DRAFT PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District 2

SR 16 PD&E Study

From International Golf Parkway to I-95

St. Johns County, Florida

Financial Management Number: 210447-5

ETDM Number: 14535

July 2025

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated May 26, 2022, and executed by Federal Highway Administration and FDOT.

Preliminary Engineering Report

SR 16 Project Development and Environment (PD&E) Study

From International Golf Parkway to I-95

St. Johns County, Florida

Financial Project ID (FPID) Number: 210447-5

Efficient Transportation Decision Making (ETDM) Number: 14535

July 2025

PROFESSIONAL ENGINEER CERTIFICATION

PRELIMINARY ENGINEERING REPORT

Project: SR 16 Project Development and Environment Study

ETDM Number: 14535

Financial Project ID: 210447-5

Federal Aid Project Number: TBD

This preliminary engineering report contains engineering information that fulfills the purpose and need for the SR 16 Project Development & Environment Study from International Golf Parkway to I-95 in St. Johns 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, and that I have prepared or approved the evaluation, findings, opinions, conclusions or technical advice for this project.

This item has been digitally signed and sealed by *[Insert P.E. Name]* on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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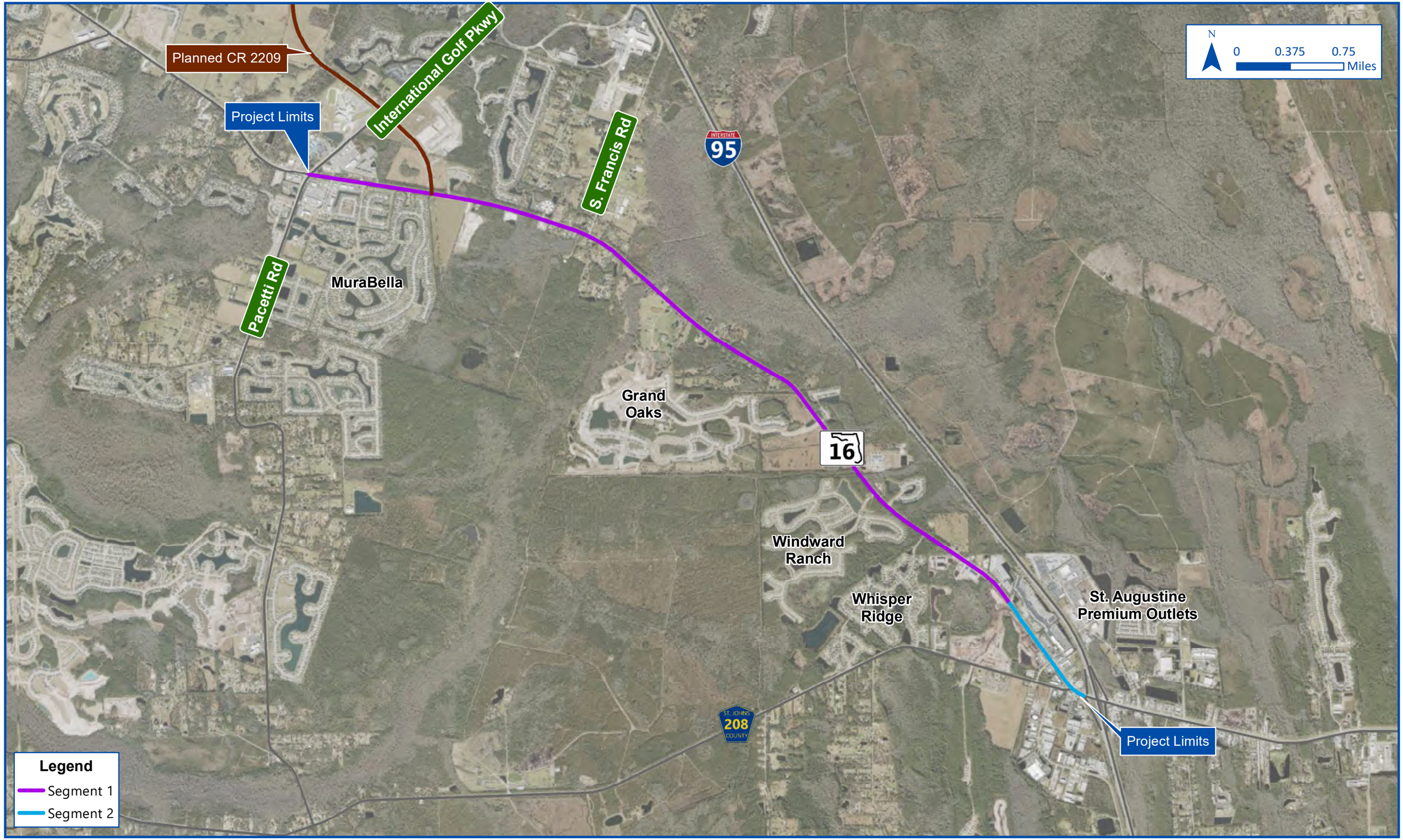
1.1 Project Description

The Florida Department of Transportation (FDOT) evaluated alternatives to improve safety and operations along State Road (SR) 16 from International Golf Parkway (IGP) to I-95, a distance of approximately 5.9 miles. The project is located in St. Johns County, Florida. A map of the project limits is shown in Figure 1.1.1. Within the project limits, SR 16 is a two-lane undivided facility and functionally classified as a rural principal arterial-other.

This study evaluated widening the existing two-lane undivided roadway to a four-lane divided roadway. In addition, multi-modal transportation improvements including continuous bicycle and pedestrian facilities were evaluated. SR 16 has one existing bridge (bridge number 780064) over Turnbull Creek, in which the structural integrity and functionality of this bridge was evaluated.

The existing typical section from IGP to the northern entrance of the St. Augustine Outlet Mall, approximately 5.1 miles, features a two-lane undivided roadway with sporadic turn lanes, paved outside shoulders, and no pedestrian or bicycle features. Figure 1.1.2 shows the existing typical section for Segment 1. From the northern entrance of the St. Augustine Outlet Mall to I-95, approximately 0.8 miles, SR 16 is generally a four-lane divided roadway with curb and gutter in the median, paved outside shoulders, and a sidewalk located on both sides of the road; however, there is a 0.3-mile stretch with no sidewalk from the start of the four-lane section to the southern entrance of the St. Augustine Outlet Mall. Figure 1.1.3 shows the existing typical section for Segment 2.

The existing SR 16 over Turnbull Creek Bridge features two lanes, undivided, with outside shoulders. Figure 1.1.4 shows the existing typical section for the bridge over Turnbull Creek.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 1.1.1: Project Location Map	Page Number: 1-2

Figure 1.1.2: Existing Typical Section – Segment 1

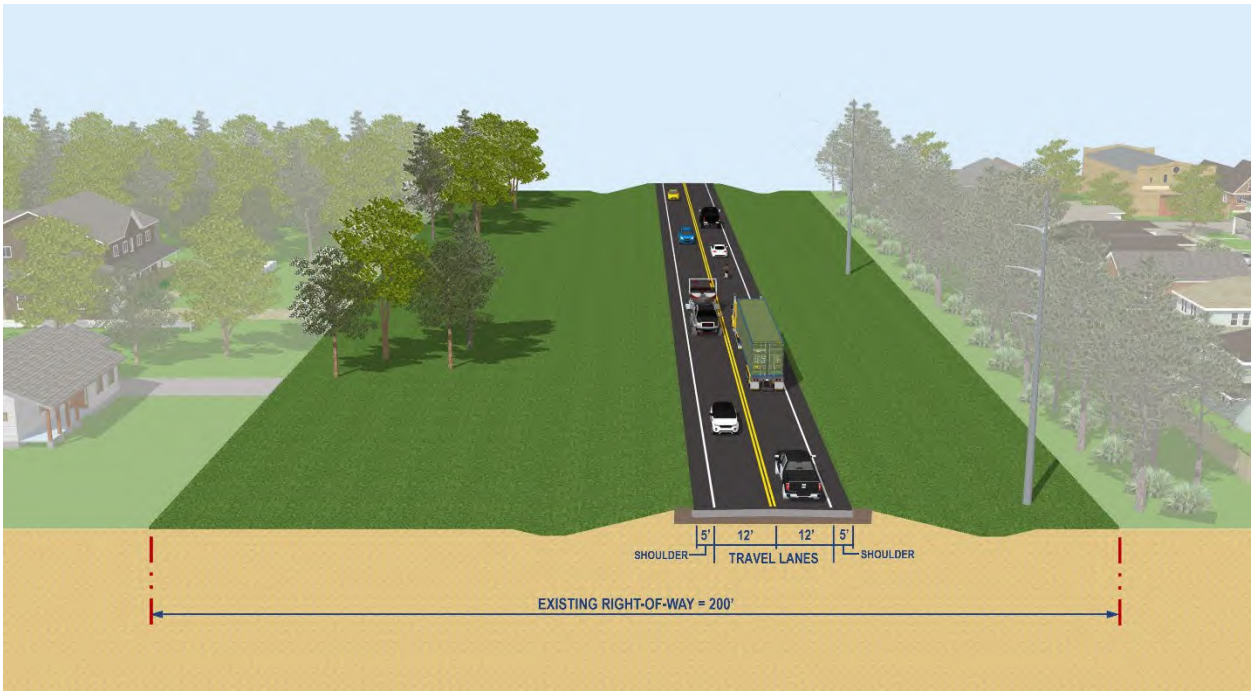


Figure 1.1.3: Existing Typical Section – Segment 2

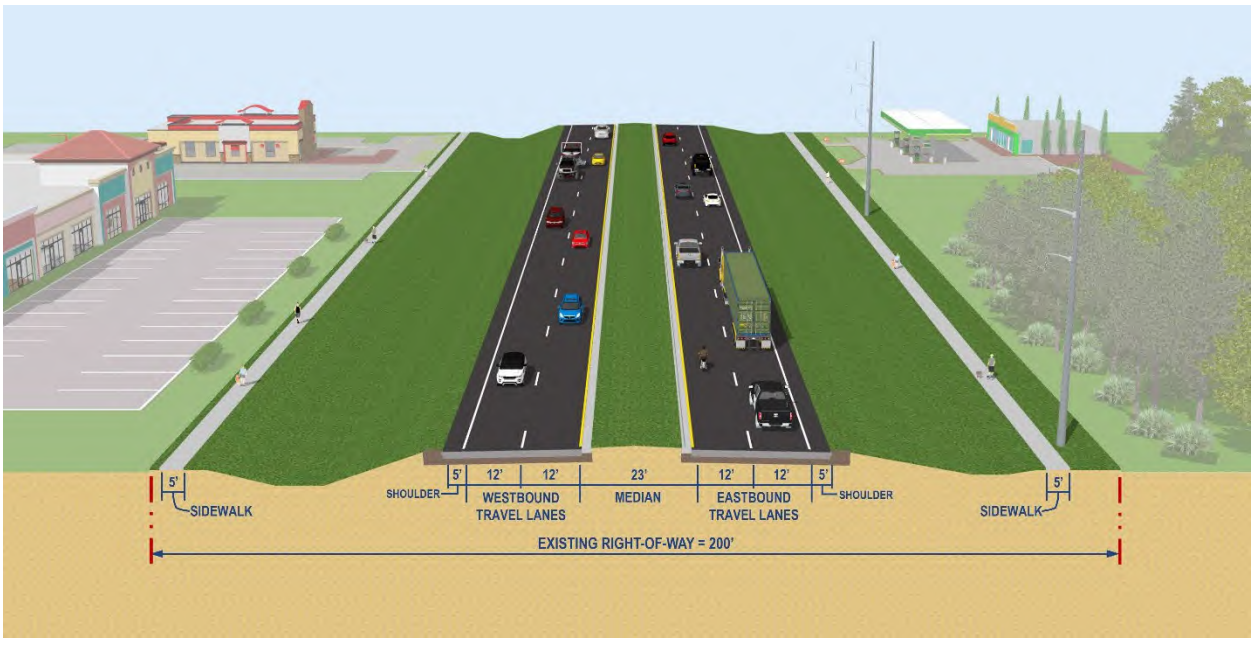
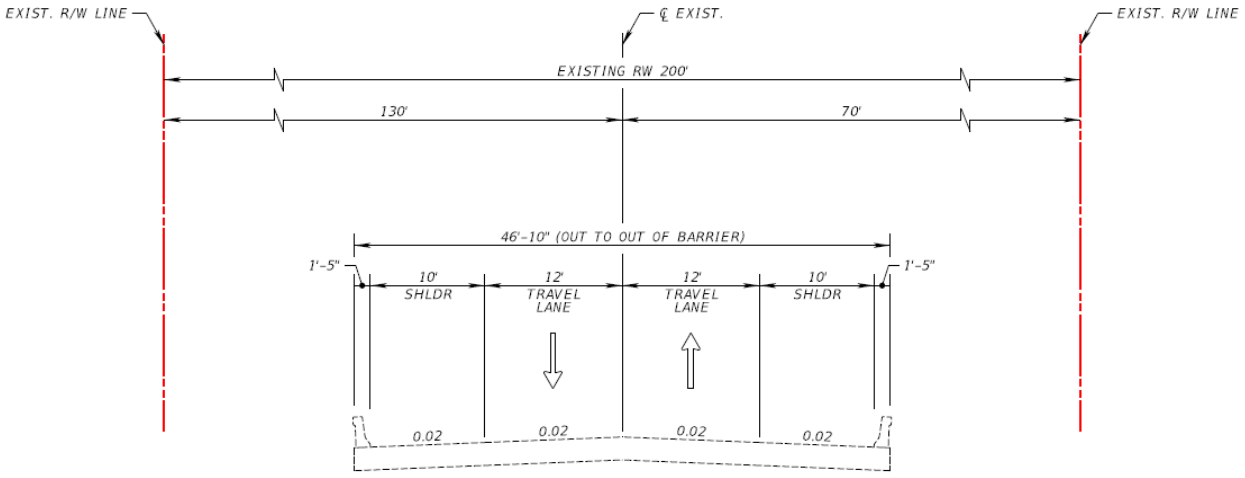


Figure 1.1.4: Existing Typical Section – Bridge Over Turnbull Creek



1.2 Purpose & Need

The purpose of this project is to improve traffic mobility, reduce congestion, and address safety on SR 16 from IGP to I-95.

The project is needed to address traffic congestion and safety concerns. A secondary need for the project is to accommodate planned developments.

1.2.1 Project Status

The North Florida Transportation Planning Organization (TPO) fiscal year 2025 to 2029 Transportation Improvement Program (TIP) includes funding for preliminary engineering in fiscal year 2025 and right-of-way in fiscal years 2025 and 2026 for SR 16 from IGP to I-95. The project is also documented in the North Florida TPO's 2050 Long Range Transportation Plan (LRTP) as an adopted need and a cost feasible project. The 2050 Adopted Needs Plan includes SR 16 from St. Johns Parkway (County Road (CR) 2209) to the St. Augustine Outlet Mall Entrance. The segments from IGP to CR 2209 and the St. Augustine Outlet Mall to I-95 are not included as these sections of SR 16 are under construction to be four lanes or are already four lanes, respectively. The FDOT State Transportation Improvement Program (STIP) includes funding for the PD&E phase and the preliminary engineering phase prior to fiscal year 2025 and in 2025 and right-of-way in fiscal years 2025 and 2026.

Primary Need

1.2.2 Capacity

The preliminary traffic analysis indicated the existing (2023) annual average daily traffic (AADT) on SR 16 varies from 19,600 to 24,700. Based on this analysis, the segment of SR 16 from IGP to the St. Augustine Outlet Mall is over capacity and operates at Level of Service (LOS) E in the current condition. The segment from the St. Augustine Outlet Mall to I-95, which is currently four-lanes, operates at LOS C in the current condition.

In the future year (2050) No-Build condition, assuming historical growth rates, SR 16 is projected to experience between 30,200 and 44,700 AADT. Both segments of SR 16 are expected to operate at LOS F, while the target LOS is D for both segments.

1.2.3 Safety

A total of 735 crashes were reported on SR 16 between IGP and I-95 based on data from FDOT State Safety Office Geographic Information System (SSOGis) and Signal Four Analytics for the years 2018 to 2022. Of the 735 crashes, the majority were rear-end crashes (52.2%), turn crashes (13.9%), and sideswipe crashes (11.7%). Most crashes resulted in no injury (75.7%) or possible injury (14.1%). There were three fatal crashes and 176 injury crashes within the study area. Table 1.2.1 summarizes the number of crashes by type, severity, lighting conditions, and surface conditions for the analysis period.

Table 1.2.1: Segment Crash Rate Summary

SR 16 from IGP to I-95 SB Ramp Terminal		Number of Crashes					5 Year Total Crashes	Percent
		2018	2019	2020	2021	2022		
Crash Type	Rear End	80	72	62	90	80	384	52.2%
	Left Turn	19	18	18	22	25	102	13.9%
	Sideswipe	14	14	15	22	21	86	11.7%
	Other	5	9	6	14	10	44	6.0%
	Off Road	8	5	4	6	7	30	4.1%
	Right Turn	6	4	4	6	5	25	3.4%
	Angle	3	6	2	4	2	17	2.3%
	Head On	2	3	3	1	3	12	1.6%
	Animal	1	2	2	2	3	10	1.4%
	Other Non-Collision	2	1	2	2	1	8	1.1%
	Unknown	0	1	2	0	3	6	0.8%
	Bicycle	2	1	0	1	1	5	0.7%
	Rollover	0	1	2	2	0	5	0.7%
	Other Non-Fixed Object	0	1	0	0	0	1	0.1%
	Pedestrian	0	0	0	0	0	0	0.0%
	Total	**142**	**138**	**122**	**172**	**161**	**735**	**100.0%**
Crash Severity	No Injury	111	104	87	133	121	556	75.7%
	Possible Injury	23	20	16	20	25	104	14.1%
	Non-Incapacitating Injury	7	13	14	16	11	61	8.3%
	Incapacitating Injury	0	1	3	3	4	11	1.5%
	Fatal (within 30 days)	1	0	2	0	0	3	0.4%
Lighting Conditions	Daylight	104	105	93	136	122	560	76.1%
	Dusk	4	0	2	7	3	16	2.2%
	Dawn	5	2	6	2	6	21	2.9%
	Dark - Not Lighted	17	19	9	12	12	69	9.4%
	Dark - Lighted	12	12	12	14	18	68	9.3%
	Dark - Unknown Lighting	0	0	0	1	0	1	0.1%
Surface Conditions	Dry	116	120	102	143	144	625	85.0%
	Wet	26	18	20	29	17	110	15.0%

The Average Crash Rate Method of crash analysis, based on identifying intersections and segments, average daily traffic, and number of crashes, was used for calculating the actual crash rate for the intersections and arterial segments within the project study area. The actual crash rates for the SR 16 intersections and segments were compared with the most recent five-year

statewide average crash rates available (2015-2019) for similar facilities to determine whether the intersection or segment was considered a high crash location during the analysis period.

The crash analysis results, as shown in Table 1.2.2, indicate that 10 out of the 12 intersections and 1 out of the 6 segments are high crash locations.

Table 1.2.2: Intersection Crash Rate Summary

Location	Analysis Type	Total Crashes (5 Years)	Actual Crash Rate[1]	Statewide Average Crash Rate[2]	High Crash Location	Crash Ratio[3]
International Golf Parkway	Intersection	215	2.94	0.67	**Yes**	**4.41**
Murabella Parkway	Intersection	22	0.50	0.28	**Yes**	**1.82**
Verona Way	Intersection	16	0.41	0.20	**Yes**	**2.10**
Between Verona Way and San Giacomo Road	Segment[4]	6	-	-	-	-
San Giacomo Road	Intersection	16	0.43	0.20	**Yes**	**2.20**
Between San Giacomo Road and Francis Road	Segment	12	0.38	1.29	No	0.29
Francis Road	Intersection	24	0.63	0.20	**Yes**	**3.18**
Between Francis Road and Turnbull Creek Road	Segment	29	0.47	1.29	No	0.36
Turnbull Creek Road	Intersection	11	0.29	0.28	**Yes**	**1.04**
Between Turnbull Creek Road and Windward Ranch Boulevard	Segment	6	0.51	1.29	No	0.39
Windward Ranch Boulevard	Intersection	2	0.05	0.20	No	0.26
Between Windward Ranch Boulevard and Whisper Ridge Drive	Segment	2	0.31	1.29	No	0.24
Whisper Ridge Drive	Intersection	8	0.23	0.20	**Yes**	**1.15**
Between Whisper Ridge Drive and West Outlet Mall Access	Segment	8	0.53	1.29	No	0.41
West Outlet Mall Access	Intersection	9	0.24	0.27	No	0.89
Between West Outlet Mall Access and Toms Road	Segment	20	2.01	1.75	**Yes**	**1.15**
Toms Road	Intersection	54	1.22	0.53	**Yes**	**2.31**
Between Toms Road and CR 208	Segment[4]	10	-	-	**-**	-

Location	Analysis Type	Total Crashes (5 Years)	Actual Crash Rate[1]	Statewide Average Crash Rate[2]	High Crash Location	Crash Ratio[3]
CR 208	Intersection	70	1.36	0.53	**Yes**	**2.59**
I-95 SB Off Ramp Terminal	Intersection	195	3.04	1.51	**Yes**	**2.02**

[1]Intersection crash rate unit is per million entering vehicles while segment crash rate unit is per million vehicle-miles.
[2]Statewide Average Crash Rate used represents the most recent 5-year average available (2015-2019).
[3]Ratio of Actual Crash Rate divided by the Statewide Average Crash Rate.
[4]Segment length of less than 0.2 miles and therefore not included in crash rate analysis.

Secondary Need

1.2.4 Social and Economic Demand

During the last two decades, St. Johns County was one of the fastest growing counties in the State of Florida and the United States. According to the University of Florida Bureau of Economic and Business Research (BEBR), St. Johns County's population doubled between 2000 and 2020 and is projected to almost double again in the next 25 years. This population growth has resulted in the construction of several large subdivisions along SR 16 with an additional 2,500 homes planned, including the Grand Oaks development which is currently under construction.

SR 16 also connects the regional workforce to a 700,000 square foot commercial development known as the World Commerce Innovation Hub (Hub), which is located at I-95 and IGP, approximately 2.0 miles northeast of the western project limit. The Hub is expected to generate more than 1,200 jobs between the recently constructed businesses (Costco, Buc-ee's, Home Depot, and Bass Pro Shop) and the planned development (Field Motorcars).

These additional residential and commercial developments along and adjacent to SR 16 will put additional pressure on the already strained roadway network. Additional capacity on SR 16 is needed to accommodate the existing neighborhoods and businesses, as well as the planned developments.

1.3 Commitments

FDOT commits to the following:

1. FDOT will utilize the most recent version of the USFWS Standard Protection Measures for the eastern indigo snake during construction.
2. FDOT will provide mitigation for impacts to wood stork Suitable Foraging Habitat within the service area of a Service-approved wetland mitigation bank or wood stork conservation bank.
3. FDOT will re-initiate consultation with USFWS to determine appropriate avoidance and minimization measures for protection of the monarch butterfly if the monarch butterfly is listed by USFWS as threatened or endangered and the project may affect the species.
4. FDOT will re-initiate consultation with USFWS to determine appropriate avoidance and minimization measures for protection of the tricolored bat if the tricolored bat is listed by USFWS as threatened or endangered and the project may affect the species.
5. FDOT will follow current agency protection measures and will employ exclusion measures as necessary to prevent negative impacts to roosting bats if bats are present in bridges or culverts. Structures within the project area will be fully inspected for the presence of bats, including the tricolored bat, during design and permitting and again prior to construction.
6. FDOT will ensure nesting bald eagles are afforded protection through the implementation of FDOT Special Provision 0070104-2.
7. FDOT is committed to the construction of feasible noise abatement measures at the noise impacted locations identified in Table 3.1 and Figure 4.1 of the Noise Study Report, contingent upon the following conditions:
    - Final recommendations on the construction of abatement measures are 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 County; 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.

1.4 Alternatives Analysis

As part of the PD&E Study, a No-Build Alternative and Build Alternative were evaluated against the purpose and need of the project. Both alternatives were presented at the Alternatives Public Meeting in February 2024. The Preferred Alternative is described in Section 1.5.

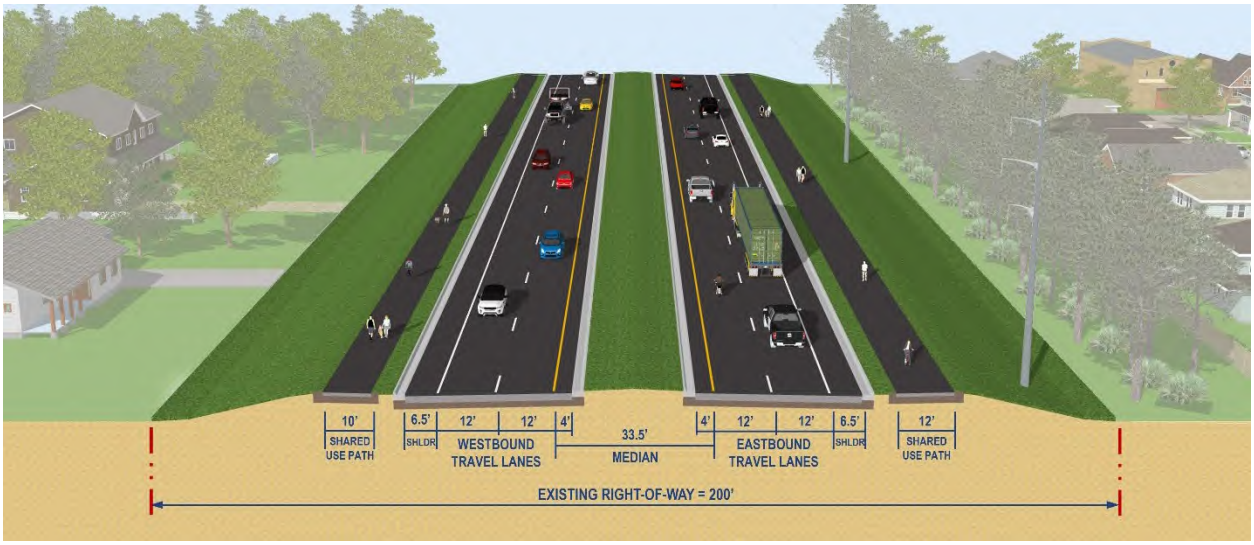
The No-Build Alternative retains the existing roadway and intersections. Under this scenario, the existing SR 16 would not be improved, but would be maintained in its current configuration. This alternative demonstrates conditions in the project's Design Year (2050) if the project is not implemented but other transportation improvements that are planned and programmed are completed. Due to the existing and future traffic demands of SR 16, the No-Build Alternative does not meet the project's purpose and need and is considered neither a viable nor a practical alternative, but it will be fully considered throughout the PD&E Study.

The Build Alternative for SR 16 is divided into two segments: Segment 1: IGP to the St. Augustine Outlet Mall, and Segment 2: St. Augustine Outlet Mall to I-95. St. Johns County is upgrading the portion of SR 16 between IGP and the proposed CR 2209, approximately 0.75 miles, to include a four-lane divided urban arterial along with intersection improvements. The concept plan sheets in Appendix A and B, as well as the intersection descriptions in Sections 5 and 7, reflect the County's proposed design at that time. The proposed improvements described below will tie into the County's project.

The proposed typical section for Segment 1 features a four-lane divided high-speed arterial with curb and gutter. The roadway consists of two 12-foot-wide lanes in each direction with a four-foot-wide paved inside shoulder and a 6.5-foot-wide paved outside shoulder. The opposing

lanes are separated by a 33.5-foot-wide raised grassed median (including the inside four-foot-wide shoulder). A 12-foot-wide shared use path is proposed in the eastbound direction and a 10-foot-wide shared use path is proposed in the westbound direction. The proposed design speed is 45 miles per hour (mph) from IGP to CR 2209, 55 mph from east of CR 2209 to west of the St. Augustine Outlet Mall, then 45 mph from the St. Augustine Outlet Mall to I-95. The existing right-of-way is approximately 200 feet, and no additional right-of-way is required to accommodate the proposed typical section. Figure 1.4.1 shows the proposed typical section for Segment 1, as shown at the Alternatives Public Meeting.

Figure 1.4.1: Proposed Typical Section – Segment 1



SR 16 is currently a two-lane undivided roadway which would be classified as non-restrictive, meaning there are no median openings. Upgrading Segment 1 to a four-lane divided facility will require the implementation of access management. The proposed access management classification is Class 3, which states directional median openings may be spaced at 1,320 feet and full median openings or signals may be spaced every 2,640 feet.

Segment 2 is already four lanes in the existing condition. Segment 2 is anticipated to meet the target LOS of D with proposed intersection improvements, so no additional capacity is recommended within this segment. The shared use paths from Segment 1 will be extended and

will tie into the existing sidewalk. Safety and operational improvements were evaluated within this segment of SR 16, including the improvements to the Toms Road intersection and crosswalks. The Toms Road intersection features a through-cut intersection to better direct vehicles through the intersection and reduce the risk of head-on and left-turn crashes. Segment 2 will maintain its access management classification of Class 3.

The estimated cost of the Build Alternative is approximately $172.3 million.

A hybrid Alternatives Public Meeting was held on February 20, 2024 and February 22, 2024. The meeting was conducted both virtually via GoToWebinar and in-person. The virtual meeting was held on Tuesday, February 20, 2024 starting at 5:30 p.m. and the in-person meeting was held on Thursday, February 22, 2024 starting at 4:30 p.m. at the World Golf Village Renaissance. The public meeting included exhibit boards describing and showing the Build Alternative as well as a presentation.

The comments received were generally in support of the project and the most common comments included specific requests for lowering the speed limit and installing signals at the major neighborhood entrances. Other comments included requests to begin the project as soon as possible, the construction timeline, requests for additional turn lanes, and requests for a noise wall.

Following the Alternatives Public Meeting, changes were made to reduce project costs, address public feedback, and incorporate the Value Engineering (VE) Study recommendations. These changes include:

- Reusing the existing roadway for the future eastbound lanes;
- Converting from an urban typical section to a rural typical section to have an open drainage system;
- Adding traffic signals to the following development entrances:
    - Turnbull Creek Road;

  - Whisper Ridge Road / Downs Corner;
  - Windward Ranch Boulevard; and
- Updating bicycle / pedestrian facilities to 12-foot-wide shared use paths on both sides of SR 16 throughout the project limits.

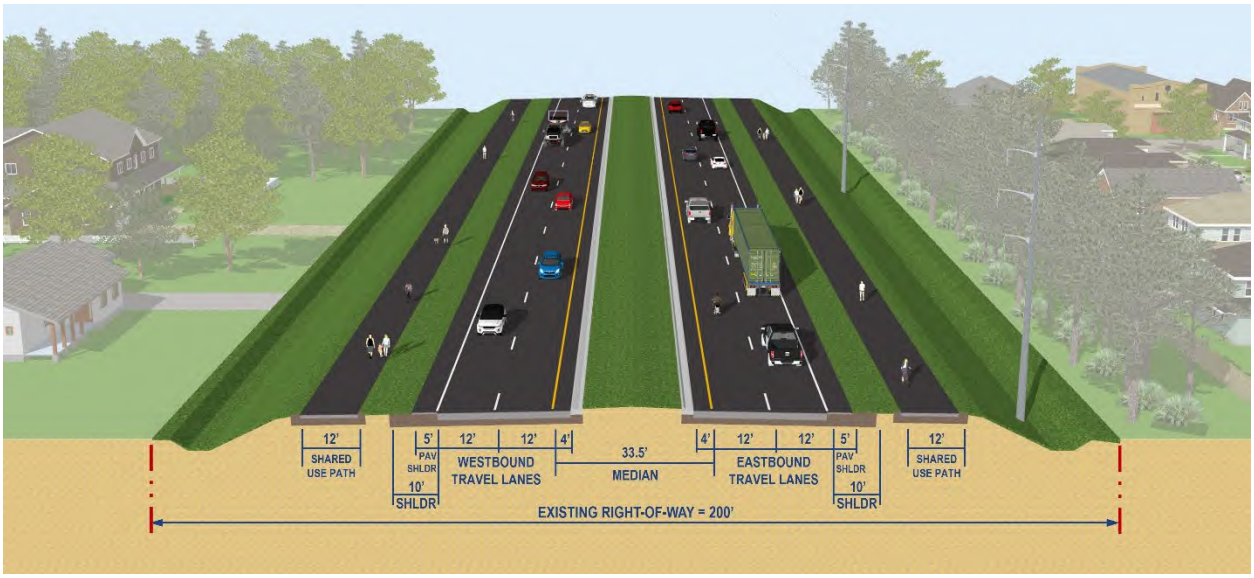
1.5 Description of the Preferred Alternative

The Preferred Alternative will be presented at the Public Hearing in August 2025 and is further described in *Section 7 Preferred Alternative*.

The Preferred Alternative for SR 16 is divided into two segments: Segment 1: IGP to the St. Augustine Outlet Mall, and Segment 2: St. Augustine Outlet Mall to I-95. St. Johns County is upgrading the portion of SR 16 between IGP and the proposed CR 2209, approximately 0.75 miles. The proposed improvements described below will tie into the County's project.

The Preferred Alternative will require milling, resurfacing, and widening of the existing SR 16 lanes (future eastbound lanes), along with constructing additional westbound lanes. The Preferred Alternative features a four-lane divided high-speed arterial with curb and gutter in the median and flush outside shoulders. The roadway consists of two 12-foot-wide lanes in each direction with a four-foot-wide paved inside shoulder and a 10-foot-wide outside shoulder (five-foot paved). The opposing lanes are separated by a 33.5-foot-wide raised grassed median (including the inside four-foot paved shoulders). A 12-foot-wide shared use path is proposed 15 feet from the edge of the travel lane on both sides of the road. The existing right-of-way is approximately 200 feet, and no additional right-of-way is required to accommodate the proposed typical section. However, in areas with high fill, shoulder gutter will be required on the shared use paths and concrete gravity walls will be located outside of the shared use paths. For more information see *Section 7.16 Bridge and Structure Analysis*. Figure 1.5.1 shows the proposed typical section.

Figure 1.5.1: Preferred Alternative Typical Section



Segment 2 is already four lanes in the existing condition and no additional capacity is recommended within this segment. The shared use paths from Segment 1 will be extended and will tie into the existing sidewalk.

The Preferred Alternative improvements include 14 signals at 10 intersections along SR 16 as described below:

- IGP / Pacetti Road (existing signal);
- CR 2209 Extension (proposed in St. Johns County SR 16 Improvements project) (signalized partial median U-turn (MUT) – two signals);
- South Francis Road (signalized hybrid MUT/thru-cut – two signals);
- Turnbull Creek Road / Grand Oaks (proposed signalized thru-cut – one signal);
- Windward Ranch Boulevard / Windward Ranch (proposed signal);
- Downs Corner Road / Park Place (proposed signal);
- Whisper Ridge Drive / Whisper Ridge (proposed signal);
- CR 208 Realignment (proposed in St. Johns County CR 208 Realignment project – one signal);
- Toms Road (existing signal) (signalized hybrid MUT/thru-cut – three signals); and

- I-95 Southbound Ramp (existing signal).

The Preferred Alternative improvements include the reconstruction of the bridge over Turnbull Creek. The length of the bridge is 140 feet, and the width is 59.5 feet. The bridges will be spaced 20 feet apart. The final configuration will be determined during the design phase when the Bridge Development Report (BDR) is finalized.

The Preferred Alternative improvements include four pond sites, Ponds 2C, 3C, 4C, and 5C. These ponds were selected due to the minimal environmental impacts and cost savings and are further described and displayed in *Section 7.14 Drainage and Stormwater Management*.

The Preferred Alternative roadway improvements do not impact any right-of-way or require any relocations; however, the preferred pond sites impact four parcels for a total of 37.8 acres. Temporary construction easements are also required for the roadway and pond improvements and are anticipated to impact 5.9 acres. No relocations are anticipated as a result of this project.

Three design variations are anticipated for base clearance, roadway slopes outside of the clear zone, and maintenance buffers. The variations are further described in *Section 7.5 Design Variations and Exception*s.

The total estimated cost for the Preferred Alternative is $225.1 million.

1.6 List of Technical Documents

Table 1.6.1 lists all of the technical documents that were prepared as part of this PD&E Study.

Table 1.6.1: Technical Documents Prepared for this Study

Report	Date Completed
Alternatives Public Meeting Summary	August 2024
Categorical Exclusion Type II	June 2025 (Draft)
Contamination Screening Evaluation Report	July 2024
Contamination Screening Evaluation Report Addendum	March 2025
Cultural Resource Assessment Survey	January 2024
Cultural Resource Assessment Survey Addendum I	May 2024
Cultural Resource Assessment Survey Addendum II	May 2025
Cultural Resource Bridge Exclusion Memo	August 2024
Location Hydraulics Report	January 2025
Natural Resources Evaluation	October 2024
Natural Resources Evaluation Addendum	April 2025
Noise Study Report	June 2025 (Draft)
Pond Siting Report	May 2025 (Draft)
Project Traffic Analysis Report	April 2025
Public Hearing Summary	Expected September 2025
Section 4(f) Determination of Applicability	May 2024
Sociocultural Effects Evaluation Report	June 2025 (Draft)
Value Engineering Study Report	October 2024
Water Quality Impact Evaluation	May 2025
Utility Assessment Report	February 2025

2.0 Existing Conditions

2.1 Previous Planning Studies

No previous planning studies occurred within the project study area.

An Efficient Transportation Decision Making (ETDM) screening was conducted for this project under number 14535. The ETDM process is FDOT's procedure for reviewing qualifying transportation projects to consider potential environmental effects in the Planning phase.

Adjacent projects and studies conducted in the area include the following:

- FM #: 434615-1 - I-95 from SR 207 to IGP resurfacing;
- FM #: 434615-2 - I-95 and SR 16 Operational Improvements;
- FM #: 210447-4 – SR 16 from CR 13A (IGP) to Toms Road;
- St. Johns County – SR 16 at IGP Intersection Improvements;
- St. Johns County – CR 2209 Extension; and
- St. Johns County – CR 208 Realignment.

2.2 Existing Roadway Conditions

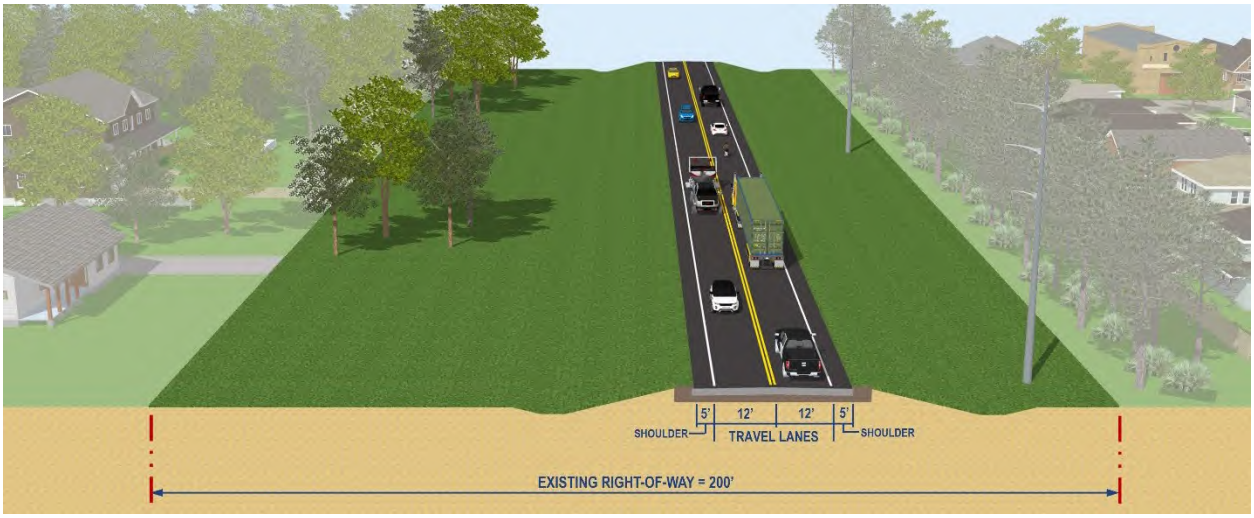
2.2.1 Roadway Typical Sections

The following section discusses the existing typical sections for SR 16 within the study area.

Segment 1: International Golf Parkway to St. Augustine Outlet Mall (North Entrance)

The typical section for Segment 1, from IGP to the St. Augustine Outlet Mall north entrance (approximately 5.1 miles), consists of a two-lane undivided arterial with 12-foot-wide lanes and five-foot-wide paved outside shoulders. The roadway is located within 200 feet of right-of-way. The posted speed for Segment 1 varies between 55 and 60 mph before lowering to 45 mph approximately 0.13 miles west of the St. Augustine Outlet Mall northern entrance. The typical section for Segment 1 is shown in Figure 2.2.1.

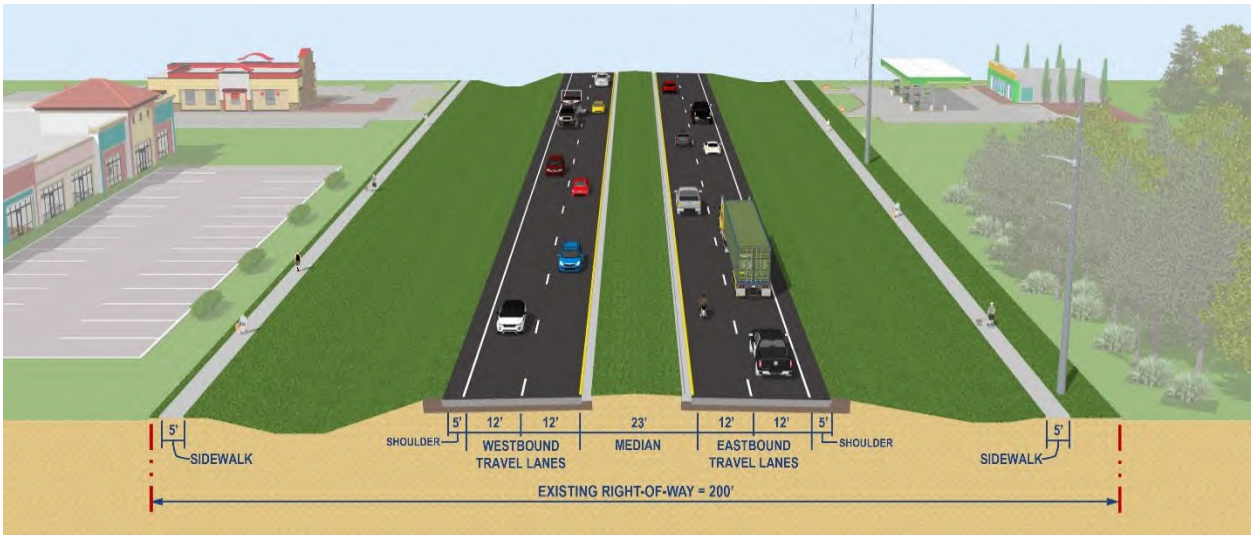
Figure 2.2.1: Existing Typical Section – Segment 1



Segment 2: St. Augustine Outlet Mall (North Entrance) to I-95

The typical section for Segment 2, from the St. Augustine Outlet Mall north entrance to I-95 (approximately 0.8 miles), consists of a four-lane divided arterial with two 12-foot-wide lanes and a five-foot-wide paved outside shoulder in each direction. The directions of travel are separated with a 23-foot-wide raised median that includes curb and gutter. A five-foot-wide discontinuous sidewalk is located on both sides of SR 16. The roadway is located within 200 feet of right-of-way. The posted speed for Segment 2 is 45 mph. Figure 2.2.2 shows the existing typical section for Segment 2.

Figure 2.2.2: Existing Typical Section – Segment 2



2.2.2 Roadway Functional and Context Classification

From IGP to South Francis Road, SR 16 has a functional classification of Urban: Principal Arterial – Other. From South Francis Road to I-95, SR 16 has a functional classification of Rural: Principal Arterial – Other. The context classifications on SR 16 are as follows:

- C3C – Suburban Commercial from IGP to Verona Way;
- C3R – Suburban Residential from Verona Way to San Giacomo Road;
- C2 – Rural from San Giacomo Road to Turning Point Academy;
- C3R – Suburban Residential from Turning Point Academy to Whisper Ridge; and
- C3C – Suburban Commercial from Whisper Ridge to I-95.

The C3C – Suburban Commercial areas are assigned due to the large shopping centers at either end of the project. The C3R – Suburban Residential areas are located at the Murabella, Windward Ranch, and Whisper Ridge neighborhoods. The C3R – Suburban Residential context classification will likely extend to include the new Grand Oaks neighborhood upon its completion. The C2 – Rural segment is assigned due to the Turnbull Creek conservation area south of SR 16. Figure 2.2.3 shows the existing context classification for SR 16.

2.2.3 Access Management Classification

The access management classification for Segment 1 is Class 4: Non-restrictive, meaning there are no medians or median openings. Connection spacings may be placed every 660 feet, and signals may be placed every 2,640 feet. The access management classification for Segment 2, from the St. Augustine Outlet Mall to I-95 is Class 3: Restrictive, meaning there is a median that physically prevents vehicles from crossing. Connection spacings may be placed every 660 feet, directional median openings may be placed every 1,320 feet, and full median openings and signals may be placed every 2,640 feet.

The access management for SR 16 is summarized in Table 2.2.1. The cells shaded in red do not meet FDOT access management standards.

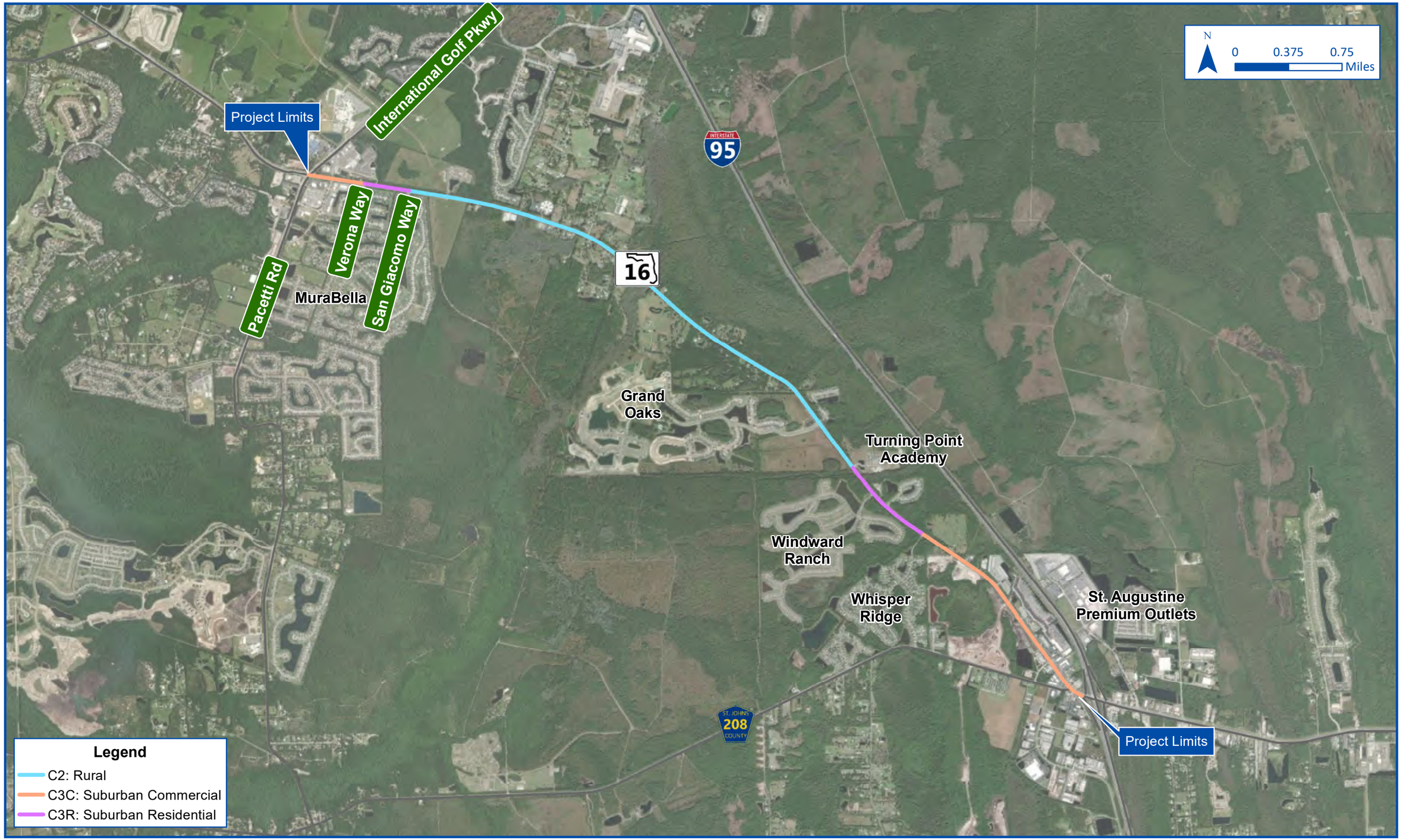

N
0
0.375
0.75
Miles
Project Limits
International Golf Pkwy
Verona Way
San Giacomo Way
Pacetti Rd
MuraBella
95
16
Grand Oaks
Turning Point Academy
Windward Ranch
Whisper Ridge
St. Augustine Premium Outlets
ST. JOHNS
208
COUNTY
Project Limits
Legend
C2: Rural
C3C: Suburban Commercial
C3R: Suburban Residential

Table 2.2.1: Existing Access Management

Side Road / Description	Existing Median Type	Existing Middle Station	Existing Median Spacing (feet)	Existing Signal Spacing (feet)
IGP	Full (Signal)	100+00		
			760	
Murabella Pkwy	WB Directional	107+60		
			1,820	
Commerce Plz Blvd	EB Directional	125+80		
			680	
San Giacomo Rd	Full	132+60		
			1,960	
Winners Way	Full	152+20		
			2,420	
Veterans Nursing Home/Superior Supply	EB Directional	176+40		
			1,540	
South Francis Road	EB Directional	191+80		
			9,600	29,540
Turnbull Creek Road	Full	287+80		
			1,770	
Turning Point at Calvary	EB Directional	305+50		
			1,110	
Windward Ranch Blvd	WB Directional	316+60		
			2,060	
Whisper Ridge Dr	WB Directional	337+20		
			2,860	
Atlantic Self Storage	Full	365+80		
			660	
CR 208 Realignment	Full	372+40		
			2,300	
Tom's Rd	Full (Signal)	395+40		1,670
			1,070	1,670
CR 208	WB Directional	406+10		
			600	
I-95 SB Off Ramp	Full (Signal)	412+10		

2.2.4 Right-of-way

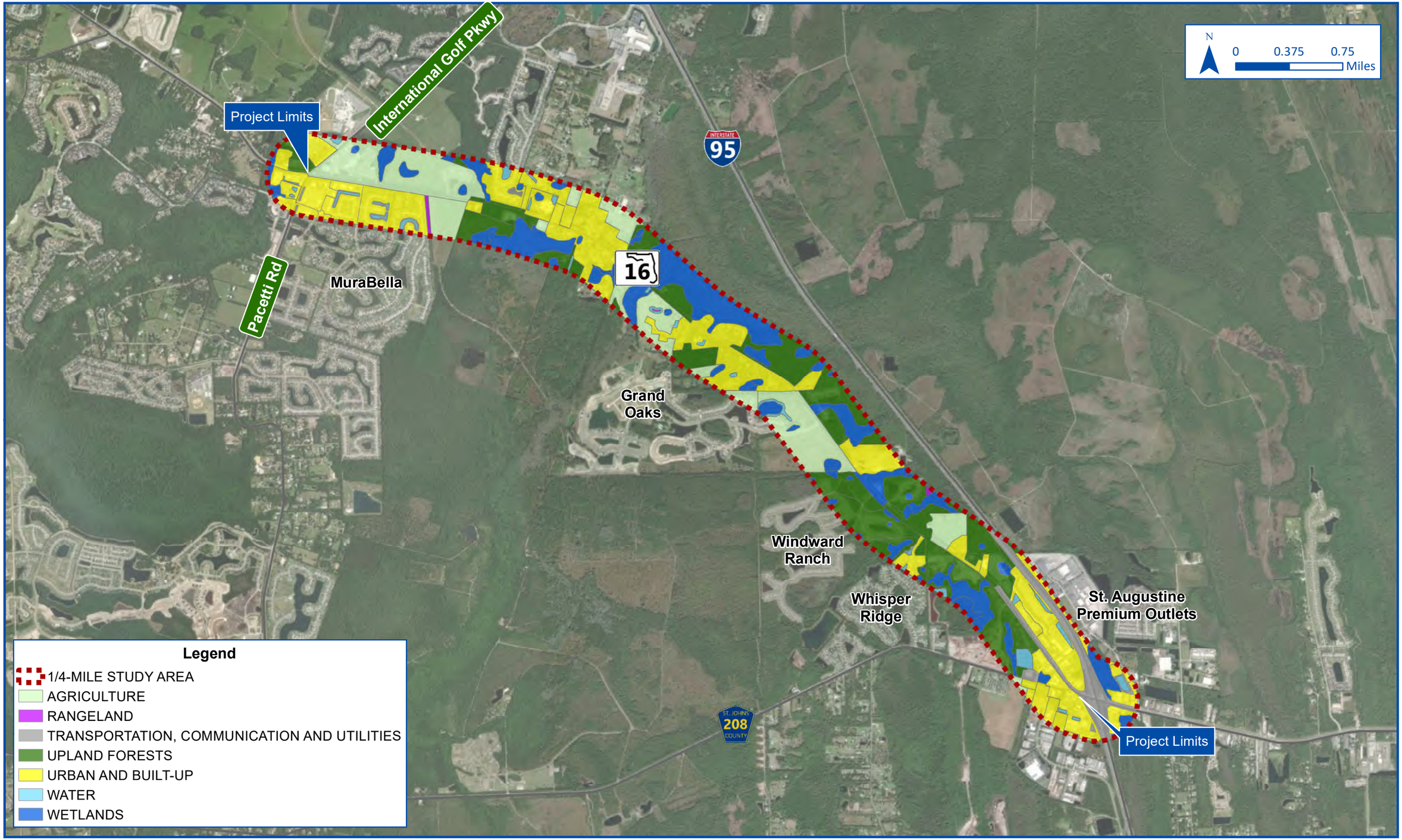
The existing right-of-way was surveyed and the right-of-way width throughout the project limits is 200 feet.

2.2.5 Adjacent Land Use

The project study area located within St. Johns County. Urban and built-up is the largest land use type within the study area (32.3%) which consists of commercial and residential properties. Upland forests (24.2%), wetlands (18.7%), and agriculture (18.3%) make up the next largest land use types. The existing land use data used for this analysis is from the St. Johns River Water Management District (SJRWMD), 2014, last updated in December 2022, however, the corridor is rapidly developing. Windward Ranch is shown as "forests" and the Grand Oaks neighborhood as well as the World Commerce Center are shown as "agriculture". Figure 2.2.4 shows the existing land use map for the project corridor.

2.2.6 Pavement Type and Condition

A Resurfacing, Restoration, and Rehabilitation project is underway for SR 16 within the project limits and the pavement survey identified light to moderate cracking. The wheel path rutting ranges from 0.05 to 0.54 inches. The structural condition of the roadway is primarily poor due to cracking, raveling, shoving, spalling, separation, and rutting.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.2.4: Existing Land Use	Page Number: 2-7

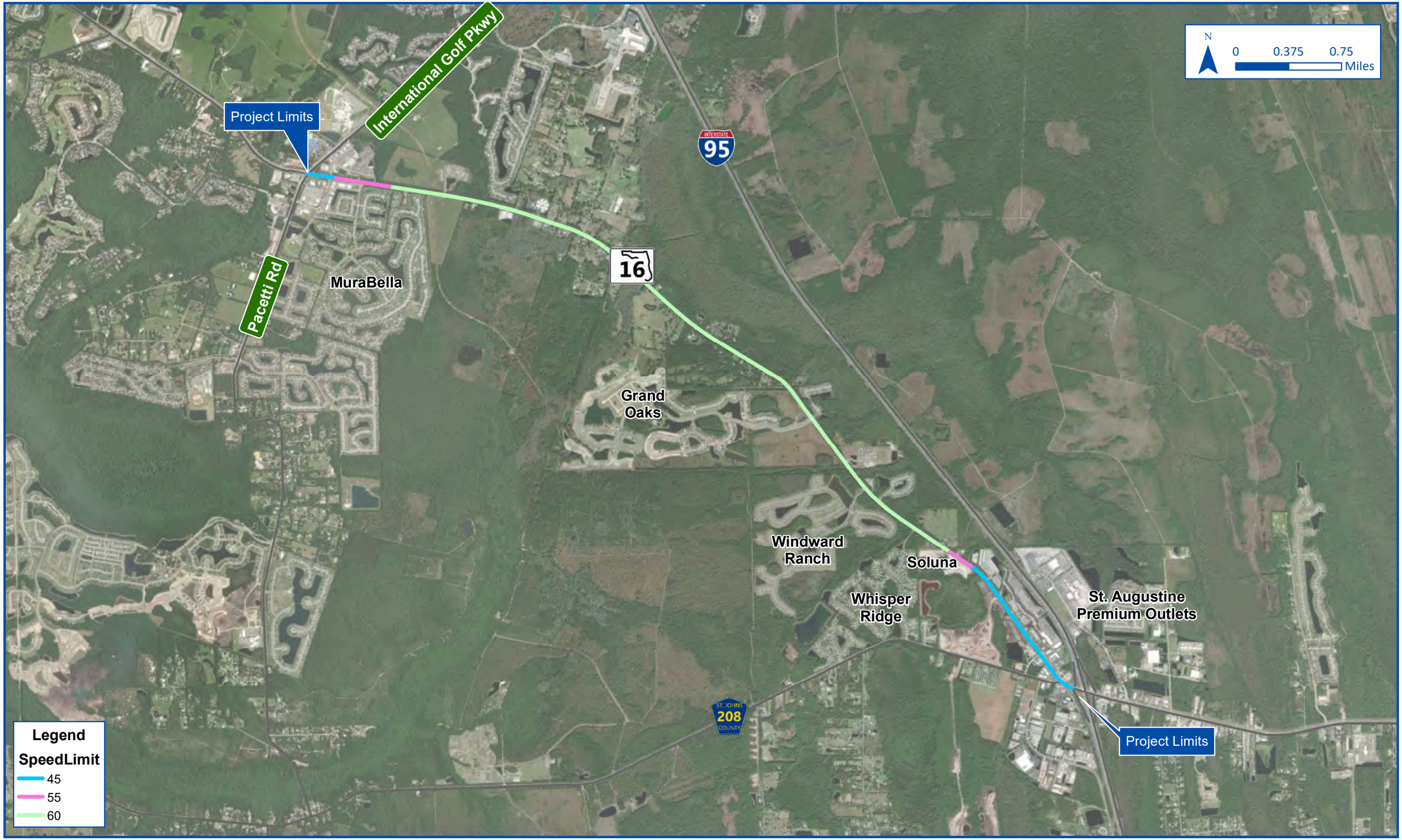
2.2.7 Existing Design and Posted Speeds

The posted speed for SR 16 varies along the corridor and changes as described below starting from west to east:

- IGP to Murabella Parkway: 45 mph;
- Murabella Parkway to just east of Commerce Plaza Boulevard: 55 mph;
- East of Commerce Plaza Boulevard to Soluna: 60 mph;
- Soluna to 0.13 miles west of the St. Augustine Mall: 55 mph; and
- 0.13 miles west of the St. Augustine Mall (north entrance) to I-95: 45 mph.

Figure 2.2.5 shows the existing posted speed limits throughout the SR 16 corridor.

As-builts showing the design speed within the project limits were not available for review.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.2.5: Existing Posted Speed Limits	Page Number: 2-9

2.2.8 Horizontal Alignment

SR 16 is generally a northwest to southeast corridor within the project limits. Below is a brief description of the existing roadway geometry:

- Starting at the IGP intersection, a tangent extends 4,630 feet in the S80°53'46"E direction;
- A 2,780-foot curve deflects the corridor to the south with a 17,188-foot radius;
- A 1,139-foot tangent directs the corridor in the S71°37'46"E direction;
- A 1,898-foot curve deflects the corridor to the south with a 4,584-foot radius;
- A 2,362-foot tangent directs the corridor in the S47°53'55"E direction;
- A 2,183-foot curve deflects the corridor to the east with a 11,459-foot radius;
- A 1,960-foot tangent directs the corridor in the S58°48'55"E direction;
- A 738-foot curve deflects the corridor to the south with a 1,910-foot radius;
- Just north of the Grand Oaks entrance, a 3,444-foot tangent directs the corridor in the S36°40'17"E direction;
- Through the Windward Ranch entrance, a 1,935-foot curve deflects the corridor to the east with a 5,730-foot radius;
- A 2,822-foot tangent directs the corridor in the S56°01'06"E direction;
- A 659-foot curve deflects the corridor to the south with a 1,910-foot radius;
- A 3,259-foot tangent directs the corridor in the S36°15'23"E direction;
- A 599-foot tangent deflects the corridor in the S36°18'30"E direction;
- A 732-foot curve deflects the corridor to the east with a 1,114-foot radius; and
- Through the I-95 interchange, a tangent directs the corridor in the S73°56'34"E direction.

2.2.9 Vertical Alignment

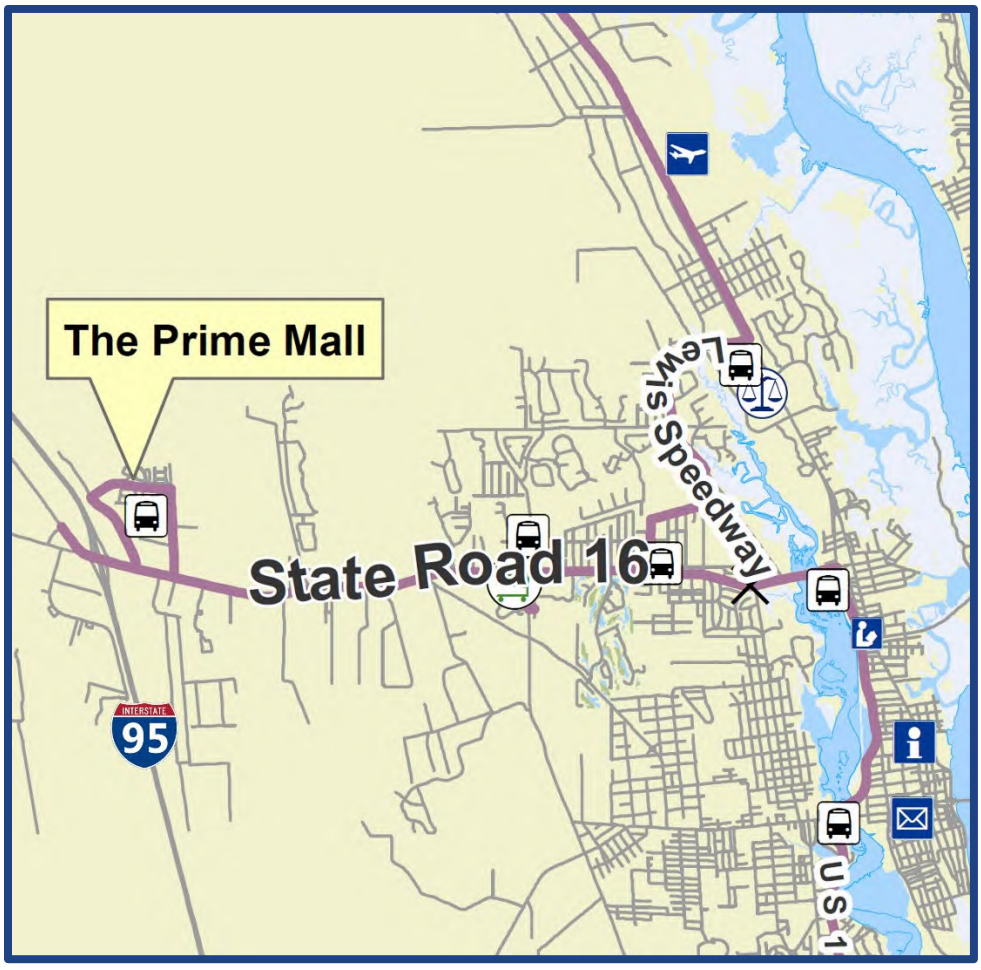
The vertical alignment data for SR 16 was captured using Google Earth. SR 16 is a relatively flat corridor with an elevation varying from approximately 28 feet to approximately 30 feet from IGP to Whisper Ridge Drive (approximately 4.5 miles). Starting at Whisper Ridge Drive, going east, the elevation changes from approximately 30 feet to approximately 48 feet just north of the St. Augustine Outlet Mall (approximately 0.7 miles). The profile then remains relatively flat between 46 and 47 feet of elevation as it approaches I-95 (approximately 0.7 miles).

2.2.10 Multimodal Facilities

Within segment 1, between IGP and the St. Augustine Outlet Mall, SR 16 features no pedestrian or bicycle facilities. Within segment 2, from the St. Augustine Outlet Mall to I-95, SR 16 features a discontinuous five-foot sidewalk located on both sides of the road and four-foot bicycle lanes.

The Sunshine Bus Company operates the transit service for St. Johns County. There is one bus route, the purple line, that runs along SR 16 from the St. Augustine Outlet Mall east into downtown St. Augustine and then north to Jacksonville. There are no bus stops located within the study limits. The closest bus stop is at the St. Augustine Outlet Mall (labeled as "The Prime Mall") east of I-95 as shown in Figure 2.2.6.

Figure 2.2.6: Purple Line Transit Map



2.2.11 Intersections

Three signalized intersections are located within the project limits and are described below.

SR 16 and IGP / Pacetti Road

SR 16 is a two-lane undivided arterial at this four-legged intersection. SR 16 in the east- and westbound directions consists of a dedicated left turn lane, a through lane, and a dedicated right turn lane. IGP and Pacetti Road consists of a dedicated left turn lane, two through lanes, and a dedicated right turn lane.

SR 16 and Toms Road

SR 16 is a four-lane divided arterial at this four-legged intersection. SR 16 in the east- and westbound directions consists of a dedicated left turn lane and two through lanes. Toms Road consists of a through lane and a dedicated right turn lane. The St. Augustine Outlet Mall consists of a dedicated left turn lane and a through lane.

SR 16 and I-95 Southbound Off Ramp

SR 16 is a four-lane divided arterial at this four-legged intersection. SR 16 in the eastbound direction consists of two through lanes and a dedicated right turn lane. SR 16 in the westbound condition consists of a dedicated left turn lane and two through lanes. The I-95 southbound off ramp consists of two dedicated left turn lanes and one dedicated right turn lane.

There are 13 unsignalized openings along SR 16 listed below:

- Murabella Parkway;
- Verona Way;
- Commerce Plaza Boulevard;
- San Giacomo Road;
- Winners Road (Mill Creek Park);
- South Francis Road;
- Turnbull Drive;

- Turnbull Creek Road / Tomoka Pines Drive;
- Windward Ranch Boulevard;
- Downs Corner Road;
- Whisper Ridge Drive;
- CR 208 Realignment (West Outlet Mall Access); and
- CR 208.

2.2.12 Physical or Operational Restrictions

No physical or operational restrictions are located within the project limits.

2.2.13 Traffic Data

Traffic data collection was conducted during September 2023, April 2024, and August 2024. Twelve-hour turning movement counts were collected at the 13 study area intersections. In addition, 72-hour bi-directional vehicle classification counts were collected at two locations along SR 16 and on South Francis Road north of SR 16, and 48-hour bi-directional vehicle counts were collected at three locations along SR 16. Appendix B of the Project Traffic Analysis Report (PTAR), under a separate cover, contains the raw traffic counts. However, the traffic volumes are expected to change with the CR 2209 extension and signalized intersection that is currently in final design and anticipated to begin construction in 2025. The traffic count data showed that the peak-hour truck percentages were generally consistent along SR 16 (eastbound and westbound approaches) within the study area. These ranged from 2% to 7% during the AM peak and from 1% to 2% during the PM peak. Therefore, an average value of 4% was selected on SR 16 for the AM peak, and an average value of 1% was selected for the PM peak.

Except for the western and eastern limits of the project, the pedestrian and bicycle activity were low along SR 16. Nine of 14 intersections experienced total pedestrian/bicycle volume ranging from zero to seven over the 12-hour period. On the western side of the project, the intersection of SR 16 at IGP/Pacetti Road observed 61 pedestrians and 16 bicyclists (primarily crossing the west side of the intersection accessing the two schools to the north on IGP), and the intersection of SR

16 at Murabella Parkway observed 18 pedestrians crossing the intersection approaches. On the eastern side of the project, the intersections of SR 16 at Toms Road, CR 208, and the I-95 Southbound Ramp Terminal observed total pedestrian/bicycle volume of 61 (59 pedestrians), 31 (24 pedestrians), and 21 (15 pedestrians), respectively.

2.2.13.1 Daily Traffic

Existing Year 2023 AADTs were developed using the 48- and 72-hour bi-directional counts. The daily traffic counts were averaged, and the appropriate seasonal and axle correction factors were applied to convert the existing count to an AADT. Existing count data was supplemented with data from Florida Traffic Online 2022, where necessary. The Existing Year 2023 AADTs are summarized in Table 2.2.2.

Table 2.2.2: Existing Year 2023 AADTs

Location	AADT
SR 16 West of International Golf Parkway	23,000
SR 16 Between San Giacomo Road and South Francis Road	19,600
SR 16 Between South Francis Road and Turnbull Creek Road	21,500
SR 16 Between Whisper Ridge Drive and West Outlet Mall Access	20,600
SR 16 Between West Outlet Mall Access and Toms Road	21,800
SR 16 Between Toms Road and CR 208	24,700
International Golf Parkway North of SR 16	29,600
Pacetti Road South of SR 16	18,000
South Francis Road North of SR 16	3,200
CR 208 South of SR 16	4,800
I-95 Southbound Off-Ramp	10,800
I-95 Southbound On-Ramp	6,900

2.2.13.2 Peak Hour Traffic

Study area peak hours were determined by analyzing the turning movement count data and tube count data to find the most frequent peak hour across the study intersections and segments. The AM peak hour was identified as 7:30 AM – 8:30 AM, while the PM peak hour was from 4:30 PM - 5:30 PM. Figure 2.2.7 shows the study intersection peak hour volumes.

2.2.14 Roadway Operational Conditions

The Existing Year 2023 operational conditions within the project study area were assessed with Synchro 11.

2.2.14.1 Existing Conditions Synchro Analysis

Synchro 11 was used to analyze the Existing Year 2023 study intersections. Of the 14 primary study intersections, three are signalized and 11 are unsignalized under existing conditions. Existing signal timings were obtained from St. Johns County and were incorporated into the existing conditions Synchro models to replicate the existing field signal timings. Intersection delay (seconds per vehicle) and LOS are reported in Table 2.2.3 in terms of the individual turning movements and the overall intersections. For the unsignalized intersections, the overall intersection delay is equivalent to the turning movement with the highest delay. The results indicate that the intersection of SR 16 and IGP / Pacetti operates at LOS E during the PM peak, while the two other signalized intersections operate at LOS D or better during both peaks. It should be noted that based on field visits, congestion was observed during the AM and PM peak hours for the eastbound, westbound, and northbound approaches at the IGP intersection. Seven of the unsignalized intersections include stop-controlled approaches that operate at LOS E or F during the AM peak. During the PM peak, eight of the unsignalized intersections include stop-controlled approaches that operate at LOS E or F. The high levels of delay are primarily due to the heavy eastbound and westbound traffic flow along SR 16 which provides few acceptable gaps and little opportunity for stop-controlled vehicles on the side streets to enter the traffic stream.

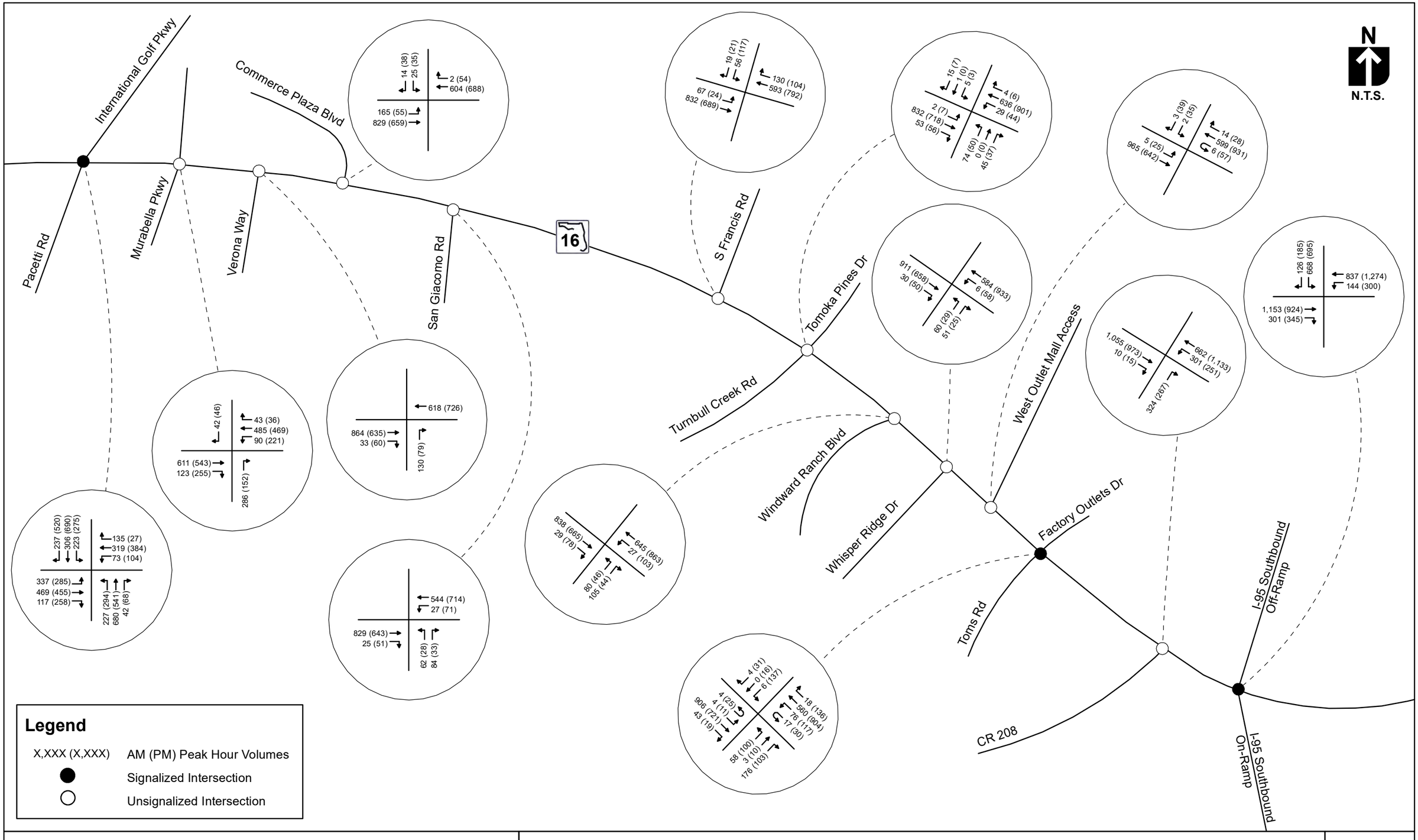

N
N.T.S.
International Golf Pkwy
Commerce Plaza Blvd
Pacetti Rd
Murabella Pkwy
Verona Way
San Giacomo Rd
16
S Francis Rd
Tomoka Pines Dr
Turnbull Creek Rd
West Outlet Mall Access
Windward Ranch Blvd
Whisper Ridge Dr
Factory Outlets Dr
Toms Rd
CR 208
I-95 Southbound Off-Ramp
I-95 Southbound On-Ramp
14 (38)
25 (35)
2 (54)
604 (688)
165 (55)
829 (659)
19 (21)
56 (117)
130 (104)
593 (792)
67 (24)
832 (689)
15 (7)
1 (0)
5 (3)
4 (6)
636 (901)
29 (44)
2 (7)
832 (718)
53 (56)
74 (50)
0 (0)
45 (37)
3 (39)
2 (35)
14 (28)
599 (931)
6 (57)
5 (25)
965 (642)
126 (185)
668 (695)
837 (1,274)
144 (300)
1,153 (924)
301 (345)
911 (658)
30 (50)
584 (933)
6 (58)
60 (29)
51 (25)
1,055 (973)
10 (15)
662 (1,133)
301 (251)
324 (267)
42 (46)
43 (36)
485 (469)
90 (221)
611 (543)
123 (255)
286 (152)
618 (726)
864 (635)
33 (60)
130 (79)
237 (520)
306 (690)
223 (275)
135 (27)
319 (384)
73 (104)
337 (285)
469 (455)
117 (258)
227 (294)
680 (541)
42 (68)
544 (714)
27 (71)
829 (643)
25 (51)
62 (28)
84 (33)
838 (665)
29 (78)
645 (863)
27 (103)
80 (46)
105 (44)
4 (31)
0 (16)
6 (137)
4 (25)
4 (11)
906 (721)
43 (19)
18 (136)
560 (904)
76 (117)
17 (30)
58 (100)
3 (10)
176 (105)
Legend
X,XXX (X,XXX) AM (PM) Peak Hour Volumes
Signalized Intersection
Unsignalized Intersection

Table 2.2.3: Existing Year 2023 Synchro Intersections Analysis

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay (sec) AM (PM)	LOS AM (PM)	Delay (sec) AM (PM)	LOS AM (PM)
International Golf Parkway / Pacetti Road	Eastbound	Left	41.8 (46.3)	D (D)	52.1 (55.7)	D **(E)**
		Through	51.2 (52.7)	D (D)		
		Right	2.4 (7.9)	A (A)		
	Westbound	Left	29.6 (29.4)	C (C)		
		Through	65.8 (64.4)	E (E)		
		Right	1.4 (0.2)	A (A)		
	Northbound	Left	80.7 (89.7)	F (F)		
		Through	64.5 (59.7)	E (E)		
		Right	0.3 (0.6)	A (A)		
	Southbound	Left	98.9 (81.5)	F (F)		
		Through	55.3 (73.6)	E (E)		
		Right	8.7 (35.7)	A (D)		
Murabella Parkway*	Westbound	Left	9.8 (11.2)	A (B)	23.4 (14.7)	C (B)
	Northbound	Right	23.4 (14.7)	C (B)		
	Southbound	Right	12.0 (11.7)	B (B)		
Verona Way*	Northbound	Right	13.4 (11.1)	B (B)	13.4 (11.1)	B (B)
Commerce Plaza Boulevard*	Eastbound	Left	9.6 (9.5)	A (A)	82.2 (44.7)	**F (E)**
	Southbound	Left	82.2 (44.7)	F (E)		
		Right	12.6 (14.1)	B (B)		
San Giacomo Road*	Westbound	Left	9.9 (9.4)	A (A)	53.0 (45.6)	**F (E)**
	Northbound	Left	53.0 (45.6)	F (E)		
		Right	18.1 (13.4)	C (B)		
Francis Road*	Eastbound	Left	9.6 (10.0)	A (B)	81.8 (201.8)	**F (F)**
	Southbound	Left / Right	81.8 (201.8)	F (F)		
Turnbull Creek Road / Tomoka Pines Drive*	Eastbound	Left	8.9 (9.9)	A (A)	174.2 (188.9)	**F (F)**
	Westbound	Left	10.1 (9.6)	B (A)		
	Northbound	Left	174.2 (188.9)	F (F)		
		Right	16.7 (14.5)	C (B)		
	Southbound	Left / Thru / Right	27.3 (36.1)	D (E)		
Windward Ranch Boulevard*	Westbound	Left	10.0 (9.8)	A (A)	91.6 (103.5)	**F (F)**
	Northbound	Left	91.6 (103.5)	F (F)		
		Right	19.6 (13.9)	C (B)		
Downs Corner Road*	Eastbound	Left	9.0 (10.2)	A (B)	39.6 (45.1)	**E (E)**
	Southbound	Left	39.6 (45.1)	E (E)		
		Right	13.2 (17.3)	B (C)		
Whisper Ridge Drive*	Westbound	Left	10.2 (9.4)	B (A)	60.0 (66.7)	**F (F)**
	Northbound	Left	60.0 (66.7)	F (F)		
		Right	18.4 (13.4)	C (B)		
West Outlet Mall Access*	Eastbound	Left	8.9 (10.3)	A (B)	16.6 (21.8)	C (C)
	Westbound	U-Turn	19.7 (14.8)	C (B)		
	Southbound	Left	16.6 (21.8)	C (C)		
		Right	13.1 (18.1)	B (C)		
Toms Road / Factory Outlets Drive	Eastbound	Left	5.5 (14.6)	A (B)	11.2 (21.6)	B (C)
		Through / Right	11.1 (26.2)	B (C)		
	Westbound	Left	5.3 (9.1)	A (A)		
		Through / Right	4.9 (15.0)	A (B)		
	Northbound	Through / Left	72.2 (74.0)	E (E)		

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
Toms Road / Factory Outlets Drive	Northbound	Right	13.5 (2.0)	B (A)	11.2 (21.6)	B (C)
	Southbound	Left	45.3 (37.8)	D (D)		
		Through / Right	0.0 (14.3)	A (B)		
CR 208*	Westbound	Left	16.3 (13.3)	C (B)	29.0 (20.4)	D (C)
	Northbound	Right	29.0 (20.4)	D (C)		
I-95 Southbound Ramp Terminal	Eastbound	Through	30.1 (55.3)	C (E)	31.1 (40.1)	C (D)
	Westbound	Left	46.0 (58.3)	D (E)		
		Through	10.8 (14.4)	B (B)		
	Southbound	Left	59.8 (56.2)	E (E)		
		Right	7.7 (23.4)	A (C)		

* Indicates an unsignalized intersection reporting the highest movement delay (LOS) for the overall intersection.
- Intersection LOS in **red** exceeds target LOS D.

2.2.15 Managed Lanes

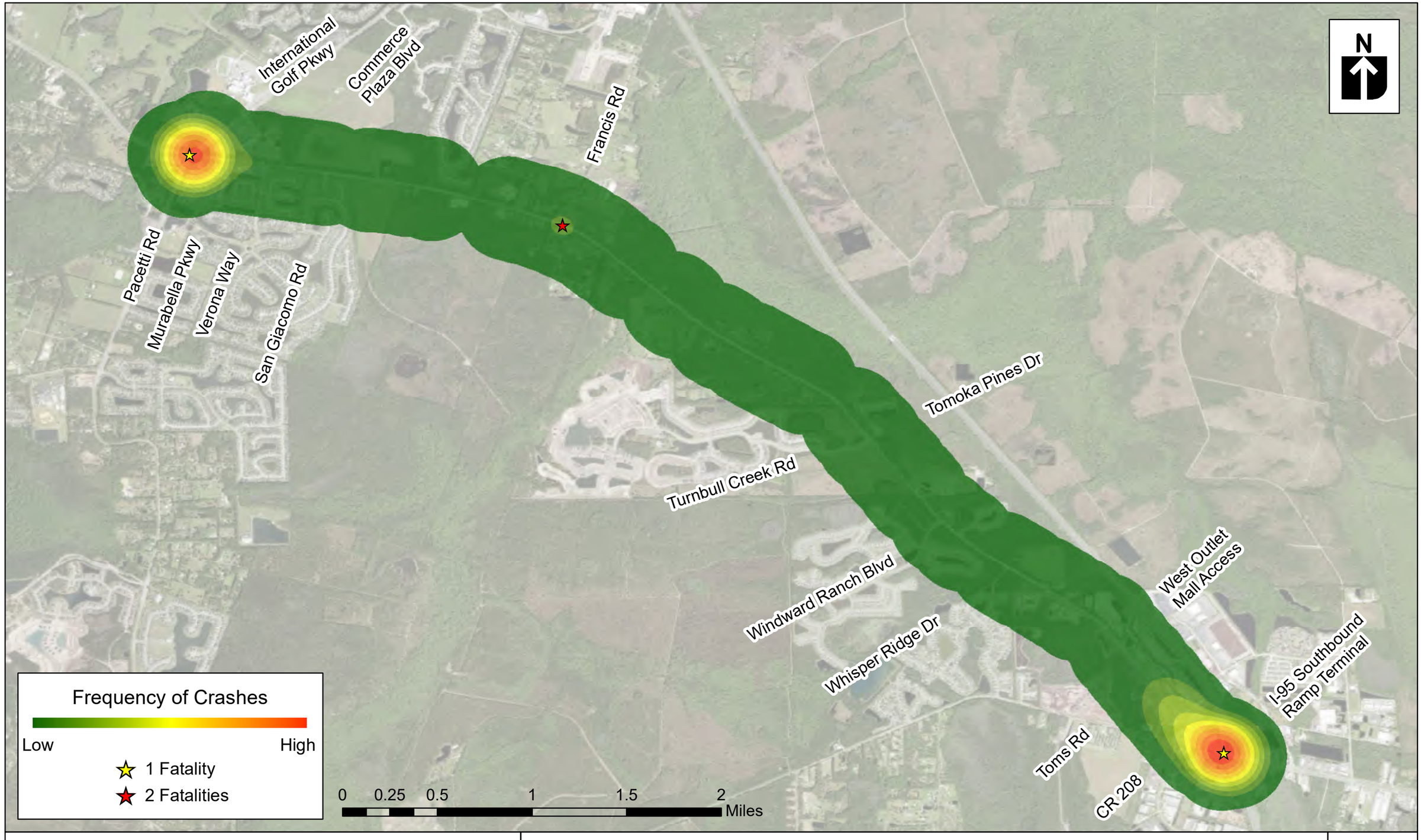
No managed lanes are located within the study area.

2.2.16 Crash Data

A total of 735 crashes were reported on SR 16 between IGP and I-95 based on data from FDOT SSOGis and Signal Four Analytics for the years 2018 to 2022. Of the 735 crashes, the majority were rear-end crashes (52.2%), turn crashes (13.9%), and sideswipe crashes (11.7%). Most crashes resulted in no injury (75.7%) or possible injury (14.1%). There were three fatal crashes resulting in four fatalities as well as 176 injury crashes within the study area. Table 2.2.4 summarizes the number of crashes by type, severity, lighting conditions, and surface conditions for the analysis period. Figure 2.2.8 shows a heat map of the historical crash data from 2018-2022.

Table 2.2.4: Segment Crash Rate Summary

SR 16 from IGP to I-95 SB Ramp Terminal		Number of Crashes					5 Year Total Crashes	Percent
		2018	2019	2020	2021	2022		
Crash Type	Rear End	80	72	62	90	80	384	52.2%
	Left Turn	19	18	18	22	25	102	13.9%
	Sideswipe	14	14	15	22	21	86	11.7%
	Other	5	9	6	14	10	44	6.0%
	Off Road	8	5	4	6	7	30	4.1%
	Right Turn	6	4	4	6	5	25	3.4%
	Angle	3	6	2	4	2	17	2.3%
	Head On	2	3	3	1	3	12	1.6%
	Animal	1	2	2	2	3	10	1.4%
	Other Non-Collision	2	1	2	2	1	8	1.1%
	Unknown	0	1	2	0	3	6	0.8%
	Bicycle	2	1	0	1	1	5	0.7%
	Rollover	0	1	2	2	0	5	0.7%
	Other Non-Fixed Object	0	1	0	0	0	1	0.1%
	Pedestrian	0	0	0	0	0	0	0.0%
	Total	**142**	**138**	**122**	**172**	**161**	**735**	**100.0%**
Crash Severity	No Injury	111	104	87	133	121	556	75.7%
	Possible Injury	23	20	16	20	25	104	14.1%
	Non-Incapacitating Injury	7	13	14	16	11	61	8.3%
	Incapacitating Injury	0	1	3	3	4	11	1.5%
	Fatal (within 30 days)	1	0	2	0	0	3	0.4%
Lighting Conditions	Daylight	104	105	93	136	122	560	76.1%
	Dusk	4	0	2	7	3	16	2.2%
	Dawn	5	2	6	2	6	21	2.9%
	Dark - Not Lighted	17	19	9	12	12	69	9.4%
	Dark - Lighted	12	12	12	14	18	68	9.3%
	Dark - Unknown Lighting	0	0	0	1	0	1	0.1%
Surface Conditions	Dry	116	120	102	143	144	625	85.0%
	Wet	26	18	20	29	17	110	15.0%


N
International Golf Pkwy
Commerce Plaza Blvd
Francis Rd
Pacetti Rd
Murabella Pkwy
Verona Way
San Giacomo Rd
Tomoka Pines Dr
Turnbull Creek Rd
Windward Ranch Blvd
Whisper Ridge Dr
West Outlet Mall Access
I-95 Southbound Ramp Terminal
Toms Rd
CR 208
Frequency of Crashes
Low
High
1 Fatality
2 Fatalities
0 0.25 0.5 1 1.5 2
Miles

The Average Crash Rate Method of crash analysis, based on identifying intersections and segments, average daily traffic, and number of crashes, was used for calculating the actual crash rate for the intersections and arterial segments within the project study area. The actual crash rates for the SR 16 intersections and segments were compared with the most recent five-year statewide average crash rates available (2015-2019) for similar facilities to determine whether the intersection or segment was considered a high crash location during the analysis period.

The crash analysis results, as shown in Table 2.2.5, indicate that 10 out of the 14 intersections and one out of the six segments are high crash locations. Commerce Plaza Boulevard and Winners Way were not open within the crash analysis period and are therefore excluded from the table. Turnbull Drive was excluded from the PTAR analysis due to the low movement counts at the intersection.

Table 2.2.5: Crash Rate Summary

Location	Analysis Type	Total Crashes (Five Years)	Actual Crash Rate[1]	Statewide Average Crash Rate[2]	High Crash Location	Crash Ratio[3]
International Golf Parkway	Intersection	215	2.94	0.67	**Yes**	**4.41**
Murabella Parkway	Intersection	22	0.50	0.28	**Yes**	**1.82**
Verona Way	Intersection	16	0.41	0.20	**Yes**	**2.10**
Between Verona Way and San Giacomo Road	Segment[4]	6	-	-	-	-
San Giacomo Road	Intersection	16	0.43	0.20	**Yes**	**2.20**
Between San Giacomo Road and Francis Road	Segment	12	0.38	1.29	No	0.29
Francis Road	Intersection	24	0.63	0.20	**Yes**	**3.18**
Between Francis Road and Turnbull Creek Road	Segment	29	0.47	1.29	No	0.36
Turnbull Creek Road	Intersection	11	0.29	0.28	**Yes**	**1.03**
Between Turnbull Creek Road and Windward Ranch Boulevard	Segment	6	0.51	1.29	No	0.39
Windward Ranch Boulevard	Intersection	2	0.05	0.20	No	0.26
Downs Corner Road	Intersection	2	0.06	0.20	No	0.29

Location	Analysis Type	Total Crashes (Five Years)	Actual Crash Rate[1]	Statewide Average Crash Rate[2]	High Crash Location	Crash Ratio[3]
Between Downs Corner Road and Whisper Ridge Drive	Segment[4]	0	-	-	-	-
Whisper Ridge Drive	Intersection	8	0.23	0.20	**Yes**	**1.15**
Between Whisper Ridge Drive and West Outlet Mall Access	Segment	8	0.53	1.29	No	0.41
West Outlet Mall Access	Intersection	9	0.24	0.27	No	0.89
Between West Outlet Mall Access and Toms Road	Segment	20	2.01	1.75	**Yes**	**1.15**
Toms Road	Intersection	54	1.22	0.53	**Yes**	**2.31**
Between Toms Road and CR 208	Segment[4]	10	-	-	**-**	-
CR 208	Intersection	70	1.36	0.53	**Yes**	**2.59**
I-95 SB Off Ramp Terminal	Intersection	195	3.04	1.51	**Yes**	**2.02**

[1]Intersection crash rate unit is per million entering vehicles while segment crash rate unit is per million vehicle-miles.
[2]Statewide Average Crash Rate used represents the most recent 5-year average available (2015-2019).
[3]Ratio of Actual Crash Rate divided by the Statewide Average Crash Rate.
[4]Segment length of less than 0.2 miles and therefore not included in crash rate analysis.

2.2.17 Railroad Crossings

No railroad crossings are located within the study area.

2.2.18 Drainage

The project is located within the limits of the Sixmile Creek basin contributing to the Lower St. Johns River basin. The majority of the corridor drains to Turnbull Creek, while the western portion drains to Mill Creek, both tributaries to Sixmile Creek. The area along the corridor is generally flat and consists of undeveloped and developed upland areas draining towards lower wetland areas. The existing SR 16 road base was generally constructed at grade and is slightly elevated above the surrounding areas. Stormwater runoff sheds from the roadway pavement and collects along a series of roadside ditches, and is conveyed to Turnbull Creek, which crosses the corridor near the center of the project limits. Areas at the western end of the project are conveyed towards the IGP intersection towards Mill Creek. Both Mill Creek and Sixmile Creek are considered open basins

that eventually outfall into the St. Johns River and the Atlantic Ocean. Within the project limits, the existing roadway basins total approximately 105 acres in area measured along the SR 16 corridor from IGP to I-95.

Existing Environmental Resource Permits (ERP) were not found within the project limits for the SR 16 corridor. Three offsite permitted stormwater ponds which outfall into the roadside ditches along SR 16 were identified:

- Clyde E. Lassen Veterans Nursing Home (ERP# 84623-27);
- Grand Oaks community (ERP# 139022-5); and
- Turning Point Christian Academy (ERP# 93623-3).

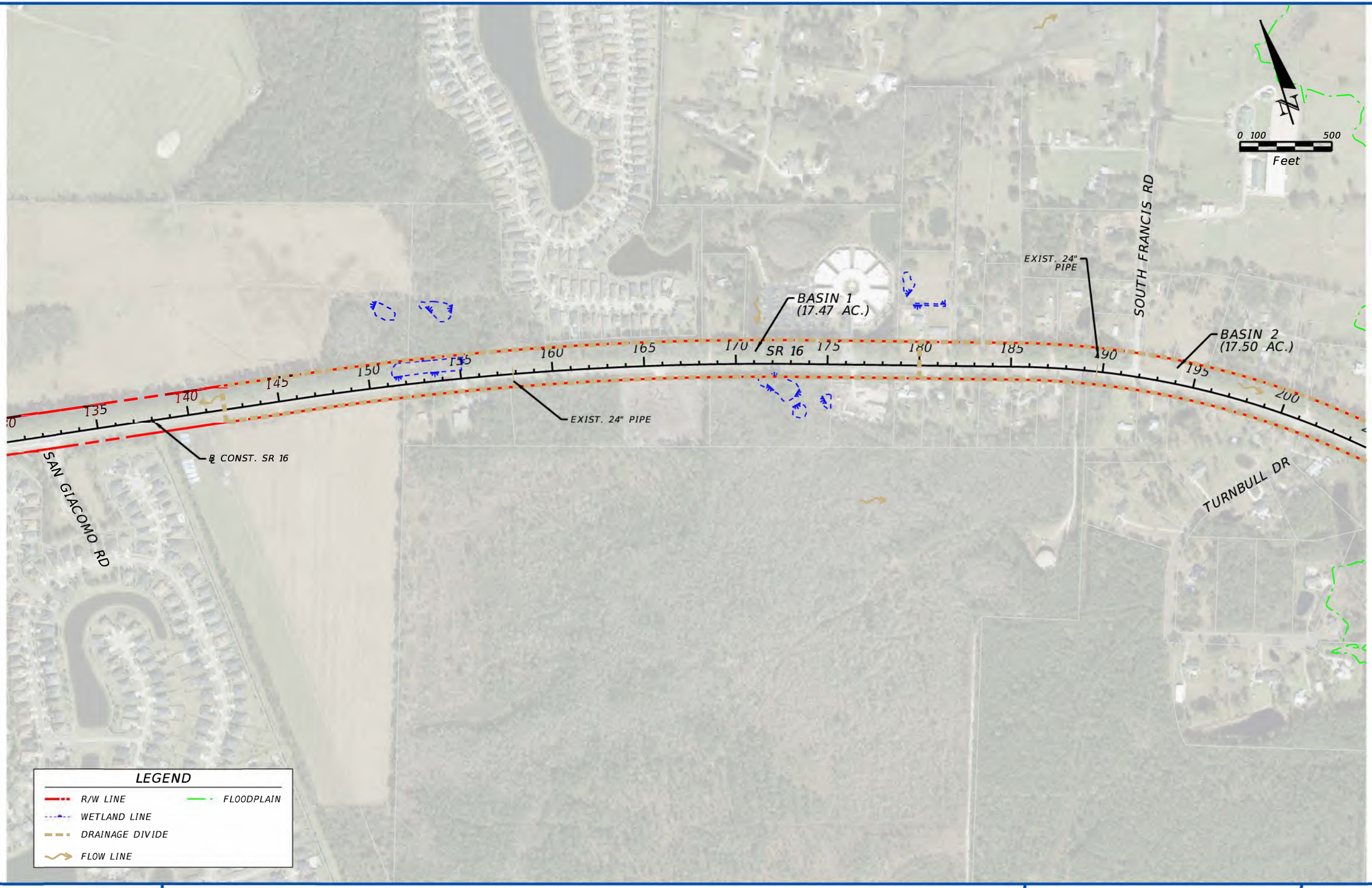
The base flood elevation of Turnbull Creek at the existing SR 16 bridge crossing has been identified as elevation 23.0 feet from the FEMA Flood Insurance Study (12109CV001D). Upstream from this crossing, Turnbull Creek flows parallel along the northside of the SR 16 corridor with base flood elevations ranging from 23.0 feet to 26.0 feet. Further east along the corridor, small pockets of floodplains feature base flood elevations of 27.5 feet and 29.5 feet.

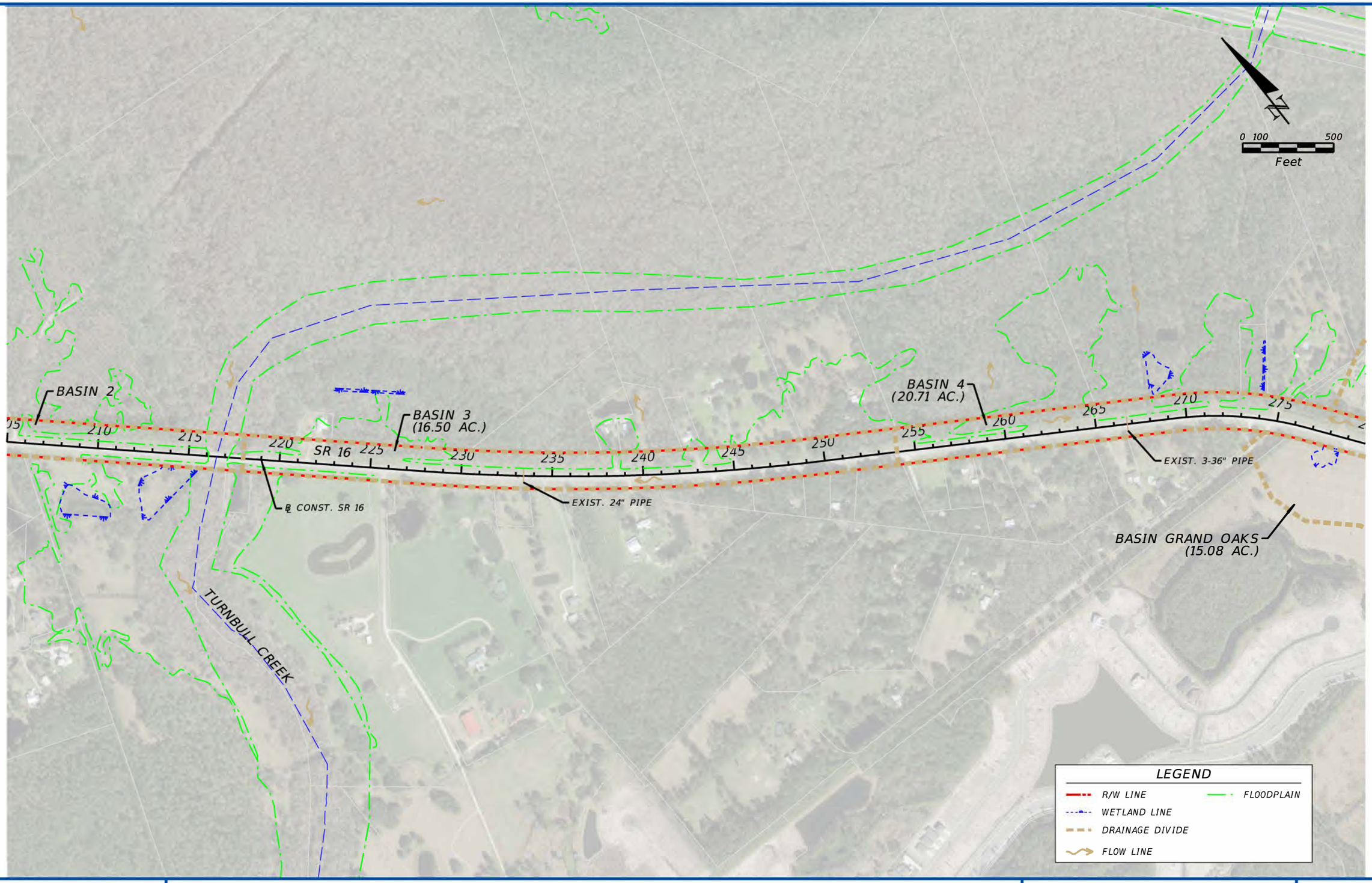
Existing Deficiencies

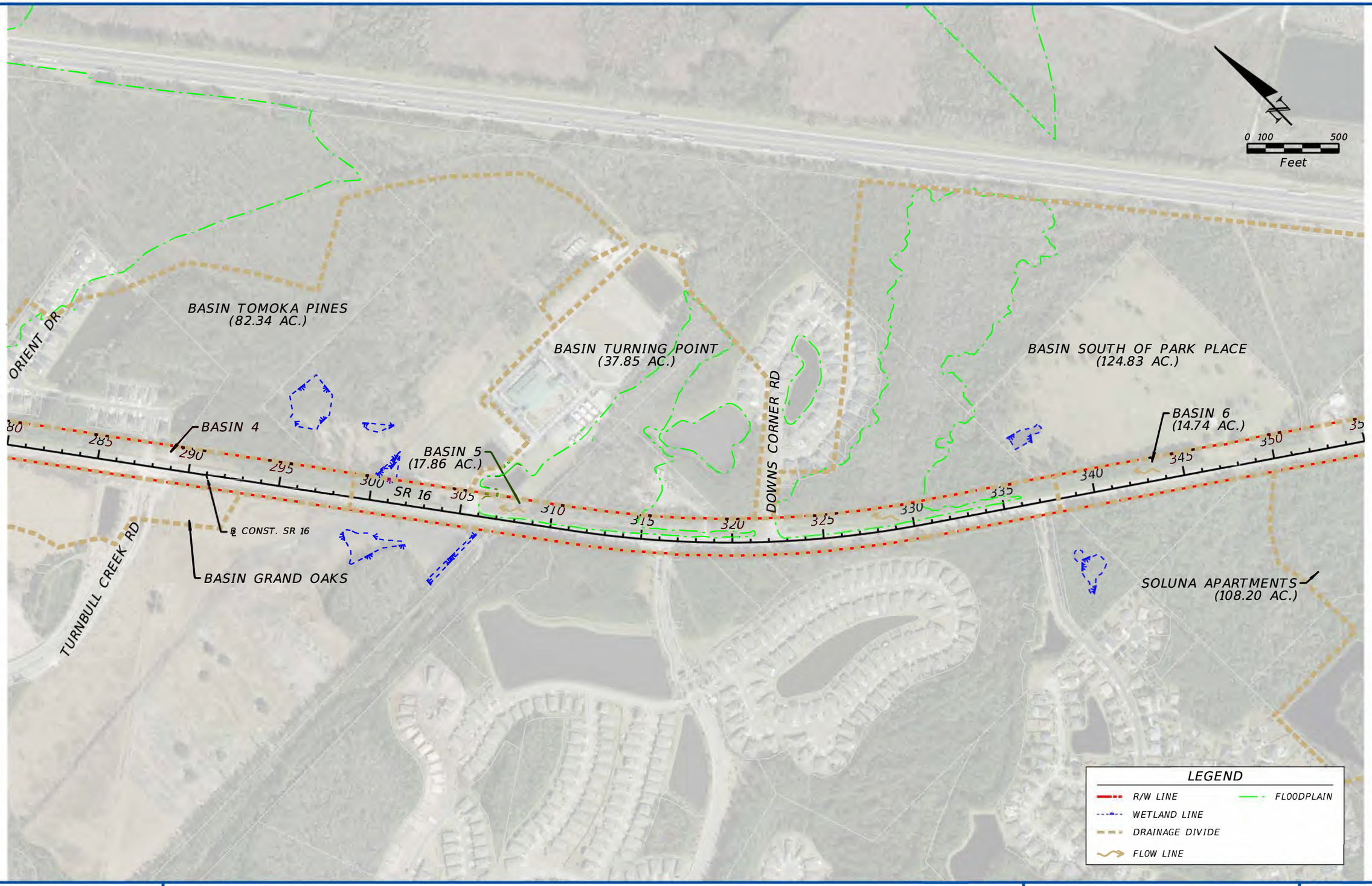
The roadside ditches along SR 16 were observed to be generally wet, and due to the flat terrain, contain stagnant runoff water throughout the year. Due to the presence of water and wet conditions, the ditches appear to be unmaintainable during the wettest times of the year. Trash and other debris collect where ditches are unmaintainable. Although the roadside ditches are generally wet, there have been no records of significant flooding or roadway overtopping. With the SR 16 road base constructed at existing grade, and due to the presence of flat areas with stagnant water conditions, the roadway base presents substandard clearances above the water table along the low segments of the corridor.

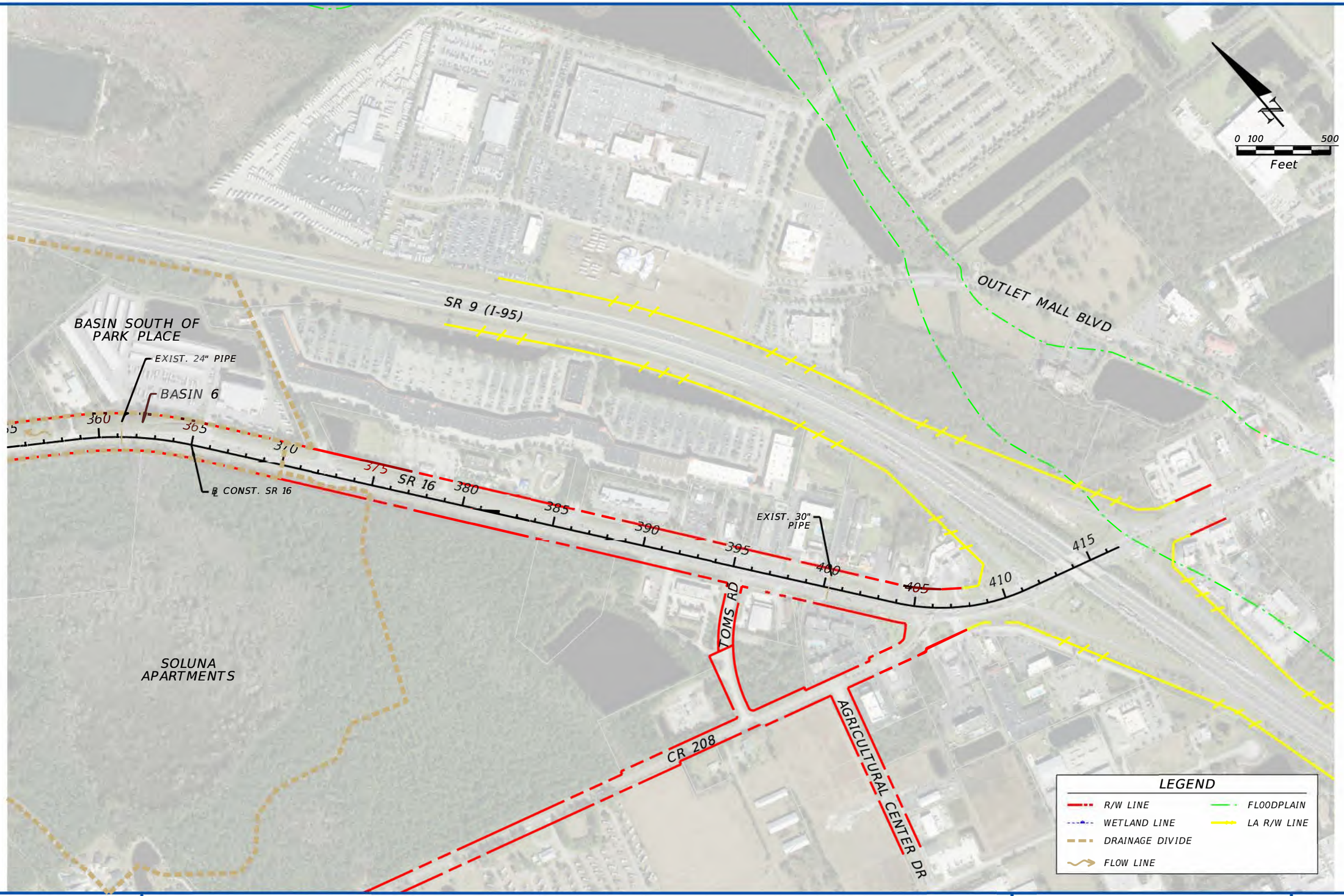
No scour or other erosion problems were observed at the bridge crossing over Turnbull Creek.

Drainage requirements for improvements to Segment 2 were not evaluated as this segment will not add capacity to SR 16. Figure 2.2.9 shows the existing drainage map for SR 16.


N
0 100 500
Feet
SOUTH FRANCIS RD
EXIST. 24" PIPE
BASIN 1
(17.47 AC.)
BASIN 2
(17.50 AC.)
SR 16
135
140
145
150
155
160
165
170
175
180
185
190
195
200
EXIST. 24" PIPE
℄ CONST. SR 16
SAN GIACOMO RD
TURNBULL DR
LEGEND
R/W LINE
WETLAND LINE
DRAINAGE DIVIDE
FLOW LINE
FLOODPLAIN


0 100 500
Feet
BASIN 2
BASIN 3
(16.50 AC.)
BASIN 4
(20.71 AC.)
SR 16
℄ CONST. SR 16
EXIST. 24" PIPE
EXIST. 3-36" PIPE
BASIN GRAND OAKS
(15.08 AC.)
TURNBULL CREEK
LEGEND
R/W LINE
WETLAND LINE
DRAINAGE DIVIDE
FLOW LINE
FLOODPLAIN


BASIN TOMOKA PINES
(82.34 AC.)
BASIN TURNING POINT
(37.85 AC.)
BASIN SOUTH OF PARK PLACE
(124.83 AC.)
ORIENT DR
DOWNS CORNER RD
BASIN 4
BASIN 5
(17.86 AC.)
BASIN 6
(14.74 AC.)
SR 16
℄ CONST. SR 16
BASIN GRAND OAKS
TURNBULL CREEK RD
SOLUNA APARTMENTS
(108.20 AC.)
280
285
290
295
300
305
310
315
320
325
330
335
340
345
350
0 100 500
Feet
LEGEND
R/W LINE
WETLAND LINE
DRAINAGE DIVIDE
FLOW LINE
FLOODPLAIN


BASIN SOUTH OF
PARK PLACE
EXIST. 24" PIPE
BASIN 6
SR 9 (I-95)
OUTLET MALL BLVD
0 100 500
Feet
360
365
370
375
SR 16
380
385
390
395
400
405
410
415
℄ CONST. SR 16
EXIST. 30"
PIPE
TOMS RD
SOLUNA
APARTMENTS
CR 208
AGRICULTURAL CENTER DR
LEGEND
R/W LINE
WETLAND LINE
DRAINAGE DIVIDE
FLOW LINE
FLOODPLAIN
LA R/W LINE

2.2.19 Lighting

Along SR 16, single-arm light poles are located north of the corridor between IGP and Verona Way spaced 150 feet apart. Approximately 350 feet southeast of the Kingdom of Jehovah's Witnesses, single-arm light poles are located on both sides of the corridor spaced approximately 150 to 330 feet apart. The lighting is maintained by the FDOT St. Augustine Maintenance Office. Figure 2.2.10 shows the location of the existing lighting along SR 16.

2.2.20 Utilities

As part of the PD&E Study, a utility coordination effort was conducted with assistance from the FDOT District Utility Coordinator (DUC). A Sunshine 811 design ticket was used to identify and request information from utility owners within 200 feet of the existing centerline along SR 16 within the project limits. The utility owners along with their respective contact information is summarized in Table 2.2.6.

Table 2.2.6: Utility Agency/Owner Contact List

Utility Owner	Utility Type	Contact Person	Contact Number	Email Address
AT&T Distribution	Telephone	PK Patel	904-699-4976	pp5963@att.com
		Dino Farruggio	-	G27896@ATT.com
		Utiliquest LLC	888-357-1922	-
Comcast	CATV	James Graham	904-509-6472	james_graham@cable.comcast.com
		Andrew Sweeny	904-738-6898	-
Florida Power & Light	Electric Distribution	Ivan Garcia	904-824-7659	ivan.garcia@fpl.com
		Jamie Purnell	386-586-6403	-
Florida Power & Light	Electric Transmission	-	-	-
Hotwire Communications	CATV, Fiber, Telephone	Walter Sancho-Davila	954-699-0900	walter.sancho-davila@hotwiremail.com
		Ralph Herrera	954-628-7023	-
St. Johns County Utility Department	Sewer & Water	Larry Miller	904-209-2624	-
		Cindy Lowe	904-209-2701	-
TECO Peoples Gas	Gas	Matthew Peak	813-951-7784	mmpeak@tecoenergy.com
		Cheyenne Thompson	813-743-7164	-
		Heath Mcardle	407-487-9004	-
Uniti Fiber LLC	Fiber	Charlie Croft	251-214-7059	-


N
0
0.325
0.65
Miles
Project Limits
International Golf Pkwy
Pacetti Rd
MuraBella
95
16
Grand
Oaks
Windward
Ranch
Whisper
Ridge
St. Augustine
Premium Outlets
Project Limits
FM #: 434615-2 Project Underway -
Light poles may vary once
construction is completed
208
Legend
Existing Light Poles

Early coordination with AT&T Distribution will be crucial as duct banks have been identified within the study area and are anticipated to require a considerable amount of lead time to adjust or relocate.

2.2.21 Soils and Geotechnical Data

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) National Cooperative Soil Survey indicates that the project area consists of soils with a variety of different hydraulic groups, ranging from A: low runoff potential (>90% sand and <10% clay), A/D: high runoff potential unless drained (>90% sand and <10% clay), B: moderately low runoff potential (50-90% sand and 10-20% clay), B/D: high runoff potential unless drained (50-90% sand and 10-20% clay), C: moderately high runoff potential (<50% sand and 20-40% clay), C/D: high runoff potential unless drained (<50% sand and 20-40% clay), and D: high runoff potential (<50% sand and >40% clay). Figure 2.2.11 shows the Hydrologic Soils map along SR 16 and Figure 2.2.12 shows the existing soil series along SR 16. Most of the soils within the project limits are classified as fine sand and assigned dual hydrologic group (A/D, B/D, or C/D) based on their drained or undrained condition.

2.2.22 Aesthetic Features

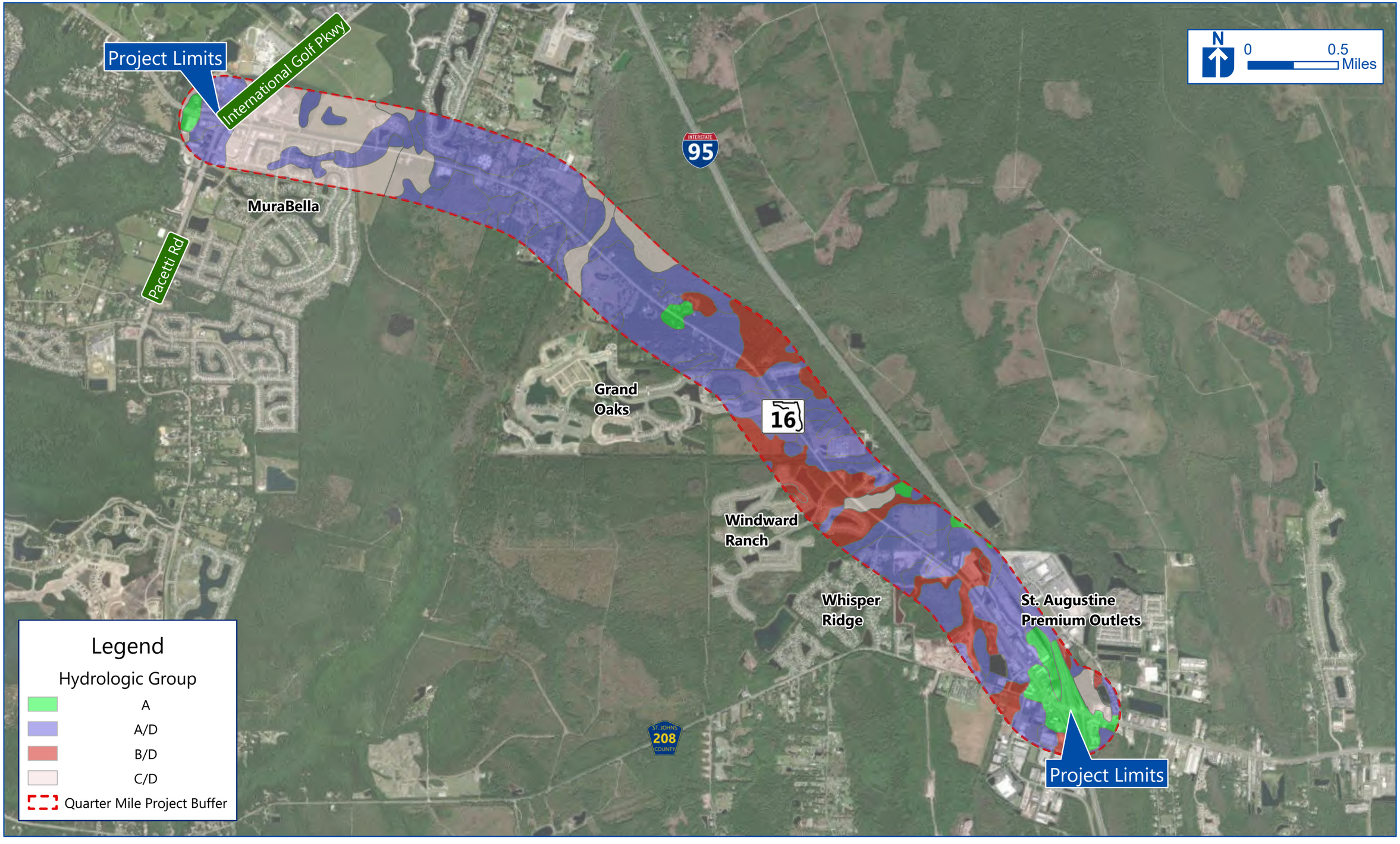
No aesthetic features are prevalent within the project limits.

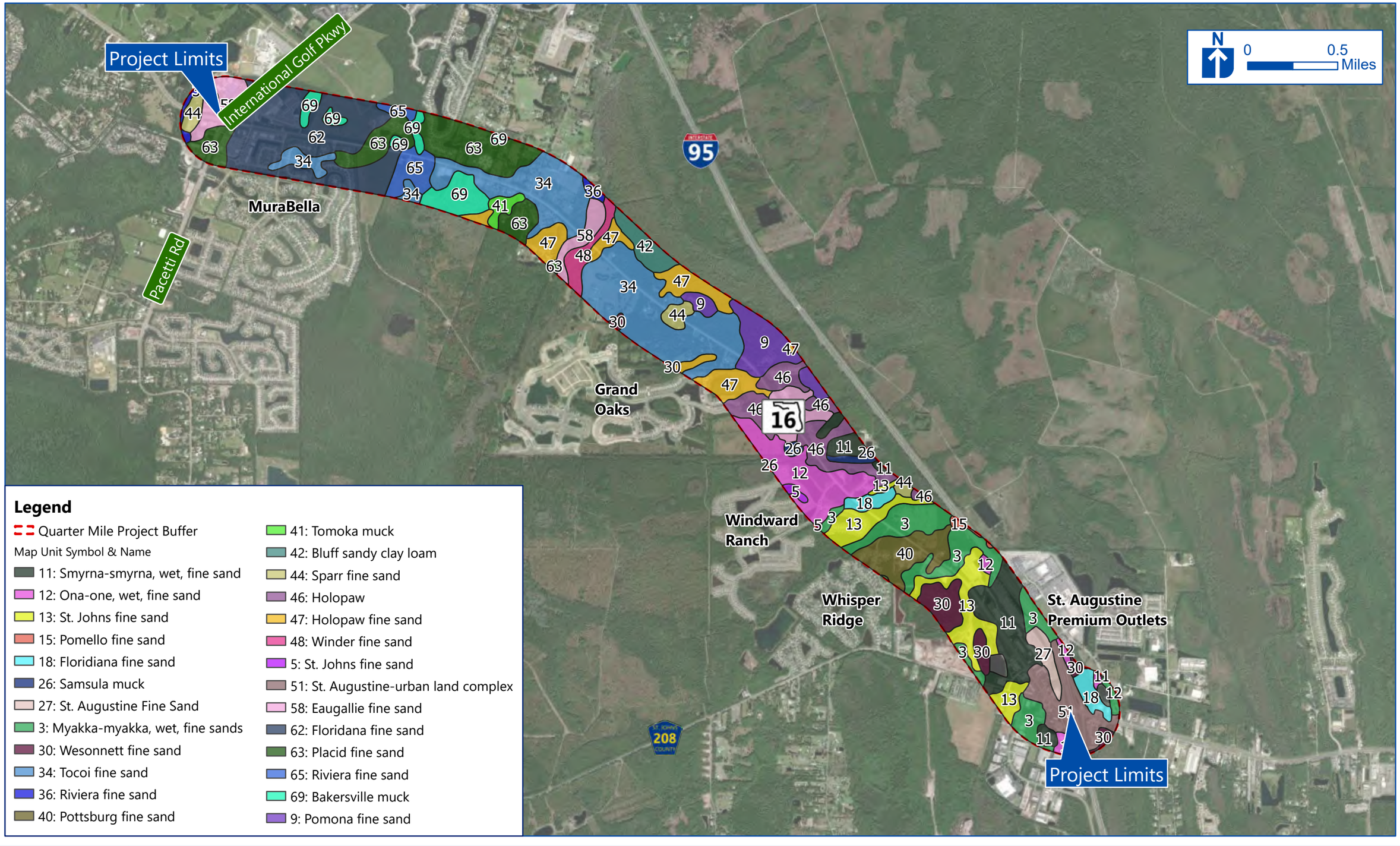
2.2.23 Traffic Signs

An inventory of the existing roadway guide signage was performed within the study area. The results of the sign inventory are shown in Figure 2.2.13.

2.2.24 Noise Walls and Perimeter Walls

No noise walls are present within the project limits.


Project Limits
International Golf Pkwy
Pacetti Rd
MuraBella
Grand Oaks
Windward Ranch
Whisper Ridge
St. Augustine Premium Outlets
Project Limits
95
16
208
N
0
0.5
Miles
Legend
Hydrologic Group
A
A/D
B/D
C/D
Quarter Mile Project Buffer


Project Limits
International Golf Pkwy
Pacetti Rd
MuraBella
Grand Oaks
Windward Ranch
Whisper Ridge
St. Augustine Premium Outlets
Project Limits
95
16
208
N
0
0.5
Miles
Legend
Quarter Mile Project Buffer
Map Unit Symbol & Name
11: Smyrna-smyrna, wet, fine sand
12: Ona-one, wet, fine sand
13: St. Johns fine sand
15: Pomello fine sand
18: Floridiana fine sand
26: Samsula muck
27: St. Augustine Fine Sand
3: Myakka-myakka, wet, fine sands
30: Wesonnett fine sand
34: Tocoi fine sand
36: Riviera fine sand
40: Pottsburg fine sand
41: Tomoka muck
42: Bluff sandy clay loam
44: Sparr fine sand
46: Holopaw
47: Holopaw fine sand
48: Winder fine sand
5: St. Johns fine sand
51: St. Augustine-urban land complex
58: Eaugallie fine sand
62: Floridana fine sand
63: Placid fine sand
65: Riviera fine sand
69: Bakersville muck
9: Pomona fine sand


16
Mill Creek Elementary School
International Golf Pkwy
Green Cove Spgs
World Golf Village
CVS
Pacetti Rd
Murabella
Mill Creek Park
S Francis Rd
INTERSTATE 95
Tomoka Pines
Grand Oaks
Turning Point at Calvary
Park Place
Windward Ranch
Whisper Ridge
Soluna (Under Construction)
St. Johns County Agricultural Center
WEST 208
Jacksonville
Miami
NORTH SOUTH 95 95
95 SOUTH Daytona Beach
95 NORTH Jacksonville
ST JOHNS 208 COUNTY
N

2.2.25 Intelligent Transportation Systems (ITS)/Transportation System Management and Operations (TSM&O) Features

Intelligent Transportation Systems (ITS) features are not currently located in the corridor. Transportation Systems Management and Operational (TSM&O) features in the project corridor include things such as dedicated turn lanes and traffic signal timing optimizations.

2.3 Existing Bridges and Structures

The SR 16 over Turnbull Creek Bridge (bridge number 780064) is the only bridge located along SR 16 within the project limits. Bridge information pertinent to the study was compiled from existing plans, the 1988 load rating analysis, and the 2023 bridge inspection report. The bridge was originally constructed as a timber bridge. In 1962, it was replaced as a concrete bridge, then widened in 1971, and had its barriers replaced in 2000. The inspection report indicates that the bridge is neither functionally obsolete nor structurally deficient and meets the FDOT Bridge Load Rating Manual's requirements for posting avoidance. The Turnbull Creek Bridge is excluded from Section 106 consideration. More information about Section 106 is available in *Section 2.4.2 Cultural Resources*.

The SR 16 over Turnbull Creek Bridge consists of five spans, each 20 feet long, with an overall bridge length of 100 feet. The superstructure consists of a cast-in-place reinforced concrete slab with an asphalt overlay. The substructure consists of pile bents with a concrete cap and 14 square-inch prestressed concrete piles.

The existing SR 16 over Turnbull Creek Bridge carries two 12-foot-wide lanes and two 10-foot-wide shoulders. The bridge is equipped with two F-Shaped traffic railings measuring 1.5 feet each. The total out-to-out bridge width is 46 feet and 10 inches. See Figure 2.3.1 for the existing typical section.

Figure 2.3.1: Existing Typical Section for Bridge 780064

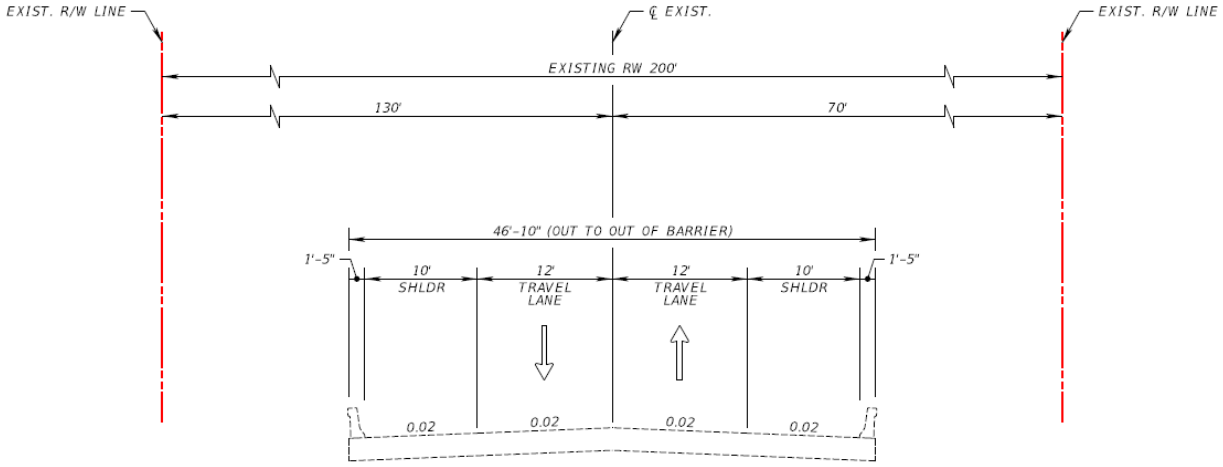


Table 2.3.1 below demonstrates the National Bridge Inventory ratings taken from the 2023 inspection report.

Table 2.3.1: Ratings for SR 16 over Turnbull Creek

Existing Bridge No.	National Bridge Inventory Rating (from Inspection Report)					
	Deck	Superstructure	Substructure	Performance Rating	Sufficiency Rating	Health Index
780064	7 (Good)	7 (Good)	6 (Satisfactory)	(Good)	79.1	58.51

The bridge has an overall Good performance rating with only the Substructure having a Satisfactory rating. Recommendations from the inspection report include sealing cracks, patching spalls, and removing abrasion.

The load rating analysis for this bridge is shown in Table 2.3.2.

Table 2.3.2: Load Rating Summary for SR 16 over Turnbull Creek

Loading Classification	Vehicle	Vehicle Weight (Tons)	Rating Level	Controlling Rating (Tons)	Load Rating Factor
Florida Legal Load	SU4	35.0	Operating	37.0	1.05
Design Loading	HS 15	36.0	Inventory	28.5	<1.0
	HS 26	36.0	Operating	47.4	1.32

As shown in Table 2.3.2, bridge number 780064 has a Load Rating Factor for the Design Inventory condition of less than 1, and a minimum Florida Legal Load Condition (SU4 Truck) Load Rating Factor of 1.05. The Structural Design Guidelines provides these options for bridges that are to be widened/rehabilitated when the inventory rating factor is less than 1:

1. Apply for a design variation
2. Program bridge for strengthening
3. Program bridge for replacement

Therefore, this bridge cannot be widened/rehabilitated without taking the previous three options into account. The FDOT Bridge Load Rating Manual states that a bridge must be posted for weight when the Florida Legal Load has an operating factor of less than 1.00. This bridge meets this requirement and is not required to be posted.

The Florida Design Manual states the minimum vertical clearance between the design flood stage and the low member of the bridge is two feet. The existing bridge has a 2-foot- 1 ⅛-inch minimum vertical clearance from the design high water elevation (25.7 feet) measured at the time the bridge was widened in 1971, with a normal flow elevation of 21.3 feet.

At the time of the 2023 inspection, Turnbull Creek was measured to have a channel depth of four feet. A profile comparison report was conducted and shows the maximum scour found from measurements taken in 1962, 2021, and 2023 was around 1.69 feet.

2.4 Existing Environmental Features

2.4.1 Social Resources

2.4.1.1 Community Focal Points

A Sociocultural Effects Evaluation (SCE) was conducted for this project and is available under a separate cover. Field reviews and existing Geographic Information Systems (GIS) data were used to assess the socioeconomic characteristics and impacts associated with the project.

Community focal points are public or private locations, facilities, or organizations that are important to local residents and communities. Community focal points include schools, worship centers, community centers, parks, cemeteries, fire stations, law enforcement facilities, government buildings, healthcare facilities, and social service facilities. The sections below summarize the community focal points in the area within a ¼-mile buffer around the corridor. This buffer will be referred to as the ¼-mile study area throughout the remainder of this section.

Schools

Five schools are located within the ¼-mile study. Figure 2.4.1 depicts the schools within the ¼-mile study area.

- Mill Creek Academy;
- Turning Point at Calvary Academy;
- Tadpole Prep Preschool;
- Florida Autism Center; and
- Tocoi Creek High School.

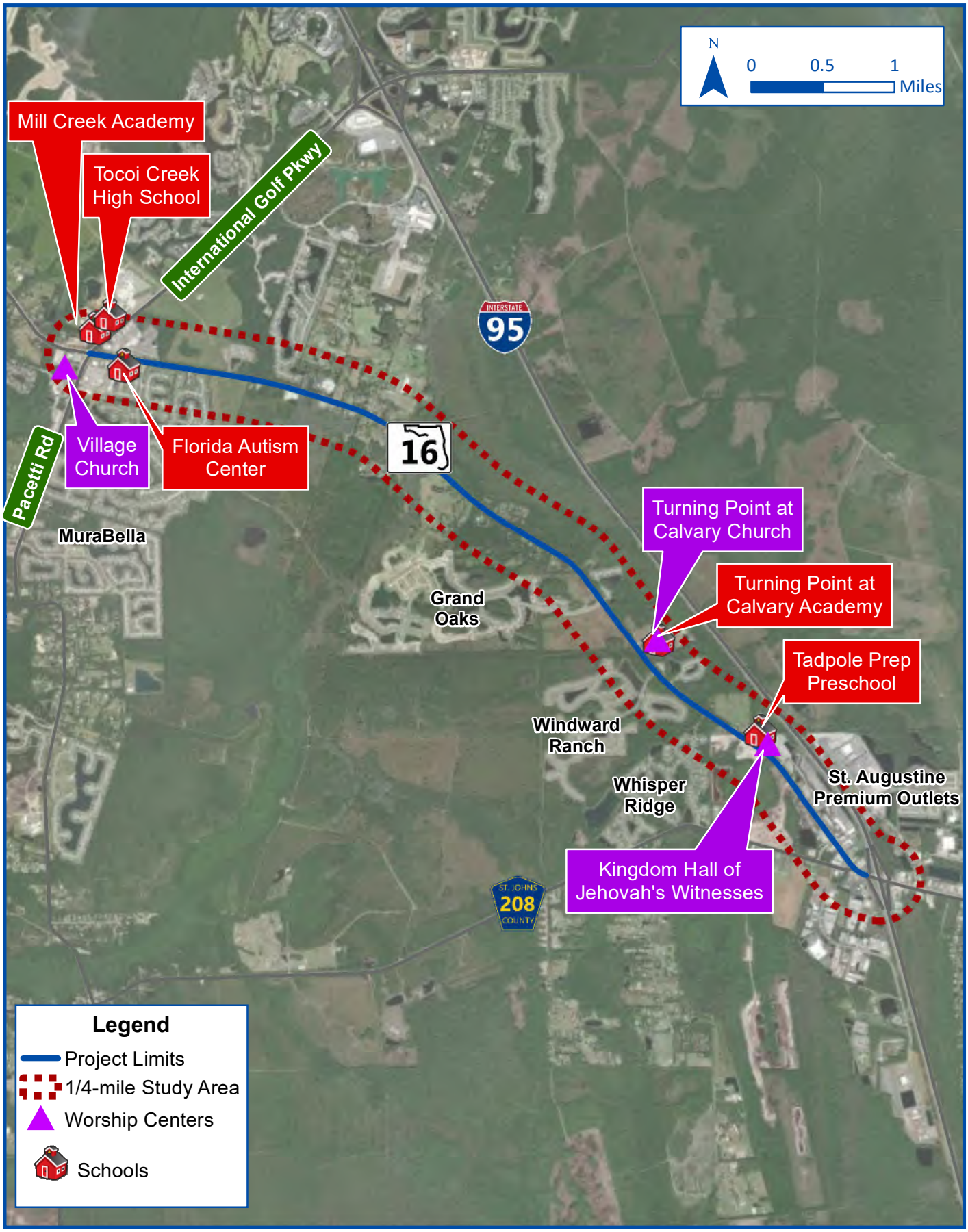
Worship Centers

Three worship centers are located within the ¼-mile study area and are listed below. Figure 2.4.1 depicts the worship centers within the ¼-mile study area.

- Village Church;
- Kingdom Hall of Jehovah's Witnesses; and
- Turning Point at Calvary Church.

Community Centers

No community centers are located within the ¼-mile study area.



FDOT	**SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study**	**Figure 2.4.1: Schools and Worship Centers**	**Page Number: 2-38**

Parks

Mill Creek Park is the only public park located within the ¼-mile study area. Mill Creek Park is located adjacent to SR 16 and is currently under construction. The park features a multipurpose field, two basketball courts, two softball fields, four batting cages, concession stands, and restrooms. Figure 2.4.2 shows the park within the ¼-mile study area.

Cemeteries

Our Lady of Good Counsel cemetery is located west of IGP as shown in Figure 2.4.2.

Fire Stations

St. Johns County Fire Rescue Station 16 is located east of Pacetti Road approximately ¼-mile south of SR 16, as shown in Figure 2.4.2.

Law Enforcement Facilities

No law enforcement facilities are located within the ¼-mile study area.

Government Buildings

No government buildings are located within the ¼-mile study area.

Healthcare Facilities

Five healthcare facilities are located within the ¼-mile study area and are listed below. Figure 2.4.3 shows the healthcare facilities within the ¼-mile study area.

- O'Connell Health Center;
- Flagler Health Village at Murabella (UF Health);
- First Coast Heart and Vascular Center
- CareFast+ Urgent Care; and
- OB-GYN Associates of St. Augustine.

Cultural Facilities

No cultural facilities are located within the ¼-mile study area.

FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.4.2: Parks, Cemeteries, and Fire Stations	Page Number: 2-40

FDOT	**SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study**	**Figure 2.4.3: Healthcare Facilities and Social Service Facilities**	**Page Number: 2-41**

Civic Centers

No civic centers are located within the ¼-mile study area.

Social Service Facilities

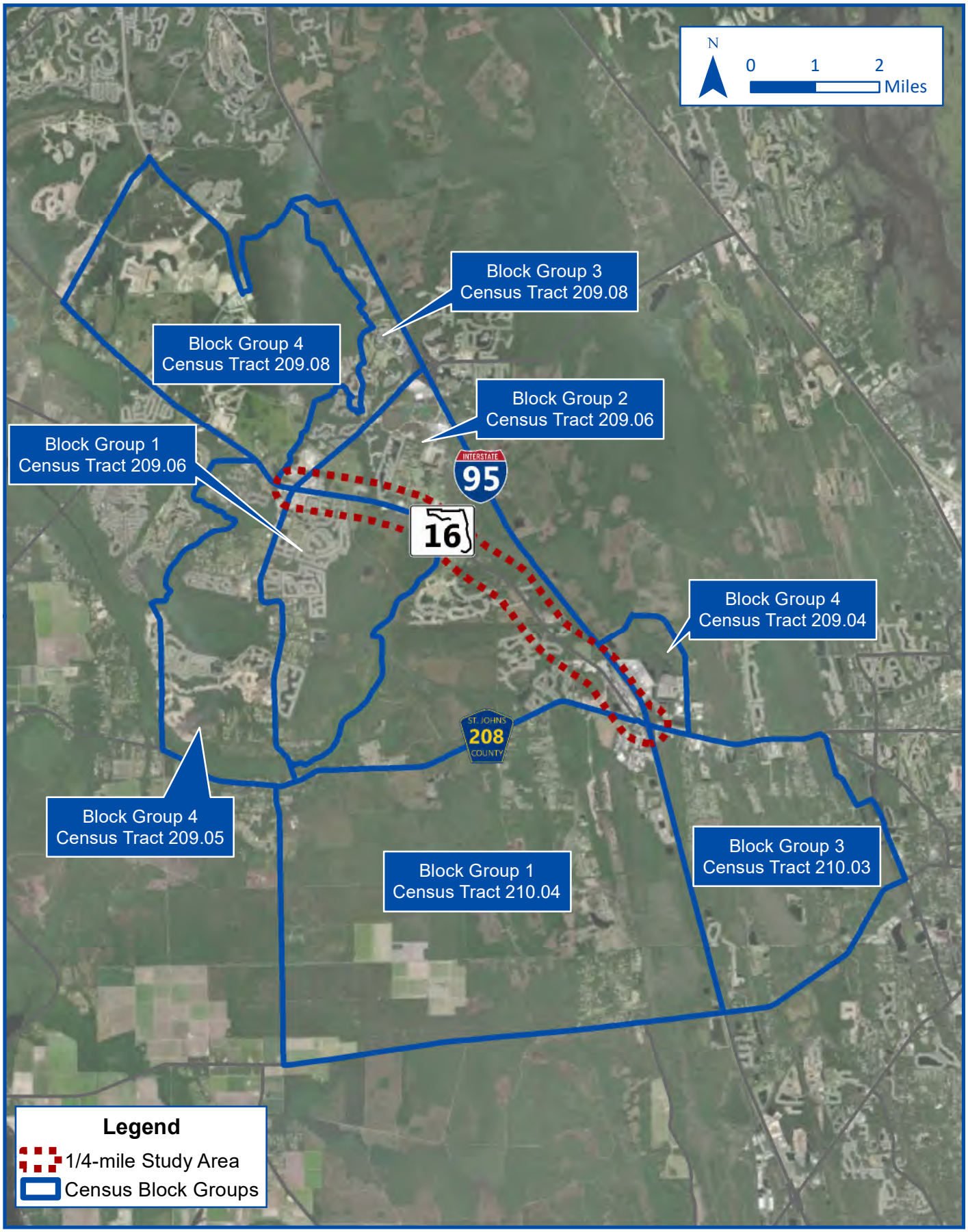
The Clyde E. Lassen State Veterans' Nursing Home is located adjacent to SR 16 as shown in Figure 2.4.3.

2.4.1.2 Demographics

Demographic data describes a community's structure and is primarily collected by local, state, or federal agencies such as the Census Bureau and other local government departments. Demographic data covers a range of topics about communities, including population size, age composition, ethnic backgrounds, household characteristics, and geographic distribution. This data assists in designing public participation, outreach, and education strategies that reflect the age, education, and economic backgrounds of the community.

The 2021 American Community Survey (ACS) was used to complete the demographic comparison and analysis contained in this document. Block groups are defined by the United States Census Bureau as "statistical divisions of census tracts and are generally defined to contain between 600 and 3,000 people." Census blocks are statistical areas bounded by visible features, such as streets, roads, streams, and railroad tracks, and by nonvisible boundaries, such as selected property lines and city, township, school district, and county limits.

The ¼-mile study area buffer overlaps with eight census block groups in St. Johns County as shown in Figure 2.4.4. Tables 2.4.1 to 2.4.6 use the average from those eight census block groups to compare specific demographic information related to the ¼-mile study area to all of St. Johns County.



FDOT	**SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study**	**Figure 2.4.4: Census Block Groups**	**Page Number: 2-43**

Table 2.4.1: Demographic Comparison: Population

Evaluation Criteria	St. Johns County	¼-Mile Study Area
Total population	265,724	18,845
Percent of the population that is White	77.2%	82.1%
Percent of the population that is Black	5.4%	2.0%
Percent of the population that is Hispanic	7.6%	9.6%
Percent of the population that is Asian	3.0%	0.4%
Percent of the population that is Other[1]	6.8%	5.9%
Percent of the population that is considered 'Minority'	22.8%	17.9%
Median population age	47.0	49.0
Percent of the population that is above 65 years old	20.1%	23.0%

[1]Other nationalities include: American Indian or Alaska native, Native Hawaiian or other Pacific Islander, or 2 or more races.

Table 2.4.2: Demographic Comparison: Density

Evaluation Criteria	St. Johns County	¼-Mile Study Area
Total acres	525,782	41,191
Population density (persons per acre)	0.5	0.5
Household density (houses per acre)	0.2	0.2
Percent of housing units occupied	82.8%	89.3%
Percent of housing units vacant	17.2%	10.7%
Average family size	3.1	3.1
Average household size	2.6	2.7

Table 2.4.3: Demographic Comparison: Income

Evaluation Criteria	St. Johns County	¼-Mile Study Area
Median Household Income ($)	$84,542	$76,296
Median Family Income ($)	$99,415	$77,581
Percent of households below the poverty line	2.7%	1.3%
Percent of the population below the poverty line	7.6%	6.1%

Table 2.4.4: Demographic Comparison: Transportation

Evaluation Criteria	St. Johns County	¼-Mile Study Area
Percent of the population that commute to / from work via a car, truck or van	80.0%	88.1%
Percent of the population that does not commute to/from work	16.7%	11.2%
Percent of the population that bikes, walks, or takes public transportation to / from work	1.7%	0.0%
Percent of the population that travels to / from work via a motorcycle	0.2%	0.0%
Percent of the population that travels to / from work via "other" means	1.1%	0.7%
Percent of occupied housing units that do not have a vehicle	2.3%	6.6%

Table 2.4.5: Demographic Comparison: Language

Evaluation Criteria	St. Johns County	¼-Mile Study Area
Percent of the population that speaks only English	90.6%	90.7%
Percent of the population that speaks a language other than English and also speaks English "very well"	6.7%	7.7%
Percent of the population that is considered to be Limited English Proficient	2.7%	1.6%

Note: People with Limited English Proficiency speak English "less than very well" or "not at all." These people have a limited ability to read, write, speak or understand English.

Table 2.4.6: Demographic Comparison: Education

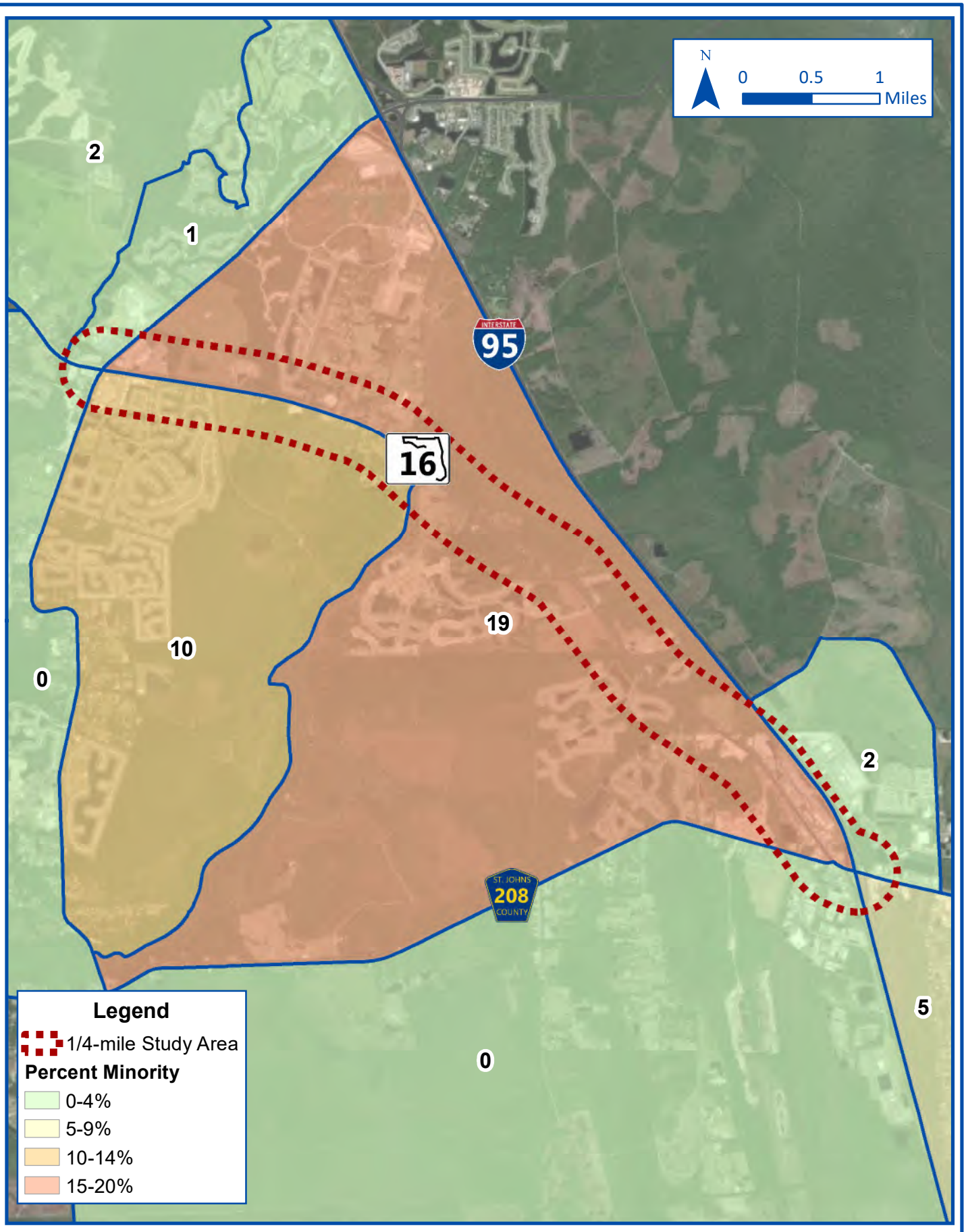
Evaluation Criteria	St. Johns County	¼-Mile Study Area
Percent of the population that is over 25 years old and has less than a 9th grade education	1.6%	0.1%
Percent of the population that is over 25 years old and has completed more than 9th grade but does not have a high school diploma	3.7%	3.4%
Percent of the population that is over 25 years old and has a high school diploma	94.7%	96.5%
Percent of the population that has some college or an associates degree	27.0%	29.2%
Percent of the population that has a bachelor's, master's, doctorate or professional degree	46.0%	41.3%

The percentage of population considered White is approximately 4.9% higher in the ¼-mile study area compared to St. Johns County at 82.1% and 77.2%, respectively. The percent of population considered Hispanic is 2.0% higher in the ¼-mile study area compared to St. Johns County at 9.6% and 7.6%, respectively. As a result, the percentage of population that is considered "minority" is approximately 4.9% higher in St. Johns County compared at the ¼-mile study area at 22.8% and 17.9%, respectively. Figure 2.4.5 shows the percent of population that is considered "minority" in the ¼-mile study area. The median population age is 47 in St. Johns County and 49 in the ¼-mile study area and the population above the age of 65 years old is 20.1% in St. Johns County and 23.0% in the ¼-mile study area. Figure 2.4.6 depicts the percentage of population above the age of 65 years old in the ¼-mile study area.

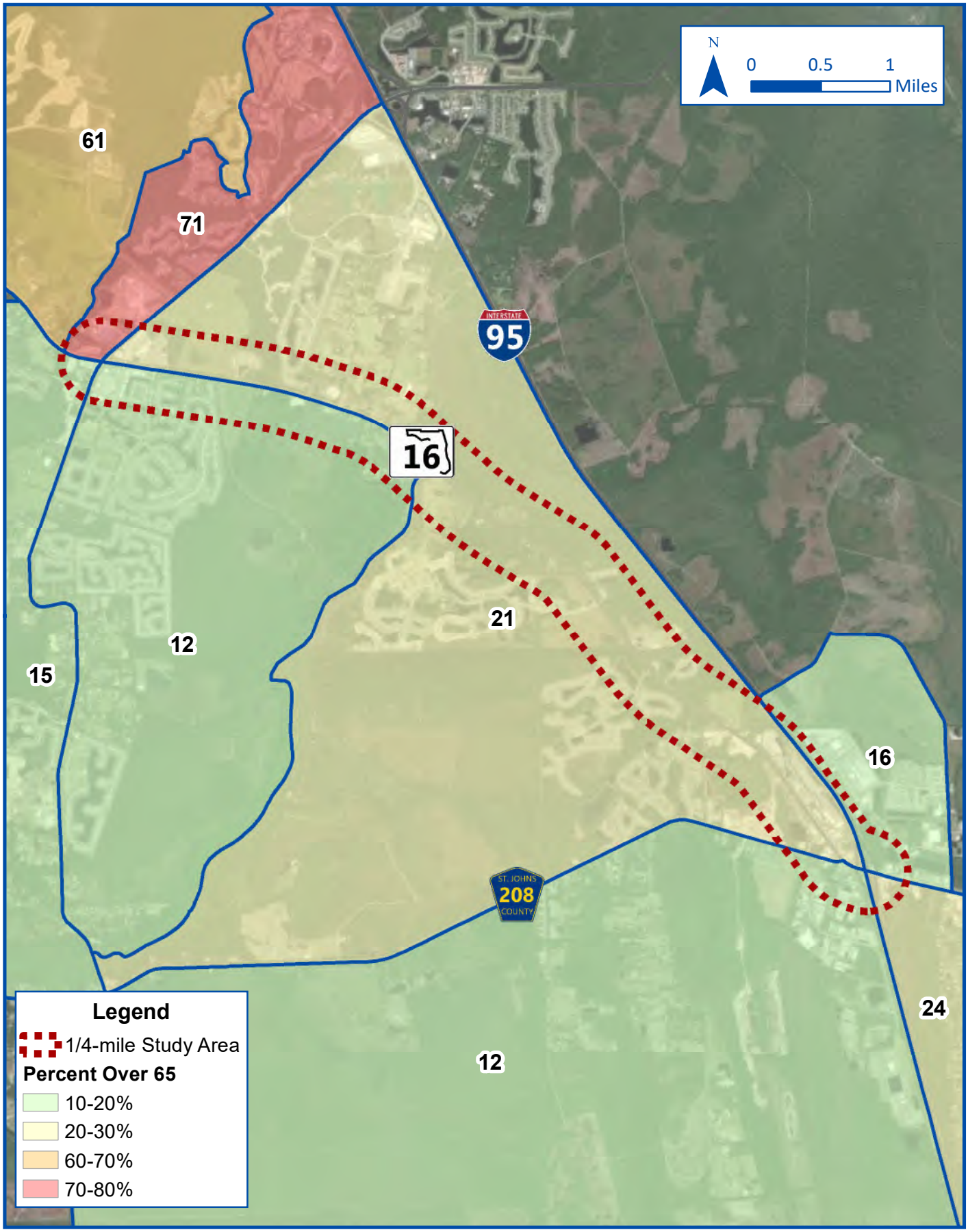
The population and household density in the ¼-mile study area and St. Johns County are the same at 0.5 and 0.2 per acre, respectively. The percentage of housing units occupied is also 6.5% higher in the ¼-mile study area compared to St. Johns County. The average family size is the same in the ¼-mile study area and St. Johns County at 3.1, and the average household size is 2.6 in St. Johns County and 2.7 in the ¼-mile study area.

The median household income is $84,542 in St. Johns County and $76,296 in the ¼-mile study area. Similarly, the median family income is $99,415 in St. Johns County and $77,581 in the ¼-mile study area. However, the percentage of households and individuals below the poverty line in St. Johns County is 2.7% and 7.6%, respectively, compared to 1.3% and 6.1%, respectively in the ¼-mile study area. Figure 2.4.7 shows the percentage of households below the poverty line.

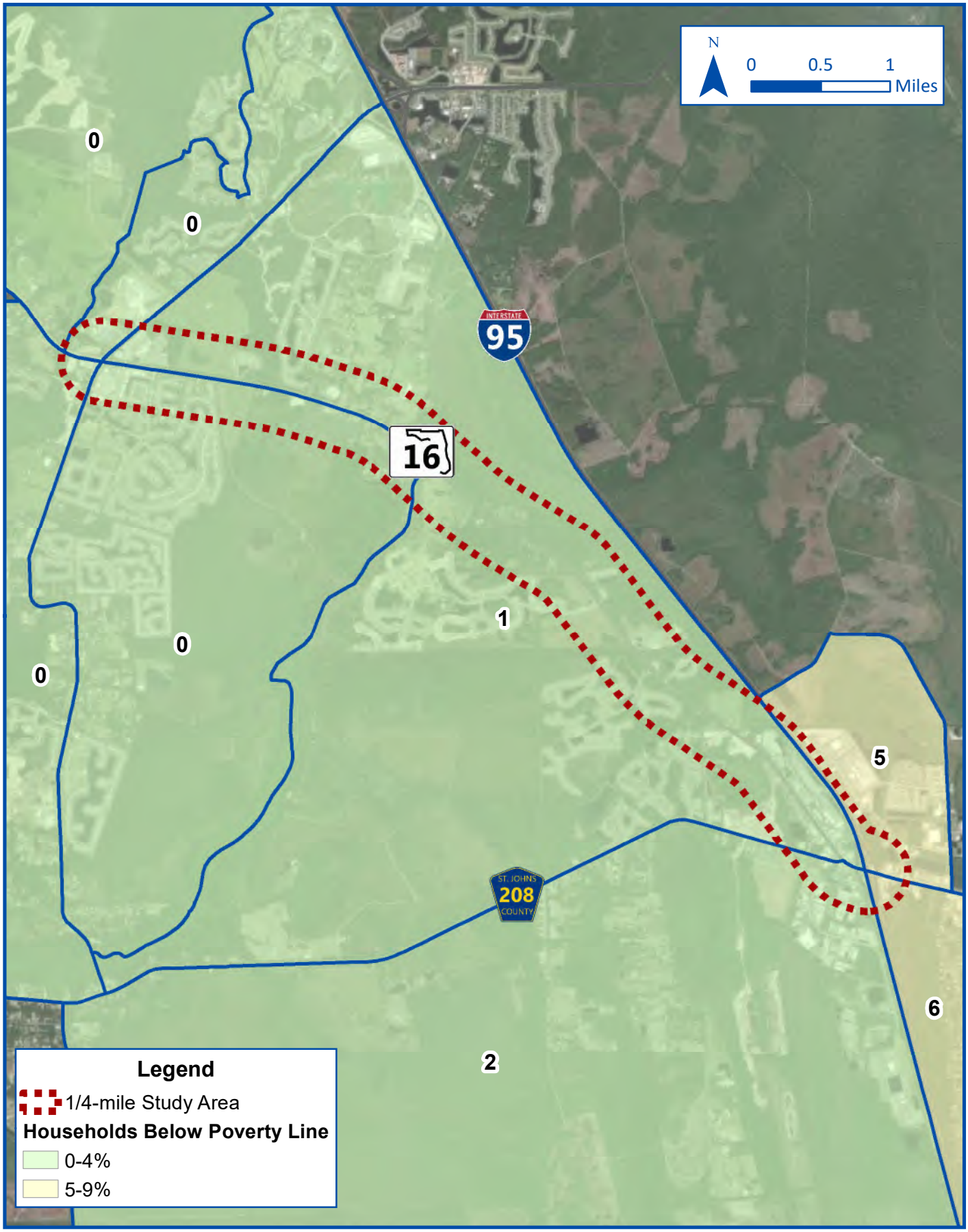
The percentage of the population that commute to and from work using a car, truck, or van is 8.1% higher in the ¼-mile study area compared to St. Johns County; however, the ¼-mile study area has a 4.3% higher population of people that do not have a vehicle compared to the St. Johns County.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.4.5: Percentage of Population Considered Minority in the Study Area	Page Number: 2-47



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.4.6: Percentage of Population Above the Age of 65 in the Study Area	Page Number: 2-48



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.4.7: Percentage of Households Below the Poverty Line in the Study Area	Page Number: 2-49

St. Johns County has a larger percentage of the population that is over 25 years old that have not completed 9th grade and have completed 9th grade but does not have a high school diploma compared to the ¼-mile study area. The ¼-mile study area has a slightly larger percentage of people that completed high school and have some college or an associates degree compared to St. Johns County. The percent of population that have a bachelor's degree is higher in St. Johns County compared to the ¼-mile study area.

The percentage of the population that is considered Limited English Proficient (LEP) is lower in the ¼-mile study area compared to St. Johns County – 1.6% compared to 2.7%. Based on the LEP percentages, translation services were not needed at the Alternatives Public Meeting and are not anticipated for the Public Hearing but will be available upon request.

2.4.2 Cultural Resources

A Cultural Resource Assessment Survey (CRAS) and two CRAS addendums were conducted for this PD&E Study and are located in the project file. An area of potential effects (APE) was developed to consider visual, audible, and atmospheric effects that the project may have on historic resources. To account for the potential effects of the project on historic properties, the archaeological APE was defined to include the existing right-of-way where improvements are proposed. The architectural history APE included the existing right-of-way and was extended to the back or side property lines of parcels adjacent to the right-of-way, or a distance of no more than 328 feet from the right-of-way line. The term "APE" refers to the combined archaeological and architectural history APE.

The architectural survey resulted in the identification and evaluation of 15 historic resources within the project APE, including four previously recorded resources. The previously recorded resources include four historic structures (8SJ04044, 8SJ05074-8SJ05076). Newly recorded resources include 11 historic structures (8SJ08214-8SJ08224). Based on the results of the current survey, one resource (8SJ08220) is obscured from the right-of-way and cannot be evaluated, and the 14 remaining resources lack the historical significance and architectural or engineering distinction

necessary for National Register of Historic Places (NRHP) eligibility. Figure 2.4.8 shows the cultural resources sites within the study area.

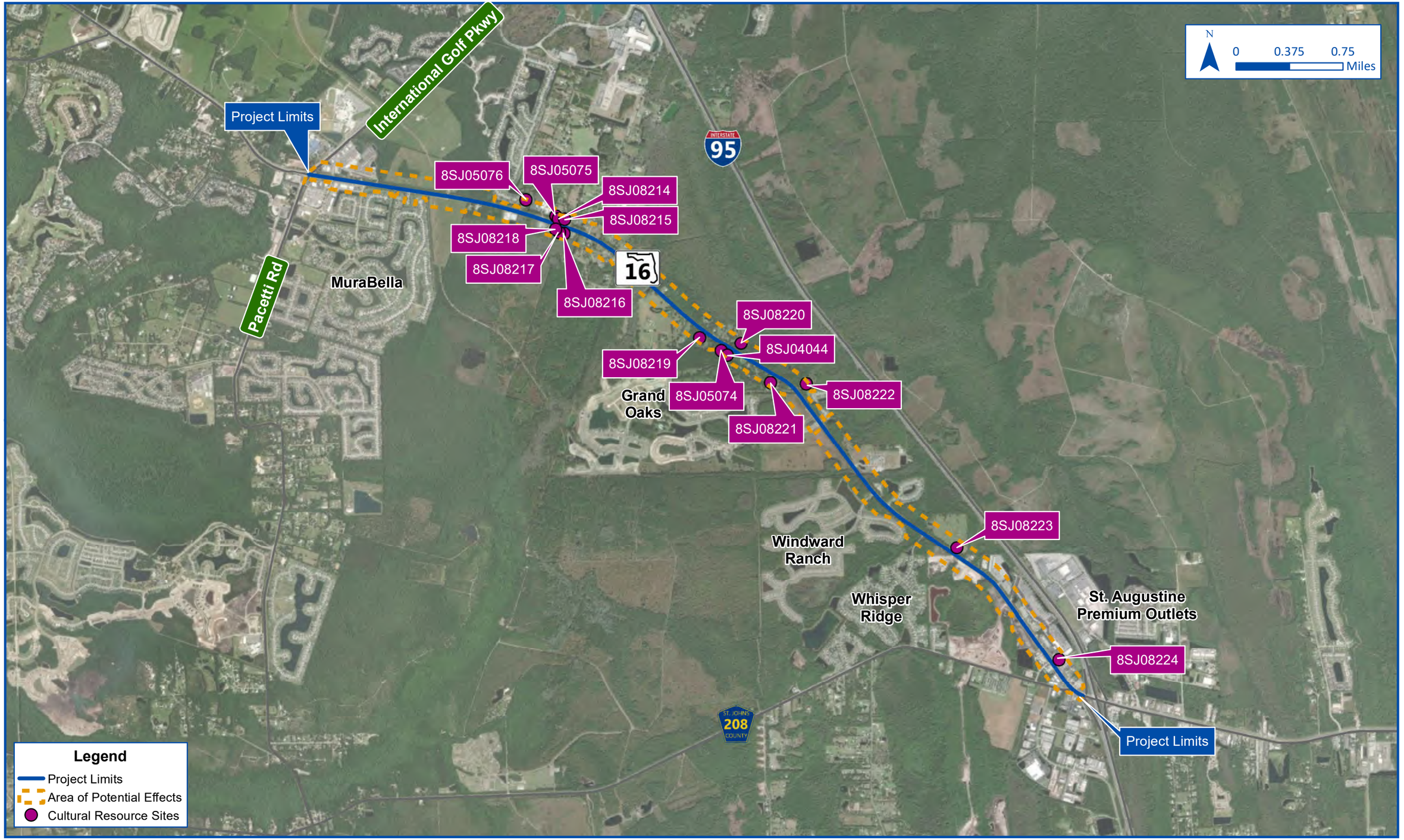
The archaeological survey consisted of pedestrian survey and systematic shovel testing in portions of the APE not covered by previous cultural resource surveys. As such, archaeological testing during the current survey was conducted within untested portions of the right-of-way, and a total of 14 shovel tests were excavated. All shovel tests were negative for artifacts; an additional 35 no-dig points were recorded where testing was not possible due to disturbance, buried utilities, or ground-surface inundation.

Archaeological testing was conducted on untested portions of the four proposed pond footprints and easement / floodplain compensation area. In total, 31 shovel tests were excavated throughout the APE and five no-dig points were marked where testing was not possible due to water inundation at the surface. All shovel tests were negative for artifacts and no archaeological sites or occurrences were identified.

A technical memorandum was prepared regarding FDOT bridge number 780064 (Turnbull Creek) within the project limits and is located in the project file. Bridge number 780064 is excluded from Section 106 consideration for the following reasons:

- This bridge is not listed in the NRHP and has not been determined eligible for such listing;
- This bridge is not located adjacent to or within a NRHP-listed or eligible historic district; and
- This bridge does not constitute an example of one of the following bridge types: an arch bridge, a truss bridge, a bridge with movable spans, a suspension bridge, a cable-stayed bridge, or a covered bridge.

For these reasons, the bridge was not recorded or evaluated by the present survey.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.4.8: Cultural Resources	Page Number: 2-52

2.4.3 Natural Resources

2.4.3.1 Protected Species and Habitat

A Natural Resource Evaluation (NRE) and NRE Addendum were conducted for this project and are available in the project file. This section combines both reports. This project was evaluated for impacts to wildlife resources, including federally protected species, in accordance with Section 7 of the Endangered Species Act (ESA, 1973), as amended, and FDOT PD&E Manual. This report summarizes information pertaining to all federally-listed, candidate, and proposed species for listing, and state-listed species that may occur within the project study area. Unless otherwise noted, all of these are collectively referred to as "listed species" in this report. In addition, this report contains information regarding non-listed wildlife species that may be impacted by the project.

Listed species known to occur in the county, but for which suitable habitat does not exist within the project study area and for which there have been no documented reports within one mile of the project study area were determined to have no probability of occurrence and will not be affected by this project. The majority of these species do not merit discussion in this report. The following listed species were determined to have no probability of occurrence but are discussed briefly in this report to clarify their evaluations.

The Black Creek crayfish *(Procambarus pictus)*; a state-threatened species and a proposed species for listing by USFWS is known to occur in St. Johns County but was determined to have no probability of occurrence in the project study area because it is not known to occur in Turnbull Creek. For the eastern black rail *(laterallus jamaicensis*); a federally-threatened species, vegetative cover is too short and thin to provide sufficient suitable freshwater marsh and wet prairie habitats for this species. Therefore, there is no probability of occurrence in project study area. The West Indian manatee (trichechus manatus); a federally-threatened species, was also determined to have no probability of occurrence in the project study area because the portion of Turnbull Creek downstream of the SR 16 bridge is too shallow to allow this large species to access the project

study area. These species will not be affected by this project and are not discussed further in this report.

A total of 38 listed species were determined to have some probability of occurrence within the project study area based on the presence of suitable habitat, as shown in Table 2.4.7.

Table 2.4.7: Federally-Listed, Proposed for Listing, Candidate Species, and State-Listed Species in the Project Study Area

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present in Study Area	Probability of Occurrence in the Study Area
Plants						
Asarum Arifolium (Hexastylis Grifolia)	Little Brown Jug	N	ST	Shady hammocks, slopes, and wetland edges.	Yes	Low
Asclepias Viridula	Southern Milkweed	N	ST	Wet flatwoods and prairies, seepage slopes, pitcherplant bogs.	Yes	Low
Calopogon Multiflorus	Manyflowered Grasspink	N	ST	Longleaf pine savannahs and flatwoods	Yes	Low
Calydorea Coelestina	Bartram's Ixia	N	SE	Wet to mesic flatwoods	Yes	Low
Carex Chapmanii	Chapman's Sedge	N	ST	Swamps, hydric hammocks, seepage slopes, and mesic hammocks	Yes	Low
Coreopsis Intergrifolia	Ciliate Leaf Tickseed	UR	SE	Floodplains and swamps	Yes	Low
Gonolobus Suberosus (Matelea Gonocarpus)	Anglepod	N	ST	Hammocks	Yes	Low
Helianthus Carnosus	Lake-Side Sunflower	N	SE	Wet flatwoods and prairies	Yes	Low
Lilium Catesbaei	Pine Lily	N	ST	Pine savannas, marshes,	Yes	Moderate

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present in Study Area	Probability of Occurrence in the Study Area
				flatwoods, and bogs		
Litsea Aestivalis	Pondspice	N	SE	Pond margins, cypress dome, and swamp edges	Yes	Low
Lobelia Cardinalis	Cardinalflower	N	ST	Swamps, riverbanks, and cypress domes.	Yes	Moderate
Lythrum Curtissii	Curtiss' Loosestrife	UR	SE	Roadside ditches, wet flatwoods, and streambanks	Yes	Low
Nemastylis Floridana	Celestial Lily	N	SE	Wet flatwoods, prairies, marshes, cabbage palm hammock edges	Yes	Low
Nolina Atopocarpa	Florida Beargrass	N	ST	Wet pine flatwoods	Yes	Low
Orbexilum Virgatum	Pineland Leatherroot	N	SE	Pine flatwoods and savannahs, usually in moist soils	Yes	Low
Pecluma Plumula	Plume Polypody	N	SE	Epiphytic on tree branches or on limestone in hammocks and swamps	Yes	Low
Pinguicula Caerulea	Blueflower Butterwort	N	ST	Marshes, swamp edges, and wet flatwoods	Yes	Low
Pinguicula Lutea	Yellow Butterwort	N	ST	Sandy bogs and open wet flatwoods	Yes	Low
Platanthera Blephariglottis Var. *Conspicua*	White Fringed Orchid	N	ST	Bogs, swamps, and marshes	Yes	Low
Platanthera Ciliaris	Yellow Fringed Orchid	N	ST	Bogs, swamps, and marshes	Yes	Low

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present in Study Area	Probability of Occurrence in the Study Area
Platanthera Nivea	Snowy Orchid	N	ST	Bogs, swamps, and marshes	Yes	Low
Pogonia Ophioglossoides	Rose Pogonia	N	ST	Wet pine savannahs and flatwoods	Yes	Low
Pycnanthemum Floridanum	Florida Mountain-mint	N	ST	Sandhills, mesic forests, and disturbed areas	Yes	Low
Rudbeckia Nitida	St. Johns Blackeyed Susan	N	SE	Wet or mesic pine flatwoods, bogs, savannahs, seepage slopes, and roadside ditches.	Yes	Low
Ruellia Noctiflora	Nightflowering Wild Petunia	N	SE	Wet flatwoods, seepage slopes, and hydric hammocks	Yes	Low
Sarracenia Minor	Hooded Pitcherplant	N	ST	Wet flatwoods, swamps, marshes, and bogs	Yes	High
Verbesina Heterophylla	Variable-Leaf Crownbeard	N	SE	Flatwoods and dry mixed forests.	Yes	Low
Zephyranthes Atamasca Var. *Atamasca*	Rainlily	N	ST	Swamps, floodplains, wet prairies, and wet roadsides	Yes	High
Zephyranthes Atamasca Var. *Treatiae*	Treat's Rainlily	N	ST	Swamps, floodplains, wet prairies, and wet roadsides	Yes	High
Insects						
Danaus Plexippus	Monarch Butterfly	PT	N	Breeding females lay eggs on Asclepias spp. (milkweeds) where the larvae develop. Non-	Yes	Moderate

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present in Study Area	Probability of Occurrence in the Study Area
				breeding and breeding adults forage on many species of wildflowers, and so may occur in areas with high densities of wildflowers.		
Reptiles						
Drymarchon Corais Couperi	Eastern Indigo Snake	T	FT	Linked to xeric habitats and gopher tortoise burrows, but also uses other natural habitats such as swamps and freshwater marshes as foraging habitat.	Xeric habitat and other desirable gopher tortoise habitat is absent but wetlands and other foraging habitats are present.	Low
Gopherus Polyphemus	Gopher Tortoise	N	ST	Sandhills, scrub, dry flatwoods, dry ruderal areas.	Uplands within the project study area are moderately to marginally suitable.	Moderate
Pituophis Melanoleucus	Pine Snake	N	ST	Sandhill, sand pine scrub and scrubby flatwoods.	Pinelands in the project study area may be moderately suitable.	Low
Birds						
Egretta Caerulea	Little Blue Heron	N	ST	Forages in a wide variety of freshwater, brackish, and	Yes	High

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present in Study Area	Probability of Occurrence in the Study Area
				saline wetlands and waterways, including ponds and ditches. Prefers freshwater habitats. Nests in mixed colonies in flooded trees or shrubs or on islands.		
Egretta Tricolor	Tricolored Heron	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and waterways, including ponds and ditches. Prefers coastal habitats. Nests in mixed colonies in flooded trees or shrubs or on islands.	Yes	Moderate
Mycteria Americana	Wood Stork	T	FT	Forages in a wide variety of freshwater and brackish wetlands and waterways, including ponds and ditches. Prefers waterbodies that have shallow or variable water levels to concentrate fish prey. Nests in colonies in	Yes	High

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present in Study Area	Probability of Occurrence in the Study Area
				flooded trees or on islands.		
Platalea Ajaja	Roseate Spoonbill	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and waterways, including ponds and ditches. Prefers coastal habitats. Nests in mixed colonies in flooded trees or shrubs or on islands.	Yes	Low
Mammals						
Perimyotis Subflavus	Tricolored Bat	PE	N	Colonies prefer to roost in culverts (less often in other artificial structures) in the colder months and in trees or Spanish moss in the warmer months.	Yes	Low

Key:
T = Threatened: species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
PE = Proposed endangered**.**
N = Not federally-listed.
UR = Not listed, but under review.
SE = State endangered.
ST = State threatened: species listed by the state that are likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
FT = Federally threatened: species federally listed as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

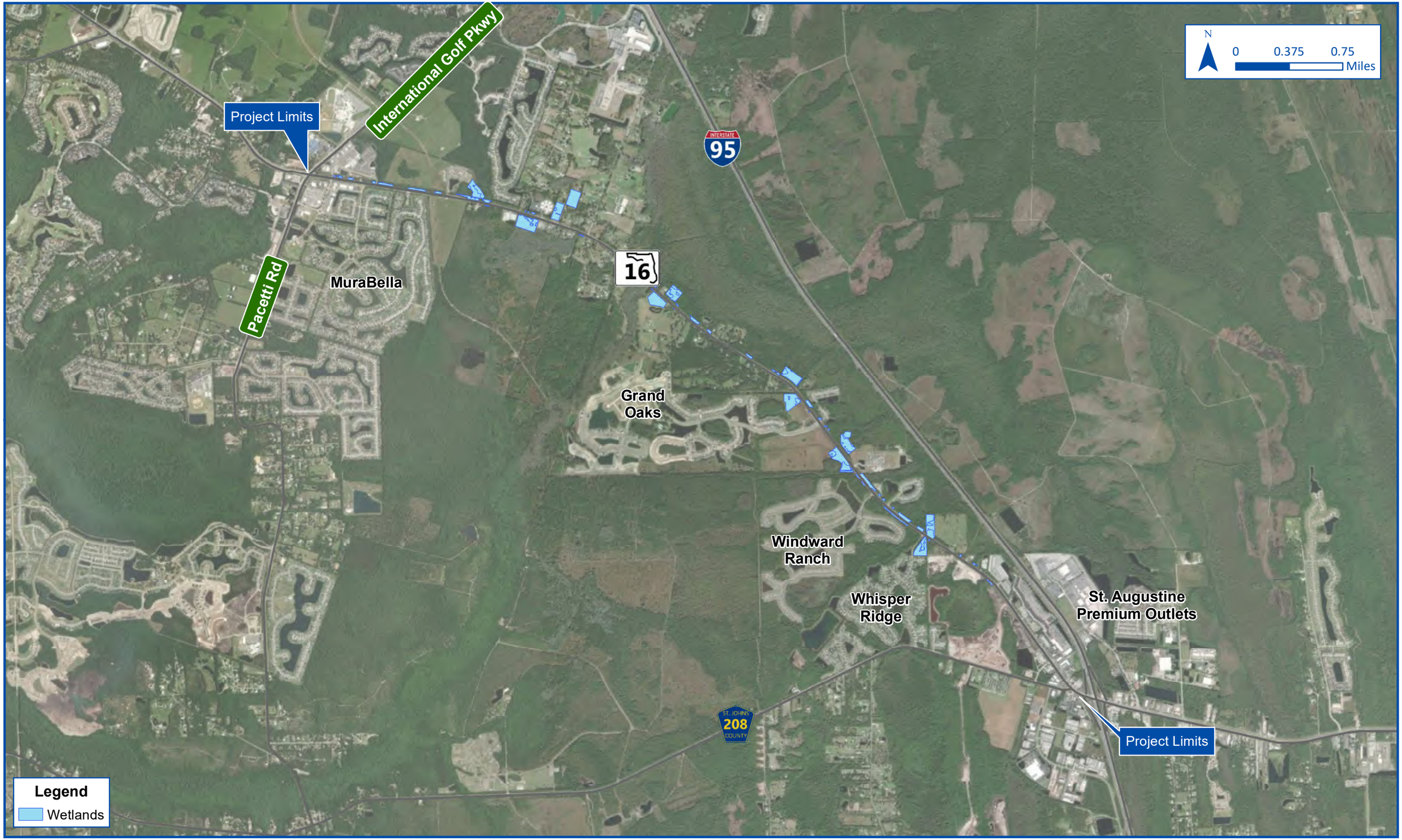
2.4.3.2 Wetland and Other Surface Waters

The following evaluation was conducted pursuant to Presidential Executive Order 11990 of 1977 as amended, Protection of Wetlands and the USDOT Order 5660.1A, Preservation of the Nation's Wetlands.

Wetlands within the project study area were identified and classified using definitions and guidelines contained in the FDOT's Florida Land Use, Cover and Form Classification System (FLUCFCS) Handbook (1999) and the Cowardin System (1979). The United States Army Corp of Engineers (USACE) Wetland Delineation Manual (1987) and its regional supplements, the Florida Wetlands Delineation Manual (Gilbert, et al., 1995), and several field guides aided in the identification of project wetlands. The attributes of the three parameters of vegetative composition, hydrologic regime, and soil classification are used to determine the presence and type of wetland system.

The boundaries of jurisdictional wetlands and waters within the project study area were estimated via desktop analysis and limited field reviews in accordance with Chapter 62-340, Florida Administrative Code (F.A.C.) and the USACE 1987 Manual and its subsequent addendums. All wetland and surface water boundaries and acreages given in this report are considered estimates and will be finalized during the permitting process.

Wetland and surface water locations within the project study area are listed in Table 2.4.8 and shown in Figure 2.4.9.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 2.4.9: Wetlands and Surface Waters	Page Number: 2-61

Table 2.4.8: Summary of Wetlands and Jurisdictional Waters within the Project Study Area

Wetland Habitat Type	FLUCFCS Code	Acres
Hydric Pine Flatwoods	411H	2.76
Hydric Coniferous Plantations	441H	2.23
Streams and Waterways	510	0.46
Wetland-cut Ditches	512	0.79
Lakes	524	0.98
Streams and Lake Swamps	615	2.90
Wetland Forested Mixed	630	26.02
Freshwater Marshes	641	7.47
Wet Prairies	643	1.34

2.4.4 Physical

2.4.4.1 Contamination

A Contamination Screening Evaluation Report (CSER) and CSER Addendum was conducted for this project and are available in the project file. The objectives of this Level I Screening Evaluation were to identify and evaluate potential contamination sources that could impact the proposed project.

Based on the results of the contamination screening activities, Contamination Risk Ratings (CRRs), developed by FDOT, were used to assess each site: No, Low, Medium, and High. A total of 18 sites, six pond sites, and one preferred pond site have been identified as having potential to impact the subject corridor from hazardous substance and/or petroleum contamination. One site, two preferred pond sites, and the floodplain compensation area received a "No" risk rating. Nine sites, four pond sites, and one preferred pond site received a "Low" risk rating. Seven sites and three pond sites received a "Medium" risk rating. Two sites and no pond sites have been identified as "High" risk. Further assessment in the vicinity of the sites that received a "Medium" or "High" risk rating should include soil and/or groundwater sampling if subsurface work is proposed on, or adjacent to, the site. Impacts to construction are not anticipated at this time from the sites that received a "No" or "Low" risk rating. Table 2.4.9 lists the potential contamination sites within the project study area.

Table 2.4.9: Contamination Sites and Risk Ratings

Number	Site Name	Site Address	Contamination Risk Rating
Sites			
1	Hortons Store / Walgreens	5445 SR 16	Medium
2	Mill Creek Academy	3720 International Golf Parkway	Low
3	CVS Pharmacy #0652	57 Tuscan Way	Low
4	7-Eleven Store #42108	3735 International Golf Parkway	Medium
5	Publix Supermarket #1729	170 Village Commons Drive	Low
6	Senior Living at the Greens	4950 SR 16	Low
7	Former Bellsouth Communications Tower	4881 SR 16	Low
8	Bellsouth Tel Inc. 3K099	4875 SR 16	Low
9	Clyde E. Lassen State Veterans Nursing Home	4650 SR 16	Low
10	Adventure Landing Station	2780 SR 16	Low
11	Flaglers Cleaners	2730 SR 16	Low
12	Racetrac #156	2711 SR 16	Medium
13	Hustler's of Hollywood	2575 SR 16	Medium
14	Days Inn	2560 SR 16	Medium
15	Texaco #24-110-0001 / Pennzoil	2500 SR 16	High
16	Exxon Station / Cell Tower	2450 SR 16	High
17	Quality Inn Motel / Discount Tire	2445-2453 (odd) SR 16	Medium
19	Former Suspected Agriculture Areas (Right-of-way Only)	N/A	Medium
Proposed Pond Sites			
1A	Undeveloped, Wooded Land	N/A	Medium
1B	Undeveloped, Wooded Land	N/A	Medium
1C	Undeveloped, Wooded Land	N/A	Low
1D	Undeveloped, Wooded Land	N/A	Low
4B	Undeveloped, Grassy land	N/A	Low
4C*	Undeveloped, Grassy land	N/A	Low
5B	Undeveloped, Wooded and Grassy land	N/A	Medium
* Signifies a Preferred Pond Site			

3.0 Future Conditions

3.1 Future Land Use

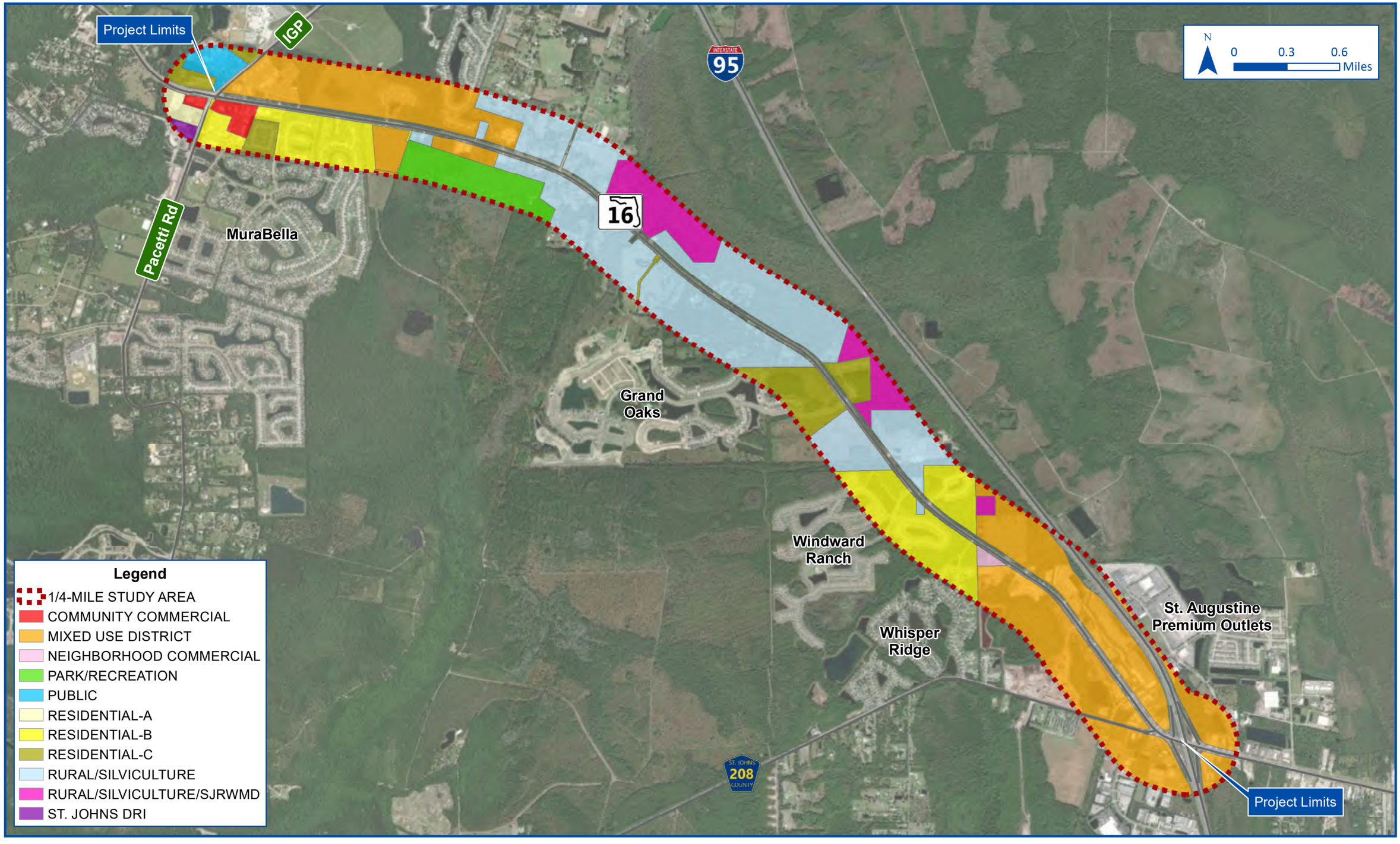
Figure 3.1.1 shows the future land use map for the project study area based on the data from the St. Johns County GIS data center (last updated in 2017). The primary land use for the study area is mixed use district (34.9%), followed by rural / silviculture (29.9%), and residential (21.1%). As mentioned in *Section 2.2.5 Existing Land Use*, the corridor is rapidly developing with both residential and commercial properties. As such, St. Johns County and FDOT are working together to keep up with the rapidly growing population and traffic by extending CR 2209, realigning CR 208, and improving the I-95 and SR 16 interchange. The proposed improvements for SR 16 does not impact the CR 2209, CR 208, or I-95 projects in the study area. The proposed improvements also do not impact the future land use.

3.2 Future Context Classification

The future context classification along SR 16 is C3 throughout the corridor. The context classifications on SR 16 are as follows:

- C3C – Suburban Commercial from IGP to Verona Way;
- C3R – Suburban Residential from Verona Way to Whisper Ridge; and
- C3C – Suburban Commercial from Whisper Ridge to I-95.

Only one segment on SR 16 will have the context classification changed. The segment of SR 16 from San Giacomo Road to Turning Point Academy will be converted from C2 – Rural to C3R – Suburban Residential.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 3.1.1: Future Land Use	Page Number: 3-2

3.3 Future Traffic Demand

3.3.1 Development of Design Traffic

The Northeast Regional Planning Model (NERPM) is the regional travel demand model developed and maintained by FDOT District 2, which has a base year of 2015 and forecast year of 2045. As a part of the forecasting effort, the regional model was reviewed for accuracy and reasonableness. The study area model was checked for illogical speed and capacity calculations, illogical trip pathing, reasonableness of trip distribution and assignment, and the reasonableness of population and employment growth. In addition, the model was reviewed to ensure that the appropriate planned transportation improvements are included in the forecast year model network. After the subarea model validation was completed for the base year, the NERPM was used to produce volume projections for the Design Year 2050. Initial annual traffic growth rates were calculated using the 2015 Validated and updated 2045 Cost Feasible NERPM runs.

Based on the review of the historical traffic data, population projections, and travel demand model projections, it was determined that the growth rates derived from the NERPM would be the most appropriate basis for the growth rates used for this study.

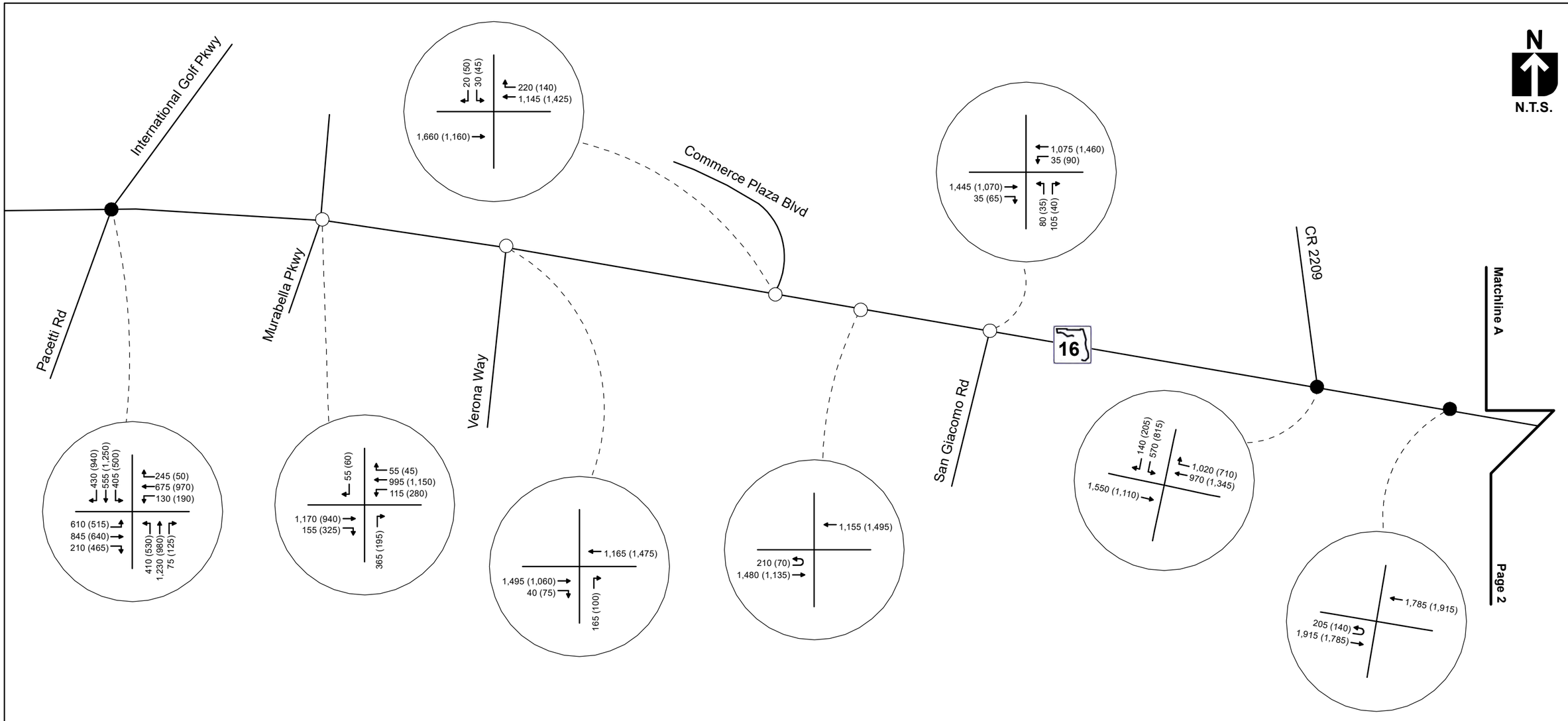
Average growth rates were used to assist in developing a consistent set of daily and peak hour traffic volumes along SR 16. A 3% growth rate was used for the SR 16 segments east of the planned SR 16 at CR 2209 intersection. Because the NERPM projections show a significant difference in growth rates west of CR 2209, a 2% growth rate was used for the SR 16 segments west of CR 2209. A 3% growth rate was used for IGP, Pacetti Road, South Francis Road, and CR 208. A 2% growth rate was used for the I-95 southbound ramps. A minimum growth rate of 1% was used for the additional side streets that aren't included in the NERPM. These growth rates were applied to the Existing Year 2023 AADTs to produce Design Year 2050 AADTs. Future year Directional Design-Hour Volumes (DDHV) were developed through the application of K and D factors.

For Elevation Parkway (which is planned to intersect with the existing intersection at the West Outlet Mall Access) traffic development and trip generation provided by St. Johns County was used as a source for the development of the DDHVs.

3.3.2 Design Year 2050 No-Build Alternative Analysis

Synchro 11 was used to analyze study intersections under the Design Year 2050 No-Build conditions. Figure 3.3.1 shows the 2050 No-Build peak hour volumes.

Table 3.3.1 summarizes the delay and LOS for intersections within the study area. The results of the analysis indicate that the signalized intersection at IGP is expected to operate at LOS F during both the AM and PM peak hours. The signalized intersection at Toms Road is also expected to operate at LOS E during the PM peak hour due to heavy demand along eastbound and westbound SR 16 in addition to increased northbound demand. During the AM peak, eight of the nine unsignalized intersections are expected to operate at LOS E or F. During the PM peak, seven of the unsignalized intersections are expected to operate at LOS E or F. It should be noted that the results marked as 'error' indicate levels of delay exceed the limitations of the Highway Capacity Manual (HCM) 6th edition capacity analysis methodologies. The high levels of delay at the unsignalized intersections are primarily due to the heavy eastbound and westbound traffic flow along SR 16 which provides few acceptable gaps and little opportunity for stop-controlled vehicles on the side streets to enter the traffic stream. The remaining intersections are expected to operate at LOS D or better.



Legend

X,XXX (X,XXX)	AM (PM) Peak Hour Volumes
●	Signalized Intersection
○	Unsignalized Intersection

N

N.T.S.

Matchline A

Page 1

S Francis Rd

Tomoka Pines Dr

Turnbull Creek Rd

Downs Corner Rd

West Outlet Mall Access

Windward Ranch Blvd

Whisper Ridge Dr

Elevation Pkwy

Factory Outlets Dr

Toms Rd

CR 208

I-95 Southbound Off-Ramp

I-95 Southbound On-Ramp

16

25 (15)
5 (5)
15 (10)
10 (15)
1,895 (1,545)
95 (100)
10 (10)
1,500 (1,895)
50 (80)
135 (90)
5 (5)
80 (65)

25 (15)
15 (10)
10 (15)
2,035 (1,350)
10 (10)
1,420 (1,890)

40 (100)
180 (210)
100 (40)
1,815 (1,660)
210 (180)
1,660 (1,815)

10 (40)
10 (25)
15 (175)
10 (45)
10 (20)
1,935 (1,475)
60 (30)
30 (180)
1,440 (1,865)
100 (155)
30 (35)
75 (125)
10 (20)
225 (130)

1,910 (1,310)
35 (100)
1,410 (1,775)
35 (130)
100 (60)
135 (55)

1,830 (1,180)
40 (65)
1,340 (1,705)
15 (75)
75 (35)
65 (35)

10 (50)
10 (10)
10 (45)
15 (35)
1,685 (1,135)
35 (30)
20 (35)
1,270 (1,405)
225 (485)
15 (105)
85 (150)
10 (115)
320 (245)

2,145 (1,805)
20 (25)
1,590 (2,200)
545 (455)
585 (485)

195 (285)
1,030 (1,070)
2,160 (2,905)

220 (460)
1,030 (1,070)
2,340 (1,790)
465 (530)

Legend

X,XXX (X,XXX)	AM (PM) Peak Hour Volumes
●	Signalized Intersection
○	Unsignalized Intersection

Table 3.3.1: Design Year 2050 No-Build Synchro Intersection Analysis

Intersection		Intersection Approach				Overall Intersection	
		Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
				AM (PM)	AM (PM)	AM (PM)	AM (PM)
International Golf Parkway / Pacetti Road		Eastbound	Left	115.1 (187.7)	F (F)	87.0 (121.5)	**F (F)**
			Through	48.7 (44.3)	D (D)		
			Right	7.8 (23.1)	A (C)		
		Westbound	Left	103.0 (78.8)	F (E)		
			Through	74.4 (74.8)	E (E)		
			Right	17.4 (0.3)	B (A)		
		Northbound	Left	87.0 (204.2)	F (F)		
			Through	174.5 (78.8)	F (E)		
			Right	1.3 (12.1)	A (B)		
		Southbound	Left	85.9 (156.0)	F (F)		
			Through	52.6 (165.5)	D (F)		
			Right	26.0 (185.6)	C (F)		
Murabella Parkway*		Westbound	Left	14.7 (19.5)	B (C)	43.8 (19.5)	**E** (C)
		Northbound	Right	43.8 (15.9)	E (C)		
		Southbound	Right	13.4 (14.2)	B (B)		
Verona Way*		Northbound	Right	25.2 (14.4)	D (B)	25.2 (14.4)	D (B)
Commerce Plaza Boulevard*	Eastbound / Westbound Main	Southbound	Left	32.4 (43.8)	D (E)	32.4 (43.8)	D **(E)**
			Left	13.3 (16.5)	B (C)		
	Eastbound U-turn	Eastbound	Right	68.4 (49.5)	F (E)	68.4 (49.5)	**F (E)**
San Giacomo Road*		Westbound	Left	14.3 (12.1)	B (B)	70.5 (36.2)	**F (E)**
		Northbound	Left	70.5 (36.2)	F (E)		
			Right	19.2 (13.1)	C (B)		
CR 2209	Eastbound / Westbound Main	Eastbound	Through	17.4 (15.3)	B (B)	14.8 (15.8)	B (B)
		Westbound	Through	9.1 (14.3)	A (B)		
		Southbound	Left	37.0 (31.1)	D (C)		
			Right	11.8 (19.6)	B (B)		
	Eastbound U-turn	Eastbound	U-turn	28.0 (31.3)	C (C)	11.6 (6.9)	B (A)
		Westbound	Through	21.7 (11.2)	C (B)		
South Francis Road*		Eastbound	Left	23.1 (20.5)	C (C)		**F (F)**

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
	Southbound	Left / Right	26,855.4 (24,720.4)	F (F)	26,855.4 (24,720.4)	
Turnbull Creek Road / Tomoka Pines Drive*	Eastbound	Left	13.8 (17.7)	B (C)	1,695.3 (2,343.3)	**F (F)**
	Westbound	Left	21.5 (17.2)	C (C)		
	Northbound	Left	error (error)	error (error)		
		Through	1,695.3 (2,343.3)	F (F)		
		Right	207.1 (57.5)	F (F)		
	Southbound	Left / Thru / Right	error (error)	error (error)		
Windward Ranch Boulevard*	Westbound	Left	19.7 (15.8)	C (C)	8,476.3 (5,377.4)	**F (F)**
	Northbound	Left	8,476.3 (5,377.4)	F (F)		
		Right	488.8 (32.8)	F (D)		
Downs Corner Road*	Eastbound	Left	13.3 (17.7)	B (C)	1,466.6 (1,145.7)	**F (F)**
	Southbound	Left	1,466.6 (1,145.7)	F (F)		
		Right	32.2 (59.6)	D (F)		
Whisper Ridge Drive*	Westbound	Left	17.6 (12.7)	C (B)	3,763.0 (1,915.7)	**F (F)**
	Northbound	Left	3,763.0 (1,915.7)	F (F)		
		Right	122.2 (24.4)	F (C)		
West Outlet Mall Access / Elevation Parkway	Eastbound	Left	7.1 (12.7)	A (B)	27.4 (33.5)	C (C)
		Through	28.1 (33.6)	C (C)		
		Right	0.1 (0.1)	A (A)		
	Westbound	Left	78.0 (73.3)	E (E)		
		Through	11.1 (16.2)	B (B)		
		Right	0.1 (0.1)	A (A)		
	Northbound	Through / Left	72.1 (89.6)	E (F)		
		Right	42.0 (10.2)	D (B)		
	Southbound	Through / Left	57.9 (64.5)	E (E)		
		Right	0.3 (0.8)	A (A)		

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
Toms Road / Factory Outlets Drive	Eastbound	Left	7.8 (27.8)	A (C)	27.6 (74.5)	C **(E)**
		Through / Right	35.0 (56.9)	C (E)		
	Westbound	Left	44.0 (53.6)	D (D)		
		Through / Right	15.2 (100.1)	B (F)		
	Northbound	Through / Left	80.5 (77.4)	F (E)		
		Right	15.4 (3.4)	B (A)		
	Southbound	Left	42.8 (42.4)	D (D)		
		Through / Right	27.4 (15.2)	C (B)		
CR 208	Eastbound	Through / Right	59.4 (22.3)	E (C)	36.8 (15.6)	D (B)
	Westbound	Left	38.1 (33.0)	D (C)		
		Through	0.3 (1.0)	A (A)		
	Northbound	Right	50.7 (39.8)	D (D)		
I-95 Southbound Ramp Terminal	Eastbound	Through	47.0 (40.7)	D (D)	45.2 (54.4)	D (D)
		Right	18.8 (29.2)	B (C)		
	Westbound	U-turn	58.9 (56.9)	E (E)		
		Through	25.6 (50.6)	C (D)		
	Southbound	Left	93.7 (103.1)	F (F)		
		Right	30.2 (39.7)	C (D)		

* Indicates an unsignalized intersection reporting the highest movement delay (LOS) for the overall intersection.
- Intersection LOS in **red** exceeds target LOS D.

Highway Capacity Software (HCS) 2023 was used to analyze the highway portion of the study area, which is between CR 2209 and the West Outlet Mall Access and covers approximately 4.4 miles of roadway. The analysis was conducted on two segments, which are west and east of South Francis Road. Several performance measures are available for two-lane highways, which include average speed, percent followers, and follower density. The LOS criteria for two-way highways is based on follower density (followers/mile/lane). It should be noted that LOS F occurs when demand exceeds

capacity. Since the Design Year 2050 peak direction hourly volumes exceed the capacity of the existing two-lane highway, detailed performance measures are not available. Table 3.3.2 provides the analysis results for the two highway segments. The 2050 No-Build Alternative is expected to operate at LOS E or LOS F for both AM and PM peaks.

Table 3.3.2: Design Year 2050 No-Build HCS Highway Segment Analysis

Highway Segment	Direction	Average Speed (mi/hr)	Percent Followers	Follower Density (LOS)
2050 AM Peak				
SR 16 West of South Francis Road	Eastbound	---	---	--- (F)
	Westbound	62.0	79.8	18.2 (E)
SR 16 East of South Francis Road	Eastbound	---	---	--- (F)
	Westbound	62.7	81.7	20.3 (E)
2050 PM Peak				
SR 16 West of South Francis Road	Eastbound	62.1	79.8	18.2 (E)
	Westbound	---	---	--- (F)
SR 16 East of South Francis Road	Eastbound	62.7	81.7	20.3 (E)
	Westbound	---	---	--- (F)

Note: "---" Value not available when demand exceeds capacity

3.3.3 Design Year 2050 Build Alternative Analysis

Intersection improvements are also proposed at several study intersections as part of the Build Alternative. Intersection Control Evaluation (ICE) Stage 1 analyses were completed for all intersections with control strategy changes, which include South Francis Road, Turnbull Creek Road, Windward Ranch Boulevard, Downs Corner Road, Whisper Ridge Drive, and Toms Road (note Appendix E of the PTAR). As part of the ICE process, various control strategies were screened based on traffic operations, safety, right-of-way (ROW) impacts, etc. The Stage 1 analysis identified a single preferred control strategy, which was incorporated into the Build Alternative. Synchro 11 was then used to analyze study intersections under the Design Year 2050 Build conditions for the Preferred Alternative. Figure 3.3.2 shows the 2050 Build peak hour volumes.

Table 3.3.3 summarizes the delay and LOS for intersections within the study area. The results of the analysis indicate that the signalized intersection at IGP is expected to operate at LOS F during both the AM and PM peak hours, similar to the No-Build Alternative.

N

N.T.S.

International Golf Pkwy

Pacetti Rd

Murabella Pkwy

Verona Way

Commerce Plaza Blvd

16

San Giacomo Rd

CR 2209

Matchline A

Page 2

20 (50)
30 (45)
220 (140)
1,145 (1,425)
1,660 (1,160)

1,075 (1,460)
35 (90)
1,445 (1,070)
35 (65)
80 (35)
105 (40)

430 (940)
555 (1,250)
405 (500)
245 (50)
675 (970)
130 (190)
610 (515)
845 (640)
210 (465)
410 (530)
1,230 (980)
75 (125)

55 (60)
55 (45)
995 (1,150)
115 (280)
1,170 (940)
155 (325)
365 (195)

1,165 (1,475)
1,495 (1,060)
40 (75)
165 (100)

1,155 (1,495)
210 (70)
1,480 (1,135)

140 (205)
570 (815)
1,020 (710)
970 (1,345)
1,550 (1,110)

1,785 (1,915)
205 (140)
1,915 (1,785)

Legend

X,XXX (X,XXX)	AM (PM) Peak Hour Volumes
●	Signalized Intersection
○	Unsignalized Intersection

SR 16 from International Golf Parkway to I-95 PD&E Study

Figure 3.3.2: Build Design Year 2050
AM (PM) Peak Hour Volumes

Matchline A

Page 1

N

N.T.S.

S Francis Rd

Tomoka Pines Dr

Turnbull Creek Rd

Windward Ranch Blvd

Downs Corner Rd

West Outlet Mall Access

Whisper Ridge Dr

Elevation Pkwy

16

Factory Outlets Dr

Toms Rd

CR 208

I-95 Southbound Off-Ramp

I-95 Southbound On-Ramp

30 (20)
15 (10)
10 (15)
1,895 (1,545)
100 (105)
15 (15)
1,500 (1,895)
50 (80)
135 (90)
85 (70)

25 (15)
15 (10)
10 (15)
2,035 (1,350)
10 (10)
1,420 (1,890)

40 (100)
180 (210)
1,915 (1,700)
310 (220)
1,660 (1,815)

1,870 (1,995)
100 (40)
1,995 (1,870)

2,000 (1,555)
15 (15)
1,535 (2,075)
140 (235)
15 (15)

20 (65)
15 (175)
1,985 (1,595)
170 (210)
50 (220)
1,580 (2,120)
75 (125)
235 (150)

30 (85)
2,205 (1,835)
1,600 (2,255)

1,910 (1,310)
35 (100)
1,410 (1,775)
35 (130)
100 (60)
135 (55)

10 (50)
10 (110)
10 (45)
15 (35)
1,685 (1,135)
35 (30)
20 (35)
1,270 (1,405)
225 (485)
15 (105)
85 (150)
10 (115)
320 (245)

1,830 (1,180)
40 (65)
1,340 (1,705)
15 (75)
75 (35)
65 (35)

2,145 (1,805)
20 (25)
1,590 (2,200)
545 (455)
585 (485)

195 (285)
1,030 (1,070)
2,160 (2,905)

220 (460)
1,030 (1,070)
2,340 (1,790)
465 (530)

Legend

X,XXX (X,XXX)	AM (PM) Peak Hour Volumes
●	Signalized Intersection
○	Unsignalized Intersection

The unsignalized intersections at Murabella Parkway, Commerce Plaza Boulevard, and San Giacomo Road are expected to operate at LOS E or F during the AM peak hour, similar to the No-Build conditions. During the PM peak hour, the unsignalized intersections at Commerce Plaza Boulevard and San Giacomo Road are expected to operate at LOS E or F, similar to the No-Build conditions.

The intersections at Turnbull Creek Road, Windward Ranch Boulevard, Downs Corner Road, and Whisper Ridge Drive are expected to operate at LOS B or better during both peak hours due to the Build improvements, which convert them to signal-controlled. It should be noted that each of these intersections was shown to operate at LOS F during both peak hours under No-Build conditions, under which they remained stop-controlled.

The intersection improvements at South Francis Road and Toms Road are expected to operate at LOS B or better during both peaks. Both locations are converted to signalized hybrid MUT/thru-cut intersections as part of the Build Alternative and were shown to operate at LOS E or F under No-Build conditions.

Table 3.3.3: Design Year 2050 Build Synchro Intersection Analysis

Intersection		Intersection Approach				Overall Intersection	
		Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
				AM (PM)	AM (PM)	AM (PM)	AM (PM)
International Golf Parkway / Pacetti Road	Eastbound	Left	196.3 (187.7)	F (F)	82.7 (121.6)	**F (F)**	**F (F)**
		Through	61.4 (46.3)	E (D)			
		Right	12.0 (24.1)	B (C)			
	Westbound	Left	80.0 (72.5)	E (E)			
		Through	74.4 (74.8)	E (E)			
		Right	14.6 (0.3)	B (A)			
	Northbound	Left	77.2 (204.2)	E (F)			
		Through	106.7 (78.8)	F (E)			
		Right	1.3 (11.3)	A (B)			
	Southbound	Left	101.9 (156.0)	F (F)			

Intersection		Intersection Approach				Overall Intersection	
		Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
				AM (PM)	AM (PM)	AM (PM)	AM (PM)
		Through	50.2 (165.5)	D (F)			
		Right	24.4 (185.6)	C (F)			
Murabella Parkway*	Westbound	Left	14.7 (19.5)	B (C)	43.8 (19.5)	**E** (C)	**E** (C)
	Northbound	Right	43.8 (15.9)	E (C)			
	Southbound	Right	13.4 (14.2)	B (B)			
Verona Way*	Northbound	Right	25.2 (14.4)	D (B)	25.2 (14.4)	D (B)	D (B)
Commerce Plaza Boulevard*	Eastbound / Westbound Main	Southbound	Left	32.4 (43.8)	D (E)	32.4 (43.8)	D **(E)**
			Left	13.3 (16.5)	B (C)		
	Eastbound U-turn	Eastbound	Right	68.4 (49.5)	F (E)	68.4 (49.5)	**F (E)**
San Giacomo Road*		Westbound	Left	14.3 (12.1)	B (B)	70.5 (36.2)	**F (E)**
		Northbound	Left	70.5 (36.2)	F (E)		
			Right	19.2 (13.1)	C (B)		
CR 2209	Eastbound / Westbound Main	Eastbound	Through	15.9 (14.3)	B (B)	13.5 (14.5)	B (B)
		Westbound	Through	8.3 (12.3)	A (B)		
		Southbound	Left	33.2 (29.2)	C (C)		
			Right	10.8 (18.8)	B (B)		
	Eastbound U-turn	Eastbound	U-turn	28.8 (32.4)	C (C)	11.6 (6.9)	B (A)
		Westbound	Through	21.7 (11.2)	C (B)		
South Francis Road	Eastbound / Westbound Main	Eastbound	Through	16.8 (16.6)	B (B)	14.2 (19.2)	B (B)
		Westbound	Through	8.4 (18.7)	A (B)		
			Right	1.8 (2.3)	A (A)		
		Southbound	Left / Right	51.8 (48.8)	D (D)		
	Eastbound U-turn	Eastbound	U-turn	43.2 (36.8)	D (D)	4.2 (3.8)	A (A)
		Westbound	Through	6.2 (6.3)	A (A)		
Turnbull Creek Road / Tomoka Pines Drive		Eastbound	Left	29.5 (34.9)	C (C)	14.3 (17.3)	B (B)
			Through	17.8 (24.2)	B (C)		
			Right	3.4 (6.2)	A (A)		
		Westbound	Left	49.5 (53.6)	D (D)		

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
		Through	7.5 (10.3)	A (B)		
		Right	0.0 (0.0)	A (A)		
	Northbound	Left	41.6 (40.0)	D (D)		
		Right	4.3 (2.2)	A (A)		
	Southbound	Left	37.5 (37.4)	D (D)		
		Right	0.7 (0.5)	A (A)		
Windward Ranch Boulevard	Eastbound	Through	24.3 (10.6)	C (B)	18.8 (12.1)	B (B)
		Right	1.7 (1.8)	A (A)		
	Westbound	Left	35.0 (42.5)	C (D)		
		Through	10.2 (10.4)	B (B)		
	Northbound	Left	44.1 (43.4)	D (D)		
		Right	11.2 (14.2)	B (B)		
Downs Corner Road	Eastbound	Left	47.2 (43.3)	D (D)	8.2 (9.7)	A (A)
		Through	7.8 (6.5)	A (A)		
	Westbound	Through	8.0 (11.4)	A (B)		
		Right	5.4 (6.2)	A (A)		
	Southbound	Left	39.1 (38.6)	D (D)		
		Right	17.2 (19.5)	B (B)		
Whisper Ridge Drive	Eastbound	Through	14.0 (20.5)	B (C)	11.0 (12.8)	B (B)
		Right	4.9 (11.7)	A (B)		
	Westbound	Left	40.6 (42.9)	D (D)		
		Through	4.7 (5.6)	A (A)		
	Northbound	Left	46.0 (40.5)	D (D)		
		Right	13.9 (15.5)	B (B)		
West Outlet Mall Access / Elevation Parkway	Eastbound	Left	6.1 (12.9)	A (B)	25.4 (34.3)	C (C)
		Through	25.8 (35.0)	C (C)		
		Right	0.1 (0.1)	A (A)		
	Westbound	Left	80.5 (72.1)	F (E)		
		Through	10.5 (19.0)	B (B)		
		Right	0.0 (0.1)	A (A)		
	Northbound	Through / Left	77.1 (81.7)	E (F)		
		Right	29.0 (9.7)	C (B)		

Intersection		Intersection Approach				Overall Intersection	
		Approach	Movement	Delay (sec)	LOS	Delay (sec)	LOS
				AM (PM)	AM (PM)	AM (PM)	AM (PM)
West Outlet Mall Access / Elevation Parkway		Southbound	Through / Left	60.5 (60.2)	E (E)	25.4 (34.3)	C (C)
			Right	0.3 (0.7)	A (A)		
Toms Road / Factory Outlets Drive	Westbound U-turn	Eastbound	Through	25.7 (12.5)	C (B)	15.6 (7.8)	B (A)
			Right	2.8 (2.2)	A (A)		
		Westbound	Left / U-turn	39.6 (42.0)	D (D)		
		Northbound	Right	18.5 (1.7)	B (A)		
	Eastbound / Westbound Main	Eastbound	Through / Right	13.8 (8.1)	B (A)	13.5 (12.7)	B (B)
		Westbound	Through	7.4 (12.2)	A (B)		
			Right	0.8 (1.2)	A (A)		
		Northbound	Left	31.2 (35.9)	C (D)		
			Right	48.7 (27.2)	D (C)		
		Southbound	Left / Right	6.4 (41.4)	A (D)		
	Eastbound U-turn	Eastbound	U-turn	31.5 (42.6)	C (D)	2.3 (6.7)	A (A)
		Westbound	Through	4.4 (10.5)	A (B)		
CR 208		Eastbound	Through / Right	55.7 (20.3)	E (C)	35.1 (14.9)	D (B)
		Westbound	Left	38.1 (32.8)	D (C)		
			Through	0.3 (1.2)	A (A)		
		Northbound	Right	50.7 (39.8)	D (D)		
I-95 Southbound Ramp Terminal		Eastbound	Through	47.0 (40.6)	D (D)	45.2 (54.4)	D (D)
			Right	18.8 (28.7)	B (C)		
		Westbound	U-turn	58.9 (56.9)	E (E)		
			Through	25.6 (50.6)	C (D)		
		Southbound	Left	93.7 (103.1)	F (F)		
			Right	30.2 (39.7)	C (D)		

* Indicates an unsignalized intersection reporting the highest movement delay (LOS) for the overall intersection.
- Intersection LOS in **red** exceeds target LOS D.

The experienced travel time (ETT) was calculated to compare the No-Build and Build intersection operations that include alternative intersections, specifically the proposed hybrid MUT/thru-cut intersections, except for Turnbull Creek Road since the thru-cut has minimal side-street through

traffic. For most turning movements, the ETT is consistent with the control delay, as documented in the previous section. For turning movements that are displaced, such as those channelized through an additional U-turn, the ETT is determined by adding the extra distance travel time (EDTT) between intersections to the control delay incurred at each turning movement. In addition, the overall intersection ETT is developed by weighing each movement ETT by its respective demand volume. This approach allows for a better understanding of the change in operations for the intersection as a whole.

The detailed ETT analysis for South Francis Road is shown in Table 3.3.4. Under No-Build conditions, this intersection is a three-leg unsignalized intersection. The Build Alternative proposes a hybrid MUT/thru-cut in which the eastbound left-turn movement is channeled through a U-turn intersection approximately 720 feet east on SR 16. For the northbound and southbound approaches, the through movements must perform a right turn onto SR 16, use the U-turn intersection, and then perform a right turn to complete their desired turning movement. Under No-Build conditions, the southbound turning movements from South Francis Road experience very high levels of delay due to the high volumes on eastbound and westbound SR 16, which limit the acceptable gaps for the two-stage southbound left-turn. The Build Alternative resolves this issue by providing signal control at the main intersection and channeling the eastbound left-turn movement through a downstream U-turn; this configuration allows two-phase signal operation and a shorter cycle length. It should be noted that signal control is needed at the eastbound U-turn intersection in order to provide acceptable operations during the Design Year 2050. In terms of the overall intersection, the Build Alternative provides a significant improvement in ETT over the No-Build Alternative.

Table 3.3.4: Design Year 2050 South Francis Road ETT Analysis

Approach / Movement		Volume (vph)	No-Build		Build	
			Movement ETT (s/veh)	Overall ETT (s/veh)	Movement ETT (s/veh)	Overall ETT (s/veh)
2050 AM Peak						
SR 16 Eastbound	Left	100	23.1		80.0	
	Through	1,690	0.0		8.4	
SR 16 Westbound	Through	1,260	0.0		15.0	
	Right	210	0.0	**1475.8**	8.0	15.3
South Francis Road Southbound	Left	180	26,855.4		51.8	
	Right	40	26,855.4		51.8	
2050 PM Peak						
SR 16 Eastbound	Left	40	20.5		74.0	
	Through	1,260	0.0		18.7	
SR 16 Westbound	Through	1,690	0.0		25.0	
	Right	180	0.0	**1913.6**	9.0	24.0
South Francis Road Southbound	Left	210	24,720.4		48.8	
	Right	100	24,720.4		48.8	

- Intersection delay in **red** exceeds target LOS D.

The detailed ETT analysis for Toms Road is shown in Table 3.3.5. Under No-Build conditions, the SR 16 intersection at Toms Road is a 4-leg signalized intersection. The Build Alternative proposes a hybrid MUT/thru-cut in which the eastbound left-turn movement is channeled through a U-turn intersection approximately 540 feet east on SR 16, and the westbound left-turn movement is channelized through a U-turn intersection approximately 360 feet west on SR 16. For the northbound and southbound approaches, the through movements must perform a right turn onto SR 16, use the U-turn intersection, and then perform a right turn to complete their desired turning movement. Under No-Build conditions, the westbound through movement on SR 16 experiences high levels of delay corresponding to LOS F. The Build Alternative provides shorter travel times along SR 16 and lower overall ETT by accommodating two-phase signal operation and a shorter cycle length. It should be noted that signal control is needed at all three intersections in order to provide acceptable operations during the Design Year 2050.

Table 3.3.5: Design Year 2050 Toms Road ETT Analysis

Approach / Movement		Volume (vph)	No-Build		Build	
			Movement ETT (s/veh)	Overall ETT (s/veh)	Movement ETT (s/veh)	Overall ETT (s/veh)
2050 AM Peak						
SR 16 Eastbound	U-turn	10	7.8	27.6	95.0	31.3
	Left	10	7.8		88.0	
	Through	1,935	35.0		40.0	
	Right	60	35.0		40.0	
SR 16 Westbound	U-turn	30	44.0		76.0	
	Left	100	44.0		76.0	
	Through	1,440	15.2		12.0	
	Right	30	15.2		5.0	
Toms Rd Northbound	Left	75	80.5		31.2	
	Through	10	80.5		97.0	
	Right	225	15.4		48.7	
Factory Outlets Drive Southbound	Left	15	42.8		6.4	
	Through	10	27.4		71.0	
	Right	10	27.4		6.4	
2050 PM Peak						
SR 16 Eastbound	U-turn	45	27.8	**74.5**	92.0	27.9
	Left	20	27.8		81.0	
	Through	1,475	56.9		21.0	
	Right	30	56.9		21.0	
SR 16 Westbound	U-turn	55	53.6		84.0	
	Left	155	53.6		84.0	
	Through	1,865	100.1		23.0	
	Right	180	100.1		12.0	
Toms Rd Northbound	Left	125	77.4		35.9	
	Through	20	77.4		87.0	
	Right	130	3.4		27.2	
Factory Outlets Drive Southbound	Left	175	42.4		41.4	
	Through	25	15.2		102.0	
	Right	40	15.2		41.4	

- Intersection delay in **red** exceeds target LOS D.

HCS 2023 was used to analyze the highway portion of the study area, which is between CR 2209 and the West Outlet Mall Access and covers approximately 4.4 miles of roadway. The analysis was conducted on two segments, which are west and east of South Francis Road. The Build Alternative is considered a multilane highway, and several performance measures are available, which include average speed and density. The LOS criteria for a multilane highway is based on density (passenger cars/mile/lane). Table 3.3.6 provides the analysis results for the two highway segments. The additional travel lane in each direction along SR 16 is expected to significantly improve the traffic operations of the roadway. The design year is expected to operate at LOS B or LOS C for both AM and PM peaks. Similar to the intersection analysis, these results indicate a significant improvement in operations over the No-Build Alternative.

Table 3.3.6: Design Year 2050 Build HCS Highway Segment Analysis

Highway Segment	Direction	Average Speed (mi/hr)	Density (pc/mi/ln)	LOS
2050 AM Peak				
SR 16 West of South Francis Road	Eastbound	53.0	18.4	C
	Westbound	52.7	13.9	B
SR 16 East of South Francis Road	Eastbound	53.2	20.2	C
	Westbound	53.4	15.1	B
2050 PM Peak				
SR 16 West of South Francis Road	Eastbound	53.0	13.5	B
	Westbound	52.7	18.0	B
SR 16 East of South Francis Road	Eastbound	53.2	14.8	B
	Westbound	53.4	19.5	C

Appendix G of the PTAR, under a separate cover, contains backup documentation of the future conditions safety analysis.

3.3.4 Future Conditions Safety Analysis

The AASHTO Highway Safety Manual (HSM) methodology was used to compare the predicted crashes of the No-Build and Build alternatives to determine the safety benefit of the improvements proposed as part of the Build Alternative.

The HSM Chapter 12 spreadsheets were used to apply the HSM predictive methodologies for this analysis. This spreadsheet-based tool helps to streamline the application of Safety Performance Functions (SPFs) and Crash Modification Factors (CMFs) as specified for urban and suburban arterials from Chapter 12 of the Highway Safety Manual. This spreadsheet tool incorporates the geometry along SR 16 as well as the intersections within the project area, which have geometric or operational improvements between the No-Build and Build alternatives. The primary difference between the No-Build and Build alternatives is the widening of SR 16 from a two-lane undivided roadway to a four-lane divided roadway. Major geometric changes were also incorporated in the Build Alternative at South Francis Road and Toms Road as well as signalizing the intersections of Turnbull Creek Road, Windward Ranch Boulevard, Downs Corner Road, and Whisper Ridge Drive.

The Build Alternative safety analysis also incorporates the crash modification factor (CMF) which accounts for conversion of a signalized intersection to an MUT. CMF ID 10865: Convert intersection to MUT intersection was used to estimate the benefit of converting the South Francis Road and Toms Road intersections from full-access intersections to a partial MUT and an MUT, respectively. The CMF for converting a signalized intersection to an MUT is 0.6508 representing a 34.92% reduction in crashes of all types and severities. It should be noted that Turnbull Creek Road is being converted into a signalized thru-cut intersection, but no CMF exists for this intersection configuration. Therefore, the number of crashes in the analysis represents a traditional signalized intersection.

Table 3.3.7 summarizes the segment, intersection, and total annual predicted crashes for the No-Build and Build alternatives. As shown in the table, the Build Alternative is expected to provide a 28.6% reduction in predicted crashes per year over the No-Build Alternative. Appendix H of the PTAR, under a separate cover, contains backup documentation of the future conditions safety analysis.

Table 3.3.7: Future Conditions Safety Analysis (Predicted Crashes Per Year)

Location	No-Build	Build	% Difference
Segments			
International Golf Parkway to Verona Way	5.1	2.7	-47.0%
Verona Way to South Francis Road	16.5	10.2	-38.2%
South Francis Road to 0.13 miles west of West Outlet Mall Access	48.5	28.8	-40.6%
0.13 miles west of West Outlet Mall Access to I-95 Southbound Terminal	8.8	8.8	0%
Intersections			
SR 16 at South Francis Road	5.1	3.7	-27.5%
SR 16 at Turnbull Creek Road	2.7	4.3	59.3%
SR 16 at Windward Ranch Boulevard	3.6	4.2	16.7%
SR 16 at Downs Corner Road	1.8	2.1	16.7%
SR 16 at Whisper Ridge Drive	2.9	3.7	27.6%
SR 16 at Toms Road	7.7	4.8	-37.7%
Total Crashes	**102.7**	**73.3**	**-28.6%**

4.0 Design Controls & Criteria

4.1 Design Controls

4.1.1 Roadway Context Classification

The proposed context classification for SR 16 is C3 – Suburban. As discussed in *Section 2.2.2 Roadway Functional and Context Classification*, the existing context classifications on SR 16 vary between C2 and C3. Due to the fast-paced development along the corridor, the current C2 sections are anticipated to be C3 by opening year. See Section *3.2 Future Context Classification* for the limits of the proposed context classification.

4.1.2 Functional Classification and Strategic Intermodal System Designation

Within the study limits, SR 16 is functionally classified as an urban principal arterial – other from IGP to South Francis Road and rural principal arterial-other from South Francis Road to I-95. SR 16 is not on the Strategic Intermodal System (SIS) system.

4.1.3 Access Management Classification and Applicable Standards

The access management classification for SR 16 is Class 3. The proposed roadway is a restricted four-lane divided arterial with directional median openings spaced no closer than 1,320 feet apart and full median openings and signals spaced no closer than 2,640 feet apart.

4.1.4 Design Speed and Target Speed

The proposed design and target speed on SR 16 is 45 mph from IGP to CR 2209, 55 mph from east of CR 2209 to west of the St. Augustine Outlet Mall, and 45 mph from west of the St. Augustine Outlet Mall. This speed varies from the current conditions that are discussed in *Section 2.2.7 Existing Design and Posted Speeds*.

4.1.5 Capacity and LOS Target

The corridor was designed to accommodate traffic with a volume-to-capacity ratio less than or equal to one.

The FDOT LOS target for urban roadways is LOS D, therefore, this PD&E Study utilized a LOS D for roadway segment operational performance. There are no FDOT LOS targets for intersection operational performance.

4.1.6 Design Vehicle

The corridor was designed to accommodate an interstate semitrailer (WB-62FL), however the hybrid MUT/thru-cut movements only accommodate a passenger vehicle (P), with the exception of the eastbound U-turn movement associated with the South Francis Road hybrid MUT/thru-cut, which was designed to accommodate a WB-62FL due to the higher turning movements for larger vehicles turning north onto South Francis Road from eastbound SR 16.

4.1.7 Pedestrian and Bicycle Requirements

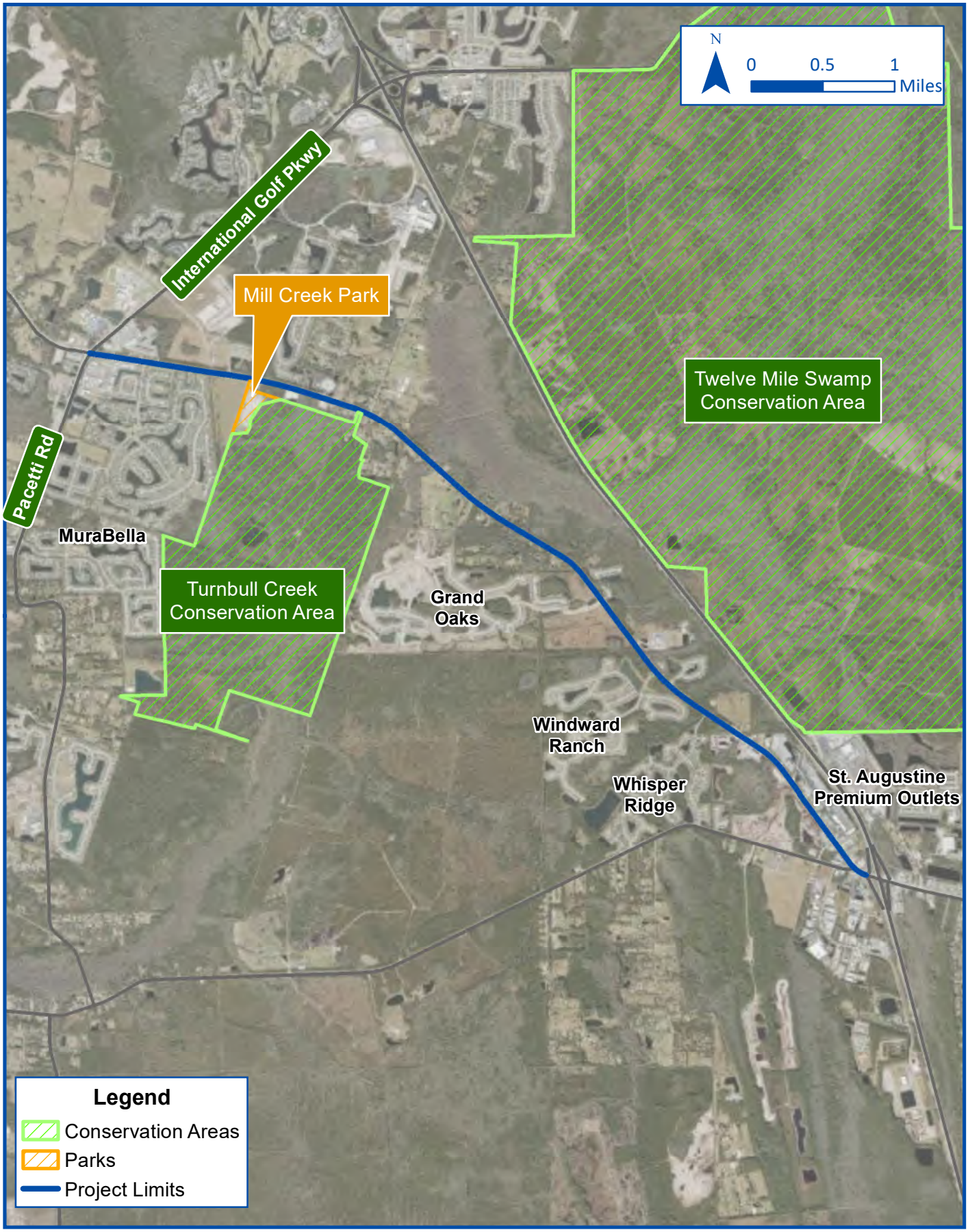
Shared use paths are being considered in place of sidewalk and bicycle lanes. The standard width of a shared use path is 12 feet, and the minimum width is 10 feet.

4.1.8 Physical Constraints

Right-of-way is a constraint for this project. As mentioned in *Section 2.2.4 Right-of-way*, the right-of-way within the project limits is consistently 200 feet.

4.1.9 Environmental Constraints

Mill Creek Park is located adjacent to SR 16 with amenities set 300 feet from the existing SR 16 right-of-way. Turnbull Creek Conservation area is located adjacent to SR 16 to the south and east of San Giacomo Road. Twelve Mile Conservation area is located north of the project, east of I-95. Figure 4.1.1 shows the conservation areas and park located within the study area.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 4.1.1: Conservation Areas and Park	Page Number: 4-3

4.1.10 Types of Stormwater Facilities

The project improvements include both open and closed drainage systems with ditches, shoulder gutters, curb and gutter, and piped systems that will be designed to meet the regulatory requirements of the applicable water management districts, the requirements outlined in the FDOT Drainage Manual, and the requirements of the FDOT Design Manual. The entirety of the project is located within the regulatory authority of the SJRWMD; therefore, an Environmental Resource Permit will be secured through this district.

4.1.10.1 SJRWMD Water Quality Criteria

For wet detention systems, the design treatment volume is the greater of the following: (a) one inch of runoff over the drainage area (b) 2.5 inches times the impervious area (excluding water bodies).

4.1.10.2 SJRWMD Water Quantity Criteria

The post-development peak discharge rate must not exceed the pre-development peak rate of discharge for the mean annual 24-hour storm for systems serving both of the following:

1. New construction area greater than 50% impervious (excluding waterbodies)
2. Projects for the construction of new developments that exceed the thresholds in paragraphs 62-330.020(2)(b) or (c), F.A.C.

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

4.1.11 Navigational Requirements

SR 16 is an inland corridor and does not contain a navigable waterway. Navigational requirements were not a design control for this project.

4.1.12 Design High-Water

Roadway base is required to be a minimum of three feet from the seasonal high-water elevation. Soil borings were taken along SR 16 every 500 feet, alternating between the proposed eastbound

and westbound shoulders. Based on the soil borings, the estimated seasonal high-water elevation varies between six inches to 4.5 feet below the existing ground, with an average depth of 2.5 feet between the existing ground and seasonal high-water elevation. Per FDM 10.10.3, the minimum clearance from the bottom of the roadway base course to the base clearance water elevation is three feet.

4.1.13 Design Wave Heights

SR 16 is an inland corridor and does not contain a coastal bridge. Design wave height is not a design control for this project.

4.2 Design Criteria

The design criteria for this study are presented in Table 4.2.1 and are based on design parameters outlined in the 2025 FDOT Design Manual.

Table 4.2.1: Design Standards for C3 Suburban – 45 and 55 mph

Design Element	45 mph	55 mph	Source
Context Classification	C3 Suburban		FDOT
Access Classification	Class 3		Access Management Classification
Design Vehicle	WB-62FL (P for U-turns)		FDM, Section 201.6 FDM, Section 212.9.1
Design Speed & Posted Speed	45 mph	55 mph	FDM, Section 201.5
Minimum Lane Widths	11 ft (travel and turning)	12 ft (travel and turning)	FDM, Table 210.2.1
Median Shoulder	N/A	4 ft (Curbed) / 5 ft Paved /10 ft Full Width (Flush Shoulder)	FDM, Section 210.5.1 / FDM, Table 210.4.1
Outside Shoulder	N/A	6.5 ft (Curbed) / 5 ft Paved /10 ft Full Width (Flush Shoulder)	FDM, Section 210.5.1 / FDM, Table 210.4.1
Inside/Outside Curb	Type E / Type F	Type E / Type E	FDM, Section 210.5 (45) FDM, Section 210.5.1 (55)
Shared Use Path Separation from Roadway	5 ft minimum (Curbed) [1] / 5 ft minimum (Flush Shoulder) [2]	5 ft minimum (Curbed) [1]/ 5 ft minimum (Flush Shoulder) [3]	FDM, Section 224.12
Shared Use Path	12 ft (10 ft minimum)		FDM, Section 224.4
Median Width	22 ft	30 ft	FDM, Table 210.3.1
Minimum Border Width	14 ft (Curbed) / 33 ft (Flush Shoulder)	35 ft (Curbed) / 40 ft (Flush Shoulder)	FDM, Table 210.7.1

[1] Separation from roadway is the distance from face of curb to edge of path.
[2] Separation from roadway is the distance from outside edge of paved shoulder to edge of path.
[3] Separation from roadway is the distance from shoulder break point to edge of path.

Design Element	45 mph	55 mph	Source
Grades	6% maximum	5% maximum	FDM, Table 210.10.1
Maximum Change in Grade w/o VC	0.70%	0.50%	FDM, Table 210.10.2
Pavement Cross Slopes	Travel Lanes (2% minimum)		FDM, Figure 210.2.1
Minimum Grade	0.3% (Curbed) / N/A (Flush Shoulder)		FDM, Section 210.10.1
Minimum Stopping Sight Distance	360 ft +/- adjustments	495 ft +/- adjustments	FDM, Table 210.11.1
Minimum/Desirable Length of Horizontal Curve	400 ft / 675 ft	400 ft / 825 ft	FDM, Table 210.8.1
Maximum Deflection w/o Horizontal Curve	1°00'00'' (Curbed) / 0°45'00'' (Flush Shoulder)	0°45'00'' (Curbed) / 0°45'00'' (Flush Shoulder)	FDM, Section 210.8.1
Maximum Curvature	8°15'00''	6°30'00''	FDM, Table 210.9.2 (45) FDM, Table 210.9.1 (55)
Maximum Curvature w/o Superelevation	Normal Crown - 2°45'00'' Reverse Crown - 6°00'00'' (e_{max} = 0.05)	Normal Crown - 0°30'00'' Reverse Crown - 0°45'00'' (e_{max} = 0.1)	FDM, Table 210.9.2 (45) FDM, Table 210.9.1 (55)
Superelevation	80% of super trans in tangent Superelevation Transition Rate: 1:200	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 = 98; L = 135 ft (minimum)	K = 185; L = 350 ft (minimum)	FDM, Table 210.10.3 FDM, Table 210.10.4
Sag Vertical Curve	K = 79; L = 135 ft (minimum)	K = 115; L= 250 ft (minimum)	FDM, Table 210.10.3 FDM, Table 210.10.4
Clear Zone Width	Travel Lane = 24 ft Auxiliary Lanes = 14 ft	Travel Lane = 30 ft Auxiliary Lanes = 18 ft	FDM, Table 215.2.1
Deceleration Distance	185 ft + Queue Length	350 ft + Queue Length	FDM, Exhibit 212-1
FDM = FDOT Design Manual (January 2025), Florida Department of Transportation			

5.0 Alternatives Analysis

5.1 No-Build (No-Action) Alternative

The No-Build Alternative provides a baseline for comparison to the Build Alternative. It represents the existing roadway network within the study area, in addition to any planned improvements. Four planned improvements exist within the study area, and the project details have been provided by St. Johns County and FDOT and are summarized below.

SR 16 at International Golf Parkway Intersection Improvements

This project is currently under design by St. Johns County. The planned improvements include additional turn lanes and storage. It should be noted that the AM and PM cycle lengths at this intersection were maintained from existing conditions, but the splits were re-optimized to account for these capacity improvements. The combination of the intersection improvements at IGP and the CR 2209 extension discussed below will include widening SR 16 to a four-lane facility from IGP to CR 2209.

CR 2209 Extension

This project is currently under design by St. Johns County. The planned improvements include an extension of CR 2209 to SR 16 by the opening year (2030). The planned intersection of SR 16 and CR 2209 is a partial MUT configuration with an eastbound U-turn intersection on SR 16 east of CR 2209, and the Senior Living at the Greens assisted living facility driveway.

Elevation Parkway and Realigned CR 208

To serve the new Elevation Pointe commercial development currently under construction, the developer in conjunction with St. Johns County is constructing a southern leg to be added to the existing intersection at the West Outlet Mall Access, which will coincide with the realigned CR 208. It is assumed that signal control will be incorporated at this intersection by the opening year in addition to dual-lane westbound left-turn lanes to accommodate the additional traffic demand.

SR 16 at I-95 Interchange Improvements

This project is currently under construction by FDOT. The existing interchange at SR 16 and I-95 will be converted to an MUT interchange.

The advantages of the No-Build Alternative include:

- No new expenditures for road design, utility relocations, right-of-way acquisition, or construction costs;
- No inconvenience to the public during construction; and
- No impacts to the natural environment.

The disadvantages of the No-Build Alternative include:

- Does not meet the purpose and need for the project;
- Incomplete pedestrian and bicycle connectivity along SR 16;
- Increased vehicular congestion and delay, which leads to increased travel, time, and delay costs;
- Increased safety concerns; and
- Increased emergency response and evacuation time.

Due to the existing and future traffic demands of SR 16, the No-Build Alternative is considered neither viable nor a practical alternative, but it will be fully considered throughout the PD&E Study.

5.2 Transportation Systems Management and Operational (TSM&O) Alternative

Transportation System Management and Operations (TSM&O) alternatives include improvements such as separate turn lanes, traffic signal timing optimization, and pavement marking improvements to enhance traffic safety and mobility. The implementation of TSM&O strategies will aid in local intersection safety and will be utilized in the proposed concepts. However, TSM&O improvements alone do not sufficiently address the capacity problems or improve overall network efficiency, and the majority of the disadvantages of the No-Build Alternative will remain. The TSM&O Alternative, by itself, is not considered a viable option, and no further evaluation of only

the TSM&O Alternative is conducted in this study. However, to assist with traffic operations, signal timing optimization was incorporated into both the No-Build and Build Alternatives.

5.3 Multimodal Alternatives

A Multimodal Alternative does not sufficiently address the capacity problems or improve overall network efficiency and safety, and the majority of the disadvantages of the No-Build Alternative will remain. Therefore, the Multimodal Alternative alone is not considered a viable option, and no further evaluation of only the Multimodal Alternative was conducted. The Build Alternative for this PD&E Study includes a 10-foot-wide shared use path north of SR 16 and a 12-foot-wide shared use path south of SR 16.

5.4 Build Alternatives

SR 16 is divided into two segments: Segment 1: IGP to the St. Augustine Outlet Mall, and Segment 2: St. Augustine Outlet Mall to I-95. St. Johns County will construct the portion of SR 16 between IGP and the proposed CR 2209 extension, approximately 0.75 miles. The proposed improvements described below will tie into the County's project.

Segment 2 is already a four-lane divided facility in the existing condition and no additional capacity is recommended within this segment. The shared use paths from Segment 1 will be extended and tie into the existing sidewalk. Safety and operational improvements have been evaluated within this segment of SR 16. The proposed design speed is 55 mph from east of CR 2209 to west of the St. Augustine Outlet Mall and then 45 mph from the St. Augustine Outlet Mall to I-95.

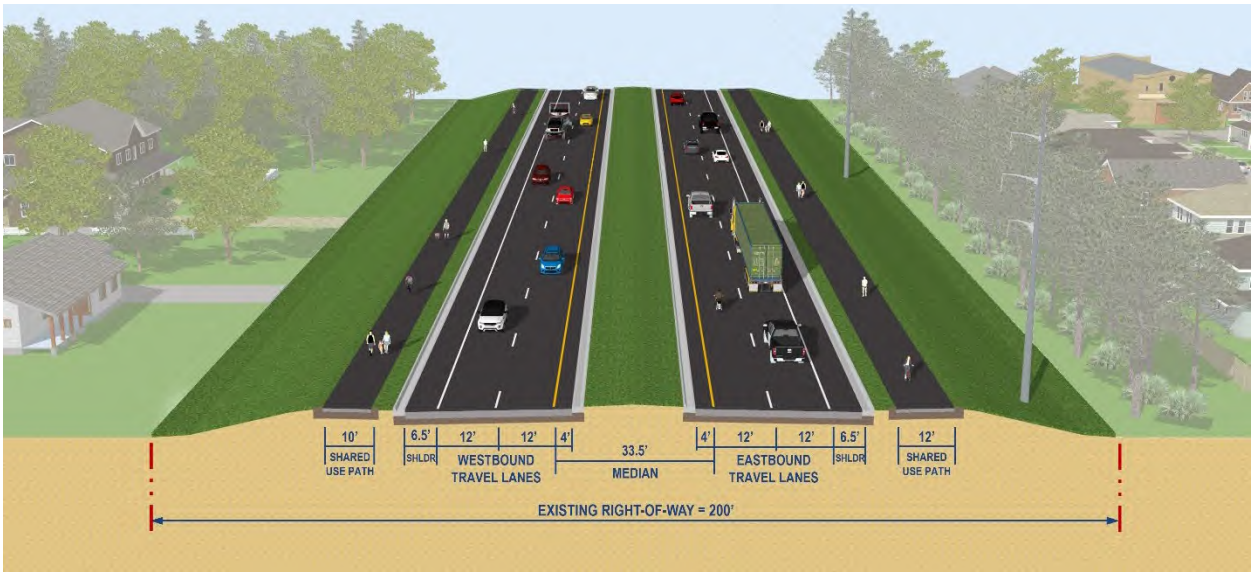
The Build Alternative was presented at the Alternatives Public Meeting in February 2024. The Preferred Alternative is described in *Section 7 Preferred Alternative* and includes further engineering descriptions of drainage, stormwater management, and floodplains. Also, the footprint for the Build Alternative and the Preferred Alternative are the same, so the environmental

impacts are also located in *Section 7 Preferred Alternative*. The traffic and safety analysis for the Build Alternative is located in *Section 3.3 Future Traffic Demand*.

5.4.1 Typical Sections

The proposed typical section features a four-lane divided high-speed arterial with curb and gutter. The roadway consists of two 12-foot-wide lanes in each direction with a four-foot-wide paved inside shoulder and a 6.5-foot-wide paved outside shoulder. The opposing lanes are divided by a 33.5-foot-wide raised grassed median (including the inside four-foot shoulder width). A 12-foot-wide shared use path is proposed in the eastbound direction and a 10-foot-wide shared use path is proposed in the westbound direction. The existing right-of-way is approximately 200 feet, and no additional right-of-way is required to accommodate the proposed typical section. Figure 5.4.1 shows the proposed typical section.

Figure 5.4.1: Proposed Typical Section



5.4.2 Horizontal Alignment

The proposed horizontal alignment for SR 16 generally follows the existing alignment with the eastbound lanes constructed on top of the existing SR 16. Below is a brief description of the existing roadway geometry:

- Starting at the IGP intersection, a tangent extends 4,613 feet in the S80°53'46"E direction;
- A 2,785-foot curve deflects the corridor to the south with a 17,220-foot radius;
- A 1,139-foot tangent directs the corridor in the S71°37'46"E direction;
- A 1,911-foot curve deflects the corridor to the south with a 4,613-foot radius;
- A 2,362-foot tangent directs the corridor in the S47°53'55"E direction;
- A 2,177-foot curve deflects the corridor to the east with a 2,177-foot radius;
- A 1,922-foot curve deflects the corridor in the S58°48'55"E direction;
- A 825-foot curve deflects the corridor to the south with a 2,135-foot radius;
- A 3,406-foot curve deflects the corridor in the S36°40'18"E direction;
- A 1,925-foot curve deflects the corridor the east with a 1,925-foot radius;
- A 2,743-foot tangent directs the corridor in the S56°01'06"E direction;
- A 825-foot curve deflects the corridor to the south with a 2,392-foot radius; and
- A 3,180-foot tangent directs the corridor in the S36°15'23"E direction.

Existing turn lanes will be included as part of the design. Appendix A shows the concept plan sheets for the Build Alternative shown at the Alternatives Public Meeting in February 2024.

5.4.3 Median Openings and Intersection / Interchange Improvements

As mentioned in *Section 2.2.3 Access Management Classification*, SR 16 is currently a two-lane undivided roadway which would be classified as non-restrictive, meaning there are no median openings. Upgrading Segment 1 to a four-lane divided facility will require the implementation of access management. The proposed access management classification is Class 3, which states directional median openings can be spaced at 1,320 feet and full median openings or signals may be spaced every 2,640 feet.

A total of six signalized intersections are proposed within the project limits at the following intersections with SR 16 and are described below:

- IGP / Pacetti Road (existing);
- CR 2209 Extension (proposed in St. Johns County SR 16 Improvements project);

- South Francis Road;
- CR 208 Realignment (proposed in St. Johns County CR 208 Realignment project);
- Toms Road (existing); and
- I-95 Southbound Ramp (existing).

Table 5.4.1 shows the access management for the Build Alternative. The cells shaded in red do not meet the current FDOT design standards.

Table 5.4.1: Build Alternative Access Management

Side Road / Description	Proposed Median Type	Proposed Middle Station	Proposed Directional Median Spacing (feet)	Proposed Full Median Spacing (feet)	Proposed Signal Spacing (feet)
IGP/Pacetti Rd[1]	Full (Signal)	100+00			
			760		
Murabella Pkwy[1]	WB Directional	107+60			
			1,080	3,260	
Commerce Plz Blvd[1]	WB Directional	118+40			3,950
			680		
San Giacomo Rd[1]	Full (Thru-Cut)	132+60			
				690	
CR 2209[1]	Full (Signalized MUT)	139+50			
			1,550		
Mill Creek Park	Dual Directional	155+00			
			2,140	5,230	5,230
Veterans Nursing Home/Superior Supply	Dual Directional	176+40			
			1,540		
S Francis Rd	Full (Signalized Partial MUT)	191+80			

Side Road / Description	Proposed Median Type	Proposed Middle Station	Proposed Directional Median Spacing (feet)	Proposed Full Median Spacing (feet)	Proposed Signal Spacing (feet)
EB U-Turn[2]	EB Directional	199+00	980		
				3,420	
Turnbull Dr	WB Directional	201+60			
			2,440		
Median Opening east of Turnbull Creek bridge	Full	226+00			
			1,460		
Median Opening west of Turnbull Creek Rd	Dual Directional	240+60			
			1,380		
Median Opening west of Turnbull Creek Rd	Dual Directional	254+40		4,880	
			1,840		
EB U-Turn	EB Directional	272+80			18,060
			1,500		
Turnbull Creek Rd	Full	287+80			
			1,770		
Turning Point at Calvary	EB Directional	305+50		2,880	
			1,110		
Windward Ranch Blvd	Full (Thru-Cut)	316+60			
				580	
Downs Corner Rd	Full (Thru-Cut)	322+40			
				1,460	
Whisper Ridge Dr	Full	337+00			
			1,620		
Tadpole Prep/Soluna	Dual Directional	353+20		3,540	
			1,920		
Atlantic Self Storage	Closed	365+80			

Side Road / Description	Proposed Median Type	Proposed Middle Station	Proposed Directional Median Spacing (feet)	Proposed Full Median Spacing (feet)	Proposed Signal Spacing (feet)
CR 208 Realignment	Full (Signal)	372+40			
			1,960	2,300	2,300
Sonny's BBQ/Race Trac[3]	Dual Directional	392+00			
			340		
Tom's Rd	Full (Signalized Hybrid MUT/Thru-Cut)	395+40			
			1070	1,670	1,670
Super 8[3]	EB Directional	400+50			
CR 208	WB Directional	406+10			
			600		
I-95 SB Off Ramp	Full (Signal)	412+10			

[1]Proposed concept between IGP and CR 2209 is from St. Johns County's SR 16 Improvements project
[2]Directional used for U-turn movement is part of alternative intersection configuration at South Francis Road
[3]Directional used for U-turn movement is part of alternative intersection configuration at Toms Rd
Note: The cells shaded in red do not meet current FDOT standards

IGP / Pacetti Road

SR 16 eastbound will feature dual left turn lanes onto IGP, two through lanes, and one right turn lane onto Pacetti Road. SR 16 westbound will feature dual left turn lanes onto Pacetti Road, two through lanes, and one right turn lane onto IGP. Pacetti Road will feature dual left turns onto SR 16 westbound, two through lanes, and one right turn lane onto SR 16 eastbound. IGP will feature dual left turn lanes onto SR 16 eastbound, two through lanes, and one right turn lane onto SR 16 westbound. Figure 5.4.2 shows the IGP / Pacetti Road intersection with SR 16.

Figure 5.4.2: IGP / Pacetti Road Intersection with SR 16

CR 2209 Extension

SR 16 eastbound and westbound will feature two through lanes and one right turn lane. CR 2209 northbound and southbound will feature one through lane and one right turn lane. Figure 5.4.3 shows the CR 2209 extension intersection with SR 16.

South Francis Road

The South Francis Road intersection with SR 16 features a signalized partial MUT. SR 16 eastbound will feature two through lanes. SR 16 westbound will feature two through lanes and one right turn lane. South Francis Road northbound and southbound will feature one lane that allows for left or right movements. Through movements on South Francis Road will not be permitted at this intersection. This intersection configuration is referred to as a hybrid MUT/thru-cut. Figure 5.4.4 shows the South Francis Road intersection with SR 16.

Figure 5.4.3: CR 2209 Extension Intersection with SR 16

Figure 5.4.4: South Francis Road Intersection with SR 16

CR 208 Realignment

SR 16 eastbound features one left turn lane, two through lanes, and one right turn lane. SR 16 westbound features dual left turn lanes, two through lanes, and one right turn lane. CR 208 northbound and southbound features one left-through lane and one right turn lane. Figure 5.4.5 shows the CR 208 Realignment intersection with SR 16.

Figure 5.4.5: CR 208 Realignment Intersection with SR 16

Toms Road

The Toms Road intersection with SR 16 features a through-cut meaning vehicles are unable to make a through movement on Toms Road. SR 16 eastbound features two through lanes. SR 16 westbound features two through lanes and a right turn lane. Toms Road northbound features one left turn lane and one right turn lane. Toms Road southbound features one lane that can be used to turn left or right. Figure 5.4.6 shows the Toms Road intersection with SR 16.

Figure 5.4.6: Toms Road Intersection with SR 16

5.4.4 Bridge and Structure Analysis

The Build Alternative will reconstruct the bridge over Turnbull Creek with two bridges spaced 20 feet apart. The length of the bridges will be 200 feet and the width will be 56.2 feet. The final configuration will be determined during the design phase when a BDR will be prepared.

5.4.5 Vertical Alignment

The proposed profile ties into the St. Johns County SR 16 Improvements project and therefore starts east of the Murabella neighborhood. The proposed profile raises the road approximately four feet. The vertical alignment of SR 16 follows the geometry shown in Table 5.4.1.

Table 5.4.1: Vertical Alignment of SR 16

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
-	-	139+99.9	30.7	-	-
243.8	-0.3%	143+68.7	29.6	250	417
324.8	0.3%	149+93.6	31.5	350	583
206.8	-0.3%	155+00.3	29.9	250	417
307.0	0.3%	161+07.3	31.8	350	583
180.2	-0.3%	165+87.5	30.3	250	419
22.0	0.3%	169+09.5	31.3	350	587
284.3	-0.3%	174+68.8	29.6	200	333
684.2	0.3%	182+52.9	32.0	0	0
277.5	0.5%	187+05.4	34.2	350	267
4.4	-0.8%	190+09.8	31.8	250	178
288.4	0.6%	195+98.2	35.3	350	250
228.3	-0.8%	200+01.5	32.1	0	0
727.1	-0.5%	208+53.6	27.8	250	250
680.6	0.5%	218+34.2	32.7	350	350
361.4	-0.5%	224+95.6	29.4	250	312
491.4	0.3%	232+87.0	31.8	350	583
450.0	-0.3%	240+37.0	29.5	250	417
25.0	0.3%	243+62.0	30.5	350	583
25.0	-0.3%	246+87.0	29.5	250	417
25.0	0.3%	250+12.0	30.5	350	583
187.8	-0.3%	254+99.8	29.0	250	417
775.0	0.3%	263+99.8	31.7	0	0
469.5	0.5%	268+69.4	34.1	0	0
363.3	0.3%	274+07.7	35.7	350	438
597.5	-0.5%	283+05.2	31.2	250	179
0.0	0.9%	286+05.6	33.9	350	233
16.1	-0.6%	289+21.7	32.0	250	278
149.6	0.3%	293+71.3	33.4	350	583
213.8	-0.3%	298+85.1	31.8	250	417
141.6	0.3%	303+26.6	33.2	350	583
125.9	-0.3%	308+14.5	31.7	374	312
0.0	0.9%	311+76.3	34.9	350	251
138.0	-0.5%	316+14.3	32.8	250	312
102.8	0.3%	320+17.0	34.0	350	607
207.8	-0.3%	325+49.9	32.5	300	386
533.2	0.5%	334+08.0	36.8	350	438
35.9	-0.3%	337+43.9	35.8	250	208

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
425.2	0.9%	342+94.1	40.7	0	0
139.7	0.5%	345+58.8	42.4	250	417
100.0	1.1%	349+58.8	46.4	350	700
515.1	0.6%	358+23.9	51.6	350	269
21.0	-0.7%	361+45.0	49.4	250	250
84.5	0.3%	365+29.5	50.5	350	4378
460.1	-0.5%	374+64.6	47.4	-	-
Note: The dashed values indicate the beginning and end of the vertical alignment which will tie into the existing vertical profile of SR 16 but are not accounted for in this table.					

5.4.6 Right-of-way

The roadway improvements fit within the existing 200 feet of right-of-way. No additional right-of-way will be required to accommodate the roadway improvements. As such, no relocations are anticipated as a result of the Build Alternative roadway improvements.

Right-of-way will be required for drainage ponds. The pond alternatives can be found in the Pond Siting Report (PSR), under a separate cover and the preferred pond sites are described in *Section 7 Preferred Alternative*.

5.5 Value Engineering Study

A VE study was conducted in September 2024 to ensure that the project objectives are addressed, and the project remains cost effective, constructible, and makes the most efficient use of resources. The VE Study was conducted from September 9 through September 13, 2024. The VE team generated 27 ideas and six were determined to be design suggestions during the Creative Idea and Evaluation phases of the VE Job Plan. Table 5.5.1 shows the recommendations from the VE Study and management's decision on each idea. In total, four ideas were recommended for further study.

Table 5.5.1: VE Study Recommendations

Number	Description	Potential Cost Savings (Potential Value Added)	Management Action
6	Move the shared-use paths closer to the edge of right-of-way	$3,507,000	Further Study
7	Change to suburban typical with swales	$20,467,000	Further Study
11	Provide conventional signalization and crosswalks at all intersections	$6,000	Rejected
14	Reclaim the existing base and reuse for Type B Stabilization for ½ of divided highway. (Roadway and Shared Use Path)	$3,227,000	Further Study
17	Install a directional median (unsignalized) at Downs Corner Road	$758,000	Rejected
18	Don't need a FIB 36. Suggest using flat slab bridge	($1,307,000)	Further Study

5.6 Comparative Alternatives Evaluation

A comparison of the Build and No-Build alternatives is shown in Table 5.6.1.

Table 5.6.1: Evaluation Matrix

	Build Alternative[1]	Preferred Alternative[2]	No-Build Alternative
Cost			
Right-of-way (million)	$0	$17.2	$0
Construction (million)	$172.3	$189.0	$0
Operations and Safety			
Design Year LOS	B / C	B/C	E / F
Annual Expected Crashes	36% Crash Reduction	29% Crash Reduction	0% Crash Reduction
Purpose and Need			
Meets the Project Purpose and Need	Yes	Yes	No
Social and Economic			
Total Parcels Impacted	0	4	0
Total Acres Impacted	0	37.8	0
Total Relocations	0	0	0
Impacts to Community Focal Points	0	0	0
Cultural			
Potential NRHP – Eligible Impacts	0	0	0
Natural			
Wetland / Surface Water Impacts (acres)	13.5	25.0	0
Floodplain Impacts (acres)	13.6	27.5	0
Protected Species and Habitat Impacts	Minor	Minor	No
Physical			
Potential Contamination Sites within the Corridor (Medium or High Risk)	9	12	0
Noise-Sensitive Areas Potentially Needing a Noise Wall	3	3	0
Air Quality Impacts	Minor	Minor	No
Utility Impacts	Minor	Moderate	No
Bicycle and Pedestrian Improvements	Yes	Yes	No

[1] Does not include ponds
[2] Includes ponds

In the comparative matrix, the Build Alternative does not include pond sites. The Build Alternative does not impact any parcels, require any right-of-way, or require relocations. The Design Year LOS is anticipated to operate at a B or C for both AM and PM peak hours for the Build Alternative compared to E or F for the No-Build Alternative. The Build Alternative is anticipated to result in a 36% crash reduction over the No-Build Alternative. No NRHP-eligible properties are anticipated to be impacted as a result of the project. A total of 13.5 acres of wetlands and surface waters and 13.6 acres of floodplains within the existing right-of-way are anticipated to be impacted by the Build Alternative. There are nine medium/high ranked contamination sites located within the project study area. The Build Alternative construction cost is $172.3 million.

5.7 Selection of the Preferred Alternative

Following the Alternatives Public Meeting, changes were made to reduce project costs, address public feedback, and incorporate the VE Study recommendations. These changes include:

- Reuse the existing roadway for the future eastbound lanes;
- Convert from an urban typical section to a rural typical section to have an open drainage system;
- Traffic signals will be added to the following development entrances:
    - Turnbull Creek Road;
    - Whisper Ridge Road / Downs Corner;
    - Windward Ranch Boulevard; and
- Update bicycle / pedestrian facilities to 12-foot-wide shared use paths on both sides of SR 16 throughout the project limits.

The Preferred Alternative was derived from the Build Alternative and includes the changes listed above. The Preferred Alternative analysis in Table 5.6.1 includes pond sites. The Preferred Alternative impacts four parcels for a total of 37.8 acres and requires no relocations. The Design Year LOS is anticipated to operate at a B or C for both AM and PM peak hours for the Preferred Alternative. The anticipated Design Year LOS presented in Table 5.6.1 accounts for the highway segment analysis. It should be noted that four of the intersections operating under minor street

stop control (two-way stop control) in the Build Alternative (Turnbull Creek Road, Windward Ranch Boulevard, Downs Corner Road, and Whisper Ridge Drive) were converted to signal control in the Preferred Alternative. The conversion to signal control at these intersections is anticipated to provide significant intersection-level operational benefits in addition to the highway segment LOS improvements. The Preferred Alternative is anticipated to result in a 29% crash reduction over the No-Build Alternative. The Preferred Alternative has a slightly higher number of predicted crashes than the Build Alternative due to the proposed changes to intersection control type. HSM methodologies predict a higher number of low-severity crashes (e.g., rear-end crashes) for signalized intersections due to introducing signal control on the major street movements. No NRHP-eligible properties are anticipated to be impacted as a result of the project. A total of 24.97 acres of wetlands and surface waters and 27.51 acres of floodplains are anticipated to be impacted by the Preferred Alternative. There are 12 medium/high ranked contamination sites located within the project study area. The Preferred Alternative construction cost is $189.0 million and the right-of-way cost is $17.2 million.

6.0 Agency Coordination & Public Involvement

6.1 Agency Coordination

The ETDM process is FDOT's procedure for reviewing qualifying transportation projects to consider potential environmental effects in the Planning phase. The ETDM process provides stakeholders the opportunity for early input, involvement, and coordination, provides for the early identification of potential project effects, and informs the development of scopes for projects advancing to the PD&E phase.

Stakeholders involved in the ETDM process generally include MPOs, county and municipal governments, federal and state agencies, and the public. To facilitate intergovernmental interaction, each of the seven geographic FDOT Districts has an Environmental Technical Advisory Team (ETAT). ETAT members and the public have the opportunity to provide input to the FDOT regarding a project's potential effects on the natural, physical, cultural, and community resources throughout the planning phase of project delivery. These comments help to determine the feasibility of a proposed project; focus the issues to be addressed during the PD&E phase; allow for early identification of potential avoidance, minimization, and mitigation opportunities; and promote efficiency and consistency during project development.

For this study, the ETAT included representatives from the following agencies:

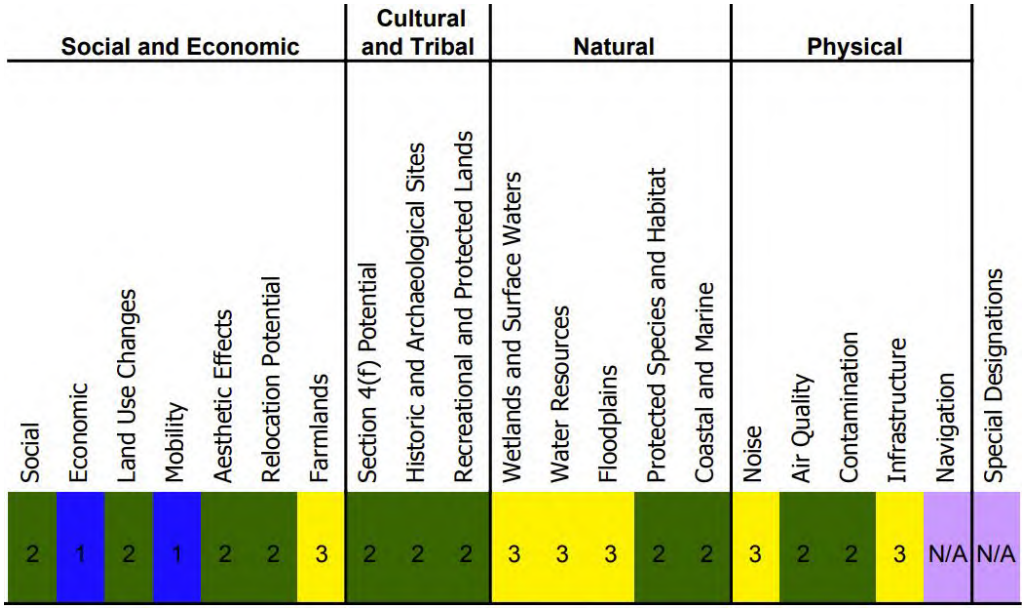
- FDOT Office of Environmental Management;
- Florida Department of Agriculture and Consumer Services;
- Florida Department of Economic Opportunity;
- Florida Department of Environmental Protection;
- Florida Department of State;
- Florida Fish and Wildlife Conservation Commission;
- National Marine Fisheries Service;
- National Park Service;
- Natural Resources Conservation Service;
- Saint Johns River Water Management District;

- Seminole Tribe of Florida;
- Southwest Florida Water Management District;
- Suwannee River Water Management District;
- US Army Corps of Engineers;
- US Coast Guard;
- US Environmental Protection Agency;
- US Fish and Wildlife Service; and
- US Forest Service.

The FDOT informs agencies, tribal representatives, elected officials, and other interested stakeholders of a proposed action through the Advance Notification (AN) process. The AN was initiated on November 2, 2023 as ETDM Project 14535. A Final Programming Screen Summary Report was published on May 3, 2024. The Final Programming Screen Summary Report includes a list of all agencies and organizations that provided comments. Figure 6.1.1 shows the Summary Degree of Effect assigned based on resource agency review. The ETDM Summary Degree of Effect has the following numeric and color coding to evaluate potential environmental impacts:

- N/A – No Involvement, purple;
- 0 – None, light blue;
- 1 – Enhanced, dark blue;
- 2 – Minimal, green;
- 3 – Moderate, yellow;
- 4 – Substantial, orange; and
- 5 – Dispute, red.

Figure 6.1.1: Summary of Degree of Effect



6.2 Alternatives Public Meeting

A hybrid Alternatives Public Meeting was held on February 20, 2024 and February 22, 2024. The meeting was conducted both virtually via GoToWebinar and in-person. The virtual meeting was held on Tuesday, February 20, 2024 starting at 5:30 p.m. and the in-person meeting was held on Thursday, February 22, 2024 starting at 4:30 p.m. at the World Golf Village Renaissance.

Public meeting invitations consisted of a project flyer and were sent by e-mail to elected officials, appointed officials, and interested parties. The flyer was also mailed via first-class mail to 302 recipients which included property owners and tenants located within 300 feet of the SR 16 centerline, and homeowner associations adjacent to SR 16. The hybrid Alternatives Public Meeting was advertised in advance with a display ad in the *St. Augustine Record* on Tuesday, January 30, and Tuesday, February 13, 2024. An Alternatives Public Meeting notification was placed in the Florida Administrative Register (FAR) February 13, 2024 Edition, Volume 50 / Number 30, and the February 15, 2024 Edition, Volume 50 / Number 32. A public notice was created January 30, 2024, and posted on the FDOT public notice website in-advance of the meetings. A press release was distributed by FDOT to major local media outlets on February 13, 2024.

The virtual public meeting began at 5:30 p.m. with an open house where attendees were encouraged to submit comments via the GoToWebinar chat feature. At 6:00 p.m., attendees were briefly welcomed and elected officials were given the opportunity to be recognized. St. Johns County Engineer, Duane Kent, was in attendance and stated support for the project. Then, the pre-recorded presentation was played. Chat comments continued to be received and answered by FDOT D2 Planning and Environmental Management Office Manager, Jamie Driggers, and the project team. After the presentation, participants had an opportunity to make verbal comments and the project team responded until there were no further questions and the meeting concluded around 6:30 p.m.

Thirty-six people attended the virtual meeting and the project team addressed 25 chat questions and five verbal comments during the meeting. The most common comment / question was regarding the location of proposed traffic signals, with the majority of the public wanting additional signals at the major neighborhood entrances. Other comments included questions on the proposed speed limit, turn lane locations, impacts to neighborhood entrances, timeline for construction, adjacent projects, and project cost.

The in-person public meeting was held at the World Golf Village Renaissance and began with an open house from 4:30 – 6:30 p.m. during which time attendees could review the project boards and engage with the project team to have their questions answered. At 6:30 p.m., Mr. Driggers provided a brief opening statement before playing the pre-recorded presentation. After the presentation, Mr. Driggers listened to and answered verbal comments and questions. The meeting concluded around 7:30 p.m.

The following project boards were displayed for attendees: Welcome, Title VI, Project Location Map, Typical Sections, Access Management, Existing Traffic Analysis (two boards), Intersections and Segments, Project Schedule, and Federal and State Requirements, as well as two copies of the proposed improvements on 1" = 100' roll plots, spanning near 30 feet each.

Eighty-four people attended the in-person public meeting, 13 comment forms were received at the meeting, and 13 people spoke during the verbal comment period. The comments were generally in support of the project and the most common comments included specific requests for lowering the speed limit and installing signals at the major neighborhood entrances. Other comments included, construction timeline, access management (additional median openings and U-turn locations), request for bicycle lanes and shared use path, and request for a smaller scale project.

Two comment forms, 32 emails, and one website comment were received during the 10-day comment period following the meeting. The comments were generally in support of the project and the most common comments included specific requests for lowering the speed limit and installing signals at the major neighborhood entrances. Other comments included a request to begin the project as soon as possible, construction timeline, request for additional turn lanes, and request for a noise wall.

The comments, exhibits, and presentation are located in the Alternatives Public Meeting Summary, under a separate cover.

6.3 Public Hearing

This section will be completed following the Public Hearing scheduled virtually on August 26, 2025 and in-person on August 28, 2025.

7.0 Preferred Alternative

The Preferred Alternative is based on the Build Alternative displayed at the Alternatives Public Meeting and includes the following changes to reduce project costs, address public feedback, and incorporate the VE Study recommendations:

- Reuse the existing roadway for the future eastbound lanes;
- Convert from an urban typical section to a rural typical section to have an open drainage system;
- Traffic signals will be added to the following development entrances:
    - Turnbull Creek Road;
    - Whisper Ridge Road / Downs Corner;
    - Windward Ranch Boulevard; and
- Update bicycle / pedestrian facilities to 12-foot-wide shared use paths on both sides of SR 16 throughout the project limits.

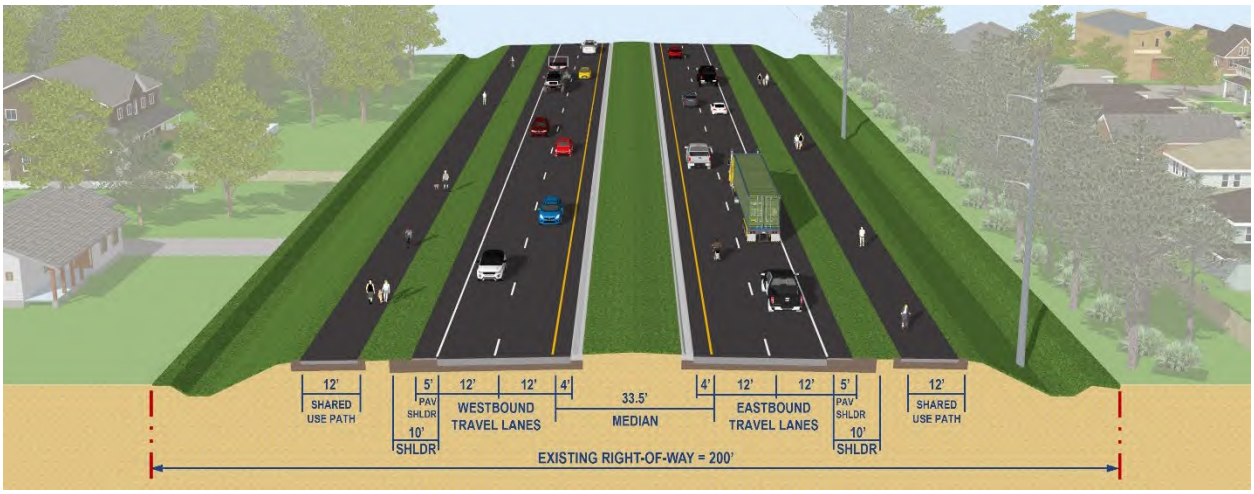
The Preferred Alternative will be displayed at the Public Hearing in August 2025.

7.1 Typical Sections

The Preferred Alternative will require milling, resurfacing, and widening of the existing SR 16 lanes (future eastbound lanes), along with constructing additional westbound lanes. The Preferred Alternative features a four-lane divided high-speed arterial with curb and gutter in the median and flush outside shoulders. The roadway consists of two 12-foot-wide lanes in each direction with a four-foot-wide paved inside shoulder and a 10-foot-wide outside shoulder (five-foot paved). The opposing lanes are separated by a 33.5-foot-wide raised grassed median (including the inside four-foot paved shoulder). A 12-foot-wide shared use path is proposed 15 feet from the edge of travel on both sides of the road. The existing right-of-way is approximately 200 feet, and no additional right-of-way is required to accommodate the proposed typical section. However, in areas with high fill (greater than five feet of embankment), shoulder gutter will be required on the shared use paths to minimize erosion and concrete gravity walls will be located

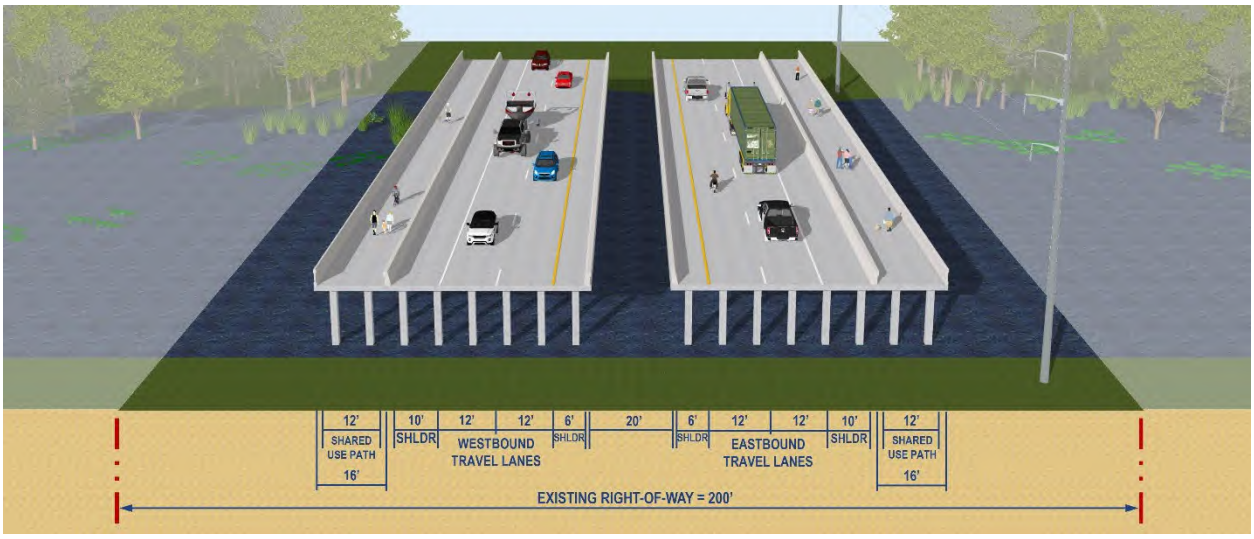
outside of the shared use paths to allow for the swale to stay within the existing right-of-way. Figure 7.1.1 shows the proposed typical section.

Figure 7.1.1: Proposed Typical Section



The Preferred Alternative will reconstruct the bridge over Turnbull Creek with two bridges spaced 20 feet apart. The length of the bridges are approximately 140 feet, and the width of each bridge is 59.5 feet. Figure 7.1.2 shows the Preferred Alternative typical section of the bridges over Turnbull Creek.

Figure 7.1.2: Proposed Bridge Typical Section



The proposed design speed for SR 16 is as follows:

- From IGP to approximately 375 feet west of Senior Living at the Greens: 45 mph;
- From approximately 375 feet west of Senior Living at the Greens to approximately 200 feet east of Tadpole Prep: 55 mph; and
- From approximately 200 feet east of Tadpole Prep to I-95: 45 mph.

Appendix C contains the Typical Section Package.

7.2 Access Management

As a restricted four-lane divided arterial, the access management classification for SR 16 is Class 3. Class 3 access management requires that directional median openings be spaced no closer than 1,320 feet apart and full median openings and signals be spaced no closer than 2,640 feet apart. Table 7.2.1 shows the access management for the Preferred Alternative. The cells shaded in red do not meet FDOT access management standards.

Fourteen signals will be included at ten intersections along SR 16. Signalized intersections are IGP, CR 2209, South Francis Road, Turnbull Creek Road, Windward Ranch Boulevard, Downs Corner Road, Whisper Ridge Drive, CR 208 Re-alignment, Toms Road, and the I-95 southbound ramp. The CR 2209 and South Francis Road intersections will require two signals, one at the intersection of SR 16 and an additional signal to the east of the main intersection for drivers traveling eastbound on SR 16 wishing to turn northbound. The Toms Road intersection will require a total of three signals: the main intersection, east of the intersection, and west side of the main intersection.

Table 7.2.1: Preferred Alternative Access Management

Side Road / Description	Proposed Median Type	Proposed Middle Station	Proposed Directional Median Spacing (feet)	Proposed Full Median Spacing (feet)	Proposed Signal Spacing (feet)
IGP/Pacetti Rd[3]	Full (Signal)	100+00			
			760	3,260	3,950
Murabella Pkwy[3]	WB Directional	107+60			
			1,820		
Commerce Plz Blvd[3]	EB Directional	125+80			
			680		
San Giacomo Rd[3]	Full (Thru-Cut)	132+60			
				690	
CR 2209[2]	Full (Signalized Partial MUT)	139+50			
			1,270	5,230	5,230
Senior Living at the Greens[4]	EB Directional (Signal)	148+40			
Mill Creek Park	WB Directional	152+20			
			1,370		
AAA Storage	WB Directional	164+10			
			1,230[5]		
Veterans Nursing Home/Superior Supply	Dual Directional	176+40			
			1,540		
South Francis Rd[6]	Full (Signalized Hybrid MUT/Thru-Cut)	191+80			
			980	4,720	9,600

[3] Proposed concept between IGP and CR 2209 is from St. Johns County's SR 16 Improvements project.

[4] Signalized directional used for U-turn movement is part of alternative intersection configuration at CR 2209.

[5] Within 10% variance of desired spacing of 1,320 feet.

[6] Signalized directional used for U-turn movement is part of alternative intersection configuration at South Francis Rd.

Side Road / Description	Proposed Median Type	Proposed Middle Station	Proposed Directional Median Spacing (feet)	Proposed Full Median Spacing (feet)	Proposed Signal Spacing (feet)
EB U-Turn	EB Directional (Signal)	199+00			
Turnbull Dr	WB Directional	201+60			
			2,260		
Median Opening east of Turnbull Dr	EB Directional	214+40			
			2,460		
Median Opening east of Turnbull Dr	Full	239+00			
			1,540		
Median Opening west of Turnbull Creek Rd	Dual Directional	254+40		4,880	
			1,940		
Median Opening west of Turnbull Creek Rd	Dual Directional	273+80			
			1,400		
Turnbull Creek Rd	Full (Signalized Thru-Cut)	287+80			
			920	2,880	2,880
Median Opening east of Turnbull Creek Rd	WB Directional	297+00			
			850		
Turning Point at Calvary	EB Directional	305+50			
			1,110		
Windward Ranch Blvd	Full (Signalized Thru-Cut)	316+60			
				580	580
Downs Corner Rd	Full (Signalized Thru-Cut)	322+40			
				1,480	1,480
Whisper Ridge Dr	Full (Signalized Thru-Cut)	337+20			
			1,600	3,520	3,520

Side Road / Description	Proposed Median Type	Proposed Middle Station	Proposed Directional Median Spacing (feet)	Proposed Full Median Spacing (feet)	Proposed Signal Spacing (feet)
Tadpole Prep/Soluna	Dual Directional	353+20			
			1,920		
Atlantic Self Storage	Closed	365+80			
CR 208 Realignment	Full (Signal)	372+40			
			1,960	2,300	2,300
Sonny's BBQ	EB Directional	391+60			
			380		
Race Trac[7]	WB Directional (Signal)	392+40			
Tom's Rd	Full (Signalized Hybrid MUT/Thru-Cut)	395+40			
			1070	1,670	1,670
Super 8[7]	EB Directional (Signal)	400+50			
CR 208	WB Directional	406+10			
			600		
I-95 SB Off Ramp	Full (Signal)	412+10			

7.3 Right-of-Way

The Preferred Alternative roadway improvements do not impact and right-of-way or require any relocations, however, the preferred pond sites impact four parcels for a total of 37.8 acres. Temporary construction easements are also required for the roadway and pond improvements and are anticipated to impact 5.9 acres. No relocations are anticipated as a result of this project. Appendix B shows the Preferred Alternative including the preferred pond sites.

[7] Signalized directional used for U-turn movement is part of alternative intersection configuration at Toms Rd.

7.4 Horizontal and Vertical Geometry

The proposed horizontal alignment for SR 16 generally follows the existing alignment; the proposed eastbound lanes utilize the existing SR 16 roadway. A brief description of the Preferred Alternative roadway geometry is shown below, and Appendix B shows the horizontal geometry of the Preferred Alternative.

- Starting at the IGP intersection, a tangent extends 4,613 feet in the S80°53'46"E direction;
- A 2,785-foot curve deflects the corridor to the south with a 17,220-foot radius;
- A 1,139-foot tangent directs the corridor in the S71°37'46"E direction;
- A 1,911-foot curve deflects the corridor to the south with a 4,613-foot radius;
- A 2,362-foot tangent directs the corridor in the S47°53'55"E direction;
- A 2,177-foot curve deflects the corridor to the east with a 2,177-foot radius;
- A 1,922-foot curve deflects the corridor in the S58°48'55"E direction;
- A 825-foot curve deflects the corridor to the south with a 2,135-foot radius;
- A 3,406-foot curve deflects the corridor in the S36°40'18"E direction;
- A 1,925-foot curve deflects the corridor the east with a 1,925-foot radius;
- A 2,743-foot tangent directs the corridor in the S56°01'06"E direction;
- A 825-foot curve deflects the corridor to the south with a 2,392-foot radius; and
- A 3,180-foot tangent directs the corridor in the S36°15'23"E direction.

The proposed project will mill, resurface, and widen the existing eastbound SR 16 roadway; therefore, it will follow the existing profile as shown in Table 7.4.1. The proposed SR 16 westbound profile ties into the St. Johns County SR 16 improvements project and therefore starts east of the Murabella neighborhood. The westbound proposed profile raises the road approximately one foot higher than the eastbound lanes and is shown in Table 7.4.2.

Table 7.4.1: Vertical Alignment of SR 16 Eastbound

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
-	-	139+99.90	28.87	0	0
477.61	-0.034%	144+77.51	28.71	0	0
332.44	-0.059%	148+09.95	28.51	0	0
992.68	-0.005%	158+02.63	28.46	0	0
297.26	0.070%	160+99.89	28.67	0	0
422.63	-0.080%	165+22.52	28.33	0	0
249.76	0.035%	167+72.28	28.42	0	0
948.74	-0.057%	177+21.02	27.88	0	0
250.00	0.197%	179+71.02	28.37	0	0
540.62	0.048%	185+11.64	28.63	0	0
148.45	-0.065%	186+60.09	28.53	0	0
104.54	0.171%	187+64.63	28.71	0	0
515.47	-0.028%	192+80.10	28.56	0	0
298.34	0.149%	195+78.44	29.00	0	0
767.42	0.011%	203+45.86	29.09	0	0
330.78	-0.064%	206+76.64	28.87	0	0
614.79	0.051%	212+91.43	29.19	0	0
374.88	-0.100%	216+66.31	28.81	0	0
250.00	0.300%	219+16.31	29.56	0	0
250.00	-0.200%	221+66.31	29.06	0	0
365.49	-.0.061%	225+31.80	28.84	0	0
250.00	0.093%	227+81.80	29.07	0	0
3029.69	-0.004%	258+11.49	28.94	0	0
356.23	0.152%	261+67.72	29.48	0	0
551.31	0.001%	267+19.03	29.49	0	0
84.23	0.268%	268+03.26	29.98	0	0
214.06	0.270%	270+17.32	30.29	0	0
207.58	-0.127%	272+24.90	30.02	0	0
174.17	-0.075%	273+99.07	29.89	0	0
176.28	0.184%	275+75.35	30.22	0	0
92.46	-0.276%	276+67.81	29.91	0	0
54.12	-0.339%	277+21.93	29.79	0	0
87.15	-0.336%	278+09.08	29.50	0	0
262.53	0.001%	280+71.61	29.50	0	0
763.32	-0.063%	288+34.93	29.02	0	0
566.24	-0.122%	294+10.17	28.32	0	0
173.94	0.064%	295+84.11	28.43	0	0
460.43	-0.009%	300+44.54	28.39	0	0

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
269.87	0.300%	303+14.41	29.19	0	0
599.63	0.138%	309+14.04	30.03	0	0
185.02	0.500%	310+99.50	30.95	0	0
0.00	-0.509%	312+75.96	31.83	352.92	350
0.00	-0.509%	315+86.71	30.25	268.57	255
0.00	0.545%	319+13.55	32.03	385.11	440
0.00	-0.331%	322+36.10	30.97	260.01	280
338.86	0.598%	328+80.65	34.82	351.36	320
215.46	-0.500%	332+70.78	32.87	0	0
429.34	0.080%	337+00.06	33.21	249.76	223
432.67	1.200%	343+82.73	40.01	351.03	475
626.45	0.461%	353+54.07	45.74	0	0
227.29	0.271%	355+81.36	46.36	0	0
254.47	0.027%	358+35.83	46.43	0	0
123.67	0.538%	359+59.50	47.09	0	0
131.81	-0.243%	360+91.31	46.77	0	0
304.34	0.078%	363+95.65	47.01	0	0
92.30	0.033%	364+87.95	47.04	0	0
171.80	-0.058%	366+59.75	46.94	0	0
99.82	0.185%	367+59.57	47.12	0	0
427.39	0.062%	371+86.96	47.39	-	-
Note: The dashed values indicate the beginning and end of the vertical alignment which will tie into the existing vertical profile of SR 16 but are not accounted for in this table.					

Table 7.4.2: Vertical Alignment of SR 16 Westbound

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
-	-	140+00.00	28.87	0	0
477.51	-0.034%	144+77.51	28.71	0	0
332.83	-0.059%	148+10.34	28.51	0	0
994.61	-0.005%	158+04.95	28.46	0	0
306.51	-0.080%	161+11.46	28.66	0	0
414.78	-0.080%	165+26.24	28.33	0	0
250.24	0.035%	167+76.48	28.42	0	0
949.96	-0.057%	177+26.44	27.88	0	0
250.00	0.197%	179+76.44	28.37	0	0
540.62	0.048%	185+17.06	28.63	0	0

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
149.37	-0.065%	186+66.43	28.53	0	0
105.30	0.170%	187+71.73	28.71	0	0
519.22	-0.028%	192+90.95	28.56	0	0
300.52	0.147%	195+91.47	29.00	0	0
773.01	0.010%	203+64.48	29.09	0	0
331.46	-0.064%	206+95.94	28.87	0	0
614.78	0.051%	213+10.72	29.19	0	0
374.88	-0.100%	216+85.60	28.81	0	0
250.00	0.300%	219+35.60	29.56	0	0
250.00	-0.200%	221+85.60	29.06	0	0
365.49	-0.061%	225+51.09	28.84	0	0
250.00	0.093%	228+01.09	29.07	0	0
3023.31	-0.004%	258+24.40	28.94	0	0
356.23	0.152%	261+80.63	29.48	0	0
551.31	0.001%	267+31.94	29.49	0	0
300.10	0.266%	270+32.04	30.29	0	0
210.86	-0.125%	272+42.90	30.02	0	0
176.92	-0.073%	274+19.82	29.89	0	0
179.07	0.181%	275+98.89	30.22	0	0
114.24	-0.271%	277+13.13	29.91	0	0
34.65	-0.334%	277+47.78	29.79	0	0
87.16	-0.336%	278+34.94	29.50	0	0
262.53	0.001%	280+97.47	29.50	0	0
763.32	-0.063%	288+60.79	29.02	0	0
575.24	-0.122%	294+36.03	28.32	0	0
173.94	0.064%	296+09.97	28.43	0	0
460.43	-0.009%	300+70.40	28.39	0	0
268.87	0.300%	303+39.27	29.19	0	0
600.62	0.138%	309+39.89	30.03	0	0
185.03	0.500%	311+24.92	30.95	355.26	356
0.00	-0.498%	314+81.96	30.91	283.38	284
34.12	0.501%	317+63.56	31.09	366.49	462
0.00	-0.301%	321+35.70	31.37	254.92	282
336.45	0.602%	327+21.42	33.77	351.19	322
212.72	-0.500%	332+85.33	32.87	0	0
429.28	0.080%	337+14.61	33.21	250.00	223
427.56	1.200%	343+92.17	39.95	350.00	477
626.46	0.461%	353+68.62	45.74	0	0
227.28	0.271%	355+95.90	46.36	0	0

Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value
255.15	0.027%	358+51.05	46.43	0	0
125.39	0.531%	359+76.44	47.09	0	0
133.60	-0.240%	361+10.04	46.77	0	0
308.07	0.077%	364+18.11	47.01	0	0
93.29	0.032%	365+11.40	47.04	0	0
173.05	-0.058%	366+84.45	46.94	0	0
99.82	0.185%	367+84.27	47.12	0	0
397.38	0.062%	371+81.65	47.37	-	-
Note: The dashed values indicate the beginning and end of the vertical alignment which will tie into the existing vertical profile of SR 16 but are not accounted for in this table.					

In areas of high fill (greater than five feet of embankment), shoulder gutter will be added to the back of the shared use path to minimize erosion. The shared use paths will have independent profiles from the roadway to ensure positive drainage into the shoulder gutter.

7.5 Design Variations and Exceptions

According to the FDOT Design Manual, the roadway base is required to be a minimum of three feet above the seasonal high ground water table. In order to reduce the roadway elevation and right-of-way impacts, the proposed roadway will not meet base clearance requirement, and a design variation will be needed.

The FDOT Design Manual requires the roadside front slope to be 1:6 to the edge of the clear zone and then 1:4 for fill heights up to five feet. In an effort to reduce the roadway elevation and right-of-way impacts, 1:3 slopes are proposed outside of the clear zone, and a design variation will be needed.

In areas where retaining walls greater than five feet in height are proposed, the FDOT Design Manual requires a 10-foot-wide maintenance area that is 1:10 slope or flatter. In order to reduce the right-of-way footprint required for the roadway, the proposed roadside ditches are located

adjacent to the retaining walls, and a design variation will be required because a 10-foot-wide maintenance area will not be provided.

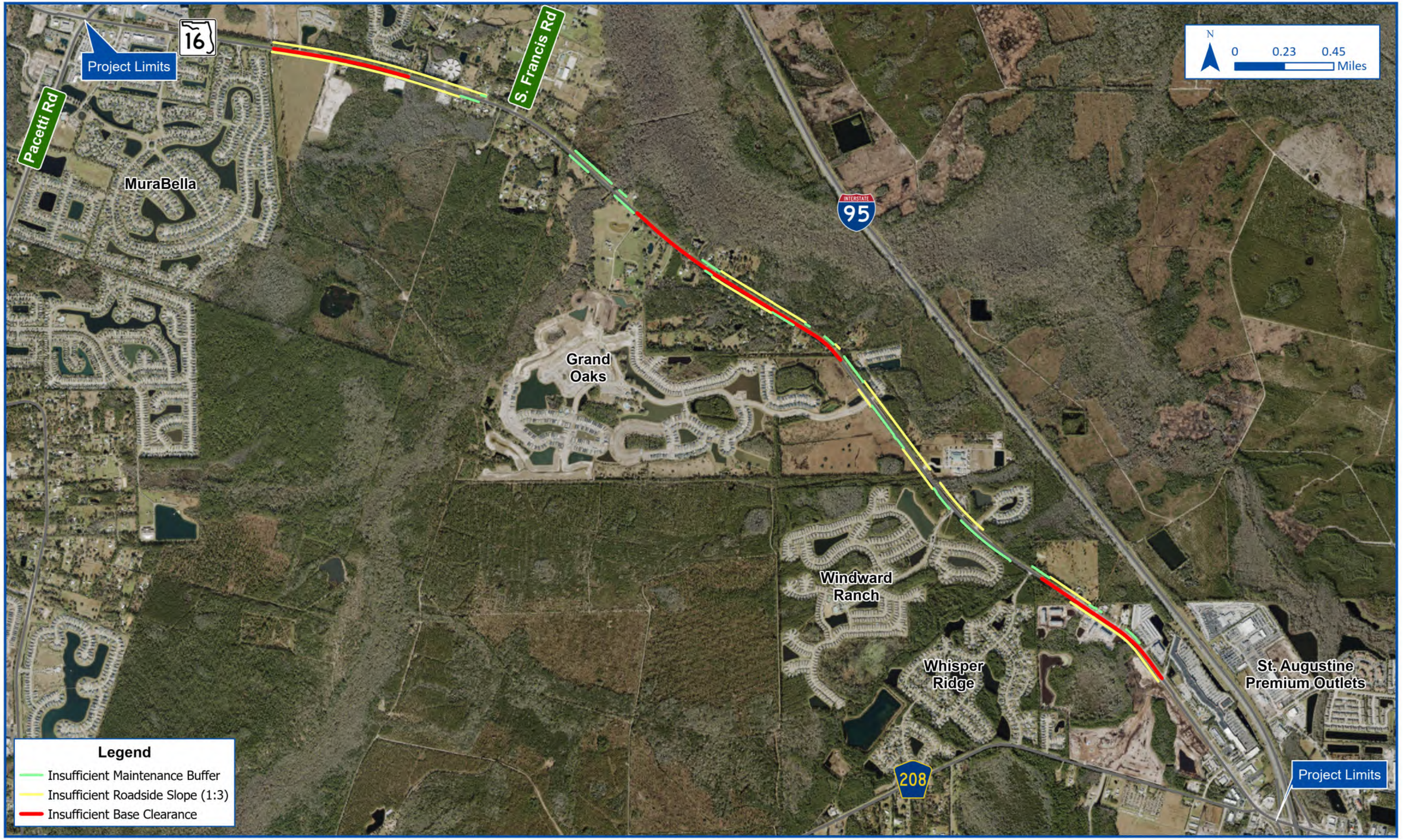
Figure 7.5.1 shows the locations of where design variations will be needed.

Design variations will be prepared during the design phase.

7.6 Multimodal Accommodations

The Preferred Alternative for this PD&E Study includes a 12-foot-wide shared use path on both sides of SR 16. Crosswalks across SR 16 are proposed at each of the following signalized intersections:

- IGP / Pacetti Road;
- CR 2209 Extension;
- South Francis Road;
- Turnbull Creek Road (Grand Oaks);
- Windward Ranch Boulevard (Windward Ranch);
- Downs Corner Road (Park Place);
- Whisper Ridge Drive (Whisper Ridge);
- CR 208 Realignment; and
- Toms Road.



FDOT

SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study

Figure 7.5.1:
Design Variations

7.7 Intersection / Interchange Concepts and Signal Analysis

A total of 10 signalized intersections, including 14 signals, are proposed within the project limits at the following intersections with SR 16 and are described below:

- IGP / Pacetti Road (existing);
- CR 2209 Extension (proposed in St. Johns County SR 16 Improvements project) (two signals);
- South Francis Road (two signals);
- Turnbull Creek Road / Grand Oaks;
- Windward Ranch Boulevard / Windward Ranch;
- Downs Corner Road / Park Place;
- Whisper Ridge Drive / Whisper Ridge;
- CR 208 Realignment (proposed in St. Johns County CR 208 Realignment project);
- Toms Road (existing) (three signals); and
- I-95 Southbound Ramp (existing).

The U-turn movements for eastbound CR 2209, eastbound South Francis Road, and eastbound Toms Road are anticipated to be signalized in the design year (2050). The westbound U-turn at Toms Road will be signalized in the opening year (2030).

IGP / Pacetti Road

SR 16 eastbound will feature dual left turn lanes onto IGP, two through lanes, and one right turn lane onto Pacetti Road. SR 16 westbound will feature dual left turn lanes onto Pacetti Road, two through lanes, and one right turn lane onto IGP. Pacetti Road will feature dual left turns onto SR 16 westbound, two through lanes, and one right turn lane onto SR 16 eastbound. IGP will feature dual left turn lanes onto SR 16 eastbound, two through lanes, and one right turn lane onto SR 16 westbound. Figure 7.7.1 shows the IGP / Pacetti Road intersection with SR 16.

Figure 7.7.1: IGP / Pacetti Road Intersection with SR 16

CR 2209 Extension

A partial MUT is proposed for the CR 2209 Extension intersection with SR 16. SR 16 eastbound will feature two through lanes and SR 16 westbound will feature two through lanes and one right turn lane. CR 2209 southbound will feature dual left turn lanes and one right turn lane. Motorists traveling eastbound on SR 16 wishing to travel northbound on CR 2209 will not be permitted to perform a left turn at the main intersection. An eastbound directional opening is proposed 980 feet to the east to accommodate U-turns for this movement and will be signalized in the design year. Figure 7.7.2 shows the CR 2209 extension intersection with SR 16.

Figure 7.7.2: CR 2209 Extension Intersection with SR 16

South Francis Road

A hybrid MUT/thru-cut intersection concept is proposed for the intersection of South Francis Road and SR 16. SR 16 eastbound will feature two through lanes. SR 16 westbound will feature two through lanes and one right turn lane. South Francis Road northbound and southbound will feature one lane that allows for left or right movements. Through movements on South Francis Road will not be permitted at this intersection. An eastbound directional opening is proposed 720 feet to the east to accommodate U-turns for this movement and will be signalized in the design year. Figure 7.7.3 shows the South Francis Road intersection with SR 16.

Turnbull Creek Road

A thru-cut is proposed for the intersection of Turnbull Creek Road and SR 16. SR 16 eastbound will feature one left turn lane, two through lanes and one right turn lane. SR 16 westbound will feature two through lanes, one left turn lane, and one right turn lane. Turnbull Creek Road northbound will feature two left turn lanes and one right turn lane. Turnbull Creek Road

southbound will feature one left turn lane and one right turn lane. Figure 7.7.4 shows the Turnbull Creek Road intersection with SR 16.

Figure 7.7.3: South Francis Road Intersection with SR 16

Figure 7.7.4: Turnbull Creek Road Intersection with SR 16

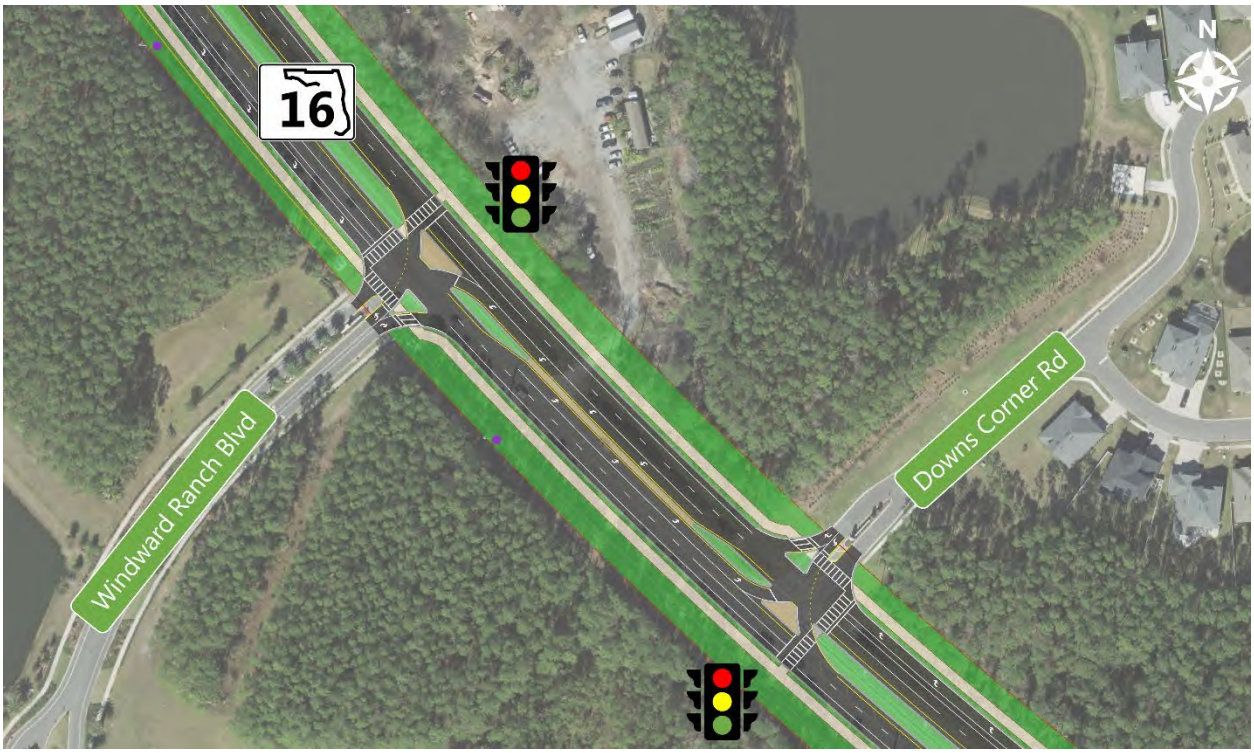
Windward Ranch Boulevard

SR 16 eastbound will feature two through lanes and one right turn lane. SR 16 westbound will feature one left turn lane and two through lanes. Windward Ranch Boulevard will feature one left turn lane and one right turn lane. Figure 7.7.5 shows the Windward Ranch Boulevard intersection with SR 16.

Downs Corner Road

SR 16 eastbound features one left turn lane and two through lanes. SR 16 westbound features two through lanes and one right turn lane. Downs Corner Road features one left turn lane and one right turn lane. Figure 7.7.5 shows the Downs Corner Road intersection with SR 16. The Windward Ranch Boulevard and Downs Corner Road signals will be synchronized and operate together due to their close proximity.

Figure 7.7.5: Windward Ranch Boulevard / Downs Corner Road Intersection with SR 16



Whisper Ridge Drive

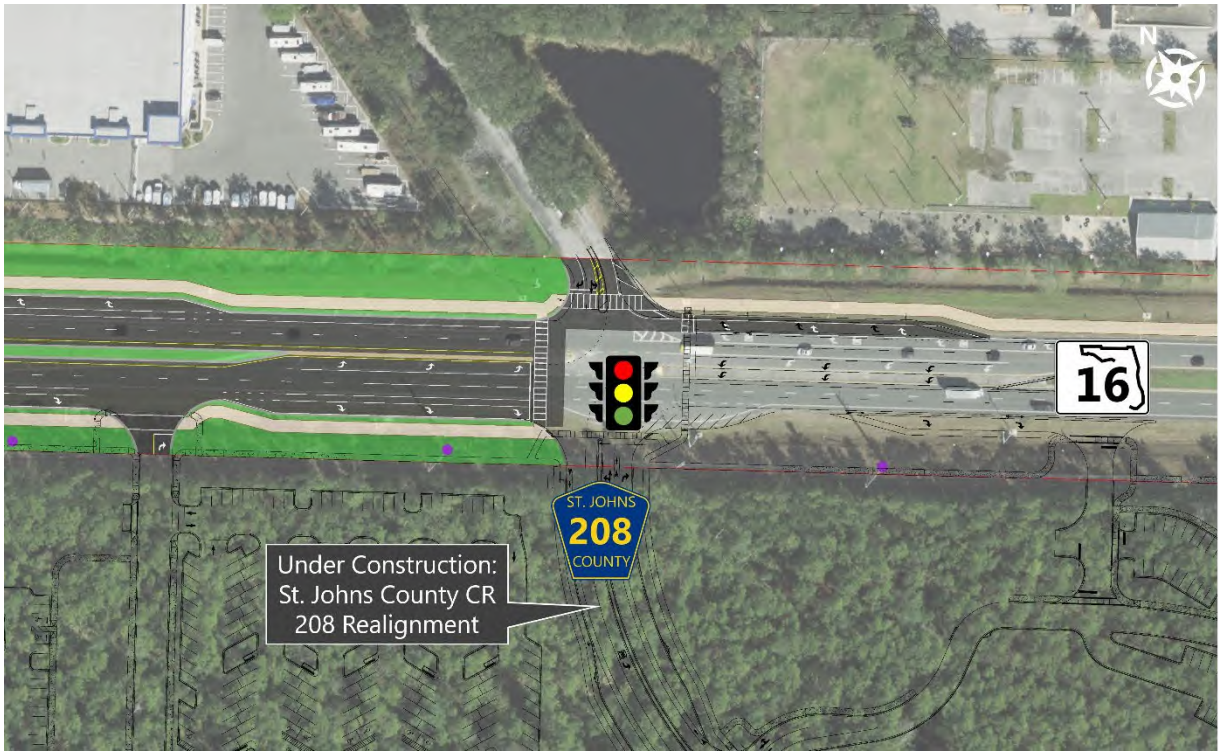
SR 16 eastbound features two through lanes and one right turn lane. SR 16 westbound features one left turn lane and two through lanes. Whisper Ridge Road features one left turn lane and one right turn lane. Figure 7.7.6 shows the Whisper Ridge Drive intersection with SR 16.

Figure 7.7.6: Whisper Ridge Drive Intersection with SR 16

CR 208 Realignment

SR 16 eastbound features one left turn lane, two through lanes, and one right turn lane. SR 16 westbound features dual left turn lanes, two through lanes, and one right turn lane. CR 208 northbound and southbound features one left-through lane and one right turn lane. Figure 7.7.7 shows the CR 208 Realignment intersection with SR 16.

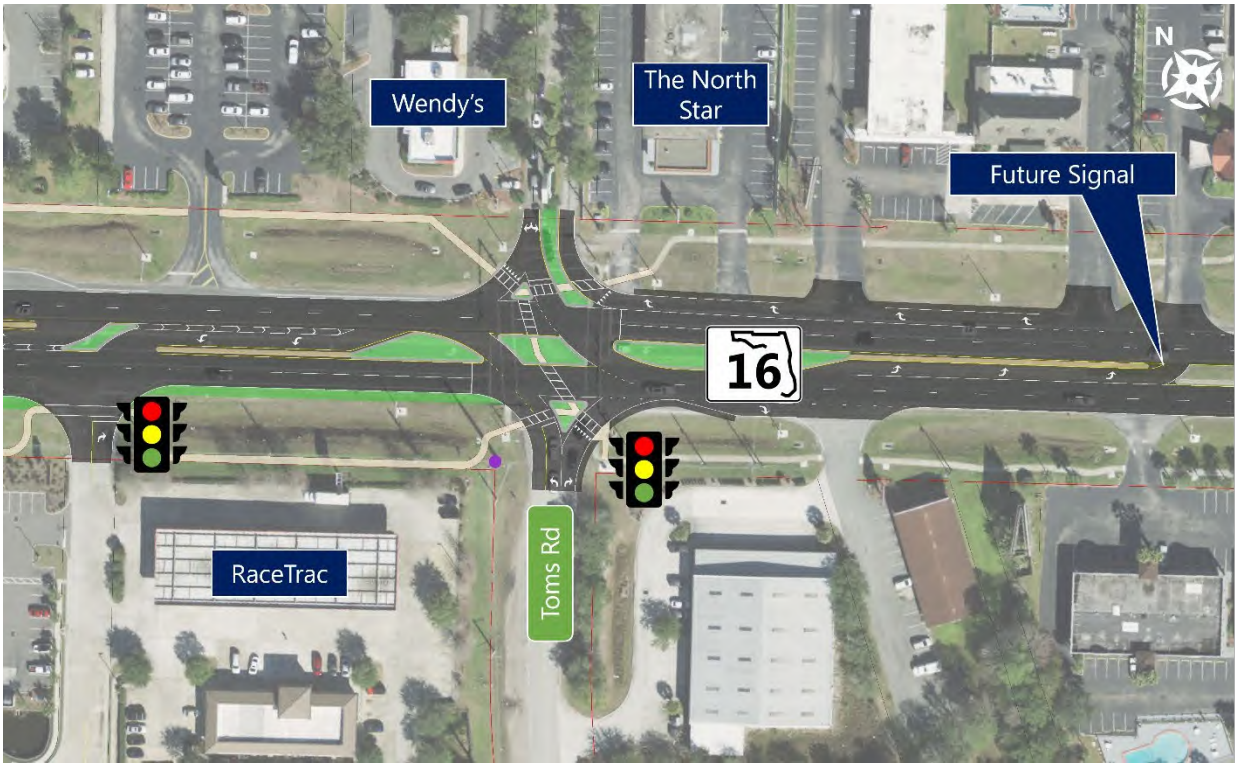
Figure 7.7.7: CR 208 Realignment Intersection with SR 16



Toms Road

A hybrid MUT/thru-cut is proposed for the intersection of Toms Road and SR 16. SR 16 eastbound features two through lanes. SR 16 westbound features two through lanes and a right turn lane. Toms Road northbound features one left turn lane and one right turn lane. Toms Road southbound features one lane that can be used to turn left or right. Drivers travelling along Toms Road will not be permitted to cross SR 16 and continue straight. To accommodate this movement, directional median openings are proposed 300 feet to the west and 510 feet to the east to provide The eastbound U-turn movements will be signalized in the design year and the westbound U-turn movement will be signalized in the opening year. Figure 7.7.8 shows the Toms Road intersection with SR 16.

Figure 7.7.8: Toms Road Intersection with SR 16



7.8 Tolled Projects

No tolls are proposed within the project limits.

7.9 Intelligent Transportation System and TSM&O Strategies

No ITS improvements are proposed as part of the project. As described in *Section 5.2 TSM&O Alternative*, many TSM&O improvements are interrelated to ITS and the corridor currently does not have any ITS infrastructure in which to implement these solutions. Optimization of the traffic signal timing has occurred in the corridor. A fiber optic backbone will be implemented as part of the project so that TSM&O strategies can be implemented in the future.

7.10 Landscape

Landscaping features will be coordinated during the design phase.

7.11 Lighting

Lighting features will be coordinated during the design phase.

7.12 Wildlife Crossings

Wildlife crossings are not proposed within the project limits due to the land use surrounding the corridor. The bridge can be used for aquatic species and other small wildlife.

7.13 Permits

The regulatory agencies exerting jurisdiction over potentially affected wetlands will require permits for unavoidable impacts. The permit will have to consider wetland impacts and / or the modification or creation of the stormwater management system. The project size, nature of the proposed work, and wetland impacts will all dictate the type of state and federal environmental resource permits required.

The project is expected to require either an Individual Environmental Resource Permit (ERP) from SJRWMD for the wetland impacts and stormwater system or be considered a modification to one or more existing ERPs. State wetland mitigation is expected to be required for all impacts to wetlands and jurisdictional waters.

In December 2020, FDEP assumed regulatory responsibility over waters of the United States (WOTUS) jurisdictional under only Section 404 of the Clean Water Act. USACE retained jurisdiction over all WOTUS deemed jurisdictional under Section 10 of the Rivers and Harbors Act of 1899. The assumption of jurisdiction is outlined in Chapter 62-331, F.A.C. and in the operating agreement between FDEP and the USEPA. Project-specific permitting responsibility is based on the location of impacts as they pertain to FDEP-Assumed or USACE-Retained waters. At this time, USACE is responsible for the federal permitting of impacts to USACE-Retained wetlands and waters, while FDEP is responsible for the federal permitting of impacts to FDEP-Assumed wetlands. The online FDEP ArcGIS tool showing approximate USACE-Retained wetlands and waters was used to estimate which agency would be responsible for permitting each wetland and water. According

to this tool, none of the wetlands or waters in the project study area should be considered Retained by USACE. This map indicates that USACE retention only extends up Turnbull Creek to about four miles downstream of the SR 16 crossing. Therefore, the federal permitting of all federally-jurisdictional wetlands and waters affected by the project should fall to FDEP. Final federal permitting authority can only be determined by USACE at the time a permit application is submitted.

The project may qualify for State 404 General Permit (GP) 248 from FDEP. If the project does not qualify for the GP, then a State 404 Individual Permit from FDEP will be required.

The potential use of GP 248 is dependent on FDOT approval of the PD&E document and that its status remains current. In addition, qualification for the use of GP 248 would depend on multiple factors, such as total project dredge and fill impacts, maximum impact acreage per mile, whether the project is determined to include "new alignment", and whether the responsible agency agrees to allow it to be processed under that permit. Regardless of the type of permit issued by FDEP, all wetland impacts are expected to require federal wetland mitigation.

Compliance with federal Section 404(b)(1) guidelines includes verification that all impacts have been avoided to the greatest extent practicable, that unavoidable impacts have been minimized, and that a compensatory mitigation plan has been provided for unavoidable wetland impacts.

Pursuant to 40 CFR parts 122 and 124, any project that results in the clearing of one or more acres of land will require a National Pollutant Discharge Elimination System (NPDES) permit from the FDEP. In association with this permit, a Stormwater Runoff Control Concept (SRCC), implemented during the construction of the project, will also be required. The primary functions of the NPDES requirements are to ensure that sediment and erosion are controlled during construction of the project. These permits require adherence to best management practices (BMPs) to ensure compliance.

Multiple coordination meetings have been held between FDOT and SJRWMD to discuss criterion for the Environmental Resource Permit. The meeting minutes are located in the Water Quality Impact Evaluation (WQIE), available in the project file.

7.14 Drainage and Stormwater Management Facilities

There are several existing ponds adjacent to the corridor that outfall into the SR 16 roadside ditches. In the proposed condition, a roadside ditch will be maintained with the use of gravity walls. The proposed drainage system will be designed to accept these offsite outfalls and convey them to Turnbull Creek during the design phase. Further analysis, such as geotechnical investigations will also be performed in the design phase.

Project improvements will be designed to meet the regulatory requirements of the applicable water management districts, the requirements outlined in the FDOT Drainage Manual, and the requirements of the FDOT Design Manual. For wet detention systems, the design treatment volume is the greater of the following: (a) one inch of runoff over the drainage area, (b) 2.5 inches times the impervious area (excluding water bodies).

The FDEP maintains the Statewide Comprehensive List of Impaired Waters, which contains waterbody-parameter combinations that have been verified as impaired based on criteria and assessment methodologies. The waters are identified by their respective waterbody ID (WBID). This project discharges into WBID 2411, Sixmile Creek. Total Maximum Daily Load (TMDL) requirements have not been adopted for this WBID. This project is within the Lower St. Johns Basin Management Action Plan (BMAP). No Special Basin Criteria were identified for this area.

When possible, a minimum of two off-site pond alternatives were analyzed for each pond basin. Ponds 2C, 3C, 4C, and 5C were selected as the Preferred Alternative pond sites due to the minimal environmental impacts and cost savings.

Pond alternatives for Basin 1 were not considered as preferred ponds because of the potential impacts to residential and commercial parcels. Basin 1 was merged with Basin 2 for the drainage analysis therefore increasing the size of Ponds 2A, 2B, and 2C to accommodate both Basins 1 and 2. Pond 2C was also increased in size to offset attenuation requirements for Basin 3, in case treatment credits are available for Basin 3. Ponds 2A and 2B were not chosen as Preferred Alternatives due to the potential frontage impact to the respective parcel along SR 16.

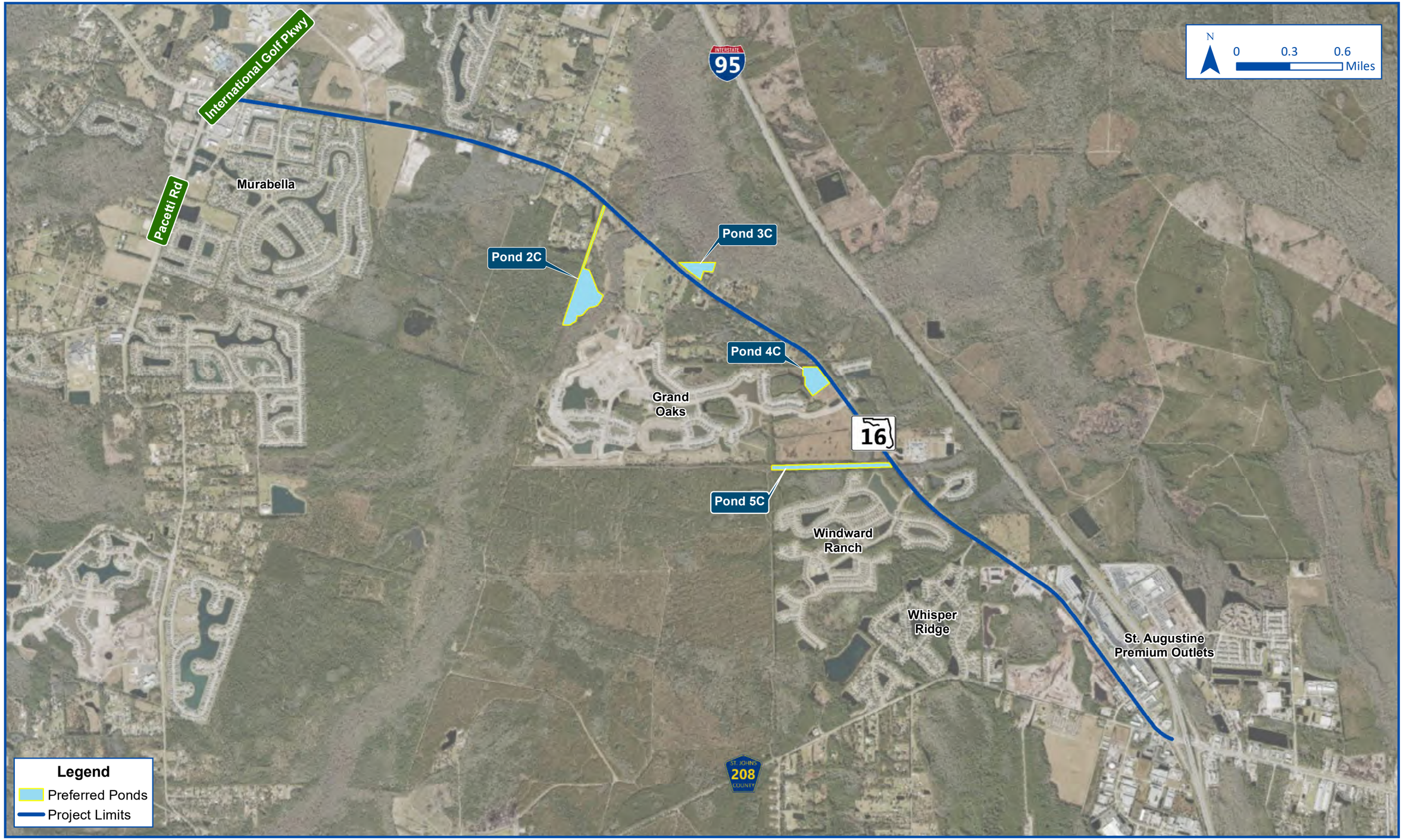
Vacant parcels were selected for pond sites for Basin 3, 4, 5, and 6. Pond 3C was selected as the Preferred Alternative over Ponds 3A and 3B because of the cost of the parcel and the owner's willingness to sell. Basin 6 was integrated with Basins 4 and 5 for the drainage analysis of Ponds 4C and 5C as a cost saving alternative. The cost and feasibility of conveying Basin 6 was also considered due to the significant distance from Basin 6 to Basins 4 and 5. There is a considerable elevation difference from Basins 5 and 6 to Basin 4, which should facilitate the conveyance of stormwater runoff. The cost for Ponds 4C and 5C was found to be less than the cost of individual ponds and conveyance systems for Basins 4, 5, and 6. Table 7.14.1 shows the preferred pond sites for each basin along with the anticipated requirements.

Table 7.14.1: Preferred Pond Sites

Basin	Preferred Pond Alternative	Right-of-way (acres)	Estimated Cost	
			Right-of-way	Construction
1+2	2C	18.6	$5,036,951	$6,199,165
3	3C	5.2	$993,770	$1,483,104
4	4C	7.4	$6,062,591	$2,974,389
5+6	5C	8.1	$3,130,715	$6,054,293

Figure 7.14.1 shows the preferred pond alternatives. For more information on the proposed pond sizing and siting, refer to the Pond Siting Report (PSR), available under a separate cover.

Drainage requirements for improvements to Segment 2 were not evaluated as this segment will maintain the existing four lanes with minimal widening at the Toms Road interchange.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 7.14.1: Preferred Pond Alternatives	Page Number: 7-26

Water Quality

A WQIE Checklist was completed for this project and is available in the project file. The results confirm that the project discharges to Sixmile Creek and Mill Creek. The project also alters the drainage system. The proposed stormwater facility design will include, at a minimum, the water quantity requirements for water quality impacts as required by the SJRWMD. It is therefore anticipated that no adverse effects will occur to the water quality within the project area. FDOT will continue to coordinate water quality and water quantity impacts and stormwater management with the appropriate regulatory agencies as required throughout the design and permitting phases of the project, as well as during and after construction. A pre-application meeting was held with SJRWMD on January 30, 2025. The meetings notes are located in WQIE.

7.15 Floodplain Analysis

Floodplain impacts resulting from the project were evaluated pursuant to Executive Order 11988 of 1977, Floodplain Management.

The FEMA Flood Insurance Rate Maps (FIRMs) for St. Johns County were reviewed to determine the extents of the FEMA floodplains within the project limits. The anticipated floodplain impacts due to the proposed roadway construction were estimated to determine potential impacts to the 100-year floodplains and necessary compensation volumes. The exact impact volume from the proposed roadway construction will need to be assessed during the design phase, when survey, geotechnical data, and proposed cross-sections are available.

The project will impact the 100-year floodplain through both longitudinal and transverse encroachments. The longitudinal impacts result from fill within floodplain areas associated with the proposed roadway widening along the project. Transverse impacts result from roadway widening occurring at cross drain locations along the corridor. To minimize impacts, Floodplain Compensation Areas (FPCAs) or cut ditch sections will be considered for practicability and feasibility. Each FPCA site would provide compensation adjacent to the same encroachment location as the corresponding impact.

The floodplain impact volumes were calculated using the USGS LiDAR data and the 100-year FEMA floodplain. Table 7.15.1 shows the flood impact volume calculated using this method.

Table 7.15.1: Summary of Flood Impact Volumes

Area	Location	Volume (ac-ft)	Total Volume (ac-ft)
1	Pond Alternative 2A	4.06	23.77
	Pond Alternative 2B	2.45	
	Pond Alternative 3A	0.07	
	Pond Alternative 3B	2.54	
	Pond Alternative 3C	12.51*	
	Pond Alternative 4A	5.68	
	Roadway right-of-way at Turnbull	11.26*	
2	Roadway right-of-way west of Downs Corner Road	1.84	1.84
3	Roadway right-of-way east of Downs Corner Road	1.90	1.90
*Values used for Area 1 total volume based on roadway and preferred pond impacts			

Roadway widening and construction of the additional westbound lanes will result in impacts to the adjacent FEMA floodplains. The anticipated floodplain impacts due to the proposed roadway improvements were calculated and FPCA alternatives were identified. The floodplain impact calculations are conservative and should be revised during design when survey, geotechnical data, and proposed cross sections are available. Floodplain compensation should be provided in roadside ditches and stormwater management facilities as the Preferred Alternative for floodplain compensation. Treatment and attenuation volumes provided in the stormwater management facilities should be used to demonstrate no adverse impact to the FEMA floodplain.

Further coordination with FEMA and local agencies shall occur throughout the PD&E study to determine the requirements for the project. The final floodplain compensation methods will be determined during final design. Floodplain encroachments will be mitigated on a cup-for-cup basis in floodplain compensation sites which have been designed such that there are no adverse

impacts to the natural and beneficial floodplain values and no changes in flood risk. There will not be a change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that the encroachment type for this study is classified as "minimal."

More information about the floodplains can be found in the Location Hydraulic Report (LHR), under a separate cover.

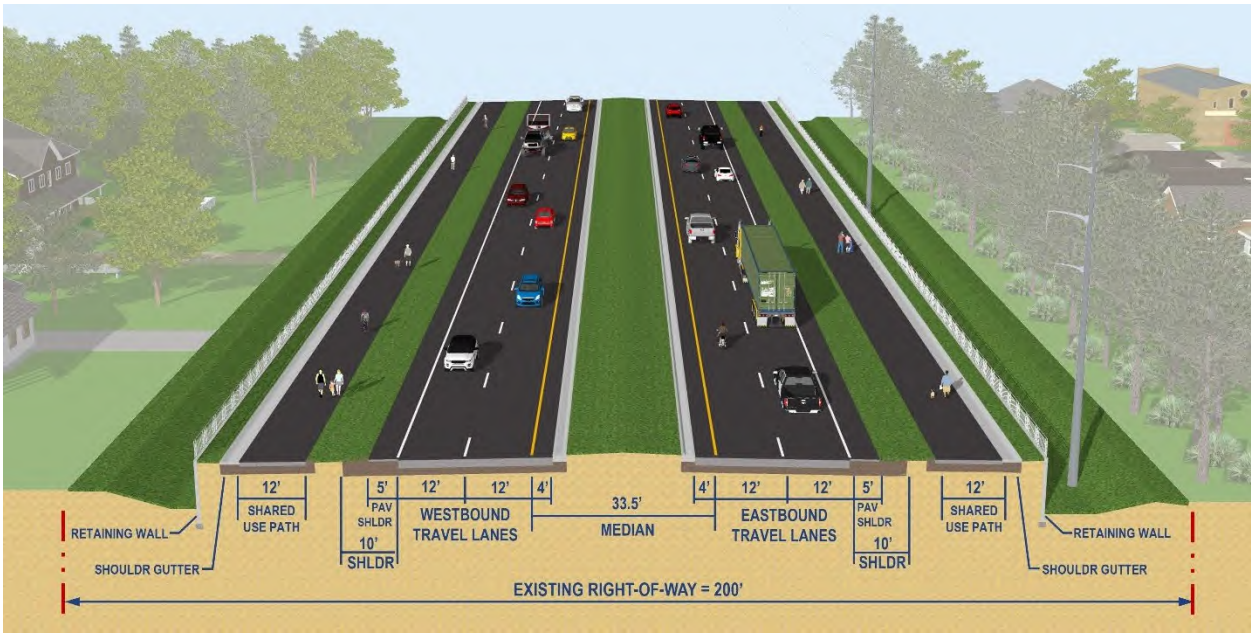
7.16 Bridge and Structure Analysis

The bridges over Turnbull Creek will be reconstructed to feature two bridges spaced 20 feet apart. The proposed typical section of the bridges over Turnbull Creek includes two 12-foot-wide travel lanes, a 12-foot-wide shared-use-path with two-foot buffers on each side, a 10-foot-wide outside shoulder, and a six-foot-wide inside shoulder. The bridges will also feature one 42-inch concrete pedestrian/bicycle railing and two 36-inch single-slope traffic railings. The total out-to-out width of each bridge will be approximately 59.5 feet and the length will be 140 feet.

The bridges are designed to be three spans which feature 14 15-inch Florida Slab Beams (FSB 15x50's) with end bents and intermediate pile bents supported by 18-inch square prestressed concrete piles. This design eliminates the need for sheet pile walls and reduces the fill required, resulting in cost savings. However, it includes two intermediate bents and a larger quantity of beam length, which may increase the construction complexity and cost. The overall lower profile, reduced maintenance needs, and improved durability position this design as the preferred solution for the bridge reconstruction.

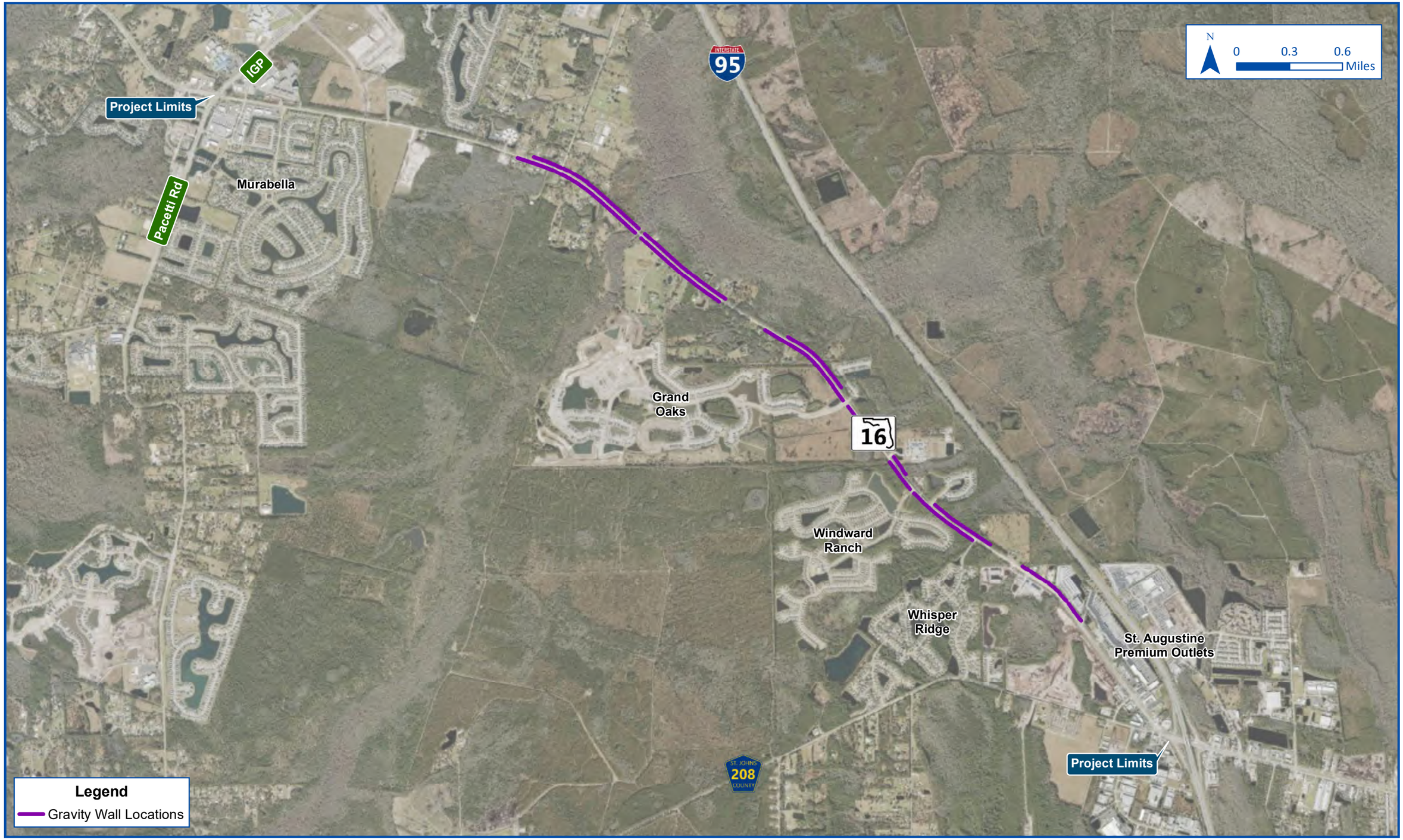
To minimize right-of-way impacts, in areas of high fill, a concrete gravity wall with a guiderail will be installed outside of the shared use paths, as shown in Figure 7.16.1. Figure 7.16.2 shows the approximate locations of where the concrete gravity walls will be located.

Figure 7.16.1: Cross Section of a Gravity Wall along SR 16



7.17 Transportation Management Plan

A detailed Transportation Management Plan (TMP) will be developed during the design phase; however, impacts to traffic will be minimized. Detours and road closures are not anticipated as traffic will be able to utilize the existing SR 16 lanes while the new westbound SR 16 lanes are constructed, then traffic will be shifted to the new westbound lanes while the eastbound lanes are milled and resurfaced. Before construction begins, the public will be notified about the start of construction through social media, websites, and press releases. If there are any temporary driveway or roadway closures, individual property owners will be notified. *Section 7.18 Constructability* describes the traffic phasing for the project.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 7.16.2: Location of Gravity Walls along SR 16	Page Number: 7-31

7.18 Constructability

The initial construction phase consists of constructing the SR 16 westbound lanes with permanent pavement to accommodate two through lanes. Once completed, all traffic will be shifted to the westbound lanes. Then the existing SR 16 travel lanes will be milled, resurfaced, and widened with permanent pavement and medians, followed by the construction of median openings. All traffic will then be shifted to the respective permanent locations. The final phase of construction will be to construct the shared use paths and concrete gravity walls as needed. During the construction of SR 16, driveway access will be maintained.

7.19 Construction Impacts

7.19.1 Social Impacts

Community Focal Points

No impacts to the schools are anticipated as a result of this project. In order to minimize disruptions to school bus and route operations and ensure safety and access concerns are addressed during construction, coordination with St. Johns County Public Schools will continue throughout the project. After the project is completed, access to schools in the study area will be improved by reduced congestion on SR 16 and the addition of shared use paths.

As mentioned in *Section 2.4.1 Social Resources*, no community centers, law enforcement facilities, government buildings, cultural facilities, or civic centers are present within the ¼-mile study area. No direct impacts are anticipated to the worship centers, park, cemetery, fire station, healthcare facilities, or social service facilities due to the proposed improvements of this project.

7.19.2 Cultural Impacts

No historic buildings or structures were identified within the APE. No further architectural survey is recommended. No NRHP-listed or -eligible cultural resources were identified within the project APE. No further cultural resources work is recommended, and the Turnbull Creek Bridge was not recorded or evaluated by the present survey.

A Cultural Resources Effects Determination Letter was sent to the State Historic Preservation Officer (SHPO) on March 6, 2024, and SHPO concurred with the findings on May 23, 2024. The letter is located in the project file. For more information about the historic or archaeological survey, please refer to the CRAS, under a separate cover.

A Cultural Resources Effects Determination Letter for the CRAS Addendum was sent to the SHPO on May 28, 2024, and SHPO concurred with the findings on June 10, 2024. A Cultural Resources Effects Determination Letter for the second CRAS Addendum was sent to the SHPO on May 16, 2025, and SHPO concurred with the findings on June 11, 2025. The letters are located in the project file. For more information about the historic or archaeological survey, refer to the CRAS or CRAS CRAS Addendums, located in the project file.

7.19.3 Natural Impacts

7.19.3.1 Protected Species and Habitats

As discussed in *Section 2.4.3 Natural Resources*, 38 species of protected plants and animals are known to occur in the project study area. Eleven species are listed by the FWC as endangered, 25 are listed as threatened, and two do not have a ranking. One species is listed by the USFWS as proposed endangered, two are listed as threatened, 32 do not have a ranking, two are under review, and one is listed as a candidate species. An effect determination was made for each listed species based on the current understanding of the proposed project and its effects. These determinations were made using effect determination keys, where appropriate, and reasonable scientific judgement. Federal effect determinations were not made for candidate species; effect determinations will be made for these species if they are listed when the project is scheduled for construction. A summary of the federally listed species and effect determinations are provided in Table 7.19.1.

Table 7.19.1: Effect Determination for Listed Species

Scientific Name	Common Name	Federal Status	State Status	Effect Determination
Plants				
Asarum arifolium (Hexastylis arifolia)	Little Brown Jug	N	ST	NAEA
Asclepias viridula	Southern Milkweed	N	ST	NAEA
Calopogon multiflorus	Manyflowered Grasspink	N	ST	NAEA
Calydorea coelestina	Bartram's Ixia	N	SE	NAEA
Carex chapmanii	Chapman's Sedge	N	ST	NAEA
Coreopsis intergrifolia	Ciliate Leaf Tickseed	UR	SE	NAEA
Gonolobus suberosus (Matelea gonocarpus)	Anglepod	N	ST	NAEA
Helianthus carnosus	Lake-side Sunflower	N	SE	NAEA
Lilium catesbaei	Pine Lily	N	ST	NAEA
Litsea aestivalis	Pondspice	N	SE	NAEA
Lobelia cardinalis	Cardinalflower	N	ST	NAEA
Lythrum curtissii	Curtiss' Loosestrife	UR	SE	NAEA
Nemastylis floridana	Celestial Lily	N	SE	NAEA
Nolina atopocarpa	Florida Beargrass	N	ST	NAEA
Orbexilum virgatum	Pineland Leatherroot	N	SE	NAEA
Pecluma plumula	Plume Polypody	N	SE	NAEA
Pinguicula caerulea	Blueflower Butterwort	N	ST	NAEA
Pinguicula lutea	Yellow Butterwort	N	ST	NAEA
Platanthera blephariglottis var. *conspicua*	White Fringed Orchid	N	ST	NAEA
Platanthera ciliaris	Yellow Fringed Orchid	N	ST	NAEA
Platanthera nivea	Snowy Orchid	N	ST	NAEA
Pogonia ophioglossoides	Rose Pogonia	N	ST	NAEA
Pycnanthemum floridanum	Florida Mountain-mint	N	ST	NAEA
Rudbeckia nitida	St. Johns Blackeyed Susan	N	SE	NAEA
Ruellia noctiflora	Nightflowering Wild Petunia	N	SE	NAEA
Sarracenia minor	Hooded Pitcherplant	N	ST	NAEA
Verbesina heterophylla	Variable-leaf Crownbeard	N	SE	NAEA

Scientific Name	Common Name	Federal Status	State Status	Effect Determination
Zephyranthes atamasca var. *atamasca*	Rainlily	N	ST	NAEA
Zephyranthes atamasca var. *treatiae*	Treat's Rainlily	N	ST	NAEA
Insects				
Danaus plexippus	Monarch Butterfly	PT	N	N/A
Reptiles				
Drymarchon corais couperi	Eastern Indigo Snake	T	FT	MANLAA
Gopherus polyphemus	Gopher Tortoise	N	ST	NAEA
Pituophis melanoleucus	Pine Snake	N	ST	NAEA
Birds				
Egretta caerulea	Little Blue Heron	N	ST	NAEA
Egretta tricolor	Tricolored Heron	N	ST	NAEA
Mycteria americana	Wood Stork	T	FT	MANLAA
Platalea ajaja	Roseate Spoonbill	N	ST	NAEA
Mammals				
Perimyotis subflavus	Tricolored Bat	PE	N	N/A

Key:
T = Threatened: species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
PE = Proposed endangered**.**
N = Not federally-listed.
UR = Not listed, but under review.
SE = State endangered.
ST = State threatened: species listed by the state that are likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
FT = Federally threatened: species federally listed as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
NAEA = No adverse effect anticipated
MANLAA = May affect, not likely to adversely affect.

Critical Habitats

Based on the USFWS Critical Habitat mapper, there is no designated Critical Habitat within the project study area.

Federally-Listed Plant Species

No federally-listed plant species were observed during the site inspections. No federally-listed plant species are known to occur in St. Johns County, and none were found to have any probability

of occurrence within the project study area. (State-listed species noted as Under Review for federal listing are not considered federally-listed.)

Federally-Listed Animal Species

Reptiles

Eastern Indigo Snake *(Drymarchon corais couperi)* - The eastern indigo snake is a federally threatened species that is linked to xeric habitats and gopher tortoise burrows, and forages in both uplands and wetlands. Indigo snakes prefer large tracts of undisturbed land. Most of the project study area consists of existing right-of-way. There has been no documented occurrence of this species within a five-mile radius of the project study area. Habitat mapping and preliminary gopher tortoise surveys conducted during the site visits on November 14, 15, and 17, 2023, July 10, 2024, and January 31, 2025 found no xeric habitats in the project study area and no active or inactive gopher tortoise burrows. The project study area is located in a region of Florida that is subject to the version of the USFWS Eastern Indigo Snake Programmatic Effect Determination Key that was updated in August 2017.

The sequence followed in the effect determination key is as follows: A) The project is not located entirely in open water or saltmarsh, B) the permit will be conditioned for the use of USFWS' Standard Protection Measures for the Eastern Indigo Snake, C) there are holes or other refugia where a snake could be buried, D) the project will not affect more than 25 acres of xeric habitat or more than 25 active and inactive gopher tortoise burrows, and E) the permit will be conditioned such that all active or inactive gopher tortoise burrows will be excavated and any indigo snakes encountered will be allow to vacate the area. This sequence concludes that the project **may affect, but is not likely to adversely affect**, the eastern indigo snake, and further consultation is not required.

Birds

Wood Stork *(Mycteria americana)* - The wood stork, federally-listed as threatened, is a wetland-dependent wading bird. It nests and roosts in areas containing woody vegetation over

standing water, preferably in cypress trees or mangroves. The wood stork ranges across the state, except for the western half of the panhandle. It routinely travels six to 25 miles to feeding sites and is known to fly between 60 to 80 miles to find food. It feeds in areas of calm and clear water that is between two to 16 inches deep. The wood stork requires areas that have long hydroperiods that allow for its prey to reproduce, and droughts that concentrate its prey into small pools making it easier to catch.

USFWS designates core foraging areas (CFAs) for each documented wood stork colony by region. St. Johns County is within the North Florida region which defines each CFA as a 13-mile radius surrounding the colony location. Wetlands and shallow waters within the regionally defined radii may be considered Suitable Foraging Habitat (SFH) for wood storks. The project study area is located within the CFA for the St. Augustine Alligator Farm wood stork colony, approximately 7.6 miles southeast of the project study area. No wood storks were observed in the project study area, but they are highly likely to occur in the project study area's wetlands and waters where surface water is present but shallow. The project is expected to incur more than 0.5 acre of impact to SFH. The project's potential effect on wood storks was evaluated using the USACE/USFWS Effect Determination Key for the Wood Stork in Central and North Peninsular Florida (2008).

The sequence followed in the effect determination key is as follows: A) The project is more than 2,500 feet from a colony site, will impact SFH, B) the project will impact more than 0.5 acre of SFH, C) the project is located in a CFA, and D) FDOT will provide SFH compensation within the service areas of FWS-approved mitigation banks. At this time, mitigation credits are available from the following mitigation banks: Fish Tail Swamp Mitigation Bank, Lake Swamp Mitigation Bank, St. Johns Mitigation Bank, St. Marks Pond Mitigation Bank, Star 4 Mitigation Bank, Town Branch Mitigation Bank, Tupelo Mitigation Bank, and Brick Road Mitigation Bank. Therefore, the project **may affect, but is not likely to adversely affect**, the wood stork. Mitigation is expected to be provided that will comply with FWS requirements.

State-Listed Plant Species

No state-listed plant species were observed during the site inspections. A total of 29 state-listed plant species were determined to have some probability of occurrence in the project study area. Probability of occurrence is based on rarity, quality of on-site habitats, and/or quantity of on-site habitats. Of these 29, 13 of them (the little brown jug, southern milkweed, manyflowered grasspink, Chapman's sedge, anglepod, Florida beargrass, blueflower butterwort, yellow butterwort, white fringed orchid, yellow fringed orchid, snowy orchid, rose pogonia, and Florida mountainmint) are state-listed as threatened and have been given a low probability of occurrence. A total of 11 (Bartram's ixia, ciliate leaf tickseed, lakeside sunflower, pondspice, Curtiss' loosestrife, celestial lily, pineland leatherroot, plume polypody, St. Johns blackeyed susan, nightflowering wild petunia, and variable-leaf crownbeard) are state-listed as endangered and have been given a moderate probability of occurrence. Two species (the pine lily and the cardinalflower) are state listed as threatened and have been given a moderate probability of occurrence, while the final three species (the hooded pitcherplant, rainlily, and Treat's rainlily) are state-listed as threatened and have been given a high probability of occurrence. None of these state-listed plant species were observed in the project study area. Potential impacts to individual plants of any of these listed plant species will not affect the species as a whole. Therefore, **no adverse effect** is anticipated for state-listed plant species. Additional survey work for listed plant species is anticipated during the permitting phase.

State-Listed Animal Species

Reptiles

Gopher Tortoise *(Gopherus polyphemus)* - The gopher tortoise is a state-threatened species that inhabits xeric and mesic forests, fields, and disturbed areas. Habitat assessment and preliminary gopher tortoise surveys conducted during the site visits on November 14, 15, and 17, 2023, July 10, 2024, and January 31, 2025 identified habitats suitable for gopher tortoises. However, these surveys found no xeric habitats and no potentially occupied gopher tortoise burrows. In general, open undeveloped areas consisted of pastures and similar managed land uses, and forested uplands generally appeared to have high water tables making them unattractive to gopher

tortoises. The gopher tortoise has been given a low probability of occurrence in the project study area. Therefore, **no adverse effect** is anticipated for this state-listed species.

Pine Snake *(Pituophis melanoleucus)* - Similar to the eastern indigo snake, the state-threatened pine snake is linked to xeric habitats and to gopher tortoise burrows. This species is found throughout Florida, with suitable habitat including longleaf pine woodlands, xerophytic oak woodlands, sand pine scrub, pine flatwoods on well-drained soils, and old fields on former sandhill sites. The pine snake avoids hammocks and forests that have a thick canopy. It burrows through the ground and moves around using burrows left by pocket gophers and gopher tortoises. While on-site uplands are suitable for this species, no pine snakes were observed. Therefore, **no adverse effect** is anticipated for this state-listed species.

Birds

Wading Birds - Three state-listed wading bird species may occur in the project study area: the little blue heron *(Egretta caerulea)*, the tricolored heron *(Egretta tricolor)*, and the roseate spoonbill *(Platalea ajaja)*. These species, state-listed as threatened, may forage in wetlands and waters in the project study area when shallow water is present. These species typically nest in mixed-species colonies (rookeries). Rookery locations are documented by FWC and their activity status is tracked. The nearest documented wading bird rookery is located approximately 4.5 miles northeast of the project study area and was last documented as active in the 1970s by the FWC rookery survey. No undocumented rookeries were observed in the project study area during the site visits.

None of these species were observed during the site inspections. The little blue heron is equally likely to occur in inland wetlands/waters as in coastal ones, while the tricolored heron and roseate spoonbill increasingly prefer coastal wetlands/waters. Each state listed wading bird was given a probability of occurrence based on their preference for inland (where the project is located) versus coastal areas. The probability of occurrence was determined to be high for the little blue heron, moderate for the tricolored heron, and low for the roseate spoonbill. These wading birds are highly mobile species; if any individuals are present during construction, they can easily leave the

area if disturbed. Therefore, **no adverse effect** is anticipated for these state-listed wading bird species.

Other Protected Species

Bald Eagle *(Haliaeetus leucocephalus)* - While no longer considered a listed species under the ESA, the bald eagle is afforded protection under the Bald and Golden Eagle Protection Act (BGEPA) of 1940, as amended. Although the bald eagle has been delisted, restrictions regarding work around their nests are still in place. These restrictions vary based on the time of year and distance from the nest. USFWS defines two buffer zones (the primary and secondary zones) from the central location of a nest. Activity restrictions are based on the distance from the nest. The primary activity zone is 330 feet from the nest and the secondary activity zone is 660 feet from the central location of the nest. Generally, if work is proposed within 660 feet of the nest, restrictions may be applicable. If the nest is active and must be destroyed to construct the project, a permit from USFWS to take the nest will be required.

An active Bald Eagle nest (SJ056) occurs near the site of pond 2C. The nest has been documented to be recently active; however, the pond was designed to eliminate any construction activities within the primary nest disturbance zone (330-foot radius from the nest tree). In addition, this zone consists of large trees that will block nesting eagles from visually observing any proposed construction. If the nest is active and work is proposed within the secondary nest protection zone during nesting season, nesting bald eagles will be afforded protection through the implementation of FDOT Special Provision 0070104-2.

Monarch Butterfly *(Danaus plexippus)* - This species is designated as a proposed threatened species for federal listing by USFWS. Adult individuals of this species may reside in Florida year-round and breed in the state or may pass through the state while migrating back and forth from breeding grounds in other states or from wintering sites in Mexico. Breeding females require milkweeds *(genus Asclepias)* to lay their eggs on, and the larvae must feed on these milkweeds. The adults, like many other species of butterflies, rely on a variety of wildflowers as nectar food

sources. No milkweeds were observed in the project study area; however, their presence cannot be ruled out. The project study area contains areas of grassy and weedy vegetation, and these areas have the potential to produce a variety of wildflowers upon which wandering (non-breeding) adult monarchs may feed. This species has been given a moderate probability of occurrence. No adult or larval individuals of this species were observed during the field investigation. The proposed project will not permanently eliminate all potential milkweed or wildflower habitats, nor will it alter the maintenance schedule to prevent flowering and seed set. Therefore, the project is unlikely to affect the monarch. If the monarch is listed by USFWS as threatened or endangered and the project may affect the species, FDOT commits to re-initiating consultation with USFWS to determine appropriate avoidance and minimization measures for protection of the newly listed species.

Tricolored Bat *(Perimyotis subflavus)* - This species was recently proposed for listing as federally endangered (September 2022). In the Southeast, this is an uncommon species that is most likely to utilize culverts during the colder months and trees and Spanish moss *(Tillandsia usneoides)* in the warmer months. This species is rare in Florida and has been given a low probability of occurrence in the project study area. If the tricolored bat is listed by the USFWS as threatened or endangered and the project may affect the species, FDOT commits to re-initiating consultation with USFWS to determine appropriate avoidance and minimization measures for protection of the newly listed species.

Non-listed Bats - FWC regulates work that affects colonies of non-listed bats that may exist under bridges and inside culverts. The primary signs of bats include accumulation of guano, staining on vertical faces of the structure, and direct bat observations or hearing their vocalizations. In Florida, the most common bat species to utilize bridges are the Brazilian free-tailed bat *(Tadarida brasiliensis)* and the big brown bat *(Eptesicus fuscus)*. The most common species to utilize culverts is the Southern myotis *(Myotis austroriparius)*. All three of these are non-listed species. The accessible and visible portion of the underside of the Turnbull Creek bridge were briefly inspected but no clear signs of bat occupation were observed. Bats can occupy, reoccupy, or abandon a site

at any time. The bridge and all culverts will be inspected for the presence of bats prior to construction. The removal of any bats is subject to rules in 68A-9.010, F.A.C. If bats are present in the bridge or in or culverts, FDOT will follow current agency protection measures and will employ exclusion measures as necessary. Therefore, the project is unlikely to affect bats.

7.19.3.2 Wetlands and Surface Waters

For the purposes of this study, the conservative assumption is made that all wetlands and jurisdictional waters within the Preferred Alternative will be permanently and completely impacted, as complete design details that would precisely identify impact areas and types are not available at this time. The Preferred Alternative is anticipated to impact a total of 24.97 acres of wetlands. Therefore, functional loss incurred by each wetland impact is calculated by multiplying the Uniform Mitigation Assessment Method (UMAM) score by the acreage of the wetland or jurisdictional water impact. Functional loss is offset by purchasing or generating an equal amount of functional gain. All estimated wetland impacts are expected to require freshwater forested wetland mitigation to offset the loss of standard wetland functional values.

The Preferred Alternative (including the preferred pond sites) will impact a total of 24.97 acres of wetlands. Table 7.19.2 summarizes the expected UMAM mitigation requirements to offset the project's impacts to standard wetland functional values in each drainage basin.

It is estimated that the wetlands and waterways in the project study area will require a total of approximately 14.66 units of standard freshwater wetland functional gain to offset the impacts in both drainage basins.

Table 7.19.2: UMAMs in the Sixmile and Julington Creeks Drainage Basin

Type	Wetland Impacts (acres)	UMAM Score	Required Standard Freshwater Functional Gain
Streams and Waterways	0.46	0.70	0.33
Wetland-cut Ditches	0.79	0.70	0.56
Hydric Coniferous Plantations	2.76	0.50	1.38
Streams and Lake Swamps	2.19	0.77	1.68
Wetland Forested Mixed	14.87	0.57	8.43
Freshwater Marshes	3.16	0.57	1.80
Wet Prairies	0.49	0.57	0.28
Streams and Lake Swamps (Wetland 62)	0.25	0.77	0.20
Totals	**24.97**	**-**	**14.66**

Avoidance and Minimization

Wetland avoidance and minimization has been a priority throughout all phases of project development. As the project advances through subsequent phases, avoidance and minimization of wetland impacts will continue to be considered to the maximum extent practicable. It is assumed that all wetlands and jurisdictional waters within the project study area will be permanently and completely impacted as complete design details that would precisely identify impact areas and types are not available at this time. As the project progresses into the design phase, it is expected that not all wetlands and jurisdictional waters in the project footprint will be permanently and completely impacted. For example, some wetland areas may be subject to temporary or partial impacts instead. In addition, some of the pond site alternatives will not be selected as part of the project's preferred alternative, as only one pond is required for each of the six project basins. At this time, it is estimated that a total of 24.97 acres of wetlands and jurisdictional waters will be permanently impacted. Temporary impacts, secondary impacts, and temporary work areas (if any) are not known at this time. Final impacts to wetlands and surface waters will be evaluated in detail in the design phase of the project. Applicable Best Management Practices (BMPs) for erosion control and water quality considerations will be adhered to during the construction phase of the project. The use of BMPs (e.g., standard silt fencing, floating turbidity barriers, etc.) as necessary will protect the water quality of downstream systems.

The required wetland mitigation credits could be sourced from one or more than one of the above-listed mitigation banks. FDOT will continue to consider all mitigation options to provide the necessary mitigation when the mitigation is required. Wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and 33 U.S.C. Section 1344.

Wetland Findings

The Preferred Alternative has been evaluated in accordance with Federal Executive Order 11990 - "Protection of Wetlands." and U.S. Department of Transportation (USDOT) Order 5660.1A, Preservation of the Nation's Wetlands. The proposed project will have no significant short-term or long-term adverse impacts to wetlands, there is no practicable alternative to construction in wetlands, and measures have been taken to minimize harm to wetlands. Short-term construction-related impacts will be minimized in accordance with the FDOT's Standard Specifications for Road and Bridge Construction.

More information about wetlands is located in the NRE and NRE Addendum, both available in the project file.

7.19.4 Physical Impacts

7.19.4.1 Highway Traffic Noise

The noise analysis was conducted pursuant to 23 CFR 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise, and Section 335.17, F.S., State highway construction; means of noise abatement.

A traffic noise study was performed for this Type I project and is documented in a Noise Study Report (NSR), available under separate cover. The traffic noise study was performed in accordance with the Federal Highway Administration's (FHWA) noise policy, Title 23 of the Code of Federal Regulations, Part 772 (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise and

Construction Noise", the FDOT's PD&E Manual, and the FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook.

The existing noise levels and future design year (2050) noise levels for the No-Build and the Preferred Alternatives were predicted using the latest approved version of FHWA's Traffic Noise Model (TNM), Version 2.5. Design year (2050) traffic noise levels for the Preferred Alternative will approach or exceed the Noise Abatement Criteria (NAC) at 47 residences and a recreational area associated with Adventure Landing, an isolated non-residential / special land use site (NAC C) within the project limits. Therefore, the feasibility and reasonableness of noise barriers were considered for those noise sensitive sites predicted to be impacted by design year (2050) traffic noise in accordance with traffic noise study requirements set forth by both the FHWA and FDOT.

For 13 of the 47 impacted residences, noise barriers were not considered a feasible noise abatement options because they represent isolated residences. For a noise barrier to be considered an acoustically feasible abatement measure, it must benefit at least two impacted receptor sites. In addition, noise barriers were not determined to be a reasonable and feasible abatement measure for the recreational area associated with Adventure Landing. Due to the type of recreational area in Adventure Landing (i.e., mini-golf course), it's reasonable to assume that the usage would not be more than 44,326 person-hours per year. An isolated impacted special land use must have enough person-hour usage to equate to at least two residences to be found feasible.

Thirty-four of the 47 impacted residences are located within four single family / multi-family residential communities including Sevilla Community, Tomoka Pines Subdivision, Soluna Apartments, and Windward Ranch. The reasonableness and feasibility of noise barriers as an abatement measure were evaluated at these residential communities. The following summarizes the barriers analysis and recommendations at these locations. Note that the final decisions on noise barrier limits and heights are made during the project design phase. Also, during the design

phase, an engineering constructability review will be conducted to confirm that the noise barrier is feasible and support for noise barriers from the benefited noise sensitive sites is determined.

- **Sevilla Community** – Encompasses the impacted single-family residences (i.e., six) within the Sevilla Community located north of SR 16 and east of Winners Way. The 16 to 22-foot-tall ground mounted noise barriers evaluated at this location meet the minimum noise reduction design goal of seven dB(A) for at least one benefited receptor and all barriers meet the reasonable cost criteria of equal to or less than $64,000 per benefited receptor site. The 22-foot-tall barrier was determined to be most effective at this location and recommended for further consideration in the design phase. This barrier would benefit 14 receptors including the six impacted receptors and with an estimated construction cost of $880,000 or $62,857 per receptor site.
- **Tomoka Pines Subdivision** – Encompasses the impacted single-family residences (i.e., eight) within the Tomoka Pines Subdivision located north of SR 16 and east and west of Tomoka Pines Drive. Only the 22-foot-tall ground mounted barriers evaluated at this location meets the minimum noise reduction design goal of seven dB(A) for at least one benefited receptor and all barriers meet the reasonable cost criteria of equal to or less than $64,000 per benefited receptor site. Therefore, the 22-foot-tall barrier was determined to be the only barrier configuration that would meet all criteria at this location and recommended for further consideration in the design phase. This barrier design would benefit 15 receptors including the eight impacted receptors and with an estimated construction cost of $959,200 or $63,947 per receptor site.
- **Soluna Apartments** – Encompasses the impacted multi-family residences (i.e., 20) within the Soluna Apartments located south of SR 16 and east of Amber Sun Way. The 20 to 22-foot-tall ground mounted noise barrier evaluated at this location meets the minimum noise reduction design goal of seven dB(A) for at least one benefited receptor and all barriers meet the reasonable cost criteria of equal to or less than $64,000 per benefited receptor site. The 22-foot-tall barrier was determined to be most effective at this location and recommended for further consideration in the design phase. This barrier design would

benefit 55 receptors, including 19 of the 20 impacted receptors and with an estimated construction cost of $915,200 or $16,640 per receptor site.

Noise barriers were also evaluated at the following location but are not recommended for further consideration at this time (unless otherwise noted below) since they did not meet FDOT's Noise Reduction Design Goal and/or FDOT's Noise Barrier Cost Reasonableness Criteria or were determined not to be feasible for construction:

- **Windward Ranch** – Encompasses the impacted single family residences within the Windward Ranch Community located south of SR 16 and east of Windward Ranch Boulevard to west of Whisper Ridge Drive. The 18 to 22-foot-tall ground mounted noise barriers evaluated at this location meets the minimum noise reduction design goal of seven dB(A) for at least one benefited receptor. However, no barriers meet the reasonable cost criteria of equal to or less than $64,000 per benefited receptor site. The lowest cost conceptual design (WR-CD1) is $90,000 which exceeds the reasonableness cost criteria.

Noise barriers recommended for further consideration in the design phase for Sevilla Community, Tomoko Subdivision, and Soluna Apartments are expected to reduce traffic noise by at least five dB(A) at 84 residences including 33 of the 47 impacted sites. The estimated cost of the recommended barriers is $2,754,400. FDOT is committed to the construction of feasible noise abatement measures for the impacted sites associated with these residential communities contingent upon the following conditions:

FDOT is committed to the construction of feasible noise abatement measures at the noise impacted locations identified in Table 4.1 in the NSR, and Figure 7.19.1 of this report contingent upon the following conditions:

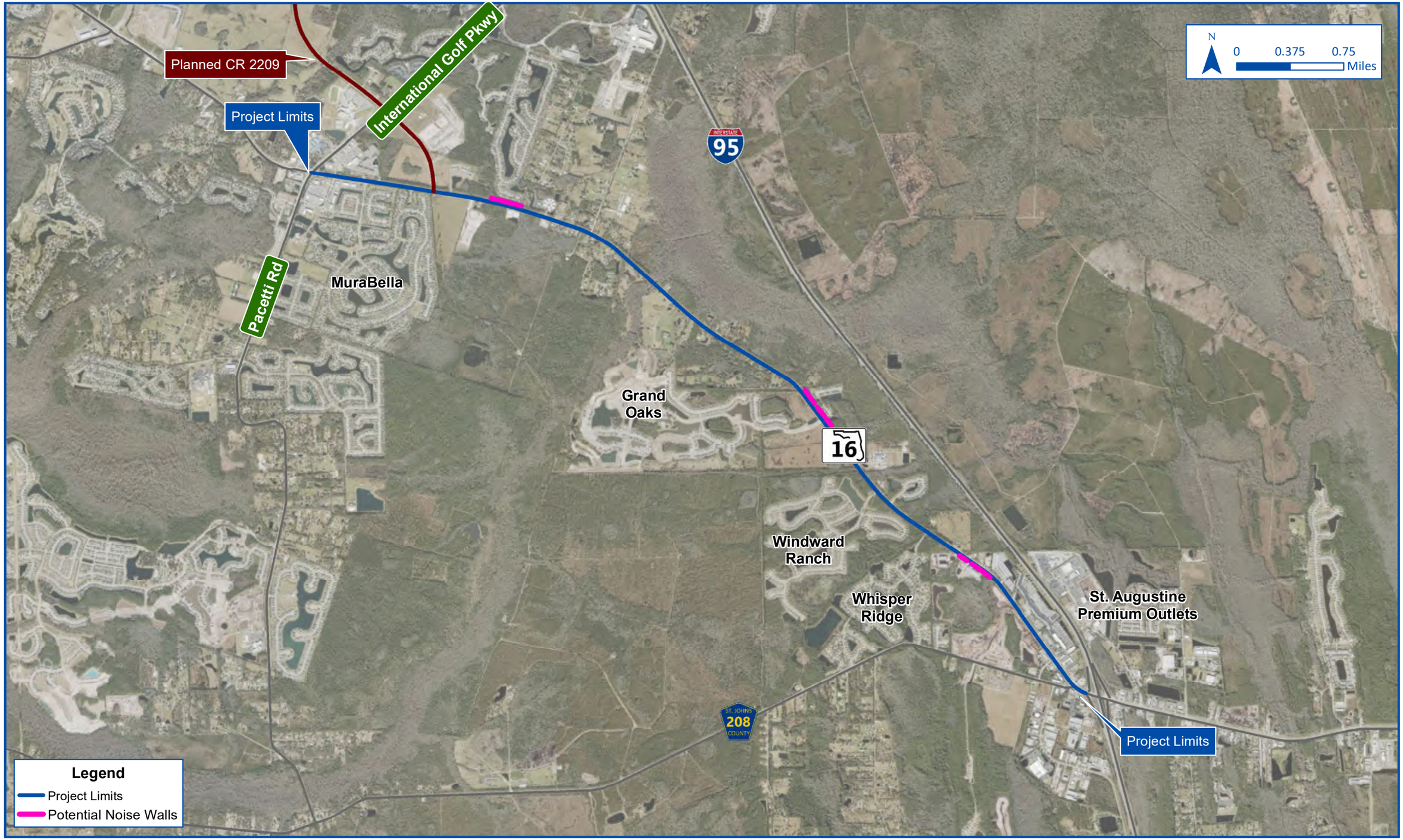
- Final recommendations on the construction of abatement measures are determined during the project's final design and through the public involvement process;
- Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement;

- 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 County; 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.

During construction of the project, there is the potential for noise impacts to be greater than those resulting from normal traffic operations because heavy equipment is typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project corridor is important in minimizing noise and vibration impacts. The project area does include residential, commercial, and institutional land uses. Construction related 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 sites particularly sensitive to construction noise and/or vibration will be performed during the design phase to ensure that impacts to such sites are minimized.

7.19.4.2 Air Quality

This project is not expected to create adverse impacts on air quality because the project area is in attainment for all National Ambient Air Quality Standards (NAAQS) and because the project is expected to improve the LOS and reduce delay and congestion on all facilities within the study area. Construction activities may cause short-term air quality impacts in the form of dust from earthwork and unpaved roads. These impacts will be minimized by adherence to applicable state regulations and to applicable FDOT Standard Specifications for Road and Bridge Construction.



FDOT	SR 16 from IGP to I-95 Project Development and Environment (PD&E) Study	Figure 7.19.1: Potential Reasonable and Feasible Noise Wall Locations	Page Number: 7-49

7.19.4.3 Contamination

As mentioned in *Section 2.4.4.1 Contamination*, a total of 19 sites, six pond sites, and one preferred pond site were identified to have contamination within the project study area.

The Preferred Alternative was designed to avoid or minimize involvement with known or potential contamination sites, where possible. However, some sites could not be avoided, and minor right-of-way acquisition is required. The roadway improvements do not require right-of-way, so no direct impacts to the contamination sites are anticipated, however, a preferred pond site (4C) is classified as a low-risk site and no contamination impacts are anticipated.

More information about contamination is located in the CSER and CSER Addendum, under a separate cover.

7.20 Special Features

Special features for this project include:

- Shoulder gutters along the shared use path in areas of high fill; and
- Concrete gravity walls with guiderails in areas of high fill.

7.21 Utilities

Segment 1 is anticipated to exhibit conflicts within the limits of new construction, including various buried gas and fiber optic lines that are currently located adjacent to the northern edge of pavement. Limited conflicts are anticipated between the southern edge of pavement and the proposed construction limits due to the addition of right turn lanes, bulb-outs, and shared use path. The improvements have been strategically located in effort to avoid impacts to existing transmission poles for the extent of the corridor. Additionally, the full reconstruction of the Turnbull Creek bridge will require temporary relocation and re-mounting of the TECO gas line.

Segment 2 is anticipated to have minimal impacts to existing utilities due to the large amount of milling and resurfacing of the existing roadway. However, possible impacts to gas and fiber optic

lines located on the north side between the Shoppes at Mill Creek and The North Star (formerly Scottish Inns) are anticipated due to the reconstruction of the Toms Road intersection and construction of a shared use path.

The potential impacts detailed above will require further investigation due to the nature of the improvements. Existing sewer, water, and gas lines may conflict with minor earthwork behind the shared use path. Assuming that these facilities are sufficiently buried, they should not require relocation. No relocation is anticipated for the utilities located adjacent to the existing southern right-of-way.

Table 7.21.1 shows the assessment of conflicts from the responsive UAOs.

Table 7.21.1: Assessment of Conflicts from Responsive Utility Agency/Owners

Utility Owner	Utility Type	Anticipated Conflict
AT&T Florida	Telephone	Minimal
Comcast	Fiber	Minimal
Florida Power & Light	Electric Distribution	Minimal
Florida Power & Light	Electric Transmission	Minimal
Hotwire Communications	Fiber	None
St. Johns County Utility Department	Sewer & Water	Minimal
TECO Peoples Gas	Gas	Minimal

7.22 Cost Estimates

The FDOT Long-Range Estimate (LRE) system was utilized to estimate the construction costs for the Preferred Alternative. Appendix D contains the LREs for this project. The total estimated cost for the Preferred Alternative is $225.1 million. This total is comprised of the following:

- Construction Cost: $189 million;
- CEI Cost: $18.9 million; and
- Right-of-way Cost: $17.2 million.

Note, the CEI costs are based on 10% of the construction cost and the right-of-way costs include the temporary construction easement costs.