

Preliminary Engineering Report

State Road 869 / SW 10th Street Connector Project Development and Environment (PD&E) Study

SW 10th Street from Florida's Turnpike / Sawgrass Expressway to I-95
(Sawgrass Expressway MP 21.077 to MP 21.835 to
SW 10th Street MP 0.00 to 1.900)

Broward County, Florida

Financial Project ID No. 439891-1-22-02

ETDM No.: 14291 / FAP No.: TBD



Prepared for:
FDOT District Four
3400 W. Commercial Blvd.
Ft. Lauderdale, FL 33309

September 2019

The environmental review, consultation, and other actions required by applicable federal environmental laws for the project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated December 14, 2016 and executed by the Federal Highway Administration and FDOT.



PROFESSIONAL ENGINEER CERTIFICATION

PRELIMINARY ENGINEERING REPORT

Project: State Road 869 / SW 10th Street Connector PD&E Study

ETDM Number: 14291

Financial Project ID: 439891-1-22-02

Federal Aid Project Number: TBD

This preliminary engineering report contains engineering information that fulfills the purpose and need for the State Road 869 / SW 10th Street Connector Project Development & Environment Study from Florida's Turnpike / Sawgrass Expressway to I-95 in Broward County, Florida. 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.

I hereby certify that I am a registered professional engineer in the State of Florida practicing with RS&H, Inc., and that I have prepared or approved the evaluation, findings, opinions, conclusions or technical advice for this project.

Insert Seal Picture

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Preliminary Engineering Report
SR 869 / SW 10th Street Connector PD&E Study

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APPENDICES

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APPENDIX B Alternatives Considered

APPENDIX C Preferred Alternative

APPENDIX D Typical Section Package

APPENDIX E Long Range Estimate (LRE)

APPENDIX F Toll Gantry Technical Memo

APPENDIX G Pump Station Technical Memo

APPENDIX H COAT Recommendations

APPENDIX I Groundwater Technical Memo

1.0 Project Summary

1.1 Project Description

The Florida Department of Transportation (FDOT) is evaluating alternatives to improve SR 869 (SW 10th Street) from Sawgrass Expressway / Florida's Turnpike to west of I-95, a distance of approximately 3.0 miles. The project is located in Broward County, Florida and is contained within the municipality of Deerfield Beach. Figure 1.1.1 shows the limits of the SW 10th Street Connector PD&E Study.

SW 10th Street currently consists of six lanes (three in each direction) from Florida's Turnpike to SR 845 (Powerline Road), four lanes (two in each direction) from Powerline Road to east of Military Trail, and five lanes (two westbound and three eastbound) from west of Military Trail to I-95. This segment of SW 10th Street is functionally classified as a Divided Urban Principal Arterial and has posted speed limits of 45 miles per hour from Florida's Turnpike to Military Trail, and 40 miles per hour from Military Trail to I-95. The access management classification from Florida's Turnpike to Powerline Road is Class 1. East of Powerline Road, the access management classification is Class 3.

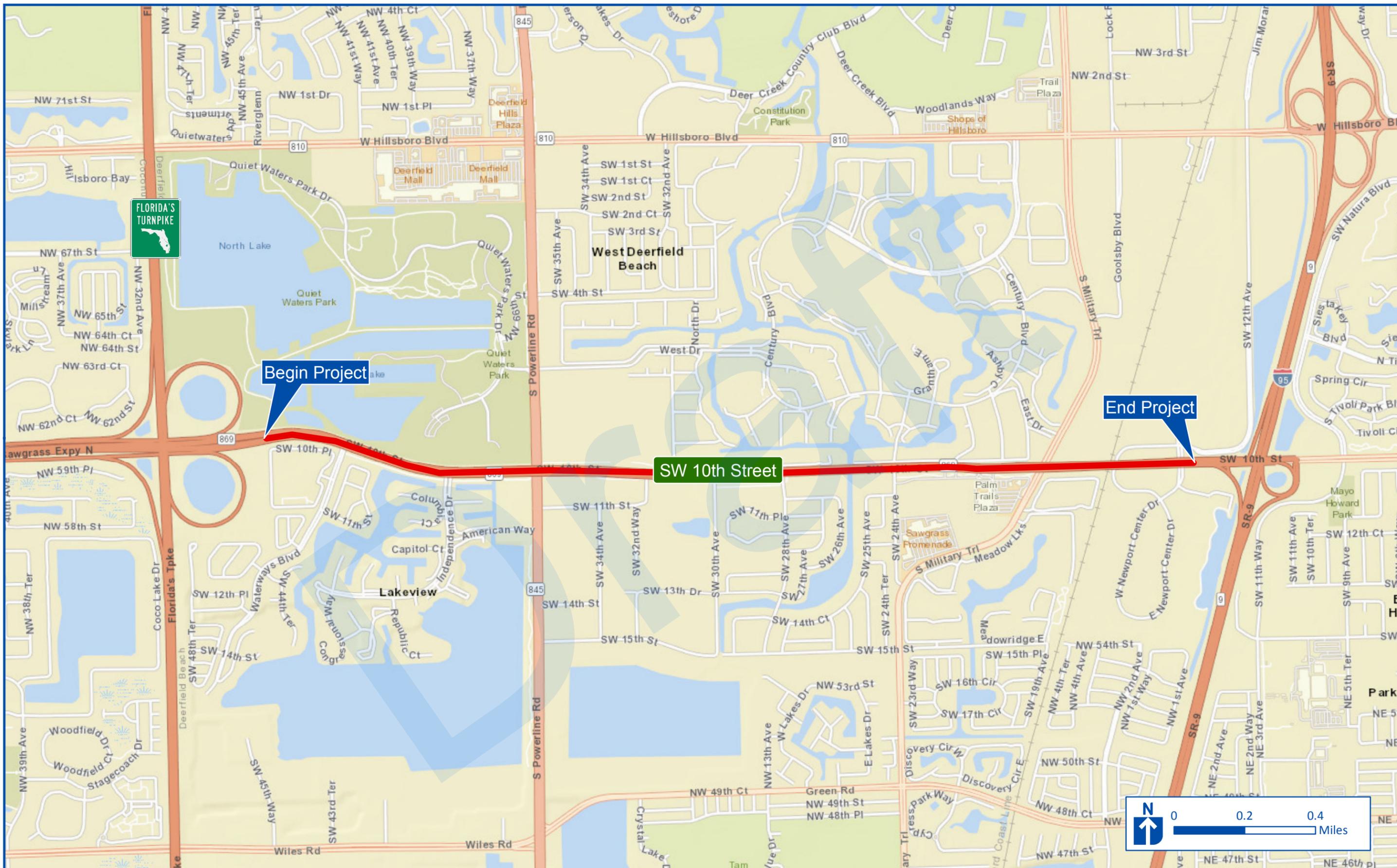
SW 10th Street is an east-west Principal Arterial that connects three limited access facilities: Florida's Turnpike, Sawgrass Expressway, and I-95. SW 10th Street is part of the state's Strategic Intermodal System (SIS) and the National Highway System (NHS). SW 10th Street from Florida's Turnpike to I-95 is a missing link in the existing and planned regional managed lanes network. This study is proposing to add additional lanes in the corridor for the purpose of closing this gap and providing a continuous link in the managed lanes network that will be separate from the local SW 10th Street facility. In addition, SW 10th Street is designated as an evacuation route.

The proposed improvements are intended to reduce the amount of traffic on local SW 10th Street by allowing vehicles to bypass the area by utilizing the managed lane facility. The ability to provide relief for local traffic is an objective of the improved connectivity between the three limited access facilities by providing dual systems (Local Access and Limited Access) within the SW 10th Street right-of-way. Improvements are planned for the

interchange at the Sawgrass Expressway / Florida's Turnpike to the west and I-95 at SW 10th Street interchange to the east.

The SW 10th Street PD&E study is adjacent to an ongoing I-95 PD&E study (FM 436964-1-22-01), which begins just south of the existing SW 10th Street / I-95 interchange and extends just north of the interchange with Hillsboro Boulevard. The I-95 PD&E study includes an examination of alternatives to address operational deficiencies, safety improvements, and long-term needs through 2040. Specifically, the I-95 PD&E study improvements include auxiliary lanes, braided ramps to reduce the number of merge / diverge points, direct-connect flyover ramps to managed lanes along SW 10th Street, interchange ramp terminal improvements, and the elimination of the southbound entrance ramp signal on SW 10th Street. These improvements address the traffic operation deficiencies by eliminating or improving the failing conditions within the interchange influence area and improving safety by reducing congestion and improving operating conditions along SW 10th Street and Hillsboro Boulevard. The SW 10th Street and I-95 PD&E studies are being completed in tandem and have undergone extensive coordination. Both projects are on the same schedule for completion and advancement to the next phase. The FDOT intends to combine both PD&E studies into a single final design and construction project.

Public involvement is essential in this PD&E Study due to the residential developments and local businesses along SW 10th Street, as well as in the surrounding areas, as this segment is a missing link in the south Florida managed lanes network. A Community Oversight Advisory Team (COAT) was formed by the Broward Metropolitan Planning Organization (MPO) and has been working towards building consensus on the future of the SW 10th Street corridor. Public involvement efforts are ongoing with the Broward MPO as a partner, continuing their efforts that began with the establishment of the COAT. Public involvement initiatives, including working directly with the COAT, as well as expanded and full representation from the City of Deerfield Beach, City of Parkland, City of Coral Springs, the City of Coconut Creek, the Broward MPO, the FDOT and members of the public, are a major part of the PD&E Study.



**State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
Sawgrass Expressway to I-95**
Financial Project ID: 439891-1-22-02, ETDM No: 14291

**Figure 1.1.1
Project Location Map**

In this document, the term “managed lanes” is used to describe the proposed limited access connection between the existing limited access facilities of I-95 and the Sawgrass Expressway. Managed lanes are defined as an envelope that is differentiated from general use lanes and may include such unique features as tolled express lanes, transit-only lanes, or truck-only lanes. Through this study process, the FDOT has determined that the managed lanes proposed in this study will not be tolled initially but will provide a high-speed connection to adjacent tolled express lanes on I-95 and the Sawgrass Expressway.

1.2 Purpose & Need

The purpose of this project is to improve local traffic flow by implementing a separate limited access connection between the Sawgrass Expressway and the I-95 managed lanes, increase capacity, and eliminate various existing operational and safety deficiencies along SW 10th Street between the Sawgrass Expressway, Florida’s Turnpike and I-95 while also providing improved connectivity of the regional transportation network.

The primary need for this project is based on capacity and operational deficiencies for local traffic and regional connector traffic, system linkage and safety issues, with secondary considerations for the needs of modal interrelationships, transportation demand, social demands and economic development, and emergency response / evacuation for local traffic and the adjacent communities, as well as regional mobility. The primary and secondary needs for the project are discussed in further detail below.

1.2.1 Project Status

The SW 10th Street Connector project is in the Broward MPO jurisdiction. The Broward MPO Transportation Improvement Program (TIP) Fiscal Year 2020 – 2024 includes funding for the SW 10th Street Connector from Powerline Road to west of Military Trail Project for Preliminary Engineering, Right-of-Way, and Construction. The FDOT State Transportation Improvement Program (STIP) 2018 includes funding for Preliminary Engineering and Right-of-Way in years 2019 to 2021. Funding for a Design-Build method of delivery is included in 2022. The FDOT SIS Adopted Five Year Plan includes funding for the SW 10th Street Connector from Powerline Road to west of Military Trail Project for Preliminary Engineering, Right-of-Way, and Construction.

The TIP, STIP, and Long Range Transportation Plan (LRTP) are consistent in respect to total funding and time frame. However, the TIP, STIP, and LRTP have different physical project limits than the proposed PD&E Study. The planning documents include SW 10th Street from Powerline Road to Military Trail whereas, this PD&E Study extends the limits along SW 10th Street from the Sawgrass Expressway / Florida's Turnpike to I-95. The PD&E study limits originally matched the planning documents; however, the limits were extended in order to provide independent utility and a more logical termini for the project. The FDOT is coordinating with the Broward MPO to update the TIP to reflect the current study limits.

1.2.2 System Linkage

SW 10th Street is part of the state's SIS and the NHS. The SIS is an intermodal network of transportation facilities that seamlessly flows from one mode to the next with the goal of providing the highest degree of mobility for people and goods traveling throughout Florida. The SIS is an integral piece of Florida's goal to enhance economic competitiveness and quality of life for its citizens and visitors. The NHS is a network of strategic highways within the United States, including the Interstate Highway System and other roads serving major airports, ports, rail or truck terminals, railway stations, pipeline terminals and other strategic transport facilities. Thus, the SW 10th Street corridor is an important facility in the transportation network.

The SW 10th Street corridor provides the opportunity for commuters and local residents to connect to three major limited access facilities: Florida's Turnpike, Sawgrass Expressway, and I-95. The ability to provide relief for local traffic is a component of the proposed connectivity improvements between the three limited access facilities by providing dual systems (Local Access and Limited Access) within the SW 10th Street right-of-way. These facilities are also on the regional freight network as identified in the March 2010 South Florida Regional Freight Plan (project #269). Florida's Turnpike provides limited access north-south connectivity from Miami-Dade County to Orlando and connects to I-75 northwest of Orlando. The Sawgrass Expressway provides limited access connectivity from the I-75 / I-595 Interchange to the Florida's Turnpike at SW 10th Street Interchange. I-95 is the primary north-south interstate facility that links all major cities along the Atlantic Seaboard.

SW 10th Street from Florida's Turnpike to I-95 is a Principal Arterial facility serving local residential communities, commercial properties and commuters alike. This section of roadway is considered the missing link in the existing and planned regional managed lane network. This project seeks to improve this linkage by reducing congestion and completing the managed lane network while reducing operational and safety deficiencies for the local users. The project will consider implementing limited access managed lanes along SW 10th Street in the project area.

1.2.3 Capacity

A need exists to improve local and regional traffic operations along the SW 10th Street corridor. Traffic volumes along SW 10th Street between the Sawgrass Expressway / Florida's Turnpike and I-95 have consistently increased over the past 15 years and are expected to continue to grow over the next 20 years. The 2016 Average Annual Daily Traffic (AADT) on SW 10th Street was as follows:

- Sawgrass Expressway / Florida's Turnpike to Powerline Road experienced an AADT of 38,000 vehicles per day (vpd);
- Powerline Road to Military Trail has an AADT of 46,000 vpd; and
- Military Trail to I-95 experienced an AADT of 54,000 vpd.

The existing traffic on SW 10th Street between Powerline Road and I-95 exceeds the current capacity of a four lane arterial roadway which can accommodate approximately 40,000 vpd. The capacity of SW 10th Street from Sawgrass Expressway / Florida's Turnpike to Powerline Road is 60,000 vpd. With the anticipated growth and the combination of local traffic and those travelers going from one limited access facility to the next, this segment is expected to reach capacity before 2040.

Additionally, five intersections currently fall below acceptable Level of Service (LOS) targets during either the AM or PM peak during the existing conditions:

- SW 10th Street at Powerline Road operates at LOS F in both the AM and PM peak;
- SW 10th Street at SW 20th Avenue operates at LOS F in both the AM and PM peak;
- SW 10th Street at SW 24th Avenue operates at LOS F in both the AM and PM peak;
- SW 10th Street at Military Trail operates at LOS F in both the AM and PM peak; and

- SW 10th Street at the I-95 Northbound ramps operate at LOS D in the AM peak and LOS F in the PM peak.

These conditions are existing concerns and are projected to worsen in the future if no action is taken. Even with an assumed 10 percent travel time savings or reduction in delay from possible traffic signal optimization, the peak hour operations are not anticipated to operate at an acceptable LOS (LOS D or better).

1.2.4 Transportation Demand

The SW 10th Street Connector PD&E Study is currently included in the Broward MPO TIP. The SW 10th Street Connector PD&E Study has been advanced to move forward in coordination with the I-95 from SW 10th Street to Hillsboro Boulevard PD&E Study (FM# 436964-1) to the east as well as the Sawgrass Expressway widening and interchange PD&E Study (FM# 435763-1) to the west. Additionally, the 2045 SIS Multi-Modal Unfunded Needs Plan listed adding capacity to this segment of SW 10th Street as a needed improvement.

1.2.5 Legislation

At this time, there is no legislation mandating the implementation of this project. However, District 4 of the FDOT has coordinated with the Central Office to evaluate the merits of allowing semi-trucks in the managed lanes. The FDOT has determined that semi-trucks will be permitted in the managed lanes within the limits of this project only.

1.2.6 Social Demand and Economic Development

Social and economic demands on the SW 10th Street corridor will continue to increase as population and employment increase in Broward County, and the greater south Florida region. The University of Florida Bureau of Economic and Business Research (BEBR) high end estimate predicts Broward County's population will grow to 2.3 million by 2040, an increase of 34 percent from the year 2011. This regional population growth will increase travel demands on the SW 10th Street corridor. Due to the built-out nature of the local area surrounding the SW 10th Street corridor, the growth will occur in the region as a whole, necessitating connections between the limited access facilities.

Multiple residential developments and businesses are located along the SW 10th Street corridor; therefore, this project will consider livability issues as well as vehicular movement. Capacity improvements to SW 10th Street have previously not advanced to design and construction. However, the Broward MPO Board directed its staff to reach out to communities along the corridor and initiate a consensus building effort to evaluate the best way to accommodate the long-term traffic demands as well as the local community considerations. As part of this consensus-building effort, a group of concerned individuals, known as the Community Oversight Advisory Team (COAT), was assembled to represent the communities along the corridor, as well as throughout the greater north Broward County area, to identify the long-term opportunities and vision for the corridor. The COAT developed recommendations for the corridor to be considered by the FDOT in evaluating the improvements in a PD&E Study.

1.2.7 Modal Interrelationships

Sidewalks are located along SW 10th Street's eastbound and westbound lanes from Military Trail to I-95; however, from Waterways Boulevard to Military Trail, sidewalks are only present in the eastbound direction. No Broward County Transit (BCT) services are present along SW 10th Street. However, Military Trail and Powerline Road both have transit options, Tri-Rail and Broward County Bus Route No. 14, respectively. The City of Deerfield Beach has partnered with BCT to provide Express I and II routes which is a community bus service. Express I and II Bus Routes are available Monday through Friday from 8 AM to 4 PM. Express Bus I Route utilizes SW 10th Street from the eastern project limits to Powerline Road. The Express I Route has one stop adjacent to the corridor – Stop 5 (Walmart). Express II Route utilizes SW 10th Street outside of the project limits. Bicycle facilities are not designated along SW 10th Street; however, existing five-foot paved shoulders, which serve as undesignated bicycle lanes, are present in both directions. The Broward MPO assigned a LOS F to the bicycle, pedestrian, and transit services along SW 10th Street. The proposed improvements will provide future accommodations for bicyclist and pedestrians, and transit modes.

1.2.8 Traffic Safety

A need exists to resolve safety issues within the project limits along the existing SW 10th Street corridor. SW 10th Street experienced a total of 896 crashes from 2012 to 2016 in this

corridor. There were 342 injury crashes and one fatal crash during the study period. A majority of crashes were rear end collisions accounting for 490 crashes, followed by angle collisions accounting for 102 crashes, and 97 sideswipe crashes. The total number of crashes has increased over the five year period, with an average of 179 crashes per year. This project seeks to reduce congestion, thus mitigating existing crash patterns, and to enhance safety through the addition of improved bicycle / pedestrian features along the local system.

The project is anticipated to improve emergency evacuation and response capabilities by enhancing capacity and connectivity to major arterials designated on the state evacuation route. SW 10th Street, Florida's Turnpike, Sawgrass Expressway, and I-95 serve as part of the emergency evacuation route network designated by the Florida Division of Emergency Management (FDEM) and by Broward County. SW 10th Street moves traffic from the east to I-95, Florida's Turnpike, and the Sawgrass Expressway. Improved travel times would also result in improved emergency response for local residents and for transport to regional facilities. Broward County Fire and Rescue Station 66 is located at 590 S. Powerline Road, approximately 0.3 miles to the north of the study area.

1.2.9 Roadway Deficiencies

Currently, SW 10th Street provides FDOT standard width travel and turn lanes. However, as previously mentioned, sidewalk is limited to the south side of SW 10th Street from Waterway's Boulevard to Military Trail. Sidewalk is present along SW 10th Street eastbound and westbound from Military Trail to I-95. Bicycle facilities are not designated along SW 10th Street, although existing five-foot paved shoulders, which serve as undesignated bicycle lanes, are present in both directions. No other known roadway deficiencies exist along the corridor. The proposed improvements will address these deficiencies.

1.3 Commitments

The following text describes the commitments the FDOT has made during the course of this PD&E Study:

- FDOT commits that bicycle and pedestrian features will be provided with the project as well as connectivity through the Powerline Road and Military Trail intersections.

- FDOT commits that the Connector Road, which will be part of the FDOT Managed Lanes Network, will allow semi-trucks to use the facility within the project's limits.
- FDOT commits to minimizing the length of elevated roadways adjacent to residential areas. Specifically, the grade-separated roadways at Military Trail and Powerline Road will be as short as possible and will transition to an at-grade section on both the east and west approaches at Powerline Road and the western approach of the Military Trail intersection as quickly as possible while following FDOT design standards. The proposed overpass in the vicinity Waterways Boulevard will not be located directly in front Waterways Boulevard and will instead be located west of this intersection. In addition, FDOT commits to providing a depressed westbound managed lane exit ramp.
- FDOT commits to providing ingress/egress points between local SW 10th Street and the Managed Lanes. In addition, residential access points will be maintained during and after construction.
- FDOT commits to constructing ground-mounted noise walls that are warranted and desired by a majority of the benefited residents as early as possible in the construction phase.
- FDOT is committed to the construction of feasible noise abatement measures at the noise impacted locations identified in Table 4-1 in the Noise Study Report upon the following conditions:
 - Final recommendations on the construction of abatement measures is determined during the project's Final Design and through the public involvement process;
 - Detailed noise analyses during the Final Design process support the need, feasibility and reasonableness of providing abatement;
 - Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
 - Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
 - Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

- FDOT commits that landscaping and aesthetic treatments will be coordinated with the local communities and the City of Deerfield Beach during the final design phase. Aesthetic treatments and landscaping schemes will be in conformance with the City of Deerfield Beach Pioneer Grove adopted standards.
- FDOT commits that the managed lanes will open and remain without tolling until performance and operations fall below acceptable levels. When the introduction of tolling could improve the declining performance levels, at such time the FDOT will notify the public and solicit feedback for any tolling that is proposed in the future.
- FDOT commits to conducting an updated bald eagle survey during the nesting season prior to the start of construction and will coordinate the results with USFWS.
- The FDOT commits to work closely with the City of Deerfield Beach to ensure that there are no impacts to their West Well Field.
- The FDOT commits to evaluating additional measures for water quality treatment for retention ponds in the next phase of this project including: baffles and weirs.
- FDOT commits that any future tolling of the managed lanes will be electronic tolling that does not require vehicles to stop and pay a toll.

1.4 Alternatives Analysis Summary

Alternatives developed for the SW 10th Street PD&E Study were influenced by the Community Oversight Advisory Team that the FDOT and the Broward County MPO partnered with during this study and the years preceding it. The goal of the SW 10th Street PD&E Study is to configure a high-speed connection between the Sawgrass Expressway and I-95 such that vehicles exiting the Sawgrass Expressway no longer need to wait at multiple traffic signals when traveling to I-95 or vice versa. However, one of the primary recommendations of the COAT is to “Minimize and attempt to eliminate the use of above-grade overpasses adjacent to residential areas.” A similar recommendation states, “Include a below-grade expressway with at-grade local access roads.”

The SW 10th Street Connector assumes two distinct corridors for travel:

- A low-speed corridor for local SW 10th Street traffic, bicyclists, and pedestrians; and
- A high-speed corridor that operates like an expressway and maintains free-flow, interstate speeds between the Sawgrass Expressway and I-95.

The SW 10th Street PD&E Study had a Public Kickoff Meeting along with two Alternatives Public Workshops, both of which functioned as a “tier” in the alternatives analysis. The first Alternatives Public Workshop offered the Tier 1 Alternatives, described in Section 4.5, and consisted of the following:

- Center Alignment Alternative; and
- North Alignment Alternative.

The premise of the SW 10th Street Connector typical section is that it must have four managed lanes (two westbound and two eastbound) as well as four local lanes (two westbound and two eastbound). The Center Alternative places the managed lanes in the center of the existing right-of-way and adds a one-way local street system on each side of the managed lanes.

As a counterpart to the Center Alternative, a North Alternative was developed. This alternative places the managed lanes along the north side of the existing right-of-way and relocates the local SW 10th Street to the south side of the right-of-way. In this fashion, the local roadway system is positioned near the sideroads along the south side, such as Waterways Boulevard, Independence Drive, SW 30th Avenue, SW 28th Avenue, and SW 24th Avenue. A local SW 10th Street positioned on the south side of the right-of-way also facilitates direct commercial access to several existing businesses that currently have existing access. By contrast, most of the north side of the existing right-of-way is adjacent to Century Village, which does not have direct access to SW 10th Street, and Quiet Waters Park west of Powerline Road.

In order to mitigate noise and visual impacts as well as facilitate the COAT recommendation of minimizing elevated roadways, the Center and North Alternatives both examined placing the four managed lanes in a depressed, or “below grade” section. The limits of this roadway depression extend from the Independence Drive intersection to the crossing of the C-2 Canal located just west of SW 24th Avenue. This depressed section was located one level below the existing grade and passed beneath the major intersection of Powerline Road. Section 4.5 describes the Tier 1 Alternatives in detail. Figures 1.4.1 and 1.4.2 display typical sections of the Center and North Alternatives, respectively.

Figure 1.4.1: Center Alternative Typical Section

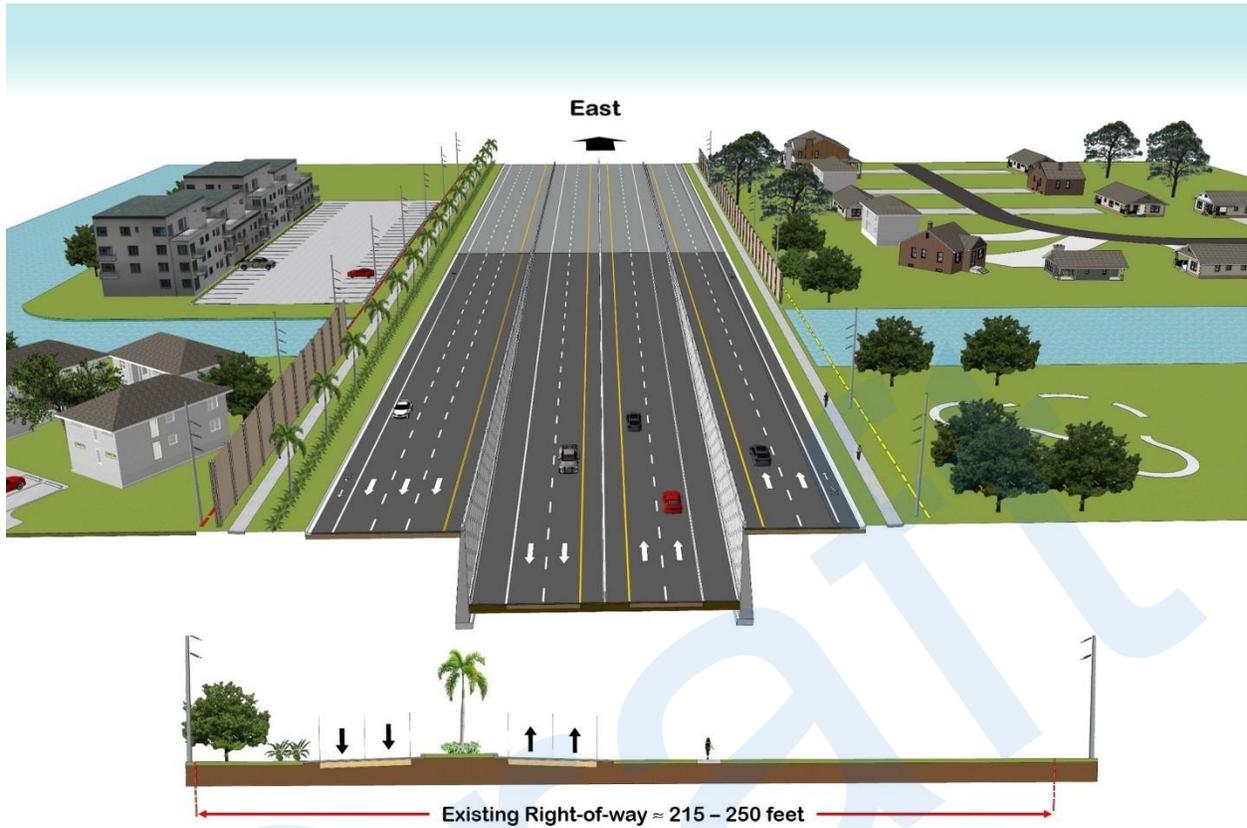
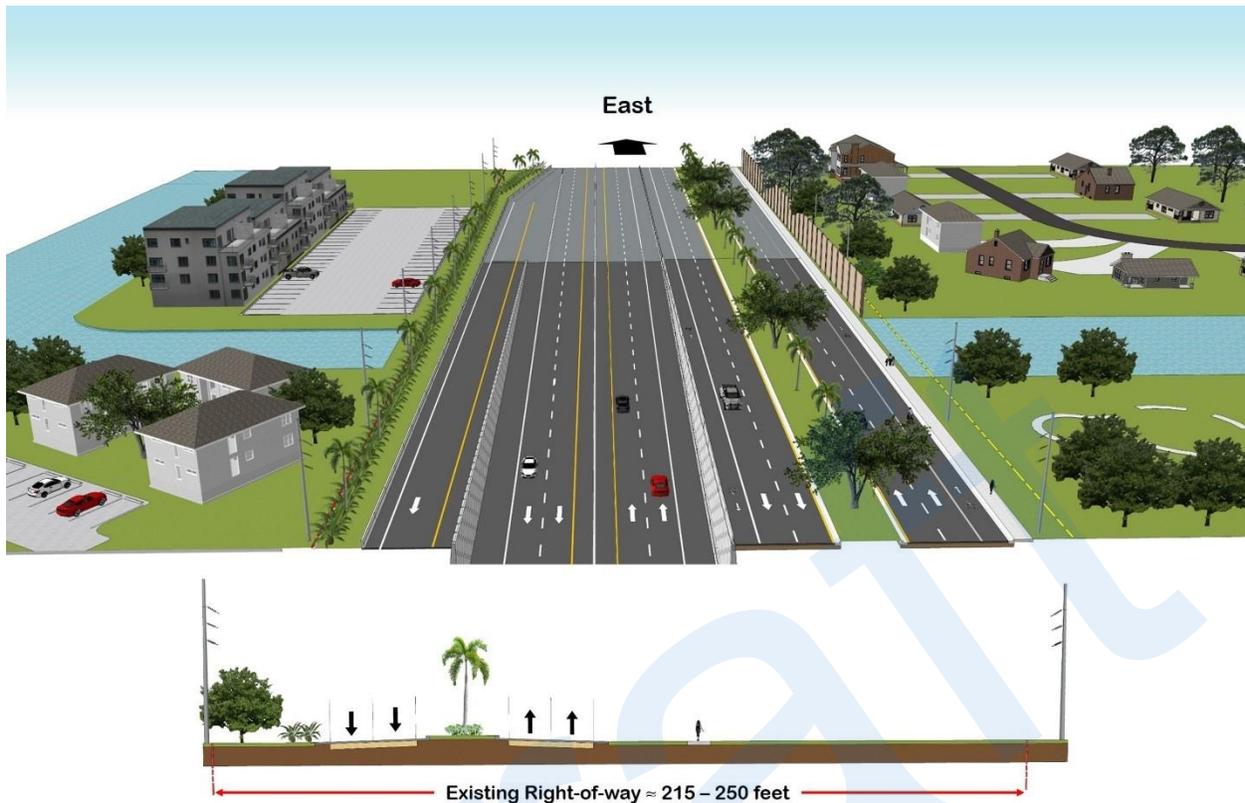


Figure 1.4.2: North Alternative Typical Section



Subsequent to the first Alternatives Public Workshop (held on April 25, 2018), public comments were analyzed and additional investigation was performed on the feasibility of a depressed section as well as providing business and sideroad access to local SW 10th Street. As a result of this analysis, the FDOT made a decision to drop the Center Alternative and carry forward three alternatives to the second Alternatives Public Workshop, held on November 29, 2018. The three “Tier 2” alternatives all featured a “north” alignment of the managed lanes within the existing right-of-way and are named as follows:

- Full Depressed Alternative;
- Partial Depressed Alternative; and
- Non-Depressed / No Managed Lane Access Alternative.

The Full Depressed Alternative is essentially the Tier 1 North Alternative presented at the first Alternative Public Workshop. In response to concerns regarding the feasibility of the

Full Depressed Alternative, particularly in regards to Powerline Road, the Partial Depressed Alternative was developed. This alternative has three sub-alternatives:

- Depressed Westbound Exit Ramp Alternative;
- Depressed Eastbound Managed Lanes Alternative;
- Depressed Eastbound and Westbound Managed Lanes Alternative;

This trio of alternatives all have one distinct feature in common: a reduction in the limits of the depressed section such that it begins east of Powerline Road and ends west of the C-2 Canal. The difference in these three sub-alternatives is how they accommodate the proposed entrance and exit ramps between the managed and local lanes. Below is a description of the ramp “braiding” for each sub-alternative:

Depressed Westbound Exit Ramp Alternative

This sub-alternative minimizes the extent of a depressed section. The managed lanes remain at-grade, and a westbound exit ramp is formed on the left side of the westbound managed lanes, passes beneath the at-grade eastbound managed lanes, and joins local SW 10th Street as an outer third lane approaching Powerline Road.

Depressed Eastbound Managed Lane Alternative

This sub-alternative is similar to the Depressed Westbound Exit Ramp Alternative except that the profiles are reversed: The eastbound managed lanes pass beneath an at-grade westbound exit ramp located on the left side of the westbound managed lanes. This alternative requires depressing only one side (eastbound) of the managed lanes.

Depressed Eastbound and Westbound Managed Lanes Alternative

The third option for accommodating ramp braiding is similar to the Depressed Eastbound Managed Lanes except that the westbound exit ramp diverges from the right side of the westbound managed lanes, remains at-grade, and passes above the depressed eastbound and westbound managed lanes. With this configuration, the both eastbound and westbound managed lanes are depressed, and the exit ramp requires more distance to cross over both sets of lanes.

Non-Depressed / No Managed Lane Access Alternative

In response to questions regarding the inclusion of entrance and exit ramps to and from the managed lanes, this alternative was developed and simply removes the ramps. By eliminating access to the managed lanes, both the managed and local lanes can remain at-grade between Quiet Waters Business Park and just east of 24th Avenue. By eliminating ramps, this alternative required the smallest footprint and offers the most amount of space for landscaping as well as bicycle and pedestrian accommodations as well as minimizing right-of-way acquisition. However, this alternative does not maximize use and benefit of the managed lanes and consequently does not remove sufficient traffic from the local lanes as compared to the other alternatives.

Figures 1.4.3 to 1.4.7 display renderings of the five alternatives that were shown to the public on November 29, 2018. Each of the figures are oriented to the west.

Figure 1.4.3: Full Depressed Alternative



Figure 1.4.4: Partial Depressed – Depressed Westbound Exit Ramp Alternative



Figure 1.4.5: Partial Depressed – Depressed Eastbound Managed Lanes Alternative



Figure 1.4.6: Partial Depressed – Depressed Eastbound & Westbound Managed Lanes Alternative



Figure 1.4.7: Non-Depressed / No Managed Lane Access Alternative



Based on the evaluation matrix that was compiled for the second Alternatives Public Workshop as well as public comments and stakeholder meetings, the FDOT made a decision to drop the Full Depressed and Non-Depressed / No Managed Lane Access Alternatives and

carry forward the Partial Depressed Alternative to the Public Hearing. Specifically, the Depressed Westbound Exit Ramp Alternative is the Preferred Alternative that will be shown at the public hearing and ultimately recommended for approval. Section 1.5 describes the Preferred Alternative in more detail.

1.5 Description of Preferred Alternative

Subsequent to the second Alternatives Public Workshop, the COAT was re-engaged for a series of three meetings along with numerous stakeholder meetings, including meetings with elected officials, neighborhood groups, and businesses. The Broward MPO was also engaged for several meetings and provided input on modifications to the alternatives presented at the second Alternatives Public Workshop. The resulting alternative, the Depressed Westbound Exit Ramp Alternative, is essentially the same concept that we presented on November 29, 2018 but with the following modifications:

- Westward shift of overpass at Waterways Boulevard;
- New median opening on north leg of Powerline Road for Quiet Waters Business Park;
- 10-foot shared use path along south side of SW 10th Street between Waterways Boulevard and Powerline Road; and
- Eight-foot sidewalk along south side of SW 10th Street between Powerline Road and Military Trail.

The junction of the Sawgrass Expressway and SW 10th Street presents a series of challenges:

- The proximity of Quiet Waters Park and the lake adjacent to the north side of the existing right-of-way;
- The need to braid key movements with an elevated structure;
- The proximity of the Waterways community and Waterways Boulevard; and
- An adjacent PD&E study by FTE that proposed an expanded interchange at this location as well as managed lanes on the Sawgrass Expressway.

After a series of meetings with the FTE, a revision to the elevated eastbound over westbound braided ramp movement was developed. Concern was expressed by the public regarding noise and visual impacts due to the proximity of this overpass to the Waterways community. As part of the Preferred Alternative, the re-designed overpass features a westward shift and a

change in the proposed profiles such that local westbound SW 10th Street now passes over the eastbound and westbound managed lanes. The new overpass is not located directly in front of the Waterways Community in an attempt to minimize impacts to the community.

A second change that was implemented after the second Alternatives Public Workshop is the addition of a full median opening on the north leg of Powerline Road just south of West Drive. While the addition of this median opening requires a design variation, the change was implemented in response to the elimination of the existing full median opening to Quiet Waters Business Park due to the insertion of the managed lanes along the north side of the right-of-way. This proposed signalized intersection will be integrated with the West Drive traffic signal and will accommodate left turns out of Quiet Waters Business Park only. Southbound left turn lanes will not be permitted. This modification preserves the ability of the business park to accommodate large trucks.

The Depressed Westbound Exit Ramp Alternative features dual left turn lanes at Powerline Road, an elevated eastbound entrance ramp (flyover) to the eastbound managed lanes, a depressed westbound exit ramp, and a third auxiliary lane between the entrance and exit ramps in both directions. Local SW 10th Street features a 10-foot shared use path along the south side of the roadway west of Powerline Road and an 8-foot sidewalk east of Powerline Road. Buffered bicycle lanes are proposed in the eastbound and westbound directions between Powerline Road and Military Trail and in the eastbound direction between Waterways Boulevard and Powerline Road.

The Preferred Alternative is being evaluated for noise walls, aesthetic elements, and landscaping. Due to the need for extensive utility relocations, additional coordination is ongoing with the utility companies and the City of Deerfield Beach. Figure 1.5.1 to 1.5.3 display renderings of the Preferred Alternative. The construction cost is estimated at \$218 million. Table 1.5.1 summarizes the right-of-way impacts. Chapter 6 provides details of the Preferred Alternative.

Figure 1.5.1: Depressed Westbound Exit Ramp Alternative - Looking West



Figure 1.5.2: Depressed Westbound Exit Ramp Alternative - Looking East



Figure 1.5.3: Depressed Westbound Exit Ramp Alternative - Looking East



Table 1.5.1: Summary of Right-of-way Impacts for Preferred Alternative

Right-of-way Categories	Impacts
Total Parcels Impacted	24
<i>Commercial</i>	17
<i>Residential</i>	4
<i>Unimproved</i>	3
Total Relocations	8
<i>Residential</i>	0
<i>Commercial</i>	8
Right-of-way Cost (\$ million)	44.2

1.6 List of Technical Documents

Table 1.6.1 lists the technical documents that were prepared as part of this PD&E Study. Documents that are in draft status are noted with a “Draft” and a date of the draft submittal in parenthesis.

Table 1.6.1: Technical Documents Prepared for this Study

Report	Date Completed
Cultural Resource Assessment	10/2/2018
Natural Resources Evaluation	10/30/2018
Contamination Screening Evaluation Report	12/1/2018
Determination of Applicability – Quiet Waters Park	12/17/2018
Determination of Applicability – Crystal Heights Park	12/17/2018
Location Hydraulics Report	8/1/2019
Drainage / Pond Siting Report	2/1/2019
Project Traffic Analysis Report	Draft (10/2/2019)
Sociocultural Effects Evaluation Report	Draft (7/24/2019)
Water Quality Impact Evaluation	Draft (7/31/2019)
Preliminary Engineering Report	Draft (10/3/2019)
Geotechnical Memorandum	Draft (8/2/2019)
Categorical Exclusion Type 2	Draft (10/1/2019)
Noise Study Report	Draft (8/11/2019)
Air Quality Technical Memorandum	Draft (8/13/2019)
Utility Assessment Report	In Progress
Conceptual Stage Relocation Plan	In Progress

2.0 Existing Conditions

2.1 Roadway

SW 10th Street is a four-lane to six-lane divided, urban principal arterial and is a designated SIS facility. Sidewalk is present on at least one-side of the road for the entire corridor, although bicycle facilities are sporadic within the corridor.

2.1.1 Typical Section

The existing SW 10th Street typical sections are shown in Figures 2.1.1, 2.1.2, 2.1.3 and 2.1.4.

SW 10th Street from the end of the Sawgrass Expressway to Powerline Road (~0.8 miles) consists of:

- Three to four 12-foot travel lanes in each direction;
- Five-foot sidewalk on the south side of SW 10th Street starting east of Waterways Boulevard;
- Raised median varies from 30 to 65 feet; and
- Right-of-way width of 250 feet.

SW 10th Street from Powerline Road to Quiet Waters Business Park Entrance Road (~0.4 miles) consists of:

- Three 12-foot travel lanes in each direction;
- Five-foot paved shoulders that serve as bicycle lanes in both directions;
- Six-foot sidewalk on both sides of SW 10th Street;
- 28-foot wide raised median; and
- Right-of-way width of 316 feet.

SW 10th Street from Quiet Waters Business Park Entrance Road to Military Trail (~1.1 miles) consists of:

- Two 12-foot travel lanes in each direction;
- Five-foot paved shoulders that serve as bicycle lanes in both directions;
- Six-foot sidewalk on the south side of SW 10th Street;
- 16-foot wide raised median; and
- Right-of-way width that varies from 215 feet to 300 feet.

SW 10th Street from Military Trail to East Newport Center Drive (~0.4 miles) consists of:

- Three 11-foot travel lanes in each direction;
- Three-foot paved shoulder;
- Five-foot curb-line sidewalk on both sides of SW 10th Street;
- Variable width raised median (15 feet to 26 feet); and
- Right-of-way width of approximately 250 feet.

Figure 2.1.1: Existing SW 10th Street Typical Section – Sawgrass Expressway to Powerline Road

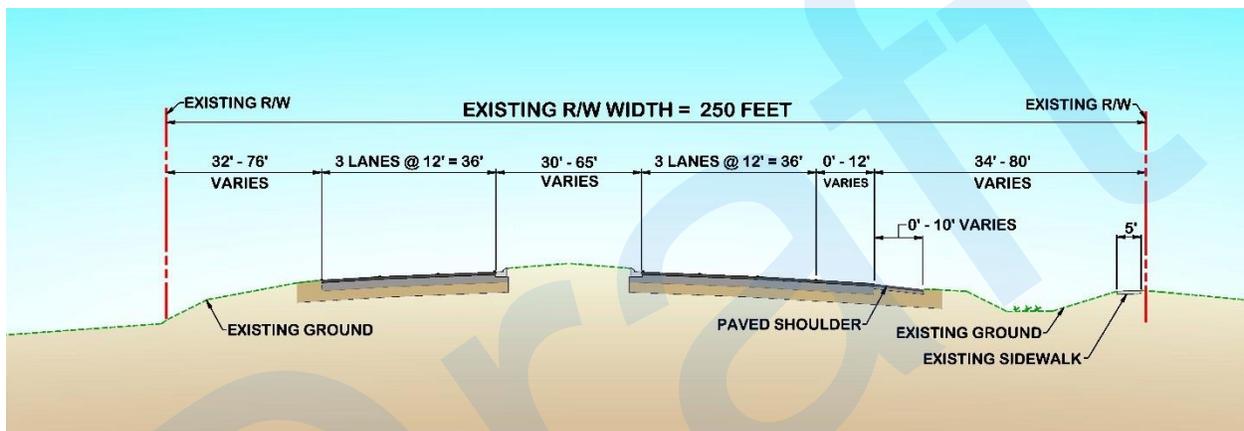


Figure 2.1.2: Existing SW 10th Street Typical Section – Powerline Road to Quiet Water Business Park Entrance Road

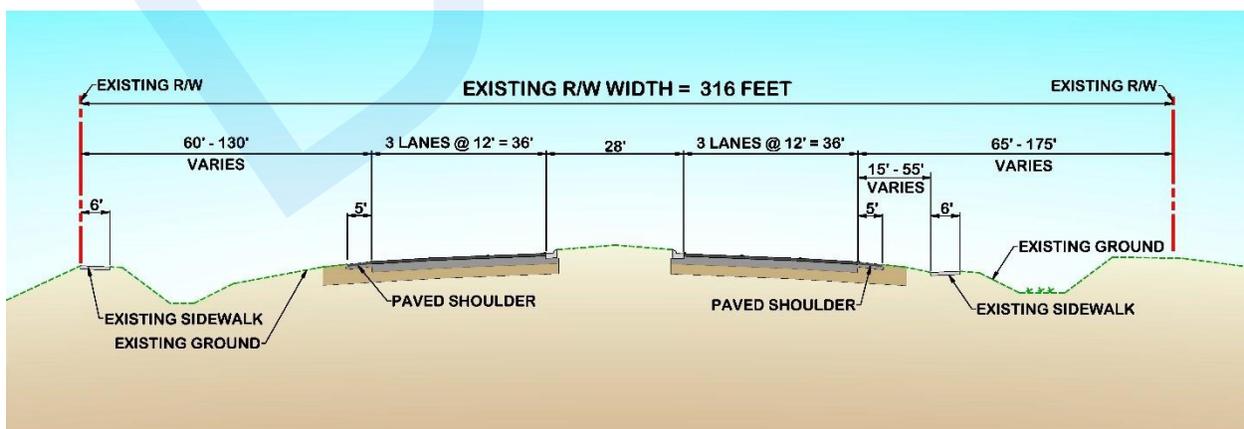


Figure 2.1.3: Existing SW 10th Street Typical Section – Quiet Water Business Park Entrance Road to Military Trail

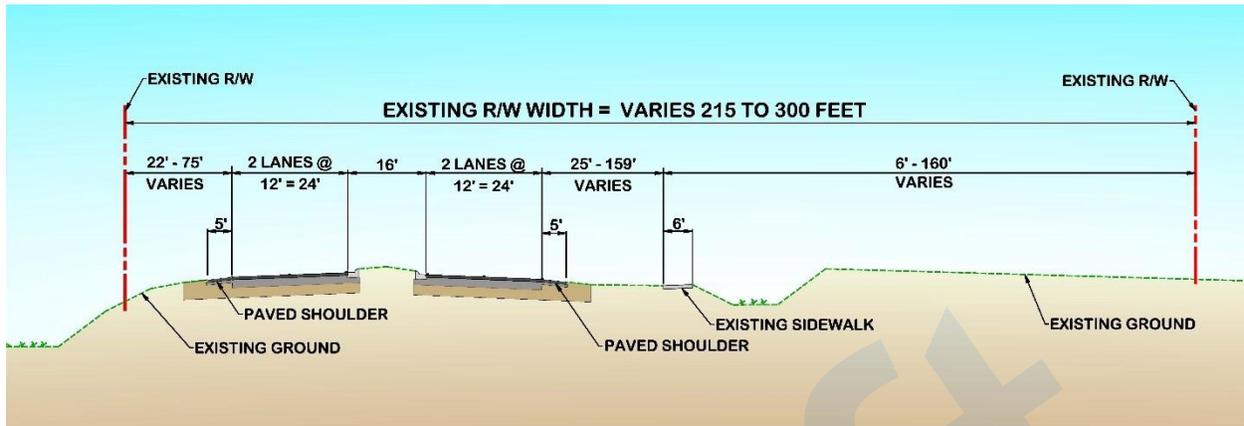
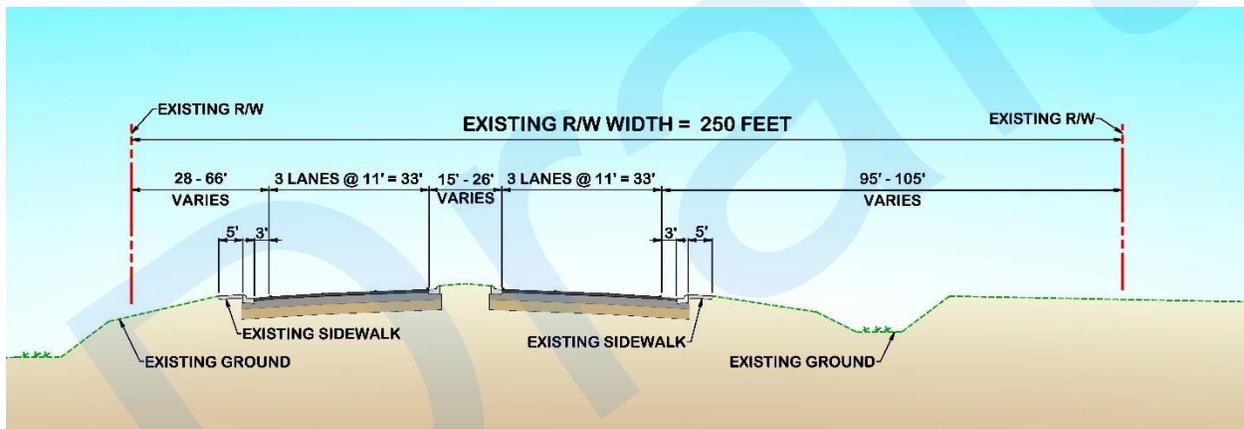


Figure 2.1.4: Existing SW 10th Street Typical Section – Military Trail to East Newport Center Drive



2.2 Right-of-Way

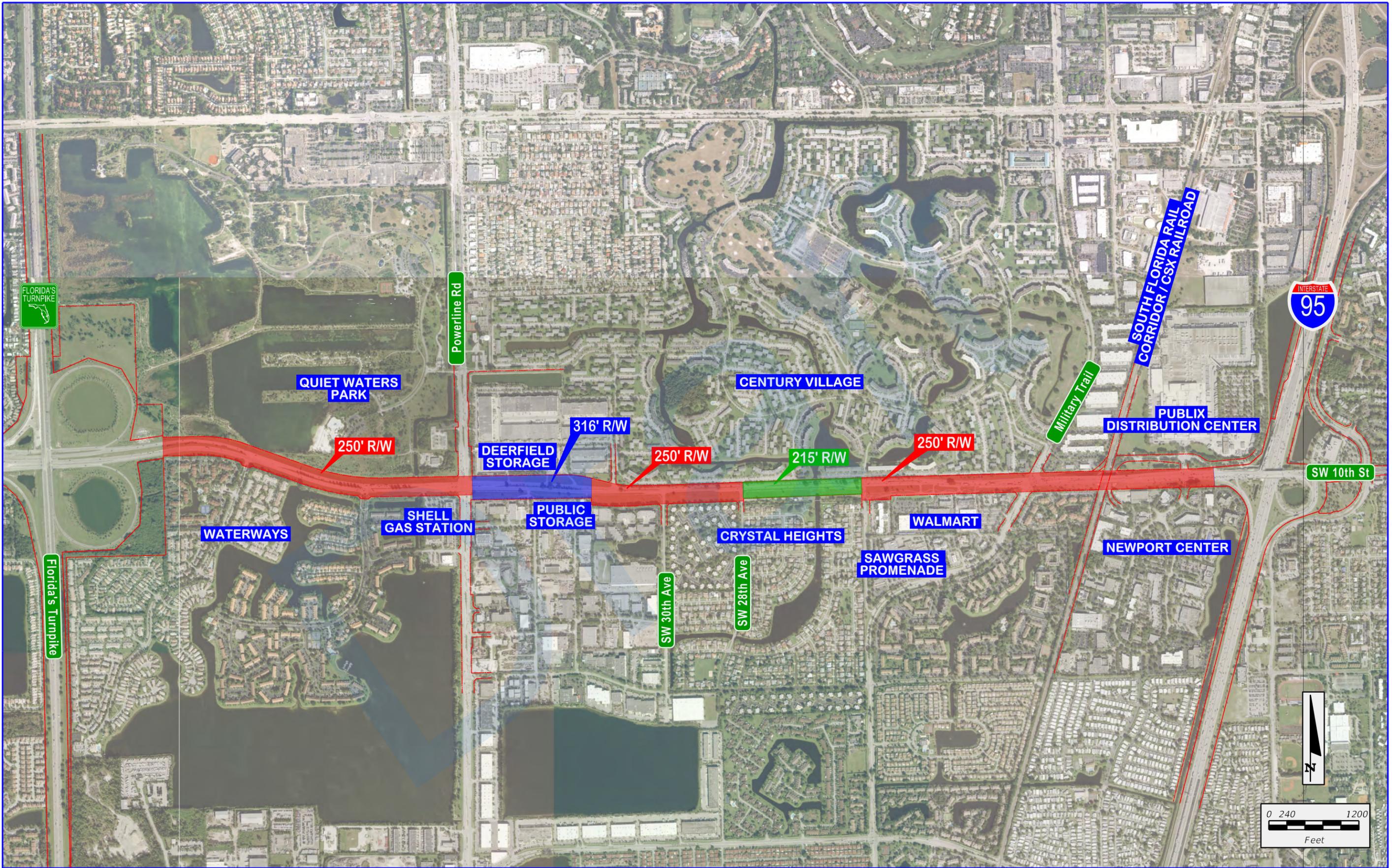
The existing right-of-way was mapped for the SW 10th Street Project. The existing right-of-way varies throughout the corridor from 215 feet to 316 feet. Below is a summary of the existing right-of-way along the corridor:

- Florida’s Turnpike / Sawgrass Expressway to Powerline Road (~1 mile) – 250 feet of right-of-way;
- Powerline Road to just west of Quiet Waters Business Park Entrance Road (~0.4 miles) – 316 feet of right-of-way;
- Just west of Quiet Waters Business Park Entrance Road to SW 28th Avenue (~0.3 miles) – 250 feet of right-of-way;

- SW 28th Avenue to SW 24th Avenue (~0.3 miles) – 215 feet of right-of-way; and
- SW 24th Avenue to East Newport Center Drive (~0.8 miles) – 250 feet of right-of-way.

Figure 2.2.1 shows the approximate right-of-way widths in the project corridor.

Draft



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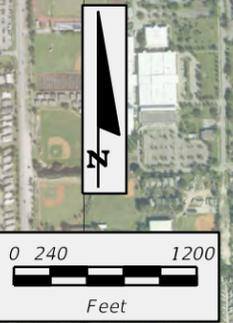


State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

- - - - Existing Right-of-Way
 / / / Existing LA Right-of-Way

Legend
█ 215' of Right-of-Way
█ 250' of Right-of-Way
█ 316' of Right-of-Way

Figure 2.2.1
 Existing Right-of-Way



2.3 Roadway Classification and Context Classification

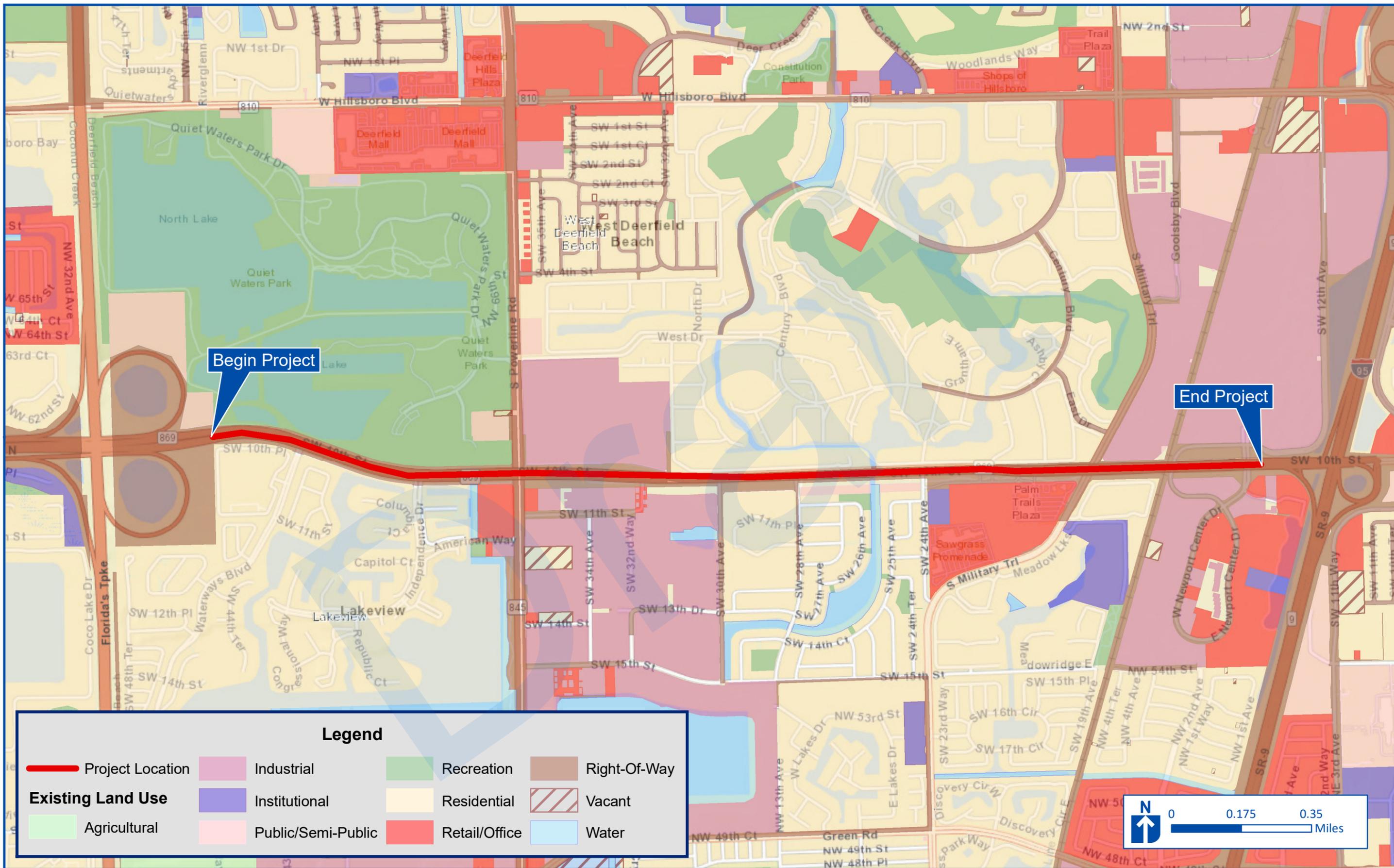
The roadway network within the project study area is comprised of Interstates, Toll Roads, US Routes, State Roads, and local roads, which provide local access to communities on SW 10th Street and also regional connectivity. SW 10th Street is an east-west Urban Principal Arterial, Other facility serving local residential communities, commercial properties and commuters alike. This section of roadway has also been considered the missing link in the existing and planned regional express lane network.

SW 10th Street is part of the state's SIS and provides the opportunity for commuters and local residents to connect to three major limited access facilities: Florida's Turnpike, Sawgrass Expressway, and I-95. The context classification from Florida's Turnpike to just east of Military Trail is Suburban Residential (C3R). The context classification changes just east of Military Trail to Suburban Commercial (C3C). The context classification remains Suburban Commercial to I-95.

2.4 Adjacent Land Use

The project lies within the City of Deerfield Beach, in Broward County, Florida. The project limits are not within the City of Deerfield Beach Community Redevelopment Area.

The primary land uses in the project corridor include: residential (multi-family and single family), recreational, industrial, and commercial. Major residential developments include: the Enclave Apartments at Waterways, Waterways, Independence Bay, Century Village, Waterford Courtyards, Waterford Homes, and the Lakes at Deerfield Apartments. Industrial development includes the Publix Distribution Center. Commercial development includes: the Sports Complex, Shell Gas Station, Med Care Pharmacy, Deerfield Beach Storage, Quiet Waters Business Park, Public Storage, Walmart, Publix, Quorum Business Center, and the Newport Center. Recreational uses along the corridor include Quiet Waters Park and Crystal Heights Park. Figure 2.4.1 shows the existing land use in the project corridor.



2.4.1 Community Focal Points

Community focal points are public or private locations, facilities or organizations that are important to local residents and communities.

Schools

Although there are no schools within the 0.25-mile project buffer, there is one day care facility, Leap Ahead Learning Center. This facility is located at 1100 SW 24th Avenue.

Religious Facilities

There are no religious facilities within the 0.25-mile project buffer.

Community Centers, Parks and Cemeteries

There are no community centers or cemeteries within the 0.25-mile project buffer. There are several parks on or near the project corridor including: Quiet Waters Park, Crystal Heights Park – North, Crystal Heights Park – 1, Trailhead Park, and Independence Bay Linear Park. Two of the parks, Quiet Waters Park and Crystal Heights Park – North, are located adjacent to the corridor.

Quiet Waters Park is a 431.4-acre regional park owned and managed by Broward County Parks and Recreation. Amenities include a marina, mountain bike trails, cable skiing, fishing, campgrounds, nature trails, restrooms and showers, volleyball and basketball courts, food concessions, picnic shelters and open picnic areas, a park and campground office, a maintenance facility and a butterfly and bird sanctuary building. SkiRixen USA operates a cable water ski business and Bike America has a facility on-site that includes bike rentals, special bicycle events, bicycle repair and safety checks, and a retail store. Of these amenities, a series of mountain bike trails, a lake used for skiing and the maintenance building are adjacent to the SW 10th Street corridor. In addition to the existing amenities, Broward County has several planned amenities near SW 10th Street and Powerline Road including an expansion of the water park, another playground, another office space, and community gardens.

Crystal Heights Park – North is a 1.37-acre community park associated with the Crystal Heights subdivision within the City of Deerfield Beach, Florida. This park is one of seven

small community parks scattered throughout this large subdivision. The park includes open grassed areas, a children's playground, covered picnic table with grill and an open-air picnic table, and approximately 100 feet of grassed parking area. This park is owned and maintained by the City of Deerfield Beach. Although the park is located within the Crystal Heights neighborhood, the neighborhood is not gated, therefore the general public could access this park.

Fire Stations

There are no fire stations within the 0.25-mile project buffer.

Law Enforcement Facilities and Government Buildings

There are no law enforcement facilities or government buildings within the 0.25-mile project buffer.

Healthcare Facilities

There are no healthcare facilities within the 0.25-mile project buffer. There is one assisted living facility within the buffer: Grand Villa of Deerfield Beach.

Cultural Facilities and Civic Centers

There are no cultural facility and/or civic centers within the 0.25-mile project buffer.

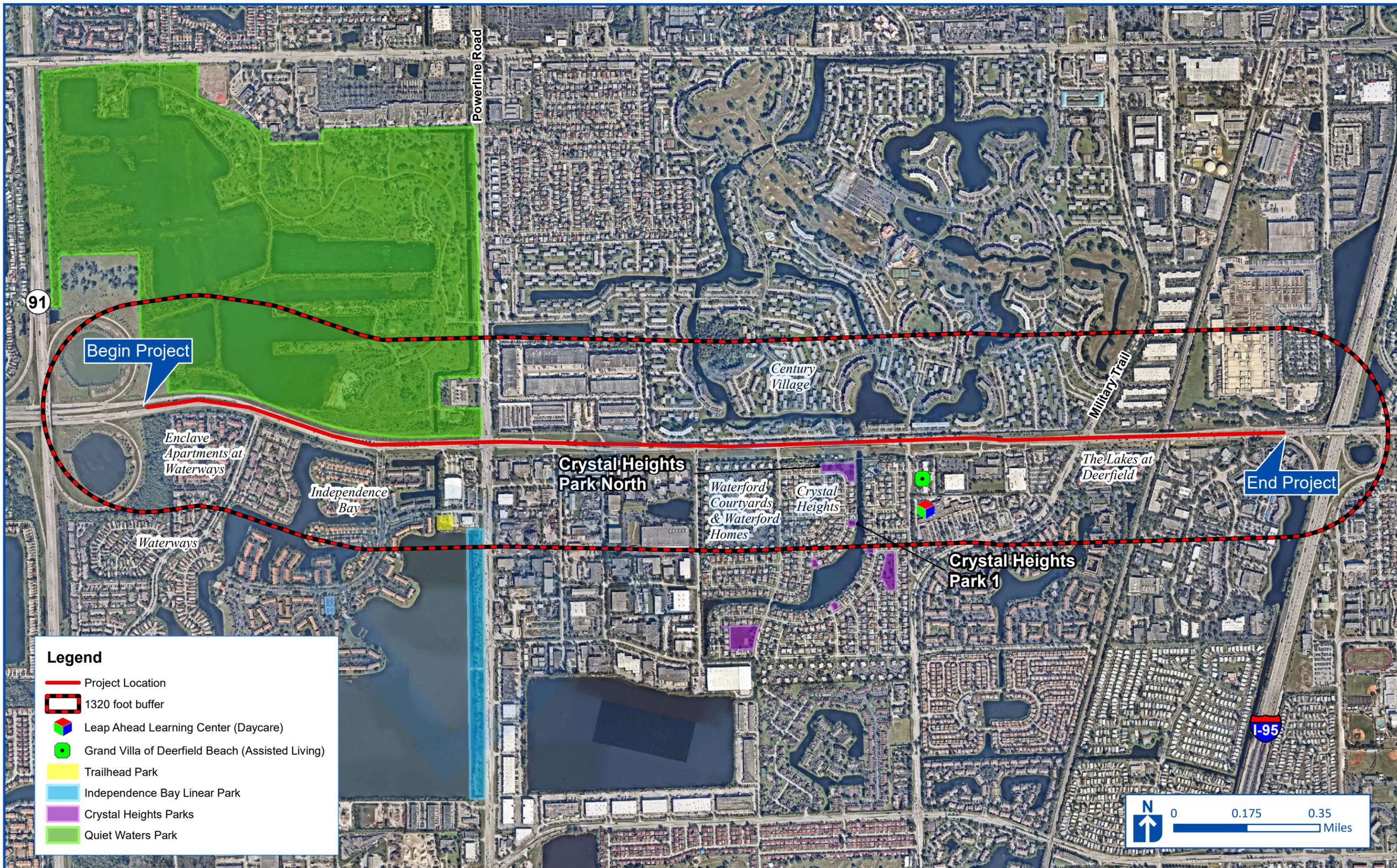
Social Service Facilities

There are no social service facilities within the 0.25-mile project buffer.

Historic Places

There are no historic places listed or eligible for listing on the National Register of Historic Places, historic monuments or locally historic features within the 0.25-mile project buffer.

The community focal points within the 0.25-mile project buffer are shown on Figure 2.4.2.



Legend

- Project Location
- 1320 foot buffer
- Leap Ahead Learning Center (Daycare)
- Grand Villa of Deerfield Beach (Assisted Living)
- Trailhead Park
- Independence Bay Linear Park
- Crystal Heights Parks
- Quiet Waters Park



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2.4.2 Demographic Profile

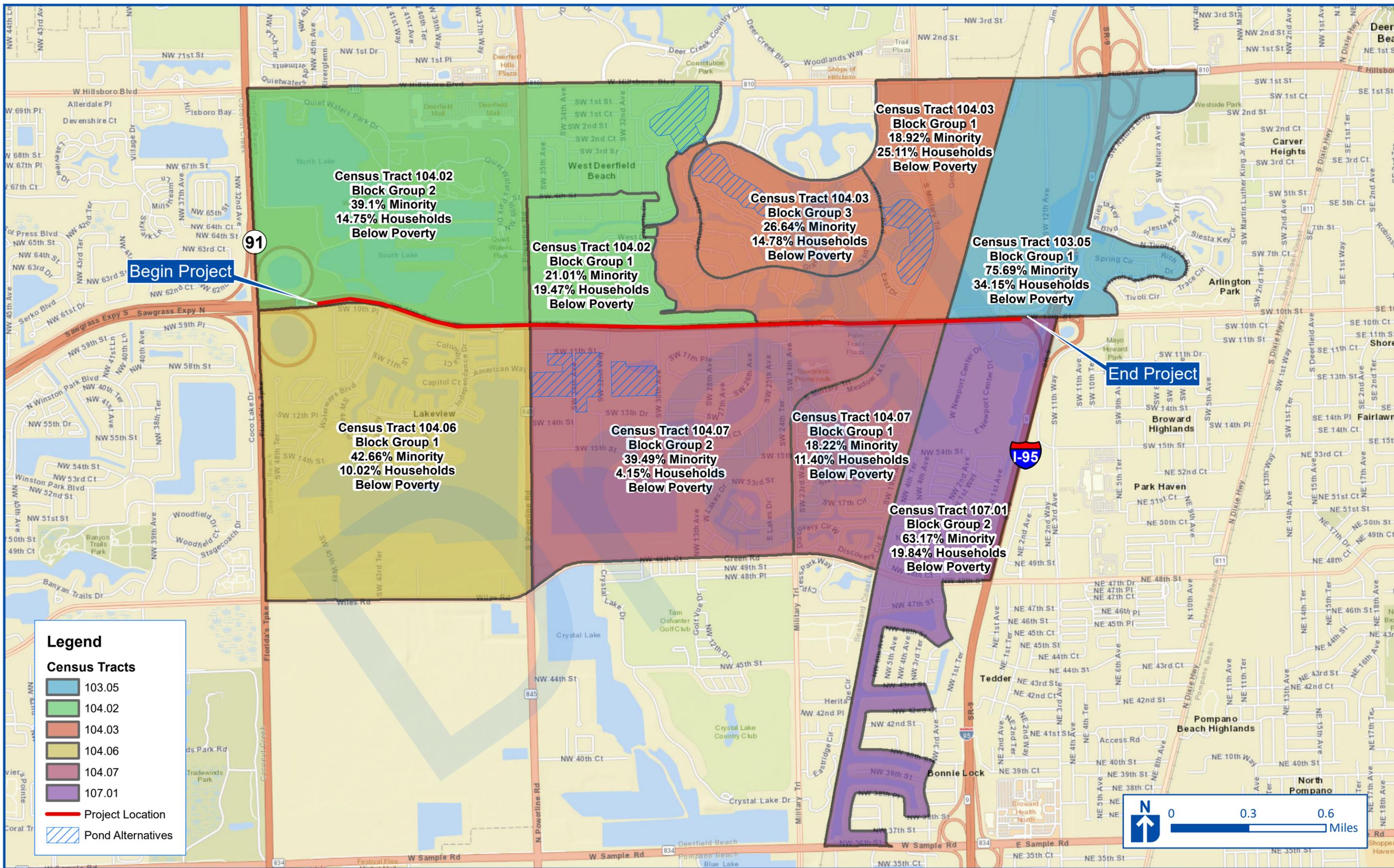
This project has been developed in accordance with the Civil Rights Act of 1964, as amended by the Civil Rights Act of 1968. Additionally, the project has been developed in accordance with Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994).

An analysis of minority and low-income populations (Environmental Justice (EJ) or Potential EJ populations) was conducted through a review of census data, field reconnaissance and public meetings. The demographics study area included those census tracts / blocks that overlap the project and field review of those populations living immediately adjacent to the project improvements. Most the study area consists of residential development, commercial, and recreational areas. Per 2017 Census data (Table 2.4.1), the residential population in the study area is approximately 44% minorities compared to 61% minorities in all of Broward County. Figure 2.4.3 shows percent minority and percent below the poverty level per census tract in the study area.

Table 2.4.1: Demographic Comparison: Population

Evaluation Criteria	Broward County	Study Area
Total population	1,890,416	20,507
Percent of the population that is White	38.15	60.63
Percent of the population that is Black	27.42	15.39
Percent of the population that is Hispanic	28.35	19.51
Percent of the population that is Asian	3.51	1.62
Percent of the population that is Other ¹	2.57	2.85
Percent of the population that is considered 'Minority'	61.34	43.91
Median population age	40.1	51.53
Percent of the population that is above 65 years old	15.60	18.54

¹ Other nationalities include: American Indian or Alaska native, Native Hawaiian or other Pacific islander, some other race, or 2 or more races.



Legend

Census Tracts

- 103.05
- 104.02
- 104.03
- 104.06
- 104.07
- 107.01
- Project Location
- Pond Alternatives



**State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
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2.5 Access Management Classification

SW 10th Street from Florida's Turnpike to Powerline Road is designated as Access Management Class 1 by the FDOT. The Access Management Classification transitions from Class 1 to Class 3 at Powerline Road. SW 10th Street from Powerline Road to I-95 is designated as Access Management Class 3.

Access Management Class 1 is designated for all freeways. Access Management Class 1 is then divided into four area types that dictate the interchange spacing requirements. The project corridor is in an existing urbanized area but not in a Central Business District (CBD) therefore, it is categorized as Area Type 2. The interchange spacing requirement for an Area Type 2 is every two miles. Access Management Class 3 allows for directional median openings every 1,320 feet and full median openings / signals every 2,640 feet.

An existing median opening inventory was completed in order to understand the type of and location of existing median openings compared to the FDOT Access Management Standards. A complete list of signalized intersections / median openings and spacing on SW 10th Street is shown below in Table 2.5.1. The red highlighted cells indicates that the existing spacing does not meet access management requirements. Although the western portion of SW 10th Street, from Florida's Turnpike to Powerline Road is classified as Access Management Class 1, this section of SW 10th Street is not a freeway and as such the entire project corridor was evaluated with Class 3 requirements. Table 2.5.2 shows a summary of the existing median opening spacing compliance. As shown in Tables 2.5.1 and 2.5.2, the majority of median openings do not meet FDOT Access Management Standards. Of the nine full median openings on SW 10th Street, none meet the full median opening spacing requirement for Access Management Class 3. Similarly, the three directional median openings also do not meet Access Management Class 3 spacing.

Table 2.5.1: Existing Median Openings and Signals

	Median Opening Description / Sideroad	Median Type	Spacing (feet)	Full Median Spacing (feet)	Directional Median Spacing (feet)	Signal Spacing (feet)
Access Management Class 1	Waterways Boulevard	Signal				
			1,600	1,600		1,600
	Independence Drive	Signal				
			1,300	1,300		1,300
	Powerline Road	Signal				
Access Management Class 3			2,000	2,000		
	Quiet Waters Business Park Entrance Road	Full				3,700
			670	670		
	SW 30 th Avenue	Full				
			1,030	1,030		
	SW 28 th Avenue	Signal				
			1,660	1,660		
	SW 24 th Avenue	Full				
			800		800	
	Frontage Road (Business Park)	Directional				3,850
			510	2,190	510	
	Frontage Road (Walmart)	Directional				
			880		880	
	Military Trail	Signal				
			2,080	2,080		2,080
East Newport Center Drive	Signal					
		740		740	740	
I-95 Southbound Entrance Ramp	Directional / Signal					

Table 2.5.2: Summary of Existing Access Management

	SW 10 th Street Corridor
Number of Signals	7
Number of Full Median Openings (Including Signals)	9
Number of Directional Median Openings (Including Signals)	3
<i>Total Number of Median Openings</i>	<i>12</i>
Average Signal Spacing (feet)	2,212
Average Full Median Opening Spacing (feet)	1,566
Average Directional Spacing (feet)	733

2.6 Design and Posted Speeds

Throughout the project corridor, the posted speed varies from 40 to 45 mph. The posted speed on SW 10th Street from Florida’s Turnpike to Military Trail is 45 mph and then drops to 40 mph from Military Trail to I-95.

Based on the SW 10th Street from Powerline Road to East Newport Center Drive (Financial Project ID: 424665-1-52-01) Plans, the Design Speed is 45 mph on SW 10th Street from Powerline Road to East Newport Center Drive.

2.7 Vertical and Horizontal Alignment

2.7.1 Vertical Alignment

SW 10th Street between Florida’s Turnpike and just west of the South Florida Rail Corridor / CSX Railroad is a relatively flat section of roadway. The majority of the existing SW 10th Street roadway varies in elevation from 14.5 feet to 17.3 feet in elevation with the lowest elevation around 9.5 feet in the vicinity of SW 24th Avenue.

2.7.2 Horizontal Alignment

SW 10th Street is oriented in the east-west direction and is generally oriented on a tangent section of roadway within the project area. Below is a brief description of the existing roadway geometry:

- Starting at Florida’s Turnpike, SW 10th Street curves with a centerline radius of 11,507 feet for a length of 1,344 feet;

- A short 220-foot tangent separates the first and second curve;
- The second curve has a centerline radius of 1,842 feet for a length of 915 feet;
- Near Waterways Boulevard, the curve transitions to a 946-foot tangent section before curve number three begins;
- The third curve has a centerline radius of 2,916 feet for a length of 1,036 feet;
- Near Independence Drive, the curve transitions to 1,372-foot tangent section ending just east of Powerline Road before curve four begins;
- The fourth curve has a centerline radius of 10,670 feet for a length of 892 feet;
- A short 310-foot tangent separates the fourth and fifth curve;
- The fifth curve has a centerline radius of 7,891 feet for a length of 623 feet. Just east of the Quiet Waters Business Park Entrance Road, the curve transitions to 565-foot long tangent section;
- A 3,062-foot tangent follows, ending just east of SW 24th Avenue before the start of curve six;
- The sixth curve has a centerline radius of 5,243 feet for a length of 498 feet;
- A short 255-foot tangent separates the sixth and seventh curve;
- The seventh curve has a centerline radius of 3,532 feet for a length of 307 feet; and
- Near the Walmart entrance, the curve transitions to 2,209-foot tangent which ends just east of the South Florida Rail Corridor / CSX Railroad.

2.8 Pedestrian Accommodations

Sidewalks are located along SW 10th Street's eastbound and westbound lanes from Military Trail to I-95. However, from Waterways Boulevard to Military Trail, sidewalks are only present in the eastbound direction, except for a short stretch between Powerline Road and Quiet Waters Business Park Entrance Road which has sidewalk on both sides of the road.

2.9 Bicycle Facilities

Bicycle facilities are not designated along SW 10th Street; however, existing five-foot paved shoulders, which serve as undesignated bicycle lanes, are present in both directions from Powerline Road to Military Trail. East of Military Trail the paved shoulder narrows to three feet and can no longer be used as a bicycle lane. Figure 2.9.1 shows the pedestrian and bicycle facilities along SW 10th Street.

Figure 2.9.1: Pedestrian and Bicycle Facilities



2.10 Transit Facilities

The City of Deerfield Beach has partnered with BCT to provide Express I and II routes. Express I and II Bus Routes are available Monday through Friday from 8 AM to 4 PM. This community bus service is intended to increase the number of destinations and connections that can be reached with public transit. Express Bus I Route utilizes SW 10th Street from the eastern project limits to Powerline Road. The Express I Route has one stop adjacent to the corridor – at the Walmart (Stop 5). Express II Route utilizes SW 10th Street outside of the project limits. There are no BCT services present along SW 10th Street. However, Military Trail and Powerline Road both have transit options, Tri-Rail and Broward County Bus Route No. 14, respectively. The Broward MPO assigned a LOS F to the bicycle, pedestrian, and transit services along SW 10th Street.

2.11 Pavement Conditions

A pavement survey was not completed for this PD&E Study. However, the FDOT Office of Transportation Statistics Road Data Shape Files for Pavement Conditions in GIS were

reviewed and field observations confirmed the existing condition of the pavement. The Pavement Conditions file was published on May 12, 2018. Based upon the research, the values in Table 2.11.1 were obtained. Table 2.11.2 provides the pavement condition scale to understand the scores.

Table 2.11.1: Pavement Conditions

Roadway	Begin Limit	End Limit	Score
SW 10 Street	Florida’s Turnpike / Sawgrass	Waterways Boulevard	4.5
SW 10 th Street	Waterways Boulevard	Powerline Road	3.5
SW 10 th Street	Powerline Road	East Newport Center Drive	5
SW 10 th Street	East Newport Center Drive	I-95	3

The values listed are based upon an overall pavement condition scale as shown in Table 2.11.2.

Table 2.11.2: Pavement Condition Scale

Value	Pavement Condition
<1.0	Very Poor
1.0 to 2.0	Poor (Large potholes, deep cracks exist)
2.0 to 3.0	Fair (Rutting, cracking and extensive patching)
3.0 to 4.0	Good (First class ride, slight deterioration)
4.0 to 5.0	Very Good (New or nearly new)

The pavement conditions shown in Table 2.11.1 indicate that the overall pavement condition is “good” in the corridor.

2.12 Traffic Volumes and Operational Conditions

The SW 10th Street corridor from east of the Sawgrass Expressway / Florida’s Turnpike to I-95 was analyzed to report existing and projected future traffic performance. The AM and PM peak hour traffic volumes during a typical weekday were analyzed, along with the capacity of the facility. Traffic analysis results are reported for existing (2016) conditions, the

2040 No Action Alternative, and the 2040 Build Alternative. Adjacent improvements planned for Florida's Turnpike, Sawgrass Expressway and I-95 are assumed to be in place for the 2040 No Action and 2040 Build conditions. The traffic analysis was prepared in coordination with the ongoing I-95 PD&E Study from SW 10th Street to Hillsboro Boulevard (FM# 436964-1), and Sawgrass Expressway PD&E Study from west of US 441 / SR 7 to Powerline Road (FM# 437153-1).

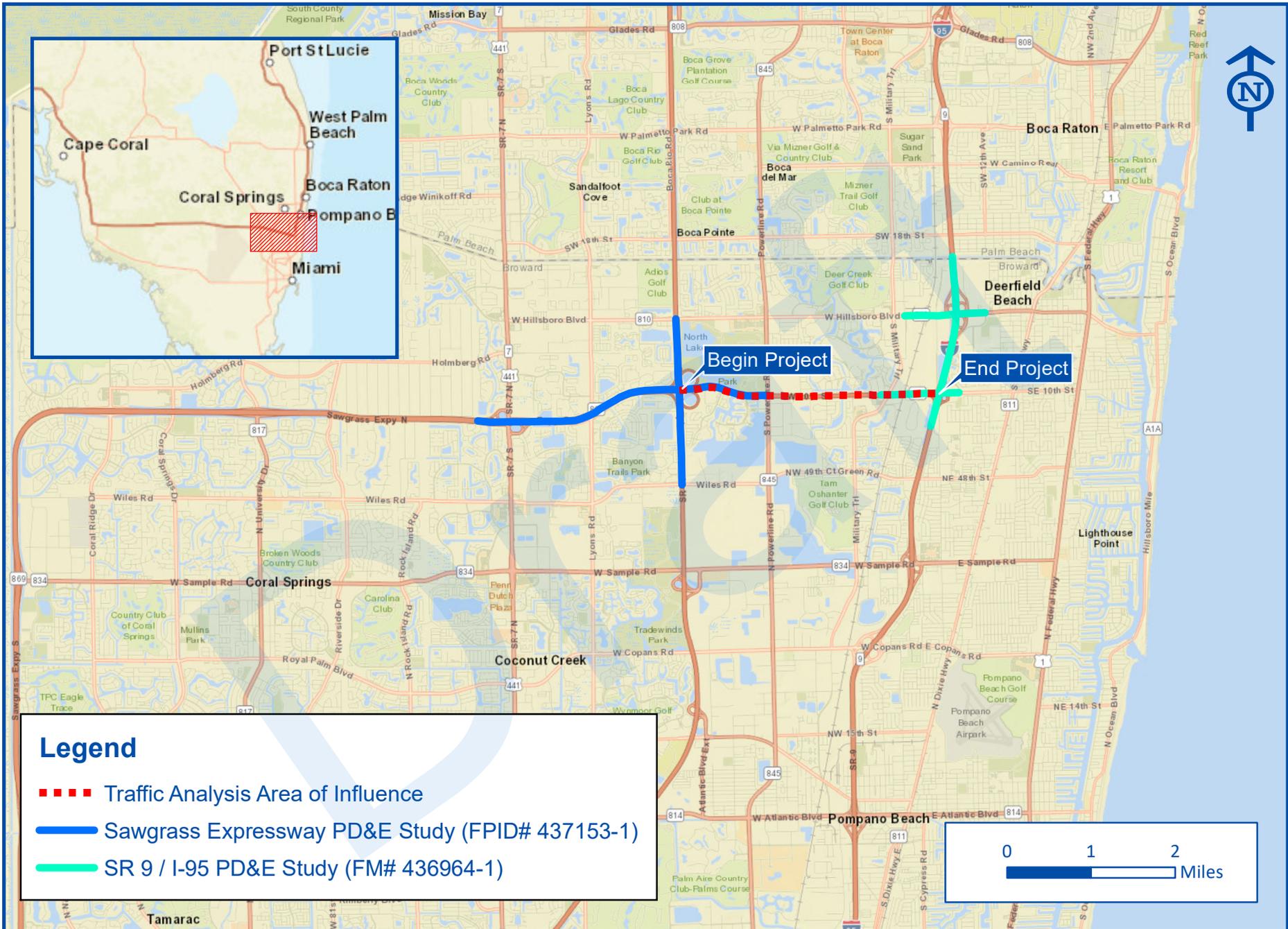
The SW 10th Street Connector project location and traffic analysis influence area is shown in Figure 2.12.1. A summary of the methodology and results of the traffic analysis are presented in the following sections.

2.12.1 Methodology

The SW 10th Street PD&E Project Traffic Forecast Memorandum (PTFM), dated January 2019, documents existing traffic data, existing conditions traffic operational analysis, travel demand modeling, future year traffic forecast, and traffic operational analysis for the No Action Alternative. Traffic forecast information contained in the PTFM, along with information provided in the *SW 10th Street Connector – Toll-Free Project Traffic Forecast Technical Memorandum*, dated July 2019, provides the basis for analysis of Build alternatives. The traffic analysis for the SW 10th Street Connector PD&E Study was completed in coordination with the I-95 PD&E Study from SW 10th Street to Hillsboro Boulevard (FM# 436964-1) to ensure that key assumptions are consistent. The traffic analysis for the SW 10th Street Connector PD&E Study is documented in the SW 10th Street Connector PD&E Project Traffic Analysis Report (PTAR), available under separate cover.

2.12.2 Data Collection

Traffic volume data for the SW 10th Street corridor was obtained through multiple data collection efforts that were also supplemented with existing and historical data from the FDOT Florida Traffic Information (FTI) online website application. Traffic volume, origin-destination, and speed data was collected in 2014, 2015 and 2016. Turning movement and 24-hour continuous count data for SW 10th Street between Sawgrass Expressway and Powerline Road were collected in October and November 2014 as part of the Sawgrass Expressway (south of Sunrise Boulevard to south of US 441) PD&E Study Traffic Technical Memorandum (TTM) effort. Additional turning movement and 24-hour continuous traffic



Legend

- ■ ■ ■ Traffic Analysis Area of Influence
- Sawgrass Expressway PD&E Study (FPID# 437153-1)
- SR 9 / I-95 PD&E Study (FM# 436964-1)



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Financial Project ID: 439891-1-22-02, ETDM No: 14291

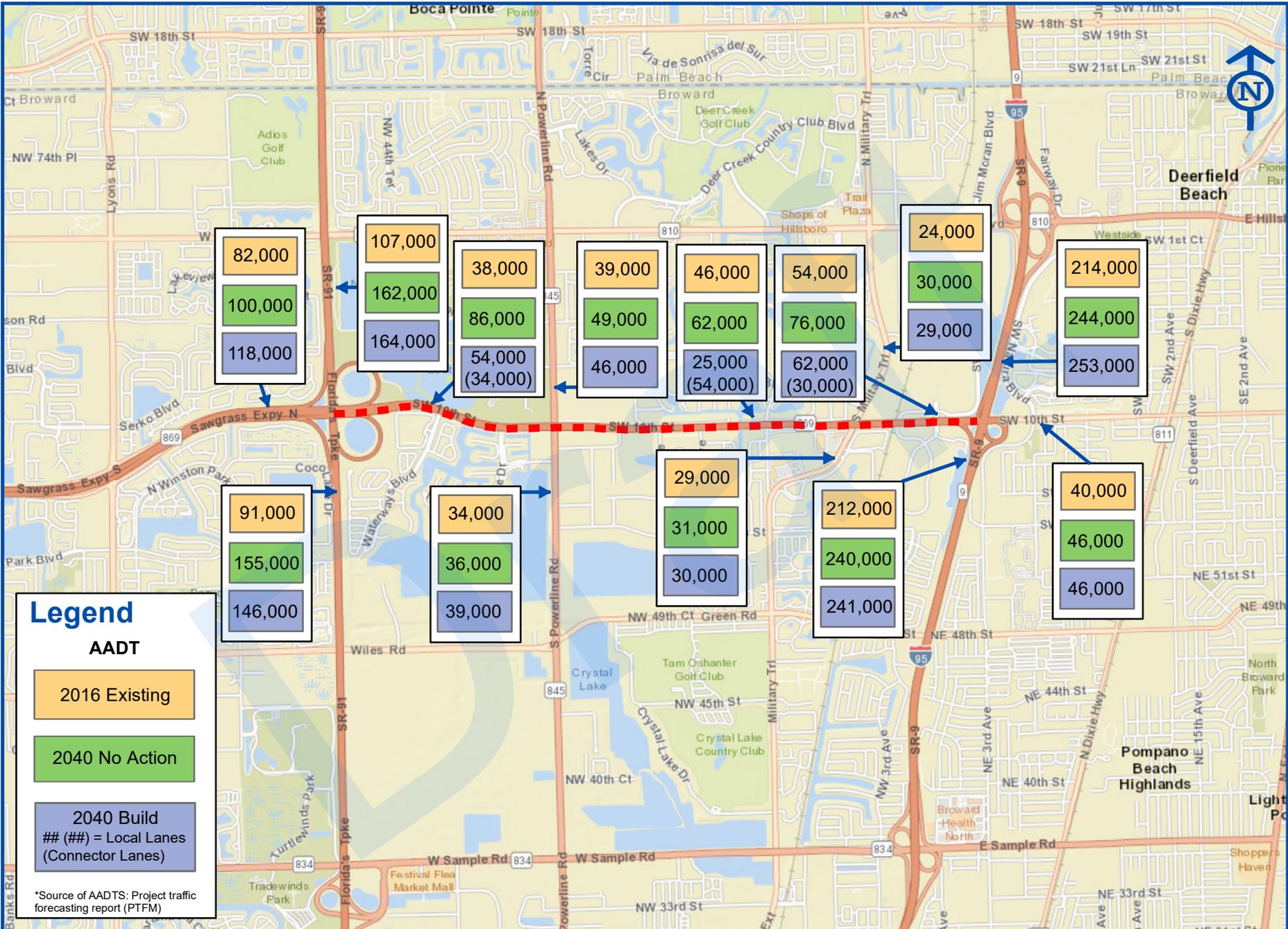
Figure 2.12.1
Project Location and Traffic Analysis Area of Influence



counts along SW 10th Street were collected by FDOT District Four in March 2016. FTE collected more turning movement and 24-hour continuous traffic counts along SW 10th Street, Powerline Road, and Military Trail in October 2016.

The traffic volume data was used to estimate the existing year 2016 AADT and directional design hour volumes (DDHVs) along the corridor, as well as AM and PM weekday peak hour intersection turning movement volumes at the study intersections. The peak hours on SW 10th Street are 7:30am – 8:30am and 5:00pm – 6:00pm. Figure 2.12.2 shows the existing year 2016 AADT volumes, while Figure 2.12.3 depicts the existing year 2016 AM and PM peak hour volumes.

Bluetooth origin-destination (O-D) data collection efforts were also completed for the SW 10th Street study corridor. Florida's Turnpike Enterprise completed an O-D study for portions of the Sawgrass Expressway, Turnpike, SW 10th Street, and I-95 in February 2015 to support multiple projects in the area. FDOT District Four collected O-D data for the SW 10th Street corridor between Florida's Turnpike and I-95 in April 2016 using Bluetooth equipment. The O-D data obtained from both efforts provided information about daily and AM and PM peak period traffic patterns. It also gave insight into the number of vehicles that would be eligible to use the proposed SW 10th Street managed lanes. The PTFM, which documents the data collection efforts within the area of influence, is available under separate cover.

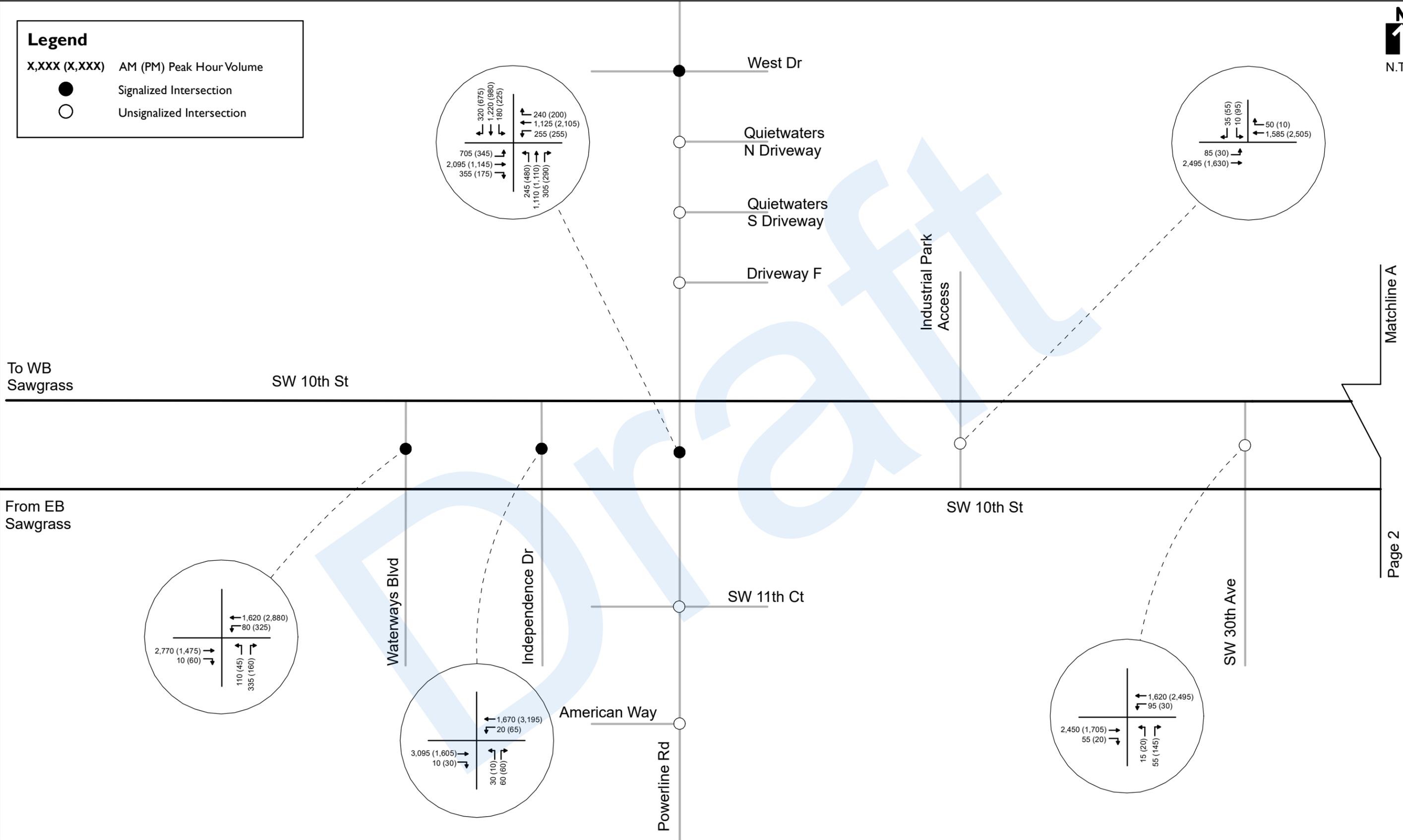


Legend

X,XXX (X,XXX) AM (PM) Peak Hour Volume

● Signalized Intersection

○ Unsignalized Intersection



Matchline A

Page 2

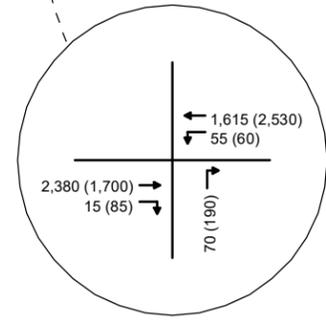
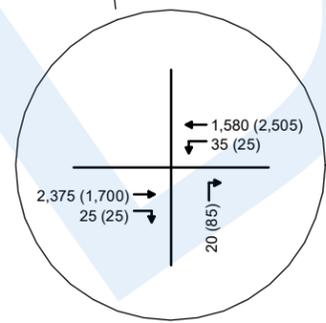
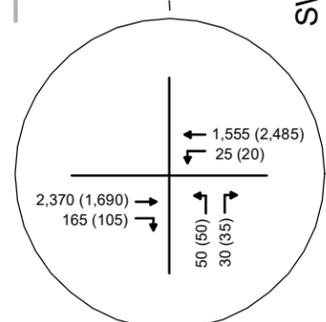
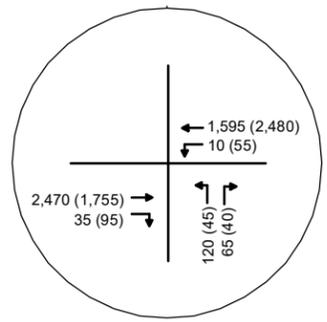
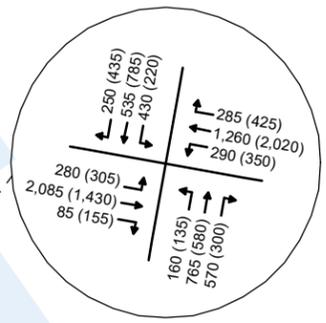
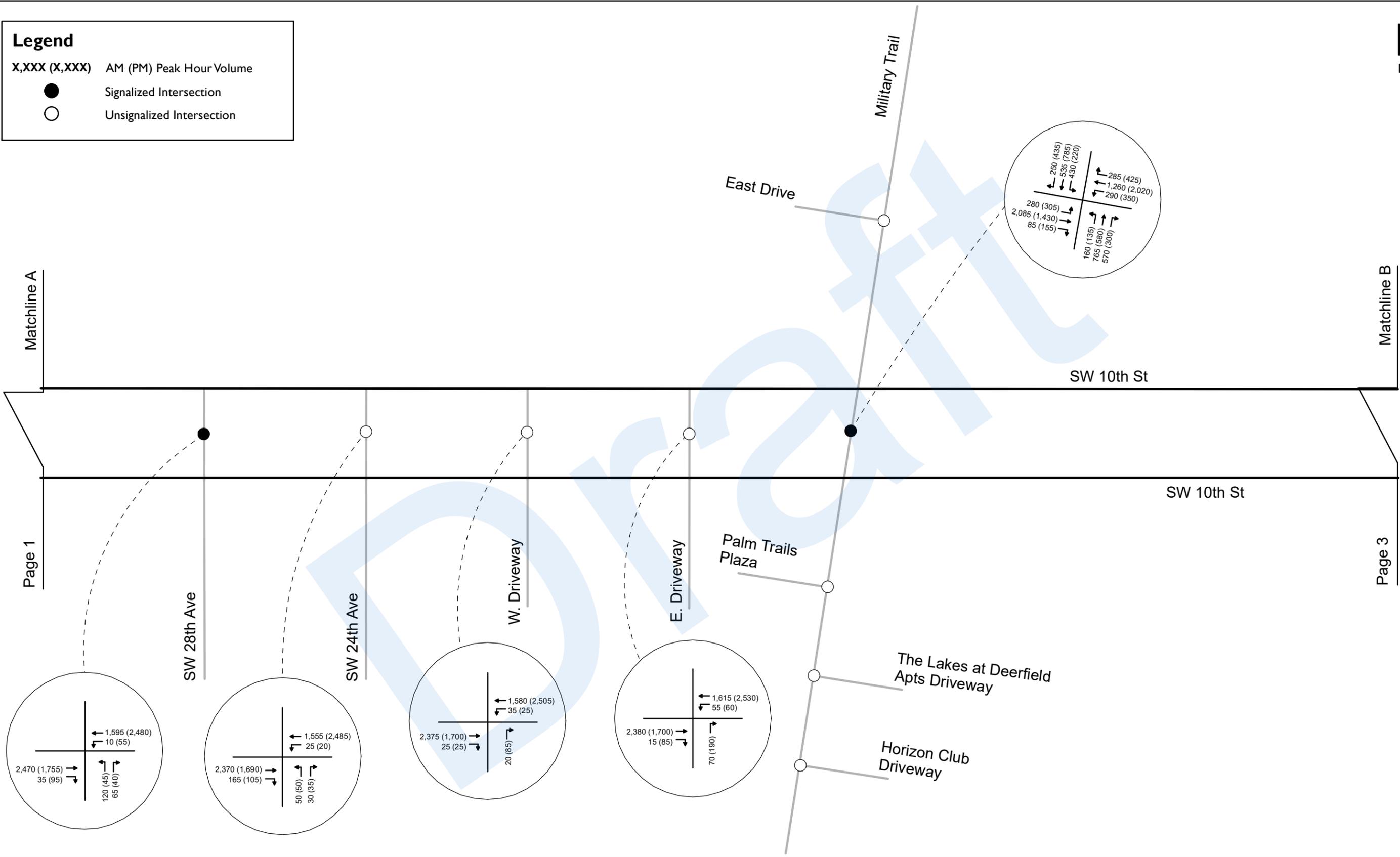


Legend

X,XXX (X,XXX) AM (PM) Peak Hour Volume

● Signalized Intersection

○ Unsignalized Intersection



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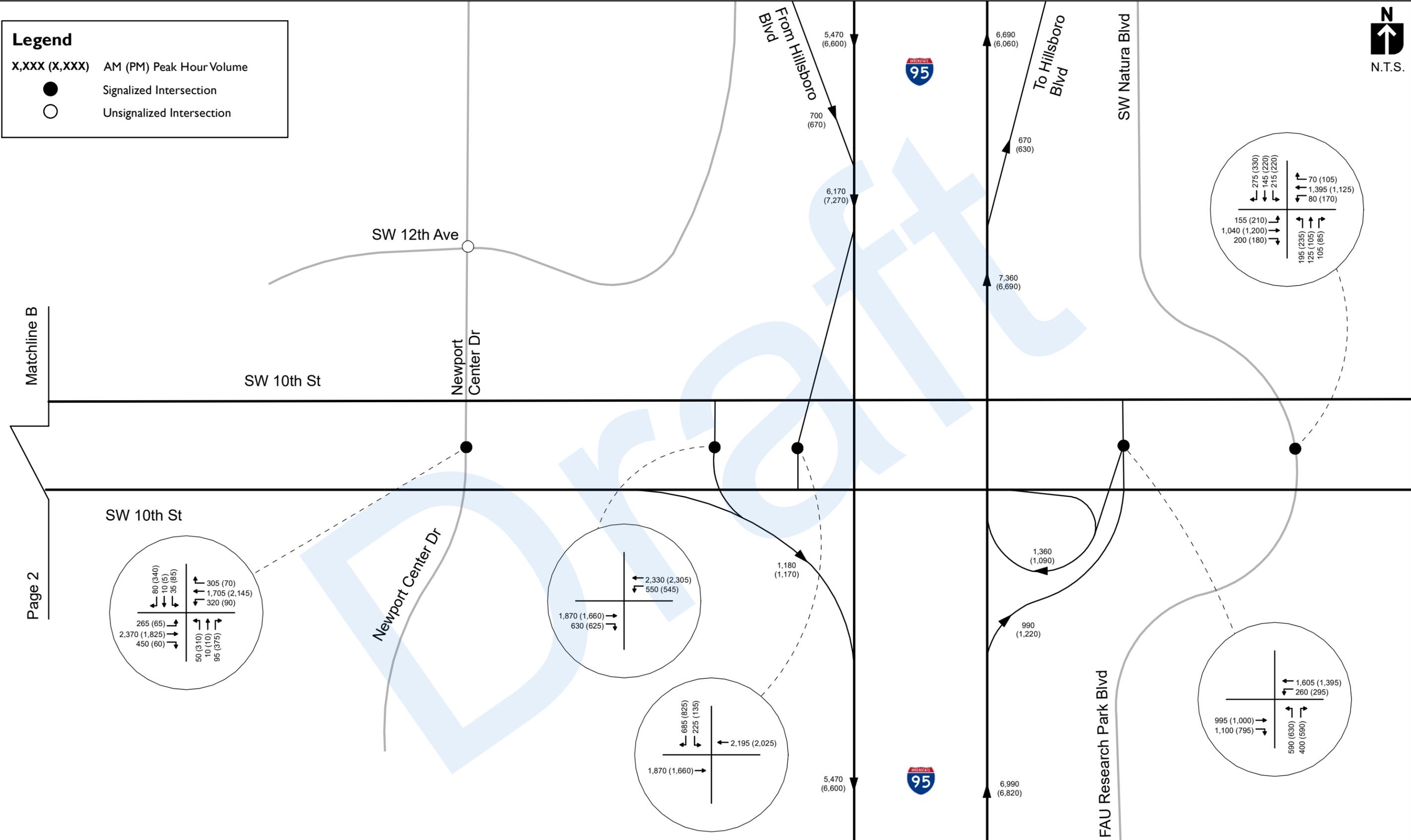
Figure 2.12.3
 Existing Year 2016 AM and
 PM Peak Hour Volumes

Legend

X,XXX (X,XXX) AM (PM) Peak Hour Volume

● Signalized Intersection

○ Unsignalized Intersection



Matchline B

Page 2



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Figure 2.12.3
Existing Year 2016 AM and PM Peak Hour Volumes

2.12.3 Traffic Development

Future year 2040 daily and peak hour traffic forecasts were developed for the SW 10th Street study corridor assuming various roadway network scenarios, including the No Action Alternative and Build Alternative. An adjusted and validated version of the Southeast Regional Planning Model (SERPM) 6.5.4, developed by FTE, was used to develop future volumes for this study. The SERPM-FTE model has a base year of 2010 and future year models were developed for years 2020 and 2040. The travel demand model (SERPM-FTE) used for the SW 10th Street project was built upon the Sawgrass PD&E travel demand model, and includes the most recent SERPM 7 socioeconomic data (version 7.062). The SERPM-FTE model was used to produce travel demand forecasts at a daily level and for three time periods: AM peak period (6:30 AM – 9:30 AM), PM peak period (3:30 PM – 6:30 PM), and off-peak period (remainder of the day).

Base 2040 forecasted volumes were first developed using the Florida's Turnpike Express Lane Time-of-Day (ELToD) model v2.2 in conjunction with the SERPM-FTE model. Year 2040 traffic volumes were forecasted for multiple scenarios and documented in the PTFM including:

- A scenario (first termed “Partial Build” in the PTFM and later termed “No Action Alternative” in the PD&E PTAR and PER) which assumes no improvements constructed along SW 10th Street, but planned improvements are constructed at the SW 10th Street and Sawgrass Expressway / Turnpike interchange and at the SW 10th Street and I-95 interchange.
- Multiple Build Alternative scenarios with various Connector lane (managed lane) access configurations (termed “Build Alternatives – North and Center alignments – Options 3D-1.1 through Option 3D-1.6” in the PTFM) which assume Connector lanes are constructed along SW 10th Street, and planned improvements are constructed at the SW 10th Street and Sawgrass Expressway / Turnpike interchange and at the SW 10th Street and I-95 interchange.

The initial Build Alternative 2040 forecasts as documented in the PTFM, assumed some portion of the Connector lanes would be tolled and trucks with three or more axles would not be allowed to use the Connector lanes. Subsequent to the PTFM being published, additional Build Alternative forecast scenarios were developed assuming the SW 10th Street Connector

corridor would be toll-free for some or all of the corridor limits from the Turnpike to I-95. In addition, the new volume forecasts assumed no vehicle eligibility restrictions, so that trucks with three or more axles would have access to and from the Connector lanes. These new 2040 Build Alternative volumes are documented in the *SW 10th Street Connector – Toll-Free Project Traffic Forecast* technical memorandum dated July 18, 2019 as Scenario 2. The final forecasted AADTs, along with K-factors and D-factors, were used to develop corridor-wide directional design hour volumes (DDHV) for the AM and PM peak hours. These volumes documented in the memorandum were used to estimate the 2040 peak hour turning movement volumes throughout each of the study intersections and were then used to complete the 2040 traffic operational analysis of the Build Alternative.

The resulting average annual linear traffic growth rate per year based on the 2016 AADTs and 2040 AADTs along the SW 10th Street corridor, is 2.68% for the No Action Alternative, and 3.75% for the Build Alternative. The 2040 No Action Alternative AADTs and 2040 Build Alternative AADTs are shown in Figure 2.12.2. The 2040 AM and PM peak hour volumes are shown in Figure 2.12.4 for the No Action Alternative, and Figure 2.12.5 for the Build Alternative.

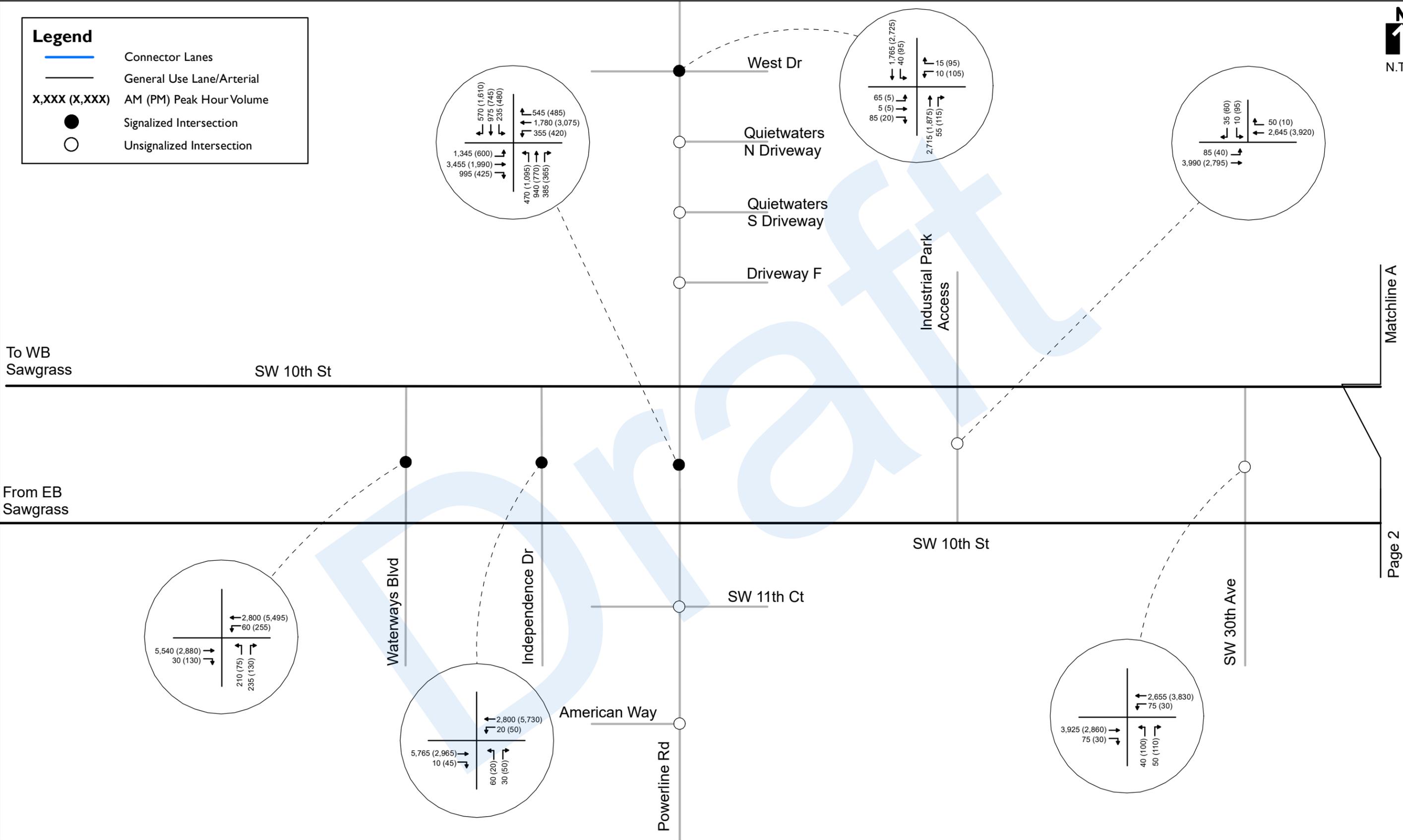
2.12.4 Analysis Procedures

The AM and PM peak hour operations along the SW 10th Street corridor were assessed under existing conditions, 2040 No Action, and 2040 Build conditions. For each of the three scenarios, the directional AM and PM peak hour volumes along the corridor were assessed against the generalized roadway capacity. In addition, intersection LOS and delays were analyzed using Synchro software and Highway Capacity Methodology for existing conditions, and using VISSIM microsimulation software for future year 2040 No Action and Build Alternatives.



Legend

-  Connector Lanes
-  General Use Lane/Arterial
- X,XXX (X,XXX)** AM (PM) Peak Hour Volume
-  Signalized Intersection
-  Unsignalized Intersection



To WB Sawgrass

SW 10th St

From EB Sawgrass

SW 10th St

SW 11th Ct

American Way

SW 30th Ave

Matchline A

Page 2



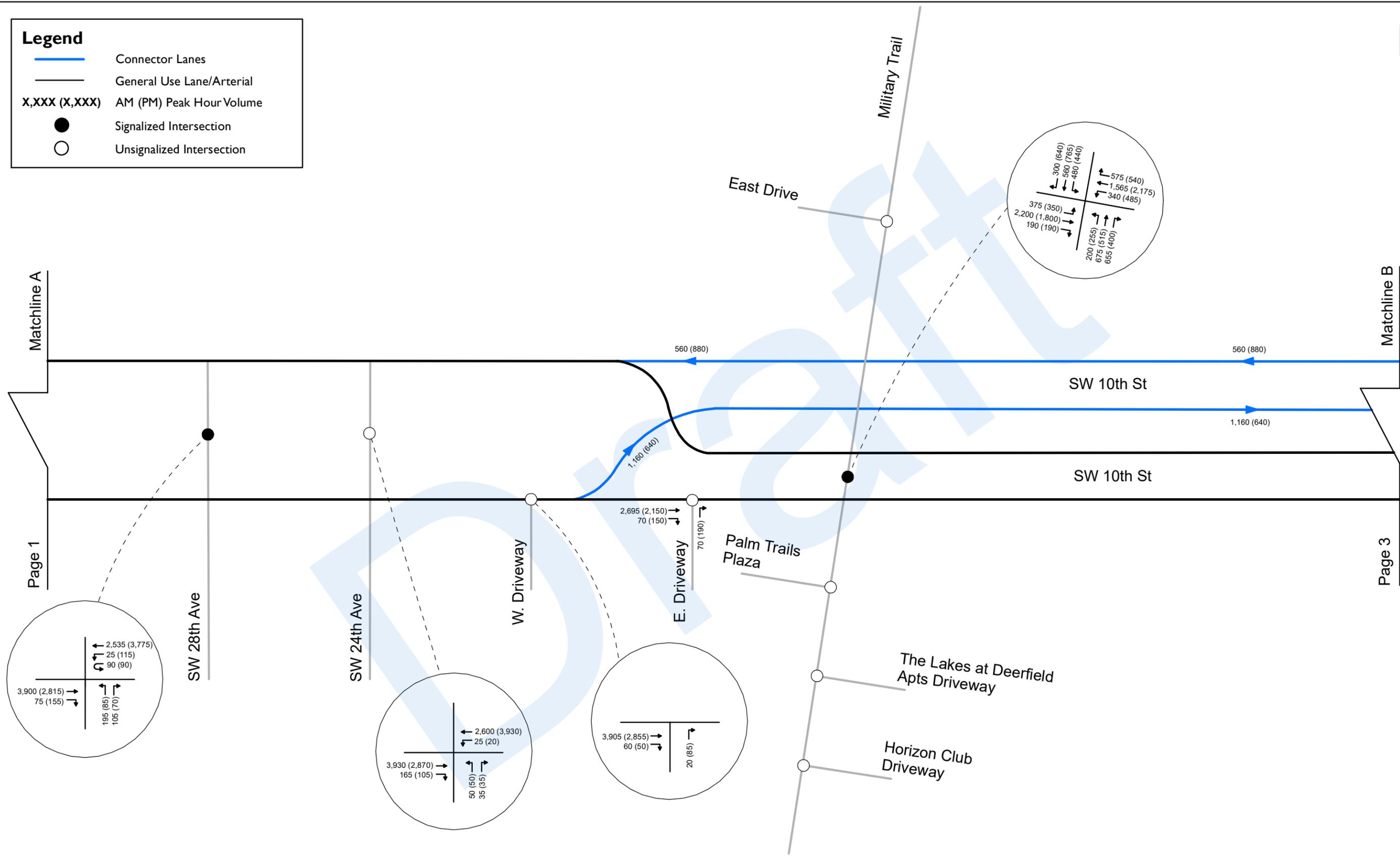
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Figure 2.12.4
 2040 No Action AM and PM Peak Hour Volume



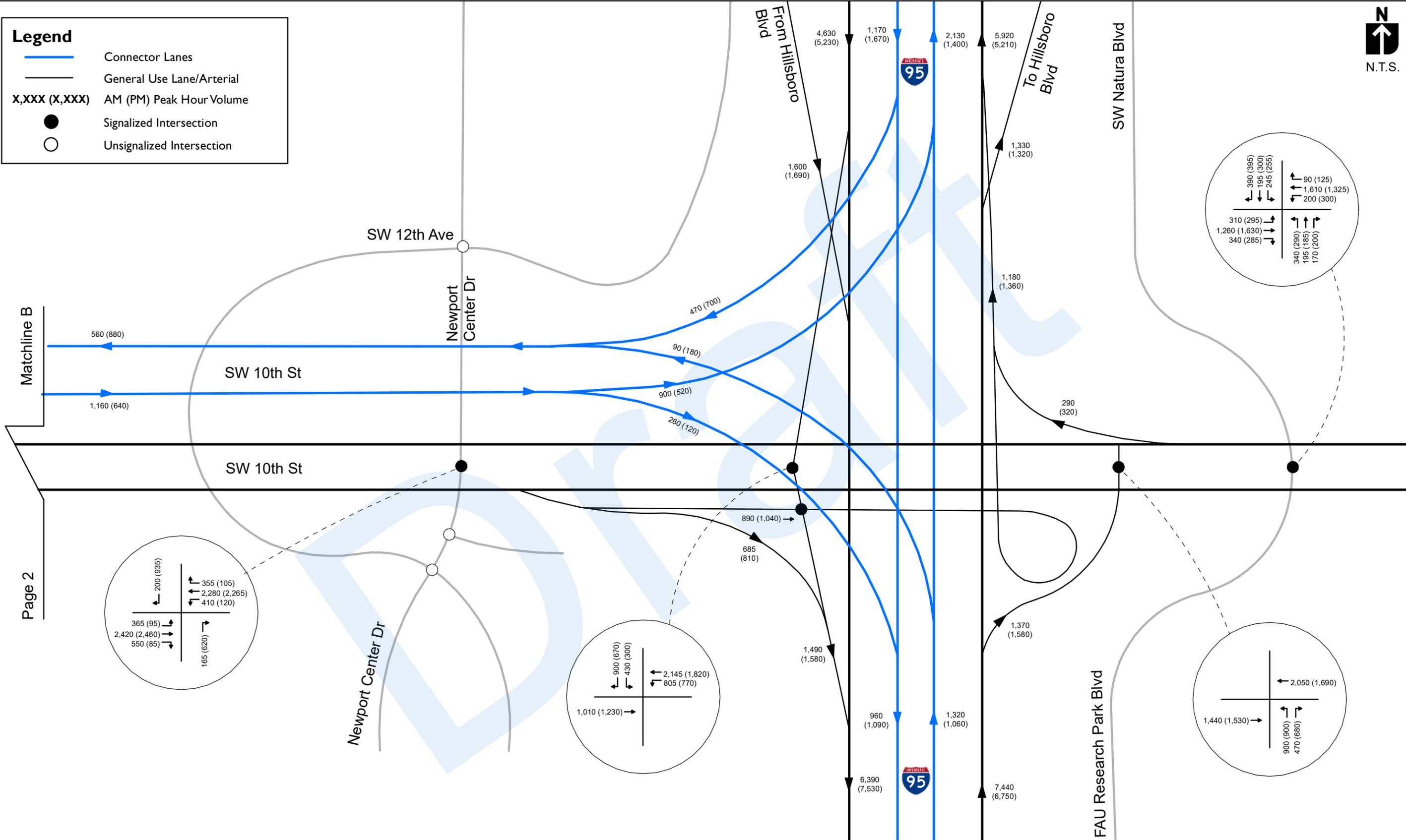
Legend

- Connector Lanes
- General Use Lane/Arterial
- X,XXX (X,XXX) AM (PM) Peak Hour Volume
- Signalized Intersection
- Unsignalized Intersection



Legend

- Connector Lanes
- General Use Lane/Arterial
- X,XXX (X,XXX) AM (PM) Peak Hour Volume
- Signalized Intersection
- Unsignalized Intersection



Matchline B

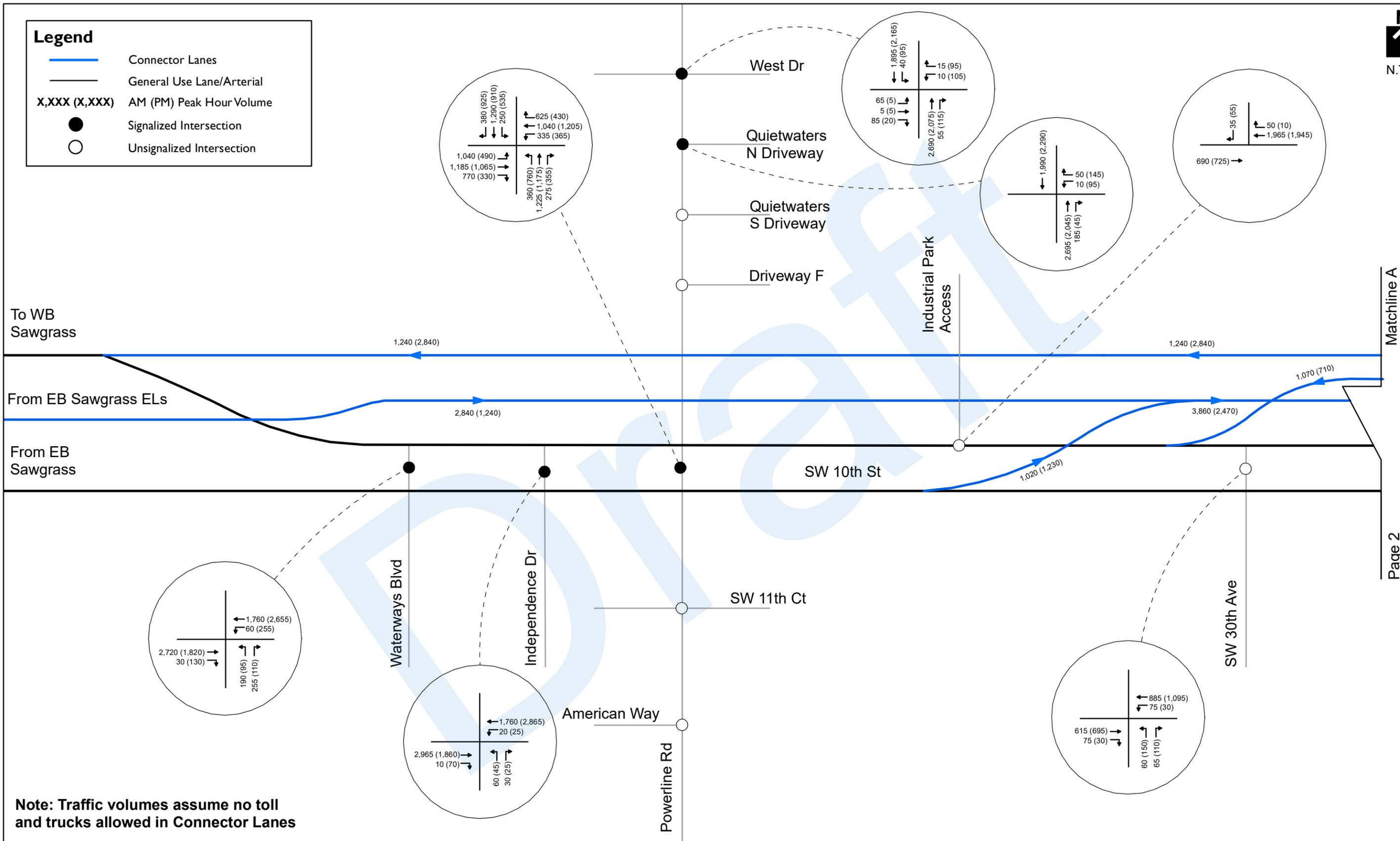
Page 2





Legend

- Connector Lanes
- General Use Lane/Arterial
- X,XXX (X,XXX)** AM (PM) Peak Hour Volume
- Signalized Intersection
- Unsignalized Intersection



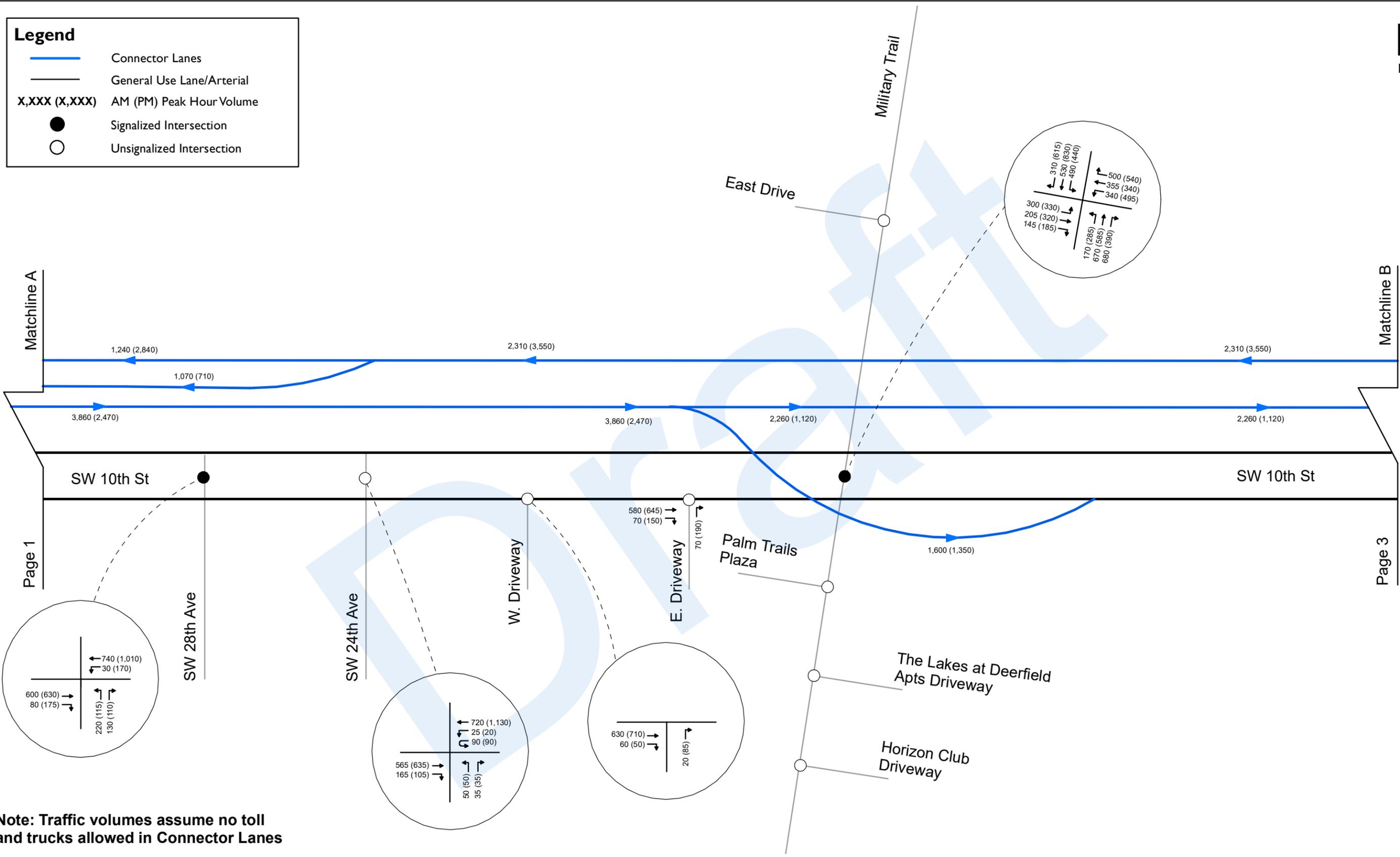
Note: Traffic volumes assume no toll and trucks allowed in Connector Lanes





Legend

- Connector Lanes
- General Use Lane/Arterial
- X,XXX (X,XXX) AM (PM) Peak Hour Volume
- Signalized Intersection
- Unsignalized Intersection

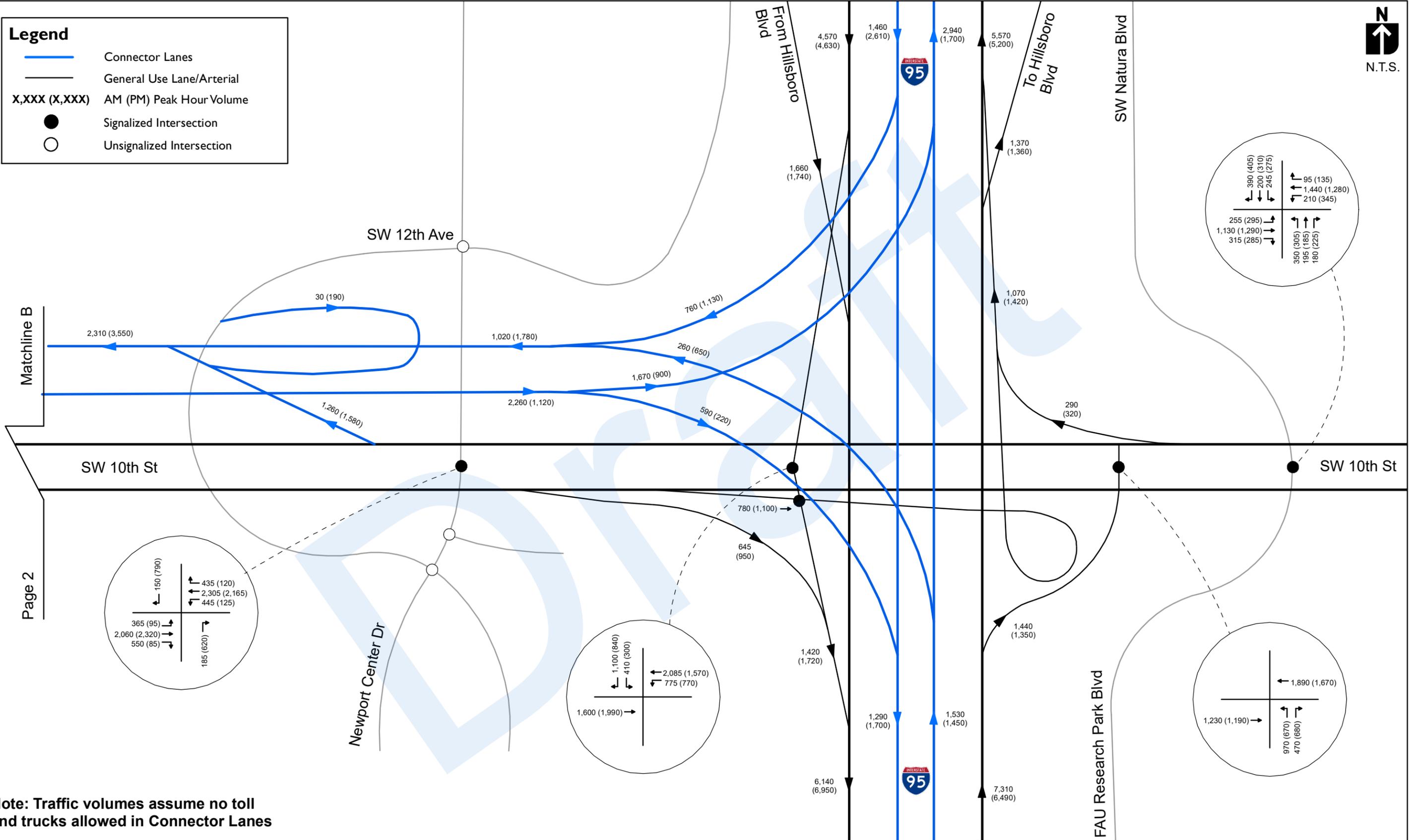


Note: Traffic volumes assume no toll and trucks allowed in Connector Lanes



Legend

-  Connector Lanes
-  General Use Lane/Arterial
- X,XXX (X,XXX)** AM (PM) Peak Hour Volume
-  Signalized Intersection
-  Unsignalized Intersection



Note: Traffic volumes assume no toll and trucks allowed in Connector Lanes



Using VISSIM, the 2040 AM and PM peak hour operations for the No Action and Build Alternatives were analyzed and the average travel speeds in the local lanes and Connector lanes were evaluated. In addition, for the Build Alternative, the 2040 AM and PM peak hour density and LOS for the Connector lanes were also analyzed to ensure these new lanes would operate acceptably. In the analysis of the Build Alternative, truck traffic, including trucks with three or more axles, was assumed to be eligible to utilize the Connector lanes, and tolling was not assumed for the Connector lanes.

FDOT Policy Topic No. 000-525-006c provides LOS targets for the State Highway System. The LOS target for the SW 10th Street corridor and intersections is LOS D. The Build Alternative aims to improve operational and safety conditions over the existing and No Action conditions.

2.12.5 Existing Conditions Analysis

The primary objective of the existing conditions analysis is to establish the current operational conditions along the SW 10th Street corridor. The 2016 existing conditions lane geometry for the roadways and intersections within the study area is shown in Figure 2.12.6. The existing geometry, volumes, and signal timings were used to analyze the existing (2016) conditions.

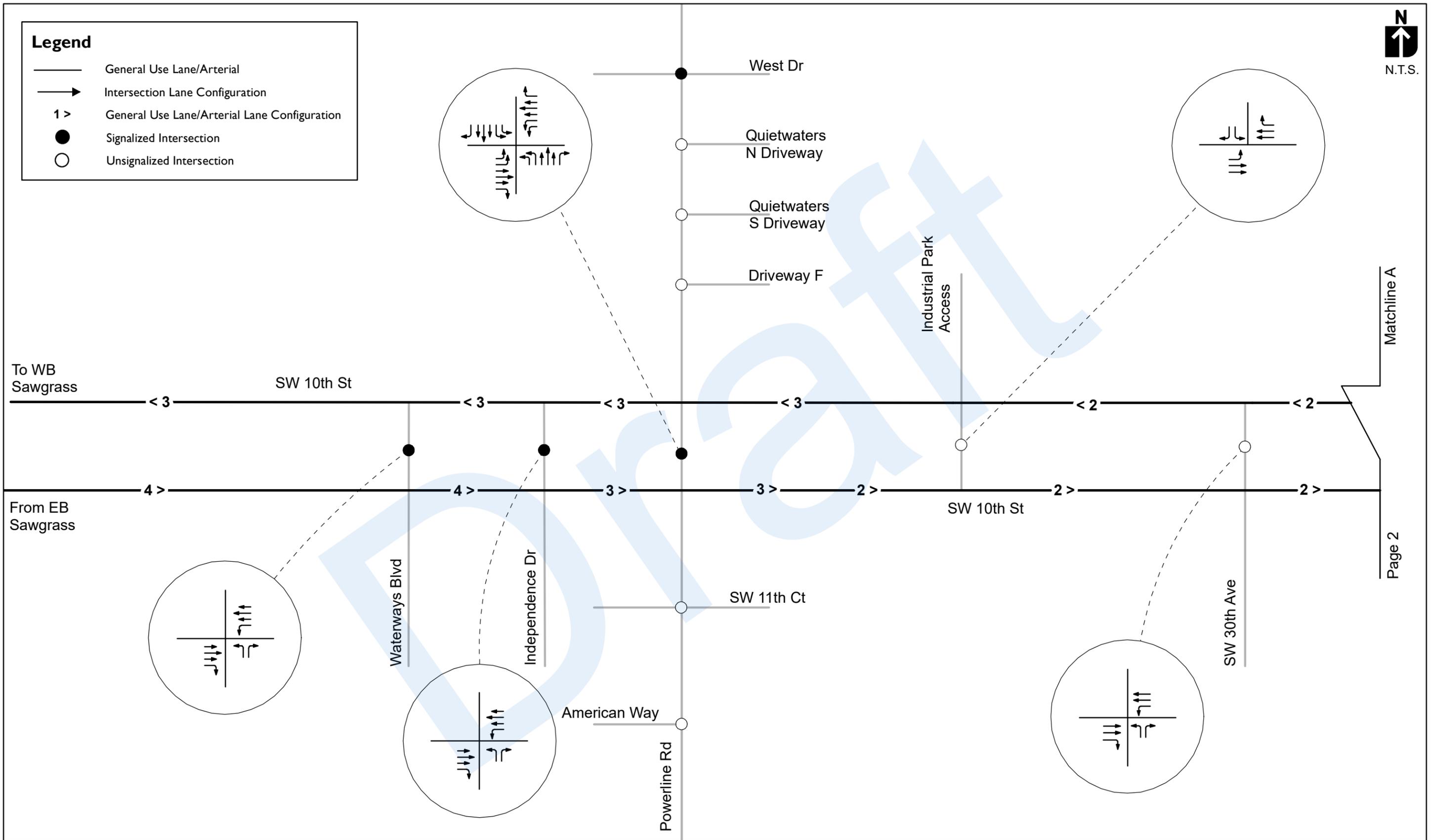
To assess existing traffic conditions along the corridor, the directional peak hour volumes were compared to the roadway capacity. Generalized peak hour directional capacity values from the 2013 FDOT Quality / Level of Service Handbook for an urbanized area were utilized. The posted speed limit on SW 10th Street between Florida's Turnpike and I-95, is 45 mph and 40 mph in various segments. Therefore, the existing conditions roadway capacity for SW 10th Street is based on the LOS D thresholds for a Class I state signalized arterial (40 mph or higher). The capacity adjustment factor for exclusive right turn lanes was applied to all local lane segments along SW 10th Street, since all major intersections include exclusive right turn lanes. The results of the volume-to-capacity analysis for existing conditions are shown in Table 2.12.1.

Legend

- General Use Lane/Arterial
- Intersection Lane Configuration
- 1 > General Use Lane/Arterial Lane Configuration
- Signalized Intersection
- Unsignalized Intersection



N.T.S.



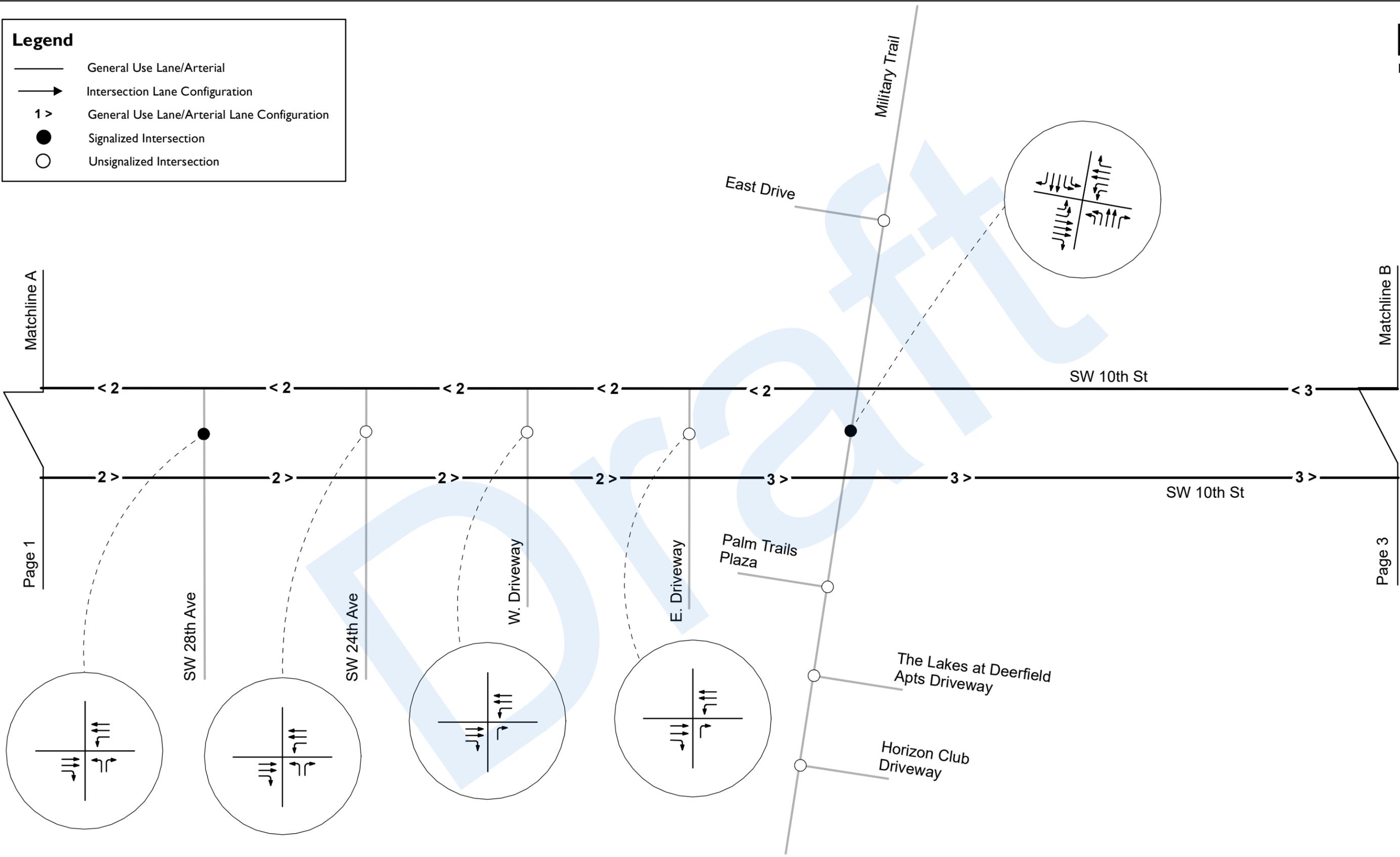
Matchline A

Page 2



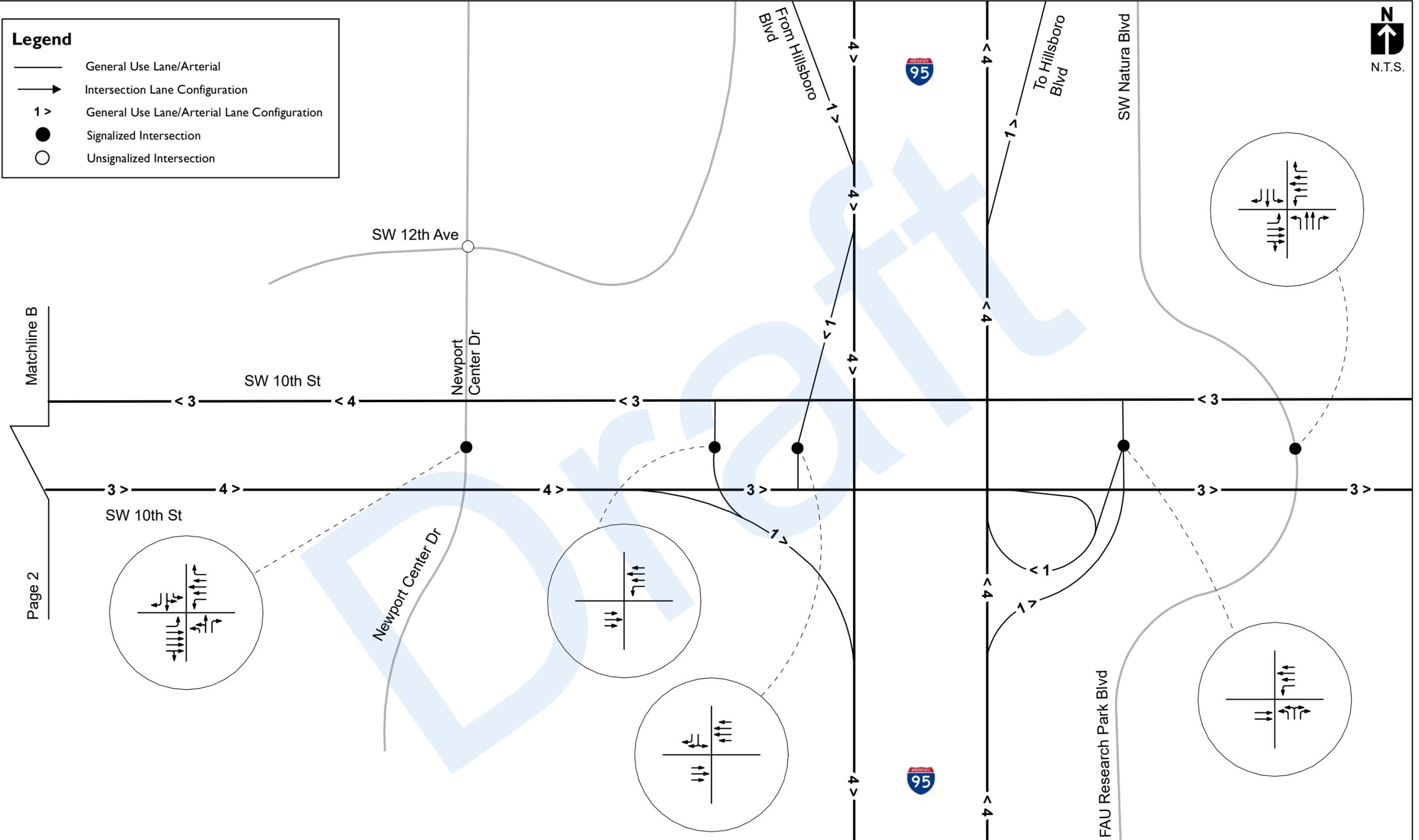
Legend

- General Use Lane/Arterial
- Intersection Lane Configuration
- 1 > General Use Lane/Arterial Lane Configuration
- Signalized Intersection
- Unsignalized Intersection



Legend

- General Use Lane/Arterial
- Intersection Lane Configuration
- 1 > General Use Lane/Arterial Lane Configuration
- Signalized Intersection
- Unsignalized Intersection



State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
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Figure 2.12.6
Existing Year 2016
Lane Configuration

Table 2.12.1: Existing Traffic Operational Analysis

	SW 10 th Street Segments Location Description	No. of Lanes	Volume		Capacity ⁽¹⁾	LOS ⁽²⁾		V/C ⁽³⁾	
			AM	PM		AM	PM	AM	PM
SW 10 th Street Eastbound	West of Waterways	4	2,780	1,535	4,242	C	C	0.66	0.36
	Waterways Blvd to Independence Dr	4	3,105	1,635	4,242	C	C	0.73	0.39
	Independence Dr to Powerline Rd	3	3,155	1,665	3,171	D	C	0.99	0.53
	Powerline Rd to west of SW 30th Ave	3	2,580	1,660	3,171	C	C	0.81	0.52
	West of SW 30th Ave to SW 28th Ave	2	2,505	1,850	2,100	F	C	1.19	0.88
	SW 28th Ave to SW 24th Ave	2	2,535	1,795	2,100	F	C	1.21	0.85
	SW 24th Ave to west of Military Trail	2	2,400	1,785	2,100	F	C	1.14	0.85
	West of Military Trail to west of Newport Center Dr	3	3,085	1,950	3,171	C	C	0.97	0.61
	West of Newport Center Drive to I-95 SB On-Ramp	4	3,085	2,285	4,242	C	C	0.73	0.54
	I-95 SB On-Ramp to Natura Blvd	3	2,095	1,795	3,171	C	C	0.66	0.57
	East of Natura Blvd	3	1,360	1,505	3,171	C	C	0.43	0.47
	SW 10 th Street Westbound	West of Waterways	3	1,730	2,925	3,171	C	C	0.55
Waterways Blvd to Independence Dr		3	1,700	3,205	3,171	C	F	0.54	1.01
Independence Dr to Powerline Rd		3	1,690	3,260	3,171	C	F	0.53	1.03
Powerline Rd to west of SW 30th Ave		3	1,620	2,560	3,171	C	C	0.51	0.81
West of SW 30th Ave to SW 28th Ave		2	1,715	2,525	2,100	C	F	0.82	1.2
SW 28th Ave to SW 24th Ave		2	1,605	2,535	2,100	C	F	0.76	1.21
SW 24th Ave to Military Trail		2	1,670	2,590	2,100	C	F	0.8	1.23
Military Trail to west of Newport Center Dr		3	1,835	2,795	3,171	C	C	0.58	0.88
West of Newport Center Drive to Newport Center Drive		4	1,835	2,795	4,242	C	C	0.43	0.66
Newport Center Drive to I-95 SB Off-Ramp		3	2,330	2,305	3,171	C	C	0.73	0.73
I-95 SB Off-Ramp to Natura Blvd		3	2,195	2,025	3,171	C	C	0.69	0.64
East of Natura Blvd		3	1,545	1,400	3,171	C	C	0.49	0.44

NOTES:

(1) Capacity thresholds from FDOT 2012 Generalized LOS Peak Hour Directional Volumes Table for Urbanized Areas at LOS D for Class I arterial (40 mph or higher), with +5% capacity adjustment for right turn lanes.

(2) LOS = Level of Service

(3) V/C = Ratio of Volume to Capacity

Eastbound SW 10th Street traffic is heavier than westbound traffic during the AM peak hour, while westbound traffic is heaviest during the PM peak hour. During the AM peak hour, eastbound SW 10th Street traffic exceeds the roadway capacity from west of SW 30th Avenue to west of Military Trail. During the PM peak hour, westbound SW 10th Street traffic exceeds capacity from Military Trail to west of SW 30th Avenue, and from Powerline Road to Waterways Boulevard.

Existing conditions intersection analysis was completed using Synchro (version 9.2) software and Highway Capacity Manual (HCM) 2000 intersection analysis methodology. The 2016 existing turning movement volumes, intersection lane configurations, and existing signal timing plans were used to assess the intersection operations during the AM and PM peak hour. A summary of the existing conditions LOS and delays for each of the study intersections along the SW 10th Street corridor is provided in Table 2.12.2. Results show that four intersections operate at a failing LOS in the AM peak hour, while five intersections operate at a failing LOS in the PM peak hour.

Field observations confirm significant queueing along the SW 10th Street corridor during the AM and PM peak hours. Significant queue lengths were observed at the following locations:

AM Peak Hour

- Eastbound at the Powerline Road and SW 10th Street intersection;
- Eastbound and northbound at the Military Trail and SW 10th Street intersection; and
- Eastbound and westbound queues on SW 10th Street between Military Trail and I-95.

PM Peak Hour

- Eastbound, westbound, northbound, and southbound at the Powerline Road and SW 10th Street intersection;
- Eastbound and southbound at the Military Trail and SW 10th Street intersection; and
- Westbound queues on SW 10th Street between Military Trail and I-95.

Table 2.12.2: Existing Conditions Intersection Analysis

SW 10 th Street Intersection		Measure	AM	PM
Waterways Blvd	Signalized	LOS	B	B
		Delay (sec)	14	12
Independence Dr	Signalized	LOS	A	B
		Delay (sec)	7	11
Powerline Rd	Signalized	LOS	F	F
		Delay (sec)	88	110
SW 30th Ave	Unsignalized	LOS	F	F
		Delay (sec)	166	372
SW 28th Ave	Signalized	LOS	C	A
		Delay (sec)	29	8
SW 24th Ave	Unsignalized	LOS	F	F
		Delay (sec)	120	114
Military Trail	Signalized	LOS	F	F
		Delay (sec)	86	96
Newport Center Dr	Signalized	LOS	C	D
		Delay (sec)	33	38
I-95 Southbound On Ramp	Signalized	LOS	B	B
		Delay (sec)	19	16
I-95 Southbound Off Ramp	Signalized	LOS	D	D
		Delay (sec)	35	46
I-95 Northbound Ramps	Signalized	LOS	D	F
		Delay (sec)	48	96
Natura Blvd	Signalized	LOS	D	D
		Delay (sec)	38	49

NOTE: Results are documented in the June 2018 SW 10th Street PD&E Study Project Traffic Forecast Memorandum.

2.13 Intersection Layout and Traffic Control

Two interchanges bookend the SW 10th Street project corridor:

- SW 10th Street and Florida’s Turnpike / Sawgrass Expressway; and
- SW 10th Street and I-95.

In addition to the two interchanges, the corridor includes seven signalized intersections, three non-signalized full median openings, and two non-signalized directional median openings. The following signalized intersections are located in the project corridor:

- Waterways Boulevard;
- Independence Drive;
- Powerline Road;
- SW 28th Avenue;
- Military Trail;
- Newport Center Drive; and
- I-95 Southbound Entrance Ramp.

For a complete list of median openings see Section 2.5, Table 2.5.1.

2.14 Railroad Crossings

The South Florida Rail Corridor (SFRC) / CSX Railroad lies approximately 0.2 miles east of the Military Trail. SW 10th Street overpasses over the SFRC / CSX Railroad.

2.15 Crash Data and Safety Analysis

FDOT's Crash Analysis Reporting System (CARS) was used to gather historical crash records for the SW 10th Street corridor (SR 869) from Florida's Turnpike / Sawgrass Expressway to I-95. Crashes were gathered for Roadway ID 86472000 (Sawgrass Expressway) from MP 20.647 to 21.835 (Florida's Turnpike to Powerline Road), and Roadway ID 86012000 (SW 10th Street from MP 0.000 to 2.152 (Powerline Road to I-95)). CARS is a database maintained annually by the FDOT for crashes reported along state highway facilities. The database provides information on various characteristics associated with each crash including: collision type, severity, weather conditions, road surface conditions and date/time information. The CARS database was researched to identify and extract crashes reported along the study corridor during the period from January 1, 2012 through December 31, 2016. The crashes were analyzed to make an assessment of safety conditions along the study corridor. A summary of the data and findings from the safety analysis are summarized below.

Crash data for the SW 10th Street corridor from Florida’s Turnpike / Sawgrass Expressway to I-95 revealed that a total of 896 reported crashes occurred during the five year period from January 2012 through December 2016. There were 342 injury crashes (or 38%) and 1 fatal crash (occurred in 2015) during the study period. A majority of the crashes experienced along the study corridor were rear end collisions accounting for 490 crashes (or 55%), followed by angle collisions accounting for 102 crashes (or 11%), and 97 sideswipe crashes (or 11%). Approximately 69% of the crashes occurred during daylight conditions, and 26% of the crashes occurred during dark conditions. The remaining 5% of the crashes occurred during dusk or dawn. Approximately 82% of the crashes occurred under dry roadway surface conditions, and 18% occurred under wet roadway surface conditions.

The total number of crashes has increased over the last five years, with an average of 179 crashes per year in the study corridor. The majority of crashes were consistently rear end collisions each year, and the majority of crashes consistently happened during daylight, in clear weather, and dry conditions. In recent years, crashes were more frequent during weekdays. The highest period of crashes was from 6pm to midnight. The most common contributing causes cited for the accidents in the corridor were “Driving in a Careless or Negligent Manner” and “Followed too closely.” Table 2.15.1 shows the crash statistics for the SW 10th Street corridor.

Table 2.15.1: Crash History - SW 10th Street from Sawgrass/Turnpike to I-95

	Year					5 Year Total Crashes	Percentage
	2012	2013	2014	2015	2016		
Crash Type							
Rear End	87	81	90	122	110	490	54.7%
Head On	0	1	0	2	0	3	0.3%
Angle	22	19	21	20	20	102	11.4%
Left Turn	2	8	8	8	10	36	4.0%
Right Turn	0	0	0	2	2	4	0.4%
Sideswipe	22	10	20	19	26	97	10.8%
Backed Into	0	0	0	0	1	1	0.1%
Pedestrian	0	0	0	3	0	3	0.3%
Bicycle	0	3	0	3	2	8	0.9%
Fixed Object	13	10	15	6	11	55	6.1%
Other Non-Fixed Object Collisions	0	2	0	0	3	5	0.6%
Non-Collisions	1	1	5	3	7	17	1.9%
Others	11	11	13	21	19	75	8.4%
Total Crashes	158	146	172	209	211	896	100.0%

	Year					5 Year Total Crashes	Percentage
	2012	2013	2014	2015	2016		
Crash Severity							
PDO Crashes	100	85	118	112	138	553	61.7%
Fatal Crashes	0	0	0	1	0	1	0.1%
Injury Crashes	58	61	54	96	73	342	38.2%
Lighting Conditions							
Daylight	108	98	110	152	154	622	69.4%
Dusk	8	9	8	7	2	34	3.8%
Dawn	3	0	1	1	2	7	0.8%
Dark	39	39	53	49	53	233	26.0%
Road Surface Conditions							
Dry	121	117	137	177	183	735	82.0%
Wet	37	29	35	32	28	161	18.0%
Time of Crash							
00:00-06:00	13	9	14	15	13	64	7.1%
06:00-09:00	24	18	30	33	42	147	16.4%
09:00-11:00	19	19	16	18	15	87	9.7%
11:00-13:00	16	19	13	19	19	86	9.6%
13:00-15:00	15	16	16	24	30	101	11.3%
15:00-18:00	38	23	32	50	41	184	20.5%
18:00-24:00	33	42	51	50	51	227	25.3%
Contributing Cause							
No Contributing Action	6	13	3	7	6	35	3.9%
Careless or Negligent Manner	19	19	37	39	51	165	18.4%
Failed to Yield Right-Of-Way	15	7	7	14	12	55	6.1%
Improper Backing	2	2	5	1	1	11	1.2%
Improper Turn	2	1	4	5	5	17	1.9%
Followed too Closely	39	27	25	43	31	165	18.4%
Ran Red Light	1	8	4	10	5	28	3.1%
Drove too Fast for Conditions	8	11	5	11	3	38	4.2%
Ran Stop Sign	0	0	1	0	0	1	0.1%
Improper Passing	3	1	3	0	2	9	1.0%
Exceed Posted Speed	2	0	2	0	1	5	0.6%
Failed To Keep In Proper Lane	6	2	6	5	9	28	3.1%
Ran Off Roadway	1	0	1	0	1	3	0.3%
Disregarded Other Traffic Sign	1	0	0	1	0	2	0.2%
Disregarded other Road Markings	0	0	0	0	1	1	0.1%
Over-Correcting/Over-Steering	0	0	3	0	0	3	0.3%
Swerved Or Avoided	2	2	0	2	2	8	0.9%
Erratic, Reckless or Aggressive	1	3	0	0	2	6	0.7%
Other Contributing Action	50	50	66	71	79	316	35.3%
Weather Condition							
Clear	94	97	125	167	166	649	72.4%
Cloudy	40	27	22	24	32	145	16.2%
Rain	24	22	25	18	13	102	11.4%

2.15.1 High Crash Locations

FDOT's high crash lists (available from CARS) were reviewed for years 2012 through 2016 to identify High Crash Locations (HCL) within the study corridor. A high crash list is determined each year by FDOT using the CARS database, and the list is available as a Statewide, Districtwide, or Countywide list. The Districtwide list for District 4 HCLs was reviewed. High Crash Locations are determined based on data from similar roadways in similar locations within the District. For an urban area location (such as SW 10th Street) to be on the high crash list, the data must have a confidence level of 99.95%. This means there is a 99.95% confidence level that the crash rate of the location is abnormally high when compared with similar locations within District 4 in that year. Three segments and five intersections along the SW 10th Street corridor were identified as high crash locations (HCLs) during at least one year between 2012 and 2016. The locations on the high crash list are noted in the Table 2.15.2 along with the years in which the locations were listed. More information on the high crash locations is included in the Project Traffic Analysis Report (PTAR).

Table 2.15.2: SW 10th Street Corridor High Crash Locations

	Description	Roadway Section ID	Begin MP	End MP	Years on High Crash List
Segments					
1	SW 10 th St - Powerline Road to Quiet Waters Business Park driveway east of Powerline Road	86012000	0.000	0.300	2012, 2013, 2014
2	SW 10 th St - east of Palm Trails Plaza driveway west of Military Trail, to east of Military Trail	86012000	1.315	1.449	2012, 2013, 2014, 2015, 2016
3	SW 10 th St - west of Newport Center Drive to east of Newport Center Drive	86012000	1.749	1.849	2015, 2016
Intersections					
1	SW 10 th Street and SW 28 th Avenue	86012000	0.699		2013
2	SW 10 th Street and Military Trail	86012000	1.427		2012, 2013, 2014, 2015, 2016
3	SW 10 th Street and I-95 SB On-Ramp	86012000	1.955		2013
4	SW 10 th Street and I-95 SB Off-Ramp	86012000	2.010		2012, 2013, 2015, 2016
5	SW 10 th Street and I-95 NB On & Off-Ramp	86012000	2.118	2.149	2012, 2013, 2014, 2015

Note: Locations identified from the FDOT District 4 High Crash Lists available in CARS for years 2012, 2013, 2014, 2015, 2016.

2.16 Drainage

A Conceptual Drainage / Pond Siting Report was prepared for this PD&E Study and is available under separate cover. The purpose of this report is to define the conceptual drainage design, evaluate minimum offsite pond requirements, and identify the recommended stormwater management facility locations.

2.16.1 Existing Drainage System

The existing drainage within the study limits consist primarily of an open swale system that collects and retains roadway runoff, with overflow discharges to the Broward County Water Control District (BCWCD) #2 C-3 and C-2 canals. The existing drainage within the project limits can be divided into two distinct systems, which are then subdivided into several sub-basins based on existing collection and conveyance systems, interconnected stormwater

management facilities, and outfalls. The existing drainage systems have been delineated as described in the following paragraphs.

The C-3 Basin for this study is defined as the segment of SW 10th Street from the begin project limits to the centerline of Powerline Road. The receiving waterbody within this basin is the BCWCD #2 C-3 Canal which crosses SW 10th Street via two 60-inch pipes. The C-3 Canal receives runoff from the entire BCWCD #2 C-3 Basin, which consists of the watershed area bounded by the Hillsboro Canal to the north, Powerline Road to the east, Sample Road to the south and Florida's Turnpike to the west. The C-3 Basin has been subdivided into five sub-basins. Within this basin, runoff from SW 10th Street eastbound is primarily retained within grassed swales and conveyed to the grassed swales along the westbound corridor, while runoff from SW 10th Street westbound is accommodated in wide grassed swales before overtopping into the C-3 Canal.

The C-2 Basin is defined as the segment of SW 10th Street from Powerline Road to the end project limits. The receiving waterbody within this basin is the BCWCD #2 C-2 Canal which crosses SW 10th Street via a 72-inch pipe. The C-2 Canal receives runoff from the entire C-2 Basin, which consists of the watershed area bounded by the Hillsboro Canal to the north, Military Trail to the east, Sample Road to the south and Powerline Road to the west.

The C-2 Canal meanders through the Century Village and Deer Creek communities and ultimately discharges to the South Florida Water Management District (SFWMD) Hillsboro Canal. The C-2 Basin has been subdivided into 23 sub-basins, including three offsite sub-basins. Runoff from SW 10th Street eastbound is accommodated within linear dry retention ponds. Runoff from SW 10th Street westbound is accommodated in narrow swales with overtopping into the adjacent Century Village parking lots during larger storm events, with a limited number of inlets and pipes within the SW 10th Street corridor, located mainly along the turn lanes and curb returns.

2.16.2 Wells

A summary of wells within a 0.25-mile radius of the study area was provided in the GeoSearch Water Well Report, dated June 5, 2018. This report indicated nine wells were identified within the aforementioned radial distance from the Water Wells Database,

managed by the USGS and FDEP. Table 2.16.1 summarizes the information within the Water Well Report. Figure 2.16.1 shows the wells within a half-mile from the project corridor.

Table 2.16.1: Wells Within ¼-mile Radius of Project Corridor

Map ID	Site ID	Site Name	Distance from Corridor (feet)	Relative Location	Date Installed	Well Depth (feet)
1	1018749	G-2702	222	Due east of SW 28 th Ave	1/1/1980	38
	1018750	G-2721	222		1/1/1980	175
	1018747	G-2986	106		2/16/2010	1340
2	01018773	G-2355A	992	Due west of southbound FL Turnpike exit ramp	04/01/1983	53.6
	01018772	G-2355	992		04/01/1983	96.4
3	DEERFLD17	NA	997	Due west of railroad	Not Reported	180
	AAL5150	NA	1,008		Not Reported	Not Reported
	01018762	G-2704	1,019		01/01/1980	40
4	01018767	G-2723	1,214	Due west of railroad	01/01/1980	180

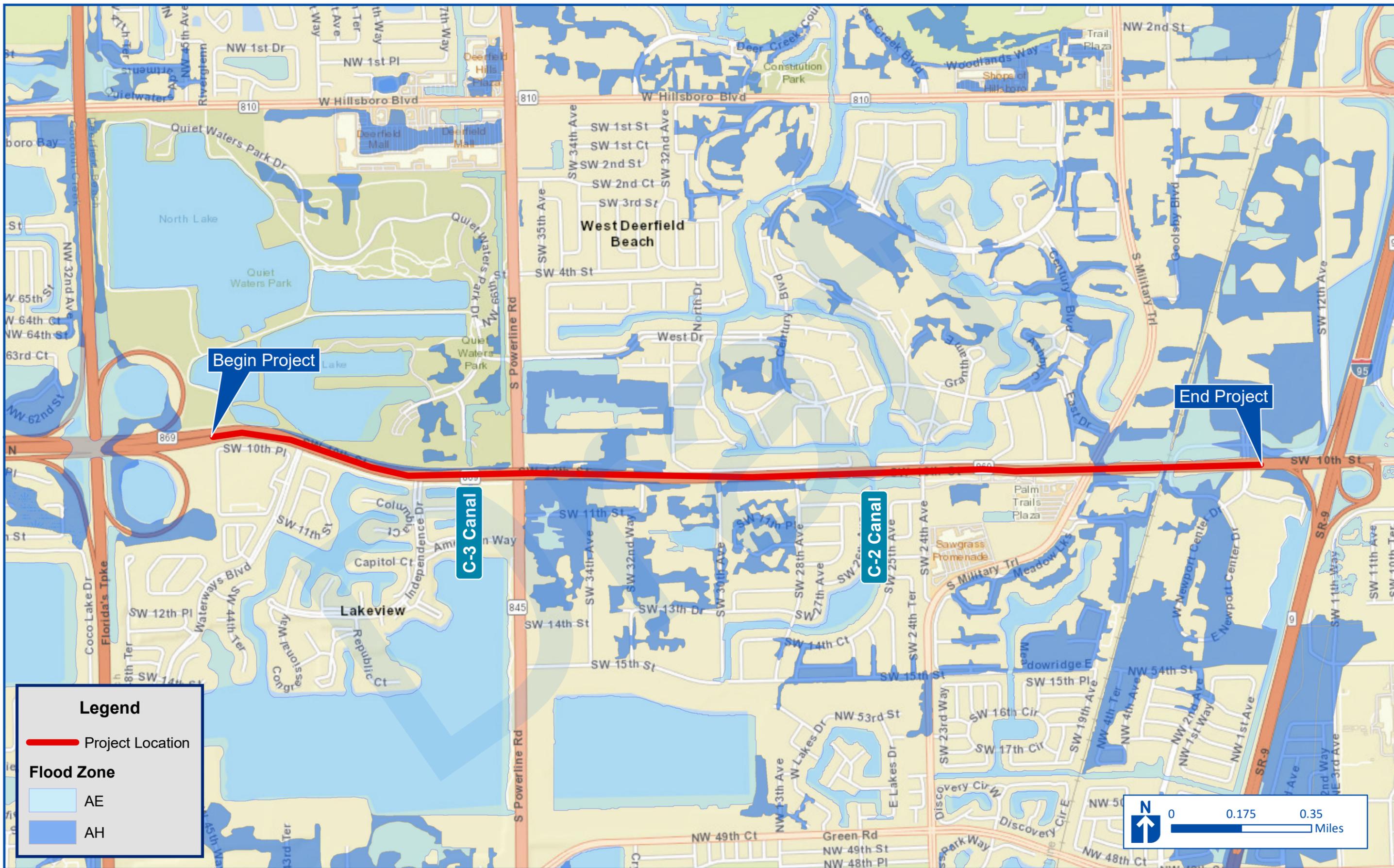
Two wells, Site ID AAL5150 and DEERFLD17, are considered large community public supply wells with a capacity of at least 150,000 gallons per day (GPD). These wells were situated north of SW 10th Street and due west of the railroad situated in the eastern section of the project corridor. These wells are associated with the Deerfield Beach west wellfield area. The eastern section of the project corridor is situated within each of the three wellfield protection zones as defined in Chapter 27, Article XIII of the Broward County Code.

The presence of these zones provides a series of safeguards to preclude potential impacts to ground water from facilities that handle, generate, and/or store hazardous waste. No septic systems and/or drain fields were identified within the project corridor.

2.16.3 Floodplains

The project corridor lies within the Federal Emergency Management Administration (FEMA) FIRM Panel 12011C0167, with much of the project area located within Floodplain Zone AH (EL. 14.00-feet NAVD). Zone AH is a special flood hazard area, subject to inundation by the 100-year flood that experiences flood depths of one to three feet (which are usually areas of ponding) with determined base flood elevations. Refer to Figure 2.16.2 for the FEMA Flood Zone Map.

Draft



Legend

- Project Location

Flood Zone

- AE
- AH



**State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
 Sawgrass Expressway to I-95**
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

2.17 Soils and Geotechnical Data

The Soil Map of Broward County published by the United States Department of Agriculture (USDA) was reviewed for general near-surface soil information within the general project vicinity. This information indicates that there are five soil mapping units. The map soil units encountered are as follows:

- Immokalee fine sand;
- Margate fine sand, occasionally ponded;
- Pomello fine sand;
- Pompano fine sand; and
- Udorthents.

The most commonly encountered soil in Broward County was Udorthents, which is characterized by somewhat well drained soil. Figure 2.17.1 displays the soils in the project corridor.

A description of the general profile of the existing soils, within the study limits, was determined by widely spaced soil borings performed throughout the study limits. The depth of the test borings was 15 feet. Soils and soil profiles found in borings drilled for the roadway alignment study generally consisted of seven general types:

- Stratum 1: Light brown to brown sand with trace roots and trace limerock fragments (Topsoil; A-8);
- Stratum 2: Light brown to brown sand with silt, with trace to little limerock fragments (A-3);
- Stratum 2A: Light brown to brown sand and some limestone fragments, with silt to silty (A-1-b);
- Stratum 2B: Dark brown sand with silt, with trace organic (A-3);
- Stratum 3: Light brown sandy to silty limestone;
- Stratum 4: Light brown to brown silty sand with little to some limerock fragments (A-2-4); and
- Stratum 5: Dark brown to black sand with silt, with few organic (A-8).

The majority of the project corridor is underlain with interlayering of Strata 1, 2, 2A and 3. However, Stratum 4 soils were found at numerous boring locations at various depths along the project corridor. Stratum 2B soils were found at only one boring location at four feet below grade. Stratum 5 soils were found at only two boring locations between four and six feet depth interval.

Stratum 1 is topsoil and shall be removed during clearing and grubbing in accordance with section 110 of the FDOT Standard Specifications.

Stratum 2 consists of select material and is adequate for subgrade and embankment support, and should be utilized according to FDOT Standard Plans, Index 120-001, fiscal year 2019 – 2020. However, portions may have slightly fine content and are likely to retain some excess moisture and could be difficult to handle, place and compact compared to ordinary A-3 materials.

Stratum 2A soils classified as A-1-b, consist of select material and is adequate for subgrade and embankment support, however these soils have high fine content ranging from six to 22 percent (with average fines content at 12.6 percent) and are likely to retain some excess moisture and could be difficult to handle, place and compact compared to ordinary A-3 materials. Hence, these soils may be used in the roadway subgrade with extra caution, and proper supervision and quality control.

Stratum 2B consists of trace organic and is classified as A-3 materials. These soils are found at only one isolated location at varied depths below grade with organic content varied from 0.7% to 1.8%. The removal of these soils is not necessary. However, these soils should not be used in the subgrade portion of the roadbed.

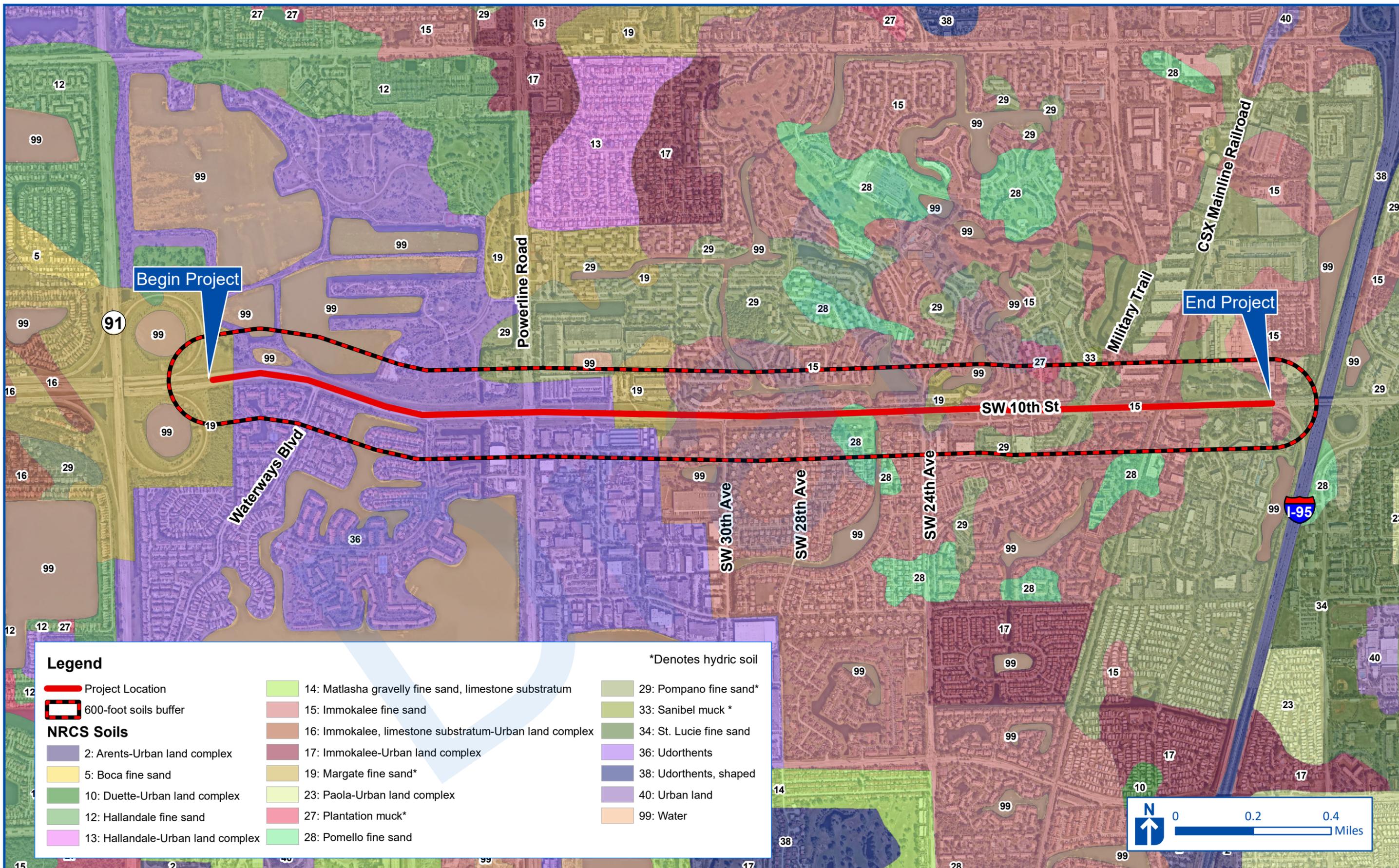
Stratum 3 consists of limestone. Specialized tools and equipment are necessary to excavate and / or penetrate the limestone layer.

Stratum 4 soils classified as A-2-4 and having fine content ranging between 12 to 23 percent (with average fines content at 17.1 percent). Stratum 4 consists mainly of soils with high fines content and are likely to retain some excess moisture and could be difficult to handle,

place and compact compared to ordinary A-3 materials. Hence, these soils may be used in the subgrade with extra caution, and proper supervision and quality control. A-2-4 material placed below the existing water level must contain less than 15% passing the No. 200 U.S. Standard Sieve.

Stratum 5 soils are classified as A-8. However only two samples are classified as A-8 with an organic content of six percent and are between four and six feet below existing grade. As per FDOT Standard Plans, Index 120-002, fiscal year 2019 – 2020, these soils will need to be removed and replaced with select embankment fill.

This above soil utilization recommendations are preliminary and prepared for the PD&E Study of the project corridor based on a minimum number of soil borings that were widely spaced. During the final design phase, based on final proposed alignment of the project corridor, additional roadway borings will be drilled at close intervals (spacing) and laboratory tests performed in order to evaluate the suitability of the existing subsoils and delineate the horizontal and vertical extents of the unsuitable soils, as deemed necessary.



2.18 Utilities

The existing and proposed utilities located within the study area were identified throughout the project corridor as part of this PD&E Study. A list of the existing Utility Agencies / Owners (UAOs) was obtained by contacting Sunshine 811. A field review was also conducted to further identify any designated existing facilities in the project corridor. All the UAOs identified in the field were also noted on the Sunshine 811 list. The existing UAOs, the identified UAO contacts and facility type are summarized in Table 2.18.1.

Table 2.18.1: Existing Utility Agencies / Owners in Study Area

Utility Agency Owner	Contact	Utility Type	Data Received	Comments
AT&T Florida 8601 W Sunrise Boulevard Plantation, FL 33322	Otis Keeve 954-723-2540 Ok1184@att.com	Communications	03/20/18	Marked plans provided
AT&T Corp 6000 Metro West Blvd, Suite 201 Orlando, FL 32875-7631	Stephen Eriksson (PEA Inc.) 321-662-9263 seriksson@pea-inc.net	Communications	03/20/18	Marked plans provided
Broward County Water/ Waste Water 255 W Copans Rd Pompano Beach, FL 33069	David O'Connor 954-831-0910 doconnor@broward.org	Water & Sewer	03/20/18	As-Builts provided
City of Deerfield Beach 290 Goolsby Blvd Deerfield Beach, FL 33442	Allen Fathi 954-420-5521 afathi@deerfield-beach.com	Water & Sewer	02/15/18	As-Builts & Atlas Maps Provided
Comcast Cable 2601 SW 145 th Avenue Miramar, FL 33027	Leonard Maxwell-Newbold 954-447-8405 leonard_maxwell-newbold@cable.comcast.com	Communications	03/21/18	Marked plans provided
Crown Castle (fka FiberNet Direct) 9250 W. Flagler St. Miami, FL 33174	Danny Haskett 954-602-3323 sezuniga@miramar.fl.gov	Communications	03/15/18	No Facilities within study area
Fiberlight 9250 W. Flagler St. Deerfield Beach, FL 33442	Wayne Kramer 561-951-6307 donald.mull@fiberlight.net	Communications	03/20/18	Marked plans
FP&L Distribution 7200 NW 4th Street Plantation, FL 33317-2211	Byron Sample 954-321-2056 byron.a.sample@fpl.com	Power	03/09/18	Marked Plans
FP&L Transmission 700 Universe Blvd, TS4/JW Juno Beach, FL 33408	Jeff Joseph 561-951-6307 donald.mull@fiberlight.net	Power (Transmission)	02/15/18	Marked Plans
Florida Gas Transmission (FGT) 2405 Lucien Way, Suite 200 Maitland, FL 32751	Joe Sanchez 786-838-7171 joseph.e.sanchez@energytransfer.com	Gas	02/15/18	Marked Plans

Utility Agency Owner	Contact	Utility Type	Data Received	Comments
CenturyLink (fka Level 3) 1025 El Dorado Blvd Broomfield, Co 80021	Jack Brady 786-495-2170 Jack.brady@centurylink.com	Communications	03/20/18	Marked Plans
Sprint 201 E. Pine St. Orlando, FL 32801	Mark Caldwell 321-287-9942 Mark.d.caldwell@sprint.com	Communications	03/14/18	Marked plans
TECO Peoples Gas 5101 MW 21st Ave, Suite 460 Ft Lauderdale, FL 33309	Max Chamorro 954-453-0812 angel.vargas@fpl.com	Gas	03/14/18	As-Builts Provided
Teleport Comm. America 6000 Metro West Blvd, Suite 201 Orlando, FL 32875-7631	Stephen Erikisson (PEA Inc.) 321-662-9263 serikisson@pea-inc.net	Communications	03/20/18	No Facilities
Verizon/MCI 16563 NW 15th Ave Miami, FL 33169	Todd Mars 786-236-8597 Todd.mars@verizon.com	Communications		No Facilities

Preliminary utility coordination was initiated through written communication to the listed utility contacts. The utility companies were informed of the PD&E study through these notification letters and were requested to provide information regarding the location, type, size and characteristics of any major utilities along or crossing the existing right-of-way. A preliminary plan set with aerial background was sent to the Utility Agencies Owners for their use in identifying their facilities. UAOs were requested to note if any utility facility is located within the FDOT right-of-way by easement or permit, and to provide an order-of-magnitude worst-case estimate for the cost of relocating any utilities affected by the proposed project.

Based on the initial utility coordination effort, utility facilities were identified within the existing or proposed right-of-way. The general location of the existing utility facilities are based on the UAOs response through the utility contact process. Exact locations of the existing utilities and the extent of impacts will be determined during the final design phase of this project. Coordination with the known UAOs during the final design phase will assist in minimizing relocation adjustments and disruptions of service to the public. Table 2.18.2 provides a summary of the existing facilities within the project corridor.

Table 2.18.2: Existing Utilities in the Study Area

Utility Agency Owner	Limits	Facility
ATT Corp	Florida's Turnpike Mainline Median	BFO
ATT Florida	North side of SW 10 th St from Florida's Turnpike to Powerline Rd	(2) BFO
	South side of SW 10 th St from Florida's Turnpike to Powerline Rd	(2) BFO
	West side of Powerline Rd north of SW 10 th St	BT
	East side of Powerline Rd north of SW 10 th St	(2) BFO
	East side of Powerline Rd south of SW 10 th St	4-4" BT
	North side of SW 10 th St from Powerline Rd to east of Military Trail	OFO
	North side of SW 10 th St from Powerline Rd to SW 30 th Ave	OFO
	North side of SW 10 th St from east of SW 30 th Ave to east of Military Trail	(2) BT
	South side of SW 10 th St from SW 30 th Ave to east of Military Trail	(2) BT
	South side of SW 10 th St from west of Powerline Rd to SW 30 th Ave	4-4" BT
	South side of SW 10 th St from west of SW 30 th St to SW 24 th Ave	BT
	SW 28 th Ave crossing SW 10 th St	BT
	SW 24 th Ave crossing SW 10 th St	OFO
	SW 24 th Ave crossing SW 10 th St	(8) BT
	South side of SW 10 th St west of Military Trail	BT
	North side of SW 10 th St west of Military Trail	MH
	West side of Military Trail north of SW 10 th St	OT
	West side of Military Trail north of SW 10 th St	(11) BT
	East side of Military Trail Crossing SW 10 th St	BT
East side of Military Trail south of SW 10 th St	BT	
Broward County Water & Sewer	East side of Powerline Rd crossing SW 10 th St	48" RW
	West side of Independence Dr crossing SW 10 th St	8" WM
	West side of Powerline Rd crossing SW 10 th St	8" WM
	West side of Powerline Rd crossing SW 10 th St	6" FM
	South side of SW 10 th St from Powerline Rd to east of Military Trail	48" RW DIP
City of Deerfield Beach	South side SW 10 th St from Waterways Blvd to Powerline Rd (1996)	12" DIP WM
	North side SW 10 th St from 500 ft east of Waterways Blvd to Powerline Rd (1998)	12" PVC WM
	Along SW 10 th St from Powerline Rd to SW 24 th Ave (1976)	20" WM
	East side of Powerline Rd crossing SW 10 th St (1986)	20" WM
	East side of Powerline Rd crossing SW 10 th St (1978)	16" WM
	North side SW 10 th St from 900 ft west of SW 31 st Ave to 31 st Ave (1977)	8" WM
	North side SW 10 th St from SW 31 st Ave to east of 28 th St (1977)	8" CAS WM
	West of SW 30 th Ave crossing SW 10 th St heading north (1977)	12" WM
	At SW 30 th Ave from SW 10 th St heading south (1985)	16" WM
	Between SW 30 th and 28 th Ave from SW 10 th St. heading south (1986)	8" DIP WM
	At SW 28 th Ave from SW 10 th St heading south (1977)	8" WM
	Along SW 10 th St from SW 24 th Ave to Military Trail (1974)	24" WM
	Along north side of SW 10 th , east of SW 28 th Ave to SW 24 th Ave (1977)	6" CAS
	At SW 24 th Ave from SW 10 th St heading south (1977)	24" / 8" WM
	East of SW 24 th Ave from SW 10 th St heading south (1982)	12" DIP WM
SW 10 th St just west of Military Trail going North (1975)	16" WM	
SW 10 th St just east of Military Trail heading north (1982)	16" DIP WM	
South side of SW 10 th St from Waterways Blvd to SW 30 th St (1996)	8" FM	

Utility Agency Owner	Limits	Facility
	At SW 31 st Ave from SW 10 th St heading north (2003)	4" FM
	Along SW 10 th St from SW 30 th Ave to east SW 24 th Ave (1985)	12" DIP FM
	Along SW 10 th St from SW 24 th Ave east to Military Rd (1985)	20" DIP FM
	At SW 30 th Ave from SW 10 th St heading south (1985)	8" PVC FM
	Between SW 28 th and 24 th Ave from SW 10 th St heading south (1977)	6" FM
	At SW 24 th Ave from SW 10 th St heading south (1980)	8" FM
	SW 10 th St heading north, east side of Military (1975)	24" DIP FM
	SW 10 th St heading south, east side of Military (1994)	6" PVC FM
	South side SW 10 th St from well site east of SW 28 th Ave to Military Trail (2009)	24" PVC BRW
	South side SW 10 th St from well site west of SW 24 th Ave to Military Trail (2009)	16" PVC FRW
	Well Site 450 ft east of SW 28 th Ave	Well & Pump
	Well Site 750 ft east of SW 24 th Ave	Well & Pump
Comcast	South side of SW 10 th St from Waterways Blvd 600 ft to east then crossing north	BFO
	North side of SW 10 th St 600 ft west of Waterways Blvd to east side of Powerline Rd	BFO
	North side of SW 10 th St Crossing south on east side of Waterways Blvd	BFO
	South side of SW 10 th St east of Waterways Blvd to just west of Powerline Rd	OFO
	South side of SW 10 th St crossing Powerline Rd	BFO
	East side of Powerline Rd crossing SW 10 th St	BFO
	North side of SW 10 th St crossing Powerline Rd	BFO
	North side of SW 10 th St 1,925 ft from Powerline Rd	OFO
	South side of SW 10 th St 900 ft west of east side of SW 30 th St	BFO
	North side of SW 10 th St 900 ft east of Powerline Rd to east side of Military Trail	BFO
	East side of Military Trail crossing SW 10 th St	OFO
	North side of SW 10 th St from east side of Military Trail to FEC	OFO
Fiberlight	West side of Military Trail crossing SW 10 th St	OFO
Crown Castle Fiber	East side of Powerline Rd crossing SW 10 th St	BFO
	South side of SW 10 th St from Powerline Rd to west of SW 30 th Ave	BFO
	East side of Military Trail Crossing SW 10 th St	BFO
Florida Gas Transmission	East R/W of Florida's Turnpike	18" & 24" GM
FPL Distribution	South Side of SW 10 th St east of Waterways Blvd to Powerline Rd	OE 13KV
	South side of Powerline Rd crossing SW 10 th St	BE 13KV
	East side of Powerline Rd crossing SW 10 th St	OE 13KV
	North Side of SW 10 th St from Powerline Rd to east of Military Trail	OE 13KV
	North Side of SW 10 th St from Powerline Rd to east of Military Trail	BE Duct 13KV
	West side of SW 30 th Ave crossing SW 10 th St	OE 13KV
	East side of SW 24 th Ave crossing SW 10 th St	OE 13KV
	West of Military Trail on south side of SW 10 th St	BE 13KV
	West side of Military Trail crossing SW 10 th St	OE 13KV
	East side of Military Trail north of SW 10 th St	BE 13KV
FPL Transmission	West side of Powerline Rd north of SW 10 th St	OE 230KV
	East side of Powerline Rd crossing SW 10 th St	OE 230KV
	North side of SW 10 th St from Powerline Rd to Military Trail	OE 230KV
	South side of SW 10 th St from Powerline Rd to east of Military Trail	OE 230KV
	West side of Military Trail north of SW 10 th St	OE 230KV

Utility Agency Owner	Limits	Facility
Level 3	North side of SW 10 th St east of Military Trail	12-1.25" BFO
	West side of Military Trail north of SW 10 th St	12-1.25" BFO
	East side of Military Trail north of SW 10 th St	OFO
Sprint	West side of Military Trail crossing SW 10 th St	1-2" BFO
	East side of Military Trail north of SW 10 th St	2-2" BFO
	South side of SW 10 th St crossing Military Trail	2-2" BFO
	North side of SW 10 th St East of Military Trail	2-2" BFO
	South side of SW 10 th St East of Military Trail	2-2" BFO
TECO Peoples Gas	East side of Powerline Rd crossing SW 10 th St	8" GM
	South side of SW 10 th St from Powerline Rd to east of Military Trail	8" GM
Teleport Comm. America	No Facilities	N/A
Verizon/MCI	No Facilities	N/A

2.19 Lighting

SW 10th Street features single-arm light poles located adjacent to the edge of pavement for both the eastbound and westbound directions. The light pole spacing ranges from approximately 200 to 250 feet on SW 10th Street from Florida’s Turnpike / Sawgrass Expressway to Powerline Road. On SW 10th Street from Powerline Road to just west of Military Trail, the single arm light poles are only present on the south side of the road (eastbound direction) with a spacing of 150 feet to 200 feet. From just west of Military Trail to East Newport Center Drive, single arm light poles are present on both sides of the road with an average spacing of 160 feet to 180 feet. Figure 2.19.1 shows an example of the lighting along the corridor.

Figure 2.19.1: Lighting on SW 10th Street



2.20 Signs

An inventory of the existing roadway signage was performed for the project along SW 10th Street. The results of the sign inventory are shown in Figure 2.20.1.



\$FILE\$
 \$TIME\$
 \$DATES\$
 \$USERS\$



State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

Figure 2.20.1
 Existing Sign Inventory

2.21 Aesthetics Features

The SW 10th Street project corridor is a typical urban roadway with minimal aesthetic features inside the existing right-of-way. However, a few noteworthy aesthetic features are located within the project area including: median landscaping, and a meandering sidewalk on the south side of the road (eastbound direction).

The existing SW 10th Street has a narrow median filled with palm trees, oak trees, and other assorted trees that are well maintained and provide an aesthetic feature while driving through the corridor. Figure 2.21.1 depicts an example of the median landscaping along SW 10th Street.

Figure 2.21.1: Median Landscaping



In addition, the existing sidewalk located on the south side of SW 10th Street meanders through the existing right-of-way and in places has a significant buffer from the SW 10th Street eastbound traffic as shown in Figures 2.21.2 and 2.21.3. This feature is an aesthetic feature for drivers and pedestrians utilizing the corridor.

Figure 2.21.2: Existing Sidewalk along SW 10th Street



Figure 2.21.3: Existing Sidewalk along SW 10th Street



2.22 Bridges and Structures

There are two canals in the project corridor (Canal C-2 and C-3) which require culverts. The culverts are non-qualifying structures since they are less than 20 feet long and therefore, do not require National Bridge Inspection Standard (NBIS) inspections. The only reason non-

qualifying culverts would be inspected is if there were signs of distress on the roadway above the structure. However, there have been no such signs of distress and therefore, no information is available about these culverts.

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3.0 Project Design Controls & Criteria

3.1 Roadway Context Classification

The context classification from Florida's Turnpike to just east of Military Trail is Suburban Residential (C3R). The context classification changes just east of Military Trail to Suburban Commercial (C3C). The context classification remains Suburban Commercial to I-95. The context classification for the project was provided by FDOT District 4 Complete Streets Coordinator.

3.2 Design Control and Criteria

3.2.1 Design Speed

The proposed design speed of the local and managed lanes are 35 mph and 60 mph, respectively.

3.2.2 Pedestrian and Bicycle Requirements

Throughout the project corridor and included in all alternatives, pedestrian and bicycle facilities will be improved and upgraded as follows:

- Minimum six-foot sidewalk for the length of the corridor (adjacent to the arterial portion of the roadway);
- Seven-foot buffered bicycle lanes; and
- Crosswalks at all signalized intersections.

3.2.3 Right-of-Way Constraints

The existing right-of-way varies throughout the corridor from 215 feet to 316 feet. Below is a summary of the existing right-of-way along the corridor:

- Florida's Turnpike / Sawgrass Expressway to Powerline Road (~1 mile) – 250 feet of right-of-way;
- Powerline Road to just west of Quiet Waters Business Park Entrance Road (~0.4 miles) – 316 feet of right-of-way;
- Just west of Quiet Waters Business Park Entrance Road to SW 28th Avenue (~0.3 miles) – 250 feet of right-of-way;
- SW 28th Avenue to SW 24th Avenue (~0.3 miles) – 215 feet of right-of-way; and
- SW 24th Avenue to East Newport Center Drive (~0.8 miles) – 250 feet of right-of-way.

Chapter 4 of this report contains an analysis of the various Build alternatives and proposed right-of-way impacts. Each alternative developed for this study has considered right-of-way minimization strategies due to the residential nature of the area.

3.2.4 Type of Stormwater Facilities

The agencies having stormwater permitting jurisdiction over the proposed improvements include:

- South Florida Water Management District (SFWMD); and
- Broward County Environmental Protection and Growth Management Department (BCEPGMD).

By Florida statute, the Department is exempt from local permitting for projects located along the State Highway System. However, the Department is not exempt for projects which require improvements within the local canal right-of-way, or which result in increased discharges to local receiving waters. As such, and as confirmed with both agencies at the FDOT-BCEPGMD and FDOT-SFWMD Drainage-Permitting Coordination Meetings conducted on 02/21/18 and 02/15/18, respectively, both agencies will have jurisdiction over the stormwater permitting for the project.

3.2.4.1 Stormwater Quality Criteria

South Florida Water Management District

The SFWMD requires that all projects meet state surface water quality standards, as set forth in Chapter 17-302, Florida Administrative Code (FAC). According to the SFWMD Applicant's Handbook, Volume II, all projects must meet the following volumetric retention/detention requirements:

1. For wet detention systems, the first inch of runoff from the project or the total runoff from 2.5 inches times the percent of imperviousness, whichever is greater, must be detained on site. A wet detention system is a system that maintains the control elevation at the seasonal high groundwater elevation and does not bleed down more than one-half inch of detention volume in 24 hours;
2. Dry detention systems must provide 75 percent (75%) of the required wet detention volume. Dry detention systems must maintain the control elevation at or above one foot above the seasonal high groundwater elevation;

3. Retention systems must provide 50 percent (50%) of the wet detention volume; and
4. For projects with more than 50 percent (50%) of imperviousness, discharge to the receiving water bodies must be made through baffles, skimmers, or other mechanisms suitable from preventing oil and grease from discharging to or from the retention/detention areas.

Projects having greater than 40% impervious area and which discharge directly to water bodies within a District permitted public water supply wellfield cone of depression, as defined by Broward County Wellfield Protection Ordinance contour for Zone 3 which are not separated from the aquifer by strata at least ten feet thick and have an average saturated hydraulic conductivity of less than 0.1 feet per day, shall provide at least one half inch of dry detention or retention pretreatment as part of the required retention/detention, as confirmed with SFWMD on 02/15/18. However, no pretreatment is required for this project since none of the alternative stormwater management facilities actually fall within the limits of a permitted public water supply wellfield cone of depression. See the Conceptual Drainage and Pond Siting Report for further details on SFWMD coordination, available under separate cover.

Broward County Environmental Protection and Growth Management

Since the project falls within the BCWCD #2 C-3 Basin and C-2 Basin, designated water quality basins, expansion of the existing stormwater management facilities to treat the additional development is an accepted practice, confirmed by BCEPGMD and SFWMD. Based on review of the Broward County Wet Season Water Table Maps, the Seasonal High Ground Water Table (SHGWT) elevation in the study area ranges from approximately 8.00 to 10.00 feet NGVD (6.50 to 8.50 feet NAVD), with an average SHGWT elevation of 9.00-feet NGVD (7.50-feet NAVD). Input from Mr. Carl Archie with BCWCD #2, indicates that Broward County pumps in accordance with a SFWMD Diversion and Impoundment permit to maintain the entire basin between 9.50 and 10.00 feet NGVD (8.00 to 8.50 feet NAVD).

Accordingly, the BCWCD #2 S-4 control structure is providing approximately 0.50 to 1.00 feet of wet retention depth for the C-2 Basin. As such the proposed expansion should provide 50 percent (50%) of the required wet detention volume, i.e. the first inch of runoff from the

project or the total runoff from 2.5 inches times the percent of imperviousness, whichever is greater.

3.2.4.2 Stormwater Quantity Criteria

SFWMD criteria govern peak discharge rate attenuation and attenuation volume by limiting the post-development peak discharge rate to the pre-development peak discharge rate for the 25-year – 72-hour design rainfall event using SFWMD 72-hour rainfall distribution. SFWMD requires that offsite discharge rates be limited to rates not causing adverse impacts to existing off-site properties, and:

- Historic discharge rates,
- Rates determined in previous SFWMD permit action, or
- Basin allowable discharge rates.

SFWMD also requires that provisions be made to replace or otherwise mitigate the loss of historical basin storage provided by the project.

However, since the project falls within the BCWCD #2 water quality basin, with regulated discharge to the SFWMD Hillsboro Canal via the S-4 control structure, both SFWMD and BCEPGMD have agreed that the stormwater quantity criteria for the project will be based on providing an expansion of the waterbodies within the BCWCD #2 basin that offsets existing storage proposed to be filled by the project and which offsets the additional runoff volume created by the project. Additionally, SFWMD has requested a regional stormwater model and application for a master permit for the C-2 basin to ensure that the proposed improvements do not increase stages or discharges.

3.2.5 Design Standards

The context classification of Suburban applies for the length of the project. Table 3.2.1 displays the detailed design standards for context classification Suburban for a 35 mph design speed. Table 3.2.2 displays the design standards for the managed lane facility which is a limited access facility.

Table 3.2.1: Design Standards for C3 Suburban – 35 mph

Design Element	Criteria	Source
Context Classification	C3 Suburban	FDOT
Access Classification	Class 3	Access Management Classification
Design Vehicle	WB-62FL	FDM, Figure 201.5.1
Design Speed / Posted Speed	35 mph	FDOT
Minimum Lane Widths	11 ft (travel) due to SIS	FDM, Table 210.2.1
Shoulders	Right Shoulder (10 ft, 5 ft paved) Left Shoulder (8 ft, 0 ft paved)	FDM, Table 210.4.1
Sidewalk	6 ft (8 ft max)	FDM, Table 222.1.1
Median Width	22 ft (min 15.5 ft)	FDM, Table 210.3.1
Minimum Border Width	12 ft	FDM, Table 210.7.1
Grades	7% max	FDM, Table 210.10.1
Max. Change in Grade w/o VC	0.90%	FDM, Table 210.10.2
Pavement Cross Slopes	Travel Lanes (2%)	FDM Figure 210.2.1
Minimum Grade	0.30%	FDM, Section 210.10.1.1
Vertical Clearance	Over Roadway (16 ft-6 in)	FDM, Table 260.6.1
	Pedestrian over Roadway (17 ft-6 in)	FDM, Table 260.6.1
	Over Railroad (23 ft-6 in)	FDM, Table 260.6.1
	Overhead Sign Structure (17 ft-6 in)	FDM, Section 210.10.3
Min. Stopping Sight Distance	250 ft +/- adjustments	FDM, Table 210.11.1
Min. Length of Horizontal Curve	525 ft (min 400 ft)	FDM, Table 210.8.1
Max. Deflection w/o Horizontal Curve	3°00'00" (700 feet)	FDM, Section 210.8.1
Max. Curvature	14°15'00" (emax = 0.05)	FDM, Table 210.9.2
Max. Curvature w/o Superelev	Normal Crown - 5°00'00" Reverse Crown - 5°15'00" (emax = 0.05)	FDM, Table 210.9.2
Superelevation	80% of super trans in tangent Superelevation Transition Rate: 1:100	FDM, Section 210.9.1 FDM, Table 210.9.3
Crest Vertical Curve	K = 47; L = 105 ft (min)	FDM, Table 210.10.3 FDM, Table 210.10.4
Sag Vertical Curve	K = 49; L = 105 ft (min)	FDM, Table 210.10.3 FDM, Table 210.10.4
Clear Zone	Travel Lane = 14 ft Auxiliary Lanes = 10 ft	FDM, Table 215.2.1
Median Left Turn Lane Length	145 ft + Queue Length	FDM, Exhibit 212-1
<i>Notes:</i>		
FDM = FDOT Design Manual (January 2018), Florida Department of Transportation		

Table 3.2.2: Design Standards for Expressway – Managed Lanes – 60 mph

Design Element	Criteria	Source
Facility Type	Expressway	FDOT
Access Classification	Class 1 – Area Type 2	FDM, Table 201.3.1
Design Vehicle	WB-62FL	FDM, Figure 201.5.1
Design Speed / Posted Speed	60 mph	FDOT
Minimum Lane Widths	12 ft (travel and auxiliary)	FDM, Section 211.2
Shoulders	Right Shoulder (12 ft, 10 ft paved) Left Shoulder (8 ft, 4 ft paved)	FDM, Table 211.4.1
Median Width	26 ft (with barrier)	FDM, Table 211.3.1
Minimum Border Width	94 ft	FDM, Section 211.6
Grades	3% max	FDM, Table 211.9.1
Max. Change in Grade w/o VC	0.40%	FDM, Table 210.10.2
Pavement Cross Slopes	Right Shoulder (6%) Left Shoulder (5%) Travel Lanes (2%)	FDM, Table 211.2.3
Vertical Clearance	Over Roadway (16 ft-6 in) Pedestrian over Roadway (17 ft-6 in) Over Railroad (23 ft-6 in) Overhead Sign Structure (17 ft-6 in)	FDM, Table 260.6.1 FDM, Table 260.6.1 FDM, Table 260.6.1 FDM, Section 210.10.3
Min. Stopping Sight Distance	645 ft +/- adjustments	FDM, Table 211.10.1
Min. Length of Horizontal Curve	1800 ft (min 900 ft)	FDM, Table 211.7.1
Max. Deflection w/o Horizontal Curve	0°45'00"	FDM, Section 210.8.1
Max. Curvature	5°15'00" (Dmax)	FDM, Table 210.9.1
Max. Curvature w/o Superelev	Normal Crown - 0°15'00" Reverse Crown - 0°30'00" (emax = 0.10)	FDM, Table 210.9.1
Superelevation	80% of super trans in tangent Superelevation Transition Rate: 1:225	FDM, Section 210.9.1 FDM, Table 210.9.3
Crest Vertical Curve	K = 245; L = 1,000 ft (min)	FDM, Table 211.9.2 FDM, Table 211.9.3
Sag Vertical Curve	K = 136; L = 800 ft (min)	FDM, Table 211.9.2 FDM, Table 211.9.3
Clear Zone	Travel Lane = 36 ft Auxiliary Lanes = 24 ft	FDM, Table 215.2.1
<i>Notes:</i>		
<i>FDM = FDOT Design Manual (January 2018), Florida Department of Transportation</i>		

4.0 Alternatives Analysis

4.1 Previous Planning Studies

A number of previous studies examining a connection between Florida's Turnpike and I-95 have been completed to determine the optimal method for connecting Florida's Turnpike / Sawgrass Expressway with I-95.

The earliest study, the Deerfield Parkway Corridor Location Study, evaluated a continuation of University Parkway in the east-west direction and was commissioned by the FDOT in 1970 and completed in 1972. The original study was defined as approximately eight-miles in length by two-miles wide. This extended from US 441 to SR A1A in the east-west direction and from Hillsboro Boulevard to NW 48th Street in a north-south direction. Proposed within this corridor was the Deerfield Parkway, a toll-free limited access facility to run from just west of the proposed US 441 interchange to the proposed interchange with I-95.

This project was consistent with the 1985 Recommended Principal Street and Highway Plan – Ft. Lauderdale and Hollywood Urban Area Transportation Study, dated September 1969. This plan was prepared jointly by the FDOT, US Bureau of Public Roads, Broward County and representatives from various affected communities including Deerfield Beach.

A Public Hearing was held on August 19, 1971 in Deerfield Beach, at which time four alternate Parkway alignments (“A”, “B”, “C”, and “D”) were publically presented and discussed. Objection was raised to any Parkway alignment which would pass through the City of Deerfield Beach, which applied to three of the four alternative presented (“A”, “C”, and “D”). The study continued on the four alternate Parkway alignments presented at the public hearing and, where possible, the study incorporated suggestions derived from public comments. Based on the social, economic, environmental, and engineering factors, Alignment “A” was selected for more detailed study. Figures 4.1.1 and 4.1.2 shows Alignment “A” from the 1972 report. A Draft Environmental Impact Statement (EIS) was prepared in 1972 but was not circulated.

Figure 4.1.1: Deerfield Parkway – Corridor “A” (US 441 to East of Turnpike)

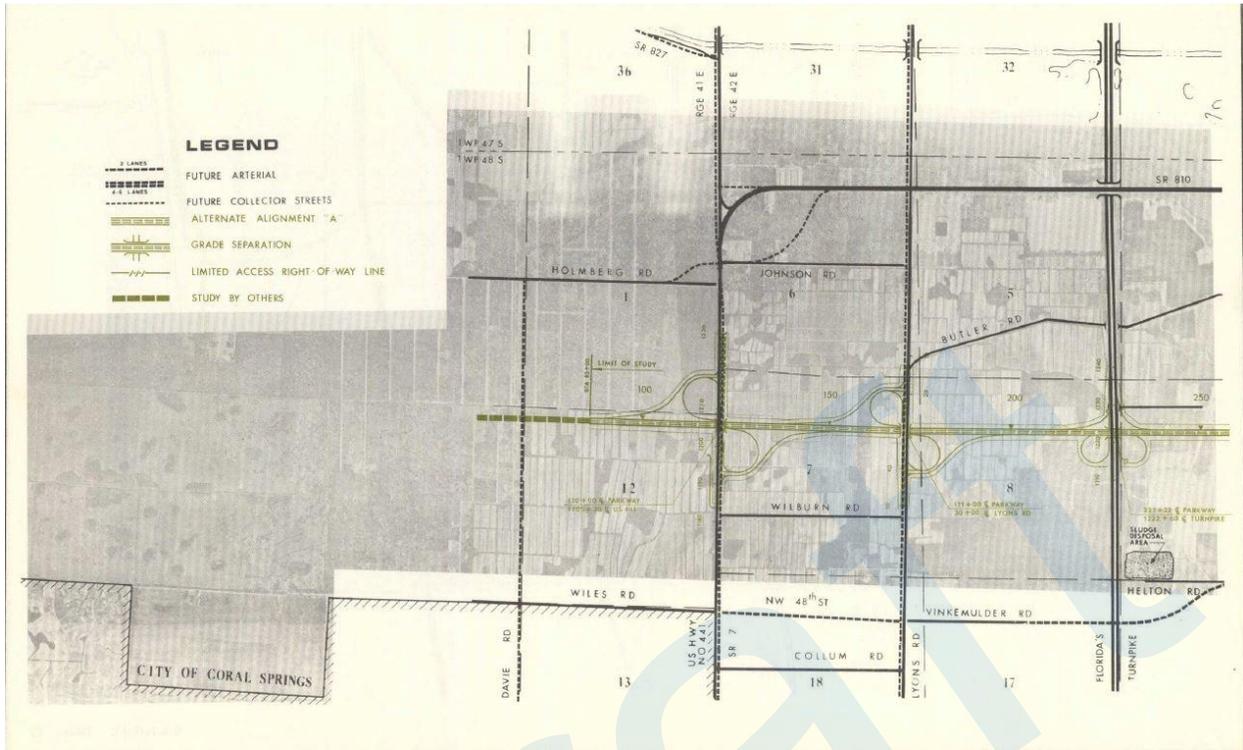
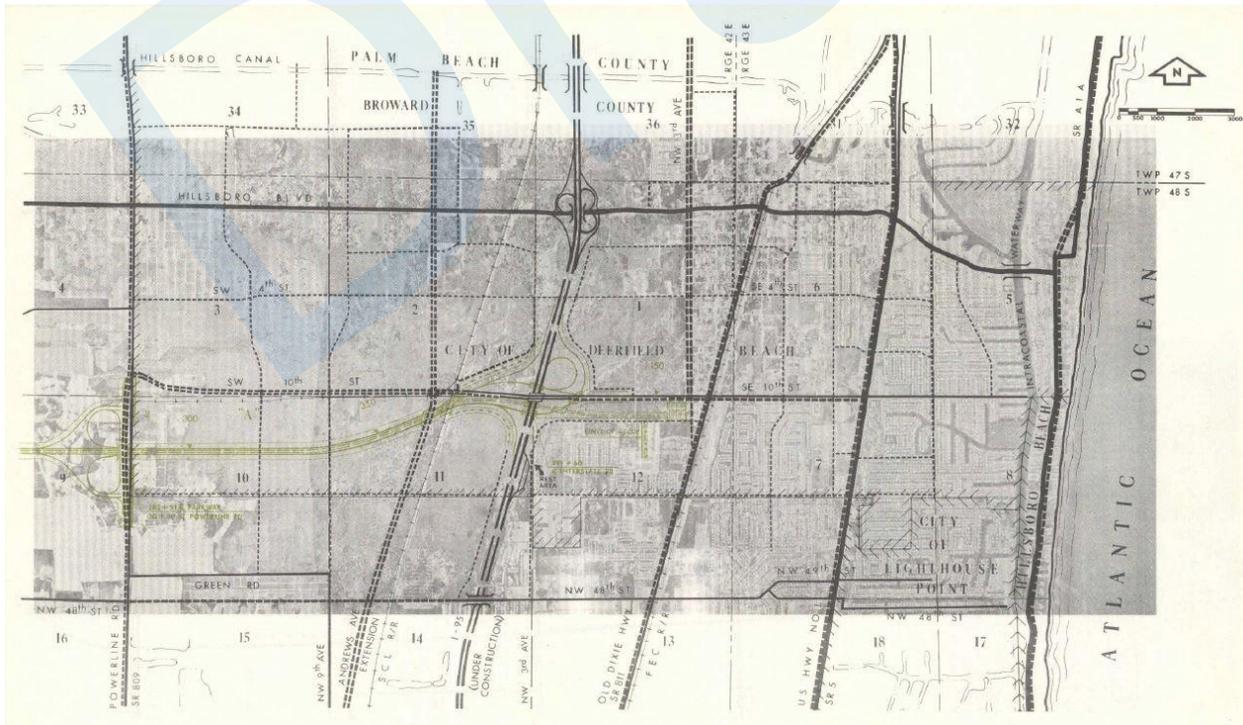
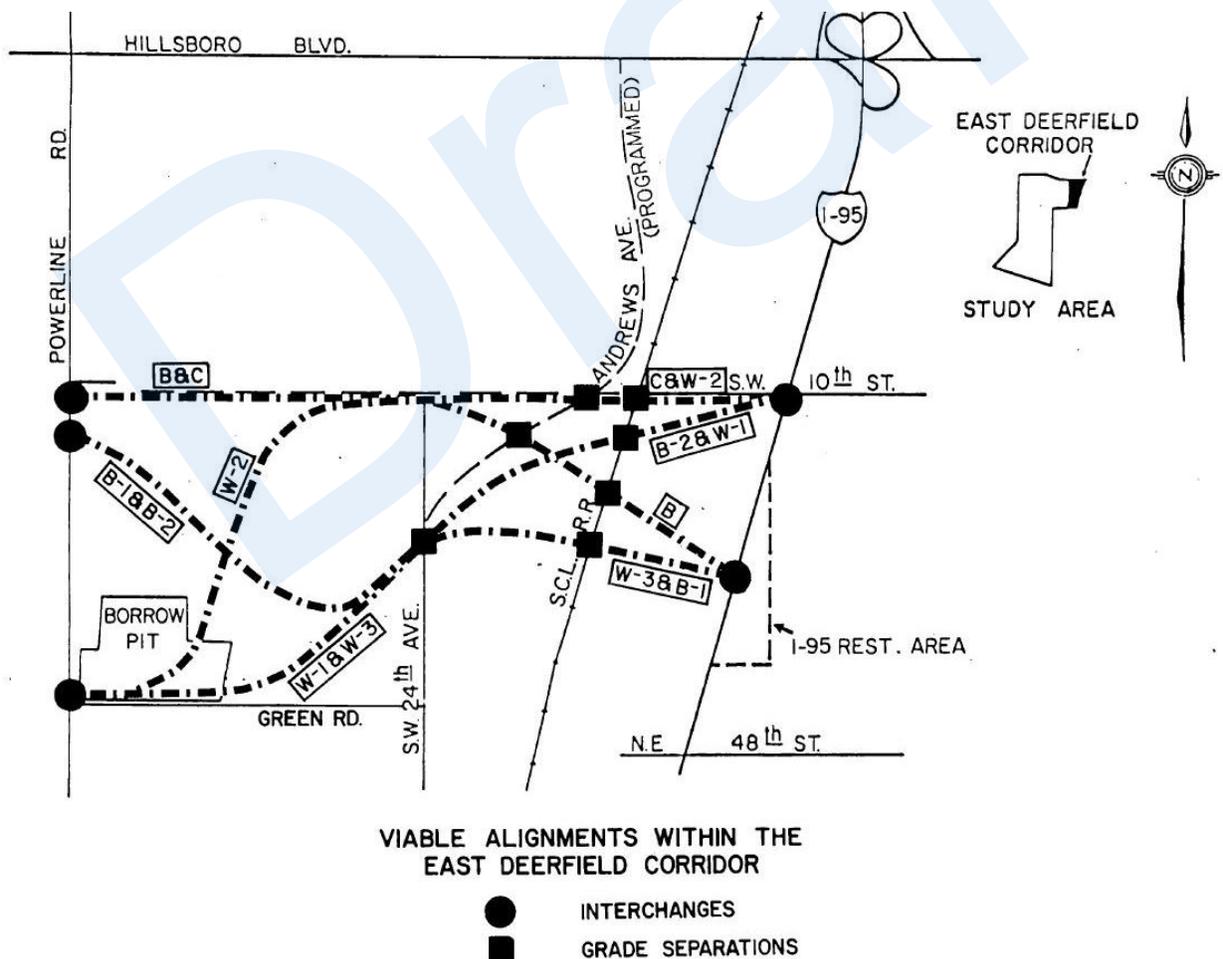


Figure 4.1.2: Deerfield Parkway – Corridor “A” (East of Turnpike to I-95)



In 1979, a Draft EIS was prepared for the University-Deerfield Expressway. This report evaluated an expressway facility linking I-75 at SR 84 to I-95 in Deerfield Beach which had been identified as a needed improvement in Broward County. This expressway linkage between two interstate highways was previously treated as two separate facilities, known as University and Deerfield Parkways. This project involved the construction of a limited access multi-lane expressway from the I-75 interchange with SR 84 north and east for approximately 24 miles to I-95. This facility was evaluated as a toll facility. The study evaluated two alignments within the University Corridor (SR 84 to South of Wiles Road), six alignments in the West Deerfield Corridor (South of Wiles Road at the Conservation Area to Powerline Road) and seven alignments in the East Deerfield Corridor (Powerline Road to I-95). The East Deerfield Beach Corridors are shown in Figure 4.1.3. One of the seven alignments evaluated was co-located with SW 10th Street.

Figure 4.1.3: East Deerfield Corridors



In 1986, Broward County began construction on the Sawgrass Expressway and it opened two years later in 1988 as shown in Figure 4.1.4.

Figure 4.1.4: Planned Route of Sawgrass Expressway (1988)



In 1990, the Broward MPO 2010 LRTP included the Sawgrass Expressway Extension. Thus the FDOT commenced a new PD&E Study evaluating a limited access facility from Florida's Turnpike to I-95 via SW 10th Street. This improvement would complete the "missing link" in a regional expressway system which includes I-95, Florida's Turnpike, the Sawgrass Expressway, I-75 and I-595. The study resulted in an Environmental Assessment (EA) completed and approved in 1993. The study recommended (Alternative D, with Design 2) a six-lane freeway, completion of the Florida's Turnpike interchange at SW 10th Street / Sawgrass Expressway to provide all movements, grade separated interchanges at Powerline Road and Military Trail, parallel frontage roads to provide access to neighboring properties, and grade separation of the freeway over the CSX railroad and between Florida's Turnpike

and Powerline Road to provide access. This alternative also proposed the construction of an access road constructed along the north side of the properties located in the northeast quadrant of the SW 10th Street and Powerline Road intersection. This access road would provide access to the businesses as their direct access to SW 10th Street would be removed for safety reasons. The recommended alternative would mostly remain within the existing right-of-way. Additional right-of-way would be required for the interchanges at Powerline Road and Military Trail. After the completion of the EA, the Broward MPO voted against the project.

In 2008, the FDOT completed a Feasibility Study for the SW 10th Street Connector. The study noted that the 2007 Broward County traffic counts exceeded the 2010 projections from the 1993 PD&E Study by 47% to 97% and indicated that traffic growth was expected to continue. The Feasibility Study concluded that the limited access link was needed to accommodate future regional travel demand. The study recommended further analysis and development of potential congestion solutions during a new PD&E Study. On January 17, 2009, alternatives were presented at a public meeting held by the FDOT. A total of 117 people attended the public meeting and 31 people provided written comments. The two most common comments were:

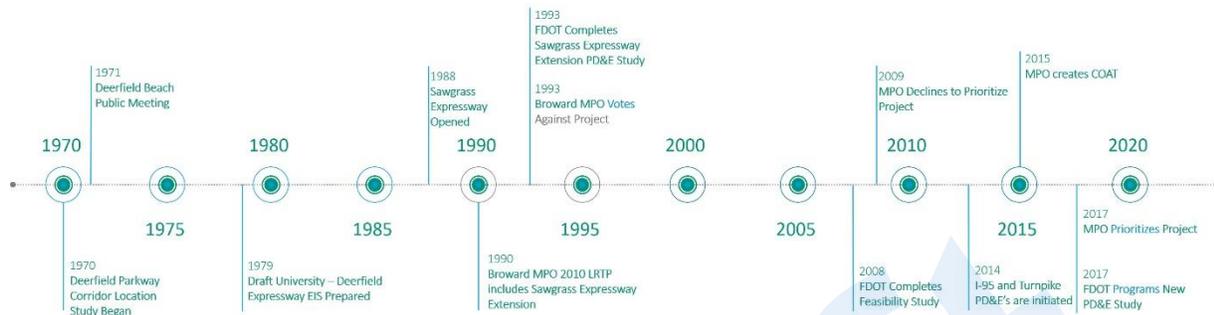
- Existing and/or future noise; and
- Impacts of a flyover/elevated highway.

Due to strong public opposition from Deerfield Beach residents, the Broward MPO decided to take no further action.

In 2014, the Broward MPO noted that with the SW 10th and I-95 PD&E Study and the SW 10th and Florida's Turnpike PD&E Studies planned, that it may be time to explore a new and innovative public involvement process on SW 10th Street. In 2015, the Broward MPO created the Community Oversight Advisory Team (COAT). The COAT was comprised of community businesses and homeowner representatives to obtain input, build a community vision and ultimately recommend improvements for the corridor to be further evaluated in a future PD&E Study. More information on the results of the COAT are contained in Section 4.4.1. The COAT effort was completed in 2016. In 2017, the Broward MPO prioritized the SW 10th

Street Connector which led to the start of this current PD&E Study. Figure 4.1.5 shows the timeline of the previous studies.

Figure 4.1.5: Previous Studies Timeline



4.1.1 Community Oversight Advisory Team

The Broward MPO formed a COAT that was tasked with obtaining consensus on a vision for the SW 10th Street corridor. The team was comprised of members from the surrounding community as well as elected and appointed officials. The composition of the team consisted of:

- Nine members from the City of Deerfield Beach:
 - Four residents from communities adjacent to SW 10th Street;
 - Two business representatives; and
 - Three citywide representatives.
- Eight members from the SW 10th Street Study Area:
 - Two from the City of Coconut Creek;
 - Two from the City of Coral Springs;
 - Two from the City of Parkland; and
 - Two representing Broward County interests.

The COAT, in partnership with the FDOT and the Broward MPO, utilized a systematic approach to engage stakeholders, community representatives, and elected officials. Various viewpoints were developed and vetted through regular meetings facilitated by transportation experts from Broward County, the FDOT, FTE, and transportation consultants. The COAT ultimately provided 18 recommendations and 15 sub-recommendations to the Broward MPO in 2016. The COAT Recommendations are included in Table 4.1.1 below. One of the key recommendations of the COAT was to study the feasibility of placing the expressway

connection in a “depressed” section in order to mitigate noise and visual impacts as illustrated in Figure 4.1.6.

Figure 4.1.6: Conceptual Depressed Section from Broward MPO COAT Study



Table 4.1.1: COAT Recommendations

COAT Recommendation Number	Recommendation
1	Creatively determine if an engineering solution which is environmentally feasible can be provided to improve safety of 10 th Street and provide an efficient traffic solution between Sawgrass / Turnpike and I-95 while maintaining quality of life
2	Improve safety while maximizing improvements to traffic flow of 10 th Street and roadway intersections and expressway interchanges
2.1	To include public safety accessibility
3	Include near term solutions

COAT Recommendation Number	Recommendation
3.1	Signal timing improvements – current technology
3.2	Adaptive signal technology
3.3	Additional traffic lanes
4	Include a below-grade expressway with at-grade local access roads
4.1	Include extending below-grade expressway, west of westerly residential roadway connection to 10 th Street
4.2	Include extending below-grade expressway as close to Military Trail as possible, that would allow Military Trail intersection to remain at-grade (no overpass of Military Trail over Expressway)
5	Minimize, and attempt to eliminate, use of above grade overpass where adjacent to residential areas
6	Improve access for local roadways and expressways west of I-95
6.1	Improve residential access to 10 th and expressways from Waterways, Independence Bay, Century Village, Waterford Homes, Waterford Courtyards, and the Renaissance (nursing home)
6.2	Improve commercial access to 10 th and expressways for Newport Center, Publix Distribution, Palm Trails Plaza, 10 th Street strip mall, industrial area along SW 30 th Street, and Sawgrass Promenade
6.3	Improve Sawgrass Expressway and Turnpike connection to I-95
7	Encourage improved access to expressway and 10 th Street from local roads east of I-95
8	Include generous table top intersections for local roads to improve pedestrian and bike connectivity north and south across 10 th Street
9	Prepare noise study and identify mitigation needs required
9.1	Include noise walls (include at the beginning of construction)
9.2	Explore sound proofing for affected homes and businesses
10	Accelerate 10 th Street PD&E scoping and consultant selection to catch up with:
10.1	PD&E for Sawgrass / 10 th Street interchange with the Turnpike

COAT Recommendation Number	Recommendation
10.2	PD&E for the 10 th Street interchange with I-95
11	Create a gateway to north Broward by landscaping along 10 th Street and north and south along adjacent connecting roadways, including landscape buffers and berms (by using native species)
11.1	Explore use of revenue generated by tolls for maintenance of landscaping and tabletop parks
12	Minimize impacts to the environment including wetlands and air and water quality
13	Encourage mass transit and carpooling alternatives
14	Protect Deerfield Beach's west wellfield
15	Maximize business signage visibility and include temporary signage for local businesses during construction
16	If tolling is planned for expressway, locate toll stations so as not to adversely affect local roadway network
17	Include alternate transportation routes during the construction phase to alleviate congestion once construction begins on SW 10 th Street and plans to alleviate congestion on Hillsboro, Sample, Wiles, and SW 18 th Street.
17.1	Explore the potential to go under the railroad tracks at Hillsboro Boulevard to alleviate traffic during the construction phase and resolve issues on I-95
18	Install utilities underground

4.2 No-Build (No-Action) Alternative

The No Action Alternative, as its name implies, retains the existing roadway characteristics. Under this scenario, the existing SW 10th Street corridor would not be improved and conditions would continue to deteriorate. The No Action Alternative has certain advantages and disadvantages. The advantages of the No Action Alternative include:

- No expenditure of public funds;

- No disruption or temporary impacts (air, noise, vibration, travel patterns) due to construction activities; and
- No right-of-way acquisition.

The disadvantages of the No Action Alternative include:

- Does not meet the project purpose and need;
- Increased vehicular congestion and delay, which leads to increased travel, time, and delay costs;
- Increased safety concerns;
- Increased emergency response and evacuation time; and
- Decreased air quality.

A noteworthy point is that the No Action Alternative assumes that the adjacent I-95 interchange improvements are implemented, including the proposed flyovers to and from I-95 and SW 10th Street. These flyovers will need to tie into existing SW 10th Street. This scenario is explored in detail in the PTAR, available under separate cover. This scenario would be difficult to implement due to the merging distance needed in advance of the local intersections. In addition, this option requires reconstruction of a portion of SW 10th Street just west of Military Trail to provide space for the ramp terminals and associated MSE walls for the rising flyover ramp profiles.

4.2.1 No Action Traffic Analysis

The No Action Alternative provides a baseline for comparison to the Build Alternative by assuming the proposed SW 10th Street Connector project is not constructed. It has the same lane geometry as existing conditions along the SW 10th Street corridor from Waterways Boulevard to west of Military Trail. For future year 2040 conditions, changes to the surrounding roadway network are assumed, along with population and employment growth. These changes contribute to significant growth in traffic volumes along SW 10th Street and in the study area by 2040.

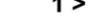
Planned and programmed roadway improvements in the area are expected to be constructed by 2040, and are assumed to be in place with the No Action Alternative. The planned

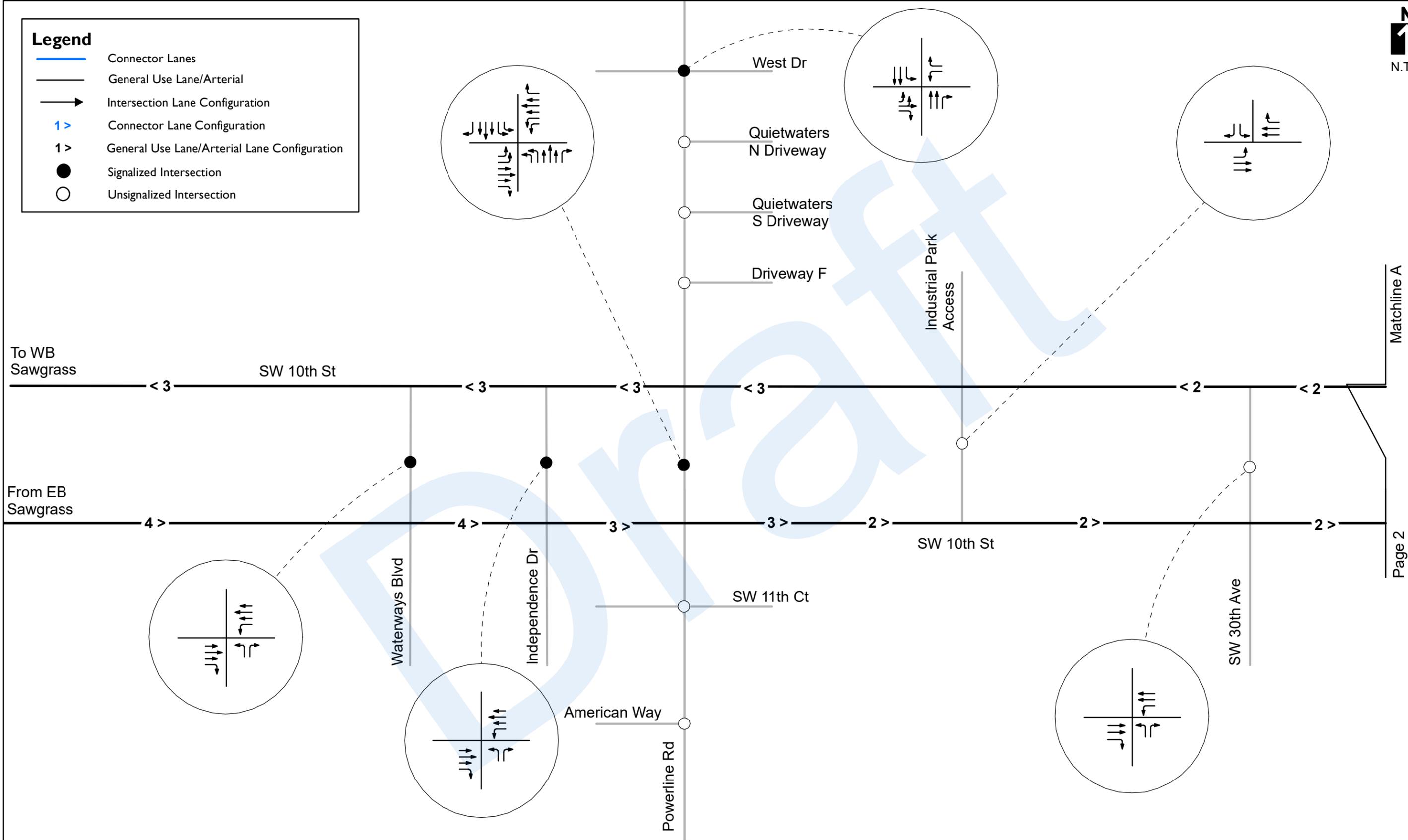
Sawgrass Expressway widening, Florida's Turnpike widening, and I-95 widening for express lanes are assumed to be complete. In addition, the planned Sawgrass Expressway / Turnpike interchange improvements are assumed to be in place. These include new ramps connecting SW 10th Street to and from the Turnpike's general purpose lanes north of SW 10th Street, and new ramps connecting SW 10th Street to and from the Turnpike's managed lanes south of SW 10th Street. Planned I-95 express lanes and interchange improvements at I-95 and SW 10th Street are also assumed to be constructed. The improvements include new ramps connecting the I-95 northbound and southbound express lanes to SW 10th Street west of I-95. The No Action Alternative lane geometry is shown in Figure 4.2.1.

The 2040 No Action peak hour directional volume-to-capacity analysis for the SW 10th Street local lanes is shown in Table 4.2.1. The results show that eastbound volumes are expected to exceed the capacity of the SW 10th Street local lanes between the Sawgrass Expressway and Newport Center Drive in the AM peak hour. Meanwhile, the westbound volumes are expected to exceed the capacity of the SW 10th Street local lanes in the AM peak hour from the Connector lanes egress west of Military Trail to west of SW 30th Avenue.

During the PM peak hour, eastbound volumes between Powerline Road and Newport Center Drive will exceed the capacity of the SW 10th Street local lanes from west of SW 30th Avenue to west of Newport Center Drive. In addition, SW 10th Street westbound volumes between Military Trail and the Sawgrass Expressway will exceed capacity in the afternoon. Many portions of the local lanes along the corridor are expected to have traffic volumes that will significantly exceed the roadway capacity.

Legend

-  Connector Lanes
-  General Use Lane/Arterial
-  Intersection Lane Configuration
-  1 > Connector Lane Configuration
-  1 > General Use Lane/Arterial Lane Configuration
-  Signalized Intersection
-  Unsignalized Intersection



Matchline A

Page 2



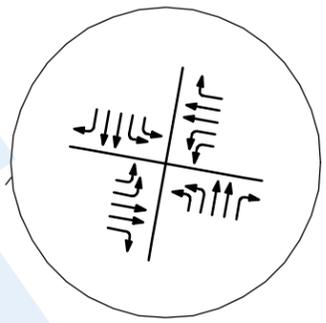
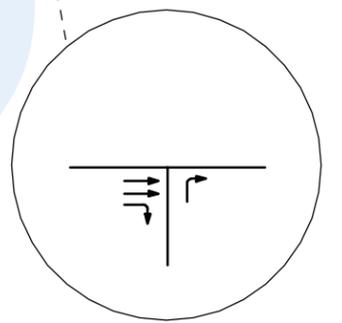
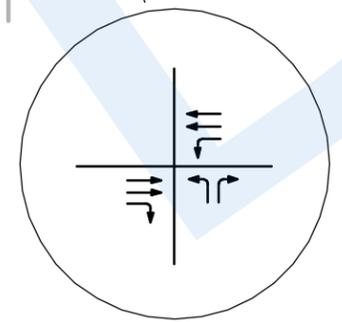
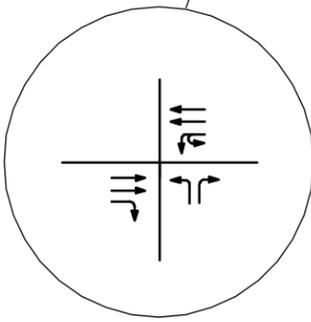
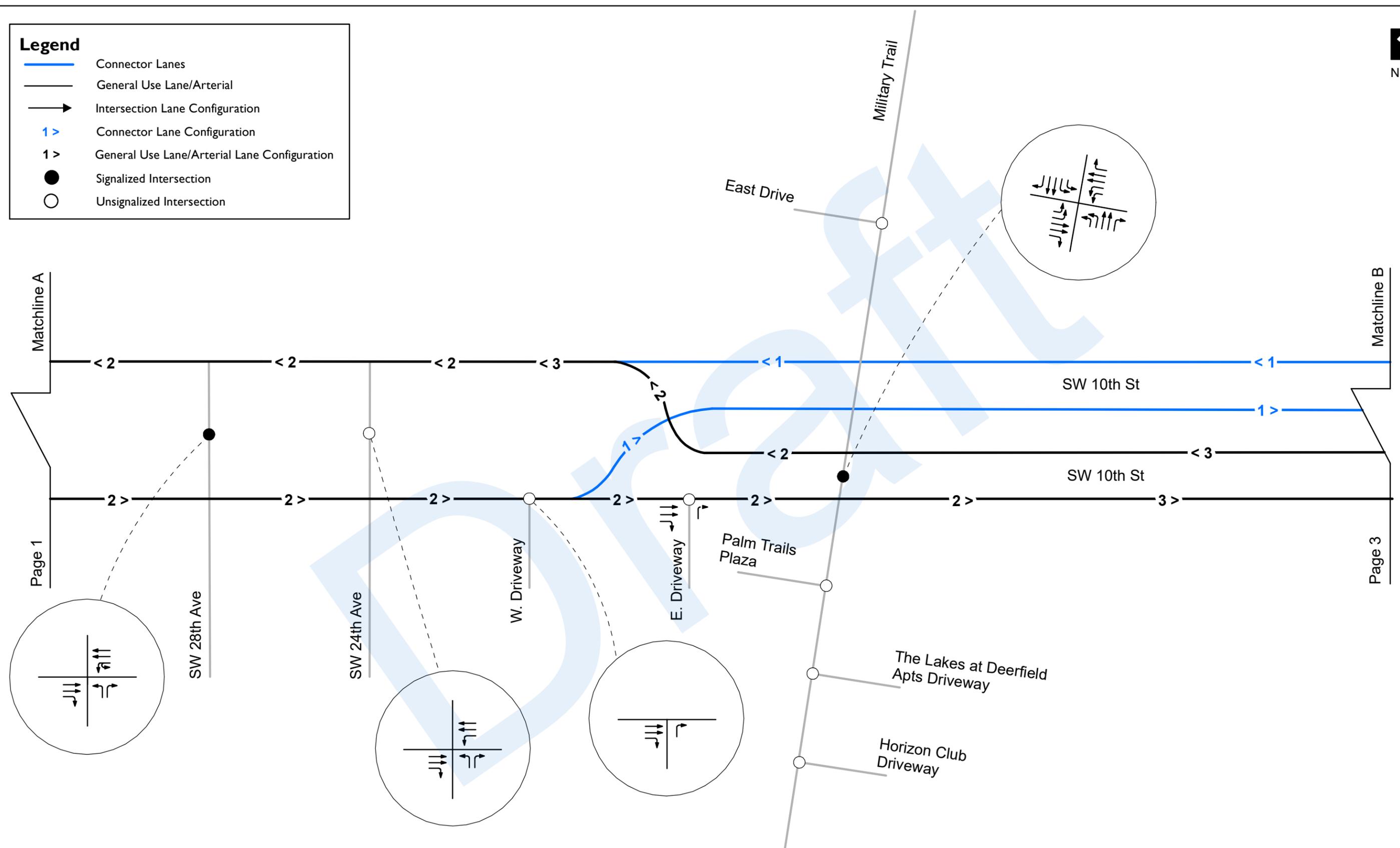
State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
Sawgrass Expressway to I-95
Financial Project ID: 439891-1-22-02, ETDM No: 14291

Figure 4.2.1
2040 No Action
Lane Geometry



Legend

- Connector Lanes
- General Use Lane/Arterial
- > Intersection Lane Configuration
- 1 > Connector Lane Configuration
- 1 > General Use Lane/Arterial Lane Configuration
- Signalized Intersection
- Unsignalized Intersection



State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
Sawgrass Expressway to I-95
Financial Project ID: 439891-1-22-02, ETDM No: 14291

Figure 4.2.1
2040 No Action
Lane Geometry

Page
2 of 3

Legend

-  Connector Lanes
-  General Use Lane/Arterial
-  Intersection Lane Configuration
-  Connector Lane Configuration
-  General Use Lane/Arterial Lane Configuration
-  Signalized Intersection
-  Unsignalized Intersection

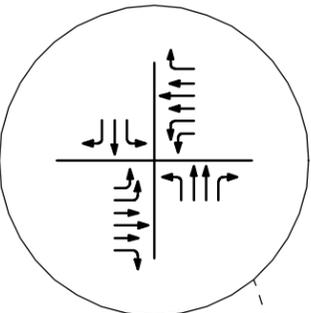
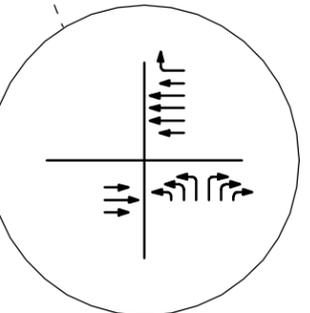
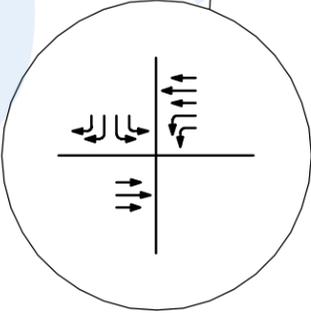
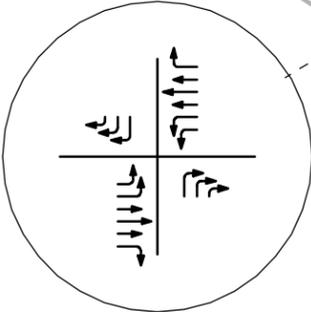
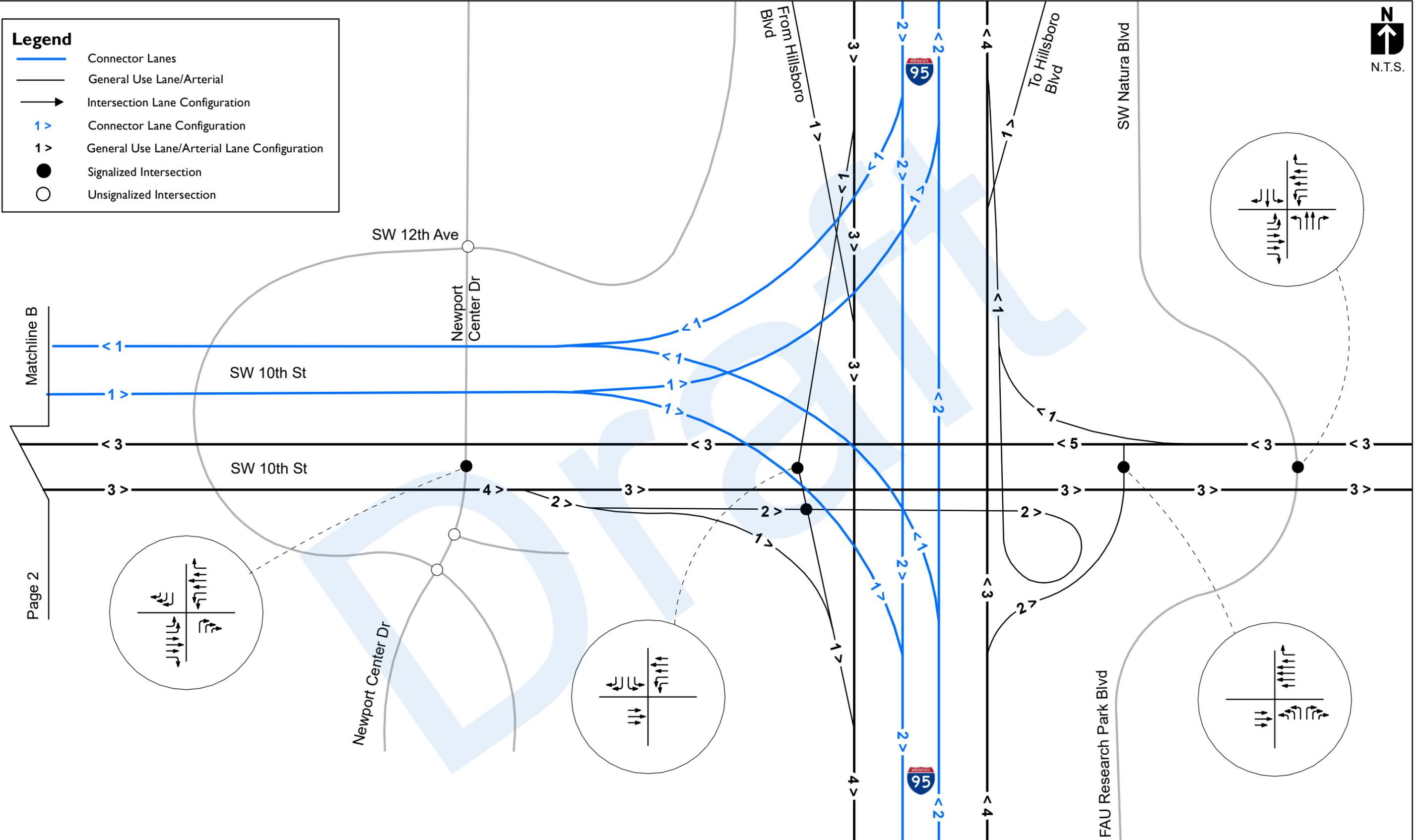


Table 4.2.1: 2040 No Action Alternative – Local Lanes Volume-to-Capacity Analysis

SW 10 th Street Local Lane Segments		No. of	Volume		Capacity (¹)	LOS(²)		V/C (³)	
	Location Description	Lanes	AM	PM		AM	PM	AM	PM
SW 10 th Street Eastbound	West of Waterways Blvd	4	5,570	3,010	4,242	F	C	1.31	0.71
	Waterways Blvd to Independence Dr	4	5,775	3,010	4,242	F	C	1.36	0.71
	Independence Dr to Powerline Rd	3	5,795	3,015	3,171	F	C	1.83	0.95
	Powerline Rd to west of SW 30th Ave	3	4,075	2,835	3,171	F	C	1.29	0.89
	West of SW 30th Ave to SW 28th Ave	2	4,000	2,970	2,100	F	F	1.90	1.41
	SW 28th Ave to SW 24th Ave	2	4,095	2,975	2,100	F	F	1.95	1.42
	SW 24th Ave to eastbound Connector lane ingress	2	3,965	2,905	2,100	F	F	1.89	1.38
	Eastbound Connector lane ingress to Military Trail	2	2,765	2,340	2,100	F	F	1.32	1.11
	Military Trail to west of Newport Center Dr	2	3,335	2,640	2,100	F	F	1.59	1.26
	West of Newport Center Dr to Newport Center Dr	3	3,335	2,640	3,171	F	C	1.05	0.83
	Newport Center Dr to I-95 SB On-Ramp	4	2,585	3,080	4,242	C	C	0.61	0.73
	I-95 SB On-Ramp to I-95 NB Off-Ramp	3	1,440	1,530	3,171	C	C	0.45	0.48
	I-95 NB Off-Ramp to Natura Blvd	3	1,910	2,210	3,171	C	C	0.60	0.70
	East of Natura Blvd	3	1,675	2,085	3,171	C	C	0.53	0.66
SW 10 th Street Westbound	West of Waterways Blvd	3	3,010	5,570	3,171	C	F	0.95	1.76
	Waterways Blvd to Independence Dr	3	2,860	5,750	3,171	C	F	0.90	1.81
	Independence Dr to Powerline Rd	3	2,820	5,780	3,171	C	F	0.89	1.82
	Powerline Rd to west of SW 30th Ave	3	2,680	3,980	3,171	C	F	0.85	1.26
	West of SW 30th Ave to SW 28th Ave	2	2,730	3,860	2,100	F	F	1.30	1.84
	SW 28th Ave to SW 24th Ave	2	2,650	3,980	2,100	F	F	1.26	1.90
	SW 24th Ave to westbound Connector lanes egress	2	2,625	3,950	2,100	F	F	1.25	1.88
	Westbound Connector lane egress to Military Trail	2	2,065	3,070	2,100	D	F	0.98	1.46
	Military Trail to Newport Center Dr	3	2,480	2,714	3,171	C	C	0.78	0.86
	Newport Center Dr to I-95 SB Off-Ramp	3	3,045	2,490	3,171	C	C	0.96	0.79
	I-95 SB Off-Ramp to west of Natura Blvd	5	2,950	2,590	5,313	C	C	0.56	0.49
	West of Natura Park Blvd to east of Natura Blvd	3	2,340	2,010	3,171	C	C	0.74	0.63

NOTES:

- (1) Capacity thresholds from FDOT 2012 Generalized LOS Peak Hour Directional Volumes Table for Urbanized Areas at LOS D for Class I arterial (40 mph or higher), with +5% capacity adjustment for right turn lanes.
- (2) LOS = Level of Service
- (3) V/C = Ratio of Volume to Capacity

Traffic along the SW 10th Street corridor between Florida's Turnpike and I-95 is expected to increase due to population and employment growth in the region. In addition, interchange improvements and new ramps added on both ends of the corridor will accommodate a larger number of vehicles to and from the Turnpike and I-95. This is expected to significantly increase future travel demand along the SW 10th Street corridor.

As shown in Table 4.2.1, with the travel demand expected to be twice the capacity of SW 10th Street in some segments, gridlock along SW 10th Street during peak hours can be expected. Without additional capacity and safety improvements in place along SW 10th Street, the duration of congestion is expected to increase, along with delay and queues along the corridor. The No Action Alternative does not satisfy the objectives or purpose and need of this project. It fails to improve local traffic flow or increase capacity throughout the corridor, and does not address existing operational and safety deficiencies.

4.3 Transportation Systems Management and Operational Alternative

The Transportation System Management and Operations (TSM&O) alternative intends to enhance the efficiency of the current transportation network by implementing established strategies that could be applied to address capacity and operational issues that exist today. The goal of TSM&O strategies is to preserve existing capacity, enhance safety, and improve reliability of the transportation network by establishing systems, services and programs that optimize utilization of the existing infrastructure and show improvements in the transportation network performance. Typical TSM&O improvements include ramp signals, arterial traffic management systems, traffic incident management, work zone traffic management, road weather management, traveler information services, congestion pricing, parking management, traffic control, commercial vehicle operations, transit signal priority systems, and freight management. These TSM&O strategies are generally applied without any right-of-way acquisition and minimal disruption to the traveling public. While the capital costs associated with TSM&O applications are generally low, these systems do require operations and maintenance funding to deliver the expected outcomes over their useable life.

Other TSM&O Strategies that were considered under this analysis were:

Advanced Traffic Management System (ATMS):

Establish an ATMS network to reduce congestion by improving the efficiency of existing infrastructure. This system would be managed out of the Broward County Regional Transportation Management Center (TMC) and requires Intelligent Transportation System (ITS) infrastructure. ATMS allows traffic engineers to modify signal timing, react to traffic incidents more efficiently, and monitor the transportation network.

Active Arterial Management (AAM):

Implement AAM along the corridor. AAM utilizes sensors and advanced signal control strategies by collecting travel time data and traffic flow characteristics to provide TMC operations staff the ability to adapt signal timings to prevailing traffic conditions.

Traffic Incident Management (TIM):

Expand current TIM strategies utilized in freeway operations to SW 10th Street to improve safety by reducing incident clearance times and minimize secondary crashes. In a freeway environment incident duration times are anticipated to be reduced by 30 to 50% by utilizing typical TIM strategies, which will reduce unscheduled non-recurring delay per person.

Integrated Corridor Management (ICM):

An ICM transportation system is the ultimate objective when it comes to operating and maintaining a complex multi-modal traffic network. ICM involves an integrated approach to transportation along a specific designated corridor or corridors. Multiple agencies and multiple modes are coordinated using shared back office systems and the adoption of compatible strategies. Through an ICM approach, transportation professionals manage the corridor as a multimodal system and make operational decisions for the benefit of the corridor.

Additional operational improvements that were considered under the TSM&O Alternative include:

- Arterial Access Management;

- Signal Phasing and Timing and Coordination Optimization;
- Adaptive Traffic Control Systems;
- Advanced Queue Detection;
- Emergency Vehicle Preemption;
- Transit Signal Priority; and
- Geometric Improvements – add / extend turn lanes, intersection widening, signing and pavement marking, etc.

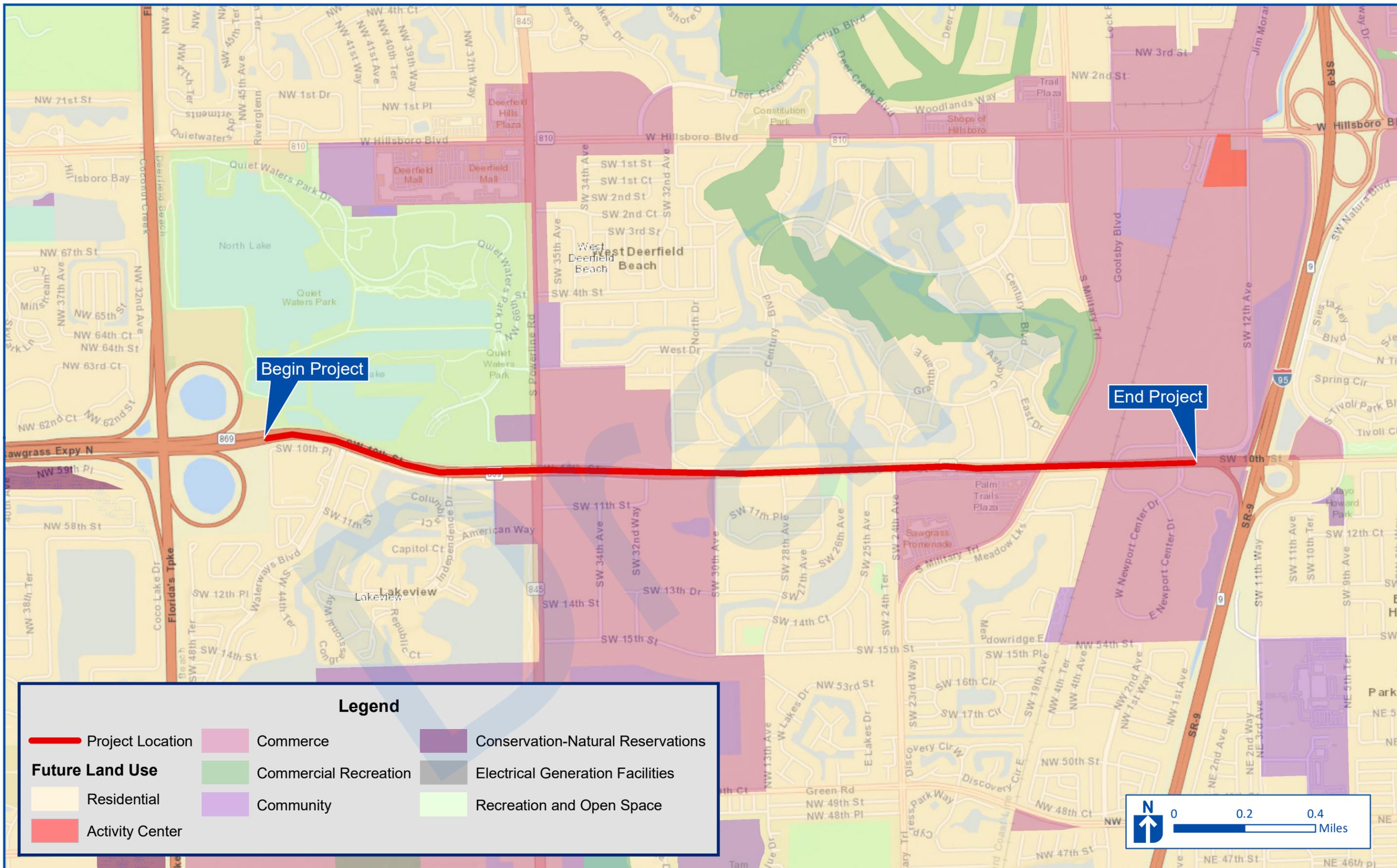
A 2040 analysis was not performed for the TSM&O Alternative since the intersection of SW 10th Street at Military Trail currently operates at LOS F in both the AM and PM peak. Additionally, the intersection of SW 10th Street at Newport Center Drive operates at LOS F in PM. With these intersections operating at undesirable LOS F, the TSM&O alternative will not meet the purpose and need of this project.

While it was determined that the TSM&O Alternative does not meet the purpose and need of this project, strategies identified in the analysis should move forward for consideration with the preferred alternative that is selected in order to ensure a comprehensive transportation network that is operated and managed to the highest level of efficiency available.

4.4 Future Conditions

4.4.1 Future Land Use

Broward County is mostly built-out in the study area with little undeveloped land in the project corridor. Therefore, significant changes in land use are not anticipated. The Broward County Future Land Use Maps are consistent with the existing land use in the study corridor. The corridor will be mostly residential (multi-family and single family) and commercial. In addition, the Broward County Future Land Use map shows Quiet Waters Park will remain Recreation / Open Space. Figure 4.4.1 shows the Broward County Future Land Use.



Begin Project

End Project

Legend

 Project Location	 Commerce	 Conservation-Natural Reservations
Future Land Use	 Commercial Recreation	 Electrical Generation Facilities
 Residential	 Community	 Recreation and Open Space
 Activity Center		



4.4.2 Traffic Analysis

The traffic analysis for the build condition was completed for the alternative known as the “Partial Depressed – Depressed Westbound Exit Ramp” described in Section 4.6.2.1 and referred to as the Build Alternative for the traffic analysis. This alternative represents a significant capacity improvement over the No Action Alternative, most notably a new managed lane freeway facility is proposed to be constructed along the north side of the corridor from the Sawgrass Expressway / Florida’s Turnpike to I-95. The Build Alternative consists of two managed lanes in each direction. An eastbound entrance ramp and eastbound exit ramp are provided, as well as a westbound entrance ramp and westbound exit ramp located between Powerline Road and Newport Center Drive.

The entrance and exit ramps provide connections between the SW 10th Street local lanes and the managed lanes. The SW 10th Street local lanes are located along the south side of the corridor and consist of three lanes in each direction from west of Waterways Boulevard to east of Powerline Road, two lanes in each direction from east of Powerline Road to Military Trail, and three lanes in each direction from Military Trail to Newport Center Drive. The SW 10th Street local lanes provide access to the adjacent residential developments and businesses, as well as connections to intersecting local roads.

The local lanes are planned to accommodate local trips traveling at slower speeds. They are adjacent to improved bicycle lanes and sidewalk along the corridor. The speed limit for the 11-foot local lanes is expected to be 35 mph to be consistent with the new design of the local roadway.

The managed lanes are expected to accommodate longer distance trips. Limited access connections will be provided and the facility will be designed for traffic to travel at a higher speed. The speed limit for the managed lanes is assumed to be posted at 60 mph. These lanes will be physically separated from the local lanes by a barrier and / or a grade separation.

Planned and programmed roadway improvements in the area that are expected to be constructed by 2040 are assumed to be in place with the Build Alternative. This includes the planned Sawgrass Expressway widening, Florida’s Turnpike widening, I-95 widening for express lanes, and interchange improvements. Sawgrass Expressway and Turnpike

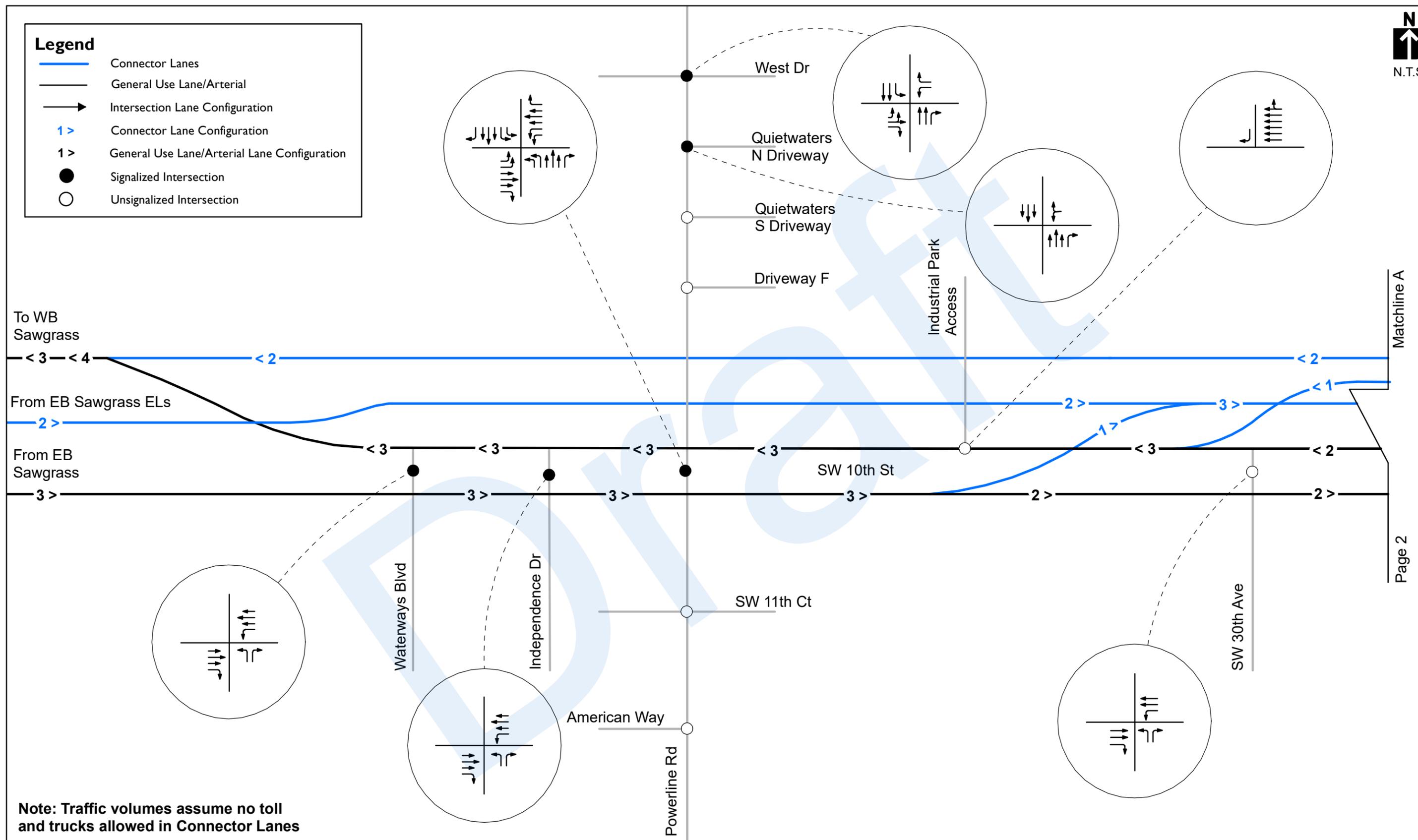
interchange improvements include new ramps connecting SW 10th Street to and from the Turnpike's general purpose lanes north of SW 10th Street, and new ramps connecting SW 10th Street managed lanes to and from the Turnpike's managed lanes south of SW 10th Street. Planned interchange improvements at I-95 and SW 10th Street include new ramps connecting the I-95 northbound and southbound express lanes to the SW 10th Street managed lanes west of I-95. The Build Alternative lane geometry is shown in Figure 4.4.2.

As noted with the No Action Alternative, 2040 traffic along the SW 10th Street corridor between Florida's Turnpike and I-95 is expected to increase from the expected population and employment growth in the region. In addition, the adjacent interchange improvements and new ramps connecting to SW 10th Street on both ends of the corridor will facilitate an increase in traffic along the corridor. Additional systemic capacity along the SW 10th Street corridor from the proposed new managed lanes is expected to accommodate at least 30% of the total corridor traffic. Removing this traffic from the local lanes provides a significant benefit to safety and operations along the SW 10th Street local lanes, including reduced delay and queues.



Legend

- Connector Lanes
- General Use Lane/Arterial
- Intersection Lane Configuration
- 1 > Connector Lane Configuration
- 1 > General Use Lane/Arterial Lane Configuration
- Signalized Intersection
- Unsignalized Intersection

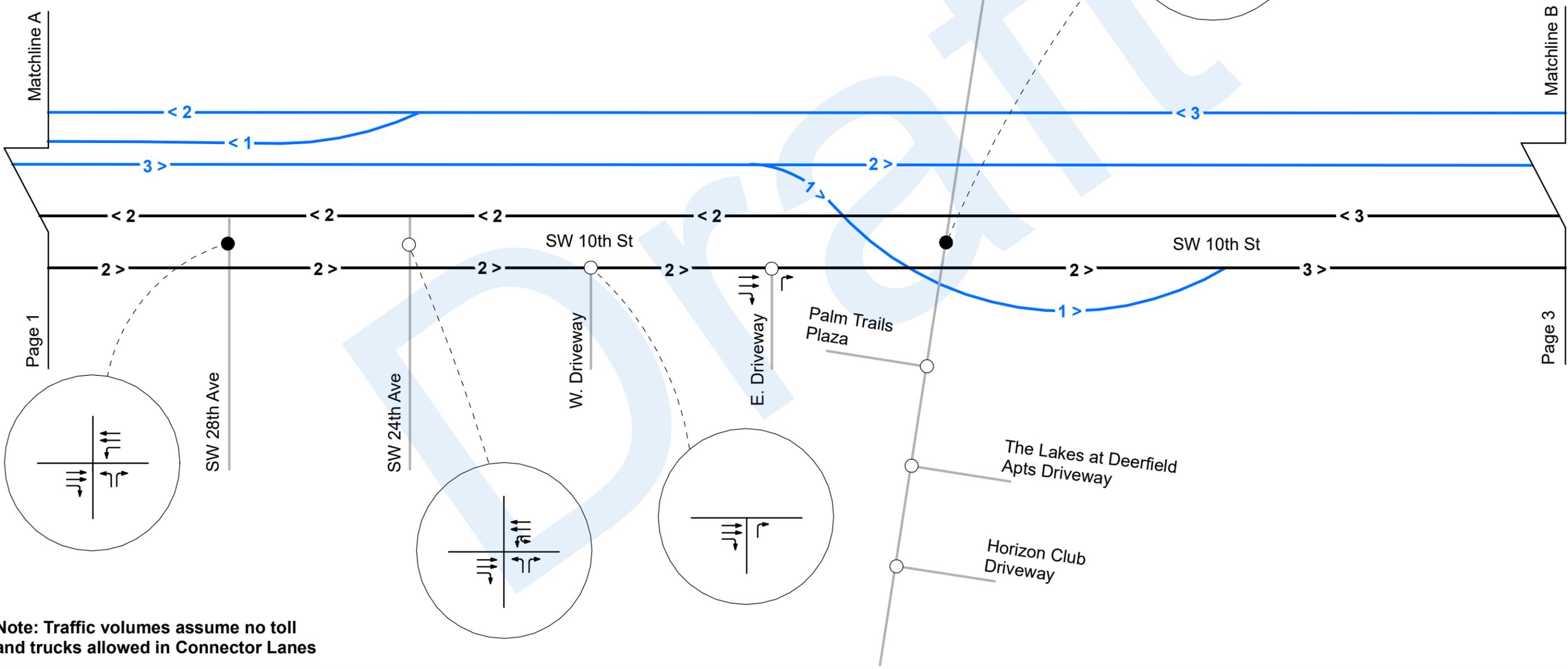


Note: Traffic volumes assume no toll and trucks allowed in Connector Lanes



Legend

- Connector Lanes
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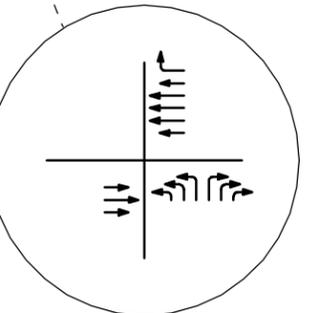
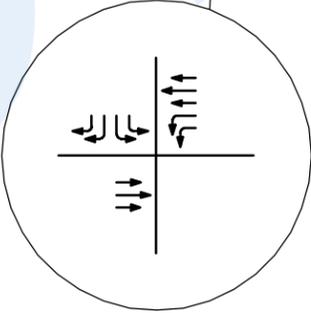
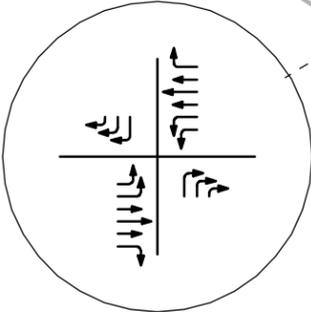
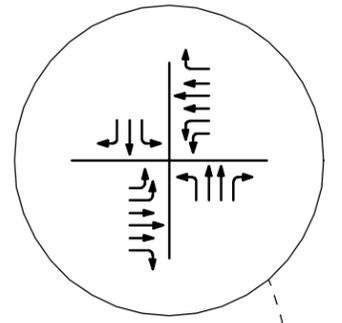
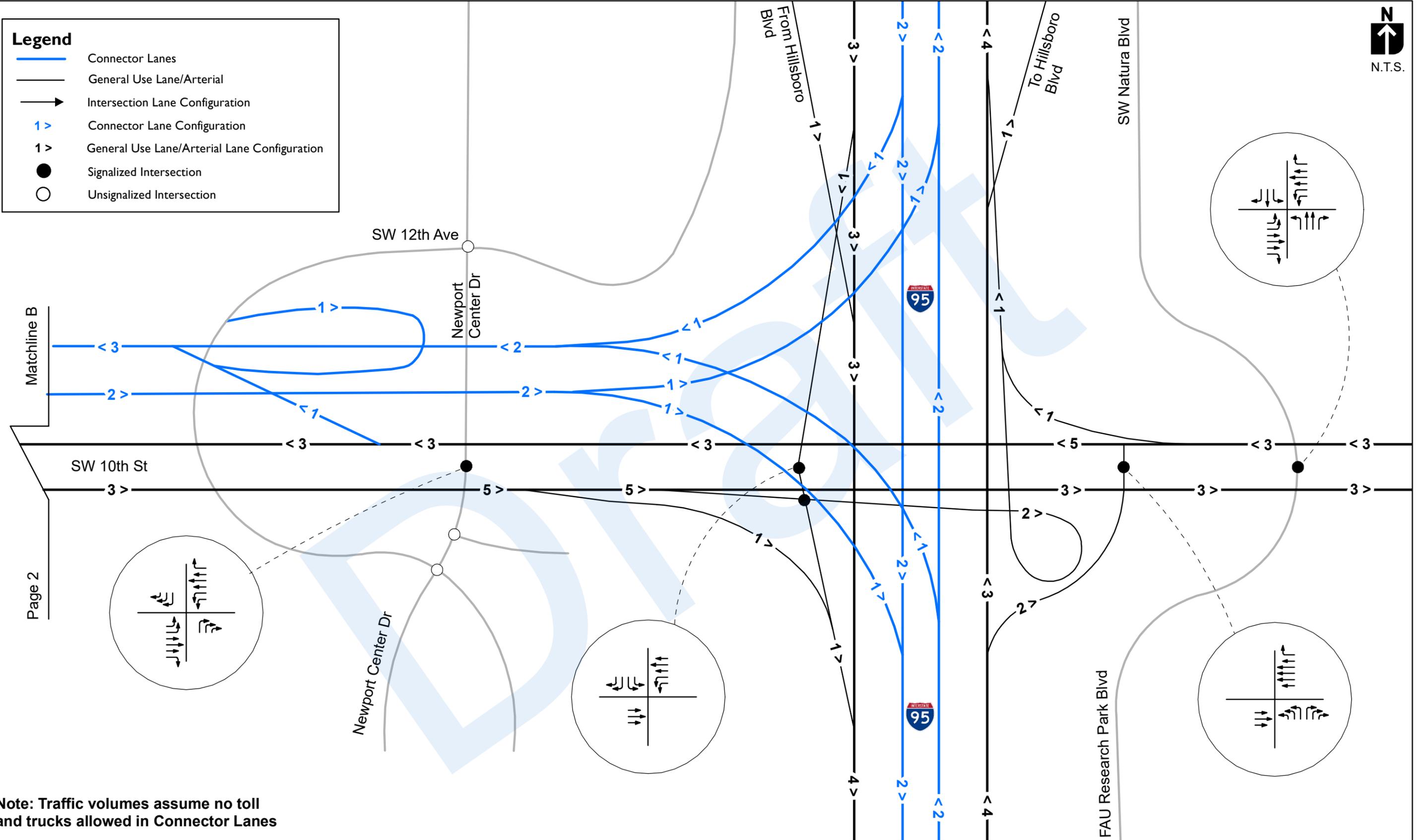


Note: Traffic volumes assume no toll and trucks allowed in Connector Lanes



Legend

- Connector Lanes
- General Use Lane/Arterial
- Intersection Lane Configuration
- 1 > Connector Lane Configuration
- 1 > General Use Lane/Arterial Lane Configuration
- Signalized Intersection
- Unsignalized Intersection



Note: Traffic volumes assume no toll and trucks allowed in Connector Lanes



SW 10th Street Local Lanes

The majority of eastbound traffic in the AM peak hour under the Build Alternative will operate at LOS D or better, except for three short segments from just west of Waterways Boulevard to Powerline Road, and from the managed lanes egress to Newport Center Drive. Westbound traffic will also operate at LOS D or better except for one short segment from Newport Center Drive to the southbound I-95 off-ramp. The eastbound and westbound volume-to-capacity ratios throughout the corridor are all well below 1.0 except in those segments previously noted.

During the PM peak hour, eastbound traffic will operate at LOS D or better throughout the corridor, with volume-to-capacity ratios below 1.0. Westbound traffic will operate at LOS D or better except between Powerline Road and west of Waterways Boulevard.

The results in Table 4.4.1 indicate that the SW 10th Street local lanes will generally allow traffic to move freely (at LOS D or better in the peak hours), except for a few segments during the peak hours. However, on those few segments where the volumes exceed capacity, the magnitude is much less than under the No Action Alternative. The additional capacity along SW 10th Street will improve local traffic flow.

Table 4.4.1: 2040 Build Alternative – Local Lanes Volume-to-Capacity Analysis

SW 10 th Street Local Lane Segments	No. of Lanes	Volume		Capacity ⁽¹⁾	LOS ⁽²⁾		V/C ⁽³⁾		
		AM	PM		AM	PM	AM	PM	
SW 10 th Street Eastbound	West of Waterways Blvd	3	2,750	1,950	2,646	F	D	1.04	0.74
	Waterways Blvd to Independence Dr	3	2,975	1,930	2,646	F	D	1.12	0.73
	Independence Dr to Powerline Rd	3	2,995	1,885	2,646	F	D	1.13	0.71
	Powerline Rd to eastbound Connector lanes ingress	3	1,710	1,955	2,646	D	D	0.65	0.74
	Eastbound Connector lanes ingress to SW 28th Ave	2	690	805	1,712	C	D	0.40	0.47
	SW 28th Ave to SW 24th Ave	2	730	740	1,712	C	C	0.43	0.43
	SW 24th Ave to Military Trail	2	650	835	1,712	C	D	0.38	0.49
	Military Trail to eastbound Connector lanes egress	2	1,375	1,150	1,712	D	D	0.80	0.67
	Eastbound managed lanes egress to Newport Center Dr	3	2,975	2,500	2,646	F	D	1.12	0.94
	Newport Center Dr to I-95 SB On-Ramp	4	2,245	2,940	3,560	D	D	0.63	0.83
	I-95 SB On-Ramp to I-95 NB Off-Ramp	3	1,230	1,190	2,646	D	C	0.46	0.45
	I-95 NB Off-Ramp to Natura Blvd	3	1,700	1,870	2,646	D	D	0.64	0.71
	East of Natura Blvd	3	1,555	1,790	2,646	D	D	0.59	0.68
	SW 10 th Street Westbound	West of Waterways Blvd	3	1,950	2,750	2,646	D	F	0.74
Waterways Blvd to Independence Dr		3	1,820	2,910	2,646	D	F	0.69	1.10
Independence Dr to Powerline Rd		3	1,780	2,890	2,646	D	F	0.67	1.09
Powerline Rd to SW 30th Ave / westbound Connector lanes egress		3	2,000	2,000	2,646	D	D	0.76	0.76
SW 30th Ave / westbound Connector lanes egress to SW 28th Ave		2	960	1,125	1,712	D	D	0.56	0.66
SW 28th Ave to SW 24th Ave		2	770	1,180	1,712	D	D	0.45	0.69
SW 24th Ave to Military Trail		2	835	1,240	1,712	D	D	0.49	0.72
Military Trail to Newport Center Dr / westbound Connector lanes ingress		3	1,195	1,375	2,646	C	D	0.45	0.52
Newport Center Dr / westbound Connector lanes ingress to I-95 SB Off-Ramp		3	3,185	2,410	2,646	F	D	1.20	0.91
I-95 SB Off-Ramp to west of Natura Blvd		5	2,860	2,340	4,473	D	D	0.64	0.52
West of Natura Blvd to east of Natura Blvd		3	2,180	1,990	2,646	D	D	0.82	0.75

NOTES

(1) Capacity thresholds from FDOT 2012 Generalized LOS Peak Hour Directional Volumes Table for Urbanized Areas at LOS D for Class II arterial (35 mph or less), with +5% capacity adjustment for right turn lanes. 5LD capacity estimated as 870 additional capacity added to 4LD capacity.

(2) LOS = Level of Service

(3) V/C = Ratio of Volume to Capacity



SW 10th Street Managed Lanes

Table 4.4.2 shows the SW 10th Street connector lanes 2040 Build Alternative peak hour directional volume-to-capacity analysis. All connector lane segments are expected to have a volume-to-capacity ratio less than 1.0. This indicates that the capacity provided by two lanes in each direction, along with a third auxiliary lane between the ingress and egress points, can accommodate the demand forecasted for the connector lanes. In addition, the capacity of the one-lane intermediate entrance and exit ramps between Powerline Road and Newport Center Drive will accommodate the forecasted future volumes.

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Table 4.4.2: 2040 Build Alternative – Managed Lanes Volume-to-Capacity Analysis

SW 10 th Street Connector Lane Segments		No. of	Volume		Capacity ⁽¹⁾	V/C ⁽²⁾	
	Location Description	Lanes	AM	PM		AM	PM
SW 10 th Street Eastbound	From west of Waterways Blvd to on ramp west of SW 30th Ave	2	2,840	1,240	4,000	0.71	0.31
	Eastbound on ramp west of SW 30th Ave	1	1,020	1,230	1,650	0.62	0.75
	From on ramp west of SW 30th Ave to off ramp east of Military Trail	3	3,860	2,470	6,000	0.64	0.41
	Eastbound off ramp east of Military Trail	1	1,600	1,350	1,650	0.97	0.82
	From off ramp east of Military Trail to I-95 direct-connect ramps	2	2,260	1,120	4,000	0.57	0.28
	Direct-connect ramp to northbound 95 express	1	1,670	900	1,650	1.01	0.55
	Direct-connect ramp to southbound 95 express	1	590	220	1,650	0.36	0.13
SW 10 th Street Westbound	From west of Waterways Blvd to off ramp west of SW 24th Ave	2	1,240	2,840	4,000	0.31	0.71
	Westbound off ramp west of SW 24th Ave	1	1,070	710	1,650	0.65	0.43
	From off ramp west of SW 24th Ave to on ramp west of Newport Center Drive	3	2,310	3,550	6,000	0.39	0.59
	Westbound (loop) on ramp from Newport Center Dr	1	30	190	1,650	0.02	0.12
	Westbound on ramp west of Newport Center Dr	1	1,260	1,580	1,650	0.76	0.96
	From on ramp west of Newport Center Dr to I-95 direct-connect ramps	2	1,020	1,780	4,000	0.26	0.45
	Direct-connect ramp from northbound 95 express	1	260	650	1,650	0.16	0.39
	Direct-connect ramp from southbound 95 express	1	760	1,130	1,650	0.46	0.68

NOTES:

(1) Capacity thresholds (pc/h/ln) from HCMV6.0 Exhibit 12-11 for 65 mph FFS Managed Lane Segments.

(2) V/C = Ratio of Volume to Capacity

4.4.2.1 2040 VISSIM Analysis

VISSIM microsimulation for the No Action Alternative and Build Alternative was also completed to analyze and compare the operations of the SW 10th Street study corridor. The 2040 VISSIM analysis included the local lanes, signalized intersections, connector lanes freeway segments, and entry and exit ramps. The detailed VISSIM microsimulation operational analysis is documented in the PTAR and findings are summarized below.

VISSIM analysis of the Build Alternative for the 2040 AM and PM peak hours shows substantial benefits when compared to the No Action Alternative.

Intersection Analysis – AM Peak Hour

The 2040 AM peak hour VISSIM analysis indicates the following SW 10th Street intersections will operate below the LOS D target under the No Action Alternative, as shown in Table 4.4.3:

- Waterways Boulevard intersection (LOS F);
- Powerline Road intersection (LOS F);
- SW 28th Avenue intersection (LOS F);
- SW 24th Avenue intersection (LOS E);
- Military Trail intersection (LOS F);
- I-95 off-ramp terminal intersections (LOS E); and
- Natura Boulevard intersection (LOS E).

The Build Alternative 2040 AM peak hour results show all study area intersections operating at an acceptable level of service (D or better). Table 4.4.4 shows the AM peak hour intersection operational results for the Build Alternative.

Intersection Analysis – PM Peak Hour

The No Action Alternative 2040 PM peak hour findings indicate the following SW 10th Street intersections are expected to operate below the LOS D target, as shown in Table 4.4.5:

- Waterways Boulevard intersection (LOS F);
- Independence Drive (LOS E);
- Powerline Road intersection (LOS F);

- SW 30th Avenue (LOS E);
- SW 28th Street intersection (LOS F);
- Military Trail intersection (LOS F);
- Newport Center Drive intersection (LOS F);
- I-95 off-ramp terminal intersections (LOS F); and
- Natura Boulevard (LOS F).

During the 2040 PM peak hour, all but one of the study area intersections will operate at LOS E or F under the No Action Alternative. The PM peak hour results for the Build Alternative indicate that all study area intersections operate at an acceptable level of service (D or better). Table 4.4.6 shows the PM peak hour intersection operational results for the Build Alternative.

Draft

Table 4.4.3: No Action Alternative AM Peak Intersection Performance

Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
Waterways Blvd	EB	T	3,079	9,651	200+ (F)	200+ (F)	187.9 (F)
		R	17	0	200+ (F)		
	WB	L	52	154	114 (F)	7.2 (A)	
		T	2,367	579	5 (A)		
	NB	L	157	1,495	200+ (F)	200+ (F)	
		R	206	1,429	160 (F)		
Independence Dr	EB	T	3,285	1,657	74 (E)	73.8 (E)	45.2 (D)
		R	5	0	7 (A)		
	WB	L	19	25	35 (C)	4.2 (A)	
		T	2,356	427	4 (A)		
	NB	L	59	152	93 (F)	81.5 (F)	
		R	31	193	60 (E)		
Powerline Rd	EB	L	770	1,315	83 (F)	74.8 (E)	91.1 (F)
		T	1,957	1,318	80 (E)		
		R	581	1,137	47 (D)		
	WB	L	285	1,375	200+ (F)	85.9 (F)	
		T	1,480	1,561	71 (E)		
		R	454	1,558	51 (D)		
	NB	L	354	592	200+ (F)	116.9 (F)	
		T	829	592	98 (F)		
		R	348	657	52 (D)		
	SB	L	198	470	200+ (F)	107.3 (F)	
T		885	550	115 (F)			
R		537	588	24 (C)			
SW 30th Ave*	EB	T	2,403	687	24 (C)	24.1 (C)	14.6 (B)
		R	45	18	9 (A)		
	WB	L	62	163	66 (F)	2.4 (A)	
		T	2,168	93	1 (A)		
	NB	L	40	111	72 (F)	58.3 (F)	
		R	47	91	47 (E)		
SW 28th Ave	EB	T	2,401	1,174	40 (D)	39.7 (D)	80.8 (F)
		R	48	80	21 (C)		
	WB	U	63	1,662	200+ (F)	68.5 (E)	
		L	19	1,662	200+ (F)		
		T	2,081	1,247	46 (D)		
	NB	L	145	2,827	200+ (F)	200+ (F)	
R		72	2,824	200+ (F)			
SW 24th Ave*	EB	T	2,429	1,653	60 (F)	59 (F)	44.1 (E)
		R	104	25	46 (E)		
	WB	L	22	69	45 (E)	12.4 (B)	
		T	2,154	532	12 (B)		
	NB	L	48	438	83 (F)	200+ (F)	
		R	24	458	200+ (F)		
Military Trail	EB	L	125	156	70 (E)	56.7 (E)	110.3 (F)
		T	1,362	693	58 (E)		
		R	66	33	5 (A)		
	WB	L	282	575	200+ (F)	145.5 (F)	
		T	1,277	2,105	165 (F)		



Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
	NB	R	496	451	35 (C)	81.6 (F)	
		L	181	287	168 (F)		
		T	652	499	78 (E)		
	SB	R	628	588	60 (E)	154.7 (F)	
		L	424	573	200+ (F)		
		T	505	573	123 (F)		
Newport Center Dr	EB	R	257	573	100 (F)	13.1 (B)	38.2 (D)
		L	264	285	88 (F)		
		T	1,754	616	4 (A)		
	WB	R	396	309	4 (A)	57.6 (E)	
		L	363	302	83 (F)		
		T	1,944	1,612	61 (E)		
NB	R	156	134	45 (D)	45.4 (D)		
SB	R	185	144	86 (F)	85.8 (F)		
I-95 Ramps	EB	L	658	224	11 (B)	19.9 (B)	70.9 (E)
		T	755	305	40 (D)		
		R	500	0	1 (A)		
	WB	L	780	683	109 (F)	75.2 (E)	
		T	1,131	683	70 (E)		
		R	279	415	3 (A)		
	NB	L	692	5,570	168 (F)	138.5 (F)	
		R	407	222	88 (F)		
	SB	L	430	2,972	79 (E)	81.6 (F)	
R		855	2,972	83 (F)			
Natura Blvd	EB	L	264	245	86 (F)	36.7 (D)	62 (E)
		T	1,046	359	32 (C)		
		R	281	216	7 (A)		
	WB	L	192	781	150 (F)	82.1 (F)	
		T	1,546	1,707	76 (E)		
		R	89	109	36 (D)		
	NB	L	334	1,309	80 (E)	67.5 (E)	
		T	201	621	79 (E)		
		R	168	118	30 (C)		
SB	L	241	1,101	58 (E)	61.5 (E)		
	T	198	1,101	90 (F)			
		R	381	1,006	49 (D)		

LOS based on Exhibit 19-8 (HCM 6th Edition)

*Stop controlled intersections. LOS based on Exhibit 20-2 (HCM 6th Edition)

Reported maximum queues are capped by the presence of upstream intersection nodes or the extent of the network

Table 4.4.4: Build Alternative AM Peak Intersection Performance

Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
Waterways Blvd	EB	T	2,684	904	13 (B)	12.7 (B)	13.2 (B)
		R	27	0	7 (A)		
	WB	L	62	161	116 (F)	6 (A)	
		T	1,737	109	2 (A)		
	NB	L	183	383	79 (E)	47.1 (D)	
		R	238	408	22 (C)		
Independence Dr	EB	T	2,895	1,101	15 (B)	14.9 (B)	12.6 (B)
		R	10	0	3 (A)		
	WB	L	21	78	63 (E)	6.4 (A)	
		T	1,746	470	6 (A)		
	NB	L	53	147	84 (F)	63.6 (E)	
		R	29	206	26 (C)		
Powerline Rd	EB	L	1,003	1,315	100 (F)	53.5 (D)	53.8 (D)
		T	1,166	788	40 (D)		
		R	748	467	11 (B)		
	WB	L	338	311	93 (F)	46.2 (D)	
		T	1,041	481	50 (D)		
		R	622	580	14 (B)		
	NB	L	344	510	87 (F)	53.9 (D)	
		T	1,184	510	54 (D)		
		R	272	572	11 (B)		
	SB	L	252	256	78 (E)	62.1 (E)	
		T	1,298	557	75 (E)		
		R	382	249	9 (A)		
SW 30th Ave*	EB	T	610	0	1 (A)	1.1 (A)	1.5 (A)
		R	76	36	2 (A)		
	WB	L	73	53	3 (A)	0.7 (A)	
		T	896	0	0 (A)		
	NB	L	68	77	11 (B)	10.2 (B)	
		R	65	95	9 (A)		
SW 28th Ave	EB	T	598	236	8 (A)	7.6 (A)	16.8 (B)
		R	78	72	2 (A)		
	WB	L	29	107	81 (F)	7.5 (A)	
		T	740	254	5 (A)		
	NB	L	228	475	80 (E)	53.9 (D)	
		R	133	139	10 (A)		
SW 24th Ave*	EB	T	567	0	1 (A)	0.7 (A)	1.2 (A)
		R	164	53	2 (A)		
	WB	U	92	105	7 (A)	0.9 (A)	
		L	25	118	4 (A)		
		T	719	0	0 (A)		
	NB	L	49	84	10 (A)	8.8 (A)	
R		31	87	7 (A)			
Military Trail	EB	L	294	294	93 (F)	40 (D)	47.4 (D)
		T	207	219	41 (D)		
		R	481	380	7 (A)		
	WB	L	322	297	83 (F)	44.4 (D)	

Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)				
					Movement	Approach	Intersection		
		T	358	217	28 (C)				
		R	150	66	1 (A)				
		L	172	168	80 (E)				
	NB	T	684	482	61 (E)	48.3 (D)			
		R	684	550	28 (C)				
		L	493	404	84 (F)				
	SB	T	522	404	52 (D)	53.8 (D)			
		R	309	404	8 (A)				
		L	370	319	105 (F)				
Newport Center Dr	EB	T	2,039	1,822	11 (B)	22.1 (C)	21.1 (C)		
		R	551	1,810	8 (A)				
		L	421	338	75 (E)				
	WB	T	2,250	937	10 (A)	18.2 (B)			
		R	437	102	4 (A)				
		L	179	157	39 (D)				
	NB	R	179	157	39 (D)	39.3 (D)			
	SB	R	143	91	38 (D)	38.1 (D)			
	I-95 Ramps	EB	L	780	350	22 (C)		24.4 (C)	52 (D)
T			799	344	44 (D)				
R			637	5	2 (A)				
WB		L	770	456	117 (F)	51.9 (D)			
		T	1,081	456	19 (B)				
		R	283	247	1 (A)				
NB		L	943	1,133	112 (F)	97.9 (F)			
		R	467	249	70 (E)				
SB		L	410	551	64 (E)	49.9 (D)			
		R	1,084	551	45 (D)				
Natura Blvd		EB	L	252	235	78 (E)	32.9 (C)	41.5 (D)	
			T	1,105	360	30 (C)			
	R		318	234	7 (A)				
	WB	L	213	473	108 (F)	45.4 (D)			
		T	1,423	641	38 (D)				
		R	92	108	7 (A)				
	NB	L	330	789	61 (E)	51.6 (D)			
		T	189	525	66 (E)				
		R	184	161	19 (B)				
	SB	L	239	655	49 (D)	42.4 (D)			
		T	183	655	78 (E)				
		R	385	319	22 (C)				

LOS based on Exhibit 19-8 (HCM 6th Edition)

*Stop controlled intersections. LOS based on Exhibit 20-2 (HCM 6th Edition)

Reported maximum queues are capped by the presence of upstream intersection nodes or the extent of the network

Table 4.4.5: No Action Alternative PM Peak Intersection Performance

Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
Waterways Blvd	EB	T	2,119	9,645	200+ (F)	200+ (F)	200+ (F)
		R	94	4	200+ (F)		
	WB	L	136	333	88 (F)	8.1 (A)	
		T	2,904	508	4 (A)		
	NB	L	76	217	138 (F)	57.1 (E)	
		R	129	151	10 (A)		
Independence Dr	EB	T	2,203	1,659	174 (F)	171.5 (F)	74.6 (E)
		R	36	0	10 (A)		
	WB	L	28	33	31 (C)	3.5 (A)	
		T	3,021	415	3 (A)		
	NB	L	17	92	92 (F)	74.8 (E)	
		R	50	133	69 (E)		
Powerline Rd	EB	L	406	1,322	200+ (F)	170 (F)	140.5 (F)
		T	1,484	1,324	109 (F)		
		R	324	826	61 (E)		
	WB	L	197	1,645	200+ (F)	200+ (F)	
		T	1,489	2,006	200+ (F)		
		R	242	2,049	186 (F)		
	NB	L	549	603	155 (F)	90.3 (F)	
		T	451	603	48 (D)		
		R	214	667	13 (B)		
	SB	L	296	326	71 (E)	35.3 (D)	
		T	472	290	47 (D)		
		R	1,011	620	20 (B)		
SW 30th Ave*	EB	T	2,040	349	3 (A)	2.6 (A)	43.4 (E)
		R	23	3	2 (A)		
	WB	L	14	72	96 (F)	90.4 (F)	
		T	1,776	1,113	90 (F)		
	NB	L	102	219	71 (F)	43.7 (E)	
		R	109	119	18 (C)		
SW 28th Ave	EB	T	2,037	792	3 (A)	2.6 (A)	98.4 (F)
		R	114	63	2 (A)		
	WB	L	42	175	108 (F)	126.2 (F)	
		T	54	175	112 (F)		
	NB	L	1,732	1,659	127 (F)	49.1 (D)	
		R	56	2,522	200+ (F)		
SW 24th Ave*	EB	T	45	2,228	200+ (F)	0.8 (A)	11 (B)
		R	2,049	64	1 (A)		
	WB	U	74	4	1 (A)	0.4 (A) 22.1 (C)	
		L	10	25	18 (C)		
		T	1,785	540	22 (C)		
	NB	L	47	99	42 (E)	33.4 (D)	
R		32	119	20 (C)			



Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
Military Trail	EB	L	148	152	93 (F)	27.7 (C)	200+ (F)
		T	1,334	685	22 (C)		
		R	85	12	2 (A)		
	WB	L	225	241	200+ (F)	200+ (F)	
		T	1,032	2,086	200+ (F)		
		R	254	158	103 (F)		
	NB	L	140	491	200+ (F)	191.3 (F)	
		T	319	359	82 (F)		
		R	251	463	37 (D)		
	SB	L	95	567	71 (E)	200+ (F)	
		T	162	567	200+ (F)		
		R	117	567	200+ (F)		
Newport Center Dr	EB	L	55	121	40 (D)	6.5 (A)	120.1 (F)
		T	1,569	825	5 (A)		
		R	53	2	4 (A)		
	WB	L	32	77	122 (F)	200+ (F)	
		T	700	1,765	200+ (F)		
		R	27	0	25 (C)		
	NB	R	589	322	41 (D)	40.7 (D)	
SB	R	841	275	53 (D)	52.9 (D)		
I-95 Ramps	EB	L	727	249	11 (B)	17.7 (B)	200+ (F)
		T	864	401	33 (C)		
		R	561	24	2 (A)		
	WB	L	462	776	109 (F)	200+ (F)	
		T	550	776	200+ (F)		
		R	192	502	16 (B)		
	NB	L	100	9,565	200+ (F)	200+ (F)	
		R	118	145	200+ (F)		
	SB	L	46	13,100	200+ (F)	200+ (F)	
R		110	13,100	200+ (F)			
Natura Blvd	EB	L	140	193	161 (F)	30.1 (C)	200+ (F)
		T	756	173	11 (B)		
		R	132	117	2 (A)		
	WB	L	142	11,793	200+ (F)	200+ (F)	
		T	629	11,791	200+ (F)		
		R	57	132	200+ (F)		
	NB	L	280	3,981	200+ (F)	200+ (F)	
		T	183	3,454	200+ (F)		
		R	199	780	200+ (F)		
	SB	L	201	3,010	200+ (F)	200+ (F)	
		T	232	3,010	200+ (F)		
		R	299	3,067	200+ (F)		

LOS based on Exhibit 19-8 (HCM 6th Edition)

*Stop controlled intersections. LOS based on Exhibit 20-2 (HCM 6th Edition)

Reported maximum queues are capped by the presence of upstream intersection nodes or the extent of the network

Table 4.4.6: Build Alternative PM Peak Intersection Performance

Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
Waterways Blvd	EB	T	1,802	522	12 (B)	11.9 (B)	11.7 (B)
		R	130	28	4 (A)		
	WB	L	241	459	90 (F)	9.5 (A)	
		T	2,598	192	2 (A)		
	NB	L	88	214	80 (E)	42.4 (D)	
		R	105	239	11 (B)		
Independence Dr	EB	T	1,836	485	4 (A)	3.9 (A)	4.1 (A)
		R	68	0	2 (A)		
	WB	L	22	75	84 (F)	2.9 (A)	
		T	2,794	422	2 (A)		
	NB	L	42	123	87 (F)	58.9 (E)	
		R	24	182	10 (A)		
Powerline Rd	EB	L	482	437	76 (E)	47.7 (D)	52.6 (D)
		T	1,042	954	47 (D)		
		R	329	50	9 (A)		
	WB	L	364	311	86 (F)	46.5 (D)	
		T	1,178	499	49 (D)		
		R	428	227	7 (A)		
	NB	L	715	523	72 (E)	55.7 (E)	
		T	1,153	523	58 (E)		
		R	349	585	15 (B)		
	SB	L	529	532	111 (F)	58.6 (E)	
		T	915	489	62 (E)		
		R	925	645	25 (C)		
SW 30th Ave*	EB	T	678	0	1 (A)	1.1 (A)	2.3 (A)
		R	31	7	2 (A)		
	WB	L	31	34	3 (A)	0.5 (A)	
		T	1,097	0	0 (A)		
	NB	L	162	124	15 (B)	12.7 (B)	
		R	116	101	10 (A)		
SW 28th Ave	EB	T	618	302	15 (B)	12.8 (B)	17.8 (B)
		R	175	174	6 (A)		
	WB	L	171	352	80 (E)	15.1 (B)	
		T	1,010	265	4 (A)		
	NB	L	119	254	86 (F)	49.1 (D)	
		R	110	116	9 (A)		
SW 24th Ave*	EB	T	619	0	1 (A)	0.7 (A)	0.9 (A)
		R	108	20	1 (A)		
	WB	U	92	56	3 (A)	0.4 (A)	
		L	21	40	2 (A)		
		T	1,130	0	0 (A)		
	NB	L	49	87	12 (B)	10.6 (B)	
R		31	90	8 (A)			
Military Trail	EB	L	316	291	88 (F)	37.8 (D)	49 (D)
		T	296	221	35 (C)		
		R	504	280	8 (A)		
	WB	L	464	375	79 (E)	50.6 (D)	

Intersection	Approach	Movement	Volume (vph)	Max. Queue (ft)	Delay and Level of Service (sec/veh)		
					Movement	Approach	Intersection
		T	340	204	37 (D)		
		R	182	59	1 (A)		
		L	286	247	83 (F)		
	NB	T	599	419	60 (E)	51.3 (D)	
		R	387	289	15 (B)		
	SB	L	437	571	78 (E)	53.1 (D)	
		T	833	571	65 (E)		
R		617	571	19 (B)			
Newport Center Dr	EB	L	98	155	46 (D)	17.1 (B)	20.9 (C)
		T	2,269	1,578	16 (B)		
		R	85	242	10 (A)		
	WB	L	122	122	80 (E)	12.5 (B)	
		T	2,110	647	9 (A)		
		R	118	0	2 (A)		
	NB	R	591	289	32 (C)	31.9 (C)	
SB	R	695	262	53 (D)	53.4 (D)		
I-95 Ramps	EB	L	1,064	341	17 (B)	21.5 (C)	37.4 (D)
		T	862	411	45 (D)		
		R	929	287	5 (A)		
	WB	L	750	125	75 (E)	33.5 (C)	
		T	863	125	9 (A)		
		R	311	0	1 (A)		
	NB	L	672	309	70 (E)	65.8 (E)	
		R	690	313	62 (E)		
	SB	L	304	391	83 (F)	50.2 (D)	
R		821	391	38 (D)			
Natura Blvd	EB	L	297	270	77 (E)	35.9 (D)	50.7 (D)
		T	1,278	627	32 (C)		
		R	280	252	9 (A)		
	WB	L	349	604	90 (F)	47.6 (D)	
		T	1,254	612	40 (D)		
		R	132	128	8 (A)		
	NB	L	284	595	53 (D)	44 (D)	
		T	182	279	59 (E)		
		R	224	173	20 (B)		
	SB	L	271	1,582	50 (D)	90.3 (F)	
		T	298	1,582	131 (F)		
R		382	1,494	87 (F)			

LOS based on Exhibit 19-8 (HCM 6th Edition)

*Stop controlled intersections. LOS based on Exhibit 20-2 (HCM 6th Edition)

Reported maximum queues are capped by the presence of upstream intersection nodes or the extent of the network

Link Evaluation – AM Peak Hour

The No Action Alternative and Build Alternative AM and PM peak hour operations along SW 10th Street were evaluated in terms of average travel speed. During the 2040 AM peak hour, the No Action Alternative is characterized by high levels of congestion in both directions of travel on SW 10th Street. This is caused by extensive queuing originating at the Military Trail intersection, which results in low speeds throughout the network.

The Build Alternative shows significantly reduced queuing across the entire network, and the intersection performance results indicate that over 90% of the demand volume is processed. In addition, local lane free flow speeds are consistent with expected speed limits in both directions on SW 10th Street, and the connector lanes will operate at free-flow speeds.

Link Evaluation – PM Peak Hour

For the No Action Alternative, the PM peak hour results revealed severe queuing and traffic metering along the SW 10th Street corridor in both directions. Queues originating at the Powerline Road intersection cause network-wide gridlock along the corridor. In the westbound direction, this impacts most of the intersecting side streets and arterials along SW 10th Street, as well as mainline operations in both directions on I-95. Additionally, the direct connect ramps from I-95 to SW 10th Street experience congestion, which extends to the southbound express lanes on I-95.

The Build Alternative, however, provides significantly improved performance in both directions on SW 10th Street during the future PM peak hour. Intersection performance results indicate that over 90% of the demand volume is processed. Local lane free flow speeds are appropriate, and the connector lanes operate at free-flow speeds. Additionally, the Build Alternative prevents queuing on the I-95 off-ramps and ensures the direct connect ramps do not impact the I-95 mainline or connector lane performance.

The addition of the Connector lanes removes a significant portion of the demand on SW 10th Street local lanes, allowing those drivers and the surrounding facilities to operate with significantly less delay. The reduction of volume on the SW 10th Street local lanes minimizes bottlenecks that severely impact the I-95 general purpose lanes and I-95 managed lane facilities that are apparent under the No Action Alternative.

Build Alternative – Connector Lanes Ingress / Egress Weave Evaluation

The Build Alternative includes a weaving section between the connector lane intermediate ingress and egress locations in the eastbound direction and in the westbound direction. To analyze the operations, the densities and speeds of vehicles traveling through these sections of the connector lanes were evaluated. The connector lanes will operate acceptably under the proposed Build Alternative with an auxiliary lane (third lane) provided between the ingress and egress ramps to accommodate the large number of vehicles, including truck traffic, that is expected to enter the connector lanes and then immediately exit the connector lanes before encountering the downstream tolled express lanes planned on I-95, the Sawgrass Expressway and Turnpike.

Weave Evaluation – AM Peak Hour

During the 2040 AM peak, in the eastbound direction, LOS D or better is maintained for all connector lane segments between the ingress and egress points. Additionally, the individual lanes exhibit speeds greater than 50 mph. In the westbound direction, LOS C or better is maintained for all connector lane segments between the ingress and egress points. All individual lanes experience average speeds higher than 50 mph.

Weave Evaluation – PM Peak Hour

In the eastbound direction during the 2040 PM peak, LOS C or better is maintained for all connector lane segments between the ingress and egress points. All individual eastbound lanes exhibit speeds greater than 50 mph. LOS D or better is maintained in the westbound direction between the ingress and egress points for all connector lane segments. The westbound individual lanes have average speeds greater than 50 mph.

Summary of Results

Future traffic volumes along the SW 10th Street corridor between Florida's Turnpike and I-95 are expected to increase due to the expected population and employment growth in the region. In addition, the adjacent interchange improvements and new ramps connecting to SW 10th Street on both ends of the corridor will facilitate an increase in traffic along the roadway. Additional systemic capacity along SW 10th Street provided by the new connector lanes is expected to accommodate at least 30% of the total SW 10th Street corridor traffic. Removing this traffic from the local lanes by allowing it to use the managed lanes provides a significant

benefit to operations along the SW 10th Street local lanes. These benefits include reduced delays and queues experienced by the motoring public.

The results of the local lane and connector lane traffic analysis shows that the Build Alternative satisfies the objectives and purpose and need of this project. The Build Alternative increases capacity throughout the corridor and improves traffic flow in the local lanes by providing a separate connector lane facility. This reduces the future 2040 traffic volumes in the local lanes especially assuming all trucks may use the connector lanes and without tolling the connector lanes. Allowing trucks in the connector lanes, and delaying tolling of the connector lanes, will maximize the utilization of the new connector lanes and allow the majority of traffic to essentially bypass portions of the local lanes, which will significantly alleviate traffic congestion in the local lanes, reduce delays, and improve the operations of the overall corridor. Improving operations in the local lanes will also help address existing corridor safety deficiencies associated with excessive congestion.

4.5 Tier 1 Alternatives

The current PD&E study detailed in this report commenced by evaluating a SW 10th Street corridor with two distinct envelopes within the existing right-of-way:

- One envelope for local lanes; and
- A second envelope for managed lanes connecting the Sawgrass Expressway with I-95.

Based on the COAT recommendations, the initial alternatives in this current PD&E study focuses on a managed lane alternative that features a managed lane profile that is one “level” below the existing ground (i.e., a “depressed” section) in conjunction with an adjacent local road system. This depressed section is commensurate with the COAT recommendations in Table 4.2.1, specifically:

- No. 4 – Include a below-grade expressway with at-grade local access roads;
- No. 4.1 – Include extending below-grade expressway west of westerly residential roadway connection to SW 10th Street;
- No. 4.2 – Include extending below-grade expressway as close to Military Trail as possible that would allow Military Trail intersection to remain at-grade (no overpass of Military Trail over expressway);

- No. 5 – Minimize and attempt to eliminate the use of above-grade overpasses where adjacent to residential areas;
- No. 8 – Include generous table-top intersections for local roads to improve pedestrian and bicycle connectivity north and south across SW 10th Street; and
- No. 11.1 – Explore use of revenue generated by tolls for maintenance of landscaping and table-top parks.

The COAT also requested that the local lanes be lower speed with pedestrian and bicycle features, aesthetic treatments, and generous landscaping. The proposed design speed of the local and managed lanes are 35 mph and 60 mph, respectively. The discussion on context classification is contained in Chapter 3.

Subsequent to the Public Kickoff Meeting held November 15, 2017, two primary alternatives, a “North Alternative” and a “Center Alternative” were developed and carried forward to the Alternatives Public Workshop #1 held on April 24, 2018. Both alternatives feature two distinct routes within the existing right-of-way – one for managed lanes and a second for local lanes. These two alternatives are described in detail below and can be distinguished from each other by the location of the managed lanes within the existing right-of-way. Both alternatives utilized the following typical section dimensions:

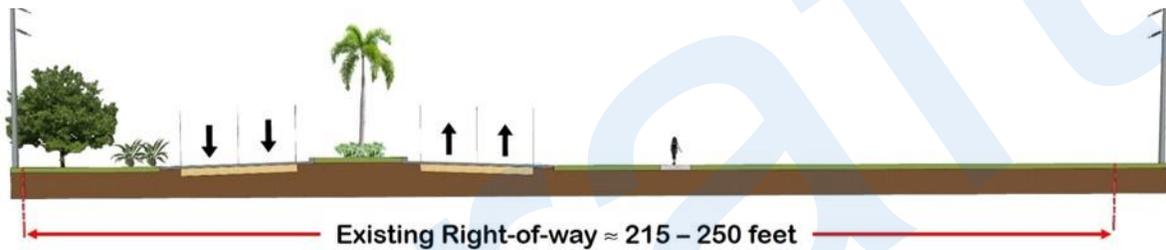
- Managed lanes:
 - Four 12-foot wide managed lanes (two in each direction);
 - Depressed section from west of Powerline Road to east of SW 28th Avenue;
 - One auxiliary lane in each direction connecting the local entrance and exit ramps; and
 - Eight-foot inside shoulders and 12-foot outside shoulders.
- Local lanes:
 - Two 11-foot through lanes in each direction;
 - Median width of 15.5 to 22 feet where applicable;
 - Seven-foot buffered bicycle lane; and
 - Six-foot sidewalk.

The conceptual typical section for the Center Alternative is shown in Figure 4.5.3 and the conceptual typical section for the North Alternative is shown in Figure 4.5.14.

4.5.1 Center Alternative

As seen in Figure 4.5.1, the existing right-of-way width ranges from 215 to 250 feet. This distance is generally sufficient to accommodate four managed lanes and four local lanes. However, when ingress / egress ramps and auxiliary lanes are added, additional right-of-way is needed, although this proposed right-of-way is generally limited to narrow slivers of acquisition along the corridor.

Figure 4.5.1: Existing Right-of-Way



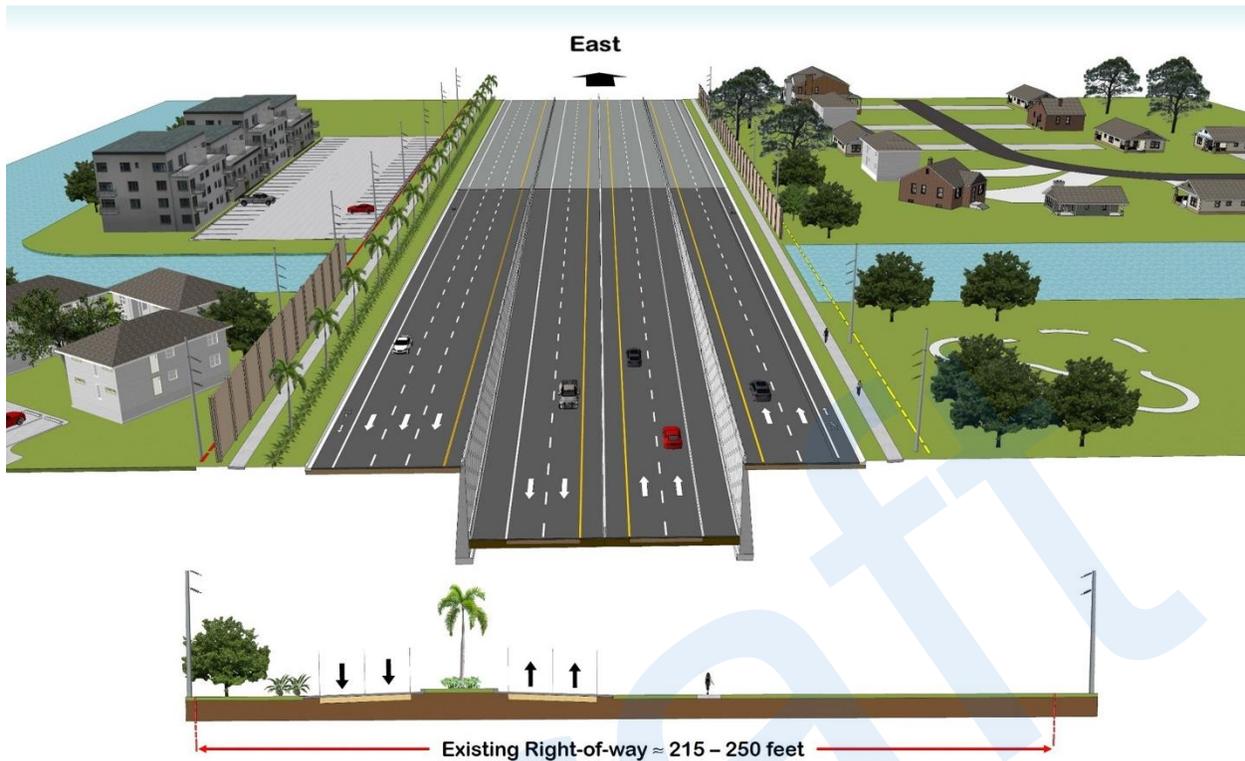
A noteworthy point is that the existing local lanes are positioned towards the north side of the existing right-of-way line as seen in Figure 4.5.1. Florida Power & Light (FPL) also maintains an aerial transmission line with the poles located just outside of the existing right-of-way and within the Century Village community. The aerial lines and supporting arms protrude over the landscaping located along the north right-of-way line. The location of this transmission line is a major constraint and causes both the Center and North Alternatives to hold this right-of-way line and impact the south side of the corridor, if necessary. A smaller FP&L transmission line is located inside of the south side right-of-way line as shown in Figure 4.5.2.

Figure 4.5.2: Existing Corridor Showing FP&L Transmission Lines (Looking East)



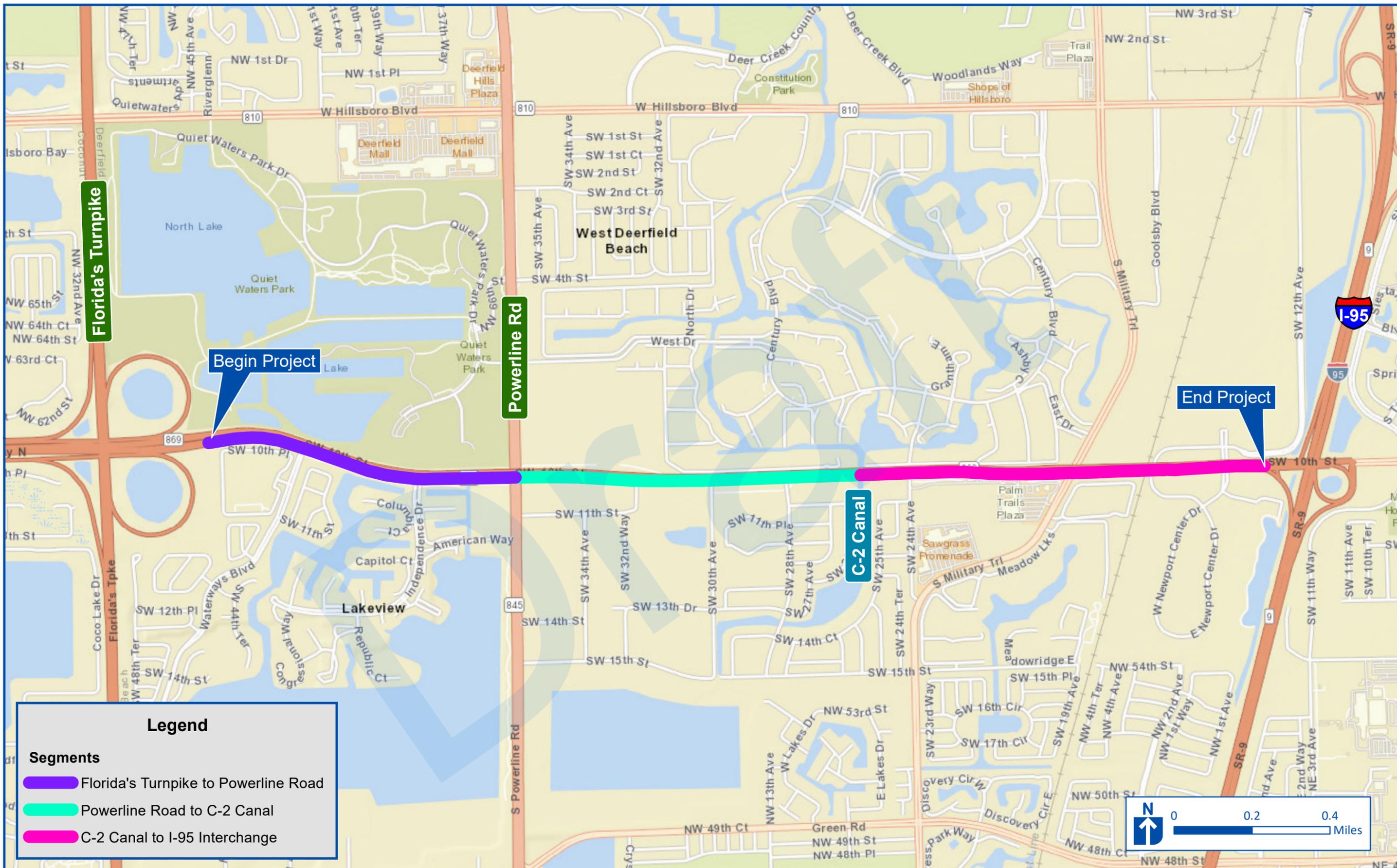
As can be seen in Figure 4.5.3, the local lanes are reconstructed as one-way frontage roads on either side of the managed lanes, which are located generally within the center of the existing right-of-way.

Figure 4.5.3: Center Alternative Typical Section



This alternative positions the managed lane connection in the center of the existing right-of-way. One-way frontage roads are located on each side of the managed lanes. For the purposes of explaining the concepts, the corridor can be subdivided into three general segments, as seen in Figure 4.5.4:

- Florida’s Turnpike to just east of Powerline Road;
- Just east of Powerline Road to C-2 Canal; and
- C-2 Canal to I-95 interchange.



Legend

Segments

- Florida's Turnpike to Powerline Road
- Powerline Road to C-2 Canal
- C-2 Canal to I-95 Interchange



**State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
Sawgrass Expressway to I-95**
Financial Project ID: 439891-1-22-02, ETDM No: 14291

**Figure 4.5.4
SW 10th Street
Segment Map**

The following discussion describes the Center Alternative in each of the aforementioned segments:

Florida's Turnpike to East of Powerline Road

At the western project limit, the Center Alternative begins with a tie-in to the existing Sawgrass Expressway. In the eastbound direction, the mainline Sawgrass Expressway forms four lanes; the inside two become the two eastbound managed lanes that convey traffic to I-95 through the SW 10th Street corridor. The outside two lanes form the beginning of the local SW 10th Street eastbound through lanes. A ramp emanating from the existing collector-distributor system through the interchange with Florida's Turnpike forms an outer third lane, which ends and merges into the inside two local lanes just east of the Powerline Road intersection.

A short overpass carries the managed lanes over an at-grade intersection of the two frontage roads and Waterways Boulevard, thereby allowing Waterways residents full access to and from the Sawgrass Expressway to the west and local SW 10th Street to the east. The managed lanes profile grade line continues downward underground such that the profile passes beneath an at-grade Powerline Road intersection. An important point to note is that, unlike the Waterways Boulevard intersection, the Independence Drive intersection has access to only the local eastbound SW 10th Street frontage road. The downgrading profile grade line in the vicinity of Independence Bay precludes a full intersection from being accommodated, since accommodating another overpass while passing beneath Powerline Road is not feasible when considering the maximum allowable profile grades.

In the westbound direction, three local through lanes are carried across the Powerline Road intersection. The inside lane accommodates left-turning vehicles into Waterways Boulevard and ultimately ends just west of this intersection. The remaining two through lanes continue to the Florida's Turnpike interchange, where the outer-most lane forms the beginning of the westbound collector-distributor system, while the inside lane joins the two westbound managed lanes to form three managed lanes continuing westward.

No direct impacts to Quiet Waters Park were identified, although the ground anchors needed to stabilize the temporary sheet piling for construction of the depressed managed lanes

extend beyond the north-side existing right-of-way line by approximately 80 feet. The depressed section traversing beneath Powerline Road, must also pass beneath the C-3 Canal located just west of the Powerline Road intersection. In order to eliminate a direct use impact to Quiet Waters Park, the south side of the roadway requires acquisition of right-of-way. This right-of-way impacts the existing frontage along the Independence Bay community retention ponds as well as narrow right-of-way acquisitions from the sports complex and Shell gas station. Narrow strips of right-of-way are also required on each side of Powerline Road.

Because the Center Alternative is flanked by one-way frontage roads in each direction, this typical section follows the FDOT standard urban criteria, with seven-foot buffered bicycle lanes and six-foot sidewalks. At the intersection with Waterways Boulevard, the outside paved shoulder adjacent to the three through lanes is converted to a seven-foot buffered bicycle lane in the eastbound direction. Conversely, the buffered bicycle lane transitions to a full-width shoulder in the westbound direction at this intersection, where both sets of sidewalks terminate.

The Powerline Road intersection features triple left-turn lanes on all four legs of the intersection. The southbound right-turn lane requires two lanes, and right-turn on red will not be permitted. Because the managed lanes pass beneath Powerline Road, advanced U-turns can be accommodated by lengthening the structure over the depressed managed lanes and adding a spur emanating from the eastbound and westbound inside left turn lanes. The unused portion of the structure can be used for landscaping, also known as a “landscape lid.” The intersection would function similar to a Single Point Urban Interchange (SPUI).

East of Powerline Road to C-2 Canal

Moving eastward from Powerline Road to the C-2 Canal, the westbound triple left-turn lanes are partially cantilevered over the depressed managed lanes. By extending beams across the managed lanes for several hundred feet past the advanced U-turn, the managed lanes are “tucked” beneath the westbound triple left turn lane in order to reduce right-of-way impacts on the north side. As can be seen in Figure 4.5.5, this encroachment of the at-grade left-turn lanes atop the depressed managed lanes is facilitated by beams exposed to the open air rather than covered by a deck.

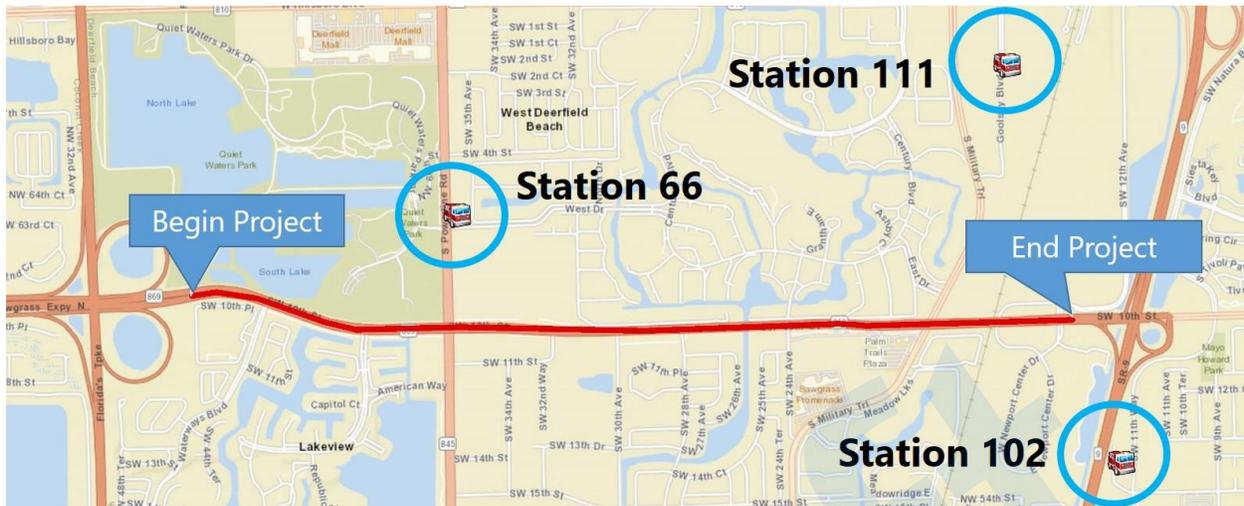
A separate study was undertaken to determine the maximum length of covered section that is permissible before adherence to tunnel criteria is required. The study team researched the National Fire Protection Association guidelines as well as met with the local first responders as seen in Figure 4.5.6. The consensus is that incorporating life safety systems for tunnels would not be required until the covered section exceeds 700 feet. As a result, the cantilevered portion is configured so that the managed lanes beneath the cantilevered section are “daylighted” to the open space above.

Figure 4.5.5: Cantilevered Westbound Left Turn Lanes Approaching Powerline Road



Figure 4.5.5 also displays “landscape lids”, which was alluded to in two COAT recommendations (8 and 11.1). These landscape lids are structures that are approximately 100 feet wide by 300 feet long and whose sole purpose is to provide space for landscaping. A total of four landscape lids are proposed in the Center Alternative, one of which facilitates the connection of the westbound exit ramp to a signalized intersection at SW 28th Avenue.

Figure 4.5.6: Emergency Service Locations in Corridor Vicinity



At a constructability meeting with FDOT, District 4 held on February 16, 2016, the consensus of the project team was to isolate the landscape lids with continuous concrete barrier wall. Concern was expressed that any transition to curb and gutter along the landscape lid could cause vehicles to vault over the barrier wall at the ends of the lids. Another consensus was that the general public should not have access to the landscape lids, although under-bridge lighting should be included beneath the landscape lids bridge decks.

SW 10th Street is currently connected to the communities along its southern boundary by three sideroads: SW 30th Avenue, SW 28th Avenue, and SW 24th Avenue. All three sideroads currently have full median openings that allow unrestricted left-turns to and from these sideroads, although SW 28th Avenue is the sole intersection that is signalized. The Center Alternative provides only one full median opening at SW 28th Avenue while the other two intersections would be converted to “right in, right out.” The SW 28th Avenue intersection would then function similar to a tight diamond interchange, with two sets of traffic signals and short left turn storage areas on the bridge deck above the depressed managed lanes as shown in Figure 4.5.7.

Approaching the C-2 Canal, the managed lanes begin transitioning from a depressed profile just east of the canal as the profile upgrades to a second-level overpass above Military Trail.

Figure 4.5.7: SW 28th Intersection with Center Alternative



C-2 Canal to I-95

A key component of connecting the Florida's Turnpike / Sawgrass Expressway with I-95 is the inclusion of entrance and exit ramps to and from the local lanes. The incorporation of ramps is also consistent with a COAT recommendation regarding access to both SW 10th Street and the managed lanes. Once the managed lane profile rises to an at-grade elevation east of the C-2 Canal, the incorporation of ingress / egress ramps is relatively straightforward and can be accommodated by short slip ramps that emanate to and from the inside local lanes. The location of the managed lanes between the one-way local lanes favors the inclusion of east- and westbound entrance and exit ramps on either side of Military Trail. In the eastbound direction, the entrance ramp is positioned just prior to the incline that raises the managed lane profile over Military Trail. Eastbound vehicles on SW 10th Street wishing to enter the managed lane system would exit local SW 10th Street on the left and enter the managed lanes on the right, where an auxiliary lane carries traffic across Military Trail to either merge into the eastbound managed lanes for access to the I-95 express lanes or to exit onto local SW 10th Street. In this case, the entrance-exit combination functions as a bypass to the Military Trail intersection. In the westbound direction, a similar maneuver occurs, with right-hand ingress occurring just west of the SW 12th Street intersection. Traffic either

merges into the westbound managed lanes or exits from the right-hand auxiliary lane onto the inside lane of local SW 10th Street.

As seen in Figure 4.5.8, the managed lanes convey traffic to and from the median express lanes on I-95. The highest flyover ramp, the northbound to westbound movement, shown in orange below, is a fourth-level structure. The I-95 interchange and the I-95 widening are being evaluated by the FDOT as a separate PD&E study, the I-95 from South of SW 10th Street to North of Hillsboro Road PD&E Study, which is available under separate cover (FM# 436964-1).

Figure 4.5.8: SW 10th Street and I-95 Interchange, Center Alternative

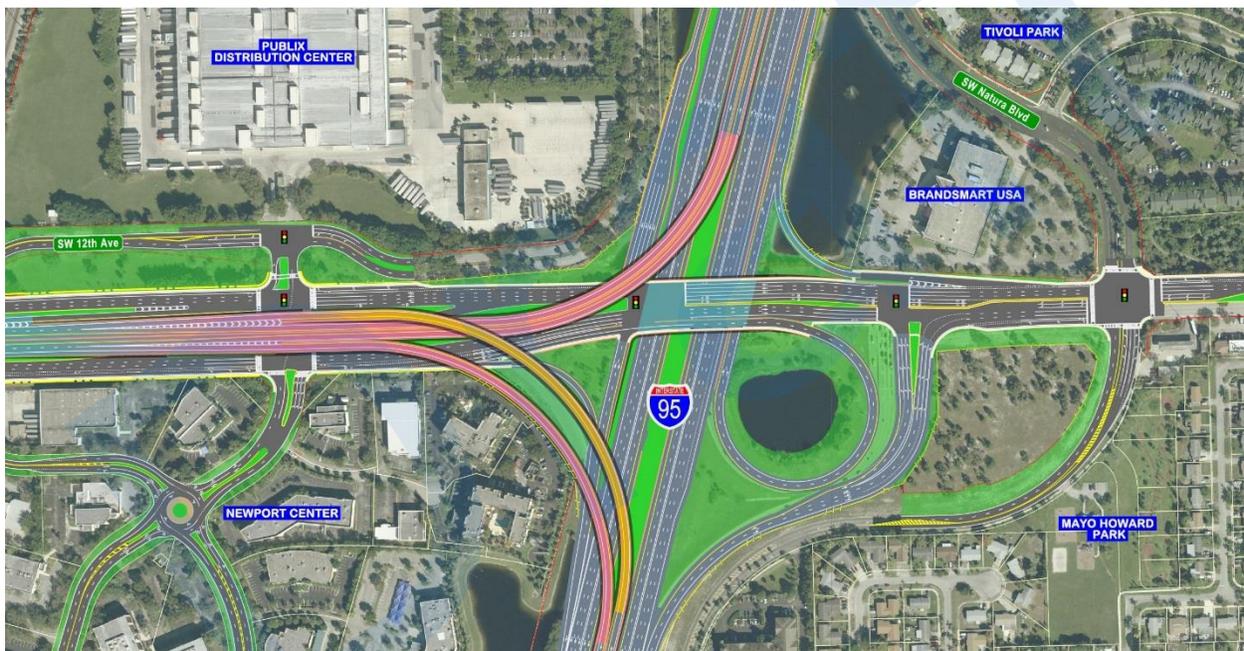


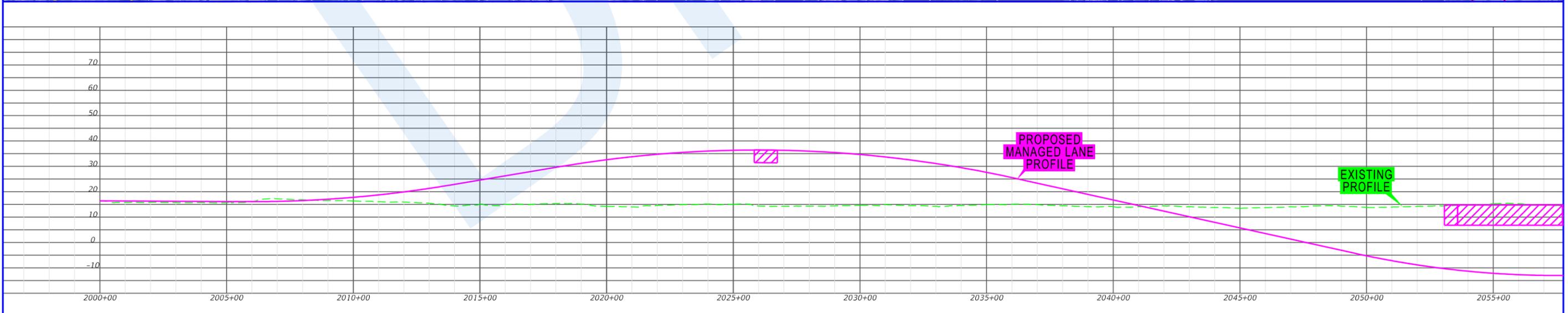
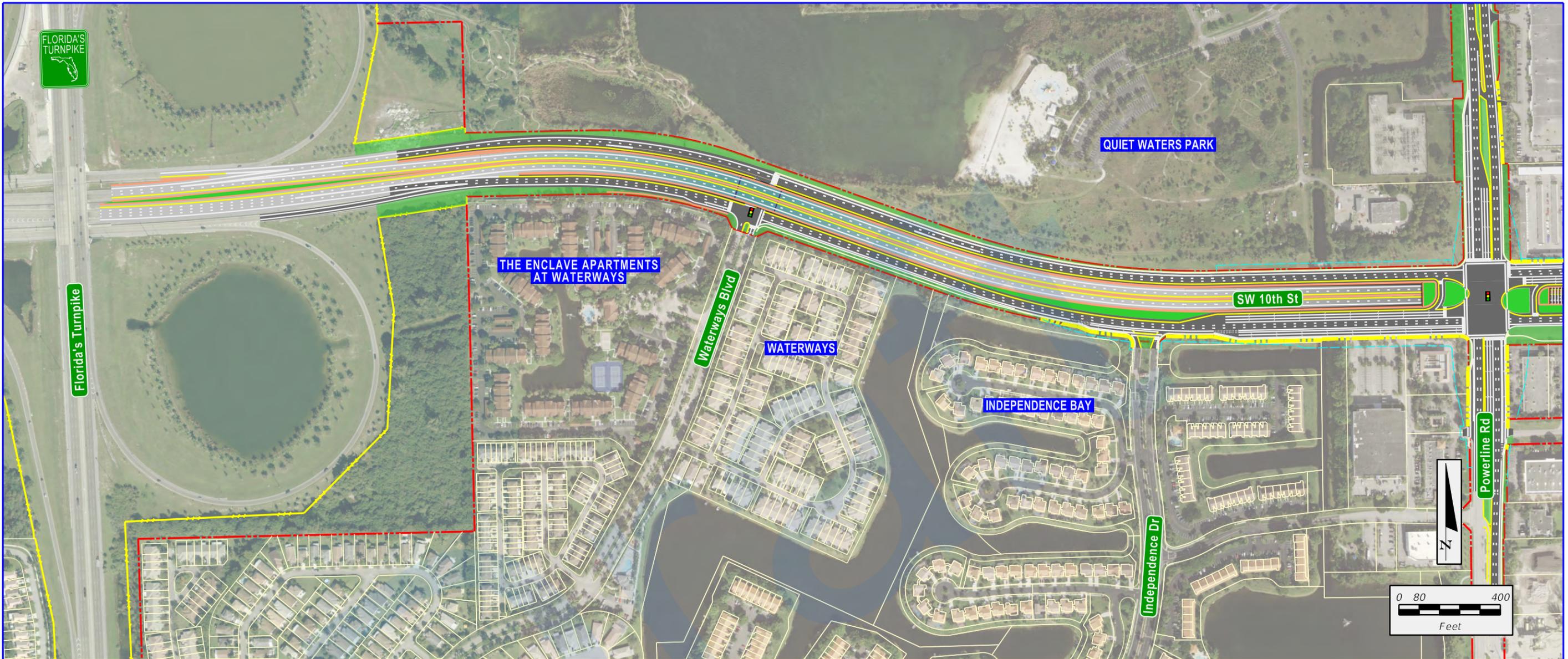
Figure 4.5.9 provides a three-sheet plan and profile overview of the Center Alternative. More detailed drawings can be found in Appendix A. The color gradients on the pavement convey that the profile is in transition. Figures 4.5.10 through 4.5.13 provide three dimensional views of the Center Alternative, which were presented to the public on April 24, 2018 at Public Alternatives Workshop #1. The next section describes the North Alternative, which is compared to the Center Alternative in an evaluation matrix in Section 4.5.3.

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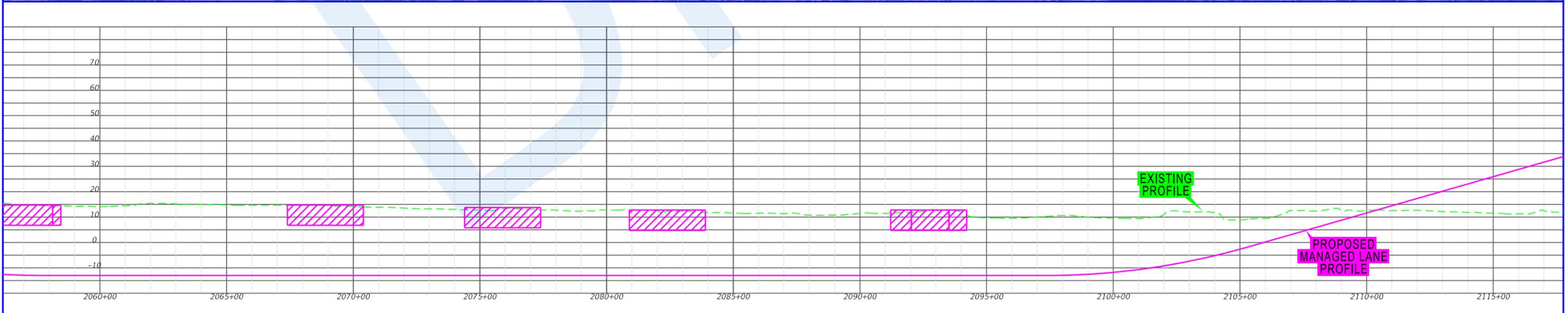
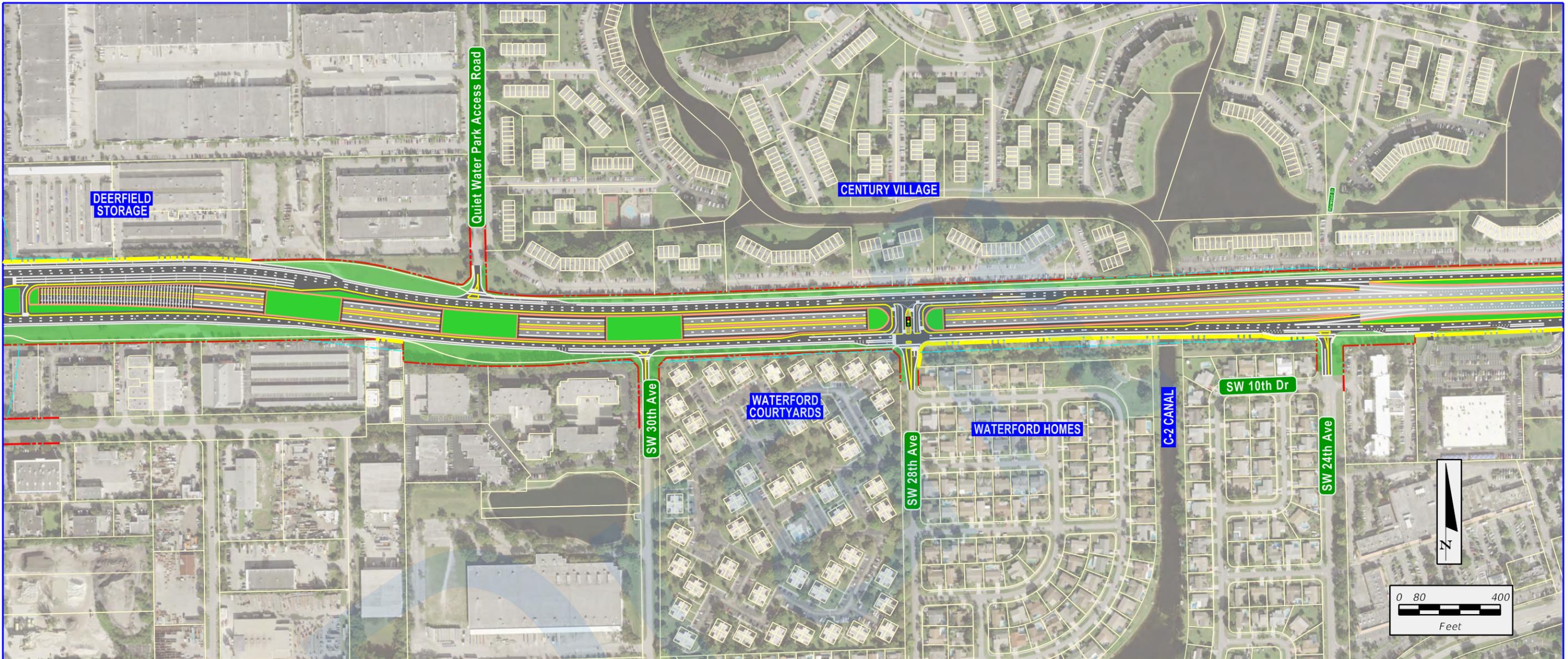
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 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED 4TH LEVEL BRIDGE		TEMPORARY EASEMENT
	PROPOSED SIDEWALK		PROPOSED TRAFFIC SIGNAL

FIGURE 4.5.9
CENTER ALIGNMENT
ALTERNATIVE
1 OF 3

SHEET NO.
4-53

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LEGEND			
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	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED 4TH LEVEL BRIDGE		TEMPORARY EASEMENT
	PROPOSED SIDEWALK		PROPOSED TRAFFIC SIGNAL

FIGURE 4.5.9
CENTER ALIGNMENT
ALTERNATIVE
2 OF 3

SHEET
 NO.
4-54

Figure 4.5.10: Center Alternative – Looking Northwest at Waterways Boulevard Overpass



Figure 4.5.11: Center Alternative – Looking Southwest at Powerline Road



Figure 4.5.12: Center Alternative – Looking West at SW 28th Avenue Intersection



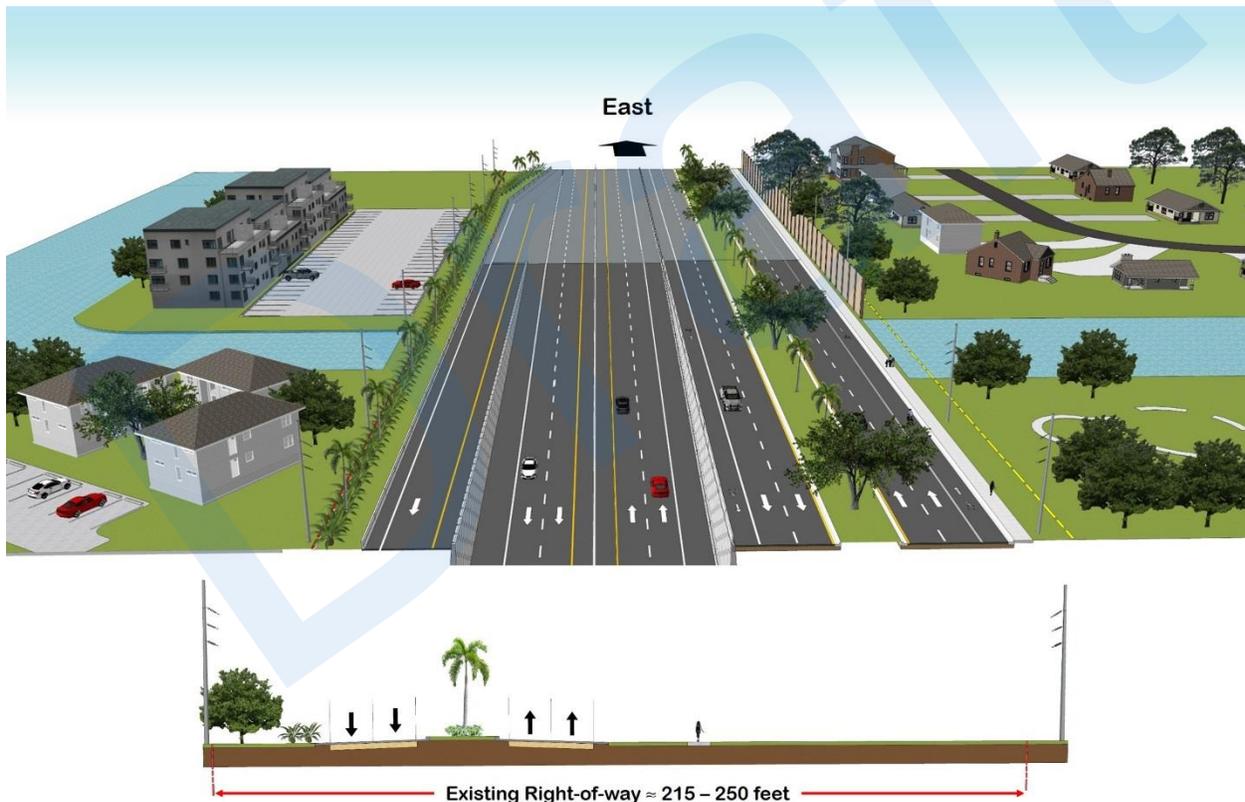
Figure 4.5.13: Center Alternative – Looking West at Depressed Section (East End)



4.5.2 North Alternative

Similar to the Center Alternative, the North Alternative utilizes two distinct envelopes for the managed and local lanes. The primary difference between the Center and North Alternatives is that the North Alternative places the managed lanes towards the northern half of the existing right-of-way and the local lanes along the southern half. The rationale for this configuration is that the local lanes should be positioned adjacent to the southern communities of Waterways, Independence Bay, Waterford Courtyards, and Waterford Homes, where the sideroads are located. By contrast, Century Village has no direct access to SW 10th Street. Figure 4.5.14 displays the typical section of the North Alternative relative to the existing typical section.

Figure 4.5.14: North Alternative Typical Section



As with the Center Alternative, the North Alternative seeks to avoid relocation of the north side transmission line. Additional discussion of the depressing the managed lane and its effect on the existing transmission poles is discussed in the utility impacts section of Chapter

6. The following discussion describes the North Alternative in the same three segments as the Center Alternative:

- Florida's Turnpike to just east of Powerline Road
- Just east of Powerline Road to C-2 Canal
- C-2 Canal to I-95 interchange

Florida's Turnpike to just east of Powerline Road

Beginning at Florida's Turnpike and moving in the eastbound direction, the two eastbound mainline lanes from the Sawgrass Expressway widen from two to four lanes just east of the Turnpike overpass. These four lanes then diverge, with the inside two lanes conveying traffic to the eastbound managed lanes and the outer two lanes joining the collector-distributor lane emanating from the Turnpike interchange. These three outer lanes then convey traffic to the Powerline Road intersection and beyond. The two inside lanes destined for the eastbound managed lanes rise to a second level in order to span the westbound local lanes and position the eastbound managed lanes on the north side of the right-of-way. This positioning places the eastbound managed lanes between the westbound managed lanes and the westbound local lanes.

In the westbound direction, three local lanes approach the Powerline Road from the east and continue through the intersection. Full signalized intersections are provided at Waterways Boulevard and Independence Bay - an important distinction from the Center Alternative. Just west of the Independence Bay intersection, the inside lane of the three lanes transitions into a left-only lane into southbound Waterways Boulevard. The remaining two lanes pass beneath the overpassing eastbound managed lanes and join with the two westbound managed lanes emanating from the I-95 interchange. Three of the four lanes then continue westward as the mainline Sawgrass Expressway, while the outermost lane forms the collector-distributor lane through the Florida's Turnpike interchange.

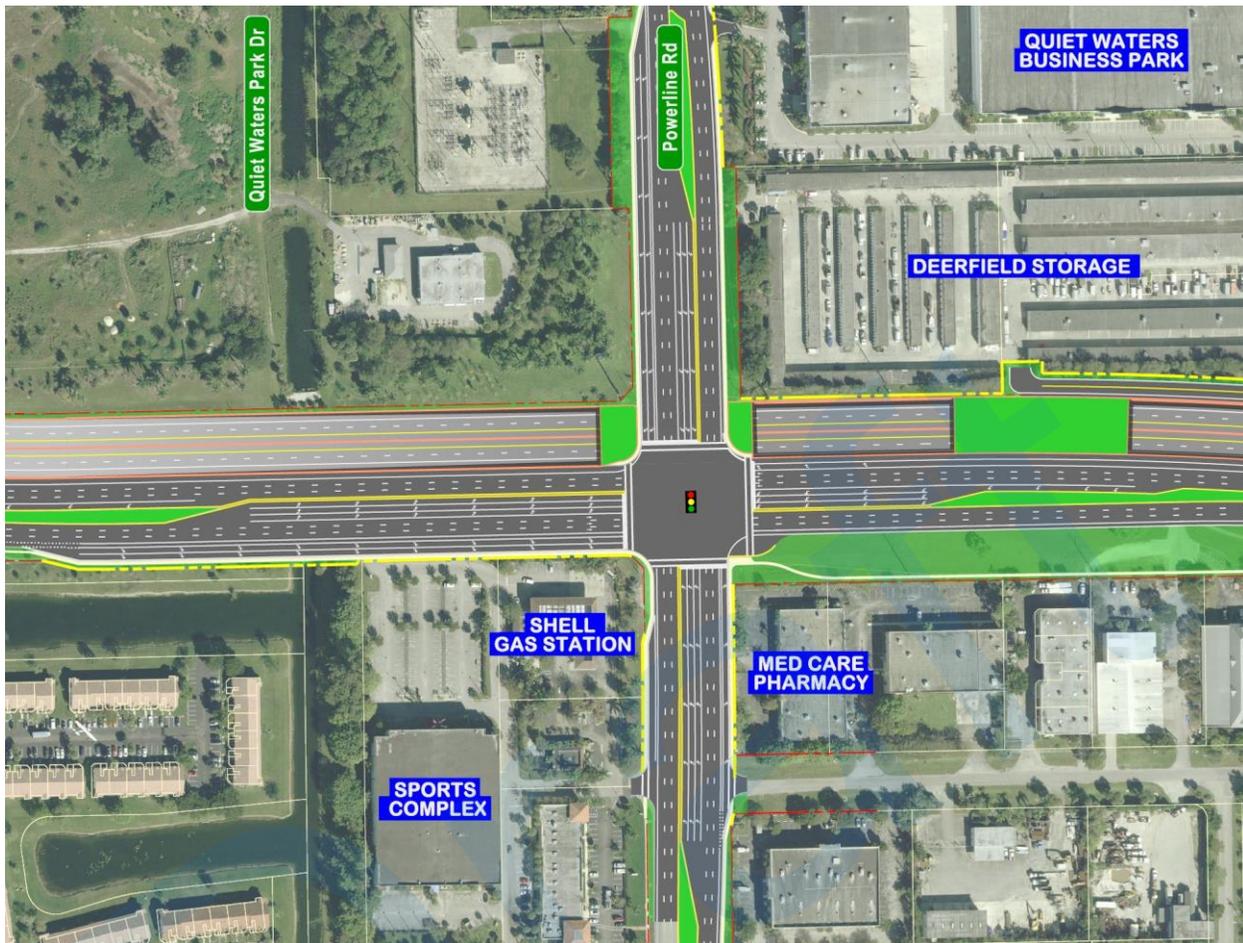
Just east of Independence Bay, both the eastbound and westbound managed lanes begin their descent to a below-grade section in advance of Powerline Road. Extending this depressed section westward such that the overpass at Waterways Boulevard could be lowered was

investigated. However, depressing the roadway through the Waterways Boulevard intersection was examined but was not carried forward for the following reasons:

- Proximity of Quiet Waters Park and the recreational lake adjacent to the north-side right-of-way;
- Difficulty in establishing ground anchors for sheet piling in the lake vicinity;
- Potential for extensive groundwater intrusion into a depressed section due to the close lake proximity;
- Difficulty in depressing managed lanes through Waterways Boulevard intersection and meeting expressway design speeds while rising to match the existing grade in advance of the Turnpike overpass; and
- Potential for additional right-of-way due to need for more retaining wall space and separation of movements due to differing profile grades.

The Powerline Road intersection is similar to the Center Alternative version, with triple left turn movements in each quadrant coupled with southbound dual right-turn lanes. Small strips of right-of-way are needed from commercial properties. The southeast corner of the Powerline Road intersection features a pavement “bulb-out” to accommodate tractor-trailers making a westbound U-turn movement. Figure 4.5.15 displays the Powerline Road intersection for the North Alternative.

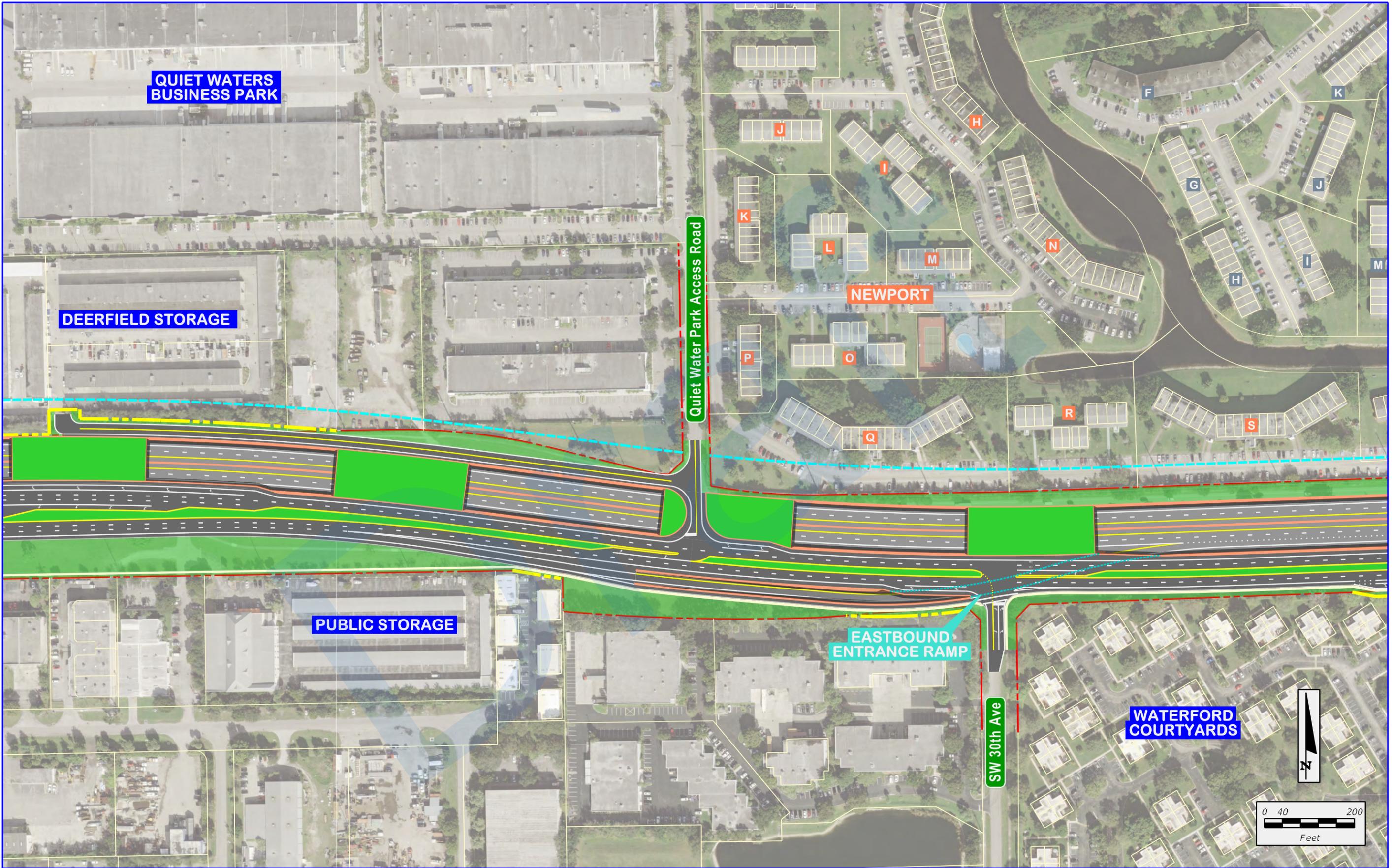
Figure 4.5.15: North Alternative at Powerline Road



Just east of Powerline Road to C-2 Canal

Figure 4.5.15 also shows a sample of the landscape lids. The North Alternative features a total of six landscape lids, with three of them partially occupied with intersection pavement.

East of Powerline Road, the outside eastbound local lane separates from the inside two lanes to form a forced exit and ramp terminal for the eastbound entrance ramp onto the managed lanes. To complete this configuration, the exiting ramp terminal from the eastbound local lane must downgrade to a depressed section and pass beneath the east- and westbound local lanes before joining the eastbound managed lanes, which are also depressed at this location. Figure 4.5.16 highlights this depressed and reverse-curving ramp. Note that the ramp also forms an eastbound auxiliary lane for over 2,000 feet before conveying traffic to an exit ramp above Military Trail.



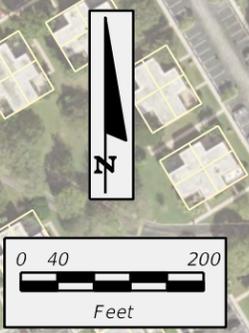
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LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	TEMPORARY EASEMENT		PROPOSED SIDEWALK
	PROPOSED TRAFFIC SIGNAL		

FIGURE 4.5.16
NORTH ALTERNATIVE
EASTBOUND ENTRANCE RAMP



As previously mentioned, the North Alternative provides unrestricted access to the sideroads along the south side of the corridor. However, access to Quiet Waters Business Park from the local lanes is also facilitated with the North Alternative. As seen in Figure 4.5.16, a proposed right-of-way acquisition on the north side of the corridor provides space for a two-way access road. A full median can be accommodated by a positioning a landscape lid across from the existing access road and striping a portion of this bridge deck as a directional median opening. While a full median opening currently exists, a directional median opening provides an opportunity for eastbound left-turns into the facility. By comparison, the Center Alternative accommodates only “right-in, right-out” movements.

To accommodate the westbound exit ramp, which is located on the north side of the managed lanes, the managed lanes are positioned such that the offset from the north-side right-of-way line and the outside barrier wall is 36 feet. To transition the managed lane alignment to this position, a reverse curve with inside edge-of-pavement radii of 7,024 and 6,054 is used. These two curves are separated by a short tangent of 343 feet and require superelevation rates slightly higher than those of a reverse crown.

At SW 28th Avenue, the 36-foot vacant envelope along the northern right-of-way line becomes occupied with the westbound exit ramp, which curves 90 degrees southward via a 114-foot radius. An at-grade, signalized intersection with SW 28th Avenue is accommodated above the depressed managed lanes via a 300-foot long bridge deck, the unused portion of which functions as a potential area for landscaping.

Approaching the C-2 Canal from the west, the profile grade line of the managed lanes begins rising from the depressed section just east of the bridge deck over the SW 28th Street intersection. However, this profile continues to be partially depressed as it crosses the C-2 Canal, requiring either a pump station or equalizing pipe (described further in Chapter 6).

Right-of-way impacts for the North Alternative include a corner clip of the public storage facility on the south side of SW 10th Street across from the Quiet Waters Business Park access road, a “strip” acquisition of Waterford Courtyards for a right-turn lane, and approximately 30 feet of acquisition from City of Deerfield Beach property adjacent to

Waterford Homes. This parcel includes the wells and pump house for the City drinking water along with an existing landscaped berm.

C-2 Canal to I-95 interchange

Approaching Military Trail from the west, the managed lane profile rises from the depressed section at SW 28th Avenue and continues rising above Military Trail and the eastbound left-turn lanes tucked beneath the extended overpass. In the eastbound direction, the auxiliary lane formed from the eastbound entrance ramp becomes a forced exit in advance of Military Trail. This auxiliary lane forms a ramp gore and exit ramp that braids across the Military Trail intersection, ultimately joining the local SW 10th Street through lanes across the CSX railroad tracks. This junction forms three approach lanes to the signalized intersection at SW 12th Avenue

In the westbound direction, the westbound managed lanes exit ramp at SW 28th Avenue is created from an auxiliary lane that is formed from a local entrance loop ramp emanating from SW 12th Avenue and westbound SW 10th Street. The managed lanes are added and dropped via four flyover ramps that provide direct, system-to-system connections between the managed lanes and the proposed express lanes located within the median of I-95 as shown in Figure 4.5.17. As noted in the Center Alternative description, the I-95 improvements and the I-95 interchange are included in a separate PD&E study available under separate cover (FM# 436964-1).

Figure 4.5.17: SW 10th Street and I-95 Interchange, North Alternative

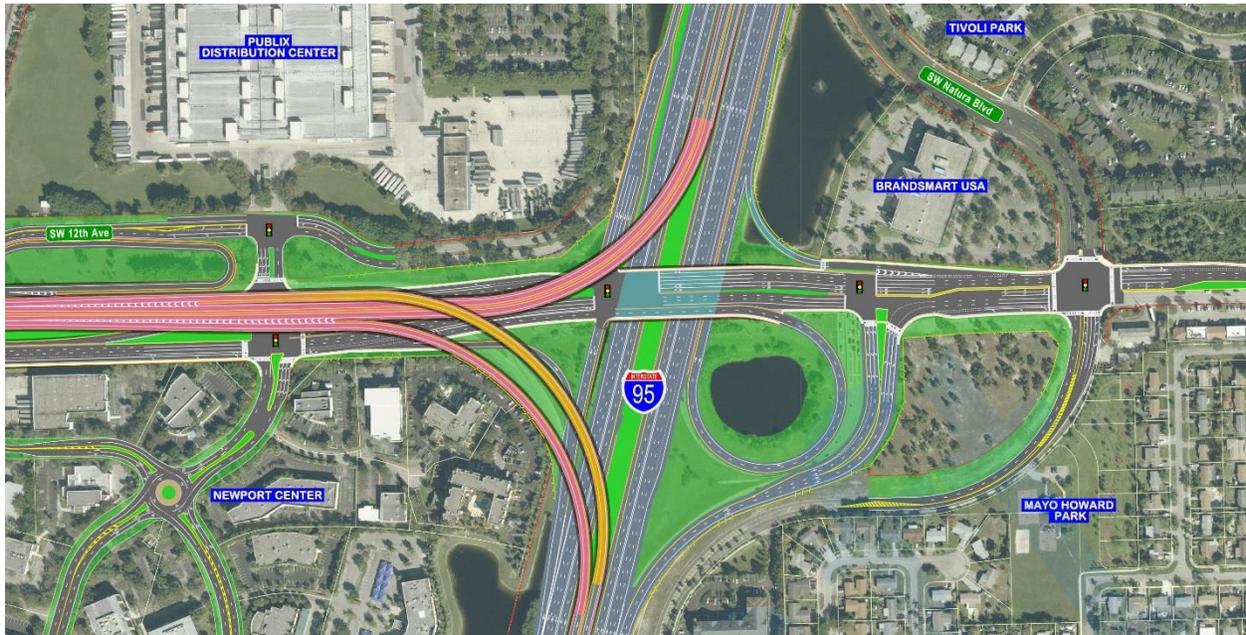
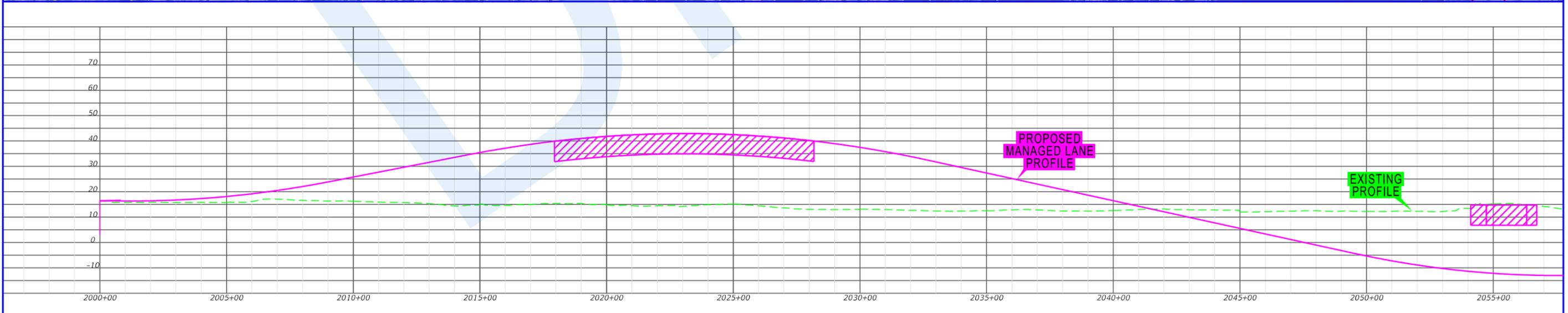
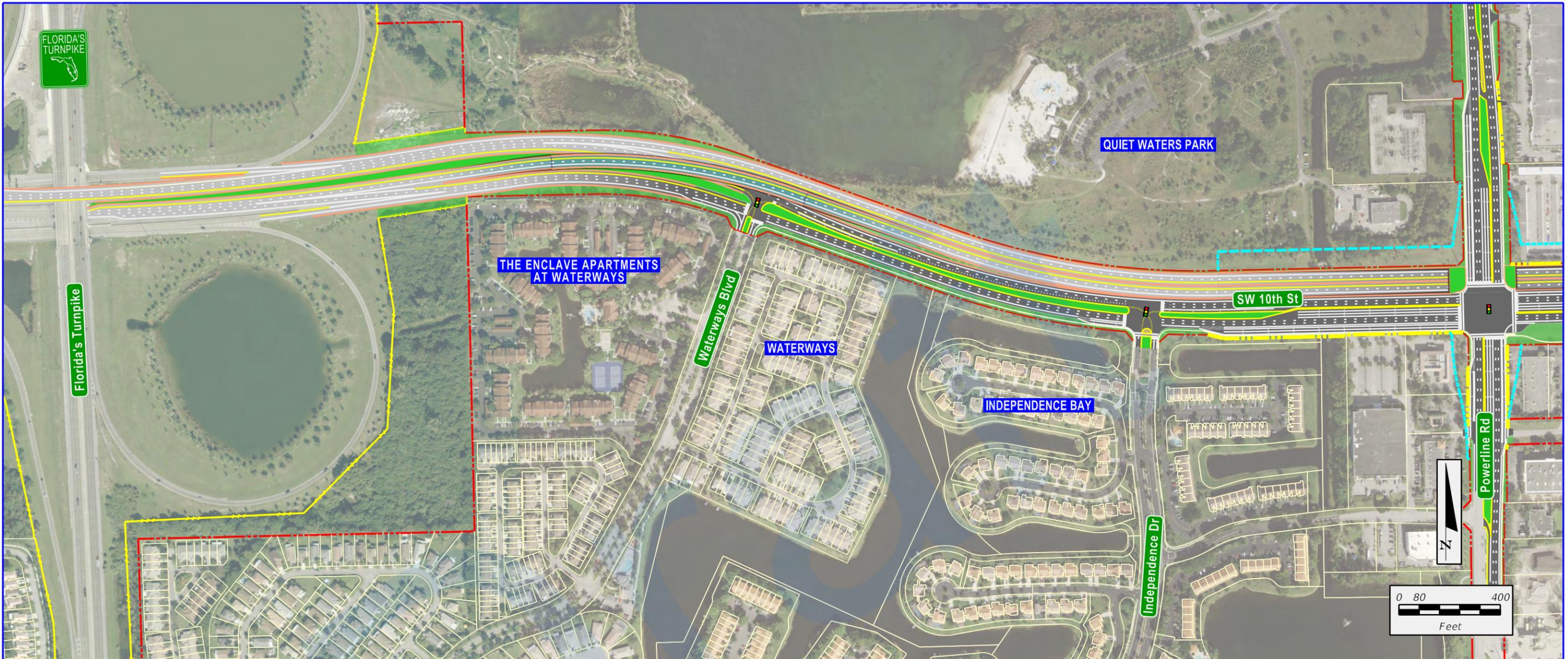


Figure 4.5.18 provides a three-sheet plan and profile overview of the North Alternative. More detailed drawings can be found in Appendix A. The color gradients on the pavement convey that the profile is in transition. Figures 4.5.19 through 4.5.22 provide three dimensional views of the North Alternative, which were presented to the public on April 24, 2018 at Public Alternatives Workshop #1. The Center and North Alternatives are compared in an evaluation matrix in Section 4.5.3.

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 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED 4TH LEVEL BRIDGE		TEMPORARY EASEMENT
	PROPOSED SIDEWALK		PROPOSED TRAFFIC SIGNAL

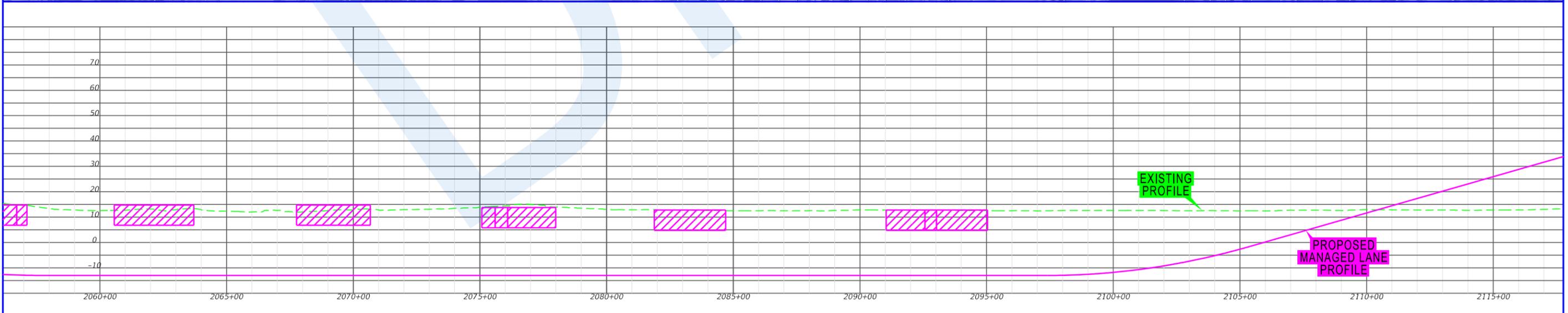
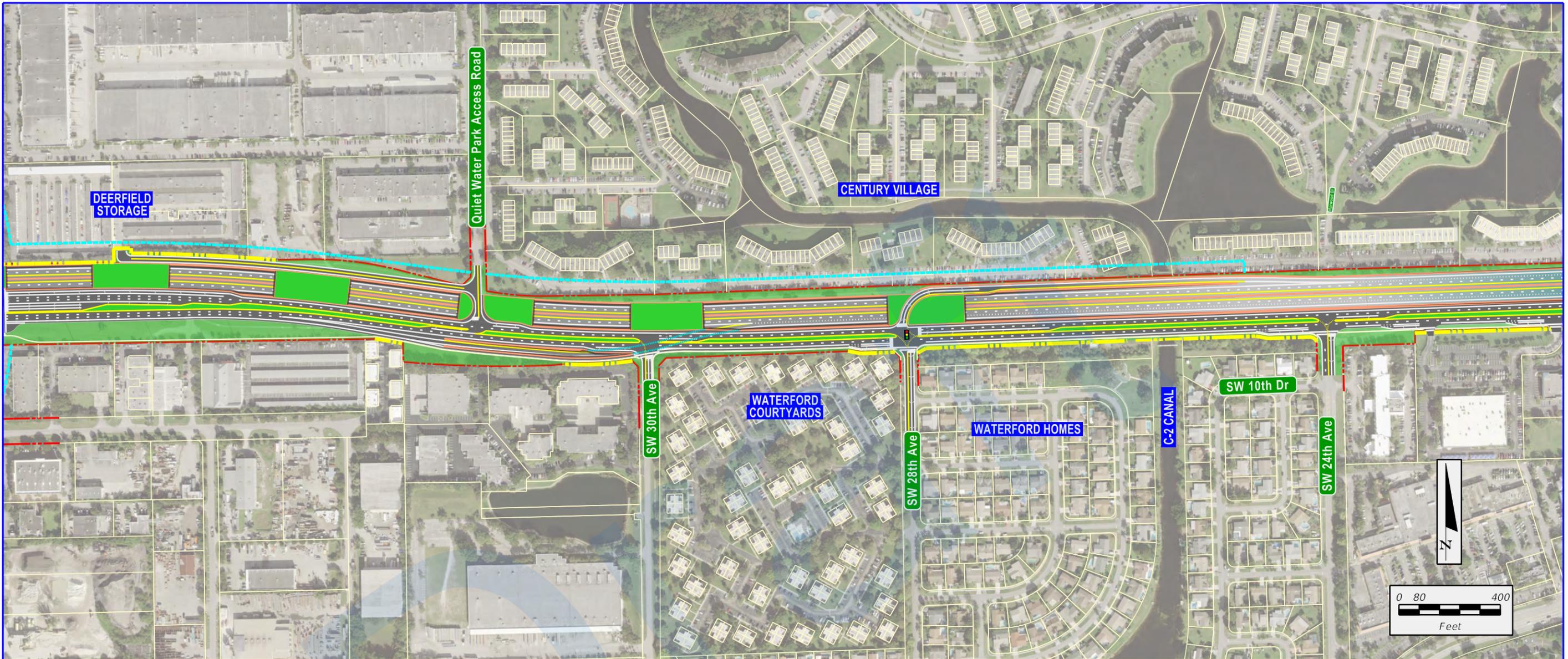
FIGURE 4.5.18
NORTH ALIGNMENT
ALTERNATIVE
1 OF 3

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LEGEND					
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST		TEMPORARY EASEMENT
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE		PROPOSED SIDEWALK
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.5.18
NORTH ALIGNMENT
ALTERNATIVE
2 OF 3

SHEET NO.
4-67

Figure 4.5.19: North Alternative – Looking Northwest at Waterways Boulevard Overpass



Figure 4.5.20: North Alternative – Looking Southwest at Powerline Road



Figure 4.5.21: North Alternative – Looking West at SW 28th Avenue Intersection



Figure 4.5.22: North Alternative – Looking West at Depressed Section (East End)



4.5.3 Center Alternative vs. North Alternative

The Center and North Alternatives each have distinct advantages and disadvantages, which are summarized below:

Center Alternative

Primary Advantages:

- Better facilitates entrance and exit ramps due to the close proximity of the one-way frontage roads to the managed lanes;
- Less severe right-of-way impacts due to location of entrance and exit ramps east of C-2 Canal;
- No right-of-way impacts to Waterford Courtyards; and
- Avoids direct impacts to City of Deerfield Beach pump house.

Primary Disadvantages

- Restricts sideroad access to “right-in, right-out” at Independence Bay, SW 30th Avenue, and SW 24th Avenue; and
- To accommodate full median opening and signalized intersection at SW 28th Avenue, requires beginning depressed section just east of C-2 Canal, thereby requiring a pump station or equalizing pipe.

North Alternative

Primary Advantages:

- Provides two distinct envelopes for both managed lanes and local SW 10th Street;
- Concentrates pedestrian facilities along south side of corridor near the residential communities; and
- Provides full median openings at Independence Bay, SW 30th Avenue, SW 28th Avenue, and SW 30th Avenue.

Primary Disadvantages

- Requires additional right-of-way for eastbound entrance ramp and westbound exit ramp; and

- Entrance and exit ramps are located west of the C-2 Canal, where right-of-way acquisition is more impactful.

The evaluation matrix comparing the Center and North Alternatives is shown in Table 4.5.1. This matrix was presented to the public on April 24, 2018 at the Alternatives Public Workshop #1.

Table 4.5.1: Evaluation Matrix: North Alternative vs. Center Alternative

Criteria	North Alignment Alternative ⁽¹⁾	Center Alignment Alternative ⁽¹⁾
Traffic Operations and Safety		
Safety	↑↑	↑↑
Emergency Response Times	↑↓	↑↓
Intersection Delay (Local Street)	↑↓	↑↓
Intersection Level of Service	AM / PM	AM / PM
<i>Waterways Boulevard</i>	C / C	C / C
<i>Independence Bay</i>	A / A	Unsignalized
<i>Powerline Road</i>	E / E	E / E
<i>SW 30th Avenue</i>	Unsignalized	Unsignalized
<i>SW 28th Avenue</i>	D / D	C / C
<i>SW 24th Avenue</i>	Unsignalized	Unsignalized
<i>Military Trail</i>	E / E	E / D
Segment Level of Service (west / middle / east)	F / E / D	F / F / F
Local SW 10 th Street Demand (Vehicle Trips) West of Powerline Road / West of Military Trail	54,000 / 28,000	56,400 / 31,700
Managed Lanes Demand (Vehicle Trips) West of Powerline Road / West of Military Trail	33,600 / 54,200	33,600 / 54,200
Direct Access to Managed Lanes	✓	✓
Access from Side Streets and Properties		
<i>Side Street Access Changes</i>	0	3
<i>Driveway Access Changes</i>	3	3
Social and Economic		
Commercial Parcels Impacted	11	19
Residential Parcels Impacted	6	4
Government Parcels Impacted	1	2
Acres of Permanent Impacts	2.10	2.49
Acres of Temporary Impacts (Construction Easements)	7.95	3.96
Potential Number of Commercial Relocations	2	2
Potential Number of Residential Relocations	0	0
Consistent with COAT Recommendations	22 of 29, 7 are TBD	19 of 29, 7 are TBD

Criteria	North Alignment Alternative ⁽¹⁾	Center Alignment Alternative ⁽¹⁾
(18 main, 15 sub categories = 33 total) 29 apply to SW 10 th Street Connector		
Cultural		
Section 4(f) Resources Impacted (Quiet Waters Park)	Yes	Yes
Permanent Section 4(f) Use (ac)	TBD	TBD
Temporary Section 4(f) Use (ac)	1.82	0.63
Natural Environment		
Wetland Impacts	Similar	Similar
Surface Water Impacts		
Protected Species and Habitat Impacts		
Physical Environment		
Noise Walls	TBD	TBD
Permanent Pumps for Drainage	Yes	Yes
Aesthetics / Visual Impacts	Similar	Similar
Multimodal		
Pedestrian Facilities	1	2
Bicycle Facilities	2	2
Utilities		
City of Deerfield Beach Wells Impacted	TBD	TBD
Total Number of Utilities Impacted	8	8
Requires Relocation of Transmission Poles and all Buried Utilities	Yes	Yes
FP&L Substation Impacted	Yes	Yes
Utility Relocation Costs	\$ \$ \$ \$ \$	\$ \$ \$ \$ \$
Constructability		
Construction Duration (does not include utility relocation timeframe)	3 to 5 years	3 to 5 years
Project Cost		
Construction	\$ \$ \$ \$ \$	\$ \$ \$ \$ \$
Right-of-way	TBD	TBD
Maintenance	TBD	TBD
Total Costs	TBD	TBD

Denotes More Favorable Criteria
 TBD To Be Determined

Notes:

- (1) Assumes 2040 conditions with I-95, Sawgrass, and Turnpike managed lanes, interchange improvements, and SW 10th Street Connector with one entrance / exit ramp in each direction to / from the managed lanes.

Based on feedback received at numerous community meetings and Alternative Public Workshop #1 in April of 2018, the Northern Alignment Alternative was carried through to the next level of analysis. Also, based on feedback, additional alternatives with a shorter depressed section and hybrid alternatives were developed and evaluated in Tier 2. However, each new alternative was based on the North Alignment concept with the managed lanes facility placed in the northern part of the right-of-way and the local SW 10th Street lanes located in the southern portion of the corridor. Tier 2 Alternatives were evaluated within a similar right-of-way footprint but have differing profiles for the managed lanes facility. The local SW 10th Street profile will remain at-grade.

Section 4.6 describes the Tier 2 Alternatives (North Alternative and its various sub-alternatives) that were developed.

4.6 Build Alternatives

The following subsections describe three alternatives that were carried forward to a second Alternatives Public Workshop held on November 29, 2018. The North Alternative mentioned in Section 4.5.2 was re-titled as the “Full Depressed Alternative” (Section 4.6.1) and compared to a “Partial Depressed Alternative.” This Partial Depressed Alternative has three sub-alternatives, which are described in Section 4.6.2. The third alternative presented is entitled the “Non-Depressed, No Managed Lane Access Alternative” and is discussed in Section 4.6.3.

From a structural standpoint, the alternatives are composed of standard bridges and depressed roadways, typically called Depressed Sections (DS). DS are non-conventional structures in Florida because they need to support large hydrostatic forces, resulting from the high-water table in South Florida. To build a DS, a temporary Support of Excavation (SOE) structure is required to provide the necessary workspace for construction below grade and to build the permanent retaining structure. The SOE design is driven by the need to retain large hydrostatic and lateral earth pressures. There are several known SOE systems in the industry that can be used; however, for this PD&E study, a conventional and proven system that uses an anchored temporary sheet pile wall system is assumed. This system was

successfully used in the DS construction of the Kinney Tunnel, Okeechobee Road, and Port of Miami Tunnel projects in South Florida, at locations of comparable SOE cuts.

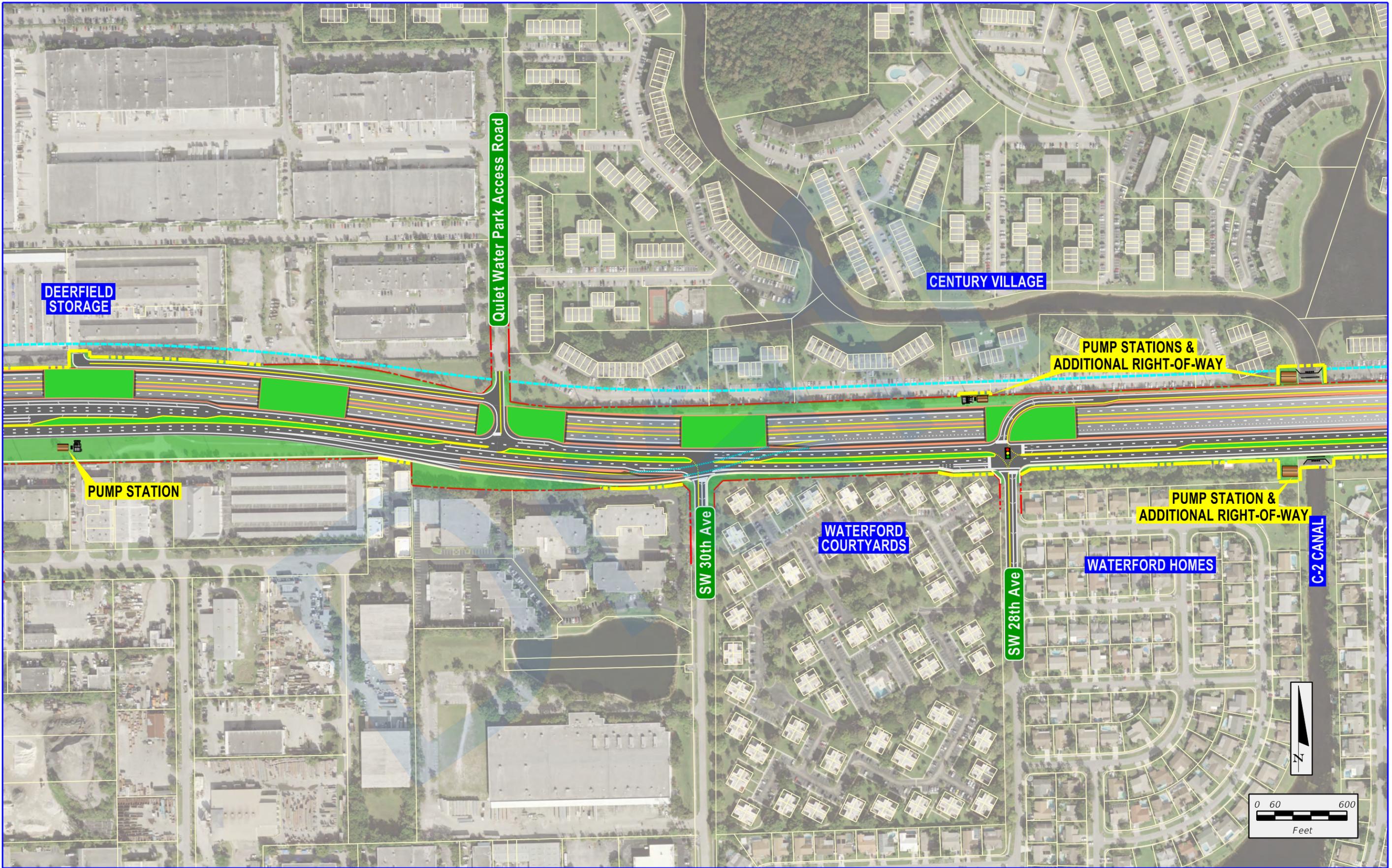
An evaluation matrix at the end of the alternatives discussion compares these three alternatives. Appendix B contains plan and profile sheets of each alternative and sub-alternative.

4.6.1 Full Depressed Alternative

The Full Depressed Alternative is essentially the same alternative that was presented at the April 24, 2018 Alternatives Public Workshop #1. No changes were made to the horizontal or vertical geometry. The alternative has the following features:

- Eastbound overpass at Waterways Boulevard intersection;
- Mainline managed lanes beneath Powerline Road;
- Eastbound entrance ramp and auxiliary lane extending to eastbound exit ramp;
- Westbound exit ramp and auxiliary lane terminating at “T” intersection at SW 28th Avenue;
- Six landscape lids, including two that facilitate local intersections (access road to Quiet Waters Business Park and SW 28th Avenue); and
- Extended eastbound structure over Military Trail to accommodate at-grade braided left-hand turn lanes on local eastbound SW 10th Street.

Two permanent pump stations were added to this alternative in order to pump storm water from the depressed section. These pump stations are located on the south side of the right-of-way across from Quiet Waters Business Park and along the north side adjacent to Century Village, where additional right-of-way is necessary to accommodate the pump station. As mentioned in Chapter 4, two pump stations are also necessary at the C-2 Canal. Figure 4.6.1 displays the pump stations that were added to this alternative, while Figures 4.6.2 to 4.6.5 display perspective views of this alternative. Note that the pump stations can also be seen in the perspective views.



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LEGEND			
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	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED MANAGED LANES		TEMPORARY EASEMENT
	PROPOSED LOCAL SW 10TH ST		PROPOSED SIDEWALK
	PROPOSED 2ND LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.1
FULL DEPRESSED ALTERNATIVE
PUMP STATION LOCATIONS

Figure 4.6.2: Full Depressed Alternative – Powerline Road



Figure 4.6.3: Full Depressed Alternative – Landscape Lids



Figure 4.6.4: Full Depressed Alternative – Looking East at Pump Station



Figure 4.6.5: Full Depressed Alternative – Looking West



Of the three alternatives carried forward to the second Alternatives Public Workshop, the Full Depressed Alternative has the highest degree of structural complexity. Below are the pertinent aspects of the structural components of this alternative:

1. The length of the fully depressed roadway is approximately 6,875 feet, and the typical width is 100.42 feet between the faces of the retaining walls;
2. The DS results in a maximum cut depth of approximately 40 feet and a typical width of 114.08 feet. The SOE cut depth is measured from the bottom of tremie seal to existing or proposed ground. The large depth of the SOE results from the depths of the bridges being supported by the DS walls, the 16.5-foot minimum vertical clearance to the riding surface, depth of structural slab, and depth of tremie seal.
3. The earth retaining system will need at least one row of soil anchors in the temporary (sheet piling) walls to support lateral earth pressure and water pressure.
4. Ground anchors in the tremie / slab system will also be required to hold down the tremie due to large vertical water pressures. The ground anchors are only needed temporarily since in the final conditions, the weight of the tremie, bottom slab, walls and barriers overcome the vertical hydrostatic pressures.

In this alternative, the ground anchors are assumed to be arranged in a square grid, with anchors spaced at 10-foot intervals in two directions and at an approximate in-ground depth of at least 50 feet. The soil anchors or horizontal anchors required to support the vertical temporary walls are assumed to provide a bond capacity of 2.5 kips per square foot (this value requires confirmation in the design phase of the project). The estimated horizontal projection is in excess of 90 feet on each side of the SOE. This length presents a challenge as it extends beyond the existing right-of-way limits of the project.

This concept also features seven bridges, six of which are supported on the DS permanent retaining walls. The bridges are located at Waterway Boulevard, Powerline Road, the access road for Quiet Waters Business Park, SW 28th Avenue plus three stand-alone landscape lids. The depressed section bridges use Florida I-beams (FIB) 45 for the superstructure spaced at approximately 10-foot intervals with eight-inch concrete decks.

Figure 4.6.6 shows the typical section at the DS including the SOE. Note the temporary soil anchors for the lateral wall and temporary ground anchors in the tremie seal to hold it down to counteract uplift hydrostatic pressure.

Figure 4.6.6: Full Depressed Alternative Typical Section

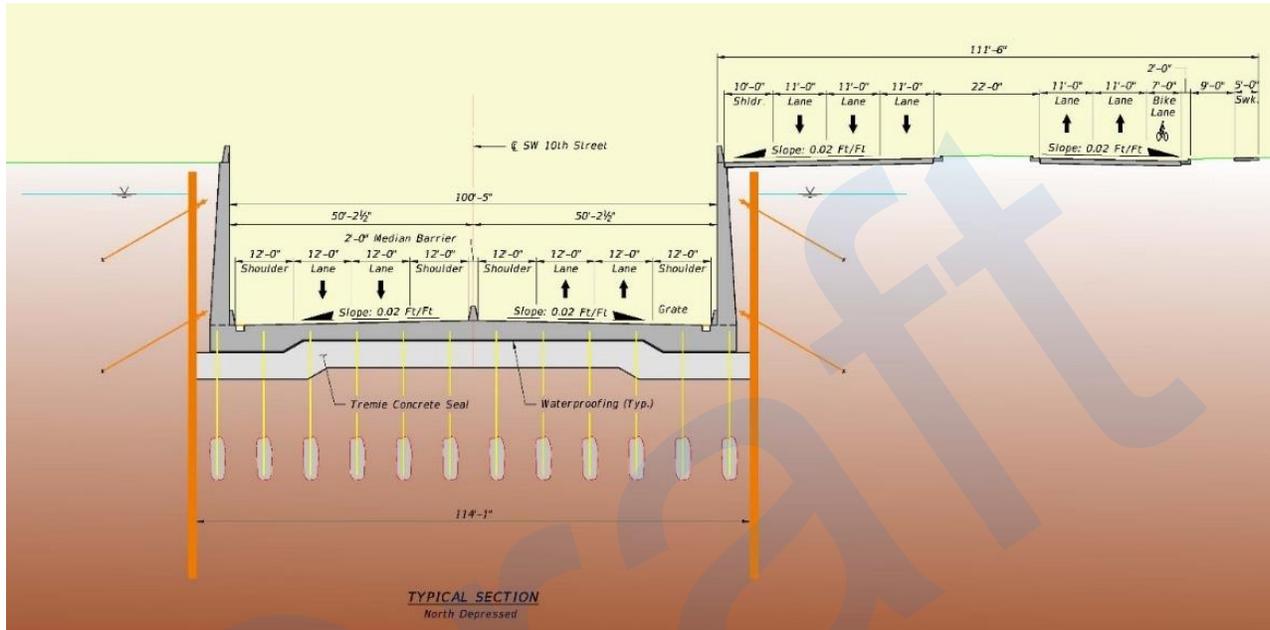


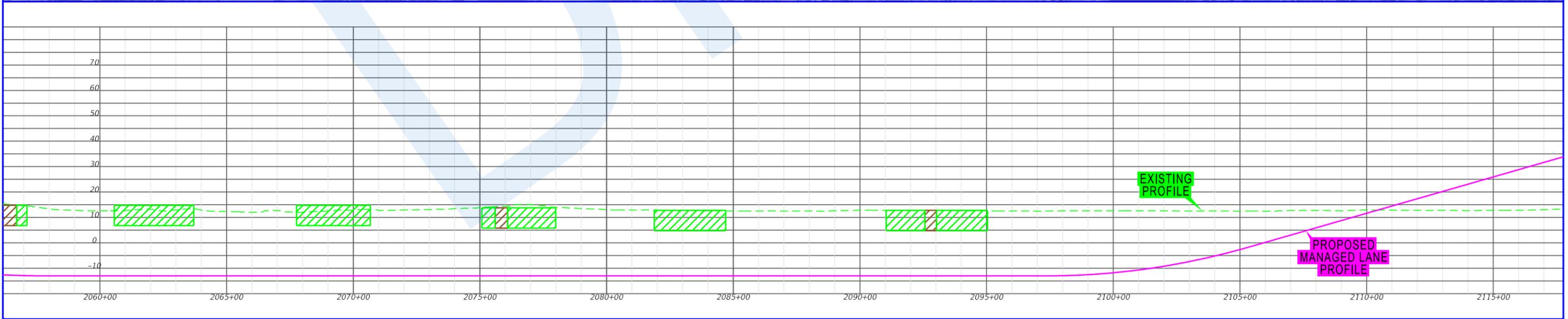
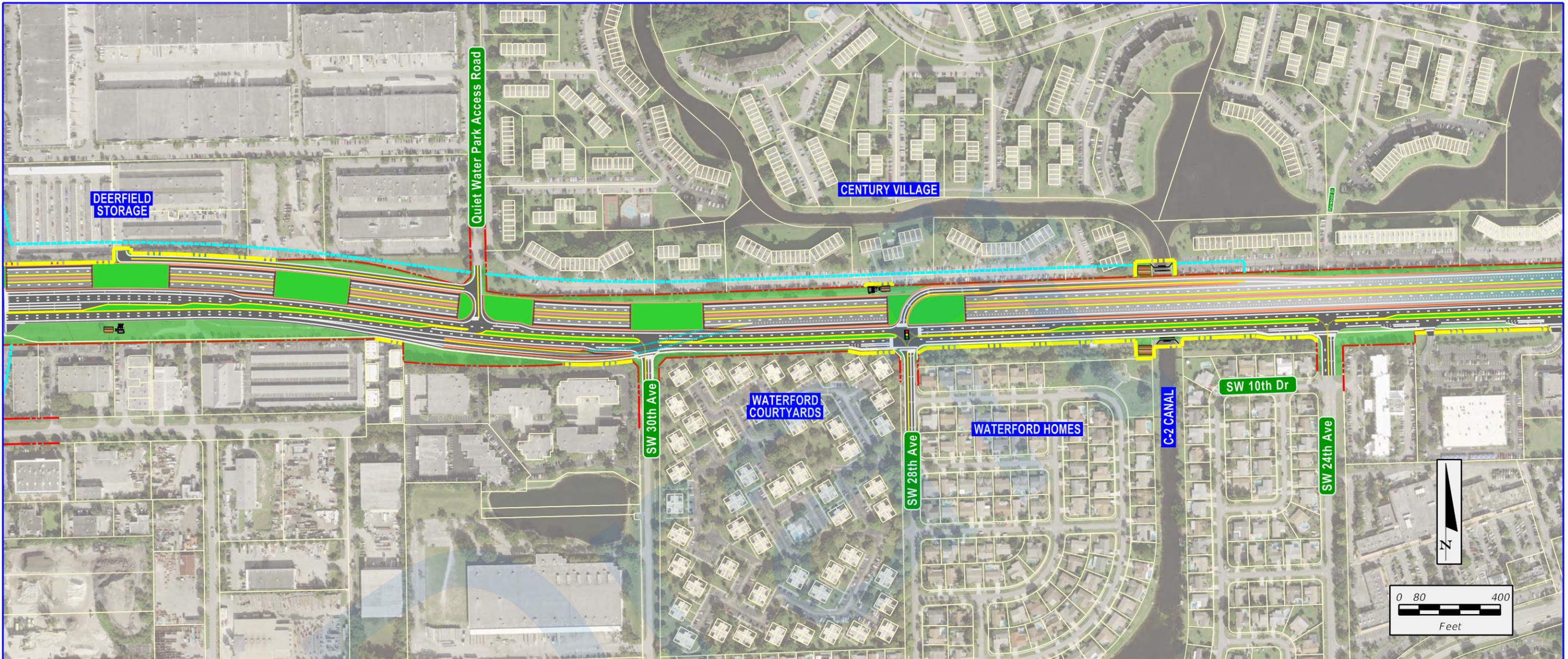
Figure 4.6.7 displays an overview of the plan and profile for the Full Depressed Alternative.

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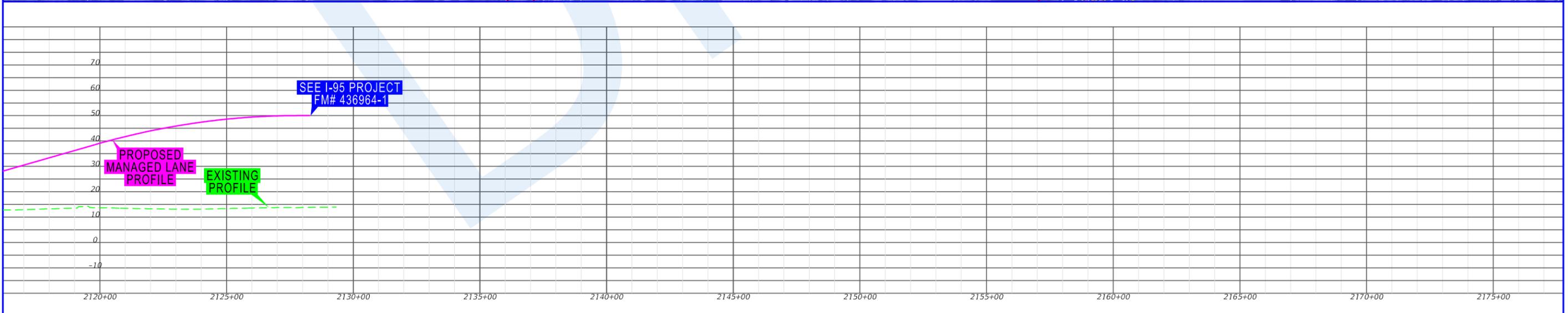
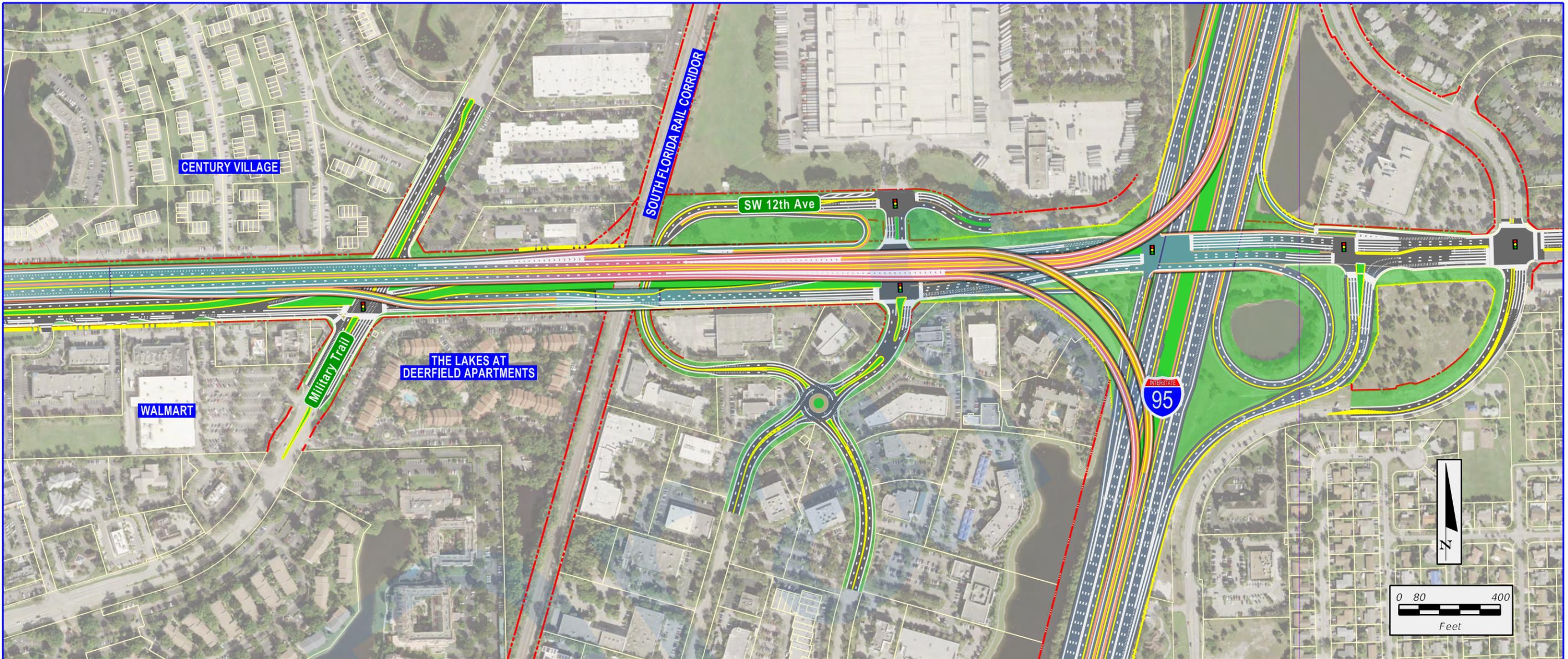
	State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike / Sawgrass Expressway to I-95 Financial Project ID: 439891-1-22-02, ETDM No: 14291	LEGEND			PROPOSED 4TH LEVEL BRIDGE TEMPORARY EASEMENT PROPOSED SIDEWALK PROPOSED TRAFFIC SIGNAL	FIGURE 4.6.7 FULL DEPRESSED ALTERNATIVE 2 OF 3	SHEET NO. 4-82
		EXISTING RIGHT-OF-WAY EXISTING PARCEL LINES LIMITED ACCESS RIGHT-OF-WAY PROPOSED RIGHT-OF-WAY	PROPOSED MANAGED LANES PROPOSED LOCAL SW 10TH ST PROPOSED 2ND LEVEL BRIDGE PROPOSED 3RD LEVEL BRIDGE				

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	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST		TEMPORARY EASEMENT
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE		PROPOSED SIDEWALK
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.7
FULL DEPRESSED ALTERNATIVE
 3 OF 3

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4-83

4.6.2 Partial Depressed Alternative

The Partial Depressed Alternative is comprised of three options that isolate the limits of the managed lane depressed section to accommodate the westbound exit ramp braid such that no elevated structure is necessary. With the Full Depressed Alternative, the westbound exit ramp curves 90 degrees and terminates at a signalized intersection with SW 28th Avenue. This configuration was deemed to be undesirable due to the sharp curvature and the possibility that northbound vehicles on SW 28th Avenue may travel the wrong way on the exit ramp. In lieu of this “T” intersection, the westbound exit ramp was re-configured to merge into westbound local SW 10th Street as a parallel-type entrance ramp. The following grade-separated options were then developed and examined:

1. Depressed Westbound Exit Ramp;
2. Depressed Eastbound Managed Lanes; and
3. Depressed Eastbound and Westbound Managed Lanes.

The three sub-alternatives listed above are essentially identical alternatives that differ only in how the westbound exit ramp from the managed lanes is “braided” over or under the managed lanes to the westbound local lanes. Consequently, the portion of the project west of and just east of Powerline Road is identical for all three sub-alternatives.

From a structural standpoint, the Partial Depressed Alternative features four bridges from Florida’s Turnpike to just west of Military Trail that are common to all three sub-alternatives. These structures include the braided ramp at Waterways Boulevard, the overpass at Powerline Road, the overpass for the relocated Quiet Waters Business Park access road, and the eastbound flyover entrance ramp to the managed lanes. Below is a brief description of the details of these structures:

- Eastbound managed lanes over westbound local lanes at Waterways Boulevard: The proposed ramp structure over Waterways is 1,010 feet in length and is framed using five spans of approximately 200 feet. The five span structure utilizes continuous curved steel I-girders that are supported by concrete end bents, and integral straddle piers. A superstructure depth of eight feet is used to provide a minimum of 16.5 feet of vertical clearance to the roadway below. This depth is consistent with American Association of State Highway and Transportation Officials (AASHTO) span to depth ratios for

continuous steel superstructure units. Precast, prestressed concrete piling is utilized at all foundation units. Pier protection barrier is placed to protect the columns of the substructure units. Per FDM Section 121.3.2, this structure is classified as a category 2 structure due to the presence of straddle piers and integral caps. This structure is a point of controversy with respect to the Waterways community.

- Managed Lanes over Powerline Road: This structure consists of a two-span 280-foot long bridge that utilizes prestressed concrete girders. The first span is 200 feet long, and the superstructure is framed using FIB 96. The second span is 80 feet long, while the superstructure fascia beams use FIB 96 and the interior beams are comprised of FIB 36. The center pier is a framed two column concrete pier.
- Managed Lanes over Quiet Waters Business Park Access Road: This structure consists of a single span, 142-foot long bridge using prestressed concrete girders. The superstructure consists of FIB 63; the girders rests on end bents that are wrapped around by mechanically stabilized earth (MSE) walls.
- SW 10th Street Eastbound Entrance Ramp Flyover Bridge: This structure consists of a four-span horizontally curved 510-foot long structure. The first and fourth spans are 105 feet long, whereas the second and third spans are 150 feet in length. The bridge superstructure is comprised of continuous steel plate girder system with 66-inch deep steel webs. The substructure is made of conventional single-column hammerhead concrete piers; however, the center pier is a straddle-pier with a post-tensioned straddle-cap of approximately 64 feet in length. Because of the need to maintain a low profile, the center pier-cap is made integral with the steel superstructure.

Figures 4.6.8 to 4.6.10 display sectional views of the conceptual substructure at the Powerline Road overpass as well as the eastbound entrance ramp flyover bridge.

Figure 4.6.8: Conceptual Bridge Pier at Powerline Road Overpass

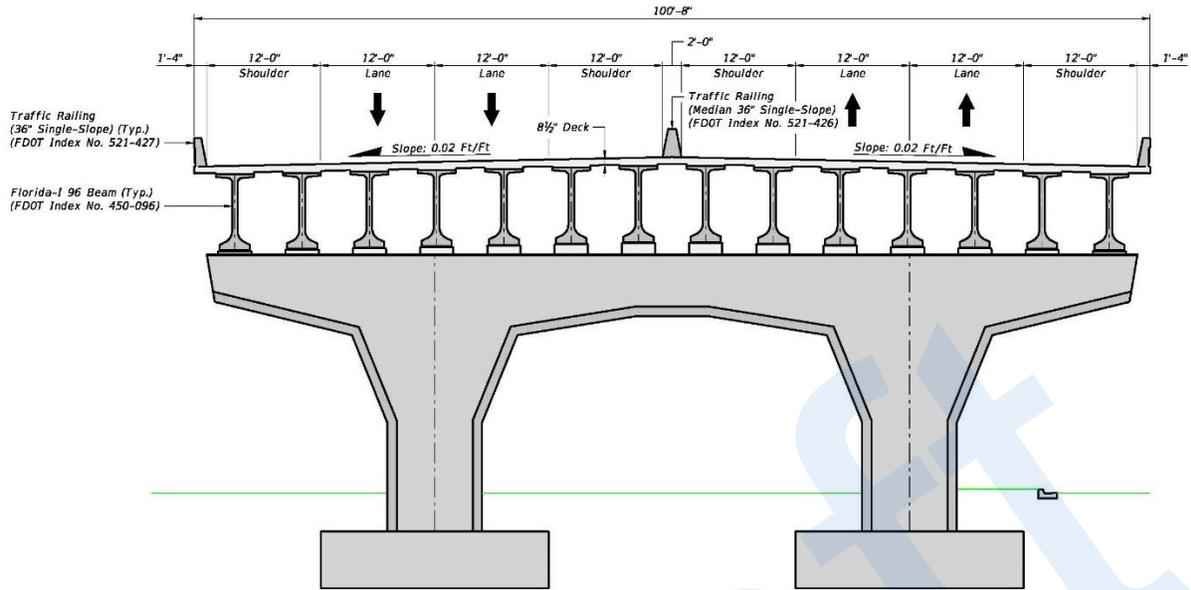


Figure 4.6.9: Conceptual Pier for Eastbound Entrance Ramp (Hammerhead)

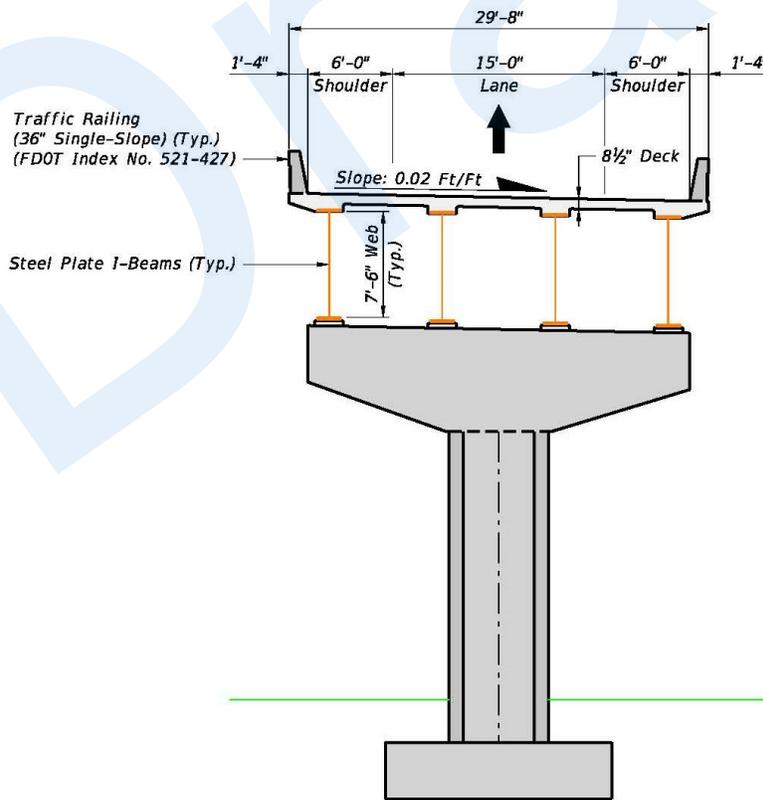
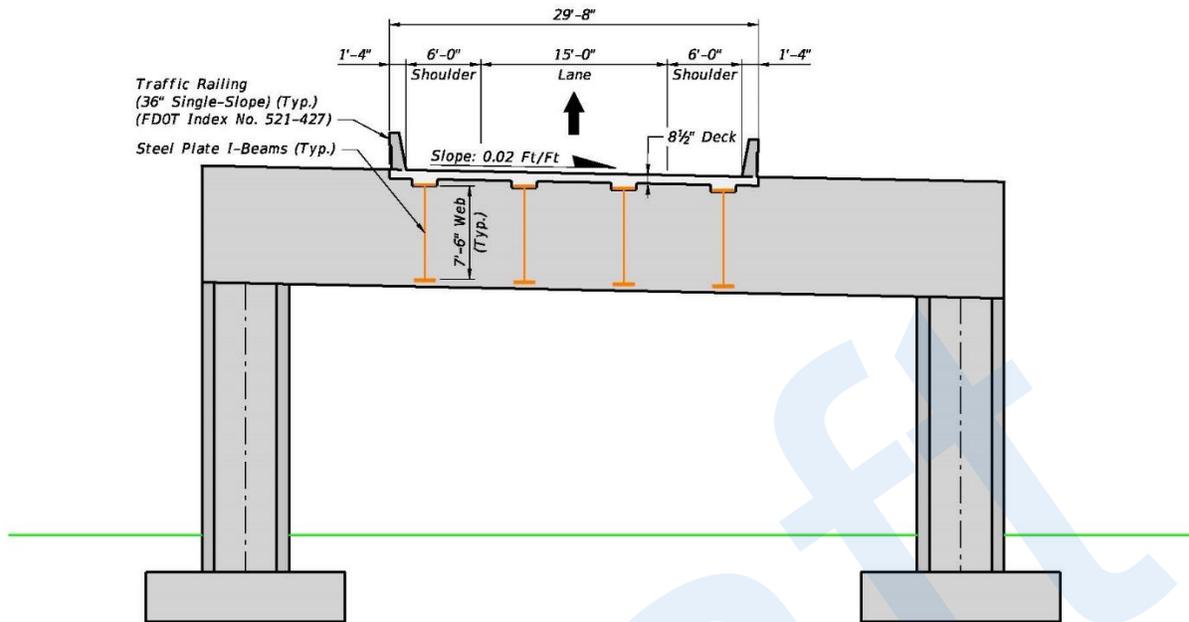


Figure 4.6.10: Conceptual Pier for Eastbound Entrance Ramp (Straddle Bent)

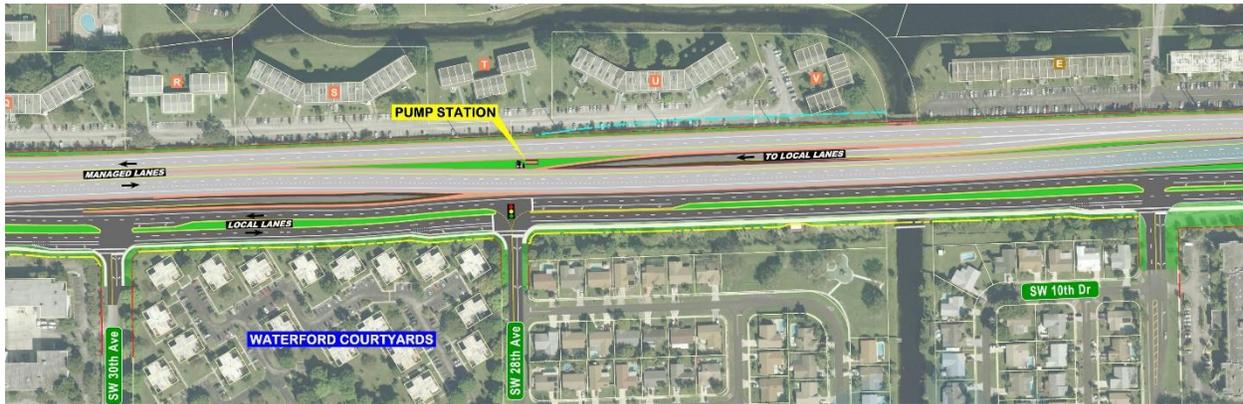


4.6.2.1 Depressed Westbound Exit Ramp

One economical method of eliminating a braided ramp overpass is to keep the local and managed lanes at the existing grade and depress the westbound exit ramp such that it passes beneath the eastbound managed lanes. This configuration requires placing the local westbound entrance ramp (east of Military Trail) on the left-hand side. While not conventional, a left-hand exit movement reduces the distance of the ramp braid across the managed lanes, since the ramp must braid beneath only the eastbound lanes as opposed to both the eastbound and westbound managed lanes. Figure 4.6.11 displays the depressed westbound exit ramp and shows the left-hand exit movement from the managed lanes coupled with the right-hand entrance on the local westbound lanes.

To provide space for the left-hand exit ramp, the eastbound managed lane departs from the westbound lanes and shifts southward via a normal-crown reverse curve before curving northward again to follow the westbound auxiliary lane.

Figure 4.6.11: Depressed Westbound Exit Ramp



The design speed of the exit ramp is 35 mph; however, the K values for the crest and sag vertical curves exceed the FDOT minimum values due to the length of curve governing. The westbound exit ramp transitions via a reverse curve with radii of 3,967 and 2,300 feet to be adjacent to the westbound local lanes and forms an outer third lane approaching Powerline Road. In order to eliminate direct impacts to Century Village, the outside of the westbound concrete barrier wall is set 10 feet from the existing right-of-way line. To accommodate the ramp braid by depressing the ramp, the alignment shift of the eastbound managed lanes requires the acquisition of additional right-of-way along the south side of local SW 10th Street. A swath of additional right-of-way up to 15 feet wide is required from Waterford Courtyards, while a swath of approximately 20 feet is required from the City-owned property east of SW 28th Avenue.

A noteworthy point is that the existing pump station for the City of Deerfield Beach wells would be located a couple of feet behind the proposed curb line and may require the use of concrete barrier and curb-to-barrier transitions. The proposed sidewalk along the south side of local SW 10th Street is six feet in the vicinity of Waterford Courtyards and 10 feet along the City-owned property. This additional sidewalk width between SW 28th Avenue and SW 30th Avenue is proposed to facilitate pedestrian activity but can be adjusted in the design phase as the engineering is refined. The distance behind the proposed sidewalk is 10 feet in order to accommodate potential noise walls and relocated utilities. Figures 4.6.12 to 4.6.15 display the associated renderings for this alternative.

Figure 4.6.12: Depressed Westbound Exit Ramp Looking West



Figure 4.6.13: Depressed Westbound Exit Ramp Looking West



Figure 4.6.14: Depressed Westbound Exit Ramp Looking East



Figure 4.6.15: Depressed Westbound Exit Ramp Looking East

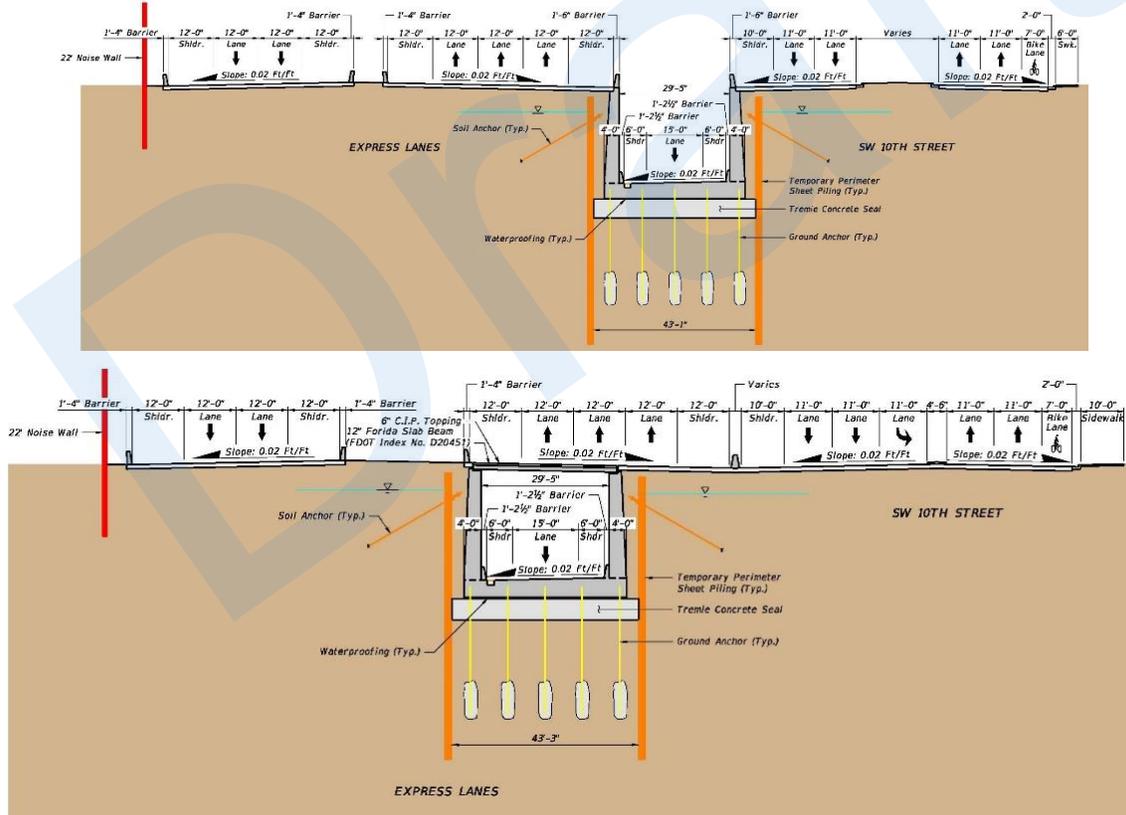


The unique segment of the Depressed Westbound Exit Ramp Alternative is the left-hand westbound exit ramp that drops below grade and passes beneath the at-grade eastbound managed lanes. The length of the depressed exit ramp is approximately 1,900 feet, from just east of SW 30th Avenue to just west of the C-2 Canal. In this scenario, the DS has a maximum cut depth at the lowest point of the profile of approximately 32 feet and a SOE width of 43.3 feet. The SOE cut is measured from the bottom of tremie seal to existing or proposed ground.

Atop this depressed westbound exit ramp are eastbound managed lanes, which are located at-grade but are supported by a 417-foot long structure consisting of 12x48 Florida Slab Beam (FSBs) spanning 29.4 feet between DS walls.

Similar to the Full Depressed Alternative, the ground anchors are arranged in a square grid at an approximate 10-foot spacing. The soil (horizontal) anchors to support the vertical temporary walls require an estimated horizontal projection of approximately 54 feet on each side of the SOE. The lengths fall well within the right-of-way limits of the project – a distinct advantage over other alternatives. Figure 4.6.16 shows conceptual sectional views at the DS including the SOE. Note that temporary soil anchors are needed for the lateral wall and temporary ground anchors to hold down the tremie.

Figure 4.6.16: Sectional Views for Depressed Westbound Exit Ramp



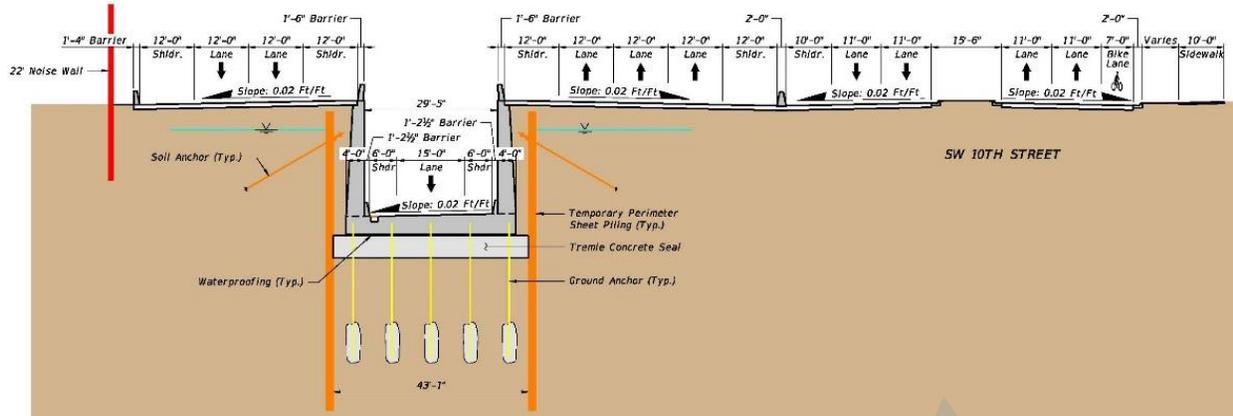


Figure 4.6.18 depicts the plan and profile of the Depressed Westbound Exit Ramp Alternative.

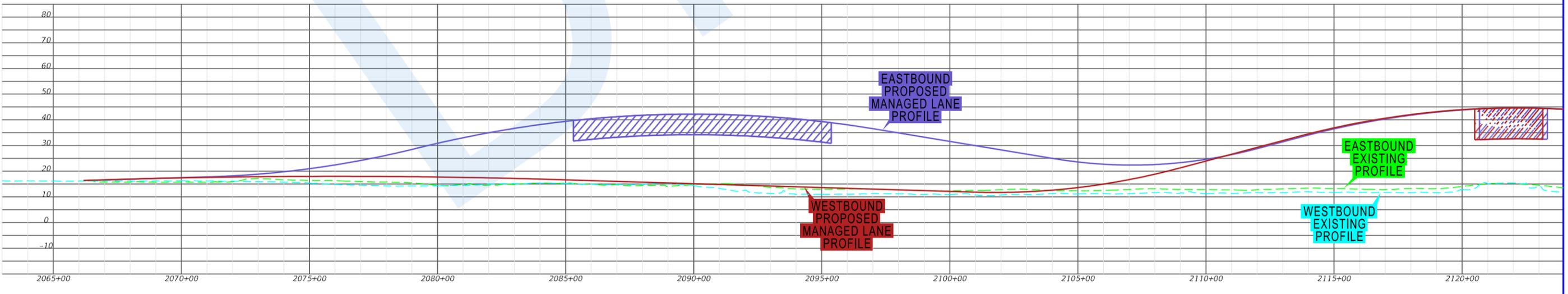
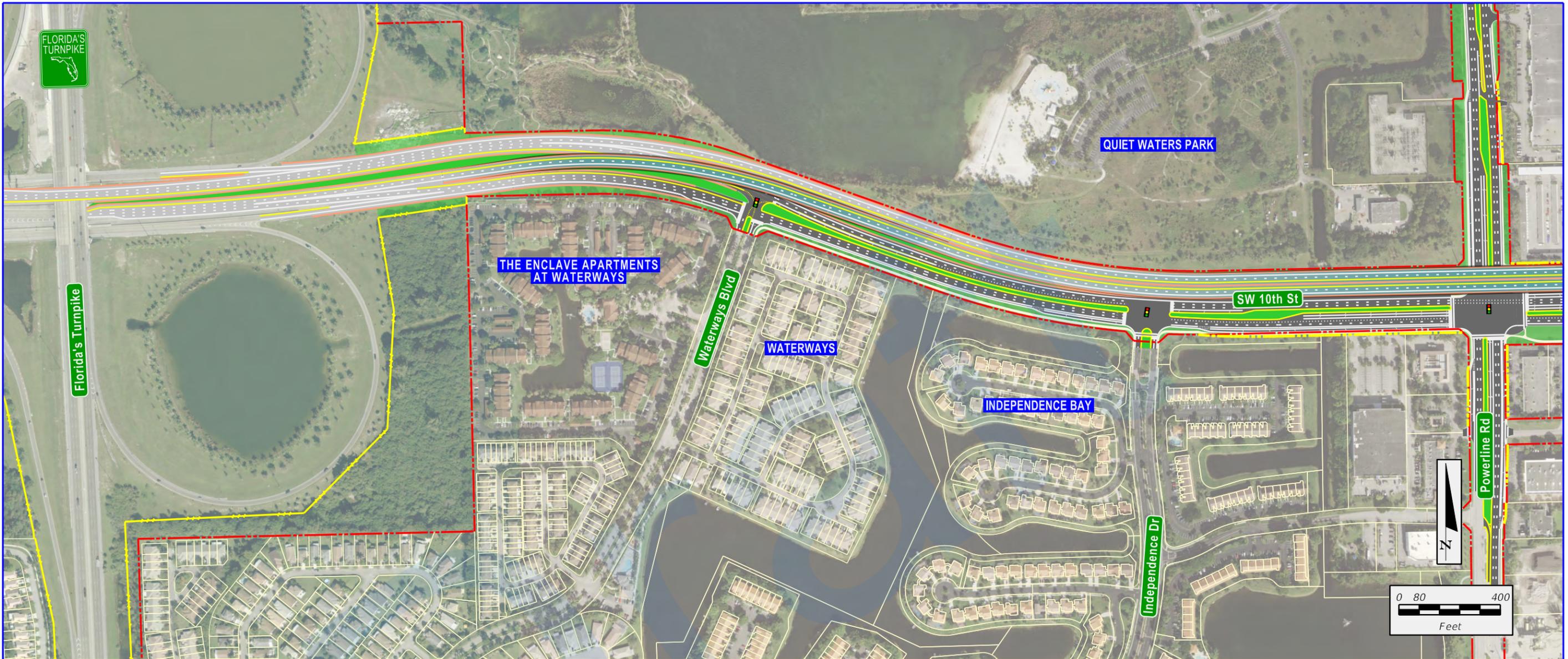
4.6.2.2 Depressed Eastbound Managed Lanes

A variation on the Depressed Westbound Exit Ramp Alternative is to swap the profiles such that the ramp profile is placed at-grade along with the westbound managed lanes, and the eastbound managed lanes are depressed. Under this scenario, the eastbound managed lanes (but not the westbound managed lanes) pass beneath an at-grade exit ramp. Figure 4.6.17 displays this configuration.

Figure 4.6.17: Depressed Eastbound Managed Lanes



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	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST		TEMPORARY EASEMENT
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE		PROPOSED SIDEWALK
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.18
DEPRESSED WESTBOUND
EXIT RAMP ALTERNATIVE
 1 OF 3

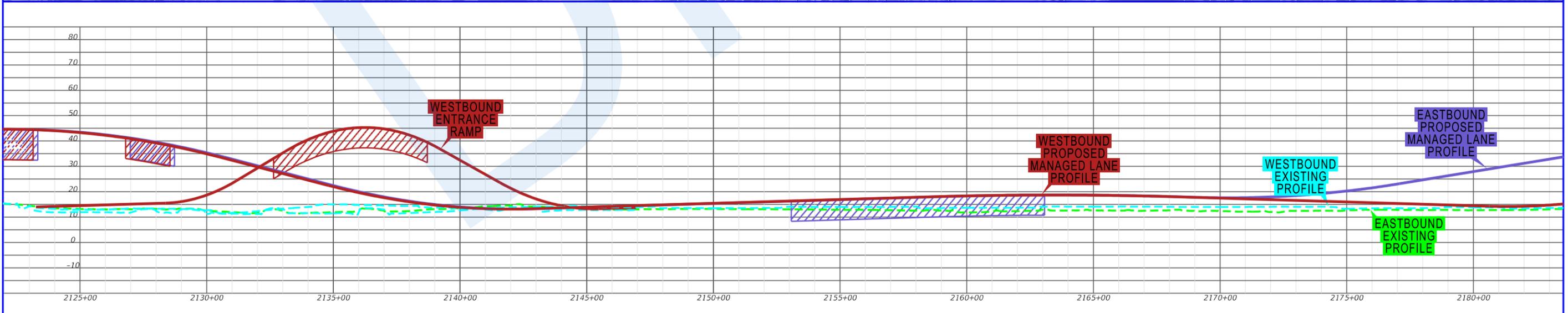
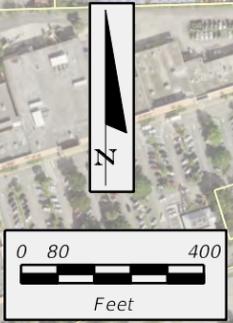
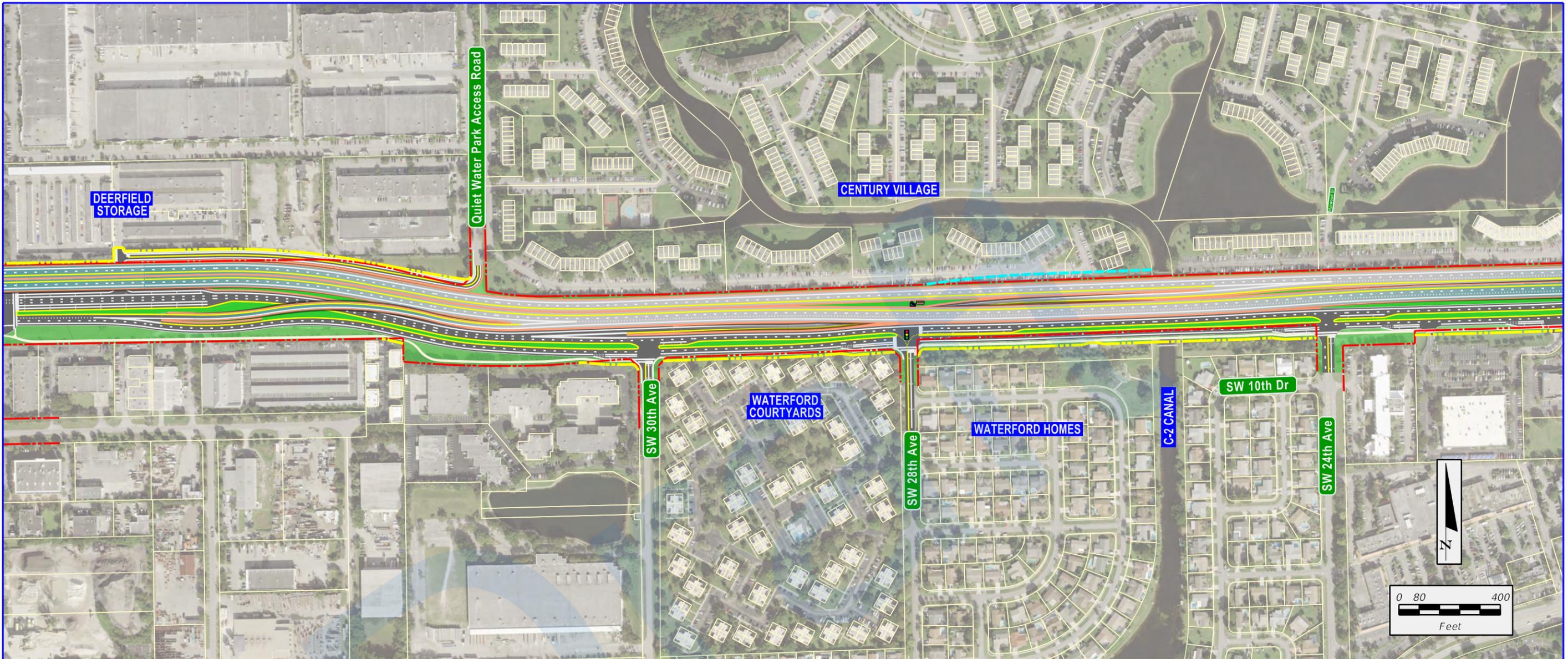
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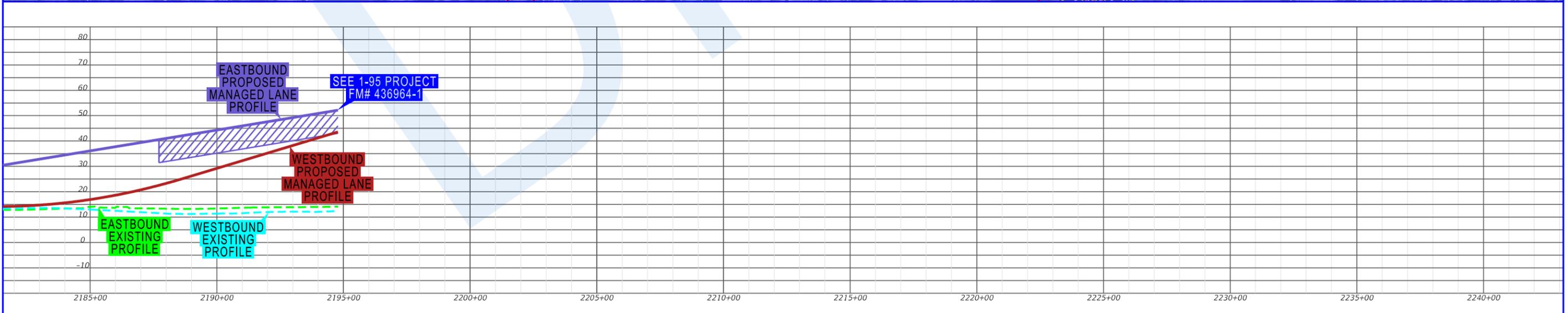
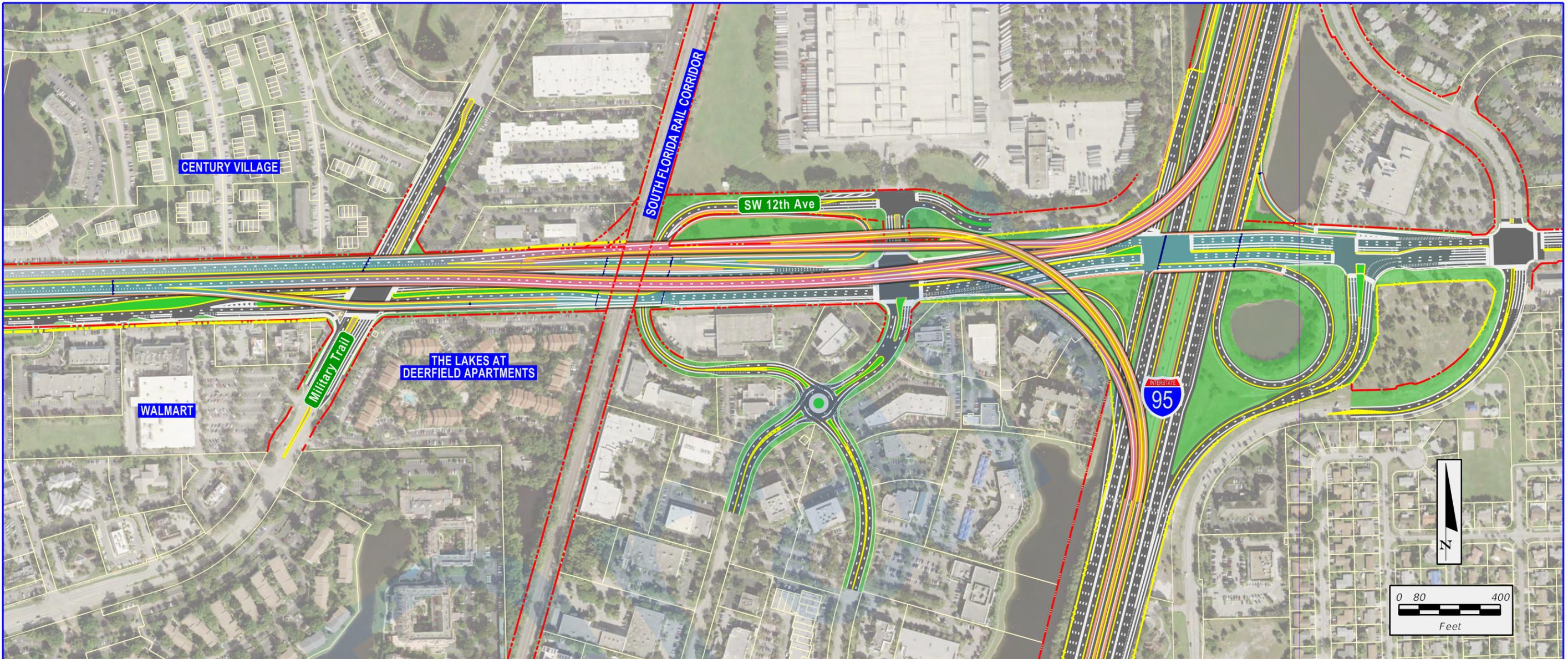
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	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED 4TH LEVEL BRIDGE		TEMPORARY EASEMENT
	PROPOSED SIDEWALK		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.18
DEPRESSED WESTBOUND
EXIT RAMP ALTERNATIVE
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	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
			PROPOSED 4TH LEVEL BRIDGE
			TEMPORARY EASEMENT
			PROPOSED SIDEWALK
			PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.18
DEPRESSED WESTBOUND
EXIT RAMP ALTERNATIVE
 3 OF 3

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As compared to the Depressed Westbound Exit Ramp Alternative, the Depressed Eastbound Managed Lanes Alternative requires only a slight departure from the adjacent westbound managed lanes in order to accommodate the wider retaining wall configuration for the depressed section. The westbound exit ramp transitions above the depressed eastbound lanes via reverse curves with radii of 1,754 and 1,837 feet. Due to the skew angle of the braided ramp, the structure supporting the reverse-curving ramp geometry must be relatively long at 550 feet. The portion of the structure that is not driving surface is proposed to be a landscaped lid. As with the Depressed Westbound Exit Ramp Alternative, the westbound exit ramp forms the third local lane in the westbound direction approaching Powerline Road.

The right-of-way impacts of the Depressed Eastbound Managed Lanes Alternative are slightly less than the Depressed Westbound Exit Ramp Alternative. At the Waterford Courtyards condominiums, the right-of-way required ranges from zero to 16 feet, and slightly less property is needed from the City-owned parcel east of SW 28th Avenue (approximately 16 feet). However, siting a permanent pump station for this alternative is a challenge, as the separation between the local and managed lanes is reduced. As a result, right-of-way acquisition of approximately 100 feet by 20 feet is needed from Waterford Courtyards for the pump station. Figures 4.6.19 to 4.6.22 display the associated renderings.

Figure 4.6.19: Depressed Eastbound Managed Lanes Looking West



Figure 4.6.20: Depressed Eastbound Managed Lanes Looking West



Figure 4.6.21: Depressed Eastbound Managed Lanes Looking East



Figure 4.6.22: Depressed Eastbound Managed Lanes Looking East



The structure carrying the westbound exit ramp over the eastbound managed lanes extends approximately 520 feet as the westbound exit ramp is on a reverse curve alignment. The bridge spans 64.5 feet between DS walls and is configured using FIB 36 at a 12-foot beam spacing.

The eastbound depressed section extends approximately 2,580 feet from SW 30th Avenue to just west of the C-2 Canal. The DS conveys three eastbound managed lanes with a total width ranging from 60 to 78 feet. The DS must provide a minimum vertical clearance of 16.5 feet; however, the lowest point in the profile is located approximately 260 feet into the covered portion of this DS. As a result, the maximum cut depth is approximately 34 feet, where the SOE requires a width of 76.08 feet. The SOE cut is measured from the bottom of tremie seal to existing or proposed ground. The challenges of this DS are similar to those of the Full Depressed Alternative.

Figure 4.6.23 shows three sectional views of the DS including the SOE. Note that temporary soil anchors are required for the lateral wall and temporary ground anchors to hold down the tremie.

Figure 4.6.23: Sectional Views for Depressed Eastbound Managed Lanes Alternative

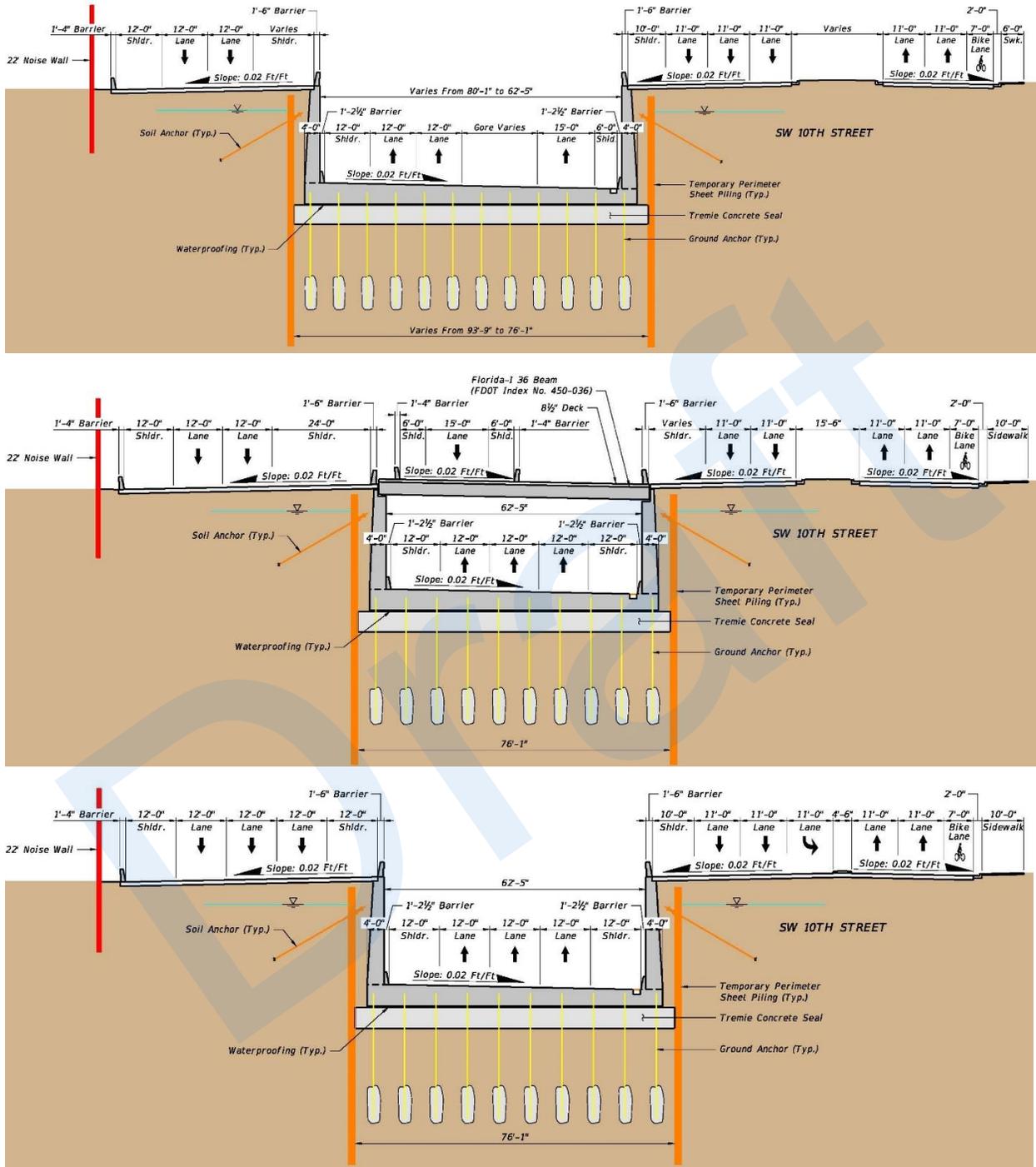
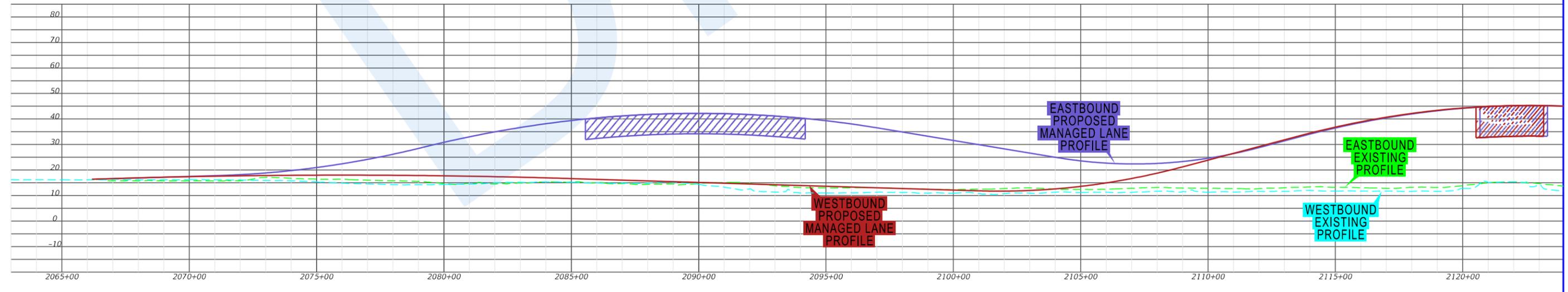
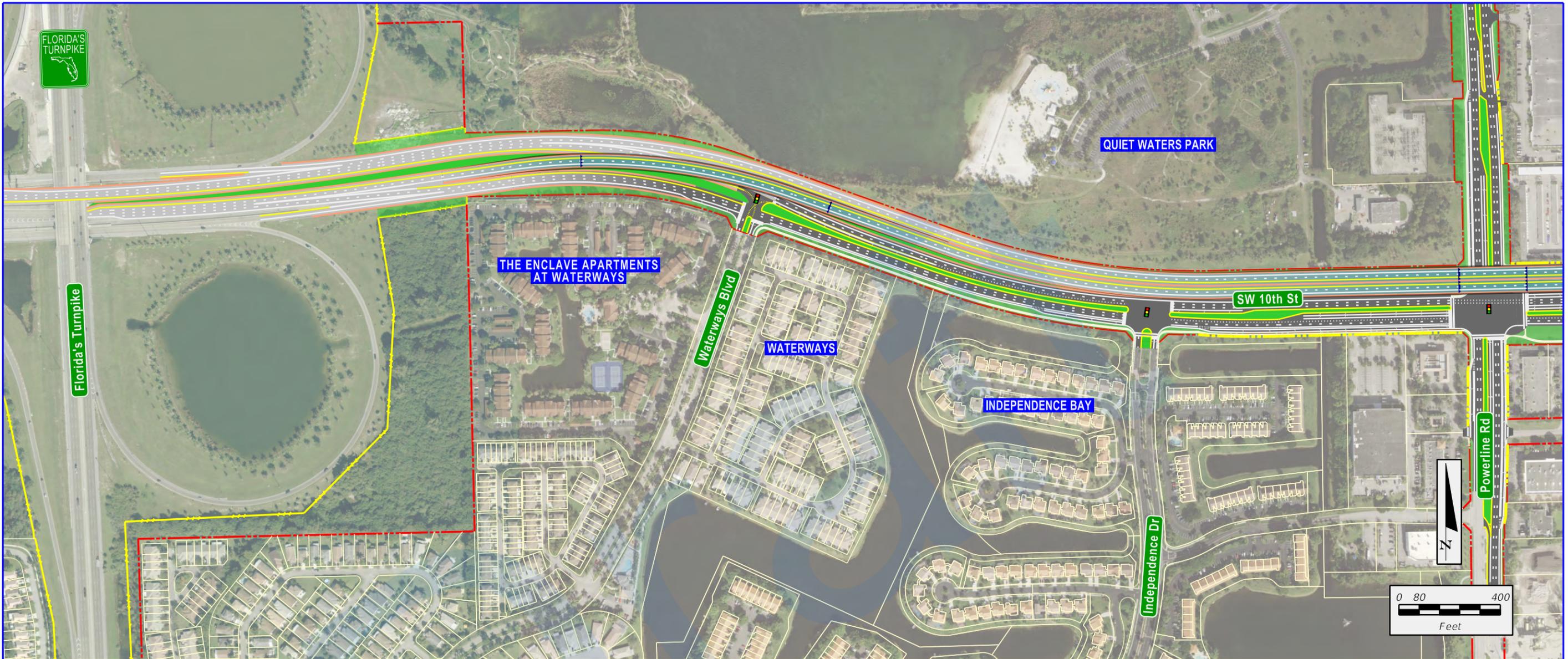


Figure 4.6.24 summarizes the plan and profile of the Depressed Eastbound Managed Lanes Alternative.

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	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED MANAGED LANES		TEMPORARY EASEMENT
	PROPOSED LOCAL SW 10TH ST		PROPOSED SIDEWALK
	PROPOSED 2ND LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.24
DEPRESSED EASTBOUND
MANAGED LANES ALTERNATIVE
 1 OF 3

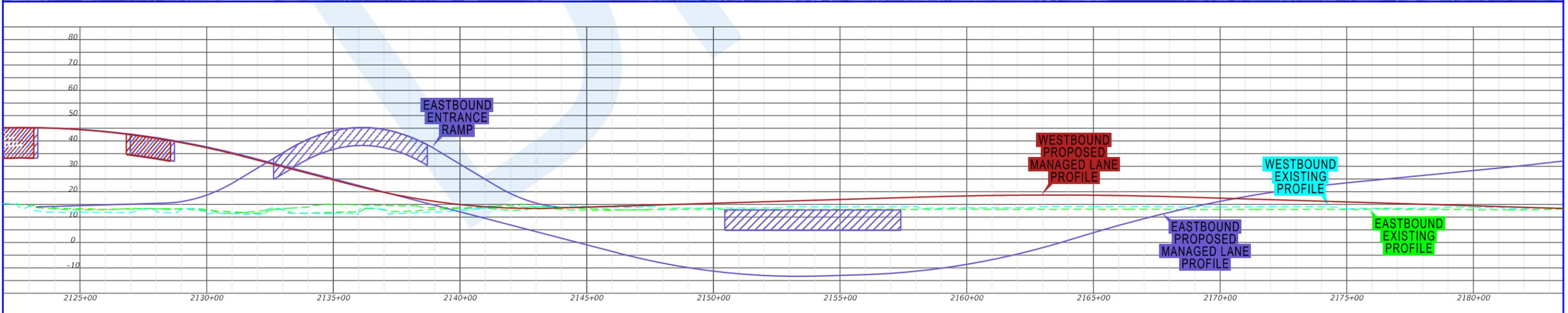
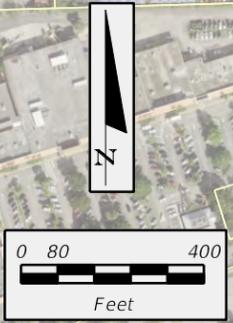
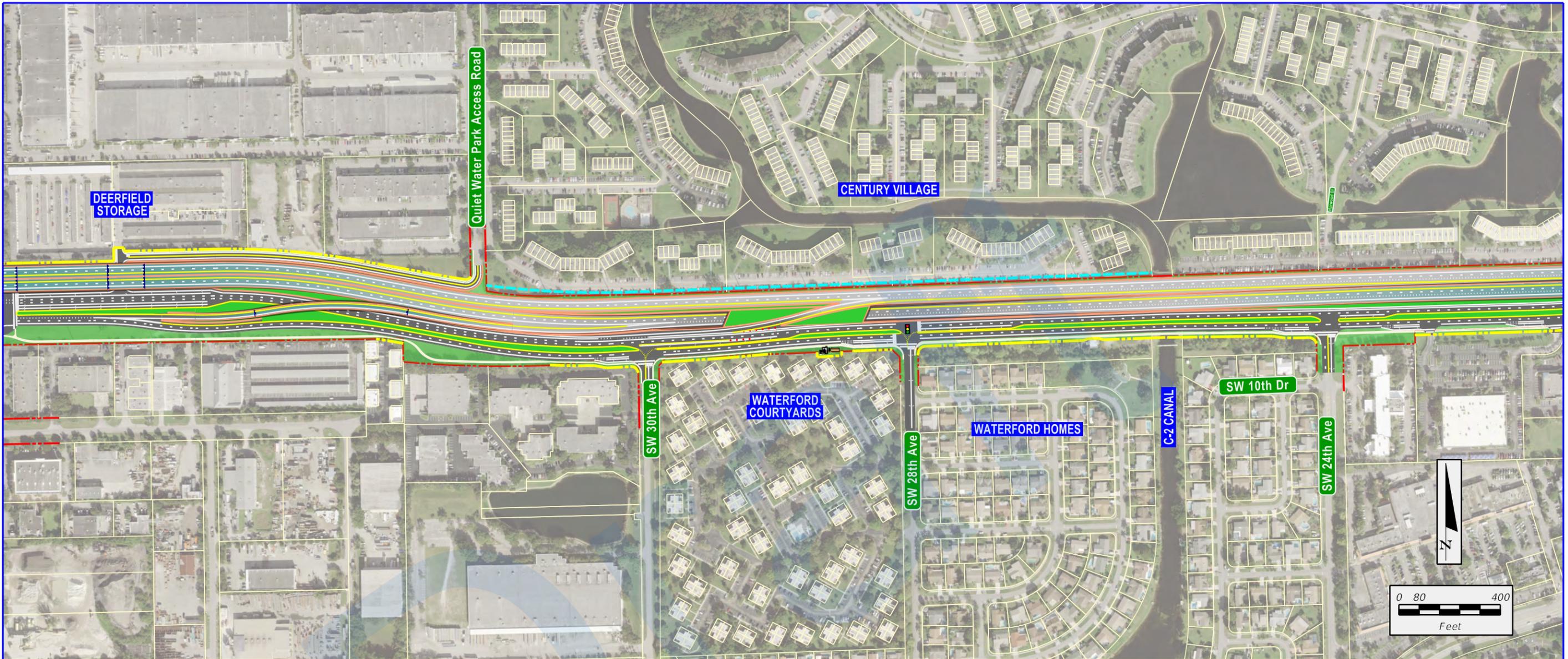
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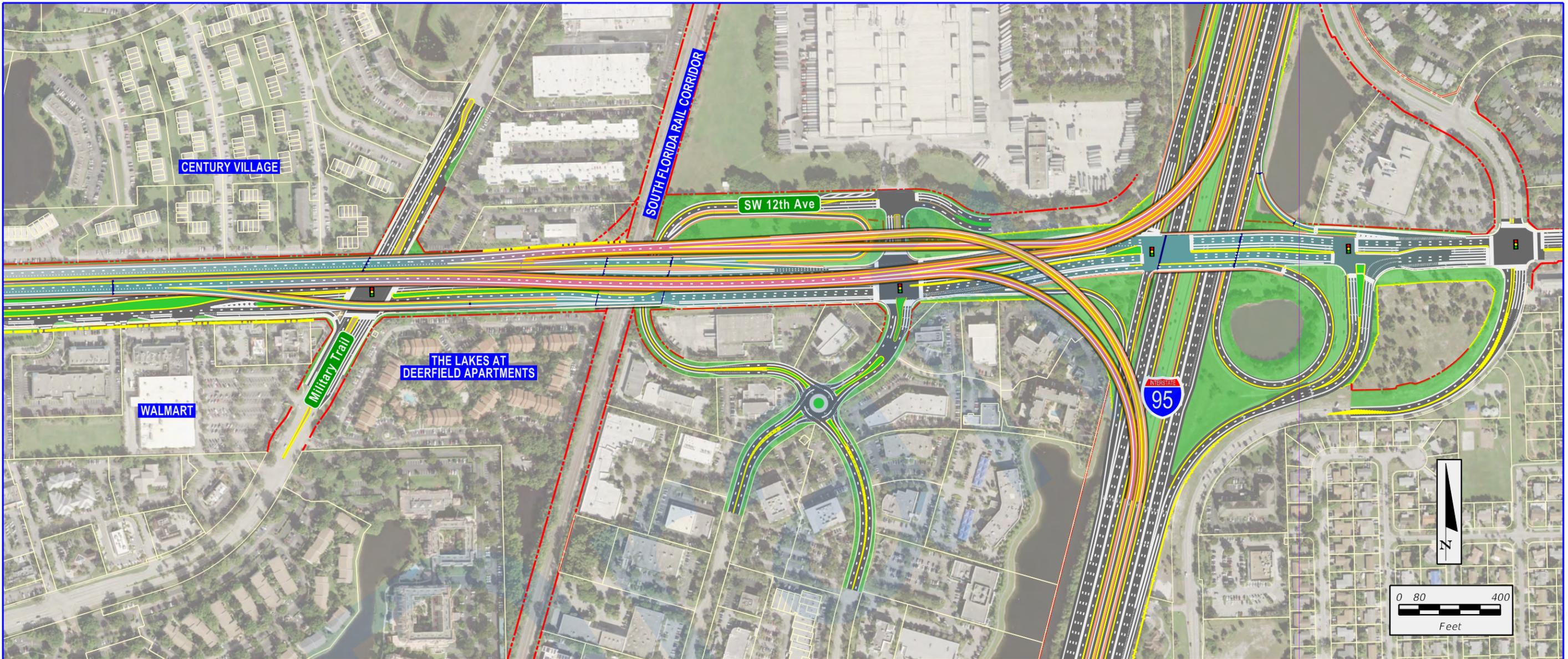
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	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED MANAGED LANES		PROPOSED SIDEWALK
	PROPOSED LOCAL SW 10TH ST		PROPOSED TRAFFIC SIGNAL
	PROPOSED 2ND LEVEL BRIDGE		TEMPORARY EASEMENT

FIGURE 4.6.24
DEPRESSED EASTBOUND
MANAGED LANES ALTERNATIVE
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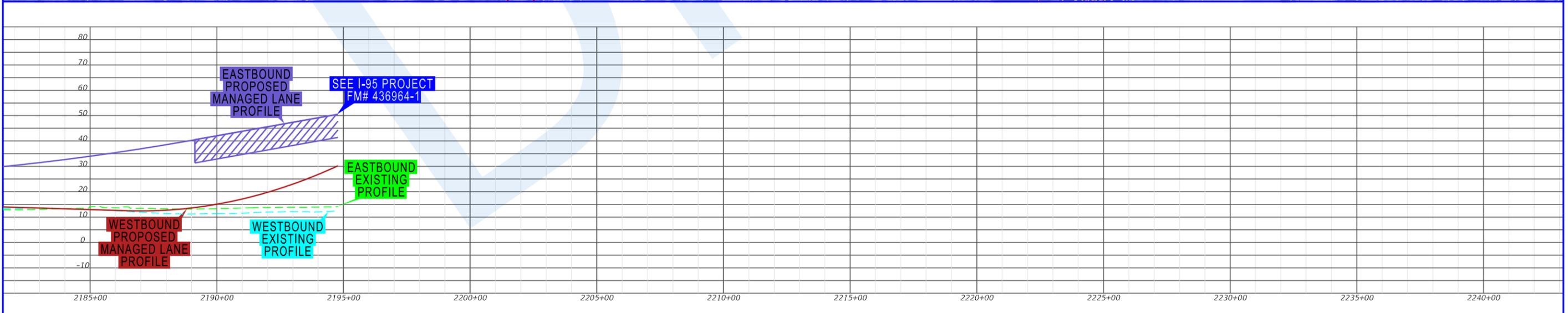
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LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED MANAGED LANES		TEMPORARY EASEMENT
	PROPOSED LOCAL SW 10TH ST		PROPOSED SIDEWALK
	PROPOSED 2ND LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL
	PROPOSED 3RD LEVEL BRIDGE		

FIGURE 4.6.24
DEPRESSED EASTBOUND
MANAGED LANES ALTERNATIVE
 3 OF 3

SHEET NO.
 4-102

4.6.2.3 Depressed Eastbound and Westbound Managed Lanes

The third sub-alternative of the Partial Depressed Alternative is similar to the Depressed Eastbound Managed Lanes Alternative except that, instead of a left-hand exit ramp, a right-hand exit ramp is used. Under this scenario, a right-hand entrance ramp is located west of Military Trail, thereby creating an auxiliary lane on the north side of the westbound managed lanes. This auxiliary lane then forms the westbound exit ramp, which provides a distance of 1,440 feet between the painted gore nose and the reverse curves of radii of 1,530 and 1,546. Figure 4.6.25 displays this right-hand exit ramp and braided crossing.

Figure 4.6.25: Depressed Eastbound & Westbound Managed Lanes



A noteworthy point is that no tangent is located between the reverse curves. Compared to the Depressed Eastbound Managed Lanes Alternative, a longer structure (692 feet) is needed to facilitate the at-grade crossing of the westbound exit ramp above the eastbound and westbound managed lanes.

The back of concrete barrier wall along the westbound exit ramp is located 10 feet from the existing right-of-way line (consistent with the other three alternatives). To provide space along the north side for this exit ramp and auxiliary lane, the mainline managed lanes are shifted southward via normal crown reverse curves. A right-of-way swath of up to five feet (up to 15 feet at the right-turn lane for SW 28th Avenue) is required from Waterford Courtyards. East of SW 28th Avenue, the right-of-way required from the City-owned parcel is approximately the same as the Depressed Westbound Exit Ramp Alternative (20 feet) but is around 15 feet less than the Depressed Eastbound Managed Lane Alternative. Hence, of

the three Partial Depressed Alternatives, the Depressed Eastbound and Westbound Managed Lanes Alternative has the least impacts to the City-owned parcel and pump house.

Locating a permanent pump station for stormwater removal in the depressed section is particularly challenging. Due to the southerly shift of the managed lane alignment to provide space for the westbound exit ramp, a width ranging from 10 to 30 feet exists just north of the ramp structure. This space is not anticipated to be sufficient for a permanent pump station with ingress / egress for maintenance vehicles, and a right-of-way acquisition from Century Village may be required. Moreover, any maintenance access must be provided to and from the exit ramp itself, potentially compromising safety on the exit ramp. Finally, the pump station may be located partially within Century Village and would require suitable fencing and aesthetic treatments. Figures 4.6.26 to 4.6.29 display the associated renderings for this alternative.

Figure 4.6.26: Depressed Eastbound & Westbound Managed Lanes Looking West



Figure 4.6.27: Depressed Eastbound & Westbound Managed Lanes Looking West



Figure 4.6.28: Depressed Eastbound & Westbound Managed Lanes Looking East



Figure 4.6.29: Depressed Eastbound & Westbound Managed Lanes Looking East



The bridge carrying the westbound exit ramp over the eastbound and westbound managed lanes extends approximately 652 feet as the westbound exit ramp is on a reverse curve alignment. The bridge or lid is comprised of FIB 54 at nine-foot beam spacing and spans approximately 112.5 feet between DS walls.

As with the Depressed Eastbound Managed Lanes, the depressed limits extend approximately 2,450 feet from SW 30th Avenue to just west of the C-2 Canal. The DS accommodates three eastbound and two westbound managed lanes with a width ranging from 110 to 128 feet. The DS has a maximum cut depth of approximately 32 feet and a SOE width of 126.08 feet. The SOE cut is measured from the bottom of tremie seal to existing or proposed ground. The challenges of this DS are similar to those of the Full Depressed Alternative; however, the large width will require a large number of cells and large amount of storm water to dewater.

Figure 4.6.30 shows the sectional views at the DS including the wide SOE. Note that temporary soil anchors are required for the lateral wall and a large amount of temporary ground anchors are needed to hold down the tremie seal.

4.6.3 Non-Depressed / No Managed Lane Access Alternative

One of the primary challenges of this corridor is whether or not to provide ingress and egress between the local SW 10th lanes and the managed lanes. The inclusion of ramps within the SW 10th Street corridor coupled with the inclusion of depressed elements, as seen with the Partial Depressed Alternative, increases the right-of-way footprint, increases utility relocations (including the south side FPL transmission line), and increases the construction cost. As an alternative to both the Full and Partial Depressed Alternatives, both of which feature ingress / egress ramps, a third alternative was developed that strives to minimize construction cost, right-of-way impacts, and construction complexity. This alternative, entitled the “Non-Depressed / No Managed Lane Access Alternative”, requires minimal right-of-way and affords the most space for enhanced pedestrian accommodations as well as landscaping. Figure 4.6.32 illustrates the additional space within the existing right-of-way when ramps and access points are not present.

Figure 4.6.32: Non-Depressed / No Managed Lane Access Alternative



At the west portion of the project, the Non-Depressed / No Managed Lane Access Alternative is identical to the Partial Depressed Alternative. The managed lane profile spans Military trail and ties into the existing grade near the west end of Century Village. A right-in / right-out access road to Quiet Waters Business Park continues to be featured, since the existing

median opening will be removed. The first primary difference between the Non-Depressed / No Managed Lane Access Alternative and the Partial Depressed Alternative is the elimination of the braided eastbound entrance ramp to the managed lanes. Similarly, the elimination of the braided westbound exit ramp affords considerably more space within the existing right-of-way. If the proposed managed lanes and local SW 10th Street lanes are located immediately adjacent to each other and separated by a concrete barrier wall, the impacts are minimized such that most of the FPL poles for the south side transmission line would be able to remain. As seen in the alternatives evaluation matrix in Table 4.7.1, the proposed utility relocation cost is essentially halved.

Approaching Military Trail, the lack of entrance and exit ramps also eliminates the need for any potential auxiliary lane in each direction. The eastbound exit ramp and westbound entrance ramp located above and east of Military Trail, respectively, are also eliminated. Access to and from the managed lanes must therefore be facilitated by other planned ingress / egress points located on I-95. These points are addressed in the PD&E study for the adjacent project, I-95 from SW 10th Street to Hillsboro Boulevard PD&E Study (FM# 436964-1), currently in progress.

The Non-Depressed / No Managed Lane Alternative has the same structural configuration as described at the beginning of the Partial Depressed section (Waterways, Powerline Road, Quiet Waters Business Park Access Road). Because this alternative lacks entrance and exit ramps along SW 10th Street, no ramp braiding is proposed and consequently no elevated or depressed elements are present between SW 30th Avenue and Military Trail.

While the Non-Depressed / No Managed Lane Access Alternative has the smallest footprint and least impacts of all the alternatives examined, the lack of ingress / egress ramps does not sufficiently reduce the amount of through traffic on local SW 10th Street. Figures 4.6.33 and 4.6.34 show the increased travel times in the a.m. eastbound and p.m. westbound periods, respectively.

Figure 4.6.33: SW 10th Street Eastbound Travel Time (Florida's Turnpike to I-95)

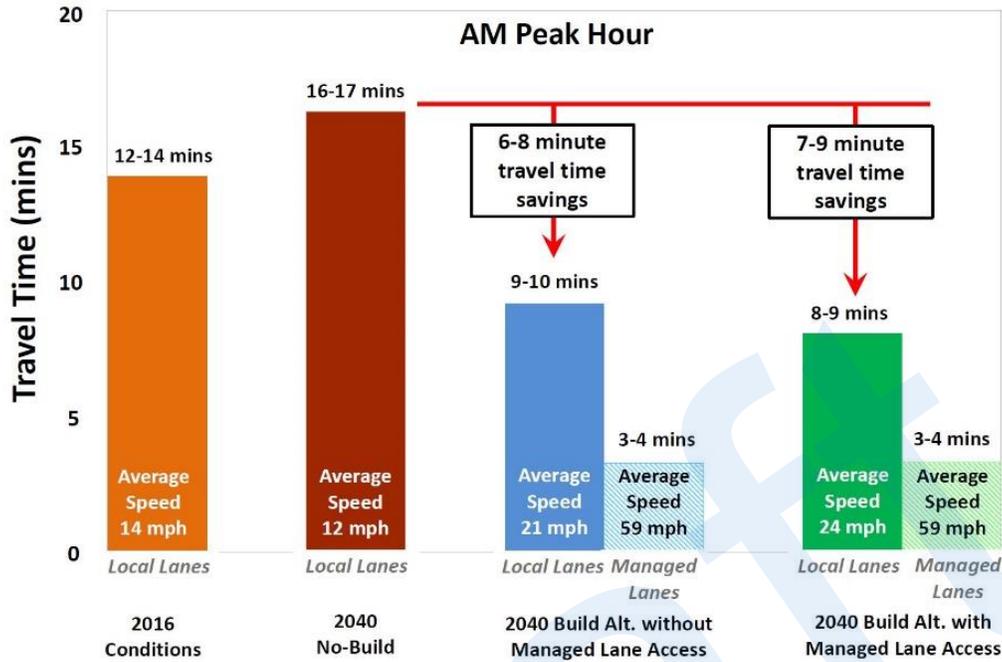
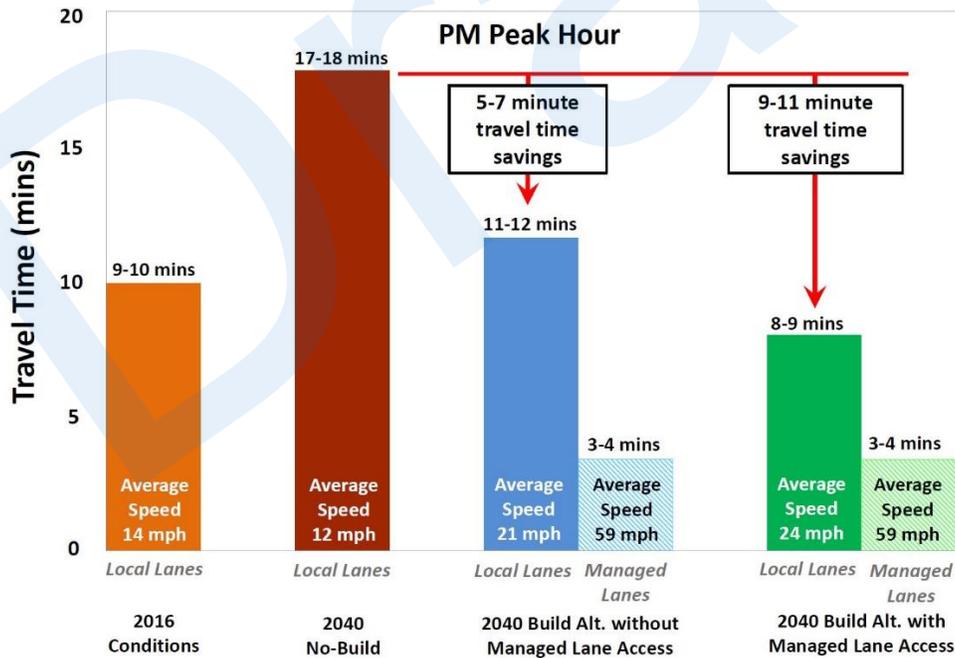


Figure 4.6.34: SW 10th Street Westbound Travel Time (Florida's Turnpike to I-95)



As can be seen by these two figures, including managed lanes with ingress and egress best facilitates travel times in the design year.

Figures 4.6.35 to 4.6.38 display the associated renderings, and Figure 4.6.39 displays the plan and profile of the Non-Depressed / No Managed Lane Access Alternative.

Figure 4.6.35: Non-Depressed / No Managed Lane Access Alternative Looking West



Figure 4.6.36: Non-Depressed / No Managed Lane Access Alternative Looking East



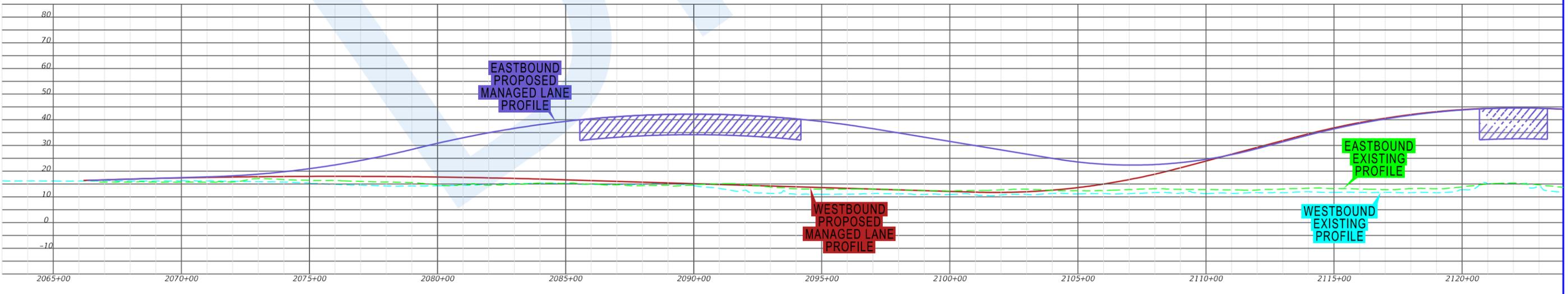
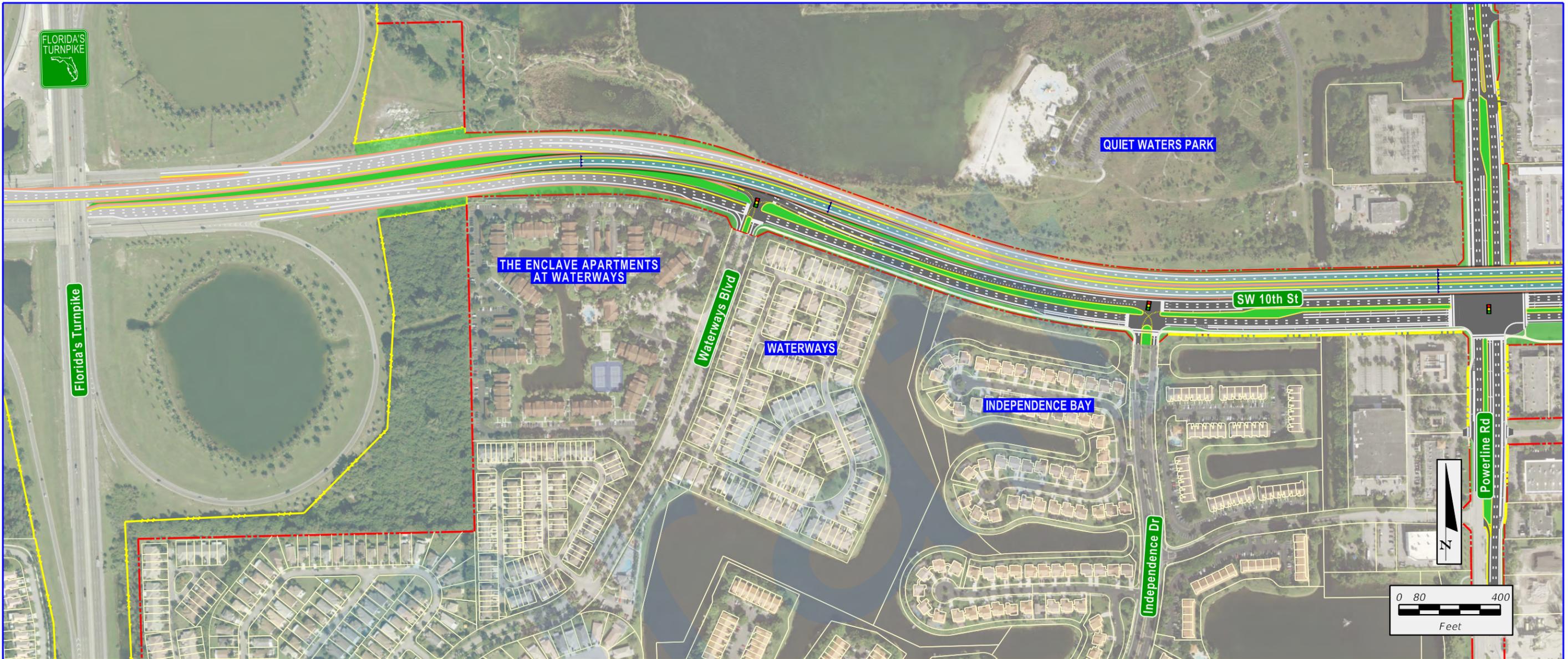
Figure 4.6.37: Non-Depressed / No Managed Lane Access Alternative Looking West



Figure 4.6.38: Non-Depressed / No Managed Lane Access Alternative Looking West



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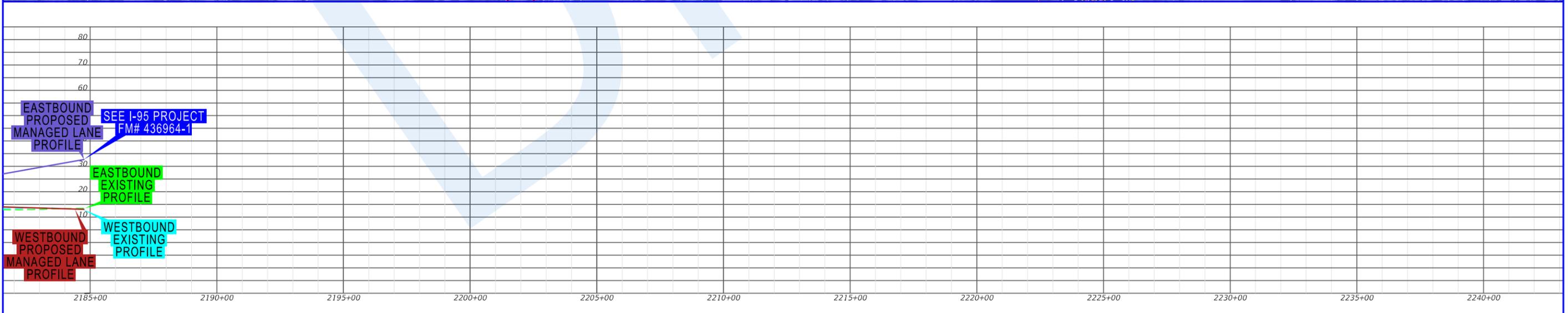
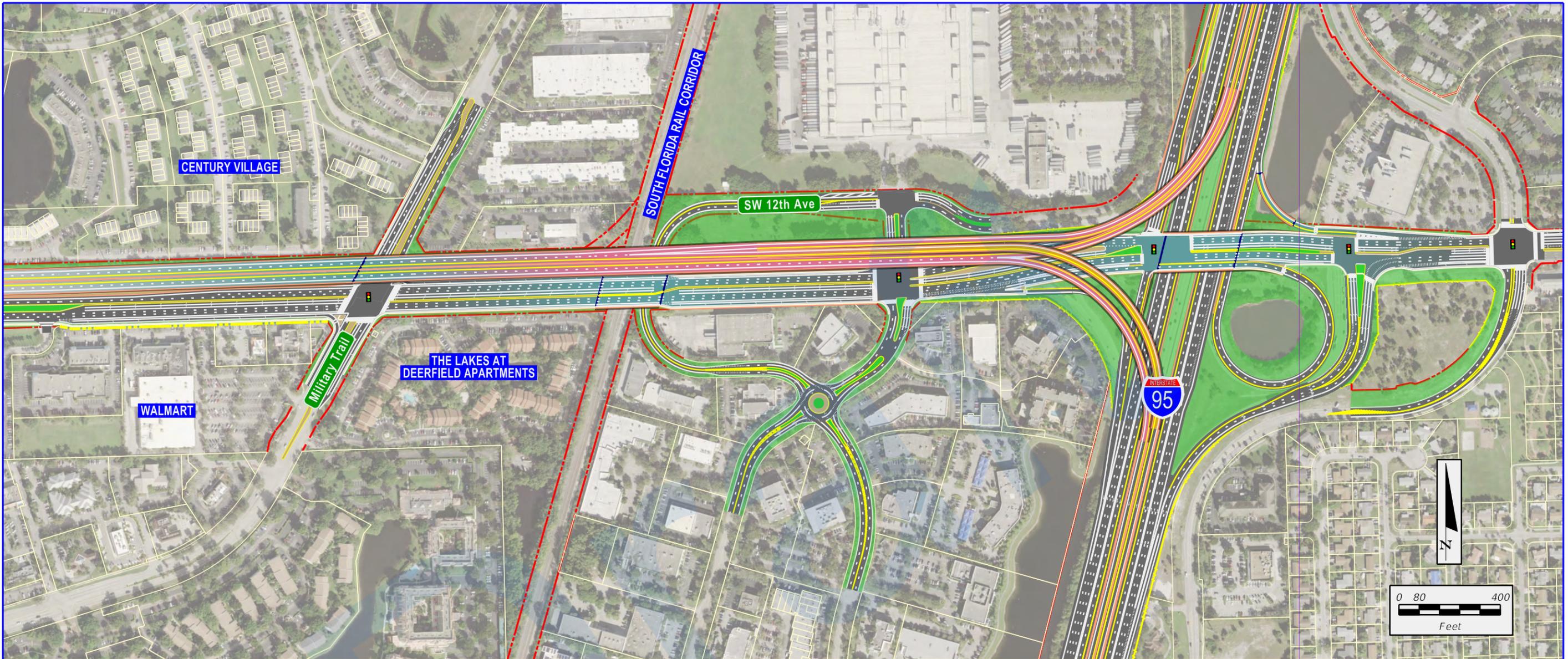


State Road 869 / SW 10th Street Connector PD&E Study
from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED MANAGED LANES		TEMPORARY EASEMENT
	PROPOSED LOCAL SW 10TH ST		PROPOSED SIDEWALK
	PROPOSED 2ND LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.39
NON-DEPRESSED / NO
MANAGED LANE ACCESS
ALTERNATIVE 1 OF 3

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State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND					
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST		TEMPORARY EASEMENT
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE		PROPOSED SIDEWALK
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.39
NON-DEPRESSED / NO
MANAGED LANE ACCESS
ALTERNATIVE 3 OF 3

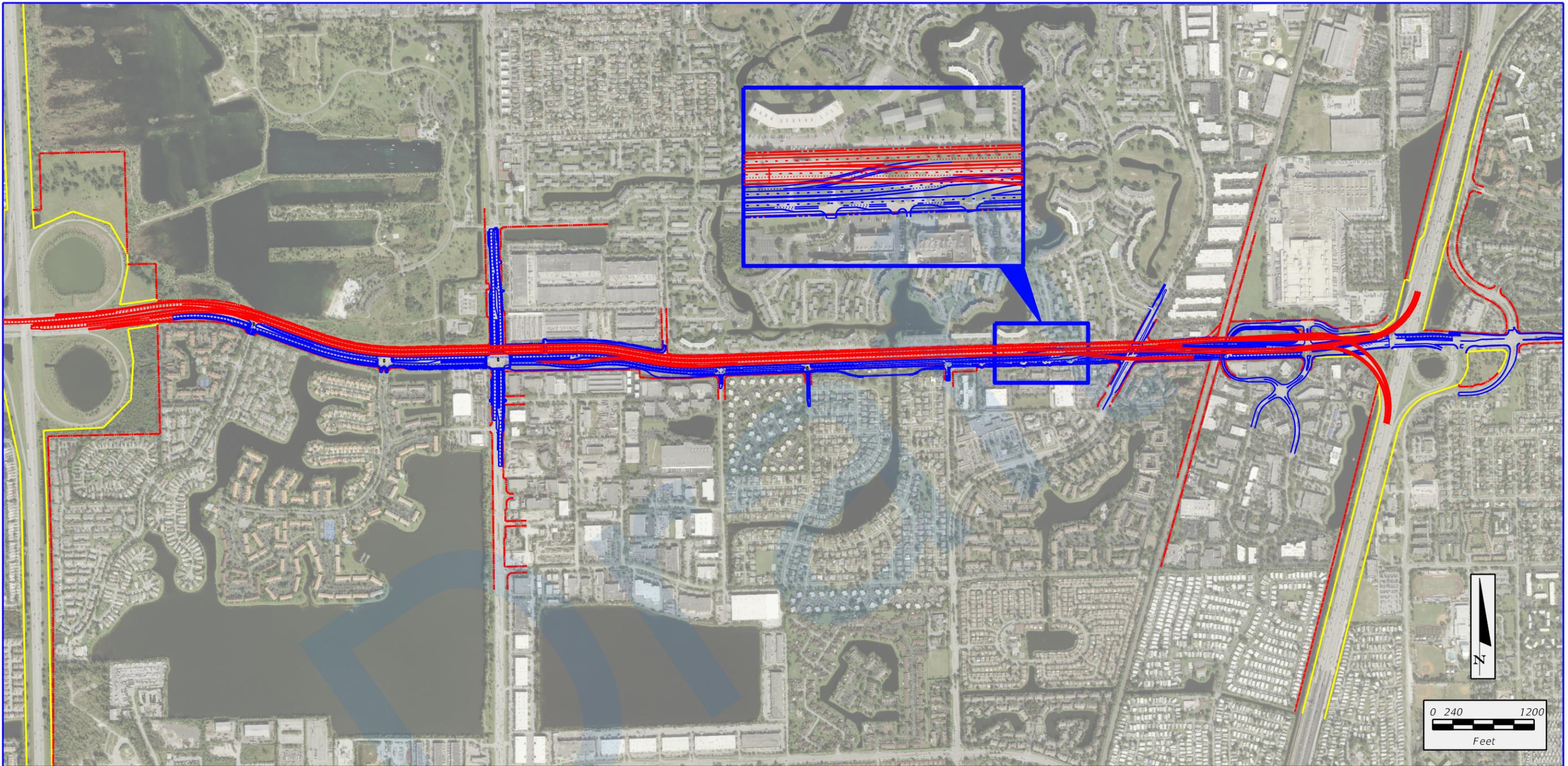
4.6.3.1 Non-Depressed / No Managed Lane Access with Westbound Exit Ramp

A variation of the Non-Depressed / No Managed Lane Access Alternative was developed in an attempt to include an exit ramp but eliminate the depressed element as with the Partial Depressed Alternative. This variation is similar to the Depressed Westbound Exit Ramp Alternative except that the westbound exit ramp is shifted eastward such that the ramp passes beneath the elevated eastbound lanes. This grade separation is possible by extending the eastbound portion of the overpass above Military Trail. In this configuration, the westbound managed lanes return to an at-grade profile via a 5% downgrade while the eastbound managed lanes are elevated for an additional 500 feet. Figure 4.6.40 displays the plan and profile of this concept.

The benefit of this alternative is that it eliminates the ramp braid west of the canal and the expanded right-of-way footprint caused by the ramp terminals. Right-of-way impacts to Waterford Courtyards are eliminated, and impacts to the City-owned parcel are also reduced. This alternative is also less costly and easier to construct than the options in the Partial Depressed Alternative.

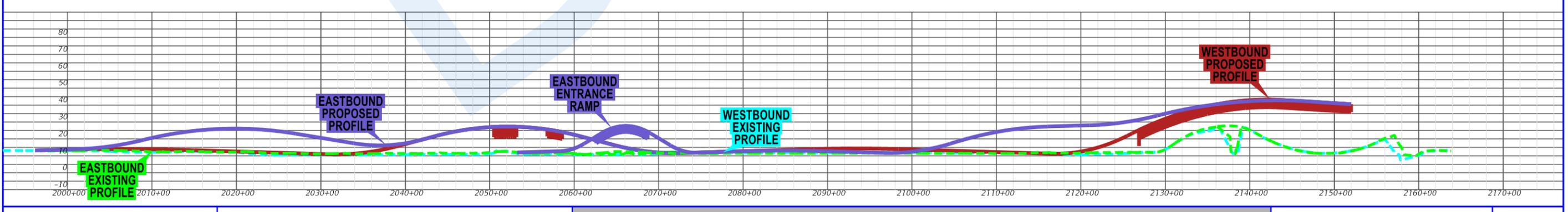
The concern with this alternative is the lengthened eastbound structure and its associated visual impacts to Century Village. This alternative also is not consistent with the COAT recommendation to minimize the raised overpasses along the project. Safety concerns were also expressed regarding the 5% downgrading profile while accommodating a weaving movement. The immediate slower-speed (35 mph) westbound exit ramp located at the bottom of the downgrade was also mentioned as a concern, although the gore spacing between the westbound entrance and exit ramps complied with the AASHTO minimum.

This alternative was not carried forward to the November 29, 2018 Alternatives Public Workshop #2 and was dropped from further consideration.



\$DATES \$TIME\$ \$FILE\$

\$USERS\$



State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED 4TH LEVEL BRIDGE		TEMPORARY EASEMENT
	PROPOSED SIDEWALK		PROPOSED TRAFFIC SIGNAL

FIGURE 4.6.40
NON-DEPRESSED / NO MANAGED
LANE ACCESS WITH WESTBOUND
EXIT RAMP ALTERNATIVE

4.7 Comparative Alternatives Evaluation

The subsequent sections compare the five build alternatives described above in terms of engineering, environmental, and social impacts. Where applicable, each subsection contains a comparison table of the alternatives.

A summary and relative comparison of the pertinent impacts of the five build alternatives are displayed in Table 4.7.1.

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Table 4.7.1: Alternatives Evaluation Matrix

	No Action ⁽¹⁾	Full Depressed ⁽²⁾	Partial Depressed Alternatives			Non-Depressed No Managed Lane Access ⁽³⁾
			Westbound Exit Ramp ⁽²⁾	Eastbound Managed Lanes ⁽²⁾	Eastbound & Westbound Managed Lanes ⁽²⁾	
Safety and Traffic Operations						
Crash Occurrence	Increases	Decreases	Decreases	Decreases	Decreases	Decreases
Emergency Response Times	Increases	Decreases	Decreases	Decreases	Decreases	Decreases
Anticipated 2040 Travel Time – Turnpike to I-95 (Eastbound - AM; Minutes / Vehicle)	12 to 14 (Local Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	9 to 10 (Local lanes) 3 to 4 (Managed Lanes)
Anticipated 2040 Travel Time – Turnpike to I-95 (Westbound - PM; Minutes / Vehicle)	9 to 10 (Local Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	8 to 9 (Local lanes) 3 to 4 (Managed Lanes)	11 to 12 (Local lanes) 3 to 4 (Managed Lanes)
Entrance & Exit Ramps to / from Managed Lanes	N/A	Yes	Yes	Yes	Yes	No
Promotes Regional Connectivity / System Linkage	None	Highest	Highest	Highest	Highest	Moderate
Right-of-Way Impacts						
Right-of-way required for Roadway?	No	Yes	Yes	Yes	Yes	Yes
Parcels Impacted (Permanent / Temporary)	None	25 / 12	24 / 1	24 / 2	23 / 1	15 / 0
Acres Impacted (Permanent / Temporary)	None	2.6 / 8.0	3.9 / 0.4	3.3 / 0.9	3.7 / 3.7	1.7 / 0
Potential Companion Parcels Impacted (Permanent / Temporary) ⁽⁴⁾	None	204 / 312	204 / 104	204 / 312	204 / 312	None
Potential Number of Commercial Relocations	None	4	8	2	2	9
Right-of-way required for Pump Stations?	No	Yes	No	Yes	Yes	No
Right-of-Way Costs (\$ million)	None	37.4	44.2	42.2	43.0	33.0
Cultural						
Section 4(f) Resources Impacted (Quiet Waters Park)	None	Yes (Below Ground)	No	No	No	No
Permanent Section 4(f) Use (acres)	0	TBD	0	0	0	0
Temporary Section 4(f) Use (acres)	0	1.8	0	0	0	0
Physical / Natural Environment						
Noise Receptors Impacted	None	Yes	Yes	Yes	Yes	Yes
Wetlands / Species Impacted	None	Low	Low	Low	Low	Low
Potential Impacts to City Wellfield	None	TBD	TBD	TBD	TBD	None
Permanent Pumps for Drainage Required	No	Yes	Yes	Yes	Yes	No
Landscaping Potential	None	Moderate	Low	Low	Low	High
Aesthetic Potential	None	Moderate	Moderate	Moderate	Moderate	High
Multimodal						
Potential for Express Bus Routes	None	Yes	Yes	Yes	Yes	Yes
Pedestrian Facilities	Same as existing	Improved	Improved	Improved	Improved	Most Improved
Bicycle Facilities	Same as existing	Improved	Improved	Improved	Improved	Most Improved
Utilities						
Requires Relocation of Transmission Poles	No	Yes	Yes	Yes	Yes	No
Utilities at FP&L Substation at Powerline Road impacted	No	Yes	No	No	No	No
Utility Relocation Costs (\$ million) ⁽⁵⁾	0	34	26	26	26	17
Construction						
Road Construction Duration (Does not include time for utility relocation)	None	4 to 5 years	3 to 4 years	3 to 4 years	3 to 4 years	2 to 3 years

	No Action ⁽¹⁾	Full Depressed ⁽²⁾	Partial Depressed Alternatives			Non-Depressed No Managed Lane Access ⁽³⁾
			Westbound Exit Ramp ⁽²⁾	Eastbound Managed Lanes ⁽²⁾	Eastbound & Westbound Managed Lanes ⁽²⁾	
Dewatering Ponds Required During Construction	No	Yes	Yes	Yes	Yes	No
Construction Impacts (Noise, De-watering, Vibrations)	None	Highest	High	High	High	Lowest
Project Cost (\$ millions)						
Construction (\$ million)	0	631	215	304	320	127
Right-of-way (\$ million)	0	37.4	44.2	42.2	43.0	33
Utility Relocation (\$ million)	0	34	26	26	26	17
Maintenance (\$ million / year)	0	0.4	0.2	0.3	0.4	0
Total Costs (\$ million)	0	703	285	373	389	177

1. Assumes 2040 conditions with I-95, Sawgrass, and Turnpike managed lanes implemented but no improvements at the interchanges.
2. Assumes 2040 conditions with I-95, Sawgrass, and Turnpike managed lanes, interchange improvements, and SW 10th Street Connector with 1 entrance / exit ramp in each direction to / from the managed lanes.
3. An At-Grade Alternative based on the North Alignment requires an elevated westbound exit ramp from the managed lanes and an overpass at Powerline Road. This alternative is currently not being considered and is not being shown. Preliminary criteria rankings shown are based on logic.
4. Companion parcels are defined as properties adjacent to common or shared property within a community (as seen with condominiums).
5. Utility costs are approximate grand totals and do not account for reimbursable / non-reimbursable costs for utility companies.

4.7.1 Aesthetic Impacts

One of the few aesthetic features of the existing SW 10th Street corridor is the landscaping in the median. All of the build alternatives will reduce the amount of “green space” available for landscaping. However, there is “green space” with each alternative and landscaping will be maximized in the space available.

All of the build alternatives include an overpass at Waterways Boulevard. The Pioneer Grove (Deerfield Beach) Design Standards were referenced to complete an aesthetics approach for the overpass at Waterways Boulevard. This aesthetics approach is shown in Figures 4.7.1 and 4.7.2

Figure 4.7.1: Waterways Boulevard Aesthetics



Figure 4.7.2: Waterways Boulevard Aesthetics



Potential aesthetic enhancements considered for all build alternatives are as follows:

- Decorative facades around bridge columns, decks, and beams;
- Colored beams on bridges;
- Florida-friendly landscaping;
- Colored stone pattern on retaining walls and noise walls;
- Benches along the sidewalk; and
- Stamped asphalt crosswalks.

The details of the aesthetic package will be completed during the final design / RFP phase.

4.7.2 Relocation Potential

A summary of the preliminary right-of-way analysis for each alternative is shown in Table 4.7.2. The Non-Depressed / No Managed Lane Access Alternative impacts significantly less parcels than the other alternatives (15 compared to 23 - 25) but requires nine relocations. However, the Depressed Eastbound Managed Lane and Eastbound and Westbound Managed Lane Alternatives have the fewest relocations at only two. None of the alternatives require residential relocations.

Table 4.7.2: Right-of-Way Comparison

	Full Depressed	Partial Depressed Alternatives			Non-Depressed No Managed Lane Access
		Westbound Exit Ramp	Eastbound Managed Lanes	Eastbound & Westbound Managed Lanes	
Total Parcels Impacted	25	24	24	23	15
<i>Commercial</i>	16	17	16	17	12
<i>Residential</i>	4	4	5	3	0
<i>Unimproved</i>	5	3	3	3	3
Total Relocations	4	8	2	2	9
<i>Residential</i>	0	0	0	0	0
<i>Commercial</i>	4	8	2	2	9
Number of Parcels impacted by Temporary Easements	12	1	2	1	0
Right-of-way Cost (\$ million)	37.4	44.2	42.2	43.0	33.0

4.7.3 Cultural Impacts

There are no archeological resources, resource groups, structures or historic cemeteries recommended for listing on the NRHP. Therefore, there will be no cultural resource impacts with any of the build alternatives.

4.7.3.1 Section 4(f) Impacts

Four of the five build alternatives have no Section 4(f) impacts. The only alternative with section 4(f) impacts is the Full Depressed Alternative. The Full Depressed Alternative impacts Quiet Waters Park due to the depressed section under Powerline Road. Temporary construction easements (TCEs) will be required in Quiet Waters Park for the ground anchors and to accommodate maintenance of traffic as described below.

A depressed section requires excavation to a depth of 40 feet and a cross section width of approximately 100 feet. Cranes will drive sheet piling deep into the ground to allow for excavation. Due to the depth of the excavation and the lateral forces exerted on the sheet piling, soil anchors are used to hold the sheet piling in place during construction. The soil anchors extend horizontally from the sheet piling for a length of approximately 75 feet, therefore extending underground into Quiet Waters Park and necessitating a TCE. Impacts to Quiet Waters Park are limited to temporary subsurface impacts due to these soil anchors,

and no trenching or ground disturbance in the park is required. The maximum TCE area for this subsurface impact is approximately 9,100 square feet. Following construction, the soil anchors are no longer needed and can remain buried in place to avoid additional impacts to the park. A TCE will be required for the Powerline Road intersection in the northwest corner of the intersection and impacts a maximum of approximately 70,000 square feet of Quiet Waters Park. There are no amenities proposed or existing that would be impacted by the TCEs, which are temporary.

Although the proposed project will require construction easements (sub-surface and surface) from Quiet Waters Park and access to the park may be temporarily impacted - but not closed - due to maintenance of traffic during construction, no recreational facilities will be negatively impacted by the project and no permanent right-of-way acquisition is required.

4.7.4 Natural Environment Impacts

The Build Alternatives were developed to maximize the use of the existing right-of-way and to minimize affecting the natural environment of the area. The proposed floodplain, wetland, and surface water impacts for each Build Alternative are discussed below.

4.7.4.1 Protected Species and Habitat

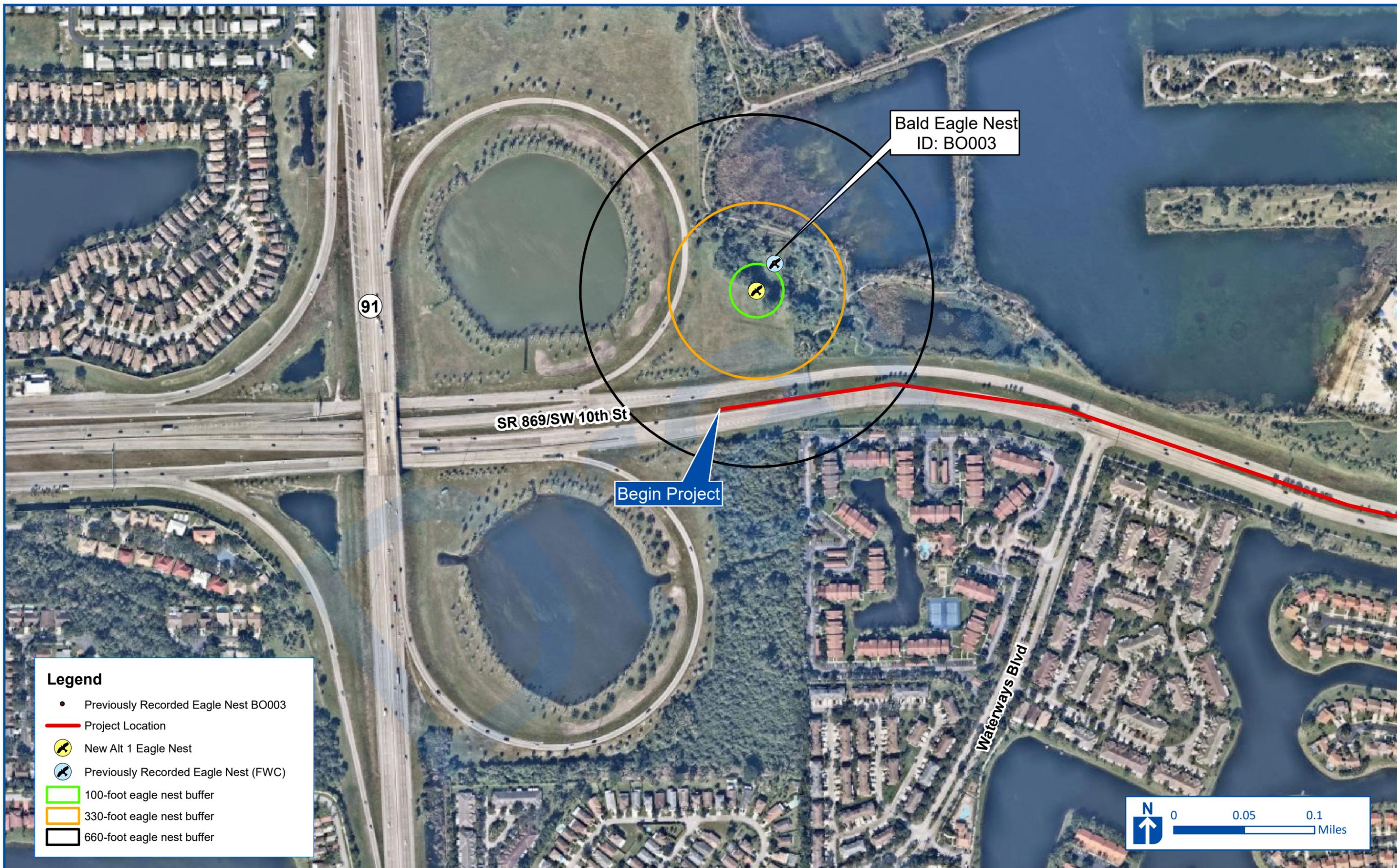
A Protected Species and Habitat Assessment was conducted in accordance with the FDOT PD&E Manual and is included as part of the *Natural Resources Evaluation* (NRE). Based on the data and literature review and subsequent field surveys, five federally listed species and seven state listed species may occur within the SW 10th Street study area. Surveys for gopher tortoise burrows, Florida burrowing owl, and listed plants were conducted in September 2017. The project is not located within any USFWS designated critical habitat. Table 4.7.3 includes the effects determinations for the federally listed species evaluated in the project corridor.

Table 4.7.3: Federally Listed Species Effects Determinations

Federally Listed Species	Effect Determination
Florida bonneted bat	No effect
West Indian manatee	No effect
Everglade snail kite	May affect, not likely to adversely affect
Wood stork	May affect, not likely to adversely affect
Eastern indigo snake	May affect, not likely to adversely affect

In a letter dated October 30, 2018, the USFWS determined that the project was not likely to adversely affect any federally listed species or designated critical habitat. No adverse effects are anticipated to the state listed species.

The FTE is conducting a separate PD&E Study along the Sawgrass Expressway which is at the western end of the project study area. As part of the Sawgrass PD&E study, FTE conducted bald eagle monitoring from October 2017 through May 2018 to determine the status of an existing eagle nest (Nest ID BO003). This nest was no longer remaining; however, an alternate nest (Alternate Nest 1) was identified and is located approximately 458 feet north of the Sawgrass Expressway / SW 10th Street interchange. Construction for SW 10th Street improvements will occur within 330 feet from the eagle’s nest as shown on Figure 4.7.3 (existing SW 10th Street / Sawgrass Expressway is within the 330-foot buffer). Coordination will occur with USFWS to determine measures to protect the eagles nest during construction.



4.7.4.2 Wetlands and Other Surface Waters

There are no wetland impacts associated with any of the build alternatives. All of the build alternatives have similar surface water impacts ranging from 2.3 to 2.4 acres. Table 4.7.4 summarizes the surface water impacts for the build alternatives.

Table 4.7.4: Surface Water Impacts

	Full Depressed	Partial Depressed Alternatives			Non-Depressed No Managed Lane Access
		Westbound Exit Ramp	Eastbound Managed Lanes	Eastbound & Westbound Managed Lanes	
Surface Water Impacts (acres)	2.34	2.38	2.35	2.38	2.30

4.7.4.3 Floodplains

The project will result only in minimal encroachments to floodplains. Encroachments resulting from the construction of the preferred alternative will be fully compensated within the proposed stormwater management facilities to insure there will be no increase in flood elevations and / or limits. Based on the proposed improvements, in the C-3 Canal Basin, a minimum pond volume of 5,727 cubic yards (CY), or 3.6 acre-feet, is required to offset 100-year floodplain encroachment volume. The C-3 Canal Basin proposed pond will provide at least 44,835 CY (27.8 acre-feet) of compensation volume, with a surplus compensation volume of 39,107 CY (24.2 acre-feet). In the C-2 Canal Basin, a minimum pond volume of 27,540 CY (17.1 acre-feet) is required to offset the 100-year floodplain encroachment volume. The C-2 Canal Basin proposed pond will provide at least 100,769 CY (62.5 acre-feet) of compensation volume, with a surplus compensation volume of 73,229 CY (45.4 acre-feet).

4.7.5 Physical Environment Impacts

The physical environment impacts related to the build alternatives are discussed below.

4.7.5.1 Highway Traffic Noise

A traffic noise study was performed in accordance with 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2010) and the FDOT’s PD&E Manual, Part 2, Chapter 18, Highway Traffic Noise (January 14, 2019). The Noise Study Report (NSR), available under separate cover, includes recommended noise walls,

which will be coordinated with affected stakeholders and incorporated into the Preferred Alternative. Section 6.2.7 will contain detailed information on the NSR and its recommendations.

4.7.5.2 Air Quality Impacts

An Air Quality screening dated August 2019 was conducted for this project and the results are contained within the Air Quality Technical Memorandum (AQTM). The proposed project is located in Broward County, which is currently designated as being in attainment for the following criteria air pollutants: ozone, nitrogen dioxide, particulate matter (2.5 microns in size and 10 microns in size), sulfur dioxide, carbon monoxide, and lead.

The Preferred Alternative and the No Build Alternative were subjected to a carbon monoxide (CO) screening model that makes various conservative worst-case assumptions related to site conditions, meteorology, and traffic. The FDOT's screening model, CO Florida 2012, uses the United States Environmental Protection Agency (USEPA) software [Motor Vehicle Emission Simulator (MOVES) version 2010a and CAL3QHC] to produce estimates of one-hour and eight-hour CO concentrations at default air quality receptor locations. The one-hour and eight-hour estimates can be directly compared to the one- and eight-hour National Ambient Air Quality Standards for CO that are 35 parts per million (ppm) and nine ppm, respectively.

The highest total traffic volumes for the No Build Alternative and Preferred Alternative are associated with the SW 10th Street and Powerline Road intersection. Both the No Build Alternative and Preferred Alternative were evaluated for the design year 2040. Estimates of CO were predicted for the default receptors that are located 10 feet to 150 feet from the edge of the roadway. Based on the results from the screening model, the highest project-related CO one- and eight-hour levels are not predicted to meet or exceed the one- or eight-hour National Ambient Air Quality Standards for this pollutant with either the No Build Alternative or Preferred Alternative. As such, the project "passes" the screening model.

The project is in an area which is designated in attainment for all of the National Ambient Air Quality Standards under the criteria provided in the Clean Air Act. Therefore, the Clean Air Act conformity requirements do not apply to the project. Construction activities will cause short-term air quality impacts in the form of dust from earthwork and unpaved roads. These

impacts will be minimized by adherence to all applicable State and local regulations and to the FDOT Standard Specifications for Road and Bridge Construction.

The project is expected to improve traffic flow through the addition of managed lanes that will relieve congestion along the local SW 10th Street, leading to an enhancement in operational capacity and overall traffic operations, which should reduce operational greenhouse gas emissions.

4.7.5.3 Contamination Impacts

A total of 23 potentially contaminated and / or known to be contaminated sites were identified along the project corridor with risk evaluation ratings ranging from No Risk to High Risk. A summary of the risk assessments for the proposed project is presented in Table 4.7.5.

Table 4.7.5: Summary of Potential Contamination Sites Risk Assessments

Risk Assessment Category	Number of Sites
No	1
Low	11
Medium	10
High	1

The build alternatives impact between five and six potentially contaminated sites as shown in Table 4.7.6. All of the build alternatives impact the following contamination sites:

- 1 – Shell First Coast Energy – Medium Ranking;
- 2 – City of Deerfield Beach Well – Low Ranking; and
- 4 – Med Care Pharmacy – Low Ranking.

Table 4.7.6: Summary of Potential Contamination Sites Impacted

	Full Depressed	Partial Depressed Alternatives			Non-Depressed No Managed Lane Access
		Westbound Exit Ramp	Eastbound Managed Lanes	Eastbound & Westbound Managed Lanes	
No	0	0	0	0	0
Low	4	4	4	4	3
Medium	2	2	2	1	2
High	0	0	0	0	0
Total	6	6	6	5	5

Additional sites impacted by the Full Depressed Alternative include:

- 3 – Home Aide Diagnostics Inc. – Low Ranking;
- 9 – United Wholesale – Low Ranking; and
- 10 – Brothers Dry Cleaning Inc. – Medium Ranking.

Additional sites impacted by the Westbound Exit Ramp and Eastbound Managed Lanes Alternatives include:

- 7 – Devcon – Low Ranking;
- 9 – United Wholesale – Low Ranking; and
- 10 – Brothers Dry Cleaning Inc. – Medium Ranking.

The Eastbound and Westbound Managed Lanes Alternative also impacts the following additional sites:

- 7 – Devcon – Low Ranking; and
- 9 – United Wholesale – Low Ranking.

The Non-Depressed No Managed Lane Access Alternative also impacts two additional sites:

- 7 – Devcon – Low Ranking; and
- 10 – Brothers Dry Cleaning Inc. – Medium Ranking.

FDOT will schedule Level II sampling once right-of-way and pond locations are determined. Level II Contamination Assessment investigations are recommended for any areas that have proposed dewatering or subsurface work activities (e.g. pole foundations, drainage features) occurring adjacent to or at any of these sites. As dewatering will be necessary during construction, a SFWMD Water Use Permit will be required. The contractor will be held responsible for ensuring compliance with any necessary dewatering permit(s). Any dewatering operations in the vicinity of potentially contaminated areas shall be limited to low-flow and short-term. A dewatering plan may be necessary to avoid potential contamination plume exacerbation. All permits will be obtained in accordance with Federal, State, and local laws and regulations.

4.7.5.4 Utilities and Railroad

There are no anticipated railroad impacts associated with this project, which ends just west of the SFRC / CSX railroad. Conservative utility relocation estimates were requested as part of the utility coordination process through the utility contact letter and subsequent follow-up with each UAO. The total combined estimated cost for relocations (as provided by the UAOs) is \$34,209,750 as shown in Table 4.7.7. For more information on Utility Impacts, reference the Utility Assessment package, available under separate cover.

Table 4.7.7: Estimated Cost of Utility Impacts for the Full Depressed Alternative

Utility Agency Owner	Total Cost
ATT Corp	\$ 0
ATT Florida	\$ 5,475,250
Broward County Water & Sewer	\$ 1,696,000
City of Deerfield Beach	\$ 3,333,000
Fiberlight LLC	\$ 10,000
Crown Castle Fiber	\$ 255,000
Florida Gas Transmission	\$ 0
FPL Distribution	\$ 9,547,500
FPL Transmission	\$ 12,600,000
Level 3	\$ 800,000
Sprint	\$ 100,000
TECO Peoples Gas	\$ 393,000
Teleport Comm. America	\$ 0
Verizon/MCI	\$ 0
Total Utility Relocation Cost	\$ 34,209,750

The costs indicated above are the “worst case scenario” and apply to the Full Depressed Alternative. Engineering judgement was used to determine the approximate percentage of costs applicable for the Partial Depressed Alternatives and the Non-Depressed / No Managed Lane Access Alternative. The utility relocation costs for the Partial Depressed Alternatives are assumed to be approximately 80% of the Full Depressed Alternative for a total of \$26 million. The utility relocation costs for the Non-Depressed No Managed Lane Access Alternative is assumed to be 50% of the Full Depressed Alternative for a total of around \$17 million.

4.7.6 Cost Estimates

The FDOT Long Range Estimates (LRE) was used to determine construction costs. A summary of the costs for the five Build Alternatives is included in Table 4.7.8. Detailed cost estimates are included in Appendix E.

Table 4.7.8: Alternatives Cost Estimates

	Full Depressed	Partial Depressed Alternatives			Non-Depressed No Managed Lane Access
		Westbound Exit Ramp	Eastbound Managed Lanes	Eastbound & Westbound Managed Lanes	
Construction Cost (\$ million)	631	215	304	320	127
Right-of-way Cost (\$ million)	37.4	44.2	42.2	43.0	33.0
Utility Relocation (\$ million)	34	26	26	26	17
Maintenance Cost (\$ millions / year)	0.4	0.2	0.3	0.4	0
Total Costs (\$ millions)	703	285	373	389	177

4.7.7 Value Engineering Study

The purpose of the Value Engineering (VE) Study is to ensure that the project objectives are addressed and the project remains cost effective, constructible, and makes the most efficient use of resources. A Cost Risk Assessment and Value Engineering (CRAVE) study was conducted during the following time periods:

- April 16, 2018 to April 19, 2018;
- May 8, 2018 to May 11, 2018; and
- July 7, 2018 to July 9, 2018.

The CRAVE study identified 18 risks that carry both potential schedule and cost impacts to the project. The CRAVE team generated 103 ideas to mitigate for the 18 potential risks and ultimately recommended 32 VE recommendations. A summary of the 32 recommendations are contained in Table 4.7.9.

Table 4.7.9: Value Engineering Recommendations

VE #	Description	Savings \$ Million (Cost Increase)	Disposition
1	Create an at-grade alignment	\$415.4	Non-Depressed / No Managed Lane Access Alternative developed and shown at second Alternatives Public Workshop
2	Begin depressed section west of canal	\$47.7	Incorporated in Partial Depressed – Depressed EB & WB Managed Lanes Alternative
3	Use cantilever roadway over depressed section	(\$0.5)	Full Depressed Alternative utilizes this configuration at Powerline Road for EB right-turn lane. The WB exit ramp also utilizes a cantilever section.
4	Construct semi-depressed section	\$47.4	Due to the need to braid a WB exit ramp over or under managed lanes, a semi-depressed section is not feasible considering the need to tie into existing sideroads and avoid substantial sideroad grade changes and reconstruction.
5	Temporary U-turns on Powerline Road	\$11.6	Restricting left-turns and utilizing downstream U-turns (as a Michigan left-turn) would be difficult to implement due to the amount of truck traffic and the size of the bulb-outs needed to accommodate a truck U-turn.
6	Early utility relocation package	\$0.0	Coordination with FPL has already begun. FDOT will continue to advance utility relocation prior to letting.
7	Construct a stormwater treatment facility (CDS units)	\$0.0	Currently, Continuous Deflective Separation System (CDS) units are not under consideration for permanent drainage but may be useful for temporary dewatering. This option may be considered in the next phase.
8	Eliminate covered sections of depressed section	\$4.1	This option applies to the Full Depressed and Partial Depressed Alternatives. Depending on the alternative selected and the configuration of any depressed element, this recommendation may be implemented.
9	Implement an extraordinary public awareness campaign	(\$1.0)	FDOT is in the process of expanding its public awareness campaign and will continue to utilize innovative techniques throughout PD&E, design, and construction phases.
10	Implement livable community opportunities	(\$1.5)	Local SW 10 th Street is being considered as a “complete street” with a lower operating speed (35 mph) and wide (8-foot) sidewalks with noise walls and landscaping.
11	Develop one-lane roundabout	\$0.0	The peak hour volumes on this project are too high to consider a roundabouts at any intersection on this project. Moreover, a roundabout would require more right-of-way. The I-95 PD&E study is recommending a roundabout at Newport Center Drive.
12	Accommodate transit	(\$19.0)	Bus rapid transit will have the ability to utilize the managed lanes as well as local SW 10 th Street. The existing bus turnout in the SW quadrant of Powerline Road will be replaced.
13	Implement truck staging strategies	\$0.0	Truck staging areas will likely be necessary and will be considered in the final design phase.

VE #	Description	Savings \$ Million (Cost Increase)	Disposition
14	TSM&O strategies during construction	(\$0.2)	TSM&O strategies were considered in a separate document prepared in late 2017. These strategies, by themselves, do not meet the purpose and need for the project. However, some TSM&O recommendations will be incorporated into the Preferred Alternative.
15	Maximize use of MSE walls	\$0.0	MSE walls are used anytime an extensive fill slope is needed.
16	Realign direct connect structures	\$7.5	The flyover ramps at I-95 have undergone several redesigns in the PD&E phase to optimize the structural configuration.
17	Seek right-of-way donations from local municipalities	\$1.6	FDOT will work with the City of Deerfield Beach regarding impacts to the City parcel.
18	Create a rail spur for hauling and delivery	\$4.6	Due to the extremely limited remaining right-of-way, constructing a railroad spur is considered not feasible.
19	Transfer utility relocations to contractor	\$0.0	Water and sewer could be considered for relocation by the design-build teams. Several utilities, such as fiber optic and transmission lines, would be beyond the abilities of a design-build team.
20	Use accelerated bridge construction	\$0.5	Accelerated bridge construction, along with numerous other construction incentives, will be examined in the final design phase.
21	Use alternative tie back methods	\$4.5	Alternative tie-back methods are being examined and will depend on the alternative carried forward.
22	Use CM/GC delivery method	\$4.0	FDOT is evaluating alternative contracting options and plans to hire a Corridor Design Consultant to assist in determining the optimal method to work as the construction manager or general contractor.
23	Use displaced left turns (EB and WB) at Military	(\$1.4)	Displaced left turns would require additional right-of-way at the Powerline Road intersection and are currently not being considered.
24	Build a second access to Waterways community	(\$2.7)	A second access to the Waterways community would require displacing existing homes or the clubhouse and is currently not under consideration.
25	Modify work restrictions and sound wall construction	\$0.0	Depending on the final results of the noise study and recommended barrier placement, FDOT will consider installing ground-mounted noise walls as the first item of work.
26	Use compensatory stormwater treatment strategy	\$0.0	Due to the volume of storm water requiring treatment, compensatory treatment is not considered desirable.
27	Use Turnpike right-of-way for ponds	\$0.0	Potential pond sites under consideration are all located within Century Village. Florida's Turnpike right-of-way is located west of the project limits.
28	Implement TSM&O strategies	(\$1.8)	TSM&O strategies are being evaluated and will be implemented where possible.

VE #	Description	Savings \$ Million (Cost Increase)	Disposition
29	Industry Outreach	\$0.0	FDOT has employed an aggressive outreach program and will consider holding an industry forum prior to the project advertisement.
30	Construction staging strategies	\$0.0	The design-build teams will be expected to develop innovating construction staging techniques.
31	Use soil mixing, ground anchors, and cellular construction	\$77.5	The design-build teams will also need to consider optimal methods of constructing a depressed section should any one of these options be carried forward.
32	Eliminate intermediate access to managed lanes	\$15.3	The Non-Depressed / No Managed Lanes Access Alternative eliminates ingress / egress to and from the managed lanes along SW 10 th Street.

4.8 Selection of the Preferred Alternative

Each of the alternatives have distinct advantages and disadvantages. Below is a summary of the major differences between the three main build alternatives and the No Action Alternative.

4.8.1 No Action Alternative

Primary Advantages

- No new expenditure for roadway design, utility relocations, right-of-way acquisition, or construction costs;
- No disruption or temporary impacts (air, noise, vibration, travel patterns) due to construction activities;
- No right-of-way acquisition or business relocations; and
- No impacts to the natural environment.

Primary Disadvantages

- Does not meet the projects purpose and need;
- Increased vehicular congestion and delay, which leads to increased travel costs;
- Increased safety concerns;
- Increased emergency response and evacuation time; and
- Decreased air quality.

4.8.2 Full Depressed Alternative

Primary Advantages

- Includes the longest section of depressed roadway and is most consistent with the COAT recommendations; and
- Includes entrance and exit ramps to and from the local SW 10th Street and managed lanes.

Primary Disadvantages

- Most disruptive to the surrounding community;
- May require right-of-way from Waterford Courtyards and Century Village;
- Impacts Quiet Waters Park; and
- Is the most difficult and expensive to construct.

4.8.3 Partial Depressed Alternative

Primary Advantages

- Includes a depressed section to comply with COAT recommendations; and
- Includes entrance and exit ramps to and from the local SW 10th Street and managed lanes.

Primary Disadvantages

- May require right-of-way from Waterford Courtyards and Century Village; and
- Is moderately expensive to construct.

4.8.4 Non-Depressed / No Managed Lane Access Alternative

Primary Advantages

- Easiest and least expensive to construct;
- No impacts to the City of Deerfield Beach Wellfield and FPL transmission lines; and
- Has the least amount of right-of-way impacts.

Primary Disadvantages

- Does not include entrance and exit ramps to and from the local SW 10th Street and managed lanes;
- Does not include a depressed section and is least consistent with COAT recommendations; and
- Has the most number of commercial relocations.

After considering the various social, cultural, environmental and engineering issues with all of the alternatives, the **Partial Depressed - Depressed Westbound Exit Ramp Alternative** appears to be the most logical choice for the Preferred Alternative for the following reasons:

- Provides ingress / egress to and from SW 10th Street and managed lanes, thereby improving local intersection LOS and providing better use of managed lanes while offering the community direct managed lane access (consistent with COAT recommendations);
- Reduces cost and construction difficulty by placing westbound exit ramp braid beneath the eastbound managed lanes, thereby minimizing elevated structures in the vicinity of residential areas (consistent with COAT recommendations);
- Utilizes left-hand exit ramp configuration, thereby requiring a ramp braid beneath only the eastbound managed lane (as opposed to the east- and westbound managed lanes).
- During extreme rain events, any flooding of the depressed ramp would not affect mainline traffic flow;

However, all alternatives remain under consideration (including the No Action Alternative), and a final decision will be made after the Public Hearing and evaluation of public comments.

5.0 Project Coordination & Public Involvement

This project was developed along with a comprehensive public involvement effort. Public involvement activities were in accordance with the following documents: FDOT PD&E Manual, Part 1, Chapter 11; Section 339.155, Florida Statutes; executive Orders 11990 and 11988; Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act; and Code of Federal Regulations 771.

A summary of the public involvement activities conducted during this project are included in the following sections.

5.1 Agency Coordination

An Elected Officials and Agency Kick-off Meeting was held on November 15, 2017 from 2:30 p.m. to 4:30 p.m. at the DoubleTree Hotel by Hilton in Deerfield Beach, Florida. The meeting was held to inform elected official and agency representatives of the PD&E Study and give them the opportunity to express their views regarding the proposed project. A presentation was given that provided information regarding the process of the study, an overview of the project alternatives, the purpose and need for the project, and the project schedule. Following the presentation, FDOT staff and consultants were available to answer questions. A court reporter was present to take notes of those attending who wished to speak and provide comments. Fifty-seven (57) persons registered as having attended the Elected Officials and Agency Kick-off Meeting, including FDOT staff and engineering consultant representatives. Comments from representatives were in regards to permitting agencies and requests for maps.

Throughout the duration of the project, meetings were held with staff from organizations that had interest in the project. At all these meetings, staff were updated on project developments and were asked to share information that could assist the project team in the development of alternatives. When the Build Alternative was sufficiently developed, additional meetings were held with the Broward MPO to obtain their feedback prior to presenting the concepts to the public. A list of the agency meetings (as of July 1, 2019) is shown below in Table 5.1.1 and Table 5.1.2.

The COAT was a major reason the Broward MPO prioritized this PD&E Study. Three follow up meetings were held with the COAT from April to June of 2019 (as shown in Table 5.1.2) to review the COAT's recommendations for the study and to assess how the PD&E Study was incorporating those recommendations. Appendix H, includes a table of the COAT recommendations along with a disposition of how each recommendation is implemented or considered and a reference for where additional information on that topic can be found.

Table 5.1.1: Elected & Appointed Official Meetings

Municipality / Stakeholder	Meetings & Dates
Broward County	<ul style="list-style-type: none"> • Mayor / Commissioner Beam Furr, District 6 (11/6/17 & 5/9/19) • Vice Mayor / Commissioner Mark Bogen, District 2 (10/2/17, 4/20/18, 5/7/18, 9/26/18 & 6/12/19) • Vice Mayor / Commissioner Dale V.C. Holness, District 9 (4/15/19) • Commissioner Nan Rich, District 1 (10/9/17) • Commissioner Michael Udine, District 3 (10/2/17, 5/7/18, 9/24/18, & 4/3/19) • Commissioner Chip LaMarca, District 4 (10/9/17) – Replaced by Fisher • Commissioner Lamar Fisher, District 4 (12/14/18) • Commissioner Steve Geller, District 5 (10/9/17) • Commissioner Tim Ryan, District 7 (11/13/17) • County Administrator Bertha Henry and Richard Tornese (10/3/18) • Broward County EPMG Drainage Meeting (2/21/18)
City of Deerfield Beach	<ul style="list-style-type: none"> • Mayor / Commissioner Bill Ganz (9/26/17, 1/30/18, 8/24/18, 2/6/19 & 6/12/19) • Vice Mayor / Commissioner Gloria Battle, District 2 (9/26/17, 4/9/18 & 10/1/18) • Commissioner Bernie Parness, District 3 (9/26/17 & 3/6/18) • Commissioner Todd Drosky, District 4 (10/10/17, 1/31/18, 8/24/18, 1/4/19, 2/11/19 & 4/24/19) • City of Deerfield Beach District 4 Community Meeting at Constitution Park with Commissioner Todd Drosky (5/31/18) • Project Update, Future Maintenance and Landscape Preliminary Discussion with Thomas Good (1/22/18 & 1/29/18) • Drainage and Utility Meeting (2/9/18 & 6/21/18) • Coordination Meeting with City of Deerfield Beach Staff (8/1/18) • Florida’s Turnpike Enterprise Meeting with the City (1/11/19) – (SW 10th Street Team attended)

Municipality / Stakeholder	Meetings & Dates
City of Coconut Creek	<ul style="list-style-type: none"> City Manager Mary Blasi (11/8/17) Commissioner Mikkie Belvedere, District B (10/15/18) Vice Mayor / Commissioner Sandra Welch, District C (12/12/18) Commissioner Becky Tooley, District A (12/13/18)
City of Coral Springs	<ul style="list-style-type: none"> Commissioner Larry Vignola, Seat 3 (5/7/18, 3/19/19 & 6/18/19)
City of Hollywood	<ul style="list-style-type: none"> Commissioner Richard Blattner, District 4 (11/2/17 & 4/4/19)
City of Parkland	<ul style="list-style-type: none"> Mayor / Commissioner Christine Hunschofsky (11/13/17 & 10/22/18)
City of Pompano	<ul style="list-style-type: none"> Vice Mayor / Commissioner Barry Moss, District 5 (4/12/19)
City of Sunrise	<ul style="list-style-type: none"> Commissioner Lawrence A. Sofield (3/25/19)
City of Tamarac	<ul style="list-style-type: none"> Vice Mayor/Commissioner Debra Placko (3/20/19)
Lighthouse Point	<ul style="list-style-type: none"> Commissioner Sandy Johnson, Seat #5 (5/21/19)
Pembroke Pines	<ul style="list-style-type: none"> Mayor Frank C. Otis (6/4/19)
Town of Davie	<ul style="list-style-type: none"> Councilman Bryan Caletka (4/5/19)
Wilton Manors	<ul style="list-style-type: none"> Vice Mayor Tom Green (5/22/19)

Table 5.1.2: Broward MPO & COAT Meetings

Stakeholder	Meetings & Dates
Broward Metropolitan Planning Organization (MPO)	<ul style="list-style-type: none"> Broward MPO Logistics for COAT (10/9/17) MPO Meeting with Gregory Stuart (11/14/17 & 3/22/18) Broward MPO Follow-up Meeting (7/16/18) Alt. Workshop Discussion (7/18/18) Broward MPO Presentation Review Meeting (10/8/18) MPO Planning and Logistics Meeting for COAT (10/9/17) Meeting with MPO Staff to Discuss Alternative Workshop, Workshop Results and Public Involvement (6/29/18, 7/8/18, 8/24/18 & 10/11/18) MPO Follow-up meeting (7/16/18) MPO Presentation Review Meeting 10/8/18 Board Meeting (5/10/18, 10/11/18 & 2/14/19) Executive Committee (12/7/17 & 5/3/18) Citizens' Advisory Committee (CAC) (4/25/18 & 10/24/18) Technical Advisory Committee (TAC) (4/25/18 & 10/24/18) Broward MPO Engagement Forum (1/10/19)

Stakeholder	Meetings & Dates
Community Oversight Advisory Team (COAT)	<ul style="list-style-type: none"> • Pre-Kick-Off meeting (10/11/17) • Pre-Alternatives Public Workshop #1 (3/29/18) • Project Update (11/19/18) • COAT Workshop Meeting (2/28/19) • COAT Recommendation Review Meeting #1 (4/25/19) • COAT Recommendation Review Meeting #2 (5/16/19) • COAT Recommendation Review Meeting #3 (6/6/19)

5.2 Public Involvement

5.2.1 Public Kick-off Meeting

A Public Kick-off Meeting was held on November 15, 2017 from 5:30 p.m. to 7:30 p.m. at the DoubleTree Hotel by Hilton in Deerfield Beach, Florida. The meeting was held to inform elected officials, agency representatives, and the public of the PD&E Study and give them the opportunity to express their views regarding the proposed project. A presentation was given that provided information regarding the process of the study, an overview of the project alternatives, the purpose and need for the project, and the project schedule. Following the presentation, FDOT staff and consultants were available to answer questions. A court reporter was present to take notes of those attending who wished to speak and provide comments. Two hundred and fifty-three (253) persons registered as having attended the Public Kick-off Meeting, including FDOT staff and engineering consultant representatives. Comments and questions from the public were in regards to concerns about decrease in property values, noise, traffic and quality of life. The meeting was noticed through direct mailings to elected and appointed officials, and to property owners and residents adjacent to project and through advertisements in the Sun Sentinel (October 26, 2017), El Sentinel (October 26, 2017), The Observer (October 26, 2017), The Pelican (October 27, 2017) and the Florida Administrative Register (November 7, 2017). A copy of the meeting presentation and display boards were uploaded to the project website (www.sw10street.com) following the meeting.

5.2.2 Alternatives Public Workshop #1

The first Alternatives Public Workshop was held on April 24, 2018 from 2:30 p.m. to 7:30 p.m. at the DoubleTree Hotel by Hilton in Deerfield Beach, Florida. This workshop began as

an open house, followed by a formal presentation with two question and answer (Q&A) sessions. The presentation provided the need for the project, information on the progress of the study, an overview of the project alternatives (North or Center Alignment or No Build Alternative) and the project schedule. The Q&A sessions gave attendees an opportunity to ask questions or voice their concerns. Throughout the workshop, FDOT staff and consultants were available to answer questions. A court reporter was present to take notes of those attending who wished to speak and to record the Q&A sessions. Two hundred and sixty (260) persons attended the first Alternatives Public Workshop. This included 40 FDOT staff and consultant representatives and 220 interested persons. The comments included concerns about the noise, traffic and decrease in property values. A project survey was handed out to the attendees. The meeting was noticed through direct mailings to elected and appointed officials, and to property owners and residents adjacent to project and through advertisements in the *Sun Sentinel* (April 5, 2018), *El Sentinel* (April 5, 2018), *The Observer* (April 5, 2018), *The Pelican* (April 6, 2018) and the *Florida Administrative Register* (April 16, 2018). A copy of the meeting presentation and display boards were uploaded to the project website (www.sw10street.com) following the meeting.

5.2.3 Alternatives Public Workshop #2

The second Alternatives Public Workshop was held on November 29, 2018 from 2:30 p.m. to 7:30 p.m. at the DoubleTree Hotel by Hilton in Deerfield Beach, Florida. This workshop was held as an open house format, and FDOT staff and consultants were available to answer questions and provide assistance throughout the workshop. There was also a presentation running every half hour. The presentation provided the need for the project, information on the progress of the study, an overview of the project alternatives (Non-Depressed, Partially Depressed, Fully Depressed and No Build) and the project schedule. A court reporter was present to take notes of those attending who wished to speak and provide comments. Two hundred and eighty-five (285) persons participated at the second Alternatives Public Workshop. This total included 53 FDOT and Florida's Turnpike Enterprise staff and consultants. Also in attendance 232 interested persons. Many attendees were in favor of the Non-Depressed Alternative, others pro No Build and others pro Partially Depressed. There were various questions about tolling and the desire for trucks to use the managed lanes. Businesses owners wanted to know detailed information on access to their property. There were questions regarding the Sawgrass Expressway project timing and alternatives and

concerns about pollution, noise and property values. The meeting was noticed through direct mailings and emails to elected and appointed officials, and to property owners and residents adjacent to project and through advertisements in the Sun Sentinel (November 8, 2018), El Sentinel (November 8, 2018), The Observer (November 8, 2018), The Pelican (November 9, 2018) and the Florida Administrative Register (November 21, 2018). Also, a truck with LED sign capabilities drove around the project corridor prior to the workshop to further advertise the meeting. A copy of the meeting presentation and display boards were uploaded to the project website (www.sw10street.com) following the meeting.

5.2.4 Stakeholder Meetings

Numerous stakeholder meeting have occurred through the life of the project and are listed in Table 5.2.3 (as of July 1, 2019).

Table 5.2.3: Stakeholder Meetings

Stakeholder / Agencies	Date(s)
Banyan Trails Community	10/30/18
Broward County Environmental and Consumer Protection Division (ECPD) Drainage / Contamination Meeting	9/10/18
Broward County Parks and Recreation Section 4(f) Meeting for Quiet Waters Park	8/9/18
Broward County Teleconference Watermain Installation on Powerline Road and SW 10 th Street	3/21/18
Century Village East	2/1/18 & 11/8/18
Century Village East Master Management	10/12/18, 11/8/18, 1/10/19, 2/28/19 & 3/28/19
City of Deerfield Beach Parks and Recreation Section 4(f) Meeting for Crystal Heights Park	7/16/18
Cocobay Community	11/14/18
Coconut Creek Senior Expo	6/1/18
Coral Springs / Coconut Creek Chamber of Council Government Affairs Committee Meeting	2/13/19
Crystal Key Pointe Community	5/16/18
Enclave at Waterways	11/13/18
Express Lane Committee Meeting	6/17/19

Stakeholder / Agencies	Date(s)
FPL / AT&T Preliminary Coordination Meeting	3/28/18
FPL Transmission Discussion Meeting	3/28/2018 & 1/18/2019
FSITE Plangineering Conference	10/30/18
Fort Lauderdale 2019 South Florida Business Conference and Expo	6/20/19
FTAC Presentation at Fort Lauderdale Allegiance	8/15/18
Greater Deerfield Beach Chamber of Commerce	9/11/18
Independence Bay Community	3/19/18 & 9/15/18
South Florida Water Management and US Army Corps of Engineers Inter-Agency Meeting	2/15/18
Meadow Lakes Community	4/9/18
Meeting with Dan Glickman to discuss content for Century Village East Meeting on 2/1/19	1/16/18
Meeting with First Responders	8/24/18
Newport Business Center	1/31/18 & 4/11/19
Parkland Chamber of Commerce	11/14/18
Parkland Farmers' Market	11/4/18
Parkland Isles Community	2/18/19
Project Update Meeting with FTE Team	4/24/19, 5/8/19, 5/22/19, 5/31/19 & 6/5/19
Publix Distribution Center	10/17/17 & 2/23/18
The Lakes at Deerfield Apartments Management	3/23/18
The Lakes at Deerfield Apartments Residents	8/21/18
Waterford Community	7/18/18
Waterways Community	3/22/18 & 10/9/18
Western Businesses	3/6/18
Zonta Club of Greater Deerfield Beach	10/16/18

6.0 Design Features of the Preferred Alternative

6.1 Engineering Details of the Preferred Alternative

As explained in Chapter 4, three alternatives were carried forward to the November 29, 2018 Alternatives Public Workshop:

1. Full Depressed Alternative
2. Partial Depressed Alternative
3. Non-Depressed / No Managed Lane Access Alternative

The Partial Depressed Alternative is comprised of three sub-alternatives:

1. Depressed Westbound Exit Ramp;
2. Depressed Eastbound Managed Lanes; and
3. Depressed Eastbound and Westbound Managed Lanes.

Subsequent to the November 29, 2018 Alternatives Public Workshop, three meetings were held with the COAT on April 25, May 16, and June 6, 2019. In addition, numerous meetings were held with elected officials and stakeholders. Presentations were given to the MPO Executive Board and the TAC / CAC on June 6, and June 26, 2019, respectively. The stakeholder meetings culminated with a presentation to the full MPO at its July 11, 2019 monthly meeting, where the FDOT expressed its intent to carry forward the Depressed Westbound Exit Ramp Alternative to a public hearing.

The “Partial Depressed – Depressed Westbound Exit Ramp Alternative” is described in Section 4.6.2.1. Based on the COAT and stakeholder meetings held between January and June 2019, two substantive design changes were made:

- The braided ramp configuration in the vicinity of the Waterways neighborhood was redesigned such that the overpass was shifted west by elevating the westbound local lanes over the eastbound lanes in lieu of eastbound over westbound as shown at the November 29, 2018 Alternatives Public Workshop.
- To mitigate the elimination of a full median opening on SW 10th Street into Quiet Waters Business Park, a new signalized full median opening has been added to the concept on the north leg of Powerline Road, just south of West Drive.

These revisions are included in a detailed description of the Preferred Alternative contained in the subsequent sections. For convenience, the “Partial Depressed – Depressed Westbound Exit Ramp Alternative” will be referred to as the “Depressed Westbound Exit Ramp Alternative” in the text that follows.

6.1.1 Typical Sections

The SW 10th Street corridor is divided into two envelopes, one for local traffic and the other for a freeway-to-freeway connection (Sawgrass Expressway to I-95):

Local SW 10th Street lanes:

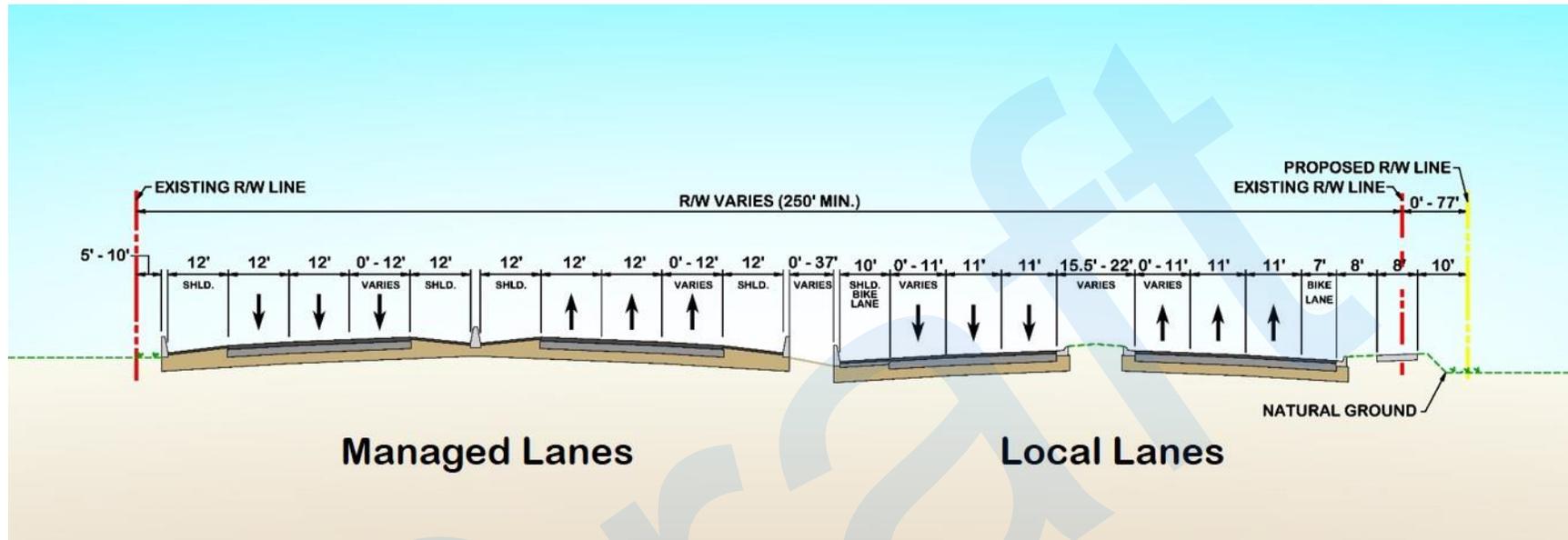
- Four 11-foot wide eastbound and westbound lanes;
- Median that varies from 15.5 to 22 feet wide;
- Variable width separation from the managed lanes;
- Additional parallel-type exit and entrance ramp terminals; and
- 12-foot wide path west of Powerline Road; eight-foot sidewalk east of Powerline Road.

Managed Lanes:

- Two 12-foot wide eastbound and westbound lanes;
- 12-foot inside and outside shoulders;
- Outside and median concrete barrier wall; and
- Eastbound and westbound auxiliary lanes between entrance and exit ramps.

Figure 6.1.1 displays the basic typical section for this corridor. Additional typical sections for ramps, the elevated overpass west of Waterways, the depressed westbound exit ramp, and Powerline Road will be featured in the typical section package and included as Appendix D. This typical section package for the Preferred Alternative will be finalized after the Public Hearing, when it will be approved by the FDOT and ultimately signed and sealed.

Figure 6.1.1: Conceptual Typical Section Package for Preferred Alternative



6.1.2 Bridges and Structures

The Preferred Alternative has five structures on the project:

1. Westbound SW 10th Street over eastbound managed lanes west of Waterways Boulevard;
2. Managed lanes over Powerline Road
3. Managed lanes over Quiet Waters Business Park Access Road Entrance;
4. Eastbound entrance ramp over westbound local lanes just east of Powerline Road;
5. Eastbound managed lanes over depressed westbound exit ramp; and

Additional bridges are required at Military Trail, including the managed lanes over Military Trail and the eastbound exit ramp that braids over local SW 10th Street and terminates at Newport Center Drive. Because these structures are long and continue into the I-95 interchange area, they are addressed in the adjacent I-95 PD&E Study (FM No. 436964-1).

Below is a synopsis of the details of each structure. Most of the text below is contained in Chapter 4 but is restated and summarized here for convenience.

Westbound SW 10th Street over eastbound managed lanes west of Waterways Boulevard

This structure underwent significant changes based on public and COAT comments after the second Alternatives Public Workshop. Concern was expressed that the overpass in the vicinity of Waterways Boulevard would be detrimental to the quality of life in the community as well as reduce property values. Consequently, the overpass was shifted west, mostly out of the Waterways viewshed (as seen in Figures 6.1.3a and 6.1.3b). The westbound local lanes now pass over the westbound and eastbound managed lanes, instead of the eastbound managed lanes passing over the westbound local lanes.

The new proposed ramp structure over the eastbound and westbound managed lanes has a total length of 1,080 feet and is framed with seven spans. The approximate span lengths are 150 feet for Span 1, 145 feet for Spans 2 through 4, and 165 feet for Spans 5 through 7. Each span utilizes Prestressed Florida I-Beam girders. The begin-and-end bridge limits are supported by concrete end bents. The remaining substructure units consist of two inverted tee straddle piers and five inverted tee hammerhead piers. A superstructure depth of 10 feet is used to provide a minimum of 16.5 feet of vertical clearance to the roadway below. Precast,

prestressed concrete piling is utilized at all foundation units. Pier protection barrier is placed to protect the columns of the substructure units. Per FDM Section 121.3.2, this structure is classified as a Category 2 structure due to the presence of straddle piers and possible post-tension components. Figure 6.1.2 displays a plan view of the conceptual bridge, while Figures 6.1.3a and 6.1.3b show renderings from the point of view of the Waterways Boulevard intersection.

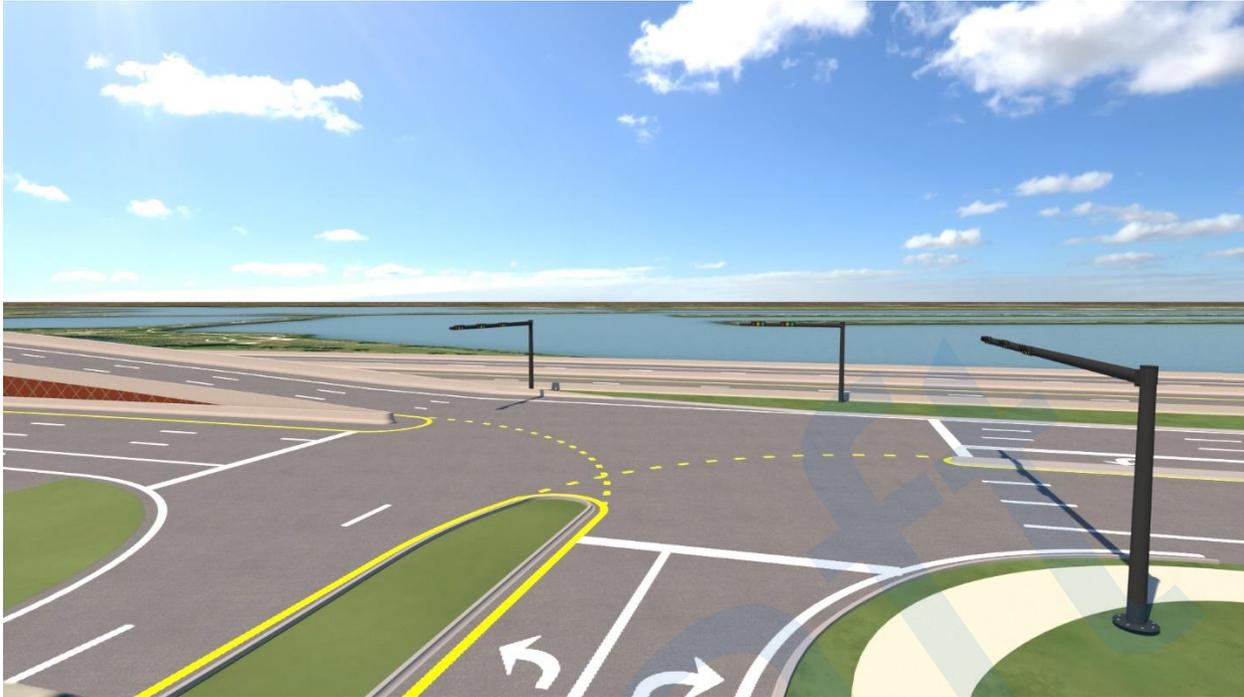
Figure 6.1.2: Westbound SW 10th Street Over Managed Lanes



Figure 6.1.3a: Westbound SW 10th Street Over Managed Lanes at Waterways



Figure 6.1.3b: Westbound SW 10th Street Over Managed Lanes at Waterways



Managed lanes over Powerline Road and Quiet Waters Business Park Access Road Entrance

This structure consists of a two-span 280-foot long bridge that utilizes prestressed concrete girders. The first span is 200 feet long, and the superstructure is framed using FIB 96. The second span is 80 feet long, while the superstructure fascia beams use FIB 96 and the interior beams are comprised of FIB 36. The center pier is a framed two-column concrete pier.

The structure carrying the managed lanes over the entrance to the Quiet Waters Business Park Access Road consists of a single span, 142-foot long bridge using prestressed concrete girders. The superstructure consists of FIB 63; the girders rests on end bents that are wrapped around by mechanically stabilized earth (MSE) walls. These walls are connected to the abutment wall at the Powerline Road overpass. A continuous structure spanning both Powerline Road and the Business Park access road entrance was also examined. However, continuous retaining wall on both sides of the managed lanes was deemed to be more cost-efficient.

Figures 6.1.4 to 6.1.6 display a plan view of the proposed bridges, a rendering, and a sectional views of the conceptual substructure at the Powerline Road overpass.

Figure 6.1.4: Managed Lanes Over Powerline Road and Quiet Waters Business Park Access Road Entrance

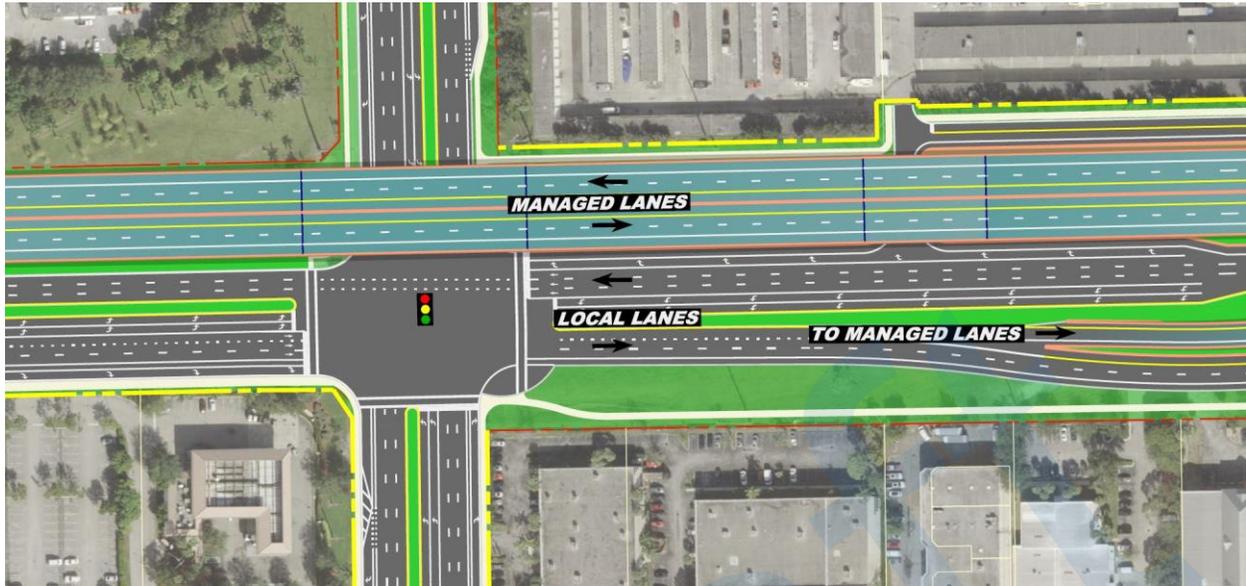
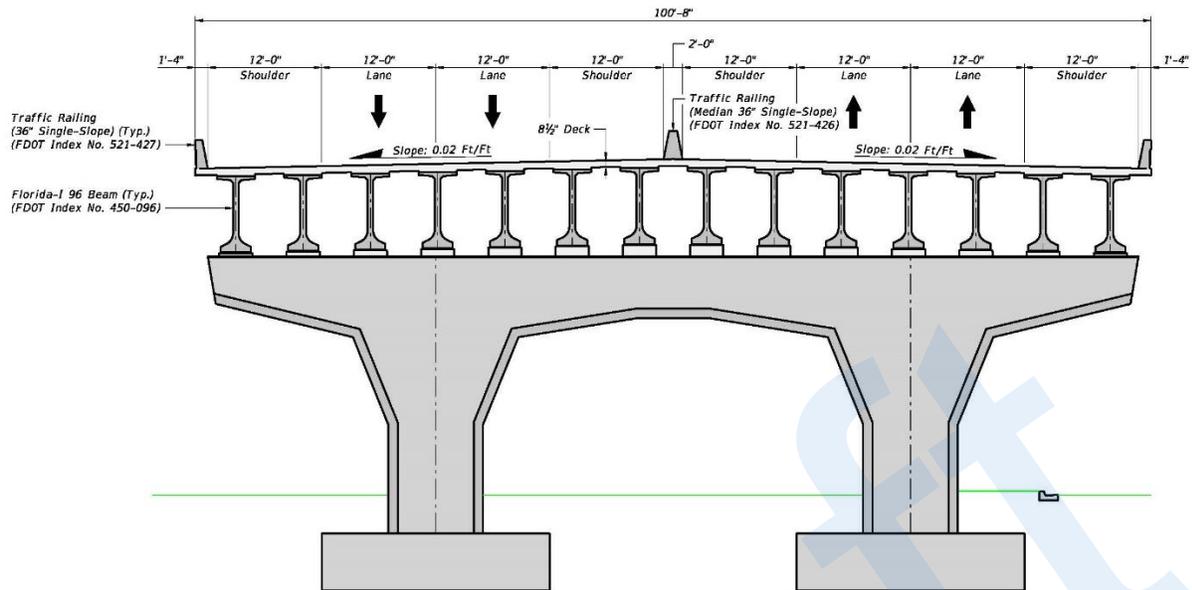


Figure 6.1.5: Conceptual Rendering of Powerline Road and Quiet Waters Business Park Access Road Overpasses



Figure 6.1.6: Conceptual Bridge Pier at Powerline Road Overpass



Eastbound entrance ramp over westbound local lanes just east of Powerline Road

This structure consists of a four-span horizontally curved 510-foot long structure. The first and fourth spans are 105 feet long, whereas the second and third spans are 150 feet in length. The bridge superstructure is comprised of continuous steel plate girder system with 66-inch deep steel webs. The substructure is comprised of conventional single-column hammerhead concrete piers; however, the center pier is a straddle-pier with a post-tensioned straddle-cap of approximately 64 feet in length. Because of the need to maintain a low profile, the center pier-cap is made integral with the steel superstructure. Figure 6.1.7 displays a plan view of the proposed structure, while Figure 6.1.8 displays a rendering, and Figures 6.1.9 and 6.1.10 display sectional views of the conceptual piers.

Figure 6.1.7: Eastbound Entrance Ramp Over Westbound Local SW 10th Street

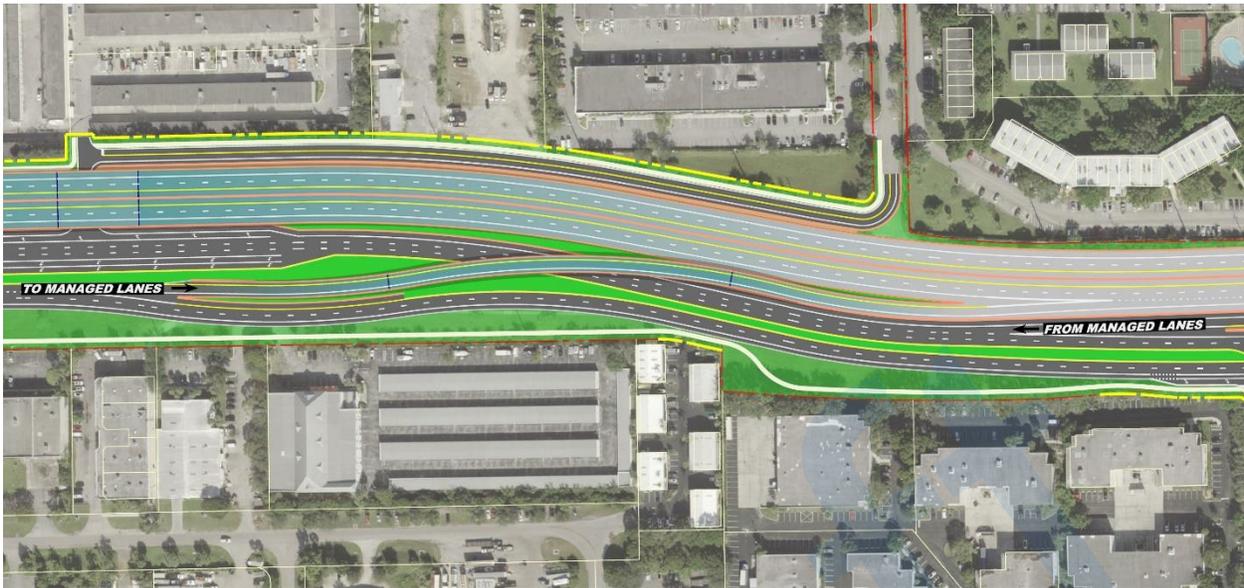


Figure 6.1.8: Conceptual Rendering of Eastbound Entrance Ramp



Figure 6.1.9: Conceptual Pier for Eastbound Entrance Ramp (Hammerhead)

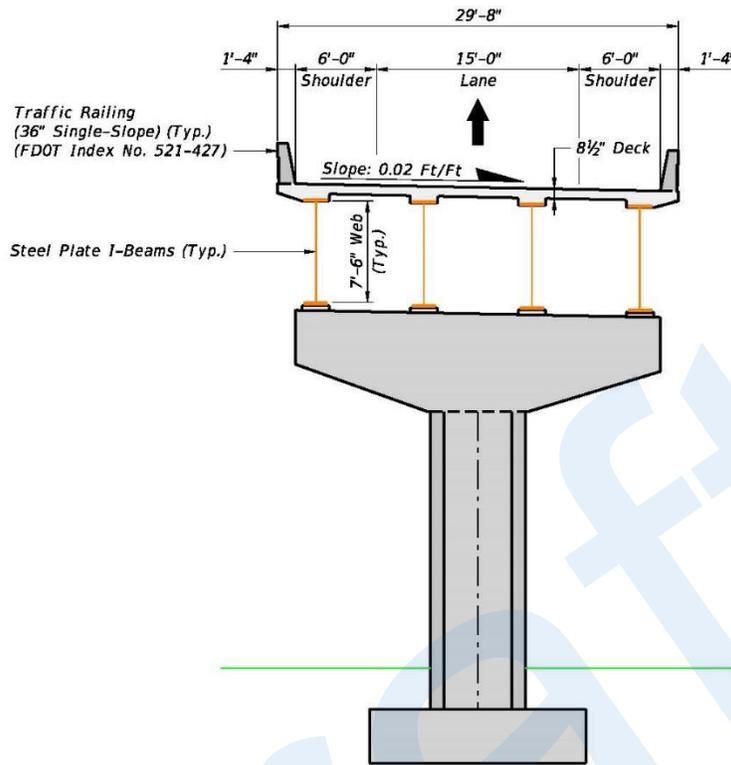
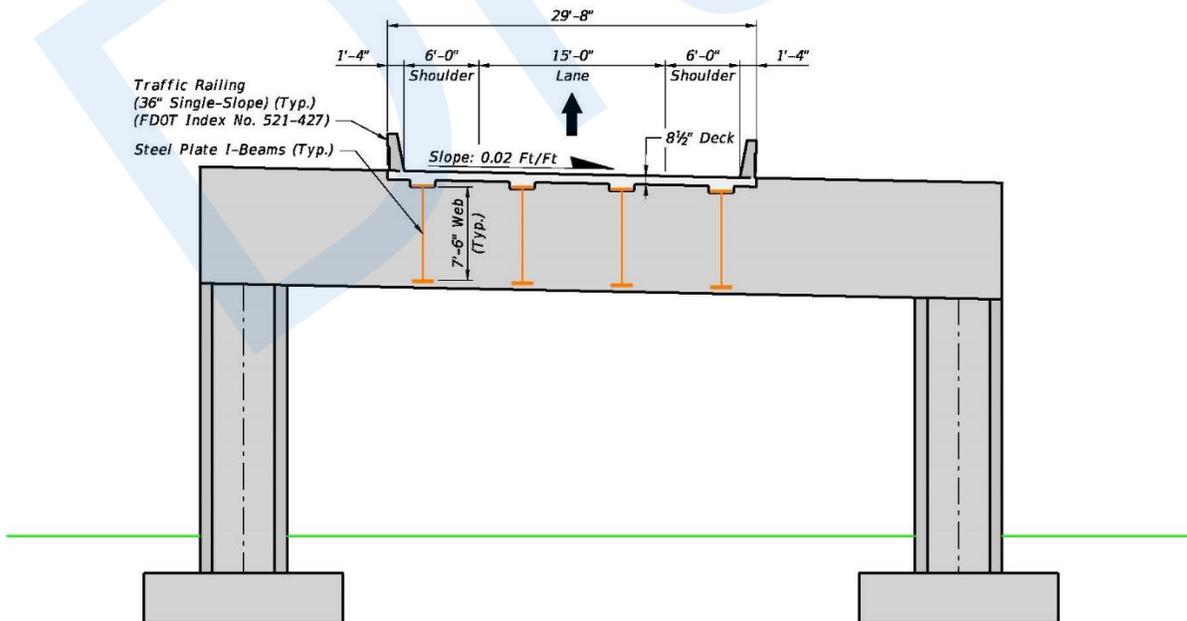


Figure 6.1.10: Conceptual Pier for Eastbound Entrance Ramp (Straddle Bent)



Eastbound managed lanes over depressed westbound exit ramp & retaining wall system

The final structure of the SW 10th Street PD&E study is also its most distinguishing feature: a depressed westbound exit ramp conveying traffic below at-grade eastbound managed lanes to the local SW 10th Street westbound lanes. To reduce the length of the depressed section, the westbound exit ramp conveys traffic from the westbound managed lanes exits from the left instead of the right side of the roadway, thereby halving the distance that the depressed exit ramp needs to braid under. The length of the depressed exit ramp is approximately 1,900 feet, from just east of SW 30th Avenue to just west of the C-2 Canal. In this scenario, the depressed section has a maximum cut depth at the lowest point of the profile of approximately 32 feet and a temporary SOE width of 43.3 feet. The SOE cut depth is measured from the bottom of tremie seal to existing or proposed ground.

Atop this depressed westbound exit ramp are eastbound managed lanes, which are located at an elevation near the existing grade but are supported by a 417-foot long structure consisting of 12x48 FSBs spanning 29.4 feet between depressed section walls.

The ground anchors are arranged in a square grid at an approximate 10-foot spacing. The soil (horizontal) anchors to support the vertical temporary walls require an estimated horizontal projection is of approximately 54 feet on each side of the SOE. The lengths fall well within the right-of-way limits of the project – a distinct advantage over other alternatives. Figures 6.1.11 and 6.1.12 display the plan view and rendering view of this alternative, respectively. Figure 6.1.13 shows conceptual sectional views at the DS including the SOE. Note that temporary soil anchors are needed for the lateral wall and temporary ground anchors to hold down the tremie.

Figure 6.1.11: Depressed Westbound Exit Ramp Beneath Eastbound Managed Lanes

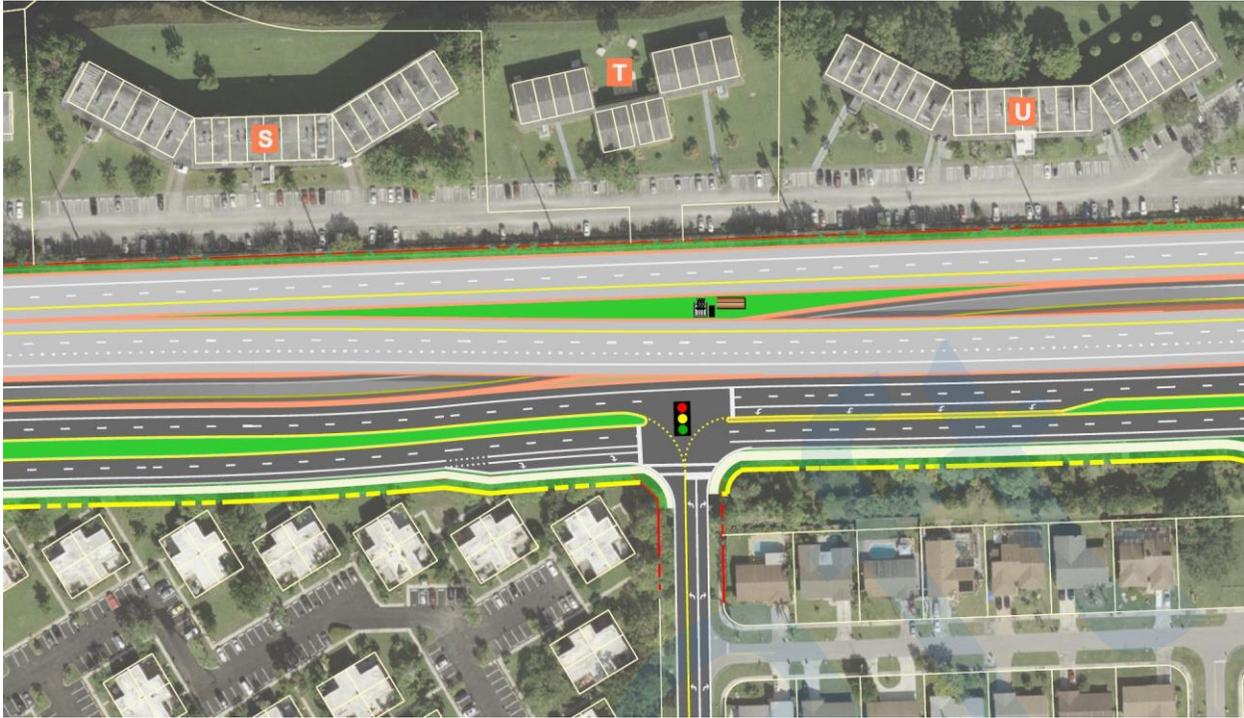
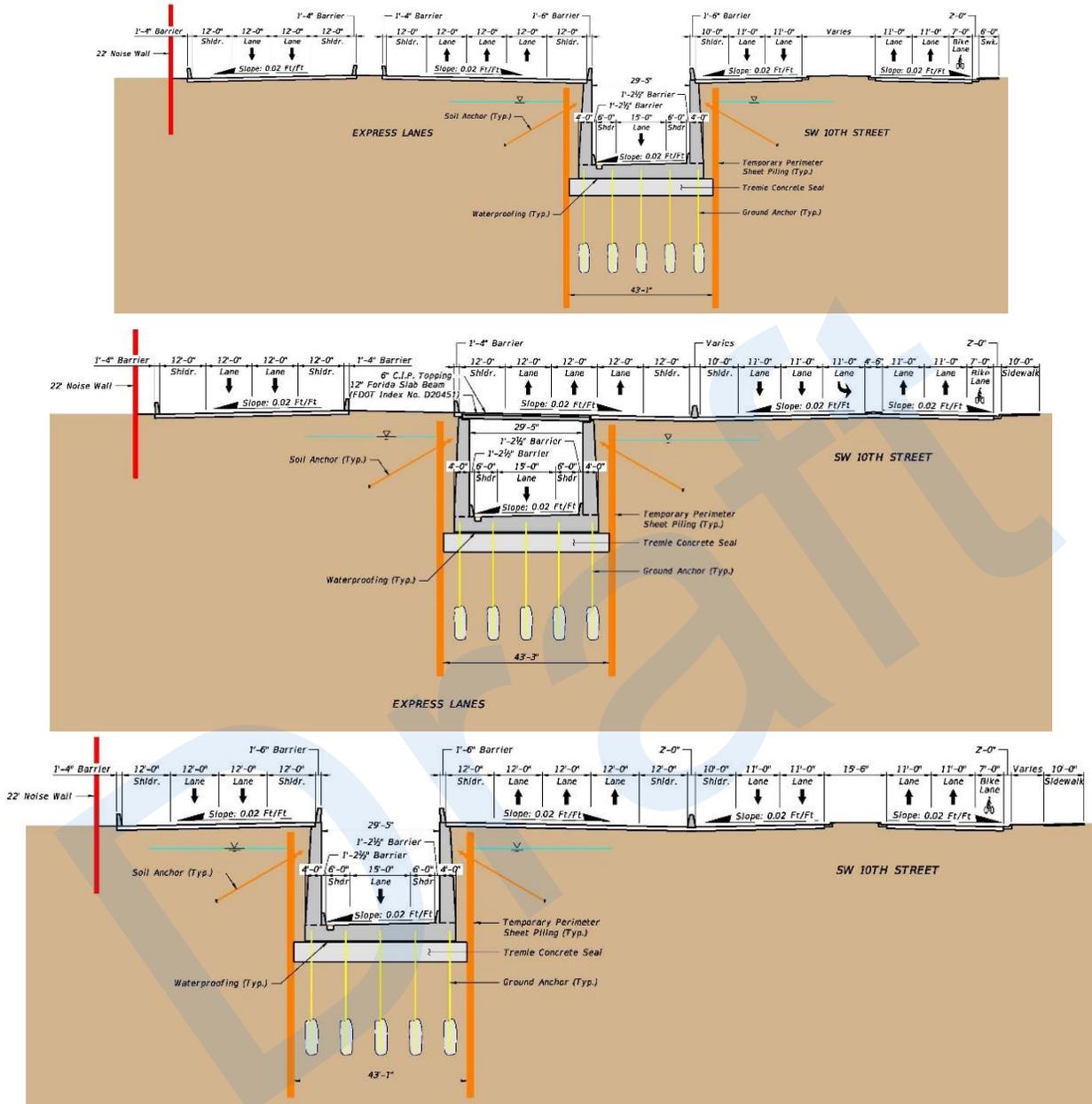


Figure 6.1.12: Conceptual Rendering of Depressed Westbound Exit Ramp



Figure 6.1.13: Sectional Views for Depressed Westbound Exit Ramp



6.1.3 Right-of-Way and Relocations

The Preferred Alternative impacts 24 parcels and will require eight relocations and is estimated to cost approximately \$44.2 million. More information on the right-of-way required for the Preferred Alternative is contained in Table 6.1.1

Table 6.1.1: Right-of-way Summary for Preferred Alternative

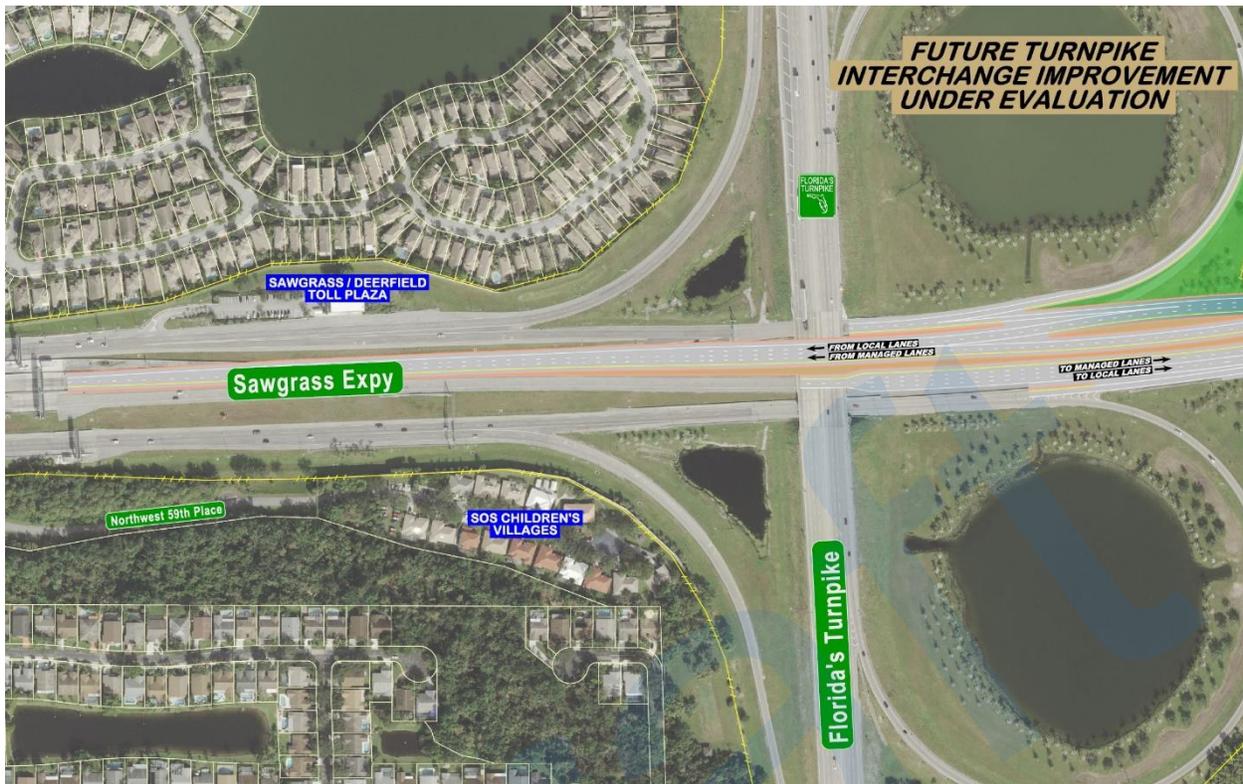
Right-of-way Categories	Impacts
Total Parcels Impacted	24
<i>Commercial</i>	17
<i>Residential</i>	4
<i>Unimproved</i>	3
Total Relocations	8
<i>Residential</i>	0
<i>Commercial</i>	8
Right-of-way Cost (\$ million)	44.2

6.1.4 Horizontal and Vertical Geometry

The Preferred Alternative, which is the Depressed Westbound Exit Ramp Alternative, begins just east of the interchange with Florida’s Turnpike. The westbound direction combines two lanes from the local lanes and two lanes from the managed lanes to form four lanes just west of the Turnpike overpass. These four lanes then transition to two lanes just west of the overpass, where an existing westbound slip ramp will also be removed. In the eastbound direction immediately east of the overpass, the two lanes widen to four lanes by adding both an additional inside and outside lane. These four eastbound lanes then split into two lanes that form the managed lanes and two lanes that form the local lanes.

The improvement proposed in this PD&E study does not require changes to the existing structure carrying the Florida’s Turnpike over the Sawgrass Expressway. Moreover, this western terminus is configured to accommodate a planned future interchange expansion by Florida’s Turnpike Enterprise. Figure 6.1.14 displays the western terminus.

Figure 6.1.14: Western Terminus



Proceeding eastward, the junction between local SW 10th Street and the Sawgrass Expressway is developed. The four eastbound lanes diverge such that the two inside lanes pass beneath an elevated pair of westbound lanes while the outer two lanes join a third lane from the Turnpike ramps to form the local SW 10th Street eastbound lanes. This 1,000-foot long overpass carries three elevated westbound lanes that convey traffic from local SW 10th Street over two newly formed eastbound managed lanes as well as two westbound managed lanes that ultimately become the inside lanes on the Sawgrass Expressway (see Figure 6.1.2). A concurrent PD&E study by FTE is evaluating the designation of these inside lanes as express lanes. The three-lane overpass is designed as a 35 mph ramp with 6% approach and departing grades.

Approaching the intersection with Waterways Boulevard, the fundamental components of the SW 10th Street typical section along the corridor is set: two distinct envelopes featuring managed lanes along the north side of the right-of-way and local SW 10th Street along the south side as described in Section 6.1.1. West of Powerline Road, however, local SW 10th

Street is comprised of three lanes in the eastbound and westbound directions. In the eastbound direction, the inside lane is dropped as a left-hand entrance ramp to the managed lanes, while the depressed westbound exit ramp forms a third outer lane approaching Powerline Road. Both of these third lanes are added and dropped just east of Powerline Road.

Figure 6.1.15: Waterways Boulevard to Quiet Waters Business Park



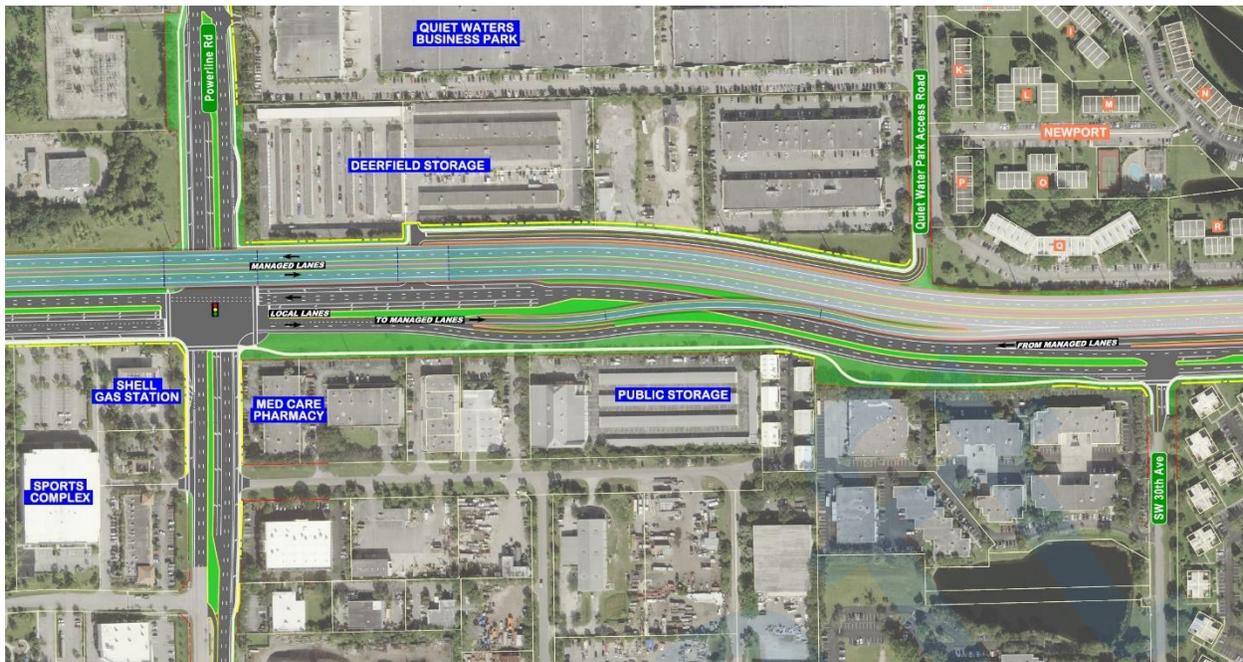
Between the Turnpike and the intersection with Independence Drive, the Preferred Alternative requires no additional right-of-way. The outside of the barrier wall along the northbound managed lanes is located as close as five feet from the existing right-of-way, and no direct impacts to Quiet Waters Park are necessary. This offset widens to approximately nine feet approaching Powerline Road. Between Independence Bay Drive and Powerline Road, an additional strip of proposed right-of-way of up to 15 feet wide is required. This right-of-way acquisition impacts existing green space adjacent to an existing retention pond as well as the entrance to a sports complex. The right-of-way line is also immediately adjacent to the parking lot of the Shell gas station but does not directly impact the parking spaces. The managed lanes are elevated to pass over Powerline Road via grades of 2.65% and 2.60%. The improvements along Powerline Road and the intersection with SW 10th Street are described in detail in Section 6.1.8.

Proceeding east of Powerline Road, the managed lanes continue on a tangent for 816 feet past the eastern abutment before curving to the southeast via a centerline radius of 2,763 feet. This curve is followed by a tangent length of 303 feet and a compound curve to the northwest with radii of 2,823, 2,941, and 4,237. The ratio of the last two radii is 1.4, which is less than the large-to-small maximum ratio of 1.5:1 and therefore does not require a design variation. The local westbound lanes primarily follow this geometry while accommodating a ramp terminal for the incoming depressed westbound exit ramp, which has approach and departing grades of 4.3%.

In the eastbound direction, the local lanes diverge from the westbound lanes via a succession of three normal crown reverse curves with radii of 1,506, 1,506, and 1,300 feet. These curves provide space for the inside through lane to form the eastbound entrance ramp to the Sawgrass Expressway. This 35 mph entrance ramp utilizes a reverse curve with dual opposing radii of 1,528 feet. This curvilinear entrance ramp climbs to a second level via a 6% incline, passes over three local westbound lanes, and declines at a 5.6% grade before forming an auxiliary lane adjacent to the eastbound managed lanes.

Figure 6.1.16 displays an overview of the Preferred Alternative east of Powerline Road.

Figure 6.1.16: Powerline Road to SW 30th Avenue



To create space for the depressed westbound exit ramp, the local lanes diverge from the managed lanes and create an offset of 59 feet between the white stripes of the managed lane and local lane pavement. East of the exit ramp, the local lanes transition to be adjacent to the managed lanes and separated by a 10-foot strip grass and curb and gutter, a center concrete barrier wall, and a 12-foot outside managed lane shoulder. This offset is maintained until near the SW 24th Avenue intersection, where the managed lanes transition northward via normal crown reverse curves of 15,000 and 12,000 as measured from the yellow stripe of the eastbound managed lanes. This reverse curve creates a separation of 39 feet between the white pavement stripes, thereby providing space for dual left-turn lanes at Military Trail as well as space for piers for the elevated eastbound managed lane exit ramp. Figure 6.1.17 shows the curvilinear geometry of the depressed westbound exit ramp.

An important feature of the Preferred Alternative is the third lane added and dropped by the entrance and exit ramp terminals in the eastbound and westbound directions. These auxiliary lanes provide additional traffic relief, particularly for trucks entering and exiting the managed lanes.

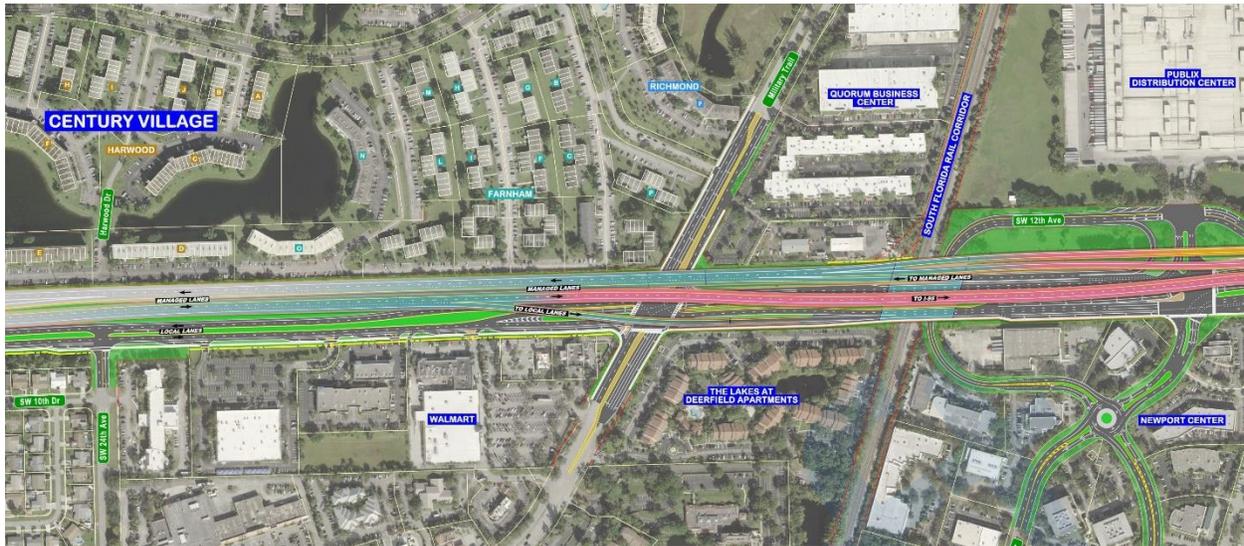
Figure 6.1.17: Depressed Westbound Exit Ramp



The eastbound auxiliary lane conveys traffic to the eastbound exit ramp located immediately west of Powerline Road, where traffic exiting to SW 12th Avenue is diverted from the auxiliary lane via a 3,200-foot radius curve. This exit ramp ultimately passes over the eastbound local lanes and dual eastbound left-turn lanes at Military Trail before transitioning downward on MSE walls to join the eastbound local lanes at a signalized intersection at Newport Center Drive.

Beyond the eastbound entrance ramp, the eastbound local lanes continue parallel to the westbound local lanes. The eastbound lanes are separated from the westbound lanes via a median with widths varying between 15.5 and 22 feet. This reduced median width assists in reducing the amount of right-of-way required along the south side of the roadway. Figure 6.1.18 displays the Preferred Alternative between the depressed westbound exit ramp and Newport Center Drive. Note that for the purposes of this PD&E study, the terminus is assumed to be Military Trail. The I-95 concept, which is also the Preferred Alternative for its PD&E Study, is shown for information and continuity.

Figure 6.1.18: SW 28th Avenue to Newport Center Drive



As mentioned in Chapter 4, a cost-efficient method of providing a depressed section is to keep the local and managed lanes at the existing grade and depress the westbound exit ramp such that it passes beneath the eastbound managed lanes. This configuration also requires placing the local westbound entrance ramp (east of Military Trail) on the left-hand side. While not conventional, a left-hand exit movement reduces the distance of the ramp braid across the managed lanes, since the ramp must braid beneath only the eastbound lanes as opposed to both the eastbound and westbound managed lanes. Figure 6.1.17, shown earlier in this section, displays the depressed westbound exit ramp and includes the left-hand exit movement from the managed lanes coupled with the right-hand entrance on the local westbound lanes.

To provide space for the left-hand exit ramp, the eastbound managed lane departs from the westbound lanes and shifts southward via a normal-crown reverse curve before curving northward again to follow the westbound auxiliary lane. Figure 6.1.19 displays a rendering of this concept.

Figure 6.1.19: Conceptual Rendering - Depressed Westbound Exit Ramp



The design speed of the exit ramp is 35 mph; however, the K values for the crest and sag vertical curves exceed the FDOT minimum values due to the length of curve governing. The westbound exit ramp transitions via a reverse curve with radii of 3,967 and 2,300 feet to be adjacent to the westbound local lanes and forms an outer third lane approaching Powerline Road. In order to eliminate direct impacts to Century Village, the outside of the westbound concrete barrier wall is set 10 feet from the existing right-of-way line. To accommodate the ramp braid by depressing the ramp, the alignment shift of the eastbound managed lanes requires the acquisition of additional right-of-way along the south side of local SW 10th Street. A swath of additional right-of-way up to 15 feet wide is required from Waterford Courtyards, while a swath of approximately 20 feet is required from the City-owned property east of SW 28th Avenue.

A noteworthy point is that the existing pump station for the City of Deerfield Beach wells would be located a couple of feet behind the proposed curb line and may require the use of concrete barrier and curb-to-barrier transitions. The proposed sidewalk along the south side of local SW 10th Street is eight feet from Powerline Road to SW 28th Avenue and from the C-2 Canal to Military Trail and 10 feet between SW 28th Avenue and the C-2 Canal. The distance behind the proposed sidewalk is 10 feet in order to accommodate potential noise walls and relocated utilities. Figure 6.1.20 shows the plan and profile of this alternative.

6.1.5 Bicycle and Pedestrian Accommodations

Existing SW 10th Street currently has sidewalk along the south side of the roadway and along the north side in the vicinity of Quiet Waters Business Park. Bicycle facilities are not designated along SW 10th Street; however, existing five-foot paved shoulders, which serve as undesignated bicycle lanes, are present in both directions from Powerline Road to Military Trail. The Preferred Alternative features the following bicycle-pedestrian improvements:

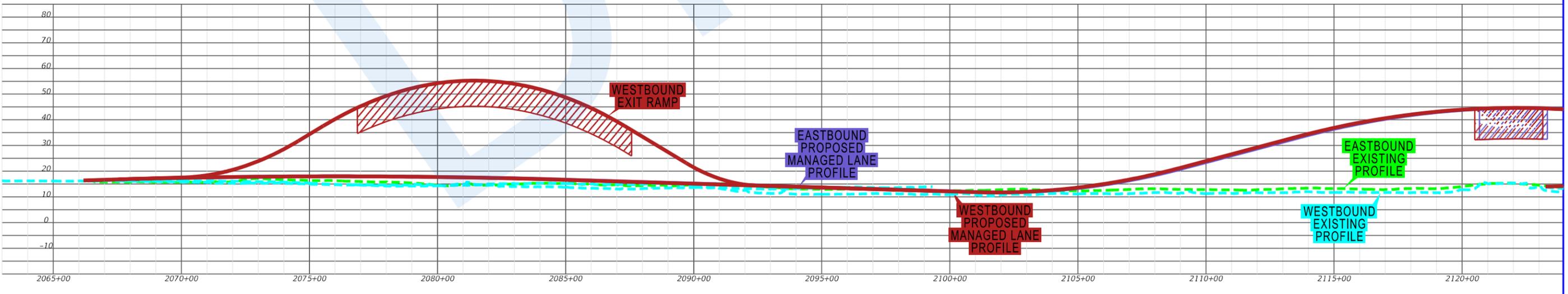
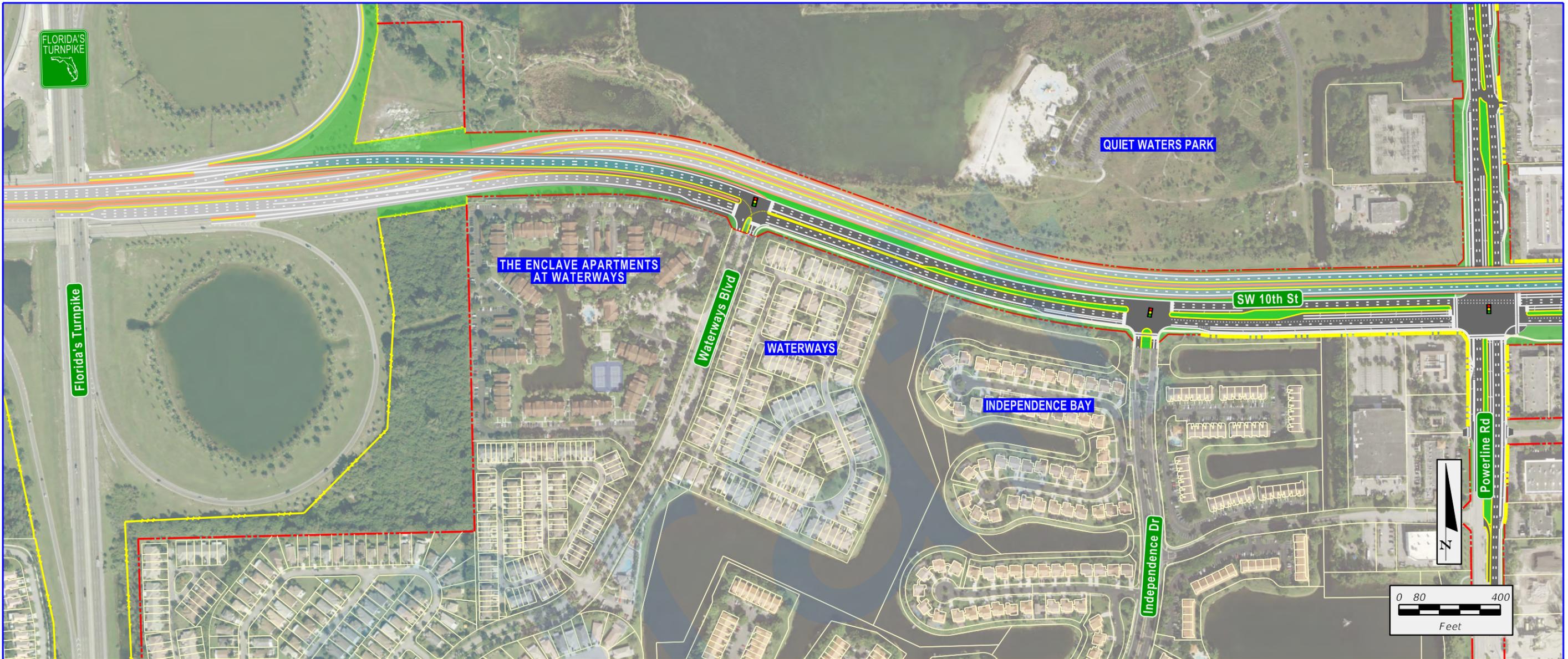
- Ten-foot shared use path along the south side of local SW 10th Street between Waterways Boulevard and Powerline Road;
- Eight-foot wide sidewalk along the south side of local SW 10th Street between Powerline Road and Military Trail, except between SW 28th Avenue and the C-2 Canal where the sidewalk is proposed to be 10 feet;
- Seven-foot buffered bicycle lanes in the eastbound and westbound directions along local SW 10th Street with the exception of the westbound direction west of Powerline Road, where bicyclists will be directed to use the ten-foot shared use path. The expansion of the sidewalk into a ten-foot shared use path west of Powerline Road was deemed to be a safer approach to accommodating bicyclists as opposed to continuing the bicycle lanes westward and terminating them at Waterways Boulevard.
- High-visibility crosswalks at all signalized intersections;
- Other improvements to be finalized in the design phase include improved lighting, modernized pedestrian-actuated signalization, and other context sensitive amenities such as benches. These items and others will be discussed and negotiated with the City of Deerfield Beach in the next phase of this project.

6.1.6 Transit Accommodations

Currently, SW 10th Street is a transit route for Express Bus I Route which is a community bus service described in Section 2.10. The Preferred Alternative will not affect the operations of this bus route. Powerline Road features two existing bus turnouts – one just south of and one just north of the Powerline Road intersection. These turnouts will be replaced in the Preferred Alternative.

A major benefit of the managed lanes and the express lane system proposed on the Sawgrass Expressway and I-95 is that buses may use these lanes for express bus service in the future.

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State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND					
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST		TEMPORARY EASEMENT
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE		PROPOSED SIDEWALK
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 6.1.20
DEPRESSED WESTBOUND
EXIT RAMP ALTERNATIVE
 1 OF 3

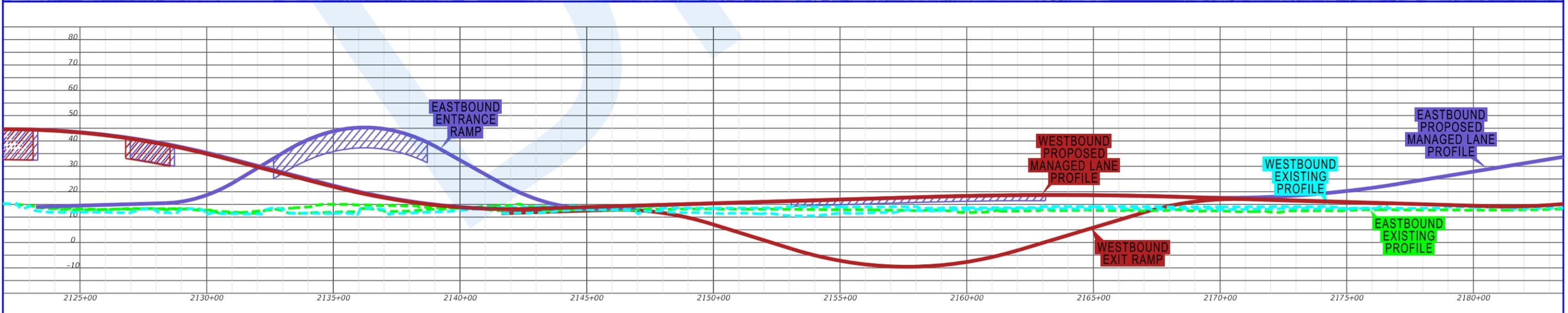
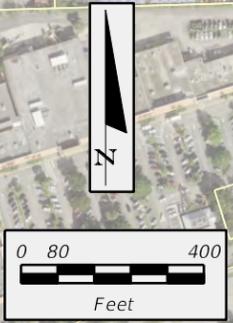
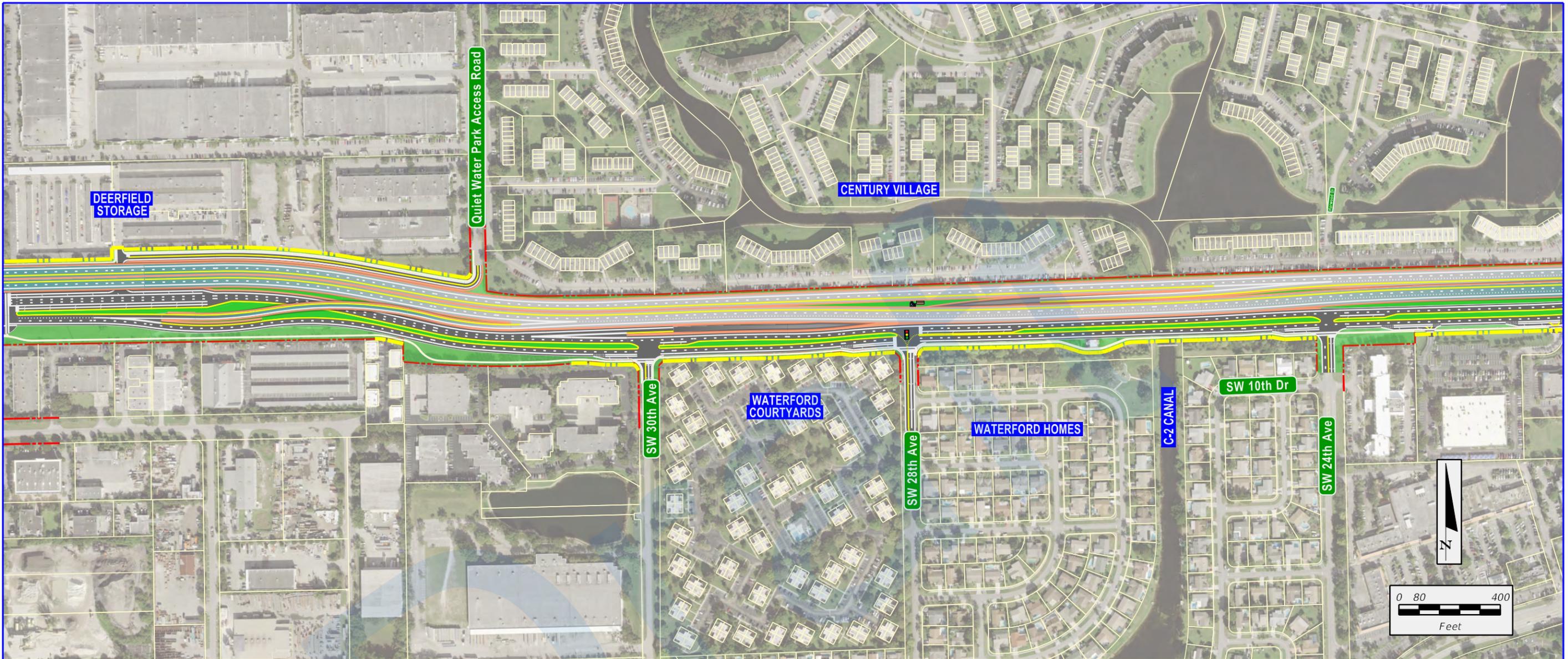
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State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND			
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE
	PROPOSED 4TH LEVEL BRIDGE		TEMPORARY EASEMENT
	PROPOSED SIDEWALK		PROPOSED TRAFFIC SIGNAL

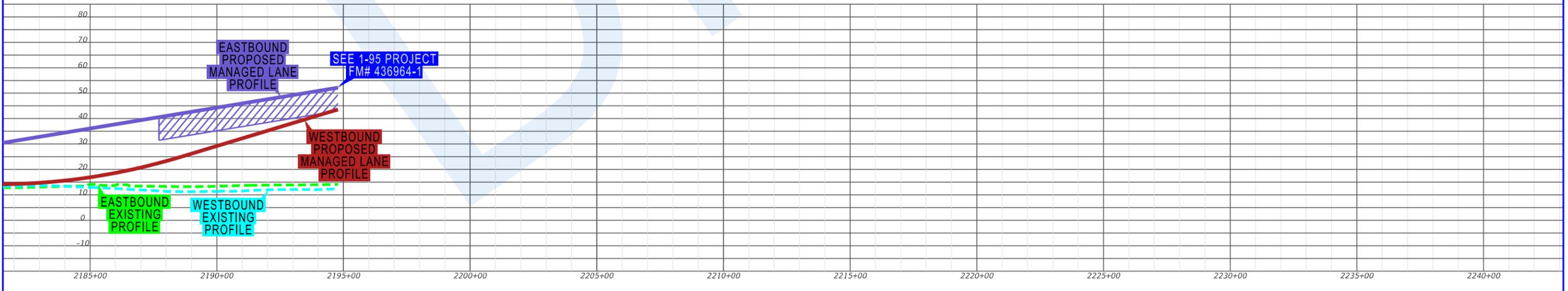
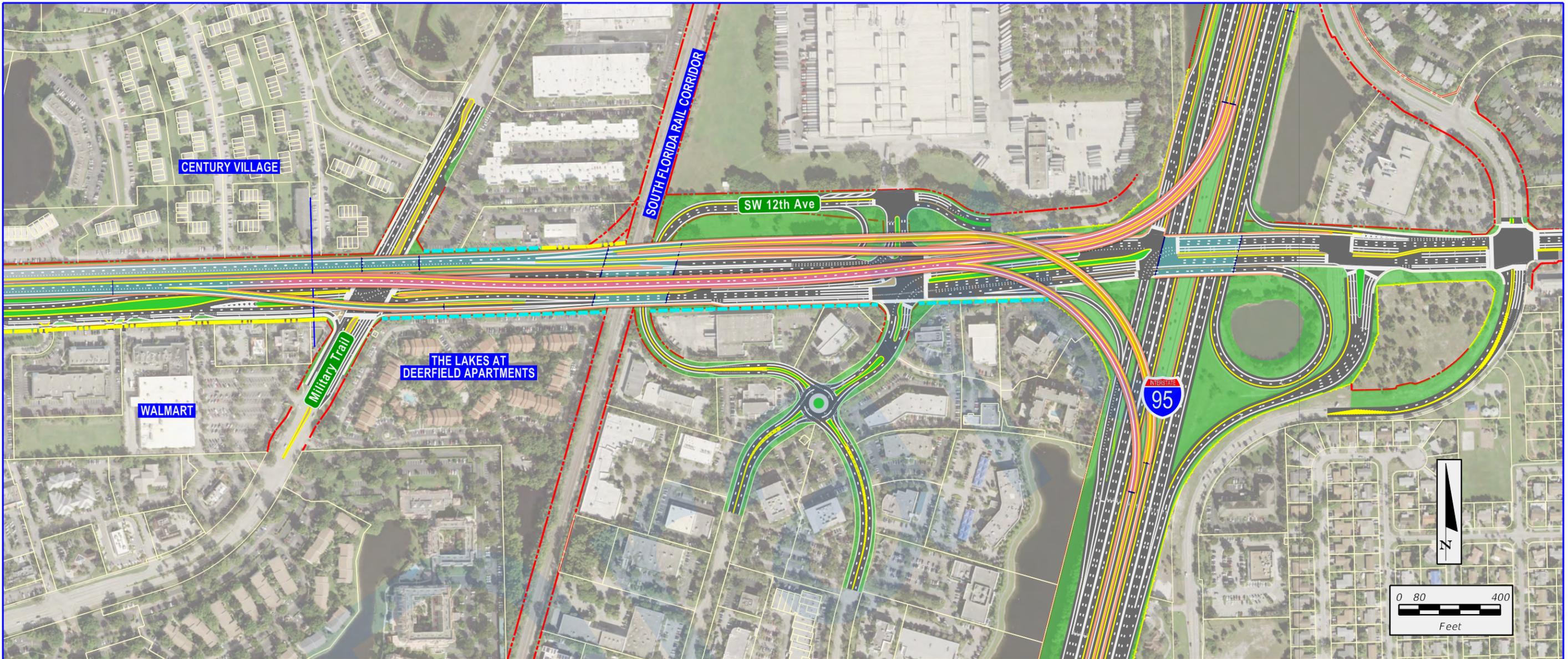
FIGURE 6.1.20
DEPRESSED WESTBOUND
EXIT RAMP ALTERNATIVE
 2 OF 3

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State Road 869 / SW 10th Street Connector PD&E Study
 from Florida's Turnpike / Sawgrass Expressway to I-95
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

LEGEND					
	EXISTING RIGHT-OF-WAY		PROPOSED MANAGED LANES		PROPOSED 4TH LEVEL BRIDGE
	EXISTING PARCEL LINES		PROPOSED LOCAL SW 10TH ST		TEMPORARY EASEMENT
	LIMITED ACCESS RIGHT-OF-WAY		PROPOSED 2ND LEVEL BRIDGE		PROPOSED SIDEWALK
	PROPOSED RIGHT-OF-WAY		PROPOSED 3RD LEVEL BRIDGE		PROPOSED TRAFFIC SIGNAL

FIGURE 6.1.20
DEPRESSED WESTBOUND
EXIT RAMP ALTERNATIVE
 3 OF 3

SHEET NO.
 6-25

6.1.7 Access Management

The proposed access management for the managed lane section will be a continuation of the access management class on the Sawgrass Expressway, Access Management Class 1, Area Type 2. This access management class allows for interchanges every two miles.

The proposed access management for local SW 10th Street is Access Management Class 3 which is the same as the existing access management classification from Powerline Road to Military Trail. Access Management Class 3 allows for directional median openings every 1,320 feet and full median openings / signals every 2,640 feet. The access management classification along Powerline Road will remain the same, Class 5. Class 5 allows for directional median openings every 660 feet and full median openings / signals every 1,320 feet.

Although four of the existing median openings along SW 10th Street are proposed to be closed with the Preferred Alternative, the majority of the median openings still do not meet Class 3 access management criteria. One of the median openings that was closed was the full median opening providing access to Quiet Waters Business Park. To facilitate better access to Quiet Waters Business Park, a new signalized median opening was added on Powerline Road just south of West Drive. To facilitate better access to Quiet Waters Business Park, a new signalized median opening was added on Powerline Road just south of West Drive. The spacing between this proposed signal and the signal at West Drive is only 300 feet but these signals will be operated from the same controller so that green time for the intersections is synchronized. In addition, the spacing between the new signal and the existing direction median opening is also less than 660 feet and does not meet standards. Table 6.1.2 shows the proposed median opening configurations for the Preferred Alternative. Highlighted cells indicate a substandard median opening spacing.

6.1.8 Intersection and Interchange Concepts

The Preferred Alternative includes four signalized intersections along SW 10th Street and one signalized intersection on the north leg of Powerline Road. Below is a description of each signalized intersection.



Table 6.1.2: Summary of Proposed Median Openings – Preferred Alternative

Existing Opening	Mile Post	Middle Station	Existing Median Type	Existing Spacing	Proposed Median Type	Proposed Spacing
SW 10th Street						
Waterways Boulevard	21.242	069+00	Full / Signal		Full / Signal	
				1,600		1,600
Independence Drive	21.549	085+00	Full / Signal		Full / Signal	
				1,300		1,300
Powerline Road	21.835 / 0.000	098+00	Full / Signal		Full / Signal	
				2,000		
Quiet Waters Business Park Entrance Road	0.381	118+00	Full		Closed	2,670
				670		
SW 30 th Avenue	0.502	124+70	Full		Full	
				1,030		1,030
SW 28 th Avenue	0.699	135+00	Full / Signal		Full / Signal	
				1,660		1,660
SW 24 th Avenue	1.014	151+60	Full		Full	
				800		
Frontage Road (Business Park)	1.156	159+60	Directional		Closed	2,190
				510		
Frontage Road (Walmart)	1.253	164+70	Directional		Closed	
				880		
Military Trail	1.427	173+50	Full / Signal		Full / Signal	
				2,080		2,080
East Newport Center Drive	1.823	194+30	Full / Signal		Full / Signal	
				740		-
I-95 SB Entrance Ramp	1.919	201+70	Directional / Signal		Closed	
Powerline Road						
American Way	11.504	-	Directional		Directional	829
				845		
SW 10 th Street	11.664	-	Full / Signal		Full / Signal	
				785		800
Quiet Waters (south access)	11.813	-	Directional		Directional	
				320		460
Quiet Waters (north access)	11.874	-	None		Signal	
				440		300
West Drive	11.957	-	Full / Signal			

SW 10th Street at Waterways Boulevard

This three-leg intersection features three eastbound and three westbound through lanes as well as single right and left turn lanes into Waterways Boulevard, which features two receiving lanes in the southbound direction. The two northbound lanes on Waterways Boulevard transition to single right and left turn lanes. Turn lanes are configured so that they meet the minimum deceleration distance and queue distance, if required. The northbound left-turning vehicles will have direct access to the Sawgrass Expressway and Turnpike via the westbound overpass ramp.

Another noteworthy point is the arrangement of bicycle and pedestrian accommodations. The north side of the intersection lacks a bicycle lane and sidewalk, as pedestrian and bicycle traffic will be directed to the south side of the roadway. Consequently, no crosswalks are necessary. Figure 6.1.21 displays the Waterways Boulevard intersection.

Figure 6.1.21: SW 10th Street at Waterways Boulevard Intersection



SW 10th Street at Independence Drive

The Independence Drive intersection is similar to the Waterways Boulevard in that it features three legs, three through-lanes in the east and west directions, single left and right turn lanes, and bicycle and pedestrian accommodations on the south side only. Independence Drive also has two southbound lanes receiving and two northbound lanes that transition into left and right turn lanes. Figure 6.1.22 provides an overview of this intersection.

Figure 6.1.22: SW 10th Street at Independence Drive Intersection



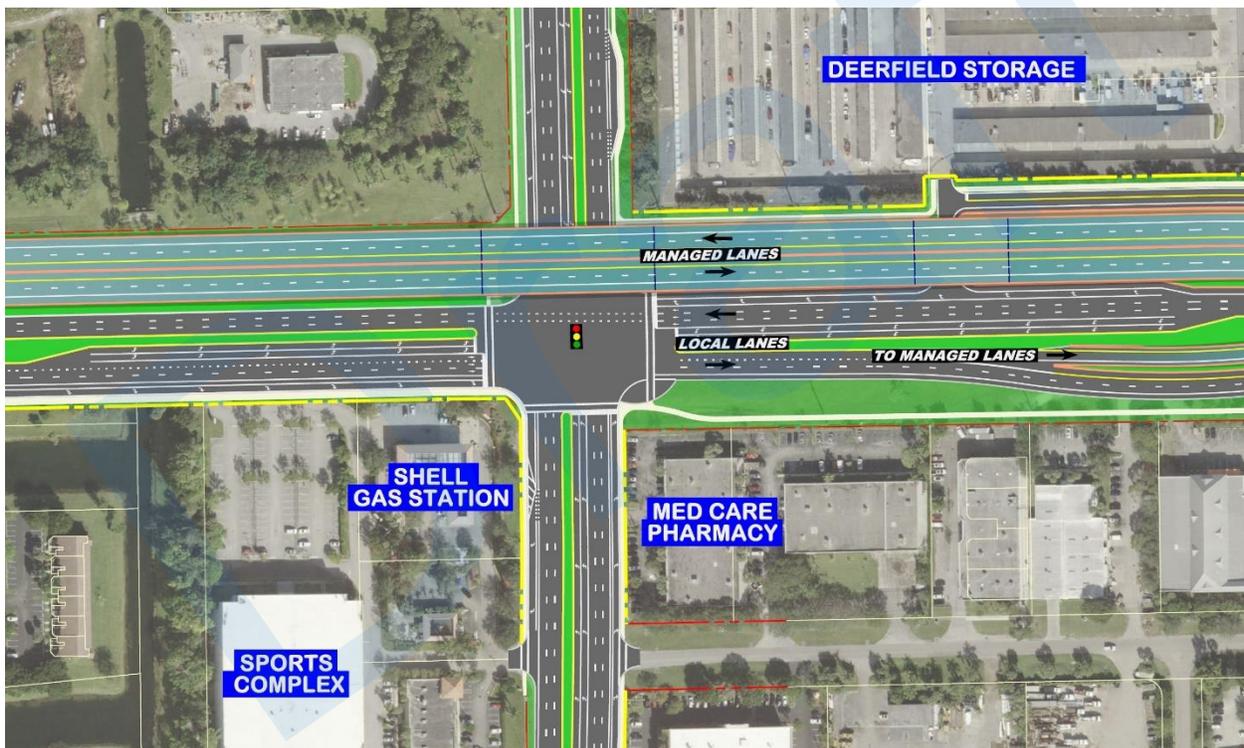
SW 10th Street at Powerline Road

The Powerline Road intersection is a major junction that accommodates the incoming traffic from the Sawgrass Expressway with a major arterial. The intersection features three through lanes on each of the four legs along with dual left and single right turn lanes. East of this intersection, the inside eastbound lane becomes the entrance ramp to the managed lanes. While triple left turn lanes could be warranted at this intersection, dual left turn lanes are proposed. However, the traffic separators on each leg of the intersection are 15.5 feet wide, thereby containing space for a future 11-foot inside left-turn lane and 4.5-foot traffic

separator. An overpass of approximately 265 feet long carries the managed lanes over the intersection.

In a similar fashion to SW 10th Street, Powerline Road features three through lanes in the northbound and southbound directions. Single right turn lanes are proposed on each leg. However, the north leg of Powerline Road is reconfigured such that a second right-turn lane would not require right-of-way from Quiet Waters Park. The Powerline Road geometry is shifted eastward by approximately one lane’s width to provide space for this potential future expansion. Figure 6.1.23 illustrates the Powerline Road intersection.

Figure 6.1.23: SW 10th Street at Powerline Road Intersection

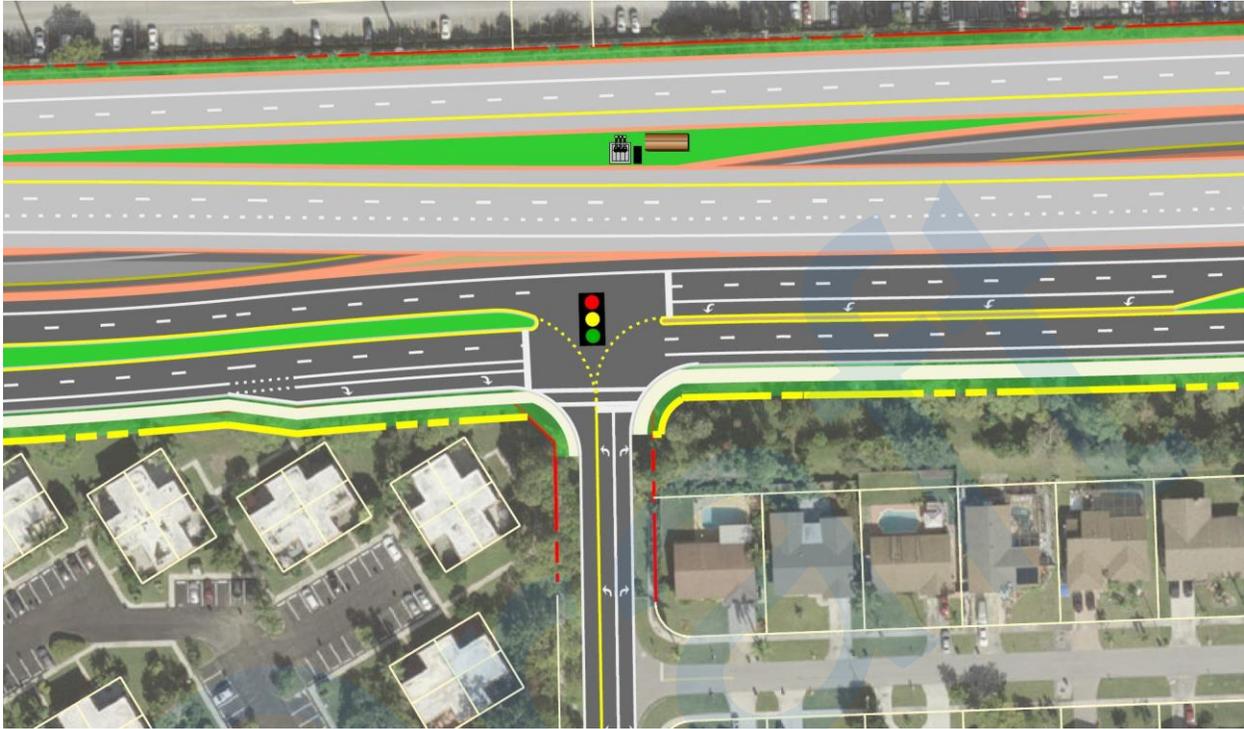


SW 10th Street at SW 28th Avenue

The SW 28th Avenue intersection is another three-leg junction but with two through lanes in each direction and single left and right-turn lanes. The southbound leg has one receiving lane and two northbound through lanes that transition to a left and right turn lane. Bicycle lanes are featured in both the eastbound and westbound directions. However, an eight-foot

sidewalk is proposed along the south side only. Consequently, no crosswalks are proposed. Figure 6.1.24 illustrates the SW 28th Avenue intersection.

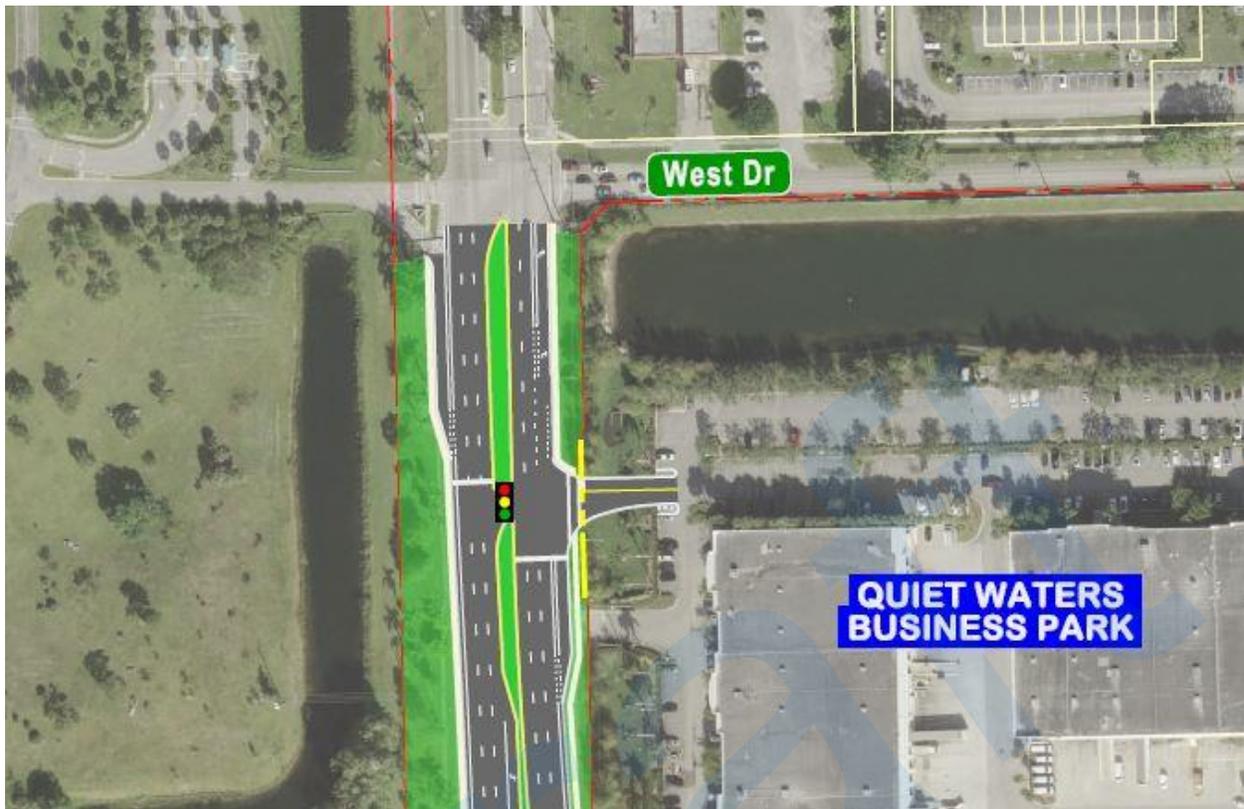
Figure 6.1.24: SW 10th Street at SW 28th Avenue Intersection



Powerline Road at Quiet Waters Business Park

This full, signalized intersection was added after dialogue with Quiet Waters Business Park and being proposed to offset the business impacts of removing the full median opening to the business park from SW 10th Street. The proposed intersection is located approximately 300 feet from the existing signalized intersection of West Drive. The full median opening will allow left turns from the Quiet Waters Business Park parking lot but not from southbound Powerline Road. The traffic signals from both West Drive and this intersection will be operated from the same controller so that green time for the intersections is synchronized. Figure 6.1.25 illustrates this additional median opening on Powerline Road.

Figure 6.1.25: Powerline Road at Quiet Waters Business Park Intersection



6.1.9 Intelligent Transportation System and TSM&O Strategies

Improvements to the SW 10th Street corridor will need to incorporate ITS enhancements. The SW 10th Street corridor is a roadway identified within the FDOT TSM&O Strategic Network that was defined by the District Four TSM&O Master Plan. The enhancements will require the following systems and infrastructure at a minimum, in order to provide a comprehensive TSM&O network:

- Fiber Optic Communications (FOC);
- 100% CCTV camera coverage along the corridor;
- Microwave Vehicle Detection Systems (MVDS);
- Bluetooth Travel Time System; and
- Dynamic Message Signs (DMS).

Existing ITS infrastructure will be documented and preserved during construction to maintain normal operation. A Systems Engineering Management Plan (SEMP) report will be completed during the design stage of the project.

6.1.10 Utilities

The utility relocation costs for the Preferred Alternative is assumed to be approximately 80% of the Full Depressed Alternative for a total of \$26 million. More information on utility impacts are included in the Utility Assessment Report, available under separate cover.

6.1.11 Drainage and Stormwater Management Facilities

Several types of stormwater management facility alternatives are commonly used on roadway projects. The more commonly used alternatives in South Florida, particularly for roadway projects, include wet/dry detention ponds, wet/dry retention ponds, and French drains (exfiltration trenches). For this project, stormwater management facility alternatives have only been evaluated for the C-2 Canal Basin since the required treatment and attenuation for the C-3 Canal Basin can be fully accommodated via modification and expansion of the existing stormwater treatment facilities within the SW 10th Street / Sawgrass Expressway and Florida's Turnpike Interchange.

However, based on the proposed improvements, available right-of-way, and impacts to existing stormwater management facilities, new offsite stormwater management facilities are required to accommodate for additional water quality treatment, discharge attenuation, and floodplain compensation within the C-2 Basin.

The use of exfiltration trenches can be ruled out for this project given the short operation life for exfiltration systems (5-10 years), the well-known maintenance issues, and discouraged use by FDOT when other options are available. Furthermore, the use of dry retention/detention ponds can be ruled out for this project due to the high groundwater table elevation and relatively poor permeability of the existing soils. In light of these constraints, the only acceptable option for the project is the use of wet detention ponds. Conventional stormwater management wet detention ponds and the alternative method of expansion of the existing stormwater management facilities within the Broward County Water Control District (BCWCD) #2 water quality basin to provide for treatment and attenuation were both considered.

The proposed improvements increase the impervious area in the C-3 Canal Basin from 9.95 to 20.02 acres resulting in a net increase of 10.07 acres of impervious area. The proposed

improvements increase the impervious area in the C-2 Canal Basin from 24.90 to 49.57 acres resulting in a net increase of 24.67 acres of impervious area. A pre-development vs. post-development analysis was completed to determine the storage volume required to maintain the allowable discharge while also providing the required water quality storage volume. Table 6.1.3 shows the proposed pond sizes for each basin based on these controlling variables.

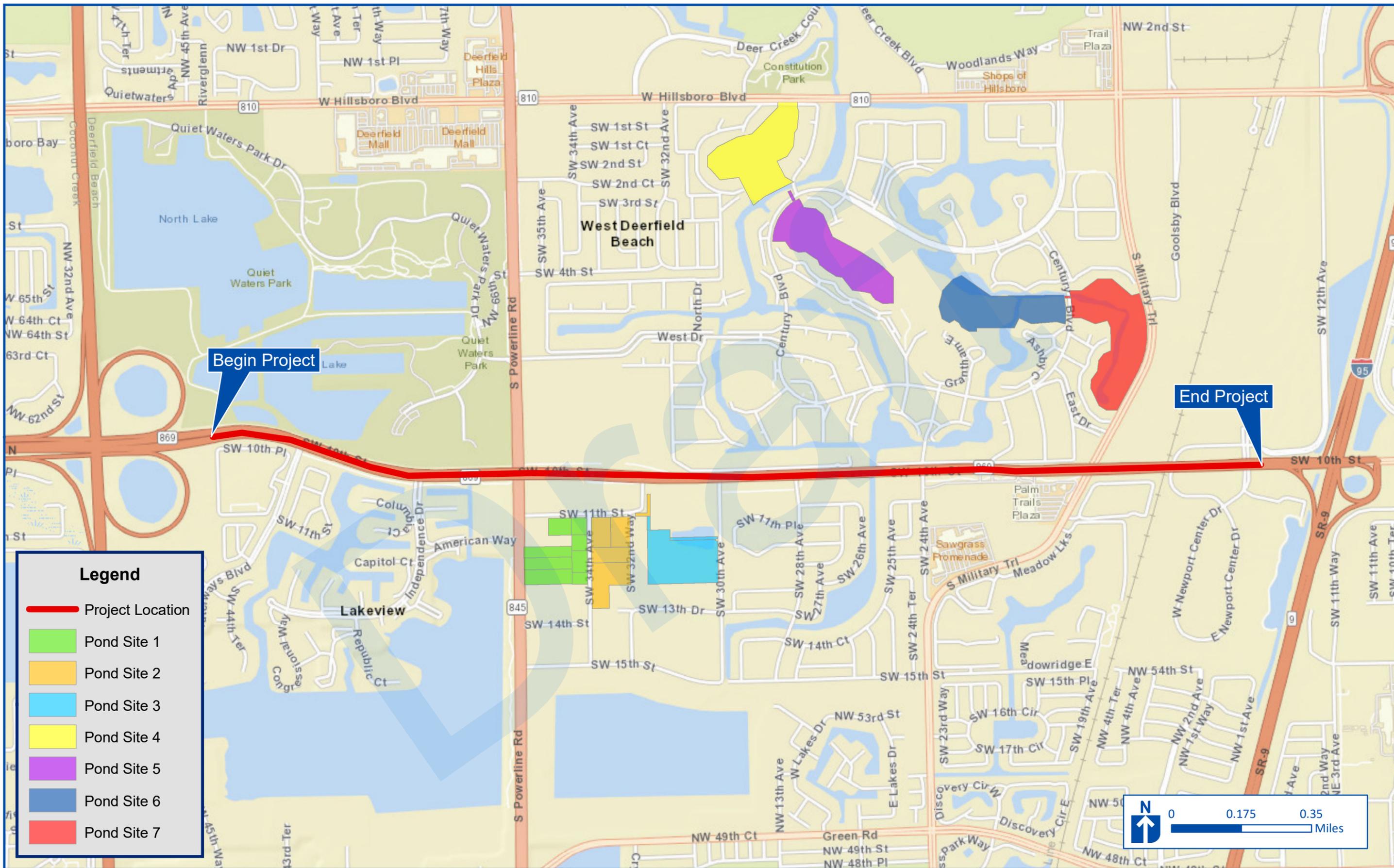
Table 6.1.3: Pond Size Requirements

Basin	Wet Detention Pond Size Required
C-3 Canal	5.14 acres
C-2 Canal	11.18 acres

The preliminary pond siting selection process included seven pond site alternatives meeting the 11.18-acre minimum pond area requirement for the C-2 Canal basin. Figure 6.1.26 identifies the location of the seven potential pond site alternatives.

The first factor when selecting pond site alternatives is any undeveloped property. No undeveloped or even partially developed areas exist within the C-2 Basin and within the SW 10th Street project limits. However, a few undeveloped and partially developed areas exist north of the SW 10th Street project limits and within the C-2 Basin, including parcels as part of an abandoned golf course within the Century Village Community, owned by Fairway Investors, LLC. Such parcels are all adjacent and/or hydraulically connected to the C-2 Canal, and could feasibly be expanded to provide treatment, attenuation, and floodplain compensation for the project since the C-2 Canal is a water quality basin.

The first three pond site alternatives, Alternatives 1 through 3, are each located south of the SW 10th Street project limits, east of Powerline Road, within industrial zoned sites with functioning businesses. While an initial pond siting screening would typically avoid developed properties, these three pond site alternatives avoid impacts to residential communities and displacement/relocation of residents, sparing the residential and commercial parcels south of SW 10th Street. Use of any of these three pond site alternatives allows the FDOT to conventionally collect and convey roadway runoff to the pond sites to be treated and attenuated before discharging through a control structure and outfall pipe to the C-2 Canal.



Legend

- Project Location
- Pond Site 1
- Pond Site 2
- Pond Site 3
- Pond Site 4
- Pond Site 5
- Pond Site 6
- Pond Site 7



Alternative 1 consists of a combination of eight different parcels for the pond construction totaling 12.82 acres, along with three additional parcels requiring easements for outflow. Alternative 2 consists of a combination of four different parcels totaling 12.07 acres, along with three additional parcels requiring easements for outflow. Alternative 3 consists of a combination of two different parcels totaling 13.54 acres, along with two additional parcels requiring easements for inflow.

The next four pond site alternatives, Alternatives 4 through 7, are each located north of the SW 10th Street project limits, within the vacated golf course (owned by Fairway Investors, LLC) inside of the Century Village community. These four pond site alternatives avoid impacts to residential communities and displacement/relocation of residents, sparing the residential and commercial parcels north of SW 10th Street as shown on Figure 6.1.26. Use of any of these four pond site alternatives allows the FDOT to make use of the opportunity to meet all drainage and permit criteria through expansion of the waterbodies within the C-2 Basin. Alternative 4 consists of the most westerly (19.26 acre) parcel contiguous with the C-2 Canal and Hillsboro Boulevard. Alternative 5, located just east of the C-2 Canal and west of the Century Village Clubhouse, consists of a 19.18 acre parcel. Alternative 6, located just east of the Century Village Golf Course, consists of a 17.11 acre parcel. Alternative 7, located just east of Alternative 6 and west of Military Trail, consists of a 22.78 acre parcel.

The selected pond site alternatives were then evaluated with a multi-disciplinary team consisting of representatives from right-of-way, roadway design, drainage design, environmental management, construction, and maintenance, based on several factors, including:

- Right-of-Way – cost, land use, zoning, easement considerations;
- Drainage – hydrology, hydraulics;
- Flood Zone (FEMA);
- Contamination and Hazardous Materials Risk;
- Utilities Involvement;
- Threatened and Endangered Species Involvement;
- Wetlands and Protected Uplands Involvement;
- Cultural Resources Involvement;

- Section 4(f) Involvement;
- Public Wellfield Impacts;
- Constructability – cost, access, methodology;
- Maintenance – cost, access; and
- Community Impact – public opinion, aesthetics.

Each of these factors was assigned a weight based on how important that factor is to the overall pond siting evaluation process for this particular project. That weight was then multiplied by the score given to each pond site alternative for each factor to compute the total score. The higher the weight and the higher the score, the more preferential the pond site. Table 6.1.3 shows the pond evaluation matrix.

Based on the comprehensive pond siting evaluation performed for this project, **Pond Alternative 6** is recommended for accommodation of drainage within the C-2 Basin, unless a shared use agreement can be executed in the future with Century Village to spread and meander the required drainage pond(s) throughout the western three pond site alternatives. Refer to the Conceptual Drainage and Pond Siting Report, available under separate cover, for more information.

Table 6.1.3: Pond Site Alternatives Evaluation Matrix.

Factor	Weight of Factor	Pond Site Alternative													
		Alt 1		Alt 2		Alt 3		Alt 4		Alt 5		Alt 6		Alt 7	
Number of Parcels for Pond	-	8		4		2		1		1		1		1	
Parcels Size (acres)	-	12.82		12.07		13.54		19.26		19.18		17.11		22.78	
Number of Parcels for Easement(s)	-	3		3		2		0		2		0		2	
Parcel Size for Easement(s) (acres)	-	0.42		0.42		0.45		0		0.14		0		0.16	
Total Parcel Cost (\$ million)	-	\$14.5		\$28.8		\$35.7		\$14.0		\$14.1		TBD		\$17.2	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Zoning (Right-of-Way)	7	1	7	2	14	3	21	10	70	9	63	10	70	8	56
Land Use	7	1	7	2	14	3	21	9	63	9	63	10	70	9	63
Right-of-Way	10	1	10	2	20	3	30	9	90	8	80	10	100	7	70
Drainage Considerations	8	4	32	4	32	6	48	9	72	8	64	9	72	8	64
Flood Zone FEMA	6	3	18	9	54	7	42	9	54	9	54	9	54	9	54
Contamination and Hazardous Materials	10	4	40	1	10	4	40	1	10	1	10	1	10	1	10
Utilities	4	2	8	2	8	3	12	9	36	8	32	9	36	7	28
Threatened and Endangered Species	2	2	4	2	4	2	4	1	2	1	2	1	2	1	2
Noise	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wetland and protected Uploads	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cultural Resources Involvement	1	6	6	6	6	10	10	10	10	10	10	10	10	10	10
Section 4(f)	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10
Public Wellfield	6	10	60	10	60	10	60	10	60	10	60	10	60	10	60
Construction	5	6	30	3	15	5	25	8	40	6.5	32.5	6.5	32.5	9	45
Maintenance	5	5	25	7	35	3	15	0	0	0	0	0	0	0	0
Aesthetics	3	5	15	5	15	3	9	0	0	0	0	0	0	0	0
Public Opinion	7	5	35	5	35	5	35	9	63	8	56	10	70	9	63
Other	0	8	0	8	0	8	0	10	0	10	0	10	0	10	0
Score		298		323		373		581		537.5		597.5		536	
Ranking		7		6		5		2		3		1		4	

6.1.11.1 Wells

The City of Deerfield Beach maintains three public water supply wells (WW-22, WW-23, and FA-2) along the southern side of SW 10th Street, as shown in Figure 6.1.27. Wells WW-22 and WW-23 are constructed into the Biscayne Aquifer whereas FA-2 is constructed into the upper Floridan aquifer, additional information about these wells is contained in Table 6.1.4.

Figure 6.1.27: Deerfield Beach Well Locations



Table 6.1.4: Deerfield Beach Well Construction Details

Well No.	Diameter (inches)	Total Depth (feet)	Casing Depth (feet)	Pump Capacity (Gallons / Minute)
WW-22	14	170	105	2,800
WW-23	14	200	105	2,800
FA-2	12	1,030	915	3,000

An analysis of the plans and Deerfield Beach well field data was performed, and no adverse impacts are anticipated to the existing public water supply wells as a result of the Preferred Alternative. Below is a summary of the pertinent information, for a more detailed analysis refer to Appendix I.

- The proposed construction dewatering associated with the depressed element of the Preferred Alternative will occur inside of sheet piled cells. The sheet piling and tremie seal will isolate the individual cells from the surrounding subsurface area and prevent the infiltration of ground water into the excavation. Conversely, the sheet piling and tremie seal will preclude drawdown of the water table outside of the excavation area. Thus, the area inside the cells may be pumped dry to facilitate excavation and construction of the depressed roadway section. The SFWMD considers the use of sheet pile as an effective physical barrier to prevent drawdown of the water table due to short-term construction dewatering activities.
- The total depths of the two Biscayne aquifer wells (WW-22 and WW-23) are 170 and 200 feet below land surface and are cased to approximately 105 feet. The depressed section will be constructed to a depth of approximately 40 feet; thus, the excavation activities will not intersect the water-bearing zone for the two production wells.
- Each depressed cell is estimated to require approximately two months to complete. Thus, the duration of the dewatering will be short-term. The SFWMD does not require corresponding impact analysis for short-term dewatering to include nearby water wells due to the limited duration at which potential impacts could occur.
- The intermediate confining unit between the surficial aquifer and the underlying Floridan aquifer will preclude any hydraulic influence on the FA-2 Floridan aquifer well.
- The primary production zone for the two Biscayne aquifer wells (WW-22 and WW-23) is between approximately 100 to 200 feet, which is 60 to 160 feet below the base of the depressed roadway section. As such, the completed depressed roadway will not physically interfere with the production zone of the well.
- The Biscayne aquifer is highly transmissive in the vicinity of SW 10th Street. Groundwater modeling performed for the City of Deerfield Beach's Water Use Permit demonstrated that the depressed roadway is within the 0.1-foot drawdown contour for WW-22 and WW-23. The limited amount of drawdown predicted to occur in the

surficial aquifer suggest that the depressed roadway will have little to no effect on the two wells.

- The depressed roadway section and wells WW-22 and WW-23 are located within the Northern Broward County Recharge System (NBCRS). The system is a diversion and impoundment project consisting of several canals that capture rainfall and runoff to maintain water levels in the surficial aquifer and recharge wetlands. The NBCRS will regionally maintain water levels in the surficial aquifer including the areas of WW-22, WW-23, and the depressed roadway. Furthermore, the two wells are located immediately adjacent to the C-2 canal, which maximizes the amount of recharge to the aquifer.

6.1.12 Floodplain Analysis

The project will result only in minimal encroachments to floodplains. Encroachments resulting from the construction of the preferred alternative will be fully compensated within the proposed stormwater management facilities to insure there will be no increase in flood elevations and / or limits. Based on the proposed improvements, in the C-3 Canal Basin, a minimum pond volume of 5,727 cubic yards (CY), or 3.6 acre-feet, is required to offset 100-year floodplain encroachment volume. The C-3 Canal Basin proposed pond will provide at least 44,835 CY (27.8 acre-feet) of compensation volume, with a surplus compensation volume of 39,107 CY (24.2 acre-feet). In the C-2 Canal Basin, a minimum pond volume of 27,540 CY (17.1 acre-feet) is required to offset the 100-year floodplain encroachment volume. The C-2 Canal Basin proposed pond will provide at least 100,769 CY (62.5 acre-feet) of compensation volume, with a surplus compensation volume of 73,229 CY (45.4 acre-feet).

6.1.13 Transportation Management Plan

A complete reconstruction of SW 10th Street will be necessary to build the Preferred Alternative. The conceptual phasing plan for the construction of a depressed roadway alternative consists of ten general phases of construction as detailed below. Figures 6.1.27 to 6.1.36 detail the conceptual staging plan for a single “cell” of a depressed section, with the first constructed cell shown in the distance and the second constructed cell shown in the foreground. Each cell measures approximately 100 feet long, and the construction of each cell is expected to take approximately two months.

Phase 1: Temporarily relocate SW 10th Street

- Construct a temporary five-lane section of pavement located on the south side of the existing SW 10th Street.

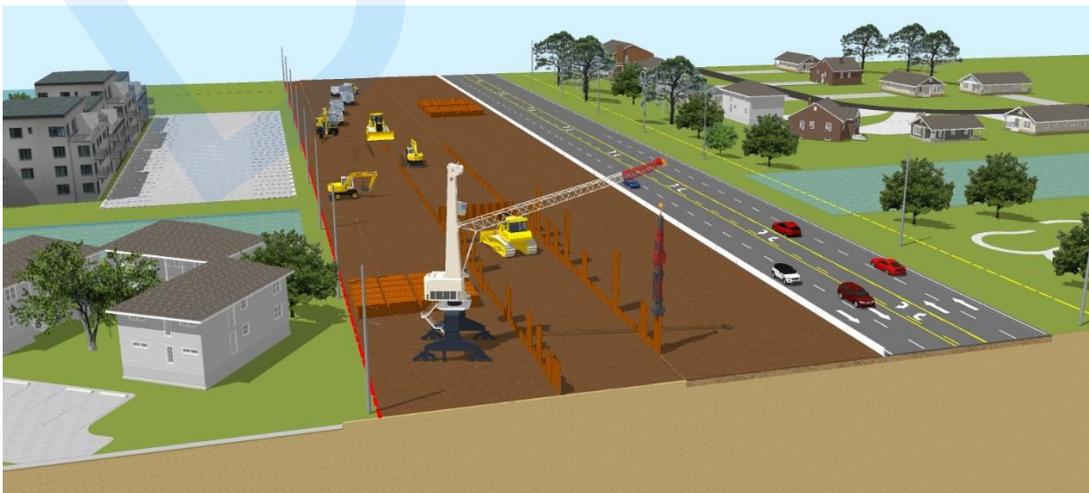
Figure 6.1.27: Phase 1 – Construct Temporary Lanes



Phase 2: Shift traffic to temporary pavement

- Shift all traffic for SW 10th Street to the temporary pavement;
- Allow for barrier-separated envelope for construction of the depressed exit ramp; and
- Install temporary sheet piling along the perimeter of the depressed section.

Figure 6.1.28: Phase 2 – Shift Traffic and Install Sheet Piling



Phase 3: Excavation

- Begin excavation within the cells;
- Install vertical ground anchors; and
- Pour tremie seal (under water) atop the ground anchors.

Figure 6.1.29: Phase 3 – Excavation



Phase 4: Dewater

- Continue adding tremie seal; and
- Begin dewatering the cell.

Figure 6.1.30: Phase 4 – Dewater



Phase 5: Install water-proofing

- Continue dewatering the cell;
- Install water-proofing on the walls and atop the tremie seal; and
- Pour concrete pavement (riding surface) atop the tremie seal.

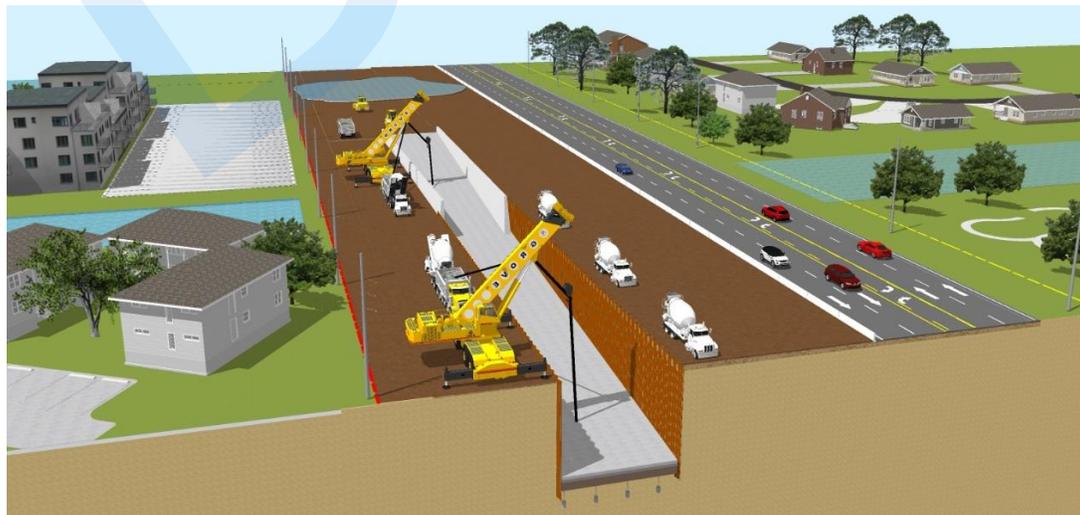
Figure 6.1.31: Phase 5 – Install Water-Proofing



Phase 6: Pour retaining walls

- Pour the concrete retaining walls; and
- Add a finished texture;

Figure 6.1.32: Phase 6 – Pour Retaining Walls



Phase 7: Stripe depressed section

- Install the concrete barrier wall in between the eastbound and westbound lanes; and
- Add striping to the concrete pavement.

Figure 6.1.33: Phase 7 – Stripe Depressed Section



Phase 8: Construct permanent westbound local lanes

- Open the managed lanes to through-traffic;
- Construct the permanent westbound local lanes; and
- Construct the permanent westbound ramp exit ramp.

Figure 6.1.34: Phase 8 – Construct Permanent Westbound Local Lanes



Phase 9: Construct permanent eastbound local lanes

- Construct the permanent eastbound local lanes; and
- Construct the permanent eastbound entrance ramp.

Figure 6.1.35: Phase 9 – Construct Permanent Eastbound Local Lanes



Phase 10: Project is complete

- Add landscaping to the median and green spaces;
- Open all lanes of traffic.

Figure 6.1.36: Phase 10 – Completed Project



6.1.14 Special Features

The primary special feature of the Preferred Alternative is the depressed westbound exit ramp, which is discussed in detail in Section 6.1.2. A second noteworthy point is the allowance of trucks in the managed lanes. While trucks are not permitted on the I-95 express lanes and in future express lanes on the Sawgrass Expressway, trucks will be permitted to utilize the managed lanes on SW 10th Street.

6.1.15 Design Variations and Design Exceptions

No design exceptions are anticipated for the Preferred Alternative. However, a few design variations are anticipated for horizontal curve lengths. A design variation relates to a Class 5 full median opening spacing between SW 30th and SW 28th Avenues and between West Drive and Quiet Waters Business Park entrance. Table 6.1.4 summarizes the known design variations for the Preferred Alternative. Minor design variations for superelevation may be encountered in the final design phase for reverse-curve entrance and exit ramps due to short tangent runout distances. However, these details will be resolved in the final design phase where other minor design variations may be encountered.

Table 6.1.5: Design Variations for the Preferred Alternative

Design Variation	Location	Required Length (ft)	Actual Length (ft)
Curve Length	EB local SW 10 th Street east of Powerline Road	400	221
Curve Length	EB entrance ramp	400	294
Curve Length	Managed Lanes between Powerline Road and SW 30 th Avenue	900	565 / 717
Full Median Opening Spacing	SW 30 th / SW 28 th Avenues	1,320	1,030
Full Signalized Opening	West Drive / Quiet Waters Business Park entrances	1,320	300

6.1.16 Cost Estimates

The Preferred Alternative is anticipated to cost a total of \$330.2 million dollars. The total construction cost is approximately \$260 million, the right-of-way is estimated at \$44.2 million, and the utility relocation costs are estimated at \$26 million. Appendix E contains the Long Range Estimate (LRE) for the Preferred Alternative.

6.2 Summary of Environmental Impacts of the Preferred Alternative

This section provides a summary of environmental issues and features that affect development of detail design of the Preferred Alternative.

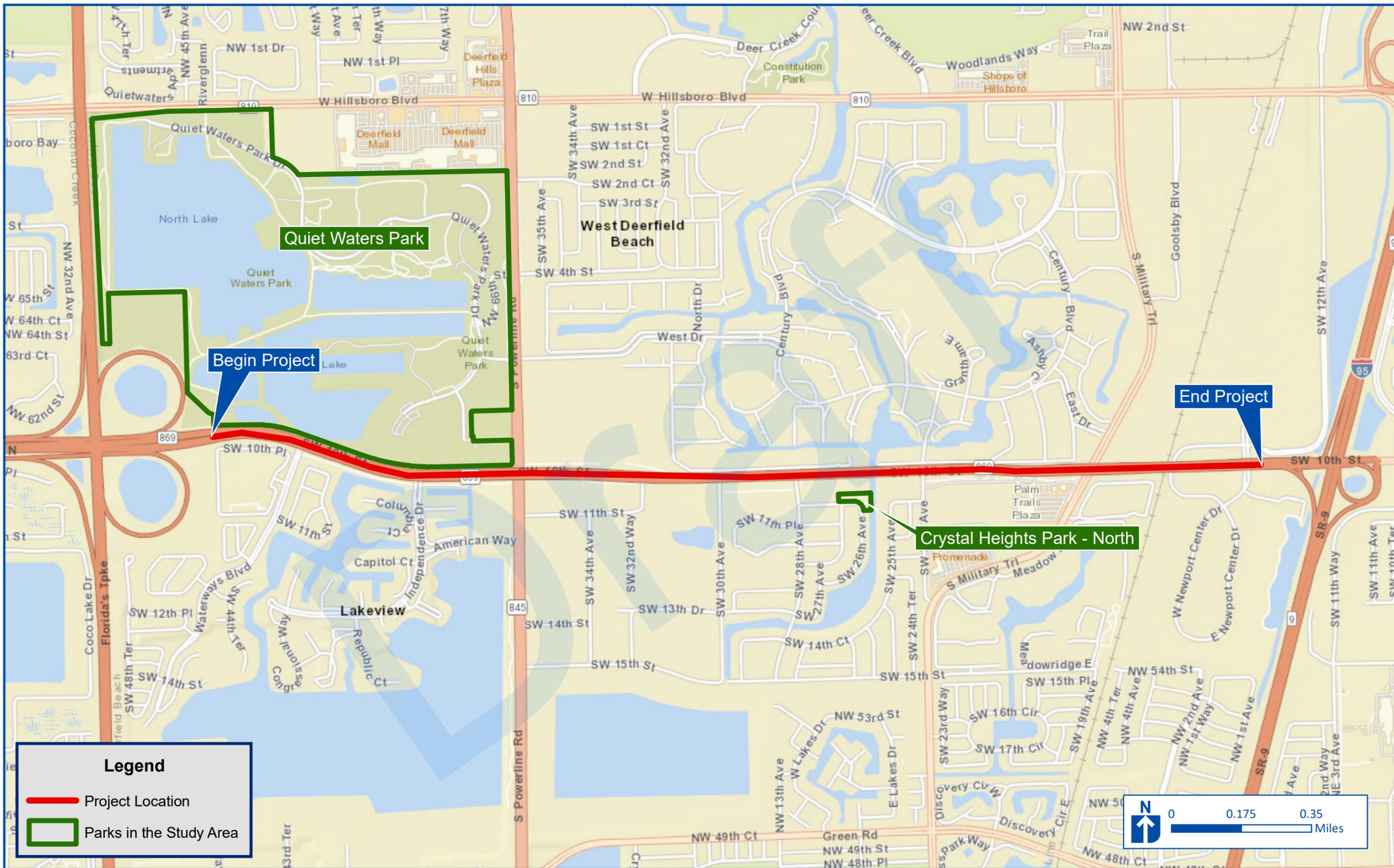
6.2.1 Future Land Use

Broward County is mostly built-out in the study area with little undeveloped land in the project corridor. Therefore, significant changes in land use are not anticipated. The Broward County Future Land Use Maps are consistent with the existing land use in the study corridor. The corridor will be mostly residential (multi-family and single family) and commerce. In addition, the Broward County Future Land Use map shows Quiet Waters Park will remain Recreation / Open Space. Figure 4.4.1 shows the Broward County Future Land Use.

6.2.2 Section 4(f)

Two *Section 4(f) Determination of Applicability (DOA)* Reports were prepared for this PD&E study and are summarized herein. Potentially protected Section 4(f) resources in the project area include: Quiet Waters Park and Crystal Heights Park – North, and are shown in Figure 6.2.1.

Quiet Waters Park is a 431.4-acre regional park owned and managed by Broward County Parks and Recreation. Amenities include a marina, mountain bike trails, cable skiing, fishing, campgrounds, nature trails, restrooms and showers, volleyball and basketball courts, food concessions, picnic shelters and open picnic areas, a park and campground office, a maintenance facility and a butterfly and bird sanctuary building. SkiRixen USA operates a cable water ski business and Bike America has a facility on-site that includes bike rentals, special bicycle events, bicycle repair and safety checks, and a retail store. Of these amenities, a series of mountain bike trails, a lake used for skiing and the maintenance building are adjacent to the SW 10th Street corridor. In addition to the existing amenities, Broward County has several planned amenities near SW 10th Street and Powerline Road including an expansion of the water park, another playground, another office space, and community gardens.



Legend

- Project Location
- Parks in the Study Area



**State Road 869 / SW 10th Street Connector PD&E Study from Florida's Turnpike /
 Sawgrass Expressway to I-95**
 Financial Project ID: 439891-1-22-02, ETDM No: 14291

**Figure 6.2.1
 Section 4(f) Properties
 in the Study Corridor**

Crystal Heights Park – North is a 1.37-acre community park associated with the Crystal Heights subdivision within the City of Deerfield Beach, Florida. This park is one of seven small community parks scattered throughout this large subdivision. The Crystal Heights Park - North is the only one adjacent to SW 10th Street. The park includes open grassed areas, a children's playground, covered picnic table with grill and an open-air picnic table, and approximately 100 feet of grassed parking area. This park is owned and maintained by the City of Deerfield Beach. Although the park is located within the Crystal Heights neighborhood, the neighborhood is not gated, therefore the general public could access this park.

6.2.3 Cultural Resources

A Cultural Resources Assessment Survey (CRAS) was completed for this project. The objective of this CRAS was to identify cultural resources and assess their eligibility for listing in the National Register of Historic Places (National Register) according to the criteria set forth in 36 CFR Section 60.4.

According to 36 CFR 800.16(d), the Area of Potential Effect (APE) is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The APE is influenced by the scale and nature of the undertaking as well as its geographical setting. The APE must include measures to identify and evaluate both archaeological and historical resources. Normally, archaeological and other below-ground resources will be affected by ground disturbing activities and changes in ownership status. Structural resources and other above ground sites, however, are often impacted by those activities as well as alterations to setting, access and appearance. As a consequence, the survey methodologies for these two broad categories of sites differ.

The archaeological APE focuses upon identifying and evaluating resources within the geographic limits of the proposed improvements and its associated ground disturbing activities within the proposed right-of-way. The archaeological APE, therefore, is confined to the footprint of the proposed project improvements and proposed right-of-way. The APE for historic resources took into consideration the scope of the proposed work and the developed urban nature of the project area. Therefore, the historic resources APE consists of the

footprint of the proposed improvements and adjacent parcels up to a distance of 150 feet from the footprint. There are no improvements associated with the project between Military Trail and I-95 so this area is outside the APE for this CRAS. This area will be covered in the CRAS PD&E Study for SR 9/I-95 from south of SW 10th Street to north of Hillsboro Boulevard (FM No. 436964-1), currently in progress.

A search of the Florida Master Site File (FMSF) as well as county and local inventories identified no previously recorded archaeological sites or archaeologically sensitive zones within one mile of the archaeological APE. No newly recorded archaeological sites were identified within the archaeological APE. Seven shovel tests were excavated within the archaeological APE. No cultural material was recovered. No subsurface testing could be conducted in most of the project area due to the presence of existing pavement, drainage ditches, and buried utilities.

A search of the FMSF identified no previously recorded cemeteries, historic districts, or historic structures, within or adjacent to the historic resources APE. The historic resources survey resulted in the identification of one newly identified historic structure. This structure, located at 3165-3175 SW 10th Street, Deerfield Beach, Florida (8BD6685) is of Masonry Vernacular style construction. The structure lacks historical associations and physical integrity and is considered National Register–ineligible. No historic bridges, cemeteries, or other potentially unrecorded historic resources were identified within the historic resources APE during the background research.

While the segment of Military Trail within in the current project APE is not historic, portions of Military Trail located outside of the current APE, to the north, have been determined ineligible for listing in the National Register by State Historic Preservation Officer (SHPO) in 2016 and in 2017. Military Trail was originally established as a native footpath by the Seminole Indians and was expanded in 1838 by the U.S. Army during the Second Seminole War. The trail has since been paved and converted into a major thoroughfare that follows the historic trail and is named Military Trail (SR 809) after this historic trail. It is recorded in the FMSF as 8PB13795. An analysis of historic aerials revealed no evidence of the original trail within the APE and no physical evidence was identified during the survey. It is likely

that any remnants of the trail within the APE were destroyed during the construction of the modern highway and adjacent development.

The SHPO concurred with the findings in the CRAS in a letter dated October 2, 2018.

6.2.4 Wetlands

A NRE has been performed for this PD&E study and is available under separate cover. The subsections below summarize the pertinent information in the NRE.

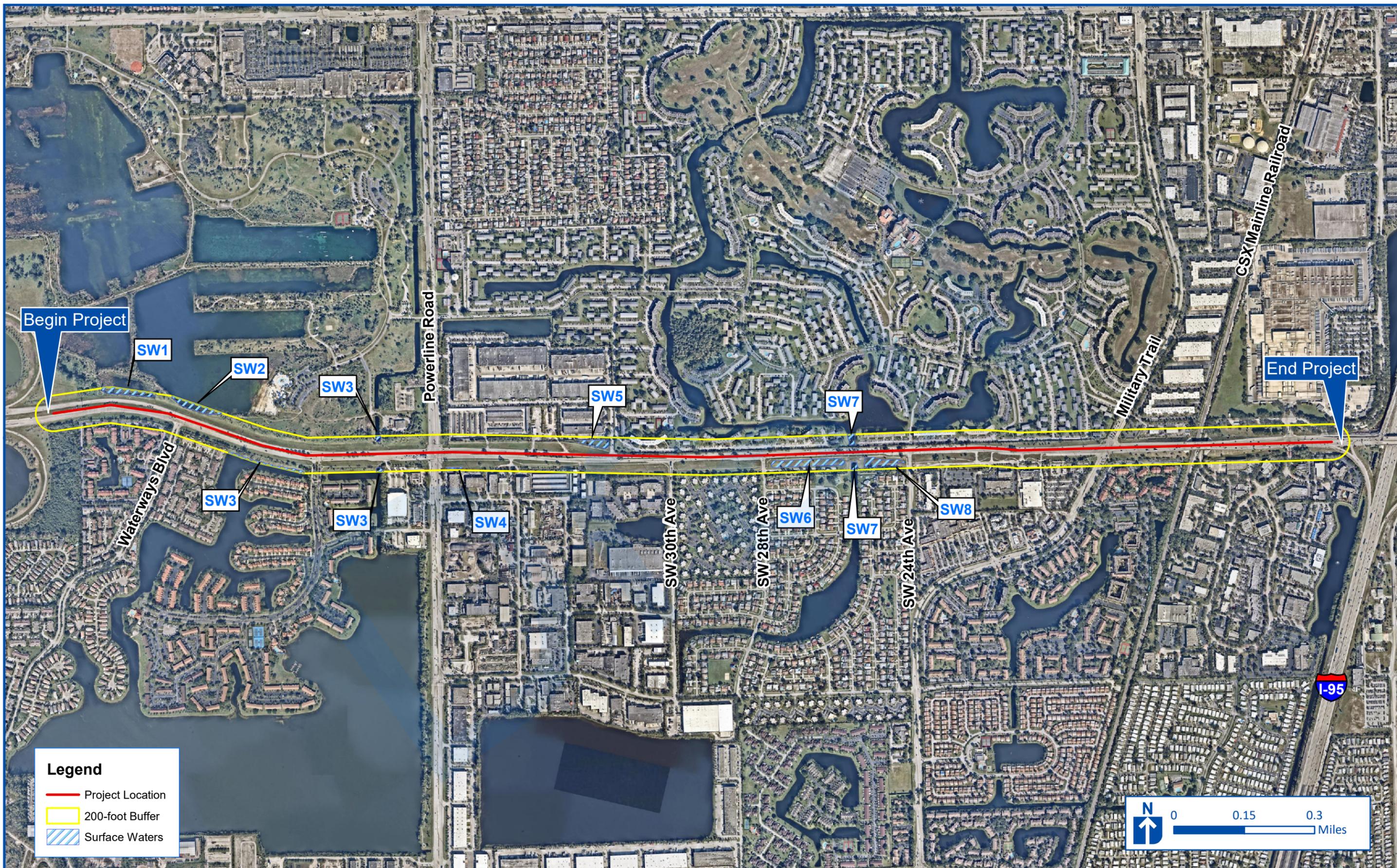
In accordance with Executive Order 11990, Protection of Wetlands, and FHWA Technical Advisory T6640 8A, the extent and types of wetlands in the study area were documented. There are several surface waters (canals, swales, ponds, and ditches) in the study area. Baseline information characterizing the surface waters located within the study area including contiguity, vegetative structural diversity, edge relationships, wildlife habitat value, hydrologic functions, and integrity is found in Table 6.2.1. The surface water polygons were individually characterized based on their Florida Land Use, Cover and Forms Classification System (FLUCFCS) type and are depicted in Figure 6.2.2. There are no wetlands within the 200-foot project study area.

Table 6.2.1: Surface Water Summary within the Study Area

Wetland ID	FLUCFCS Code	USFWS Code	Contiguity	Vegetative Structural Diversity	Edge Relationships	Wildlife Habitat Value	Hydrologic Function	Integrity	Size (Acres)
SW1	524	Lacustrine Limnetic Unconsolidated Bottom – Permanently Flooded (L1UBH)	Isolated	Low structural diversity along banks of surface water (some <i>Typha spp.</i> is present)	Situated adjacent to grassed shoulders of road right-of-way and recreational trails within Quiet Waters Park	Provides opportunistic foraging habitat for wading birds	Provides some stormwater retention	Surface water appears to be naturally occurring, however Park maintenance could have impacted this surface water	0.75
SW2	523	Lacustrine Limnetic Unconsolidated Bottom – Permanently Flooded (L1UBH)	Isolated	Low structural diversity along banks of surface water (some <i>Typha spp.</i> is present)	Situated adjacent to grassed shoulders of road right-of-way and located within Quiet Waters Park	Provides some habitat for wildlife especially fish, herpetofauna, and foraging birds	Provides some stormwater retention	Surface water has been historically manipulated for mining purposes	0.73*
SW3	522	Lacustrine Limnetic Unconsolidated Bottom – Permanently Flooded (L1UBH)	Connected via culvert to other roadside swales	No wetland vegetation present along lake shore	This surface water occurs within the study area in three separate places. Generally, surface water is adjacent to grass shoulders of road right-of-way, adjacent to residential buildings, and maintenance building of Quiet Waters Park	Minimal habitat value. Potential opportunistic foraging.	Provides some stormwater retention	It appears that this surface water has been artificially manipulated during construction of adjacent residential neighborhood. Surrounding development and regular mowing also affects the habitat composition and structure.	0.45*
SW4	510	Riverine Lower Perennial Unconsolidated Bottom – Temporarily Flooded (R2UBA)	Connected via culvert to other roadside swales	Low structural diversity, periodically mowed. Species include white-topped sedge, dollarweed, torpedo grass, and spikerush.	Situated between roads and paved parking lot.	Provides minimal habitat value due to isolation, intermittent hydrology, and adjacent land uses.	Primarily provides stormwater detention, treatment, and sedimentation abatement functions.	Surface water was designed to convey/treat stormwater runoff. Surrounding development and regular mowing also affects the habitat composition and structure.	0.06
SW5	534	Lacustrine Limnetic Unconsolidated Bottom – Temporarily Flooded (L1UBA)	Isolated	Low structural diversity, periodically mowed. Species include torpedo grass, dollarweed, and flatsedge.	Situated between roads and paved parking lot.	Provides minimal habitat value due to isolation, intermittent hydrology, and adjacent land uses.	Primarily provides stormwater detention, treatment, and sedimentation abatement functions.	Surface water was designed to convey/treat stormwater runoff. Surrounding development and regular mowing also affects the habitat composition and structure.	0.48
SW6	534	Lacustrine Limnetic Unconsolidated Bottom – Temporarily Flooded (L1UBA)	Isolated	Low structural diversity, periodically mowed. Species include torpedo grass, dollarweed, and flatsedge.	Situated between roads and residential neighborhood.	Provides minimal habitat value due to isolation, intermittent hydrology, and adjacent land uses.	Primarily provides stormwater detention, treatment, and sedimentation abatement functions.	Surface water was designed to convey/treat stormwater runoff. Surrounding development and regular mowing also affects the habitat composition and structure.	1.38

Wetland ID	FLUCFCS Code	USFWS Code	Contiguity	Vegetative Structural Diversity	Edge Relationships	Wildlife Habitat Value	Hydrologic Function	Integrity	Size (Acres)
SW7	510 (Canal 1)	Riverine Lower Perennial Unconsolidated Bottom – Permanently flooded (R2UBH)	Connected to various surface waters and canals throughout the area.	No wetland vegetation present along canal banks.	Situated between roads and residential neighborhoods.	Provides some habitat for wildlife especially fish and foraging birds	May provide some stormwater detention for the surrounding area.	Area receives runoff from adjacent roads and neighborhoods.	0.32*
SW8	534	Lacustrine Limnetic Unconsolidated Bottom – Temporarily Flooded (L1UBA)	Isolated	Low structural diversity, periodically mowed. Species include torpedo grass, dollarweed, and flatsedge.	Situated between roads and residential neighborhood.	Provides minimal habitat value due to isolation, intermittent hydrology, and adjacent land uses.	Primarily provides stormwater detention, treatment, and sedimentation abatement functions.	Surface water was designed to convey/treat stormwater runoff. Surrounding development and regular mowing also affects the habitat composition and structure.	0.05

Draft



6.2.5 Protected Species and Habitat

In accordance with the FDOT PD&E Manual, Part 2, Chapter 16 (June 14, 2017), a Protected Species and Habitat Assessment was conducted for this study and the results are summarized in the NRE. Information on the potential occurrence of federal and state listed species within the project corridor was assessed based on a review of available literature, database review, and based on field reconnaissance that was conducted along the corridor. Field reconnaissance was conducted in September 2017, which included pedestrian transects throughout the study area surveying for listed flora and fauna and identification of any potential habitat. Because there is the potential for gopher tortoises or Florida burrowing owl to occur even in disturbed roadside areas, the study area was surveyed for Florida burrowing owl and a 15% gopher tortoise survey was completed.

Pursuant to Section 7(c) of the Endangered Species Act of 1973, the project corridor was evaluated for the potential occurrence of federal and / or state listed threatened and endangered species, species classified by federal agencies as candidates for listing, and state species classified as species of special concern. The likelihood of species occurrences considered for the study area were determined based on several factors including whether the species were positively identified by project biologists during field surveys, suitable habitat was observed or is known to occur, species life history, and local knowledge. This assessment also included review of data obtained from the Florida Department of Agriculture and Consumer Services (FDACS) publication Notes on Florida's Endangered and Threatened Plant, information from Florida Natural Areas Inventory (FNAI), and the Atlas of Florida Vascular Plants pertaining to listed plant species that may be present in the study area. Based on the data and literature review and subsequent field surveys, state and federally listed species that may occur in the project area are identified in Table 6.2.2.

Table 6.2.2: Potential Federal and State Listed Fauna and Flora

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
Mammals				
Florida bonneted bat	<i>Eumops floridanus</i>	E	FE	Low
West Indian manatee	<i>Trichechus manatus</i>	T	FT	Low
Birds				
Everglade snail kite	<i>Rostrhamus sociabilis plumbeaus</i>	E	FE	Low
Wood stork	<i>Mycteria americana</i>	T	FT	Medium
Florida burrowing owl	<i>Athene cunicularia floridana</i>	NL	ST	Low
Tricolored heron	<i>Egretta tricolor</i>	NL	ST	Medium
Roseate spoonbill	<i>Platalea ajaja</i>	NL	ST	Medium
Little blue heron	<i>Egretta caerulea</i>	NL	ST	Medium
Bald eagle*	<i>Haliaeetus leucephalus</i>	NL	NL	High
Reptiles				
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T	FT	Low
Gopher tortoise	<i>Gopherus polyphemus</i>	C	ST	Low
Amphibians				
None				
Fish				
None				
Plants				
Florida royal palm	<i>Roystonea elata</i>	NL	SE	Low
Large-flowered rosemary	<i>Conradina grandiflora</i>	NL	ST	Low

Based on *Florida's Endangered and Threatened Species* updated January 2017 available on <http://myfwc.com/wildlifehabitats/imperiled/>

Federal Status: E = Endangered; T = Threatened; SSC = Species of Special Concern; C = Candidate Species; NL = Not Listed

State Status: FE- Federally Endangered; FT – Federally Threatened; ST- State Threatened. Note: Coordination is not required with FWC for Federally listed species.

* The Bald eagle is still protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act and FWC Management Plan regulations.

Each species and their habitat requirements are briefly discussed in the following paragraphs.

Federally Listed Species

Florida Bonneted Bat

The bonneted bat is a large bat approximately 5 to 6.5 inches. Adult fur color varies from dark gray to brown on the dorsal side of the bat, with lighter, grayish fur underneath. The bases of the ears are joined at the midline of the head and are large and broad and slant forward over the eyes. Little is known about habitat associations and natural roost site preferences of the bonneted bats, but this species has been documented in urban, rural, and native landscapes with roost sites found in tree cavities, buildings, rock outcroppings, and bat houses. Florida bonneted bats have only been found in four counties in Florida: Lee, Collier, Charlotte, and Miami-Dade. Habitat for the bonneted bat may occur within adjacent habitats; however, habitat does not occur within the SW 10th Street right-of-way. The study area does not fall within the Consultation Area for the bonneted bat. Bats or evidence of bats was not noted during field reconnaissance, and no habitat exists within the study area.

West Indian Manatee

The manatee is a large, gray, nearly hairless, aquatic mammal that has a round, paddle-shaped tail. Adult manatees typically average nine feet in length, weigh around 900-1,000 pounds, and inhabit coastal waters, bays, rivers, and occasionally lakes. Manatees range from the southeastern United States to Central America and require warm-water refugia such as springs or cooling effluent during cold weather. Manatees are herbivorous and commonly feed on seagrass species.

The project is not within the USFWS Consultation Area for this species. A review of the USACE Manatee Key Broward County map (2013), shows no Important Manatee Areas (IMA) or Warm Water Aggregation Areas (WWAA) near the study area. Although manatees could occur within the Hillsboro Canal (which is connected to Canal 1 within the study area), there is a water control structure within Hillsboro Canal prohibiting movement of manatees to Canal 1.

Everglade Snail Kite

The everglade snail kite is a medium-sized raptor that is dark slate gray to black with a white tail and a long, hooked bill. Snail kites inhabit large, open, freshwater marshes and lakes from the St. Johns River headwaters south. They prefer relatively shallow water (less than

four feet) and a low density of emergent vegetation. Their primary food source is the apple snail which they catch at the water's surface. Snail kites usually nest over the water in a low tree or shrub. Dense, thick vegetation or sparse emergent vegetation is not optimal for foraging because either the apple snails cannot be readily seen in dense vegetation or do not survive or reproduce in sparse vegetation.

The study area falls within the USFWS Consultation Area for the snail kite, but does not fall within the critical habitat for this species. Large, open water lakes exist adjacent to the study area; however, these lakes lack the emergent vegetation required by the snail kite for nesting. Although apple snail shells were observed along the canal edges within Century Village, no snail kites were observed within the study area.

Wood Stork

Wood storks are typically found in marshes, cypress swamps, and mangrove swamps, but their presence in artificial ponds, seasonally flooded roadside or agricultural ditches, and managed impoundments has become common. Wood stork breeding areas extend from South Florida through Georgia and along the coastal areas of South Carolina. Large, colonial nesting areas are typically established in swamps or islands surrounded by broad, open water areas. The same colony site may be used over many years, provided the site remains undisturbed and sufficient foraging habitat is available. Wood storks are known to nest with other wading bird species, including white ibis, tricolored herons, snowy egrets, and great blue herons. Foraging habitat consists of nearly any calm, shallow water area (between 10 and 25 centimeters) wetland depression that concentrates fish and is not overgrown with dense, aquatic vegetation. Some examples of foraging sites include freshwater marshes, stocked ponds, shallow ditches, narrow tidal creeks, shallow tidal pools, and depressional areas of cypress heads and swamp sloughs provide foraging habitat.

The shallow surface waters within the study area are man-made swales, ponds and stormwater detention areas that may provide some minimal opportunistic foraging habitat, but no nesting habitat was present and no wood storks were observed.

Eastern Indigo Snake

The eastern indigo snake occurs in a range of habitats, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. Eastern indigo snakes are often found in strong association with gopher tortoises, though this is more prevalent where temperatures drop to below 50 degrees regularly in the winter, but are also known to use the burrows of armadillos, cotton rats, and land crabs (in coastal areas). These snakes require large tracts of land for survival and are typically restricted to xeric habitats on pine-oak sandhills. Indigo snakes forage in hydric habitats, often along wetland ecotones. Habitat for the eastern indigo snake does not exist within the study area and no indigo snakes were observed during field reconnaissance.

State Listed Species

Florida Burrowing Owl

This small, ground-dwelling owl is boldly spotted and barred with brown and white. They average nine inches in height and have a wingspan of approximately 21 inches. They often dig their own burrow and line the entrance with decorative materials prior to laying eggs at the bottom of the burrow. They also have been documented to use gopher tortoise burrows or armadillo burrows. They inhabit, high, sparsely vegetated, sandy ground with low groundcover vegetation, and more recently can be found in ruderal areas such as pastures, airports, ball fields, golf courses, and road right-of-way. FNAI listed that a pair of owls was observed within the study area in 1991.

Tricolored Heron

The tricolored heron is a medium-sized heron with a slender neck. The body color appears two-toned with dark slate coloration on the head, neck, and body that contrasts with a white rump, belly, and undertail. A reddish-brown and white streak extends along the front of the neck. During breeding season, adults have white head plumes and rufous to whitish shoulders. Young birds have more reddish-brown on head, neck, and mantle but otherwise similar to adults. This species' nesting season is from late February to August, and nesting typically occurs in mangrove or willow trees in mixed or single species rookeries. The tricolored heron feeds on small fish, frogs, tadpoles, crustaceans, snails, worms, and aquatic insects. There is no suitable nesting habitat within the study area. The surface waters within

the study area contain suitable foraging habitat for this species. Tricolored herons were not observed during field reconnaissance and drainage features will still exist following construction.

Roseate Spoonbill

These wading birds are characterized by their bright pink bodies, white necks, and spoon-like bills. Immature birds are whitish, acquiring the pink coloration as they mature. Roseate spoonbills are the only spoonbill native to the Western Hemisphere and the only pink bird that breeds in Florida. Their primary nesting sites include coastal mangrove islands or in Brazilian pepper on man-made dredge spoil islands near suitable foraging habitat. Roseate spoonbills typically forage in shallow water of variable salinity, including marine tidal flats and ponds, coastal marshes, mangrove-dominated inlets and pools, and freshwater sloughs and marshes.

Most of the known breeding sites occur within federally owned national parks and wildlife refuges and National Audubon Society sanctuaries. Nests are found in Florida from Tampa Bay on the Gulf coast and Brevard County on the Atlantic coast, south to northern Florida Bay. There is no suitable nesting habitat within the study area. The surface waters within the study area contain suitable foraging habitat for this species. Roseate spoonbills were not observed during field reconnaissance and drainage features will still exist following construction.

Little Blue Heron

The little blue heron is a medium-sized heron, with a purplish to maroon-brown head and neck. There is a small white patch on the throat and the upper neck. The body is slate-blue. The bill is black towards the tip, especially during breeding season, with the other exposed areas on the head appearing dark gray to cobalt blue. The legs are grayish to green, becoming black in breeding season. Immature birds are mostly white with pale slate-gray tips on primary wing feathers. Legs of young birds are yellowish green. There is no suitable nesting habitat within the study area. The surface waters within the study area contain suitable foraging habitat for this species. Little blue herons were not observed during field reconnaissance and drainage features will still exist following construction.

Gopher Tortoise

The gopher tortoise ranges throughout the southeastern U.S. and suitable habitat occurs in all Florida counties. The gopher tortoise excavates extensive underground burrows and spends much of its life in these burrows. Gopher tortoise habitat generally has the following characteristics: well drained, sandy soils; abundant groundcover; relatively open canopy and sparse shrub cover.

These habitat characteristics occur in a variety of Florida's native upland communities, including scrub communities, coastal strand and pine flatwoods. Development pressures on many of the upland communities in Florida have been increasing. Thus, more disturbed habitats, such as fence rows, old fields, range lands, and canal banks have become important to gopher tortoises. Gopher tortoise burrows are important shelter for a variety of species including the Eastern indigo snake, gopher frog and Florida mouse. Suitable habitat for this species can be found within the road right-of-way in the study area. However, no gopher tortoises were observed within the study area during field reconnaissance.

Florida Royal Palm

Florida royal palm is a native, large palm that can grow to heights of 50-70 feet, with a spread of 20-25 feet. The trunk is smooth and light grey and can be up to two feet in diameter. Royal palms are considered self-cleaning and will shed their dying leaves. Inflorescences consisting of hundreds of tiny cream-colored flowers appear in late summer, which are followed by dark red to black fruits. The Florida royal palm can be found in a variety of habitats although does not have a high salt tolerance. This species was not observed during field surveys.

Large-Flowered Rosemary

The large-flowered rosemary is a long-lived perennial shrub that reaches a height of three to four feet and a width of one to two feet, with purple to lavender flowers. Native habitat for large-flowered rosemary includes scrub and coastal strand; it has also been known to inhabit disturbed areas. Large-flowered rosemary flowers year-round (blue) and can therefore be surveyed at any time. Habitat for large-flowered rosemary is limited within the study area (disturbed areas); however, no individuals were observed during field surveys.

Other Protected Species

Bald Eagle

As of 2008, the bald eagle is no longer listed by the USFWS or FWC as endangered or threatened. Bald eagles are still protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and FWC's bald eagle rule (F.A.C. 68A-16.002). Potential habitat for bald eagles (e.g. tall pine trees) occurs throughout the project study area, and commonly includes areas in proximity to bays, rivers, lakes, or other bodies of water that provide concentrated prey availability. Eagles usually nest in tall trees (mostly live pines) that provide clear views of the surrounding area.

There is one eagle nest documented in the FWC Eagle Nest Locator database just north of SW 10th Street adjacent to Quiet Waters Park and the northbound off-ramp of the Turnpike. Per FWC's online eagle nest locator database, the eagle nest (nest ID BO003) was last active in 2014. The Florida's Turnpike Enterprise (FTE) is conducting a separate PD&E Study along the Sawgrass Expressway which is at the western end of the project study area. As part of the Sawgrass study, FTE conducted bald eagle monitoring from October 2017 through May 2018 to determine status of the existing eagle nest (Nest ID BO003). The following is a summary of the data provided by FTE consultants. At the beginning of the nest monitoring, nest BO003 appeared partially degraded and by the end of the nest monitoring (May 2018), the nest was no longer present. An alternate nest (Alternate Nest 1) was identified during the monitoring events, which is located approximately 458 feet north of the Sawgrass Expressway / SW 10th Street interchange and 275 feet east of the Turnpike northbound off-ramp. Alternate Nest 1 was active during the 2017 / 2018 breeding season and produced one eagle that fledged. Figure 4.7.3 shows the location of the bald eagle nest.

Based on the survey results, most of the perch locations were within the adjacent pines close to the nest. Many of the flights to and from the nest were near the nest, though the eagles routinely flew south / southwest over the Turnpike northbound off-ramp. There were no documented flights over SW 10th Street during the survey.

6.2.6 Essential Fish Habitat

The Preferred Alternative does not occur in federal marine waters and no Essential Fish Habitat (EFH) exists within the study area. Therefore, EFH Assessment was not required.

6.2.7 Highway Traffic Noise

A traffic noise study, dated August 2019, was performed in accordance with 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2010), the FDOT's PD&E Manual, Part 2, Chapter 18, Highway Traffic Noise (January 14, 2019), and FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook (January 1, 2016). Design year traffic (2040) noise levels for the Build Alternative will approach or exceed the Noise Abatement Criteria (NAC) at 163 residences and five special land use sites within the project limits. Consequently, the feasibility and reasonableness of noise barriers were considered for those noise sensitive sites predicted to be impacted.

Five separate common noise environments (CNEs) were used to assess noise barriers for the noise sensitive sites that approach or exceed the NAC:

- E1S - Represents the 23 impacted residences in the Enclave Apartments at Waterways;
- E2S - Represents the 50 impacted residences in the Waterways, Independence Bay, and Freedom Square residential developments;
- E3N - Represents a ~300-foot segment of a recreation trail within Quiet Waters Park;
- E4S - Represents the 20 impacted residences within the Waterford Courtyards and Crystal Heights Communities and a non-residential site (i.e., Crystal Heights Park); and
- E5N - Represents the 70 impacted residences and two non-residential sites (i.e., park benches) within Century Village.

Table 4-1 in the NSR summarizes the results of the noise barrier analyses and recommendations for each of the locations where noise barriers were evaluated. Noise barriers at four of the CNEs (E1S, E2S, E4S, and E5N) were determined to be feasible and cost reasonable and are recommended for further consideration during the design phase and for public input. The locations of the recommended noise barriers are depicted on Figure 6.2.3. The cost per benefited site of the recommended conceptual noise barrier designs are

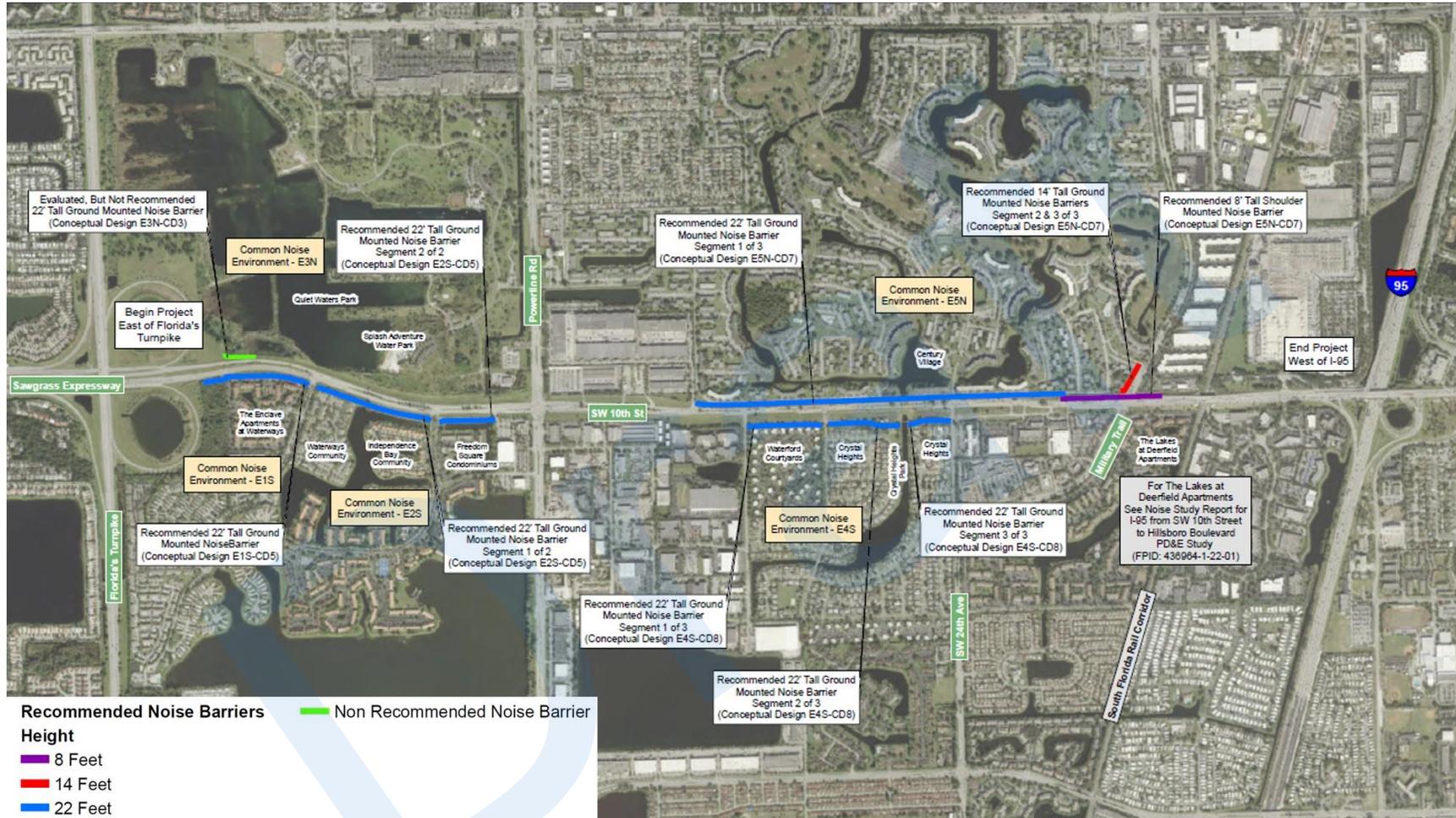
within FDOT's noise barrier cost criteria of equal to or less than \$42,000 per benefited site and they will meet FDOT's noise reduction reasonableness criteria of 7 dB(A) at one or more impacted sites. The recommended noise barriers are expected to reduce traffic noise by at least 5 dB(A) at 277 residences including 159 of the 163 impacted residences. The estimated cost of the recommended barriers is \$7,666,200. Additional noise barrier analysis will be performed during the Final Design phase to confirm the dimensions of the recommended noise barriers at these locations. Final decisions on barrier dimensions are made during the Final Design phase of the project and after determining the support for noise barriers from the benefited noise sensitive sites.

Noise barriers were not found to be cost reasonable at the Quiet Waters Park recreational trails (CNE-E3N). The usage of this trail was less than required to be cost reasonable; therefore, a noise barrier is not recommended for further consideration or construction at this location. Based on the noise analyses performed to date, there appears to be no apparent solutions available to mitigate the noise impacts at this recreational area or the four impacted residences not benefited (i.e., Receptor Sites IBC9, FSC301S, CH1, and CH28) that are located at the ends of the recommended noise barriers. The traffic noise impacts to these noise sensitive sites are an unavoidable consequence of the project.

FDOT is committed to the construction of feasible noise abatement measures at the noise impacted locations identified in Table 4-1 of the NSR and Figure 6.2.3 upon the following conditions:

- Final recommendations on the construction of abatement measures is determined during the project's Final Design and through the public involvement process;
- Detailed noise analyses during the Final Design process support the need, feasibility and reasonableness of providing abatement;
- Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
- Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
- Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

Figure 6.2.3: Noise Barrier Recommendation Map



It is likely that the noise abatement measures for the identified locations will be constructed if found feasible based on the contingencies listed above. If, during the Final Design phase, any of the contingency conditions listed above cause abatement to no longer be considered reasonable or feasible for a given location(s), such determination(s) will be made prior to requesting approval for construction advertisement. Commitments regarding the exact abatement measure locations, heights, and type (or approved alternatives) will be made during project reevaluation and at a time before the construction advertisement is approved.

During construction of the project, there is the potential for noise impacts to be substantially greater than those resulting from normal traffic operations because heavy equipment is typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project corridor is important in minimizing noise and vibration impacts. The project area does include residential, commercial, and institutional land uses. Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's Standard Specifications for Road and Bridge Construction. A reassessment of the project corridor for additional sites particularly sensitive to construction noise and/or vibration will be performed during design to ensure that impacts to such sites are minimized.

6.2.8 Contamination

A preliminary contamination screening evaluation of SW 10th Street between Florida's Turnpike and Military Trail, was conducted to determine potential contamination from properties or operations located within the vicinity of the project. The preliminary evaluation included reviewing environmental databases and aerial imagery, performing visual reconnaissance of the project corridor and surrounding areas, obtaining pertinent environmental records from state and local agencies, and assigning potential contamination ratings for each source within, and adjacent to, the project corridor.

The contamination rating system is divided into four degrees of risk: No, Low, Medium and High. This system expresses the degree of concern for potential contamination problems and are explained as follows:

- **No Risk** - A review of available information on the property and a review of the conceptual or design plans indicates there is no potential contamination impact to the project. It is possible that contaminants had been handled on the property. However, findings from the contamination screening evaluation or sampling and testing results indicate that contamination impacts are not expected.
- **Low Risk** - A review of available information indicates that former or current activities on the property have an ongoing contamination issue, has a hazardous waste generator identification number, or handles hazardous materials in some capacity. However, based on the review of conceptual plans and/or findings from the contamination screening evaluation or sampling and testing results, it is not likely that there would be any contamination impacts to the project.
- **Medium Risk** - After a review of conceptual plans and findings from a contamination screening evaluation or sampling and testing results, a potential contamination impact to the project has been identified. If there is insufficient information to make a determination as to the potential for contamination impact, and there is reasonable suspicion that contamination may exist, the property should be rated at least as a “Medium.” Properties used historically as gasoline stations and which have not been evaluated or assessed by regulatory agencies, sites with abandoned in place underground petroleum storage tanks or currently operating gasoline stations should receive this rating.
- **High Risk** - After a review of all available information and conceptual plans, there is appropriate analytical data that shows contamination will substantially impact construction activities, have implications to right-of-way acquisition or have other potential transfer of contamination related liability to the FDOT. A recommendation for each site with a rating of medium or high should include a listing of the analytical parameters of concern and media (e.g., soil, groundwater), a discussion of potential involvement with right-of-way acquisition and/or construction and if the site is anticipated to warrant additional assessment.

A total of 23 potentially contaminated and/or known to be contaminated sites were identified along the project corridor with risk evaluation ratings ranging from No Risk to High Risk.

Figure 2.19.4 shows the locations of the potential contamination sites. A summary of the risk assessment for the proposed project is as follows:

- No – 1 sites;
- Low – 11 sites;
- Medium – 10 sites; and
- High – 1 site.

Table 6.2.3 provides a list of all medium and high rated sites in the project corridor.

Table 6.2.3: Medium and High Potential Contamination Sites

Site Number	Facility Name	Risk Evaluation Rating
1	Shell – First Coast Energy #1836	Medium
10	Brothers Dry Cleaning Inc. / One Price Dry Cleaner	Medium
12	City of Deerfield Beach – Turner Envirologic Area	Medium
13	East Coast Asphalt Corporation	Medium
16	Man-Con Inc. / Stan Freitag Equipment Rental, Inc.	Medium
17	Cen-Deer Management Inc. / Nanaks Landscaping / Trolley Tours	Medium
18	Cache Cleaners	Medium
19	Deerfield Beach City – Well #17	Medium
20	Rexall Sundown, Inc.	Medium
22	Hardrives Asphalt Company	Medium
23	Century Village Golf Course	High

