







I-95 Multimodal Master Plan
FACILITY ENHANCEMENT REPORT

June 2020

Prepared for: **Florida Department of Transportation – District Four (D4)**

Prepared by: **RS&H, Inc.**

SR 9 / I-95 MULTIMODAL MASTER PLAN

FACILITY ENHANCEMENT REPORT

Financial Project ID: 436577-1-22-01

Martin, St Lucie, and Indian River Counties

Prepared For:
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June 2020

PROFESSIONAL ENGINEER CERTIFICATE

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

Financial Project ID: 436577-1-22-01
Project: SR 9 / I-95 Multimodal Master Plan
FACILITY ENHANCEMENT REPORT
From Palm Beach/Martin County Line to Indian River/Brevard County Line
County: Martin, St Lucie, and Indian River Counties
FDOT Project Manager: Christine Fasiska

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

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Date: June 2020

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1.0 PROJECT OVERVIEW

1.1 Introduction

The Florida Department of Transportation (FDOT) is preparing a Multimodal Master Plan for SR 9 / I-95 between the Palm Beach/Martin County Line to the Indian River/Brevard County Line, a distance of approximately 71 miles. The study limits are shown in **Figure 1-1**. The plan includes the SR 9 / I-95 mainline, interchanges, and other road segments and intersections within the anticipated area of influence for the project. The horizon year of the Master Plan study is 2045.

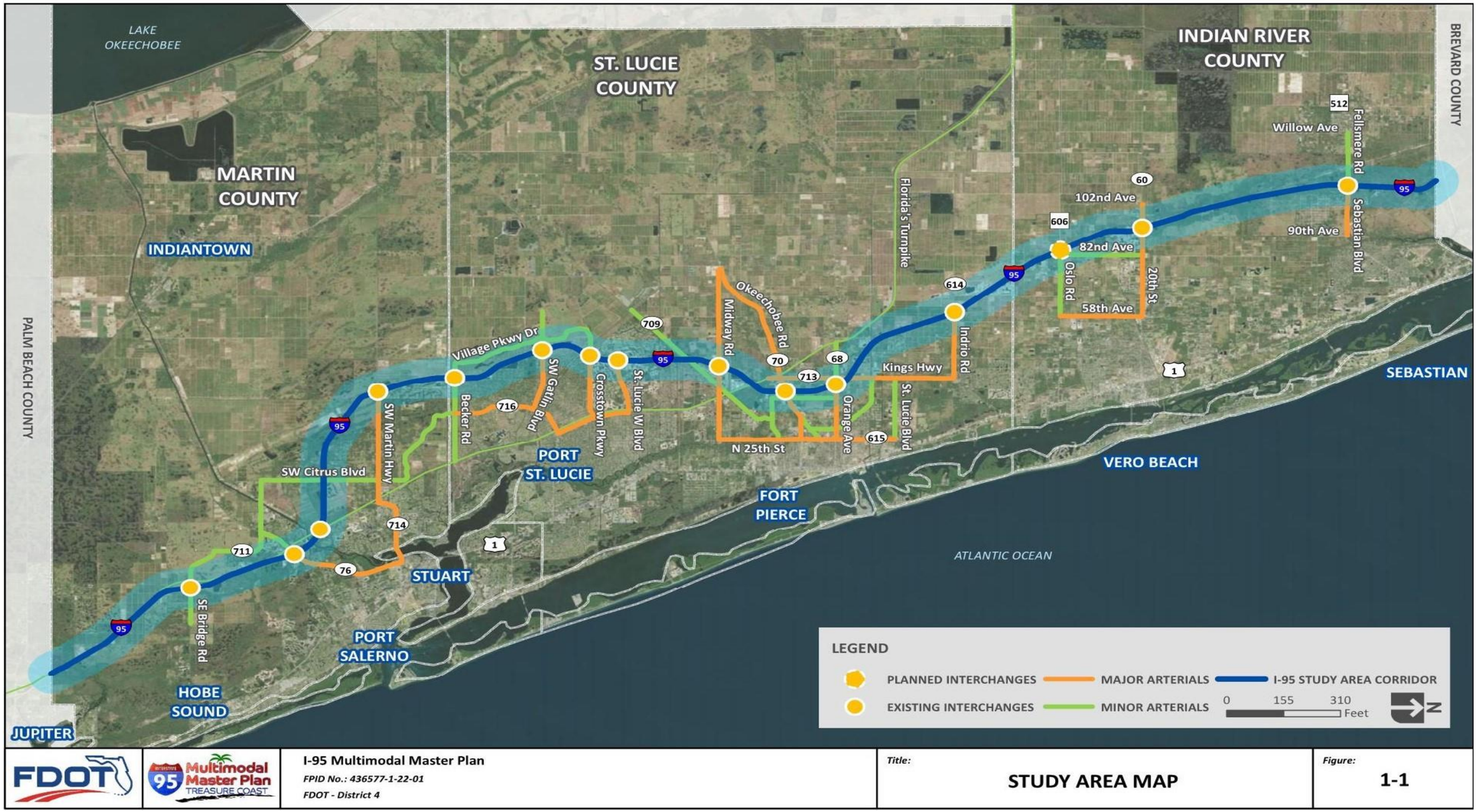
1.2 Purpose and Need

The purpose of this Facility Enhancement Element is to document the need, type, extent and estimated cost of long range (2045) SR 9 / I-95 mainline and interchange improvements. For SR 9 / I-95 and other roadways designated as Strategic Intermodal System (SIS) facilities, long term conceptual improvements are intended to meet the SIS criteria and standards and reflect improvements needed for the transportation infrastructure to function effectively through 2045.

The needs assessment provides an analysis of physical improvement alternatives and includes analyses of alternative modes, Transportation System Management (TSM) techniques, and multi-modal improvements. Cost comparisons consider a variety of items such as preliminary design, right-of-way acquisition, and construction costs. The development of improvement concepts is based on a multi-discipline, multi-agency approach that considers all aspects of the analysis of Alternatives including benefits, costs, impacts, and state and local agency input.

The product of the Facility Enhancement Element identifies recommendations for long term improvements to the SR 9 / I-95 mainline and noted interchange influence areas. Additionally, this report provides information regarding the timing and staging of specific improvements. Priority for advance right-of-way acquisition and protection is also identified.

Figure 1.1 – Study Area Map



FDOT	Multimodal Master Plan TREASURE COAST	I-95 Multimodal Master Plan *FPID No.: 436577-1-22-01* *FDOT - District 4*	*Title:* STUDY AREA MAP	*Figure:* 1-1

2.0 MAINLINE

2.1 General Description

The limits of the section of SR 9 / I-95 being studied are from the Palm Beach/Martin County Line to the Indian River/Brevard County Line, all of which is in the jurisdiction of FDOT District 4. There are 15 interchanges in the study area, and they are listed in the following Table 2.1.

Table 2.1 | Study Area Interchange Locations

County	Interchange Location
Martin	CR 708 / SE Bridge Road
Martin	SR 76 / SW Kanner Highway
Martin	SW High Meadows Avenue
Martin	CR 714 / SR 714 / SW Martin Highway
St. Lucie	SW Becker Road
St. Lucie	Tradition Parkway / SW Gatlin Blvd.
St. Lucie	Crosstown Parkway
St. Lucie	Reserve Blvd. / St Lucie West Blvd.
St. Lucie	CR 712 / W. Midway Road
St. Lucie	SR 70 / Okeechobee Road
St. Lucie	SR 68 / Orange Avenue
St. Lucie	SR 614 / Indrio Road
Indian River	CR 606 / Oslo Road
Indian River	SR 60 / 20th Street
Indian River	CR 512 / Fellsmere Road

2.1.1 Primary Features of the SR 9 / I-95 Corridor

SR 9 / I-95 in the study area accommodates regional mobility and truck traffic. Increases in both the volume of truck traffic and the percentage of truck traffic within the overall traffic stream is anticipated, thus ensuring the continued importance of the facility as a major freight corridor.

2.2 Non-Auto Mode Usage

2.2.1 Transit Service

Martin County - Presently, there is no transit service being operated along SR 9 / I-95 within Martin County. The primary fixed route bus transit provider in Martin County is the Martin County Public Transit (Marty). The Marty has four (4) fixed routes, none of which runs along SR 9 / I-95 within the study area.

The future volumes on SR 9 / I-95 through Martin County (which are estimated to approach 122,000 vehicles per day by 2045) are not expected to reach levels observed on SR 9 / I-95 in Miami-Dade or Broward Counties (close to 300,000 vehicles per day) where transit service is currently provided. Congestion is typically a motivator for people to use transit/express bus services. Since future traffic volumes and substantial congestion in Martin County are not anticipated, travel time savings and/or cost savings due to high parking costs are not anticipated to be large motivators for transit use.

Assuming a new transit service is provided along the SR 9 / I-95 corridor, such as an express bus service, a low and high end transit ridership range was estimated based on commute market magnitudes and ridership data. Between 50 and 270 average riders per weekday are estimated to use transit along the SR 9 / I-95 corridor in the Treasure Coast. Assuming the high end of the ridership range, the peak hour volume in 2045 on SR 9 / I-95 could be reduced by up to 54 vehicles in each direction during the peak hour. This level of ridership will not decrease the volume on SR 9 / I-95 significantly enough to eliminate the need for additional lanes in some parts of the corridor. For additional details, please refer to the SR 9 / I-95 Multimodal Master Plan Traffic Element Report, dated April 2019.

St. Lucie County - Under existing conditions, the primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, although none of the routes currently travel along SR 9 / I-95.

Future volumes on SR 9 / I-95 through St Lucie County (which are estimated to approach 160,000 vehicles per day by 2045) are not expected to reach levels observed on SR 9 / I-95 in Miami-Dade or Broward Counties (close to 300,000 vehicles per day) where transit service is currently provided. Congestion is typically a motivator for people to use transit/express bus services. Since future traffic volumes and substantial congestion in St Lucie County are not anticipated, travel time savings and/or cost savings due to high parking costs are not anticipated to be large motivators for transit use.

As noted in the SR 9 / I-95 Multimodal Master Plan Traffic Element Report, dated April 2019, between 50 and 270 average riders per weekday are estimated to use transit along the SR 9 / I-95 corridor in the Treasure Coast. Assuming the high end of the ridership range, the peak hour volume in 2045 on SR 9 / I-95 could be reduced by up to 54 vehicles in each direction during the peak hour. This level of ridership will not decrease the volume on SR 9 / I-95 within St Lucie County significantly enough to eliminate the need for additional lanes along some parts of the corridor.

Indian River County - The primary fixed route bus transit provider in Indian River County is the GoLine. The GoLine has 15 fixed routes, and includes one bus route in Indian River County that travels on SR 9 / I-95. It is known as the GoLine Route 15, which runs from the Indian River County Intergenerational Center to Indian River State College Main Campus in Fort Pierce. It enters and exits SR 9 / I-95 at SR 70/Okeechobee Road and SR 614 / Indrio Road, respectively.

Future volumes on SR 9 / I-95 within Indian River County are estimated to be approximately 64,000 vehicles per day by 2045. Further, the SR 9 / I-95 mainline is expected to operate at an acceptable level of service without the need for additional lanes in 2045. Since future traffic volumes and substantial congestion in Indian River County are not anticipated, travel time savings and/or cost savings are not anticipated to be large motivators for transit use.

2.2.2 Express Bus Service

The 2040 Treasure Coast Regional LRTP prioritized five (5) regional transit needs. One of these is a proposed new SR 9 / I-95 Express Bus Route consisting of a commuter bus route operating along the SR 9 / I-95 corridor from Palm Beach County to Gatlin Boulevard.

The potential transit market located near the SR 9 / I-95 corridor is not large, but is expected to grow over time with planned population growth. Express bus service using the SR 9 / I-95 corridor was previously provided between 2009 and 2012, and should be considered again in the future to serve regular long distance commuters primarily between Martin County and Palm Beach County. Express bus service can work together with the planned park-and-ride lot to be located at the SR 9 / I-95 and SR 76 / Kanner Highway interchange to pick up and drop off riders at park-and-ride sites along the corridor. Such a service would accommodate medium and long distance trips, using the general purpose and managed lanes on SR 9 / I-95. In addition, express bus service is relatively easy to implement and is a lower cost option to consider within the planning horizon of 2045.

The potential transit market located near the SR 9 / I-95 corridor is not large, but is expected to grow over time with planned population growth west of SR 9 / I-95 in St Lucie County. Express bus service using the SR 9 / I-95 corridor, which was previously provided between 2009 and 2012, should be considered in the future to serve regular long distance commuters primarily between St Lucie County and Palm Beach County. Express bus service can work together with the planned park-and-ride lot to be located at SR 9 / I-95 and Gatlin Boulevard to pick up and drop off riders at park-and-ride sites along the corridor. Such a service would accommodate medium and long distance trips, using general purpose and managed lanes on SR 9 / I-95.

Express Bus routes on SR 9 / I-95 in Indian River County are not anticipated through 2045.

2.3 Transportation Demand Management

Transportation Demand Management (TDM) is the practice by which people make optimal use of locally available transportation resources, with a strong focus on getting people out of Single-Occupant Vehicles (SOVs) and into more efficient modes of commuting. TDM programs aim to provide information, incentives, resources, and support to people who want to make the best possible use of available transportation options. The full set of options are expansive and can include varying forms of congestion management, flexible schedules, telecommuting, public transit, carpooling, vanpooling, ridesharing, walking, cycling and others.

A comprehensive TDM program should be engaged with urban design and municipal planning at a higher level. TDM strategies can be used to encourage broader engagement with transportation alternatives, and guide local residents to use them more often. At this level, key concepts include walkability indices and "complete streets," sustainability, urban livability, and the integrated management of key transportation corridors.

2.3.1 Transportation Management Strategies Objectives[1]

The objectives of a TDM strategy should fit with the vision and goals of a community. TDM is about more than just managing the way people get around; it's about the overall health and wellness of communities. As such, the field has evolved to include a number of objectives, all of which are supported by the use of better methods of transportation and urban design. Examples of major TDM objectives include:

2.3.1.1 Reducing traffic congestion

Getting cars off the road is one of the most common and immediate goals of transportation demand management. When fewer vehicles are competing for road space, traffic moves more quickly, average commute times are reduced, and the environmental impact of idling is reduced.

2.3.1.2 Conserving energy and reducing emissions

Vehicle emissions and greenhouse gases are a major contributor to climate change and environmental degradation. Therefore, getting people to make better use of shared transportation options is one of the most important ways for communities to encourage environmentally-friendly policies and actions.

2.3.1.3 Improving community health and fitness levels

TDM leads to better levels of health and fitness among community members by encouraging people to be more physically active as they move around town. Improving the walkability of communities and adding cycling infrastructure, such as dedicated bike lanes, are two TDM strategies that can be used to promote healthier and more active lifestyles.

2.3.1.4 Achieving equity

One negative effect of prioritizing the needs of drivers is that it leads to socio-economic inequality. As more resources are dedicated to the infrastructure needs of single-occupancy vehicles, those who don't drive or are unable to afford their own car suffer. The best approaches to TDM seek to create a level playing field, in which the interests of all community members are considered.

2.3.1.5 Enhancing urban livability

Studies have shown that community-oriented modes of transportation can lead to significant improvements in personal satisfaction and happiness. People are more engaged when they are

[1] https://rideamigos.com/transportation-demand-management-tdm/

active stakeholders in the communities they live in. By improving social quality for residents, commuters, and visitors alike, TDM helps improve the overall livability of communities.

2.3.1.6 Solving parking problems

High demand for parking is challenging in urban areas, leading to major increases in traffic congestion during peak times. TDM offers streamlined approaches to the creation and management of parking infrastructure by making it more accessible and affordable, thus reducing spillover rates and improving traffic flow.

2.3.1.7 Enhancing community safety

The more vehicles that are on the road, the more pedestrian, cyclist, and motorist safety becomes an issue. One of the key ancillary benefits of reducing urban traffic congestion is an improvement in community safety. As such, it's a central concern of any comprehensive TDM strategy.

2.3.1.8 Making alternative transportation more affordable

One of the most effective ways to get people to leave their cars at home is to make TDM-preferred modes of transportation more affordable than solo driving. Communities that are less dependent on single-occupancy vehicles also have a trickle-down effect. It reduces the amount of resources people earmark for their transportation needs. This supports other important TDM objectives including better livability, improved equity and community safety, and reductions in traffic congestion and environmental impact.

Various methods can be used to achieve these objectives. TDM-friendly policy decisions and legislation are essential, but elements like incentives for using sustainable transportation, disincentives for driving, education and information accessibility are also important.

2.3.2 TDM Programs in the Treasure Coast

One existing resource for TDM in the Treasure Coast is the South Florida Commuter Services (SFCS) program. SFCS is funded by the Florida Department of Transportation to provide planning, communication, implementation, technical assistance services, and professional personnel. Its objective is to promote and improve multimodal mobility options via implementation of a state-of-the-art Transportation Demand Management (TDM) Program.

The SFCS program covers seven counties including Martin, St. Lucie and Indian River counties. Some of the services provided by the SFCS program include a carpool, vanpool and Park and Ride matching program; and technical assistance to private and public-sector employers to develop and implement TDM programs. Such TDM programs include technical support for transit service providers to increase the utilization of multiple modes, as well as Park and Ride lots, transit services, community shuttle and trolley services, managed lanes, express bus service, and the interconnection of the various transit services in the region. Marketing these services is also a key component of the SFCS program.

2.4 Access Management

Access management is the coordinated planning, regulation, and design of access between roadways and land development. It promotes the efficient and safe movement of people and goods by reducing conflicts on the roadway system and at its interface with other modes of travel.

Roadways serve two primary purposes: mobility and access. Mobility is the efficient movement of people and goods. Access is getting those people and goods to specific properties. A roadway designed to maximize mobility typically does so by managing access to adjacent properties. An example of this is an Interstate Highway. While a motorist could expect to travel quite efficiently over a long distance using an Interstate Highway, the number of access points is restricted to only freeway interchanges every few miles. This type of roadway serves primarily a mobility function 2.

Within the Treasure Coast study area, SR 9 / I-95 is considered an Access Class 1 facility according to Florida Administrative Code (FAC) 14-97, which governs access management. Interchange spacing standards within urbanized areas in or near a Central Business District (CBD)

are defined to be 1 mile, while interchanges within urbanized areas not within a CBD are characterized by 2-mile spacing.

By definition, Access Class 1 consists of limited access facilities whose roadways do not provide direct property connections. These roadways provide for high speed and high volume traffic movements serving interstate, interregional, intercity, and sometimes intracity travel needs. The interchange spacing standards, based on the Area Type the highway is passing through, are for the through lanes or mainline of the facility. New interchanges to Access Class 1 facilities shall be based on an engineering analysis of the operation and safety of the system. These interchanges can only be approved through the interchange justification process. Approval by the Department and Federal Highway Administration (FHWA) is required before any new interchange is constructed.

Presently, the interchange spacing along SR 9 / I-95 within Martin County is as follows.

- Indiantown Road (Palm Beach County) to CR 708 / SE Bridge Road = 9 miles
- CR 708 / SE Bridge Road to SR 76 / Kanner Highway = 4.5 miles
- SR 76 / Kanner Highway to High Meadow Avenue = 1.6 miles
- High Meadow Avenue to SR 714 / Martin Highway = 7.8 miles
- SR 714 / Martin Highway to Becker Road (St Lucie County) = 3.4 miles

Such interchange spacing is consistent with an Access Class 1 facility. No additional interchanges along SR 9 / I-95 are anticipated within Martin County through 2045.

Presently, the interchange spacing along SR 9 / I-95 within St Lucie County is as follows.

- SR 714/Martin Highway to Becker Road (St Lucie County) = 3.4 miles
- Becker Road to Gatlin Boulevard = 4 miles
- Gatlin Boulevard to Crosstown Parkway = 2.2 miles
- Crosstown Parkway to St Lucie West Boulevard = 1.2 miles
- St Lucie West Boulevard to Midway Road = 4.4 miles
- Midway Road to SR 70/Okeechobee Road = 3.2 miles
- SR 70/Okeechobee Road to SR 68/Orange Avenue = 2.2 miles
- SR 68/Orange Avenue to SR 614/Indrio Road = 6.4 miles
- SR 614/Indrio Road to Oslo Road (Indian River County) = 5.5 miles

Such interchange spacing is consistent with an Access Class 1 facility. No additional interchanges along SR 9 / I-95 are anticipated within St Lucie County through 2045.

Including the under-design interchange at Oslo Road, the current interchange spacing along SR 9 / I-95 within Indian River County is as follows.

- SR 614 / Indrio Road (St Lucie County) to Oslo Road = 5.5 miles
- Oslo Road to SR 60 = 3.7 miles
- SR 60 to Fellsmere Road = 9 miles
- Fellsmere Road to Micco Road (Brevard County) = 9.7 miles

Such interchange spacing is consistent with an Access Class 1 facility. No additional interchanges along SR 9 / I-95 are planned by FDOT within Indian River County at this time. However, Indian River County has expressed a desire for an interchange on SR 9 / I-95 at 53rd Street, which would be located between SR 60 and CR 512 / Fellsmere Road. It is currently listed in their Long Range Transportation Plan as an “aspirational” interchange.

2.5 Design criteria

Design and operational standards are well defined for Florida's limited- access facilities. They provide the framework for evaluating current geometric and operational deficiencies and future designs to meet mobility needs. Design elements presented in this section are based on parameters outlined in the following references.

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)
- Diverging Diamond Interchange - Federal Highway Administration (2014)

2.5.1 Level of Service

The term "Level of Service" (LOS) is defined as the system of six designated ranges of values for a particular aspect of roadway facility performance, graded from "A" (best) to "F" (worst) based on a user's perception. Urbanized areas with populations over 500,000 aspire to achieve a minimum LOS D on Florida Intrastate Highway System (FIHS) limited access highways (i.e., SR 9 / I-95). Areas transitioning into urbanized areas with populations over 5,000 have a LOS C target, while rural areas have a LOS B target on limited access highways. The targets are listed in Table 2.2.

Table 2.2 | LOS Targets for Freeways

Level of Service	Density (pc/mi/ln)
A	≤ 11
B	> 11 - 18
C	> 18 - 26
D	> 26 - 35
E	> 35 - 45
F	Demand exceeds capacity OR Density > 45

Source: Highway Capacity Manual (6th Edition), Exhibit 12-15

The LOS at signalized intersections is determined by traffic delay. The average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersection as a whole. Intersections within the study area were assessed based on a LOS D target. The targets are listed in Table 2.3.

Table 2.3 | LOS Target for Intersections

Level of Service by Volume-to-Capacity Ratio		Control Delay (s/veh)
≤ 1 .0	> 1.0	
A	F	≤ 10
B	F	> 10 - 20
C	F	> 20 - 35
D	F	> 35 - 55
E	F	> 55 - 80
F	F	> 80

Source: Highway Capacity Manual (6th Edition), Exhibit 19-8

The LOS at the un-signalized intersections is also determined by traffic delay. LOS for a two-way stop controlled (TWSC) intersection is determined by the computed or measured control delay

for each minor movement. The LOS targets for TWSC intersections are different from the targets for signalized intersections because a signalized intersection is designed to carry higher traffic volumes and experience greater delay than an un-signalized intersection. Those targets are listed in Table 2.4.

Table 2.4 | LOS Targets for TWSC Intersections

Level of Service by Volume-to-Capacity Ratio v/c ≤ 1 .0	v/c > 1.0	Control Delay (s/veh)
A	F	0-10
B	F	> 10 - 15
C	F	> 15 -25
D	F	> 25 - 35
E	F	> 35 - 50
F	F	> 50

Source: Highway Capacity Manual (6th Edition), Exhibit 20-2

2.5.2 Typical Section Design Elements

Table 2.5 summarizes design element standards as defined within their respective source.

Table 2.5 | Typical Section Design Elements

Design Element	Design Standard	Source
Minimum Median Width - Interstate, Without Barrier - All, With Barrier	 64' 26'	FDM, Part 2, Table 211.3.1
Lane Width - Mainline (I-95) - Single Lane Ramp - Dual Lane Ramp - Natural C1 (40-45 mph) - Rural C2 (40-45 mph) - Rural C2 (≥ 50 mph)	 12' (tangent) 15' (tangent) 24' (tangent) 11' 11' 12'	 FDM, Part 2, Table 210.2.1 FDM, Part 2, 211.2 FDM, Part 2, 211.2.1
- Suburban C3 (40-45 mph) - Suburban C3 (≥ 50 mph) - Urban General C4 (40-45 mph)	11' 12' 11'	
Shoulder Width w/o Shoulder Gutter for Limited Access Facility - Full Width 2 Lane 3 Lane or more 1 Lane Express Lane 1 Lane Ramp 2 Lane Ramp Interstate CD Road – 1 Lane - Paved Width 2 Lane 3 Lane or more 1 Lane Express Lane 1 Lane Ramp	Outside 12' 12' 12' 6' 12 6' 10' 10' 12' 4'	Median/ Left 8' 12' 12' 6' 8' 6' 4' 10' 12' 2'	FDM, Part 2, Table 211.4.1
2 Lane Ramp Interstate CD Road – 1 Lane	10' 4'	4' 2'	
Shoulder Width w/ Shoulder Gutter for Limited Access Facility - Full Width 2 Lane 3 Lane or more 1 Lane Express Lane 1 Lane Ramp 2 Lane Ramp Interstate CD Road – 1 Lane - Paved Width 2 Lane 3 Lane or more 1 Lane Express Lane 1 Lane Ramp 2 Lane Ramp Interstate CD Road – 1 Lane	Outside 15.5' 15.5' 13.5' 11.5' 15.5' 11.5' 8' 8' 10' 4' 8' 4'	Median/ Left 13.5' 15.5' 13.5' 11.5' 13.5' 11.5' 6' 8' 10' 4' 6' 4'	FDM, Part 2, Table 211.4.1

Design Element	Design Standard		Source
Shoulder Width w/o Shoulder Gutter for Arterial and Collectors	Outside	Median/ Left	FDM, Part 2, Table 210.4.1
- Full Width			
4 Lanes or more	10'	10'	
3 Lanes	10'	10'	
1 Lane & 2 Lanes	10'	8'	
Aux. Lanes (All)	10'	8'	
- Paved Width			
4 Lanes or more	5'	4'	
3 Lanes	5'	0'	
1 Lane & 2 Lanes	5'	0'	
Aux. Lanes (All)	5'	0'	
Roadway Cross Section Slope for Limited Access Facilities			FDM, Part 2, Figure 211.2.1
- Roadway Standard Pavement	0.03 max. (> 45mph)		
- 5 Lanes slope in one direction	0.035 max.		
- Inside Shoulder	0.05		FDM, Part 2, 211.4.2
- Outside Shoulder	0.06		
Roadway Cross Section Slope for Arterial and Collectors			FDM, Part 2, Figure 210.2.1
- Roadway Standard Pavement	0.04 max. (45 mph or less) 0.03 max. (> 45mph)		
- 5 Lanes slope in one direction	0.035 max.		
- Inside Shoulder	0.05		FDM, Part 2, 210.4.1
- Outside Shoulder	0.06		
Clear Zone			FDM, Part 2, Table 215.2.1
- Mainline I-95 (60 ≥ mph)	36'		
- Single Lane Ramp (30 mph-50 mph)	10' - 14'		
- Dual Lane Ramp (30 mph-50 mph)	12'- 24'		
- Travel Lanes (40 mph)	18'		
- Travel Lanes (45 mph)	24'		
- Travel Lanes (50 mph)	24'		
- Travel Lanes (55 mph)	30'		
Border Width for Limited Access Facilities			FDM, Part 2, 211.6
- Mainline (I-95)	94'		
Border Width for Arterial and Collectors			FDM, Part 2, Table 210.7.1
- C2 Rural - Flush Shoulder (≥ 50 mph)	40'		
- C3 Suburban - Curb & Gutter (40 mph)	12'		
- C3 Suburban - Curb & Gutter (45 mph)	14'		
- C3 Suburban - Curb & Gutter (50 mph)	29'		
- C3 Suburban - Flush Shoulder (≥ 50 mph)	40'		
Limited Access Right of Way			FDM, Part 2, 211.15
- Rural Interchanges	300' beyond end of the accel. or decel. taper		
- Interchanges in Urban Areas	LA R/W will end a min. of 100' beyond the end of taper or radius point of return		

2.5.3 Horizontal and Vertical Alignment Design Elements

Description of design elements such as profiles, curves, superelevation and vertical clearance which are considered in the design of horizontal and vertical alignment, are summarized in Table 2.6.

Table 2.6 | Horizontal and Vertical Alignment Design Elements

Design Element	Design Standard	Source
Design Vehicle	WB-62FL	FDM, Part 2, 201.6
Design Speed for Limited Access Facilities - Mainline (I-95) - SSI	70 mph	FDM, Part 2, Table 201.5.1

Design Element	Design Standard	Source
- Ramp Design Speeds		
Loop and Semi-Direct	30 mph	
Outer Cloverleaf	35 mph	FDM, Part 2, Table 201.5.2
Intermediate Portions of Long Ramps	40 mph	
Direct Connection	50 mph	
Design Speed for Arterials and Collectors		
- Natural C1	55-70 (mph)	
- Rural C2	55-70 (mph)	FDM, Part 2, Table 201.5.1
- Suburban C3	35-55 (mph)	
- Urban General C4	30-45 (mph)	
Min. Decision Sight Distance [(1)]		
- Mainline (I-95) - 70 mph		
Rural	1105'	
Suburban	1275'	AASHTO (2011) Table 3-3
Urban	1445'	
Min. Stopping Sight Distance for Limited Access Facilities		
- Mainline (I-95) (≤ 2 downgrade-70 mph)	820'	FDM, Part 2, Table 211.10.1
- Ramp (≤ 2 downgrade-50 mph)	425'	
- Ramp (≤ 2 downgrade-45 mph)	360'	FDM, Part 2, Table 211.10.2
- Ramp (≤ 2 downgrade-30 mph)	200'	
Min. Stopping Sight Distance for Arterials and Collectors		
- ≤ 2 grade downgrade - 55 mph	495'	
- ≤ 2 grade downgrade - 50 mph	425'	FDM, Part 2, Table 210.11.1
- ≤ 2 grade downgrade - 45 mph	360'	
- ≤ 2 grade downgrade - 40 mph	305'	
Max. Degree of Curve		
- Mainline (I-95) (70 mph)	3°30'	
Ramp (50 mph)	8°15'	FDM, Part 2, Table 210.9.1
Ramp (30 mph)	24°45' [(2)]	
Max. Profile Grade for Limited Access Facilities		
- Mainline (I-95) (70 mph)	3%	FDM, Part 2, Table 211.9.1
- Ramp (45 mph - 50 mph)	5%	
- Ramp (35 mph - 40 mph)	6%	
- Ramp (25 mph - 30 mph)	7%	
Max. Profile Grade for Arterials and Collectors		
- Rural C2 (60 mph)	3%	
- Rural C2 (50 mph)	4%	
- Suburban C3 (50 mph)	6%	FDM, Part 2, Table 210.10.1
- Suburban C3 (45 mph)	6%	
- Suburban C3 (40 mph)	7%	
- Urban C4 (45 mph)	6%	
Max. Change in Grade w/o Vertical Curve		
- 70 mph	0.20%	
- 50 mph	0.60%	
- 45 mph	0.70%	FDM, Part 2, Table 210.10.2
- 40 mph	0.80%	
- 35 mph	0.90%	
Min. Crest Vertical Curve Length		
- Interstate (Open Highway)	1000'	
- Interstate (Within Interchanges)	1800'	
- Ramp (50 mph)	300’	
- Ramp (45 mph)	135’	FDM, Part 2, Table 211.9.3
- Ramp (40 mph)	120’	
- Ramp (35 mph)	105’	
- Ramp (30 mph)	90'	
Min. Crest Vertical Curve Length for Arterials & Collectors		
- 60 mph	400'	
- 55 mph	350'	
- 50 mph	300'	FDM, Part 2, Table 210.10.4
- 45 mph	135'	
- 40 mph	120'	
Min. Sag Vertical Curve Length		
- Interstate	800'	
- Ramp (50 mph)	200'	FDM, Part 2, Table 211.9.3
- Ramp (45 mph)	135’	

Design Element	Design Standard	Source
- Ramp (40 mph)	120’	
- Ramp (35 mph)	105’	
- Ramp (30 mph)	90’	
Min. Sag Vertical Curve Length for Arterials & Collectors		FDM, Part 2, Table 210.10.4
- 60 mph	300'	
- 55 mph	250'	
- 50 mph	200'	
- 45 mph	135'	
- 40 mph	120'	
K Values for Sag Vertical Curve		FDM, Part 2, Table 211.9.2
- Interstate 70 mph	206’	
- Ramps 50 mph	96’	
- Ramps 45 mph	79’	
- Ramps 40 mph	64’	
- Ramps 35 mph	49’	
- Ramps 30 mph	37’	
Min. K Valules for Sag Vertical Curve for Arterials & Collectors		FDM, Part 2, Table 210.10.3
- 60 mph	136'	
- 55 mph	115'	
- 50 mph	96'	
- 45 mph	79'	
- 40 mph	64'	
K Values for Crest Vertical Curve		FDM, Part 2, Table 211.9.2
- Interstate 70 mph	506’	
- Ramps 50 mph	136’	
- Ramps 45 mph	98’	
- Ramps 40 mph	70’	
- Ramps 35 mph	47’	
- Ramps 30 mph	31’	
Min. K Valules for Crest Vertical Curve for Arterials & Collectors		
- 60 mph	245'	
- 55 mph	185'	FDM, Part 2, Table 210.10.3
- 50 mph	136'	
- 45 mph	98'	
- 40 mph	70'	
Min. Vertical Clearance		FDM, Part 2, Table 260.6.1
- Roadway over Limited Access Rd	16.5'	
- Roadway over Arterial or Collector Rd	16.5'	
- Roadway over Railroad	23.5'	
- Roadway over Electrified Railroad	24.25'	
Max. Superelevation (e)	10%	FDM, Part 2, 210.9 and Table 210.9.1
Max. Shoulder “Roll-Over”	7%	Standard Plans, Index 000-510
Max. Lane “Roll-Over”	4%	FDM, Part 2, 211.2.2

Notes:

1. Decision Sight Distance - all new alignment configurations to adhere to values listed.
2. Existing 25 mph design speed ramps may remain if no other interchange geometry revision are proposed or if R/W constraints dictate.

2.5.4 Interchange Improvement Criteria

Description of interchange design elements such as spacing, ramp terminals, decision sight distance, and the applicable design standard source, are summarized in the following sections.

2.5.4.1 Interchange Spacing

Interchange spacing is defined as the distance from a proposed interchange to the next existing or proposed upstream or downstream interchange as measured from the center lines of the crossroads at the interchange.

The interchange spacing standards shown in Table 2.7 represent the minimum desired spacing between Freeway Interchanges. The existing SR 9 / I-95 roadway is classified by FDOT as Access Class 1.

Table 2.7 | Interchange Spacing

Area Type	Spacing (miles)	Source
Area Type 1 CBD & CBD Fringe for Cities in Urbanized Areas	1.0	FDM, Part 2, Table 201.4.1
Area Type 2 Existing Urbanized Areas Other than Area Type 1	2.0	
Area Type 3 Transitioning Urbanized Areas, and Urban Areas Other Than Area Type 1 or 2	3.0	
Area Type 4 Rural Areas	6.0	

Table 2.8 summarizes the design standards associated with interchange ramps that were employed during the preparation of conceptual alternatives for this Master Plan study.

Table 2.8 | Interchange Ramp Length, Type and Terminals

Design Element	Design Standard	Source
Min. Decision Sight Distance [1] - Speed/Path/Direction change Maneuver C (Rural - 50 mph) - Speed/Path/Direction change Maneuver C (Rural - 45 mph) - Speed/Path/Direction change Maneuver C (Rural - 30 mph)	750' 675' 450'	AASHTO (2011), Table 3-3
Min. Ramp Terminal Spacing, Freeway - Entrance to Exit		
Service to Service Interchange System to Service Interchange - Exit to Entrance - Exit to Exit - Entrance to Entrance	1600' 2000' 500' 1000' 1000'	AASHTO (2011), Figure 10-68
Entrance Ramp - Taper Length - Accel. Length	300' min. Varies [2]	AASHTO (2011), Table 10-3, Figures 10-69
Exit Ramp Decel. Length	Varies	AASHTO (2011), Table 10-5, Figures 10-70, Standard Plans Index 000-525
Min. Lane Drop Taper - Basic Lane - Auxiliary Lane	70:1 50:1	AASHTO (2011), Figures 10-52, Page 10-80
Entrance Ramp Type - Single Lane - Dual Lane Exit Ramp Type - Single Lane - Dual Lane	Taper/Parallel Taper/Parallel Taper/Parallel Taper/Parallel	AASHTO (2011), Figures 10-69, 10-70,10-73, 10-74, Standard Plans Index 000-525
Exit Ramp Design - Divergence	4°	Standard Plans Index 000-525
Access Management - Cross Road Median Opening	660' min from ramp intersection	FDM Part 2, Table 201.4.2

2.6 Existing Conditions Analysis

2.6.1 Typical Section

MAINLINE TYPICAL SECTIONS

SR 9 / I-95 is a limited access facility considered a key part of Florida's Strategic Intermodal System (SIS). The typical section of SR 9 / I-95 varies within the study area as there are a total of six typical sections. The typical section for the roadway segment extending from the Palm Beach / Martin County Line starts approximately at STA. 116+00.00 to STA 145+92.82. It differs from the rest of the corridor typicals as it is immediately adjacent to the Florida Turnpike Expressway and is separated by a concrete barrier wall. The other SR 9 / I-95 typical sections have a varying number of travel lanes. These sections contain between three 12-foot lanes and five 12-foot lanes in each direction. Shoulder and median widths vary throughout the study area as well. Table 2.9 summarizes the typical sections along SR 9 / I-95, separating northbound and southbound directions in different rows and colors. Aerials and existing roadway geometric and cross section data, including design speed, vertical and horizontal alignment, cross section and right-of-way width are included in Appendix A, while typical sections are included in Appendix D.

Table 2.9 | Existing Typical Summary

STATION	STATION	I-95	LANES	LT-SHLDR	RT-SHLDR	MEDIAN
116+00.	145+92.82	NB	3-12' LANES	(16' PAVT)	(16' PAVT)	34'
116+00.	145+92.82	SB	3-12' LANES	(16' PAVT)	(16' PAVT)	34'
145+92.82	181+85.75	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	88'-582'
145+92.82	182+26.75	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
183+85.75	510+22.74	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
184+26.75	510+32.78	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
511+99.99	567+09.	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
512+10.03	567+77.6	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
567+89.	761+45.5	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
568+57.6	761+63.4	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
763+57.	810+00.	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
763+71.9	810+00.	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
819+07.	849+24.7	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
819+07.	847+37.7	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
851+23.7	1260+06.5	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
853+14.51	1258+73.4	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
1260+99.4	3229+31.8	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
1262+32.5	3229+55.9	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3231+59.8	3324+54.4	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3231+83.9	3324+71.45	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3328+70.4	3363+34.65	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3328+87.45	3363+34.65	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3363+34.65	3390+00.	NB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	88'-172.60'
3363+34.65	3385+10.07	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3390+00.	3569+39.25	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	88'-471.5'
3385+10.07	3568+18.1	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3572+95.43	3642+04.2	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3574+16.58	3643+50.	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3644+46.6	3735+50.	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3645+92.4	3734+93.2	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3737+01.2	3763+54.4	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3737+58.	3759+88.	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3768+82.	3770+00.	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3770+00.	3815+24.18	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	40'-243'
3772+48.4	3815+53.79	NB	5-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3817+69.35	3845+00.	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3817+98.96	3845+00.	NB	5-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3845+00.	3933+09.68	NB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	40'-323'
3845+00.	3933+56.2	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3935+22.26	3966+01.	NB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3935+68.78	3965+37.65	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
3967+12.15	4066+75.83	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	

STATION	STATION	I-95	LANES	LT-SHLDR	RT-SHLDR	MEDIAN
3967+75.5	4071+28.5	NB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
4071+68.39	4245+00.	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
4076+21.06	4245+00.	NB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
4245+00.	4275+61.9	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	64'-113'
4245+00.	4276+50.	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
4278+42.46	8201+26.	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
4279+30.56	8201+26.	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
8201+26.	8210+69.4	NB/SB	6-12' LANES	12' PAVT	(10' PAVT) 12'	26 concrete wall
8213+28.15	8218+06.5	NB/SB	6-12' LANES	12' PAVT	(10' PAVT) 12'	
8220+85.5	8234+56.96	NB/SB	6-12' LANES	12' PAVT	(10' PAVT) 12'	
8234+56.96	8280+00.	NB/SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	45-113'
8280+00.	8325+00.	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	27'-113'
8280+00.	8322+45.55	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
8324+49.55	8325+00.	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
8325+00.	8803+60.94	SB	4-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
8325+00.	8803+66.21	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	27'-563'
8805+54.88	9013+16.03	NB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	
8805+49.61	9013+16.03	SB	3-12' LANES	(10' PAVT) 12'	(10' PAVT) 12'	

BRIDGE TYPICAL SECTIONS

SR 9 / I-95 consists of various grade-separated crossings that are summarized in Table 2.10. Some bridges will have to be replaced or widened due to the proposed improvements; which will be discussed in a later section of this report. The typical section of the bridges throughout the study area vary between three 12-foot lanes and six 12-foot lanes in each direction. Shoulder and Median Widths vary throughout the study area as well. Aerials and existing roadway geometric and cross section data, including design speed, vertical and horizontal alignment, cross section and right-of-way width are included in Appendix A.

Table 2.10 | Existing Bridge Typical Section Summary

CROSSING	STATION	STATION	BRIDGE No	LANES	LT-SHLDR	RT-SHLDR	MEDIAN
Cypress Creek Canal	181+85.75	183+85.75	890116	3-12' LANES	10'	10'	88'
Cypress Creek Canal	182+26.75	184+26.75	890115	3-12' LANES	10'	10'	
CR 708/Bridge Rd	510+22.74	511+99.99	890118	3-12' LANES	10'	10'	88'
CR 708/Bridge Rd	510+32.78	512+10.03	890117	3-12' LANES	10'	10'	
Drainage Canal	567+09.	567+89.	890130	3-12' LANES	10'	10'	88'
Drainage Canal	567+77.6	568+57.6	890131	3-12' LANES	10'	10'	
SR 76 / Kanner Hwy	761+45.5	763+57.	890128	3-12' LANES	10'	10'	88'
SR 76 / Kanner Hwy	761+63.4	763+71.9	890129	4-12' LANES	10'	6'	
St. Lucie Canal	810+00.	819+07.	890133	3-12' LANES	10'	10'	88'
St. Lucie Canal	810+00.	819+07.	890132	3-12' LANES	10'	10'	
Florida Turnpike	847+37.7	851+23.7	890121	4-12' LANES	10'	6'	88'
Florida Turnpike	849+24.7	853+14.51	890122	4-12' LANES	10'	6'	
CR 714 / Martin Hwy	1258+73.4	1260+99.4	890109	3-12' LANES	10'	10'	372.5'
CR 714 / Martin Hwy	1260+06.5	1262+32.5	890108	3-12' LANES	10'	10'	
Tradition Pkwy/ Gatlin Blvd.	3229+55.9	3231+83.9	940108	3-12' LANES	10'	10'	88'
Tradition Pkwy/ Gatlin Blvd.	3229+31.8	3231+59.8	940109	3-12' LANES	10'	10'	
Galiano Rd / C-24 Canal	3324+71.45	3328+87.45	940113	3-12' LANES	10'	10'	88'
Galiano Rd / C-24 Canal	3324+54.4	3328+70.4	940114	3-12' LANES	10'	10'	
Glades Cut-Off Rd (CR 709) & FECRR	3568+18.1	3572+95.43	940115	3-12' LANES	10'	10'	88'
Glades Cut-Off Rd (CR 709) & FECRR	3569+39.25	3574+16.58	940116	3-12' LANES	10'	10'	
Midway Road	3642+04.2	3644+46.6	940112	3-12' LANES	10'	10'	394'
Midway Road	3643+50.	3645+92.4	940111	3-12' LANES	10'	10'	
SR 91 / Florida's Turnpike	3735+50.	3737+58.	940126	3-12' LANES	10'	10'	88'
SR 91 / Florida's Turnpike	3734+93.2	3737+01.2	940127	3-12' LANES	10'	10'	
Ten Mile Creek	3763+54.4	3772+48.4	940123	3-12' LANES	10'	10'	188'
Ten Mile Creek	3759+88.	3768+82.	940122	3-12' LANES	10'	10'	

CROSSING	STATION	STATION	BRIDGE No	LANES	LT-SHLDR	RT-SHLDR	MEDIAN
SR 70 / Okeechobee Rd	3815+53.79	3817+98.96	940102	6-12' LANES	12'5"	12'	27.83'
SR 70 / Okeechobee Rd	3815+24.18	3817+69.35	940101	5-12' LANES	12'5"	12'	
SR 68 / Orange Ave	3933+09.68	3935+22.26	940096	4-12' LANES, 1-15' LANE	10' , 6'	10', 6'	40'
SR 68 / Orange Ave	3933+56.2	3935+68.78	940097	4-12' LANES, 1-15' LANE	10' , 6'	10', 6'	
SR 713/ Kings Hwy	3966+01.	3967+75.5	940163	4-12' LANES	10'	10'	40'
SR 713/ Kings Hwy	3965+37.65	3967+12.15	940162	4-12' LANES	10'	10'	
Angle Road / Belcher Canal	4071+28.5	4076+21.06	940092	4-12' LANES	10'	10'	323'
Angle Road / Belcher Canal	4066+75.83	4071+68.39	940093	4-12' LANES	10'	10'	
SR 614 / Indrio Road	4276+50.	4279+30.56	940086	3-12' LANES	10'	10'	64'
SR 614 / Indrio Road	4275+61.9	4278+42.46	940087	3-12' LANES	10'	10'	
4th Street / Canal D	8210+69.4	8213+28.15	880100	6-12' LANES	12'	10'	26'
90th Ave	8218+06.5	8220+85.5	880101	6-12' LANES	12'	10'	26'
SR 60 / Osceola Blvd	8322+45.55	8324+49.55	880102	4-12' (SB) 3-12 (NB)	12'	10'	26'
CR 512 / Fellsmere Rd	8803+60.94	8805+49.61	880105	3-12' LANES	12'	10'	26'
CR 512 / Fellsmere Rd	8803+66.21	8805+54.88	88037	3-12' LANES	12'	10'	

2.6.2 Interchange Configuration

Table 2.11 summarizes the interchange spacing along SR 9 / I-95. The interchanges are listed from south to north, with interchange spacing measured from the interchange to the south.

Table 2.11 | Interchange Spacing along SR 9/ I-95 Corridor

County	Interchange Location	Type	Area Type	Minimum Desired Interchange Spacing (miles)	Interchange Spacing (miles)	Meets FDOT Requirement
Martin	CR 708 / SE Bridge Rd.	Diamond	4	6	9	Yes
Martin	SR 76 / SW Kanner Hwy.	Partial Cloverleaf (one loop)	2	2	4.8	Yes
Martin	SW High Meadows Ave.	Partial Cloverleaf (two loops)	3	3	1.7	No
Martin	SR 714 / SW Martin Hwy.	Diamond	3	3	7.8	Yes
St. Lucie	SW Becker Rd.	Diamond	2	2	3.4	Yes
St. Lucie	SR 716 / SW Gatlin Blvd. / Tradition Pkwy.	Diamond	2	2	4.1	Yes
St. Lucie	Crosstown Pkwy.	Diamond	2	2	2.2	Yes
St. Lucie	St Lucie West Blvd. / Reserve Blvd.	Partial Cloverleaf (1 loop)	2	2	1.2	No
St. Lucie	SR 712 / Midway Rd.	Diamond	3	3	4.4	Yes

County	Interchange Location	Type	Area Type	Minimum Desired Interchange Spacing (miles)	Interchange Spacing (miles)	Meets FDOT Requirement
St. Lucie	SR 70 / Okeechobee Rd.	Partial Cloverleaf (2 loops)	3	3	3.3	Yes
St. Lucie	SR 68 / Orange Ave.	Partial Cloverleaf (2 loops)	3	3	2.2	No
St. Lucie	SR 614 / Indrio Rd.	Diamond	4	6	6.5	Yes
Indian River	CR 606 / Oslo Rd	Partial Cloverleaf (2 loops)	4	6	4.4	No
Indian River	SR 60 / 20th St.	Partial Cloverleaf (1 loop)	4	6	9.2	Yes
Indian River	CR 512 / Fellsmere Rd.	Diamond	4	6	9.1	Yes

Lane widths of exit and entrance ramps associated with interchanges in the study area are summarized in Table 2.12.

Table 2.12 | Interchange Ramps Lane Widths

County	Interchange Location	Ramp Description	Width Provided (ft.)	FDOT Widths required (ft.)	Meets FDOT Requirement
Martin	CR 708 / SE Bridge Road	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
Martin		SB On	15	15	Yes
	SR 76 / SW Kanner Highway	SB On Loop	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
Martin	SW High Meadows Ave.	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
Martin	CR 714 / SR 714 / SW Martin Highway	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
St. Lucie	SW Becker Road	SB On	15-24	15-24	Yes
		NB Off	15-36	15-36	Yes
		SB Off	15-36	15-36	Yes
		NB On	15-24	15-24	Yes
St. Lucie	Tradition Pkwy. / SW Gatlin Blvd.	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
St. Lucie	Crosstown Pkwy.	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
St. Lucie	Reserve Blvd. / St Lucie West Blvd.	SB On	15	15	Yes
		SB On Loop	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes

County	Interchange Location	Ramp Description	Width Provided (ft.)	FDOT Widths required (ft.)	Meets FDOT Requirement
St. Lucie	CR 712 / W. Midway Rd.	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
St. Lucie	SR 70 / Okeechobee Rd.	SB On	24	24	Yes
		SB On Loop	15	15	Yes
		NB Off	24	24	Yes
		SB Off	24	24	Yes
		NB On	15	15	Yes
		NB On Loop	15	15	Yes
St. Lucie	SR 68 / Orange Ave.	SB On	15	15	Yes
		NB Off	15	15	Yes
		NB Off Loop	15	15	Yes
		SB Off	15	15	Yes
		SB Off Loop	15	15	Yes
		NB On	15	15	Yes
St. Lucie	SR 614 / Indrio Rd.	SB On	15	15	Yes
		NB Off	24	24	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
Indian River	CR 606 / Oslo Rd	SB On	15	15	Yes
		NB Off	15-24	15-24	Yes
		SB Off	15-24	15-24	Yes
		NB On	15	15	Yes
Indian River	SR 60 / 20th St.	SB On	15	15	Yes
		SB On Loop	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes
Indian River	SR 512 / Fellsmere Rd.	SB On	15	15	Yes
		NB Off	15	15	Yes
		SB Off	15	15	Yes
		NB On	15	15	Yes

2.6.3 Design Speed

The design speed for SR 9 / I-95 within the study limits is 70 miles per hour (mph), which matches the posted speed.

2.6.4 Horizontal Alignment

Existing data for all horizontal curves along SR 9 / I-95 were collected from construction plans. Existing Roadway Geometrics and Cross Section Data are summarized in Appendix A. All curves were reviewed for deficiencies in length, radius and superelevation rates against the standards described in Section 2.5. The deficiencies are also summarized in Appendix A.

2.6.5 Vertical Alignment

Vertical curve data were compared to the standards described in Section 2.5 to identify deficiencies in the K value for SR 9 / I-95. The existing vertical curve data are contained in Appendix A. To obtain K, the formula K=L/A was used, where L is the minimum length and A is the algebraic difference in grades (in percent). Again, the existing condition described in this report and Appendix A is based on information from the latest available construction plans. Some Mainline Plan Sheets (Appendix A) did not include information regarding the vertical alignment since this information was not available. Therefore, it is assumed to remain unchanged from the original construction plans.

2.6.6 Right-of-Way

The right-of-way width varies throughout the corridor, particularly at rest areas, weigh stations and interchanges. The minimum total mainline right-of-way provided for SR 9 / I-95 in the study area is 300 feet. Appendix A contains existing right-of-way information for the study area.

2.6.7 Lighting

Aerial photographs along the SR 9 / I-95 corridor were used to determine the location of lighting structures. Lighting structures exist at all 15 interchanges along the corridor. For more information on lighting refer to each cross street's respective lighting section.

2.6.8 Drainage

Table 2.13 summarizes the box culverts and cross drains identified along the SR 9 / I-95 study corridor. There were 117 concrete box culverts and cross drains identified in Martin County, 173 in St. Lucie County, and 146 in Indian River County within the study area.

Rainfall discharges to the swale systems located at the right or left side of the road through a concrete box culverts, concrete pipes or corrugated metal pipes under SR 9/ I-95 to finally discharge to the SR 9 / I-95 interchange ponds.

Table 2.13 | Box Culverts and Cross Drains

Location	Side of Road	No. of Structures	Type of Structure
Martin County			
MP 0.028	Right	1	Concrete Pipe
MP 0.058	Right	1	Concrete Pipe
MP 0.085	Right	1	Concrete Pipe
MP 0.115	Right	1	Concrete Pipe
MP 0.142	Right	1	Concrete Pipe
MP 0.191	Right	1	Concrete Pipe
MP 0.233	Left	1	Concrete Pipe
MP 0.248	Right	1	Concrete Pipe
MP 0.326	Left	1	Concrete Pipe
MP 0.335	Left	1	Concrete Pipe
MP 0.359	Left	1	Concrete Pipe
MP 0.361	Right	1	Concrete Pipe
MP 0.398	Left	1	Concrete Pipe
MP 0.404	Left	1	Concrete Pipe
MP 0.546	Right	1	Concrete Pipe
MP 0.582	Left	1	Concrete Pipe
MP 0.634	Left	1	Concrete Pipe
MP 0.635	Left	1	Concrete Pipe
MP 0.693	Left	1	Concrete Pipe
MP 0.705	Left	1	Concrete Pipe
MP 0.768	Right	1	Concrete Pipe
MP 0.816	Composite	1	Concrete Pipe
MP 1.005	Right	1	Concrete Pipe
MP 1.383	Right	1	Concrete Pipe
MP 1.573	Right	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 1.768	Composite	1	Concrete Pipe
MP 1.943	Composite	1	Concrete Box Culvert
MP 2.141	Composite	1	Concrete Pipe
MP 2.331	Right	1	Concrete Pipe
MP 2.367	Right	1	Concrete Pipe
MP 2.405	Composite	2	Concrete Box Culvert
MP 2.520	Right	1	Concrete Pipe
MP 2.709	Left	1	Concrete Pipe
MP 2.899	Right	1	Concrete Pipe
MP 3.000	Right	1	Concrete Pipe
MP 3.190	Right	1	Concrete Pipe
MP 3.378	Right	1	Concrete Pipe
MP 3.756	Right	1	Concrete Pipe
MP 4.355	Composite	1	Concrete Box Culvert
MP 4.513	Right	1	Concrete Pipe
MP 4.703	Right	1	Concrete Pipe
MP 4.867	Composite	1	Concrete Box Culvert
MP 5.162	Right	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 5.361	Right	1	Concrete Pipe
MP 5.922	Right	1	Concrete Pipe
MP 5.750	Right	1	Concrete Pipe
MP 6.592	Right	1	Concrete Pipe
MP 6.971	Right	1	Concrete Pipe
MP 7.160	Right	1	Concrete Pipe
MP 8.107	Left	1	Concrete Pipe
MP 8.297	Right	1	Concrete Pipe
MP 8.410	Right	1	Concrete Pipe
MP 8.827	Right	1	Concrete Pipe
MP 9.059	Left	1	Concrete Pipe
MP 10.871	Right	1	Concrete Pipe
MP 11.293	Right	1	Concrete Pipe
MP 12.823	Right	1	Concrete Pipe
MP 12.975	Right	1	Concrete Pipe
MP 14.509	Right	1	Concrete Pipe
MP 14.679	Right	1	Concrete Pipe
MP 14.868	Left	1	Concrete Pipe
MP 14.884	Right	1	Concrete Pipe
MP 15.152	Left	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 15.448	Left	1	Concrete Pipe
MP 15.464	Right	1	Concrete Pipe
MP 15.646	Left	1	Concrete Pipe
MP 15.727	Right	1	Concrete Pipe
MP 15.911	Left	1	Concrete Pipe
MP 16.080	Left	1	Concrete Pipe
MP 16.158	Right	1	Concrete Pipe
MP 16.365	Left	1	Concrete Pipe
MP 16.417	Right	1	Concrete Pipe
MP 16.528	Left	1	Concrete Pipe
MP 16.569	Right	1	Concrete Pipe
MP 17.004	Right	1	Concrete Pipe
MP 17.011	Left	1	Concrete Pipe
MP 17.340	Left Right	1 1	Concrete Pipe
MP 17.796	Right	1	Concrete Pipe
MP 17.809	Left	1	Concrete Pipe
MP 18.009	Right	1	Concrete Pipe
MP 18.018	Left	1	Concrete Pipe
MP 18.263	Right	1	Concrete Pipe
MP 18.267	Left	1	Concrete Pipe
MP 18.375	Right	1	Concrete Pipe
MP 18.381	Left	1	Concrete Pipe
MP 18.535	Right	1	Concrete Pipe
MP 18.667	Left Right	1 1	Concrete Pipe
MP 19.141	Left	1	Concrete Pipe
MP 19.349	Right	1	Concrete Pipe
MP 19.785	Left Right	1 1	Concrete Pipe
MP 20.012	Right	1	Concrete Pipe
MP 20.239	Right	1	Concrete Pipe
MP 20.618	Right	1	Concrete Pipe
MP 20.788	Right	1	Concrete Pipe
MP 21.272	Left	1	Concrete Pipe
MP 21.942	Left	1	Concrete Pipe
MP 22.485	Right	1	Concrete Pipe
MP 22.529	Left	1	Concrete Pipe
MP 22.842	Left	1	Concrete Pipe
MP 22.851	Right	1	Concrete Pipe
MP 23.074	Right	1	Concrete Pipe
MP 23.152	Left	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 23.419	Left	1	Concrete Pipe
MP 23.481	Left	1	Concrete Pipe
MP 23.492	Left	1	Concrete Pipe
MP 23.522	Left	1	Concrete Pipe
MP 23.581	Right	1	Concrete Pipe
MP 23.614	Left	1	Concrete Pipe
MP 23.680	Right	1	Concrete Pipe
MP 23.784	Right	1	Concrete Pipe
MP 23.925	Right	1	Concrete Pipe
MP 23.962	Left	1	Concrete Pipe
MP 24.376	Left	1	Concrete Pipe
St. Lucie County			
MP 0.668	Right	1	Concrete Pipe
MP 1.127	Right	2	Concrete Pipe
MP 1.172	Left	2	Concrete Pipe
MP 1.291	Left	1	Concrete Pipe
MP 1.380	Right	1	Concrete Pipe
MP 1.466	Right	1	Concrete Pipe
MP 1.741	Left	2	Concrete Pipe
MP 1.813	Right	2	Concrete Pipe
MP 2.068	Left	1	Concrete Pipe
MP 2.285	Left	1	Concrete Pipe
MP 2.502	Left	2	Concrete Pipe
MP 2.505	Right	2	Concrete Pipe
MP 2.723	Left	1	Concrete Pipe
MP 2.844	Left	2	Concrete Pipe
MP 2.886	Right	2	Concrete Pipe
MP 3.179	Left	1	Concrete Pipe
MP 3.938	Left	2	Concrete Pipe
MP 4.745	Right	2	Concrete Pipe
MP 5.250	Right	1	Concrete Pipe
MP 5.402	Composite	1	Concrete Pipe
MP 5.644	Left	1	Concrete Pipe
MP 5.669	Right	1	Concrete Pipe
MP 5.813	Right	1	Concrete Pipe
MP 7.209	Left	1	Concrete Pipe
MP 7.253	Right	1	Concrete Pipe
MP 7.795	Right	1	Concrete Pipe
MP 8.202	Left	1	Concrete Pipe
MP 8.246	Right	1	Concrete Pipe
MP 8.615	Left	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 8.821	Right	1	Concrete Pipe
MP 8.995	Left	1	Concrete Pipe
MP 9.064	Right	1	Concrete Pipe
MP 9.560	Left	1	Concrete Pipe
MP 9.604	Right	1	Concrete Pipe
MP 10.051	Left	1	Concrete Pipe
MP 10.098	Right	1	Concrete Pipe
MP 10.333	Right	1	Concrete Pipe
MP 10.602	Composite	2	Concrete Pipe
MP 11.059	Left	2	Concrete Pipe
MP 11.108	Right	2	Concrete Pipe
MP 11.408	Left	1	Concrete Pipe
MP 11.558	Right	1	Concrete Pipe
MP 11.567	Left	1	Concrete Pipe
MP 11.633	Right	1	Concrete Pipe
MP 12.014	Left	1	Concrete Pipe
MP 12.089	Right	1	Concrete Pipe
MP 12.654	Left	1	Concrete Pipe
MP 12.701	Right	1	Concrete Pipe
MP 13.422	Right	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 13.486	Left	1	Concrete Pipe
MP 13.642	Right	1	Concrete Pipe
MP 14.159	Left	1	Concrete Pipe
MP 15.090	Left	1	Corrugated Metal Pipe
MP 15.170	Composite	1	Concrete Pipe
MP 15.203	Left	1	Corrugated Metal Pipe
MP 15.368	Composite	1	Concrete Pipe
MP 15.709	Composite	1	Concrete Pipe
MP 15.813	Left	1	Concrete Pipe
MP 15.814	Left	1	Concrete Pipe
MP 15.917	Right	1	Concrete Pipe
MP 16.116	Right	1	Corrugated Metal Pipe
MP 16.171	Composite	1	Concrete Box Culvert
MP 16.301	Left	1	Corrugated Metal Pipe
MP 16.367	Left	1	Corrugated Metal Pipe
MP 16.405	Composite	1	Concrete Pipe
MP 16.495	Right	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 16.608	Composite Right	1 1	Concrete Pipe
MP 16.671	Composite	1	Concrete Box Culvert
MP 16.807	Right	1	Corrugated Metal Pipe
MP 16.968	Left	1	Corrugated Metal Pipe
MP 17.133	Right	1	Corrugated Metal Pipe
MP 17.206	Composite	1	Concrete Pipe
MP 17.214	Left	1	Concrete Pipe
MP 17.300	Left	1	Corrugated Metal Pipe
MP 17.432	Left	1	Corrugated Metal Pipe
MP 17.463	Right	1	Concrete Pipe
MP 17.493	Right	1	Corrugated Metal Pipe
MP 17.555	Composite	1	Concrete Pipe
MP 17.667	Right	1	Corrugated Metal Pipe
MP 17.811	Left	1	Corrugated Metal Pipe
MP 17.877	Left	1	Corrugated Metal Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 17.935	Composite	1	Corrugated Metal Pipe
MP 17.936	Composite	1	Corrugated Metal Pipe
MP 18.038	Left	1	Concrete Pipe
MP 18.105	Left	1	Corrugated Metal Pipe
MP 18.152	Left	1	Concrete Pipe
MP 18.171	Left	1	Concrete Pipe
MP 18.207	Left	1	Corrugated Metal Pipe
MP 18.218	Left	1	Concrete Pipe
MP 18.219	Left	1	Corrugated Metal Pipe
MP 18.262	Left	1	Corrugated Metal Pipe
MP 18.300	Left	1	Corrugated Metal Pipe
MP 18.307	Left	1	Corrugated Metal Pipe
MP 18.417	Left	1	Corrugated Metal Pipe
MP 18.421	Left	1	Corrugated Metal Pipe
MP 18.474	Composite	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 18.531	Composite	1	Concrete Pipe
MP 18.597	Left Right	1 1	Corrugated Metal Pipe
MP 18.657	Composite	1	Concrete Pipe
MP 18.682	Right	1	Corrugated Metal Pipe
MP 18.862	Left	1	Corrugated Metal Pipe
MP 18.960	Composite	1	Concrete Box Culvert
MP 19.033	Right	1	Corrugated Metal Pipe
MP 19.260	Right	1	Concrete Pipe
MP 19.364	Right	1	Corrugated Metal Pipe
MP 19.497	Left	1	Corrugated Metal Pipe
MP 19.563	Composite	1	Concrete Pipe
MP 19.789	Right	1	Corrugated Metal Pipe
MP 19.790	Right	1	Corrugated Metal Pipe
MP 20.095	Right	1	Concrete Pipe
MP 20.178	Right	1	Concrete Pipe
MP 20.215	Right	1	Concrete Pipe
MP 20.216	Right	1	Corrugated Metal Pipe
MP 20.272	Right	1	Corrugated Metal Pipe
MP 20.323	Right	1	Corrugated Metal Pipe
MP 20.361	Right	1	Concrete Pipe
MP 20.449	Right	1	Concrete Pipe
MP 20.463	Right	1	Corrugated Metal Pipe
MP 20.483	Right	1	Corrugated Metal Pipe
MP 20.509	Right	1	Concrete Pipe
MP 20.510	Right	1	Corrugated Metal Pipe
MP 20.586	Right	1 1	Concrete Pipe Corrugated Metal Pipe
MP 20.962	Composite	2	Concrete Box Culvert
MP 20.974	Right	1	Corrugated Metal Pipe
MP 21.239	Left	1	Concrete Pipe
MP 21.447	Left	1	Corrugated Metal Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 21.505	Composite	1	Concrete Box Culvert
MP 21.580	Left	1	Corrugated Metal Pipe
MP 21.769	Left	1	Concrete Pipe
MP 21.883	Left	1	Corrugated Metal Pipe
MP 22.025	Left	1	Corrugated Metal Pipe
MP 22.041	Composite	1	Concrete Box Culvert
MP 22.177	Right	1	Corrugated Metal Pipe
MP 22.309	Left	1	Concrete Pipe
MP 22.486	Right	1	Corrugated Metal Pipe
MP 22.578	Composite	1	Concrete Box Culvert
MP 22.591	Composite	1	Concrete Pipe
MP 22.660	Left	1	Corrugated Metal Pipe
MP 22.844	Left	1	Concrete Pipe
MP 22.852	Composite	1	Concrete Pipe
MP 22.929	Right	1	Corrugated Metal Pipe
MP 23.076	Left	1	Corrugated Metal Pipe
MP 23.119	Composite	1	Concrete Box Culvert
MP 23.228	Right	1	Corrugated Metal Pipe
MP 24.145	Composite	1	Concrete Pipe
MP 24.315	Right	1	Concrete Pipe
MP 24.564	Right	1	Concrete Pipe
MP 24.740	Composite	1	Concrete Box Culvert
MP 24.923	Right	1	Concrete Pipe
MP 25.113	Right	1	Concrete Pipe
MP 25.374	Composite	1	Concrete Box Culvert
MP 25.779	Right	1	Concrete Pipe
MP 26.006	Composite	1	Concrete Box Culvert
MP 26.332	Right	1	Concrete Pipe
MP 26.638	Composite	1	Concrete Box Culvert
MP 27.012	Right	1	Concrete Pipe
Indian River County			
MP 0.002	Composite	1	Concrete Box Culvert

Location	Side of Road	No. of Structures	Type of Structure
MP 0.319	Right	1	Concrete Pipe
MP 0.617	Composite	1	Concrete Box Culvert
MP 0.925	Right	1	Concrete Pipe
MP 1.124	Left	1	Concrete Pipe
MP 1.125	Right	1	Concrete Pipe
MP 1.810	Composite	1	Concrete Box Culvert
MP 1.999	Right	1	Concrete Pipe
MP 2.021	Right	1	Concrete Pipe
MP 2.325	Composite	1	Concrete Box Culvert
MP 2.642	Right	1	Concrete Pipe
MP 3.951	Composite	1	Concrete Pipe
MP 4.050	Composite	1	Concrete Pipe
MP 4.308	Composite	1	Concrete Pipe
MP 4.430	Left	1	Concrete Pipe
MP 4.551	Composite	1	Concrete Box Culvert
MP 4.684	Right	1	Concrete Pipe
MP 5.248	Left Right	1 1	Concrete Pipe
MP 5.265	Left	1	Concrete Pipe
MP 5.394	Composite	1	Concrete Pipe
MP 5.416	Left	1	Concrete Pipe
MP 5.785	Left	1	Concrete Pipe
MP 5.933	Right	1	Concrete Pipe
MP 5.959	Left	1	Concrete Pipe
MP 6.159	Right	1	Concrete Pipe
MP 6.206	Left	1	Concrete Pipe
MP 6.223	Right	1	Concrete Pipe
MP 6.583	Left Right	1 1	Concrete Pipe
MP 6.867	Right	1	Concrete Pipe
MP 7.020	Right	1	Concrete Pipe
MP 7.023	Left	1	Concrete Pipe
MP 7.202	Right	1	Concrete Pipe
MP 7.421	Left	1	Concrete Pipe
MP 7.435	Right	1	Concrete Pipe
MP 7.515	Left	1	Concrete Pipe
MP 7.618	Left	1	Concrete Pipe
MP 7.639	Right	1	Concrete Pipe
MP 7.732	Right	1	Concrete Pipe
MP 7.807	Right	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
MP 7.919	Right	1	Concrete Pipe
MP 7.959	Left	1	Concrete Pipe
MP 8.052	Right	1	Concrete Pipe
MP 8.150	Right	2	Concrete Box Culvert
MP 8.156	Left	2	Concrete Box Culvert
MP 8.321	Right	1	Concrete Pipe
MP 8.546	Right	1	Concrete Pipe
MP 8.934	Left Right	1 1	Concrete Pipe
MP 9.350	Composite	1	Concrete Box Culvert
MP 9.641	Left	1	Concrete Pipe
MP 9.788	Composite	1	Concrete Box Culvert
MP 9.890	Left Right	1 1	Concrete Pipe
MP 10.043	Left Right	1 1	Concrete Pipe
MP 10.280	Composite	2	Concrete Box Culvert
MP 10.439	Left Right	1 1	Concrete Pipe
MP 10.530	Left Right	1 1	Concrete Pipe
MP 10.682	Left	1	Concrete Pipe
MP 10.096	Left	1	Concrete Pipe
MP 11.023	Composite	2	Concrete Box Culvert
MP 11.191	Left	1	Concrete Pipe
MP 11.362	Left Right	1 1	Concrete Pipe
MP 11.629	Right	1	Concrete Pipe
MP 11.780	Right	1	Concrete Pipe
MP 11.922	Composite	1	Concrete Box Culvert
MP 12.054	Right	1	Concrete Pipe
MP 12.197	Right	1	Concrete Pipe
MP 12.449	Right	1	Concrete Pipe
MP 12.669	Left Right	1 1	Concrete Pipe
MP 12.896	Right	1	Concrete Pipe
MP 13.010	Left Right	1 1	Concrete Pipe
MP 13.256	Left Right	1 1	Concrete Pipe
MP 13.488	Composite	1	Concrete Box Culvert
MP 13.728	Right	1	Concrete Pipe
MP 14.011	Left	1	Concrete Pipe

Location	Side of Road	No. of Structures	Type of Structure
	Right	1	
MP 14.244	Composite	1	Concrete Pipe
MP 14.517	Composite	1	Concrete Box Culvert
MP 14.633	Right	1	Concrete Pipe
MP 15.007	Composite	1	Concrete Box Culvert
MP 15.087	Left Right	1 1	Concrete Pipe
MP 15.381	Composite	1	Concrete Pipe
MP 15.532	Composite	1	Concrete Pipe
MP 15.760	Composite	1	Concrete Pipe
MP 15.996	Right	1	Concrete Pipe
MP 16.105	Composite	2	Concrete Box Culvert
MP 16.279	Right	1	Concrete Pipe
MP 16.562	Composite	1	Concrete Pipe
MP 16.903	Composite	2	Concrete Box Culvert
MP 16.960	Left Right	1 1	Concrete Pipe
MP 17.254	Composite	1	Concrete Box Culvert
MP 17.414	Left Right	1 1	Concrete Pipe
MP 17.678	Left Right	1 1	Concrete Pipe
MP 17.773	Right	21	Concrete Pipe
MP 17.972	Right	1	Concrete Box Culvert
MP 18.038	Left	1	Concrete Box Culvert
MP 18.196	Right	2	Concrete Pipe
MP 18.254	Left	2	Concrete Pipe
MP 18.439	Right	2	Concrete Pipe
MP 18.473	Left	1	Concrete Pipe
MP 18.680	Right	1	Concrete Pipe
MP 18.693	Left	1	Concrete Pipe
MP 18.993	Composite	1	Concrete Pipe
MP 19.118	Composite	1	Concrete Pipe

2.6.9 Pavement Conditions

Table 2.14 summarizes the SR 9 /I-95 pavement conditions, which are based on the 2018 Pavement Condition Survey (PCS), within the study area. The table includes information on the crack rating and ride rating for northbound and southbound for both 2018 and FAST forecast ratings for the year 2023.

Table 2.14 | Pavement Conditions

			NB				SB			
			2018		2023		2018		2023	
	BMP	EMP	Cracking	Ride	Cracking	Ride	Cracking	Ride	Cracking	Ride
Martin County	0	7.849	5.5	7.7	3.5	7.5	5.5	7.5	3.5	7.3
	7.785	11.49	10	8.3	8	8.1	10	8.3	8	8.1
	11.49	24.817	10	8.7	7.5	8.5	10	8.6	7.5	8.4
St. Lucie County	0	0.739	10	8.4	8	8.2	10	8.5	8	8.3
	0.739	3.97	9	8.5	7	8.3	9	8.5	7	8.3
	3.97	5.093	9	8.4	9.5	7.4	9	8.4	8.5	7.4
	5.093	6.018	9	8.6	7	8.4	9	8.5	7	8.3
	6.018	7.131	9	8.4	7	8.2	9	8.4	7	8.2
	7.131	11.731	9	8.4	7	8.2	9	8.5	7	8.3
	11.731	12.858	9	8.4	9.5	7.4	9	8.3	9.5	7.4
	12.858	14.52	9	8.5	7	8.3	9	8.2	7	8
	14.52	23.51	10	8.4	9	8	10	8.4	9	8
	23.51	26.865	10	8.5	9	8.1	10	8.4	9	8
	26.865	27.259	10	8.7	9.5	8.2	10	8.7	9.5	8.2
Indian River County	0	6.4	10	8.6	9.5	8.1	10	8.5	9.5	8
	6.4	15.22	6.5	8	10	7.5	5.5	7.6	10	7.5
	15.22	19.198	6.5	7.5	10	7.5	6.5	7.8	10	7.5

2.6.10 Utilities

Utility companies were contacted to obtain utility information in the project area. This information is summarized in Table 2.15.

Table 2.15 | Utilities and Service Areas

County	Service Area Name	Utility Type	Contact
Martin St. Lucie Indian River	COMCAST	Cable TV	Tony Springsteel
Martin St. Lucie	ATT	Communications	Nancy Pence
Martin St. Lucie Indian River	FLA. Gas	Gas Pipeline	Joseph E. Sanchez
Martin St. Lucie Indian River	Crown Castle Fiber	Fiber	Danny Haskett
Martin St. Lucie Indian River	FPL	Electric	Joel Bray
Martin	Hometown Cable TV	Fiber	Terry Day
Martin St. Lucie Indian River	FDOT	Electric & Fiber	Katherine Rico
Martin	Indiantown Telephone System	Unknown	Larry Luston
Martin	Martin County Public Services Traffic Division	Traffic	Damin Bono
Martin St. Lucie	City of Port St. Lucie	Lighting, Signals	Paul Johnson
Martin St. Lucie Indian River	ATT	Telephone	Dino Farruggio
Martin St. Lucie	City of Port St. Lucie	Water, Sewer & Irrigation	Lisa Campbell
St. Lucie Indian River	Amerigas	Gas Propane	Scott Moody

County	Service Area Name	Utility Type	Contact
St. Lucie	City of Fort Pierce	Traffic Signal	Dina Hermoso
St. Lucie	Fort Pierce Utilities Authorities	Water/Sewer/Gas/Electric	Valerie Schulte
St. Lucie	St. Lucie County Utilities	Water and Sewer	Ray Marankus
Martin Indian River	City Gas Company of Florida	Gas	Ron Muller
St. Lucie	Reserve Community Development District	Water & Sewer	Tina Perkins
St. Lucie	St. Lucie West Services District	Irrigation, Water, Sewer, Drainage & Storm water	Dennis Pickle
Indian River	City of Fellsmere	Water and Sewer	Jason Nunemaker
Indian River	Florida Public Utilities	Gas	Dale M Butcher
Indian River	Indian River County Utilities	Water and Sewer	Kevin Osthus
Indian River	Indian River County Public Works	Traffic Signalization	Marc Webb

2.6.11 Need for Improvement

As part of the study, the SR 9 / I-95 corridor geometric and cross sectional characteristics were evaluated for compliance with current FDOT and Florida Intrastate Highway System/Strategic Intermodal Systems (FIHS/SIS) standards. Substandard elements were identified throughout the study limits. These substandard elements are presented in more detail in Appendix A.

As the 2045 needs were identified and corresponding improvements developed, consideration was taken to upgrade substandard elements where feasible. The proposed improvements along SR 9 / I-95 entail the addition of one managed lane in each direction (northbound/southbound) from the Palm Beach / Martin County Line to SR 70 / Okeechobee Road, ramp reconstruction/reconfiguration with a braided ramp system between the Crosstown Parkway and St. Lucie West Boulevard interchanges, and extensions of some acceleration/deceleration lanes. Additional study improvements are noted for the interchanges and cross roads. Tables 2-16 through 2-19 summarize the substandard elements along SR 9 / I-95 that are recommended to remain in place. These existing substandard elements do not meet the allowable FDOT criteria, but do meet AASHTO Greenbook (2011) criteria within the project limits. No safety and/or operation history was associated with corresponding substandard elements.

Table 2.16 | Sub-standard Median

STA.	STA.	Existing Median
3850+00.00	4025+60.00	40'
4115+00.00	4245+60.00	40'
8189+00.00	8245+00.00	26'-40'
8301+00.00	8342+00.00	26'-40'
8774+00.00	8841+00.00	26'-40'
9000+00.00	9013+16.03	40'

Table 2.17 | Substandard Vertical Curve and Bridge Vertical Clearance

BOUND	STA.	STA.	K Value	Length	SSD	Vertical Clearance	COMMENTS
SB	497+00.00	524+00.00	502	ok	1040	16.40	Bridge Road- Bridge Replaced
NB	497+00.00	524+00.00	502	ok	1040	ok	Bridge Road- Bridge Replaced
SB	1251+00.00	1272+00.00	396	ok	924	16.36	Martin Hwy- Widening Bridge
NB	1251+00.00	1272+00.00	396	ok	924	16.32	Martin Hwy- Widening Bridge
NB & SB	3229+00.00	3232+00.00	ok	ok	ok	16.35	Gatlin Blvd - Bridge Replaced
NB & SB	3325+00.00	3329+00.00	ok	ok	ok	16.33	Widening Bridge over C-24 & Galiano Rd
NB & SB	3340+00.00	3350+00.00	406	800'	ok	ok	Under Crosstown Prkwy
NB & SB	3412+00.00	3413+00.00	*	*	*	16.47	Under St. Lucie West Blvd
SB	3569+00.00	3573+00.00	ok	ok	ok	23	Glades Cut-Off Rd- Rail road
NB	3569+00.00	3573+00.00	ok	ok	ok	20.75	Glades Cut-Off Rd- Rail road

BOUND	STA.	STA.	K Value	Length	SSD	Vertical Clearance	COMMENTS
SB	3632+00.00	3654+00.00	457	ok	ok	16.40	Midway Rd - Widening Bridge
NB	3634+00.00	3655+00.00	456	ok	ok	16.40	Midway Rd - Widening Bridge
SB	3654+00.00	3667+00.00	504	ok	ok	n/a	North of Midway Road
NB	3655+00.00	3668+00.00	503	ok	ok	n/a	North of Midway Road
SB	3807+00.00	3826+00.00	293	1600	795	16.1	Okeechobee Rd - Bridge Replaced
NB	3815+00.00	3818+00.00	293	1600	795	ok	Okeechobee Rd - Bridge Replaced
SB	3830+00.00	3839+00.00	293	800	794	n/a	North of Okeechobee Rd
NB	3830+00.00	3838+00.00	293	800	1314	n/a	North of Okeechobee Rd
NB & SB	3865+00.00	3874+00.00	ok	800	*	*	Under Graham Rd
NB & SB	3890+00.00	3899+00.00	ok	800	ok	n/a	South of Orange Ave
SB	3925+00.00	3943+00.00	276	*	772	16.17	Orange Ave - Length not available
NB	3925+00.00	3943+00.00	276	*	772	16.45	Orange Ave - Length not available
NB & SB	3943+00.00	3956+00.00	293	*	796	n/a	north of Orange Rd - Length not available
NB & SB	4071+00.00	4090+00.00	320	ok	830	*	Under Belcher Canal
NB & SB	4090+00.00	4097+00.00	240	600	731	n/a	not a bridge- North of Belcher Canal
NB & SB	4251+00.00	4260+00.00	ok	600	ok	n/a	not a bridge
NB & SB	4268+00.00	4285+00.00	320	1600	830	16.20	Indrio Road
NB & SB	4285+00.00	4295+00.00	ok	600	*	n/a	north of Indrio Road
NB & SB	4295+00.00	4311+00.00	ok	600	ok	n/a	north of Indrio Road

n/a = not applicable
* = information was not found

Table 2.18 | Sub-standard Superelevation

STA.	STA.	I-95	Comment
3873+60.00	3874+62.00	SB	Transition -0.02 to -0.037 (4-lanes)
3874+50.00	3875+52.00	NB	Transition 0.02 to 0.037 (4-lanes)
3898+00.00	3899+53.00	NB	Transition 0.037 to 0.02 (5-lanes)
3901+00.00	3903+40.00	SB	Transition -0.02 to 0.02 (2-lanes)
3946+50.00	3949+62.00	SB	Transition -0.02 to -0.072 (4-lanes)
3947+00.00	3950+12.00	NB	Transition 0.02 to 0.072 (4-lanes)
3970+00.00	3974+20.00	SB	Transition -0.072 to -0.02 (4-lanes)
3971+00.00	3975+20.00	NB	Transition 0.072 to 0.02 (4-lanes)
4059+00.00	4060+0.00	SB	Transition 0.02 to 0.037

Table 2.19 | Substandard Ramp Terminals

STA.	I-95	Comment
291+00.00	NB	I-95 Off ramp to Weight Station
1241+00.00	NB	I-95 Off ramp to Martin Hwy
1279+00.00	SB	I-95 Off ramp to Martin Hwy
3007+00.00	SB	I-95 On ramp from Becker Rd
3215+00.00	SB	I-95 On ramp from Gatlin Blvd
3427+00.00	NB	I-95 On ramp from St Lucie W. Blvd
3430+00.00	SB	I-95 Off ramp to St Lucie W. Blvd
3662+00.00	NB	I-95 On ramp from Midway Rd
4294+00.00	NB	I-95 On ramp from Indrio Rd
8338+00.00	SB	I-95 Off ramp to SR 60 / 20th St

2.7 Proposed Improvements

2.7.1 Typical Section

The recommended alternative consists of eight lanes (four lanes in each direction) on SR 9 / I-95 from the Palm Beach / Martin County Line to SR 70 / Okeechobee Road, which includes one managed lane in each direction. The recommended improvements are sufficient to satisfy the FDOT minimum LOS target for the study area through 2045.

The proposed work is presented in two typical sections. Figure 2.1 depicts the proposed typical section between the Palm Beach / Martin County Line starting at approximately STA. 116+00.00 to STA 145+92.82 which consists of a full roadway reconstruction of eight 12-foot lanes (three general purpose and one managed lane in each direction) with a barrier wall on each side and the median. This typical matches the proposed typical section developed to the south as part of the FDOT Palm Beach Master Plan. It is also compatible with Florida's Turnpike plans to widen its facility, which is located immediately west of SR 9 / I-95 in this section.

The second typical starts approximately at STA. 145+92.82 to STA. 3763+54.50 which consists of eight 12-foot lanes (three general purpose and one managed lane in each direction). Northbound and southbound travel lanes will be widened 1 lane towards the inside with 10-foot outside paved shoulders (12 feet if guardrail is needed); a 10-foot inside paved shoulder; and a varied median width. The typical section for the recommended alternative is illustrated in Figure 2.2.

Figure 2-1 | Proposed Typical Section - SR 9 / I-95

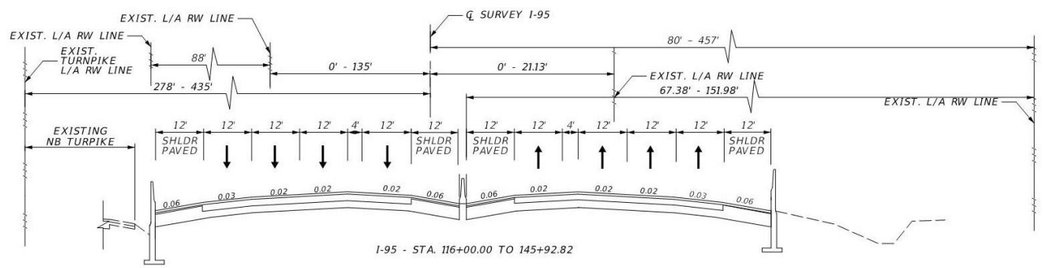
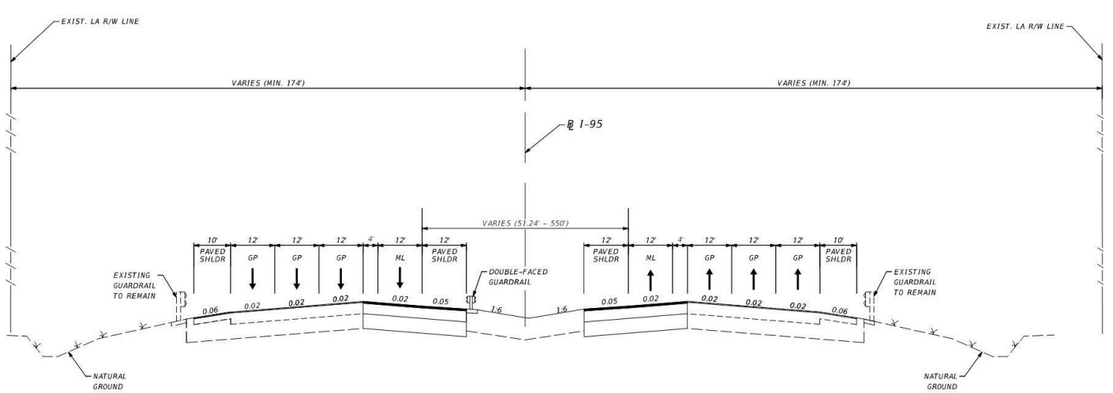


Figure 2-2 | Proposed Typical Section - SR 9 / I-95



2.7.2 Structural Impacts

All bridges before SR 70 / Okeechobee Road will need to be widened or replaced to accommodate the three existing general purpose lanes and one proposed managed lane in each direction and 12-foot inside and outside shoulders. Appendix B includes a list of bridges that are recommended to be replaced and widened. A bridge inventory was conducted along the study area to assess the condition of each bridge. This was performed to identify bridges that were not being impacted, but need replacing due to deficiencies. This inventory is summarized in Appendix E.

2.7.3 Interchange Configuration

The configuration of many interchanges within the study area will remain unchanged. This includes the ramp merge and diverge connections to the SR 9 / I-95 mainline. However, there are a handful of locations where future conditions require improvements. Corrections to interchange ramps were considered to meet current FDOT Standards to provide sufficient ramp length to safety merge or exit, and a sufficient number of lanes to accommodate traffic projections. The proposed acceleration and deceleration lengths are summarized in Table 2.20.

Table 2.20 | Proposed Acceleration and Deceleration Lane Lengths

County	Interchange Location	SR 9 / I-95 Ramp Description	1 to 2 Lanes	Acceleration Lane	Deceleration Lane	Lengthened (ft)
Martin	CR 708 / SE Bridge Road	NB Off			X	475
Martin	SR 76 / SW Kanner Highway	NB Off	X		X	950
		SB On	X	X		1500
		SB Off	X		X	700
St. Lucie	Tradition Pkwy. / SW Gatlin Blvd.	NB Off			X	325
		NB On	X	X		1500
St. Lucie	Crosstown Pkwy.	NB Off			X	800
		NB On			X	800
		SB Off	X	X		800
St. Lucie	St. Lucie West Blvd.	NB Off	X		X	800
		SB On	X	X		800
St. Lucie	CR 712 / W. Midway Rd.	SB On		X		850
		NB Off			X	400
		SB Off			X	450
St. Lucie	SR 70 / Okeechobee Rd.	SB On	X	X		1500
		SB Off			X	1500
St. Lucie	SR 68 / Orange Ave.	NB Off			X	1500
St. Lucie	SR 614 / Indrio Rd.	SB On				
		NB Off	X		X	1500
Indian River	SR 60 / 20th St.	NB Off	X		X	1500

SR 9 / I-95 Between Gatlin Boulevard and Crosstown Parkway

A new auxiliary lane will connect the southbound SR 9 / I-95 on-ramp at Crosstown Parkway and southbound off-ramp Gatlin Boulevard for a distance of approximately 7,700 feet. This additional travel lane will provide better traffic operations for vehicles entering and exiting from these interchange ramps. The SR 9 /I-95 southbound off-ramp at Gatlin Boulevard will be widened from one lane to two lanes.

SR 9 / I-95 Between Crosstown Parkway and St. Lucie West Boulevard

The existing interchange spacing between Crosstown Parkway and St. Lucie West Boulevard is 1.2 miles, which creates a weaving section along I-95. This interstate segment will function at a failing LOS and congestion is expected in the future. The proposed improvements replace the existing

weaving section with a system of braided ramps between the interchanges eliminating existing congestion. The braided ramps consist of two 12-foot lanes with 12-foot paved shoulders on the outside travel lanes and 8-foot paved shoulders on the inside. The proposed design speed is 45 mph.

The current SR 9 / I-95 northbound exit ramp diverge to the St Lucie West Boulevard interchange will be relocated further south from its current position and the SR 9 / I-95 on-ramp from Crosstown Parkway will be realigned to create a grade separation with the St Lucie West Boulevard off-ramp. Additionally, the SR 9 / I-95 northbound braided ramp system will include a right hand side single lane parallel ramp connection that will by-pass the braided system and avoid entering SR 9 / I-95 providing a direct connection from Crosstown Parkway to St Lucie West Boulevard.

Similarly the existing SR 9 / I-95 southbound exit ramp diverge to the Crosstown Parkway interchange will be relocated further south. The braided ramp concept will grade separate the SR 9 / I-95 on-ramp from St Lucie West Boulevard such that it vertically passes over the Crosstown Parkway off-ramp.

The proposed design for a southbound braided ramp along SR 9 / I-95 between St Lucie West Boulevard and Crosstown Parkway will impact existing Overhead Transmission Lines. Field investigations and further coordination are recommended during PD&E and Design Phases.

SR 9 / I-95 and St. Lucie West Boulevard

St. Lucie West Boulevard westbound to southbound SR 9 / I-95 loop on-ramp merges with St. Lucie West Boulevard eastbound to southbound on-ramp to become the two-lane braided ingress ramp to southbound SR 9 / I-95.

SR 9 / I-95 and SR 614 / Indrio Road

The SR 614 / Indrio Road southbound on-ramp is also proposed to be slightly reconfigured by 2045. The existing southbound on-ramp currently merges into three southbound travel lanes. A short distance south of this merge point, the SR 9/ I-95 mainline expands to include a fourth southbound travel lane. This fourth southbound travel lane is currently provided by widening towards the inside. The proposed reconfiguration would eliminate the merge and extend the SR 614 / Indrio Road southbound on-ramp to continue directly into a fourth southbound travel lane. This conceptual alternative creates a smooth transition along southbound SR 9 / I-95 and enhances driver expectancy of lanes balance. These proposed interchange modifications are summarized in Appendix B.

2.7.4 Right-of-Way

Along the SR 9 / I-95 mainline corridor, right-of-way is only needed to accommodate one conceptual alternative. The proposed braided ramps between Crosstown Parkway and St. Lucie West Boulevard is outside the existing right-of-way limits. Right-of-way acquisition for SR 9 / I-95 segment will be necessary to accommodate this proposed improvement. Please refer to Appendix F for an estimate of the right-of-way impacts.

2.7.5 TSM&O

FHWA defines Transportation System Management and Operations (TSM&O) as “an integrated program to optimize the performance of existing multi-modal infrastructure through implementation of systems, services and projects to preserve capacity and improve the security, safety, and reliability of our transportation system”. TSM&O solutions are designated to address three major areas of concern in transportation: congestion, safety and travel-time reliability. TSM&O is recommended along SR 9 / I-95 using CCTV in various locations:

- SR 9 / I -95 at Becker Road
- SR 9 / I -95 at Crosstown Parkway
- SR 9 / I -95 at St. Lucie West Boulevard
- SR 9 / I-95 at Braided Ramps between Crosstown Parkway and St. Lucie West Boulevard

- SR 9 /I -95 at Oslo Road

Dynamic Truck Parking has been recommended for SR 9 / I-95. Utilizing Dynamic Truck Parking signs on SR 9 / I-95 will let truck drivers know the parking accessibility. The truck drivers would know which rest stops have availability and they will be able to plan their route better as it nears their time to rest. Thus, drivers can avoid choosing to park at unsafe locations such as on the shoulder of the road, exit ramps or vacant lots.

Touch Screen Information Kiosk have been recommended for northbound and southbound of SR 9 / I-95 at St. Lucie County Rest Area. As motorists stop at the various Treasure Coast rest stops, a touch screen kiosk would be made available to show tourists places of interest in the area. Conceptually, a person could approach the digital kiosk, most likely a hardened LCD display with a touchscreen, and be able to click parts of a map which would contain activities or places to visit in that area, such as parks, beaches, museums, or other economic draws.

2.8 Alternative Analysis

2.8.1 Cost Estimate

FDOT's Long Range Estimates (LRE) web-based computer system was used to develop construction cost estimates. The LRE is a parametric estimating tool used for conceptual estimating prior to the development of design quantities. Cost estimates were developed for the SR 9 / I-95 limits extending from the Palm Beach / Martin County line to SR 70 / Okeechobee Road that entailed the widening of the mainline for the addition of one managed lane in each direction. The cost estimates were further divided to match the assigned proposed PD&E projects.

1. FPID No. 413253-2: SR 9 / I-95 from Palm Beach / Martin County line to Bridge Road
2. FPID No. 413254-2: SR 9 / I-95 from Bridge Road to High Meadows
3. FPID No. 422681-5: SR 9 / I-95 from High Meadows to Martin / St. Lucie County line
4. FPID No. 422681-6: SR 9 / I-95 from Martin / St. Lucie County line to SR 70 / Okeechobee Road.

Appendix G contains the LREs.

2.8.2 Environmental Impacts

Martin County

Potential environmental impacts due to the widening of SR 9 / I-95 between Station 116+00.00 to Station 145+92.82 (outside widening) and Station 145+92.82 to Station 1424+71.04 / 3000+00.00 (inside widening) in Martin County are anticipated to be moderate. No impacts to special activity sites and social and cultural features, or relocation impacts are anticipated. The proposed project may impact contaminated sites within the project right of way and would require further evaluation during a PD&E Study. Impacts to a Wild and Scenic River, OFW, Section 4(f) Resources, wetlands, OSWs, noise sensitive sites, and floodplains are anticipated. Due to the natural habitats in this area, a PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

St. Lucie County

Potential environmental impacts due to the widening of SR 9 / I-95 from Station 1424+71.04 / 3000+00.00 to Station 3786+00.00 in St. Lucie County are anticipated to be minimal. No impacts to special activity sites or social and cultural features are anticipated. The proposed project may impact contaminated sites within the project right of way and would require further evaluation during a PD&E Study. Impacts to wetlands, OSWs, and floodplains are anticipated. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, a PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

Indian River County

Potential environmental impacts are not anticipated as improvements to SR 9 / I-95 in Indian River County are not proposed at this time.

2.8.3 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.0 CROSS ROADS

3.1 CR 708 / SE Bridge Road

3.1.1 General Description

CR 708 / SE Bridge Road (Roadway ID 89510000) is a roadway located in Martin County. The limits of the section being studied are from an Unnamed Section Line Road approximately 0.7 miles west of SR 9 / I-95 southbound off-ramp to the 1760 Bridge Road Access intersection (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this Bridge Road roadway segment is under the jurisdiction of Martin County. Its Functional Classification is Minor Arterial. The roadway's Context Classification is C2-Rural, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.1.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Martin County is the Martin County Public Transit (Marty). The Marty has four (4) fixed routes, none of which runs along CR 708 / SE Bridge Road within the study area. There are also no existing park-and-ride facilities near the interchange of SR 9 / I-95 and CR 708 / SE Bridge Road, and this interchange area is not a planned site for a future park-and-ride lot.

3.1.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and CR 708 / SE Bridge Road there are no existing sidewalks or bicycle facilities. The Martin County MPO has identified CR 708 / SE Bridge Road east and west of SR 9 / I-95 as a Designated Greenway. The greenways designation does not necessarily represent existing bike facilities, rather they identify the corridor along which to provide a facility.

The Martin County MPO published a Bicycle Pedestrian and Trails Master Plan document in November 2017. This was a county-wide effort to assess and identify locations for bicycle and pedestrian facilities to promote a multimodal transportation system in Martin County. The objective is to enable Martin County to become a bicycle-and-pedestrian-friendly, walkable, and livable community.

Results of Martin County's Bicycle Pedestrian and Trails Master Plan identified CR 708 / SE Bridge Road east and west of SR 9 / I-95 as a candidate location for buffered bicycle lanes. This future facility would be consistent with Martin County's designation of CR 708 / SE Bridge Road as a Designated Greenway. Such multimodal facilities are included in the long term future vision of the CR 708 / SE Bridge Road corridor in this SR 9 / I-95 Multimodal Master Plan document.

Consistent with Martin County's vision, a shared use path on the north side of CR 708 / SE Bridge Road within the interchange influence area is included in the concept.

3.1.3 Access Management

CR 708 / SE Bridge Road is a County facility, and its access management principles are derived from Martin County. As such, Martin County has determined that CR 708 / SE Bridge Road from west of SR 9 / I-95 to east of SR 9 / I-95 should be considered an Access Class 3 roadway.

Access Class 3 roadways are controlled access facilities where direct access to abutting land is controlled to maximize the operation of the through traffic movement. The land adjacent to these roadways is generally not extensively developed and/or the probability of significant land use change exists. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 3 facilities are 2,640 feet for full median openings and signalized intersections, and 1,320 feet for directional median openings.

A review of the current intersection and median opening spacing along CR 708 / SE Bridge Road was conducted and a summary provided in Table 3-1. Results indicate that the present location of the full opening intersection at 1760 CR 708 / SE Bridge Road Access east of SR 9 / I-95 is only 1,300 feet, which is more than 50% below the minimum spacing standard of 2,640 feet for a full opening intersection. The full intersection west of SR 9 / I-95 (designated as Median Opening #1) is situated nearly 3,100 feet from the SR 9 / SR 9 / I-95 southbound off-ramp termini intersection. This exceeds the minimum spacing standard.

There are no anticipated changes to the current access openings along CR 708 / SE Bridge Road for future 2030 or 2045 conditions.

Table 3-1 | Access Management Summary of CR 708 / SE Bridge Road Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
Bridge Road	Martin County	Unnamed Section Line Road	Full	-		2,640		
		Median Opening #1	Full	3,094		2,640	454	
		SB Off-Ramp Termini	Full	680		2,640	-1,960	-74.2%
		NB Off-Ramp Termini	Full	660		2,640	-1,980	-75.0%
		1760 Bridge Rd Access	Full	1,300		2,640	-1,340	-50.8%

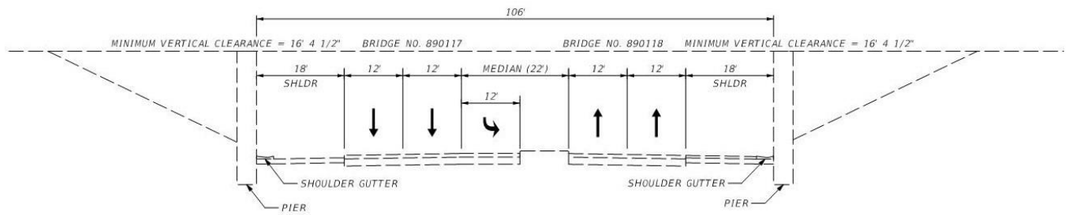
** Spacing based on Martin County access class designation of Class 3*

3.1.4 Existing Conditions Analysis

3.1.4.1 Typical Section

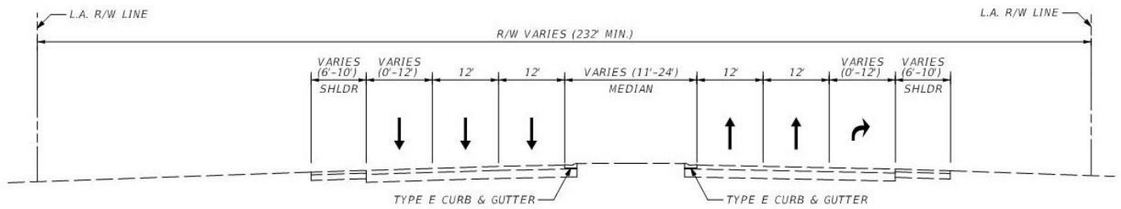
CR 708 / SE Bridge Road is a four-lane divided roadway with two 12-foot through lanes in each direction and left lane at the terminal intersection. The roadway segment between the interchange's two terminal intersections has 18-foot wide paved shoulders and a 22-foot wide raised concrete median, as shown in Figure 3-1. The existing minimum vertical clearance is 16 feet - 4.5 inches.

Figure 3-1 | Typical Section - CR 708 / SE Bridge Road below SR 9 / I-95



The roadway segments west and east of the terminal intersections have two 12-foot through lanes in each direction, 10-foot wide outside shoulders (from 6 to 10 feet paved shoulders), and a raised grass median (width varies from 11 to 24 feet) with curb and gutter Type E, as shown in Figure 3-2.

Figure 3-2 | Typical Section - CR 708 / SE Bridge Road



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one varied width (from 15 to 20 feet) lane with 6-foot wide inside and outside shoulders.

3.1.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with four single-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps are yield-controlled and all left turns onto SR 9 / I-95 off-ramps are stop-controlled. Additionally, all right turns onto SR 9 / I-95 are free-flow movements.

3.1.4.3 Design Speed

The design speed for CR 708 / SE Bridge Road within the study limits is 60 mph, and the posted speed is 55 mph. The design speed for all of the SR 9 / I-95 on-ramps and off-ramps transitions from 35 mph to 50 mph. The advisory posted speed for the off-ramps is 35 mph.

3.1.4.4 Horizontal Alignment

The existing horizontal geometry of CR 708 / SE Bridge Road within the vicinity of the SR 9 / I-95 interchange consists of a tangent segment extending from west of the Florida's Turnpike east up to Powerline Avenue.

3.1.4.5 Vertical Alignment

The vertical alignment of CR 708 / SE Bridge Road is mostly flat from east of SR 91 / Florida's Turnpike extending east beyond the study area with SR 9 / I-95 crossing over CR 708 / SE Bridge Road. A vertical curve is developed west of the SR 9 / I-95 interchange as CR 708 / SE Bridge Road crosses over SR 91 / Florida's Turnpike.

3.1.4.6 Right-of-Way

The right-of-way varies along the CR 708 / SE Bridge Road roadway segment. The minimum total right-of-way provided in the study area is 232 feet.

3.1.4.7 Lighting

The existing lighting for CR 708 / SE Bridge Road was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast light poles were identified along the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges. There is no lighting provided for CR 708 / SE Bridge Road outside the interchange.

3.1.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows off the road and down the shoulder into the adjacent swales.

3.1.4.9 Pavement Conditions

Field reviews indicated the existing pavement along CR 708 / SE Bridge Road is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.1.5 Proposed Improvements

The proposed roadway improvements for CR 708 / SE Bridge Road are as follow:

- Proposed signalization of the SR 9 / I-95 northbound and southbound ramp terminal intersections.
- Adding a second eastbound and westbound left turn lanes to the CR 708 / SE Bridge Road onto SR-9 / I-95 northbound and southbound on-ramp respectively.
- Adding two through lanes to the CR 708 / SE Bridge Road eastbound and one through lane to westbound.
- Proposed shared use path to the north side of CR 708 / SE Bridge Road.
- Removable of right turn free flow movement by urbanizing the intersections at SR 9 / I-95 ramp terminals.

Appendix C contains a Roadway set of plans of the proposed improvements described.

3.1.5.1 Design Criteria

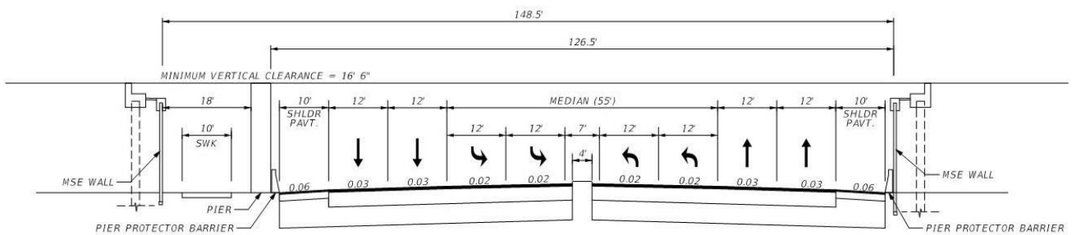
The proposed improvements at the CR 708 / SE Bridge Road interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.1.5.2 Typical Section

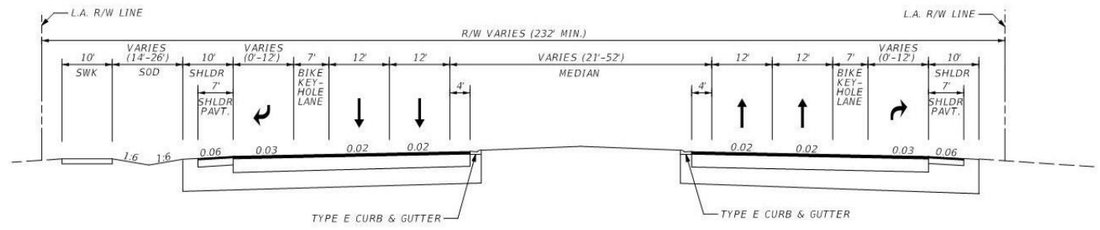
The proposed typical sections for CR 708 / SE Bridge Road shown in Figure 3-3 have two 12-foot through lanes in each direction. The proposed roadway segment between the interchange's two terminal intersections has 10-foot wide paved shoulders with pier protection barriers on each side and a 55-foot wide raised concrete median. A 10-foot wide sidewalk is located on the north side of the road between the proposed bridge end bent and pier.

Figure 3-3 | Typical Section - CR 708 / SE Bridge Road below SR 9 / I-95



The proposed roadway segments west and east of the terminal intersections depicted in Figure 3-4 have two 12-foot through lanes in each direction, 10-foot wide shoulders (7-foot paved shoulders), and a raised grass median (width varies from 21 to 52 feet) with curb and gutter Type E. A 10-foot wide sidewalk is located on the north side of the road.

Figure 3-4 | Typical Section - CR 708 / SE Bridge Road



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with 8-foot wide inside shoulders and 12-foot wide outside shoulders.

3.1.5.3 Structural Impacts

Due to the proposed improvements, the existing bridge structure will need to be replaced. The bridge main span will need to increase from 106 feet to 126.5 feet.

3.1.5.4 Interchange Configuration

The proposed interchange configuration maintains the standard diamond with four single-lane diagonal ramps. The terminal intersections will be upgraded to a signalized system removing the free-flow ramp "urbanizing" intersection and providing signal controlled pedestrian/bicycle movements.

3.1.5.5 Design Speed

The proposed design speed for the roadway segment is 60 mph, and the proposed posted speed is 55 mph. The proposed design speed for all of the SR 9 / I-95 on-ramps and off-ramps transitions from 35 mph to 50 mph.

3.1.5.6 Horizontal Alignment

The proposed horizontal geometry of CR 708 / SE Bridge Road will remain linear throughout the study limits. There is a 45 minutes deflection in each of the interchange's terminal intersections that was used in lieu of a reverse curve to allow the proposed typical section to match the existing typical section.

3.1.5.7 Vertical Alignment

The vertical alignment of CR 708 / SE Bridge Road will remain unchanged throughout the study limits.

3.1.5.8 Right-of-Way

Right-of-way acquisition will not be necessary for this roadway segment. The proposed design improvements will be accommodated within the existing right-of-way limits (232 feet Min.)

3.1.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.1.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.1.5.11 Pavement Design

Pavement design will be evaluated during the design phase.

3.1.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT and MUTCD requirements. All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.1.5.13 Traffic Signal Modification

The proposed signal improvements include signalizing the SR 9 / I-95 northbound and southbound Ramp terminals. These improvements consist of a new steel mast arm, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.1.5.1 TSM&O

Transportation System Management and Operations (TSM&O) improvements recommended along CR 708 / Bridge Road consist of one Arterial Dynamic Message Sign (ADMS) along the eastbound and one ADMS along the westbound of CR 708 / Bridge Road, mast arm mounted CCTVs at the proposed signalized intersections for traffic monitoring, automated traffic signal performance measures (ATSPM) software to monitor performance of the intersection, and cellular connectivity of the traffic signal to the County's Centracs traffic signal management system.

3.1.6 Alternative Analysis

3.1.6.1 Cost Estimate

Cost estimates were developed for CR 708 / SE Bridge Road improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.1.6.2 Benefit-Cost Analysis

Drivers along CR 708 / Bridge Road experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $8.2 million in 2030 and $45.4 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $194.8 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $4.0 million, this equates to a benefit-cost ratio of approximately 49.0. The resultant NPV is about $190.8 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.1.6.3 Environmental Impacts

Potential environmental impacts within the CR 708 / SE Bridge Road are anticipated to be minimal. The area around the CR 708 / SE Bridge Road Interchange is primarily undeveloped. No impacts to special activity sites and social and cultural features, floodplains, relocation impacts, or noise are anticipated. The proposed improvements to CR 708 / SE Bridge Road are not anticipated to impact contaminated sites since no High or Medium risk sites are proposed to be impacted by the project. Impacts to wetlands and OSWs are anticipated to be minimal. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation.

3.1.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.2 SR 76 / SW Kanner Highway

3.2.1 General Description

SR 76 / SW Kanner Highway (Roadway ID 89060000) is a roadway located in Martin County. The limits of the section being studied are from west of Jack James Drive west of SR 9 / I-95 interchange to east of Cove Road (which is located east of the interchange). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SR 76 / Kanner Highway roadway segment is under the jurisdiction of Martin County. Its Functional Classification is Minor Arterial west of the SR 9 / I-95 interchange and Principal Arterial-Other east of SR 9 / I-95 interchange. The roadway's Context Classification is C3R-Suburban Residential, in accordance with Context Classification Approach for District 4 - Final Report (October 2017). Construction for financial project identification number (FPID) 422641-3-52-01 widening project along SR 76 / Kanner Highway from Lost River Road to south of SW Monterey Road was completed in the summer of 2019.

3.2.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Martin County is the Martin County Public Transit (Marty). The Marty has four (4) fixed routes, with Indiantown Mart Route 2 running along SR 76 / Kanner Highway from east of SR 9 / I-95 towards Indiantown. There is an existing 75-space park-and-ride lot in the southeast quadrant of the SR 76 / Kanner Highway interchange near Halpatiokee Park. FDOT's Park-and Ride Lot Master Plan prepared in 2018 conceptually relocated the park-and-ride lot to a more visible site west of SR 9 / I-95 adjacent to SR 76 / Kanner Highway. This conceptual location is included in the future vision of the SR 76 / Kanner Highway corridor.

3.2.2.1 Park-and-Ride Facilities

The FDOT Work Program shows one planned park-and-ride lot within the three county study area. The Gatlin Boulevard Park-and-Ride Lot is located between Brescia Street and Edgarce Street in St. Lucie County and is funded for construction in FY 2020. In addition, based on the latest information available as of July 2018 from the District Four Draft Park-and-Ride Lot Master Plan, one additional new park-and-ride lot site is being considered in the study area for funding by FDOT District Four. It is located at the SR 9 / I-95 and SR 76 / Kanner Highway interchange. This will supplant the existing park-and-ride lot located in Halpatiokee Park.

3.2.2.2 Bicycle and Pedestrian Facilities

Currently, there are bicycle and pedestrian facilities located along SR 76 / Kanner Highway within the study area. Beginning west of the Jack James Drive intersection to east of Lost River Road, 5-foot wide bicycle lanes are provided on both sides of SR 76 / Kanner Highway. In general, a 5-foot wide sidewalk is currently present on the south side of SR 76 / Kanner Highway from Jack James Drive to east of SR 9 / I-95 near Lost River Road. A 5-foot wide sidewalk is present on both the north and south sides of SR 76 / Kanner Highway east of Lost River Road.

The Martin County MPO published a Bicycle Pedestrian and Trails Master Plan document in November 2017. This was a county-wide effort to assess and identify locations for bicycle and pedestrian facilities to promote a multimodal transportation system in Martin County. The objective is to enable Martin County to become a bicycle-and-pedestrian-friendly, walkable, and livable community.

Results of Martin County's Bicycle Pedestrian and Trails Master Plan identified SR 76 / Kanner Highway east and west of SR 9 / I-95 as a candidate location for a future shared use path and an Opportunity Trail. Such multimodal facilities are included in the long term future vision of the SR 76 / Kanner Highway corridor from Jack James Drive west of SR 9 / I-95 to Cove Road east of SR 9 / I-95 in this Multimodal Master Plan document. The future shared use path is located on the north and south side of SR 76 / Kanner Highway and provides connectivity to facilities along Cove Road that are outside of the interchange influence area.

3.2.3 Access Management

SR 76 / Kanner Highway is a state facility with a posted speed limit of 45 miles per hour (mph) that has been classified as an Access Class 5 facility. Access Class 5 roadways are controlled access facilities where adjacent land has been extensively developed and where the probability of major land use change is not high. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 5 facilities with speed limits of 45 mph or less are 1,320 feet for full median openings and signalized intersections, and 660 feet for directional median openings.

A review of the current intersection and median opening spacing along SR 76 / Kanner Highway was conducted and a summary provided in Table 3-2. Results indicate that the present location of the full opening intersection at Jack James Drive west of SR 9 / I-95 is 530 feet from the SR 9 / I-95 southbound off-ramp termini intersection, which is nearly 60% less than the minimum spacing standard of 1,320 feet for a full opening. Lost River Drive east of SR 9 / I-95 is located about 1,220 feet from the SR 9 / I-95 northbound off-ramp termini intersection. This is less than 10% of the minimum spacing standard of 1,320 feet.

With the introduction of a DDI configuration, the future access spacings along SR 76 / Kanner Highway in 2045 are changed slightly. A review of those future spacings indicate that the distance between Jack James Drive and the southbound off-ramp termini increases to approximately 890 feet. While that still does not meet the minimum standard for a Class 5 facility, it is an improvement when compared to current conditions. Further, the spacing distance on the east side of the interchange remain essentially unchanged. A summary of the future spacings is included in Table 3-2.

Table 3-2 | Access Management Summary of SR 76 / Kanner Highway Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Existing Conditions: Spacing of Opening (feet)	Existing Conditions: Access Class	Existing Conditions: Standard Spacing (feet)	Existing Conditions: Variance (feet)	Existing Conditions: Variance (%)	For DDI Concept: Spacing of Opening (feet)	For DDI Concept: Variance (feet)	For DDI Concept: Variance (%)
SR 76/Kanner Highway	FDOT	Jack James Drive	Full	-	5	1,320			-		
		SB Off-Ramp Termini	Full	530	5	1,320	-790	-59.8%	890	-430	-32.6%
		NB Off-Ramp Termini	Full	990	5	1,320	-330	-25.0%	775	-545	-41.3%
		SW Lost River Drive	Full	1,220	5	1,320	-100	-7.6%	1,140	-180	-13.6%
		Cove Road	Full	1,630	5	1,320	310		1,630	310	

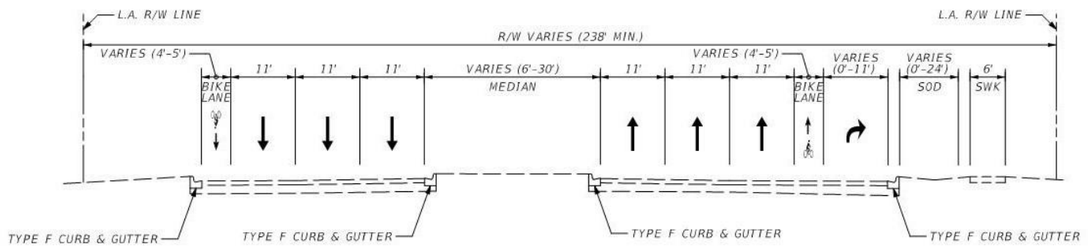
45 mph posted speed limit within study area

3.2.4 Existing Conditions Analysis

3.2.4.1 Typical Section

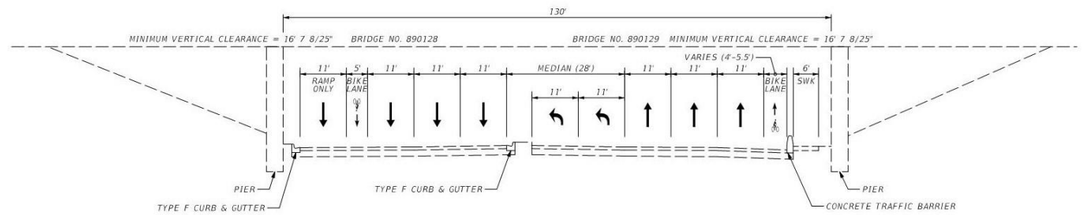
SR 76 / Kanner Highway is a six-lane divided roadway with three 11-foot through lanes in each direction and occasional auxiliary lanes. The roadway segment between west of SW Jack James Drive and SR 9 / I-95 southbound Bridge has a bicycle lane (width varies from 4 to 5.5 feet) with curb and gutter Type F, and a raised grass median (width varies from 6 to 30 feet) with curb and gutter Type F. A 6-foot sidewalk is located on the south side of the road, as shown in Figure 3-5.

Figure 3-5 | Typical Section-SR 76 / Kanner Highway between west of SW Jack James Drive and SR 9 / I-95



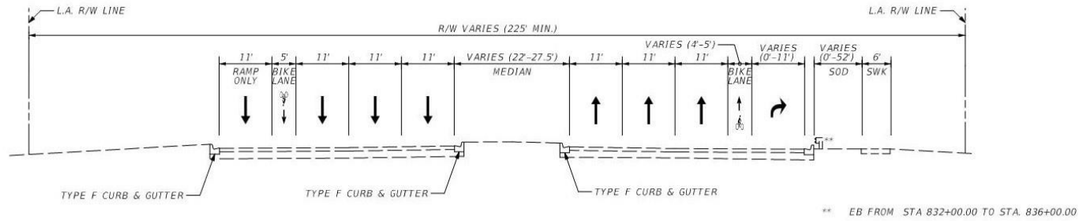
The roadway segment below SR 9 / I-95 shown in Figure 3-6 consists of three 11-foot through lanes in each direction with curb and gutter Type F on the westbound travel lanes, a bicycle lane (width varies from 4 to 5.5 feet), and a 28-foot wide raised concrete median with curb and gutter Type F. A 9-foot wide sidewalk is located on the south side of the road protected with a concrete traffic barrier. The existing minimum vertical clearance is 16 feet - 7.3 inches.

Figure 3-6 | Typical Section-SR 76 / Kanner Highway below SR 9 / I-95



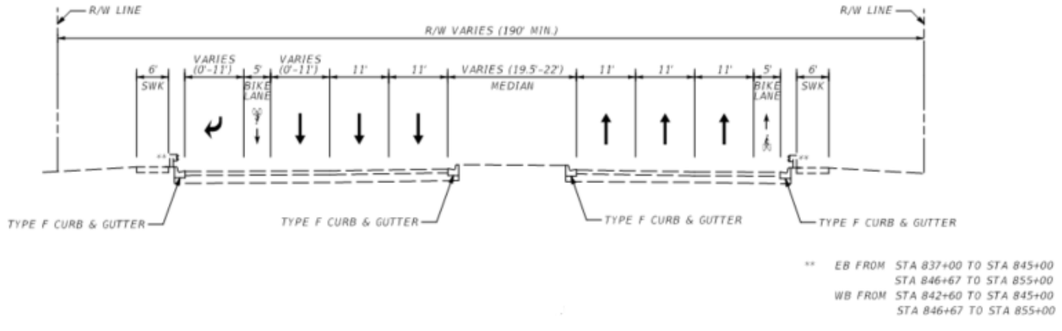
The roadway segment between SR 9 / I-95 northbound Bridge and SW Lost River Road consists of three 11-foot through lanes in each direction with curb and gutter Type F, an 11-foot wide ramp-only lane on the west bound, a bicycle lanes (width varies from 4 to 5 feet), and a raised grass median (width varies from 22 to 27.5 feet) with curb and gutter Type F. A 6-foot wide sidewalk is located on the south side of the road, as shown in Figure 3-7.

Figure 3-7 | Typical Section-SR 76 / Kanner Highway between SR 9 / I-95 and SW Lost River Road



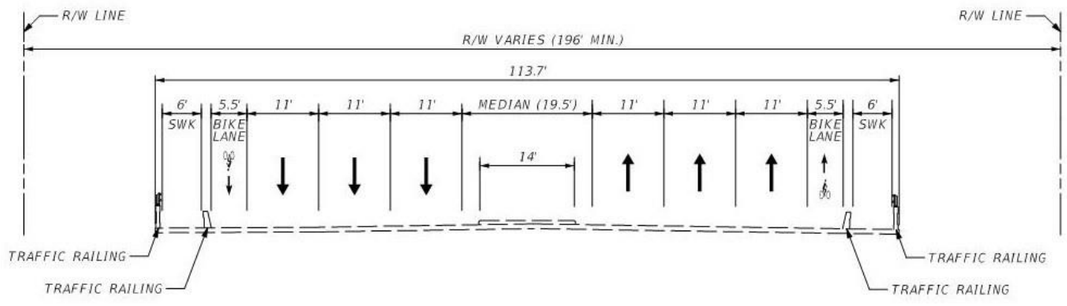
The roadway segment between SW Lost River Road and SE Cove Road varies between three 11-foot to two 11-foot through lanes in each direction with curb and gutter Type F, 5-foot wide bicycle lanes, and a raised grass median (width varies from 19.5 to 22 feet) with curb and gutter Type F. A 6-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-8.

Figure 3-8 | Typical Section-SR 76 / Kanner Highway between SW Lost River Road and SE Cove Road



The bridge over the South Fork of the St. Lucie River, between SW Lost River Road and SE Cove Road consists of three 11-foot wide through lanes in each direction, 5.5-foot wide bicycle lanes, and a 19.5-foot wide raised concrete median. A 6-foot wide sidewalk is located on both sides of the road protected with traffic railings, as shown in Figure 3-9.

Figure 3-9 | Typical Section-SR 76 / Kanner Highway - Bridge over the South Fork of the St. Lucie River



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp accommodates two 15-foot eastbound left turn lanes and one 15-foot westbound right turn lane that eventually merge into a single 15-foot wide lane ramp. The SR 9 / I-95 northbound off-ramp has one 15-foot wide lane that diverges into three 11-foot right turn lanes and two 12-foot left turn lanes at the terminal intersection. The SR 9 / I-95 southbound on-ramp along the westbound consists of a 15-foot wide single-lane loop ramp and along the eastbound consists of a 15-foot wide single-lane ramp. The SR 9 / I-95 southbound off-ramp has one 15-foot wide lane that diverges into two 12-foot left turn lanes and one 12-foot right turn lane at the terminal intersection. All ramps have 6-foot wide inside and outside shoulders.

3.2.4.2 Interchange Configuration

The existing interchange configuration is a partial cloverleaf that contains one single-lane cloverleaf loop ramp and four single-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and right/left turns from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps are single lane free-flow movements.

3.2.4.3 Design Speed

The design speed and the posted speed for the roadway segment is 45 mph. The design speed for the SR 9 / I-95 northbound off-ramp and southbound on-ramp (cloverleaf loop ramp) is 35 mph, while for the northbound on-ramp and southbound on-ramp (diagonal ramp) transitions from 35 mph to 70 mph, and from 35 mph to 50 mph for the southbound off-ramp. The advisory posted speed for all ramps is 35 mph.

3.2.4.4 Horizontal Alignment

The existing horizontal geometry of SR 76 / SW Kanner Highway consists of a tangent alignment that extends from the southwest of SW Locks Road up to the northeast side of the SR 9 / I-95 interchange. A series of normal crown reverse curves continue north up to SW Monterey Road.

3.2.4.5 Vertical Alignment

The existing vertical alignment of SR 76 / SW Kanner Highway consists of sag and crest curves near the bridges over the St. Lucie River and SR 91 / Florida's Turnpike. The vertical alignment is mostly flat along the SR 9 / I-95 interchange as SR 9 / I-95 crosses over SR 76 / SW Kanner Highway.

3.2.4.6 Right-of-Way

The right-of-way varies along the SR 76 / SW Kanner Highway the roadway segment. The minimum total right-of-way provided in the study area is 190 feet.

3.2.4.7 Lighting

The existing lighting for SR 76 / SW Kanner Highway was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast light poles were identified along the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges. There are standard roadway lights on SR 76 / SW Kanner Highway on the north side of the road, east of SW Lost River Rd.

3.2.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.2.4.9 Pavement Conditions

SR 76 / SW Kanner Highway is currently being widened through FPID 422641-3-52-01 with an opening year of 2020. This project includes widening and milling and resurfacing, which warrants an assumption that the pavement will be in adequate condition through the design life of the project (2040).

3.2.5 Proposed Improvements

The proposed roadway improvements for SR 76 / SW Kanner Highway are as follow:

- Diverging Diamond Interchange (DDI) configuration is proposed. Eastbound and westbound traffic along the arterial is flipped from the right-hand-side of the roadway to the left-hand-side of the roadway with a tangent of 100 feet and flip back to original position. Traffic traveling through the interchange along the arterial passes through signalized intersections in each direction.
- Proposed signalization of the SR 9 / I-95 northbound and southbound ramp terminal intersections.
- Proposed signalization at SR 76 / SW Kanner Highway and Cove Road.
- Retiming existing signalized intersection at SR 76 / SW Kanner Highway and Jack James Drive. Additionally, retiming existing signalized intersection at for SR 76 / SW Kanner Highway and Lost River Road.
- Sidewalk is provided on both sides of SR 76 / SW Kanner Highway.
- Proposed location for Park and Ride location.
- Adding two left turn lanes to the Cove Road northbound and existing shared left/right turn lane changed to an exclusive right turn lane.
- Adding a fourth lane along eastbound SR 76 / SW Kanner Highway from Diverging Diamond Interchange thru Lost River Road and up to Cove Road where it drops as a right turn lane.
- Adding a proposed bridge over St. Lucie River Canal.

Appendix C contains a Roadway set of plans of the proposed improvements described.

3.2.5.1 Design Criteria

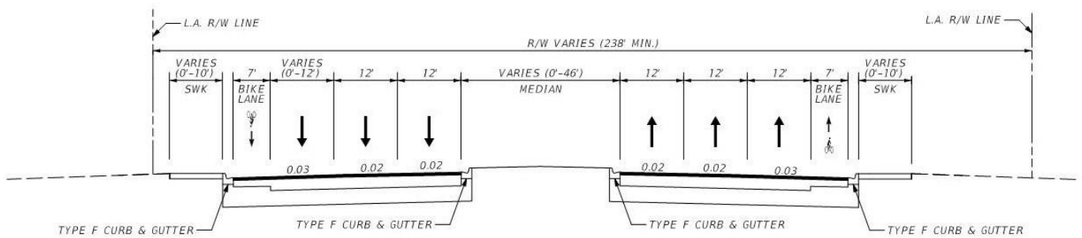
The proposed improvements at the SR 76 / SW Kanner Highway interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)
- Diverging Diamond Interchange Information Guide, FHWA (2014)
- Alternative Intersections/Interchanges: Informational Report (AIIR), FHWA (2010)

3.2.5.2 Typical Section

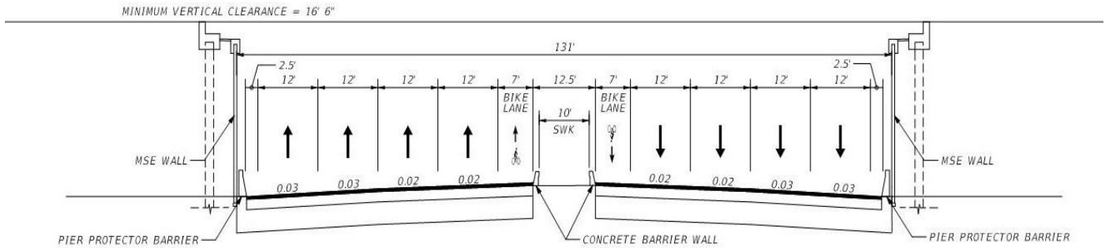
There are five proposed typical sections (Figure 3-10 through Figure 3-14) for SR 76 / SW Kanner Highway. The proposed roadway segment between west of SW Jack James Drive and SR 9 / I-95 southbound Bridge consists of three 12-foot through lanes in each direction; however, the road merges into two 12-foot through lanes in the west direction just west of SW Jack James Drive. Within the mentioned limits the facility has curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 0 to 46 feet) with curb and gutter Type F. A 10-foot wide sidewalk is located on both sides of the road.

Figure 3-10 | Typical Section-SR 76 / Kanner Highway between west of SW Jack James Drive and SR 9 / I-95



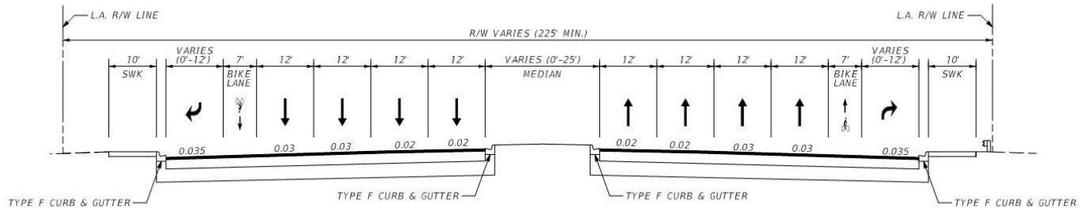
The proposed roadway segment below SR 9 / I-95 has four 12-foot through lanes in each direction, 2.5-foot paved shoulders with pier protection barriers on each side, 7-foot wide bicycle lanes, and a 12.5-foot wide median containing a 10-foot sidewalk protected with concrete barrier walls.

Figure 3-11 | Typical Section-SR 76 / Kanner Highway below SR 9 / I-95



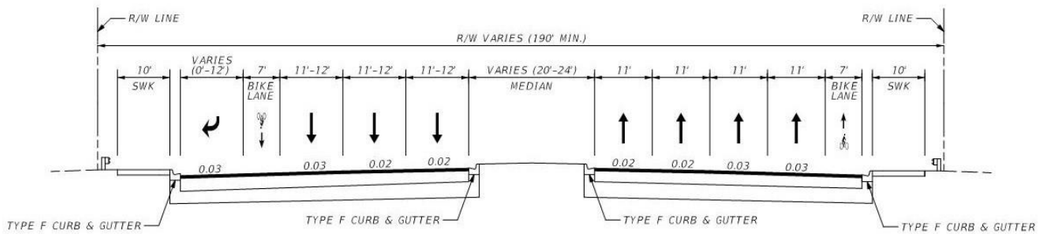
The proposed roadway segment between SR 9 / I-95 northbound Bridge and SW Lost River Road consists of four 12-foot through lanes in each direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 0 to 25 feet) with curb and gutter Type F. A 10-foot wide sidewalk is located on both sides of the road.

Figure 3-12 | Typical Section-SR 76 / Kanner Highway between SR 9 / I-95 and SW Lost River Road



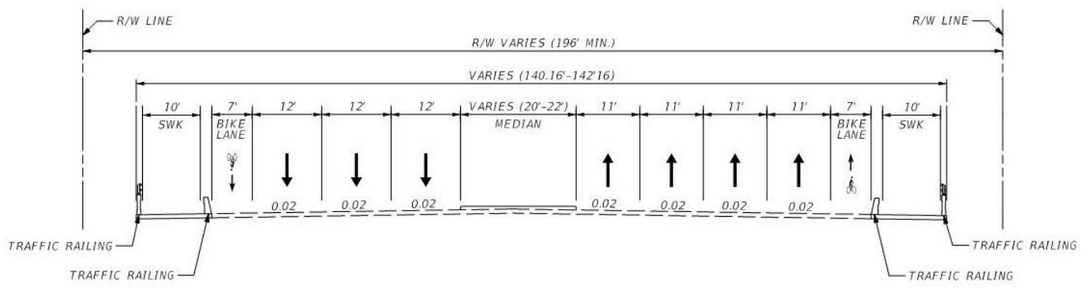
The proposed roadway segment between SW Lost River Road and SE Cove Road has four 11-foot through lanes in the east direction and a varied width (11-12 feet) through lanes in the west direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 20 to 24 feet) with curb and gutter Type F. A 10-foot sidewalk is located on both sides of the road.

Figure 3-13 |Typical Section-SR 76 / Kanner Highway between SW Lost River Road and SE Cove Road



The proposed typical section for the bridge over the South Fork of the St. Lucie River, between SW Lost River Road and SE Cove Road consists of four 11-foot through lanes in the east direction and three 12-foot through lanes in the west direction, with 7-foot wide bicycle lanes, and a raised concrete median (width varies from 20 to 22 feet). A 10-foot wide sidewalk is located on both sides of the road protected with traffic railings.

Figure 3-14 |Typical Section-SR 76 / Kanner Highway-Bridge over the South Fork of the St. Lucie River



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp accommodates one 15-foot eastbound left turn lane and one 15-foot westbound right turn lane, 15 feet that eventually merge into a single 15-foot wide lane ramp. The SR 9 / I-95 northbound off-ramp has two 12-foot wide lanes that diverge into three 12-foot right turn lanes and one 15-foot left turn lane at the terminal intersection. The SR 9 / I-95 southbound on-ramp consists of two 12-foot westbound left turn lanes and one 15-foot eastbound right turn lane that eventually merge into one 12-foot wide lane ramp. The SR 9 / I-95 southbound off-ramp has two 12-foot wide lanes that diverge into three 12-foot left turn lanes and one 15-foot right turn lane at the terminal intersection. All ramps have 6 or 8-foot wide inside shoulders and 6 or 12-foot wide outside shoulders.

3.2.5.3 Structural Impacts

Due to the proposed improvements, the existing bridge structure will need to be replaced. The bridge span will need to increase from 130 feet to 131 feet.

3.2.5.4 Interchange Configuration

The proposed interchange configuration is a Diverging Diamond Interchange (DDI) with two single-lane diagonal ramps and two double-lane diagonal ramps. Traffic projections show that this type of interchange configuration would provide better traffic flow and reduce conflict points, thus increasing safety to pedestrian/bicycle movements.

3.2.5.5 Design Speed

The proposed design speed for the Diverging Diamond Interchange (DDI) is 40 mph with a proposed posted speed of 40 mph. The proposed design and posted speeds along SR 76 / Kanner Highway west and east of the SR 9 / I-95 interchange will remain at 45 mph. The proposed design speed for the SR 9 / I-95 northbound off-ramp is 35 mph, while for the northbound on-ramp and southbound on-ramp transitions from 35 mph to 70 mph, and from 35 mph to 50 mph for the southbound off-ramp.

3.2.5.6 Horizontal Alignment

The horizontal alignment consists of a standard Diverging Diamond Interchange (DDI). The interchange's terminal intersections consist of two intersecting reverse curves, each with a 593 feet inside radius and a 100 feet tangent. The crossover angle of 30° at both intersections meets the general FHWA requirements of a cross angle between 30° and 50°.

3.2.5.7 Vertical Alignment

The vertical alignment for SR 76 / SW Kanner Highway will be slightly altered to accommodate the proposed design. The necessary alterations are to be evaluated during the design phase.

3.2.5.8 Right-of-Way

Right-of-way acquisition will not be necessary for this roadway segment. The proposed design improvements will be accommodated within the existing right-of-way limits (190 feet Min.)

3.2.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.2.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.2.5.11 Pavement Design

Pavement analysis will be evaluated during the design phase.

3.2.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT, and MUTCD. Although a Diverging Diamond Interchange (DDI) may operate in a different manner, the pavement marking used is similar to other interchanges. For more information refer to Diverging Diamond Interchange Information Guide (FHWA). All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.2.5.13 Traffic Signal Modification

The proposed signal improvements include retiming the SR 76 / SW Kanner Highway and SW Jack James Dr. intersection and retiming the SR 76 / SW Kanner Highway and SW Lost River Dr. intersection. The proposed improvements also include adding turn lanes to the SR 76 / SW Kanner Highway and SE Cove Rd. intersection. This improvement would require a new steel mast arm and a new traffic signal head. The diverging diamond interchange (DDI) would require new signals at both the west and east terminals. These new signals would require new steel mast arms, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.2.5.14 TSM&O

Transportation System Management and Operations (TSM&O) improvements recommended along SR 76 / Kanner Highway consist of one Arterial Dynamic Message Sign (ADMS) along eastbound, one along westbound and one along proposed Park and Ride. In addition to the ADMS improvements, CCTV is proposed at all adjacent signalized intersections from Salerno Road to the north to SW 96th Street (CR 711) to the south, as well as under SR 9 / I-95 Bridge. A signal priority system and ATSPM software is also recommended at all signalized intersections as well as underground fiber optic cable between these two termini.

3.2.6 Alternative Analysis

3.2.6.1 Cost Estimate

Cost estimates were developed for SR 76 / SW Kanner Highway improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.2.6.2 Benefit-Cost Analysis

Drivers along SR 76 / SW Kanner Highway experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario,

as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $2.1 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $7.3 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $19.4 million, this equates to a benefit-cost ratio of approximately 0.4. The resultant NPV is about -$12.1 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.2.6.3 Environmental Impacts

Potential environmental impacts within the SR 76 / Kanner Highway are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or relocation impacts are anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Impacts to wetlands, OSWS, and floodplains are anticipated. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.2.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.3 SW High Meadow Avenue.

3.3.1 General Description

SW High Meadow Avenue (Roadway ID 89000032) is a roadway located in Martin County. The limits of the section being studied are from south of the SR 9 / I-95 interchange to SW Swallowtail Highway (which is located north of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SW High Meadow Avenue roadway segment is under the jurisdiction of Martin County. Its Functional Classification is Minor Arterial. The roadway's Context Classification is C3R-Suburban Residential, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.3.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Martin County is the Martin County Public Transit (Marty). The Marty has four (4) fixed routes, none of which runs along High Meadow Avenue within the study area. There are also no existing park-and-ride facilities near the interchange of SR 9 / I-95 and High Meadow Avenue, and none are planned for the future.

3.3.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and High Meadow Avenue there are no existing sidewalk. Further, there are no bicycle lanes present on High Meadow Avenue in the southbound direction, and only a short 400-foot section of a bicycle lane on the northbound side.

This short bicycle lane is located between the SR 9 / I-95 northbound exit ramp terminal ramp and Swallowtail Road between the northbound travel lane and the right-turn lane.

The Martin County MPO published a Bicycle Pedestrian and Trails Master Plan document in November 2017. This was a county-wide effort to assess and identify locations for bicycle and pedestrian facilities to promote a multimodal transportation system in Martin County. The objective is to enable Martin County to become a bicycle-and-pedestrian-friendly, walkable, and livable community.

Results of Martin County's Bicycle Pedestrian and Trails Master Plan does not identify High Meadow Avenue near SR 9 / I-95 for any candidate multimodal facilities. As a result, no additional multimodal facilities are included in the long term future vision of the High Meadow Avenue corridor in this SR 9 / I-95 Multimodal Master Plan document.

3.3.3 Access Management

High Meadow Avenue is a local, non-state facility and its access management principles are derived from Martin County. As such, Martin County has determined that High Meadow Avenue from SR 9 / I-95 to SW Golden Bear Way is an Access Class 3 roadway.

Access Class 3 roadways are controlled access facilities where direct access to abutting land is controlled to maximize the operation of the through traffic movement. The land adjacent to these roadways is generally not extensively developed and/or the probability of significant land use change exists. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 3 facilities are 2,640 feet for full median openings and signalized intersections, and 1,320 feet for directional median openings.

A review of the current intersection and median opening spacing along High Meadow Avenue was conducted and a summary provided in Table 3-3. Results indicate that the present location of SW Swallowtail Highway north of SR 9 / I-95 is only 790 feet from the northbound on-ramp terminal intersection. This is approximately 40% below the minimum spacing standard of 1,320 feet for a full opening.

There are no anticipated changes to the current access openings along High Meadow Avenue for future 2030 or 2045 conditions.

Table 3-3 | Access Management Summary of High Meadow Avenue Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
High Meadow Avenue	Martin County	NB On-Ramp Termini Intersection	Directional	-				
		SW Swallowtail Hwy	Full	790		1,320	-530	-40.2%

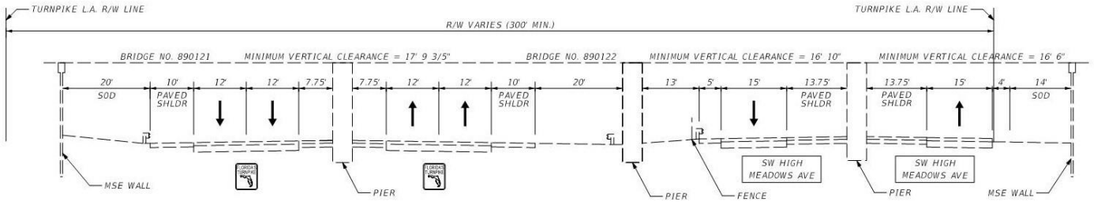
** Spacing based on Martin County access class designation of Class 3 from I-95 to SW Golden Bear Way*

3.3.4 Existing Conditions Analysis

3.3.4.1 Typical Section

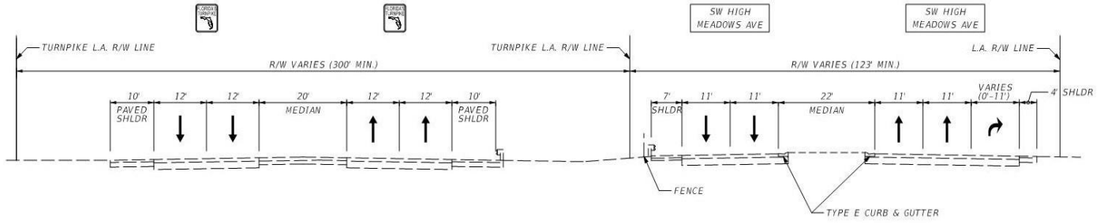
SW High Meadow Avenue varies between a two lane and four lane divided roadway. The roadway segment below SR 9 / I-95 consists of one 15-foot through lane in each direction with outside paved shoulder (4 or 5 feet), and a 32-foot wide concrete median containing 13.75-foot wide shoulders, as shown in Figure 3-15. The existing minimum vertical clearance is 16 feet - 6 inches. SR 91 / Florida's Turnpike adjacent to SW High Meadow Avenue has two 12-foot through lanes in each direction, 10-foot wide outside paved shoulders, and a 20-foot wide concrete median containing 7.75-foot wide shoulders. The existing minimum vertical clearance is 17 feet - 9.6 inches.

Figure 3-15 | Typical Section – SW High Meadow Avenue below SR 9 / I-95



The roadway segment north and south of SW Bald Eagle Drive is a four lane divided roadway with two 11-foot through lanes in each direction, paved shoulders (4 and 7 feet), and a 22-foot wide raised grass median with curb and gutter Type E as shown in Figure 3-16. SR 91 / Florida's Turnpike adjacent to SW High Meadow Avenue has two 12-foot through lanes in each direction, 10-foot wide outside paved shoulder, and a 20-foot concrete median containing 9-foot wide shoulders.

Figure 3-16 | Typical Section – North and South of SW Bald Eagle Drive



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp and southbound off-ramp consist of a 15-foot wide single-lane loop ramp. The SR 9 / I-95 northbound off-ramp and southbound on-ramp consist a 15-foot wide single-lane diagonal ramp. All ramps have 6-foot wide inside and outside shoulders.

3.3.4.2 Interchange Configuration

The existing interchange configuration is a partial cloverleaf that contains two single-lane cloverleaf loop ramps and two double-lane diagonal ramps. All right turns onto SR 9 / I-95 on-ramps and from off-ramps are single lane free-flow movements. Additionally, left turn onto SR 9 / I-95 on ramp is stop-controlled.

3.3.4.3 Design Speed

The design speed and the posted speed for the roadway segment is 55 mph. The design speed for the SR 9 / I-95 northbound off-ramp is 35 mph, while for the southbound off-ramp and northbound on-ramp (cloverleaf loop ramps) is 30 mph. The advisory posted speed for SR 9 / I-95 northbound off-ramp is 35 mph, while for southbound on-ramp, southbound off-ramp and northbound on-ramp (cloverleaf loop ramps) is 25 mph.

3.3.4.4 Horizontal Alignment

The existing horizontal geometry of SW High Meadow Avenue is mostly linear throughout the study area running parallel to the SR 91 / Florida's Turnpike.

3.3.4.5 Vertical Alignment

The existing vertical geometry of SW High Meadow Avenue is mostly flat throughout the study area as SR 9 / I-95 crosses over SW High Meadow Avenue.

3.3.4.6 Right-of-Way

The right-of-way varies along the SW High Meadow Avenue roadway segment. The minimum total right-of-way provided in the study area is 123 feet.

3.3.4.7 Lighting

The existing lighting for SW High Meadow Avenue was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Standard roadway lights were identified along the interchange and SW High Meadow Avenue east and west of the interchange. Decorative luminaries are present along the median, north and south of SW Bald Eagle Drive, and wall mount fixtures are placed on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.3.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows off the road and down the shoulder into the adjacent swales.

3.3.4.9 Pavement Conditions

Field reviews indicated the existing pavement along SW High Meadow Avenue is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.3.5 Proposed Improvements

The proposed roadway improvement for SW High Meadow Avenue is as follow:

- Proposed signalization at SW High Meadow Avenue and Swallowtail Lane intersection.

Appendix B contains a Roadway set of plans of the proposed improvements described in the following sections.

3.3.5.1 Design Criteria

The proposed improvements at the SW High Meadow Avenue interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.3.5.2 Traffic Signal Modification

The proposed signal improvements include signalizing the SW High Meadow Avenue and SW Swallowtail Ln. intersection. This new signalized intersection would require a new steel mast arm system, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.3.5.1 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along High Meadow Avenue using one Arterial Dynamic Message Sign (ADMS) along southbound of High Meadow Avenue. Fiber optic cable should be installed from the interchange to the proposed signalized intersection at Swallowtail Lane and to the ADMS. The intersection should have ATSPM software to monitor performance, and CCTV to monitor the intersection as well.

3.3.6 Alternative Analysis

3.3.6.1 Cost Estimate

Cost estimates were developed for SW High Meadow Avenue improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.3.6.2 Benefit-Cost Analysis

Drivers along SW High Meadow Avenue experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = - $271,341 in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of - $950,076 in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $311,767 this equates to a negative benefit-cost ratio and a negative NPV. The NPV analysis for this conceptual alternative is included in Appendix I.

3.3.6.3 Environmental Impacts

Potential environmental impacts are not anticipated as improvements to SW High Meadow Avenue are not proposed at this time.

3.3.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.4 CR 714 / SR 714 / SW Martin Highway

3.4.1 General Description

CR 714 / SR 714 / SW Martin Highway (Roadway ID 89090000) is a roadway located in Martin County. The limits of the section being studied are from SW Green Farms Lane west of SR 9 / I-95 interstate to SW Stuart West Boulevard (which is located east of interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this CR 714 / SR 714 / SW Martin Highway roadway segment is under the jurisdiction of Martin County. Its Functional Classification is Minor Arterial west of the SR 9 / I-95 interchange, and Principal Arterial-Other east of the SR 9 / I-95 interchange. The roadway's Context Classification is C2-Rural, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.4.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Martin County is the Martin County Public Transit (Marty). The Marty has four (4) fixed routes, none of which runs along CR 714 / SR 714 / Martin Highway within the study area. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and CR 714 / SR 714/Martin Highway.

3.4.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and CR 714 / SR 714/Martin Highway there are no existing sidewalks. Furthermore, bicycle lanes are not present on CR 714 / SR 714/ Martin Highway in the westbound and eastbound direction, with the exception of a short 325-foot section of bicycle lane in the eastbound direction approaching Stuart West Boulevard east of SR 9 / I-95. This short bicycle lane is located between the eastbound travel lane and the right-turn lane.

The Martin County MPO published a Bicycle Pedestrian and Trails Master Plan document in November 2017. This was a county-wide effort to assess and identify locations for bicycle and pedestrian facilities to promote a multimodal transportation system in Martin County. The objective is to enable Martin County to become a bicycle-and-pedestrian-friendly, walkable, and livable community.

Results of Martin County's Bicycle Pedestrian and Trails Master Plan identified CR 714 / SR 714 / Martin Highway east and west of SR 9 / I-95 as a candidate location for a shared use path. Such multimodal facilities are included in the long term future vision of the CR 714 / SR 714 / Martin Highway corridor in this SR 9 / I-95 Multimodal Master Plan document. A shared use path is included in interchange concepts along the south side of CR 714 / SR 714 / Martin Highway within the interchange influence area.

3.4.3 Access Management

CR 714 / SR 714 / Martin Highway is a state facility with a posted speed limit of 45 miles per hour (mph) that has been classified as an Access Class 3 facility. Access Class 3 roadways are controlled access facilities where direct access to abutting land is controlled to maximize the operation of the through traffic movement. The land adjacent to these roadways is generally not extensively developed and/or the probability of significant land use change exists. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 3 facilities are 2,640 feet for full median openings and signalized intersections, and 1,320 feet for directional median openings.

A review of the current intersection and median opening spacing along CR 714 / SR 714 / Martin Highway was conducted and a summary provided in Table 3-4. Results indicate that the present location of the full opening intersection at SW Green Farms Lane west of SR 9 / I-95 is 1,305 feet from the SR 9 / I-95 southbound off-ramp termini intersection, which is about 50% less than the minimum spacing standard of 2,640 feet for a full opening. SW Stuart Boulevard east of SR 9 / I-95 is located about 1,255 feet from the SR 9 / I-95 northbound off-ramp termini intersection. This is 52% of the minimum spacing standard of 2,640 feet.

There are no anticipated changes to the current access openings along CR 714 / SR 714 / Martin Highway for future 2030 or 2045 conditions.

Table 3-4 | Access Management Summary of SR 714 / Martin Highway Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
SR 714/Martin Hwy	FDOT	SW Green Farms Lane	Full	-	3	2,640		
		SB Off-Ramp Termini	Full	1,305	3	2,640	-1,335	-50.6%
		NB Off-Ramp Termini	Full	1,605	3	2,640	-1,035	-39.2%
		SW Stuart W Blvd	Full	1,255	3	2,640	-1,385	-52.5%

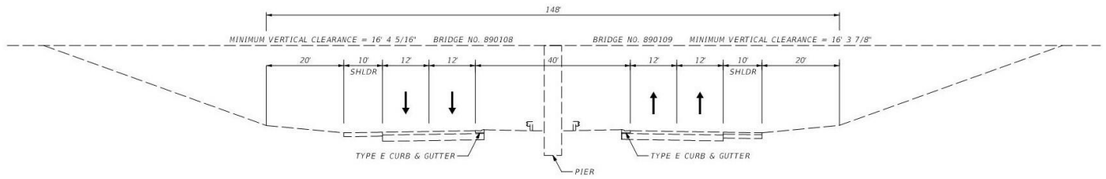
45 mph posted speed limit within study area

3.4.4 Existing Conditions Analysis

3.4.4.1 Typical Section

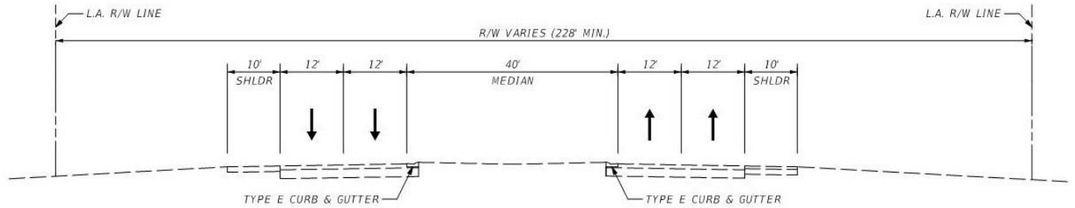
CR 714 / SR 714 / SW Martin Highway is a four-lane divided roadway with two 12-foot through lanes in each direction. The roadway segment between the interchange's two terminal intersections has 10-foot wide paved shoulders and a 40-foot wide raised grass median with curb and gutter Type E, as shown in Figure 3-17. The existing minimum vertical clearance is 16 feet - 3.8 inches.

Figure 3-17 | Typical Section - CR 714 / SR 714 / SW Martin Highway below SR 9 / I-95



The roadway segments west and east of the terminal intersections have two 12-foot through lanes in each direction, 10-foot wide paved shoulders, and a 40-foot wide raised grass median with curb and gutter Type E, as shown in Figure 3-18.

Figure 3-18 | Typical Section - CR 714 / SR 714 / SW Martin Highway



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of a 15-foot wide single-lane ramp with 6-foot wide inside and outside shoulders.

3.4.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with four single-lane diagonal ramps. The westbound to northbound, southbound to westbound, and eastbound to southbound on/off - ramps are single lane free-flow movements, the northbound to eastbound, northbound to westbound, and southbound to eastbound are stop-controlled, and all left turns at the ramp termini intersections from CR 714 / SR 714 / SW Martin Highway onto SR 9/ I-95 on-ramps are yield-controlled.

3.4.4.3 Design Speed

The design speed for the roadway segment is 50 mph, and the posted speed is 45 mph. The design speed for the SR 9 / I-95 off-ramps transitions from 35 mph to 50 mph, while for the on-ramps transitions from 35 mph to 55 mph. The advisory posted speed for SR 9 / I-95 off-ramps is 35 mph.

3.4.4.4 Horizontal Alignment

The existing horizontal geometry of CR 714 / SR 714 / SW Martin Highway consists of a tangent alignment throughout the study area. There are transition areas outside of the study limits where the CR 714 / SR 714 / SW Martin Highway typical section changes from a two-lane undivided facility to a four-lane divided facility.

3.4.4.5 Vertical Alignment

The existing vertical geometry of CR 714 / SR 714 / SW Martin Highway is mostly flat throughout the study area as SR 9 / I-95 crosses over CR 714 / SR 714 / SW Martin Highway.

3.4.4.6 Right-of-Way

The right-of-way varies along the CR 714 / SR 714 / SW Martin Highway roadway segment. The minimum total right-of-way provided in the study area is 228 feet.

3.4.4.7 Lighting

The existing lighting for CR 714 / SR 714 / SW Martin Highway was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast light poles were identified along the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges. There is no lighting provided for CR 714 / SR 714 / SW Martin Highway outside the interchange.

3.4.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows off the road and down the shoulder into the adjacent swales and ponds.

3.4.4.9 Pavement Conditions

Field reviews indicated the existing pavement along CR 714 / SR 714 / SW Martin Highway is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.4.5 Proposed Improvements

The proposed roadway improvements for CR 714 / SR 714 / SW Martin Highway are as follow:

- Proposed signalization of the northbound and southbound SR 9 / I-95 ramp terminal intersections.
- Proposed signalization at CR 714 / SR 714 / SW Martin Highway and Stuart Boulevard intersection.
- Proposed shared use path to the south side of CR 714 / SR 714 / SW Martin Highway.
- Adding second left turn lanes to the eastbound and westbound CR 714 / SR 714 / SW Martin Highway onto SR-9 / I-95 northbound and southbound on-ramps.
- Removable of right turn free flow movement by urbanizing the intersections at SR 9 / I-95 ramp terminals and replaced by adding a proposed right turn lane to the eastbound and westbound CR 714 / SR 714 / SW Martin Highway onto on-ramp SR 9 / I-95.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.4.5.1 Design Criteria

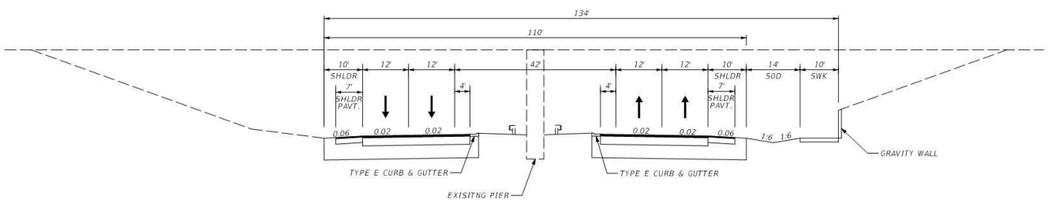
The proposed improvements at the CR 714 / SR 714 / SW Martin Highway interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.4.5.2 Typical Section

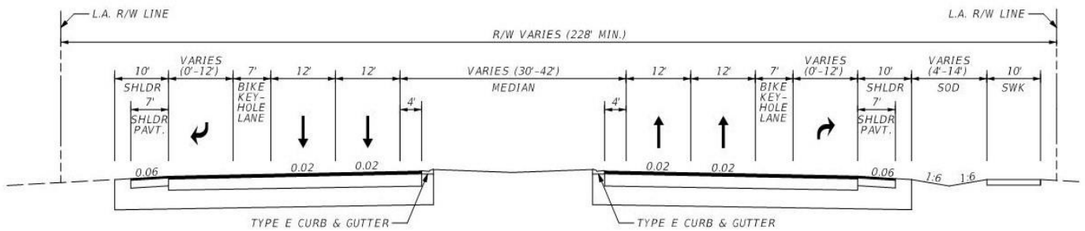
The proposed typical sections for CR 714 / SR 714 / SW Martin Highway shown in Figure 3-19 and Figure 3-20 have two 12-foot through lanes in each direction. The proposed roadway segment between the interchange's two terminal intersections has 10-foot wide shoulders (7 feet paved shoulders) and a 42-foot wide raised grass median with curb and gutter Type E. A 10-foot wide sidewalk is located on the south side of the road.

Figure 3-19 | Typical Section - CR 714 / SR 714 / SW Martin Highway below SR 9 / I-95



The proposed roadway segments west and east of the terminal intersections have two 12-foot through lanes in each direction, 10-foot wide shoulders (7 feet paved shoulders), and a raised grass median (width varies from 30 to 42 feet) with curb and gutter Type E. A 10-foot wide sidewalk is located on the south side of the road.

Figure 3-20 | Typical Section - CR 714 / SR 714 / SW Martin Highway



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with 8-foot wide inside shoulders and 12-foot wide outside shoulders.

3.4.5.3 Structural Impacts

Due to the proposed improvements, a gravity wall / MSE wall will be required on the south side of CR 714 / SR 714 / SW Martin Highway. The bridge spans will not be affected.

3.4.5.4 Interchange Configuration

The proposed interchange configuration maintains the standard diamond with four single-lane diagonal ramps. The terminal intersections will be upgraded to a signalized system removing the free-flow ramp “urbanizing” intersection and providing signal controlled pedestrian/bicycle movements.

3.4.5.5 Design Speed

The proposed design speed for the roadway segment is 50 mph, and the proposed posted speed is 45 mph. The proposed design speed for the SR 9 / I-95 off-ramps transitions from 35 mph to 50 mph, while for the on-ramps transitions from 35 mph to 55 mph.

3.4.5.6 Horizontal Alignment

The proposed horizontal geometry of CR 714 / SR 714 / SW Martin Highway will remain linear throughout the study limits. There is a maximum deflection of 45 minutes in each of the interchange’s terminal intersections that was used in lieu of a reverse curve to allow the proposed typical section to match the existing typical section.

3.4.5.7 Vertical Alignment

The vertical alignment of CR 714 / SR 714 / SW Martin Highway will remain unchanged throughout the study limits.

3.4.5.8 Right-of-Way

Right-of-way acquisition will not be necessary for this roadway segment. The proposed design improvements will be accommodated within the existing right-of-way limits (228 feet Min.)

3.4.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.4.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.4.5.11 Pavement Design

Pavement analysis will be evaluated during the design phase.

3.4.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT and MUTCD requirements. All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.4.5.13 Traffic Signal Modification

The proposed signal improvements include signalizing the SR 9 / I-95 northbound and southbound Ramp terminals and the CR 714 / SR 714 / SW Martin Highway and SW Stuart W Boulevard intersection. These improvements consist of new steel mast arms, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.4.5.14 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along CR 714 / SR 714 / Martin Highway using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of CR 714 / SR 714 / Martin Highway. Fiber optic cable should be installed from SW Stuart West Boulevard to the western I-95 interchange (southbound) signal as well as to the ADMSs, and CCTVs and ATSPM software at the three proposed intersections.

3.4.6 Alternative Analysis

3.4.6.1 Cost Estimate

Cost estimates were developed for CR 714 / SR 714 / SW Martin Highway improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.4.6.2 Benefit-Cost Analysis

Drivers along SW CR 714 / SR 714 / SW Martin Highway experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = -$1.5 million in 2030 and $3.7 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $6.5 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $4.5 million this equates to a benefit-cost ratio of approximately 1.4. The resultant NPV is about $2.0 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.4.6.3 Environmental Impacts

Potential environmental impacts within the CR 714 / SR 714 / SW Martin Highway are anticipated to be minimal. The area around the CR 714 / SR 714 / SW Martin Highway Interchange is primarily undeveloped. No impacts to special activity sites and social and cultural features, floodplains, or relocation impacts are anticipated. The proposed improvements to CR 714 / SR 714 / SW Martin Highway are not anticipated to impact contaminated sites since no High or Medium risk sites are proposed to be impacted by the project. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.4.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.5 SW Becker Road

3.5.1 General Description

SW Becker Road (Roadway ID 94000058) is a roadway located in St. Lucie County. The limits of the section being studied are from west of Village Parkway west of SR 9 / I-95 interchange to east of SW Edinburgh Drive (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SW Becker Road roadway segment is under the jurisdiction of City of Port St. Lucie. Its Functional Classification is Minor Arterial. The roadway's Context Classification is C1-Natural west of the SR 9 / I-95 interchange and C3R-Suburban Residential east of the SR 9 / I-95 interchange, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.5.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, although none of the routes currently travel along Becker Road within the study area. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and Becker Road.

3.5.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and Becker Road there are approximately seven foot wide sidewalks located on the north and south sides of Becker Road. The existing sidewalks are typically located immediately behind the curb adjacent to the travel way. They extend along Becker Road throughout the entire interchange influence area.

It is noteworthy that bicycle lanes are not present on Becker Road in the westbound or eastbound direction within the influence area.

Multimodal facilities are included in the long term future vision of the Becker Road corridor in this SR 9 / I-95 Multimodal Master Plan document. Sidewalks along the north and south side of Becker Road are included in interchange concept. They extend east and west along the corridor providing pedestrian connectivity to pedestrian facilities along roadways that intersect with Becker Road between Village Parkway west of SR 9 / I-95 and Hallmark Street east of SR 9 / I-95. In addition, buffered bicycle lanes are provided in the concept on Becker Road throughout the interchange influence area. As a result, bicyclists will have a connected, uninterrupted bike lane along Becker Road from Village Parkway to Hallmark Street.

3.5.3 Access Management

Becker Road is a City facility, and its access management principles are derived from St Lucie County. As such, St Lucie County's Land Development Code states that the study portion of Becker Road is subject to spacing standards where the intersection with a Major Collector or Arterial Roadway shall be separated by a minimum distance of 660 feet, as measured from centerline to centerline.

A review of the current intersection and median opening spacing along Becker Road was conducted and a summary provided in Table 3-5. Results indicate that the intersections and median openings west of SR 9 / I-95 meet or exceed the spacing standards set forth in St Lucie

County's Land Development Code. Similarly, the spacing between the intersection of SW Hallmark Street east of SR 9 / I-95 and the northbound SR 9 / I-95 off-ramp termini intersection exceeds the minimum spacing standard.

There are no anticipated changes to the current access openings along Becker Road for future 2030 or 2045 conditions.

Table 3-5 | Access Management Summary of Becker Road Corridor

Roadway	Jurisdiction	Roadway	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
Becker Road	St Lucie	Village Parkway	St Lucie	-		660		
		Median Opening #1	Full	1,200		660	540	
		Median Opening #2	Directional	1,220		660	560	
		SB Off-Ramp Termini	Full	1,370		660	710	
		NB Off-Ramp Termini	Full	400		660	-260	-39.4%
		SW Hallmark Street	Full	2,520		660	1,860	

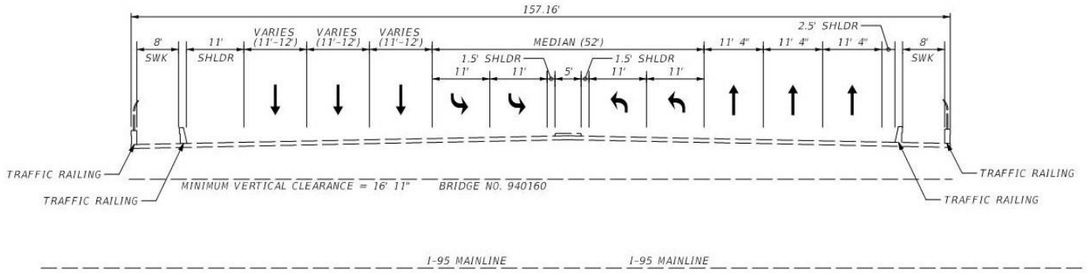
** Spacing based on St Lucie County Land Development Code Section 7.01.03*

3.5.4 Existing Conditions Analysis

3.5.4.1 Typical Section

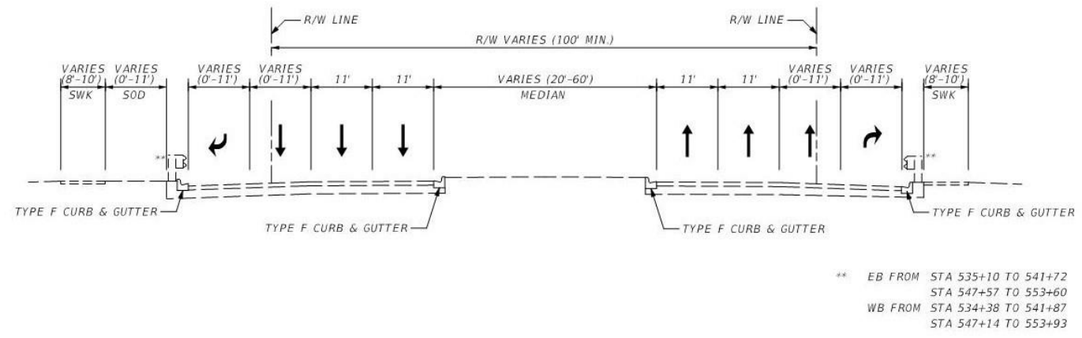
SW Becker Road is a six-lane divided roadway with three through lanes (width varies from 11 to 12 feet) in each direction and occasional auxiliary lanes. The roadway segment between the interchange's two terminal intersections consists of a bridge crossing over SR 9 / I-95, with 2.5 and 11-foot wide paved shoulders and a 52-foot wide median. An 8-foot wide sidewalk protected with traffic railings is located on both sides of the road, as shown in Figure 3-21. The existing minimum vertical clearance is 16 feet - 11 inches.

Figure 3-21 | Typical Section - SW Becker Road over SR 9 / I-95



The roadway segments west and east of the terminal intersections vary from three 11-foot to two 11-foot through lanes in each direction, with curb and gutter Type F and a raised grass median (width varies from 20 to 60 feet) with curb and gutter Type F. Sidewalk is located on both sides of the road (width varies from 8 to 10 feet), as shown in Figure 3-22.

Figure 3-22 | Typical Section - SW Becker Road



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with 10-foot wide inside and outside shoulders.

3.5.4.2 Interchange Configuration

The existing interchange configuration is a tight diamond with four single-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and right/left turns from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps are single lane free-flow movements.

3.5.4.3 Design Speed

The design speed and posted speed for SW Becker Road is 45 mph. The design speed for all the SR 9 / I-95 on-ramps and off-ramps has been assumed to transition from 35 mph to 50 mph, based on the advisory posted speed of 35 mph for the SR 9 / I-95 off-ramps.

3.5.4.4 Horizontal Alignment

The existing horizontal geometry of SW Becker Road consists of a tangent alignment throughout the study area. The tangent segment continues east up to the SR 91 / Florida's Turnpike from which there a horizontal curve is introduced.

3.5.4.5 Vertical Alignment

The existing vertical alignment of SW Becker Road consists of sag and crest curves near the interchange as the road crosses over SR 9 / I-95.

3.5.4.6 Right-of-Way

The right-of-way varies along the SW Becker Road roadway segment. The minimum total right-of-way provided in the study area is 100 feet.

3.5.4.7 Lighting

The existing lighting for SW Becker Road was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Standard roadway lights were identified along the interchange and SW Becker Road east and west of the interchange, and pendant hung lights under the bridge deck passing over SR 9 / I-95.

3.5.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.5.4.9 Pavement Conditions

Field reviews indicated the existing pavement along SW Becker Road is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.5.5 Proposed Improvements

The proposed roadway improvements for SW Becker Road are as follow:

- Adding a second left turn lane to the SR 9 / I-95 northbound off-ramp onto westbound SW Becker Road.
- Adding a second right turn lane to the SR 9 / I-95 southbound off-ramp onto westbound SW Becker Road.
- Adding two left turn lanes to the Village Parkway Drive southbound onto eastbound SW Becker Road.
- Channelize the westbound SW Becker Road right turn lane onto Village Parkway Drive.
- Adding two through lanes to the SW Becker Road westbound at Village Parkway Drive intersection.
- New construction, adding two northbound lanes (one exclusive right turn and one shared left-through lanes) and a median to the northbound Village Parkway Drive.

- At SW Becker Road and south side of Village Parkway Drive, approximate 311 feet of new construction was included, adding one southbound lane, two northbound lanes (one exclusive right turn and one shared left-through lanes) and a median.
- Right turn lanes at multiple locations along eastbound/westbound SW Becker Road were introduced from Village Parkway Drive to west of SR 9 / I-95.
- Adding a third through lane to the SW Becker Road eastbound and westbound from east of SR 9 / I-95 ramp terminal to east of Hallmark Street.
- Proposed signalization at SW Becker Road and Village Parkway Drive.
- Proposed signalization of the SR 9 / I-95 northbound and southbound ramp terminal intersections.
- Retiming existing signalized intersection at SW Becker Road and Hallmark Street.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.5.5.1 *Design Criteria*

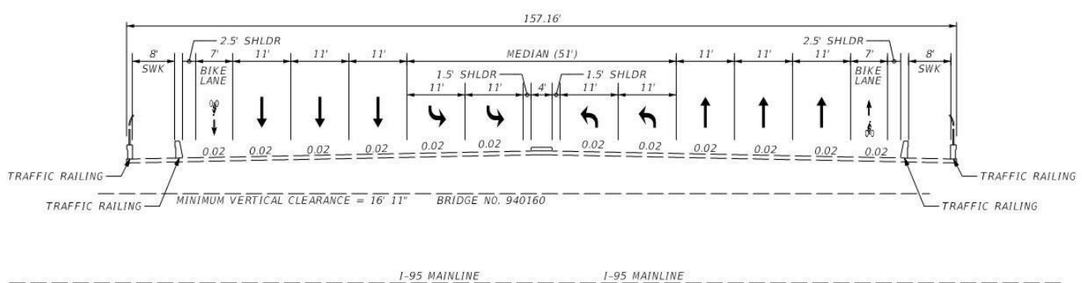
The proposed improvements at the SW Becker Road interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.5.5.2 *Typical Section*

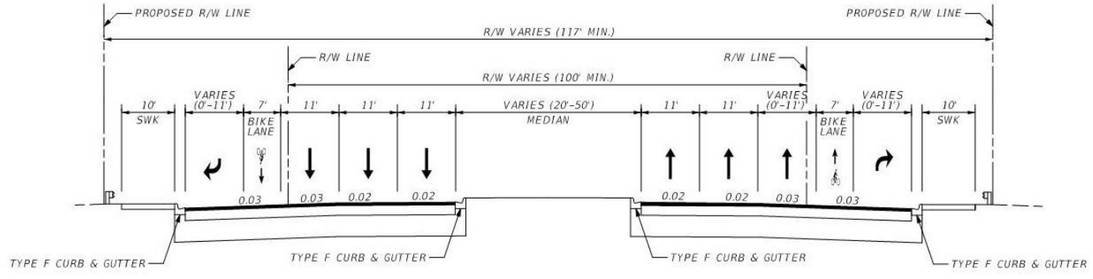
The proposed typical sections shown in Figure 3-23 and Figure 3-24 for SW Becker Road have three 11-foot through lanes in each direction. The proposed roadway segment between the interchange's two terminal intersections has 7-foot wide bicycle lanes, 2.5-foot wide shoulders, and a 51-foot wide median. An 8-foot wide sidewalk protected with traffic railings is located on both sides of the road.

Figure 3-23 | Typical Section - SW Becker Road over SR 9 / I-95



The proposed roadway segments west and east of the terminal intersections have three 11-foot through lanes in each direction; however, the road merges into two 11-foot through lanes in the eastbound direction just east of the SW Hallmark Street intersection. Within the mentioned limits the facility has curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 20 to 50 feet) with curb and gutter Type F. A 10-foot wide sidewalk is located on both sides of the road.

Figure 3-24 | Typical Section - SW Becker Road



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with inside shoulder width (6 or 8 feet) and outside shoulder width (6 or 12 feet).

3.5.5.3 Structural Impacts

No structures will be impacted as result of the proposed improvements.

3.5.5.4 Interchange Configuration

The proposed interchange configuration maintains the tight diamond with four single-lane diagonal ramps.

3.5.5.5 Design Speed

The proposed design speed and posted speed for the roadway segment is 45 mph.

3.5.5.6 Horizontal Alignment

The proposed horizontal geometry of SW Becker Road will remain mostly linear throughout the study limits. There are multiple deflections of 1 minute or less between intersections, and 3° or less through the intersections.

3.5.5.7 Vertical Alignment

The vertical alignment of SW Becker Road will remain unchanged throughout the study limits.

3.5.5.8 Right-of-Way

The existing roadway footprint east of the SR 9 / I-95 interchange is outside of the existing right-of-way. The property parcels in which the existing roadway footprint is beyond the right-of-way belong to the City of Port St. Lucie. Right-of-way acquisition will be necessary for this roadway segment to accommodate the proposed improvements. Please refer to Appendix F.

3.5.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.5.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.5.5.11 Pavement Design

Pavement design will be evaluated during the design phase.

3.5.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT and MUTCD requirements. All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.5.5.13 Traffic Signal Modification

The proposed signal improvements include retiming the SW Becker Road and SW Hallmark Street intersection. The proposed improvements also include adding turn lanes to the northbound and southbound terminals, and the SW Becker Road and Village Parkway Drive intersection. These improvements would require new steel mast arms and new traffic signal heads.

3.5.5.14 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along Becker Road using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of Becker Road. (Possible one additional ADMS per direction). In addition to the ADMS improvements, CCTV is proposed at the two adjacent signalized intersections from Village Parkway Drive to the west, to SW Hallmark Street to the east. Signal priority system and ATSPMs is also

recommended at all signalized intersections as well as underground fiber optic cable between these two termini and to the ADMS sites.

3.5.6 Alternative Analysis

3.5.6.1 Cost Estimate

Cost estimates were developed for SW Becker Road improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.5.6.2 Benefit-Cost Analysis

Drivers along SW Becker Road experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $2.3 million in 2030 and $47.7 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $176.9 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $22.6 million, this equates to a benefit-cost ratio of approximately 7.8. The resultant NPV is about $154.3 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.5.6.3 Environmental Impacts

Potential environmental impacts within the SW Becker Road are anticipated to be minimal. No impacts to special activity sites and social and cultural features, contaminated sites, or floodplains are anticipated. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.5.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.6 Tradition Parkway / Gatlin Boulevard

3.6.1 General Description

Tradition Parkway / Gatlin Boulevard (Roadway ID 94000134 and 94120000) is a roadway located in St. Lucie County. The limits of the section being studied are from west of SW Village Parkway west of SR 9 / I-95 interchange to east of SW Kensington Street (which is located east of the intersection). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this Tradition Parkway / Gatlin Boulevard roadway segment is under the jurisdiction of City of Port St. Lucie. Its Functional Classification is Minor Arterial west of the SR 9 / I-95 interchange and Principal Arterial-Other east of the SR 9 / I-95 interchange. The roadway's Context Classification is C3C-Suburban Commercial along the SR 9 / I-95 interchange and C4-Urban General along the SW Village Parkway intersection, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.6.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, with one route (TCC Route #5) currently traveling along Tradition Parkway / Gatlin Boulevard within the study area.

3.6.2.1 Park-and-Ride Facilities

There are no existing park-and-ride facilities near the interchange of SR 9 / I-95 and Tradition Parkway / Gatlin Boulevard. However, there is a planned park-and-ride lot at this location. The planned Gatlin Boulevard Park-and-Ride Lot is located between Brescia Street and Edgarce Street, which is based on the FDOT-4 Draft Park-and-Ride Lot Master Plan. The FDOT Work Program includes this Tradition Parkway / Gatlin Boulevard Park-and-Ride Lot and it is funded for construction in FY 19/20.

3.6.2.2 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and Tradition Parkway / Gatlin Boulevard there are approximately 8-foot wide sidewalks located on the north and south sides of Tradition Parkway / Gatlin Boulevard. The existing sidewalks are typically located immediately behind the curb adjacent to the travel way. They extend along Tradition Parkway / Gatlin Boulevard throughout the entire interchange influence area.

Existing bicycle lanes are not present on Tradition Parkway / Gatlin Boulevard in the westbound or eastbound direction within the influence area.

Multimodal facilities are included in the long term future vision of the Tradition Parkway / Gatlin Boulevard corridor in this SR 9 / I-95 Multimodal Master Plan document. Sidewalks along the north and south side of Tradition Parkway / Gatlin Boulevard are included in interchange concept. They extend east and west along the corridor providing pedestrian connectivity to pedestrian facilities along roadways that intersect with Tradition Parkway / Gatlin Boulevard between Village Parkway west of SR 9 / I-95 and east of Savage Boulevard (which is located east of SR 9 / I-95). In addition, buffered bicycle lanes are provided in the concept on Tradition Parkway / Gatlin Boulevard throughout the interchange influence area. As a result, bicyclists will have a connected, uninterrupted bike lane along the Tradition Parkway / Gatlin Boulevard corridor from Village Parkway to east of Savage Boulevard.

3.6.3 Access Management

Tradition Parkway / Gatlin Boulevard is a County facility, and its access management principles are derived from St Lucie County. As such, St Lucie County's Land Development Code states that the study portion of Tradition Parkway / Gatlin Boulevard is subject to spacing standards where the intersection with a Major Collector or Arterial Roadway shall be separated by a minimum distance of 660 feet, as measured from centerline to centerline.

A review of the current intersection and median opening spacing along Tradition Parkway / Gatlin Boulevard was conducted and a summary provided in Table 3-6. Results indicate that the intersections and median openings west and east of SR 9 / I-95 meet or exceed the spacing standards set forth in St Lucie County's Land Development Code.

With the introduction of a DDI configuration, the future access spacing along Tradition Parkway / Gatlin Boulevard in 2045 are changed slightly. A review of those future intersection and median opening spacing indicate that the distance between Brescia Street and the northbound off-ramp termini increases to approximately 1,370 feet. This future spacing exceeds the minimum standard for Tradition Parkway / Gatlin Boulevard as defined by St Lucie County's Land Development Code. Further, the spacing between all remaining median openings and intersections remain essentially unchanged. A summary of the future intersection and median opening spacing is included in Table 3-6.

Table 3-6 | Access Management Summary of Gatlin Boulevard Corridor

				Existing Conditions					For DDI Concept		
Roadway	**Jurisdiction**	**Median Location**	**Median Opening Type**	**Spacing of Opening (feet)**	**Access Class**	**Standard Spacing (feet)**	**Variance (feet)**	**Variance (%)**	**Spacing of Opening (feet)**	**Variance (feet)**	**Variance (%)**
Gatlin Boulevard/Tradition Pkwy	St Lucie	Village Parkway	Full	-		660			-		
		SB Off-Ramp Termini	Full	2,120		660	1,460		2,120	1,460	
		NB Off-Ramp Termini	Full	1,600		660	940		1,490	830	
		Brescia Street	Full	1,220		660	560		1,370	710	
		SW Cahaly Rd	Directional	990		660	330		990	330	
		SW Savage Blvd	Full	950		660	290		950	290	

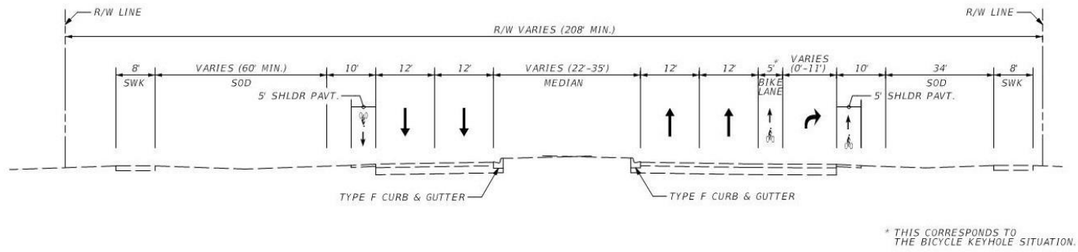
** Spacing based on St Lucie County Land Development Code Section 7.01.03*

3.6.4 Existing Conditions Analysis

3.6.4.1 Typical Section

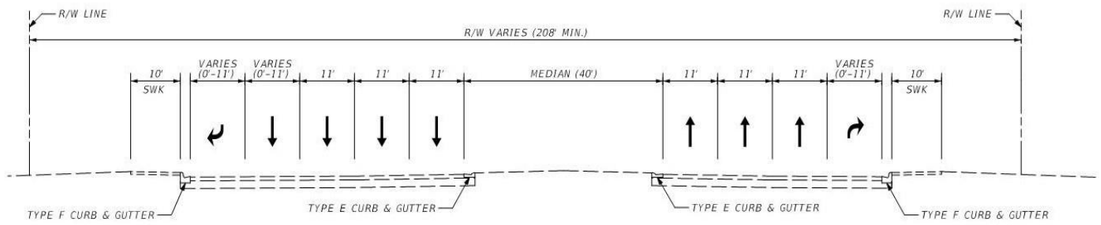
Tradition Parkway / Gatlin Boulevard is a six-lane divided roadway with two to three through lanes (width varies from 11 to 12 feet) in each direction. The roadway segment west of SW Village Parkway has 12-foot wide travel lanes, 10-foot wide shoulders (5-foot paved shoulders), and a raised grass median (width varies from 22 to 35 feet) with curb and gutter Type F. An 8-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-25.

Figure 3-25 | Typical Section - Tradition Parkway west of SW Village Parkway



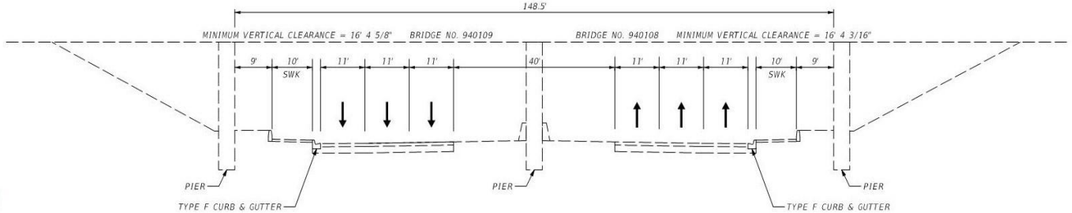
The roadway segment between SW Village Parkway and west of SR 9 / I-95 southbound Bridge has three 11-foot through lanes in each direction with curb and gutter Type F, and a 40-foot wide raised grass median with curb and gutter Type E. A 10-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-26.

Figure 3-26 | Typical Section- Tradition Parkway between SW Village Parkway and SR 9 / I-95



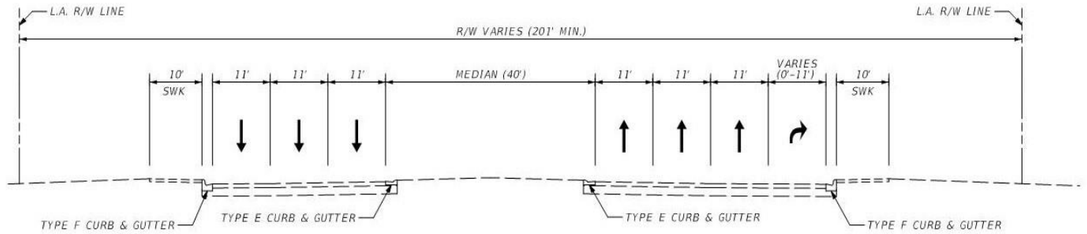
The roadway segment below SR 9 / I-95 consists of three 11-foot through lanes in each direction with curb and gutter Type F, and a 40-foot wide concrete median containing 18-foot inside paved shoulders. A 10-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-27. The existing minimum vertical clearance is 16 feet - 4.6 inches.

Figure 3-27 | Typical Section - Tradition Parkway / Gatlin Boulevard below SR 9 / I-95



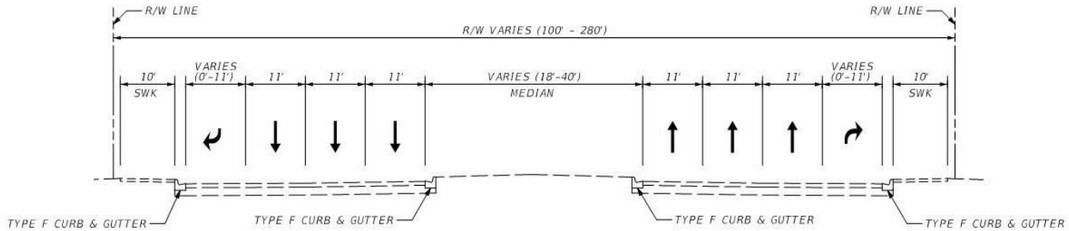
The roadway segment between SR 9 / I-95 northbound Bridge and Brescia Street has three 11-foot through lanes in each direction with curb and gutter Type F, and a 40-foot wide raised grass median with curb and gutter Type E. A 10-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-28.

Figure 3-28 | Typical Section - Gatlin Boulevard between SR 9 / I-95 and Brescia Street



The roadway segment east of Brescia Street to SW Kensington Street has three 11-foot through lanes in each direction with curb and gutter Type F, and a raised grass median (width varies from 18 to 40 feet) with curb and gutter Type F as well. A 10-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-29.

Figure 3-29 | Typical Section - Gatlin Boulevard between Brescia Street and Kensington Street



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with inside and outside shoulders (width varies from 6 to 12 feet).

3.6.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with four single-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and right/left turns from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps are single lane free-flow movements.

3.6.4.3 Design Speed

The design speed for Tradition Parkway / Gatlin Boulevard is 50 mph and posted speed is 45 mph. The design speed for all of the SR 9 / I-95 on-ramps and off-ramps is 40 mph, while the advisory posted speed for the off-ramps is 35 mph.

3.6.4.4 Horizontal Alignment

The existing horizontal geometry of Tradition Parkway / Gatlin Boulevard consists of a tangent alignment throughout the study area. The Tradition Parkway / Gatlin Boulevard facility initiates on a horizontal curve from the west that ends just east of SW Stony Creek Way. The tangent segment continues east up to SW Rosser Boulevard where a new horizontal curve begins to develop.

3.6.4.5 Vertical Alignment

The existing vertical geometry of Tradition Parkway / Gatlin Boulevard is mostly flat throughout the study area as SR 9 / I-95 crosses over Tradition Parkway / Gatlin Boulevard.

3.6.4.6 Right-of-Way

The right-of-way varies along the Tradition Parkway / Gatlin Boulevard roadway segment. The minimum total right-of-way provided in the study area is 100 feet.

3.6.4.7 Lighting

The existing lighting for Tradition Parkway / Gatlin Boulevard was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Standard and decorative roadway lights were identified along Tradition Parkway / Gatlin Boulevard east and west of the interchange, high mast light poles along the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.6.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.6.4.9 Pavement Conditions

Field reviews indicated the existing pavement along Tradition Parkway / Gatlin Boulevard is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.6.5 Proposed Improvements

The proposed roadway improvements for Tradition Parkway / Gatlin Boulevard are as follow:

- Diverging Diamond Interchange configuration is proposed. Eastbound and westbound traffic along the arterial is flipped from the right-hand-side of the roadway to the left-hand-side of the roadway with a tangent of 100 feet and flip back to original position. Traffic traveling through the interchange along the arterial passes through signalized intersections in each direction.
- Retiming existing signalized intersection at Tradition Parkway / Gatlin Boulevard and Brescia Street. Additionally, retiming existing signalized intersection at Tradition Parkway / Gatlin Boulevard and Savage Boulevard.
- Proposed signalization of the SR 9 / I-95 northbound and southbound ramp terminal intersections.
- Adding a through lane to the Tradition Parkway / Gatlin Boulevard westbound from east of SR 9 / I-95 interchange to east Savage Boulevard.

- Adding a third through lane to the Tradition Parkway / Gatlin Boulevard eastbound from east of Community Blvd to east of Savage Boulevard.
- Proposed bridge at north side of Village Parkway Drive.
- Adding a third left turn lane to the Village Parkway southbound onto eastbound Tradition Parkway / Gatlin Boulevard.
- Adding a third through lane to the Village Parkway Drive southbound.
- Adding a right turn lane free flow to the Village Parkway Drive northbound onto eastbound Tradition Parkway / Gatlin Boulevard and also, adding a right turn lane free flow to the Tradition Parkway / Gatlin Boulevard westbound onto northbound Village Parkway Drive.
- Proposed signalization at Tradition Parkway / Gatlin Boulevard and Village Parkway Drive.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.6.5.1 Design Criteria

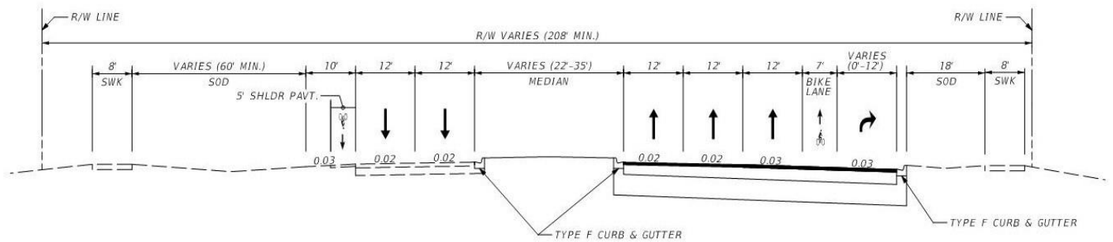
The proposed improvements at the Tradition Parkway / Gatlin Boulevard interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)
- Diverging Diamond Interchange Information Guide, FHWA (2014)
- Alternative Intersections/Interchanges: Informational Report (AIIR), FHWA (2010)

3.6.5.2 Typical Section

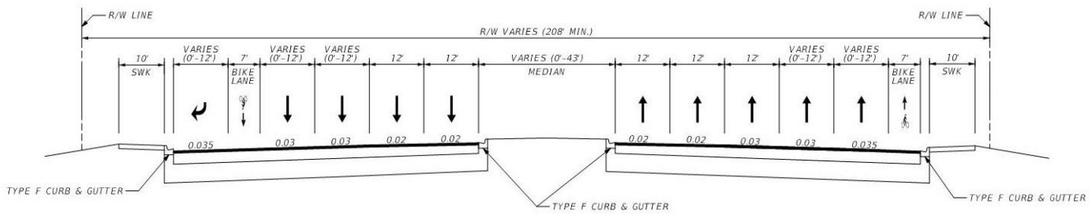
There are five proposed typical sections (Figure 3-30 through Figure 3-34) for Tradition Parkway / Gatlin Boulevard. The proposed roadway segment west of SW Village Parkway has two 12-foot through lanes in the west direction (matching existing) and three 12-foot through lanes in the east direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 22 to 35 feet) with curb and gutter Type F. An 8 feet wide sidewalk is located on both sides of the road.

Figure 3-30 | Typical Section - Tradition Parkway between SW Village Parkway and SR 9 / I-95



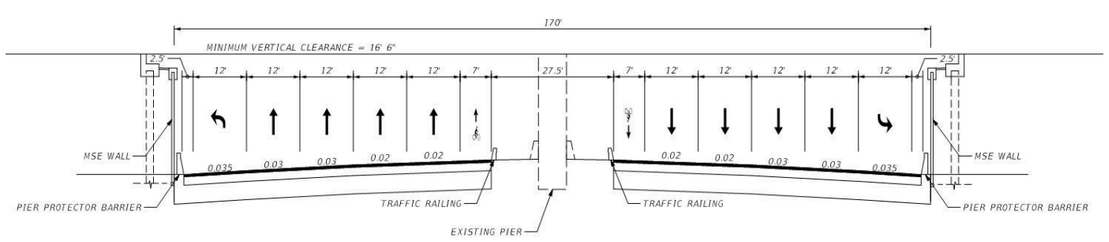
The proposed roadway segment between SW Village Parkway and SR 9 / I-95 southbound Bridge varies from three 12-foot to five 12-foot though lanes in each direction. On the westbound the roadway merges from four 12-foot to two 12-foot through lanes as the facility approaches SW Village Parkway, and on the eastbound the roadway goes from three 12-foot to five 12-foot through lanes as the facility approaches the SR 9 / I-95 interchange. Within the mentioned limits the roadway has curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 0 to 43 feet) with curb and gutter Type F. A 10-foot wide sidewalk is located on both sides of the road.

Figure 3-31 | Typical Section - Tradition Parkway between SW Village Parkway and SR 9 / I-95



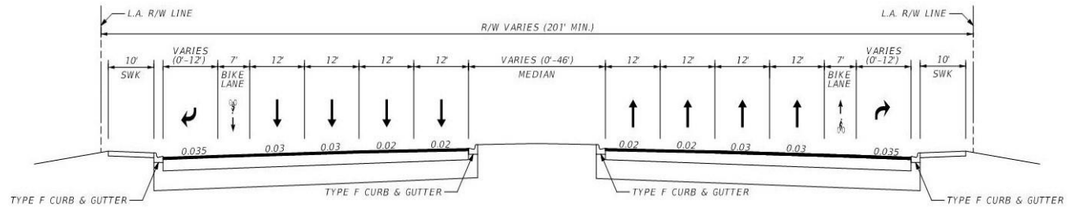
The proposed roadway segment below SR 9 / I-95 has five 12-foot through lanes in each direction, 2.5-foot wide paved shoulders with pier protection barriers on each side, 7-foot wide bicycle lanes, and a 27.5-foot wide raised concrete median containing a sidewalk (10 feet minimum) protected with traffic railings.

Figure 3-32 | Typical Section - Tradition Parkway / Gatlin Boulevard below SR 9 / I-95



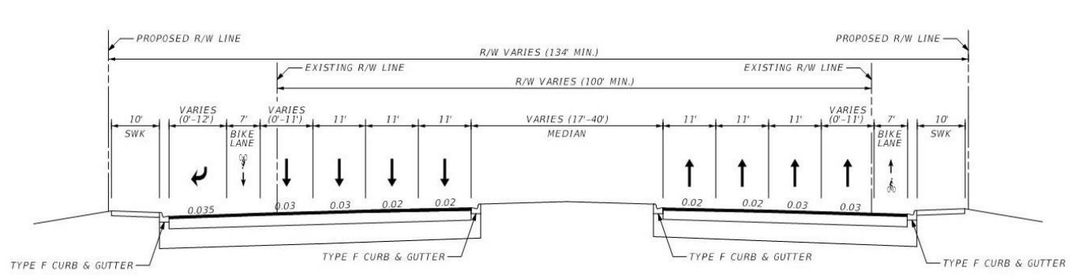
The proposed roadway segment from east of SR 9 / I-95 northbound Bridge to SW Brescia Street consists of four 12-foot through lanes in each direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 0 to 46 feet) with curb and gutter Type F. A 10-foot sidewalk is located on both sides of the road.

Figure 3-33 | Typical Section - Gatlin Boulevard between SR 9 / I-95 and SW Brescia Street



The proposed roadway segment from east of SW Brescia Street to SW Kensington Street has three 11-foot to four 11-foot though lanes in each direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 17 to 40 feet) with curb and gutter Type F. A 10-foot wide sidewalk is located on both sides of the road.

Figure 3-34 | Typical Section - Gatlin Boulevard between SW Brescia Street and SW Kensington Street



Ramps Typical Sections

The SR 9 / I-95 northbound off-ramp and southbound on-ramp consist of one 15-foot wide lane, and the northbound on-ramp and southbound off-ramp consist of a two-lane ramp with 12-foot wide

travel lanes. All of the ramps within the SR 9 / I-95 interchange have an inside shoulder width (6 or 8 feet) and outside shoulder width (6 or 12 feet).

3.6.5.3 Structural Impacts

Due to the proposed improvements, the existing bridge structure will need to be replaced. The bridge span will need to increase from 148.5 to 170 feet.

3.6.5.4 Interchange Configuration

The proposed interchange configuration is a diverging diamond interchange (DDI) with two single-lane diagonal ramps and two double-lane diagonal ramps. Traffic projections show that this type of interchange configuration would provide better traffic flow and reduce conflict points, thus increasing safety to pedestrian/bicycle movements.

3.6.5.5 Design Speed

The proposed design speed for the DDI is 45 mph with a proposed posted speed of 40 mph. The design speed along Tradition Parkway / Gatlin Boulevard west and east of the SR 9 / I-95 interchange will remain at 50 mph with a posted speed of 45 mph. The proposed design speed for all of the SR 9 / I-95 on-ramps and off-ramps is 40 mph.

3.6.5.6 Horizontal Alignment

The horizontal alignment consists of a standard diverging diamond interchange configuration. The interchange's terminal intersections consist of two intersecting reverse curves, each with a 794 feet inside radius and a 100 feet tangent. The crossover angles of 31° and 32° at the west and east intersections respectively meets the general FHWA requirements of a cross angle between 30° and 50°.

3.6.5.7 Vertical Alignment

The vertical alignment for Tradition Parkway / Gatlin Boulevard will be slightly altered to accommodate the proposed design. The necessary alterations are to be evaluated during the design phase.

3.6.5.8 Right-of-Way

The proposed roadway footprint east of the Gatlin Boulevard and SW Brescia Street intersection is outside the existing right-of-way. Right-of-way acquisition will be necessary on this area to accommodate the proposed improvements. Please refer to Appendix F.

3.6.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.6.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.6.5.11 Pavement Design

Pavement design will be evaluated during the design phase.

3.6.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all substandard ground-mounted signs to meet current FDOT, and MUTCD. Although a Diverging Diamond Interchange (DDI) may operate in a different manner, the pavement marking used is similar to other interchanges. For more information refer to Diverging Diamond Interchange Information Guide (FHWA). All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.6.5.13 Traffic Signal Modification

The proposed signal improvements include retiming the Tradition Parkway / Gatlin Boulevard and SW Brescia Street intersection and retiming Tradition Parkway / Gatlin Boulevard and SW Savage Boulevard intersection. The proposed improvements also include adding turn lanes to the Tradition Parkway / Gatlin Boulevard and SW Village Parkway Dr. intersection. This improvement would require a new steel mast arm and new traffic signal heads. The diverging diamond interchange (DDI) would require new signals at both the west and east terminals. These new signals would require a new steel mast arm, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.6.5.14 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along Traditional Parkway / Gatlin Boulevard using two Arterial Dynamic Message Signs (ADMS) along eastbound (one ADMS is recommended at Proposed Park and Ride) and one along westbound of Traditional Parkway / Gatlin Boulevard. In addition to the ADMS improvements, CCTV and ATSPM is proposed at all intersections from Village Parkway Drive to the west to SW Rosser Boulevard to the east as well as under the SR9 / I-95 Bridge. A signal priority system is also recommended at all signalized intersections, as well as underground fiber optic cable between these two termini and to the ADMS sites.

3.6.6 Alternative Analysis

3.6.6.1 Cost Estimate

Cost estimates were developed for Tradition Parkway / Gatlin Boulevard improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.6.6.2 Benefit-Cost Analysis

Drivers along Tradition Parkway / Gatlin Boulevard experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $6.3 million in 2030 and $41.0 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $170,757,418 in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $30.1 million this equates to a benefit-cost ratio of approximately 5.7. The resultant NPV is about $140.7 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.6.6.3 Environmental Impacts

Potential environmental impacts within the Tradition Parkway / Gatlin Boulevard are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or floodplains are anticipated. Impacts to wetlands and OSWS are anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.6.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost

estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.7 Crosstown Parkway

3.7.1 General Description

Crosstown Parkway (Roadway ID 94000122) is a roadway located in St. Lucie County. The limits of the section being studied are from SW Visconti Way west of the SR 9 / I-95 interchange to east of SW California Boulevard (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this Crosstown Parkway roadway segment is under the jurisdiction of City of Port St. Lucie. Its Functional Classification is Minor Arterial west of the SR 9 / I-95 interchange and Principal Arterial-Other east of the SR 9 / I-95 interchange. The roadway's Context Classification is C3R-Suburban Residential, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.7.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, although none of the routes currently travel along Crosstown Parkway within the study area. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and Crosstown Parkway.

3.7.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and Crosstown Parkway there are approximately eight foot wide sidewalks located on the north and south sides of the facility. The existing sidewalks are typically located immediately behind the curb adjacent to the travel way, except on the south side of Crosstown Parkway east of SR 9 / I-95. In this area from east of SR 9 / I-95 to California Boulevard, the existing 8-foot sidewalk is set back from the travel way by approximately twenty five feet. Overall, existing sidewalks are provided along Crosstown Parkway throughout the entire interchange influence area.

Existing marked bicycle lanes that are approximately 5 feet wide are present on Crosstown Parkway in the westbound and eastbound direction. They are provided along the roadway for entire interchange influence area.

Multimodal facilities are included in the long term future vision of the Crosstown Parkway corridor in this SR 9 / I-95 Multimodal Master Plan document. Sidewalks along the north and south side of Crosstown Parkway are retained in interchange concept. They will continue to extend east and west along the corridor providing pedestrian connectivity along roads that intersect with Crosstown Parkway between Visconti Way west of SR 9 / I-95 and California Boulevard east of SR 9 / I-95. In addition, marked bicycle lanes are retained in the Crosstown Parkway interchange concept. Bicyclists will continue to enjoy a connected, uninterrupted bike lane within the interchange influence area.

3.7.3 Access Management

Crosstown Parkway is a County facility, and its access management principles are derived from St Lucie County. As such, St Lucie County's Land Development Code states that the study portion of Crosstown Parkway is subject to spacing standards the intersection with a Major Collector or Arterial Roadway shall be separated by a minimum distance of 660 feet, as measured from centerline to centerline.

A review of the current intersection and median opening spacing along Crosstown Parkway was conducted and a summary provided in Table 3-7. Results indicate that the intersections and median openings east and west of SR 9 / I-95 meet or exceed the spacing standards set forth in St Lucie County's Land Development Code.

There are no anticipated changes to the current access openings along Crosstown Parkway for future 2030 or 2045 conditions.

Table 3-7 | Access Management Summary of Crosstown Parkway Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
Crosstown Pkwy	St Lucie	SW Visconti Way	Full	-		660		
		SB Off-Ramp Termini	Full	2,090		660	1,430	
		NB Off-Ramp Termini	Full	610		660	-50	-7.6%
		Median Opening #1	Directional	1,600		660	940	
		SW Congo Street	Full	1,760		660	1,100	
		SW California Blvd	Full	2,250		660	1,590	

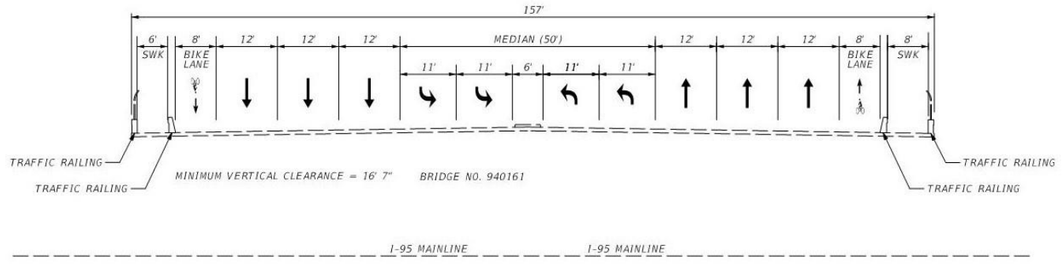
** Spacing based on St Lucie County Land Development Code Section 7.01.03*

3.7.4 Existing Conditions Analysis

3.7.4.1 Typical Section

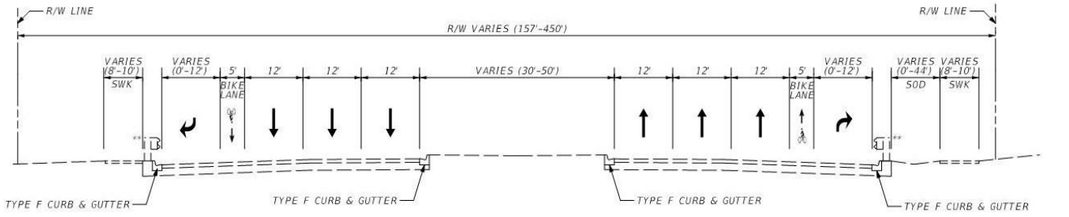
Crosstown Parkway is a six-lane divided roadway with three 12-foot through lanes in each direction. The roadway segment between the interchange's two terminal intersections is a bridge passing over SR 9 / I-95, with 8-foot wide bicycle lanes and a 50-foot wide raised concrete median. Sidewalks (6 feet width on the north side and 8 feet width on the south side) protected with traffic railings are located on both sides of the road, as shown in Figure 3-35. The existing minimum vertical clearance is 16 feet – 7 inches.

Figure 3-35 | Typical Section - Crosstown Parkway over SR 9 / I-95



The roadway segments west and east of the terminal intersections have three 12-foot through lanes in each direction with curb and gutter Type F, 5-foot wide bicycle lanes, and a raised grass median (width varies from 30 to 50 feet) with curb and gutter Type F. A sidewalk is located on both sides of the road (width varies from 8 to 10 feet), as shown in Figure 3-36.

Figure 3-36 | Typical Section - Crosstown Parkway



** EB FROM STA 1025+08 TO 1028+83
STA 1036+40 TO 1040+47
WB FROM STA 1025+08 TO 1029+57
STA 1036+99 TO 1040+62

Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15 feet wide lane with inside shoulders (width varies from 3 to 10 feet) and outside shoulder (width varies from 5 to 10 feet).

3.7.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with four single-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and right/left from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps are single lane free-flow movements.

3.7.4.3 Design Speed

The design speed and posted speed for Crosstown Parkway is 45 mph. The design speed for all the SR 9 / I-95 on-ramps and off-ramps has been assumed to transition from 35 mph to 50 mph, based on the advisory posted speed of 35 mph for the SR 9 / I-95 off-ramps.

3.7.4.4 Horizontal Alignment

The existing horizontal geometry of Crosstown Parkway consists of a tangent alignment with a normal crown reverse curve throughout the study area. There is a horizontal curve west of SW Visconti Way. East of the SR 9 / I-95 interchange area and following the normal crown reverse curve, the tangent segment continues east past SW Cashmere Boulevard where a new horizontal curve begins to develop.

3.7.4.5 Vertical Alignment

The existing vertical geometry of Crosstown Parkway consists of sag and crest curves near the interchange as the road crosses over SR 9 / I-95.

3.7.4.6 Right-of-Way

The right-of-way varies along the Crosstown Parkway roadway segment. The minimum total right-of-way provided in the study area is 157 feet.

3.7.4.7 Lighting

The existing lighting for Crosstown Parkway was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Decorative roadway lights were identified along the interchange and Crosstown Parkway east and west of the interchange, and pendant hung lights under the bridge deck passing over SR 9 / I-95.

3.7.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.7.4.9 Pavement Conditions

Field reviews indicated the existing pavement along Crosstown Parkway is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.7.5 Proposed Improvements

The proposed roadway improvements for Crosstown Parkway are as follow:

- Adding a third left turn lane to the Crosstown Parkway eastbound and westbound onto the SR 9 / I-95 northbound and southbound on-ramp respectively.
- Adding a second right turn lane to the Crosstown Parkway westbound onto SR 9 / I-95 northbound on-ramp.
- Adding a second right turn lane from SR 9 / I-95 northbound off-ramp onto eastbound Crosstown Parkway.

- Adding a right turn lane to the California Boulevard southbound onto westbound Crosstown Parkway. Additionally, adding a second though lane to the California Boulevard northbound and southbound.
- Proposed signalization of the SR 9 / I-95 northbound and southbound ramp terminal intersections.
- Proposed signalization at Crosstown Parkway and California Boulevard intersection.
- Retiming existing signalized intersection at Crosstown Parkway and SW Visconti way.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.7.5.1 Design Criteria

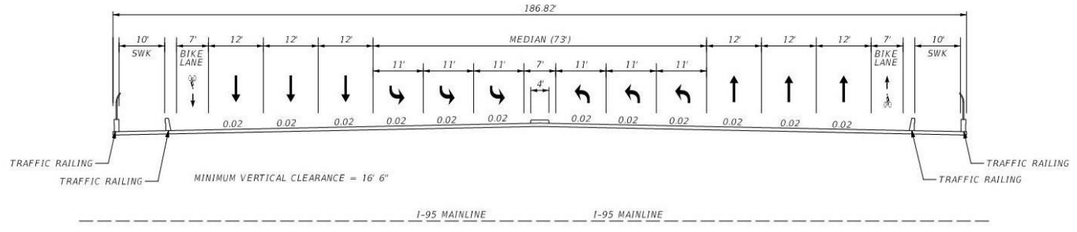
The proposed improvements at the Crosstown Parkway interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.7.5.2 Typical Section

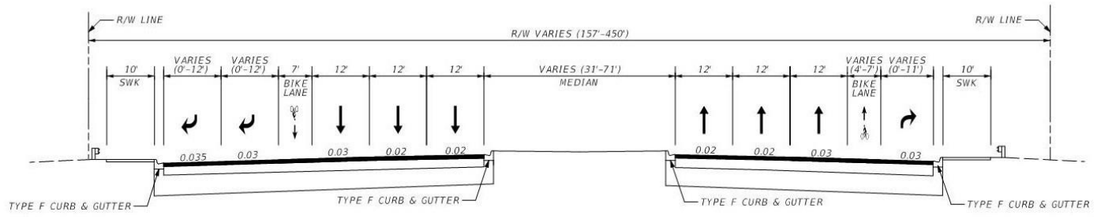
The proposed typical sections for Crosstown Parkway have three 12-foot through lanes in each direction. The proposed roadway segment between the interchange's two terminal intersections is a bridge passing over SR 9 / I-95 with 7-foot wide bicycle lanes and a 73-foot wide median. A 10-foot wide sidewalk protected with traffic railings is located on both sides of the road, as shown in Figure 3-37.

Figure 3-37 | Typical Section - Crosstown Parkway over SR 9 / I-95



The proposed roadway segments west and east of the terminal intersections have three 12-foot through lanes in each direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 31 to 71 feet) with curb and gutter Type F, as well. A 10-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-38.

Figure 3-38 | Typical Section - Crosstown Parkway



Ramps Typical Sections

The SR 9 / I-95 northbound off-ramp and southbound on-ramp consist of one 15-foot wide lane. The northbound on-ramp and southbound off-ramp consist of a grade-separated ramp that crosses

over/under one of the St. Lucie West Boulevard interchange ramps, completing a braided system of ramps. All ramps have 8-foot wide inside shoulders and 12-foot wide outside shoulders.

3.7.5.3 Structural Impacts

Due to the proposed improvements, the existing bridge structure will need to be replaced. The bridge width will need to increase from 157 to 186.8 feet.

3.7.5.4 Interchange Configuration

The proposed interchange configuration maintains the standard diamond with three single-lane and one double-lane diagonal ramps. The existing weaving section between Crosstown Parkway and St. Lucie West Boulevard currently provides a failing level of service. The proposed improvements replace the existing weaving sections with a system of braided ramps between the interchanges eliminating existing congestion.

3.7.5.5 Design Speed

The proposed design speed and posted speed for the roadway segment is 45 mph.

3.7.5.6 Horizontal Alignment

The proposed horizontal alignment of Crosstown Parkway involves curves approaching the northbound and southbound terminals to accommodate auxiliary lanes, and contains a tangent through the bridge crossing over SR 9 / I-95.

3.7.5.7 Vertical Alignment

The vertical alignment of Crosstown Parkway will be slightly altered to accommodate the proposed design. The necessary alterations are to be evaluated during the design phase.

3.7.5.8 Right-of-Way

The proposed roadway footprint along California Boulevard is outside the existing right-of-way limits. Right-of-way acquisition for this roadway segment east of the SR 9 / I-95 interchange will be necessary to accommodate the proposed improvements. Please refer to Appendix F.

3.7.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.7.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.7.5.11 Pavement Design

Pavement design will be evaluated during the design phase.

3.7.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT and MUTCD requirements. All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.7.5.13 Traffic Signal Modification

The proposed signal improvements include retiming the Crosstown Parkway and Commerce Centre Dr. / Visconti Way intersection. The proposed improvements also include adding turn lanes to the northbound and southbound ramp terminals and the Crosstown Parkway and SW California Boulevard intersection. These improvements would require new steel mast arms and new traffic signal heads.

3.7.5.14 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along Crosstown Parkway using two Arterial Dynamic Message Signs (ADMS) along eastbound and two along westbound of Crosstown Parkway. In addition to the ADMS improvements, CCTV and ATSPM is proposed at all intersections from SW Fairgreen Road to the west to SW California Boulevard to the east. A signal priority system is also recommended at all signalized intersections, as well as north on California Boulevard from Crosstown Parkway to St. Lucie West Boulevard. Underground fiber optic cable should be installed from the termini on Crosstown Parkway, and on California from Crosstown Parkway to St Lucie West.

3.7.6 Alternative Analysis

3.7.6.1 Cost Estimate

Cost estimates were developed for Crosstown Parkway improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.7.6.2 Benefit-Cost Analysis

Drivers along Crosstown Parkway experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $10.5 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $36,593,127 in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $24.9 million this equates to a benefit-cost ratio of approximately 1.5. The resultant NPV is about $11.7 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.7.6.3 Environmental Impacts

Potential environmental impacts within the Crosstown Parkway are anticipated to be minimal. No impacts to special activity sites and social and cultural features, floodplains, or relocation impacts are not anticipated. The proposed improvements to Crosstown Parkway are not anticipated to impact contaminated sites since no High or Medium risk sites are proposed to be impacted by the project. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.7.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.8 St. Lucie West Boulevard

3.8.1 General Description

St. Lucie West Boulevard (Roadway ID 94000151 and 94813000) is a roadway located in St. Lucie County. The limits of the section being studied are from Commerce Centre Drive roundabout west of SR 9 / I-95 interchange to Lake Charles Boulevard (which is located east of the interstate). Consistent with FDOT District 4 Roadway Atlas, dated March 2019, this St. Lucie West Boulevard roadway segment is under the jurisdiction of St. Lucie County west of the SR 9 / I-95 interchange

and City of Port St. Lucie east of the SR 9 / I-95 interchange. Its Functional Classification is Major Collector west of the SR 9 / I-95 interchange and Principal Arterial-Other east of the SR 9 / I-95 interchange. The roadway's Context Classification is C3C-Suburban Commercial, in accordance with Context Classification Approach for District 4 - Final Report (October 2017). This road is being designed under FPID 435337-1-52-01 with estimated completion date of 2021.

3.8.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, with one route (TCC Route #6) currently traveling along St Lucie West Boulevard within the study area. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and St Lucie West Boulevard.

3.8.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and St Lucie West Boulevard there is an approximate 7-foot wide sidewalk located on the north side of the east-west roadway. The existing sidewalk is typically set back a variable distance between 0 and 45 feet from the travel way. There will be sidewalks present on the south side of St Lucie West Boulevard within the interchange influence area designed by FPID 435337-1-52-01.

Multimodal facilities are included in the long term future vision of the St Lucie West Boulevard corridor in this SR 9 / I-95 Multimodal Master Plan document. Sidewalks along the north side of St Lucie West Boulevard are retained in interchange concept, while they are added on the south side. In this manner, pedestrian connectivity north and south of St Lucie West Boulevard is provided throughout the entire interchange influence area.

Marked bicycle lanes are retained in the St Lucie West Boulevard interchange concept, and extended throughout the entire influence area. The bicycle lanes will extend from Commerce Center Drive west of SR 9 / I-95 to east of Peacock Boulevard. Overall, bicyclists will be provided a connected, uninterrupted bike lane within the entire interchange influence area.

3.8.3 Access Management

St Lucie West Boulevard is a County facility, and its access management principles are derived from St Lucie County. As such, St Lucie County's Land Development Code states that the study portion of St Lucie West Boulevard is subject to spacing standards where the intersection with a Major Collector or Arterial Roadway shall be separated by a minimum distance of 660 feet, as measured from centerline to centerline.

A review of the current intersection and median opening spacing along St Lucie West Boulevard was conducted and a summary provided in Table 3-8. Results indicate that the intersections and median openings east and west of SR 9 / I-95 meet or exceed the spacing standards set forth in St Lucie County's Land Development Code.

There are no anticipated changes to the current access openings along St Lucie West Boulevard for future 2030 or 2045 conditions.

Table 3-8 | Access Management Summary of St Lucie West Boulevard Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
St Lucie West Blvd	St Lucie	Commerce Center Drive	Full	-		660		
		SB Off-Ramp Termini	Full	1,615		660	955	
		NB Off-Ramp Termini	Full	2,180		660	1,520	
		NW Peacock Blvd	Full	1,325		660	665	

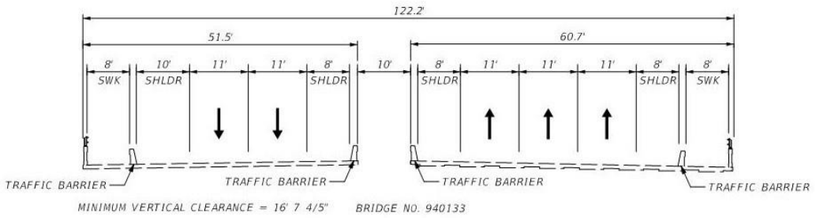
** Spacing based on St Lucie County Land Development Code Section 7.01.03*

3.8.4 Existing Conditions Analysis

3.8.4.1 Typical Section

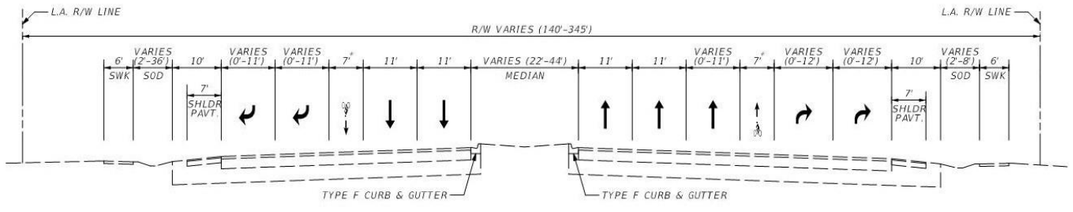
St. Lucie West Boulevard is a five-lane divided roadway with three 11-foot and two 11-foot through lanes in the east and west directions respectively. The roadway segment passing over SR 9 / I-95 consists of two bridges (10 feet apart), with 8 and 10-foot paved shoulders, as shown in Figure 3-39. An 8-foot wide sidewalk protected with traffic barriers is located on both bridges. The existing minimum vertical clearance is 16 feet -7.8 inches.

Figure 3-39 | Typical Section - St. Lucie West Boulevard over SR 9 / I-95



The roadway segments west and east of SR 9 / I-95 have two 11-foot through lanes in each direction, 10-foot wide shoulders (7-foot paved shoulders), 7-foot wide bicycle lanes, and a raised grass median (width varies from 22 to 44 feet) with curb and gutter Type F. A 6-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-40.

Figure 3-40 | Typical Section - St. Lucie West Boulevard



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp accommodates two 11-foot eastbound left turn lanes and two 11-foot westbound right turn lanes that eventually merge into a single 12-foot wide lane ramp. The SR 9 / I-95 northbound off-ramp has one 15-foot wide lane that diverges into three 12-foot right turn lanes and two 12-foot left turn lanes at the terminal intersection. The SR 9 / I-95 southbound on-ramp along the westbound consists of a 15-foot wide single-lane loop ramp and along the eastbound consists of a double-lane diagonal ramp with 12-foot wide lanes. The SR 9 / I-95 southbound off-ramp has one 15-foot wide lane that diverges into two 12-foot left turn lanes and one 12-foot right turn lane at the terminal intersection. All ramps have 8-foot wide inside shoulders and 12-foot wide outside shoulders.

3.8.4.2 Interchange Configuration

The existing interchange configuration is a partial cloverleaf that contains one single-lane cloverleaf loop ramp and four single-lane diagonal ramps. All right/left turns onto SR 9 / I-95 on-ramps and right/left turns from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps are free-flow movements.

3.8.4.3 Design Speed

The design speed and posted speed for St. Lucie West Boulevard is 40 mph. The design speed for all of the SR 9 / I-95 on-ramps and off-ramps is 40 mph.

3.8.4.4 Horizontal Alignment

The existing horizontal geometry of St. Lucie West Boulevard consists of a combination of tangents and normal crown horizontal curves throughout the study area. A more pronounced horizontal curve is developed west of NW Peacock Boulevard.

3.8.4.5 Vertical Alignment

The existing vertical geometry of St. Lucie West Boulevard consists of sag and crest curves near the interchange as the road crosses over SR 9 / I-95.

3.8.4.6 Right-of-Way

The right-of-way varies along the St. Lucie West Boulevard roadway segment. The minimum total right-of-way provided in the study area is 140 feet.

3.8.4.7 Lighting

The existing lighting for St. Lucie West Boulevard was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast light poles were identified along the interchange, standard roadway lights along St. Lucie West Boulevard east and west of the interchange, and pendant hung lights under the bridge deck passing over SR 9 / I-95.

3.8.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows into DBIs that discharge into adjacent ponds.

3.8.4.9 Pavement Conditions

St. Lucie West Boulevard is currently being widened through FPID 435337-1-52-01 with an opening year of 2021. This project includes widening and milling and resurfacing, which warrants an assumption that the pavement will be in adequate condition through the design life of the project (2041).

3.8.5 Proposed Improvements

The proposed roadway improvements for St. Lucie West Boulevard are as follow:

- Adding a third through lane to the St. Lucie West Boulevard westbound from SR 9 / I-95 southbound loop off-ramp to east of Peacock Boulevard. Proposed bridge along westbound St. Lucie West Boulevard with three-lanes.
- Adding a third left turn lane and a third through lane to the St. Lucie West Boulevard eastbound and Peacock Boulevard intersection.
- Adding a second left turn lane, a third through lane and a second right turn lane to the St. Lucie West Boulevard westbound and Peacock Boulevard intersection.
- Adding a second through lane to the Peacock Boulevard northbound and St. Lucie West Boulevard intersection.
- Adding a third left turn lane, a second through lane and a second right turn lane to the Peacock Boulevard southbound and St. Lucie West Boulevard.
- Proposed signalization at St. Lucie West Boulevard and SR 9 / I-95 northbound on-ramp and St. Lucie West Boulevard and Peacock Boulevard intersection.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.8.5.1 Design Criteria

The proposed improvements at the St. Lucie West Boulevard interchange were prepared consistent with the design criteria from the following publications:

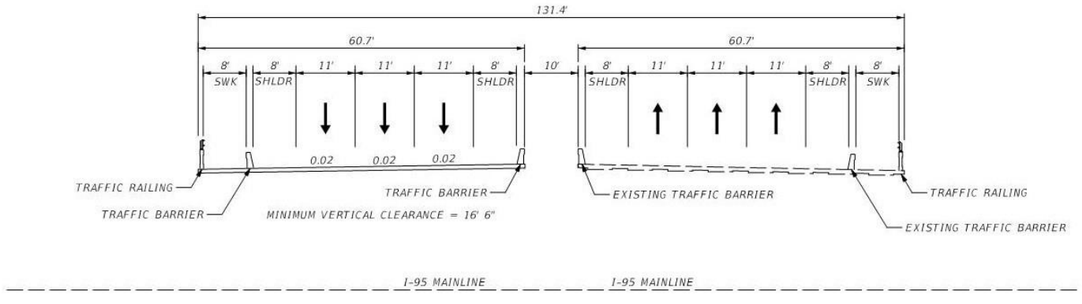
- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.8.5.2 Typical Section

The proposed typical section for St. Lucie West Boulevard has three 11-foot through lanes in each direction. The proposed roadway segment passing over SR 9 / I-95 consists of two bridges (10 feet

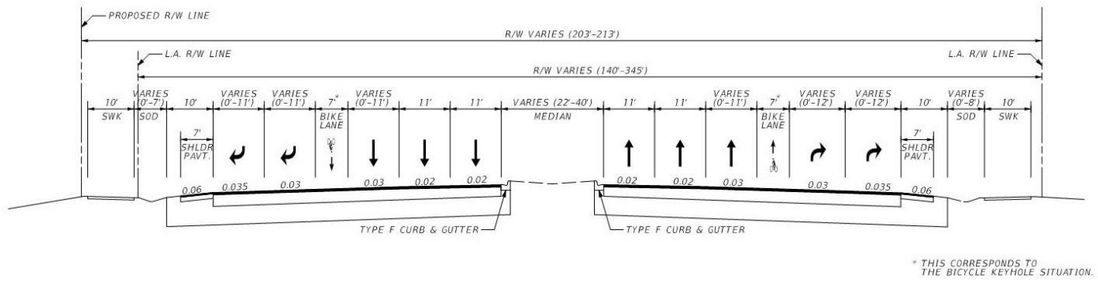
apart), with 8-foot wide inside and outside shoulders. An 8-foot wide sidewalk protected by traffic barriers is located on both bridges, as shown in Figure 3-41.

Figure 3-41 | Typical Section - St. Lucie West Boulevard over SR 9 / I-95



The proposed roadway segments west and east of SR 9 / I-95 have two to three 11-foot through lanes in each direction, 10-foot wide outside shoulders (7-foot paved shoulders), and a raised grass median (width varies from 22 to 40 feet) with curb and gutter Type F. A 10-foot wide sidewalk is located on both sides of the road, as shown in Figure 3-42.

Figure 3-42 | Typical Section - St. Lucie West Boulevard



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp and southbound off-ramp consist of one 15-foot wide lane. The southbound on-ramp along the westbound consists of a 15-foot wide single-lane loop ramp, and along the eastbound accommodates two 12-foot right turn lanes that eventually merge into a 12-foot wide single-lane ramp, which merge to become a grade-separated ramp crossing over one of the Crosstown Parkway interchange ramps. The northbound off-ramp has a double-lane diagonal ramp with 12-foot wide lanes that crosses under one of the Crosstown Parkway interchange ramps, completing a braided system of ramps. All ramps have 8-foot wide inside shoulders and 12-foot wide outside shoulders.

3.8.5.3 Structural Impacts

Due to the proposed improvements, the existing westbound bridge structure will need to be replaced. The bridge deck will be widened from 51.5 to 60.7 feet.

3.8.5.4 Interchange Configuration

The proposed interchange configuration maintains the partial cloverleaf containing one single-lane cloverleaf loop ramp, three single-lane diagonal ramps, and one double-lane diagonal ramp. The existing weaving section between Crosstown Parkway and St. Lucie West Boulevard currently provides a failing level of service. The proposed improvements replace the existing weaving sections with a system of braided ramps between the interchanges eliminating existing congestion.

3.8.5.5 Design Speed

The proposed design speed and posted speed for the roadway segment is 40 mph. The proposed design speed for all of the SR 9 / I-95 on-ramps and off-ramps is 40 mph.

3.8.5.6 Horizontal Alignment

The proposed horizontal geometry of St. Lucie West Boulevard will remain unchanged throughout the study limits.

3.8.5.7 Vertical Alignment

The vertical alignment of St. Lucie West Boulevard will remain unchanged throughout the study limits.

3.8.5.8 Right-of-Way

The proposed roadway footprint along the St. Lucie W Boulevard and Peacock Boulevard intersection is outside the existing right-of-way limits. Right-of-way acquisition for this area east of the SR 9 / I-95 interchange will be necessary to accommodate the proposed improvements. Please refer to E.

3.8.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.8.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.8.5.11 Pavement Design

Pavement design will be evaluated during the design phase.

3.8.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT and MUTCD requirements. All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.8.5.13 Traffic Signal Modification

The proposed signal improvements include adding turn lanes and changing the signal phasing of the SR 9 / I-95 northbound ramp terminal. The proposed improvements also include adding turn lanes to the St. Lucie West Boulevard and SW Peacock Boulevard intersection. This improvement would require a new steel mast arm and new traffic signal heads.

3.8.5.14 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along St. Lucie West Boulevard using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of St. Lucie West Boulevard. In addition to the ADMS improvements, CCTV and ATSPM is proposed at all intersections from NW Peacock Boulevard to the west to NW Cashmere Boulevard to the east as well as standalone CCTV poles at the unsignalized SR 9 / I-95 ramp intersections. A signal priority system is also recommended at all signalized intersections. Underground fiber optic cable between these west ramp CCTV to NW Cashmere and to the ADMS sites should also be installed.

3.8.6 Alternative Analysis

3.8.6.1 Cost Estimate

Cost estimates were developed for St. Lucie West Boulevard improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.8.6.2 Benefit-Cost Analysis

Drivers along St. Lucie West Boulevard experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $4.7 million in 2030 and $12.2 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with

the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $63.2 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $15.1 million this equates to a benefit-cost ratio of approximately 4.2. The resultant NPV is about $48.2 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.8.6.3 Environmental Impacts

Potential environmental impacts within the St. Lucie West Boulevard are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or floodplains are anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.8.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.9 CR 712 / W Midway Road

3.9.1 General Description

CR 712 / W Midway Road (Roadway ID 94530000) is a roadway located in St. Lucie County. The limits of the section being studied are from east of Gordy Exd west of the SR 9 / I-95 interchange to east of Glades Cut-Off Road (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this CR 712 / W Midway Road roadway segment is under the jurisdiction of St. Lucie County. Its Functional Classification is Principal Arterial-Other. The roadway's Context Classification is C2-Rural along the SR 9 / I-95 interchange and C3C-Suburban Commercial along the Glades Cut-Off Road intersection, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.9.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven fixed routes, although none of the routes currently travel along CR 712 / W Midway Road within the study area. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and Midway Road.

3.9.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and CR 712 / W Midway Road there is an approximate 7-foot wide sidewalk located on the north side of the east-west roadway in the immediate vicinity of the Glades Cut-Off Road intersection. This sidewalk segment is immediate adjacent to the travel way. The remaining portions of the interchange influence area do not include sidewalks.

Existing unmarked bicycle lanes that are approximately 5 feet wide are present on CR 712 / W Midway Road in the westbound and eastbound direction. They are provided along the east-west roadway only from the southbound SR 9 / I-95 ramp termini intersection to the northbound SR 9 / I-

95 ramp termini intersection. The remaining existing sections of the influence area do not include bicycle lanes.

Given that there are no capacity needs identified for the SR 9 / I-95 at Midway Road interchange itself, no additional pedestrian or bicycle improvements are included at this site. The modest turn lane improvements conceptually identified at the intersection of CR 712 / W Midway Road and Glades Cut-Off Road will retain sidewalks throughout the intersection.

3.9.3 Access Management

CR 712 / Midway Road is a County facility, and its access management principles are derived from St Lucie County. As such, St Lucie County's Land Development Code states that the study portion of CR 712 / W Midway Road is subject to spacing standards where the intersection with a Major Collector or Arterial Roadway shall be separated by a minimum distance of 660 feet, as measured from centerline to centerline.

A review of the current intersection and median opening spacing along CR 712 / W Midway Road was conducted and a summary provided in Table 3-9. Results indicate that the intersections and median openings east and west of SR 9 / I-95 meet or exceed the spacing standards set forth in St Lucie County's Land Development Code.

There are no anticipated changes to the current access openings along Midway Road for future 2030 or 2045 conditions.

Table 3-9 | Access Management Summary of Midway Road Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
Midway Road/CR 712	St Lucie	Gordy Exd	Full	-		660		
		SB Off-Ramp Termini	Full	1,390		660	730	
		NB Off-Ramp Termini	Full	1,460		660	800	
		Median Opening #1	Full	1,350		660	690	
		LTC Parkway/Median Opening #2	Full	775		660	115	
		Tropicana Driveway/Median Opening #3	Full	1,740		660	1,080	
		Glades Cut-Off Rd	Full	945		660	285	

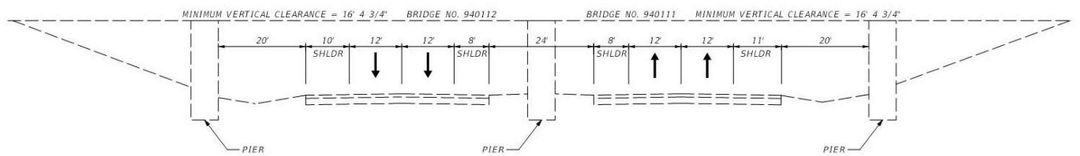
** Spacing based on St Lucie County Land Development Code Section 7.01.03*

3.9.4 Existing Conditions Analysis

3.9.4.1 Typical Section

CR 712 / W Midway Road is a four-lane divided roadway with two 12-foot through lanes in each direction. The roadway segment between the interchange's two terminal intersections has 8-foot wide inside paved shoulder and 10 or 11-foot wide outside paved shoulders; in addition, a 24-foot wide concrete median, as shown in Figure 3-43. The existing minimum vertical clearance is 16 feet - 4.75 inches.

Figure 3-43 | Typical Section - CR 712 / W Midway Street below SR 9 / I-95



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with 6-foot wide inside and outside shoulders.

3.9.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with four single-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and from off-ramps are traffic signal-controlled. Additionally all right turns onto SR 9 / I-95 on-ramps and from off-ramps are single lane free-flow movements.

3.9.4.3 Design Speed

The design speed for CR 712 / W Midway Road is 50 mph, and the posted speed is 45 mph. The design speed for the SR 9 / I-95 northbound on-ramp and southbound off-ramp is 40 mph, while the advisory posted speed for the off-ramps is 35 mph. Not information was found for the Design Speed of southbound on-ramp and northbound off-ramp.

3.9.4.4 Horizontal Alignment

The existing horizontal geometry of CR 712 / W Midway Road consists of a tangent alignment throughout the study area. There are transition areas outside of the study limits where the CR 712 / W Midway Road typical section changes from a two-lane undivided facility to a four-lane divided facility.

3.9.4.5 Vertical Alignment

The existing vertical geometry of CR 712 / W Midway Road is mostly flat throughout the study area as SR 9 / I-95 crosses over CR 712 / W Midway Road.

3.9.4.6 Right-of-Way

The right-of-way varies along the CR 712 / W Midway Road roadway segment. The minimum total right-of-way provided in the study area is 70 feet.

3.9.4.7 Lighting

The existing lighting for CR 712 / W Midway Road was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast light poles were identified along the interchange, standard roadway lights along CR 712 / W Midway Road east and west of the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.9.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows off the road and down the shoulder into the adjacent swales.

3.9.4.9 Pavement Conditions

Field reviews indicated the existing pavement along CR 712 / W Midway Road is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.9.5 Proposed Improvements

The proposed roadway improvements for CR 712 / Midway Road are as follow:

- Adding a second left turn lane to the SR 9 / I-95 southbound off-ramp onto eastbound CR 712 / Midway Road.
- Adding a second left turn lane to the CR 712 / Midway Road westbound and Cut-Off Road intersection.
- Retiming existing signalized intersection at CR 712 / Midway Road and SR 9 / I-95 northbound and southbound ramps.
- Proposed signalization at CR 712 / Midway Road and Glades Cut-Off Road.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.9.5.1 Design Criteria

The proposed improvements at the CR 712 / W Midway Road interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.9.5.2 Right-of-Way

The proposed roadway footprint along the CR 712 / W Midway Road and Glades Cut-Off Road intersection is outside the existing right-of-way limits. Right-of-way acquisition for this area east of the SR 9 / I-95 interchange will be necessary to accommodate the proposed improvements. Please refer to Appendix F.

3.9.5.3 Traffic Signal Modification

The proposed signal improvements include retiming the northbound and southbound ramp terminals (not shown in plan sheets). The proposed improvements also include adding turn lanes to the CR 712 / W Midway Road and Glades Cut-Off Road intersection. This improvement would require a new steel mast arm and a new traffic signal head.

3.9.5.4 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along CR 712 / Midway Road using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of CR 712 / Midway Road. In addition to the ADMS improvements, CCTV and ATSPM is proposed at all intersections from southbound ramp to Glades Cut-Off Road. A signal priority system is also recommended at all signalized intersections. Underground fiber optic cable between the west ramp to Glades Cut-Off Road and to the ADMS sites should also be installed.

3.9.6 Alternative Analysis

3.9.6.1 Cost Estimate

Cost estimates were developed for CR 712 / W Midway Road improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.9.6.2 Benefit-Cost Analysis

Drivers along CR 712 / W Midway Road experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $1.7 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $6.1 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $2.8 million this equates to a benefit-cost ratio of approximately 2.2. The resultant NPV is about $3.4 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.9.6.3 Environmental Impacts

Potential environmental impacts within the CR 712 / W Midway Road are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or floodplains are anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.9.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.10 SR 70 / Okeechobee Road

3.10.1 General Description

SR 70 / Okeechobee Road (Roadway ID 94030000) is a roadway located in St. Lucie County. The limits of the section being studied are from west of SR 713 / Kings Highway west of SR 9 / I-95 interchange to east of Jenkins Road (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SR 70 / Okeechobee Road roadway segment is under the jurisdiction of St. Lucie County. Its Functional Classification is Principal Arterial-Other. The roadway's Context Classification is C3C-Suburban Commercial, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.10.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, with one route (TCC Route #3) currently traveling along SR 70 / Okeechobee Road within the study area. In addition, Indian River County's GoLine also provides one route (Go Line Route #15) through this interchange. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and SR 70 / Okeechobee Road.

3.10.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and SR 70 / Okeechobee Road there is an approximate 7-foot wide sidewalk located on the north and south sides of the east-west roadway. The existing sidewalk is generally located behind the curb along SR 70 / Okeechobee Road west of SR 9 / I-95. However, east of SR 9 / I-95 the sidewalk tends to be setback from the travel way a variable distance between 5 and 40 feet.

Existing marked bicycle lanes that are approximately 5 feet wide are present on SR 70 / Okeechobee Road in the westbound and eastbound direction. They are present throughout the entire interchange influence area from Kings Highway to Jenkins Road.

Multimodal facilities are included in the long term future vision of the SR 70 / Okeechobee Road corridor in this SR 9 / I-95 Multimodal Master Plan document. Sidewalks along the north and south sides of SR 70 / Okeechobee Road are provided in interchange concept. Pedestrians will continue to enjoy complete connectivity along the east-west roadway within the entire interchange influence area.

Buffered bicycle lanes are provided in the SR 70 / Okeechobee Road interchange concept from Crossroads Parkway east of SR 9 / I-95 to Jenkins Road. Marked bicycle lanes between Kings Highway and Crossroads Parkway will continue to be maintained. Overall, bicyclists will be provided a connected, uninterrupted bike lane within the entire interchange influence area.

3.10.3 Access Management

SR 70 / Okeechobee Road is a state facility with a posted speed limit of 45 miles per hour (mph) that has been classified as an Access Class 5 facility. Access Class 5 roadways are controlled access facilities where adjacent land has been extensively developed and where the probability of major land use change is not high. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 5 facilities with speed limits of 45 mph or less are 1,320 feet for full median openings and signalized intersections, and 660 feet for directional median openings.

A review of the current intersection and median opening spacing along SR 70/Okeechobee Road from Kings Highway to Jenkins Road was conducted and a summary provided in Table 3-10. Results indicate that the present location of the median openings and intersections either exceeds or is within 5% of the respective minimum spacing standards.

With the introduction of a DDI configuration for the long term condition (2045), the future access spacing along SR 70 / Okeechobee Road are changed slightly. A review of those future intersection and median opening spacing indicate that the distance between Crossroads Parkway and the southbound off-ramp termini increases to approximately 1,330 feet. That spacing distance meets the minimum standard for a Class 5 facility, and is a slight access management improvement when compared to current conditions. Further, the spacing distance on the east side of the interchange between the northbound exit ramp termini intersection and Jenkins Road is also increased to 1,320 feet. This spacing is consistent with the minimum spacing standards for a Class 5 facility. A summary of the future intersection and median opening spacing is included in Table 3-10.

Table 3-10 | Access Management Summary of SR 70/Okeechobee Road Corridor

				Existing Conditions					For DDI Concept		
Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)	Spacing of Opening (feet)	Variance (feet)	Variance (%)
SR 70/Okeechobee Rd	FDOT	Kings Hwy/Turnpike Interchange	Full	-	5	660			-		
		Median Opening #1	Directional	875	5	660	215		875	215	
		Crossroads Parkway	Full	840	5	660	180		840	180	
		SB Off-Ramp Termini	Full	1,275	5	1,320	-45	-3.4%	1,330	10	
		NB Off-Ramp Termini	Full	1,340	5	1,320	20		1,210	-110	-8.3%
		Jenkins Road	Full	1,255	5	1,320	-65	-4.9%	1,320	0	

45 mph posted speed limit within study area

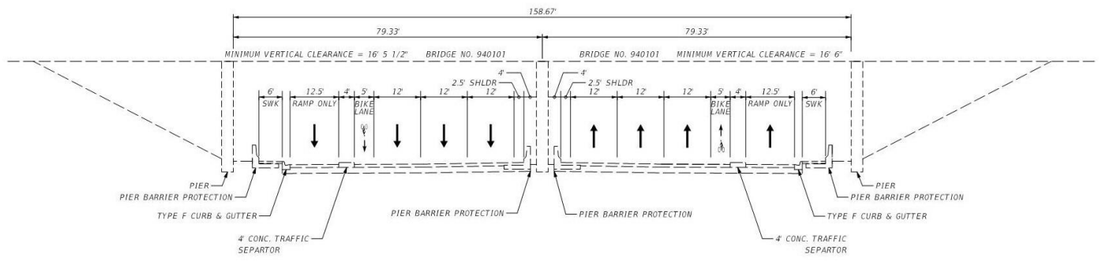
3.10.4 Existing Conditions Analysis

3.10.4.1 Typical Section

SR 70 / Okeechobee Road is six-lane divided roadway with three 12-foot through lanes in each direction. The roadway segment below SR 9 / I-95 has 2.5-foot wide inside paved shoulders, 5-foot wide bicycle lanes, 12.5-foot wide ramp-only lanes with curb and gutter Type F, and a 14.5-foot

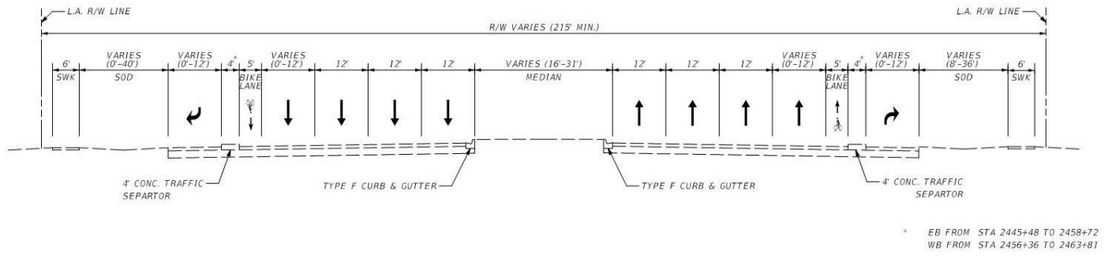
wide raised concrete median. A 6-foot wide sidewalk is located on both sides of the road next to the bridge end bents, as shown in Figure 3-44. The existing minimum vertical clearance is 16 feet - 5.5 inches.

Figure 3-44 | Typical Section - SR 70 / Okeechobee Road below SR 9 / I-95



The roadway segments west and east of SR 9 / I-95 have three 12-foot through lanes in each direction, 5-foot wide bicycle lanes, and a raised grass median (width 16 to 31 feet) with curb and gutter Type F, as shown in Figure 3-45. A 6-foot wide sidewalk is located on both sides of the road.

Figure 3-45 | Typical Section - SR 70 / Okeechobee Road



Ramps Typical Sections

The SR 9 / I-95 southbound on-ramp along the westbound consists of a 15-foot wide single-lane loop ramp and along the eastbound consists of a double-lane eastbound diagonal ramp with 12-foot wide travel lanes. The SR 9 / I-95 northbound on-ramp along the eastbound consists of a 15-foot wide single-lane loop ramp and along the westbound consists of a 15-foot wide single-lane diagonal ramp. The SR 9 / I-95 northbound and southbound off-ramps consist of a double-lane diagonal ramp with 12-foot wide travel lanes that diverge into three 12-foot right turn lanes and three 12-foot left turn lanes at the terminal intersection. All ramps have 6 or 8-foot wide inside shoulders and 6 or 12-foot wide outside shoulders.

3.10.4.2 Interchange Configuration

The existing interchange configuration is a partial cloverleaf that contains two single-lane cloverleaf loop ramps, one single-lane diagonal ramp, and three double-lane diagonal ramps. All right / left turns onto SR 9 / I-95 from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps are single/double lane free-flow movements.

3.10.4.3 Design Speed

The design speed and posted speed for SR 70 / Okeechobee Road is 45 mph. The design speed for the SR 9 / I-95 northbound on-ramp and southbound on-ramp (cloverleaf loop ramps) is 30 mph, while for the northbound off-ramp transitions from 30 mph to 50 mph, and from 35 mph to 50 mph for the southbound on-ramp (diagonal ramp). The design speed of the northbound on-ramp (diagonal ramp) and the southbound off-ramp is not available. The advisory posted speed for the SR 9 / I-95 northbound off-ramp, southbound off-ramp and southbound on-ramp (diagonal ramp) is 35 mph, while for the northbound on-ramp (diagonal ramp), southbound on-ramp and northbound on-ramp (cloverleaf loop ramps) is 25 mph.

3.10.4.4 Horizontal Alignment

The existing horizontal geometry of SR 70 / Okeechobee Road consists of a tangent alignment throughout the study area.

3.10.4.5 Vertical Alignment

The existing vertical geometry of SR 70 / Okeechobee Road is mostly flat throughout the study area as SR 9 / I-95 crosses over SR 70 / Okeechobee Road.

3.10.4.6 Right-of-Way

The right-of-way varies along the SR 70 / Okeechobee Road roadway segment. The minimum total right-of-way provided in the study area is 215 feet; however, along the intersections of SR 70 / Okeechobee Road with SR 713 / N Kings Highway and Jenkins Road the minimum total right-of-way provided is 80 feet and 122 feet respectively.

3.10.4.7 Lighting

The existing lighting for SR 70 / Okeechobee Road was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Standard roadway lights were identified along the interchange and SR 70 / Okeechobee Road east and west of the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.10.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.10.4.9 Pavement Conditions

Field reviews indicated the existing pavement along SR 70 / Okeechobee Road is generally in fair condition, excluding multiple locations that are in poor condition with cracking, asphalt bleeding, and rutting. Based on the 2018 Pavement Condition Survey (PCS), the existing pavement indicated a Crack Rating of 9.0 and Ride Ratings of 8.0 from MP 21.359 to MP 25.225. The FAST forecast ratings for the year 2023 are 8.0 and 7.8 respectively. From MP 20.358 to MP 20.939 the existing pavement indicated a Crack Rating of 10.0 for both sides and Ride Ratings of 7.0 or under. The FAST forecast ratings for the year 2023 are 9.5 and 6.1 respectively.

3.10.5 Proposed Improvements

The proposed roadway improvements for SR 70 / Okeechobee Road are as follow:

- Diverging Diamond Interchange (DDI) configuration is proposed. Eastbound and westbound traffic along the arterial is flipped from the right-hand-side of the roadway to the left-hand-side of the roadway with a tangent of 100 feet and flip back to original position. Traffic traveling through the interchange along the arterial passes through signalized intersections in each direction.
- Adding a proposed third right turn lane to the SR 713 / Kings Highway northbound and SR 70 / Okeechobee Road intersection.
- Adding a third left turn lane to the Jenkings Road northbound onto westbound SR 70 / Okeechobee Road.
- Retiming existing signalized intersection at SR 70 / Okeechobee Road and Crossroad Parkway intersection.
- Proposed signalization at SR 70 / Okeechobee Road and SR 9 / I-95 northbound and southbound ramps intersection, SR 70 / Okeechobee Road and SR 713 / Kings Highway intersection, and SR 70 / Okeechobee Road and Jenkins Road intersection.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.10.5.1 Design Criteria

The proposed improvements at the SR 70 / Okeechobee Road interchange were prepared consistent with the design criteria from the following publications:

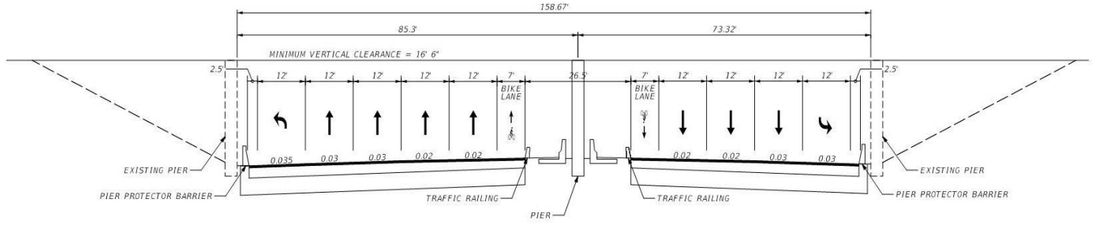
- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)

- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)
- Diverging Diamond Interchange Information Guide, FHWA (2014)
- Alternative Intersections/Interchanges: Informational Report (AIIR), FHWA (2010)

3.10.5.2 Typical Section

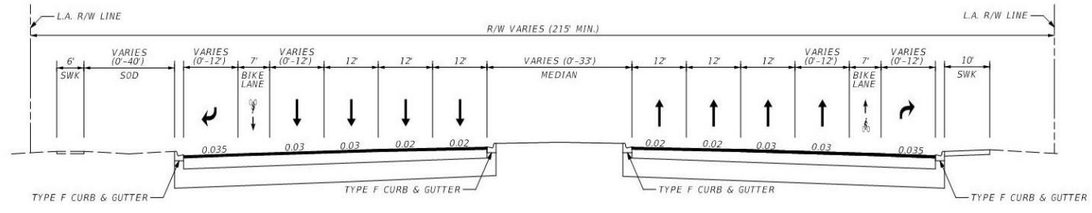
The proposed typical section for SR 70 / Okeechobee Road has three 12-foot to four 12-foot through lanes in each direction. The roadway segment below SR 9 / I-95 has 2.5-foot paved shoulders with pier protection barriers, 7-foot wide bicycle lanes, and a 26.5-foot wide concrete median that accommodates a 10-foot sidewalk protected by traffic railings on both sides, as shown in Figure 3-46.

Figure 3-46 | Typical Section - SR 70 / Okeechobee Road below SR 9 / I-95



The roadway segments west and east of SR 9 / I-95 have three 12-foot to four 12-foot through lanes in each direction with curb and gutter Type F, 7-foot wide bicycle lanes, and a raised grass median (width varies from 0 to 33 feet) with curb and gutter Type F. A sidewalk is located on both sides of the road (6 or 10 feet), as shown in Figure 3-47.

Figure 3-47 | Typical Section - SR 70 / Okeechobee Road



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp accommodates one 15-foot westbound right turn lane and one 15-foot eastbound left turn lane that eventually merge into a single 15-foot wide lane ramp. The SR 9 / I-95 southbound off-ramp has two 12-foot wide lanes that diverge into two 12-foot left turn lanes and two 12-foot right turn lanes at the terminal intersection. The SR 9 / I-95 southbound on-ramp accommodates one 15-foot eastbound right turn lane and two 12-foot westbound left turn lanes that eventually merge into a double-lane ramp with 12-foot wide travel lanes. The SR 9 / I-95 northbound off-ramp has two 12-foot wide lanes that diverge into three 12-foot right turn lanes and two 12-foot left turn lanes at the terminal intersection.

3.10.5.3 Structural Impacts

Due to the proposed improvements, the existing bridge structure will need to be replaced. Also, the existing central pier will be removed and replaced since the two existing bridge spams of 79.33 feet each will be change to 85.30 feet and 73.32 feet respectively, in order to accommodate the proposed roadway footprint.

3.10.5.4 Interchange Configuration

The proposed interchange configuration is a diverging diamond interchange (DDI) that contains one single-lane diagonal ramp and three double-lane diagonal ramps. Traffic projections show that this

type of interchange configuration would provide better traffic flow and reduce conflict points, thus increasing safety to pedestrian/bicycle movements.

3.10.5.5 Design Speed

The proposed design speed for the DDI is 40 mph with a proposed posted speed of 40 mph. The design and posted speeds along SR 70 / Okeechobee Road west and east of the SR 9 / I-95 interchange will remain at 45 mph. The proposed design speed for SR 9 / I-95 northbound off-ramp transitions from 30 mph to 50 mph, and from 35 mph to 50 mph for the southbound on-ramp.

3.10.5.6 Horizontal Alignment

The horizontal alignment consists of a standard diverging diamond interchange (DDI) configuration. The interchange's terminal intersections consist of two intersecting reverse curves, each with a 593 feet inside radius and a 100 feet tangent. The crossover angles of 32° at the west intersection and 33° at the east intersection meet the general FHWA requirements of a cross angle between 30° and 50°.

3.10.5.7 Vertical Alignment

The vertical alignment for SR 70 / Okeechobee Road will be slightly altered to accommodate the proposed design. The necessary alterations are to be evaluated during the design phase.

3.10.5.8 Right-of-Way

The proposed roadway footprint along the intersections of SR 70 / Okeechobee Road with SR 713 / N Kings Highway and Jenkins Road is outside the existing right-of-way limits. Right-of-way acquisition for this areas west and east of the SR 9 / I-95 interchange will be necessary to accommodate the proposed improvements. Please refer to Appendix F.

3.10.5.9 Lighting

Lighting analysis will be evaluated during the design phase.

3.10.5.10 Drainage

Drainage analysis will be evaluated during the design phase.

3.10.5.11 Pavement Design

Pavement design will be evaluated during the design phase.

3.10.5.12 Signing and Pavement Markings

Signing improvements include the upgrade of all sub-standard ground-mounted signs to meet current FDOT, and MUTCD. Although a Diverging Diamond Interchange (DDI) may operate in a different manner, the pavement marking used is similar to other interchanges. For more information refer to Diverging Diamond Interchange Information Guide (FHWA). All pavement markings within the study limits should be replaced to meet current FDOT Standard Plans for Road Construction.

3.10.5.13 Traffic Signal Modification

The proposed signal improvements include retiming the SR 70 / Okeechobee Road and Crossroads Parkway intersection. The proposed improvements also include adding turn lanes to the SR 70 / Okeechobee Road and SR 713 / Kings Highway intersection and the SR 70 / Okeechobee Road and Jenkins Road intersection. These improvements would require a new steel mast arms and a new traffic signal heads. The diverging diamond interchange (DDI) would require new signals at both the west and east terminals. These new signals would require a new steel mast arm, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.10.5.14 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along SR70 / Okeechobee Road using two Arterial Dynamic Message Signs (ADMS) along eastbound and two along westbound of SR 70 / Okeechobee Road. In addition to the ADMS improvements, CCTV, ATSPM, and a signal priority system is also recommended at all signalized intersections from S Kings Highway to Hartman Road. An additional CCTV is proposed under SR 9 / I-95 Bridge to improve mobility and safety. Underground fiber optic cable between the S Kings Highway to Hartman Road and to the ADMS sites should also be installed.

3.10.6 Alternative Analysis

3.10.6.1 Cost Estimate

Cost estimates were developed for SR 70 / Okeechobee Road improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.10.6.2 Benefit-Cost Analysis

Drivers along SR 70 / Okeechobee Road experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $419,373 in 2030 and $12.7 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $46.1 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $22.1 million this equates to a benefit-cost ratio of approximately 2.1. The resultant NPV is about $24.0 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.10.6.3 Environmental Impacts

Potential environmental impacts within the SR 70 / Okeechobee Road are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or floodplains are anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.10.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.11 SR 68 / Orange Avenue

3.11.1 General Description

SR 68 / Orange Avenue (Roadway ID 94070000) is a roadway located in St. Lucie County. The limits of the section being studied are from west of SR 713 / Kings Highway west of SR 9 / I-95

interstate to Jenkins Road (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SR 68 / Orange Avenue roadway segment is under the jurisdiction of St. Lucie County. Its Functional Classification is Principal Arterial-Other. The roadway's Context Classification is C2-Rural, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.11.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, although none of the routes currently travel along SR 68 / Orange Avenue within the study area. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and SR 68 / Orange Avenue.

3.11.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and SR 68 / Orange Avenue there are approximately 8-foot wide sidewalks located on the north and south sides of the roadway. The existing sidewalks are typically located immediately behind the curb adjacent to the travel way. Overall, existing sidewalks are provided along SR 68 / Orange Avenue throughout the entire interchange influence area.

Existing marked bicycle lanes that are approximately 5 feet wide are present on SR 68 / Orange Avenue in the westbound and eastbound direction. They are provided along the roadway for entire interchange influence area.

Multimodal facilities are included in the long term future vision of the SR 68 / Orange Avenue corridor in this SR 9 / I-95 Multimodal Master Plan document. Sidewalks along the north and south side of the arterial are retained in interchange concept from Kings Highway to Jenkins Road. In addition, marked bicycle lanes are retained in the SR 68 / Orange Avenue interchange concept. Bicyclists will continue to enjoy a connected, uninterrupted bike lane within the interchange influence area.

3.11.3 Access Management

SR 68 / Orange Avenue is a state facility with a posted speed limit of 45 miles per hour (mph) that has been classified as an Access Class 5 facility. Access Class 5 roadways are controlled access facilities where adjacent land has been extensively developed and where the probability of major land use change is not high. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 5 facilities with speed limits of 45 mph or less are 1,320 feet for full median openings and signalized intersections, and 660 feet for directional median openings.

A review of the current intersection and median opening spacing along SR 68 / Orange Avenue was conducted and a summary provided in Table 3-11. Results indicate that the present location of the full opening intersection at Kings Highway west of SR 9 / I-95 is 1,080 feet from the SR 9 / I-95 southbound off-ramp termini intersection, which is about 18% less than the minimum spacing standard of 1,320 feet for a full opening. In addition, the four full median openings east of SR 9 / I-95 are all spaced less than the minimum spacing standards for a Class 5 facility. The current full openings are between 6% and 62% below the minimum spacing standard of 1,320 feet.

There are no anticipated changes to the current access openings along SR 68 / Orange Avenue for future 2030 or 2045 conditions.

Table 3-11 | Access Management Summary of SR 68 / Orange Avenue Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
SR 68/Orange Avenue	FDOT	Kings Hwy/Turnpike Interchange	Full	-	5	1,320		
		SB Off-Ramp Termini	Full	1,080	5	1,320	-240	-18.2%
		NB Off-Ramp Termini	Full	1,080	5	1,320	-240	-18.2%
		Lamont Road	Full	1,240	5	1,320	-80	-6.1%
		Loop Road	Full	595	5	1,320	-725	-54.9%
		Median Opening #1	Full	495	5	1,320	-825	-62.5%
		Jenkins Road	Full	785	5	1,320	-535	-40.5%

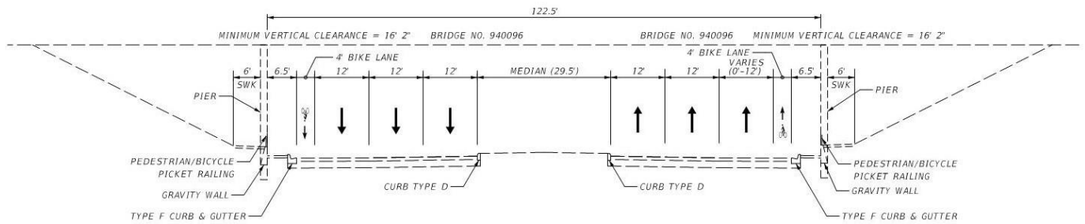
45 mph posted speed limit within study area

3.11.4 Existing Conditions Analysis

3.11.4.1 Typical Section

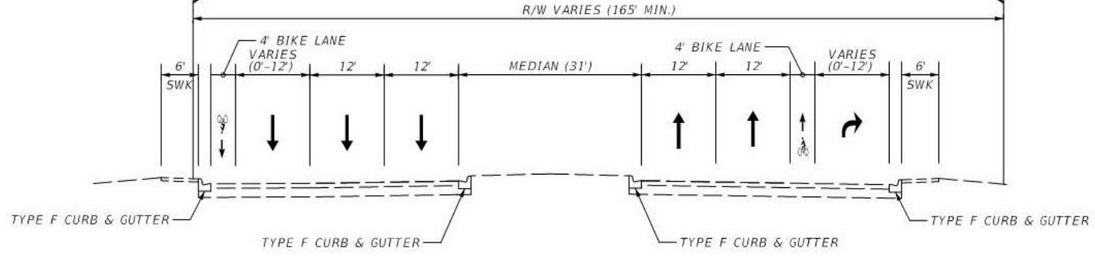
SR 68 / Orange Avenue is a four-lane divided roadway with two 12-foot through lanes in each direction and occasional auxiliary lanes. The roadway segment below SR 9 / I-95 has 4-foot wide bicycle lanes with curb and gutter Type F, and a 29.5-foot wide raised concrete median with curb Type D. A 6-foot wide raised sidewalk is located on both sides of the road between the bridge end bent and pier, as shown in Figure 3-48. The existing minimum vertical clearance is 16 feet – 2 inches.

Figure 3-48 | Typical Section - SR 68 / Orange Avenue under SR 9 / I-95



The roadway segment between S Kings Highway and SR 9 / I-95 southbound Bridge consists of two 12-foot through lanes in each direction and occasional auxiliary lanes, with curb and gutter Type F, 4-foot wide bicycle lanes, and a 31-foot wide raised grass median with curb and gutter Type F. A 6-foot sidewalk is located on both sides of the road, as shown in Figure 3-49.

Figure 3-49 | Typical Section - SR 68 / Orange Avenue



Ramps Typical Sections

The SR 9 / I-95 off-ramp along the westbound consists of a 15-foot wide single-lane loop ramp and along the eastbound consists of a 15-foot wide single-lane diagonal ramp. The SR 9 / I-95 southbound off-ramp along the eastbound consists of a 15-foot wide single-lane loop ramp and along the westbound consists of a 15-foot wide single-lane diagonal ramp. The northbound on-ramp accommodates two 12-foot eastbound left turn lanes and one 15-foot right turn lane that eventually merge into a 15-foot wide single lane diagonal ramp. The southbound on-ramp accommodates one

15-foot eastbound right turn lane and two 12-foot westbound left turn lanes that eventually merge into a double-lane diagonal ramp with 12-foot wide travel lanes. All ramps have 6 or 8-foot wide inside shoulders and 6 or 12-foot wide outside shoulders.

3.11.4.2 Interchange Configuration

The existing interchange configuration is a partial cloverleaf that contains two single-lane cloverleaf loop ramps, three single-lane diagonal ramps, and one double-lane diagonal ramp. All left turns onto SR 9 / I-95 on-ramps and right turn from off-ramp are traffic signal-controlled. Additionally, all right turns onto SR 9 / I-95 on-ramps and from off-ramps are single lane free-flow movements.

3.11.4.3 Design Speed

The design speed and posted speed for SR 68 / Orange Avenue is 45 mph. The design speed for the SR 9 / I-95 southbound off-ramp and northbound off-ramp (cloverleaf loop ramps) is 30 mph, while for the northbound off-ramp (diagonal ramp) transitions from 35 mph to 50 mph, and from 30 mph to 50 mph for the southbound on-ramp and southbound off-ramp (diagonal ramp). The advisory posted speed for the SR 9 / I-95 diagonal off-ramps is 35 mph, and 25 mph for the cloverleaf loop ramps.

3.11.4.4 Horizontal Alignment

The existing horizontal geometry of SR 68 / Orange Avenue consists of a tangent alignment throughout the study area.

3.11.4.5 Vertical Alignment

The existing vertical geometry of SR 68 / Orange Avenue is mostly flat throughout the study area as SR 9 / I-95 crosses over SR 68 / Orange Avenue.

3.11.4.6 Right-of-Way

The right-of-way varies along the SR 68 / Orange Avenue roadway segment. The minimum total right-of-way provided in the study area is 165 feet.

3.11.4.7 Lighting

The existing lighting for SR 68 / Orange Avenue was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Standard roadway lights were identified along the interchange and SR 68 / Orange Avenue east and west of the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.11.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.11.4.9 Pavement Conditions

Field reviews indicated the existing pavement along SR 68 / Orange Avenue is generally in fair condition, excluding multiple locations that are in poor condition with cracking, asphalt bleeding, and rutting. Based on the 2018 Pavement Condition Survey (PCS), the existing pavement indicated a Crack Rating of 10.0 for both sides of the roadway, and Ride Ratings of 9.0. The FAST forecast ratings for the year 2023 are 9.5 and 7.4 respectively.

3.11.5 Proposed Improvements

The proposed roadway improvements for SR 68 / Orange Avenue are as follow:

- Relocate SR 9 / I-95 southbound on-ramp approximate 500 feet east of existing location to improve the weaving operation along SR 68 / Orange Avenue.
- Adding a second right turn lane to the SR 68 / Orange Avenue westbound onto SR 713/ Kings Highway.
- Increasing westbound deceleration length for the eastbound SR 68 / Orange Avenue and SR 713 / Kings Highway intersection; as well as, increasing deceleration length for the southbound SR 713 / Kings Highway and SR 68 / Orange Avenue intersection.

- Proposed signalization at SR 68 / Orange Avenue and SR 713 / Kings Highway.
- Retiming existing signalized intersection at SR 68 / Orange Avenue and SR 9 / I-95 northbound and southbound ramp intersections. Additionally, retiming existing signalized intersection at SR 68 / Orange Avenue and Jenkins Road intersection.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.11.5.1 Design Criteria

The proposed improvements at the SR 68 / Orange Avenue interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009).

3.11.5.1 Right-of-Way

The proposed roadway footprint along the SR 68 / Orange Avenue and SR 713 / N Kings Avenue intersection is outside the existing right-of-way limits. Right-of-way acquisition for this area west of the SR 9 / I-95 interchange will be necessary to accommodate the proposed improvements. Please refer to Appendix F.

3.11.5.2 Traffic Signal Modification

The proposed signal improvements include retiming the northbound and southbound ramp terminals and the SR 68 / Orange Avenue and Jenkins Road intersection. The proposed improvements also include adding turn lanes to the SR 68 / Orange Avenue and SR 713 / Kings Highway. This improvement would require a new steel mast arm and new traffic signal heads.

3.11.5.3 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along SR 68 / Orange Avenue using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of SR 68 / Orange Avenue. Fiber optic cable should be installed from S Kings Highway to Jenkins Rd as well as to the ADMSs. CCTV and ATSPM should be installed at the five signalized intersections.

3.11.6 Alternative Analysis

3.11.6.1 Cost Estimate

Cost estimates were developed for SR 68 / Orange Avenue improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.11.6.2 Benefit-Cost Analysis

Drivers along SR 68 / Orange Avenue experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = -$92,244 in 2030 and $6.8 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $23.3 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $2.4 million this equates to a benefit-cost ratio of approximately 9.6. The resultant NPV is about $20.8 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.11.6.3 Environmental Impacts

Potential environmental impacts within the SR 68 / Orange Avenue are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or floodplains are anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.11.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.12 SR 614 / Indrio Road

3.12.1 General Description

SR 614 / Indrio Road (Roadway ID 94004000) is a roadway located in St. Lucie County. The limits of the section being studied are from Aico Road west of SR 9 / I-95 interstate to Koblegard Road (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SR 614 / Indrio Road roadway segment is under the jurisdiction of St. Lucie County. Its Functional Classification is Principal Arterial-Other. The roadway's Context Classification is C2-Rural, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.12.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in St Lucie County is the Treasure Coast Connector (TCC). The Treasure Coast Connector has seven (7) fixed routes, although none of the routes currently travel along SR 614 / Indrio Road within the study area. However, Indian River County's GoLine bus service provider offers one route (GoLine Route #15) through this interchange. It is noted that GoLine Route #15 is the only bus route that currently operates on SR 9 / I-95. There are also no existing or planned park-and-ride facilities near the interchange of SR 9 / I-95 and SR 614 / Indrio Road.

3.12.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and SR 614 / Indrio Road there are no sidewalks along the roadway within the interchange influence area. However, existing unmarked bicycle lanes that are approximately 5 feet wide are present on SR 614 / Indrio Road in the

westbound and eastbound direction. They are provided along the east-west roadway for the entire influence area.

Given that there are no capacity needs identified for the SR 9 / I-95 at SR 614 / Indrio Road interchange itself, no additional pedestrian or bicycle improvements are included at this site.

3.12.3 Access Management

SR 614 / Indrio Road is a state facility with a posted speed limit of 45 miles per hour (mph) that has been classified as an Access Class 3 facility. Access Class 3 roadways are controlled access facilities where direct access to abutting land is controlled to maximize the operation of the through traffic movement. The land adjacent to these roadways is generally not extensively developed and/or the probability of significant land use change exists. These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 3 facilities are 2,640 feet for full median openings and signalized intersections, and 1,320 feet for directional median openings.

A review of the current intersection and median opening spacing along SR 614 / Indrio Road was conducted and a summary provided in Table 3-12. Results indicate that the present location of the full opening intersection at AICO Road west of SR 9 / I-95 is 1,090 feet from the SR 9 / I-95 southbound off-ramp termini intersection, which is about 58% less than the minimum spacing standard of 2,640 feet for a full opening. The realignment of Spanish Lakes Boulevard and Kobelgard Road east of SR 9 / I-95 into a single intersection opening will be located approximately 1,790 feet from SR 9 / I-95 northbound off-ramp termini intersection. This is 32% of the minimum spacing standard of 2,640 feet.

There are no anticipated changes to the current access openings along SR 614 / Indrio Road for future 2030 or 2045 conditions.

Table 3-12 | Access Management Summary of SR 614 / Indrio Road Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
SR 614/Indrio Road	FDOT	AICO Road	Full	-	3	2,640		
		SB Off-Ramp Termini	Full	1,090	3	2,640	-1,550	-58.7%
		NB Off-Ramp Termini	Full	930	3	2,640	-1,710	-64.8%
		Spanish Lakes Blvd/ Koblegard Rd*	Full	1,790	3	2,640	-850	-32.2%

45 mph posted speed limit within study area

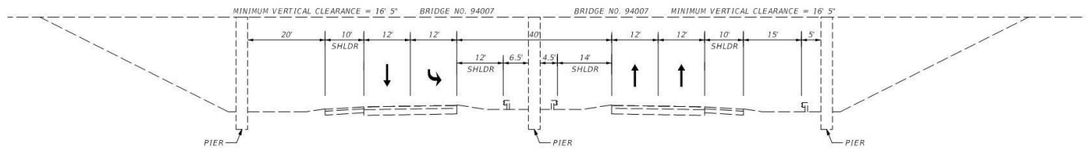
** Spanish Lakes Blvd and Koblegard Road are being consolidated into a single intersection opening along SR 614*

3.12.4 Existing Conditions Analysis

3.12.4.1 Typical Section

SR 614 / Indrio Road is a four-lane divided roadway with two 12-foot through lanes in each direction. The roadway segment between the interchange's two terminal intersections has 10-foot wide outside paved shoulders and a 40-foot wide grass median, as shown in Figure 3-50. The existing minimum vertical clearance is 16 feet – 5 inches.

Figure 3-50 | Typical Section - SR 614 / Indrio Road below SR 9 / I-95



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide or two 12-foot wide lanes with an inside shoulder width (6 or 8 feet) and outside shoulders width (6 or 12 feet).

3.12.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with three single-lane diagonal ramps, and one double-lane diagonal ramp. All left turns onto SR 9 / I-95 on-ramps and from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 /I-95 on-ramps and from off-ramps are single lane free-flow movements.

3.12.4.3 Design Speed

The design speed and posted speed for SR 614/ Indrio Road is 45 mph. The design speed for all SR 9 / I-95 on-ramps and off-ramps is 50 mph, and the advisory posted speed for the off-ramps is 35 mph.

3.12.4.4 Horizontal Alignment

The existing horizontal geometry of SR 614 / Indrio Road consists if a tangent alignment throughout the study area. There are transition areas outside of the study limits where the SR 614 / Indrio Road typical section changes from a two-lane undivided facility to a four-lane divided facility.

3.12.4.5 Vertical Alignment

The existing vertical geometry of SR 614 / Indrio Road is mostly flat throughout the study area as SR 9 / I-95 crosses over SR 614 / Indrio Road.

3.12.4.6 Right-of-Way

The right-of-way varies along the SR 614 / Indrio Road roadway segment. The minimum total right-of-way provided in the study area is 160 feet.

3.12.4.7 Lighting

The existing lighting for SR 614 / Indrio Road was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast pole lights were identified along the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges. There is no lighting provided for SR 614 / Indrio Road outside the interchange.

3.12.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows off the road and down the shoulder into the adjacent swales.

3.12.4.9 Pavement Conditions

Field reviews indicated the existing pavement along SR 614 / Indrio Road is generally in fair condition that typically corresponds to minor rutting and distortion. Additionally, no severe cracks or pavement deficiencies were identified throughout the study limits. A Pavement Evaluation Coring and Condition Data report will typically be provided for PD&E or Design Phase that will provide accurate details on pavement condition.

3.12.5 Proposed Improvements

The proposed roadway improvements for SR 614 / Indrio Road are as follow:

- Retiming existing signalized intersection at SR 614 / Indrio Road and SR 9 / I-95 northbound and southbound intersections. Additionally, retiming existing signalized intersection at SR 614 / Indrio Road and Koblegard Road.

Appendix B contains a Roadway set of plans of the proposed improvements described in the following sections.

3.12.5.1 Design Criteria

The design criteria utilized for this project is in conformance with the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.12.5.1 Traffic Signal Modification

The proposed signal improvements include retiming the northbound and southbound ramp terminals and the SR 614 / Indrio Road and Koblegard Road intersection. No infrastructure improvements is needed for retiming.

3.12.5.2 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along SR 614 / Indrio Road using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of SR 614 / Indrio Road. Fiber optic cable should be installed from the SB Ramp intersection to Koblegard Rd as well as to the ADMSs. CCTV and ATSPM should be installed at the three signalized intersections.

3.12.6 Alternative Analysis

3.12.6.1 Cost Estimate

Proposed improvements for SR 614 / Indrio Road are limited to existing signal timing modifications. Therefore a cost estimate was not prepared for this location.

3.12.6.2 Benefit-Cost Analysis

Proposed improvements for SR 614 / Indrio Road are limited to existing signal timing modifications. Therefore a benefit cost analysis was not conducted for this location.

3.12.6.3 Environmental Impacts

Potential environmental impacts are not anticipated as improvements to SR 614 / Indrio Road are not proposed at this time.

3.12.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.13 CR 606 / Oslo Road

3.13.1 General Description

CR 606 / Oslo Road (Roadway ID 88000421) is a roadway located in Indian River County. The limits of the section being studied are from 86th Avenue west of SR 9 / I-95 interchange to 82nd Avenue (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this CR 606 / Oslo Road roadway segment is under the jurisdiction of Indian River County. Its Functional Classification is Local west of the SR 9 / I-95 interchange and Major Collector east of the SR 9 / I-95 interchange. The roadway's Context Classification is C2-Rural, in accordance with Context Classification Approach for District 4 - Final Report (October 2017). This road is being designed under FPID 413048-2-32-01 with estimated completion date of 2027.

3.13.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Indian River County is the GoLine. The GoLine has 15 fixed routes, although none of the routes currently travel along CR 606 / Oslo Road within the study area. There are also no existing or planned park-and-ride facilities near the future interchange of SR 9 / I-95 and CR 606 / Oslo Road.

3.13.2.1 Bicycle and Pedestrian Facilities

Presently, CR 606 / Oslo Road near SR 9 / I-95 is a grade-separated overpass that does access SR 9 / I-95. The existing CR 606 / Oslo Road corridor between 90th Avenue and 82nd Avenue does not include sidewalks on either side of the roadway. Further, no bicycle lanes are present on CR 606 / Oslo Road in direction of travel.

Given the future interchange at SR 9 / I-95 and CR 606 / Oslo Road is currently under design, the SR 9 / I-95 Multimodal Master Plan found there are no additional capacity needs for this interchange. No additional pedestrian or bicycle improvements are included at this site as part of this Master Plan effort.

3.13.3 Access Management

Oslo Road/CR-606 is a County facility, and its access management principles are derived from Indian River County. Indian River County's Land Development Code, Section 952.12, states that the study portion of CR 606 / Oslo Road is subject to spacing standards such that median openings shall be spaced at a distance of at least 660 feet from any signalized intersection or median opening.

Because the CR 606 / Oslo Road interchange is currently under design, a review of the current spacings at this roadway corridor was conducted (without the interchange ramp terminal intersections. A summary of the existing conditions is provided in Table 3-13. Results indicate that the present intersections and median openings east and west of SR 9 / I-95 meet or exceed the spacing standards set forth in Indian River County's Land Development Code.

For future 2030 or 2045 conditions, the CR 606 / Oslo Road interchange and ramp terminal intersections will be present along the corridor. As a component of the interchange design, 86 Avenue is designed to no longer intersect with CR 606 / Oslo Road west of SR 9 / I-95. Instead, 86 Avenue will terminate in a cul-de-sac configuration just south of CR 606 / Oslo Road.

With the introduction of an interchange, the future access spacing along CR 606 / Oslo Road were evaluated. A review of those future spacing indicate that the distance between 82 Avenue and the northbound off-ramp termini will be approximately 1,800 feet. That spacing distance exceeds the minimum spacing standard prescribed by Indian River County's Land Development Code. A summary of the future spacing is included in Table 3-13.

Table 3-13 | Access Management Summary of CR 606 / Oslo Road Corridor

				Existing Conditions					With Interchange		
Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)	Spacing of Opening (feet)	Variance (feet)	Variance (%)
Oslo Road	Indian River County	86 Avenue	Full	-		660			-		
		SB Off-Ramp Termini	Full	n/a			n/a		n/a**	n/a	
		NB Off-Ramp Termini	Full	n/a			n/a		2,300	1,640	
		82 Avenue	Full	2,680		660	2,020		1,800	1,140	

** Spacing based on Indian River County Land Development Code Section 952.12*
*** - With the designed interchange, 86 Avenue will no longer intersect with Oslo Road*

3.13.4 Proposed Improvements

The proposed roadway improvements for CR 606 / Oslo Road is as follow:

- Proposed signalization at CR 606 / Oslo Road and 82nd Avenue.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.13.4.1 Design Criteria

The proposed improvements at the CR 606 / Oslo Road interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.13.4.2 Traffic Signal Modification

The proposed signal improvements include signalizing the CR 606 / Oslo Road and 82nd Avenue intersection. This new signal would need a new steel mast arm, traffic signal heads, video/loop vehicle detection systems, push button/signal pedestrian signalized systems, traffic controllers, and ancillary features (conduit, conductor, electric service, etc.).

3.13.4.3 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along CR 606 / Oslo Road using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of CR 606 / Oslo Road. Fiber optic cable should be installed from the eastbound ADMS to the westbound ADMS or 82nd Avenue intersection, as well as a CCTV and ATSPM at the 82nd Avenue signalized intersection.

3.13.5 Alternative Analysis

3.13.5.1 Cost Estimate

Cost estimates were developed for CR 606 / Oslo Road improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.13.5.2 Benefit-Cost Analysis

Drivers along CR 606 / Oslo Road experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $335,913 in 2030 and $3.7 million in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $14.3 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $330,747 this equates to a benefit-cost ratio of approximately 43.2. The resultant

NPV is about $14.0 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.13.5.3 Environmental Impacts

Potential environmental impacts are not anticipated as improvements to CR 606 / Oslo Road are not proposed at this time.

3.13.5.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

3.14 SR 60 / 20th Street

3.14.1 General Description

SR 60 / 20th Street (Roadway ID 88060000) is a roadway located in Indian River County. The limits of the section being studied are from 94th Drive west of SR 9 / I-95 to 98th Avenue (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this SR 60 / 20th Street roadway segment is under the jurisdiction of Indian River County. Its Functional Classification is Principal Arterial-Other. The roadway's Context Classification is C4-Urban General, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.14.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Indian River County is the GoLine. The GoLine has 15 fixed routes, with GoLine Route #13 currently traveling along SR 60 / 20th Street within the study area. There are also no existing or planned park-and-ride facilities near the future interchange of SR 9 / I-95 and SR 60 / 20th Street.

3.14.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and SR 60 / 20th Street there are approximately 6-foot wide sidewalks located on the north and south sides of the roadway. The existing sidewalks are typically setback a variable distance from the corridor roadway. This distance varies between 0 and nearly 50 feet. Overall, existing sidewalks are provided along SR 60 / 20th Street throughout the entire interchange influence area and allows pedestrians access to properties on the east and west side of the interchange.

Existing marked bicycle lanes that are approximately 5 feet wide are present on SR 60 / 20th Street in the westbound and eastbound direction. They are provided along the roadway for entire interchange influence area.

Given that there are no capacity needs identified for the SR 9 / I-95 at SR 60 / 20th Street Interchange itself, no additional pedestrian or bicycle improvements are included at this site.

3.14.3 Access Management

SR 60 / 20th Street is a state facility with a posted speed limit of 45 miles per hour (mph) in the study area. The roadway has been classified as an Access Class 3 facility. Access Class 3 roadways are controlled access facilities where direct access to abutting land is controlled to maximize the operation of the through traffic movement. The land adjacent to these roadways is generally not extensively developed and/or the probability of significant land use change exists.

These roadways are distinguished by existing or planned restrictive medians. Spacing standards for Class 3 facilities are 2,640 feet for full median openings and signalized intersections, and 1,320 feet for directional median openings.

A review of the current intersection and median opening spacing along SR 60 / 20th Street was conducted and a summary provided in Table 3-14. Results indicate that the present location of the 98th Avenue and 94th Drive intersections of SR 9 / I-95 are 1,875 feet and 790 feet from the SR 9 / I-95 southbound off-ramp termini intersection. This indicates that the spacings are about 29% and 70% less than the minimum spacing standard of 2,640 feet for a full opening. The full median opening and 90th Avenue intersection located east of SR 9 / I-95 at situated 935 feet and 615 feet apart, respectively, from the SR 9 / I-95 northbound off-ramp termini intersection. These openings are 65% and 76% less than the minimum spacing standard of 2,640 feet.

There are no anticipated changes to the current access openings along SR 60 / 20th Street for future 2030 or 2045 conditions.

Table 3-14 | Access Management Summary of SR 60 Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing (feet)	Variance (feet)	Variance (%)
SR 60	FDOT	98th Avenue	Full	-	3	2,640		
		94 Drive	Full	1,875	3	2,640	-765	-29.0%
		SB Off-Ramp Termini	Full	790	3	2,640	-1,850	-70.1%
		NB Off-Ramp Termini	Full	1,040	3	2,640	-1,600	-60.6%
		Median opening #1	Full	935	3	2,640	-1,705	-64.6%
		90th Avenue	Full	615	3	2,640	-2,025	-76.7%

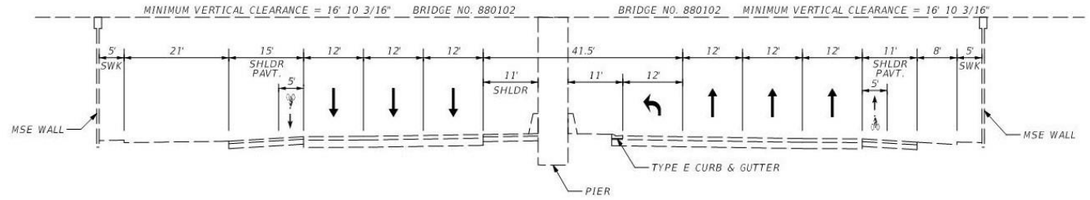
45 mph posted speed limit within study area

3.14.4 Existing Conditions Analysis

3.14.4.1 Typical Section

SR 60 / 20th Street is a six-lane divided roadway with three 12-foot through lanes in each direction. The roadway segment between the interchange's two terminal intersections has paved shoulders (width varies from 11 to 15 feet), and a 41.5-foot wide raised concrete median with curb and gutter Type E on the east bound. A 5-foot sidewalk is located on both sides of the road, as shown in Figure 3-51. The existing minimum vertical clearance is 16 feet -10.19 inches.

Figure 3-51 | Typical Section - SR 60 / 20th Street below SR 9 / I-95



Ramps Typical Sections

The SR 9 / I-95 northbound on-ramp accommodates one 15-foot eastbound left turn lane and one 15-foot westbound right turn lane that eventually merge into a single 15-foot wide ramp. The SR 9 / I-95 northbound off-ramp consists of a double-lane ramp with 12-foot wide travel lanes that diverge into one 15-foot right turn lane and two 12-foot left turn lanes at the terminal intersection. The SR 9 / I-95 southbound on-ramp along the westbound consists of a 15-foot wide single-lane loop ramp and along the eastbound consists of a 15-foot wide single-lane diagonal ramp. The SR 9 / I-95 southbound off-ramp consists of a double-lane ramp with 12-foot wide travel lanes that diverge into three 12-foot left turn lanes and two 12-foot right turn lanes at the terminal intersection. All ramps have inside shoulders width (6 or 8 feet) and outside shoulders width (6 or 12 feet).

3.14.4.2 Interchange Configuration

The existing interchange configuration is a partial cloverleaf that contains one single-lane cloverleaf loop ramp, two single-lane diagonal ramps, and two double-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and right/left turns from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 /I-95 on-ramps and from off-ramps are single lane free-flow movements.

3.14.4.3 Design Speed

The design speed and posted speed for SR 60 / 20th Street is 45 mph. The design speed for all of the SR 9 / I-95 on-ramps and off-ramps transitions from 35 mph to 50 mph. The advisory posted speed for SR 9 / I-95 off-ramps is 35 mph, and 25 mph for the southbound on-ramp (cloverleaf loop ramp).

3.14.4.4 Horizontal Alignment

The existing horizontal geometry of SR 60 / 20th Street consists of a tangent alignment throughout the study area.

3.14.4.5 Vertical Alignment

The existing vertical geometry of SR 60 / 20th Street is mostly flat throughout the study area as SR 9 / SR 9 / I-95 crosses over SR 60 /20th Street.

3.14.4.6 Right-of-Way

The right-of-way varies along the SR 60 / 20th Street roadway segment. The minimum total right-of-way provided in the study area is 225 feet.

3.14.4.7 Lighting

The existing lighting for SR 60 / 20th Street was assessed by conducting field review throughout the corridor to determine the location of lighting structures. Standard roadway lights were identified along the interchange and SR 60 / 20th Street east and west of the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.14.4.8 Drainage

There is an existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing curbed roadway is crowned and the storm water sheet is caught through inlets that later discharge into the adjacent swales and ponds.

3.14.4.9 Pavement Conditions

Field reviews indicated the existing pavement along SR 60 / 20th Street is generally in fair condition, excluding multiple locations that are in poor condition with cracking, asphalt bleeding, and rutting. Based on the 2018 Pavement Condition Survey (PCS), the existing pavement indicated a Crack Rating of 10.0 for both sides of the roadway, and Ride Ratings of 8.3. The FAST forecast ratings for the year 2023 are 9.0 and 8.2 respectively.

3.14.5 Proposed Improvements

The proposed roadway improvements for SR 60 / 20th Street are as follow:

- Retiming existing signalized intersection at SR 60 / 20th Street and SR 9 / I-95 northbound and southbound ramps, SR 60 / 20th Street and 98th Avenue, SR 60 / 20th Street and 90th Avenue. Additionally, SR 60 / 20th Street and 94th Drive.

Appendix B contains a Roadway set of plans of the proposed improvements described in the following sections.

3.14.5.1 Design Criteria

The proposed improvements at the SR 60 / 20th Street interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)

- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009)

3.14.5.2 Traffic Signal Modification

The proposed signal improvements include retiming the northbound and southbound ramp terminals, the SR 60 / 20th Street and 98th Avenue, the SR 60 / 20th Street and 90th Avenue, and the SR 60 / 20th Street and 94th Dr. intersections. No infrastructure improvements needed for retiming.

3.14.5.3 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along SR 60 / 20th Street using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of SR 60 / 20th Street. Fiber optic cable should be installed 98th Street to 90th Street as well as to the ADMSs, ATSPMs, and CCTVs to the five signalized intersections.

3.14.6 Alternative Analysis

3.14.6.1 Cost Estimate

Proposed improvements for SR 60 / 20th Street are limited to existing signal timing modifications. Therefore a cost estimate was not prepared for this location.

3.14.6.2 Benefit-Cost Analysis

Proposed improvements for SR 60 / 20th Street are limited to existing signal timing modifications. Therefore a benefit cost analysis was not conducted for this location

3.14.6.3 Environmental Impacts

Potential environmental impacts are not anticipated as improvements to SR 60 / 20th Street are not proposed at this time.

3.14.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed in the design phase with the intent to relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE).

3.15 CR 512 / Fellsmere Road

3.15.1 General Description

CR 512 / Fellsmere Road (Roadway ID 88040000) is a roadway located in Indian River County. The limits of the section being studied are from east of Willow Street west of SR 9 / I-95 interchange to 106th Avenue (which is located east of the interstate). Consistent with the FDOT District 4 Roadway Atlas, dated March 2019, this CR 512 / Fellsmere Road roadway segment is under the jurisdiction of Indian River County. Its Functional Classification is Minor Arterial west of the SR 9 / I-95 interchange and Principal Arterial-Other east of the SR 9 / I-95 interchange. The roadway's Context Classification is C2-Rural, in accordance with Context Classification Approach for District 4 - Final Report (October 2017).

3.15.2 Non-Auto Mode Usage

The primary fixed route bus transit provider in Indian River County is the GoLine. The GoLine has 15 fixed routes, with GoLine Route #10 currently traveling along CR 512 / Fellsmere Road within the study area. There are also no existing or planned park-and-ride facilities near the future interchange of SR 9 / I-95 and CR 512 / Fellsmere Road.

3.15.2.1 Bicycle and Pedestrian Facilities

Presently, within the interchange influence area of SR 9 / I-95 and CR 512 / Fellsmere Road there is an approximately 8-foot wide sidewalk located on the north side of the corridor from about 1,400 feet west of SR 9 / I-95 to the eastern limit of the interchange influence area. West of the SR 9 / I-95 interchange area, no sidewalks are present on the north side of the corridor, and with the exception of short segment from east of SR 9 / I-95 to east of 108th Avenue, no sidewalks are provided on the south side of CR 512 / Fellsmere Road. In general, the existing sidewalks are typically setback a variable distance between 0 and nearly 50 feet from the corridor roadway.

Existing unmarked bicycle lanes that are approximately 5 feet wide are present on CR 512 / Fellsmere Road in the westbound and eastbound direction. They are provided along the roadway for entire interchange influence area.

Beyond nominal turn lane improvements suggested at the intersection of CR 512 / Fellsmere Road and 108th Avenue, no capacity needs were identified for the SR 9 / I-95 at CR 512 / Fellsmere Road interchange. Consequently, the existing sidewalks and bicycle lanes will be retained, and no additional pedestrian or bicycle improvements are included at this site.

3.15.3 Access Management

CR 512 / Fellsmere Road is a County facility, and its access management principles are derived from Indian River County. Indian River County's Land Development Code, Section 952.12, states that the study portion of CR 606 / Oslo Road is subject to spacing standards such that median openings shall be spaced at a distance of at least 660 feet from any signalized intersection or median opening.

A review of the current intersection and median opening spacing along CR 512 / Fellsmere Road was conducted and a summary provided in Table 3-15. The corridor west of SR 9 / I-95 is characterized by numerous and regularly spaced full median openings between Willow Street and 125th Avenue. Overall, there are 13 full openings that are each approximately 295 feet apart. Each opening is approximately 10% of the minimum spacing standard of 330 feet. East of SR 9 / I-95, the intersection of 108th Avenue is situated about 795 feet from the SR 9 / I-95 northbound off-ramp termini. This spacing distance exceeds the minimum spacing prescribed in Indian River County's Land Development Code.

There are no anticipated changes to the current access openings along CR 512 / Fellsmere Road for future 2030 or 2045 conditions.

Table 3-15 | Access Management Summary of CR 512 / Fellsmere Road Corridor

Roadway	Jurisdiction	Median Location	Median Opening Type	Spacing of Opening (feet)	Access Class	Standard Spacing* (feet)	Variance (feet)	Variance (%)
Fellsmere Road/CR 512	Indian River County	Willow Street	Full	-		330		
		129 Drive	Full	175		330	-155	-47.0%
		129th Court	Full	330		330	0	
		129 Avenue	Full	285		330	-45	-13.6%
		128th Court	Full	295		330	-35	-10.6%
		128th Avenue	Full	295		330	-35	-10.6%
		127th Court	Full	295		330	-35	-10.6%
		127th Avenue	Full	295		330	-35	-10.6%
		126th Court	Full	295		330	-35	-10.6%
		126th Avenue	Full	295		330	-35	-10.6%
		125th Drive	Full	295		330	-35	-10.6%
		125th Court	Full	295		330	-35	-10.6%
		125th Avenue	Full	285		330	-45	-13.6%
		RTC Church Driveway	Full	850		330	520	
		Median Opening #1 (Horse Farm on south side of	Full	695		330	365	
		Median Opening #2	Full	7,600		330	7,270	
		SB Off-Ramp Termini	Full	835		660	175	
		NB Off-Ramp Termini	Full	450		660	-210	-31.8%
		108 Avenue	Full	795		660	135	

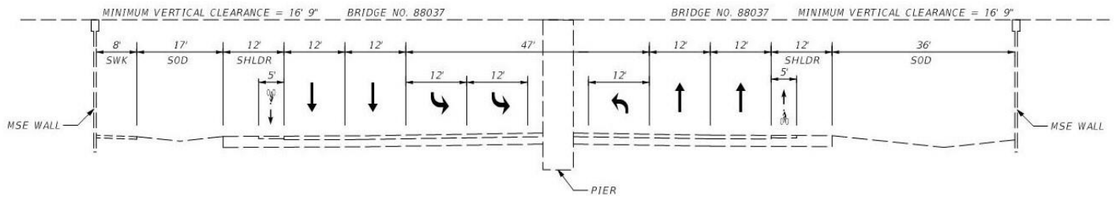
** Spacing based on Indian River County Land Development Code Section 952.12*

3.15.4 Existing Conditions Analysis

3.15.4.1 Typical Section

CR 512 / Fellsmere Road is a four-lane divided roadway with two 12-foot through lanes in each direction. The roadway segment between the interchange's two terminal intersections has 12-foot wide paved shoulders and a 47-foot wide concrete median. An 8-foot wide sidewalk is located on the north side, as shown in Figure 3-52. The existing minimum vertical clearance is 16 feet - 9 inches.

Figure 3-52 | Typical Section - CR 512 / Fellsmere Road below SR 9 / I-95



Ramps Typical Sections

All of the SR 9 / I-95 on-ramps and off-ramps within the interchange consist of one 15-foot wide lane with 6-foot wide inside shoulders and 8-foot wide outside shoulders.

3.15.4.2 Interchange Configuration

The existing interchange configuration is a standard diamond with four one-lane diagonal ramps. All left turns onto SR 9 / I-95 on-ramps and from off-ramps are traffic signal-controlled. Additionally, all right turns onto SR 9 /I-95 on-ramps and from off-ramps are single lane free-flow movements.

3.15.4.3 Design Speed

The design speed for CR 512 / Fellsmere Road is 50 mph, and the posted speed is 45 mph. The design speed for all of the SR 9 / I-95 on-ramps and off-ramps transitions from 35 mph to 50 mph, and the advisory posted speed for the off-ramps is 35 mph.

3.15.4.4 Horizontal Alignment

The existing horizontal geometry of CR 512 / Fellsmere Road consists of a tangent alignment throughout the study area.

3.15.4.5 Vertical Alignment

The existing vertical geometry of CR 512 / Fellsmere Road is mostly flat throughout the study area as SR 9 / SR 9 / I-95 crosses over CR 512 / Fellsmere Road.

3.15.4.6 Right-of-Way

The right-of-way varies along the CR 512 / Fellsmere roadway segment. The minimum total right-of-way provided in the study area is 200 feet.

3.15.4.7 Lighting

The existing lighting for CR 512 / Fellsmere Road was assessed by conducting field review throughout the corridor to determine the location of lighting structures. High mast light poles were identified along the interchange, standard roadway lights along CR 512 / Fellsmere west of the interchange, and wall mount fixtures on the pier caps under the SR 9 / I-95 northbound and southbound bridges.

3.15.4.8 Drainage

There is no existing storm water collection system for the conveyance and disposal of the roadway storm water runoff. The existing roadway is crowned and the storm water sheet flows off the road and down the shoulder into the adjacent swales.

3.15.4.9 Pavement Conditions

CR 512 / Fellsmere Road was recently widened through FPID 413049-2-52-01 with an opening year of 2018. This projects included widening and milling and resurfacing, which warrants an assumption that the pavement will be in adequate condition through the design life of the project (2038).

3.15.5 Proposed Improvements

The proposed roadway improvements for CR 512 / Fellsmere Road are as follow:

- Adding a westbound right turn lane at CR 512 / Fellsmere Road and Fellsmere Trailhead Preserve to eliminate westbound merge prior to driveway immediately west of SR 9 / I-95 southbound off-ramp termini.
- Proposed right turn lane at southbound 108th Avenue and CR 512 / Fellsmere Road.
- Proposed signalization at CR 512 / Fellsmere Road and 108th Avenue.
- Retiming existing signalized intersection at CR 512 / Fellsmere Road and SR 9 / I-95 northbound and southbound intersections. Additionally, retiming existing signalized intersection at CR 512 / Fellsmere Road and Willow Street.

Appendix C contains a Roadway set of plans of the proposed improvements described in the following sections.

3.15.5.1 Design Criteria

The proposed improvements at the CR 512 / Fellsmere Road interchange were prepared consistent with the design criteria from the following publications:

- FDOT Design Manual (2020), Florida Department of Transportation, Part 1 and 2
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways - Florida Greenbook (2016)
- FDOT Traffic Engineering Manual (2019)
- Standard Plans for Road and Bridge Construction, Florida Department of Transportation (2020-2021)
- A Policy of Geometric Design of Highways and Streets – AASHTO Greenbook (2011)
- Manual of Uniform Traffic Control Devices (2009).

3.15.5.2 Right-of-Way

The proposed roadway footprint along 108th Avenue is outside the existing right-of-way limits. Right-of-way acquisition for this area east of the SR 9 / I-95 interchange will be necessary to accommodate the proposed improvements. Please refer to Appendix F.

3.15.5.3 Traffic Signal Modification

The proposed signal improvements include retiming the northbound and southbound ramp terminals, and the CR 512 / Fellsmere Road and Willow St. intersection (not shown in plan sheets). The proposed improvements also include adding turn lanes to the CR 512 / Fellsmere Road and 108th Avenue intersection. This improvement would require a new steel mast arm and a new traffic signal head.

3.15.5.4 TSM&O

Transportation System Management and Operations (TSM&O) is recommended along CR 512 / Fellsmere Road using one Arterial Dynamic Message Sign (ADMS) along eastbound and one along westbound of CR 512 / Fellsmere Road Fiber optic cable should be installed from the SB Ramp intersection to 108th Avenue, as well as to the ADMSs, ATSPMs, and CCTVs at the three signalized intersections.

3.15.6 Alternative Analysis

3.15.6.1 Cost Estimate

Cost estimates were developed for CR 512 / Fellsmere Road improvements using the FDOT LRE web-based computer system.

Appendix G contains the LRE.

3.15.6.2 Benefit-Cost Analysis

Drivers along CR 512 / Fellsmere Road experience congestion and travel time delay on a daily basis through the study intersections. Providing more intersection capacity and/or reduced intersection delay provides motorists with a shorter duration trip and reduced overall travel time.

A quantitative benefit-cost analysis was performed to assess the value of reducing travel time for drivers through the study site. The cost for peak hour delay was calculated for the No Build scenario, as well as for the conceptual improvement alternative. The resultant costs were then compared. Results indicate that the total travel time savings are:

- Conceptual Alternative #1: = $761,871 in 2045.

This is based on a conservative estimate of the monetized value of delay of $16.80 per vehicle-hour for South Florida commuters. The benefit analysis is included in Appendix H.

The Net Present Value (NPV) of these benefits was also calculated relative to the current cost of the proposed improvements for each Build scenario. Given a discount rate of 4%, consistent with the NPV analysis conducted by FDOT, and assuming an opening year of 2030, the travel time savings were calculated for each year between 2030 and 2045.

The annual travel time savings for Conceptual Alternative #1 were amortized to a present day value of $2.7 million in travel time savings benefits. Given that the estimated cost of Conceptual Alternative #1 is $3.7 million this equates to a benefit-cost ratio of approximately 0.7. The resultant NPV is about -$1.0 million. The NPV analysis for this conceptual alternative is included in Appendix I.

3.15.6.3 Environmental Impacts

Potential environmental impacts within the CR 512 / Fellsmere Road are anticipated to be minimal. No impacts to special activity sites and social and cultural features, or floodplains is anticipated. Due to the potential to impact contaminated sites within this interchange, the PD&E Study would require further evaluation of these sites for contamination potential. Impacts to wetlands are not anticipated and impacts to OSWs are anticipated to be minimal. Right-of-way impacts are anticipated but no relocations will be required. Due to the natural habitats in this area, the PD&E Study would require assessment of and include listed species surveys and USFWS consultation. Noise impacts are anticipated and would require consideration of noise abatement measures.

3.15.6.4 Maintenance of Traffic

A Transportation Management Plan (TMP) will need to be developed during the design phase. This plan will relieve congestion during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. The TMP scope, content, and degree of detail may vary based upon the expected work zone impacts of the project. The TMP should be produce in accordance FDOT Design Manual, Chapter 240. The Maintenance of Traffic cost estimates were generated using FDOT Long Range Estimates (LRE), which are included in Appendix G.

4.0 STAGING OF IMPROVEMENTS

The Multimodal Master Plan for SR 9 / I-95 between the Palm Beach/Martin County Line to the Indian River/Brevard County Line evaluated the short and long term conceptual improvements that are intended to meet the SIS criteria and standards and reflect improvements needed for the transportation infrastructure to function effectively through 2045.

The needs assessment conducted for this study included an analysis of physical improvement alternatives that includes analyses of alternative modes, Transportation System Management (TSM) techniques, and multi-modal improvements. Cost comparisons considering a variety of items such as preliminary design, right-of-way acquisition, and construction costs were conducted. The development of the improvement concepts were based on a multi-discipline, multi-agency approach that considered all aspects of the analysis of Alternatives including benefits, costs, impacts, and state and local agency input.

The noted improvements along the I-95 mainline and the interchange influence areas were prioritized through collaborative discussions with a multi-discipline group of FDOT-4 staff. This prioritization summary for 2030 and 2045 improvements is included in Appendix J. Projects were differentiated based on the type and number of modes affected by the improvement; if the improvement specifically addresses safety concerns; if right-of-way is needed to construct the improvement; and the improvement's construction cost. Separate prioritization lists were compiled for improvements needed by 2030 and by 2045. (It is noted that these prioritization lists do not necessarily imply that an individual improvement is staged to be constructed within the timeframes listed.)

4.1 2030 Prioritization

There are 14 separate improvements needed by 2030 that were prioritized. A high prioritized improvement project is the short-term enhancements at SR 70/Okeechobee Road on the west side of the interchange extending east to Jenkins Road. In addition to being on a Strategic Intermodal System (SIS) facility, the improvements affect multiple modes of transportation; are intended to address immediate safety concerns in the westbound direction of travel; and can be built within the existing right-of-way. The next prioritized project is the addition of a managed lane in each direction of the I-95 mainline from the Martin/Palm Beach county line to SR 70/Okeechobee Road. This improvement is needed by 2030 to proactively address capacity deficiencies along the I-95 mainline which will ensure the continued efficient movement of people and goods throughout the region and state. Given the length of this improvement and its regional nature through two counties, FDOT separated the I-95 mainline improvements into four distinctly defined segments. They are:

- I-95 from Martin/Palm Beach county line to Bridge Road (FM #413253-2)
- I-95 from Bridge Road to High Meadow Avenue (FM #413254-2)
- I-95 from High Meadow Avenue to Martin/St Lucie county line (FM #422681-5)
- I-95 from Martin/St Lucie county line to SR 70/Okeechobee Road (FM #422681-6)

Another high priority improvement project for 2030 is the braided ramp improvement for northbound I-95 between Crosstown Parkway and St Lucie West Boulevard. It benefits multiple modes of transportation; and directly addresses potential safety concerns along this weaving section of the I-95 mainline. It does, however, require some right-of-way to be constructed.

The complete priority list of 2030 needed improvements is included in Appendix J. A full description of the short-term (2030) needs is provided in the companion documented, *Facility Preservation and Operations Element* report.

4.2 2045 Prioritization

Improvements that are needed by 2045 were separately prioritized from the more urgent needs identified for 2030. Sixteen separate improvements were prioritized based on the criteria described herein. The list of those improvements is included in Appendix J.

Given that the I-95 mainline improvement to add a managed lane in each direction is needed by 2030, the enhancements needed by 2045 generally focus on the needs within the interchange influence areas. There is one notable exception – the 2045 need to provide a braided ramp on southbound I-95 between St Lucie West Boulevard and Crosstown Parkway. Similar to the northbound direction, this project benefits multiple modes of transportation; and directly addresses potential safety concerns within the I-95 weaving section. It also requires some right-of-way to be constructed. The braided ramp improvement for the subject section of southbound I-95, coupled with interchange improvements at St Lucie West Boulevard, is a high priority project for 2045.

Other high priority projects are interchange improvements at SR 76/Kanner Highway, Gatlin Boulevard, Crosstown Parkway, and SR 70/Okeechobee Road. Each includes substantial interchange upgrades needed to address future capacity deficiencies. All include multi-modal improvements, while SR 76/Kanner Highway and SR 70/Okeechobee Road are intended to address a defined safety concern. Right-of-way is needed at each location, except SR 76/Kanner Highway.

A complete priority list of 2045 improvements is included in Appendix J.

5.0 FUNDING

The prioritized improvements for 2030 and 2045 were reviewed to identify each project's future work program phases. There are five separate phases that were reviewed, and include:

- Project Development and Environment (PD&E)
- Design
- Right-of-Way
- Construction
- Construction Engineering and Inspection (CEI)

Construction cost estimates were developed based on conceptual designs developed for each improvement and are included in Appendix G. Additionally, coordination with the Right-Of-Way office resulted in conceptual cost estimates of right-of-way for those alternatives where it is needed.

Unlike other work program phases, cost estimates for the Design (Phase 32) and CEI (Phase 62) phases are based on FDOT-4 cost estimates as a percentage of the construction cost estimate. Such an estimated percentage is multiplied against the construction cost estimate to calculate the estimated Design or CEI phase cost. In general, the Design and CEI cost percentages provided by FDOT-4 are applied on a graduated scale. As the construction cost of an improvement increases, the percentage of the Design and CEI phase cost decreases. A tabular summary of the work program phase cost estimate percentages is provided in Table 5-1.

Table 5-1 | Work Program Phase Cost Estimates

DISTRICT IV DESIGN CONSULTANT MANAGEMENT													
DESIGN COST (PHASE 32) AS A PERCENTAGE OF CONSTRUCTION COST (PHASE 52) (FOR PROGRAMMING PURPOSES ONLY)													
CONSTRUCTION COST ESTIMATE		UNDER $500K		$500K to $1.5 M		$1.5M to $3.5 M		$3.5M to $5M		$5M to $10 M		OVER $10M	
DESIGN COST ESTIMATE	ON-SYSTEM	SW AVG - 53% D4 AVG - 47%	40%	SW AVG - 30% D4 AVG - 31%	25%	SW AVG - 22% D4 AVG - 23%	18%	SW AVG - 20% D4 AVG - 19%	16%	SW AVG - 17% D4 AVG - 16%	13%	SW AVG - 15% D4 AVG - 15%	12%
	OFF-SYSTEM	SW AVG - 65%	45%	SW AVG - 37%	35%	SW AVG - 24%	19%	SW AVG - 20%	17%	SW AVG - 20%	15%	SW AVG - 19%	15%
PERCENTAGES ABOVE ARE BASED ON STATEWIDE (SW) AND D-4 HISTORICAL DATA COMPARING ACTUAL COMPLETED DESIGN COST (PHASE 32) TO ACTUAL CONSTRUCTION COST (PHASE 52) OVER A FIVE YEAR PERIOD FROM FY 2010 TO FY 2015 PERCENTAGES ABOVE HAVE BEEN REDUCED FROM THE ACTUAL DATA FOR ALLOWANCE OF DESIGN SUPPLEMENTAL AGREEMENTS													
POST-DESIGN COST (PHASE 62-40) AS A PERCENTAGE OF CONSTRUCTION COST (PHASE 52) (FOR PROGRAMMING PURPOSES ONLY)													
POST-DESIGN COST ESTIMATE	ON-SYSTEM		8%		4%		2.5%		1.7%		1.5%		1.5%
	OFF-SYSTEM		9%		5%		3.5%		2.5%		1.7%		1.5%

5.1 2030 Work Program Needs

A summary of the work program needs for the 14 identified improvements identified for 2030 is included in Appendix J. The sequence of the improvements matches the prioritization list noted in Section 4.0, beginning with the improvement project at SR 70/Okeechobee Road and ending with the signalization project at Oslo Road and 82nd Avenue. Each noted improvement includes an applicable work program phase and its corresponding estimated cost, which are reported as 2019 dollars.

Several improvements are coupled together for work program purposes. This includes the braided ramp improvement along I-95 between Crosstown Parkway and St Lucie West Boulevard. Although the braided ramp improvement for the southbound I-95 weaving section is needed by 2045, it is packaged together with the northbound I-95 braided ramp improvement when estimating the PD&E work program phase as these two improvements are expected to be evaluated under a single PD&E study.

Similarly, it was assumed the four defined segments of I-95 from the Martin/Palm Beach county line to SR 70/Okeechobee Road will incorporate each of the corresponding interchange improvements, even if that need was identified for 2045, given a 20-year design year horizon for a 2025 study will encompass 2045. For example from a work program standpoint, I-95 from Martin/Palm Beach county line to Bridge Road (FM #413253-2) will include the addition of two managed lanes as well as interchange improvements at Bridge Road, while I-95 from north of Bridge Road to High Meadow Avenue (FM #413254-2) will include two managed lanes and interchange improvements at SR 76/Kanner Highway and High Meadow Avenue.

As noted in Section 4.0, the I-95 corridor where a managed lane is planned has been differentiated into four subsegments. Each of these I-95 subsegments has an estimated PD&E phase capped at a cost of $3.0 million, regardless of the construction cost, as these PD&E studies are expected to require the most rigorous evaluation. Improvements that are anticipated to have fewer impacts were assigned a cost estimate for the PD&E work program phase with a lesser value. Projects with the fewest impacts and necessitating the least rigorous National Environmental Policy Act (NEPA) action were assigned a minimum PD&E phase cost of $0.3 million. An example of such a PD&E work program cost is the improvements at SR 68/Orange Avenue from Kings Highway to I-95. The remaining work program phase cost estimates are based on a percentage of the construction cost estimate, as specified in Table 5-1.

5.2 2045 Work Program Needs

Given that the individual interchange improvements are packaged with the corresponding I-95 subsegment for work program purposes, the remaining 2045 improvements are comprised of off-system intersection improvements located outside of the immediate interchange footprint. These improvements also include minor I-95 mainline and ramp enhancements located north of SR 70/Okeechobee Road. A summary of these long-term work program needs is included in Appendix J.

Work program phase cost estimates for the Design (Phase 32) and CEI (Phase 62) phases are based on FDOT-4 cost estimates as a percentage of the construction cost estimate. These were applied to the estimated construction cost of each project to develop costs for each phase. Each of the off-system intersection improvements will require right-of-way, as well as a minor NEPA action. Improvements at the various ramps along I-95, as well as the lane transition improvement on southbound I-95 south of SR 614/Indrio Road, do not require right-of-way and will unlikely need a PD&E work program phase.

6.0 FINDINGS AND RECOMMENDATIONS

The Florida Department of Transportation (FDOT) is preparing a Multimodal Master Plan for SR 9 / I-95 between the Palm Beach/Martin County Line to the Indian River/Brevard County Line, a distance of approximately 71 miles. The plan includes the SR 9 / I-95 mainline, interchanges, and other road segments and intersections within the anticipated area of influence for the project. The horizon year of the Master Plan study is 2045.

This Facility Enhancement Element documents the need, type, extent and estimated cost of long range (2045) SR 9 / I-95 mainline and interchange improvements. For SR 9 / I-95 and other roadways designated as Strategic Intermodal System (SIS) facilities, long term conceptual improvements are intended to meet the SIS criteria and standards and reflect improvements needed for the transportation infrastructure to function effectively through 2045.

The needs assessment provided an analysis of physical improvement alternatives and includes analyses of alternative modes, Transportation System Management (TSM) techniques, and multi-modal improvements. The development of improvement concepts was based on a multi-discipline, multi-agency approach that considered all aspects of the analysis of Alternatives including benefits, costs, impacts, and state and local agency input. The improvements were developed in concert with substantial traffic operational and safety analyses within the study area, as noted in the companion document, *I-95 Multimodal Master Plan Traffic Element Report,* submitted in February 2020.

For the I-95 mainline, it was found that one managed lane facility in each direction is needed from the Palm Beach/Martin County Line to SR 70/Okeechobee Road. This results in a wider interstate footprint for approximately 40 miles of I-95. Of the 15 interchanges studied and their corresponding influence areas, a series of improvements were identified to address future capacity deficiencies specific to each location. Those interchange improvements varied from adding signalization to an intersection to reconfiguring the interchange's geometry to accommodate future volumes. Each interchange improvement was developed and tailored to that particular location's unique characteristics consistent with federal, state, and local guidelines.

Cost estimates considered a variety of items such as preliminary design, right-of-way acquisition, and construction costs. A preliminary work program phase cost estimate was developed, as well as a staging plan for the implementation of the various improvements. Several individual improvements were grouped together for work program cost estimate purposes. It is noted that FDOT separated the I-95 mainline improvements into four distinctly defined segments. They are:

- I-95 from Martin/Palm Beach county line to Bridge Road (FM #413253-2)
- I-95 from Bridge Road to High Meadow Avenue (FM #413254-2)
- I-95 from High Meadow Avenue to Martin/St Lucie county line (FM #422681-5)
- I-95 from Martin/St Lucie county line to SR 70/Okeechobee Road (FM #422681-6)

Individual interchange improvement needs were generally grouped within the corresponding I-95 segment when work program phase cost estimates were developed.

The four I-95 segments are currently listed in the work program with an initial PD&E phase programmed for 2025. However, the remaining improvement needs not already grouped within these I-95 segments are not currently included in the FDOT work program. Ongoing coordination needs to be conducted to document and identify future funding for PD&E studies, design projects, construction, operation and maintenance of the recommended alternatives.