

FIGURE 13 | Employment Density

Babcock Street Corridor Planning Study

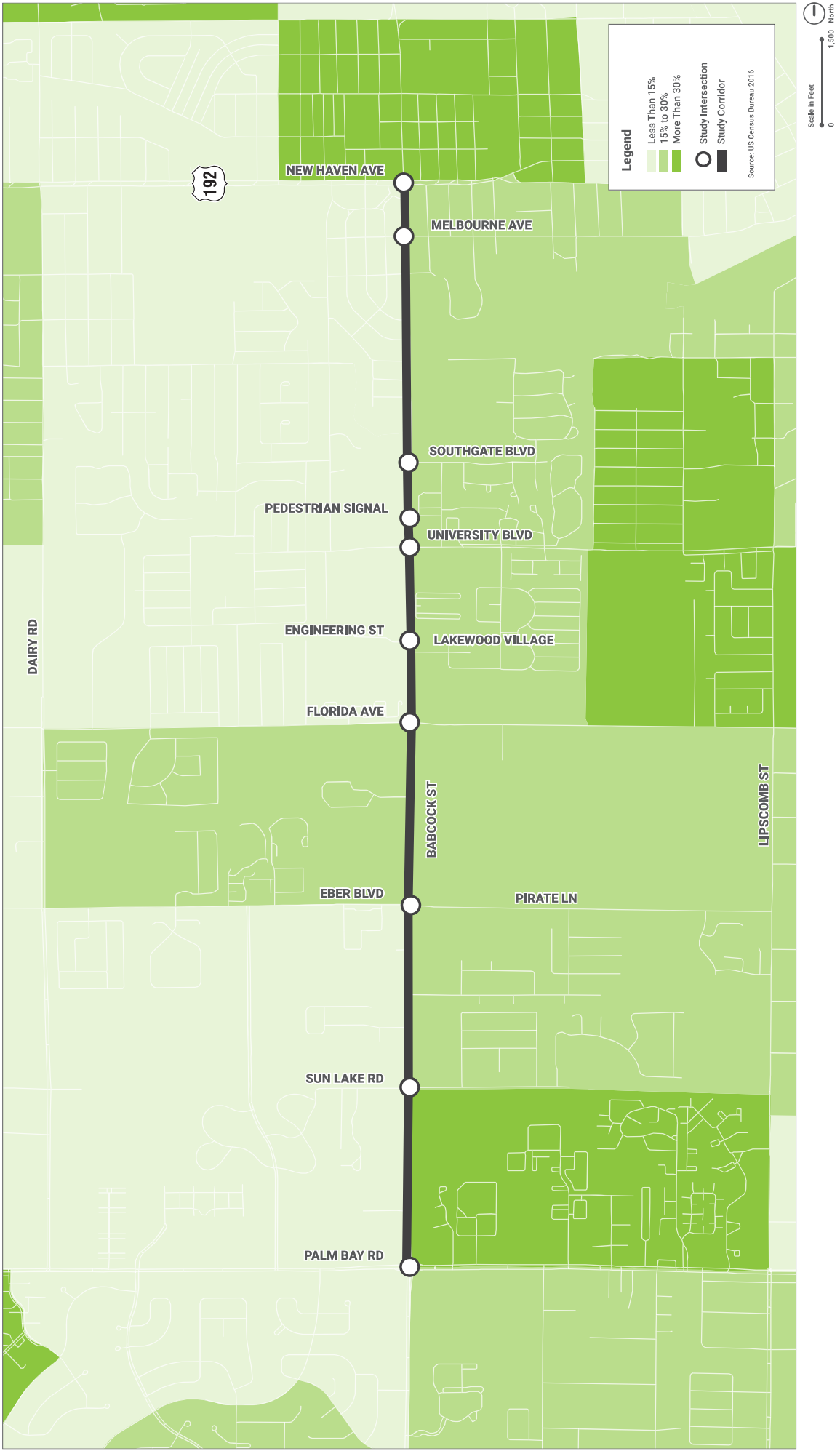


FIGURE 14 | Household in Poverty

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Zero-Vehicle Households

The percentage of households without access to a vehicle are shown in **Figure 15**. Most households (more than 80 percent) have access to a vehicle along the corridor, with the exception two areas in the southwest and northeast parts of the study corridor. The following census block groups have more than 20 percent of households with no access to a vehicle:

- Palm Bay Road to Sun Lake Road (both sides)
- Sun Lake Road to Eber Boulevard (west side)
- University Boulevard to US 192 (east side)

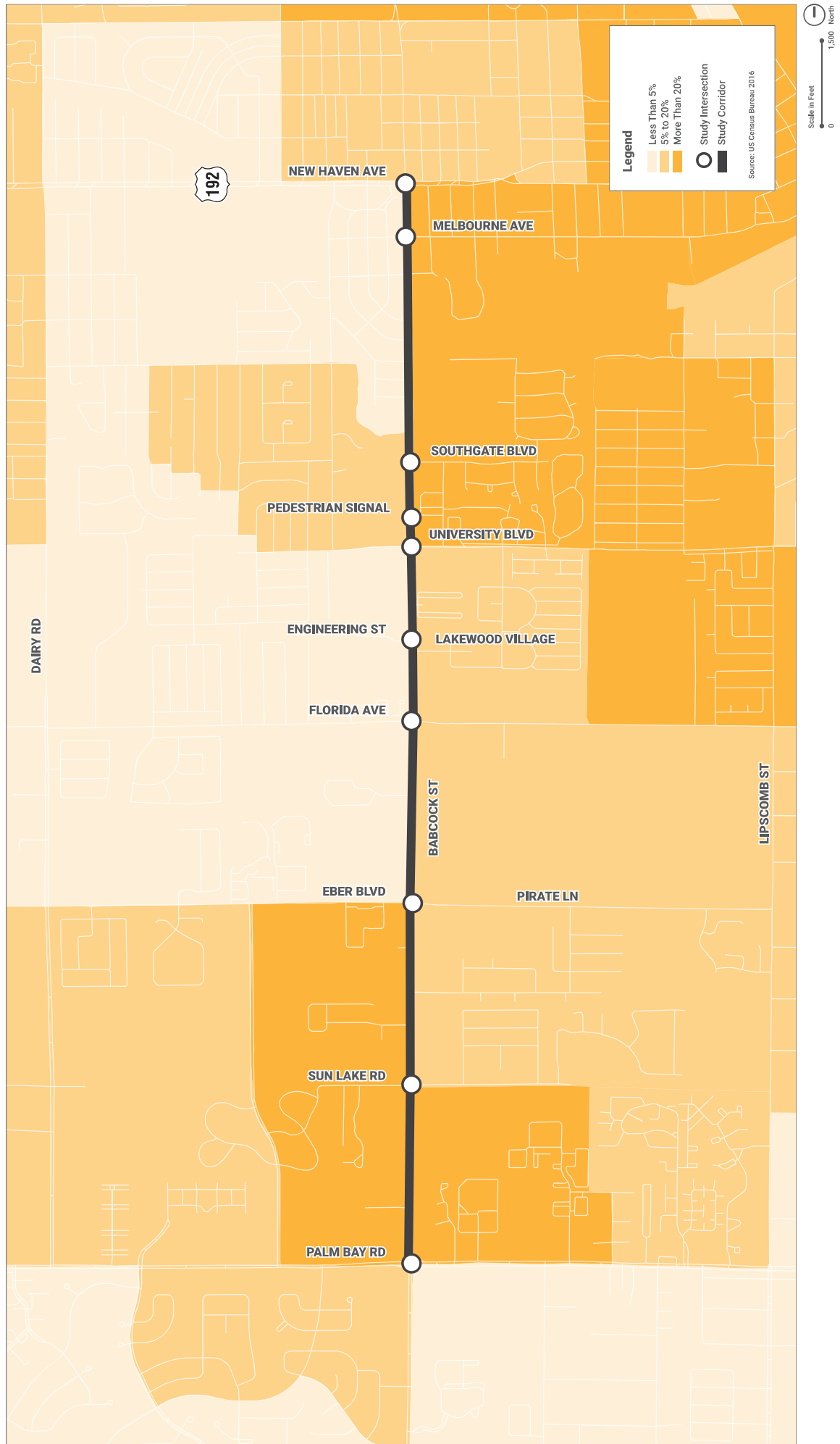


FIGURE 15 | Zero-Vehicle Households

Roadway Facilities and Characteristics

The following section summarizes the surrounding roadway network and the existing roadway characteristics for Babcock Street, including its existing typical sections, right-of-way (ROW) widths, pedestrian and bicycle facilities, transit facilities/ridership, and utilities.

Roadway Network

Babcock Street is classified as a Principal Arterial and is one of four north-south regional connections between Malabar Road and Eau Gallie Boulevard. The other north-south regional connections include:

- I-95 (*Interstate*)
- Minton Road/Wickham Road (*Principal Arterial*)
- US 1 (*Principal Arterial*)

Babcock Street is one of six north-south sub-regional connections between Palm Bay Road and US 192. The other north-south sub-regional connections are generally spaced one mile apart and include:

- Minton Road (*Principal Arterial*)
- Hollywood Boulevard (*Minor Arterial*)
- Dairy Road (*Minor Arterial*)
- Lipscomb Road (*Major Collector*) – connects terminates at US 1 just south of US 192
- US 1 (*Principal Arterial*)

The roadway network in the immediate vicinity of the study corridor is illustrated in **Figure 16**. Most residential subdivisions have multiple route alternatives to access the surrounding north-south and east-west collectors and arterials. The presence of this local road network and sub-regional network of collectors and arterials distributes traffic demand and relieves pressure on Babcock Street for motorized vehicles. However, the large block spacing and disjointed local network across collectors and arterials does not provide a high level of connectivity for pedestrian and bicycle mobility.

Roadway Characteristics

The general roadway characteristics obtained from Florida Transportation Information (FTI) DVD for the Babcock Street study corridor are summarized below:

- Roadway ID 70012000 (Brevard County) – milepost 2.528 (Palm Bay Road) to 5.528 (US 192)
- Functional Classification – Urban Principal Arterial
- SIS Designation – Non-SIS
- Designated Evacuation Route – Palm Bay Road to US 192
- Speed Limits –
 - 45 miles per hour (MPH) from Palm Bay Road to just south of University Boulevard
 - 40 MPH from just south of University Boulevard to just south of Devonshire Drive
 - 35 MPH from just south of Devonshire Drive to US 192
- Access Classification – 5
 - Access Class 5 roadways are controlled access facilities where adjacent land has been extensively developed and where the probability of major land use change is not high. These roadways are distinguished by existing or planned restrictive medians.
 - 1,320' standard spacing for full median openings.

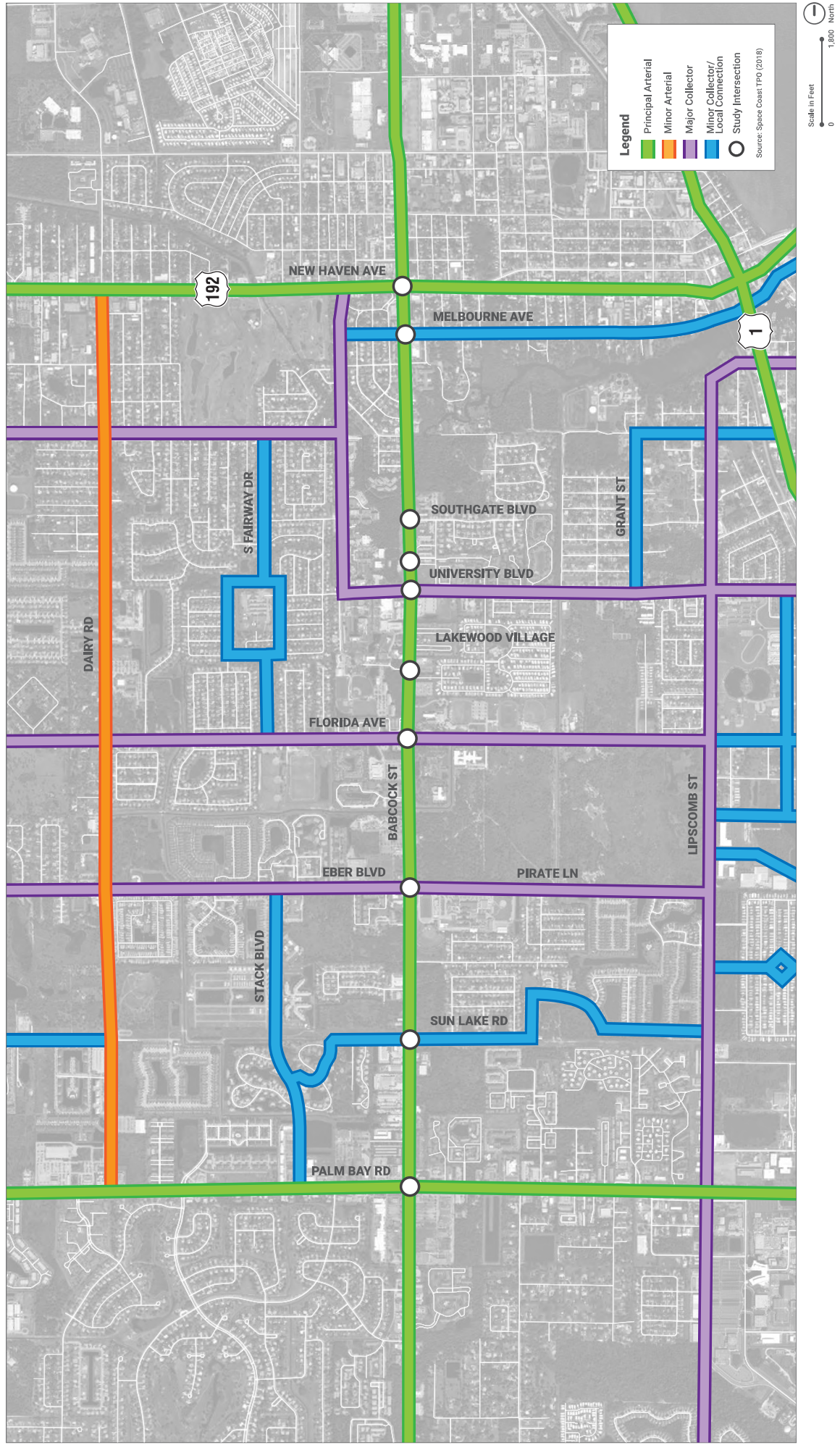


FIGURE 16 | Road Network Connectivity

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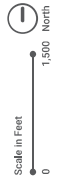
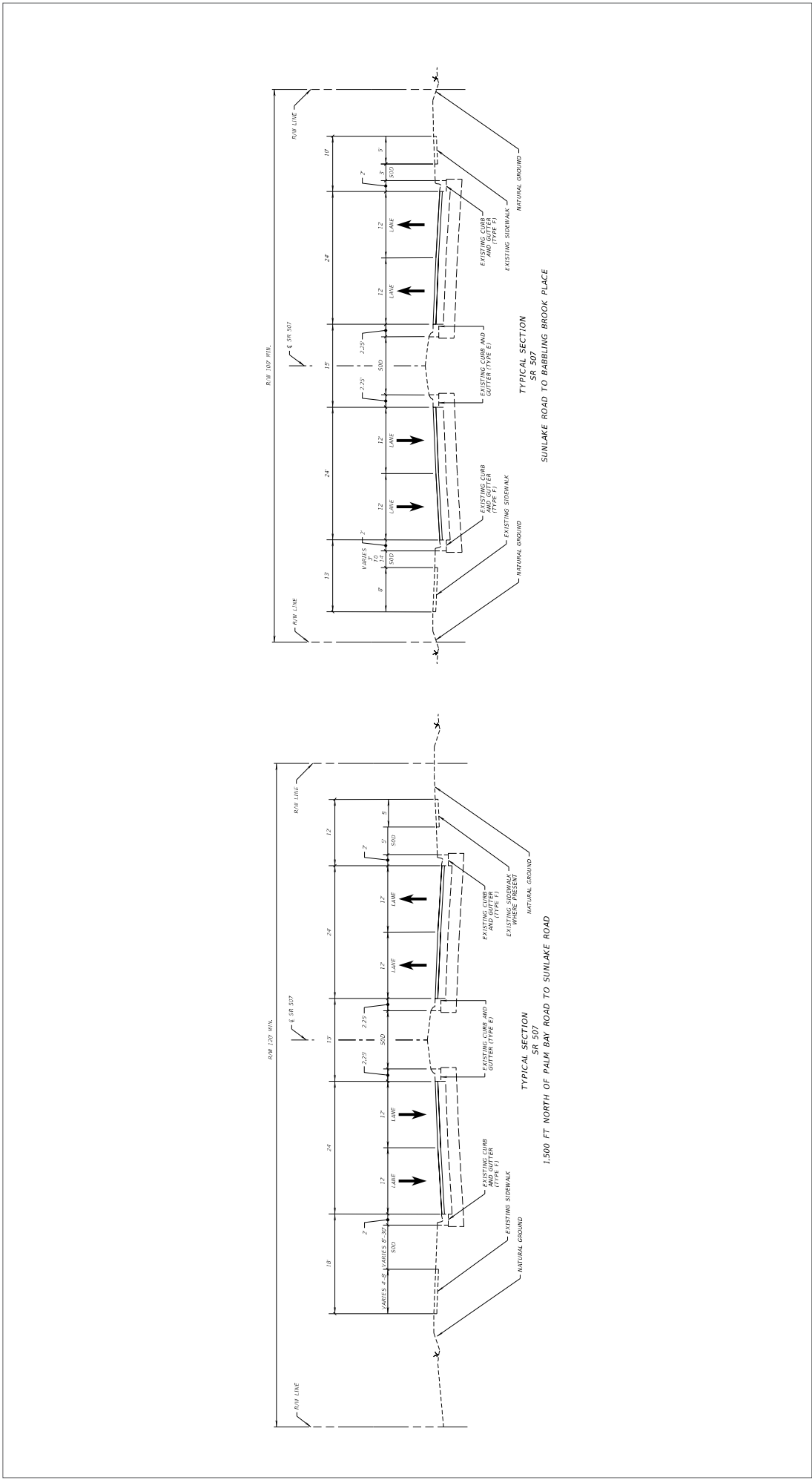
Typical Section and Right-of-Way

The Study Team performed a field review on August 29, 2018 to review the cross-sectional elements. Below is a summary of general cross-section elements:

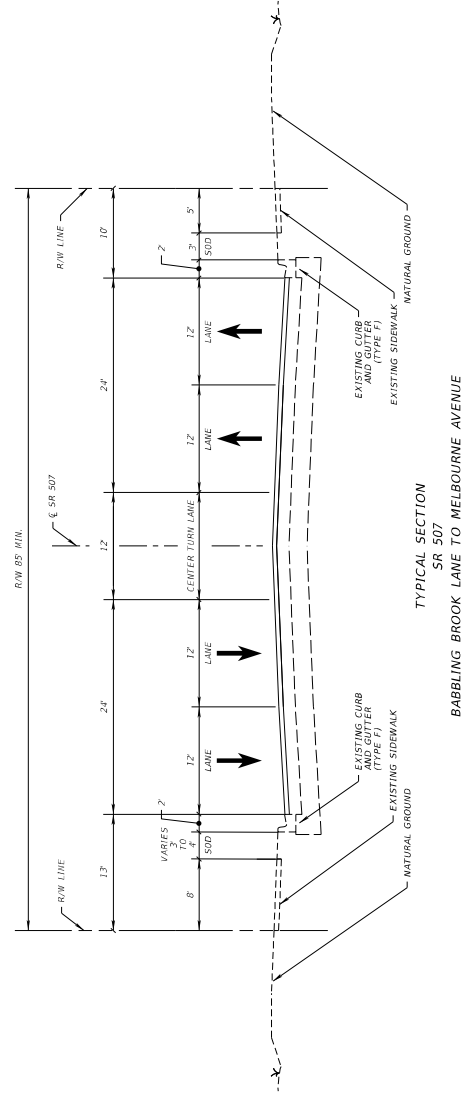
- Four- to six-lane divided by a grass median:
 - Six-lane roadway section (three lanes southbound and three lanes northbound) present between Palm Bay Road and 0.18 miles north of Palm Bay Road (0.18 miles)
 - Five-lane roadway section (three lanes southbound and two lanes northbound) present between 0.18 miles north of Palm Bay Road and 0.28 miles north of Palm Bay Road (0.10 miles)
 - Four-lane roadway section (two lanes southbound and two lanes northbound) present between 0.28 miles north of Palm Bay Road and US 192 (2.72 miles)
- Raised median:
 - 16-foot-wide grass/vegetation median between Palm Bay Road and Crane Creek bridge (2.31 miles)
 - 12-foot-wide paved median between Crane Creek and US 192 (0.69 miles)
- 12-foot wide travel lanes
- Curb and gutter drainage structure
- Three-foot-wide hard shoulder is present in select locations:
 - Southbound between Melbourne Avenue and US 192 (0.15 miles)
 - Southbound between 0.17 miles north of Palm Bay Road and 0.27 miles north of Palm Bay Road (0.10 miles)
 - Northbound between 0.12 miles north of Palm Bay Road and 0.29 miles north of Palm Bay Road (0.17 miles)
- Babcock Street crosses Crane Creek Bridge 0.10 miles north of Southgate Boulevard
 - Guardrail provided along corridor's east side from 0.02 miles south of Crane Creek Bridge to 0.16 miles north of the bridge.
 - Guardrail provided along corridor's west side from 0.07 miles south of Crane Creek Bridge to 0.04 miles north of the bridge.

Figure 17 illustrates the typical sections along Babcock Street, which were created based upon aerial and street view imagery from Google Earth (2017) and FDOT straight line diagrams (provided in **Appendix C**).

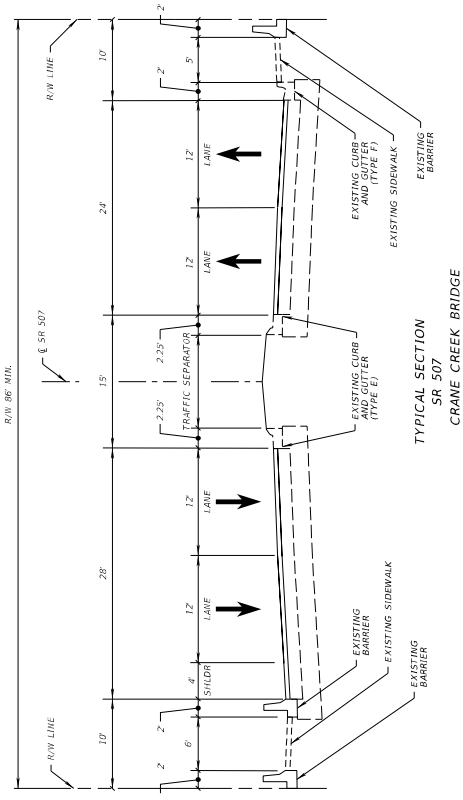
The existing right-of-way (ROW) along the corridor was obtained from the FDOT District 5 ROW Department. Babcock Street ROW varies between 170 feet in the southern end to 85 feet in the northern end of the corridor, as illustrated in **Figure 18**. The majority of the corridor, from Sun Lake Road to north of Southgate Boulevard, has a typical ROW width of 100 feet.



Babcock Street Corridor Planning Study **FIGURE 17A | Typical Sections**



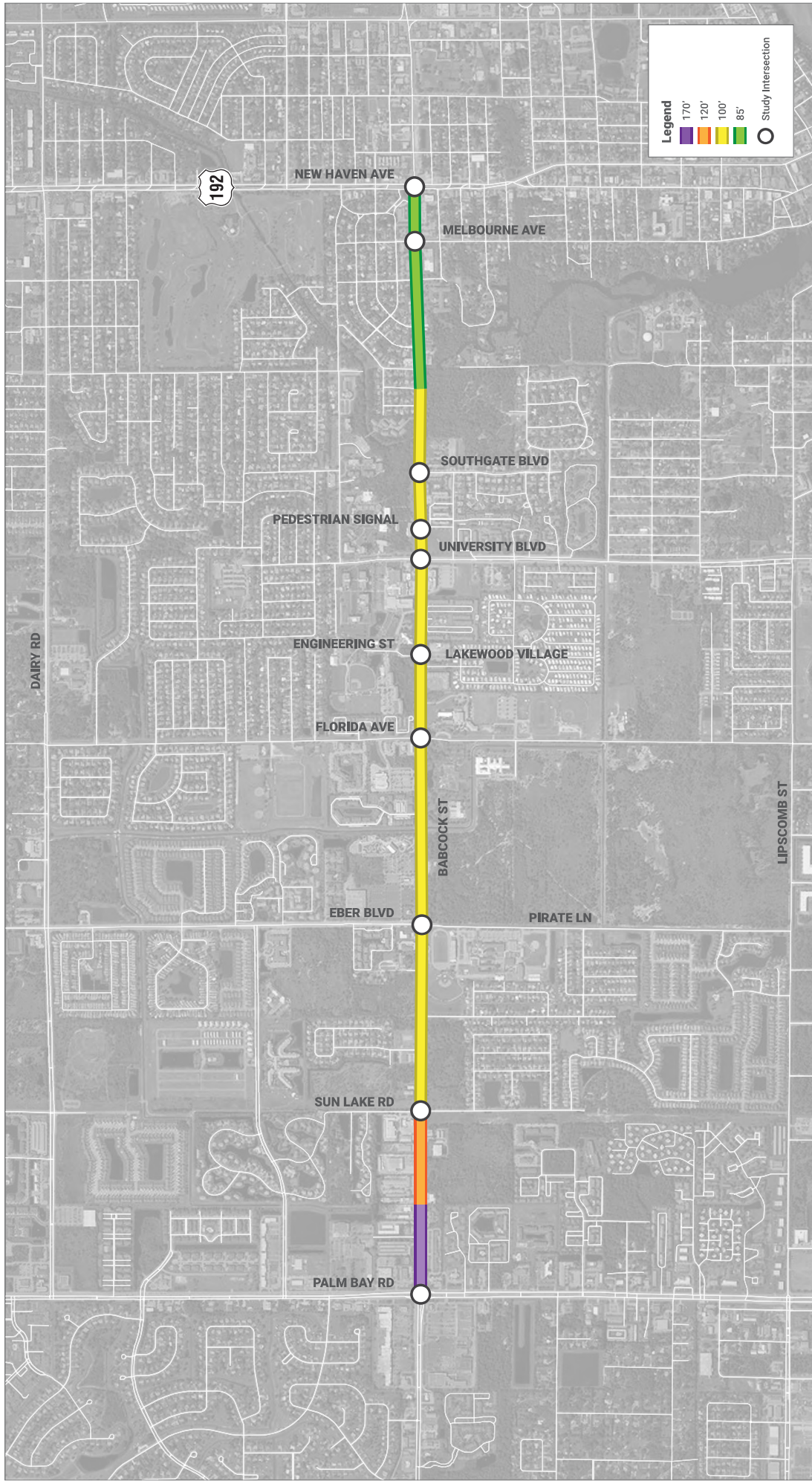
TYPICAL SECTION
SR 507
BABBLING BROOK LANE TO MELBOURNE AVENUE



TYPICAL SECTION
SR 507
CRANE CREEK BRIDGE



FIGURE 17B | Typical Sections



Note: ROW measured from the roadway centerline.

Babcock Street Corridor Planning Study

FIGURE 18 | Typical Right-of-Way Widths

Intersection Characteristics

The signalized intersections and key unsignalized intersections along the corridor were identified as study intersections. The study intersections are summarized as follows:

- Babcock Street at Palm Bay Road (signalized)
- Babcock Street at Sun Lake Road (unsignalized)
- Babcock Street at Eber Boulevard / Pirate Lane (signalized)
- Babcock Street at Florida Avenue (signalized)
- Babcock Street at Engineering Street / Lakewood Village (offset, unsignalized)
- Babcock Street at University Boulevard (signalized)
- Babcock Street at Pedestrian Crossing (signalized)
- Babcock Street at Southgate Boulevard (signalized)
- Babcock Street at Melbourne Avenue (signalized)
- Babcock Street at US 192 (signalized)

Intersection geometry was determined through aerial and street view imagery from Google Earth taken in 2017. The Study Team performed a field review to verify the intersection lane configurations. Intersection traffic control and geometric lane configurations for each study intersection are illustrated in **Figure 19**.

Pedestrian and Bicycle Facilities

Figure 20 illustrates the bicycle and pedestrian facilities along the study corridor. Sidewalks are present along most of the developed property on the corridor. The sidewalk coverage is described below.

- 92 percent sidewalk coverage on both sides of Babcock Street
- 8 percent sidewalk coverage on only one side of Babcock Street
- 0 percent with no sidewalk coverage

The sidewalk generally ranges from 4 to 6 feet along Babcock Street. The sidewalk is at the back-of-curb in several locations, and in other sections the sidewalk is buffered from the curb by as little as two feet or as much as 30 feet. The sidewalk across Crane Creek Bridge is buffered by a guard rail. Street trees are provided along the east side of Babcock Street in various locations with some shade also provided by the natural landscape.

The sidewalk on the west side of Babcock Street from Palm Bay Road to Sun Lake Road includes a 1,000-foot paved asphalt section which has cracked and begun to erode in many locations. In the same section, there is a 1,200-foot sidewalk gap on the east side of Babcock Street.

Opportunities to cross Babcock Street are provided at the seven signalized intersections and the one signalized pedestrian crossing. Half-mile to one-mile spacing between crossings south and north of FIT provide little opportunity for pedestrians to cross Babcock Street. Three of the signalized crossings are near FIT's campus with average spacing of 625 feet, and the two closely-spaced signalized intersections at the north end of the corridor have a spacing of approximately 700 feet.

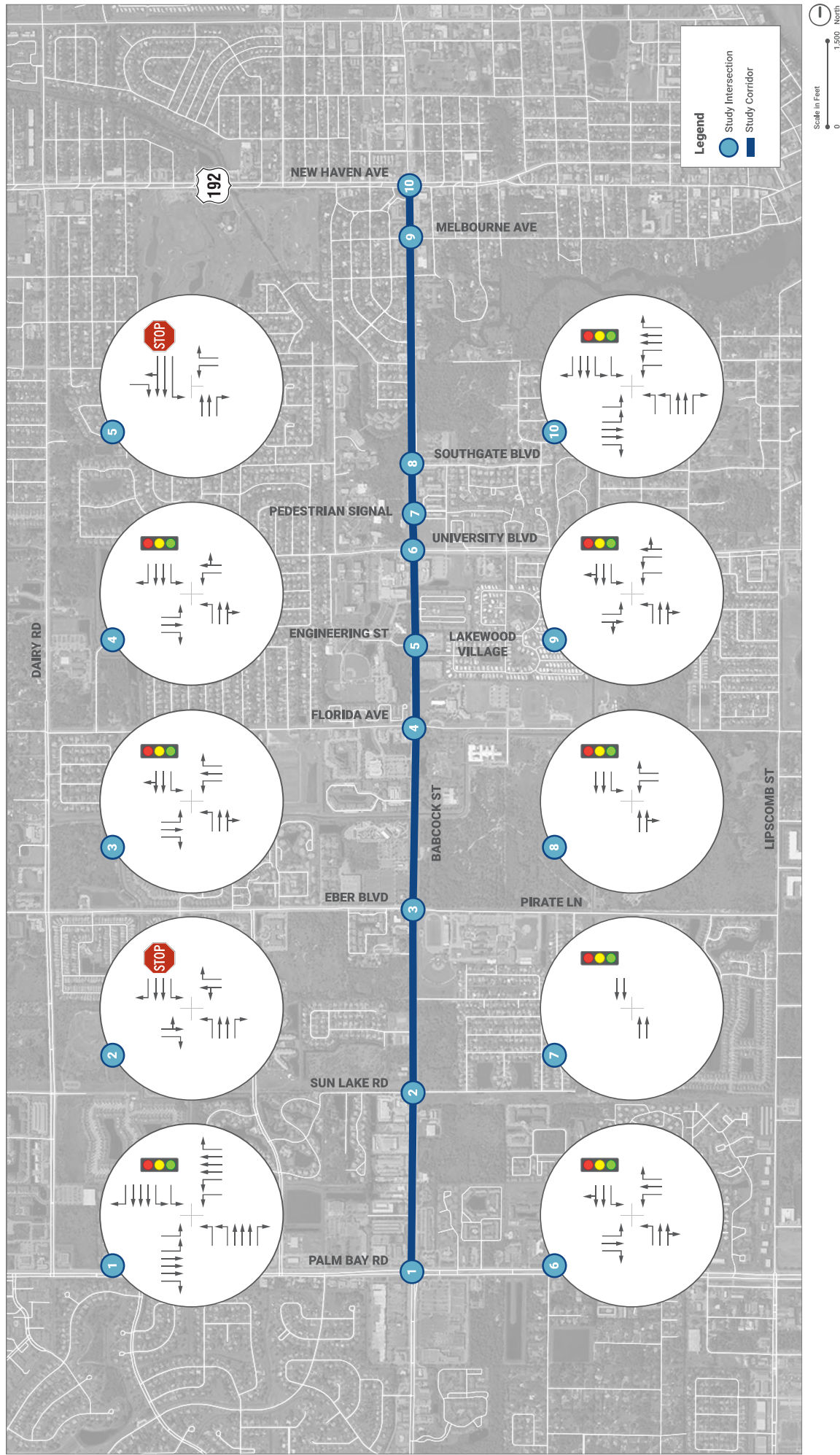


FIGURE 19 | Study Intersection Characteristics

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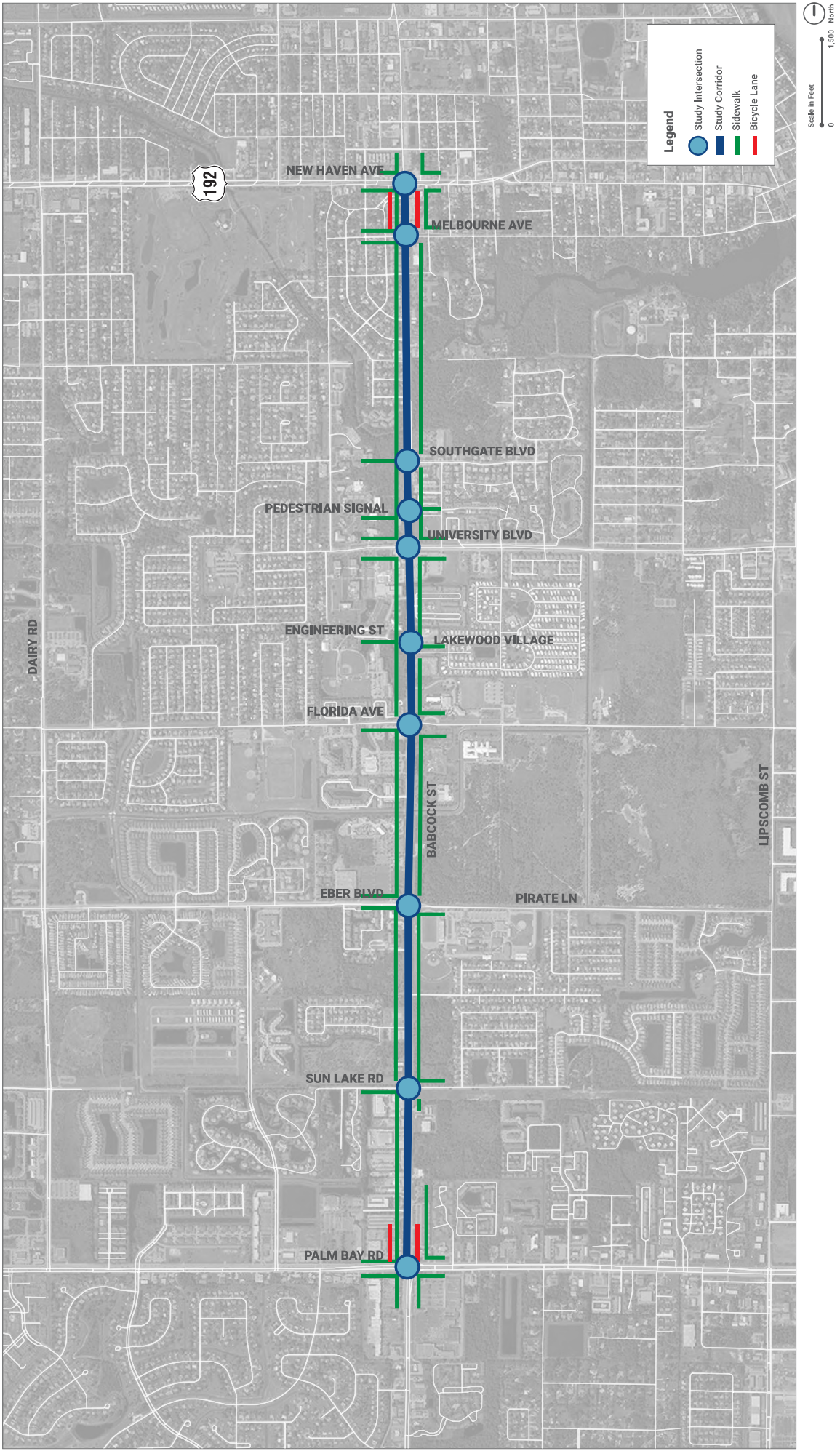


FIGURE 20 | Pedestrian and Bicycle Facilities

Babcock Street Corridor Planning Study

Babcock Street has marked bicycle lanes in both directions between Melbourne Avenue and US 192 and keyhole bicycle lanes connecting to 5-foot wide shoulders within ¼-mile of the Palm Bay Road intersection. These bicycling facilities lack buffer from the travel lanes, creating an uncomfortable riding environment. Bicycle facilities are not provided on the other parts of the corridor (approximately 85 percent). An 8-foot wide sidewalk is provided from Sun Lake Road to Melbourne Avenue (2.35 miles) on Babcock Street's west side, which runs along FIT's frontage and is regularly used for walking and bicycling.

Transit Facilities

Multiple transit routes run along and across the study corridor, as shown in **Figure 21**. Bus routes 1, 21, 25, 26, and 27 run along the study corridor, and bus routes 21, 26, and 27 cross the corridor at University Boulevard or US 192. These routes have 21 bus stops on the study corridor within 1,000 feet of the corridor. These routes run with a range of headways from 30 minute to two hours during the weekday. Based upon available onboarding information, the highest ridership stop in the corridor vicinity is in the Florida Institute of Technology campus near the intersection of Babcock Street and University Boulevard, with a total of 69 daily onboardings. The highest ridership stop on the study corridor is at Palm Bay Road at Las Palmas Shopping Center with 45 daily onboardings. Out of 949 stops in the Space Coast Area Transit System, Babcock Street at Florida Tech is the 32nd highest ridership stop, while Babcock Street at Las Palmas Shopping Center (north of Palm Bay Road) is among the top 100.

The Transit Development Plan 2018 has plans to increase the frequency on all routes, extend service on all existing routes, implement Sunday Service on all routes, split route 26 into two routes, and add the fixed routes of Melbourne-Sebastian via US 1 and Palm Bay-Barefoot Bay via US 1.

Utilities

A Sunshine One Call ticket was requested for Babcock Street within the project limits in Brevard County. The Sunshine One Call verified the following utilities along the study corridor:

- Traffic Signals;
- CATV;
- Water;
- Gas;
- Fiber Optic;
- Electric;
- Wastewater Re-Use;
- Telephone; and
- Sewer.

Utility poles are located near the edge of the paved roadway in the following locations:

- Along the southbound right turn lane into Misty Oak Drive
- Along the southbound right turn lane into Cinnamon Lake Circle
- Along the southbound right turn lane into Lake in the Woods Drive
- Along the southbound right turn lane into British Petroleum fuel station
- Along the east side of Babcock Street for 0.06 miles south of Habitat for Humanity
- Along the northbound right turn lane into Health First Babcock Center

Appendix D contains the Sunshine One Call specifying the companies operating the various utilities along the corridor for Brevard County.

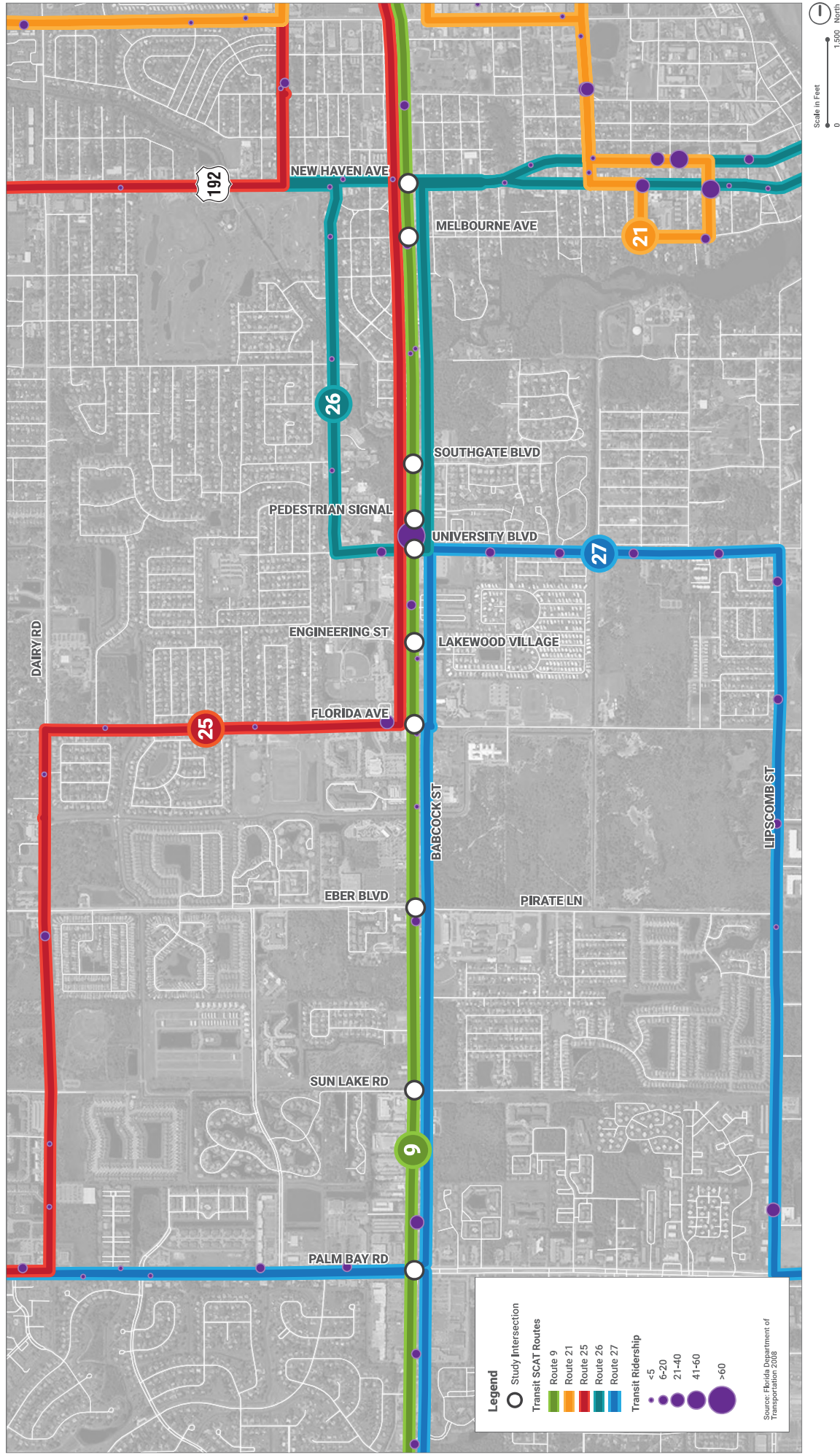


FIGURE 21 | Transit Routes and Ridership

Babcock Street Corridor Planning Study

Multimodal Traffic Operations

An existing traffic operations analysis was completed using Highway Capacity Manual (HCM) methodologies to evaluate existing operational conditions on the study corridor and intersections. This section describes the data collection, AM and PM peak hour field observations, and the results of the existing traffic operations analysis.

Data Collection

Weekday segment volumes along the study corridor were obtained from SCTPO's annual count program and are summarized in **Table 2** and illustrated in **Figure 22**.

Table 2: Existing (2017) Segment Volumes

Roadway	Count Type	Count Dates	AADT
Palm Bay Road to Eber Boulevard	SCTPO Count Station	2017	33,100
Eber Boulevard to Florida Avenue	SCTPO Count Station	2017	35,900
Florida Avenue to University Boulevard	SCTPO Count Station	2017	37,700
University Boulevard to Melbourne Avenue	SCTPO Count Station	2017	34,600
Melbourne Avenue to US 192	SCTPO Count Station	2017	31,800

Intersection turning volumes were collected at the study intersection during the AM peak period (7-9 AM) and PM peak period (4-6 PM) on Wednesday, August 29, 2018, while school was in session. The count at the offset intersection of Engineering Street / Villagewood Place was retaken on Thursday, September 27, 2018, due to an error on the initial collection date. The raw intersection turning movement counts were adjusted in a series of steps to prepare for the intersection operational analysis:

1. A system peak hour was determined to provide a consistent operational analysis.
2. The raw counts were adjusted for seasonal variability using a seasonal factor of 1.12 obtained from the FTI.
3. Due to the presence of driveways along the corridor, traffic volumes were not balanced between intersections, with the exception of the segments between the Pedestrian Signal and University Boulevard, Engineering Street and Lakewood Village Place, and southbound from Lakewood Village Place to Florida Avenue.

The AM and PM peak hour intersection volumes are illustrated in **Figure 23** and **Figure 24**, respectively. Pedestrian and bicycle volumes were also collected at the intersection crosswalks. The AM and PM peak hour crosswalk volumes are illustrated in **Figure 25**. Supporting information from Florida Traffic Online and the raw intersection count data is provided in **Appendix E**.

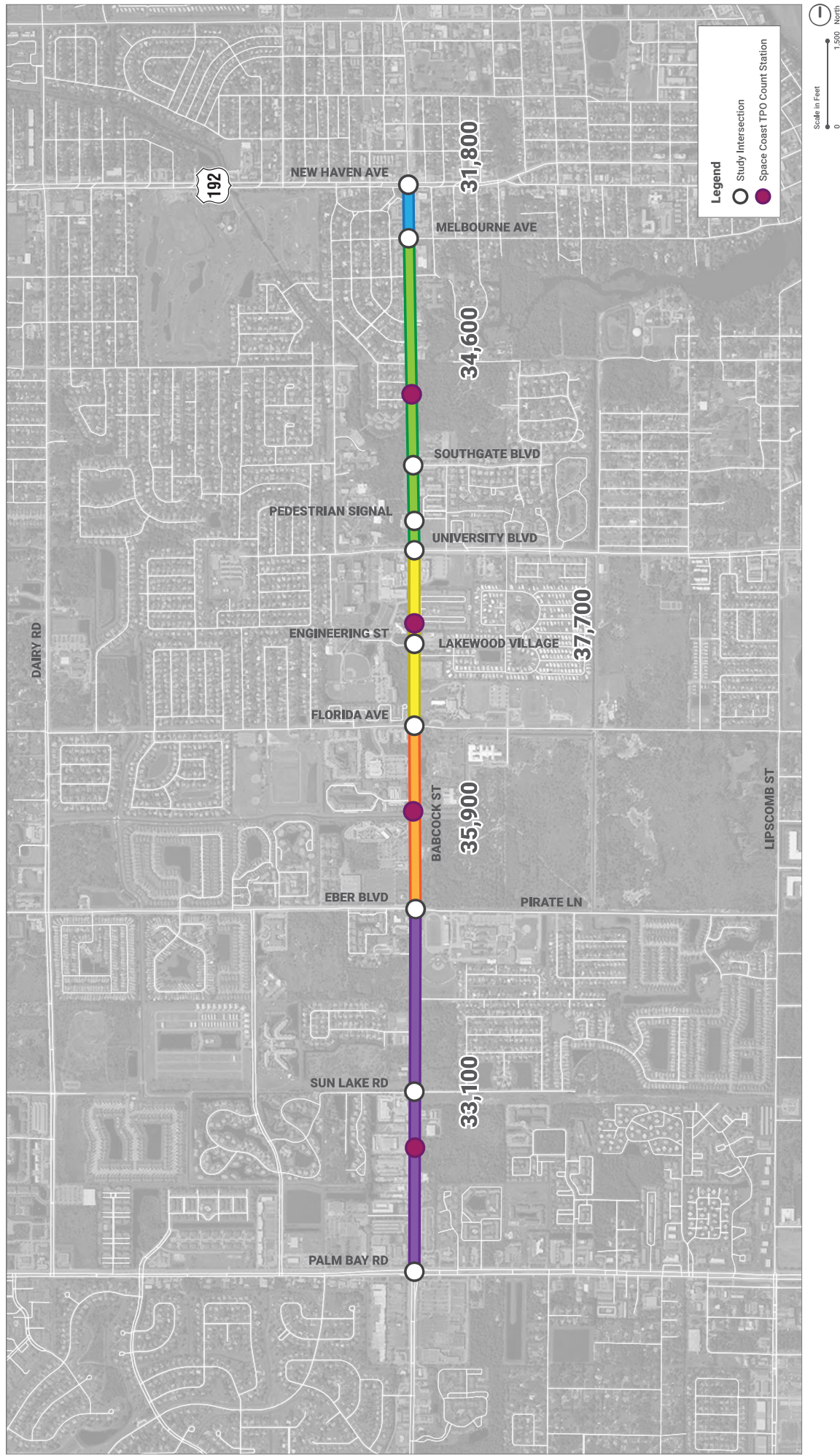


FIGURE 22 | 2017 Annual Average Daily Traffic

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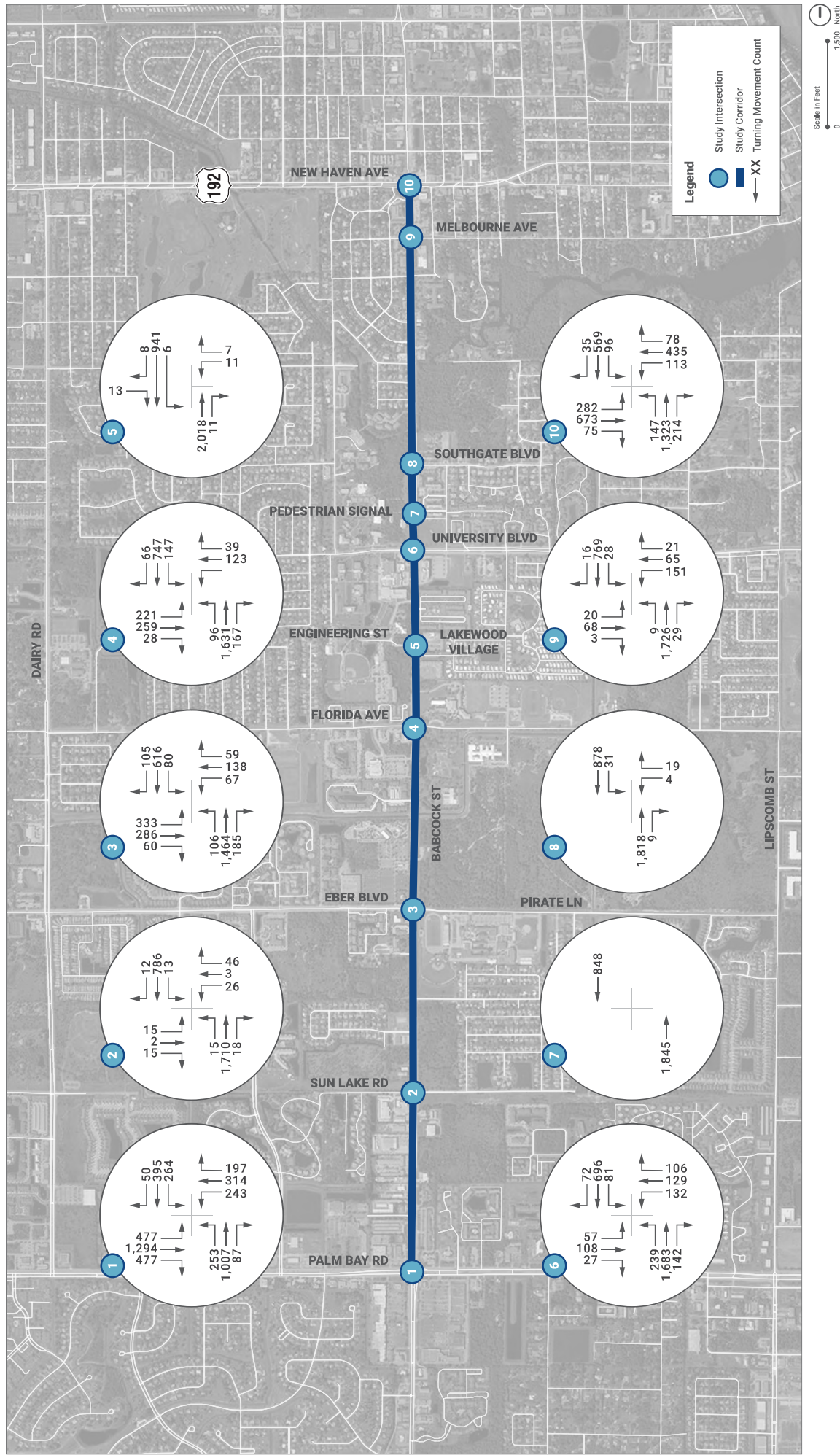


FIGURE 23 | 2018 AM Peak Hour Intersection Volumes

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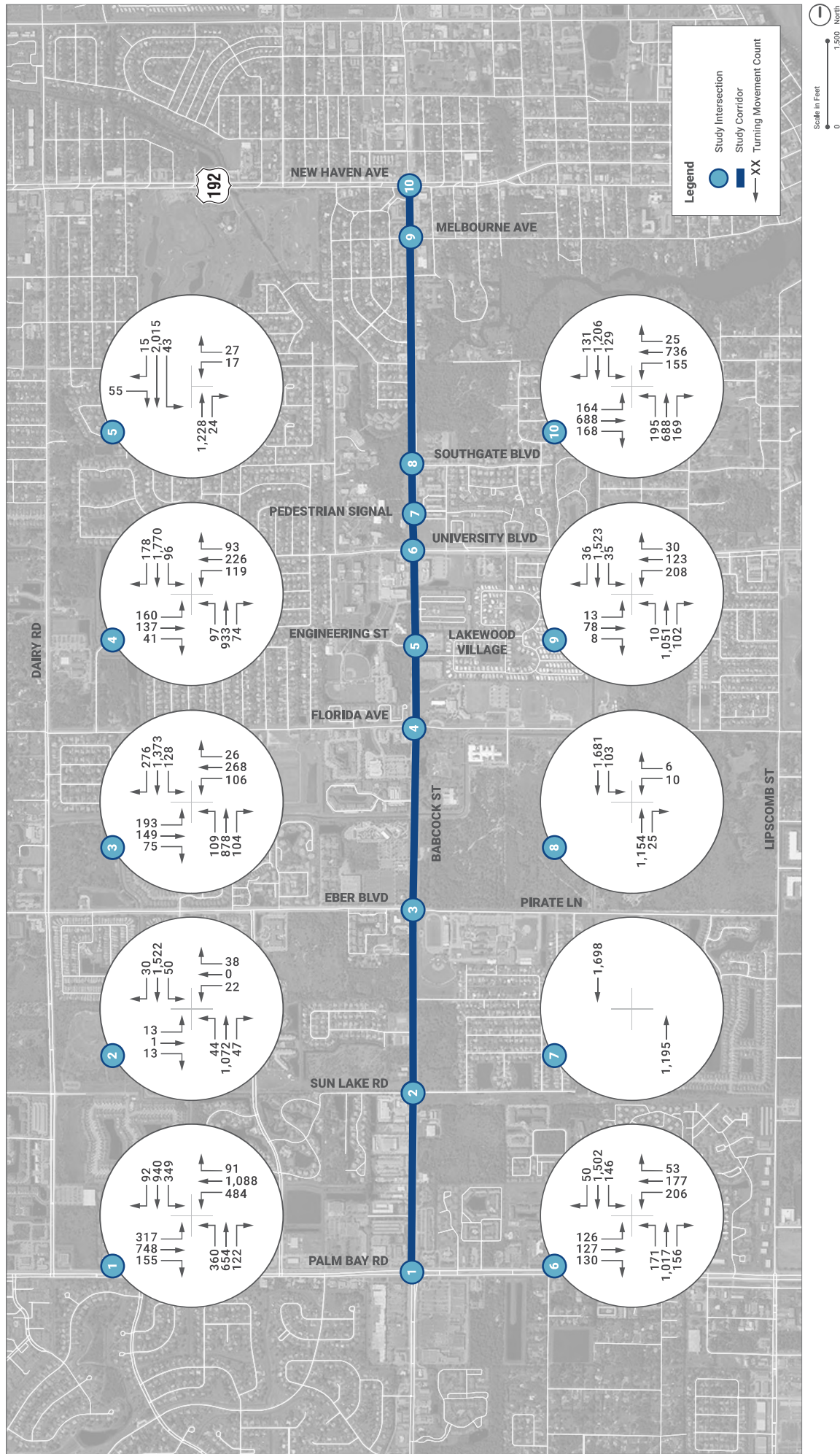


FIGURE 24 | 2018 PM Peak Hour Intersection Volumes

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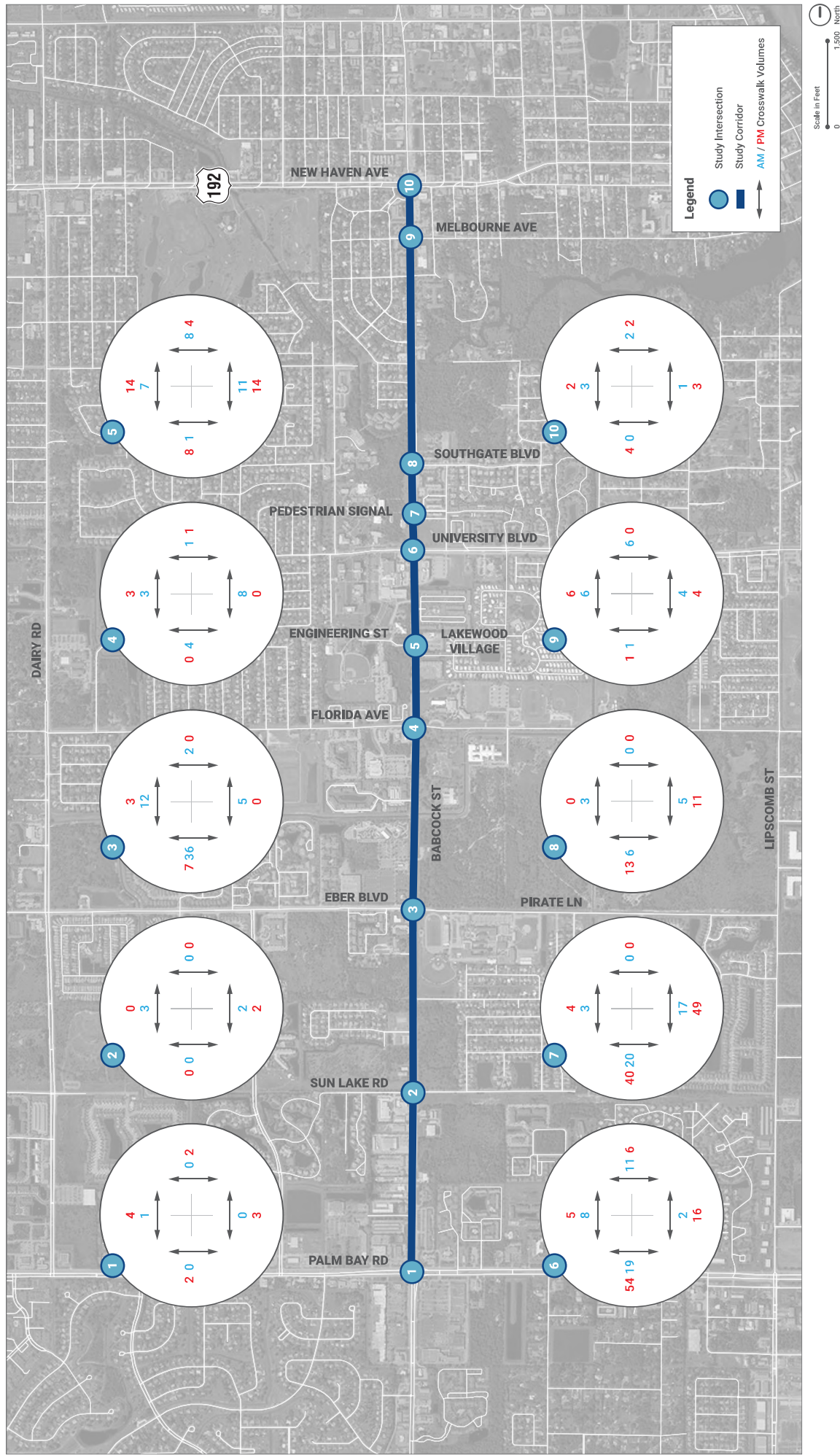


FIGURE 25 | 2018 Peak Hour Pedestrian and Bicycle Crosswalk Volumes

Babcock Street Corridor Planning Study

Peak Period Field Observations

To verify existing traffic operations along the Babcock Street study corridor during the AM and PM peak hours, the Study Team performed a field review on Wednesday August 29, 2018. The following are observations from these field reviews.

AM Peak Period

- The northbound queue at **Palm Bay Road** extends back approximately 600 feet to the upstream directional median opening, and the cycle sometimes did not clear the entire queue.
 - High demand was noted for the northbound left-turn movement.
 - Approximately two-thirds of northbound right-turns occurred on red.
- Westbound left-turn queue at **Pirate Lane/Eber Boulevard** extends back approximately 500 feet to Palm Bay High School driveway (**Figure 26**).
 - Congestion at the high school driveway began to create a queue for eastbound vehicles on Pirate Lane. It was observed that approximately seven westbound left-turn vehicles were processed each cycle.
 - The northbound queue extends approximately 800 feet, but the green time given allowed the northbound queue – along with the southbound queue and the eastbound queue on Florida Avenue – to clear without issue.

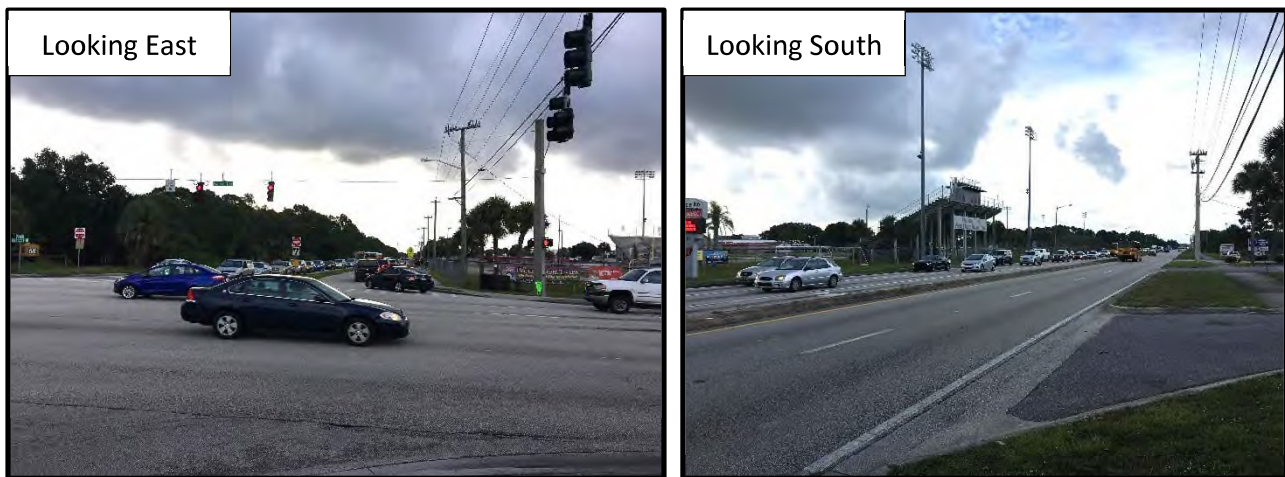


Figure 26: Traffic Queueing Westbound and Northbound at Pirate Lane/Eber Boulevard

- Heavy northbound queueing was observed at **US 192** and extended approximately 1,200 feet to Devonshire Drive (**Figure 27**). It was later noted that construction activity reduced Babcock Street to one northbound lane north of US 192, causing the northbound queueing through the US 192 and Melbourne Avenue intersections. This is considered a nonrecurring (i.e., irregular) observance caused by construction activity.



Figure 27: Traffic Queueing Northbound at US 192 and Melbourne Avenue

PM Peak Period

- Bicyclists and pedestrians were seen crossing between signalized intersections at FIT particularly between Engineering Street and University Boulevard (**Figure 28**).

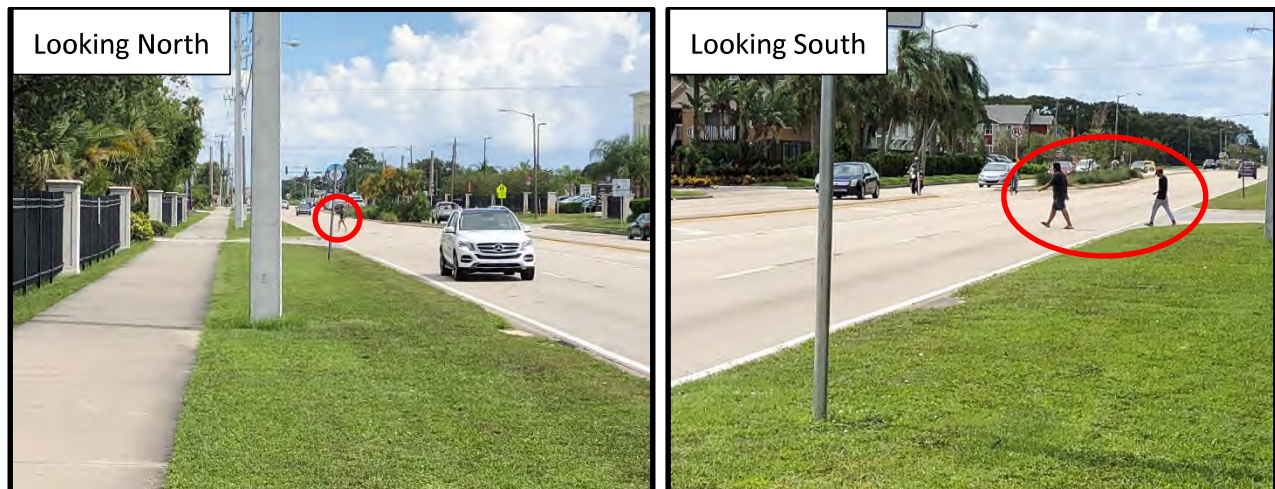


Figure 28: Pedestrians Crossing Babcock Street Between Signalized Intersections

- Conflicts were observed between vehicles turning right to head south onto Babcock Street and pedestrians and bicyclists crossing Babcock Street at University Boulevard during the ped crossing phase (**Figure 29**).



Figure 29: Pedestrians and Bicyclists Crossing Babcock Street at University Boulevard

Roadway Segment Operations

Roadway segments operations were evaluated in terms of Level of Service and average travel speeds.

Level of Service Evaluation

FDOT's policy ([Topic No.: 000-525-006-c](#)) defines the LOS target for a specific facility by the facility's area type. Roadways within an urbanized area have an LOS target of D, and roadways outside an urbanized area have an LOS target of C. Babcock Street is classified as an Urban Principal Arterial and has an FDOT target LOS of D. For the segment analysis, Babcock Street was divided into six (6) individual segments between signalized intersections in the study area. The six segments are displayed in **Figure 30**.

An evaluation of the existing LOS along Babcock Street was performed by comparing segment AADTs versus the LOS volume threshold from the [FDOT Generalized LOS Tables](#) (see **Appendix F**) found in the 2013 FDOT Quality/LOS Handbook. Based on Babcock Street's functional classification (urban arterial) and posted speed limits, class 1 volume thresholds from "Table 1 – Generalized Annual Average Daily Volumes for Urbanized Areas" were used for segments south of Melbourne Avenue, and Class 2 volume thresholds were used for the segment north of Melbourne Avenue. The service volume thresholds were increased by five percent for the segment from Florida Avenue to University Boulevard and Melbourne Avenue to US 192 due to the presence of exclusive right-turn lanes at signalized intersections. The roadway segment analysis is summarized in **Table 3**. In the existing condition, all segments meet the LOS target based on the FDOT generalized LOS evaluation.

A multimodal LOS was also completed and is shown in **Table 4**. This analysis evaluated the bicycle and pedestrian LOS along the corridor utilizing the multimodal LOS thresholds from the FDOT Generalized LOS Tables. The bicycle LOS scores were typically lower due to the lack of bicycle facilities on those segments.

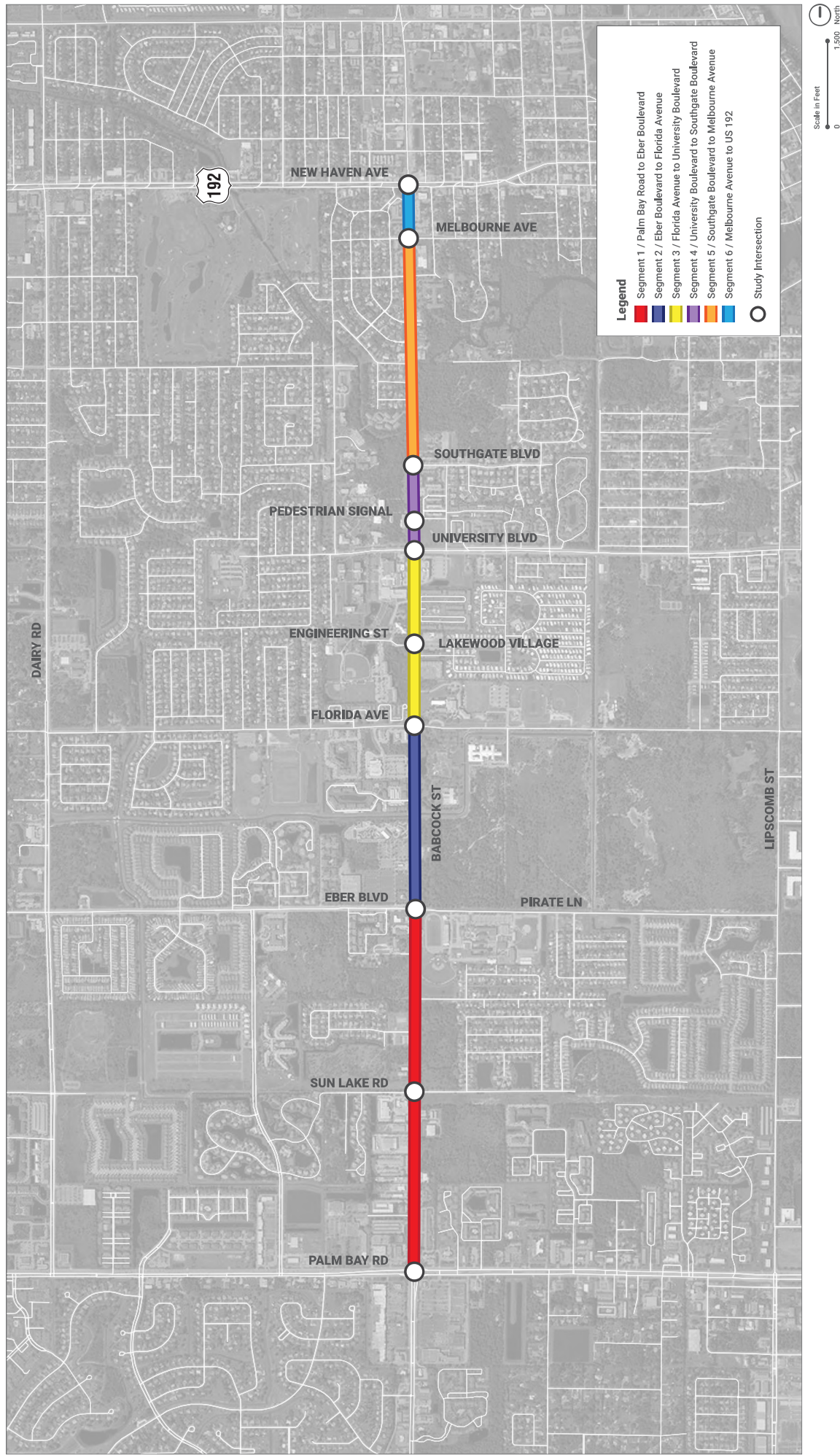


FIGURE 30 | Segments for Operational Analysis

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Table 3: 2017 Roadway Segment Analysis

Segment	No. Lanes	AADT	Posted Speed	FDOT LOS Target	Adjusted LOS Volume Standard	LOS
Palm Bay Road to Pirate Lane/Eber Boulevard	4LD	33,100	45	D	39,800	C
Pirate Lane/Eber Boulevard to Florida Avenue	4LD	35,900	45	D	39,800	C
Florida Avenue to University Boulevard	4LD	37,700	45	D	41,800	C
University Boulevard to Southgate Boulevard	4LD	34,600	40	D	39,800	C
Southgate Boulevard to Melbourne Avenue	4LD	34,600	40	D	39,800	C
Melbourne Avenue to US 192	4LD	31,800	35	D	34,000	D

*Source: 2013 FDOT Quality/LOS Handbook Tables

Table 4: 2017 Pedestrian and Bicycle LOS Analysis

Segment	AADT	Posted Speed	Bike Lane Coverage	Bicycle LOS Score	Sidewalk Coverage	Pedestrian LOS Score	Transit LOS
Palm Bay Road to Pirate Lane/Eber Boulevard	33,100	45	25%	E	88%	D	F
Pirate Lane/Eber Boulevard to Florida Avenue	35,900	45	0%	E	100%	E	F
Florida Avenue to University Boulevard	37,700	45	0%	E	100%	E	D
University Boulevard to Southgate Boulevard	34,600	40	0%	E	100%	D	D
Southgate Boulevard to Melbourne Avenue	34,600	40	0%	E	100%	D	D
Melbourne Avenue to US 192	31,800	35	100%	C	100%	D	D

*Source: 2013 FDOT Quality/LOS Handbook Tables