

LITHIA PINECREST

ALTERNATIVES TO WIDENING

Summary Report

Prepared by:

HDR

On behalf of:

April 23, 2020



**Hillsborough
County** Florida

Accommodation Statement

In accordance with the requirements of title II of the Americans with Disabilities Act of 1990 ("ADA"), Hillsborough County will not discriminate against qualified individuals with disabilities on the basis of disability in its services, programs, or activities. Persons with disabilities who need an accommodation for this document should email the [Hillsborough County ADA Officer](#) or call (813) 276-8401; TTY: 7-1-1.



CONTENTS

1. Overview	1
1.1 Purpose of Study.....	1
1.2 Context Summary	1
1.3 Modeling Methods & Results	1
1.4 Recommendations.....	2
2. Analysis Methodology.....	5
3. Context & Existing Conditions.....	7
3.1 Existing Population/Employment & Projected Growth	7
3.2 Crash & Safety Analysis.....	15
3.3 Existing Network Performance.....	21
4. Network Alternatives Analysis.....	26
4.1 Improvement Projects	26
4.2 Alternative Sets	27
4.3 Network Performance of Each Alternative Set	38
4.4 Overall Summary of Performance	58
5. Recommendations	64
5.1 Short Term Project Recommendations.....	64
5.2 Long Term Major Investments	69
Appendix I. Transit Service Concepts.....	70

This page intentionally blank.



1. OVERVIEW

1.1 Purpose of Study

The *Lithia Pinecrest: Alternatives to Widening Study* is a high-level analysis undertaken by Hillsborough County to identify and assess potential alternatives to widening of Lithia Pinecrest Road from Fishhawk Boulevard to Lumsden Road from two to four lanes. The study team tested various combinations of roadway capacity and intersection improvements to see which combination has the potential to improve transportation network deficiencies in the greater Brandon area. The network approach to this study is different from other corridor or intersection specific studies, in that the performance of improvements or alternative sets was evaluated for a larger study area.

As shown in Figure 1, the study area included corridors and intersections extending from south of SR 60 (Brandon Boulevard) to the Alafia River and from I-75 and Falkenburg Road to Lithia Pinecrest Road. During the study, the effectiveness of potential combinations of improvements within the study area to address deficiencies was compared to the effectiveness of the Lithia Pinecrest Road widening project. The comparative analysis resulted in the identification of improvement projects, including alternatives to the full widening of Lithia Pinecrest Road, that could advance into more detailed phases of engineering and design.

1.2 Context Summary

Projected population and employment growth within and around the study area is concentrated along the western edges of Brandon near I-75 and to the south of the Alafia River south of Boyette Road and Fishhawk Boulevard along the Balm Riverview and Balm Boyette Road corridors. The eastern areas of Brandon are mostly built out, with relatively modest potential for increases in population, and to the southeast of Fishhawk Ranch, little growth is projected.

The three major east-west arterials (SR 60, Lumsden Road, and Bloomingdale Avenue) and Lithia Pinecrest Road carry the majority of traffic within and through the study area, and the majority of crashes and congestion are concentrated at intersections along these corridors. This is not surprising given the area has a very limited secondary roadway network. Rather than disperse trips through a fine-grain network of lower-speed local streets, Brandon's suburban pattern results in the concentration of trips on a limited number of major corridors, forcing short, local trips to access the arterial network and mix with higher-speed traffic.

1.3 Modeling Methods & Results

Using Aimsun traffic analysis software, the project team developed a series of traffic models for the study area. An initial model, called the Existing plus Committed (E+C) Model was developed to show roadway conditions and operations adjusted to account for committed and funded projects. This model provided a starting point for understanding network performance characteristics, defining potential improvement alternatives, and completing comparisons between the Lithia Pinecrest widening project and various sets of improvement alternatives.

The E+C Model run resulted in the identification of several important issues and deficiencies, including bottleneck locations with particularly high volume-to-capacity ratios, slow travel times, and low average travel speeds. This initial modeling confirmed observations that both capacity constraints and connectivity issues negatively impact peak period during commutes. During the AM peak period, high volumes of vehicles attempt to traverse the network to areas of high employment outside of the network; in the PM peak period, these vehicles return from these outside employment centers and again must travel through the study area. These vehicles have limited options to traverse east and west through the study area due to the poor interconnectivity of local roadways and capacity constraints along major arterials. The initial modeling also revealed uneven



splits in volumes between the AM and PM peak periods. For example, initial modeling showed that Bloomingdale Avenue is typically more congested than Lumsden Road in the AM, but this is reversed in the PM.

Based on the initial modeling, the project team worked with County staff to understand factors contributing to problem areas and define potential improvement strategies. Consultation with County staff resulted in the identification of a number of potential improvement projects, which were subsequently combined into seven different alternative sets. These alternative sets were developed with the intent of serving as alternatives to the full Lithia Pinecrest widening project, however, with no clear performance improvement identified, the best performing aspects of each were combined to create alternative 8.

The results of the alternative set modeling effort were compared to the Lithia Pinecrest widening alternative. Performance measures used during the evaluation included volume to capacity (V/C) ratio and travel time comparisons along the study area's major roadways.

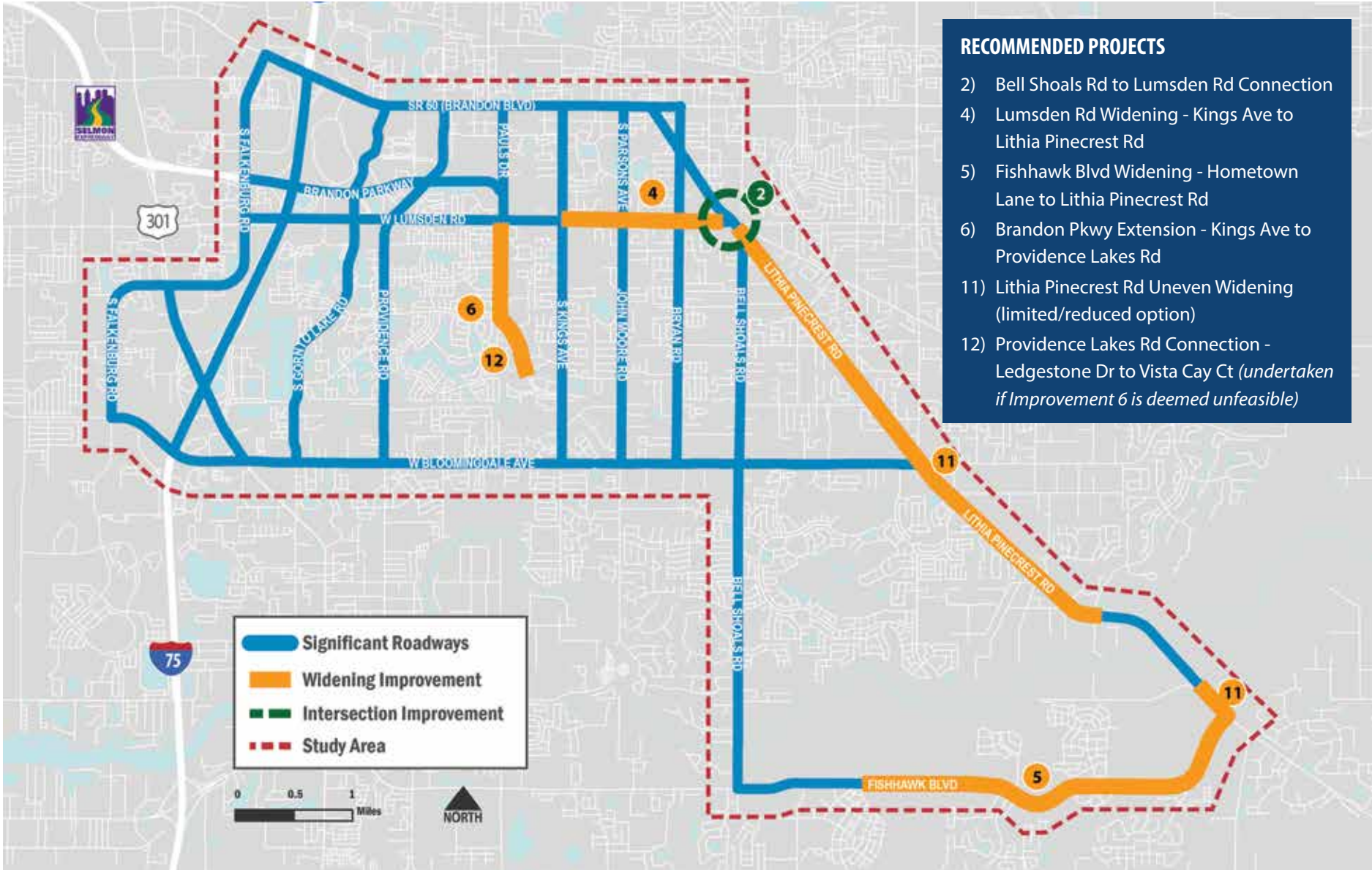
1.4 Recommendations

While none of the alternative sets significantly outperformed the others, the results indicated that several individual improvement projects would provide benefits to the network. Of the 12 projects included in the seven alternative sets, the six improvement projects shown in Figure 1 are recommended for further analysis. These were identified as having the greatest potential to improve overall network-wide performance in the AM and PM peak periods. Though right of way acquisition could result in costs exceeding that of the full widening of Lithia Pinecrest Road, these improvements provide additional capacity to the most traveled roadways, as well as provide increased connectivity throughout the network. The six recommended projects are as follows:

- **Improvement Project 2 – Bells Shoals Road to Lumsden Road Connection.** Provide northbound left access onto Lumsden Road from Bell Shoals Road. (see Figure 48 for conceptual alignment)
- **Improvement Project 4 – Lumsden Road Widening.** Widen Lumsden Road from four to six lanes from Kings Avenue to Lithia Pinecrest Road.
- **Improvement Project 5 – Fishhawk Boulevard Widening.** Widen Fishhawk Boulevard from two lanes to four lanes from Hometown Lane to Lithia Pinecrest Road.
- **Improvement Project 6 – Brandon Parkway Extension.** Provide a connection for Providence Lakes Road between LedgeStone Drive and Vista Cay Court, as well as extend the Brandon Parkway from Lumsden Road south to Providence Lakes Road.
- **Improvement Project 11 – Lithia Pinecrest Road Uneven Widening (limited/reduced option).** Provide capacity and intersection improvements along Lithia Pinecrest Road from Fishhawk Boulevard to Lumsden Road, including northbound widening from one to two lanes from south of New River Hills Parkway to Bloomingdale Avenue and southbound widening from one to two lanes from Lumsden Road to Adelaide Avenue. The Lithia Pinecrest Road/Fishhawk Boulevard intersection is also converted to a continuous green intersection for the northbound direction by widening to two lanes northbound from Fishhawk Boulevard and tapering back to one lane prior to Lithia Springs Road.
- **Improvement Project 12 – Providence Lakes Road Connection.** Provide a connection for Providence Lakes Road between LedgeStone Drive and Vista Cay Court. This improvement project should be undertaken if Improvement Project 6 – Brandon Parkway Extension is considered unfeasible.



Figure 1. Network Alternatives Analysis Study Area Map & Recommended Projects



As described in Sections 4 and 5, the recommended improvement projects (Alternative 8) were included in a recommended alternative set model that was compared against the E+C+LP model (see Figure 49 for results). The combination of the improvement projects under the recommended alternative set provides additional capacity on some of the network's most utilized roadways, while also forming additional connections between them. It is recommended that these individual improvement projects be evaluated in greater detail as part of the planned PD&E study.

The planned investment can not provide vehicle capacity adequate to eliminate congestion on the Brandon network, so this study also makes recommendations for transit improvements for the Brandon area, as well as long term investment strategies. An assessment of the potential congestion reduction benefits of a park and ride facility to the south and west of the study area is included in Appendix I.



2. ANALYSIS METHODOLOGY

The alternatives analysis process included several steps to compare the network performance of widening Lithia Pinecrest Road to other alternatives. The analysis used Aimsun simulation and forecasting software calibrated to represent existing traffic conditions using existing regional traffic model data, intersection traffic counts, and signal timings.

Aimsun is a unique software because of its ability to analyze the performance of roadway networks under existing or potential improvements at both the large-scale regional scale or smaller intersection and corridor level. The Aimsun software allows multiple projects to be added or removed depending on the alternative to be tested. These tests can be performed and results processed and evaluated quickly. The benefit of Aimsun for this type of study is that it combines two scales of modeling, with regional model inputs (macroscopic) with intersection or corridor model inputs (microscopic), to create a hybrid model (mesoscopic) that offers a variety of analysis techniques.

Aimsun macroscopic modeling operates similar to Cube modeling (Tampa Bay Regional Planning Model or TBRPM), which utilizes Origin-Destination (OD) matrices and link parameters in determining routing information.

Aimsun microsimulation operates similar to Vissim microsimulation, utilizing traffic control features and car-following and lane changing models. These models allow for interaction between vehicles and can show model animation. Mesoscopic modeling, also called hybrid models, combines the individual vehicle modeling found in microsimulation with the higher level, regional modeling performed in macrosimulation.

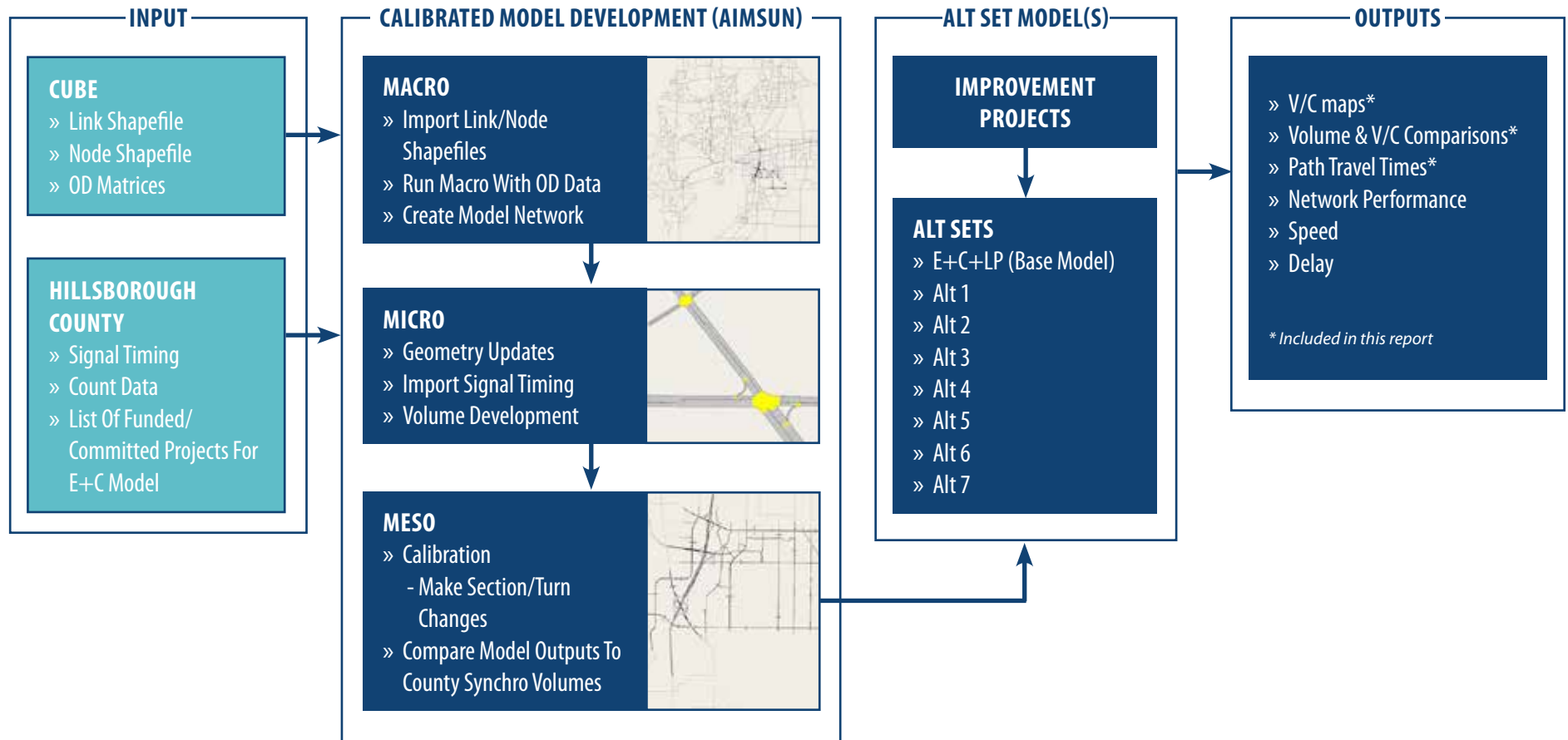
As described below and summarized in the Figure 2, the study team employed the following process to complete the modeling effort:

1. Use Cube software to run the Tampa Bay Regional Planning Model (TBRPM v8.2). Cube output includes link and node shapefiles and OD matrices. The link and node shapefiles are imported into Aimsun.

This allows the Aimsun model to use the same basic roadway network, roadway attributes, centroid data, and Origin-Destination (OD) data as the TBRPM.

2. While in Aimsun, run a macroscopic model and compare with results of the Cube output. If the results meet at least a 95% match, the subarea network was created.
3. Once the modeling limits were selected, Hillsborough County provided the traffic counts, signal timings, and funded or committed projects within the study area. Intersection and roadway geometries, along with intersection control types, were updated to create an Existing plus Committed (E+C) Model, which was used as the starting point for all the alternative sets that were analyzed.
4. Microscopic models were run for the E+C model to develop AM and PM volumes. The output from the E+C model was compared to the count data supplied by the County. The Aimsun model went through a calibration process of adjusting section and turn parameters to make the AM and PM Aimsun volumes match the count data. When the majority of turning movement volumes matched between these two sources, the volumes were finalized. These volumes became the basis for all alternative set models, so all alternatives were analyzed with a consistent set of volumes.
5. Mesoscopic modeling was performed on the E+C Model and results can be found in Section 3.3. Another feature of Aimsun mesoscopic modeling that was used in this analysis is dynamic assignment, which allows the traffic to reroute at specified intervals to better mimic how drivers act in the real world.
6. The E+C Model was used as the starting point for the Existing plus Committed plus Lithia Pinecrest Widening (E+C+LP) Alternative, as well as the alternative sets 1 through 7. The seven alternative sets were compared to the E+C+LP Model (see Section 4 for results).

Figure 2. Traffic Modeling Process



While the Aimsun software provides us with several unique opportunities and advantages, there are limitations in the software and how it can be utilized for this subarea. The subarea did not include the connection of Fishhawk Blvd/Boyette Road/Gibson Drive from Lithia Pinecrest Road

to I-75. This was outside the study area limits, so no improvement projects along this corridor were included, which may have rerouted traffic away from corridors such as Bloomingdale Avenue and Lumsden Road.



3. CONTEXT & EXISTING CONDITIONS

Development in the Bloomingdale and Lithia communities has resulted in increased traffic volumes, traffic congestion, and travel safety issues along arterial corridors within the study area. Growth within and to the south and southeast of the study area has contributed to increases in peak period travel along Lithia Pinecrest Road, Bloomingdale Avenue, and Lumsden Road corridors to and from regional employment centers west and north of the study area.

To support efforts to identify potential transportation improvements for the study, evaluations of population and employment projections as well as safety and crash data was undertaken. Summaries of these analyses follow.

3.1 Existing Population/Employment & Projected Growth

Projected population and employment growth in the study area is mostly concentrated along the western edges of Brandon near I-75 and southeast of the study area along Fishhawk Boulevard. The Brandon Corridors and Mixed Use Centers Pilot Program evaluated redevelopment potential within the greater Brandon area. As shown in Figure 3, the Brandon area itself is mostly built out. Future development is anticipated to occur in areas to the south of the Alafia River between US 41 and the Balm Riverview Road corridor.

Using the existing population and employment estimates and 2040 projections from the TBRPM v8.2, the study team evaluated the existing (2020) and future (2040) number of residents and workers within the study area. (The 2040 projections were used because the 2045 estimates were not available at the time of the analysis.) In 2020, the study area is anticipated to have approximately 240,000 residents and 94,000

employees. By 2040, these numbers are expected to grow to about 286,000 residents and 123,000 employees. Overall, the area is anticipated to see a 19 percent change in residents and a 30 percent change in employees from 2020 to 2040.

To better understand the spatial distribution of new growth projected for the study area between 2020 and 2040, the change in population and employment density was calculated for each study area TAZ. As shown in Figures 4 to 7, the 2020 employment and population densities within the study area are low, with the majority of the TAZs having less than 10 residents or employees per acre. Population and employment densities are expected to grow modestly by 2040.

Figures 8 and 9 show the TAZs where more significant changes to population and employment density are expected. As shown on these figures, the following areas within and around the study area expected to see the most significant increases in residents and employees by 2040:

- The Brandon Main Street area just east of the Brandon Town Center shopping mall and Westfield Brandon Mall is projected for increases in residential density.
- Areas along the I-75 between SR 60 and Bloomingdale Avenue are projected for increases in employment.
- New residential density is projected outside the study area to the south of the Alafia River south of Boyette Road and Fishhawk Boulevard along the Balm Riverview and Balm Boyette Road corridors.

The eastern areas of Brandon are mostly built out, with relatively modest potential for increases in population, and little growth is expected to the southeast of Fishhawk Ranch.

LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 3. Development and Redevelopment Potential and Constraints (Brandon Corridors & Mixed Use Centers Pilot Project, 2017)

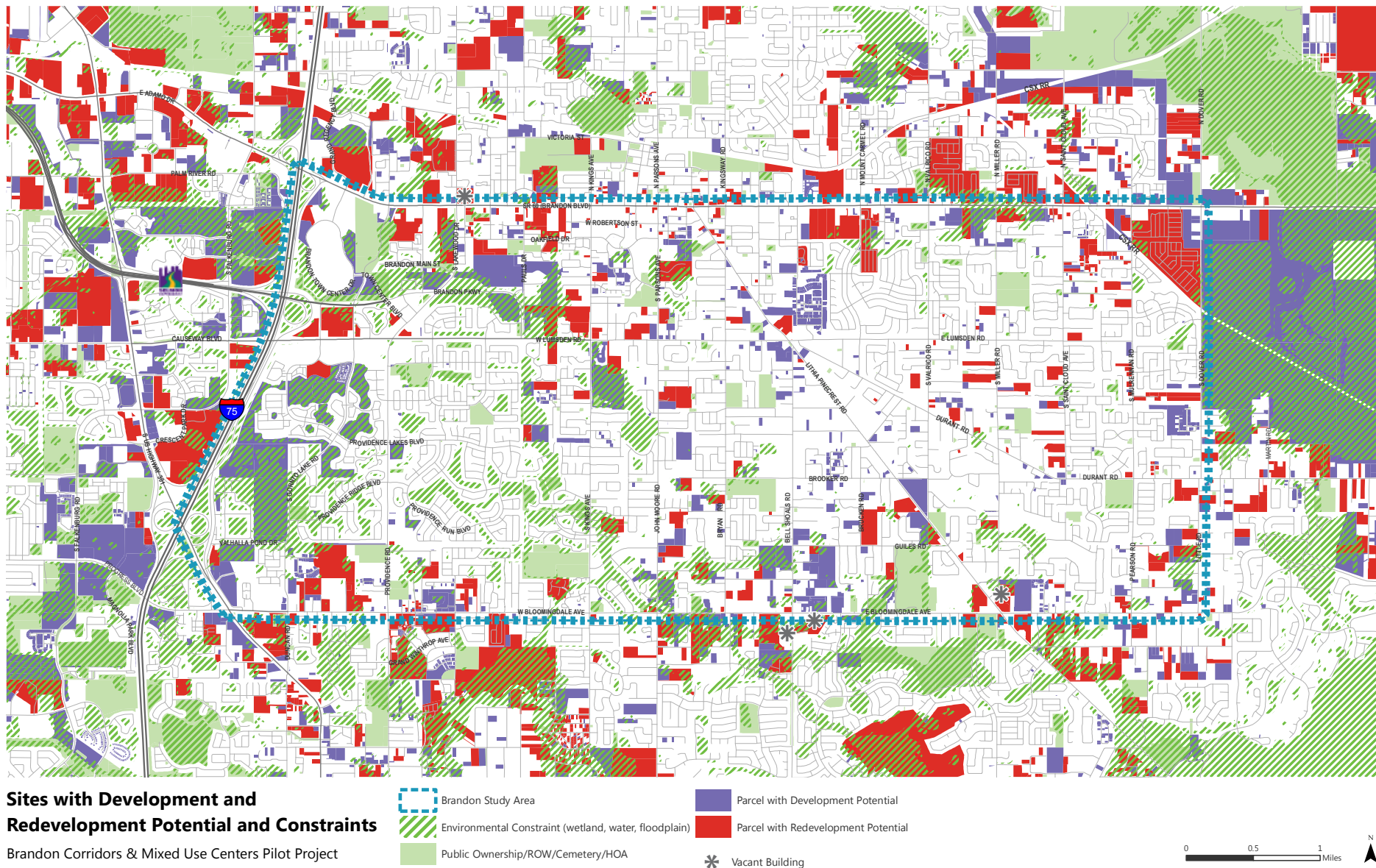




Figure 4. Population Density by TAZ, 2020

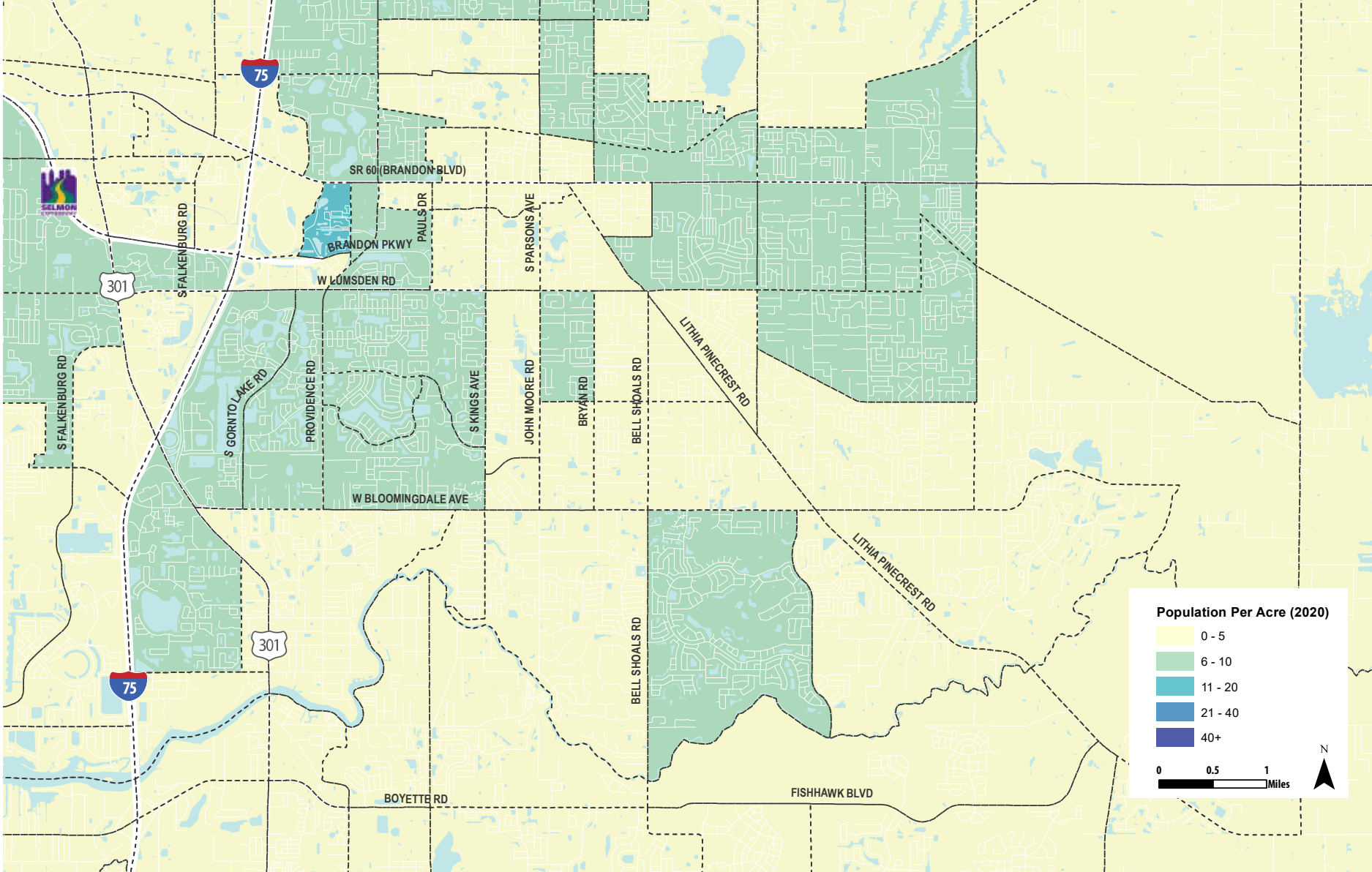


Figure 5. Population Density by TAZ, 2040

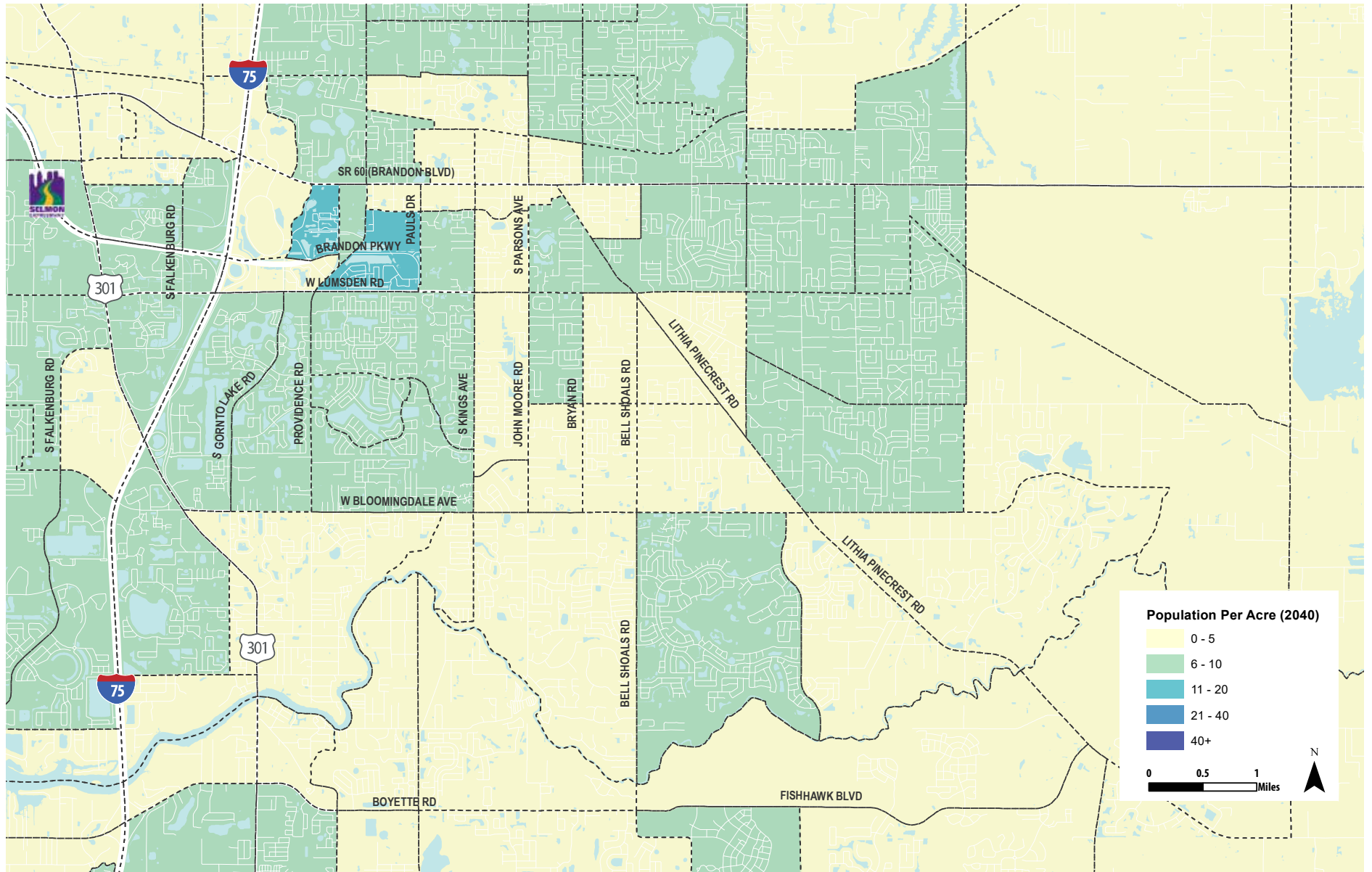




Figure 6. Employment Density by TAZ, 2020

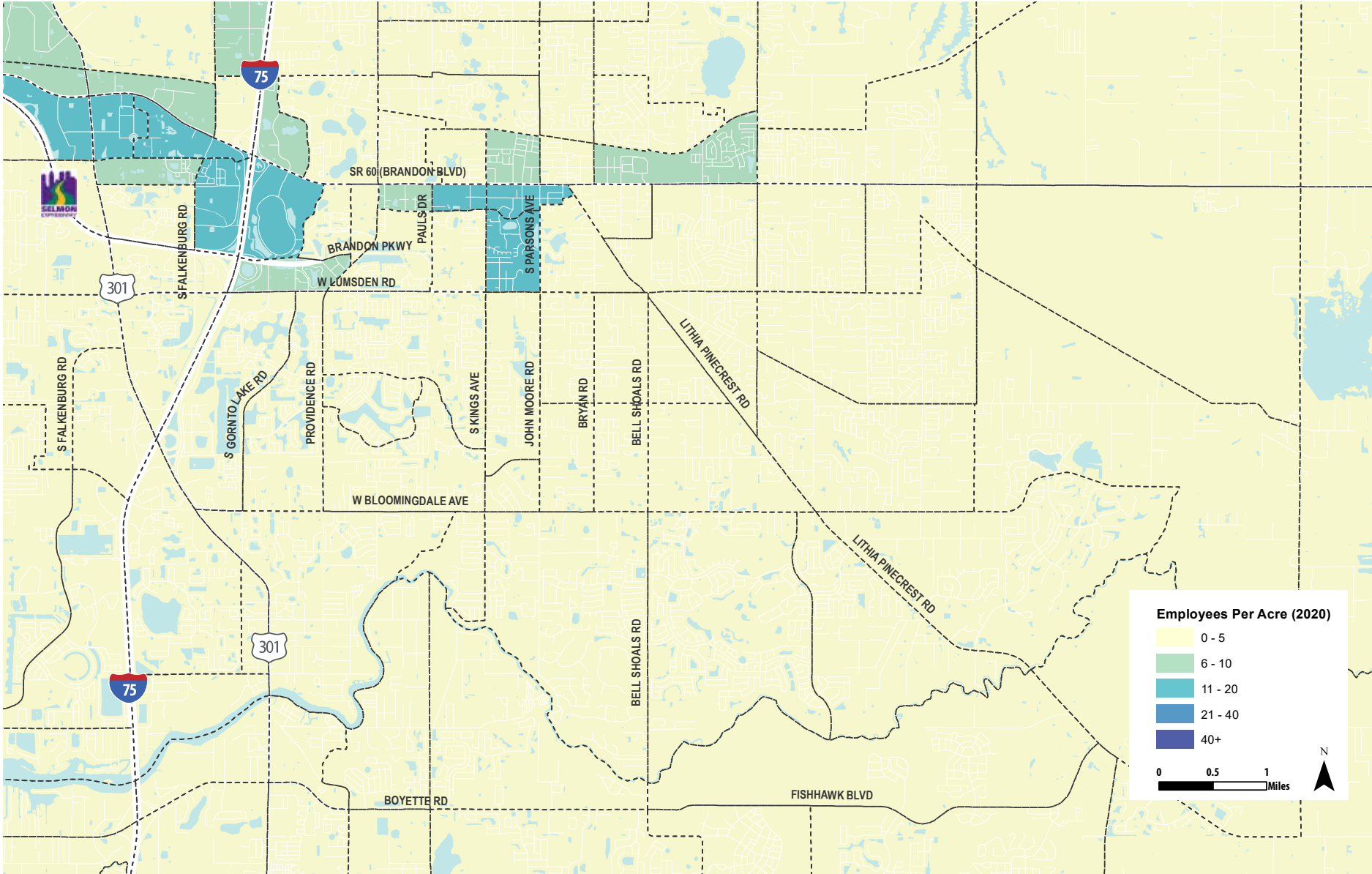


Figure 7. Employment Density by TAZ, 2040

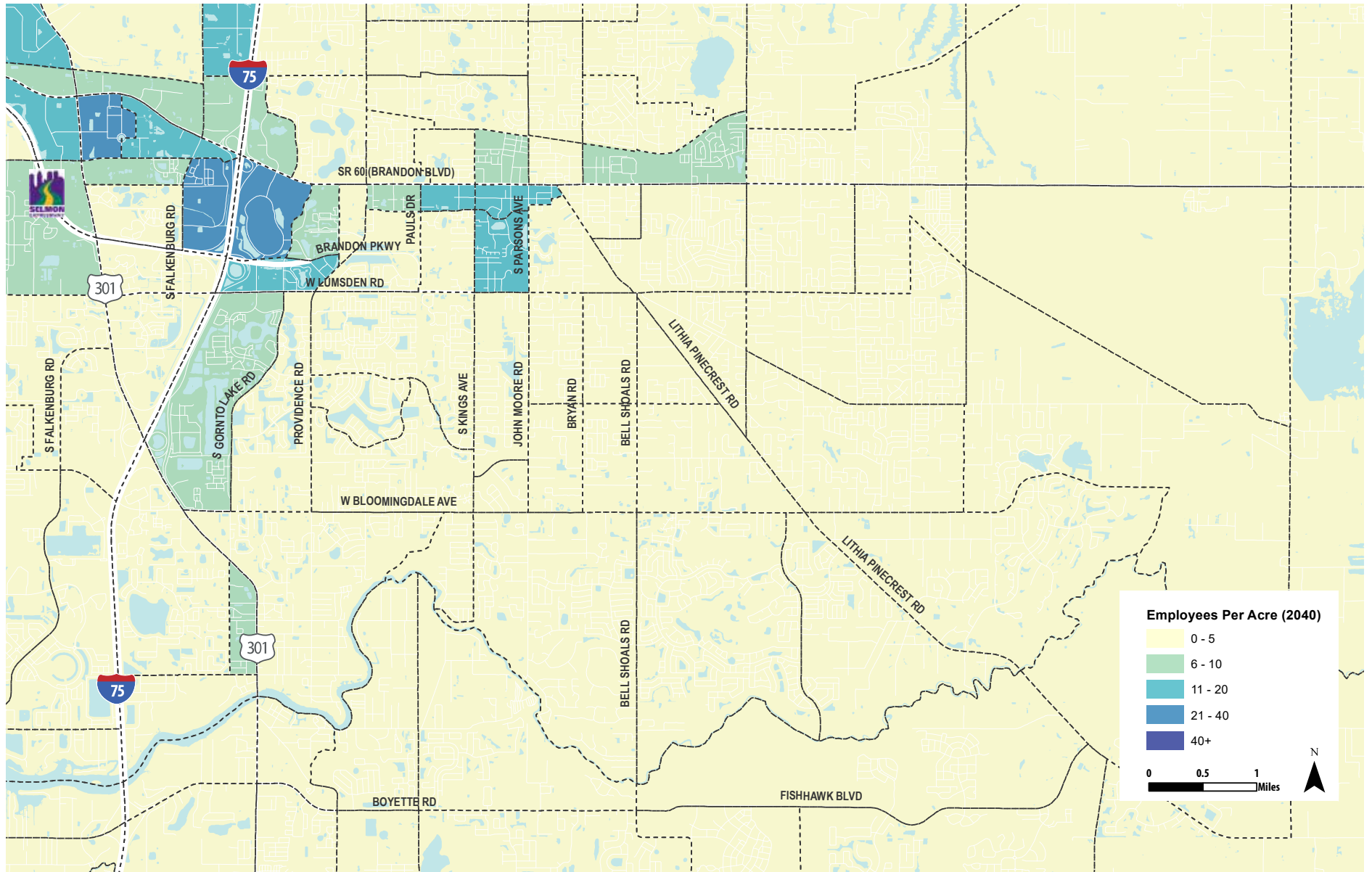
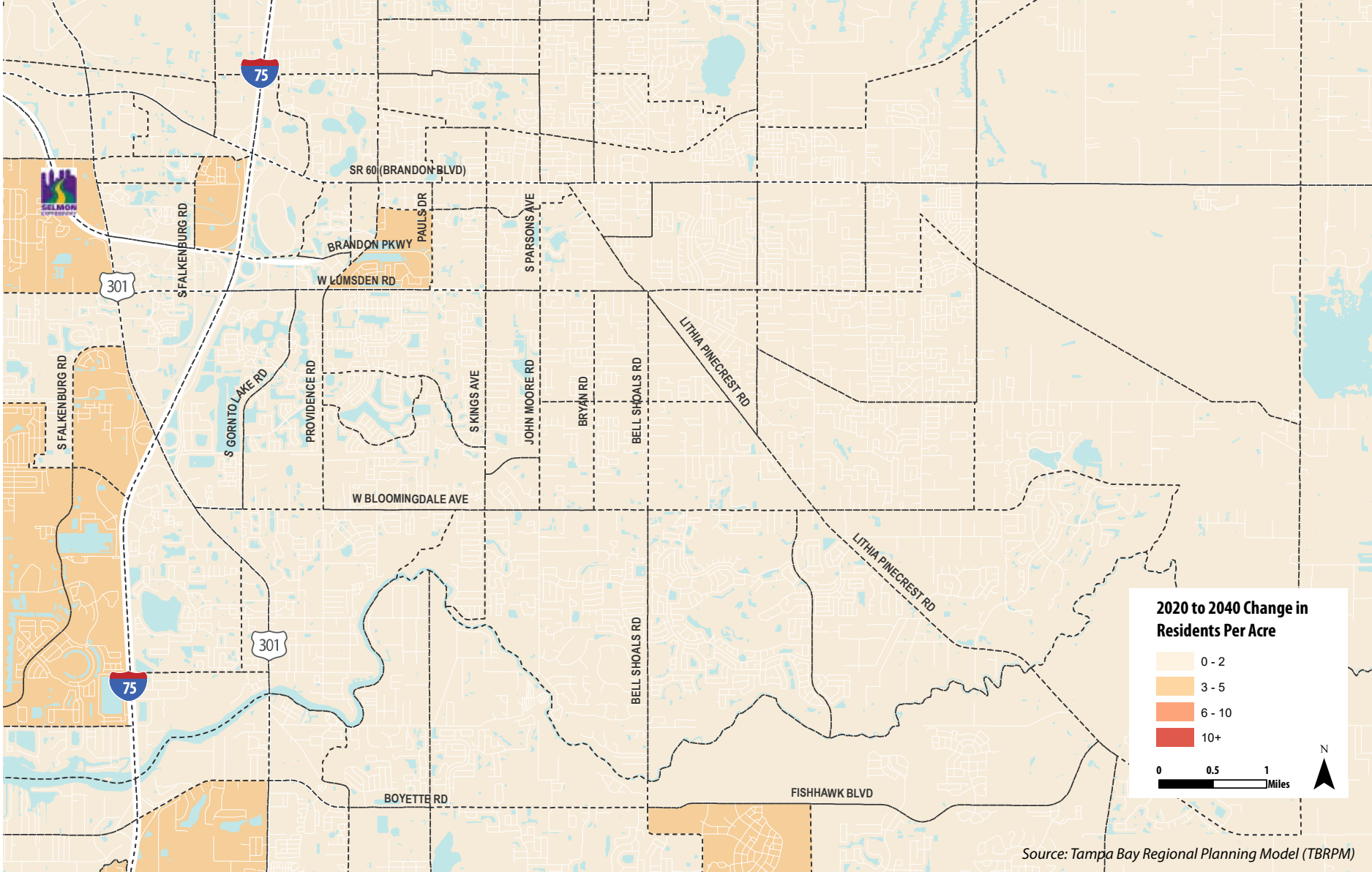


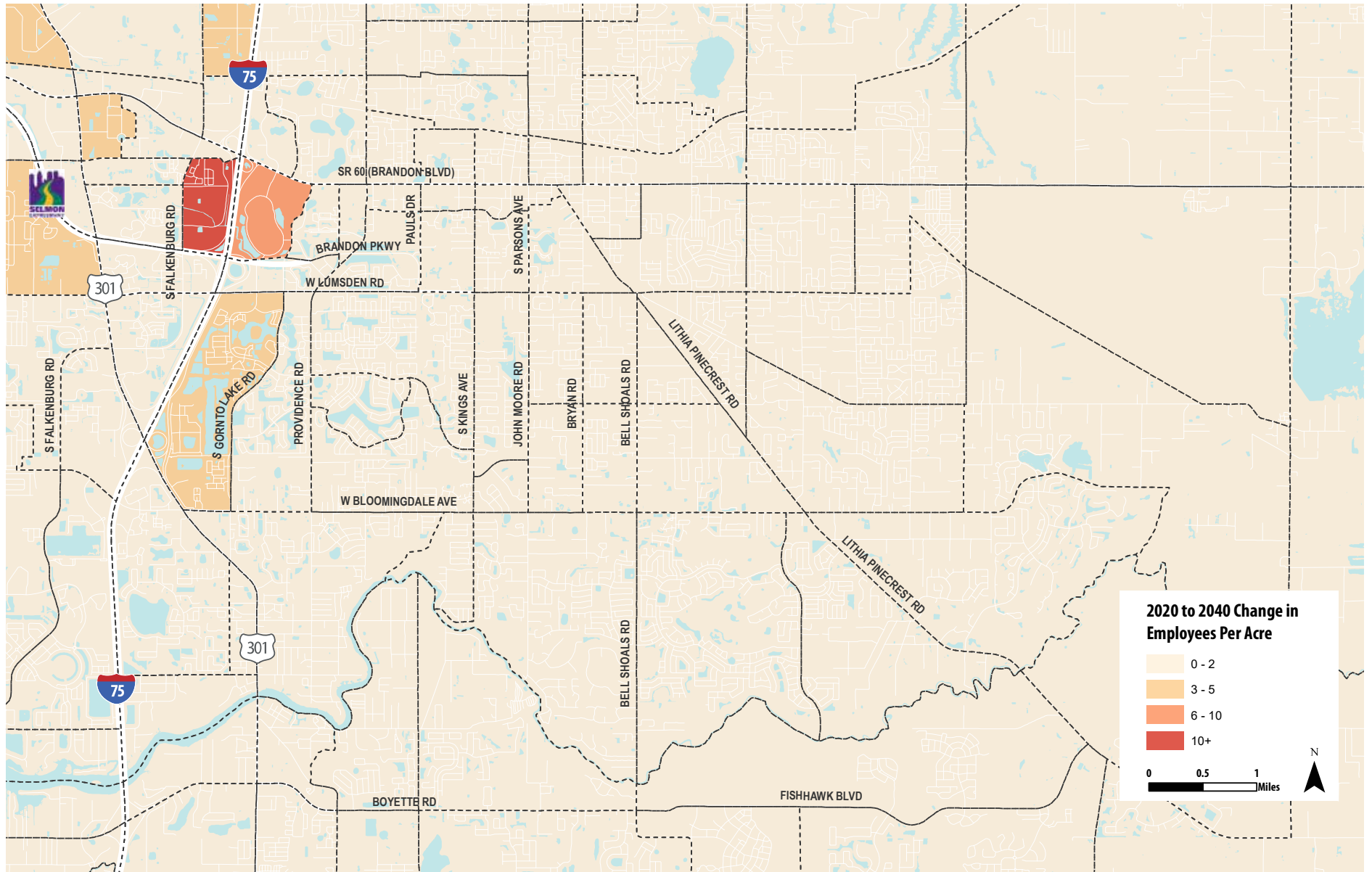


Figure 8. New Residents per Square Mile by TAZ, 2020 to 2040



Source: Tampa Bay Regional Planning Model (TBRPM)

Figure 9. New Employees per Square Mile by TAZ, 2020 to 2040





3.2 Crash & Safety Analysis

The majority of crashes within the Brandon area are rear-end crashes concentrated along SR 60, Lumsden Road, Bloomingdale Avenue, and Lithia Pinecrest Road. This is not surprising given the area has a limited secondary roadway network forcing motorists to travel on these major arterials that carry the bulk of the volume. In addition, portions of these roadways allow for higher speeds followed by sudden and abrupt stops due to long queuing at intersections, resulting in high frequencies of rear-end crashes.

CRASH HOT SPOTS

Plan Hillsborough's *Vision Zero Plan* was prepared in 2017 by the Hillsborough MPO, in partnership with Hillsborough County; the Cities of Tampa, Temple Terrace, and Plant City; and the Florida Department of Transportation (FDOT) in support of reduced fatalities and serious injuries on roadways. Figure 10 shows Hillsborough County's top 20 corridors and crash spots with the highest number of severe injury crashes per mile between 2014 and 2018. The top 20 corridors with severe injury crashes are represented by black lines along the roads. To determine specific problem locations, the study team evaluated Signal Four Analytics crash data collected from 2014 to 2018 (see Figures 11 and 12).

Key observations:

- Within the study area, SR 60 between I-75 and Parsons Avenue, is identified as one of the County's top high crash corridors.
- SR 60, between I-75 and Parsons Avenue, is a high crash area during the PM peak period.
- The US 301 and Bloomingdale Avenue intersection has high crash occurrences in both the AM and PM periods.
- Several intersections along Bloomingdale Avenue and Lumsden Road also have high crash occurrences in both the AM and PM periods.

- Lumsden Road also has a higher rate of crashes in the PM period compared to the AM period, due in part to the higher volumes that use this roadway in the PM.

CRASH LOCATION BY TYPE

The study team also used the Signal Four Analytics crash data from 2014 to 2018 to evaluate the types of crashes and where they were occurring within the study area. Figures 13 and 14 show crash locations by type for AM and PM peak periods.

Key observations for the AM peak period:

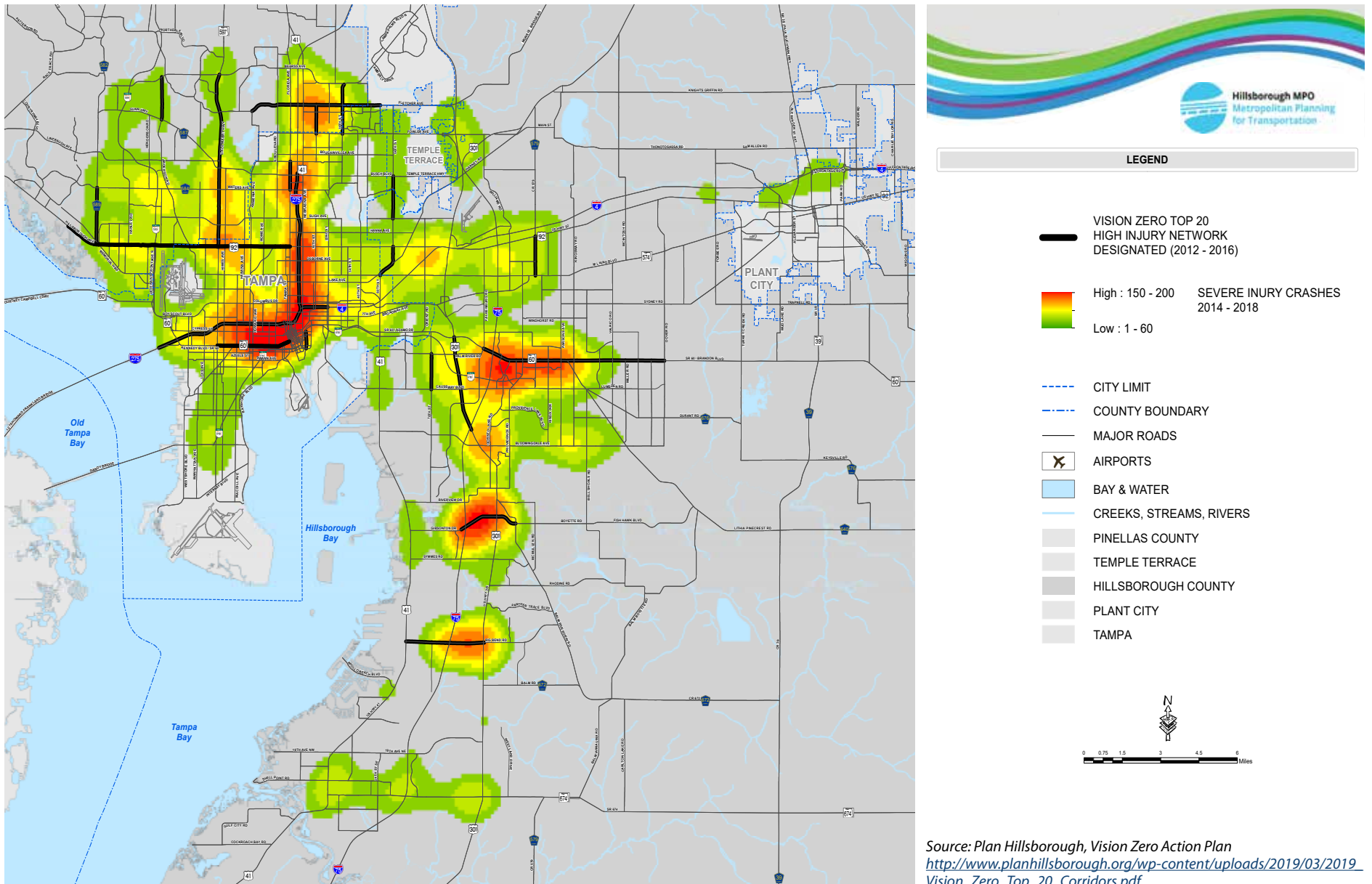
- A high frequency of rear end crashes occurred on Bell Shoals Road; Lithia Pinecrest Road at Bloomingdale Avenue; and along Bloomingdale Avenue, Lumsden Road, and SR 60.
- Left turn crashes occurred at major intersections along Bloomingdale Avenue.
- Only a few sideswipes occurred on these arterial roadways.
- Widening Lithia Pinecrest Road and Bell Shoals Road may reduce rear end crashes, but increase the possibility of sideswipes.
- SR 60 and Lumsden Road saw the highest incidence of pedestrian and bicycle crashes. Bicycle and pedestrian involved crashes typically occurred at intersections and along commercial corridors that experience higher volumes of pedestrian and bicycle activity.

In the PM peak period:

- A higher number of rear end crashes occurred along SR 60, Lumsden Road, Lithia Pinecrest Road, Bloomingdale Avenue, and Bell Shoals Road. These crashes were concentrated on the east end of the network (east of Kings Avenue).
- Left turn crashes occurred along Bloomingdale Avenue at major intersections.
- The highest incidence of pedestrian and bicycle crashes occurred along SR 60 and Bloomingdale Avenue in the PM peak period.

LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 10. Hillsborough County Vision Zero Top 20 Corridors & High Crash Spots



Source: Plan Hillsborough, Vision Zero Action Plan
http://www.planhillsborough.org/wp-content/uploads/2019/03/2019_Vision_Zero_Top_20_Corridors.pdf



Figure 11. Study Area Crash Hotspots, AM Peak Period, 2014-2018

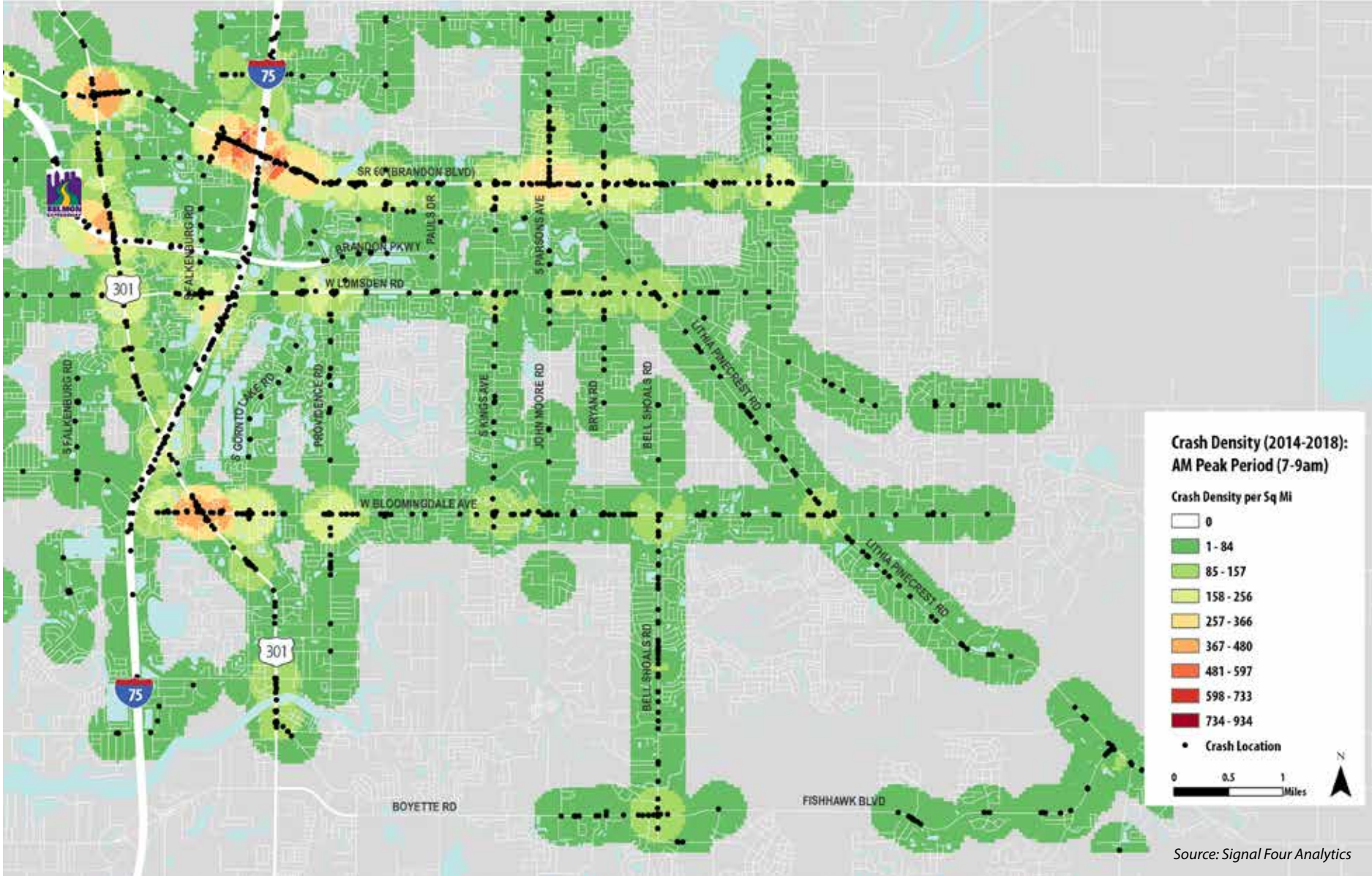


Figure 12. Study Area Crash Hotspots, PM Peak Period, 2014-2018

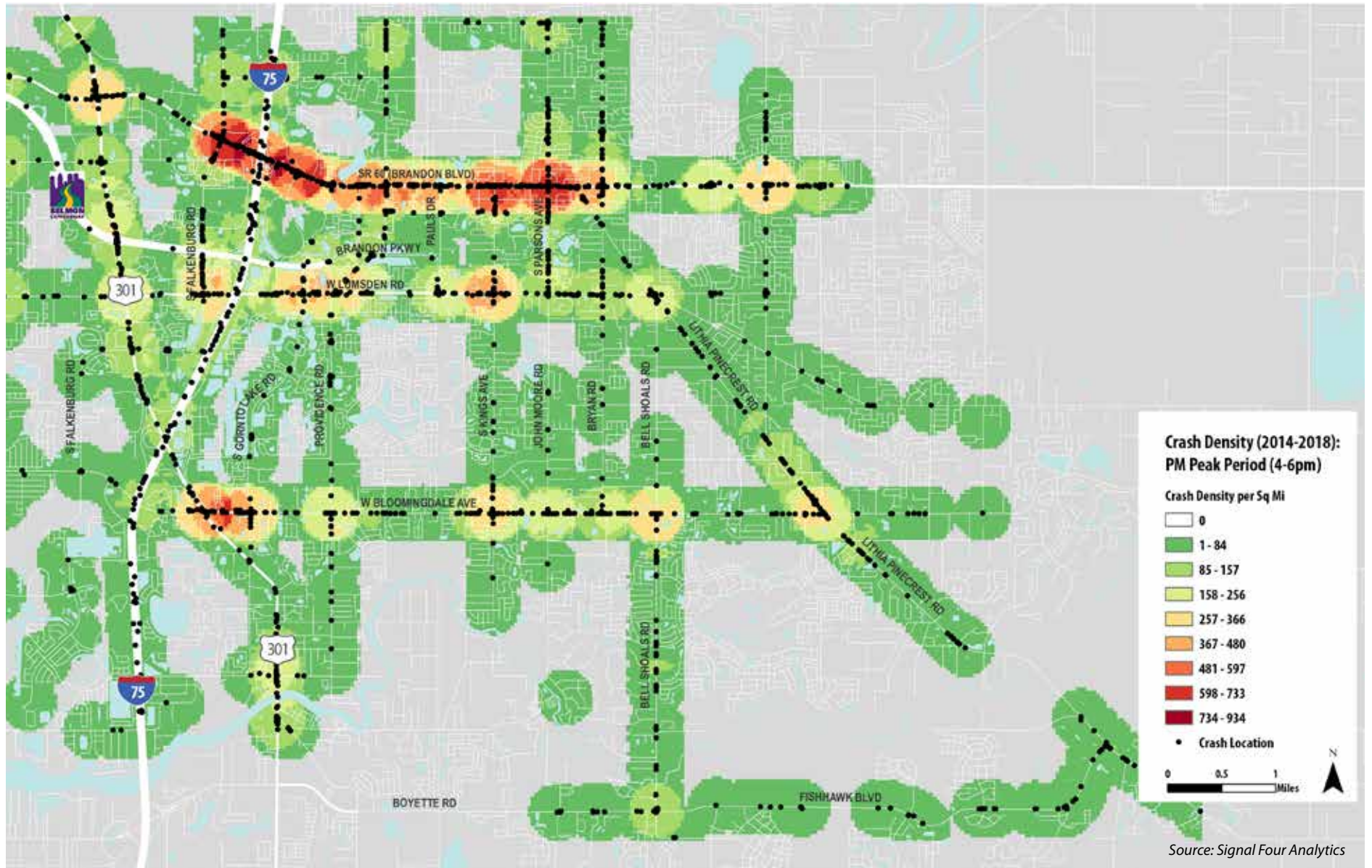




Figure 13. Study Area Crash Location by Types, AM Peak Period, 2014-2018

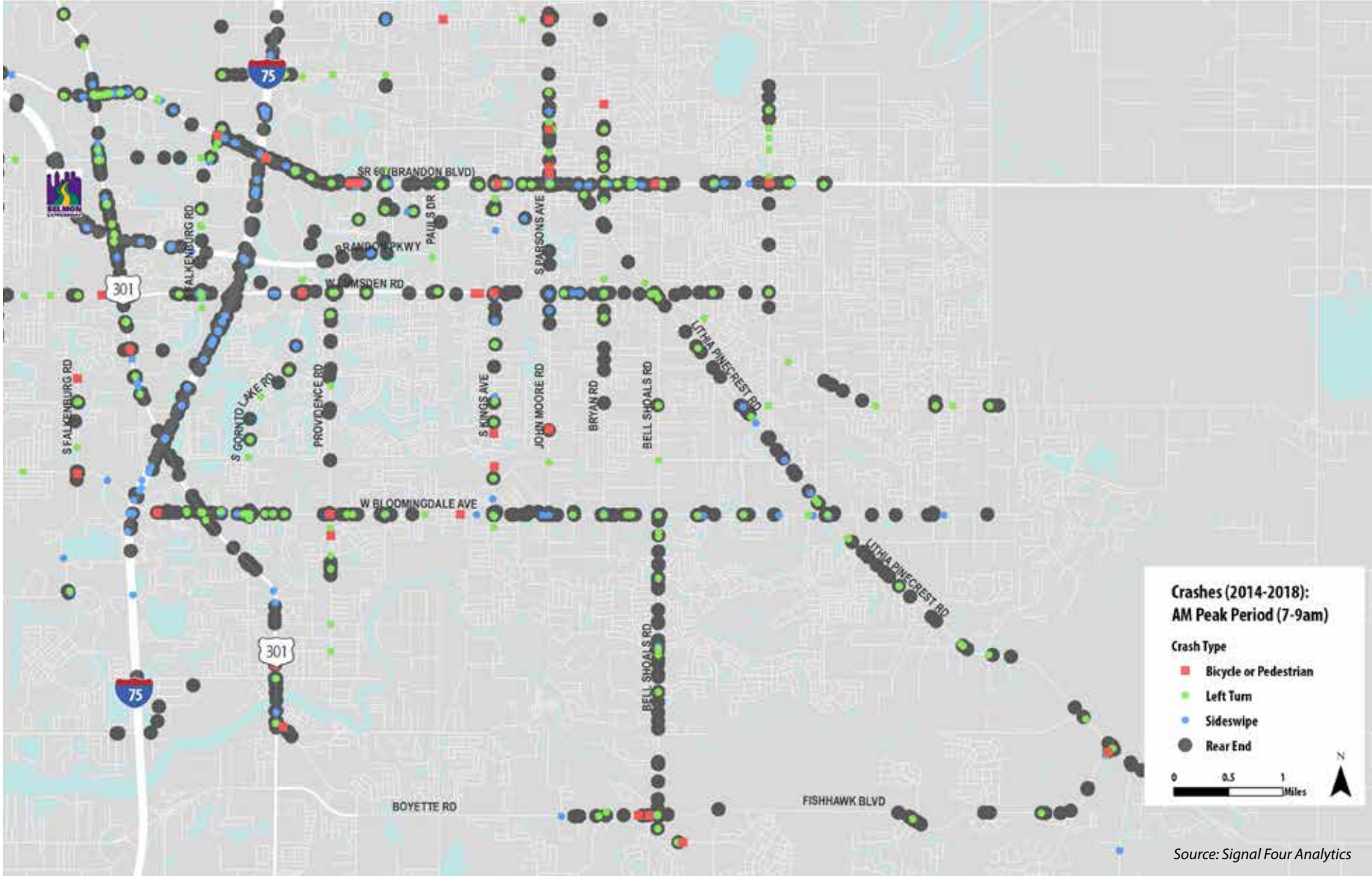
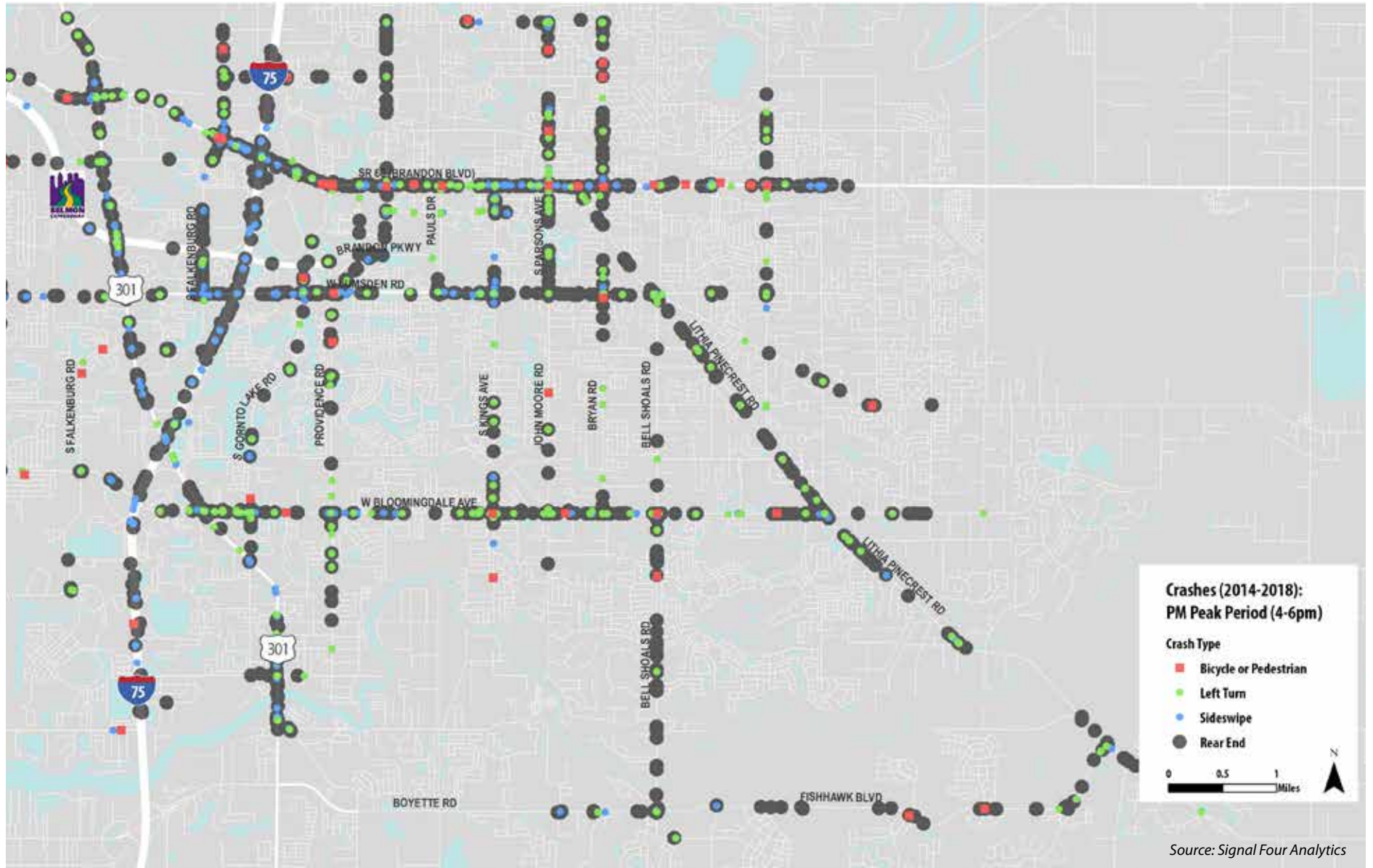


Figure 14. Study Area Crash Location by Types, PM Peak Period, 2014-2018





3.3 Existing Network Performance

The initial Aimsun model was developed using the existing roadway network along with funded or committed projects. The funded or committed projects that were included are shown in Table 1 and Figure 15.

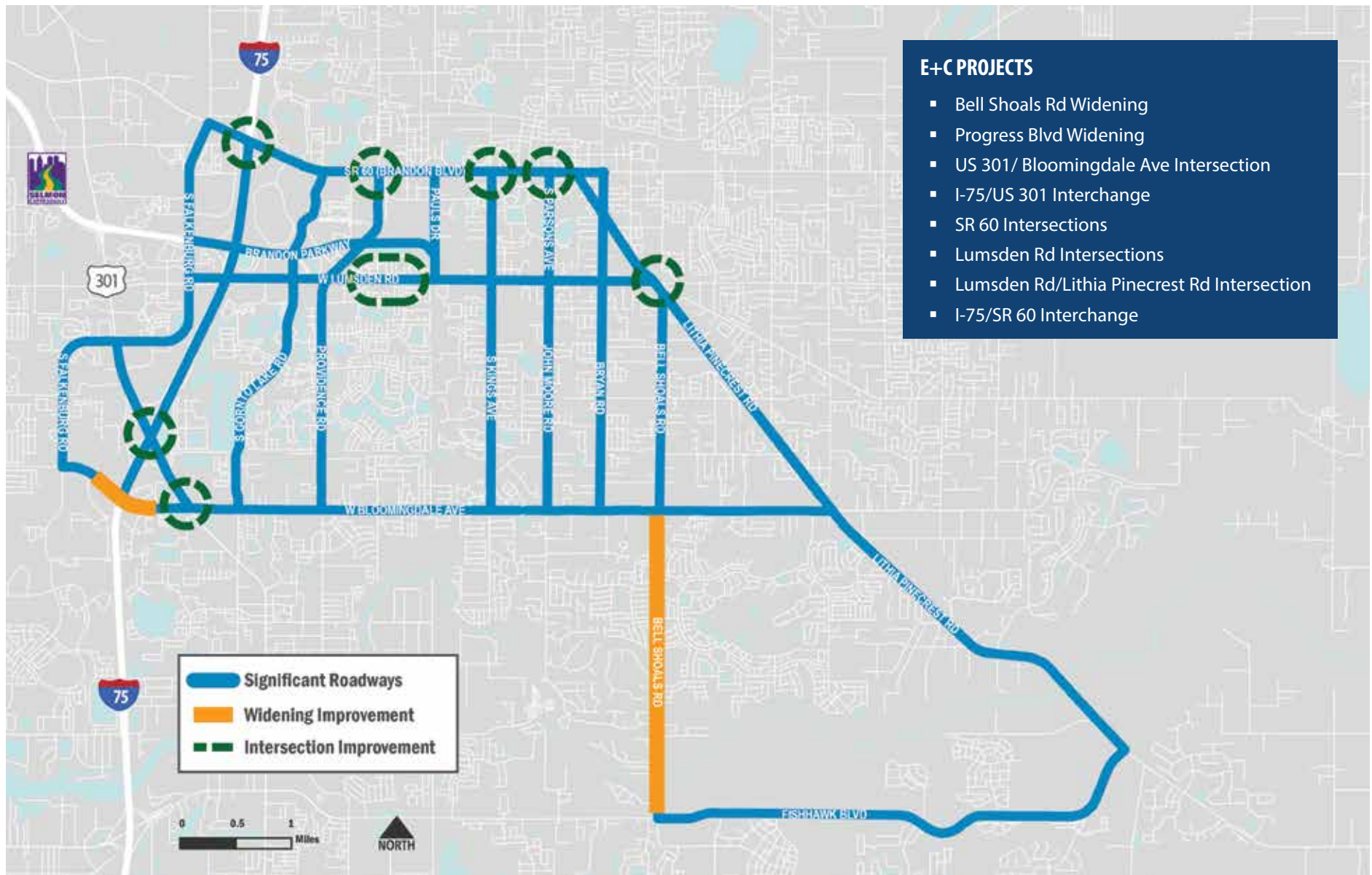
The performance results of the E+C Model were analyzed to illustrate how vehicles move through the network and isolate congestions hot spots by peak travel period. An existing volume to capacity (V/C) ratio was calculated for each of the major roadways within the study area in the AM and PM peak periods (see Figures 16 and 17).

The E+C Model results show that motorists have different travel patterns and use different roadways in the AM and PM peak periods as they travel between home, work, and other destinations. Also, recent growth in the Fishhawk area and the Bell Shoals Road widening project, will result in some roadways, including Fishhawk Boulevard, having higher levels of congestion. Additionally, the existing network relies on three major east-west corridors, which experience heavy congestion from local traffic as well as regional traffic through the study area. The study area does not have a well-developed secondary roadway network to help support these major east-west corridors.

Table 1. Funded/Committed Projects Included in E+C Model

Facility	From	To	Existing Lanes	Improvement
Bell Shoals Road	Fishhawk Boulevard	Bloomingtondale Avenue	2-lane undivided	Widen to 4-lane divided.
Progress Boulevard	Magnolia Park Boulevard	Tranquility Lake Circle/ Valleydale Drive	2-lane undivided	Widen to 4-lane.
US 301/Bloomingtondale Avenue Intersection	-	-	-	Extend the northbound right (NBR) lane and convert to a shared northbound through right (NBTR) lane. Widen to allow for two WBT lanes.
US 301/I-75 Interchange	-	-	-	Widen the NB I-75 On Ramp from NB US 301 from 1 lane to 2 lanes.
SR 60 Intersections	-	-	-	Intersection improvements at SR 60/Lakewood Drive, SR 60/Kings Drive, and SR 60/Parsons Boulevard.
Lumsden Road Intersections	Kensington Ridge Boulevard/ Heather Lakes Boulevard	Paddock Club Drive/ Heather Lakes Boulevard	-	Extend turn bays and convert unsignalized intersections to signalized intersections.
Lumsden Road/Lithia Pinecrest Road Intersection	-	-	-	Intersection geometry reconfiguration involving Durant Road and Bell Shoals Road.
I-75/SR 60 Interchange	-	-	-	Entrance to the NB I-75 Loop On Ramp moved to connect with the SB I-75/ Frontage Road On Ramp.

Figure 15. Existing + Committed Projects





Other key observations include:

- In the AM peak period, Bloomingdale Avenue serves as a significant attractor for westbound trips due to its access to both I-75 and the Selmon Expressway, which are the primary routes to access employment centers west and north of the study area. However, due to challenges in accessing I-75 and the Selmon Expressway near US 301, even with committed improvements, Bloomingdale Avenue experiences poor operations at the west end of the corridor.
- Lumsden Road and SR 60 are less desirable westbound routes in the AM peak period, due to these routes only having access to one of the two major highways (the Selmon Expressway via Lumsden Road and I-75 via SR 60).
- In the PM peak period, drivers can't access eastbound Bloomingdale Avenue from the Selmon Expressway without leaving the limited access facility and utilizing local roadways, which results in higher PM peak hour volumes on Lumsden Road and Lithia Pinecrest Road.
- The results of the E+C Model, which includes the Bell Shoals Road widening, demonstrate that additional vehicles will be attracted to Bell Shoals Road from the Fishhawk area, causing Fishhawk Boulevard to exceed capacity.
- Northbound Lithia Pinecrest Road experiences higher congestion in the AM peak period between Fishhawk Boulevard and Bloomingdale Avenue. In the PM peak period, congestion occurs on southbound Lithia Pinecrest Road from Lumsden Road to south of Bloomingdale Avenue.

LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 16. Existing + Committed Volume to Capacity (V/C) Ratio, AM Peak

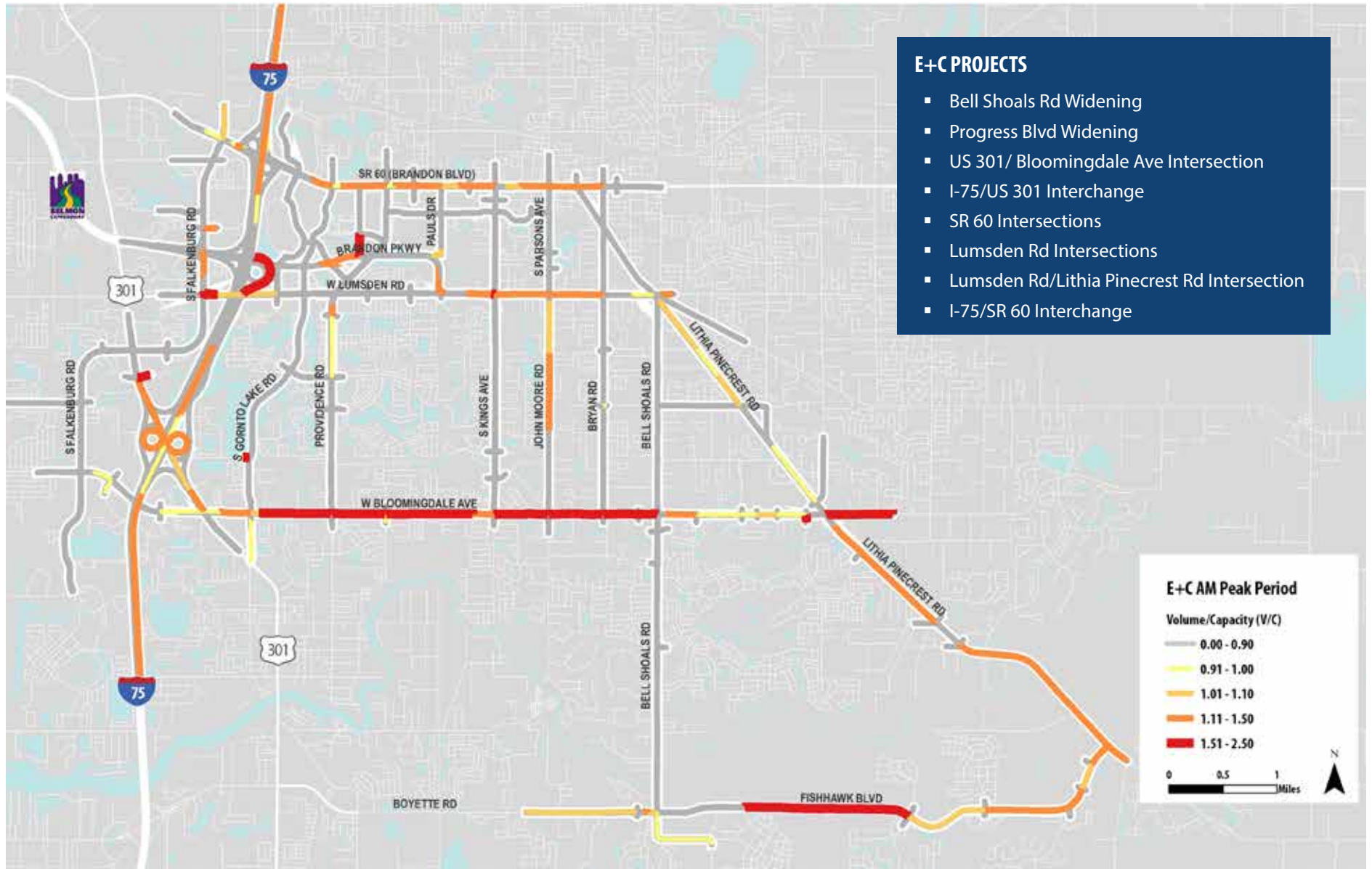
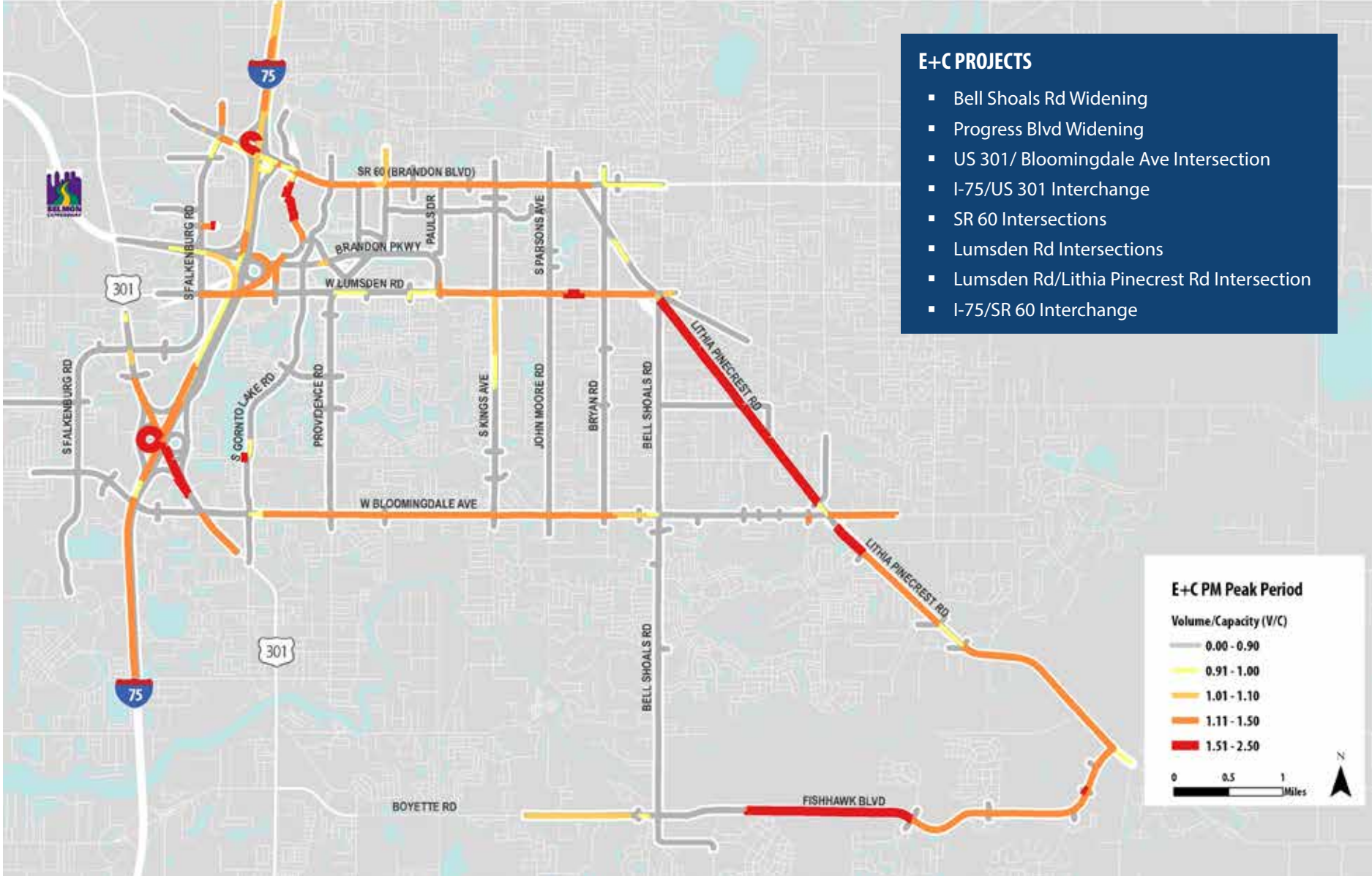




Figure 17. Existing + Committed Volume to Capacity (V/C) Ratio, PM Peak



4. NETWORK ALTERNATIVES ANALYSIS

4.1 Improvement Projects

Based on a review of the E+C Model results and existing conditions and discussions with Hillsborough County, FDOT, and Hillsborough MPO staff, the study team developed a list of potential improvement projects. These potential projects included improvements related to increased roadway capacity/lanes, intersection geometry improvements, and new roadway corridors. Given the current pattern of development and concerns for

right-of-way limits and property impacts, the study area has limited potential for new corridors and significant roadway widening projects. Additionally, to address existing issues within the study area, short-term improvements (less than five years) that would improve existing conditions were considered in favor of longer term projects.

Each of the improvement projects were developed to address a specific issue or need identified in the existing conditions review and findings from the E+C Model outputs. The summary of each of these projects is included in Table 2.

Table 2. Improvement Project Summary

Improvement Project	Description of Improvement	Issue Addressing
1. Lithia Pinecrest Road Widening - Fishhawk Boulevard to Lumsden Road	Widen from two to four lanes for entire length of corridor.	Address congestion on Lithia Pinecrest Road by providing additional capacity.
2. Bell Shoals Road to Lumsden Road Connection	Provides for new northbound left turn access from Bell Shoals Road onto Lumsden Road near the intersection of Lithia Pinecrest Road and Lumsden Road. (See Figure 48 for detailed concept)	Address congestion on Lithia Pinecrest Road by providing alternative connection to Lumsden Road.
3. Lithia Pinecrest Road/Bloomingdale Avenue Intersection Improvement	Widen southbound Lithia Pinecrest Road departure lane from two to three lanes south of Bloomingdale Avenue. Roadway narrows to one southbound lane north of Erindale Drive.	Provides additional capacity on Lithia Pinecrest Road for vehicles turning right from Bloomingdale Avenue.
4. Lumsden Road Widening - Kings Avenue to Lithia Pinecrest Road	Widen from four to six lanes for entire length of corridor.	Address congestion on Lumsden Road.
5. Fishhawk Boulevard Widening - Hometown Lane to Lithia Pinecrest Road	Widen from two to four lanes for entire length of corridor.	Address congestion on Fishhawk Boulevard, due to growth and Bell Shoals Road widening.
6. Brandon Parkway Extension - Kings Avenue to Providence Lakes Road	New two lane roadway connection for Providence Lakes Road between Ledgestone Drive and Vista Cay Court. New roadway connection between Providence Lakes Road and the end of the Brandon Parkway.	Provide additional north-south roadway connection to Brandon Parkway and new east-west connection between Kings Avenue and Providence Road.



Table 2 (cont.) Improvement Project Summary

Improvement Project	Description of Improvement	Issue Addressing
7. Lithia Pinecrest Road Intermittent Widening	Widen from two to four lanes between Erindale Drive and Bloomingdale Avenue and between Brooker Road and Lumsden Road.	Address congestion on Lithia Pinecrest Road by providing additional capacity at key locations.
8. Lumsden Road Widening - Kings Avenue to John Moore Road	Widen from four to six lanes for entire length of corridor.	Address congestion on Lumsden Road at most congested intersections to provide better connection to John Moore Road.
9. Lithia Pinecrest Road Uneven Widening	Widen northbound lanes from one to two lanes between Fishhawk Boulevard and Bloomingdale Avenue and southbound lanes from one to two lanes between Adelaide Avenue and Lumsden Road.	Address congestion on Lithia Pinecrest Road by providing additional capacity to support uneven travel patterns in AM and PM peak periods.
10. Causeway Boulevard Intersections Turn Bay Improvements	Extension of westbound left turn bay on Causeway Boulevard at the Falkenburg Road/Causeway Boulevard intersection. Addition of second eastbound left turn bays on Causeway Boulevard at the Brandon Town Center/Causeway Boulevard intersection.	Address left turn bay deficiencies at these key intersections near I-75 and Selmon Expressway.
11. Lithia Pinecrest Road Uneven Widening (limited/reduced option)	Widen northbound lanes from one to two lanes between south of New River Hills Parkway and Bloomingdale Avenue and southbound lanes from one to two lanes between Adelaide Avenue and Lumsden Road. Convert Lithia Pinecrest Road/Fishhawk Boulevard intersection to a continuous green and widen northbound lanes from one to two lanes between Fishhawk Boulevard and south of Lithia Springs Road.	Address congestion on Lithia Pinecrest Road by providing additional capacity to support uneven travel patterns in AM and PM peak periods. Limited option to not result in impacts to bridge over Alafia River.
12. Providence Lakes Road Connection - Ledgestone Drive to Vista Cay Court	New two lane roadway connection for Providence Lakes Road between Ledgestone Drive and Vista Cay Court.	Provide new east-west connection between Kings Avenue and Providence Road.

4.2 Alternative Sets

In addition to the Lithia Pinecrest full widening alternative (see Figure 18), seven other alternative sets were developed using combinations of the twelve improvement projects previously identified. The best performing improvements in these alternatives were identified and combined into Alternative 8, the recommended alternative. These alternative sets were

coded into separate Aimsun models and compared against the proposed Lithia Pinecrest Road widening alternative. Table 3 provides a comparison of the improvement projects used in each of the alternative sets. Figures 19 through 26 graphically show the improvements included in each alternative set. The roadway segments with proposed capacity related projects are highlighted in orange and intersection improvement projects are circled in green on the figures.

Table 3. Alternative Sets Project Lists

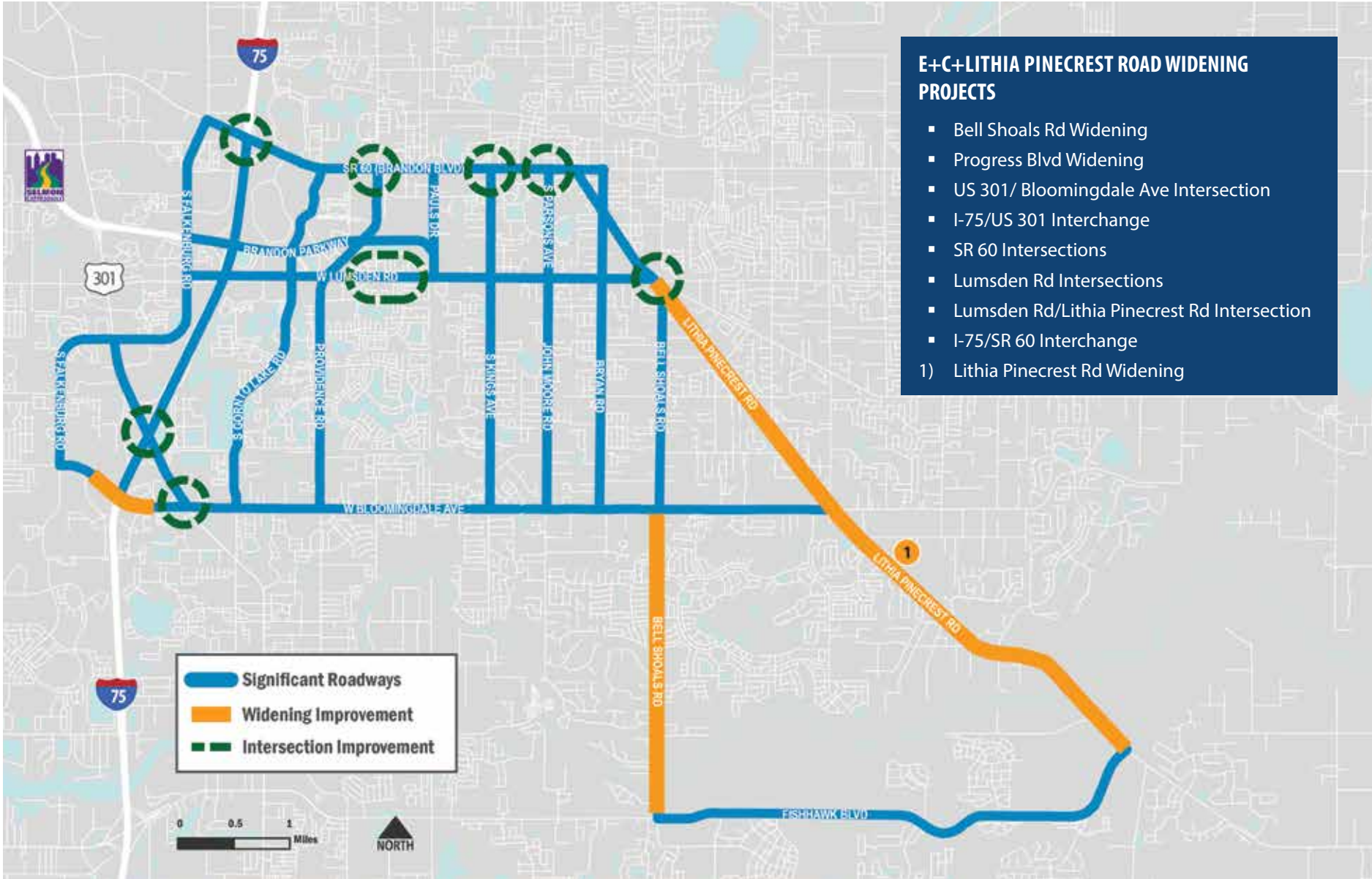
Improvement Project	E+C	E+C+LP	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8*
1. Lithia Pinecrest Road Widening - Fishhawk Boulevard to Lumsden Road	-	✓	-	-	-	-	-	-	-	-
2. Bell Shoals Road to Lumsden Road Connection	-	-	✓	-	-	-	-	-	-	✓
3. Lithia Pinecrest Road/Bloomingdale Avenue Intersection Improvement	-	-	✓	✓	-	-	-	-	-	-
4. Lumsden Road Widening - Kings Avenue to Lithia Pinecrest Road	-	-	✓	-	✓	-	-	-	-	✓
5. Fishhawk Boulevard Widening - Hometown Lane to Lithia Pinecrest Road	-	-	✓	✓	✓	✓	✓	✓	✓	✓
6. Brandon Parkway Extension - Kings Avenue to Providence Lakes Road	-	-	-	✓	-	-	✓	✓	-	✓
7. Lithia Pinecrest Road Intermittent Widening	-	-	-	-	✓	✓	-	-	-	-
8. Lumsden Road Widening - Kings Avenue to John Moore Road	-	-	-	-	-	✓	-	✓	✓	-
9. Lithia Pinecrest Road Uneven Widening	-	-	-	-	-	-	✓	-	-	-
10. Causeway Boulevard Intersections Turn Bay Improvements	-	-	-	-	-	-	-	✓	✓	-
11. Lithia Pinecrest Road Uneven Widening (limited/reduced option)	-	-	-	-	-	-	-	✓	✓	✓
12. Providence Lakes Road Connection - Ledgestone Drive to Vista Cay Court	-	-	-	-	-	-	-	-	✓	✓

* For Alternative 8, Improvement Project 12 should be undertaken if Improvement Project 6 is considered unfeasible.

To assist in comparison purposes, the alternative sets included projects that were roughly similar in estimated costs to the proposed Lithia Pinecrest Road widening project (approximately \$200 million total investment including right-of-way acquisition, design and construction). Unknowns related to right-of-way acquisition, however, could result in some recommendations to be more costly than anticipated.



Figure 18. Existing + Committed Projects + Lithia Pinecrest Widening Alternative



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 19. Alternative Set 1 Projects

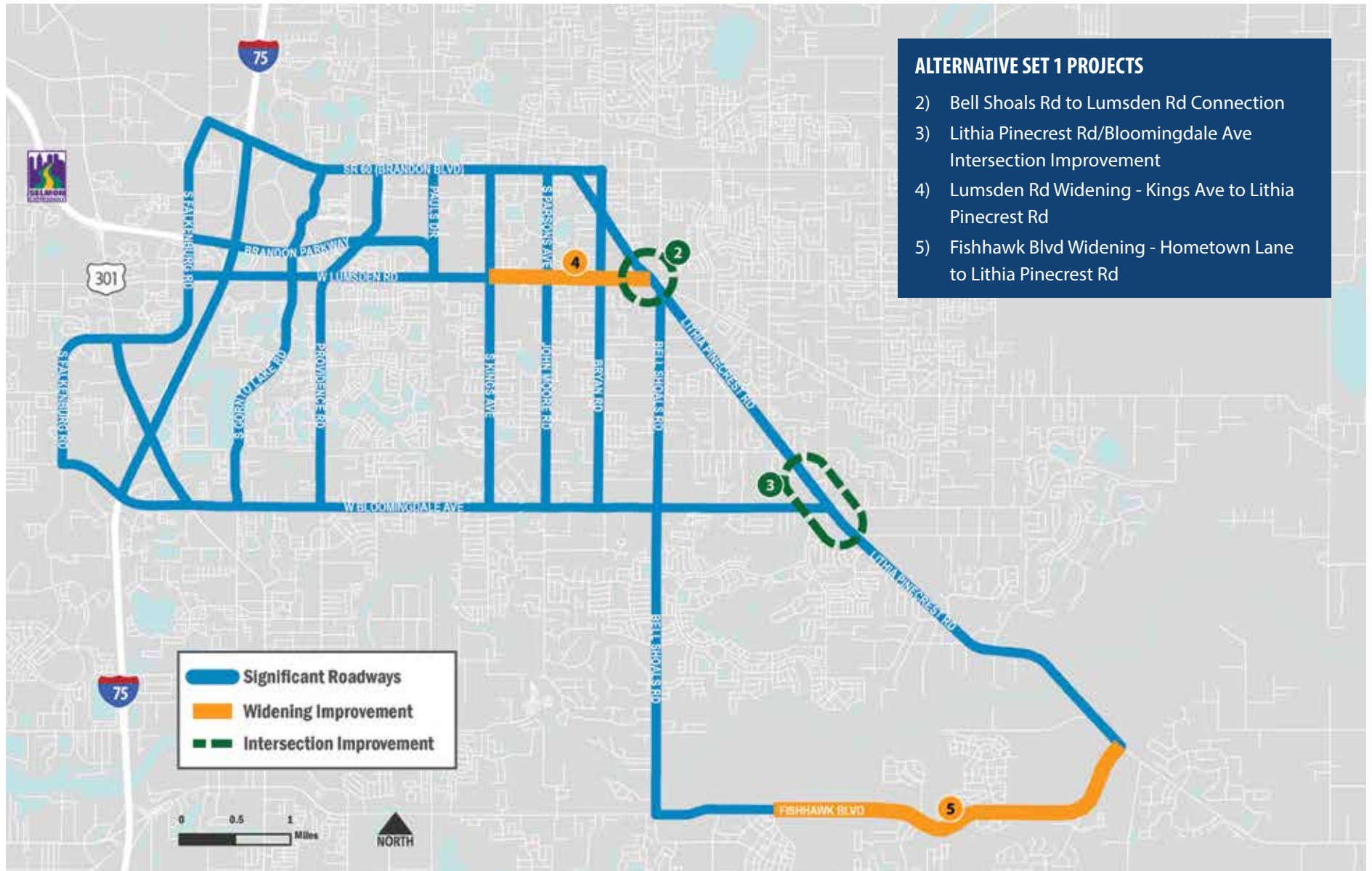
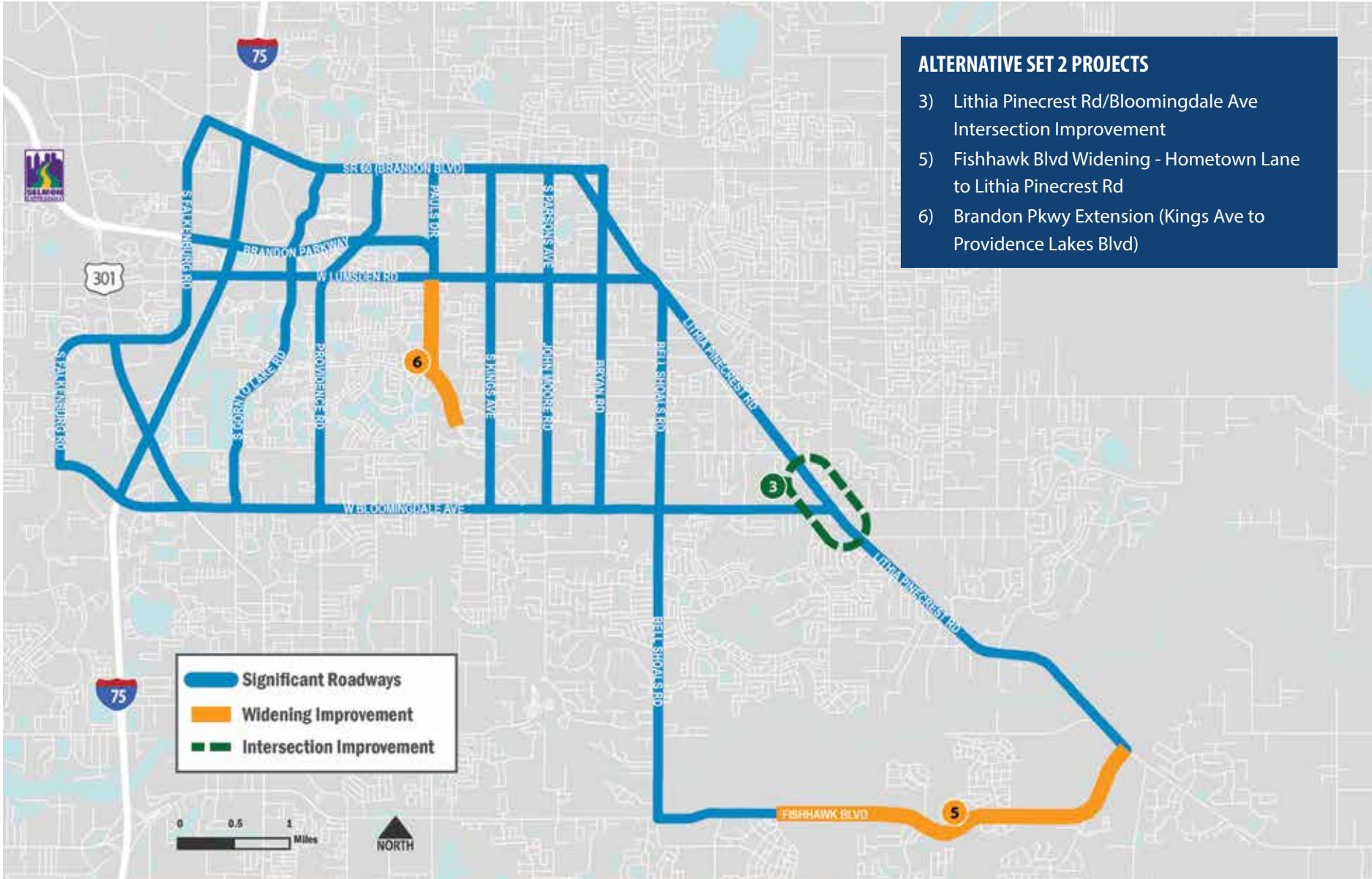


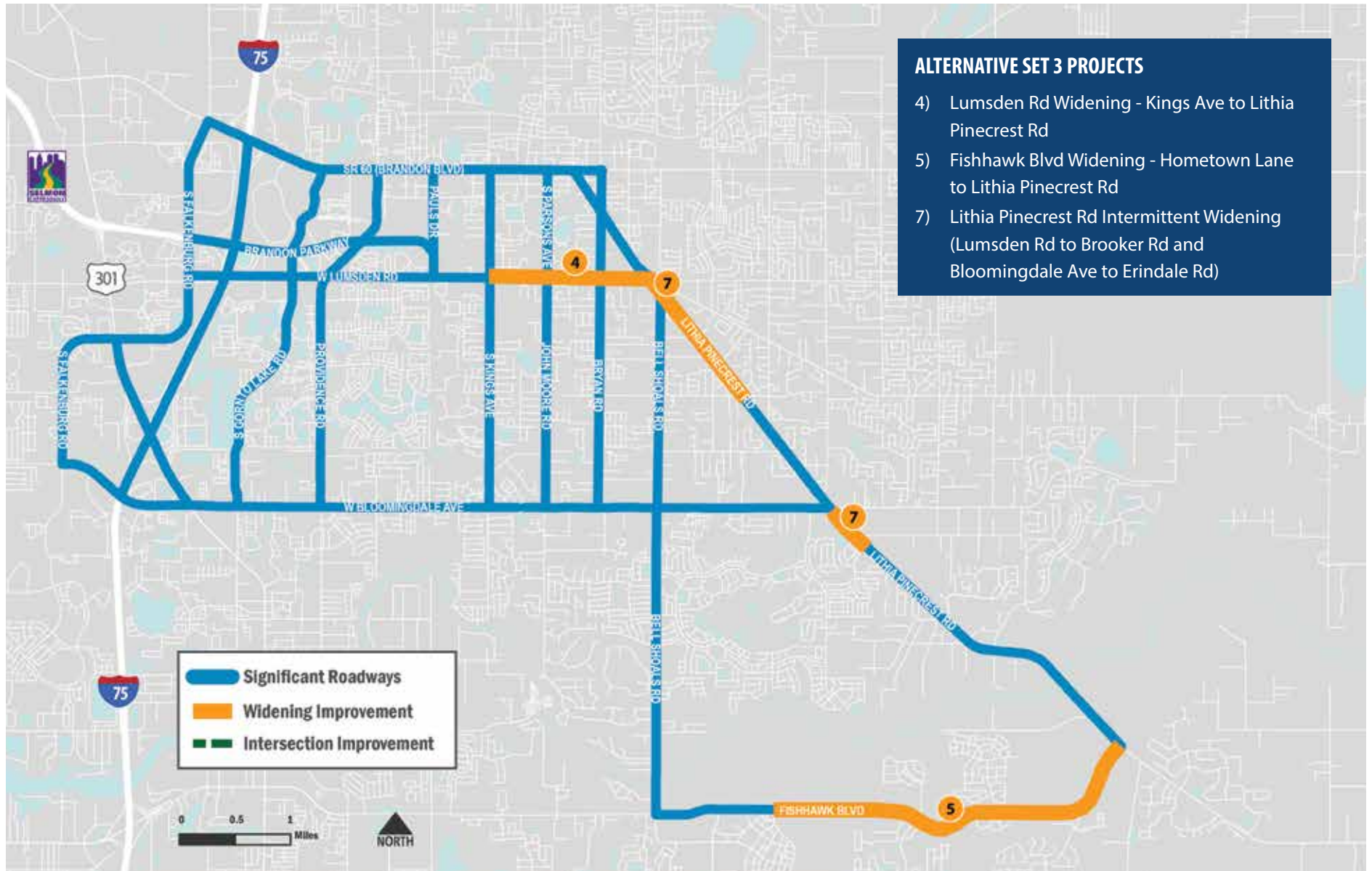


Figure 20. Alternative Set 2 Projects



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 21. Alternative Set 3 Projects



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 23. Alternative Set 5 Projects

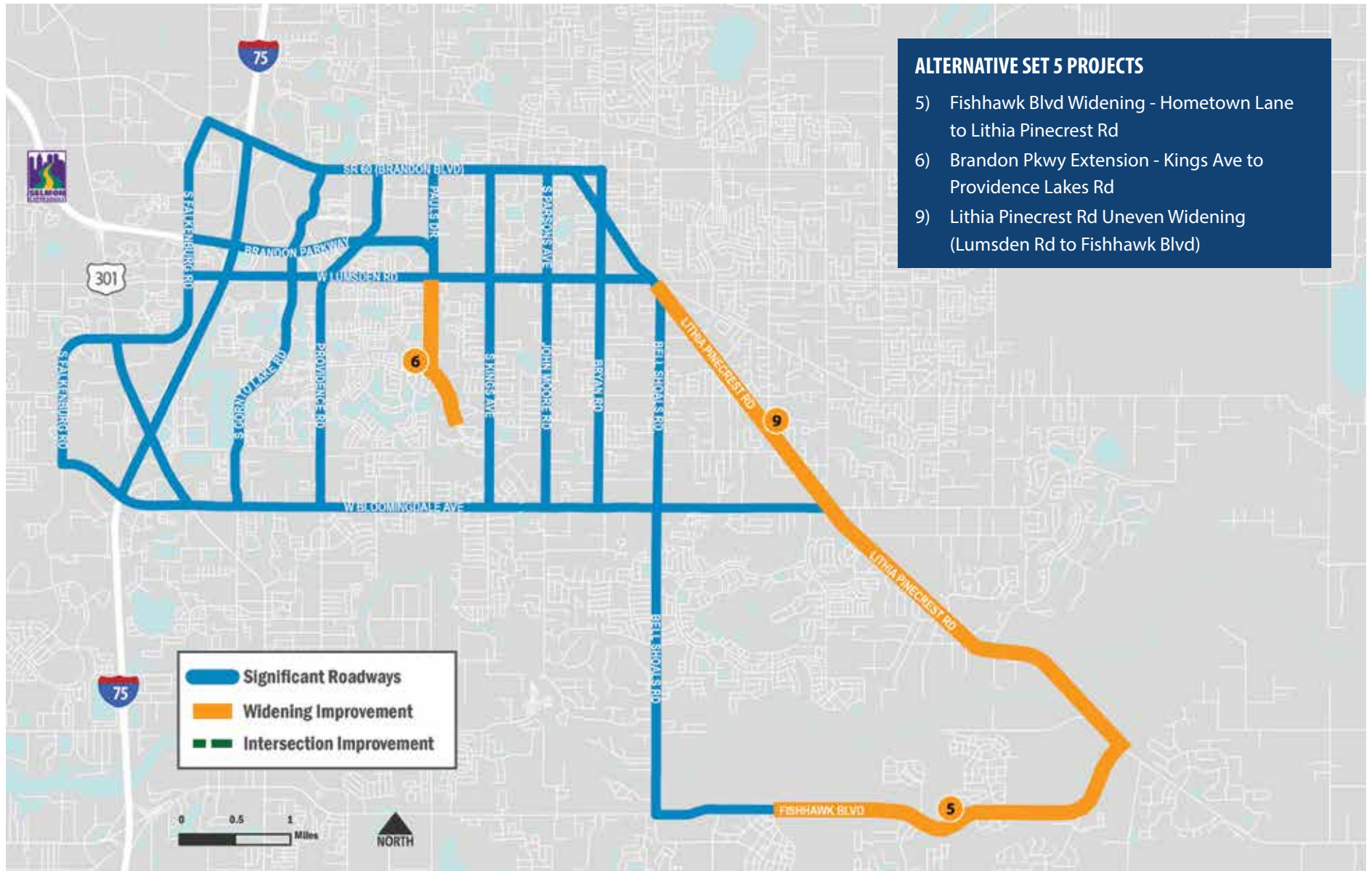
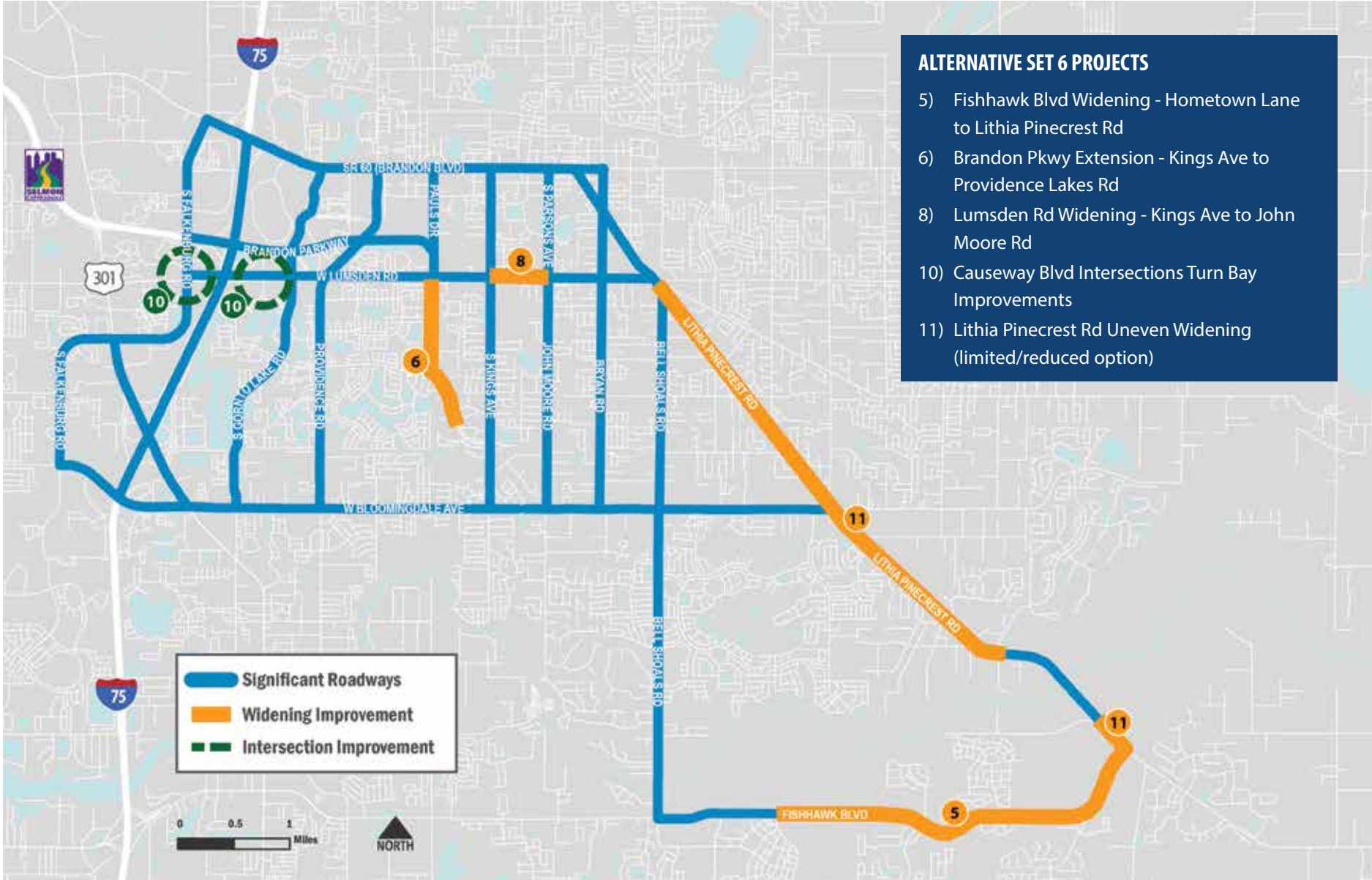




Figure 24. Alternative Set 6 Projects



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 25. Alternative Set 7 Projects

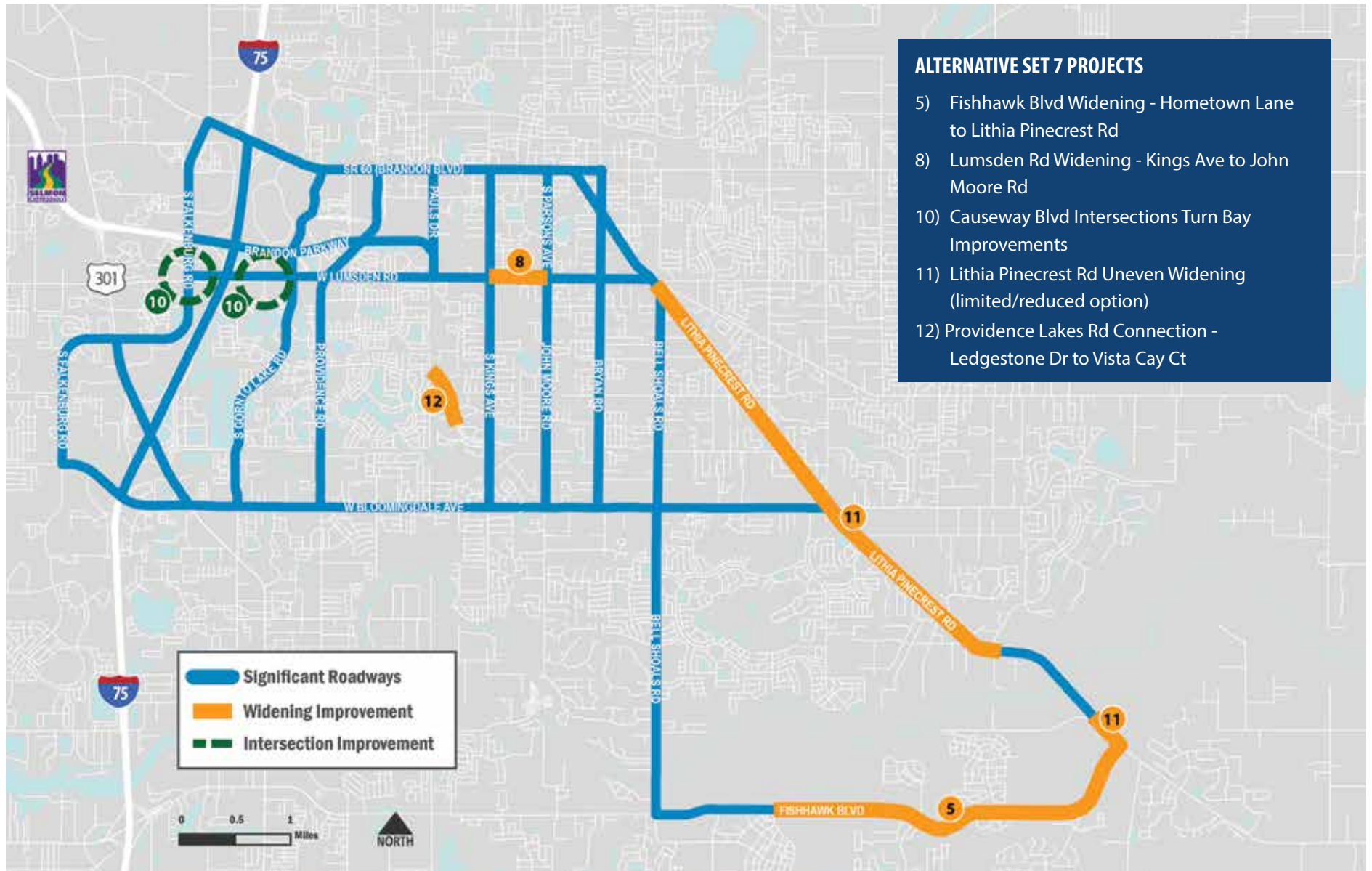
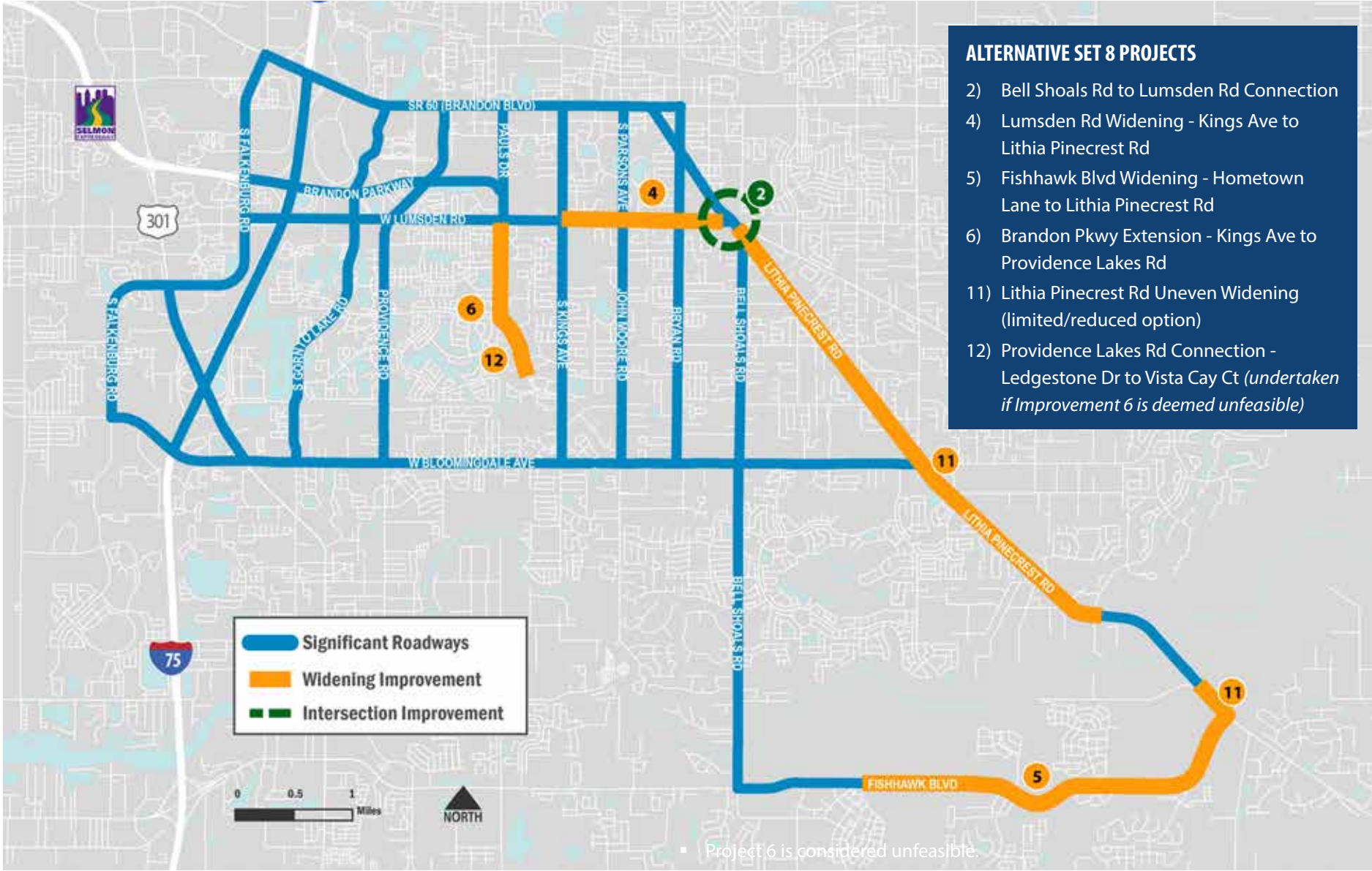




Figure 26. Alternative Set 8 Projects



4.3 Network Performance of Each Alternative Set

Similar to the analysis completed for the E+C Model, the volume to capacity (V/C) ratio was calculated for the AM and PM peak periods for E+C+LP Widening and each alternative. Results are shown in Figures 27 to 44. Table 4 provides a summary of the findings for each of the alternative

sets. Generally, the results show that individual projects included in all of the alternatives provide a benefit in some way, without causing a corresponding detriment on another roadway. In all alternatives during the AM peak period, Bloomingdale Avenue continues to be over congested in the westbound direction, but is not expected to get significantly worse or better under any alternative. Results for the recommended alternative are discussed in Section 5.

Table 4. Alternative Set Comparison Project Summary

Alt Set	Issues Addressed	Model Results
E+C+LP	Addresses congestion on Lithia Pinecrest Road by providing additional capacity.	Additional capacity on Lithia Pinecrest Road draws more traffic away from Fishhawk Boulevard and Bell Shoals Road, reducing congestion on these roadways. The widening also reduces congestion on Lithia Pinecrest Road, but pushes more traffic onto Lumsden Road and SR 60, causing these facilities to worsen.
Alternative Set 1	Addresses congestion on Lithia Pinecrest Road by providing an alternative connection to Lumsden Road, while addressing the congestion on Lumsden Road and Fishhawk Boulevard.	In the AM peak period, traffic is routed away from Lithia Pinecrest Road to Bell Shoals Road, due to the new connection to Lumsden Road. This reduces congestion on Lithia Pinecrest Road, but worsens conditions on Bell Shoals Road. Lumsden Road also sees an improvement due to the widening. In the PM peak period, the Lumsden Road widening continues to provide a benefit on this roadway, but the improved connection between Lumsden Road and Bell Shoals Road is not as pronounced; Lithia Pinecrest Road continues to be heavily congested in the PM.
Alternative Set 2	Provides an additional north-south roadway connection to Brandon Parkway and a new east-west connection between Kings Avenue and Providence Road. Also addresses congestion on Fishhawk Boulevard.	Vehicles utilize the new Brandon Parkway extension in both the AM and PM peak periods, however, there is not a substantial shift in traffic to this new roadway away from Lithia Pinecrest Road to make a significantly noticeable overall benefit to the network.
Alternative Set 3	Addresses congestion on Lumsden Road and Fishhawk Boulevard with the use of full corridor widening. Lithia Pinecrest Road congestion is addressed through the use of intermittent widening.	In the both the AM and PM peak periods, Lithia Pinecrest Road sees mild congestion relief north of Bloomingdale Avenue, while Lumsden Road sees congestion reduction. Lithia Pinecrest Road south of Bloomingdale Avenue, along with other major roadways in the network see virtually no change in operations.
Alternative Set 4	Addresses Fishhawk Boulevard with full widening and Lumsden Road with partial widening. Lithia Pinecrest Road congestion is addressed through the use of intermittent widening.	In both the AM and PM peak periods, vehicles are rerouted to Bloomingdale Avenue from Lithia Pinecrest Road to reach John Moore Road and ultimately the widened portion of Lumsden Road. This rerouting results in some congestion relief on Lithia Pinecrest Road, without significantly impacting Bloomingdale Avenue.



Table 4. (cont.) Alternative Set Comparison Project Summary

Alt Set	Issues Addressed	Model Results
Alternative Set 5	Provides an additional north-south roadway connection to Brandon Parkway and a new east-west connection between Kings Avenue and Providence Road. Also addresses congestion on Fishhawk Boulevard. Lithia Pinecrest Road congestion is addressed through the use of uneven widening.	In the AM peak period, the northbound widening of Lithia Pinecrest allows for improved conditions south of Bloomingdale. There is a large drop off of vehicles onto Bloomingdale Avenue to access US 301 and the new Brandon Parkway Extension. This does not cause a significant worsening of operations on Bloomingdale Avenue. In the PM peak period, vehicles exiting the Selmon Expressway can use either the new Brandon Parkway Extension or the new southbound widening of Lithia Pinecrest Road. This helps split the southbound PM traffic onto two viable routes, so Lumsden is not worsened by vehicles attracted to the Lithia Pinecrest widening.
Alternative Set 6	Addresses Fishhawk Boulevard with full widening and Lumsden Road with partial widening. Lithia Pinecrest Road congestion is addressed through the use of a refined uneven widening. In addition, the Brandon Pkwy Extension provides a new north-south connection in the network, along with a new east-west connection between Kings Avenue and Providence Road.	This Alternative Set sees similar operations as Alternative Set 5 with the exception that due to the Lumsden Road widening from Kings Avenue to John Moore Road, vehicles now utilize these two north-south roadways, slightly improving conditions on Lumsden Road and Lithia Pinecrest Road.
Alternative Set 7	Addresses Fishhawk Boulevard with full widening and Lumsden Road with partial widening. Lithia Pinecrest Road congestion is addressed through the use of a refined uneven widening. In addition, provides a new east-west connection between Kings Avenue and Providence Road.	This Alternative Set is similar to Alternative Set 6, but removes the Brandon Parkway Extension. This makes vehicles less attracted to Bloomingdale Avenue and instead more likely to use Lithia Pinecrest Road or other north-south roadways. Overall, Lumsden Road and Lithia Pinecrest see improved operations.
Alternative Set 8	Addresses Fishhawk Boulevard and Lumsden Road with full widening. Lithia Pinecrest Road congestion is addressed through the use of a refined uneven widening, as well as providing an alternative connection to Lumsden via Bell Shoals. In addition, the Brandon Parkway Extension provides a new north-south connection in the network, along with a new east-west connection between Kings Avenue and Providence Road.	In the AM peak period, northwestbound traffic is separated onto three viable paths, Lithia Pinecrest Road through the uneven widening, Bell Shoals Road via the connection to Lumsden Road, and the Brandon Parkway Extension with access to the Selmon Expressway or Lumsden Road. These alternative routes help to balance traffic among the major roadways, without overburdening any one particular roadway. In the PM peak period, these same three routes are available to drivers heading southeast, which helps to evenly balance vehicles throughout the system. Lithia Pinecrest continues to be a major route choice in the PM peak period, which causes it to become overcongested in the southbound direction in the PM peak period, due to the uneven widening ending at the bridge over the Alafia River.

LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 27. Existing + Committed + Lithia Pinecrest Road Widening Volume to Capacity (V/C) Ratio, AM Peak

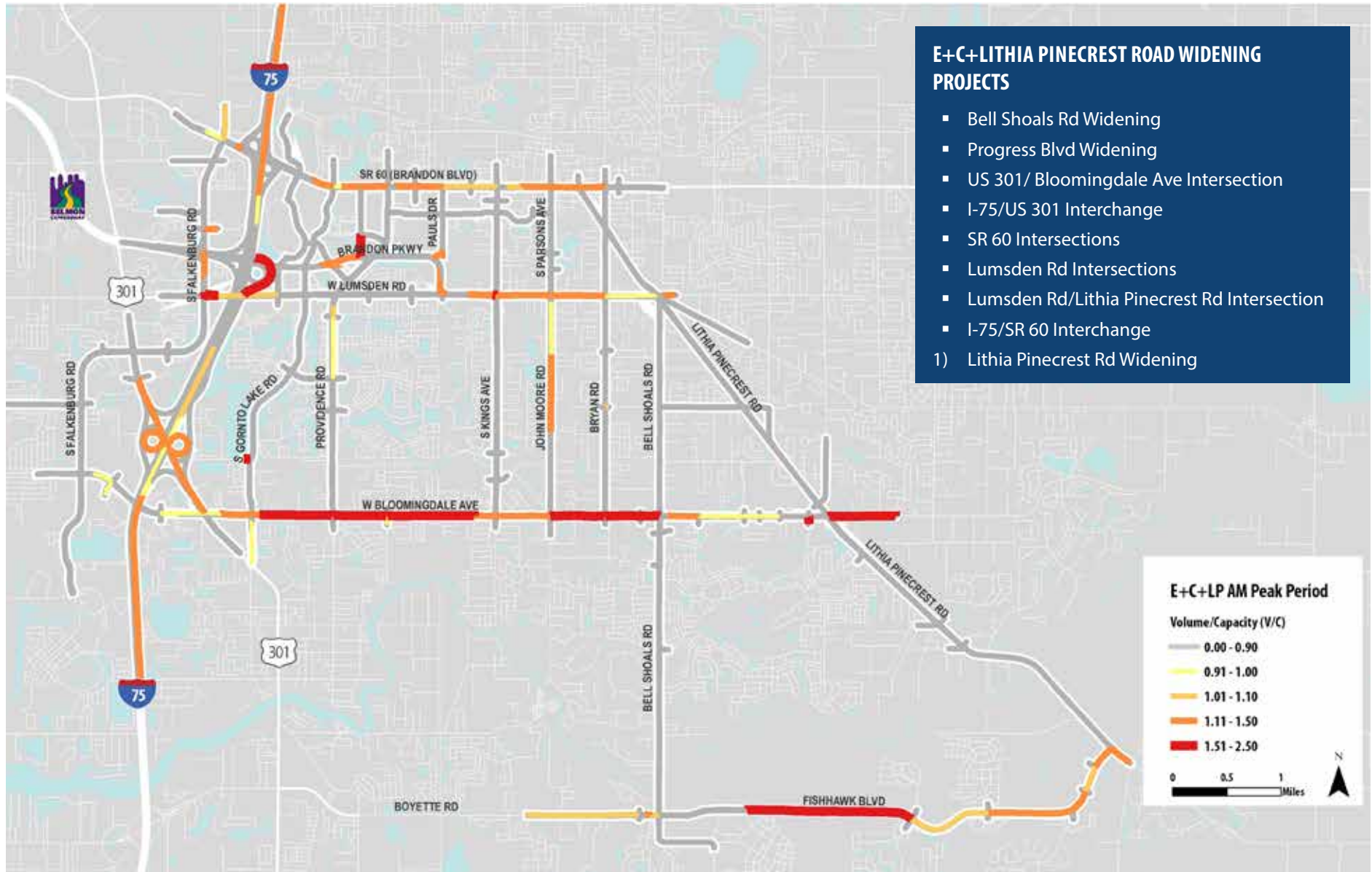
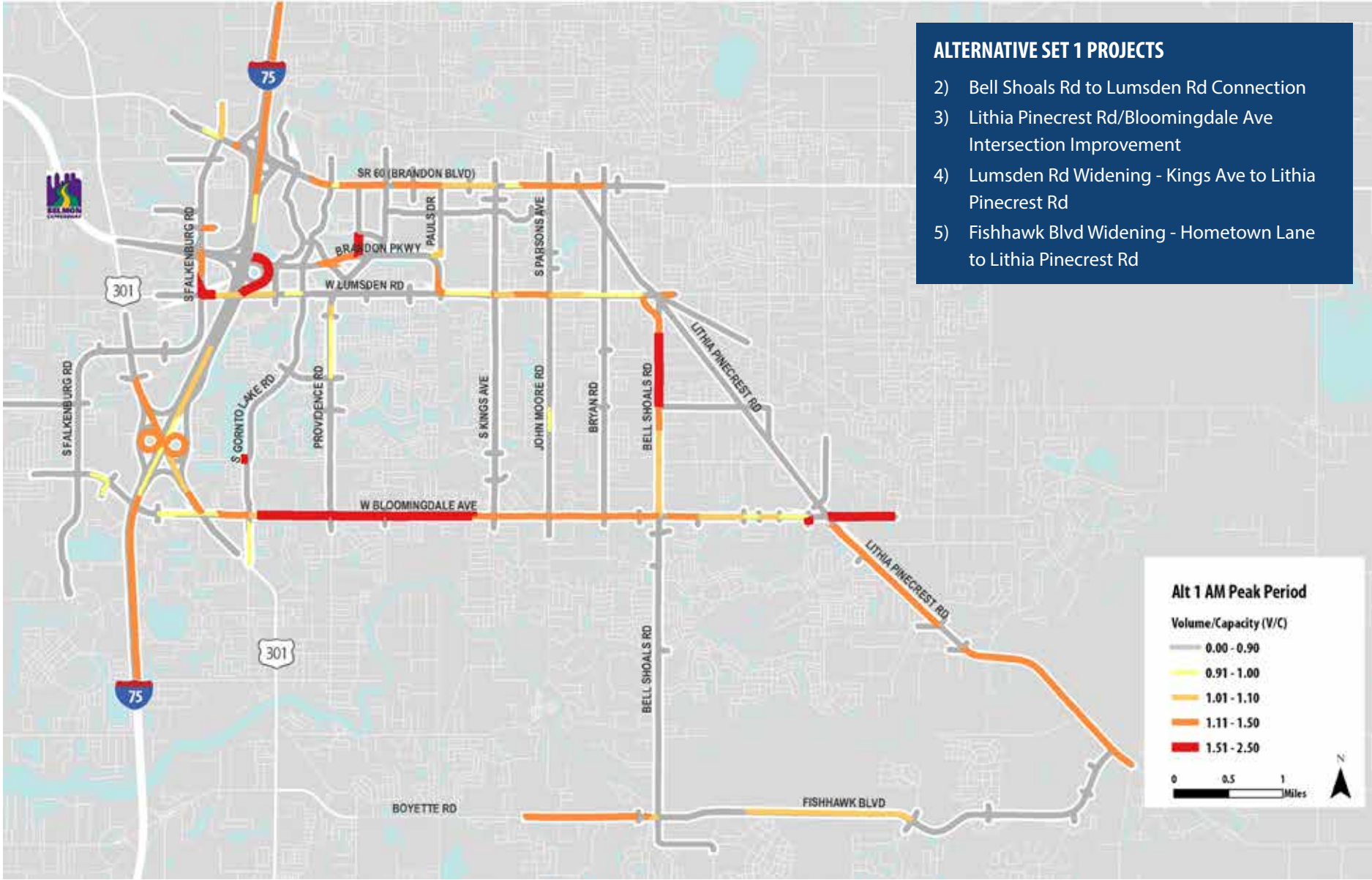




Figure 28. Alternative Set 1 Volume to Capacity (V/C) Ratio, AM Peak



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 29. Alternative Set 2 Volume to Capacity (V/C) Ratio, AM Peak

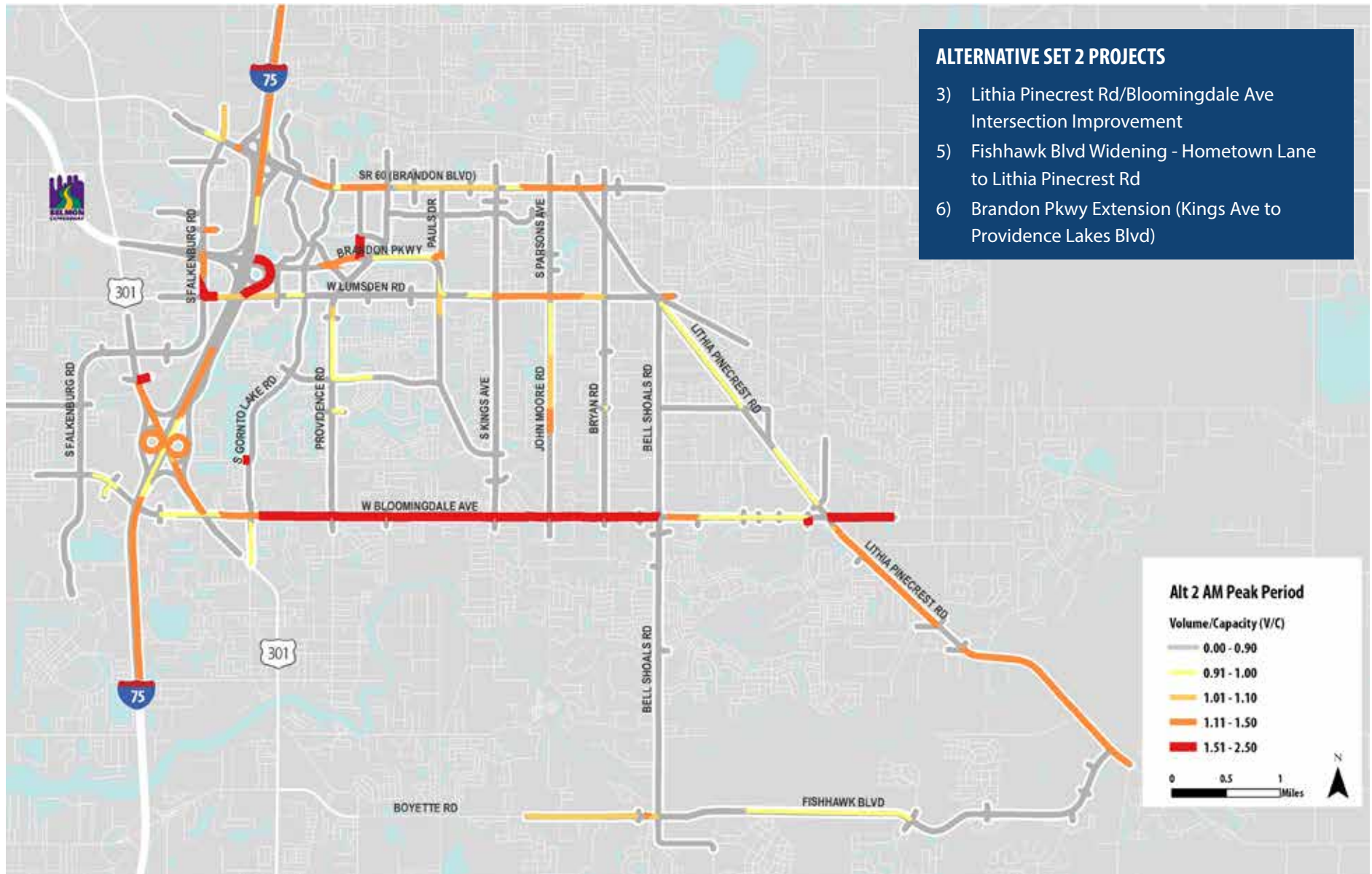
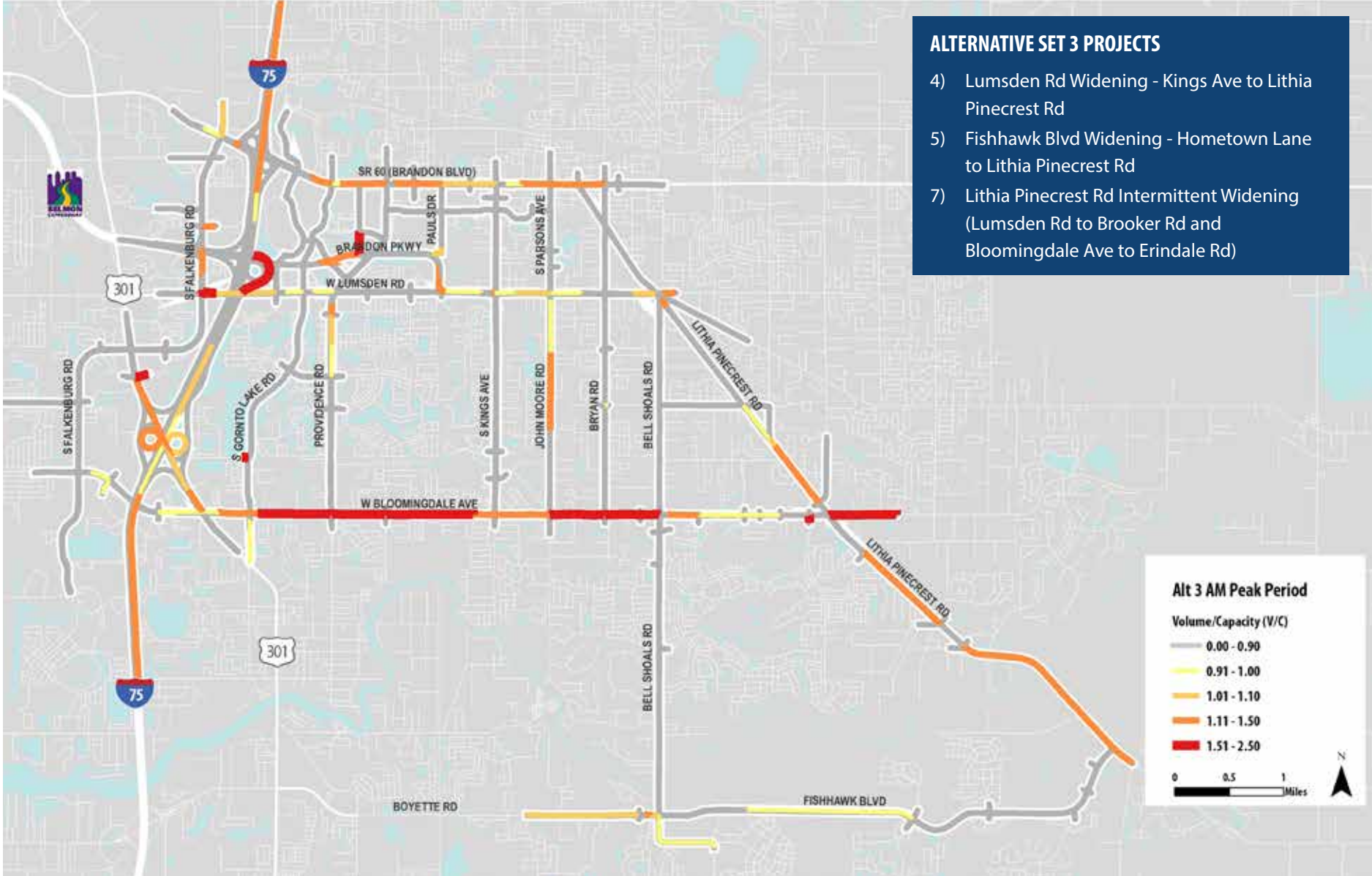




Figure 30. Alternative Set 3 Volume to Capacity (V/C) Ratio, AM Peak



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 31. Alternative Set 4 Volume to Capacity (V/C) Ratio, AM Peak

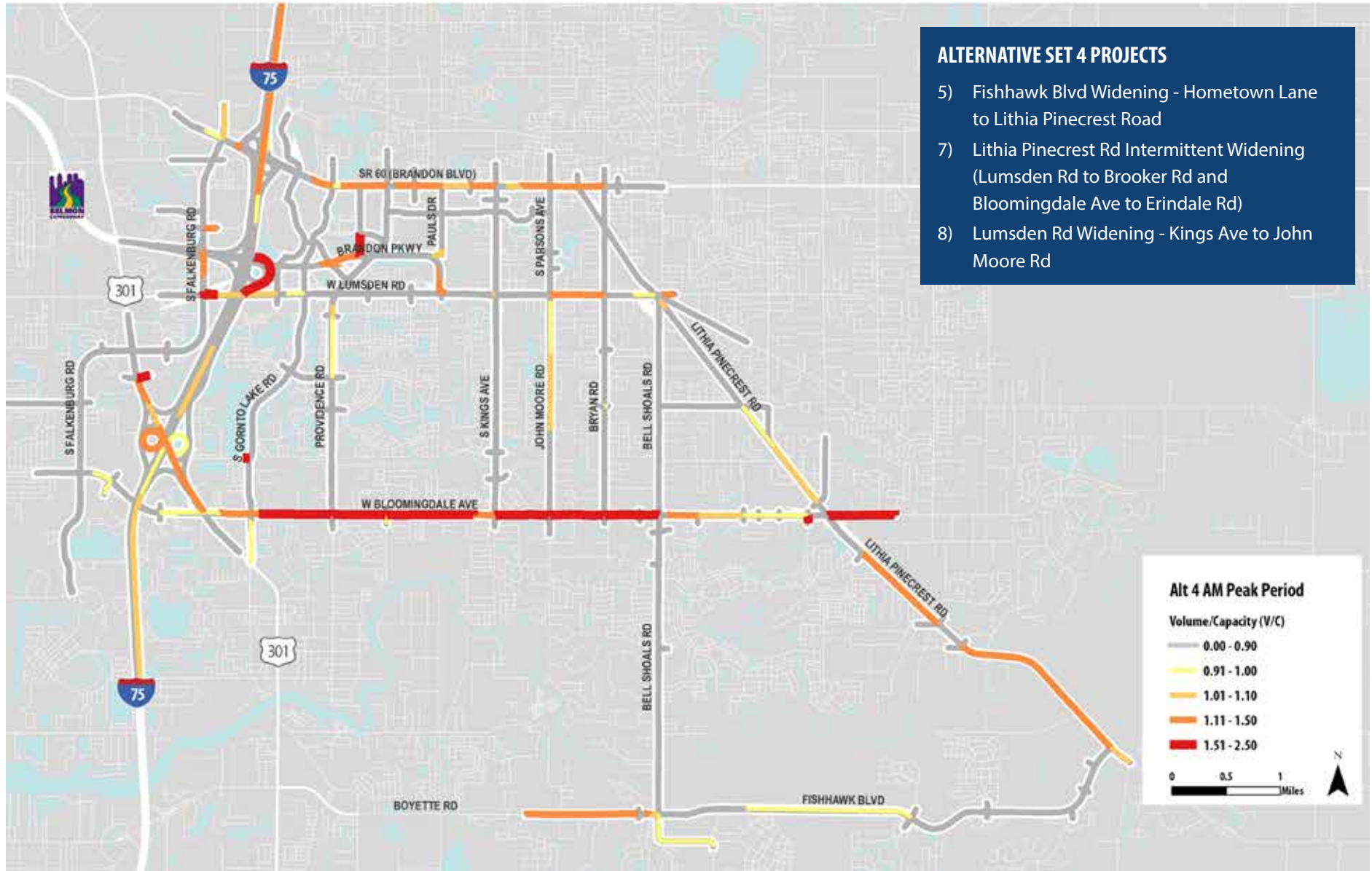
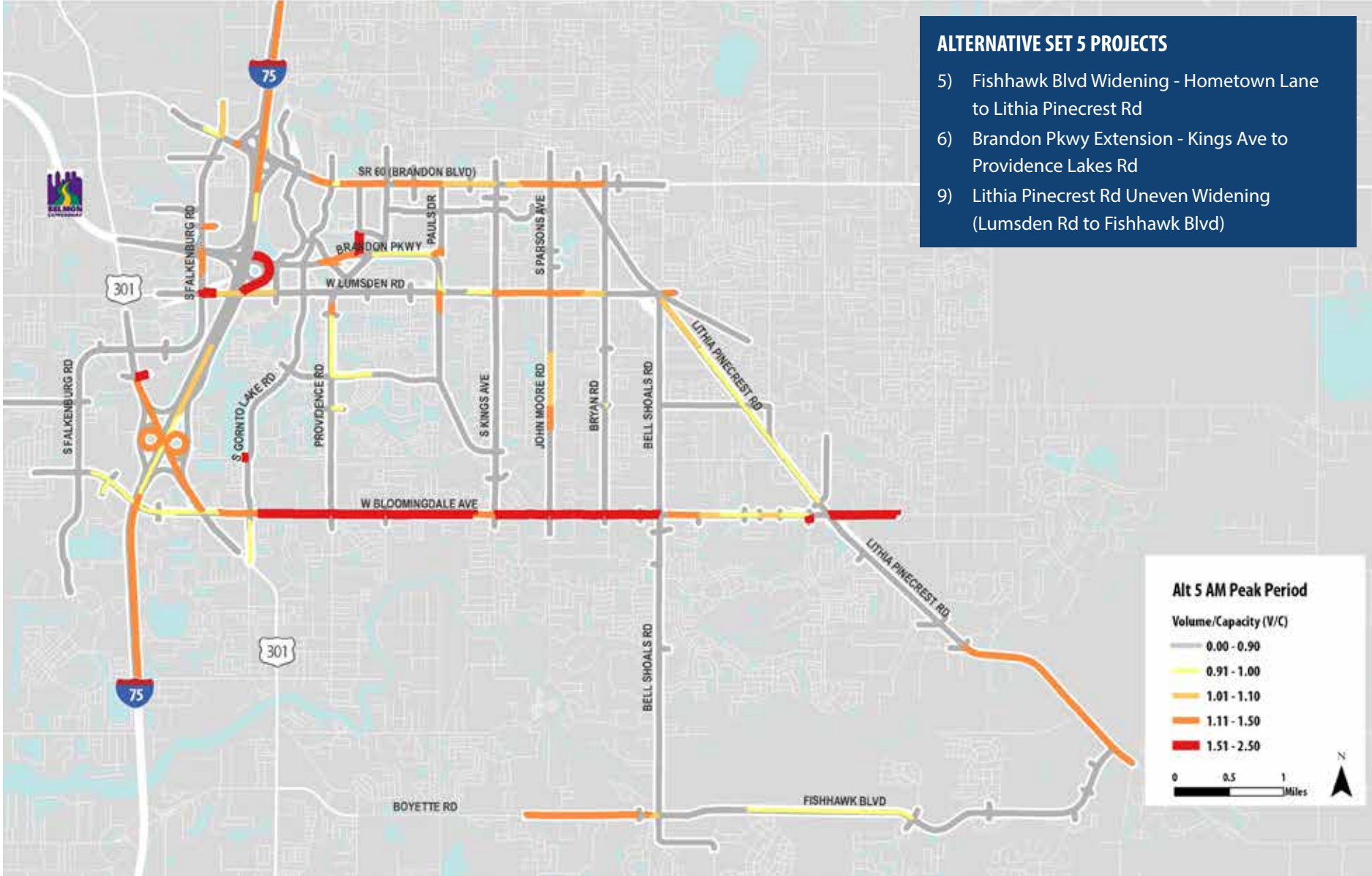




Figure 32. Alternative Set 5 Volume to Capacity (V/C) Ratio, AM Peak



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 33. Alternative Set 6 Volume to Capacity (V/C) Ratio, AM Peak

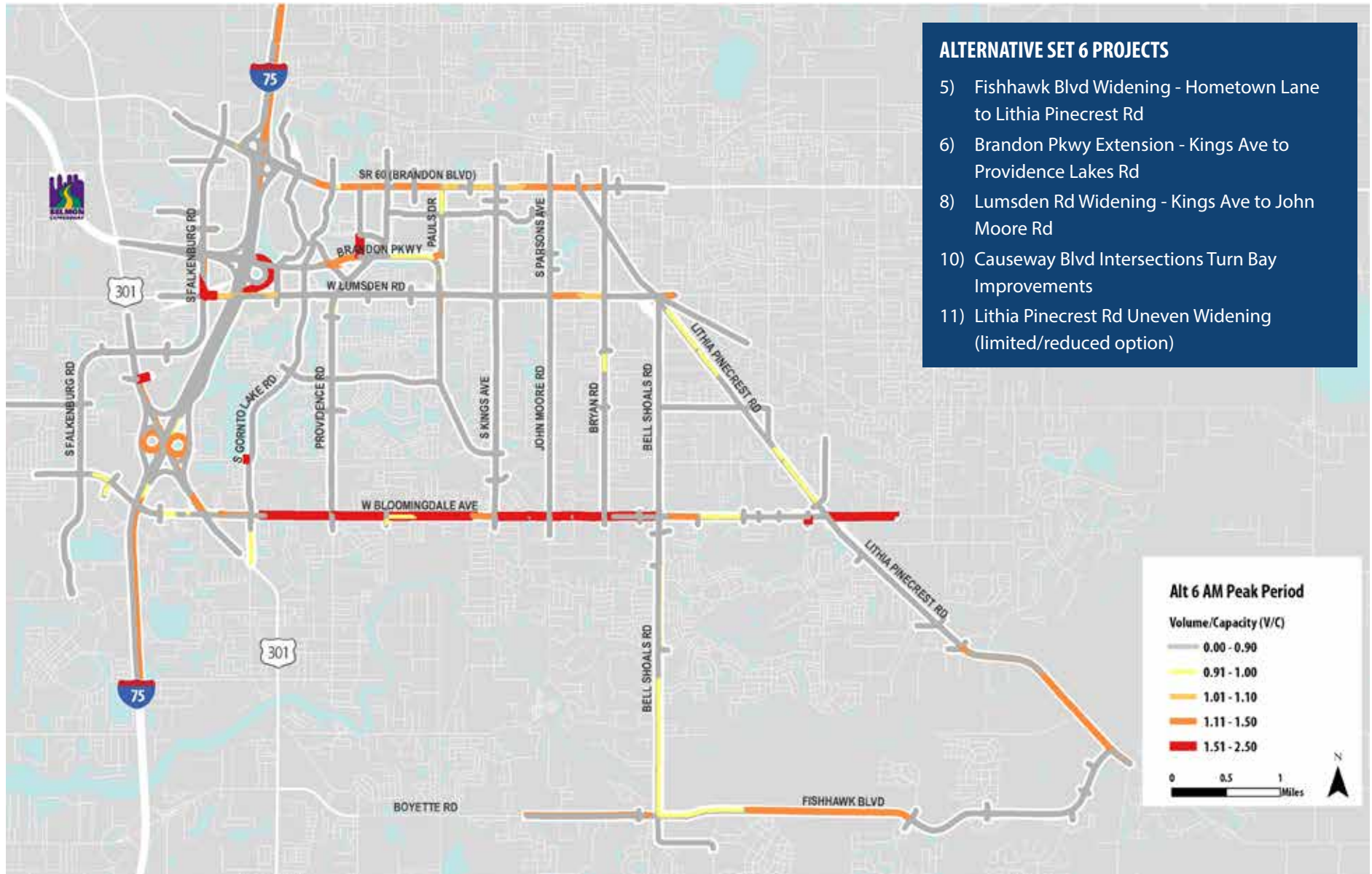
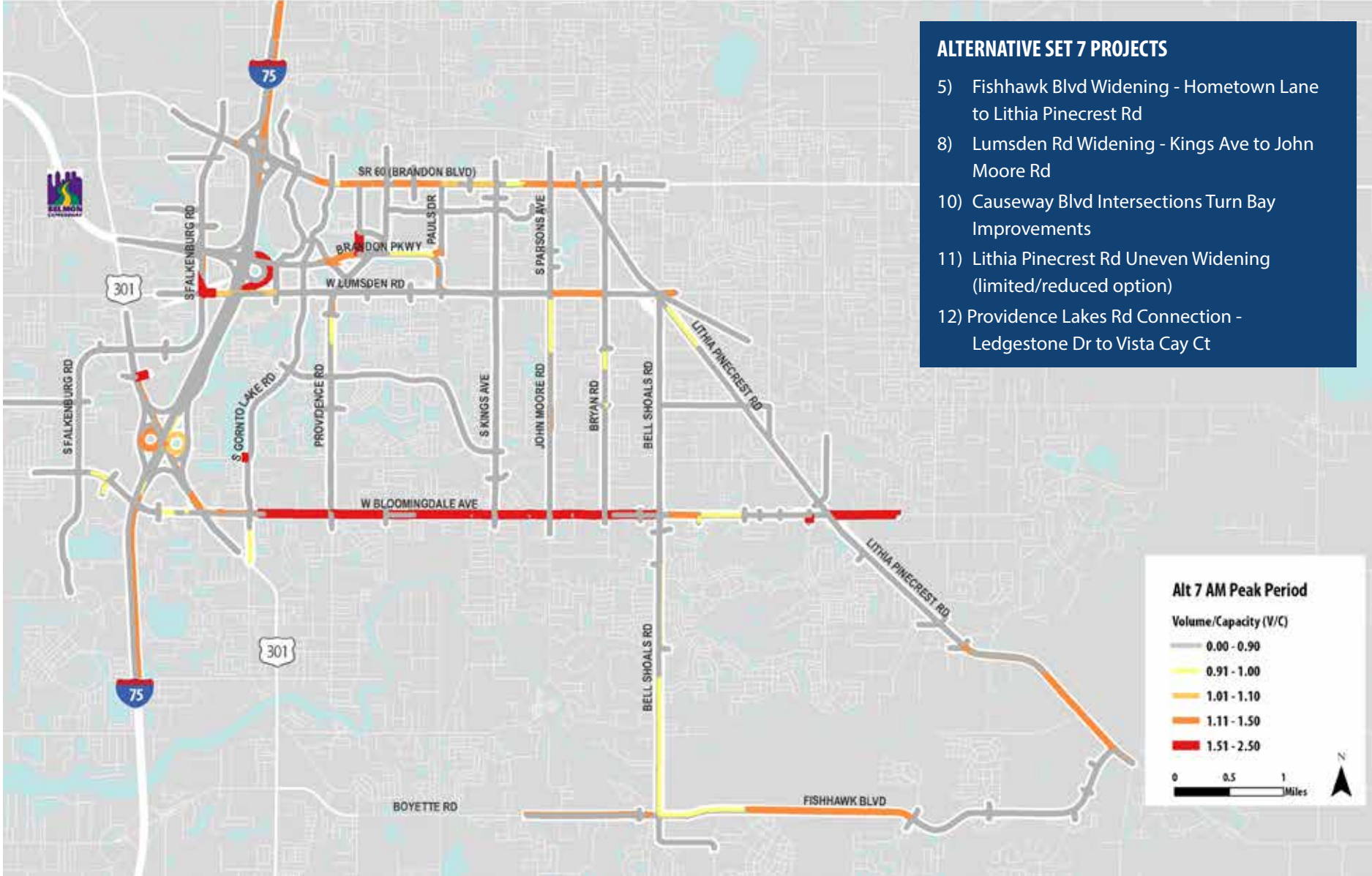




Figure 34. Alternative Set 7 Volume to Capacity (V/C) Ratio, AM Peak



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 35. Alternative Set 8 Volume to Capacity (V/C) Ratio, AM Peak

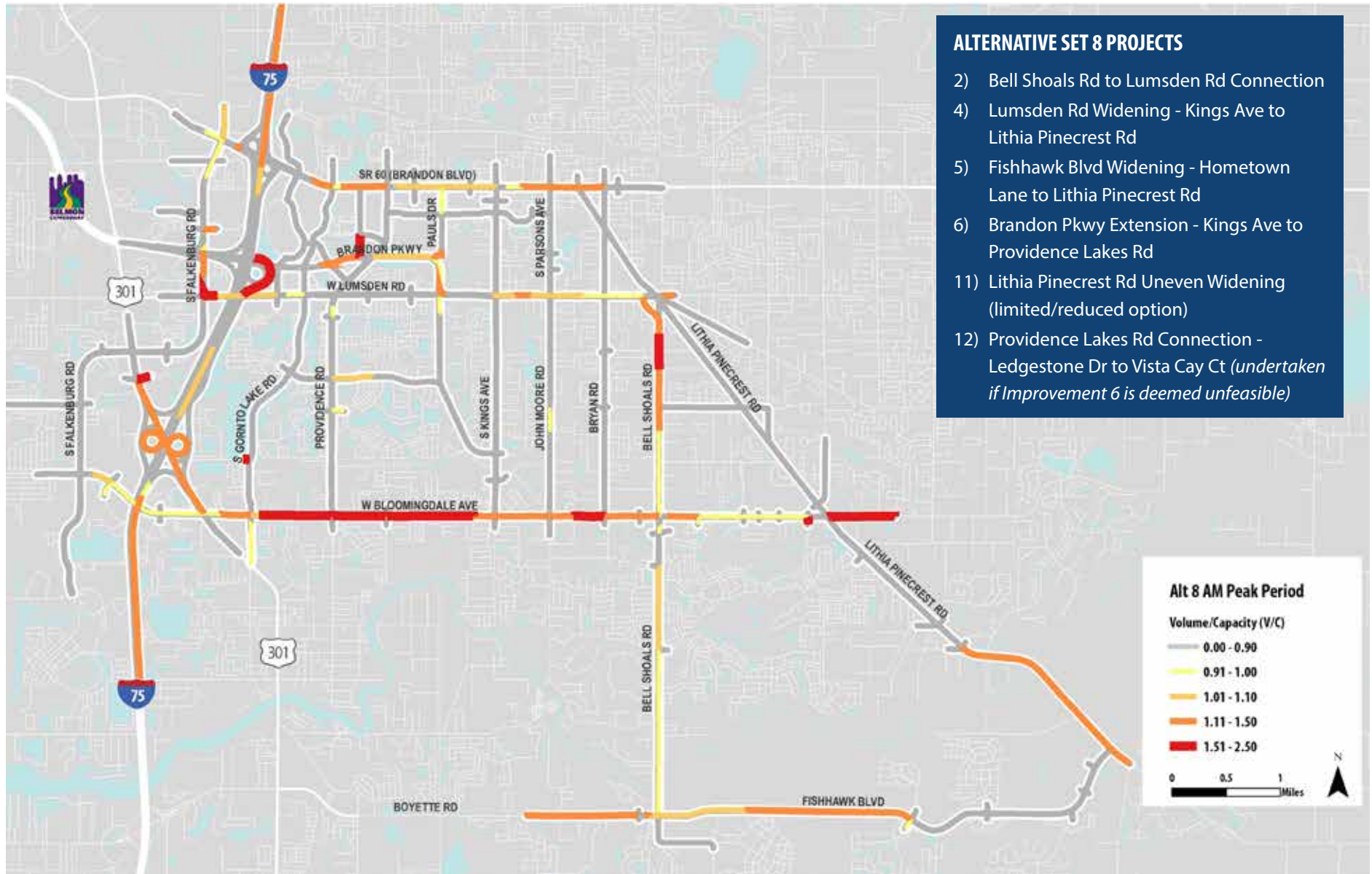
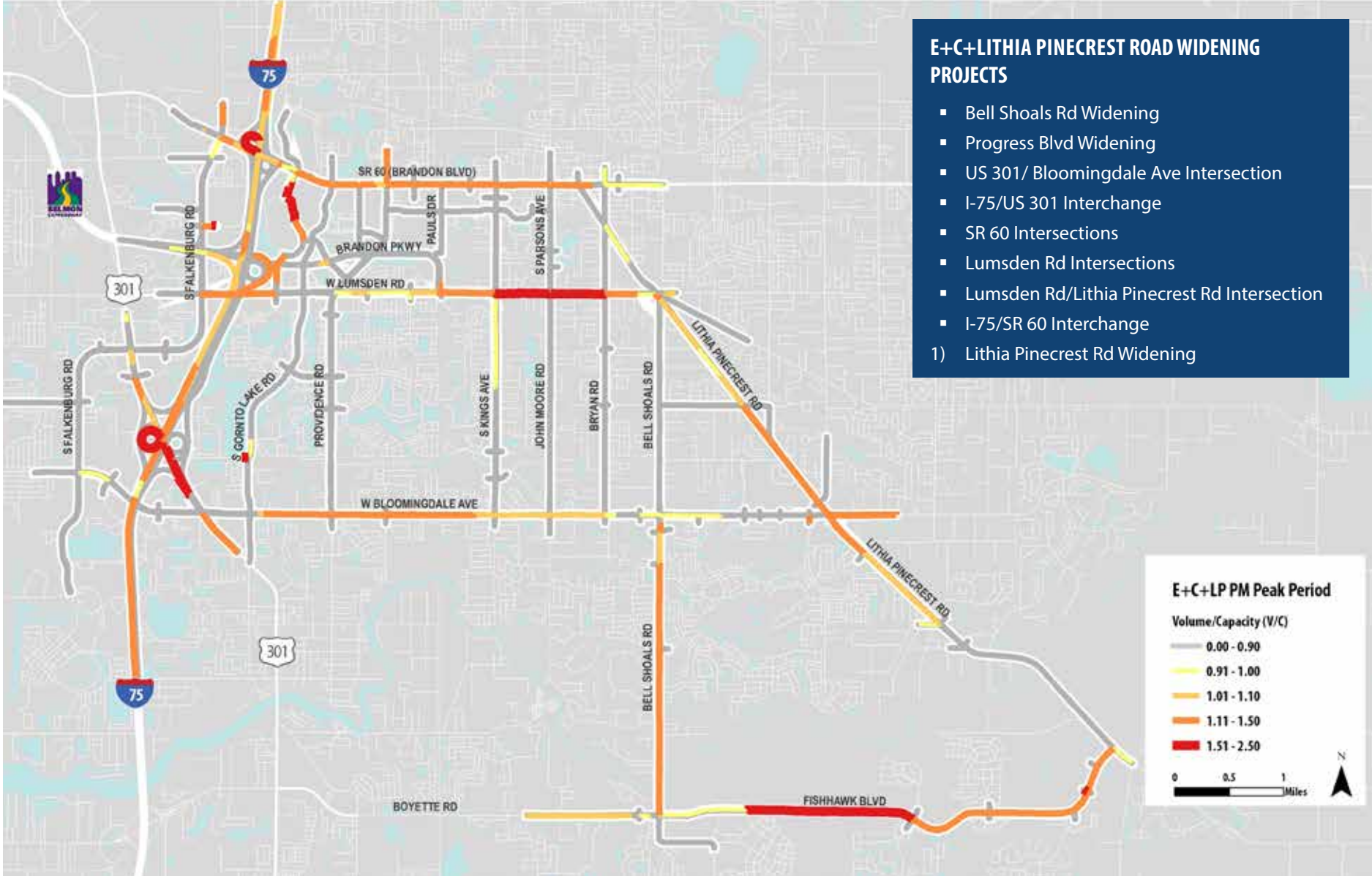




Figure 36. Existing + Committed + Lithia Pinecrest Road Widening Volume to Capacity (V/C) Ratio, PM Peak



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 37. Alternative Set 1 Volume to Capacity (V/C) Ratio, PM Peak

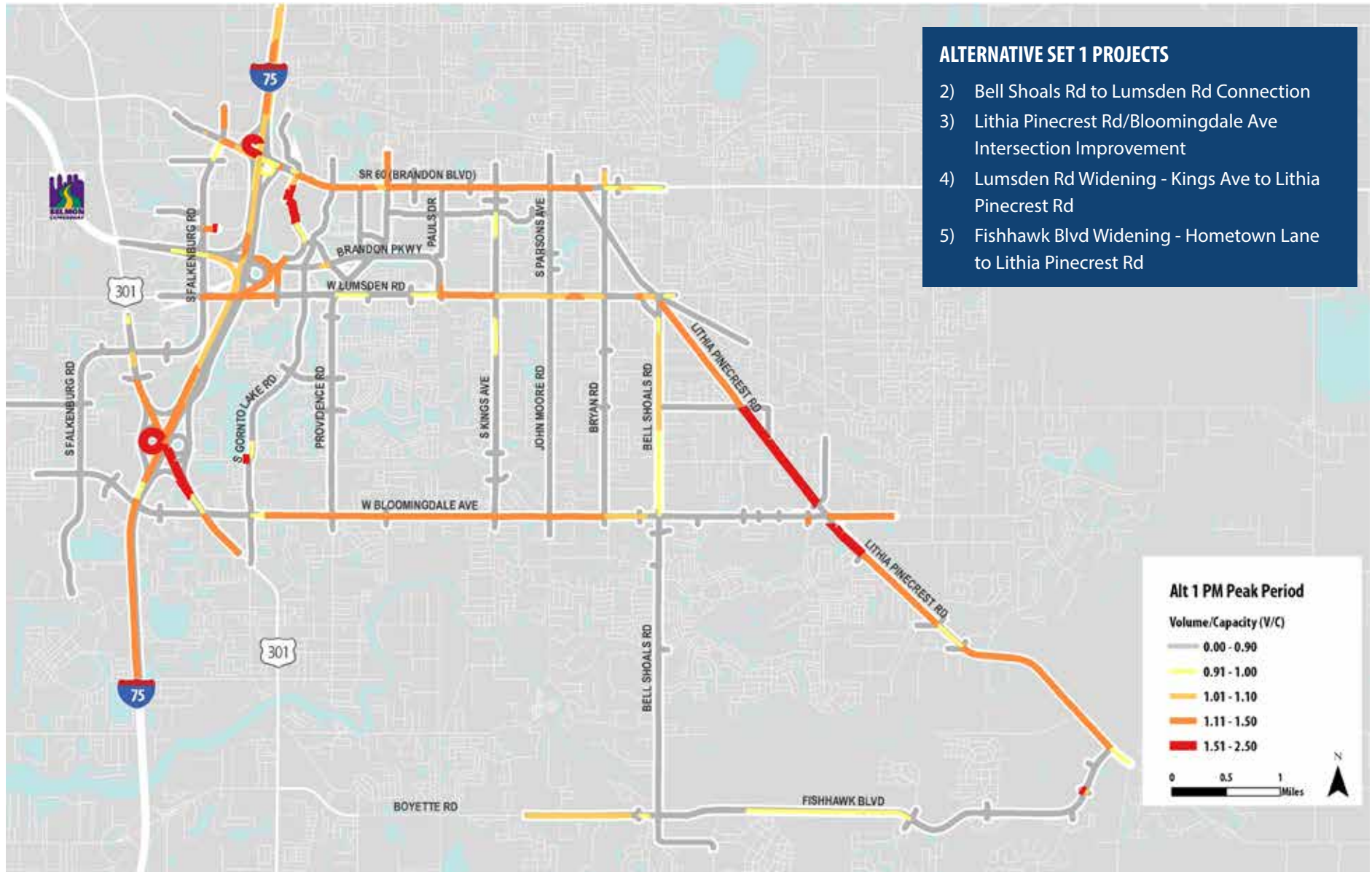




Figure 38. Alternative Set 2 Volume to Capacity (V/C) Ratio, PM Peak

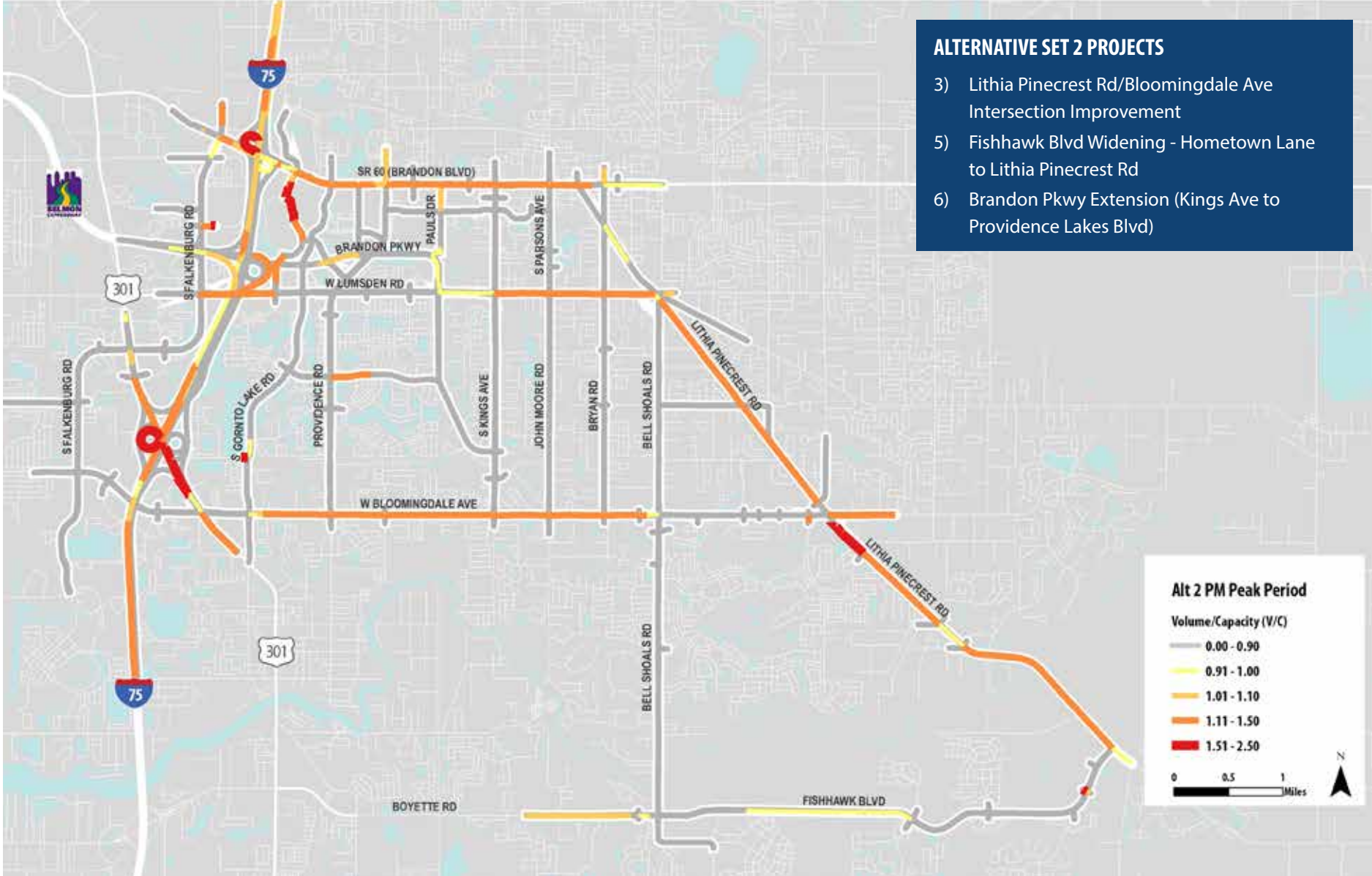


Figure 39. Alternative Set 3 Volume to Capacity (V/C) Ratio, PM Peak

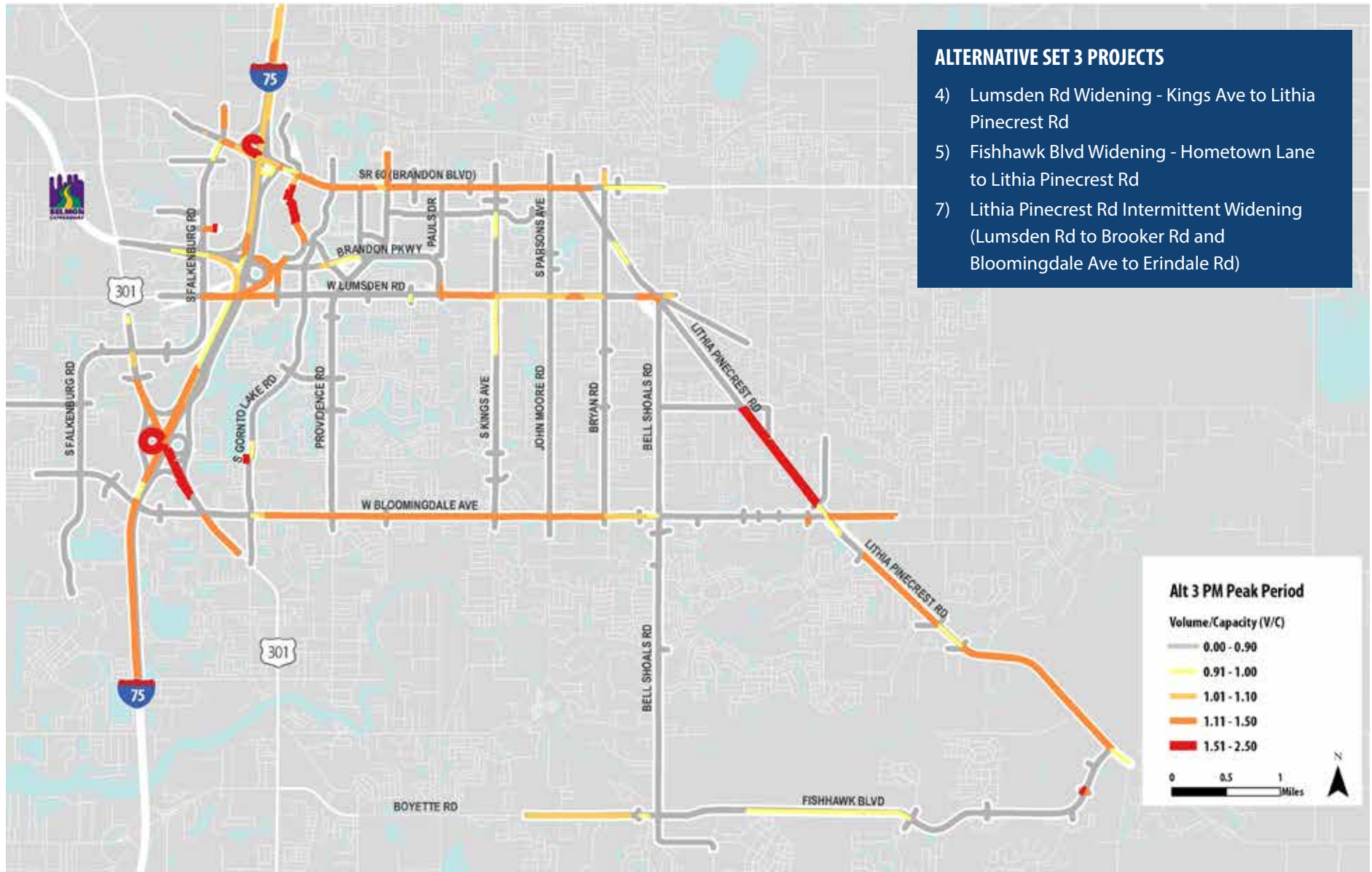
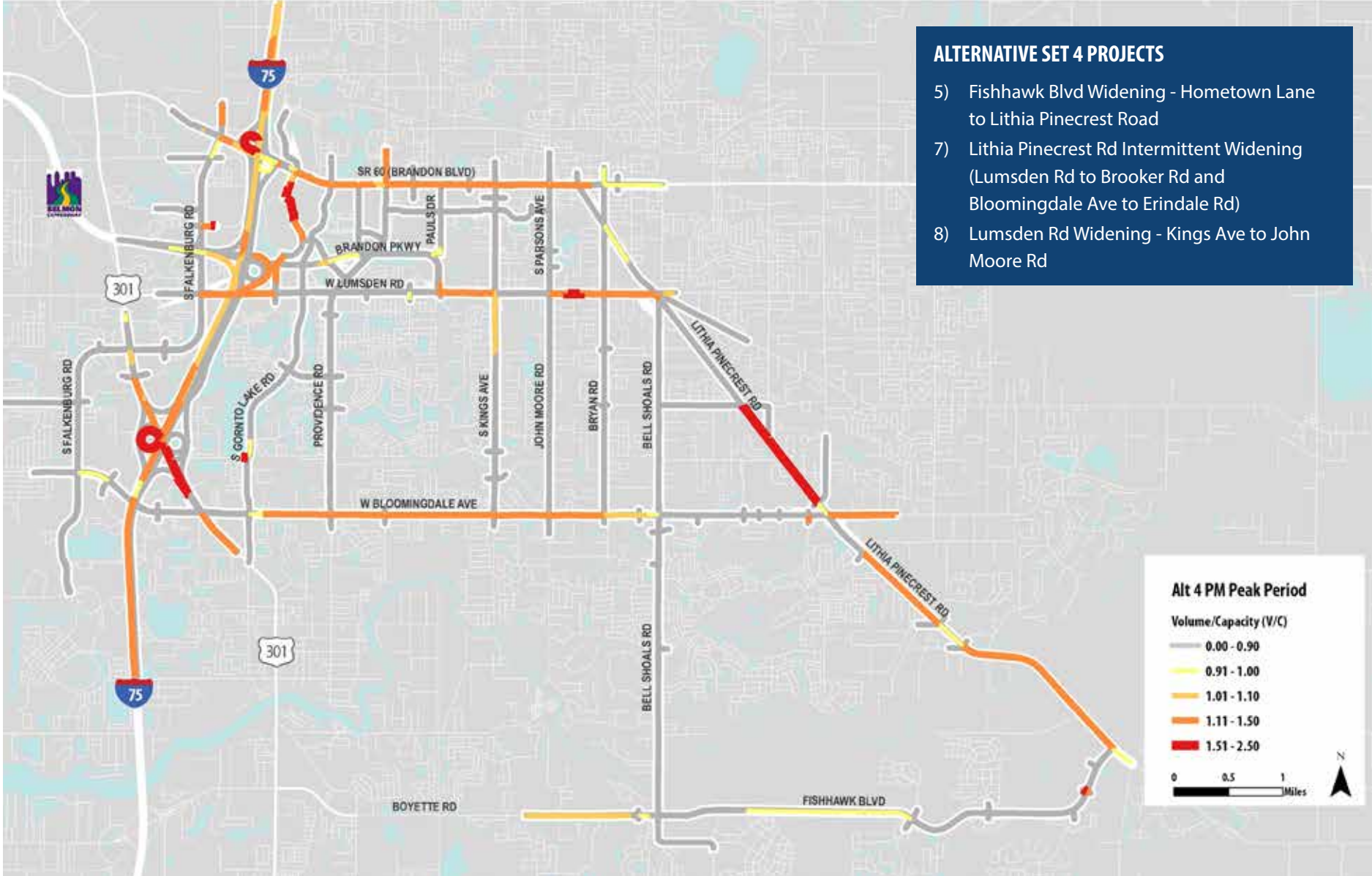




Figure 40. Alternative Set 4 Volume to Capacity (V/C) Ratio, PM Peak



LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 41. Alternative Set 5 Volume to Capacity (V/C) Ratio, PM Peak

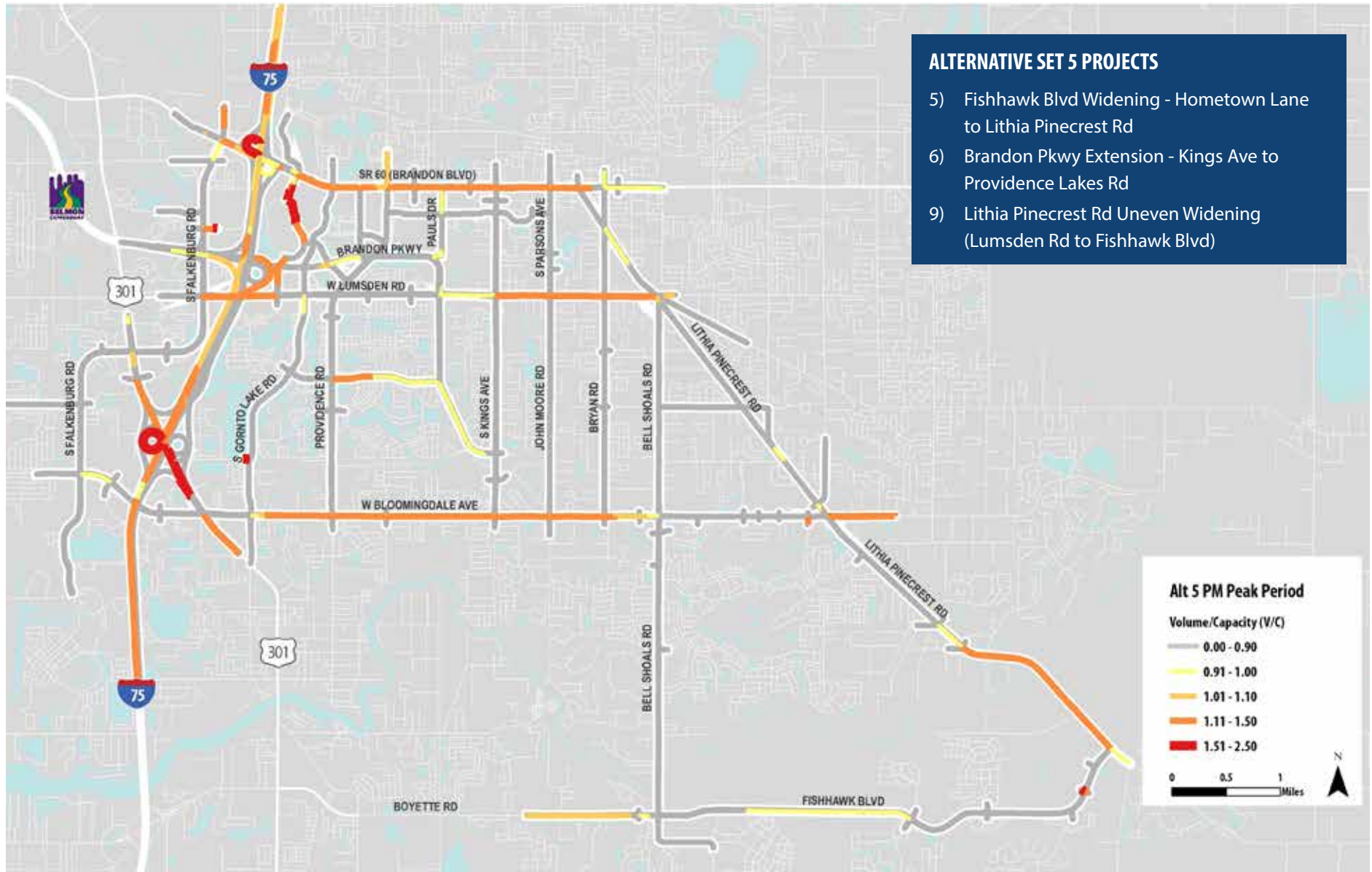




Figure 42. Alternative Set 6 Volume to Capacity (V/C) Ratio, PM Peak

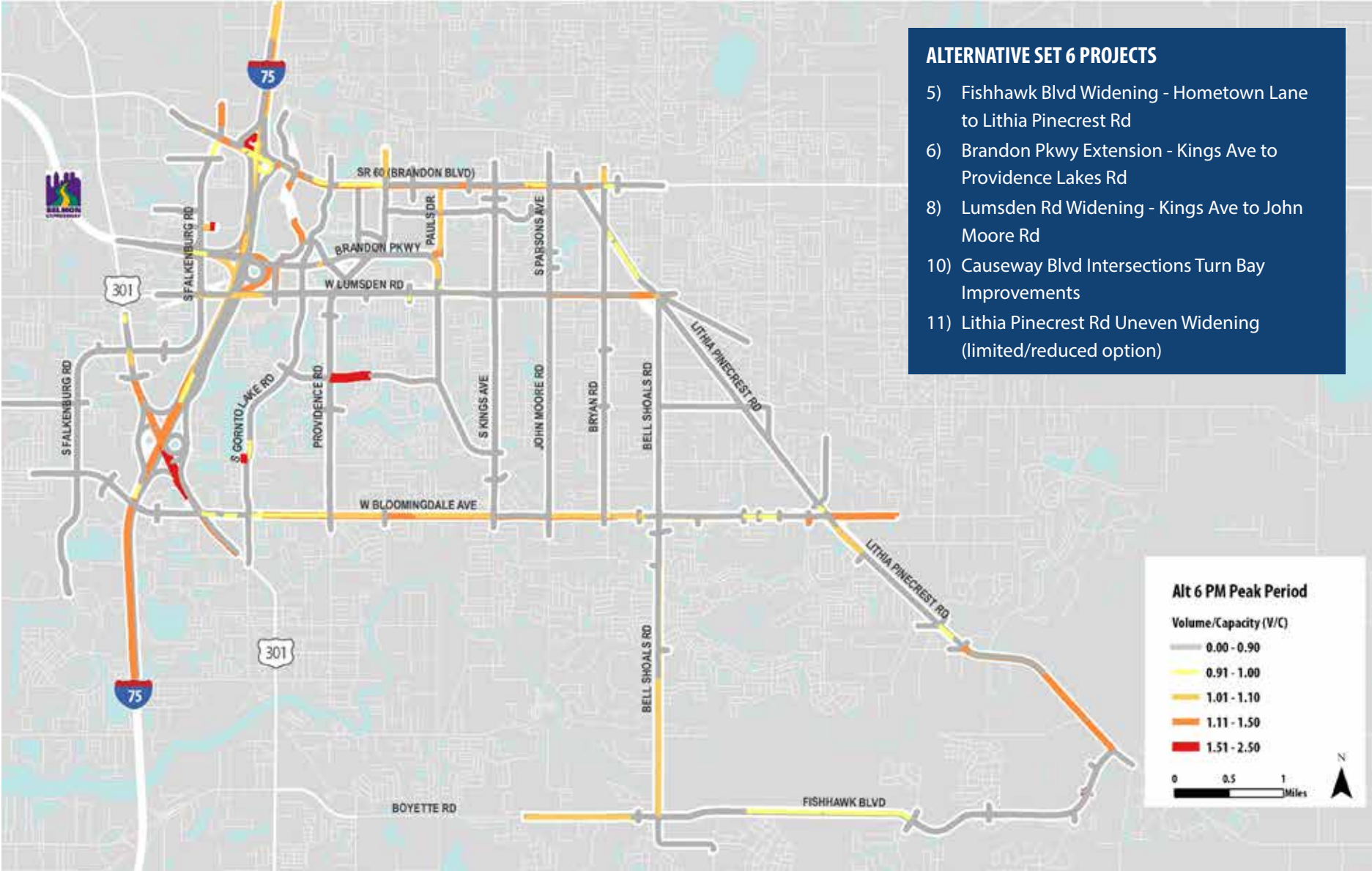


Figure 43. Alternative Set 7 Volume to Capacity (V/C) Ratio, PM Peak

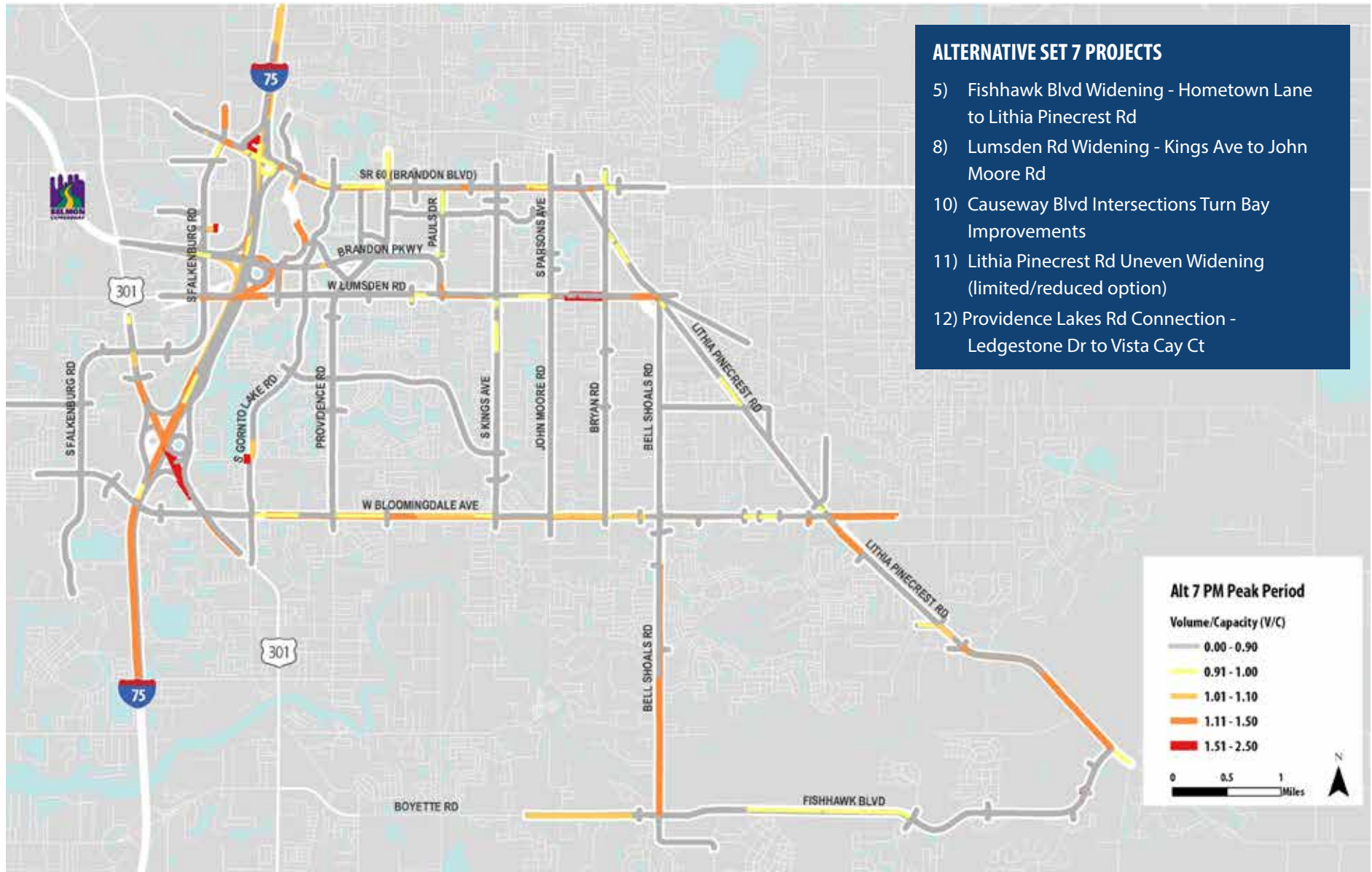
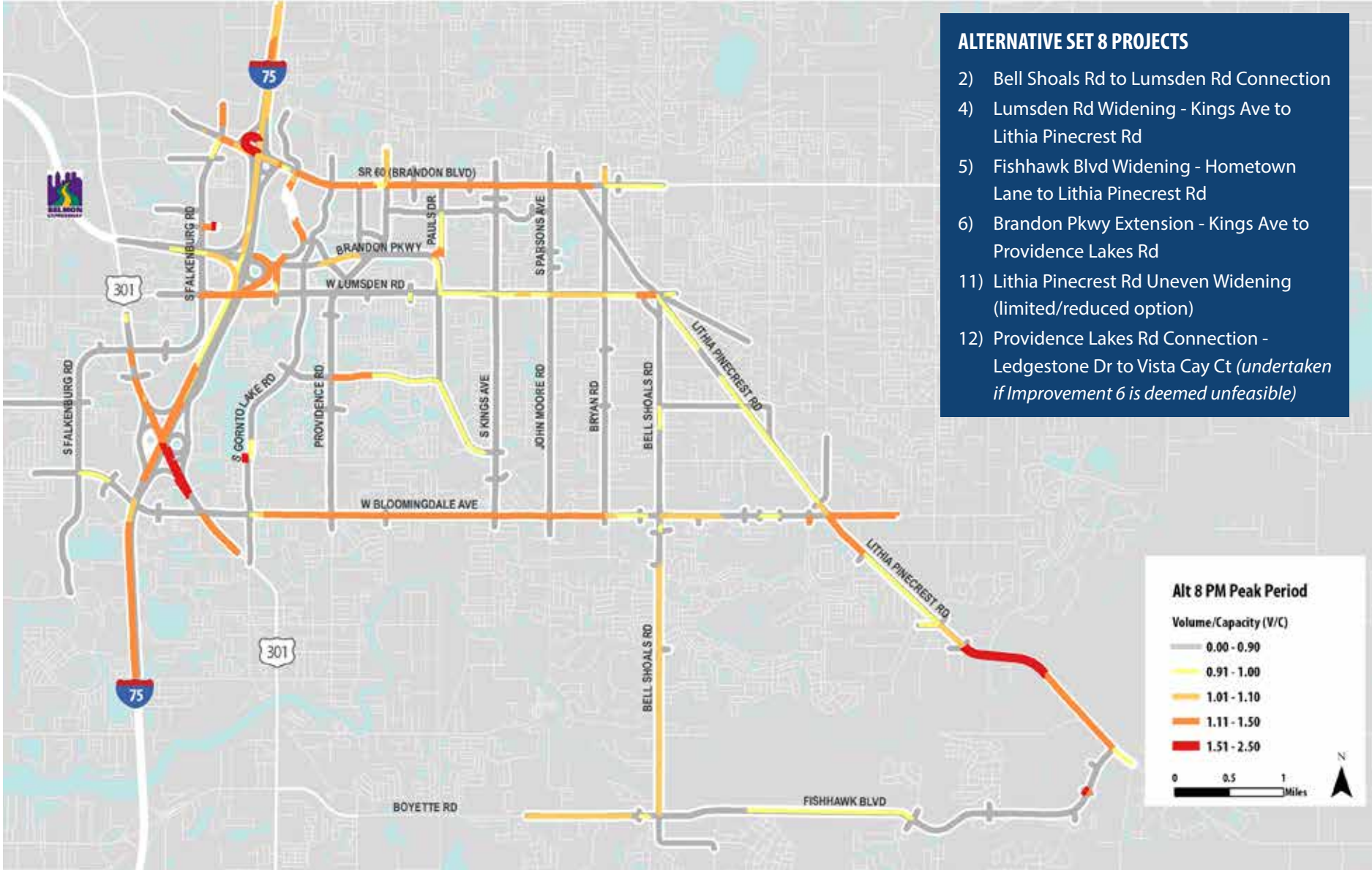




Figure 44. Alternative Set 8 Volume to Capacity (V/C) Ratio, PM Peak



4.4 Overall Summary of Performance

Each of the seven alternative sets and the E+C model results were compared to the E+C+LP model results to determine if an alternative set could provide a benefit to the overall network wide performance over the full widening of Lithia Pinecrest Road. Table 5 and Table 6 compare the volume and V/C results of roadway segments within the study area during the AM and PM peak, respectively. In these tables, the V/C ratio of each of the alternatives is compared to the E+C+LP model and color coded based on the significance of the percent change. These can also be seen graphically on Figures 45 and 46, which show a comparison for the following eight different roadway segments within the study area:

- Bloomingdale Avenue (US 301 to Kings Avenue)
- Bloomingdale Avenue (Kings Avenue to Bell Shoals Road)
- Bloomingdale Avenue (Bell Shoals Road to Lithia Pinecrest Road)
- Bell Shoals Road (Bloomingdale Avenue to Fishhawk Boulevard)
- Fishhawk Boulevard (Bell Shoals Road to Lithia Pinecrest Road)
- Lithia Pinecrest Road (Lumsden Road to Bloomingdale Avenue)
- Lithia Pinecrest Road (Bloomingdale Avenue to Fishhawk Boulevard)
- Lumsden Road (Brandon Parkway to Lithia Pinecrest Road)

In the AM peak period, westbound Bloomingdale Avenue experiences no significant change under almost all alternatives. The exception is Alternative Set 1, due to the diversion of vehicles up Bell Shoals Road. For all alternatives, the most significant positive changes occur on Fishhawk Boulevard and Lumsden Road, which is where the majority of widening projects occur. Because the E+C+LP model involves widening Lithia Pinecrest Road from 2 to 4 lanes, the V/C ratio for this roadway is significantly reduced. This results in the Alternative Sets without Lithia Pinecrest Road widening to operate at a higher V/C ratio along Lithia Pinecrest Road. However, Alternative Sets 5, 6, and 7 utilize the uneven Lithia Pinecrest Widening improvement project, which allows for the

V/C ratios on Lithia Pinecrest Road between Fishhawk Boulevard to Bloomingdale Avenue to remain similar to the full widening of Lithia Pinecrest Road alternative.

In the PM peak period, eastbound Bloomingdale Avenue (from US 301 to Kings Avenue) and southbound Bell Shoals Road (from Bloomingdale Avenue to Fishhawk Boulevard) experience no significant change under any of the initial seven alternatives. For most alternatives, the most significant positive changes occur on Fishhawk Boulevard, Lumsden Road, and Bloomingdale Avenue (from Bell Shoals Road to Lithia Pinecrest Road). As is the case with the AM peak period, the widening of Lithia Pinecrest Road under the E+C+LP alternative reduces the V/C ratios along Lithia Pinecrest Road. This results in the Alternative Sets without Lithia Pinecrest Road widening to operate at a higher V/C ratio along Lithia Pinecrest Road. However, Alternative Sets 5, 6, and 7 utilize the uneven Lithia Pinecrest Widening improvement project, which allows for the V/C ratios on Lithia Pinecrest Road between Lumsden Road to Bloomingdale Avenue to improve significantly over the E+C+LP alternative.

Key observations of these results include:

- Widening Fishhawk Boulevard is necessary to accommodate the increased traffic that will utilize Bell Shoals Road after the widening project is complete. Widening Fishhawk Boulevard may also see a shift in traffic onto Fishhawk Boulevard away from Lithia Pinecrest Road, allowing improved operations on Lithia Pinecrest Road, south of Bloomingdale Avenue.
- Lithia Pinecrest Road is a congested roadway and requires some combination of widening and alternative north-south roadway enhancements to improve overall flow throughout the network. Due to the uneven AM and PM volume splits along Lithia Pinecrest Road, a full widening from Fishhawk Boulevard to Lumsden Road is not necessary. However, strategic widening associated with the peak direction of travel is more beneficial and less costly. In addition to widening Lithia Pinecrest Road, other north-south roadways can be



improved, such as providing a better connection to/from Bell Shoals Road to Lumsden Road or providing an extension of the Brandon Parkway.

- Any of the proposed Lithia Pinecrest Road widening improvement projects will allow vehicles to travel more easily on Lithia Pinecrest Road, but will eventually lead to increased congestion on the major east-west roadways of Bloomingdale Avenue, Lumsden Road, and SR 60 if proper widening accommodations aren't met. The full Lumsden Road widening would provide the greatest benefit. The Providence Lakes Road connection improvement would also facilitate improved east-west travel on the western end of the network.

Since none of alternative sets provided a substantial network-wide benefit but several of the individual projects appeared to be beneficial, Alternative Set 8 was created using the initial seven alternatives' most promising improvements. The Alternative Set 8 improvement projects (Improvement Project 2, 4, 5, 6, and 11) were modeled and results were compared against the E+C+LP model.

The performance results for Alternative Set 8 is shown in Tables 5 and 6 and graphically depicted on Figures 45 and 46. The V/C ratio of Alternative Set 8 is compared to the E+C+LP model and color coded based on the significance of the percent change. The combination of the improvement projects under Alternative Set 8 would provide additional capacity on some of the network's most utilized roadways, while also forming additional connections between them.

The results indicate that in the AM peak period, Alternative Set 8 experiences a significant positive change on three of the study segments, a significant negative change on two of the study segments, and no significant change on three of the study segments. However, the segments with negative change, are expected to operate at a V/C ratio under 1.00. The connection between Bell Shoals Road and Lumsden Road, along with the Brandon Parkway extension, draw traffic away from northbound Lithia

Pinecrest Road, ultimately helping to reduce V/C ratios by spreading out the traffic.

The PM peak period results show that Alternative Set 8 experiences a significant positive change on three of the study segments, a significant negative change on three of the study segments, and no significant change on two of the study segments. One of these segments with negative change is along southbound Lithia Pinecrest Road, between Bloomingdale Avenue and Fishhawk Boulevard, has approximately 1.75 fewer miles of widening compared to the E+C+LP model, which may explain why the V/C ratio increased in the Alternative Set 8. Similar to the AM peak period, new connections within the network provide additional options for drivers, which spreads out the traffic to different roadways reducing or maintaining V/C ratios as compared to the E+C+LP model.

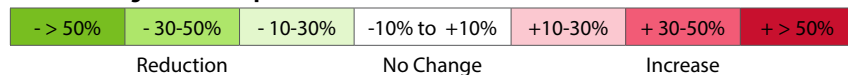
Based on these findings and comparison with E+C+LP alternative, Alternative Set 8 is the recommended alternative.

LITHIA PINECREST ALTERNATIVES TO WIDENING

Table 5. Alternative Set Performance Comparison, AM Peak

Scenario	Roadway Segment							
	WB Bloomingdale (Lithia Pinecrest to Bell Shoals)	WB Bloomingdale (Bell Shoals to Kings)	WB Bloomingdale - (Kings to US 301)	NB Bell Shoals (Fishhawk to Bloomingdale)	WB Fishhawk (Lithia Pinecrest to Bell Shoals)	NB Lithia Pinecrest (Fishhawk to Bloomingdale)	NB Lithia Pinecrest (Bloomingdale to Lumsden)	WB Lumsden (Lithia Pinecrest to Brandon Parkway)
AM Volume								
E+C+LP	1612	2652	2929	1068	1145	888	903	2198
E+C	1668	2741	2894	1145	1179	819	800	2161
Alt 1	1688	2352	2884	1187	1231	763	610	2619
Alt 2	1609	2858	2926	1136	1175	810	754	1945
Alt 3	1600	2658	2922	1111	1172	876	878	2297
Alt 4	1654	2756	2929	1090	1147	834	826	2091
Alt 5	1691	2799	2886	1059	1159	846	761	1968
Alt 6	1596	2836	2867	1453	1339	578	743	1897
Alt 7	1616	2792	2953	1443	1369	571	737	2031
Alt 8	1654	2355	2759	1481	1347	585	599	2478
AM V/C								
E+C+LP	0.94	1.60	1.64	0.71	1.30	0.56	0.56	1.16
E+C	0.98	1.65	1.62	0.77	1.33	1.01	0.97	1.14
Alt 1	0.99	1.42	1.62	0.79	0.77	0.94	0.73	0.99
Alt 2	0.94	1.72	1.64	0.76	0.74	1.00	0.91	1.04
Alt 3	0.94	1.60	1.64	0.74	0.73	1.01	0.81	0.89
Alt 4	0.97	1.66	1.64	0.73	0.72	0.96	0.76	0.95
Alt 5	0.99	1.69	1.62	0.71	0.73	0.53	0.92	1.05
Alt 6	0.94	1.71	1.60	0.97	0.84	0.51	0.90	0.88
Alt 7	0.95	1.68	1.66	0.97	0.86	0.51	0.89	0.95
Alt 8	0.97	1.42	1.55	0.99	0.84	0.52	0.72	0.95

Percent Change in V/C Compared to E+C+LP Condition



Level of Congestion Based on V/C Ratio

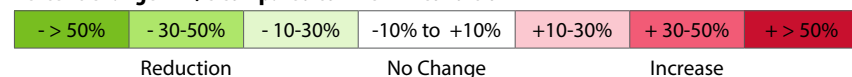
<0.9 = not congested
 0.9 to 1.0 = at capacity
 >1.0 = congested



Table 6. Alternative Set Performance Comparison, PM Peak

Scenario	Roadway Segments							
	EB Bloomingdale (US 301 to Kings)	EB Bloomingdale (Kings to Bell Shoals)	EB Bloomingdale (Bell Shoals to Lithia Pinecrest)	SB Bell Shoals (Bloomingdale to Fishhawk)	EB Fishhawk (Bell Shoals to Lithia Pinecrest)	SB Lithia Pinecrest (Lumsden to Bloomingdale)	SB Lithia Pinecrest (Bloomingdale to Fishhawk)	EB Lumsden (Brandon Parkway to Lithia Pinecrest)
PM Volume								
E+C+LP	2117	1623	1376	1024	877	1687	1504	2618
E+C	2217	1996	1260	1035	1244	1209	1112	2411
Alt 1	2285	1898	1235	1064	1224	1210	1099	2591
Alt 2	2265	2114	1270	1072	1250	1126	1075	2094
Alt 3	2268	1872	1166	1092	1277	1384	1119	2584
Alt 4	2206	1860	1165	1080	1254	1325	1125	2418
Alt 5	2234	1995	1233	1051	1268	1266	1113	2226
Alt 6	2252	1982	1606	1097	1075	1285	1226	2154
Alt 7	2234	1871	1635	1067	1057	1428	1285	2461
Alt 8	0.97	1.42	1.55	0.99	0.84	0.52	0.72	0.95
PM V/C								
E+C+LP	1.19	0.96	0.82	0.69	0.97	1.07	0.95	1.39
E+C	1.24	1.18	0.75	0.70	1.42	1.47	1.38	1.31
Alt 1	1.28	1.12	0.73	0.72	0.77	1.48	1.35	1.07
Alt 2	1.27	1.25	0.75	0.72	0.78	1.37	1.33	1.15
Alt 3	1.27	1.11	0.69	0.74	0.80	1.26	1.29	1.08
Alt 4	1.23	1.10	0.69	0.73	0.79	1.20	1.31	1.20
Alt 5	1.25	1.18	0.73	0.71	0.80	0.80	1.11	1.22
Alt 6	1.26	1.17	0.95	0.74	0.67	0.81	1.18	1.08
Alt 7	1.25	1.10	0.97	0.72	0.66	0.90	1.23	1.22
Alt 8	1.24	1.07	0.93	0.76	0.67	0.92	1.26	1.00

Percent Change in V/C Compared to E+C+LP Condition



Level of Congestion Based on V/C Ratio

<0.9 = not congested
 0.9 to 1.0 = at capacity
 >1.0 = congested

LITHIA PINECREST ALTERNATIVES TO WIDENING

Figure 45. Alternative V/C Performance Comparison, AM Peak

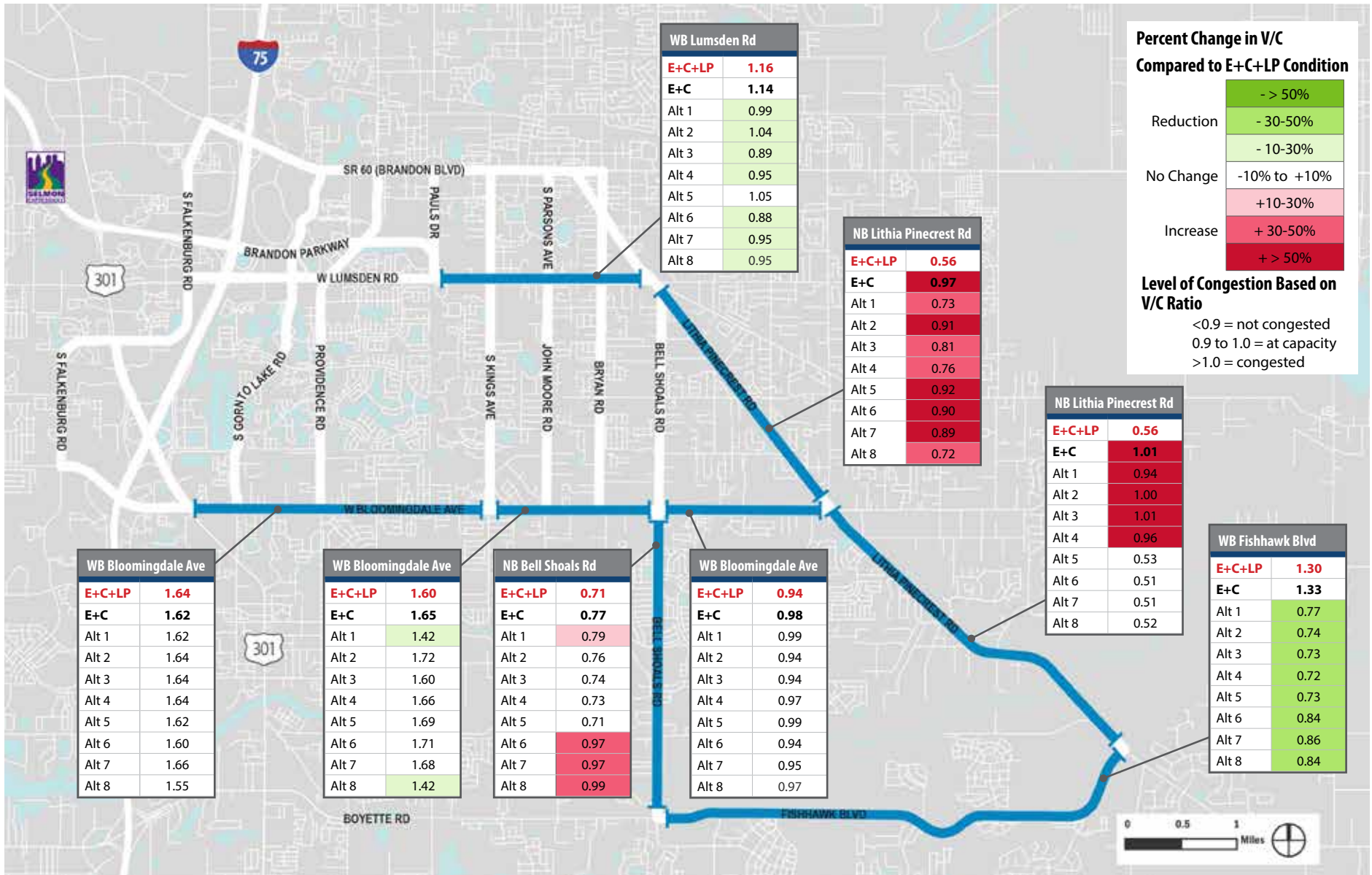
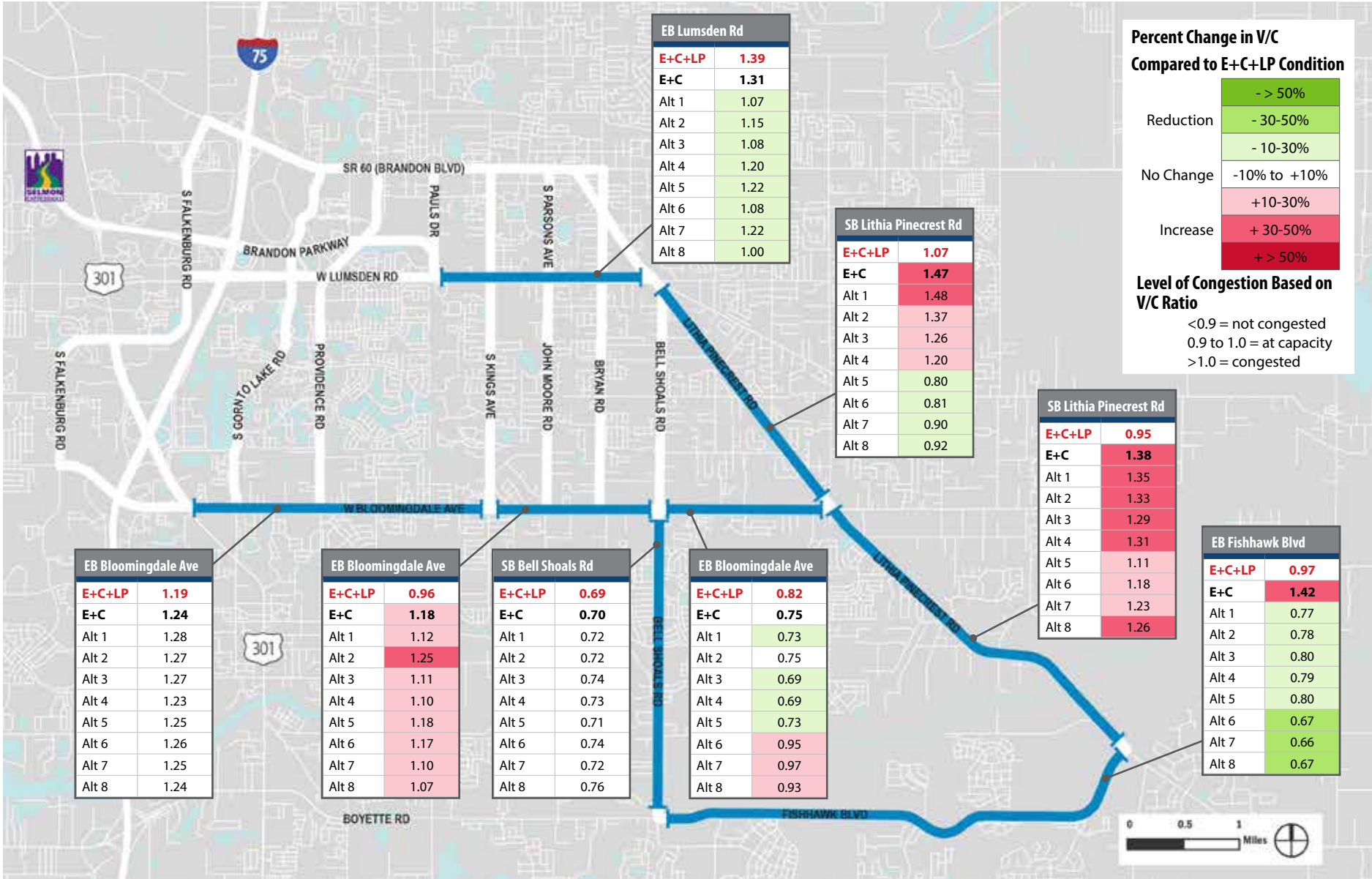




Figure 46. Alternative V/C Performance Comparison, PM Peak



5. RECOMMENDATIONS

The current investment level of approximately \$200 million is not adequate to provide needed capacity improvements to the entire network. However, the recommended improvement projects provide a benefit over the E+C+LP model and longer term investments and traffic management solutions should be further analyzed and reviewed to further alleviate congestion within the Brandon network. Study recommendations are organized in four broad categories: short term project recommendations; long term major investments; safety and traffic management; and alternatives to single occupancy vehicles.

5.1 Short Term Project Recommendations

The Aimsun alternatives analysis resulted in the identification of improvement projects with the greatest potential to address congestion concerns in the study area over the short term. These improvements, in various combinations, increase capacity and improve traffic operations to help distribute traffic more evenly across the network, improve intersection operations, and address the volume imbalances between AM and PM peak periods along key corridors.

RECOMMENDED PROJECTS FOR FURTHER EVALUATION

The following improvements shown in Figure 47 have been identified as having the greatest potential to improve peak period network wide operations. These projects should be evaluated in greater detail as part of the PD&E study.

- **Improvement Project 2 – Bells Shoals Road to Lumsden Road Connection.** Provide northbound left access onto Lumsden Road from Bell Shoals Road. (see Figure 48 for conceptual alignment)

- **Improvement Project 4 – Lumsden Road Widening.** Widen Lumsden Road from four to six lanes from Kings Avenue to Lithia Pinecrest Road.
- **Improvement Project 5 – Fishhawk Boulevard Widening.** Widen Fishhawk Boulevard from two lanes to four lanes from Hometown Lane to Lithia Pinecrest Road.
- **Improvement Project 6 – Brandon Parkway Extension.** Provide a connection for Providence Lakes Road between Ledgestone Drive and Vista Cay Court, as well as extend the Brandon Parkway from Lumsden Road south to Providence Lakes Road.
- **Improvement Project 11 – Lithia Pinecrest Road Uneven Widening (limited/reduced option).** Provide capacity and intersection improvements along Lithia Pinecrest Road from Fishhawk Boulevard to Lumsden Road, including northbound widening from one to two lanes from south of New River Hills Parkway to Bloomingdale Avenue and southbound widening from one to two lanes from Lumsden Road to Adelaide Avenue. The Lithia Pinecrest Road/Fishhawk Boulevard intersection is also converted to a continuous green intersection for the northbound direction by widening to two lanes northbound from Fishhawk Boulevard and tapering back to one lane prior to Lithia Springs Road.
- **Improvement Project 12 – Providence Lakes Road Connection.** Provide a connection for Providence Lakes Road between Ledgestone Drive and Vista Cay Court. This improvement project should be undertaken if Improvement Project 6 – Brandon Parkway Extension is considered unfeasible.

Figure 49 shows the comparison of V/C results for the E+C+LP, E+C, and Recommended Alternative for seven roadway segments within the study area during the AM and PM peak, respectively. As shown, the recommended alternative eliminated congestion on three of the studied segments and reduced congestion on one segment in the AM period. In the PM period, the recommended alternative eliminated congestion on two segments and reduced it on three.



Figure 47. Recommended Projects Map

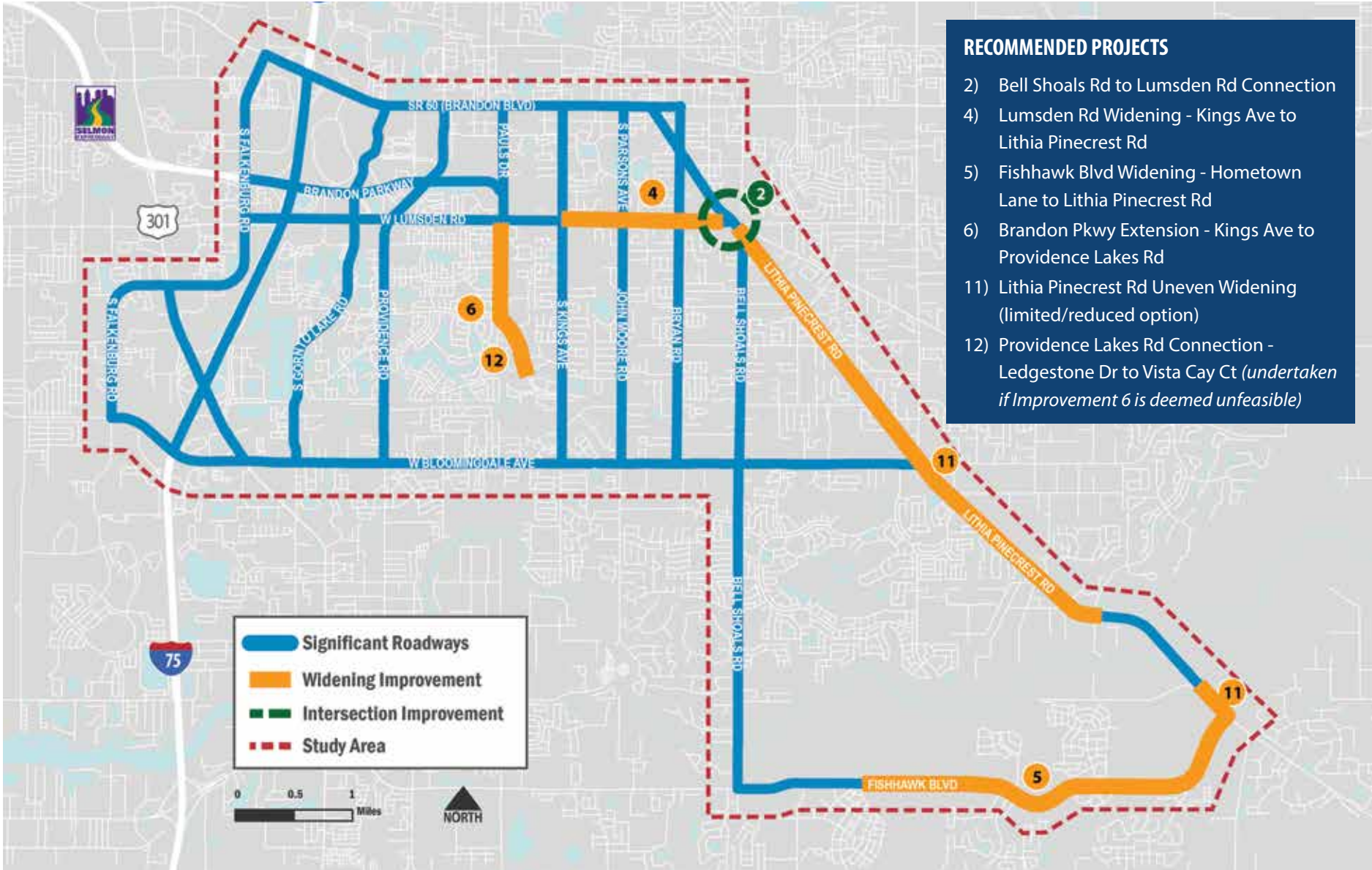


Figure 48. Improvement Project 2 - Bells Shoals to Lumsden Road Connection Concept

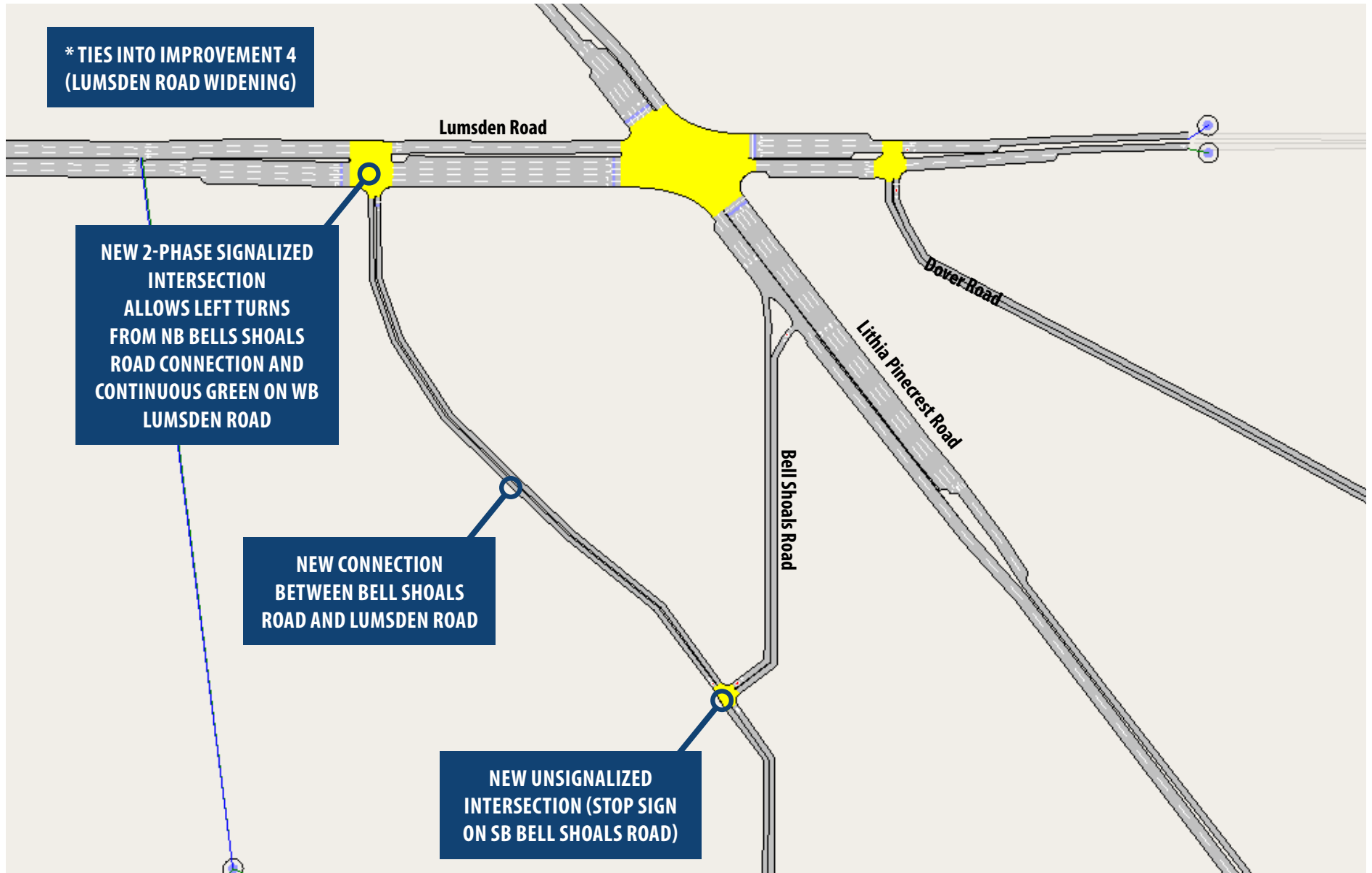
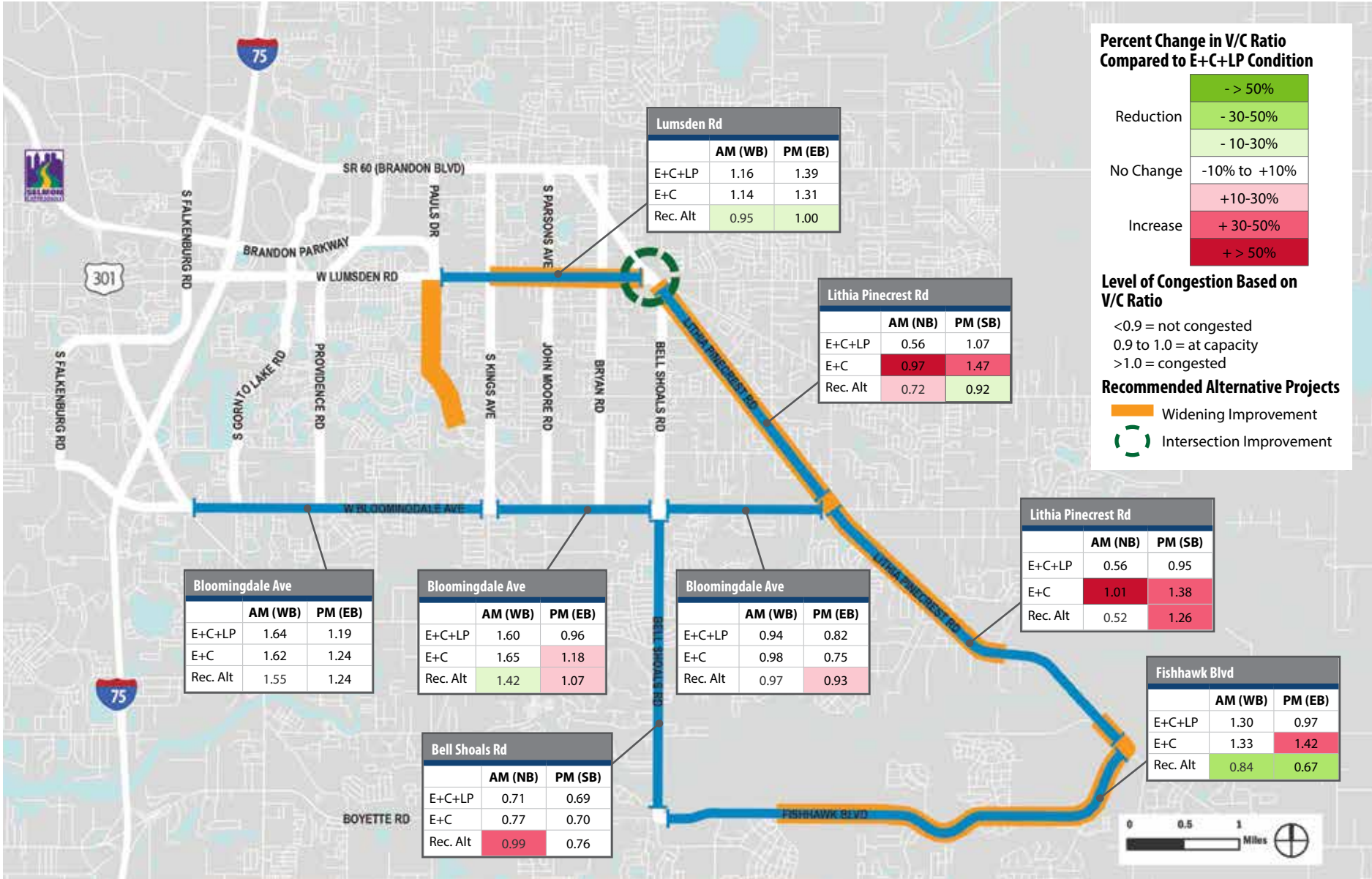




Figure 49. Recommended Alternative V/C Performance Comparison, AM and PM Peak Periods



ALTERNATIVES TO SINGLE OCCUPANCY VEHICLE TRAVEL

The County should plan for improvements to increase mobility choices, including improving accommodations for bicycle/pedestrian travel and working with HART to improve regional and local transit options.

- **Enhanced Transit.** HART has completed an assessment (Appendix I) of the potential congestion reduction benefits of a Park and Ride facility to the south and east of the study area. This facility has the potential to further reduce peak hour congestion through the Brandon community. The County should continue to work with HART and other regional partners to improve transit service serving local travel within the study area and connecting Brandon to major employment centers including Downtown Tampa, Westshore, USF, and MacDill Air Force Base.
- **Improved Bicycle/Pedestrian Accommodations.** Develop plans and priorities for sidewalk, crosswalk, and bicycle facility improvements along major corridors. Improvements could include mid-block crossings, refuge areas, adjustments in striping and signal timing, bike lane buffers and bike boxes at intersections, and other innovative strategies to address safety, limit exposure, and promote active transportation.
- **Trail Connections.** Identify opportunities for regional trail extensions along major corridors including Fishhawk Boulevard, Lithia Pinecrest Road, Lumsden Road, and others and improvements to existing trail facilities

SAFETY AND TRAFFIC MANAGEMENT

To improve safety and traffic flow along corridors throughout the study area, the County should explore implementation of the following improvements and traffic management strategies:

- **Access Management and Median U-Turns.** The County should identify local arterials where the implementation of access management improvements may be appropriate to address safety and operational issues. Options to explore include converting two-way left turn lanes to medians and channelized lefts, converting full intersection openings to directional openings, and limiting driveways to right in, right out operations. These options could help to reduce the number of severe crash types like head on and left turning crashes. In addition, replacing left turn movements at intersections with median U-turns may reduce the number of crashes at intersections, while also providing improved operations.
- **Speed Management, Progression, and Adaptive Signal Control.** The County should identify arterials where advanced progression techniques and adaptive signal control can be implemented. These techniques can be implemented to slow vehicles and meter through traffic along congested corridors like Bloomingdale Avenue. Slower average speeds could result in fewer crashes, while metering traffic may reduce long queues and heavy congestion.
- **Incident Response.** The County should explore expansion of existing traffic incident management programs similar to Road Rangers and RISC, with the goal of accelerating response to and clearance of accident sites and incidents. Benefits of these programs include increased safety at the accident site, a reduction in secondary incidents, and reduction of accident duration.
- **Roundabouts.** Roundabouts are an effective intersection traffic control type that can provide improved operations and increased safety. By reducing the number of conflict points at an intersection and requiring yield conditions to enter the roundabout, the amount and severity of crashes at roundabouts is significantly reduced over more traditional intersections. In the right location, roundabouts can also reduce approach and intersection delay, as well as queue lengths.



5.2 Long Term Major Investments

Improvements to address the effects of long term projected future growth, especially south of the Alafia River, should be studied carefully and in close coordination with FDOT and THEA. Potential future changes to existing plans for I-75, US 301, US 41, and the Selmon Expressway could significantly influence peak hour travel patterns and volumes within and south of the study area. For example, capacity improvements along I-75 or an extension of the Selmon Expressway along US 301 could draw significant volumes to east-west roadways south of the Alafia River and provide substantial relief to corridors in the study area.

In coordination with FDOT, THEA, and other entities, the County should explore the feasibility and potential impacts of the following:

- **Improvements to the US 301/I-75 Interchange.** The County should work with FDOT to explore improvements to address the northbound I-75 on ramp operations and the US 301/Bloomingdale Avenue intersection operations in the AM peak and the southbound approach of the US 301/Bloomingdale Avenue intersection in the PM peak.
- **Network Connectivity and Capacity.** The County should continue to explore strategies to increase connectivity and capacity of the roadway network. The County should 1) plan for capacity improvements along existing arterial corridors south of the Alafia River including Fishhawk Boulevard/Boyette Road/Gibsonton Drive, Balm Riverview Road, and Rhodine Road; 2) provide for increased roadway network connectivity in and between existing, infill, and developing neighborhoods and commercial districts; and 3) explore the potential for new Alafia River crossings.
- **Selmon Expressway Improvements and Extension.** The County should work with THEA to explore potential two-way operations of the existing reversible lane section between Town Center Boulevard and Falkenburg Road. In addition, the potential for an Expressway Extension south along the US 301 right-of-way to Big Bend Road should be further evaluated. Such an improvement could draw traffic from the Lithia Pinecrest Road corridor to access new capacity along US 301.

APPENDIX I. TRANSIT SERVICE CONCEPTS



Hillsborough Area Regional Transit Authority

LP Alts to Widening

Service Development

April, 2020

Alternatives to Widening Lithia Pinecrest – Transit Element

What are the potential transit options for reducing traffic volumes and attracting more transit riders during the peak period?

- Assessment of current traffic volumes and travel patterns
- Assessment of current transit, ridership, costs and available capacity
- Recommendation for reducing existing costs of service and future costs of service expansion
- Recommendation for peak-hour service expansion to attract ridership to the most dense urban job centers that can reasonably be served by a single-seat transit trip

Potential Action Plan

Short Term Improvements: Create Incentives to Increase Ridership on Existing Services

Ridership Grows and Capacity is reached

Plan for new facility to reduce costs



Mid Term Improvements: Increase Frequency to meet demand and plan for new facility

Establish New Facility and utilize vehicles with a greater seating capacity

Reduce Cost of Operations



Long Term Improvements: Modify future services based on Demand


Expand Service to Key Destinations

Enhance and Modify Services

What is the existing demand and what corridors are over capacity?



How many of those trips are bound for “dense” job centers and could realistically be served by transit?
(Westshore, Downtown, USF, etc.)



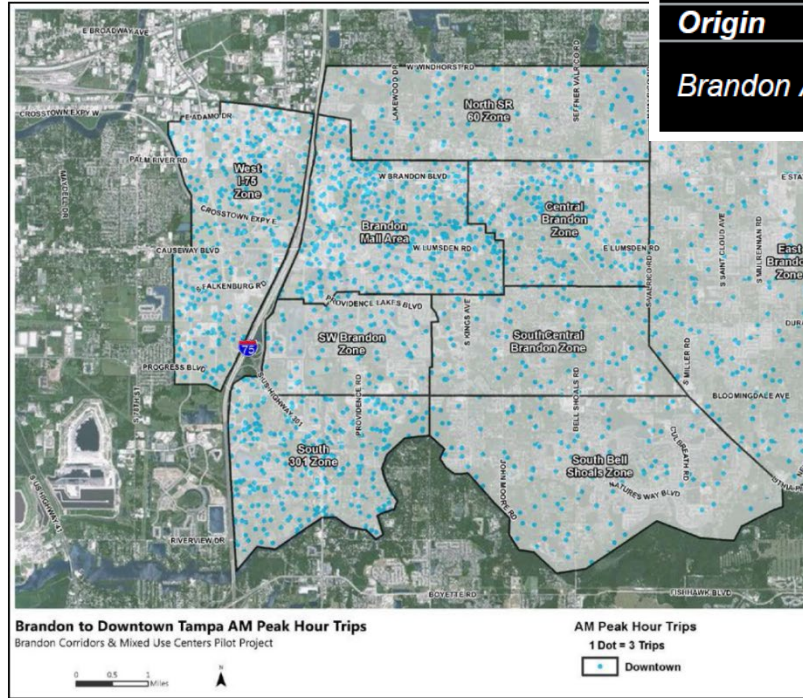
How many trips do we need to switch to transit to impact peak-hour traffic?

How much existing transit capacity is available?

How much more transit service is needed to make an impactful mode-shift possible?



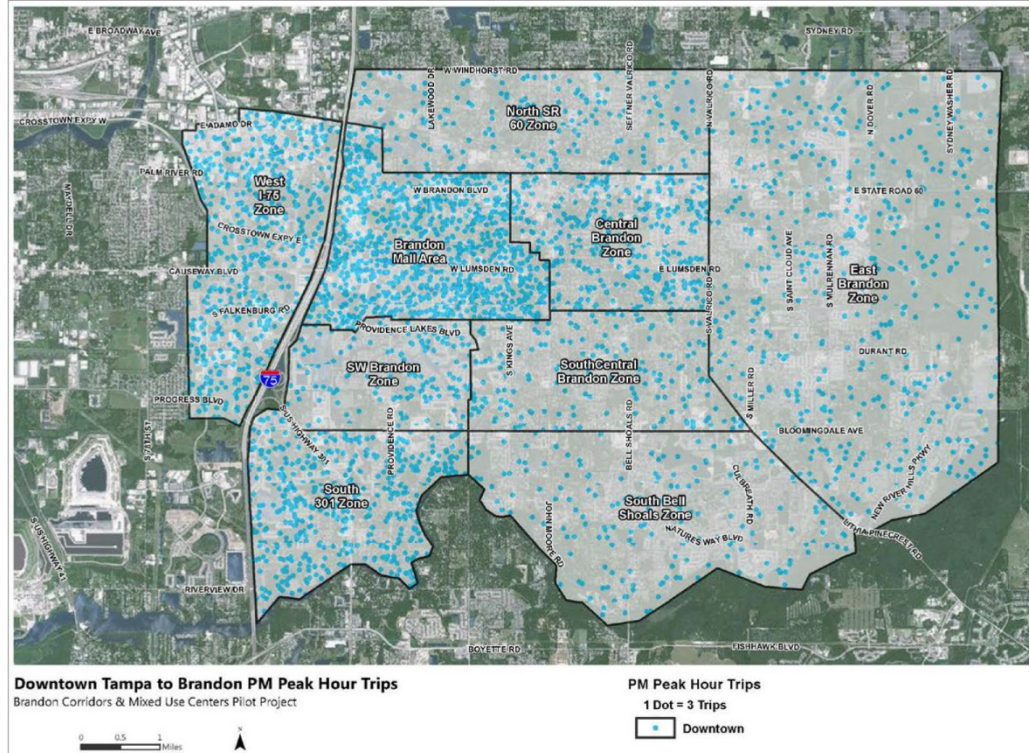
Existing Travel Demand – Peak



Destination	Downtown Tampa	MacDill AFB	USF	WestShore	Total
Origin	5,813	1,887	2,704	3,638	14,042
Brandon Area	41.4%	13.4%	19.3%	25.9%	100%

AM Peak

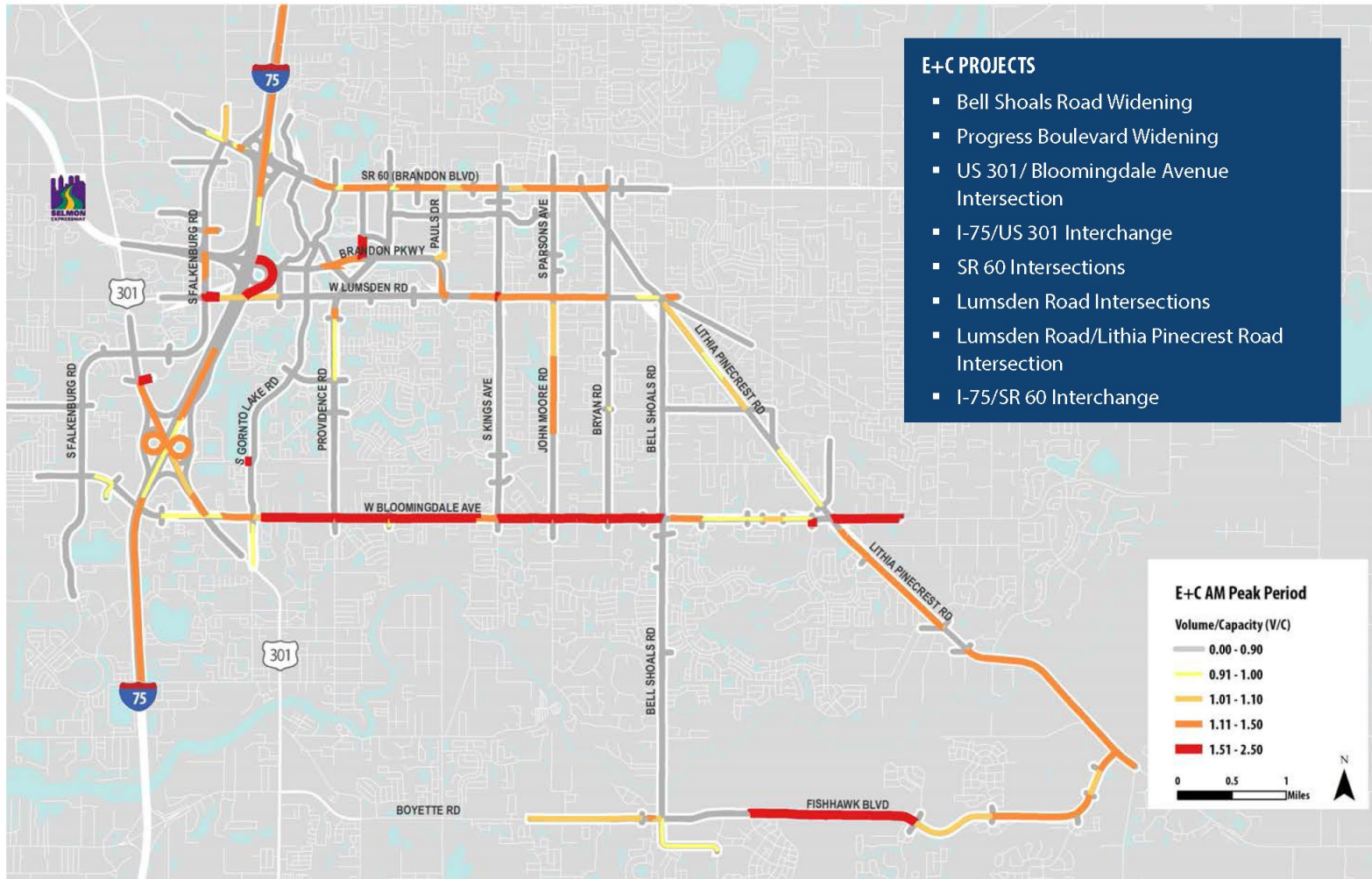
PM Peak



Destination	Brandon Area	
Origin		
Downtown Tampa	4,884	36.8%
MacDill AFB	2,026	15.3%
USF	2,743	20.7%
WestShore	3,625	27.3%
Total	13,278	100%

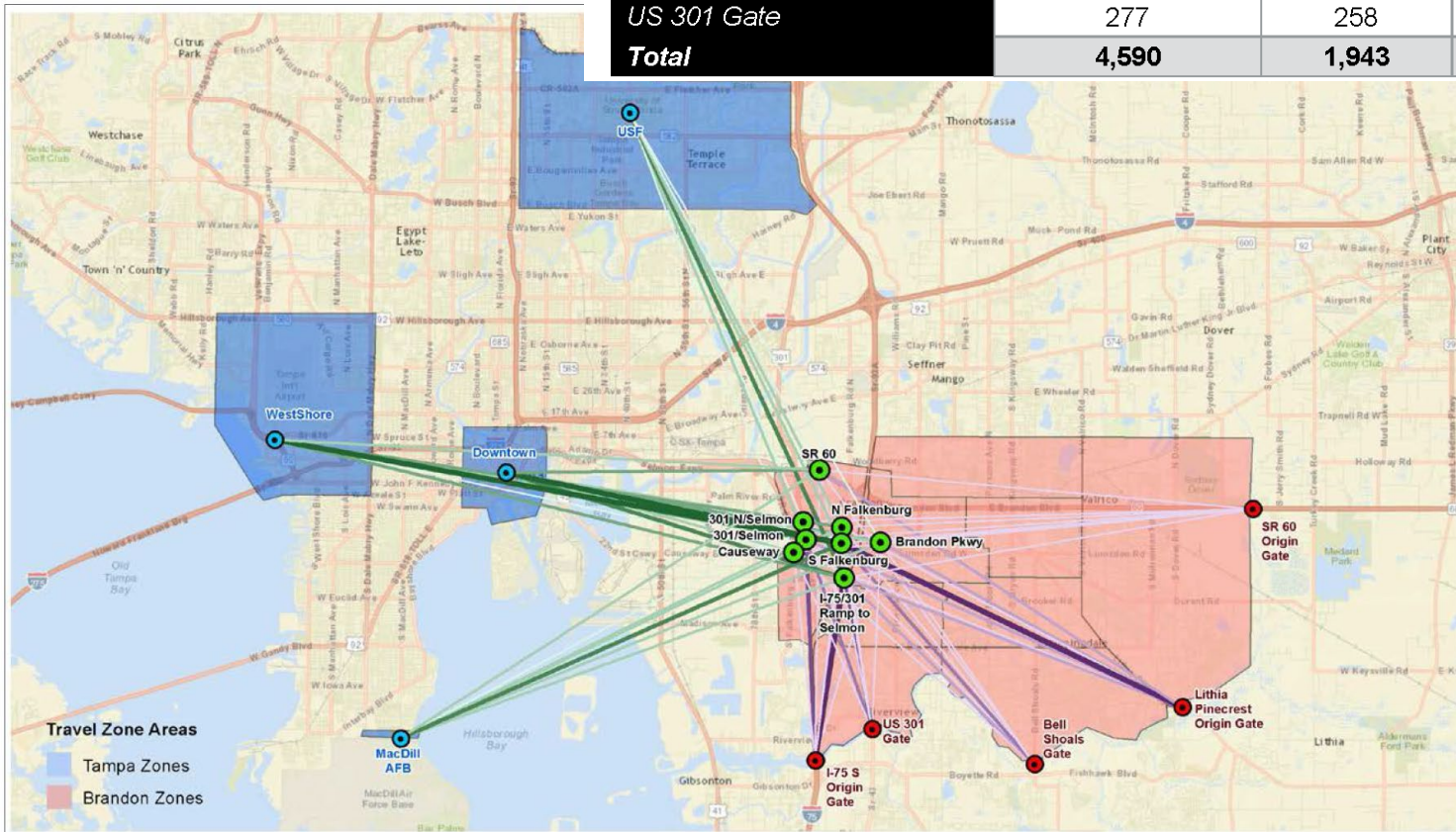
Over capacity corridors

Figure 16. Existing + Committed Volume to Capacity (V/C) Ratio, AM Peak



Gateway Analysis – Vehicle Trips

		Destination				
Origin		Downtown Tampa	MacDill AFB	USF	WestShore	Total
Bell Shoals Gate		32	336	67	65	500
I-75 S Origin Gate		3,532	1,281	2,399	2,047	9,259
Lithia Pinecrest Origin Gate		722	64	26	63	875
SR 60 Origin Gate		27	4	0	10	41
US 301 Gate		277	258	167	116	818
Total		4,590	1,943	2,659	2,301	11,493



Tampa to Middle Gates to Brandon External Gates
AM Peak Hour Trips
 Brandon Corridors & Mixed Use Centers Pilot Project

- Travel Zone Centroids**
- Tampa Zones
 - Brandon Gates
 - Middle Zones

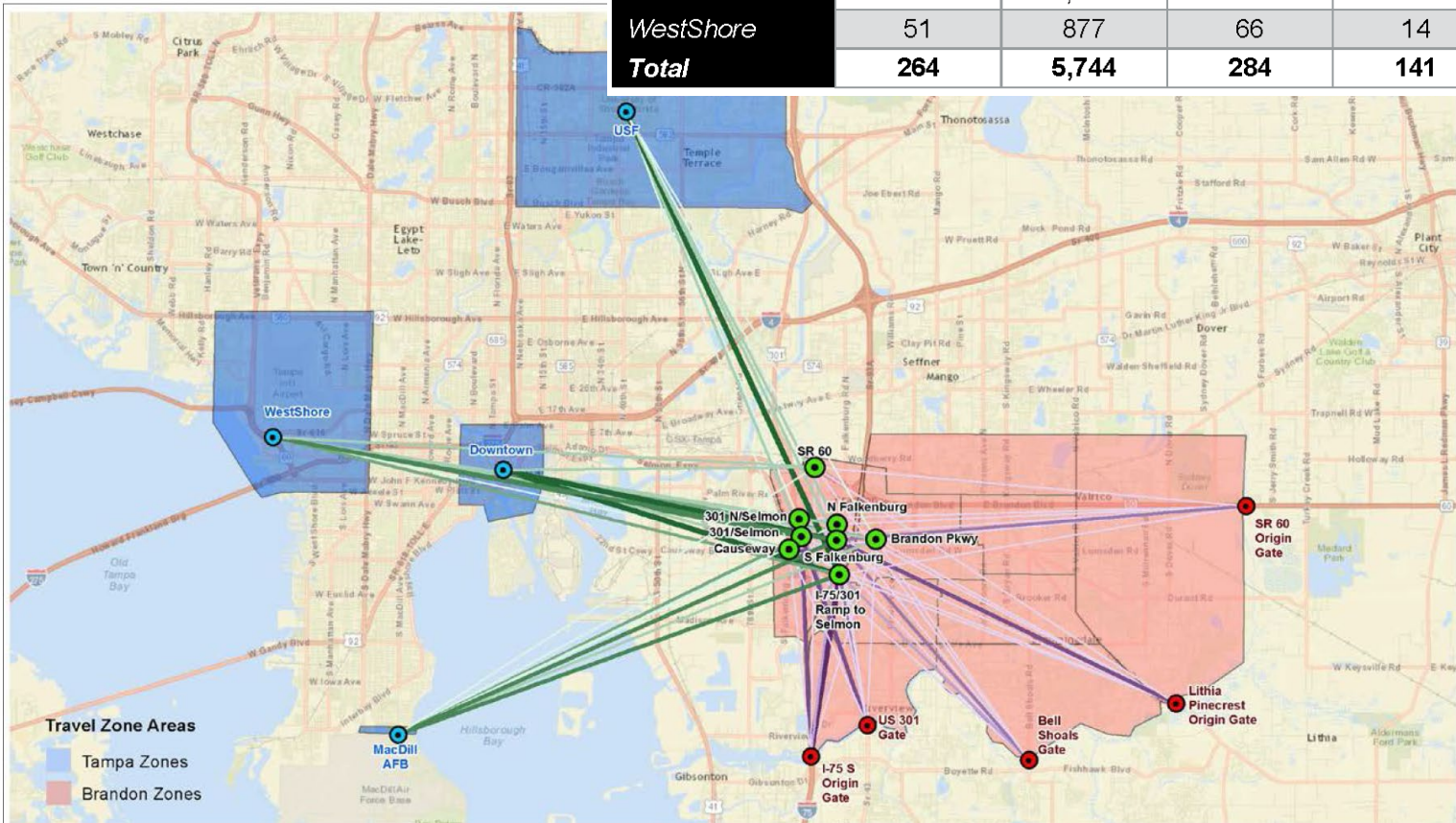
- AM Peak Hour Trips (Employment Zones to Brandon)**
- 1 - 100
 - 101 - 300
 - 301 - 600
 - 601 - 1,200
 - > 1,200

- AM Peak Hour Trips (Middle Zones to Brandon Gates)**
- 1 - 50
 - 51 - 150
 - 151 - 300
 - 301 - 500
 - > 500



Gateway Analysis – Vehicle Trips

Destination	Bell Shoals Gate	I-75 S Origin Gate	Lithia Pinecrest Origin Gate	SR 60 Origin Gate	US 301 Gate	Total
Origin						
Downtown	33	1,939	193	125	187	2,477
MacDill AFB	91	1,287	23	2	328	1,731
USF	89	1,641	2	0	238	1,970
WestShore	51	877	66	14	249	1,257
Total	264	5,744	284	141	1,002	7,435



Tampa to Middle Gates to Brandon External Gates PM Peak Hour Trips
 Brandon Corridors & Mixed Use Centers Pilot Project

Travel Zone Centroids

PM Peak Hour Trips (Employment Zones to Brandon)

PM Peak Hour Trips (Middle Zones to Brandon Gates)



- Tampa Zones
- Brandon Gates
- Middle Zones
- 1 - 150
- 151 - 500
- 501 - 1,000
- 1,001 - 1,500
- > 1,500
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 1,000
- > 1,000

Existing Weekday Transit Services



24LX & 25LX do not alleviate peak hour demand, they depart between 5am and 7am and depart MacDill between 3pm and 5pm, which is earlier than the normal rush hour.

Existing Weekday Transit Services

Route	Total Vehicles/Vehicle Hours (dead head)	Annual Cost (dead-head cost)	Peak Trips (5am – 8am)	MAX LOAD Leaving Study Area (unused seated capacity)	Unused Peak Seated Capacity (trips*empty seats)
24LX (5am-7am)	4 / 23.6 (11.4)	\$652k (\$315k)	5	27 (13)	65
25LX (5am-7am)	3 / 15 (6.5)	\$415k (\$189k)	3	21 (19)	57
360LX (hourly)	3 / 49.5 (2)	\$1.36M (55k)	3	12 (28)	84
60LX (hourly)	3 / 51.33 (2)	\$1.42M (55k)	3	10 (30)	90
TOTAL	13	\$3.84M (\$614k)	14	N/A	296

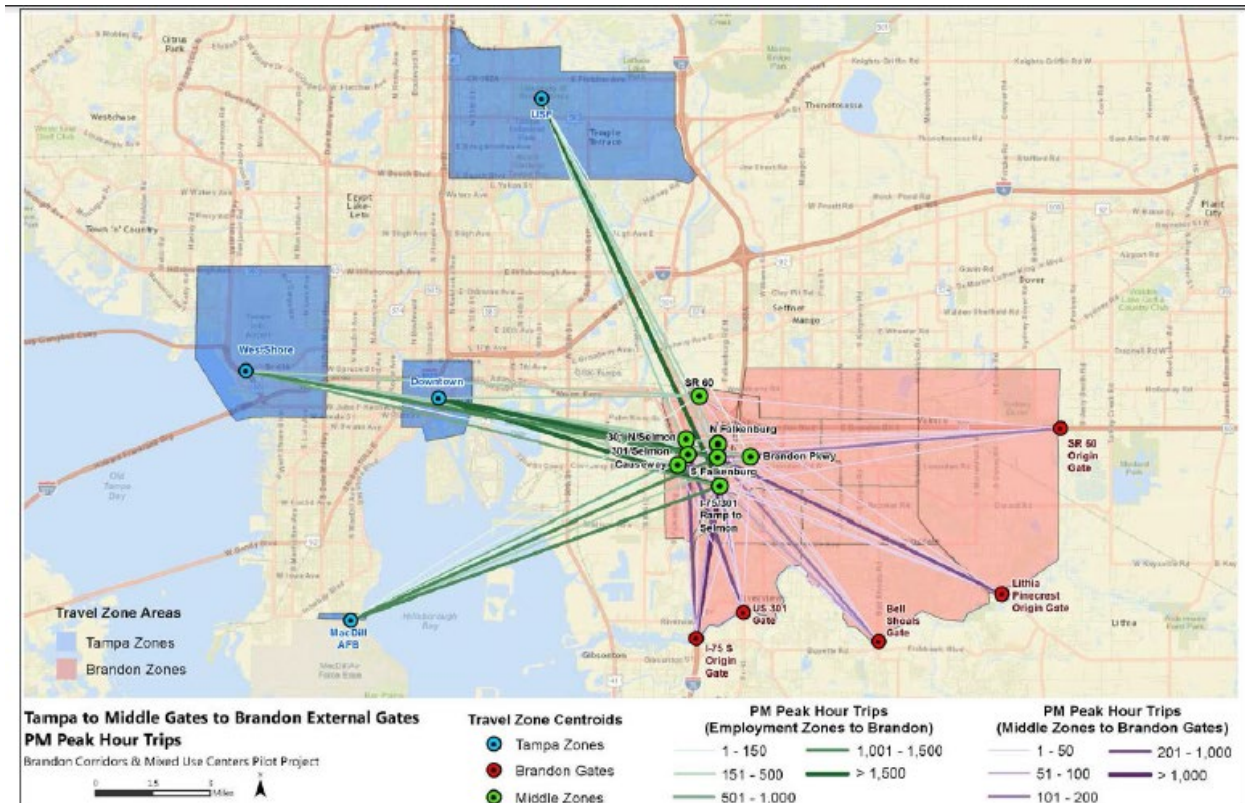
- **24LX & 25LX operate between 5am and 7am** and depart MacDill between 3pm and 5pm.
- Unused Capacity for 60/360LX is 58 seated passengers per hour (one trip each) **Hourly service is inadequate to attract ridership and impact congestion in a meaningful way, even with full buses.**
- **Any additional peak-hour service to the area will also likely require significant dead-head without additional capital investment.** (note: also dead-head to/from MacDill)

Dead-head represents time that the vehicles travel to and from the garage. Due to the nature of the long south county Limited-express routes, there are high amounts of

Takeaways:

- MacDill Service is adequate compared to Downtown and Westshore
- Downtown and Westshore need better Peak-hour service from 7 am to 9 am, existing MacDill routes that serve Downtown Tampa miss the typical commuter peaks
- USF needs Peak-hour service established

Note: Westshore and USF are much larger and harder to serve with a single-seat transit trip than MacDill or Downtown Tampa.



>\$500k Annually in Dead-head

- Increasing service to the area would also increase costs for dead-head
- Doubling peak service, would likely double the cost of dead-head

How could we potentially decrease those recurring costs

- An East Brandon light maintenance facility could reduce the annual dead-head costs
 - Potential additional savings of >\$100k annually in paratransit dead-head
- Create a park-and-ride facility in conjunction with light maintenance
- Would decrease the costs for increasing the level of service in the area and make further service expansion less cost prohibitive.

Design and Operational Considerations

- Fueling and potentially CNG (Planning level costs \$20-\$25m for Light Maintenance Facility) – Natural Gas available in zip code 33511
- Number of maintenance bays to make site viable (>5)
- Park-and-ride capacity to create a viable mobility hub (cars, bikes, etc.)
- Increase vehicle capacity with articulated buses to increase passengers per trip and reduce total number of vehicles (this is important for facility design)
 - Consider coach buses to increase seating capacity

How could we increase ridership and ease congestion?

- Subsidize routes and/or transit passes for existing service
 - Along congested corridors, entire route or between major points?
 - Offer free fare program to commuters in the area

Route	Annual Cost (dead-head cost)	Current Peak Trips (5am – 8am)	FY 2020 Year to Date Ridership	Revenue Estimate (\$2 per boarding)
24LX (5am – 7am peak)	\$630 (\$305k)	5	22,430	\$44,860
25LX (5am – 7am peak)	\$398k (\$172k)	3	15,942	\$31,884
360LX	\$1.3M (55k)	3	74, 806	\$149,612
60LX	\$1.4M (88k)	3	34,425	\$68,850
Total	\$3.7M (\$616,590)	13	147,603	\$295,206

Current farebox return offsets approximately \$295,000.00 of the \$3.7 million annual operating costs.

Short Term: Create Incentives to Increase Ridership on Existing Services

Ridership Grows and Capacity is reached

Plan for new facility to reduce costs



Mid Term: Increase Frequency to meet demand and plan for new facility

Establish New Facility and utilize vehicles with a greater seating capacity

Reduce Cost of Operations



Long Term: Modify future services based on Demand

Expand Service to Key Destinations

Enhance and Modify Services

Short-term

- Create incentives for transit use
- Maximize the effectiveness of the service already in the area
- Consider doubling the amount of peak service in the area to Downtown/Westshore, creating USF Route
 - 10 Vehicles @~\$500k each = \$5M in Capital Costs
 - Additional Peak Service (7am-9am)
 - Lithia Pinecrest to Bloomingdale and Lithia Pinecrest to Causeway/Lumsden
 - 6 Peak trips to Downtown/Westshore = ~\$750k (~\$125k per trip)
 - Additional 240 (120 per hour) seated trip capacity (plus standing)
 - 4 Peak trips to USF Area = ~\$500k (~\$125k per trip)
 - Additional 160 (80 per hour) seated trip capacity (plus standing)
 - 10-Year Costs = \$17.5m (recurring with vehicle replacement)
 - Compare to cost of resurfacing
 - Operating costs will come down with new facility

Mid-term

- Increase peak service to Downtown Tampa and Westshore
 - Hourly service inadequate to Downtown Tampa and Westshore
 - Develop cost estimates for different frequencies
 - Focus Zones: S. Falkenburg, S. 301, Brandon Mall, Central Brandon
 - Increase Vehicle Capacity –Articulated Vehicles (increase seated capacity)
 - Maintenance Implications
- Evaluate alternative sites for bus staging for midday to reduce dead-head

Long-term

- Create Light-maintenance facility and Park-and-Ride in Lithia Pinecrest vicinity for end-of-line for long-haul routes
 - \$20-\$25m for maintenance facility infrastructure + parking costs
 - Reduce long-term dead-head costs and reduce overall costs of service expansion in south and east county for fixed-route and paratransit
 - Costs per revenue hour for 24LX and 25LX is >\$185 due to dead-head compared to 360LX at \$109
 - Use coach or articulated vehicles to increase capacity per trip

Transit Capacity Impacts of Actions

Route (with existing dead-head)	Annual Cost	New Peak Trips (7am – 9am)	Additional Seated Capacity with Existing Fleet (per hour)	Additional Seated Capacity Coach or Articulated (per hour)
New Trips (Downtown + Westshore)	\$750k	6	240 (120)	300 (150)
New USF Route	\$500k	4	160 (80)	200 (100)
Existing 24&25LX	\$1.02m	8		
Total	\$2.27m	18	400 (200)	500 (250)

Route (with new facility)	Annual Cost	Peak Trips (7am – 9am)	Additional Seated Capacity with Existing Fleet (per hour)	Additional Seated Capacity Coach or Articulated (per hour)
New Trips (Downtown + Westshore)	~\$563k	6	240 (120)	300 (150)
New USF Route	~\$375k	4	160 (80)	200 (100)
Existing 24&25LX	~\$790k	8		
Total	\$1.73m	18	400 (200)	500 (250)

50% reduction of dead-head, would save \$.5m annually (conservative estimate), plus local routes and paratransit



Hillsborough Area Regional Transit Authority
