build and Recommended Alternative are 42.7 and 50.3, respectively. Predicted exterior noise levels at the St. Matthew Missionary Baptist Church under the No Build and Recommended Build are 47.1 and 56.6 respectively.

5.7 Noise Impact Analysis

Eighty-five (85) residences with the potential to be impacted by the proposed improvements were identified within the project study area. These residences include 76 single family homes, three (3) multi-family homes, four (4) mobile homes and two (2) receptors representative of the Sebastian River Landing neighborhood (Receptors StonyPt and MorganCr). Also, five (5) noise sensitive non-residential/special-use sites were identified in the project study area. These include two (2) places of worship, two (2) schools, and one (1) day care.

Predicted design year traffic noise levels under the Recommended Alternative were compared to the NAC and to the noise levels predicted for the existing condition to assess potential noise impacts associated with the proposed project (**Appendix C**).

Traffic noise levels are predicted to approach or exceed the FHWA NAC [67 dB(A) in all cases] at six residences. The noise level for the five residences represented by SFH16, SFH 19, SFH34, SFH36, SFH60, and SFH68 range from 66.7 dB(A) to 69.7 dB(A).

Based on the FHWA and FDOT methodologies used to evaluate traffic noise levels in this study, modifications proposed with this project were determined to generate noise impacts at noise sensitive sites within the project study area. However, no cases of substantial noise increase (increase of 15 dB(A) as defined by FDOT) were found within the project study area.

6 NOISE ABATEMENT ANALYSIS

The FDOT requires that the reasonableness and feasibility of noise abatement be considered when the NAC is approached or exceeded. The most common and effective noise abatement measure for projects such as this is construction of a noise barrier as close as possible to the impacted sites. Noise barriers reduce noise by blocking the sound path between a roadway and a noise sensitive area. To be effective, noise barriers must be long, continuous, and have sufficient height to block the path between the noise source and the receptor site. A wide range of factors are used to evaluate the feasibility and reasonableness of noise abatement measures.

Feasibility primarily concerns the ability to reduce noise levels by at least 5 dB(A) at the impacted receptor sites using standard construction methods and techniques. In accordance with FDOT policy presented in Chapter 18 of the FDOT PD&E Manual, and the 2016 FDOT Traffic Noise Modeling and Analysis Practitioners Handbook the number of impacted receptors required to achieve a 5 dB(A) reduction or greater in order for a noise barrier to be considered feasible will be two or greater. Engineering considerations typically assessed during the feasibility analysis include access, drainage, utilities, safety and maintenance. In accordance with FDOT policy presented in Chapter 18 of the FDOT PD&E Manual, noise barriers cannot exceed the following heights:

- For ground mounted noise barriers the maximum height will be 22 feet.
- For noise barriers on bridge and retaining wall structures the maximum height will be 8 feet unless a taller noise barrier is specifically approved in writing by the State Structures Design Engineer.
- For ground mounted Traffic Railing/Noise Barrier combinations the maximum height will be 14 feet.

Reasonableness implies that common sense and good judgment were applied in a decision related to noise abatement. A reasonableness analysis includes consideration of the cost of abatement, the amount of noise abatement benefit, and consideration of the viewpoints of the impacted and benefited property owners and residents. The FDOT's current statewide average noise barrier unit cost is $30 per square-foot. To be deemed reasonable, a noise barrier must, at a minimum, meet two important FDOT criteria:

- The estimated construction cost cannot exceed the FDOT's reasonable cost criteria of $42,000 per benefited receptor site; and,
- According to the FDOT's noise reduction reasonableness criteria, the noise barrier must reduce noise levels by at least 7 dB(A) at one or more impacted receptor sites.

The feasibility and reasonableness of noise barriers were considered for the six residences that are predicted to be impacted by traffic noise after construction of the planned improvements. Those residences are located at the following locations:

- SFH16 - 8496 75 Court, Vero Beach, FL 32967
- SFH19 – 6325 85 Street, Vero Beach, FL 32967
- SFH34 - 8485 59 Avenue, Vero Beach, FL 32967
- SFH36 - 5845 85 Street, Vero Beach, FL 32967
- SFH60 - 7800 85 Street, Vero Beach, FL 32967
- SFH68 - 8526 61 Drive, Vero Beach, FL 32967

6.1 Isolated Single-Family Homes

Receptors SFH16, SFH19, SFH60, and SFH68 are discrete locations. No other residence is predicted to be impacted in the area of the three discrete receptors. FDOT policy requires 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.

6.2 Single-Family Homes

Two residences, SFH34 and SFH36, on the south side of CR 510 near 59 Avenue are expected to be impacted by the traffic noise due to the planned improvements. Under the Recommended Alternative, the design year traffic noise levels at the impacted residences are predicted to be 69.4 dB(A) and 66.7 dB(A) for SFH34 and SFH36, respectively. The improvements near these residences include one additional travel lane, a bike lane and sidewalk in each direction. The edge of the nearest eastbound travel lane of CR 510 is expected to be moved approximately 30 feet closer to these residences.

Noise abatement was considered for the two receptors and analyzed as a common noise environment in order to meet FDOT policy requiring that at least two (2) impacted receptors achieve a 5 dB(A) reduction or greater. The two impacted residences are 275 feet apart and are separated by both 59 Avenue and a driveway for SFH36. The subject driveway onto CR 510 is the only access point for the property represented by the SFH36 receptor. Since 59 Avenue and the driveway cannot be closed, three noise barriers segments were analyzed. The most effective location for a noise barrier is along the southern right-of-way line. **Figure 6-1** illustrates the location of the analyzed noise barrier and adjacent receptors. The results of this noise barrier analysis are summarized in **Table 6-1**.

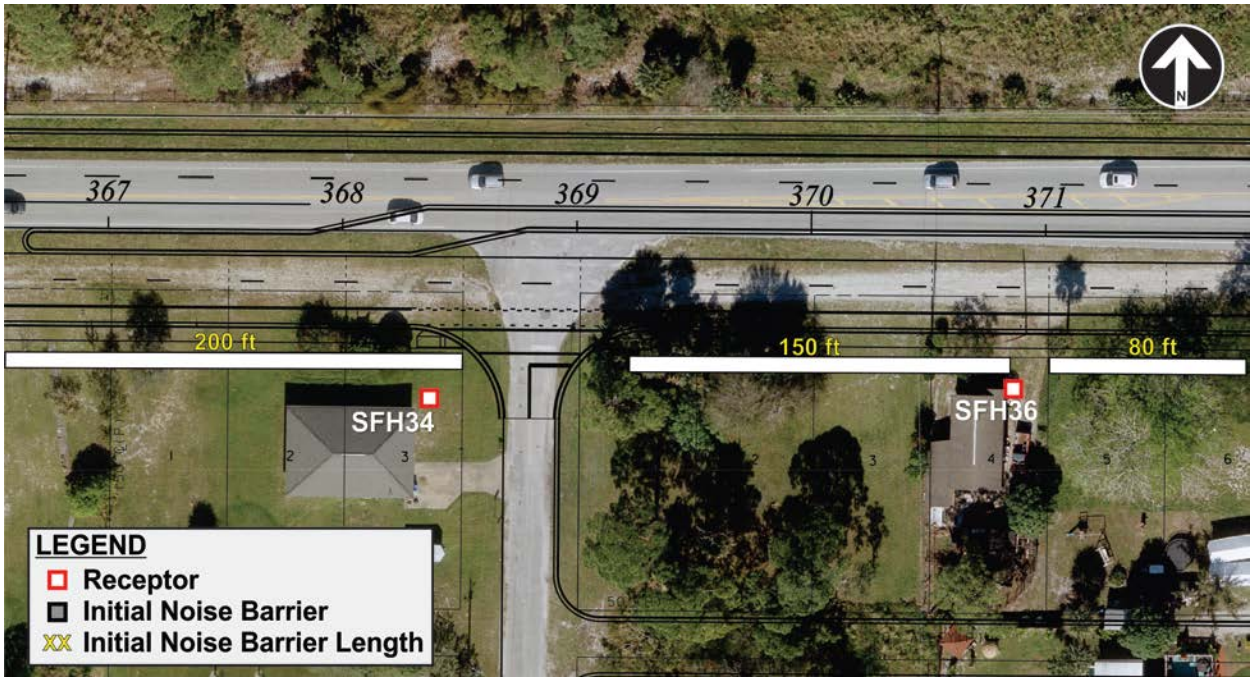

Figure 6-1 Noise Barrier Analysis

Table 6-1 Noise Barrier Analysis Summary

NB#	Noise Barrier Height (feet)	Overall Noise Barrier Length (feet)	Number of Impacted Receptors	Noise Reduction at Impacted Receptors[1] (dB(A))			Number of Benefited Receptors[2]			Average (Maximum) Reduction for Benefited Receptors (dB(A))[1]	Total Estimated Cost[3]	Cost per Benefited Receptor[4]
				5 -5.9 dB(A)	6 – 6.9 dB(A)	> 7 dB(A)	Impacted	Not Impacted	Total			
NB01	8	430	2	0	0	0	0	0	0	-	$ 103,200	-
NB02	10	430	2	1	0	0	1	0	0	5.0 (5.0)	$ 129,000	$ 129,000
NB03	10	390	2	1	0	0	1	0	0	5.0 (5.0)	$ 117,000	$ 117,000
NB04	14	390	2	1	0	0	1	0	0	5.2 (5.2)	$ 163,800	$ 163,800
NB05	22	390	2	1	0	0	1	0	0	5.5 (5.5)	$ 257,400	$ 257,400

1 Receptors with a predicted noise level of 66 dB(A) or greater.
2 Receptors with a predicted reduction of five dB(A) or more are considered benefited.
3 Based on a unit cost of $30 per square foot.
4 FDOT cost reasonable criterion is $42,000 per benefited receptor.

The initial noise barrier concept (NB01) that was considered had a barrier height of eight (8) feet and an overall length of 430 feet and consisted of three noise barrier segments with lengths of 200 feet, 150 feet and 80 feet. Two barrier openings were modeled, one for 59 Avenue and the other for the SFH36 driveway. Barrier segments and openings are depicted in **Figure 6-1**. Under this barrier concept, neither of the two impacted receptors achieve the minimum of 5.0 dB(A) noise reduction to be considered benefited. In addition, NB01 does not meet FDOT's noise reduction reasonableness criteria, the noise barrier must reduce noise levels by at least 7 dB(A) at one or more impacted receptor sites. Noise barrier concept NB01 is not recommended.

Noise carrier concept NB02 is similar to NB01 but increases the barrier height to 10 feet. This noise barrier concept does not meet 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. Noise barrier concept NB02 is not recommended.

Noise barrier concepts NB03, NB04 and NB05 reduce the overall length to 390 feet and analyzes the barrier effectiveness at the heights of 10 feet, 14 feet and 22 feet, respectively. Results from these barrier analyses show that none of the concepts meet FDOT reasonableness and feasibility criteria. The barrier concepts are unable to completely break the lines of sight between the impacted receptors and the roadway due to the barrier openings required for 59 Avenue and the SFH 36 driveway. As a result, the effectiveness of the barrier concepts to reduce noise levels are greatly affected.

7 SUMMARY

Based on the FHWA and FDOT methodologies used to evaluate traffic noise levels in this study, modifications proposed with this project were determined to generate noise impacts at noise sensitive sites within the project study area. Traffic noise levels were predicted for noise sensitive locations along the project corridor for the existing (2015) conditions and the design year (2040) No-Build and Recommended Alternative. The Recommended Alternative traffic noise levels 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 NAC B [66 dB(A)] at six residences. These residences are represented 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 SFH68 are discrete locations. No other residence is predicted to be impacted in the area of the four discrete receptors. FDOT policy requires 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.

Noise abatement was considered for the receptors SFH34 and SFH36, and analyzed as a common noise environment in order to meet FDOT policy requiring that at least two (2) impacted receptors achieve a 5 dB(A) reduction or greater. The two impacted residences are 275 feet apart and are separated by both 59 Avenue and a driveway for SFH36. The subject driveway onto CR 510 is the only access point for the property represented by the SFH36 receptor. Since 59 Avenue and the driveway cannot be closed, three noise barriers segments were analyzed. Results from the barrier analysis shows that none of the concepts meet FDOT reasonableness and feasibility criteria. The barrier concepts are unable to completely break the lines of sight between the impacted receptors and the roadway due to the barrier openings required for 59 Avenue and the SFH 36 driveway. As a result, the effectiveness of the barrier concepts to reduce noise levels are greatly affected.

Noise abatement is not considered reasonable and feasible for the six impacted residences. Therefore, based on the noise analysis performed to date, there are no apparent solutions available to mitigate the noise impacts along this project corridor.

8 CONSTRUCTION NOISE AND VIBRATION

During construction of the project, there is the potential for noise impacts to be greater than those resulting from normal traffic operations because heavy equipment is typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project corridor is important in minimizing noise and vibration impacts. The following sites that may result in vibration impacts have been identified:

- HS - Sebastian River High School – 9001 90 Avenue
- TC-ES - Treasure Coast Elementary – 8955 85 Street
- DC – RCMA Day Care – 7625 85 Street
- CH01 - Allen Chapel African Methodist Church – 6425 85 Street
- CH02 - St. Matthew Missionary Baptist Church – 8550 64 Avenue
- Residences closest to the proposed improvements: SFH2, SFH4, SFH16, SFH19, SFH34, SFH60, and SFH68

Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's *Standard Specifications for Road and Bridge Construction*. Should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

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9 COORDINATION WITH LOCAL OFFICIALS

Coordination with local agencies and officials has been accomplished during the development of this project. In addition, local and community officials have had the opportunity to comment on the proposed project at the project's public meetings.

To aid in promoting land use compatibility, a copy of the NSR, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be provided to Santa Rosa County. In addition, generalized future noise impact contours for the properties in the immediate vicinity of the project have been developed for Noise Abatement Activity Categories B/C and E (i.e., residential/other sensitive land uses and sensitive commercial, respectively). These contours represent the approximate distance from the edge of the nearest proposed travel lane of CR 510 to the limits of the area predicted to approach [i.e., within 1 dB(A)] or exceed the NAC in the design year 2040. These contours do not consider any shielding of noise provided by structures between the receiver and the proposed travel lanes. Within the project corridor, the distances between the proposed edge of the outside travel lane and the contour at various locations are presented in **Table 9-1**. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond this distance.

Table 9-1 Design Year Noise Impact Contour Distances

LOCATION		**DISTANCE FROM PROPOSED NEAREST CR 510 TRAVEL LANE TO NOISE CONTOUR LINE (feet)**	
FROM (Station)	**TO (Station)**	**71 dB(A) – ACTIVITY CATEGORY E/ 51dB(A) – Activity Category D***	**66 dB(A) – ACTIVITY CATEGORY B/C**
CR 512 (100+00)	Hammerhead Way (137+00)	5’	40’
Hammerhead Way (137+00)	86 Avenue 187+00	5’	40’
86 Avenue 187+00	West of 66 Avenue 305+00	20’	60’
West of 66 Avenue 305+00	58 Avenue 375+00	10’	50’

Notes: * = 20 dB(A) noise reduction factor applied for interior, Activity Category D, sites.

10 REFERENCES

23 CFR Part 772, "*Procedures for Abatement of Highway Traffic Noise and Construction Noise*", Federal Register, Vol. 75, No. 133, Tuesday, July 13, 2010; pages 39834-39839.

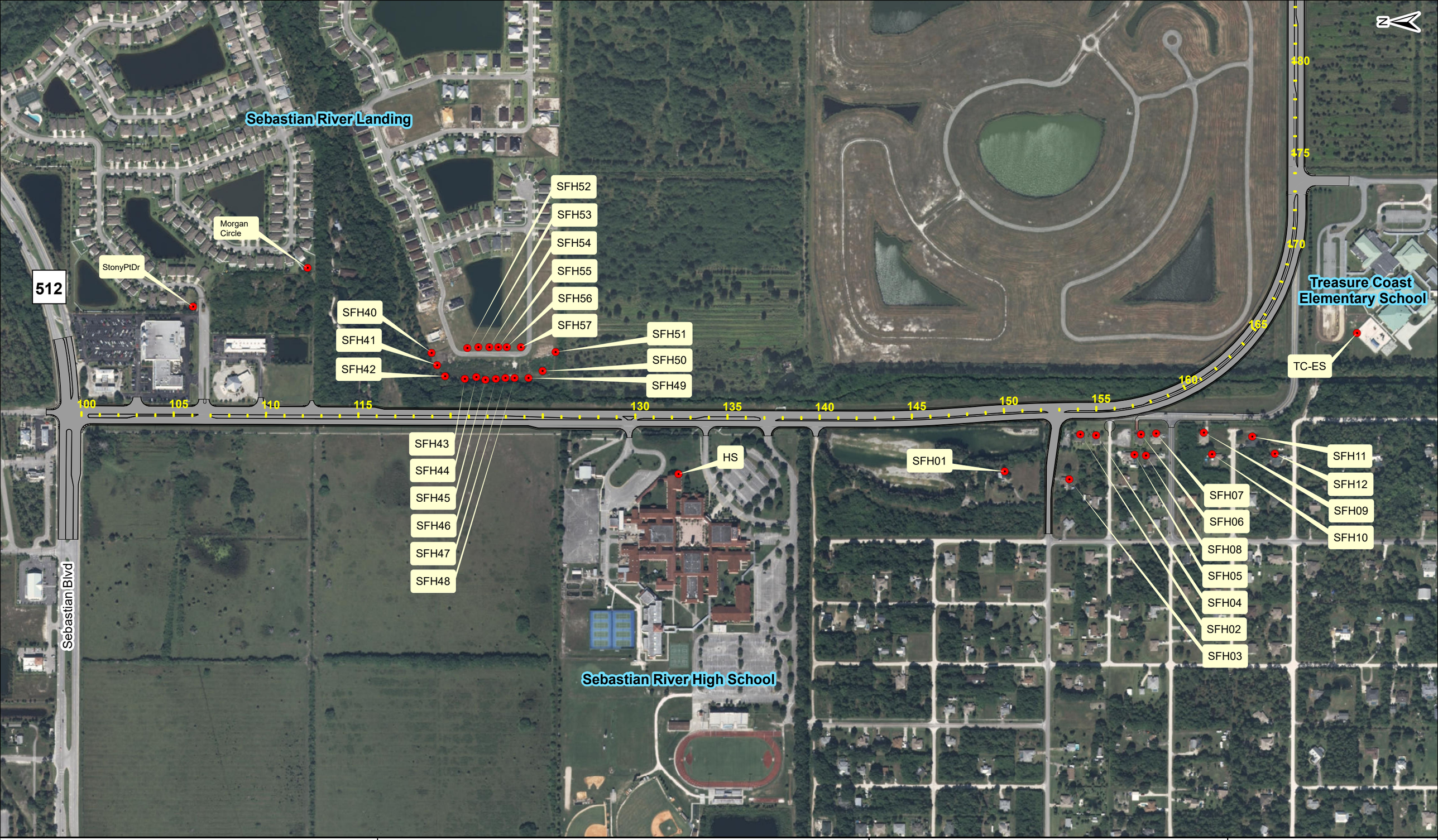
Federal Highway Administration. 1996. Report Number FHWA-PD-96-046, "*Measurement of Highway-Related Noise*". Cynthia S.Y. Lee and Gregg Fleming; 206 pages.

Florida Department of Transportation. 2010. *Standard Specifications for Road and Bridge Construction* 996 pages.

Florida Department of Transportation. 2017. *Project Development and Environment Manual, Part 2, Chapter 18*, updated June 14, 2017.

Florida Department of Transportation. January 1, 2016. *Traffic Noise Modeling & Analysis Practitioners Handbook*

APPENDIX A: NOISE ANALYSIS FIGURES



Aerial Imagery By
National Agriculture Imagery Program (NAIP)
Dated 8/14/2013

CR 510 PD&E
INDIAN RIVER COUNTY, FLORIDA

0 250 500 1,000 Feet

Legend

Model Receptors

Aerial Imagery By
National Agriculture Imagery Program (NAIP)
Dated 8/14/2013

CR 510 PD&E
INDIAN RIVER COUNTY, FLORIDA

0 250 500 1,000 Feet

Legend

- Model Receptors
- Impacted Receptors

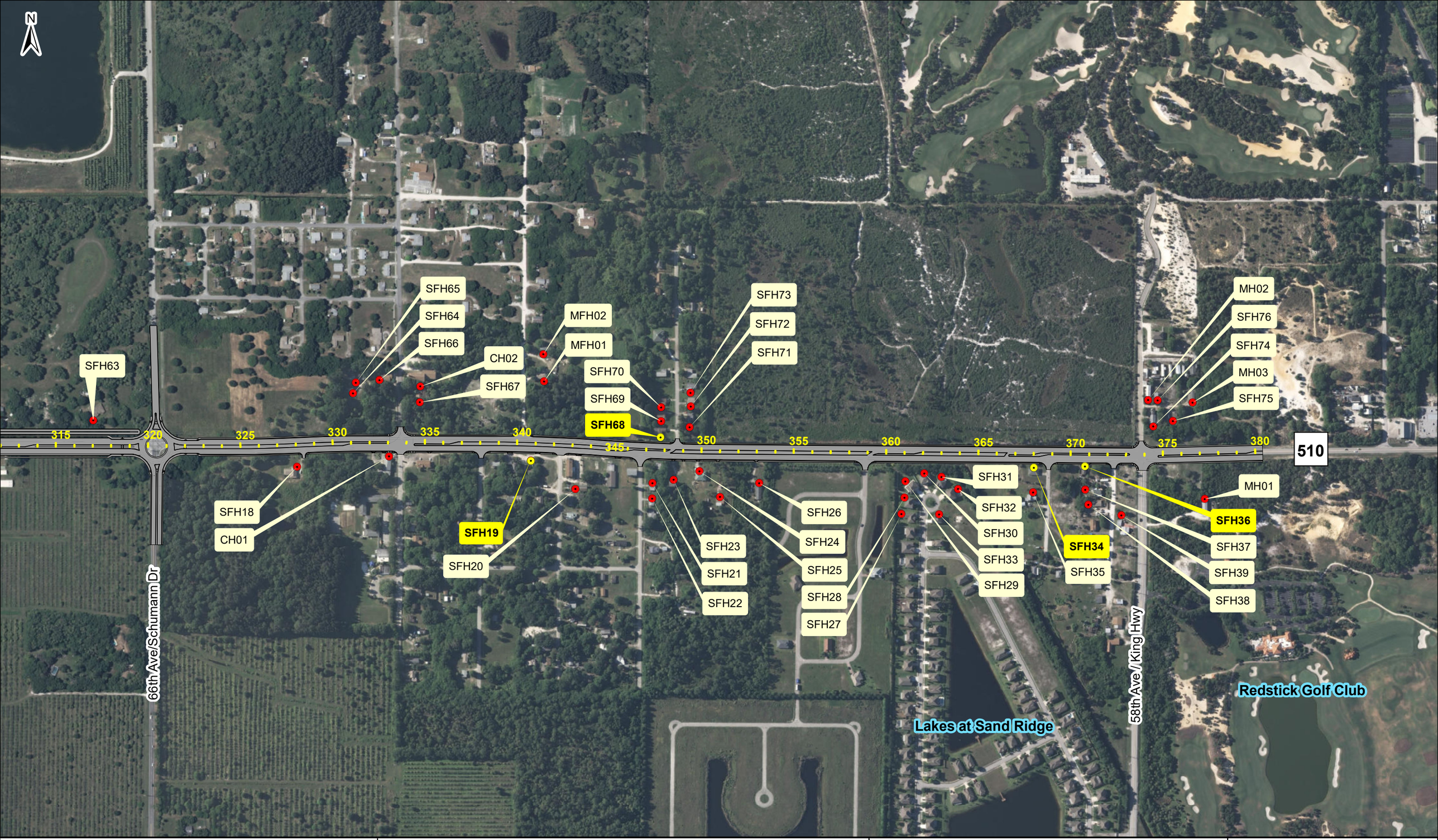
Aerial Imagery By
National Agriculture Imagery Program (NAIP)
Dated 8/14/2013

CR 510 PD&E
INDIAN RIVER COUNTY, FLORIDA

0 250 500 1,000 Feet

Legend

- Model Receptors
- Impacted Receptors



Aerial Imagery By
National Agriculture Imagery Program (NAIP)
Dated 8/14/2013

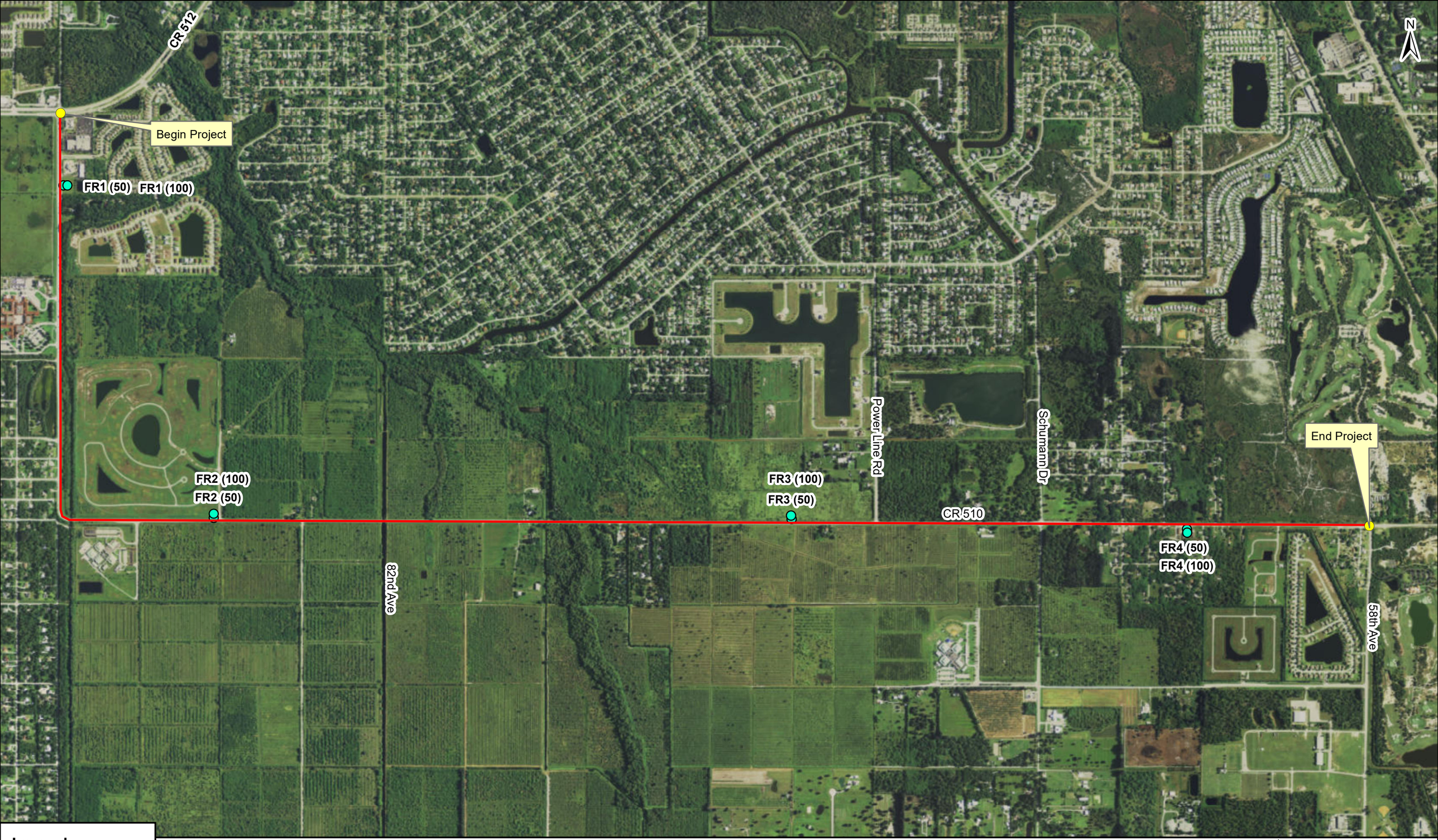
CR 510 PD&E
INDIAN RIVER COUNTY, FLORIDA

0 250 500 1,000 Feet

Legend

- Model Receptors
- Impacted Receptors

APPENDIX B: NOISE DATA MEASUREMENT SHEETS AND TNM TRAFFIC DATA



Legend

- Project Terminus
- Project Corridor
- Receptor Location

Field Receptor Sites
CR 510 PD&E
INDIAN RIVER COUNTY, FLORIDA

Miles
0 0.125 0.25 0.5

Noise Measurement Data Sheet

Date: 12/13/2016 **Measurement Taken by:** MEI

Project: CR-510

Site ID: FR-1

Weather Conditions	Clear		Partly Cloudy	✓	Cloudy		Other
Temperature	Start:	83.1	End:	81.3 (°F)			
Wind Direction	Start:	E	End:	ESE			
Wind Speed (Start):	Min:	2.1	Max:	2.4	Average:	2.2	(mph)
Wind Speed (End):	Min:	0.1	Max:	2.1	Average:	1.7	(mph)
Humidity	Start:	57.3	End:	68.4 (%)			

Equipment Data

Sound Level Meter:	CEL-246	Serial Number	1443727	&	2533754
Date of Last Traceable Calibration:					
Calibration:	Start:	✓	End:	✓	Difference: 0
Battery:	Start:	Full	End:	Full	
Weighting Scale:	A	Response:			
Calibrator:	CEL-120/2	Serial Number:	2044846		

Results: Leq:
in dB(A)

Major Noise Sources:

Bacground Noise Sources:

Other Notes/Observations:

Site/Run #

Noise Measurement Data Sheet

Sample Detailed Data	FR1-1 (1:19PM)										FR1-2 (1:29PM)									
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Samples	40	39	18	24	2	3	0	0	0	0	53	51	9	13	2	1	0	1	1	2
Speed	46	38	44	42	40	43					42	32	48	37	45	35		37	43	58
	30	32	52	38	49	42					37	47	42	43	41				47	40
	42	40	50	44		30					54	40	43	40						
	37	38	51	42							45	41	53	51						
	43	44	45	36							46	40	52	55						
	44	42	48								44	34		47						
	42	38									45	43								
	36	47									42	41								
	48	44									44	37								
	50	39									50	33								
	42	40									50	41								
Average Speed	42	40	48	40	45	38					45	39	48	46	43	35		37	45	49
Speed percentile (85%)	48	45									51	44								

Sample Detailed Data	FR1-3 (1:40PM)																			
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Samples	46	43	18	13	0	2	0	0	1	0										
Speed	45	41	42	34		41			45											
	48	45	38	41																
	41	48	39	41																
	44	52	45	30																
	40	38	44	32																
	46	44	47	31																
	44	45	39	30																
	43	47																		
	40	42																		
	43	38																		
	44	42																		
Average Speed	43	44	42	34		41			45											
Speed percentile (85%)	46	49																		

Noise Measurement Data Sheet

Date: 12/13/2016 **Measurement Taken by:** MEI

Project: CR-510

Site ID: FR-2

Weather Conditions	Clear		Partly Cloudy	✓	Cloudy	Other
Temperature	Start:	83.6	End:	85.4 (°F)		
Wind Direction	Start:	NW	End:	E		
Wind Speed (Start):	Min:	1.0	Max:	3.1 (mph)	Average: 2.1	(mph)
Wind Speed (End):	Min:	1.3	Max:	2.8	Average: 2.6	(mph)
Humidity	Start:	68.2	End:	63.1 (%)		

Equipment Data

Sound Level Meter: CEL-246 Serial Number 1443727 & 2533754

Date of Last Traceable Calibration:

Calibration: Start: ✓ End: ✓ Difference: 0

Battery: Start: Full End: Full

Weighting Scale: A Response:

Calibrator: CEL-120/2 Serial Number: 2044846

Results: Leq:
in dB(A)

Major Noise Sources:

Bacground Noise Sources:

Other Notes/Observations:

Noise Measurement Data Sheet

Sample Detailed Data	FR2-1 (10:49AM)										FR2-2 (11:01AM)									
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Samples	43	29	10	10	0	1	1	0	1	1	35	29	20	12	2	1	0	0	0	0
Speed	49	54	44	43		43	46		52	51	53	47	47	50	47	47				
	48	52	52	47							47	47	51	42		50				
	45	58	45	42							47	49	50	41						
	50	55		44							51	53	43	48						
	57	50		45							52	47	42							
	44	48									47	48								
	53	44									55	47								
	53	47									57	46								
	50	48									53	48								
	49	48									58	53								
	51	54									47	47								
Average Speed	50	51	47	44		43	46		52	51	52	48	47	45	47	49				
Speed percentile (85%)	54	56									57	53								

Sample Detailed Data	FR2-3 (11:11AM)																			
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Samples	38	40	17	12	6	1	0	1	1	0										
Speed	43	47	43	44	44	45		43	57											
	45	43	50	43	45															
	44	53	51		43															
	56	59	45																	
	54	48	41																	
	45	53	42																	
	46	54																		
	51	43																		
	53	47																		
	52	51																		
	47	44																		
Average Speed	49	49	45	44	44	45		43	57											
Speed percentile (85%)	54	55																		

Noise Measurement Data Sheet

Date: 12/13/2016 **Measurement Taken by:** MEI

Project: CR-510

Site ID: FR-3

Weather Conditions	Clear		Partly Cloudy	✓	Cloudy	Other
Temperature	Start:	87.7	End:	85.5 (°F)		
Wind Direction	Start:	E	End:	SE		
Wind Speed (Start):	Min:	2.1	Max:	3.2	Average: 2.3	(mph)
Wind Speed (End):	Min:	1.3	Max:	4.0	Average: 3.1	(mph)
Humidity	Start:	59.9	End:	62.2 (%)		

Equipment Data

Sound Level Meter: CEL-246 Serial Number 1443727 & 2533754

Date of Last Traceable Calibration:

Calibration: Start: ✓ End: ✓ Difference: 0

Battery: Start: Full End: Full

Weighting Scale: A Response:

Calibrator: CEL-120/2 Serial Number: 2044846

Results: Leq:
in dB(A)

Major Noise Sources:

Bacground Noise Sources:

Other Notes/Observations:

Noise Measurement Data Sheet

Sample Detailed Data	FR3-1 (3:10PM)										FR3-2 (3:21PM)									
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Samples	70	46	31	23	4	3	2	3	0	0	66	64	35	24	2	2	1	2	1	1
Speed	45	42	47	52	48	47	48	48			52	47	51	38	52	50	48	47	53	54
	56	42	48	45	47	46		53			55	44	52	39	55	53				
	55	55	55	56	42	51					53	49	51	41						
	53	54	46	50							54	47	49	50						
	54	47	51	53							55	46	51	38						
	54	52	48	46							56	50	46	37						
	51	55	42								58	51	47	45						
	47	56									54	50	48							
	44	53									53	60	57							
	51	50									57	54	60							
	48	47									48	56	55							
Average Speed	51	50	48	50	46	48	48	51			54	50	52	41	54	52	48	47	53	54
Speed percentile (85%)	55	55									57	57								

Sample Detailed Data	FR3-3 (3:31PM)										FR3-4									
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Samples	77	67	28	16	6	1	2	2	2	0										
Speed	56	48	51	57	47	55	47	56	52											
	52	57	49	52	50		49	50	49											
	53	51	47	58																
	56	52	46	49																
	55	56	46	59																
	58	55	52	51																
	55	52	51																	
	57	52	48																	
	53	57	46																	
	50	56																		
	53	54																		
Average Speed	54	54	48	54	49	55	48	53	51											
Speed percentile (85%)	57	57																		

Noise Measurement Data Sheet

Date: 12/13/2016 **Measurement Taken by:** MEI

Project: CR-510

Site ID: FR-4

Weather Conditions	Clear		Partly Cloudy	✓	Cloudy	Other
Temperature	Start:	85.2	End:	85.8 (°F)		
Wind Direction	Start:	E	End:	ESE		
Wind Speed (Start):	Min:	1.7	Max:	4.0	Average: 2.2	(mph)
Wind Speed (End):	Min:	0.9	Max:	2.4	Average: 1.4	(mph)
Humidity	Start:	64.9	End:	59.3 (%)		

Equipment Data

Sound Level Meter: CEL-246 Serial Number 1443727 & 2533754

Date of Last Traceable Calibration:

Calibration: Start: ✓ End: ✓ Difference: 0

Battery: Start: Full End: Full

Weighting Scale: A Response:

Calibrator: CEL-120/2 Serial Number: 2044846

Results: Leq:
in dB(A)

Major Noise Sources:

Bacground Noise Sources:

Other Notes/Observations: Minor side street activity on 63 Avenue

Noise Measurement Data Sheet

Sample Detailed Data	FR4-1 (11:52AM)										FR4-2 (12:05PM)									
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Samples	48	40	19	20	4	1	2	2	0	0	34	44	19	19	5	2	0	1	0	1
Speed	43	37	35	35	42	34	40	38			46	39	43	39	35	35				41
	38	39	41	32	38		35	34			47	36	32	41	33	32				
	47	35	42	31							49	35	41	33	42					
	45	45	38	34							51	41	39	35	44					
	37	39	39	39							45	37	37	43	43					
	40	43	41	38							37	40	32		41					
	36	37	40								43	37								
	48	35	37								44	42								
	42	36									51	42								
	47	37									37	38								
	43	36									46	38								
	44	37									45	51								
	40	42									39	41								
	47	36									36	44								
Average Speed	43	38	39	35	40	34	38	36			44	40	37	38	40	34				41
Speed percentile (85%)	47	43									51	44								

Sample Detailed Data	FR4-3 (12:26 PM)																			
Vehicle Types	Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)		Auto (mph)		Med. Truck (mph)		Heavy Truck (mph)		Bus (mph)		Motorcycle (mph)	
Orientation	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Samples	45	39	18	13	2	2	1	0	0	0										
Speed	36	45	36	33	40	37	37													
	44	42	34	35		37														
	39	38	37	34																
	38	36	36	33																
	43	44	34	37																
	37	44	40	38																
	42	45	41																	
	37	38																		
	43	46																		
	40	33																		
	40	36																		
	38	37																		
Average Speed	40	40	37	35	40	37	37													
Speed percentile (85%)	43	45																		

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	CR 512 to Hammerhead Way
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	54.6	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	780	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	812	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	54.6	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	780	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	860	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

Build Alternative (Design Year):		D=	54.6	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	924	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Stefan Escanes, PE — Print Name — Signature — Date: 9/21/2017

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — Date: 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	Hammerhead Way to 87 Street
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	56.6	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	780	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	642	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

No Build Alternative **(Design Year):**		D=	56.6	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design **Hour Vol.**
		MT=	1.35	% of Design **Hour Vol.**
LOS C Peak Hour Directional Volume:	780	HT=	0.9	% of Design **Hour Vol.**
Demand Peak Hour Volume:	875	B=	0.45	% of Design **Hour Vol.**
Posted Speed:	45	MC=	0.31	% of Design **Hour Vol.**

Build Alternative (Design Year):		D=	56.6	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	967	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Stefan Escanes, PE — Print Name — Signature — **Date:** 9/21/2017

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — **Date:** 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	87 Street CR 510 Curve
Section Number:	N/A
Mile Post To/From:	

Existing Facility		D=	69.7	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	780	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	727	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	780	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	994	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	1085	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Stefan Escanes, PE — Print Name — Signature — **Date:** 9/21/2017

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — **Date:** 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	CR 510 Curve
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	69.7	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	330	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	727	B=	0.45	% of Design Hour Vol.
Posted Speed:	25	MC=	0.31	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	330	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	994	B=	0.45	% of Design Hour Vol.
Posted Speed:	25	MC=	0.31	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	1085	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Stefan Escanes, PE — Print Name — Signature — **Date:** 9/21/2017

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — **Date:** 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	CR 510 Curve to Treasure Coast Ele.
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	69.7	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	350	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	727	B=	0.45	% of Design Hour Vol.
Posted Speed:	35	MC=	0.31	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	350	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	994	B=	0.45	% of Design Hour Vol.
Posted Speed:	35	MC=	0.31	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.35	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.9	% of Design Hour Vol.
Demand Peak Hour Volume:	1085	B=	0.45	% of Design Hour Vol.
Posted Speed:	45	MC=	0.31	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

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FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — Date: 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	Treasure Coast Ele. to 86 Avenue
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	70.2	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	350	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	734	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	350	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1108	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1190	B=	0.39	% of Design Hour Vol.
Posted Speed:	45	MC=	0.89	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

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FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — **Date:** 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	86 Avenue to E of Powerline Road
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	71.7	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	750	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	734	B=	0.39	% of Design Hour Vol.
Posted Speed:	55	MC=	0.89	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	750	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1209	B=	0.39	% of Design Hour Vol.
Posted Speed:	55	MC=	0.89	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1431	B=	0.39	% of Design Hour Vol.
Posted Speed:	55	MC=	0.89	% of Design Hour Vol.

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FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — Date: 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	E of Powerline Road to 66 Avenue
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	71.7	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	330	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	871	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	330	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1383	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1569	B=	0.39	% of Design Hour Vol.
Posted Speed:	45	MC=	0.89	% of Design Hour Vol.

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FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — Date: 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	66 Avenue to 58 Avenue
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	71.7	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	330	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	683	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

No Build Alternative (Design Year).		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	330	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	974	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1213	B=	0.39	% of Design Hour Vol.
Posted Speed:	45	MC=	0.89	% of Design Hour Vol.

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FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — Date: 10/4/2017

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	4984-004-S
FPID Number(s):	405606-2-22-02
State/Federal Route No.:	NA/NA (County Road 510)
Road Name:	SW 90 Avenue/85 Street
Project Description:	PD&E Study from CR 512 to 58 Avenue
Segment Description:	58 Avenue to E of 58 Avenue
Section Number:	N/A
Mile Post To/From:	

Existing Facility:		D=	65.2	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2015	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	350	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	720	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

No Build Alternative (Design Year):		D=	67.1	%
		T24=	5.4	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.7	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	350	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1051	B=	0.39	% of Design Hour Vol.
Posted Speed:	35	MC=	0.89	% of Design Hour Vol.

Build Alternative (Design Year):		D=	67.1	%
		T24=	5.40	% of 24 Hour Vol.
Year:	2040	Tpeak=	2.70	% of Design Hour Vol.
		MT=	1.44	% of Design Hour Vol.
LOS C Peak Hour Directional Volume:	1720	HT=	0.87	% of Design Hour Vol.
Demand Peak Hour Volume:	1248	B=	0.39	% of Design Hour Vol.
Posted Speed:	45	MC=	0.89	% of Design Hour Vol.

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Stefan Escanes, PE — Print Name — Signature — Date: 9/21/2017

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: Hui Zhao, PE — Print Name — Signature — Date: 10/4/2017

APPENDIX C: TNM RESULTS

Modeled Noise Receptor Locations and Noise Analysis Results

Representative Model Receptor	Site and Address	Type	Description (Noise Abatement Activity Category)	FDOT Noise Abatement Approach Criteria [dB(A)]	Location (Side of Road, Station)	Number Of Noise Sensitive Sites	Distance To Nearest Traffic Lane* (Existing/No Build/ Rec. Alt.	Predicted Traffic Noise Levels [Leq(h), dB(A)]			Notes
								Existing (2015)	Design Year (2040)		
									No Build	Rec. Alt.	
HS	SEBASTIAN RIVER HIGH SCHOOL 9001 90TH AV VERO BEACH, FL 32967	C	School	66	West Side Sta. 132+40	1	280/280/270	57.6	57.8	56.6	20 dB(A) noise reduction factor applied for interior, Category D, sites.
SFH01	9010 87TH ST VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 150+00	1	290/290/280	57.9	58.5	58.9	
SFH02	8675 90TH AV VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 154+20	1	80/80/100	66.0	65.6	65.8	
SFH03	9055 87TH ST VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 153+60	1	330/330/340	56.4	57.2	58.7	
SFH04	9016 86TH PL VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 155+00	1	90/90/100	65.8	65.3	64.9	
SFH05	9035 86TH PL VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 157+00	1	190/190/220	58.1	56.0	53.0	
SFH06	8635 90TH AV VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 157+20	1	80/80/120	66.0	65.4	63.1	
SFH07	9016 86TH ST VERO BEACH, FL 32967	B	Residential	66	West Side Sta.158+00	1	80/80/140	66.3	65.6	61.8	
SFH08	9026 86TH ST VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 157+00	1	190/190/240	56.8	54.8	54.3	
SFH09	8575 90TH AV VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 157+80	1	70/70/220	66.8	66.0	58.0	
SFH10	8575 90TH AV VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 159+80	1	70/70/350	58.3	57.4	52.5	
SFH11	9015 85TH PL VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 160+20	1	90/90/380	60.8	60.1	53.9	
SFH12	9026 85TH ST VERO BEACH, FL 32967	B	Residential	66	West Side Sta. 161+60	1	210/210/530	49.8	49.9	49.7	
TC-ES	TREASURE COAST ELEMENTARY 8955 85TH ST VERO BEACH, FL 32967	C	School	66	South Side Sta. 165+40	1	330/330/450	50.2	50.2	54.1	
SFH13	7801 85TH S VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 237+40	1	190/190/160	58.6	58.8	63.2	
DC	REDLANDS CHRISTIAN MIGRANT ASSOCIATION DAY CARE 7625 85TH ST VERO BEACH, FL 32967	C	Daycare	66	South Side Sta. 252+40	1	210/210/200	52.3	51.5	56.6	
SFH14	7595 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 254+80	1	160/160/150	61.4	61.4	64.8	
SFH15	8455 75TH CT	B	Residential	66	South Side	1	360/360/360	49.3	50.0	54.6	

Modeled Noise Receptor Locations and Noise Analysis Results

Representative Model Receptor	Site and Address	Type	Description (Noise Abatement Activity Category)	FDOT Noise Abatement Approach Criteria [dB(A)]	Location (Side of Road, Station)	Number Of Noise Sensitive Sites	Distance To Nearest Traffic Lane* (Existing/No Build/ Rec. Alt.	Predicted Traffic Noise Levels [Leq(h), dB(A)]			Notes
								Existing (2015)	Design Year (2040)		
									No Build	Rec. Alt.	
	VERO BEACH, FL 32967				Sta. 254+20						
SFH16A	8496 75TH CT VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 259+00	1	80/80/80	68.2	68.3	68.9	
SFH16P	8496 75TH CT VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 259+40	1	110/110/120	62.4	63.9	64.5	
SFH17	8476 75TH CT VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 258+20	1	210/210/220	57.6	59.5	61.9	
SFH18	6525 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 328+00	1	110/110/90	57.6	57.5	65.4	
CH01	ALLEN CHAPEL AFRICAN METHODIST CHURCH 6425 85TH ST VERO BEACH, FL 32967	C	Place of worship	66	South Side Sta. 333+00	1	40/40/40	42.7	42.7	50.3	20 dB(A) noise reduction factor applied for interior, Category D, sites.
SFH19	6325 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 341+00	1	60/60/60	60.9	60.9	67.7	
SFH20	8476 63RD AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 344+00	1	210/210/200	49.5	48.2	55.8	
SFH21	8440 62ND AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 347+20	1	180/180/140	53.0	53.0	61.5	
SFH22	8440 62ND AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 347+20	1	260/260/230	44.8	45.0	53.1	
SFH23	6165 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 348+60	1	160/160/120	54.4	54.4	63.5	
SFH24	6135 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 350+00	1	110/110/80	56.7	56.7	65.8	
SFH25	6125 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 351+00	1	240/240/210	49.0	49.1	57.8	
SFH26	6105 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 353+00	1	170/170/130	53.7	53.7	61.8	
SFH27	5967 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 361+00	1	320/320/290	44.9	45.0	55.1	
SFH28	5969 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 361+00	1	240/240/200	47.3	47.2	57.2	
SFH29	5971 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 361+00	1	150/150/120	52.3	51.7	60.9	
SFH30	5973 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 362+00	1	100/100/70	54.3	52.8	61.4	
SFH31	5975 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 363+00	1	130/130/60	52.6	51.3	59.6	

Modeled Noise Receptor Locations and Noise Analysis Results

Representative Model Receptor	Site and Address	Type	Description (Noise Abatement Activity Category)	FDOT Noise Abatement Approach Criteria [dB(A)]	Location (Side of Road, Station)	Number Of Noise Sensitive Sites	Distance To Nearest Traffic Lane* (Existing/No Build/ Rec. Alt.	Predicted Traffic Noise Levels [Leq(h), dB(A)]			Notes
								Existing (2015)	Design Year (2040)		
									No Build	Rec. Alt.	
SFH32	5977 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 364+00	1	190/190/160	49.6	48.8	56.9	
SFH33	5981 RIDGE LAKE CIR VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 363+00	1	330/330/300	41.4	41.9	50.1	
SFH34	8485 59TH AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 368+00	1	70/70/40	59.6	59.6	69.4	
SFH35	8465 59TH AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 368+00	1	200/200/170	50.8	50.7	59.8	
SFH36	5845 85TH ST VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 370+80	1	60/60/30	60.8	60.5	66.8	
SFH37	8475 58TH CT VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 370+80	1	190/190/150	52.4	52.2	61.3	
SFH38	8455 58TH CT VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 371+00	1	270/270/230	47.0	47.0	56.2	
SFH39	8435 58TH AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 372+80	1	330/330/290	55.3	56.1	59.9	
MH01	8466 58TH AV VERO BEACH, FL 32967	B	Residential	66	South Side Sta. 377+20	1	240/240/210	51.2	51.2	60.0	
SFH40	142 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 119+00	1	320/320/310	53.3	53.3	53.0	
SFH41	144 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 119+20	1	260/260/250	56.3	56.4	55.9	
SFH42	146 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 119+80	1	200/200/190	59.5	59.3	58.8	
SFH43	148 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 120+80	1	190/190/170	60.0	59.8	59.3	
SFH44	150 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 121+ 40	1	190/190/180	48.8	47.7	48.3	
SFH45	152 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 121+80	1	180/180/270	60.2	59.9	59.4	
SFH46	154 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 122+40	1	180/180/180	60.1	59.6	59.6	
SFH47	156 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 123+00	1	190/190/180	60.2	59.7	60.5	
SFH48	158 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 123+40	1	190/190/180	60.2	59.5	60.5	
SFH49	160 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 124+20	1	190/190/180	59.5	58.8	58.8	

Modeled Noise Receptor Locations and Noise Analysis Results

Representative Model Receptor	Site and Address	Type	Description (Noise Abatement Activity Category)	FDOT Noise Abatement Approach Criteria [dB(A)]	Location (Side of Road, Station)	Number Of Noise Sensitive Sites	Distance To Nearest Traffic Lane* (Existing/No Build/ Rec. Alt.	Predicted Traffic Noise Levels [Leq(h), dB(A)]			Notes
								Existing (2015)	Design Year (2040)		
									No Build	Rec. Alt.	
SFH50	162 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 125+00	1	230/230/220	58.0	57.5	58.0	
SFH51	164 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 125+60	1	330/330/320	54.2	53.9	54.4	
SFH52	145 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 121+00	1	350/350/340	47.1	47.7	47.9	
SFH53	151 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 121+60	1	360/360/340	45.3	46.2	46.9	
SFH54	153 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 122+00	1	360/360/350	45.9	46.6	47.0	
SFH55	155 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 122+60	1	360/360/350	45.9	46.5	47.1	
SFH56	157 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 123+00	1	360/360/350	46.2	46.5	47.3	
SFH57	163 PORT ROYAL CT SEBASTIAN, FL 32958	B	Residential	66	East Side Sta. 123+80	1	360/360/350	47.8	48.0	48.2	
SFH58	8420 85TH ST VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 199+60	1	140/140/110	63.3	63.4	64.2	
SFH59	8380 85TH ST VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 201+80	1	300/300/270	54.9	55.0	59.3	
SFH60	7800 85TH ST VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 237+40	1	100/100/70	65.8	65.8	69.7	
SFH61	6780 85TH ST VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 310+00	1	230/230/220	49.3	49.4	60.7	
SFH62	6650 85TH ST VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 311+80	1	140/140/120	54.3	54.2	64.5	
SFH63	6630 85TH ST VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 317+00	1	110/110/100	57.7	57.7	64.8	
SFH64	8535 64TH CT SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 331+00	1	270/270/240	49.9	49.9	59.2	
SFH65	8545 64TH CT SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 331+20	1	330/330/300	46.5	46.6	56.1	
SFH66	8545 64TH AV SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 332+60	1	350/350/310	48.1	46.1	55.8	
SFH67	8540 64TH AV SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 334+80	1	230/230/190	51.1	51.1	60.9	
CH02	ST. MATTHEW MISSIONARY BAPTIST CHURCH	C	Place of worship	66	North Side Sta. 334+80	1	310/310/280	47.1	47.1	56.6	

Modeled Noise Receptor Locations and Noise Analysis Results

Representative Model Receptor	Site and Address	Type	Description (Noise Abatement Activity Category)	FDOT Noise Abatement Approach Criteria [dB(A)]	Location (Side of Road, Station)	Number Of Noise Sensitive Sites	Distance To Nearest Traffic Lane* (Existing/No Build/ Rec. Alt.	Predicted Traffic Noise Levels [Leq(h), dB(A)]			Notes
								Existing (2015)	Design Year (2040)		
									No Build	Rec. Alt.	
	8550 64TH AV SEBASTIAN, FL 32967										
MFH01	8560 63RD AV SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 341+20	1	350/350/310	47.0	47.0	56.7	
MFH02	8560 63RD AV SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 341+20	1	500/500/460	42.3	42.5	51.7	
SFH68	8526 61ST DR VERO BEACH, FL 32967	B	Residential	66	North Side Sta. 347+80	1	50/50/40	61.7	61.7	69.4	
SFH69	8536 61ST DR SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 347+80	1	140/140/130	53.0	52.2	59.9	
SFH70	8546 61ST DR SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 347+80	1	210/210/200	49.1	48.3	55.9	
SFH71	8535 61ST DR SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 349+20	1	110/110/100	56.9	56.9	64.5	
SFH72	8545 61ST DR SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 349+20	1	210/210/210	49.1	48.7	57.0	
SFH73	8555 61ST DR SEBASTIAN, FL 32967	B	Residential	66	North Side Sta. 349+20	1	290/290/290	46.2	44.1	52.4	
SFH74	8520 58TH AV SEBASTIAN, FL 32958	B	Residential	66	North Side Sta. 374+60	1	120/120/120	57.1	57.2	65.1	
SFH75	5765 85TH PL SEBASTIAN, FL 32958	B	Residential	66	North Side Sta. 374+20	1	150/150/150	54.9	54.8	62.9	
SFH76	5780 85TH PL SEBASTIAN, FL 32958	B	Residential	66	North Side Sta. 374+80	1	250/250/260	47.8	47.9	55.9	
MH02	8550 58TH AV SEBASTIAN, FL 32958	B	Residential	66	North Side Sta. 374+00	1	270/270/270	51.5	52.0	58.9	
MH03	5740 85TH PL SEBASTIAN, FL 32958	B	Residential	66	North Side Sta. 376+80	1	250/250/250	48.8	48.7	57.3	
MH04	9260 90TH AV VERO BEACH, FL 32967	B	Residential	66	East Side Sta. 115+20	1	180/180/160	59.4	59.0	59.4	
MorganCircle	Sebastian Landing Neighborhood	B	Residential	66	East Side Sta. 112+00	1	760/760/750	44.6	44.9	46.7	
StonyPtDr	Entrance to Sebastian Landing Neighborhood	B	Residential	66	East Side Sta. 106+40	1	550/550/530	46.4	47.0	46.6	

Notes: * = To existing edge-of-pavement of the nearest through-lane on CR 510.
Bold numbers indicate noise levels above FDOT Noise Abatement Criteria
SLU = Special Land Use site, Sta. = Station
†=Indoor receptor site, includes 20 dB(A) building noise reduction factor