WEST BUSCH BOULEVARD

Corridor Alternatives & Strategies Report

DRAFT FINAL August 31, 2018

SR 580/Busch Blvd. from N. Dale Mabry Hwy. to N. Nebraska Ave.

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FDOT

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Executive Summary

The Florida Department of Transportation (FDOT), District Seven, initiated the West Busch Boulevard Corridor Study to address safety and mobility concerns on Busch Boulevard from Dale Mabry Highway to Nebraska Avenue in unincorporated Hillsborough County and the City of Tampa. The goal of the study was to establish a vision for the corridor's character, explore typical section options, and define a strategy to achieve the stated vision. To realize this goal, FDOT combined engineering analysis with an enhanced public outreach program that included a Project Advisory Group (PAG) of local partner agency representatives, a Public Visioning Workshop, and an Alternatives Public Meeting. This Corridor Alternatives and Strategies Report documents the study process, analysis, and recommendations to meet future traffic demand, accommodate all users, and achieve the corridor vision.

The study area extends 3.3 miles and varies from a four-lane undivided roadway, to a four-lane roadway divided by a two-way left-turn lane (TWLTL), and finally a six-lane divided roadway near I-275. Vehicular traffic is high, with average annual daily traffic (AADT) exceeding 50,000. This high number of vehicles regularly mixes with bicycle traffic, pedestrian traffic, multiple bus routes, and access to social services and Chamberlain High School. Although the Hillsborough County Comprehensive Plan shows Busch Boulevard as a six-lane preservation corridor, the City of Tampa Comprehensive Plan constrains segments of Busch Boulevard to four lanes. Existing right-of-way (ROW) is limited, and an active CSX rail line runs parallel to the south side of the corridor for most of the study area. There are no bike lanes in the corridor, and sidewalks are not contiguous. There are sidewalk gaps along the south side and gaps in connections to sidewalks along Gunn Highway, North Boulevard, and Nebraska Avenue. Crashes frequently occur along the corridor, and the Hillsborough Metropolitan Planning Organization (MPO) has identified Busch Boulevard as the fourth most dangerous corridor for bicycles and pedestrians within the County.

Existing deficiencies and community input helped define the desired future of the corridor through a series of goals and objectives related to accessibility and connectivity, economic development, mobility, and safety. Safety, above all else, was found to be the community's top concern. The community's priorities were summarized through the following corridor vision statement:

> *"The Busch Boulevard corridor offers safe, comfortable and convenient access through and across the corridor for all users and all travel modes."*

The study team considered a wide range of potential improvements for their consistency with the established vision and their ability to address deficiencies. Viable alternatives were presented to the PAG and at the Alternatives Public Meeting. The feedback from these meetings shaped the proposed improvements that are recommended for further evaluation or development in coordination with partner agencies.

These proposed improvements include the addition of a restrictive landscaped median to improve safety, address access issues, and accommodate turn lane improvements; continuous 7' buffered bicycle lanes; continuous 6' sidewalks; pedestrian lighting; intersection improvements that enhance pedestrian safety, with a focus on Chamberlain High School at North Boulevard; signal coordination to improve traffic flow; improvements to transit stops; reduced lane widths as a method of traffic calming; and reducing the posted speed. Additionally, the study recommends further evaluation of potential six-lane widening between Dale Mabry Highway and Armenia Avenue.

Some of these proposed improvements require significant ROW and would first need to be further evaluated in a Project Development and Environment (PD&E) Study, which is not currently funded. Therefore, the totality of the proposed improvements detailed above are considered a long-term investment. In an effort to actively advance the corridor towards the vision, an implementation strategy was developed that identifies improvements which could be advanced in the near- and mid-term, independent of a PD&E Study.

Report Organization

This final report summarizes the key findings of the 1½-year-long corridor study effort, including key multimodal issues and opportunities for the Busch Boulevard Corridor. In addition, this report documents the decision-making process used throughout the study, the preliminary alternatives considered, and the proposed alternatives and strategies recommended for further consideration.

This Report is organized around the following questions:

- Introduction – Why West Busch Boulevard?
- Existing Conditions – What Is West Busch Boulevard Like Today?
- Corridor Vision – What Is the Desired Future for West Busch Boulevard?
- Preliminary Alternatives – What Improvements were Considered?
- Recommendations – What Alternatives and Strategies are Proposed?

The Florida Department of Transportation may adopt this planning product into the environmental review process, pursuant to Title 23 USC 168(4)(d) or the state project development process.

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1. Introduction

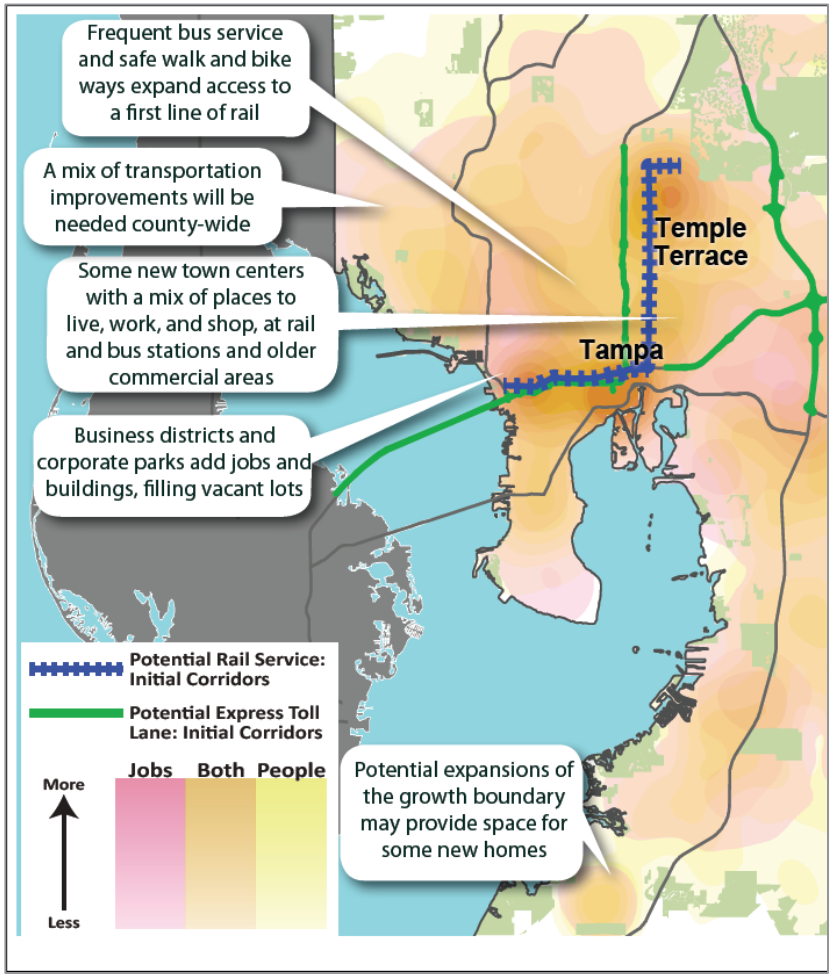
Why West Busch Boulevard?

Hillsborough County's population is projected to grow an additional 29 percent by 2040, with growth in population and employment most heavily concentrated within the cities of Tampa and Temple Terrace (see **Exhibit 1**) [1,2]. This growth will place an additional strain on the area's already congested roadway network.

State Road 580 (SR 580; Busch Boulevard) functions as an important east-west roadway connection in Northwest Hillsborough County and serves both the high-growth cities of Temple Terrace and Tampa. Busch Boulevard links regionally significant routes, including the Veterans Expressway to the west and both Interstate 275 (I-275) and Interstate 75 (I-75) to the east. The corridor also serves as one of the primary links to the Busch Gardens Tampa Bay theme park. If no mobility and safety improvements are made, traffic congestion, travel delays, and crashes will increase along this corridor in the future.

While future regional mobility is an important consideration, Busch Boulevard functions as more than just a means of through-travel to destinations east and west. The corridor borders a variety of land uses, including six schools, churches, small businesses with direct access to and from Busch Boulevard, the North Tampa Branch Public Library, the career resource center CareerSource Tampa Bay, the Suncoast division for the Florida Department of Children and Families, and the Tampa Language Center, which serve some of the community's most vulnerable populations. Additionally, Hillsborough Area Regional Transit Authority (HART) provides transit service along the corridor, with 2 transit routes and 15 transit stops within the study limits.

Exhibit 1. Hillsborough County Growth Map



Source: Imagine 2040: Hillsborough Long Range Transportation Plan (Hillsborough County Metropolitan Planning Organization, 2014)

[1] Imagine 2040: Hillsborough Long Range Transportation Plan (2014). http://www.planhillsborough.org/wp-content/uploads/2014/10/2040-LRTP-Final-Full-Report-Modified-4-6-18.pdf

[2] Bureau of Economic and Business Research, Population Estimates (2017). https://www.bebr.ufl.edu/sites/default/files/Research%20Reports/estimates_2017.pdf

The Florida Department of Transportation (FDOT) – District 7, initiated the West Busch Boulevard Corridor Study to find a balance of acceptable levels of access and mobility, within the context of **Complete Streets**[3] and **Towards Zero Deaths**[4,5,6] policies, and to identify alternatives and strategies that will address travel-related problems, such as congestion, access, and operational efficiency, as well as reduce the number of vehicular, pedestrian, and bicyclist crashes and support safe accessibility to transit along the corridor.

What is FDOT's Approach to Complete Streets?

In September 2014, the FDOT adopted the Statewide Complete Streets Policy (Topic No. 000-625-017-a).

Complete Streets serve the transportation needs of transportation system users of all ages and abilities, including pedestrians, bicyclists, transit riders, motorists, and freight handlers. A transportation system based on Complete Streets principles can help to promote safety, quality of life, and economic development.

Safety:

Safety for all users is FDOT's top priority. Roadways with context-appropriate speeds can result in reduced fatalities and serious injuries. The Complete Streets approach considers the mobility, convenience, accessibility, and safety of all road users, and places an emphasis on the most vulnerable users of a given roadway.

Quality of Life:

A Complete Streets approach helps to align transportation decisions with land use, resulting in quality places where transportation investments support a community's quality of life.

Economic Development:

A Complete Streets approach connects communities and supports Florida's existing economic centers, employment centers, and visitor destinations by striving to provide the highest level of multimodal infrastructure in these core areas.

Implementing Complete Streets is a department-wide priority for FDOT. The Complete Streets approach builds on flexibility and innovation in roadway planning and design to put the right street in the right place.

[3] FDOT. Completing Florida's Streets. http://www.flcompletestreets.com/files/FDOT-CompleteStreets-Brochure.pdf

[4] Toward Zero Deaths (June 2014). http://www.towardzerodeaths.org/strategy/

[5] FDOT. Florida Strategic Highway Plan (2012). http://www.fdot.gov/safety/SHSP2016/SHSP-2012.shtm

[6] Plan Hillsborough. Vision Zero Action Plan (2017). http://www.planhillsborough.org/vision-zero/

The Towards Zero Deaths Vision

Otherwise known as "Vision Zero," the U.S. has adopted a National Strategy vision of a highway system free of fatalities through a sustained and even accelerated decline in transportation-related deaths and injuries. At the core of the Vision Zero movement is the belief that death and injury on roadways is preventable – in other words, that these aren't "accidents," but the result of poor behaviors combined with unforgiving roadway designs.

Florida shares the national traffic safety vision, "Toward Zero Deaths," and formally adopted its own version of the national vision, "Driving Down Fatalities," in 2012. FDOT and its partners are committed to eliminating fatalities and reducing serious injuries with the understanding that the death of any person is unacceptable. The Florida Strategic Highway Safety Plan defines overarching strategies to help reach the safety vision through engineering, education, enforcement, and emergency services.

Engineering:

- Identify, develop, and deploy engineering solutions and best practices that encourage safe driving behavior and reduce roadway fatalities and serious injuries.
- Incorporate policies and practices into roadway design, construction, operation, and maintenance that make Florida's transportation system safer for all users.
- Ensure infrastructure design allows for safe and efficient access for first responders.

Enforcement:

- Increase targeted enforcement activities in high-crash locations and at relevant times.
- Increase enforcement of high-risk driving behaviors.

Education:

- Educate all road users on sharing the road.
- Develop and implement communication strategies for all road users and improve public awareness of highway safety.
- Increase motorists' understanding of engineering solutions and best practices and vehicle technologies that can reduce the number and injury severity of crashes.

Emergency Response:

- Improve emergency response time.
- Facilitate the quick clearance of traffic crashes.

In December 2017, the Hillsborough County "Safer Streets Now, Vision Zero" Action Plan was developed, and a "Vision Zero" goal resolution was adopted by the Tampa City Council, Hillsborough County Commission, Temple Terrace City Council, Plant City Commission, and by the School Board of Hillsborough County. **The Action Plan identifies Busch Boulevard as the 4th most dangerous corridor for bicycles and pedestrians within the County, based on the number of severe bicycle and pedestrian crashes that occurred per mile between 2012 and 2016.** The Plan calls for further study of dangerous corridors to identify potential countermeasures and design treatments that would create a safer travel environment for the roadways' most vulnerable users.

Project Description

Study Area

The project study area, as shown in **Exhibit 2**, extends along 3.3 miles of Busch Boulevard, from North Dale Mabry Highway to North Nebraska Avenue, just east of the I-275 interchange. The western 1.3 miles of the study area falls within unincorporated Hillsborough County, with the jurisdiction shifting to the City of Tampa from just west of the North Armenia Avenue intersection through the eastern limits of the study.

An active CSX rail line runs parallel along the south side of the corridor except between North Armenia Avenue and North Boulevard, where the CSX rail line shifts one block south of the corridor.

Exhibit 2. Study Area Map

Study Overview

The corridor study followed an 18-month schedule, kicking off in March 2017 and concluding in August 2018 (see **Exhibit 3**).

The purpose of the study was to collaborate with stakeholders to:

1. **Identify a long-term corridor vision, and**
2. **Identify potential near-, mid-, and long-term recommendations that together could help achieve the defined vision.**

During the first phase of the study, the study team listened to the community's desires and used this input to shape the corridor vision, which ultimately informed the study approach. Concurrent with the public outreach efforts, the study team analyzed the corridor land use context as well as transportation characteristics, including existing and future traffic, transit, bicycle and pedestrian conditions.

Guided by the corridor vision, the study team developed preliminary strategies and long-term alternatives. The study team presented the viable alternatives to the community and used the feedback to refine and finalize the study recommendations.

Exhibit 3. Study Schedule

Public Involvement Process

The corridor study was shaped by a robust public involvement process. Community input was gathered through two primary means:

1. **Public Outreach and Public Meetings**
2. **A Project Advisory Group (PAG)**

The public involvement approach was developed in compliance with all Federal and State requirements as described in Part 1, Chapter 11 of the FDOT PD&E Manual (2017), including Title VI of the Civil Rights Act of 1964, as amended, and other nondiscrimination laws.

Public Outreach

Public Visioning Workshop

On November 16, 2017, a Public Visioning Workshop was held at the Christian Family Church from 5:30 pm to 7:30 pm. Members of the public were introduced to the study and presented with the findings from the existing and future conditions analysis. The attendees were then asked to provide input on existing concerns along the corridor, rank potential goals and objectives, and to indicate their top five potential corridor improvements. A User Preference Survey was distributed during the Visioning Workshop to gain additional feedback on the goals, objectives and potential improvements. The input from this meeting was used to develop the corridor vision statement and evaluation criteria (as detailed in Chapter 3), and to identify improvements to be considered during the development of the potential alternatives (as detailed in Chapter 4).

Alternatives Public Meeting

On July 10, 2018, an Alternatives Public Meeting was held at the Tampa First Seventh-Day Adventist Church from 5:30 pm to 7:30 pm. The preliminary strategies and long-term alternatives were presented to the public to gain their input and gauge public support of the various preliminary long-term alternatives. The input from this meeting was used to refine the alternatives into the recommended improvements (as detailed in Chapter 5).

Outreach Tools

Project Website
Project materials, study updates, and opportunities to submit public comment were posted on the project website http://www.fdotd7studies.com/westbuschblvd/.

Project Newsletters and Meeting Invitations
Four newsletters were developed throughout the study that provided the latest updates. These newsletters were distributed through email blasts to partner agencies, city and county elected and appointment officials, and other interested individuals, posted on the project website, mailed to property owners along the corridor, and hand delivered to homeowner's associations, schools, churches, libraries, and other gathering places along the corridor.

In addition to the newsletters, invitations to the Public Visioning Workshop and the Alternatives Public Meeting were distributed in the form of postcards and flyers.

Virtual Comment Tool
Via a link on the project website, members of the public were able to access an interactive map of the study area where they could provide location specific comments.

User Preference Survey
A web-version of the User Preference Survey was developed to provide an opportunity for specific input on goals, objectives, and potential improvements from those unable to attend the in-person meeting.

Project Advisory Group

At the project kick-off meeting, attendees were invited to join the PAG. City and County elected and appointed officials, representatives from Federal regulatory agencies, and staff of the Southwest Florida Water Management District, Tampa Bay Area Regional Transportation Authority, Tampa International Airport, CSX Railroad, Tampa Bay Regional Planning Council, Hillsborough County-City Planning Commission and Metropolitan Transportation Organization, Hillsborough Area Transit Authority, and Hillsborough County Public School Transportation were among those invited to participate. The PAG members are listed on the inside front cover of this report. Those that were not able to join the PAG were kept informed through the project newsletters and updates to the project website and were encouraged to provide comments throughout the study.

The PAG met four times during key milestones of the study process. **Exhibit 4** summarizes the PAG meetings and discussion items.

Key input from the PAG and the public is referenced throughout the remaining chapters of this report. **Appendix E** includes the Public Involvement Plan, meeting summaries, public involvement materials, and public comments.

Exhibit 4. PAG Meetings Summary

Meeting/Date	Agenda
Project Kick-off **June 29, 2017**	• Provided overview of project • Solicited input on issues and concerns in the corridor • Invited participation in the PAG
Project Advisory Group #1 **August 29, 2017**	• Reviewed existing roadway and corridor characteristics, including existing and future traffic projections, bicycle/pedestrian counts, and context classification • Discussed corridor vision
Project Advisory Group #2 **October 24, 2017**	• Reviewed draft materials for the Public Visioning Workshop • Reviewed draft User Preference Survey
Project Advisory Group #3 **January 23, 2018**	• Shared feedback received at the Public Visioning Workshop • Finalized corridor vision statement • Reviewed preliminary strategies (spot improvements) to achieve the vision
Project Advisory Group #4 **May 31, 2018**	• Reviewed draft materials for the Alternatives Public Meeting • Discussed agency partners' roles in achieving the long-term vision

2. Existing Conditions

What is West Busch Boulevard like today?

This chapter defines the surrounding land use context (using FDOT's context classification system) and the transportation characteristics of the Busch Boulevard corridor, and summarizes findings related to roadway users, travel demand, and challenges and opportunities of each roadway user.

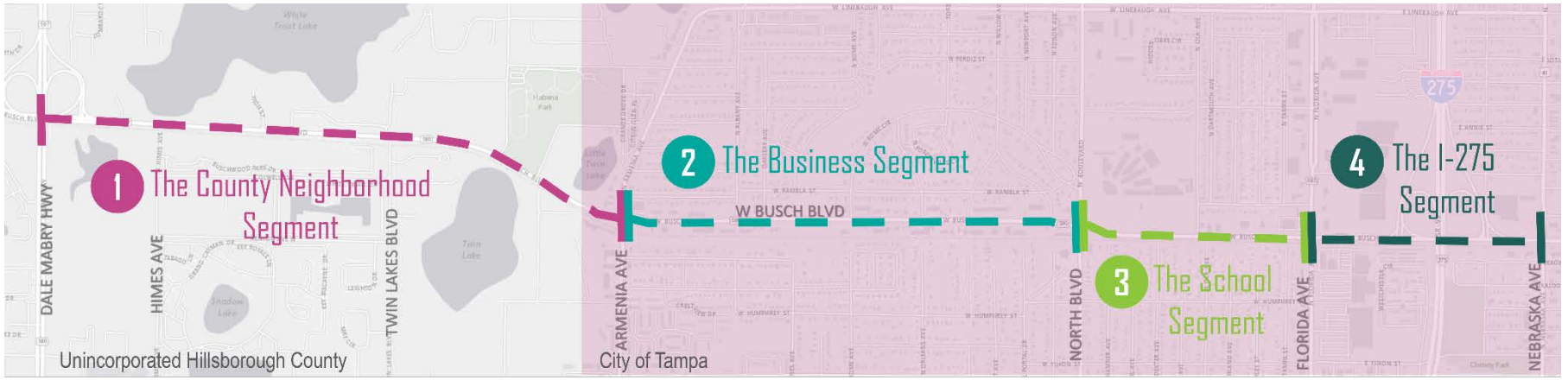
Study Segments

For the purposes of this study, the study area was divided into the following four segments (**Exhibit 5**):

1. ***The County Neighborhood Segment***: The segment west of North Armenia Avenue near the County/City boundary
2. ***The Business Segment***: Between North Armenia Avenue and North Boulevard where the parallel CSX rail line shifts one block south, allowing businesses and driveways on both sides of the corridor
3. ***The School Segment***: Between North Boulevard and North Florida Avenue where Chamberlain High School is located
4. ***The I-275 Segment***: East of North Florida Avenue to North Nebraska Avenue, which is primarily defined by the I-275 interchange

This section describes the typical sections and the general findings related to the context classification of the four corridor segments. More detailed information on the context classification for the study area is included in **Appendix D.**

Exhibit 5. Corridor Study Segments

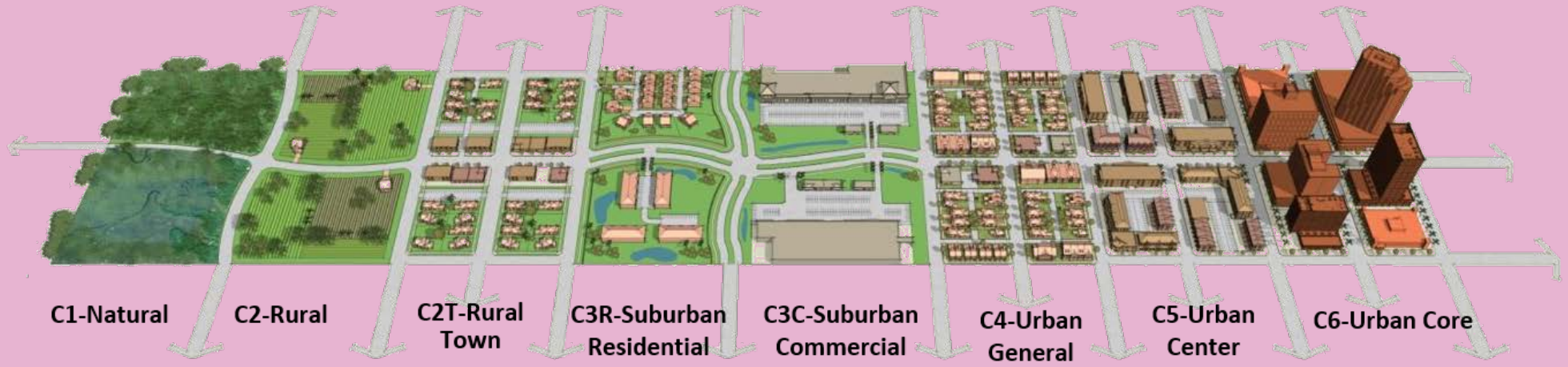


Context Classification

FDOT has adopted a standardized context classification system[1] to describe the general characteristics of the land use, development patterns, and connectivity of the street grid along a roadway. The identified context classification is used to inform the design criteria and standards used in FDOT's planning, Project Development and Environment (PD&E), design, construction, and maintenance approaches to ensure that roadways are supportive of safe and comfortable travel for their anticipated users.

Context classifications range from C1-Natural to C6-Urban Core. **Exhibit 6** shows the range of the eight FDOT context classifications. The primary measures used to define the context classification are street connectivity, including block length, block perimeter and intersection density, and development form and intensity, including building placement, presence of fronting uses, location of off-street parking, land uses, and building heights. The secondary measures used to define context classification include allowable residential density (dwelling units per acre [du/ac]), allowable office density (floor area ratio), population density, and employment density.

Exhibit 6. FDOT Context Classification System



[1] FDOT Context Classification. August 2017. http://www.fdot.gov/roadway/CSI/files/FDOT-context-classification.pdf

1 The County Neighborhood Segment:

North Dale Mabry Highway to North Armenia Avenue

Typical Section

The County Neighborhood Segment extends approximately 1.3 miles from the Dale Mabry Highway off-ramps (Mile Post [MP] 0.000) to North Armenia Avenue (MP 1.315). The existing typical section is a four-lane undivided highway as shown in **Exhibit 7**. Sidewalks are continuous along both sides of the roadway, with the southern sidewalk located within a CSX easement. Existing lane widths range from 11 to 13 ft.

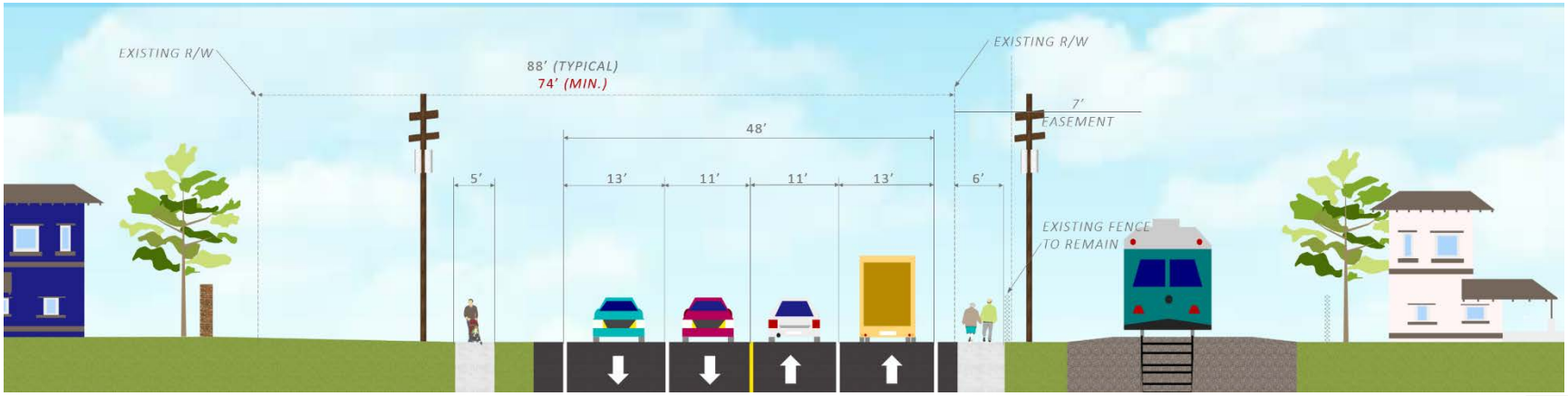
Context Classification

From North Dale Mabry Highway to North Armenia Avenue, the bordering land uses are single-family residences and medium-sized commercial office buildings (zoned as planned development) on the north, and the CSX rail line immediately adjacent to the ROW on the south. Additional single-family homes and small office parks are south of the rail line, but the connection to this street network is precluded by the rail corridor.

On the north side, buildings are generally 1 to 2 stories in height, detached structures with medium to large setbacks from the street, and have large, off-street parking lots. The average block length is 1,142 feet (ft).

This segment is almost entirely within unincorporated Hillsborough County.

Exhibit 7. Existing Typical Section – Dale Mabry Highway to Armenia Avenue (C3R-Suburban Residential)



Current County zoning permits single-family residential land uses at a density of up to 6 du/ac to provide a "suburban living environment" [2]. Similar low-density residential development is prescribed in the adopted future land use plan[3].

These findings are consistent with the **C3R – Suburban Residential** context classification, which is defined as mostly residential uses within large blocks and a disconnected or sparse roadway network.

Notable community features within this segment include:

- The planned White Trout Lake Subdivision development, which has an approved site plan to subdivide the parcel on the north side of the corridor between North Himes Avenue and Mossvale Lane to add an additional 16 single-family homes with direct access to the Busch Boulevard,
- The Forest Hills Youth Baseball Park between Orange Grove Avenue and Mabry Street, and
- Caminiti Exceptional Center, North Tampa Alternative School, and Twin Lakes Elementary, all located off Armenia Avenue on the south side of the corridor.

[2] Hillsborough County Land Development Code. https://library.municode.com/fl/hillsborough_county/codes/land_development_code

[3] Hillsborough County Adopted 2025 Future Land Use Map. Effective Date: December 21, 2017. http://www.planhillsborough.org/wp-content/uploads/2013/02/Adopted_Unincorporated_FLU.pdf

2 The Business Segment: North Armenia Avenue to North Boulevard

Typical Section

The Business Segment extends 1 mile from North Armenia Avenue (MP 1.315) to North Boulevard (MP 2.315). The existing typical section is a four-lane divided roadway with a flush unrestricted median (two-way left-turn lane), as shown in **Exhibit 8**. Sidewalks are continuous along the north side of the roadway, but sidewalk gaps exist on the south side. Existing lane widths range from 10½ to 11 ft.

Context Classification

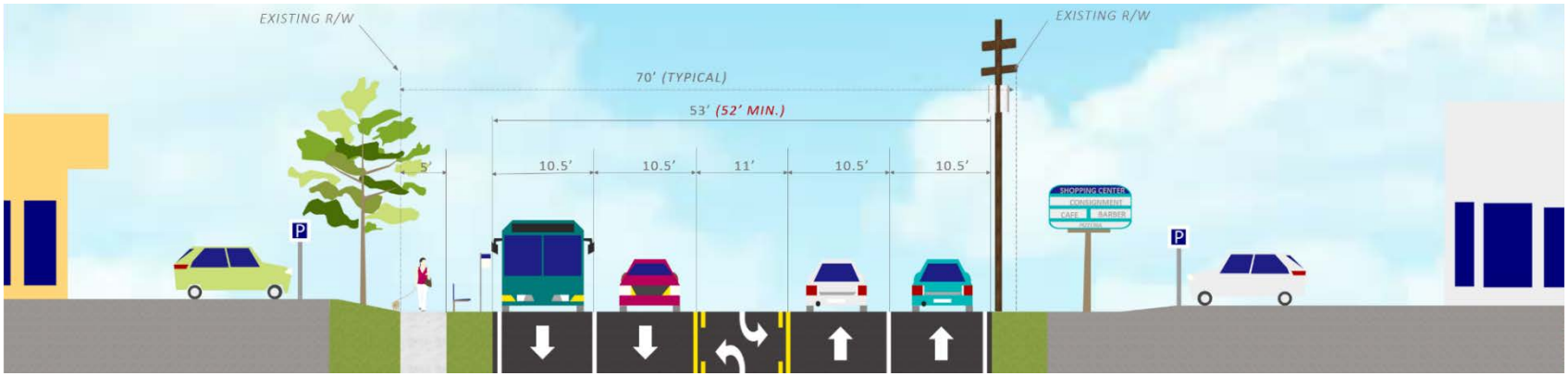
Between North Armenia Avenue and North Boulevard, the CSX rail line alignment shifts one block to the south, which creates the opportunity for access to bordering land uses on both sides of the street. Small retail and office buildings along both sides of the roadway include a veterinary clinic, a child daycare, repair shops, salons, and insurance and law offices. Generally, buildings are 1 to 2 stories in height, with allowable height increasing to 65 ft. in some locations. Buildings have small to medium setbacks, featuring off-street front and side parking lots. The average block length is 745 ft.

This segment is within the City of Tampa. City zoning permits single-family residential land uses at a slightly higher density than found in the County Neighborhood Segment. Zoning also allows for small- to medium-sized commercial, retail services, and offices that are compatible with residential land uses, including the conversion of family residences to offices (lot sizes 5,000 to 10,000 square feet). The future land use is general mixed use, which allows similar and more high-intensity development in the future.

These findings are consistent with the **C4-Urban General** context classification, generally defined as a mix of uses set within small blocks with a well-connected roadway network. The roadway network usually connects to residential neighborhoods immediately along the corridor or on the back side of blocks fronting the roadway.

The North Tampa Branch Library is located at the southeast corner of the North Boulevard intersection.

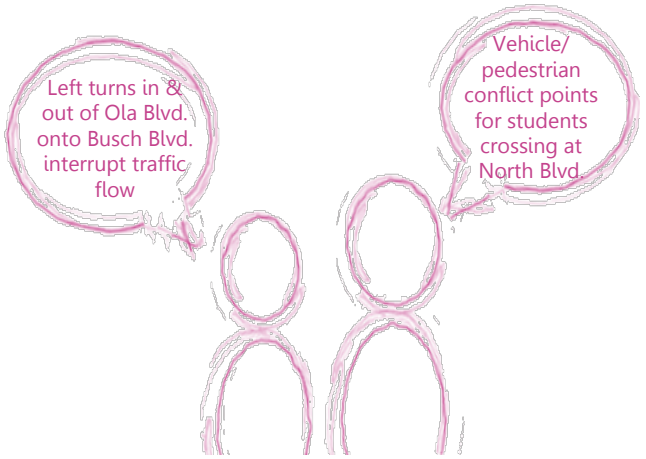
Exhibit 8. Existing Typical Section - Armenia Avenue to North Boulevard (C4-Urban General)



3 The School Segment: North Boulevard to North Florida Avenue

Typical Section

The School Segment extends a little over half a mile from North Boulevard (MP 2.315) to North Florida Avenue (MP 2.817). The existing typical section is a four-lane undivided roadway as shown in **Exhibit 9**. Sidewalks are continuous along both sides of the roadway. Lane widths are 12 feet.



Context Classification

East of North Boulevard, the CSX rail line alignment again runs directly adjacent to the Busch Boulevard southern ROW. Chamberlain High School is at the northeast corner of the North Boulevard intersection. Low- to medium-density residential neighborhoods are north of the high school and south of the rail line.

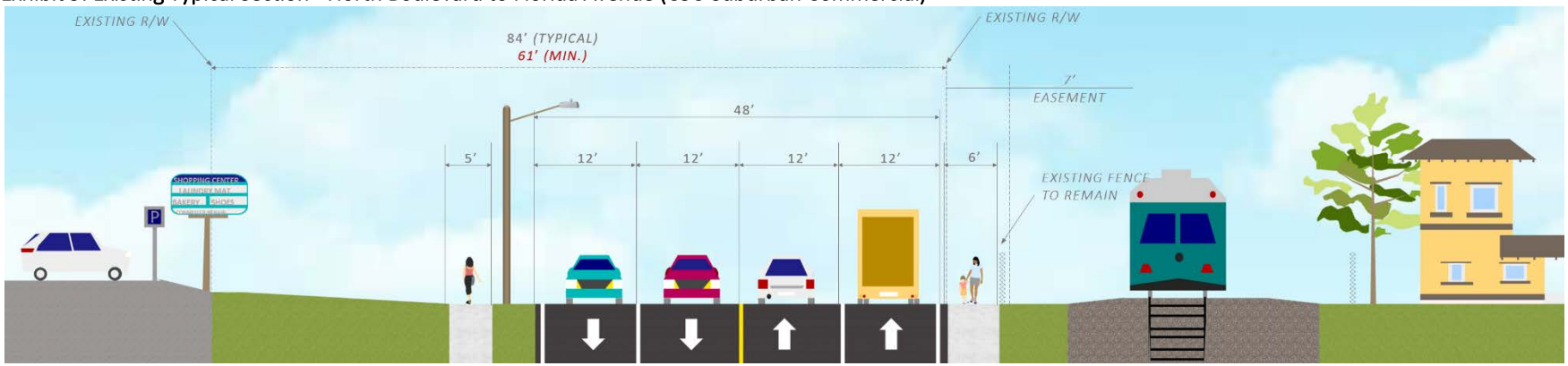
Directly adjacent land uses include general commercial, such as CVS pharmacy. Generally, buildings are 1 to 2 stories in height, detached structures with medium to large setbacks, featuring large off-street parking lots. The average block length is 1,320 ft. Similar commercial development is prescribed in the adopted future land use plan.

These findings are consistent with the **C3C-Suburban Commercial** context classification, which is generally described as mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

Notable community features in this segment include:

- Chamberlain High School, Adams Middle School, and Forest Hills Elementary School to the north of the corridor, off North Boulevard. Chamberlain High School is directly off Busch Boulevard at the northeast corner of the North Boulevard intersection.

Exhibit 9. Existing Typical Section - North Boulevard to Florida Avenue (C3C-Suburban Commercial)



4 The I-275 Segment: North Florida Avenue to North Nebraska Avenue

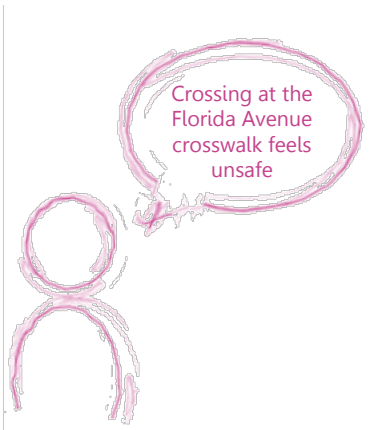
Typical Section

The I-275 Segment extends a little more than 0.5 miles from North Florida Avenue (MP 2.817) to North Nebraska Avenue (MP 3.32). The existing typical section is a six-lane divided roadway with a raised median as shown in **Exhibit 10**. Sidewalks are continuous along both sides of the roadway. Lane widths are 12 ft.

Context Classification

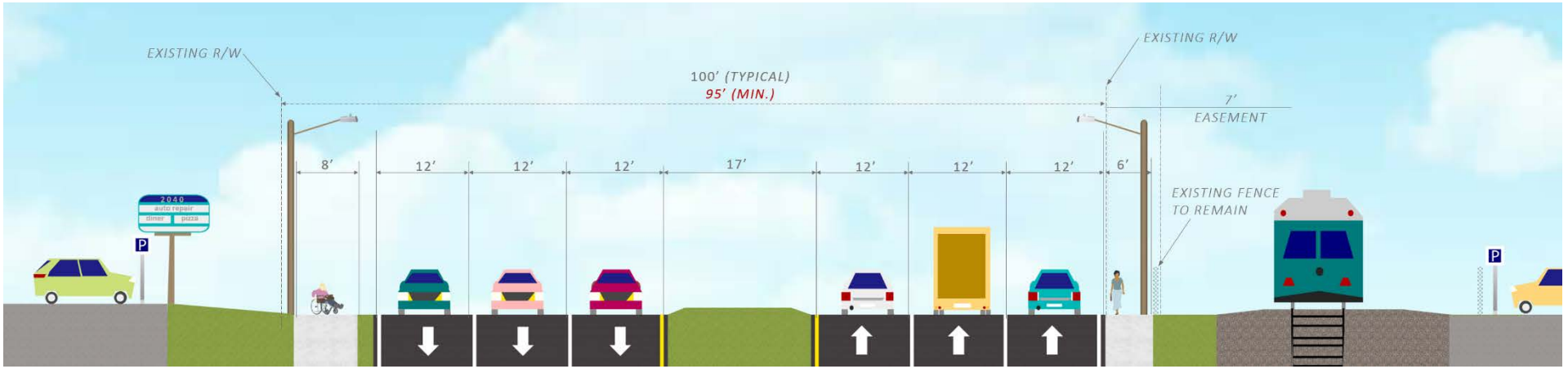
Directly adjacent land uses include intense commercial and service uses, including a Walmart Neighborhood Center and a gas station. A commercial strip mall at the northeast corner of Busch Boulevard and North Florida Avenue provides important community resources, such as the Florida Department of Children and Families, the Tampa Language Center, and CareerSource Tampa Bay. The HART Yukon Transfer Center is south of the corridor off North Florida Avenue. The I-275 ramps are also between North Florida Avenue and North Nebraska Avenue.

Much like segment 3, buildings are 1 to 2 stories in height, detached structures with medium to large setbacks, featuring large off-street parking lots. The average block length is 1,320 ft. Similar commercial development is prescribed in the adopted future land use plan.



These findings are consistent with the **C3C-Suburban Commercial** context classification, which is generally described as mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

Exhibit 10. Existing Typical Section - Florida Avenue to Nebraska Avenue (C3C-Suburban Commercial)



Transportation Characteristics

This section describes the transportation characteristics related to existing and future conditions along the West Busch Boulevard corridor by each mode of travel: motorized vehicles, transit, bicyclists, and pedestrians.

Motorized Vehicles

West Busch Boulevard is classified as an *urban principal arterial other* throughout the corridor study limits. The design speed is 45 miles per hour (mph) throughout the corridor. The posted speed is 45 mph from the North Dale Mabry Highway interchange (MP 0.000) to east of North Willow Avenue (MP 2.107) and 40 mph east of North Willow Avenue (MP 2.107) to west of North Nebraska Avenue (MP 3.320).

There are 11 signalized intersections and 8 unsignalized, stop controlled intersections in the study area. Because of the CSX rail line that parallels the south side of West Busch Boulevard, 14 of the 19 intersections are T-intersections. **Exhibit 11** summarizes the intersection configuration and traffic control type for each of them.

Exhibit 11. West Busch Boulevard Study Area Intersections

Intersection	Configuration	Traffic Control
Southbound Dale Mabry Highway Ramps	T-Intersection	Signalized
NB Dale Mabry Highway Ramps	T-Intersection	Signalized
Himes Avenue	T-Intersection	Signalized
Mossvale Avenue/Twin Lakes Boulevard	Four Leg Intersection	Signalized
Orange Grove Road	T-Intersection	Signalized
North Arrawana Avenue	T-Intersection	Stop Controlled
North Armenia Avenue	Four Leg Intersection	Signalized
North Albany Avenue	T-Intersection	Stop Controlled
North Oakleaf Avenue	T-Intersection	Stop Controlled
North Rome Circle	T-Intersection	Stop Controlled
North Orleans Avenue	T-Intersection	Stop Controlled
North Willow Avenue	T-Intersection	Stop Controlled
North Edison Avenue	T-Intersection	Stop Controlled
North Boulevard	Four Leg Intersection	Signalized
North Ola Avenue	T-Intersection	Stop Controlled
North Florida Avenue	Four Leg Intersection	Signalized
Southbound I-275 Ramps	T-Intersection	Signalized
Northbound I-275 Ramps	T-Intersection	Signalized
North Nebraska Avenue	Four Leg Intersection	Signalized

Existing and Future Level of Service

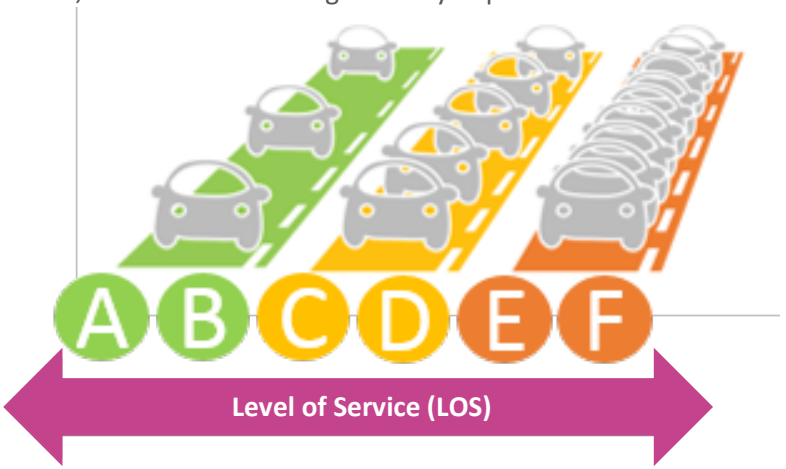
Traffic volume counts were performed throughout the corridor study area in May 2017. **Exhibit 12** provides the existing AADT for the project corridor and the side streets as documented in the traffic report. The typical AADT range for a four-lane urban arterial is 37,000 to 42,000[4]. Existing traffic volumes along SR 580 range from 42,000 to 52,000 AADT, indicating that the corridor is at the high end of capacity thresholds during the peak hours of operation.

North Dale Mabry Highway and I-275 have AADT volumes of 72,500 and 141,500, respectively. In general, the traffic volumes are the lightest in the middle of the corridor and become heavier as travelers head west and east toward Dale Mabry Highway or I-275. Other notable north-south cross streets within the corridor limits are North Florida Avenue and North Nebraska Avenue, with existing AADT volumes that range from 23,000 to 31,000.

Levels of Service (LOS) were developed using information in the Design Traffic Report completed as part of this study (**Appendix G**). LOS is a sliding scale used to describe traffic conditions during peak periods; LOS A represents free-flow conditions while LOS F represents forced or breakdown flow.

As shown in **Exhibit 13**, most of the intersection and segments within the corridor are operating at an LOS E or F during current am and pm peak traffic periods. In the future no-build condition, the level of service degrades further.

While the future traffic projections warrant additional travel lanes on the corridor, the traffic analysis shows that additional lanes will cause induced demand. This means the corridor will be able to handle greater AADT, but the LOS is not significantly improved.



[4] FDOT Plans Preparation Manual, Volume 1, Glossary.

Exhibit 12. Existing (2017) AADT

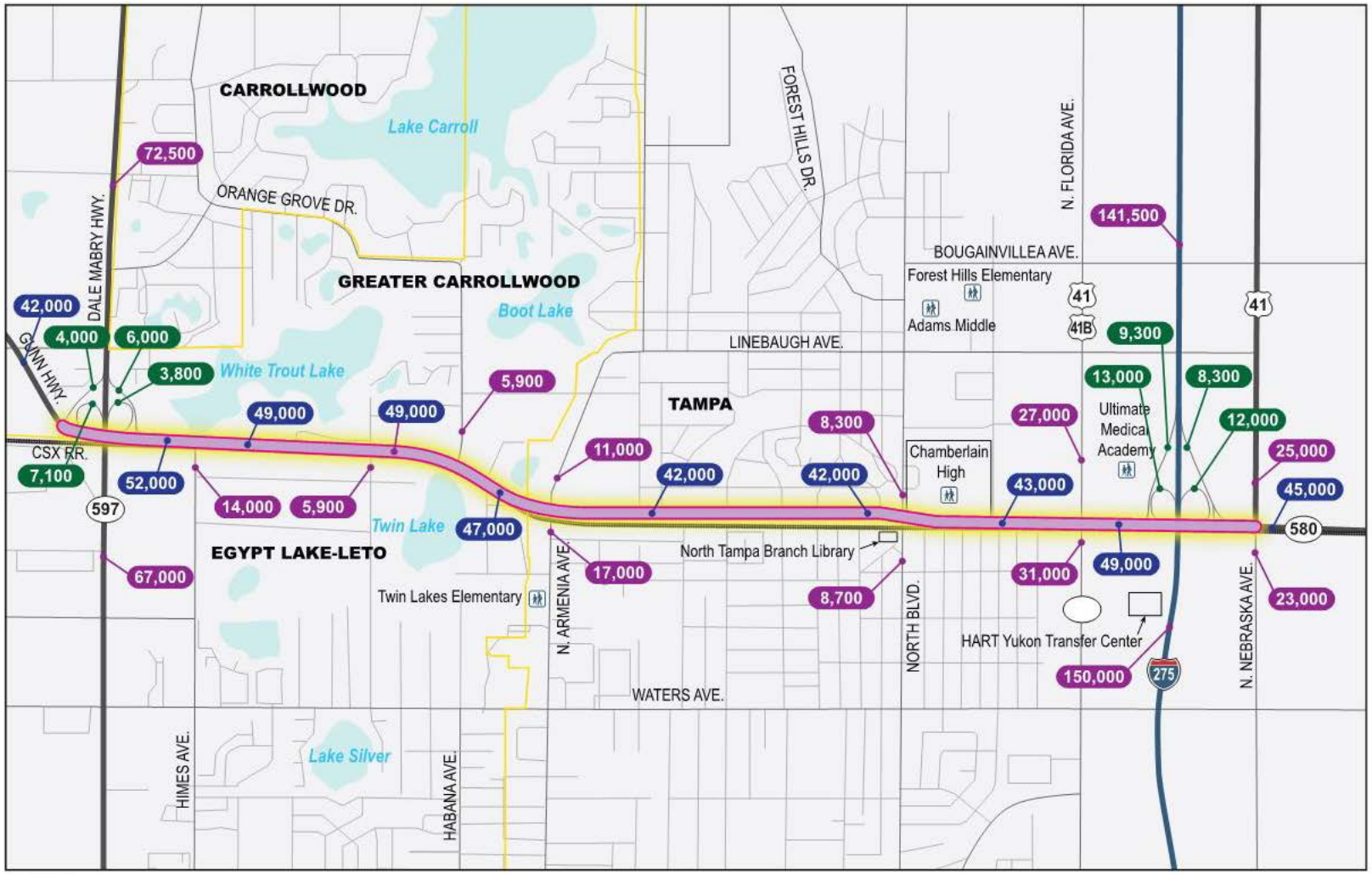


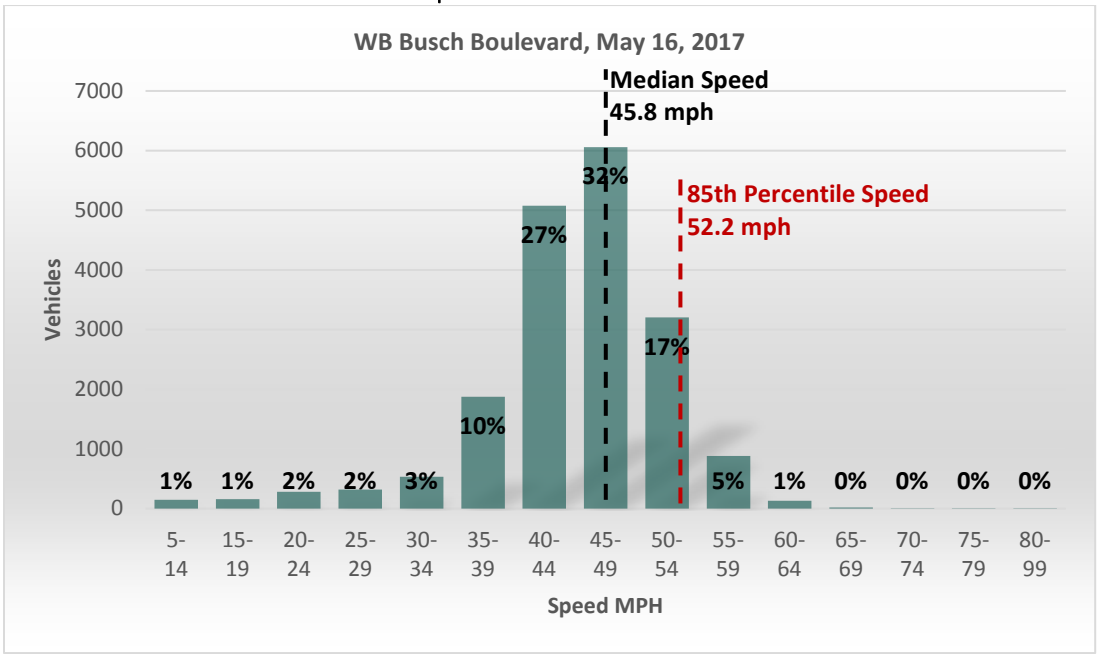
Exhibit 13. Existing and Future Traffic LOS Map

Speed

Input from the PAG and the public has indicated that people are driving too fast on Busch Boulevard and that the speed should be reduced. A spot speed study also showed that half of the speeds checked were above the posted speed limit, and the existing posted speed reduction from 45 mph to 40 mph near North Boulevard had no effect on free-flow speed.[5] Additional existing speed data was collected as part of the traffic analysis vehicle classification count. These data, collected near Oakleaf Avenue, corroborated the results of the Spot Speed Study that indicated speeding was a problem along the corridor.

Exhibit 14 shows the speed distribution, median speed, and 85th percentile speed for a 24-hour period on May 16, 2017. The Manual on Uniform Traffic Control Devices (MUTCD) recommends that the posted speed be within 5 mph of the 85th-percentile speed of free-flowing traffic.

Exhibit 14. Westbound Busch Boulevard Speed Distribution



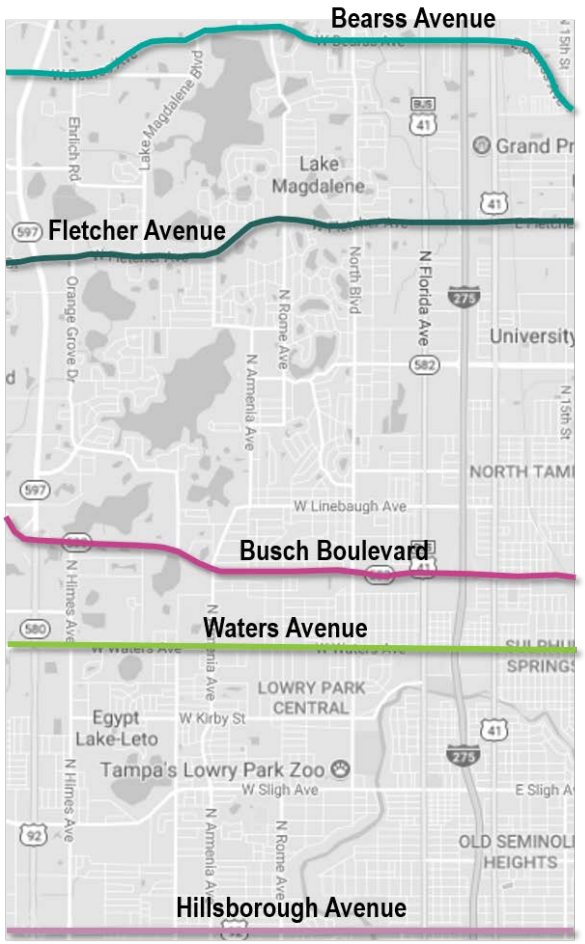
5 FDOT Districtwide Traffic Data Collection, Spot Speed Studies, Busch Boulevard (SR 580) MP 0.507 to 2.565, March 2018

Parallel Facilities

Exhibit 15 shows the parallel east-west routes within proximity to the study corridor. The closest parallel routes that provide regional east-west connectivity comparable to West Busch Boulevard are Bearss Avenue, 3.8 miles north of the study corridor, and Hillsborough Avenue, 2.6 miles south of the study corridor. Both corridors face similar capacity constraints as West Busch Boulevard.

Exhibit 15. Parallel Facilities

Corridor	Lanes	AADT	Notes
Bearss Avenue	4-lane	54,000	3.8 miles north
Fletcher Avenue	4-lane	23,500	Limited western connectivity
Busch Boulevard	4-lane	50,000	--
Waters Avenue	4-lane	27,000	Limited eastern connectivity
Hillsborough Avenue	6-lane	51,500	2.6 miles south



Safety

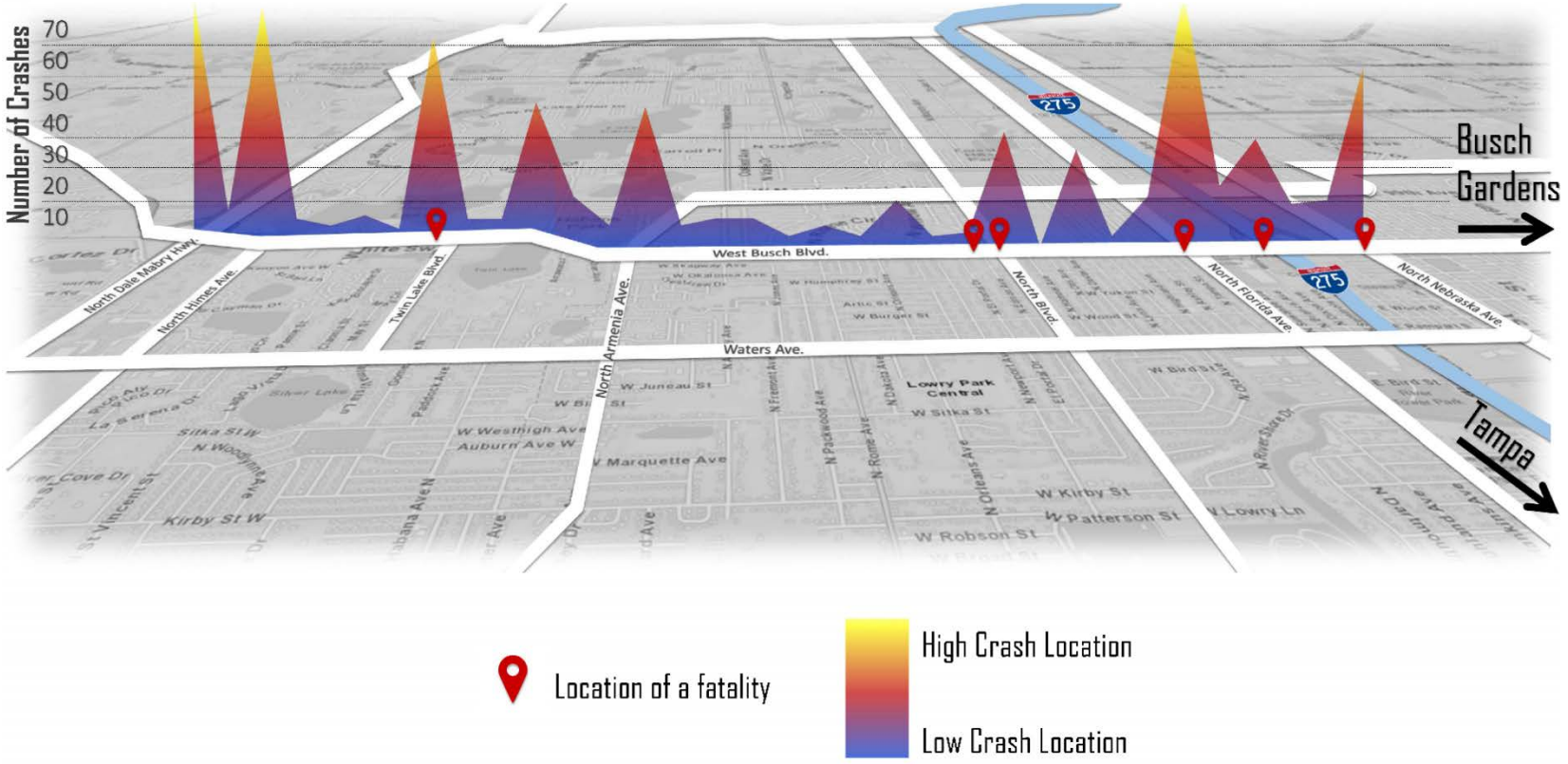
Based on the 5-year crash dataset from 2011 to 2015 provided by the FDOT's Safety Office, 665 crashes occurred within the study area. The most frequent crash type was a rear-end collision, resulting in 53 percent (351) of total crashes.

A total of 49 of the 665 crashes were severe, of which 43 were incapacitating and 6 were fatal. The rear-end crash type accounted for 35 percent of all fatalities and incapacitating injuries. Right-angle crashes accounted for another 31 percent.

Exhibit 16 depicts crash and fatality locations.

An Access Management and Safety Review (AMSR) was developed separately for the corridor study. The purpose of the AMSR was to document the safety performance and access management conditions within the study corridor and provide recommendations to improve them in a manner that is consistent with the vision statement. The AMSR is included in **Appendix F**. Railroad crossing safety is also a concern due to train conflicts with the high vehicle and pedestrian traffic.

Exhibit 16. Crash Map, 5-Year Crash Data (2011-2015)



Transit

HART is the regional transit authority within Hillsborough County. Within the study area, HART provides local bus service along the following routes[6]:

- Along West Busch Boulevard from Dale Mabry Highway to Nebraska Avenue:
  - Route 39 – Busch Boulevard (both directions)
  - Route 14 – Armenia/Howard Avenue (eastbound)
- Crossing West Busch Boulevard, with stops in proximity to intersections within the study area:
  - Route 36 – Dale Mabry Highway/Himes Avenue
  - Route 1 – Florida Avenue
  - Route 42 – University Area Connector

The Yukon Transfer Center (400 East Yukon Street) is just south of the study area and serves as a stop and transfer location for the local routes 14, 42 and 45.

Exhibit 17 describes the existing headways and hours of operation along the two routes that provide service along the corridor.

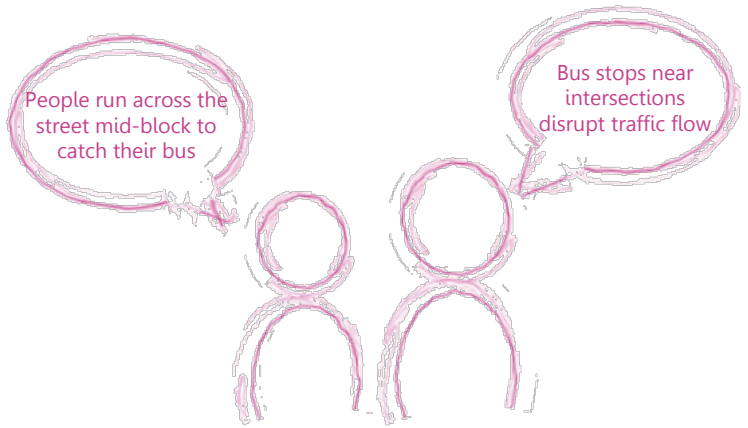
Exhibit 17. Existing headways and hours of operation

Route No.	Route Name	Headway	Hours of Operation
39	Busch Boulevard	Weekday 30 min Saturday 30 min Sunday 60 min	Weekday 4:30 am – 11:19 pm Saturday 6:00 am – 11:14 pm Sunday 6:00 am – 11:08 pm
14	Armenia/Howard Avenue	Weekday 30 min Saturday 30 min	Weekday 5:00 am – 11:15 pm Saturday 6:00 am – 11:11 pm

15 transit stops are located along the West Busch Boulevard within the study limits. Based on data provided by HART, over 600 passengers either board or disembark at these bus stops on a typical weekday. Amenities, such as bus shelters and/or benches are inconsistent along the corridor. Bus stop locations vary in distance from signalized intersections.

Unsafe crossing behavior related to transit stop locations was a frequently stated concern during the public involvement process, as well as the desire for bus bays at major stops to prevent loading times from disrupting traffic flow.

Exhibit 18 summarizes the existing conditions of the bus stops. **Exhibit 19** provides a map of the transit routes and stops in proximity to the study area.

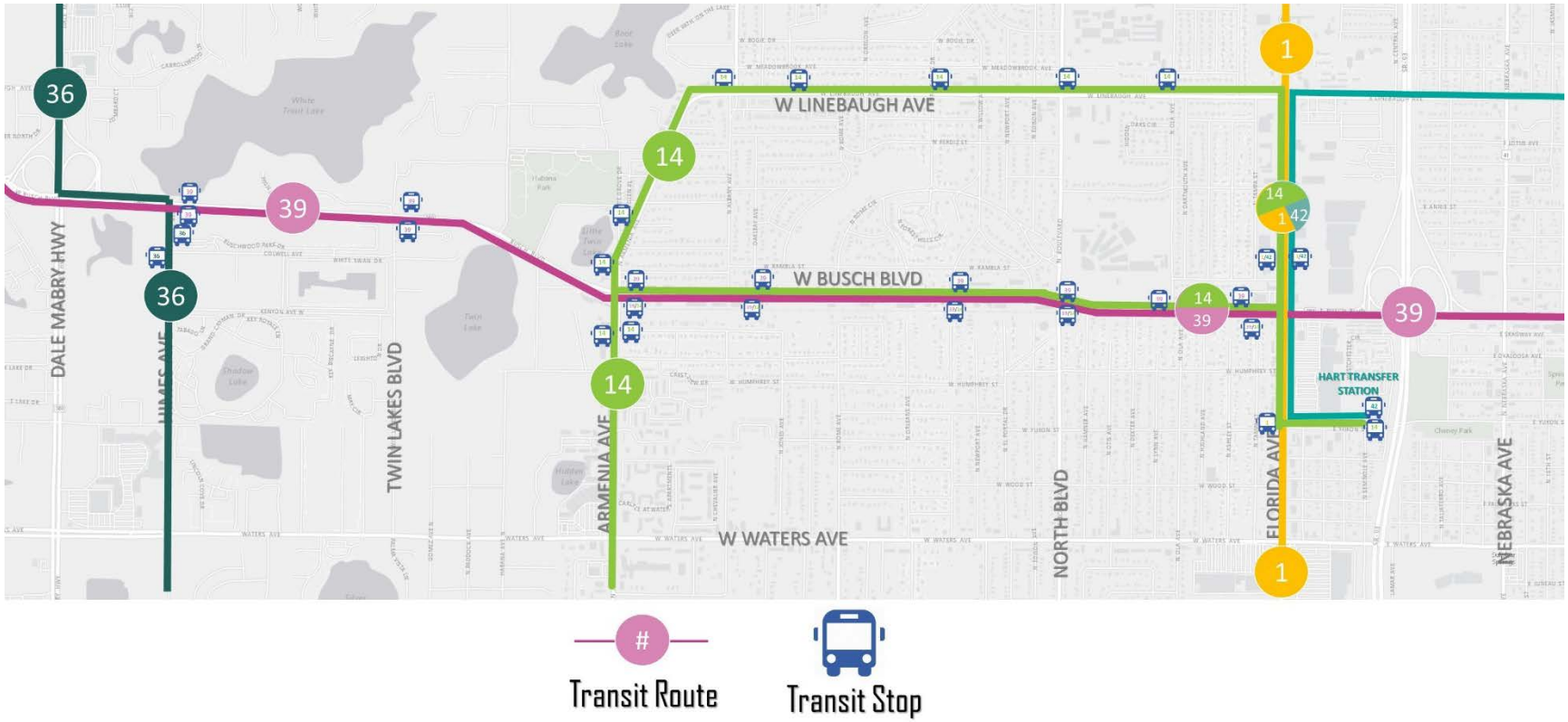


[6] HART System Map. Effective February 25, 2018. http://gohart.org/Style%20Library/goHART/pdfs/maps/system-map-all-services.pdf

Exhibit 18. Transit Stop Existing Conditions

Transit Stop	Traffic Control	Amenities	Route 39 Eastbound		Route 39 Westbound		Route 14 Eastbound	
			Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Himes Avenue	Signal	Lighting, covered shelter and bench	32	28	26	34	No bus stop	
Twin Lakes Boulevard	Signal	Lighting, covered shelter and bench	8	2	3	8	No bus stop	
Armenia Avenue	Signal	Lighting, bench	30	37	19	22	10	20
Oakleaf Avenue	Two-Way Stop Controlled	none	8	4	2	7	2	2
Willow Avenue	Two-Way Stop Controlled	Lighting, bench	3	2	2	4	1	1
North Boulevard	Signal	Lighting, covered shelter and bench	48	30	19	37	11	12
Ola Avenue	Two-Way Stop Controlled	Lighting, covered shelter and bench	No Bus Stop		2	1	No Bus Stop	
Florida Avenue	Signal	Lighting, bench	9	57	17	9	4	41
Total			**138**	**160**	**92**	**122**	**28**	**76**

Exhibit 19. Transit Map



Transit Quality Level of Service (LOS)

Using FDOT Quality Level of Service Tables, existing transit Quality LOS were calculated using peak hour frequency, sidewalk coverage and pedestrian Quality LOS. As shown in **Exhibit 20** (and detailed in the Design Traffic Report, **Appendix G**), the transit Quality LOS for existing conditions are predominately Quality LOS E during both peak hours. The only segment experiencing Quality LOS D during both peak hours is between North Boulevard to Florida Avenue.

The 2017 HART Transit Development Plan's objective is to decrease headways to 15 minutes by 2027 for both route 39 and 14. In addition, HART would like to operate all routes 7 days per week, improve transit stop infrastructure, and meet Americans with Disabilities Act (ADA) accessibility requirements.

If no improvements to transit headways are implemented, additional segments will operate at Quality LOS E in the future. The recommendations for bicycle and pedestrian improvements included in this study would improve future Quality LOS.

Exhibit 20. Transit Quality Level of Service

		Existing Conditions				2040 No-Build				2040 No-Build + Continuous Sidewalks & (5- or 7-ft) Bicycle Lanes			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Roadway Segment - SR 580	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
1	Dale Mabry Hwy SB Ramps - Dale Mabry Hwy NB Ramps	E	E	E	E	E	E	E	E	E	E	E	E
2	Dale Mabry Hwy NB Ramps - Himes Ave	E	D	E	E	E	D	E	E	E	D	E	E
3	Himes Ave - Twin Lakes Blvd	D	E	D	D	D	E	E	E	D	E	D	E
4	Twin Lakes Blvd - Orange Grove Dr	E	D	D	D	D	E	E	E	D	D	E	E
5	Orange Grove Dr - N Armenia Ave	E	D	E	D	E	D	E	E	E	D	E	E
6	N Armenia Ave - North Blvd	E	D	E	D	E	D	E	D	D	D	D	D
7	North Blvd - Florida Ave	D	D	D	D	D	D	D	D	D	D	D	D
8	Florida Ave - I-275 SB Ramps	E	E	E	E	E	E	E	E	E	E	E	E
9	I-275 SB Ramps - I-275 NB Ramps	E	D	E	E	E	E	E	D	E	D	E	D
10	I-275 NB Ramps - Nebraska Ave	E	E	E	E	D	D	E	D	E	D	E	D
Total Segment		**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**D**	**E**	**E**

Notes:
EB = eastbound
WB = westbound
SB = southbound
NB = northbound

Local Government Transit Corridor Improvements

The City of Tampa's adopted Comprehensive Plan (Imagine 2040) includes Policy 1.5.7 (provided below), which encourages the preservation of ROW for future transit envelopes:

> *Policy 1.5.7: Where appropriate, work with the Florida Department of Transportation, Hillsborough Area Regional Transit Authority, and the Metropolitan Planning Organization to reserve a future transit "envelope" within existing or acquired rights-of-way in the following designated future transit corridors.*

The West Busch Boulevard corridor is one of the designated future transit corridors referenced in the policy, and states that ROW be preserved for premium transit facilities, including express bus, bus only lanes, bus rapid transit and light rail transit.

Additionally, the City of Tampa Comprehensive Plan identifies Busch Boulevard from Dale Mabry to North Boulevard as a constrained roadway because of physical constraints (that is, CSX rail line to the south and development adjacent to the northern limits of existing ROW). These constraints provide an opportunity to focus on other modes of travel (for example, transit, bicycle lanes. and sidewalks) to enhance LOS and improve the livability and commerce for the area. Specifically, Mobility (MBY) Policy 3.2.2 refers to MBY Policy 3.2.1 regarding transit enhancements that can be implemented on constrained roadways. The types of improvements listed in Policy 3.2.1 include:

- Bus turn-outs and transit station areas
- Queue-jump lanes
- Dedicated transit through-lanes/rail facilities

The MPO, HART and the Tampa Bay Area Regional Transit Authority (TBARTA) have explored the long-term potential to operate passenger rail on the CSX rail line, or to operate light-rail adjacent to the CSX corridor, although no decisions regarding feasibility or implementation have been made.

Bicyclists

The existing corridor does not have dedicated bicycle facilities. Given the existing speed limit of 45 mph, most bicyclists use the sidewalk rather than cycle in the road.

As part of the corridor study, two-hour peak morning and afternoon intersection counts for bicyclists were conducted in May 2017 at 11 signalized intersections along the corridor. **Exhibit 21** summarizes these counts. Much greater bicycle activity was observed crossing the corridor north-south rather than traveling along the corridor east-west. Nebraska Avenue had the most significant bicycle activity, with 48 cyclists observed crossing the corridor. The most significant east-west activity was between North Boulevard and Florida Avenue. HART data shows that bicyclists regularly board at transit stops along the corridor with their bicycles. Those that bicycle along the corridor include some of our most vulnerable populations, including school children and those without other means of transportation.

With the exception of Florida Avenue, there are no existing east-west or north-south trails or dedicated bicycle facilities which could tie into bicycle improvements on the corridor. Further, the City of Tampa Walk/Bike Plans do not identify any planned bicycle improvements in the future which would connect to the study area. Portions of West Yukon Street, a parallel route south of Busch Boulevard is identified by the city as a priority for bicycle infrastructure investments.

14 bicycle crashes occurred within the limits of the corridor study between 2011 and 2015. Dedicated bicycle facilities are shown to reduce crash risk. However, the high-speed nature of the corridor, coupled with the high traffic volumes would make most inexperienced riders uncomfortable with riding on the corridor, regardless of what type of bicycle infrastructure was in place.

Exhibit 21. Bicycle Counts Map

* Based on observations from 7 a.m – 9 a.m. & 4 p.m. – 6 p.m. on Thursday May 4, 2017

Pedestrians

Most of the study area has sidewalks on both sides of the roadway; however, sidewalk gaps exist in isolated locations. FDOT completed a project (FPID 254677-2-52-911) to complete the sidewalk along the north side of Busch Boulevard from Florida Avenue to Nebraska Avenue. This project began after the start of the study but for the purposes of this study was considered an existing condition.

Exhibit 22 summarizes the existing sidewalk conditions throughout the corridor study for the north and south sides of the road.

Exhibit 22. Pedestrian Facilities

MP Limit	MP Limit	Side	Description
0.000	**3.320**	North	Sidewalk
0.000	**1.398**	South	Sidewalk
1.398	**1.660**	South	Missing Sidewalk
1.660	**1.770**	South	Sidewalk
1.770	**2.190**	South	Missing Sidewalk
2.190	**3.320**	South	Sidewalk

The existing sidewalk gaps extend for approximately 3,500 ft along the south side of Segment 2. The distance from back of curb to the ROW line at these locations is as narrow as 3.5 ft. **Exhibit 23** shows a picture of a typical sidewalk gap along West Busch Boulevard. Completing the sidewalks requires acquiring additional ROW.

Existing pedestrian facilities are compliant with the Americans with Disabilities Act (ADA) guidelines except at driveways where the cross slopes exceed 2%. Although driveways are not typically reconstructed only for ADA reasons, any driveway improvements should be brought into compliance with ADA guidelines.

Exhibit 23. Existing West Busch Boulevard Sidewalk Gap
(Between N. Orleans Ave. and N. Willow Ave.)

As part of the corridor study, two-hour peak morning and afternoon intersection counts for pedestrians were conducted in May 2017 at 11 signalized intersections along the corridor. **Exhibit 24** summarizes these counts.

Similar to the bicycle activity, pedestrians were more often observed crossing the corridor north-south rather than traveling along the corridor east-west. The total number of pedestrian and bicyclists counted on corridor was roughly even. A total of 216 pedestrians crossed at signalized intersections along the corridor during the observation period. North Boulevard had the most significant pedestrian activity, with 61 pedestrians observed crossing the corridor north-south, and 15 crossing east-west. Data provided by HART shows that over 600 passengers board or depart from HART route 39 or 14 bus stops along the corridor on a typical weekday. Each transit rider begins and ends their trips as a pedestrian or bicyclist, so their needs must be considered as both a transit user and a pedestrian.

Pedestrian safety was a top concern for the community. Those that walk along the corridor include some of our most vulnerable populations, including school children and those without other means of transportation.

21 pedestrian crashes occurred within the limits of the corridor study between 2011 and 2015. West Busch Boulevard is #4 on the MPO Top 20 severe crash corridors for people walking or biking (between Dale Mabry and 30th Street), and Chamberlain High School safety study is #1 on the MPO School Transportation Working Group list of priority safety audits.

The MPO has completed the school safety study (dated April 2018) and the findings have been incorporated into the recommendations of this study.

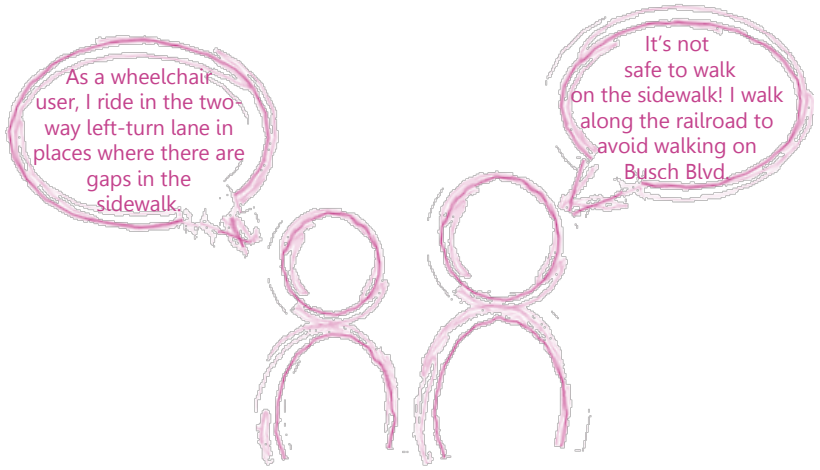


Exhibit 24. Pedestrian Counts Map

* Based on observations from 7 a.m – 9 a.m. & 4 p.m. – 6 p.m. on Thursday May 4, 2017

Related Projects

As described in more detail below, adjacent and ongoing projects are improving the existing condition of the corridor. These projects include intersection improvements at Armenia Avenue, intersection improvements at Florida Avenue, and the Innovation Gateway project at the I-275 interchange.

Armenia Avenue Improvements

The City of Tampa is leading an intersection improvement project (FPID 437044-1-58-01) under the Local Agency Program. The proposed improvements include additional north-south lanes through the intersection and the addition of an eastbound right-turn lane along Busch Boulevard. This project will improve traffic flow through this busy intersection and is funded for construction in 2019.

Florida Avenue Improvements

FDOT is leading a rail safety project (FPID 433862-1-52-01) to improve the Florida Avenue intersection with Busch Boulevard. The proposed improvements include a tighter curb return in the southwest corner, a new corner island in the southeast, and shorter crosswalk distances. This project will improve pedestrian mobility and rail safety at the intersection. This project is scheduled to begin construction in May 2018.

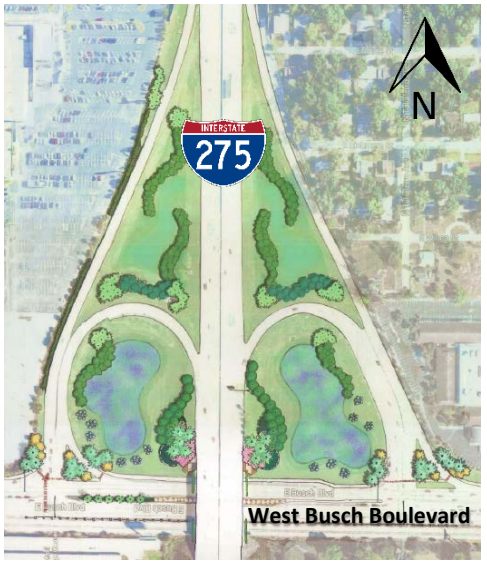
Innovation Gateway

The Innovation Gateway Project is a creative entry feature to improve both safety and aesthetics at the I-275 interchange with Busch Boulevard and Fowler Avenue.[7] The project includes:

- Under bridge LED Lighting
- Pedestrian Lighting
- Enhanced Crosswalks
- Public Art
- Gateway Element
- Replaced CSX fence
- Extensive Landscaping (see **Exhibit 25**)

Coordinating with this gateway project could harmonize with corridor aesthetics outside the interchange.

Exhibit 25. Innovation Gateway Concept Plan



[7] http://www.planhillsborough.org/innovation-gateway/

3. Corridor Vision

What is the desired future for West Busch Boulevard?

The purpose of this study was to develop a series of guiding goals and objectives and a range of multimodal solutions that reflect the long-term vision for the study corridor.

Developing the Vision Statement

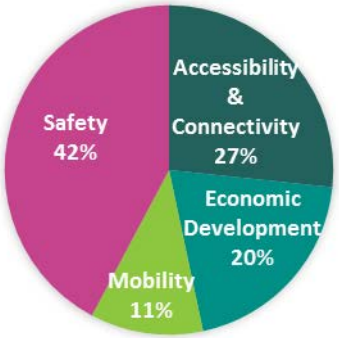
Developing the future vision for the corridor began by determining what the corridor is like today.

At the agency kick-off meeting, participants described the existing corridor as violent, outdated, depressing, too fast, congested, and car-centric. The challenges and ideas discussed for the corridor focused heavily around safety and multimodal accommodations.

The Public Visioning Workshop was held to get additional input on key concerns along the corridor and to get community input on the priority of potential goals and objectives for the corridor in the future. Attendees were asked to indicate their top five objectives for the corridor study by placing a sticker next to pre-defined objectives, or to add their own. Additional input on the goals and objectives were obtained through the User Preference Survey.

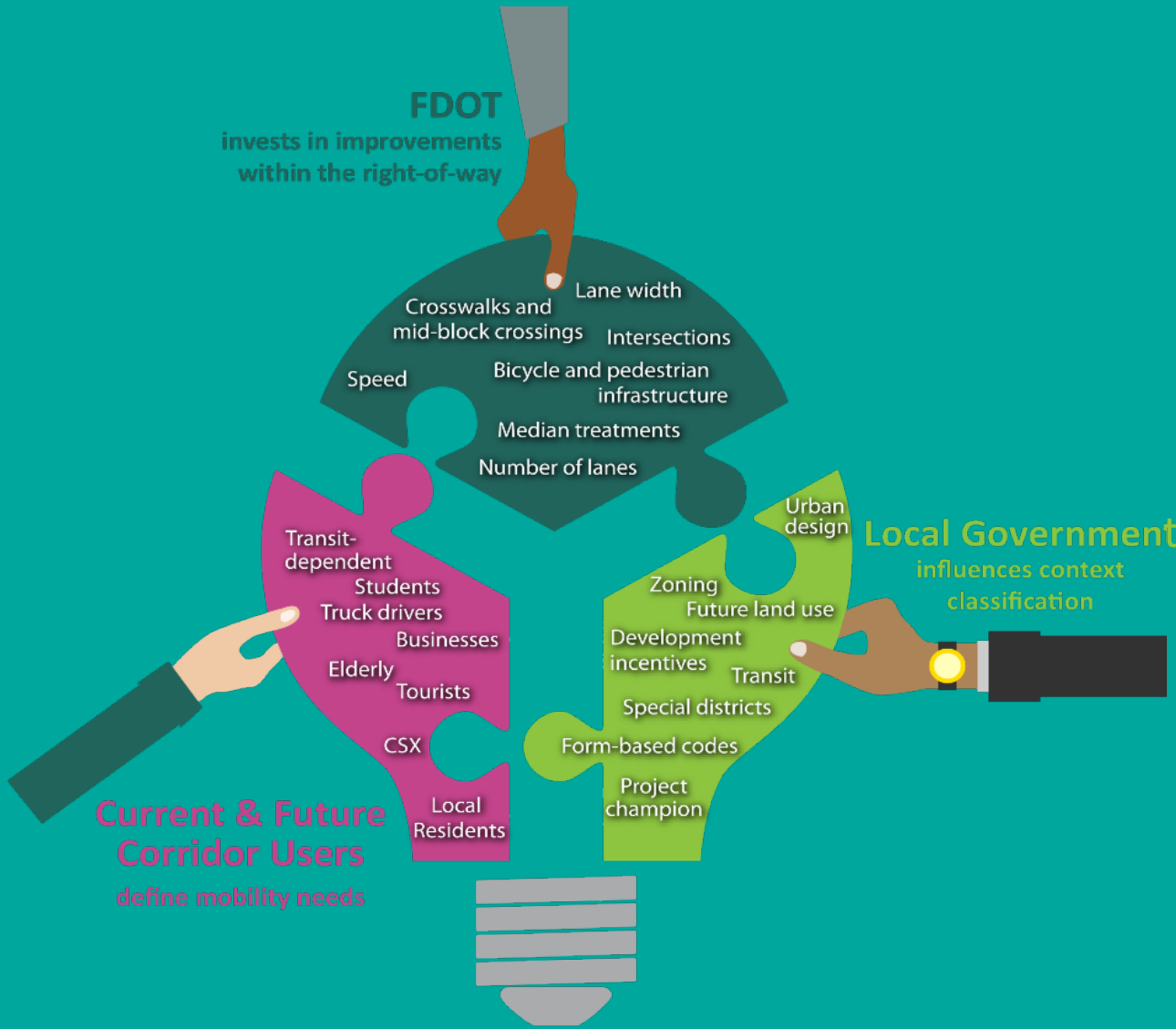
As shown on **Exhibit 26**, the community's top concerns were related to safety, with accessibility and connectivity as the second-most important goal for the community.

Exhibit 26. Input from the Public Visioning Workshop



With feedback from the Public Visioning Workshop, the PAG adopted the following vision for the future of West Busch Boulevard:

"The Busch Boulevard corridor offers safe, comfortable and convenient access through and across the corridor for all users and all travel modes."
– Corridor Vision Statement



The Locals Role in achieving the Corridor Vision

FDOT plays only one role in achieving the long-term vision for the corridor.

Local governments are responsible for land use decisions that create supportive infrastructure and development patterns that match community goals and visions.

Comprehensive plans, subarea plans, and land development regulations are some of the documents that help determine the future vision. There is no FDOT funding source specifically for Complete Streets, and FDOT limits their investment into the corridor based on the criteria associated with the corridor's context classification.

If local governments or other partners would like to include features that go beyond what is required by FDOT design criteria, such as decorative lighting or landscaping, patterned pavements, or street furniture and wayfinding, they must coordinate with FDOT to align local resources and projects with the FDOT project.

Guiding Goals and Objectives

In support of the vision, the following specific goals and objectives were used to identify improvements for inclusion in the potential alternatives.

Accessibility and Connectivity

- Transit users have shade and comfortable amenities: the corridor currently lacks shade trees, and many bus stops along the corridor do not provide benches or shelters.
- A continuous sidewalk runs the length of the corridor: sidewalk gaps currently exist on the south side of the corridor. Additionally, there are gaps is connectivity at Gunn Highway, North Boulevard, and Nebraska Avenue. Completing sidewalk gaps ranked as one of the top four improvements preferred by stakeholders.
- Bicycle connectivity is enhanced to adjacent homes and businesses: no bicycle infrastructure currently exists in the corridor. Bicycle lanes were not identified as a priority improvement by many stakeholders, however buffered bicycle lanes were ranked as the highest priority improvement by one stakeholder.
- Safe and frequent options are provided for pedestrians and bicyclists to cross the corridor: long distances between signalized crossings, coupled with transit stops and other pedestrian attractors located mid-block, encourage pedestrians and bicyclists to cross mid-block or at unsignalized locations.

Economic Development

- Aesthetic enhancements provide shade and adds beauty to the corridor: when the PAG and members of the public were asked to describe the existing corridor, many comments resonated around the aesthetic character of the corridor, and the need for beautification projects.
- The corridor adds a unique and inviting character to the community: as a gateway to many of the area's public schools and the Busch Gardens theme park, the existing corridor does not offer a unique sense of place.
- Existing businesses are preserved along the corridor: limited existing ROW, especially in the business segment, would make business impacts necessary for major improvements along the corridor.
- The roadway attracts reinvestment into the corridor and surrounding areas: much of the existing development along the corridor is dated and does not meet the highest-intensity uses allowable through zoning or future land use.

Mobility

- Travelers experience efficient and reliable travel times: although the corridor may experience congestion during peak periods, certain corridor improvements could ensure that drivers have a consistent experience traveling through the corridor.
- Facilities are ADA-compliant: adequate sidewalk widths, intersection treatments, and driveway slopes ensure that all users can travel along the corridor.
- Congestion is reduced on the corridor: today much of the corridor operates at a failing level of service. Capacity and operational improvements could reduce some of the congestion along the corridor.
- Citizens with limited mobility have enough time to cross the street: intersection improvements, such as pedestrian islands, tighter curb radii, and medians, shorten crossing distances.

Safety

- Crashes occur less frequently and are not as severe: the recent crash resulting in the fatality of a student of Chamberlain High School highlighted the importance to the community of reducing crashes and their severity along the corridor.
- Drivers slow down to a safe speed: members of the PAG and the public often described Busch Boulevard as a place where speeding is common. The proximity of many schools and transit stops makes this objective one of the most important stressed by the community. Additionally, a lower speed limit was the top ranked improvement at the Public Visioning Workshop.
- Increased lighting improves visibility for drivers and pedestrians: the current lighting on the corridor is focused on the cars within the roadway, but often leaves pedestrians in shadows and hidden from clear view. A recently completed lighting project at Linebaugh Avenue and Busch Boulevard was suggested as a best practice that could be replicated along the entire corridor.
- Children can travel to and from school safely, regardless of mode of travel: the proximity of public schools and residential neighborhoods means Busch Boulevard is used by children that are not served by school buses, and must walk, bike, or use other means of travel to and from school.
- Consolidated driveways reduce conflict points for vehicles and pedestrians: the adjacent land uses to Busch Boulevard result in a higher driveway density than typically found on a similar corridor. Driveways cause conflict points, not only for vehicles, but also for pedestrians and bicyclists traveling along the sidewalk.

Corridor Vision Evaluation Criteria

Once the corridor vision, goals and objectives were established, the study team developed a range of preliminary alternatives with these in mind. Several alternatives were eliminated for further consideration based on engineering viability. The remaining viable alternatives were compared on a variety of criteria, one of which being their ability to best satisfy the corridor vision.

To objectively compare the viable alternatives, evaluation criteria were developed for each of the four components of the vision statement: safety, comfort, convenient through travel, and convenient crossing. For each of these four components, a question and scoring methodology was developed for the four travel modes: auto, transit, bicycle, and pedestrian. The evaluation criteria developed to measure how well the vision is satisfied is shown in **Exhibit 27** on the following page. The next chapter includes the application of these criteria to the viable alternatives.

Exhibit 27. Evaluation Criteria

	Mode	Question	Score 1	Score 2	Score 3	Score 4
Safety	Auto	What is the median treatment and does it reduce or increase conflict points? (worst case corridor-wide)	Wide restricted median (>20 ft)	Narrow restricted median (<20 ft)	Two Way Left Turn Lane	Undivided
	Transit	Is travel speed <40 mph? Is pedestrian lighting provided? Are continuous sidewalks provided?	Alternative satisfies all 3	Alternative satisfies 2	Alternative satisfies 1	Alternative satisfies 0
	Bike	Is travel speed <40 mph? Is pedestrian lighting provided? Are continuous bike lanes provided?	Alternative satisfies all 3	Alternative satisfies 2	Alternative satisfies 1	Alternative satisfies 0
	Pedestrian	Is travel speed <40 mph? Is pedestrian lighting provided? Are continuous sidewalks provided?	Alternative satisfies all 3	Alternative satisfies 2	Alternative satisfies 1	Alternative satisfies 0
Comfort	Auto	Which of the following corridor aesthetics are improved: landscaped median, hardscaping, lighting?	Alternative satisfies all 3	Alternative satisfies 2	Alternative satisfies 1	Alternative satisfies 0
	Transit	How much room is provided for potential bus stop shelter enhancements within the proposed ROW? (least "typical" distance corridor-wide)	13 ft from edge of pavement	11–12 ft from edge of pavement	8–10 ft from edge of pavement	<8 ft from edge of pavement
	Bike	What is the degree of separation (from vehicular traffic) of dedicated bicycle infrastructure?	Cycle track or shared use path	Buffered bike lane	Bike lane	None (share the road)
	Pedestrian	What is the offset of the side walk from travel lane? (worst-case corridor-wide) Are shade trees provided? (within ROW on any segment)	Offset >9 ft with shade trees	Offset <9 ft with shade trees	Some offset without shade trees	No offset and no shade trees
Convenient through Travel	Auto	What is the 2040 LOS averaged across the corridor?	LOS A or LOS B	LOS C	LOS D	LOSE or F
	Transit	Is there a dedicated transit lane? If not, what is the 2040 LOS averaged across the corridor?	Transit only lane	LOS A or B	LOS C or LOS D	LOSE or F
	Bike	What is the width of dedicated bicycle infrastructure?	Cycle track or shared use path	Buffered bike lane	Bike lane	None (share the road)
	Pedestrian	What is the width of sidewalk?	8 ft with obstructions or 6 ft unobstructed	6 ft with obstructions	5 ft with obstructions	<5 ft and/or sidewalk gaps
Convenient Crossing	Auto	How does the median treatment support convenient crossing? (worst-case corridor-wide)	Two Way Left Turn Lane	Undivided	Divided 6 lane	Divided 4-lane (no U-Turn)
	Transit	Are the crossing locations and distance relative to bus stop locations improved?	-	Improved (e.g., bus stop relocation and/or added mid-block crossings)	Not improved	-
	Bike	What is the average no. of lanes crossed from bike box, or sidewalk if no bike lanes?	With bike box <60 ft crossing distance	With bike box crosses >60 ft crossing distance	From sidewalk <60 ft crossing distance	From sidewalk >60 ft crossing distance
	Pedestrian	What is the average cross walk length compared to existing condition?	Decreases average crossing distance	Average crossing distance remains same	Average crossing distance increases <20 ft	Average crossing distance increasing >20 ft

Overall score determined by the average score across the 4 questions.

An average score of 1.00–1.75 =

An average score of 1.76–2.50 =

An average score of 2.51–3.25 =

An average score of 3.26–4.00 =

4. Preliminary Alternatives

What improvements were considered?

This chapter summarizes the process used to bridge the gap between the corridor goals, objectives and vision and the viable alternatives presented at the fourth PAG meeting and the Alternatives Public Meeting.

Identifying a Range of Alternatives

Many permutations of individual improvements could be used to form an alternative. An Initial Screen was the first process to remove from consideration potential improvements that are not practical. Second, viable alternatives were developed so that a full range of alternatives could be studied in more detail. Finally, the preliminary concepts were those that met the goals, objectives and vision, and were best suited for comparative analysis.

Initial Screening

The initial screening considered a combination of stakeholder input, best practices, and innovations being utilized elsewhere. Improvements were developed to meet all FDM criteria unless specifically noted. **Exhibit 28** describes potential improvements that notes which were determined to be viable or not viable, and why.

Exhibit 28. Initial Screening

Potential Improvement	Remarks
No-Build	The No-Build alternative is the existing condition plus programmed improvements. This is a requirement for all segments and all studies.
Lane Elimination (Road Diet)	Although reducing the number of travel lanes would improve the potential for bicycle and pedestrian improvements within the ROW, high traffic volume and a lack of parallel corridors are fatal flaws to this concept. Thus, lane elimination is not viable.
Roundabouts	Although roundabouts have safety and speed management benefits, the context is not well-suited because of the following criteria from FDM 116 p.2: 1. Major roadway AADT exceeds 90% of total intersection AADT in most cases 2. Presence of pedestrians with special needs, such as near schools 3. Locations where exiting the roundabout could be interrupted by a train Thus, roundabouts are not viable.
Shared-Use Path (Trail)	Although a shared-use path would provide improved bicycle facilities, the context is not well-suited because of the following conditions from FDM 224.1.2: 1. The path would lack adequate access to local streets and destinations if adjacent to the railroad 2. The path would have many driveway conflicts between Armenia Avenue and North Boulevard 3. The path would lack path continuity with other bikeways Thus, a shared-use-path is not viable.
Separated Bicycle Facilities (Cycle Track)	A physically-separated bicycle-only facility would have the same benefit as a shared-use path, but also the same access and connectivity problems. Separated bicycle facilities are not viable.
Reversible Lane	The reversible lane typical section is an innovative concept that would use the two-way left-turn lane as a through lane during peak hours. The temporary through lane could then be reversed at a different time of day to allow traffic in the opposite direction. This alternative is not viable because of the turning restrictions and the increased crossing difficulty for bikes and pedestrians.
Elevated Expressway	The elevated expressway typical section would introduce a viaduct to serve the regional traffic, thus improving at-grade bike, pedestrian, transit, and local traffic operations. This alternative is not viable because of lack of connectivity for the viaduct, which would need to be part of a regional system.
4-Lane	The 4-lane typical section includes a restrictive median, a wide sidewalk, and border width that would meet FDM standards but does not include any additional vehicle lanes or bike lanes (variation needed). This option is considered viable in Segments 1 through 3.
5-Lane	The 5-lane typical section includes an unrestricted median two-way left-turn lane (variation needed at 45 mph), buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards. This option is considered viable in Segments 1 through 3.
6-Lane	The 6-lane typical section includes a restrictive median, additional travel lanes, buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards. This option is considered viable for all segments.
6-Lane without bike lanes	The 6-lane without bike lanes typical section includes a restrictive median, a wide sidewalk, and border widths that would meet FDM standards but does not include bike lanes (variation needed). This option is considered viable in Segment 4.

Note: FDM = FDOT Design Manual (2018) http://www.fdot.gov/roadway/FDM

Viable Alternatives

Exhibit 29 lists the viable typical section alternatives for each segment.

Exhibit 29. Viable Typical Section Alternatives by Segment

Segment	Alternatives
Segment 1	No-Build, 4-Lane, 5-Lane, and 6-Lane
Segment 2	No-Build, 4-Lane, 5-Lane, and 6-Lane
Segment 3	No-Build, 4-Lane, 5-Lane, and 6-Lane
Segment 4	No-Build, 6-Lane, and 6-Lane without bike lanes

Exhibits 30 – 33 illustrate the viable typical section alternatives. These exhibits denote potential footprints based on a range of design speeds.

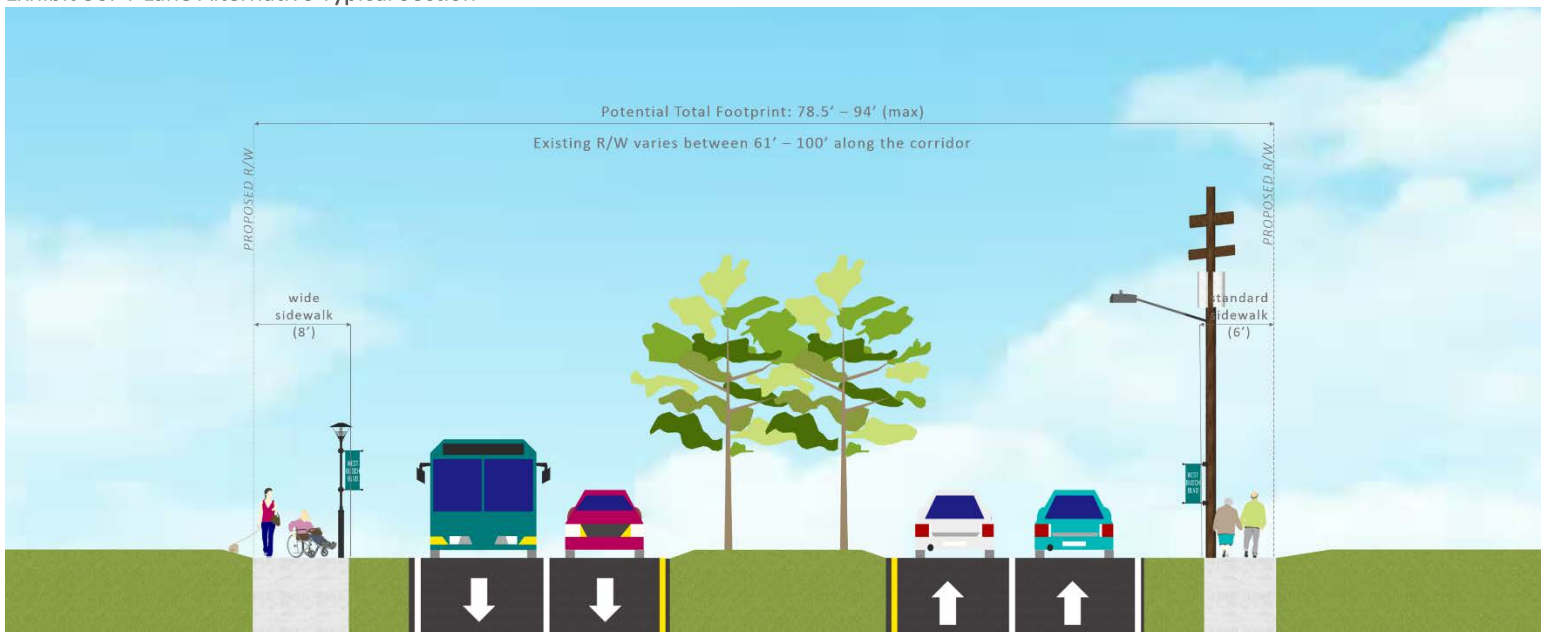
No-Build Alternative

The No-Build alternative is a *status-quo* preservation of the existing roadway. This alternative serves as a baseline against which the other alternatives can be evaluated.

4-Lane Alternative Typical Section

The 4-lane alternative (**Exhibit 30**) has the lowest impact of the build alternatives but also the least improvement. Essentially, the 4-lane alternative implements FDM criteria without adding any new travel or bike lanes. An 8-ft-wide sidewalk on the north side is proposed to accommodate increased pedestrian demand because of lack of bike lanes. A variation would be needed for lack of bicycle facilities.

Exhibit 30. 4-Lane Alternative Typical Section

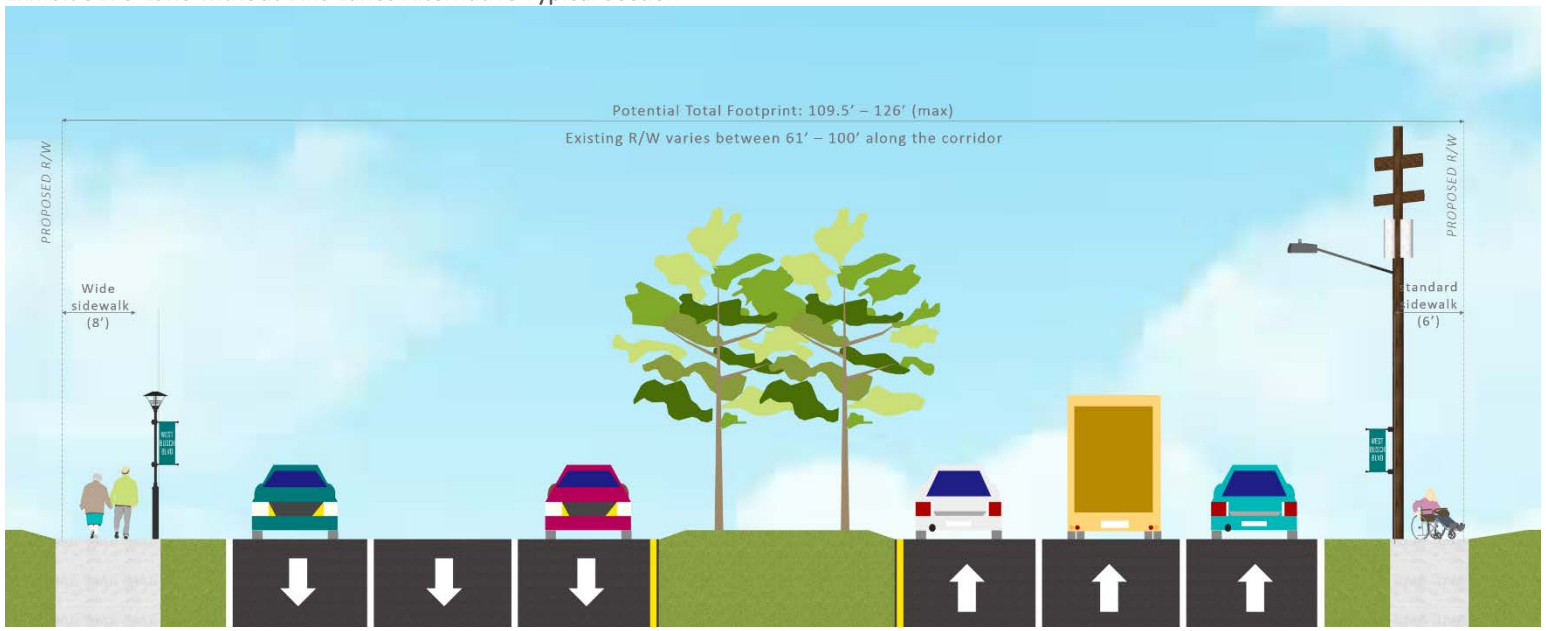


6-Lane without Bike Lanes Typical Section

The 6-lane without bike lanes alternative (**Exhibit 31**) is the lower impact build alternative for Segment 4, which already has 6 lanes. This alternative would implement FDM criteria without adding bike lanes.

An 8-ft-wide sidewalk on the north side is proposed to accommodate increased pedestrian demand because of lack of bike lanes. A variation would be needed for lack of bike facilities.

Exhibit 31. 6-Lane without Bike Lanes Alternative Typical Section

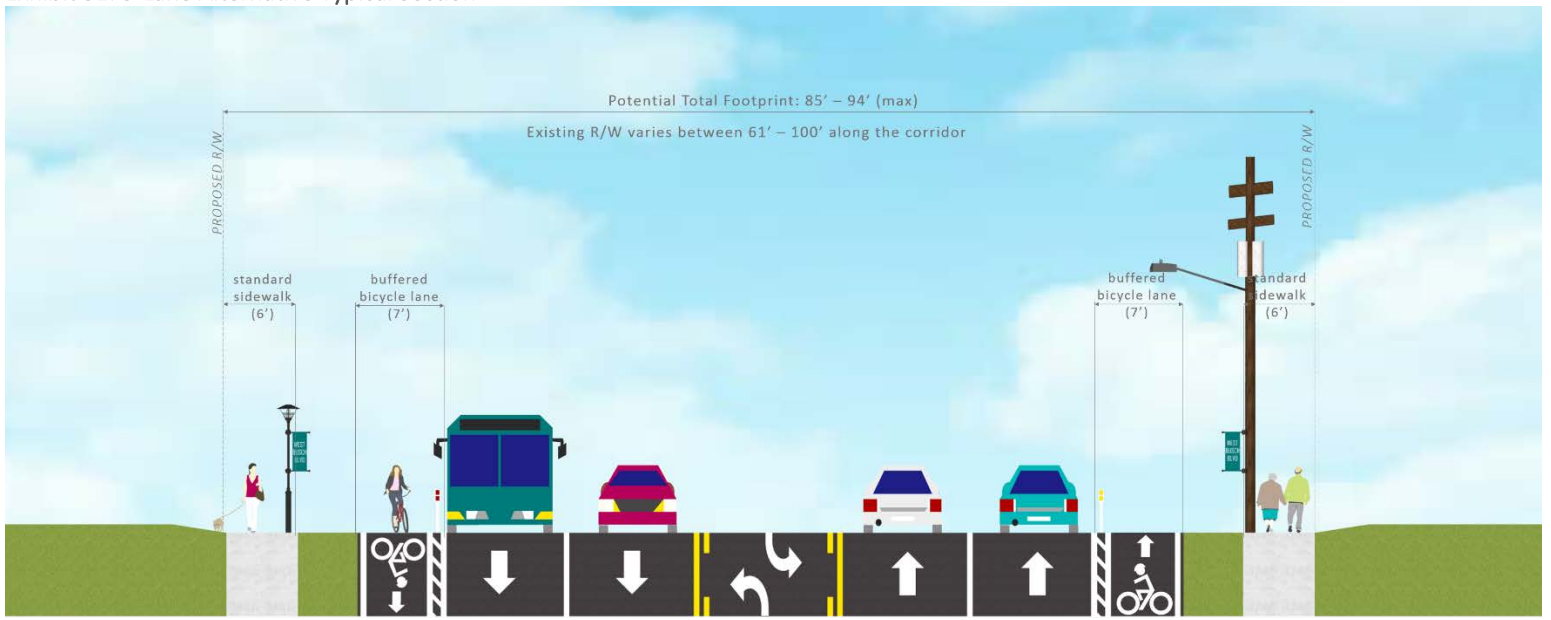


5-Lane Alternative Typical Section

The 5-lane alternative (**Exhibit 32**) adds an unrestricted median and buffered bike lanes to the roadway. Bike lanes with tubular delineators in the buffer space and bike boxes at intersections could be considered to increase bicycle comfort and encourage use.

The two-way left-turn lane does not meet standards at 45 mph and would require a variation.

Exhibit 32. 5-Lane Alternative Typical Section

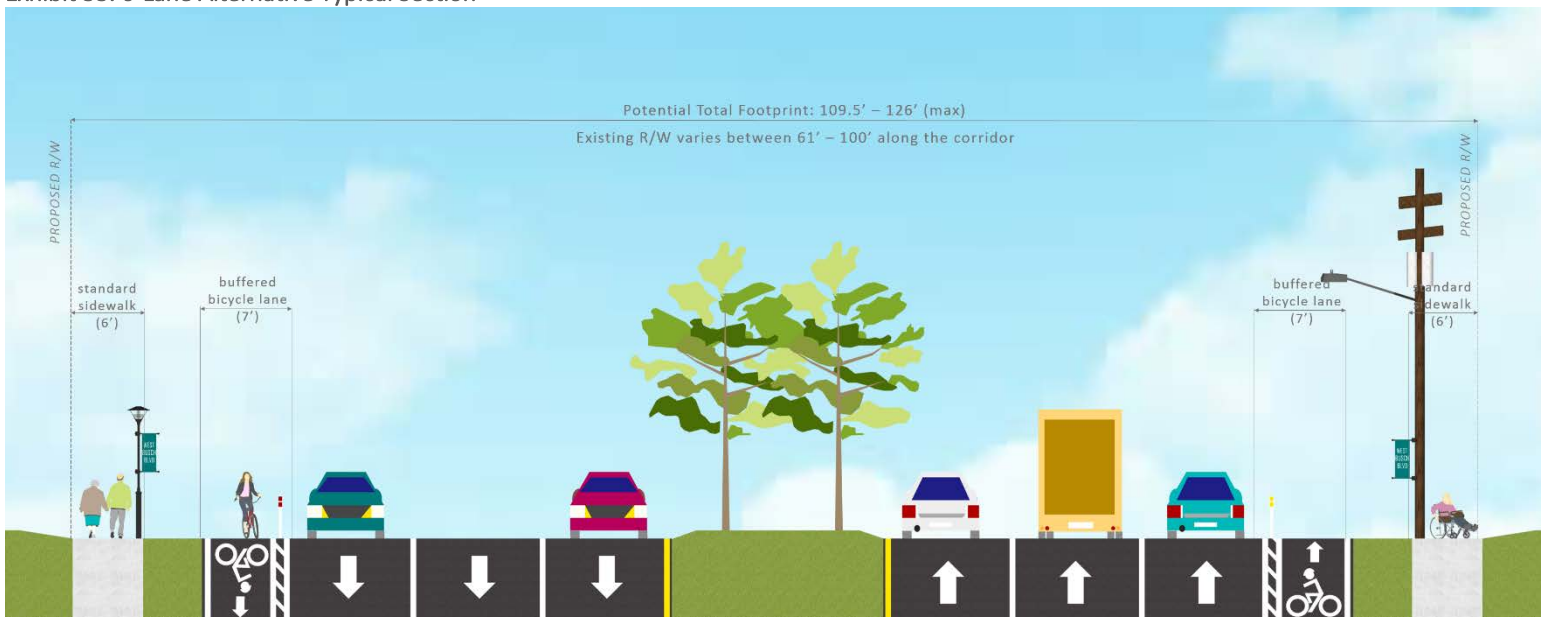


6-Lane Alternative Typical Section

The 6-lane alternative (**Exhibit 33**) improvements include everything practical, including additional lanes, restrictive median, and buffered bike lanes.

Bike lanes with tubular delineators in the buffer space and bike boxes at intersections could be considered to increase bicycle comfort and encourage use. This alternative has the most improvement but also the highest impacts.

Exhibit 33. 6-Lane Alternative Typical Section



Preliminary Concepts

For simplicity, three concept plans were developed from a combination of the viable alternative typical sections, as described in **Exhibit 34**. These alternatives represent a range of potential improvements and impacts for stakeholder input.

Exhibit 34. Preliminary Concepts

Concept Name	Description
"4-Lane"	• 4-lane alternative typical section in Segments 1 – 3 • 6-lane without bike lanes in Segment 4
"5-Lane"	• 5-lane alternative typical section in Segments 1 – 3 • 6-lane alternative typical section in Segment 4
"6-Lane"	• 6-lane alternative typical section in Segments 1 - 4

The preliminary concept plans and design criteria are provided in **Appendixes A and C**, respectively. The concept plans utilized the largest potential footprint with a 45 mph design speed for the 4-Lane Alternative Typical Section and 6-Lane Alternative Typical Section, and 40 mph design speed for the 5-Lane Alternative Typical Section. This is because the 5-Lane typical section does not meet the 45 MPH design criteria standards.

Potential Refinements

Several possible refinements to the viable alternatives were identified that would result in similar footprints, and therefore were not evaluated as separate alternatives. The following potential refinements to the viable alternatives were communicated to stakeholders for input.

Inclusion or Exclusion of Buffered Bike lanes

Buffered bike lanes are the standard (FDM 223.2.1.1), and a design variation is required when that standard is not met. However, the context of this project, with no existing bike lanes to the east or west, means that the benefit of bike lanes may be limited compared to the additional impacts. The 4-lane concept was proposed without bike lanes to establish a lower impact alternative. This is to ensure the community has clarity regarding the correlation of increasing improvements to increasing impacts as the number of improvements increase. With additional impacts, buffered bicycle lanes could be added to the 4-lane alternative. Conversely, buffered bicycle lanes could be excluded from the 5-lane or 6-lane alternative to reduce impacts.

Additional Lanes Designated as a Bus-only Lane

Bus-only lanes are a potential refinement to the 6-lane alternative. Instead of additional travel lanes, the alternative could include additional bus-only lanes within the same footprint. The City of Tampa Comprehensive Plan (adopted Jan. 7, 2016) lists Busch Boulevard from Armenia Avenue to North Boulevard (Segment 2) as a physically constrained roadway but widening to allow bus lanes is not restricted (MBY Policy 3.2.2).

On-street Parking in-lieu of Bike Lanes

On-street parking improves the pedestrian environment by providing a physical barrier between travel lanes and sidewalk. It also creates perceived side friction causing drivers to reduce their speed. On-street parking is a key element of urban context zones and, when not present, should be evaluated to meet local plans, to manage speed, or to increase parking supply (FDM 210.2.3). Because on-street parking has the same footprint as the buffered bike lane, 8 ft measured from the face of curb, the buffered bike lanes could be exchanged for on-street parking and sharrows in Segment 2 (**Exhibit 35**). On-street parking is for posted speeds of 35 mph or less and is not compatible with the many existing driveways along Segment 2. Therefore, significant changes to adjacent development would be needed to consolidate driveways, move buildings toward the street, and move parking to the back (**Exhibit 36**). Policy changes to promote cross-access and a 30% reduction in required off-street parking would also be needed.

Exhibit 36. On-Street Parking Concept

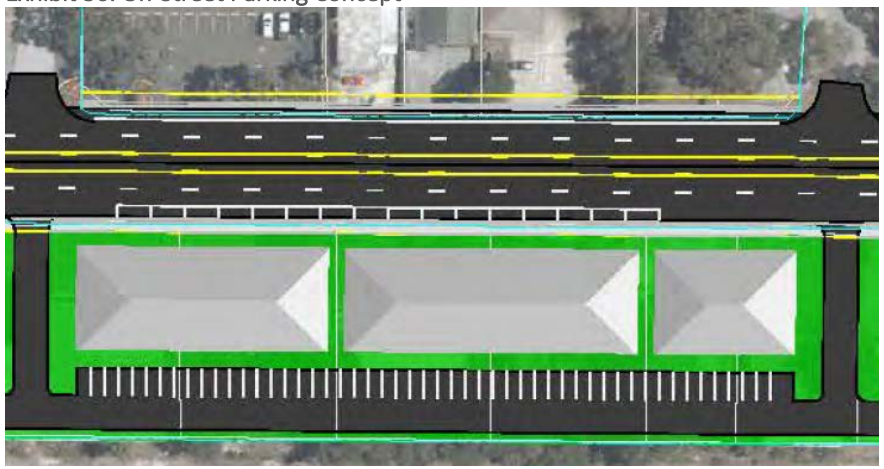
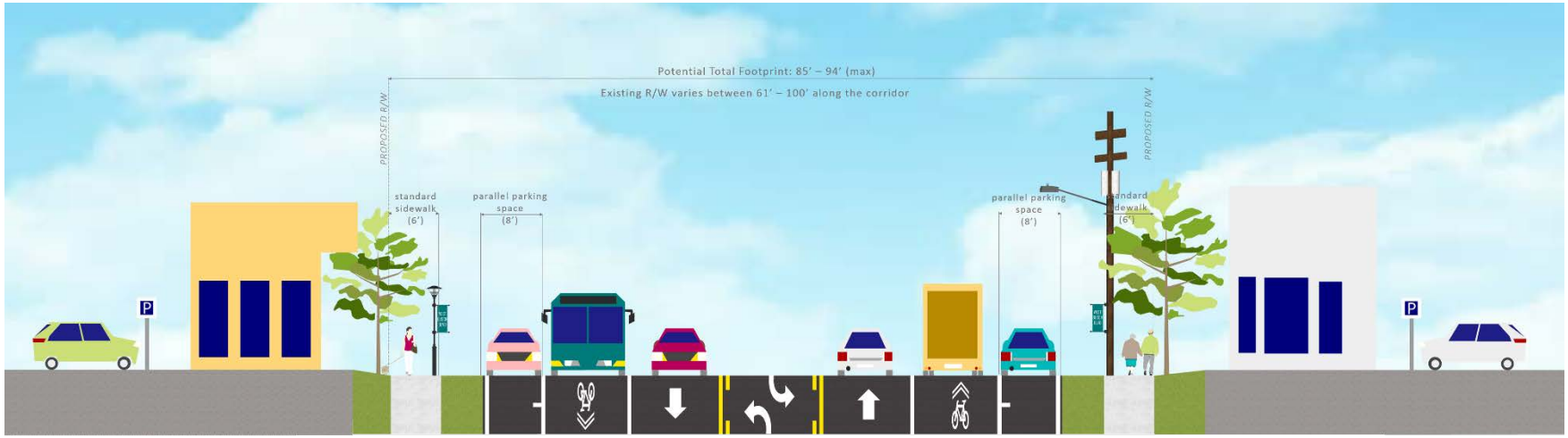


Exhibit 35. On-Street Parking Typical Section



Comparative Evaluation of Alternatives

The 4-lane, 5-lane, and 6-lane concepts were evaluated for relative stakeholder support, comparative costs, and consistency with the corridor vision. The results of these analyses are summarized in the alternative evaluation matrix at the end of this chapter (**Exhibit 41**).

Stakeholder Input

The fourth PAG meeting and the Alternatives Public Meeting included an interactive exercise where stakeholders selected an emoticon sticker to represent their sentiments for the No-Build, 4-lane, 5-lane, and 6-lane alternatives.

Exhibit 37 summarizes the combined input from both meetings.

Exhibit 37. Stakeholder Input on Alternatives

	Count				Average value
	(value of 1)	*(value of 2)*	*(value of 3)*	*(value of 4)*	
Existing Condition	2	0	2	2	3.467
4-Lane Alternative	7	3	7	7	2
5-Lane Alternative	4	8	2	2	2.125
6-Lane Alternative	4	3	1	8	2.8125

An average score of 1.00 - 1.75 =
An average score of 1.76 - 2.50 =
An average score of 2.51 - 3.25 =
An average score of 3.26 - 4.00 =

The results showed overall negative sentiment towards the No-Build and overall positive sentiment towards the 4-Lane alternative and 5-Lane alternative. Most of the PAG was not supportive of the 6-lane alternative, but feedback from the Public Alternatives Meeting was mixed.

A second interactive exercise completed at both meetings allowed stakeholders to select their favored alternative for each segment, including bus-only lanes or parallel parking lane options. **Exhibit 38** summarizes the preferences from both meetings for each alternative by segment.

Exhibit 38. Stakeholder Input by Segment

	Segment 1	Segment 2	Segment 3	Segment 4
% Existing Condition	0%	0%	0%	0%
% 4-Lane	27%	13%	33%	n/a
% 5-Lane	47%	40%	40%	n/a
% 5-Lane with Parallel Parking	n/a	13%	n/a	n/a
% 6-Lane with bike lanes	27%	20%	13%	73%
% 6-Lane with bus only lanes	n/a	13%	13%	n/a
% 6-Lane, no bike lanes	n/a	n/a	n/a	27%

The greatest preference was shown for the 5-lane alternative in Segments 1 and 2, preference was divided between the 4-lane alternative and 5-lane alternative in Segment 3, and the majority supported the addition of bike lanes to the existing 6-lanes in Segment 4.

Overall feedback was supportive of adding bike lanes. Little interest was shown in options for bus-only lanes or parallel parking. Several stakeholders noted their preference for a footprint similar to the five-lane alternative, with the stipulation that they would only support this alternative if it included median islands or a full restrictive median rather than the two-way left turn lane.

Cost

Planning level estimates were completed for construction cost, potential ROW impacts (acres), and potential number of business impacts. None of the alternatives would result in residential relocations. Potential utility impacts are identified in the Utility Assessment Package in Appendix H. ROW acquisition costs were not evaluated. **Exhibit 39** summarizes the ROW and business impacts per segment. Construction cost estimates are included in the evaluation matrix (**Exhibit 41**).

Achieving the Corridor Vision

The corridor vision evaluation criteria, included in the Corridor Vision Chapter, **Exhibit 27**, was applied to the 4-lane, 5-lane, and 6-lane alternatives. The corridor vision evaluation scores are shown in **Exhibit 40**. Future (2040) traffic volumes were considered in the Auto mode score per the analysis in the Design Traffic Report (**Appendix G**).

Exhibit 39. Alternative ROW Impacts

	Potential ROW Impacts	4-Lane	5-Lane	6-Lane
Segment 1	Total ROW (acres)	0.04	0.22	4.01
	ROW acres/mi.	0.03	0.16	2.99
	Total Business Impacts	1	8	24
	Business Impacts per mi.	0.75	5.96	17.89
Segment 2	Total ROW (acres)	1.64	1.62	9.19
	ROW acres/mi.	1.63	1.61	5.17
	Total Business Impacts	60	60	61
	Business Impacts per mi.	59.77	59.77	60.77
Segment 3	Total ROW (acres)	0.64	0.72	2.15
	ROW acres/mi.	1.26	1.42	4.23
	Total Business Impacts	7	7	7
	Business Impacts per mi.	13.78	13.78	13.78
Segment 4	Total ROW (acres)	0.21	0.4	0.4
	ROW acres/mi.	0.42	0.8	0.8
	Total Business Impacts	5	5	5
	Business Impacts per mi.	9.94	9.94	9.94
Total	Total ROW (acres)	2.53	2.96	11.75
	ROW acres/mi.	0.75	0.88	3.50
	Total Business Impacts	73	80	97
	Business Impacts per mi.	21.75	23.83	28.90

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Exhibit 40. Evaluation Scores – Achieving the Corridor Vision

		Safety	Comfort	Convenient through Travel	Convenient Crossing	Average Score	Result
No-Build	Auto	4	4	4	2	3.5	
	Transit	4	4	4	3	3.75	
	Bike	4	4	4	3	3.75	
	Pedestrian	4	4	4	2	3.5	
4-Lane Alternative	Auto	1	1	3	4	2.25	
	Transit	2	1	3	2	2	
	Bike	3	4	4	4	3.75	
	Pedestrian	2	3	1	3	2.25	
5-Lane Alternative	Auto	3	2	3	1	2.25	
	Transit	2	3	3	2	2.5	
	Bike	2	2	2	1	1.75	
	Pedestrian	2	3	2	3	2.5	
6-Lane Alternative	Auto	1	1	3	2	1.75	
	Transit	2	2	3	2	2.25	
	Bike	2	2	2	2	2	
	Pedestrian	2	3	2	4	2.75	

Evaluation Matrix

The Evaluation Matrix summarizes the results of the corridor vision evaluation, stakeholder input, and costs (**Exhibit 41**). The stakeholder support wheels show the proportion of input that was favorable (green) versus unfavorable (red).

The Evaluation Matrix highlights the trade-offs between each of the alternatives; what benefits one mode may hinder another, or the benefits may not feel in proportion to the costs.

These evaluations were used to inform the proposed long-term alternatives described in Chapter 5.

Exhibit 41. Evaluation Matrix

		Corridor Alternatives			
		No-Build	4-Lane	5-Lane	6-Lane
Satisfies Vision	How well does this alternative satisfy safety, comfort, and convenience of travel through and across for **auto mode**?				
	How well does this alternative satisfy safety, comfort, and convenience of travel through and across for **transit users**?				
	How well does this alternative satisfy safety, comfort, and convenience of travel through and across for **bicyclists**?				
	How well does this alternative satisfy safety, comfort, and convenience of travel through and across for **pedestrians**?				
Stakeholder Support	Relative Project Advisory Group Support				
	Relative Public Support				
Cost	Potential Residential & Business Impacts*	-	73	80	97
	Potential Right-of-Way Impacts*	-	2.5 acres	3 acres	12 acres
	Construction Cost**	-	$39 M	$33.7 M	$43.2 M

5. Recommendations

What Improvements and Strategies are Proposed?

Implementation Strategy

As detailed in Chapter 4, study alternatives require significant ROW. Before this ROW can be acquired, these alternatives would first need to be further evaluated in a Project Development and Environment (PD&E) Study, which is not currently funded.

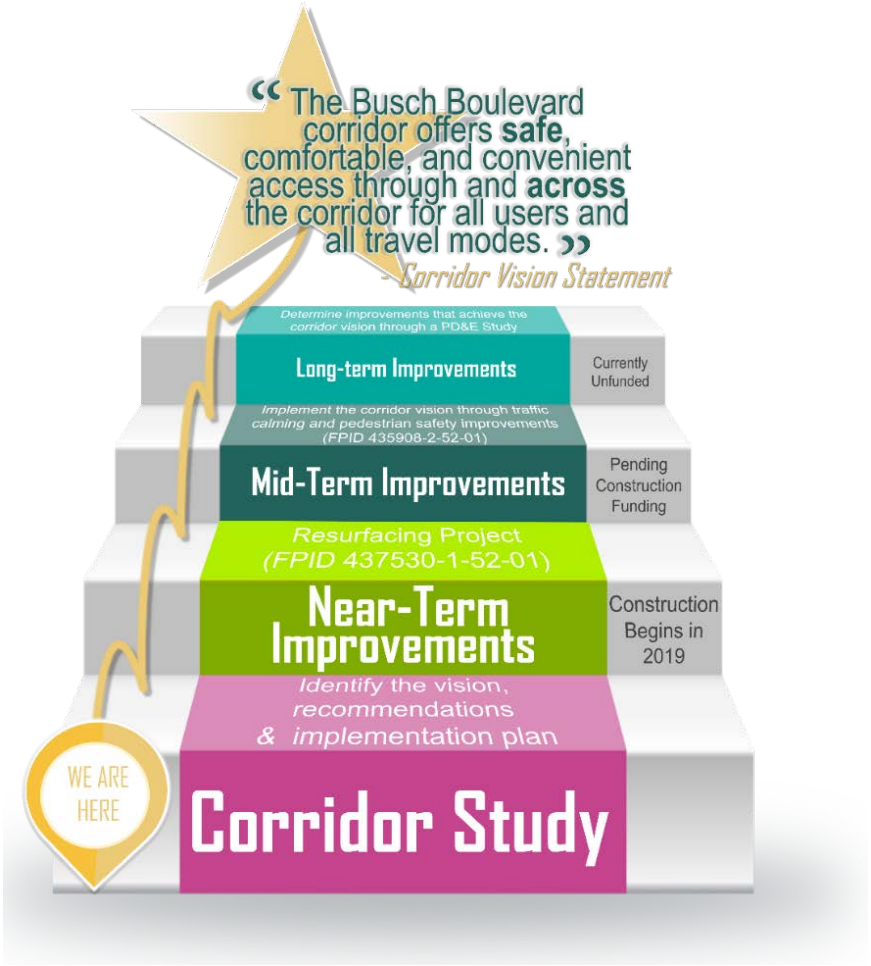
In an effort to actively advance the corridor towards the vision, improvements were identified which could be advanced in the near- and mid-term, independent of a PD&E Study.

Therefore, the proposed recommendations of this study should be implemented in a series of improvements in the near-, mid-, and long-term to achieve the Corridor Vision.

Further, some of the study recommendations are outside of FDOT's jurisdiction and are recommended for implementation by partner agencies.

Exhibit 42 illustrates the overall implementation strategy.

Exhibit 42. Implementation Strategy



Near-Term Improvements

Near-Term improvements are ready to be constructed and include: resurfacing and restriping the pavement as part of on-going maintenance from just west of North Armenia Avenue to just east of North Florida Avenue; ADA improvements including curb ramp reconstruction, detectable warning surfaces, and reducing the grade of the sidewalk; improvements to the sidewalk where it is cracked or deficient, and constructing some sidewalk on the south side of the corridor near North Boulevard. These improvements are being implemented as part of the resurface, restore, and rehabilitate (RRR) project along SR 580 from just east of North Armenia Avenue to just west of North Florida Avenue, a length of approximately 1.3 miles (FPID 437530-1-52-01), which was developed concurrent to this corridor planning study. Construction of these improvements are funded for 2019.

Mid-Term Improvements

Improvements that are considered for mid-term implementation need further refinement and design analysis before they can be implemented along the corridor. The identified mid-term alternatives and strategies (as detailed in the following sections) are funded for design in 2018 (FPID 435908-2-52-01). Construction funding is pending. In general, these improvements will be construction ready within 5 years.

Long-Term Improvements

The proposed long-term improvement is a refinement of the preliminary alternatives presented in Chapter 4, which would require significant ROW and reconstruction of the roadway. The proposed improvements would first need to be further evaluated through a PD&E Study, which is currently unfunded. Funding for a PD&E Study to evaluate the proposed long-term improvements as identified in the following sections is a recommendation of this study.

Proposed Improvements and Strategies

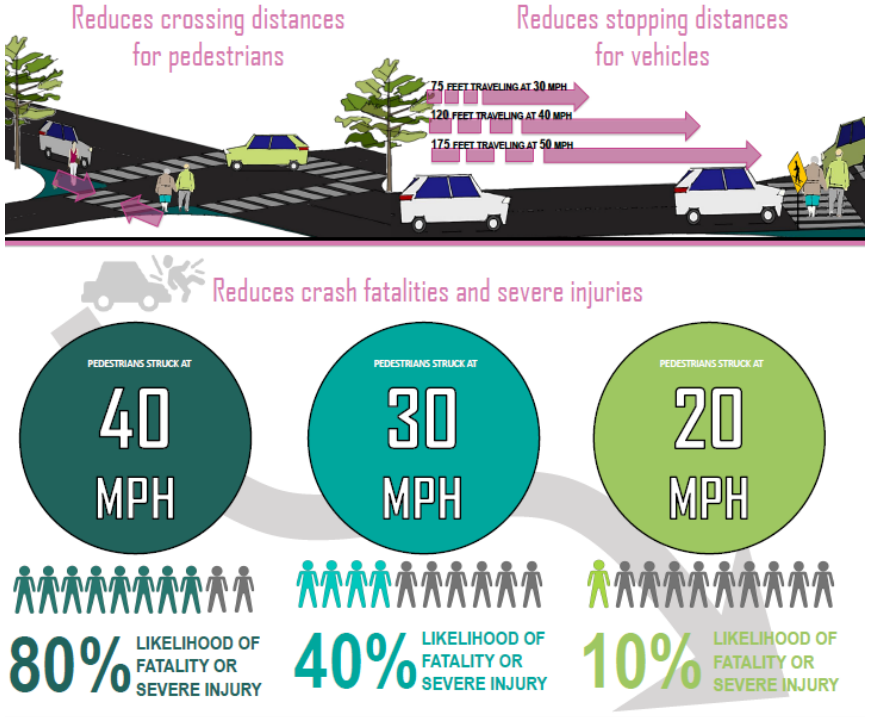
The proposed improvements and strategies detailed in the following section include the strategy for Speed Reduction, Long-term Improvements, Mid-term Improvements, and Additional Strategies.

Speed Reduction

Speed management to reduce speeding is a strategy included in all improvement timeframes. FDOT guidance in the Complete Streets brochure states that context appropriate speeds can reduce fatalities and serious injuries.[1] The FDOT Speed Zoning Manual defines the speed that vehicles should operate in a specific land use context as Target Speed.[2] While the FDM provides flexibility in design speed within specific context zones, FDOT guidance for choosing target speed is still in development. Best practice from the Institute of Transportation Engineers (ITE) proposes the maximum target speed for walkable urban arterial streets is 35 mph. The National Association of City Transportation Officials *Urban Street Design Guide* and ITE *Designing Walkable Urban Thoroughfares* advise a proactive urban street design where Target Speed is achieved through a combination of various speed management measures.[3] Based on the findings of this study, a design speed of 35 mph is recommended for both the mid-term and long-term proposed alternatives. Consistent with the corridor vision, reducing the design speed from 45 mph to 35 mph improves the comfort and convenience of travel through and across the corridor for pedestrians, bicyclists and transit users. Additionally, 35 mph design criteria allows trees, lighting, and utilities to be located outside of the sidewalk, minimizes ROW impacts, and reduces construction cost. **Exhibit 43** summarizes some of the safety benefits provided by a lower design speed.

Strategies for traffic calming and encouraging travel speeds that are consistent with the design speed are reflected in the following recommendations for speed enforcement measures, narrow travel lanes, median treatments, landscape and aesthetics, and signal coordination. The proposed long-term alternative and proposed mid-term alternative are based on 35 mph design criteria.

Exhibit 43. Safety Benefits of a Lower Speed



1 http://www.flcompletestreets.com/files/FDOT-CompleteStreets-Brochure.pdf Accessed March 21, 2018

2 FDOT *Speed Zoning Manual*, July 2017, p.24, accessed March 21, 2018 from http://www.fdot.gov/traffic/speedzone/speed_zone_manual.shtm

3 ITE, 2010, *Designing Walkable Urban Thoroughfares*, Table 6.4 p.70 & p.109

Proposed Long-Term Improvements

Exhibit 44 summarizes the proposed long-term typical section alternatives by segment that are recommended for further evaluation in a recommended PD&E Study. The proposed alternatives were developed in consideration of the preliminary alternatives evaluation and stakeholder feedback, as described in Chapter 4.

The PD&E Study will further detail the environmental, social, and economic impacts of these alternatives, and a Transportation Systems Management and Operations (TSM&O) alternative, before recommending a preferred alternative.

Within Segment 1, the 6-lane alternative is consistent with the Hillsborough County Comprehensive Plan preservation corridor. This segment also has the highest future AADT. However, as documented in Chapter 4, the 6-lane alternative has significant right-of-way and business impacts. There are also other tradeoffs to consider. While the 6-lane alternative accommodates greater AADT, LOS is only marginally improved. Further, the 6-lane alternative has drawbacks for the safety and comfort of pedestrians, bicyclists and transit users, and may be inconsistent with speed reduction goals. The PD&E Study will confirm local planning consistency and stakeholder buy-in before selecting a preferred alternative.

The PD&E Study will also provide documentation of planned improvements which could then be accommodated in other projects. For example, if the PD&E recommended alternative proposes an expanded footprint under the I-275 bridge, this footprint could be accommodated during future I-275 bridge reconstruction.

Exhibit 44. Proposed Long-Term Typical Section Alternatives

Segment	Proposed Typical Sections
Segment 1	• No-Build • 4-Lane with Bike Lanes - includes a restrictive median, buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards. • 6-Lane - includes a restrictive median, additional travel lanes, buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards.
Segment 2	• No-Build • 4-Lane with Bike Lanes - includes a restrictive median, buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards.
Segment 3	• No-Build • 4-Lane with Bike Lanes - includes a restrictive median, buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards.
Segment 4	• No-Build • 6-Lane with Bike Lanes - includes a restrictive median, additional travel lanes, buffered bicycle lanes, sidewalks, and border widths that would meet FDM standards.

Proposed Mid-Term Improvements

The Proposed Mid-Term Improvements were developed in the spirit of the proposed long-term improvements, but are able to be advanced without further evaluation in a PD&E Study. Many mid-term improvements require design variations that must be documented and approved by the District Design Engineer.

If implemented as proposed, these improvements will become the long-term "No-Build" alternative. Specifics of the proposed mid-term alternative are described in the sections below.

Complete Sidewalks

The existing sidewalk gaps (located within Segment 2) can be completed in the mid-term by acquiring additional ROW on the south side to accommodate a 6-ft-wide standard sidewalk behind the existing curb.

Narrow Travel Lanes

Narrow travel lanes require more driver attention to keep the vehicle in the lane and induce slower speeds. Within all segments, travel lanes can be narrowed from existing widths to a minimum of 10'. 11' outside lanes may be considered to accommodate transit.

Median Treatment

Median islands or a raised restrictive median narrow the perceived roadway especially when landscaped, resulting in more driver attention and inducing slower speeds. Raised medians also provide access control and reduce conflict points. Finally, although not intended as a pedestrian refuge, restrictive medians provide a safer refuge point for pedestrians choosing to cross mid-block compared to the existing undivided or two-way left turn lane conditions. In combination with 10' travel lanes, the following median treatments fit within existing ROW constraints: 22' in Segment 1, 13' in Segment 2, 8' in Segment 3, and 29' in Segment 4'. Median widths can be adjusted based on travel lane widths. Median widths below 15.5' require design variations.

Bicycle Lanes

Improvements in the mid-term are constrained by available ROW. Sidewalks and median treatments were prioritized based on stakeholder input related to corridor improvement priorities and focus on safety. Therefore, bicycle lanes are only proposed as part of the long-term alternative to maximize connectivity throughout the corridor.

Additional Strategies

Additional strategies to meet the vision, goals and objectives were identified based on stakeholder input and engineering analysis. These strategies include TSM&O improvements and could be implemented independent of the selected typical section alternative and so they were not included in the comparative analysis. Some strategies require Joint Participation Agreements (JPA) for local funding and maintenance agreements. Most of these strategies can be designed in the mid-term under FPID 435908-2-32-01, or potentially advanced in the near-term through an alternative lead agency or funding source.

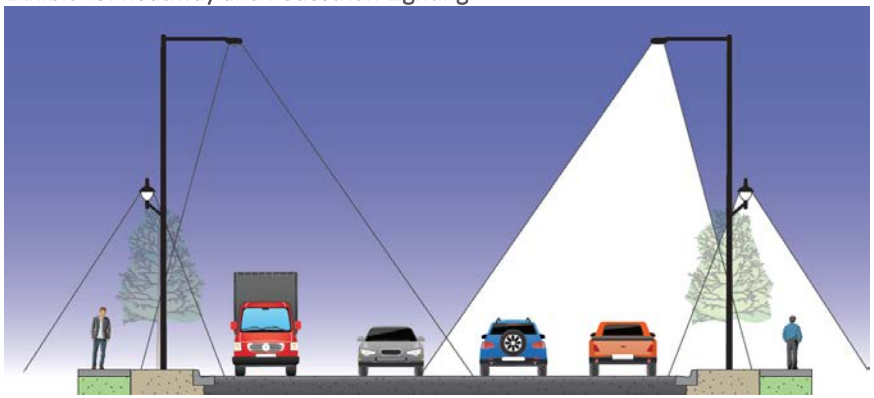
Select strategies are discussed in more detail below. Additional recommended strategies are summarized in **Exhibit 51**.

Roadway and Pedestrian Lighting

Lighting improvements have been requested to improve nighttime safety, especially that of pedestrians. Although there are existing intersection lights and some roadway lighting, a lighting study and justification report is recommended to determine lighting needs. In addition to roadway lighting, pedestrian-scale lighting should be evaluated to improve walkability and communicate the presence of pedestrians to drivers. Area lighting in Segment 2 should also be evaluated to diminish dark areas between the sidewalk and buildings to support Crime Prevention Through Environmental Design. City of Tampa staff have expressed interest in leading the lighting project to use an existing service from TECO for lighting design and maintenance.[4]

Exhibit 45 illustrates the difference between roadway and pedestrian lighting.

Exhibit 45. Roadway and Pedestrian Lighting

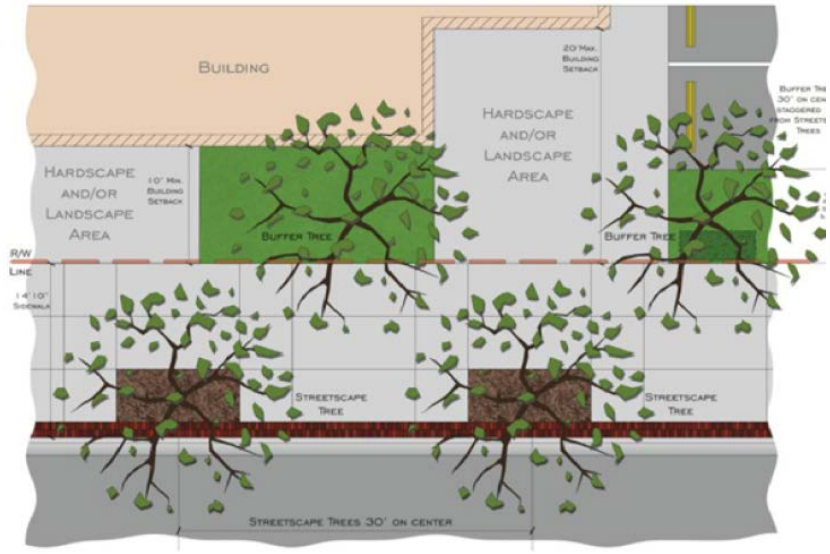


[4] Outdoor Lighting – Tampa Electric, accessed April 15, 2018 from https://www.tampaelectric.com/business/programs/outdoorlighting/

Landscape and Aesthetics

Landscape can significantly benefit the pedestrian environment and improve corridor aesthetics. These benefits include traffic calming, shade, mitigating the heat-island effect, reducing stormwater runoff, and increasing biodiversity. Landscape opportunity areas within the existing ROW are limited. For example, the type of vegetation in median islands less than 12 ft is restricted so as not to impede sight distance.[5] The local development code, which requires planting trees in the setback area between the sidewalk and buildings, is another way to improve landscape along the corridor (**Exhibit 46**). Median landscaping could discourage pedestrians from crossing mid-block or walking along the median.

Exhibit 46. Westshore Boulevard Sidewalk Plan



(Code 27-238g)

Patterned Pavement on the State Highway System is allowed per FDM Section 226 if the local maintaining agency provides the additional funding, ongoing maintenance, and inspection for minimum friction compliance. The Approved Products List contains accepted treatments.[6] Use is restricted to marked crosswalks utilizing the same pavement type as the adjacent roadway, and non-vehicular areas. Replacing an entire flexible (asphalt) pavement intersection and crosswalks with rigid (concrete) pavement (such as shown on **Exhibit 47**) is the most expensive option and would require approval from the State Roadway Design Engineer.

Exhibit 47. Concrete Intersection at Livingston St. and Maguire Blvd.

(credit: CH2M)

Enhanced lighting, landscaping, crosswalk treatment and patterned pavement are included in the MPO's Innovation Gateway Project recommendations at Busch Boulevard and I-275. Additional Busch Boulevard improvements should be designed to harmonize with the proposed corridor aesthetics from that study.

[5] FDOT Design Manual, 2018, Table 212.11.1, accessed April 15, 2018 from http://www.fdot.gov/roadway/FDM/current/2018FDM212Intersections.pdf

[6] FDOT Approved Products List, specification 523, accessed April 15, 2018 from https://fdotwp1.dot.state.fl.us/ApprovedProductList/ProductTypes/Index/126

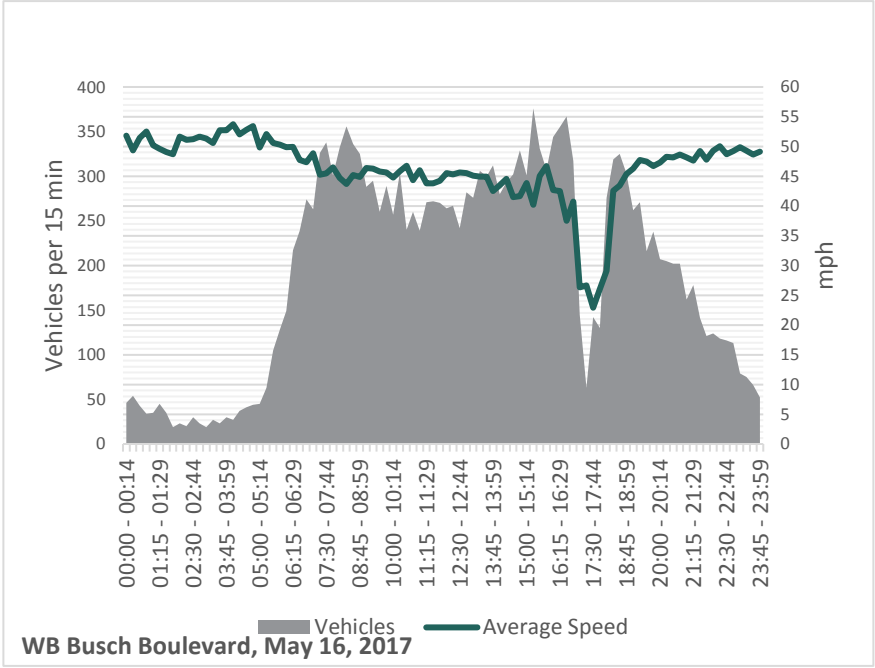
Signal Coordination

Federal Highway Administration (FHWA) guidance extols the many benefits of signal coordination including vehicle platoons, less stops, more constant speeds, and larger gaps for turning vehicles, all resulting in reduced crashes.[7] While signal coordination is likely being employed on some of the signals, the oversaturated traffic along the corridor necessitates designing a progressive system from Dale Mabry Highway to I-275. The City of Tampa and Hillsborough County could implement a signal maintenance swap so that the change in jurisdiction does not require a change in signal progression.

Speed data collected on Busch Boulevard demonstrates the detrimental effect that an oversaturated traffic condition has on speed and capacity pm) during the afternoon peak.

Exhibit 48 shows an oversaturated condition from 16:45 to 17:45 (4:45 pm to 5:45 pm) during the afternoon peak.

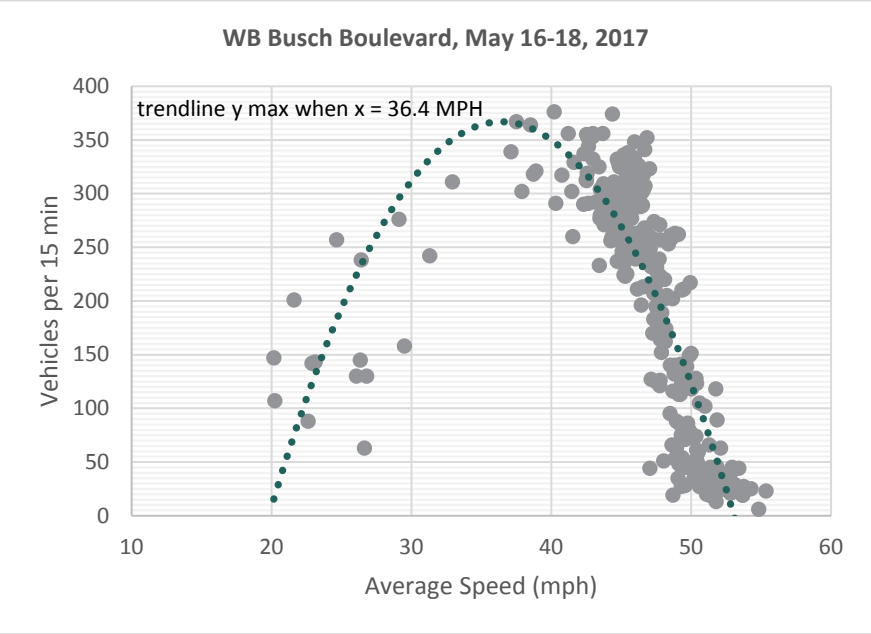
Exhibit 48. Westbound Busch Boulevard 24-hour Speed Chart



[7] FHWA Safety Strategy A4, accessed April 15, 2018 from https://safety.fhwa.dot.gov/intersection/other_topics/fhwasa08008/sa4.cfm

It is common for traffic speeds to decrease as traffic volume increases because of less space and more friction between vehicles. Furthermore, above a critical capacity both volume and speed of vehicles decreases precipitously. Ramp metering projects queue vehicles on the on-ramps to keep mainline traffic below the critical capacity. While Busch Boulevard cannot utilize ramp metering, an opportunity exists to time the signal progression to optimize capacity, minimize delay, and manage speeds. **Exhibit 49** shows a trendline curve fit to the traffic speed-volume data. Although there is a fair amount of variability in the data, the trend shows maximum throughput of 360 vehicles per 15 minutes around 36 mph.

Exhibit 49. Westbound Busch Boulevard Speed-Volume Diagram



Based on this analysis, a signal progression speed of 35 mph is recommended to maximize throughput while manage corridor speed. Delay can be reduced by queueing vehicles just once, at the beginning of the group of coordinated signals. The Manual of Uniform Traffic Control Devices sign I1-1 Traffic Signal Speed (**Exhibit 50**) should be used for driver awareness. A variable-speed display is recommended so that the display can be turned off when not operating in coordinated mode, not to increase the signal progression speed. An additional traffic signal between Armenia Avenue and North Boulevard may be needed to maintain progression. The FDOT Manual of Uniform Traffic Studies Warrant 6 allows adding signals for a coordinated signal system.[8]

Exhibit 50. Traffic Signals Speed Sign

(MUTCD I1-1)

Turn Lane Improvements

The Design Traffic Report identifies turn lane improvements that would improve intersection operations. However, right turn lanes are not consistent with pedestrian safety and speed management goals. Left turn lane improvements were included in the mid-term and long-term alternatives where they are consistent with existing plans, in response to stakeholder input, and where recommended based on physical constraints. Turn lanes improvements can be refined in future studies.

[8] FDOT Manual of Uniform Traffic Studies, 2016, p.3-15, accessed April 15, 2018 from http://www.fdot.gov/traffic/trafficservices/Studies/MUTS/MUTS%20Final%2001.2016.pdf

Exhibit 51. Additional Strategies

Strategy	Remarks
Add lighting for roadway, intersections, and sidewalk (corridor-wide)	FDOT JPA with city/county implemented through FDOT design project or city project. City/County responsible for operations and maintenance (O&M).
Add landscaping in opportunity areas (corridor-wide)	FDOT JPA with city/county implemented through FDOT design project. City/County responsible for operations and maintenance (O&M).
Interconnect signals to increase platooning	The 11 traffic signals on the project should be investigated for potential signal interconnection to increase platooning at 35 mph. Implemented through FDOT design project. City or County responsible for operations and maintenance (O&M); potential for signal swap.
Transit Improvements	Stakeholder input reflected a desire for bus bays. Bus bays provide safety benefits for bus passengers as there is a greater separation from moving vehicles. Bus bays also prevent bus loading and unloading from hindering the flow of traffic. However, in congested conditions, bus bays may cause delays in the bus schedule because of difficulties merging back into travel lanes. As an alternative, bus stops could be re-located adjacent to right-turn lanes for a similar benefit. In combination with transit signal priority, this can allow buses to skip the queue. Based on stakeholder feedback, bus shelters should be provided where not present at high-volume locations. FDOT to coordinate with HART to determine feasibility of relocated bus shelters and introducing transit signal priority technology in either the mid-term or long-term improvement.
Speed Detection Signage	Speed signing, such as "YOUR SPEED" radar speed signs, provide feedback to drivers without taking their eyes off the road and have been effective at reducing speed.[9] This improvement is being advanced in the near-term.
Add Gunn Highway Sidewalk	FDOT JPA with county implemented through FDOT design project.
Safety improvements at Dale Mabry off-ramp	Stakeholder feedback indicated safety concerns at the Dale Mabry off-ramp. Preliminary recommendations include adding a SIGNAL AHEAD sign, rumble strips, mast arms signals, crosswalk(s), lighting, and NW pedestrian island. Improvements will be further refined in the FDOT design project.
Extend WB right-turn lane at Dale Mabry intersection	Improvements will be further refined in the FDOT design project.
Add new signalized at Rome Circle	There are no signalized intersections or crosswalks between Armenia Avenue and N. Boulevard, the longest stretch along the study corridor. A new signal between these existing signalized intersections (Rome Circle) will facilitate system interconnection to manage speed, platoon traffic to reduce delay, and add a marked pedestrian crossing to increase safety. Improvements will be further refined in the FDOT design project.
Leading pedestrian interval or ped-only signal phase at North Blvd.	A leading pedestrian interval or pedestrian-only phase, in combination with "No Right Turn on Red" at North Boulevard will improve the crossing safety during school hours and eliminate pedestrian crossing and vehicle-turning conflicts.

[9] Veneziano D, Dec. 2010, Effective Deployment of Radar Speed Signs, accessed on Mar. 22, 2018 from https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa1304/resources2/37%20-%20Effective%20Deployment%20of%20Radar%20Speed%20Signs.pdf

Exhibit 51. Additional Strategies

Strategy	Remarks
	Improvements will be further refined in the FDOT design project.
Add patterned pavement to intersection at North Blvd. and potentially other high-emphasis crosswalks	Crosswalk paving materials with a different color and texture than the normal roadway communicate that the space is different and emphasizes that pedestrians could be present. Decorative elements should be coordinate with the Gateway project. FDOT JPA with city implemented through FDOT design project.
Add refuge islands or tighten curb radius at S.E. corner of N. Florida Ave.	Smaller curb-return radii require drivers to slow down more to perform the turning maneuver. This slowing causes slower mainline speeds and reduces the stopping distance when the turn conflicts with pedestrians. Improvements will be further refined in the FDOT design project.
Add refuge islands or tighten curb radius at N.E. and S.E. corners at N. Nebraska Ave.	Smaller curb-return radii require drivers to slow down more to perform the turning maneuver. This slowing causes slower mainline speeds and reduces the stopping distance when the turn conflicts with pedestrians. Improvements will be further refined in the FDOT design project.
RR Crossing safety improvements at North Boulevard and Nebraska	Requires coordination with CSX and City of Tampa. Improvements will be further refined in the FDOT design project.
Complete sidewalk along N. Boulevard from SR 580 to Library	Requires coordination with City of Tampa. Improvements will be further refined in the FDOT design project.
Complete sidewalk along SR 45 (Nebraska Ave.) from SR 580 to Skagway Ave.	Requires coordination with utility agencies/owners and possible relocations. Improvements will be further refined in the FDOT design project.
Implement 20 MPH School Zone	The intersection of Busch Boulevard and North Boulevard is within 1 mile of Forest Hills Elementary School, Adams Middle School, and adjacent to Chamberlain High School. Florida House Bill 493 (Chpt. 2017-108) required FDOT to evaluate pavement markings and signage for safe school crossing locations.[10] School Zone designation is consistent with stakeholder input and the MPO School Safety Study recommendations. Establishing a school zone requires an engineering study.

[10] FL Chpt. 2017-108, Accessed on April 15, 2018 from http://laws.flrules.org/files/Ch_2017-108.pdf

Costs

Planning level construction cost estimates for the proposed long-term alternative is $41.4M. The Long-term construction cost estimate conservatively assumes 6-lane widening is Segment 1, and full reconstruction of the roadway in all segments.

Planning level construction cost estimates for the proposed Mid-term alternative is $15M, and assumes existing pavement resurfacing and widening as needed. More detailed estimates would be produced during PD&E study or Design, respectively.

Potential ROW impacts (acres) and potential number of business impacts for the Proposed Mid-term and Proposed Long-term improvements are summarized in **Exhibit 52**. Additional ROW needs are anticipated to meet drainage requirements which are not included in these estimates. Residential relocations are not anticipated. Potential utility impacts are identified in the Utility Assessment Package in Appendix H. ROW acquisition costs were not evaluated.

Summary of Proposed Improvements

Exhibit 53 provides a high-level summary of the proposed mid-term and long-term improvements. This table is not comprehensive of all recommendations described above.

The proposed mid-term and long-term concept plans and design criteria are included in **Appendix B and C**, respectively. Many of the additional strategies described above are reflected on the Proposed Mid-Term Concept Plans.

Exhibit 52. Proposed Alternatives R/W Impacts

	Potential ROW Impacts	Mid-Term Improvements	Long-Term Improvements	Total
Segment 1	Total ROW (acres)	0	2.4	2.4
	Total Business Impacts (parcels)	0	25	25
	Potential Relocations	0	1 (plus parking impacts)	1 (plus parking impacts)
Segment 2	Total ROW (acres)	0.5	1.3	1.8
	Total Business Impacts (parcels)	30	30	60
	Potential Relocations	0	1 (plus parking impacts)	1 (plus parking impacts)
Segment 3	Total ROW (acres)	0	0.7	0.7
	Total Business Impacts (parcels)	0	7	7
	Potential Relocations	0	2 (plus parking impacts)	2 (plus parking impacts)
Segment 4	Total ROW (acres)	0	0.4	0.4
	Total Business Impacts (parcels)	0	5	5
	Potential Relocations	0	0 (parking impacts only)	Parking impacts only
Total	Total ROW (acres)	0.5	4.8	5.3
	Total Business Impacts (parcels)	30	67	97
	Potential Relocations	0	4 (plus parking impacts)	4 (plus parking impacts)

Exhibit 53. Summary of Proposed Improvements

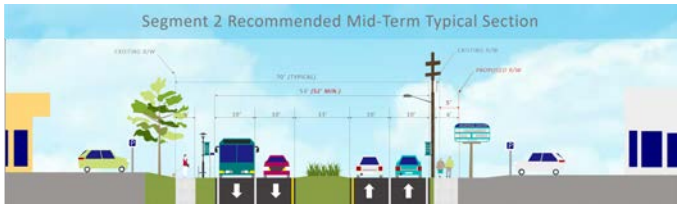
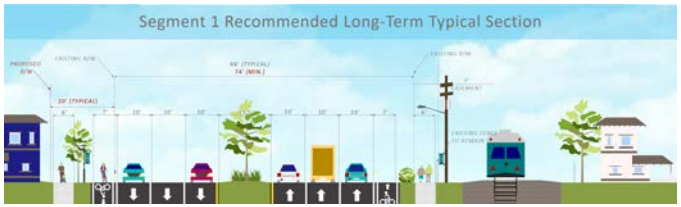
	Segment 1: Dale Mabry Hwy. – Armenia Ave.	Segment 2: Armenia Ave. – N. Boulevard
Proposed Mid-Term Typical Sections • *Design funded - FPID 435908-2-52-01*	 • Reduce design speed & posted speed (35 mph) • Hold existing south curb line; reconstruct north curb and 6' north sidewalk • Reduce lanes to 10' [traffic calming] • Construct standard 22' raised median/turn lanes [reduced conflict points] • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • Provide enhanced landscaping and lighting [traffic calming and pedestrian safety] • Minor R/W required on the north for drainage (impacts TBD)	 • Reduce design speed & posted speed (35 mph) • Hold existing curb lines (constrained by available R/W) • Reduce lanes to 10' [traffic calming] • Replace TWLTL with sub-standard raised median/turn lanes (13') [reduced conflict points] • *Option of 11' outside lanes with intermittent median islands [to accommodate transit and freight]* • Construct 6' south sidewalk within existing gaps [pedestrian safety] • Provide enhanced landscaping and lighting [traffic calming and pedestrian safety] • Minor R/W required on the south to complete sidewalk (impacts 30 parcels [0.5 acres])
Proposed Long-Term Typical Sections • *Additional corridor improvements beyond the mid-term recommendation* *Needs further evaluation through a future PD&E Study*	 • 35 mph design speed & posted speed • Full reconstruction (hold existing south R/W): • Construct additional 10' travel lane in each direction (6 lane widening) • Construct 7' buffered bicycle lanes • Reduce raised median to 15.5' [minimized impacts] • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • 20' R/W required on the north (typical)	 • 35 mph design speed & posted speed • Full reconstruction (hold mid-term south R/W): • Construct 7' buffered bicycle lanes • 15.5' raised median/turn lanes • 6' north sidewalk • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • 15' R/W required on the north (typical)

Exhibit 53. Summary of Proposed Improvements

	Segment 3: N. Boulevard – Florida Ave.	Segment 4: Florida Ave. – Nebraska Ave.
Proposed Mid-Term Typical Sections • *Design funded - FPID 435908-2-52-01*	 • Reduce design speed & posted speed (35 mph) • Hold existing curb lines (constrained by R/W pinch points) • Reduce lanes to 10' [traffic calming] • Construct sub-standard 8' raised median [reduced conflict points] • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • Provide enhanced landscaping and lighting [traffic calming and pedestrian safety]	 • Reduce design speed & posted speed (35 mph) • Hold existing curb lines (constrained by available R/W) • Reduce lanes to 10' [traffic calming] • Construct 29' raised median (accommodates extended turn lanes or dual left turn lanes as needed) [operational improvement] • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • Provide enhanced landscaping and lighting [traffic calming and pedestrian safety]
Proposed Long-Term Typical Sections • *Additional corridor improvements beyond the mid-term recommendation* *Needs further evaluation through a future PD&E Study*	 • 35 mph design speed & posted speed • Full reconstruction (hold existing south R/W): • Construct 7' buffered bicycle lanes • 15.5' raised median/turn lanes • 6' north sidewalk • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • Up to 23' R/W required on the north at pinch points	 • 35 mph design speed & posted speed • Full reconstruction (hold existing south R/W): • Construct 7' buffered bicycle lanes • Reduce raised median to 24' [minimized impacts] • 6' north sidewalk • *Option of 11' outside lanes by reducing median width [to accommodate transit and freight]* • 12' R/W required on the north (typical)

Other Recommendations

The following recommendations further support the overall corridor vision, goals and objectives, and are included for consideration by partner agencies.

Hillsborough Metropolitan Planning Organization

Regional Origin-Destination Study

East-west traffic in Hillsborough County is concentrated into a limited number of roads, of which Busch Boulevard is one. Traffic modeling reveals that even a widened Busch Boulevard would likely be congested with traffic, indicating suppressed demand. Input received during the study revealed a perception that most of the travel within the study area is "through travel", and therefore a wider lens is needed to understand regional east-west mobility needs. A regional origin/destination planning study, led by the Hillsborough Metropolitan Planning Organization (MPO), could better identify and prioritize transportation improvements through additional roadway capacity and/or transit investment.

Passenger Rail Transit

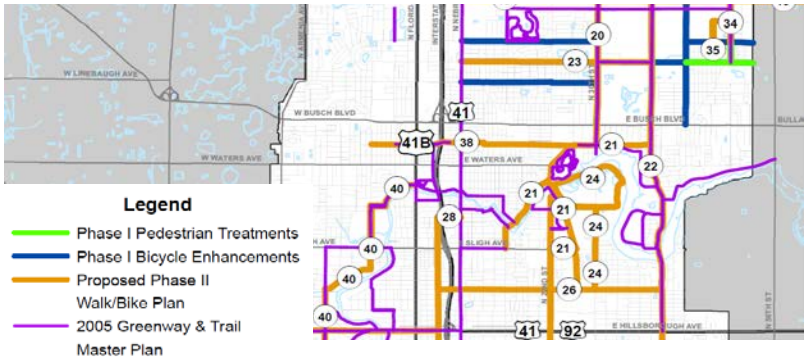
The CSX railroad is a physical constraint to Busch Boulevard but is also a transit opportunity. Regional passenger rail opportunities, including the potential use of the CSX corridor adjacent to the study area, have been explored numerous times over the past two decades. However, no stations or routes are being actively studied at this time.

If rail transit investment were to be planned along the corridor in the future, this would fundamentally change the future vision of the corridor as identified in this study. Shifting people away from the automobile to more efficient transit involves more than connecting central business districts —it requires planning for intermodal connectivity and walkability along the system. As Hillsborough MPO continues to work with local partners to evaluate potential future passenger rail transit systems, the MPO should coordinate with FDOT as to how Busch Boulevard can help deliver those plans.

Regional Bicycle Priority Network

Busch Boulevard lacks bicycle-only facilities within the study area and to the east and west. While bicycle lanes are included as part of the recommended alternatives for further study, they provide limited regional connectivity benefits. Furthermore, roads parallel to Busch Boulevard may be better-suited for bicycle facilities because of less traffic and lower speeds. Tampa's Walk/Bike Plan (Phase I and II)[11] identify opportunities for bicycle facilities, but little has been identified in the northeast portion of Tampa nor within unincorporated Hillsborough County (**Exhibit 54**). FDOT encourages the MPO to plan and prioritize additional opportunities to improve bicycle connectivity in this part of the county in relation to the potential investments along Busch Boulevard.

Exhibit 54. City of Tampa Walk/Bike Plan Phase 2



[11] Tampa Walk/Bike Plan. 2012. http://www.planhillsborough.org/wp-content/uploads/2012/10/Tampa-WB-Plan-Phase-I-II-Map.pdf

Hillsborough County

Mossvale Lane Extension

The private Mossvale Lane serves multiple homes in the unincorporated part of the corridor and consolidates the number of driveways along Busch Boulevard. If Mossvale Lane were extended west into the planned White Trout Lake subdivision, it would further consolidate access and reduce conflict points on Busch Boulevard.

City of Tampa

Overlay District

The City of Tampa has an important role to play in the development context along Busch Boulevard within the city jurisdiction, east of Armenia Avenue. The small parcels between Armenia Avenue and North Boulevard present a challenge to redevelopment that would help improve urban form and advance the corridor vision. An overlay district, such as overlay districts at Kennedy Boulevard or Westshore, could establish specific regulations for the Busch Boulevard corridor. Special consideration should be given to cross-access, shared parking, parallel parking, reduced parking requirements, plant palette, form-based code, and corridor preservation for the long-term improvement project.

Development setbacks have an important impact on the pedestrian environment, as shown on **Exhibit 55** Busch Boulevard, Tampa FL (top) has a large setback to development while Orange Avenue and South Downtown Orlando FL (bottom) has a more desirable, narrow setback.

Exhibit 55. Development setback examples

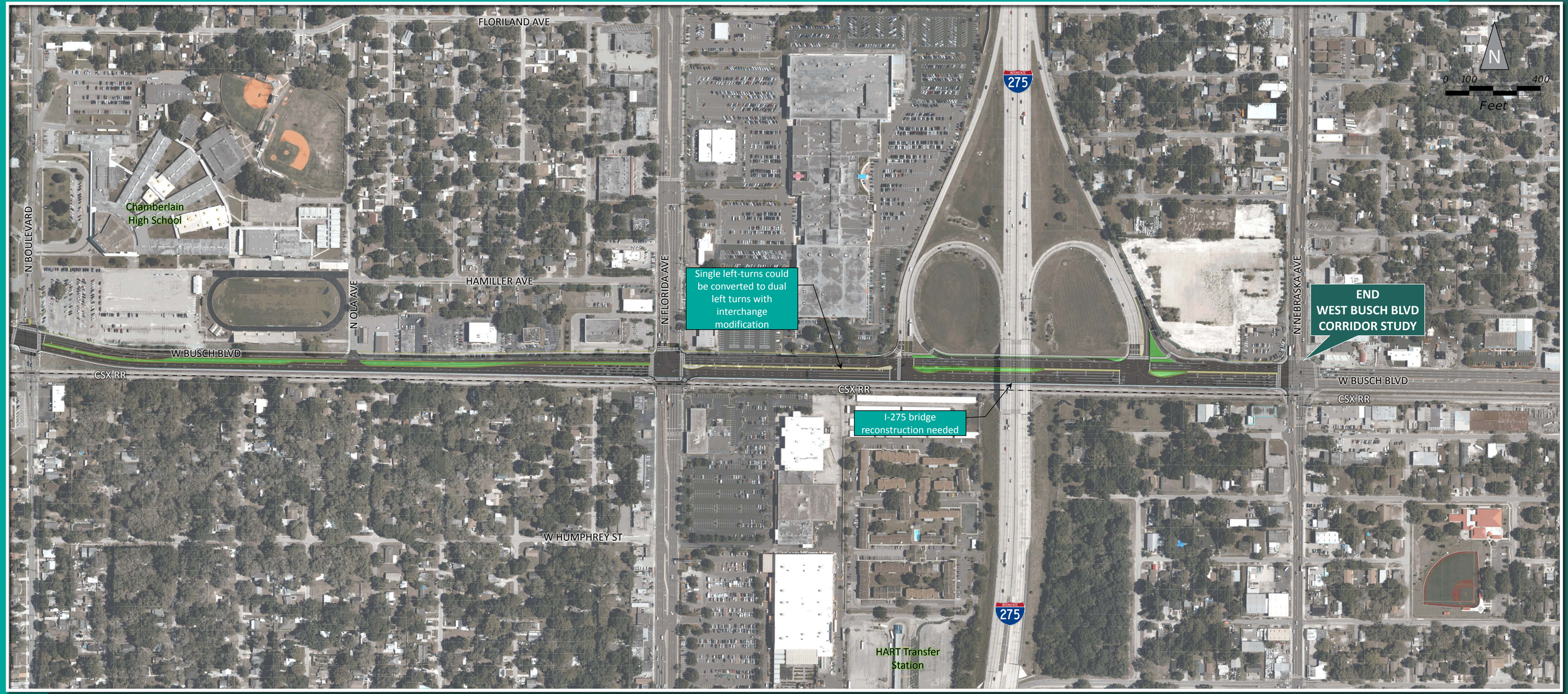
(credits: CH2M)

Appendix A
Preliminary Concept Plans

4-Lane Alternative (Sheet 1 of 3)

4-Lane Alternative (Sheet 2 of 3)

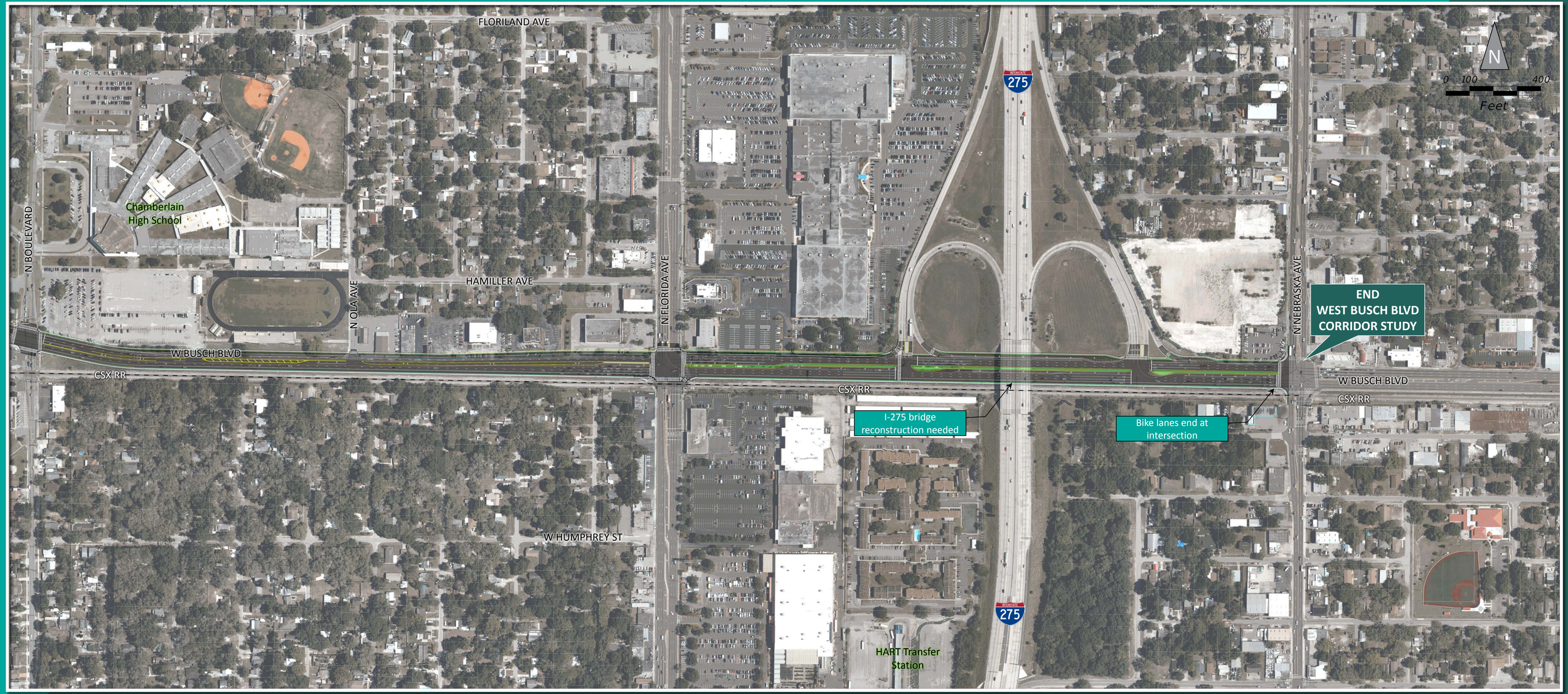
4-Lane Alternative (Sheet 3 of 3)



5-Lane Alternative (Sheet 1 of 3)

5-Lane Alternative (Sheet 2 of 3)

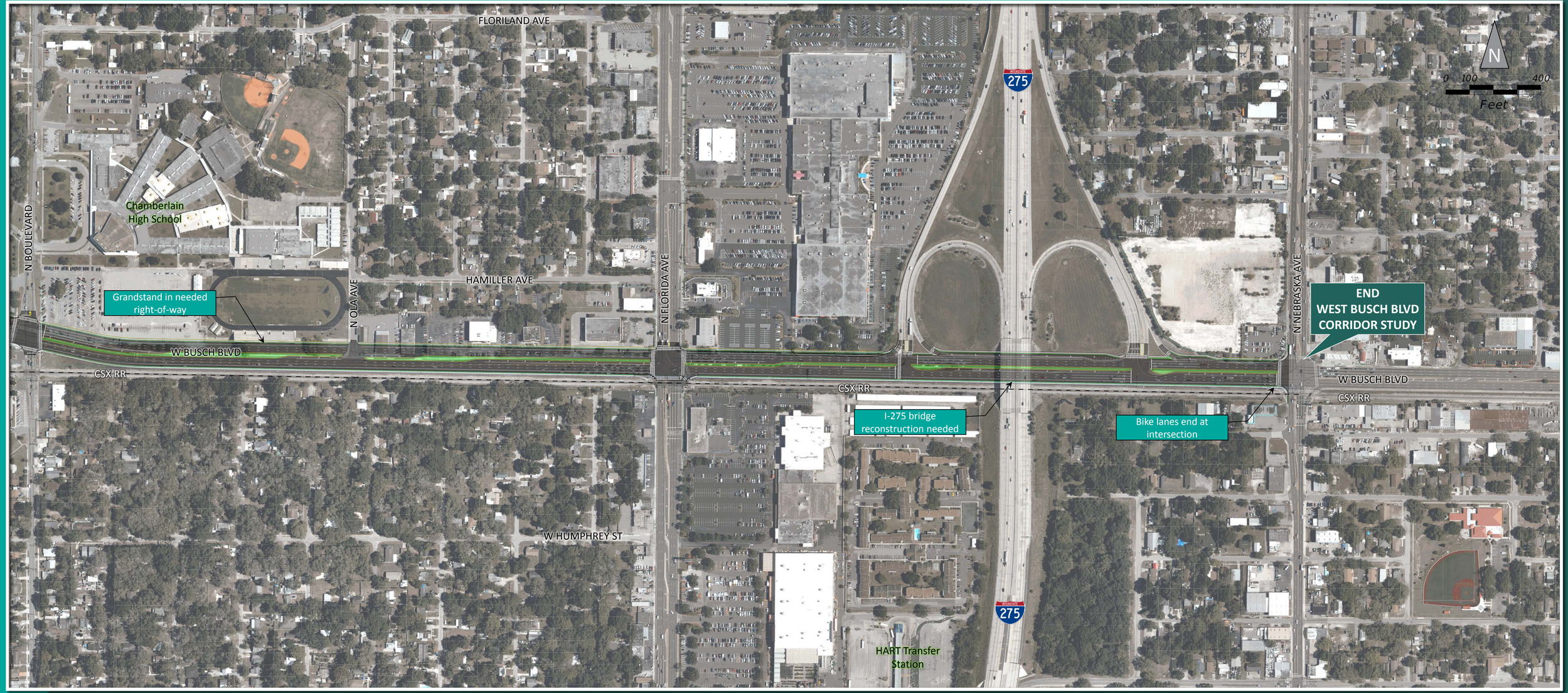
5-Lane Alternative (Sheet 3 of 3)



6-Lane Alternative (Sheet 1 of 3)

6-Lane Alternative (Sheet 2 of 3)

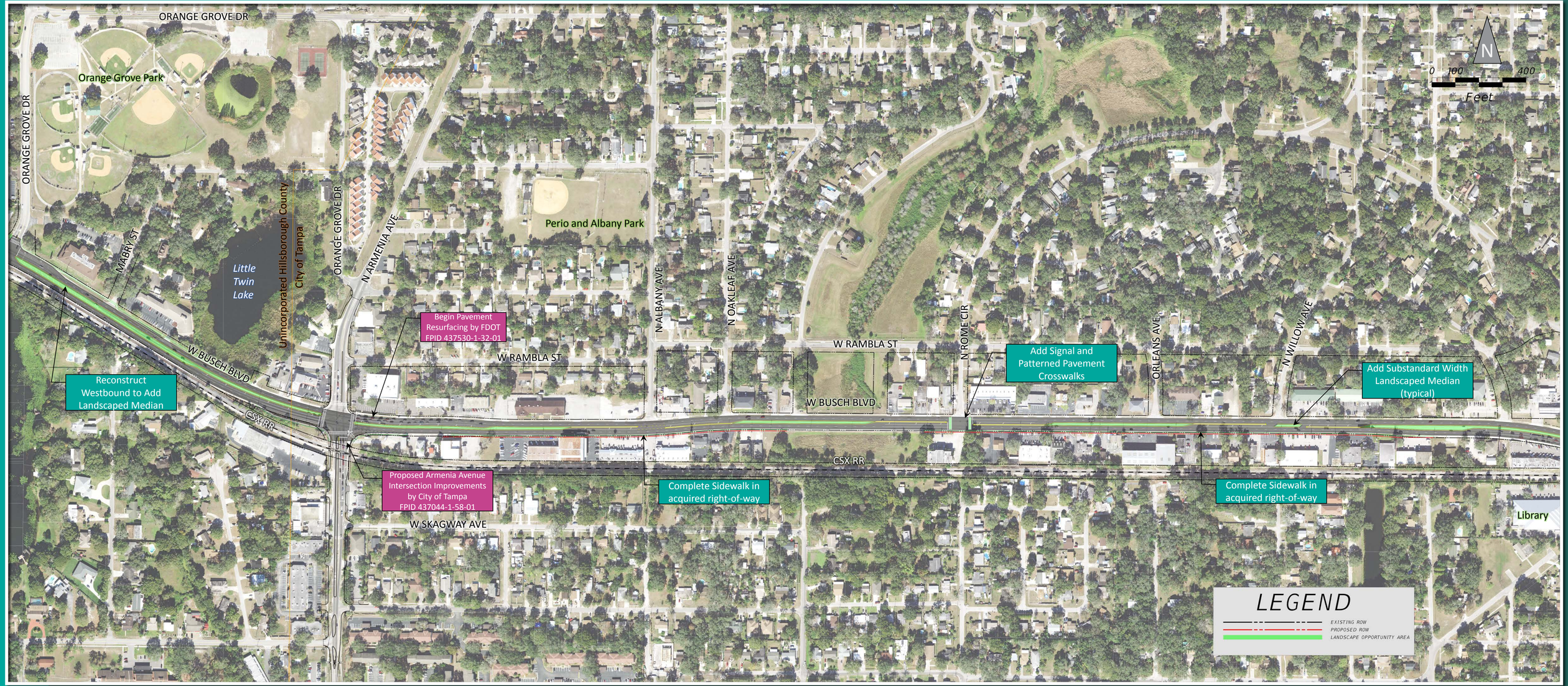
6-Lane Alternative (Sheet 3 of 3)



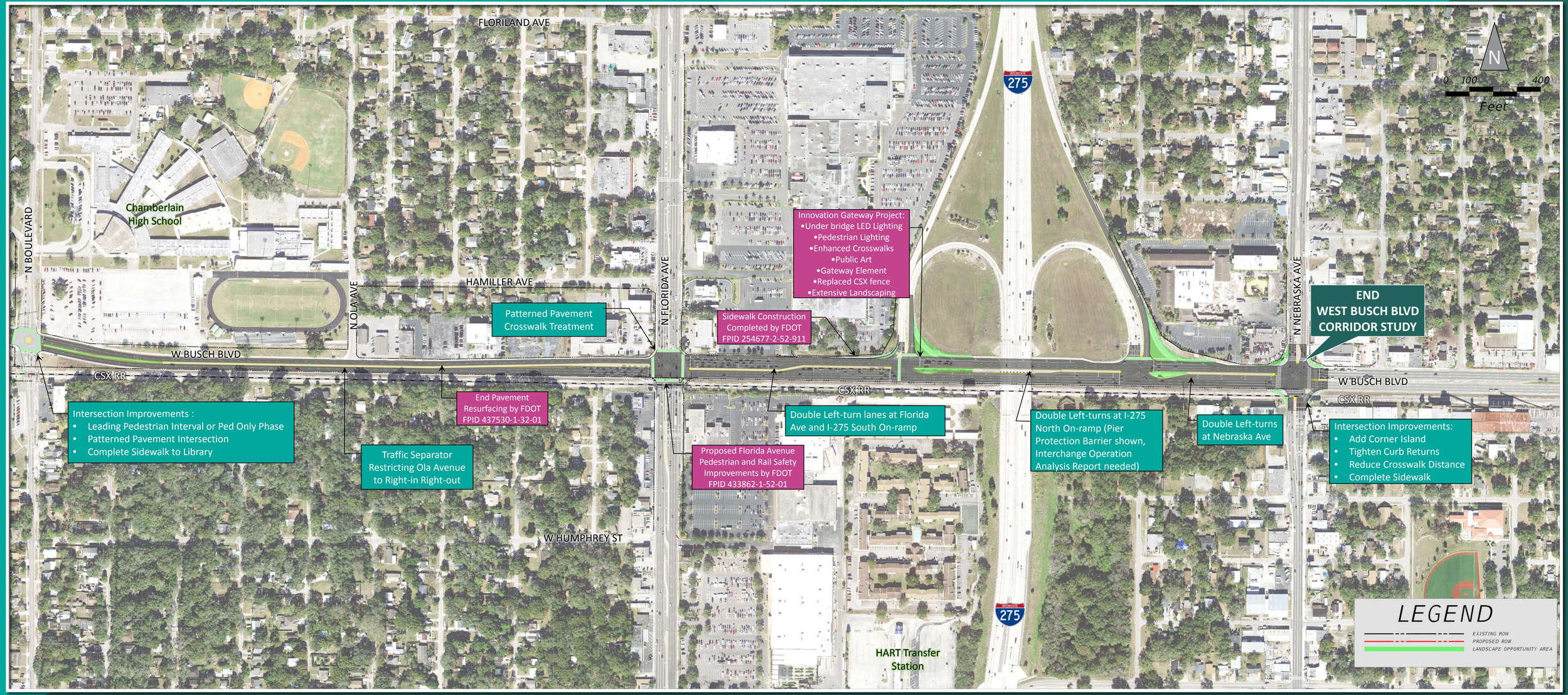
Appendix B
Proposed Concept Plans

Proposed Mid-term (Sheet 1 of 3)

Proposed Mid-term (Sheet 2 of 3)

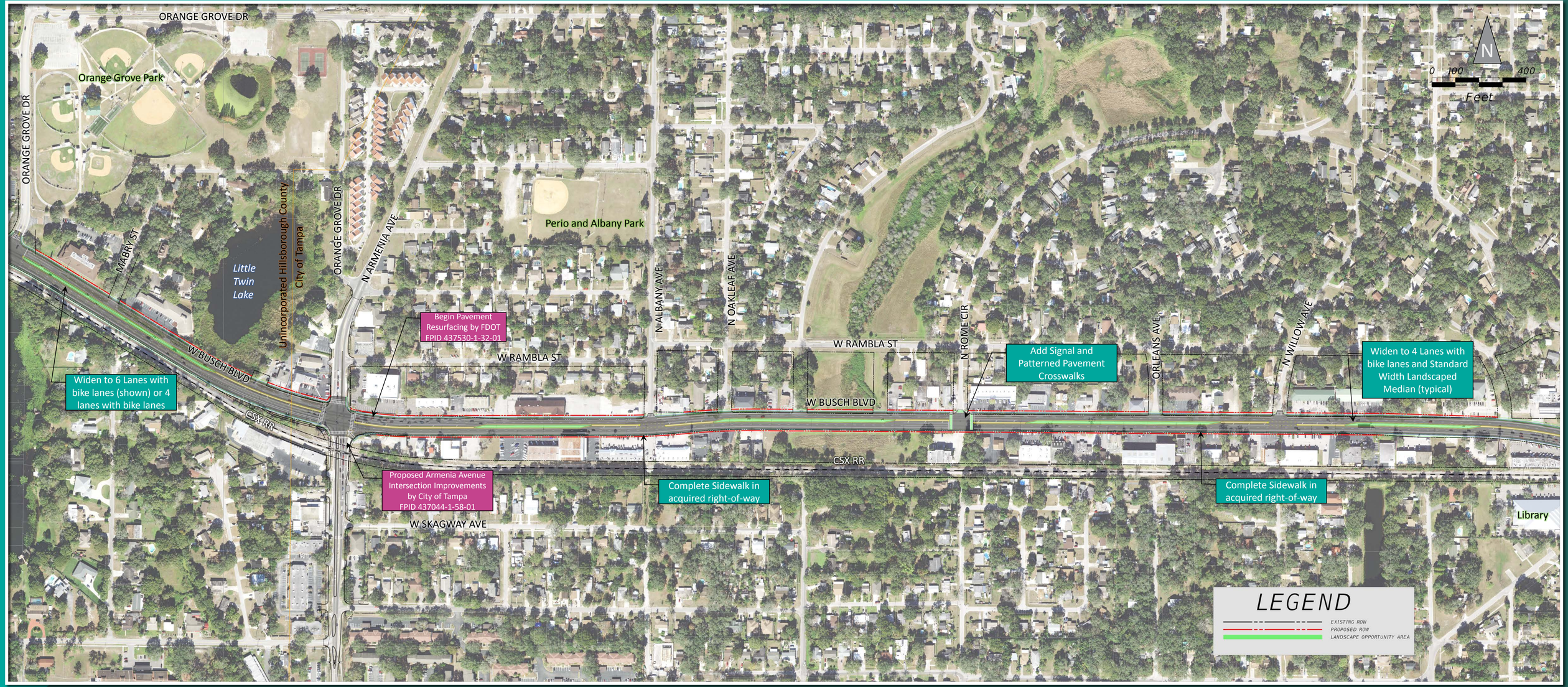


Proposed Mid-Term (Sheet 3 of 3)

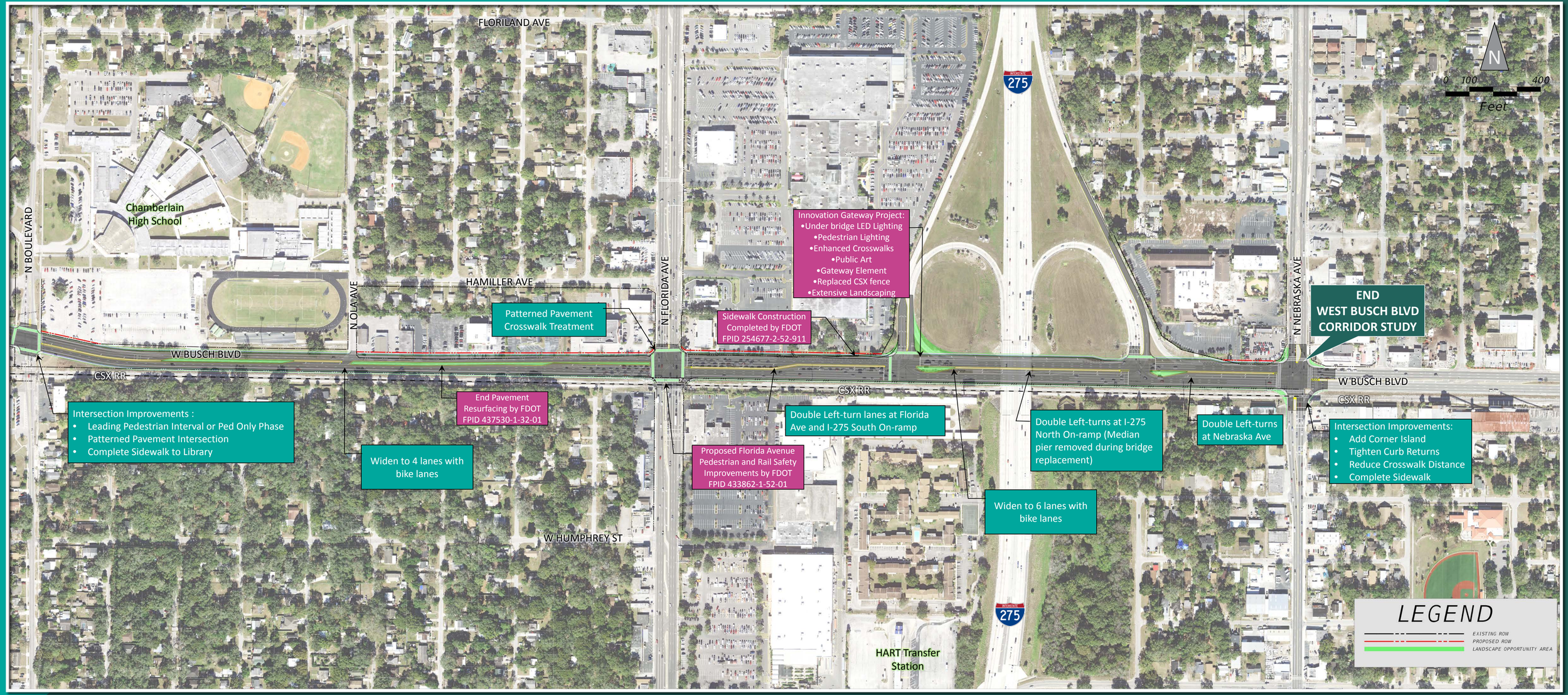


Proposed Long-term (Sheet 1 of 3)

Proposed Long-term (Sheet 2 of 3)



Proposed Long-Term (Sheet 3 of 3)



Appendix C
Design Criteria

Design Criteria for
45 MPH Target Speed

	Design Element	SR 580 Segment 1	SR 580 Segment 2	SR 580 Segment 3	SR 580 Segment 4	Source
General	Functional Classification	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial	FDOT Straight Line Diagram 10310000
	Access Management Class	5	7	7	7	FDOT GIS ACMANCLS feature
	Context Classification	C3R	C4	C3C	C3C	Busch Blvd Context Classification Tech Memo (May 19, 2017)
	Design Speed	45 MPH	45 MPH	45 MPH	45 MPH	FDM 201.4
	Posted Speed	45 MPH	45 MPH	40 MPH	40 MPH	
Typical Section	No. Lanes	4	4	4	6	Existing lanes
	Lane Width	11'	11'	11'	11'	FDM Table 210.2.1
	Two-way Left-turn Lane Width	N/A	N/A	N/A	N/A	FDM Table 210.2.1
	Parking Lane Width	8'	8'	8'	8'	from curb face, FDM 210.2.3
	Bike Lane Width	7' (4' min.)	7' (4' min.)	7' (4' min.)	7' (4' min.)	FDM 223.2.1.1
	Sidewalk Width	6'	6'	6'	6'	FDM Table 222.1.1
	Median Width	22' (19.5' min.)	22' (19.5' min.)	22' (19.5' min.)	22' (19.5' min.)	FDM Table 210.3.1
	Border Width	14' (8' min.)	14' (8' min.)	14' (8' min.)	14' (8' min.)	FDM 210.7.1
	Lateral Offset	4'	4'	4'	4'	from curb face, FDM Table 215.2.2
	Existing ROW Width	88' (74' min.)	70'	84' (61' min.)	100'	Control Survey
Horizontal	Min. Stopping Sight Distance	360'	360'	360'	360'	FDM Table 210.11.1
	Max. Deflection w/o Curve	1° 00'	1° 00'	1° 00'	1° 00'	FDM 210.8.1
	Length of Curve Desired (Min.)	675' (400')	675' (400')	675' (400')	675' (400')	FDM Table 210.8.1
	Max. Curvature (Min. Radius)	8°15' (694')	8°15' (694')	8°15' (694')	8°15' (694')	FDM Table 210.9.2
	Max. Superelevation	0.05	0.05	0.05	0.05	FDM 210.9
Vertical	Max. Grade	6%	6%	6%	6%	FDM Table 210.10.1
	Max. Change in Grade w/o VC	0.70	0.70	0.70	0.70	FDM Table 210.10.2
	Base Clearance above BCWE	3'	1'	3'	3'	FDM 210.10.3 (2)
	Crest Curve K	98	98	98	98	FDM Table 210.10.3
	Sag Curve K	79	79	79	79	FDM Table 210.10.3
	Vertical Clearance over Road	16.5'	16.5'	16.5'	16.5'	FDM Table 260.6.1

	Design Element	SR 580 Segment 1	SR 580 Segment 2	SR 580 Segment 3	SR 580 Segment 4	Source
General	Functional Classification	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial	FDOT Straight Line Diagram 10310000
	Access Management Class	5	7	7	7	FDOT GIS ACMANCLS feature
	Context Classification	C3R	C4	C3C	C3C	Busch Blvd Context Classification Tech Memo (May 19, 2017)
	Design Speed	40 MPH	40 MPH	40 MPH	40 MPH	FDM 201.4
	Posted Speed	40 MPH	40 MPH	40 MPH	40 MPH	
Typical Section	No. Lanes	4	4	4	6	Existing lanes
	Lane Width	11'	11'	11'	11'	FDM Table 210.2.1
	Two-way Left-turn Lane Width	12'	12'	12'	12'	FDM Table 210.2.1
	Parking Lane Width	8'	8'	8'	8'	from curb face, FDM 210.2.3
	Bike Lane Width	7' (4' min.)	7' (4' min.)	7' (4' min.)	7' (4' min.)	FDM 223.2.1.1
	Sidewalk Width	6'	6'	6'	6'	FDM Table 222.1.1
	Median Width	22' (15.5' min.)	22' (15.5' min.)	22' (15.5' min.)	22' (15.5' min.)	FDM Table 210.3.1
	Border Width	12' (8' min.)	12' (8' min.)	12' (8' min.)	12' (8' min.)	FDM 210.7.1
	Lateral Offset	4'	4'	4'	4'	from curb face, FDM Table 215.2.2
	Existing ROW Width	88' (74' min.)	70'	84' (61' min.)	100'	Control Survey
Horizontal	Min. Stopping Sight Distance	305'	305'	305'	305'	FDM Table 210.11.1
	Max. Deflection w/o Curve	2° 00'	2° 00'	2° 00'	2° 00'	FDM 210.8.1
	Length of Curve Desired (Min.)	600' (400')	600' (400')	600' (400')	600' (400')	FDM Table 210.8.1
	Max. Curvature (Min. Radius)	10°45' (533')	10°45' (533')	10°45' (533')	10°45' (533')	FDM Table 210.9.2
	Max. Superelevation	0.05	0.05	0.05	0.05	FDM 210.9
Vertical	Max. Grade	7%	7%	7%	7%	FDM Table 210.10.1
	Max. Change in Grade w/o VC	0.80	0.80	0.80	0.80	FDM Table 210.10.2
	Base Clearance above BCWE	3'	1'	3'	3'	FDM 210.10.3 (2)
	Crest Curve K	70	70	70	70	FDM Table 210.10.3
	Sag Curve K	64	64	64	64	FDM Table 210.10.3
	Vertical Clearance over Road	16.5'	16.5'	16.5'	16.5'	FDM Table 260.6.1

Design Criteria for
35 MPH Target Speed

	Design Element	SR 580 Segment 1	SR 580 Segment 2	SR 580 Segment 3	SR 580 Segment 4	Source
General	Functional Classification	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial	Urban Principal Arterial	FDOT Straight Line Diagram 10310000
	Access Management Class	5	7	7	7	FDOT GIS ACMANCLS feature
	Context Classification	C3R	C4	C3C	C3C	Busch Blvd Context Classification Tech Memo (May 19, 2017)
	Design Speed	35 MPH	35 MPH	35 MPH	35 MPH	FDM 201.4
	Posted Speed	35 MPH	35 MPH	35 MPH	35 MPH	
Typical Section	No. Lanes	4	4	4	6	Existing lanes
	Lane Width	10'	10'	10'	10'	FDM Table 210.2.1
	Two-way Left-turn Lane Width	11'	11'	11'	11'	FDM Table 210.2.1
	Parking Lane Width	8'	8'	8'	8'	from curb face, FDM 210.2.3
	Bike Lane Width	7' (4' min.)	7' (4' min.)	7' (4' min.)	7' (4' min.)	FDM 223.2.1.1
	Sidewalk Width	6'	6'	6'	6'	FDM Table 222.1.1
	Median Width	22' (15.5' min.)	15.5'	22' (15.5' min.)	22' (15.5' min.)	FDM Table 210.3.1
	Border Width	12' (8' min.)	12' (8' min.)	12' (8' min.)	12' (8' min.)	FDM 210.7.1
	Lateral Offset	1.5'	1.5'	1.5'	1.5'	from curb face, FDM Table 215.2.2
	Existing ROW Width	88' (74' min.)	70'	84' (61' min.)	100'	Control Survey
Horizontal	Min. Stopping Sight Distance	250'	250'	250'	250'	FDM Table 210.11.1
	Max. Deflection w/o Curve	2° 00'	2° 00'	2° 00'	2° 00'	FDM 210.8.1
	Length of Curve Desired (Min.)	525' (400')	525' (400')	525' (400')	525' (400')	FDM Table 210.8.1
	Max. Curvature (Min. Radius)	14°15' (402')	14°15' (402')	14°15' (402')	14°15' (402')	FDM Table 210.9.2
	Max. Superelevation	0.05	0.05	0.05	0.05	FDM 210.9
Vertical	Max. Grade	7%	7%	7%	7%	FDM Table 210.10.1
	Max. Change in Grade w/o VC	0.90	0.90	0.90	0.90	FDM Table 210.10.2
	Base Clearance above BCWE	3'	1'	3'	3'	FDM 210.10.3 (2)
	Crest Curve K	47	47	47	47	FDM Table 210.10.3
	Sag Curve K	49	49	49	49	FDM Table 210.10.3
	Vertical Clearance over Road	16.5'	16.5'	16.5'	16.5'	FDM Table 260.6.1

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