

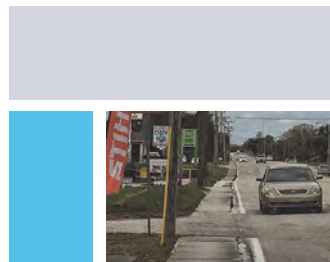
2017

WICKHAM ROAD

OPERATIONAL ANALYSIS

Final Report

Eau Gallie Boulevard to Lake Washington Road



Prepared for:
Space Coast Transportation Planning Organization
2725 Judge Fran Jamieson Way
Melbourne, FL 32940
spacecoasttpo.com

Prepared by:
Kittelson & Associates, Inc.
225 E. Robinson Street, Suite 450
Orlando, FL 32801
kittelson.com



FINAL REPORT

Wickham Road Operational Analysis

From Eau Gallie Boulevard to Lake Washington Road
Brevard County, Florida

Prepared For:
Space Coast Transportation Planning Organization
2725 Judge Fran Jamieson Way, Building B, Room 105
Melbourne, FL 32940

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- Appendix D Wickham Road Public Involvement Comments and Coordination Summary

Report Purpose

This document serves as the final report for the Wickham Road Operational Analysis. This report provides an overview of the study, defines the purpose and need, analyzes existing conditions and future no build/build conditions, and reviews the future alternative development and analysis. This final report will provide potential improvement alternatives for future phases of project development (i.e. Design).

Introduction

PROJECT DESCRIPTION

Kittelson & Associates, Inc. (KAI) was retained by the Space Coast Transportation Planning Organization (SCTPO) to conduct an operational analysis of Wickham Road between Eau Gallie Boulevard and Lake Washington Road. Wickham Road is a key north/south arterial in Brevard County, starting at US 192 in the south and ending west of I-95 to the north. The scope of this study will address the observed congestion and safety issues on Wickham Road while also incorporating multi-modal solutions to facilitate pedestrian, bicycle, and transit movement within the study limits.

PROJECT GOALS

The following summarizes the goals identified for the Study:

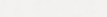
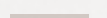
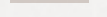

- Assess capacity improvement at the signalized intersections along the study corridor and recommend a feasible preferred alternative at each intersection, targeting congestion reduction;
- Assess alternatives to provide improved pedestrian, bicycle, and transit facilities along the length of the corridor, with an emphasis at signalized intersections, and recommend a feasible preferred alternative targeting pedestrian/bicycle mobility;
- Assess typical section changes such as constructing raised medians to reduce vehicular conflicts and improve safety along the corridor; and
- Solicit input from the public throughout the course of the project. A Project Advisory Team (PAT) was developed for the purposes of providing guidance for the preferred alternative.

STUDY AREA DESCRIPTION

Wickham Road from Eau Gallie Boulevard to Lake Washington Road is classified as an urban principal arterial – other. The annual average daily traffic (AADT) along this section ranges from approximately 32,000 to 35,000 based on the counts collected in late 2016. Wickham Road is primarily surrounded by commercial/retail land uses along the length of the corridor. Residential land uses are present behind the commercial/retail development in the surrounding areas. The study corridor is illustrated in **Figure 1**. Wickham Road falls within the jurisdiction of both the City of Melbourne and Brevard County within the study corridor limits.



LEGEND

-  Study Corridor
-  City of Melbourne
-  Brevard County
-  Signalized Intersection

Scale in Feet
 0 700 North

Previous/Ongoing Studies and Future Improvements

During the existing conditions data collection and PAT Kick-Off Meeting, the Study Team obtained information on the following studies:

- Wickham Road between Sarno Road and Parkway Drive – Road Safety Audit (Completed in June 2016);
- Wickham Road and Eau Gallie Boulevard Feasibility Study (July 2016);
- Aurora Road Corridor Study (Ongoing Study); and
- Aurora Road Sidewalk Improvements (Short Term Improvement).

The following summarizes the locations of the previous/ongoing studies and future improvement projects along and within the immediate vicinity of the study corridor. The information presented in this section has been summarized from the *Wickham Road Existing Conditions Summary*, which is provided in **Appendix A**.

WICKHAM ROAD SAFETY AUDIT – JUNE 2016

The SCTPO completed a Road Safety Audit (RSA) for Wickham Road between Sarno Road and Parkway Drive. The RSA evaluated crash history to identify a prioritized list of short-term/maintenance-type, near-term, and long-term recommendations. These recommendations were developed to address vehicular and multi-modal mobility and safety needs. The RSA also assigned a qualitative risk rating for the issues observed along the Wickham Road study corridor. **Category III** issues have the greatest risk compared to the other issues (summarized in **bold** below). **Category II** issues indicate higher risk than some issues and lower risk relative to other observed issues. **Category I** issues indicate the least risk compared to the other observed issues. The following summarizes the **Category III**, **Category II**, and **Category I** issues and specific recommendations for the corridor and at specific high crash locations identified in the RSA that are applicable to the study limits of this study:

- Corridor-wide
 - Category III Issues
 - Left-Turn Movements at Signalized Intersections along Wickham Road
 - Unsignalized Crosswalk at Trimble Road
 - Incomplete Pedestrian Facilities at the Aurora Road and Lake Washington Road Intersections
 - Category II Issues
 - Lack of Right-Turn Lanes at Signalized Intersections
 - Intersection Crosswalk Markings
 - Lack of Sidewalks along Wickham Road
 - Lighting from Aurora Road to Lake Washington Road
 - Category I Issues
 - Observed Americans with Disabilities Act (ADA) Issues
 - Street Name Signage Visibility
 - School Zone Extents

- Intersections
 - Eau Gallie Boulevard Intersection
 - **Right-Turn Phase Conflict with Pedestrians Crossings at Eau Gallie Boulevard (Category III)**
 - Eastbound Right-Turn Curb Radius Return (Category I)
 - Aurora Road Intersection
 - **Incomplete Pedestrian Facilities (Category III)**
 - Westbound Through Movement Alignment (Category I)
 - Northgate Plaza Intersection
 - Lack of Pedestrian Facilities (Category II)
 - Lake Washington Road Intersection
 - **Incomplete Pedestrian Facilities (Category III)**
 - Driveway Turn Movement Conflicts (Category II)
 - Pedestrian Crosswalk Alignment on the Southbound Approach at Lake Washington Road (Category II)
 - Westbound Lane Drop (Category I)

As part of the RSA, the Space Coast Area Transit’s Americans with Disabilities Act (ADA) report was reviewed for the transit stops along the study corridor and the recommendations from the ADA report were incorporated into the RSA. The transit improvements identified previously will be included as part of the preferred concept development discussed later in this report. The specific transit improvements are summarized in the **Alternative Analysis and Development** section.

WICKHAM ROAD AND EAU GALLIE BOULEVARD TURN LANE ADDITIONS – JULY 2016

Brevard County, in partnership with the City of Melbourne, conducted a feasibility study at the intersection of Wickham Road and Eau Gallie Boulevard to improve safety and operations. The results of the feasibility study recommended the installation of a 535’ exclusive southbound right-turn lane and 710’ exclusive northbound right-turn lane. Concepts were developed to identify potential impacts to adjacent properties and utilities. The feasibility study identified that additional right-of-way and construction easements are necessary. Impacts to three adjacent properties on either side of Wickham Road are anticipated. Relocation of four Florida Power and Light (FPL) power poles along the east side of Wickham Road is also necessary. The draft feasibility study was submitted to the County in July 2016; however, the County wishes to combine improvements identified as part of this Operational Analysis Study with the improvements identified in the turn lane feasibility study.

AURORA ROAD CORRIDOR STUDY

The SCTPO is currently studying Aurora Road from Wickham Road to Stewart Avenue to explore alternatives to improve pedestrian and bicycle facilities and to address safety issues, traffic operations, and transit mobility along the corridor. The Aurora Road Corridor Study will be ongoing with the Wickham Road Operational Analysis Study; however, it is scheduled to finish approximately four months after the Wickham Road Study (May 2018). The preferred alternative at the Wickham

Road/Aurora Road intersection was coordinated with the Aurora Road Corridor Study to maintain consistency between the two projects.

AURORA ROAD SIDEWALK IMPROVEMENTS

Brevard County is finalizing right-of-way acquisition for a planned eight-foot sidewalk connection along the north side of Aurora Road, west of Wickham Road, from Marywood Lane to Wickham Road (approximately 1.5 miles of new sidewalk). The County is also in the process of obtaining construction funding for this project.

Existing Facility Characteristics

The information presented in this section has been summarized from the *Wickham Road Existing Conditions Summary*, which is provided in **Appendix A**. For more detail on the existing analysis, please reference this report.

LAND USE AND COMMUNITY CHARACTERISTICS

Figure 2 displays the residential communities that exist along or near the Wickham Road study corridor. Most of these communities do not front Wickham Road. Lansing Ridge has direct access to Wickham Road at Lansing Street; however, most communities connect to Wickham Road using minor streets such as Lake Washington Road, Aurora Road, and Eau Gallie Boulevard.

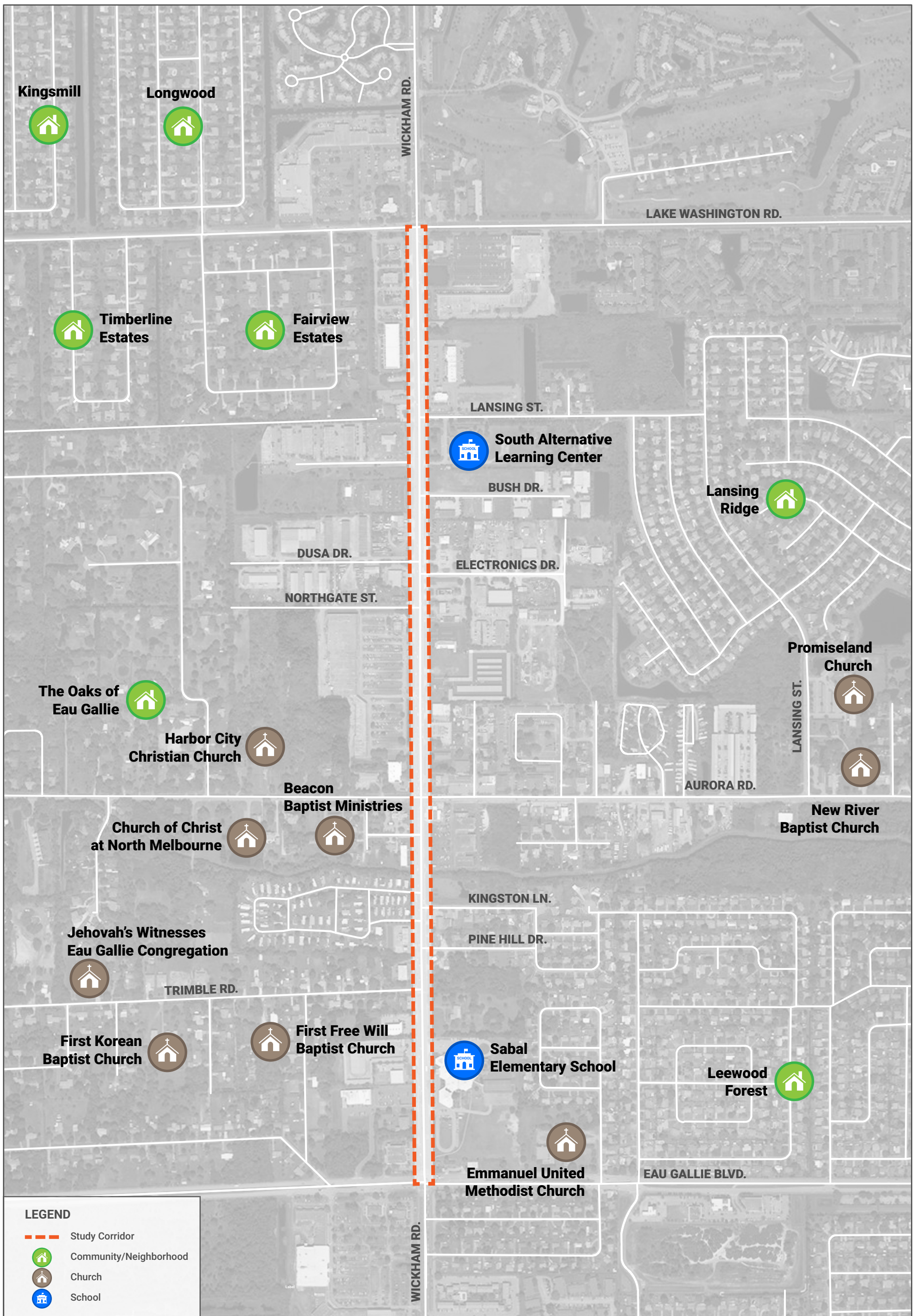
Figure 2 also displays the community features (places of worship and schools) present along and near the Wickham Road study corridor. There are two schools located along Wickham Road:

- Sabal Elementary School (northeast corner of the Wickham Road/Eau Gallie Boulevard intersection:
 - School hours: 8:00 AM – 2:30 PM
 - Early release on Wednesdays: 8:00 AM – 1:15 PM
 - School zone with overhead structure: 15 mph zone when flashing
 - Crossing guards are present at the intersections of Eau Gallie Boulevard and Trimble Road to facilitate children crossing the street
- South Alternative Learning Center (southeast corner of the Wickham Road/Lansing Street intersection:
 - School hours: 7:00 AM – 3:00 PM





STORMWATER AND DRAINAGE BASIN CHARACTERISTICS

Wickham Road is located within the St. Johns River Water Management District (SJRWMD). The study corridor lies within the Water Body Identification (WBID) 3082, Eau Gallie River, which is classified as an impaired basin for nutrients (chlorophyll-a). The project has an adopted Total Maximum Daily Load (TMDL) for fecal coliform. The project corridor is also part of an existing Basin Management Access Plan (BMAP).

Wickham Road has a closed drainage system with curb and gutter along the entire study corridor. The stormwater management facilities that provide water quality treatment for Wickham Road are limited to one existing FDOT and one Brevard County stormwater pond. No current relevant SJRWMD permits were found. A field review was conducted on Tuesday, February 28, 2017 and examples of existing drainage features are illustrated in **Figure 3**.



LEGEND

-  Study Corridor
-  Community/Neighborhood
-  Church
-  School

Scale in Feet
 0 700 North



Figure 3: Existing Drainage Features along Wickham Road

EXISTING UTILITIES

The following sources were used to obtain information on the existing utilities located within the project corridor:

- 1) Sunshine One Call;
- 2) Data from the City of Melbourne; and
- 3) Field visit.

The Sunshine One Call verified the following utilities along the study corridor:

- AT&T;
- Brevard County Fiber/Signal;
- Brighthouse Networks, LLC;
- City of Melbourne Utilities – Water;
- Florida City Gas;
- Florida Gas Transmission Company;
- Florida Power & Light;
- Level 3 Communications, LLC; and
- Transcore.

The overhead utilities and transmission lines lie adjacent to the west side of Wickham Road for most of the study corridor (examples shown in **Figure 4**). **Appendix A** includes the list of utilities identified along the corridor based on the Sunshine One Call.



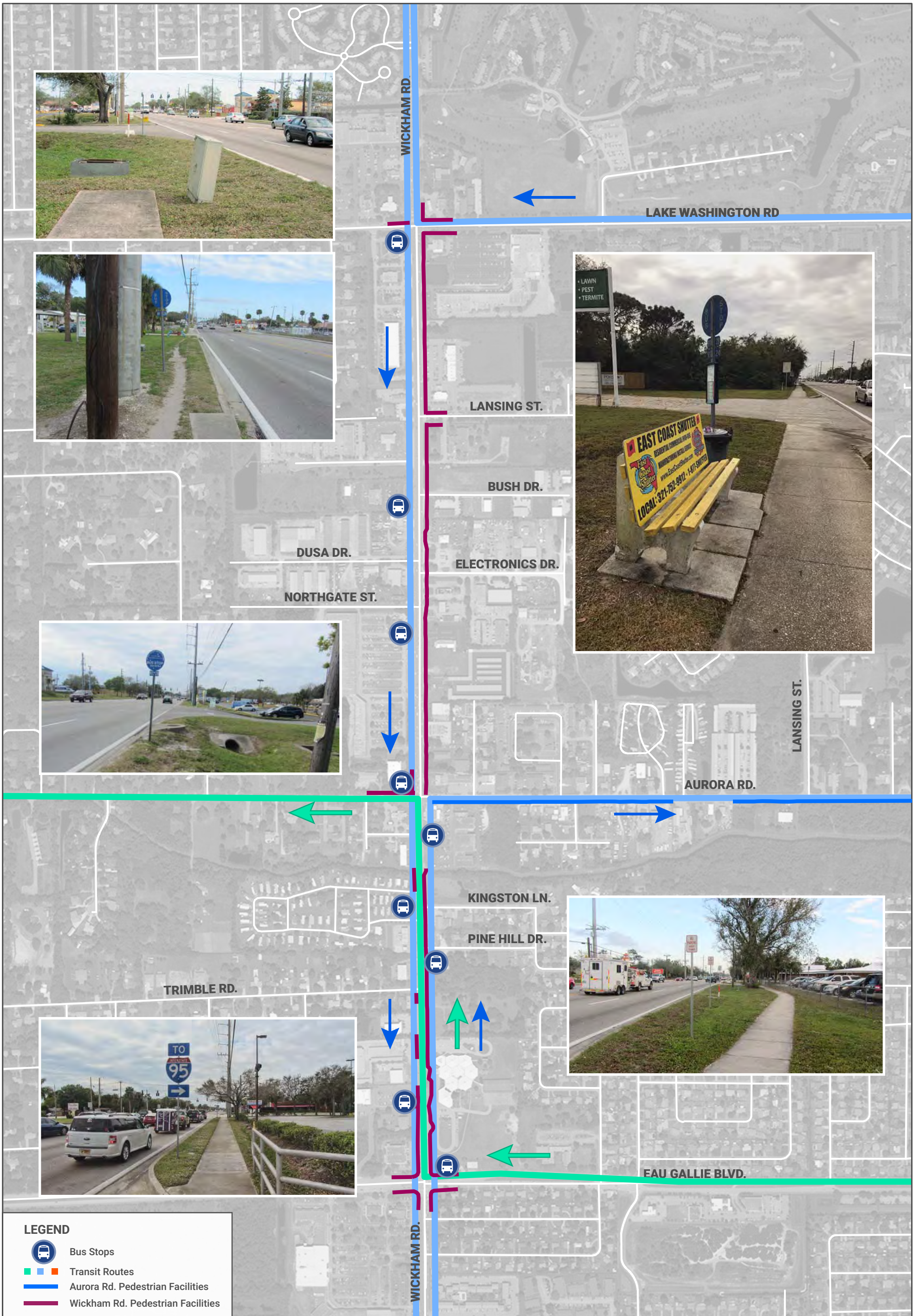
Figure 4: Adjacent Utilities along Wickham Road

PEDESTRIAN AND BICYCLE FACILITIES

Figure 5 illustrates the existing pedestrian facilities along the study corridor. A six-foot sidewalk is present along the east side of Wickham Road for the entire length of the study corridor except for a gap from approximately 450' south of Aurora Road to the southwest corner of the Aurora Road intersection. A five- to six-foot sidewalk is present along the west side of Wickham Road between Eau Gallie Boulevard to the southwest corner of the Trimble Road intersection. There are gaps in sidewalk connectivity along the remainder of the west side of Wickham Road (within the study limits) with a few short sections of sidewalk (less than 175' in length). No paved shoulders or bicycle lanes are provided along Wickham Road within the study limits.

TRANSIT FACILITIES

Space Coast Area Transit provides fixed-route service along the Wickham Road study corridor. Space Coast Area Transit Route 28 serves North Melbourne and operates on one-hour headways Monday through Saturday. There are nine stops along the study corridor, many of which include a transit stop sign only. The existing transit route and facilities are shown in **Figure 5**.



SAFETY ASSESSMENT

Crash records were obtained for Wickham Road within the study limits for the most recent five-year period on record (2011 through 2015) from the University of Florida's Signal Four Analytics Database. This section summarizes the corridor wide crash statistics and then reviews crash data for high crash locations along the study corridor. A detailed pedestrian/bicycle safety review is also discussed in this section.

Corridor Wide Crash Statistics

A summary of crash frequency by year along with their respective severity from 2011 to 2015 is displayed in **Figure 6**. There was a total of 667 crashes reported during this period, 187 of which (28 percent) resulted in at least one injury and five (5) of which resulted in at least one fatality. As displayed in **Figure 6**, the number of crashes increased in each year between 2011 and 2014 but decreased in 2015. Note the University of Florida did not have access to all local jurisdiction crash reports in 2011 and 2012, thus the reason for the disparity in crashes between 2011-2012 and 2013-2015. A more detailed summary of the 2011 to 2015 Wickham Road (overall corridor) crash data set in tabular and graphical format is provided in **Appendix A**.

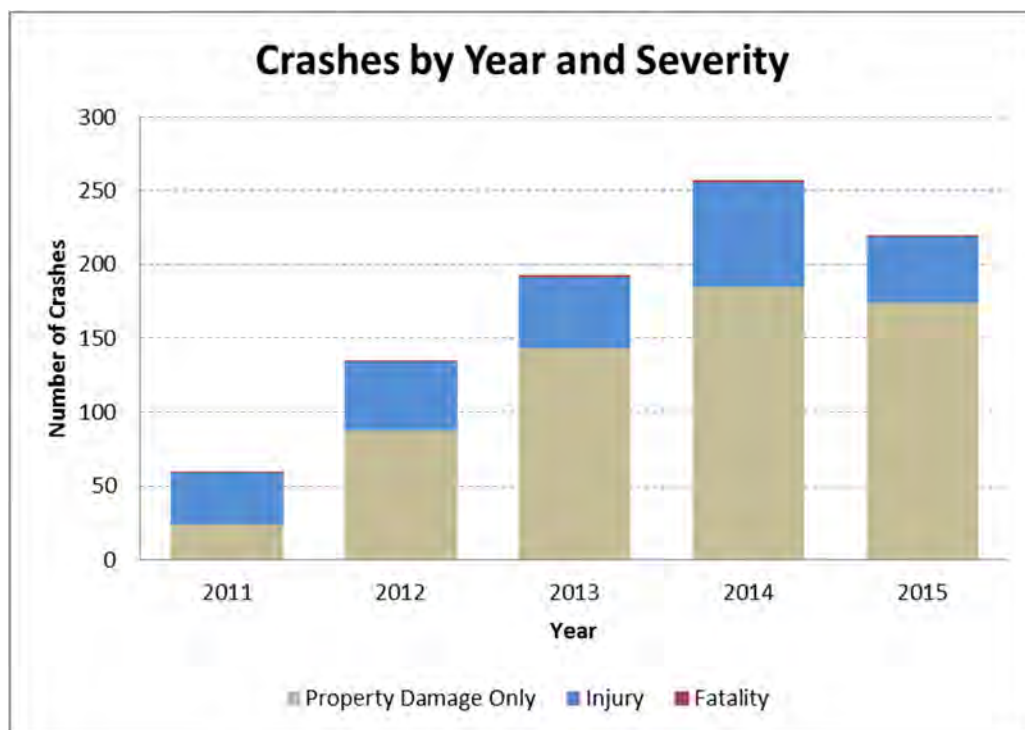


Figure 6: Crashes per Year (Corridor Wide)

Figure 7 displays the crashes along the corridor by type and severity for the five-year study period. The highest crash type observed was rear end, comprising 50 percent of the total crashes. Left-Turn (17 percent) and sideswipe (8 percent) were the second and third highest crash types. There were six pedestrian and 21 bicycle crashes over the five years resulting in three of the five fatal crashes (60 percent). A fixed object and angle crash accounted for the other two fatal crashes.

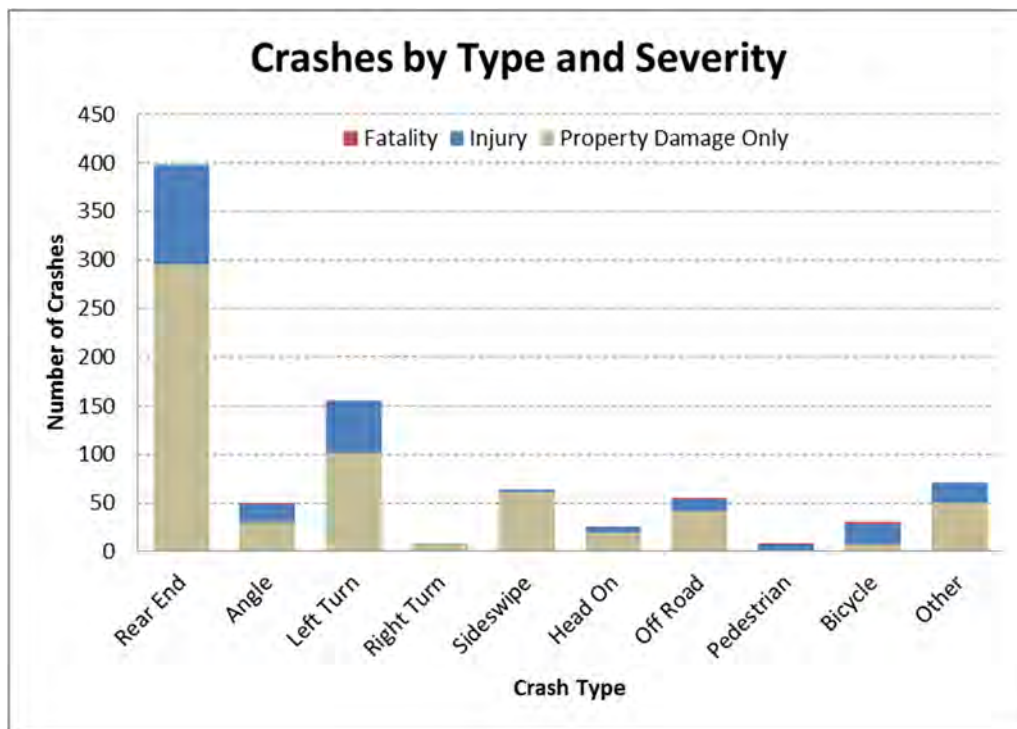


Figure 7: Crashes by Type and Severity (Corridor Wide)

Other crash statistics to note include the following:

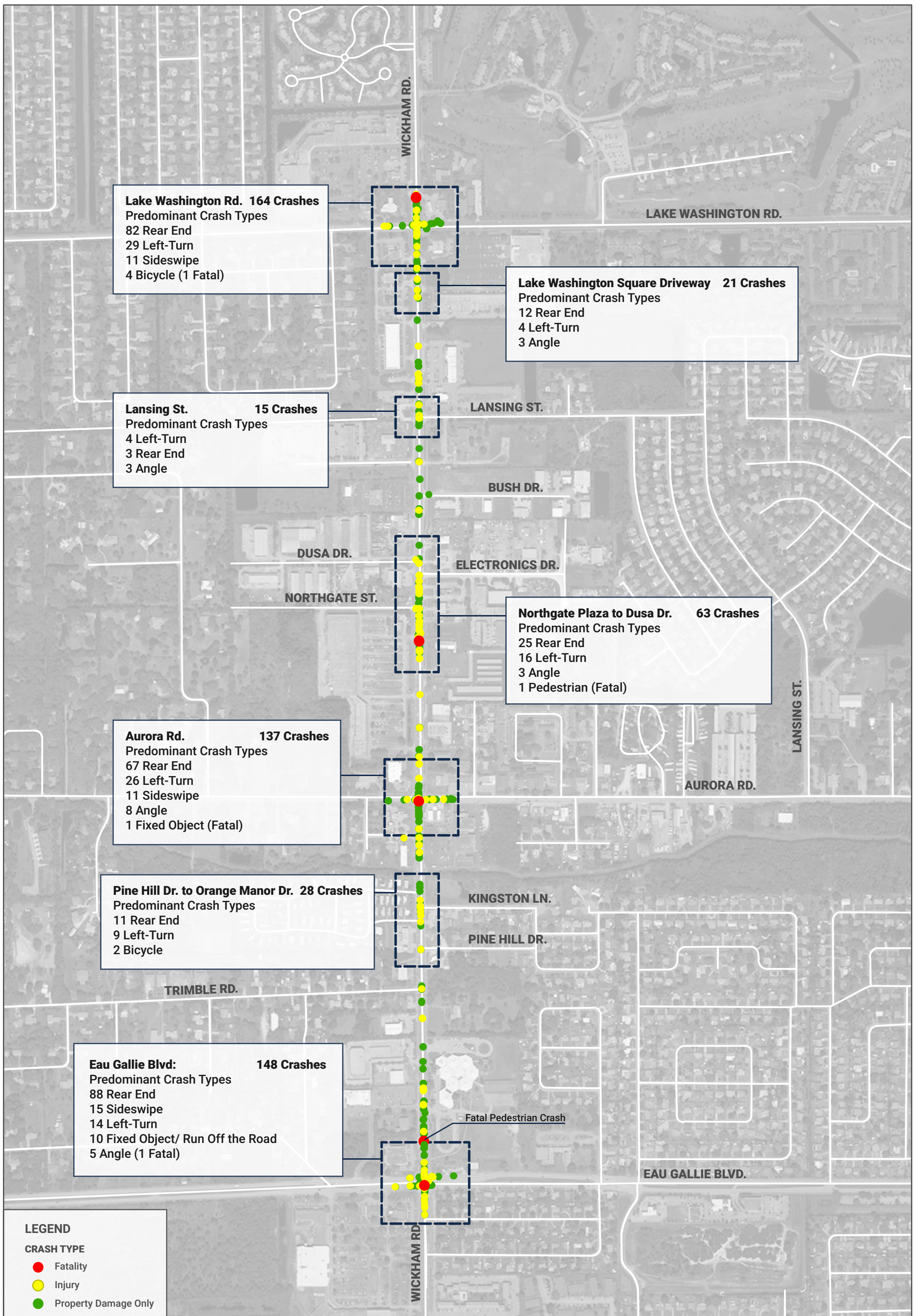
- Crashes occurring in non-daylight conditions accounted for approximately 22 percent of the crashes.
- Crashes occurring in wet roadway surfaces conditions accounted for 17 percent of the crashes.
- Eighty (80) percent of the total crashes occurred on a weekday (Monday through Friday).
- Twenty-eight (28) percent of the crashes were observed between 11 AM and 2 PM.
- Thirty-three (33) percent of the crashes occurred between 3 PM and 6 PM.
- Alcohol and drug-related crashes accounted for three percent of the total crashes (23 crashes).

The crashes along Wickham Road (2011-2015), as well as the high crash intersections and segments are detailed in **Figure 8**. The figure details the total number of crashes at each high crash intersection/segment, along with the predominant crash types.

Pedestrian and Bicycle Crashes

There were six (6) pedestrian crashes and 21 bicycle crashes during the analysis period. General pedestrian and bicycle statistics are summarized below:

- Of the six (6) pedestrian crashes, two (2) were fatal and four (4) were injury.
- Of the 21 bicycle crashes, one (1) was fatal and 15 were injury.
- Twelve (12) of the 27 pedestrian/bicycle related crashes (44 percent) occurred in non-daylight conditions.



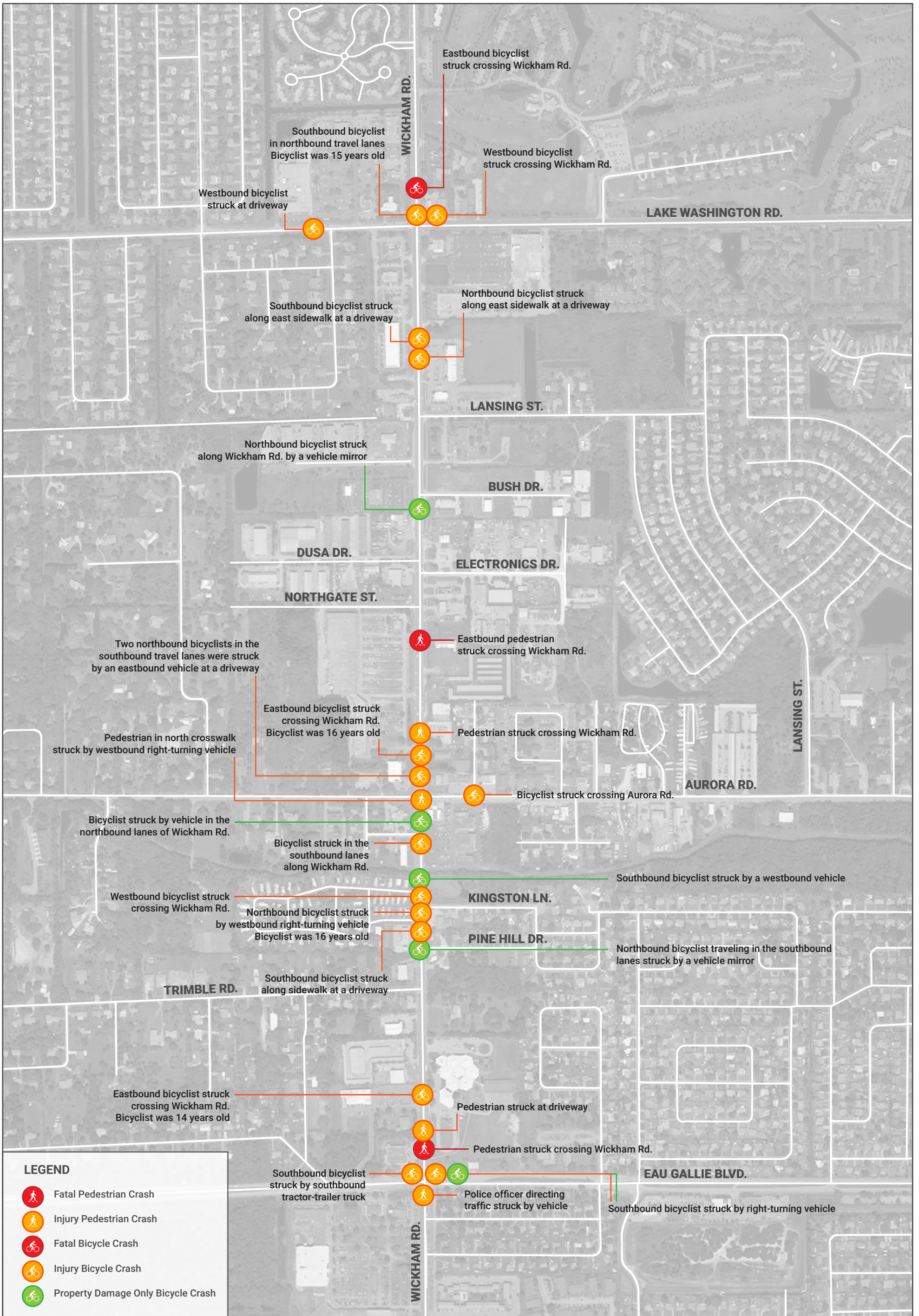
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- Eight (8) of the 27 pedestrian/bicycle related crashes (30 percent) occurred on a Friday.
- Alcohol and/or drugs was involved in three (3) of the 27 crashes (11 percent).

Pedestrian and bicycle crashes by location are displayed in **Figure 9**. Detailed crash trends are summarized below:

- Five (5) bicycle crashes occurred between Pine Hill Drive and Kingston Lane (south of Aurora Road). Three of the five crashes resulted in injury.
- Eight (8) of the 27 pedestrian/bicycle crashes occurred when a pedestrian/bicyclist attempted to cross Wickham Road between signalized intersections, including all three reported fatalities.
- Six (6) bicycle crashes involved bicyclists struck while traveling along Wickham Road.
- Eight (8) bicycle crashes and one pedestrian crash occurred at a driveway location with the pedestrian or bicyclist traveling along the sidewalk.

A more detailed summary of the 2011 to 2015 Wickham Road pedestrian/bicycle crash data set in tabular and graphical format is provided in **Appendix A**.



Scale in Feet
 0 700 North

Existing and Future No-Build Traffic Summary

The information presented in this section has been summarized from the *Wickham Road Existing Conditions Summary (Appendix A)* and the *Wickham Road Future Conditions Summary (Appendix B)*. For more detail on the existing and future no-build analyses, please reference these two reports.

EXISTING TRAFFIC FACTORS AND SEGMENT VOLUMES

Field collected volume counts and turning movement counts were adjusted using a seasonal adjustment factor, obtained from 2015 FDOT Florida Transportation Information (FTI) DVD, to estimate 2016 Annual Average Daily Traffic (AADT). An axle correction factor was also applied to the volume counts. These seasonally adjusted AADT's and turning movement volumes were used for the existing conditions analysis. The existing 2016 segment AADT's along the study corridor are presented in **Table 1** and in **Figure 10**.

Table 1: Existing AADTs along Wickham Road

Roadway	48-Hour Volume Count Dates	ADT	Axle Adj. Factor	Seasonal Adj. Factor	AADT
South of Eau Gallie Boulevard	10/24/16 – 10/25/16	35,118	0.98	0.99	35,000
Between Trimble Road and Pine Hills Drive	11/28/16 – 11/29/16	32,378	0.98	0.99	32,000
Between Lansing Street and Lake Washington Road	10/24/16 – 10/25/16	34,178	0.98	0.99	34,000
North of Lake Washington Road	10/25/16 – 10/26/16	33,053	0.98	0.99	33,000

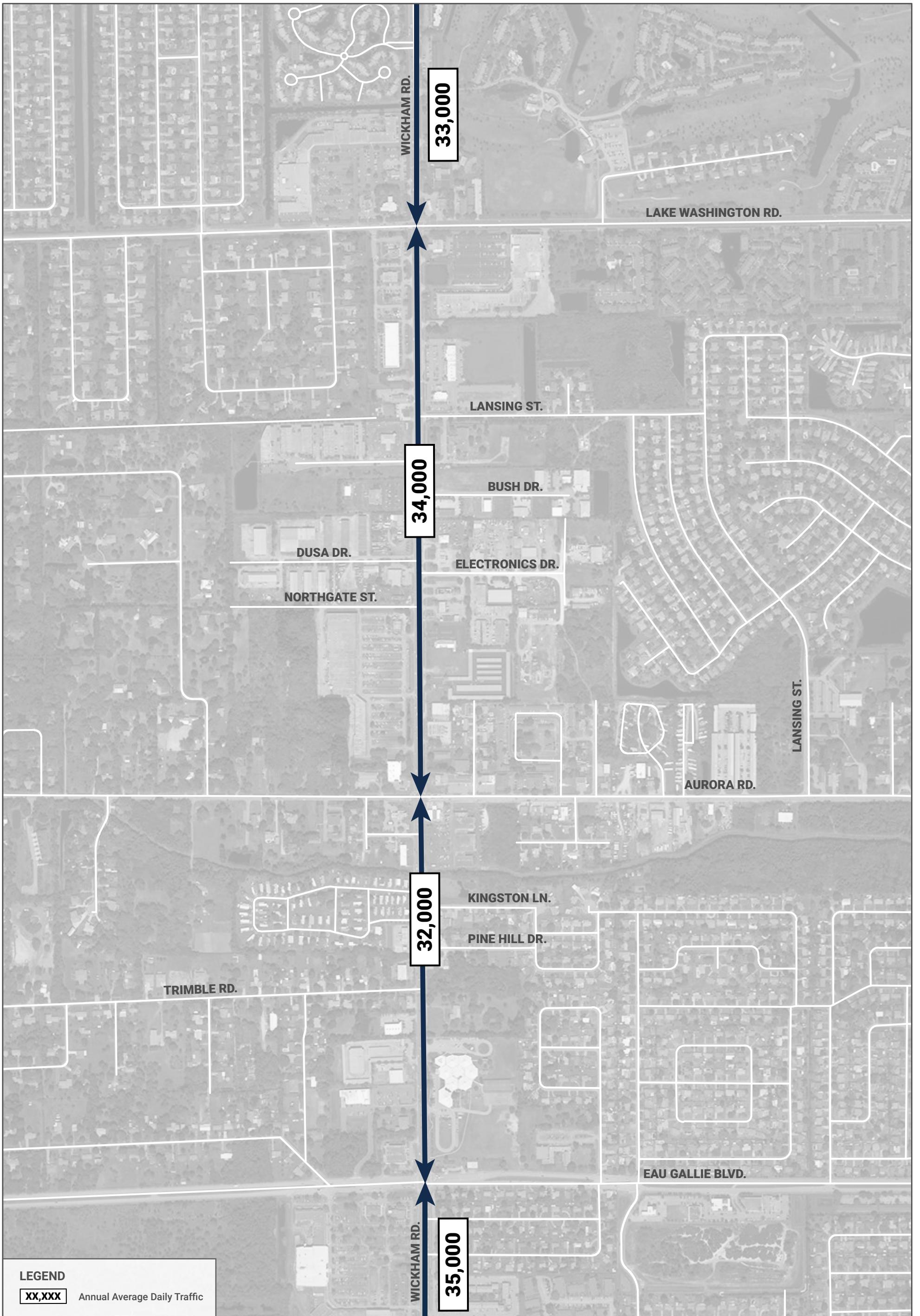
Note: ADT – Average Daily Traffic
AADT – Annual Average Daily Traffic

EXISTING TRAFFIC OPERATIONS

An existing traffic operations analysis was completed using *Highway Capacity Manual (HCM) 2010* methodologies to identify capacity-constrained intersections along the Wickham Road study corridor. This section describes the AM and PM peak hour field reviews, segment operations, and HCM intersection analysis results. This information provides a base line for the traffic analyses and can support verification that analyses reasonably reflect actual conditions in the field.

AM and PM Peak Hour Field Reviews

The study team conducted a field review on Tuesday, February 28, 2017 to observe existing traffic operations along the Wickham Road study corridor during the AM and PM peak hours. The following summarizes the observations of the peak hour reviews:



Scale in Feet
 0 700 North

FIGURE 10
 Existing AADT along Wickham Road

AM Peak Hour – 7:30-8:30

- Southbound queuing along Wickham Road at the Eau Gallie Boulevard intersection extended approximately 1,200' to Trimble Road (**Figure 11**).



Figure 11: Southbound Queuing along Wickham Road – AM Peak Hour

- Westbound left-turn queue at Lake Washington Road extends approximately 350' into the center TWLTL –
 - The existing storage for the westbound left-turn lane is 150'.
 - The queue spillback restricted the ability for vehicles to use the center turn lane for an eastbound left-turn into local businesses along Lake Washington Road.
 - The current green time allocated to the left-turn phase did not serve the queued vehicles.

PM Peak Hour – 5:00-6:00

- Southbound left-turn queuing at Aurora Road –
 - The southbound left-turn movement experienced queues of five to ten (10) vehicles and would only clear about 75 percent of the queue on average.
 - During some cycles, the southbound left-turn phase was skipped and would go to the permissive phase only.
- Southbound left-turn queuing and delay at Lansing Street –
 - Queues were observed extending approximately 7 vehicles (approximately 175').
 - Due to northbound traffic volume during the PM peak hour, the southbound left-turn movement would wait 3+ minutes to turn left onto Lansing Street.
 - This would create additional delay for westbound left-turning vehicles. These vehicles would have to wait until both the northbound traffic and the

southbound left-turning traffic made their movements before the westbound lefts could turn.

- Similar westbound queuing along Lake Washington Road was present during the PM peak hour as the AM –
 - Westbound queues were observed extending over 500’ along Lake Washington Road (**Figure 12**).
 - The current green time allocated to the left-turn phase did not serve the queued vehicles.



Figure 12: Westbound Queuing along Lake Washington Road – PM Peak Hour

Existing Segment Operations

Brevard County maintains a policy and procedure addressing the operating level of service standards for its arterial and collector roadway system. The term “level of service” (LOS) is defined as the system of six designated ranges from “A” (best) to “F” (worst) used to evaluate roadway facility performance. The LOS standard for a specific facility is defined by the area type it is located within. Class II non-state arterials within an urbanized area in Brevard County have a LOS standard of E. Due to Wickham Road being a class II non-state roadway in an urban area, the LOS standard is E within the study limits.

For the segment analysis, Wickham Road was divided into three individual segments between the four signalized intersections along the study corridor. The three segments below:

- Segment 1 – Wickham Road from Eau Gallie Boulevard to Aurora Road;
- Segment 2 – Wickham Road from Aurora Road to Northgate Plaza; and
- Segment 3 – Wickham Road from Northgate Plaza to Lake Washington Road.

Two analyses were performed to identify segment deficiencies along the Wickham Road corridor:

1. LOS evaluation based on Generalized LOS Tables; and
2. LOS evaluation based on HCM (2010) Methodologies.

Generalized LOS Evaluation

An evaluation of the existing LOS along Wickham Road was performed by comparing segment AADTs versus the LOS volume threshold from the generalized LOS volume thresholds from the SCTPO's 2015 State of the System (SOS) report. As summarized in **Table 2**, the 2016 AADT between Aurora Road and Lake Washington Road are below the SOS volume threshold.

Table 2: Generalized LOS Analysis

Segment	AADT	Area Type	Segment Type	Speed Limit (MPH)	LOS Standard	LOS Volume Standard*	Existing Volumes Below LOS Standard?
Eau Gallie Boulevard to Aurora Road	32,000	Urban	Signalized Arterial	35	E	33,800	N
Aurora Road to Northgate Plaza	34,000	Urban	Signalized Arterial	35	E	33,800	Y
Northgate Plaza to Lake Washington Road	34,000	Urban	Signalized Arterial	40	E	33,800	Y

*Source: 2015 State of the System Report

The generalized LOS analysis methodology is a sketch-planning level tool developed to provide a quick review of capacity and LOS for the roadway being studied. HCM methodologies are the most widely used for analyzing existing facilities and future improvements to corridors.

HCM 2010 LOS Evaluation

A HCM 2010 Urban Street Segment analysis was performed for the three Wickham Road study segments. This methodology is applicable for segments less than two miles in length between signalized intersections. The HCM 2010 section 17.1 was referenced to evaluate the segment LOS based on the average travel speed (ATS) as a percentage of the base free flow speed (%BFFS). The LOS thresholds for urban street segments are summarized in **Table 3**.

Table 3: LOS for Urban Street Segments (HCM 2010)

LOS	Travel Speed as a Percentage of Free Flow Speed (%)
A	>85
B	>67 – 85
C	>50 – 67
D	>40 – 50
E	>30 – 40
F	≤30

The segment analysis was performed for the AM and PM peak hours in the northbound and southbound directions for each Wickham Road segment. **Table 4** and **Table 5** display the existing conditions LOS for each segment from the HCM analysis. The operational results for each segment are illustrated in **Figure 13**. **Appendix A** contains the HCM inputs and the various outputs/calculations for the segment analysis.

Table 4: HCM LOS Evaluation Results – AM Peak Hour

Segment	BFFS (MPH)	Average Travel Speed (MPH)	% of BFFS	LOS	Segment LOS Below LOS Standard?
Northbound Direction					
Eau Gallie Boulevard to Aurora Road	35	18.1	44%	D	No
Aurora Road to Northgate Plaza	35	17.7	44%	D	No
Northgate Plaza to Lake Washington Road	40	19.3	45%	D	No
Southbound Direction					
Lake Washington Road to Northgate Plaza	40	22.2	52%	C	No
Northgate Plaza to Aurora Road	35	9.9	24%	F	Yes
Aurora Road to Eau Gallie Boulevard	35	14.6	36%	E	No

Table 5: HCM LOS Evaluation Results – PM Peak Hour

Segment	BFFS (MPH)	Average Travel Speed (MPH)	% of BFFS	LOS	Segment LOS Below LOS Standard?
Northbound Direction					
Eau Gallie Boulevard to Aurora Road	35	16.3	40%	E	No
Aurora Road to Northgate Plaza	35	14.6	36%	E	No
Northgate Plaza to Lake Washington Road	40	15.7	36%	E	No
Southbound Direction					
Lake Washington Road to Northgate Plaza	40	21.3	49%	D	No
Northgate Plaza to Aurora Road	35	10.1	24%	F	Yes
Aurora Road to Eau Gallie Boulevard	35	18.8	46%	D	No

Existing Peak Hour Intersection Operations

The existing operating conditions (2016) for eight (8) intersections along the study corridor were evaluated for the weekday AM and PM peak hour traffic volume conditions. Four of the intersections are signalized, while the other four intersections are unsignalized intersections with stop control along the minor street approaches. The peak hour intersection operations were shown alongside the segment operations in **Figure 13**. The existing lane configurations and traffic control for the eight study intersections are shown in **Figure 14**. The existing 2016 peak hour intersection turning movement volumes are summarized in **Figure 15**.



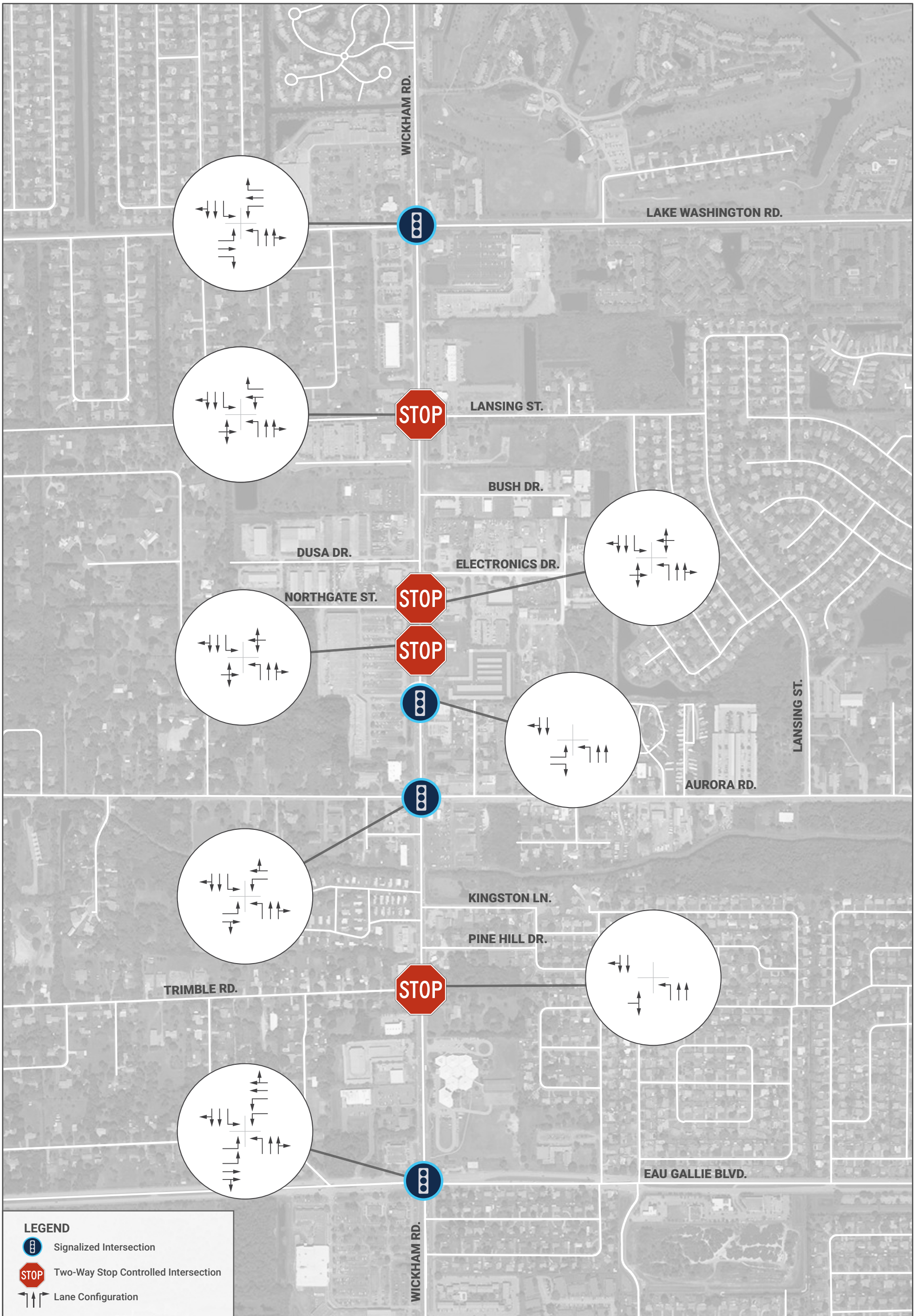


FIGURE 14
 Existing Intersection Lane Configurations and Traffic Control

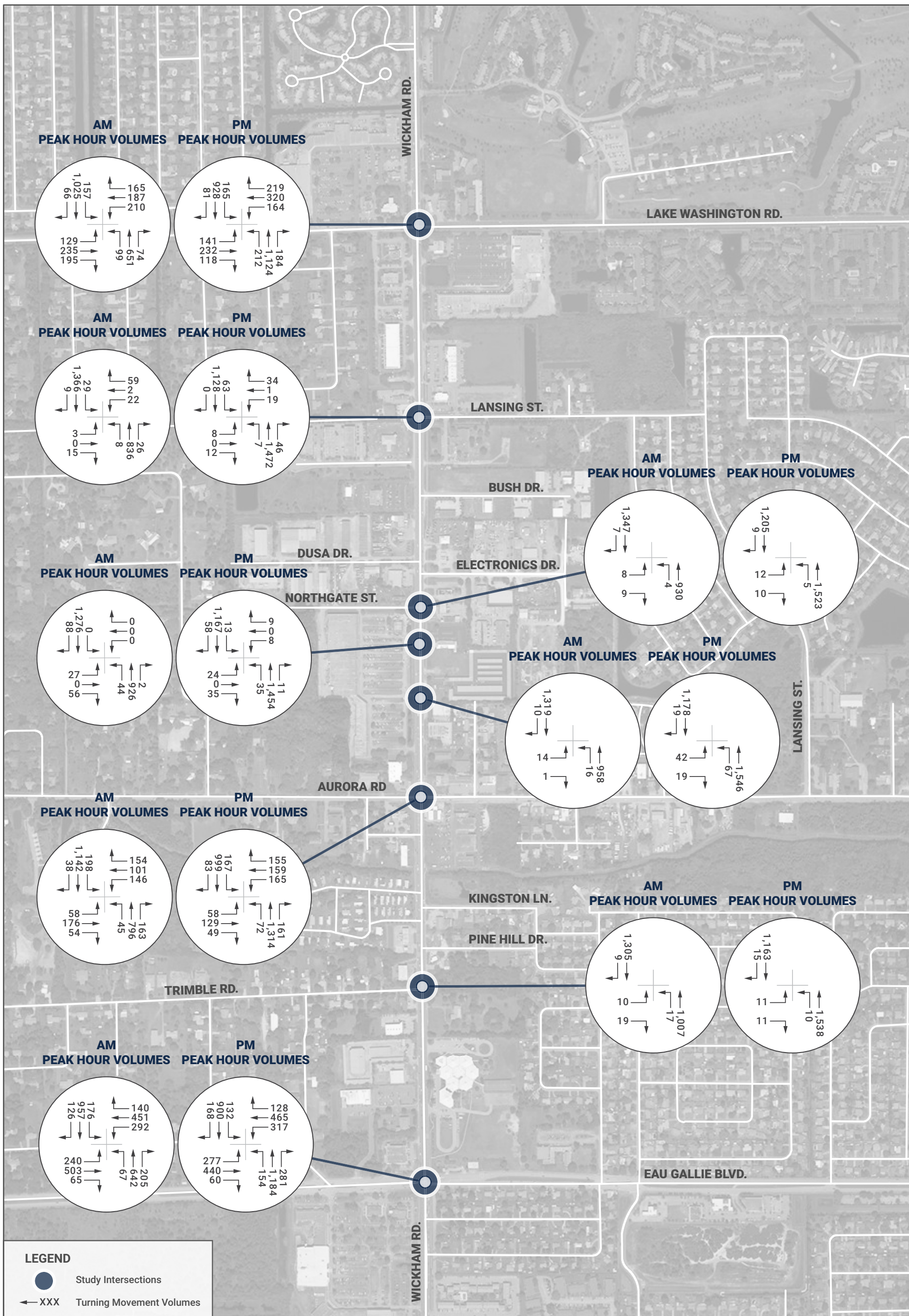


FIGURE 15
 Existing Peak Hour Intersection Turning Movement Volumes

SELECTION OF APPLIED GROWTH RATE

The study team completed a preliminary sensitivity analysis using applied linear growth rates of 0.5, 1.0, 1.5, and 2.0 percent. Segment and intersection operational analyses were completed to gain an understanding of the potential operational implications of each growth rate. The study team, along with members of the SCTPO and Brevard County, concluded that an applied annual linear growth rate of one percent is reasonable for the study corridor based on a review of the historical, population, and model growth rates in addition to the corridor functionality (serving primarily commuter traffic). A summary of the sensitivity analysis and the various growth rates reviewed is included in **Appendix B**.

FUTURE YEAR TRAFFIC VOLUMES AND LOS

The following sections summarize the future no-build AM and PM peak hour segment and intersection operations for the future year (2040). A LOS evaluation based on the generalized LOS tables (segments only) and Highway Capacity Manual (HCM) 2010 methodologies (segment and intersection operations) was conducted as part of the future no-build operational analysis. The selected one percent annual linear growth rate was applied to the existing year (2016) volumes to estimate future year 2040 AADTs and turning movement volumes.

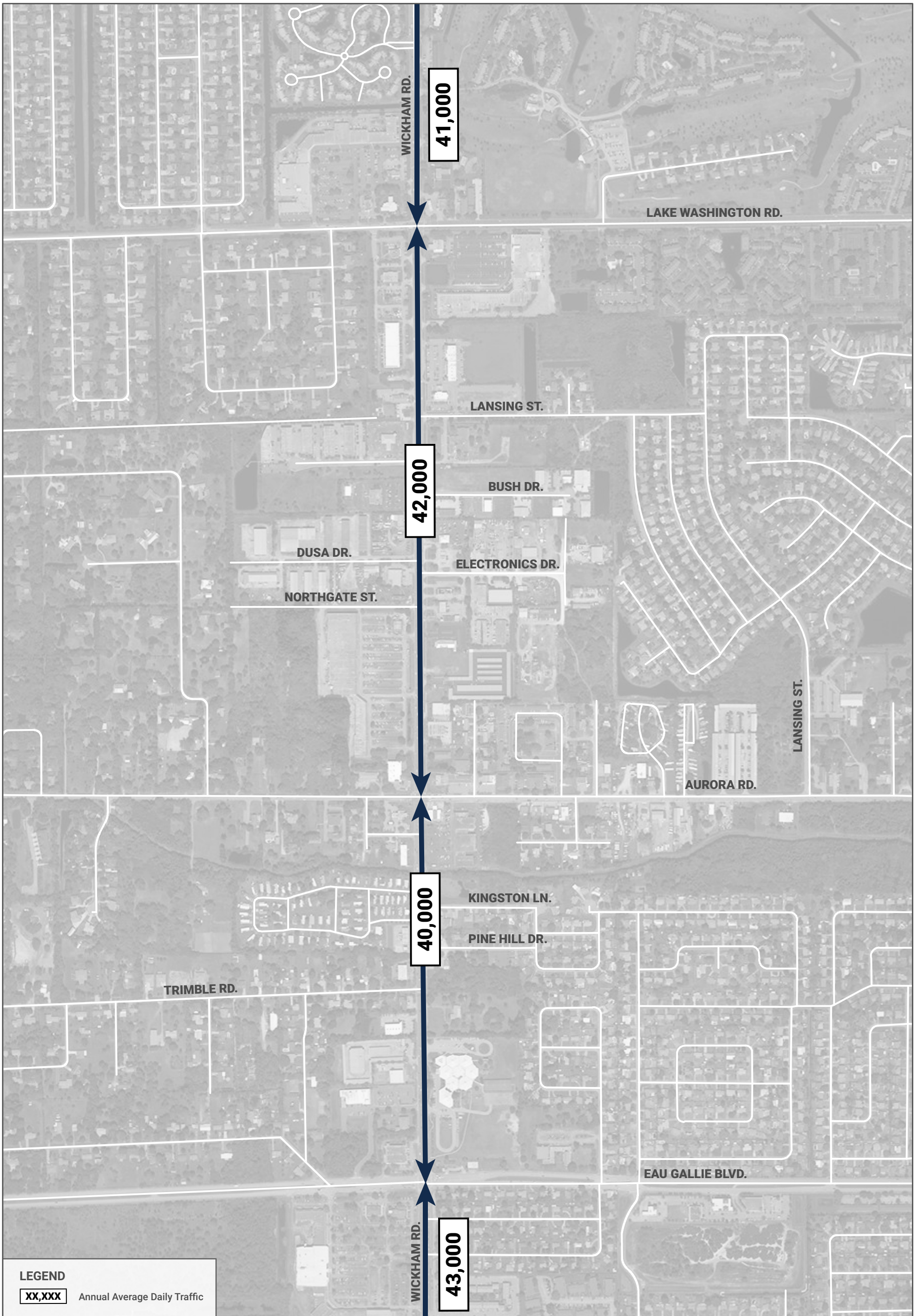
Generalized LOS Evaluation

An evaluation of the existing LOS along Wickham Road was performed by comparing segment AADTs versus the LOS volume threshold from the generalized LOS volume thresholds from the SCTPO's 2015 State of the System (SOS) report. The selected one percent annual linear growth rate was applied to the existing year (2016) AADTs to estimate the future 2040 AADTs (shown in **Table 6**). The LOS standard and volume thresholds are consistent from the **Existing Segment Operations** section. **Table 6** summarizes the 2040 AADT for each study segment and the results of the generalized LOS evaluation. As summarized in **Table 6**, the three study segments along Wickham Road are not anticipated to meet the LOS standard based on future 2040 volumes.

Table 6: 2040 No-Build Generalized LOS Evaluation

Segment	2016 AADT	2040 AADT	Area Type	Segment Type	Speed Limit (MPH)	LOS Standard	LOS Volume Standard*	2040 Volumes Exceed LOS Volume Standard?
Eau Gallie Boulevard to Aurora Road	32,000	40,000	Urban	Signalized Arterial	35	E	33,800	Yes
Aurora Road to Northgate Plaza	34,000	42,000	Urban	Signalized Arterial	35	E	33,800	Yes
Northgate Plaza to Lake Washington Road	34,000	42,000	Urban	Signalized Arterial	40	E	33,800	Yes

*Source: 2015 State of the System Report



Scale in Feet
 0 700 North

HCM 2010 LOS Evaluation

The segment analysis was performed for the 2040 AM and PM peak hours in the northbound and southbound directions for each Wickham Road segment. **Table 7** and **Table 8** display the 2040 no-build peak hour results from the HCM analysis and the LOS for each segment. The bolded rows in the tables represent segments that are anticipated to operate below the LOS E threshold. The operational results for each segment are illustrated in **Figure 17**. The following summarizes the operations and anticipated deficiencies (by direction) identified as part of the 2040 AM peak hour HCM segment operations (shown in bold in **Table 7**):

- Northbound –
 - The segments along Wickham Road are anticipated to operate at LOS D.
- Southbound –
 - Wickham Road between Northgate Plaza and Aurora Road is anticipated to operate at LOS F.

The following briefly summarizes the anticipated deficiencies (by direction) identified as part of the 2040 PM peak hour segment operations (shown in **Table 8**):

- Northbound –
 - Wickham Road between Eau Gallie Boulevard and Aurora Road is anticipated to operate at LOS F.
 - Wickham Road between Northgate Plaza and Lake Washington Road is anticipated to operate at LOS F.
- Southbound –
 - Wickham Road between Northgate Plaza and Aurora Road is anticipated to operate at LOS F.

Table 7: No-Build HCM LOS Evaluation Results – 2040 AM Peak Hour

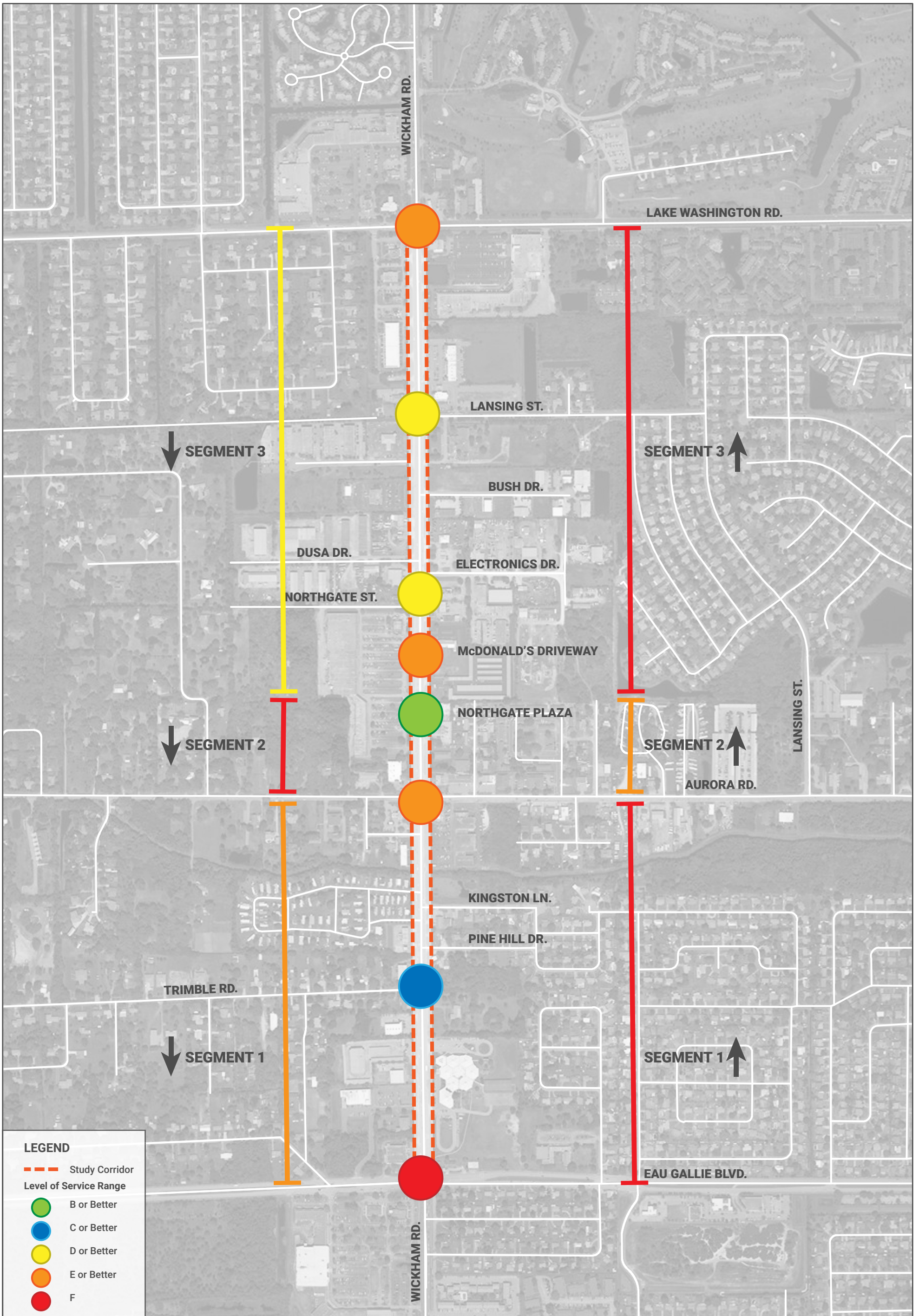
Segment	BFFS (MPH)	Average Travel Speed (MPH)	% of BFFS	LOS	Segment LOS Below LOS Standard?
Northbound Direction					
Eau Gallie Boulevard to Aurora Road	41.1	17.0	41%	D	No
Aurora Road to Northgate Plaza	40.6	17.8	44%	D	No
Northgate Plaza to Lake Washington Road	43.1	18.0	42%	D	No
Southbound Direction					
Lake Washington Road to Northgate Plaza	43.1	21.6	50%	C	No
Northgate Plaza to Aurora Road	41.5	9.1	22%	F*	Yes
Aurora Road to Eau Gallie Boulevard	40.7	17.7	43%	D	No

*Note: Segment was below LOS standard under 2016 volumes

Table 8: No-Build HCM LOS Evaluation Results – 2040 PM Peak Hour

Segment	BFFS (MPH)	Average Travel Speed (MPH)	% of BFFS	LOS	Segment LOS Below LOS Standard?
Northbound Direction					
Eau Gallie Boulevard to Aurora Road	41.1	12.9	31%	F	Yes
Aurora Road to Northgate Plaza	40.6	15.9	39%	E	No
Northgate Plaza to Lake Washington Road	43.1	12.6	29%	F	Yes
Southbound Direction					
Lake Washington Road to Northgate Plaza	43.1	21.4	50%	D	No
Northgate Plaza to Aurora Road	41.5	9.7	23%	F*	Yes
Aurora Road to Eau Gallie Boulevard	40.7	15.1	37%	E	No

*Note: Segment was below LOS standard under 2016 volumes



Scale in Feet
0 700 North

2040 No-Build Peak Hour Intersection Operations

HCM 2010 LOS Evaluation

The same eight (8) intersections from the existing conditions were evaluated as part of the 2040 no-build peak hour intersection operational analysis. The future 2040 no-build intersection lane configurations are summarized in **Figure 18**. No changes in lane configurations or traffic control were assumed in the no-build intersection analysis.

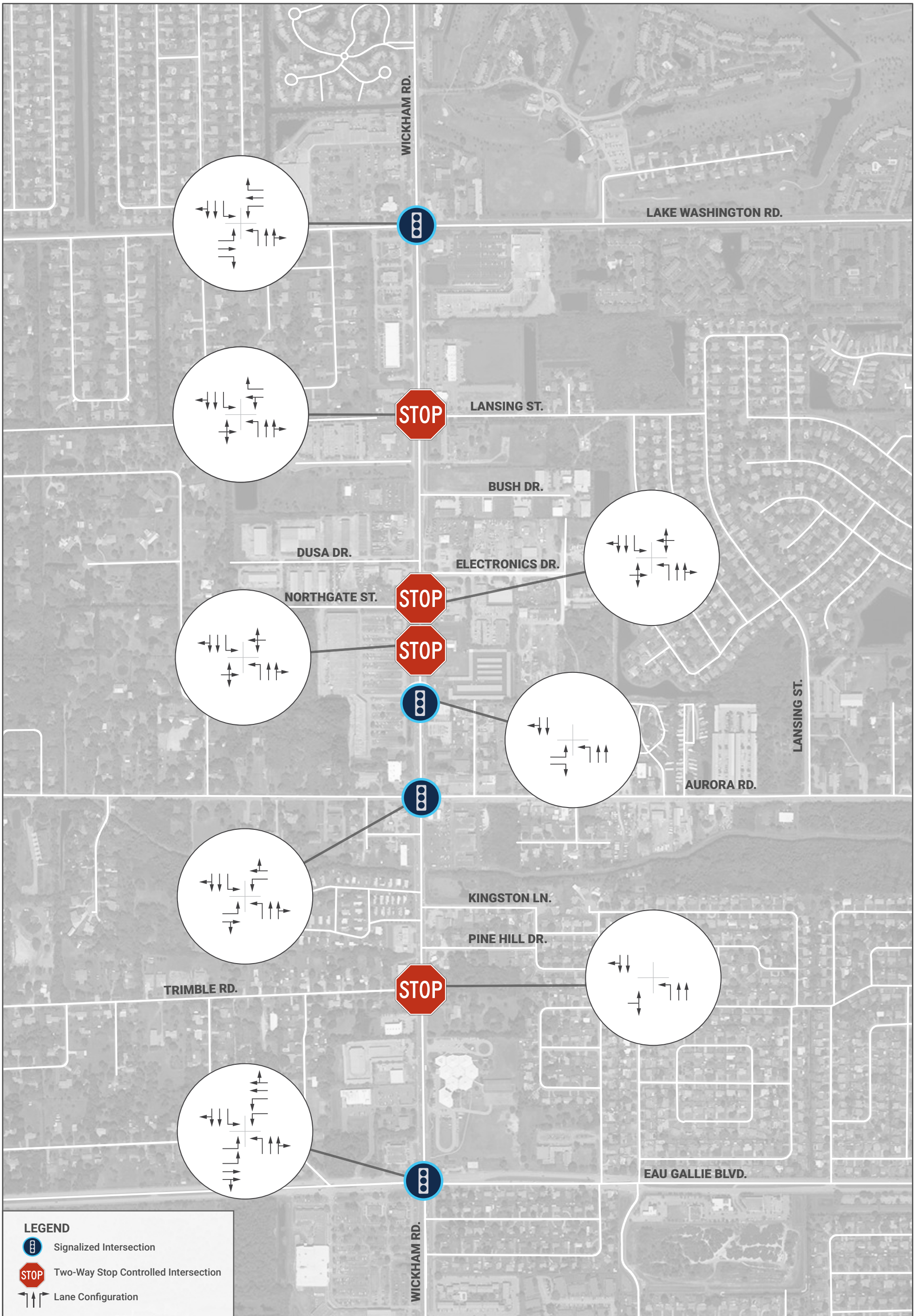
The selected one percent annual linear growth rate on Wickham Road was applied to the existing turning movement volumes except for the turning movement volumes along Aurora Road. The ongoing Aurora Road Corridor Study is utilizing a 0.5 percent annual linear growth rate for future traffic volume forecasting purposes. Therefore, a 0.5 percent growth rate was applied to the eastbound and westbound turning movements along Aurora Road at the Wickham Road intersection. **Figure 19** summarizes the turning movement volumes for the 2040 no-build scenario. The peak hour intersection operations were shown alongside the segment operations in **Figure 17**.

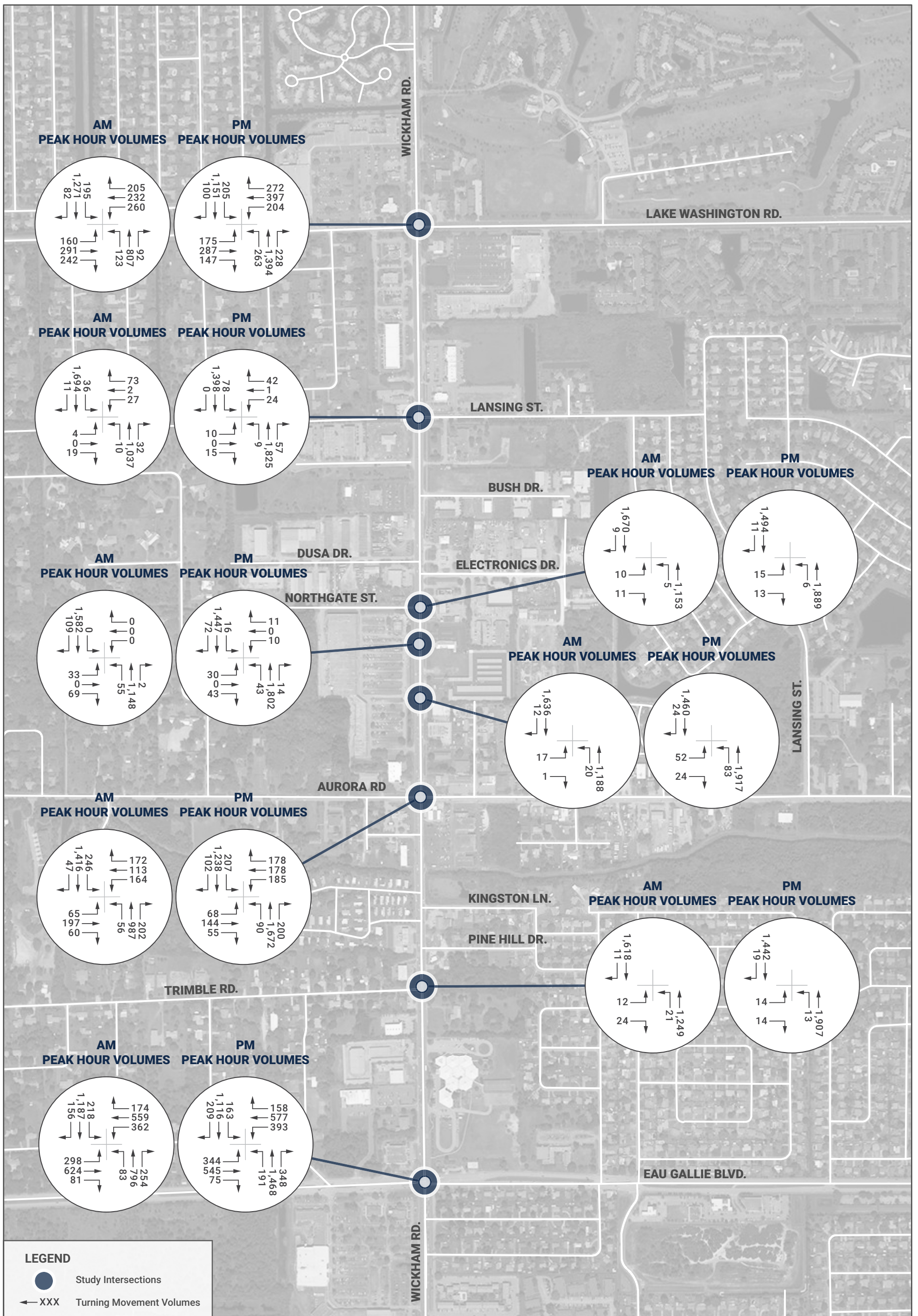
Overall Intersection LOS Deficiencies

During the 2040 AM peak hour, the intersections are anticipated to operate at an overall LOS D or better. For the unsignalized intersections, the minor street movements are anticipated to operate at LOS C or better.

During the 2040 PM peak hour, the intersections below are anticipated to operate at a LOS E or worse:

- Eau Gallie Boulevard (LOS F);
- Aurora Road;
- McDonald's Driveway – eastbound left-turn critical movement (unsignalized intersection); and
- Lake Washington Road.





Intersection Turning Movement Deficiencies

The following summarizes intersection movement deficiencies (v/c ratio greater than 1.0) at the study signalized intersections during the 2040 PM peak hour:

PM Peak Hour

- Eau Gallie Blvd
 - Eastbound left-turn (v/c ratio of 1.12)
 - Eastbound through (v/c ratio of 1.10)
 - Eastbound right-turn (v/c ratio of 1.11)
 - Westbound left-turn (v/c ratio of 1.12)
 - Westbound through (v/c ratio of 1.21)
 - Westbound right-turn (v/c ratio of 1.21)
 - Northbound through (v/c ratio of 1.04)
 - Northbound right-turn (v/c ratio of 1.09)
 - Southbound left-turn (v/c ratio of 1.24)
- Aurora Road
 - Westbound right-turn (v/c ratio of 1.16)
 - Northbound through (v/c ratio of 1.05)
 - Northbound right-turn (v/c ratio of 1.08)
 - Southbound left-turn (v/c ratio of 1.05)
- Lake Washington Road
 - Eastbound left-turn (v/c ratio of 1.05)
 - Westbound through (v/c ratio of 1.02)
 - Northbound through (v/c ratio of 1.03)
 - Northbound right-turn (v/c ratio of 1.05)
 - Southbound left-turn (v/c ratio of 1.01)

When identifying potential improvements at the study intersections, the study team will attempt to improve the operations at each intersection so that each turning movement is under capacity (v/c ratio less than 1.0) and the overall intersection LOS is no worse than LOS E.

Alternative Analysis and Development

Based upon the existing and future conditions no-build analysis, issues and opportunities were identified along the Wickham Road corridor. This section discusses the issues/opportunities identified and reviews the alternatives analyzed to address those issues/opportunities.

IDENTIFIED ISSUES AND OPPORTUNITIES

The following opportunities for improvement were identified along the Wickham Road study corridor based on the results of the existing conditions analysis and meetings with the PAT. The following summary of issues and opportunities includes feedback from the public that was solicited during the Existing Conditions Public Meeting held in May.

Pedestrian, Bicycle, and Transit Issues and Opportunities

- There is a desire and need for enhanced/continuous pedestrian and bicycle facilities along the corridor:
 - There is one sidewalk gap (approximately 400') along the east side of Wickham Road to the south of the Aurora Road intersection.
 - Continuous sidewalks are not present along the west side of Wickham Road.
 - There are incomplete pedestrian facilities at three signalized intersections along the corridor:
 - Aurora Road;
 - Northgate Plaza; and
 - Lake Washington Road.
 - The Eau Gallie Boulevard intersection has the most complete pedestrian facilities of the four signalized intersections within the study limits; however, there were two pedestrian and three bicycle crashes reported at the intersection within the study period (2011 to 2015).
 - There are opportunities to improve the unsignalized crossing along the south leg of the Trimble Road intersection as identified in the previously conducted RSA.
 - Potential future signalization of the Lansing Street intersection provides an opportunity to provide pedestrian facilities at the intersection.
 - There were 21 bicycle crashes over the five-year crash analysis period. Six of these crashes involved bicyclists traveling along Wickham Road in the travel. No bicycle facilities exist along the corridor.
- Transit stop improvements were identified for the stops along Wickham Road as part of a Space Coast Area Transit ADA assessment:
 - Non-compliant boarding and alighting areas and a lack of detectable warning surfaces were common identified issues.

The pedestrian, bicycle, and transit issues and opportunities are summarized in **Figure 20**.








Vehicular, Drainage, and Utility Issues and Opportunities

- Safety along the corridor is a concern with a total of 667 reported crashes from 2011 to 2015, 187 of which (28 percent) resulted in at least one injury and five (5) of which resulted in at least one fatality. Left-turn and angle crashes, which tend to result in higher severity, were an important focus of this project:
 - Left-turn crash statistics were reported at the following signalized intersections:
 - Eau Gallie Boulevard – 14 left-turn crashes (9 percent of intersection total)
 - Aurora Road – 26 left-turn crashes (19 percent of intersection total)
 - Lake Washington Road – 29 left-turn crashes (18 percent of intersection)
 - Left-turn/angle crash statistics were reported between the following intersections:
 - Pine Hill Drive to Orange Manor Drive – 9 left-turn crashes (32 percent)
 - Northgate Plaza to Dusa Drive – 16 left-turn and 3 angle crashes (30 percent)
 - Lansing Street – 4 left-turn and 3 angle crashes (47 percent)
 - Lake Washington Square Driveways – 4 left-turn and 3 angle crashes (33 percent)
- Northbound queuing along Wickham Road was observed at the Eau Gallie Boulevard intersection during the PM peak hour. The queues were observed extending approximately 750', with approximately 25 percent of the queue remaining at the end of each signal cycle.
- Northbound and southbound peak hour queuing was observed along Wickham Road between the Eau Gallie Boulevard and Aurora Road intersections.
- Southbound left-turn lane queuing at the Wickham Road/Aurora Road intersection was observed during the PM peak hour. The queues were observed extending approximately 250', with approximately 75 percent of the queue remaining at the end of each signal cycle.
- Westbound left-turn lane queuing at the Wickham Road/Lake Washington Road intersection was observed during both peak hours. The queuing spilled back approximately 350' which blocks the existing center TWLTL. The existing conditions operations also identified operational deficiencies along the westbound approach during the AM and PM peak hours.
- Consideration will need to be given to existing drainage features and utilities along the corridor, specifically adjacent to the west side of Wickham Road when developing roadway concepts.

The vehicular, drainage, and utility issues and opportunities are summarized in **Figure 21**.



LEGEND

-  Left-Turn Crash Emphasis Intersection
-  Left-Turn/Angle Crash Emphasis Area
-  Peak Hour Queuing
-  Utilities Adjacent to Roadway
-  Drainage Facilities Adjacent to Roadway

Scale in Feet
 0 700 North

SHORT-TERM IMPROVEMENTS

To address some of the issues and opportunities identified for Wickham Road, the following short-term improvements were discussed with the Project Advisory Team (PAT). The PAT is further discussed in the **Public Involvement** section.

- **Pedestrian Facility Improvements at Aurora Road and Lake Washington Road Intersections** – These concepts are discussed separately later in this section.
- **PedSafe** – PedSafe is an innovative pedestrian and bicycle collision avoidance system currently being designed by FDOT. PedSafe will connect advanced signal controller capability, use of Connected Vehicle (CV) technologies, and existing communication capabilities to reduce the occurrence of pedestrian and bicycle crashes. As a region and a state that annually tops the Dangerous by Design list of most dangerous areas for walking, development and implementation of PedSafe is an immediate priority with multiple benefits. The PedSafe improvement could be installed at the four signalized intersections along the corridor.
- **LED Corridor Lighting** – Roadway lighting benefits motorists by improving their ability to see roadway geometry and other vehicles at extended distances ahead. Intersection lighting allows for greater visibility of pedestrians that may be crossing the roadway as well.
- **Brevard County Signal Re-Timing** – Brevard County was performing a signal re-timing study along Wickham Road from Sarno Road to Business Center Boulevard. The project is scheduled for completion in early 2018.

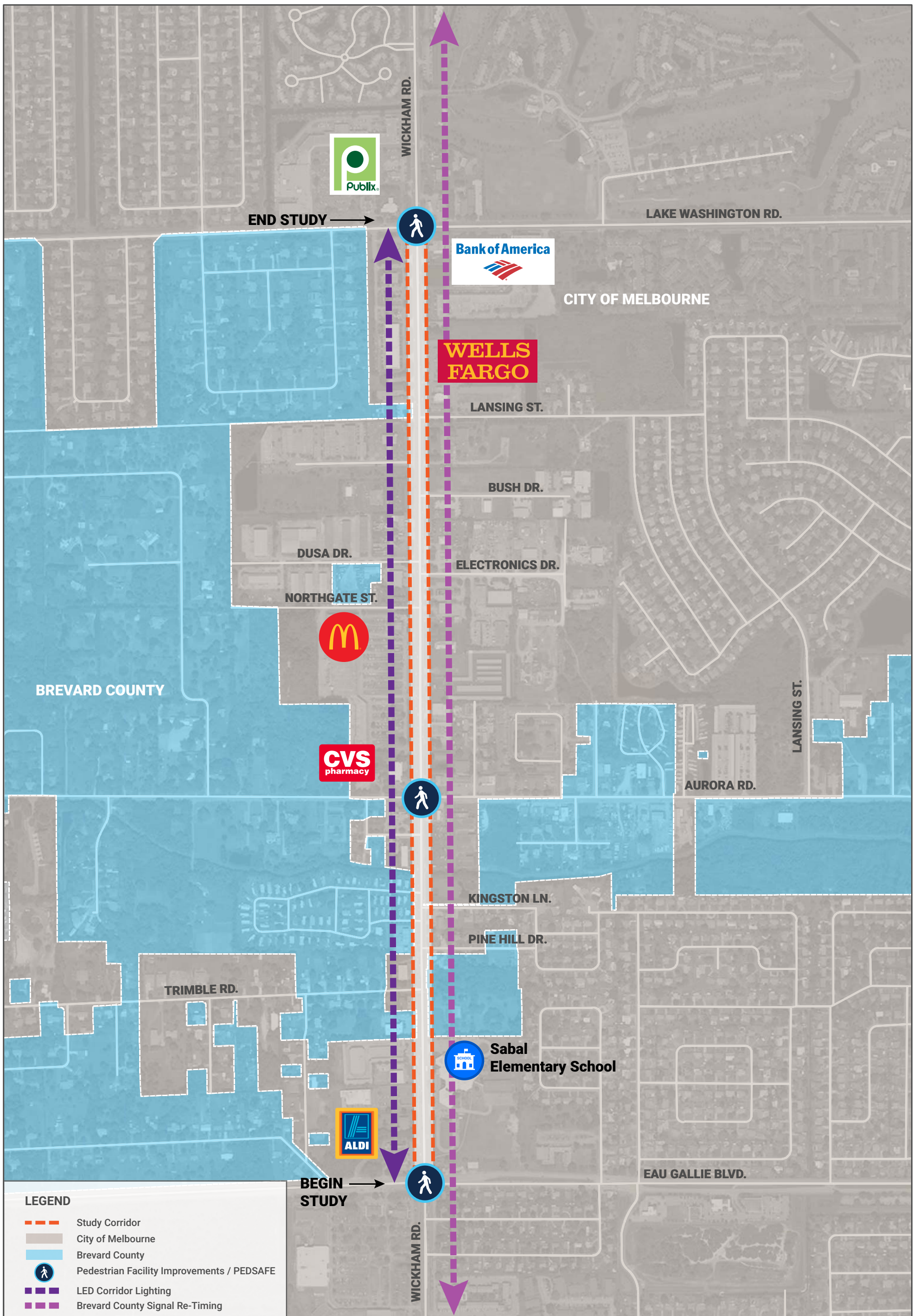
The short-term improvements are displayed in **Figure 22**.

Aurora Road – Short-Term Pedestrian Facility Improvements

In addition to the corridor wide improvements noted above, there is an opportunity to enhance pedestrian facilities at the Wickham Road/Aurora Road intersection. The following details the types of improvements that could be made to the intersection:

- New crosswalks in the east and south legs to complete the intersection;
- New pedestrian landing pad in the southeast corner of the intersection;
- Rebuilding pedestrian landing pads on the southwest, northeast, and northwest corners of the intersection; and
- New bus stop landing pads and sidewalk connections.

Table 9 displays the planning level cost estimates for the short-term pedestrian facility improvements for Wickham Road at Aurora Road. A bullet list detailing the costs for each element is provided after the table.



Scale in Feet
 0 700 North

Table 9: Wickham Road at Aurora Road Short Term Pedestrian Facility Improvements

Element	Cost
Construction	\$60,000
Utility Relocations	\$0
Engineering/CEI	\$20,000
Roadway ROW	\$80,000
Total Cost	\$160,000

- **Construction** – The construction cost includes the new sidewalk landing pads on the SW and SE corners of the intersection. Also included is the re-build of the existing sidewalk landing pads on the NW and NE corners. New sidewalk is also included for the bus stop connections along Wickham Road and west of Wickham Road on Aurora Road. Re-striping of the intersection with special emphasis crosswalks are also included in the cost.
- **Utility Relocations** – No utility impacts are anticipated as part of this improvement.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost.
- **Roadway ROW** – This improvement may require corner clips for the parcel in the SW corner of the intersection and to Buz’s Automotive in the SE corner of the intersection.

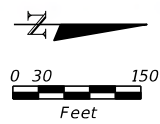
Figure 23 displays the short-term improvement concept at Wickham Road and Aurora Road.

Lake Washington Road – Short-Term Pedestrian Facility Improvements

Like Aurora Road, there is an opportunity to enhance pedestrian facilities at the Wickham Road/Lake Washington Road intersection. The following details the types of improvements that could be made to the intersection:

- New crosswalks in the west and south legs to complete the intersection;
- New pedestrian landing pad in the southwest corner of the intersection;
- Rebuilding pedestrian landing pads on the northeast and southeast corners of the intersection;
and
- New bus stop landing pads and sidewalk connections.

Table 10 displays the planning level cost estimates for the short-term pedestrian facility improvements for Wickham Road at Aurora Road. A bullet list detailing the costs for each element is provided after the table.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES

-RIGHT-OF-WAY AND PROPERTY LINES ARE GEOGRAPHICAL REPRESENTATIONS ONLY AND DO NOT DEPICT ACCURATE BOUNDARIES. DO NOT USE TO DESCRIBE, ASSESS, OR OTHERWISE ESTABLISH THE LIMITS OF PROPERTIES OR LOCATIONS OF FEATURES IN RELATION TO PROPOERTY LINES SHOWN HEREIN.
 -AERIAL PHOTOGRAPHY COURTESY OF FLORIDA DEPARTMENT OF TRANSPORTATION. FLIGHT YEAR 2015.



SPACE COAST
TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD
AT AURORA ROAD
SHORT TERM IMPROVEMENTS

FIGURE NO.
23

Table 10: Wickham Road at Lake Washington Road Short Term Pedestrian Facility Improvements

Element	Cost
Construction	\$50,000
Utility Relocations	\$0
Engineering/CEI	\$20,000
Roadway ROW	\$0
Total Cost	\$70,000

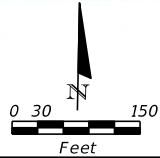
- **Construction** – The construction cost includes the new sidewalk landing pads on the SW corner of the intersection. Also included is the re-build of the existing sidewalk landing pads on the NE and SE corners. New sidewalk is also included for the bus stop connections along Wickham Road north and south of the intersection. Re-striping of the intersection with special emphasis crosswalks are also included in the cost.
- **Utility Relocations** – No utility impacts are anticipated as part of this improvement.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost.
- **Roadway ROW** – No ROW impacts are anticipated as part of this improvement.

Figure 24 displays the short-term improvement concept at Wickham Road and Lake Washington Road.

Short-Term RSA Improvements

As part of the Wickham Road Safety Audit performed in June 2016, the following short-term improvements could be made without the implementation of the preferred alternative concept:

- Corridor-wide
 - Left-Turn Movements at Signalized Intersections along Wickham Road –
 - Consider replacing the “doghouse” five-section signal displays with 4-section flashing yellow arrow (FYA) protected/permissive left-turn display. If the left turn phasing is converted to a FYA display, consider providing protected only left-turn phasing during peak periods and allow the protected-permissive phasing during the off-peak periods.
 - Street Name Signage Visibility
 - Consider replacing street name signage (D3-1) with new retro-reflective signs using applicable font size following the guidance provided in section 2D-43 of the 2009 Manual on Uniform Traffic Control Devices (MUTCD). Table I-2 specifies 6” letter height on post mounted street signs at intersections along roadways with a posted speed of 40 mph or less. Consider internally illuminated, overhead LED street name signs at the signalized locations, per Table 2A-1 of the MUTCD.
 - School Zone Extents
 - Consider extending the school zone to the Eau Gallie Boulevard intersection.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES

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SPACE COAST
TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD AT
LAKE WASHINGTON ROAD
SHORT TERM IMPROVEMENT

FIGURE NO.

24

- Intersections
 - **Eau Gallie Boulevard – Right-Turn Phase Conflict with Pedestrians Crossings at Eau Gallie Boulevard**
 - Implement leading pedestrian phase intervals, delaying the through green phase until after pedestrians have had a chance to begin crossing.
 - Install signage that reminds turning traffic to yield to pedestrians (see R10-15 from the 2009 MUTCD).
 - Restrict right-turns on red during school hours with a dynamic message sign.

INTERSECTION IMPROVEMENT ALTERNATIVES

Multiple options were developed at the Eau Gallie Boulevard and Aurora Road intersections aimed at addressing the operational and multi-modal issues discussed in the previous sections. This section reviews the alternatives considered during the evaluation process and provides insight for selection of the preferred alternative at these locations.

Wickham Road at Eau Gallie Boulevard

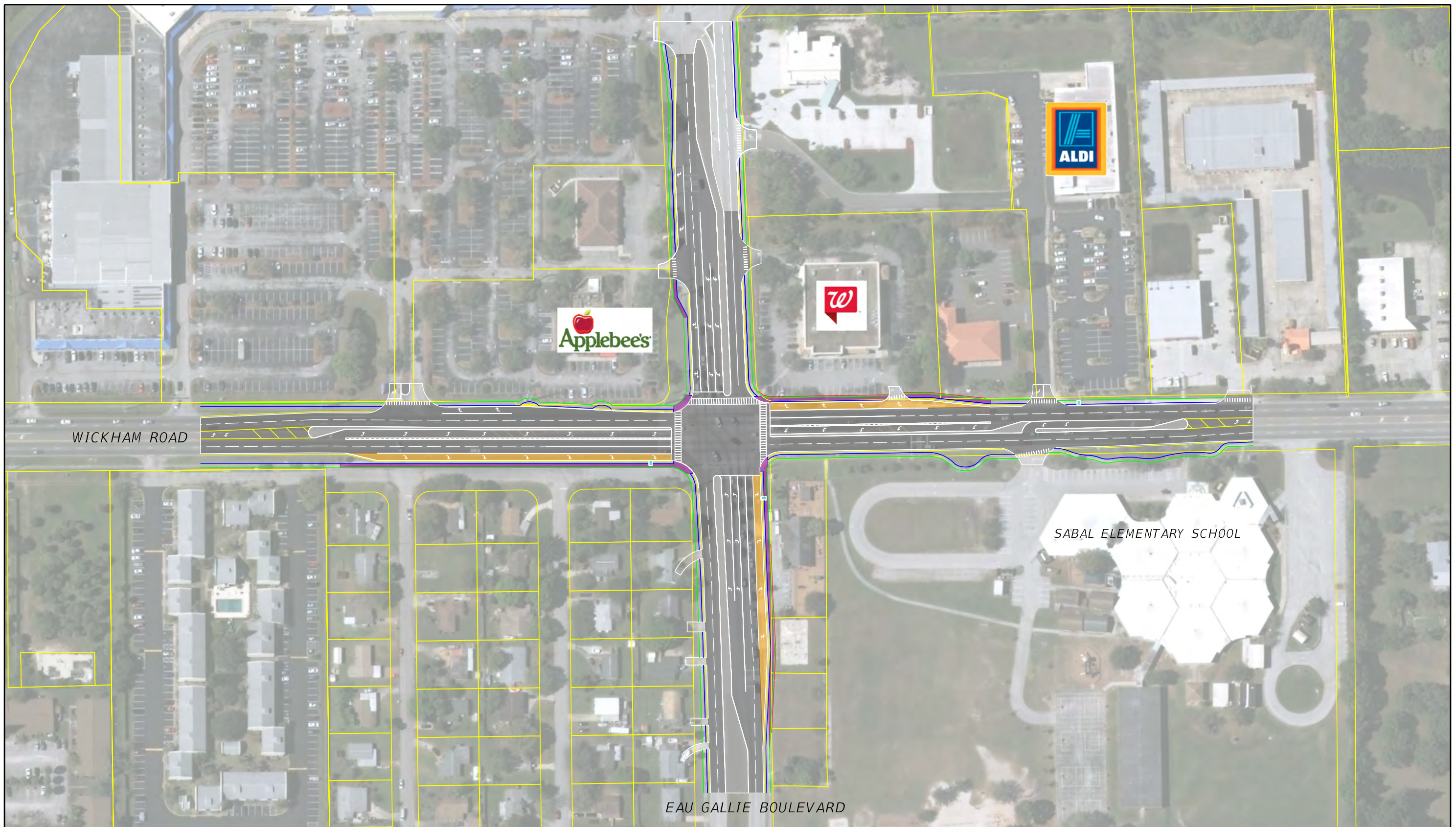
Based on the no-build conditions, Wickham Road at Eau Gallie Boulevard experiences LOS F operations with nine over-capacity movements in the 2040 PM peak hour. This section reviews the operational improvement options, the pedestrian/bicycle/transit improvements, and the cost comparison between options.

Intersection Operational Improvements

To improve traffic operations at the Wickham Road/Eau Gallie Boulevard intersection, two improvement options were developed:

- Eau Gallie Boulevard – ***Option A***
 - New exclusive northbound right turn lane;
 - New exclusive southbound right turn lane; and
 - New exclusive westbound right turn lane.
- Eau Gallie Boulevard – ***Option B***
 - New exclusive northbound right turn lane;
 - New exclusive southbound right turn lane; and
 - New exclusive eastbound right turn lane.

In addition to the turn lane improvements, the northbound and southbound left turn lanes were extended to better support queuing demands. To improve vehicular safety, raised concrete traffic separators and a striped buffer were added to the northbound and southbound left turn lanes to provide offset left turn lanes. These offset lanes will provide better visibility for the permissive northbound/southbound left turning movements. The concepts for Options A and B are presented in **Figure 25** and **Figure 26**.

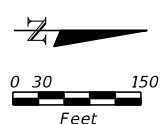


WICKHAM ROAD



SABAL ELEMENTARY SCHOOL

EAU GALLIE BOULEVARD



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES

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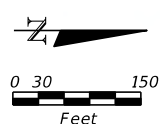
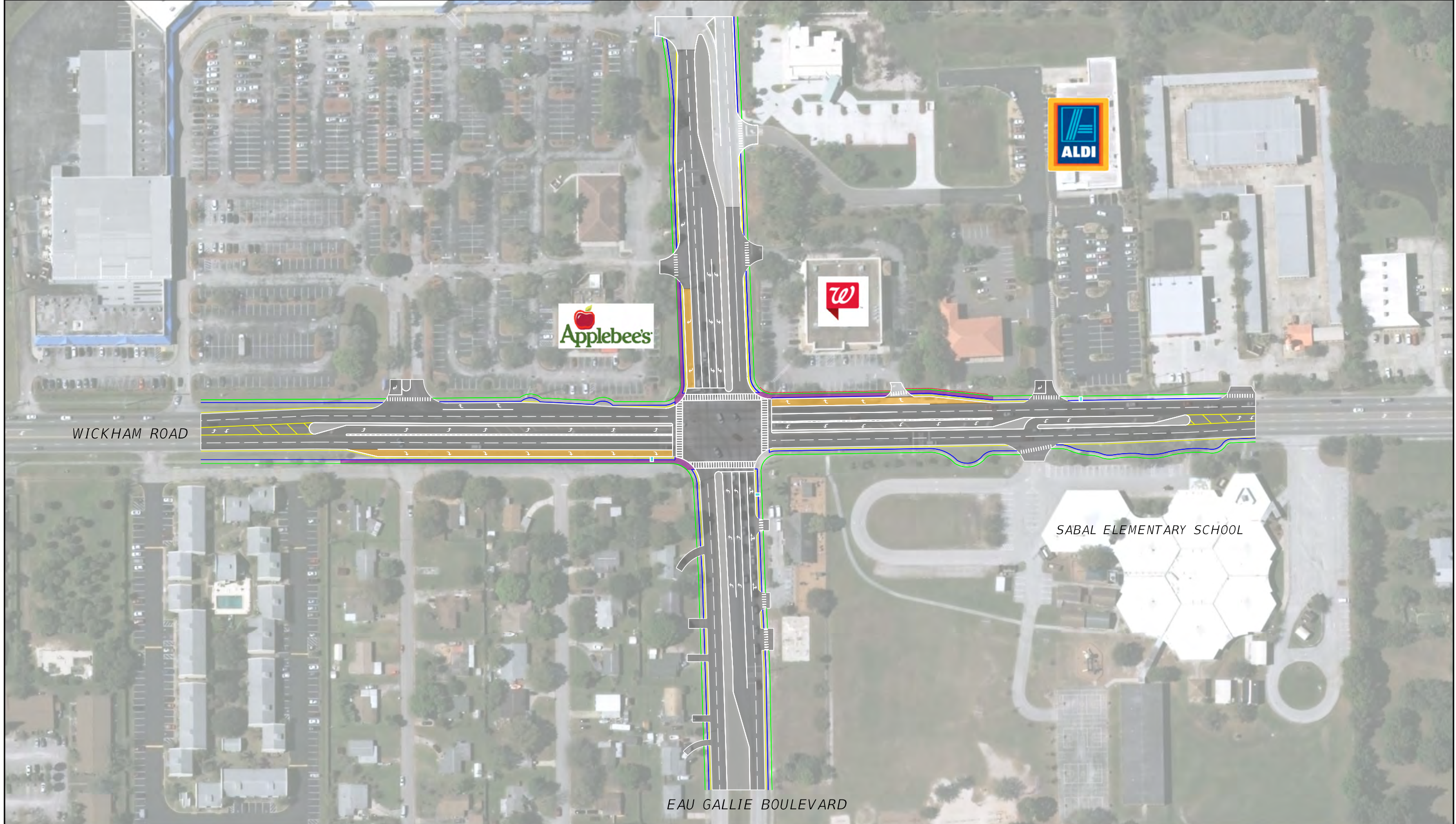
SPACE COAST
TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD AT
EAU GALLIE BOULEVARD
OPTION A

FIGURE NO.

25



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES

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SPACE COAST
TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD AT
EAU GALLIE BOULEVARD
OPTION B

FIGURE NO.
26

Multi-Modal Facility Improvements

The addition of exclusive right turn lanes will require the construction of new pavement and as a result, new sidewalk. The new sidewalk construction will occur on the east side south of the intersection, west side north of the intersection, and north side east of the intersection. Existing transit facilities were also evaluated, and the following improvements were made for both Options A and B:

- Melbourne Village Northbound
 - Move the stop 450' north;
 - Pave a level 5'x8' slab with a raised 6" curb for the boarding and alighting area and connect to the adjacent sidewalk;
 - Add detectable warnings to the nearby curb ramps; and
 - Move the pole with the bus schedule adjacent to the pavement to make it accessible.
- Eau Gallie Boulevard Westbound
 - Pave a level 5'x3' slab between the curb and sidewalk to complete a 5'x8' boarding and alighting area; and
 - Add detectable warnings to the nearby curb ramps.
- Aldi's Southbound
 - Pave a level 5'x2' slab behind the sidewalk to complete a 5'x8' boarding and alighting area; and
 - Extend the detectable warning at the nearby curb ramps.

LOS Evaluation and Cost Comparison

A HCM level analysis was performed on both improvement options with the following results:

- Option A operates at LOS E during the 2040 PM peak hour with no over-capacity movements; and
- Option B operates at LOS E during the 2040 PM peak hour with three over-capacity movements.

Table 11 displays a comparison of the planning level cost estimates for both improvement options. A bullet list with details comparing the costs for each option is provided after the table.

Table 11: Cost Comparison – Wickham Road at Eau Gallie Boulevard Options

	Eau Gallie Blvd. – Option A	Eau Gallie Blvd. – Option B
Construction	\$2,000,000	\$1,900,000
Utility Relocations	\$800,000	\$900,000
Engineering/CEI	\$840,000	\$840,000
Roadway ROW	\$3,600,000	\$400,000
Total Cost	\$7,240,000	\$4,040,000
Benefit/Cost	3.98	6.99

- **Construction** – While the construction cost is estimated to be similar for both alternatives, Option A has a slightly higher cost due to needing more pavement for turn lane additions.

- **Utility Relocations** – Underground utilities and overhead power/transmission lines are present along the Wickham Road corridor. It is anticipated that existing utilities would be impacted for both improvement alternatives. Option B will cost slightly more due to additional utilities present in the southwest corner of the intersection where the eastbound right turn lane would be located.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost. The engineering/CEI cost estimate is the same for both improvement options.
- **Roadway ROW** – It is anticipated that the addition of the southbound exclusive right turn lane for both alternatives will result in ROW impacts along the Walgreens in the northwest corner of the intersection. For Option A only, it is anticipated that the addition of the westbound exclusive right turn lane will result in full parcel takes for the two properties in the northeast corner of the intersection, thus the approximate \$3 million difference between Options A and B. No pond sites are anticipated for either option.
- **Benefit/Cost** – A benefit/cost ratio was calculated based on the estimated value of the delay savings each alternative provides versus the overall cost of the improvement. Both improvement alternatives resulted in benefit/cost ratios above a 1.0, indicating that the anticipated benefit is greater than the estimated costs. The operational benefit from Option A is greater than that of Option B, as evidenced by no over-capacity movements. But the additional ROW cost due to the full parcel takes in the northeast corner result in an overall lower B/C ratio for Option A.

After reviewing comments from the public and the PAT, **Option A** was selected as the preferred intersection alternative for Wickham Road at Eau Gallie Boulevard. These comments mainly focused on the better operational results of Option A versus Option B, thus the reason for selection. During the development of the preferred alternative concept, some adjustments were made to **Option A**, which are described in the **Preferred Alternative** section.

Wickham Road at Aurora Road

Based on the no-build conditions, Wickham Road at Aurora Road experiences LOS E operations with four over-capacity movements in the 2040 PM peak hour. This section reviews the operational improvement options, the pedestrian/bicycle/transit improvements, and the cost comparison between options.

Intersection Operational Improvements

To improve traffic operations at the Wickham Road/Eau Gallie Boulevard intersection, two improvement options were developed:

- Aurora Road – **Option A**
 - New exclusive northbound right turn lane; and
 - Lane swap the east leg of the intersection, removing a receiving eastbound lane and adding an exclusive westbound right turn lane.

- Aurora Road – **Option B**
 - Lane swap the east leg of the intersection, removing a receiving eastbound lane and adding an exclusive westbound right turn lane.

In addition to the additional turn lanes, the proposed options will include the extension of the northbound, southbound, and westbound left turn lanes to better accommodate queuing demands. In the existing condition, the eastbound shared through/right lane develops below the left turn lane. Thus when the left turn lane is extended west into the eastbound travel lane, new pavement will be added to extend/develop the eastbound shared through/right lane sooner. To improve vehicular safety, raised concrete traffic separators and a striped buffer will be added to the northbound and southbound left turn lanes to provide offset left turn lanes. These offset lanes will provide better visibility for the permissive northbound/southbound left turning movements. The concepts for Options A and B are presented in **Figure 27** and **Figure 28**.

Multi-Modal Facility Improvements

In the existing condition, Wickham Road at Aurora Road has crosswalks on the north and west legs of the intersection and sidewalks present north of the intersection. Both improvement alternatives will incorporate construction of new sidewalk along each approach and the addition of crosswalks on the east and south legs of the intersection. Additionally, new sidewalk will be constructed to connect to transit facilities. Existing transit facilities were also evaluated, and the following improvements were made for both Options A and B:

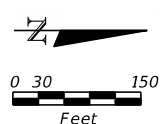
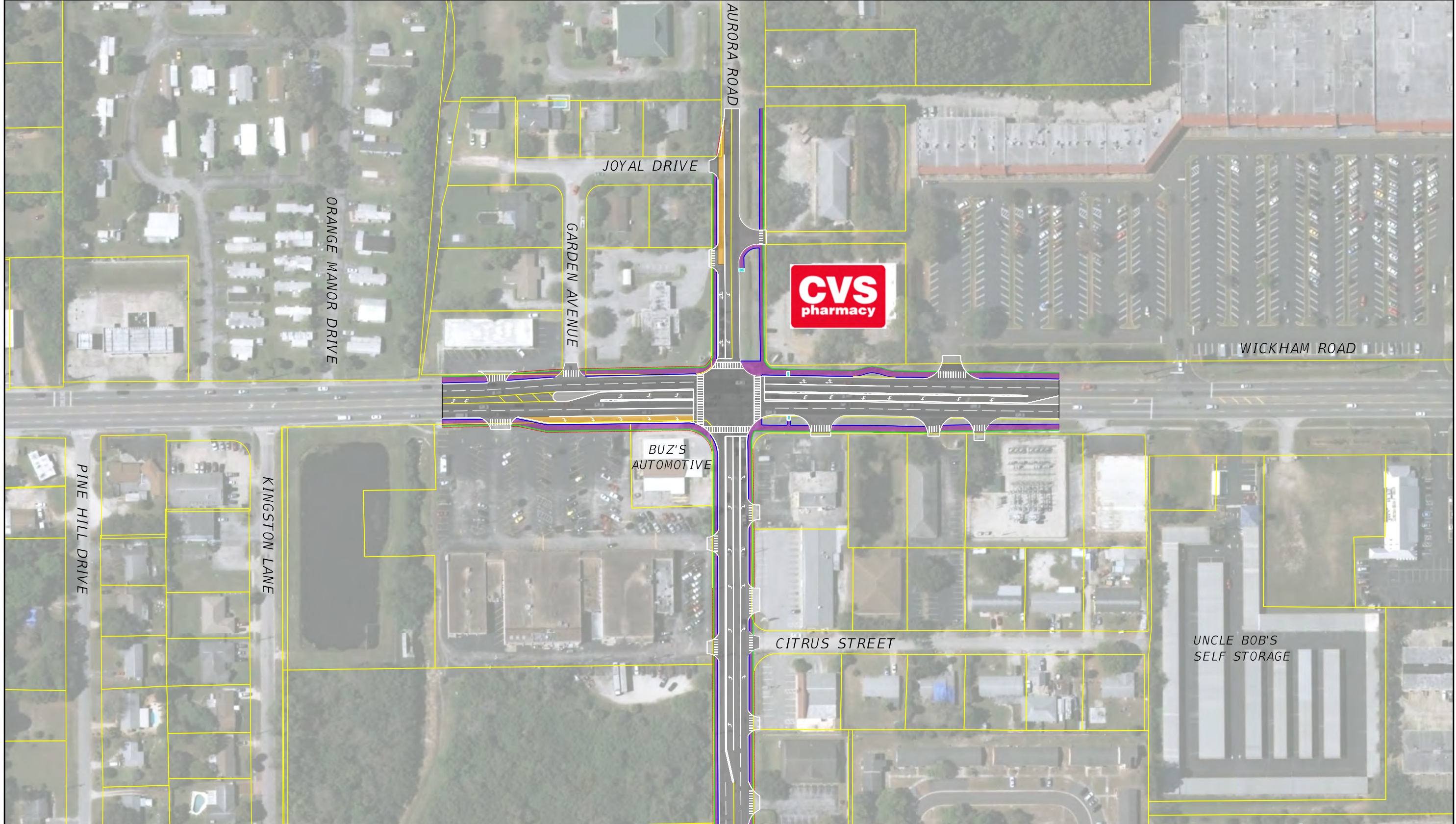
- Aurora Road Northbound
 - Move the bus stop 380' north;
 - Pave a level 5'x8' slab for the boarding and alighting area;
 - Add a 10' path from the boarding and alighting area to the sidewalk; and
 - Add detectable warnings to the nearby curb ramps.
- Aurora Road/CVS Southbound
 - Pave a level 5'x6' slab between the curb and sidewalk to complete a 5'x8' boarding and alighting area;
 - Add detectable warnings to the nearby curb ramps; and
 - Move the pole with the bus schedule adjacent to the pavement to make it accessible.

LOS Evaluation and Cost Comparison

A HCM analysis was performed on both improvement options with the following results:

- Option A operates at LOS E during the 2040 PM peak hour with no over-capacity movements; and
- Option B operates at LOS E during the 2040 PM peak hour with two over-capacity movements.

Table 12 displays a comparison of the planning level cost estimates for both improvement options. A bullet list with details comparing the costs for each option is provided after the table.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

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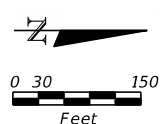
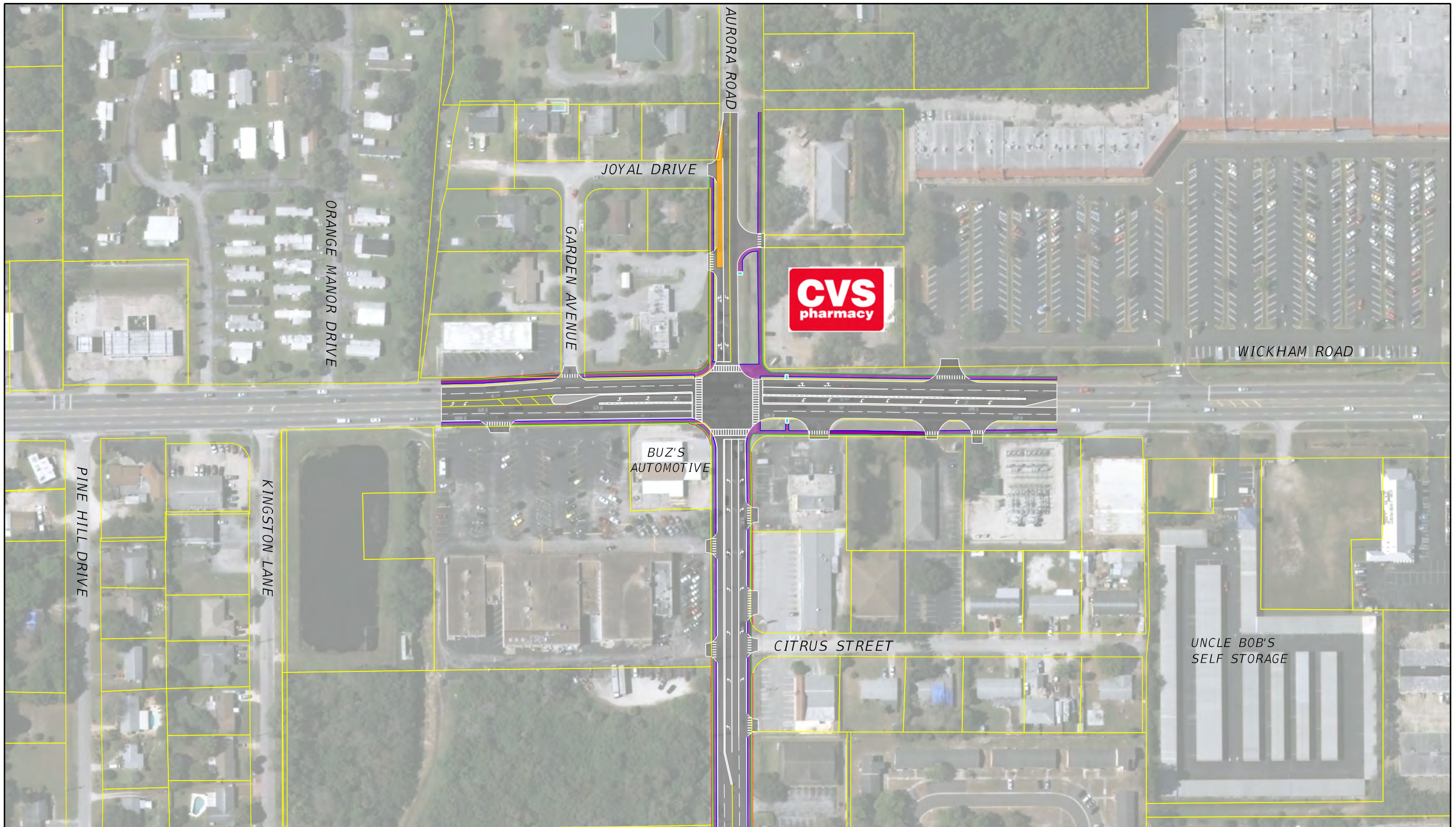


SPACE COAST
TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD
AT AURORA ROAD
OPTION A

FIGURE NO.
27



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

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SPACE COAST
TRANSPORTATION PLANNING ORGANIZATION

ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD
AT AURORA ROAD
OPTION B

FIGURE NO.
28

Table 12: Cost Comparison – Wickham Road at Aurora Road Options

	Aurora Road – Option A	Aurora Road – Option B
Construction	\$1,300,000	\$1,100,000
Utility Relocations	\$250,000	\$100,000
Engineering/CEI	\$470,000	\$360,000
Roadway ROW	\$2,700,000	\$800,000
Total Cost	\$4,720,000	\$2,360,000
Benefit/Cost	2.24	2.49

- **Construction** – Option A has higher construction cost due to the new pavement for the northbound exclusive right turn lane.
- **Utility Relocations** – Underground utilities and overhead power/transmission lines are present along the Wickham Road corridor. It is anticipated that existing utilities would be impacted for both improvement alternatives. Option A will cost slightly more due to the additional utilities impact due to the northbound right turn lane in the southeast corner of the intersection.
- **Engineering/CEI** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost. The engineering/CEI cost estimate is higher for Option A due to the higher construction and utility relocation cost.
- **Roadway ROW** – It is anticipated that the extension to the eastbound shared through right turn lane and the construction of new sidewalk on all approaches will result in ROW impacts for both alternatives. Option A is anticipated to result in a full parcel take for Buz’s Automotive in the southeast corner due to the addition of the northbound exclusive right turn lane, thus the approximate \$2 million difference in ROW cost between Option A and B. No pond sites are anticipated for either option.
- **Benefit/Cost** – A benefit/cost ratio was calculated based on the estimated value of the delay savings each alternative provides versus the overall cost of the improvement. Both improvement alternatives resulted in benefit/cost ratios above a 1.0, indicating that the anticipated benefit is greater than the estimated costs. The operational benefit from Option A is greater than that of Option B, as evidenced by no over-capacity movements. But the additional ROW cost due to the full parcel take in the southeast corner result in an overall lower B/C ratio for Option A.

After reviewing comments from the public and the PAT, **Option A** was selected as the preferred intersection alternative for Wickham Road at Aurora Road. These comments mainly focused on the better operational results of Option A versus Option B, thus the reason for selection. During the development of the preferred alternative concept, some adjustments were made to **Option A**, which are described in the **Preferred Alternative** section.

TYPICAL SECTION ALTERNATIVES

Wickham Road is a five-lane roadway with a center TWLTL. **Figure 29** and **Figure 30** show the existing typical sections along Wickham Road between Eau Gallie Boulevard and Trimble Road and Trimble Road to Lake Washington Road. Below is a summary of typical sectional elements:

- Five-lane roadway with a center TWLTL –
 - Two lanes northbound and two lanes southbound, consistently 12' wide;
 - One center TWLTL, consistently 12' wide; and
 - Type F curb and gutter to the outside.
- Sidewalk width varies between 5' and 6' wide along the west side of Wickham Road (6' wide along the east side of Wickham Road);
- The grass buffer strip between the sidewalk and the curb adjacent to Wickham Road varies along the corridor (no buffer up to approximately 25' wide); and
- ROW varies along the corridor from approximately 76' to 100' of total ROW.

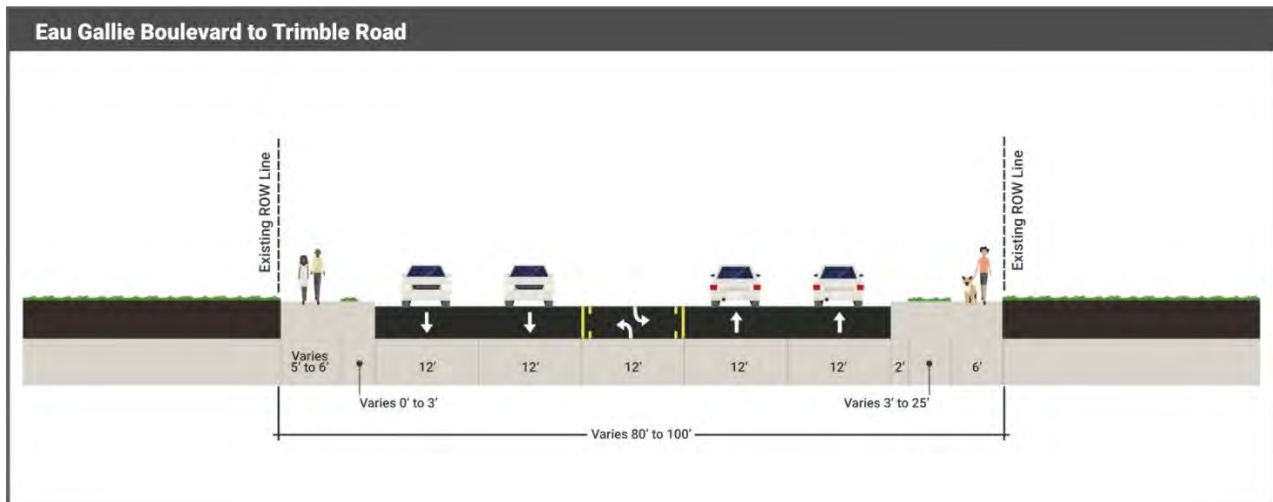


Figure 29: Existing Typical Section – Wickham Road from Eau Gallie Boulevard to Trimble Road

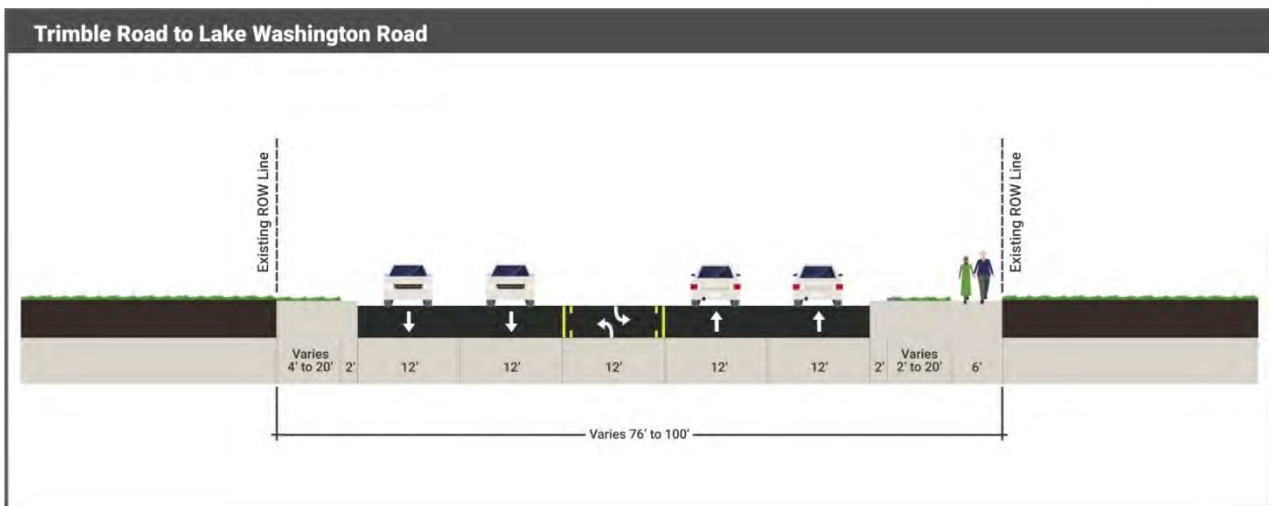


Figure 30: Existing Typical Section – Wickham Road from Trimble Road to Lake Washington Road

Based on the above existing typical sections and the issues identified during the analysis, the following typical section alternatives were evaluated as part of this study:

- **Alternative 1 – Figure 31**
 - Maintain existing two-way center left turn lane;
 - New bike lanes adjacent to travel lanes;
 - New sidewalk on the west side of the corridor;
 - Rebuild all existing sidewalks; and
 - Approximately 0' to 10' of additional ROW would be needed on either side.

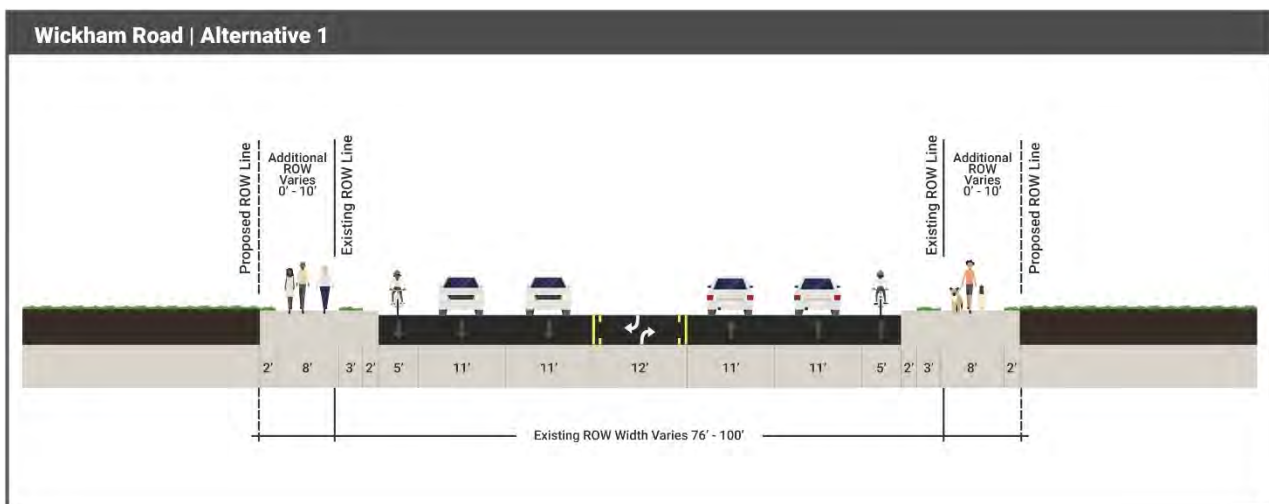


Figure 31: Wickham Road from Eau Gallie Boulevard to Lake Washington Road Typical Section Alternative 1

- **Alternative 2 – Figure 32**
 - Maintain existing two-way center left turn lane;
 - New 10' wide shared use path on the west side of the corridor;
 - Replace existing sidewalk with 10' wide shared use path; and
 - Approximately 0' to 9' of additional ROW would be needed on either side.

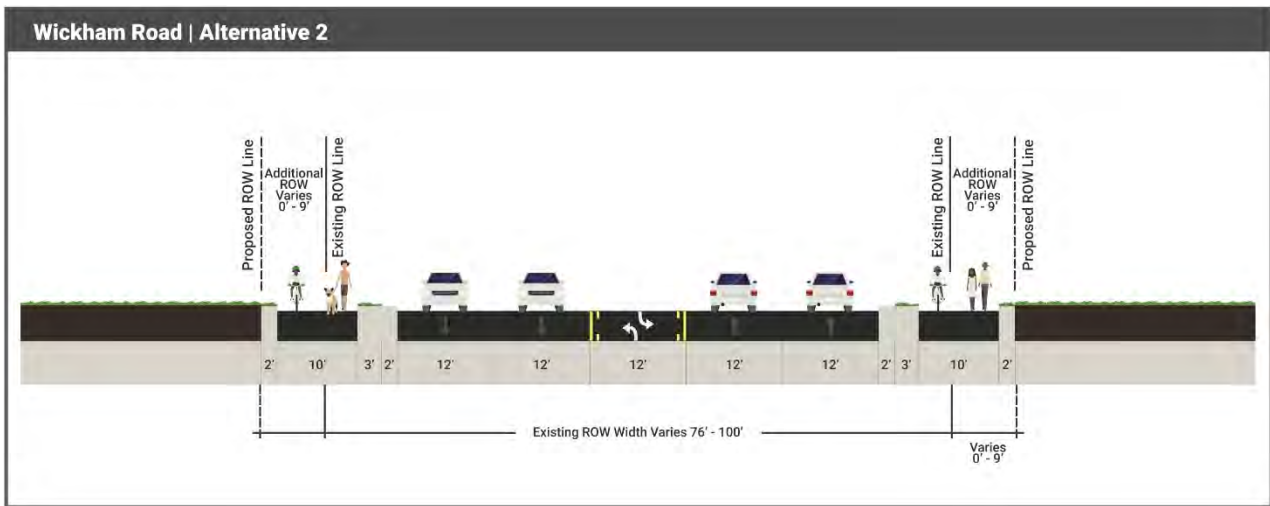


Figure 32: Wickham Road from Eau Gallie Boulevard to Lake Washington Road Typical Section Alternative 2

- **Alternative 3 – Figure 33**
 - Convert two-way center left turn lane to raised median;
 - New bike lanes adjacent to travel lanes;
 - New sidewalk on the west side of the corridor;
 - Rebuild all existing sidewalks; and
 - Approximately 0' to 12' of additional ROW would be needed on either side.

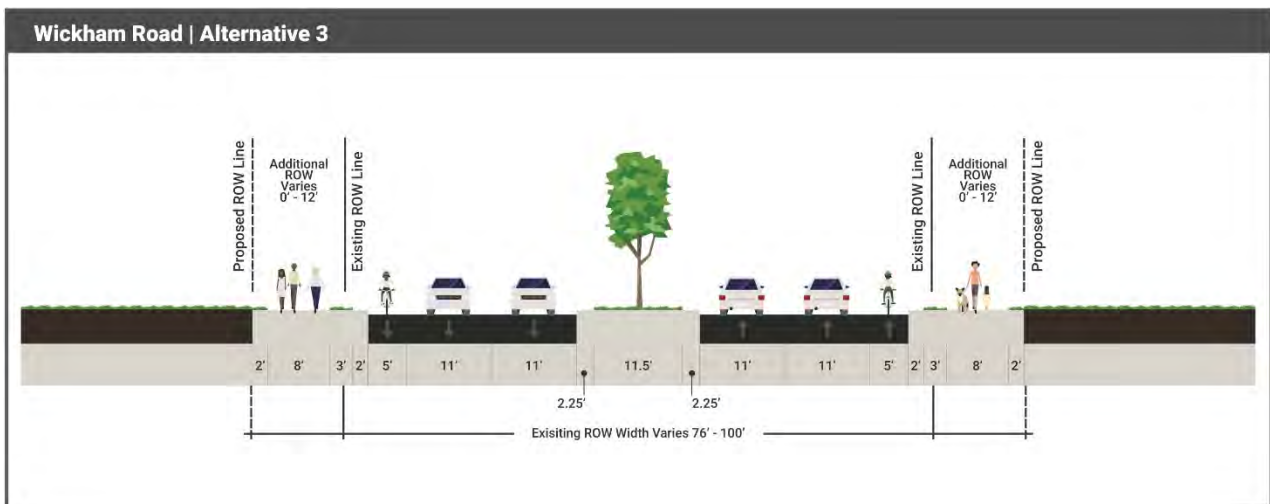


Figure 33: Typical Section Alternative 3

- **Alternative 4 – Figure 34**
 - Convert two-way center left turn lane to raised median;
 - New 10' wide shared use path on the west side of the corridor;
 - Replace existing sidewalk with 10' wide shared use path; and
 - Approximately 0' to 9' of additional ROW would be needed on either side.

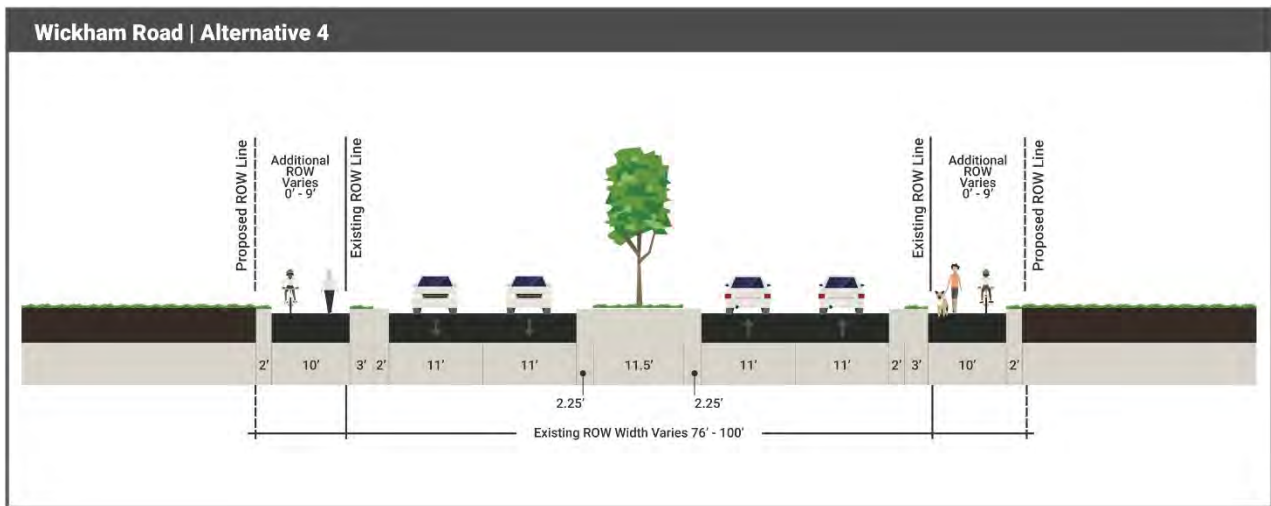


Figure 34: Wickham Road from Eau Gallie Boulevard to Lake Washington Road Typical Section Alternative 4

Typical Section Alternatives Comparison Matrix

The alternative typical sections for Wickham Road are compared in **Table 13** based on measures of effectiveness (MOEs) such as pedestrian/bicycle mobility, overall safety, ROW impacts, drainage impacts, utility impacts, and cost. These impacts are qualitative (positive, moderate, or no change) for the first four MOEs and cost based (high, moderate, or least) for the last four. A summary of the qualitative impacts or cost impacts for each MOE is provided after the table.

Table 13: Typical Section Measures of Effectiveness

MOE	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Improve Pedestrian Mobility/Safety	Positive	Positive	Positive	Positive
Improve Bicycle Mobility/Safety	Moderate	Positive	Moderate	Positive
Improve Vehicular Mobility	No Change	No Change	Moderate	Moderate
Improve Vehicular Safety	Moderate	No Change	Positive	Positive
ROW Impacts	High Cost	Moderate Cost	High Cost	High Cost
Drainage Impacts	High Cost	Moderate Cost	High Cost	High Cost
Utility Impacts	High Cost	Moderate Cost	High Cost	High Cost
Cost Comparison	Moderate Cost	Least Cost	High Cost	High Cost

- **Improve Pedestrian Mobility/Safety** – Each of the alternatives provides either wider sidewalks than what is existing or shared-use paths near the ROW line. Thus, the reason for the positive rating.
- **Improve Bicycle Mobility/Safety** – Each of the typical section alternatives are providing some type of bicycle facility where it is not currently present today, either in the form of a shared-use path or bicycle lane. A bicycle lane does not provide as much safety as a shared-use path, thus the reason for the moderate rating for Alternatives 1 and 2.
- **Improve Vehicular Mobility** – The center TWLTL would remain in Alternatives 1 and 2, thus no impacts to vehicular mobility. The addition of a raised, concrete median and access management improvements for Alternatives 3 and 4 would require vehicles from the minor streets/driveways to make U-turns at upstream/downstream U-turn locations. At some locations, Wickham Road vehicles would no longer be able to turn left onto minor streets/driveways as well. Thus the moderate impact to vehicular mobility.
- **Improve Vehicular Safety** – By providing bike lanes outside of the travel lanes, the risk of run off the road crashes is slightly reduced for Alternative 1. The center TWLTL would remain in Alternative 2, thus no improvements to vehicular safety. The addition of raised concrete medians for Alternatives 3 and 4 increases safety by reducing the number of conflict points for left turning vehicles onto Wickham Road from minor streets, thus the positive rating. In addition to reducing left turning conflicts, opposing head-on crashes would be reduced due to the introduction of the raised median.
- **ROW Impacts** – Each of the alternatives requires ROW acquisition. Alternative 2 would have a moderate cost rating as opposed to a high because expanding the existing sidewalk would have less impacts than rebuilding the roadway and moving the sidewalk further east/west, which is being proposed in the other alternatives.
- **Drainage Impacts** – The high cost drainage impacts are a result of existing curb and gutter being moved/reconstructed in Alternatives 1, 3, and 4. Alternative 2 would have a moderate cost because new curb and gutter will be added in locations where it is absent today.
- **Utility Impacts** – Power lines are located on the west side of the corridor and underground fiber optic cable, water, and sewer lines are present along the corridor. Moving the sidewalk further to the outside due to the addition of bike lanes (Alternatives 1 and 3) and/or a raised median (Alternatives 3 and 4) will result in high utility relocation costs. A moderate rating was given for Alternative 2 for the same reasons noted in the ROW impacts bullet.
- **Cost Comparison** – The primary cost difference between the alternatives is the amount of construction work that will be needed. The addition of a raised median for Alternatives 3 and 4 would require a complete rebuild of the roadway, thus resulting in the highest cost of the alternatives. The moderate cost for Alternative 1 is due to the addition of bike lanes resulting in new pavement and curb/gutter. Alternative 2 would have the lowest cost because it is not moving curb.

The preferred alternative typical section was selected by the PAT after public feedback on the alternatives was obtained during the Alternatives Public Meeting (detailed further in the **Public Involvement** section). Issues important to the public were safety/comfort for pedestrians and bicyclists. The shared-use paths presented in Alternatives 2 and 4 provide a safer and more comfortable

experience for bicyclists as opposed to the dedicated bicycle lanes presented in Alternatives 1 and 3. As a result, the preference of the public was Alternatives 2 and 4. After reviewing the feasibility of the preference of the public, **Alternative 2** was selected due to the lower overall costs. This Alternative would also require the least amount of Wickham rebuild and will tie-in with the existing Wickham Road sections south of Eau Gallie Boulevard and north of Lake Washington Road.

PREFERRED ALTERNATIVE

As discussed in the previous sections, an alternatives analysis was performed on two of the signalized intersections (Eau Gallie Boulevard and Aurora Road) and the corridor typical sections. This analysis produced the following preferred alternatives:

- Eau Gallie Boulevard – ***Option A***
 - New exclusive northbound right turn lane;
 - New exclusive southbound right turn lane; and
 - New exclusive westbound right turn lane.
- Aurora Road – ***Option A***
 - New exclusive northbound right turn lane; and
 - Lane swap the east leg of the intersection, removing a receiving eastbound lane and adding an exclusive westbound right turn lane.
- Typical Section Alternative 2
 - Maintain existing two-way center left turn lane;
 - New 10' wide shared use path on the west side of the corridor;
 - Replace existing sidewalk with 10' wide shared use path; and
 - Approximately 0' to 9' of additional ROW would be needed on either side.

In addition to Eau Gallie Boulevard and Aurora Road, a preferred concept was also prepared for the following locations along the corridor:

- Wickham Road from Eau Gallie Boulevard to Aurora Road – segment improvements based on typical section Alternative 2.
- Wickham Road from Northgate Plaza to north of Northgate Street –
 - Convert the center TWLTL to a raised median and provide directional median openings/access management along this segment; and
 - Move the existing traffic signal from Northgate Plaza to Northgate Street.
- Wickham Road at Venture Lane/Lansing Street –
 - Add new roadway connecting Venture Lane and Lansing Street on the south side of the South Area Alternative Learning Center;
 - Add new traffic signal at Venture Lane; and
 - Add raised median north and south of Venture Lane along Wickham Road to provide access management treatments.
- Wickham Road from Lansing Street to Lake Washington Road – segment improvements based on typical section Alternative 2.
- Wickham Road at Lake Washington Road –

- New northbound right turn lane;
- New pavement added to extend eastbound exclusive right turn lane;
- Second westbound through lane extended to the Publix driveway; and
- New eastbound left turn lane into the Publix driveway.

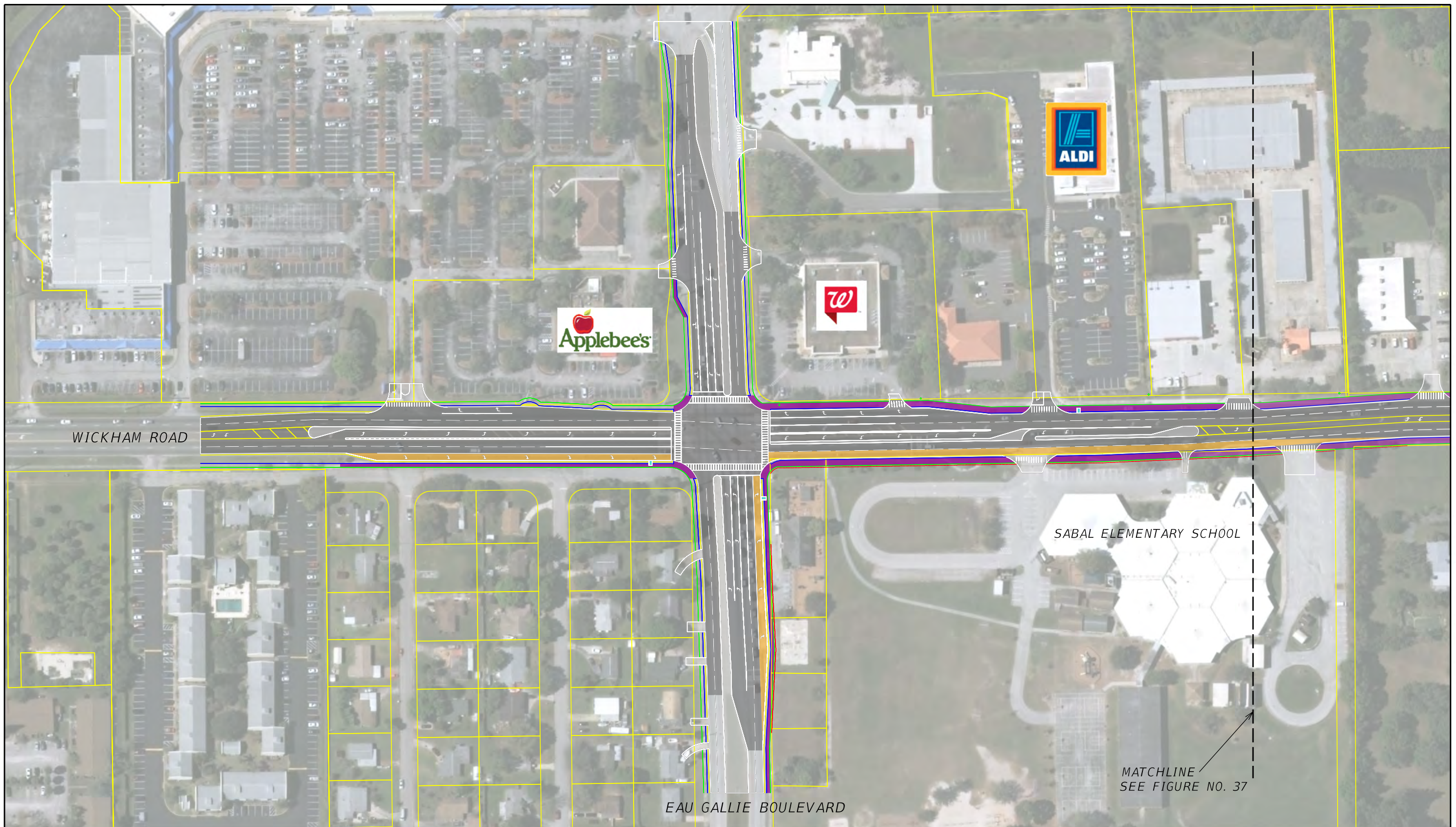
Preferred concept details for each of the above locations are discussed in the remainder of this section.

Wickham Road at Eau Gallie Boulevard

During preferred alternative concept development, modifications were made to Option A to refine the engineering elements of the concept. The preferred alternative concept for Wickham Road at Eau Gallie Boulevard is presented in **Figure 35**. The following are specific details related to the preferred concept for Wickham Road at Eau Gallie Boulevard:

- Lane widths along Wickham Road are 12' wide, and turn lanes are 11' wide;
- Lane widths along Eau Gallie Boulevard were maintained at 12' (including turn lanes);
- Turn lane lengths were created based on future build operational queue lengths plus appropriate deceleration distance based on the 35 MPH speed limit along Wickham Road and 45 MPH speed limit along Eau Gallie Boulevard. The turn lane lengths are as follows:
 - 570' for the northbound left (extended by 320' from existing conditions);
 - 520' for the northbound right;
 - 430' for the dual westbound lefts;
 - 430' for the westbound right;
 - 400' for the southbound left (extended by 200' from existing conditions);
 - 350' for the southbound right;
 - 400' for the dual eastbound lefts.
- Four-foot concrete traffic separators introduced between the northbound/southbound through lanes and opposing left turn lanes. Two-foot wide white striped areas were also provided between the northbound/southbound through lanes and adjacent left turn lanes.
- Existing sidewalk is present along the north and south sides of Eau Gallie Boulevard west of the intersection, on the south side of Eau Gallie Boulevard east of the intersection, and on the west side of Wickham Road south of the intersection.
- New six-foot sidewalk is proposed along the north side of Eau Gallie Boulevard east of the intersection, and along the east side of Wickham Road south of the intersection to tie-in with existing sidewalk. Additionally, to maintain a straight walking path across the Applebee's driveway along the east side of Eau Gallie Boulevard west of the intersection, new six-foot sidewalk is proposed to provide a transition to the existing sidewalk.
- New 10' shared-use path is proposed along both sides of Wickham Road north of the intersection.

To eliminate the ROW takes impacting parcels such as Walgreens and Aldi's on the west side of Wickham Road, the north leg of the intersection will shift to the east. The parcel on the northeast corner was already proposed as a full ROW take, thus shifting to the east will take advantage of that full take without also impacting the Walgreens and Aldi's. This shift would also impact school property.

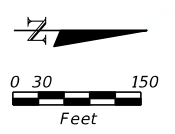


WICKHAM ROAD

EAU GALLIE BOULEVARD

SABAL ELEMENTARY SCHOOL

MATCHLINE
SEE FIGURE NO. 37



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- ◇ UTILITY POLE
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES

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SPACE COAST TRANSPORTATION PLANNING ORGANIZATION		
ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

WICKHAM ROAD AT
EAU GALLIE BOULEVARD
PREFERRED ALTERNATIVE

FIGURE NO.
35

Additionally, this shift will create a skew for northbound and southbound vehicles. Based on the Florida Department of Transportation (FDOT) Design Manual (FDM), the maximum deflection angle for a lane shift is six degrees for a 35 MPH design speed, shown in **Figure 36**. The lane shift presented in the preferred alternative is approximately three degrees, which is within the recommended deflection angle from the FDM.

Table 212.2.1 Maximum Deflection Angle Through Intersection

Maximum Deflection Angle Through Intersection (DM)					
Design Speed (mph)					
≤ 20	25	30	35	40	45
16° 00'	11° 00'	8° 00'	6° 00'	5° 00'	3° 00'

Lane Shift

Deflection Thru Intersection

Figure 36: FDOT Design Manual Table 212.2.1 Lane Shifts

During field reviews, it was observed that the queueing of cars entering Sabal Elementary School occupies the two-way center left turn lane and extends along Wickham Road, which causes conflicts with vehicles attempting to turn left onto Wickham Road from driveways on the west side of the road. To resolve this, the preferred alternative includes a 230' exclusive southbound left turn lane with a six-foot wide traffic separator for the southern driveway of Sabal Elementary School. Additionally, the traffic separator becomes a full concrete median at the end of the southbound exclusive left turn and is extended an additional 25' to the north to restrict both left turns onto Wickham Road from the second Sabal Elementary driveway and southbound left turns from Wickham Road into the second Sabal Elementary driveway, thus making it a right-in/right-out only movement.

Table 14 displays the final planning level cost estimates for the preferred alternative for Wickham Road at Eau Gallie Boulevard. A bullet list detailing the costs for each element is provided after the table.

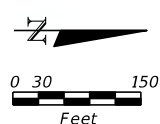
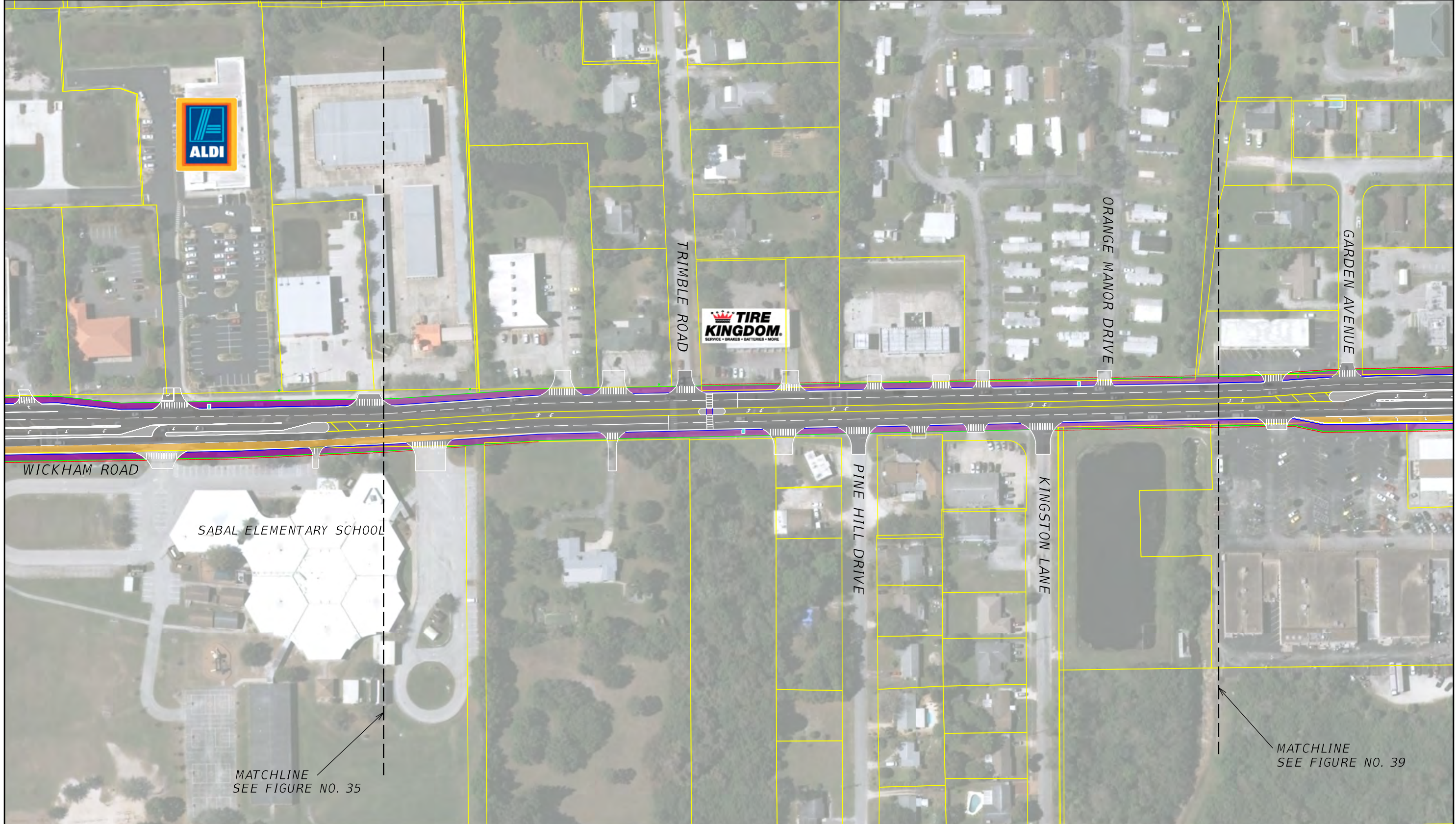
Table 14: Wickham Road at Eau Gallie Boulevard Preferred Alternative

Element	Cost
Construction	\$2,700,000
Utility Relocations	\$700,000
Engineering/CEI	\$1,000,000
Roadway ROW	\$8,500,000
Total Cost	\$12,900,000
Benefit/Cost	3.17

- **Construction** – The construction cost is higher in the preferred alternative due to the addition of 10' wide shared-use paths on both sides of Wickham Road north of the intersection, and access management improvements for Sabal Elementary School. Due to the Wickham Road lane shift to the east, new pavement is required on the east side north of the intersection. This cost also includes the resurfacing/reconstruction of Wickham Road and Lake Washington Road due to the turn lane improvements. This estimate also includes construction of mast arms at the signal.
- **Utility Relocations** – The preferred alternative is shifting Wickham Road to the east through the intersection, thus reducing impacts to utilities on the west side in front of the Walgreens and Aldi's properties over Option A.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost. The construction cost increased in the preferred alternative, thus this cost increased as well.
- **Roadway ROW** – The preferred alternative no longer anticipates impacts along the Walgreens in the northwest corner of the intersection due to the lane shift improvement. It is still anticipated that the addition of the southbound exclusive right turn lane and the addition of the westbound exclusive right turn lane will result in ROW impacts. This cost increases in the preferred alternative due to the inclusion of a pond due to the amount of new pavement being constructed for the northbound lanes north of the intersection.
- **Benefit/Cost** – After the adjustments made to the preferred alternative, the improvements still resulted in benefit/cost ratio above a 1.0, indicating that the anticipated benefit is greater than the estimated costs.

Wickham Road from Eau Gallie Boulevard to Aurora Road

This segment provides improvements from the preferred typical section alternative. These improvements include a 10' wide shared-use path on both sides of Wickham Road and maintaining the existing 5-lane section. The preferred alternative concept for Wickham Road from Eau Gallie Boulevard to Aurora Road is presented in **Figure 37**.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- ◆ UTILITY POLE
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

MATCHLINE
SEE FIGURE NO. 35

MATCHLINE
SEE FIGURE NO. 39

NOTES
 -RIGHT-OF-WAY AND PROPERTY LINES ARE GEOGRAPHICAL REPRESENTATIONS ONLY AND DO NOT DEPICT ACCURATE BOUNDARIES. DO NOT USE TO DESCRIBE, ASSESS, OR OTHERWISE ESTABLISH THE LIMITS OF PROPERTIES OR LOCATIONS OF FEATURES IN RELATION TO PROPOERTY LINES SHOWN HEREIN.
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SPACE COAST TRANSPORTATION PLANNING ORGANIZATION		
ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

**WICKHAM ROAD FROM
EAU GALLIE BOULEVARD TO AURORA ROAD
PREFERRED ALTERNATIVE**

FIGURE NO.
37

At Trimble Road, there was an opportunity to improve the pedestrian crossing on the south leg of the intersection. This crossing is utilized by Sabal Elementary school children and is staffed by a crossing guard during the AM drop-off and PM pick-up times. To provide a safer crossing, the preferred alternative concept proposes moving the crossing to the north leg of the intersection and provide a raised concrete median as a pedestrian refuge. Another treatment that would improve pedestrian safety at the crossing would be the installation of an *Manual on Uniform Traffic Control Devices* (MUTCD) compliant vehicle warning sign, such as pedestrian-activated flashing LEDs in the border of a warning sign (shown in **Figure 38**). Moving forward into further analysis or concept design for this recommendation should be coordinated with Sabal Elementary School, crossing guards, local police, and the surrounding neighborhood.

Pedestrian-activated Flashing LEDs in the Border of a Warning Sign –Section 2A.07 describes the use of flashing white or yellow LEDs in the border of a pedestrian crossing warning sign. The flashing LEDs may be pedestrian activated to increase their effectiveness in making the crossing sign more conspicuous when a pedestrian desires to cross the roadway.



Figure 38: FHWA Description of Pedestrian-activated Flashing LEDs in the Border of a Warning Sign

Existing transit facilities were evaluated, and the following improvements were made for the preferred alternative:

- Pine Hill Drive Northbound
 - Move the bus stop 175' south;
 - Pave a level 5'x3' slab between the curb and sidewalk to complete a 5'x8' boarding and alighting area; and
 - Add detectable warnings to the nearby curb ramps.
- Orange Manor Southbound
 - Pave a level 5'x3' slab between the curb and sidewalk to complete a 5'x8' boarding and alighting area; and
 - Add detectable warnings to the nearby curb ramps.

Table 15 displays the planning level cost estimates for the recommended improvements for Wickham Road from Eau Gallie Boulevard to Aurora Road. A bullet list detailing the costs for each element is provided after the table.

Table 15: Cost Estimate – Wickham Road from Eau Gallie Boulevard to Aurora Road

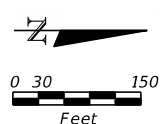
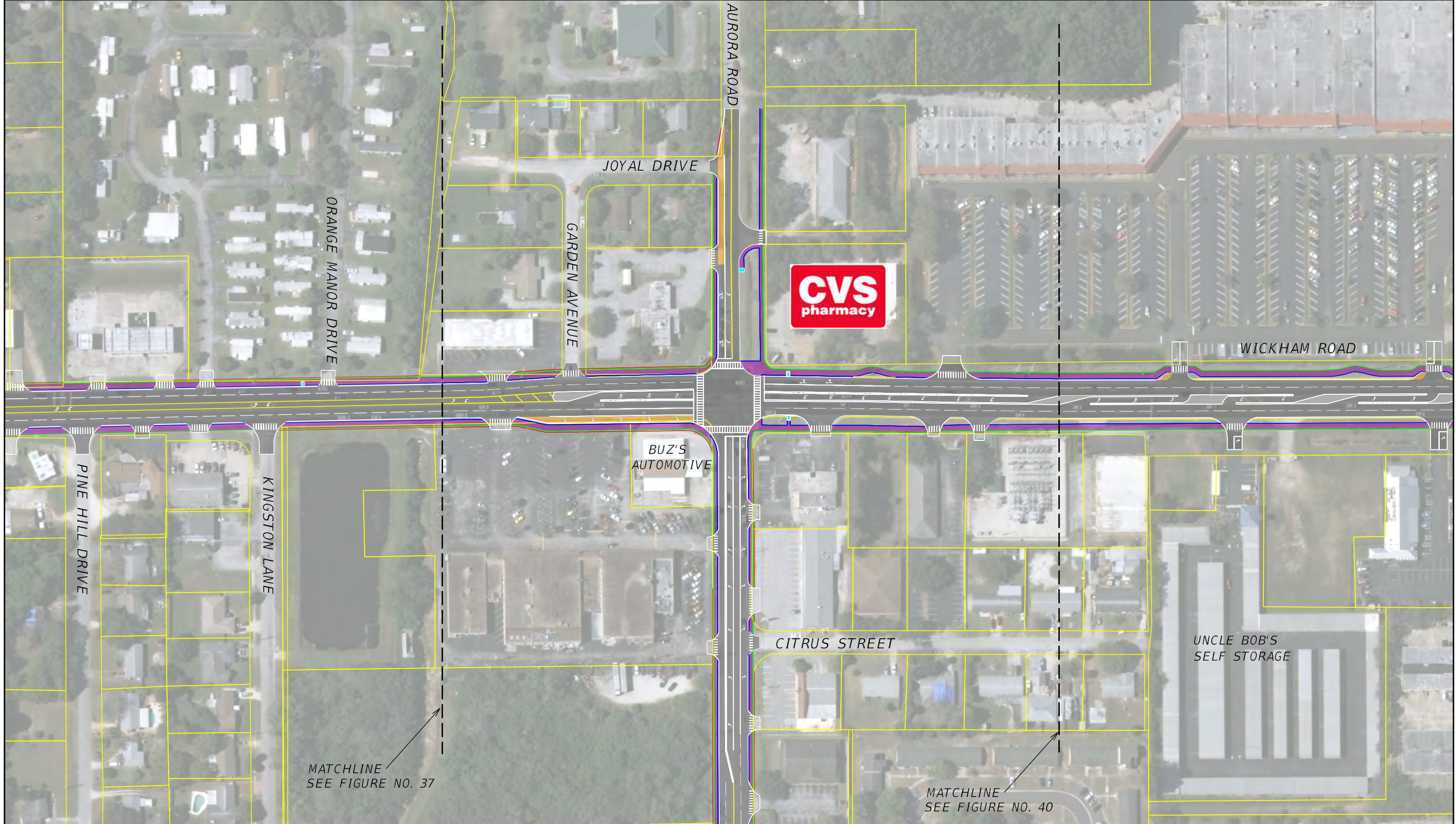
Element	Cost
Construction	\$600,000
Utility Relocations	\$0
Engineering/CEI	\$200,000
Roadway ROW	\$900,000
Total Cost	\$1,700,000

- **Construction** – This construction cost is based on the addition of the 10' wide shared-use paths on both sides of Wickham Road. This cost also includes the resurfacing of Wickham Road.
- **Utility Relocations** – No utility impacts are anticipated for this segment as the shared-use path wraps around the existing utility poles, where necessary.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation costs.
- **Roadway ROW** – The preferred alternative has anticipated ROW impacts on the west side of the roadway to the Tire Kingdom property, the Orange Manor Mobile Home Park, and the retention pond on the north side of Kingston Lane due to the shared-use path.

Wickham Road at Aurora Road

During preferred alternative concept development, slight modifications were made to Option A to refine the engineering elements of the concept. The preferred alternative concept for Wickham Road at Aurora Road is presented in **Figure 39**. The following are specific details related to the preferred concept for Wickham Road at Aurora Road:

- Lane widths along Wickham Road are 12' wide, and turn lanes are 11' wide;
- Lane widths along Aurora Road were maintained at 12' (including turn lanes);
- Turn lane lengths were created based on future build operational queue lengths plus appropriate deceleration distance based on the 35 MPH speed limit along Wickham Road, 45 MPH speed for Aurora Road eastbound, and 40 MPH speed limit for Aurora Road westbound. The turn lane lengths are as follows:
 - 200' for the northbound left;
 - 280' for the northbound right;
 - 550' for the westbound left (note the westbound right is a lane drop scenario thus there is no turn lane length);
 - 470' for the southbound left (extended by 290' from existing conditions);
 - 390' for the eastbound through-right (extended by 170' from existing conditions).
- Two-foot concrete traffic separators introduced between the northbound/southbound and eastbound/westbound through lanes and opposing left turn lanes. Two-foot wide white striped areas were also provided between the northbound/southbound through lanes and adjacent left turn lanes.
- Existing sidewalk is present along the south side of Aurora Road east of the intersection, on the north side of Aurora Road west of the intersection, and on both sides of Wickham Road north of the intersection.
- New six-foot sidewalk is proposed along both sides of Aurora Road both east and west of the intersection.
- New 10' shared-use path is proposed along both sides of Wickham Road north and south of the intersection.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- ◇ UTILITY POLE
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES
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SPACE COAST TRANSPORTATION PLANNING ORGANIZATION		
ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

**WICKHAM ROAD
AT AURORA ROAD
PREFERRED ALTERNATIVE**

FIGURE NO.
39

Existing transit facilities were evaluated, and the following improvements were made for the preferred alternative:

- Aurora Road/CVS Westbound
 - Pave a level 5'x3' slab between the curb and sidewalk to complete a 5'x8' boarding and alighting area;
 - Pave a level six-foot wide sidewalk adjacent to the edge of pavement on the east side of the CVS driveway on Aurora Road connecting the transit stop to the existing sidewalk; and
 - Add detectable warnings to the nearby curb ramps.

There is an existing 12' skew between the westbound through lane east of the intersection and the westbound receiving lane west of the intersection. There was an opportunity to reduce this skew during the development of the alternatives concept. The proposed improvement shows a lane swap on Aurora Road east of the intersection with the following changes:

- The existing westbound through lane becomes a new westbound exclusive right turn lane;
- The existing westbound exclusive left-turn lane becomes the new westbound through lane, thus reducing the skew; and
- The existing inside eastbound through lane becomes the new westbound exclusive left turn lane.

This lane swap removes an eastbound receiving lane east of the intersection. During the traffic operations analysis, it was determined that there was no operational benefit for a second eastbound through lane east of the intersection. **Table 16** shows the planning level cost estimates for the recommended improvements for Wickham Road at Aurora Road. A bullet list detailing the costs for each element is provided after the table.

Table 16: Wickham Road at Aurora Road Preferred Alternative

Element	Cost
Construction	\$1,400,000
Utility Relocations	\$50,000
Engineering/CEI	\$400,000
Roadway ROW	\$2,700,000
Total Cost	\$4,550,000
Benefit/Cost	3.16

- **Construction** – The construction cost is higher in the preferred alternative due to the addition of 10' wide shared-use paths on both sides of Wickham Road both north and south of the intersection. This cost also includes the resurfacing/reconstruction of Wickham Road and Lake Washington Road due to the turn lane improvements. This estimate also includes construction of mast arms at the signal.
- **Utility Relocations** – During the development of the preferred alternative, it was determined that there would be less utility impacts than previously anticipated. The previous options

assumed utility impacts if the sidewalk touched the utility poles but for the preferred alternative, the shared-use path width was adjusted around the poles so they would not have to be relocated.

- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost. Since the utility costs decreased for the preferred alternative, the overall engineering/CEI cost decreased from Option A.
- **Roadway ROW** – The preferred alternative saw no changes in the anticipated ROW impacts. This includes a full take of Buz’s Automotive, impacts to the dental office parcel on the southwest corner, impacts on the north side of Aurora Road east of the intersection, and a corner clip on the parcel in the southwest corner at Joyal Drive.
- **Benefit/Cost** – After the adjustments made to the preferred alternative, the improvements resulted in a benefit/cost ratio greater than Option A, indicating that the anticipated benefit is greater than the estimated costs.

Wickham Road at Northgate Plaza/Northgate Street

The segment of Wickham Road through the Northgate Plaza area had the highest crash frequency along any study segment. These crashes are a result of a high number of left-turn crashes out of the multiple driveways in the Northgate Plaza area. To improve the safety and traffic operations of this segment, the following improvements were developed:

- The existing traffic signal located at Northgate Plaza will be removed and relocated to the Northgate Street intersection, which is currently unsignalized.
 - Note that a signal warrant analysis was not performed as part of this Project. Further engineering analysis would be required to justify relocating this signal to Northgate Street.
- The traffic signal at Northgate Plaza will be replaced with a directional median that restricts eastbound left turns out of Northgate Plaza onto northbound Wickham Road.
- Directional medians will also be placed at the McDonald’s driveway and the Uncle Bob’s Self Storage driveway. Left turns on these directional medians will have a raised concrete traffic separator to provide additional safety.
- Northbound and southbound left turns at the Wickham Road and Northgate Street intersection will also have raised concrete traffic separators.
- To allow ease of vehicle U-turns at the new directional medians, additional pavement bulb-outs will be constructed at the Northgate Plaza driveway, the McDonald’s driveway, and Northgate Street. The bulb-out at Northgate Street will be larger than the ones located at the other driveways to provide U-turn access for larger vehicles, such as box trucks, utilizing the storage facility.

Vehicles attempting to access northbound Wickham Road from Northgate Plaza and McDonald’s will have to exit via Northgate Street and use the new traffic signal to make the left-turn onto Wickham Road. Providing left turn access at the signalized location will increase safety for left-turning vehicles

onto Wickham Road. The new traffic signal at Northgate Street will also service the planned development on the parcel west of Northgate Plaza. The preferred alternative concept for Wickham Road at Northgate Plaza/Northgate Street is presented in **Figure 40**. The following are specific details related to the preferred concept for Wickham Road at Northgate Plaza/Northgate Street:

- Lane widths along Wickham Road are 12' wide, and turn lanes are 11' wide;
- Turn lane lengths were created based on future build operational queue lengths plus appropriate deceleration distance based on the 35 MPH speed limit along Wickham Road. The turn lane lengths are as follows:
 - 190' for the northbound left into Northgate Plaza;
 - 150' for the southbound left into Uncle Bob's Storage;
 - 160' for the northbound left into McDonald's;
 - 150' for the northbound left at Northgate Street; and
 - 170' for the southbound left at Northgate Street.
- Two-foot concrete traffic separators introduced between the northbound/southbound through lanes and opposing left turn lanes. Two-foot wide white striped areas were also provided between the northbound/southbound through lanes and adjacent left turn lanes.
- Existing sidewalk is present along the east side of Wickham Road.
- New 10' shared-use paths are proposed along both sides of Wickham Road.

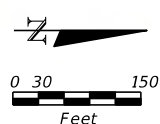
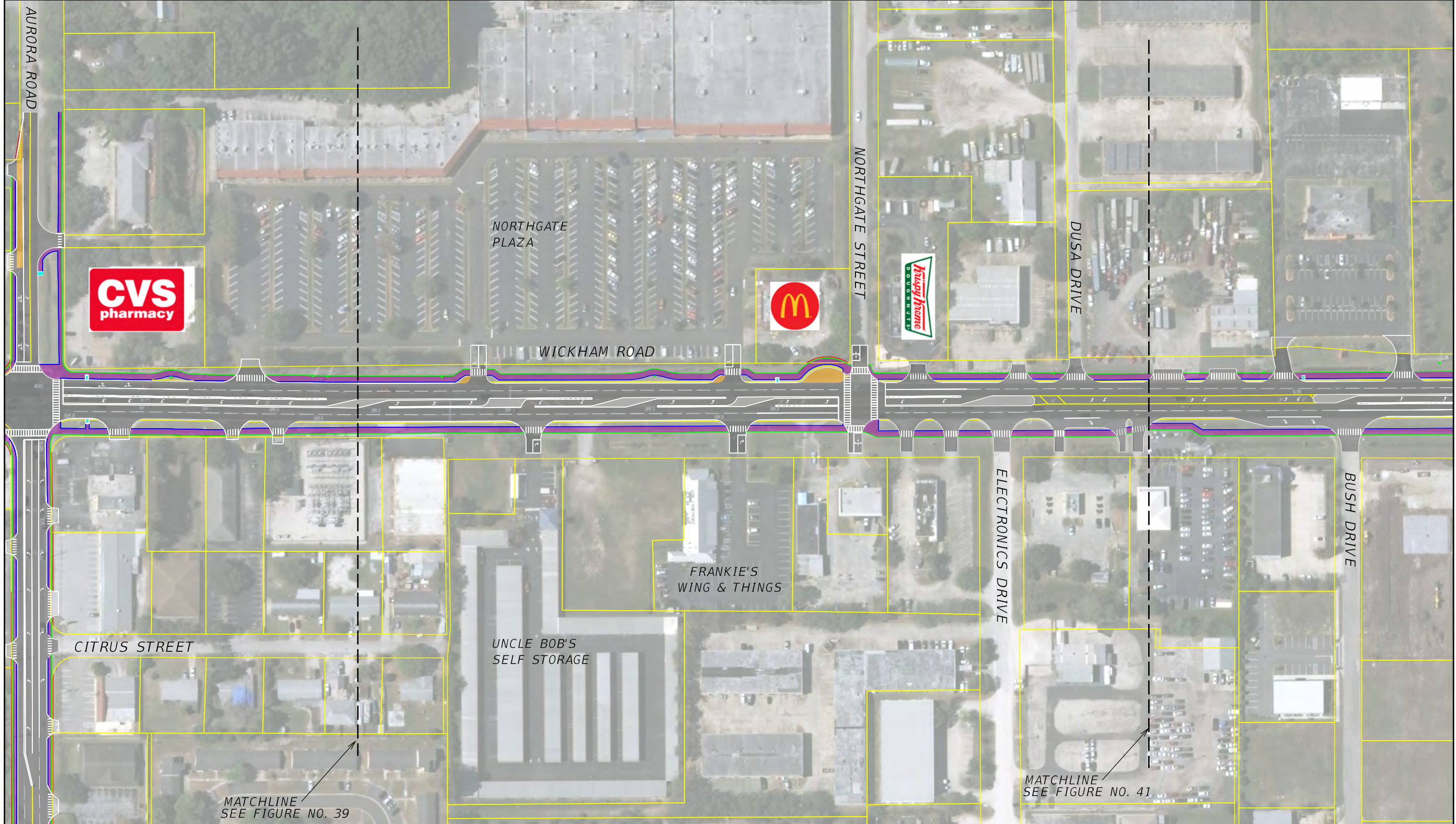
Existing transit facilities were evaluated, and the following improvements were made for the preferred alternative:

- Northgate Plaza McDonald's
 - Move the bus stop 195' north;
 - Pave a level 5'x8' slab with a raised 6" curb for the boarding and alighting area;
 - Connect the boarding and alighting area to the nearby sidewalk; and
 - Add detectable warnings to the nearby curb ramps.

Table 17 displays the planning level cost estimates for the recommended improvements for Wickham Road at Northgate Plaza/Northgate Street. A bullet list detailing the costs for each element is provided after the table.

Table 17: Cost Estimate – Wickham Road at Northgate Plaza/Northgate Street

Element	Cost
Construction	\$1,000,000
Utility Relocations	\$0
Engineering/CEI	\$300,000
Roadway ROW	\$100,000
Total Cost	\$1,400,000



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- ◇ UTILITY POLE
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

MATCHLINE
SEE FIGURE NO. 39

MATCHLINE
SEE FIGURE NO. 41

NOTES
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SPACE COAST TRANSPORTATION PLANNING ORGANIZATION		
ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

*WICKHAM ROAD AT
NORTHGATE PLAZA/NORTHGATE STREET
PREFERRED ALTERNATIVE*

FIGURE NO.
40

- **Construction** – This construction cost is based on the addition of the 10' wide shared-use paths on both sides of Wickham Road. This cost also includes the resurfacing/reconstruction of Wickham Road due to the access management improvements. The removal of the existing signalized intersection and the construction of a new mast arm signalized intersection is included in this estimate.
- **Utility Relocations** – No utility impacts are anticipated for this segment as the shared-use path wraps around the existing utility poles, where necessary.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation costs.
- **Roadway ROW** – The preferred alternative has anticipated ROW impacts to the McDonald's parcel due to the new pavement for the bulb-out U-turn at the southwest corner of Northgate Street.

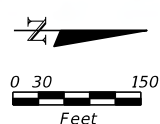
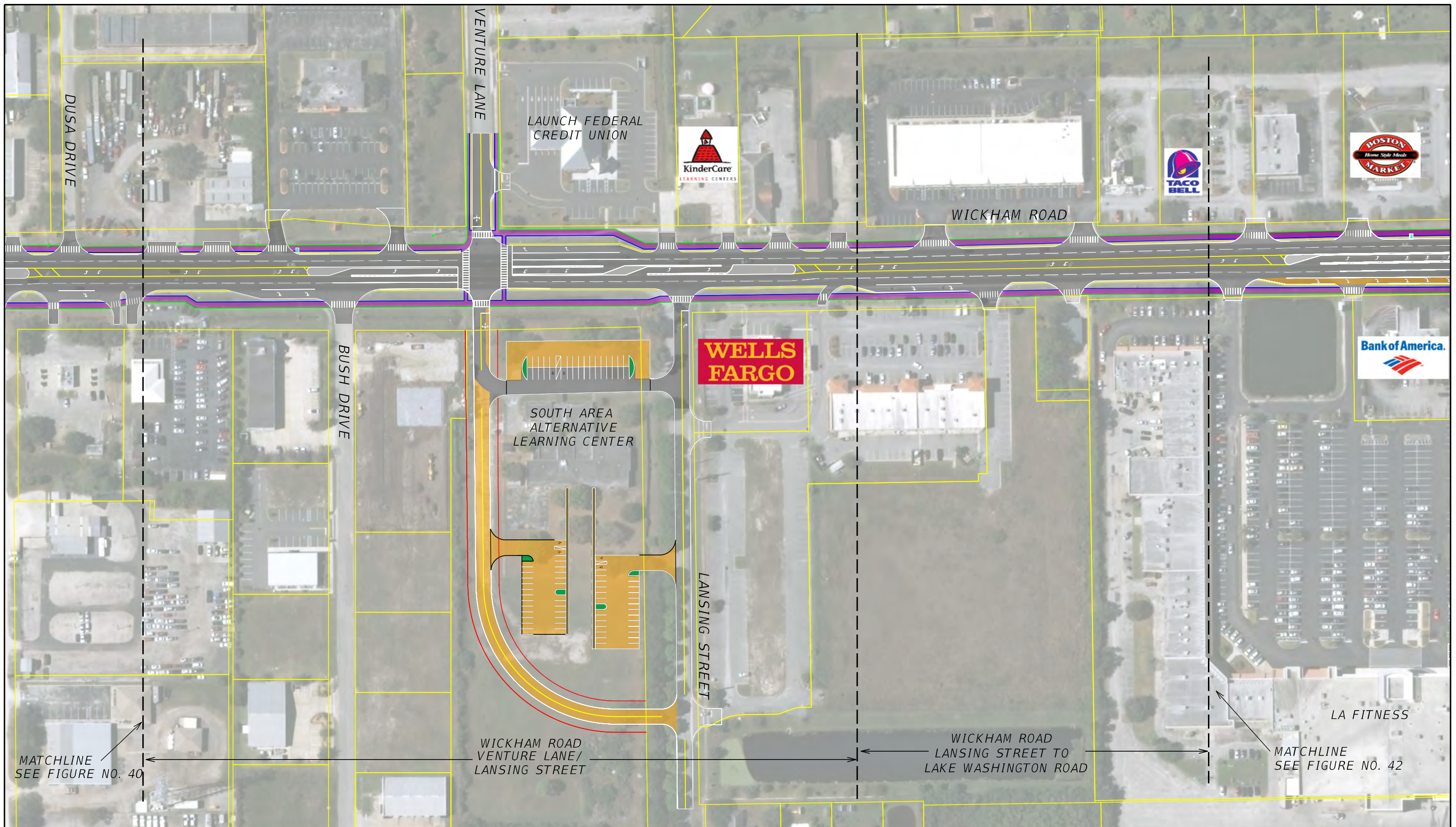
Wickham Road at Venture Lane/Lansing Street

Based on a previous study, a signal is warranted at the intersection of Wickham Road and Lansing Street. During the public involvement outreach activities, a member of the public recommended a new traffic signal be placed at the intersection of Wickham Road and Venture Lane to serve the warehouse office complex and other businesses along that roadway. Upon further coordination with the Brevard County School Board, the following alternative was proposed for the Venture Lane/Lansing Street area:

- Incorporate a new traffic signal at Venture Lane.
- Add a northbound left turn directional median at Lansing Street that restricts westbound left turns out of Lansing Street onto southbound Wickham Road.
- To continue allowing left turn access onto southbound Wickham Road, a new roadway will be constructed on the south side of the South Area Alternative Learning Center to connect Lansing Street to the new traffic signal on the Venture Lane intersection.
- Raised concrete traffic separators to provide additional safety will be constructed for the northbound left turn at Lansing Street, and the northbound/southbound left turns at the Venture Lane intersection.

The preferred alternative concept for Wickham Road at Venture Lane/Lansing Street is presented in **Figure 41**. The following are specific details related to the preferred concept for Wickham Road at Venture Lane/Lansing Street:

- Lane widths along Wickham Road are 12' wide, and turn lanes are 11' wide;
- Turn lane lengths were created based on future build operational queue lengths plus appropriate deceleration distance based on the 35 MPH speed limit along Wickham Road. The turn lane lengths are as follows:
 - 200' for the northbound left at Venture Lane;
 - 180' for the southbound left at Venture Lane; and
 - 160' for the northbound left into KinderCare.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- ◆ UTILITY POLE
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

NOTES
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SPACE COAST TRANSPORTATION PLANNING ORGANIZATION		
ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

**WICKHAM ROAD FROM VENTURE LANE
 TO LAKE WASHINGTON ROAD
 PREFERRED ALTERNATIVE**

FIGURE NO.
41

- Two-foot concrete traffic separators introduced between the northbound/southbound through lanes and opposing left turn lanes. Two-foot wide white striped areas were also provided between the northbound/southbound through lanes and adjacent left turn lanes.
- Existing sidewalk is present along the east side of Wickham Road and in front of the Launch Federal Credit Union on the west side of Wickham Road north of Venture Lane.
- New 10' shared-use path is proposed along both sides of Wickham Road. Sidewalks are also anticipated along the new roadway south of the School.

During the development of the new roadway from Lansing Street to the new traffic signal at Venture Lane, the internal team met with the South Area Alternative Learning Center to discuss potential impacts. Details of this meeting are discussed further in the **Public Involvement** section. Because the new roadway would impact staff parking on the south side of the building, additional parking spaces for the school were added to the preferred alternative concept. The anticipation is that if the roadway is constructed, Brevard County could work with the School Board to build additional parking lot(s) in lieu of acquiring ROW for the new roadway. The details of the parking lot concepts are as follows:

- Parking Lot Option A: New pavement increases the capacity of the existing parking lot in front of the school from 17 spaces to 34 spaces;
- Parking Lot Option B: New parking lot with a capacity of 28 spaces and a driveway entrance to the proposed new road east of the school building; and
- Parking Lot Option C: New parking lot with a capacity of 28 spaces and a driveway entrance to Lansing Street east of the school building.

Table 18 displays the planning level cost estimates for the recommended improvements for Wickham Road at Venture Lane/Lansing Street. A bullet list detailing the costs for each element is provided after the table.

Table 18: Cost Estimate – Wickham Road at Venture Lane/Lansing Street

Element	Cost
Construction	\$1,700,000
Utility Relocations	\$0
Engineering/CEI	\$500,000
Roadway ROW	\$9,200,000
Total Cost	\$11,400,000

- **Construction** – This construction cost is based on the addition of the 10' wide shared-use paths on both sides of Wickham Road. This cost also includes the resurfacing/reconstruction of Wickham Road and the construction of the new roadway connecting Venture Lane and Lansing Street. The construction of a new mast arm signalized intersection is included in this estimate.
- **Utility Relocations** – No utility impacts are anticipated for this segment as the shared-use path wraps around the existing utility poles, where necessary.

- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation costs.
- **Roadway ROW** – The ROW cost includes the parcel impacts for the new roadway. The new roadway would also need a pond site, but it is anticipated the pond could be placed on the east side of the school parcel between the new roadway and the eastern parcel ROW line. Through discussions with the County and the School Board, there may be opportunities for reduced ROW costs thus the displayed cost may be a conservative estimate.

Wickham Road from Lansing Street to Lake Washington Road

This segment provides improvements from the preferred typical section alternative. These improvements include a 10' wide shared-use path on both sides of Wickham Road and maintaining the existing 5-lane section. The preferred alternative concept for Wickham Road from Lansing Street to Lake Washington Road is presented alongside the Wickham Road at Venture Lane concept in **Figure 41**.

Table 19 displays the planning level cost estimates for the recommended improvements for Wickham Road from Lansing Street to Lake Washington Road. A bullet list detailing the costs for each element is provided after the table.

Table 19: Cost Estimate – Wickham Road from Lansing Street to Lake Washington Road

Element	Cost
Construction	\$250,000
Utility Relocations	\$0
Engineering/CEI	\$80,000
Roadway ROW	\$0
Total Cost	\$330,000

- **Construction** – This construction cost is based on the addition of the 10' wide shared-use paths on both sides of Wickham Road. This cost also includes the resurfacing of Wickham Road.
- **Utility Relocations** – No utility impacts are anticipated for this segment as the shared-use path wraps around the existing utility poles, where necessary.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation costs.
- **Roadway ROW** – No ROW impacts are anticipated within this segment.

Wickham Road at Lake Washington Road

Currently in the existing condition, Lake Washington Road experiences delay in the northbound right turn, westbound left turn, and eastbound right turn movements. To improve traffic operations at the intersection, the following improvements are being proposed for the preferred alternative:

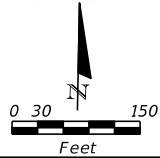
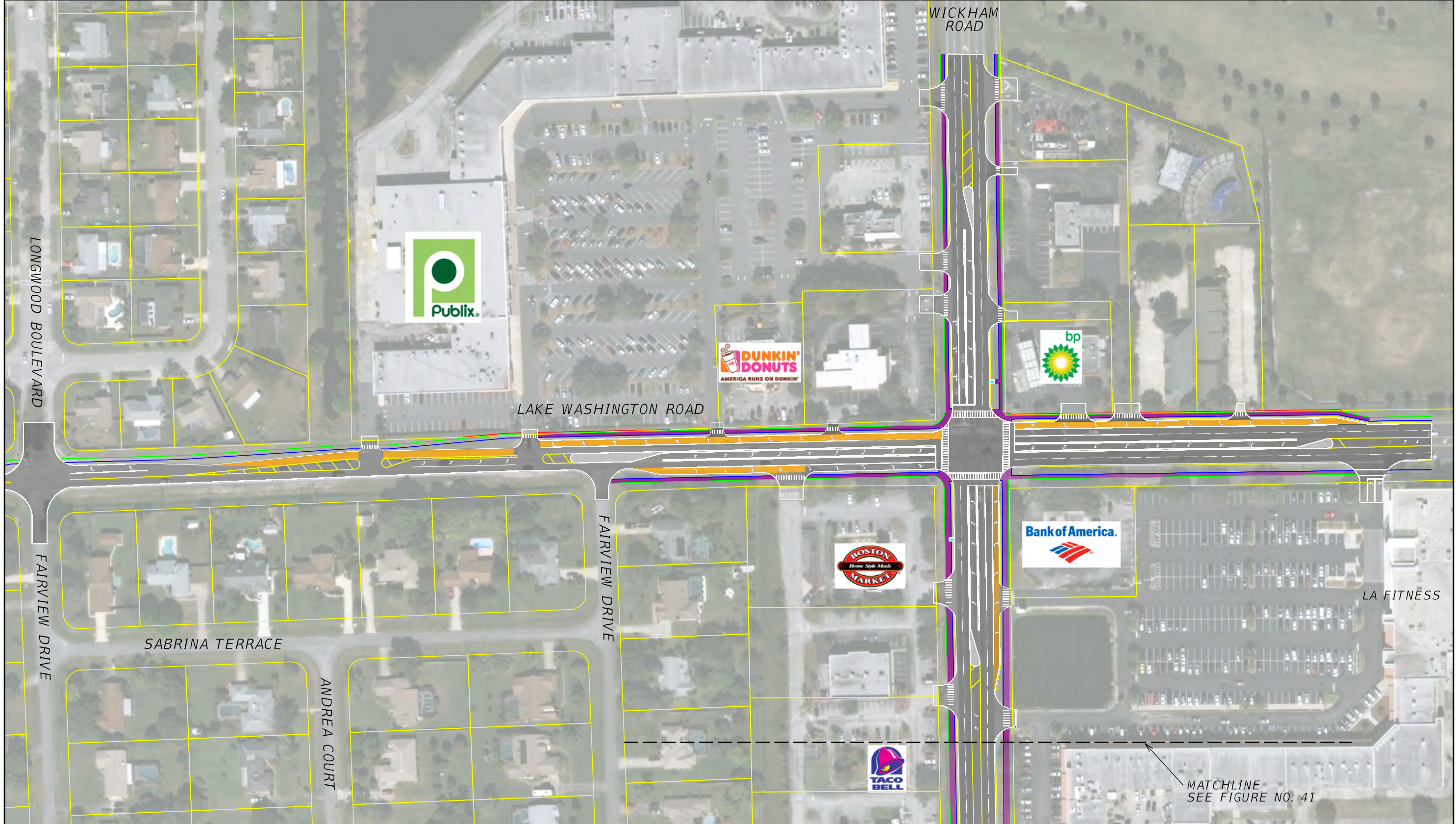
- Add an exclusive northbound right turn lane.
- Add new pavement to extend the eastbound right turn lane.
- Extend the westbound left turn lane and add a second westbound through lane across Wickham Road, where it will be dropped west of the intersection.

The preferred alternative concept for Wickham Road at Lake Washington Road is presented in **Figure 42**. The following are specific details related to the preferred concept for Wickham Road at Lake Washington Road:

- Lane widths along Wickham Road are 12' wide, and turn lanes are 11' wide;
- Lane widths along Lake Washington Road were maintained at 12' (including turn lanes);
- Turn lane lengths were created based on future build operational queue lengths plus appropriate deceleration distance based on the 40 MPH speed limit along Wickham Road and 40 MPH speed limit along Lake Washington Road. The turn lane lengths are as follows:
 - 280' for the northbound left (extended by 110' from existing conditions);
 - 330' for the northbound right;
 - 500' for the westbound left (extended by 240' from existing conditions);
 - 560' for the westbound right;
 - 340' for the southbound left (extended by 140' from existing conditions);
 - 480' for the eastbound left (extended by 235' from existing conditions); and
 - 480' for the eastbound right (extended by 300' from existing conditions).
- Two-foot concrete traffic separators introduced between the northbound/southbound and eastbound/westbound through lanes and opposing left turn lanes. Two-foot wide white striped areas were also provided between the northbound/southbound and eastbound/westbound through lanes and adjacent left turn lanes.
- Existing sidewalk is present along the both the north and south sides of Lake Washington Road east of the intersection, on the north side of Lake Washington Road west of the intersection, and on the east side of Wickham Road on both sides of the intersection.
- New six-foot sidewalk is proposed along the south side of Lake Washington Road both east and west of the intersection, along the north side of Lake Washington Road east of the intersection, and along both sides of Wickham Road north of the intersection. Additionally, new sidewalk is proposed to connect to transit stops.
- New 10' shared-use path is proposed along both sides of Wickham Road south of the intersection.

Existing transit facilities were evaluated, and the following improvements were made for the preferred alternative:

- Lake Washington Road Southbound
 - Pave a level 5'x8' slab for the boarding and alighting area;
 - Move the pole with the bus schedule adjacent to the pavement to make it accessible;
 - Add a 100' path to connect the north;
 - Construct a curb ramp with a slope $\leq 8.3\%$;
 - Add detectable warnings to the nearby curb ramps; and
 - Add a crosswalk at the intersection.



- PARCEL LINES
- PROPOSED ROW LINE
- BACK OF CURB
- SIDEWALK FRONT
- SIDEWALK BACK
- NEW SIDEWALK
- RESURFACED PAVEMENT
- NEW PAVEMENT
- CONCRETE MEDIAN
- ◇ UTILITY POLE
- TRANSIT STOP

PRELIMINARY CONCEPT - FOR DISCUSSION ONLY

MATCHLINE
SEE FIGURE NO. 41

NOTES
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SPACE COAST TRANSPORTATION PLANNING ORGANIZATION		
ROAD NO.	COUNTY	DATE
WICKHAM ROAD	BREVARD	FEBRUARY 2018

*WICKHAM ROAD AT
LAKE WASHINGTON ROAD
PREFERRED ALTERNATIVE*

FIGURE NO.
42

During the development of the additional westbound through lane and subsequent lane drop, the following considerations were made. Based on the National Cooperative Highway Research Program (NCHRP) 707, the maximum length for a lane drop should be between ¼ to ½ mile. **Figure 43** shows the recommended lane drop length based on level of through-movement congestion and merge speed. Given that the westbound congestion level on Lake Washington Road is less than 1.0, with a merge speed of 35 MPH, the figure shows that the recommended length should be roughly 750' long. As a result, the second westbound through lane will be dropped at the second Publix driveway, which is approximately 700' west of the intersection. New pavement will be added to transition from the lane drop at Publix to the existing condition, while adding an exclusive eastbound left turn lane into the Publix driveway.

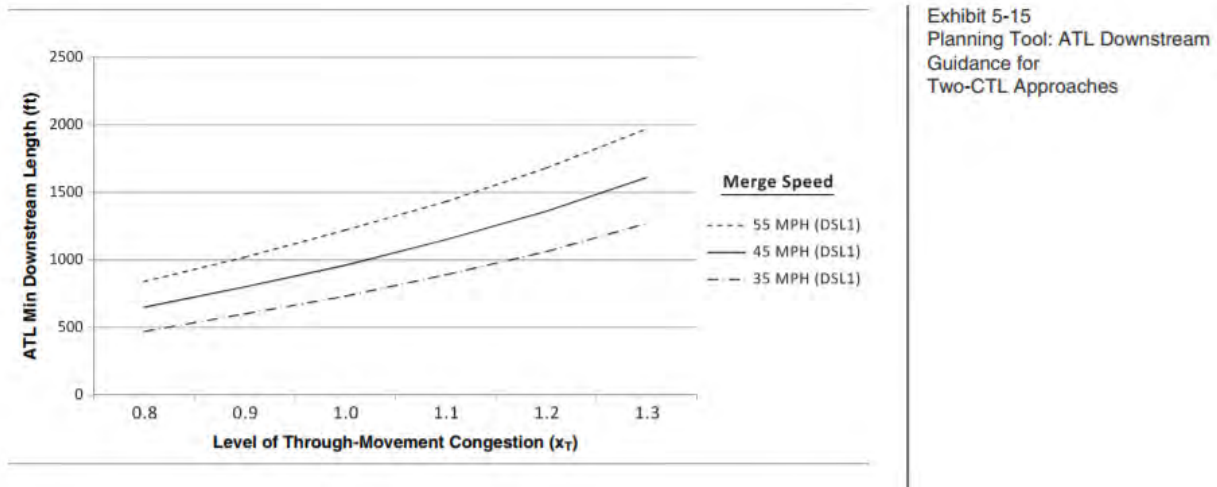


Figure 43: NCHRP 707 Exhibit 5-15

Table 20 displays the planning level cost estimates for the recommended improvements for Wickham Road at Lake Washington Road. A bullet list detailing the costs for each element is provided after the table.

Table 20: Cost Estimate – Wickham Road at Lake Washington Road

Element	Cost
Construction	\$2,600,000
Utility Relocations	\$400,000
Engineering/CEI	\$900,000
Roadway ROW	\$4,600,000
Total Cost	\$8,500,000
Benefit/Cost	2.47

- Construction** – This construction cost is based on the addition of the 10' wide shared-use paths on both sides of Wickham Road. This cost also includes the resurfacing/reconstruction of Wickham Road and Lake Washington Road due to the turn lane improvements. The construction of new mast arms for the signalized intersection is included in this estimate.

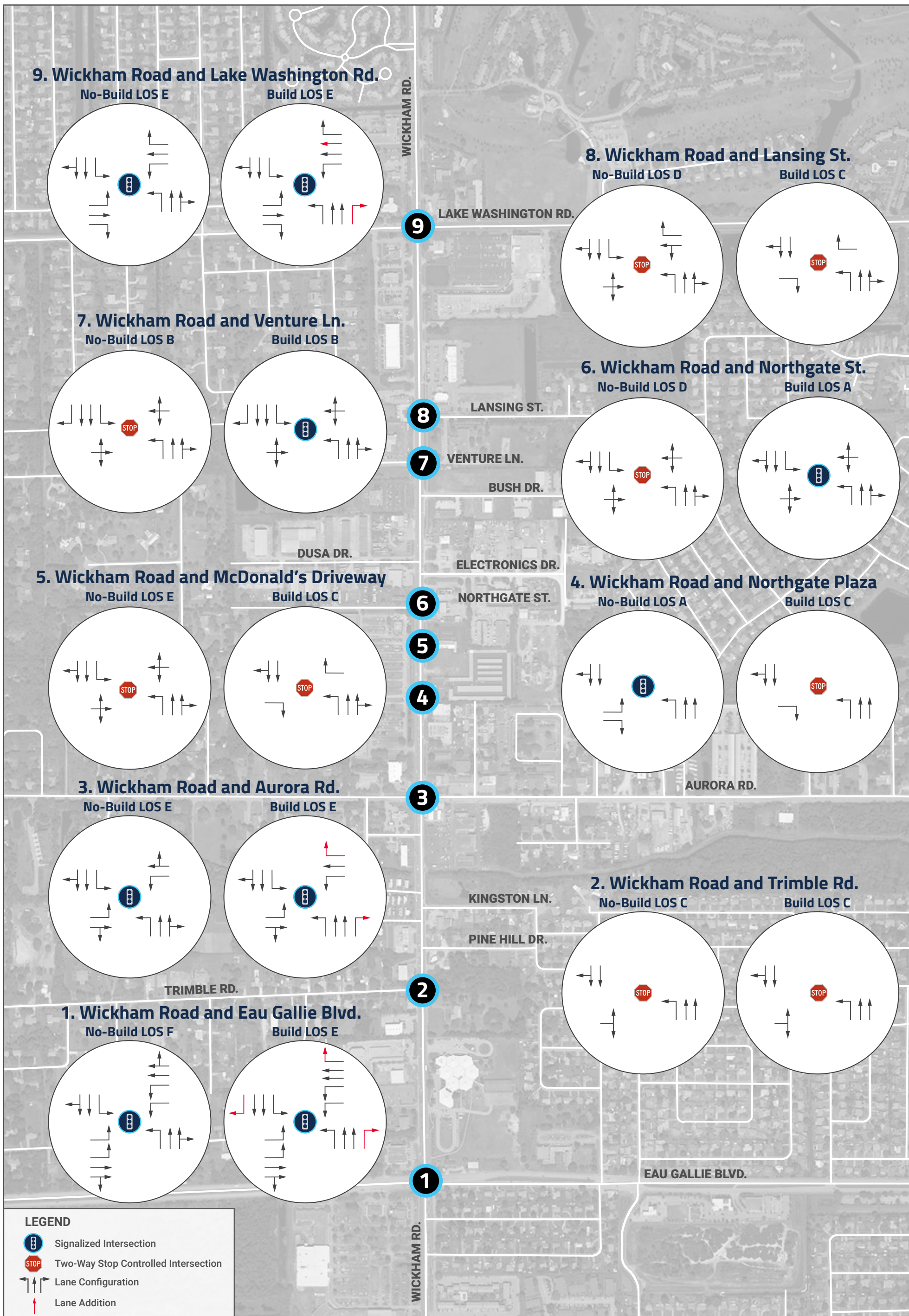
- **Utility Relocations** – The preferred alternative is anticipated to have utility impacts on the north side of Lake Washington Road east of the intersection due to the eastbound right turn lane addition.
- **Engineering/Construction Engineering Inspection (CEI)** – This cost is calculated as 30 percent (20 percent for engineering, 10 percent for CEI) of the combined construction and utility relocation cost.
- **Roadway ROW** – The preferred alternative is anticipated to have ROW impacts to parcels on the north side of Lake Washington Road east of the intersection due to the eastbound right turn lane addition. A pond site is also included due to the amount of new pavement being constructed for the new eastbound right turn lane and second westbound through lane west of the intersection.
- **Benefit/Cost** – A HCM level analysis was performed on the improvement alternative which operated at LOS E during the 2040 PM peak hour with no over-capacity movements. The improvement alternative resulted in benefit/cost ratio above a 1.0, indicating that the anticipated benefit is greater than the estimated costs.

ALTERNATIVES ANALYSIS SUMMARY

The above intersection improvements were incorporated into the AM and PM peak hour intersection analysis to determine if the improvements improved LOS and v/c ratios. This analysis resulted in the five intersections from Eau Gallie Boulevard to Lake Washington Road operating at LOS E or better based on the improvements noted in the preferred alternative section. The v/c ratios for each movement at each intersection are less than 1.0. **Figure 44** displays the future build intersection lane configurations/LOS compared to the future no-build configurations/LOS. Detailed HCM output reports are in **Appendix C**.

The RSA improvements were also reviewed, and some suggestions were incorporated into the preferred alternative. The following details the list of suggestions and how they were addressed as part of this study:

- Corridor-wide
 - Category III Issues
 - Left-Turn Movements at Signalized Intersections along Wickham Road –
 - The signal heads were addressed as part of the Short-Term RSA Improvements. The offset left turn lanes were addressed as part of the preferred intersection concepts.
 - Unsignalized Crosswalk at Trimble Road –
 - Enhancements were made to this crossing as part of the Eau Gallie Boulevard to Aurora Road concept, including a median refuge and pedestrian activated warning signs.



- Incomplete Pedestrian Facilities at the Aurora Road and Lake Washington Road Intersections –
 - Short-term pedestrian facility improvements were proposed at these two locations.
 - Category II Issues
 - Lack of Right-Turn Lanes at Signalized Intersections –
 - Right turn lanes were added to enhance operations and safety at the Eau Gallie Boulevard, Aurora Road, and Lake Washington Road intersections.
 - Intersection Crosswalk Markings –
 - Crosswalk marking upgrades were proposed in the short-term Aurora Road and Lake Washington Road intersection improvements and the preferred intersection concepts for all signalized intersections.
 - Lack of Sidewalks along Wickham Road –
 - The preferred typical section alternative addresses the lack of sidewalk.
 - Lighting from Aurora Road to Lake Washington Road –
 - This was included as a short-term improvement.
 - Category I Issues
 - Observed Americans with Disabilities Act (ADA) Issues –
 - These issues would be addressed as part of the preferred typical section alternative but in the near term, an ADA assessment can be performed to identify/address improvements that can be upgraded before the preferred alternative is constructed.
 - Street Name Signage Visibility –
 - Addressed as part of the Short-Term RSA Improvements.
 - School Zone Extents –
 - Addressed as part of the Short-Term RSA Improvements.
 - Intersections
 - Eau Gallie Boulevard Intersection
 - **Right-Turn Phase Conflict with Pedestrians Crossings at Eau Gallie Boulevard (Category III) –**
 - Addressed as part of the Short-Term RSA Improvements.
 - Eastbound Right-Turn Curb Radius Return (Category I) –
 - This was addressed in the Eau Gallie Boulevard preferred alternative concept.
 - Aurora Road Intersection
 - **Incomplete Pedestrian Facilities (Category III) –**
 - Short-term pedestrian facility improvements were proposed at these two locations. Complete pedestrian facilities were also included in the preferred intersection concepts.
 - Westbound Through Movement Alignment (Category I) –

- This was addressed by the lane swap on the east leg in the preferred alternative concept.
- Northgate Plaza Intersection
 - Lack of Pedestrian Facilities (Category II) –
 - Pedestrian facilities were incorporated into the preferred alternative concept.
- Lake Washington Road Intersection
 - **Incomplete Pedestrian Facilities (Category III) –**
 - Short-term pedestrian facility improvements were proposed at these two locations. Complete pedestrian facilities were also included in the preferred intersection concepts.
 - Driveway Turn Movement Conflicts (Category II) –
 - The northernmost driveway on the southeast corner of the intersection was changed to be to right-in/right-out only by the installation of a traffic separator for the northbound left turn in the preferred alternative concept.
 - Pedestrian Crosswalk Alignment on the Southbound Approach at Lake Washington Road (Category II) –
 - This was addressed on the east leg in the preferred alternative concept.
 - Westbound Lane Drop (Category I) –
 - This was addressed by adding a second westbound through lane west of the intersection in the preferred alternative concept.

Public Involvement

SUMMARY OF PUBLIC INVOLVEMENT

This Study allowed for an ideal opportunity to engage local and regional groups in the identification of issues and project visioning for the development of the preferred improvement alternatives along the corridor. Three key groups were included throughout the course of the study to solicit guidance and input: 1. Project Advisory Team (PAT), 2. Local Stakeholders, and 3. Members of the Public.

The SCTPO project website for the Study can be found at <http://spacecoasttpo.com/plan/wickham-road-operational-analysis/>. The project website contains files such as the Existing and Future Conditions Summaries and public meeting materials. Another website aimed at gathering public feedback was created for the project at <http://maps.kittelsohn.com/wickhamroad>. This website was an interactive forum where members of the public could leave comments/questions/concerns about issues along the study corridor and “Like” these comments. In total, 39 comments were received and 459 “Likes” were totaled during the project. These comments are summarized in the *Wickham Road Public Involvement Comments and Coordination Summary* located in **Appendix D**.

PROJECT ADVISORY TEAM

A PAT comprised of regional agency and municipal representatives was established to help guide the identification of issues for the study. The PAT team provided initial review/feedback for the Study Team (SCTPO and consultant staff) as it shared findings and developed strategies and alternatives to address the needs along the corridor. The PAT met at key milestones throughout the study process. The PAT is comprised of members from the following partner organizations:

- SCTPO;
- Brevard County;
- City of Melbourne;
- Florida Department of Transportation (FDOT) District 5; and
- Space Coast Area Transit.

A kick-off meeting was held with the PAT group on April 25, 2017 to review the existing conditions, issues/opportunities, and guiding principles for the Wickham Road corridor. The second meeting was held on August 18, 2017 to discuss the future no-build analysis and initial build alternatives for the corridor. The third meeting was held on October 5, 2017 to review the final future build alternatives that were presented to the public on October 25, 2017. The presentation and meeting notes from each of the PAT meetings can be found in the *Wickham Road Public Involvement Comments and Coordination Summary* located in **Appendix D**.

STAKEHOLDER MEETINGS

Meetings were conducted with stakeholders to identify current land use, economic development, and transportation issues and opportunities that could guide and inform the Study. The meetings were

completed in an informal setting and while there were several key questions asked during each meeting, conversations were mostly free-flowing. The following summarizes those meetings and major discussion topics that occurred during those meetings:

- October 16, 2017 – Brevard County School Board
 - A new road realigning Lansing Street to the potential new signal at Venture Lane would be located on Brevard County School Board property (South Area Alternative Learning Center).
 - It was recommended that the Study Team meet with the principal of the South Area Alternative Learning Center to see what potential issues these impacts could have.
- November 16, 2017 – South Area Alternative Learning Center
 - The main concern from the school was the proposed new roadway would impact the area south of the school where staff currently park.
 - From this meeting, the Study Team developed the parking lot concepts presented in the **Preferred Alternative** section.

Detailed notes from the stakeholder meetings can be found in the *Wickham Road Public Involvement Comments and Coordination Summary* located in **Appendix D**.

PUBLIC MEETINGS

The Study Team obtained public feedback and input on the project through two public meetings. The Existing Conditions Public Meeting was held on May 9, 2017 and the Alternatives Public Meeting was held on October 25, 2017. The public meetings were held in an open house type format, with 30 minutes reserved at the beginning for the public to review the concept boards/handouts and ask questions of the study team staff. Once the initial question and answer time finished, a presentation was given outlining the following topics about the project:

- Project Background/Overview
- Existing Conditions Analysis Results (*Existing Conditions Public Meeting Only*)
- Issues/Opportunities Along Corridor
- Intersection and Typical Section Alternatives (*Alternatives Public Meeting Only*)
- Measures of Effectiveness (*Alternatives Public Meeting Only*)
- Schedule and Next Steps

After the presentation was completed, the public was encouraged to review the concept boards and ask any additional questions of the study team staff. The Public Meetings adjourned at 7:30 PM. The summary packages from the public meetings can be found in the *Wickham Road Public Involvement Comments and Coordination Summary* located in **Appendix D**.

Next Steps/Summary

This Study identified various solutions for the key issues along the Wickham Road corridor, which were presented to the SCTPO Board in December 2017. A planning level implementation plan was also developed and presented to the SCTPO Board. The following summarizes the improvement implementation plan identified for the Wickham Road Operational Analysis.

SHORT-TERM IMPROVEMENTS

The following improvements were identified as potentially having a shorter time frame for implementation (within the next 3-5 years):

- Corridor-wide improvements –
 - LED corridor lighting; and
 - PedSafe.
- Pedestrian facility improvements at Aurora Road –
 - New crosswalks in the east and south legs to complete the intersection;
 - New pedestrian landing pad in the southeast corner of the intersection;
 - Rebuilding pedestrian landing pads on the southwest, northeast, and northwest corners of the intersection; and
 - New bus stop landing pads and sidewalk connections.
- Pedestrian facility improvements at Lake Washington Road –
 - New crosswalks in the west and south legs to complete the intersection;
 - New pedestrian landing pad in the southwest corner of the intersection;
 - Rebuilding pedestrian landing pads on the northeast and southeast corners of the intersection; and
 - New bus stop landing pads and sidewalk connections.

The planning level cost estimates for the short-term improvements are displayed in **Table 21** through **Table 23**. Note that the summary provided in **Table 23** excludes LED lighting and PedSafe.

Table 21: Wickham Road at Aurora Road Short Term Pedestrian Facility Improvements

Element	Cost
Construction	\$60,000
Utility Relocations	\$0
Engineering/CEI	\$20,000
Roadway ROW	\$80,000
Total Cost	\$160,000

Table 22: Wickham Road at Lake Washington Road Short Term Pedestrian Facility Improvements

Element	Cost
Construction	\$50,000
Utility Relocations	\$0
Engineering/CEI	\$20,000
Roadway ROW	\$0
Total Cost	\$70,000

Table 23: Summary of Short-Term Improvement Planning Level Costs

Element	Cost
Construction	\$110,000
Utility Relocations	\$0
Engineering/CEI	\$40,000
Roadway ROW	\$80,000
Total Cost	\$230,000

NEAR-TERM INTERSECTION IMPROVEMENTS

The following improvements were identified as having a near-term time frame for implementation (within the 5-10 years):

- Preferred alternative improvements at Eau Gallie Boulevard:
 - New exclusive northbound right turn lane;
 - New exclusive southbound right turn lane; and
 - New exclusive westbound right turn lane.
- Preferred alternative improvements at Aurora Road:
 - New exclusive northbound right turn lane;
 - New pavement added to extend eastbound shared through/right lane; and
 - Lane swap the east leg of the intersection, removing a receiving eastbound lane and adding an exclusive westbound right turn lane.
- Preferred alternative improvements at Lake Washington Road:
 - New northbound right turn lane;
 - New pavement added to extend eastbound exclusive right turn lane;
 - Second westbound through lane extended to the Publix driveway; and
 - New eastbound left turn lane into the Publix driveway.

The planning level cost estimates for the near-term improvements are displayed in **Table 24** through **Table 27**.

Table 24: Wickham Road at Eau Gallie Boulevard Preferred Alternative

Element	Cost
Construction	\$2,700,000
Utility Relocations	\$700,000
Engineering/CEI	\$1,000,000
Roadway ROW	\$8,500,000
Total Cost	\$12,900,000
Benefit/Cost	3.17

Table 25: Wickham Road at Aurora Road Preferred Alternative

Element	Cost
Construction	\$1,400,000
Utility Relocations	\$50,000
Engineering/CEI	\$400,000
Roadway ROW	\$2,700,000
Total Cost	\$4,550,000
Benefit/Cost	3.16

Table 26: Cost Estimate – Wickham Road at Lake Washington Road

Element	Cost
Construction	\$2,600,000
Utility Relocations	\$400,000
Engineering/CEI	\$900,000
Roadway ROW	\$4,600,000
Total Cost	\$8,500,000
Benefit/Cost	2.47

Table 27: Summary of Near-Term Improvement Planning Level Costs

Element	Cost
Construction	\$6,700,000
Utility Relocations	\$1,150,000
Engineering/CEI	\$2,300,000
Roadway ROW	\$15,800,000
Total Cost	\$25,950,000

LONG-TERM CORRIDOR IMPROVEMENTS

The following improvements were identified as having a long-term time frame for implementation (10+ years):

- Northgate Plaza access management and signal relocation –

- While the construction cost is relatively low, the public involvement and “buy-in” from local stakeholders would make implementation a longer process.
- Venture Lane/Lansing Street new roadway and signal –
 - This project could be implemented sooner if public-private partnership is involved with local businesses in the area who would directly benefit from the new traffic signal at Venture Lane.
- Shared-use path additions from Eau Gallie Boulevard to Aurora Road and from Lansing Street to Lake Washington Road.

The planning level cost estimate for the long-term improvements is displayed in **Table 28** through **Table 32**.

Table 28: Cost Estimate – Wickham Road from Eau Gallie Boulevard to Aurora Road

Element	Cost
Construction	\$600,000
Utility Relocations	\$0
Engineering/CEI	\$200,000
Roadway ROW	\$900,000
Total Cost	\$1,700,000

Table 29: Cost Estimate – Wickham Road at Northgate Plaza/Northgate Street

Element	Cost
Construction	\$1,000,000
Utility Relocations	\$0
Engineering/CEI	\$300,000
Roadway ROW	\$100,000
Total Cost	\$1,400,000

Table 30: Cost Estimate – Wickham Road at Venture Lane/Lansing Street

Element	Cost
Construction	\$1,700,000
Utility Relocations	\$0
Engineering/CEI	\$500,000
Roadway ROW	\$9,200,000
Total Cost	\$11,400,000

Table 31: Cost Estimate – Wickham Road from Lansing Street to Lake Washington Road

Element	Cost
Construction	\$250,000
Utility Relocations	\$0
Engineering/CEI	\$80,000
Roadway ROW	\$0
Total Cost	\$330,000

Table 32: Summary of Long-Term Improvement Planning Level Costs

Element	Cost
Construction	\$3,550,000
Utility Relocations	\$0
Engineering/CEI	\$1,080,000
Roadway ROW	\$10,200,000
Total Cost	\$14,830,000