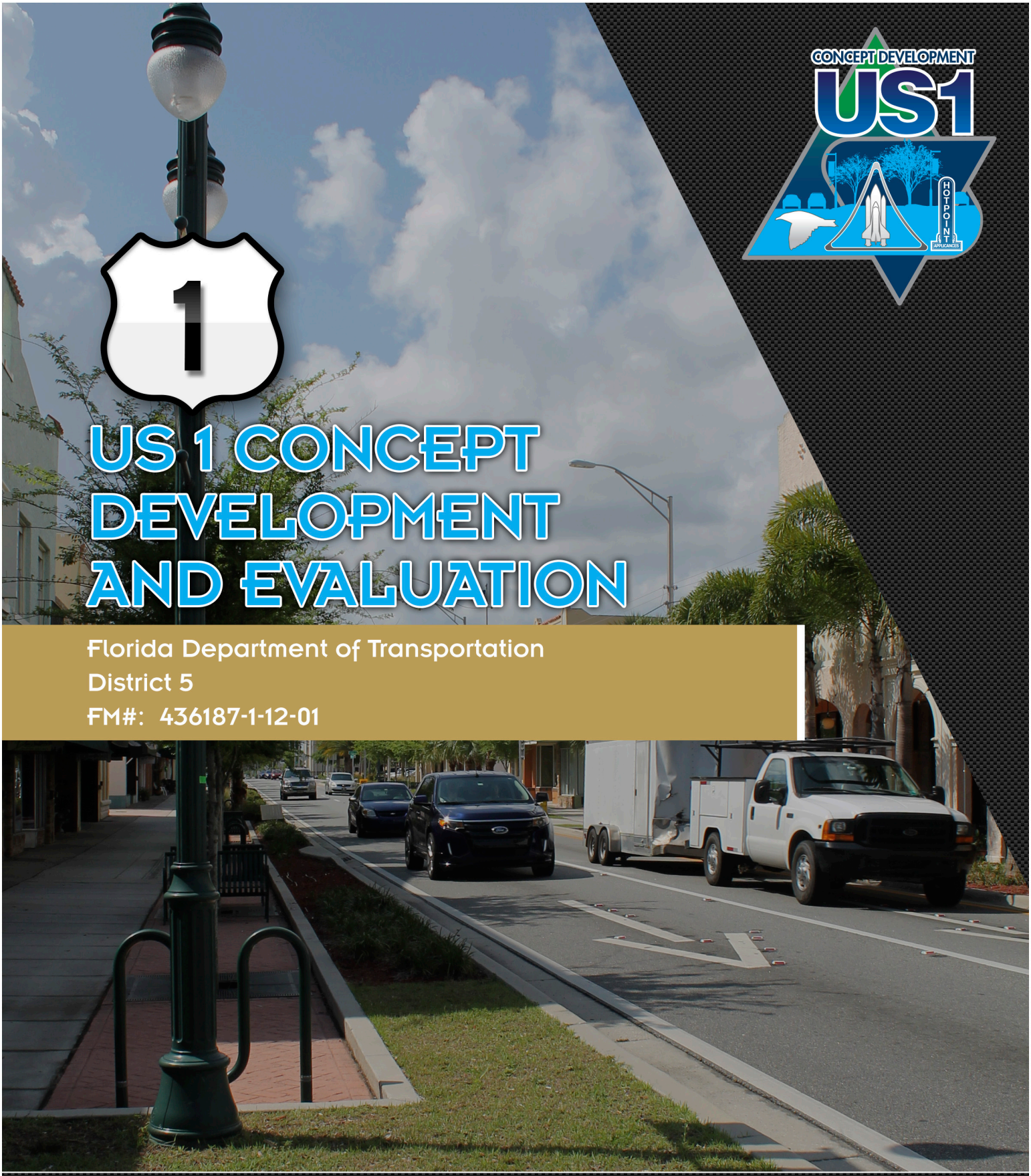

US 1 CONCEPT DEVELOPMENT AND EVALUATION

Florida Department of Transportation
District 5
FM#: 436187-1-12-01

Existing Conditions Report

December 2017

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1 Introduction

1.1 Report Purpose

The purpose of this Existing Conditions Report is to identify all existing plans, amenities, and physical features that the corridor currently provides. This report will evaluate these existing conditions and identify issues and opportunities that will be analyzed further in the alternatives phase of the project.

In December 2017, Florida Department of Transportation (FDOT) updated the Existing Conditions Report previously published in May 2015. This report provides an update to the existing plans, physical features, traffic, and amenities that may have changed since the last update.

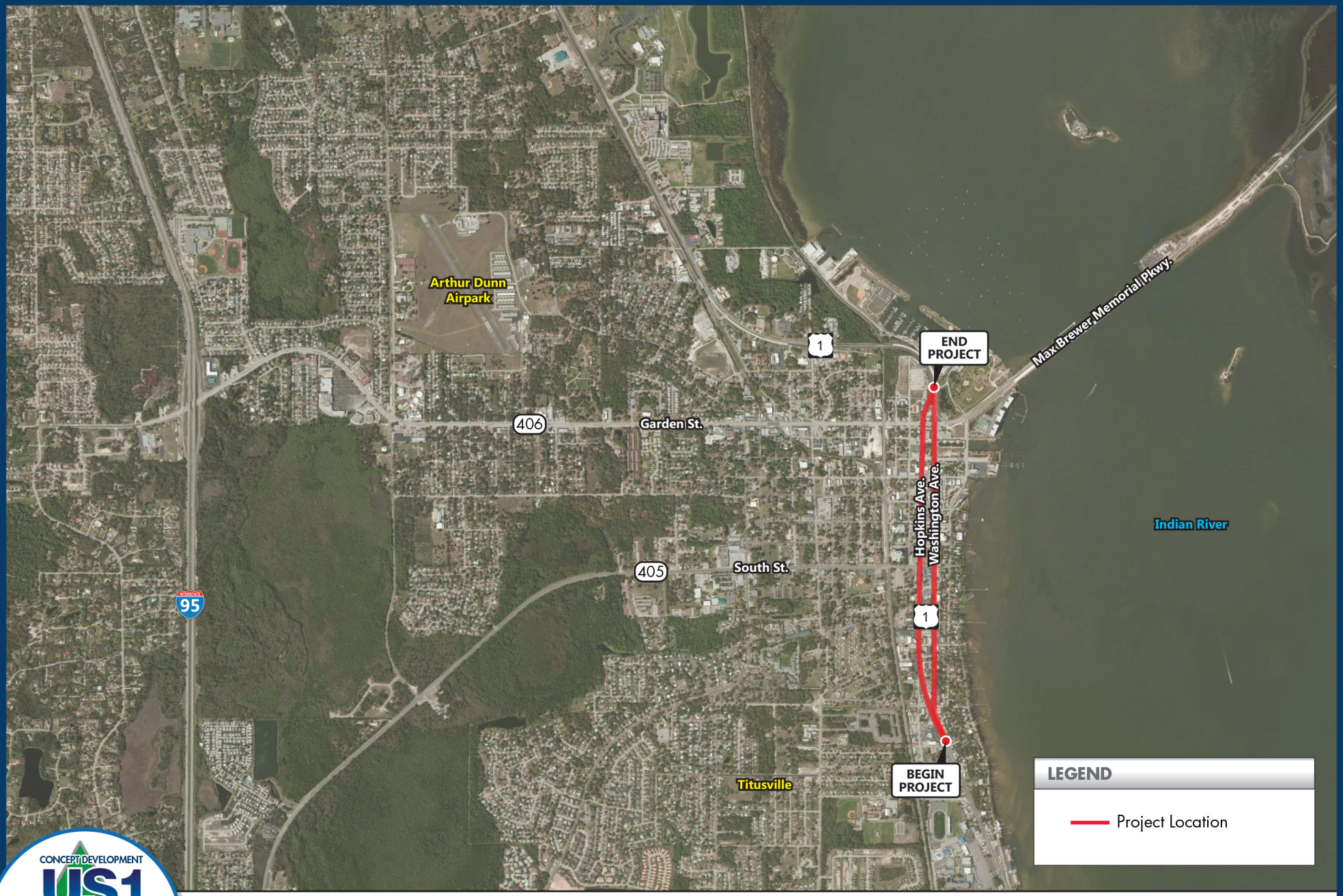
1.2 Project Background and Purpose

In January 2015, FDOT began a Corridor Planning Study on US 1 (including both Washington Avenue and Hopkins Avenue) from Laurel Place to Indian River Avenue in Titusville, Florida. Figure 1 illustrates the Study Area. A Corridor Planning Study is a high-level evaluation of safety, environmental and geometric concerns along a transportation corridor where needs, possible improvement options and planning level cost estimates are identified. The purpose of the study was to develop a multimodal design-driven vision, rather than a model-driven vision to determine how best to meet the needs of the current and future end users of the corridor, and to establish a long-term plan to guide evolution of the corridor. Multimodal corridor projects are essential to network efficiency, safety, and livability within the context of future transportation needs.

This project was requested by the City of Titusville to coordinate the development of a future vision for the US 1 corridor that will establish a multimodal approach to addressing future transportation needs. This study involved a community-based evaluation to determine how best to meet the needs of current and future users. It then established a long-term plan to guide evolution of the corridor that appropriately correlates the balance between land use and transportation planning. This project was coordinated with local and regional agency partners, such as the Space Coast Transportation Planning Organization (SCTPO), Brevard County, the City of Titusville, Space Coast Area Transit (SCAT), Titusville Community Redevelopment Area (CRA) and Florida East Coast (FEC) Railway to develop potential solutions that establish a more multimodal urban environment utilizing a context-sensitive approach. US 1 has been the subject of various previous planning studies and improvement efforts. Several development and planning goals have been identified and implemented to create a more walkable urban environment for the historic downtown Titusville business district. As part of the analysis, previous studies, improvement plans, as well as an inventory of existing traffic, pedestrian and bicycle, and transit conditions and facilities were evaluated. This process combined planning and engineering efforts

to develop a range of potential improvement strategies. The Corridor Planning Study concluded in September 2016.

In July 2017, the project process continued with the start of the Concept Development and Evaluation Study. This study continues what was started in the Corridor Planning Study by further evaluating the alternatives identified, creating concept plans, and identifying and evaluating impacts. This study will continue the public and agency involvement effort that was previously established by continuing to engage the project visioning team throughout the process as well as holding a public meeting to receive local input.



US 1 Concept Development & Evaluation

LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 1
Study Area Location Map

2

Existing Conditions

2.1 Introduction to the Corridor

The US 1 Study Area consists of an approximately 1.25 mile, one-way pair section (Hopkins Avenue and Washington Avenue) of US 1 within the City of Titusville in Brevard County, Florida. The Study Area begins at Laurel Place and extends north to Indian River Avenue, which encompasses the entire one-way pair section through historic downtown Titusville. The Study Area corridor can be characterized as an urbanized two lane roadway, in an area of predominantly retail and service land uses.

2.2 Summary of Transportation Plans

The following transportation plans were reviewed in order to identify planned improvements within the Study Area:

- Space Coast Transportation Planning Organization's (TPO) 2040 Long Range Transportation Plan;
- Space Coast TPO's Transportation Improvement Plan;
- FDOT Five Year Work Program;
- City of Titusville Comprehensive Plan Policies
- Space Coast TPO's Bicycle & Pedestrian Mobility Plan; and
- Space Coast Area Transit's Transit Development Plan.

Space Coast TPO 2040 Long Range Transportation Plan (LRTP)

The SCTPO 2040 LRTP identifies a multimodal range of improvements for Brevard County through 2040. The LRTP identifies a section of SR 406 (Garden Street) from Park Avenue to US 1 SB (Hopkins Avenue) in which to add sharrows and 'Bike May Use Full Lane' (BMUFL) signage with an estimated cost of $109,000. A sharrow and BMUFL sign was identified from north of SR 406 (Garden Street) to SR 405 (South Street) along US 1 for the cost of $98,000. ITS Improvements were identified along US 1 from SR 406 (Garden Street) to SR 405 (South Street) with an estimated cost of $1.3 Million. An off road shared use path along US 1 was identified between Dairy Road and SR 406 (Garden Street).

Space Coast TPO Transportation Improvement Plan (TIP) FY 2018-FY2022

The TIP is a priority list of federal and state funded projects that have been scheduled for implementation by the Space Coast TPO. The TIP includes financially feasible multimodal projects that were previously adopted by state and local officials, and transportation agencies. This plan was updated in July of 2017. A resurfacing is

funded for construction in FY 2019 for SR 406 (Garden Street) from East of Petty Circle to US 1 NB (Washington Avenue).

FDOT Five-Year Work Program FY 2018-FY 2022

Each year, FDOT develops the Five-Year Work Program in accordance with Section 339.135, Florida Statutes. The plan reviewed was updated in December 2017. The Five-Year Work Program is an ongoing process that is used to forecast the funds needed for upcoming transportation system improvements scheduled for the next five years. The development of this Work Program involves extensive coordination with local governments, including Metropolitan Planning Organizations and other city and county officials. After review of the programmed improvements, there were no projects identified along US 1 in the Study Area.

City of Titusville Comprehensive Plan Policies

The City of Titusville Comprehensive Plan, adopted in 1988 and last revised in April of 2014, has adopted multiple Comprehensive Plan Objectives and Policies that focus on multi-modal transportation options. Some of these include complete streets, street beautification and creating a system-wide multi-modal transportation network master plan. Objective 1.13 of the Future Land Use Element identifies policies and strategies concerning land uses along the US 1 corridor.

The 2006 US 1 Corridor Master Plan included the southern portion of the current study corridor, from Grace Street to Laurel Place, and seeks to encourage the recommended master plan by developing a Neighborhood Plan. This involves designating land uses that protect the interior established single-family areas of the neighborhood by preserving and revitalizing the commercial uses along US 1, and preventing these uses from encroaching into the established single-family neighborhoods. The City of Titusville has also adopted policies that the 2006 Master Plan recommended regarding strengthening and encouraging a pedestrian-friendly, mixed-use district along US 1, that can include, but is not limited to high density residential, retail, and public areas, and that is intended to contain urban elements of increased density, intensity and height.

Space Coast TPO Bicycle & Pedestrian Mobility Plan

The Space Coast TPO Bicycle & Pedestrian Mobility Plan, published in 2013, documents future improvements to the bicycle/pedestrian network within Brevard County. It is a synthesis of prior plans, regional projects and local plans which identifies short- and long-term improvements that address gaps or deficiencies in the bicycle/pedestrian network. The following improvement projects were identified:

- Installation of sharrows along US 1 from St Johns Street to Grace Street. There is no existing funding for this project.
- Installation of sharrows and BMUFL signs along US 1 from SR 405 (South Street) to 1,200 feet north of SR 406 (Garden Street). It does not have any existing funding.
- A designated bike lane from north of SR 406 (Garden Street) to SR 405 (South Street) along US 1. There is no existing funding for this project.
- A designated bike lane from St. Johns Street to Grace Street along US 1. There is no existing funding for this project.
- An off road shared use path along US 1 was identified between Dairy Road and SR 406 (Garden Street).

Space Coast Area Transit 2013-2022 Transit Development Plan

The Space Coast Area Transit (SCAT) 2013-2022 Transit Development Plan (TDP) documents future transit improvements throughout Brevard County for a ten-year window. Transit improvements can include new routes, expanded hours of operation, or increased frequencies. The following improvements are noted as unfunded and are summarized by implementation year:

Year 2018

- Start Sunday service on Route 1

Year 2019

- Increase weekday frequency to 30 minutes on Routes 1 and 2
- Increase Saturday frequency to 30 minutes on Routes 1 and 2
- Extend service on weekdays to 9 PM on Route 1
- Extend service on Saturday to 9 PM on Route 1
- Start Sunday service on Route 2

Year 2020

- Increase weekday frequency to 30 minutes on Route 5
- Start Saturday service on Route 5
- Extend service on weekdays to 9 PM on Routes 2 and 5
- Extend service on Saturday to 9 PM on Route 2
- Start Sunday service on Route 5

Year 2021

- Create a new route that provides north-south connectivity in Brevard County (documented in the TDP as Alternative 18: BCC Connector). The route would run north/south along US 1 for the length of the Study Area.

Year 2022

- Create a new route that connects Downtown Titusville to Canaveral National Seashore. This is documented in the TDP as Alternative 21: Canaveral National Seashore. The route would begin at SR 405 (South Street) and move north/south along the US 1 corridor before connecting east to Canaveral National Seashore along SR 406 (Garden Street).

2.2.1 Local Small Area Plans and Community Redevelopment Areas

The Community Redevelopment Agency (CRA) program was created in Florida in 1969 to help communities revitalize downtown areas. The Florida Legislature established criteria to allow and encourage CRA redevelopment and revitalization activities when certain conditions exist, including but not limited to the presence of substandard or inadequate structures, higher crime rates than surrounding areas, inadequate infrastructure, insufficient roadways, deterioration of sites or other improvements, and inadequate parking.

The US 1 Study Area is located fully within The Downtown Titusville CRA. The CRA encompasses land from Buffalo Road in the north, to Grace Street in the south, and lands from the Indian River Lagoon in the east to the FEC rail road in the west. The CRA projects implemented within the Study Area include a US 1 Streetscape Plan, with the goal to adjust the horizontal alignment, calm traffic, provide greater pedestrian activity, shaded areas, on-street parking, includes entryway signage, wider sidewalks, landscaping and historic lighting along the corridor. Designed and engineered by the firm Wilson Miller, this plan was constructed beginning in 2009.

The 2006 Downtown Master Plan lead to a Downtown Mixed Use Smart Code for the CRA, which was adopted in 2010. These standards were intended to encourage mixed-use buildings for infill development and new public facilities, while maintaining the historic character of the community. These codes were revised in 2013.

In 2014, a Community Redevelopment Plan update was created to "develop a plan for coordinated growth in the Downtown CRA" and to create a downtown area with a vibrant mixed-use town center environment. The FY 2018/2022 5-Year Capital Improvement Plan, published in the 2017 CRA Adopted Budget, identifies $50,000 annually towards concrete street repairs on US 1 side streets. This is relevant to the identified parallel pedestrian and bicycle route on Indian River Avenue.

A Main Street Streetscape design project, funded by the CRA program, includes a new sidewalk and pavement milling and resurface. The project was planned to not change the existing typical section of the roadway, which included bike lanes and on-street parking. This project later included the addition of the cycle track for the Downtown Titusville Trail that is part of the Coast-to Coast network.

2.2.2 Developments of Regional Impact

Information on Developments of Regional Impact (DRIs) was collected from the Florida Department of Economic Opportunity (DEO), Regional Planning Councils, and county governments. There are no DRIs located within one mile of the Study Area.

2.2.3 Related Traffic Studies

A safety study was performed at the intersection of State Road 406 and US 1 one-way pair intersections in February 2017 to evaluate the operations and safety of the intersections. Due to the high angle crash history, many short and mid-term improvements were recommended. A potential long-term improvement identified for further evaluation is to combine both intersections into an elongated roundabout. This would involve significant right of way impacts to adjacent properties on both sides of SR 406 (Garden Street).

In addition to that study, a Traffic Signal Warrant Study was also conducted at the intersection of US 1 NB (Washington Avenue) and Julia Street in July 2014. This study recommended that a traffic signal not be installed, however it was recommended to install Rectangular Rapid Flashing Beacons, or RRFB's, providing an enhanced crosswalk to improve pedestrian safety at the intersection. This RRFB's was installed in late 2015.

2.3 Land Use

Land use data was compiled from the Brevard County Property Appraiser parcel data and FDOT District 5 Generalized Land Use Data generated in 2015. This data was used to identify existing land uses around the study corridor.

2.3.1 Existing Land Use

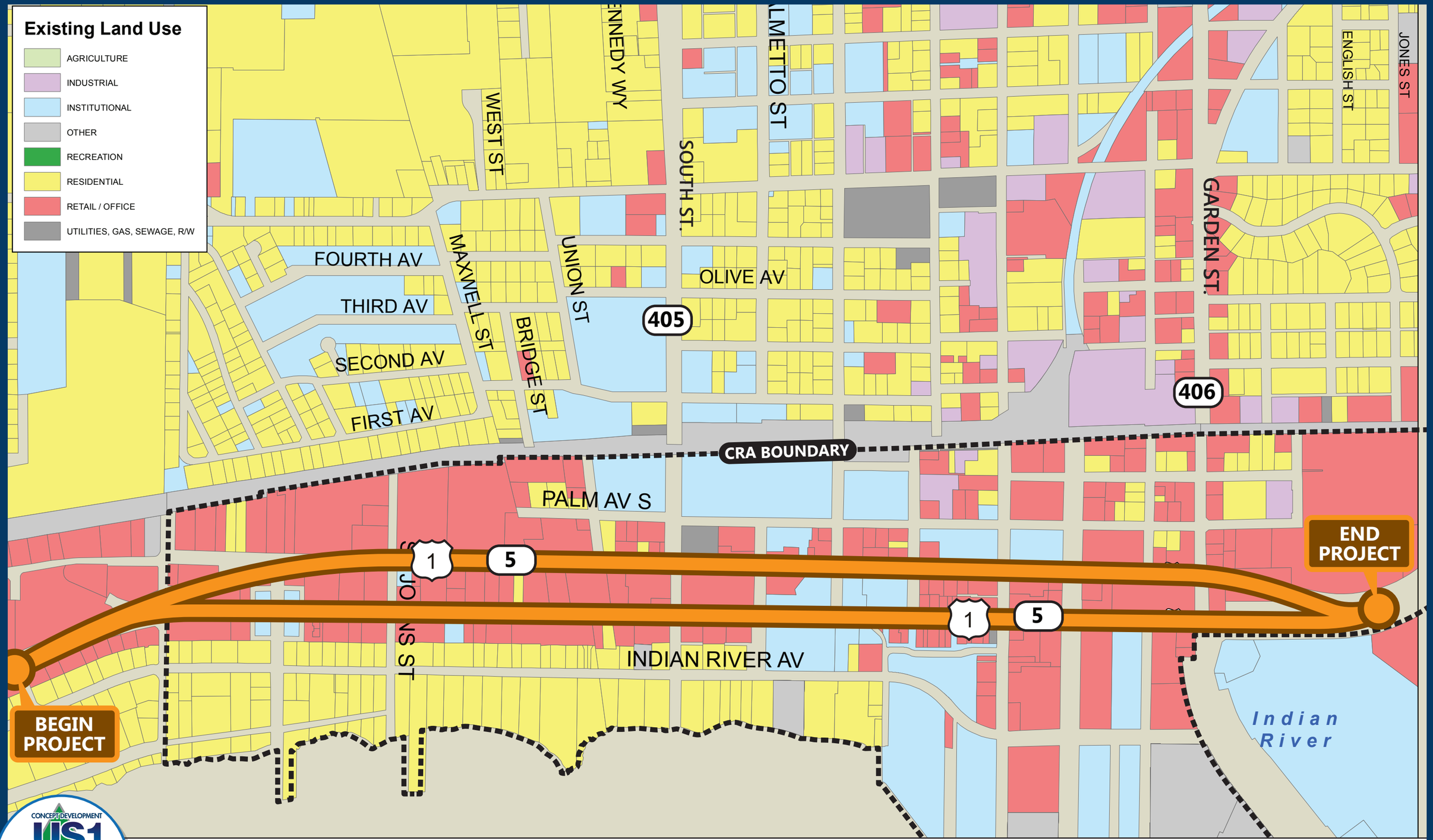
Residential and retail/office uses are the predominant existing land uses for the lands abutting and around the study corridor. These categories each account for approximately 19 percent of the land within a ¼ mile of the study corridor. The next highest percentage of land use is public/semi-public, with approximately 11.7 percent of the existing land use. Over 6.5 percent of the land within a ¼ mile of the study corridor is currently vacant. Figure 2 depicts the existing land uses.

2.3.2 Future Land Use

The Future Land Uses (FLUs) assigned to the Study Area, Figure 3, are generally consistent with the existing land uses along, and adjacent to the corridor.

The entirety of the land adjacent to the study corridor is designated as Downtown Mixed-Use. The City of Titusville specifies that the Downtown Mixed-Use FLU is permitted to have a maximum density of 20 dwelling units per acre and a maximum Floor Area Ratio (FAR) of 5.0. The FAR is the ratio of a buildings total floor area (Gross Floor Area) to the size of the parcel that it is built on, and is generated by dividing the building area by the parcel area. The Downtown Mixed-Use FLU was established by the City of Titusville to "pursue the renewal of Downtown Titusville as the center of professional, governmental, financial and unique retail and redevelop blighted areas." The Downtown Mixed-Use FLU is intended to enhance the visual attractiveness of downtown, utilize the waterfront, encourage and promote pedestrian spaces, and emphasize development and redevelopment east of US 1 that uses the waterfront as an amenity.

Along the study corridor, the Downtown Mixed-Use district extends to Indian River Avenue east of US 1 NB (Washington Avenue). Further east, between Indian River Avenue and the Indian River, the majority of the land is designated as Residential Medium. Medium density residential lands are permitted for a maximum density of 10 dwelling units per acre, and are intended to consider existing and proposed land uses during development to ensure compatibility with surrounding uses.



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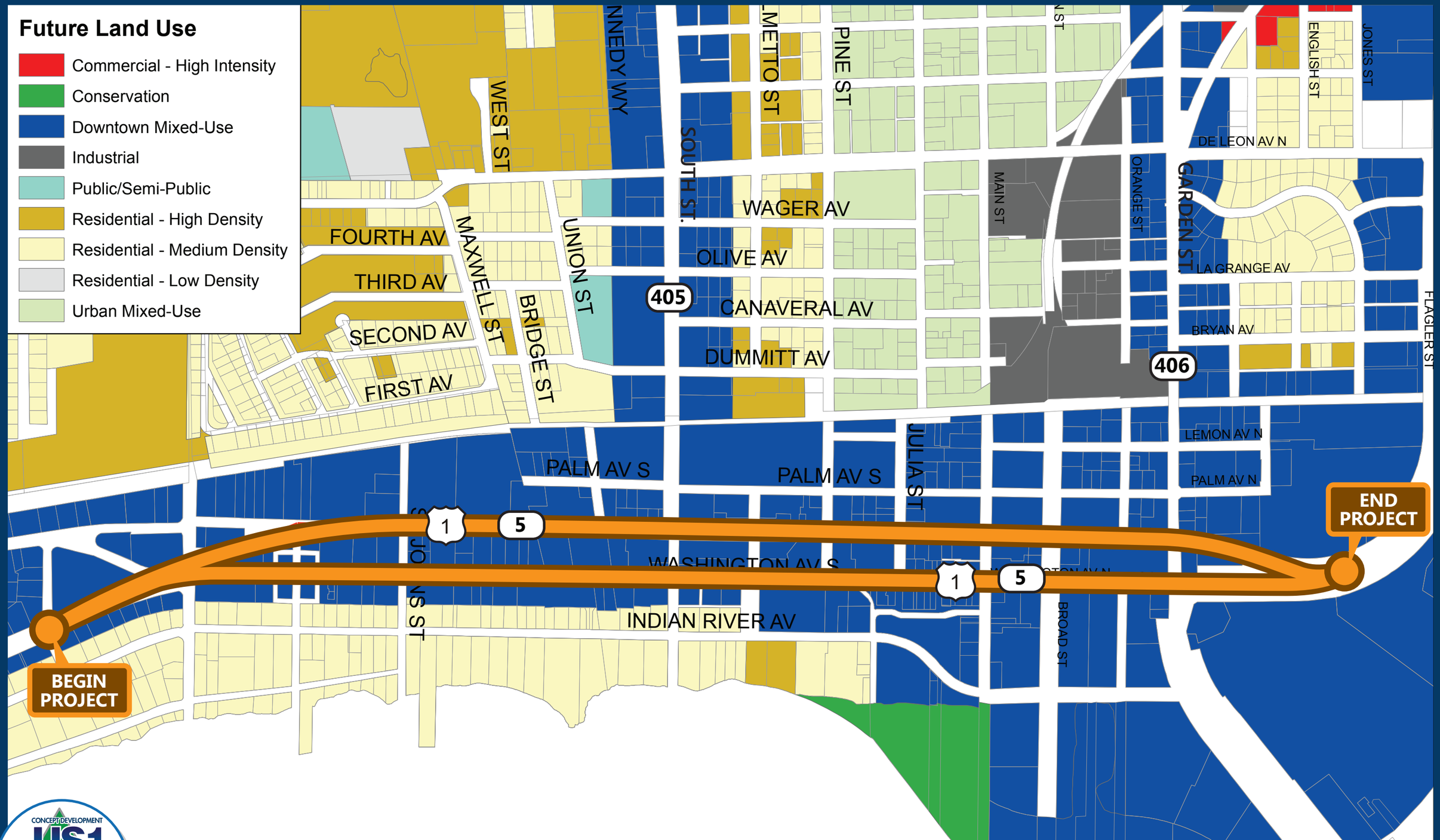
LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 2
Existing Land Use Map



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LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 3
Future Land Use Map

2.4 Existing Physical Features

The existing physical features were collected through field inspection and design/construction plans obtained from FDOT and the affected jurisdictions. The features evaluated include existing right of way, speed limit, typical sections, access management, utilities, on-street parking, lighting, bicycle, and pedestrian facility locations. A matrix of the data collected for this document is provided in Appendix A.

2.4.1 Roadway Classification, Jurisdiction, and Posted Speed

US 1 from Indian River Avenue to Laurel Place is classified as an "urban principal arterial other" and is owned and maintained by the Florida Department of Transportation. The roadway ID of US 1 from Laurel Place to Grace Street is 70030000. This segment begins at MP 2.925, the roadway then splits into northbound and southbound one-way pairs at MP 3.078. The roadway ID for US 1 NB (Washington Avenue) is also 70030000 and extends from MP 3.078 until the project end at MP 4.2, for a total of 1.275 miles. US 1 SB (Hopkins Avenue begins at the split to one-way as MP 1.397 and extends to MP 0.285 for a total of 1.112 miles. The roadway ID for the southbound portion of US 1 is 7030101.

The posted speed limit varies along US 1; from south of the Study Area to north of Laurel Place the posted speed limit is 45 miles per hour (MPH), immediately to the north of Laurel Place to south of SR 405 (South Street) it transitions to 40 MPH, from south of SR 405 (South Street) to north of SR 406 (Garden Street) the posted speed is 30 MPH, and transitions to 35 MPH south of Indian River Avenue.

2.4.2 Right of Way

The roadway right of way (R/W) has been inventoried for the roadway corridors within the Study Area using FDOT R/W maps. Table 1 shows the available R/W by roadway segment.

Table 1: Right of Way Summary

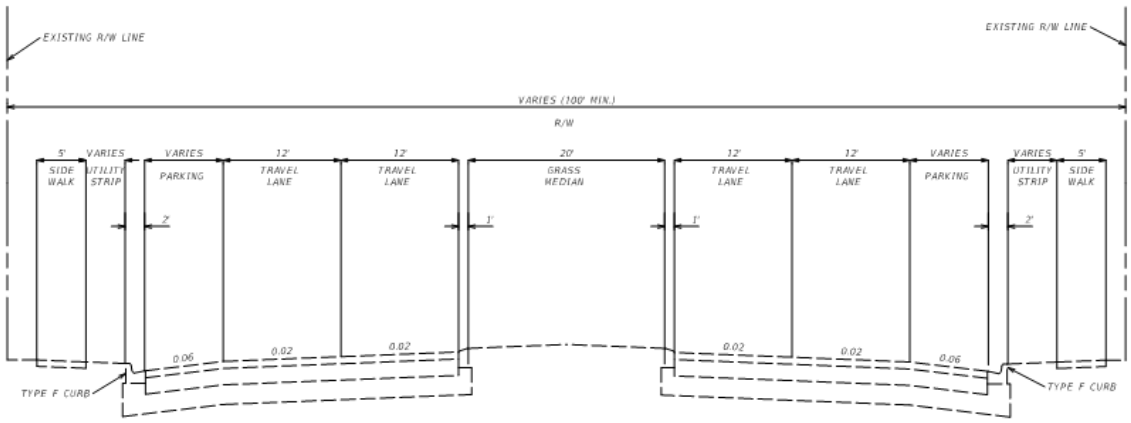
Roadway	Roadway ID	From	To	R/W Width (Feet)
US 1	70030000	Laurel Place	Grace Street	Varies (Min. 100)
US 1 NB (Washington Avenue)	70030000	Grace Street	Brevard Street	55-60
		Brevard Street	SR 406 (Garden Street)	59-61
US 1 SB (Hopkins Avenue)	70030101	Grace Street	St. Johns Street	53-60
		St. Johns Street	Union Street	50-58
		Union Street	SR 405 (South Street)	60-69
		SR 405 (South Street)	SR 406 (Garden Street)	49-51
US 1	70030000	SR 406 (Garden Street)	Indian River Road	Varies (Min. 200)

Source: FDOT R/W Maps

2.4.3 Typical Sections

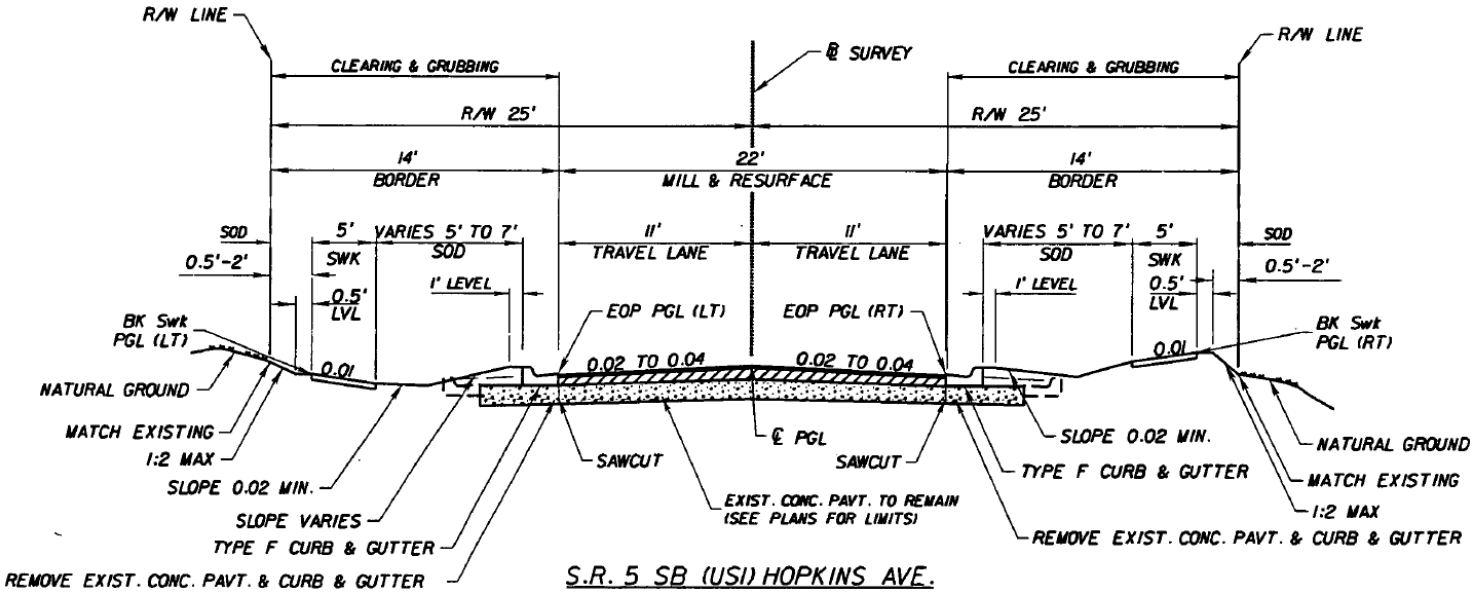
There are two predominate typical sections of US 1 within the Study Area. The four-lane bidirectional segment from Laurel Place to Grace Street is illustrated in Figure 4. The other section of the one-way pair is illustrated in Figure 5. Figure 4 is based of R/W maps and existing field review.

Figure 4: Existing US 1 Typical Section – Laurel Place to Grace Street



The two-lane, one-way pair segment from Grace Street to Indian River Avenue is illustrated in Figure 5. The exception to this typical section is sporadic eight foot on-street parking facilities that are located throughout the segment. The on-street parking on US 1 NB (Washington Avenue) is located on both sides of the travel lanes while on US 1 SB (Hopkins Avenue) on-street parking is located on the west side. An approximately four-foot wide paved shoulder is provided between Main Street and Indian River Avenue on both US 1 Northbound and Southbound. Figure 5 is taken from a 2011 Contract Plan provided by FDOT for the resurfacing of US 1 from SR 406 (Garden Street) to Grace Street (Financial Project ID is 418647-1-52-01).

Figure 5: Existing US 1 Typical Section – One-Way Pair Grace Street to SR 406 (Garden Street)



2.4.4 Access Management

The FDOT classifies access on state roadways using a seven-tier access management system, established in Chapter 14-97, Administrative Rules of the Department of Transportation, State Highway System Access Management Classification System and Standards (Rule 14-97). The classification system ranges from Access Class 1, reserved for limited access freeways, to Access Class 7, assigned to lower priority state highways in areas that are already highly urbanized. This classification system assigns standards for driveway connections, spacing, median opening spacing, and signal spacing.

Table 2 shows the approximate limits for Access Class categories for the Study Area and corresponding posted speed limits (mph). The spacing standards for each Access Class as per FDOT are shown in Table 3.

Table 2: FDOT Access Management Classifications and Posted Speeds

Roadway	Limits	Access Class	Posted Speed
US 1	Laurel Place to Grace Street	5	40
US 1 NB (Washington Avenue)	Grace Street to SR 406 (Garden Street)	7	30/40
US 1 NB (Washington Avenue)	SR 406 (Garden Street) to Indian River Avenue	3	30/35
US 1 SB (Hopkins Avenue)	Indian River Avenue to Grace Street	7	30/35/40

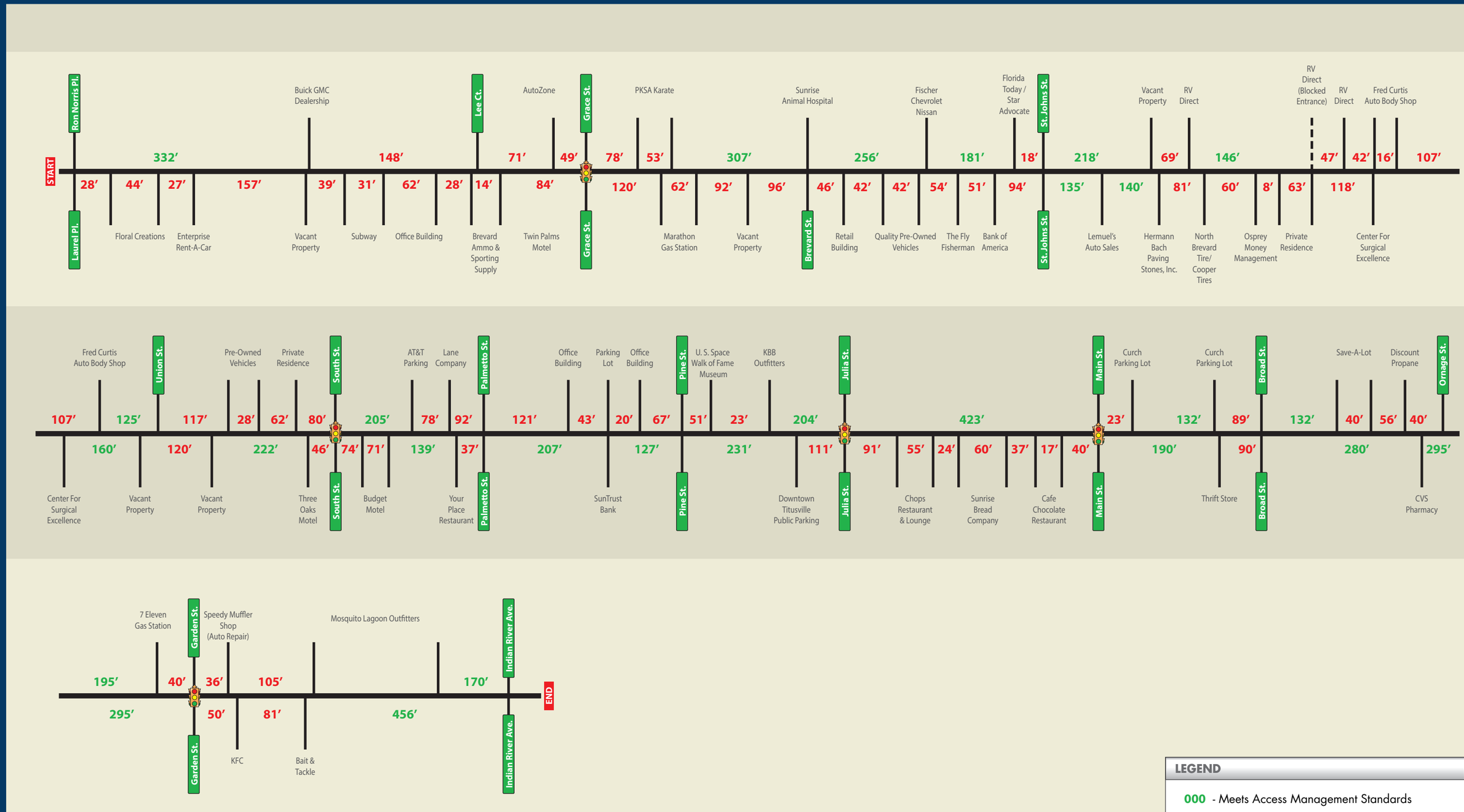
Source: FDOT Straight Line Diagram

Table 3: Access Class Spacing Standards

FDOT Access Management Class	Minimum Connection Spacing (feet)	Minimum Median Opening Spacing (feet)		Minimum Signal Spacing (feet)
		Directional	Full	
Class 3	660/440[1]	1,320	2,640	2,640
Class 5	440/245[1]	660	2,640/1,320[1]	2,640/1,320[1]
Class 7	125	330	660	1,320

Source: Section 14-97.003, Florida Administrative Code
[1] Greater than 45 MPH / Less than or equal to 45 MPH

Figure 6 through Figure 10 illustrate the existing access management and whether or not the median, connection, and signal spacing's are currently satisfying access management standards.



LEGEND

000 - Meets Access Management Standards

000 - Does Not Meet Access Management Standards

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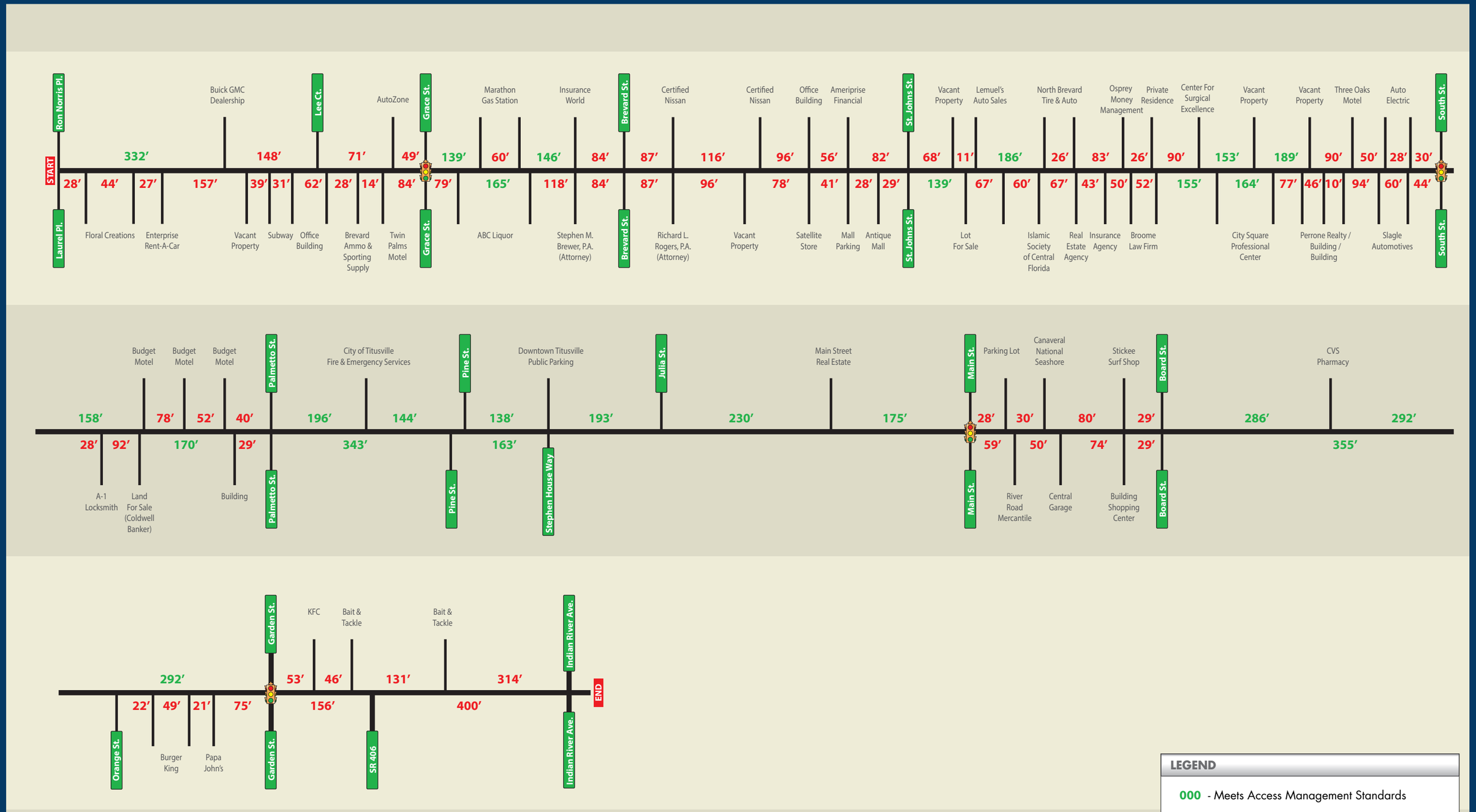
HOPKINS AVENUE | LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 6

Access Management - Driveway Spacing



LEGEND

000 - Meets Access Management Standards

000 - Does Not Meet Access Management Standards

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WASHINGTON AVENUE | LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 7

Access Management - Driveway Spacing

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LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 8

Access Management - Signalized Intersection Spacing

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FIGURE 9

Access Management - Signalized Intersection Spacing

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LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 10

Access Management - Signalized Intersection Spacing

2.4.5 Existing Intersection Geometry

Figure 11 provides the year 2017 intersection geometry for the following Study Area intersections:

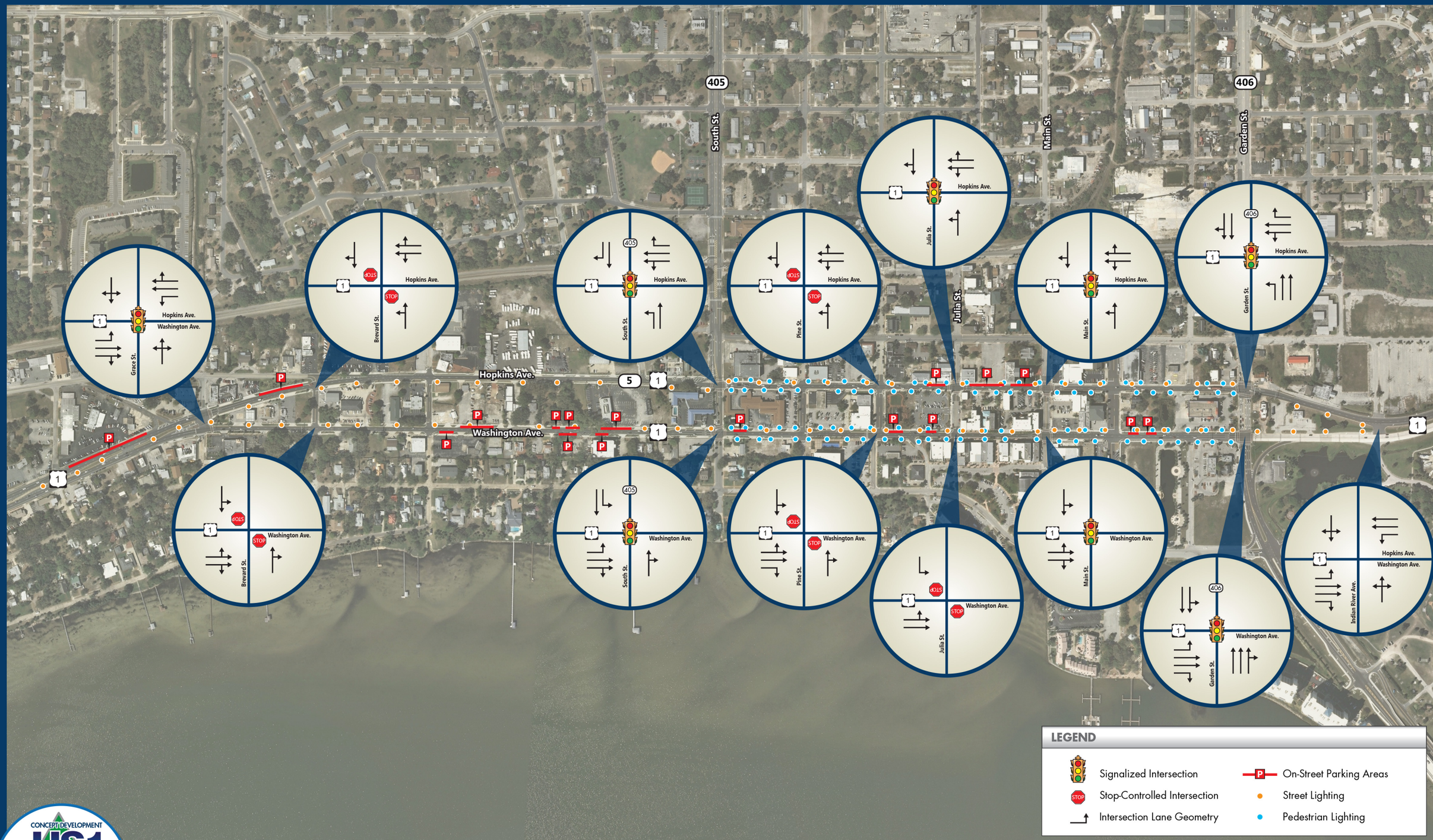
- US 1/Grace Street (Signalized)
- US 1 NB (Washington Avenue)/Brevard Street (Un-signalized)
- US 1 SB (Hopkins Avenue)/Brevard Street (Un-signalized)
- US 1 NB (Washington Avenue)/SR 405 (South Street) (Signalized)
- US 1 SB (Hopkins Avenue)/ SR 405 (South Street) (Signalized)
- US 1 NB (Washington Avenue)/Pine Street (Un-signalized)
- US 1 SB (Hopkins Avenue)/Pine Street (Un-signalized)
- US 1 NB (Washington Avenue)/Julia Street (Un-signalized)
- US 1 SB (Hopkins Avenue)/Julia Street (Signalized)
- US 1 NB (Washington Avenue)/Main Street (Signalized)
- US 1 SB (Hopkins Avenue)/Main Street (Signalized)
- US 1 NB (Washington Avenue)/SR 406 (Garden Street) (Signalized)
- US 1 SB (Hopkins Avenue)/SR 406 (Garden Street) (Signalized)
- US 1/Indian River Avenue (Un-signalized)

2.4.6 Parking

Existing public parking facilities within the Study Area consist of on-site parking lots, public parking lots, and on-street parking in various locations. US 1 NB (Washington Avenue) provides 39 on-street parking spots while US 1 SB (Hopkins Avenue) provides 25 on-street parking spots within the one-way pair. Between Laurel Place and Grace Street 375 linear feet of on-street parking is available on the northbound side. Parking is not allowed in this section but appears to be utilized by business along the roadway. On the southbound side, there 475 linear feet of paved shoulder wide enough for parking. This side has no signage prohibiting parking. Figure 11 illustrates the location of existing on-street parking.

2.4.7 Lighting

Street lighting is provided along US 1 for the entire length of the Study Area. Traversing from the southern study limits to the northern limits, street lighting commences with two-way lamps installed in the median of US 1. As US 1 splits into one-way pairs, overhead lighting is provided for both directional roadways. Additional pedestrian lighting is present from SR 405 (South Street) to SR 406 (Garden Street) for both roadways in the downtown area. As the one-way pairs converge at the northern study limits lighting is located on poles in the median serving both travel directions of US 1. Specific lighting locations are illustrated on Figure 11.



US 1 Concept Development & Evaluation

LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 11
Existing Intersection Geometry, Parking, and Lighting Facilities

2.4.8 Utilities

A Sunshine One-call ticket was processed in August 2017 to identify a listing of potential utilities provided within the Study Area. Utilities located within one quarter mile of the roadway center line were inventoried along within the Study Area and documented in this section. Table 3 below lists the various utility companies/agencies that have facilities located within the Study Area.

Table 3: Utility Agency Contacts

Utility Company	Notes
Florida City Gas *Bock Kreinhagen* *(321) 638-3424*	2-inch polyethylene pipe starts at SR 406 (Garden Street) heading south along the east side of Indian River Avenue splitting at Main Street with one segment heading further south ending at SR 405 (South Street) and the other crossing over Washington Avenue on the south side ending just before Hopkins Avenue. 2-inch polyethylene pipe also crosses Washington Avenue on the south side of Palmetto Street where it turns to 1.25 inch polyethylene before crossing over Hopkins Avenue on the south side as 1.25 inch steel piping. This piping then runs south on Palm Avenue along the west side and ends after Union Street.
CenturyLink *George McElvain* *(303) 992-9931*	No information provided.
Florida Power & Light *Joel Bray* *(954) 581-3088*	Utilities run from south of Study Area along the west side of Hopkins Avenue until SR 405 (South Street) where it switches to the east side ending just north of SR 406 (Garden Street). There are also utilities that parallel US 1 along the west side of Indian River Avenue ending east of the study area on SR 406 (Garden Street). Utilities can also be found from Riverside Drive to SR 405 (South Street) on the east side of Washington Avenue and crossing over both Washington Avenue and Hopkins Avenue on the south side of SR 405 (South Street) and north side of Riverside Drive, Main Street, Broad Street, SR 406 (Garden Street), and Indian River Avenue.
Level 3 Communications LLC *Michael Nunez* *(877) 366-8344* *Ext: 2*	Underground utilities run throughout the entire Study Area parallel to US 1 in the railroad right of way. Aerial utilities can be found along the west side of Palm Avenue from SR 405 (South Street) to Main Street.
Advanced Cabling Solutions INC *Joseph Muniz* *(407) 883-8881*	No information provided.
MCI (Verizon) *Dean Boyers* *(469) 886-4238*	Verizon Business buried cable runs along the railroad tracks parallel to US 1 throughout the entire study area before splitting at SR 406 (Garden Street) with one segment continuing north along the railroad tracks and the other segment heading east along SR 406 (Garden Street) crossing over both Hopkins Avenue and Washington Avenue ending just east of the Study Area.
City of Titusville *Jimmy Gager* *(321) 567-3883*	No information provided.
AT&T Distribution *Bryan Coughlin* *(954) 249-0558*	Aerial cable runs from SR 405 (South Street) to SR 406 (Garden Street) along the east side of Hopkins Avenue. It can also be found crossing both Hopkins Avenue and Washington Avenue on the north side of SR 406 (Garden Street), Broad Street, Main Street, Riverside Drive, and south side of SR 405 (South Street). There is also aerial

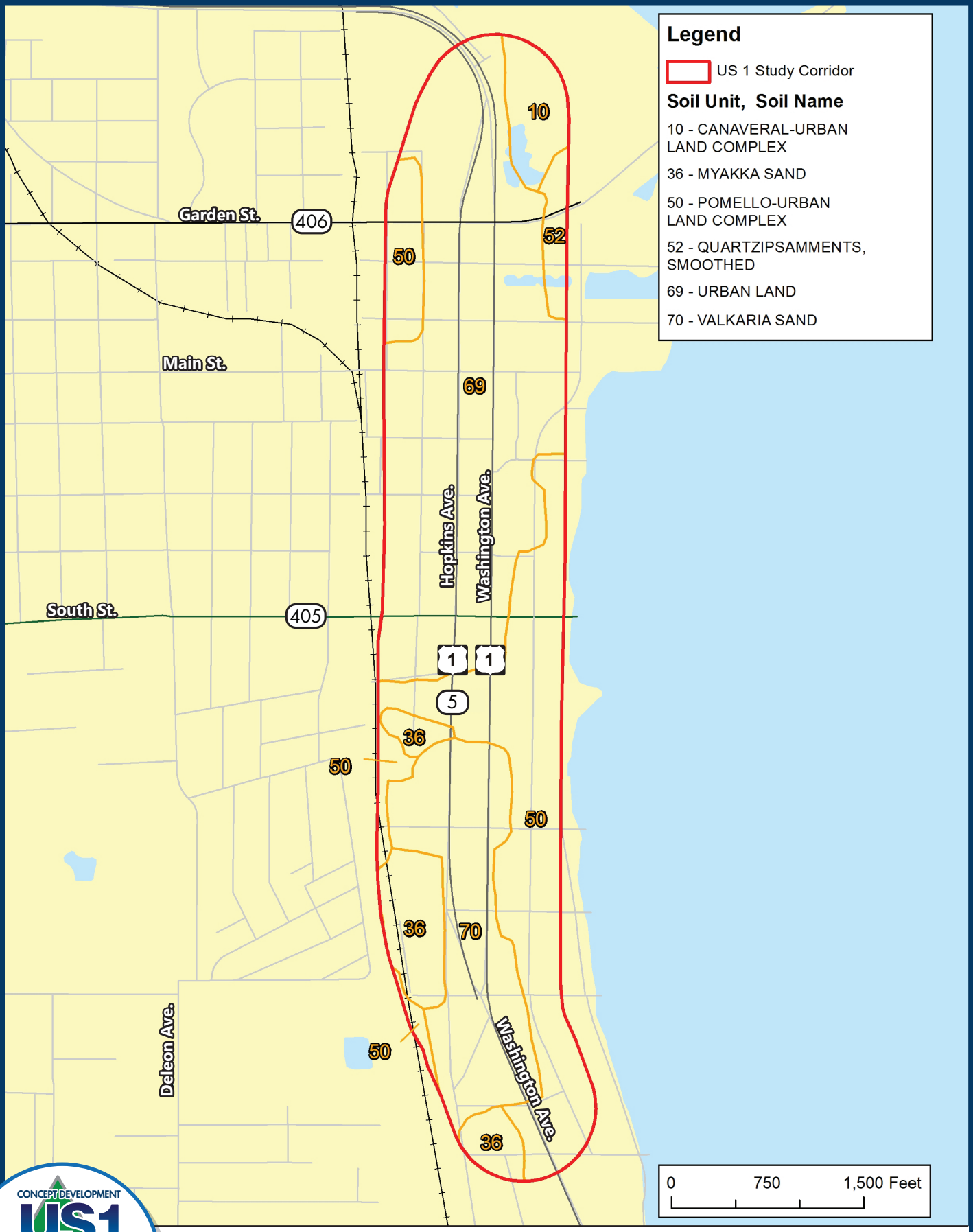
	cable along the east side of Washington Avenue from south of Brevard Street to North of SR 405 (South Street). Buried cable can be found crossing Washington Avenue and Hopkins Avenue on the south side of Julia Street, Pine Street, and Brevard Street and the south side of SR 405 (South Street) and St. John's Street. It is also located along the west side of Hopkins Avenue south of SR 405 (South Street) switching to the east side before ending at St. John's Street. A segment can also be found north of SR 406 (Garden Street) ending at Indian River Avenue on the east side of both Washington Avenue and Hopkins Avenue. Underground duct banks can be found along the west side of Hopkins Avenue from Grace Street to Julia Street.
Transcore *Tushar Patel* *(386) 943-5315*	Utilities can be found along the entire Study Area on the east side of Hopkins Avenue.
Sprint Nextel *Mark Caldwell* *(407) 422-6670*	Utility company representative specified that Sprint is only in the FEC railroad right of way. No other information was provided.
Spectrum *Paul Rymer* *(321) 757-6451*	Overhead fiber optic utilities can be found along the west side of Hopkins Avenue from south of the study area to SR 405 (South Street) where it goes west of the study area. It also runs along the east side of Washington Avenue from Brevard Street to south of SR 405 (South Street). There are also overhead fiber optic utilities on the east side of Hopkins Avenue from Julia Street to Main Street. They cross over Washington Avenue on the north side of Main Street and St. Johns Street; and the south side of SR 405 (South Street). It also crosses over Hopkins Avenue on the north side of Main Street and St. Johns Street and just south of Brevard Street. Underground fiber optic utilities are located crossing Washington Avenue on the north side of Brevard Street and between St. Johns Street and SR 405 (South Street).
Brevard County Water Resources *Roy Hawthorne* *(321) 633-2089*	No utilities located in Study Area.

Source: Sunshine State One. Data was aggregated to reflect Study Area section limits

Listed utilities in the Sunshine ticket does not indicate definite presence within the corridor. These utility companies will be contacted to verify the location and content of the utilities during the study.

2.4.9 Soils

Soil conditions were inventoried within the Study Area using data provided by the National Resources Conservation Service. Six soil types occur within the study corridor and are represented on Figure 12. Given the level of urbanization, most of the soils have been disturbed and reworked during development.



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LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 12
Soils Map

2.4.10 Drainage

The general stormwater conveyance system that serves the US 1 corridor is curb and gutter along the roadway with storm pipes that direct runoff to either a stormwater management facility or directly to an outfall. US 1 is generally depicted as flat terrain along the corridor. The United States Geological Survey (USGS) maps indicate a high point north of St. John's Street. The roadway elevation is approximately 14 National Geodetic Vertical Datum (NGVD) at this point and tapers to 10 NGVD at the southern limit of the Study Area and 2 NGVD at the northern limit. There are other local low points to facilitate drainage within the closed system. Ultimately, stormwater runoff from the US 1 corridor flows to the Indian River, east of the road.

Floodplain

As shown in Figure 13, according to the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRMS) for Brevard County (community panel 12009C0210G dated March 2014), US 1 has a small portion of the roadway within the Zone X. This zone has areas of 0.2% annual chance of flood; areas of 1% chance of flood with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance of flood. The area in the Zone X is located at SR 406 (Garden Street) in the northern limit of the Study Area. This area is also adjacent to a Floodplain Zone AE, where the base flood elevations have been determined (1.7 North American Vertical Datum (NAVD)). Any fill placed in this area between the Seasonal Highwater Level (SHWL) and the floodplain elevation will require floodplain compensation. No net encroachment into the floodplain is allowed between the SHWL and the floodplain elevation.

Existing Drainage Conditions

Stormwater runoff from the US 1 corridor is conveyed to a curb and gutter system that provides drainage for the US 1 corridor. Along the corridor, curb inlets and catch basins connected to storm sewer systems that direct runoff to either a stormwater management facility or directly to the Indian River, east of the road. Construction as-builts provided by FDOT show six known discharge locations in the corridor. The locations are listed below.

1. Grace Street
2. Brevard Street
3. St. Johns Street
4. South Street
5. Main Street
6. Orange Street

The detailed existing drainage conditions are described below. These were obtained from field observation, aerial review, general topography review and available adjacent permits and as-builts. The roadway itself does not have a permit with the SJRWMD. The overall drainage pattern is shown in Figure 14. Permit research and field notes are provided in Appendix E.

Intersection of Grace Street, Edison Avenue and South Washington Avenue

As shown in Drainage Map & Field Notes US 1 & Grace St in Appendix E. All the drainage in the vicinity of this intersection consists of a curb and gutter section draining to curb inlets. From SJRWMD permit 63864-4 for Ron Norris Honda – Buick GMC, the storm sewer system north of the Ron Norris car dealership flows north, before ultimately outfalling to the Indian River. The storm sewer south of Ron Norris, flows south, and then ultimately towards the Indian River. Additional supporting information is provided in the Field Notes US 1 & Grace Street figure in Appendix E.

Intersection of SR 406 (Garden Street) and US 1

As shown in Drainage Map & Field Notes SR 406 & US 1 in Appendix E. All the drainage in the vicinity of this intersection consists of a curb and gutter section draining to curb inlets. From SJRWMD permits 34976-1 (CVS Pharmacy) and 56330-3 (Titusville Downtown Stormwater Park), the conveyance of stormwater runoff in this area is as follows:

The storm sewer system on SR 406 (Garden Street) flows east along SR 406 (Garden Street) and then south along South Washington Avenue. It discharges to the Space Park pond, a wet detention pond on Orange Street. In the past, this pond has been an alum injection treatment system, before outfalling east in a 60-inch concrete storm sewer pipe along Orange Avenue to the Indian River. It is unclear if this pond is still an alum treatment system. The existing pond is shown in the Drainage Map & Field Notes SR 406 & US 1 figure in Appendix E.

SJRWMD Criteria

Proposed improvements to US 1 will be subject to the St. John's River Water Management District (SJRWMD) criteria that are current at the time of the improvement. In addition, the FDOT Drainage Manual requires that roadway projects' stormwater management facilities comply with Chapter 14-86 of the Florida Administrative Code regarding water quality, rate and volume.

The site is in the North Indian River Lagoon Basin, which is a hydraulically open basin that is impaired for nutrients. Stormwater may need to be treated prior to its discharge to the respective water bodies and adequate erosion and turbidity barriers will be used during the proposed construction activities.

If treatment volumes are required, and wet detention systems are used, the project will need to provide storage for the water quality volume equal to 1-inch of runoff detention over the drainage area, or 2.5-inches times the percentage of impervious (excluding water bodies), whichever is greater. Additional water quality treatment volume and permanent pool volume are required because the North Indian River is a Class III. Water quality classifications are arranged in order of the degree of protection required, with Class I water having generally the most stringent water quality criteria and Class V the least. Class III designation necessitates that the waterbody remained viable for fish consumption; as well as recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

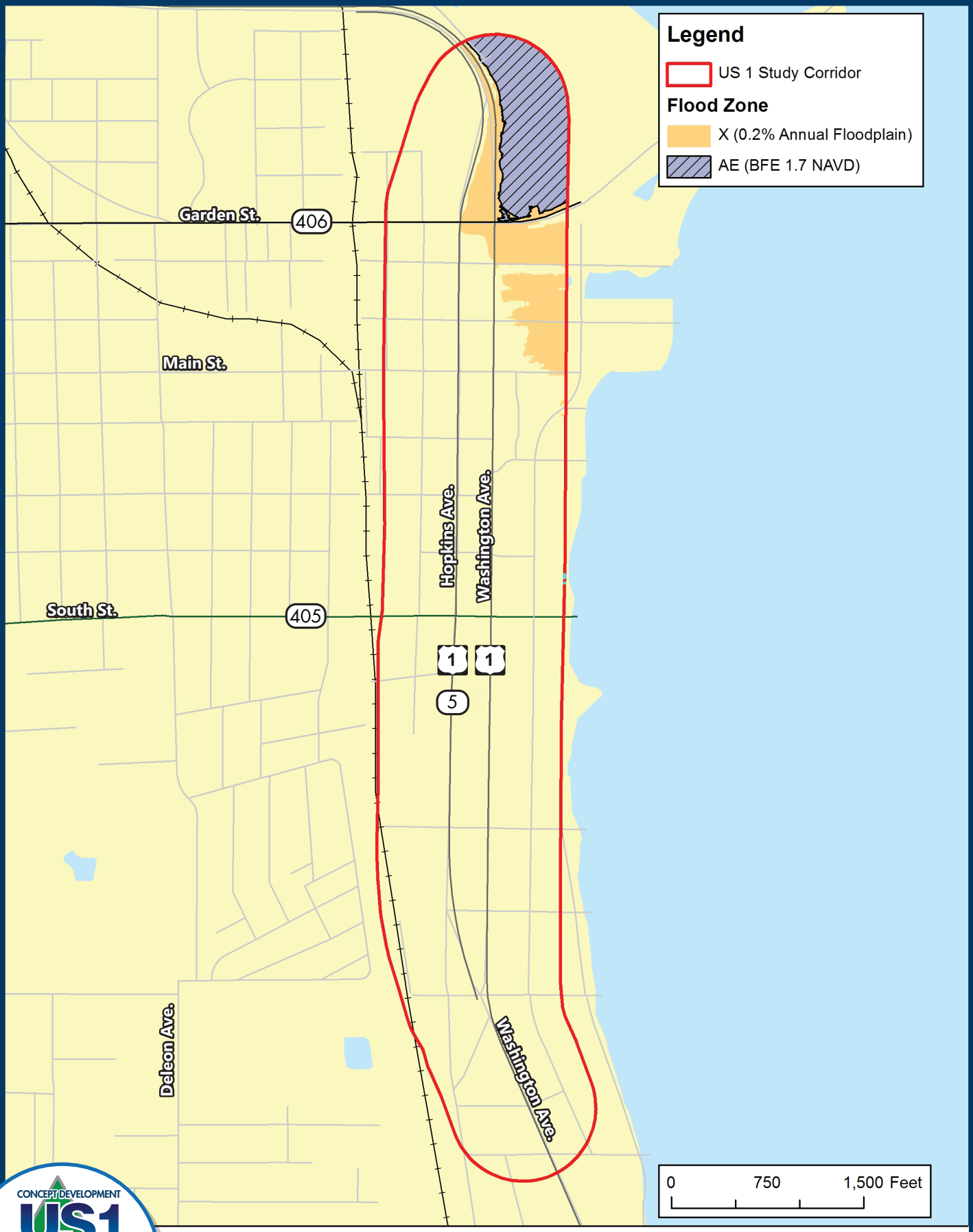

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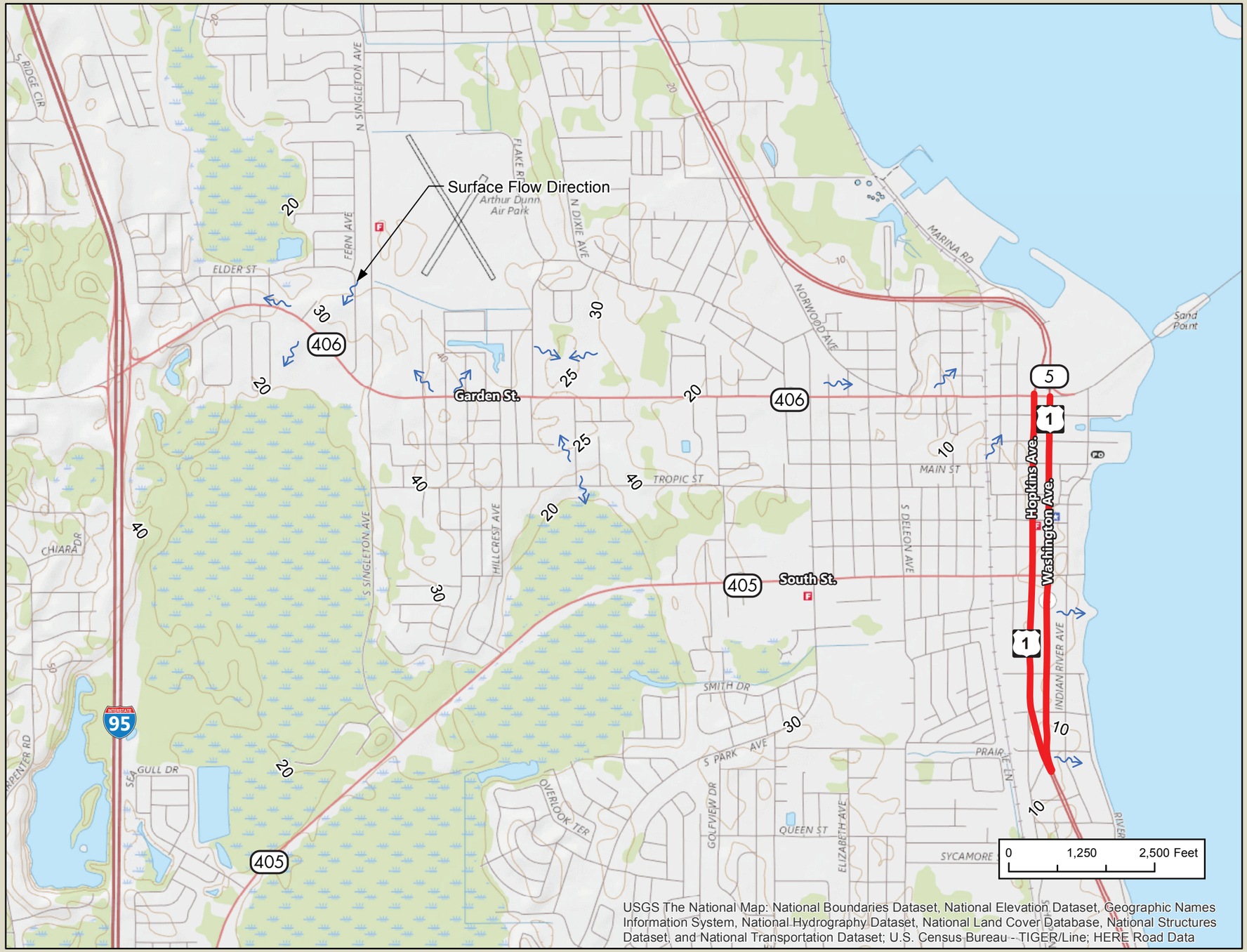
FIGURE 13
Floodplains Map



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LAUREL PLACE TO INDIAN RIVER AVENUE

FIGURE 14
USGS Drainage Map

2.4.11 Bicycle and Pedestrian Infrastructure

Bicycle and pedestrian connectivity plays an important role within the Study Area given the number of destinations along the corridor. This section details the existing bicycle and pedestrian network in the Study Area.

Bicycle Facilities

Undesignated bike lanes were identified along both sides of US 1 from Main Street north to Indian River Avenue as well as on the east side of US 1 NB (Washington Avenue) from Laurel Place to Grace Street. Figure 15 illustrates the location of existing bicycle facilities within the Study Area.

Pedestrian Facilities and Curb Cuts

US 1 has sidewalks present on both sides of the road, with the exception of the following locations:

- Sporadic sidewalk coverage on the east side of US 1 from Laurel Place to Grace Street
- No sidewalks on both sides of US 1 SB (Hopkins Avenue) between SR 406 (Garden Street) and Indian River Avenue
- No sidewalks along the west side of US 1 NB (Washington Avenue) between SR 406 (Garden Street) and Indian River Avenue

In general, curb ramps are provided at all intersections, except at the following location:

- Southwest corner of the US 1 Southbound/Brevard Street intersection

Existing pedestrian facilities locations are highlighted in Figure 15.

Crosswalks

Signalized crosswalks located at:

- US 1 and Grace Street
- US 1 and SR 405 (South Street)
- Hopkins Avenue and Julia Street
- US 1 and Main Street
- US 1 and SR 406 (Garden Street)

Non-Signalized crosswalks located at:

- Hopkins Avenue and SR 405 (South Street)

Mid-Block crosswalks located:

- On Washington Avenue between Palmetto Street and Pine Street (2)
- On Washington Avenue between Pine Street and Julia Street

Marked crosswalks at Study Area intersections are presented in Figure 15.

Trails

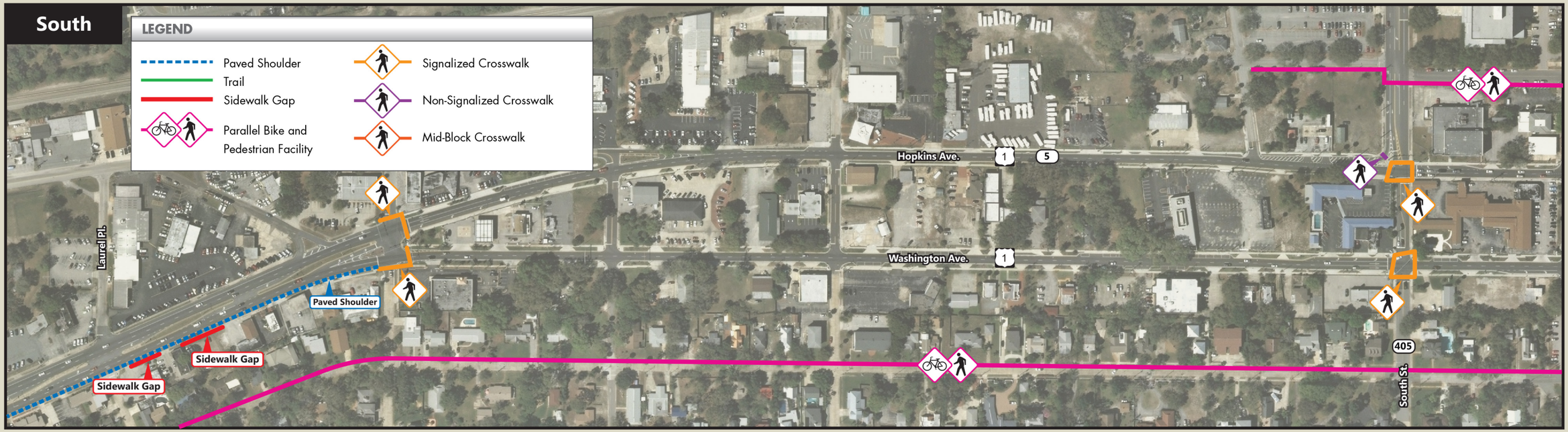
In addition to sidewalks and bike lanes, existing and planned regional trails within the Study Area were inventoried. Trails are multi-use paths that are used by runners, bicyclists, rollerbladers, and other non-motorized recreational users.

The Downtown Titusville Trail, illustrated in Figure 15, crosses both US 1 NB (Washington Avenue) and US 1 SB (Hopkins Avenue) at the Main Street intersections across the southern leg. This facility was recently (2017) implemented to provide a connection between the East Central Florida Regional Rail Trail to the northwest and the Future Space Coast Trail to the east. These trails are all part of the Coast-to-Coast trail network connecting St. Petersburg to the Space Coast.

Parallel Bicycle and Pedestrian Routes

The following parallel bicycle and pedestrian routes are highlighted in Figure 15:

- **Indian River Avenue** – Located one block east of US 1 NB (Washington Avenue), Indian River Avenue runs parallel to US 1 from Laurel Place to SR 406 (Garden Street), a distance of about 1.2 miles. Sidewalk coverage is sporadic and there are no designated bike lanes, however this route has been identified as a pareallel route for bicycles due to its slower traffic speeds and lower traffic volume as compared with US 1. Signing is provided along Indian River Avenue indicate 'Bike Sharing Roadway.'
- **Palm Avenue** – Located one block west of US 1 SB (Hopkins Avenue), Palm Avenue runs from SR 405 (South Street) to SR 406 (Garden Street), a distance of about half a mile. Sidewalks are provided along both sides of the road. There are no designated bike lanes, however this route offers slower traffic speeds and lower volume than the parallel US 1.



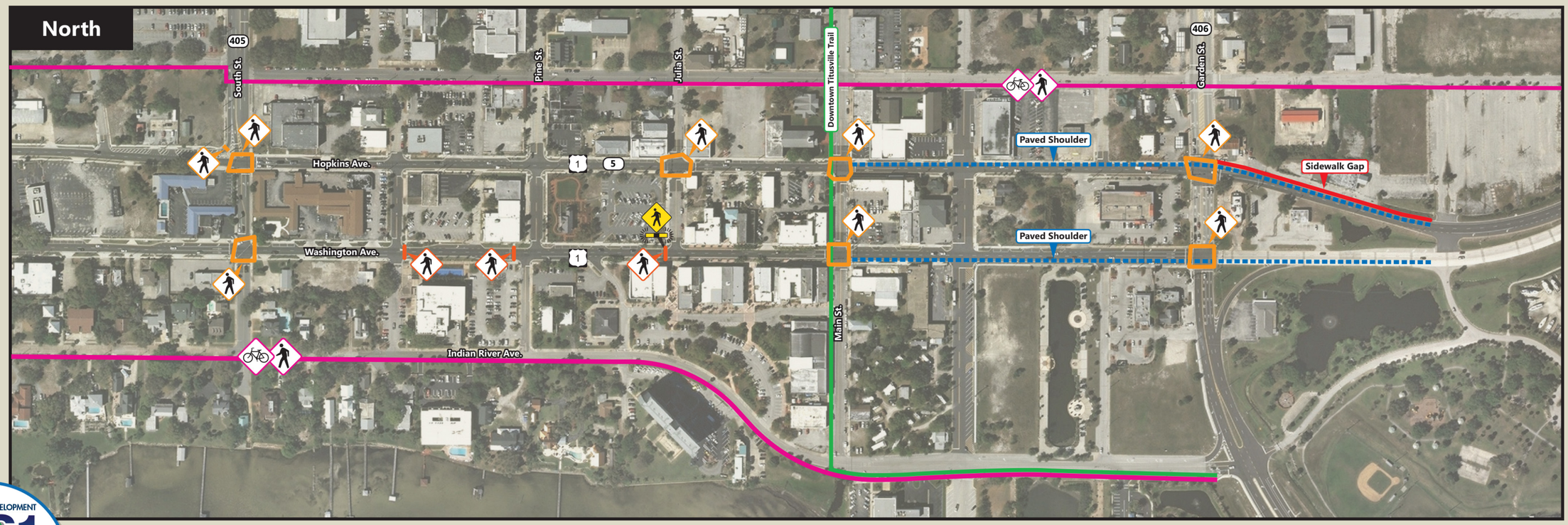


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FIGURE 15
Existing and Proposed Trails,
Existing Bicycle & Pedestrain Facilities

School Bus Routes

There are no public schools located within the Study Area. However, Brevard Public Schools (BPS) operates a school bus route on US 1 throughout the Study Area, with potential bus stops on US 1 or the parallel facilities.

2.4.12 Transit Service and Infrastructure

Existing transit services in the Study Area are operated by Space Coast Area Transit (SCAT).

Overview of SCAT

SCAT provides transit service within Brevard County, featuring 19 local fixed bus routes. SCAT also provides paratransit service and commuter assistance vanpools. The existing SCAT transit service types found within the Study Area are described below in more detail.

Fixed-route – Regular local bus service providing frequent stops typically spaced every two blocks. Several routes within the SCAT system operate using "flag stops". Flag stops enable passengers to board a bus anywhere along the route simply by waving to the bus driver.

Paratransit Service - The paratransit program provides service for eligible individuals who are not able to use the regular fixed-route bus service because of a disability or other limitations. Paratransit service is subsidized depending on the type of trip through one of the following: the Americans with Disabilities Act (ADA) program, the Transportation Disadvantaged (TD) program, or a negotiated agency contract.

Commuter Assistance Vanpools - The vanpool program provides vehicles that are purchased by the Brevard County Commission with support from federal capital grants. These vehicles are then provided to a third party, vRide, who then lease these vehicles to commuters. The leasing rate includes all maintenance, insurance, and administration costs.

The paratransit service and the commuter assistance vanpools are available on a case-by-case basis by request.

SCAT Transit Service

SCAT fixed-routes located along or intersecting with the US 1 Study Area include:

- *Route 1 (Melbourne/Titusville – North Loop)* – The North Loop of Route 1 connects Titusville with Cocoa. It provides service along US 1 from the southern terminus of the Study Area (Laurel Place) to SR 405 (South Street). This route only serves the Study Area during morning and evening hours (all-day service is provided along a shorter segment of the route).
- *Route 2 (Titusville)* – This route serves as a local circulator for Titusville, operating in a counter-clockwise loop around the city. Within the Study Area, Route 2 provides service along US 1 NB (Washington Avenue) from Grace Street to Stephen House Way and on US 1 SB (Hopkins Avenue) from SR 406 (Garden Street) to SR 405 (South Street). Limited service is provided along US 1 (both directions) north of SR 406 (Garden Street) past the northern terminus of the Study Area (Indian River Avenue).

- *Route 5 (Titusville/Mims)* – This route connects Titusville with Mims. This route provides service along the entire length of the US 1 Study Area.

There are no transit centers located within the Study Area. Figure 16 shows the existing SCAT bus routes serving the Study Area.

SCAT service in the Study Area is provided on weekdays and Saturdays with service not provided on select major holidays. Table 4 presents the span of service, frequency, and annual ridership for each Study Area transit route.

Table 4: SCAT Study Area Route Summary

Route	Route Description	Span of Service	Service Frequency	Flag Stop Route	October 2016 – August 2017 Total Ridership
1	Melbourne/Titusville (North Loop)	5:40 AM to 7:15 AM* 5:00 PM to 8:00 PM* Monday – Friday* One run at 7:45 AM* One run at 4:55 PM and 5:55 PM* Saturday*	60/30 Min* N/A*	Yes	225,217
2	Titusville	6:55 AM to 7:55 PM Monday – Friday 9:00 AM to 5:55 PM Saturday	60 Min 60 Min	No	82,807
5	Mims/Titusville	8:00 AM to 4:55 PM Monday – Friday 8:00 AM to 4:55 PM Saturday	60 Min	Yes	44,089

*Note: Route 1 offers all-day service, however it only provides limited service to the Study Area. The span of service and frequency data represents service provided to the US 1 Study Area.
*Note: Limited Service for Route 2 extends north on US 1 for the first and last 3 runs of the day for weekday service and at 1 PM and 5 PM on Saturday
Source: SCAT Posted Timetables (Effective 08/01/2017), SCAT 2013 Transit Development Plan, FY 2017 ridership provided by SCAT

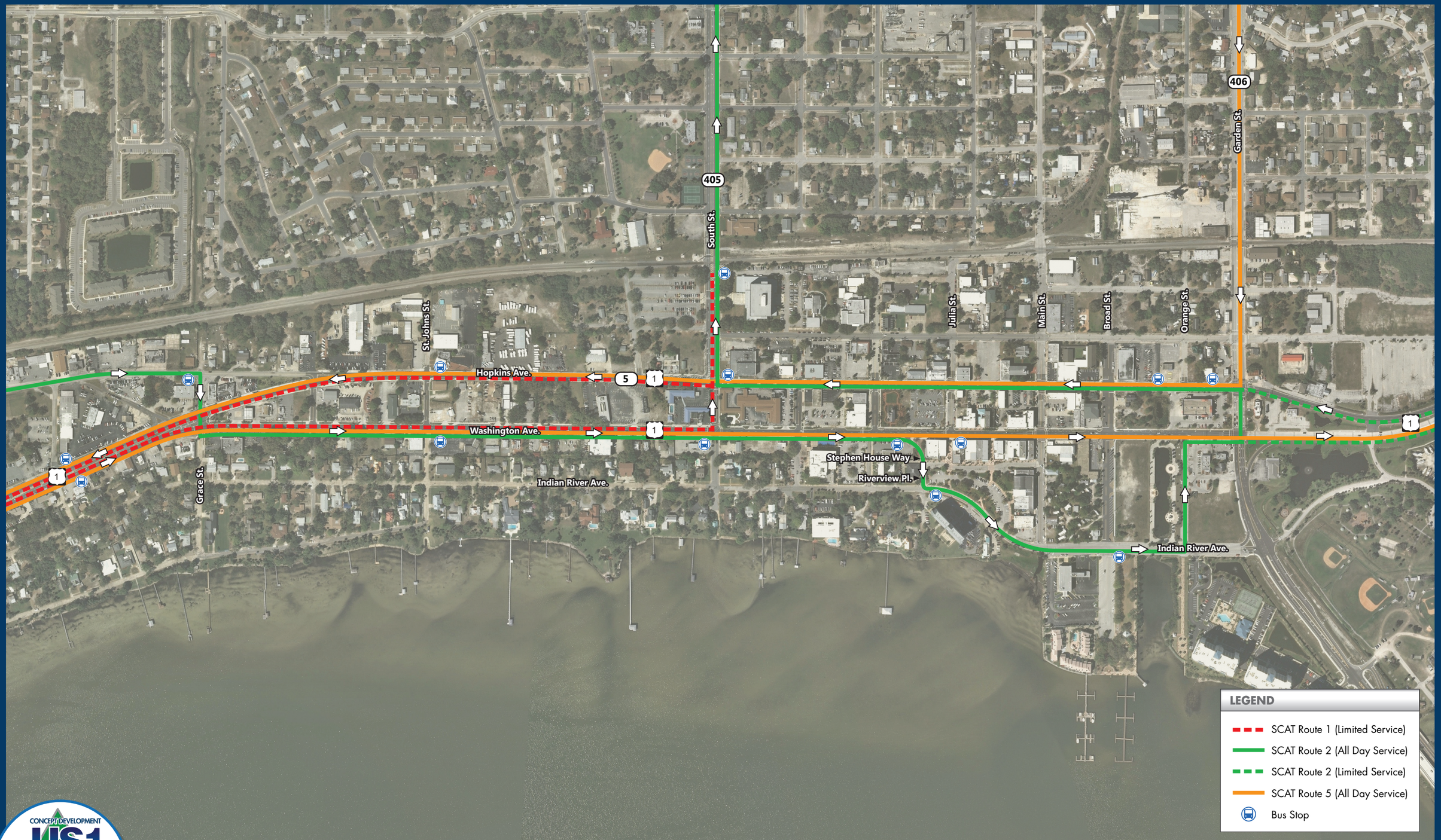

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FIGURE 16
Transit Routes & Facilities

2.5 Existing Traffic Conditions

2.5.1 Existing Traffic Volumes

Traffic counts were collected in August 2017 at the following Study Area locations:

24-hr Tube Count Locations

- **US 1 NB (Washington Avenue)**
  - South of Grace Street
  - North of Grace Street
  - South of SR 406 (Garden Street)
  - North of SR 406 (Garden Street)
- **US 1 SB (Hopkins Avenue)**
  - South of Grace Street
  - North of Grace Street
  - South of SR 406 (Garden Street)
  - North of SR 406 (Garden Street)
- **Grace Street**
  - West of US 1 SB
  - East of US 1 NB

Existing roadway 24-hour bi-directional volume counts were collected at the above mentioned locations. Weekday turning movement counts were collected at the Study Area intersections for the AM (7:00 – 9:00 AM) and PM (4:00 – 6:00 PM) peak hours.

Intersections

- US 1 at Grace Street
- US 1 NB (Washington Avenue) at SR 406 (Garden Street)
- US 1 SB (Hopkins Avenue) at SR 406 (Garden Street)

All traffic count data collected was adjusted utilizing the latest (2016) FDOT axle and seasonal adjustment factors for Brevard County to provide 2017 annual average conditions. All collected traffic counts and seasonal factors are provided in Appendix A. Existing 2017 volumes are illustrated in Figure 17 and Figure 18.

2.5.2 Spot Speed Study

Four spot speed studies were conducted along US 1 corridor in March of 2015. The posted speed limit within the Study Area on US 1 NB (Washington Avenue) from Grace Street to SR 405 (South Street) is 40 mph, from SR 405 (South Street) to north of SR 406 (Garden Street) is 30 mph, and increases to 35 mph between SR 406 (Garden Street) and Indian River Avenue. The posted speed limit for US 1 SB (Hopkins Avenue) from Indian River Avenue to north of SR 406 (Garden Street) is 35 mph, from north of SR 406 (Garden Street) to SR 405 (South Street) is 30 mph and from SR 405 (South Street) to Grace Street is 40 mph.

Factors used in interpreting spot speeds are defined below:

a) 85th Percentile Speed – The speed that 85% of the free flowing vehicles do not exceed.

b) 50th Percentile Speed – The speed that 50% of the free flowing vehicles do not exceed.
c) Pace – A 10-mph range that includes the highest number of vehicles observed.

Table 5: Vehicle Spot Speed Summary

Locations #1 and #2 North of St. Johns Street		
Direction	**SB**	**NB**
Posted Speed	40	40
85th Percentile	42.0	42.0
50th Percentile	38.0	37.0
10 mph Pace	33-42	33-42
Locations #3 and #4 North of Palmetto Street		
Posted Speed	30	30
85th Percentile	34.0	35.0
50th Percentile	29.0	30.0
10 mph Pace	24-33	25-34

The speed data reveals that vehicles traveling southbound and northbound through stations 3 and 4 move at 34.0 mph and 35.0 mph, consecutively. The 30-mph posted speed is above the 50th Percentile Speed for the southbound direction and at the 50th Percentile Speed for the northbound direction. The 30-mph posted speed is within the 10 mph Pace at these locations.

Based on the spot speed studies data analyses and engineering judgment, we conclude that the operating speed along the study segment of US 1 is above the posted speed of 30 mph for the segment from SR 405 (South Street) to SR 406 (Garden Street), while the operating speed appeared to be lower than the posted speed of 40 mph for the segment from Grace Street to SR 405 (South Street).

2.5.3 Existing Operational Analysis

Existing 2017 operational analysis was conducted to determine the Level of Service (LOS) for the roadway segments and the Study Area intersections. Peak hour peak direction volumes along the different segments were compared against the latest Generalized Peak Hour Directional Service Volumes Tables from the 2012 FDOT Quality/Level of Service Handbook to obtain the arterial LOS. The LOS for the Study Area intersections were determined using the procedures as outlined in the Transportation Research Board's (TRB) – Highway Capacity Manual (HCM 2010) using Synchro Software (version 9.0).

Roadway Operational Analysis

According to FDOT, the study corridor is classified as an "urban principal arterial other" and has an adopted LOS "D". The generalized peak hour directional service volumes for the LOS letters "A" through "F" were obtained from Table 7 of the 2012 FDOT Quality/Level of Service Handbook and compared with volumes collected from the 24-Hour bi-directional tube counts. A summary of the LOS analysis for the study roadways is included in Table 6.

Table 6: Existing Roadway Level of Service

Roadway/Segment	Daily		AM Peak (Peak Direction)		PM Peak (Peak Direction)	
	AADT	LOS	Volume	LOS	Volume	LOS
US 1						
Laurel Place to Grace Street	23,000	C	880 (NB)	C	1000 (NB)	C
US 1 SB (Hopkins Avenue)						
Grace Street to SR 405 (South Street)	12,000	C	800	C	920	C
SR 405 (South Street) to SR 406 (Garden Street)	12,000	D	850	C	860	C
SR 406 (Garden Street) to Indian River Avenue	8,900	D	630	C	690	C
US 1 NB (Washington Avenue)						
Grace Street to SR 405 (South Street)	12,000	C	840	C	940	C
SR 405 (South Street) to SR 406 (Garden Street)	12,000	D	840	C	980	D
SR 406 (Garden Street) to Indian River Avenue	8,300	C	580	C	700	C
Grace Street						
West of US 1 SB (Hopkins Avenue)	1,600	C	60 (WB)	C	210 (WB)	C
East of US 1 NB (Washington Avenue)	490	C	20 (WB)	C	35 (WB)	C

2012 FDOT Quality/Level of Service Handbook Tables
*AADT = Data Collected * Seasonal Factor (1.06) * Axle Factor (0.98)*

As shown in Table 6, the US 1 corridor currently operates within acceptable LOS standards. The existing arterial LOS conditions are illustrated in Figure 17.

Intersection Operational Analysis

The year 2017 intersection LOS is obtained by applying the field TMCs to the existing intersection geometry. According to the HCM 2010, for signalized intersections, an average control delay per vehicle from 55 seconds up to 80 seconds is considered to be a LOS E condition. Beyond 80 seconds is considered to be a LOS F condition. A summary of the LOS analysis for the study intersections is included in Table 7.

Table 7: Existing Intersection Level of Service

Intersection	Control	AM Peak		PM Peak	
		Delay	LOS	Delay	LOS
US 1/Grace Street	Signalized	5.2	A	5.5	A
US 1 NB (Washington Avenue)/SR 406 (Garden Street)	Signalized	8.8	A	9.9	A
US 1 SB (Hopkins Avenue)/SR 406 (Garden Street)	Signalized	14.4	B	13.6	B

As seen in Table 7, all Study Area intersection and roadway segments currently operate under acceptable LOS conditions during the AM and PM peak hours. This intersection as a whole operates above the adopted LOS. The existing intersection operations are illustrated in Figure 18. The Synchro summary sheets are provided in Appendix C.

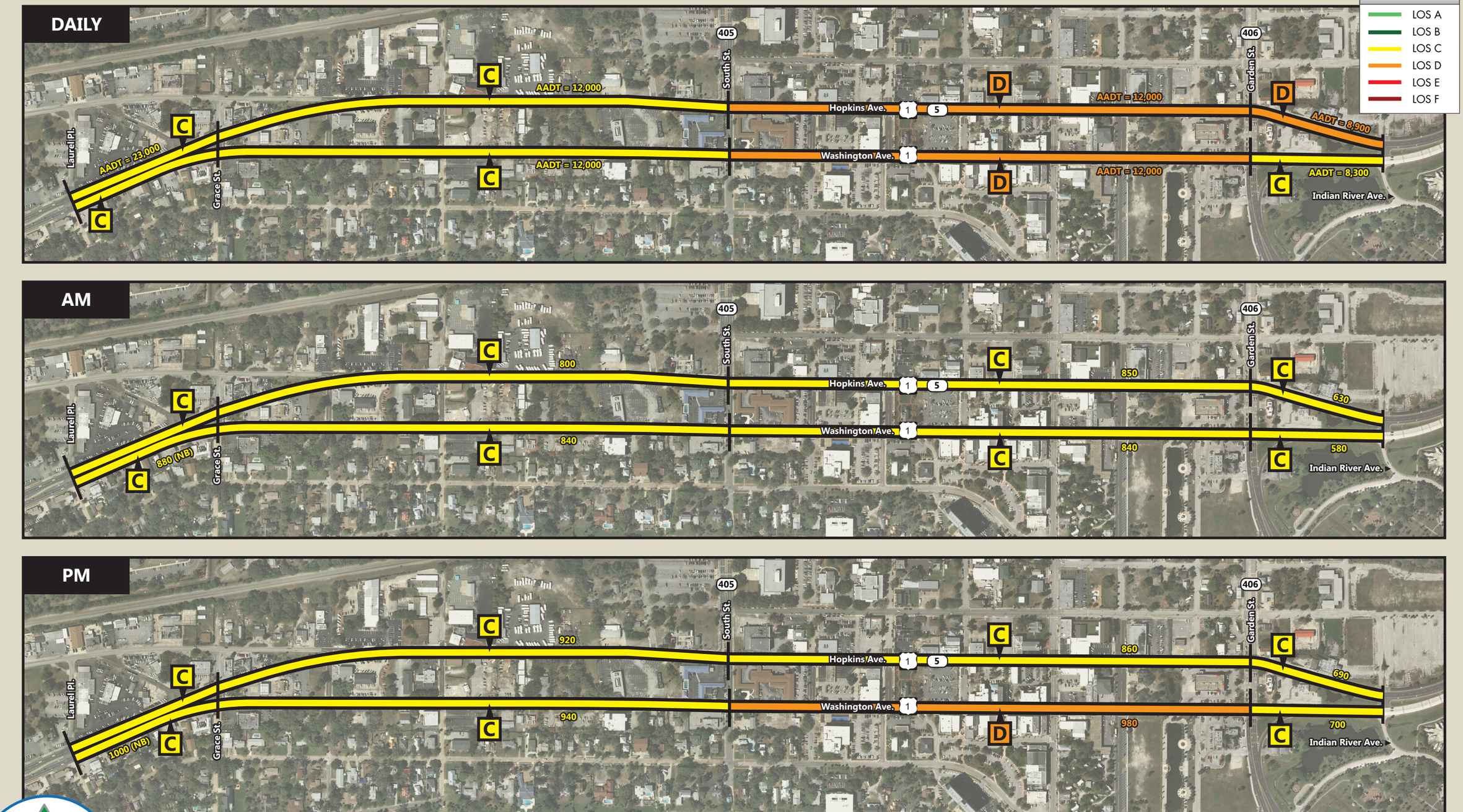

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FIGURE 17
Existing 2017 Roadway Operations

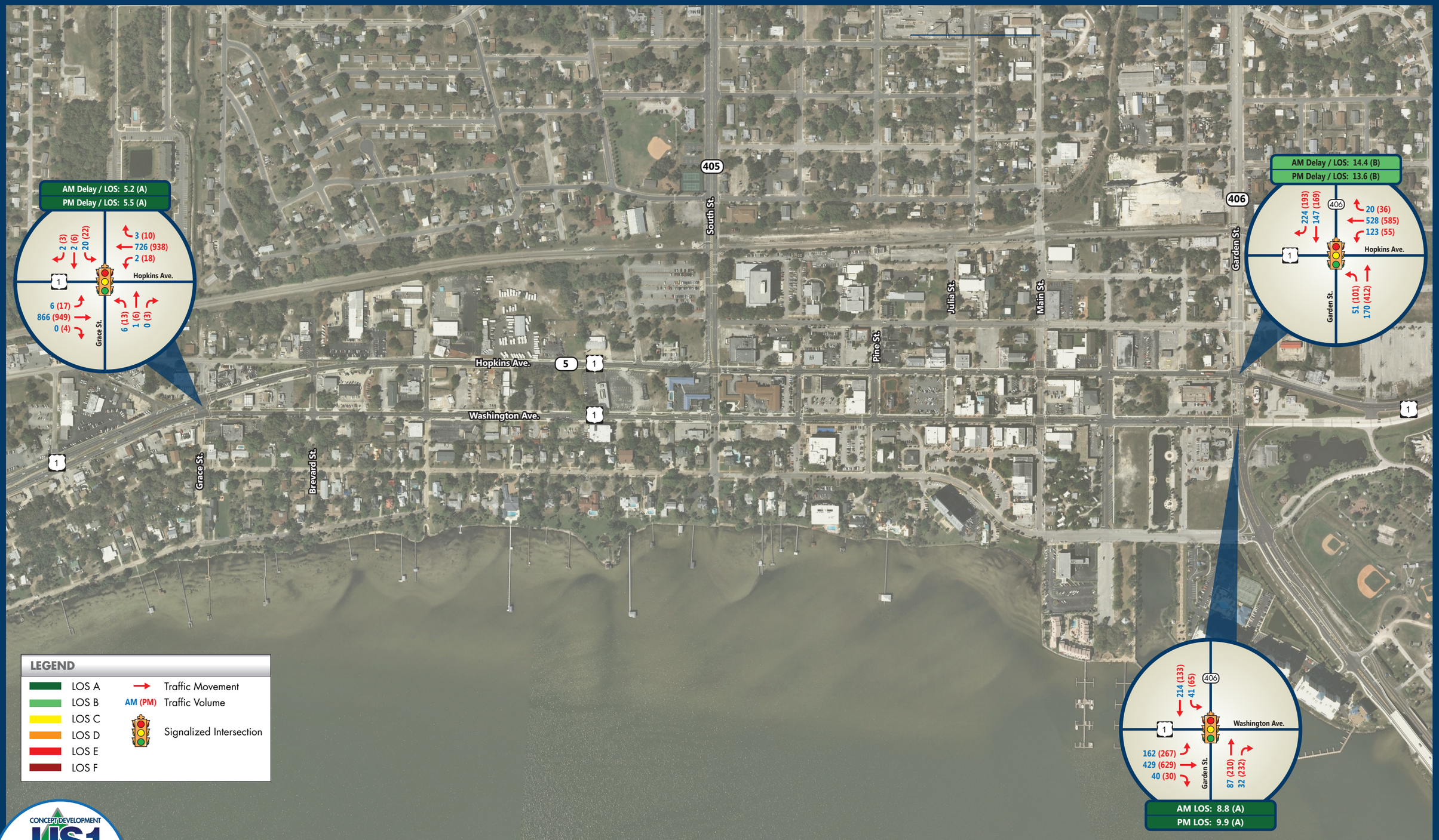

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FIGURE 18

Existing 2017 Intersection Operations

2.6 Safety and Crash Analysis

Crash Data was obtained from Signal Four Analytics for the previous five years (January 01, 2011 to December 31, 2015) along US 1 from south of Grace Street to north of SR 406 (Garden Street).

2.6.1 Total Crashes

A total of 418 crashes, 114 of those resulting in injuries, were reported over the five-year period along US 1 within the Study Area, as illustrated by Table 9 and Figure 19.

Table 9: Crash Data Summary by Year

Year	Total Number of Crashes	Number of Injury Crashes	Total Number of Injuries	Number of Fatal Crashes	Total Number Fatalities	Number of Night Crashes	Number of Wet Crashes
Roadway: US 1 NB (Washington Avenue) Roadway ID: 70030000 Milepost: 2.925 to 4.290							
2011	25	9	11	0	0	5	0
2012	38	10	16	0	0	7	4
2013	48	12	22	0	0	9	4
2014	56	16	24	0	0	7	8
2015	38	4	7	0	0	5	2
2011-2015	205	51	80	0	0	33	18
Average	***41.0***	***10.2***	***16.0***	***0.0***	***0.0***	***6.6***	***3.6***
Percent	***-***	***24.9%***	***-***	***0.0%***	***-***	***16.1%***	***8.8%***
Roadway: US 1 SB (Hopkins Avenue) Roadway ID: 70030101 Milepost: 0.000 to 1.397							
2011	26	9	12	0	0	3	2
2012	43	13	17	0	0	6	3
2013	51	17	26	0	0	5	2
2014	54	17	25	0	0	4	3
2015	39	7	14	0	0	6	4
2011-2015	213	63	94	0	0	24	14
Average	***42.6***	***12.6***	***18.8***	***0.0***	***0.0***	***4.8***	***2.8***
Percent	***-***	***29.6%***	***-***	***0.0%***	***-***	***11.3%***	***6.6%***
Grand Total	***418***	***114***	***174***	***0***	***0***	***57***	***32***
Grand Percent	***-***	***27.3%***	***-***	***0.0%***	***-***	***13.6%***	***7.7%***

It was concluded from the analysis of both directions that the predominant crash types were angle crashes (25.8%) and sideswipe crashes (15.9%).

Table 10, summarizes the number of crashes by harmful event along the US 1 corridor.

Table 10: Crash Data Summary by Harmful Event

Crash Type	2011	2012	2013	2014	2015	2011-2015	Average Per Year	Percent
Roadway: US 1 NB (Washington Avenue)								
Roadway ID: 70030000 Milepost: 2.925 to 4.290								
Angle	5	9	10	13	6	43	**8.6**	**21.0%**
Sideswipe	4	9	3	10	8	34	**6.8**	**16.6%**
Rear End	3	4	9	8	8	32	**6.4**	**15.6%**
Left Turn	0	4	4	3	3	14	**2.8**	**6.8%**
Off Road	0	1	6	4	2	13	**2.6**	**6.3%**
Bicycle	2	0	0	2	0	4	**0.8**	**2.0%**
Right Turn	0	0	0	0	2	2	**0.4**	**1.0%**
Head On	0	0	0	0	1	1	**0.2**	**0.5%**
Pedestrian	0	0	0	1	0	1	**0.2**	**0.5%**
Rollover	0	1	0	0	0	1	**0.2**	**0.5%**
Other	11	10	16	15	8	60	**12.0**	**29.3%**
Total	***25***	***38***	***48***	***56***	***38***	***205***	**-**	***100.0%***
Roadway: US 1 SB (Hopkins Avenue)								
Roadway ID: 70030001 Milepost: 0.000 to 1.397								
Angle	12	9	19	15	10	65	**13.0**	**30.5%**
Sideswipe	4	7	6	10	8	35	**7.0**	**16.4%**
Rear End	3	4	8	5	4	24	**4.8**	**11.3%**
Left Turn	1	1	0	4	1	7	**1.4**	**3.3%**
Off Road	0	0	2	0	2	4	**0.8**	**1.9%**
Head On	1	0	2	0	0	3	**0.6**	**1.4%**
Right Turn	0	0	1	0	2	3	**0.6**	**1.4%**
Pedestrian	1	1	0	0	0	2	**0.4**	**0.9%**
Bicycle	1	0	0	1	0	2	**0.4**	**0.9%**
Rollover	0	0	0	0	1	1	**0.2**	**0.5%**
Other	3	21	13	19	11	67	**13.4**	**31.5%**
Total	***26***	***43***	***51***	***54***	***39***	***213***	**-**	***100.0%***
Grand Total	***51***	***81***	***99***	***110***	***77***	***418***	**-**	**-**

Segment crash rates in crashes per million vehicle-miles traveled were calculated for the US 1 corridor in order to compare the actual crash rate of the corridor to the statewide average crash rate for similar facilities during the study period. Each transition in crash rate category or AADT requires a break in the segment crash rate calculation, resulting in three distinct segments on US 1 NB (Washington Avenue), three distinct segments on Hopkins Avenue and one for Laurel Place to Grace Street for which an individual crash rate was calculated and compared to the statewide average for the corresponding crash rate category. The Statewide Average Crash Rate was extracted from the FDOT CAR system.

As seen in Table 11 both roadway segment of US 1 from SR 406 (Garden Street) to SR 405 (South Street) as well as from Laurel Place to Grace Street experienced an average crash rate higher than the average crash rate for similar facilities according to FDOT's State wide average. The length of the Laurel Place to Grace Street segment, 0.153 miles, implies a higher per-mile concentration of crashes compared to the statewide average crash rate. These segments are noted as high crash segments and will be considered during the planning process. The high crash rate from SR 406 (Garden Street) to SR 405 (South Street) for both northbound and southbound segments of US 1 can be primarily attributed to a high rate of crashes at the intersections of US 1 and SR 406 (Garden Street). Safety at these intersections will be a major consideration moving forward.

Table 11: Summary of Crash Rates (number of crashes per million vehicle miles)

From/To	Number [1] of Crashes[4]	Length (miles)	AADT	ACR[2]	Crash Rate Category	AVG[3]	High Crash Segment?
Roadway: US 1 Roadway ID: 70030000 Milepost: 2.925 to 3.078							
Laurel Place to Grace Street	13	0.153	23,000	3.43	Urban 4-5 Ln 2Way Divided Road	3.12	Yes
Roadway: US 1 NB (Washington Avenue) Roadway ID: 70030000 Milepost: 3.078 to 4.290							
Grace Street to SR 405 (South Street)	38	0.497	12,000	3.49	Urban One Way	9.40	No
SR 405 (South Street) to SR 406 (Garden Street)	130	0.509	12,000	11.66	Urban One Way	9.40	Yes
SR 406 (Garden Street) to Indian River Avenue	15	0.206	8,200	4.87	Urban One Way	9.40	No
Roadway: US 1 SB (Hopkins Avenue) Roadway ID: 70030101 Milepost: 0.000 to 1.397							
Grace Street to SR 405 (South Street)	79	0.497	11,000	7.92	Urban One Way	9.40	No
SR 405 (South Street) to SR 406 (Garden Street)	132	0.509	12,000	11.84	Urban One Way	9.40	Yes
SR 406 (Garden Street) to Indian River Avenue	2	0.206	8,900	0.60	Urban One Way	9.40	No

Notes:

1- Number of crashes from January 1, 2011 to December 31, 2015.

2- Average Crash Rate = (N*1,000,000)/(365*Y*AADT*L), where N = number of crashes, Y = number of years, AADT = Annual Average Daily Traffic, and L = Length of the segment in miles.

3- AVG = Statewide Average Crash Rate for Corresponding Category.

4- Segments are defined as not including the 'from' intersection, but including the 'to' intersection

2.6.2 Bicycle and Pedestrian Crashes

Nine crashes including a pedestrian and a cyclist occurred on US 1 within the Study Area from 2011 to 2015. Of those, four cyclist and one pedestrian incident occurred northbound, while southbound there were two of each. Northbound, one incident with a bicyclist occurred during the night in dry conditions while the other four happened during dry daytime conditions, including the single pedestrian collision. Southbound, three of the four incidents occurred during dry daytime conditions while the other happened during dry night time conditions.

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FIGURE 19
Crash Location Map

2.7 Environmental Character

The existing environmental conditions were extracted from Geographical Information System (GIS) datasets maintained by the Florida Geographic Data Library (FGDL). For purposes of this environmental analysis, a buffer of 500 feet was used for the study area.
The following were examined as part of this review:

- Cultural Resources
- Social Resources
- Population Characteristics
- Socioeconomic Characteristics
- Major Employers and Activity Centers
- Threatened and Endangered Species
- Wetlands
- Floodplains
- Contamination

2.7.1 Cultural Resources

Cultural resources are defined by the National Historic Preservation Act (NHPA) of 1966 and governed by federal and state regulations. Section 106 of the NHPA provides a general process for cultural resource assessments and requires that historic and archaeological resources be considered in project planning for federally funded or permitted projects. Cultural resources or "historic properties" include any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the *National Register of Historic Places (NRHP)."*

Archaeological sites or historic resources that are listed, determined eligible, or considered potentially eligible by the State Historic Preservation Office (SHPO) for listing in the NRHP are listed in Table 12. These sites along with other state recorded sites and survey locations are graphically depicted in Figure 20.

Table 12: Summary of Cultural Resources

Cultural Resources	Within Study Area
SHPO Structures	166
SHPO Bridges	0
SHPO Resource Groups	4
National Register (Site, District, Building)	6
Archaeological/Historic Sites	1
SHPO Surveys	5

Source: FGDL, ETDM

The SHPO Resource Groups include 2 linear resources, Florida East Coast Railroad and US Highway 1/Cocal Boulevard, and 2 Historic Districts which include the Titusville Downtown Residential and Commercial Districts. According to the Florida Master Site File (FMSF), six sites or structures are listed on the NHRP within the Study Area, with others shown as eligible for listing. These sites include:

- St. Gabriel's Episcopal Church (Listed)
- Judge George Robbins House (Listed)
- Pritchard House (Listed)
- Titusville Commercial District (Listed)
- Wager House (Listed)
- Spell House (Listed)
- Florida East Coast Railroad (Eligible
- Brevard County Courthouse (Eligible)
- 423 Palm Avenue (Eligible)

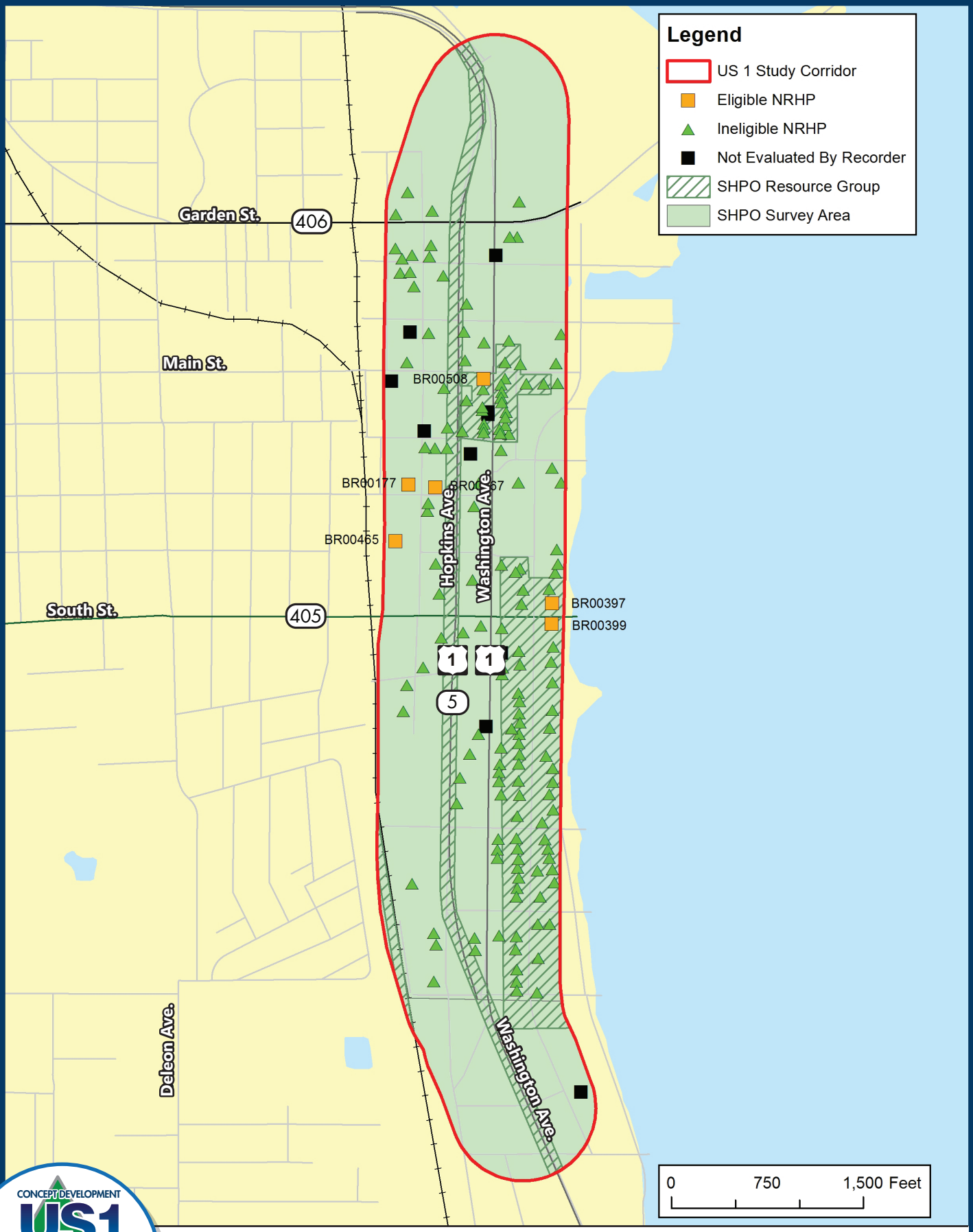

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FIGURE 20
Cultural Resources Map

2.7.2 Social Resources

Any public or private social resources that were considered relevant to the Study Area were tabulated. Table 13 below summarizes the public facilities within the Study Area. Figure 21 graphically displays the results of the social resource evaluation. Several of the government buildings are clustered into government complexes, thus only 3 are presented graphically.

Table 13: Summary of Public Facilities

Social Resources	Within Study Area
FDEM* Places of Worship	2
Florida Marine Facilities	1
Cemeteries	0
Community Centers	1
Cultural Centers	1
Fire Stations	1
Government Buildings	6
Health Care Facilities	4
Homeowner and Condominium Associations	2
Parks	2
Religious Centers	8
Schools	0
Social Service Facilities	2

Source: FGDL, ETDM

*FDEM – Florida Department of Emergency Management

The Study Area is adjacent to Sand Point Park and Space View Park. These parks are protected under the Department of Transportation Act (DOT Act) of 1966-section 4(f). The project area is also part of the Indian River Lagoon National Scenic Byway. The Indian River Lagoon National Scenic Byway received its recognition in 2000 for its outstanding scenic, historic, cultural, natural, recreational and archeological qualities.

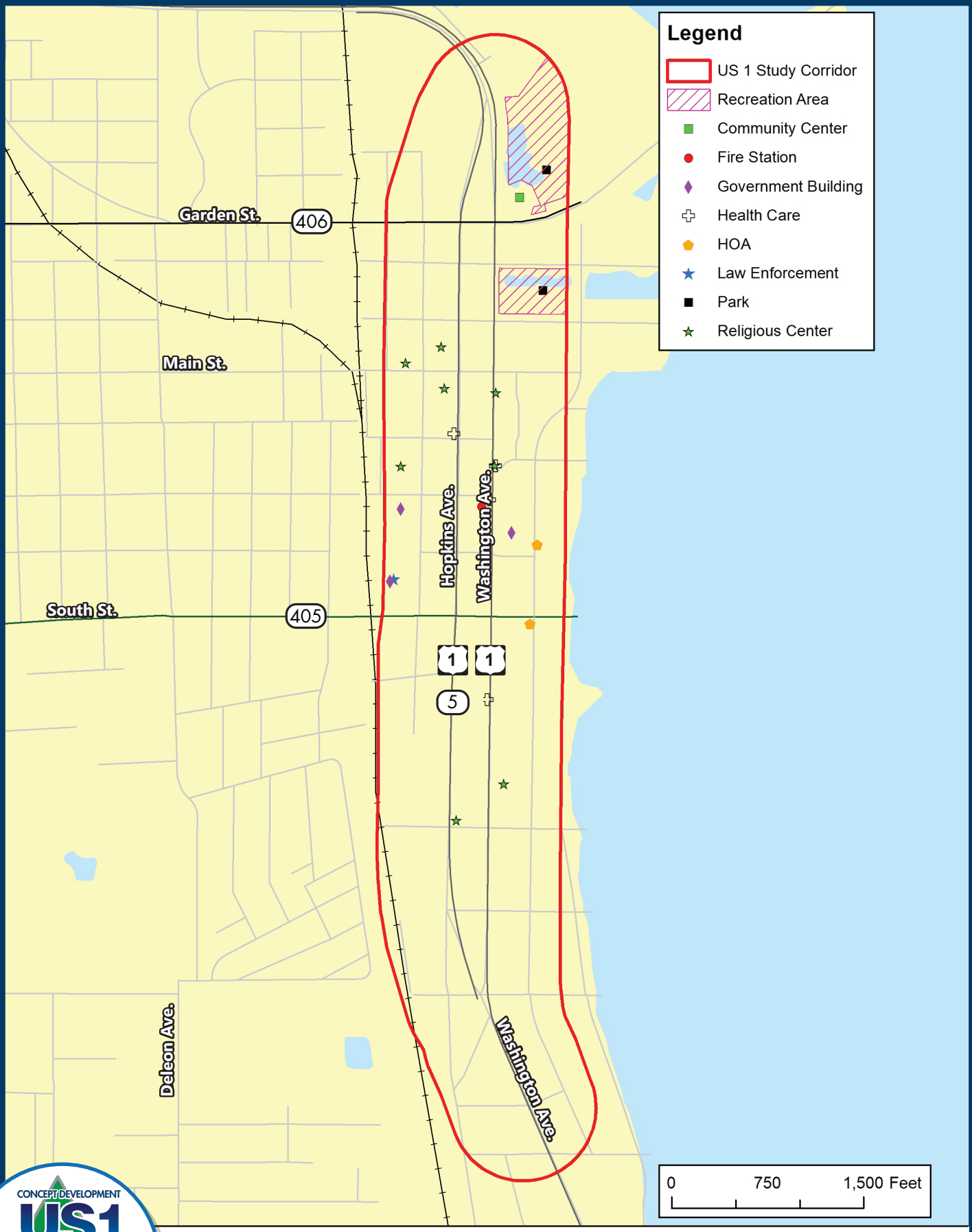

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FIGURE 21
Public Facilities Map

2.7.3 Population Characteristics

An overview of the corridor population and demographics data collected for the US Census 2010 and the American Community Survey are provided in Table 14. The data presented reflects an analysis based on abutting Census Tracts. Population density is approximately 4.46 persons per acre and housing density is 1.21 households per acre. Average household size in the abutting area is 2.42 persons per household and the median age is 38 years old.

Table 14: Population Characteristics

Characteristic	Study Area
Total Population	1,429
Population Density (Persons per Acre)	4.46
Total Households	652
Average Household Size	2.42
Household Density (Households per Acre)	1.21
Median Age	38
Population Over 65	21.8%
Male	50.0%
Female	50.0%

2.7.4 Socioeconomic Data

Table 15 provides an overview of the socioeconomic characteristics. In the US 1 Study Area, the median household income is $34,063, and 29.6 percent of the households are below the poverty line. Of the 950 total housing units, 26.6 percent are owner-occupied, and 42.0 percent are renter-occupied. The remaining 31.4 percent of housing units in the Study Area are vacant. Approximately Twenty-seven percent of the households have no vehicle available and 36.4 percent have only one vehicle available. The majority of the population, 61.7 percent, in the Study Area identifies as white only, and 33.3 percent identify themselves as black or African American. Given the percentage of households below the poverty level and the population that identifies as black or African American, environmental justice should be considered with future project planning. Figure 22 and Figure 23 illustrate median household income and households with no vehicles, respectively.

Table 15: Socioeconomic Characteristics

Population	Study Area
Median Household Income	$34,063
Households Below Poverty Level	29.6%
Total Housing Units	950
Owner-Occupied	26.6%
Renter-Occupied	42.0%
Vacant	31.4%
Households with No Vehicles	27.4%
Households with 1 Vehicle	36.4%
Total Population	1,429
White	61.7%
Hispanic or Latino	4.6%
Not Hispanic or Latino	57.1%
Black of African American	33.3%
Asian	0.6%
Other	4.4%

2.7.5 Major Employers and Activity Centers

The City of Titusville is the largest employer along the study corridor. The Titusville Sewer and Water Department, which is just one of the City departments along the corridor employs 500 persons. Other major employers along the US 1 corridor include Brevard County and the Florida Department of Education.

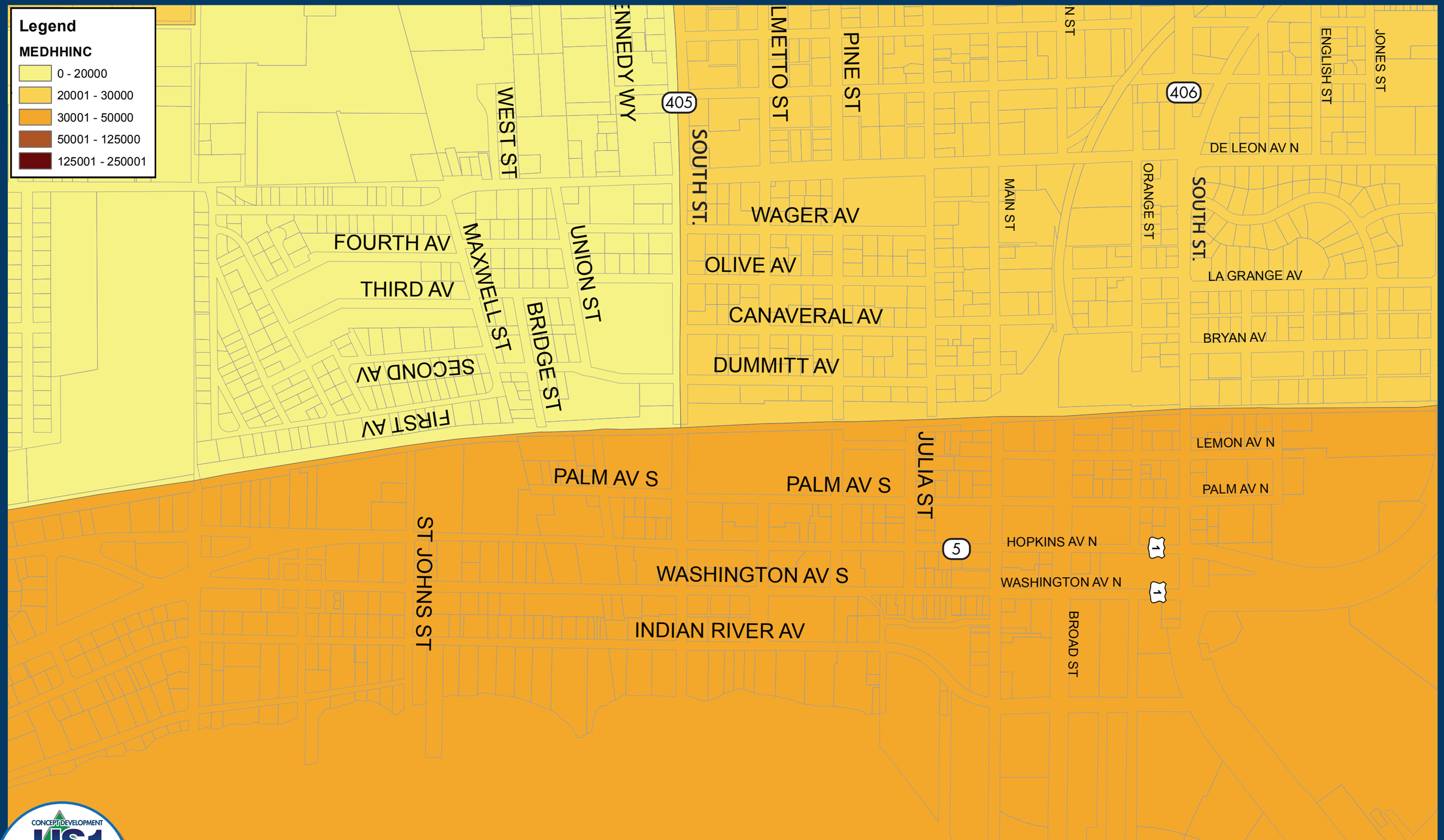

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FIGURE 22
Median Household Income Map

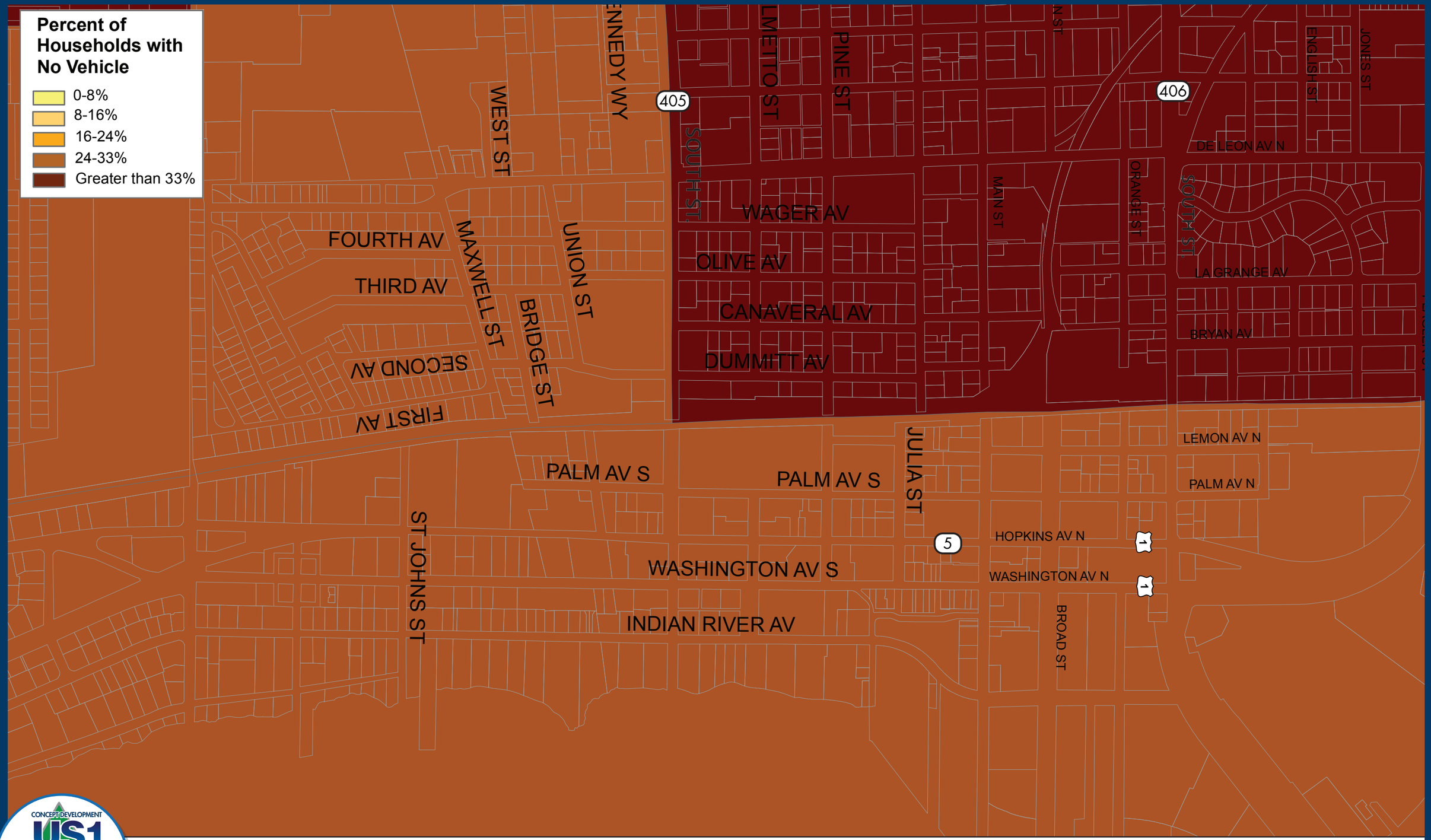

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FIGURE 23
Percentage of Households with No Vehicles Map

2.7.6 Threatened and Endangered Species

Reviews of the Florida Natural Areas Inventory (FNAI) and GIS data from the US Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC) identified critical habitat and/or consultation areas for threatened or endangered species. Consultation areas, identified by USFWS, encompass all areas where populations are known to exist. These threatened and endangered species consultation areas and/or critical habitats are summarized in Table 16 and shown in Figure 24. It must be noted that the entire Study Area is located within low quality habitat with limited habitat richness due to the developed nature of the area. However, existing stormwater ponds and swales may provide intermittent foraging habitat for protected wading and colonial bird species.

Table 16: Summary of Wildlife and Habitat

Wildlife and Habitat	Abutting Buffer	Study Area	Habitat within Study Area
Wood Stork Core Foraging Areas	Yes	Yes	Yes
Red-cockaded Woodpecker Consultation Areas	No	No	No
Crested Caracara Consultation Area	Yes	Yes	No
Florida Scrub Jay Consultation Area	Yes	Yes	No
Atlantic Salt Marsh Snake Consultation Area	Yes	Yes	No
Snail Kite Consultation Area	Yes	Yes	No
Piping Plover Consultation Area	Yes	Yes	No

Source: US Fish and Wildlife Service (USFWS), 2011; Florida Natural Areas Inventory (FNAI), 2009.

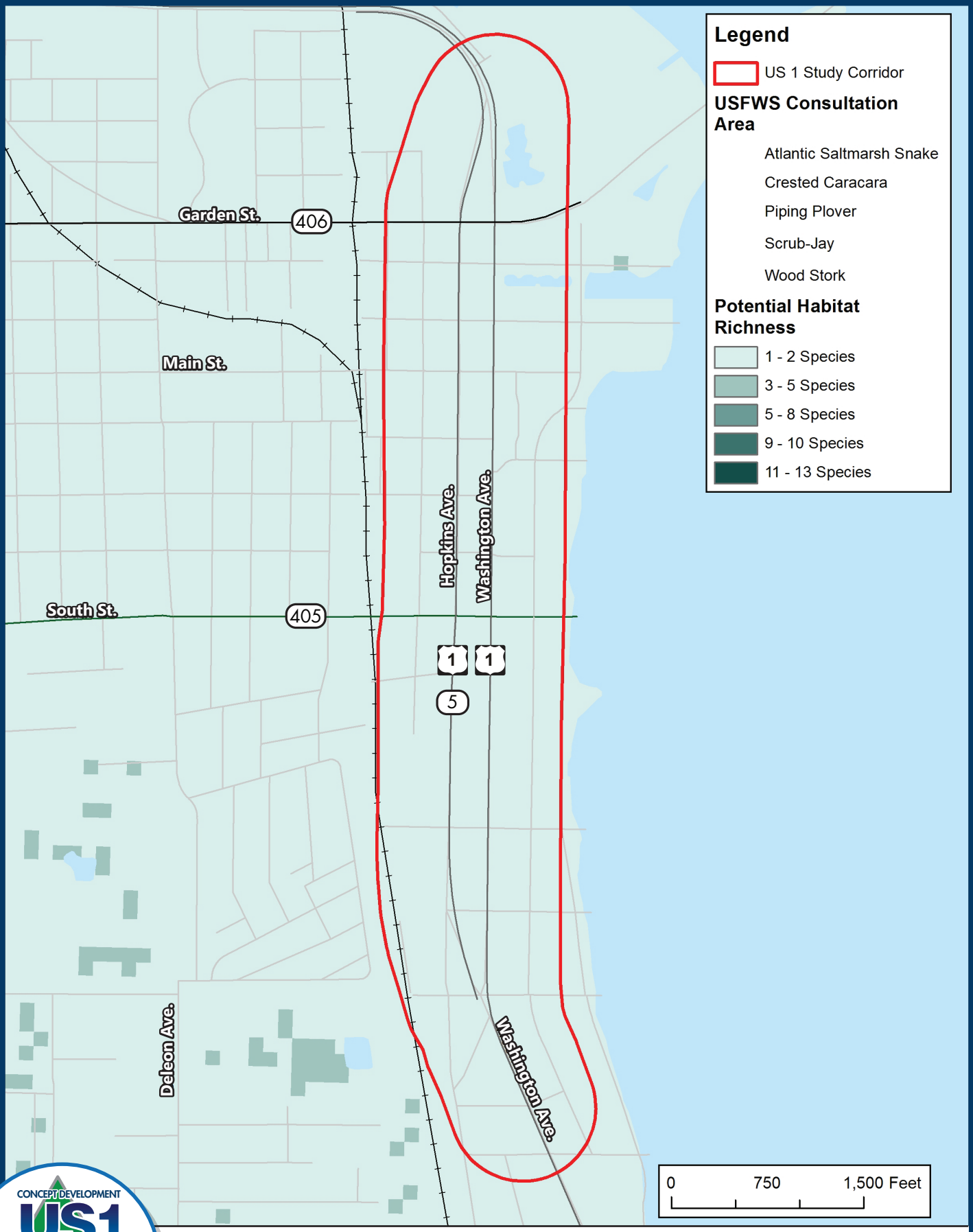

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FIGURE 24
Wildlife & Habitat Map

2.7.7 Wetlands

The wetlands analysis used GIS data made available from the St John's River Water Management District (SJRWMD) dated 2009. The data shows that no wetlands are located within the Study Corridor. "Other surface waters", which include ponds and drainage swales/ditches are present within the area. Figure 25 illustrates the surface water systems as presented in the data, however, drainage swales and ditches are not depicted.

2.7.8 Contamination

Contaminated sites within the Study Area were identified using data made available by the Florida Department of Health (FDOH) and the Florida Department of Environmental Protection (FDEP). Table 17 summarizes the areas that have the potential for contamination and Figure 26 illustrates the location of these sites. It must be noted that the facilities shown are regulated facilities which have the potential for contamination or environmental concern, but are not necessarily contaminated.

Table 17: Summary of Contamination Analysis

Analysis Type	Within Study Area
Biomedical Waste	14
Hazardous Waste Facilities	15
Petroleum Contamination Monitoring Sites	14
Storage Tank Contamination Monitoring (STCM)	24
US EPA Resource Conservation and Recovery Act (RCA) Regulated Facilities	19
Toxic Release Inventory	0
Waste Cleanup Sites	0

Source: FDOH, FDEP, FGDL, ETDM

As shown in Figure 26, the Study Area contains "potential" hazards and risk sites. Seven facilities are being monitored for petroleum contamination with clean-up work underway, four facilities have been closed and are no longer monitored, and three facilities do not require cleanup as no released contaminants have been found. No offsite contamination notices have been issued by FDEP within the Study Area. No other known hazardous contamination sites were found. Furthermore, while not listed in the existing data, railway data shows that contaminants may also be associated with rail lines and spurs. Work in these areas may warrant further investigation.

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FIGURE 25
Wetlands Map

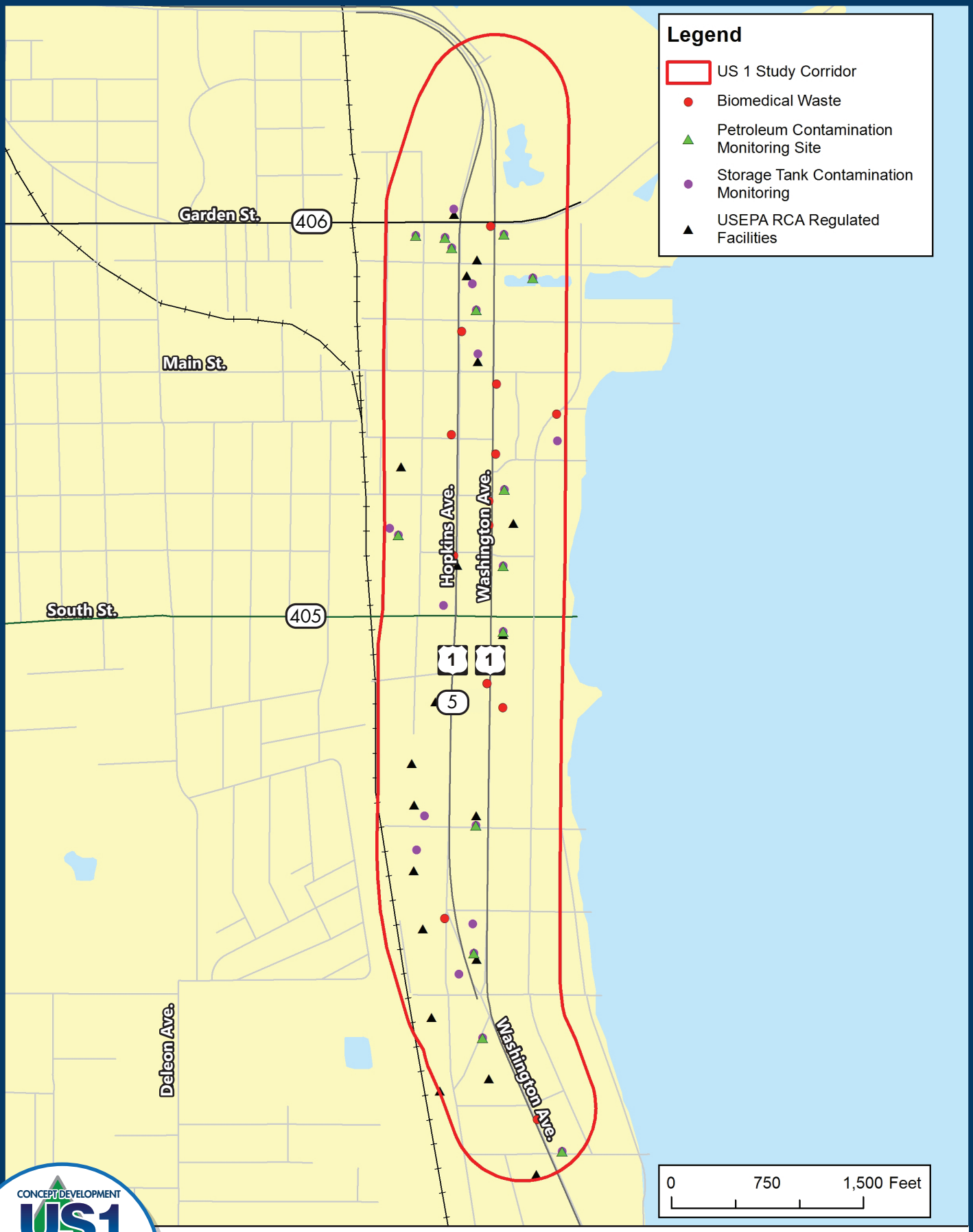

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FIGURE 26
Contamination Map

3

Issues and Opportunities

The assessment of existing conditions is developed to provide a more-comprehensive understanding of the study corridor, and to provide a solid foundation to support the next phases of the planning process. This involves an extensive due diligence process to collect the appropriate available data from a variety of sources, to inventory physical features of the roadway and surrounding land uses, assess current operating conditions, and review safety characteristics. This process also provides an opportunity for the Study Team to develop a feel for the community and its socio-cultural characteristics, to identify natural features, and to document other unique attributes.

This section is intended to summarize the issues identified along the corridor to be evaluated during the study, as well as opportunities to consider in the development of potential improvement strategies. During the data collection and existing conditions inventory process, elements within the corridor that were found to be deficient were noted appropriately as summarized in this section. Wherever possible, other aspects of the corridor that represent potential opportunities to support future enhancements were also documented. In addition, the current local agency transportation plans were scoured to identify a range of potential improvement strategies.

3.1 Access Management

There are a high number of driveways that have direct access to US 1 due to the designated land uses surrounding the corridor. Parcels with multiple driveways, have been identified, which may provide opportunities to condense driveway access without restricting business access or circulation.

3.2 Bicycle & Pedestrian Facilities

Undesignated bike lanes are present on US 1 from Main Street to north of Indian River Avenue which are connected to the planned Downtown Titusville Trail. No bicycle facilities are provided between Laurel Place and Main Street beyond the paved shoulder on the east side of US 1 from Laurel Place to Grace Street. The study may identify recommendations along the parallel facilities of Indian River Avenue and Palm Avenue to be implemented by local jurisdictions. Further data will be collected to determine any locations of high volume mid-block pedestrian crossings.

3.3 Transit

All designated bus stops within the Study Area are located in areas where there is existing sidewalk. However, multiple bus stop locations are situated in areas where it is difficult for wheelchair or elderly passengers to board and alight. The accessibility issues range from a lack of a landing pad, to the lack of a flat landing area to board/alight passengers as illustrated in Figure 27. Landing pads are especially helpful for wheelchair users and the elderly that have difficulty navigating through the grass when boarding/alighting the bus.

Figure 27: Bus Stop Location Lacking a Paved Landing Pad

3.4 Existing Traffic Conditions

Analysis of the existing traffic volumes and LOS revealed that all Study Area intersections and roadway segments currently operate under acceptable LOS conditions during the AM and PM peak hours. This provides an opportunity for reworking the existing roadway while avoiding major capacity impacts.

The spot speed study revealed that average speed on US 1 in the segments with the 30 mph and 40 mph posted speed range from 24-33 mph and 33-42 mph, respectively. Vehicles do not appear to be traveling at excessive speeds within the Study Area.

3.5 Crash Analysis and Safety

Identified in the crash analysis, the US 1 Northbound and Southbound segments between SR 406 (Garden Street) and SR 405 (South Street), as well as the segment from Laurel Place to Grace Street, have crash rates higher than the state average for their roadway types. The high crash rate from SR 406 (Garden Street) to SR 405 (South Street) for both northbound and southbound segments of US 1 can be primarily attributed to a high rate of crashes at the intersections of US 1 and SR 406 (Garden Street). Safety at these intersections will be a major consideration moving forward. Further analysis will be conducted to determine any potential solutions to identified contributing factors of these crashes.

3.6 Summary of Transportation Plans

Any potential alternatives will be developed with consideration for programmed improvement plans and projects identified throughout the review of the following transportation plans:

- The City of Titusville Comprehensive Plan Objectives and Policies identifies land use designation along the southern portion of the current study corridor. The City of Titusville also adopted policies to strengthen and encourage a pedestrian-friendly, mixed-use district along US 1.
- The SCTPO 2040 LRTP identifies a multimodal range of improvements for Brevard County through 2040. Sharrows and BMUFL signage was identified to be installed along the corridor. ITS improvements were identified along US 1 from SR 406 (Garden Street) to SR 405 (South Street).
- The SCTPO Bicycle & Pedestrian Mobility Plan recognizes gaps or deficiencies in the existing network. The plan identifies installation of sharrows along US 1 from Grace Street to St Johns Street and from SR 405 (South Street) to 1,200 feet north of SR 406 (Garden Street). The plan also identifies the need for designated bike lanes along these same stretches of road. There is no current funding for these projects.
- The CRA Community Redevelopment Plan involves coordinating growth in the Downtown CRA and creating a downtown area with vibrant mixed-use town center environment. Through coordination, there is a potential to combine efforts with the 5-Year Capital Improvement Plan for $250,000 towards Concrete Street Repairs in fiscal years 2018/2022 for Indian River Avenue. This funding could support Indian River Avenue as a parallel bicycle and pedestrian facility.

3.7 Conclusion

The issues and opportunities that were identified in this section will guide the project and identify the purpose and need for the study. These topics will be analyzed further and discussed in greater detail as the planning process proceeds and potential improvement alternatives are developed.