SR 9/I-95 AT LANTANA ROAD

Palm Beach County, Florida

FPID No.: 413258-1-22-02 | ETDM# 14338

PD&E Study

Preliminary Engineering Report

December 2020

TECHNICAL REPORT COVERSHEET

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District Four

SR 9/I-95 at Lantana Road Interchange PD&E Study

Limits of Project: From North of Hypoluxo Road to South of 6th Avenue S (MP 18.420 to MP 19.158)

Palm Beach County, Florida

Financial Management Number: 413258-1-22-02

ETDM Number: 14338

December 31, 2020

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

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1.0 PROJECT SUMMARY

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study that proposes improvements to SR 9/I-95 at Lantana Road Interchange. The SR 9/I-95 at Lantana Road interchange is located along SR 9/I-95 (MP 18.420 to MP 19.158) between the Hypoluxo Road interchange (1.04 miles to the south) and the 6th Avenue South interchange (1.54 miles to the north) within the Town of Lantana in eastern Palm Beach County. The limits of the project along Lantana Road extends from High Ridge Road to Andrew Redding Road. This Preliminary Engineering Report (PER) contains detailed information that fulfills the purpose and need for the project. This project has been developed in compliance with Title VI of the Civil Rights Act of 1964 and other related federal and state nondiscrimination authorities. Neither the Florida Department of Transportation (FDOT) nor this project will deny the benefits of, exclude from participation in, or subject to discrimination, anyone on the basis of race, color, national origin, age, sex, disability, or family status. This project has been screened through the Efficient Transportation Decision Making (ETDM) process. The Summary Report was published on April 26, 2018 and can be viewed under the ETDM # 14338.

1.1 PROJECT BACKGROUND

SR 9/I-95 is the main Interstate Highway on the East Coast of the United States serving areas from Florida to Maine. Within the State of Florida, SR 9/I-95 is a major state transportation resource critical in the facilitation of statewide travel and is included in the Strategic Intermodal System (SIS) established by the Florida Legislature in 2003, for its role in supporting the State's economy and mobility.

SR 9/I-95 has experienced increasing traffic volumes since its completion in Palm Beach County in 1980: fueled largely by population and economic growth within the County. The FDOT has responded to this increased transportation demand with various interventions to improve operations and safety along the SR 9/I-95 mainline including, adding a High Occupancy Vehicle (HOV) lane and auxiliary lanes from south of Linton Boulevard to north of PGA Boulevard in the 1990s and 2000s, and minor interchange improvements at eight interchange locations within this segment of SR 9/I-95.

In December 2015, the FDOT completed the SR 9/I-95 Interchange Master Plan for Palm Beach County to identify short-term and long-term needs at the interchange locations within the County through the 2040 design year horizon. This Master Plan included design concepts to address traffic spillback onto SR 9/I-95, improve interchange operations, reduce congestion, and increase safety at 17 interchanges from Linton Boulevard to Northlake Boulevard. SR 9/I-95 at Lantana Road Interchange was one of the interchange locations evaluated as part of the I-95 Interchange Master Plan.

A Concept Development Report (CDR) was completed for this interchange as part of the I-95 Interchange Master Plan Study for Palm Beach County. The CDR identified several preliminary short-term and long-term improvements at the SR 9/I-95 at Lantana Road Interchange including:

- Dual right-turn lanes for the SR 9/I-95 southbound off-ramp
- Dual eastbound left-turn lanes from Lantana Road to the SR 9/I-95 northbound on-ramp
- Additional westbound through lane between the SR 9/I-95 southbound off-ramp and High Ridge Road
- Additional eastbound through lane between the SR 9/I-95 northbound off-ramp and Andrew Redding Road
- Improvements at various intersections along Lantana Road including High Ridge Road, Andrew Redding Road, Sunset Road and Shopping Center Drive

Within Palm Beach County, the Transportation Planning Agency (TPA) adopted a vision to transform the County into a place where bicycling is a safe and convenient transportation option and an attractive form of recreation for residents and visitors alike by 2035. In keeping with this vision, Palm Beach County adopted the Master Comprehensive Bicycle Transportation Plan (MCBTP) with recommendations to include/improve bicycle facilities throughout Palm Beach County. Lantana Road from Jog Road to Dixie Highway was identified as one of the corridors for inclusion in the Priority Bicycle Network.

This PD&E Study is being conducted to evaluate concepts that improve interchange operations and safety, accommodate future transportation demand at the Lantana Road Interchange, and provide bicycle accommodations along Lantana Road within the project limits.

1.2 PROJECT DESCRIPTION

The SR 9/I-95 at Lantana Road interchange is primarily located within the Town of Lantana in Palm Beach County, Florida, between the 6th Avenue South (1.54 miles to the north) and the Hypoluxo Road (1.04 miles to the south) interchanges (see Figure 1-1 Project Location Map). The project length is 0.81 miles. The interchange provides access to the Palm Beach County Park/Lantana Airport, Hypoluxo Island, Lantana Scrub Natural Area, and the Lantana Lake Worth Health Center. The study interchange is a typical tight urban diamond interchange (TUDI) and the project limits along Lantana Road extend from High Ridge Road to Andrew Redding Road. The

South Florida Rail Corridor (SFRC)/CSX Railroad runs parallel along the west side of SR 9/I-95 in this area and crosses below an elevated section of Lantana Road.

SR 9/I-95 near the Lantana Road interchange is a ten-lane divided urban interstate, aligned south to north, providing four general purpose lanes and one High Occupancy Vehicle (HOV) lane in each direction. Auxiliary lanes are provided in both the northbound and southbound direction within the study area. At the Lantana Road interchange, SR 9/I-95 crosses below an elevated section of Lantana Road. SR 9/I-95 is a SIS designated highway as well as an emergency evacuation route.

Within the project limits, Lantana Road is primarily a four-lane urban principal arterial under the jurisdiction of Palm Beach County, aligned west to east, with two through lanes in each direction. At the interchange location, Lantana Road is elevated over SR 9/I-95 and the SFRC/CSX Railroad. There is one dedicated left-turn lane in each direction to access the SR 9/I-95 on-ramps and two through lanes in each direction. A single free-flow right-turn lane is also provided in both eastbound and westbound directions along Lantana Road to serve the SR 9/I-95 on-ramps. Sidewalks are provided along both sides of Lantana Road; however, bicycle lanes do not exist. The segment of Lantana Road from SR 9/I-95 to SR 5/US-1 is designated as an emergency evacuation route.

The proposed improvements will include operational and safety improvements to the Interchange including capacity improvements along Lantana Road, additional turning lanes at the SR 5/I-95 ramp terminal intersections and signal improvements. The project will also include improvements to sidewalks, ADA ramps, guide signs, and designated bicycle lanes. The project location map is shown in **Figure 1-1**.

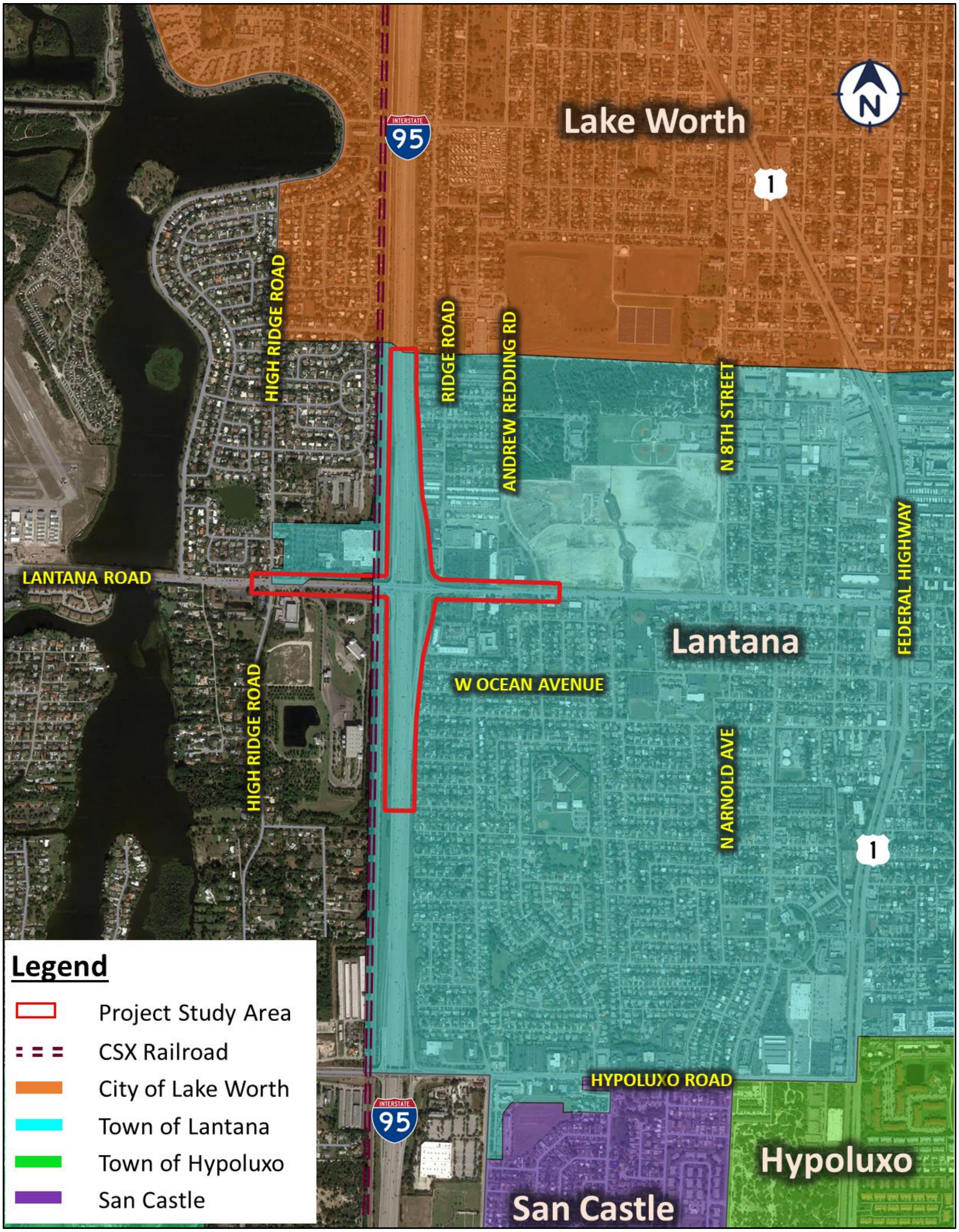


Figure 1-1 Project Location Map

1.3 PURPOSE AND NEED

The purpose of the project is to enhance the overall traffic operations and safety at the existing interchange of SR 9/I-95 and Lantana Road. The project will evaluate alternatives that eliminate traffic spillback onto SR 9/I-95, enhance interchange operations and safety, reduce congestion, while providing for multimodal accommodations at this interchange location.

1.3.1 System Linkage

Lantana Road is a county roadway (CR 812) that provides access to the Town of Lantana and Hypoluxo Island via East Ocean Avenue (Lantana) Bridge. To the west, Lantana Road provides access to the Palm Beach County Park/Lantana Airport and the City of Atlantis. Although Lantana Road is not a designated road in the state's SIS, SR 9/I-95 is a part of the SIS system. The SIS includes Florida's important transportation facilities that support the State's economy and mobility. Improved interchange operations at Lantana Road will help to reduce traffic spillback onto I-95 thereby enhancing connectivity among the local and regional network.

Based on Palm Beach County's Evacuation Routes and Zones Map, Lantana Road is classified as an evacuation route from SR 5/US-1 to SR 9/I-95. Therefore, improvements to the interchange of I-95 and Lantana Road, along with improvements to nearby intersections, will decrease evacuation times by increasing connectivity between eastern and western towns/cities and SR 9/I-95. Additionally, emergency response times will be decreased by the proposed improvements due to the enhanced mobility.

1.3.2 Modal Interrelationships

The SR 9/I-95 at Lantana Road interchange accommodates east-west sidewalks on the north and south sides of Lantana Road, from High Ridge Road to Shopping Center Drive, extending beyond both intersections. Bicycle lanes are not currently provided in both directions along Lantana Road within the project limits. The Transportation Planning Authority (TPA) Master Comprehensive Bicycle Transportation Plan (MCBTP) includes recommendations to improve bicycle facilities throughout Palm Beach County. The MCBTP recommends a "Detailed Corridor Study" along Lantana Road. Additionally, the MCBTP designates segments of High Ridge Road as "Bike Level of Service (LOS) Threshold Met" and "Shoulder Candidate." As part of the study, provision of bike lanes would be evaluated along Lantana Road.

Four schools are located within approximately one mile of the interchange: Barton Elementary School, Lantana Elementary School, Lantana Middle School, and Palm Beach Maritime Academy. There are no Palm Tran transit bus stops within the project limits. However, bus stops are located on Lantana Road west of High Ridge Road and east of Andrew Redding Road. Adding improvements to bicycle and pedestrian facilities at the intersections within the study area will increase the safety of the local community pedestrian users traveling the corridor.

1.3.3 Capacity and Transportation Demand

The SR 9/I-95 southbound ramps within the study area currently operate at an overall LOS E during the A.M. peak hours, while the northbound ramps operate at a LOS C. During the P.M. peak hours, the southbound ramps operate at LOS D, and the northbound ramps operate LOS C. If no improvements are made to the I-95/Lantana Road interchange, it is forecasted that by 2045, both the southbound and northbound ramps will operate at LOS F for both the A.M. and P.M. peak hours.

Due to the current need to increase capacity, the proposed interchange improvements are included in the Palm Beach County TPA 2045 Long Range Transportation Plan (LRTP). Funding for Design (Preliminary Engineering and PD&E) and right of way are identified in 2020-2024 and Construction in 2025-2030. The interchange improvements are also included in the SIS Adopted 5-Year Plan 2020/2021-2024/2025 The interchange is also included in the I-95 Interchange Master Plan.

1.3.4 Safety

Crash data from 2014 to 2018 for SR 9/I-95 (Roadway ID: 93220000) from south of Lantana Road to the north of Lantana Road, SR 9/I-95 Ramps at Lantana Road (Roadway ID: 93220037, 93220038, 93220039, and 93220040), and Lantana Road (Roadway ID: 93530000) from High Ridge Road to Andrew Redding Road (MP 2.80 to MP 3.50) was obtained from the FDOT State Safety Office GIS (SSOGis) Query Tool on the Traffic Safety Web Portal. Based on the crash analysis, 313 crashes occurred on the SR 9/I-95 mainline, 157 crashes occurred on the SR 9/I-95 ramps at Lantana Road interchange and 172 crashes occurred on Lantana Road within the study area from 2014 to 2018. The predominant crash types that occurred within the study area were rear-end collisions, sideswipe collisions, and angled collisions. Crashes of these types are typically attributed to congested conditions along the arterials and interchange ramps and terminals. As such, providing capacity improvements for different modes of transportation within the study area will help to improve safety by alleviating congestion.

1.4 PLANNED AND ONGOING ADJACENT PROJECTS

Transportation plans from the state, county, city, and municipal level were reviewed to identify projects that impact the SR 9/I-95 at Lantana Road PD&E Study Area. Transportation plans that were reviewed as part of this study include: FDOT District Four Five Year Work Program, Palm Beach County TPA 2045 LRTP, Palm Beach County Transportation Improvement Program (TIP) and Palm Beach County MCBTP. A number of planned or ongoing projects were identified within the influence area of the SR 9/I-95 at Lantana Road PD&E Study. **Table 1-1** below provides a summary of these projects.

Table 1-1 Ongoing and Adjacent Projects

Project #	Project Name	Work Mix	Fiscal Year
427516-2	SR 9/I-95 From Gateway Boulevard to Lantana Road	Resurfacing	2020
444202-1	I-95 Managed Lanes from Linton Blvd. to 6th Ave	PD&E Study	2024
413257-1	SR 9/I-95 at Hypoluxo Road	PD&E	2020
436963-1	SR 9/I-95 at 6th Avenue South	PD&E / P.E.	2020
444340-1	SR 9 @ 6th Avenue South	Landscaping	2022
20230001	Lantana Road from Hagen Ranch to SR 9/I-95	Resurfacing	2023
N/A	Water Town Commons Development	Mixed-Use Development	Ongoing

Lantana Road is also included as a priority corridor in the Palm Beach County adopted MCBTP), with recommendations for bicycle lanes along Lantana Road from Jog Road to Dixie Highway.

1.5 COMMITMENTS

The following commitments and recommendations have been made by the Florida Department of Transportation (FDOT) and will be adhered to during the final design and/or construction phases.

1. To minimize adverse effects to gopher tortoises, a survey is needed prior to the start of construction. Surveys should be conducted within the existing and proposed right of way, dry swales, and area underneath the proposed underpass service road. Any gopher tortoises located within 25 feet of proposed construction will be relocated by a Florida Fish and Wildlife Conservation Commission (FWC) Authorized Gopher Tortoise Agent to an approved recipient site.
2. The FDOT will adhere to the most recent version of the U.S. Fish and Wildlife Service's (USFWS) "Standard Protection Measures for the Eastern Indigo Snake" during construction to prevent adverse impacts to this species.
3. The FDOT will continue to coordinate with South Florida Regional Transportation Authority (SFRTA) and CSX Transportation during design phase of the project to ensure that the proposed interchange improvements provide a clear envelope over the South Florida Rail Corridor (SFRC) when placing bridge piers to accommodate future planned expansion.

1.6 DESCRIPTION OF PREFERRED ALTERNATIVE

The Preferred Alternative reconfigures the existing Tight Urban Diamond Interchange (TUDI) into a Diverging Diamond Interchange (DDI) configuration (See **Figure 1-2**). The diverging diamond concept requires drivers to briefly cross to the left, or opposite side of the road at carefully designed crossover intersections. Drivers travel for a short distance, then cross back to the traditional or right side of the road. This unconventional design allows movements for the left and right-turns to and from the I-95 ramps onto Lantana Road without crossing the path of opposing traffic. The crossover is made at the signal where the opposing traffic flows split the signal green time. The major advantage of this type of interchange is that the left-turning vehicles do not require a signal phase which makes this a two-phased signal system with more green time for the opposing traffic. In addition, the DDI has fewer conflict points (i.e., 14 for DDI, 26 for TUDI) resulting in significant safety and operational improvement at the interchange. The following improvements are proposed to accommodate the design year traffic demand under the preferred alternative:

- Widen Lantana Road to provide 3 lanes in each direction between High Ridge Road and Andrew Redding Road.
- Replace the existing single Lantana Road bridge over I-95 and SFRC/CSX Railroad with two separate bridges over SR 9/I-95 and SFRC/CSX Railroad.
- Replace the existing ramp bridges for the southbound on and off ramps with embankment and MSE walls.
- Provide dual right-turn lanes and dual left-turn lanes for the SR 9/I-95 northbound and southbound off-ramps.
- Provide dual eastbound and westbound right-turn lanes from Lantana Road onto I-95 southbound and northbound on-ramps, respectively.
- Provide dual eastbound and westbound left-turn lanes from Lantana Road onto the I-95 northbound and southbound on-ramps.
- Eliminate eastbound left-turn movement at the Sunset Road intersection, widen the westbound right turn lane at Sunset Road to accommodate the design vehicle and provide a directional median opening.
- Provide an underpass road that connects Sunset Road and the existing Solid Waste Authority (SWA) service road underneath the reconstructed Lantana Road Bridge over SFRC/CSX Railroad.
- Provide exclusive southbound and northbound right-turn lane along High Ridge Road.
- Provide 7-foot bicycle lanes and 6-foot sidewalks along Lantana Road in both directions.
- Provide ITS improvements including Arterial Dynamic Message Signs (ADMS), Surveillance and verification CCTV cameras and wrong way detection system for the interchange ramps.

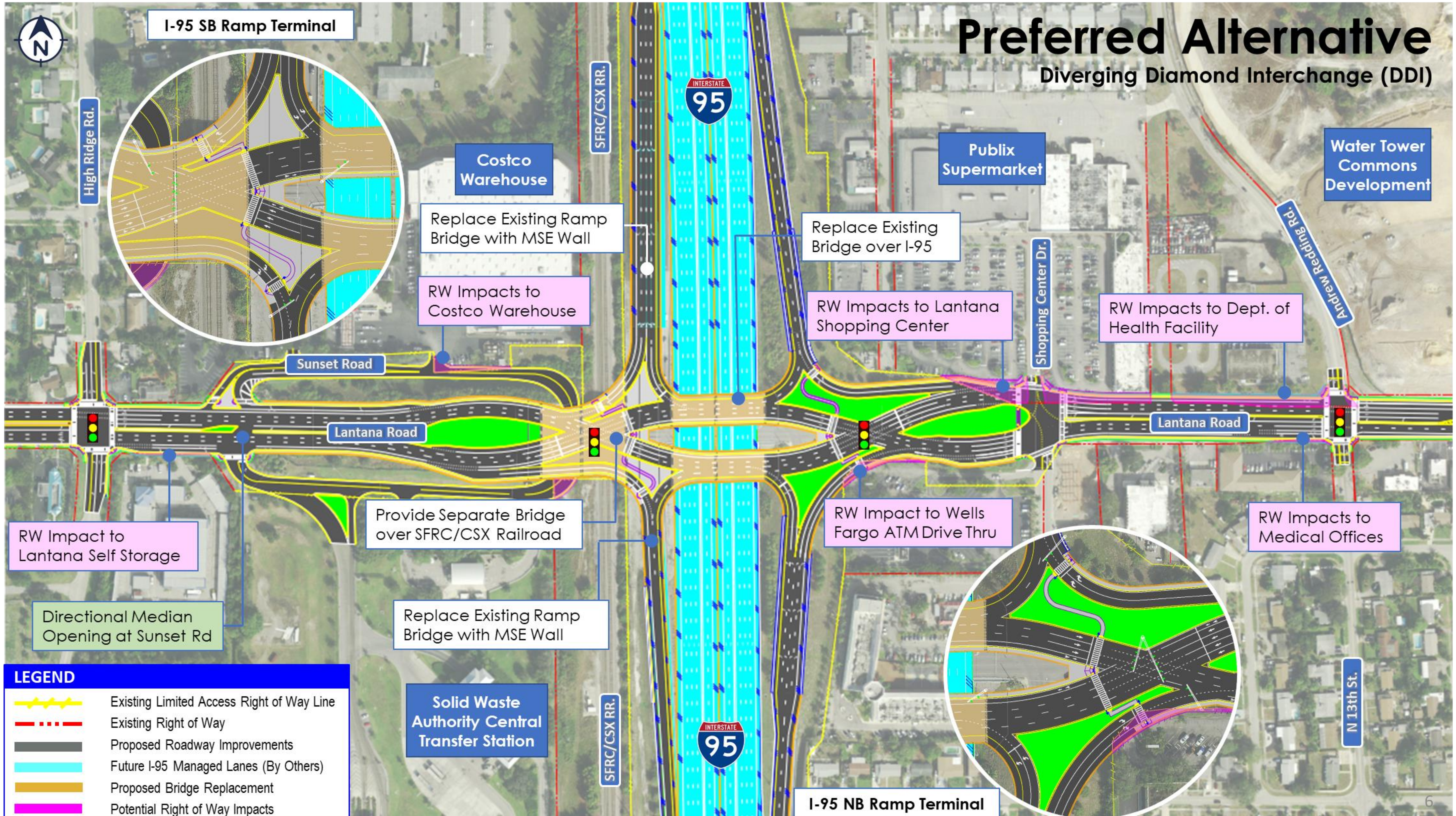


Figure 1-2 Conceptual Layout for Preferred Alternative

2.0 EXISTING CONDITIONS

2.1 ROADWAY CHARACTERISTICS

2.1.1 Context Classification

In 2014, the Florida Department of Transportation (FDOT) adopted the Statewide Complete Streets Policy (Topic No. 000-625-017-a), a comprehensive statewide policy to promote safety, quality of life, and economic development along the state roads. The context classification is based on the existing or future land use characteristics, development patterns, and roadway connectivity of an area. Lantana Road is a non-state road under the jurisdiction of Palm Beach County with a context classification of C4-Urban General. In the case of interstates and limited-access facilities, the function of the roadway is considered complete. As such, no context classification is assigned for SR 9/I-95.

2.1.2 Functional Classification

The existing roadway network within the project study area is comprised of state roads, county roads, and local roads which provide access and traffic circulation within residential, commercial, and industrial areas. SR 9/I-95, near the Lantana Road interchange, is a ten-lane divided interstate freeway classified as an Urban Interstate. It is part of the National Highway System (NHS) and serves as an integral part of the Strategic Intermodal System (SIS) highway network. Lantana Road within the project limits, is a four-lane divided county roadway classified as an Urban Principal Arterial. High Ridge Road is a two-lane undivided city roadway classified as an Urban Minor Collector. **Figure 2-1** shows the functional classifications of the roadways within the study limits. The straight-line diagram for SR 9/I-95 is provided in **Appendix A**.

2.1.3 Design and Posted Speed

SR 9/I-95 has a design speed of 70 mph and a posted speed of 65 mph. Lantana Road within the study area has a design speed of 45 mph and a posted speed of 40 mph. High Ridge Road has a posted speed of 30 mph, while Andrew Redding Road has a posted speed of 30 mph north of Lantana Road, and 25 mph south of Lantana Road.

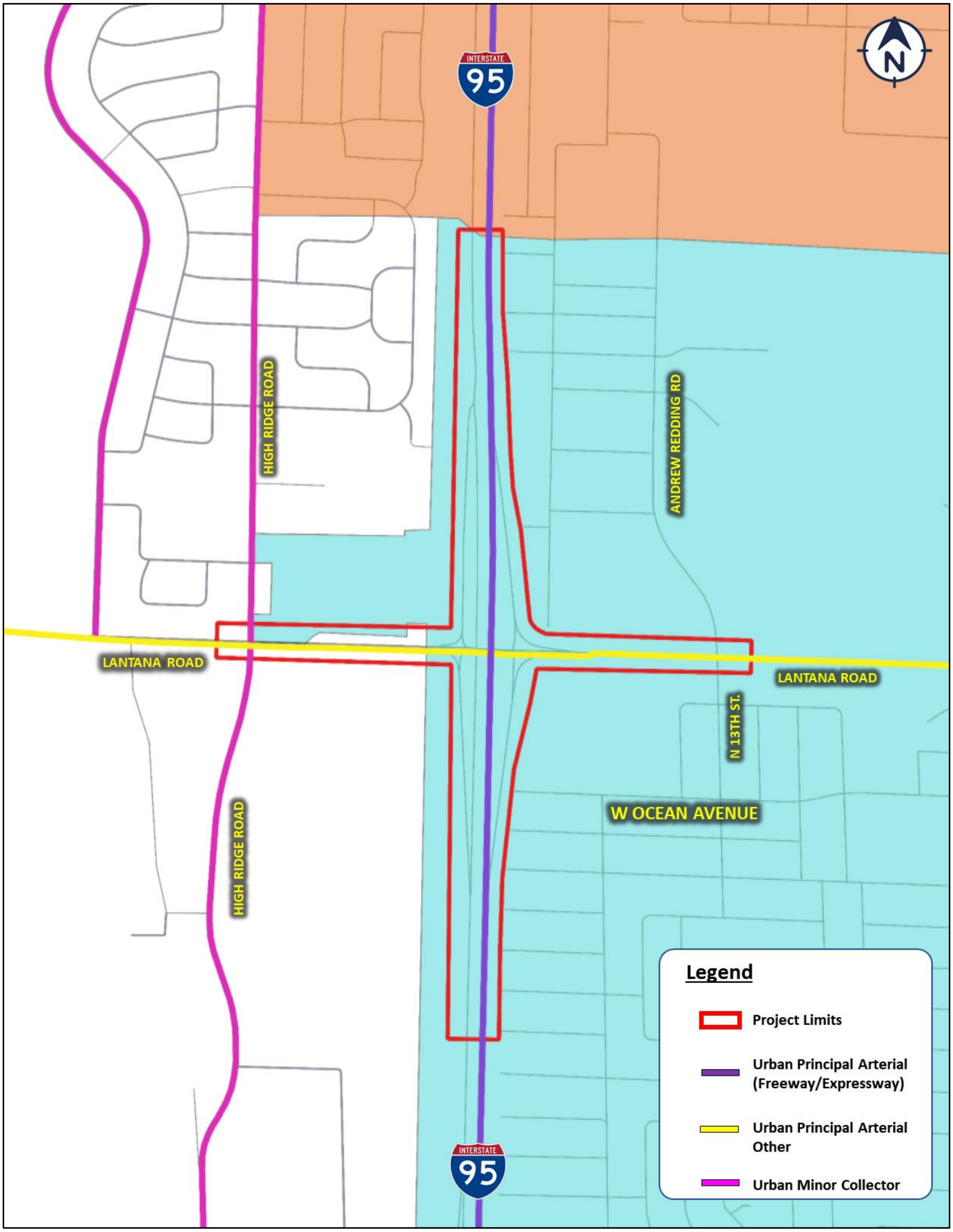


Figure 2-1 Functional Classification

2.1.4 Access Management

A major contributing factor to congestion and functional deterioration of any highway system is unregulated access to the system. The Florida Department of Transportation found that regulation of access was necessary to preserve the functional integrity of the state highway system and to promote the safe and efficient movement of people and goods within the state. The Department's access management classification system under Rules 14-97 F.A.C. divides surface transportation facilities into seven (7) classes depending in part on the ability of motorists to cross the median and make left turns. SR 9/I-95 is a Limited Access Facility classified as Access Class 1. Lantana Road is an off-system roadway and is not classified by FDOT. However, Palm Beach County Access Management Standards classifies roadways under their jurisdiction into one of two categories:

- 80' Right of Way Undivided Collector Roadway Constructed to 5 Lane Section or 80' Right of Way Collector Roadway with Islands Constructed to 4/5 Lane Section.
- 100' Or Greater Right of Way Divided Arterial Roadway

Table 2-1 below shows a summary of the Palm Beach County Access Management Standards.

Table 2-1 Palm Beach County Access Management Standards

Roadway Classification	Corner Clearance Distance (Minor St)	Corner Clearance Distance (Thoroughfare Plan Road)	Driveway Connection Spacing	Median Opening (Full)	Median Opening (Directional)	Median Opening (Expanded intersection) (Full)	Median Opening (Exp. Int. Directional)	Signal Spacing
80' R/W Collector	50	75'	125'	N/A	N/A	N/A	N/A	0.25 mile
80'R/W Collector with islands	50'	125'	125'	N/A	N/A	N/A	N/A	0.25 mile
100' or Greater Arterial	75'	125'	245'	660'/830'	660'	830'	660'	0.5 mile

The existing right of way along Lantana Road within the project limits varies from 80' on the east side to 122' on the west side. However, the Thoroughfare Right of Way Identification Map identifies the segment of Lantana Road within the project limit as a 110' right of way thoroughfare roadway. As such, the access management classification for 100' or Greater was applied.

There are 6 full median openings along Lantana Road within the project limits. These include 5 signalized intersections at High Ridge Road, SR 9/I-95 SB Ramps, SR 9/I-95 NB Ramps, Shopping Center Drive and Andrew Redding Road and one unsignalized intersection at Sunset Road. These median openings and the spacing between them are summarized in Table 2.

As shown in **Table 2-2,** the intersections within the project limits do not meet the access management requirement for Lantana Road. All the five signalized intersections provide access to freeways, major business are residential developments as follows:

Table 2-2 Existing Access Management

Existing Median Opening	Mile Post	Median Opening Type	Existing Spacing (ft)	Deviation from Standard (%)
High Ridge Road	2.861	Full (Signal)	0	0
Sunset Road	2.923	Full	327	50%
SR 9/I-95 SB Ramps	3.118	Full (Signal)	1030	61%
SR 9/I-95 NB Ramps	3.194	Full (Signal)	401	85%
Shopping Center Drive	3.295	Full (Signal)	533	80%
Andrew Redding Road	3.430	Full (Signal)	713	73%

The Access Management Memorandum prepared as part of this study is included in **Appendix B**.

2.1.5 Typical Sections

2.1.5.1 SR 9/I-95

SR 9/I-95 (Roadway ID: 93220000) is a ten-lane divided interstate freeway providing four general purpose lanes and one High Occupancy Vehicle (HOV) lane separated by a 4-ft buffer in each direction. The travel lanes are 12-ft wide with 15-ft paved inside shoulders and 12-ft outside shoulders with 10-ft paved in each direction. The shoulders underneath Lantana Road bridge vary from 13-ft to 14.5-ft paved inside shoulders and 10-ft paved outside shoulders. A 2-ft raised concrete barrier divides the roadway. Two auxiliary lanes are provided in the northbound direction and one auxiliary lane is provided in the southbound direction, north of Lantana Road between the Lantana Road and 6th Avenue South interchanges. South of Lantana Road, one auxiliary lane is provided in both directions between the Lantana Road and Hypoluxo Road interchanges. The existing typical sections for SR 9/I-95 are provided in **Figure 2-2** through **Figure 2-4**.

2.1.5.2 Lantana Road

Lantana Road (Roadway ID: 93530000) extends approximately 0.57 miles from High Ridge Road (MP 2.861) to Andrew Redding Road (MP 3.430). West of SR 9/I-95, the typical section consists of two 11-ft travel lanes in each direction separated by either a traffic separator or raised landscape median. An exclusive right-turn lane and an inside left-turn lane are provided in the eastbound direction to connect to the SR 9/I-95 southbound on-ramp and northbound on-ramp, respectively. The roadway has Type F curb and gutter and sidewalks provided along both sides of the roadway. The sidewalk width is 6-ft when adjacent to the curb and gutter and 5-ft when separated by a sod buffer. The typical sections for this section of Lantana Road are provided in **Figure 2-5** and **Figure 2-6**.

East of SR 9/I-95, the typical sections along Lantana Road consist of two travel lanes in each direction with 11 to 12-ft lane widths separated by either a traffic separator or a painted median. At the SR 9/I-95 interchange, single right-turn and left-turn lanes provide access from Lantana Road to the SR 9/I-95 northbound and southbound ramps, respectively. 5-ft sidewalks separated from the roadway curb and gutter by a sod buffer are provided along both sides of the roadway. The typical sections for Lantana Road, east of SR 9/I-95 are provided in **Figure 2-7** and **Figure 2-8.**

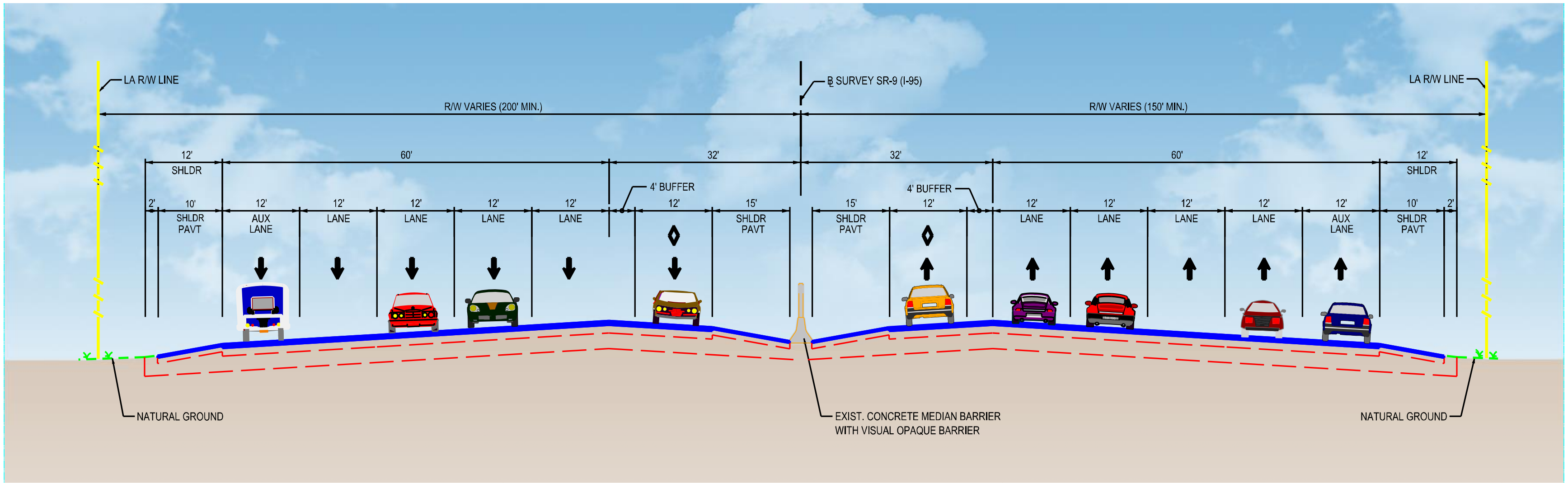


Figure 2-2 Typical Section – SR 9/I-95 South of Lantana Road

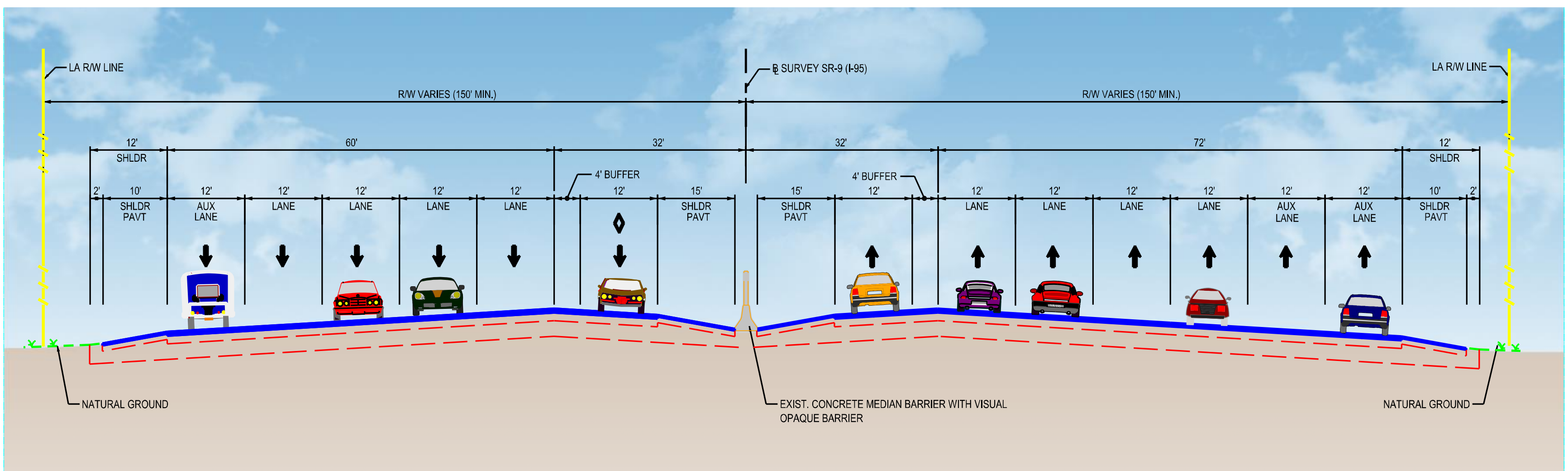


Figure 2-3 Typical Section – SR 9/I-95 North of Lantana Road

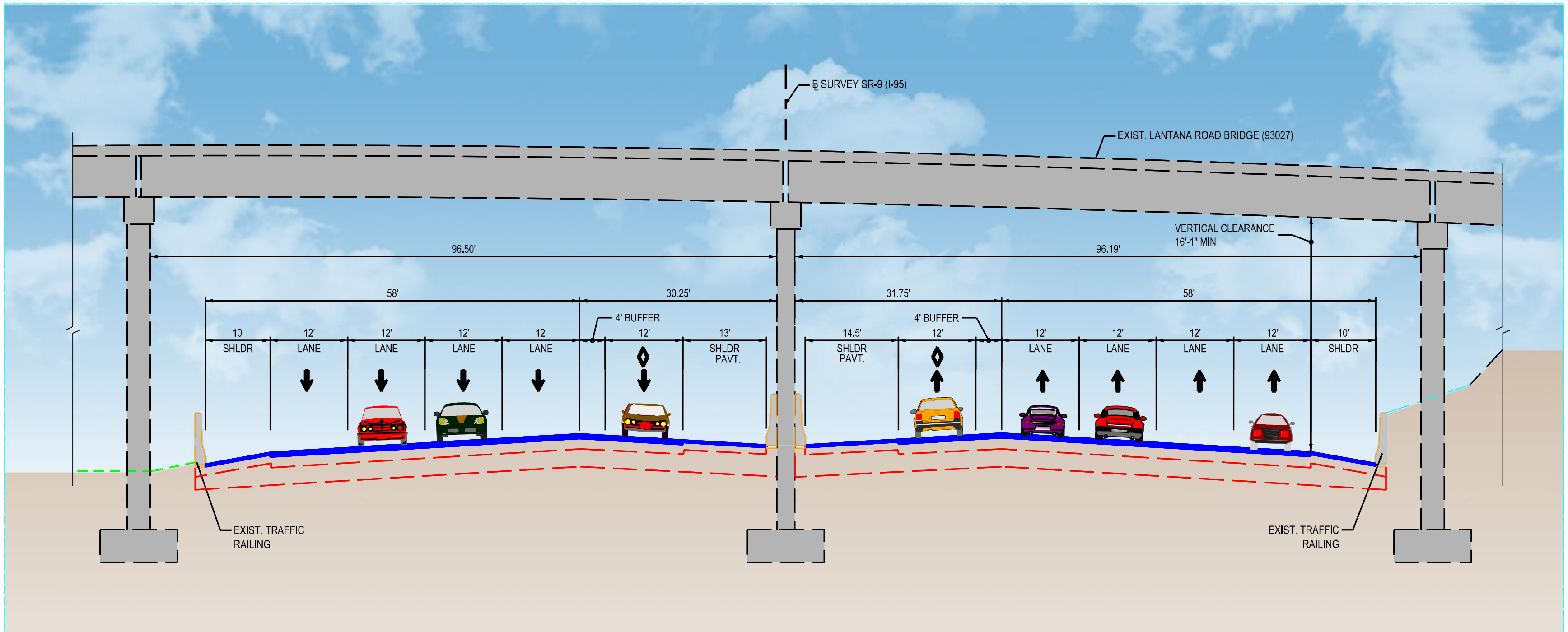


Figure 2-4 Typical Section – SR 9/I-95 Underneath Lantana Road

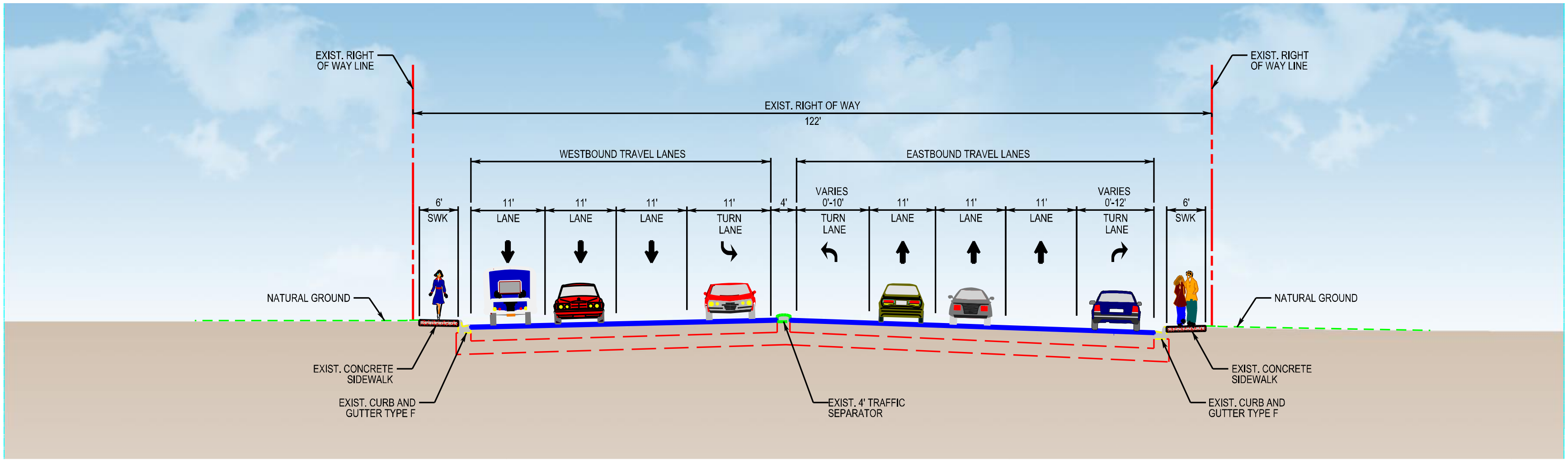


Figure 2-5 **Typical Section - Lantana Road from High Ridge Road to Sunset Road**

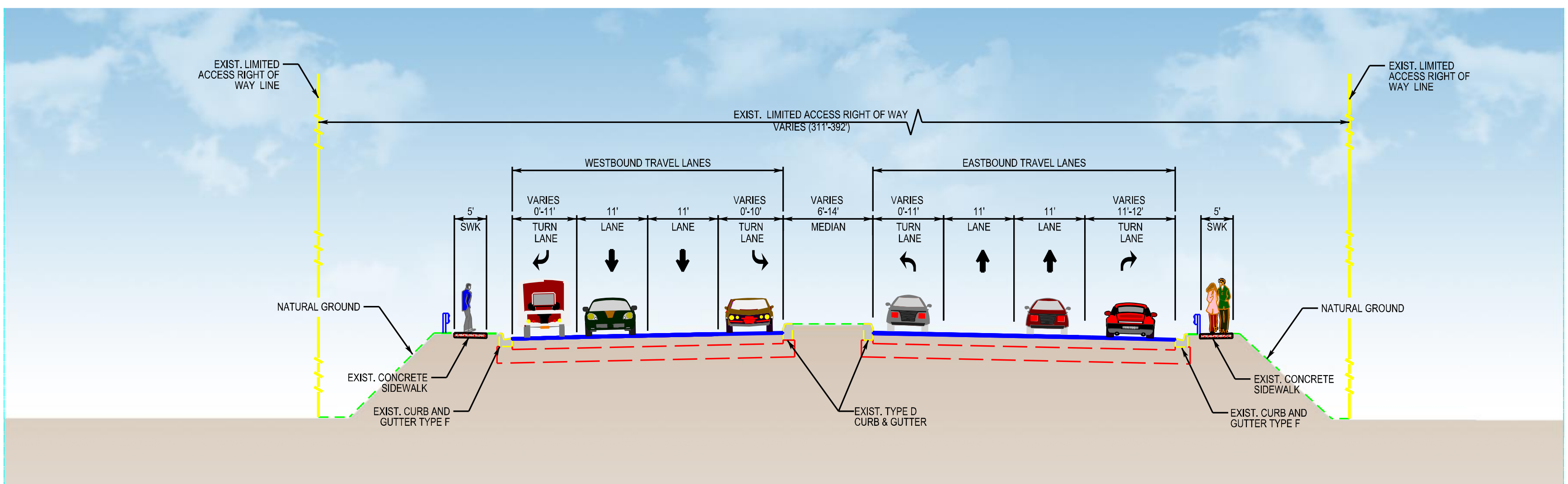


Figure 2-6 **Typical Section - Lantana Road from Sunset Road to SR 9/I-95**

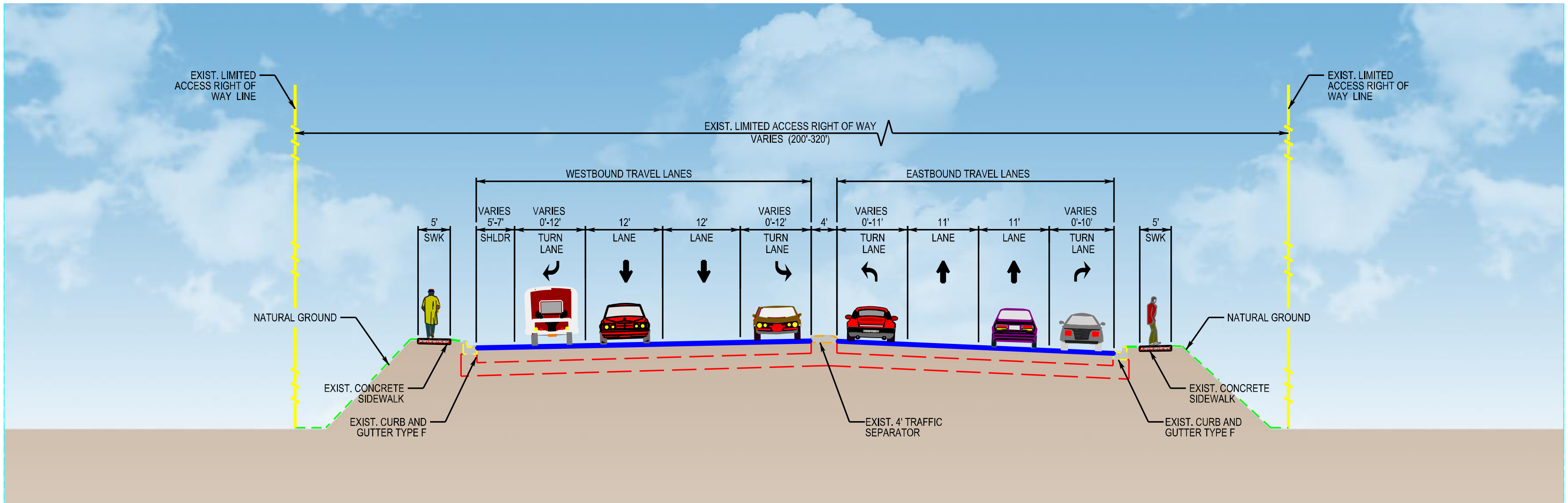


Figure 2-7 Typical Section - Lantana Road from SR 9/I-95 to Shopping Center Drive

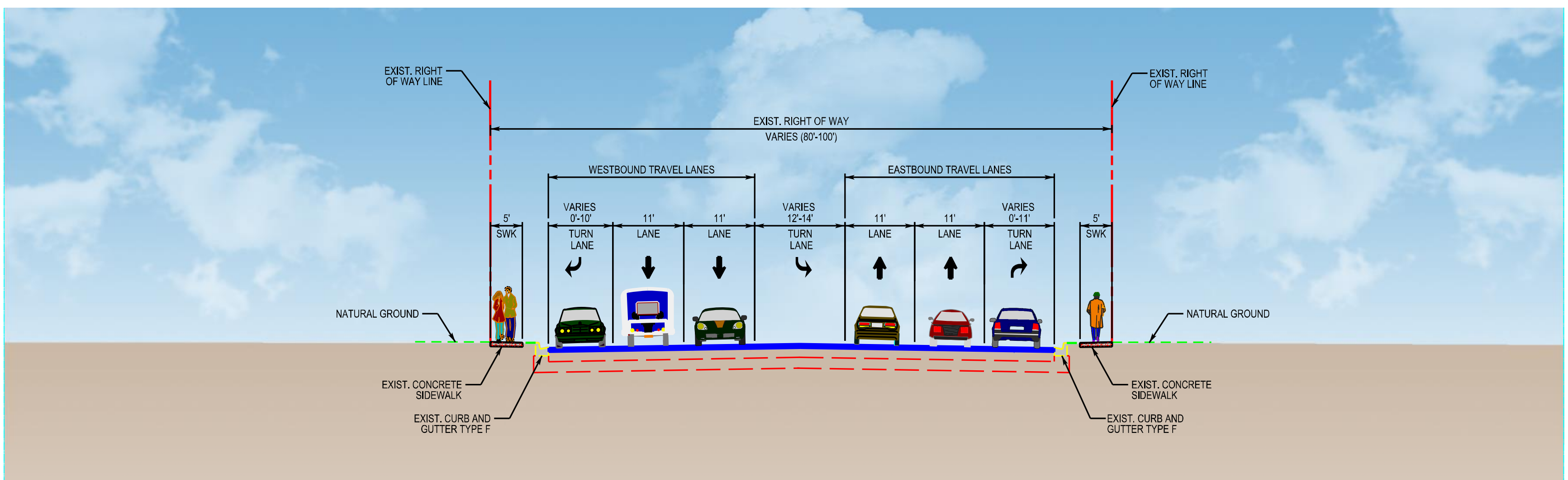


Figure 2-8 Typical Section - Lantana Road from Shopping Center Dr to Andrew Redding Road

2.1.6 Right of Way

The existing right of way along Lantana Road varies from 80-ft to 122-ft. At the interchange with the SR 9/I-95 ramps, the right of way reaches a maximum of 392-ft to accommodate the ramps. The limited access right of way along SR 9/I-95 typically varies from 300-ft to 526-ft to accommodate the ramps at the interchange. The South Florida Rail Corridor (SFRC), which runs parallel to SR 9/I-95 on the west side is approximately 100-ft wide north of Lantana Road and varies from 100-ft to 191-ft wide south of Lantana Road. The existing right of way along Lantana Road and SR 9/I-95 is presented in **Table 2-3**.

Table 2-3 Existing Right of Way

Roadway	Segment	Right of Way Width
Lantana Road	West of SR 9/I-95	110-ft to 392-ft
	East of SR 9/I-95	80-ft to 320-ft
SR 9/I-95	North of Lantana Road	300-ft to 517-ft
	South of Lantana Road	350-ft to 526-ft

2.1.7 Horizontal Alignment

A review of the existing horizontal geometry for the major roadway segments and ramps was performed as part of this PD&E Study. The evaluation of the horizontal geometry for the roadway and ramps compared the existing alignments to design standards and were focused on the following design elements:

1. Radius of Curvature
2. Superelevation
3. Horizontal Curve Length
4. Horizontal Stopping Sight Distance

The alignment along Lantana Road is tangential with 00°01'58" deflection at the High Ridge Road intersection. **Table 2-4** summarizes the existing horizontal geometric characteristics for the I-95 mainline and ramps at the Lantana Road interchange.

As shown in the tables below, most of the horizontal alignment design elements meet both the FDOT Design Manual (FDM) standards and AASHTO requirements. However, the horizontal curve length for the interchange ramps do not meet the FDM requirements. Since Horizontal curve length is not one of the critical design elements, a design variation will be required if the existing conditions are maintained.

Table 2-4 Existing Horizontal Alignment

Roadway	Curve No.	Design Speed (mph)	Length (L) (ft)	Radius (R) (ft)	Super-elevation (e) (ft/ft)	Horizontal SSD (ft)	FDM Criteria	AASHTO Criteria	Variation or Exception
I-95 Mainline	1	70	1,435.07	24,555.33	NC	1,880	L = 1050-ft min e = NC SSD = 820-ft	L = 1050-ft min e = NC SSD = 730-ft	OK
	2	70	1,322.81	24,555.33	NC	1,880			OK
SB On-Ramp (Q)	Q-1	60	248.26	5,729.58	0.03	N/A	L = 400-ft min e = 0.03 SSD = 570-ft	L = N/A e = 0.03 SSD = 570-ft	Variation[1]
NB On-Ramp (S)	S-1	60	455.39	5,729.58	0.03	N/A			Variation[1]
NB Off-Ramp (R)	R-1	40	327.31	5,729.58	NC	N/A	L = 400-ft min e = NC SSD = 305-ft	L = N/A e = NC SSD = 305-ft	Variation[1]
SB Off-Ramp (T)	T-1	35	181.51	5,729.58	NC	742	L = 400-ft min e = NC SSD = 250-ft	L = N/A e = NC SSD = 250-ft	Variation[1]
	T-2	35	125.04	5,729.58	NC	908			Variation[1]

Notes
1. Design variation for substandard horizontal curve length

2.1.8 Vertical Alignment

Overview of the existing vertical geometry for the major roadway segments and ramps within the study area was also performed as part of this PD&E Study. The evaluation of the existing vertical geometry focused on the review of the following design elements:

1. Grades
2. Vertical Curve K-Value
3. Vertical Curve Length
4. Vertical Stopping Sight Distance

The vertical alignment for the SR 9/I-95 mainline northbound and southbound travel lanes is generally flat with no vertical curves. There is a single Vertical Point of Intersection (VPI) north of the Lantana Road Bridge (Sta. 1000+00.00) with a maximum grade of 0.045%. Along the median barrier wall, a sawtooth profile with 0.3% grades is provided for positive drainage.

Table 2-5 summarizes the existing vertical geometric characteristics for the SR 9/I-95 ramps and Lantana Road. The table indicates that most of the vertical alignment along the existing ramps and Lantana Road do not meet the current FDM criteria. Ramp S will require a design variation for vertical curve length. Ramp T will require variation for maximum grade and exceptions for k-value and vertical curve length. No vertical curve information was available for Ramp Q. Lantana Road will also require a design variation for maximum grade, k-value, stopping sight distance and vertical curve length.

Table 2-5 Existing Vertical Alignment

Roadway	PI Station	Design Speed (mph)	Curve Type	ΔG (%)	Length (L) (ft)	Max. Grade (g) (%)	K-Value	Vertical SSD (ft)	FDM Criteria	AASHTO Criteria	Variation or Exception
SB On-Ramp (Q)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NB Off-Ramp (R)	2989+40.00	60	Sag	1.940	300	1.740	155	-	L = 300-ft min g = 4% K = 136	L = 264-ft min g = 5% K = 136	OK
NB On-Ramp (S)	3002+75.00	60	Crest	0.756	250	2.356	331	663	L = 400-ft min g = 4% K = 245 SSD = 570-ft	L = 115-ft min g = 5% K = 151 SSD = 570-ft	Variation [4]
	3008+00.00	60	Sag	2.556	350	2.356	137	-	L = 348-ft min g = 4% K = 136	L = 348-ft min g = 5% K = 136	OK
SB Off-Ramp (T)	4004+25.00	35	Crest	2.809	142	4.889	51	259	L = 132-ft min g = 6% K = 47 SSD = 250-ft	L = 82-ft min g = 7% K = 29 SSD = 250-ft	OK
	4008+56.00	55	Sag	5.156	570	4.889	111	-	L = 593-ft min g = 4% K = 115	L = 593-ft min g = 5% K = 115	Variation [1] Exception [2,4]
Lantana Road	51+98.00	45	Crest	10.00	700	6.000	70	322	L = 980-ft min g = 5% K = 98 SSD = 360-ft	L = 610-ft min g = 6% K = 61 SSD = 360-ft	Variation [1,2,3,4]

Notes
NA No information available
1. Design variation/exception for substandard maximum grade
2. Design variation/exception for substandard k-value
3. Design variation/exception for substandard vertical stopping sight distance
4. Design variation/exception for substandard vertical curve length

2.2 PAVEMENT CONDITIONS

Pavement survey data is collected, reviewed, processed, and analyzed by the Pavement Systems Evaluation Section of the FDOT State Materials Office annually. Each section of pavement is rated for cracking and ride on a 0-10 scale with 0 as the worst and 10 as the best. A crack rating of 6.0 or less is considered deficient. A ride rating of 6.0 or less is considered deficient for facilities with speed limits greater than 45 mph. The following ratings shown in **Table 2-6** were assigned for the SR 9/I-95 segment within the project study area based on a Pavement Condition Survey (PCS) conducted for the year 2019 (See **Appendix C**).

As shown in **Table 2-6** below, the northbound segment of SR 9/I-95 between MP 16.205 - 18.612 was identified as being deficient for cracking. The crack rating for the entire SR 9/I-95 segments within the project limits is also projected to be deficient by 2024. The FDOT has a planned resurfacing project along SR 9/I-95 from Gateway Boulevard to Lantana Road (FM# 427516-2) to improve the pavement condition.

Table 2-6 Existing Pavement Conditions

Roadway	Begin Milepost	End Milepost	Direction	Existing (2019)		Future (2024)	
				Cracking	Ride	Cracking	Ride
SR 9/I-95	16.383	18.802	SB	6.5	7.4	1.5	7.2
	18.802	20.409	SB	9.0	7.5	3.5	7.3
	16.205	18.612	NB	4.5	7.0	0.0	6.8
	18.612	20.409	NB	9.0	7.8	3.5	7.6

No PCS information is available for Lantana Road since it is not a state road. However, based on the field reviews, the existing pavement is in good to fair condition between Sunset Road and Shopping Center Drive due to the recent interchange improvements completed in 2015. The pavement condition for the remaining segments along Lantana Road is in fair to poor condition with several pavement distresses identified including cracking and raveling.

2.3 PEDESTRIAN AND BICYCLE FACILITIES

Sidewalks are provided along Lantana Road, Andrew Redding Road and High Ridge Road for pedestrian use. Along Lantana Road, 6-ft sidewalks are provided on both sides of the roadway adjacent to the curb and gutter west of SR 9/I-95. East of SR 9/I-95, 5-ft sidewalks separated by a sod buffer are provided along both sides of Lantana Road. Along High Ridge Road, 6-ft sidewalks are provided on the east side of the roadway south of Lantana Road and on the west side of the roadway north of Lantana Road. The sidewalks are separated from the roadway by a landscaped buffer. 5-ft sidewalks separated by a sod area are provided along Andrew Redding Road north of Lantana Road. South of Lantana Road, 5-ft sidewalks separated by a sod area are provided on both sides of the roadway. Crosswalks are provided at all the intersections along Lantana Road including the SR 9/I-95 ramp terminals except for the east leg of Shopping Center Drive. Also, the pavement marking for the crosswalk at the eastbound to northbound on-ramp is barely visible. ADA compliant curb ramps and pedestrian signals with countdown are generally provided at the intersections along Lantana Road with the exceptions of the intersections at High Ridge Road and Andrew Redding Road where the existing curb ramps do not have tactile domes and the pedestrian signals do not have countdown. There are no bicycle lanes along any of the roadways within the study area.

2.4 TRANSIT

Palm Beach County operates two Palm Tran services within the project study area. The County's Palm Tran Connection, a transportation disadvantaged service, providing transportation services to disadvantaged populations from Jupiter to Boca Raton and from Palm Beach to South Bay also operates within the study area. In addition, MV Transportation Inc., a paratransit provider has operations within the study area.

Palm Tran routes 63 and route 70 operate within the project area. Route 63 runs along Lantana Road and Jog Road from Hypoluxo Road and US 1 to River Bridge Center/Forest Hill Boulevard with connections to routes 1, 2, 3, 46, 60, 61, 62, 64, 70 and 71. Route 63 operates an hourly service on weekdays and weekends with extended hours on weekdays. Route 70 operates via Seacrest Boulevard from Lantana Road to Delray Beach Tri-Rail Station, with connections to routes 2, 63, 71, 73, 80, 81, and 88. This route has more frequent services on weekdays with a 40-minute headway. On weekends, the service runs hourly with a weekend-only stop at Andrew Reading Road.

There are three bus stops located within the study limits. Two bus stops are located east of Andrew Redding Road intersection in the eastbound and westbound direction. Both bus stops have a shelter, bench, and garbage disposal. The third bus stop is located west of High Ridge Road intersection in the westbound direction with no shelter, bench, or garbage disposal. All three bus stops do not have bus bays. The existing transit information within the study area is provided in **Appendix D.**

2.5 INTERSECTION LAYOUT AND SIGNALIZATION

The geometry of the existing signalized intersections along Lantana Road was verified during the field review and data collection effort and are shown in **Figure 2-9**. There are six intersections along Lantana road within the study area. Five of these six intersections are signalized with traffic signal assemblies mounted on span wires and loop detection system. These include:

1. High Ridge Road
2. I-95 SB Ramp Terminal
3. I-95 NB Ramp Terminal
4. Shopping Center Drive
5. Andrew Redding Road

The remaining intersection at Sunset Drive is a two-way stop-controlled intersection which provides access to the Costco Wholesale and the Palm Beach County Solid Waste Authority (SWA) Central Transfer Station.

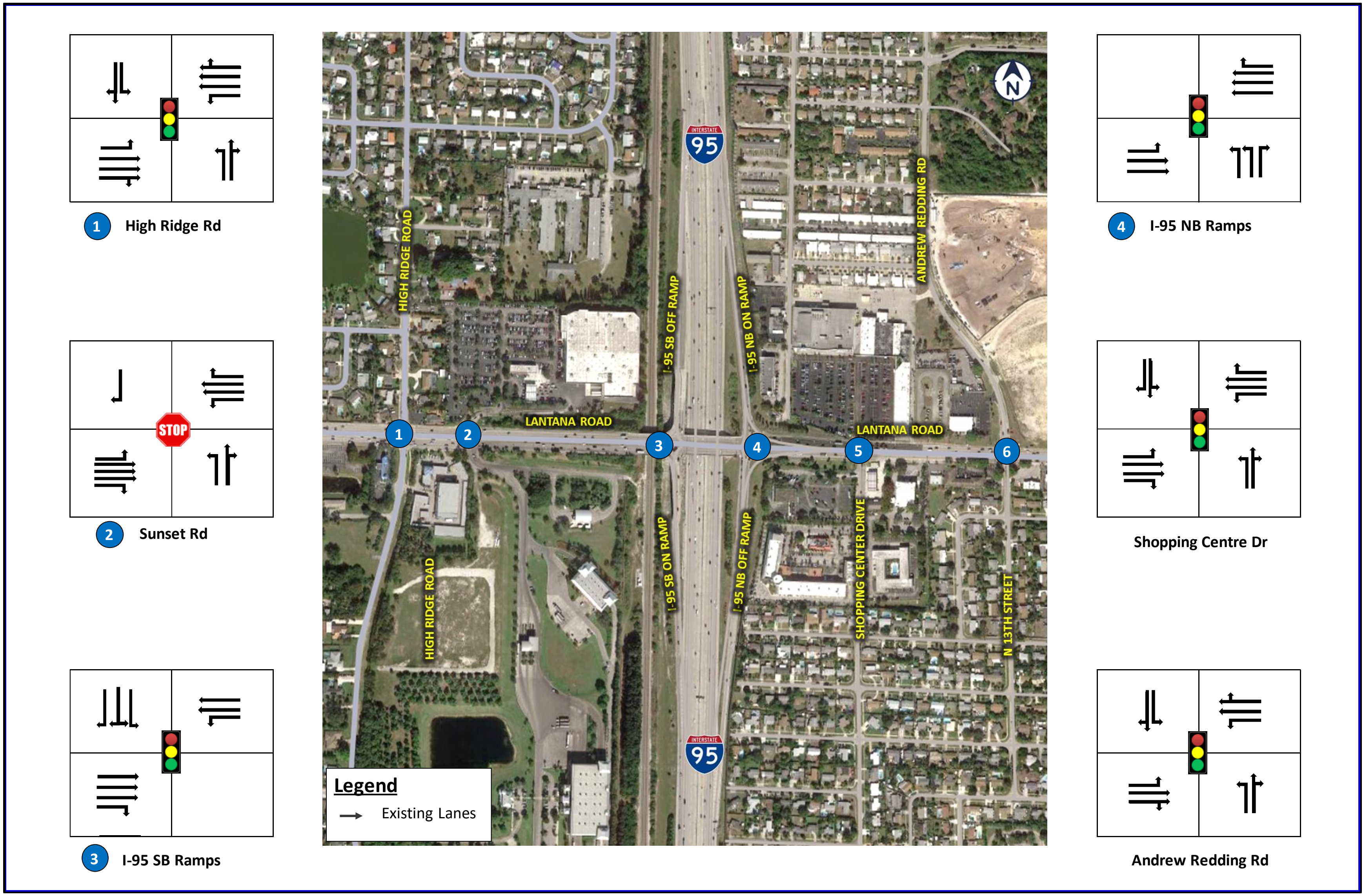


Figure 2-9 Existing Intersection Configuration

2.6 TRAFFIC DATA

2.6.1 Existing Traffic Volumes

Daily traffic counts recorded by 15-minute intervals were obtained for all the study intersections approaches for a three-day period from 09/26/2017 to 09/28/2017. For additional traffic information, refer to the Interchange Modification Report on file with FDOT District Four. The Average Daily Traffic (ADT) volume was then estimated as the average of the three-day counts. The Annual Average Daily Traffic (AADT) was computed by applying the seasonal factor (SF) and axle factor (AF) published in the 2016 FDOT Traffic DVD. **Table 2-7** and **Figure 2-10** show the AADT obtained for the various roadway segments within the study area.

Table 2-7 2017 Existing AADT Volumes

Intersection	Location	ADT (3-Day Avg)	SF	AF	AADT
High Ridge Road	High Ridge Road north of Lantana Road	8,209	1.02	0.99	8,300
	Lantana Road east of High Ridge Road	51,953	1.02	0.99	52,000
	High Ridge Road south of Lantana Road	3,801	1.02	0.99	3,800
	Lantana Road west of High Ridge Road	43,495	1.02	0.99	44,000
Sunset Road	Sunset Road north of Lantana Road	5,343	1.02	0.99	5,400
	Lantana Road east of Sunset Road	45,540	1.02	-	46,000
	Sunset Road south of Lantana Road	2,201	1.02	0.99	2,200
	Lantana Road west of Sunset Road	51,953	1.02	0.99	52,000
I-95 SB Ramps	I- 95 SB Off Ramp	13,850	1.04	-	14,000
	Lantana Road east of I-95 SB Ramps	46,307	1.02	0.99	47,000
	I-95 SB On Ramp	13,650	1.04	-	14,000
	Lantana Road west of I-95 SB Ramps	45,540	1.02	-	4,6000
I-95 NB Ramps	I-95 NB on Ramp	9,373	1.04	-	9,700
	Lantana Road east of I-95 NB Ramps	37,749	1.02	-	39,000
	I- 95 NB Off Ramp	12,892	1.04	-	13,000
	Lantana Road west of I-95 NB Ramps	46,307	1.02	0.99	47,000
Lantana Shopping Center Drive	Shopping Center Drive north of Lantana Road	15,498	1.02	0.99	16,000
	Lantana Road east of Shopping Center Drive	38,340	1.02	0.99	39,000
	Shopping Center Drive south of Lantana Road	7,746	1.02	0.99	7,800
	Lantana Road west of Lan Shopping Center Drive	37,749	1.02	-	39,000
Andrew Redding Road/N13 Street	Andrew Redding Road north of Lantana Road	6,439	1.02	0.99	6,500
	Lantana Road east of Andrew Redding Road	29,110	1.02	0.99	29,000
	N 13 Street south of Lantana Road	6,187	1.02	0.99	6,200
	Lantana Road west of Andrew Redding Road	38,340	1.02	0.99	39,000
I-95	I-95 north of Lantana Road	256,634	0.94	0.94	232,000
I-95	I-95 south of Lantana Road	235,000[1]	-	-	235,000

[1] Traffic Data obtained from FDOT Count Station Site 932222

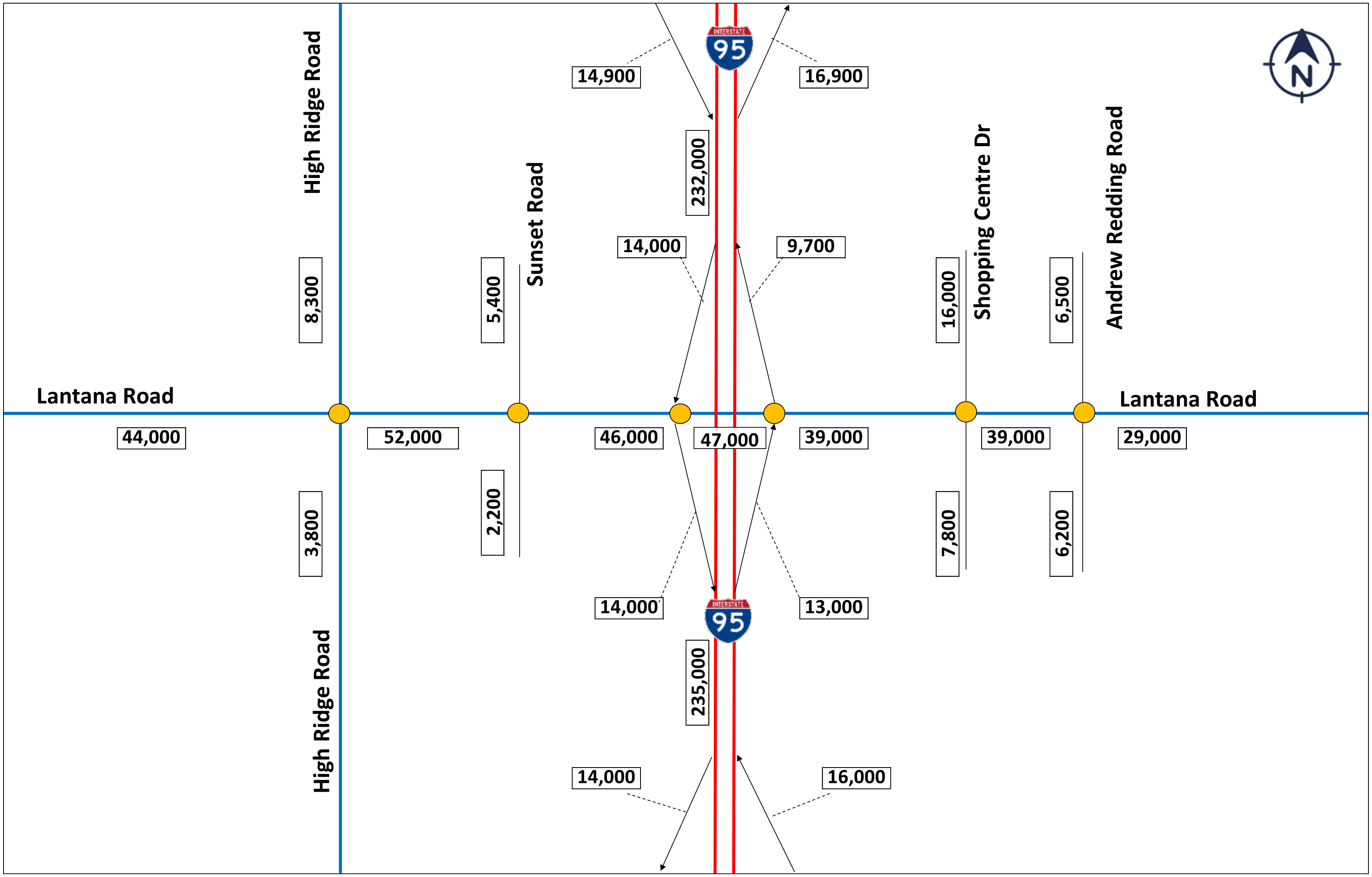


Figure 2-10 Existing Segment AADT Volume

2.6.2 Turning Movement Counts (TMCs)

Six-hour vehicle turning movement counts (TMCs) were obtained as part of the data collection effort for the following study intersections.

1. Lantana Road & High Ridge Road
2. Lantana Road & Sunset Road
3. Lantana Road & SR 9/I-95 SB Ramps
4. Lantana Road & SR 9/I-95 NB Ramps
5. Lantana Road at Shopping Center Drive
6. Lantana Road & Andrew Redding Road

The TMCs consist of 3 hours during the morning peak period (from 6:00 am to 9:00 am), and 3 hours during the evening peak period (from 4:00 pm to 7:00 pm). The TMCs were obtained for three consecutive days from 09/26/2017 to 09/28/2017.

The peak hour for the AM and PM peak periods was established by analyzing the 72- hour machine counts to find a single window for the morning (AM) and evening (PM) peak periods. This was done by considering the total volumes at the study intersections for every hour in 15 minutes increments and selecting the peak hour as the 4 consecutive 15 minutes periods with the highest total volumes for the AM and PM peak periods.

Based on the turning movement counts, the period from 7:30 AM to 8:30 AM and the period from 4:15 PM to 5:15 PM, were identified as the AM and PM peak hours, respectively. **Figure 2-11** and **Figure 2-12** show the TMCs obtained for the study intersections.

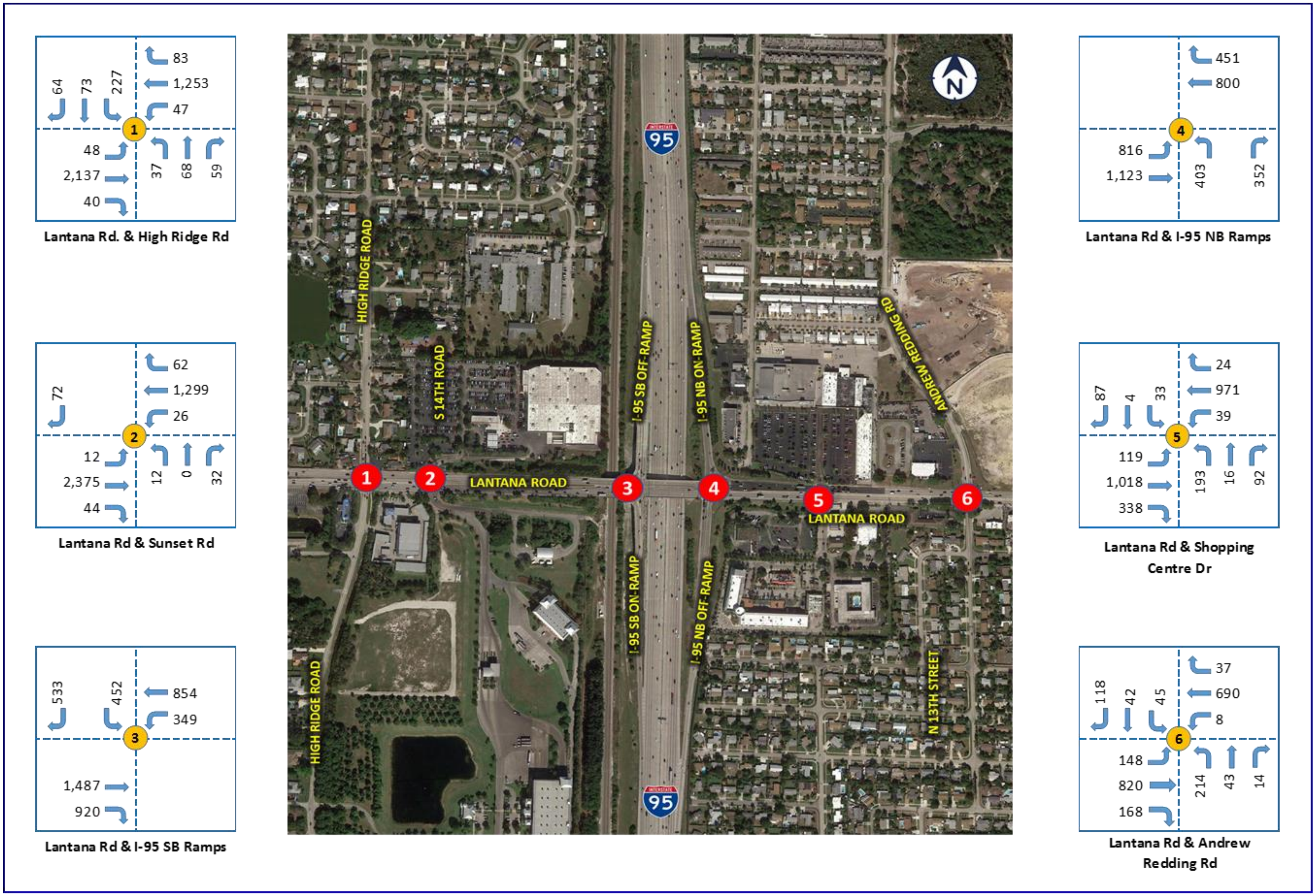


Figure 2-11 Existing Intersection Turning Movement Volumes – AM Peak Hour

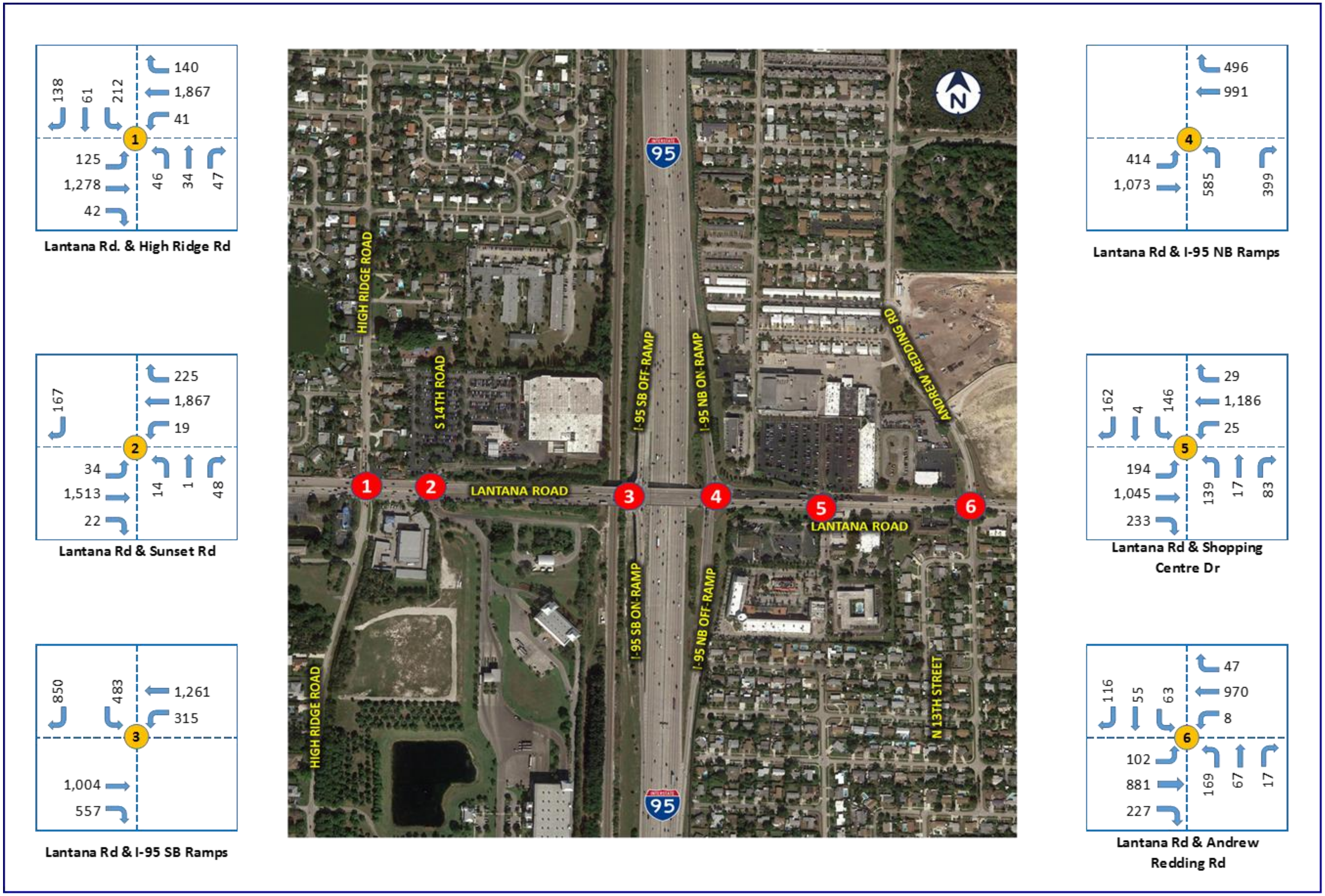


Figure 2-12 Existing Intersection Turning Movement Volumes – PM Peak Hour

2.6.3 Vehicle Classification

Vehicle classification counts were performed as part of the intersection approach counts at eight locations within the study area. The vehicle classification counts were collected for three consecutive days from 09/26/2017 to 09/28/2017. **Table 2-8** shows the summary of the vehicle classification counts.

Table 2-8 Vehicle Classification Summary

Location	Direction	Passenger Vehicles	Buses	Medium Trucks	Heavy Trucks	Trucks and Buses
Lantana Road East of Sunset Road	E	96.0%	0.5%	2.0%	1.5%	4.0%
	W	95.4%	0.5%	2.3%	1.8%	4.6%
Lantana Road West of I-95 SB Off Ramp	E	96.0%	0.5%	2.0%	1.5%	4.0%
	W	95.4%	0.5%	2.3%	1.8%	4.6%
Lantana Road East of I-95 NB Off Ramp	E	96.8%	0.3%	1.6%	1.3%	3.2%
	W	94.9%	0.7%	2.4%	1.9%	5.1%
Lantana Road West of Shopping Center Dr	E	96.8%	0.3%	1.6%	1.3%	3.2%
	W	94.9%	0.7%	2.4%	1.9%	5.1%
I -95 SB Off Ramp	S	93.8%	0.3%	1.7%	4.2%	6.2%
I-95 SB On Ramp	S	94.5%	0.8%	2.8%	1.9%	5.5%
I-95 NB On Ramp	N	95.8%	0.6%	2.2%	1.3%	4.2%
I-95 NB Off Ramp	N	91.7%	1.1%	5.6%	1.7%	8.3%

2.6.4 Signal Timings

Traffic signal timing information was obtained from the Palm Beach County Traffic Engineering Division for the major intersections in the study area, including all the interchange ramp intersections. Field visits were conducted to verify the signal timing and phasing information provided during the AM and PM peak hours. It is essential to confirm the signal timing information in the field, as recent projects in the region might have altered these timings. Field visits were also be conducted to inventory the following items:

- Stop/yield sign locations.
- Regulatory/advisory speed limits
- Guide sign locations

2.7 OPERATIONAL ANALYSIS

Existing year operational analysis was performed for the freeways and ramps segments along SR 9/I-95 as well as the intersections and arterial segments along Lantana Road within the project limits. The detailed operational analysis results are included in the Interchange Modification Report on file with FDOT District Four.

2.7.1 Freeways and Ramps

The existing AM and PM peak hour operating conditions for the off-ramps, on- ramps and I-95 mainline sections between the ramps were analyzed using Highway Capacity Software 7. The High Occupancy Vehicle (HOV) lane along the I-95 mainline was analyzed as a Continuous Access Managed Lane with a default capacity of 1,750 pc/h/ln as per HCM 6 methodologies for managed lanes. The freeway segments were analyzed to determine the operational analysis type. For the segments between the adjacent interchanges, when the computed maximum weaving length (Lmax) exceeds the length between ramps, then the segment qualifies to be analyzed as a weaving segment. **Table 2-9** shows the operational analysis performed for the freeway segments.

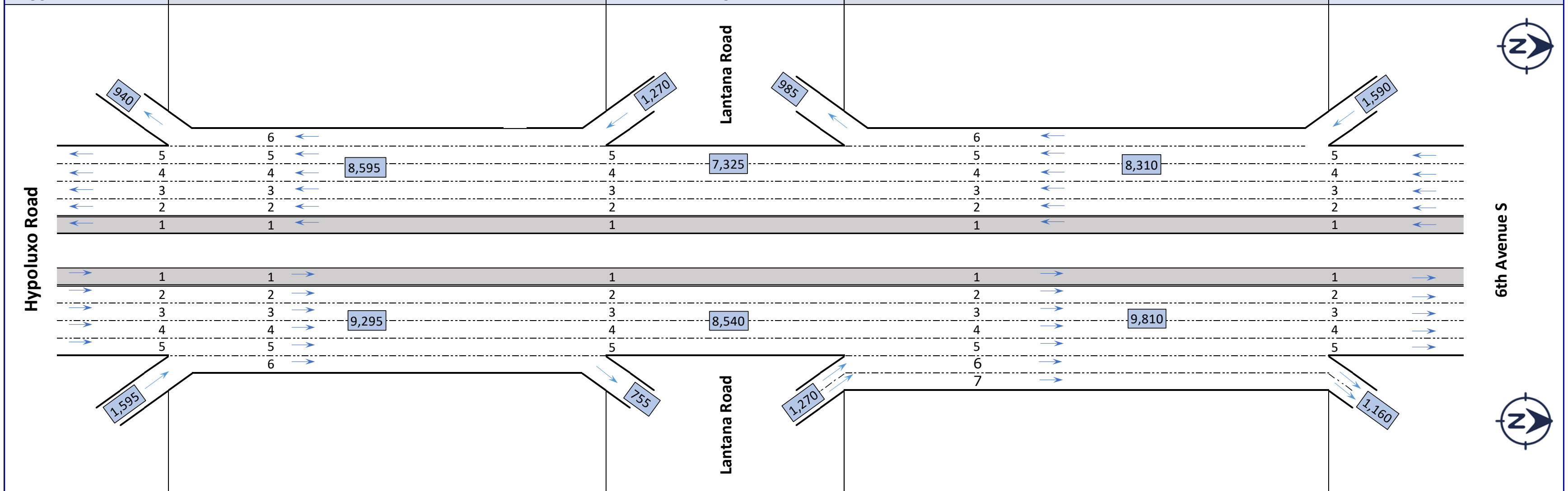
Table 2-9 Operational Analysis Type for Freeway Segments

No.	Segment	Distance (ft)	Weaving Length – Lmax (ft)	Operational Type
1	Hypoluxo Road NB On-Ramp to Lantana Road NB Off-Ramp	2,265	5,530	Weaving
2	Lantana Road NB Off-Ramp to Lantana Road NB On-Ramp	3,165	-	Basic Freeway
3	Lantana Road NB On-Ramp to 6th Avenue S NB Off-Ramp	4,445	5,456	Weaving
4	Lantana Road SB On-Ramp to Hypoluxo Road SB Off-Ramp	2,165	5,691	Weaving
5	Lantana Road SB Off-Ramp to Lantana Road SB On-Ramp	3,065	-	Basic Freeway
6	6th Avenue S SB On-Ramp to Lantana Road SB Off-Ramp	4,375	6,402	Weaving

Figure 2-13 and **Figure 2-14** show the density, speed, volume to capacity ratio, and level of service for the freeway segments for the AM and PM peak periods, respectively.

Based on the analysis, the basic freeway segments between the ramp terminals operate at LOS D or better during both AM and PM peak periods. Most of the weaving segments analyzed operate at LOS F during both AM and PM peak periods, except the section of I-95 from Lantana Road to Hypoluxo Road southbound direction which operates at LOS D during the AM peak period and the section of I-95 from Hypoluxo Road to Lantana Road northbound direction which operates at LOS D and LOS E during the AM and PM peak period, respectively.

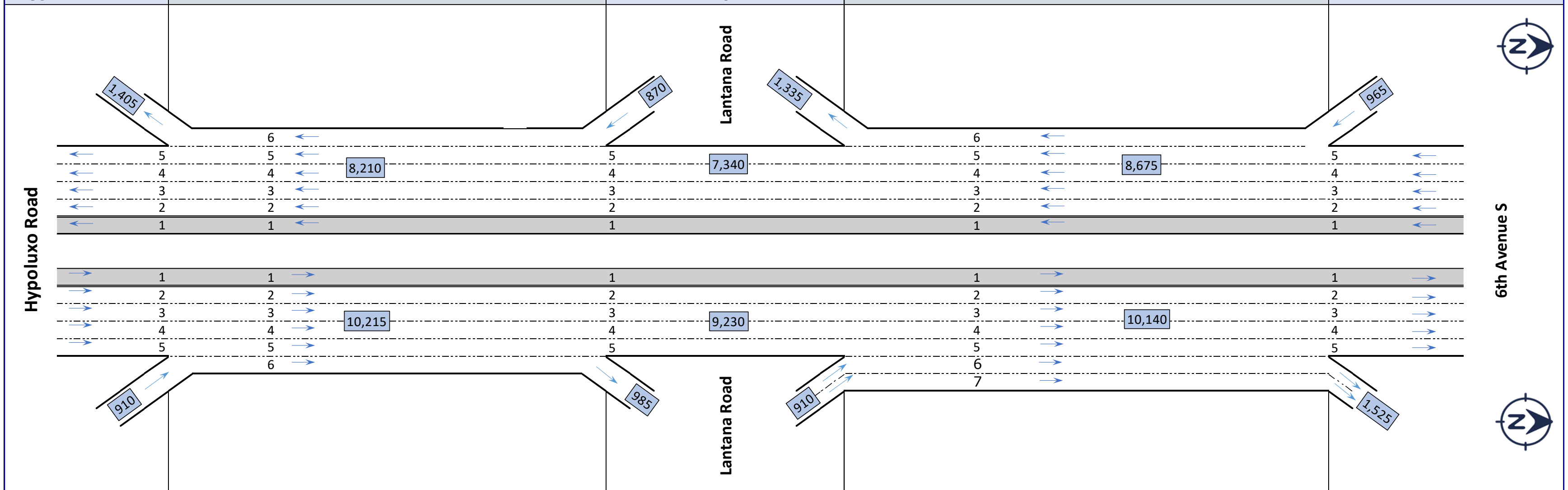
I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	31.7 pc/mi/ln	24.0 pc/mi/ln	-	
Speed	48.3 mph	65.6 mph	-	
V/C Ratio	**0.96**	**0.67**	**1.11**	
LOS	**D**	**C**	**F**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	34.8 pc/mi/ln	29.8 pc/mi/ln	-	
Speed	47.4 mph	62.7 mph	-	
V/C Ratio	**0.99**	**0.79**	**1.03**	
LOS	**D**	**D**	**F**	
I-95 Northbound				

Figure 2-13 2017 Existing Freeway Analysis – AM Peak

I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	24.4 pc/mi/ln	-	
Speed	-	65.5 mph	-	
V/C Ratio	**1.01**	**0.68**	**1.02**	
LOS	**F**	**C**	**F**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	37.8 pc/mi/ln	34.4 pc/mi/ln	-	
Speed	48.9 mph	59.7 mph	-	
V/C Ratio	**0.83**	**0.87**	**1.04**	
LOS	**E**	**D**	**F**	
I-95 Northbound				

Figure 2-14 2017 Existing Freeway Analysis – PM Peak

2.7.2 Intersection Operations

Existing traffic conditions for signalized intersections were analyzed using HCM 2010 methodology or HCM 2000 methodology where HCM 2010 was not applicable. SYNCHRO 10 software was used to perform the analysis. The analysis was performed for the AM and PM peak periods. For the existing conditions analysis, the actual Right Turn on Red (RTOR) volumes obtained from the data collection were used instead of the estimated values from SYNCHRO. **Table 2-10** and **Table 2-11** show the existing conditions LOS analysis results for the signalized intersections.

The analysis results show that all the existing signalized intersections are operating at an overall LOS D or better during both the AM and PM peak periods. However, some of the movements and approaches operate at LOS F. For the SR 9/I-95 ramp terminals, the northbound approach at the NB off-ramp operates at LOS D while the southbound approach at the SB off-ramp terminal operates at LOS E during the AM peak period. During the PM peak period, the northbound approach at the NB off-ramp operates at LOS D while the southbound approach at the SB off-ramp terminal operates at LOS F.

It should be noted that the northbound left-turn movement for the Lantana Road at Sunset Road unsignalized intersection is overcapacity due to excessive delays from lack of gaps in the east-west traffic stream. As such, the HCS methodology does not provide any delay values for the northbound left-turn movement. This impacts the combined delays for the northbound approach as well as the overall intersection delays. Consequently, the northbound approach delay and overall intersection delay and LOS for the Lantana Road at Sunset Road unsignalized intersection was omitted from the results table.

Table 2-10 2017 Existing Intersections Level of Service - AM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	17.6	B	24.8	C	64.6	E	58.7	E	35.1	D
			T	25.3	C	40.6	D	79.2	E	44.2	D		
			R	27.4	C	41.2	D						
			App	25.9	C	40.3	D	75.9	E	53.3	D		
2	Lantana Rd & Sunset Rd.	AM	L	13.0	B	95.8	F	OC	F	-	-	-	-
			T	-	-	-	-	38.7	E	-	-		
			R	-	-	-	-			16.5	C		
			App	-	-	-	-	OC	F	16.5	C		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	16.2	B	-	-	75.5	E	48.4	D
			T	70.2	E	2.4	A	-	-	-	-		
			R	44.1	D	-	-	-	-	46.4	D		
			App	60.2	E	6.4	A	-	-	70.9	E		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	40.6	D	-	-	53.6	D	-	-	36.7	D
			T	1.3	A	93.5	F	-	-	-	-		
			R	-	-	0.4	A	38.5	D	-	-		
			App	17.8	B	59.9	E	46.6	D	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	27.5	C	31.1	C	33.4	C	54.6	D	33.7	C
			T	47.6	D	15.5	B	-	-	-	-		
			R	42.3	D	9.8	A	27.1	C	56.7	E		
			App	44.8	D	16.0	B	31.1	C	56.1	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	21.3	C	30.6	C	39.6	D	47.9	D	29.1	C
			T	22.4	C	30.3	C	31.4	C	52.3	D		
			R	22.4	C	30.3	C						
			App	22.3	C	30.3	C	37.9	D	51.3	D		

Table 2-11 2017 Existing Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	62.4	E	43.5	D	76.2	E	60.5	E	31.7	C
			T	18.8	B	29.4	C	71.7	E	53.1	D		
			R	19.3	B	31.5	C						
			App	22.7	C	30.4	C	73.4	E	56.9	E		
2	Lantana Rd & Sunset Rd.	PM	L	23.3	C	25.8	D	OC	F	-	-	-	-
			T	-	-	-	-	129.9	F	-	-		
			R	-	-	-	-			49.4	E		
			App	-	-	-	-	OC	F	49.4	E		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	8.4	A	-	-	102.9	F	49.7	D
			T	56.1	E	3.9	A	-	-	-	-		
			R	22.1	C	-	-	-	-	58.8	E		
			App	44.0	D	4.8	A	-	-	109.6	F		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	16.7	B	-	-	58.7	E	-	-	35.7	D
			T	4.5	A	82.6	F	-	-	-	-		
			R	-	-	0.4	A	32.9	C	-	-		
			App	7.9	A	55.2	E	48.2	D	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	74.9	E	42.6	D	61.5	E	88.2	F	50.8	D
			T	52.4	D	41.2	D	-	-	-	-		
			R	41.3	D	24.8	C	42.8	D	63.3	E		
			App	53.6	D	40.9	D	53.7	D	75.2	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	63.4	E	74.4	E	57.1	E	63.8	E	27.8	C
			T	14.5	B	21.4	C	42.9	D	79.1	E		
			R	14.5	B	21.3	C						
			App	18.6	B	21.7	C	52.4	D	75.0	E		

2.7.3 Arterial Operations

The arterial Level of Service (LOS) analysis for the Lantana Road arterial segment was determined using SYNCHRO 10 for both the AM and PM peak periods based on the travel speed. The travel speed within each segment is based on signalized intersection spacing, the running time between intersections, and the control delay to through vehicles at each signalized intersection. **Table 2-12** and **Table 2-13** show the existing LOS along Lantana Road.

Table 2-12 2017 Existing Arterial Level of Service - AM Peak Period

Corridor	Cross Street	Eastbound			Westbound		
		Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
Lantana Road	High Ridge Road	58.1	12.1	F	66.2	13.4	E
	I-95 SB On Ramp/I-95 SB Off Ramp	97.7	9.1	F	11.7	24.5	C
	I-95 NB On Ramp/I-95 NB Off Ramp	10.6	27.0	C	104.9	3.7	F
	Shopping Centre Dr.	58.9	6.6	F	49.1	10.3	F
	Andrew Redding Road	21.7	23.4	C	57.5	14.2	E
	Total	**247.0**	**11.2**	F	**289.4**	**10.0**	F

Table 2-13 2017 Existing Arterial Level of Service - PM Peak Period

Corridor	Cross Street	Eastbound			Westbound		
		Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
Lantana Road	High Ridge Road	40.4	17.4	D	65.2	13.6	E
	I-95 SB On Ramp/I-95 SB Off Ramp	85.1	10.4	F	13.3	21.5	D
	I-95 NB On Ramp/I-95 NB Off Ramp	14.0	20.5	D	95.0	4.1	F
	Shopping Centre Dr.	44.0	8.8	F	62.5	8.1	F
	Andrew Redding Road	35.5	14.3	E	53.3	15.3	E
	Total	**219.0**	**12.7**	F	**289.3**	**10.0**	F

The analysis results show that Lantana Road operates at an overall LOS F in the eastbound direction with an average speed of 11.2 mph and LOS F with an average speed of 12.7 mph during the AM and PM peak periods, respectively. The westbound direction also operates at an overall LOS F with average speeds of 10.0 mph during the AM and PM peak hours, respectively.

2.7.4 Intersection Queue Analysis

A queuing analysis was performed as part of the study to determine the adequacy of the existing turn lane storage lengths for the intersections within the study area. For this analysis, the 95th percentile vehicular queue length in feet (ft.) for left and right-turn movements at each of the study intersections were evaluated and compared against the existing storage distance to determine if the available storage lengths provided can accommodate the vehicular demands. **Table 2-14** compares the 95th percentile queues for the turning movements with the existing storage lengths and identifies instances where the estimated queue exceeds the storage capacity.

Table 2-14 Existing Intersection Queue Length

Corridor	No.	Intersection	Approach		AM	PM	Max Queue Length (ft)	Existing Storage (ft)	Storage Deficiency	Over Existing Storage
Lantana Road	1	High Ridge Road	EB	L	44	160	160	200	No	-
			WB	L	m64	33	64	250	No	-
			NB	L	71	100	100	200	No	-
			SB	L	240	295	295	500	No	-
	3	SB Off-Ramp	WB	L	m159	m127	159	480	No	-
			SB	L	#550	#668	668	930	No	-
				R	103	#526	103	930	No	-
	4	NB Off-Ramp	EB	L	m#1125	m82	1125	490	Yes	130%
			NB	L	251	#415	251	940	No	-
				R	224	171	224	940	No	-
	5	Shopping Center Drive	EB	L	157	225	225	270	No	-
				R	278	103	278	280	No	-
			WB	L	m32	36	36	400	No	-
				R	m23	0	23	365	No	-
			NB	L	198	240	240	200	Yes	20%
			SB	R	130	97	130	120	Yes	8%
	6	Andrew Redding Road	EB	L	m27	74	74	120	No	-
			WB	L	17	16	17	200	No	-
			NB	L	232	193	232	150	Yes	55%
			SB	L	80	108	108	200	No	-

- 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

Based on the analysis, 4 out of the 20 locations (20%) have deficient storage lengths. Although the analysis results indicate that I-95 NB and SB ramps approaches queue lengths currently do not exceed the available storage length, significant queues were observed during the field reviews for the southbound off-ramps. It should be noted that the off ramps were recently widened in 2015 as part of a short-term improvement project. As such, although the existing queues observed in the field were significant, they did not extend into I-95 mainline.

2.8 SAFETY ANALYSIS

Safety analysis was performed along SR 9/I-95 and Lantana Road within the study area using the latest available 5 years of crash data to identify crash patterns, contributing causes, countermeasures and provide recommendations for further studies, if needed. The following sections summarize the safety analysis performed. The detailed crash data and safety analysis are provided in the Interchange Modification Report on file with FDOT District Four.

2.8.1 Crash Data

Crash data from 2014 to 2018 for SR 9/I-95 (Roadway ID: 93220000) from south of Lantana Road to north of Lantana Road, SR 9/I-95 ramps at Lantana Road (Roadway ID: 93220037, 93220038, 93220039, and 93220040), and Lantana Road (Roadway ID: 93530000) from High Ridge Road to Andrew Redding Road (MP 2.80 to MP 3.50) was obtained from the FDOT State Safety Office GIS (SSOGis) Query Tool on the Traffic Safety Web Portal. The data includes environmental and driver characteristics that were existent at the time of each crash and provides the basis for the crash data analysis.

2.8.2 Crash Summary

2.8.2.1 SR 9/I-95 Mainline

Based on the crash analysis, a total of 313 crashes occurred on the SR 9/I-95 mainline within the study area from 2014 to 2018. Except for 2015 and 2017 which saw a decline from the previous years' crashes, all the other years recorded a gradual increase in crashes.

Rear-end crashes were the predominant crash type accounting for 134 (43%) of the total crashes followed by 57 sideswipe crashes (18%), 49 fixed object crashes (16%), and 26 angle crashes (8%). Majority of the crashes (183 crashes, 58.5%) occurred under daylight conditions with 112 crashes (35.8%) occurred during nighttime. The percentage of nighttime crashes is higher than the statewide percentage of 33%. Poor surface conditions contributed only marginally to the number of crashes recorded over the five-year period as 235 (75.1%) of the total crashes occurred during clear weather conditions and on dry pavement surface. 77 of crashes (24.6%) occurred on wet pavement. This is higher than the statewide average of 15%.

Two (2) fatal crashes occurred within the study limits during the five-year period. Property Damage Only (PDO) crashes accounted for 162 (51.8%) of all crashes; 149 crashes (47.6%) resulted in Injury. Among the contributing causes documented in the crash data, 'carelessness or negligent manner' (116 crashes, 37%), resulted in the most crashes. Other contributing causes included 'failed to keep in proper lane' (18 crashes, 6%), 'drove to fast for conditions' (16 crashes, 5%), 'followed too closely' (12 crashes, 4%), and 'over-correcting /over-steering' (9 crashes, 3%). A significant number of crashes were documented to have been the result of 'other contributing action' (69 crashes, 22%) and 'no contributing action' (54 crashes, 17%). **Table 2-15** and **Figure 2-15** show the crash summary along SR 9/I-95 mainline within the study area.

Table 2-15 SR 9/I-95 Crash Summary Statistics

SR 9/I-95 at Lantana Road		Number of Crashes					5 Year Total Crashes	Mean Crashes Per Year	%
		Year							
		2014	2015	2016	2017	2018			
CRASH TYPE	Rear End	31	16	28	26	33	134	25	42.8%
	Head On	0	0	0	0	0	0	0	0.0%
	Angle	6	4	8	6	2	26	6	8.3%
	Left-turn	0	0	0	0	0	0	0	0.0%
	Right-turn	0	0	0	0	0	0	0	0.0%
	Sideswipe	15	10	16	6	10	57	14	18.2%
	Backed Into	0	0	0	0	0	0	0	0.0%
	Pedestrian	0	0	0	0	0	0	0	0.0%
	Bicycle	0	0	0	0	0	0	0	0.0%
	Fixed Object	*11*	*11*	*11*	*7*	*9*	*49*	*11*	*15.7%*
	Impact Attenuator/Crash Cushion	0	0	1	0	0	1	0	0.3%
	Bridge Overhead Structure	0	0	0	0	0	0	0	0.0%
	Bridge Pier or Support	0	0	0	0	0	0	0	0.0%
	Bridge Rail	0	0	0	0	0	0	0	0.0%
	Culvert	0	0	0	0	0	0	0	0.0%
	Curb	0	0	0	0	0	0	0	0.0%
	Ditch	0	1	0	0	1	2	0	0.6%
	Embankment	0	0	0	0	0	0	0	0.0%
	Guardrail Face	0	2	0	0	1	3	1	1.0%
	Guardrail End	0	0	0	1	0	1	0	0.3%
	Cable Barrier	0	0	0	0	0	0	0	0.0%
	Concrete Traffic Barrier	4	7	8	5	5	29	6	9.3%
	Other Traffic Barrier	1	0	0	0	0	1	0	0.3%
	Tree (Standing)	2	0	0	0	0	2	0	0.6%

Table 2-15 SR 9/I-95 Crash Summary Statistics									
SR 9/I-95 at Lantana Road		Number of Crashes – Year 2014	2015	2016	2017	2018	5 Year Total Crashes	Mean Crashes Per Year	%
	Utility Pole/Light Support	3	0	0	0	0	3	1	1.0%
	Traffic Sign Support	1	1	1	1	0	4	1	1.3%
	Traffic Signal Support	0	0	0	0	0	0	0	0.0%
	Other Post, Pole or Support	0	0	0	0	0	0	0	0.0%
	Fence	0	0	0	0	1	1	0	0.3%
	Mailbox	0	0	0	0	0	0	0	0.0%
	Other Fixed Object	0	0	1	0	1	2	0	0.6%
	Other Non-Fixed Object Collisions	*1*	*5*	*3*	*2*	*3*	*14*	*3*	*4.5%*
	Railway Vehicle (Train, Engine)	0	0	0	0	0	0	0	0.0%
	Animal	0	0	0	0	0	0	0	0.0%
	Motor Vehicle in Transport	0	0	0	0	0	0	0	0.0%
	Parked Motor Vehicle	0	1	1	0	0	2	0	0.6%
	Work Zone/Maintenance Equip.	0	0	0	0	0	0	0	0.0%
	Struck by Falling/Shifting Cargo	1	1	2	2	1	7	1	2.2%
	Other Non-Fixed Object	0	3	0	0	2	5	1	1.6%
	Non-Collisions	*3*	*5*	*4*	*4*	*3*	*19*	*4*	*6.1%*
	Overturn/Rollover	1	2	2	2	2	9	2	2.9%
	Fire/Explosion	0	0	0	0	0	0	0	0.0%
	Immersion	0	0	0	0	0	0	0	0.0%
	Jackknife	0	0	1	0	0	1	0	0.3%
	Cargo/Equipment Loss or Shift	2	0	0	0	0	2	0	0.6%
	Fell/Jumped from Motor Vehicle	0	0	1	0	0	1	0	0.3%
	Thrown or Falling Object	0	0	0	1	0	1	0	0.3%
	Ran into Water/Canal	0	0	0	0	0	0	0	0.0%
	Other Non-Collision	0	3	0	1	1	5	1	1.6%
	Others	2	3	1	4	4	14	3	4.5%
	Total Crashes	**69**	**54**	**71**	**55**	**64**	**313**	**63**	**100.0%**
SEVERITY	PDO Crashes	34	27	35	29	37	162	32	51.8%
	Fatal Crashes	1	1	0	0	0	2	0	0.6%
	Injury Crashes	34	26	36	26	27	149	30	47.6%
LIGHTING CONDITIONS	Daylight	40	35	42	32	34	183	37	58.5%
	Dusk	2	0	1	2	5	10	2	3.2%
	Dawn	1	1	2	2	2	8	2	2.6%
	Dark	26	18	26	19	23	112	22	35.8%
	Unknown	0	0	0	0	0	0	0	0.0%
SURFACE CONDITIONS	Dry	48	40	52	42	53	235	47	75.1%
	Wet	21	14	18	13	11	77	15	24.6%
	Others	0	0	1	0	0	1	0	0.3%
MONTH OF YEAR	January	5	6	8	5	6	30	6	9.6%
	February	3	7	8	2	4	24	5	7.7%

Table 2-15 SR 9/I-95 Crash Summary Statistics										
SR 9/I-95 at Lantana Road		Number of Crashes Year 2014	2015	2016	2017	2018	5 Year Total Crashes	Mean Crashes Per Year	%
	March	6	3	7	5	4	25	5	8.0%
	April	3	5	2	4	6	20	4	6.4%
	May	4	7	5	4	3	23	5	7.3%
	June	7	0	3	5	2	17	3	5.4%
	July	6	6	3	6	4	25	5	8.0%
	August	5	4	8	5	10	32	6	10.2%
	September	7	4	11	3	2	27	5	8.6%
	October	5	3	6	2	6	22	4	7.0%
	November	12	7	4	7	9	39	8	12.5%
	December	6	2	6	7	8	29	6	9.3%
DAY OF WEEK	Monday	15	8	13	6	12	54	11	17.3%
	Tuesday	9	6	9	12	6	42	8	13.4%
	Wednesday	13	10	8	9	14	54	11	17.3%
	Thursday	7	10	12	9	10	48	10	15.3%
	Friday	14	4	11	11	9	49	10	15.7%
	Saturday	4	2	13	7	8	34	7	10.9%
	Sunday	7	14	5	1	5	32	6	10.2%
HOUR OF DAY	00:00-06:00	8	6	11	8	10	43	9	13.7%
	06:00-09:00	13	11	26	16	15	81	16	25.9%
	09:00-11:00	5	1	3	3	6	18	4	5.8%
	11:00-13:00	6	1	3	3	2	15	3	4.8%
	13:00-15:00	2	4	5	5	5	21	4	6.7%
	15:00-18:00	13	17	7	6	11	54	11	17.3%
	18:00-24:00	22	14	16	14	15	81	16	25.9%
CONTRIBUTIN G CAUSES (VEHICLE ONLY)	No Contributing Action	8	11	18	12	5	54	11	17.3%
	Careless or Negligent Manner	29	13	26	18	30	116	23	37.1%
	Failed to Yield Right of way	0	0	1	2	1	4	1	1.3%
	Improper Backing	0	0	0	0	0	0	0	0.0%
	Improper Turn	0	0	0	0	0	0	0	0.0%
	Followed too Closely	3	3	1	0	5	12	2	3.8%
	Ran Red Light	0	0	0	0	1	1	0	0.3%
	Drove too Fast for Conditions	2	5	2	5	2	16	3	5.1%
	Ran Stop Sign	0	0	0	0	0	0	0	0.0%
	Improper Passing	0	1	2	2	1	6	1	1.9%
	Exceed Posted Speed	0	0	0	0	0	0	0	0.0%
	Wrong Side or Wrong Way	0	0	0	0	1	1	0	0.3%
	Failed to Keep in Proper Lane	2	5	4	2	5	18	4	5.8%
	Ran Off Roadway	0	0	0	2	1	3	1	1.0%
	Disregarded Other Traffic Sign	0	0	0	0	0	0	0	0.0%
	Disregarded Road Markings	0	0	0	0	0	0	0	0.0%
	Over-Correcting/Steering	0	6	1	2	0	9	2	2.9%
	Swerved or Avoided	0	1	2	0	0	3	1	1.0%
	Erratic, Reckless or Aggressive	0	0	1	0	0	1	0	0.3%

Table 2-15 SR 9/I-95 Crash Summary Statistics									
SR 9/I-95 at Lantana Road		Number of Crashes					5 Year Total Crashes	Mean Crashes Per Year	%
		Year							
		2014	2015	2016	2017	2018			
	Other Contributing Action	25	9	13	10	12	69	14	22.0%
WEATHER CONDITIONS	Clear	39	30	42	33	43	187	37	59.7%
	Cloudy	19	15	23	17	15	89	18	28.4%
	Rain	11	9	6	5	6	37	7	11.8%
	Fog, Smog, Smoke	0	0	0	0	0	0	0	0.0%
	Sleet/Hail/Freezing Rain	0	0	0	0	0	0	0	0.0%
	Blowing Sand, Soil, Dirt	0	0	0	0	0	0	0	0.0%
	Severe Crosswinds	0	0	0	0	0	0	0	0.0%
	Other	0	0	0	0	0	0	0	0.0%

Figure 2-15 SR 9/I-95 Crash Summary Statistics Histograms

2.8.2.2 SR 9/I-95 Ramps at Lantana Road

Based on the crash analysis, a total of 157 crashes occurred on the SR 9/I-95 ramps at Lantana Road interchange within the study area from 2014 to 2018.

Rear-end crashes were the predominant crash type accounting for 96 crashes (61%) of the total crashes followed by 19 angle crashes (12%), 17 sideswipe crashes (11%), and 11 fixed object crashes (7%). Majority of the crashes (107 crashes, 68.2%) occurred under daylight conditions while 44 crashes (28%) occurred during nighttime. The percentage of nighttime crashes is lower than the statewide average of 33%. Poor surface conditions contributed only slightly to the number of crashes recorded over the five-year period as 128 (80.3%) of the total crashes occurred on dry pavement surface. 19.7% of crashes (31) occurred on wet pavement. This is higher than the statewide average of 15%.

No fatal crashes occurred within the study limits during the five-year period. Property damage Only (PDO) crashes accounted for 83 (52.9%) of all crashes and 74 crashes (47.1%) resulted in injury. Among the contributing causes documented in the crash data, ‘carelessness or negligent manner’ (61 crashes, 39%), ‘other contributing action’ (41 crashes, 26%) and ‘no contributing action’ (12 crashes, 8%) were among the highest. Other contributing causes include ‘followed too closely’ (11 crashes, 7%), ‘ran red light’ (11 crashes, 4%), ‘drove to fast for conditions’ (6 crashes, 4%), and ‘improper passing’ (4 crashes, 3%). **Table 2-16** and **Figure 2-16** show the crash summary at SR 9/I-95 and Lantana Road.

Table 2-16 SR 9/I-95 Ramps at Lantana Road Crash Summary Statistics

I-95 Ramps at Lantana Road		Number of Crashes					5 Year Total Crashes	Mean Crashes Per Year	%
		Year							
		2014	2015	2016	2017	2018			
CRASH TYPE	Rear End	30	19	20	15	12	96	23	61.1%
	Head On	0	0	0	0	0	0	0	0.0%
	Angle	3	4	4	4	4	19	4	12.1%
	Left-turn	0	0	0	0	0	0	0	0.0%
	Right-turn	0	0	0	0	0	0	0	0.0%
	Sideswipe	3	2	5	2	5	17	3	10.8%
	Backed Into	0	0	0	0	0	0	0	0.0%
	Pedestrian	0	0	0	0	0	0	0	0.0%
	Bicycle	0	0	3	3	1	7	1	4.5%
	Fixed Object	*5*	*0*	*3*	*1*	*2*	*11*	*3*	*7.0%*
	Impact Attenuator/Crash Cushion	1	0	0	0	0	1	0	0.6%
	Bridge Overhead Structure	0	0	0	0	0	0	0	0.0%
	Bridge Pier or Support	0	0	0	0	0	0	0	0.0%
	Bridge Rail	0	0	0	0	1	1	0	0.6%
	Culvert	0	0	0	0	0	0	0	0.0%
	Curb	0	0	0	0	0	0	0	0.0%
	Ditch	0	0	0	0	0	0	0	0.0%
	Embankment	0	0	0	0	0	0	0	0.0%
	Guardrail Face	0	0	0	0	0	0	0	0.0%
	Guardrail End	0	0	0	0	0	0	0	0.0%
	Cable Barrier	0	0	0	0	0	0	0	0.0%
	Concrete Traffic Barrier	2	0	1	1	0	4	1	2.5%
	Other Traffic Barrier	0	0	0	0	0	0	0	0.0%
	Tree (Standing)	0	0	0	0	0	0	0	0.0%
	Utility Pole/Light Support	2	0	1	0	1	4	1	2.5%
	Traffic Sign Support	0	0	0	0	0	0	0	0.0%
	Traffic Signal Support	0	0	0	0	0	0	0	0.0%
	Other Post, Pole or Support	0	0	0	0	0	0	0	0.0%
	Fence	0	0	0	0	0	0	0	0.0%
	Mailbox	0	0	0	0	0	0	0	0.0%
	Other Fixed Object	0	0	1	0	0	1	0	0.6%
	Other Non-Fixed Object Collisions	*1*	*0*	*1*	*0*	*0*	*2*	*0*	*1.3%*
	Railway Vehicle (Train, Engine)	0	0	0	0	0	0	0	0.0%
	Animal	0	0	0	0	0	0	0	0.0%
	Motor Vehicle in Transport	0	0	0	0	0	0	0	0.0%
	Parked Motor Vehicle	1	0	0	0	0	1	0	0.6%
	Work Zone/Maintenance Equip.	0	0	0	0	0	0	0	0.0%
	Struck by Falling/Shifting Cargo	0	0	1	0	0	1	0	0.6%
	Other Non-Fixed Object	0	0	0	0	0	0	0	0.0%
	Non-Collisions	*0*	*1*	*0*	*2*	*2*	*5*	*1*	*3.2%*

Table 2-16 SR 9/I-95 Ramps at Lantana Road Crash Summary Statistics

I-95 Ramps at Lantana Road		Number of Crashes Year 2014	2015	2016	2017	2018	5 Year Total Crashes	Mean Crashes Per Year	%
	Overturn/Rollover	0	0	0	1	0	1	0	0.6%
	Fire/Explosion	0	0	0	0	0	0	0	0.0%
	Immersion	0	0	0	0	0	0	0	0.0%
	Jackknife	0	0	0	1	0	1	0	0.6%
	Cargo/Equipment Loss or Shift	0	1	0	0	0	1	0	0.6%
	Fell/Jumped from Motor Vehicle	0	0	0	0	0	0	0	0.0%
	Thrown or Falling Object	0	0	0	0	0	0	0	0.0%
	Ran into Water/Canal	0	0	0	0	0	0	0	0.0%
	Other Non-Collision	0	0	0	0	2	2	0	1.3%
	Others	0	0	0	0	0	0	0	0.0%
	Total Crashes	**42**	**26**	**36**	**27**	**26**	**157**	**31**	**100.0%**
SEVERITY	PDO Crashes	23	16	18	13	13	83	17	52.9%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	19	10	18	14	13	74	15	47.1%
LIGHTING CONDITIONS	Daylight	26	22	25	16	18	107	21	68.2%
	Dusk	1	0	0	2	0	3	1	1.9%
	Dawn	3	0	0	0	0	3	1	1.9%
	Dark	12	4	11	9	8	44	9	28.0%
	Unknown	0	0	0	0	0	0	0	0.0%
SURFACE CONDITIONS	Dry	33	19	28	24	22	126	25	80.3%
	Wet	9	7	8	3	4	31	6	19.7%
	Others	0	0	0	0	0	0	0	0.0%
MONTH OF YEAR	January	2	2	2	3	3	12	2	7.6%
	February	0	2	7	2	2	13	3	8.3%
	March	5	2	3	1	2	13	3	8.3%
	April	7	0	4	2	1	14	3	8.9%
	May	3	4	2	3	3	15	3	9.6%
	June	4	0	5	2	6	17	3	10.8%
	July	2	3	3	1	0	9	2	5.7%
	August	4	1	1	4	3	13	3	8.3%
	September	6	4	5	2	2	19	4	12.1%
	October	3	4	1	0	2	10	2	6.4%
	November	1	4	2	1	0	8	2	5.1%
	December	5	0	1	6	2	14	3	8.9%
DAY OF WEEK	Monday	8	7	2	4	2	23	5	14.6%
	Tuesday	7	6	7	2	3	25	5	15.9%
	Wednesday	7	3	4	6	6	26	5	16.6%
	Thursday	4	1	6	5	1	17	3	10.8%
	Friday	6	5	8	4	6	29	6	18.5%
	Saturday	7	2	4	5	4	22	4	14.0%
	Sunday	3	2	5	1	4	15	3	9.6%
HOUR	00:00-06:00	5	1	2	3	3	14	3	8.9%

Table 2-16 SR 9/I-95 Ramps at Lantana Road Crash Summary Statistics									
I-95 Ramps at Lantana Road		Number of Crashes Year					5 Year Total Crashes	Mean Crashes Per Year	%
		2014	2015	2016	2017	2018			
OF DAY	06:00-09:00	8	3	3	4	0	18	4	11.5%
	09:00-11:00	2	3	1	2	4	12	2	7.6%
	11:00-13:00	1	2	3	1	2	9	2	5.7%
	13:00-15:00	7	4	2	2	2	17	3	10.8%
	15:00-18:00	8	7	11	6	8	40	8	25.5%
	18:00-24:00	11	6	14	9	7	47	9	29.9%
CONTRIBUTIN G CAUSES (VEHICLE ONLY)	No Contributing Action	4	2	2	1	3	12	2	7.6%
	Careless or Negligent Manner	20	13	13	9	6	61	12	38.9%
	Failed to Yield Right of way	0	0	0	0	1	1	0	0.6%
	Improper Backing	0	0	0	1	0	1	0	0.6%
	Improper Turn	0	0	1	2	0	3	1	1.9%
	Followed too Closely	1	1	2	2	5	11	2	7.0%
	Ran Red Light	0	1	1	3	2	7	1	4.5%
	Drove too Fast for Conditions	1	3	1	0	1	6	1	3.8%
	Ran Stop Sign	0	0	0	0	0	0	0	0.0%
	Improper Passing	0	2	1	0	1	4	1	2.5%
	Exceed Posted Speed	0	0	0	0	0	0	0	0.0%
	Wrong Side or Wrong Way	0	0	0	0	0	0	0	0.0%
	Failed to Keep in Proper Lane	0	0	2	1	0	3	1	1.9%
	Ran Off Roadway	1	0	0	0	1	2	0	1.3%
	Disregarded Other Traffic Sign	0	0	0	0	0	0	0	0.0%
	Disregarded other Road Markings	0	0	0	0	0	0	0	0.0%
	Over-Correcting/Over-Steering	0	0	0	1	0	1	0	0.6%
	Swerved or Avoided	0	0	1	0	0	1	0	0.6%
	Erratic, Reckless or Aggressive	2	0	1	0	0	3	1	1.9%
	Other Contributing Action	13	4	11	7	6	41	8	26.1%
WEATHER CONDITIONS	Clear	25	12	22	21	17	97	19	61.8%
	Cloudy	15	10	9	6	8	48	10	30.6%
	Rain	2	4	5	0	1	12	2	7.6%
	Fog, Smog, Smoke	0	0	0	0	0	0	0	0.0%
	Sleet/Hail/Freezing Rain	0	0	0	0	0	0	0	0.0%
	Blowing Sand, Soil, Dirt	0	0	0	0	0	0	0	0.0%
	Severe Crosswinds	0	0	0	0	0	0	0	0.0%
	Other	0	0	0	0	0	0	0	0.0%

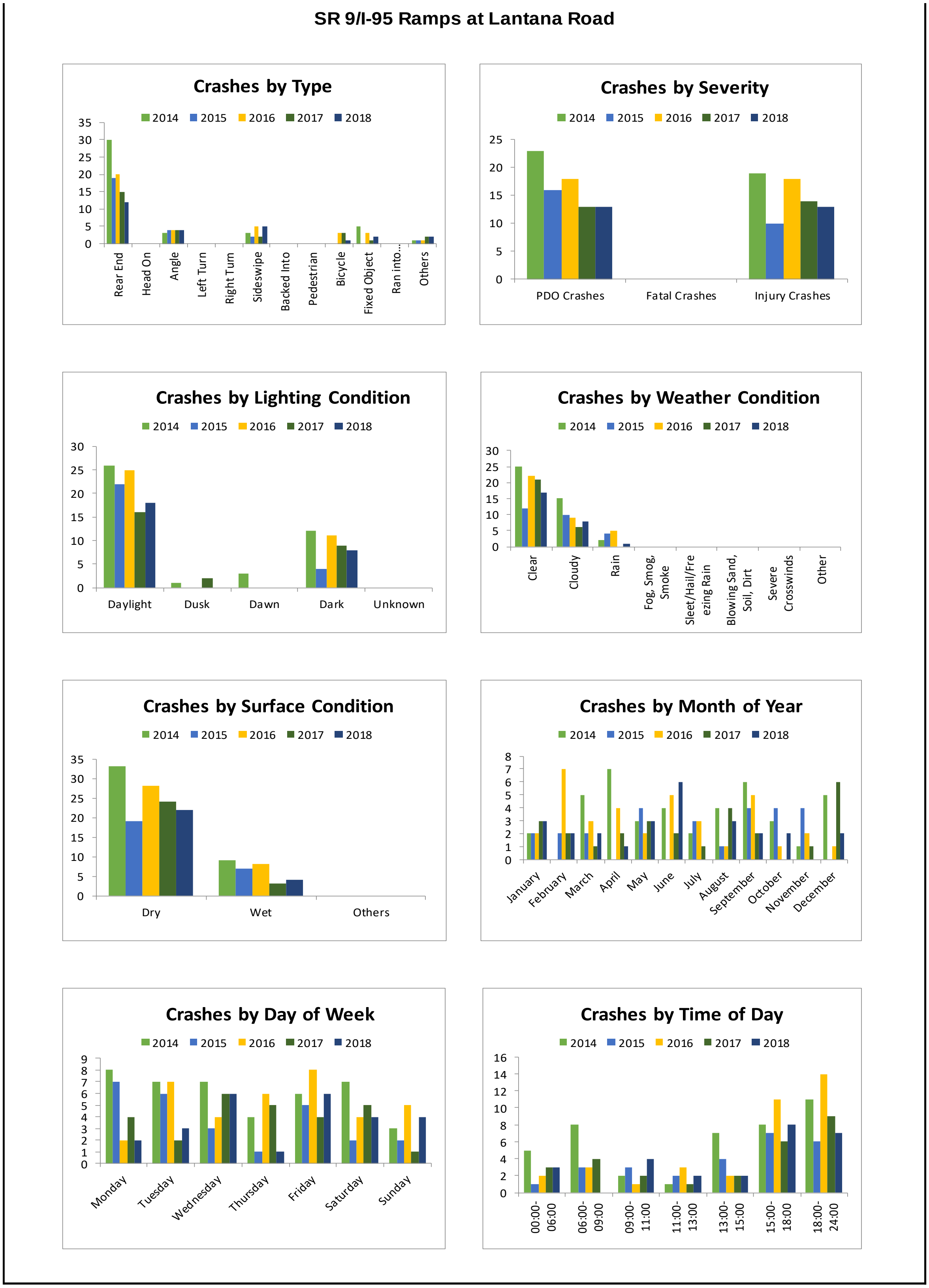


Figure 2-16 SR 9/I-95 Ramps at Lantana Road Crash Summary Histogram

2.8.2.3 Lantana Road

Based on the crash analysis, a total of 172 crashes occurred on Lantana Road within the study limits from 2014 to 2018. Except for 2018 which saw a decline from the previous years' crashes, all the other years recorded a gradual increase in crashes.

The predominant crash types recorded include rear-end crashes, (90 crashes, 52%), angle crashes (51 crashes, 30%), and sideswipe crashes (14 crashes, 8%). Majority of the crashes (133 crashes, 77%) occurred under daylight conditions with only 32 crashes (19%) occurring during nighttime. The percentage of nighttime crashes is lower than the statewide percent of 33%. 138 (80%) of the total crashes occurred during clear weather conditions and 146 (85%) on dry pavement surface. 15% of crashes (26) occurred on wet pavement.

No fatal crashes occurred within the study limits during the five-year period. Property Damage Only (PDO) crashes accounted for 103 (60%) of all crashes and 69 crashes (40%) resulted in injury. Among the contributing causes documented in the crash data, 'carelessness or negligent manner' (39 crashes, 23%), 'followed too closely' (37 crashes, 22%), 'other contributing action' (35 crashes, 20%) and 'failed to yield right of way' (26 crashes, 15%) were among the highest. Other contributing causes include 'ran red light' (13 crashes, 8%),'no contributing action' (7 crashes, 4%), 'improper turn' (5 crashes, 3%) and 'failed to keep in proper lane' (4 crashes, 2%). **Table 2-17** and **Figure 2-17** show the crash summary along Lantana Road within the study area.

Table 2-17 Lantana Road Crash Summary Statistics

Lantana Road		Number of Crashes					5 Year Total Crashes	Mean Crashes Per Year	%
		Year							
		2014	2015	2016	2017	2018			
CRASH TYPE	Rear End	11	16	20	21	22	90	16	52.3%
	Head On	0	0	0	0	0	0	0	0.0%
	Angle	6	9	12	13	11	51	9	29.7%
	Left-turn	0	0	0	0	0	0	0	0.0%
	Right-turn	0	0	0	0	0	0	0	0.0%
	Sideswipe	1	2	6	2	3	14	3	8.1%
	Backed Into	0	0	0	0	0	0	0	0.0%
	Pedestrian	0	0	0	0	1	1	0	0.6%
	Bicycle	0	0	0	0	0	0	0	0.0%
	Fixed Object	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0.6%*
	Impact Attenuator/Crash Cushion	0	0	0	0	0	0	0	0.0%
	Bridge Overhead Structure	0	0	0	0	0	0	0	0.0%
	Bridge Pier or Support	0	0	0	0	0	0	0	0.0%
	Bridge Rail	0	0	0	0	0	0	0	0.0%
	Culvert	0	0	0	0	0	0	0	0.0%
	Curb	0	0	0	0	0	0	0	0.0%

Table 2-17 Lantana Road Crash Summary Statistics

Lantana Road		Number of Crashes – Year 2014	2015	2016	2017	2018	5 Year Total Crashes	Mean Crashes Per Year	%
	Ditch	0	0	0	0	0	0	0	0.0%
	Embankment	0	0	0	0	0	0	0	0.0%
	Guardrail Face	0	0	0	0	0	0	0	0.0%
	Guardrail End	0	0	0	0	0	0	0	0.0%
	Cable Barrier	0	0	0	0	0	0	0	0.0%
	Concrete Traffic Barrier	0	0	0	0	0	0	0	0.0%
	Other Traffic Barrier	0	0	0	0	0	0	0	0.0%
	Tree (Standing)	0	0	0	0	0	0	0	0.0%
	Utility Pole/Light Support	0	0	0	0	0	0	0	0.0%
	Traffic Sign Support	0	0	0	0	0	0	0	0.0%
	Traffic Signal Support	0	0	0	0	0	0	0	0.0%
	Other Post, Pole or Support	0	0	0	1	0	1	0	0.6%
	Fence	0	0	0	0	0	0	0	0.0%
	Mailbox	0	0	0	0	0	0	0	0.0%
	Other Fixed Object	0	0	0	0	0	0	0	0.0%
	Other Non-Fixed Object Collisions	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*0.6%*
	Railway Vehicle (Train, Engine)	0	0	0	0	0	0	0	0.0%
	Animal	0	0	0	0	0	0	0	0.0%
	Motor Vehicle in Transport	0	0	0	0	0	0	0	0.0%
	Parked Motor Vehicle	0	1	0	0	0	1	0	0.6%
	Work Zone/Maintenance Equip.	0	0	0	0	0	0	0	0.0%
	Struck by Falling/Shifting Cargo	0	0	0	0	0	0	0	0.0%
	Other Non-Fixed Object	0	0	0	0	0	0	0	0.0%
	Non-Collisions	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*0.6%*
	Overturn/Rollover	0	0	0	0	0	0	0	0.0%
	Fire/Explosion	0	0	0	0	0	0	0	0.0%
	Immersion	0	0	0	0	0	0	0	0.0%
	Jackknife	0	1	0	0	0	1	0	0.6%
	Cargo/Equipment Loss or Shift	0	0	0	0	0	0	0	0.0%
	Fell/Jumped from Motor Vehicle	0	0	0	0	0	0	0	0.0%
	Thrown or Falling Object	0	0	0	0	0	0	0	0.0%
	Ran into Water/Canal	0	0	0	0	0	0	0	0.0%
	Other Non-Collision	0	0	0	0	0	0	0	0.0%
	Others	0	0	2	7	4	13	3	7.6%
	Total Crashes	**18**	**29**	**40**	**44**	**41**	**172**	**34**	**100.0%**
SEVERITY	PDO Crashes	8	14	26	28	27	103	21	59.9%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	10	15	14	16	14	69	14	40.1%
LIGHTING CONDITIONS	Daylight	17	28	28	33	27	133	27	77.3%
	Dusk	1	0	2	1	2	6	1	3.5%
	Dawn	0	0	1	0	0	1	0	0.6%
	Dark	0	1	9	10	12	32	6	18.6%
	Unknown	0	0	0	0	0	0	0	0.0%

Table 2-17 Lantana Road Crash Summary Statistics

Lantana Road		Number of Crashes Year 2014	2015	2016	2017	2018	5 Year Total Crashes	Mean Crashes Per Year	%
SURFACE CONDITIONS	Dry	16	27	33	35	35	146	29	84.9%
	Wet	2	2	7	9	6	26	5	15.1%
	Others	0	0	0	0	0	0	0	0.0%
MONTH OF YEAR	January	3	2	6	2	2	15	3	8.7%
	February	2	2	2	1	1	8	2	4.7%
	March	1	3	2	2	4	12	2	7.0%
	April	2	4	6	2	7	21	4	12.2%
	May	1	2	1	5	2	11	2	6.4%
	June	1	2	2	2	5	12	2	7.0%
	July	3	3	4	4	4	18	4	10.5%
	August	0	2	3	8	2	15	3	8.7%
	September	1	3	1	3	3	11	2	6.4%
	October	0	3	3	6	2	14	3	8.1%
	November	3	2	3	6	8	22	4	12.8%
	December	1	1	7	3	1	13	3	7.6%
DAY OF WEEK	Monday	3	7	6	8	7	31	6	18.0%
	Tuesday	4	5	5	8	7	29	6	16.9%
	Wednesday	2	3	6	9	6	26	5	15.1%
	Thursday	1	6	8	5	8	28	6	16.3%
	Friday	4	4	10	5	6	29	6	16.9%
	Saturday	4	3	1	4	6	18	4	10.5%
	Sunday	0	1	4	5	1	11	2	6.4%
HOUR OF DAY	00:00-06:00	0	0	3	1	0	4	1	2.3%
	06:00-09:00	3	4	5	7	6	25	5	14.5%
	09:00-11:00	1	3	2	4	2	12	2	7.0%
	11:00-13:00	3	5	4	4	6	22	4	12.8%
	13:00-15:00	2	8	4	4	3	21	4	12.2%
	15:00-18:00	8	7	11	13	10	49	10	28.5%
	18:00-24:00	1	2	11	11	14	39	8	22.7%
CONTRIBUTING CAUSES (VEHICLE ONLY)	No Contributing Action	0	0	2	4	1	7	1	4.1%
	Careless or Negligent Manner	7	9	11	7	5	39	8	22.7%
	Failed to Yield Right of way	0	8	5	5	8	26	5	15.1%
	Improper Backing	1	0	0	0	0	1	0	0.6%
	Improper Turn	1	0	1	2	1	5	1	2.9%
	Followed too Closely	4	7	7	8	11	37	7	21.5%
	Ran Red Light	2	2	2	1	6	13	3	7.6%
	Drove too Fast for Conditions	0	0	0	2	0	2	0	1.2%
	Ran Stop Sign	0	0	0	0	0	0	0	0.0%
	Improper Passing	0	0	0	1	0	1	0	0.6%
	Exceed Posted Speed	0	0	0	0	0	0	0	0.0%
	Wrong Side or Wrong Way	0	0	1	0	0	1	0	0.6%
	Failed to Keep in Proper Lane	0	0	3	0	1	4	1	2.3%

Table 2-17 Lantana Road Crash Summary Statistics

Lantana Road		Number of Crashes – Year 2014	2015	2016	2017	2018	5 Year Total Crashes	Mean Crashes Per Year	%
	Ran Off Roadway	0	0	0	0	0	0	0	0.0%
	Disregarded Other Traffic Sign	0	0	0	0	0	0	0	0.0%
	Disregarded other Road Markings	0	0	0	0	0	0	0	0.0%
	Over-Correcting/Over-Steering	0	0	0	0	0	0	0	0.0%
	Swerved or Avoided	0	0	0	1	0	1	0	0.6%
	Erratic, Reckless or Aggressive	0	0	0	0	0	0	0	0.0%
	Other Contributing Action	3	3	8	13	8	35	7	20.3%
WEATHER CONDITIONS	Clear	12	25	32	35	34	138	28	80.2%
	Cloudy	5	3	1	4	4	17	3	9.9%
	Rain	1	1	7	5	3	17	3	9.9%
	Fog, Smog, Smoke	0	0	0	0	0	0	0	0.0%
	Sleet/Hail/Freezing Rain	0	0	0	0	0	0	0	0.0%
	Blowing Sand, Soil, Dirt	0	0	0	0	0	0	0	0.0%
	Severe Crosswinds	0	0	0	0	0	0	0	0.0%
	Other	0	0	0	0	0	0	0	0.0%

Figure 2-17 Lantana Road Crash Summary Histogram

2.8.3 Crash Hotspots

A crash accumulation analysis was conducted along Lantana Road to identify specific segments or intersections with high crash frequencies and identify possible roadway deficiencies that can be improved. The crash accumulation analysis is graphically illustrated in **Figure 2-18.** Based on analysis, the following locations were identified as high crash frequency locations i.e., greater than 10 crashes for the five-year.

1. Lantana Road at High Ridge Road and Sunset Road (MP: 2.861 – MP 2.901)
2. Lantana Road at Andrew Redding Road (MP:3.421 – 4.440)

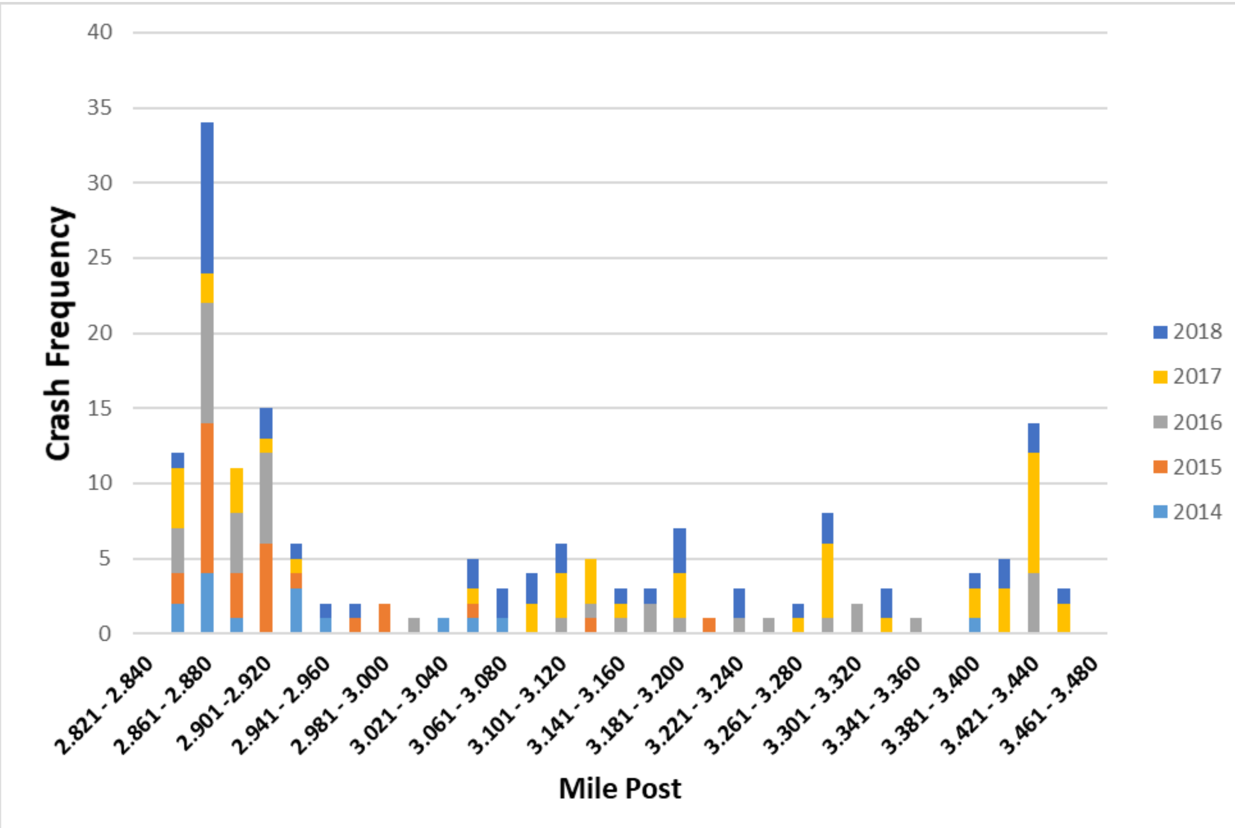


Figure 2-18 Safety Hotspots along Lantana Road

High Ridge Road provides access to the Costco Wholesale as well as several residential neighborhoods, businesses, and schools (Sunshine Park Academy and Northern Private School). Sunset Road provide access to Costco Wholesale and the Palm Beach County Solid Waste Authority (SWA) Central Transfer Station. Andrew Redding Road provides access to the new Water Tower Commons Mixed Use development as well as several residential and businesses.

Based on the crash analysis, a total of 169 crashes occurred within this hot spot areas identified from 2014 to 2018. Rear-end crashes were the predominant crash type accounting for 87 crashes (51%) of the total crashes followed by 51 angle crashes (30%), 14 sideswipe crashes (8%), 1 pedestrian (1%) crash, and 1 fixed object crash (1%). Among the contributing causes documented in the crash data, 'carelessness or negligent manner' (39 crashes, 23%), 'failed to yield right of way' (26 crashes, 15%), 'no contributing action' (35 crashes, 21%), 'followed too Closely' (35 crashes, 21%), 'improper turn' (5 crashes, 3%) and 'ran red light' (13 crashes, 8%) were among the highest.

Most of the angle crashes occurring at High Ridge Road intersection were mainly due to drivers running the red light which may be attributed to inadequate signal timing for this intersection. At Sunset Road intersection, most of the angle crashes were attributed to 'failed to yield right of way' which could also be due to the difficulty in judging correctly adequate gaps for the downhill traffic stream to make the left-turn maneuver at this intersection. The results also show most crashes occurred between the hours of 15:00 – 18:00 (48 crashes), which corresponds with the peak traffic and a high activity period for the Costco Wholesale which has access from both High Ridge Road and Sunset Road.

At Andrew Redding Road intersection, most of the observed crashes were rear-end and angle crashes attributed mostly to following too closely and failing to yield the right of way. This may be attributed to poor signal timing and coordination. **Figure 2-19** show the crash summary at within the crash hotspots.

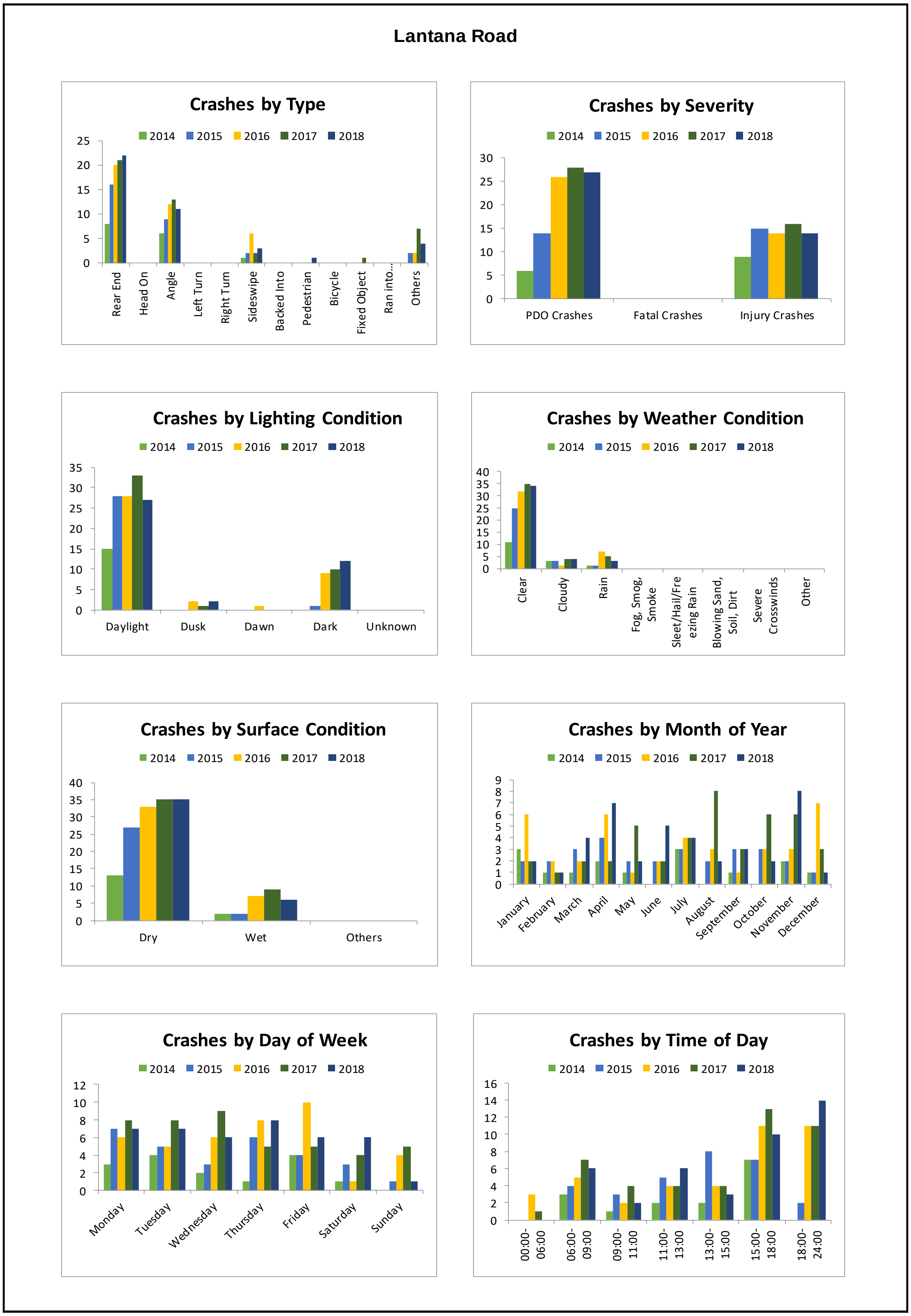


Figure 2-19 Crash Summary at Hotspots Locations along Lantana Road

2.8.4 Fatal Crashes

Fatal crashes are a major concern in roadway safety analysis. Based on the crash data, there were a total of 2 fatal crashes within the study area. All fatal crashes occurred on SR 9/I-95. There were no fatal crashes on Lantana Road.

The police reports for these crashes were obtained from the FDOT and reviewed to identify specific contributing factors that may have caused or influenced these fatal crashes. Fatal crash descriptions, as obtained from the crash reports, are presented below.

On 11/10/2014, a vehicle traveling NB (north of Lantana Road), lost control while changing lanes, ran off road, and hit the concrete median barrier. The driver of this vehicle died due to the impact. This crash occurred under wet surface conditions and during the daytime.

On 5/6/2015, a vehicle traveling NB (south of Lantana Road), lost control due to an unknown vehicle cut off, oversteered, and overturned 3 times on the travel way. The driver got ejected while the vehicle was overturning. This crash occurred under dry surface conditions and during daytime.

Figure 2-20 shows the fatal crash locations that were identified within the study area.

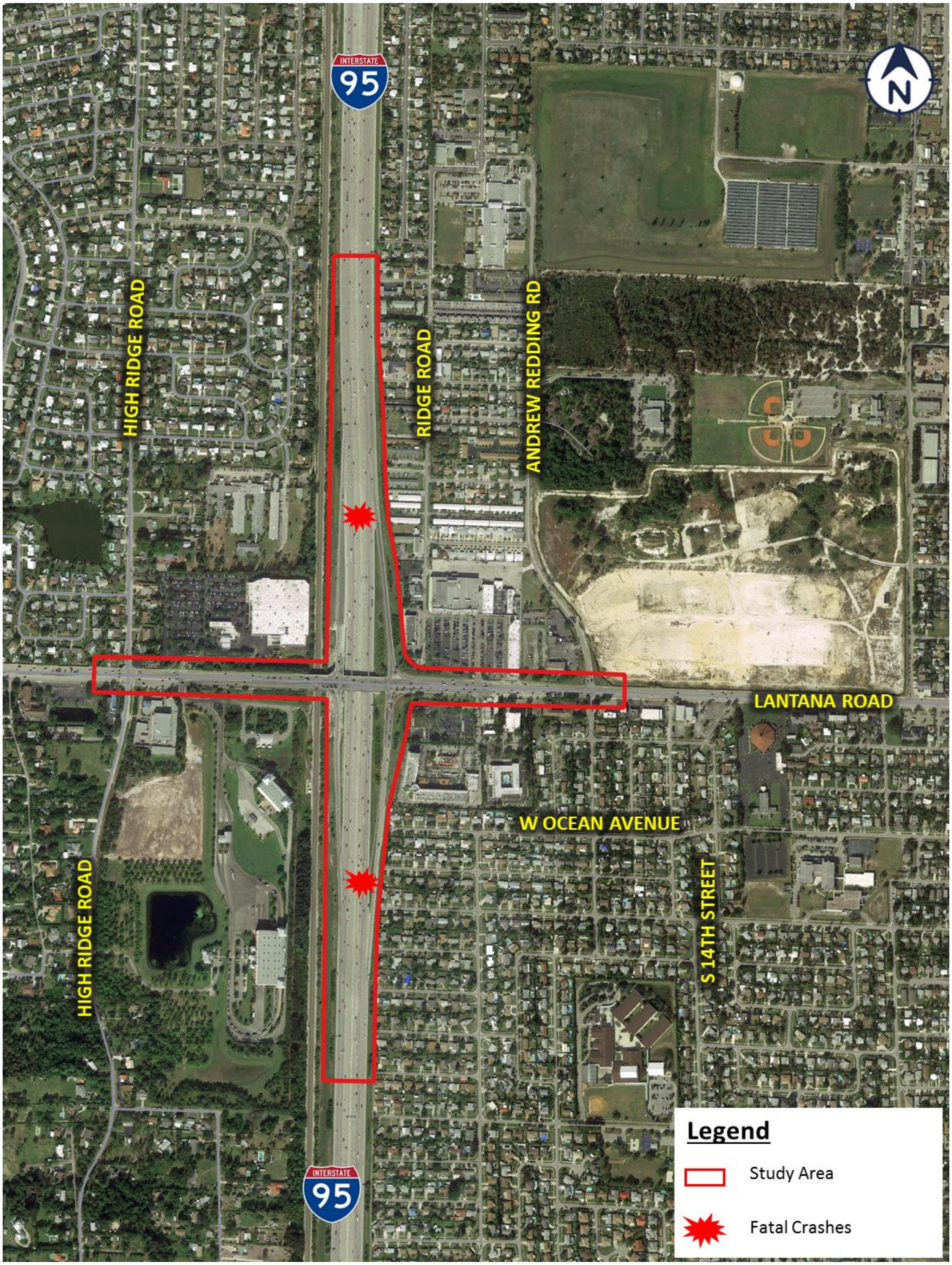


Figure 2-20 Fatal Crashes within Study Area

2.8.5 Crash Frequencies and Rates

SR 9/I-95 and Lantana Road within the study area were segmented into ten areas as presented in **Figure 2-21** This was done to further analyze the crash frequencies and rates at different sections of the roadway within the project limits to provide a better understanding of the existing crash patterns. **Table 2-18** provides the existing crash frequencies and rates along the different roadway sections as described in **Figure 2-21.**

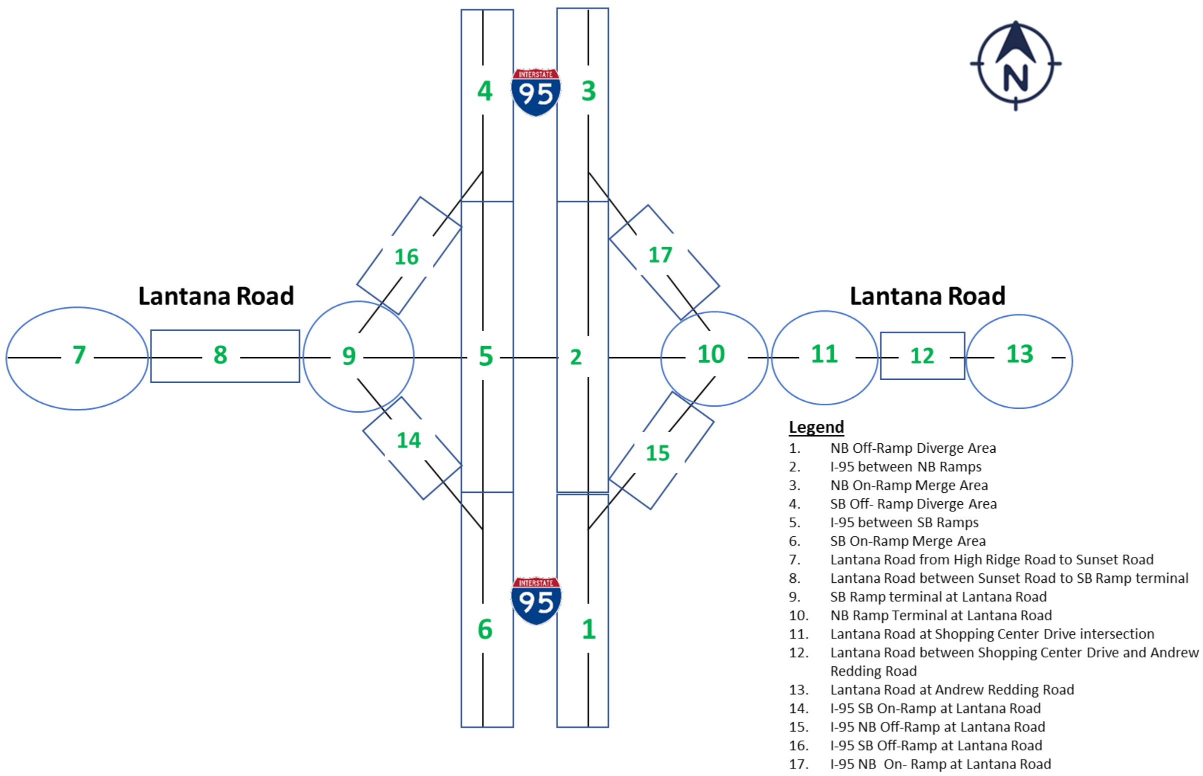


Figure 2-21 Roadway Segmentation for Crash Analysis

Based on the analysis presented in **Table 2-18**, on Lantana Road, Section 16 has the highest crash rate of 8.54 crashes per million vehicle miles travelled while Section 11 has the lowest with a crash rate of 0.18 crashes per million vehicle miles travelled. On SR 9/I-95, Section 4, is identified as having the highest crash rate of 1.80 crashes per million vehicle miles travelled while Section 3 has the lowest crash rate of 0.56 crashes per million vehicle miles travelled. Comparing the crash rates at both ramp terminals also shows the SB ramp terminal has a higher crash rate of 0.62 crashes per million vehicle miles travelled as compared to 0.48 crashes per million vehicle miles travelled on the NB ramp terminal.

Table 2-18 Existing Crash Frequencies and Rates

Seg	Description	Number of Crashes			Traffic Volume (vpd)	Segment Length (ft.)	Crash Frequency (Crash/yr)	Crash Rate (Crash/ MVMT)	Statewide Avg. Crash Rates (Crash/ MVMT)
1	NB Off-Ramp Diverge Area	Total		52	128,000	950	10.4	1.24	2.64
		Fatal	1	25					
		Injuries	24						
		PDO	28	28					
2	I-95 between NB Ramps	Total		68	115,000	2,000	13.6	0.86	2.64
		Fatal	0	32					
		Injuries	32						
		PDO	36	36					
3	NB On-Ramp Merge Area	Total		20	125,000	820	4	0.56	2.64
		Fatal	1	13					
		Injuries	12						
		PDO	7	7					
4	SB Off- Ramp Diverge Area	Total		52	102,000	820	10.4	1.80	2.64
		Fatal	0	26					
		Injuries	26						
		PDO	26	26					
5	I-95 between SB Ramps	Total		92	93,000	2,000	18.4	1.43	2.64
		Fatal	0	47					
		Injuries	47						
		PDO	45	45					
6	SB On-Ramp Merge Area	Total		34	107,000	950	6.8	0.97	2.64
		Fatal	0	14					
		Injuries	14						
		PDO	20	20					
7	Lantana Road at High Ridge Road &Sunset Road intersection	Total		85	48,000	-	17	0.97	1.06
		Fatal	0	46					
		Injuries	46						
		PDO	39	39					
8	Lantana Road between Sunset Road to SB Ramp terminal	Total		10	46,000	520	2	1.21	12.87
		Fatal	0	4					
		Injuries	4						
		PDO	6	6					

Table 2-18 Existing Crash Frequencies and Rates

Seg	Description	Number of Crashes			Traffic Volume (vpd)	Segment Length (ft.)	Crash Frequency (Crash/yr)	Crash Rate (Crash/ MVMT)	Statewide Avg. Crash Rates (Crash/ MVMT)
9	SB Ramp terminal at Lantana Road	Total		53	46,500	-	10.6	0.62	2.05
		Fatal	0	22					
		Injuries	22						
		PDO	31	31					
10	NB Ramp Terminal at Lantana Road	Total		38	43,000	-	7.6	0.48	2.05
		Fatal	0	14					
		Injuries	14						
		PDO	24	24					
11	Lantana Road at Shopping Center Drive intersection	Total		13	39,000	-	2.6	0.18	1.06
		Fatal	0	2					
		Injuries	2						
		PDO	11	11					
12	Lantana Road between Shopping Center Drive and Andrew Redding Road	Total		6	39,000	365	1.2	1.22	7.71
		Fatal	0	0					
		Injuries	0						
		PDO	6	6					
13	Lantana Road at Andrew Redding Road intersection	Total		27	34,000	-	5.4	0.44	1.35
		Fatal	0	7					
		Injuries	7						
		PDO	20	20					
14	I-95 SB On Ramp at Lantana Road	Total		7	14,000	800	1.4	1.81	-
		Fatal	0	3					
		Injuries	3						
		PDO	4	4					
15	I-95 NB Off-Ramp at Lantana Road	Total		34	13,000	1,300	6.8	5.82	-
		Fatal	0	13					
		Injuries	13						
		PDO	21	21					
16	I-95 SB Off-Ramp at Lantana Road	Total		38	14,000	920	7.6	8.54	-
		Fatal	0	21					
		Injuries	21						
		PDO	17	17					
17	I-95 NB On-Ramp at Lantana Road	Total		4	9,700	750	0.8	1.59	-
		Fatal	0	4					
		Injuries	4						
		PDO	0	0					

2.9 RAILROAD FACILITY

The South Florida Rail Corridor (SFRC)/CSX Railroad runs parallel along the west side of SR 9/I-95 and crosses below an elevated section of Lantana Road. The portion of the CSX railway located within the study area consist of two tracks and is owned by the Florida Department of Transportation for use by Tri-Rail commuter trains. Currently, eight (8) freight, fifty (50) Tri-Rail, and four (4) Amtrak trains use the system daily. The existing top train speed on the SFRC/CSX Railroad is 79 mph. The SFRC/CSX railroad corridor right of way is 100-ft north of Lantana Road and varies from 100-ft to 191-ft south of Lantana Road.

2.10 DRAINAGE

2.10.1 Drainage Basins

There are three main drainage basins in the vicinity of the SR 9/I-95 and Lantana Road Interchange. The schematic Existing Drainage Basin Map is provided in **Figure 2-22**.

Basin 1: This basin extends from north of Hypoluxo Road to just south of Lantana Road overpass including the SR 9/I-95 northbound off-ramp. The basin also includes some adjacent areas south of Lantana Road from SR 9/I-95 to approximately 350-ft to the east. The system is composed of a dry swale/ditch (on both the east and west sides) that runs parallel to SR 9/I-95 towards the south. Also, there is a French drain trunk line along the median that collects all stormwater runoff on the median. This French drain is connected with a dry retention pond at Hypoluxo Road on the southbound off-ramp, which ultimately discharges via a 60” pipe into the Lake Worth Drainage District (LWDD) E-4 Canal.

Basin 2: This basin includes the segment of Lantana Road east and west of SR 9/I-95 and the northeast quadrant of SR 9/I-95/Lantana Road Interchange. This basin captures the runoff on the northeast quadrant of the Lantana Road Interchange through curb inlets and connects to an existing 48” pipe that runs west and ultimately discharges into Lake Osborne/LWDD E-4 Canal. Currently, no water quality is being provided from this quadrant/system, which is compensated for in Basins 1 and 3. The existing drainage system along Lantana Road consists of a series of curb inlets on both sides of the road collecting the stormwater runoff and connecting to a trunk line (located on the median along Lantana Road), which is connected to a 48” pipe that discharges into Lake Osborne.

Basin 3: This basin extends from north of the Lantana Road overpass to the north, beyond the limits of the project study. There is a dry detention pond underneath the Lantana Road overpass and the SR 9/I-95 on/off-ramps. This pond has a detention control structure that connects and discharges into a northern swale on the west side of SR 9/I-95 with an ultimate discharge to the Lake Osborne through an existing 60" pipe underneath 12th Avenue. This basin also has a French drain trunk line collection system along the median of SR 9/I-95, which is connected to swales on both sides of SR 9/I-95.

CSX Basin: This basin is contiguous to drainage detention swales west of SR 9/I-95. However, there is a berm between the two swales, so there should not be any shared runoff treatment considered.

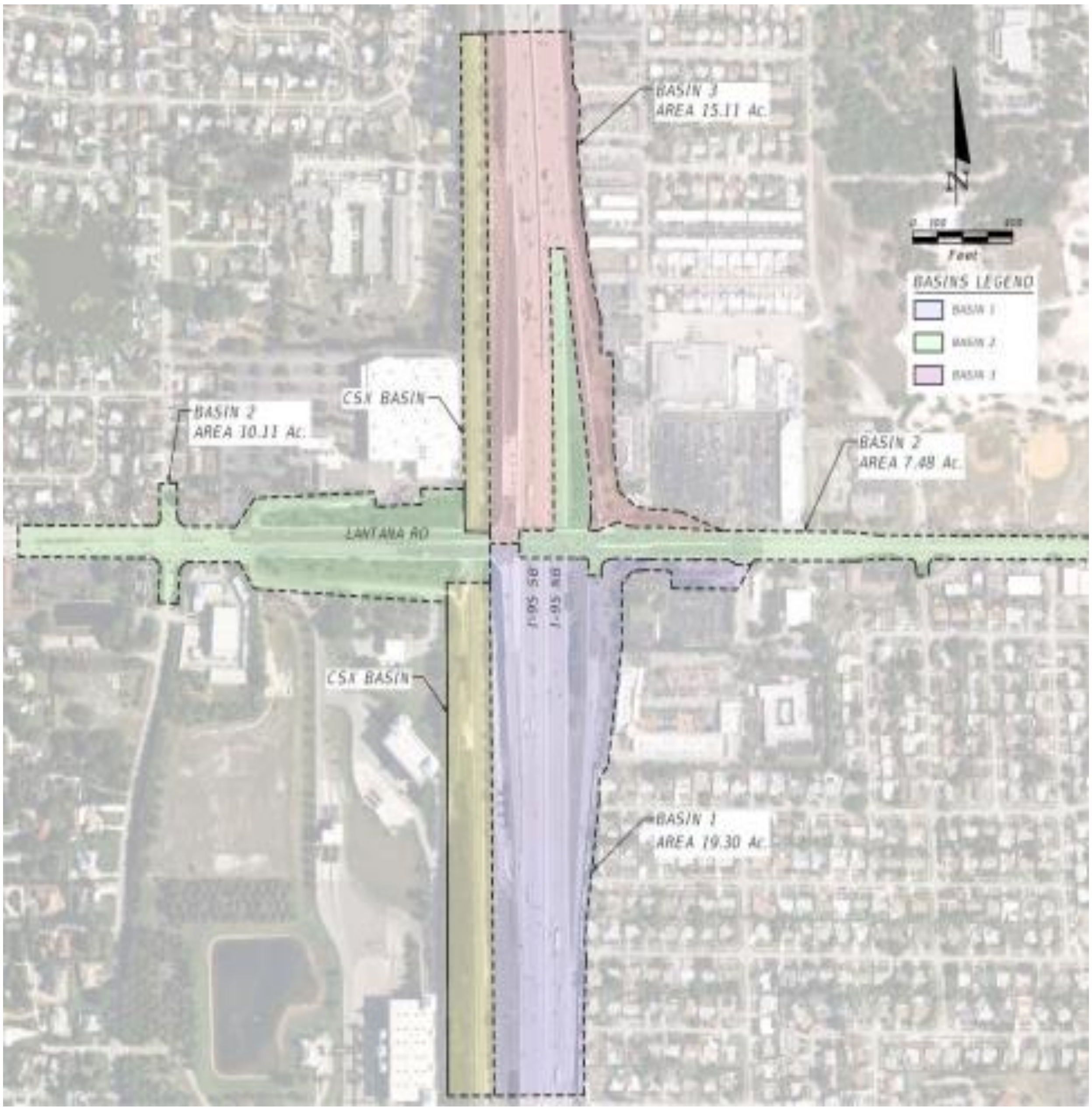


Figure 2-22 Existing Drainage Basin Map

2.10.2 Existing Permits

The project limits are within the South Florida Water Management District (SFWMD) C-16 and LWDD jurisdiction and therefore, permitting coordination with both agencies will be required. There are several permit modifications that have taken place within the project study limits and are mentioned below:

- ER **Permit No. 50-03485-S:** All three basins are covered under this Permit.
- ER **Permit No. 50-09127-P:** Includes the portion of Lantana Road west of SR 9/I-95.
- ER **Permit No. 50-03570-S:** Includes the Lantana Road portion east of SR 9/I-95 with a trunk line of 24” heading west, which is connected with curb inlets on both side of the road.
- ER **Permit No. 50-06540-P:** Includes a private property (Simmers and White) located on the southeast corner of Lantana Road and High Ridge Road. This property has a French drain system with an overflow connection to the FDOT drainage system via a control structure and a 24” pipe.

2.11 UTILITIES

There are 12 Utility Agency Owners (UAO) with facilities within the study area that were contacted as part of the study. **Table 2-19** below shows the list of utility agency owners and utility contact data obtained from Sunshine State One Call of Florida (SSOCOF).

Table 2-19 Utilities in the project study area

ID	Utility Agency / Owner	Facility Type	Contact Person	Phone	Master Agreement
1	AT&T Florida/BellSouth	Communication	Garth Bedward	(561) 540-9263	Yes
2	City of Lake Worth-Electric	Power	Jean St. Simon	(561) 586-1699	Yes
3	City of Lake Worth-Water & Sewer	Water/Sewer	Giles Rhoads	(561) 586-1640	Yes
4	Comcast Cable	Cable TV	Anthony Springsteel	(772) 321-3425	No*
5	Crown Castle Fiber	Communication	Danny Haskett	(786) 610-7073	No*
6	Florida Power & Light-Distribution	Power	Luca Fasani	(561) 685-8786	Yes
7	Florida Power & Light-Transmission	Power	Tricia D'Annunzio	(561) 904-3560	Yes
8	Florida Public Utilities Co.	Gas	Dale Butcher	(561) 366-1635	Yes
9	MCI/Verizon	Communication	Dean Boyers	(972) 729-6016	No
10	Palm Beach County-Traffic	Traffic	Rod Friedel	(561) 681-4371	No
11	Solid Waste Authority of Palm Beach Co.	Waste	Patrick Carroll	(561) 640-4608	No
12	Town of Lantana	Water/Sewer	Darrell Blom	(561) 540-5778	No

**although master agreements with FDOT do not exist under current UAO ownership, master agreements were executed with FDOT under previous ownerships, Comcast ABB Management Corp. and FPL-Fibernet, LLC, respectively.*

2.12 LIGHTING

The existing lighting varies throughout the project study area. Along the SR 9/I-95 mainline, the existing lighting consists of conventional light poles with 50-ft mounting heights and LED luminaires along the median and on both sides of the highway. Along the interchange ramps, the lighting consists of conventional light poles with 40-ft mounting heights and high-pressure sodium luminaires. Lighting along Lantana Road consist of conventional light poles with high-pressure sodium luminaires mounted on aluminum poles, concrete poles or on utility poles. Within the interchange area, from Sunset Road to Shopping Center Drive, the luminaires are mounted on aluminum poles both sides of the roadway. For the remaining segments along Lantana Road, the luminaires are generally mounted on aluminum poles on the south side and attached to utility poles on the north side. At the signalized intersections of High Ridge Road, Shopping Center Drive and Andrew Redding Road, the luminaires for intersection lighting are mounted on the concrete strain poles supporting the traffic signals.

2.13 INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

ITS components along SR 9/I-95 include the following systems:

- Closed Circuit Television (CCTV) Camera
- Microwave Vehicle Detection System (MVDS)
- Voice over IP (VOIP)
- Highway Advisory Radio Transmitter (HART)
- Fiber Optic Cable (FOC) Communication
- Power Distribution System

CCTV cameras are typically spaced at one and one half-mile intervals and generally located on the east side of SR 9/I-95. MVDS are installed along the corridor and are spaced at one-mile intervals generally on the eastside of the corridor.

These field elements are connected to District Four's SMART SunGuide® Transportation Management Center via the Fiber Optic Cable (FOC) based Ethernet communication network along SR 9/I-95. The existing underground infrastructure consists of one 144-count single-mode fiber optic cable in one 2-inch High Density Polyethylene (HDPE) conduit, one 2-inch HDPE spare conduit, and one 2-inch HDPE conduit with electrical service conductors. Service point for these devices is located at the northeast quadrant of SR 9/I-95 and Hypoluxo road interchange.

There is only one existing CCTV Camera located along Lantana Road and it is located at the NE corner of the SR 9/I-95 and Lantana Road interchange. Preliminary design has indicated two Arterial Dynamic Message Signs (ADMS) along the project corridor. One ADMS is allocated for the eastbound approach and another one is allocated for the westbound approach along Lantana road approach SR 9/I-95.

2.14 GEOTECHNICAL

The United States Department of Agriculture (USDA) and Natural Resources Conservation Service (NRCS) soil survey for the project area was reviewed for general information of surficial soils along the project alignment. **Table 2-20** shows a review of the Palm Beach County Soil Survey along the project alignment.

A review of the Geologic Map of Florida, published by the Florida Geological Survey, indicates that the existing and proposed deep foundations bear within the Anastasia Formation, which consists of interbedded sands and coquinoid limestone. A review of the previous geotechnical exploration performed at the site and presented in the As-Builts of Bridge No. 930274, Lantana Road over SR 9/I-95 and CSX Railroad, dated October 1969, indicates that the subsurface conditions generally consist of tan to brown medium to fine sand within the upper 25-ft and overlying gray medium to fine sand with cemented sand and shell to the borings' termination depth of approximately 52-ft. Based on our experience in the area, below the upper 50-ft, sands with varying percentages of silt, shells, and limestone are anticipated. Soils encountered during the drilling of the roadway and bridge borings (February 2011) are indicative of the soil survey. Fine to medium sand to sand with silt (SP, SP-SM) was encountered from the ground surface to termination depths up to 125-ft below existing ground surface.

Groundwater was encountered at depths of 12 to 13-ft below existing grades. Fluctuation in ground water levels should be expected due to seasonal climatic changes, tidal changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors. Since ground water level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

The Seasonal High-Water Table (SHWT) is the highest average depth of soil saturation during the wet season in a normal year. A review of the Palm Beach County Soil Survey indicated that the depth to water table is noted as 0 to 1-ft or greater than 6-ft below natural ground surface for these soil types. The area has been built-up for the existing roadway. Since the groundwater measurements at the existing test boring locations may not necessarily reflect the SHWT, a review of historical groundwater data was conducted, which shows the SHWT ranging from approximately 5.5 to 6.4-ft NGVD based on USGS well data near the site. **Table 2-21** shows the groundwater levels at project location.

Table 2-20 Subsurface soil type in project location

USDA Soil Type	Depth (inches)	USDA Soil Description	USCS	AASHTO	Permeability (in/hr)	Seasonal High-Water Table Depth (ft)
Myakka fine sand, 0 to 2 percent slopes (21)	0-26	Sand	SP, SP-SM	A-3	6.0-20	0-1.0
	26-47	Sand	SM, SP-SM	A-3, A-2-4	0.6-6.0	
	47-72	Sand	SP, SP-SM	A-3	6.0-20	
St. Lucie-Paola-Urban land complex, 0 to 8 percent slopes (41)	0-80	Sand	SP	A-3	> 20.0	>6.0
Urban land, 0 to 2 percent slopes (48)	-	-	-	-	-	-

Table 2-21 Groundwater levels at project location

Source	Location	Distance from Site	Ground Surface Elevation (ft, NGVD)	Groundwater Level	
				Elevation (ft, NGVD)	Duration
USGS Well No. PB-1717/ USGS ID 263453080031501	26°34’53.5”, 80°03’13.1”	Approx. 1-mile SE	13.3	5.5 (Average)	Wet Season
				1.6 (Lowest)	2004
				7.8 (Highest)	2014
USGS Well No. PB-1639/ USGS ID 263656080033502	26°36’56.8”, 80°03’33.8”	Approx. 2 miles NE	17.6	6.4 (Average)	Wet Season
				2.1 (Lowest)	2004
				10.6 (Highest)	2012

2.15 EXISTING STRUCTURAL CHARACTERISTICS

There are 3 bridges along the Lantana Road project corridor that were evaluated as part of this PD&E Study. The locations of these bridges are shown in **Figure 2-23** and a summary of the general geometry and structural information pertaining to the bridges are summarized in **Table 2-22.** These three bridges were originally constructed in 1975; however, the two ramp bridges were recently widened in 2014.

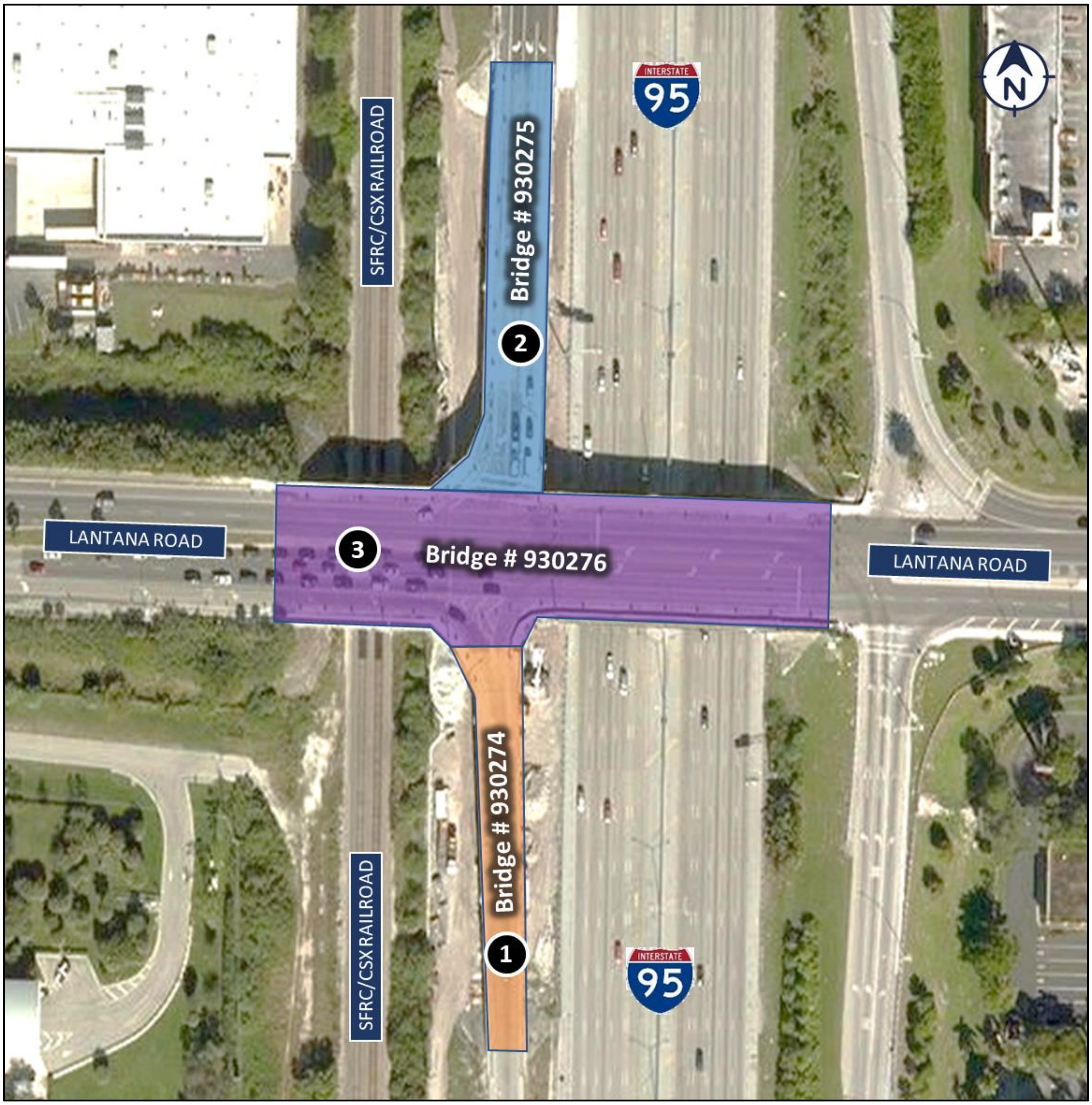


Figure 2-23 Existing Bridge Structures

2.15.1 Type of Structure

The superstructure for bridges 930274 (Bridge 1), 930275 (Bridge 2), and 930276 (Bridge 3) consists of a cast-in-place (CIP) deck supported on AASHTO beams. The substructures for the bridges consist of multicolumn piers or pile bents supported by squares pre-stressed 18" concrete piles.

2.15.2 Condition of Existing Structures

FDOT performs bi-annual inspections and evaluations of all bridge structures under its jurisdiction, as part of the “National Bridge Inventory (NBI) and Structural Inventory and Appraisal Program” required by FHWA. The term structurally deficient means that the bridge should undergo a series of repairs. All structurally deficient bridge structures must be repaired or replaced within six years of being designated as a structurally deficient structure. The term functionally obsolete means that the bridge section does not meet the latest road design standards. The functionally obsolete rating is not associated with its structural capacity. Health index is a tool that measures the overall condition of a bridge; the lower the health index, the more work that is needed to bring the bridge to an ideal condition. Sufficiency Rating is a tool used to determine whether a bridge that is structurally deficient or functionally obsolete should be repaired or replaced. The Sufficiency Rating considers several factors with only about half of which relate to the condition of the bridge itself. The Sufficiency Rating is not a direct reflection of the bridges’ ability to carry traffic loads. The Bridge Load Rating indicates the reserved capacity of the bridge to carry live loads. Bridges are rated at three different stress levels, referred to as Operating Rating, Inventory Rating, and Legal Rating.

The latest available Bridge Load Rating Reports and Bridge Inspection Reports were obtained for the existing bridges, and a review of the existing reports indicated that all bridges have an acceptable Sufficiency Rating varying from 90.7 to 100.0 and health indexes varying from 99.61 to 99.92 with no structural deficiency. A review of the Bridge Load Rating Reports and existing bridge plans also showed that all the bridges had an inventory rating factor greater than 1. These values are shown on **Table 2-22**.

2.15.3 Vertical Clearance

The primary purpose of having adequate vertical clearance to structures going over roadways and railroads consists of providing safe passage to tall design vehicles or rail cars beneath these structures. The January 2019 FDOT Design Manual specifies that the highest point on the roadway below a bridge structure has to measure a minimum of 16.5-ft to the lowest point (low member) beneath the structure. This includes provisions for a future underpass resurfacing of 6” over the existing pavement elevation. For railroad underpasses, a minimum 23.5-ft vertical clearance is recommended which includes allowance for 12” of railroad track adjustments. The South Florida Rail Corridor (SFRC) however, has a greater clearance requirement set at 24.25-ft.

AASHTO requires a minimum vertical clearance of 16-ft for structures passing over roadway including auxiliary lanes and the usable width of shoulders. Further guidance allows a minimum vertical clearance of 14-ft in highly urbanized areas provided there is an alternate facility with the minimum 16-ft clearance. For railroad underpasses, AASHTO recommends a minimum vertical clearance of 23-ft.

An evaluation of the existing bridges within the project limits indicates that the Lantana Road Bridge over SR 9/I-95 (#930276) does not meet the FDOT vertical clearance requirements over SR 9/I-95 and the SFRC/CSX Railroad and the AASHTO vertical clearance requirements for railroad underpass.

2.15.4 Horizontal Clearance

The horizontal clearance underneath the existing bridges is the lateral distance from the roadway edge of travel lane to the bridge abutment or piers. The horizontal clearance requirements for roadside features and objects are based on providing the required clear zone. Both the FDOT Design Manual and AASHTO require bridge piers and abutment walls to be placed outside the clear zone unless shielded by a crashworthy barrier. A field review of the project corridor indicated that bridges 930274, 930275, and 930276 are adequately protected by barrier wall and/or guardrail.

2.15.5 Historical Significance

The existing bridges within the project study area were reviewed to determine if any are considered historic or possess any substantial community value. As previously mentioned, the existing bridges were originally constructed in 1975 and the two ramp bridges were widened in 2014. based on the Cultural Resources Assessment Survey (CRAS) Report prepared for this study, none of these bridges are either non-historic or have non-historic reconstruction dates and not eligible for listing in the National Register of Historic Places (NRHP).

Table 2-22 Existing Bridge Characteristics

Bridge No.	Location/Description	Bridge No.	Min. Vertical Clearance (ft)	Superstructure Type	Substructure Type	Average Bridge Width ft)	Bridge Length (ft)	No. of Spans	Max. Span Length (ft)	Load Rating	Sufficiency Rating (SR)	Health Index (HI)	Bridge Railings	Substructure	Restriction	Deficiency	Year Built/ Reconstructed
1	SB I-95 Off-Ramp to Lantana Road	930274	N/A	AASHTO Type II & III Beams	Pier/Bents/18" Prest. Piles	37'-6" (out to out)	319'-1"	6	67'-6"	1.583	100.0	99.92	Standard	Good	Open, No Restriction	N/A	1975/2014
2	SB I-95 On-Ramp from Lantana Road	930275	N/A	AASHTO Type II & III Beams	Pier/Bents/18" Prest. Piles	37'-6" (out to out)	322'-6"	6	67'-6"	1.619	100.0	99.61	Standard	Good	Open, No Restriction	N/A	1975/2014
3	CR 812 Lantana Rd over I-95/SR 9 & CSX Railroad (SFRC)	930276	16'-1" (Roadway)[1] 22'-10 ⅛" (Railroad)[1]	AASHTO Type II & IV Beams	Pier/Bents/18" Prest. Piles	100'-9" (out to out)	471'-0"	6	100'-5"	1.056	90.7	99.86	Standard	Good	Open, No Restriction	N/A	1975

Notes:

- (1) Values extracted from Existing Plans
- NBI Bridge Condition; Deck, Superstructure & Substructure: Satisfactory to Very Good
- Load Rating; IRF (Inventory Rating Factor)
- Vertical clearance values in red do not meet the FDOT Design Manual recommended minimum of 16.5-ft (roadway over roadway), 23.5-ft (roadway over railroad), SFRC recommended minimum 24.25-ft (roadway over railroad)

Definitions:

- Load Rating - indicates the live-load capacity of the bridge based on current conditions.
- Sufficiency Rating - a measure used to determine whether a bridge that is structurally deficient or functionally obsolete should be repaired or just replaced.
- F.O.= Functionally Obsolete - refers to a bridge that does not meet current roadway design standards
- Health Index - a measure used to indicate overall conditions of a bridge. A Health Index below 85 generally indicates that some repairs are needed.

2.16 ENVIRONMENTAL CHARACTERISTICS

2.16.1 Land Use

The study area falls within the Town of Lantana in Palm Beach County. The existing land use is a mix of retail/office, residential, industrial, recreational, agricultural, institutional, public, semi-public, right of way and vacant residential and non-residential uses. **Figure 2-24** shows the existing land use within the study area.

Land use directly adjacent to the SR 9/I-95 at Lantana Road interchange between Andrew Redding Road and High Ridge Road is primarily commercial, interspersed with some institutional uses. Residential uses are located behind the adjacent commercial and institutional uses within the study limits and along Lantana Road, east of Andrew Redding Road and west of High Ridge Road.

The Lantana Shopping Center is adjacent to the study intersection in the northeast quadrant. The shopping center houses large retailers including Publix, AutoZone as well as restaurants and other small-scale retailers. The Lantana Bureau of Administrative Review building is located east of the Lantana Shopping Center along Lantana Road. Further east is the parcel demarcated for the construction of the Water Tower Commons in Lantana. This development will feature 360 apartment units with various amenities.

The southeast quadrant of the study intersection features banking institutions including Chase Bank and Wells Fargo, a McDonald's restaurant, Dollar general and the Palm Beach Maritime Academy. Shell Gas Station and 7-eleven Gas Station are located west and east of Andrew Redding Road adjacent to Lantana Road within this quadrant. First Baptist Church and Holy Spirit Catholic Church are located east of Andrew Redding Road.

The Lantana Road Costco Wholesale is located in the northwest quadrant of the study intersection with Sunshine Park Academy directly adjacent to the Costco Wholesale to the west. Lake Osborne Estate is located west of High Ridge Road. The Palm Beach County Park/Lantana Airport is located further west between Lake Osborne Drive and S Congress Avenue.

The southwest quadrant between High Ridge Road and the SR 9/I-95 interchange is occupied by the Palm Beach County Solid Waste Authority (SWA) Central Transfer Station and lantana Self-Storage. Seacoast Bank and Living Word Lutheran Church are located west of High Ridge Road. Future land use within the project location is anticipated to remain unchanged. **Figure 2-25** shows the future land use in the project location.

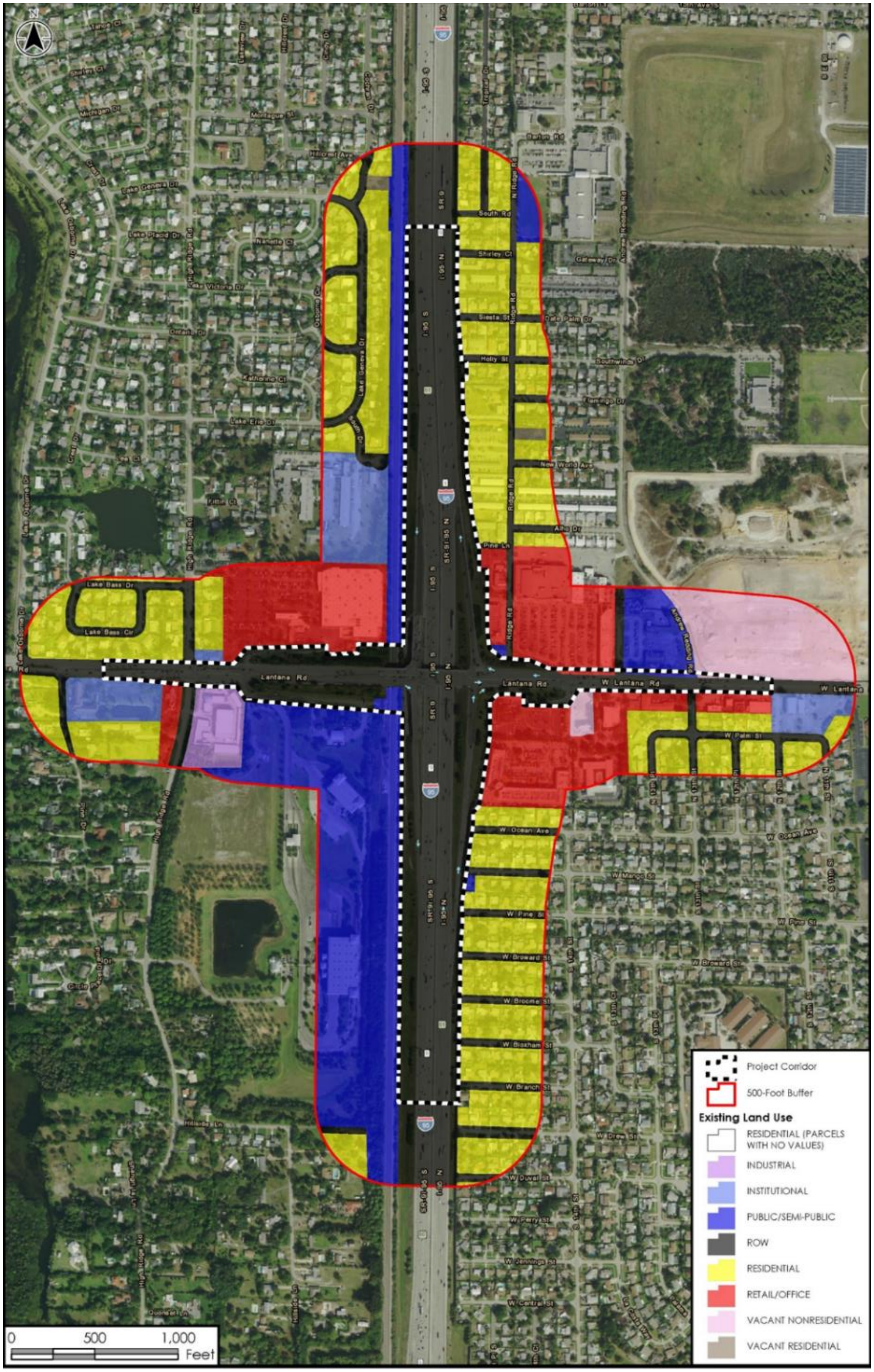


Figure 2-24 Existing Land Use Map

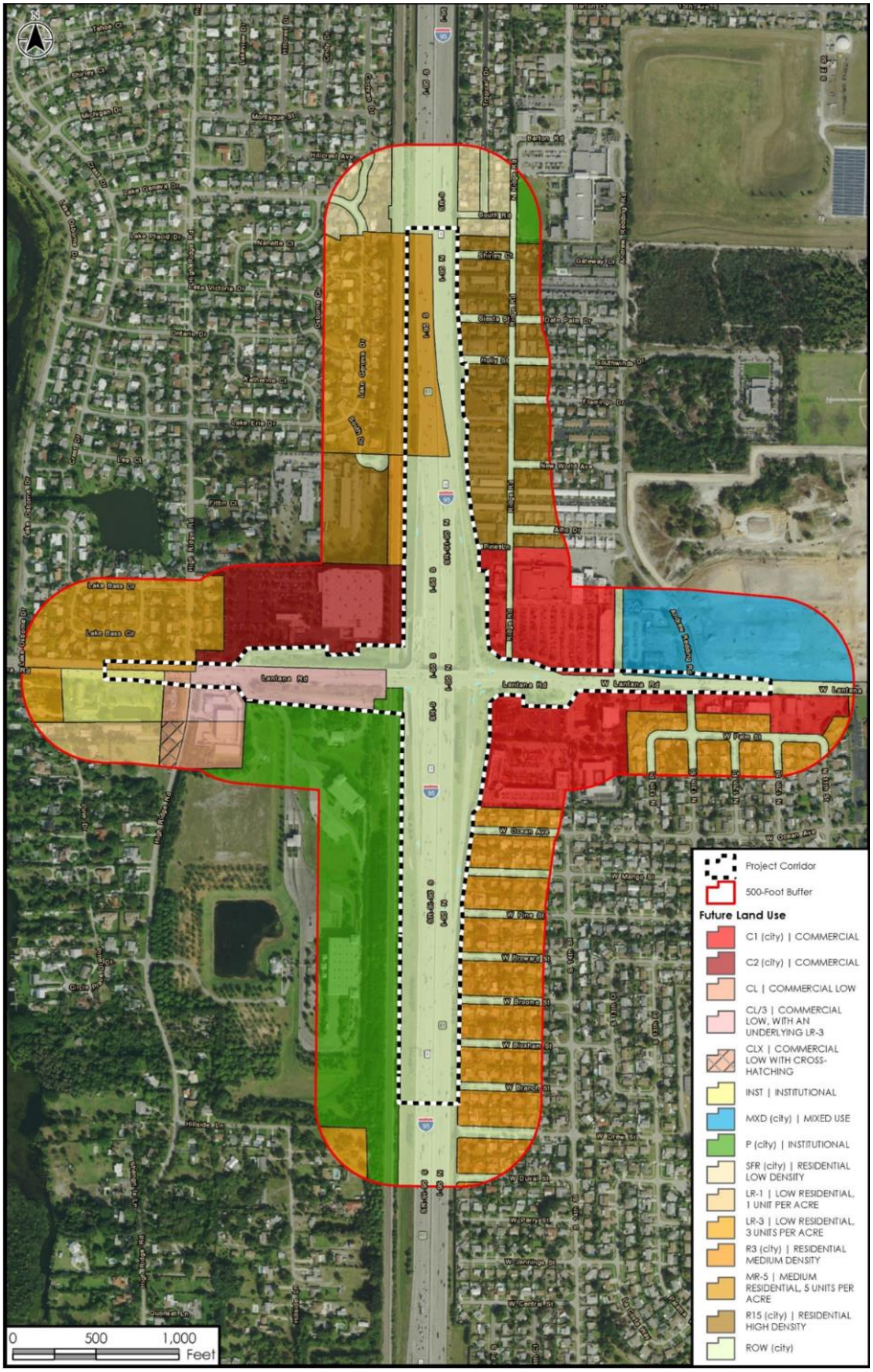


Figure 2-25 Future Land Use Map

2.16.2 Cultural Resource Assessment Survey

Background research was conducted to identify National Register–listed, determined National Register–eligible, and potentially National Register–eligible historic resources and historic districts located within the Area of Potential Effect (APE). Background research included a review of information from the Florida Master Site File (FMSF) and geographic information systems (GIS) data. The information obtained as part of the background research provided the previously recorded or existing historic resources located in the study area.

A portion of the Seaboard Airline Railroad (8PB12917) intersects Lantana Road to the west of SR 9/I-95. Although this portion of the railroad may have not been recorded previously, the railroads when intact are typically considered to be eligible for inclusion in the National Register based on their historical significance.

No other previously recorded historic resources or archaeological sites were identified within or adjacent to the project APE. The bridges within the APE included in the FGDL data have a 1975 construction year in the FDOT bridge list. The FGDL data did not identify any cemeteries within the APE. A search of property appraiser records indicates there are at least 10 unrecorded historic resources within the project APE.

2.16.3 Community Facilities

The project area is located in an urban region of eastern Palm Beach County. Community features include local and commercial businesses, religious centers, schools, and residential areas. The notable community service resources that were identified within the project vicinity are documented in **Table 2-23**. **Figure 2-26** shows the locations of the community facilities identified in the project study area.

Table 2-23 Section 4(f) Resources within 1/4-Mile of the Project Area

Map ID	Name	Address	Feature Type
1	South Area Secondary Intensive Transition Program	1509 Barton Rd	School
2	Barton Elementary School	1700 Barton Rd	School
3	Northern Private School	1822 High Ridge Rd	School
4	All Nations Church	1510 High Ridge Rd	Religious Facility
5	Living Word Lutheran Church	2116 Lantana Rd	Religious Facility
6	First Baptist Church	1126 W Lantana Rd	Religious Facility
7	Holy Spirit Catholic Church	1000 W Lantana Rd	Religious Facility
8	John Prince Park	2700 6th Ave S	Park
9	Lantana Scrub Natural Area	E of Andrew Redding Rd & N of Southwinds Dr	Park
10	Lantana/Lake Worth Clinic	1250 Southwinds Dr	Health Facility
11	Flamingo Drive Cluster - Florida Mentor	1285 Flamingo Dr	Health Facility
12	C L Brumback Primary Care Clinic	1250 Southwinds Dr	Health Facility
13	Village on High Ridge	1800 South Dr	Health Facility
14	Palm Beach County Tax Collector - Lantana Service Center	1299 W Lantana Rd	Government Facility
15	For the Children, Inc.	1700 Barton Rd	Day Care
16	The Sunshine Park Academy, Inc.	1969 Lantana Rd	Day Care
17	Hernandez, Wendy	1438 West Broward St	Day Care
18	Head, Janet	501 S. 13th Pl	Day Care
19	Palm Beach Maritime Academy	1518 W Lantana Rd	School
20	Palm Beach School for Autism	1199 W Lantana Rd	School

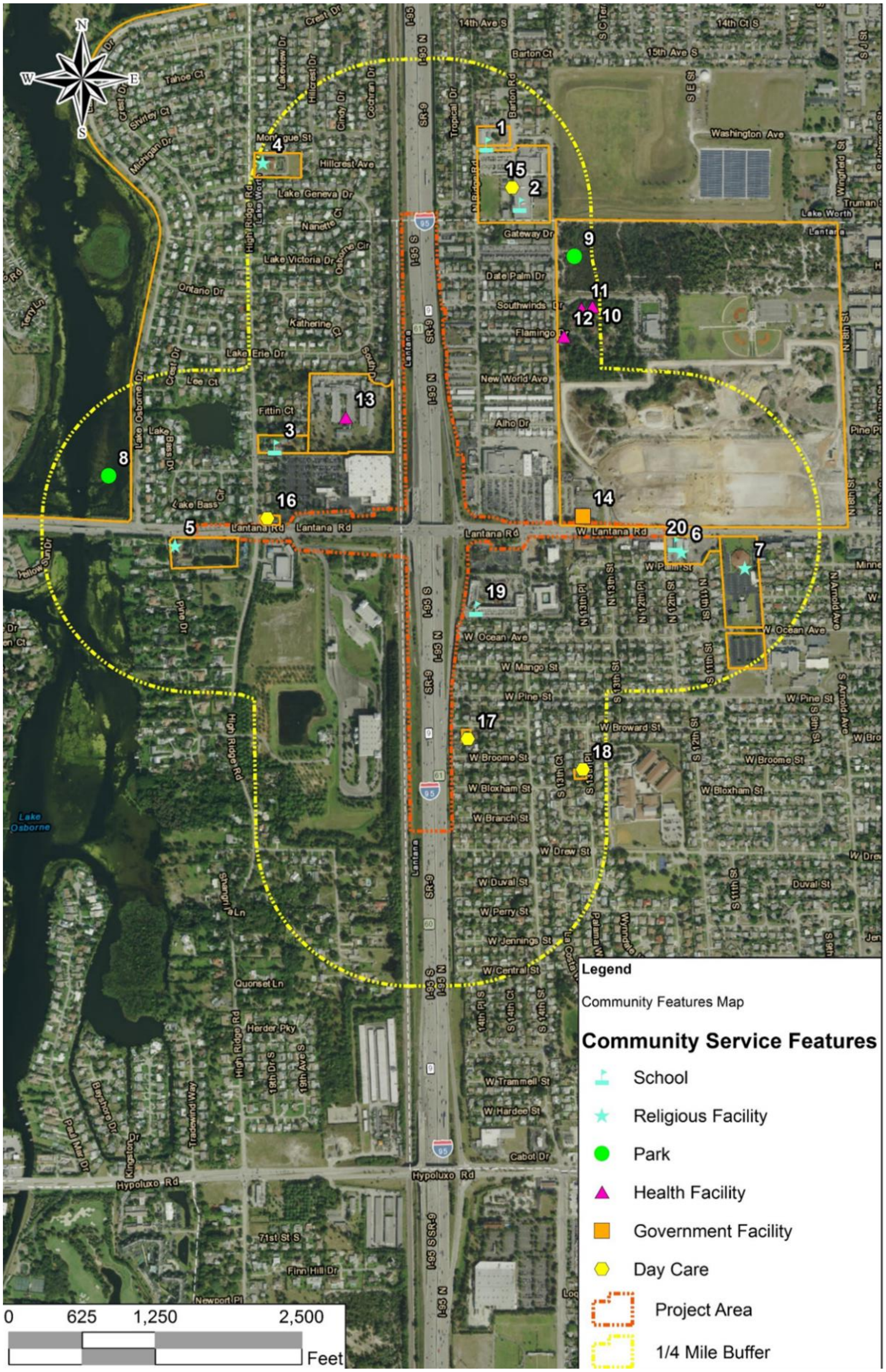


Figure 2-26 Community Features Map

2.16.4 Wetlands and Water Quality

Based on a review of the ETDM EST and aerial imagery, no wetlands were identified within the project study area. The nearest surface water feature (Lake Osborne) is located approximately 1,000-ft west of the study limits. In addition, the E-4 Canal and the Lake Worth Lagoon are in the vicinity of the project area, although located over 1,000-ft away.

2.16.5 Floodplains/Floodways

The project area is located outside the 100 and 500-year floodplain (Zone X). Zone X represents areas outside the 500-year flood plain with less than 0.2% annual probability of flooding. It has been determined, through consultation with local, state, and federal water resources and floodplain management agencies that there is no regulatory floodway involvement on the project and that the project will not support base floodplain development that is incompatible with existing floodplain management programs.

2.16.6 Endangered and Threatened Species, Wildlife, And Critical Habitats

The ETDM EST identified that the project limits are located within the U.S. Fish and Wildlife Service's (USFWS) Consultation Area for the Florida scrub jay (*Aphelocoma coerulescens*) and West Indian manatee (*Trichechus manatus*). While this project is not located within the designated Critical Habitat for the West Indian manatee, Lake Osborn to the west and Lake Worth Lagoon to the east are both designated Critical Habitat. In addition, the project area is within the Core Foraging Area (CFA) for four (4) wood stork rookeries.

2.16.7 Air Quality

The project is located in an area which is designated attainment for all the National Ambient Air Quality Standards under the criteria provided in the Clean Air Act.

2.16.8 Noise

Noise sensitive sites are found along the east side of the SR 9/I-95 project corridor along most of the project limits and along the west side, north of Lantana Road. The residential noise sensitive sites include single-family homes and smaller apartment buildings. Noise sensitive areas at these residences primarily include yards and patios. Other noise sensitive sites include the Finnish

American Village assisted living facility, the Palm Beach Maritime Academy, a medical office, and an outdoor seating area at Riggins Crabhouse. Land use within this project also include office buildings, warehouses and industrial/light industrial enterprises that are not considered to be noise sensitive sites.

2.16.9 Contamination

Available state, local and federal records were reviewed to identify all contamination sites within 500 feet, non-landfill solid waste sites within 1000 feet, and superfund landfill sites within a 1/2 mile. Based on the said review, a total of 9 potential contamination sites were identified. **Table 2-24** summarizes the sites identified in the project study area. **Figure 2-27** shows the locations of the identified contamination sites in the project area.

Table 2-24 Identified Contamination Sites

Map ID	FACILITY ID #	NAME	ADDRESS	SITE TYPE	RISK RATING	STATUS
1	FDEP# 65859	Lake Worth Sanitary Landfill	End of South E St	Class I Landfill	Low	Closed
2	FDEP# 9808145	Publix Store #817	1589 W Lantana Rd	Fuel User/Non-Retail	Low	Closed
3	FDEP# 9701062	Costco Gasoline (Loc 180)	1873 Lantana Rd	Retail Station	Medium	Open
4	FDEP# 9803549	R & R Transportation Spill	Northbound Median I-95 At Lantana Rd	Emergency Response Spill Site	Low	Closed
5	FDEP# 9803570	Waste Mgmt. Truck Spill	ROW Lantana Rd & I-95	Emergency Response Spill Site	Medium	Closed
6	FDEP# 8732176	Shell Station	1785 Lantana Rd	Retail Station	Medium	Closed
7	FDEP# 9600101	Palm Beach Cleaners	1400 Lantana Rd	Dry Cleaners	No	Closed
8	FDEP# 65564	Central County Transfer Station	I-95 & Lantana Rd	Solid Waste	Medium	Active
9	N/A	CSX Railroad (No Facility ID)	N/A – Railroad right of way	Hazardous Treatment	Medium	Open

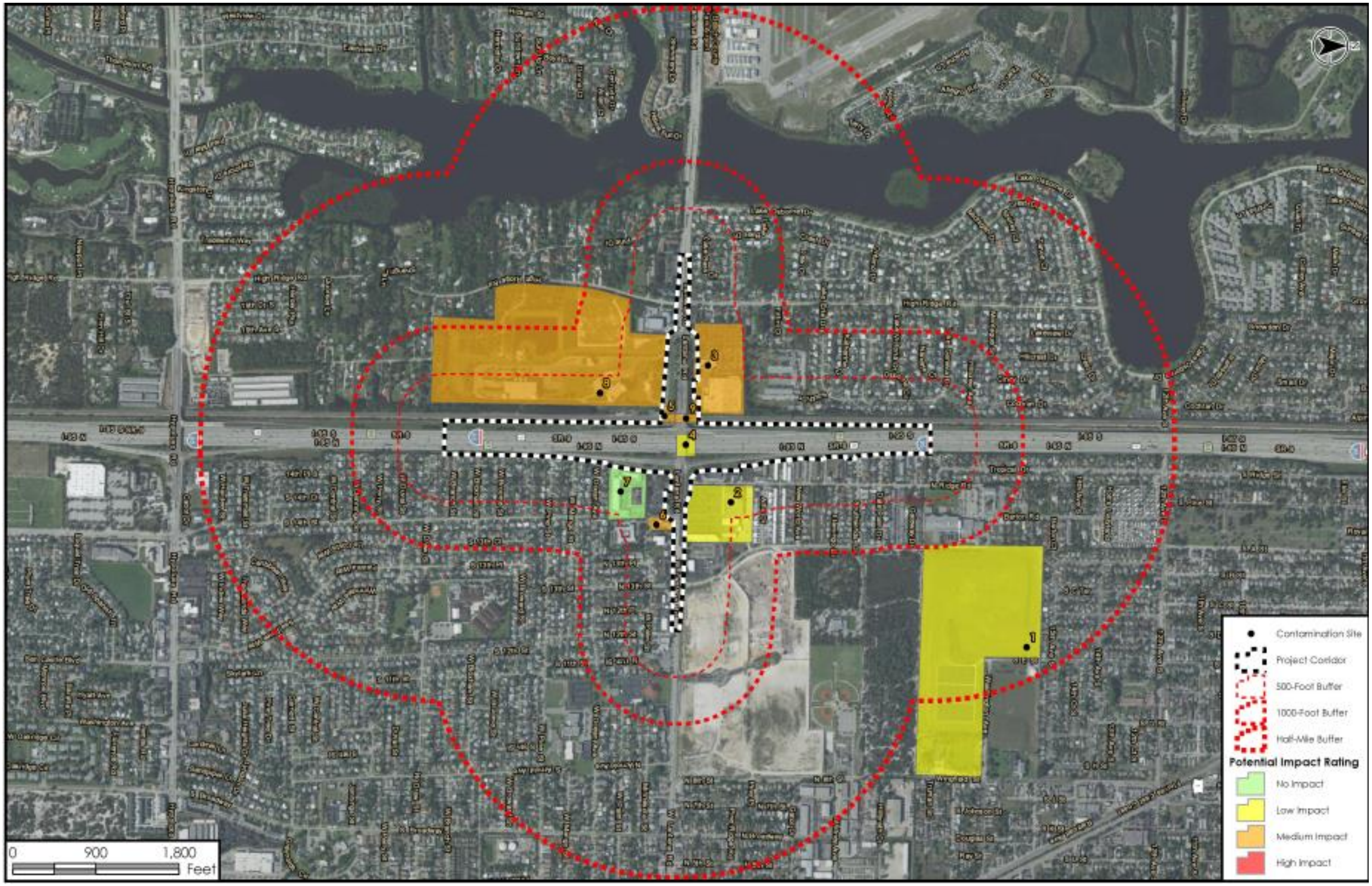


Figure 2-27 Identified Contamination Sites

3.0 PLANNING PHASE

Over the past decade, the FDOT District Four has been evaluating several operational improvements to SR 9/I-95 to reduce congestion and improve safety at the interchanges within Palm Beach County. Several planning studies were completed prior to the PD&E phase. The two most prominent studies completed prior to this PD&E study are discussed below.

3.1 I-95 Master Plan Study

In 2015, the FDOT District Four completed the I-95 Master Plan Study. This study evaluated seventeen interchanges along I-95 in Palm Beach County from Linton Boulevard to Northlake boulevard. The Study analyzed existing and future deficiencies and identified capacity, operational and safety needs. The SR 9/I-95 at Lantana Road interchange was one of the interchanges evaluated as part of this Master Plan. The proposed improvements identified in the CDR for the interchange included:

- Add a second (dual) right-turn lane to the I-95 southbound off-ramp.
- Add a second (dual) eastbound left-turn lane from Lantana Road to the I-95 northbound on-ramp and provide associated auxiliary lane to eastbound approach at the I-95 southbound ramps intersection.
- Realign the I-95 northbound off-ramp right-turn lane to the west. Signalize and overlap the northbound right-turn movement with the concurrent westbound left-turn phase at the I-95 southbound ramp.
- Provide appropriate signing and pavement marking to facilitate free-flow eastbound right-turns onto the I-95 southbound on-ramp.
- Extend the eastbound left-turn lane at the High Ridge Road intersection.
- Add a westbound through lane between the I-95 southbound off-ramp and Sunset Road.
- Add a receiving lane on the I-95 northbound on-ramp.
- Add an eastbound through lane between the I-95 northbound off-ramp and North 13th Street.
- Extend the inside left-turn lane on the I-95 northbound off-ramp.

These recommendations were utilized as the basis for the alternatives development for this PD&E Study.

3.2 I-95 Managed Lanes Master Plan

In 2019, the FDOT District Four completed the I-95 Managed Lanes Master Plan from South of Linton Boulevard to Palm Beach/Martin County Line. The purpose of the study was to identify long term capacity needs along the I-95 mainline and develop managed lanes design concepts to address any segments identified along the Corridor as operating below the Level of Service target adopted for this facility as part of the Strategic Intermodal System (SIS) designation. As part of the Master Plan, the following Alternatives were considered:

Alternative A - Convert the existing High Occupancy Vehicle (HOV) lane to a managed lane while maintaining the existing number of general use lanes. Separation treatment: Buffered separation with tubular delineators.

Alternative B - Convert the existing High Occupancy Vehicle (HOV) lane to a managed lane and adding a second managed lane while maintaining the existing number of general use lanes. Separation treatment: Buffered separation with tubular delineators.

Alternative C - Convert the existing High Occupancy Vehicle (HOV) lane to a managed lane and adding a second managed lane while maintaining the existing number of general use lanes. Separation treatment: Concrete barrier separation between managed lanes and general use lanes with standard FDOT shoulder widths.

Based on the evaluation results, the Master Plan recommended the implementation of Alternative B for the I-95 corridor within the study limits, since Alternative B resulted in minimal impacts to the corridor while meeting the study purpose and objectives. Subsequently, the Master Plan was segmented into four for future PD&E Phase as follows:

Seg #	FM Number	Description	PD&E Phase
1	444202-1	SR-9/I-95 from S. of Linton Blvd to 6th Ave North	FY 2023
2	444202-2	SR-9/I-95 from 6th Ave North to N. of Okeechobee Blvd	FY 2024
3	444202-3	SR-9/I-95 from N. of Okeechobee Blvd to S. of Indiantown Rd	FY 2025
4	413252-2	SR-9/I-95 S. of Indiantown Rd Palm Beach/Martin County Line	FY 2025

4.0 DESIGN CRITERIA

Several design standards and manuals were consulted to establish the final design criteria for this PD&E Study. The design criteria are based on design parameters outlined in the current editions of the following publications:

- A Policy on Geometric Design of Highways and Streets, American Association of State Highway Transportation Officials (AASHTO), 2018
- FDOT Design Manual, FDOT, January 2020
- Design Standards, FDOT, 2020-21
- Drainage Manual, FDOT, 2020
- Flexible Pavement Design Manual, FDOT, 2020
- Rigid Pavement Design Manual, FDOT, 2020
- Pavement Type Selection Manual, FDOT, 2019
- Highway Capacity Manual, Transportation Research Board, 2016
- Highway Safety Manual, Transportation Research Board, 2016
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance of Streets and Highways (Florida Green Book), FDOT, 2018
- Manual of Uniform Traffic Control Devices (MUTCD), FHWA, 2012
- Project Development and Environment Manual, FDOT, 2020
- Project Traffic Forecasting Handbook, FDOT, 2019
- Roadside Design Guide, AASHTO, 2011
- Standard Specifications for Road and Bridge Construction, FDOT, 2021
- Structures Design Guidelines, FDOT, 2020
- Traffic Analysis Handbook, FDOT, 2014
- Interchange Access Request Users Guide, FDOT, 2020
- Utility Accommodation Manual, FDOT, 2017

4.1 FREEWAY DESIGN CRITERIA

Table 4-1 Design Criteria for Freeways		
Design Elements	**Criteria**	**Source**
Functional Classification	I-95: Urban Interstate	FDOT Straight Line Diagram
Access Classification	Class 1 (Area Type 2)	FDM, Table 201.3.1
Interchange Spacing	2 miles (Area Type 2)	FDM, Table 201.3.1
Number of Lanes	I-95: 6-8 General Use lanes & 4 Express Lanes	Existing Conditions
Design Vehicle	WB-62FL	FDM, Section 201.5
Design Speed/Posted Speed	I-95: 70 mph / 65 mph	FDM, Table 201.4.1
Lane Widths	12-ft	FDM, 211.2
Outside / Right Shoulder Width	12-ft (10-ft paved)	FDM, Table 211.4.1
Inside / Left Shoulder Width	12-ft (10-ft paved)	
Bridge Width	Travel Lanes + 10' Shoulders	FDM Section 260.1.1
Structural Capacity	HL-93 Design Load	AASHTO LRFD 2010
Vertical Clearance		
Roadway over Roadway	16-ft – 6-inch	FDM Table 260.6.1
Roadway Over Railroad	23-ft – 6-inch	FDM Table 260.6.1
Overhead Sign Structure	17-ft – 6-inch	FDM Section 210.10.3
Roadway Over Canal	2-ft Min from Design Flood Stage and Bridge Low Member Elev. & 6-ft above Normal High Elevation or control elevation	FDM Section 260.8.1
Grades		
Maximum	3% (70 mph)	FDM Table 211.9.1
Cross Slopes		
Travel Lanes	Inside lanes sloped towards the median @ 0.02 when more than 3 lanes Remaining lanes sloped towards the outside @ 0.02 for first two lanes and @ 0.03 thereafter	FDM Fig 211.2.1
Outside / Right Shoulder Width	6%	FDM Table 211.2.3
Inside / Left Shoulder Width	5%	
Bridge Deck	2% in each direction with no break in slope	FDM Section 211.2.2
Max algebraic difference between adjacent through lanes	4%	FDM Fig 211.2.1
Max algebraic difference at turning road terminals	5% for 35 mph or more ramp speed	FDM Table 211.2.2
Maximum Shoulder Cross Slope Break	6%	FDM Figure 210.4.2
Superelevation		
Maximum Superelevation Rate	emax = 10%	FDM Section 211.8
Superelevation Transition Rate	1:190 for 4 or more lanes	FDM Table 210.9.3

Table 4-1 Design Criteria for Freeways		
Design Elements	**Criteria**	**Source**
Superelevation Ratio	20:80 preferred, 50:50 minimum	FDM Table 210.9.3
Horizontal Alignment		
Min. Length of Horizontal Curves	15V min = 1050-ft 30V preferred = 6300-ft	FDM Section 211.7.2
Maximum deflection without curve	0° 45' 00"	FDM Section 211.7.1
Maximum curvature	3° 00'	FDM Table 210.9.1
Auxiliary lane length	Min 2500-ft in advance of the exit or after entry	AASHTO 2011 Figure 10-52 & 10-53
Vertical Alignment		
Max Change in Grade w/o Curve	0.20%	FDM Table 210.10.2
Min. Length of Crest Curve	Crest (Open Highway): L=KA but not < 1000-ft Crest (Within Interchanges): L=KA but not < 1800-ft	FDM Table 211.9.3
Minimum Length of Sag Curve	L=KA but not <800-ft	FDM Section 211.9.3
Minimum Crest K-Value	506	FDM Section 211.9.2
Minimum Sag K-Value	206	FDM Section 211.9.2
Stopping Sight Distance	Interstate: 820-ft + adjustments	FDM Table 210.11.1
Recoverable Terrain	36-ft	FDM Table 215.2.1
Horizontal Clearance		
Bridge Piers	Outside Clear Zone	FDM Table 215.2.2
Above ground fixed objects (e.g., utility poles, ITS poles, and other obstacles)	Outside Clear Zone	FDM Table 215.2.2
Light Poles	20-ft from travel lanes 14-ft from auxiliary lanes, or Clear Zone width, whichever is less.	FDM Table 215.2.2
Drop-off and Canal Hazards	60-ft from travel lanes (≥50 mph)	FDM Section 215.3.2
Median Width	26-ft with Barrier wall	FDM Table 211.3.1
Border Width	94-ft	FDM Section 211.6
Roadway Base Clearance	3.0-ft above SHGW Elev.	FDM Section 210.10.3
Roadside Slopes		
Front Slope	1:6 for fills <5-ft 1:6 to edge of CZ then 1:4 for fills 5-ft-10-ft 1:6 to edge of CZ then 1:3 for fills 10-ft-20-ft 1:2 (with guardrail) for fills >20-ft	FDM Table 215.2.3
Back Slope	1:4 or 1:3	
Transverse Slope	1:10 or Flatter	

4.2 INTERCHANGE RAMP DESIGN CRITERIA

Table 4-2 Design Criteria for Interchange Ramps

Design Elements	Criteria	Source
Design Vehicle	WB-62FL	FDM Section 201.5
Design Speed/Posted Speed		
Connector Ramps	40 mph/ 35 mph	AASHTO 2011 Table 10-1
Lane Widths		
One-Lane Ramps	15-ft	FDM, Section 211.2.1
Two-Lane Ramps	24-ft (12-ft each)	
Shoulder Width		
Outside / Right Shoulder Width	One-Lane Ramps: 6-ft (4-ft paved) Two-Lane Ramps: 12-ft (10-ft paved)	FDM Table 211.4.1
Inside / Left Shoulder Width	6-ft (2-ft paved) – One-Lane Ramps 8-ft (4-ft paved) – Two-Lane Ramps	
Bridge Width		
One-Lane Ramps	Travel Lanes + 6-ft Shoulders	FDM, Section 260.9.1.1
Multi-Lane Ramps	Travel Lanes + 10-ft Outside and 6-ft Inside Shoulders	
Structural Capacity	HL-93 Design Load	AASHTO LRFD 2010 (Section 5.2.3, Table 5-6)
Vertical Clearance		
Ramp over Roadway	16-ft –6-inch	FDM Table 260.6.1
Ramp Over Railroad	23-ft – 6-inch	FDM Table 260.6.1
Overhead Sign Structure	17-ft – 6-inch	FDM Section 210.10.3 TPPPH (2012) Section 2.10
Ramp Over Canal	2-ft Min from Design Flood Stage and Bridge Low Member Elev. & 6-ft above Normal High Elevation or control elevation	FDM Section 260.8.1
Grades	6% Max - Ramps	FDM Table 211.9.1
Cross Slopes		
Travel Lanes	2% Min, varies for superelevated segments	FDM, Figure 211.2.1
Outside / Right Shoulder Width	6%	FDM, Table 211.2.3
Inside / Left Shoulder Width	5%	
Maximum Shoulder Cross Slope Break	5%	FDM, Table 211.2.2
Superelevation (e)		
Maximum Superelevation Rate	emax = 10%	FDM Section 211.8
Superelevation Transition Rate	1:175 – Connector Ramps	FDM Table 210.9.3
Superelevation Ratio	20:80 preferred 50:50 minimum	FDM Section 210.9.1 Standard Index 510
Horizontal Alignment		
Min. Length of Horizontal Curves	15V min	FDM Section 211.7.2
Maximum deflection without curve	2° 00' 00" (Connector Ramps)	FDM Section 211.7.1

Table 4-2 Design Criteria for Interchange Ramps		
Design Elements	**Criteria**	**Source**
Maximum curvature	17º45'00" (35 mph)	FDM Table 210.9.1
Exit Ramp Taper Angle	4º±	Design Standards Index 525
Ramp Entrance Taper Length	1:50	Design Standards Index 525
Lane Drop Taper	1:50 min., 1:70 Desirable	AASHTO 2011 Figure 10-52
Ramp Terminal Spacing		
Entrance - Entrance or Exit - Exit	1000-ft for freeways 800-ft for C-D Road system	FDM Fig 211.12.1
Exit - Entrance	500-ft for freeways 400-ft for C-D Road system	
Turning Roadways	800-ft for system interchange 600-ft for service interchange	
Entrance - Exit	2000-ft for system to service – freeways 1600-ft for service to service – freeways	
Vertical Alignment		
Max Change in Grade w/o Curve	0.8 % (40 mph)	FDM Table 210.10.2
Min. Length of Crest Curve	L=KA but not <120-ft	FDM Table 211.9.3
Minimum Length of Sag Curve	L=KA but not < 120-ft	FDM Table 211.9.3
Minimum Crest K-Value	70 (40 mph)	FDM Table 210.10.3
Minimum Sag K-Value	64 (40 mph)	FDM Table 210.10.3
Stopping Sight Distance	305-ft (40 mph)	FDM Table 211.10.2
Horizontal Clearance		
Bridge Piers	Outside Clear Zone	FDM Table 215.2.2
Above ground fixed objects (e.g., utility poles, ITS poles and other)	Outside Clear Zone	FDM Table 215.2.2
Light Poles	20-ft from travel lanes 14-ft from auxiliary lanes 4-ft minimum behind guardrail	FDM Table 215.2.2
Drop-off and Canal Hazards	50-ft from travel lanes (Flush shoulder) 40-ft from travel lanes (Curbed Shoulder)	FDM Section 215.3.2
Border Width	94-ft	FDM Section 211.6
Recoverable Terrain	10-ft - One-Lane Ramps (35 mph) 14-ft –Multi Lane Ramps (35 mph)	FDM Table 215.2.1
Roadway Base Clearance		
Ramp Proper	2.0-ft above SHGW Elev.	FDM Section 210.10.3
Low Point on-ramps at Crossroads	1.0-ft above SHGW Elev.	

4.3 ARTERIAL ROADWAY DESIGN CRITERIA

Table 4-3 Design Criteria for Arterials		
Design Element	**Criteria**	**Source**
Functional Classification	Principal Arterial (Urban)	AASHTO 2011 Section 1-3
Context Classification	C4 – Urban General	FGB, Chp 1, Figure 1-1
Design Vehicle	WB-62FL, Articulated Bus	Table 3-2
Design Speed/Posted Speed	45 mph 35 mph within DDI Area	FGB, Chp 3, Table 3-1
Through Lane	11-ft Minimum	FGB, Chp 3, Table 3-19
Turn Lane	11-ft Minimum	FGB, Chp 3, Table 3-19
Bike Lane Width	4-ft Minimum	FGB, Chp 9, Figure 9-1
Sidewalk	Minimum 5-ft	FGB, Chp 8, Section B.1
	Minimum 6-ft Adjacent to curb	
Shoulder Width	4-ft Minimum	FGB Section, Chp 3, C.7.c1
Median Width	22-ft (recommended) 19.5-ft Minimum (Constrained RW)	FGB Table, Chp 3, Table 3-22
Structural Capacity	HL-93 Design Load	AASHTO LRFD 2010
Shoulder Cross Slopes	2% -6% (Paved shoulders)	FGB, Chp 3, Table 3-21
Grades	7% max (35 mph) 6% max (45 mph)	FGB Chp 3, Table 3-16
Roadway over Roadway	16.5-ft (major arterials); 16-ft (other streets and highways) and 14-ft allowed in specific conditions	FGB, Chp 3, C.7.j.4(b)
Roadway Over Railroad	23-ft-6-inch	FGB, Chp 3, C.7.j.4(b)
Pedestrian over Roadway	17-ft	
Pedestrian over Railroad	23-ft – 6-inch	FGB, Chp 7, Table 7-2
Roadway over canal	-	-
Overhead Sign Structure	17-ft-6-inch	FDM 210.10.3
Overhead Dynamic Message Sign Structures	-	-
Superelevation	e_{max} = 5%	FGB, Chp 3, C.4.C.2
Maximum curvature	17°45' (35 mph) 10°15' (45 mph)	FGB, Chp 3, Table 3-14
Max. deflection without curve	0°45'00" (≤45mph)	FDM 210.8.1
Min. Length of Horizontal Curves	675- (45 mph), 525-ft (35 mph) 400-ft (minimum)	FGB, Chp 3, Table 3-8
Max Change in Grade w/o Curve	0.9% (35 mph) 0.7% (45 mph)	FGB, Chp 3, Table 3-17
Min. Length of Crest Curve	Varies $L = \frac{AS^2}{1329}$ but not < 300-ft	FGB Figure 3-3

Table 4-3 Design Criteria for Arterials		
Design Element	**Criteria**	**Source**
Minimum Length of Sag Curve	Varies $L = \frac{AS^2}{400+3.5(S)}$ but not < 200-ft	FGB Figure 3-5
Stopping Sight Distance	250-ft + Adjustments (35 mph) 360-ft + Adjustments (45 mph)	FGB, Chp 3, Table 3-4
Fixed Objects	Outside Clear Zone	FGB, Chp. 4, D.8
Light Poles	Outside Clear Zone	FGB, Chp. 4, D.5
ITS Poles and Related Items	Outside Clear Zone	FGB, Chp. 4, D.4
Clear Zone	20ft	FGB, Chp. 4, Table 4-1
Above ground fixed objects	Outside Clear Zone	FGB Section 4.D.8
Conventional Lighting	Outside of clear zone /Far from travel lanes or Should be protected	FGB, Chp. 4, D.5a
Drop-off and Canal Hazards	Outside Clear Zone	FGB, Chp 4, B.2.C
Border Width	12-ft (40 mph) 14-ft (45 mph) 8-ft (Constrained ROW)	FDM Table 210.7-1
Bridge Piers	Placed outside of clear zone if possible / Placed at or beyond the required shoulder	FGB, Chp. 17, Section C.4.c. and Chp. 3, C.7.j.4 (a)

4.4 DRAINAGE DESIGN CRITERIA

Table 4-4 Design Criteria for Drainage		
Design Element	**Criteria**	**Source**
Cross Drains	50-Year design frequency	D.M. Section 4.3.1
Design Tailwater		
All Conditions	Conditions vary with outfall	D.M. Section 3.4
Time of Concentration (TOC)	Minimum T.O.C. of 10 Minutes	D.M. Section 3.5.1
	Other T.O.C calculations to follow NRCS TR-55	
Pipe Slopes		
Minimum	Min. slope to produce v=2.5-ft./sec flowing full	D.M. Section 3.6.1
Manning's "n" Coefficient		
Pipes	0.012 (smooth pipes) 0.024 (corrugated pipe)	D.M. Section 3.6.4
Asphalt (rough texture)	0.016 Asphalt Pavement	D.D.G. Table B-2
Grades		
Longitudinal Gutter Grade	minimum gutter grade is 0.3%	D.M. Section 3.8.1
Spread Standards		
Design Speed < 45	Keep ½ travel lane clear	D.M. Section 3.9
45 < Design Speed <55	Keep 8-ft. of travel lane clear	
Design Speed >55	No encroachment	
Pipe Size and Length		
Trunk Line	18-in Minimum Diameter.	D.M. Section 3.10.1
Length Between Structure	18 in. Pipe=300-ft., 24 in. - 36 in.=400-ft., >42 in.=500-ft.	D.M. Section 3.10.1
Ground Water Clearance		
Dry-retention	Pond bottom minimum 1-ft. above SHGWT	B.M.P. Section VIII
Freeboard		
Storm Drain	Minimum 1-ft. Below Theoretical Gutter Elevation	D.D.G. Section 6.5
Ponds	Minimum 1-ft. above peak design stage	D.M. Section 5.4.4.2
Roadside Swale	Minimum of 0.5-ft. freeboard	D.M. Section 5.4.4.2
Stormwater Management System		
Water Quality	Water quality standards, as set forth in Chapter 62-302, Florida Administrative Code.	ERP II 4.1.1
Discharge Limitations	Historic Discharges, Post <= Pre	ERP II 3.2

5.0 CONSIDERED ALTERNATIVES

The alternatives considered as part of the SR 9/I-95 at Lantana Road PD&E Study include a No-Action Alternative, Transportation System Management & Operations (TSM&O) Alternative, and three Build Alternatives. The Alternatives are described below:

5.1 NO-ACTION ALTERNATIVE

The No-Action Alternative assumes no proposed improvements to the study interchange and serves as a baseline for comparison against the Build Alternatives. The No-Action Alternative includes consideration for the Water Tower Commons Development located in the northeast quadrant of Lantana Road and Andrew Redding Road Intersection. This is a 73-acre mixed-use development with 1,100 residential units and 209,000 square feet of commercial space for offices, retail stores and restaurants.

5.2 TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSM&O)

The TSM&O Alternative considers minor improvements to enhance operations and safety without the addition of through lanes. TSM&O includes low-cost improvements such as adding turn lanes at intersections, adjusting signal phasing and timings, and considering opportunities to enhance alternative travel modes. It also includes implementation of intelligent transportation systems (ITS) technologies. The Build Alternatives developed for this PD&E Study also incorporate TSM&O improvements. The proposed TSM&O improvements to be incorporated as part of the Build Alternatives include:

- Incident Management CCTV Cameras
- Wrong Way Detection Technology
- Vehicle Detection System
- Dynamic Message Signs on Lantana Road east and west of I-95

TSM&O improvements will only alleviate some operational, geometric and safety deficiencies along some portions of the study area. Their implementation alone does not meet the purpose and need for this project. TSM&O improvements are only viable in combination with the Build Alternatives that are discussed in the next section of this report.

5.3 BUILD ALTERNATIVES

5.3.1 Build Alternative 1

Build Alternative 1 is generally based on the preliminary conceptual design recommended as part of the I-95 Interchange Master Plan Study and described in Section 1.1. This Alternative maintains the existing Tight Urban Diamond Interchange (TUDI) configuration; however, additional improvements were incorporated into the original concept from the I-95 Interchange Master Plan Study to better accommodate the design year traffic demand. The following improvements are proposed under Build Alternative 1 (See **Figure 5-1**):

- Widen Lantana Road to provide 3 lanes in each direction from High Ridge Road to Andrew Redding Road.
- Widen the existing Lantana Road bridge over I-95 and the two ramp bridges.
- Provide triple right-turn lanes and dual left-turn lanes for the SR 9/I-95 northbound and southbound off-ramps.
- Provide dual eastbound and westbound right-turn lanes onto I-95 southbound and northbound on-ramps, respectively.
- Provide dual eastbound and westbound left-turn lanes from Lantana Road to the I-95 southbound and northbound on-ramps, respectively.
- Eliminate eastbound left-turn movement and provide directional median opening at the Sunset Road intersection.
- Provide exclusive southbound and northbound right-turn lane along High Ridge Road and extend the EB left urn storage from 200-ft to 300-ft.
- Widen right-turn lane at Sunset Road to accommodate WB62FL Design Vehicles.
- Provide 7-ft buffered bicycle lanes and 6-ft sidewalks along Lantana Road in both directions.

These improvements are necessary to enhance the operations of the intersections within the interchange influence area. The proposed improvements under this alternative will also require right of way impacts to 9 commercial properties along Lantana Road.

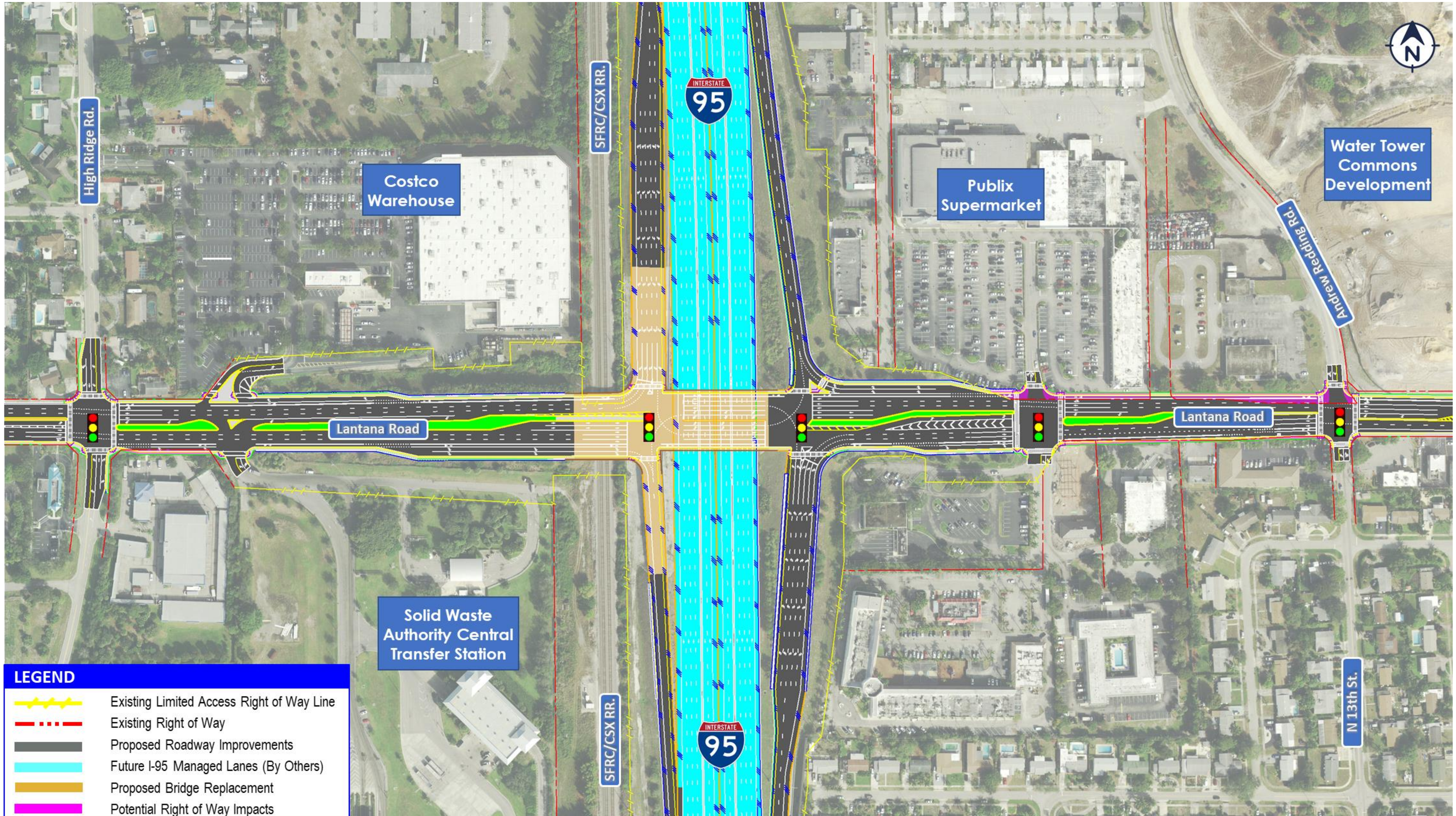


Figure 5-1 Build Alternative 1: Tight Urban Diamond Interchange (TUDI)

5.3.2 Build Alternative 2

Build Alternative 2 reconfigures the existing Tight Urban Diamond Interchange into a Diverging Diamond Interchange (DDI) configuration (See **Figure 5-2**). The diverging diamond concept requires drivers to briefly cross to the left, or opposite side of the road at carefully designed crossover intersections. Drivers travel for a short distance, then cross back to the traditional or right side of the road. This unconventional design allows movements for the left and right-turns to and from the I-95 ramps onto Lantana Road without crossing the path of opposing traffic. The crossover is made at the signal where the opposing traffic flows split the signal green time. The major advantage of this type of interchange is that the left-turning vehicles do not require a signal phase which makes this a two-phased signal system with more green time for the opposing traffic. In addition, the DDI has fewer conflict points (i.e., 14 for DDI, 26 for TUDI) resulting in significant safety and operational improvement at the interchange. The following improvements are proposed to accommodate the design year traffic demand under Build Alternative 2:

- Widen Lantana Road to provide 3 lanes in each direction between High Ridge Road and Andrew Redding Road.
- Replace the existing single Lantana Road bridge over I-95 and SFRC/CSX Railroad with two separate bridges over SR 9/I-95 and SFRC/CSX Railroad.
- Replace the existing ramp bridges for the southbound on and off ramps with embankment and MSE walls.
- Provide dual right-turn lanes and dual left-turn lanes for the SR 9/I-95 northbound and southbound off-ramps.
- Provide dual eastbound and westbound right-turn lanes from Lantana Road onto I-95 southbound and northbound on-ramps, respectively.
- Provide dual eastbound and westbound left-turn lanes from Lantana Road onto the I-95 northbound and southbound on-ramps.
- Eliminate the eastbound left-turn, northbound left-turn and thru movements and provide a directional median opening at the Sunset Road intersection.
- Widen westbound right-turn lane at Sunset Road to accommodate WB62FL Design Vehicles.
- Provide an underpass road that connects Sunset Road and the existing Solid Waste Authority (SWA) service road underneath the reconstructed Lantana Road Bridge over SFRC/CSX Railroad.
- Provide exclusive southbound and northbound right-turn lane along High Ridge Road.

- Provide 7-ft buffered bicycle lanes and 6-ft sidewalks along Lantana Road in both directions.

These improvements are necessary to enhance the operations of the intersections within the interchange influence area. The proposed improvements under this alternative will also require right of way impacts to 6 commercial properties along Lantana Road.

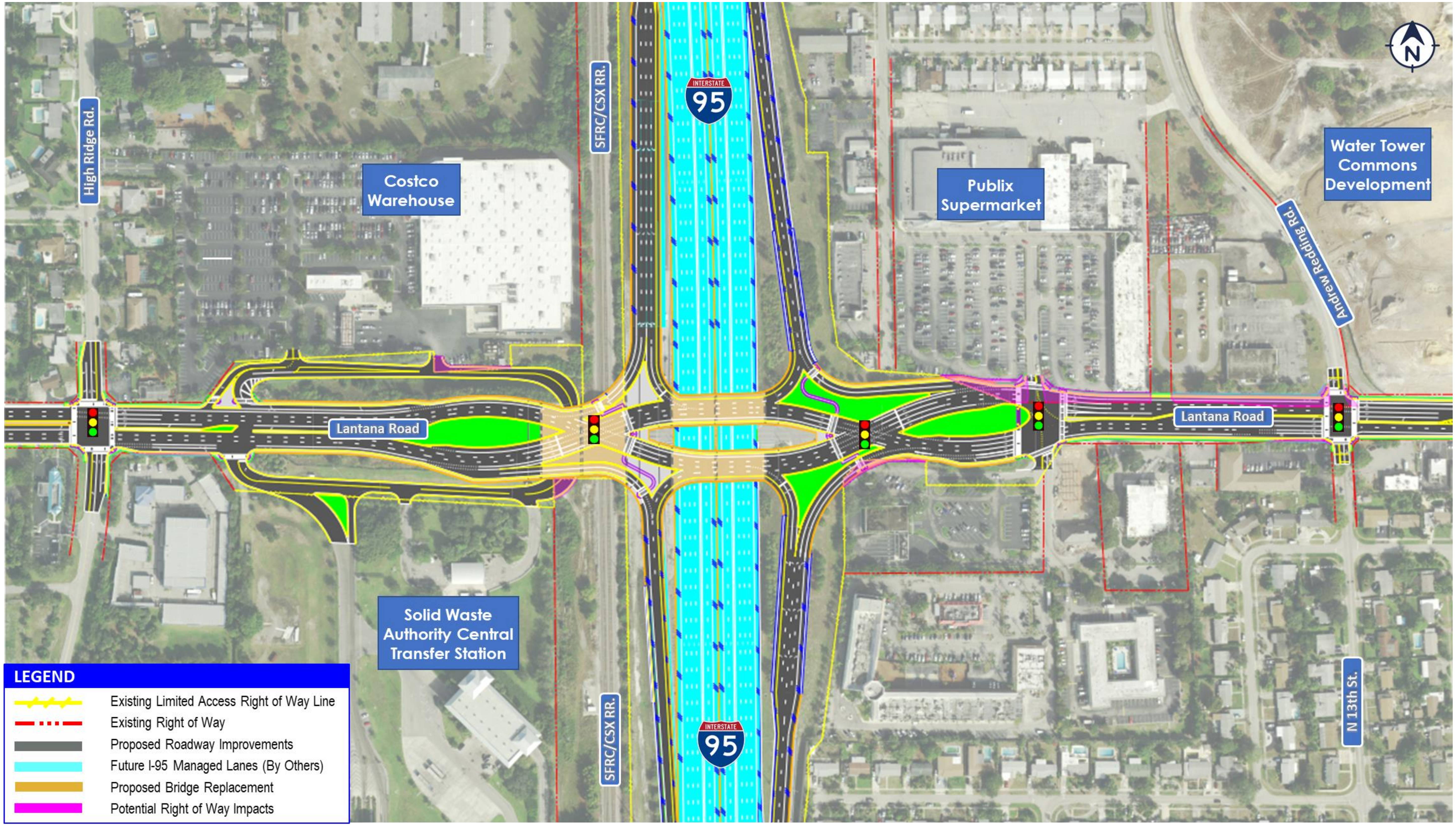


Figure 5-2 Build Alternative 2: Diverging Diamond Interchange (DDI)

5.3.3 Build Alternative 3

Build Alternative 3 reconfigures the existing Tight Urban Diamond Interchange into a Single Point Urban Interchange (SPUI) configuration (See **Figure 5-3**). The SPUI concept consolidates the two intersections of a TUDI into one single intersection. This allows left-turning traffic from both directions of the intersecting roadways to turn simultaneously without crossing the path of the opposing left-turns. Since traffic passing through the SPUI is controlled by a single signal, vehicles can clear the intersection much more quickly compared to a TUDI. The major advantages of SPUI are improved operational efficiency and safety. This can be attributed to the single, three-phase traffic signal and less conflict points compared to the TUDI. In addition, the SPUI also allows for wider turns, easing movement for heavy trucks. The following improvements are proposed to accommodate the design year traffic demand under Build Alternative 3:

- Widen Lantana Road to provide 3 lanes in each direction from High Ridge Road to Andrew Redding Road
- Replace the existing Lantana Road bridge over I-95 and the two ramp bridges.
- Provide triple right-turn lanes and dual left-turn lanes for the SR 9/I-95 northbound and southbound off-ramps.
- Provide dual eastbound and westbound right-turn lanes onto I-95 southbound and northbound on-ramps, respectively.
- Provide dual eastbound and westbound left-turn lanes from Lantana Road to the I-95 southbound and northbound on-ramps, respectively.
- Provide dual eastbound and westbound left-turn lanes from Lantana Road to the I-95 southbound and northbound on-ramps, respectively.
- Eliminate the eastbound left-turn, northbound left-turn and thru movements and provide a directional median opening at the Sunset Road intersection with an underpass access road.
- Provide exclusive southbound and northbound right-turn lane along High Ridge Road
- Widen right-turn lane at Sunset Road to accommodate WB62FL Design Vehicles
- Provide 7-ft buffered bicycle lanes and 6-ft sidewalks along Lantana Road in both directions.

These improvements are necessary to enhance the operations of the intersections within the interchange influence area. The proposed improvements under this alternative will also require right of way impacts to 9 commercial properties along Lantana Road.

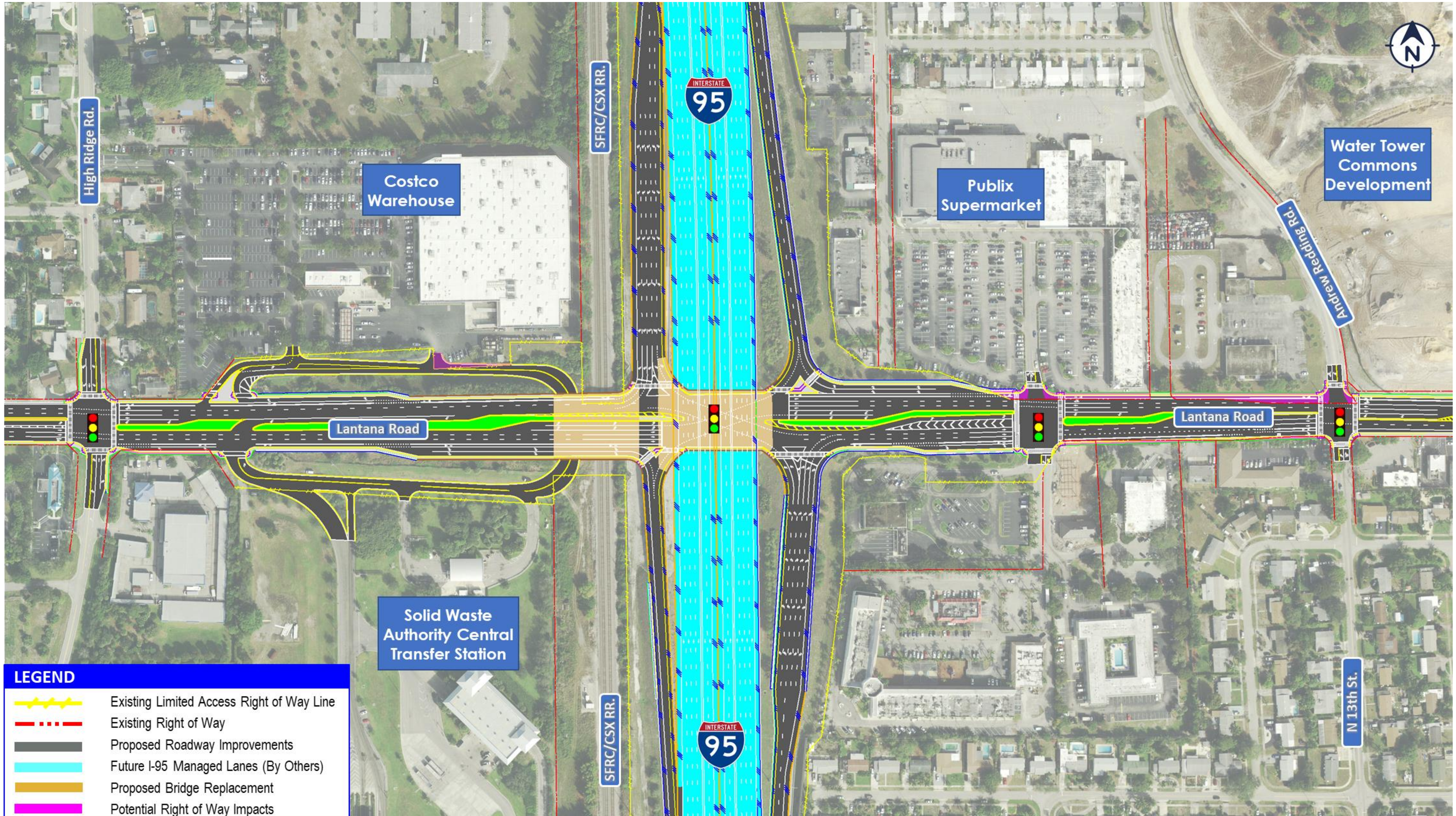


Figure 5-3 Build Alternative 3: Single Point Urban Interchange (SPUI)

6.0 ALTERNATIVES ANALYSIS

6.1 FUTURE TRAFFIC OPERATIONAL ANALYSIS

2025 Opening year and 2045 Design year operational analyses were performed for the freeways and ramps segments along SR 9/I-95 as well as the intersections and arterial segments along Lantana Road within the project limits. The detailed operational analysis results are included in the Interchange Modification Report on file with FDOT District Four.

6.1.1 No-Action Alternative

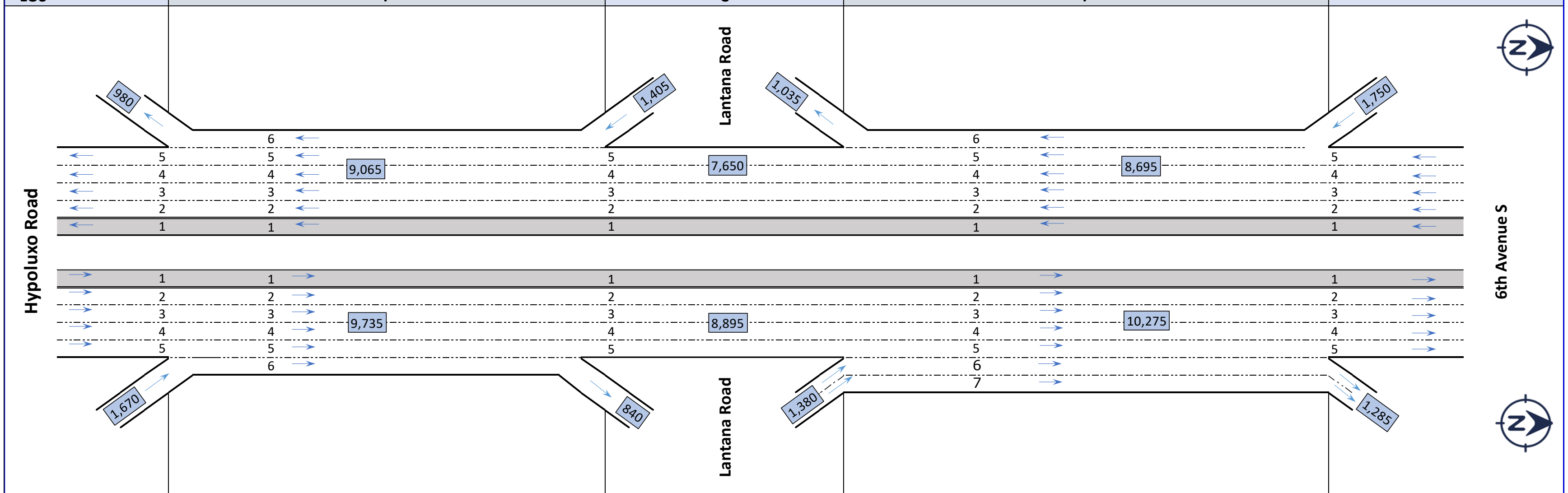
6.1.1.1 Freeway and Ramps

The 2025 and 2045 No-Action conditions for the I-95 freeway segments between the ramps and weaving segments between the adjacent interchanges were analyzed using Highway Capacity Software (HCS 7). The High Occupancy Vehicle (HOV) lane along the I-95 mainline was analyzed as a Continuous Access Managed Lane as per HCM 6 methodologies for managed lanes. **Figure 6-1** through **Figure 6-4** show the density, speed, and level of service for the freeway segments as well as the weaving segments for the AM and PM peak periods, respectively.

Based on the analysis, most of the weaving segments along SR 9/I-95 operate at LOS F under the 2025 No-Action conditions during both the AM and PM peak periods, except the section of I-95 from Hypoluxo Road to Lantana Road northbound direction which operates at LOS E during the PM peak period. The I-95 basic freeway segment between the Lantana Road SB off-ramp and SB on-ramp operates at LOS C during both the AM and PM peak periods, while the I-95 basic freeway segment between the Lantana Road NB off-ramp and NB on-ramp operates at LOS D and LOS E during the AM and PM peak periods, respectively.

Under the 2045 No-Action conditions, all the weaving segments along SR 9/I-95 operate at LOS F during both the AM and PM peak periods in both directions. The I-95 basic freeway segment between the Lantana Road SB off-ramp and SB on-ramp operates at LOS D during both the AM and PM peak periods, while the I-95 basic freeway segment between the Lantana Road NB off-ramp and NB on-ramp operates at LOS E and LOS F during the AM and PM peak periods, respectively.

I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	25.6 pc/mi/ln	-	
Speed	-	65.0 mph	-	
V/C Ratio	**1.04**	**0.70**	**1.20**	
LOS	**F**	**C**	**F**	

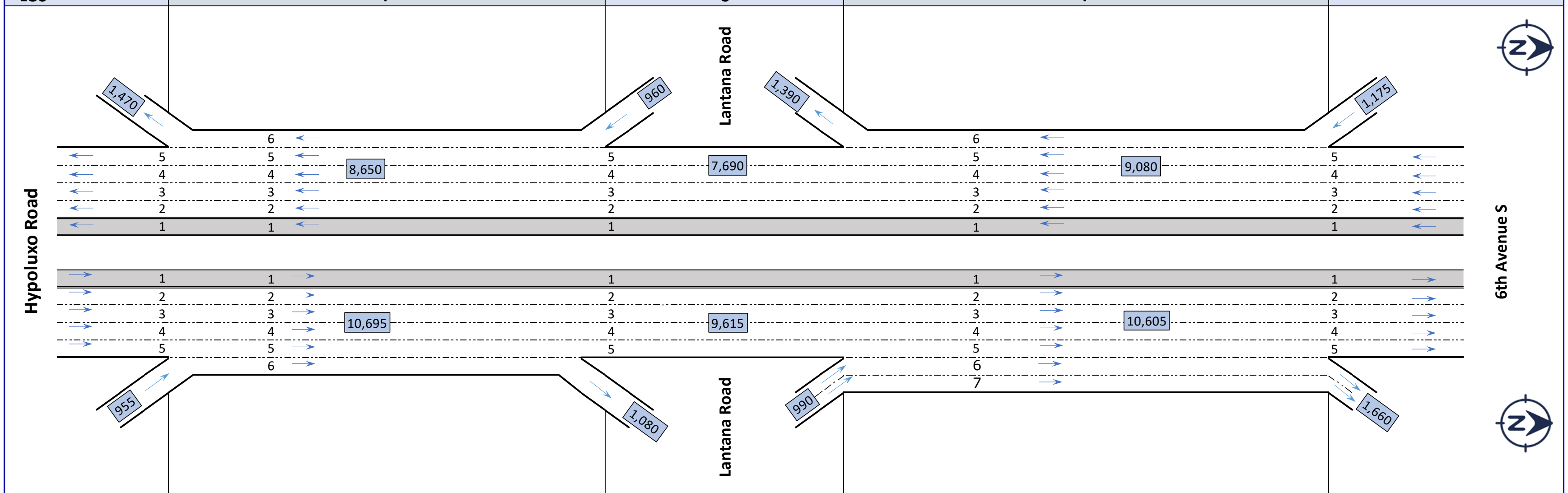


Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	33.1 pc/mi/ln	-	
Speed	-	60.5 mph	-	
V/C Ratio	**1.08**	**0.85**	**1.16**	
LOS	**F**	**D**	**F**	
I-95 Northbound				

Figure 6-1 2025 No-Action Freeway Analysis – AM Peak

I-95 Southbound

Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	25.8 pc/mi/ln	-	
Speed	-	64.9 mph	-	
V/C Ratio	**1.06**	**0.71**	**1.12**	
LOS	**F**	**C**	**F**	

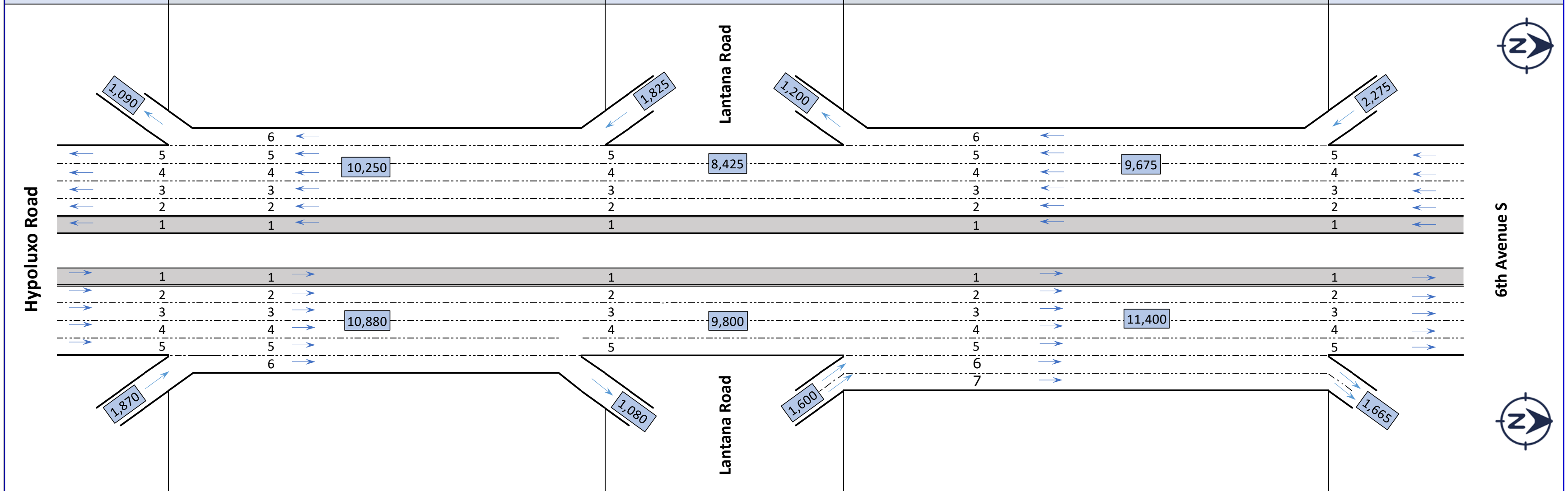


Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	42.4 pc/mi/ln	38.9 pc/mi/ln	-	
Speed	47.0 mph	56.6 mph	-	
V/C Ratio	**0.90**	**0.93**	**1.15**	
LOS	**E**	**E**	**F**	

I-95 Northbound

Figure 6-2 2025 No-Action Freeway Analysis – PM Peak

I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	30.0 pc/mi/ln	-	
Speed	-	62.6 mph	-	
V/C Ratio	**1.27**	**0.79**	**1.50**	
LOS	**F**	**D**	**F**	

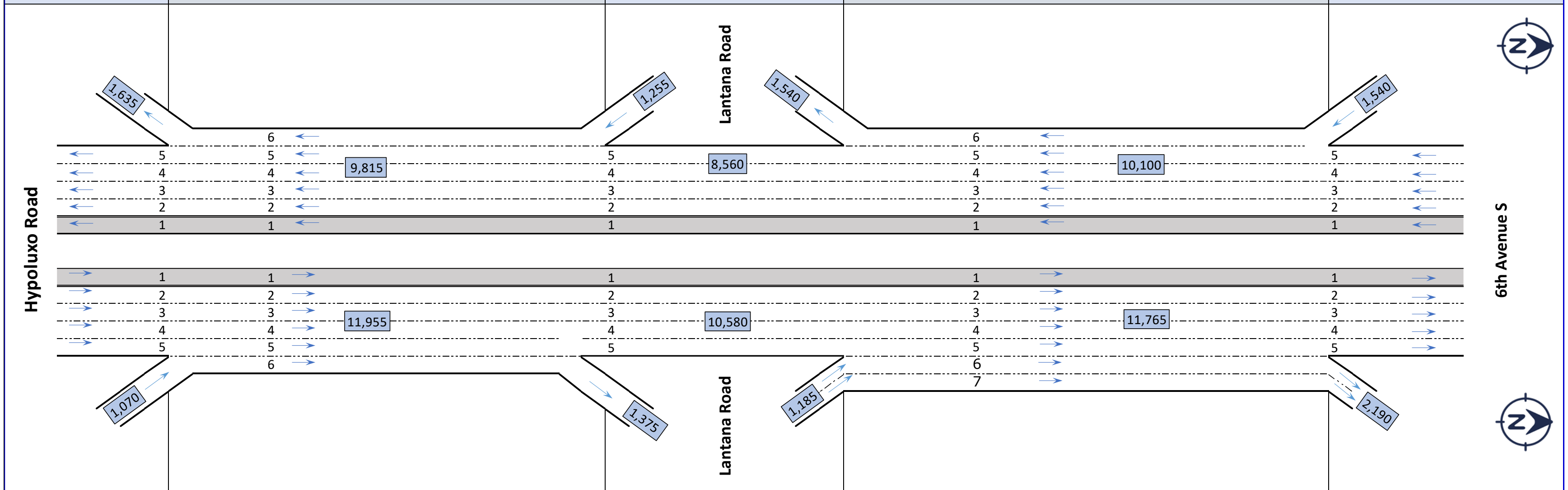


Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	40.6 pc/mi/ln	-	
Speed	-	55.4 mph	-	
V/C Ratio	**1.27**	**0.95**	**1.42**	
LOS	**F**	**E**	**F**	
I-95 Northbound				

Figure 6-3 2045 No-Action Freeway Analysis – AM Peak

I-95 Southbound

Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	30.8 pc/mi/ln	-	
Speed	-	62.0 mph	-	
V/C Ratio	**1.26**	**0.81**	**1.34**	
LOS	**F**	**D**	**F**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	-	-	
Speed	-	-	-	
V/C Ratio	**1.03**	**1.04**	**1.47**	
LOS	**F**	**F**	**F**	

I-95 Northbound

Figure 6-4 2045 No-Action Freeway Analysis – PM Peak

6.1.1.2 Intersection Operations

Table 6-1 through **Table 6-4** show the Future No-Action conditions LOS analysis results for the signalized intersections within the study area. The existing signal timings were optimized for the No-Action analysis to account for traffic growth and demand.

Based on the analysis results, during the AM and PM peak periods, most of the study intersections will operate at LOS D or better in the 2025 opening year except for the Lantana Road and I-95 southbound ramp terminal intersection which will operate at LOS E. In addition, 9 intersection movements and approaches will operate at LOS F during the AM peak period, while 18 intersection movements and approaches will operate at LOS F during the PM peak period.

For the 2045 design year, most of the study intersections will operate at LOS E or worse during the AM peak period except for the Lantana Road at Shopping Center Drive and Andrew Redding Road intersections which will operate at LOS D or better. During the PM peak periods, five out of the six study intersections will operate at LOS E or worse. In addition, 26 intersection movements and approaches will operate at LOS F during the AM peak period, while 40 intersection movements and approaches will operate at LOS F during the PM peak period.

For the 2025 opening year, the I-95 northbound ramp terminal intersection will operate at LOS D while the southbound ramp terminal intersection will operate at LOS E during the AM and PM peak periods. For the 2045 design year, both the I-95 northbound and southbound ramp terminal intersections will operate at LOS F during both AM and PM peak periods with most of the approaches also operating at LOS F.

It should be noted that the northbound left-turn movement for the Lantana Road at Sunset Road unsignalized intersection is overcapacity due excessive delays from lack of gaps in the east-west traffic stream. As such, the HCS methodology does not provide any delay values for the northbound left-turn movement. This impacts the combined delays for the northbound approach as well as the overall intersection delays. Consequently, the northbound approach delay and overall intersection delay and LOS for the Lantana Road at Sunset Road unsignalized intersection was omitted from the results table.

Table 6-1 2025 No-Action Intersections Level of Service - AM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	15.6	B	33.4	C	62.1	E	169.2	F	34.3	C
			T	25.6	C	19.0	B	77.4	E	47.5	D		
			R	28.4	C	20.0	B						
			App	26.4	C	19.8	B	74.0	E	125.1	F		
2	Lantana Rd & Sunset Rd.	AM	L	15.9	C	147.5	F	OC	F	-	-	-	-
			T	-	-	-	-	48.3	E	-	-		
			R	-	-	-	-			21.3	C		
			App	-	-	-	-	OC	F	21.3	C		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	23.2	C	-	-	172.8	F	71.0	E
			T	61.9	E	3.1	A	-	-	-	-		
			R	109.2	F	-	-	-	-	52.8	D		
			App	79.3	E	8.7	A	-	-	144.7	F		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	86.5	F	-	-	64.4	E	-	-	46.8	D
			T	0.8	A	72.0	E	-	-	-	-		
			R	-	-	0.4	A	76.5	E	-	-		
			App	35.3	D	49.7	D	70.3	E	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	15.9	B	12.8	B	55.5	E	54.9	D	21.1	C
			T	15.1	B	17.6	B	40.7	D				
			R	12.3	B	10.5	B			57.8	E		
			App	14.6	B	17.2	B	50.3	D	57.0	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	25.4	C	33.3	C	54.4	D	51.9	D	31.6	C
			T	22.1	C	32.8	C	34.9	C	58.6	E		
			R	22.2	C	32.7	C						
			App	22.5	C	32.8	C	50.6	D	57.1	E		

Table 6-2 2025 No-Action Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS EB		WB		NB		SB		Intersection Control Delay (s/veh)/ LOS	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1.0	Lantana Rd. & High Ridge Rd.	PM	L	83.9	F	44.9	D	75.0	E	83.9	F	38.1	D
			T	21.1	C	35.9	D	69.7	E	52.2	D		
			R	21.8	C	40.1	D						
			App	26.8	C	37.5	D	71.5	E	69.3	E		
2.0	Lantana Rd & Sunset Rd.	PM	L	29.4	D	29.1	D	OC	F	-	-	-	-
			T	-	-	-	-	1576.7	F	-	-		
			R	-	-	-	-			73.7	F		
			App	-	-	-	-	OC	F	73.7	F		
3.0	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	20.3	C	-	-	144.4	F	62.1	E
			T	70.0	E	4.1	A	-	-	-	-		
			R	23.0	C	-	-	-	-	65.6	E		
			App	53.8	D	7.5	A	-	-	143.5	F		
4.0	Lantana Rd & I-95 NB Off-Ramp and On-Ramp Terminal	PM	L	14.6	B	-	-	119.5	F	-	-	39.1	D
			T	2.9	A	54.0	D	-	-	-	-		
			R	-	-	0.4	A	54.2	D	-	-		
			App	6.1	A	37.1	D	91.7	F	-	-		
5.0	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	250.3	F	42.7	D	78.8	E	138.3	F	50.7	D
			T	24.8	C	34.9	C	46.0	D				
			R	19.1	B	19.6	B			75.1	E		
			App	51.9	D	34.5	C	64.8	E	104.3	F		
6.0	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	76.2	E	88.3	F	164.9	F	62.5	E	36.0	D
			T	15.0	B	23.9	C	44.8	D	81.7	F		
			R	15.2	B	23.9	C						
			App	20.0	B	24.6	C	128.8	F	76.7	E		

Table 6-3 2045 No-Action Intersections Level of Service - AM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	29.1	C	146.9	F	53.9	D	259.7	F	62.7	E
			T	56.9	F	30.1	C	87.8	F	39.9	D		
			R	66.8	F	32.9	C						
			App	59.7	E	36.8	D	81.4	F	186.2	F		
2	Lantana Rd & Sunset Rd.	AM	L	20.3	C	383.8	F	OC	F	-	-	-	-
			T	-	-	-	-	83.3	F	-	-		
			R	-	-	-	-			35.3	E		
			App	-	-	-	-	OC	F	35.3	E		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	163.3	F	-	-	247.3	F	123.4	F
			T	110.4	F	6.0	A	-	-	-	-		
			R	177.6	F	-	-	-	-	56.4	E		
			App	135.1	F	61.3	E	-	-	199.9	F		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	132.7	F	-	-	73.5	E	-	-	104.4	F
			T	2.9	A	194.6	F	-	-	-	-		
			R	-	-	0.3	A	220.6	F	-	-		
			App	52.8	D	136.6	F	154.1	F	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	63.1	E	32.7	C	87.7	F	55.6	E	38.8	D
			T	30.0	C	39.4	D	45.9	D				
			R	19.4	B	16.7	B			60.7	E		
			App	30.1	C	38.3	D	71.8	E	59.3	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	101.9	F	55.5	E	121.4	F	52.8	D	54.0	D
			T	27.0	C	60.9	E	35.1	D	72.1	E		
			R	28.0	C	61.9	E						
			App	35.2	D	61.4	E	105.7	F	67.7	E		

Table 6-4	2045 No-Action Intersections Level of Service - PM Peak Period													
No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1.0	Lantana Rd. & High Ridge Rd.	PM	L	95.6	F	66.7	E	88.1	F	178.9	F	75.9	E
			T	27.1	C	86.2	F	77.5	E	50.8	D		
			R	28.4	C	109.8	F						
			App	33.8	C	93.5	F	80.8	F	125.7	F		
2.0	Lantana Rd & Sunset Rd.	PM	L	85.7	F	43.2	E	OC	F	-	-	-	-
			T	-	-	-	-	29.3	D	-	-		
			R	-	-	-	-			319.4	F		
			App	-	-	-	-	OC	F	319.4	F		
3.0	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	23.3	C	-	-	186.5	F	84.8	F
			T	132.3	F	16.1	B	-	-	-	-		
			R	24.7	C	-	-	-	-	81.8	F		
			App	95.8	F	17.8	B	-	-	182.8	F		
4.0	Lantana Rd & I-95 NB Off-Ramp and On-Ramp Terminal	PM	L	15.5	B	-	-	172.5	F	-	-	104.1	F
			T	5.4	A	196.6	F	-	-	-	-		
			R	-	-	0.1	A	149.3	F	-	-		
			App	8.0	A	142.8	F	161.2	F	-	-		
5.0	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	253.9	F	42.9	D	111.9	F	230.4	F	98.7	F
			T	32.5	C	137.2	F	46.8	D				
			R	20.6	C	20.3	C			112.0	F		
			App	53.2	D	130.1	F	83.0	F	162.0	F		
6.0	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	243.8	F	95.5	F	306.3	F	56.5	E	80.9	F
			T	23.9	C	80.7	F	39.0	D	102.7	F		
			R	25.3	C	85.5	F						
			App	46.9	D	83.3	F	236.0	F	92.3	F		

6.1.1.3 Arterial Operations

Table 6-5 to **Table 6-8** show the 2025 opening year and 2045 design year No-Action LOS along the study arterials. The results indicate that for the 2025 opening year, the Lantana Road corridor will operate at an overall LOS F in both the eastbound and westbound directions with an average speed of 12.7 mph and 12.0 mph respectively during the AM peak period. During the PM peak period, Lantana Road will operate at LOS E in the eastbound direction with an average speed of 13.8 mph and LOS F in the westbound direction with an average speed 11.4 mph.

Table 6-5 2025 No-Action Arterial Level of Service - AM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	58.0	12.1	F	51.4	17.3	D
Lantana Rd & Sunset Rd.	88.7	10.0	F	12.5	22.9	C
I-95 SB On Ramp/I-95 SB Off Ramp	10.0	28.6	B	84.5	4.6	F
I-95 NB On Ramp/I-95 NB Off Ramp	32.8	11.8	F	33.2	15.3	E
Shopping Centre Dr	29.5	17.2	D	58.4	13.9	E
Andrew Redding Road / N 13th St.	**219**	**12.7**	F	**240.0**	**12.0**	F
Total	58.0	12.1	F	51.4	17.3	D

Table 6-6 2025 No-Action Arterial Level of Service - PM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	41.8	16.8	E	66.6	13.3	E
Lantana Rd & Sunset Rd.	97.9	9.1	F	13.5	21.2	D
I-95 SB On Ramp/I-95 SB Off Ramp	12.1	23.7	C	67.5	5.7	F
I-95 NB On Ramp/I-95 NB Off Ramp	16.7	23.2	C	53.8	9.4	F
Shopping Centre Dr	33.2	15.3	E	51.0	16.0	E
Andrew Redding Road / N 13th St.	**201.7**	**13.8**	E	**252.4**	**11.4**	F
Total	41.8	16.8	E	66.6	13.3	E

For the 2045 design year, the Lantana Road corridor will operate at an overall LOS F in the eastbound and westbound directions during the AM peak period with an average speed of 8.6 mph and 7.1 mph, respectively. During the PM peak period, Lantana Road will operate at LOS F in both the eastbound and westbound directions with an average speed of 10.0 mph and 4.8 mph, respectively.

Table 6-7 2045 No-Action Arterial Level of Service - AM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	103.9	6.8	F	59.3	15.0	E
I-95 SB On Ramp/I-95 SB Off Ramp	133.3	6.7	F	15.3	18.7	D
I-95 NB On Ramp/I-95 NB Off Ramp	12.1	23.7	C	195.0	2.0	F
Shopping Centre Dr	41.9	9.2	F	50.6	10.0	F
Andrew Redding Road / N 13th St.	32.3	15.7	E	84.7	9.6	F
Total	**323.5**	**8.6**	F	**404.9**	**7.1**	F

Table 6-8 2045 No-Action Arterial Level of Service - PM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	48.6	14.5	E	108.0	8.2	F
I-95 SB On Ramp/I-95 SB Off Ramp	150.8	5.9	F	25.7	11.1	F
I-95 NB On Ramp/I-95 NB Off Ramp	14.6	19.6	D	199.0	1.9	F
Shopping Centre Dr	19.9	19.5	D	156.9	3.2	F
Andrew Redding Road / N 13th St.	42.8	11.9	F	111.8	7.3	F
Total	**276.7**	**10.0**	F	**601.4**	**4.8**	F

6.1.1.4 Intersection Queue Lengths

A queuing analysis for the 2045 No-Action future condition was performed as part of the study to determine the adequacy of the existing left-turn storage lengths for the intersections along the corridor using Synchro 10. The 95th percentile vehicular queue length in feet for the left-turn and right-turn movements at each of the study intersections were obtained. These were compared against the existing storage lengths to identify storage deficiencies where the estimated queue exceeds the storage capacity. The queue analysis results for the 2045 No-Action conditions are shown in **Table 6-9.**

Based on the analysis, 10 out of the 20 (50%) locations with existing turn storages have deficient storage lengths. The queue analysis also indicated that both the right-turn of the northbound off-ramp and left-turn of the southbound off-ramp approaches experience queue spillovers during the AM and PM peak periods onto the I-95 mainline. It is anticipated that the northbound off-ramp will exceed the existing ramp storage by 27% while the southbound off-ramp will exceed the existing storage by 9%. In addition, the eastbound and westbound left-turns at the ramp terminals will exceed the existing storage by 79% and 49%, respectively. It should be noted that the results from the SYNCHRO analysis only show the maximum queues after two cycles. However, the queues may be longer due to residual queues remaining after each cycle as a result of the traffic congestion. Further analysis using the SIMTRAFFIC microsimulation tool indicated that the queues for the SB ramp terminal intersection will extend beyond the gore point during the AM peak period.

Table 6-9 2045 No-Action Alternative Queue Length Analysis									
No.	Intersection	Approach		AM	PM	Max Queue Length (ft)	Existing Storage (ft)	Storage Deficiency	Over Existing Storage
1	High Ridge Road	EB	L	#69	#301	301	200	Yes	51%
		WB	L	m#162	m49	162	250	No	-
		NB	L	101	133	133	200	No	-
		SB	L	#491	#488	491	500	No	-
3	I-95 SB Off-Ramp	WB	L	m#717	m189	717	480	Yes	49%
		SB	L	#834	#1015	1015	930	Yes	9%
			R	234	#612	612	930	No	-
4	I-95 NB Off-Ramp	EB	L	m#877	m117	877	490	Yes	79%
		NB	L	#353	#644	644	940	No	-
			R	#1041	#1191	1191	940	Yes	27%
5	Shopping Center Drive	EB	L	m#139	m#369	369	270	Yes	37%
			R	m162	m32	162	280	No	-
		WB	L	m56	#70	70	400	No	-
			R	m26	83	83	365	No	-
		NB	L	#425	257	425	200	Yes	113%
		SB	R	199	#452	452	120	Yes	277%
6	Andrew Redding Road	EB	L	m#238	#376	376	120	Yes	213%
		WB	L	35	34	35	200	No	-
		NB	L	#395	#468	468	150	Yes	212%
		SB	L	111	132	132	200	No	-

- 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

6.1.2 Build Alternatives

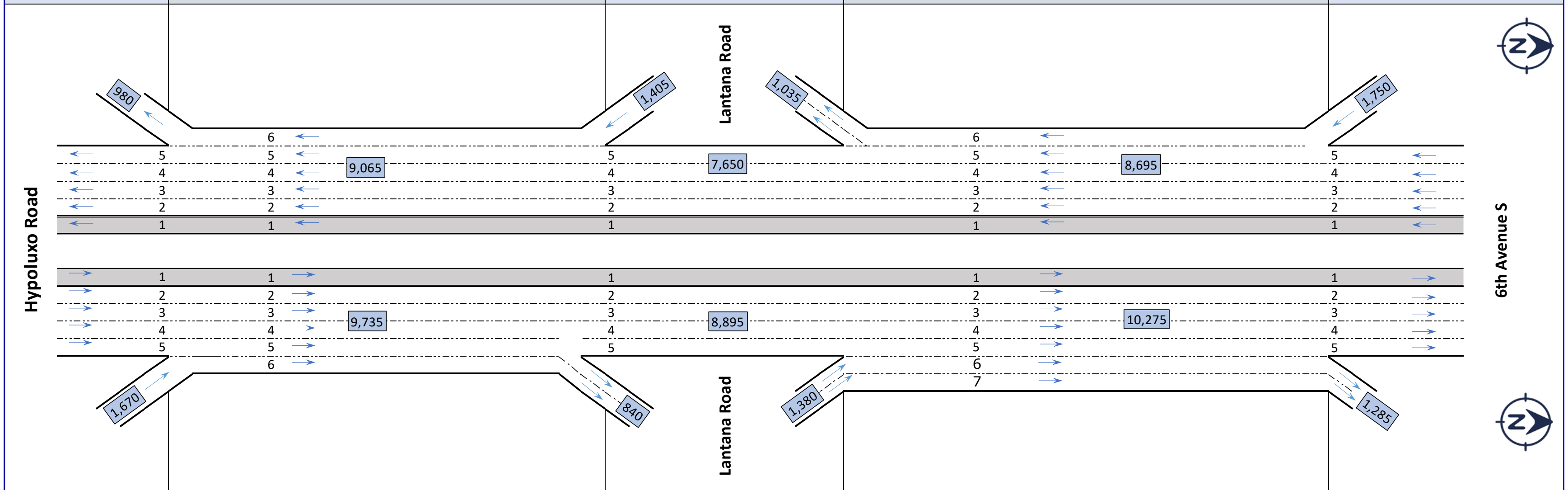
6.1.2.1 Freeway and Ramps

As part of the Build Alternatives analysis, an additional exit lane was added to the northbound and southbound off-ramps to Lantana Road. An evaluation of the proposed configuration was performed using Highway Capacity Software (HCS 7) for the 2025 opening year and 2045 design year during the AM and PM peak periods. The High Occupancy Vehicle (HOV) lane along the I-95 mainline was analyzed as a Continuous Access Managed Lane as per HCM 6 methodologies for managed lanes. **Figure 6-5** through **Figure 6-8** show the density, speed, and level of service for the freeway segments as well as the weaving segments for the AM and PM peak periods, respectively.

Based on the analysis results, overall, the proposed additional lanes for the off-ramps improve the volume to capacity ratios along the freeway. During the 2025 opening year, the additional exit lane improves the weaving segment from 6th Avenue S southbound on-ramp to Lantana Road southbound off-ramp from LOS F to LOS D during the AM peak period. The weaving segment from Hypoluxo Road northbound on-ramp to Lantana Road northbound off-ramp also improves from LOS F to LOS E during the AM peak period. During the PM peak period, the weaving segment from 6th Avenue S southbound on-ramp to Lantana Road southbound off-ramp improves from LOS F to LOS D while the weaving segments from Hypoluxo Road northbound on-ramp to Lantana Road northbound off-ramp remains at LOS E; however, the v/c ratio improves from 0.90 to 0.85. The basic freeway segment between the Lantana Road ramps in both directions will maintain the No-Action LOS conditions since no capacity improvements are being proposed along I-95.

During the 2045 design year, most of the weaving segments will operate at a LOS F during both AM and PM peak periods except the northbound weaving segment from Hypoluxo Road to Lantana Road, and the southbound weaving segment from 6th Avenue S to Lantana Road which will operate at LOS E during the AM and PM peak periods, respectively. However, the volume to capacity ratios for the weaving segments are better compared to the No-Action conditions. The basic freeway segment between the Lantana Road ramps in both directions will maintain the No-Action LOS conditions since no capacity improvements are being proposed along I-95. It should be noted that, additional future mainline improvements are planned along I-95 to improve the corridor level of service (FM# 444202-1 and FM# 444202-2).

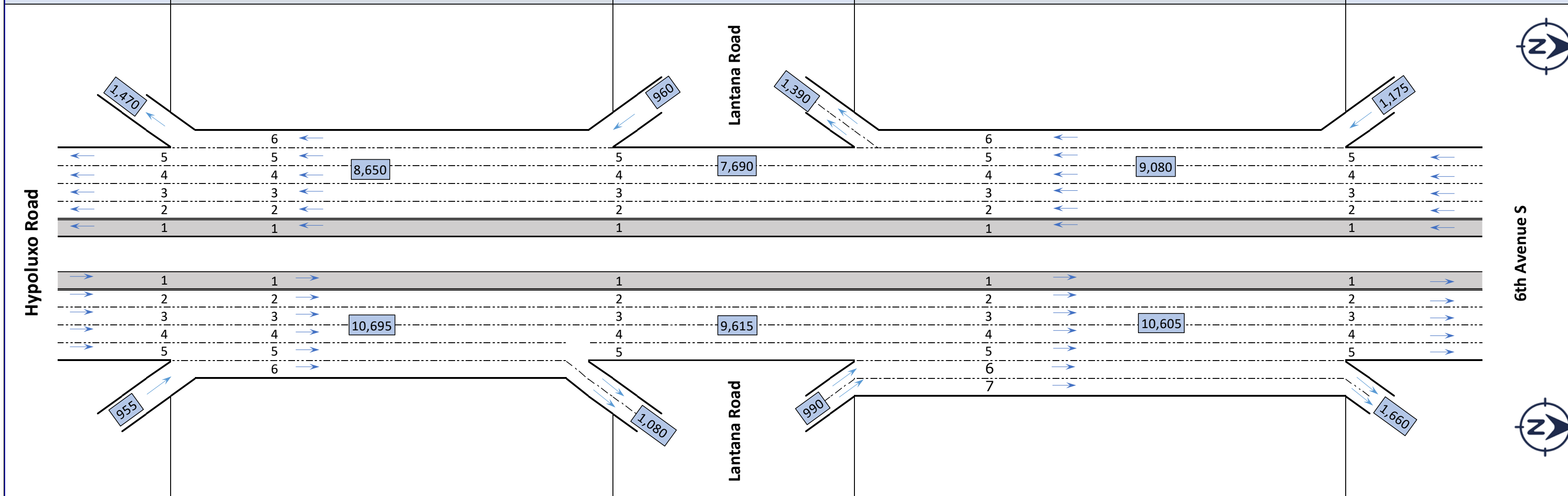
I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	25.6 pc/mi/ln	29.6 pc/mi/ln	
Speed	-	65.0 mph	52.4 mph	
V/C Ratio	**1.04**	**0.70**	**0.83**	
LOS	**F**	**C**	**D**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	35.1 pc/mi/ln	33.1 pc/mi/ln	-	
Speed	50.7 mph	60.5 mph	-	
V/C Ratio	**0.78**	**0.85**	**1.16**	
LOS	**E**	**D**	**F**	
I-95 Northbound				

Figure 6-5 2025 Build Freeway Analysis – AM Peak

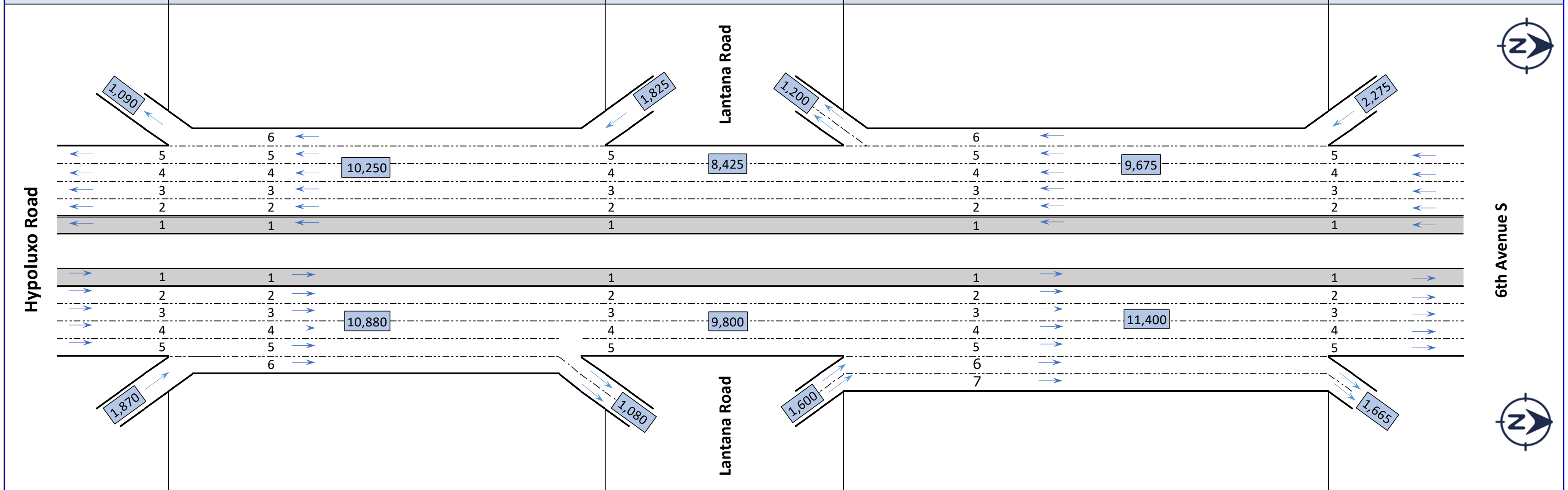
I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	25.8 pc/mi/ln	29.8 pc/mi/ln	
Speed	-	64.9 mph	55.0 mph	
V/C Ratio	**1.06**	**0.71**	**0.76**	
LOS	**F**	**C**	**D**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	37.0 pc/mi/ln	38.9 pc/mi/ln	-	
Speed	53.9 mph	56.6 mph	-	
V/C Ratio	**0.85**	**0.93**	**1.15**	
LOS	**E**	**E**	**F**	
I-95 Northbound				

Figure 6-6 2025 Build Freeway Analysis – PM Peak

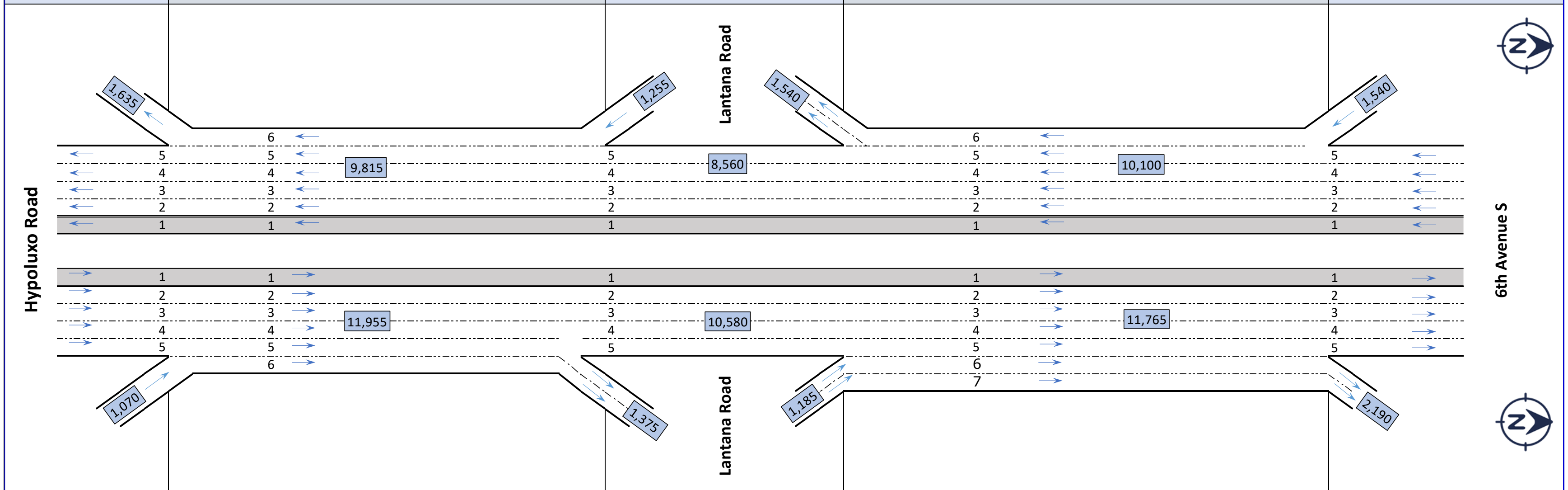
I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	30.0 pc/mi/ln	-	
Speed	-	62.6 mph	-	
V/C Ratio	**1.27**	**0.79**	**1.03**	
LOS	**F**	**D**	**F**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	41.9 pc/mi/ln	40.6 pc/mi/ln	-	
Speed	48.5 mph	55.4 mph	-	
V/C Ratio	**0.90**	**0.95**	**1.42**	
LOS	**E**	**E**	**F**	
I-95 Northbound				

Figure 6-7 2045 Build Freeway Analysis – AM Peak

I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	30.8 pc/mi/ln	35.6 pc/mi/ln	
Speed	-	62.0 mph	52.2 mph	
V/C Ratio	**1.26**	**0.81**	**0.92**	
LOS	**F**	**D**	**E**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	43.6 pc/mi/ln	-	-	
Speed	52.0 mph	-	-	
V/C Ratio	**0.97**	**1.04**	**1.47**	
LOS	**F**	**F**	**F**	
I-95 Northbound				

Figure 6-8 2045 Build Freeway Analysis – PM Peak

6.1.2.2 Intersection Operations

6.1.2.2.1 Build Alternative 1

Figure 6-9 shows the intersection configuration for the proposed improvements under Build Alternative 1. **Table 6-10** through **Table 6-13** show the future LOS analysis results for the signalized intersections under Build Alternative 1.

Based on the analysis results, during the AM and PM peak periods, all the study intersections will operate at overall LOS D or better in the 2025 opening year. However, 4 intersection movements and approaches will operate at LOS F during the AM peak period, while 5 intersection movements and approaches will operate at LOS F during the PM peak period. For the 2045 design year, all the study intersections will operate at LOS D or better during both the AM and PM peak periods. However, 7 intersection movements and approaches will operate at LOS F during the AM peak period, while 13 intersection movements and approaches will operate at LOS F during the PM peak period.

Most of the intersection movement and approaches operating at LOS F during the 2025 opening year and 2045 design year occur along the northbound and southbound approaches at the side streets. This may be attributed to the fact that the signals along Lantana Road are coordinated and configured to favor the east-west movements sometimes resulting in significant delays for the minor side streets. Given that the volume of traffic on these minor side streets is relatively small compared to the volume along Lantana Road, the delays do not significantly affect the entire intersection operation.

Build Alternative 1 includes access modifications at Lantana Road at Sunset Road unsignalized intersection which eliminates the eastbound left-turn movement. However, the northbound left-turn movement for this unsignalized intersection is overcapacity due excessive delays from lack of gaps in the east-west traffic stream. As such, the HCS methodology does not provide any delay values for the northbound left-turn movement. This impacts the combined delays for the northbound approach as well as the overall intersection delays. Consequently, the northbound approach delay and overall intersection delay and LOS for the Lantana Road at Sunset Road unsignalized intersection was omitted from the results table.

For both the 2025 opening year and 2045 design year, the I-95 northbound ramp terminal intersection will operate at LOS C during both the AM and PM peak periods while the southbound ramp terminal intersection will operate at LOS C and LOS D during the AM and PM peak periods, respectively. However, for the 2045 design year, the northbound approach, and movements as well as the southbound approach and movements will operate at LOS E during both the AM and PM peak periods which does not meet the FDOT LOS targets.

Further evaluation of Build Alternative 1 was also performed with the option of providing three left-turn and right-turn lanes at the southbound and northbound off-ramp terminal intersections. The objective of the additional evaluation was to determine if the additional turn lanes will mitigate the deficient LOS at the ramp terminal intersections. Based on the analysis and evaluation conducted, the addition of a third left-turn lane to the off-ramps at both the northbound and southbound ramp terminal intersections provide very little improvement to the overall LOS and delays at the ramp terminals. In addition, the northbound and southbound approaches continue to operate at a LOS E which does not meet the FDOT LOS targets even with triple left and right-turn lanes. Furthermore, the additional cost for the triple right and triple left configuration results in a benefit-cost ratio of 1.11. Consequently, it was eliminated from further consideration.

Figure 6-9 Intersection Configuration – Build Alternative 1

Table 6-10	2025 Alternative 1 Intersections Level of Service - AM Peak Period													
No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	13.0	B	27.0	C	62.8	E	104.3	F	26.5	C
			T	20.0	C	15.7	B	71.6	E	57.9	E		
			R	21.3	C	16.5	B	68.9	E	54.8	D		
			App	20.3	C	16.4	B	68.5	E	86.9	F		
2	Lantana Rd & Sunset Rd.	AM	L	-	-	147.5	F	OC	F	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	47.8	E	25.2	D		
			App	-	-	-	-	OC	F	25.2	D		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	19.3	B	-	-	48.0	D	26.9	C
			T	28.1	C	6.1	A	-	-	-	-		
			R	31.0	C	-	-	-	-	46.5	D		
			App	29.2	C	9.8	A	-	-	47.2	D		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	11.2	B	-	-	54.6	D	-	-	26.7	C
			T	5.1	A	43.2	D	-	-	-	-		
			R	-	-	27.1	C	50.3	D	-	-		
			App	7.5	A	38.2	D	52.5	D	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	24.2	C	21.8	C	59.2	E	65.2	E	30.1	C
			T	25.4	C	29.6	C	51.8	D				
			R	7.4	A	30.7	C			62.8	E		
			App	21.7	C	29.7	C	56.6	E	63.5	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	21.3	C	30.1	C	64.0	E	68.2	E	30.2	C
			T	20.1	C	27.9	C	49.0	D				
			R	15.7	B	28.8	C			60.3	E		
			App	19.7	B	28.3	C	61.1	E	63.7	E		

Note: OC = Overcapacity

Table 6-11 2025 Alternative 1 Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	53.4	D	10.2	B	68.4	E	123.9	F	27.4	C
			T	11.6	B	20.0	C	74.2	E	66.8	E		
			R	11.7	B	16.8	B	74.4	E	62.9	E		
			App	16.2	B	18.7	B	72.4	E	96.4	F		
2	Lantana Rd & Sunset Rd.	PM	L	-	-	29.1	D	OC	F	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	22.4	C	113.4	F		
			App	-	-	-	-	OC	F	113.4	F		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	12.7	B	-	-	46.6	D	32.8	C
			T	54.4	D	4.8	A	-	-	-	-		
			R	30.0	C	-	-	-	-	54.5	D		
			App	46.0	D	6.4	A	-	-	51.6	D		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	7.5	A	-	-	54.1	D	-	-	31.6	C
			T	7.3	A	45.0	D	-	-	-	-		
			R	-	-	35.4	D	46.4	D	-	-		
			App	7.4	A	42.0	D	50.8	D	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	32.0	C	20.1	C	74.3	E	75.7	E	32.6	C
			T	21.6	C	29.9	C	70.2	E				
			R	8.8	A	31.0	C			60.9	E		
			App	20.9	C	30.0	C	72.5	E	67.7	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	22.4	C	33.5	C	61.2	E	78.4	E	31.7	C
			T	21.7	C	29.0	C	52.9	D				
			R	17.5	B	30.0	C			66.8	E		
			App	21.1	C	29.4	C	58.7	E	72.7	E		

Note: OC = Overcapacity

Table 6-12 2045 Alternative 1 Intersections Level of Service - AM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	24.3	C	71.4	E	56.0	E	116.6	F	40.4	D
			T	37.4	D	23.4	C	64.1	E	52.7	D		
			R	44.2	D	25.3	C	65.4	E	48.8	D		
			App	39.3	D	26.4	C	63.2	E	94.6	F		
2	Lantana Rd & Sunset Rd.	AM	L	-	-	383.8	F	OC	F	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	77.7	F	45.9	E		
			App	-	-	-	-	OC	F	45.9	E		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	20.2	C	-	-	61.6	E	27.6	C
			T	25.9	C	3.2	A	-	-	-	-		
			R	28.0	C	-	-	-	-	60.8	E		
			App	26.7	C	9.2	A	-	-	61.1	E		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	15.5	B	-	-	63.4	E	-	-	27.2	C
			T	3.6	A	37.4	D	-	-	-	-		
			R	-	-	16.9	B	60.4	E	-	-		
			App	8.1	A	31.3	C	61.7	E	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	41.6	D	27.5	C	81.3	F	63.4	E	35.7	D
			T	29.0	C	33.5	C	62.1	E				
			R	9.2	A	35.2	D			62.2	E		
			App	26.3	C	33.8	C	74.0	E	62.6	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	43.7	D	52.8	D	73.3	E	63.7	E	39.4	D
			T	28.7	C	39.6	D	49.3	D				
			R	18.5	B	42.5	D			56.7	E		
			App	29.1	C	40.8	D	68.9	E	59.5	E		

Note: OC = Overcapacity

Table 6-13 2045 Alternative 1 Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	91.2	F	16.6	B	65.2	E	156.0	F	53.0	D
			T	16.1	B	54.4	D	69.6	E	62.7	E		
			R	16.3	B	73.5	F	68.9	E	49.7	D		
			App	25.2	C	59.4	E	67.9	E	113.5	F		
2	Lantana Rd & Sunset Rd.	PM	L	-	-	43.2	E	OC	F	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	28.5	D	437.0	F		
			App	-	-	-	-	OC	F	437.0	F		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	15.0	B	-	-	51.8	D	35.8	D
			T	57.9	E	7.3	A	-	-	-	-		
			R	25.6	C	-	-	-	-	74.9	E		
			App	46.9	D	9.1	A	-	-	66.5	E		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	9.3	A	-	-	67.7	E	-	-	32.4	C
			T	8.0	A	41.9	D	-	-	-	-		
			R	-	-	13.5	B	55.6	E	-	-		
			App	8.3	A	34.1	C	61.8	E	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	76.7	E	18.5	B	136.4	F	116.8	F	40.8	D
			T	19.4	B	34.3	C	112.1	F				
			R	8.4	A	36.1	D			70.4	E		
			App	23.6	C	34.5	C	125.6	F	90.0	F		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	73.7	E	50.9	D	78.6	E	73.1	E	46.8	D
			T	27.6	C	51.4	D	57.0	E				
			R	19.6	B	58.0	E			58.4	E		
			App	31.0	C	53.7	D	72.9	E	64.8	E		

Note: OC = Overcapacity

6.1.2.2.2 Build Alternative 2

Figure 6-10 shows the intersection configuration for the proposed Diverging Diamond Interchange configuration under Build Alternative 2. This unconventional design allows movements for the left and right-turns to and from the I-95 ramps onto Lantana Road without crossing the path of opposing traffic. The crossover is made at the signal where the opposing traffic flows split the signal green time. The major advantage of this type of interchange is that the left-turning vehicles do not require a signal phase which makes this a two-phased signal system with more green time for the opposing traffic. In addition, the DDI has fewer vehicular conflict points (i.e., 14 for DDI, 26 for TUDI) resulting in significant safety and operational improvement at the interchange.

The pedestrian sidewalks for the DDI utilizes the inside walkway configuration. For this configuration, the sidewalks transition from the outside into the median within the interchange area. This creates 8 signalized conflict points for the DDI compared to 6 signalized conflict points for the TUDI Alternative. However, the crossings along the DDI are shorter. In addition, the DDI enables crossing of Lantana Road from the north side to the south side and vice versa.

The following movements are signalized at the DDI Ramp terminal intersections.

SB Ramp Terminal

- SB Right-turn
- SB Left-turn
- EB Through
- WB Through
- EB right-turn

NB Ramp Terminal

- NB Right-turn
- NB Left-turn
- EB Through
- WB Through
- WB right-turn

Table 6-14 through **Table 6-17** show the future LOS analysis results for the signalized intersections under Build Alternative 2.

Based on the analysis results, during the AM and PM peak periods, all the study intersections will operate at overall LOS D or better in the 2025 opening year. However, 4 intersection movements and approaches will operate at LOS F during the AM peak period, while 3 intersection movements and approaches will operate at LOS F during the PM peak period. For the 2045 design year, all the study intersections will operate at LOS D or better during both the AM and PM peak periods. However, 6 intersection movements and approaches will operate at LOS F during the AM peak period, while 9 intersection movements and approaches will operate at LOS F during the PM peak period.

Similar to Build Alternative 1, most of the intersection movement and approaches operating at LOS F during the 2025 opening year and 2045 design year occur along the northbound and southbound approaches at the side streets. This may be attributed to the fact that the signals along Lantana Road are coordinated and configured to favor the east-west movements, sometimes resulting in delays for the minor side streets. Given that the volume of traffic on these minor side streets is relatively small compared to the volume along Lantana Road, the delays do not significantly affect the entire intersection operation.

Build Alternative 2 includes access modifications at the Sunset Road Intersection which eliminates the northbound left-turn and eastbound left-turn movements and an underpass access road resulting in redistribution of traffic at the Sunset Road and High Ridge Road intersections. As a result, although the some of the movements at Sunset Road indicates LOS F with high delays, the northbound approach under Build Alternative 2 operates better compared to the No-Action Alternative and Build Alternatives 1.

For the 2025 opening year, the I-95 northbound ramps crossover intersection will operate at LOS B and LOS C during the AM and PM peak periods, respectively, while the southbound ramps crossover intersection will operate at LOS C during both the AM and PM peak periods. For the 2045 design year, both the I-95 northbound and southbound ramps crossover intersections will operate at LOS C for both the AM and PM peak periods. In addition, all the signalized movements within the diverging diamond interchange will operate at LOS C or better for both the 2025 opening year and 2045 design year.

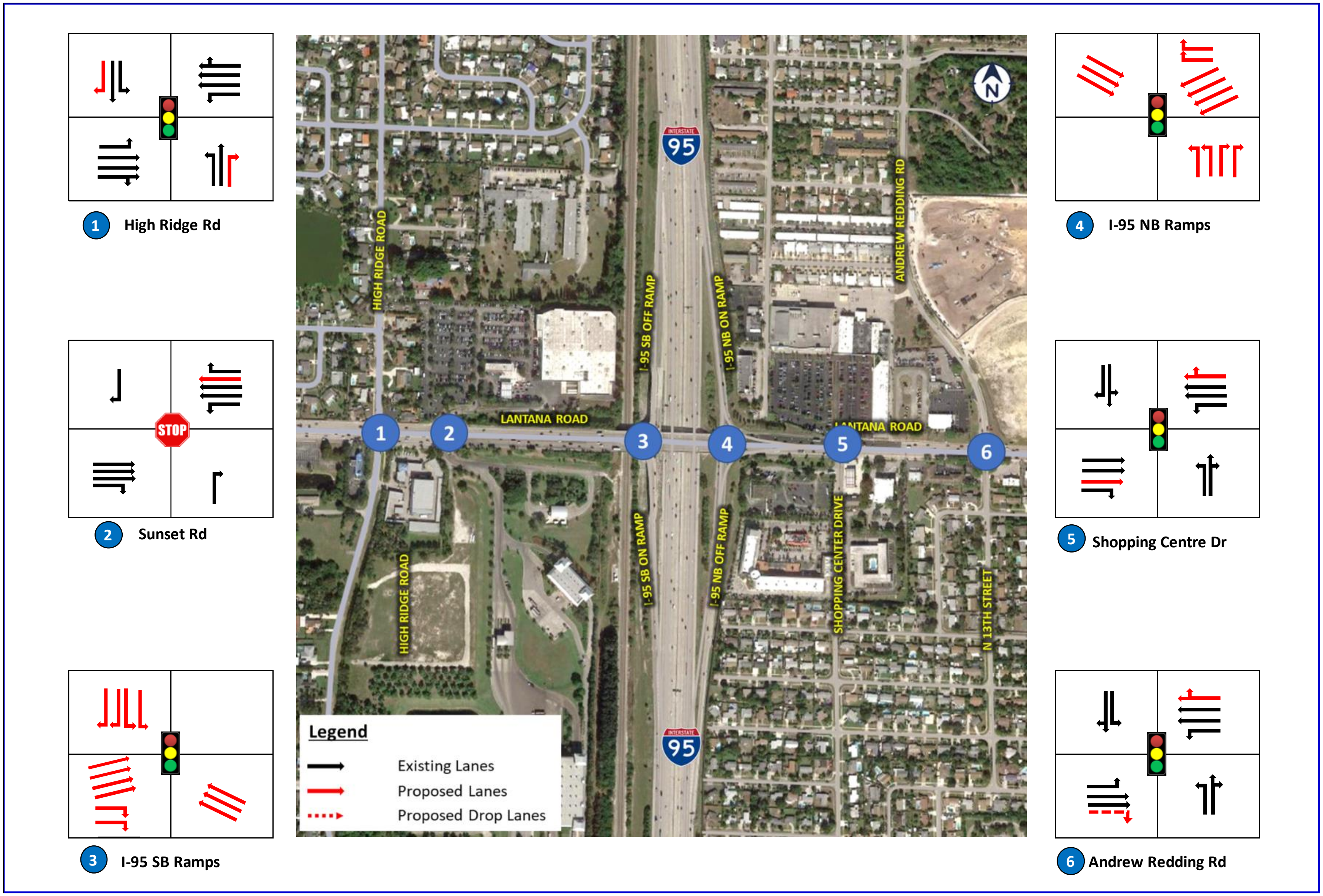


Figure 6-10 Intersection Configuration – Build Alternative 2

Table 6-14 2025 Alternative 2 Intersections Level of Service - AM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	12.9	B	24.6	C	62.8	E	92.5	F	26.3	C
			T	20.7	C	16.1	B	71.6	E	57.0	E		
			R	22.1	C	16.9	B	69.3	E	54.2	D		
			App	21.0	C	16.6	B	68.6	E	79.1	E		
2	Lantana Rd & Sunset Rd.	AM	L	-	-	152.4	F	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	55.3	F	25.6	D		
			App	-	-	-	-	55.3	F	25.6	D		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	-	-	-	-	19.5	B	21.8	C
			T	21.5	C	22.2	C	-	-	-	-		
			R	-	-	-	-	-	-	15.5	B		
			App	21.5	C	22.2	C	-	-	19.5	B		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	-	-	14.7	B	-	-	18.9	B
			T	19.9	B	17.8	B	-	-	-	-		
			R	-	-	-	-	13.7	B	-	-		
			App	19.9	B	17.8	B	14.7	B	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	23.9	C	20.7	C	59.2	E	65.3	E	26.7	C
			T	16.1	B	29.6	C	51.8	D				
			R	4.8	A	30.7	C			62.8	E		
			App	14.3	B	29.6	C	56.6	E	63.5	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	21.3	C	30.1	C	64.0	E	68.2	E	30.2	C
			T	20.1	C	27.9	C	49.0	D				
			R	15.7	B	28.8	C			60.3	E		
			App	19.7	B	28.3	C	61.1	E	63.7	E		

Table 6-15 2025 Alternative 2 Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	41.6	D	10.8	B	69.5	E	90.0	F	26.2	C
			T	12.9	B	20.1	C	74.2	E	62.8	E		
			R	13.0	B	22.0	C	74.9	E	61.7	E		
			App	15.4	B	20.5	C	72.9	E	77.1	E		
2	Lantana Rd & Sunset Rd.	PM	L	-	-	30.5	D	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	23.6	C	124.4	F		
			App	-	-	-	-	23.6	C	124.4	F		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	-	-	-	-	23.6	C	20.3	C
			T	13.4	B	25.4	C	-	-	-	-		
			R	-	-	-	-	-	-	18.3	B		
			App	13.4	B	25.4	C	-	-	23.6	C		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	-	-	14.0	B	-	-	22.0	C
			T	24.2	C	19.9	B	-	-	-	-		
			R	-	-	-	-	45.7	D	-	-		
			App	24.2	C	19.9	B	14.0	B	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	31.3	C	19.5	B	74.3	E	75.7	E	29.4	C
			T	11.9	B	30.1	C	70.2	E				
			R	5.0	A	31.1	C			60.7	E		
			App	13.2	B	30.1	C	72.5	E	67.7	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	22.4	C	33.5	C	61.2	E	78.4	E	31.7	C
			T	21.7	C	29.0	C	52.9	D				
			R	17.5	B	30.0	C			66.8	E		
			App	21.1	C	29.4	C	58.7	E	72.7	E		

Table 6-16	2045 Alternative 2 Intersections Level of Service - AM Peak Period												
No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	21.4	C	58.2	E	55.9	E	115.4	F	38.6	D
			T	34.9	C	22.7	C	63.9	E	52.6	D		
			R	40.9	D	24.5	C	69.1	E	49.6	D		
			App	36.6	D	24.7	C	64.9	E	93.9	F		
2	Lantana Rd & Sunset Rd.	AM	L	-	-	405.8	F	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	117.0	F	49.5	E		
			App	-	-	-	-	117.0	F	49.5	E		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	-	-	-	-	19.4	B	23.0	C
			T	25.7	C	19.3	B	-	-	-	-		
			R	-	-	-	-	-	-	18.6	B		
			App	25.7	C	19.3	B	-	-	19.4	B		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	AM	L	-	-	-	-	18.2	B	-	-	20.5	C
			T	19.0	B	21.9	C	-	-	-	-		
			R	-	-	-	-	12.8	B	-	-		
			App	19.0	B	21.9	C	18.2	B	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	42.9	D	24.3	C	81.3	F	63.4	E	31.8	C
			T	18.5	B	33.6	C	62.1	E				
			R	5.9	A	35.2	D			62.1	E		
			App	17.8	B	33.7	C	74.0	E	62.5	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	43.7	D	52.8	D	73.3	E	63.7	E	39.4	D
			T	28.7	C	39.6	D	49.3	D				
			R	18.5	B	42.5	D			56.7	E		
			App	29.1	C	40.8	D	68.9	E	59.5	E		

Table 6-17 2045 Alternative 2 Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	77.8	E	15.3	B	65.1	E	139.1	F	44.2	D
			T	15.9	B	41.5	D	69.5	E	61.6	E		
			R	16.1	B	56.8	E	70.8	E	53.8	D		
			App	21.6	C	46.0	D	68.8	E	104.6	F		
2	Lantana Rd & Sunset Rd.	PM	L	-	-	47.2	E	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	32.9	D	476.7	F		
			App	-	-	-	-	32.9	D	476.7	F		
3	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	-	-	-	-	24.2	C	23.2	C
			T	17.3	B	27.1	C	-	-	-	-		
			R	-	-	-	-	-	-	24.9	C		
			App	17.3	B	27.1	C	-	-	24.9	C		
4	Lantana Rd & I-95 SB Off-Ramp and On-Ramp Terminal	PM	L	-	-	-	-	19.4	B	-	-	24.0	C
			T	21.9	C	25.6	C	-	-	-	-		
			R	-	-	-	-	16.8	B	-	-		
			App	21.9	C	25.6	C	19.4	B	-	-		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	79.2	E	17.5	B	121.1	F	116.8	F	37.3	D
			T	9.3	A	35.4	D	102.4	F				
			R	4.1	A	37.4	D			70.2	E		
			App	15.6	B	35.6	D	112.8	F	89.9	F		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	73.5	E	50.9	D	78.6	E	73.1	E	46.7	D
			T	27.6	C	51.4	D	57.0	E				
			R	19.6	B	58.0	E			58.4	E		
			App	31.0	C	53.7	D	72.9	E	64.8	E		

6.1.2.2.3 Build Alternative 3

Figure 6-11 shows the intersection configuration for the proposed improvements for the proposed Single Point Urban Interchange (SPUI) configuration under Build Alternative 3. The single point urban interchange is similar to the Tight Urban Diamond Interchange (TUDI) under Build Alternative 1; however, the two intersections of the Tight Urban Diamond Interchange are combined into one single intersection. This allows the opposing left-turns to proceed simultaneously resulting in improved operation efficiency and safety.

Table 6-18 through **Table 6-21** show the future LOS analysis results for the signalized intersections under Build Alternative 3.

Based on the analysis results, during the AM and PM peak periods, all the study intersections will operate at overall LOS D or better in the 2025 opening year. However, 4 intersection movements and approaches will operate at LOS F during the AM peak period, while 3 intersection movements and approaches will operate at LOS F during the PM peak period. For the 2045 design year, all the study intersections will operate at LOS D or better during both the AM and PM peak periods. However, 6 intersection movements and approaches will operate at LOS F during the AM peak period, while 9 intersection movements and approaches will operate at LOS F during the PM peak period.

Similar to Build Alternatives 1 and 2, most of the intersection movement and approaches operating at LOS F during the 2025 opening year and 2045 design year occur along the northbound and southbound approaches at the side streets. This may be attributed to the fact that the signals along Lantana Road are coordinated and configured to favor the east-west movements, sometimes resulting in delays for the minor side streets. Given that the volume of traffic on these minor side streets is relatively small compared to the volume along Lantana Road, the delays do not significantly affect the entire intersection operation.

Build Alternative 3 also includes access modifications at the Sunset Road Intersection which eliminates the northbound left-turn and eastbound left-turn movements and an underpass access road resulting in redistribution of traffic at the Sunset Road and High Ridge Road intersections. As a result, although the some of the movements at the Sunset Road indicate LOS F with high delays, the northbound approach under Build Alternative 3 operates better compared to the No-Action Alternative and Build Alternatives 1.

For both the 2025 opening year and 2045 design year, the combined I-95 northbound and southbound ramp terminal intersection will operate at LOS C during both the AM and PM peak periods. However, the northbound and southbound left-turn movements as well as the eastbound left-turn movement will operate at LOS E during the PM peak period. Build Alternative 3 provides significant operational improvements compares to Build Alternative. However, its operational performance is less than that of Build Alternative 2.

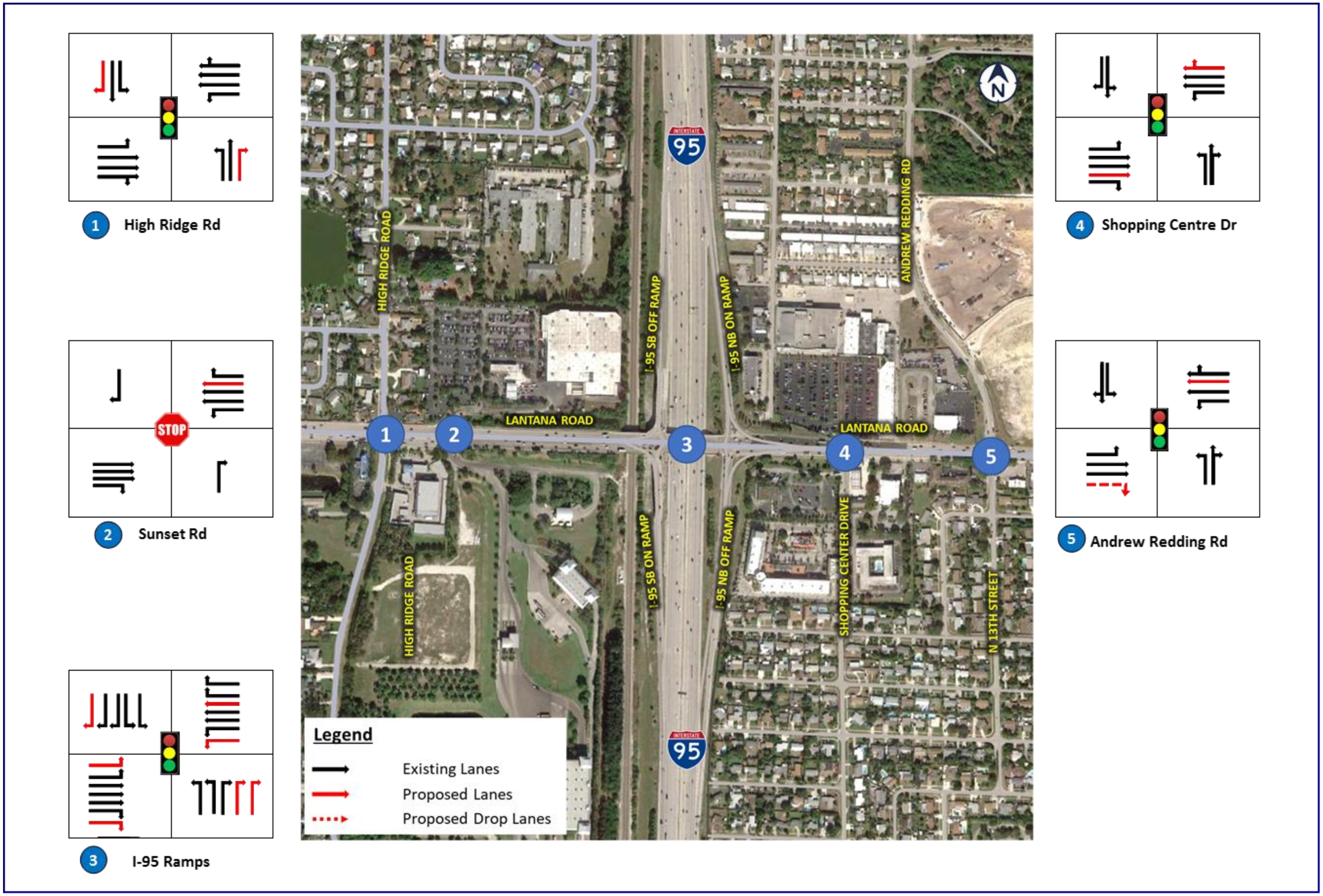


Figure 6-11 Intersection Configuration – Build Alternative 3

Table 6-18 2025 Alternative 3 Intersections Level of Service - AM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	12.9	B	24.6	C	62.8	E	92.5	F	26.3	C
			T	20.7	C	16.1	B	71.6	E	57.0	E		
			R	22.1	C	16.9	B	69.3	E	54.2	D		
			App	21.0	C	16.6	B	68.6	E	79.1	E		
2	Lantana Rd & Sunset Rd.	AM	L	-	-	152.4	F	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	55.3	F	25.6	D		
			App	-	-	-	-	55.3	F	25.6	D		
3	Lantana Rd & I-95 NB and SB Off-Ramp and On-Ramp Terminal	AM	L	25.1	C	23.9	C	50.9	D	52.5	D	24.6	C
			T	25.2	C	30.9	C	-	-	-	-		
			R	9.0	A	14.3	B	17.8	B	12.5	B		
			App	19.2	B	23.9	C	34.7	C	31.0	C		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	24.1	C	21.8	C	59.2	E	65.2	E	30.1	C
			T	25.4	C	29.6	C	51.8	D				
			R	7.4	A	30.7	C			62.8	E		
			App	21.7	C	29.7	C	56.6	E	63.5	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	21.3	C	30.1	C	64	E	68.2	E	30.2	C
			T	20.1	C	27.9	C	49.0	D				
			R	15.7	B	28.8	C			60.3	E		
			App	19.7	B	28.3	C	61.1	E	63.7	E		

Table 6-19 2025 Alternative 3 Intersections Level of Service - PM Peak Period														
No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	41.6	D	10.8	B	69.5	E	90.0	F	26.2	C
			T	12.9	B	20.1	C	74.2	E	62.8	E		
			R	13.0	B	22.0	C	74.9	E	61.7	E		
			App	15.4	B	20.5	C	72.9	E	77.1	E		
2	Lantana Rd & Sunset Rd.	PM	L	-	-	30.5	D	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	23.6	C	124.4	F		
			App	-	-	-	-	23.6	C	124.4	F		
3	Lantana Rd & I-95 NB and SB Off-Ramp and On-Ramp Terminal	PM	L	58.8	E	24.7	C	63.4	E	56.9	E	30.4	C
			T	33.0	C	11.1	B	-	-	-	-		
			R	7.9	A	0.6	A	22.3	C	34.4	C		
			App	31.0	C	10.7	B	45.9	D	42.7	D		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	31.8	C	20.1	C	74.3	E	75.7	E	32.6	C
			T	21.6	C	29.9	C	70.2	E				
			R	8.8	A	31.0	C			60.9	E		
			App	20.9	C	30.0	C	72.5	E	67.7	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	22.4	C	33.5	C	61.2	E	78.4	E	31.7	C
			T	21.7	C	29	C	52.9	D				
			R	17.5	B	30	C			66.8	E		
			App	21.1	C	29.4	C	58.7	E	72.7	E		

Table 6-20 2045 Alternative 3 Intersections Level of Service - AM Peak Period														
No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	AM	L	21.4	C	58.2	E	55.9	E	115.4	F	38.6	D
			T	34.9	C	22.7	C	63.9	E	52.6	D		
			R	40.9	D	24.5	C	69.1	E	49.6	D		
			App	36.6	D	24.7	C	64.9	E	93.9	F		
2	Lantana Rd & Sunset Rd.	AM	L	-	-	405.8	F	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	117.0	F	49.5	E		
			App	-	-	-	-	117.0	F	49.5	E		
3	Lantana Rd & I-95 NB and SB Off-Ramp and On-Ramp Terminal	AM	L	31.5	C	28.4	C	50.9	D	52.2	D	25.5	C
			T	26.5	C	31.6	C	-	-	-	-		
			R	6.1	A	17.2	B	18.0	B	13.0	B		
			App	20.6	C	26.3	C	32.9	C	30.1	C		
5	Lantana Rd & Lantana Shopping Centre Dr.	AM	L	41.5	D	27.5	C	81.3	F	63.4	E	35.6	D
			T	28.9	C	33.5	C	62.1	E				
			R	9.2	A	35.2	D			62.2	E		
			App	26.3	C	33.8	C	74.0	E	62.6	E		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	AM	L	43.7	D	52.8	D	73.3	E	63.7	E	39.4	D
			T	28.7	C	39.6	D	49.3	D				
			R	18.5	B	42.5	D			56.7	E		
			App	29.1	C	40.8	D	68.9	E	59.5	E		

Table 6-21 2045 Alternative 3 Intersections Level of Service - PM Peak Period

No	Intersection	Time	Move-ment	Approach Delay (s/veh)/LOS								Intersection Control Delay (s/veh)/ LOS	
				EB		WB		NB		SB			
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Lantana Rd. & High Ridge Rd.	PM	L	77.8	E	15.3	B	65.1	E	139.1	F	44.2	D
			T	15.9	B	41.5	D	69.5	E	61.6	E		
			R	16.1	B	56.8	E	70.8	E	53.8	D		
			App	21.6	C	46.0	D	68.8	E	104.6	F		
2	Lantana Rd & Sunset Rd.	PM	L	-	-	47.2	E	-	-	-	-	-	-
			T	-	-	-	-	-	-	-	-		
			R	-	-	-	-	32.9	D	476.7	F		
			App	-	-	-	-	32.9	D	476.7	F		
3	Lantana Rd & I-95 NB and SB Off-Ramp and On-Ramp Terminal	PM	L	64.9	E	30.8	C	64.3	E	55.1	E	32.3	C
			T	43.5	D	17.5	B	-	-	-	-		
			R	13.4	B	4.8	A	20.4	C	32.3	C		
			App	38.5	D	17.1	B	42.9	D	40.6	D		
5	Lantana Rd & Lantana Shopping Centre Dr.	PM	L	77.2	E	18.5	B	136.4	F	116.8	F	40.8	D
			T	19.4	B	34.3	C	112.1	F				
			R	8.4	A	36.1	D			70.4	E		
			App	23.7	C	34.5	C	125.6	F	90.0	F		
6	Lantana Rd & Andrew Redding Rd./ N 13th St.	PM	L	73.7	E	50.9	D	78.6	E	73.1	E	46.8	D
			T	27.6	C	51.4	D	57.0	E				
			R	19.6	B	58	E			58.4	E		
			App	31.0	C	53.7	D	72.9	E	64.8	E		

6.1.2.3 Arterial Operations

Arterial operational analysis was performed for the three Build Alternatives under evaluation for comparison to the No-Action Alternative. The three Build Alternatives have different configurations particularly between the interchange ramp terminals due to the different interchange configurations. In addition, the signal timings and coordination, which is different for all the alternatives also accounts for differences in the delays and travel speed. As such, the comparison of the arterial travel speed among the alternatives was based on the entire Lantana roadway segment within the project limits.

6.1.2.3.1 Build Alternative 1

Table 6-22 to Table 6-25 show the 2025 opening year and 2045 design year Build Alternative 1 LOS along the study arterials. The results indicate that for the 2025 opening year, the Lantana Road corridor will operate at an overall LOS E in both the eastbound and westbound directions with an average speed of 15.5 mph in the eastbound and 13.4 mph in the westbound directions during the AM peak period. Similarly, during the PM peak period, Lantana Road will operate at LOS E in both the eastbound and westbound directions with an average speed of 15.5 mph and 13.3 mph in the eastbound and westbound directions, respectively.

For the 2045 design year, the Lantana Road corridor will operate at an overall LOS E in the eastbound direction and LOS F in the westbound direction with an average speed of 13.3 mph and 12.6 mph, respectively, during the AM peak period. During the PM peak period, Lantana Road will operate at LOS E in the eastbound direction with an average speed of 14.1 mph and LOS F in the westbound direction with an average speed of 10.4 mph. Compared to the No-Action Alternative, Build Alternative 1 provides a 35% and 43% reduction in the overall travel time in the eastbound and westbound directions, respectively, in the AM peak period. During the PM peak period, Build Alternative 1 provides a 29% and 54% reduction in the overall travel time in the eastbound and westbound directions, respectively.

Table 6-22 2025 Build Alternative 1 Arterial Level of Service - AM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	50.6	13.9	E	32.8	27.1	C
I-95 SB On Ramp/I-95 SB Off Ramp	55.4	16.0	E	15.4	18.6	D
I-95 NB On Ramp/I-95 NB Off Ramp	14.5	19.7	D	56.9	6.8	F
Shopping Centre Dr	25.3	15.3	E	53.5	9.5	F
Andrew Redding Road / N 13th St.	33.0	15.4	E	56.7	14.4	E
Total	**178.8**	**15.5**	**E**	**215.3**	**13.4**	**E**

Table 6-23 2025 Build Alternative 1 Arterial Level of Service - PM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	35.6	19.8	D	47.8	18.6	D
I-95 SB On Ramp/I-95 SB Off Ramp	81.7	10.9	F	14.2	20.2	D
I-95 NB On Ramp/I-95 NB Off Ramp	16.8	17.0	D	58.6	6.6	F
Shopping Centre Dr	21.4	18.1	D	35.3	14.4	E
Andrew Redding Road / N 13th St.	23.1	22.0	D	60.4	13.5	E
Total	**178.6**	**15.5**	**E**	**216.3**	**13.3**	**E**

Table 6-24 2045 Build Alternative 1 Arterial Level of Service - AM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	71.7	9.8	F	36.6	24.3	C
I-95 SB On Ramp/I-95 SB Off Ramp	53.3	16.7	E	12.4	23.1	C
I-95 NB On Ramp/I-95 NB Off Ramp	12.9	22.2	C	50.8	7.6	F
Shopping Centre Dr	37.7	10.3	F	59.9	8.5	F
Andrew Redding Road / N 13th St.	33.6	15.1	E	69.6	11.7	F
Total	**209.2**	**13.3**	**E**	**229.3**	**12.6**	**F**

Table 6-25 2045 Build Alternative 1 Arterial Level of Service - PM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	39.2	18.0	D	90.1	9.9	F
I-95 SB On Ramp/I-95 SB Off Ramp	85.2	10.4	F	16.7	17.1	D
I-95 NB On Ramp/I-95 NB Off Ramp	17.4	16.5	E	55.0	7.0	F
Shopping Centre Dr	30.8	12.6	F	32.8	15.5	E
Andrew Redding Road / N 13th St.	23.6	21.5	D	81.4	10.0	F
Total	**196.2**	**14.1**	**E**	**276.0**	**10.4**	**F**

6.1.2.3.2 Build Alternative 2

Table 6-26 to **Table 6-29** show the 2025 opening year and 2045 design year Build Alternative 2 LOS along the study arterials. The results indicate that for the 2025 opening year, the Lantana Road corridor will operate at an overall LOS D in the eastbound direction and LOS E in the westbound directions with average speeds of 17.7 mph and 15.5 mph, respectively, during the AM peak period. During the PM peak period, the Lantana Road corridor will operate at an overall LOS D in both the eastbound direction and LOS E in the westbound directions with average speeds of 18.6 mph and 14.0 mph, respectively.

For the 2045 design year, the Lantana Road corridor will operate at an overall LOS E in both the eastbound and westbound directions with average speeds of 15.8 mph and 14.2 mph, respectively, during the AM peak period. During the PM peak period, Lantana Road will operate at LOS E in both the eastbound and westbound directions with average speeds of 16.9 mph and 13.1 mph, respectively. Compared to the No-Action alternative, Build Alternative 2 provides a 41% and 50% reduction in the overall travel time in the eastbound and westbound directions respectively during the AM peak period. During the PM peak period, Build Alternative 2 provides a 36% and 62% reduction in the overall travel time in the eastbound and westbound directions, respectively.

Table 6-26 2025 Build Alternative 2 Arterial Level of Service - AM Peak Period

Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	46.0	15.7	E	32.9	21.9	D
I-95 SB On-Ramp/I-95 SB Off-Ramp	44.0	20.5	D	44.7	20.1	D
I-95 NB On-Ramp/I-95 NB Off-Ramp	27.1	10.6	F	25.0	11.5	F
Shopping Centre Dr	28.6	13.8	E	32.6	12.1	F
Andrew Redding Road / N 13th St.	18.2	27.7	C	43.4	11.6	F
Total	**163.9**	**17.7**	**D**	**178.6**	**15.5**	**E**

Table 6-27 2025 Build Alternative 2 Arterial Level of Service - PM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	32.0	22.5	C	39.2	18.4	D
I-95 SB On-Ramp/I-95 SB Off-Ramp	35.9	25.1	C	47.9	18.8	D
I-95 NB On-Ramp/I-95 NB Off-Ramp	31.4	9.2	F	27.1	10.6	F
Shopping Centre Dr	23.1	17.1	D	35.0	11.3	F
Andrew Redding Road / N 13th St.	26.3	19.2	D	47.0	10.7	F
Total	**148.7**	**18.6**	**D**	**196.2**	**14.0**	**E**

Table 6-28 2045 Build Alternative 2 Arterial Level of Service - AM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	65.9	10.9	F	36.5	19.7	D
I-95 SB On-Ramp/I-95 SB Off-Ramp	48.2	18.7	D	41.8	21.5	D
I-95 NB On-Ramp/I-95 NB Off-Ramp	26.2	11.0	F	29.1	9.9	F
Shopping Centre Dr	29.9	13.2	E	37.0	10.7	F
Andrew Redding Road / N 13th St.	20.1	25.1	C	56.2	9.0	F
Total	**190.3**	**15.8**	**E**	**200.6**	**14.2**	**E**

Table 6-29 2045 Build Alternative 2 Arterial Level of Service - PM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	33.9	21.2	D	57.6	12.5	F
I-95 SB On-Ramp/I-95 SB Off-Ramp	44.9	20.0	D	55.2	16.3	E
I-95 NB On-Ramp/I-95 NB Off-Ramp	30.3	9.5	F	27.3	10.5	F
Shopping Centre Dr	47.9	8.3	F	21.4	18.5	D
Andrew Redding Road / N 13th St.	20.0	25.2	C	68.1	7.4	F
Total	**177.0**	**16.9**	**E**	**229.6**	**13.1**	**E**

6.1.2.3.3 Build Alternative 3

Table 6-30 to **Table 6-33** show the 2025 opening year and 2045 design year Build Alternative 3 LOS along the study arterials. The results indicate that for the 2025 opening year, the Lantana Road corridor will operate at an overall LOS E in the eastbound and westbound directions with an average speed of 16.7 mph and 15.6 mph, respectively, during the AM peak period. During the PM peak period, Lantana Road will operate at LOS E in both the eastbound and westbound directions with an average speed of 16.3 mph and 16.1 mph, respectively.

For the 2045 design year, the Lantana Road corridor will operate at an overall LOS E in both the eastbound and westbound directions with an average speed of 14.8 mph and 14.2 mph, respectively, during the AM peak period. During the PM peak period, Lantana Road will operate at LOS E in the eastbound direction with an average speed of 15.8 mph and LOS F in the westbound direction with an average speed of 13.0 mph. Compared to the No-Action Alternative, Build Alternative 3 provides a 42% and 50% reduction in the overall travel time in the eastbound and westbound directions, respectively, in the AM peak period. During the PM peak period, Build Alternative 3 provides a 37% and 63% reduction in the overall travel time in the eastbound and westbound directions, respectively.

Table 6-30 2025 Build Alternative 3 Arterial Level of Service - AM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	50.9	13.8	E	39.6	25.9	C
I-95 SB On-Ramp/I-95 SB Off-Ramp	54.6	18.8	D	48.1	11.1	F
Shopping Centre Dr	37.4	14.3	E	40.4	12.6	F
Andrew Redding Road / N 13th St.	22.8	22.2	C	56.7	14.4	E
Total	**165.7**	**16.7**	**E**	**184.8**	**15.6**	**E**

Table 6-31 2025 Build Alternative 3 Arterial Level of Service - PM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	37.0	19.0	D	46.5	22.1	C
I-95 SB On-Ramp/I-95 SB Off-Ramp	63.0	16.3	E	28.9	18.5	D
Shopping Centre Dr	37.5	14.3	E	43.5	11.7	F
Andrew Redding Road / N 13th St.	32.8	15.5	E	60.4	13.5	E
Total	**170.3**	**16.3**	**E**	**179.3**	**16.1**	**E**

Table 6-32 2045 Build Alternative 3 Arterial Level of Service - AM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	66.5	10.6	F	39.4	26.1	C
I-95 SB On-Ramp/I-95 SB Off-Ramp	55.7	18.4	D	48.9	11.0	F
Shopping Centre Dr	40.1	13.4	E	45.5	11.1	F
Andrew Redding Road / N 13th St.	25.7	19.7	D	69.6	11.7	F
Total	**188.0**	**14.8**	**E**	**203.4**	**14.2**	**E**

Table 6-33 2045 Build Alternative 3 Arterial Level of Service - PM Peak Period						
Cross Street	Eastbound			Westbound		
	Travel Time (s)	Speed (mph)	LOS	Travel Time (s)	Speed (mph)	LOS
High Ridge Road	38.6	18.2	D	71.7	14.3	E
I-95 SB On-Ramp/I-95 SB Off-Ramp	73.4	14.0	E	35.2	15.2	E
Shopping Centre Dr	32.6	16.4	E	32.8	15.5	E
Andrew Redding Road / N 13th St.	30.8	16.5	E	81.4	10.0	F
Total	**175.4**	**15.8**	**E**	**221.1**	**13.0**	**E**

6.1.2.4 Intersection Queue Lengths

A queuing analysis for Build Alternatives 1, 2 and 3 was performed for the 2045 design year for comparison among the Build Alternatives using Synchro 10. The 95th percentile vehicular queue length in feet for the left-turn and right-turn movements at each of the study intersections were obtained. As part of the alternatives development process, additional storage improvements for were evaluated for the Build Alternatives were feasible while taking into consideration various constraints such as location of preceding left turn storage, location of adjacent intersection, driveways, utilities and right of way. The queue analysis results for the 2045 Build Alternatives are shown in **Table 6-34** through **Table 6-36.**

For Build Alternative 1, 6 out of the 23 (26%) locations with turn storages have deficient storage lengths. For the I-95 NB and SB off-ramp terminals, analysis results show a reduction of up to 47% and 59% reduction in maximum queue lengths at the I-95 SB and NB ramp terminals respectively compared to the No-Action Alternative. However, these results are based on deterministic analysis that only show the maximum queues after two cycles. Further analysis using the SIMTRAFFIC microsimulation tool indicated that the queues for the SB ramp terminal intersection may be longer due to residual queues remaining after each cycle which may extend beyond the gore point during the AM peak period.

For Build Alternative 2, 5 out of the 20 (25%) locations with turn storages have deficient storage lengths. For the I-95 NB and SB off-ramp terminals, the queue lengths can be adequately accommodated along the ramps without any spillback onto the I-95 mainline. Build Alternative 2 also results in up to 74% and 88% reduction in maximum queue lengths at the I-95 SB and NB ramp terminals respectively compared to the No-Action Alternative.

For Build Alternative 3, 6 out of the 23 locations (26%) locations with turn storages have deficient storage lengths. For the I-95 NB and SB off-ramp terminals, the queue lengths can be adequately accommodated along the ramps without any spillback onto the I-95 mainline. Build Alternative 3 also results in up to 66% and 62% reduction in queue length at the I-95 SB and NB ramp terminals, respectively, compared to the No-Action Alternative.

Table 6-34 2045 Build Alternative 1 Queue Length Analysis

No.	Intersection	Approach		AM	PM	Max Queue Length (ft)	Storage (ft)	Storage Deficiency	% Over Storage
1	High Ridge Road	EB	L	98	291	291	350	No	-
		WB	L	m#147	m43	147	200	No	-
		NB	L	88	112	112	200	No	-
			R	119	34	119	150	No	-
		SB	L	#520	#612	612	500	Yes	22%
			R	50	128	128	150	No	-
3	I-95 SB Off-Ramp	EB	R	m248	m256	256	500	No	-
		WB	L	m304	m124	304	450	No	-
		SB	L	335	347	347	1200	No	-
			R	291	#534	534	1200	No	-
4	I-95 NB Off-Ramp	EB	L	507	m134	507	565	No	-
		WB	R	m289	m167	289	300	No	-
		NB	L	315	#488	488	1150	No	-
			R	257	303	303	1150	No	-
5	Shopping Center Drive	EB	L	m127	#325	325	300	Yes	8%
			R	150	38	150	250	No	-
		WB	L	m88	m11	88	200	No	-
		NB	L	#470	#398	470	200	Yes	135%
		SB	R	135	278	278	120	Yes	132%
6	Andrew Redding Road	EB	L	#273	m#305	305	340	No	-
		WB	L	34	35	35	180	No	-
		NB	L	#449	#427	449	150	Yes	199%
		SB	R	168	218	218	200	Yes	9%

- 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

Table 6-35 2045 Build Alternative 2 Queue Length Analysis

No.	Intersection	Approach		AM	PM	Max Queue Length (ft)	Storage (ft)	Storage Deficiency	% Over Storage
1	High Ridge Road	EB	L	63	211	211	350	No	-
		WB	L	#133	m35	133	200	No	-
		NB	L	88	112	112	200	No	-
			R	121	35	121	150	No	-
		SB	L	#520	#601	601	500	Yes	20%
			R	51	131	131	150	No	-
3	I-95 SB Off-Ramp	EB	R	m213	m128	213	400	No	-
		SB	L	112	84	112	1200	No	-
			R	104	264	264	1200	No	-
4	I-95 NB Off-Ramp	WB	R	m116	m113	116	350	No	-
		NB	L	80	185	185	1100	No	-
			R	97	140	116	1200	No	-
5	Shopping Center Drive	EB	L	135	#340	340	250	Yes	36%
		WB	L	m77	m13	77	200	No	-
		NB	L	89	#387	387	200	Yes	94%
		SB	R	135	278	278	120	Yes	132%
6	Andrew Redding Road	EB	L	#273	m#299	299	340	No	-
		WB	L	34	35	35	180	No	-
		NB	L	#449	#427	449	150	Yes	199%
		SB	R	168	133	168	200	No	-

- 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

Table 6-36 2045 Build Alternative 3 Queue Length Analysis

No.	Intersection	Approach		AM	PM	Max Queue Length (ft)	Storage (ft)	Storage Deficiency	% Over Storage
1	High Ridge Road	EB	L	63	211	211	350	No	-
		WB	L	m#111	m40	111	200	No	-
		NB	L	88	112	112	200	No	-
			R	121	35	121	150	No	-
		SB	L	#520	#601	601	500	Yes	20%
			R	51	131	131	150	No	-
3	I-95 SB and NB Off-Ramps	EB	L	m443	m313	443	320	Yes	-
			R	m83	m200	200	500	No	-
		SB	L	317	343	343	1200	No	-
			R	143	332	332	1200	No	-
		NB	L	294	448	448	1150	No	-
			R	150	171	171	1150	No	-
		WB	L	m349	m282	282	300	No	-
			R	m311	m163	311	320	No	-
5	Shopping Center Drive	EB	L	m159	#336	336	250	Yes	34%
			R	60	71	71	250	No	-
		WB	L	m80	m11	80	200	No	-
		NB	L	#470	#398	470	200	Yes	135%
		SB	R	135	278	278	120	Yes	132%
6	Andrew Redding Road	EB	L	#272	m#306	306	340	No	-
		WB	L	34	35	35	180	No	-
		NB	L	#449	#427	449	150	Yes	199%
		SB	R	168	218	218	200	Yes	9%

\# - 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

6.1.3 Comparison of Build Alternatives

Table 6-37 and **Table 2-19** show a comparison of the operational analysis results between the No-Action Alternative and the three Build Alternatives for the 2045 design year during the AM and PM peak periods. The results indicate that during both the AM and PM peak periods, the SR 9/I-95 ramp terminals will operate at LOS F under the No-Action Alternative with queues in excess of 1,000 feet. However, these conditions improve under all three Build Alternatives to provide acceptable level of service for the ramp terminal intersections.

The SR 9/I-95 ramp terminals will operate at LOS C or D during the AM and PM peak periods in Build Alternative 1. However, the northbound approach and movements as well as the southbound approach and movements will operate at LOS E during both the AM and PM peak periods which does not meet the FDOT LOS targets. For Build Alternative 2 and Build Alternative 3, the SR 9/I-95 SB ramp terminal will operate at LOS C during both the AM and PM peak periods. It is anticipated that the Build Alternatives will provide 78% to 81% and 58% to 73% reduction in delays for the I-95 SB ramp terminal during the AM and PM peak periods, respectively, compared to the No-Action Alternative. At the I-95 NB ramp terminal, the Build Alternatives will provide 74% to 80% and 69% to 77% reduction in delays during the AM and PM peak periods, respectively, compared to the No-Action Alternative. Alternative 2 provides the best operations at the ramp terminals compared to the other Alternatives due to the DDI configuration which reduces the number of signal phases.

A comparison of the queue lengths at the ramp terminal approaches indicate that all the Build Alternatives provide significant reduction in queues compared to the No-Action Alternative. It is anticipated that the Build Alternatives will result in a 47% to 74% reduction in queue length at the I-95 SB off-ramp and 59% to 88% reduction in queue length at the I-95 NB off-ramp. However, for Build Alternative 1, the queue lengths may be longer as indicated in the table below due to residual queues remaining after each cycle which may extend beyond the gore point. Further analysis using the SIMTRAFFIC microsimulation tool indicated that the queues for the SB ramp terminal intersection may be longer due to residual queues remaining after each cycle which may extend beyond the gore point during the AM peak period.

Table 6-37 Comparison of Alternatives – SR 9/I-95 Ramps

Performance Criteria		No-Action Alternative	Build Alternative 1 - TUDI	Build Alternative 2 – DDI	Build Alternative 3 - SPUI
I-95 SB Ramp Terminal	LOS (AM/PM)	F/F	C/D	C/C	C/C
	Maximum Intersection Overall Delay (s)	AM: 123.4 PM: 84.8	AM: 27.6 PM: 35.8	AM: 23.0 PM: 23.2	AM: 25.5 PM: 32.3
	Delay Reduction over No-Action Alternative	-	AM: 78% PM: 58%	AM: 81% PM: 73%	AM: 79% PM: 62%
	Maximum Queue Length (ft)	#1,015	#534	264	343
	Storage Deficiency	Yes (9%)	No	No	No
	Queue Length Reduction over No-Action Alternative	-	-47%	-74%	-66%
I-95 NB Ramp Terminal	LOS (AM/PM)	F/F	C/C	C/C	C/C
	Maximum Intersection Overall Delay (s)	AM: 104.4 PM: 104.1	AM: 27.2 PM: 32.4	AM: 20.5 PM: 24.0	AM: 25.5 PM: 32.3
	Delay Reduction over No-Action Alternative	-	AM: 74% PM: 69%	AM: 80% PM: 77%	AM: 76% PM: 69%
	Maximum Queue Length (ft)	#1,191	#488	140	448
	Storage Deficiency	Yes (27%)	No	No	No
	Queue Length Reduction over No-Action Alternative	-	-59%	-88%	-62%

- 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.

A comparison of the six intersections within the study area shows LOS improvements at all six intersections under the three Build Alternatives. The intersection of Lantana Road and High Ridge Road will improve from LOS E conditions under the No-Action Alternative to LOS D under the Build Alternatives during both the AM and PM peak periods. Similarly, LOS F conditions under the No-Action Alternative at the SR 9/I-95 ramp terminals will improve under the Build Alternatives to LOS D or better during both the AM and PM peak periods. At the Shopping Center Drive and Andrew Redding Road intersection, LOS D and F conditions under the No-Action Alternative will improve to LOS D conditions under the Build Alternatives during the AM and PM peak periods.

Overall, Build Alternative 2 provides the best results from a traffic operations perspective.

<table>
<tr><th colspan="18">Table 6-38 Comparison of Alternatives - Future Intersection Analysis</th></tr>
<tr><th rowspan="3">#</th><th rowspan="3">Intersection</th><th colspan="4">No-Action Alternative</th><th colspan="4">Build Alternative 1</th><th colspan="4">Build Alternative 2</th><th colspan="4">Build Alternative 3</th></tr>
<tr><th colspan="2">AM</th><th colspan="2">PM</th><th colspan="2">AM</th><th colspan="2">PM</th><th colspan="2">AM</th><th colspan="2">PM</th><th colspan="2">AM</th><th colspan="2">PM</th></tr>
<tr><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th><th>Delay (s)</th><th>LOS</th></tr>
<tr><td>1</td><td>Lantana Rd and High Ridge Rd</td><td>62.7</td><td>E</td><td>75.9</td><td>E</td><td>40.4</td><td>D</td><td>53.0</td><td>D</td><td>36.8</td><td>D</td><td>44.2</td><td>D</td><td>36.8</td><td>D</td><td>44.2</td><td>D</td></tr>
<tr><td>2</td><td>Lantana Rd & Sunset Rd[1]</td><td>OC[2]</td><td>F</td><td>OC[2]</td><td>F</td><td>OC[2]</td><td>F</td><td>OC[2]</td><td>F</td><td>117.0</td><td>F</td><td>32.9</td><td>D</td><td>117.0</td><td>F</td><td>32.9</td><td>D</td></tr>
<tr><td>3</td><td>Lantana Rd & I-95 SB Ramps</td><td>123.4</td><td>F</td><td>84.8</td><td>F</td><td>27.6</td><td>C</td><td>35.8</td><td>D</td><td>23.0</td><td>C</td><td>23.2</td><td>C</td><td rowspan="2">25.5</td><td rowspan="2">C</td><td rowspan="2">32.3</td><td rowspan="2">C</td></tr>
<tr><td>4</td><td>Lantana Rd & I-95 NB Ramps</td><td>104.4</td><td>F</td><td>104.1</td><td>F</td><td>27.2</td><td>C</td><td>32.4</td><td>C</td><td>20.5</td><td>C</td><td>24.0</td><td>C</td></tr>
<tr><td>5</td><td>Lantana Rd & Shopping Centre Dr.</td><td>38.8</td><td>D</td><td>98.7</td><td>F</td><td>35.7</td><td>D</td><td>40.8</td><td>D</td><td>31.8</td><td>C</td><td>37.3</td><td>D</td><td>35.6</td><td>D</td><td>40.8</td><td>D</td></tr>
<tr><td>6</td><td>Lantana Rd & Andrew Redding Rd</td><td>54.0</td><td>D</td><td>80.9</td><td>F</td><td>39.4</td><td>D</td><td>46.8</td><td>D</td><td>39.4</td><td>D</td><td>46.7</td><td>D</td><td>39.4</td><td>D</td><td>46.8</td><td>D</td></tr>
</table>

Notes:
1: Delays and LOS based on northbound approach at Lantana Road and Sunset Road intersection
2: OC = Overcapacity, HCM methodology does not provide delays

6.2 QUANTITATIVE SAFETY ANALYSIS

A future crash prediction analysis was conducted for the SR 9/I-95 ramp terminals at Lantana Road, interchange ramp segments and the section of SR 9/I-95 and Lantana Road within the interchange influence area under the various project alternatives. The HSM Enhanced Interchange Safety Analysis Tool (ISATe) used for the safety analysis does not predict more than 23 years beyond the first year of the existing crash data (2014). Hence the 10-year period from the opening year (2025-2034) was used. The crash prediction analysis follows the methodology outlined in the Highway Safety Manual (HSM).

Expected crashes were predicted for the No-Action Alternative during the 10-year crash analysis period from the 2025 opening year to 2034 using the HSM Enhanced Interchange Safety Analysis Tool (ISATe). The expected crashes along the arterials for 2025 opening year and 2045 design year were also estimated for the No-Action Alternative using the HSM predictive spreadsheets for urban arterials. Both crash prediction spreadsheets implement the Empirical Bayesian Analysis methodology which combines the predicted crashes from the safety performance functions with the historical crash data to obtain the expected crashes.

For the arterial predictive analysis, since the spreadsheet does not include crash analysis over a period, a straight-line interpolation between the expected crashes for 2025 and 2045 was used to estimate the expected crashes for the 10-year period from 2025 to 2034. Based on the analysis, the estimated average crashes on the arterials was 31.0 crashes per year and 113.2 crashes per year within the interchange during the 10-year analysis period.

To obtain the expected crashes for the various Build Alternatives, Crash Modification Factors (CMF) obtained from the Federal Highway Administration (FHWA) CMF Clearinghouse was applied to the expected crashes for the No-Action Alternative. For Build Alternative 1, a CMF of 0.85 (15% crash reduction) for roadway capacity improvements from 4 lanes to 6 lanes (CMF ID: 7924) was utilized. For Build Alternative 2, a CMF of 0.592 (40.8% crash reduction) for converting a tight urban diamond interchange to a diverging diamond interchange (CMF ID: 9104) was utilized. In addition, a CMF of 0.85 (15% crash reduction) for roadway capacity improvements from 4 lanes to 6 lanes (CMF ID: 7924) was utilized for the Lantana Road widening. The crash reduction from these two improvements were then combined to obtain a composite CRF of 35.6%.

There is no CMF for Single Point Urban Interchanges (SPUI) available from the FHWA CMF Clearinghouse. A search through existing literature on SPUIs suggests that there is no significant difference in crash reduction between the Tight Urban Diamond interchange (TUDI) and SPUI configurations. However, the SPUIs were found to be safer than the comparable TUDIs for injury/fatality crashes (Bared et al, 2005). Using a conservative approach, the same CMF for Build Alternative 1 was applied to Build Alternative 3.

All three Build Alternatives include providing additional lanes for the northbound and southbound off-ramps as well as access modifications to the Lantana road at Sunset Road intersection. These improvements are anticipated to further enhance safety within the interchange influence area by easing congestion and reducing conflict points.

Table 6-39 shows the average predicted crashes per year at the Lantana Road interchange and arterial segments. The detailed crash prediction analyses are provided in the Interchange Modification Report on file with FDOT District Four.

Table 6-39 Predicted Crashes at Lantana Interchange

Segment	Crash Severity	Crash Frequency				% Change from No-Action		
		No-Action	Build Alt. 1	Build Alt. 2	Build Alt. 3	Build Alt. 1	Build Alt. 2	Build Alt. 3
Interchange	**Fatal & Injury**	53	45	31	45	-15.0%	-40.8%	-15.0%
	Property Damage Only	61	52	36	52			
Arterial	**Fatal & Injury**	11	9	9	9	-15.0%	-15.0%	-15.0%
	Property Damage Only	21	18	18	18			
Total		**146**	**124**	**94**	**124**	**-15.0%**	**-35.6%**	**-15.0%**

Based on the results shown in **Table 6-39,** Build Alternative 2 results in the lowest number of expected total crashes with an overall crash reduction of 35.6% compared to the No-Action Alternative at the Lantana Road Interchange. Build Alternative 1 and Build Alternative 3 provide similar overall crash reduction of 15% compared to No-Action Alternative at the Lantana Road Interchange.

6.3 ENGINEERING EFFECTS

6.3.1 Geometric Compliance to Design Controls

The No-Action Alternative has several geometric design deficiencies. The horizontal curve length for the interchange ramps and the vertical alignment along the existing ramps and Lantana Road do not meet the current FDOT Design Manual (FDM) requirements. In order to maintain the existing conditions, vertical alignment design variations would be required for the SR 9/I-95 northbound on-ramp for substandard vertical cure length. For the southbound off-ramp, a design variation for substandard maximum grade, substandard k-value and substandard vertical curve length will be required. Along Lantana Road, design variations would be required for substandard K-Value, vertical stopping sight distance and vertical curve length under the No-Action Alternative. In addition, the vertical clearance of Lantana Road over the SFRC/CSX railroad does not meet the required minimum vertical clearance.

Build Alternative 1 includes widening of the Lantana Road Bridge over SR 9/I-95 and reconstruction of the interchange ramps. The proposed improvements under Build Alternative 1 will address the horizontal and vertical alignment along the interchange ramps. However, it does not resolve the vertical alignment and vertical clearance deficiencies along Lantana Road.

Build Alternatives 2 and 3 correct the vertical and horizontal clearance deficiencies that will persist under the No-Action Alternative and Build Alternative 1. Both Build Alternatives 2 and 3 propose replacement of the existing Lantana Road Bridge over SR 9/I-95 with a separate bridge over the SFRC/CSX Railroad as well as replacement of the existing ramp bridges with MSE walls. The proposed new bridges meet both FDOT Design Manual standards and AASHTO requirements for geometric compliance. Hence, no design variations would be required for Build Alternatives 2 and 3.

6.3.2 Utility Impacts

No utility impacts are anticipated with the No-Action Alternative, as no roadway modifications are proposed. The existing utility facilities along the corridor are to remain. The proposed Build Alternatives will, however, impact the following utilities within the study limits:

- AT &T Florida
  - A 6-4" PVC duct bank along the south R/W of Lantana Rd. east of I-95 may be in conflict with roadway widening.
  - Manhole located northeast of northbound off-ramp from I-95.
  - Buried copper and fiber facilities crossing southbound on-ramp to I-95.

- City of Lake Worth Water & Sewer
  - 12" PVC WM and 3" PVC FM east of High Ridge Road
  - Private lift station and 3” PVC FM interconnect within the adjacent property
- Comcast
  - Aerial Cables
- Crown Castle Fiber
  - Handholes along Lantana Road
- Florida Public Utilities Co.
  - 6" PE and 6" Steel GM are generally present in these areas.
- Florida Power & Light Distribution
  - Pole (13kV conductors) located at the southeast corner of the intersection of High Ridge Road
  - Poles (13kV conductors) at the entrance to Sunset Road
  - 5 poles (13kV) immediately to the west of Andrew Redding Road
- Town of Lantana Water & Sewer
  - 6" PVC FM generally present at back of north sidewalk from Publix Shopping Center entrance to east of Andrew Redding Rd.
  - 6" WM also located within the same area.
  - Town-owned lift station and control panel
  - Abandoned 6" FM.
  - An 8" DIP FM (in 18" Steel casing) and a 12" DIP WM (in 24" Steel casing) cross the I-95 on/off-ramps and mainline just north of the Lantana Road bridge over I-95.
  - A 4" DIP FM (in 20" Steel casing) crosses Lantana Rd. near the Solid Waste site west of I-95.
  - 12" DIP WM (in 24" Steel casing) that crosses I-95 approx. 1,000-ft south of Lantana Rd. (at W. Mango St).
- Verizon/MCI
  - Existing buried fiber lines within railroad R/W.

Build Alternatives 1 and 3 have similar utility impacts. However, Build Alternative 2 has an additional impact to the City of Lake Worth Electric Transmission facility. A 138kV Transmission facility runs north-south along the SFRC/CSX railroad right of way within the study area. These transmission poles will be directly impacted by the proposed Diverging Diamond Interchange configuration proposed under Build Alternative 2. The transmission poles will need to be relocated to accommodate the new ramps.

6.3.3 Multimodal (Transit/Pedestrian/Bicycle Facilities)

The No-Action Alternative does not propose any improvements to the existing multimodal facilities within the study area. The existing sub-standard ADA curb ramps at the intersections of High Ridge Road and Andrew Redding Road will remain under the No-Action Alternative. In addition, there are no bicycle lanes along Lantana Road, and none are proposed under the No-Action Alternative.

All three Build Alternatives provide improved multimodal facilities including 7-foot bicycle lanes along the Lantana Road corridor. The deficient ADA curb ramps at the intersection of High Ridge Road and Andrew Redding Road will be upgraded to ADA compliant curb ramps under all three Build Alternatives. In addition, all three Build Alternatives provide high emphasis crosswalks at all signalized intersections within the study limits to offer protected pedestrian movements. All sidewalks impacted by widening along Lantana Road will be relocated along the roadway under all the Build Alternatives. The existing transit infrastructure along the study corridor would not be impacted by any of the three Build Alternatives.

Compared to the No-Action Alternative, the three Build Alternatives provide bicycle facilities and improve on the existing pedestrian features within the study limits. Build Alternatives 1 and 3 have 6 signalized pedestrian crossings. For Build Alternative 2 with Diverging Diamond Interchange configuration, the pedestrian sidewalks utilize the inside walkway configuration. For this configuration, the sidewalks transition from the outside into the median within the interchange area. This create 8 signalized conflict points for the DDI compared to 6 signalized conflict points for Build Alternatives 1 and 3. However, the crossings along the DDI are shorter. In addition, the DDI enables crossing of Lantana Road from north side to the south side and vice versa.

6.3.4 Access Modifications

The No-Action Alternative does not propose any modifications to the existing access management classification or access locations as no roadway modifications are proposed along Lantana Road and SR 9/I-95.

All three Build Alternatives on the other hand propose access modifications along Lantana Road. Build Alternative 1 eliminates the existing eastbound left-turn and northbound thru movements into the Costco Warehouse at the Lantana Road and Sunset Road unsignalized intersection. This proposed access modification is expected to reduce the existing conflict at the Sunset Road Intersection and thereby improve safety conditions. For Build Alternatives 2 and 3, an underpass service road connecting Sunset Road and the existing Solid Waste Authority (SWA)service road underneath the new bridge over the SFRC/CSX Railroad is proposed. This enables the existing eastbound left-turn as well as the northbound left-turn and thru movements to be eliminated, further enhancing the operations and safety at this intersection.

6.4 ENVIRONMENTAL EFFECTS

An evaluation of the potential impacts to the social, cultural, natural, and physical environment associated with the proposed improvements was performed as part of this study. The findings are summarized in the following sections:

6.4.1 Socioeconomic

Land use in the project area encompasses mainly non-public land uses consisting of a mix of institutional areas, industrial areas, residential areas, retail/office areas, and vacant use areas. There are areas of public/semi-public land uses directly to the west of I-95 which include the CSX Railroad and the Solid Waste Authority Central Transfer Station. No right of way impacts to residential properties are anticipated. However, impacts to adjacent businesses are anticipated. Build Alternatives 1 and 3 will impact 9 businesses while Build Alternative 2 will impact 6 businesses. Build Alternative 2 has a greater impact to the Shell gas station (1320 W. Lantana Road). In addition, it will also impact the Wells Fargo Bank ATM driveway. All three Build Alternatives will prevent eastbound motorists from making a left onto Sunset Road to access Costco due to the proposed directional median modification.

Access to residences and businesses could temporarily be affected, and in some cases permanently modified, by the proposed improvements. The overall impacts on the social environment and community cohesion are anticipated to be minimal.

Lantana Road is a major east-west corridor in Palm Beach County that provides access to local and commercial businesses, residential communities, religious centers, schools, parks, health facilities and I-95. Aesthetics, mobility, and the overall economic effects are expected to be enhanced by the implementation of the proposed improvements along Lantana Road and at the I-95 interchange.

6.4.2 Cultural, Historical and Archeological

Fifteen historic resources were identified within the study limits. Of the fifteen, one is previously recorded and fourteen are newly recorded. The previously recorded resource has been determined National Register–eligible outside of the current project APE: Seaboard Air Line Railroad (8PB12917) within the current project APE. The segment of this resource, within the project APE was recorded in 2010 but was not evaluated by the SHPO. Therefore, an updated FMSF form was completed for this resource and is included in the Cultural Resource Assessment Survey (CRAS). The current survey considers the segment of the Seaboard Air Line Railroad (8PD12917) within the current project APE to be National Register–eligible under Criterion A in the categories of Transportation and Community Planning and Development.

The fourteen newly recorded resources (8PB18592-8PB18605) were identified. Of those, thirteen are Masonry Vernacular style buildings and one is Mid-Century Modern. Only one of the fourteen newly recorded resources is considered to be National Register-eligible: First Federal Savings and Loan Association (Chase Bank) (8PB18601) at 1300 W Lantana Road. This building is a well-intact example of Mid-Century Modern architecture. It is a rare example of this style of architecture within the Lantana area, in which there are few well-intact Mid-Century Modern style structures. Due to its high integrity and significance as a rare example of this style of architecture in the area, the First Federal Savings and Loan Association (Chase Bank) (8PB18601) at 1300 W Lantana Road is considered eligible for listing in the National Register under Criterion C in the area of Architecture. A sliver of right of way is required along the roadway adjacent to the Chase Bank only for Build Alternatives 1 and 3, but not Build Alternative 2. However, no impacts to the building would occur. The other resources within the study area have been determined to be National Register ineligible.

No newly or previously recorded archaeological resources were identified within or adjacent to the project APE. No major impacts are anticipated to either of the resources discussed above.

6.4.3 Section 4(f)

There are no Section 4(f) properties are located within or adjacent to the project limits and no use of Section 4(f) properties is expected.

6.4.4 Threatened & Endangered Species

The project lies within the United States Fish and Wildlife Service (USFWS) Consultation Area for the Florida Scrub Jay (*Aphelocoma coerulescens*) and within the Core Foraging Area (CFA) for four (4) wood stork (*Mycteria Americana*) rookeries. The project is not within USFWS designated Critical Habitat; however, Lake Osborne to the west of the project is a Critical Habitat for the

West Indian manatee (*Trichechus manatus*). The Eastern indigo snake also has the potential to occur within the project area. The project area is commercially developed and there is little to no suitable habitat or resources for these species and no in-water work is proposed. Therefore, no involvement regarding these protected species is anticipated.

Gopher tortoises (*Gopherus polyphemus*) were observed during the field review along the west side of the railway and south side of Lantana Boulevard, on the property located at 1810 Lantana Road. All three Alternatives include widening to the south of the railway to accommodate additional lanes to the I-95 southbound on-ramp. An updated gopher tortoise survey is required prior to construction.

A detailed evaluation of protected species in the project area is included in the Protected Species and Habitat Evaluation section of the Natural Resources Evaluation (NRE) report.

6.4.5 Essential Fish Habitat

The project area does not include any essential fish habitat (EFH) or any critical habitat under the purview of the National Marine Fisheries Service (NMFS). Therefore, no impacts to EFH are anticipated.

6.4.6 Wetlands and Other Surface Waters

There are several man-made drainage features within the I-95 right of way, including one dry detention pond located under the I-95 southbound off-ramp to Lantana Road. These drainage features, which are permitted for stormwater management, may be inundated during the rainy season and after heavy storm events and may include herbaceous, hydrophytic, emergent vegetation. However, there are no naturally occurring wetlands within the project limits. A detailed evaluation is included in the wetlands section of the NRE prepared as part of the PD&E Study.

6.4.7 Water Quality

No impaired waters are located within the project area. However, the project discharges to Lake Osborne (WBID 3265A) which is impaired for nutrients. Also, the E-4 Canal (WBID 3262), which is impaired for nutrients, runs through Lake Osborne. A Water Quality Impact Evaluation was conducted as part of the PD&E Study. Based on the evaluation, minimal involvement regarding water quality and quantity is anticipated for the following reasons:

1) Additional stormwater treatment is included for additional impervious area.
2) The project is designed to meet state water quality and quantity standards; and,
3) Construction related disturbances are anticipated to be minimal and temporary and best management practices will be utilized during construction.

The project limits lie within the boundaries of the recharge area for the Biscayne Sole Source Aquifer, the principal drinking water source for the area. In accordance with the Sole Source Aquifer Program, authorized by Section 1424(e) of the Safe Drinking Water Act of 1974, FDOT requested concurrence from the EPA regarding potential impacts to the Biscayne Aquifer. On January 5, 2021, the EPA concurred that the project is not expected to cause significant impacts to the aquifer system with proper implementation of best management practices (BMPs). These include adherence to the following.

1. FDOT Design Manual Chapter 320 Stormwater Pollution Prevention Plan (SWPPP)
2. FDOT Standard Specification for Road and Bridge Construction,
   a. Section 6 – Control of Materials
   b. Section 104 – Prevention, Control, And Abatement of Erosion and Water Pollution
   c. Section 455 – Structures Foundations
3. U.S. Bureau of Reclamation Engineering Geology Field Manual – Chapter 20 Water Control

6.4.8 Contamination

Contamination Screening Evaluation Report was prepared as part of the PD&E Study. Several potential contamination sites were identified within the vicinity of the SR-9/I-95 and Lantana Road Interchange. Nine potentially contaminated sites are within the screening area. A 500-foot buffer was utilized to search for registered facilities and potential contamination sources, a 1000-foot buffer was used for non-landfill solid waste sites (such as recycling facilities, transfer stations and debris placement areas), and a 1/2-mile buffer was utilized for CERCLA, National Priorities List (NPL) Superfund sites, and landfill sites. All sites were evaluated separately and adjacent activities and conditions, such as surface water and groundwater flows, were considered for each location.

The evaluated sites and associated risk ratings are shown in **Table 6-40.** Risk rating criteria was followed as set per the PD&E Manual (January 14, 2019). Risk ratings were assigned to parcels based on contamination history, contamination type and proximity to the interchange and proposed improvements. For properties that have more than one facility identification number, the risk rating was assigned for the entire property based on the site's overall contamination history.

Five Medium Risk, and three Low Risk potential contamination sites were identified. One site evaluated was determined to be No Risk. The Low Risk sites are primarily sites listed as petroleum spills, hazardous waste sites, or sites with storage tanks which are not anticipated to have contamination impacts based on regulatory record review and/or distance from the project area. The Medium Risk sites are sites which have received Notice of Violations (NOVs) or for which there is unknown information to determine the potential for contamination impacts. The Medium Risk sites should be further evaluated during subsequent phases to determine if contaminants may be disturbed during project activities.

Table 6-40 Contaminated Sites Ranking

Site #	Site Name (Facility ID)	Site Address	Risk/Database(s)	Distance from Corridor	Risk Rating
1	Lake Worth Sanitary Landfill (65859)	1699 Wingfield Street Lake Worth, FL 33460	Inactive Landfill/No Regulatory Files	1,015 feet east of the I-95 right of way	Low
2	Publix Store (9808145)	1589 W Lantana Road Lantana, FL 33462	Above Ground Storage Tank for Generator/FDEP OCULUS, CINEMA	Approx. 400 feet north of Lantana Road and 275 feet east of the I-95 northbound on-ramp	Low
3	Costco Gasoline (9701062)	1873 W Lantana Road Lantana, FL 33462	Underground Storage Tanks (Petroleum)/FDEP OCULUS, CINEMA	Adjacent to SFRC/CSX Railroad just west of the SB I-95 right of way	Medium
4	R&R Transportation Spill (9803549)	I-95 Northbound Lane at Lantana Road (26.588687, -80.069011))	Petroleum Spill/FDEP OCULUS, CINEMA	Within the median of I-95 northbound at Lantana Road	Low
5	Waste MGMT Truck Spill (9803570)	I-95 Southbound Lane at Lantana Road in railroad ROW (26.586821, -80.069739)	Petroleum Spill/FDEP OCULUS, CINEMA	Within the SFRC/CSX Railroad right of way adjacent to southbound I-95	Medium
6	Shell Station (8732176)	1320 Lantana Road Lantana, FL 33462	Underground Storage Tanks (petroleum)/FDEP OCULUS, CINEMA	Adjacent to Lantana Road	Medium
7	Palm Beach Cleaners (9600101)	NA	Former dry cleaner/No regulatory files	Site no longer exists, but was located approximately 330 feet east of the I-95 right of way	No
8	Solid Waste Authority of PBC-Central County Transfer Station (65564)	1810 Lantana Road Lantana, FL 33462	Storage Tanks (diesel)/FDEP OCULUS, CINEMA Solid Waste/FDEP OCULUS, CINEMA	Adjacent to SFRC/CSX Railroad just west of the southbound I-95 right of way and south of Lantana Road	Medium
9	CSX Railroad (No Facility ID)	N/A – Railroad right of way	Hazardous Treatment	Adjacent to southbound I way -95 right of	Medium

There are three existing bridge structures within the project limits. Bridge 930274 is the southbound SR 9/I-95 off-ramp onto Lantana Road, Bridge 930275 is the southbound I-95 on-ramp from Lantana Road, and Bridge 930276 is Lantana Road over SR 9/I-95 & SFRC/CSX Railroad. The superstructure for each of the three bridges consists of a cast-in-place (CIP) deck supported on AASHTO beams. The substructures for the bridges consist of multicolumn piers or pile bents supported by squares pre-stressed 18" concrete piles.

Asbestos surveys were not conducted as part of this PD&E Study. However, asbestos surveys were conducted for all three bridges in July 2011. The surveys determined the presence of asbestos in Class V finish on the three bridges. Subsequently, asbestos removal was performed in 2013 to abate these bridges.

It should also be noted that no LBP surveys were required for this study since the bridges are made of concrete and do not contain any materials that were coated with LBP.

6.4.9 Noise

Noise sensitive receptors are found along most of the east side of the I-95 project limits and north of Lantana Road west of I-95. Most of these noise sensitive receptors are single-family homes and smaller apartment buildings where the noise sensitive areas are primarily yards and patios. These residences are generally all located behind one of three noise barriers found along I-95 within the project limits: two east of I-95 and one west of I-95. An assisted living facility, a private school and an outdoor seating area at a restaurant are also found within approximately 500 feet of I-95. Noise sensitive receptors along Lantana Road include a single-family home, medical offices, and a preschool. Other land uses within the project study area include office buildings, commercial use and industrial/light industrial enterprises that are not considered noise sensitive.

Due to the nature of the planned improvements and the presence of noise barriers adjacent to most of the noise sensitive receptors, noise, and vibration related impacts due to the planned improvements are anticipated to be minor and no additional noise walls are recommended. During construction of the project, there is the potential for noise and vibration impacts to be substantially greater than those resulting from normal traffic operations due to the heavy equipment typically used to build roadways. The detailed traffic noise impact and abatement analysis are provided in the Noise Study Report prepared as part of the PD&E Study.

6.4.10 Landscaping and Aesthetics

Landscaping is provided within the pedestrian island separating the channelized right-turn lane on the northbound on-ramp. The City's welcome/entry sign is located on the southeastern corner between the northbound ramps and Shopping Centre drive. Between Sunset Road and the Southbound ramps at the interchange, there exists nice landscaping with the medians. There is extensive landscaping with large trees along both sides of the roadway behind the pedestrian existing sidewalks.

6.5 PROJECT COSTS AND BENEFITS

6.5.1 Project Cost Estimate

The estimated construction costs were developed for the Lantana Road Interchange Alternatives using the FDOT Long Range Estimates (LRE) Program. Design Engineering Costs were estimated at 12% of the total construction cost and Construction Engineering Inspection (CEI) were estimated at 12.5%. Right of way costs were provided by FDOT and include right of way acquisition and business damages. **Table 6-41** reflects the estimated project costs for the Lantana Road Interchange Alternatives.

Table 6-41 Estimated Project Costs for Lantana Road Interchange Alternatives

Costs	No-Action	Build Alternative 1	Build Alternative 2	Build Alternative 3
Roadway Construction Costs	$0.00	$18,400,000	$32,700,000	$30,700,000
Design Engineering Costs (12%)	$0.00	$2,200,000	$3,900,000	$3,700,000
CEI Costs (12.5%)	$0.00	$2,300,000	$4,100,000	$3,800,000
Right of Way Costs	$0.00	$13,300,000	$12,800,000	$13,300,000
Utility Relocation Cost	$0.00	$0.00	$800,000	$0.00
Total Alternative Cost	**$0.00**	**$36,200,000**	**$54,300,000**	**$51,500,000**

6.5.2 Benefit-Cost Analysis

A Benefit to Cost (B/C) Analysis of the proposed improvements was completed for safety and operational benefits. The B/C analysis evaluates the ratio of the cost savings associated with implementation of the proposed improvements over a 20-year life cycle versus the present value construction cost of the proposed improvements.

The cost component represents the total project cost including construction cost, utility relocation costs, right of way costs as well as the design and construction engineering supervision costs. The benefit component represents the savings associated with the projected reduction in crashes due to the proposed improvements. The Crash Reduction Factors (CRF) obtained from the FHWA CMF Clearing house was used to estimate the potential crash savings which was then monetized by applying the average crash cost obtained from the FDM Table 122.6.1. Due to the relatively short arterial segment under consideration, with closely spaced signalized intersections, the potential benefits from travel time savings were not considered.

A 4%-time value for money was utilized to discount and annualize the future costs and benefits over the design periods for the various cost components**. Table 6-42** shows the benefit cost analysis for the different Build Alternatives.

Table 6-42 Benefit Cost Analysis for Lantana Road Interchange Alternatives

Alternative	Annual Cost	Annual Benefit	Benefit Cost Ratio (B/C)	Net Present Value (NPV)
Build Alternative 1	$2,302,149.20	$2,675,278.71	1.16	$5,070,951.81
Build Alternative 2	$3,708,073.85	$6,288,221.29	1.70	$35,065,045.73
Build Alternative 3	$3,478,342.85	$2,675,278.71	0.77	-$10,913,903.74

Based on the results of the benefit-cost analysis, Build Alternative 2 has the best benefit-cost ratio of 1.70. Build Alternative 1 is next with a benefit-cost ratio of 1.16 and finally Build Alternative 3 with a benefit-cost ratio of 0.77. The detailed benefit cost analysis including the specific CRF used for the analysis are provided in **Appendix E.**

6.6 EVALUATION OF ALTERNATIVES

6.6.1 Comparative Analysis

A comparative (qualitative) analysis of the advantages and disadvantages for the No-Action and Build Alternatives was conducted based on the engineering and environmental impacts of the alternatives discussed previously. **Table 6-43** presents a summary of this analysis.

Table 6-43 Evaluation Matrix

	Evaluation Factors	No-Action Alternative	Build Alternative 1	Build Alternative 2	Build Alternative 3
Traffic & Safety	**Level of Service I-95 Ramp terminals**	Overall **LOS F** (NB & SB) SB and NB approaches operate at **LOS F**	Overall LOS C (NB) and LOS D (SB). NB and SB approaches operate at **LOS E**	Overall LOS C (NB & SB)	Overall LOS D (NB) and LOS C (SB)
	Queue Spillback onto I-95 Mainline	NB and SB Ramp queue spillback onto I-95 mainline	Potential queue spillback for NB off-ramp	No queue spillback of NB and SB off-ramp	No queue spillback of NB and SB off-ramp
	Safety Benefits	Potential for increased crashes due to congestion	15% reduction in crashes	36% reduction in crashes	15% reduction in crashes
Engineering	**Geometric Compliance to Design Controls**	Several geometric design deficiencies	Design Exceptions required for vertical clearance and vertical alignment	No Design Exceptions required	No Design Exceptions required
	Utility Impacts	None	Impacts to 9 Utilities	Impacts to 10 Utilities. Requires relocation of 2 transmission poles	Impacts to 9 Utilities
	Multimodal (Transit/ Ped/ Bike)	None	Provides Bicycle Lanes along Lantana Road	Provides Bicycle Lanes along Lantana Road	Provides Bicycle Lanes along Lantana Road
			Upgrades deficient ADA curb ramps at High Ridge Rd	Upgrades deficient ADA curb ramps at High Ridge Rd	Upgrades deficient ADA curb ramps at High Ridge Rd
	Access Modifications	Maintains existing access and travel patterns	Access impacts to Sunset Road intersection	Access impacts to Sunset Road intersection with new underpass service road	Access impacts to Sunset Road intersection with new underpass service road
	Maintenance of Traffic	None	Minimum MOT required for bridge widening over SFRC/CSX Railroad	Moderate MOT required to replace bridge over SFRC/CSX Railroad	High MOT required to replace bridge over SFRC/CSX Railroad

Table 6-43 Evaluation Matrix

	Evaluation Factors	No-Action Alternative	Build Alternative 1	Build Alternative 2	Build Alternative 3
Socio-Economic	**R/W & Property Impacts**	None	**9 properties impacted**	**6 properties impacted**	**9 properties impacted**
	Social and Neighborhood Impacts	None	Loss of 16 parking spots at Lantana Shopping Center	Loss of 24 parking spots at Lantana Shopping Center	Loss of 16 parking spots at Lantana Shopping Center
	Economic and Employment Opportunity	None	Enhanced development opportunities with improved mobility	Enhanced development opportunities with improved mobility	Enhanced development opportunities with improved mobility
	Visual & Aesthetic Impacts	None	Low landscape opportunity along roadway embankment	High opportunity for landscape within median	Moderate landscape opportunity along roadway embankment
	Public Comments	None	**Least preferred**	**Most preferred**	**Moderately preferred**
Environment	**Threatened & Endangered Species**	None	No involvement regarding protected species	No involvement regarding protected species	No involvement regarding protected species
	Wetland & Surface Waters	None	None	None	None
	Water Quality	None	Minimal impacts to water quality	Minimal impacts to water quality	Minimal impacts to water quality
	Contamination	None	5 Medium Risk Sites	5 Medium Risk Sites	5 Medium Risk Sites
	Noise	None	Minimal traffic noise	Minimal traffic noise	Minimal traffic noise
Project Cost	**R/W Cost**	None	**$13.3 Million**	**$12.8 Million**	**$13.3 Million**
	Construction Cost	None	**$18.4 Million**	**$32.7 Million**	**$30.7 Million**

6.6.2 Evaluation Matrix

The quantitative evaluation of the Lantana Road Interchange Alternatives was performed based on the multi-criteria evaluation methodology. This methodology involves quantitative analysis to combine the different impacts for each Alternative. These performance criteria are not all monetized and usually have different dimensions (units). Therefore, a ranking scale number was assigned for each evaluation criteria for all Alternatives. The ranking scale used is as follows:

1 = Substantial Negative Effect or Worse Alternative
2 = Generally Negative Effect or Inferior Alternative
3 = Generally No Effect or Moderate Alternative
4 = Generally Positive Effect or Good Alternative
5 = Substantial Positive Effect or Best Alternative

Based on the analysis and evaluation of several key evaluation parameters including traffic operations, safety benefits, access impacts, utility impacts, right of way impacts, environmental impacts, construction costs as well as public comments, Build Alternative 2 with the Diverging Diamond Interchange (DDI) configuration had the highest score due to the significantly higher safety and traffic operational benefits it provides to offset its relatively higher construction cost. The No-Action Alternative had the least score from the evaluation. **Table 6-44** shows the evaluation matrix for the Lantana Road Interchange Alternatives.

Table 6-44 Alternatives Evaluation Matrix

Evaluation Factors		Alternatives			
		No-Action	Build Alternative 1	Build Alternative 2	Build Alternative 3
Traffic	Level of Service	1	3	5	4
	Delay / Queue Removed from I-95 Mainline	1	4	5	4
	Safety Benefits	1	3	5	3
Engineering	Geometric Compliance to Design Controls	1	3	4	4
	Utility Impacts	3	2	1	2
	Multimodal (Transit/Pedestrian /Bicycle)	1	4	4	4
	Access Modifications	3	2	3	3
	Maintenance of Traffic	3	2	2	1
Socio-Economic	R/W and Property Impacts	3	1	2	1
	Social & Neighborhood Impacts	3	2	1	2
	Economic & Employment Impacts	3	4	4	4
	Community Services/ Features	3	3	3	3
	Visual & Aesthetics Impacts	3	3	5	4
	Public Comments	1	2	5	3
Environment	Threatened & Endangered Species	3	3	3	3
	Wetland / Surface Water Impacts	3	3	3	3
	Water Quality	3	2	2	2
	Contamination	3	2	2	2
	Noise	3	2	3	2
Cost	R/W Cost	3	1	2	1
	Construction Cost	3	2	1	2
SCORE		**51**	**53**	**65**	**57**
RANKING		**4**	**3**	**1**	**2**

6.6.3 Selection of Preferred Alternative

Based on the comprehensive evaluation performed as part of this PD&E Study, Build Alternative 2 with the Diverging Diamond Interchange (DDI) configuration was selected as the preferred alternative due to the significantly higher safety and traffic operational benefits it provides to offset its relatively higher construction cost. Build Alternative 2 also satisfies the purpose and need of this project and offers several advantages compared to the No-Action Alternative including the following:

- **Reduced Travel Time and Delays:** The traffic operational analysis performed as part of this study indicated that for Build Alternative 2, all the approaches for I-95 ramp terminals will operate at LOS C during both the AM and PM peak periods for the 2045 design years compared to LOS F for the No-Action Alternative. For the Lantana Road ramp terminal approaches, the southbound off-ramp approach will experience 81% 73% reduction in delay whereas the northbound off-ramp approach will experience 80% and 77% reduction in delay compared to the No-Action Alternative for both the AM and PM peak periods, respectively.
- **No Queue Spillback onto I-95 Mainline:** The queuing analysis performed indicated that Build Alternative 2 results in 74% and 88% reduction in queue length at the I-95 SB and NB ramp terminals respectively compared to the No-Action Alternative. The No-Action Alternative will exceed the existing ramp storage by 9% and 27% at the SB and NB off-ramps, respectively.
- **Enhanced Safety & Access Management:** The proposed improvements under Build Alternative 2 are anticipated to result in an overall crash reduction of 35.6% compared to the No-Action Alternative due to DDI configuration. This will significantly enhance the safety within the interchange area. In addition, Build Alternative 2 provides access management improvements along Lantana Road by closing the eastbound left turn at Sunset Road and providing a new access road underneath the reconstructed Lantana Road bridge over the SFRC/CSX Railroad. This proposed underpass road provides alternative access for the existing movements at the Sunset Road Intersection. It also improves traffic operations and safety along Lantana Road by eliminating some of the vehicle conflicts at the intersection. In addition, it also eliminates traffic from the Costco to the adjacent residential communities.

Refer to the Selection of Preferred Alterative Memorandum in **Appendix F**.

7.0 PUBLIC INVOLVEMENT AND COORDINATION

7.1 PUBLIC INVOLVEMENT PLAN

A comprehensive Public Involvement Program (PIP) was initiated as part of this PD&E Study. This program is in compliance with the FDOT's PD&E Manual, Part 1, Chapter 11; Section 339.155, Florida Statutes; Executive Orders 11990 and 11988; Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act; and 23 Code of Federal Regulations 771.

7.2 OUTREACH ACTIVITIES

The following measures were taken to adequately inform the public of the project and to provide them with avenues to communicate their concerns:

- Newspaper Advertisements
- Invitation Letters
- Project Fact Sheet
- Press Releases
- Public Notices
- Project Website (www.fdot.gov/projects/95lantana)
- Agency/Stakeholder Coordination
- Social Media Posts and Notifications

7.3 IDENTIFICATION OF AGENCIES, ELECTED OFFICIALS AND AFFECTED PUBLIC

Federal, state, regional, and local agencies with a direct, expressed interest, or jurisdictional oversight within the project area were identified and contacted by the FDOT through the Advance Notification (AN) process during the Programming Screening event of the ETDM process in accordance with the PD&E Manual, Part 1, Chapter 3, Preliminary Environmental Discussion and Advanced Notification. A contact list was developed including the Environmental Technical Advisory Team (ETAT) Members and federally recognized Native American Tribes.

Local, state, and national interest groups or organizations having a direct or expressed interest in the project study were also identified and contacted by FDOT. As other concerned public interest organizations were identified throughout the study process, they also were listed and contacted.

The mailing list with details of identified agencies, elected officials, appointed officials, and the affected public is included in the Public Involvement Plan.

7.4 AGENCY/STAKEHOLDER COORDINATION

Coordination meetings were held with the following agencies and stakeholders to provide information about the project and solicit feedback:

- South Florida Water Management District
- Town of Lantana
- Palm Beach County (Mayor)
- Palm Beach County (Key Departments)
- Greater Lantana Chamber of Commerce
- Solid Waste Authority of Palm Beach County
- Palm Beach County Transportation Planning Agency

7.5 PROJECT KICK-OFF MEETING

7.5.1 Elected Officials/Agency Kick-Off Meeting

The Elected Officials & Agency Kick-off Meeting for the SR 9/I-95 at Lantana Road, Project Development and Environment (PD&E) Study was held on Tuesday, May 14, 2019, from 2:30 p.m. to 4:30 p.m. The meeting was intended to introduce the study and give local, state, and federal officials and agencies an opportunity to comment and provide initial input on the future transportation improvements. The Kick-Off Meeting began with an open house at 2:30 p.m., with a formal presentation at 3 p.m.

Three elected officials/representatives from the Town of Lantana, Palm Beach County Mayor's office and the State Senator's office attended the meeting. Some of the key discussion points included drainage concerns, additional traffic to be generated by the Water Tower Commons development and construction dates. The details of the Elected Officials/Agency Kick-Off Meeting are provided in the Project Kick-Off Meeting Summary Report.

7.5.2 Public Kick-Off Meeting

The Public Kick-off Meeting for the SR 9/I-95 at Lantana Road Project Development and Environment (PD&E) Study was held on Tuesday, May 14, 2019, from 5:30 p.m. to 7:30 p.m. The meeting was intended to introduce the project to the public and provide an opportunity to discuss the social, environmental, and economic impacts of potential improvements.

Thirty-three people including three FDOT staff attended the meeting. Three written comments were provided by attendees. The discussion focused on additional traffic from the Water Tower Commons development, construction noise and vibration, providing interim improvements along Lantana Road prior to the scheduled construction date, relocation and right of way acquisition, and traffic monitoring during construction. The details of the Public Kick-Off Meeting are provided in the Project Kickoff Summary Report.

7.6 ALTERNATIVE PUBLIC WORKSHOP

The Alternatives Public Workshop for the SR 9/I-95 at Lantana Road, Project Development and Environment (PD&E) Study was held on Wednesday, November 13, 2019, from 5:30 p.m. to 7:30 p.m. The purpose of this meeting was to provide an opportunity for the public to review the 3 preliminary Build Alternatives and the No-Action Alternative and provide feedback on their preferred improvement. The meeting was conducted as an open-house format, allowing the public to arrive at any time within the 2-hour meeting to review the display boards and discuss the project with the study team.

44 people attended the meeting including 19 FDOT and Consultant Team members Florida Department of Transportation. In general, the Attendees were in support of the project to provide the necessary mobility improvements and safety enhancements along Lantana Road. Most attendees identified Build Alternative 2 (Diverging Diamond Interchange (DDI) Configuration) as their preferred choice among the three Build Alternatives presented. Some of the key discussion points included the following:

- Provide an underpass to connect the access roads on the west side of I-95 by extending the bridge over the SFRC Railroad. This will allow for the removal of the EB and NB left turns to enhance safety of the Sunset Road intersection
- Concerns about drainage impacts from proposed improvements on the adjacent residential properties in the southeast quadrant of the interchange.
- Provide an EB acceleration lane or extend the EB to SB storage lane to the Solid Waste Authority access road to “avoid a bottleneck”.
- Need for walkable/livable community consideration.
- Need to provide sufficient capacity to handle the additional traffic associated with Water Common Development

- Signal improvements to enhance mobility.
- Minimize right of way impacts to the medical offices at the SW quadrant of Andrew Redding Road
- Current weaving issues from vehicles exiting the Costco wanting to make a U-turn at High Ridge Road

The details of the Alternatives Public Workshop are provided in the Alternatives Public Workshop Summary Report.

7.7 PUBLIC HEARING

A Hybrid Public Hearing was held on Tuesday, December 15, 2020 and Wednesday, December 16, 2020 with both virtual and in-person components. The virtual public hearing was held on Tuesday, December 15, 2020 on the GoToWebinar platform while the in-person public hearing was held on Wednesday, December 16, 2020 at the Lantana Road Branch Library located at 4020 Lantana Road. Lake Worth, Florida 33462. Both hearings began at 5:30 p.m. with an open house followed by a formal presentation at 6:00 p.m., and a comment period.

The public hearing format was developed in response to COVID-19 pandemic restrictions and in compliance with the FDOT's Public Engagement Interim Process issued on August 3, 2020. The guidelines were predicated on Governor DeSantis' "Safe. Smart. Step-by-Step. Plan for Florida's Recovery" during the COVID-19 pandemic. Prior to the scheduled hearing, a Hybrid Public Hearing Strategy was developed and approved. The strategy detailed estimated attendance based on survey poll and extrapolation of attendance from the two prior public meetings, accommodations to ensure inclusion for members of the public with limited access to technology, as well as strategies to ensure safety at the in-person public hearing.

The survey poll was conducted among property owners within the study limits to gauge the public's readiness in attending the in-person hearing and their preferred participation method. The survey was mailed out on October 10, 2020 with options to complete online at the project website, or by return by prepaid mail. 1000 surveys were mailed out. 31 of these were completed online and 22 were completed and returned by mail. Based on the responses, most attendees opted for the virtual public hearing with a limited number opting to attend the in-person public hearing. A copy of the poll is provided in the Public Hearing Summary Report.

Draft documents were available for public review starting November 24, 2020 and remained accessible at the following locations through December 30, 2020.

- Town of Lantana Town Hall, 500 Greynolds Circle, Lantana, FL 33462
- Lantana Road Branch Library, 4020 Lantana Road, Lake Worth, FL 33462
- Project website: https://www.fdot.gov/projects/95lantana

7.7.1 Virtual Public Hearing

The virtual public hearing began at 5:30 pm with a virtual open house where the project team took attendees through the project displays shown as presentation slides. The open house included a video on the operations of a Diverging Diamond Interchange – The Preferred Alternative, and a simulation on the proposed access changes and its impact on travel patterns. A pre-recorded voiceover presentation was played at 6:00 p.m. The presentation included the project background, Alternatives, Alternatives Evaluation, right of way impacts and schedule. The presentation was followed by a comment period.

55 members of the public pre-registered to attend the virtual public hearing. However, only 23 members of the public and 9 FDOT and consultant team members attended. There was a court reporter present at the virtual public hearing. 11 questions and comments were submitted through the GoToWebinar question pane. In addition, 2 verbal comments were expressed during the formal comment period. One email comment was received after the virtual public hearing. The questions and comments centered on the following:

- Maintaining the Lantana Road access to the Lantana Self Storage during and after construction.
- Impact of increased traffic volume from the proposed underpass service road on the operations of the SWA trucks.
- Travel pattern for SWA trucks accessing northbound I-95 via Lantana Road.
- Noise impacts and provision of additional noise walls to mitigate highway noise along I-95.
- Maintenance of Traffic and access to businesses and property during construction.
- Lighting for the proposed underpass service road.
- Support for Preferred Alternative – DDI for its safety and operational benefits.

The virtual public hearing ended at 6:35 p.m. The details of the virtual public hearing are provided in the Public Hearing Summary Report.

7.7.2 In-Person Public Hearing

The in-person public hearing began at 5:30 pm with an open house where the project team walked attendees through the project displays. A pre-recorded voiceover presentation was played at 6:00 p.m. followed by a comment period. The formal presentation included a video on the operations of a Diverging Diamond Interchange – The Preferred Alternative.

7 members of the public and 11 FDOT and consultant team members were also present the in-person public hearing. There was a court reporter present at the in-person public hearing. 2 verbal comments were expressed during the formal comment period. 2 additional email comments were received after the in-person public hearing. The questions and comments centered on the following:

- Maintaining the Lantana Road access to the Lantana Self Storage during and after construction.
- Right of way impacts at the medical offices located at 1280 Lantana Road. Business owners at this location were concerned that any loss of parking at their property would damage their business.
- Concerns about the drainage impacts and its effect on the adjacent residential neighborhoods.
- Support for the underpass service road to enhance safety at the High Ridge Road and Sunset Road intersections.

The in-person public hearing ended at 6:35 p.m. The details of the in-person public hearing are provided in the Public Hearing Summary Report.

7.8 PUBLIC INVOLVEMENT SUMMARY

A public involvement summary report was produced at the conclusion of each public meeting containing all documentation regarding public participation performed throughout the study period. This summary includes all comments and responses received from the public and coordination with local officials and agencies. Other items included in the summary are a proof of advertisements, meeting notes and sign-in sheets, verbatim transcript from the public hearing, public hearing certification, and all public correspondence. The public involvement summary reports for the various public meetings will be kept on file at FDOT District Four.

8.0 PREFERRED ALTERNATIVE

The Preferred Alternative, as illustrated in **Figure 1-2** is Build Alternative 2 – Diverging Diamond Interchange. The diverging diamond concept requires drivers to briefly cross to the left, or opposite side of the road at carefully designed crossover intersections. Drivers travel for a short distance, then cross back to the traditional or right side of the road. This unconventional design allows free-flow movements for the left and right-turns to and from the I-95 ramps onto Lantana Road without crossing the path of opposing traffic. The crossover is made at the signal where the opposing traffic flows split the signal green time. The major advantage of this type of interchange is that the left-turning vehicles do not require a signal phase which makes this a two-phased signal system with more green time for the opposing traffic. In addition to the interchange reconfiguration, the following improvements will be implemented with the preferred alternative:

- Widen Lantana Road to provide 3 lanes in each direction between High Ridge Road and Andrew Redding Road.
- Replace the existing single Lantana Road bridge over I-95 and SFRC/CSX Railroad with two separate bridges over SR 9/I-95 and SFRC/CSX Railroad.
- Replace the existing ramp bridges for the southbound on and off ramps with embankment and MSE walls.
- Provide dual right-turn lanes and dual left-turn lanes for the SR 9/I-95 northbound and southbound off-ramps.
- Provide dual eastbound and westbound right-turn lanes from Lantana Road onto I-95 southbound and northbound on-ramps, respectively.
- Provide dual eastbound and westbound left-turn lanes from Lantana Road onto the I-95 northbound and southbound on-ramps.
- Eliminate eastbound left-turn movement at the Sunset Road intersection, widen the westbound right turn lane at Sunset Road to accommodate design vehicles and provide a directional median opening.
- Provide an underpass road that connects Sunset Road and the existing Solid Waste Authority (SWA) service road underneath the reconstructed Lantana Road Bridge over SFRC/CSX Railroad.
- Provide exclusive southbound and northbound right-turn lane along High Ridge Road.
- Provide 7-foot bicycle lanes and 6-foot sidewalks along Lantana Road in both directions.
- Provide ITS improvements including Arterial Dynamic Message Signs (ADMS), Surveillance and verification CCTV cameras and wrong way detection system for the interchange ramps.

The conceptual layouts that detail the proposed typical sections, horizontal and vertical alignments, bridge improvements and right of way impacts for the Preferred Alternative are provided in **Appendix G**.

8.1 PROPOSED TYPICAL SECTIONS

8.1.1 SR 9/I-95

This project does not include modifications to the SR 9/I-95 mainline. The existing typical section which consists of a ten-lane divided interstate freeway providing four general purpose lanes and one HOV lane separated by a 4-ft buffer in each direction will be maintained. The travel lanes are 12-ft wide with 12-ft paved inside shoulders and 12-ft outside shoulders with 10-ft paved in each direction. The median width is typically 26-ft with a 2-ft raised concrete barrier that divides the roadway. Two auxiliary lanes are provided in the northbound direction and one auxiliary lane is provided in the southbound direction, north of Lantana Road between the Lantana Road and 6th Avenue South interchanges. South of Lantana Road, one auxiliary lane is provided in both directions between the Lantana Road and Hypoluxo Road interchanges. The new Lantana Road bridges over SR 9/I-95 will be constructed such that it can accommodate the future managed lanes planned along this segment of SR 9/I-95. This future managed lane typical section consists of two 12-ft managed lanes and four 12-ft wide general travel lanes in each direction. The managed lanes will be separated from the general-purpose lanes by a 4-ft buffer with tubular makers. There is a 12-ft shoulder on either side of the travel lanes in both directions with a minimum vertical clearance of 16.6-ft. **Figure 8-1** shows the future typical section for the managed lanes along SR 9/I-95 underneath the proposed Lantana Road Bridges.

8.1.2 Lantana Road

Figure 8-3 to **Figure 8-7** show the proposed typical sections for the Preferred Alternative along Lantana Road. The typical section within the study limits consists of three 11-ft to 14-ft wide travel lanes in each direction. They are separated by a landscaped median of varying widths. A 7-ft bicycle lane is provided in each direction next to the roadway. 6-ft sidewalks provided along both sides of the roadway adjacent to the curb and gutter. Between High Ridge Road and Sunset Road, a dedicated right-turn lane is provided in the westbound direction. Two right-turn lanes are provided at the ramp terminal in both the eastbound and westbound direction to connect to SR 9/I-95 on/off ramps. At Andrew Redding Road, one through lane transitions into a right-turn lane in the eastbound direction, providing for two through lanes beyond the intersection.

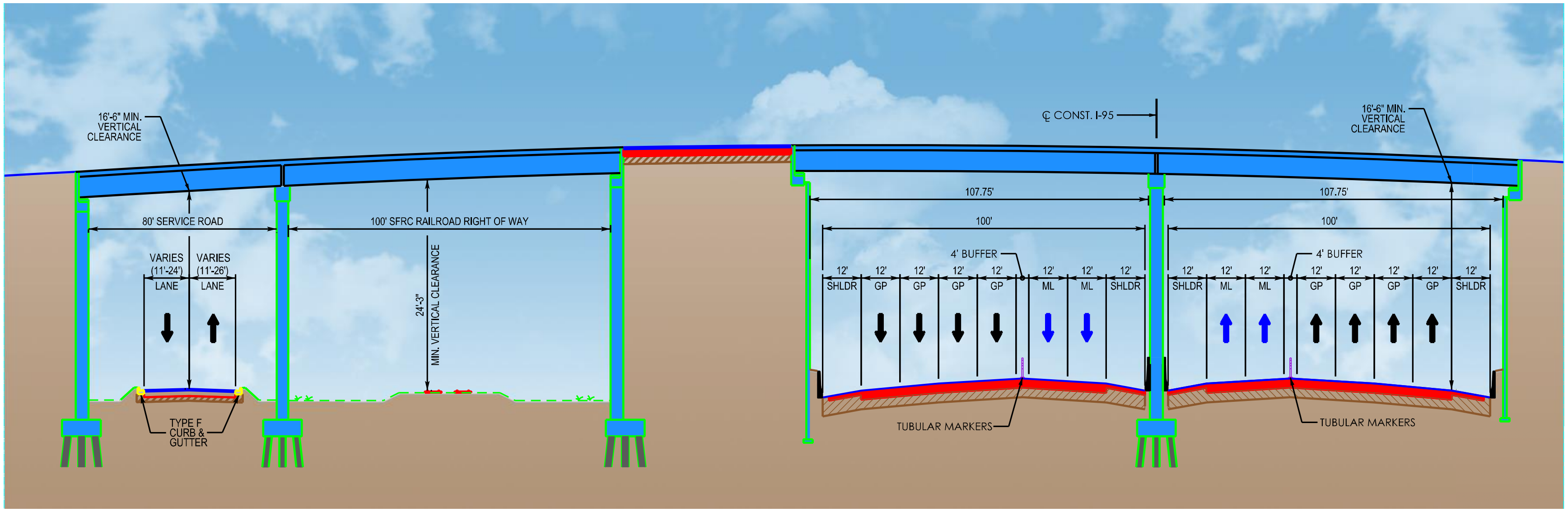


Figure 8-1 Typical Section – I-95 and SFRC/CSX Railroad underneath Lantana Road

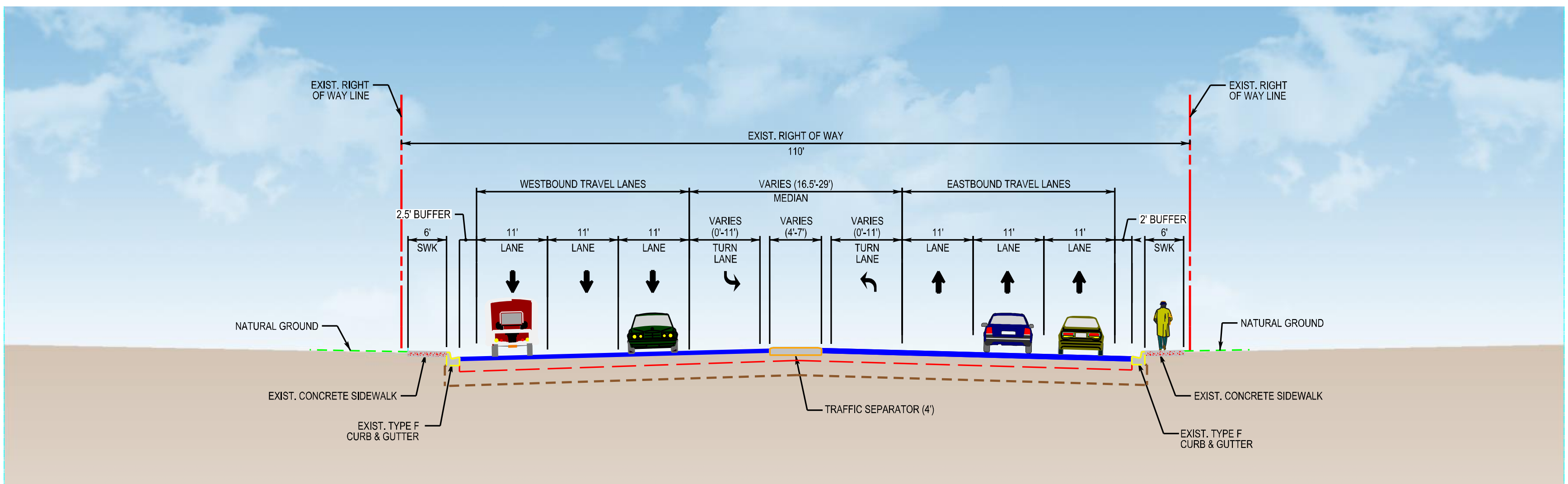


Figure 8-2 Typical Section - Lantana Road west of High Ridge Road

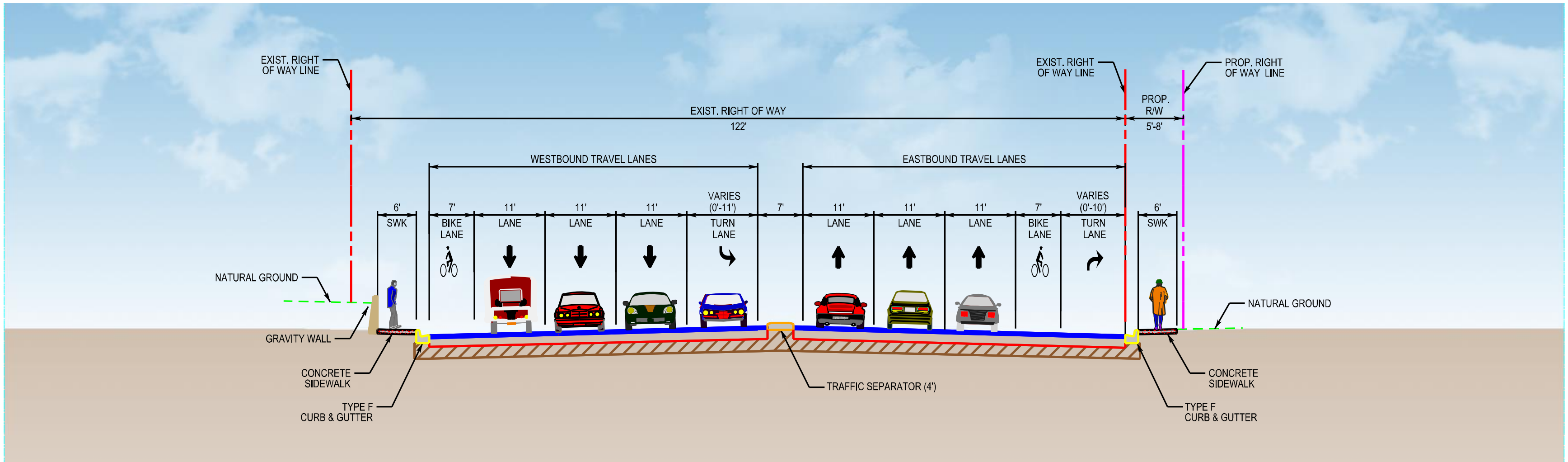


Figure 8-3 Typical Section - Lantana Road from High Ridge Road to Sunset Road

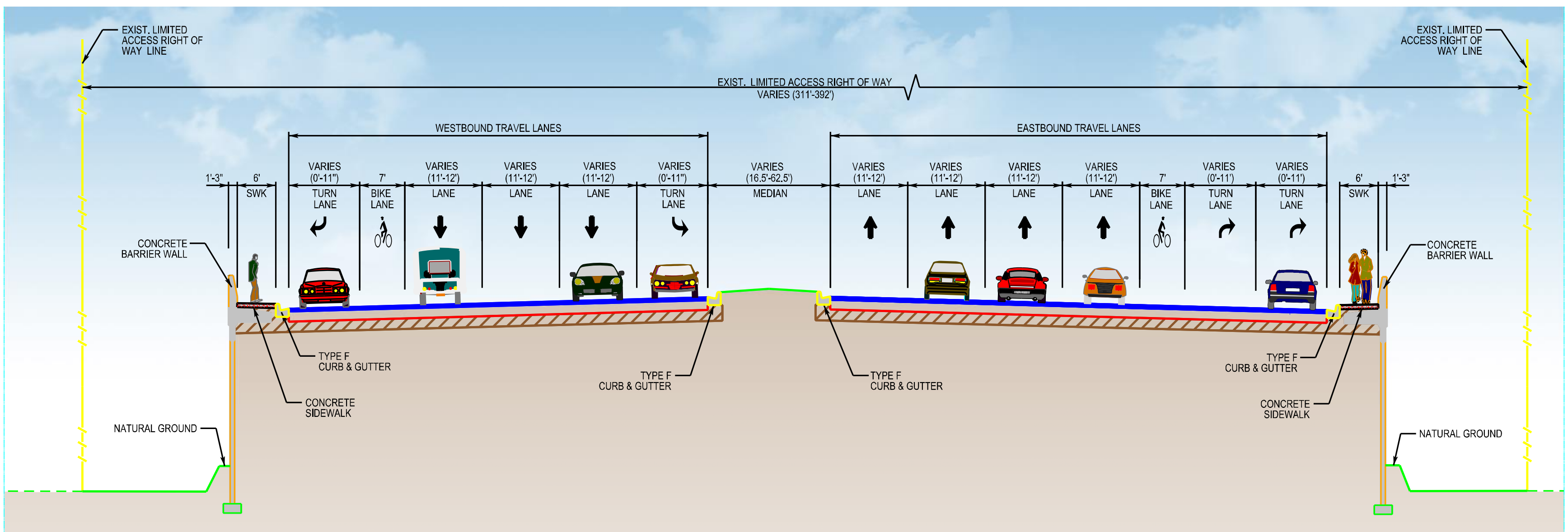


Figure 8-4 Typical Section - Lantana Road from Sunset Road to SR 9/I-95

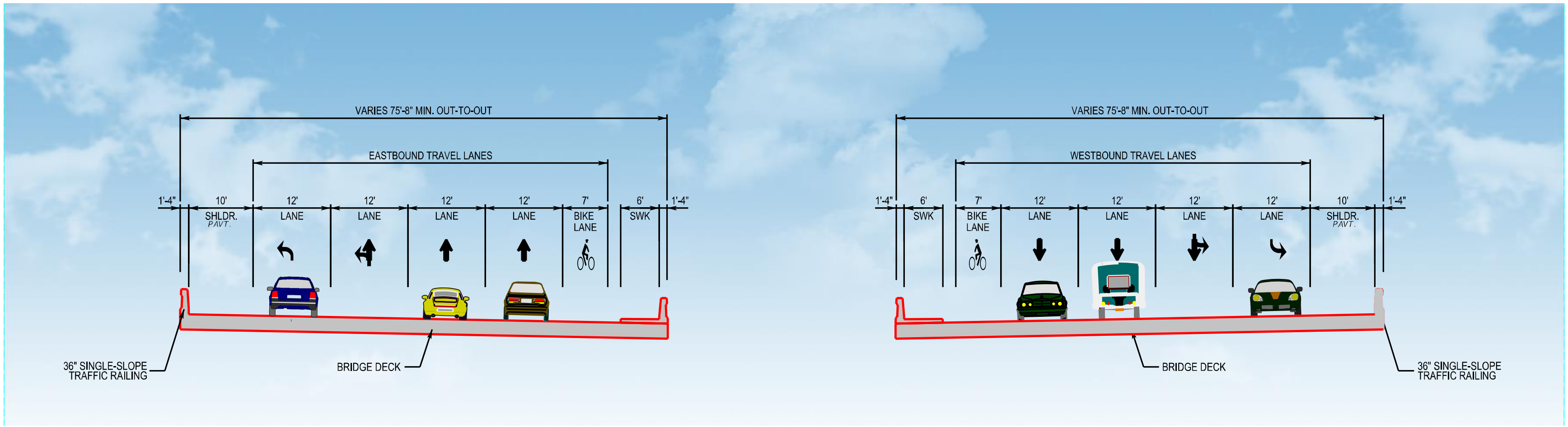


Figure 8-5 Typical Section - Lantana Road Bridge Over SR 9/I-95

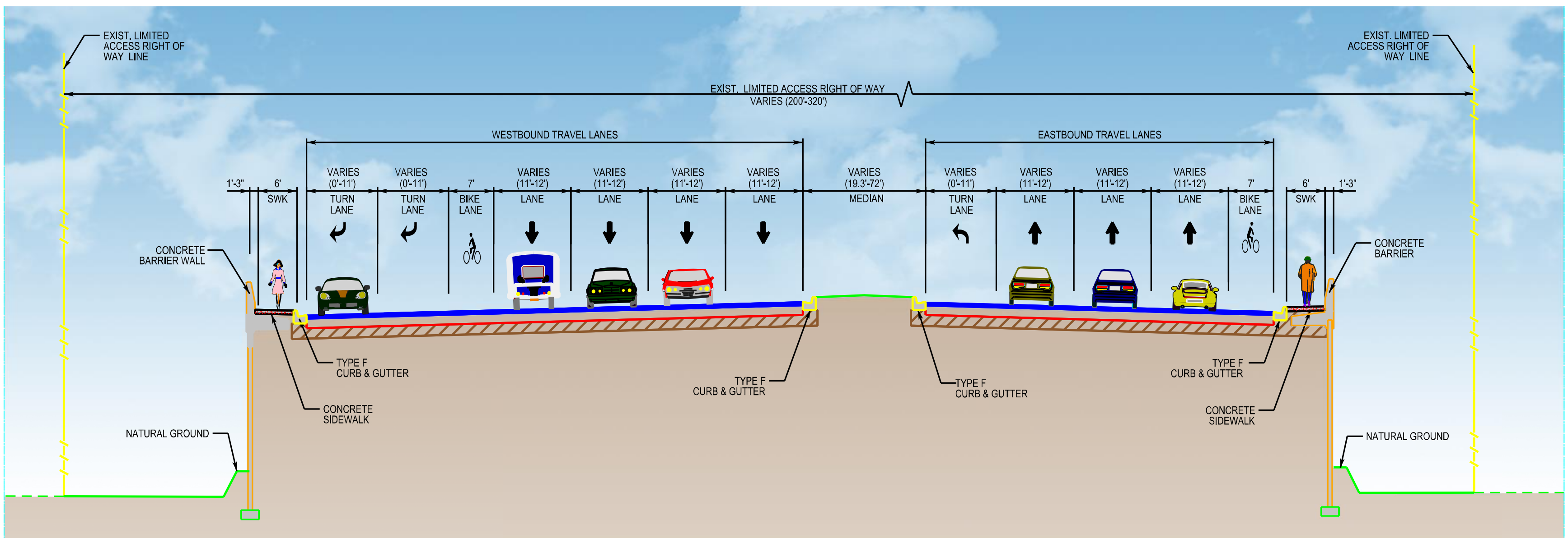


Figure 8-6 Typical Section - Lantana Road from SR 9/I-95 to Shopping Center Drive

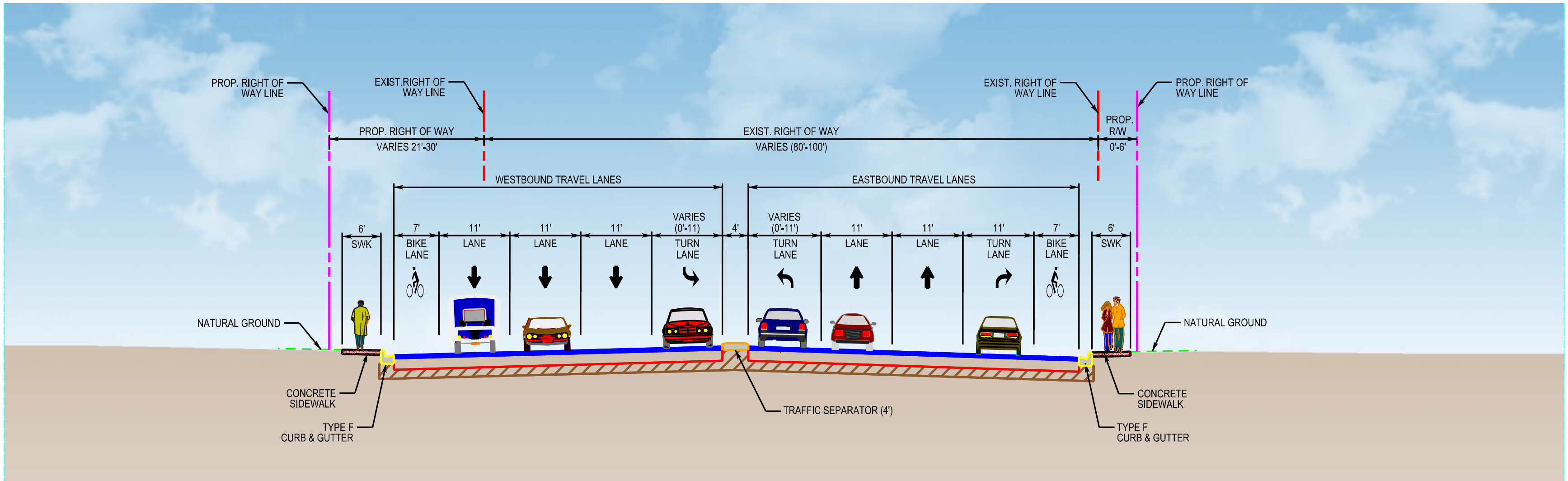


Figure 8-7 Typical Section - Lantana Road from Shopping Center Dr to Andrew Redding Road

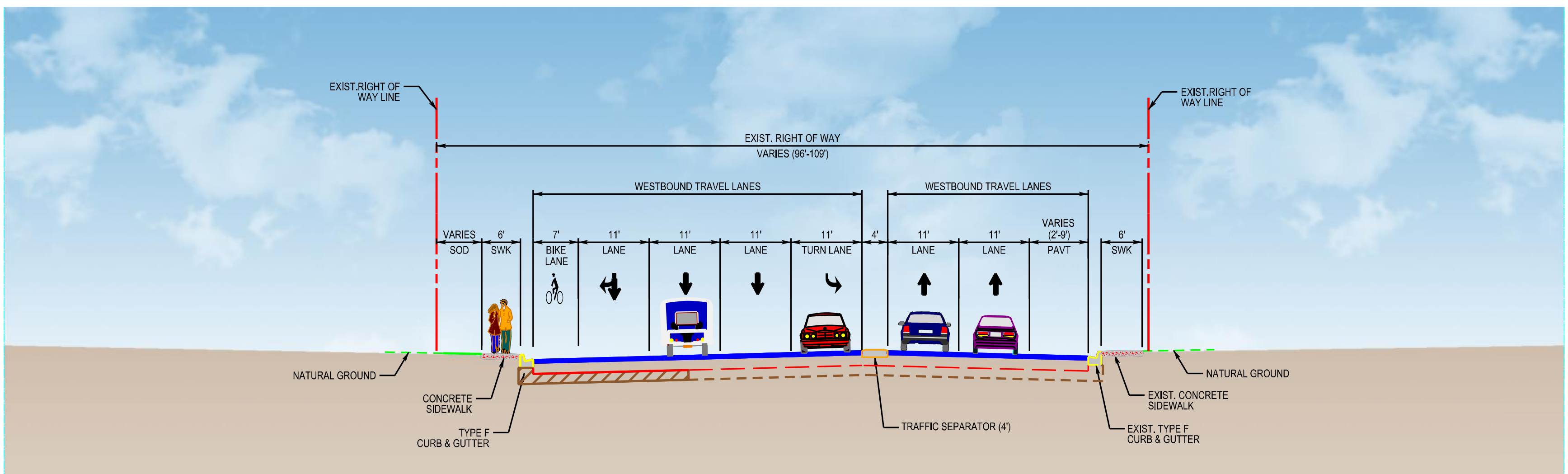


Figure 8-8 Typical Section - Lantana Road west of Andrew Redding Road

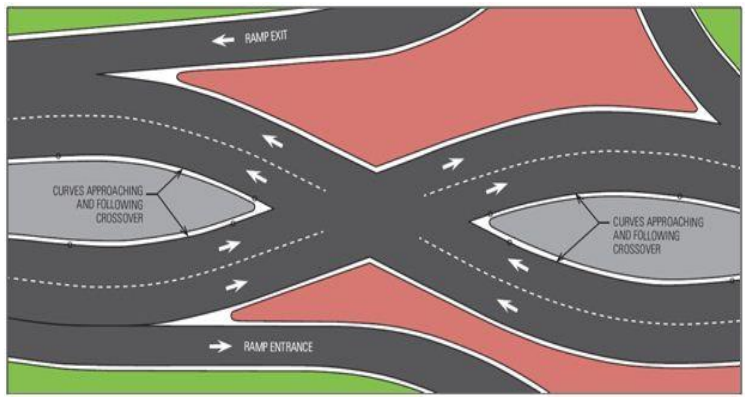
8.2 GEOMETRIC DESIGN

The Diverging Diamond Interchange (DDI) configuration is a relatively new freeway cross-street interchange design. The current FDM or Florida Green Book does not have specific design criteria developed for the DDI. As such, the FHWA *Diverging Diamond Interchange Informational Guide (August 2014)* and *AASHTO Green Book* was utilized as the basis for the DDI geometric design.

8.2.1 Horizontal Alignment

The horizontal alignment for the DDI consist of three main interacting elements: 1) design speed and curve radii approaching and following the crossover; 2) crossing angle; 3) tangent length approaching and following the crossover.

Design Speed and Curve Radii: Design speed at a DDI affects the reverse curve radii and configuration through the two intersection crossovers (see figure on the right). The FHWA DDI Guidelines recommends design speeds range from 25 to 35 mph within the interchange area since the geometry is within the influence of intersections. This correlates to minimum curve radii of approximately 175 to 400-ft. In addition, field observations at five DDI sites documented average free-flow speeds through the crossover movements ranging from of 22.3 to 31.1 mph. Consequently, for this DDI design, a design speed of 35 mph was adopted within the interchange area which is consistent with the FHWA Guidelines (See Design Speed Memorandum in **Appendix H**). The required curve radii were then obtained from the equations (AASTHO Green book) below based on the superelevation rates of +0.2 (Reverse Crown) and -0.2 (Normal Crown) and the corresponding side friction factors.



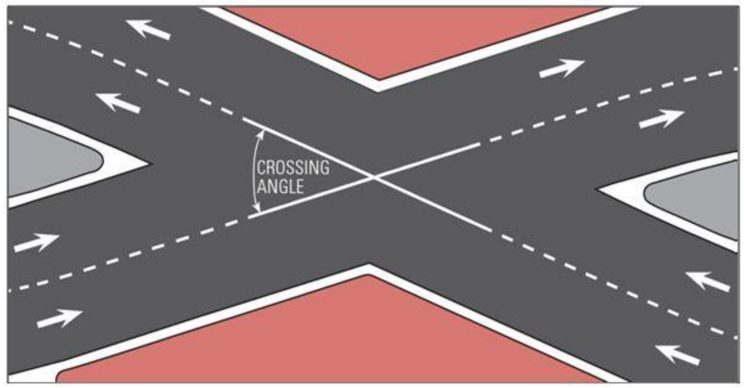
Source: FHWA Diverging Diamond Interchange Informational Guide (2014)

$V = 3.4415R^{0.3861}$ for e = +0.02 (Reverse Crown)

$V = 3.4614R^{0.3673}$ for e = -0.02 (Normal Crown)

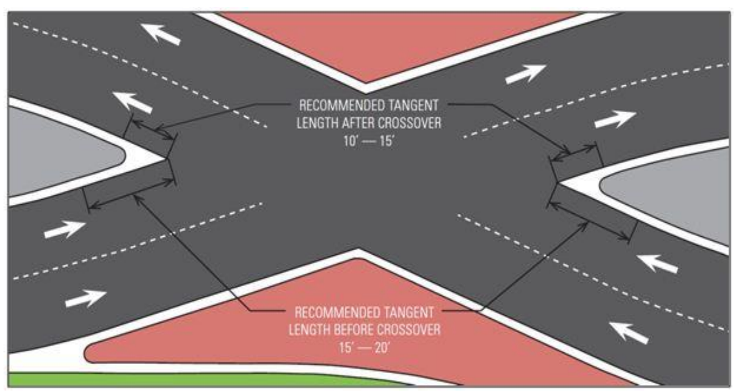
Where:
V = Predicted speed, mph
R = Radius of curve, ft
e = Superelevation, ft/ft

Using the equations above, for 35 mph design speed, the minimum curve radii obtained are 407-ft for reverse crown (RC) and 545-ft for normal crown (NC) and were utilized as the basis for the design of the DDI geometry.



Source: FHWA Diverging Diamond Interchange Informational Guide (2014)

Crossing Angle: The crossing angle is the acute angle between lanes of opposing traffic within the crossover as shown in the figure on the right. It orients drivers to the appropriate lane while decreasing the potential for confusion and wrong way movements. The FHWA DDI Guidelines recommend crossing angle ranges from 40º to 50º. For this DDI Alternative, a minimum crossover angle of 40º was used. This helps minimize wrong way movements at the crossovers. Additional signing and pavement markings were provided at the gore of the crossovers to further discourage wrong turn movements.



Source: FHWA Diverging Diamond Interchange Informational Guide (2014)

Tangent Length: This refers to the approach and receiving tangent segments at the signalized crossovers as shown in the figure on the right. The purpose of this is to align vehicles with their correct receiving lane as they approach the crossover and prevents path overlaps due to the use of reverse curves. A tangent length of approximately 100-ft is recommended within the crossover to guide vehicles to the appropriate receiving lanes through the crossover. It also recommends providing 15-ft to 20-ft of tangent at the approaches and 10-ft to 15-ft tangent at the receiving roadway legs. This DDI Alternative, provides the recommended minimum 100-ft crossover tangent with 20-ft approach and 10-ft receiving tangents.

Table 8-1 summarizes the proposed horizontal geometric characteristics for ramps and along the Lantana Road interchange. As shown in the tables below, the horizontal alignment design elements meet all the design criteria except for horizontal curve length. The detailed horizontal geometry is provided in the Preliminary Concept Plans.

Table 8-1 Proposed Horizontal Alignment for Preferred Alternative

Roadway	Curve No.	Design Speed (mph)	Length (ft)	Radius (ft)	Super-elevation (ft/ft)	Horizontal SSD (ft)	Variation or Exception
DDI Eastbound	EB1	35	152.1	739.0	RC	N/A	None[1]
	EB2	35	314.8	556.0	NC	N/A	None[1]
	EB3	35	153.5	463.0	RC	280	None[1]
	EB4	35	158.2	463.0	RC	280	None[1]
	EB5	35	277.1	545.0	NC	N/A	None[1]
	EB6	35	148.3	575.0	RC	N/A	None[1]
DDI Westbound	WB1	35	153.4	750.0	RC	N/A	None[1]
	WB2	35	265.3	545.0	NC	N/A	None[1]
	WB3	35	174.0	463.0	RC	280	None[1]
	WB4	35	189.6	463.0	NC	280	None[1]
	WB5	35	314.1	556.0	RC	N/A	None[1]
	WB6	35	126.7	739.0	RC	N/A	None[1]
SB On-Ramp (A)	A1	35	877.5	16,000.0	NC	1,765	None
NB On-Ramp (C)	C2	35	1,055.9	16,500.0	NC	1,780	None
	C3	35	1,440.0	24,442.3	NC	2,166	None

Note
1 - A design variation is not required for horizontal curve length for the DDI since is within the influence area of the interchange. The 400-foot minimum criteria is for open road conditions and does not apply to the DDI interchange.

8.2.2 Vertical Alignment

Table 8-2 summarizes the proposed vertical alignment characteristics for the SR 9/I-95 ramps and Lantana Road for the Preferred Alternative. The table indicates that all the proposed vertical curves along the interchange ramps and Lantana Road meet the current design criteria for the respective design speeds.

Table 8-2 Proposed Vertical Alignment for Preferred Alternative

Roadway	PI Station	Design Speed (mph)	Curve Type	Δ G (%)	Length (ft)	Max. Grade (%)	K-Value	Vertical SSD (ft)	Variation or Exception
DDI Eastbound	24+21.92	35	Sag	3.80	500	5.00	132	-	None
	33+08.57	35	Crest	10.00	750	5.00	75	458	None
	42+60.78	35	Sag	4.70	500	5.00	106	-	None
DDI Westbound	14+21.52	35	Sag	3.80	500	5.00	132	-	None
	23+08.57	35	Crest	10.00	750	5.00	75	458	None
	32+67.57	35	Sag	4.70	500	5.00	106	-	None
SB On-Ramp (A)	109+59.79	40	Sag	3.80	243	5.50	64	-	None
	115+70.08	35	Crest	7.92	372	5.50	47	363	None
NB Off-Ramp (B)	204+77.13	50	Sag	3.42	328	3.42	96	-	None
	212+60.20	40	Crest	7.16	501	3.74	70	443	None
NB On-Ramp (C)	302+46.63	35	Crest	8.51	400	4.71	47	363	None
	309+25.83	50	Sag	3.80	365	3.80	96	-	None
SB Off-Ramp (D)	403+70.35	40	Crest	6.83	478	4.80	70	443	None
	412+96.41	50	Sag	3.30	317	4.80	96	-	None

8.3 TRAFFIC ANALYSIS

8.3.1 Project Traffic Volumes

The AADT forecast volumes for this PD&E Study was developed under a separate study – *Traffic Data Collection and Traffic Projections for SR 9/I-95 at Lantana Road PD&E Study, dated December 2017*. The traffic forecasting methodology used for each intersection approach was based on the 2017 AADT obtained from the field as well as 2010 and 2040 SERPM 7.062 model volumes.

The future Directional Design Hour Volumes (DDHV) for the freeways, ramps and arterial segments were calculated from the future AADTs previously discussed, using the recommended D-factor and the standard K-factor, and applying the formula DDHV = AADT x K x D. The Directional Design Hour Volumes (DDHV) obtained were then balanced and smoothened to ensure consistency between the freeways, ramp, and intersection volumes.

The future year turning movement volumes (TMV) for the study intersections were based on the existing turning movement percentages obtained from the field. The latest TMTOOL spreadsheet (Version 2) was used to estimate turning movement volumes for the design years based on projected link volumes and existing turning movements. The turning movement volumes obtained were then balanced and smoothened to ensure consistency between the adjacent intersections as well as taking into consideration the trip distribution from the adjacent Water Tower Commons Development.

Table 8-3 and **Figure 8-9** show the DDHVs for the SR 9/I-95 freeway mainline segments and ramps. **Table 8-4** shows the 2045 DDHVs for the Lantana Road arterial segments while **Figure 8-10** and **Figure 8-11** show the 2045 future turning movements at the study intersections.

Table 8-3 Directional Design Hour Volume (DDHV) for I-95 Mainline and Ramps

Roadway Segment			AADT	Standard K Factor	Recommended D Factor	2045 DDHV			
						AM Peak Hour		PM Peak Hour	
			2045			EB/NB	WB/SB	EB/NB	WB/SB
1	I-95 Mainline	North of Lantana Road	271,000	8.0%	54.3%	11,400	9,625	11,765	10,100
2		South of Lantana Road	275,000			10,880	10,250	11,955	9,815
3	Lantana Road Ramps	NB On-Ramp	12,600	8.0%	100.0%	1,600	-	1,185	-
4		NB Off-Ramp	17,000			1,080	-	1,375	-
5		SB Off-Ramp	16,000	8.0%	100.0%	-	1,200	-	1,540
6		SB On-Ramp	16,000			-	1,825	-	1,255
7	Hypoluxo Road Ramps	NB On-Ramp	18,800	8.0%	100.0%	1,870	-	1,070	-
8		SB Off-Ramp	16,400	8.0%	100.0%	-	1,090	-	1,635
9	6th Avenue S Ramps	NB Off-Ramp	30,800	8.0%	100.0%	1,665	-	2,190	-
10		SB On-Ramp	28,400	8.0%	100.0%		2,275	-	1,540

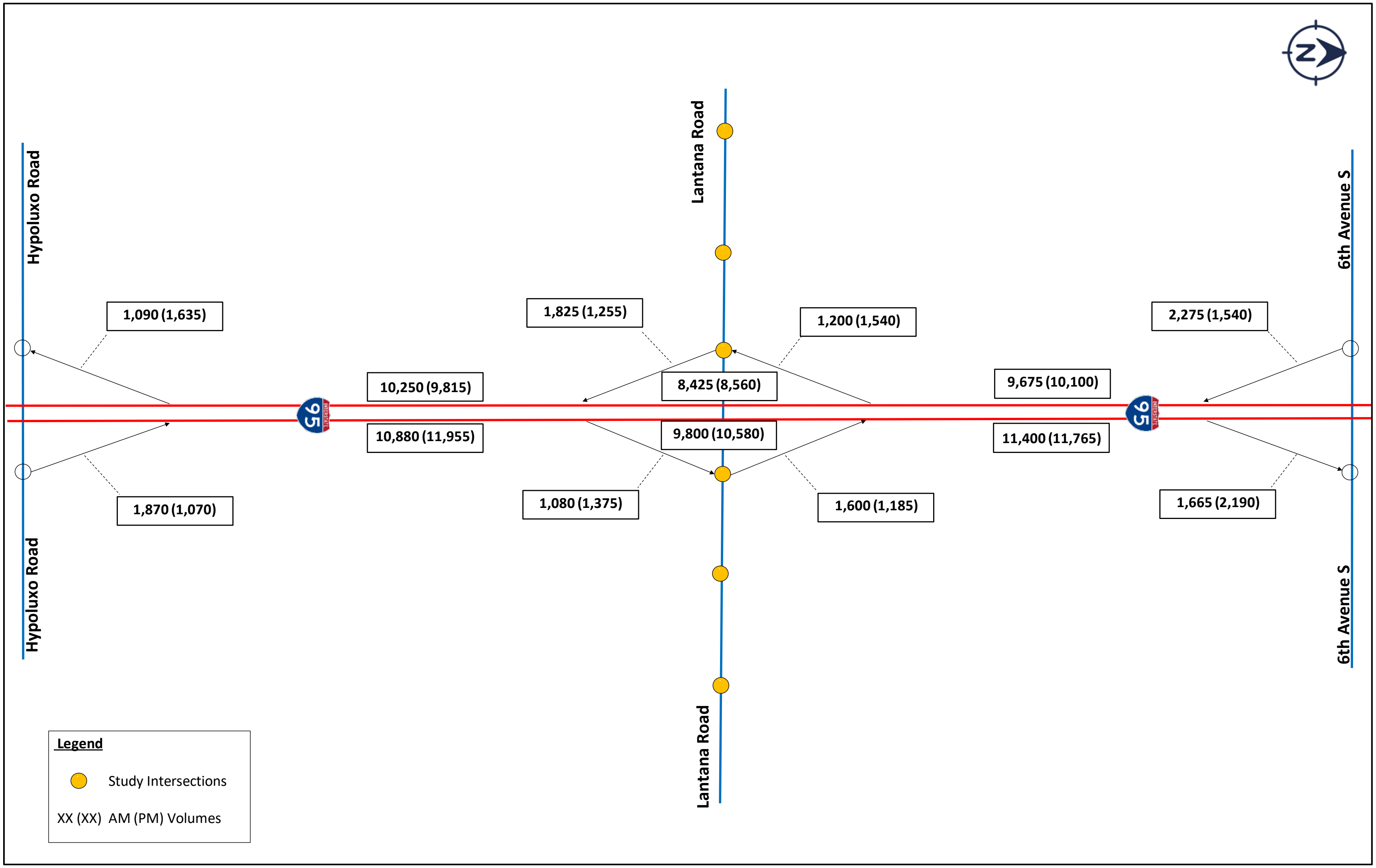


Figure 8-9 2045 DDHVs for I-95 Mainline and Ramps

Table 8-4 Directional Design Hour Volume (DDHV) for Lantana Road									
Roadway Segment			2045 AADT Volumes (vpd)	Standard K Factor	Recommended D Factor	2045 DDHV (vph)			
						AM Peak Hour		PM Peak Hour	
						EB/NB	WB/SB	EB/NB	WB/SB
1	Lantana Road	West of High Ridge Road	50,000	9.0%	57.9%	2,759	1,907	1,803	2,927
2		High Ridge Road to Sunset Road	59,000	9.0%	57.9%	3,074	2,053	2,030	2,927
3		Sunset Road to I-95 SB Ramps	53,000	9.0%	57.9%	3,013	2,006	1,951	2,959
4		I-95 SB Ramps to I-95 NB Ramps	58,000	9.0%	57.9%	2,431	2,049	1,850	2,572
5		I-95 NB Ramps to Shopping Centre Drive	53,000	9.0%	57.9%	2,089	2,227	2,045	2,574
6		Shopping Centre Drive to Andrew Redding Road	53,000	9.0%	57.9%	1,812	1,958	1,852	2,291
7		East of Andrew Redding Road	34,000	9.0%	57.9%	1,495	1,570	1,475	1,928
8	High Ridge Road	North of Lantana Road	9,600	9.0%	56.2%	366	447	409	501
9		South of Lantana Road	5,800	9.0%	56.2%	323	234	223	221
10	Sunset Road	North of Lantana Road	6,200	9.0%	60.8%	114	119	325	186
11		South of Lantana Road	2,600	9.0%	60.8%	70	89	91	63
12	Shopping Centre Drive	North of Lantana Road	18,400	9.0%	57.4%	215	195	316	420
13		South of Lantana Road	9,000	9.0%	57.4%	469	457	342	356
14	Andrew Redding Road	North of Lantana Road	15,000	9.0%	55.1%	302	296	341	364
15		South of Lantana Road	7,400	9.0%	55.1%	356	279	350	387

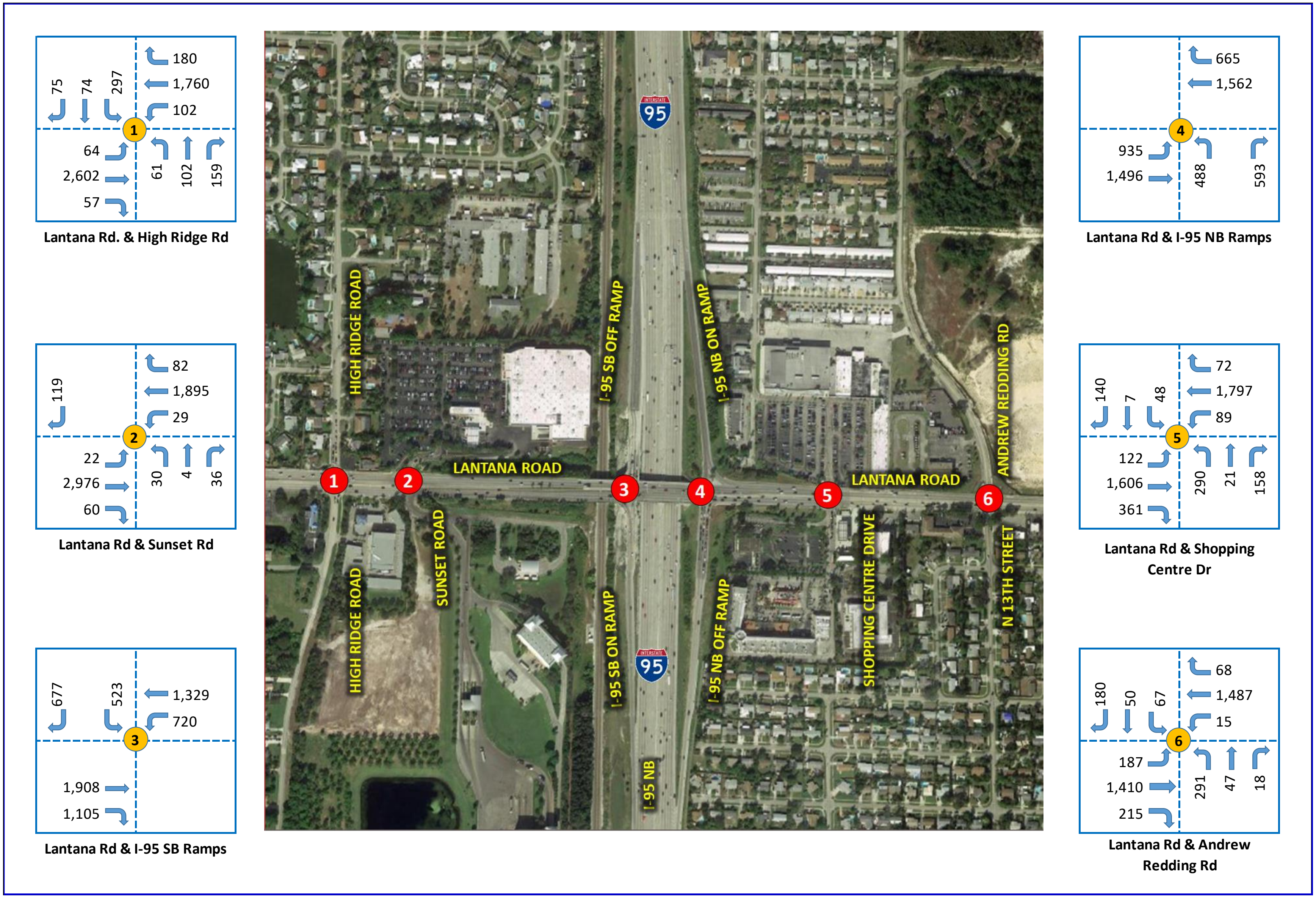


Figure 8-10 2045 Future Intersection Turning Movement Volumes – AM Peak Hour

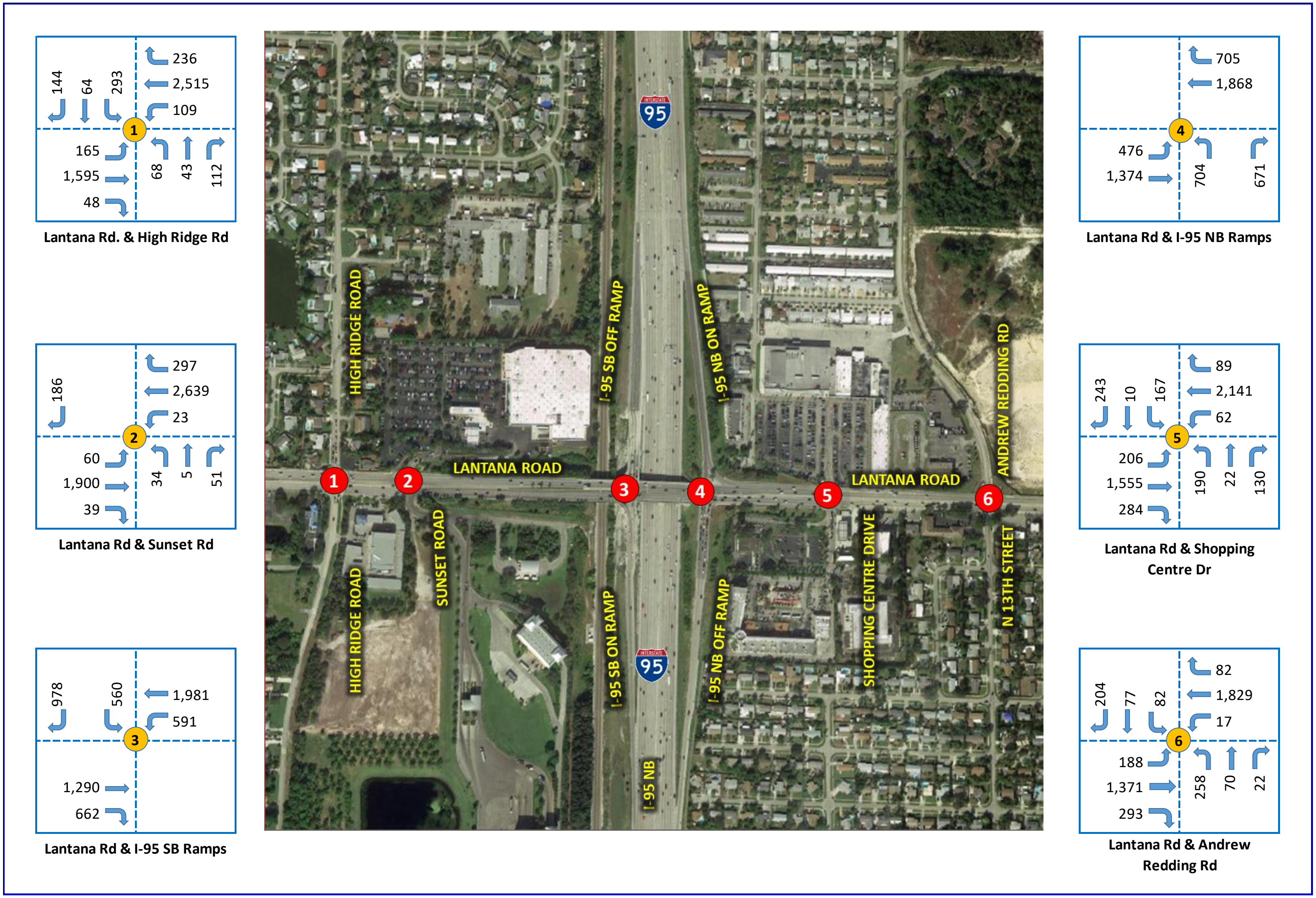


Figure 8-11 2045 Future Intersection Turning Movement Volumes – PM Peak Hour

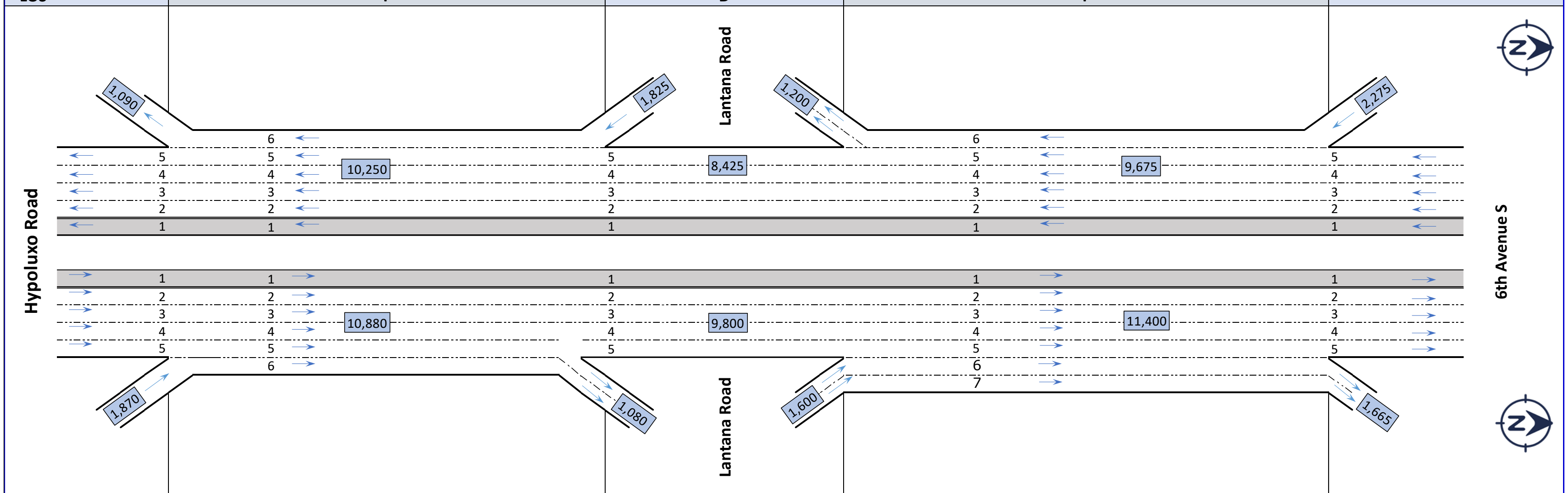
8.3.2 Traffic Operations

A comparative traffic operations analysis was performed for the No-Action Alternative and Preferred Alternative for the freeways and ramps as well as the study intersections for the design year 2045 using Highway Capacity Software (HCS 7), based on Highway Capacity Manual 6th Edition methodology for the AM and PM peak periods. The results of the analysis are as follows:

8.3.2.1 Freeway and Ramps

Based on the analysis results, most of the weaving segments will operate at a LOS F during both AM and PM peak periods except the northbound weaving segment from Hypoluxo Road to Lantana Road, and the southbound weaving segment from 6th Avenue S to Lantana Road which will operate at LOS E during the AM and PM peak periods, respectively. However, the volume to capacity ratios for the weaving segments are better compared to the No-Action conditions. The basic freeway segment between the Lantana Road ramps in both directions will maintain the No-Action LOS conditions since no capacity improvements are being proposed along I-95. It should be noted that, additional future mainline improvements are planned along I-95 to improve the corridor level of service (FM# 444202-1 and FM# 444202-2). The results of the freeway analysis are provided in **Figure 8-12** and **Figure 8-13.**

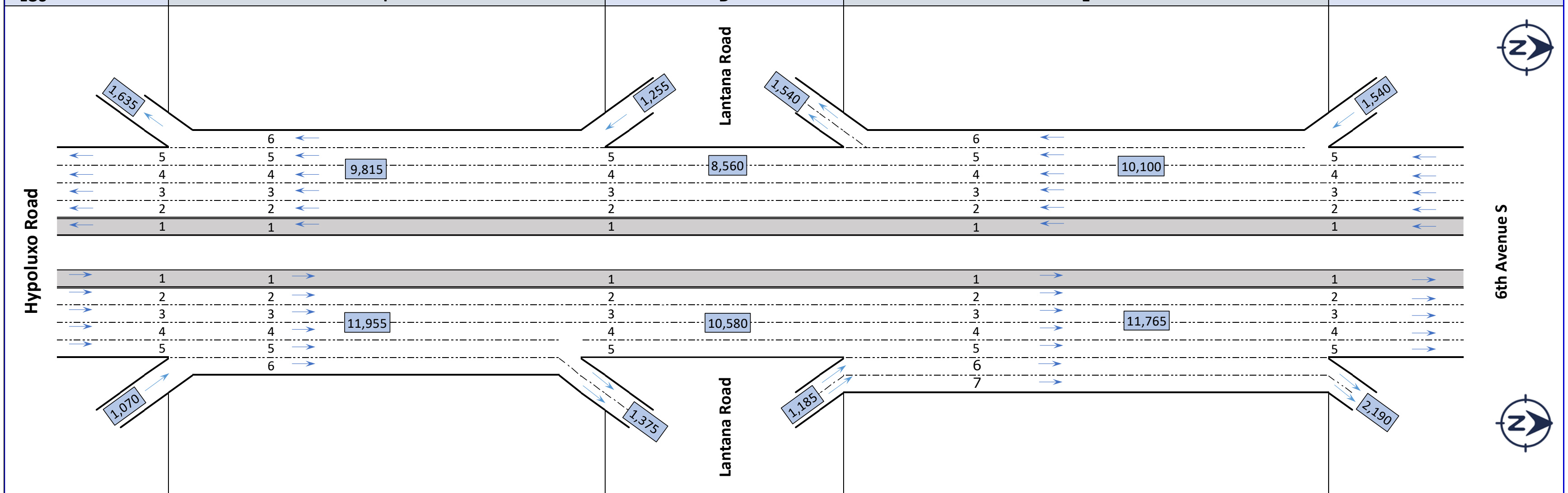
I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	29.0 pc/mi/ln	-	
Speed	-	64.7 mph	-	
V/C Ratio	**1.27**	**0.78**	**1.03**	
LOS	**F**	**D**	**F**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	41.9 pc/mi/ln	40.6 pc/mi/ln	-	
Speed	48.5 mph	55.4 mph	-	
V/C Ratio	**0.90**	**0.95**	**1.42**	
LOS	**E**	**E**	**F**	
I-95 Northbound				

Figure 8-12 2045 Build Freeway Analysis – AM Peak

I-95 Southbound				
Length	2,165-ft	3,065-ft	4,375-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	-	30.8 pc/mi/ln	35.6 pc/mi/ln	
Speed	-	62.0 mph	52.2 mph	
V/C Ratio	**1.26**	**0.81**	**0.92**	
LOS	**F**	**D**	**E**	



Length	2,265-ft	3,165-ft	4,445-ft	
Analysis Type	Weaving	Basic Freeway	Weaving	
Density	43.6 pc/mi/ln	-	-	
Speed	52.0 mph	-	-	
V/C Ratio	**0.97**	**1.04**	**1.47**	
LOS	**F**	**F**	**F**	
I-95 Northbound				

Figure 8-13 2045 Build Freeway Analysis – PM Peak

8.3.2.2 Intersection Operations

The results of the operational analysis at the six study intersections indicates that the intersections experience improved operations with LOS D or better conditions under the Preferred Alternative except for the Sunset Road intersection, which will operate at LOS F during the AM Peak period. At the SR 9/I-95 ramp terminals, LOS F conditions under the No-Action Alternative improve to LOS C conditions under Preferred Alternative during both the AM and PM peak periods for the 2045 design year. (See **Table 8-5).**

Table 8-5 2045 Intersection Level of Service Summary – Preferred Alternative

#	Intersection	No-Action Alternative				Preferred Alternative			
		AM		PM		AM		PM	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	Lantana Rd and High Ridge Rd	62.7	E	75.9	E	36.8	D	44.2	D
2	Lantana Rd & Sunset Rd[1]	OC[2]	F	OC[2]	F	117.0	F	32.9	D
3	Lantana Rd & I-95 SB Ramps	123.4	F	84.8	F	23.0	C	23.2	C
4	Lantana Rd & I-95 NB Ramps	104.4	F	104.1	F	20.5	C	24.0	C
5	Lantana Rd & Shopping Centre Dr.	38.8	D	98.7	F	31.8	C	37.3	D
6	Lantana Rd & Andrew Redding Rd	54.0	D	80.9	F	39.4	D	46.7	D

Notes:
1: Delays and LOS based on northbound approach at Lantana Road and Sunset Road intersection
2: OC = Overcapacity, HCM methodology does not provide delays

The results also indicate that during both the AM and PM peak periods, the SR 9/I-95 ramp terminals will operate at LOS F under the No-Action Alternative with queues in excess of 1,000 feet. These conditions improve to LOS C during both the AM and PM peak periods under the Preferred Alternative with 74% reduction in queues at the southbound ramp terminal and 88% queue reduction at the northbound ramp terminal. The SR 9/I-95 ramp terminals will experience an 81% and 73% reduction in delay at the SB ramp terminal during the AM and PM peak periods respectively and an 80% and 77% reduction in delay at the NB ramp terminal during the AM and

PM peak periods, respectively. In addition, the Preferred Alternative eliminates the storage deficiencies that occur with the No-Action Alternative along the ramp terminals. (See **Table 8-6**).

Table 8-6 SR 9/I-95 Ramp Analysis – Preferred Alternative

Performance Criteria		No-Action Alternative	Preferred Alternative
I-95 SB Ramp Terminal	LOS (AM/PM)	F/F	C/C
	Maximum Intersection Overall Delay (s)	AM: 123.4 PM: 84.8	AM: 23.0 PM: 23.2
	Delay Reduction over No-Action Alternative	-	AM: 81% PM: 73%
	Maximum Queue Length (ft)	#1,015	264
	Storage Deficiency	Yes (9%)	No
	Queue Length Reduction over No-Action Alternative	-	-74%
I-95 NB Ramp Terminal	LOS (AM/PM)	F/F	C/C
	Maximum Intersection Overall Delay (s)	AM: 104.4 PM: 104.1	AM: 20.5 PM: 24.0
	Delay Reduction over No-Action Alternative	-	AM: 80% PM: 77%
	Maximum Queue Length (ft)	#1,191	140
	Storage Deficiency	Yes (27%)	No
	Queue Length Reduction over No-Action Alternative	-	-88%

Note: # 95th percentile volume exceeds capacity, queue may be longer, Queue shown is maximum after two cycles

8.3.2.3 Intersection Queue Lengths

A queuing analysis for 2045 future condition was performed as part of the study to determine the adequacy of the existing left-turn storage lengths for the intersections along the corridor using Synchro 10. The 95th percentile vehicular queue length in feet for the left-turn and right-turn movements at each of the study intersections were obtained. These were compared against the existing storage lengths to identify storage deficiencies where the estimated queue exceeds the existing storage capacity and identifies storage requirements.

The results indicate that the Preferred Alternative, adequately accommodates queues along the ramps without any spillback onto the I-95 mainline. In addition, the Preferred Alternative results in 74% and 88% reduction in queue length at the I-95 SB and NB ramp terminals respectively compared to the No-Action Alternative. However, five approaches out of twenty would continue to experience queues that exceed available storage under the Preferred Alternative. The results of the queue analysis are provided in **Table 8-7.**

Table 8-7 2045 Preferred Alternative Queue Length Analysis

No.	Intersection	Approach		AM	PM	Max Queue Length (ft)	Storage (ft)	Storage Deficiency	% Over Storage
1	High Ridge Road	EB	L	63	211	211	350	No	-
		WB	L	#133	m35	133	200	No	-
		NB	L	88	112	112	200	No	-
			R	121	35	121	150	No	-
		SB	L	#520	#601	601	500	Yes	20%
			R	51	131	131	150	No	-
3	I-95 SB Off-Ramp	EB	R	m213	m128	213	400	No	-
		SB	L	112	84	112	1200	No	-
			R	104	264	264	1200	No	-
4	I-95 NB Off-Ramp	WB	R	m116	m113	116	350	No	-
		NB	L	80	185	185	1100	No	-
			R	97	140	116	1200	No	-
5	Shopping Center Drive	EB	L	135	#340	340	250	Yes	36%
		WB	L	m77	m13	77	200	No	-
		NB	L	89	#387	387	200	Yes	94%
		SB	R	135	278	278	120	Yes	132%
6	Andrew Redding Road	EB	L	#273	m#299	299	340	No	-
		WB	L	34	35	35	180	No	-
		NB	L	#449	#427	449	150	Yes	199%
		SB	R	168	133	168	200	No	-

- 95th percentile volume exceeds capacity; queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

8.4 BICYCLES AND PEDESTRIANS

As part of the proposed improvements with the Preferred Alternative, 7-ft buffered bicycle lanes will be provided along Lantana Road on both sides of the roadway. Existing 5-ft sidewalks along Lantana Road from Sunset Road to Andrew Redding Road would be widened to 6-ft to provide a wider and consistent sidewalk width along the corridor.

Deficient ADA curb ramps at the intersection of High Ridge Road and Andrew Redding Road will be upgraded to ADA compliant curb ramps. In addition, high emphasis crosswalks will be provided at all signalized intersections within the study limits to offer protected pedestrian movements.

For the diverging diamond interchange configuration, the placement of the sidewalks greatly affects the overall design and operation. There are two basic ways to accommodate pedestrians at a DDI. The sidewalks can be placed in the middle of the crossroad between the crossovers or kept on the outside perimeter. For the Preferred Alternative, the pedestrian sidewalks utilize the inside walkway configuration. For this configuration, the sidewalks transition from the outside into the median within the interchange area. This creates 8 signalized conflict points for the DDI compared to 6 signalized conflict points for the TUDI alternative. However, the crossings along the DDI are shorter. In addition, the DDI enables crossing of Lantana Road from north side to the south side and vice versa.

8.5 TRANSIT CONSIDERATIONS

The Preferred Alternative maintains the existing transit service along Lantana Road. Three transit stops are located along Lantana Road just outside the limits of the project. No bus stop relocation is required. The proposed improvements would result in temporary delays during construction activities. However, once completed, the operational improvements provided by the Preferred Alternative would enhance transit operations within the study limits.

8.6 ACCESS MANAGEMENT

There are 6 full median openings along Lantana Road within the project limits. These include 5 signalized intersections at High Ridge Road, SR 9/I-95 SB Ramps, SR 9/I-95 NB Ramps, Shopping Center Drive and Andrew Redding Road and one unsignalized intersection at Sunset Road. These median openings and the spacing between them as well as the recommended changes are summarized in **Table 8-8**.

Table 8-8 Lantana Road Access Management Plan

Existing Median Opening	Mile Post	Existing Conditions			Proposed Conditions		
		Median Opening Type	Existing Spacing (ft)	Deviation from Standard (%)	Recommended Changes	Revised Spacing (ft)	Deviation from Standard (%)
High Ridge Road	2.861	Full (Signal)	0	0	None	0	0
Sunset Road	2.923	Full	327	50%	Change to WB Directional Median Opening with Underpass Service Road	327	50%
SR 9/I-95 SB Ramps	3.118	Full (Signal)	1030	61%	Change to Diverging Diamond Crossover intersections	918	65%
SR 9/I-95 NB Ramps	3.194	Full (Signal)	401	85%		625	76%
Shopping Center Drive	3.295	Full (Signal)	533	80%	None	421	84%
Andrew Redding Road	3.430	Full (Signal)	713	73%	None	713	73%

As shown in the table above, the intersections within the project limits do not meet the access management requirement for Lantana Road. The only unsignalized intersections along the corridor is at Sunset Road. This full median opening provides access to the Costco Warehouse on the northside and the Palm Beach County Solid Waste Authority (SWA) Central Transfer Station on the southside. This intersection is also located only 327-ft east of the High Ridge Road signalized intersection. Based on the safety analysis performed as part of the PD&E Study, the High Ridge Road and Sunset Road intersections account for 67% of the crashes along Lantana Road within the project limits. Some of this safety concern can be attributed to inadequate gaps for eastbound to Costco Warehouse at Sunset Road movement and weaving maneuvers from Costco Warehouse at Sunset Road to access the westbound left turn lane at High Ridge Road intersection to make a U-turn to get onto SR 9/I-95.

To improve mobility while enhancing safety along the project corridor, two access modifications are proposed as part of the improvements with the Preferred Alternative as illustrated in **Figure 8-14.**

1. Eliminate the existing eastbound left-turn at Sunset Road and provide a westbound directional median opening.
2. Provide an underpass service road underneath the reconstructed Lantana Road bridge over the SFRC/CSX Railroad is also provided. This underpass service road connects Sunset

Road on the north side, which provides access to the Costco Warehouse and the existing service road on the south side, which provides access to the Solid Waste Authority (SWA).

The proposed access management modifications will alter existing travel patterns between I-95 and High Ridge Road as follows:

From Costco Wholesale to SR 9/I-95: Motorists traveling from Costco Wholesale to SR 9/I-95 currently use two travel options. The first is to exit Costco along High Ridge Road and turn left at the Lantana Road intersection. The second option is to exit Costco along Lantana Road, weave through 3 lanes of traffic, and make a U-turn at High Ridge Road. This traffic weaving pattern has been identified as one of the safety concerns at this location. The proposed improvement maintains the left turn at High Ridge Road onto Lantana Road but restricts the U-turn at High Ridge Road. Motorist travelling from Costco to SR 9/I-95 can use the proposed underpass service road and loop underneath the Lantana Road bridge over the SFRC/CSX railroad to the intersection of Lantana Road and the SWA service road and proceed to make a right-turn onto eastbound Lantana Road towards the I-95 ramps.

From Eastbound Lantana Road to Costco Wholesale: In the existing conditions, motorists traveling along eastbound Lantana Road can make an eastbound left turn at the median opening at Sunset Road to Costco. This movement was also identified as a safety concern due to the difficulty in judging correctly adequate gaps for the downhill traffic stream to make the left turn maneuver at this intersection. With the proposed improvements, motorists along eastbound Lantana Road would make a right turn onto the SWA service road, make a loop underneath the Lantana Road bridge over the SFRC/CSX railroad, and connect to Sunset Road which provides access to Costco.

From SWA to Westbound Lantana Road: Under the existing conditions, motorists from the SWA can make a left turn at the median opening at the Sunset Road intersection by crossing over three eastbound land three westbound lanes to access westbound Lantana Road. This movement is typically used by heavy slow vehicles which must cross 6 lanes of traffic and has been identified as a safety concern. The proposed access modification eliminates this movement. Motorists would be required to travel east along the proposed service road, make the loop underneath the Lantana Road bridge over the SFRC/CSX railroad, and connect to westbound Lantana Road via right turn movement from the Costco exit.

Although the access modifications proposed will alter existing commute patterns, the new underpass road accommodates all the existing movements at the Sunset Road Intersection while enhancing the safety and operations within this segment of Lantana Road. In addition, it also eliminates traffic from the adjacent residential communities. Other improvements include providing exclusive northbound and southbound right-turn lanes at the High Ridge Road intersection and extending the eastbound left-turn storage length at High Ridge Road. The preferred alternative will also require modification to the existing Wells Fargo ATM Drive-Thru to accommodate the SR 9/I-95 northbound off-ramp to eastbound Lantana Road. The existing access management classifications within the study limits would remain unchanged.

Between Shopping Center Drive and Andrew Redding road, modifications will be made to median to enhance safety. The existing painted median will be replaced by a 4-foot traffic separator in that location. This would not impact existing travel patterns.

The Access Management Memorandum prepared as part of this study is included in **Appendix B**.

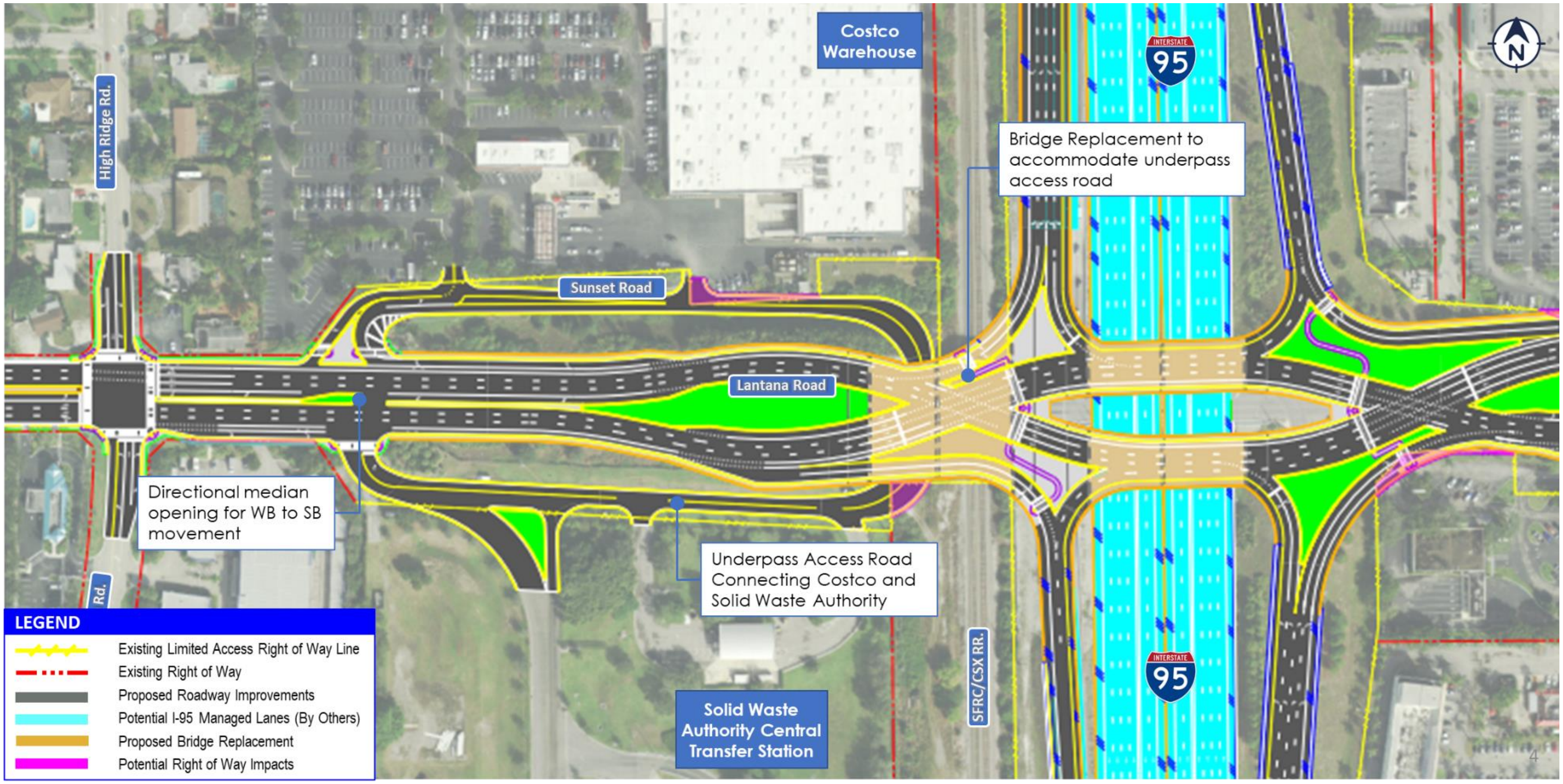


Figure 8-14 Proposed Underpass Service Road

8.7 SIGNALIZATION

There are 5 signalized intersections at High Ridge Road, SR 9/I-95 SB Ramps, SR 9/I-95 NB Ramps, Shopping Center Drive and Andrew Redding Road. The proposed signalization improvements are described below.

8.7.1 High Ridge Road

This intersection serves as the primary access to the Costco Warehouse in the northeast quadrant. On the north side, it also provides access to Lake Osborn Estate, Sunshine Park Academy, Northern Private School and the Finnish-American Village Assisted Living Facility. On the south side, it provides primary access for the Lantana Self storage and the Seacoast Bank. The intersection is recommended to remain as a signalized intersection. However, the existing strain pole signals are recommended to be upgraded to mast arm signals.

8.7.2 SR 9/I-95 NB and SB Ramp Terminals

These intersections provide full access for the SR 9/I-95 at Lantana Road Tight Urban Diamond Interchange (TUDI). As part of the proposed improvements, the existing ramp terminal intersections will be modified to serve as the crossover intersections for the proposed Diverging Diamond Interchange (DDI) configuration. The following movements are signalized at the DDI Ramp terminal intersections mast arm signals.

SB Ramp Terminal

- SB Right Turn
- SB Left Turn
- EB Through
- WB Through
- EB right turn

NB Ramp Terminal

- NB Right Turn
- NB Left Turn
- EB Through
- WB Through
- WB right turn

8.7.3 Shopping Center Drive

This intersection provides primary access to the Lantana Shopping Center on the northside. This shopping center includes several businesses such as Publix Supermarket, AutoZone Auto Parts, Dunkin Doughnuts and SunTrust Bank. On the south side, the intersection serves as the only access for the Wells Fargo Bank, Palm Beach Maritime Academy, Motel 6 Lantana, Dollar General and a McDonald's restaurant. The intersection is recommended to remain as a signalized intersection. However, the existing strain pole signals are recommended to be upgraded to mast arm signals.

8.7.4 Andrew Redding Road:

This intersection serves as one of the primary access for the Water Tower Commons Development. This is a 73-acre mixed-use development with 1,100 residential units and 209,000 square feet of commercial space currently under development. It also provides access to Florida Mentor Nursing Home and the Palm Beach County Public Health Facility on the north side. On the south side, it provides primary access to several residences. The intersection is recommended to remain as a signalized intersection. However, the existing strain pole signals are recommended to be upgraded to mast arm signals.

8.8 LIGHTING

The proposed improvements under the preferred alternative will impact the existing conventional light poles along Lantana Road and the interchange ramps and will require the provision of new conventional light poles with LED luminaires within the project limits. Lighting analysis should be performed as part of the design phase to ensure that the illumination levels meet the current FDOT requirements. In addition, lighting analysis should be performed for the signalized intersections to ensure that both the horizontal and vertical illuminance criteria for pedestrian within the proposed crosswalks are met**. Table 8-9** shows the required lighting criteria for the interstate, ramps, major arterials, and signalized intersections within the project limits.

Table 8-9 Proposed Lighting Design Criteria

Roadway Classification	Illumination Level Average Foot Candle		Illumination Uniformity Ratios		Veiling Luminance Ratio
	Horizontal (H.F.C.)	Vertical (V.F.C.)	Avg./Min.	Max./Min.	$L_V(MAX)/L_{AVG}$
Limited Access Facilities	1.5	N/A	4:1 or Less	10:1 or Less	0.3:1 or Less
Major Arterials	1.5	N/A	4:1 or Less	10:1 or Less	0.3:1 or Less
Signalized Intersection	3.0	2.3	4:1 or Less	10:1 or Less	N/A

8.9 BRIDGE ANALYSIS

A comprehensive analysis of the existing bridge conditions and proposed improvements for each bridge structure was conducted as part of this PD&E study. There are 3 bridge structures within the study limits. As part of this study, each bridge was evaluated to determine if the bridge needed to be replaced, widened, and/or remain in place. This assessment was based on the proposed roadway geometrics and alignment, horizontal and vertical clearance requirements, and structural condition.

The proposed improvements under the Preferred Alternative involve, replacing the existing single Lantana Road bridge over I-95 and SFRC/CSX Railroad with separate bridges. This includes two bridges for Lantana Road over SR 9/I-95, one for westbound traffic and one for eastbound traffic and ne bridge over SFRC/CSX Railroad. The existing ramp bridges for the southbound on and off ramps will also be replaced with embankment and MSE walls. **Table 8-10** summarizes the proposed bridge improvements. The detailed bridge analysis and recommendations are provided in the Bridge Analysis Report.

Table 8-10 Recommended Bridge Structure Treatments

#	Location	Bridge Number	Proposed Improvement	Bridge Width (ft)	Bridge Length (ft)	Depth of Structure (ft)	Minimum Vertical Clearance (ft)	Super-structure Type
1	Lantana Road Over SR 9/I-95 and SFRC Railroad	930276	Replace with two new bridges over SR 9/I-95	73’-0” to 112’-0¼”	227’-0”	5’-5”	16’-6”	18’ Square Prestressed Concrete Piles
			Replace with a new bridge over SFRC	170’-3¾” to 296’-6”	211’-0”	5’-5”	24’-3”	
2	Lantana Road SB On-Ramp Bridge	930274	Replace existing bridge with embankment and MSE Walls	-	-	-	-	-
3	Lantana Road SB Off-Ramp Bridge	930275	Replace existing bridge with embankment and MSE Walls	-	-	-	-	-

8.10 VARIATIONS AND EXCEPTIONS

Based on the preliminary design performed as part of the PD&E study, it is anticipated that a design variation for median width along Lantana Road will be required for transition at the east and west termini to match the existing roadway. This design variation will be further evaluated for approval during the design phase. **Table 8-11** summarize the design variation identified for the Preferred Alternative.

Table 8-11 Design Variations for Preferred Alternative

#	Design Element	Location/Description	Existing	Proposed	Criteria	Comment
1	Median Width	15-ft median width at some sections along Lantana Road to accommodate left turns	12-ft minimum	15-ft minimum	FGB: 22-ft (recommended) 19.5-ft (min)	Transition to match existing roadway

8.11 RAILROAD

The South Florida Rail Corridor (SFRC)/CSX Railroad runs parallel along the west side of SR 9/I-95 and crosses below an elevated section of Lantana Road. The portion of the CSX railway located within the study area consist of two tracks and is owned by the Florida Department of Transportation for use by Tri-Rail commuter trains. As part of the Preferred Alternative, the existing Lantana Road Bridge over SR 9/I-95 and the SFRC/CSX Railroad will be replaced to provide a separate bridge over the SFRC/CSX Railroad. The new bridge will provide a clear envelope over the SFRC/CSX Railroad right of way when placing the bridge piers and abutments to avoid any right of way impacts. Coordination will be required for construction over the railroad tracks to minimize potential impact to rail operations.

8.12 UTILITIES

As part of the PD&E study, 12 Utility Agency Owners (UAOs) known to have operations within the project limits were contacted to obtain information on their respective facilities. **Table 8-12** shows the list of utility companies with potential for involvement within the project study limits.

Table 8-12 Utilities within Project Area

ID	Utility Agency / Owner	Facility Type	Contact Person	Phone	Master Agreement
1	AT&T Florida/BellSouth	Communication	Garth Bedward	(561) 540-9263	No
2	City of Lake Worth-Electric	Power	Jean St. Simon	(561) 586-1699	Yes
3	City of Lake Worth-Water & Sewer	Water/Sewer	Giles Rhoads	(561) 586-1640	Yes
4	Comcast Cable	Cable TV	Anthony Springsteel	(772) 321-3425	No*
5	Crown Castle Fiber	Communication	Danny Haskett	(786) 610-7073	No*
6	FPL - Distribution	Power	Luca Fasani	(561) 685-8786	Yes
7	FPL-Transmission	Power	Tricia D'Annunzio	(561) 904-3560	Yes
8	Florida Public Utilities Co.	Gas	Dale Butcher	(561) 366-1635	Yes
9	MCI/Verizon	Communication	Dean Boyers	(972) 729-6016	No
10	Palm Beach County-Traffic	Traffic	Rod Friedel	(561) 681-4371	No
11	Solid Waste Authority	Waste	Patrick Carroll	(561) 640-4608	No
12	Town of Lantana	Water/Sewer	Darrell Blom	(561) 540-5778	No

**although master agreements with FDOT do not exist under current UAO ownership, master agreements were executed with FDOT under previous ownerships, Comcast ABB Management Corp. and FPL-Fibernet, LLC, respectively.*

The proposed improvement under the Preferred Alternative would impact the Lake Worth Electric Utilities 138kV Overhead Electric Transmission facility that runs north-south along the I-95 western right of way limit adjacent to the SFRC/CSX rail corridor. The transmission poles immediately to the north and south of Lantana Road will need to be relocated to accommodate new ramps. In addition, FPL Poles (13kV conductors) located at the southeast corner of the intersection of High Ridge Road, at the entrance to Sunset Road and immediately to the west of Andrew Redding Road may also be impacted.

AT&T Florida's existing 6-4" PVC duct bank along south of Lantana Road, east of SR 9/I-95 and 4-4" PVC ducts, Handhole, and Manhole located northeast of northbound off-ramp from I-95. In addition, there are existing buried copper and fiber facilities crossing southbound on-ramp to SR 9/I-95 may also be impacted. In addition, the City of Lake Worth watermain and force main located east of High Ridge Road may be impacted. No impact to the private lift station within the Lantana Self Storage property are anticipated.

The FDOT District Four Utility Office will maintain coordination with all the utility providers throughout the subsequent final design phase regarding any potential impacts. Based on early coordination with the utility owners, no significant impacts to the utility services or disruptions of services to area businesses are expected to occur.

8.13 INTELLIGENT TRANSPORTATION SYSTEM (ITS)

Proposed ITS components along Lantana Road interchange include the following systems:

- Two Arterial Dynamic Message Signs (ADMS) – one for EB approach and one for WB approach
- Two verification CCTV cameras, one for each of the ADMS locations
- One surveillance CCTV Camera for the interchange of I-95 & Lantana Road
- Wrong way detection system along proposed ramps

These field elements are connected to District Four's SMART SunGuide® Transportation Management Center via the Fiber Optic Cable (FOC) based Ethernet communication network along I-95. The existing underground infrastructure consists of one 144-count single-mode fiber optic cable SM FOC) in one 2-inch High Density Polyethylene (HDPE) conduit, one 2-inch HDPE spare conduit, and one 2-inch HDPE conduit with electrical service conductors. The proposed underground infrastructure will consist of one 24-count SM FOC in one 2-inch HDPE conduit, one 2-inch HDPE spare conduit, and one 2-inch HDPE conduit with electrical service conductors. The connection point of 24-count SM FOC will be at existing splice vault located along I-95 NB.

Wrong way detection system will be provided at I-95 NB Off-Ramp and I-95 SB Off-Ramps. These LED highlighted solar powered wrong-way detection signs will be communicating via cellular connection to District Four's SMART SunGuide® Transportation Management Center. The locations of these ITS Facilities are provided as part of the Preliminary Concept Plans.

8.14 TRANSPORTATION MANAGEMENT PLAN

Proper traffic control will be critical to minimize impacts to the community and construction cost. Care should be taken to ensure the safety and mobility of both vehicular and pedestrian traffic and impacts to transit, and businesses should be minimized. As part of this PD&E Study, a preliminary traffic control plan for the construction of the proposed improvements under the Preferred Alternative. Due to the high traffic volume along the freeways and interchange ramps, the existing number of travel lanes should be maintained during each construction phase.

However, temporary lane closures may be required in some locations such as overhead construction over existing roadway and will be limited to off -peak hours. In addition, pedestrian detours will also be provided to guide them around the construction zone appropriately.

The preliminary temporary traffic control plan along Lantana Road, for the Preferred Alternative, will be accomplished with three basic phases as follows and illustrated in **Figure 8-15**.

PHASE I: During this phase, traffic will be maintained on the existing travel lanes and the roadway and bridge reconstruction and roadway widening will begin on the south side of Lantana Road. Construction of the proposed MSE walls and drainage along the south side of Lantana Road also be completed during this phase.

PHASE II: During this phase, eastbound traffic will be shifted on to the newly constructed roadway on the south side of Lantana Road and the westbound traffic shifted on to the existing eastbound lanes. Roadway widening and bridge reconstruction will be performed on the north side of Lantana Road. In addition, construction of the proposed MSE walls and drainage along the north side of Lantana Road also be completed during this Phase.

PHASE III: During this phase, shift the westbound traffic onto the newly constructed roadway on the northside of Lantana Road and maintain the eastbound traffic on the newly constructed roadway on the south side of Lantana Road. Perform roadway widening and bridge reconstruction on the inside lanes and median of Lantana Road.

The replacement of the existing bridges along the I-95 Southbound On-Ramp and Off-Ramps can be accomplished in two phases. **PHASE I** will involve shifting traffic to utilize the inside lanes and perform partial bridge demolition, roadway widening and construction of the MSE wall. During **PHASE II**, shift traffic to the newly constructed outside lanes and perform partial bridge demolition, roadway widening and construction of the MSE wall on the inside lane section.

The details of the temporary traffic control plans are included in the conceptual design plans in **Appendix G**.

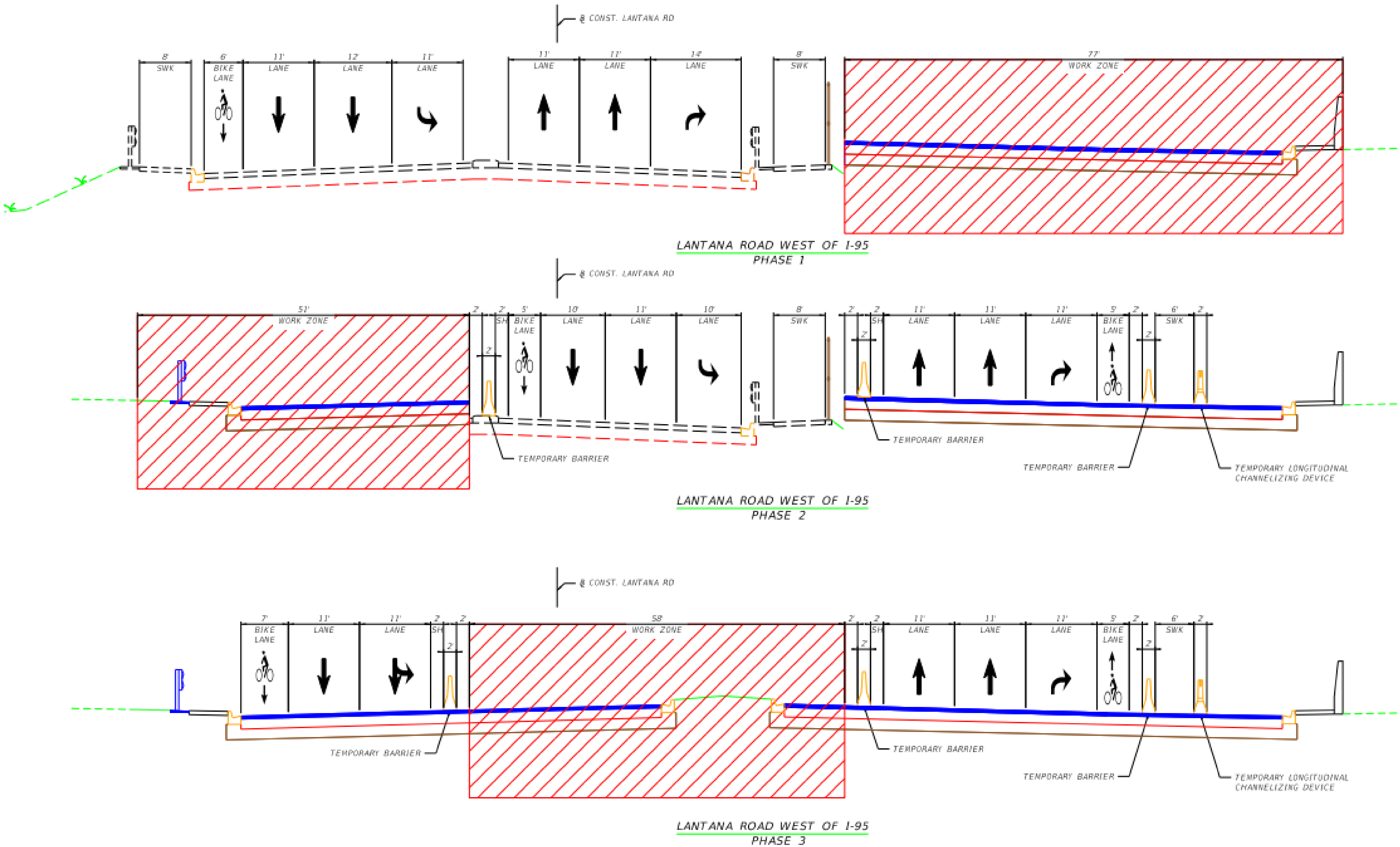


Figure 8-15 Temporary Traffic Control Plan

8.15 DRAINAGE AND FLOODPLAINS

The proposed roadway improvements under the Preferred Alternative will require drainage improvements along Lantana Road and the interchange ramps, including new drainage structures, pipes, and stormwater treatment facilities. In addition to the existing stormwater management facilities that will be impacted from the reconstruction, the project will result in an increase in impervious area.

For **Basin 1**, the improvements will add 2.60 acres of additional impervious area. Treatment and attenuation for the additional 2.82 ac-ft of runoff volume will be provided with 160 linear feet of French drain and a proposed 0.61-acre dry retention pond. The dry retention pond will be located in the swale west of I-95 southbound between the proposed MSE wall for the SB on-ramp and the basin boundary with a depth of 6.5-ft. A total of 2.82 ac-ft of French drains and dry retention is provided for water treatment within this basin.

For **Basin 2** improvements will add 3.02 acres of additional impervious area. Treatment and attenuation for the additional 3.28 ac-ft of runoff volume will be provided with 116 linear feet of French drain and a proposed 0.60-acre dry retention pond. The dry retention pond will be located in the NE Infield between the proposed MSE wall on the I-95 northbound on-ramp and east of I 95 with a depth of 8.0-ft. A total of 3.28 ac-ft of French drains and dry retention is provided for water treatment within this basin.

For **Basin 3**, the proposed improvements will impact the dry detention pond, and the detention volume will be reduced by 76%. The improvements will add 1.50 acres of additional impervious area. Treatment and attenuation for the additional 1.98 ac-ft of runoff volume will be provided with 84 linear feet of French drain and a proposed 0.46-acre dry retention pond. The dry retention pond will be located north of the existing location along the FDOT swale between the proposed MSE wall and basin boundary with a depth of 4.5-ft. A total of 1.98 ac-ft of French drains and dry retention is provided for water treatment within this basin.

The project area is located outside of the 100 and 500-year floodplain (Zone X). Zone X represents areas outside the 500-year flood plain with less than 0.2% annual probability of flooding. There are no regulated floodways within the project limits. As such, there will be no floodplain involvement within Federally designated floodways.

8.16 RIGHT OF WAY

Based on the preliminary design preformed during this study, additional right of way will be required to implement the proposed improvements under the Preferred Alternative. A total of 6 commercial parcels will be impacted. No residential properties will be affected. The right of way acquisition will include partial acquisition of these parcels to accommodate the proposed diverging diamond interchange configuration as well as the 7-ft buffered bike lanes along Lantana Road within the project limits. **Table 8-13** below summarizes the preliminary right of way impacts to the affected parcels along Lantana Road. A graphical representation of the impacted parcels is shown **Figure 8-16**.

Table 8-13 Summary of Right of Way Impacts				
#	Folio	Area of Impact (Sq-ft)	Owner	Property Address
1	40-43-44-33-00-000-7020	2,152 SF	Costco Wholesale Corp	1873 W. Lantana Road Lantana, FL 33462
2	40-43-44-33-15-000-0010	12,792 SF	BT Lantana LLC	1400 W. Lantana Road Lantana, FL 33462
3	40-43-44-33-00-000-5030	9,846 SF	Dept of Health	1299 W. Lantana Road Lantana, FL 33462
4	00-43-45-04-22-000-0000	964 SF	Keepers Self Storage Lantana LLC	1930 Lantana Road Lake Worth, FL 33462
5	40-43-45-04-05-002-0010	1,495 SF	Limestone Wells LLC	1320 W. Lantana Road Lantana, FL 33462
6	40-43-45-04-05-009-0020	439 SF	Lantana Road Investments LLC	1500 W. Lantana Road Lantana, FL 33462

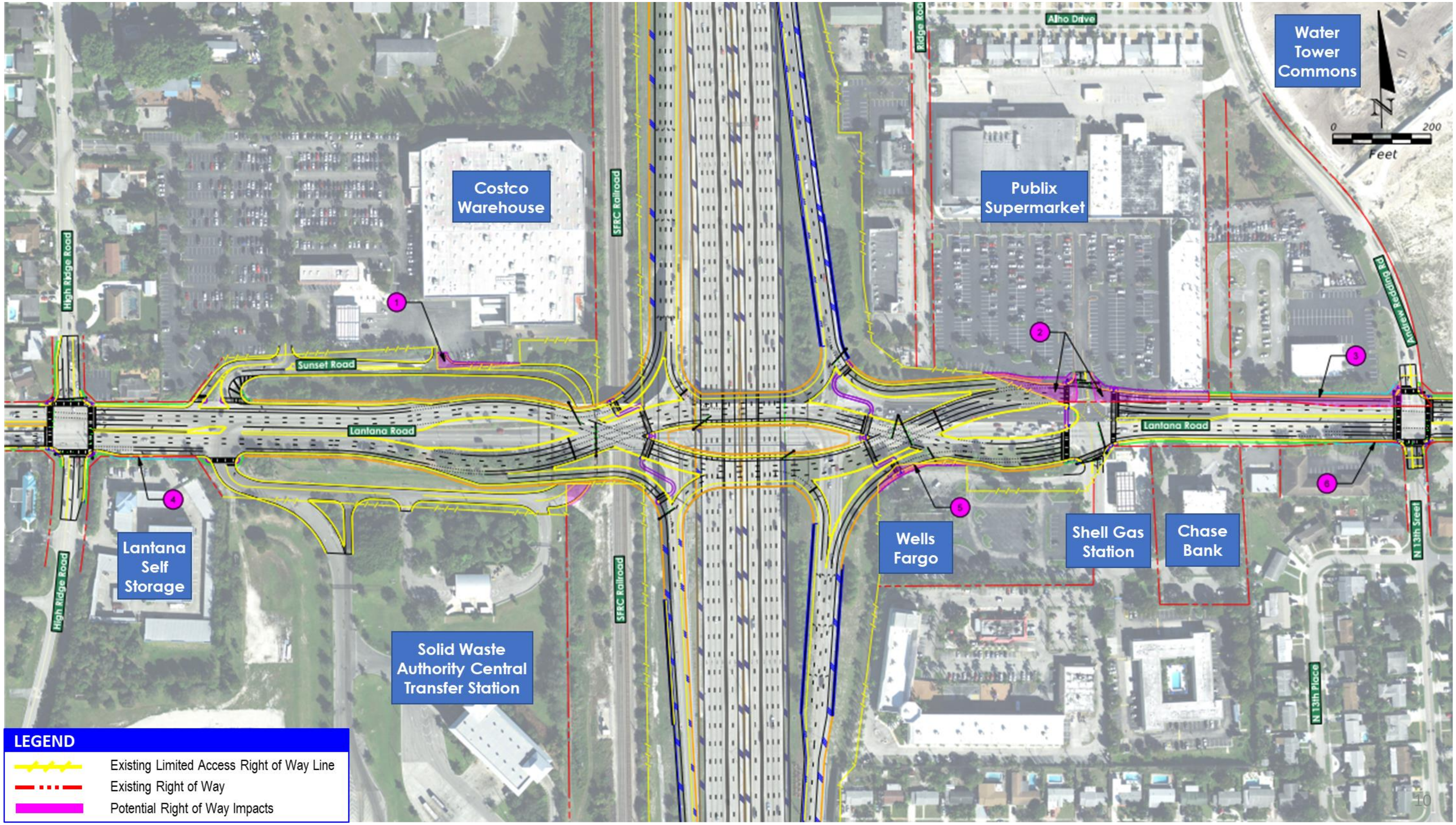


Figure 8-16 Right of Way Impacts for Preferred Alternative

8.17 ENVIRONMENTAL

8.17.1 Social Impacts

Lantana Road is a major east-west corridor in Palm Beach County that provides access to local and commercial businesses, residential communities, religious centers, schools, parks, health facilities and I-95. Land use in the project area encompasses mainly non-public land uses consisting of a mix of institutional areas, industrial areas, residential areas, retail/office areas and vacant use areas. There are areas of public/semi-public land uses directly to the west of I-95 which include the CSX Railroad and the Solid Waste Authority Central Transfer Station. No right of way impacts to residential properties are anticipated. However, impacts to adjacent businesses are anticipated. The Preferred Alternative will impact 6 businesses with significant impact to the Shell gas station (1320 W. Lantana Road). In addition, it will also impact the Wells Fargo Bank ATM Drive-Thru. The proposed improvements will also result in a loss of approximately 24 parking spaces within the Lantana Shopping Center. The overall impacts on the social environment and community cohesion from Preferred Alternative is anticipated to be minimal. In addition, aesthetics, mobility, and the overall economic effects are expected to be enhanced by the implementation of the proposed improvements along Lantana Road and at the I-95 interchange.

8.17.2 Cultural Impacts

Minimal involvement with historical and archeological sites is anticipated due to the commercial land use. A portion of the Seaboard Airline Railroad (8PB12917) intersects Lantana Road to the west of SR 9/I-95. Although this portion of the railroad may have not been recorded previously, the railroads when intact are typically considered to be eligible for inclusion in the National Register based on their historical significance. A right of way corner clip is required along the Seaboard Airline Railroad to accommodate the underpass service road. As such, a Section 4(f) "de minimus" documentation would be completed for this resource. The Chase Bank building (1300 W. Lantana Road, FL 33462) may be considered eligible for listing in the National Register based on age. However, the Preferred Alternative would not impact this property. No other previously recorded historic resources or archaeological sites were identified within or adjacent to the project APE. As such, minimal impacts to Cultural Historical and Archeological resources are expected under all Preferred Alternative.

8.17.3 Natural Impacts

There are thirteen (13) federally or state-listed species with the potential to occur within the project corridor. No natural areas exist within the project area, and the limited habitat available for certain species, including the Florida burrowing owl, Eastern indigo snake and gopher tortoise is degraded. Therefore, no involvement regarding these protected species is anticipated. Furthermore, only the gopher tortoise was observed during the species survey. Prior to construction, a 100% gopher tortoise survey will be completed, and any individuals observed will be relocated. No Essential Fish Habitat (EFH) assessment is required for this project, as this project has no involvement with any areas that support EFH or National Oceanic and Atmospheric Administration (NOAA) trust fishery resources.

No jurisdictional wetlands or other surface waters are located within the project area, therefore no direct or indirect impacts to wetlands are associated with the preferred alternative. One stormwater management feature, a SFWMD detention pond located under the I-95 on/off-ramps and Lantana Road overpass, will be impacted from the conversion of the existing ramp bridges to MSE walls. This impact will reduce storage volume by 76%. To account for the volume loss, and provide additional storage for new impervious area, the pond will be relocated north of the existing location along an FDOT swale. In addition, BMPs for erosion and sedimentation control would be implemented during construction. Overall, impacts to the natural environment within the project corridor are not anticipated due to the highly urbanized nature of the project area.

8.17.4 Physical Impacts

A total of nine potential contamination sites were identified within the project area. Three sites within 500 feet of the project are considered to present 'Low' risk based on their current and historical permits, site use, and regulatory status. This includes those sites which have no records of industrial or storage tank permits and/or no documented contamination events. One site evaluated was determined to have 'No' contamination risk to the project. The remaining five sites were assigned a Medium risk rating for potential contamination concerns. Of the five Medium risk sites, the following three are directly adjacent to or within 500-feet of the recommended improvements.

1. Costco Gasoline (Site #3)
2. Shell Gas Station (Site #6)
3. The CSX Railroad (Site #9)

Partial right of way acquisition will be required from two sites rated as Medium risk (Site #3 and Site #6). Due to the potential for soil and/or groundwater contamination and proposed right of way acquisition at these two adjacent sites, a Level II Contamination Assessment is recommended to determine the extent of contamination. The remaining Medium risk sites are unlikely to have direct involvement with the project; however, these sites should be reevaluated during the Final Design phase.

Approximately 193 residences and eight areas at six special land use sites that have the potential to be impacted by noise from the proposed improvements were identified along I-95 and Lantana Road within the project study area. The residences include single-family residences, smaller apartment complexes and a retirement home. The noise sensitive non-residential areas include an outdoor pavilion, an outdoor seating area at a restaurant, playground areas at two private schools and the interiors of two medical offices and at one of the private schools. Under the existing conditions, the primary source of noise at the nearby noise sensitive sites is traffic on the subject roadways (i.e., I-95 and Lantana Road). Based on the results of the noise analysis, the predicted noise levels approach or exceed the FHWA NAC – 67 dB(A) threshold at one residence on High Ridge Road north of Lantana Road and at a playground of the Sunshine Park Academy on the northeast corner of the Lantana Road/High Ridge Road intersection. Noise barriers were evaluated at these two locations to mitigate noise impacts.

Based on the noise analysis results, the one impacted residence does not meet the FDOT's noise reduction feasibility criterion requiring that a noise barrier must provide a 5.0 dB(A) reduction for at least two impacted receptors to be considered feasible. In addition, the Sunshine Park Academy does not have sufficient usage to meet FDOT's reasonable cost criteria for special use sites ($995,935/person-hours/square-foot). Therefore, noise barriers are not recommended for further consideration or construction at either of these locations.

8.18 LANDSCAPING

The proposed improvements under the Preferred Alternative will impact the existing landscape along Lantana Road. However, these areas will be restored when construction activities are completed. In addition, the wide median provided by the DDI curves provides opportunities for landscaping to enhance the aesthetic appeal of Lantana Road within the vicinity of the project. during the final design phase whenever feasible. It is recommended to incorporate the "Bold Initiative" into the landscape plans during the final design phase whenever feasible. The "Bold Initiative" encourages the use of bold performing landscapes (i.e., large trees with few shrubs if any) that mimic natural processes (i.e., filter air, abate noise, shade pedestrians, conserve energy, provide habitat) and grow in value.

8.19 PRELIMINARY COST ESTIMATES

Preliminary project costs for construction, preliminary engineering (PE), right of way and construction engineering and inspection (CEI) costs were developed for the Preferred Alternative. The estimates included the major cost components typically associated with highway construction including roadway, bridge, and interchange construction. The estimated construction cost was developed using the FDOT Long Range Estimate (LRE). Right of way costs were provided by FDOT and include right of way acquisition and business damages. **Table 8-14** reflects the estimated project costs for the Preferred Alternative. The LRE for the Preferred Alternative is included as **Appendix I.**

Table 8-14 Preliminary Cost Estimates for Roadway Construction

Components	Costs
Roadway Construction Costs	$32,700,000
Design Engineering Costs (12%)	$3,900,000
CEI Costs (12.5%)	$4,100,000
Right of Way Costs	$12,800,000
Utility Relocation Cost	$800,000
Total Alternative Cost	**$54,300,000**

8.20 VALUE ENGINEERING

A Value Engineering (VE) Study was held from March 2, 2020 to March 6, 2020. The purpose of the Value Engineering Study is to ensure that the project objectives are addressed, and the project remains cost effective, constructible, and makes the most efficient use of existing resources. The Value Engineering Report detailing the findings and recommendations from the VE Study Team was submitted to the Florida Department of Transportation District Four on March 17, 2020. **Table 7-19** summarizes the Study Team's responses to the VE Team's recommendations. These recommendations are detailed in the Value Engineering Report included in **Appendix J** together with the Value Engineering Study Responses Memorandum.

Table 8-15 Value Engineering Recommendations

No.	Description	Status	Reason
1A	Shift alignment north to avoid Shell Gas Station, Wells Fargo, Chase Bank, and Dr. Office.	Accepted	The VE Recommendation will eliminate impacts to the Shell Gas Station resulting in significant right of way cost savings. This recommendation needs to be combined with VE Recommendation No. 2
2	Consider approach speed to the intersection from 40 mph to 35 mph and reduce median width.	Accepted	Using a 35 mph design speed results in a smaller footprint for the DDI configuration. This recommendation combined with VE Recommendation No. 1A avoids the Shell Gas Station resulting in significant right of way savings. It also reduces ROW impact to the Lantana Shopping Center.
3	Eliminate the bike lanes in the corridor.	Rejected	The recommendation does not meet the purpose and need of the project which includes providing for multimodal accommodations within the interchange area.
4	Revise the right turn to the Solid Waste Authority (SWA)	Rejected	The existing right turn lane is used by trucks to access Solid Waste Authority (SWA) Central Transfer Station. Elimination of this right turn lane will result in slow moving trucks impeding the traffic flow.
6	Modify existing ramp bridges and reduced MSE wall.	Rejected	The new Lantana Road bridge over I-95 will be constructed approximately 2.5-ft higher elevation to meet the vertical clearance requirement over the SFRC/CSX Railroad. The existing ramp bridges are at a lower elevation and will not tie into the new bridge. As such they will have to be reconstructed. Using MSE walls as proposed under the PD&E Concept will result in a lower cost.
7A	Eliminate sloped abutment and place retaining wall at the right of way line.	Accepted	The VE Recommendation will minimize the bridge length and provide accommodation for the underpass service road connecting the Solid Waste Authority (SWA) and the Costco Warehouse
7B	Eliminate sloped abutment and place retaining wall at west end of bridge.		
9	Consider retaining wall type from MSE wall to steel wall with concrete facia.	Rejected	The use of steel sheet pile walls with concrete facing is more suited for reducing MOT impact for minor widenings when the proposed retaining walls are adjacent to mainline traffic

9.0 LIST OF TECHNICAL REPORTS

Public Involvement

- Public Involvement Plan
- Agency/Public Kick-Off Meeting Summary Report
- Alternatives Public Workshop Summary Report
- Public Hearing Summary Report

Engineering

- Interchange Modification Report (IMR)
- Preliminary Engineering Report (PER)
- Typical Section Package
- Drainage Analysis Report (DAR)
- Location Hydraulics Report (LHR)
- Bridge Analysis Report (BAR)
- Geotechnical Report
- Utilities Assessment Memorandum (UAM)

Environmental

- Sociocultural Effects Evaluation (SCER)
- Natural Resource Evaluation Report (NRER)
- Contamination Screening Evaluation Report (CSER)
- Water Quality Impact Evaluation (WQIE)
- Noise Study Report (NSR)
- Air Quality Technical Memorandum (AQTM)
- Conceptual Stage Relocation Plan (CSRP)
- Cultural Resource Assessment Survey (CRAS)
- Section 4(f) Determination of Applicability

APPENDIX A

(Straight Line Diagram)

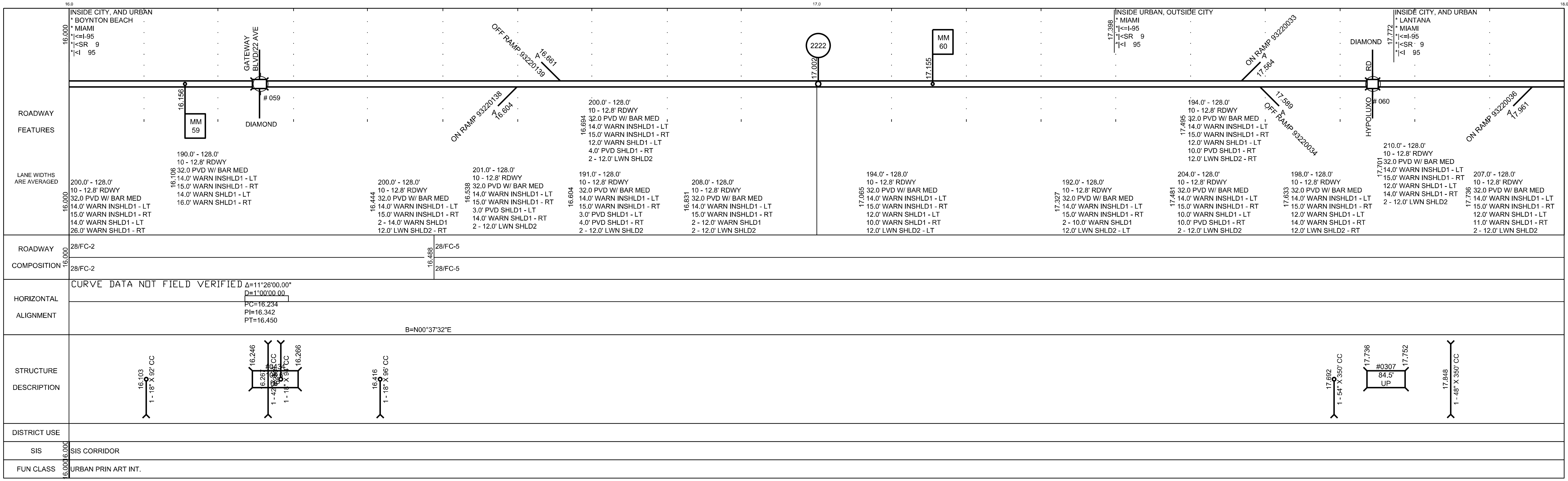
	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	09/02/2014	09/22/2014	000.000	046.018	02/28/2017 FDOT-D4	02/28/2017 FDOT-D4
			036.001	036.655	04/12/2016 FDOT-D4	04/12/2016 FDOT-D4
BY	CALTRAN	CALTRAN	000.000	046.018	04/07/2015 CALTRAN	04/07/2015 CALTRAN

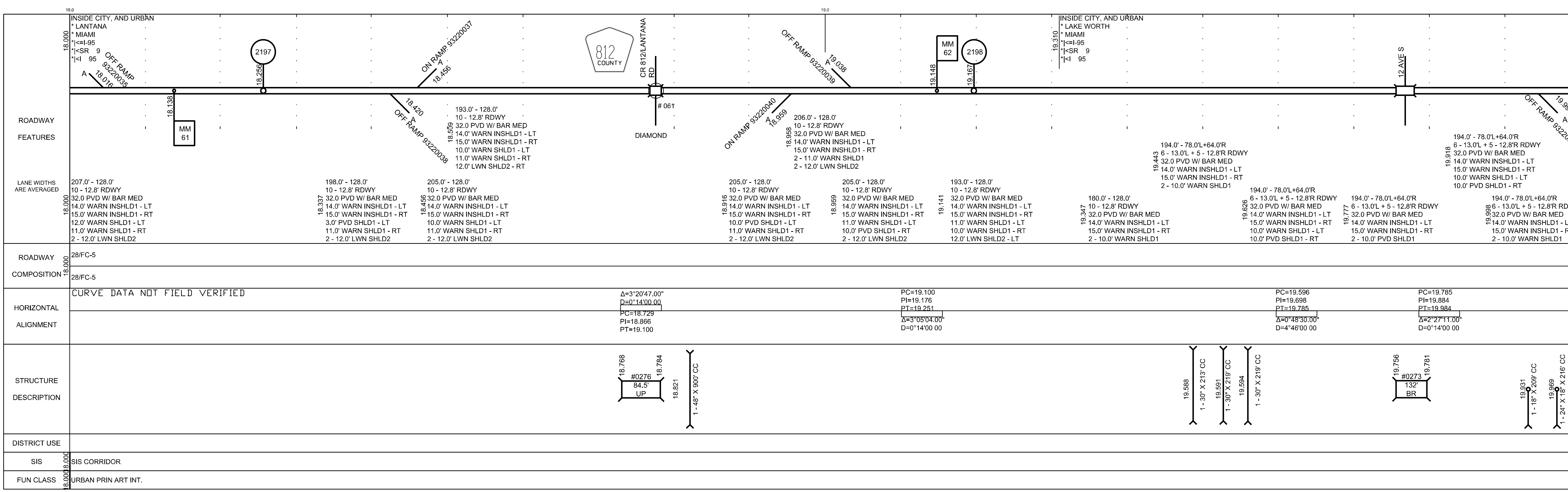
FLORIDA DEPARTMENT OF TRANSPORTATION

FDOT

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02	I 95	SR 9	PALM BEACH	04	93220000	5 OF 12





	5 YR INV	SLD REV
DATE	09/02/2014	09/22/2014
BY	CALTRAN	CALTRAN

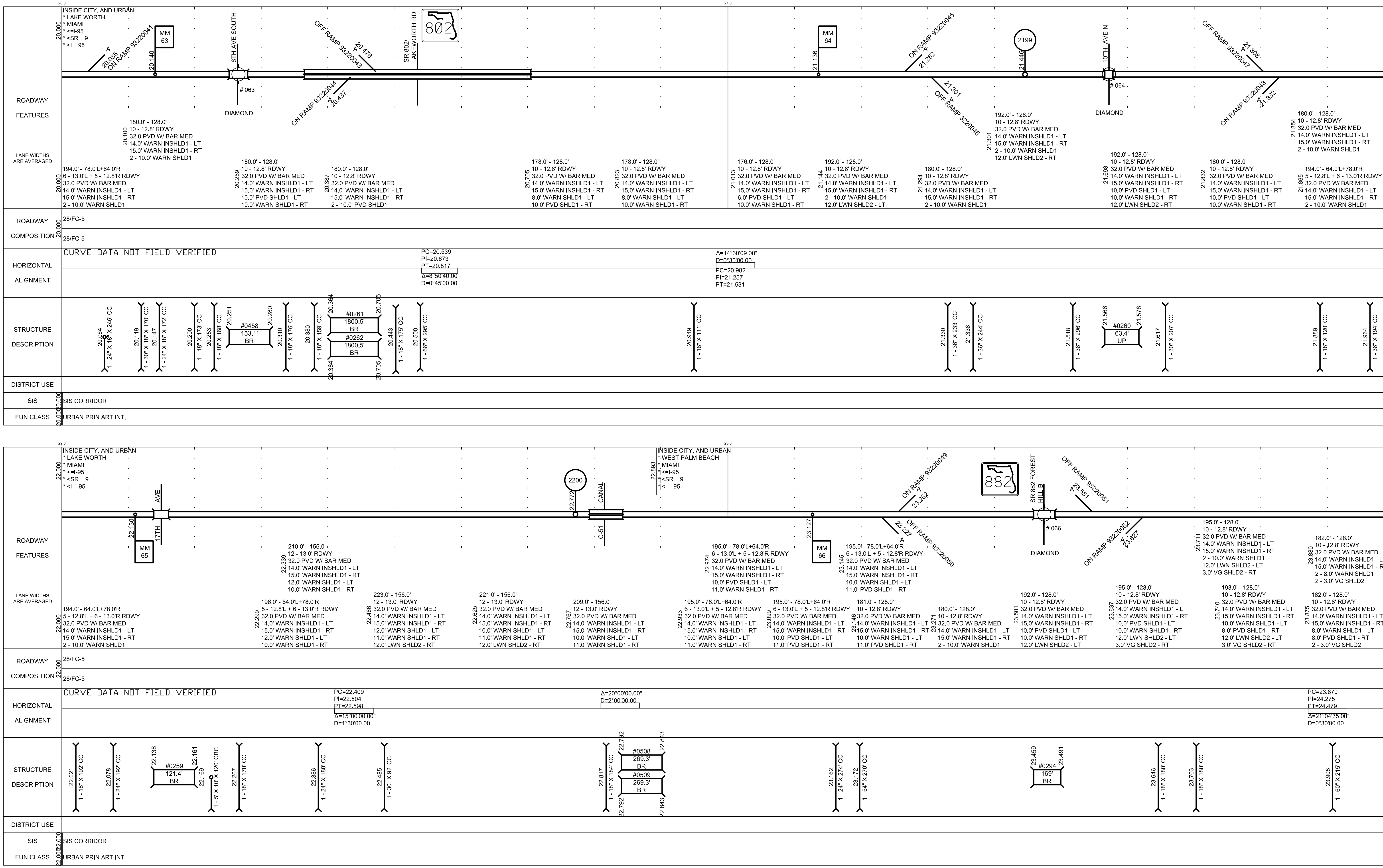
BMP	EMP	INV		SLD REV	
000.000	046.018	02/28/2017	FDOT-D4	02/28/2017	FDOT-D4
036.001	036.655	04/12/2016	FDOT-D4	04/12/2016	FDOT-D4
000.000	046.018	04/07/2015	CALTRAN	04/07/2015	CALTRAN

FLORIDA DEPARTMENT OF TRANSPORTATION

FDOT

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02	I 95	SR 9	PALM BEACH	04	93220000	6 OF 12



Version: 1.4.2.26 02/28/2017

APPENDIX B

(Access Management Memorandum)

Date: June 24, 2020

To: Vandana Nagole, P.E., FDOT Project Manager

From: Godfrey Lamptey, P.E., PTOE, GOAL Project Manager

Reference: **Access Management Plan Memorandum**
SR-9/I-95 at Lantana Road Interchange PD&E Study
Palm Beach County, Florida
FPID No.: 413258-1-22-02|ETDM No.: 14338

Attachments: A – Preferred Alternative Concept Plan
B – Palm Beach County Access Management Standards
C – Thoroughfare Right of Way Identification Map
D – Proposed Access Management Plan

INTRODUCTION

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study at the SR 9/I-95 and Lantana Road Interchange within the Town of Lantana, in Palm Beach County. The purpose of the project is to enhance the overall traffic operations and safety at the existing interchange of SR 9/I-95 and Lantana Road in order to eliminate traffic spillback onto SR 9/I-95. As part of this PD&E Study, three Build Alternatives were developed in order to provide the necessary improvements to accommodate the 2045 design year traffic demand. The build alternatives considered include:

- Build Alternative 1 – Tight Urban Diamond Interchange (TUDI)
- Build Alternative 2 – Diverging Diamond Interchange (DDI)
- Build Alternative 3 – Single Point Urban Interchange (SPUI)

The No-Action Alternative, which assumes no proposed improvements to the study interchange was also considered as a baseline for comparison against the Build Alternatives. Based on the analysis and evaluation of several key evaluation parameters including traffic operations, safety benefits, access impacts, utility impacts, right of way impacts, environmental impacts, construction costs as well as public comments, Build Alternative 2 with the Diverging Diamond Interchange configuration had the highest score due to the significantly higher safety and traffic operational benefits it provides to offset its relatively higher construction cost. As such, Build Alternative was selected as the Preferred Alternative for this PD&E Study (See **Attachment A**).

ACCESS MANAGEMENT STANDARDS

A major contributing factor to congestion and functional deterioration of any highway system is unregulated access to the system. As such, regulation of access is necessary to preserve the functional integrity of the roadway network. and to promote the safe and efficient movement of people and goods.

Lantana Road within the project limits, is a four-lane divided county roadway classified as an Urban Principal Arterial under the jurisdiction of Palm Beach County. Since Lantana Road is an off-system roadway, the access management is not defined by the Department's access management classification system under Rules 14-97 F.A.C. but must conform to the Palm Beach County Access Management Standards (See **Attachment B**).

For the purposes of access management all County maintained roadways are classified into one of two categories:

- 80' Right of Way Undivided Collector Roadway Constructed to 5 Lane Section or 80' Right of Way Collector Roadway with Islands Constructed to 4/5 Lane Section.
- 100' Or Greater Right of Way Divided Arterial Roadway

Table 1 below shows a summary of the Palm Beach County Access Management Standards.

Table 1 Palm Beach County Access Management Standards

Roadway Classification	Corner Clearance Distance (Minor St)	Corner Clearance Distance (Thoroughfare Plan Road)	Driveway Connection Spacing	Median Opening (Full)	Median Opening (Directional)	Median Opening (Expanded intersection) (Full)	Median Opening (Exp. Int. Directional)	Signal Spacing
80' R/W Collector	50	75'	125'	N/A	N/A	N/A	N/A	0.25 mile
80'R/W Collector with islands	50'	125'	125'	N/A	N/A	N/A	N/A	0.25 mile
100' or Greater Arterial	75'	125'	245'	660'/830'	660'	830'	660'	0.5 mile

The existing right of way along Lantana Road within the project limits varies from 80' on the east side to 122' on the west side. However, the Thoroughfare Right of Way Identification Map (See **Attachment C**) identifies the segment of Lantana Road within the project limit as a 110' right of way thoroughfare roadway. As such, the access management classification for 100' or Greater was applied.

ACCESS MANAGEMENT PLAN

There are 6 full median openings along Lantana Road within the project limits. These include 5 signalized intersections at High Ridge Road, SR 9/I-95 SB Ramps, SR 9/I-95 NB Ramps, Shopping Center Drive and Andrew Redding Road and one unsignalized intersection at Sunset Road. These median openings and the spacing between them are summarized in Table 2.

As shown in the table above, the intersections within the project limits do not meet the access management requirement for Lantana Road. All the five signalized intersections provide access to freeways, major business are residential developments as follows:

Table 2 Lantana Road Access Management Plan

Existing Median Opening	Mile Post	Existing Conditions			Proposed Conditions		
		Median Opening Type	Existing Spacing (ft)	Deviation from Standard (%)	Recommended Changes	Revised Spacing (ft)	Deviation from Standard (%)
High Ridge Road	2.861	Full (Signal)	0	0	None	0	0
Sunset Road	2.923	Full	327	50%	Change to WB Directional Median Opening with Underpass Service Road	327	50%
SR 9/I-95 SB Ramps	3.118	Full (Signal)	1030	61%	Change to Diverging Diamond Crossover intersections	918	65%
SR 9/I-95 NB Ramps	3.194	Full (Signal)	401	85%		625	76%
Shopping Center Drive	3.295	Full (Signal)	533	80%	None	421	84%
Andrew Redding Road	3.430	Full (Signal)	713	73%	None	713	73%

High Ridge Road: This intersection serves as the primary access to the Costco Warehouse in the northeast quadrant. On the north side, it also provides access to Lake Osborn Estate, Sunshine Park Academy, Northern Private School and the Finnish-American Village Assisted Living Facility. On the south side, it provides primary access for the Lantana Self storage and the Seacoast Bank. The intersection is recommended to remain as a signalized intersection. However, the existing strain pole signals are recommended to be upgraded to mast arm signals.

SR 9/I-95 NB and SB Ramp Terminal Intersections: These intersections provide full access for the SR 9/I-95 at Lantana Road Tight Urban Diamond Interchange (TUDI). As part of the proposed improvements, the existing ramp terminal intersections will be modified to serve as the crossover intersections for the proposed Diverging Diamond Interchange (DDI) configuration. The following movements are signalized at the DDI Ramp terminal intersections mast arm signals.

SB Ramp Terminal
- SB Right Turn
- SB Left Turn
- EB Through
- WB Through
- EB right turn

NB Ramp Terminal
- NB Right Turn
- NB Left Turn
- EB Through
- WB Through
- WB right turn

Shopping Center Drive: This intersection provides primary access to the Lantana Shopping Center on the northside. This shopping center includes several businesses such as Publix Supermarket, AutoZone Auto Parts, Dunkin Doughnuts and SunTrust Bank. On the south side, the intersection serves as the only access for the Wells Fargo Bank, Palm Beach Maritime Academy, Motel 6 Lantana, Dollar General and a McDonald's restaurant. The intersection is recommended to remain as a signalized intersection. However, the existing strain pole signals are recommended to be upgraded to mast arm signals.

Andrew Redding Road: This intersection serves as one of the primary access for the Water Tower Commons Development. This is a 73-acre mixed-use development with 1,100 residential units and 209,000 square feet of commercial space currently under development. It also provides access to Florida Mentor Nursing Home and the Palm Beach County Public Health Facility on the north side. On the south side, it provides primary access to several residences. The intersection is recommended to remain as a signalized intersection. However, the existing strain pole signals are recommended to be upgraded to mast arm signals.

The only unsignalized intersections along the corridor is at Sunset Road. This full median opening provides access to the Costco Warehouse on the northside and the Palm Beach County Solid Waste Authority (SWA) Central Transfer Station on the southside. This intersection is also located only 327-ft east of the High Ridge Road signalized intersection. Based on the safety analysis performed as part of the PD&E Study, the High Ridge Road and Sunset Road intersections account for 67% of the crashes along Lantana Road within the project limits. Some of this safety concern can be attributed to inadequate gaps for eastbound to Costco Warehouse at Sunset Road movement and weaving maneuvers from Costco Warehouse at Sunset Road to access the westbound left turn lane at High Ridge Road intersection in order to make a U-turn to get onto SR 9/I-95.

To improve mobility while enhancing safety along the project corridor, two access modifications are proposed as part of the improvements with the Preferred Alternative as illustrated in Figure 1.

1. Eliminate the existing eastbound left-turn at Sunset Road and provide a westbound directional median opening.
2. Provide an underpass service road underneath the reconstructed Lantana Road bridge over the SFRC/CSX Railroad is also provided. This underpass service road connects Sunset Road on the north side, which provides access to the Costco Warehouse and the existing service road on the south side, which provides access to the Solid Waste Authority (SWA).

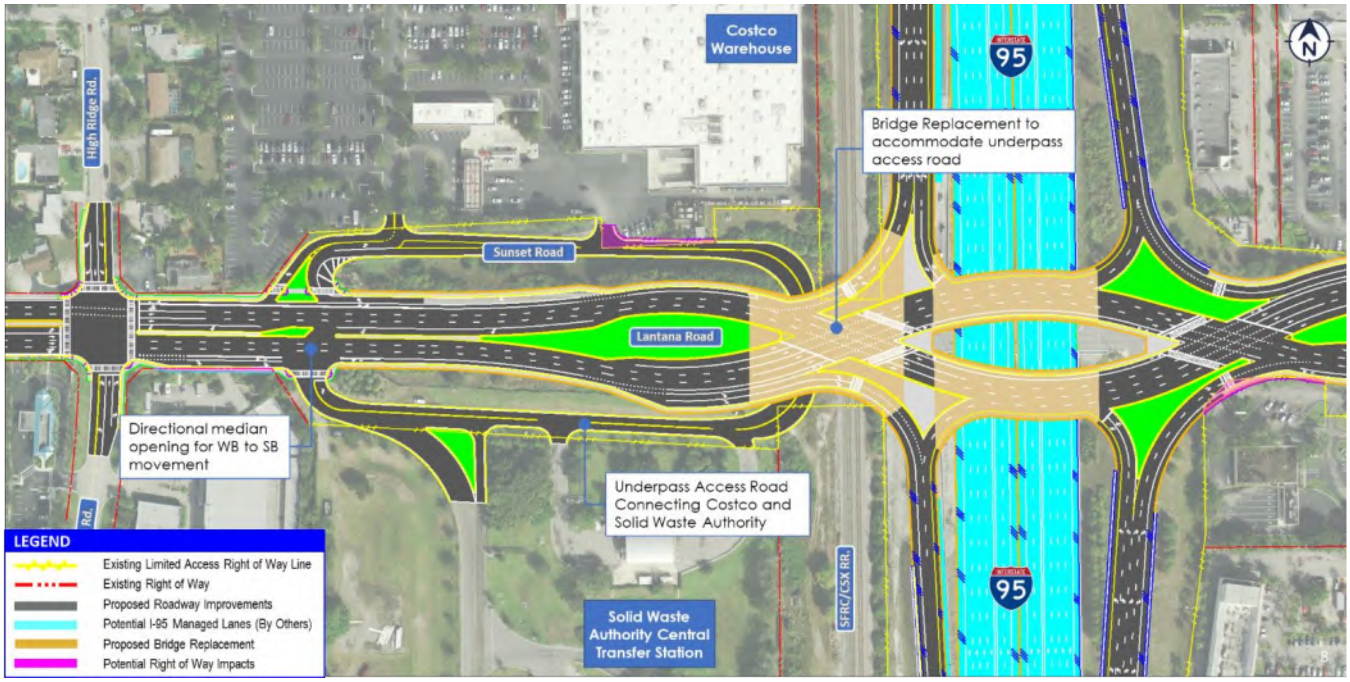


Figure 1: Proposed Access management Modifications

The proposed access management modifications will alter existing travel patterns between I-95 and High Ridge Road as follows:

From Costco Wholesale to SR 9/I-95: Motorists traveling from Costco Wholesale to SR 9/I-95 currently use two travel options. The first is to exit Costco along High Ridge Road and turn left at the Lantana Road intersection. The second option is to exit Costco along Lantana Road, weave through 3 lanes of traffic, and make a U-turn at High Ridge Road. This traffic weaving pattern has been identified as one of the safety concerns at this location. The proposed improvement maintains the left turn at High Ridge Road onto Lantana Road but restricts the U-turn at High Ridge Road. Motorist travelling from Costco to SR 9/I-95 can use the proposed underpass service road and loop underneath the Lantana Road bridge over the SFRC/CSX railroad to the intersection of Lantana Road and the SWA service road and proceed to make a right-turn onto eastbound Lantana Road towards the I-95 ramps.

From Eastbound Lantana Road to Costco Wholesale: In the existing conditions, motorists traveling along eastbound Lantana Road can make an eastbound left turn at the median opening at Sunset Road to Costco. This movement was also identified as a safety concern due to the difficulty in judging correctly adequate gaps for the downhill traffic stream to make the left turn maneuver at this intersection. With the proposed improvements, motorists along eastbound Lantana Road would make a right turn onto the SWA service road, make a loop underneath the Lantana Road bridge over the SFRC/CSX railroad, and connect to Sunset Road which provides access to Costco.

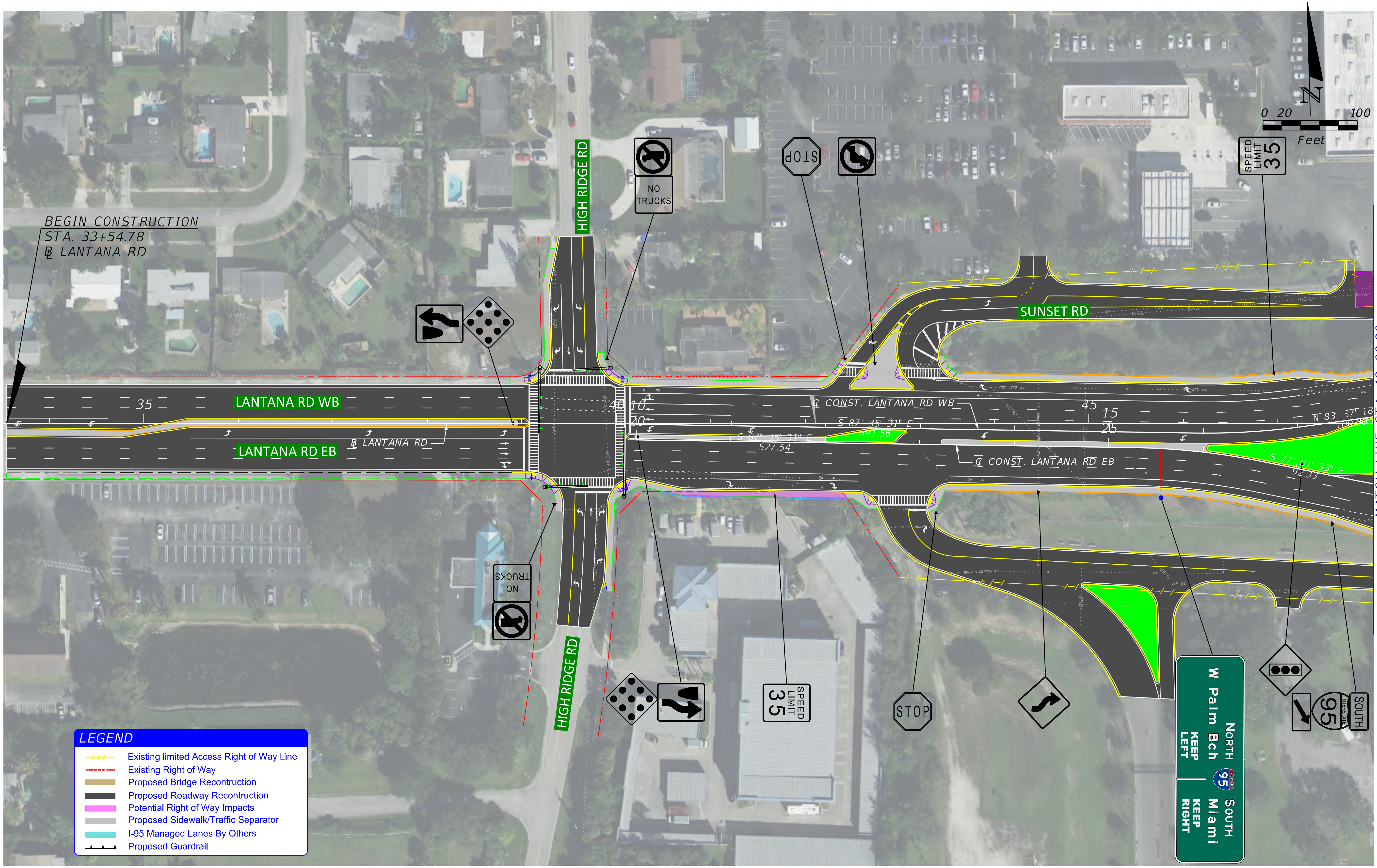
From SWA to Westbound Lantana Road: Under the existing conditions, motorists from the SWA can make a left turn at the median opening at the Sunset Road intersection by crossing over three eastbound land three westbound lanes to access westbound Lantana Road. This movement is typically used by heavy slow vehicles which must cross 6 lanes of traffic and has been identified as a safety concern. The proposed access modification eliminates this movement. Motorists would be required to travel east along the proposed service road, make the loop underneath the Lantana Road bridge over the SFRC/CSX railroad, and connect to westbound Lantana Road via right turn movement from the Costco exit.

CONCLUSION

The proposed access management modifications will alleviate most of the safety concerns at the High Ridge Road and Sunset Road intersections along Lantana Road. It also improves traffic circulation by alleviating Costco traffic from the residential properties along High Ridge Road adjacent to the Costco Warehouse. The study team met with Palm Beach County Engineering Department and the Solid Waste Authority and both agencies are in support of the proposed access modifications.

ATTACHMENT A

(Preferred Alternative Concept Plan)



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
MIAMI LAKES, FL 33016

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

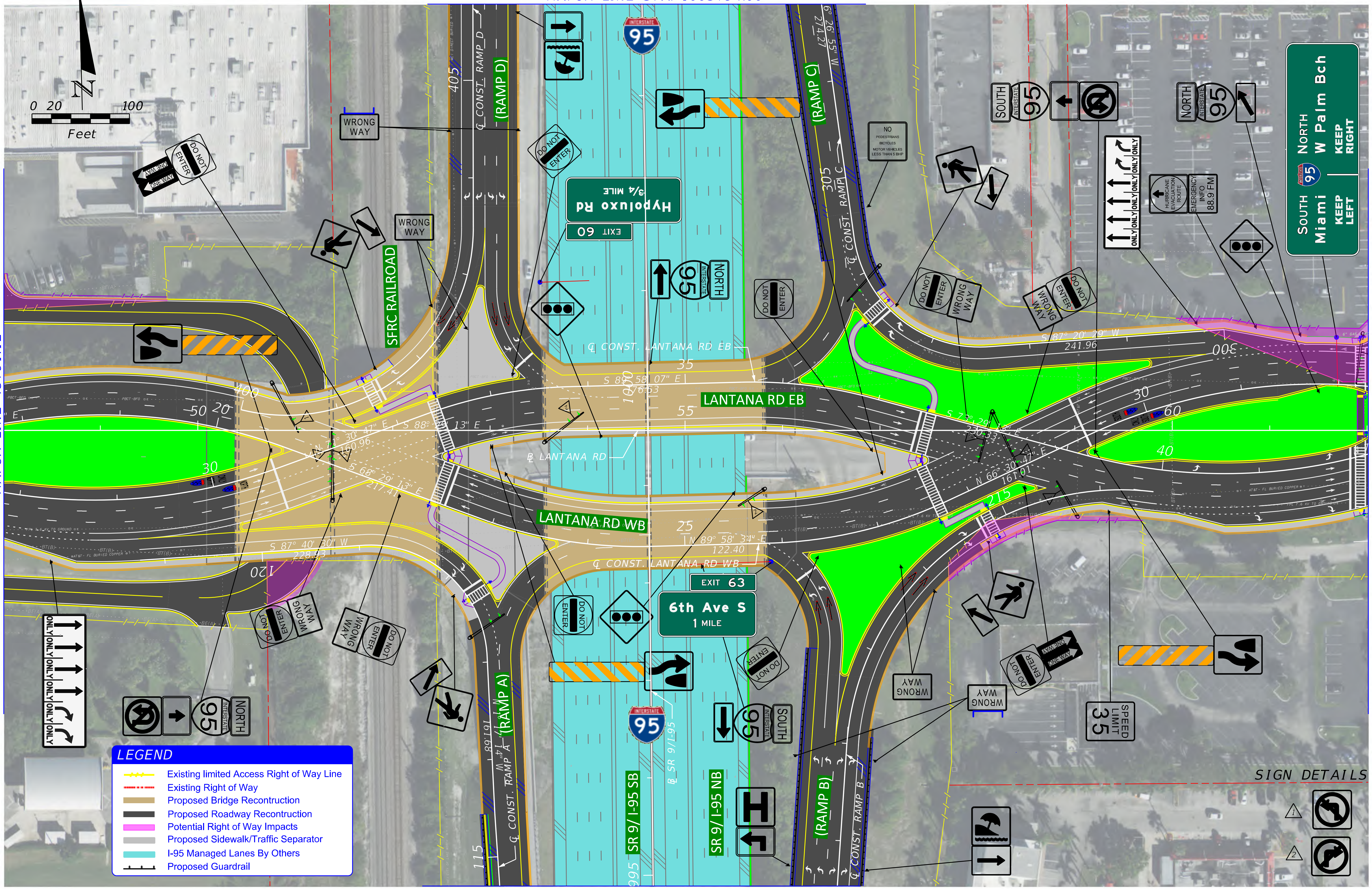
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO.
14

MATCH LINE STA. 1003+94.00

MATCH LINE 48+01.12



MATCH LINE STA. 62+01.21

MATCH LINE STA. 994+89.00

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
MIAMI LAKES, FL 33016

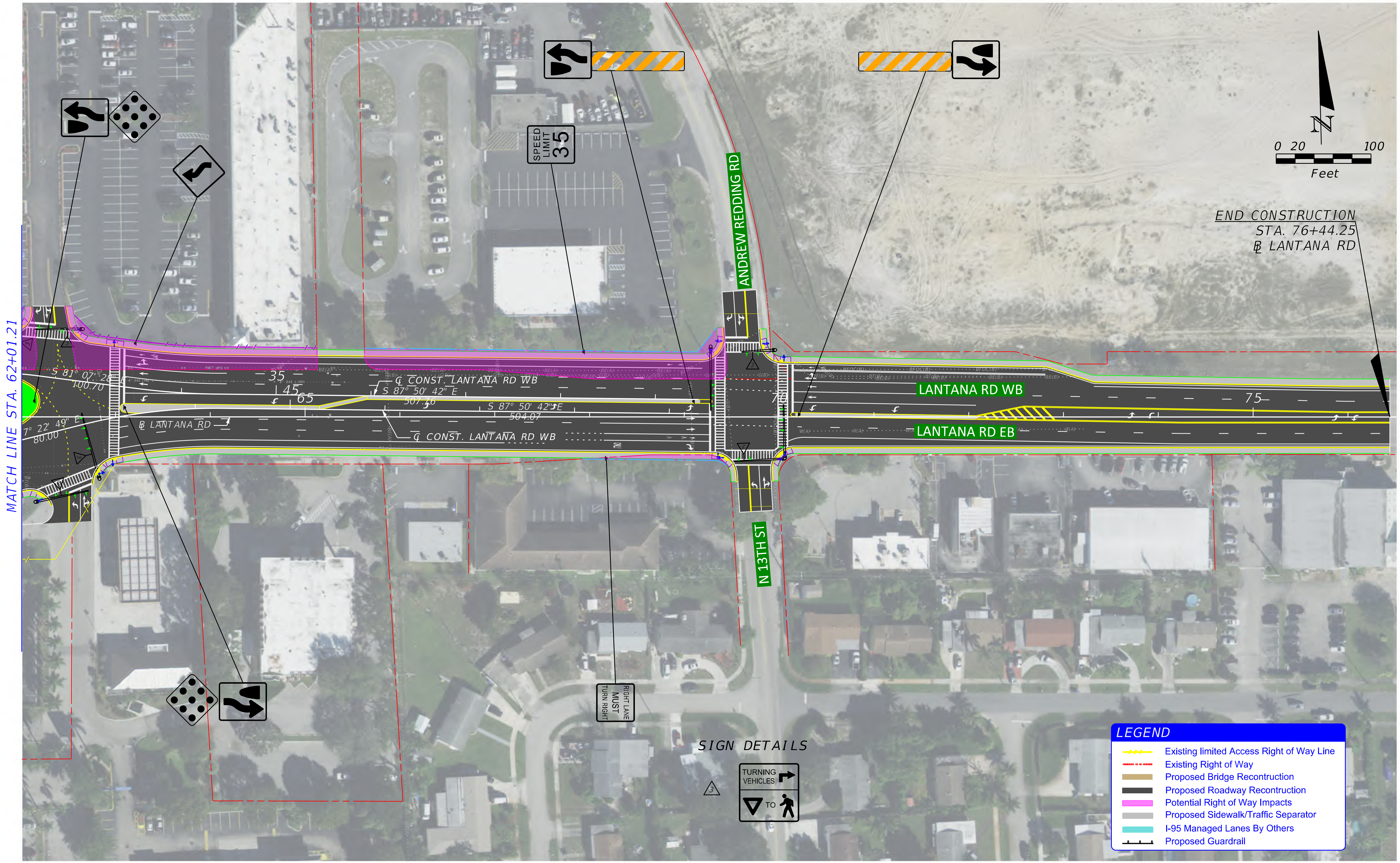
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO.
15

shernandez 8/14/2020 6:52:53 PM C:\Users\shernandez\Goal Associates Inc\Goal Associates - Projects\GA19002 - D4-I-95



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
MIAMI LAKES, FL 33016

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

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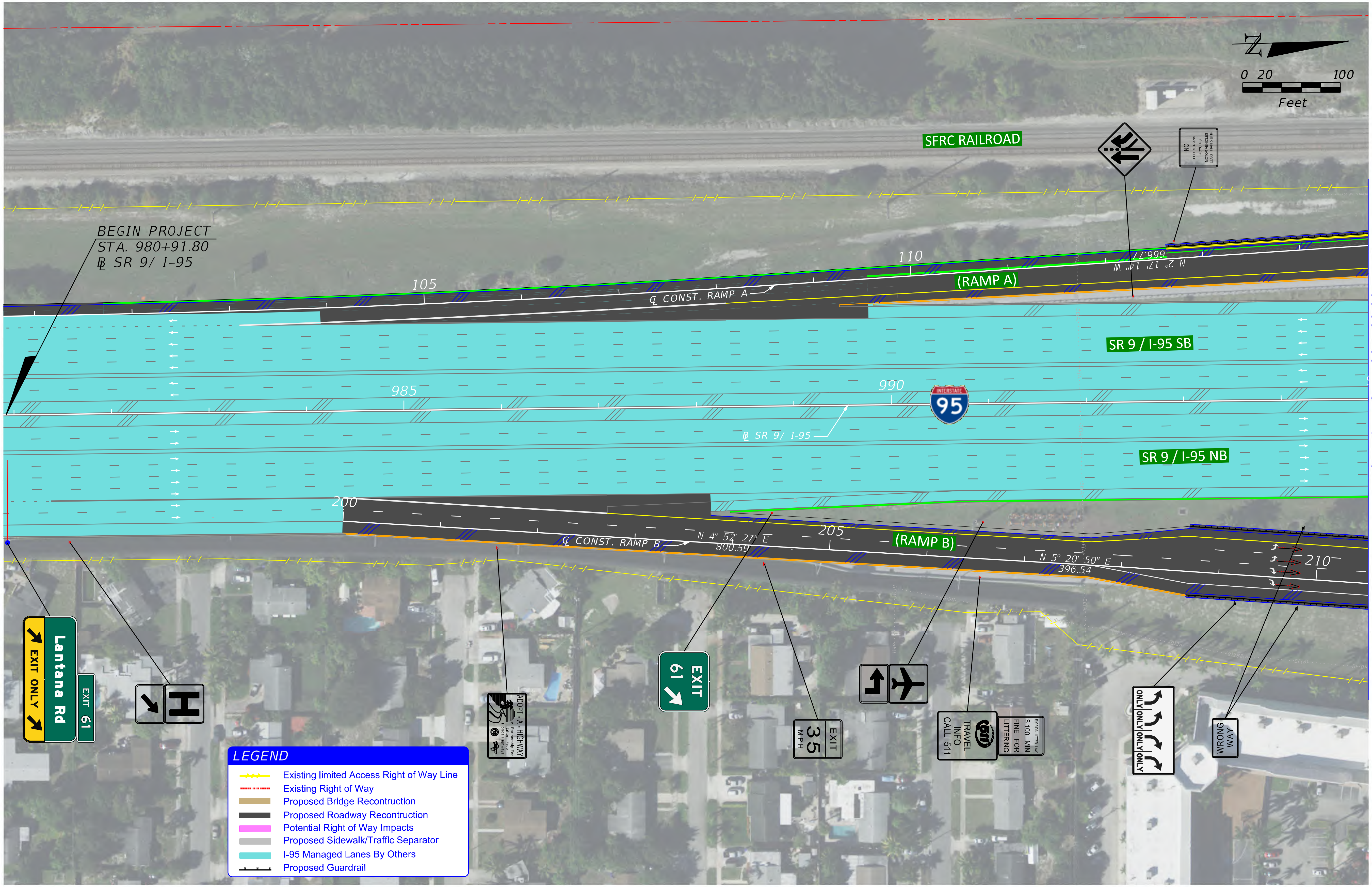

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
MIAMI LAKES, FL 33016

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO. 17

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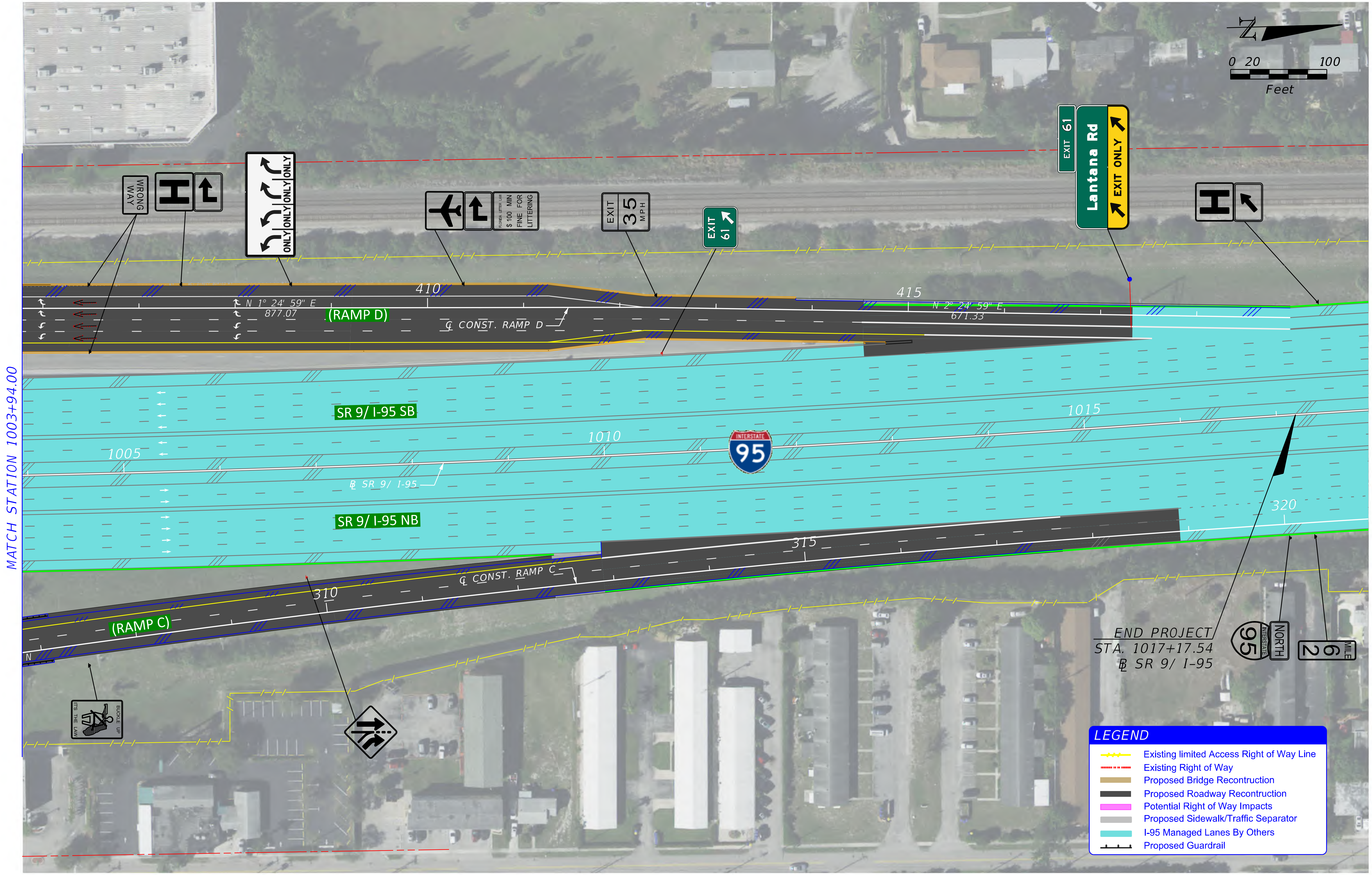

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
MIAMI LAKES, FL 33016

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO. 18

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ATTACHMENT B

(Palm Beach County Access Management Standards)

ACCESS MANAGEMENT STANDARDS

FOR COUNTY ROADS ON THE

THOROUGHFARE RIGHT OF WAY IDENTIFICATION MAP

PRODUCED BY:

PALM BEACH COUNTY ENGINEERING
AND
PUBLIC WORKS DEPARTMENT

October 2004
Updated September 2016

Roadway Classifications

For the purposes of access management all County maintained roadways shown on the Thoroughfare Right of Way Identification Map shall be classified into one of two categories:

- 80' Right Of Way Undivided Collector Roadway Constructed To 5 Lane Section or 80' Right Of Way Collector Roadway With Islands Constructed To 4/5 Lane Section.
- 100' Or Greater Right Of Way Divided Arterial Roadway

80' Right Of Way Undivided Collector Roadways Or Collector Roadways With Islands have a 5 lane curb and gutter typical section with sidewalks on both sides. The center lane on such County roadways is marked for two-way left turns, except for the islands or where conditions indicate that dedicated one-way turn lanes should be provided. One-way turn lanes would be provided for signalized intersections and in locations where physical barriers (such as adjacent parallel canals) preclude turning in one direction.

Such roadways are intended to be expanded to provide separate right turn lanes at intersections with other Thoroughfare Plan Roadways. Roadway may have a median and dual left turn lanes at the intersection with Thoroughfare Plan Roadways if required by the traffic volumes.

In the cases of 80' right of way roads that have not been built to their ultimate sections, the spacing of connections and turn lanes shall be based on the ultimate design section for the roadway.

100' Or Greater Right Of Way Divided Arterial Roadways include all divided County roadways shown on the Thoroughfare Plan whose rights of way are 100' or greater. Typically, these roadways have 4 or more lane ultimate sections, but in some cases may have up to 8 lanes. In either case, the ultimate sections have median and outside curb and gutter, and sidewalks are generally provided on both sides of the roadway. Left turn lanes are accommodated within the medians of these roadways.

Such roadways are intended to be expanded to provide separate right turn lanes and dual left turn lanes at their intersections with other Thoroughfare Plan Roadways.

In the cases of 100' or greater right of way roads that have not been built to their ultimate sections, the spacing of connections and turn lanes shall be based on the ultimate design section for the roadway.

PALM BEACH COUNTY
DEPARTMENT OF ENGINEERING & PUBLIC WORKS
TRAFFIC DIVISION

TO:	Traffic Division Personnel	**PPM NUMBER:**	ETO-402
FROM:	Director, Traffic Division	**REVIEWED DATE:**	09/20/2016
		REVISED DATE:	09/26/2016
		EFFECTIVE DATE:	03/01/1994

SUBJECT: Waivers from the County's Adopted Access Management Standards

---

CONTACT POSITIONS: Director, Traffic Division
Assistant Director, Traffic Division

PURPOSE: To provide a policy and procedure to request waivers from the County's adopted Access Management Standards.

POLICY: The Director of the Traffic Division (or in his absence, his designee) shall have the authority to administer and interpret the County's adopted Access Management Standards on all roadways governed by those standards. Upon the formal request for a waiver being made, the Director shall have one week within which to render a decision on the request. In cases when a request for access has been denied by the Director because it did not comply with the adopted standards, the applicant may seek a waiver from the standards using the following procedure.

PROCEDURE:

All appealed requests for waivers from the adopted Access Management Standards shall be made in writing to the Director of the Traffic Division. Such requests are to contain justification to support the requested waiver, along with any relevant support materials.

The Director shall schedule a meeting of the Waiver Committee to consider such waiver requests. This Committee shall consist of the Deputy County Engineer, the Assistant County Engineer, the Director of Roadway Production and the Director of Land Development. The Committee shall evaluate each request on the basis of the evidence submitted, along with testimony from the applicant, and input from the Director of the Traffic Division.

It is the intent that the Committee meet within two weeks of the Director of Traffic Division receiving a request for a waiver. Ordinarily, a decision will be reached by the Committee during its meeting. However, the Committee may take up to one week after the meeting to evaluate a waiver request, if it finds such additional time necessary.

APPROVALS:

Division Director ______________________________ Date ________

Department Director *[signature]* Date 9/28/16

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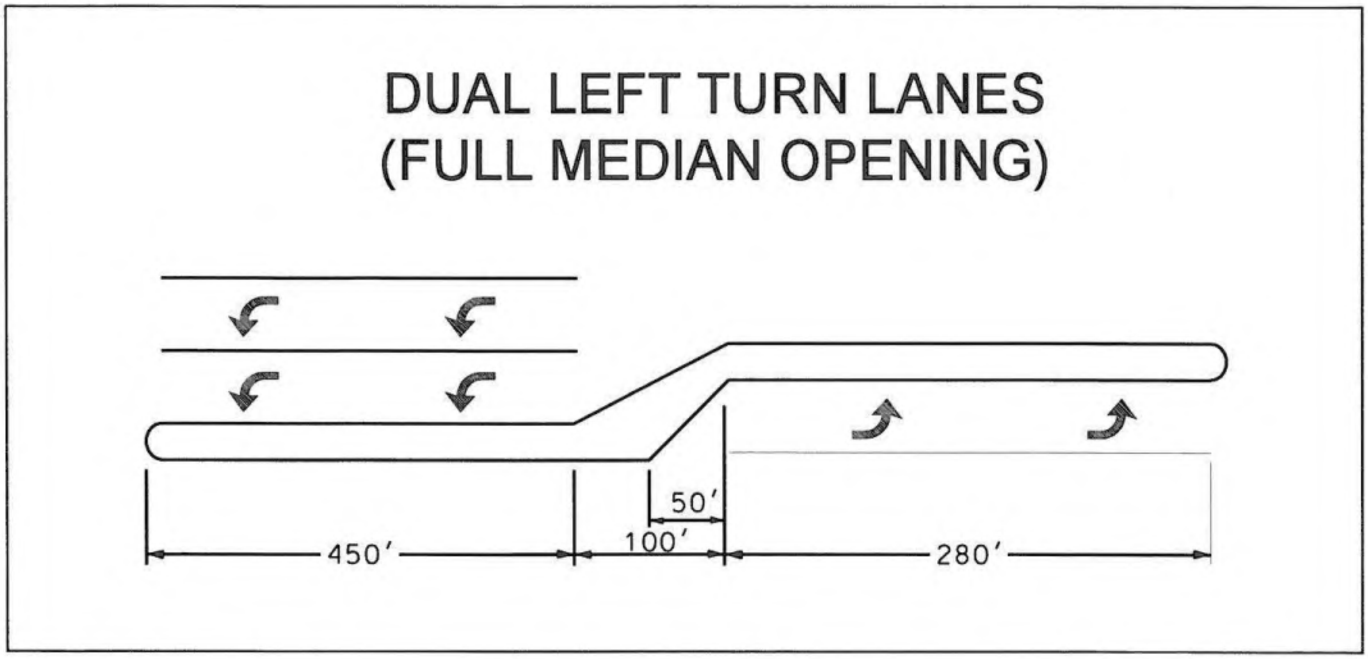
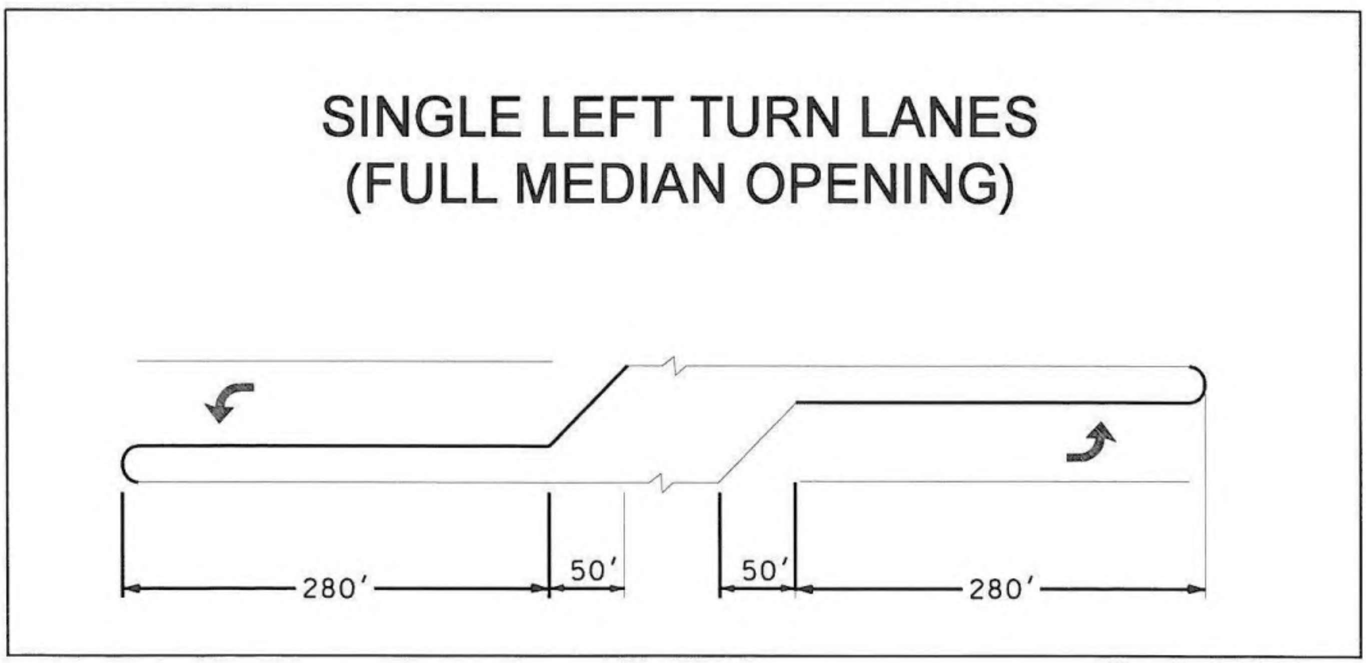
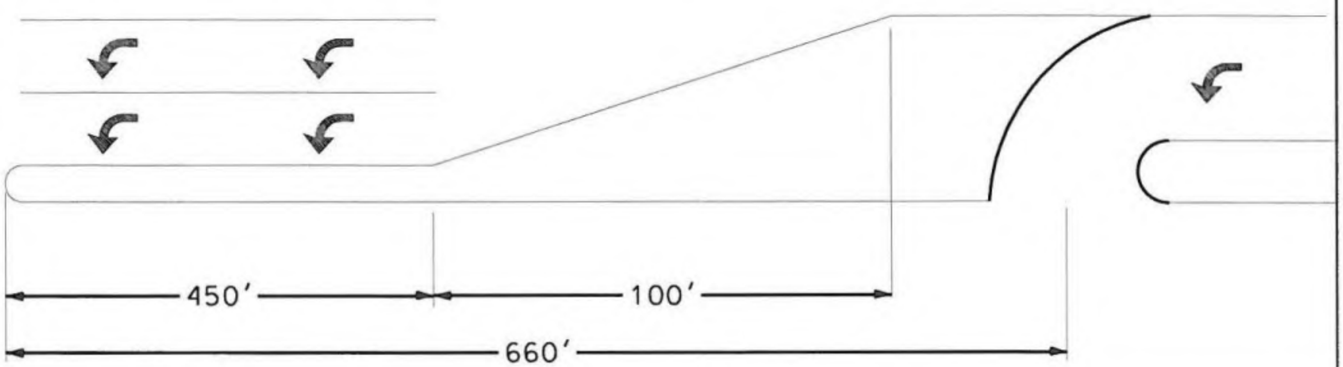


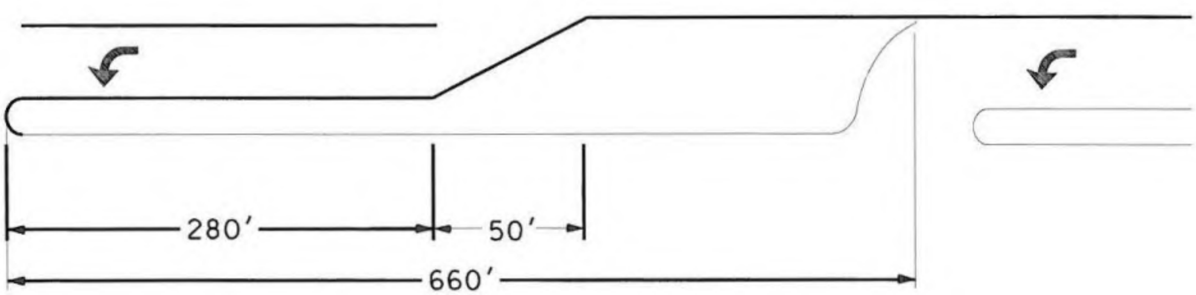


DRAWING NOT TO SCALE

DUAL LEFT TURN LANES
(DIRECTIONAL MEDIAN OPENING)



LEFT TURN LANE
(DIRECTIONAL MEDIAN OPENING)



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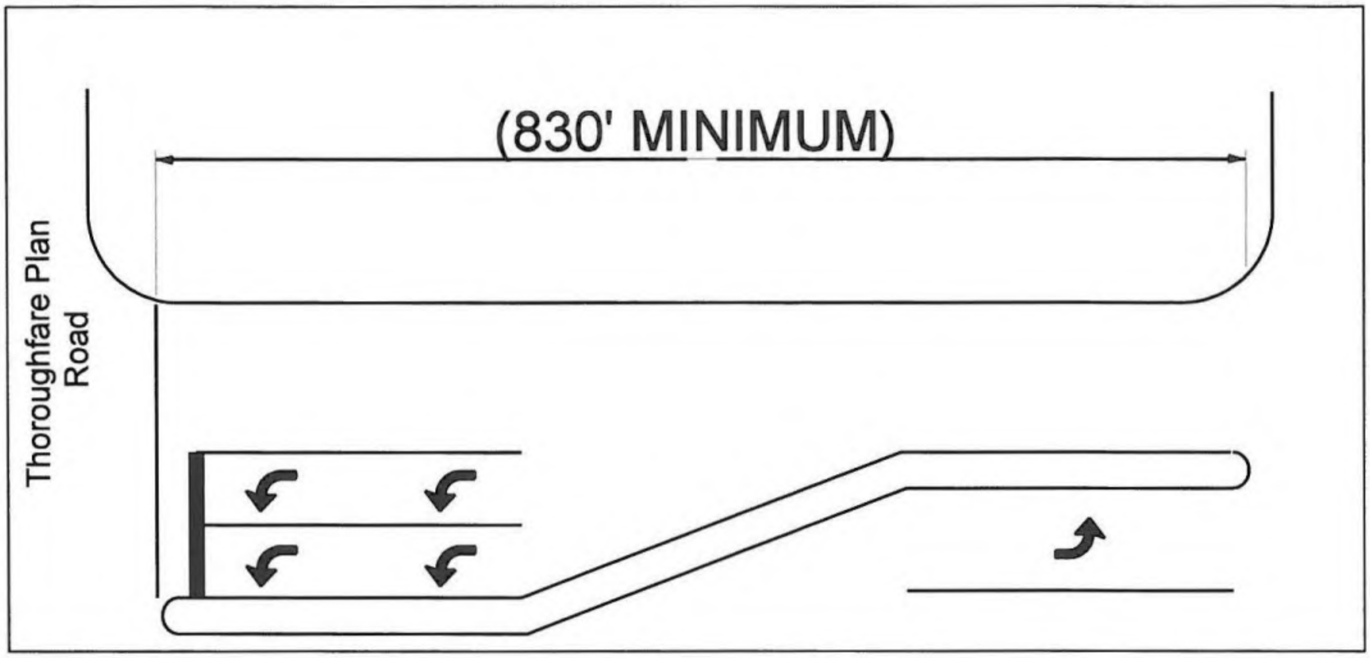
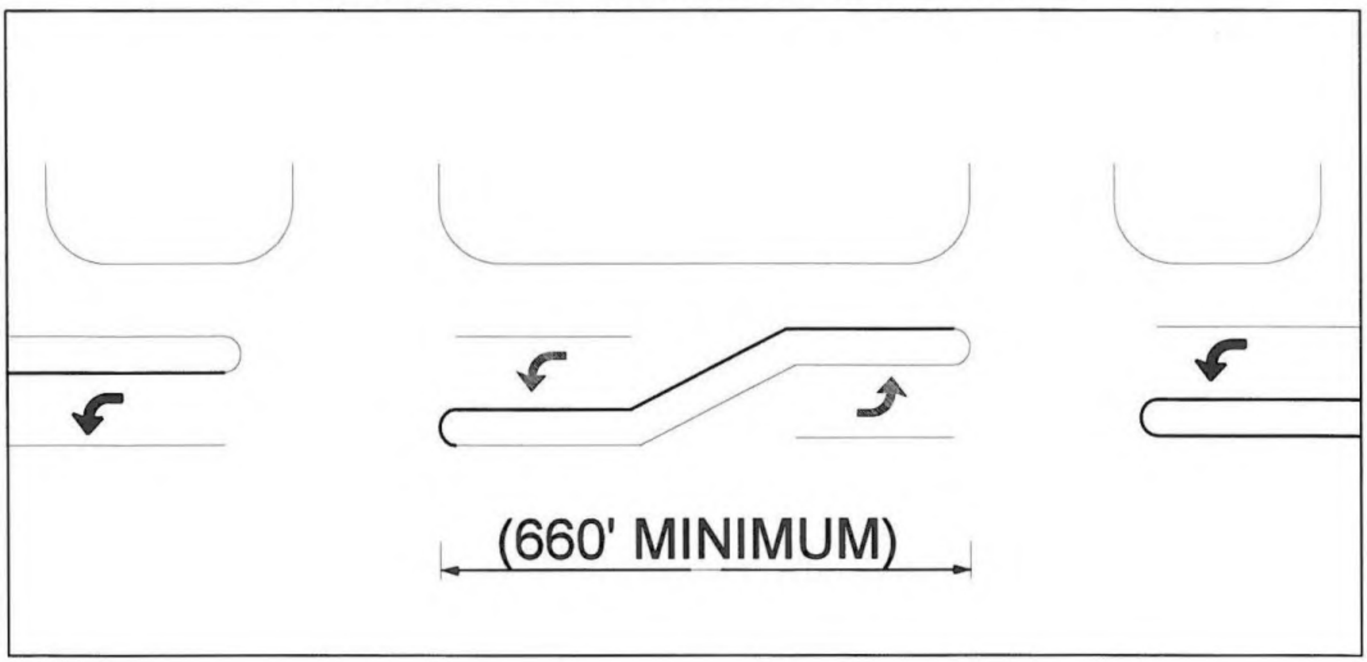
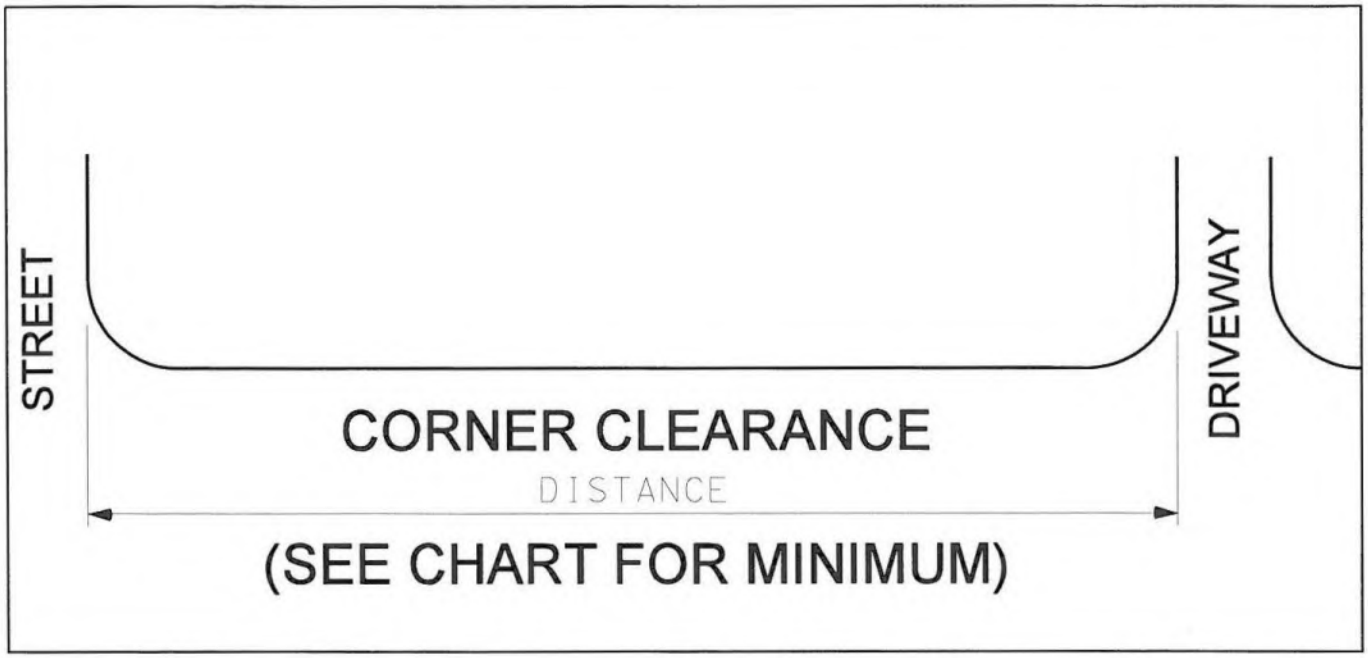


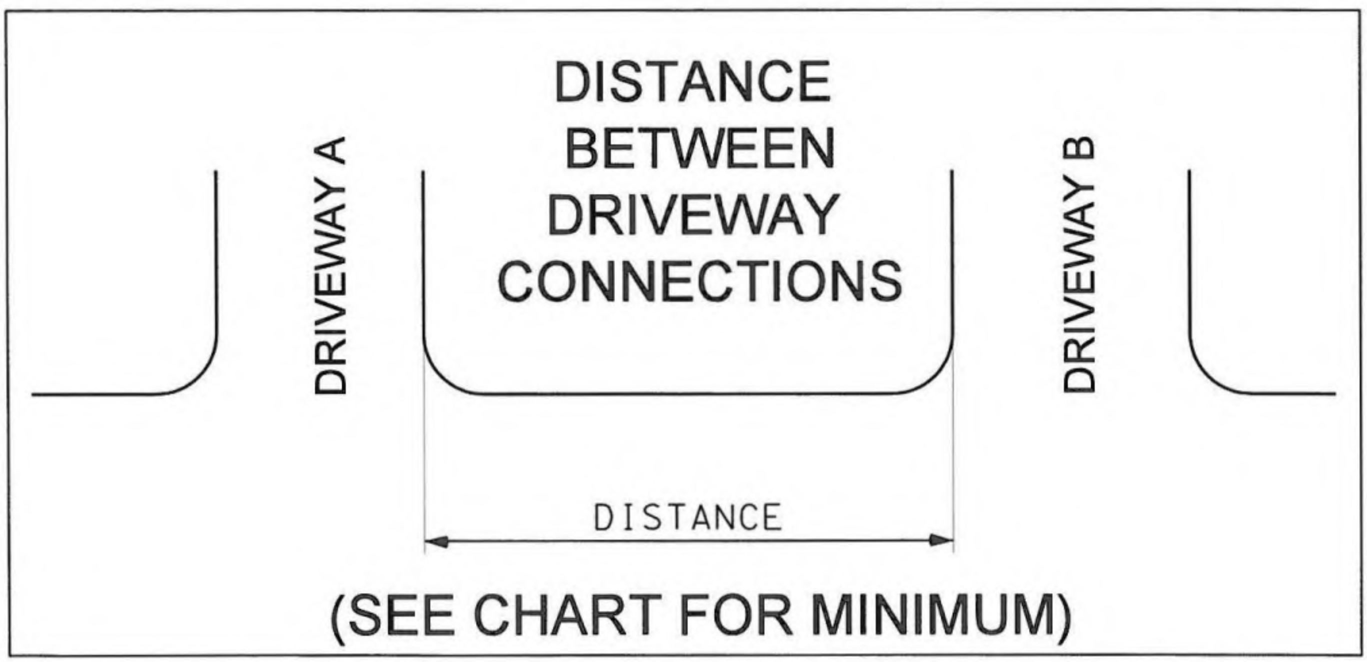
DISTANCE BETWEEN DUAL LEFT TURN LANES AND FIRST MEDIAN OPENING



DISTANCE BETWEEN MEDIAN OPENINGS

DRAWING NOT TO SCALE





DRAWING NOT TO SCALE

ACCESS MANAGEMENT
MINIMUM DIMENSIONS

Roadway Classification	Corner Clearance Distance (Minor St)	Corner Clearance Distance (Thoroughfare Plan Road)	Driveway Connection Spacing	Median Opening (Full)	Median Opening (Directional)	Median Opening (Expanded Intersection) (Full)	Median Opening (Exp. Int. Directional)	Signal Spacing
80' R/W Collector	50'	75' **	125' *	N/A	N/A	N/A	N/A	.25 mile
80' R/W Collector with islands	50'	125' **	125' *	N/A	N/A	N/A	N/A	.25 mile
100' or Greater Arterial	75'	125' **	245' *	660'/830'	660'	830'	660'	.5 mile

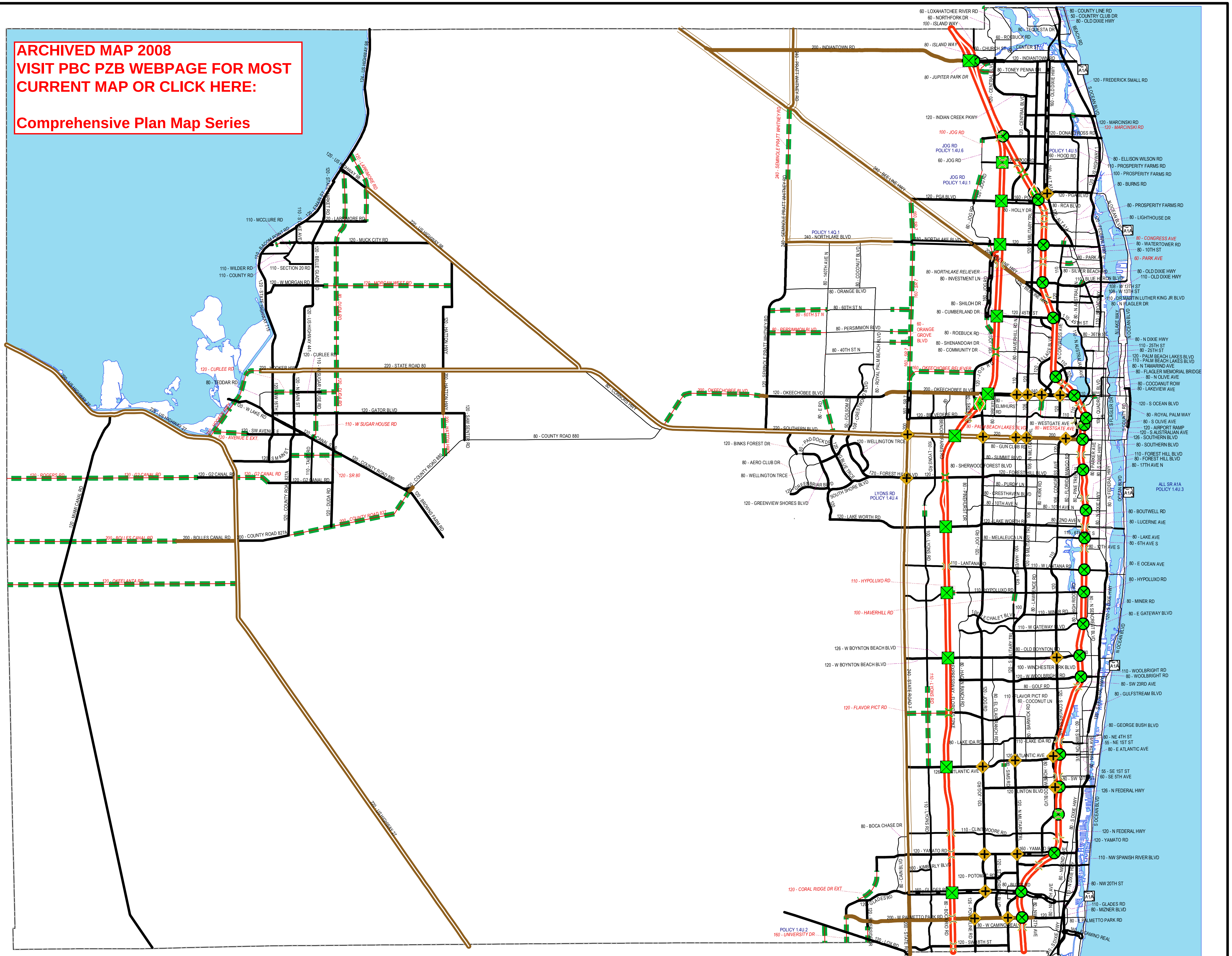
All stated dimensions are minimums

On roads not built to their ultimate sections, spacing is to be in accordance with ultimate roadway classification.

* This is the minimum spacing allowed between driveways. The number of driveways to serve a site shall be kept to a minimum and shall be evaluated on a case by case basis.
** Egress high volume (>500 ADT) driveway shall not be located within designated right turn lane. Even where no right turn lane exists, the egress from a high volume driveway shall not be located within 200 feet of an intersection.

ATTACHMENT C

(Thoroughfare Right of Way Identification Map)



MAP TE 14.1

THOROUGHFARE RIGHT OF WAY IDENTIFICATION MAP

"THE INTERSECTION OF ALL THOROUGHFARES INTERSECTING AT GRADE SHALL HAVE THE RIGHT-OF-WAY PROTECTED TO PROVIDE FOR AN EXPANDED INTERSECTION WITH SPECIAL LANES. THIS RIGHT-OF-WAY SHALL BE AS DETAILED IN THE SPECIAL INTERSECTION TREATMENT DRAWINGS. THE COUNTY ENGINEER SHALL HAVE THE DISCRETION TO WAVE THE EXPANDED INTERSECTION REQUIREMENT WHERE HE DETERMINES THAT EXISTING DEVELOPMENT MAKES THE REQUIRMENT UNFEASIBLE."

POLICY 1.4-Q: TO PROTECT THE RURAL CHARACTER OF ROADWAYS OUTSIDE OF THE URBAN / SUBURBAN TIER, THE COUNTY HEREBY ESTABLISHES THE RURAL PARKWAY CONCEPT. RURAL PARKWAYS SHALL ACCOMMODATE FUTURE TRANSPORTATION PLANNING NEEDS TO ENSURE THAT THE CROSS-SECTION AND ALIGNMENT OF THE ROADS PRESERVES THE RURAL RESIDENTIAL LIFESTYLE, SENSE OF PLACE AND QUALITY OF LIFE OF THE ADJACENT AREAS. FOR PROPERTIES FRONTING ON RURAL PARKWAYS, A PORTION OF THE DESIGNATED RIGHT-OF-WAY MAY BE RETAINED IN PRIVATE OWNERSHIP PROVIDED THAT THE PROPERTY OWNER DEDICATESA PARKWAY EASEMENT TO PALM BEACH COUNTY FOR NON-VEHICULAR PATHWAYS. SUCH DEDICATIONS SHALL ONLY BE REQUIRED WHEN CONSISTENT WITH THE CRITERIA CONTAINED IN TRANSPORTATION POLICY 1.4-D. THE FOLLOWING ROADWAY SEGMENTS ARE HEREBY DESIGNATED AS RURAL PARKWAYS:

1. NORTHLAKE BLVD., FROM SEMINOLE PRATT-WHITNEY RD TO THE WESTERN EDGE OF THE PALM BEACH GARDENS MUNICIPAL GOLF COURSE, WITH A 50 FOOT EASEMENT ON EACH SIDE OF THE ROAD BEING DEDICATED EXCLUSIVELY FOR MULTIPURPOSE PATHS.
2. LYONS ROAD, FROM ATLANTIC AVENUE TO BOYNTON BEACH BOULEVARD, WITH A 100 FOOT EASEMENT ON EACH SIDE IN ORDER TO ACCOMMODATE MULTIPURPOSE PATHWAYS. UNDULATING BERMS, NO TALLER THAN FIVE FEET AND LANDSCAPED WITH NATIVE VEGETATION, SHALL BE REQUIRED. NO WALLS SHALL BE ALLOWED WITHIN THE PARKWAY EASEMENTS.

POLICY 1.4-U: THE FOLLOWING NOTES REFLECT CONDITIONS ASSOCIATED WITH ROADWAY SEGMENTS IN THE COUNTY'S THOROUGHFARE RIGHT-OF-WAY IDENTIFICATION MAP (TIM):

1. THE EXTENTION OF JOG RD (RYDER CUP BLVD) IS SHOWN AS A PUBLIC WAY: FROM NORTHLAKE BLVD TO THORTON DR, JOG RD IS A 120 FOOT RIGHT-OF-WAY WITH FOUR LANES; FROM THORTON DR TO CARRICK RD, JOG RD IS A 60FOOT RIGHT-OF-WAY WITH TWO LANES, WITH THE REMAINING 60 FEET OF RIGHT-OF-WAY OWNED BY THE NORTHERN PALM BEACH COUNTY WATER CONTROL DISTRICT RESTRICTED TO SUCH USES AS PUBLIC UTILITIES, OPEN SPACE, DRAINAGE, PATHWAYS AND LANDSCAPING; AND FROM CARRICK RD TO PGA BLVD, JOG RD IS A 120 FOOT RIGHT-OF-WAY WITH FOUR LANES.
2. UNIVERSITY DR, FROM THE PALM BEACH COUNTY / BROWARD COUNTY LINE TO PALMETTO PARK RD, IS A 120 FOOT SECTION WITH 40 FEET OF RIGHT-OF-WAY TO BE USED FOR LANDSCAPING.
3. SR A1A FROM THE BROWARD COUNTY / PALM BEACH COUNTY LINE TO INDIANTOWN RD AND FROM U.S.1 TO THE PALM BEACH / MARTIN COUNTY LINE IS RESTRICTED TO A TWO-LANE ROADWAY.
4. LYONS RD, FROM SOUTHERN BLVD TO LAKE WORTH RD, IS A 100 FOOT SECTION THAT SHALL BE RESTRICTEDTO TWO THROUGH LANES WITH THE REMAINING RIGHT-OF-WAY TO BE USED FOR DRAINAGE, LANDSCAPING, PATHWAYS, TURNING LANES, AND BICYCLE PATHS.
5. HOOD RD, FROM ALTERNATE A1A TO PROSPERITY FARMS RD, IS A 60FOOT SECTIONTHAT SHALL BE RESTRICTED TO TWO THROUGH LANES WITH AN ADDITIONAL 50 FEET TO BE USED FOR LANDSCAPING AND BUFFERING.
6. JOG ROAD, FROM HOOD ROAD TO DONALD ROSS ROAD, IS A 100-FOOT SECTION THAT SHALL BE RESTRICTED TO TWO THROUGH LANES WITH THE REMAINING RIGHT-OF-WAY TO BE USED FOR DRAINAGE, LANDSCAPING, PATHWAYS, TURNING LANES AND BICYCLE PATHS. THIS 100-FOOT RESTRICTION DOES NOT APPLY TO LOCATIONS WHERE ROUNDABOUTS ARE NEEDED.

R.O.W. WIDTH

ROAD NAME

80 - EXISTING RD

120 - FUTURE RD

- 80' (OR AS OTHERWISE INDICATED)
- 110' (OR AS OTHERWISE INDICATED)
- 120' (OR AS OTHERWISE INDICATED)
- 140'
- 160'
- 180'
- 200'
- 220'
- 240'
- EXPRESSWAY
- FUTURE ROADS
- URBAN INTERCHANGE
- I-95 INTERCHANGE
- TURNPIKE INTERCHANGE
- PARTIAL INTERCHANGE
- GRADE SEPARATION
- FUTURE GRADE SEPARATION

or existing where development precludes obtaining additional R/W

NOTES: PROPOSED FACILITIES INDICATE CORRIDOR NEEDS ONLY. LOCATION TO BE DETERMINED BY SPECIFIC CORRIDOR & DESIGN STUDIES.

SOURCES: ENGINEERING & PUBLIC WORKS DEPT. GEOPROCESSING SECTION

Last Amended In Round 07-RA by Ord. 2007-037

PALM BEACH COUNTY COMPREHENSIVE PLAN MAP SERIES

N W E S

1 0 1 2 3 4 Miles

Effective Date: 01/03/08

Filename: N:\Map Series\MXDsAdopted

Contacts: PBC Planning Department or PBC Engineering & Public Works Department Geoprocessing Section

ATTACHMENT D

(Proposed Access Management Plan)

ACCESS MANAGEMENT PLAN

State Section Number: Lantana Road (93530000)
FM Number: 413258-1-22-02
State Road Number: N/A (County Road 812)
Limits: High Ridge Road to Andrew Redding Road
County: Palm Beach County
Classification: Off-System
Speed Limit: 35 mph
Date: May 13, 2020

	Existing Opening	Mile Post	Approx. Station	Existing Opening Type	Existing Spacing (feet)	Recommended Changes	Proposed Spacing (feet)	Deviation from Standard (%)
1	High Ridge Road	2.861	39+50	Full (Signal)	0	None	0	0
2	Sunset Road	2.923	42+77	Full	327	Change to WB Directional median opening with Underpass Roadway	327	50%
3	SR 9/I-95 SB Ramps	3.118	53+07	Full (Signal)	1030	Change to Diverging Diamond Crossover Intersections	918	65%
4	SR 9/I-95 NB Ramps	3.194	57+08	Full (Signal)	401		625	76%
5	Shopping Center Drive	3.295	62+42	Full (Signal)	533	None	421	84%
6	Andrew Redding Road	3.430	69+54	Full (Signal)	713	None	713	73%
7								
8								
9								
10								
11								
12								

Recommended By:

Godfrey Lamptey, P.E., PTOE — Date
Project Manager

Concurred By:

Vandana Nagole, P.E. — Date
FDOT Project Manager

Dalila Fernandez, P.E. — Date
District Traffic Access Manager

REVISIONS		
Date	By	Description

APPENDIX C

(Pavement Condition Survey)

FLORIDA DEPARTMENT OF TRANSPORTATION

ALL SYSTEM PAVEMENT CONDITION FORECAST

PAVEMENT IMPROVEMENT PROJECTS IN FM WPA TENTATIVE PLAN -- 2020 - 2025, EXTRACTED ON 07/09/2019

SORT BY RDWYID MILEPOST R ASCENDING L DESCENDING

```
----------------------------------------------   DISTRICT = 4  COUNTY = PALM BEACH   ----------------------------------------------

RDWYID      BMP    EMP RW SYS TYP SPD DISTRESS SURVEYED YEAR                                                                 FUTURE
 SR   US   G_BMP  G_EMP LN    %T   AADT RATINGS  1994  1995  1996  1997  1998  1999  2000  2001  2002  2003  2004  2005  2006
INTERSECT AT (MP|SIDE)      SURFTYPE ========
ITMSEG-P   W_BMP  W_EMP RW FY-P WKMX-P
CONTRACTOR (AGE_ONE YEAR)      ASTYPE            2007  2008  2009  2010  2011  2012  2013  2014  2015  2016  2017  2018  2019  2024
ITMSEG-F   W_BMP  W_EMP RW FY-F WKMX-F                                                                                       (FAST)

93220000   5.087  7.600  R   4   1  65 CRACKING        10.0  10.0  10.0   9.0   9.0   7.5   6.5   6.5   6.5   4.5*  4.5*
9    I95    47.7   50.2  4  7.4 229000 RIDE             7.7   7.9   7.9   8.1   8.5   8.4   8.4   8.4   8.1   7.2   7.1
                                FC2
4088871    4.303  8.057  C 2003   0012 CRACKING 10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   6.5   6.5   6.5   6.5   6.5   1.5
HARDRIVES OF DELRAY, INC. (2007)       RIDE      8.1   8.1   8.1   8.0   7.9   7.9   7.7   7.6   7.6   7.9   7.9   7.8   7.6   7.4
4331095    2.269  8.100  C 2019   0234

93220000   7.600 14.400  R   4   1  65 CRACKING  3.5*  3.5*  3.5*  3.5*  3.5*        10.0  10.0                          10.0
9    I95    50.2   57.0  5  6.1 203059 RIDE      7.7   7.9   7.9   7.8   7.6         8.6   8.7                           7.0
                                FC5M
4268432    7.715 14.400  R 2011   0012 CRACKING 10.0  10.0  10.0  10.0  10.0   9.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   6.5
COMMUNITY ASPHALT CORP.    (2013)     SPRIDE     7.7   7.6   7.6   7.4   7.1   7.1   8.1   8.2   8.2   8.4   8.5   8.4   8.3   8.1

93220000  14.400 16.205  R   4   1  65 CRACKING  3.5*  3.5*  3.5*  3.5*  3.5*        10.0  10.0                          10.0
9    I95    57.0   58.8  5  7.4 218000 RIDE      7.7   7.9   7.9   7.8   7.6         8.6   8.7                           7.8
                                FC5
2319171   11.392 16.451  C 2000   0213 CRACKING 10.0  10.0   9.0   9.0   9.0   9.0   9.0   8.0   5.5*  5.5*  5.5*  3.5*  3.5*  0.0
HARDRIVES OF DELRAY, INC. (2006)      SPRIDE     7.6   7.6   7.5   7.4   7.2   7.2   7.2   7.1   6.9   7.4   7.4   7.4   7.0   6.8
4275161   11.442 16.427  C 2018   0012

93220000  16.205 18.612  R   4   1  65 CRACKING  3.5*  3.5*  3.5*  3.5*  3.5*        10.0  10.0  10.0  10.0  10.0
9    I95    58.8   61.2  5  7.4 234000 RIDE      7.8   7.9   8.0   7.8   7.9         9.0   9.0   9.0   8.9   8.5
                                FC5
2319371   16.451 19.837  C 2002   0213 CRACKING 10.0  10.0  10.0   9.0   9.0   9.0   9.0   7.5   7.5   6.5   6.5   4.5*  4.5*  0.0
HUBBARD CONSTRUCTION COMPA(2007)      SPRIDE     7.4   7.4   7.5   7.5   7.4   7.5   7.2   7.1   7.0   7.4   7.3   7.1   7.0   6.8
4275162   16.427 18.781  C 2020   0012

93220000  18.612 20.409  R   4   1  65 CRACKING  3.5*  3.5*  3.5*  3.5*  3.5*        10.0  10.0  10.0  10.0  10.0        10.0
9    I95    61.2   63.0  5  7.4 241000 RIDE      7.8   7.9   8.0   7.8   7.9         9.0   9.0   9.0   8.9   8.5         7.7
                                FC5
                                       CRACKING 10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   9.0   9.0   9.0   3.5
                           (2009)      RIDE      7.5   7.8   7.8   7.7   7.8   7.8   7.8   7.8   7.8   7.8   8.0   7.9   7.8   7.6

93220000  20.844 21.570  R   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0  10.0
9    I95    63.4   64.2  5  7.4 212000 RIDE      7.7   7.9   7.8   7.6   7.6         9.0   8.9   8.8   8.7   8.3   8.4
                                FC5
2319181   19.807 21.610  C 2004   0213 CRACKING             10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   3.5
ASTALDI CONSTRUCTION CORP.(2009)      SPRIDE                 7.6   7.7   7.7   7.9   7.7   7.7   7.9   7.6   7.8   7.6   7.4   7.2

93220000  21.570 24.555  R   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0  10.0
9    I95    64.2   67.1  5  7.4 212000 RIDE      7.7   7.9   7.8   7.6   7.6         9.0   8.9   8.8   8.7   8.3   8.4
                                FC5
2319182   21.610 23.993  C 2004   0213 CRACKING                   10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   2.5
HUBBARD CONSTRUCTION COMPA(2010)      S RIDE                       8.0   7.9   8.1   8.0   8.1   8.1   7.9   8.0   7.8   7.6   7.4

93220000  24.555 25.111  R   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0  10.0
9    I95    67.1   67.7  5  7.4 199500 RIDE      7.7   7.9   7.8   7.6   7.6         9.0   8.9   8.8   8.7   8.3   8.4
                                OGFC
2319191   24.594 25.328  C 2003   0213 CRACKING       10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   2.5
ARCHER WESTERN CONTRACTORS(2008)      SPRIDE           7.8   8.0   8.0   8.1   8.1   7.9   7.8   8.0   8.2   8.3   8.2   7.7   7.5

93220000  25.111 26.761  R   4   1  65 CRACKING  7.5   7.5   7.5   7.5   7.5   7.0                                     10.0
9    I95    67.7   69.4  5  7.4 232000 RIDE      8.1   7.9   8.0   7.9   8.2   8.2                                      7.8
                                OGFC
                                       CRACKING 10.0              10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   2.5
                           (2010)      RIDE      7.8               7.9   7.9   8.0   7.9   7.9   7.9   8.1   8.2   8.0   7.7   7.5

93220000  26.761 29.740  R   4   1  65 CRACKING  7.5   7.5   7.5   7.5   7.5   7.0         10.0  10.0  10.0  10.0  10.0
9    I95    69.4   72.3  5  7.4 253000 RIDE      8.1   7.9   8.0   7.9   8.2   8.2          8.8   8.7   8.5   8.0   8.0
                                OGFC
                                       CRACKING                         10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   3.5
                           (2011)      RIDE                              8.0   8.1   8.0   8.0   8.1   8.0   8.1   8.0   7.9   7.7

93220000  29.740 34.326  R   4   1  65 CRACKING  7.5   7.5   7.5   7.5   7.5               10.0  10.0  10.0  10.0  10.0
9    I95    72.3   76.9  5  7.4 253000 RIDE      8.1   7.9   8.0   7.9   8.2                8.7   8.9   8.6   8.1   8.0
                                FC5
                                       CRACKING                   10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   2.5
                           (2010)      RIDE                        8.2   8.2   8.3   8.2   8.1   8.3   8.3   8.4   8.3   8.2   8.0
```

"*" INDICATES PAVEMENT DEFICIENT (ANY RATING <=6); START 2006, RIDE RATING OF 6 NOT CONSIDERED DEFICIENT WHEN SPEED LIMIT < 50 MPH.
"*" INDICATES PAVEMENT DEFICIENT (ANY RATING <=6); START 2002, RIDE RATING OF 6 NOT CONSIDERED DEFICIENT WHEN SPEED LIMIT < 45 MPH.
"@" INDICATES G1 PROJECT LENGTH SHORTER THAN ROADWAY SEGMENT 1 MILE OR MORE.
2024 FORECASTED BY FLORIDA'S ANALYSIS SYSTEM FOR TARGETS(FAST).

FLORIDA DEPARTMENT OF TRANSPORTATION

ALL SYSTEM PAVEMENT CONDITION FORECAST

PAVEMENT IMPROVEMENT PROJECTS IN FM WPA TENTATIVE PLAN -- 2020 - 2025, EXTRACTED ON 07/09/2019

SORT BY RDWYID MILEPOST R ASCENDING L DESCENDING

```
----------------------------------------------  DISTRICT = 4  COUNTY = PALM BEACH  ----------------------------------------------

RDWYID       BMP    EMP RW SYS TYP SPD DISTRESS SURVEYED YEAR                                                                FUTURE
 SR   US   G_BMP  G_EMP LN    %T   AADT RATINGS  1994  1995  1996  1997  1998  1999  2000  2001  2002  2003  2004  2005  2006
INTERSECT AT (MP|SIDE)        SURFTYPE ========
ITMSEG-P   W_BMP  W_EMP RW FY-P WKMX-P
CONTRACTOR (AGE_ONE YEAR)       ASTYPE           2007  2008  2009  2010  2011  2012  2013  2014  2015  2016  2017  2018  2019  2024
ITMSEG-F   W_BMP  W_EMP RW FY-F WKMX-F                                                                                      (FAST)

93220000   23.520 24.817  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0  10.0
9    I95     66.1   67.4  5  7.4 237000 RIDE       7.8   7.7   7.7   7.4   7.7         8.9   9.0   8.5   8.9   8.4   8.3
                                FC2
                                        CRACKING              10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   3.5
                        (2009)          RIDE                   7.6   7.7   7.6   7.8   7.7   7.7   7.8   7.7   7.7   7.6   7.4   7.2

93220000   22.038 23.520  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0  10.0
9    I95     64.6   66.1  5  7.4 212000 RIDE       7.8   7.7   7.7   7.4   7.7         8.9   9.0   8.5   8.9   8.4   8.3
                                FC5
2319182    21.610 23.993  C 2004   0213 CRACKING              10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   3.5
HUBBARD CONSTRUCTION COMPA(2009)      S RIDE                   8.1   7.8   8.1   8.1   8.1   8.1   8.1   7.9   8.0   7.8   7.8   7.6

93220000   20.844 22.038  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0  10.0
9    I95     63.4   64.6  5  7.4 212000 RIDE       7.8   7.7   7.7   7.4   7.7         8.9   9.0   8.5   8.9   8.4   8.3
                                FC5
2319181    19.807 21.610  C 2004   0213 CRACKING              10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   3.5
ASTALDI CONSTRUCTION CORP.(2009)      SPRIDE                   7.9   7.8   7.7   7.9   7.9   7.8   7.8   7.7   7.7   7.6   7.5   7.3

93220000   18.802 20.409  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0        10.0
9    I95     61.4   63.0  5  7.4 241000 RIDE       7.9   7.8   8.0   7.5   7.8         8.9   8.9   8.8   8.9   8.3         7.5
                                FC5
                                        CRACKING 10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   9.0   9.0   9.0   3.5
                        (2009)          RIDE      7.6   7.5   7.8   7.7   7.7   7.8   7.8   7.8   7.8   7.6   7.7   7.6   7.5   7.3

93220000   16.383 18.802  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0  10.0  10.0  10.0
9    I95     59.0   61.4  5  7.4 234000 RIDE       7.9   7.8   8.0   7.5   7.8         8.9   8.9   8.8   8.9   8.3
                                FC5
2319371    16.451 19.837  C 2002   0213 CRACKING 10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   8.0   8.0   8.0   6.5   6.5   1.5
HUBBARD CONSTRUCTION COMPA(2007)      SPRIDE      7.3   7.5   7.5   7.3   7.3   7.4   7.4   7.4   7.3   7.6   7.7   7.7   7.4   7.2
4275162    16.427 18.781  C 2020   0012

93220000   11.476 16.383  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0                          10.0
9    I95     54.1   59.0  5  6.1 203059 RIDE       7.7   7.8   7.9   7.7   7.6         8.6   8.6                           7.9
                                FC5
2319171    11.392 16.451  C 2000   0213 CRACKING 10.0  10.0  10.0  10.0   9.0   9.0   9.0   9.0   8.0   6.5   6.5   4.5*  4.5*  0.0
HARDRIVES OF DELRAY, INC. (2006)      SPRIDE      8.0   8.1   8.0   7.9   7.8   7.7   7.7   7.7   7.5   8.0   8.0   7.9   7.7   7.5
4275161    11.442 16.427  C 2018   0012

93220000    7.530 11.476  L   4   1  65 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*        10.0  10.0                          10.0
9    I95     50.1   54.1  5  5.6 215000 RIDE       7.7   7.8   7.9   7.7   7.6         8.6   8.6                           7.3
                                FC5M
4268431     8.200 11.476  L 2010   0012 CRACKING 10.0  10.0  10.0   9.0   9.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0  10.0   4.5
RANGER CONSTRUCTION INDUST(2012)      SPRIDE      7.4   7.4   7.3   7.3   7.2   8.3   8.3   8.4   8.1   8.6   8.7   8.6   8.5   8.3

93220000    5.019  7.530  L   4   1  65 CRACKING        10.0  10.0  10.0   9.0   9.0   7.5   6.5   5.5*  5.5*  5.5*  5.5*
9    I95     47.6   50.1  4  7.4 229000 RIDE             7.7   8.0   7.7   7.8   8.5   8.3   8.3   8.2   7.8   7.0   7.7
                                FC2
4088871     4.303  8.057  C 2003   0012 CRACKING 10.0  10.0  10.0  10.0   9.5   9.5   9.5   9.0   6.5   6.5   6.5   4.5*  4.5*  0.0
HARDRIVES OF DELRAY, INC. (2007)        RIDE      8.3   8.2   8.3   7.8   7.9   7.8   7.7   7.6   7.5   7.9   7.9   7.8   7.6   7.4
4331095     2.269  8.100  C 2019   0234

93220000    4.058  5.019  L   4   8  65 CRACKING        10.0  10.0  10.0   9.0   9.0   7.5   6.5   5.5*  5.5*  5.5*  5.5*
9    I95     46.7   47.6  4  7.4 229000 RIDE             7.7   8.0   7.7   7.8   8.5   8.3   8.3   8.2   7.8   7.0   7.7
                                FC2
4088871     4.303  8.057  C 2003   0012 CRACKING 10.0  10.0  10.0  10.0   9.5   9.5   9.5   9.0   6.5   6.5                    10.0
HARDRIVES OF DELRAY, INC. (2007)        RIDE      8.3   8.2   8.3   7.8   7.9   7.8   7.7   7.6   7.5   7.9                     7.5
4331095     2.269  8.100  C 2019   0234

93220000    0.000  4.058  L   4   1  65 CRACKING 10.0  10.0  10.0  10.0   9.0   9.0   7.5   6.5   6.5   6.5   6.5   6.5
9    I95     42.6   46.7  4  4.6 199000 RIDE      8.9   8.6   8.8   8.2   8.5   8.9   8.6   8.7   8.7   8.4   7.7   7.7
                                FC2
4088861     0.000  4.303  C 2003   0012 CRACKING 10.0  10.0  10.0  10.0  10.0  10.0   9.0   9.0   6.5   6.5   6.5   4.5*  4.5*  0.0
HARDRIVES OF DELRAY, INC. (2007)      SPRIDE      8.3   8.3   8.3   8.1   8.0   8.0   7.8   7.7   7.6   8.1   8.1   8.0   7.8   7.6
4331094     0.000  2.719@ C 2017   0234
-----------------------------------------------------------------------------------------------------------------------------------
93230000    0.000  2.290  C   1   1  45 CRACKING  4.5*  4.5*  4.5*  4.5*  4.5*  2.0* 10.0  10.0  10.0   9.0   8.0   7.5   7.5
729                       2 26.7   4000 RIDE       6.3*  6.1*  5.6*  5.6*  5.0*  4.8*  8.3   8.4         7.6   7.2   7.4   6.6
S LAKE AVE( 0.0C)               FC95M
4153191     0.000  2.283  C 2010   0012 CRACKING  7.0   6.0*  5.5*  5.5*  5.5* 10.0  10.0   9.0   8.5   7.5   7.5   7.0   7.0   5.0
RANGER CONSTRUCTION INDUST(2012)      SPRIDE      7.2   7.1   7.1   7.0   6.5   8.5   8.4   8.0   7.7   7.5   7.2   6.9   6.4   6.3

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"*" INDICATES PAVEMENT DEFICIENT (ANY RATING <=6); START 2006, RIDE RATING OF 6 NOT CONSIDERED DEFICIENT WHEN SPEED LIMIT < 50 MPH.
"*" INDICATES PAVEMENT DEFICIENT (ANY RATING <=6); START 2002, RIDE RATING OF 6 NOT CONSIDERED DEFICIENT WHEN SPEED LIMIT < 45 MPH.
"@" INDICATES G1 PROJECT LENGTH SHORTER THAN ROADWAY SEGMENT 1 MILE OR MORE.
2024 FORECASTED BY FLORIDA'S ANALYSIS SYSTEM FOR TARGETS(FAST).

APPENDIX D

(Existing Transit Data)

SOUTH COUNTY

ROUTE 70 Ruta 70 / Rout 70

Via Seacrest Blvd.—Lantana Rd. to Delray Beach Tri-Rail

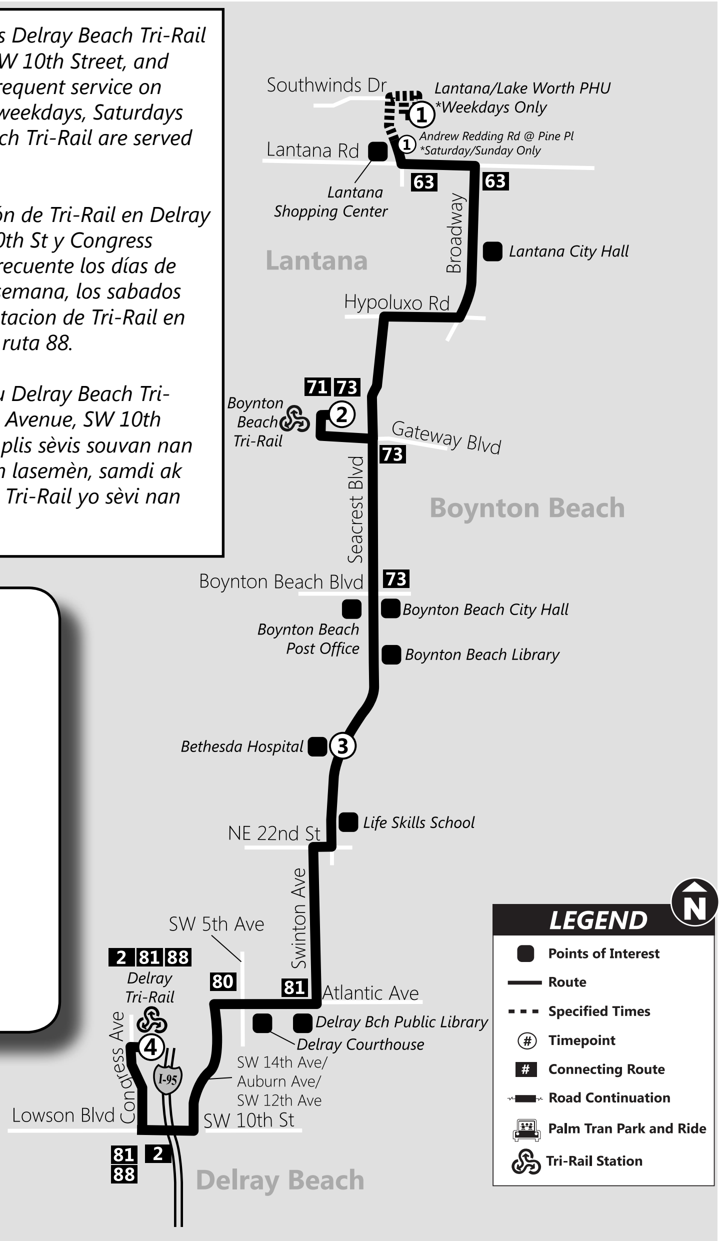
Route Performance MAXIMIZATION RPM

Route 70 *provides service as far west as Delray Beach Tri-Rail via Atlantic Avenue, SW 12th Avenue, SW 10th Street, and Congress Avenue. Route 70 has more frequent service on weekdays. Route 70 extends service on weekdays, Saturdays and Sundays. Areas west of Delray Beach Tri-Rail are served by new Route 88.*

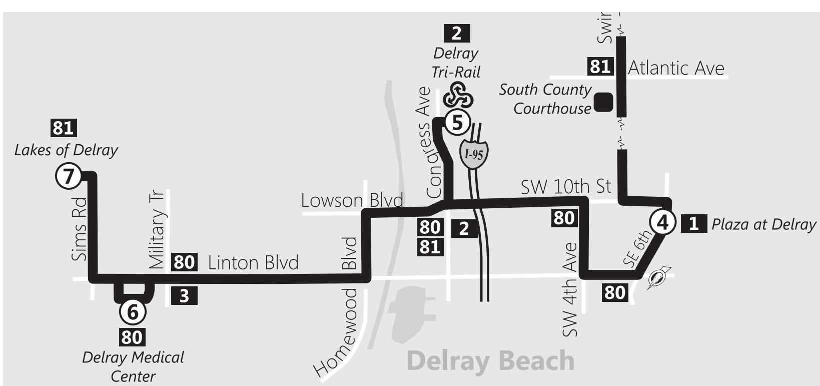
Ruta 70 *provee servicio hasta la estación de Tri-Rail en Delray Beach vía Atlantic Av., SW 12 Av., SW 10th St y Congress Av. La ruta 70 tiene tiene servicio mas frecuente los días de semana. Servicio extendido los días de semana, los sabados y Domingos. Las áreas al oeste de la Estacion de Tri-Rail en Delray Beach son servidas por la nueva ruta 88.*

Wout 70 *bay sèvis osi lwen lwès tankou Delray Beach Tri-Rail pase nan Atlantic Avenue, SW 12th Avenue, SW 10th Street, ak Kongrè Avenue. Wout 70 gen plis sèvis souvan nan jou lasemèn yo. Wout 70 fin fè sèvis nan lasemèn, samdi ak dimanch. Zòn ki nan lwès Delray Beach Tri-Rail yo sèvi nan nouvo wout 88.*

- **Lantana/ Lake Worth Public Health Unit**
- **Lantana Shopping Center**
- **Lantana City Hall**
- **Boynton Beach Tri-Rail**
- **Boynton Beach Post Office**
- **Boynton Beach City Hall**
- **Boynton Beach Library**
- **Bethesda Hospital**
- **Life Skills School**
- **Delray Courthouse**
- **Plaza at Delray**
- **Delray Beach Tri-Rail Station**



PREVIOUS ROUTE 70 SEGMENT ANTERIORMENTE SEGMENTO DE LA RUTA 70 SEGMENT NAN WOUT 70



Route 70 Southbound Sur/Sid

Weekday / Semana / Lasémèn

1 Lantana Public Health Unit Bus Stop #6186	2 Boynton Beach Tri-Rail Bus Stop #679	3 Bethesda Hospital Bus Stop #6522	4 Delray Beach Tri-Rail Bus Stop #706
	5:15	5:30	5:54
5:30	5:55	6:12	6:36
6:10	6:35	6:52	7:16
6:50	7:15	7:32	7:56
7:30	7:55	8:12	8:36
8:10	8:35	8:52	9:16
8:50	9:15	9:32	9:56
9:30	9:55	10:12	10:36
10:10	10:35	10:52	11:16
10:50	11:15	11:32	11:56
11:30	11:55	**12:12**	**12:36**
12:10	**12:35**	**12:52**	**1:16**
12:50	**1:15**	**1:32**	**1:56**
1:30	**1:55**	**2:12**	**2:36**
2:10	**2:35**	**2:52**	**3:16**
2:50	**3:15**	**3:32**	**3:56**
3:30	**3:55**	**4:12**	**4:36**
4:10	**4:35**	**4:52**	**5:16**
4:50	**5:15**	**5:32**	**5:56**
5:30	**5:55**	**6:12**	**6:36**
6:10	**6:35**	**6:50**	**7:09**

Saturday / Sábado / Samdi

1 Andrew Redding Rd @ Pine Place Bus Stop #6518	2 Boynton Beach Tri-Rail Bus Stop #679	3 Bethesda Hospital Bus Stop #6522	4 Delray Beach Tri-Rail Bus Stop #706
7:30	7:55	8:10	8:35
8:30	8:55	9:10	9:35
9:30	9:55	10:10	10:35
10:30	10:55	11:10	11:35
11:30	11:55	**12:10**	**12:35**
12:30	**12:55**	**1:10**	**1:35**
1:30	**1:55**	**2:10**	**2:35**
2:30	**2:55**	**3:10**	**3:35**
3:30	**3:55**	**4:10**	**4:35**
4:30	**4:55**	**5:10**	**5:35**
5:30	**5:55**	**6:10**	**6:35**

Sunday / Domingo / Dimanch

1 Andrew Redding Rd @ Pine Place Bus Stop #6518	2 Boynton Beach Tri-Rail Bus Stop #679	3 Bethesda Hospital Bus Stop #6522	4 Delray Beach Tri-Rail Bus Stop #706
	8:45	9:00	9:25
9:35	10:00	10:15	10:40
10:50	11:15	11:30	11:55
12:05	**12:30**	**12:45**	**1:10**
1:20	**1:45**	**2:00**	**2:25**
2:35	**3:00**	**3:15**	**3:40**
3:50	**4:15**	**4:30**	**4:55**
5:05	**5:30**	**5:45**	**6:10**

P.M. times are shown in **bold**/Los horarios de P.M. se muestran en **negrilla**/Lè nan apremidi yo prezante an **fonse**

Route 70 Northbound Norte / Nô

Weekday / Semana / Lasémèn

4 Delray Beach Tri-Rail Bus Stop #706	3 Bethesda Hospital Bus Stop #6470	2 Boynton Beach Tri-Rail Bus Stop #679	1 Lantana Public Health Unit Bus Stop #6186
6:06	6:28	6:49	7:07
6:46	7:08	7:29	7:47
7:26	7:48	8:09	8:27
8:06	8:28	8:49	9:07
8:46	9:08	9:29	9:47
9:26	9:48	10:10	10:29
10:06	10:28	10:50	11:09
10:46	11:08	11:30	11:49
11:26	11:48	**12:10**	**12:29**
12:06	**12:28**	**12:50**	**1:09**
12:46	**1:08**	**1:30**	**1:49**
1:26	**1:48**	**2:10**	**2:29**
2:06	**2:28**	**2:50**	**3:09**
2:46	**3:08**	**3:30**	**3:49**
3:26	**3:49**	**4:11**	**4:31**
4:06	**4:29**	**4:51**	**5:11**
4:46	**5:09**	**5:31**	**5:51**
5:26	**5:49**	**6:11**	**6:31**
6:06	**6:28**	**6:48**	**7:06**

Saturday / Sábado / Samdi

4 Delray Beach Tri-Rail Bus Stop #706	3 Bethesda Hospital Bus Stop #6470	2 Boynton Beach Tri-Rail Bus Stop #679	1 Andrew Redding Rd @ Pine Place Bus Stop #6514
6:58	7:22	7:45	8:03
7:58	8:22	8:45	9:03
8:58	9:22	9:45	10:03
9:58	10:22	10:45	11:03
10:58	11:22	11:45	**12:03**
11:58	**12:22**	**12:45**	**1:03**
12:58	**1:22**	**1:45**	**2:03**
1:58	**2:22**	**2:45**	**3:03**
2:58	**3:22**	**3:45**	**4:03**
3:58	**4:22**	**4:45**	**5:03**
4:58	**5:22**	**5:45**	**6:03**
5:58	**6:22**	**6:45**	**7:03**

Sunday / Domingo / Dimanch

4 Delray Beach Tri-Rail Bus Stop #706	3 Bethesda Hospital Bus Stop #6470	2 Boynton Beach Tri-Rail Bus Stop #679	1 Andrew Redding Rd @ Pine Place Bus Stop #6514
9:35	9:59	10:22	10:40
10:50	11:14	11:37	11:55
12:05	**12:29**	**12:52**	**1:10**
1:20	**1:44**	**2:07**	**2:25**
2:35	**2:59**	**3:22**	**3:40**
3:50	**4:14**	**4:37**	**4:55**
5:05	**5:29**	**5:52**	**6:10**

P.M. times are shown in **bold**/Los horarios de P.M. se muestran en **negrilla**/Lè nan apremidi yo prezante an **fonse**

ROUTE 63 Ruta 63 / Rout 63

Via Lantana Rd. and Jog Rd. - Lantana to River Bridge Centre

Route Performance MAXIMIZATION RPM

Route 63 *extends north from Lantana Rd. on Jog Rd. to River Bridge Centre/Forest Hill Blvd. Route 63 has extended evening service on weekdays and Sundays.*

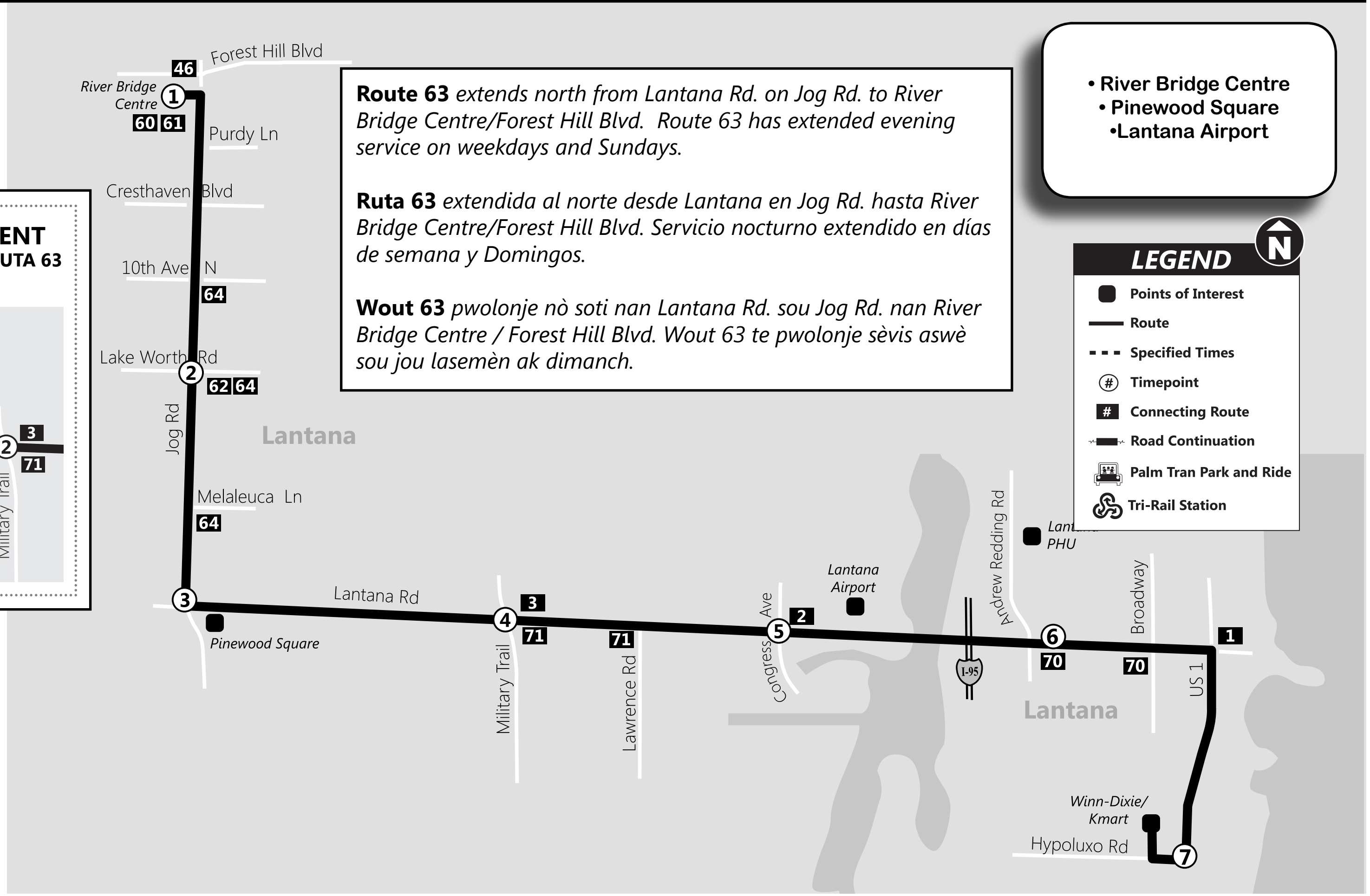
Ruta 63 *extendida al norte desde Lantana en Jog Rd. hasta River Bridge Centre/Forest Hill Blvd. Servicio nocturno extendido en días de semana y Domingos.*

Wout 63 *pwolonje nò soti nan Lantana Rd. sou Jog Rd. nan River Bridge Centre / Forest Hill Blvd. Wout 63 te pwolonje sèvis aswè sou jou lasemèn ak dimanch.*

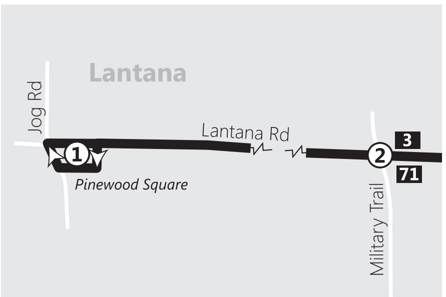
- River Bridge Centre
- Pinewood Square
- Lantana Airport

LEGEND

- Points of Interest
- Route
- Specified Times
- Timepoint
- Connecting Route
- Road Continuation
- Palm Tran Park and Ride
- Tri-Rail Station



PREVIOUS ROUTE 63 SEGMENT
ANTERIORMENTE SEGMENTO DE LA RUTA 63
SEGMENT NAN WOUT 63



Route 63 Eastbound Este / Lès

Weekday / Semana / Lasémèn

1 River Bridge Centre Bus Stop #1472	2 Lake Worth & Jog Bus Stop #5614	3 Lantana & Jog Bus Stop #6700	4 Lantana & Military Bus Stop #6191	5 Lantana & Congress Bus Stop #6117	6 Lantana Public Health Unit Bus Stop #6123	7 Hypoluxo & US1 Bus Stop #173
5:50	5:59	6:07	6:15	6:19	6:26	6:33
6:50	6:59	7:07	7:15	7:19	7:26	7:33
7:50	7:59	8:07	8:15	8:19	8:26	8:33
8:50	8:59	9:07	9:14	9:18	9:24	9:31
9:50	9:59	10:07	10:14	10:18	10:24	10:31
10:50	10:59	11:07	11:14	11:18	11:24	11:31
11:50	11:59	**12:07**	**12:14**	**12:18**	**12:24**	**12:31**
12:50	**12:59**	**1:07**	**1:14**	**1:18**	**1:24**	**1:31**
1:50	**1:59**	**2:07**	**2:14**	**2:18**	**2:24**	**2:31**
2:50	**2:59**	**3:07**	**3:14**	**3:18**	**3:24**	**3:31**
3:50	**3:59**	**4:07**	**4:14**	**4:18**	**4:24**	**4:31**
4:50	**4:59**	**5:07**	**5:14**	**5:18**	**5:24**	**5:31**
5:50	**5:59**	**6:07**	**6:13**	**6:17**	**6:22**	**6:29**
6:50	**6:59**	**7:07**	**7:13**	**7:17**	**7:22**	**7:29**
7:40	**7:49**	**7:57**	**8:03**	**8:07**	**8:12**	**8:19**

Saturday / Sábado / Samdi

1 River Bridge Centre Bus Stop #1472	2 Lake Worth & Jog Bus Stop #5614	3 Lantana & Jog Bus Stop #6700	4 Lantana & Military Bus Stop #6191	5 Lantana & Congress Bus Stop #6117	6 Lantana Public Health Unit Bus Stop #6123	7 Hypoluxo & US1 Bus Stop #173
7:50	7:59	8:07	8:13	8:17	8:22	8:29
8:50	8:59	9:07	9:13	9:17	9:22	9:29
9:50	9:59	10:07	10:13	10:17	10:22	10:29
10:50	10:59	11:07	11:13	11:17	11:22	11:29
11:50	11:59	**12:07**	**12:13**	**12:17**	**12:22**	**12:29**
12:50	**12:59**	**1:07**	**1:13**	**1:17**	**1:22**	**1:29**
1:50	**1:59**	**2:07**	**2:13**	**2:17**	**2:22**	**2:29**
2:50	**2:59**	**3:07**	**3:13**	**3:17**	**3:22**	**3:29**
3:50	**3:59**	**4:07**	**4:13**	**4:17**	**4:22**	**4:29**
4:50	**4:59**	**5:07**	**5:13**	**5:17**	**5:22**	**5:29**
5:50	**5:59**	**6:07**	**6:13**	**6:17**	**6:22**	**6:29**

Sunday / Domingo / Dimanch

1 River Bridge Centre Bus Stop #1472	2 Lake Worth & Jog Bus Stop #5614	3 Lantana & Jog Bus Stop #6700	4 Lantana & Military Bus Stop #6191	5 Lantana & Congress Bus Stop #6117	6 Lantana Public Health Unit Bus Stop #6123	7 Hypoluxo & US1 Bus Stop #173
9:50	9:59	10:07	10:13	10:17	10:22	10:29
10:50	10:59	11:07	11:13	11:17	11:22	11:29
11:50	11:59	**12:07**	**12:13**	**12:17**	**12:22**	**12:29**
12:50	**12:59**	**1:07**	**1:13**	**1:17**	**1:22**	**1:29**
1:50	**1:59**	**2:07**	**2:13**	**2:17**	**2:22**	**2:29**
2:50	**2:59**	**3:07**	**3:13**	**3:17**	**3:22**	**3:29**
3:50	**3:59**	**4:07**	**4:13**	**4:17**	**4:22**	**4:29**
4:50	**4:59**	**5:07**	**5:13**	**5:17**	**5:22**	**5:29**

P.M. times are shown in **bold**/Los horarios de P.M. se muestran en **negrilla**/Lè nan apremidi yo prezante an **fonse**

Route 63 Westbound Oeste / Louès

Weekday / Semana / Lasémèn

7 Hypoluxo & US1 Bus Stop #335	6 Lantana Public Health Unit Bus Stop #6516	5 Lantana & Congress Bus Stop #6192	4 Lantana & Military Bus Stop #6799	3 Lantana & Jog Bus Stop #6411	2 Lake Worth & Jog Bus Stop #4587	1 River Bridge Centre Bus Stop #1472
7:00	7:07	7:12	7:16	7:22	7:30	7:40
8:00	8:07	8:12	8:16	8:22	8:30	8:40
9:00	9:06	9:11	9:15	9:21	9:29	9:39
10:00	10:06	10:11	10:15	10:21	10:29	10:39
11:00	11:06	11:11	11:15	11:21	11:29	11:39
12:00	**12:06**	**12:11**	**12:15**	**12:21**	**12:29**	**12:39**
1:00	**1:06**	**1:11**	**1:15**	**1:21**	**1:29**	**1:39**
2:00	**2:06**	**2:11**	**2:15**	**2:21**	**2:29**	**2:39**
3:00	**3:07**	**3:14**	**3:18**	**3:24**	**3:32**	**3:42**
4:00	**4:07**	**4:14**	**4:18**	**4:24**	**4:32**	**4:42**
5:00	**5:07**	**5:14**	**5:18**	**5:24**	**5:32**	**5:42**
6:00	**6:06**	**6:11**	**6:15**	**6:21**	**6:29**	**6:39**
7:00	**7:06**	**7:11**	**7:15**	**7:21**	**7:29**	**7:39**
8:00	**8:06**	**8:11**	**8:15**	**8:21**	**8:29**	**8:39**

Saturday / Sábado / Samdi

7 Hypoluxo & US1 Bus Stop #335	6 Lantana Public Health Unit Bus Stop #6516	5 Lantana & Congress Bus Stop #6192	4 Lantana & Military Bus Stop #6799	3 Lantana & Jog Bus Stop #6411	2 Lake Worth & Jog Bus Stop #4587	1 River Bridge Centre Bus Stop #1472
8:00	8:06	8:11	8:14	8:20	8:28	8:38
9:00	9:06	9:11	9:14	9:20	9:28	9:38
10:00	10:06	10:11	10:14	10:20	10:28	10:38
11:00	11:06	11:11	11:14	11:20	11:28	11:38
12:00	**12:06**	**12:11**	**12:14**	**12:20**	**12:28**	**12:38**
1:00	**1:06**	**1:11**	**1:14**	**1:20**	**1:28**	**1:38**
2:00	**2:06**	**2:11**	**2:14**	**2:20**	**2:28**	**2:38**
3:00	**3:06**	**3:11**	**3:14**	**3:20**	**3:28**	**3:38**
4:00	**4:06**	**4:11**	**4:14**	**4:20**	**4:28**	**4:38**
5:00	**5:06**	**5:11**	**5:14**	**5:20**	**5:28**	**5:38**
6:00	**6:06**	**6:11**	**6:14**	**6:20**	**6:28**	**6:38**

Sunday / Domingo / Dimanch

7 Hypoluxo & US1 Bus Stop #335	6 Lantana Public Health Unit Bus Stop #6516	5 Lantana & Congress Bus Stop #6192	4 Lantana & Military Bus Stop #6799	3 Lantana & Jog Bus Stop #6411	2 Lake Worth & Jog Bus Stop #4587	1 River Bridge Centre Bus Stop #1472
11:00	11:06	11:11	11:14	11:20	11:28	11:38
12:00	**12:06**	**12:11**	**12:14**	**12:20**	**12:28**	**12:38**
1:00	**1:06**	**1:11**	**1:14**	**1:20**	**1:28**	**1:38**
2:00	**2:06**	**2:11**	**2:14**	**2:20**	**2:28**	**2:38**
3:00	**3:06**	**3:11**	**3:14**	**3:20**	**3:28**	**3:38**
4:00	**4:06**	**4:11**	**4:14**	**4:20**	**4:28**	**4:38**
5:00	**5:06**	**5:11**	**5:14**	**5:20**	**5:28**	**5:38**

P.M. times are shown in **bold**/Los horarios de P.M. se muestran en **negrilla**/Lè nan apremidi yo prezante an **fonse**

APPENDIX E

(Benefit Cost Analysis Results)

BENEFIT-COST ANALYSIS

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Build Alternative 1
Benefit-Cost Analysis

District: **Four** County: **93 - Palm Beach** Date Prepared: 10/21/19

Location: **I-95 at Lantana Road**

Section : **93530000** Beg. Milepost : **2.861** End Milepost : **3.43**
Rdway Type: **6+ Lanes Urban Divided**

Control Element: **Other (describe in box below)**

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW	$	13,300,000.00	100	0.0408	$	542,640.00
P.E.C.E.I.	$	4,508,000.00	15	0.0899	$	405,269.20
Structure			75	0.0425	$	-
Roadway	$	18,400,000.00	20	0.0736	$	1,354,240.00
Drainage			20	0.0736	$	-
Signal & Lighting			20	0.0736	$	-
Other			20	0.0736	$	-
Sub-Total	$	36,208,000.00			$	2,302,149.20
				Annual Cost =	$	2,302,149.20

	Interchange	Arterial
Total number of crashes =	1133	310
# of correctable crashes, PC =	1133	310
# of years of crash data, YD =	10	10
PC/YD =	113.30	31.00
Crash reduction factor, CRF =	15.0%	15.0%
CRF x (PC/YD) =	17.00	4.65
Cost per crash, CPC =	$123,598.00	$123,598.00
Benefit =	$2,100,548	$574,731

Interchange crash reduction factor (%): 15
Increase lanes from 4 to 6

Arterial crash reduction factor (%): 15
Increase lanes from 4 to 6

Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\$2,675,278.71}{\$2,302,149.20} = \mathbf{1.16}$$

Based on CMF ID: 7924: Increase lanes from 4 to 6

Prepared by: Godfrey Lamptey, P.E., PTOE

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Build Alternative 2
Benefit-Cost Analysis

District: **Four** County: **93 - Palm Beach** Date Prepared: 10/21/19

Location: **I-95 at Lantana Road**

Section : **93530000** Beg. Milepost : **2.861** End Milepost : **3.43**
Rdway Type: **6+ Lanes Urban Divided**

Control Element: **Other (describe in box below)**

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW	$	12,800,000.00	100	0.0408	$	522,240.00
P.E.C.E.I.	$	8,011,500.00	15	0.0899	$	720,233.85
Structure			75	0.0425	$	-
Roadway	$	32,700,000.00	20	0.0736	$	2,406,720.00
Drainage			20	0.0736	$	-
Signal & Lighting			20	0.0736	$	-
Other	$	800,000.00	20	0.0736	$	58,880.00
Sub-Total	$	54,311,500.00			$	3,708,073.85
				Annual Cost =	$	3,708,073.85

	Interchange	Arterial
Total number of crashes =	1133	310
# of correctable crashes, PC =	1133	310
# of years of crash data, YD =	10	10
PC/YD =	113.30	31.00
Crash reduction factor, CRF =	40.8%	15.0%
CRF x (PC/YD) =	46.23	4.65
Cost per crash, CPC =	$123,598.00	$123,598.00
Benefit =	$5,713,491	$574,731

Interchange crash reduction factor (%): 40.8
Covert diamond interchange to diverging diamond interchange

Arterial crash reduction factor (%): 15
Increase lanes from 4 to 6

Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\$6,288,221.29}{\$3,708,073.85} = \mathbf{1.70}$$

Based on CMF ID: 9104: Covert diamond interchange to diverging diamond interchange

Prepared by: Godfrey Lamptey, P.E., PTOE

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Build Alternative 3
Benefit-Cost Analysis

District: **Four** County: **93 - Palm Beach** Date Prepared: 10/21/19

Location: **I-95 at Lantana Road**

Section : **93530000** Beg. Milepost : **2.861** End Milepost : **3.43**
Rdway Type: **6+ Lanes Urban Divided**

Control Element: **Other (describe in box below)**

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW	$	13,300,000.00	100	0.0408	$	542,640.00
P.E.C.E.I.	$	7,521,500.00	15	0.0899	$	676,182.85
Structure			75	0.0425	$	-
Roadway	$	30,700,000.00	20	0.0736	$	2,259,520.00
Drainage			20	0.0736	$	-
Signal & Lighting			20	0.0736	$	-
Other			20	0.0736	$	-
Sub-Total	$	51,521,500.00			$	3,478,342.85
				Annual Cost =	$	3,478,342.85

	Interchange	Arterial
Total number of crashes =	1133	310
# of correctable crashes, PC =	1133	310
# of years of crash data, YD =	10	10
PC/YD =	113.30	31.00
Crash reduction factor, CRF =	15.0%	15.0%
CRF x (PC/YD) =	17.00	4.65
Cost per crash, CPC =	$123,598.00	$123,598.00
Benefit =	$2,100,548	$574,731

Interchange crash reduction factor (%): 15
Increase lanes from 4 to 6

Arterial crash reduction factor (%): 15
Increase lanes from 4 to 6

Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\$2,675,278.71}{\$3,478,342.85} = \mathbf{0.77}$$

Based on CMF ID: 7924: Increase lanes from 4 to 6

Prepared by: Godfrey Lamptey, P.E., PTOE

CMF

CMF / CRF Details

CMF ID: 7924

Increase from 4 lanes to 6 lanes

Description:

Prior Condition: 4 lane roadway

Category: Roadway

Study: ***Assessment of safety effects for widening urban roadways in developing crash modification functions using nonlinearizing link functions*, Park et al., 2015**

Star Quality Rating:	[View score details]

Crash Modification Factor (CMF)	
Value:	0.85
Adjusted Standard Error:	
Unadjusted Standard Error:	0.073

Crash Reduction Factor (CRF)	
Value:	15 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	

Unadjusted Standard Error:	7.3

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not specified
Number of Lanes:	
Road Division Type:	
Speed Limit:	40-60
Area Type:	Urban
Traffic Volume:	20500 to 60683 *Annual Average Daily Traffic (AADT)*
Time of Day:	

If countermeasure is intersection-based

Intersection Type:	
Intersection Geometry:	
Traffic Control:	
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Development Details

Date Range of Data Used:	2003 to 2012
Municipality:	
State:	FL

Country:	
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Mar-08-2016
Comments:	

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

CMF / CRF Details

CMF ID: 9104

Convert diamond interchange to Diverging Diamond Interchange (DDI) or Double Crossover Diamond (DCD)

Description: Convert a diamond interchange to a Diverging Diamond Interchange (DDI) or a Double Crossover Diamond (DCD)

Prior Condition: Conventional diamond interchange

Category: Interchange design

Study: *Safety Evaluation of Diverging Diamond Interchanges in Missouri*, Claros et al., 2015

Star Quality Rating:	★★★★☆ [View score details]

Crash Modification Factor (CMF)	
Value:	0.592
Adjusted Standard Error:	
Unadjusted Standard Error:	0.029

Crash Reduction Factor (CRF)	
Value:	40.8 *(This value indicates a **decrease** in crashes)*

Adjusted Standard Error:	
Unadjusted Standard Error:	2.9

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	All
Number of Lanes:	multilane
Road Division Type:	
Speed Limit:	c
Area Type:	Urban
Traffic Volume:	
Time of Day:	Not specified
If countermeasure is intersection-based	
Intersection Type:	Other
Intersection Geometry:	Not specified
Traffic Control:	Not specified
Major Road Traffic Volume:	33000 to 152000 Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	16000 to 29000 Annual Average Daily Traffic (AADT)

Development Details

Date Range of Data Used:	
Municipality:	

State:	MO
Country:	
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Jan-17-2018
Comments:	This CMF applies to the entire interchange footprint (i.e., ramp terminals, ramp segments, speed-change lanes, crossroad, and freeway segment).

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

APPENDIX F

(Selection of Preferred Alternative Memorandum)

Date: June 5, 2020

To: Vandana Nagole, P.E., FDOT Project Manager

From: Godfrey Lamptey, P.E., PTOE, GOAL Project Manager

Reference: **Selection of Preferred Alternative**
SR-9/I-95 at Lantana Road Interchange PD&E Study
Palm Beach County, Florida
FPID No.: 413258-1-22-02|ETDM No.: 14338

Attachments: A – Meeting Notes from Meeting with the Town of Lantana
B – Meeting Notes from Meeting with Palm Beach County Mayor
C – Comments from the Alternatives Public Workshop
D – Benefit-Cost Analysis

INTRODUCTION

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study at the SR 9/I-95 and Lantana Road Interchange within the Town of Lantana, in Palm Beach County. The purpose of the project is to enhance the overall traffic operations and safety at the existing interchange of SR 9/I-95 and Lantana Road in order to eliminate traffic spillback onto SR 9/I-95. As part of this PD&E Study, three Build Alternatives were developed in order to provide the necessary improvements to accommodate the 2045 design year traffic demand. The build alternatives considered include:

- Build Alternative 1 – Tight Urban Diamond Interchange (TUDI)
- Build Alternative 2 – Diverging Diamond Interchange (DDI)
- Build Alternative 3 – Single Point Urban Interchange (SPUI)

The No-Action Alternative, which assumes no proposed improvements to the study interchange was also considered as a baseline for comparison against the Build Alternatives. The No-Action Alternative together with the three Build Alternatives were analyzed and evaluated to determine the traffic operations and safety impacts, engineering impacts, socio-economic impacts, environmental impacts, cost estimates as well as public comments under each alternative.

PUBLIC INVOLVEMENT

As part of the preparation for the Alternatives Public Workshop, project briefing meetings were held with the Town of Lantana (Mayor David K. Stewart and Town Manager Deborah Manzo) and Palm Beach County Mayor Mack Bernard. (See **Attachments A and B**). Both Mayor Steward and Mayor Bernard indicated their preference for Build Alternative 2 – Diverging Diamond Interchange (DDI) due to the significantly higher traffic operations and safety improvements at the interchange. They also expressed their concerns with the traffic operations and safety issues at the High Ridge Road and Sunset Road intersections which provide access to the Costco Warehouse.

An Alternatives Public Workshop was held on Wednesday, November 13, 2019 from 5:30 p.m. to 7:30 p.m., at the Lantana Road Branch Library, located at 4020 Lantana Road, Lake Worth, Florida 33462. The workshop provided an opportunity for residents, businesses and stakeholders to comment and provide input on the various alternatives under consideration at this interchange.

A total of 44 people attended the meeting including 19 FDOT and Consultant Team members. Based on the comments received, in general, the attendees were in support of the project to provide the necessary mobility improvements and safety enhancements along Lantana Road. In addition, most attendees identified Build Alternative 2 i.e. DDI configuration as their preferred choice among the three Build Alternatives presented (See **Attachment C**).

BENEFIT-COST ANALYSIS

A Benefit to Cost (B/C) Analysis was performed for the various Build Alternatives. A 4%-time value for money was utilized to discount future costs and benefits over the design periods for the various cost components**. Table 1** shows the results of the benefit cost analysis.

Table 1 Benefit Cost Analysis for Lantana Road Interchange Alternatives

Build Alternative	Project Cost	Annualized Costs	Annualized Benefits	B/C Ratio
Build Alternative 1 (TUDI)	$18,400,000	$2,302,149.20	$2,675,278.71	1.16
Build Alternative 2 (DDI)	$32,700,000	$3,708,073.85	$6,288,221.29	1.70
Build Alternative 3 (SPUI)	$30,700,000	$3,478,342.85	$2,675,278.71	0.77

Based on the results of the benefit-cost analysis, Build Alternative 2 has the best benefit-cost ratio of 1.70, followed by Build Alternative 1 with a benefit-cost ratio of 1.16, and finally Build Alternative 3 with a benefit-cost ratio of 0.77 (See **Attachment D**).

EVALUATION MATRIX

A comparative (qualitative) analysis of the No-Action and Build Alternatives was conducted based on the traffic operations and safety, engineering and environmental impacts as well as public comments of the alternatives (See **Table 2**). In addition, a quantitative evaluation of the interchange alternatives was performed based on the multi-criteria evaluation methodology. The various performance criteria under each alternative were assigned values based on a ranking scale number as follows:

1 = Substantial Negative Effect or Worse Alternative
2 = Generally Negative Effect or Inferior Alternative
3 = Generally No Effect or Moderate Alternative
4 = Generally Positive Effect or Good Alternative
5 = Substantial Positive Effect or Best Alternative

Table 3 shows the evaluation matrix for the alternatives considered under this PD&E Study.

CONCLUSION

Based on the analysis and evaluation of several key evaluation parameters including traffic operations, safety benefits, access impacts, utility impacts, right of way impacts, environmental impacts, construction costs as well as public comments, Build Alternative 2 with the Diverging Diamond Interchange configuration had the highest score due to the significantly higher safety and traffic operational benefits it provides to offset its relatively higher construction cost. **As such, Build Alternative is recommended as the Preferred Alternative for this PD&E Study**.

Table 2 Qualitative Evaluation

	Evaluation Factors	No-Action Alternative	Build Alternative 1	Build Alternative 2	Build Alternative 3
Traffic & Safety	**Level of Service I-95 Ramp terminals**	Overall **LOS F** (NB & SB) SB and NB approaches operate at **LOS F**	Overall LOS C (NB) and LOS D (SB). NB and SB approaches operate at LOS E	Overall LOS C (NB & SB)	Overall LOS D (NB) and LOS C (SB)
	Queue Spillback onto I-95 Mainline	NB and SB Ramp queue spillback onto I-95 mainline	Potential queue spillback for NB off-ramp	No queue spillback of NB and SB off-ramp	No queue spillback of NB and SB off-ramp
	Safety Benefits	Potential for increased crashes due to congestion	15% reduction in crashes	36% reduction in crashes	15% reduction in crashes
Engineering	**Geometric Compliance to Design Controls**	Several geometric design deficiencies	Design Exceptions required for vertical clearance and vertical alignment	No Design Variations and Exceptions required	No Design Variations and Exceptions required
	Utility Impacts	None	Impacts to 9 Utilities	Impacts to 10 Utilities. Requires relocation of 2 transmission poles	Impacts to 9 Utilities
	Multi-Modal (Transit/ Ped/ Bike)	None	Provides Bicycle Lanes along Lantana Road	Provides Bicycle Lanes along Lantana Road	Provides Bicycle Lanes along Lantana Road
			Upgrades deficient ADA curb ramps at High Ridge Rd	Upgrades deficient ADA curb ramps at High Ridge Rd	Upgrades deficient ADA curb ramps at High Ridge Rd
	Access Modifications	Maintains existing access and travel patterns	Access impacts to Sunset Road intersection	Access impacts to Sunset Road intersection	Access impacts to Sunset Road intersection
	Maintenance of Traffic	None	Minimum MOT required for bridge widening over SFRC/CSX Railroad	Moderate MOT required to replace bridge over SFRC/CSX Railroad	High MOT required to replace bridge over SFRC/CSX Railroad

Table 2 Qualitative Evaluation

	Evaluation Factors	No-Action Alternative	Build Alternative 1	Build Alternative 2	Build Alternative 3
Socio-Economic	**R/W & Property Impacts**	None	**9 properties impacted**	**6 properties impacted**	**9 properties impacted**
	Social and Neighborhood Impacts	None	Loss of 16 parking spots at Lantana Shopping Center	Loss of 24 parking spots at Lantana Shopping Center	Loss of 16 parking spots at Lantana Shopping Center
	Economic and Employment Opportunity	None	Enhanced development opportunities with improved mobility	Enhanced development opportunities with improved mobility	Enhanced development opportunities with improved mobility
	Visual & Aesthetic Impacts	None	Low landscape opportunity along roadway embankment	High opportunity for landscape within median	Moderate landscape opportunity along roadway embankment
	Public Comments	None	**Least preferred**	**Most preferred**	**Moderately preferred**
Environment	**Threatened & Endangered Species**	None	No involvement regarding protected species	No involvement regarding protected species	No involvement regarding protected species
	Wetland & Surface Waters	None	None	None	None
	Water Quality	None	Minimal impacts to water quality	Minimal impacts to water quality	Minimal impacts to water quality
	Contamination	None	1 High Risk Location (Shell Gas Station)	1 High Risk Location (Shell Gas Station)	1 High Risk Location (Shell Gas Station)
	Noise	None	Minimal construction noise	Minimal construction noise	Minimal construction noise
Project Cost	**R/W Cost**	None	**$13.3 Million**	**$12.8 Million**	**$13.3 Million**
	Construction Cost	None	**$18.4 Million**	**$32.7 Million**	**$30.7 Million**
	Engineering Design & CEI Cost	None	**$4.5 Million**	**$8.0 Million**	**$7.5 Million**

Table 3 Alternatives Evaluation Matrix

Evaluation Factors		Alternatives			
		No-Action	Build Alternative 1	Build Alternative 2	Build Alternative 3
Traffic	Level of Service	1	3	5	4
	Delay / Queue Removed from I-95 Mainline	1	4	5	4
	Safety Benefits	1	3	5	3
	Meets Purpose and Need	1	3	5	4
Engineering	Geometric Compliance to Design Controls	1	3	5	5
	Utility Impacts	3	2	1	2
	Multi-modal (Transit/Pedestrian /Bicycle)	1	4	4	4
	Access Modifications	3	2	2	2
	Maintenance of Traffic	3	2	2	1
Socio-Economic	R/W and Property Impacts	3	1	2	1
	Social & Neighborhood Impacts	3	2	1	2
	Economic & Employment Impacts	3	4	4	4
	Community Services/ Features	3	3	3	3
	Visual & Aesthetics Impacts	3	3	5	4
	Public Comments	1	2	5	3
Environment	Threatened & Endangered Species	3	3	3	3
	Wetland / Surface Water Impacts	3	3	3	3
	Water Quality	3	2	2	2
	Contamination	3	2	2	2
	Noise	3	2	2	2
Cost	R/W Cost	3	1	2	1
	Construction Cost	3	2	1	1
	Engineering Design & CEI Costs	3	2	2	2
SCORE		**55**	**58**	**71**	**62**
RANKING		**4**	**3**	**1**	**2**

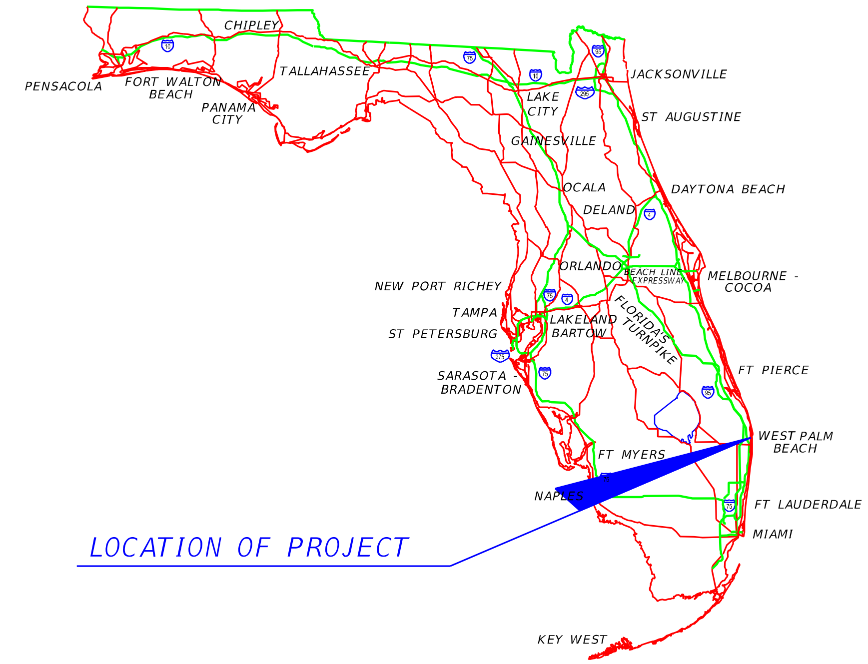
APPENDIX G

(Preferred Alternative Concept Plans)

STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

PRELIMINARY PD&E CONCEPT PLANS



LOCATION OF PROJECT

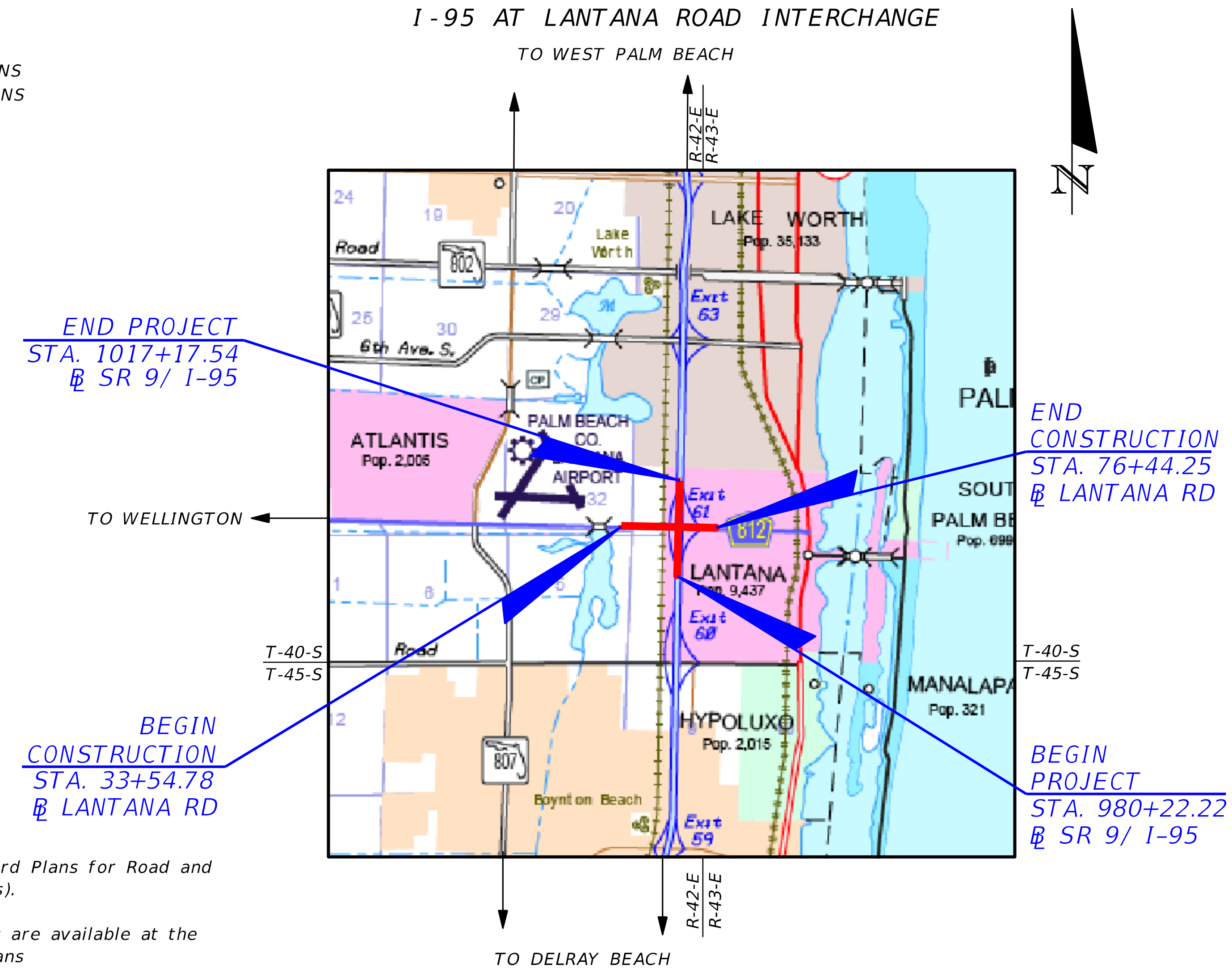
INDEX OF CONCEPT PLANS

FINANCIAL PROJECT ID 413258-1-22-02

PALM BEACH COUNTY (93220)

STATE ROAD NO. 9

I-95 AT LANTANA ROAD INTERCHANGE



GOVERNING STANDARD PLANS:

Florida Department of Transportation, FY 2020-21 Standard Plans for Road and Bridge Construction and applicable Interim Revisions (IRs).

Standard Plans for Road Construction and associated IRs are available at the following website: http://www.fdot.gov/design/standardplans

Standard Plans for Bridge Construction are included in the Structures Plans Component

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, JANUARY 2020 Standard Specifications for Road and Bridge Construction at the following website: http://www.fdot.gov/programmanagement/Implemented/SpecBooks

CONCEPT PLANS ENGINEER OF RECORD:

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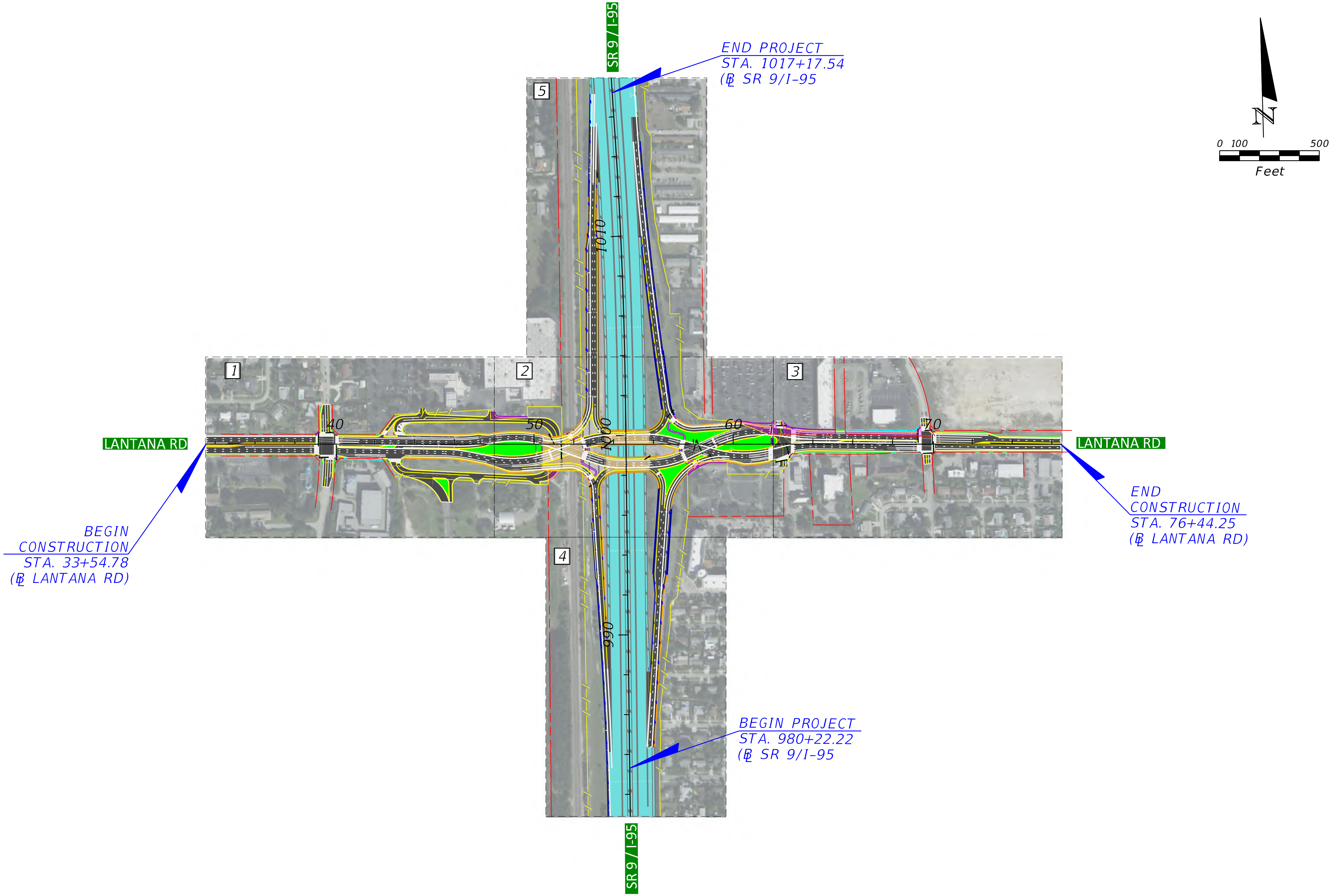
MIAMI LAKES, FLORIDA 33016
CONTRACT NO.: CA247
VENDOR NO.: F464649215

FDOT PROJECT MANAGER:

VANDANA NAGOLE, P.E.

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
	2029	1



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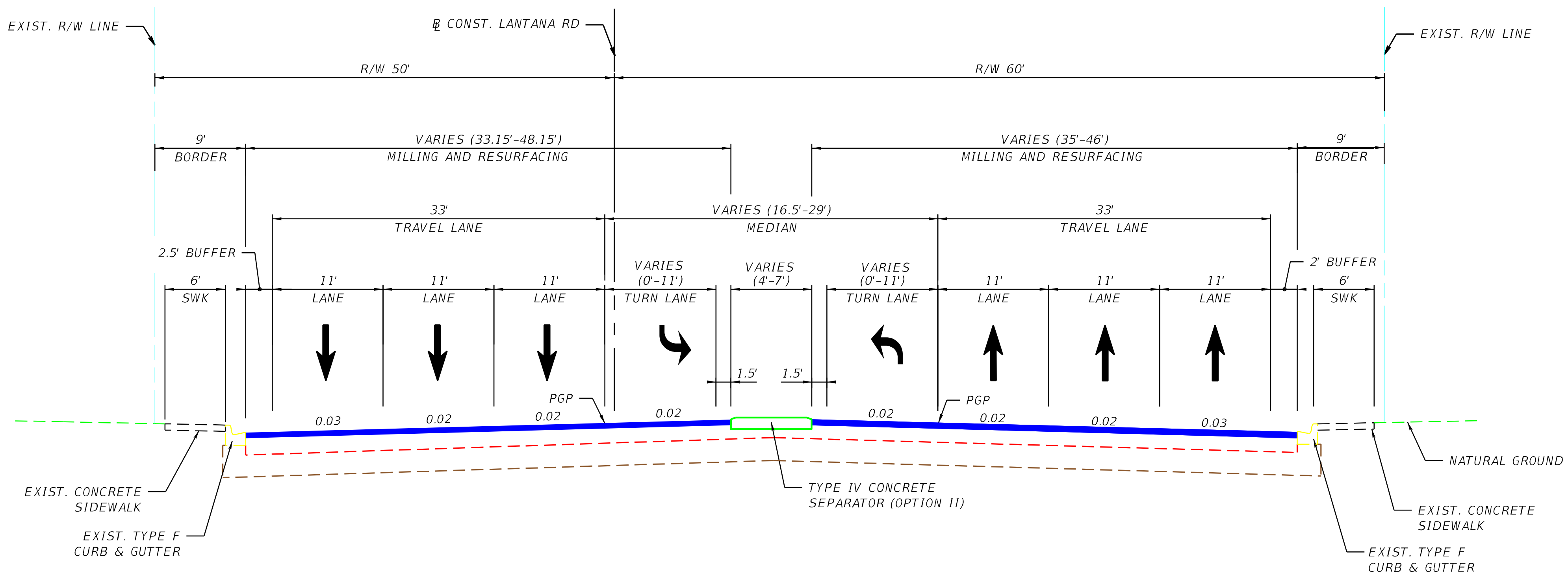
PROJECT LAYOUT

SHEET NO. 2



TYPICAL SECTION (1)
(WEST OF HIGH RIDGE RD)
STA. 33+54.78 TO STA. 40+08.13

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TYPICAL SECTION

SHEET NO. 3

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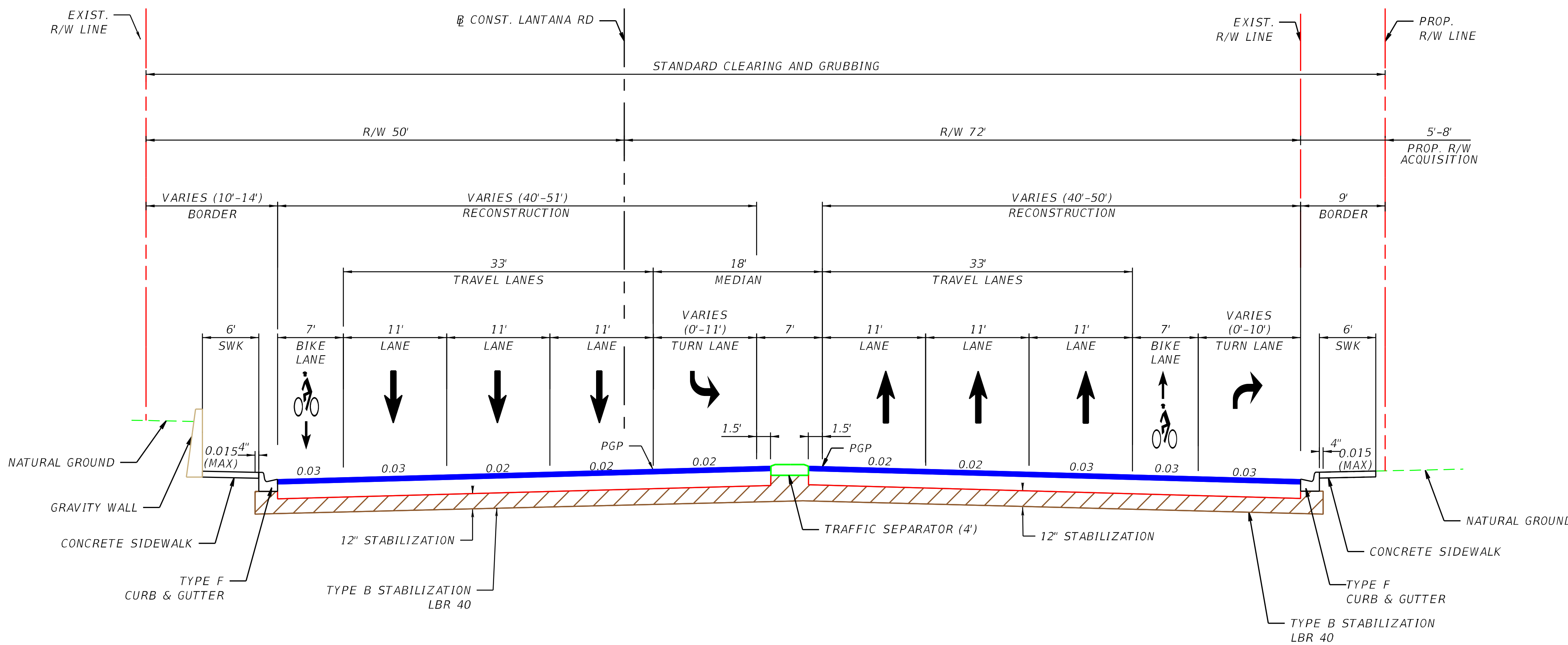

TYPICAL SECTION (2)
(HIGH RIDGE RD TO SUNSET RD)
STA. 40+08.13 TO STA. 42+11.12

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TYPICAL SECTION

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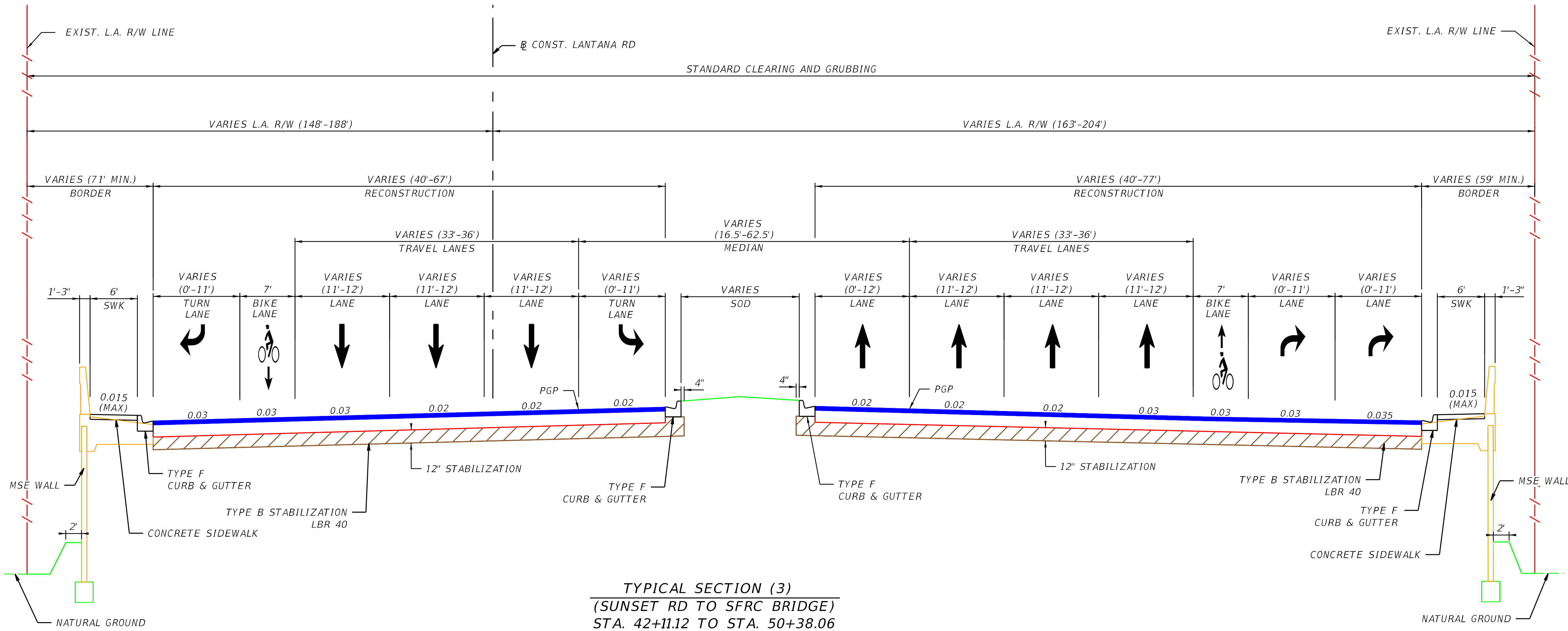

TYPICAL SECTION (3)
(SUNSET RD TO SFRC BRIDGE)
STA. 42+11.12 TO STA. 50+38.06

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TYPICAL SECTION

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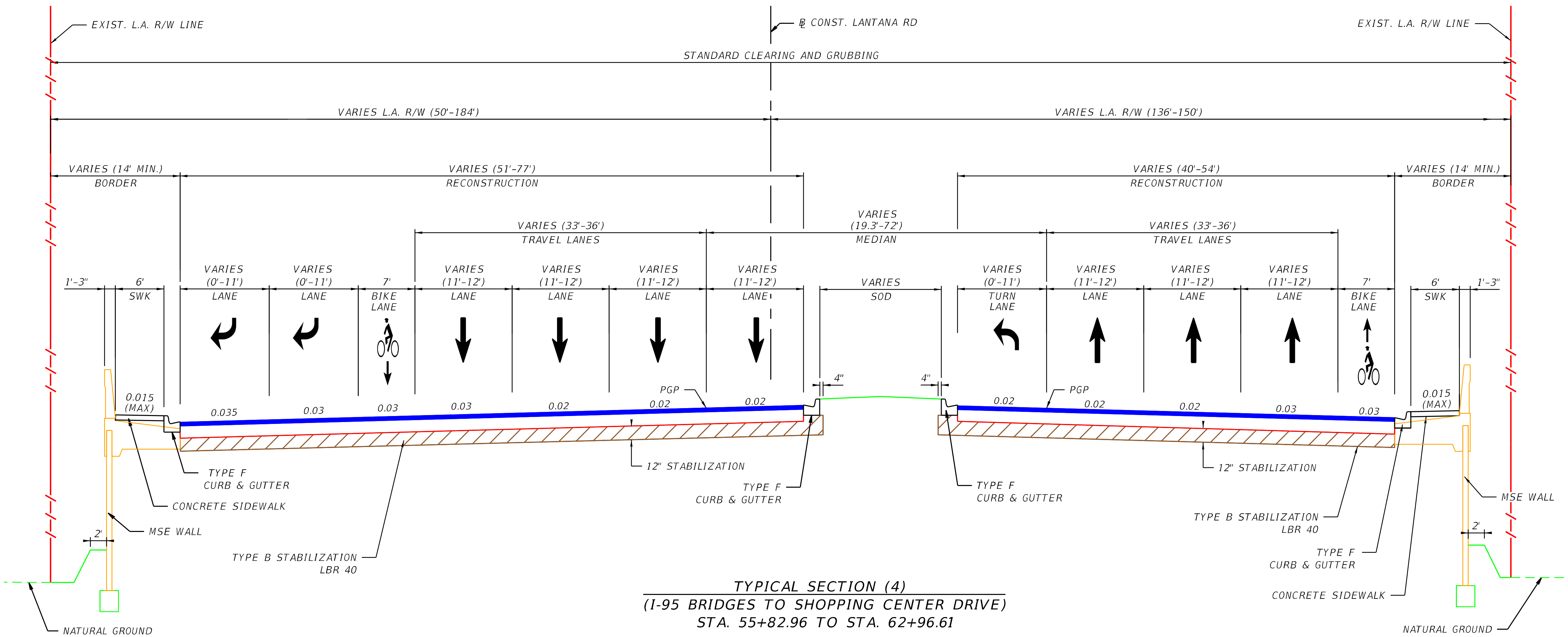

TYPICAL SECTION (4)
(I-95 BRIDGES TO SHOPPING CENTER DRIVE)
STA. 55+82.96 TO STA. 62+96.61

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TYPICAL SECTION

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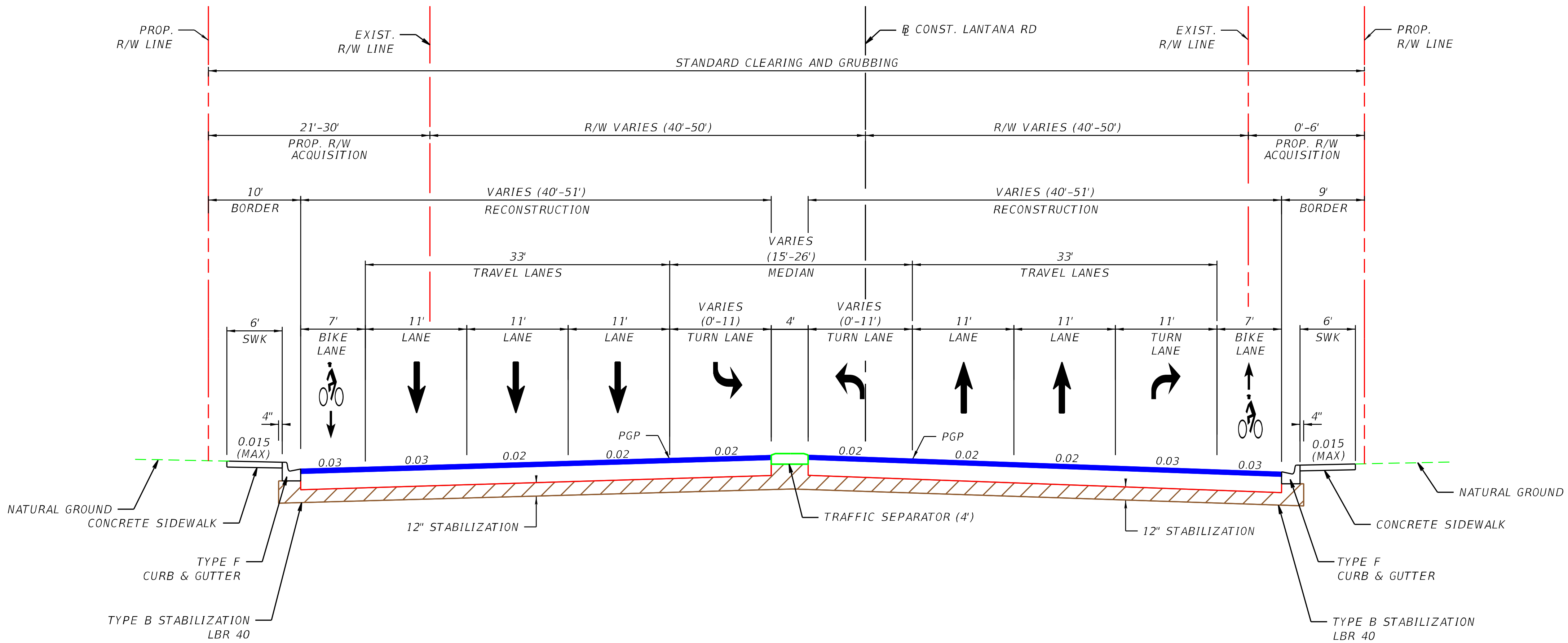

TYPICAL SECTION (5)
(SHOPPING CENTER DRIVE
TO ANDREW REDDING RD)
STA. 62+96.61 TO STA. 65+12.68

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TYPICAL SECTION

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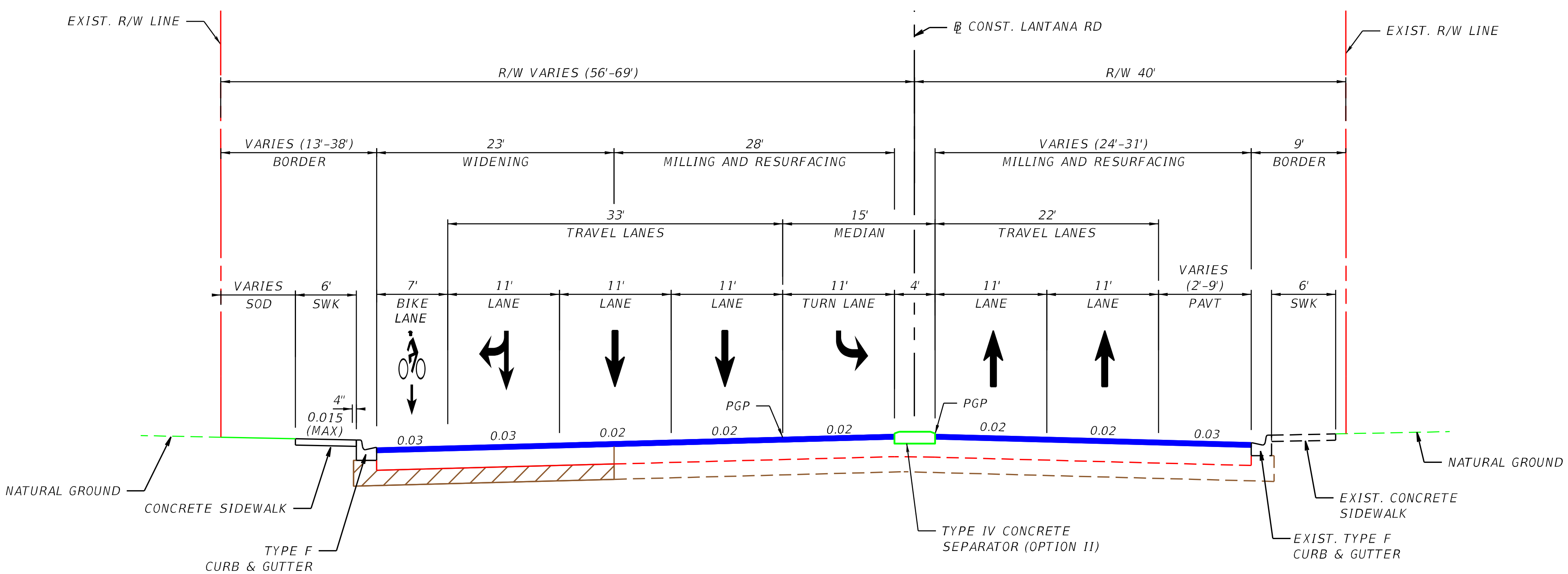

TYPICAL SECTION (6)

(EAST OF ANDREW REDDING RD)
STA. 70+00.00 TO STA. 76+44.25

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TYPICAL SECTION

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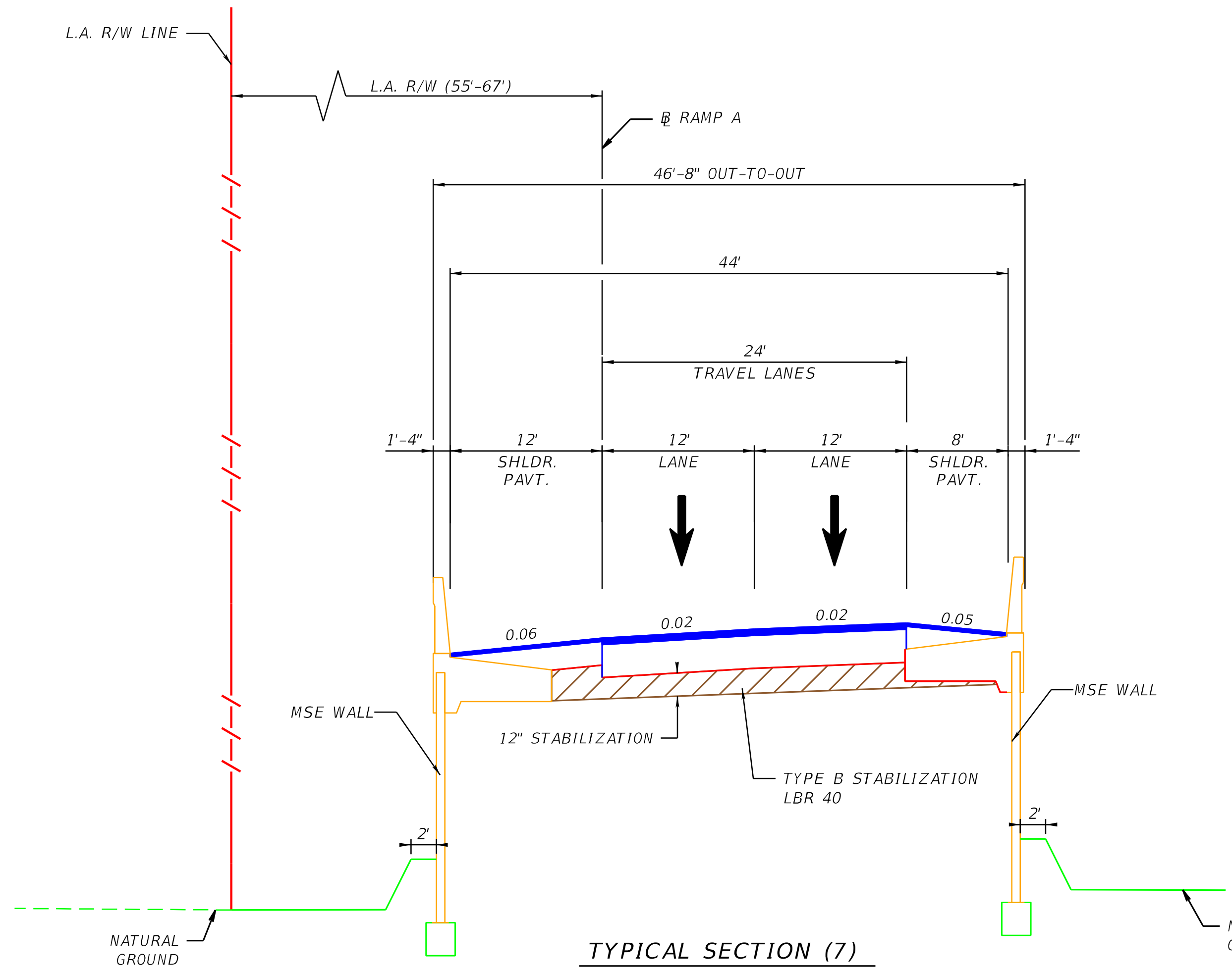

TYPICAL SECTION (7)

I-95 SB ON-RAMP
(RAMP A)

REVISIONS			
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TYPICAL SECTION

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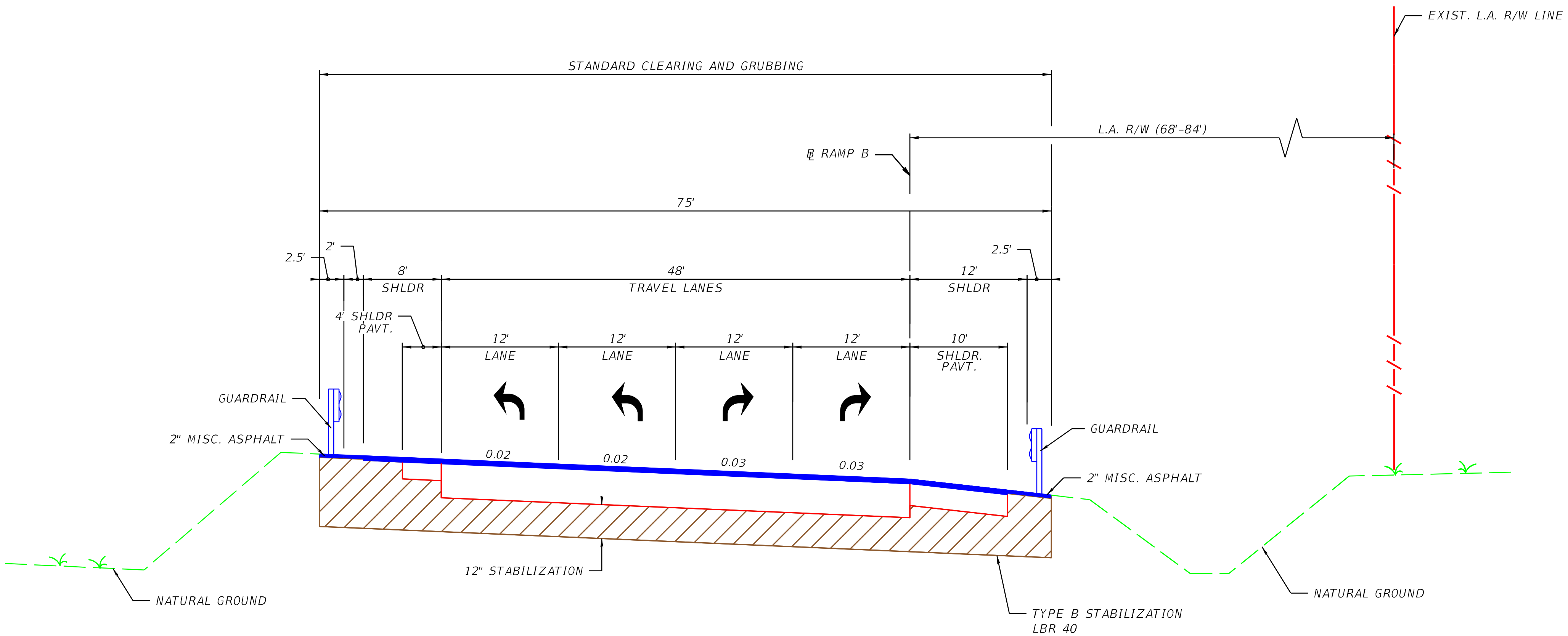

TYPICAL SECTION (8)

I-95 NB OFF-RAMP
(RAMP B)

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TYPICAL SECTION

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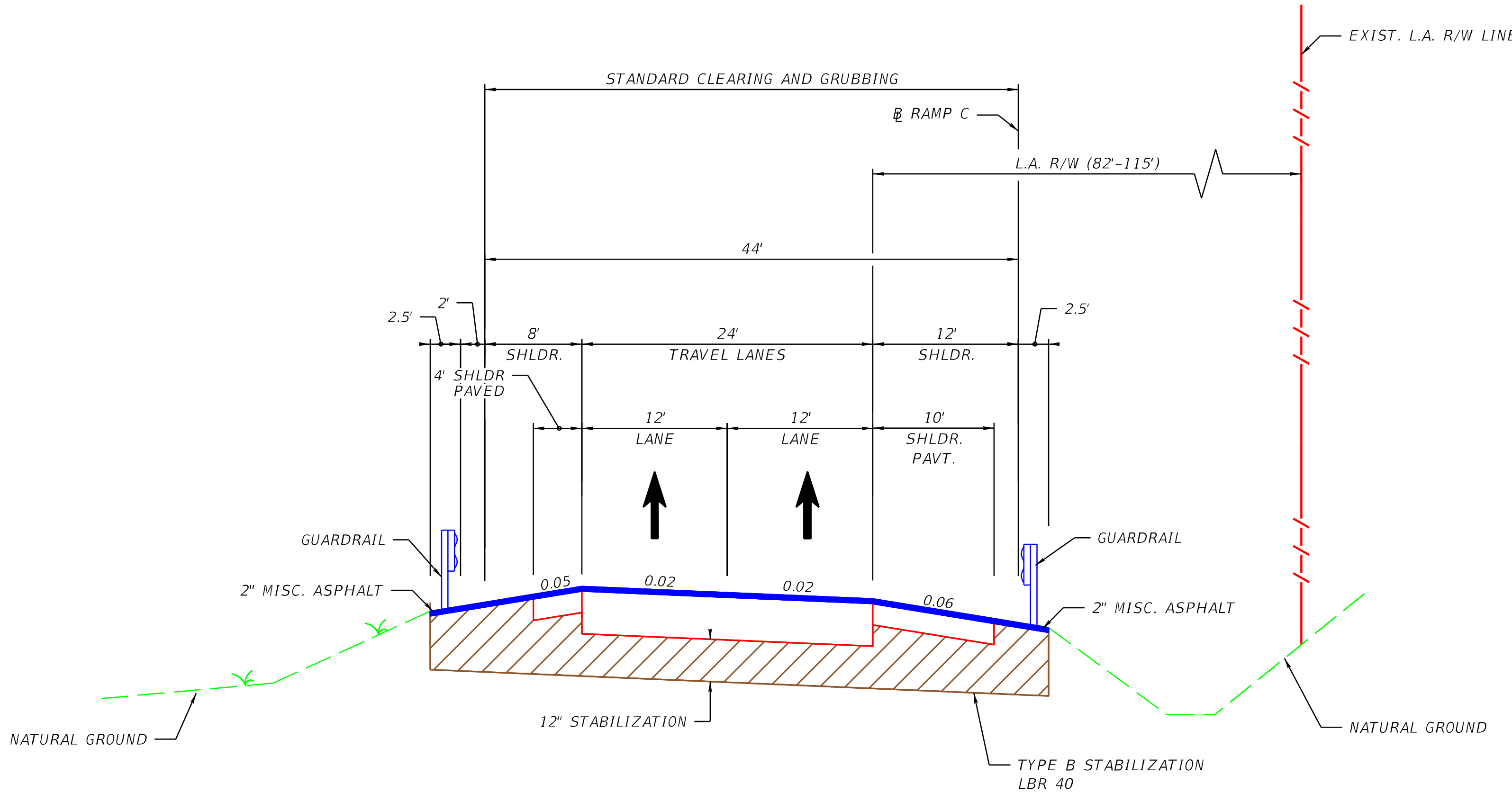

TYPICAL SECTION (9)

I-95 NB ON-RAMP
(RAMP C)

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TYPICAL SECTION

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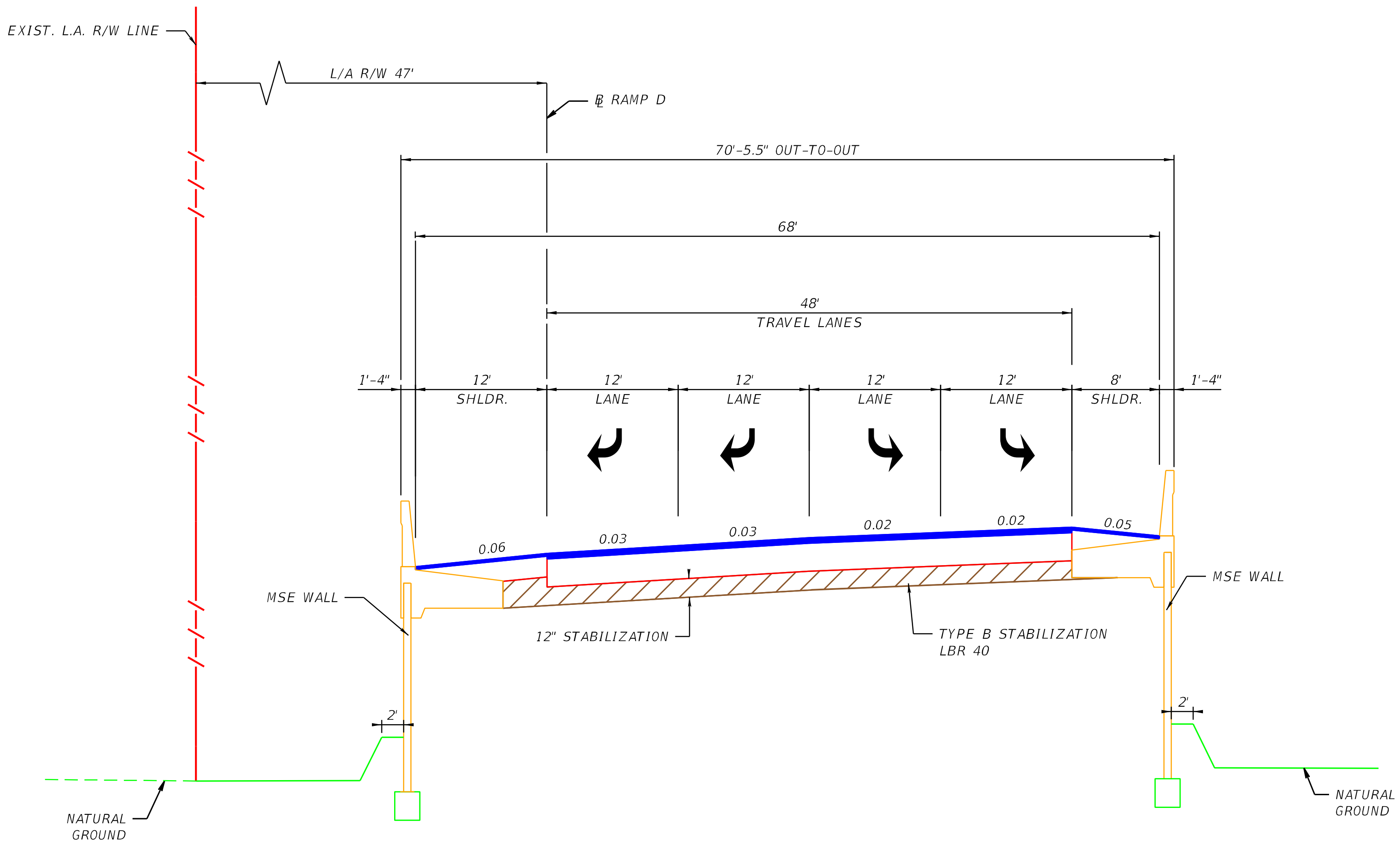

TYPICAL SECTION (10)
I-95 SB OFF-RAMP
(RAMP D)

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TYPICAL SECTION

SHEET NO.
12

LANTANA RD DDI EB

CURVE DATA DDI_EB1
PI STA. = 25+95.87
Δ = 10° 33' 57" (RT)
D = 6° 56' 42"
T = 76.29
L = 152.14
R = 825.00
PC STA. = 25+19.58
PT STA. = 26+71.72
Ds = 35 mph
e = RC

CURVE DATA DDI_EB2
PI STA. = 29+17.82
Δ = 32° 26' 09" (LT)
D = 10° 18' 18"
T = 161.72
L = 314.76
R = 556.00
PC STA. = 27+56.10
PT STA. = 30+70.86
Ds = 35 mph
e = NC

CURVE DATA DDI_EB3
PI STA. = 33+07.30
Δ = 18° 31' 06" (RT)
D = 12° 03' 44"
T = 77.44
L = 153.52
R = 475.00
PC STA. = 32+29.86
PT STA. = 33+83.39
Ds = 35 mph
e = RC

CURVE DATA DDI_EB4
PI STA. = 36+25.02
Δ = 16° 28' 54" (RT)
D = 10° 25' 03"
T = 79.66
L = 158.21
R = 550.00
PC STA. = 35+45.36
PT STA. = 37+03.57
Ds = 35 mph
e = RC

CURVE DATA DDI_EB5
PI STA. = 40+62.93
Δ = 29° 07' 57" (LT)
D = 10° 30' 47"
T = 141.62
L = 277.11
R = 545.00
PC STA. = 39+21.31
PT STA. = 41+98.42
Ds = 35 mph
e = NC

CURVE DATA DDI_EB6
PI STA. = 43+52.97
Δ = 14° 46' 28" (RT)
D = 9° 57' 52"
T = 74.55
L = 148.27
R = 575.00
PC STA. = 42+78.42
PT STA. = 44+26.69
Ds = 35 mph
e = RC

LANTANA RD DDI WB

CURVE DATA DDI_WB1
PI STA. = 16+49.18
Δ = 8° 47' 11" (LT)
D = 5° 43' 46"
T = 76.83
L = 153.35
R = 1,000.00
PC STA. = 15+72.35
PT STA. = 17+25.70
Ds = 35 mph
e = RC

CURVE DATA DDI_WB2
PI STA. = 19+41.90
Δ = 27° 53' 28" (RT)
D = 10° 30' 47"
T = 135.33
L = 265.30
R = 545.00
PC STA. = 18+06.49
PT STA. = 20+71.80
Ds = 35 mph
e = NC

CURVE DATA DDI_WB3
PI STA. = 23+77.26
Δ = 21° 32' 12" (LT)
D = 12° 22' 30"
T = 88.06
L = 174.04
R = 463.00
PC STA. = 22+89.20
PT STA. = 24+63.24
Ds = 35 mph
e = RC

CURVE DATA DDI_WB4
PI STA. = 26+81.78
Δ = 23° 27' 48" (LT)
D = 12° 22' 30"
T = 96.15
L = 189.60
R = 463.00
PC STA. = 25+85.63
PT STA. = 27+75.24
Ds = 35 mph
e = RC

CURVE DATA DDI_WB5
PI STA. = 30+97.59
Δ = 32° 21' 45" (RT)
D = 10° 18' 18"
T = 161.34
L = 314.05
R = 556.00
PC STA. = 29+36.25
PT STA. = 32+50.30
Ds = 35 mph
e = NC

CURVE DATA DDI_WB6
PI STA. = 33+94.39
Δ = 6° 43' 14" (LT)
D = 5° 18' 19"
T = 63.41
L = 126.68
R = 1,080.00
PC STA. = 33+30.98
PT STA. = 34+57.65
Ds = 35 mph
e = 0.02

I-95 SB ON-RAMP(RAMP A)

CURVE DATA RAMPA1
PI STA. = 104+38.86
Δ = 3° 08' 32" (LT)
D = 0° 21' 29"
T = 438.86
L = 877.51
R = 16,000.00
PC STA. = 100+00.00
PT STA. = 108+77.51
Ds = 35 mph
e = NC

I-95 NB ON-RAMP(RAMP C)

CURVE DATA RAMPC2
PI STA. = 312+39.97
Δ = 3° 40' 00" (RT)
D = 0° 20' 50"
T = 528.14
L = 1,055.93
R = 16,500.00
PC STA. = 307+11.83
PT STA. = 317+67.75
Ds = 35 mph
e = NC

CURVE DATA RAMPC3
PI STA. = 324+87.95
Δ = 3° 22' 32" (RT)
D = 0° 14' 04"
T = 720.20
L = 1,439.98
R = 24,442.32
PC STA. = 317+67.75
PT STA. = 332+07.74
Ds = 35 mph
e = NC

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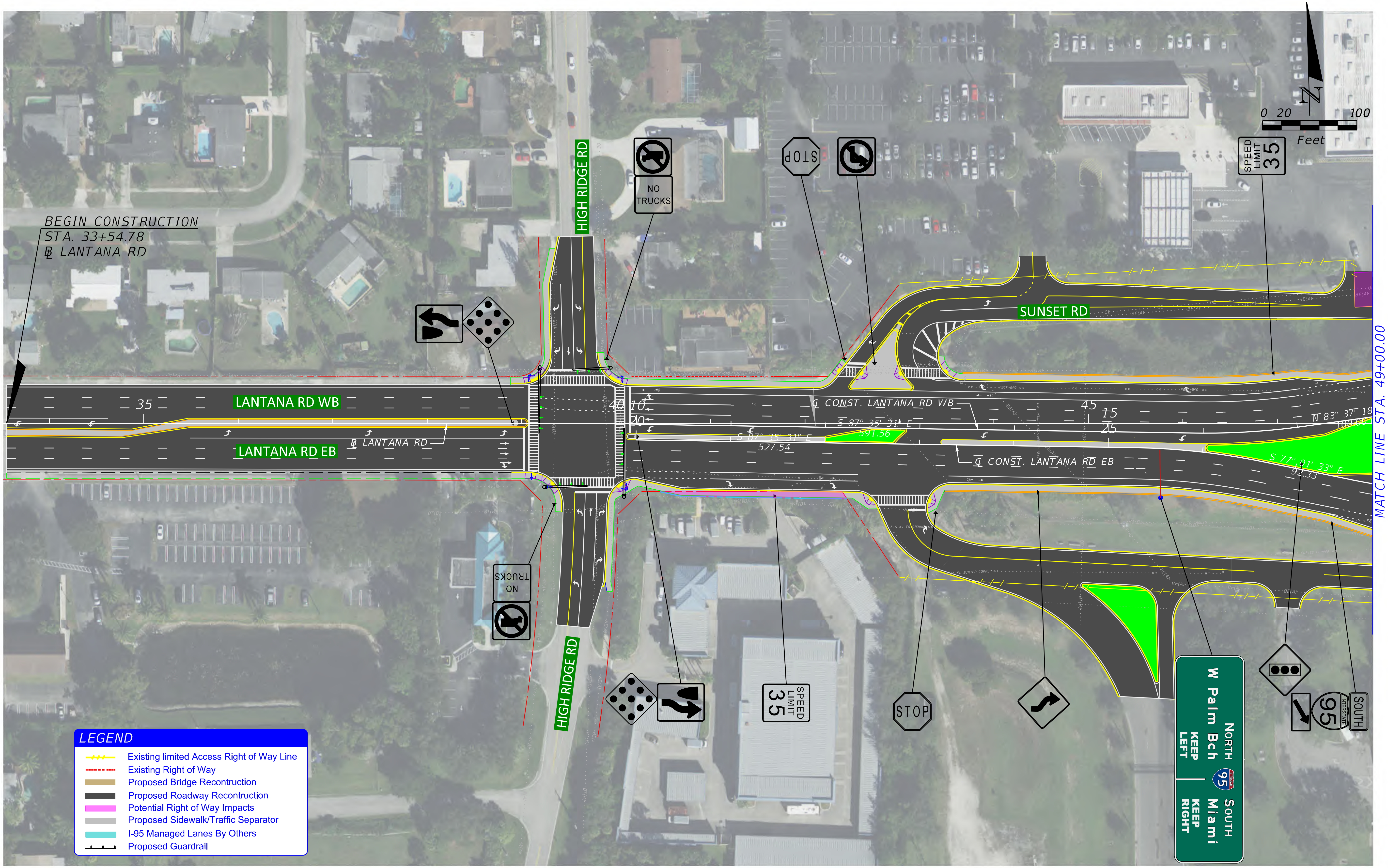
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CURVE DATA

SHEET NO.



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
MIAMI LAKES, FL 33016

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

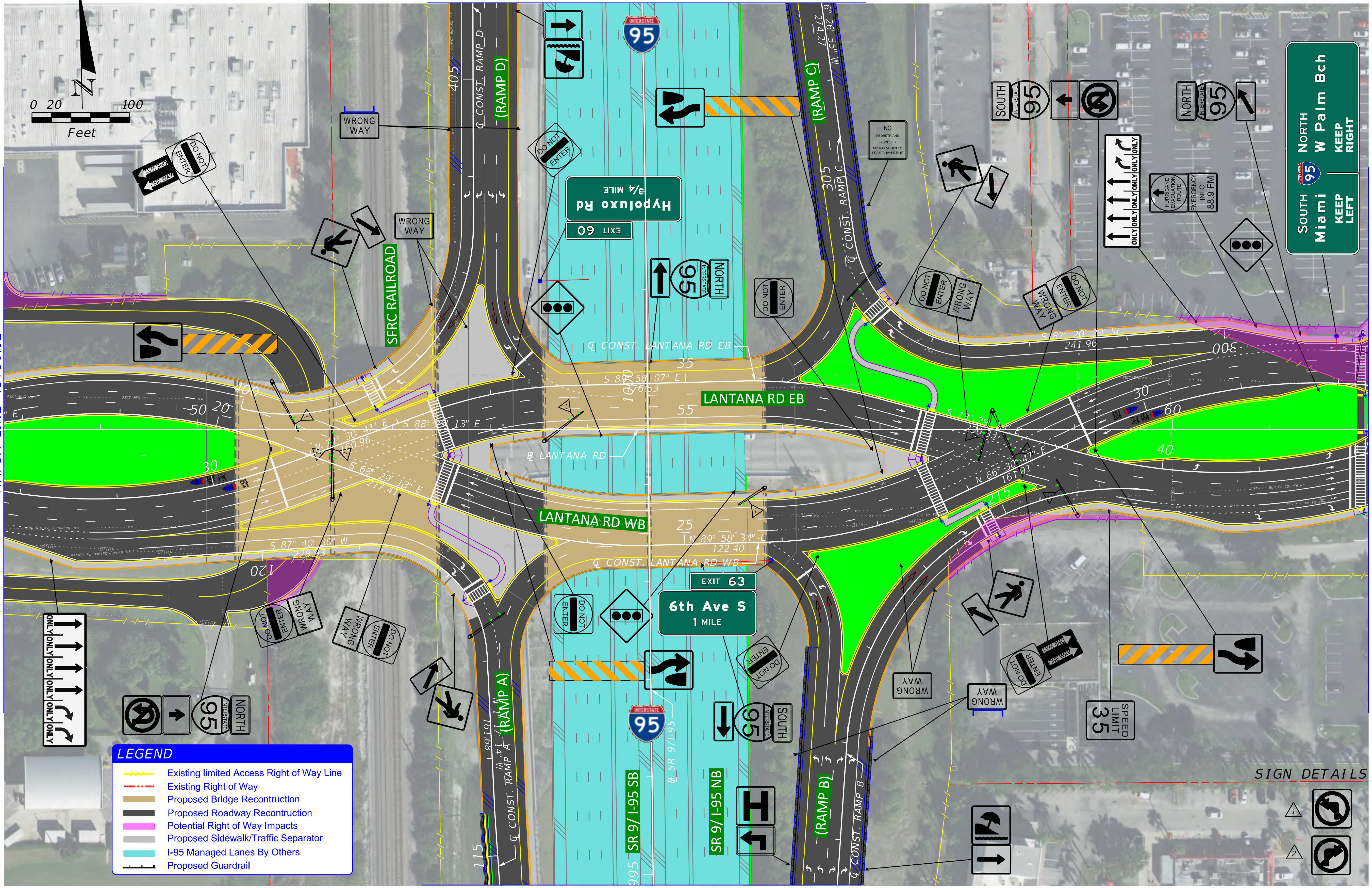
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO. 14

MATCH LINE STA. 1003+94.00

MATCH LINE 48+01.12



MATCH LINE STA. 62+01.21

MATCH LINE STA. 994+89.00

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
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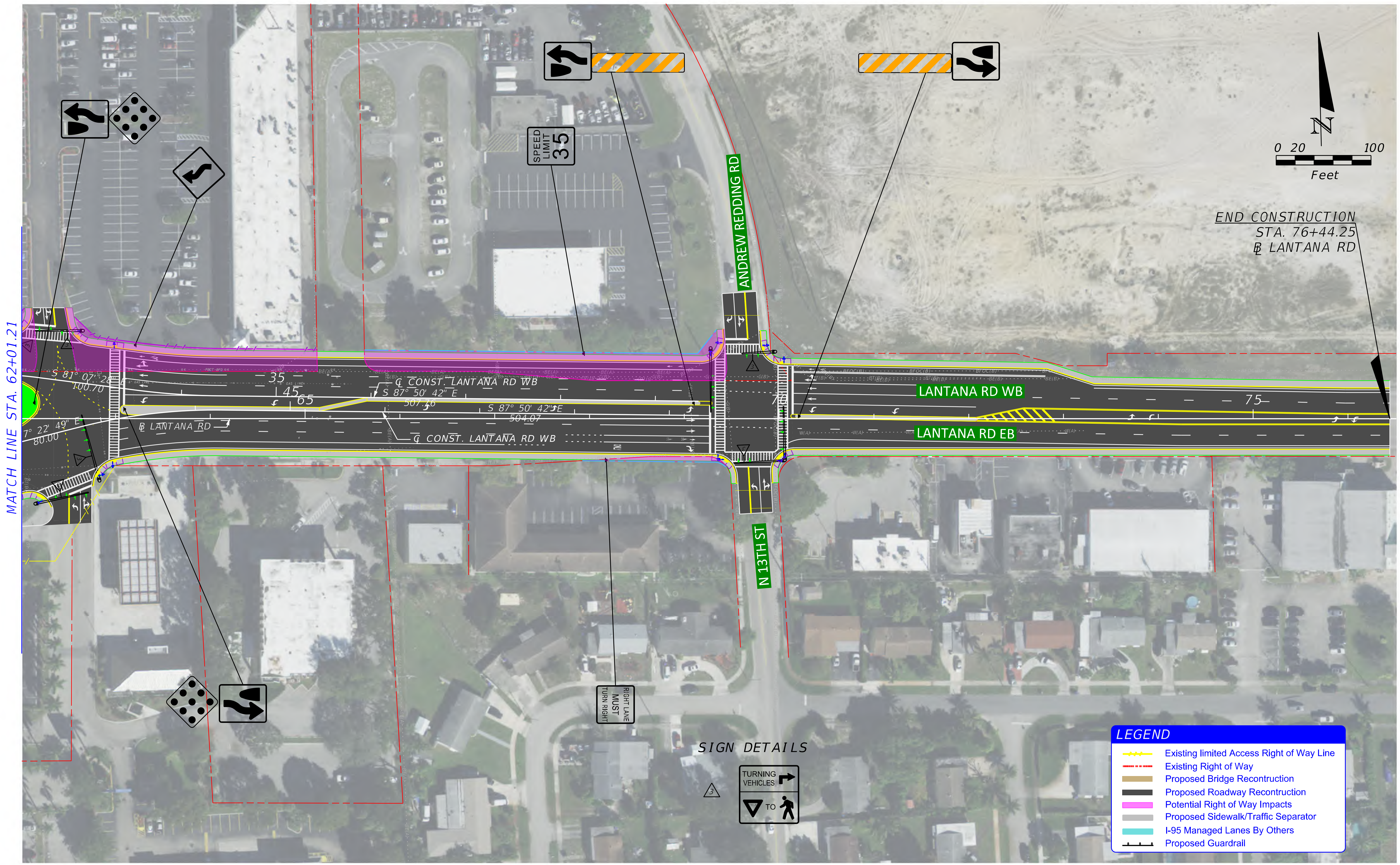
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO.
15



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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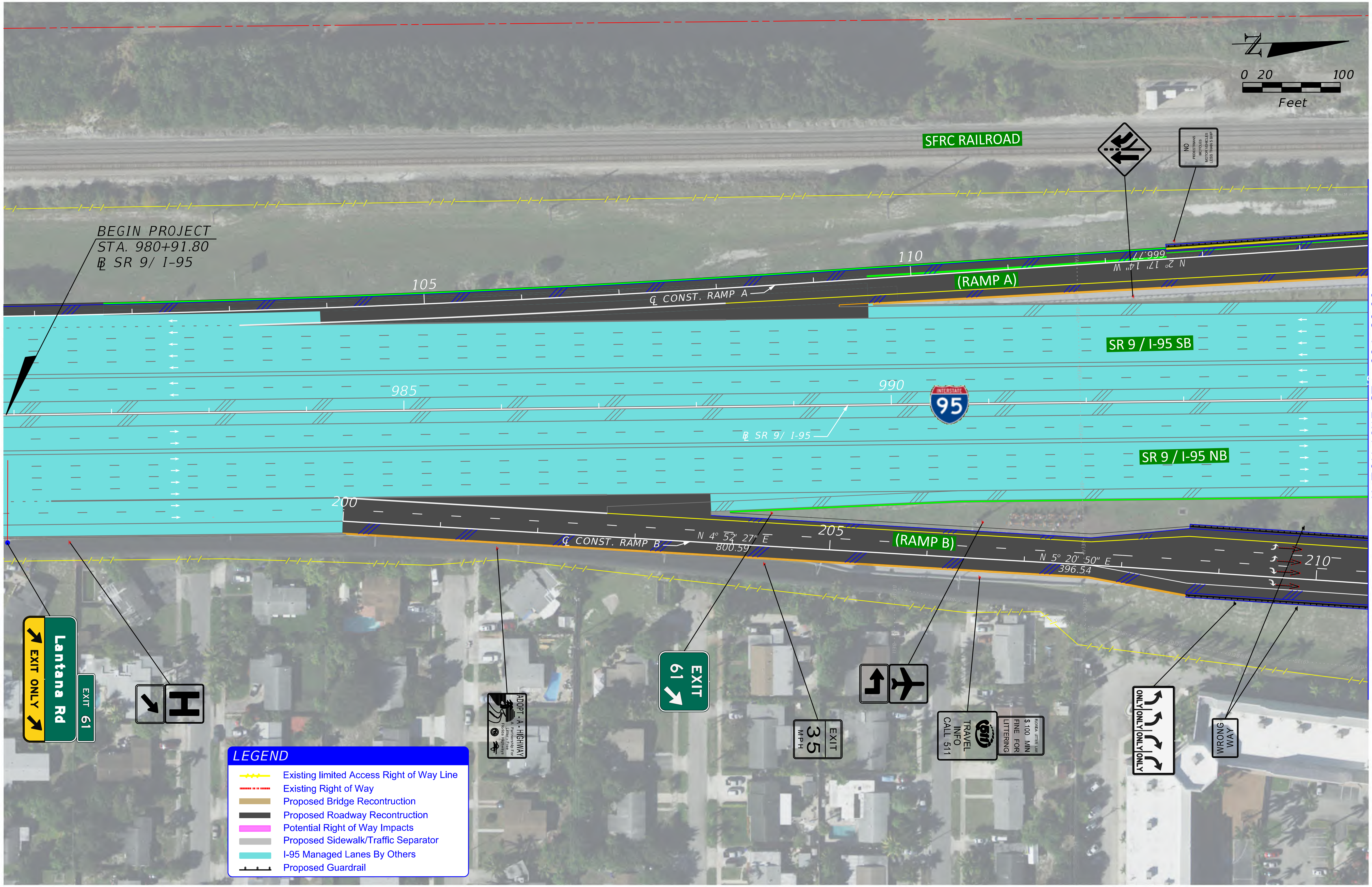
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO. 16



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
GOAL ASSOCIATES, INC.
14750 NW 77TH COURT, SUITE 320
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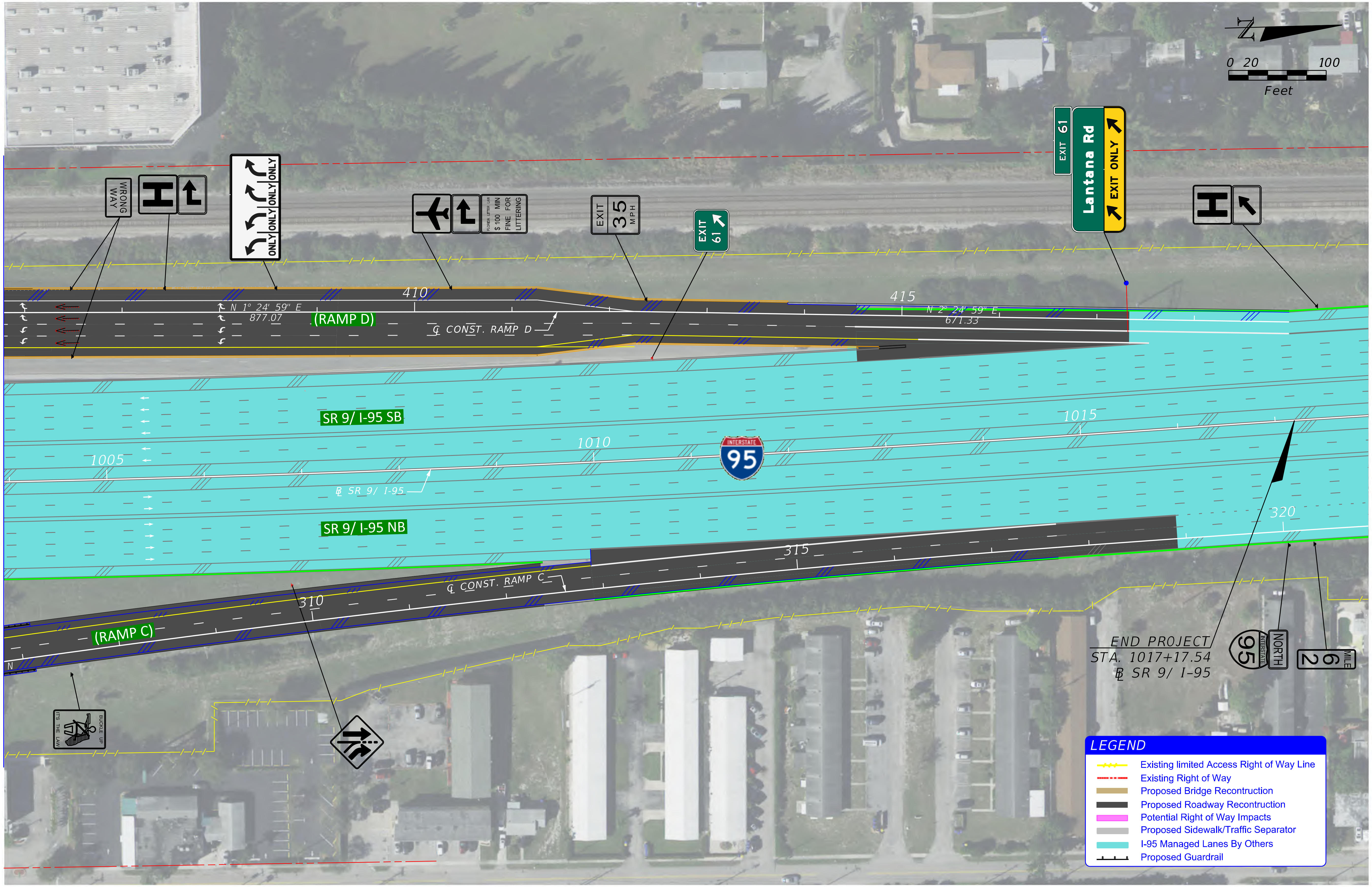
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO. 17

MATCH STATION 1003+94.00



REVISIONS			
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GODFREY A. O. LAMPTEY, P.E., PTOE
P.E. LICENSE NUMBER 68261
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

CONCEPT PLANS

SHEET NO. 18

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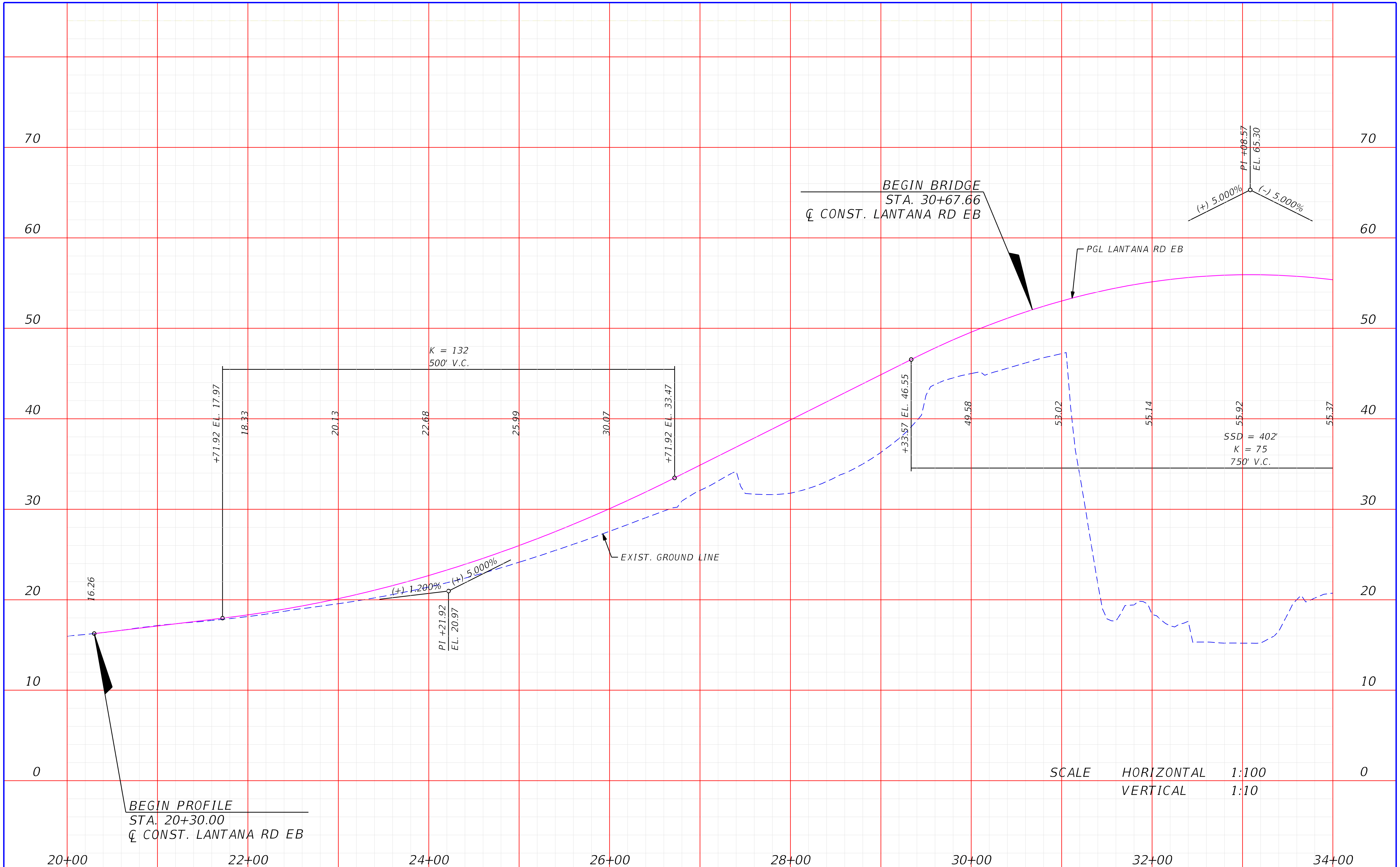

REVISIONS			
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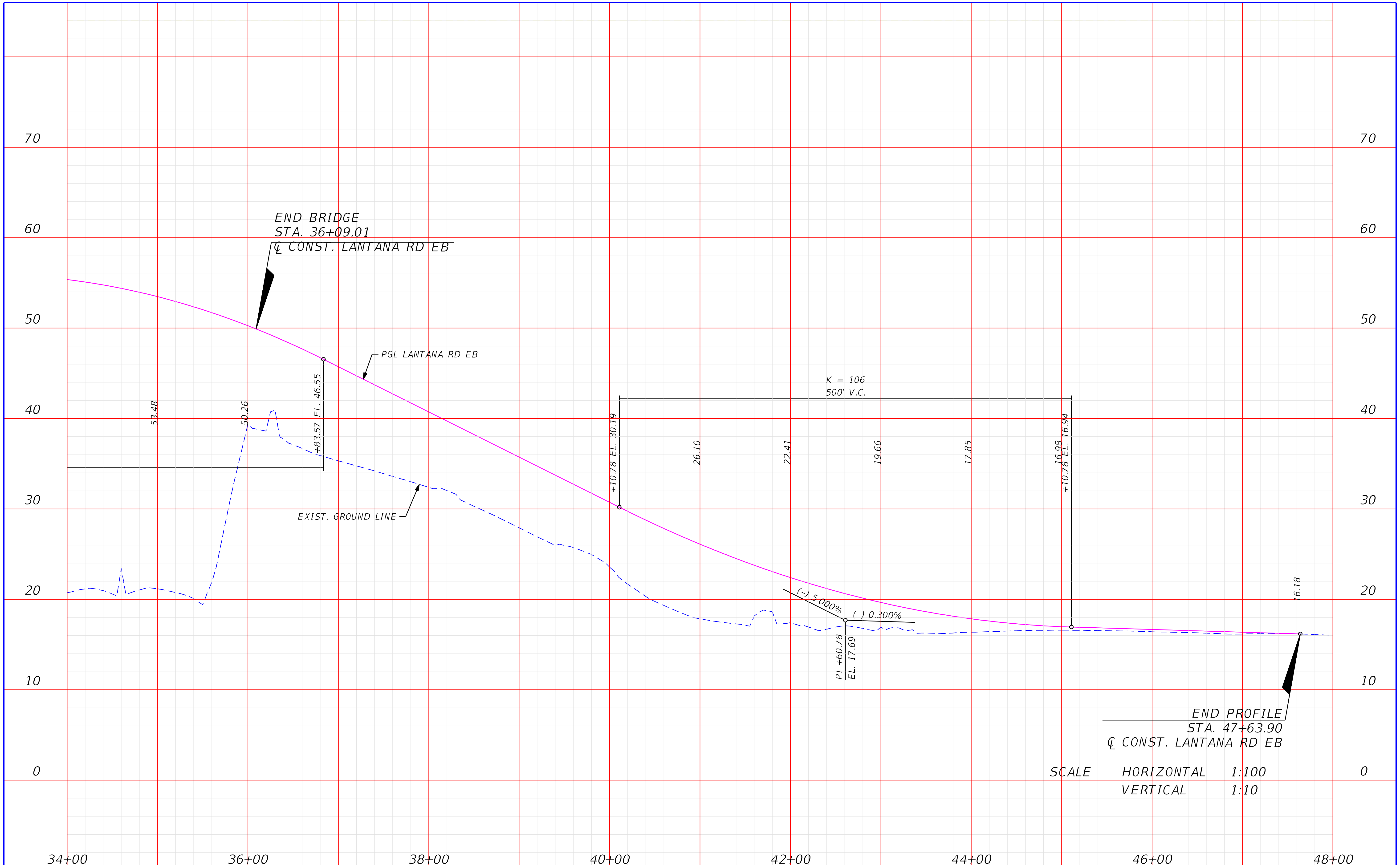
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
LANTANA ROAD (EB)

SHEET NO.
19



REVISIONS			
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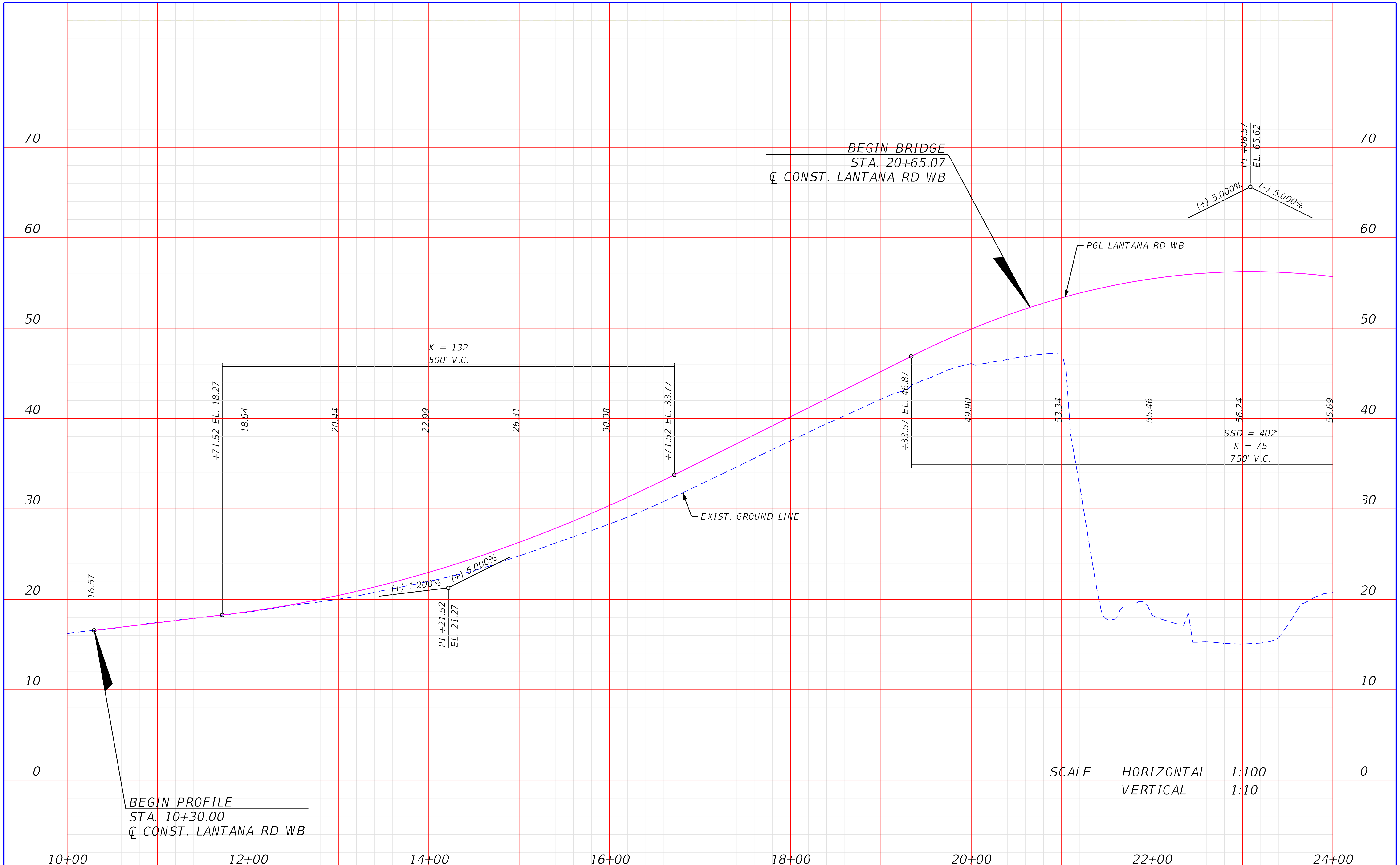
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
LANTANA ROAD (EB)

SHEET NO.
20



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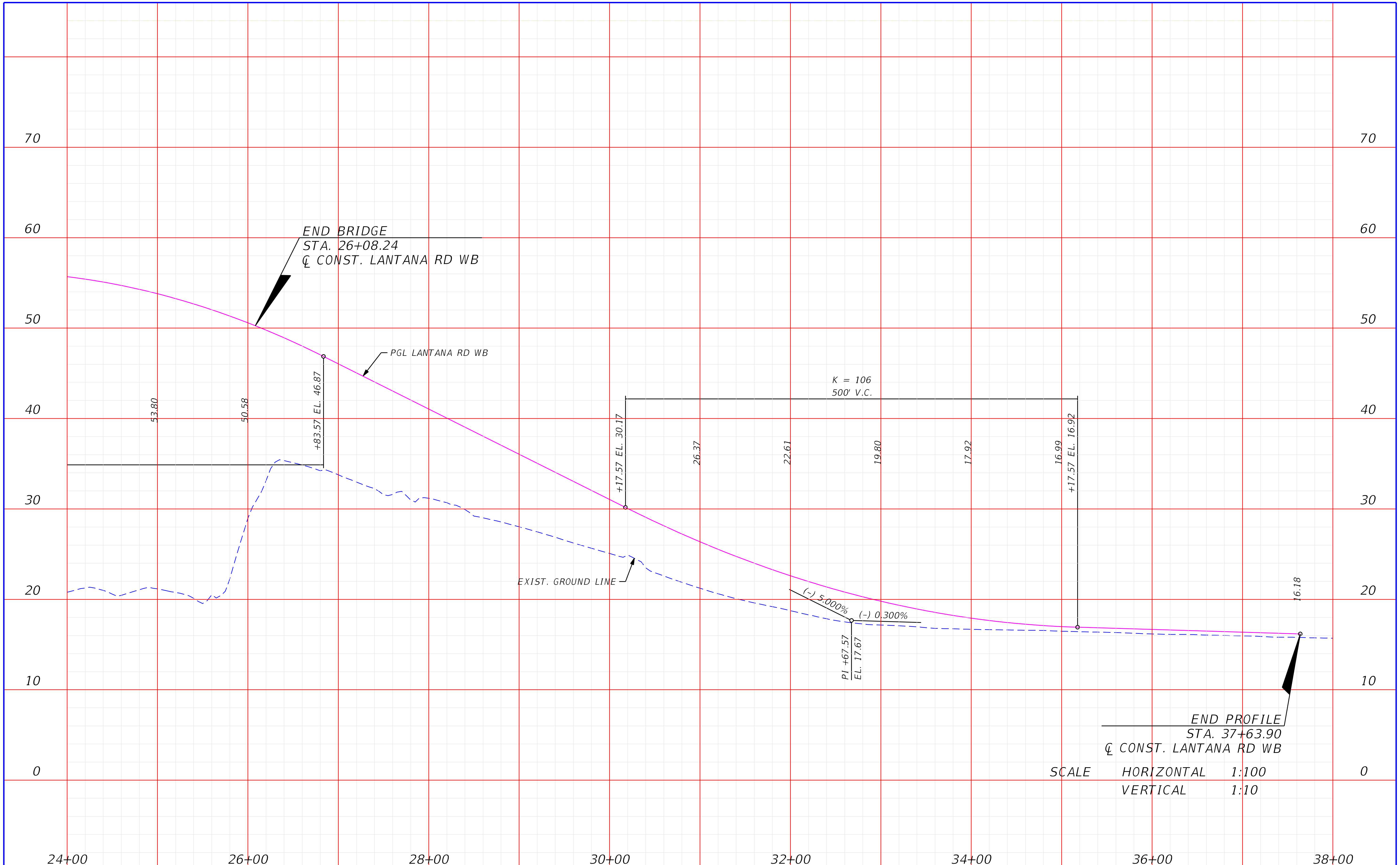
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
LANTANA ROAD (WB)

SHEET NO.
21



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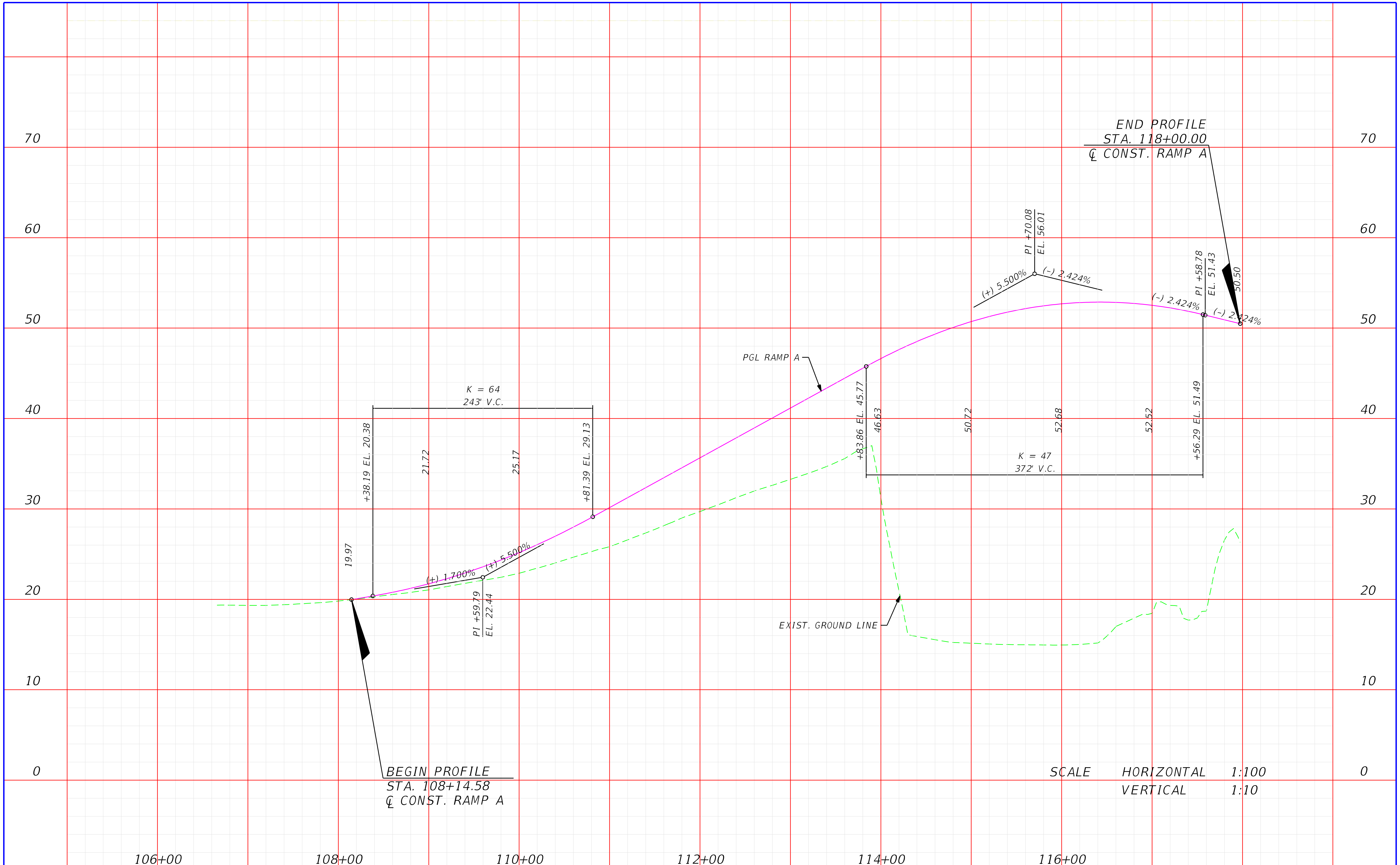
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
LANTANA ROAD (WB)

SHEET NO.
22



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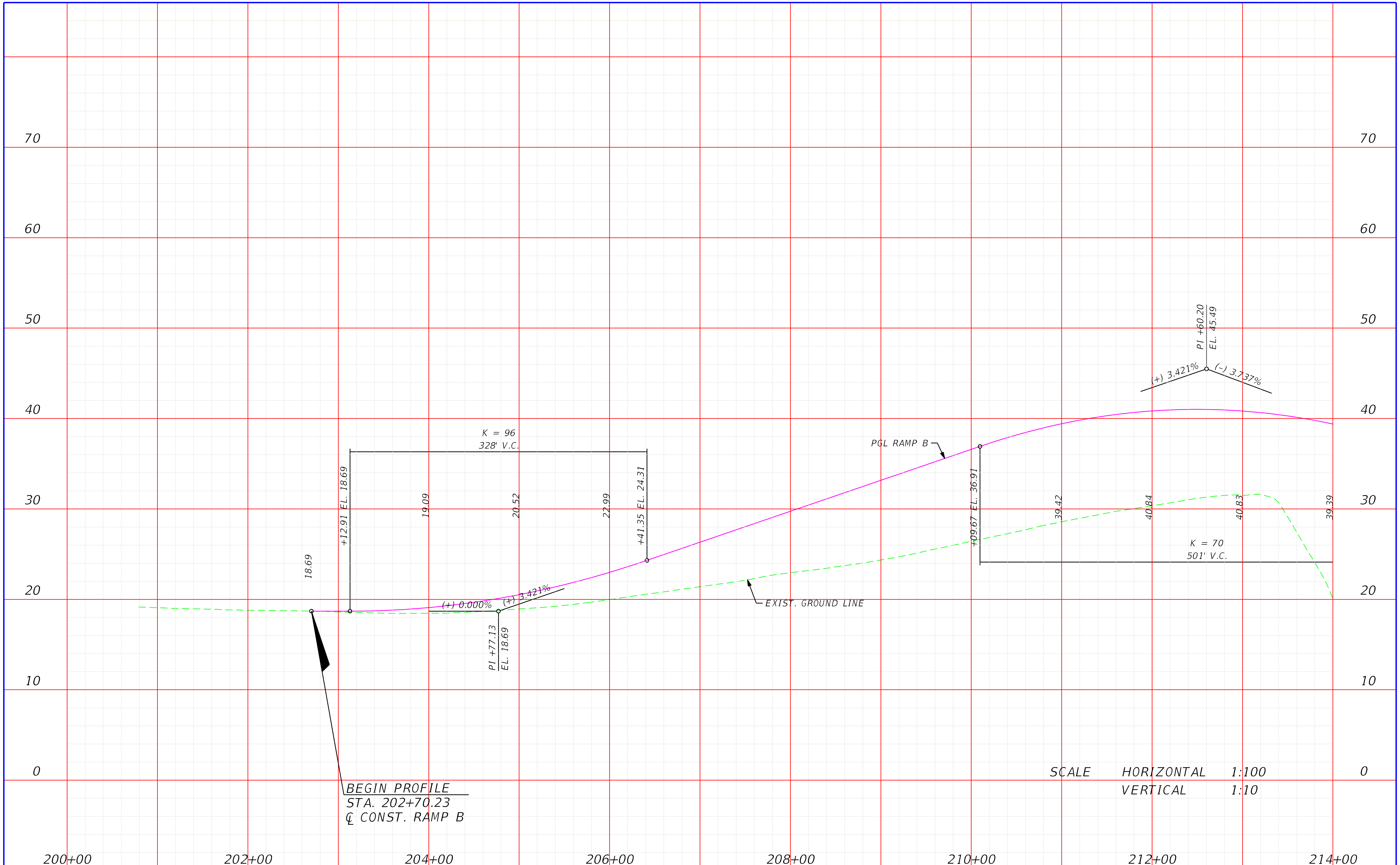
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
RAMP A

SHEET NO.
23



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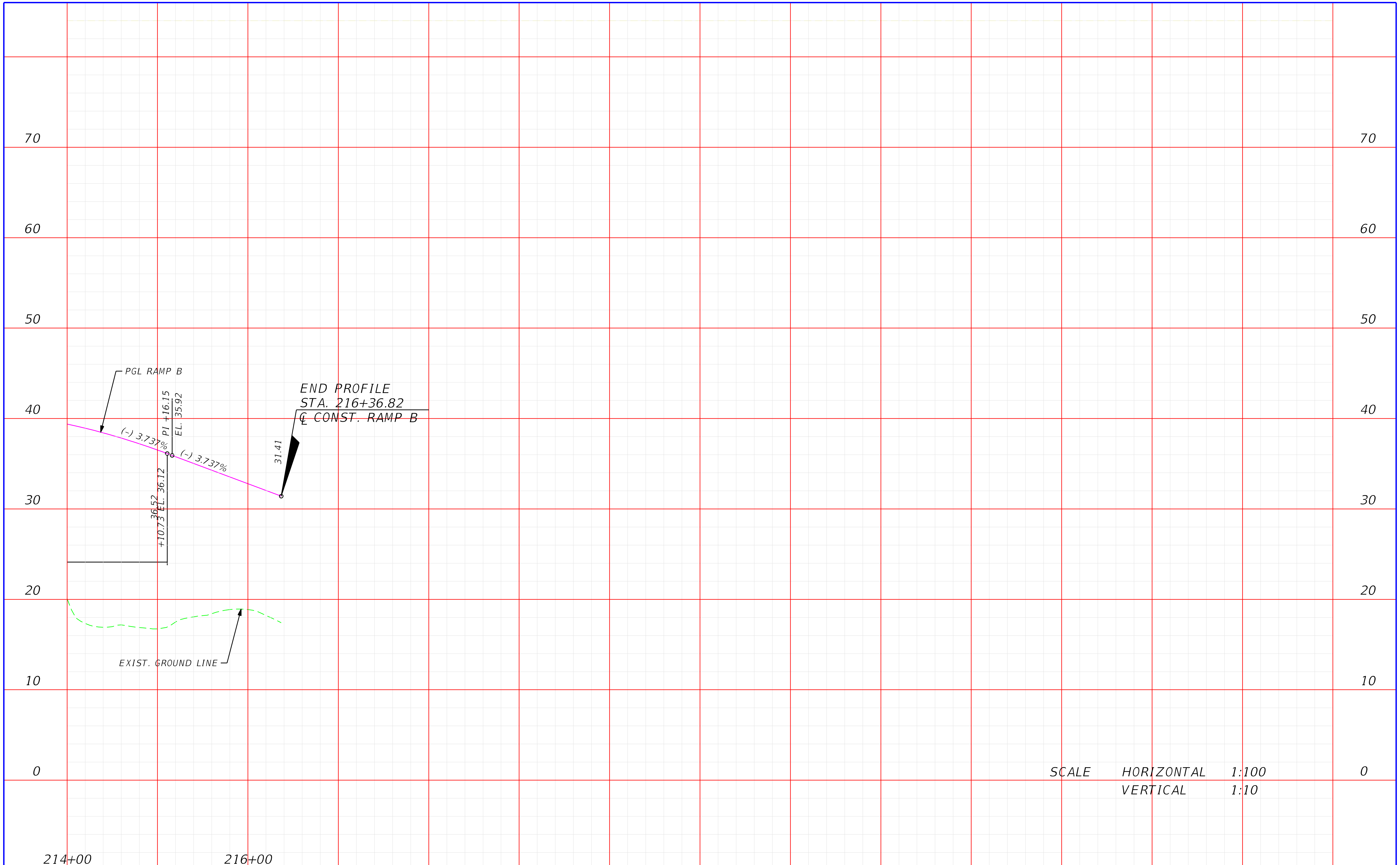
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
RAMP B

SHEET NO.
24



REVISIONS			
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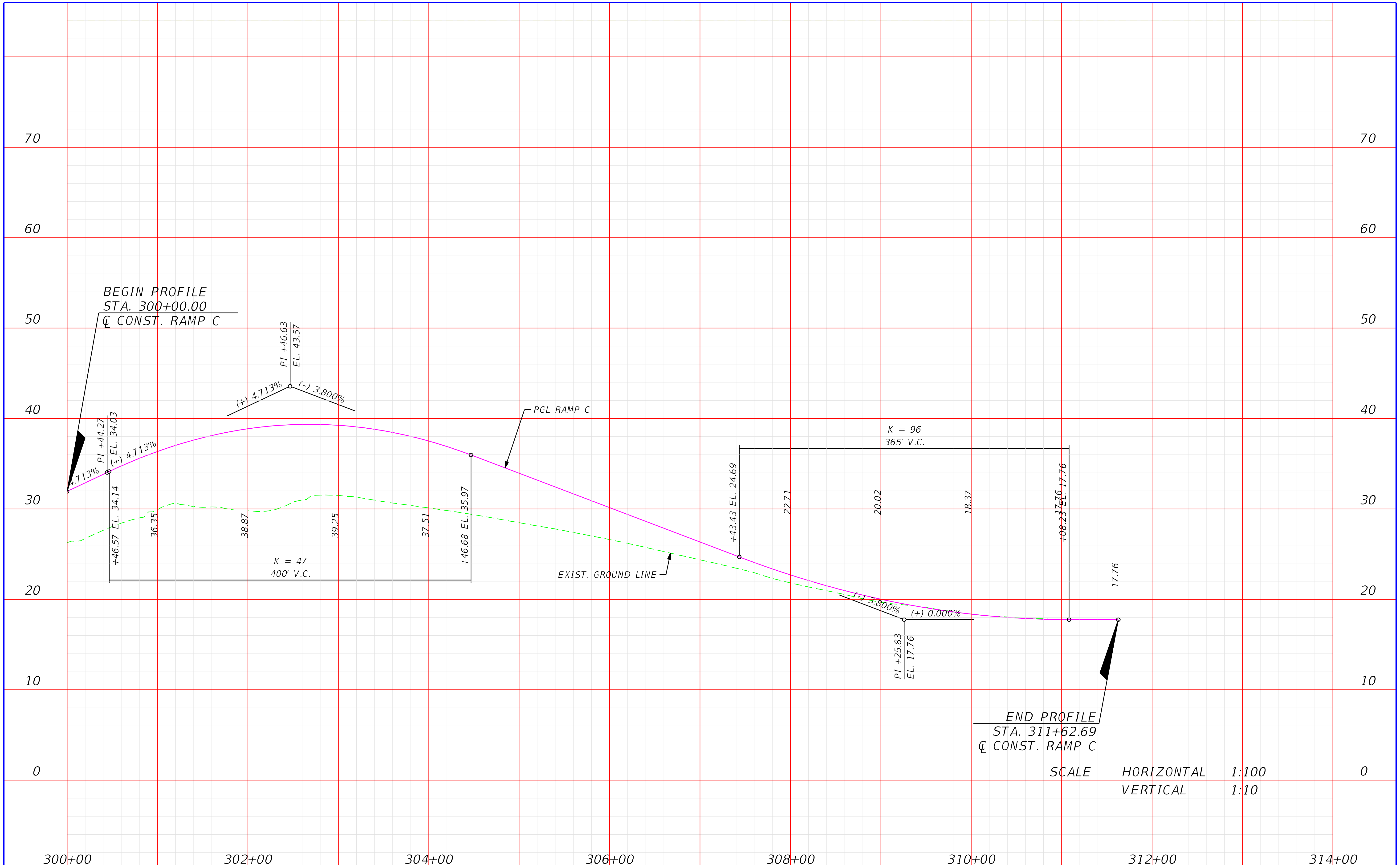
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
RAMP B

SHEET NO. 25



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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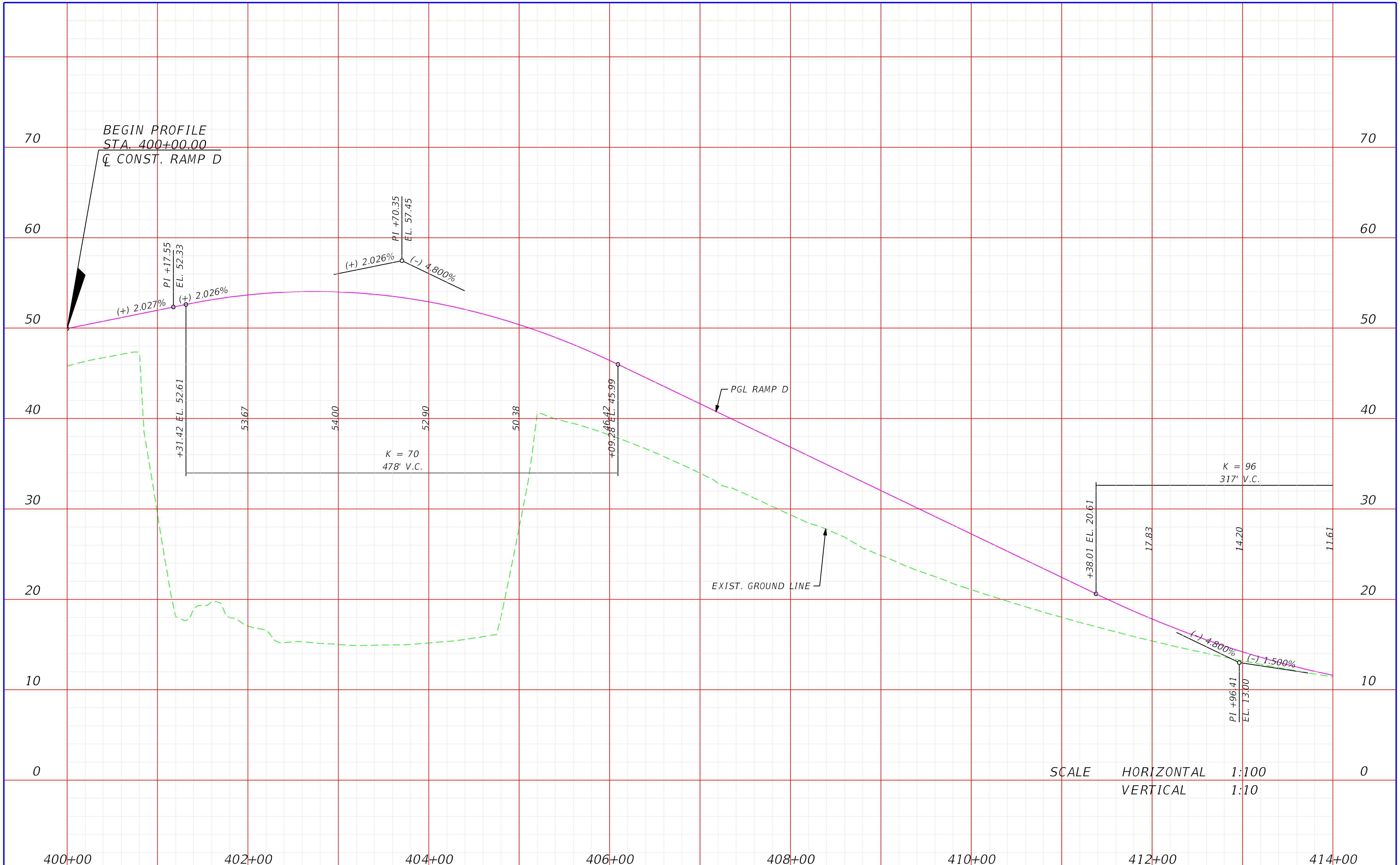
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
RAMP C

SHEET NO.
26



REVISIONS			
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STATE OF FLORIDA
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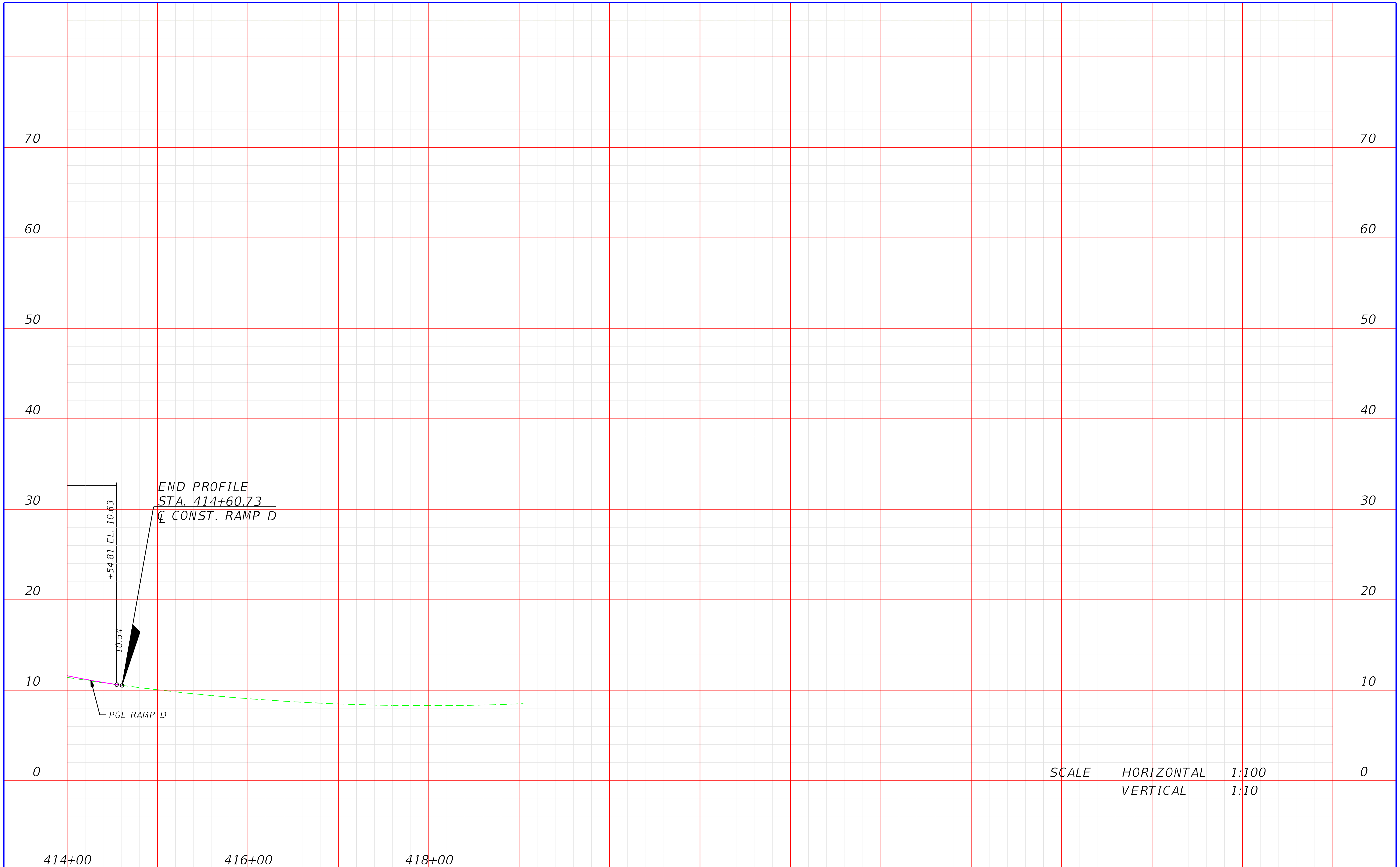
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

PROFILES
RAMP D

SHEET NO.
27



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STATE OF FLORIDA
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SR 9	PALM BEACH	413258-1-22-02

PROFILES
RAMP D

SHEET NO.
28

PHASING NOTES:

LANTANA ROAD

PHASE 1:

1. INSTALL TEMPORARY TRAFFIC CONTROL DEVICES, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000.
2. MAINTAIN TRAFFIC ON EXISTING TRAVEL LANES.
3. PERFORM ROADWAY AND BRIDGE RECONSTRUCTION ON THE SOUTH SIDE OF LANTANA ROAD.

PHASE 2:

1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050, 102-100 AND 102-110 TO CLOSE THE LANTANA ROAD WESTBOUND OUTSIDE LANES.
2. SHIFT WESTBOUND TRAFFIC ONTO THE EXISTING EASTBOUND LANES.
3. SHIFT EASTBOUND TRAFFIC ONTO THE NEWLY CONSTRUCTED ROADWAY ON THE SOUTH SIDE OF LANTANA ROAD.
4. PERFORM ROADWAY AND BRIDGE RECONSTRUCTION ON THE NORTH SIDE OF LANTANA ROAD.

PHASE 3:

1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050, 102-100 AND 102-110 TO CLOSE THE LANTANA ROAD INSIDE LANES.
2. SHIFT WESTBOUND TRAFFIC ONTO THE NEWLY CONSTRUCTED ROADWAY ON THE NORTH SIDE OF LANTANA ROAD.
3. MAINTAIN EASTBOUND TRAFFIC ON THE NEWLY CONSTRUCTED ROADWAY ON THE SOUTH SIDE OF LANTANA ROAD.
4. PERFORM ROADWAY AND BRIDGE RECONSTRUCTION ON THE INSIDE LANES AND MEDIAN OF LANTANA ROAD.

RAMP A & D

PHASE 1:

1. INSTALL TYPE K TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050 AND 102-110 TO CLOSE RAMP A AND D OUTSIDE LANES AND SHIFT TRAFFIC TO THE INSIDE LANES.
2. PERFORM PARTIAL BRIDGE DEMOLITION, ROADWAY RECONSTRUCTION AND CONSTRUCTION OF THE MSE WALL.

PHASE 2:

1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050 AND 102-100 TO CLOSE RAMP A AND D INSIDE LANES AND SHIFT TRAFFIC TO THE NEWLY CONSTRUCTED OUTSIDE LANES.
2. PERFORM PARTIAL BRIDGE DEMOLITION, ROADWAY RECONSTRUCTION AND CONSTRUCTION OF THE MSE WALL.

RAMP B

PHASE 1:

1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050 AND 102-100 TO CLOSE RAMP B INSIDE LANES AND SHIFT TRAFFIC TO THE OUTSIDE LANES.
2. PERFORM ROADWAY RECONSTRUCTION AND CONSTRUCT TEMPORARY PAVEMENT.

PHASE 2:

1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050 AND 102-100 TO CLOSE RAMP B OUTSIDE LANES AND SHIFT TRAFFIC TO THE NEWLY CONSTRUCTED INSIDE LANES AND TEMPORARY PAVEMENT.
2. PERFORM ROADWAY RECONSTRUCTION AND INSTALL OUTSIDE GUARDRAIL.

PHASE 3:

1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS ON THE WEST SIDE OF RAMP B AS PER INDEXES 102-000 AND 102-100.
2. REMOVE TEMPORARY PAVEMENT, INSTALL INSIDE GUARDRAIL AND CONSTRUCT SLOPES.

RAMP C

PHASE 1:

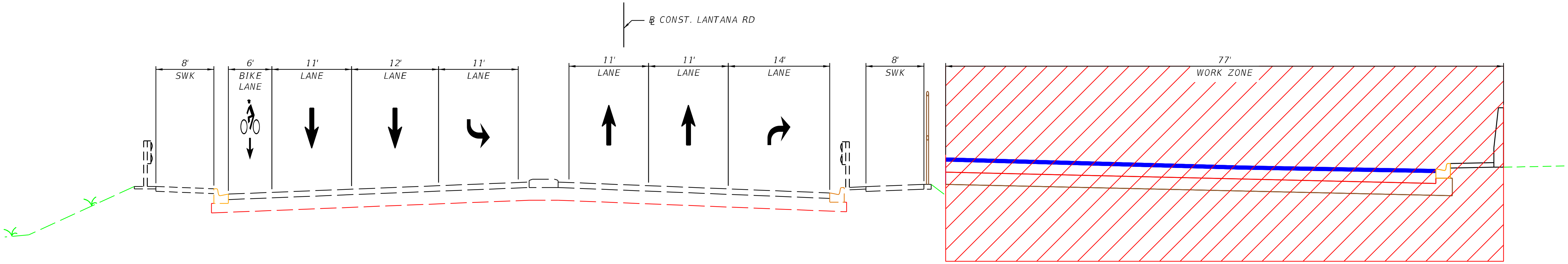
1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050 AND 102-100 TO CLOSE RAMP C OUTSIDE LANES AND SHIFT TRAFFIC TO THE INSIDE LANES.
2. PERFORM ROADWAY RECONSTRUCTION AND CONSTRUCT TEMPORARY PAVEMENT.

PHASE 2:

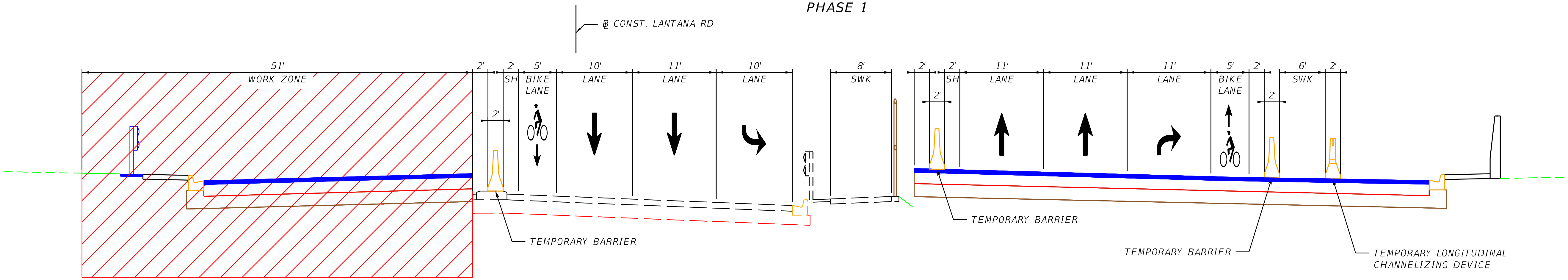
1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS AS PER INDEXES 102-000, 102-045, 102-050 AND 102-100 TO CLOSE RAMP C INSIDE LANES AND SHIFT TRAFFIC TO THE NEWLY CONSTRUCTED OUTSIDE LANES AND TEMPORARY PAVEMENT.
2. PERFORM ROADWAY RECONSTRUCTION.

PHASE 3:

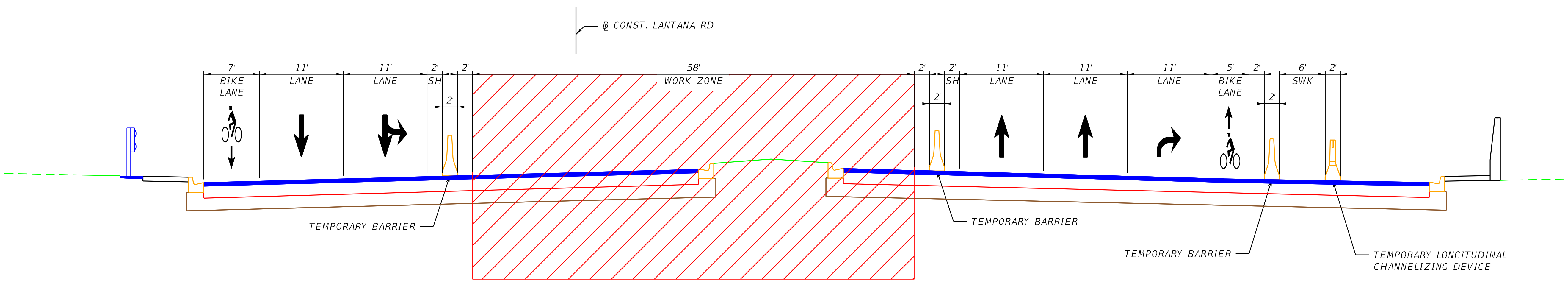
1. INSTALL TEMPORARY BARRIER, EROSION AND SEDIMENT CONTROL DEVICES, AND SIGNS ON THE EAST SIDE OF RAMP C AS PER INDEXES 102-000 AND 102-100.
2. REMOVE TEMPORARY PAVEMENT AND CONSTRUCT SLOPES.



LANTANA ROAD WEST OF I-95
PHASE 1



LANTANA ROAD WEST OF I-95
PHASE 2



LANTANA ROAD WEST OF I-95
PHASE 3

LANTANA ROAD

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

GODFREY A. O. LAMPTEY, P.E., PTOE
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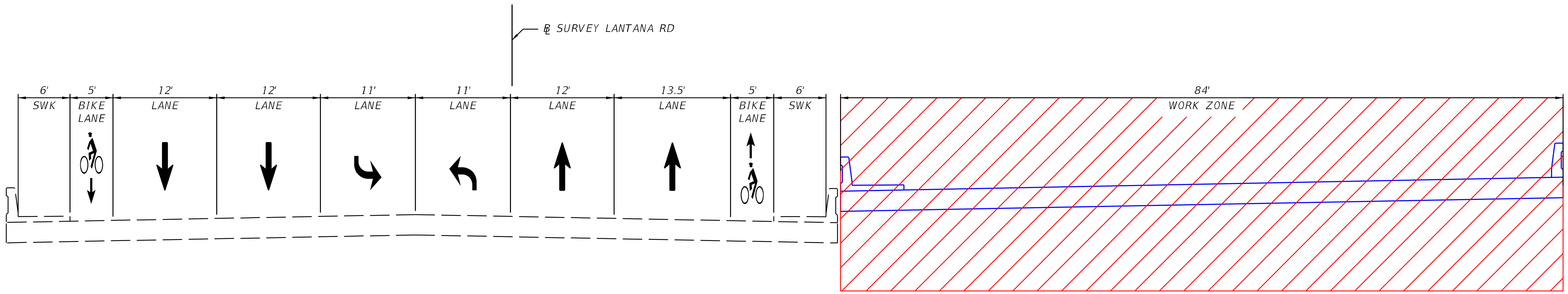
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

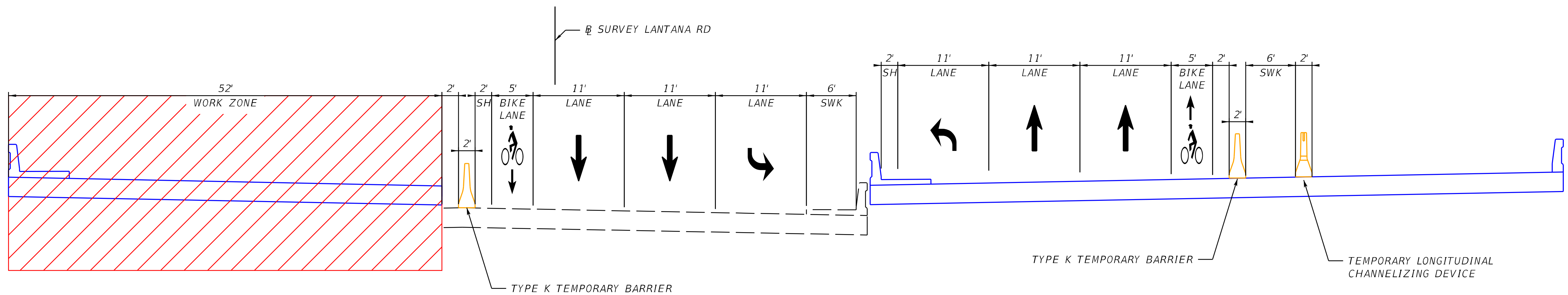
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

TEMPORARY
TRAFFIC CONTROL PLANS

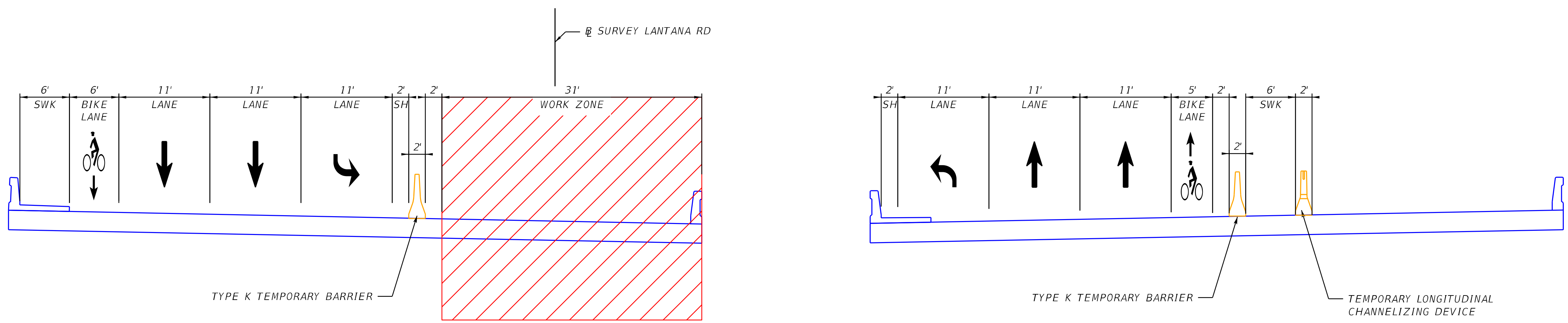
SHEET NO.
30



LANTANA RD OVER I-95
PHASE 1



LANTANA RD OVER I-95
PHASE 2



LANTANA RD OVER I-95
PHASE 3

LANTANA ROAD

REVISIONS			
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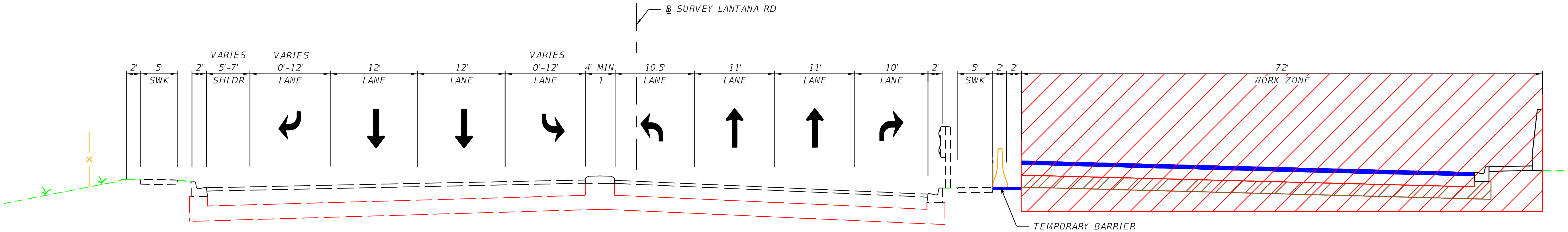
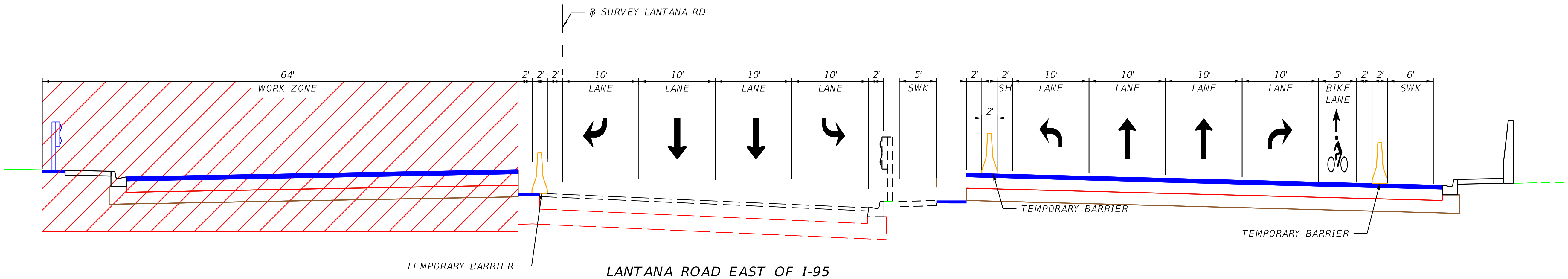
SR 9	PALM BEACH	413258-1-22-02

TEMPORARY
TRAFFIC CONTROL PLANS

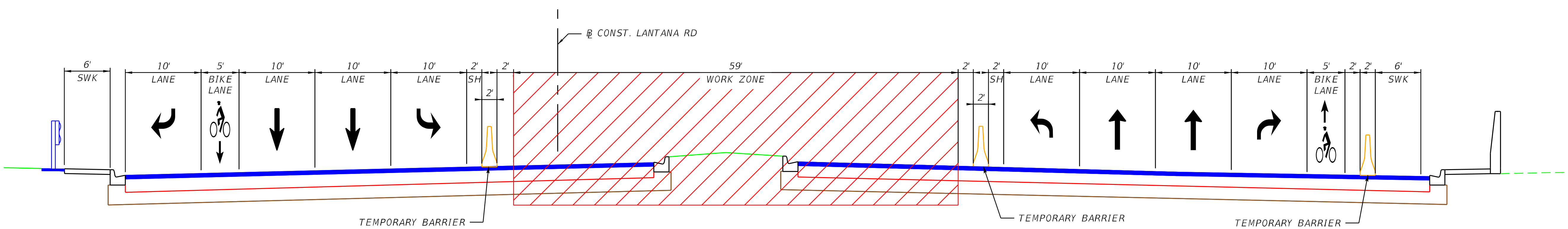
SHEET NO.
31



LANTANA ROAD EAST OF I-95
PHASE 1



LANTANA ROAD EAST OF I-95
PHASE 2



LANTANA ROAD EAST OF I-95
PHASE 3

LANTANA ROAD

REVISIONS			
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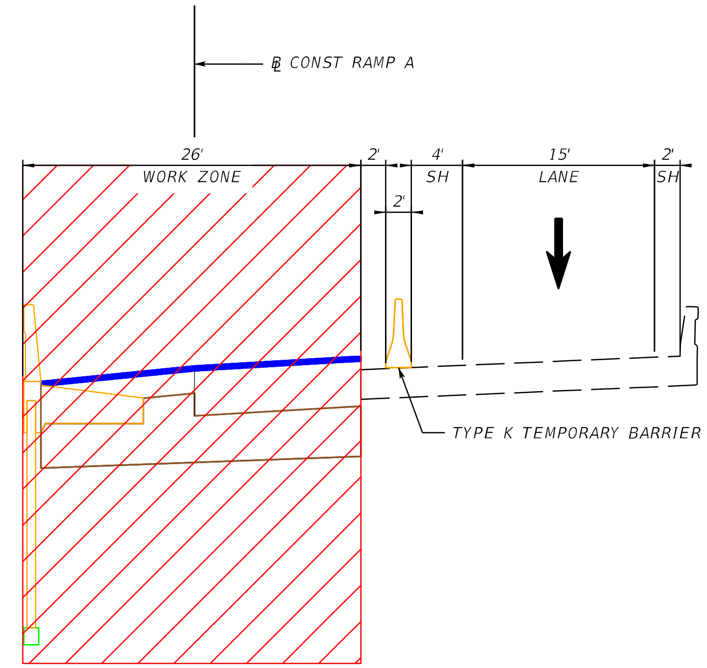
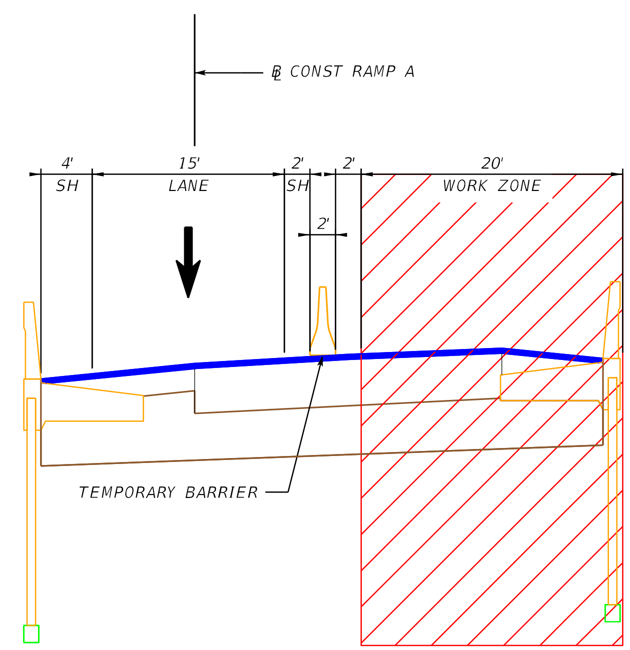
SR 9	PALM BEACH	413258-1-22-02

TEMPORARY TRAFFIC CONTROL PLANS

SHEET NO.
32



I-95 SB ON-RAMP (RAMP A)
PHASE 1



I-95 SB ON-RAMP (RAMP A)
PHASE 2

RAMP A

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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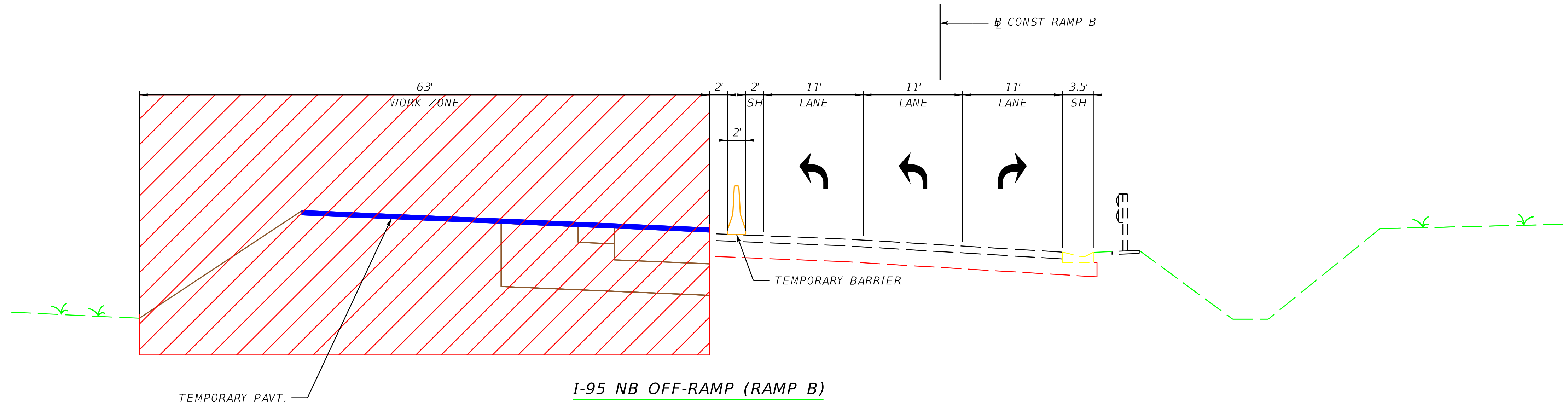
SR 9	PALM BEACH	413258-1-22-02

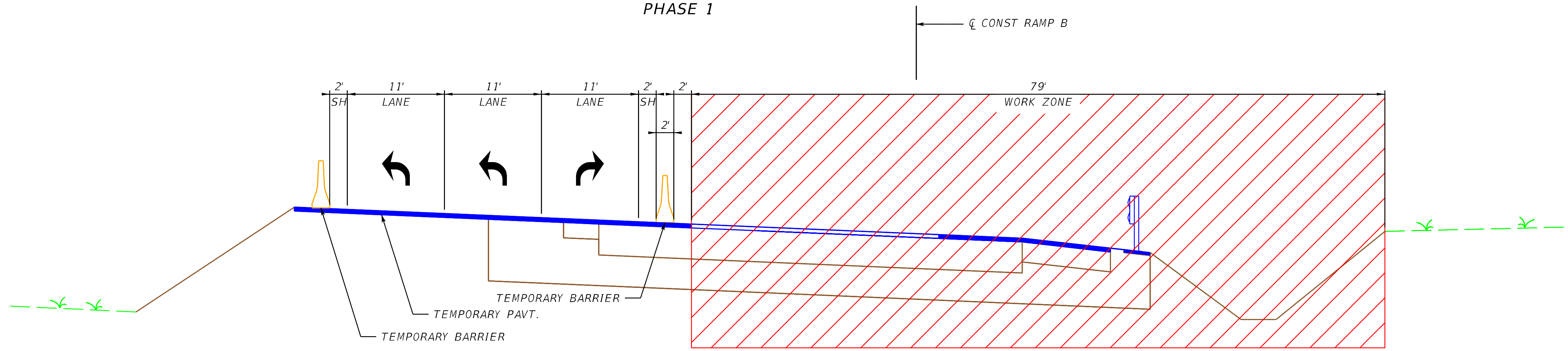
TEMPORARY
TRAFFIC CONTROL PLANS

SHEET NO.
33



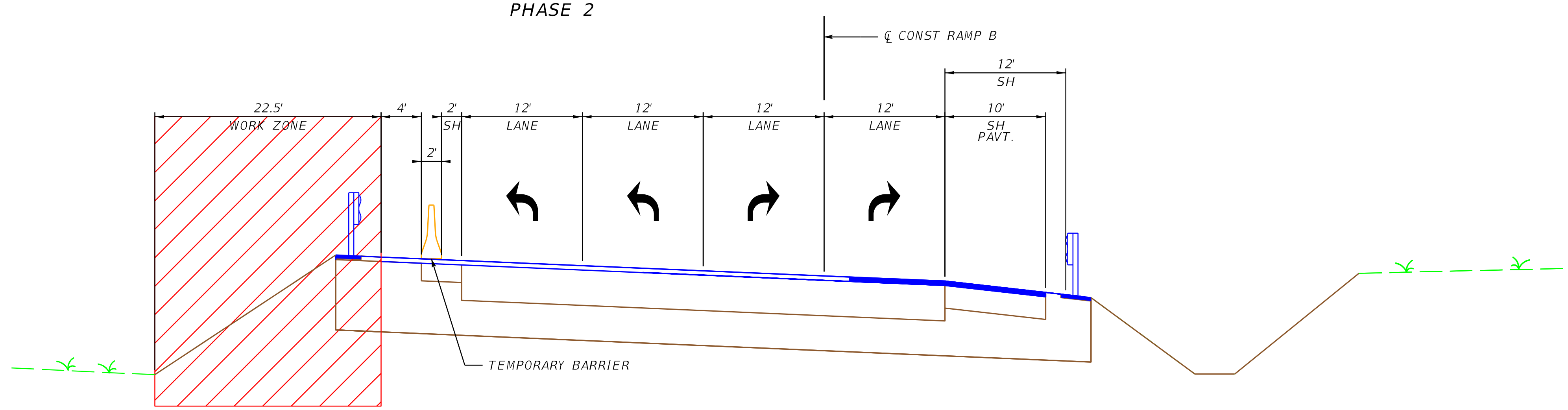
I-95 NB OFF-RAMP (RAMP B)

PHASE 1



I-95 NB OFF-RAMP (RAMP B)

PHASE 2



I-95 NB OFF-RAMP (RAMP B)

PHASE 3

RAMP B

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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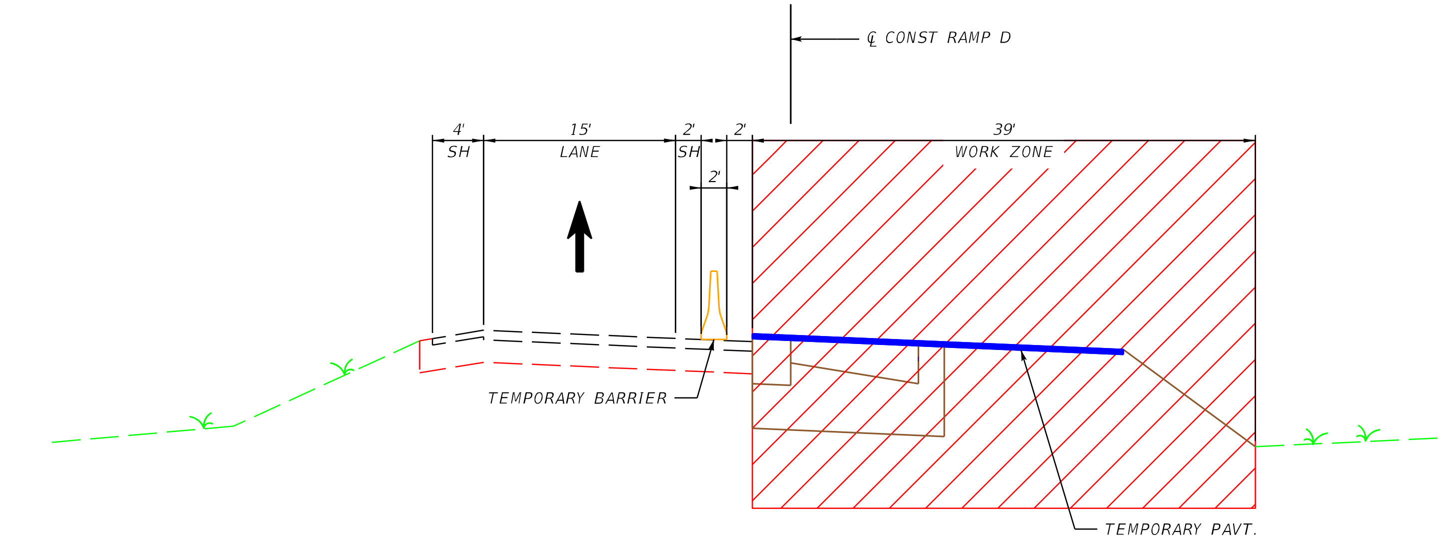
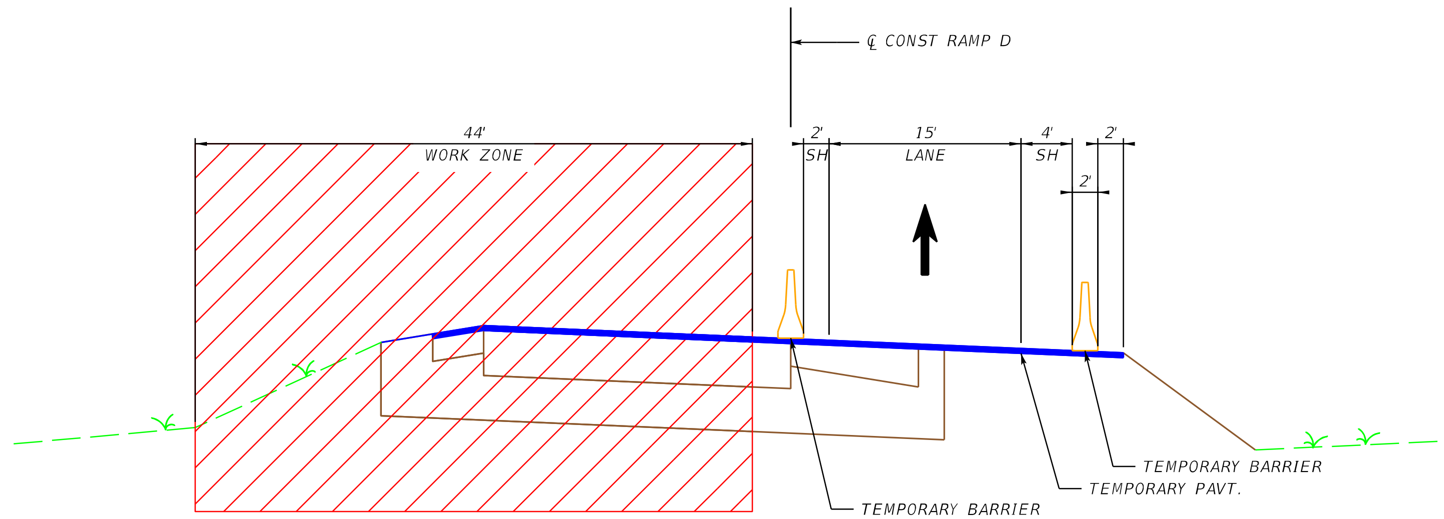
SR 9	PALM BEACH	413258-1-22-02

TEMPORARY
TRAFFIC CONTROL PLANS

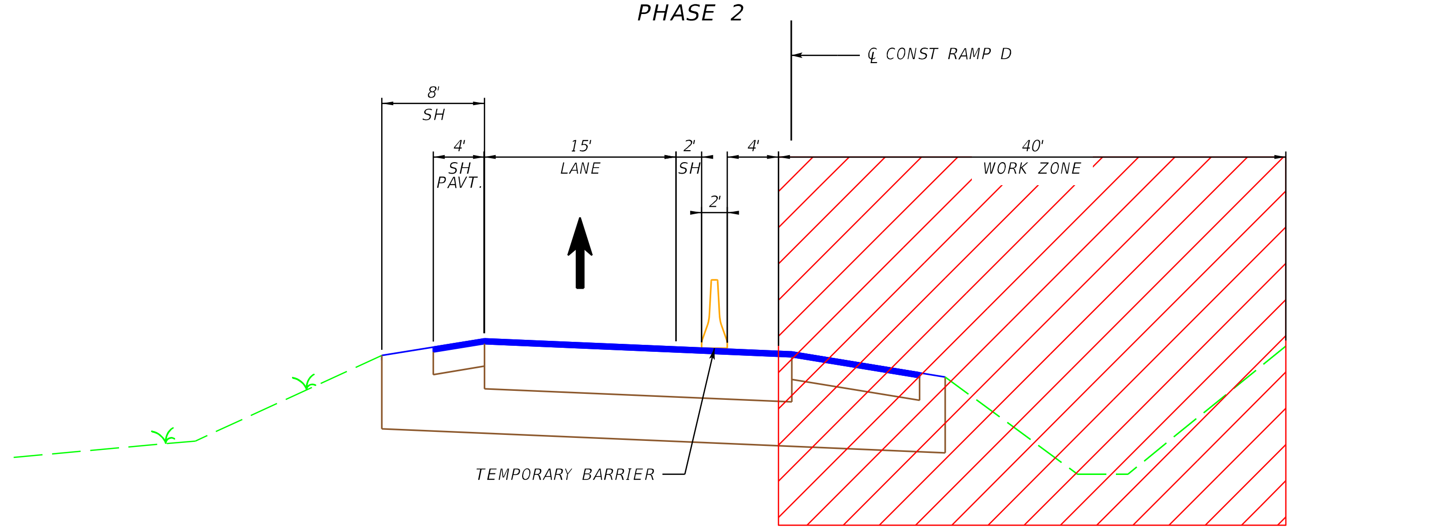
SHEET NO.
34



I-95 NB ON-RAMP (RAMP C)
PHASE 1



I-95 NB ON-RAMP (RAMP C)
PHASE 2



I-95 NB ON-RAMP (RAMP C)
PHASE 3

RAMP C

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

TEMPORARY
TRAFFIC CONTROL PLANS

SHEET NO.
35

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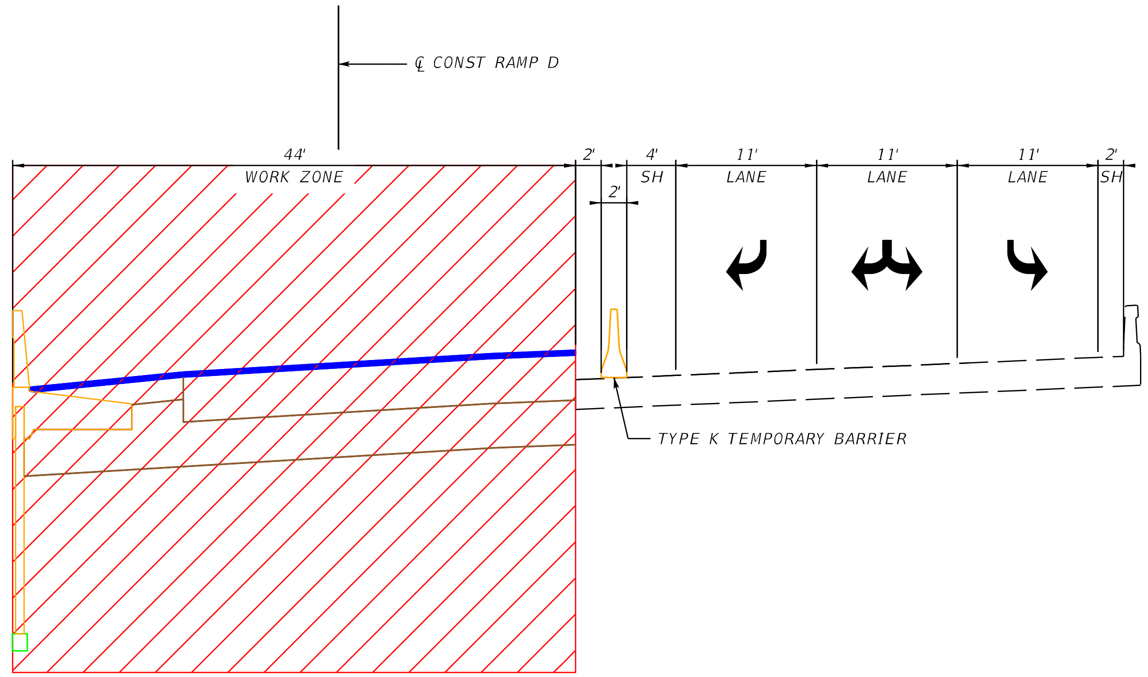

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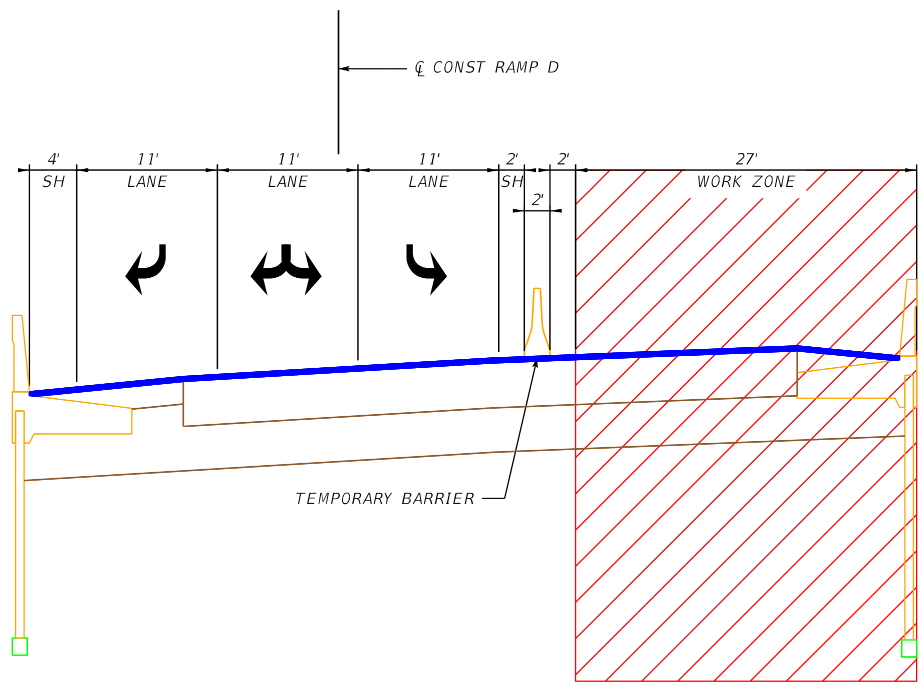

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PHASE 2

RAMP D

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SR 9	PALM BEACH	413258-1-22-02

TEMPORARY
TRAFFIC CONTROL PLANS

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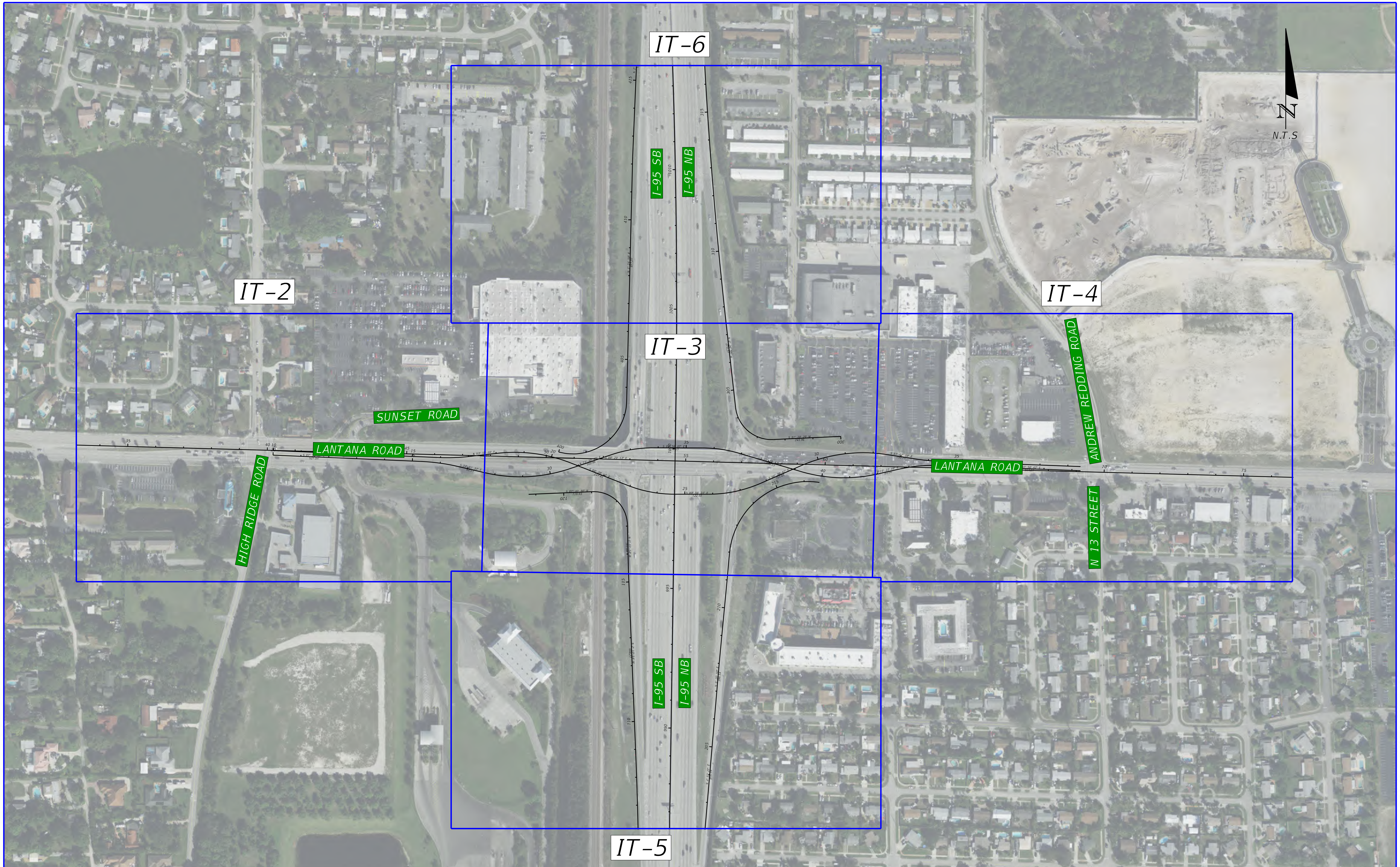

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
812	PALM BEACH	413258-1-22-02

PROJECT LAYOUT

SHEET NO.
IT-1

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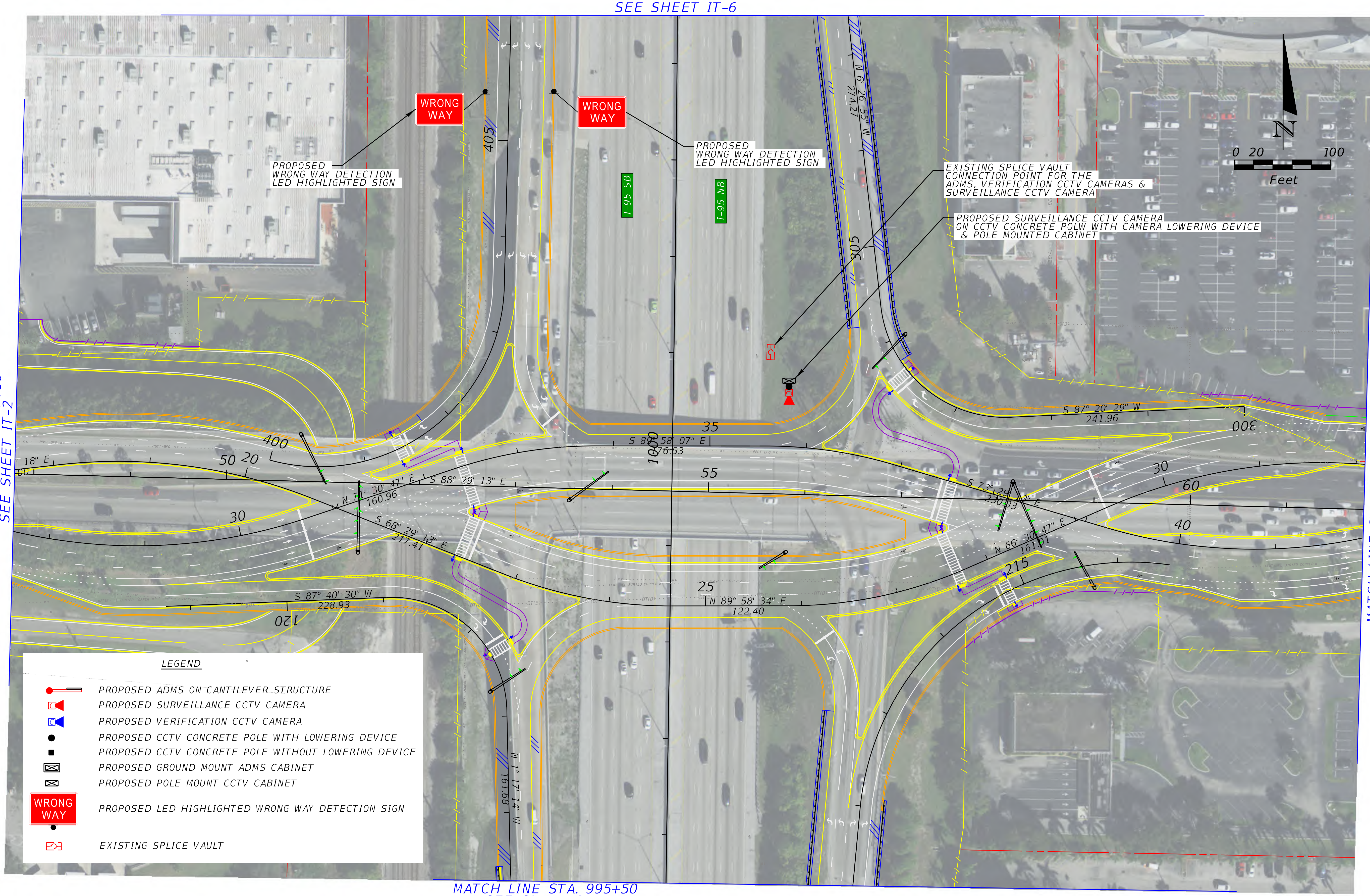
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
812	PALM BEACH	413258-1-22-02

ITS PLAN

SHEET NO.
IT-2

MATCH LINE STA. 1004+50
SEE SHEET IT-6

MATCH LINE STA. 47+80
SEE SHEET IT-2



MATCH LINE STA. 61+80
SEE SHEET IT-4

LEGEND

- PROPOSED ADMS ON CANTILEVER STRUCTURE
- PROPOSED SURVEILLANCE CCTV CAMERA
- PROPOSED VERIFICATION CCTV CAMERA
- PROPOSED CCTV CONCRETE POLE WITH LOWERING DEVICE
- PROPOSED CCTV CONCRETE POLE WITHOUT LOWERING DEVICE
- PROPOSED GROUND MOUNT ADMS CABINET
- PROPOSED POLE MOUNT CCTV CABINET
- WRONG WAY — PROPOSED LED HIGHLIGHTED WRONG WAY DETECTION SIGN
- EXISTING SPLICE VAULT

MATCH LINE STA. 995+50
SEE SHEET IT-5

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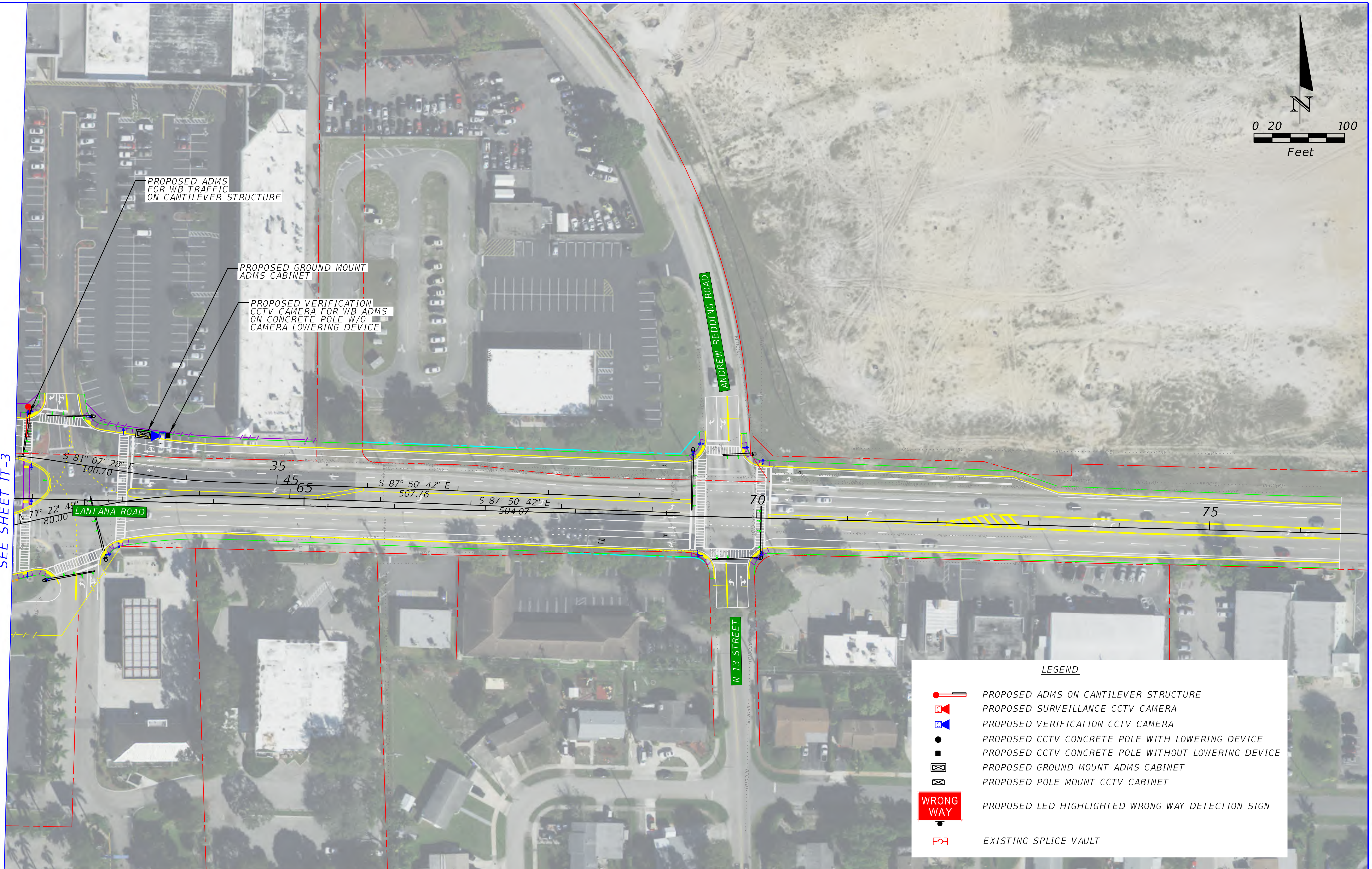
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
812	PALM BEACH	413258-1-22-02

ITS PLAN

SHEET NO.
IT-3



LEGEND

	PROPOSED ADMS ON CANTILEVER STRUCTURE
	PROPOSED SURVEILLANCE CCTV CAMERA
	PROPOSED VERIFICATION CCTV CAMERA
	PROPOSED CCTV CONCRETE POLE WITH LOWERING DEVICE
	PROPOSED CCTV CONCRETE POLE WITHOUT LOWERING DEVICE
	PROPOSED GROUND MOUNT ADMS CABINET
	PROPOSED POLE MOUNT CCTV CABINET
WRONG WAY	PROPOSED LED HIGHLIGHTED WRONG WAY DETECTION SIGN
	EXISTING SPLICE VAULT

REVISIONS

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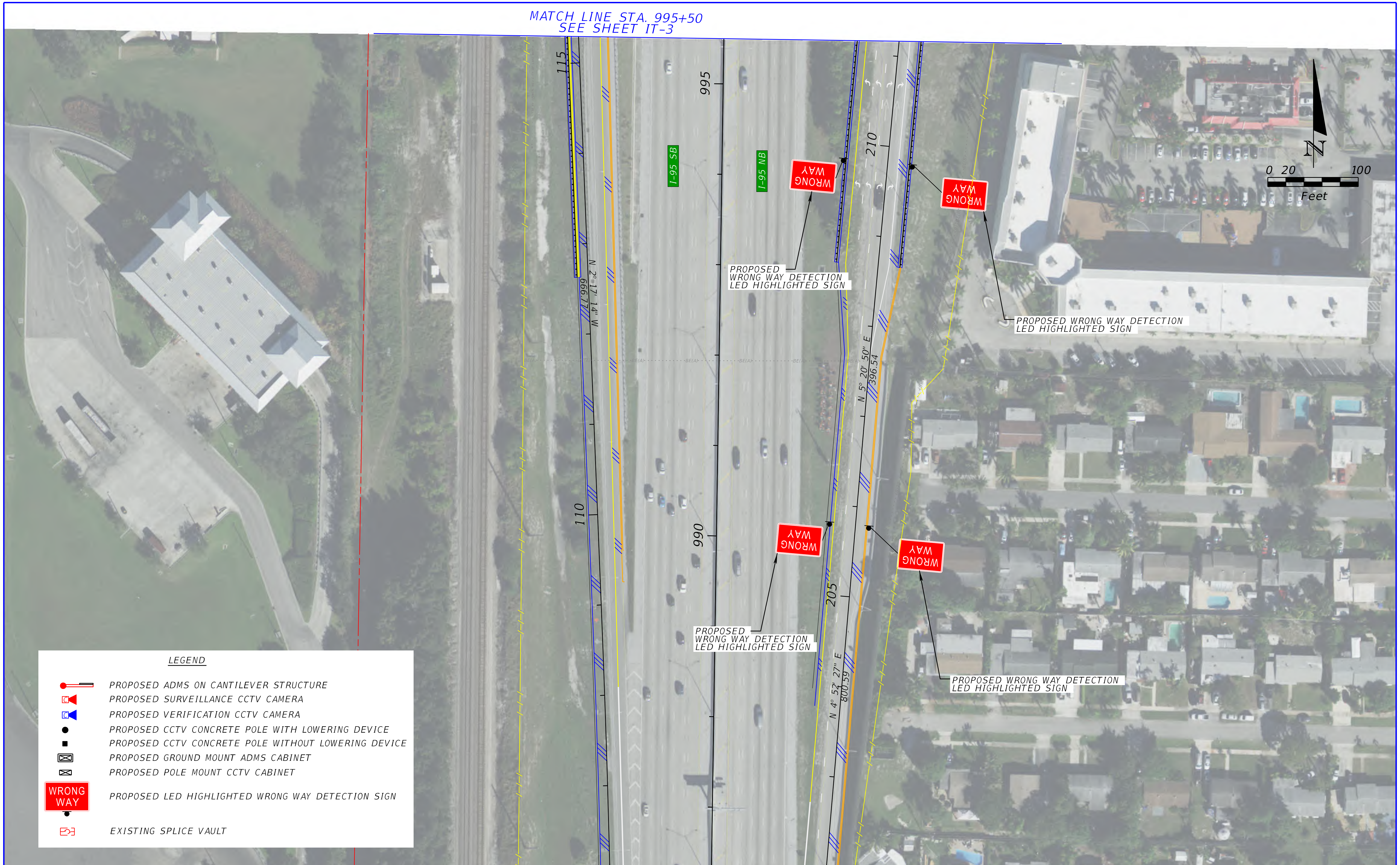
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
812	PALM BEACH	413258-1-22-02

ITS PLAN

SHEET NO.
IT-4



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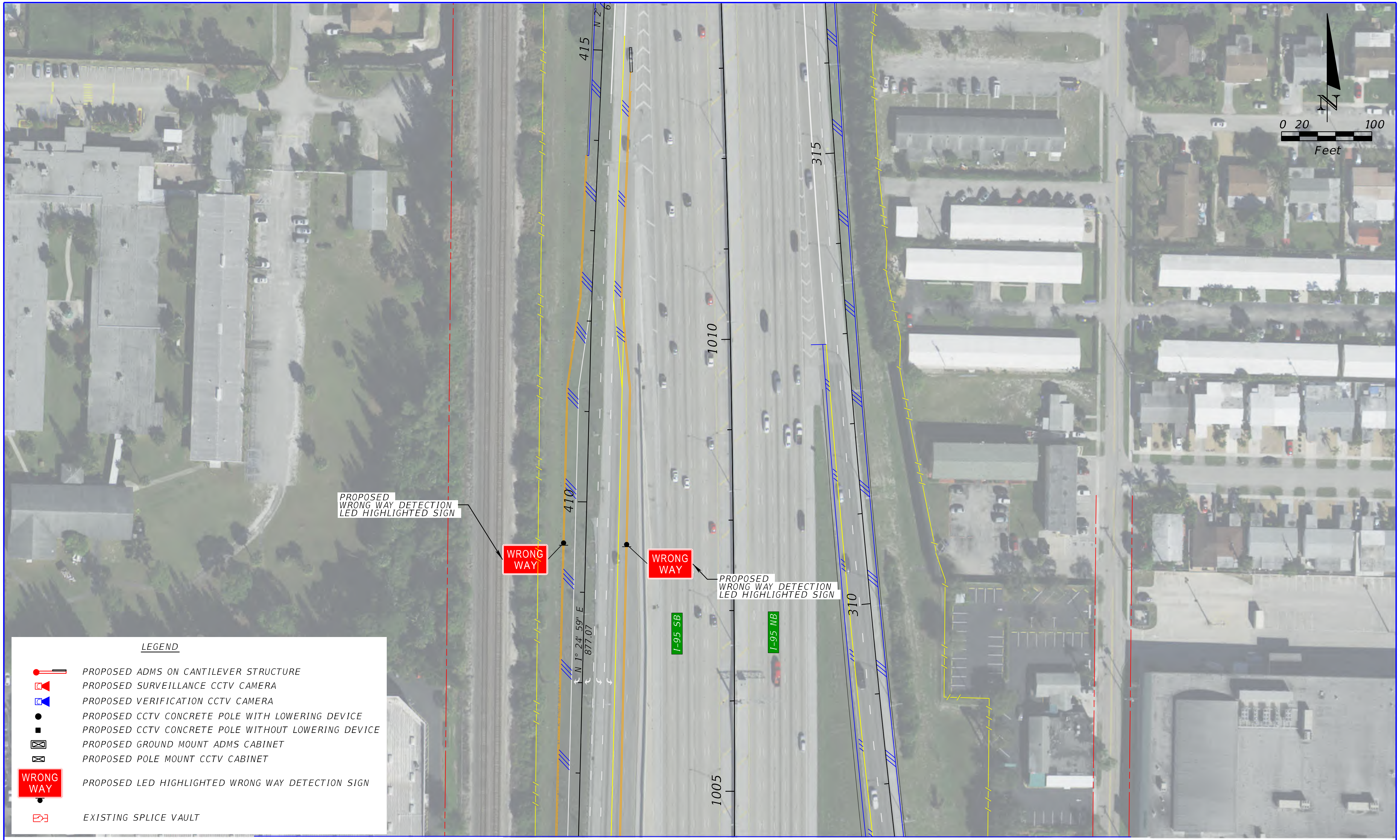
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
812	PALM BEACH	413258-1-22-02

ITS PLAN

SHEET NO.
IT-5



MATCH LINE STA. 1004+50
SEE SHEET IT-3

REVISIONS			
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ITS PLAN

SHEET NO.
IT-6

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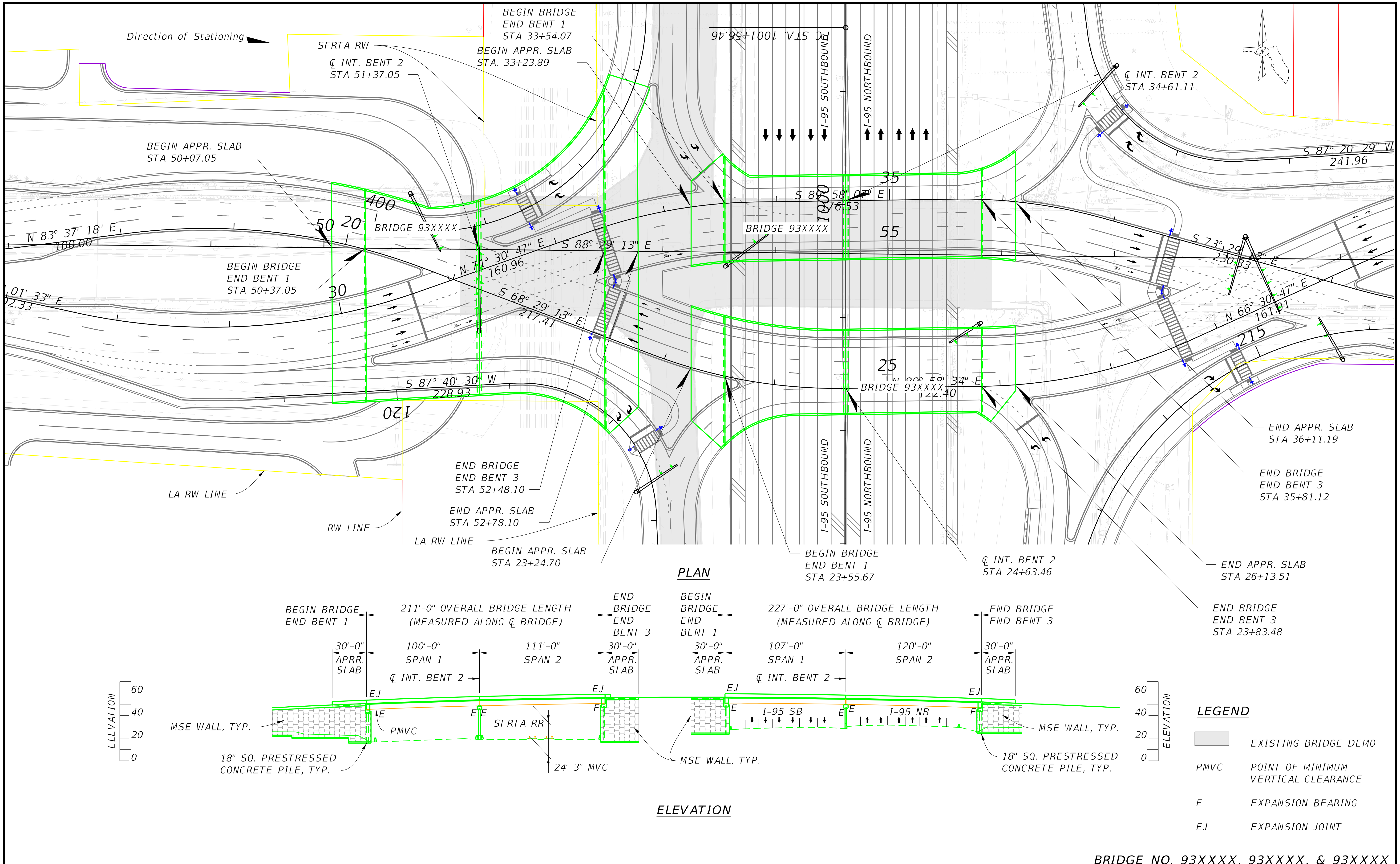

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

SOHEILA SADOUGH, P.E.
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CHECKED BY: SS 05-20
DESIGNED BY: SS 05-20
CHECKED BY: RA 05-20

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

SHEET TITLE: PLAN AND ELEVATION

PROJECT NAME: I-95 AT LANTANA ROAD INTERCHANGE

REF. DWG. NO.

SHEET NO. BR-1

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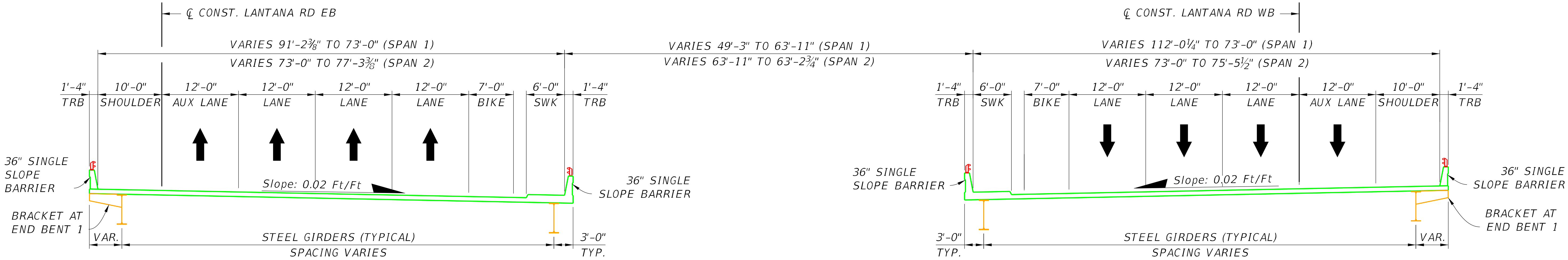
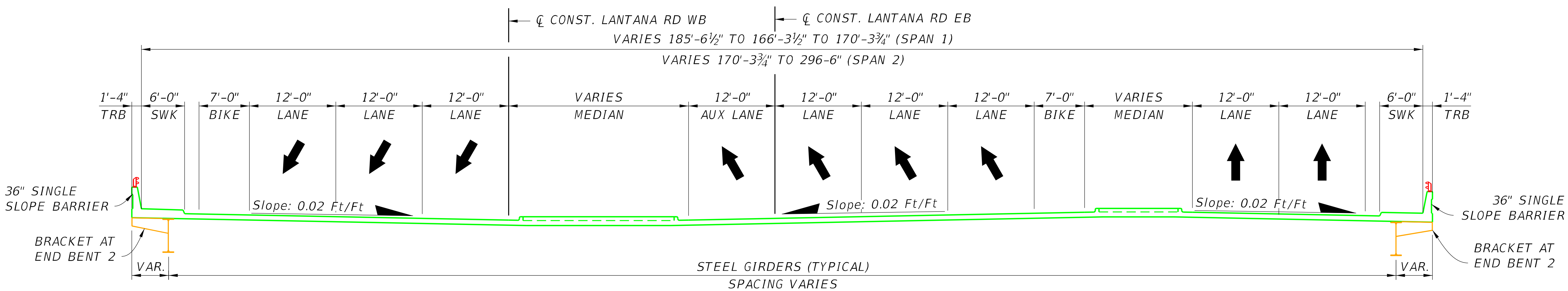


TYPICAL SECTION

LANTANA ROAD OVER SR 9 / I-95

STA. 53+53.94 TO STA. 55+82.96



TYPICAL SECTION

LANTANA ROAD OVER SFRC/CSX RAILROAD

STA. 50+38.06 TO STA. 52+47.08

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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CHECKED BY:	SS 05-20
DESIGNED BY:	SS 05-20
CHECKED BY:	RA 05-20

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	PALM BEACH	413258-1-22-02

SHEET TITLE: TYPICAL SECTION

PROJECT NAME: I-95 AT LANTANA ROAD INTERCHANGE

REF. DWG. NO.

SHEET NO. BR-2

APPENDIX H

(Design Speed Memorandum)

Date:	July 8, 2020
To:	Vandana Nagole, P.E., FDOT Project Manager
From:	Godfrey Lamptey, P.E., PTOE, GOAL Project Manager
Reference:	**Design Speed Memorandum** SR-9/I-95 at Lantana Road Interchange PD&E Study Palm Beach County, Florida FPID No.: 413258-1-22-02|ETDM No.: 14338
Attachments:	A – Preferred Alternative Concept Plan B – Design Speed Criteria for DDI C – Existing Plans D – FHWA Field Evaluation at DDIs E – Right of Way Impacts

INTRODUCTION

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study at the SR 9/I-95 and Lantana Road Interchange within the Town of Lantana, in Palm Beach County. The purpose of the project is to enhance the overall traffic operations and safety at the existing interchange of SR 9/I-95 and Lantana Road in order to eliminate traffic spillback onto SR 9/I-95. As part of this PD&E Study, three Build Alternatives were developed in order to provide the necessary improvements to accommodate the 2045 design year traffic demand. The build alternatives considered include:

- Build Alternative 1 – Tight Urban Diamond Interchange (TUDI)
- Build Alternative 2 – Diverging Diamond Interchange (DDI)
- Build Alternative 3 – Single Point Urban Interchange (SPUI)

The No-Action Alternative, which assumes no proposed improvements to the study interchange was also considered as a baseline for comparison against the Build Alternatives. Based on the analysis and evaluation of several key parameters including traffic operations, safety benefits, access impacts, utility impacts, right of way impacts, environmental impacts, construction costs and public comments, Build Alternative 2 with the Diverging Diamond Interchange configuration had the highest score due to the significantly higher safety and traffic operational benefits it provides to offset its relatively higher construction cost. As such, Build Alternative 2 was selected as the Preferred Alternative for this PD&E Study (See **Attachment A**).

DIVERGING DIAMOND INTERCHANGE (DDI)

The Diverging Diamond Interchange (DDI), is a variation of a conventional diamond interchange. The DDI concept requires drivers to briefly cross to the left, or opposite side of the road at carefully designed crossover intersections. Drivers travel on the left for a short distance, then cross back to the traditional or right side of the road. This unconventional design allows movements for the left and right-turns to and from the I-95 ramps onto Lantana Road without crossing the path of opposing traffic. The crossover is made at the signal where the opposing traffic flows split the signal green time. The major advantage of this type of interchange is that the left-turning vehicles do not require a signal phase which makes this a two-phased signal system with more green time for the opposing traffic. In addition, the DDI has fewer conflict points (i.e. 14 for DDI, 26 for TUDI) resulting in significant safety and operational improvements at the interchange.

DESIGN SPEED CRITERIA FOR DDI

One of the key design elements for any roadway facility is the selection of the design speed which determines the various geometric design features of the roadway. Since the DDI interchange configuration is a relatively new interchange concept (the first DDI in the United States was opened to traffic in 2009), the selection of the appropriate design speed is critical to ensure the desired combination of safety, mobility and efficiency.

The first national publication that provided guidelines for the DDI design was the Federal Highway Administration (FHWA) Diverging Diamond Interchange Informational Guide (August 2014). The recommended design speed for the DDI ranges from 25 mph to 35 mph which correlates to minimum curve radii of approximately 175-ft to 400-ft (See **Attachment B**).

In 2018, the American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets (GDHS) was updated to include design guidance for DDI. Section 10.9.3.5 states that the cross over area of a DDI tends to operate best at lower speeds. As such, the design speed for the crossover alignment should be in the range of 20 mph to 35 mph resulting in cross over radii of 100-ft to 500-ft (See **Attachment B**).

FDOT does not currently have specific criteria covering DDI design. This topic is currently being worked on. However, early application of this design indicates that the turning radii at the crossover junctions to displace the movements should be approximately 300-ft which corresponds to 30 mph design speed (See **Attachment B**).

PROPOSED DESIGN SPEED FOR DDI

The Preferred Alternative reconfigures the existing the Tight Urban Diamond Interchange (TUDI) into a DDI. For the DDI design, a design speed of 35 mph was adopted within the interchange area which is consistent with the FHWA Guidelines and the AASHTO GDHS. The required curve radii were then obtained from the equations (AASTHO GDHS) below based on the superelevation rates of +0.02 (Reverse Crown) and -0.02 (Normal Crown) and the corresponding side friction factors

$V = 3.4415R^{0.3861}$ for e = +0.02 (Reverse Crown)

$V = 3.4614R^{0.3673}$ for e = -0.02 (Normal Crown)

Where:

V = Predicted speed, mph

R = Radius of curve, ft

e = Superelevation, ft/ft

Using the equations above, for 35 mph design speed, the minimum curve radii obtained are 407-ft for reverse crown (RC) and 545-ft for normal crown (NC) and were utilized as the basis for the design of the DDI geometry.

JUSTIFICATION

<u>Existing Posed and Design Speeds</u>

The existing posted speed along Lantana Road within the project limits (between High Ridge Road and Andrew Redding Road) is 40 mph. The posted speed is 35 mph east of Andrew Redding Road and 45 mph west of High Ridge Road (see **Figure 1**). During the recent widening of the Lantana Road Bridge over the SFRC/CSX Railroad and I-95 (2015), a design speed of 45 mph was utilized for the improvements. However, a review of the original bridge construction plans for the Lantana Road Bridge over the SFRC/CSX Railroad and I-95 (1975) shows a 700-ft crest curve with a 10% grade break. This corresponds to a K-value of 70 which correlates with 40 mph design speed (See **Attachment C**). This 40-mph design speed is more appropriate for the Lantana Road segment within the project limits since it serves as a transition between the suburban area west of High Ridge Road and the urbanized area east of Andrew Redding Road. Consequently, the proposed 35 mph design speed for the DDI design is consistent with the general practice of reducing the existing design speed by 5-10 mph.

Figure 1: Existing Posted Speeds

DDI Operating Speed

The AASHTO GDHS recommends that the selected design speed should be consistent with the speeds that drivers are likely to travel on a given roadway i.e. operating speed. Recent studies by FHWA indicated that field observations at seven DDI sites documented average free-flow speeds through the crossover movements ranging from of 24 mph to 26 mph. Similarly, the speed between the crossover movements ranges from about 25 mph to 31 mph (See **Attachment D**). Based on these findings, a design speed of 35 mph can accommodate the expected operating speed for a DDI.

Traffic Safety

The free-flow speeds within the DDI directly impact the safety and comfort of pedestrian and bicycle movements at DDIs. Faster speeds have been linked to a reduced quality of service and safety concerns for cyclists. In addition, faster speeds have also been correlated with a decreased propensity of drivers to yield to pedestrians as well as a greater chance of serious injury or death in the event of a pedestrian-vehicle collision. Consequently, there are no documented safety benefits associated with higher design speeds within the DDI. One of the advantages of the DDI is that the geometry of the crossover intersections has an added benefit of reducing motorized vehicle speeds through the interchange, resulting in a traffic calming effect which reduces crash frequency and severity. The proposed 35 mph will help facilitate this lower operating speed thereby enhancing safety within the interchange area.

Right of Way Impacts

As part of this study, the right of way impacts for the DDI was evaluated for two design speeds: 40 mph and 35 mph. The DDI design concept with 40 mph design speed will result in right of way impacts to the Federal Savings and Loan Association (Chase Bank) located at 1300 W Lantana Road, Lantana FL 33462. This building is a well-intact example of Mid-Century Modern architecture and is considered eligible for listing in the National Register. However, the DDI design concept with 35 mph design speed avoids the right of way impact to the historic property (See **Attachment E**).

CONCLUSION

Based on the evaluation documented above, the proposed 35 mph design speed for the DDI design under the Preferred Alternative is consistent with the current AASHTO GDHS standards and FHWA DDI Guidelines, as well as the general practice of reducing the existing design speed by 5-10 mph for DDIs. Although FDOT does not currently have specific criteria covering DDI design, the proposed 35 mph design speed is consistent with the early applications of the FDOT Central Office design recommendations for DDI design. Furthermore, the DDI design speed of 35 mph can accommodate the expected operating speed for a DDI which ranges between 24 mph and 31 mph based on recent FHWA field studies. The proposed 35 mph will also help facilitate lower operating speed which reduces crash frequency and severity, thereby enhancing safety within the interchange area. It also minimizes right of way impacts and avoids impacts to one potential historical building considered eligible for listing in the National

Register. Consequently, a design speed of 35 mph is recommended for the geometric design elements of the DDI along Lantana Road between High Ridge Road and Andrew Redding Road under the Preferred Alternative since there are no documented safety benefits associated with higher design speeds.

Prepared By

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PROFESSIONAL ENGINEER

Godfrey Lamptey, P.E., PTOE
Project Manager

Date

Concurrence

John Olson, P.E.
District Design Engineer

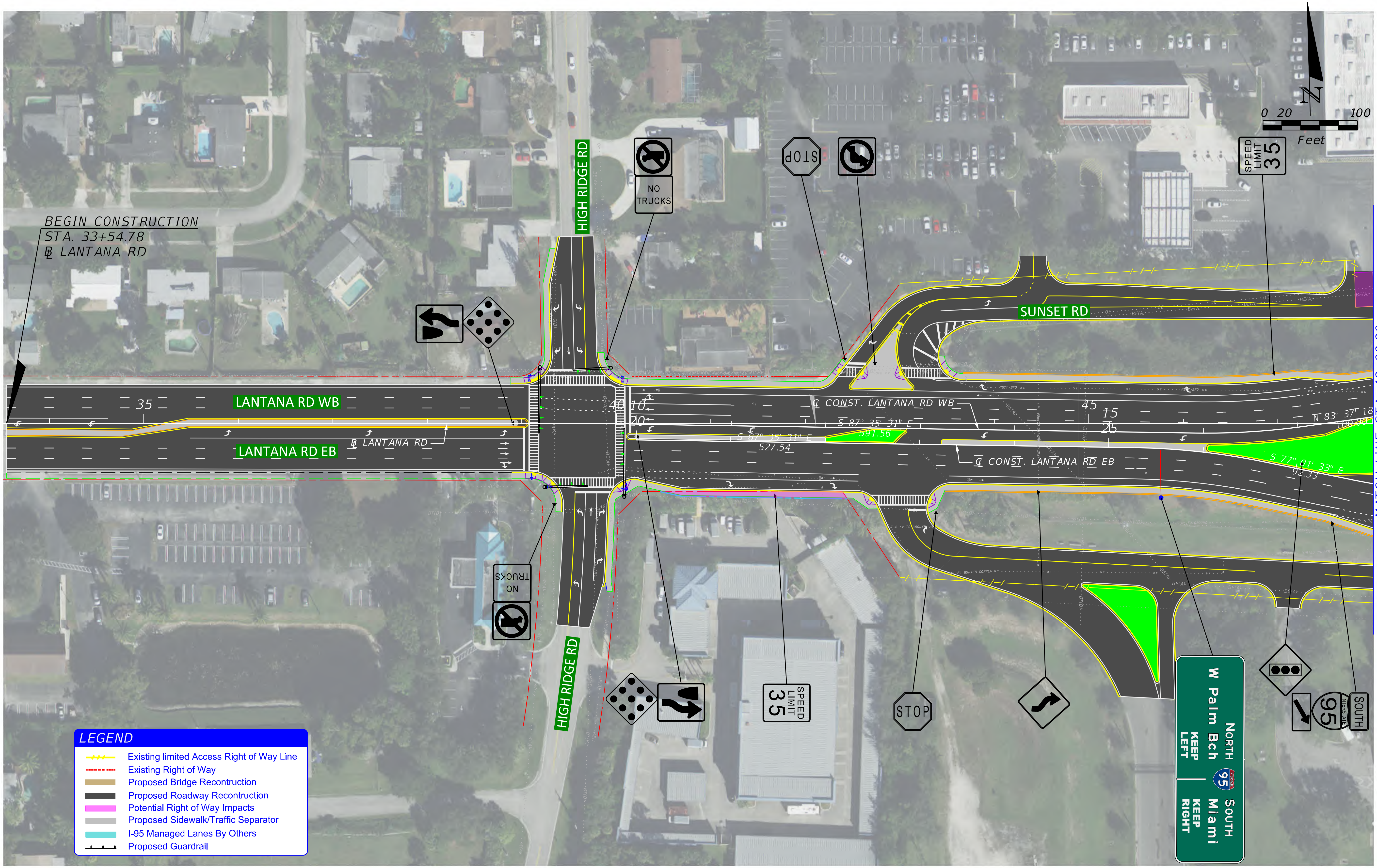
Date

John Krane, P.E.
District Planning Environmental Administrator

Date

ATTACHMENT A

Preferred Alternative Concept Plan



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CONCEPT PLANS

SHEET NO.
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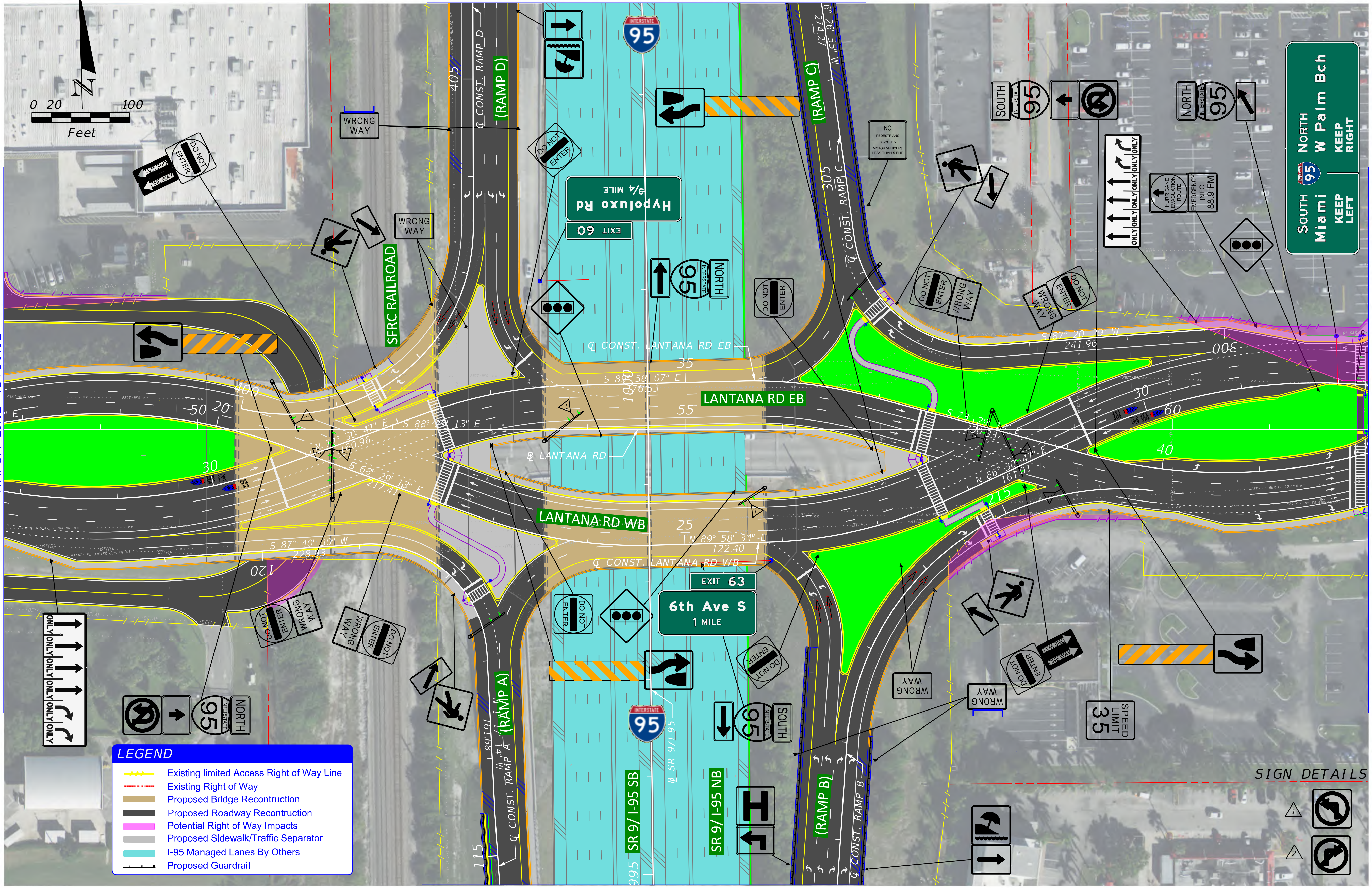

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CONCEPT PLANS

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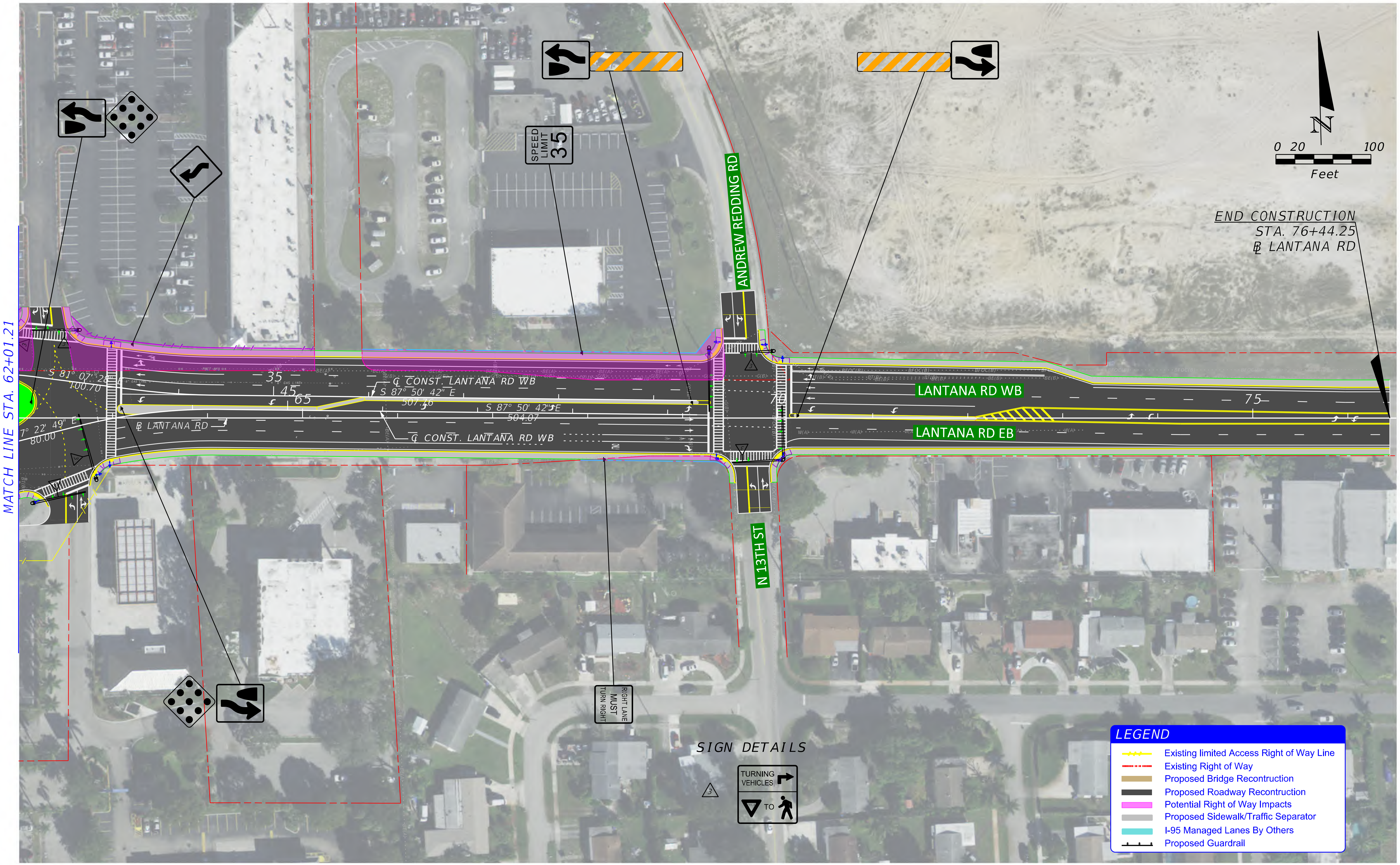

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CONCEPT PLANS

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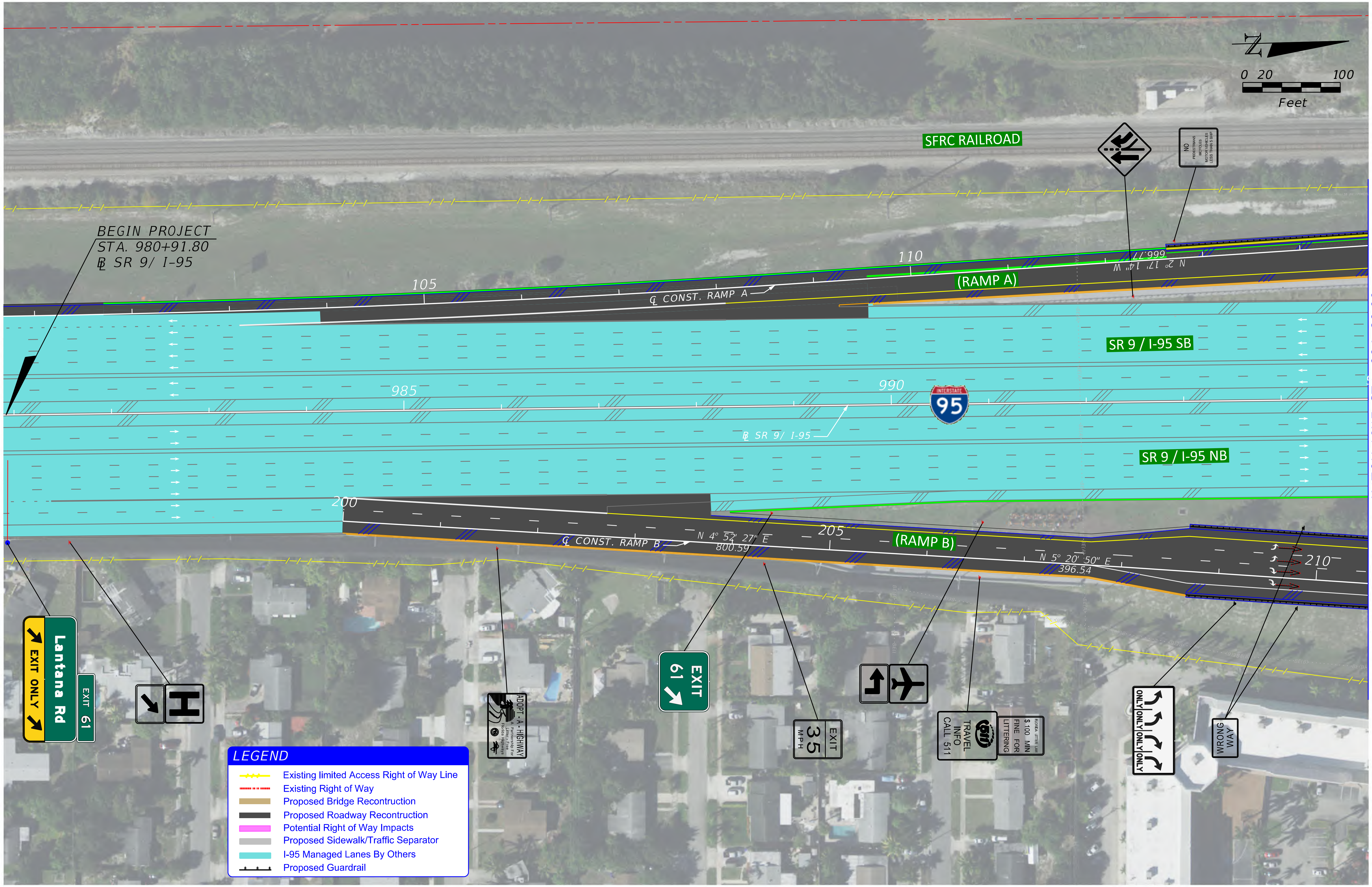

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CONCEPT PLANS

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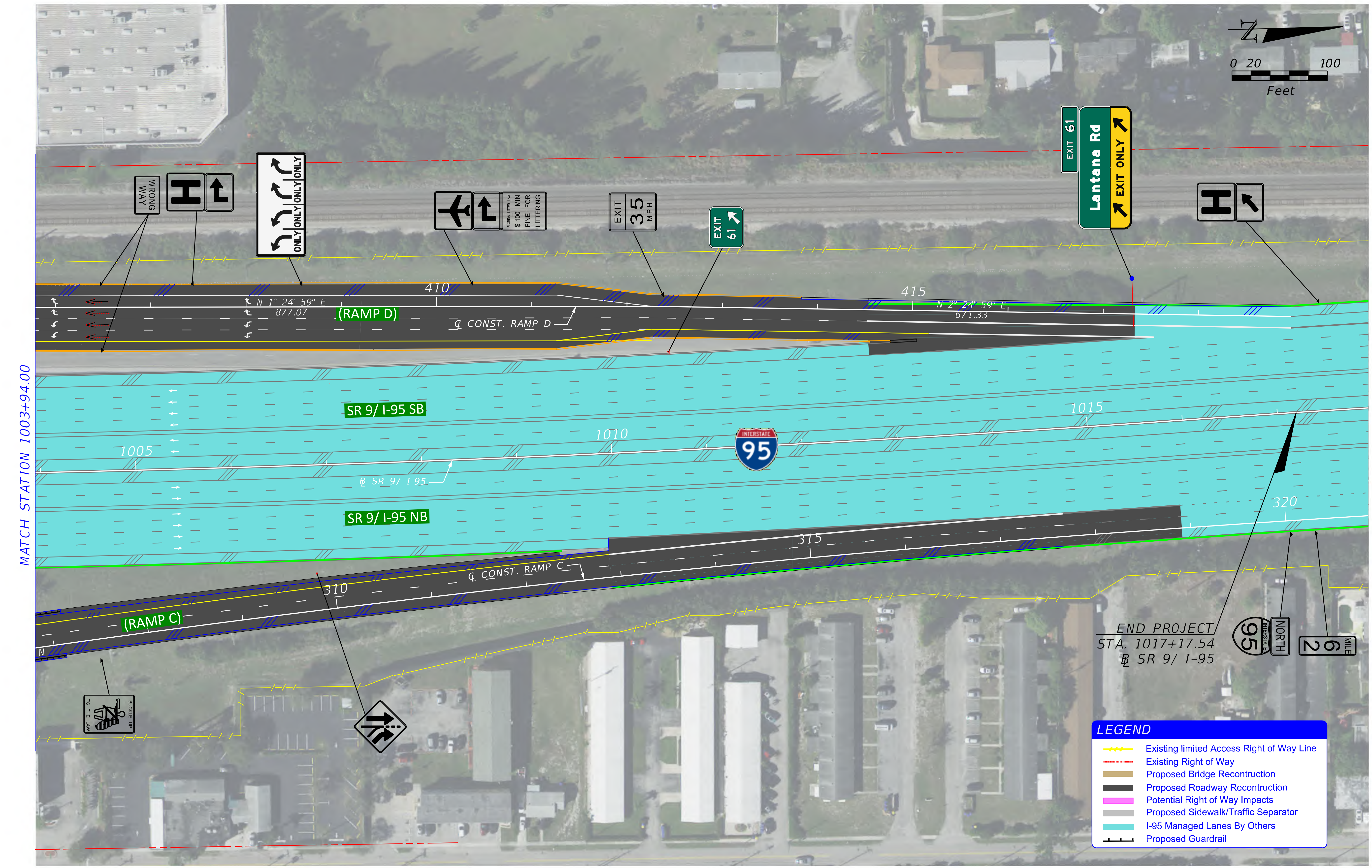

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CONCEPT PLANS

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ATTACHMENT B

Design Speed Criteria for DDI

1. FHWA Diverging Diamond Interchange Informational Guide (August 2014).
2. AASHTO A Policy on Geometric Design of Highways and Streets (2018 - 8th Edition)
3. FDOT Central Office Diverging Diamond Interchange Memorandum

Federal Highway Administration (FHWA)
Diverging Diamond Interchange Informational Guide
(August 2014).

Design Speed

Design speed at a DDI affects the reverse curve radii and configuration through the two intersection crossovers. The crossovers' chief purpose is to create the contraflow operations between the ramp terminal intersections that reduce signal phases for conflicting approaches. Target crossover angles of no less than 45 degrees facilitate efficient passage through the crossover. The angle and resulting design is a product of considering ROW constraints outside the DDI and available cross-section over or under the bridge. Reverse curves provide the transition from parallel to conflicting through movements. These curves provide the necessary approach angle through the crossover, but also act as a traffic-calming device to control speeds.

The cross street and exit ramp left- and right-turn speeds should also be considered; however, their design is generally understood given the similarities to other interchanges. Factors directly influencing the design speed selection of a DDI are traffic volumes, percentage of trucks, ROW, and other existing safety performance and site context conditions. The assumed speeds for each of these movements will determine the minimum turning radius for each location. For the crossover movements, traffic operations and safety performance will benefit from designing for speeds ranging from 25 to 35 mph. For exit ramp turning movements, considerations are similar to other service interchange forms and include pedestrian crossing conditions and intersection and stopping sight distance.

Additional information related to design speed can be found in the Design Guidance section of this chapter.

Crossover Design

State DOTs recommend crossover angles of no less than 45 degrees between opposing approaches. Research findings indicate a higher correlation between lower crossover angles and the likelihood for increased wrong-way maneuvers into opposing lanes. This is especially apparent at sites where the predominant movements are left turns on and off the limited access facility. Exhibit 7-6 shows vehicle paths through a crossover.

Several factors influencing crossing angles:

- *Wrong-way maneuvers:* Minimizing the likelihood of a wrong-way maneuver into opposing traffic is a key consideration in DDI design. The greater the crossing angle, the less the intersection will appear different than a conventional location. Minimizing skew angle is a common objective at any intersection type.

- *Right-of-way constraints:* The surrounding environment will influence a DDI configuration. For instance, a reconstruction design may be constrained by bridge abutments and built-out developments on either side of the crossover. These constraints can make it difficult for designers to attain reverse curve crossover angles of 45 degrees or greater.

- *Driver discomfort:* Greater crossing angles require corresponding reverse curves. Smaller curve radii increase traffic calming effects and promote reduce speeds. Overall speed

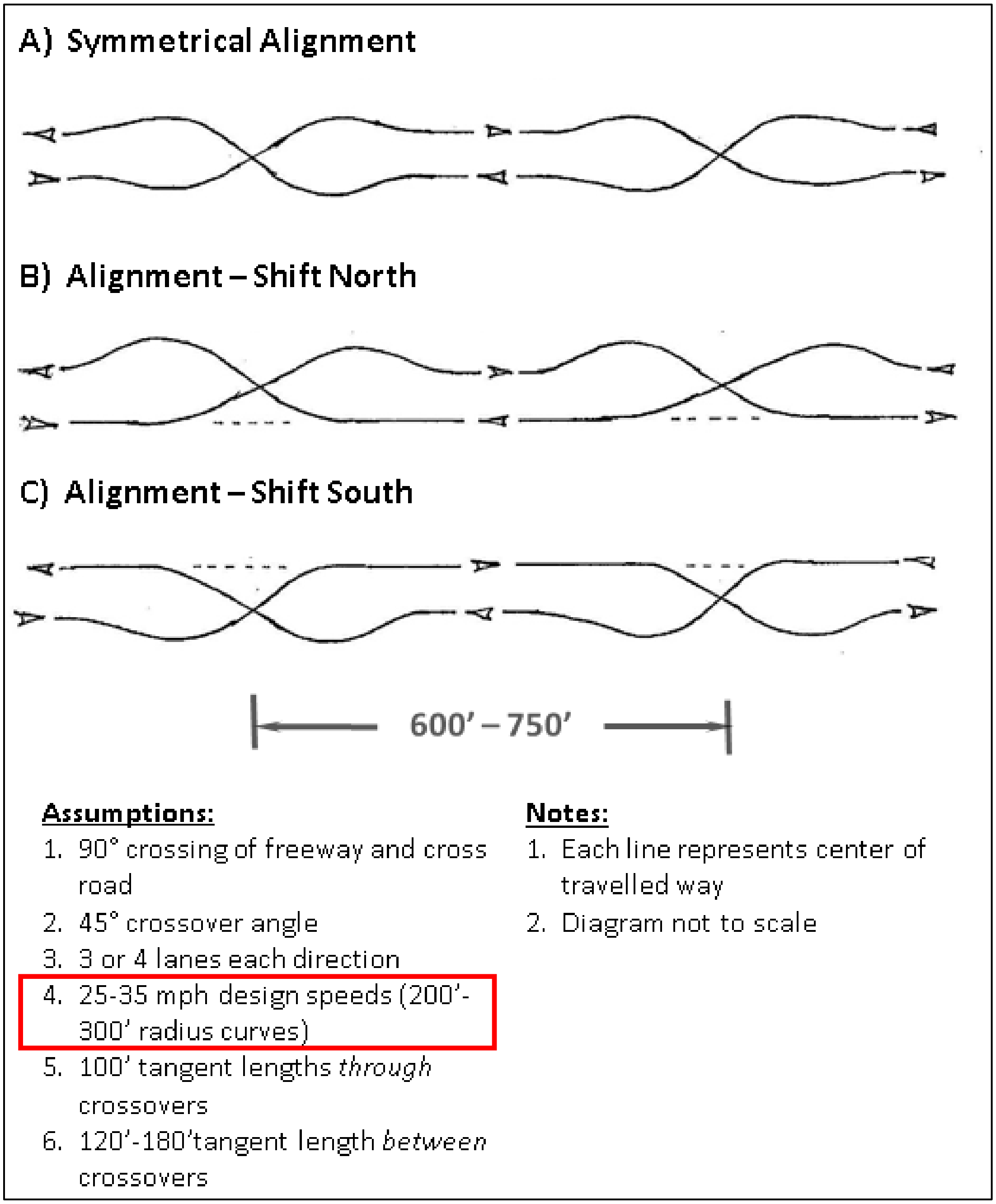
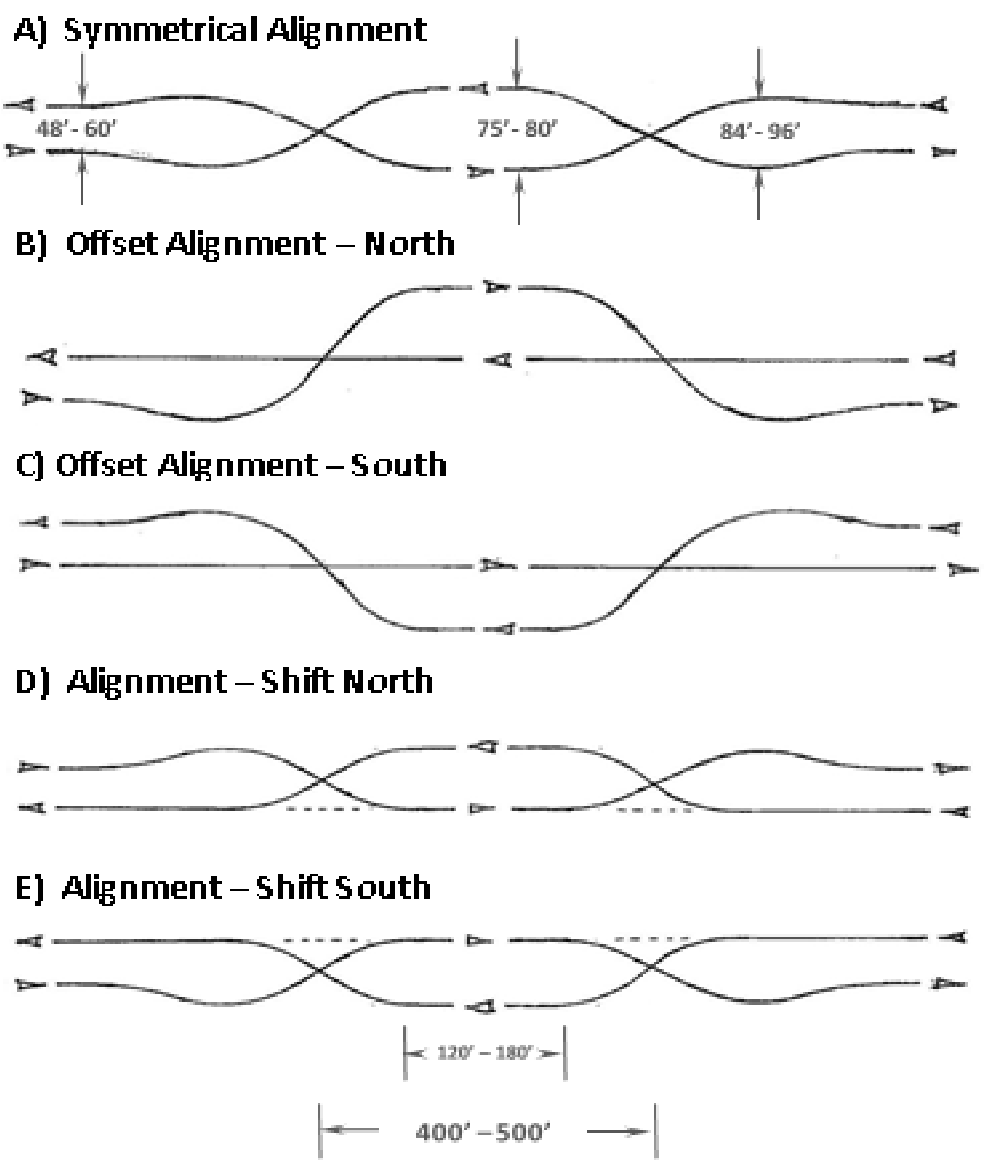


Exhibit 7-7. Alignment alternatives that minimize cross-sections over or under a bridge.[14]

Minimize the Distance between Crossovers and Amount of Reverse Curvature

Reverse configurations that minimize cross-section between crossovers typically have at least four reverse curves in each direction at each crossover. The number of curves and providing needed tangents between reverse curves increases the overall spacing requirements between crossovers. Eliminating some of reverse curves reduces driver work load and allows shorter spacing. With a wider median, the number of reverse curves between the cross overs can be minimized. In new construction or reconstruction where sufficient width exists across the limited



Assumptions:

1. 90° crossing of freeway and cross road
2. 45° crossover angle
3. 3 or 4 lanes each direction
4. 25-35 mph design speeds (200'-300' radius curves)
5. 100' tangent lengths *through* crossovers
6. 120'-180' tangent length *between* crossovers

Notes:

1. Each line represents center of travelled way
2. Diagram not to scale

Exhibit 7-8. Alignment alternatives to minimize the distance between crossovers and amount of reverse curvature.[14]

Exhibit 7-13. Cross-sectional distances for a shifted alignment with no reverse curves between crossovers (Pioneer Crossing, American Fork, UT).[26]

DESIGN GUIDANCE

While the previous sections provided general geometric parameters and principles related to the DDI, this section provides more specific guidance to assist designers in configuring DDI components. The primary source for geometric design guidance is the AASHTO Green Book.[8] This chapter augments AASHTO Green Book guidance to support decisions with respect to DDIs.

Design Speed

The relationship between horizontal curvature and travel speed is documented in the AASHTO Green Book. The predicted speed associated with minimum radii can be determined using the equations provided below. The equations apply a simplified relationship between speed and radius based on the most common superelevation rates of +0.2 and -0.2 and the corresponding side friction factors based on assumed speeds.

$$V = 3.4415R^{0.3861}, \quad \text{for } e = +0.02$$

$$V = 3.4614R^{0.3673}, \quad \text{for } e = -0.02$$

where

V = predicted speed, mph
R = radius of curve, ft
e = superelevation, ft/ft

Exhibit 7-14 provides a quick reference of the speed-curvature relationship for both superelevation rates.[42] For DDIs, it is reasonable to assume the superelevation rates and side friction factors used below will provide a reasonable estimate of speeds at crossover and ramp movements.

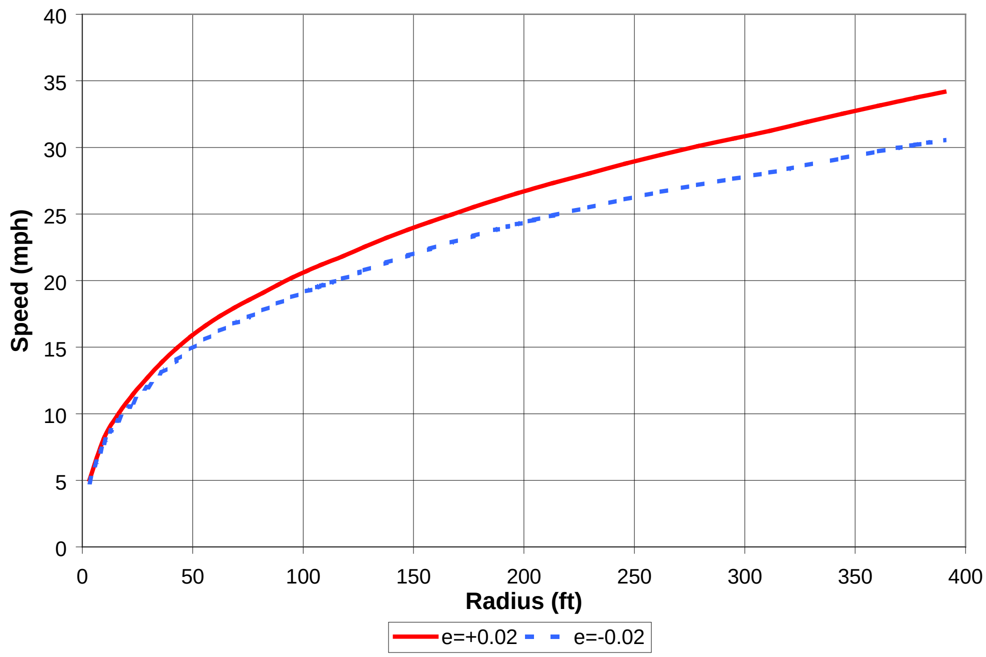


Exhibit 7-14. Speed-radius relationship.[42]

Three key areas of the DDI are directly affected by the design vehicle: 1) through movements at the crossover, 2) left turns at the exit ramp, and 3) right turns at the exit ramp. The first two areas are unique to the DDI with respect to interchange design; however, they build on concepts used for designing other street facilities such as roundabout and one-way street designs. The third area, right turning vehicle paths, is not new to DDI.

For scenario 1, it is desirable for through movements to progress though the crossover of a DDI at 20 to 30 mph without encroachment of vehicles on adjacent lanes. This corresponds to minimum curve radii in the range of 100 to 300 feet, respectively. For designs minimizing the spacing between crossovers, a larger median width is required as there are no reverse curves (just the reverse curve of the crossover itself) on the closest side to the bridge abutments. This additional space is sometimes used to accommodate larger turning radii, which in turn requires smaller lane widths to accommodate design vehicle swept paths. The design speeds usually range from 25 to 35 mph, which correlates to minimum curve radii of approximately 175 to 400 feet, respectively.

Field observations at five DDI sites documented average free-flow speeds through the crossovers for inbound and outbound movements ranging from of 22.3 to 31.1 mph. This corresponds to curves with radii between 180 to 350 feet.[14] Based on these findings, where space is available, design speeds upward of 35 mph can be used while providing narrower lane widths to serve the design vehicle swept path.

For scenarios 2 and 3, turning movements to and from ramp terminal intersections typically accommodate slower speeds in the realm of 15 to 20 mph, correlating to curve radii ranging from approximately 50 to 100 feet. These design speeds are similar to other interchange forms. The DDI configuration has unique sight lines compared to other interchange forms; as such, the intersection design will reflect the need to provide sight angles specific to the upstream crossover movement.

Crossover Design

Crossover angles of 45 degrees or more support operations and safety performance targets. However, MoDOT recommends crossover angles range from 40 to 50 degrees, while UDOT recommends angles be 30 degrees or greater. Generally speaking, it is desirable to provide the largest crossing angle while adapting to each site's unique conditions.

Based on documented ongoing research efforts, seven DDIs in various states used crossover angles ranging from 28 to 52 degrees. As noted in Chapter 4, lower crossover angles of 40 degrees or less had the highest number of wrong-ways movements, especially for sites that progressed traffic on and off the limited access facility and not along the cross road. These initial findings seem to align well with recommendations made by MoDOT. However, there are DDI designs with crossover angles below 40 degrees that integrate different design criteria and features to discourage wrong-way movements.

Commonly used treatments supplement the crossover angle as a means of discouraging wrong way movement at the crossovers include: signing at the gore, pavement markings, and signal heads with arrows. These treatments are summarized in more detail in Chapter 8. UDOT recommends installing a vertical barrier to block the line of sight of the opposing movement in the crossover area. This is intended as a means of discouraging right turns into the conflicting approach at the crossover.[43] Exhibit 7-15 illustrates of the barrier versus a raised channelizing traffic island at the inbound and outbound approaches of two different DDIs. If this raised barrier is used, sight distances should be accommodated.

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(2018 - 8th Edition)

10.9.3.5 Diverging Diamond Interchanges

The Diverging Diamond Interchange (DDI), also known as the Double Crossover Diamond (DCD), is a variation of a conventional diamond interchange. The first DDI in the United States was constructed and opened to traffic in 2009 as a retrofit of an existing conventional diamond interchange. The DDI uses directional crossover intersections to shift traffic on the cross street to the left-hand side between the ramp terminals within the interchange. Crossing the through movements to the opposite side replaces left-turn conflicts with same-direction merge/diverge movements and eliminates the need for exclusive left-turn signal phases to and from the ramp terminals. All connections from the ramps to and from the cross street are joined outside of the cross-over intersections, and these connections can be controlled by two-phase signals, have stop or yield control, or be free flowing.

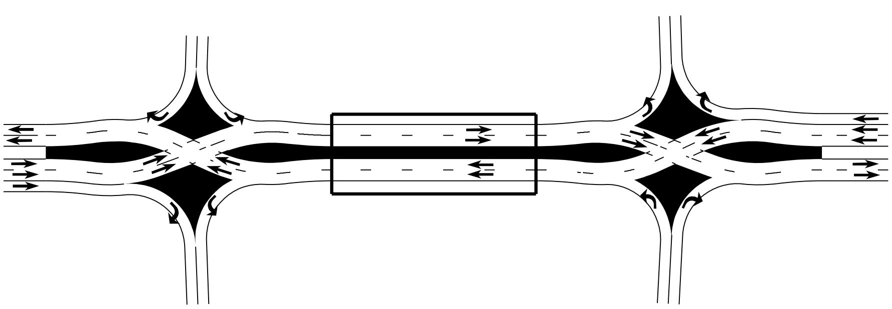
The DDI offers several advantages in comparison to a conventional diamond interchange. By allowing the ramp-terminal intersections to operate with simple, two-phase signal operations, the design provides flexibility to accommodate varying traffic patterns. The DDI design has significantly fewer vehicle-to-vehicle, vehicle-to-pedestrian, and vehicle-to-bike conflict points compared to a conventional diamond interchange. Left-turn volume capacity at a DDI is generally higher, and fewer and shorter signal phases are needed to accommodate both motorized and nonmotorized movements. Overall operations of a DDI may be greater compared to a conventional signalized diamond interchange due to shorter cycle lengths, reduced time lost per cycle phase, reduced stops and delay, and shorter queue lengths. The DDI also reduces the number and severity of conflict points for both motorized and nonmotorized users. The crossing distances for pedestrians are comparatively shorter, and usually involve traffic approaching from only one direction at a time. The cross-sectional characteristics of a DDI provide multiple options for facilitating convenient pedestrian and bicycle movements, and the geometry of the crossover intersections have an added benefit of reducing motorized vehicle speeds through the interchange, resulting in a traffic calming effect which may reduce crashes.

At an existing conventional diamond interchange where additional capacity is needed, it may be advantageous to convert the interchange into a DDI. Retrofitting to a DDI may be less costly than options involving widening the crossroad near the interchange (including widening the bridge) and adding additional lanes to the ramps. For new interchanges, the operational efficiency of a DDI may allow for a smaller structural footprint since fewer lanes are generally needed to accommodate the traffic demands. In some contexts, the DDI may allow for reduced right-of-way needs and construction costs compared to other interchange forms.

A DDI may be designed with the crossroad as either an underpass or overpass (see Figure 10-27), depending on site conditions. In some conditions it may be advantageous to use multiple structures at the grade separation, especially where the skew angle between facilities is significant. The spacing between ramp intersections is also a key consideration as this will impact signal design and operations on the crossroad corridor. Crossroads that are heavily skewed to the main facility typically need greater intersection spacing. On the other hand, very tight spacing between ramp intersections may constrain the design of the crossovers and limit queue storage and signal timing options.

– A – Underpass DDI
Source: Oregon DOT

– B – Overpass DDI
Source: Tennessee DOT



– C – DDI Diagram

Figure 10-27. Underpass and Overpass Diverging Diamond Interchanges

The proximity to a DDI of adjacent signalized intersections along the crossroad may impact the performance of the DDI at a given location. If an adjacent signal is too close and the queue storage length is inadequate, the traffic spillback may inhibit the movement of traffic along the crossroad, and potentially block traffic from the exit ramps. Modifications to adjacent signalized intersections along the crossroad may be necessary to maintain the overall signal progression along the corridor and reduce potential effects of queue spillback. Although this consideration is not unique to the DDI, the potential operational benefits of the DDI ramp intersections may be overshadowed by poor operational performance of nearby signals on the crossroad. Another operational consideration is that the DDI form does not accommodate typical "up and over" exit to entrance movements for oversized vehicles or authorized vehicles during maintenance or emergency situations.

Several key design elements of a DDI are interrelated, and the overall design should collectively consider the combinations of the related dimensions for application to specific sites. The appropriate choices for design elements such as design speed, reverse curve radii, lane widths, median widths, and other features will vary from one application to another.

Since the crossover area of a DDI tends to operate best at lower speeds, design speeds for crossover alignments should be in the range of 20 to 35 mph [30 to 60 km/h], resulting in crossover radii in the range of 100 to 500 ft [30 to 150 m] depending upon chosen cross slope (which is typically in the range of plus or minus 2 percent). Along higher speed crossroads, it is appropriate to lower speeds in advance of the DDI crossover area with advance warning signs and geometric features. The reverse curves at the crossovers should have an appropriate combination of radius and length, as geometry that is too abrupt can make it difficult, especially for large vehicles, to maintain a natural driving path in their own lane. Providing a tangent alignment between the crossover intersections assists drivers in maintaining the desired vehicle tracking and the curve-tangent-curve sequence promotes driving at the desired target speed. Using an alignment that provides approximately 50 to 100 ft [15 to 30 m] of tangent between sets of reversing curves through the crossover is recommended to provide positive guidance through the crossover intersections. The considerations for designing curvature radii at the exit and entrance ramp movements are similar to other interchange forms and include the turning path of the design vehicle, sight distance needs, pedestrian and bicycle crossing conditions, and intersection traffic control type.

In addition to selecting appropriate combinations of crossover radii for the reversing curves and the tangent length between them, the crossover angle is a design element that needs consideration of the trade-offs involved. The crossing angle is the acute angle between lanes of opposing traffic within the crossover based on the tangent sections or lines perpendicular to the radii at points of reverse curvature. The greater the crossover angle, the more the crossover will appear like a "normal" intersection of two different cross routes and decrease the likelihood of a driver making a wrong-way movement. However, greater crossing angles generally result in larger footprints and may be constrained in a DDI retrofit of an existing interchange. Also, larger crossing angles in combination with sharp reverse curves can increase the potential for overturning of vehicles with high centers of gravity and excessive driver discomfort through the crossovers. The recommended approach is to attain the largest crossing angle possible that is in balance with the other geometric parameters and site constraints. The crossover angle of a DDI is generally between 30 to 50 degrees. Crossover angles less than 30 degrees may increase the potential for wrong-way movements. Additional features, such as supplemental signs and pavement markings, should be used at a DDI to minimize the likelihood of a wrong-way movement.

Appropriate lane widths along the crossroad of a DDI typically range from 12 to 15 ft [3.6 to 4.6 m] depending on site location and consideration for design vehicles traveling side by side through the crossover area. Tapering to provide wider lane width typically occurs prior to and after the crossover curves. The additional lane width is typically not continued between the two crossovers. Shoulders may or may not be present along the crossroad leading to a DDI. As with other interchange forms, designs should reduce the potential for wrong-way maneuvers. For most interchange configurations the outside shoulder is typically used for emergency response. Due to the crossover design, the inside, as opposed to the outside shoulder should be wide enough for emergency vehicle accommodation. Marked bicycle lanes may be provided along the crossroad to the right side of traffic through a DDI. Bicycle movements through a DDI are similar to motor vehicle traffic in that they perform the same crossover movements as other vehicles. If bicycles are legally permitted to use the limited access facility, the turn movements to enter or exit the limited access facility may be served by the interchange ramps.

In some situations it is advantageous to add auxiliary lanes in advance of the crossover to reduce lane changing between ramps. Lanes added or dropped in the interchange area may take various forms. These can be lanes dedicated for left or right turns, shared through/left lanes, or exclusive through lanes. When lanes are added in advance of crossovers, together with overhead signs, it allows drivers to select appropriate lanes ahead of time, reducing lane changes and confusion through the middle of the interchange. When lanes are dropped within the interchange or beyond the outbound crossover, it should be done at a place that drivers can easily recognize; such as left turns onto the entrance ramp or a lane reduction beyond the crossover area.

Alternative methods for developing the directional alignments on the crossroad through a DDI exist. The considerations for determining which method is most suitable for a specific site include: the desire to minimize the cross-section under or over a bridge (common in retrofit situations); minimizing the distance between crossovers or matching existing ramp spacing on the crossroad (new and retrofit situations); minimizing the amount of reverse curvature and/or right-of-way at crossovers; and constructability issues. Methods that are typically used to develop the crossover include: symmetrical alignments using reversed curves, often used in retrofit situations; offset alignment, where one direction is held basically as-is and the other is deflected with appropriate combinations of curves; and shifted alignments, where both directional alignments move sideways – often to avoid a specific impact or facilitate staged construction.

Other design elements that should to be taken into consideration at DDIs include sight distance for both the crossover intersections and ramp terminals, signalization of certain ramp movements, and signing and pavement markings. Sight distance at DDIs is important for both vehicles maneuvering through the crossovers or turning left and right from the ramp terminals onto the cross street, especially when the turning ramp terminal traffic is under yield control. Typical DDI design includes a concrete median between the signalized crossovers that can be used for pedestrians, while raised islands are typically used in the ramp terminal areas. Sight distance for right turning vehicles from the ramp terminal should be reviewed so that oncoming cross over traffic and pedestrians in the median are adequately seen. Visual obstructions created by bridges, signal and illumination poles, signing, landscaping, and other potential objects should be considered when determining available cornering sight distance.

The DDI form offers excellent opportunities to integrate multimodal facilities into an interchange. It is possible to integrate pedestrian facilities along the outside of the crossroad through lanes and in the median between the signalized ramp terminals. Designing a DDI with a center walkway minimizes the overall number of conflict points, including accelerating conflicts, while providing full access of pedestrians to also cross the arterial street. With a center walkway, vehicular left turns to the entrance ramps can be made freely without conflict with pedestrian crossings. Lines of sight to and from the pedestrian crossings may also be improved by using a center walkway. Pedestrian facilities on the outside of the crossroad are also possible, but require pedestrians to cross both left and right turns from the ramp terminals. Regardless of the crossing strategy used, the channelization at a DDI for right- and left-turns to and from the crossroad presents an opportunity to utilize pedestrian-focused design choices through the use of appropriate curve radii and refuge areas for multi-stage pedestrian crossings.

A disadvantage of the DDI design is the inability to route oversized trucks or bus rapid transit from the exit ramp directly through the intersection and onto the entrance ramp. Consideration of oversize loads and bus transit stops is key when evaluating the DDI as an optional interchange form. The FHWA *Diverging Diamond Interchange Informational Guide* (*20*) provides additional information on diverging diamond interchanges.

10.9.3.6 Cloverleaf Interchanges

Cloverleafs are four-leg interchanges that employ loop ramps to accommodate left-turning movements. Interchanges with loops in all four quadrants are referred to as "full cloverleafs" and all others are referred to as "partial cloverleafs." A full cloverleaf may not be warranted at major–minor crossings where, with the provision of only two loops, freedom of movement for traffic on the major road can be maintained by confining the direct at-grade left turns to the minor road. The principal disadvantages of the cloverleaf are the additional travel distance for left-turning traffic, the weaving maneuver generated, the very short weaving length typically available, and the relatively large right-of-way areas needed. When collector–distributor roads are not used, further disadvantages include weaving on the main line, the double exit on the main line, and difficulties in placing signing for the second exit. Because cloverleafs are consid-

FDOT Central Office

Diverging Diamond Interchange Memorandum

Diverging Diamond Interchange/Double Crossover Intersection

Overview

The Diverging Diamond Interchange (DDI), is a recognized design concept to improve traffic flow and reduce congestion. The purpose of this design is to accommodate left-turning movements onto arterials and limited-access highways while eliminating the need for left-turn bays and signal phases at the signalized ramp terminals. Figure 1 shows the typical movements that are accommodated in a DDI. The highway is connected to the arterial cross street by two on-ramps and two off-ramps in a manner similar to a conventional diamond interchange. However, on the cross street, the traffic moves to the left side of the roadway between the ramp terminals. This allows the vehicles on the cross street that need to turn left onto the ramps to continue to the on-ramps without conflicting with the opposing through traffic.

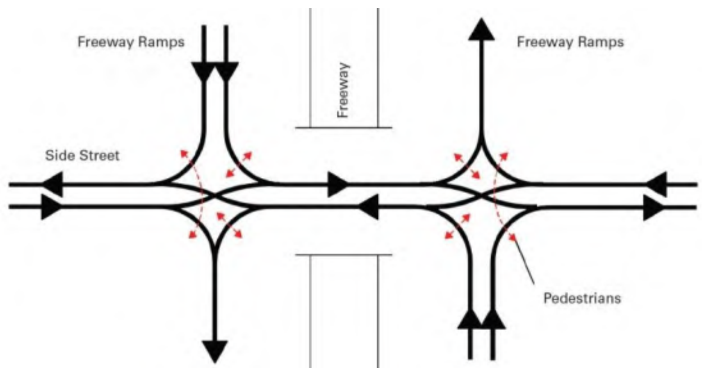


Figure 1 – Diverging Diamond Interchange Movements

The DDI design provides a safety benefit because it reduces the number of potential conflict points through the elimination of potential crossing conflicts between vehicles turning left onto the freeway and opposing arterial traffic. Although traffic signals are used to separate conflicts between vehicles, and other roadway design features, such as signs and markings, are intended to reduce the probability of driver errors that may result in crashes, safety performance generally is better when the number of conflict points is minimized.

Besides the potential safety benefits of the DDI, the design also offers operational and cost benefits over alternatives at grade-separated interchanges. In locations where the DDI has been implemented, construction costs are approximately half as much as a conventional diamond interchange retrofit because the additional turn lanes typically required during an interchange improvement would require widening the overpassing bridge. Furthermore, traffic modeling suggests that a DDI operates at a much higher level of service and capacity.

Design Criteria

Because of the relatively new design of the DDI and DCX, specific design criteria has not been completely developed. Driver expectation is compromised with the counterintuitive direction of travel between the ramp terminals, and it may be necessary to introduce a greater skew at the crossover junctions and the application of proper signs and markings to avoid wrong-way travel. Early application of this design indicates that the turning radii at the crossover junctions to displace the movements should be approximately 300 feet. These suggested radii must be examined during geometric analyses to ensure the accommodation of the design vehicle.

Specifications:

There are no specifications devoted to the DDI or DCX. Standard specifications that apply to roadway construction are sufficient to govern these designs.

Implementation Plan:

There are eight DDIs under consideration in the State of Florida at time of this publication. The interchange of Interstate 75 at University Parkway in Sarasota County is currently under design as part of the I-75 corridor widening project. A video presentation produced by FDOT demonstrates the operation of that DDI. Seven more are being considered in preliminary engineering studies.

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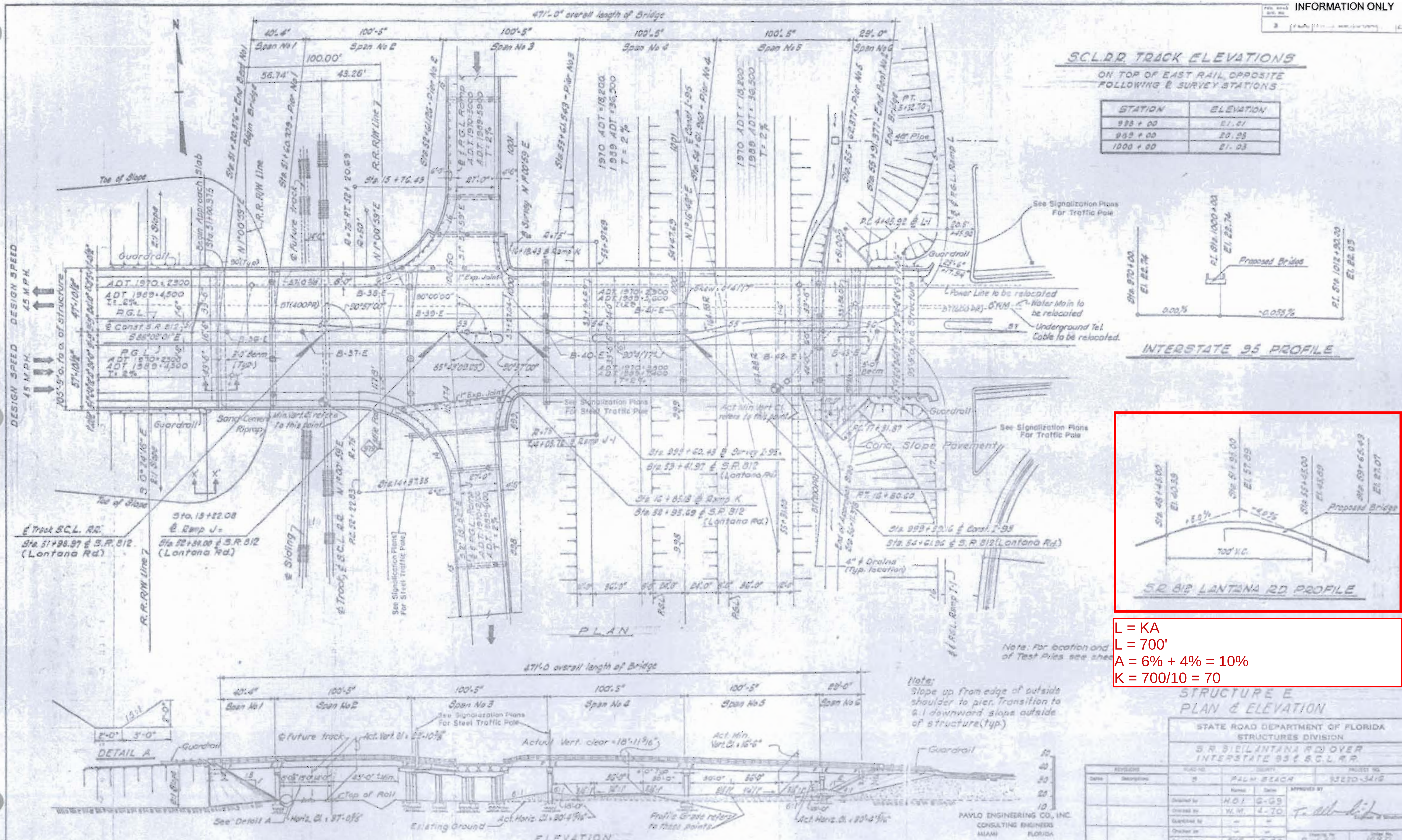
Roadway Design Engineer
Phone: 850-414-4792
Email: david.amato@dot.state.fl.us

ATTACHMENT C

Existing Plans

SHEET NO. BX1-8
FPID 429198-1-52-01
EXISTING PLANS FOR
INFORMATION ONLY



L = KA
L = 700'
A = 6% + 4% = 10%
K = 700/10 = 70

Table 210.10.3 K Values for Vertical Curves

	Minimum K Values For Curves									
	Design Speed (mph)									
	25	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
Sag	26	37	49	64	79	96	115	136	157	181
Crest (new const.)	19	31	47	70	98	136	185	245	313	401
Crest (RRR Criteria)	12	19	29	44	61	84	114	151	193	247

Notes:

Length, L = KA

Where: K = Rate of vertical curvature

L = Length of vertical curve, (feet)

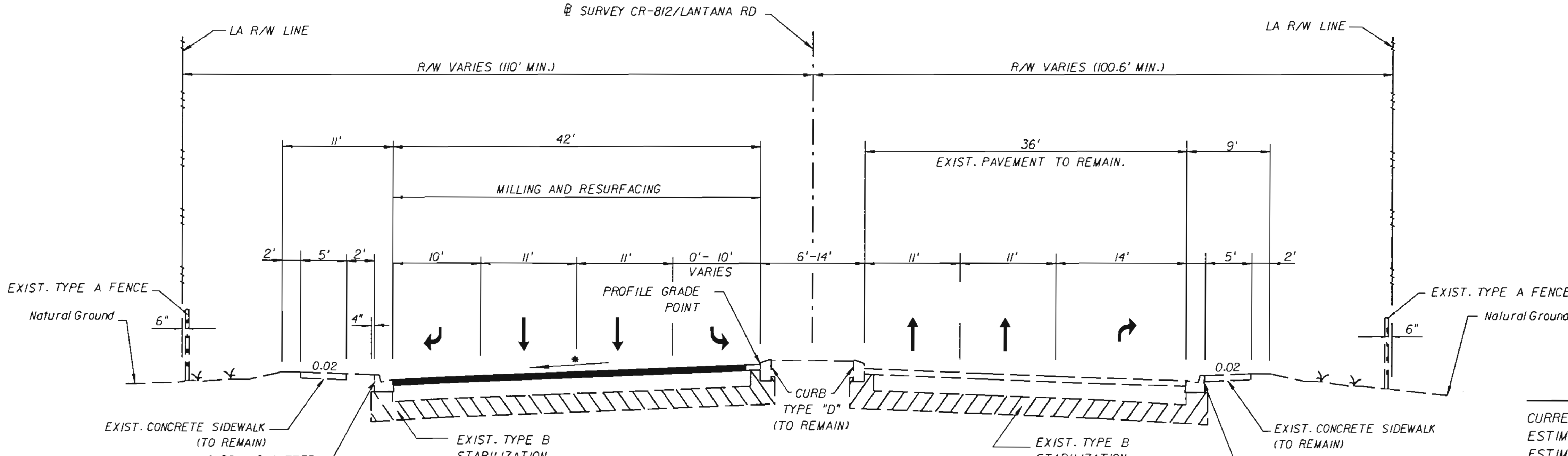
A = Algebraic difference in grades, (percent)

(1) New Construction K values are based on an eye height of 3.5 feet and an object height of 6 inches. RRR Criteria K values are based on an eye height of 3.5 feet and an object height of 2 feet.

(2) The minimum curve length must not be less than values shown in ***Table 210.10.4***.

Table 210.10.4 Minimum Vertical Curve Lengths

	Minimum Curve Length (feet)									
	Design Speed (mph)									
	25	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
Sag	75	90	105	120	135	200	250	300	350	400
Crest						300	350	400	450	500



TYPICAL SECTION (SUNSET RD TO BRIDGE)

CR 812 (LANTANA RD)

STA. 42+11.12 TO STA. 51+20.27

DESIGN SPEED 45 MPH

N.T.S

TRAFFIC DATA

CURRENT YEAR = 2010 AADT = 40,000
ESTIMATED OPENING YEAR = 2014 AADT = 41,600
ESTIMATED DESIGN YEAR = 2034 AADT = 49,800
K = 9% D = 61.3% T = 5.5% (24 HOUR)
DESIGN SPEED = 45 MPH

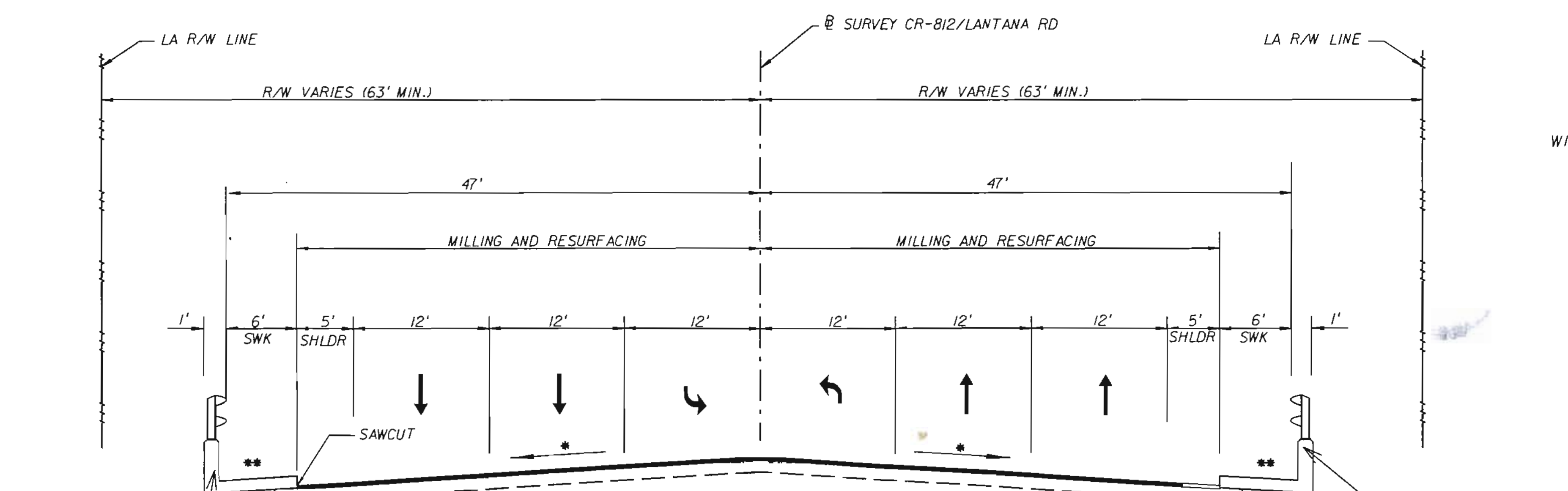
MILLING AND RESURFACING

MILL EXISTING 1/2" (AVERAGE) OVERLAY
MILL 2" OF EXISTING PAVEMENT AND RESURFACE
WITH TYPE SP STRUCTURAL COURSE (TRAFFIC C)(1")
AND FRICTION COURSE FC-9.5 (RUBBER)(TRAFFIC C)(1")

MILLING AND RESURFACING
LANTANA BRIDGE

MILL 2" OF EXISTING PAVEMENT AND RESURFACE
WITH FRICTION COURSE FC-9.5 (RUBBER)(TRAFFIC C)(1")

* MATCH EXISTING SLOPE
** SEE STRUCTURE PLANS FOR DETAILS



BRIDGE 930276 TYPICAL SECTION WITH TURN LANES

CR 812 (LANTANA RD)

STA. 51+20.15 TO STA. 55+91.13

DESIGN SPEED 45 MPH

N.T.S

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
BETSY JEFFERS, P.E.
P.E. LICENSE NUMBER 50745
FDOT DISTRICT IV
3400 WEST COMMERCIAL BLVD
FT. LAUDERDALE, FL 33309

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	PALM BEACH	429198-1-52-01

TYPICAL SECTIONS

SHEET NO. 5

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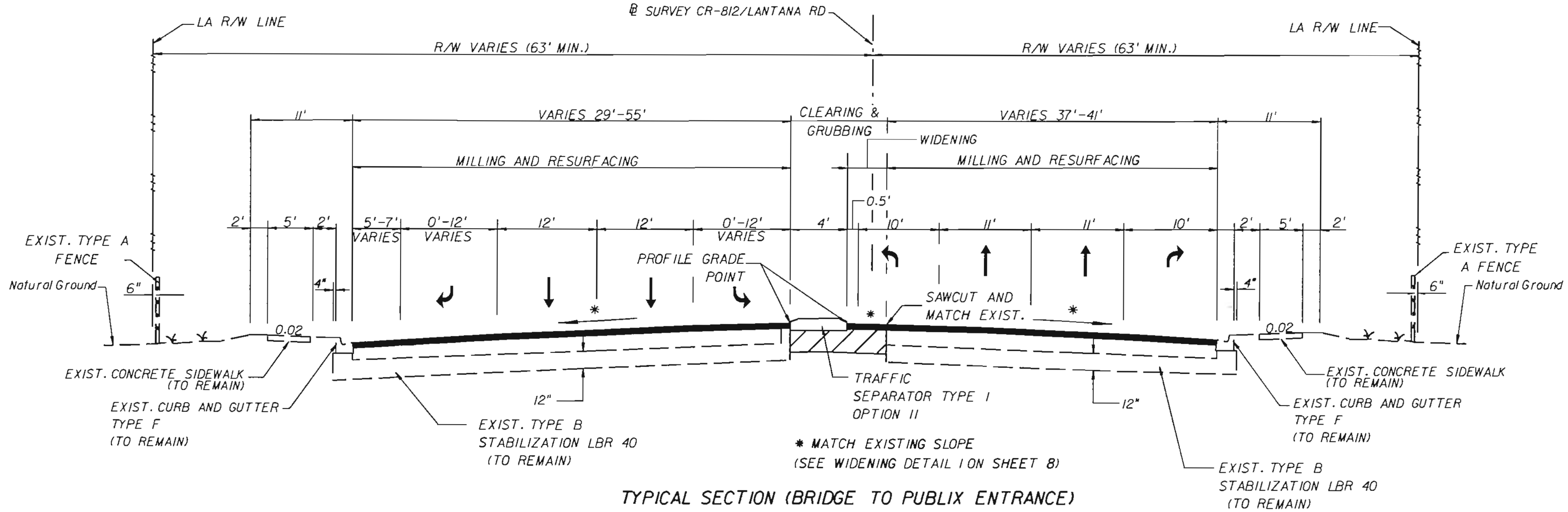
NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.



TYPICAL SECTION (BRIDGE TO PUBLIX ENTRANCE)

CR 812 (LANTANA RD)

STA. 55+91.13 TO STA. 62+96.61

DESIGN SPEED 45 MPH

N.T.S

TRAFFIC DATA

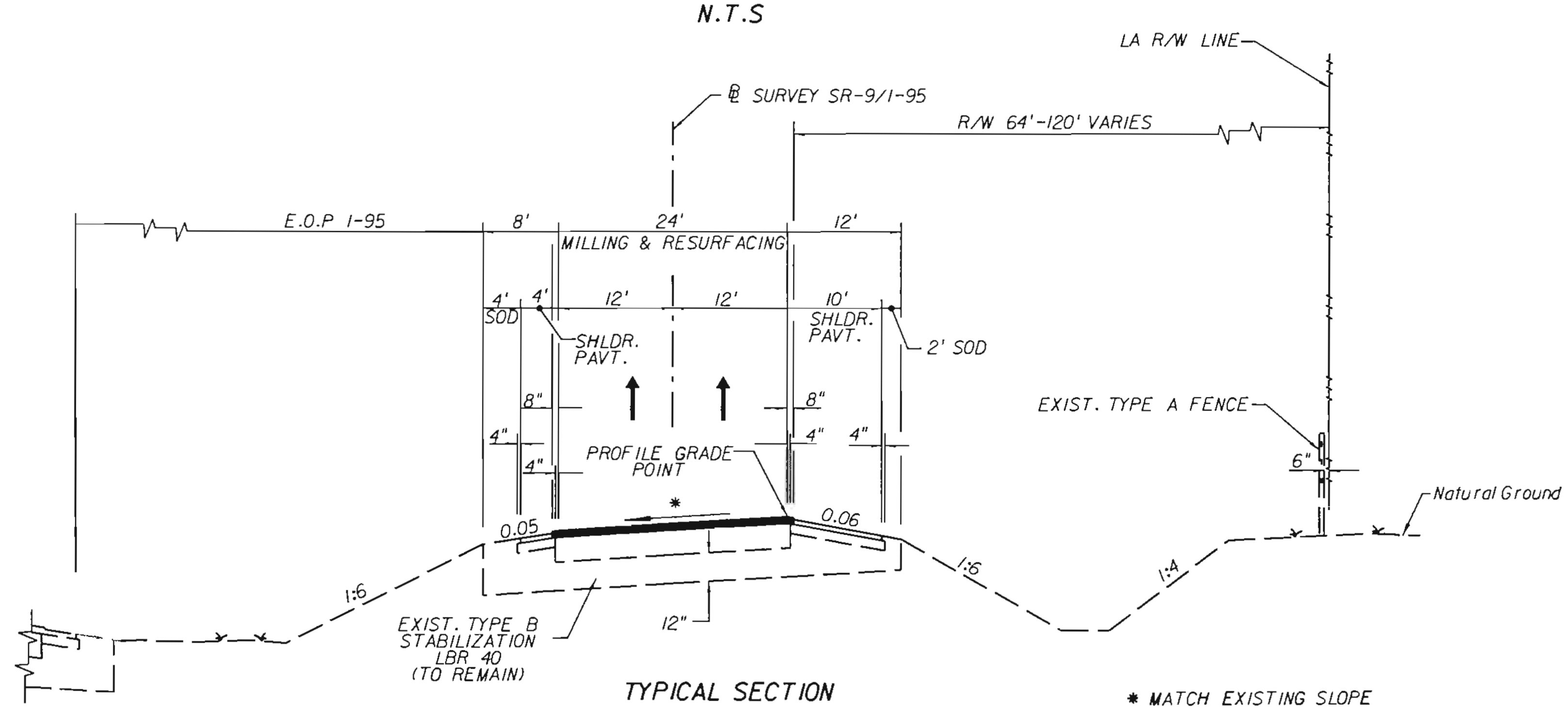
CURRENT YEAR = 2010 AADT = 40,000
ESTIMATED OPENING YEAR = 2014 AADT = 41,600
ESTIMATED DESIGN YEAR = 2034 AADT = 49,800
K = 9% D = 61.3% T = 5.5% (24 HOUR)
DESIGN SPEED = 45 MPH

MILLING AND RESURFACING

MILL 2" OF EXISTING PAVEMENT AND RESURFACE WITH TYPE SP STRUCTURAL COURSE (TRAFFIC C)(1") AND FRICTION COURSE FC-9.5 (RUBBER)(TRAFFIC C)(1")

RECONSTRUCTION/ WIDENING

OPTIONAL BASE GROUP 15 (TYPE B-12.5 ONLY) WITH TYPE SP STRUCTURAL COURSE (TRAFFIC C)(2") AND FRICTION COURSE FC-9.5 (RUBBER)(TRAFFIC C)(1")



TYPICAL SECTION

SR-9 (I-95) NB ON RAMP

STA. 999+96.95 TO STA. 1009+73.75

DESIGN SPEED 35 MPH

N.T.S

* MATCH EXISTING SLOPE

TRAFFIC DATA

CURRENT YEAR = 2010 AADT = 40,000
ESTIMATED OPENING YEAR = 2014 AADT = 41,600
ESTIMATED DESIGN YEAR = 2034 AADT= 49,800
K = 9% D = 61.3% T = 5.5% (24 HOUR)
DESIGN SPEED = 35 MPH

MILLING AND RESURFACING

MILL 0.75" OF EXISTING PAVEMENT AND RESURFACE WITH FRICTION COURSE FC-5 (RUBBER)(TRAFFIC C)(3/4")

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
BETSY JEFFERS, P.E.
P.E. LICENSE NUMBER 50745
FDOT DISTRICT IV
3400 WEST COMMERCIAL BLVD
FT. LAUDERDALE, FL 33309

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	PALM BEACH	429198-1-52-01

TYPICAL SECTIONS

SHEET NO. 6

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ATTACHMENT D

FHWA Field Evaluation at DDIs

Saturation Flow Rate

The unique geometric configuration of the crossover has been linked to reductions in saturation flow rate. FHWA's Saxton Lab is currently developing a saturation flow prediction equation for DDI movements.

Speed Profiles

Free-flow speeds are limited by the geometrics of the DDI. Field studies at DDIs across the U.S. have shown that free-flow speeds through and between the crossovers are lower than the posted speed limit even without interaction effects of other traffic. Free-flow speeds for the left-turn and right-turn movements are also limited by geometry.

Free-flow speeds impact the capacity of traffic movements. Speed-limiting geometry may be unexpected to drivers, and a transition zone in advance of a crossover (e.g. through the introduction of a reverse curve upstream of the crossover) may be beneficial. This is discussed further in Chapter 7.

Free-flow speeds also directly impact the safety and comfort of pedestrian and bicycle movements at DDIs. For bicyclists in a shared lane or striped bicycle lane, faster speeds have been linked to a reduced quality of service for cyclists and further cause safety concerns. Faster speeds have also been correlated with a decreased propensity of drivers to yield to pedestrians at unsignalized crossings, as well as a greater chance of serious of injury or death in the event of a pedestrian-vehicle collision. As such, slow speeds through the interchange can greatly benefit non-motorized users of the facility.

Field free-flow speeds at seven DDIs are summarized in Exhibit 5-8.

Exhibit 5-8. Field-measured speed parameters for DDI sites.[(14)]

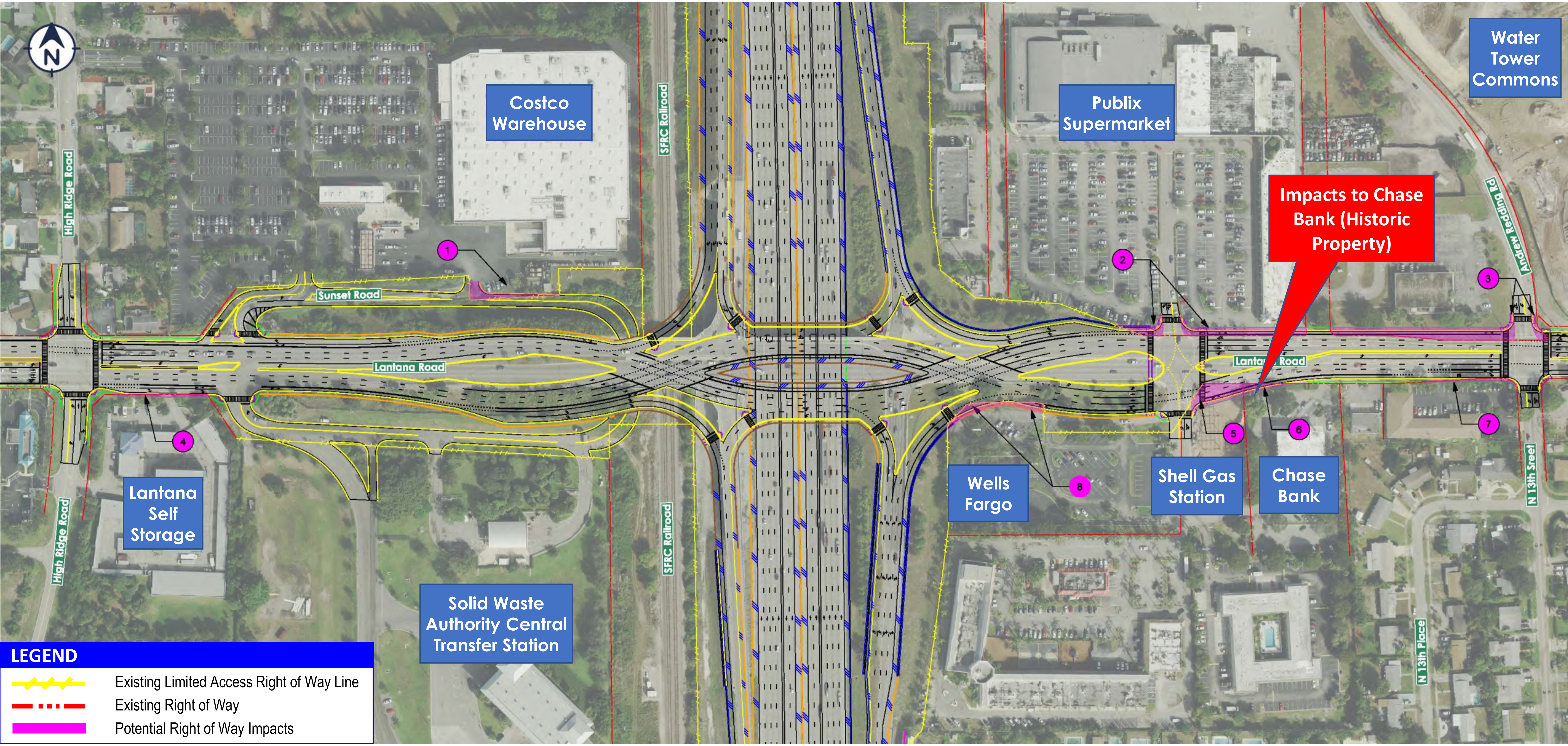
Interchange	Speed Limit (mph)	Crossover Speed (mph)		Turn Speed for Lefts from Freeway (mph)		Speed Between Crossovers (mph)	
		Avg.	StdDev.	Avg.	StdDev.	Avg.	StdDev.
MO 13, Springfield, MO	40	24.0	3.5	15.0	2.5	25.0	3.5
National Ave, Springfield, MO	40	25.0	3.0	21.0	2.9	29.0	4.0
Bessemer St, Alcoa, TN	35	26.0	2.5	15.5	3.0	32.0	4.0
Dorsett Rd, Maryland H., MO	30	26.0	3.0	23.5	3.0	31.0	4.0
Harrodsburg Rd, Lexington, KY	45	26.2	3.2	22.8	2.8	29.7	3.5
Front St, Kanas City, MO	35	24.1	3.1	20.0	3.2	26.8	3.1
Winton Rd, Rochester, NY	45	28.9	3.7	18.6	2.3	31.1	3.5

Exhibit 5-8 suggests the crossover speeds are a fairly consistently in the 24 to 26 mph range independent of the speed limit. Similarly, the speed on or beneath a bridge between the crossovers appears to range from about 25 to 31 mph. Consequently, the geometric design of the DDI appears to control free-flow vehicle speeds more than the posted speed limit. This may reduce lane capacity but also offers traffic calming benefits.

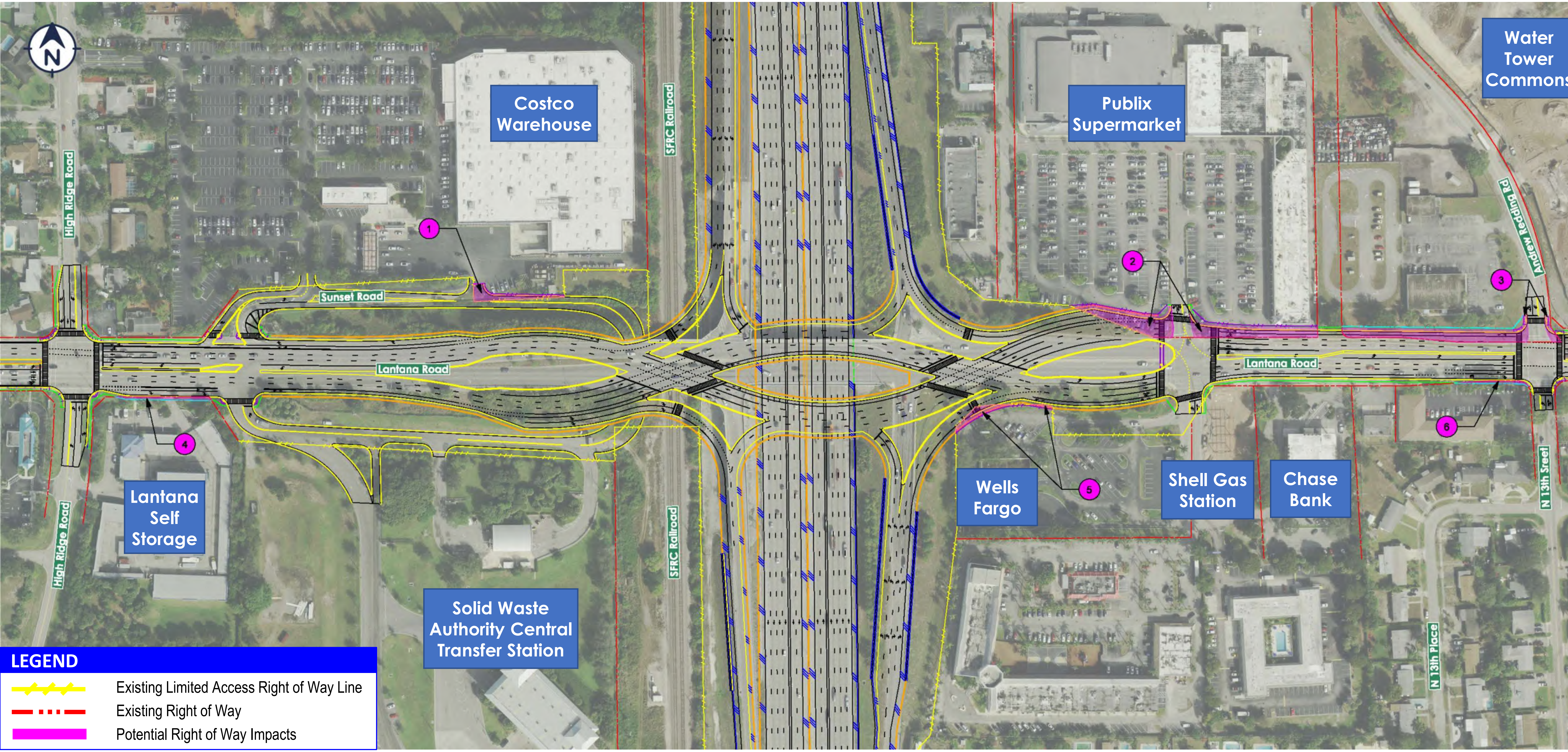
ATTACHMENT E

Right of Way Impacts

Right of Way Impacts – 40 mph



Right of Way Impacts – 35 mph



APPENDIX I

(LRE for Preferred Alternative)

Date: 5/6/2020 7:05:34 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 413258-1-52-01 **Letting Date:** 07/2024

Description: SR-9/I-95 @ LANTANA ROAD

District: 04	**County:** 93 PALM BEACH	**Market Area:** 12	**Units:** English
Contract Class: 1	**Lump Sum Project:** N	**Design/Build:** N	**Project Length:** 0.010 MI

Project Manager: NAGOLE

Version 13 Project Grand Total **$32,733,828.15**

Description: RECONFIGURE THE EXISTING INTERCHANGE INTO A DDI CONFIGURATION, REPLACE EXISTING BRIDGE OVER I-95 AND SFRC, WIDEN THE I-95 NB AND SB EXIT RAMPS, AND WIDEN LANTANA RD FR 4 TO 6 LANES BETWEEN HIGH RIDGE RD AND ANDREW REDDING RD

Sequence: 1 NDU - New Construction, Divided, Urban **Net Length:** 0.814 MI 4,300 LF

Description: LANTANA ROAD RECONSTRUCTION

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	40.00 / 40.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.814
Top of Structural Course For Begin Section	103.00
Top of Structural Course For End Section	103.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	2 to 1 / 2 to 1
Median Shoulder Cross Slope L/R	4.00 % / 4.00 %
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	7.89 AC	$25,215.44	$198,949.82
120-6	EMBANKMENT	63,746.11 CY	$25.72	$1,639,549.95
	Earthwork Component Total			$1,838,499.77

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	6
Roadway Pavement Width L/R	40.00 / 40.00
Structural Spread Rate	275
Friction Course Spread Rate	165

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	43,153.21 SY	$9.11	$393,125.74
285-709	OPTIONAL BASE,BASE GROUP 09	38,222.51 SY	$22.98	$878,353.28
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	5,255.59 TN	$169.38	$890,191.83
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	3,153.36 TN	$131.08	$413,342.43

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
999-20-1	DISPUTES REVIEW BD, MEETING-DO NOT BID	36.00 DA	$3,300.00	$118,800.00
999-20-2	DISPUTES REVIEW BD, HEARING-DO NOT BID	2.00 EA	$4,000.00	$8,000.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	4

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
706-1-1	RAISED PAVMT MARK, TYPE B W/O FINAL SURF	550.00 EA	$4.18	$2,299.00
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	6.52 GM	$972.53	$6,340.90
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	6.52 GM	$377.64	$2,462.21

Peripherals Subcomponent

Description	Value
Off Road Bike Path(s)	0
Off Road Bike Path Width L/R	0.00 / 0.00
Bike Path Structural Spread Rate	0
Noise Barrier Wall Length	0.00
Noise Barrier Wall Begin Height	0.00
Noise Barrier Wall End Height	0.00

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
339-1	MISCELLANEOUS ASPHALT PAVEMENT	52.67 TN	$270.66	$14,255.66
536-1-1	GUARDRAIL- ROADWAY, GEN TL-3	1,500.00 LF	$20.45	$30,675.00
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	8.00 EA	$2,982.78	$23,862.24
	Roadway Component Total			$2,781,708.29

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	13.25 / 13.25
Total Outside Shoulder Perf. Turf Width L/R	5.00 / 5.00
Sidewalk Width L/R	6.00 / 6.00

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
520-1-10	CONCRETE CURB & GUTTER, TYPE F	4,300.03 LF	$26.16	$112,488.78
520-1-10	CONCRETE CURB & GUTTER, TYPE F	4,300.03 LF	$26.16	$112,488.78
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	5,733.38 SY	$43.66	$250,319.37
570-1-1	PERFORMANCE TURF	4,777.81 SY	$1.20	$5,733.37

Erosion Control

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	8,600.06 LF	$1.69	$14,534.10
104-11	FLOATING TURBIDITY BARRIER	203.60 LF	$13.61	$2,771.00
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	203.60 LF	$4.20	$855.12
104-15	SOIL TRACKING PREVENTION DEVICE	1.00 EA	$3,166.81	$3,166.81
104-18	INLET PROTECTION SYSTEM	42.00 EA	$104.21	$4,376.82
107-1	LITTER REMOVAL	20.73 AC	$28.84	$597.85
107-2	MOWING	20.73 AC	$48.49	$1,005.20
	Shoulder Component Total			$508,337.20

MEDIAN COMPONENT

User Input Data

Description	Value
Total Median Width	50.00
Performance Turf Width	50.00

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
520-1-7	CONCRETE CURB & GUTTER, TYPE E	8,600.06 LF	$20.14	$173,205.21
520-5-11	TRAF SEP CONC-TYPE I, 4' WIDE	1,825.00 LF	$37.17	$67,835.25
570-1-2	PERFORMANCE TURF, SOD	23,889.07 SY	$3.47	$82,895.07
	Median Component Total			$323,935.53

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	14.66 CY	$1,858.71	$27,248.69

425-1-351	INLETS, CURB, TYPE P-5, <10'	30.00	EA	$5,427.82	$162,834.60
425-1-451	INLETS, CURB, TYPE J-5, <10'	9.00	EA	$7,111.79	$64,006.11
425-1-521	INLETS, DT BOT, TYPE C, <10'	5.00	EA	$3,249.37	$16,246.85
425-2-41	MANHOLES, P-7, <10'	5.00	EA	$4,244.43	$21,222.15
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	2,160.00	LF	$110.41	$238,485.60
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	200.00	LF	$190.15	$38,030.00
430-175-148	PIPE CULV, OPT MATL, ROUND, 48"S/CD	3,504.00	LF	$620.06	$2,172,690.24
570-1-1	PERFORMANCE TURF	247.58	SY	$1.20	$297.10
	Drainage Component Total				$2,741,061.34

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	20.00	AS	$400.79	$8,015.80
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	2.00	AS	$1,324.47	$2,648.94
700-2-15	MULTI- POST SIGN, F&I GM, 51-100 SF	2.00	AS	$6,249.20	$12,498.40
700-2-16	MULTI- POST SIGN, F&I GM, 101-200 SF	2.00	AS	$10,419.23	$20,838.46
	Signing Component Total				$44,001.60

SIGNALIZATIONS COMPONENT

Signalization 1

Description	Value
Type	6 Lane Mast Arm
Multiplier	1
Description	High Ridge Road

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	700.00	LF	$8.50	$5,950.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	300.00	LF	$23.58	$7,074.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00	PI	$5,337.81	$5,337.81
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	22.00	EA	$677.58	$14,906.76
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00	AS	$2,608.78	$2,608.78
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00	LF	$5.08	$304.80
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00	EA	$1,085.17	$1,085.17
646-1-11	ALUMINUM SIGNALS POLE, PEDESTAL	8.00	EA	$1,245.94	$9,967.52
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00	EA	$40,287.14	$161,148.56
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	14.00	AS	$1,004.46	$14,062.44

653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00 AS	$648.54	$5,188.32
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00 EA	$189.99	$1,519.92
670-5-111	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT	1.00 AS	$27,728.69	$27,728.69
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00 EA	$234.97	$939.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	2.00 EA	$2,753.12	$5,506.24

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	4.00 EA	$7,665.15	$30,660.60
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00 EA	$3,208.14	$12,832.56

Signalization 2

Description	Value
Type	6 Lane Mast Arm
Multiplier	1
Description	I-95 SB Ramp Terminal

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	700.00 LF	$8.50	$5,950.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	300.00 LF	$23.58	$7,074.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00 PI	$5,337.81	$5,337.81
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	22.00 EA	$677.58	$14,906.76
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00 AS	$2,608.78	$2,608.78
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00 LF	$5.08	$304.80
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00 EA	$1,085.17	$1,085.17
646-1-11	ALUMINUM SIGNALS POLE, PEDESTAL	8.00 EA	$1,245.94	$9,967.52
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00 EA	$40,287.14	$161,148.56
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	14.00 AS	$1,004.46	$14,062.44
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00 AS	$648.54	$5,188.32
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00 EA	$189.99	$1,519.92
670-5-111	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT	1.00 AS	$27,728.69	$27,728.69
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00 EA	$234.97	$939.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	2.00 EA	$2,753.12	$5,506.24

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	4.00 EA	$7,665.15	$30,660.60
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00 EA	$3,208.14	$12,832.56

Signalization 3

Description	Value
Type	6 Lane Mast Arm
Multiplier	1
Description	I-95 NB Ramp Terminal

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	700.00 LF	$8.50	$5,950.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	300.00 LF	$23.58	$7,074.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00 PI	$5,337.81	$5,337.81
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	22.00 EA	$677.58	$14,906.76
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00 AS	$2,608.78	$2,608.78
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00 LF	$5.08	$304.80
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00 EA	$1,085.17	$1,085.17
646-1-11	ALUMINUM SIGNALS POLE, PEDESTAL	8.00 EA	$1,245.94	$9,967.52
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00 EA	$40,287.14	$161,148.56
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	14.00 AS	$1,004.46	$14,062.44
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00 AS	$648.54	$5,188.32
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00 EA	$189.99	$1,519.92
670-5-111	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT	1.00 AS	$27,728.69	$27,728.69
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00 EA	$234.97	$939.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	2.00 EA	$2,753.12	$5,506.24

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	4.00 EA	$7,665.15	$30,660.60
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00 EA	$3,208.14	$12,832.56

Signalization 4

Description	Value
Type	6 Lane Mast Arm
Multiplier	1
Description	Shopping Center Drive

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	700.00 LF	$8.50	$5,950.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	300.00 LF	$23.58	$7,074.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00 PI	$5,337.81	$5,337.81
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	22.00 EA	$677.58	$14,906.76
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00 AS	$2,608.78	$2,608.78
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00 LF	$5.08	$304.80
641-2-11	PREST CNC POLE,F&I,TYP P-II,PEDESTAL	1.00 EA	$1,085.17	$1,085.17
646-1-11	ALUMINUM SIGNALS POLE, PEDESTAL	8.00 EA	$1,245.94	$9,967.52
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00 EA	$40,287.14	$161,148.56
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	14.00 AS	$1,004.46	$14,062.44
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00 AS	$648.54	$5,188.32
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00 EA	$189.99	$1,519.92
670-5-111	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT	1.00 AS	$27,728.69	$27,728.69
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00 EA	$234.97	$939.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	2.00 EA	$2,753.12	$5,506.24

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	4.00 EA	$7,665.15	$30,660.60
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00 EA	$3,208.14	$12,832.56

Signalization 5

Description	Value
Type	6 Lane Mast Arm
Multiplier	1
Description	Andrew Redding Road

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	700.00 LF	$8.50	$5,950.00
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	300.00 LF	$23.58	$7,074.00
632-7-1	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL	1.00 PI	$5,337.81	$5,337.81
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	22.00 EA	$677.58	$14,906.76
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	1.00 AS	$2,608.78	$2,608.78
639-2-1	ELECTRICAL SERVICE WIRE, F&I	60.00 LF	$5.08	$304.80
641-2-11		1.00 EA	$1,085.17	$1,085.17

	PREST CNC POLE,F&I,TYP P-II,PEDESTAL			
646-1-11	ALUMINUM SIGNALS POLE, PEDESTAL	4.00 EA	$1,245.94	$4,983.76
649-21-10	STEEL MAST ARM ASSEMBLY, F&I, 60'	4.00 EA	$40,287.14	$161,148.56
650-1-14	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W	14.00 AS	$1,004.46	$14,062.44
653-1-11	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY	8.00 AS	$648.54	$5,188.32
665-1-11	PEDESTRIAN DETECTOR, F&I, STANDARD	8.00 EA	$189.99	$1,519.92
670-5-111	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT	1.00 AS	$27,728.69	$27,728.69
700-3-101	SIGN PANEL, F&I GM, UP TO 12 SF	4.00 EA	$234.97	$939.88
700-5-21	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF	2.00 EA	$2,753.12	$5,506.24

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
660-4-11	VEHICLE DETECTION SYSTEM-VIDEO, CABINET	4.00 EA	$7,665.15	$30,660.60
660-4-12	VEHICLE DETECTION SYSTEM-VIDEO, ABOVE G	4.00 EA	$3,208.14	$12,832.56

Signalizations Component Total $1,529,126.49

LIGHTING COMPONENT

Conventional Lighting Subcomponent

Description	Value
Spacing	MIN

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	4,300.03	LF	$8.50	$36,550.25
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	853.49	LF	$23.58	$20,125.29
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	29.00	EA	$677.58	$19,649.82
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	15,704.89	LF	$2.14	$33,608.46
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	29.00	EA	$5,357.24	$155,359.96
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	29.00	EA	$602.20	$17,463.80
	Subcomponent Total				$282,757.59

Lighting Component Total $282,757.59

BRIDGES COMPONENT

Bridge 01

Description	Value
Estimate Type	SF Estimate
Primary Estimate	YES

Length (LF)	210.00
Width (LF)	225.00
Type	Overpass Bridge
Cost Factor	1.25
Structure No.	930276
Removal of Existing Structures area	15,765.00
Default Cost per SF	$75.00
Factored Cost per SF	$93.75
Final Cost per SF	**$100.96**
Basic Bridge Cost	**$4,429,687.50**
Description	LANTANA ROAD OVER SFRC/CSX RAILROAD

Bridge Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	15,765.00 SF	$44.24	$697,443.60
400-2-10	CONC CLASS II, APPROACH SLABS	500.00 CY	$496.01	$248,005.00
415-1-9	REINF STEEL- APPROACH SLABS	87,500.00 LB	$1.06	$92,750.00
	Bridge 01 Total			$5,467,886.10

Bridge 02

Description	**Value**
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	230.00
Width (LF)	85.00
Type	Overpass Bridge
Cost Factor	1.25
Structure No.	930275
Removal of Existing Structures area	35,115.42
Default Cost per SF	$75.00
Factored Cost per SF	$93.75
Final Cost per SF	**$100.33**
Basic Bridge Cost	**$1,832,812.50**
Description	EB LANTANA ROAD OVER SR 9/I-95 INCLUDING REMOVAL OF SB ON-RAMP BRIDGE

Bridge Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	35,115.42 SF	$44.24	$1,553,506.18
400-2-10	CONC CLASS II, APPROACH SLABS	188.89 CY	$496.01	$93,691.33
415-1-9	REINF STEEL- APPROACH SLABS	33,055.75 LB	$1.06	$35,039.10
	Bridge 02 Total			$3,515,049.11

Bridge 03

Description	**Value**
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	230.00
Width (LF)	85.00

Type	Overpass Bridge
Cost Factor	1.25
Structure No.	930274
Removal of Existing Structures area	28,529.00
Default Cost per SF	$75.00
Factored Cost per SF	$93.75
Final Cost per SF	**$100.33**
Basic Bridge Cost	**$1,832,812.50**
Description	WB LANTANA ROAD OVER SR 9/I-95 INCLUDING REMOVAL OF SB OFF-RAMP BRIDGE

Bridge Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	28,529.00 SF	$44.24	$1,262,122.96
400-2-10	CONC CLASS II, APPROACH SLABS	188.89 CY	$496.01	$93,691.33
415-1-9	REINF STEEL- APPROACH SLABS	33,055.75 LB	$1.06	$35,039.10
	Bridge 03 Total			$3,223,665.89
	Bridges Component Total			$12,206,601.10

RETAINING WALLS COMPONENT

Retaining Wall 1

Description	Value
Length	100.00
Begin height	15.00
End Height	15.00
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	1,500.00 SF	$26.74	$40,110.00

Retaining Wall 2

Description	Value
Length	165.00
Begin height	25.00
End Height	25.00
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	4,125.00 SF	$26.74	$110,302.50

Retaining Wall 3

Description	Value
Length	235.00
Begin height	25.00
End Height	25.00

Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	5,875.00 SF	$26.74	$157,097.50

Retaining Wall 4

Description	Value
Length	235.00
Begin height	25.00
End Height	25.00
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	5,875.00 SF	$26.74	$157,097.50

Retaining Wall 5

Description	Value
Length	86.00
Begin height	17.00
End Height	17.00
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	1,462.00 SF	$26.74	$39,093.88

Retaining Wall 6

Description	Value
Length	86.00
Begin height	17.00
End Height	17.00
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	1,462.00 SF	$26.74	$39,093.88

Retaining Walls Component Total $542,795.26

Sequence 1 Total $22,798,824.17

Sequence: 2 WUR - Widen/Resurface, Undivided, Rural **Net Length:** 0.187 MI
985 LF

Description: SB ON-RAMP WIDENING

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	0.00 / 12.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.190
Top of Structural Course For Begin Section	102.00
Top of Structural Course For End Section	102.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Existing Front Slope L/R	2 to 1 / 2 to 1
Existing Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Front Slope L/R	2 to 1 / 2 to 1
Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.27 AC	$25,215.44	$6,808.17

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	10,500.00 CY	$25.72	$270,060.00
	Earthwork Component Total			$276,868.17

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	12
Existing Roadway Pavement Width L/R	12.00 / 12.00
Structural Spread Rate	165
Friction Course Spread Rate	80
Widened Outside Pavement Width L/R	0.00 / 12.00
Widened Structural Spread Rate	275
Widened Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	3,722.05 SY	$9.11	$33,907.88
285-709	OPTIONAL BASE,BASE GROUP 09	1,349.79 SY	$22.98	$31,018.17
327-70-5	MILLING EXIST ASPH PAVT, 2" AVG DEPTH	2,627.33 SY	$3.00	$7,881.99
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	216.75 TN	$169.38	$36,713.12
334-1-13		180.63 TN	$169.38	$30,595.11

	SUPERPAVE ASPHALTIC CONC, TRAFFIC C			
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	105.09 TN	$131.08	$13,775.20
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	52.55 TN	$131.08	$6,888.25

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
536-73	GUARDRAIL REMOVAL	85.00 LF	$3.00	$255.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	11

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	327.00 EA	$4.50	$1,471.50
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.75 NM	$975.00	$731.25
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	4.11 GM	$377.64	$1,552.10
	Roadway Component Total			$164,789.57

SHOULDER COMPONENT

User Input Data

Description	Value
Existing Total Outside Shoulder Width L/R	8.00 / 12.00
New Total Outside Shoulder Width L/R	10.00 / 12.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Existing Paved Outside Shoulder Width L/R	4.00 / 10.00
New Paved Outside Shoulder Width L/R	6.00 / 10.00
Structural Spread Rate	110
Friction Course Spread Rate	0
Total Width (T) / 8" Overlap (O)	T
Rumble Strips ï¿½No. of Sides	2

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
285-704	OPTIONAL BASE,BASE GROUP 04	1,823.80 SY	$15.00	$27,357.00
327-70-1	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	1,532.61 SY	$3.80	$5,823.92
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	96.34 TN	$169.38	$16,318.07

546-72-1	GROUND-IN RUMBLE STRIPS, 16"	0.37 GM	$1,945.00	$719.65

Erosion Control

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	2,266.07 LF	$1.69	$3,829.66
104-11	FLOATING TURBIDITY BARRIER	18.66 LF	$13.61	$253.96
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	18.66 LF	$4.20	$78.37
104-15	SOIL TRACKING PREVENTION DEVICE	1.00 EA	$3,166.81	$3,166.81
104-18	INLET PROTECTION SYSTEM	1.00 EA	$104.21	$104.21
107-1	LITTER REMOVAL	0.45 AC	$28.84	$12.98
107-2	MOWING	0.45 AC	$48.49	$21.82
	Shoulder Component Total			$57,686.45

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	3.36 CY	$1,858.71	$6,245.27
430-174-124	PIPE CULV, OPT MATL, ROUND,24"SD	32.00 LF	$463.20	$14,822.40
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	16.00 LF	$190.15	$3,042.40
430-984-129	MITERED END SECT, OPTIONAL RD, 24" SD	2.00 EA	$1,944.00	$3,888.00
570-1-1	PERFORMANCE TURF	75.39 SY	$1.20	$90.47
	Drainage Component Total			$28,088.54

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	1.00 AS	$400.79	$400.79
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	4.00 AS	$1,324.47	$5,297.88
700-1-50	SINGLE POST SIGN, RELOCATE	1.00 AS	$295.30	$295.30
700-1-60	SINGLE POST SIGN, REMOVE	4.00 AS	$28.58	$114.32
700-2-13	MULTI- POST SIGN, F&I GM, 21-30 SF	1.00 AS	$4,287.16	$4,287.16
700-2-60	MULTI- POST SIGN, REMOVE	1.00 AS	$847.31	$847.31
	Signing Component Total			$11,242.76

LIGHTING COMPONENT

Rural Lighting Subcomponent

Description	Value
Multiplier (Number of Poles)	6

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	1,200.00	LF	$8.50	$10,200.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	6.00	EA	$677.58	$4,065.48
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	3,600.00	LF	$2.14	$7,704.00
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	6.00	EA	$602.20	$3,613.20

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	6.00	EA	$5,357.24	$32,143.44
	Subcomponent Total				$57,726.12

	Lighting Component Total	$57,726.12

RETAINING WALLS COMPONENT

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount

Retaining Wall 1

Description	Value
Length	855.50
Begin height	30.00
End Height	5.00
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	14,971.25	SF	$26.74	$400,331.22

	Retaining Walls Component Total	$400,331.23

Sequence 2 Total	$996,732.84

Sequence: 3 WUR - Widen/Resurface, Undivided, Rural **Net Length:** 0.180 MI 950 LF

Description: NB OFF-RAMP WIDENING

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	20.00 / 0.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.255
Top of Structural Course For Begin Section	102.00
Top of Structural Course For End Section	102.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Existing Front Slope L/R	6 to 1 / 6 to 1
Existing Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Front Slope L/R	6 to 1 / 6 to 1
Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.44 AC	$25,215.44	$11,094.79
120-2-2	BORROW EXCAVATION, TRUCK MEASURE	385.97 CY	$20.94	$8,082.21

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	9,000.00 CY	$25.72	$231,480.00
	Earthwork Component Total			$250,657.00

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	2
Existing Roadway Pavement Width L/R	24.00 / 12.00
Structural Spread Rate	165
Friction Course Spread Rate	80
Widened Outside Pavement Width L/R	12.00 / 0.00
Widened Structural Spread Rate	275
Widened Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	3,799.49 SY	$9.11	$34,613.35
285-709	OPTIONAL BASE,BASE GROUP 09	1,301.32 SY	$22.98	$29,904.33
327-70-5	MILLING EXIST ASPH PAVT, 2" AVG DEPTH	3,799.49 SY	$3.00	$11,398.47
334-1-13		313.46 TN	$169.38	$53,093.85

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
	SUPERPAVE ASPHALTIC CONC, TRAFFIC C				
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	174.14	TN	$169.38	$29,495.83
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	151.98	TN	$131.08	$19,921.54
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	50.66	TN	$131.08	$6,640.51

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
520-6	SHOULDER GUTTER- CONCRETE	450.00	LF	$25.00	$11,250.00
536-73	GUARDRAIL REMOVAL	435.00	LF	$3.00	$1,305.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	24.00	EA	$4.50	$108.00
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.72	NM	$975.00	$702.00
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	0.36	GM	$377.64	$135.95

Peripherals Subcomponent

Description	Value
Off Road Bike Path(s)	0
Off Road Bike Path Width L/R	0.00 / 0.00
Bike Path Structural Spread Rate	0
Noise Barrier Wall Length	0.00
Noise Barrier Wall Begin Height	0.00
Noise Barrier Wall End Height	0.00

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
339-1	MISCELLANEOUS ASPHALT PAVEMENT	15.33	TN	$270.66	$4,149.22
536-1-1	GUARDRAIL- ROADWAY, GEN TL-3	450.00	LF	$20.45	$9,202.50
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	1.00	EA	$2,982.78	$2,982.78
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	1.00	EA	$2,982.78	$2,982.78

	Roadway Component Total	$217,886.11

SHOULDER COMPONENT

User Input Data

Description	Value
Existing Total Outside Shoulder Width L/R	8.00 / 12.00
New Total Outside Shoulder Width L/R	12.00 / 12.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Existing Paved Outside Shoulder Width L/R	4.00 / 10.00
New Paved Outside Shoulder Width L/R	6.00 / 10.00
Structural Spread Rate	110
Friction Course Spread Rate	0
Total Width (T) / 8" Overlap (O)	T
Rumble Strips ï¿½No. of Sides	2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
285-704	OPTIONAL BASE,BASE GROUP 04	1,758.32	SY	$15.00	$26,374.80
327-70-1	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	1,477.58	SY	$3.80	$5,614.80
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	92.88	TN	$169.38	$15,732.01
546-72-1	GROUND-IN RUMBLE STRIPS, 16"	0.36	GM	$1,945.00	$700.20

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	2,184.71	LF	$1.69	$3,692.16
104-11	FLOATING TURBIDITY BARRIER	17.99	LF	$13.61	$244.84
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	17.99	LF	$4.20	$75.56
104-15	SOIL TRACKING PREVENTION DEVICE	1.00	EA	$3,166.81	$3,166.81
104-18	INLET PROTECTION SYSTEM	1.00	EA	$104.21	$104.21
107-1	LITTER REMOVAL	0.44	AC	$28.84	$12.69
107-2	MOWING	0.44	AC	$48.49	$21.34

	Shoulder Component Total	$55,739.42

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	3.24	CY	$1,858.71	$6,022.22
430-174-124	PIPE CULV, OPT MATL, ROUND,24"SD	32.00	LF	$463.20	$14,822.40
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	16.00	LF	$190.15	$3,042.40
430-984-129	MITERED END SECT, OPTIONAL RD, 24" SD	2.00	EA	$1,944.00	$3,888.00
570-1-1	PERFORMANCE TURF	72.68	SY	$1.20	$87.22

	Drainage Component Total				$27,862.24

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	1.00	AS	$400.79	$400.79
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	4.00	AS	$1,324.47	$5,297.88
700-1-50	SINGLE POST SIGN, RELOCATE	1.00	AS	$295.30	$295.30
700-1-60	SINGLE POST SIGN, REMOVE	4.00	AS	$28.58	$114.32
700-2-13	MULTI- POST SIGN, F&I GM, 21-30 SF	1.00	AS	$4,287.16	$4,287.16
700-2-60	MULTI- POST SIGN, REMOVE	1.00	AS	$847.31	$847.31
	Signing Component Total				$11,242.76

LIGHTING COMPONENT

Rural Lighting Subcomponent

Description	Value
Multiplier (Number of Poles)	6

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	1,200.00	LF	$8.50	$10,200.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	6.00	EA	$677.58	$4,065.48
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	3,600.00	LF	$2.14	$7,704.00
715-4-14	LIGHT POLE COMPLETE, F&I- STD, 45'	6.00	EA	$7,028.84	$42,173.04
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	6.00	EA	$602.20	$3,613.20
	Subcomponent Total				$67,755.72

	Lighting Component Total	$67,755.72
Sequence 3 Total		$631,143.25

Sequence: 4 WUR - Widen/Resurface, Undivided, Rural **Net Length:** 0.180 MI 950 LF

Description: NB ON-RAMP WIDENING

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	20.00 / 0.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.255
Top of Structural Course For Begin Section	102.00
Top of Structural Course For End Section	102.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Existing Front Slope L/R	2 to 1 / 2 to 1
Existing Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Front Slope L/R	2 to 1 / 2 to 1
Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.44	AC	$25,215.44	$11,094.79

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	1,000.00	CY	$25.72	$25,720.00
	Earthwork Component Total				$36,814.79

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	2
Existing Roadway Pavement Width L/R	12.00 / 12.00
Structural Spread Rate	165
Friction Course Spread Rate	80
Widened Outside Pavement Width L/R	6.00 / 6.00
Widened Structural Spread Rate	275
Widened Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	3,799.49	SY	$9.11	$34,613.35
285-709	OPTIONAL BASE,BASE GROUP 09	1,336.15	SY	$22.98	$30,704.73
327-70-5	MILLING EXIST ASPH PAVT, 2" AVG DEPTH	2,532.99	SY	$3.00	$7,598.97
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	208.97	TN	$169.38	$35,395.34
334-1-13		174.14	TN	$169.38	$29,495.83

	SUPERPAVE ASPHALTIC CONC, TRAFFIC C			
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	101.32 TN	$131.08	$13,281.03
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	50.66 TN	$131.08	$6,640.51

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
520-6	SHOULDER GUTTER- CONCRETE	450.00 LF	$25.00	$11,250.00
536-73	GUARDRAIL REMOVAL	435.00 LF	$3.00	$1,305.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	24.00 EA	$4.50	$108.00
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.72 NM	$975.00	$702.00
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	0.36 GM	$377.64	$135.95

Peripherals Subcomponent

Description	Value
Off Road Bike Path(s)	0
Off Road Bike Path Width L/R	0.00 / 0.00
Bike Path Structural Spread Rate	0
Noise Barrier Wall Length	0.00
Noise Barrier Wall Begin Height	0.00
Noise Barrier Wall End Height	0.00

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
339-1	MISCELLANEOUS ASPHALT PAVEMENT	22.33 TN	$270.66	$6,043.84
536-1-1	GUARDRAIL- ROADWAY, GEN TL-3	650.00 LF	$20.45	$13,292.50
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	2.00 EA	$2,982.78	$5,965.56
536-85-24	GUARDRAIL END TREATMENT-PARA APP TERM	2.00 EA	$2,982.78	$5,965.56
	Roadway Component Total			$202,498.17

SHOULDER COMPONENT

User Input Data

Description	Value
Existing Total Outside Shoulder Width L/R	8.00 / 12.00
New Total Outside Shoulder Width L/R	12.00 / 12.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Existing Paved Outside Shoulder Width L/R	4.00 / 10.00
New Paved Outside Shoulder Width L/R	6.00 / 10.00
Structural Spread Rate	110
Friction Course Spread Rate	0
Total Width (T) / 8" Overlap (O)	T
Rumble Strips ï¿½No. of Sides	2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
285-704	OPTIONAL BASE,BASE GROUP 04	1,758.32	SY	$15.00	$26,374.80
327-70-1	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	1,477.58	SY	$3.80	$5,614.80
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	92.88	TN	$169.38	$15,732.01
546-72-1	GROUND-IN RUMBLE STRIPS, 16"	0.36	GM	$1,945.00	$700.20

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	2,184.71	LF	$1.69	$3,692.16
104-11	FLOATING TURBIDITY BARRIER	17.99	LF	$13.61	$244.84
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	17.99	LF	$4.20	$75.56
104-15	SOIL TRACKING PREVENTION DEVICE	1.00	EA	$3,166.81	$3,166.81
104-18	INLET PROTECTION SYSTEM	1.00	EA	$104.21	$104.21
107-1	LITTER REMOVAL	0.44	AC	$28.84	$12.69
107-2	MOWING	0.44	AC	$48.49	$21.34
	Shoulder Component Total				$55,739.42

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	3.24	CY	$1,858.71	$6,022.22
430-174-124	PIPE CULV, OPT MATL, ROUND,24"SD	32.00	LF	$463.20	$14,822.40
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	16.00	LF	$190.15	$3,042.40
430-984-129	MITERED END SECT, OPTIONAL RD, 24" SD	2.00	EA	$1,944.00	$3,888.00
570-1-1	PERFORMANCE TURF	72.68	SY	$1.20	$87.22
	Drainage Component Total				$27,862.24

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	1.00	AS	$400.79	$400.79
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	4.00	AS	$1,324.47	$5,297.88
700-1-50	SINGLE POST SIGN, RELOCATE	1.00	AS	$295.30	$295.30
700-1-60	SINGLE POST SIGN, REMOVE	4.00	AS	$28.58	$114.32
700-2-13	MULTI- POST SIGN, F&I GM, 21-30 SF	1.00	AS	$4,287.16	$4,287.16
700-2-60	MULTI- POST SIGN, REMOVE	1.00	AS	$847.31	$847.31
	Signing Component Total				$11,242.76

LIGHTING COMPONENT

Rural Lighting Subcomponent

Description	Value
Multiplier (Number of Poles)	6

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	1,200.00	LF	$8.50	$10,200.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	6.00	EA	$677.58	$4,065.48
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	3,600.00	LF	$2.14	$7,704.00
715-4-14	LIGHT POLE COMPLETE, F&I-STD, 45'	6.00	EA	$7,028.84	$42,173.04
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	6.00	EA	$602.20	$3,613.20
	Subcomponent Total				$67,755.72

Lighting Component Total	$67,755.72
Sequence 4 Total	$401,913.10

Sequence: 5 WUR - Widen/Resurface, Undivided, Rural **Net Length:** 0.288 MI 1,520 LF

Description: SB OFF-RAMP WIDENING

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	40.00 / 0.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.290
Top of Structural Course For Begin Section	102.00
Top of Structural Course For End Section	102.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Existing Front Slope L/R	2 to 1 / 2 to 1
Existing Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Front Slope L/R	2 to 1 / 2 to 1
Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.40 AC	$25,215.44	$35,301.62
120-2-2	BORROW EXCAVATION, TRUCK MEASURE	1,206.81 CY	$20.94	$25,270.60

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	21,500.00 CY	$25.72	$552,980.00
	Earthwork Component Total			$613,552.22

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	12
Existing Roadway Pavement Width L/R	12.00 / 24.00
Structural Spread Rate	165
Friction Course Spread Rate	80
Widened Outside Pavement Width L/R	24.00 / 0.00
Widened Structural Spread Rate	275
Widened Friction Course Spread Rate	80

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	5,742.65 SY	$9.11	$52,315.54
285-709	OPTIONAL BASE,BASE GROUP 09	4,109.37 SY	$22.98	$94,433.32
327-70-5	MILLING EXIST ASPH PAVT, 2" AVG DEPTH	6,080.45 SY	$3.00	$18,241.35
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	501.64 TN	$169.38	$84,967.78
334-1-13		557.37 TN	$169.38	$94,407.33

	SUPERPAVE ASPHALTIC CONC, TRAFFIC C			
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	243.22 TN	$131.08	$31,881.28
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	162.15 TN	$131.08	$21,254.62

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	11

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS	505.00 EA	$4.50	$2,272.50
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	1.15 NM	$975.00	$1,121.25
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	6.33 GM	$377.64	$2,390.46
	Roadway Component Total			$403,285.43

SHOULDER COMPONENT

User Input Data

Description	Value
Existing Total Outside Shoulder Width L/R	0.00 / 0.00
New Total Outside Shoulder Width L/R	10.00 / 0.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Existing Paved Outside Shoulder Width L/R	0.00 / 0.00
New Paved Outside Shoulder Width L/R	10.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	0
Total Width (T) / 8" Overlap (O)	T
Rumble Strips ï¿½No. of Sides	2

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
285-704	OPTIONAL BASE,BASE GROUP 04	1,744.75 SY	$15.00	$26,171.25
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	92.90 TN	$169.38	$15,735.40
546-72-1	GROUND-IN RUMBLE STRIPS, 16"	0.58 GM	$1,945.00	$1,128.10

Erosion Control

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	3,496.26 LF	$1.69	$5,908.68
104-11	FLOATING TURBIDITY BARRIER	28.79 LF	$13.61	$391.83
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	28.79 LF	$4.20	$120.92

104-15	SOIL TRACKING PREVENTION DEVICE	1.00 EA	$3,166.81	$3,166.81
104-18	INLET PROTECTION SYSTEM	1.00 EA	$104.21	$104.21
107-1	LITTER REMOVAL	0.70 AC	$28.84	$20.19
107-2	MOWING	0.70 AC	$48.49	$33.94
	Shoulder Component Total			$52,781.33

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	5.18 CY	$1,858.71	$9,628.12
430-174-124	PIPE CULV, OPT MATL, ROUND,24"SD	48.00 LF	$463.20	$22,233.60
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	24.00 LF	$190.15	$4,563.60
430-984-129	MITERED END SECT, OPTIONAL RD, 24" SD	3.00 EA	$1,944.00	$5,832.00
570-1-1	PERFORMANCE TURF	116.31 SY	$1.20	$139.57
	Drainage Component Total			$42,396.89

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	1.00 AS	$400.79	$400.79
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	6.00 AS	$1,324.47	$7,946.82
700-1-50	SINGLE POST SIGN, RELOCATE	1.00 AS	$295.30	$295.30
700-1-60	SINGLE POST SIGN, REMOVE	6.00 AS	$28.58	$171.48
700-2-13	MULTI- POST SIGN, F&I GM, 21-30 SF	1.00 AS	$4,287.16	$4,287.16
700-2-60	MULTI- POST SIGN, REMOVE	1.00 AS	$847.31	$847.31
	Signing Component Total			$13,948.86

LIGHTING COMPONENT

Rural Lighting Subcomponent

Description	Value
Multiplier (Number of Poles)	6

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	1,200.00	LF	$8.50	$10,200.00
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	6.00	EA	$677.58	$4,065.48
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	3,600.00	LF	$2.14	$7,704.00
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	6.00	EA	$602.20	$3,613.20

X-Items

Pay item	Description	Quantity	Unit	Extended Amount

				Unit Price	
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	5.00	EA	$5,357.24	$26,786.20
	Subcomponent Total				$52,368.88

	Lighting Component Total	$52,368.88

RETAINING WALLS COMPONENT

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount

Retaining Wall 1

Description	Value
Length	814.50
Begin height	15.00
End Height	15.00
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	12,217.50	SF	$26.74	$326,695.95
	Retaining Walls Component Total				$326,695.95

Sequence 5 Total	$1,505,029.56

Sequence: 6 NUU - New Construction, Undivided, Urban **Net Length:** 0.379 MI
2,000 LF

Description: UNDERPASS ACCESS ROAD

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	20.00 / 20.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.250
Top of Structural Course For Begin Section	103.00
Top of Structural Course For End Section	103.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	6 to 1 / 6 to 1
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.84 AC	$25,215.44	$46,396.41
120-6	EMBANKMENT	7,544.53 CY	$25.72	$194,045.31
	Earthwork Component Total			$240,441.72

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	2
Roadway Pavement Width L/R	12.00 / 12.00
Structural Spread Rate	275
Friction Course Spread Rate	165

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	6,480.21 SY	$9.11	$59,034.71
285-709	OPTIONAL BASE,BASE GROUP 09	5,333.50 SY	$22.98	$122,563.83
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	733.36 TN	$169.38	$124,216.52
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	440.01 TN	$131.08	$57,676.51

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
706-1-1	RAISED PAVMT MARK, TYPE B W/O FINAL SURF	51.00 EA	$4.18	$213.18
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	3.03 GM	$972.53	$2,946.77
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	0.76 GM	$377.64	$287.01
	Roadway Component Total			$366,938.53

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	7.25 / 7.25
Total Outside Shoulder Perf. Turf Width L/R	5.00 / 5.00
Sidewalk Width L/R	0.00 / 0.00

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
520-1-10	CONCRETE CURB & GUTTER, TYPE F	2,000.06 LF	$26.16	$52,321.57
520-1-10	CONCRETE CURB & GUTTER, TYPE F	2,000.06 LF	$26.16	$52,321.57
570-1-1	PERFORMANCE TURF	2,222.29 SY	$1.20	$2,666.75

Erosion Control

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	4,000.13 LF	$1.69	$6,760.22
104-11	FLOATING TURBIDITY BARRIER	94.70 LF	$13.61	$1,288.87
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	94.70 LF	$4.20	$397.74
104-15	SOIL TRACKING PREVENTION DEVICE	1.00 EA	$3,166.81	$3,166.81
104-18	INLET PROTECTION SYSTEM	20.00 EA	$104.21	$2,084.20
107-1	LITTER REMOVAL	4.59 AC	$28.84	$132.38
107-2	MOWING	4.59 AC	$48.49	$222.57
	Shoulder Component Total			$121,362.68

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
400-2-2	CONC CLASS II, ENDWALLS	6.82 CY	$1,858.71	$12,676.40
425-1-351	INLETS, CURB, TYPE P-5, <10'	14.00 EA	$5,427.82	$75,989.48
425-1-451	INLETS, CURB, TYPE J-5, <10'	4.00 EA	$7,111.79	$28,447.16
425-1-521	INLETS, DT BOT, TYPE C, <10'	2.00 EA	$3,249.37	$6,498.74
425-2-41	MANHOLES, P-7, <10'	2.00 EA	$4,244.43	$8,488.86
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	1,200.00 LF	$110.41	$132,492.00
570-1-1	PERFORMANCE TURF	115.16 SY	$1.20	$138.19

	Drainage Component Total				$264,730.83

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	8.00	AS	$400.79	$3,206.32
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	1.00	AS	$1,324.47	$1,324.47
	Signing Component Total				$4,530.79

LIGHTING COMPONENT

Conventional Lighting Subcomponent

Description	Value
Spacing	MAX

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
630-2-11	CONDUIT, F& I, OPEN TRENCH	2,000.06	LF	$8.50	$17,000.51
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	260.99	LF	$23.58	$6,154.14
635-2-11	PULL & SPLICE BOX, F&I, 13" x 24"	8.00	EA	$677.58	$5,420.64
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	6,783.17	LF	$2.14	$14,515.98
715-4-13	LIGHT POLE COMPLETE, F&I-STD, 40'	8.00	EA	$5,357.24	$42,857.92
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	8.00	EA	$602.20	$4,817.60
	Subcomponent Total				$90,766.80

	Lighting Component Total				$90,766.79

Sequence 6 Total	$1,088,771.34

Date: 5/6/2020 7:05:36 PM

FDOT Long Range Estimating System - Production
R3: Project Details by Sequence Report

Project: 413258-1-52-01 **Letting Date:** 07/2024

Description: SR-9/I-95 @ LANTANA ROAD

District: 04	**County:** 93 PALM BEACH	**Market Area:** 12	**Units:** English
Contract Class: 1	**Lump Sum Project:** N	**Design/Build:** N	**Project Length:** 0.010 MI

Project Manager: NAGOLE

Version 13 Project Grand Total **$32,733,828.15**

Description: RECONFIGURE THE EXISTING INTERCHANGE INTO A DDI CONFIGURATION, REPLACE EXISTING BRIDGE OVER I-95 AND SFRC, WIDEN THE I-95 NB AND SB EXIT RAMPS, AND WIDEN LANTANA RD FR 4 TO 6 LANES BETWEEN HIGH RIDGE RD AND ANDREW REDDING RD

Project Sequences Subtotal			**$27,422,414.26**
102-1	Maintenance of Traffic	10.00 %	$2,742,241.43
101-1	Mobilization	8.00 %	$2,413,172.46
Project Sequences Total			**$32,577,828.15**
Project Unknowns		0.00 %	$0.00
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-16	PARTNERING (DO NOT BID)	2.00	LS	$3,000.00	$6,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$150,000.00	$150,000.00
Project Non-Bid Subtotal					**$156,000.00**

Version 13 Project Grand Total **$32,733,828.15**

APPENDIX J

(VE Report and Response Memorandum)

VALUE ENGINEERING STUDY

OF

SR-9/I-95 AT LANTANA ROAD

PALM BEACH COUNTY

FINANCIAL PROJECT ID: 413258-1-22-02

STUDY NUMBER: 2000401

Ft. Lauderdale, Florida

MARCH 2 – 6, 2020

DRAFT REPORT

THE FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 4

VALUE ENGINEERING STUDY
OF

SR-9/I-95 AT LANTANA ROAD

PALM BEACH COUNTY

FINANCIAL PROJECT ID: 413258-1-22-02

STUDY NUMBER: 2000401

Ft. Lauderdale, Florida

MARCH 2 – 6, 2020

DRAFT REPORT

THE FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 4

This report includes a summary of data collection, alternative analysis, and Value Engineering recommendations. I acknowledge that the procedure and reference used to develop the results contained in the report are standard to the Professional Practice of Value Engineering, as applied through Professional Judgment and Experiences. I hereby certify that I am a Registered Professional Engineer in the State of Florida and that this study has been performed in the accordance with current applicable FDOT Value Engineering Procedures.

William F. Ventry, P.E., CGC, C.V.S. (LIFE)
Florida Registration No. 21235

DATE

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering Study performed by ***VE Group, L.L.C.*** for the Florida Department of Transportation District 4. The study was performed during the week of ***March 2-6, 2020.***

The subject of the study was ***SR-9/I-95 AT LANTANA ROAD, PALM BEACH COUNTY (*****413258-1-22-02).**

PROJECT DESCRIPTION

The proposed improvements will include operational and safety improvements to the Interchange including capacity improvements along Lantana Road, additional turning lanes at the SR 5/I-95 ramp terminal intersections and signal improvements. The project will also include improvements to sidewalks, ADA ramps, guide signs, and designated bicycle lanes.

Total estimated **Construction Cost** (from LRE provided to VE team):	***$42,500,000***
Estimated **Right of Way** cost:	***19,800,000***
Total Project Cost:	***$62,300,000***

I. EXECUTIVE SUMMARY

METHODOLOGY

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis.

This process included the following phases:

1. Information
2. Functional Analysis
3. Speculation
4. Evaluation
5. Development
6. Presentation
7. Report Preparation/Resolution

I. EXECUTIVE SUMMARY

AREAS OF FOCUS

A Pareto Chart and a Functional Analysis Worksheet are tools of the Value Engineering Process and are only used for determining the areas that the Value Engineering Team may focus on for possible alternatives. After development of the Pareto Chart and Functional Analysis Worksheet, the Value Engineering Team focused on the following Areas of Focus:

A. RIGHT OF WAY

B. BRIDGES

I. EXECUTIVE SUMMARY

RESOLUTION/FHWA CHART

SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)

The following Value Engineering Alternatives were developed and are recommended for Implementation:

<table>
<tr><th>VALUE ENGINEERING RECOMMENDATIONS</th><th>RECOM-MEND ACCEPT</th><th>RECOM-MEND REJECT</th><th>STUDY FURTHER/ COMMENTS</th><th colspan="2">FHWA CATEGORIES</th></tr>
<tr><td rowspan="5">RECOMMENDATION NUMBER 1:

RIGHT OF WAY

<u>Value Engineering Alternative No. 2</u>:

Consider changing the approach speed to the intersection from 40 mph to 35 mph and reduce median width.

(See pg. 35 for details)

Possible savings of $15,989,000.</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td>SAFETY: Recommendations that mitigate or reduce hazards on the facility.</td><td></td></tr>
<tr><td>ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.</td><td></td></tr>
<tr><td>OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.</td><td></td></tr>
<tr><td>CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.</td><td></td></tr>
<tr><td>OTHER: Recommendations not readily categorized by above performance indicators.</td><td>X</td></tr>
<tr><td rowspan="5">If Value Engineering Alternative No. 2 cannot be implemented, then the Value Engineering Team recommends <u>Value Engineering Alternative No. 1A.</u>

<u>Value Engineering Alternative No.1A:</u>

Shift Alignment North to Avoid Shell Gas Station, Wells Fargo Bank, Chase Bank, Royal Mart, and Medical Offices.

(See pg. 31 for details)

Possible savings of $7,656,000.</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td>SAFETY: Recommendations that mitigate or reduce hazards on the facility.</td><td></td></tr>
<tr><td>ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.</td><td></td></tr>
<tr><td>OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.</td><td></td></tr>
<tr><td>CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.</td><td></td></tr>
<tr><td>OTHER: Recommendations not readily categorized by above performance indicators.</td><td>X</td></tr>
<tr><td rowspan="5">RECOMMENDATION NUMBER 2:

RIGHT OF WAY

<u>Value Engineering Alternative No. 3</u>:

Eliminate the bike lanes in the corridor.

(See pg.38 for details)

Possible savings of $3,900,250.</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td>SAFETY: Recommendations that mitigate or reduce hazards on the facility.</td><td></td></tr>
<tr><td>ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.</td><td></td></tr>
<tr><td>OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.</td><td></td></tr>
<tr><td>CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.</td><td></td></tr>
<tr><td>OTHER: Recommendations not readily categorized by above performance indicators.</td><td>X</td></tr>
</table>

(Continued):

I. EXECUTIVE SUMMARY

RESOLUTION/FHWA CHART

SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)

VALUE ENGINEERING RECOMMENDATIONS	RECOM-MEND ACCEPT	RECOM-MEND REJECT	STUDY FURTHER/ COMMENTS	FHWA CATEGORIES	
RECOMMENDATION NUMBER 3: ***RIGHT OF WAY*** ***Value Engineering Alternative No. 4:*** ***Revise the right turn to the solid waste agency (SWA).*** *(See pg.* ***42*** *for details)* ***Possible savings of: $2,773,954***				**SAFETY: Recommendations that mitigate or reduce hazards on the facility.**	
				ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural and/or cultural resources.	
				OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.	
				CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.	
				OTHER: Recommendations not readily categorized by above performance indicators.	**X**
RECOMMENDATION NUMBER 4: ***BRIDGES*** ***Value Engineering Alternative No. 7A:*** ***Eliminate sloped abutment at Railroad Bridge and put MSE wall at Railroad R/W.*** *(See pg.****50*** *for details)* ***Possible savings of $1,561,371***				**SAFETY: Recommendations that mitigate or reduce hazards on the facility.**	
				ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.	
				OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.	
				CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.	**X**
				OTHER: Recommendations not readily categorized by above performance indicators.	
If Value Engineering Alternative No. 7A cannot be implemented, then the Value Engineering Team recommends Value Engineering Alternative No. 7B. ***Value Engineering Alternative No.7B:*** ***Eliminate sloped abutment at Railroad Bridge and put MSE wall at western abutment.*** *(See pg.* ***52*** *for details)* ***Possible INCREASE of $191,445***				**SAFETY: Recommendations that mitigate or reduce hazards on the facility.**	
				ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.	
				OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.	
				CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.	**X**
				OTHER: Recommendations not readily categorized by above performance indicators.	

(Continued):

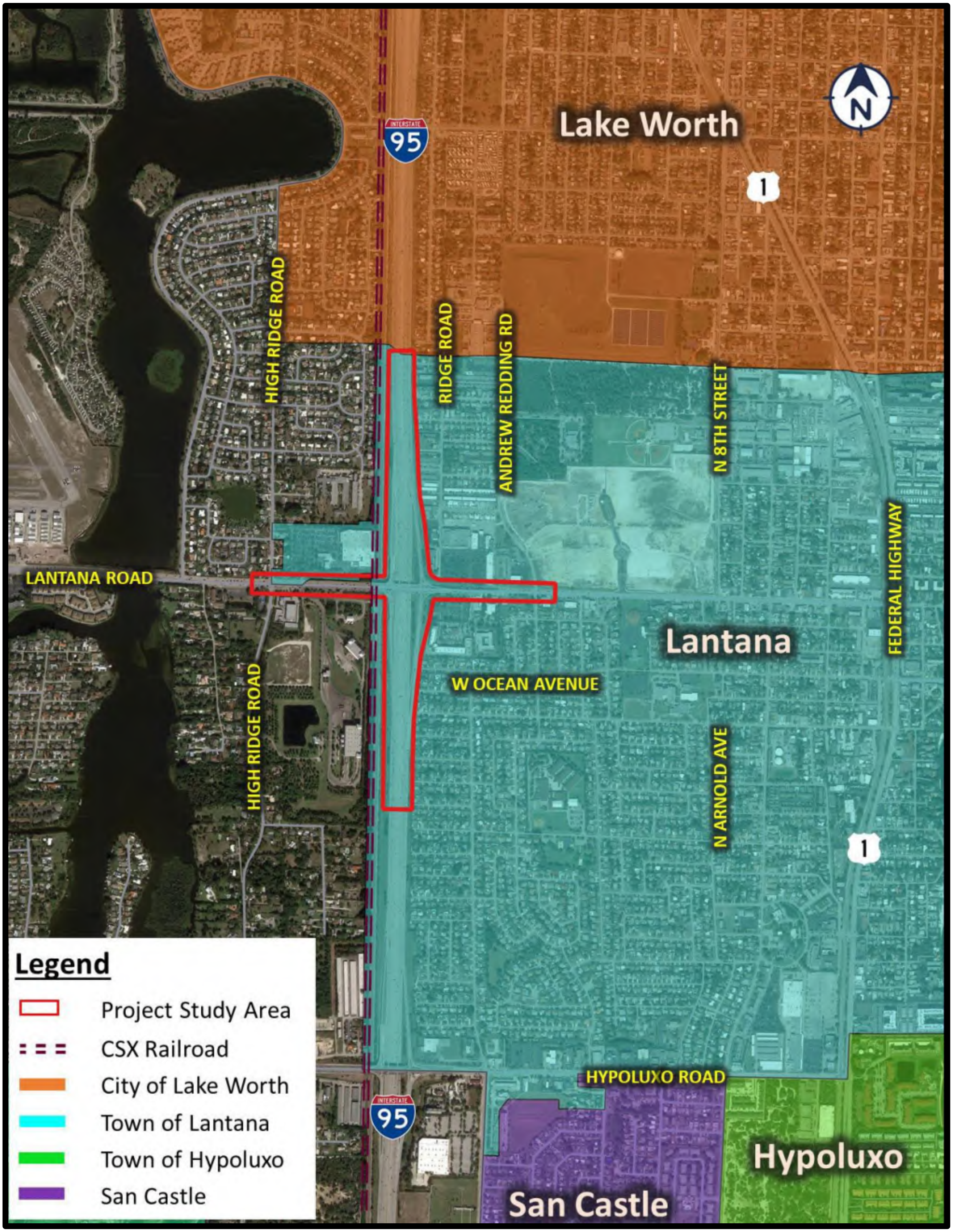
I. EXECUTIVE SUMMARY

RESOLUTION/FHWA CHART

SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)

VALUE ENGINEERING RECOMMENDATIONS	RECOM-MEND ACCEPT	RECOM-MEND REJECT	STUDY FURTHER/ COMMENTS	FHWA CATEGORIES	
RECOMMENDATION NUMBER 5: ***BRIDGES*** ***<u>Value Engineering Alternative No.6</u>:*** ***Modify existing ramp bridges and reduced RE wall.*** *(See pg.**46** for details)* ***Possible savings of $3,391,504*** ***Life Cycle Cost Savings: -$2,561,742***				**SAFETY: Recommendations that mitigate or reduce hazards on the facility.**	
				ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.	
				OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.	
				CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.	**X**
				OTHER: Recommendations not readily categorized by above performance indicators.	
If Value Engineering Alternative No. 6 cannot be implemented, then the Value Engineering Team recommends <u>Value Engineering Alternative No. 9</u>. ***<u>Value Engineering Alternative No.9</u>:*** ***Consider retaining wall type from MSE wall to steel wall with concrete facia.*** *(See pg. **57** for details)* ***Possible savings of $187,749***				**SAFETY: Recommendations that mitigate or reduce hazards on the facility.**	
				ENVIRONMENT: Recommendations that successfully avoid or mitigate impacts to natural, historical, and/or cultural resources.	
				OPERATION: Recommendations that improve real-time service and/or local corridor or regional levels of service.	
				CONSTRUCTION: Recommendations that improve work zone conditions, or expedite the project delivery.	**X**
				OTHER: Recommendations not readily categorized by above performance indicators.	
TOTAL				**SAFETY**	**0**
				ENVIRONMENT	**0**
				OPERATION	**0**
				CONSTRUCTION	**4**
				OTHER	**4**

II. LOCATION OF PROJECT



III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS *SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)* ***MARCH 2 – 6, 2020***			
NAME	**AFFILIATION**	**EXPERTISE**	**PHONE NUMBER**
William F. Ventry, P.E., C.V.S. (Life)	VE Group, L.L.C.	Team Leader	850/627-3900
Del Younker, CCC, CVS	VE Group, L.L.C.	Estimates/Construction	850/627-3900
Frank Ventry, A.V.S.	VE Group, L.L.C.	CADD	850/627-3900
Dustin Sumner	FDOT	Maintenance	602/777-1553
Sanjay Singh	FDOT	Maintenance/Construction	954/298-7934
Matt Carlock, PE	FDOT	Construction	561/370-1127
Mike Irwin, PE	CARDNO	Construction	561/723-7669
Nicole Robson	FDOT	Roadway Design	954/777-4075
James Vomacka, PE	Propel Engineering	Design	561/628-8734
Stephen Fisher	FDOT/ROW Valuation	Right of Way Acquisition	954/777-4246
Mark Rodwell	FDOT/Right of Way	Right of way Scheduling	954/777-4291
Hui Shi, PE	FDOT/Drainage	Drainage/Permitting	954/777-4557
Mackenson Jonassaint	FDOT/Design	Roadway Design	954/777-4473
Ricardo Dornelius	FDOT PLEMO	Concept/Analysis	954/777-4296
Alexander Alvarez	FDOT	Structures Design	954/777-4448
Mark Renteria	FDOT	Maintenance/Inspection	954/830-8786
Oscar Sosa	FDOT	Maintenance	954/777-4203
Maria Salgado	FDOT/Environmental	Environment	954/777-4286

III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study that proposes improvements to SR 9/I-95 at Lantana Road Interchange from High Ridge Road to Andrew Redding Road.

The SR 9/I-95 at Lantana Road interchange is located within the Town of Lantana in Palm Beach County, Florida, between the 6th Avenue South (1.54 miles to the north) and the Hypoluxo Road (1.04 miles to the south) interchanges. The interchange provides access to the Palm Beach County Park/Lantana Airport, Hypoluxo Island, Lantana Scrub Natural Area, and the Lantana Lake Worth Health Center. The study interchange is a typical diamond interchange and the limits along Lantana Road extend from High Ridge Road to Andrew Redding Road. The South Florida Rail Corridor (SFRC)/CSX Railroad runs parallel along the west side of SR 9/I-95 in this area. SR 9/I-95 near the Lantana Road interchange is a ten-lane divided urban interstate, providing four general purpose lanes and one High Occupancy Vehicle (HOV) lane in each direction. Auxiliary lanes are provided in both the northbound and southbound direction within the study area. At the Lantana Road interchange, SR 9/I-95 crosses below an elevated section of Lantana Road. SR 9/I-95 is a SIS designated highway as well as an emergency evacuation route. Within the project limits, Lantana Road is primarily a four-lane urban principal arterial under the jurisdiction of Palm Beach County, with two through lanes in each direction. At the interchange location, Lantana Road is elevated over SR 9/I-95 and the SFRC/CSX Railroad. There is one dedicated left-turn lane in each direction to access the SR 9/I-95 on-ramps and two through lanes in each direction. A single free-flow right-turn lane is also provided in both eastbound and westbound directions along Lantana Road to serve the SR 9/I-95 on-ramps. Sidewalks are provided along both sides of Lantana Road; however, bicycle lanes do not exist. The segment of Lantana Road from SR 9/I-95 to SR 5/US-1 is designated as an emergency evacuation route. Land use adjacent to the interchange is predominantly commercial with some industrial, institutional and residential uses. The adjacent signalized intersections within the project limits are: High Ridge Road west of SR 9/I-95 southbound ramps, and Shopping Center Drive and Andrew Redding Road east of SR 9/I-95 northbound ramps.

The proposed improvements will include operational and safety improvements to the Interchange including capacity improvements along Lantana Road, additional turning lanes at the SR 5/I-95 ramp terminal intersections and signal improvements. The project will also include improvements to sidewalks, ADA ramps, guide signs, and designated bicycle lanes.

IV. INFORMATION PHASE

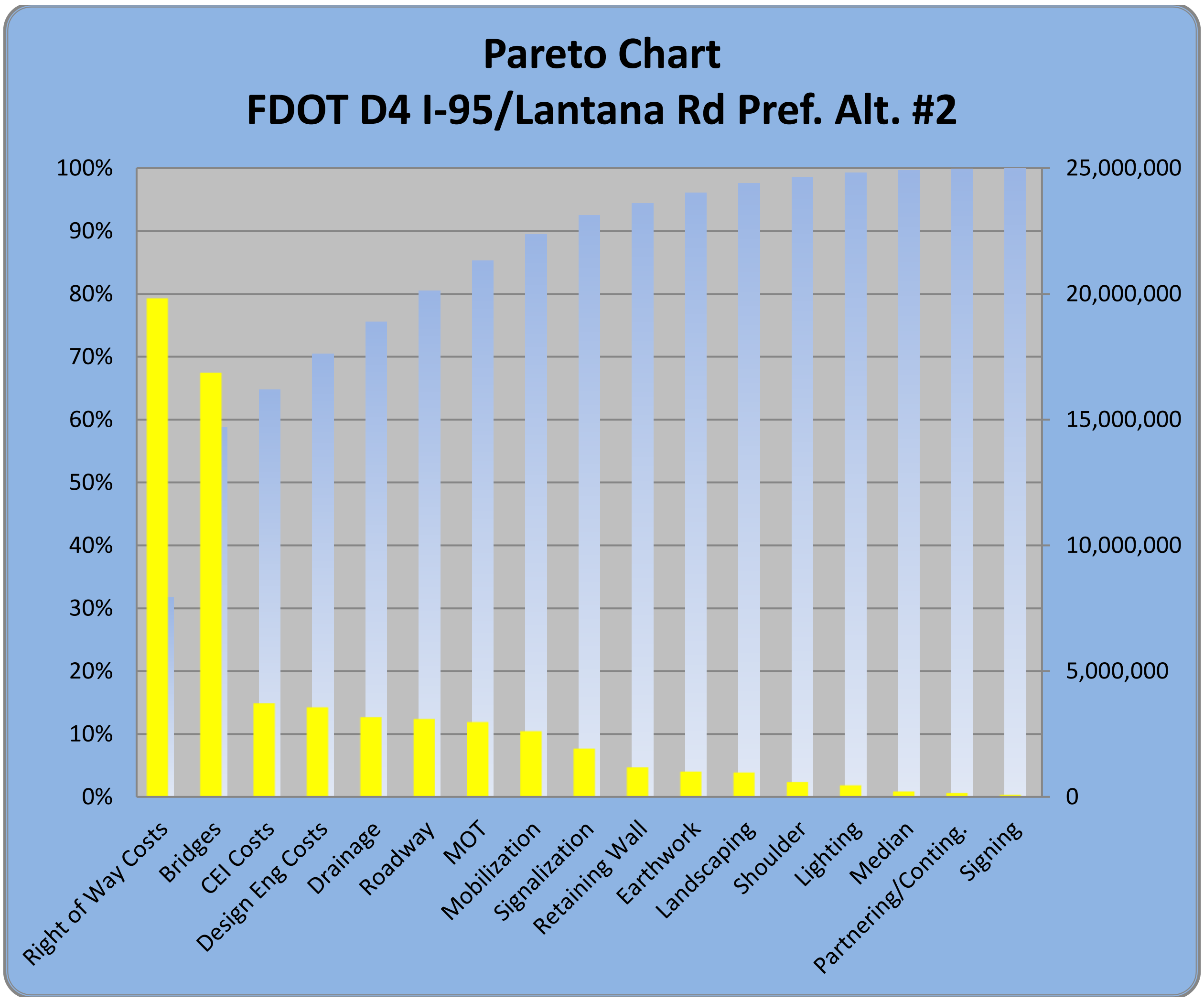
STUDY BRIEFING *SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)* ***MARCH 2, 2020***		
NAME	***AFFILIATION***	**PHONE**
William F. Ventry	VE Group, L.L.C.-Team Leader	850/627-3900
Del Younker, CCC, CVS	VE Group, L.L.C.	850/627-3900
Dustin Sumner	FDOT	602/777-1553
Sanjay Singh	FDOT	954/298-7934
Matt Carlock, PE	FDOT	561/370-1127
Mike Irwin, PE	CARDNO	561/723-7669
Nicole Robson	FDOT	954/777-4075
James Vomacka, PE	Propel Engineering	561/628-8734
Stephen Fisher	FDOT/ROW Valuation	954/777-4246
Mark Rodwell	FDOT/Right of Way	954/777-4291
Hui Shi, PE	FDOT/Drainage	954/777-4557
Mackenson Jonassaint	FDOT/Design	954/777-4473
Ricardo Dornelius	FDOT PLEMO	954/777-4296
Alexander Alvarez	FDOT	954/777-4448
Mark Renteria	FDOT	954/830-8786
Oscar Sosa	FDOT	954/777-4203
Maria Salgado	FDOT/Environmental	954/777-4286
Victoria Buxton-Fetteh	GOAL	786/600-3350
Kadian McLean	FDOT/Utility/VE	954/777-4360
Vandana Nagole	FDOT/Design	954/777-4281
Godfrey Lampley	GOAL Eng.	786/543-2037

IV. INFORMATION PHASE

STUDY RESOURCES *SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)* *MARCH 2 – 6, 2020*		
NAME	**AFFILIATION**	**PHONE**
Godfrey Lampley	GOAL Eng.	786/543-2037
Dawn Steele	CARDNO	561/722-3720
Ramon Otero	FDOT D4 Structures	954/777-4162
Joseph Donegan	FDOT D4 Structures	954/777-4154

V. FUNCTIONAL ANALYSIS PHASE

PARETO ANALYSIS WORKSHEETS



***** Note:*** ***This worksheet is a tool of the Value Engineering Process and is only used for determining the areas that the Value Engineering Team should focus on for possible alternatives.***

V. FUNCTIONAL ANALYSIS PHASE

FUNCTIONAL ANALYSIS WORKSHEET

SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)

MARCH 2 – 6, 2020

ITEM	FUNCT. VERB	FUNCT. NOUN	*TYPE	COST	WORTH	VALUE INDEX
Right of Way	Obtain	Space	B	19,800,000	10,000,000	2.0
Bridges	Span	Obstacle	B	9,150,489	5,000,000	1.8
CEI	Construct	Project	B	3,200,000	3,000,000	1.1
Drainage	Convey	Runoff	B	3,172,832	3,000,000	1.1
Design	Design	Improvement	B	3,100,000	3,000,000	1.0
Roadway	Convey	Traffic	B	3,099,864	2,500,000	1.2
MOT	Maintain	Traffic	B	2,182,065	2,000,000	1.1
Mobilization	Construct	Project	B	1,920,217	1,500,000	1.3
Signalization	Channel	Traffic	B	1,911,272	900,000	2.1
Retaining Wall	Retain	Earth	B	1,177,870	500,000	2.4
Earthwork	Shape	Surface	B	1,002,825	900,000	1.1
Landscaping	Beautify	Area	S	966,123	250,000	3.9
Lighting	Illuminate	Surface	B	460,904	350,000	1.3
Shoulder	Refuge	Vehicle	S	585,267	250,000	2.3
Median	Separate	Traffic	S	216,863	150,000	1.4
Partnering/Contingency	Build	Project	S	156,000	150,000	1.0
Signing	Inform	Traveler	B	76,337	75,000	1.0

***B – Basic S – Secondary**

***** Note: This worksheet is a tool of the Value Engineering Process and is only used for determining the areas that the Value Engineering Team should focus on for possible alternatives. The column for COST indicates the approximate amount of the cost as shown in the cost estimate. The column for WORTH is an estimated cost for the lowest possible alternative that would provide the FUNCTION shown. Many times, the lowest cost alternatives are not considered implementable but are used only to establish a worth for a function. A value index greater than 1.00 or less than 1.00, indicates the Value Engineering Team intends to focus on this area of the project.***

V. FUNCTIONAL ANALYSIS PHASE

The following areas have a value index greater than 1.00 on the preceding Functional Analysis Worksheet or were identified in the Pareto Chart and therefore have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

A. RIGHT OF WAY

B. BRIDGES

VI. SPECULATION PHASE

Ideas generated, utilizing the brainstorming method, for performing the functions of previously identified areas of focus.

A. RIGHT OF WAY

- Shift alignment to avoid Shell Gas Station
- Consider approach speed to the intersection from 40 mph to 35 mph
- Reduce the lane width
- Eliminate the bike lanes in the corridor (use shared use path)
- Reduce number of lanes on Lantana
- Reduce the median width in the Gas station area
- ~~Eliminate sidewalk at the access road at Costco~~
- Shift alignment south to avoid parking spaces at shopping center
- ~~Run access road behind Costco~~
- Eliminate the right turn to the solid waste agency (SWA)
- ~~Shift alignment to north to avoid R/W at Wells Fargo~~

B. BRIDGES

- Eliminate Curved bridge and replace with pavement, fill and MSE wall (both ends)
- More Ramp Bridge and less RE Wall (combined with below modify ramp bridge)
- Eliminate Bridge at Railroad
- Use MSE Wall tunnel for Railroad no bridge
- ~~Toll bridge~~
- Review the bridge beams for more economical sizes
- Eliminate sloped abutment at Railroad Bridge
- Build a new bridge to the south and modify existing bridge for north
- Modify existing ramp bridges and reduced RE wall
- Consider single span ILO 2 span over railroad tracks
- Use post tension slabs ILO beams
- Tunnel for access road before the generator and lift station
- Pedestrian in the median through DDI (eliminate pedestrian crossings)

VI. SPECULATION PHASE

C. DESIGN COMMENTS

- Eliminate Costco truck traffic through residential streets (design comments)
- Match typical section for I-95 managed lanes
- For Frontage Road - Avoid the pumping station and generator at Costco
- Review the bridge beams for more economical sizes
- Use post tension slabs ILO beams
- Pedestrian in the median through DDI (eliminate pedestrian crossings)
- Verify that the Federal Greenbook meets the FDOT Design Standards

VII. EVALUATION PHASE

ALTERNATIVES

The following alternatives were formulated during the "eliminate and combine" portion of the Evaluation Phase.

A. RIGHT OF WAY (James, Sanjay, Nicole, Steven, Mark Ro, Hui, Mark Re)

- ***Value Engineering Alternative No. 1A:*** ***Shift alignment north to avoid Shell Gas Station, Wells Fargo, Chase Bank, and Dr. Office.***
- ***Value Engineering Alternative No. 1B:*** ***Shift alignment south to avoid parking spaces at shopping center. DROPPED AT MIDPOINT MEETING***
- ***Value Engineering Alternative No. 2:*** ***Consider approach speed to the intersection from 40 mph to 35 mph and reduce median width.***
- ***Value Engineering Alternative No. 3:*** ***Eliminate the bike lanes in the corridor.***
- ***Value Engineering Alternative No.4:*** ***Revise the right turn to the solid waste agency (SWA).***

VII. EVALUATION PHASE

ALTERNATIVES

B. BRIDGES (Matt, Dustin, Mike, Mackenson, Ricardo, Oscar, Maria, Alex)

- ***Value Engineering Alternative No.5:*** *Eliminate Curved bridge and replace with pavement, fill and MSE wall (both ends).* ***DROPPED AT MIDPOINT MEETING***

- ***Value Engineering Alternative No. 6:*** *Modify existing ramp bridges and reduced RE wall.*

- ***Value Engineering Alternative No. 7A:*** *Eliminate sloped abutment and place retaining wall at right of way line.*

- ***Value Engineering Alternative No. 7B:*** *Eliminate sloped abutment and place retaining wall at west end of bridge.*

- ***Value Engineering Alternative No. 7C:*** *Install a single span bridge over railroad tracks and maintenance area (access road) versus the two-span bridge.*

- ***Value Engineering Alternative No. 8:*** *Build a new bridge to the south and modify existing bridge for north.* ***DROPPED AT MIDPOINT MEETING***

- ***Value Engineering Alternative No. 9:*** *Consider retaining wall type from MSE wall to steel wall with concrete facia.*

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

The following Advantages and Disadvantages were developed for the Value Engineering Alternatives previously generated during the speculation phase. It also includes the Advantages and Disadvantages for the "Current Design."

A. RIGHT OF WAY

"Current Design": ***The current design is Alternative #2 Diverging Diamond Interchange with Right of Way takes required on both the north and south along Lantana. The Total R/W cost=$19.8 million***

Advantages

- Design requirements are being met (Greenbook meets FDOT standards?)
- Meets the traffic projections for the interchange and meets project intent (improves capacity)
- Reduces conflict points
- Provides bike lanes
- Improves interchange operational and safety
- Aesthetically appealing
- Accommodates future water tower development increased capacity

Disadvantages

- High Right of Way cost
- Increased Utility Cost
- Driver expectation

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

A. RIGHT OF WAY

<u>Value Engineering Alternative No. 1A:</u> ***Shift alignment north to avoid Shell Gas Station, Wells Fargo, Chase Bank, and Dr. Office.***

<u>Advantages</u>

- Potential reduced right of way impacts on the south side

<u>Disadvantages</u>

- Increased right of way impacts to the north side

<u>Conclusion</u>

CARRY FORWARD FOR FURTHER EVALUATION

<u>Value Engineering Alternative No. 1B:</u> ***Shift alignment south to avoid parking spaces at shopping center.***

<u>Advantages</u>

- Potential reduced right of way impacts on the north side

<u>Disadvantages</u>

- Increased right of way impacts to the south side

<u>Conclusion</u>

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

A. RIGHT OF WAY

Value Engineering Alternative No. 2: ***Consider changing the approach speed to the intersection from 40 mph to 35 mph and reduce median width.***

Advantages

- Possible reduction of Right of Way takes on both sides
- Increases traffic calming
- Changes the approach angle which can reduce the median width (added right of way savings)

Disadvantages

- Reduces design speed on Lantana
- Could affect Level of Service

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION

Value Engineering Alternative No. 3: ***Eliminate the bike lanes in the corridor.***

Advantages

- Eliminates Right of Way takes
- Reduces construction cost
- Reduces drainage needs

Disadvantages

- Does not accommodate bike lanes through facility

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

A. RIGHT OF WAY

Value Engineering Alternative No. 4: ***Revise the right turn to the solid waste agency (SWA).***

Advantages

- Eliminates Right of Way takes at that location
- Eliminate Right of Way take on opposite side

Disadvantages

- More traffic impacts on Lantana Road

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

B. BRIDGES

"Current Design": ***The current design is Alternative #2 DDI, utilizing two side by side bridges over I 95 replacing the existing bridge over I-95, and provides a new bridge over the SFRTA railroad. Also includes curved bridges at ramp terminus***

Advantages

- Spans the I-95 and Railroad
- Meets the railroad vertical clearance requirements
- Improves Capacity

Disadvantages

- Increased Construction Costs
- May not accommodate future I-95 future expansion beyond managed lanes

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

B. BRIDGES

<u>Value Engineering Alternative No. 5:</u> ***Eliminate Curved bridge and replace with pavement, fill and MSE wall (both ends).***

<u>Advantages</u>

- Lower construction cost
- Less future bridge maintenance and inspection

<u>Disadvantages</u>

- Maintenance of traffic during construction
- Requires increased drainage capacity requirements

<u>Conclusion</u>

CARRY FORWARD FOR FURTHER EVALUATION

<u>Value Engineering Alternative No. 6:</u> ***Modify existing ramp bridges and reduce RE wall.***

<u>Advantages</u>

- Lower construction cost
- Maintenance of traffic during construction
- Reduced construction time
- Decreased drainage capacity requirements

<u>Disadvantages</u>

- Possible more future bridge maintenance and inspection
- Possible reduced life cycle
- Does not correct vertical clearance requirements

<u>Conclusion</u>

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

B. BRIDGES

Value Engineering Alternative No. 7A: ***Eliminate sloped abutment and place retaining wall at right of way line.***

Advantages

- Lower construction cost
- Less future bridge maintenance and inspection

Disadvantages

- None apparent

Conclusion (*Retaining Wall is a preferred method for cost and long-term maintenance.*)

CARRY FORWARD FOR FURTHER EVALUATION

Value Engineering Alternative No. 7B: ***Eliminate sloped abutment and place retaining wall at west end of bridge.***

Advantages

- Lower construction cost
- Less future bridge maintenance

Disadvantages

- Additional Utility Relocations not noted in the concept plans
- Potential for higher costs, unknown at this time, due to railroad schedules and work stoppages.

Conclusion (*Retaining Wall is a preferred method for cost and long-term maintenance.*)

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

B. BRIDGES

<u>Value Engineering Alternative No. 7C:</u> ***Install a single span bridge over railroad tracks and maintenance area (access road) versus the two-span bridge.***

<u>Advantages</u>

- Reduction in impacts with the railway
- Reduction in maintenance cost long-term

<u>Disadvantages</u>

- Additional costs of maintenance, should the access road be constructed
- Additional utility relocation will be required to clear the area for the bridge construction.

<u>Conclusion</u> *(This option is viable and preferred should the access road option be developed.)*

DROPPED FROM FURTHER CONSIDERATION

<u>Value Engineering Alternative No. 8:</u> ***Build a new bridge to the south and modify existing bridge for north.***

<u>Advantages</u>

- Lower construction cost
- Reduce construction time
- Better maintenance of traffic

<u>Disadvantages</u>

- Possible future maintenance
- Does not correct substandard vertical clearance over railroad
- Possible would not meet required load rating

<u>Conclusion</u>

DROPPED FROM FURTHER CONSIDERATION

VII. EVALUATION PHASE

ADVANTAGES AND DISADVANTAGES

B. BRIDGES

Value Engineering Alternative No. 9*:** ***Consider retaining wall type from MSE wall to steel wall with concrete fascia.

Advantages

- Lower construction duration for the project due to quicker construction of the ramps.
- Lower costs in materials and time to construct.

Disadvantages

- Potential effects due to vibration of the sheet piles

Conclusion *(Sheet piling versus MSE Walls are technically equal. The sheet piling option is slightly less cost to construct with some indirect benefits. It is recommended the sheet pile method e allowed for at least an= bid option.)*

CARRY FORWARD FOR FURTHER EVALUATION

VII. EVALUATION PHASE

MIDPOINT REVIEW *SR-9/I-95 AT LANTANA ROAD (PALM BEACH COUNTY)* *MARCH 4, 2020*		
NAME	***AFFILIATION***	***PHONE***
William F. Ventry	VE Group, L.L.C.-Team Leader	850/627-3900
Del Younker	VE Group, L.L.C.	850/627-3900
Frank Ventry	VE Group, L.L.C.	850/627-3900
Dustin Sumner	FDOT	602/777-1553
Sanjay Singh	FDOT	954/298-7934
Matt Carlock	FDOT	561/370-1127
Mike Irwin	CARDNO	561/723-7669
Nicole Robson	FDOT	954/777-4075
James Vomacka	Propel Engineering	561/628-8734
Stephen Fisher	FDOT/ROW Valuation	954/777-4246
Mark Rodwell	FDOT/Right of Way	954/777-4291
Hui Shi, PE	FDOT/Drainage	954/777-4557
Mackenson Jonassaint	FDOT/Design	954/777-4473
Ricardo Dornelius	FDOT PLEMO	954/777-4296
Alexander Alvarez	FDOT	954/777-4448
Mark Renteria	FDOT	954/830-8786
Oscar Sosa	FDOT	954/777-4203
Maria Salgado	FDOT/Environmental	954/777-4286
Godfrey Lampley	GOAL Eng.	786/543-2037

VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

- **CURRENT DESIGN**
- **VALUE ENGINEERING ALTERNATIVE NO. 1A**
- **VALUE ENGINEERING ALTERNATIVE NO. 1B**
  (DROPPED AT MIDPOINT MEETING)
- **VALUE ENGINEERING ALTERNATIVE NO. 2**
- **VALUE ENGINEERING ALTERNATIVE NO. 3**
- **VALUE ENGINEERING ALTERNATIVE NO. 4**

B. BRIDGES

- **CURRENT DESIGN**
- **VALUE ENGINEERING ALTERNATIVE NO. 5**
  (DROPPED AT MIDPOINT MEETING)
- **VALUE ENGINEERING ALTERNATIVE NO. 6**
- **VALUE ENGINEERING ALTERNATIVE NO. 7A**
- **VALUE ENGINEERING ALTERNATIVE NO. 7B**
- **VALUE ENGINEERING ALTERNATIVE NO. 7C**
  (DROPPED DURING DEVELOPMENT PHASE)
- **VALUE ENGINEERING ALTERNATIVE NO. 8**
  (DROPPED AT MIDPOINT MEETING)
- **VALUE ENGINEERING ALTERNATIVE NO. 9**

C. DESIGN COMMENTS

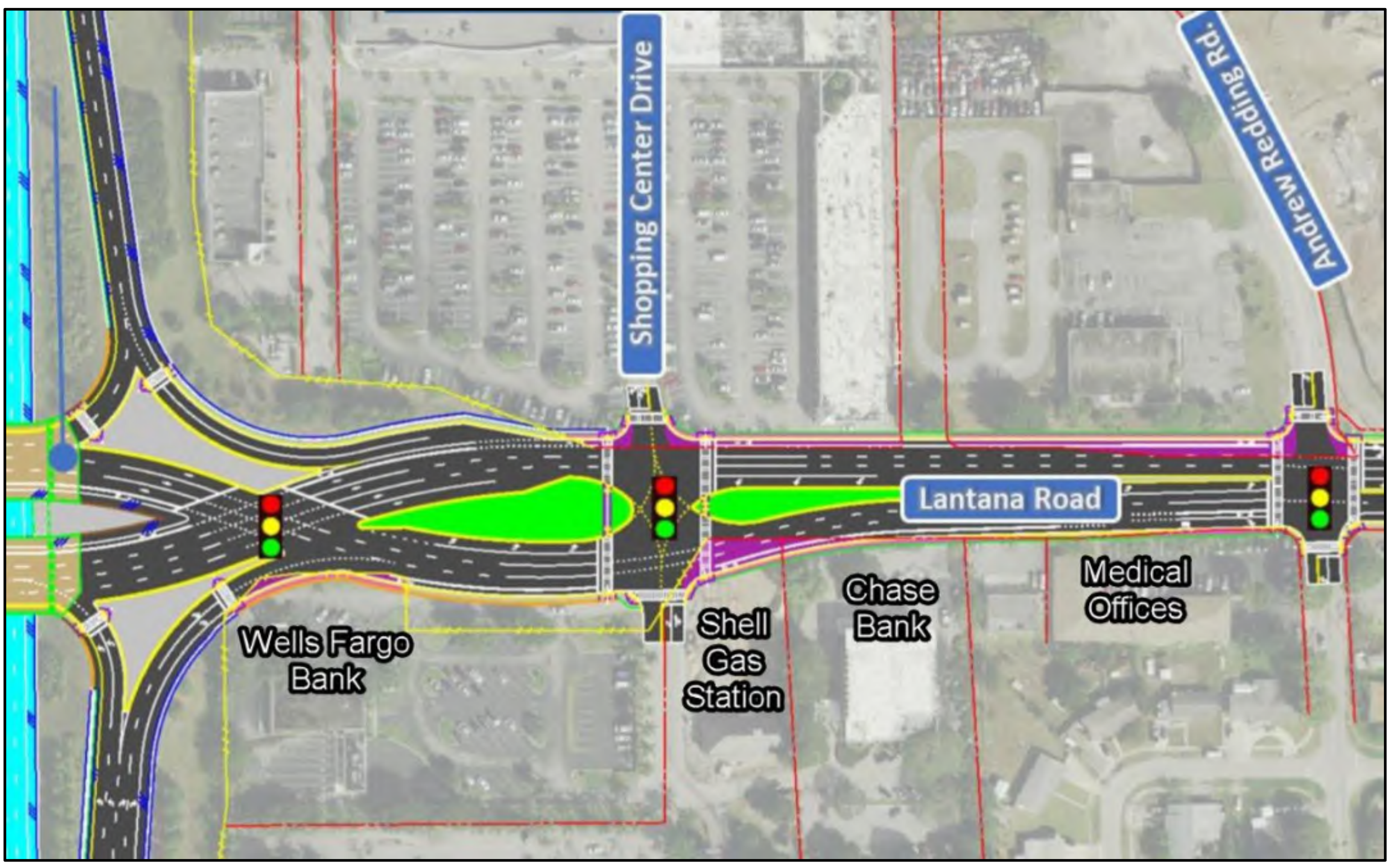
VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

"Current Design": ***Baseline Alignment of Lantana Road Impacts Right of Way of Shell Gas Station, Wells Fargo Bank, Chase Bank, Royal Mart, and Medical Offices on the South Side***

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study that proposes improvements to SR 9/I-95 at Lantana Road Interchange from High Ridge Road to Andrew Redding Road.

Baseline alignment east of I-95 interchange requires right of way from the Shell Gas Station, Wells Fargo Bank, Chase Bank and Medical Offices on the south side of Lantana Road. The existing underground fuel tanks for the Shell Gas station will be impacted resulting in loss of function for the gas station.

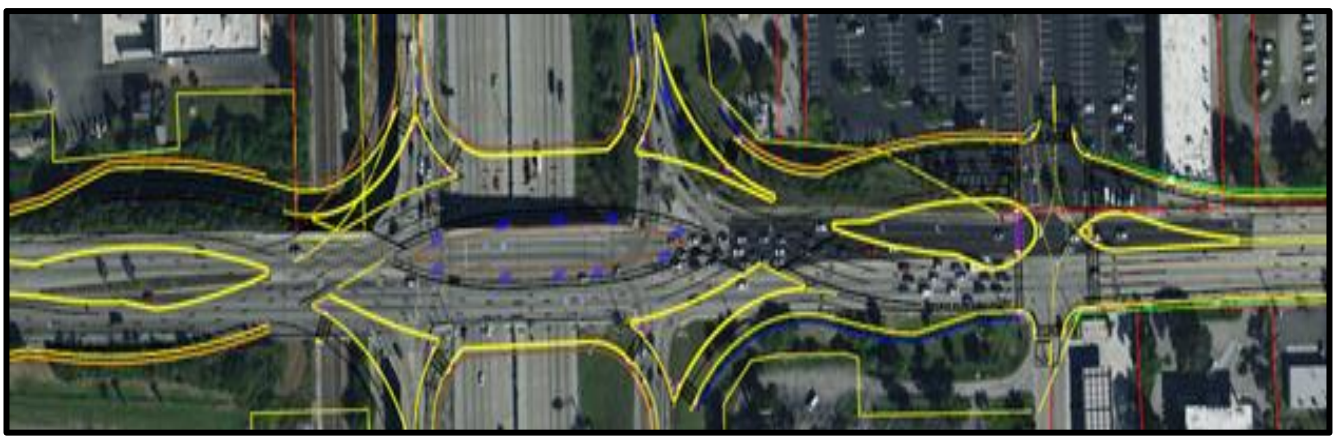


VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

Value Engineering Alternative No. 1A:	***Shift Alignment North to Avoid Shell Gas Station, Wells Fargo Bank, Chase Bank, Royal Mart, and Medical Offices.***

This alternative proposes to modify the alignment to minimize or avoid R/W on the south side of Lantana, in particular avoiding damages to the Shell Gas station. The proposed alignment would maintain eastbound Lantana Road on approximately the existing location and curve westbound Lantana Road to the north into the Publix shopping plaza.



RIGHT OF WAY

VALUE ENGINEERING ALTERNATIVE NO. 1A

COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Construction Cost from Consultant	LS	29,674,947	1	$29,674,947	1	$29,674,947
SUBTOTAL				**$29,674,947**		**$29,674,947**
MOBILIZATION		**10%**		$2,967,495		$2,967,495
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,611,395
CEI & DESIGN		**24.5%**		$7,270,362		$7,270,362
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	12,144,000	$12,144,000
GRAND TOTAL				**$62,324,199**		**$54,668,199**

POSSIBLE SAVINGS: $7,656,000

VIII. DEVELOPMENT PHASE

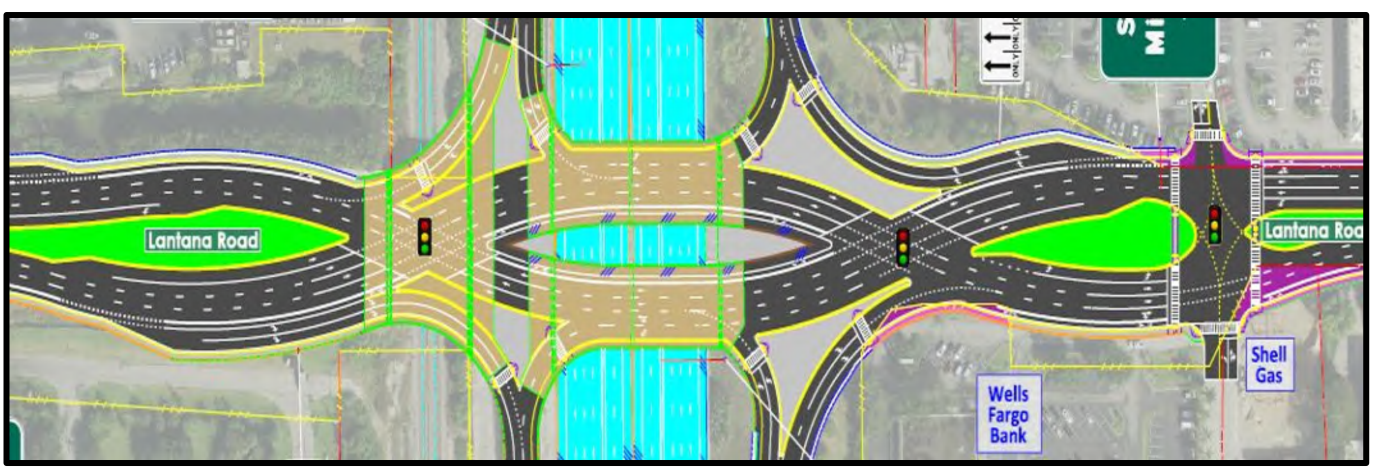
A. RIGHT OF WAY

"Current Design": ***Approach Speed to the Intersection 40 mph on Lantana Road at West of I-95 and Medium Width Up to 26 Feet.***

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study that proposes improvements to SR 9/I-95 at Lantana Road Interchange from High Ridge Road to Andrew Redding Road.

Design speed for Lantana Road within the project limits is 45mph with a posted speed of 40 mph. Lantana Road(Roadway ID: 93530000) extends approximately 0.57 miles from High Ridge Road (MP 2.861) to Andrew Redding Road (MP 3.430).The typical section consists of two 11-ft. travel lanes in each direction separated by either a traffic separator or raised landscape median. An exclusive right-turn lane and an inside left-turn lane are provided in the eastbound direction to connect to the SR 9/I-95 southbound on-ramp and northbound on-ramp respectively. The roadway has Type F curb and gutter along both sides of the pavement with 6-ft wide sidewalks on both sides adjacent to the curb and gutter. The right of way for this segment of Lantana Road varies with 110-ftminimum width. The typical section for this section of Lantana Road are provided below. East of SR 9/I-95, the typical section along Lantana Road consist of two travel lanes in each direction with 11to 12-ft lane widths separated by either a traffic separator or a painted median.

The median width varies from 16 feet to 26 feet on Lantana Road at the west side of I-95.



VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

Value Engineering Alternative No. 1B:	***Shift alignment south to avoid parking spaces at shopping center.***

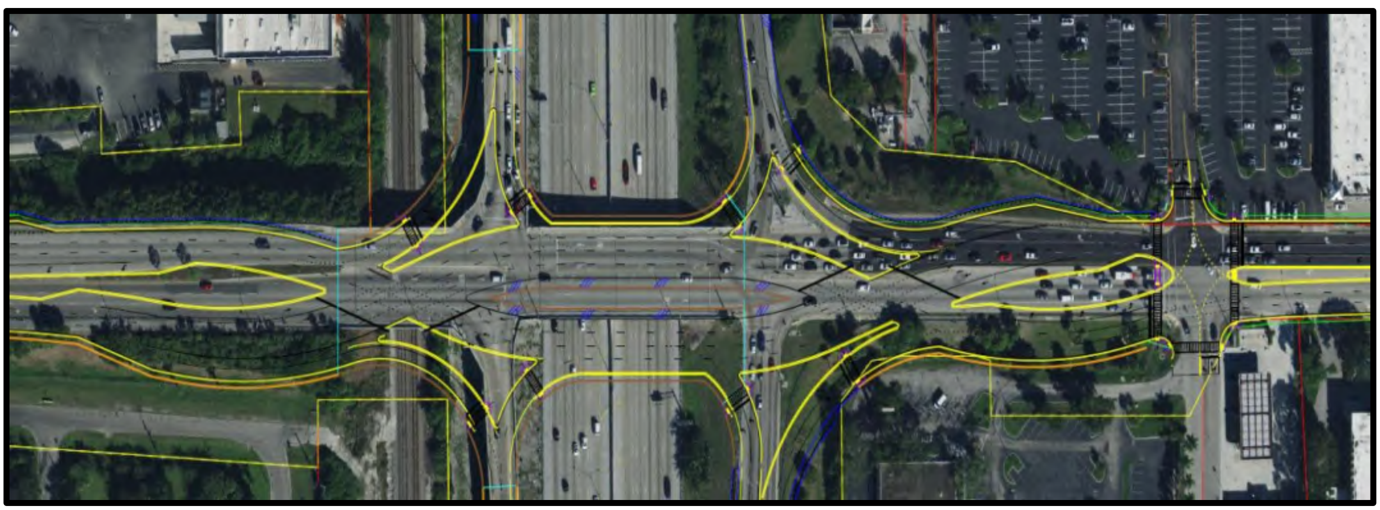
DROPPED AT MIDPOINT MEETING

VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

Value Engineering Alternative No. 2:	***Consider changing the approach speed to the intersection from 40 mph to 35 mph and reduce median width.***

This alternative reduces the design speed for the roadway geometry from 40 MPH to 35 MPH. The existing posted speed limit east of the intersection is 35 MPH. This alternative reduces the footprint of the roadway leading to a significant reduction in the R/W requirements.



RIGHT OF WAY
VALUE ENGINEERING ALTERNATIVE NO. 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Construction Cost from Consultant	LS	$29,674,947	1	$29,674,947	1	$29,674,947
SUBTOTAL				**$29,674,947**		**$29,674,947**
MOBILIZATION		**10%**		$2,967,495		$2,967,495
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,611,395
CEI & DESIGN		**24.5%**		$7,270,362		$7,270,362
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	3,811,000	$3,811,000
GRAND TOTAL				**$62,324,199**		**$46,335,199**

POSSIBLE SAVINGS: $15,989,000

VIII. DEVELOPMENT PHASE

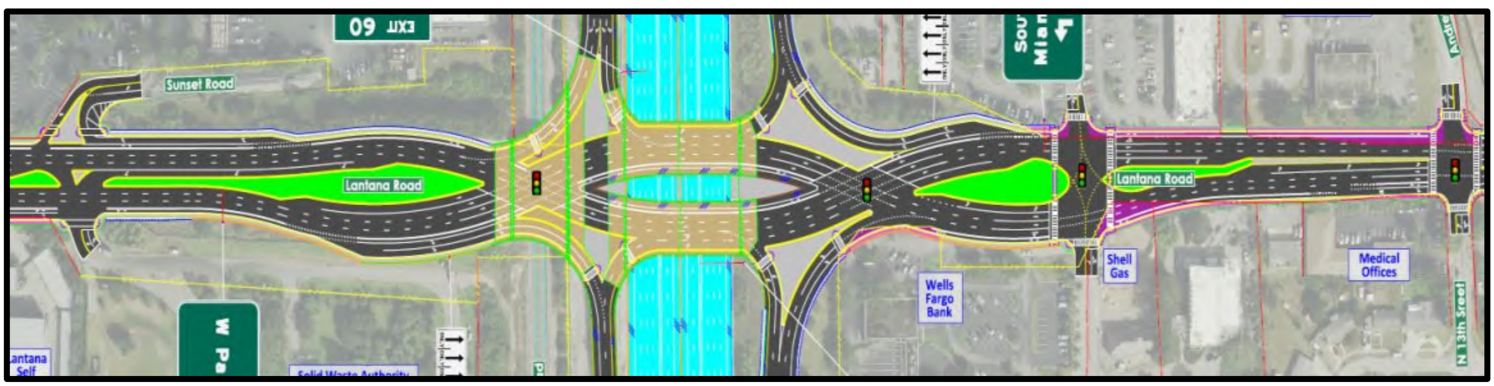
A. RIGHT OF WAY

"Current Design": ***7 Feet Bike Lanes in Both Directions Along Lantana Road.***

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study that proposes improvements to SR 9/I-95 at Lantana Road Interchange from High Ridge Road to Andrew Redding Road.

Currently there are no bicycle lanes along Lantana Road. The baseline proposes improved multi-modal facilities including 7 feet bicycle lanes along the Lantana Road corridor in both directions.

The typical section within the study limits consists of three 11-ft to 14-ft wide travel lanes in each direction. They are separated by a landscaped median of varying widths. A 7-ft bicycle lane is provided in each direction next to the roadway. 6-ft sidewalks provided along both sides of the roadway adjacent to the curb and gutter.



VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

Value Engineering Alternative No. 3: Eliminate the bike lanes in the corridor.

This alternative eliminates the bike lanes in both directions along Lantana Road. There are no existing bike lanes on Lantana Road on either side of the project. In addition, if this is incorporated along with Alternative No. 2 to reduce the design speed, sharrows can be used to accommodate bicycles.

RIGHT OF WAY VALUE ENGINEERING ALTERNATIVENO. 3 COST COMPARISON SHEET						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
Construction Cost from Consultant	LS	$29,674,947	1	$28,873,656	1	$28,873,656
Bike Lanes in each direction on pavement	LS	$1.00	275,868	$275,868	0	$0
Bike Lanes in each direction on Bridge	SF	$80.26	4,032	$323,608	0	$0
Bike Lanes in each direction on Bridge	SF	$83.81	2,408	$201,814	0	$0
SUBTOTAL				**$29,674,947**		**$28,873,656**
MOBILIZATION		**10%**		$2,967,495		$2,887,366
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,540,882
CEI & DESIGN		**24.5%**		$7,270,362		$7,074,046
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	17,048,000	$17,048,000
GRAND TOTAL				**$62,324,199**		**$58,423,949**
POSSIBLE SAVINGS:				**$3,900,250**		

VIII. DEVELOPMENT PHASE

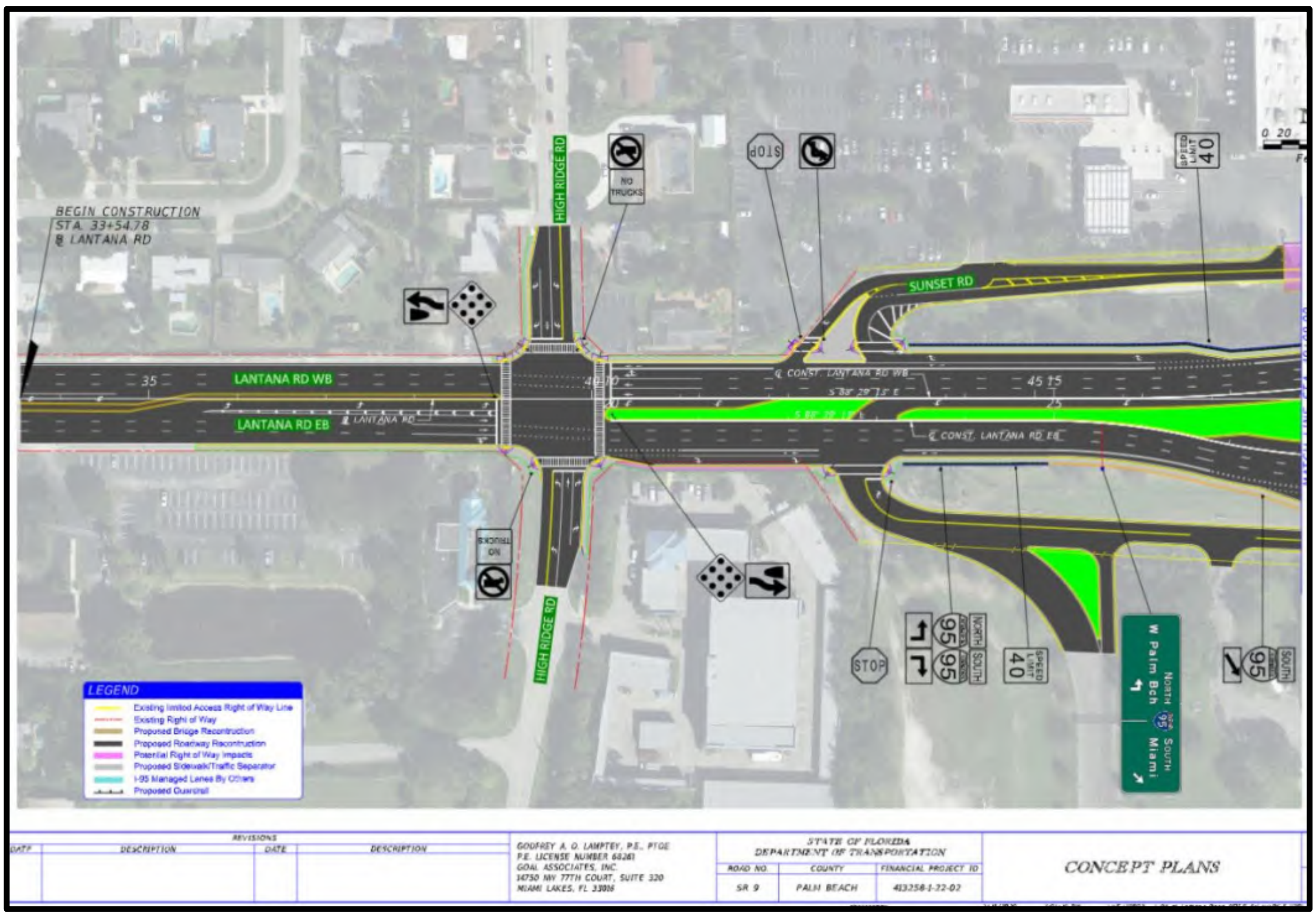
A. RIGHT OF WAY

“Current Design”:	***The Right Turn Lane to the Solid Waste Agency (SWA) Impacts Right of Way.***

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study that proposes improvements to SR 9/I-95 at Lantana Road Interchange from High Ridge Road to Andrew Redding Road.

The baseline proposes right turn lane to the Solid Waste Agency (SWA) from Sta. 40+00 to Sta. 43+00 on Lantana Road, which impacts Right of Way.

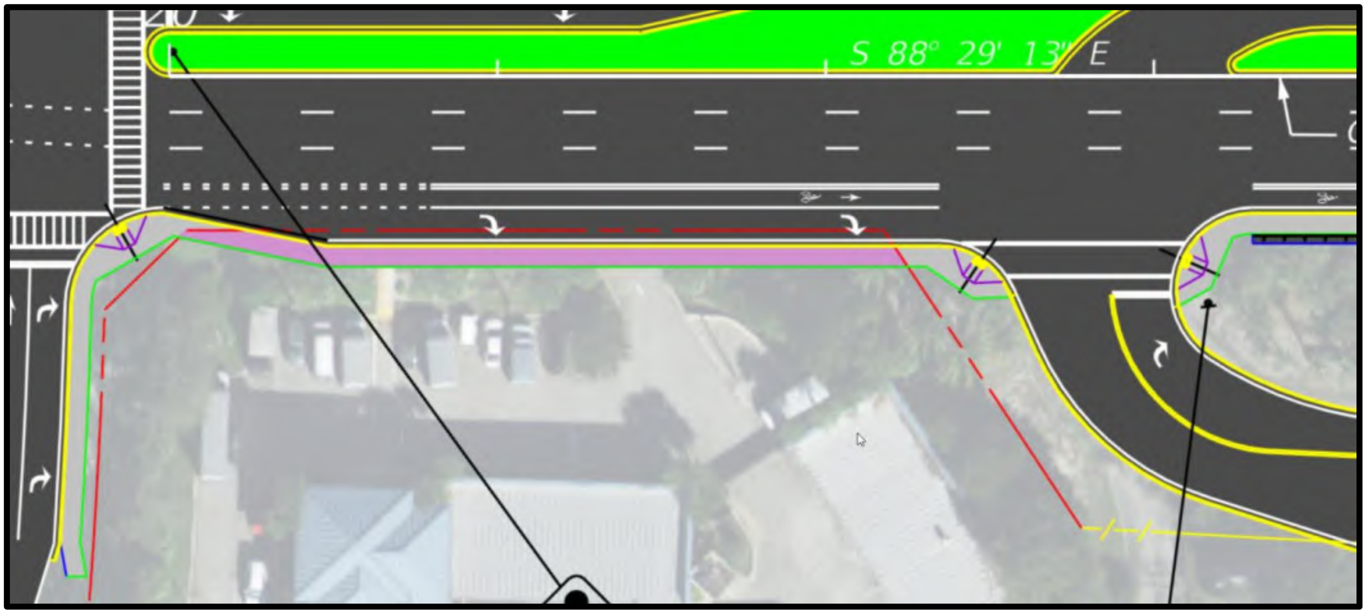
The typical section within the project limits consists of three 11-ft. to 14-ft. wide travel lanes in each direction. They are separated by a landscaped median of varying widths. A 7-ft. bicycle lane is provided in each direction next to the roadway. 6-ft. sidewalks provided along both sides of the roadway adjacent to the curb and gutter.

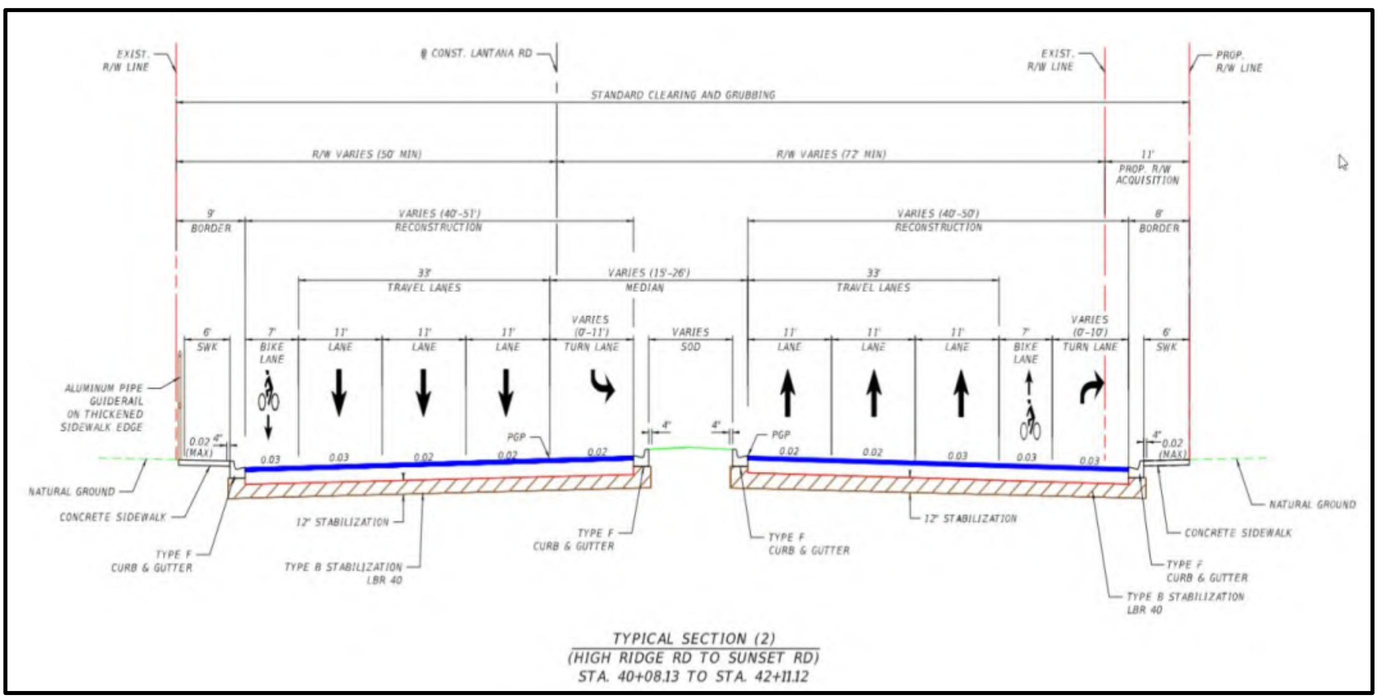


VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

"Current Design":	***The Right Turn Lane to the Solid Waste Agency (SWA) Impacts Right of Way.***



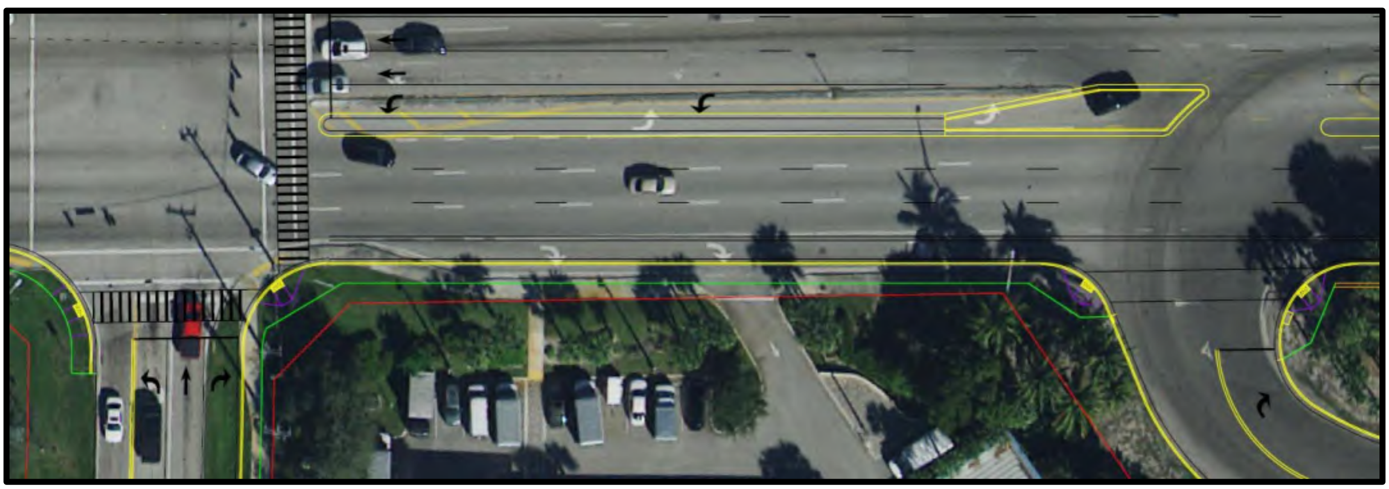


VIII. DEVELOPMENT PHASE

A. RIGHT OF WAY

Value Engineering Alternative No. 4:	*Revise the right turn to the solid waste agency (SWA).*

This alternative removes the eastbound right turn lane to the Solid Waste Authority (SWA) entrance. The outside lane on the eastbound approach to High Ridge Road is a right/thru lane. This configuration will continue to the SWA entrance and eliminate the exclusive right turn lane.



RIGHT OF WAY

VALUE ENGINEERING ALTERNATIVE NO. 4

COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Construction Cost from Consultant	LS	$29,674,947	1	$29,658,929	1	$29,658,929
Revise turn lane to SWA	LS	16,018	1	$16,018	0	$0
SUBTOTAL				**$29,674,947**		**$29,658,929**
MOBILIZATION		**10%**		$2,967,495		$2,965,893
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,609,986
CEI & DESIGN		**24.5%**		$7,270,362		$7,266,438
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	17,049,000	$17,049,000
GRAND TOTAL				**$62,324,199**		**$59,550,245**

POSSIBLE SAVINGS: $2,773,954

VIII. DEVELOPMENT PHASE

B. BRIDGES

"Current Design"

The proposed DDI concept for the interchange enhancement consists of replacing the bridges at Lantana Road/I-95 and Lantana Road/SFRC-CSX Railroad tracks, raising the elevation to accommodate vertical clearance requirements; 16.5 ft. for I-95 and 24.25 ft. for the railroad and converting the southbound on and off ramp to ramps supported by retaining wall.

In the concept, both southbound on and off ramps are built using retaining wall on both sides while no longer using both retaining wall and bridge.

Proposed Plan view of
I-95 Southbound Off-Ramp

Proposed Plan view of
I-95 Southbound On-Ramp

VIII. DEVELOPMENT PHASE

B. BRIDGES

Value Engineering Alternative No. 5:	***Eliminate Curved bridge and replace with pavement, fill and MSE wall (both ends).***

DROPPED AT MIDPOINT MEETING.

VIII. DEVELOPMENT PHASE

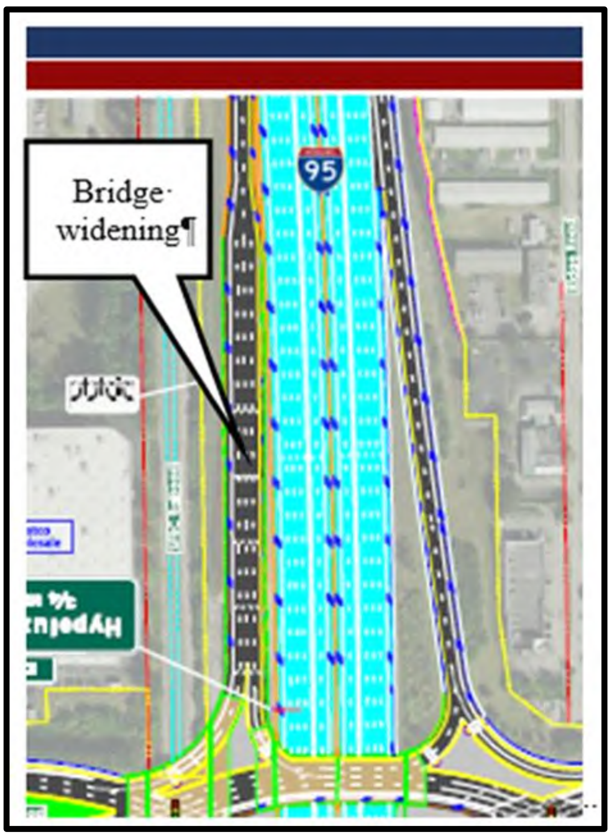
B. BRIDGES

Value Engineering Alternative No. 6: ***Modify existing ramp bridges and reduced RE wall.***

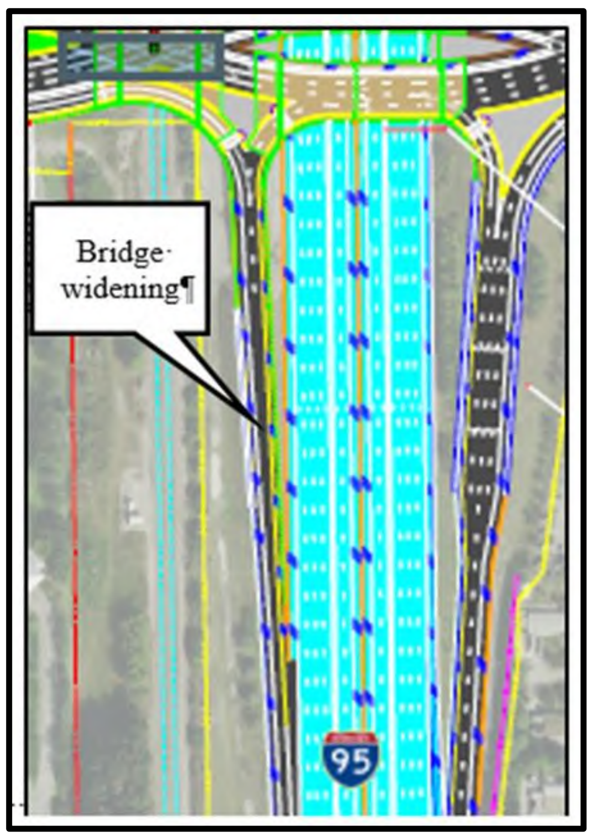
The intent of Value Engineering Alternative No. 6 is to utilize the existing bridge ramp structures for both the I-95 Southbound on and off ramps with CR-812/Lantana Road. With the utilization of the existing ramps, this alternative would then widen to the west side of the ramps.

On the I-95 Southbound Off-ramp, there was a recent widening project along the east side of the ramp to provide an additional lane which was completed in 2014. This proposed concept would capitalize on this recent work and focus the widening on the west side of the ramp.

This concept provides benefits to the traveling public in both reduced construction costs as well as reduced construction time throughout the life of the project. There is also a reduction in traffic control costs due to reduced phasing of the work.



Alternative Plan view of I-95 Southbound Off-Ramp



Alternative Plan view of I-95 Southbound On-Ramp

BRIDGES
VALUE ENGINEERING ALTERNATIVE NO. 6
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Construction Cost from Consultant	LS	29,674,947	1	$26,836,949	1	$26,836,949
Retaining Walls Component Total	SF	27	20,299	$542,795	1	$27
Bridge Demolition Cost	SF	$35.00	26,000	$910,000		$0
Earthwork	CY	$17.48	22,669	$396,254	0	$0
Drainage	CY	$0.33	3,172,000	$1,046,760	0	$0
Roadway	LS	$1,189,450	1	$1,189,450	0	$0
Bridge Removal Cost (Ramp A&B)	SF	$160.00		$0	3,200	$512,000
Bridge Widening	SF	$142.00		$0	10,880	$1,544,960
Roadway Component (Widen Ramp A On)	LS	$105,337	1	$105,337	0	$0
Roadway Component (Widen Ramp B Off)	LS	$233,106	1	$233,106	0	$0
SUBTOTAL				**$31,260,651**		**$28,893,935**
MOBILIZATION		**10%**		$3,126,065		$2,889,394
MAINTENANCE OF TRAFFIC		**8%**		$2,750,937		$2,542,666
CEI & DESIGN		**24.5%**		$7,658,860		$7,079,014
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	19,800,000	$19,800,000
GRAND TOTAL				**$64,596,513**		**$61,205,010**

POSSIBLE SAVINGS: $3,391,504

I-95 AT LANTANA DDI ALT. #2

75 Year Life Cycle Cost Comparison

Enter the Interest Rate = 5%

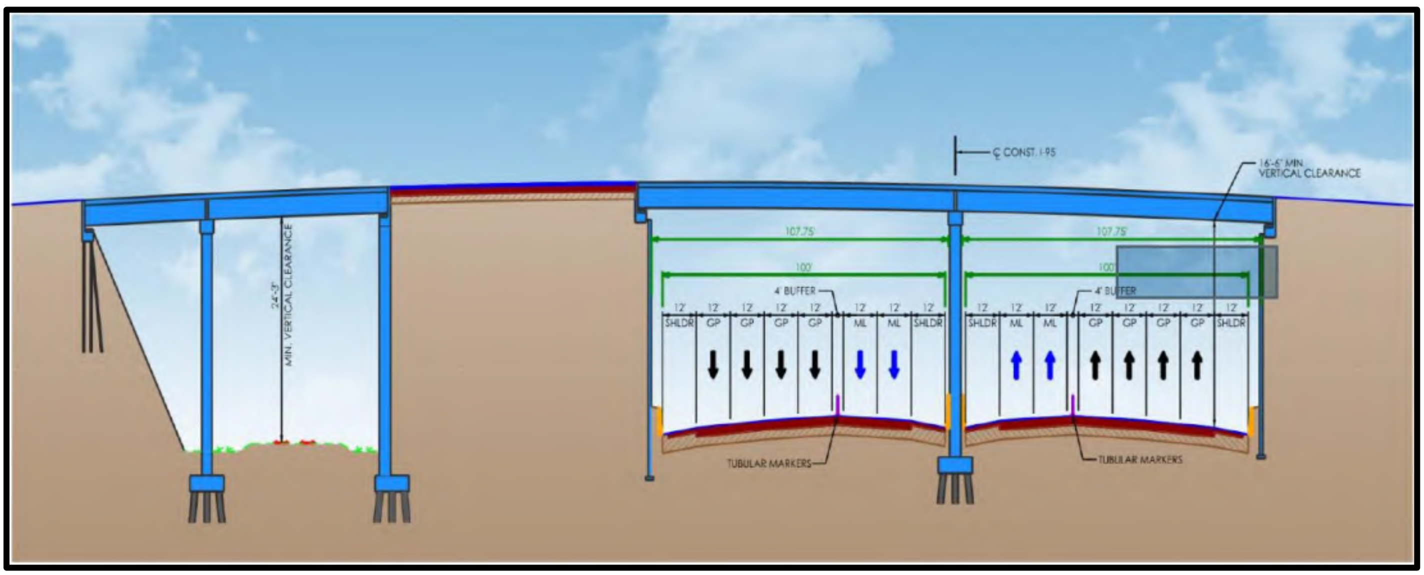
Year		CURRENT DESGIN		ALT 6	
		Total	Present Worth	Total	Worth
0	INITIAL COST	$6,303,778	-$6,303,778	$2,931,207	-$2,931,207
1	OPS/MAINT	$2,500	-$2,381	$5,000	-$4,762
2	OPS/MAINT	$2,500	-$2,268	$5,000	-$4,535
3	OPS/MAINT	$2,500	-$2,160	$5,000	-$4,319
4	OPS/MAINT	$2,500	-$2,057	$5,000	-$4,114
5	OPS/MAINT	$2,500	-$1,959	$5,000	-$3,918
6	OPS/MAINT	$2,500	-$1,866	$5,000	-$3,731
7	OPS/MAINT	$2,500	-$1,777	$5,000	-$3,553
8	OPS/MAINT	$2,500	-$1,692	$5,000	-$3,384
9	OPS/MAINT	$2,500	-$1,612	$5,000	-$3,223
10	OPS/MAINT	$2,500	-$1,535	$5,000	-$3,070
11	OPS/MAINT	$2,500	-$1,462	$5,000	-$2,923
12	OPS/MAINT	$2,500	-$1,392	$5,000	-$2,784
13	OPS/MAINT	$2,500	-$1,326	$5,000	-$2,652
14	OPS/MAINT	$2,500	-$1,263	$5,000	-$2,525
15	OPS/MAINT	$2,500	-$1,203	$5,000	-$2,405
16	OPS/MAINT	$2,500	-$1,145	$5,000	-$2,291
17	OPS/MAINT	$2,500	-$1,091	$5,000	-$2,181
18	OPS/MAINT	$2,500	-$1,039	$5,000	-$2,078
19	OPS/MAINT	$2,500	-$989	$5,000	-$1,979
20	OPS/MAINT	$2,500	-$942	$5,000	-$1,884
21	OPS/MAINT	$2,500	-$897	$5,000	-$1,795
22	OPS/MAINT	$2,500	-$855	$5,000	-$1,709
23	OPS/MAINT	$2,500	-$814	$5,000	-$1,628
24	OPS/MAINT	$2,500	-$775	$5,000	-$1,550
25	OPS/MAINT	$2,500	-$738	$5,000	-$1,477
26	OPS/MAINT	$2,500	-$703	$5,000	-$1,406
27	OPS/MAINT	$2,500	-$670	$5,000	-$1,339
28	OPS/MAINT	$2,500	-$638	$5,000	-$1,275
29	OPS/MAINT	$2,500	-$607	$5,000	-$1,215
30	OPS/MAINT	$2,500	-$578	$5,000	-$1,157
31	OPS/MAINT	$2,500	-$551	$5,000	-$1,102
32	OPS/MAINT	$2,500	-$525	$5,000	-$1,049
33	OPS/MAINT	$2,500	-$500	$5,000	-$999
34	OPS/MAINT	$2,500	-$476	$5,000	-$952
35	OPS/MAINT	$2,500	-$453	$5,000	-$906
36	OPS/MAINT	$2,500	-$432	$5,000	-$863
37	OPS/MAINT	$2,500	-$411	$5,000	-$822
38	OPS/MAINT	$2,500	-$392	$5,000	-$783
39	OPS/MAINT	$2,500	-$373	$5,000	-$746
40	OPS/MAINT	$2,500	-$355	$5,000	-$710
41	OPS/MAINT	$2,500	-$338	$6,303,778	-$852,785
42	OPS/MAINT	$2,500	-$322	$2,500	-$322
43	OPS/MAINT	$2,500	-$307	$2,500	-$307
44	OPS/MAINT	$2,500	-$292	$2,500	-$292
45	OPS/MAINT	$2,500	-$278	$2,500	-$278
46	OPS/MAINT	$2,500	-$265	$2,500	-$265
47	OPS/MAINT	$2,500	-$252	$2,500	-$252
48	OPS/MAINT	$2,500	-$240	$2,500	-$240
49	OPS/MAINT	$2,500	-$229	$2,500	-$229
50	OPS/MAINT	$2,500	-$218	$2,500	-$218
51	OPS/MAINT	$2,500	-$208	$2,500	-$208
52	OPS/MAINT	$2,500	-$198	$2,500	-$198
53	OPS/MAINT	$2,500	-$188	$2,500	-$188
54	OPS/MAINT	$2,500	-$179	$2,500	-$179
55	OPS/MAINT	$2,500	-$171	$2,500	-$171
56	OPS/MAINT	$2,500	-$163	$2,500	-$163
57	OPS/MAINT	$2,500	-$155	$2,500	-$155
58	OPS/MAINT	$2,500	-$148	$2,500	-$148
59	OPS/MAINT	$2,500	-$141	$2,500	-$141
60	OPS/MAINT	$2,500	-$134	$2,500	-$134
61	OPS/MAINT	$2,500	-$127	$2,500	-$127
62	OPS/MAINT	$2,500	-$121	$2,500	-$121
63	OPS/MAINT	$2,500	-$116	$2,500	-$116
64	OPS/MAINT	$2,500	-$110	$2,500	-$110
65	OPS/MAINT	$2,500	-$105	$2,500	-$105
66	OPS/MAINT	$2,500	-$100	$2,500	-$100
67	OPS/MAINT	$2,500	-$95	$2,500	-$95
68	OPS/MAINT	$2,500	-$91	$2,500	-$91
69	OPS/MAINT	$2,500	-$86	$2,500	-$86
70	OPS/MAINT	$2,500	-$82	$2,500	-$82
71	OPS/MAINT	$2,500	-$78	$2,500	-$78
72	OPS/MAINT	$2,500	-$75	$2,500	-$75
73	OPS/MAINT	$2,500	-$71	$2,500	-$71
74	OPS/MAINT	$2,500	-$68	$2,500	-$68
75	OPS/MAINT	$2,500	-$64	$2,500	-$64
76	SALVAGE	$0	$0	-$3,446,065	$84,516
			-$6,352,490		**-$3,790,749**
		LCC SAVINGS			**$2,561,742**

VIII. DEVELOPMENT PHASE

B. BRIDGES

"Current Design"

The as proposed concept proposes to replace the existing single Lantana Road bridge over I-95 and SFRC/CSX Railroad and provide two separate bridges over SR 9/I-95 and SFRC/CSX Railroad to satisfy the Diverging Diamond Interchange. The current bridge consists of a cast-in-place (CIP) deck supported on AASHTO type II and IV beams. Span numbers one and two of the existing bridge span over SFRX/CSX Railroad underneath Lantana Road and will be replaced with a new similar bridge. The new bridge will have a vertical clearance of 24 ft.-3 inches to satisfy South Florida Rail Corridor (SFRC) requirements. A Mechanically Stabilized Earth (MSE) wall will be placed on the east side of the railroad track, and the existing sloped embankment to the west side will remain.



Typical Section – I-95 and SFRC/CSX Railroad underneath Lantana Road

VIII. DEVELOPMENT PHASE

B. BRIDGES

Value Engineering Alternative No. 7A:	*Eliminate sloped abutment at Railroad Bridge and put MSE wall at Railroad R/W.*

This alternative consists of removing the sloped abutment that the PD&E team is proposing on the Lantana Road just before the Railroad Bridge. A Mechanically Stabilized Earth (MSE) wall will be placed on the west side of the railroad track. The intent is to eliminate the need for the bridge on the west side of the railroad.

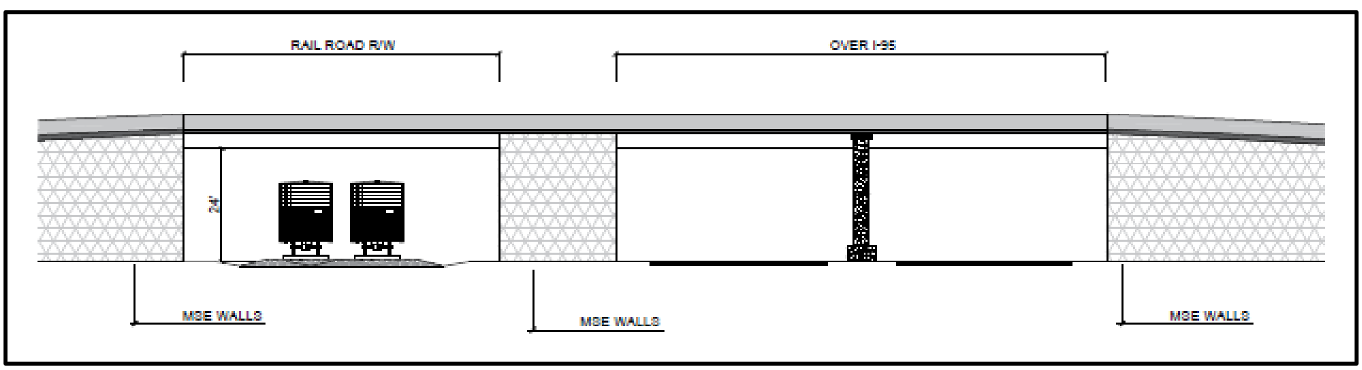
<u>Advantages</u>

- Reduction of construction cost
- Simple and faster construction than pile.
- Reduces the use of heavy equipment.
- Reduces excavation works for footings.
- Less future maintenance and inspection
  The cost of the bridge was calculated based on Structures Design Guidelines 2020 (9-BDR Cost Estimating)

  The cost of the MSE wall was calculated using Pay item 548-12 of FDOT Basic of Pay Item.

<u>Disadvantages</u>

- Eliminating the ability to install the access road underneath Lantana Road.



Proposed typical section with retaining wall at railroad right of way

BRIDGES **VALUE ENGINEERING ALTERNATIVE NO. 7A** **COST COMPARISON SHEET**						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
Construction Cost from Consultant	LS	28,475,129.50	1	$28,475,130	1	$28,475,130
Bridge Cost (170x10.33)	SF	175.00	6,856	$1,199,818		$0
MSE Wall (170x24.25	SF	26.74		$0	4,123	$110,236
SUBTOTAL				**$29,674,947**		**$28,585,365**
MOBILIZATION		**10%**		$2,967,495		$2,858,537
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,515,512
CEI & DESIGN		**24.50%**		$7,270,362		$7,003,414
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	19,800,000	$19,800,000
GRAND TOTAL				**$62,324,199**		**$60,762,828**

POSSIBLE SAVINGS: $1,561,371

VIII. DEVELOPMENT PHASE

B. BRIDGES

Value Engineering Alternative No. 7B:	***Eliminate sloped abutment at Railroad Bridge and put MSE wall at western abutment.***

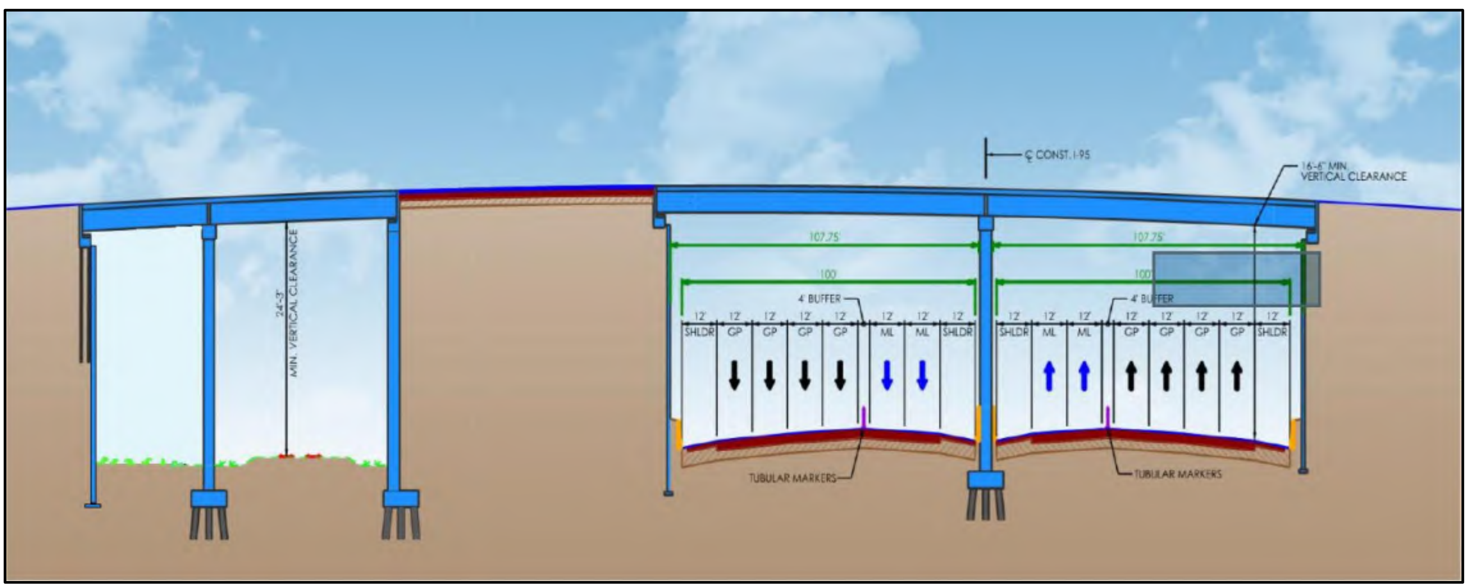
Alternative 7 explores the option of removing the existing sloped embankment to the west side of the Railroad underneath the Lantana Road bridge and replace it with a Mechanically Stabilized Earth (MSE) wall. The intent of this alternative is to provide adequate space for an underpass access road connecting Costco and Solid Waste Authority. In comparison to the proposed design, this alternative replaces the sloped embankment with an MSE wall.

Advantages:

- Provides access road for both Costco and Solid Waste Authority
- Increases safety

Disadvantages:

- Increase cost due to MSE wall



Typical Section – I-95 and SFRC/CSX Railroad underneath Lantana Road

BRIDGES

VALUE ENGINEERING ALTERNATIVE NO. 7B

COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Construction Cost from Consultant	LS	29,674,947	1	$29,674,947	1	$29,674,947
MSE Wall (170x24.25	SF	26.74		$0	4,123	$110,236
Removal of Sloped Embankment	CY	$7.58		$0	3,082	$23,362
SUBTOTAL				**$29,674,947**		**$29,808,544**
MOBILIZATION		**10%**		$2,967,495		$2,980,854
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,623,152
CEI & DESIGN		**24.5%**		$7,270,362		$7,303,093
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	19,800,000	$19,800,000
GRAND TOTAL				**$62,324,199**		**$62,515,644**

POSSIBLE INCREASE: -$191,445

VIII. DEVELOPMENT PHASE

B. BRIDGES

Value Engineering Alternative No. 7C:	***Install a single span bridge over railroad tracks and maintenance area (access road) versus the two-span bridge.***

DROPPED DURING DEVELOPMENT

VIII. DEVELOPMENT PHASE

B. BRIDGES

Value Engineering Alternative No. 8:	***Build a new bridge to the south and modify existing bridge for north.***

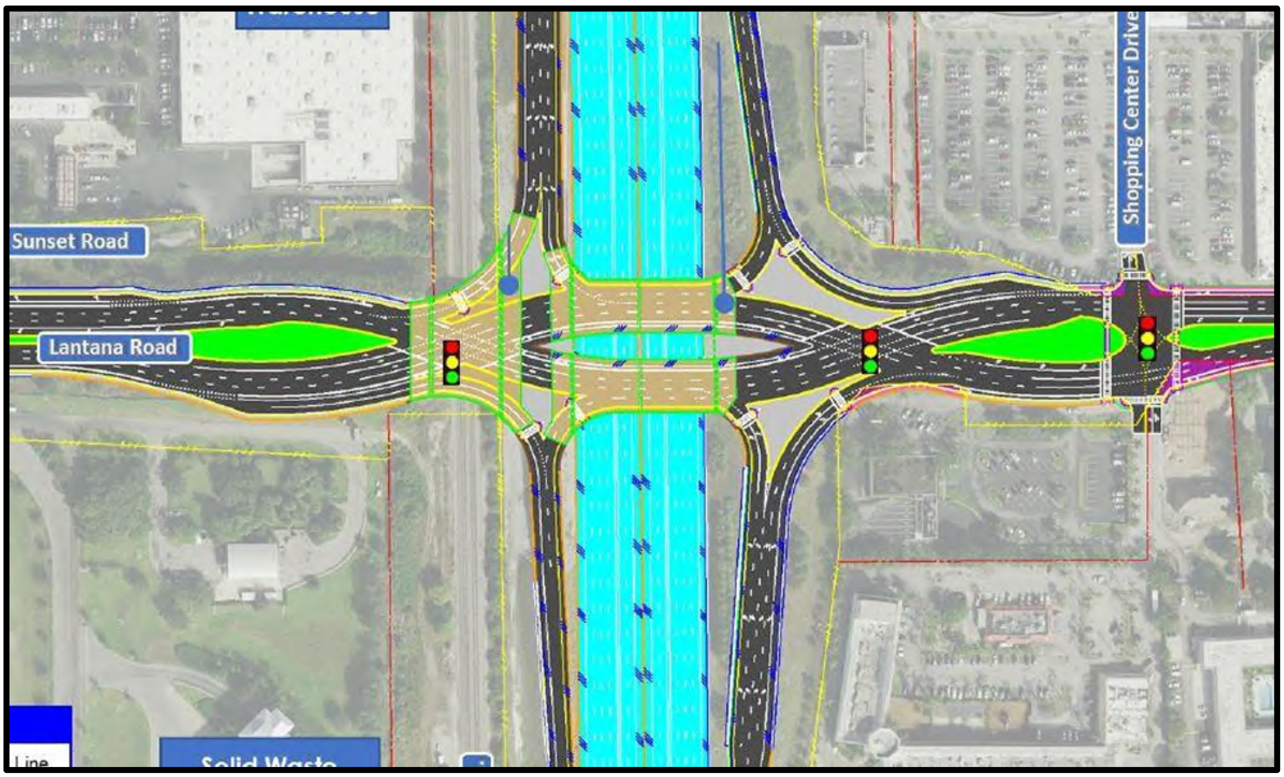
DROPPED AT MIDPOINT MEETING.

VIII. DEVELOPMENT PHASE

B. BRIDGES

"Current Design"

The proposed DDI concept for the interchange enhancement consists of replacing the bridges at Lantana Road/I-95 and Lantana Road/SFRC-CSX Railroad tracks, raising the elevation to accommodate vertical clearance requirements; 16.5 ft. for I-95 and 24.25 ft. for the railroad. The concept provides 3 separate structures, connecting to Lantana Road and the southbound on/off ramps, founded by MSE Walls.



Proposed plan view of interchange

VIII. DEVELOPMENT PHASE

B. BRIDGES

Value Engineering Alternative No. 9:	***Consider retaining wall type from MSE wall to steel wall with concrete facia.***

The alteration includes the utilization of steel sheet pile walls with concrete facing in lieu of MSE walls for the southbound on and off ramps. Not only will this option provide a benefit in lower cost to construct, but also will provide the benefits of reduced mobilization costs of staging and storage as well as a faster method of construction, reducing project duration.

Proposed view of steel wall with concrete facia

BRIDGES **VALUE ENGINEERING ALTERNATIVE NO. 9** **COST COMPARISON SHEET**						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
Construction Cost from Consultant	LS	29,674,947	1	$28,813,165	1	$28,813,165
Retaining Wall System Ex Barrier	SF	26.74	20,299	$542,795		$0
Retaining wall Barrier	CY	$211.11	1,511	$318,987		$0
Sheet Wall Perm	SF	$36.00		$0	20,299	$730,764
SUBTOTAL				**$29,674,947**		**$29,543,929**
MOBILIZATION		**10%**		$2,967,495		$2,954,393
MAINTENANCE OF TRAFFIC		**8%**		$2,611,395		$2,599,866
CEI & DESIGN		**24.5%**		$7,270,362		$7,238,262
RIGHT OF WAY	LS	**1**	19,800,000	$19,800,000	19,800,000	$19,800,000
GRAND TOTAL				**$62,324,199**		**$62,136,450**
POSSIBLE SAVINGS:					**$187,749**	

VIII. DEVELOPMENT PHASE

C. DESIGN COMMENTS

- Eliminate Costco truck traffic through residential streets (design comments)
- Match typical section for I-95 managed lanes
- For Frontage Road - Avoid the pumping station and generator at Costco
- Review the bridge beams for more economical sizes
- Use post tension slabs ILO beams
- Pedestrian in the median through DDI (eliminate pedestrian crossings)
- Verify that the Federal Greenbook meets the FDOT Design Standards

IX. FINAL PRESENTATION ATTENDEE SHEET

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VALUE ENGINEERING STUDY PRESENTATION

SR 9/I-95 AT LANTANA ROAD (Palm Beach County)

MARCH 6, 2020

NAME	AFFILIATION	PHONE
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VALUE ENGINEERING STUDY PRESENTATION *SR 9/I-95 AT LANTANA ROAD (Palm Beach County)* *MARCH 6, 2020*		
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Ivana Robinson	FDOT R/W	4236
Yenny O. Soca	FDOT Design	4193
Molly Winn	FDOT PLEMO	4342
Megan Beck	"	4245
David De Torres	FDOT D4	
Lynne Cachet	FDOT D4	4201
Tony Castro	FDOT Maint.	x4449
Vinita Saini	FDOT	#4468

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VALUE ENGINEERING STUDY PRESENTATION SR 9/I-95 AT LANTANA ROAD (Palm Beach County) MARCH 6, 2020		
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Helen James	FDOT DESIGN	4346
Gerri O'Reilly	FDOT	
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Anne Petit Frere	FDOT R/W	
Marvin Joseph	FDOT Design	
Brian Campbell	R/W FDOT	
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Henry Oaikhena	FDOT	4445
Istvan Viras	FDOT	4369
RUBEN RODRIGUEZ	"	4461
Robert Lopes	FDOT	4425
Vandana Nagole	FDOT	4287

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VALUE ENGINEERING STUDY PRESENTATION SR 9/I-95 AT LANTANA ROAD (Palm Beach County) MARCH 6, 2020		
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Farhad Raof	FDOT/Design	X 4684
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DAWN RADUANO	FDOT/LEGAL	4508
Scott Thurman	FDOT/DESIGN	4135
Chris Clunk	FDOT/BOPS	
HAIYAN Ou	FDOT/Design	4641
Christopher Lee	FDOT/PLEMO	
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SHANORA DAVIS	FDOT PLEMO	7896
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FDOT

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

KEVIN J. THIBAULT, P.E.
SECRETARY

MEMORANDUM

Date: April 20, 2020 (Revised July 8, 2020)

To: Kadian McLean, District Utility / VE Administrator

From: Steven C. Braun, P.E. Director of Transportation Development

Copies: John Olson, P.E., Robert Bostian, P.E., Vandana Nagole, P.E., VE Team Members

Subject: **Value Engineering Study Responses**
SR 9/I-95 at Lantana Road PD&E Study
Palm Beach County
Financial Project ID: 413258-1-22-02

This memorandum is in response to the subject Value Engineering (VE) review conducted during the week of March 2, 2020 to March 6, 2020. We appreciate the VE Team's efforts in reviewing the project and putting forth cost savings or value-added recommendations. This memorandum memorializes our responses to the recommendations contained in the draft Value Engineering Report. The VE Team generated 12 ideas during the Creative Ideas phase of the VE Job Plan and concluded with nine (8) VE Recommendations, as described below.

VE RECOMMENDATION NO. 1A:

Shift Alignment North to Avoid Shell Gas Station, Wells Fargo Bank, Chase Bank, Royal Mart, and Medical Offices.

VE Recommended Change:

Modify the alignment to minimize or avoid R/W on the south side of Lantana, in particular avoiding damages to the Shell Gas station. The proposed alignment would maintain eastbound Lantana Road on approximately the existing location and curve westbound Lantana Road to the north into the Publix shopping plaza.

PD&E Proposed:

The proposed alignment east of I-95 interchange requires right of way from the Shell Gas Station, Wells Fargo Bank, Chase Bank and Medical Offices on the south side of Lantana Road. This will impact the existing underground fuel tanks for the Shell Gas station resulting in loss of function for the gas station.

PD&E Design Response: Accepted

The VE Recommendation will eliminate impacts to the Shell Gas Station resulting in significant right of way cost savings. This recommendation needs to be combined with VE Recommendation No. 2 to minimize right of way impact to the Lantana Shopping Center.

VE RECOMMENDATION NO. 2:

Consider changing the approach speed to the intersection from 40 mph to 35 mph and reduce median width.

VE Recommended Change:

Reduce the design speed for the roadway geometry from 40 MPH to 35 MPH. The existing posted speed limit east of the intersection is 35 MPH. This alternative reduces the footprint of the roadway leading to a significant reduction in the right of way requirements.

PD&E Proposed:

The PD&E DDI Design is based on 40 mph design speed.

PD&E Design Response:

The study team has prepared a design speed memorandum with a recommendation to modify the design speed to 35mph. If approved, the VE recommendation will be accepted.

VE RECOMMENDATION NO. 3:

Eliminate the bike lanes in the corridor.

VE Recommended Change:

Eliminate the bike lanes in both directions along Lantana Road. There are no existing bike lanes on Lantana Road on either side of the project. In addition, if this is incorporated along with VE Recommendation No. 2 to reduce the design speed, sharrows can be used to accommodate bicycles.

PD&E Proposed:

The proposed concept provides 7 ft buffered bike lanes per the requirements of the FDM, Florida Green Book and Palm Beach County Thoroughfare Road Typical Sections.

PD&E Design Response: Rejected

The recommendation does not meet the purpose and need of the project which includes providing for multimodal accommodations within the interchange area including bicycle lanes.

VE RECOMMENDATION NO. 4:

Revise the right turn to the Solid Waste Authority (SWA)

VE Recommended Change:

Remove the eastbound right turn lane to the Solid Waste Authority (SWA) entrance. The outside lane on the eastbound approach to High Ridge Road is a right/thru lane. This configuration will continue to the SWA entrance and eliminate the exclusive right turn lane.

PD&E Proposed:

The proposed concept maintains the existing 10' exclusive right turn lane serving the Solid Waste Authority (SWA) Central Transfer Station.

PD&E Design Response: Rejected

The existing right turn lane is used by trucks to access Solid Waste Authority (SWA) Central Transfer Station. Elimination of this right turn lane will result in slow moving trucks impeding the traffic flow.

VE RECOMMENDATION NO. 5:

Modify existing ramp bridges and reduced MSE wall.

VE Recommended Change:

Utilize the existing bridge ramp structures for both the I-95 Southbound on and off ramps to Lantana Road. With the utilization of the existing ramps, this alternative would then widen to the west side of the ramps.

PD&E Proposed:

The PD&E Concept consists of replacing the Lantana Road bridge over I-95 and SFRC/CSX Railroad to accommodate the DDI configuration. The new bridge elevation will be set higher to accommodate the vertical clearance requirements of 16.5 ft over I-95 and 24.25 ft over for the railroad. The existing southbound on and off ramp will be replaced with embankment supported by MSE retaining walls.

PD&E Design Response: Rejected

The new Lantana Road bridge over I-95 will be constructed approximately 2.5 ft higher elevation to meet the vertical clearance requirement over the SFRC/CSX Railroad. The existing ramp bridges are at a lower elevation and will not tie into the new bridge. Due to the new profile, widening of the ramp bridges would require jacking/raising the existing bridges. The existing ramp bridges have multiple spans thus jacking/raising of ramp bridges would be time consuming and costly. As such the ramp bridges will be reconstructed using MSE walls as proposed under the PD&E Concept and will result in a lower cost.

VE RECOMMENDATION NO. 7A & 7B:

7A: Eliminate sloped abutment and place retaining wall at the right of way line.
7B: Eliminate sloped abutment and place retaining wall at west end of bridge.

VE Recommended Change:

Remove the sloped abutment the proposed sloped embankment to the west side of the Railroad underneath the Lantana Road bridge and replace it with a Mechanically Stabilized Earth (MSE) wall to provide adequate space for an underpass service road connecting Costco and Solid Waste Authority.

PD&E Proposed:

The PD&E Concept replaces the existing single Lantana Road bridge over I-95 and SFRC/CSX Railroad and provide two separate bridges over SR 9/I-95 and SFRC/CSX Railroad to accommodate the Diverging Diamond Interchange.

PD&E Design Response: Accepted

The proposed bridge over the SFRC/CSX Railroad would utilize MSE wall on the west side of the railroad right of way. As recommended in the VE Report. This will minimize the bridge length and also provide accommodation for the underpass service road connecting the Solid Waste Authority (SWA) and the Costco Warehouse. This underpass service road will improve operations and safety at the High Ridge Road and Sunset Road intersections.

<u>VE RECOMMENDATION NO. 9:</u>

Consider changing retaining wall type from MSE wall to steel wall with concrete facia.

VE Recommended Change:

Utilize steel sheet pile walls with concrete facing in lieu of MSE walls for the southbound on and off ramps. This option provides the benefit of lower construction cost, reduced mobilization costs of staging and storage and a faster method of construction.

PD&E Proposed:

The PD&E Concept consists of providing MSE retaining walls replacing existing ramp bridges for the DDI alternative.

PD&E Design Response: Rejected

The use of steel sheet pile walls with concrete facing is more suited for reducing MOT impact for minor widenings when the proposed retaining walls are adjacent to mainline traffic. However, the proposed MSE walls are for the replacement of the existing ramp bridges and would be less costly than permanent steel sheet piling with concrete facing. Also driving steel piling next to the residential/ commercial area would not be favorable due to noise & vibration issues. The VE recommendation may be one option for the retaining walls required for this project and should be further evaluated as part of the Bridge Development Report during the design phase.

SUMMARY

The VE recommendations that will be considered are VE Recommendations 1A, 2, 7A and 7B. These four recommendations will have a potential savings of approximately $8.37 Million.