

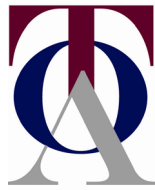
EAST HILLSBOROUGH AVENUE CORRIDOR STUDY

**HILLSBOROUGH COUNTY METROPOLITAN PLANNING ORGANIZATION
CONGESTION MANAGEMENT/CRASH MITIGATION PROCESS**

DECEMBER 2013



Prepared by:



**Tindale-Oliver
&
Associates, Inc.**
Planning and Engineering

1000 North Ashley Drive
Suite 400

Tampa, FL 33602

Phone: (813) 224-8862

www.tindaleoliver.com

Project Number: 335017-01.13

Sub-consultant to:

JACOBS®

18302 Highwoods Preserve Parkway
Suite 200

Tampa, FL 33647

Phone: (813) 977-3434

www.jacobs.com

Project Number: E9W93516

Prepared for:



601 East Kennedy Boulevard
18th Floor

Tampa, FL 33601

Phone: (813) 272-5940

www.hillsboroughmpo.org

Task Authorization: TWO #16

This page intentionally left blank

Executive Summary

Introduction

East Hillsborough Avenue, also known as US 92 and SR 600, is an important east-west arterial roadway that connects the Interstate 4/US 301/Interstate 75 interchanges with Central Tampa neighborhoods, Interstate 275, and points west. In addition to serving as an important east-west arterial roadway, East Hillsborough Avenue traverses the northern edge of the East Tampa Community Redevelopment Area (CRA), bisects the Seminole Heights neighborhood, and has been identified as part of the route of HART's planned East-West MetroRapid service.

East Hillsborough Avenue from Interstate 275 to Interstate 4 has been identified through prior Hillsborough County Metropolitan Planning Organization (MPO) studies as an important multimodal corridor with persistent safety and mobility issues.¹ The purpose of the East Hillsborough Avenue Corridor Study is to assess operational conditions along the roadway for all transportation modes and develop and evaluate short- and longer-term strategies for the corridor that better balance the transportation mobility needs for all people, reduce the frequency and severity of crashes, support the economic development vision for the corridor, and are consistent with the values of the community. The focus area for this study is defined as East Hillsborough Avenue between Interstate 275 and Interstate 4, but the primary focus of this study is on the existing six-lane section of East Hillsborough Avenue between Interstate 275 and 50th Street.

The goals and objectives of the East Hillsborough Avenue Corridor Study are the same as those defined in the Hillsborough County MPO's Congestion Management/Crash Mitigation Process (CM/CMP), which have been carefully aligned with the goals and objectives found in the Long Range Transportation Plan (LRTP) and other growth management policies and plans. Since the East Hillsborough Avenue corridor was identified as a high crash corridor in a previous MPO study and the area is considered a high pedestrian corridor, special emphasis was given to *Objective 1.1: Reduce the frequency and severity of crashes focusing on the highest crash areas* and *Objective 2.2: Improve the safety and comfort of bicycling and walking trips*. The CM/CMP's goals and objectives are:

- **Goal #1: Improve Reliability of Travel.**
 - *Objective 1.1: Reduce the frequency and severity of crashes focusing on the highest crash areas.*
 - *Objective 1.2: Minimize the effect of unscheduled incidents.*

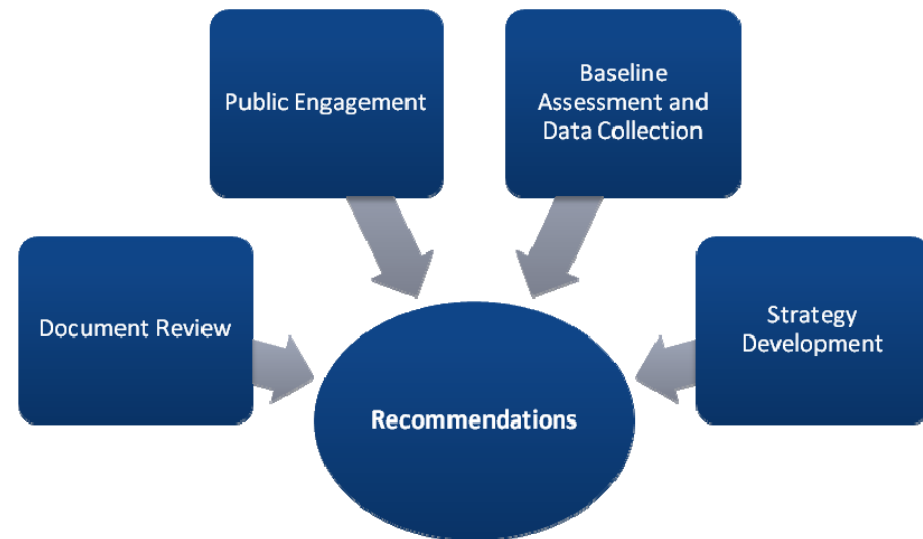
¹ CM/CMP Feasibility Study on Implementing HOV, Reversible Lanes and Time-of-Day Parking Strategies (November 2012) and the CM/CMP Crash Severity Reduction Report (March 2013).

- **Goal #2: Shift Peak-Hour Trips to Modes of Travel Instead of Single-Occupant Cars.**
 - *Objective 2.1: Improve the attractiveness of transit and HOV trips.*
 - *Objective 2.2: Improve the safety and comfort of bicycling and walking trips.*
- **Goal #3: Reduce Peak-Hour Impacts.**
 - *Objective 3.1: Improve peak-hour operations.*
 - *Objective 3.2: Reduce peak-hour demand on our roadways.*

Study Process

The East Hillsborough Avenue Corridor Study was organized into five tasks, with the first four feeding into the fifth, the study recommendations. The five study tasks are:

- Document Review
- Public Engagement
- Baseline Assessment and Data Collection
- Strategy Development
- Recommendations



Document Review

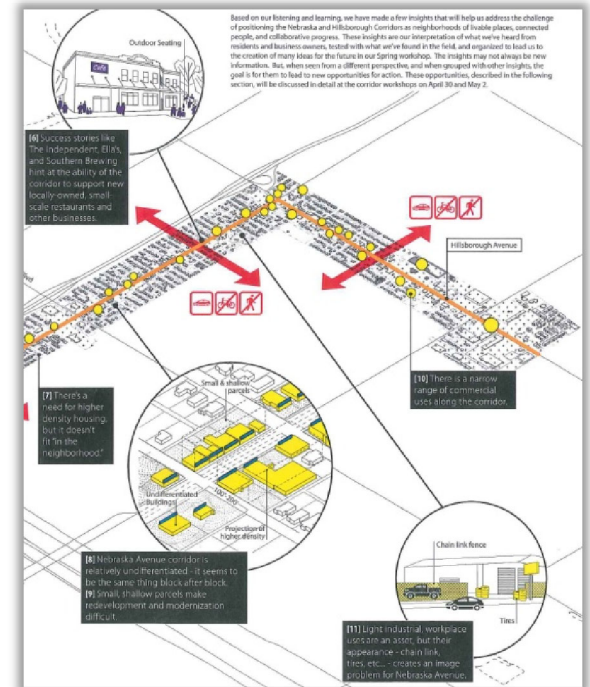
A document review was conducted to provide a greater understanding of past and current plans within the study area and to provide for a reasonable degree of consistency between this study and previous planning and engineering efforts. Some of the recurring key themes from the reviewed documents were the desire to increase mobility options (bicycle, pedestrian, and transit), make streets safer (e.g., reduce crashes, calm traffic, enhance lighting), and create livable/walkable neighborhoods with integrated land uses. Listed below are some of the more notable documents/planning efforts that were reviewed as part of this study:

- InVision Tampa
- HART MetroRapid East-West PD&E Report
- East Tampa CRA
- East Lake Orient Park Community Plan
- Greater Seminole Heights Vision Plan
- 40th Street Vision Plan
- Florida Department of Transportation (FDOT) Hillsborough Avenue Two-Way Left Turn Lane Median Revision Before-After Summary

Public Engagement

Recognizing that public input and participation are key components to developing a successful plan, two public open house/workshop events were held. In addition to providing the benefit of expanded public awareness and support these events were specifically held to:

- Inform the public about the Study and to answer two general questions; why is the Hillsborough County MPO looking at East Hillsborough Avenue, and what kind of recommendations are being considered, and
- Engage the public and receive input from those who live and work along or near East Hillsborough Avenue.



InVision Tampa Workshop Handout



Baseline Assessment and Data Collection

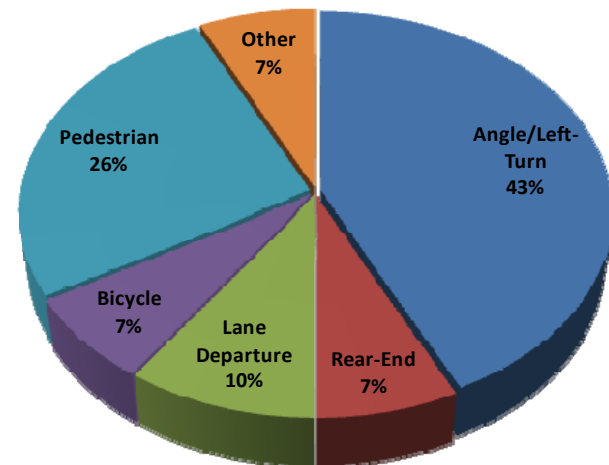
The baseline assessment and data collection process was completed to establish baseline conditions along the corridor and to assist in the development of strategies to improve safety and mobility along East Hillsborough Avenue. Most of the baseline assessment was conducted using data available from the Florida Department of Transportation, City of Tampa, Hillsborough County, HART, and the Hillsborough County MPO. Additional field data collection (e.g., traffic counts, pedestrian counts) was conducted as part of this study to supplement the existing available data. The baseline assessment was mainly focused on the following topics, which are summarized on the following pages.

Crash History – An evaluation of crashes along the corridor was conducted to gain a better understanding of potential safety issues along the corridor. Since the corridor has been identified by the MPO as a high severe injury (fatal and incapacitating injury) crash corridor and one of the study’s objectives is to reduce the frequency of severe injury crashes, extra attention was paid to the severe injury crashes along the corridor. Bicycle and pedestrian crashes make up a third of the severe injury crashes (60% of fatal crashes) along East Hillsborough Avenue, another 45 percent of the severe crashes are related to angle and left-turn crashes.

Traffic Operations – The traffic operations assessment evaluated existing speed limits; existing and historic traffic volumes, including evaluating traffic flows by direction and time of day; turning movements at existing signalized intersections; and bicycle and pedestrian counts at various locations along the corridor.

Transit Ridership – Transit ridership was evaluated at the stop-level to identify high-volume stop locations. Route 34, which provides service along East Hillsborough Avenue, is one of HART’s most productive routes from a ridership standpoint. On average, there are about 2,400 people either boarding or alighting a bus within along the corridor every day. HART’s future East-West MetroRapid route is anticipated to run along East Hillsborough Avenue between Nebraska Avenue and 56th Street. This enhanced service has the potential to increase ridership and activity along the corridor. Therefore, understanding where current transit activity is occurring and where future transit enhancements are anticipated helps in identifying strategies that ensure that people have safe access to and from transit stops.

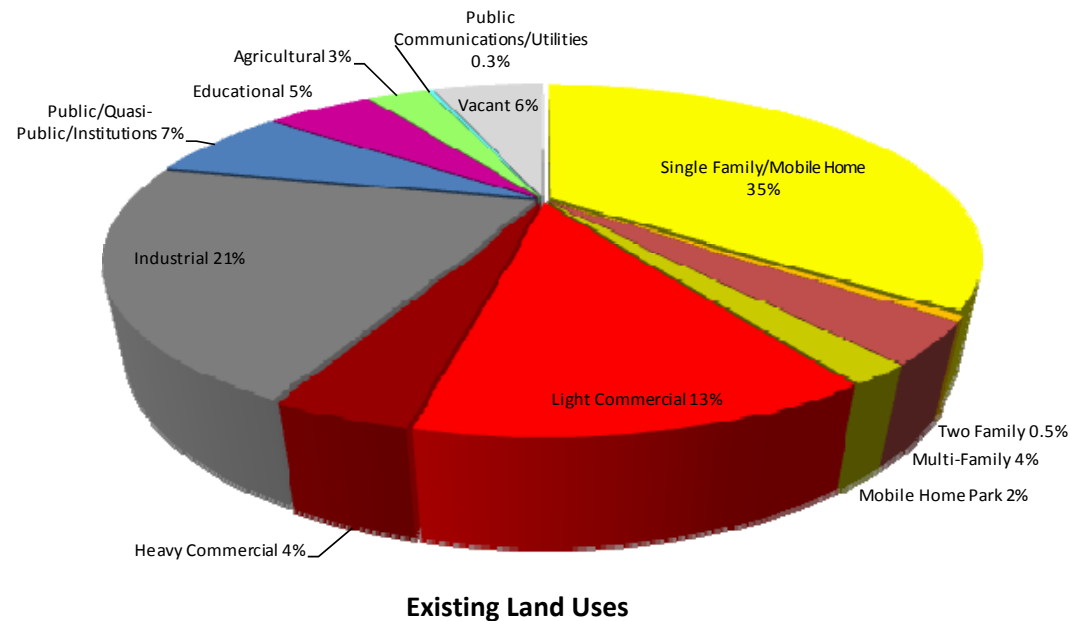
Lighting Conditions – Using available lighting level data, the existing lighting levels along East Hillsborough Avenue were assessed and documented. While providing enhanced lighting was expected to be a general recommendation, reviewing the existing lighting levels helps to



Severe Injury Crashes by Crash Type (2010–2012)

identify any locations that may need immediate or extra attention. It is important to note that enhancing street lighting has recently become a major initiative of both FDOT (special emphasis on intersection lighting) and the City of Tampa.

Land Use Evaluation –While much of the study focuses on transportation, it is important to recognize the direct link between transportation and land use. An assessment of the existing and future land uses was conducted for the properties in and around East Hillsborough Avenue. The InVision Tampa Plan is looking specifically at East Hillsborough Avenue between Nebraska Avenue and 22nd Street. Continued monitoring of this planning process and the outcomes could have a significant impact on a portion of the East Hillsborough Avenue corridor.



Strategy Development

The strategy development portion of the study identified and evaluated the menu of strategies to improve safety and mobility along East Hillsborough Avenue. This portion of the study identified strategies related to the topics listed below:

- Speed (Posted Limits)
- Sidewalks
- Bicycle Facilities
- Pedestrian/Bicycle Crossings
- Transit
- Signal Phasing
- Lighting
- Landscaping

Recommendations

The study provides recommendations for both specific improvements and for more general “best practice” enhancements. The timeframe for these recommendations vary from longer-term (5+ years) to shorter-term projects (0–2 years), some of which may be implementable almost immediately. One important note is that the while work in the field was conducted as part of this study; this work was done to collect data and identify potential “fatal” flaws that would prohibit the type of improvements that are being recommended. It is suggested that necessary engineering, survey, and/or design work be completed prior to commencing the recommended enhancements identified in this document.

The recommendations have been organized into three categories—Short-Term, Mid-Term, and Longer-Term—and are summarized on the following pages.

Short-Term Recommendations (0–2 Years)

Pavement Markings (Crosswalks)

- Enhance existing crosswalks to high-emphasis (ladder) crosswalks.
- Provide high-emphasis crosswalks along East Hillsborough Avenue at all non-signalized intersections.
- Supplement marked crossings with appropriate signage.

High-Emphasis Crosswalk



Speed Limit

- Lower the speed limit on East Hillsborough Avenue between 34th Street and 50th Street from 45 mph to 40 mph. (The current posted speed limit on East Hillsborough Avenue is 40 mph between Nebraska Avenue and 34th Street and 45 mph between 34th Street and 50th Street.) Evaluate lowering the speed limit on East Hillsborough Avenue from Nebraska Avenue to 50th Street to 35 mph. The probability of a fatality for all crashes at 45 mph is 16 percent; at 40 mph it drops to 10 percent, and at 35 mph it is 6 percent.² The relationship between speed and risk of fatality is even greater for crashes involving pedestrians; a crash at 45 mph has a nearly 90 percent fatality risk, at 40 mph an 80 percent risk, and at 35 mph approximately a 55 percent risk.³ Lower speed limits as part of an overall speed management strategy for the corridor can also reduce crashes by providing for greater reaction time for drivers.

² Joksch, Effect of Change in Speed at Impact on Fatality Risk, 1993.

³ Pasanen, Vehicle Speed and Fatality Probability in Pedestrian Crashes, 1992.

Area-Wide Master Plan

- Develop an area-wide master plan for the East Hillsborough Avenue corridor.
 - The master plan should look to expand on the InVision Tampa efforts that are currently underway by establishing a cohesive land use and transportation vision for the entire corridor while identifying potential future connections (streets, bicycle trails) that could be created by the redevelopment of sites along the corridor.
 - A key aspect of the master plan should be re-establishing the street grid in the area between 22nd Street and 40th Street to provide for alternative travel paths for cyclists and pedestrians.

Signal Timing

- Reduce signal cycle lengths along the corridor from 190 seconds (AM peak) and 180 seconds (PM peak) to 120 seconds and change all mainline left-turn movements to protected-only phasing when a pedestrian conflict is detected or when the opposing traffic is nearing saturated conditions (i.e. during peak hour). Reducing the cycle lengths can generate more compressed and predictable vehicular platoons, which can improve safety and side street operations by creating better “gaps” for vehicles and pedestrians to enter/cross the roadway.
- Prohibit right turns on red when a pedestrian conflict is detected.
- Initiate a leading pedestrian interval. This gives pedestrians a few second head-start before parallel traffic is allowed to proceed.



Lighting

- Provide enhanced intersection lighting consistent with FHWA guidelines for crosswalk illumination.
- Enhance corridor lighting and consider installation of pedestrian-scale lighting (mid- to long-term recommendation.)



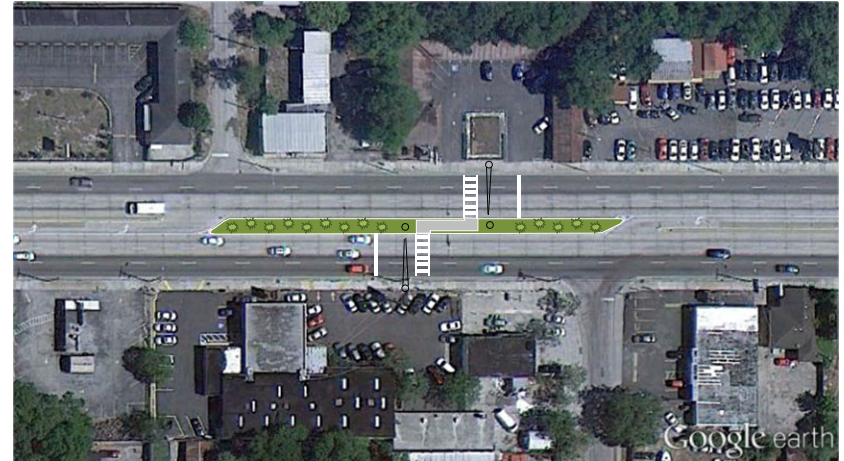
Parallel Bicycle Facilities (Bike Boulevards)

- Provide parallel bicycle facilities along Comanche Avenue, Mohawk Avenue, Giddens Avenue, or Frierson Avenue.
 - Monitor traffic volumes and evaluate the potential for bicycle boulevards along these streets.

Mid-Term Recommendations (0–5 Years)

Reduce Distance between Controlled Crossings

- Goal – Reduce the distance between controlled crossings to no more than a quarter mile.
- Perform necessary signal warrant studies for the following locations; if they meet warrants, install signal:
 - East Hillsborough Avenue at East Gate Plaza/ Meridian Pointe Apartment entrance
 - East Hillsborough Ave at 47th Street
- Perform the necessary mid-block crossing warrant studies for the following locations; if they meet warrants. install controlled mid-block crossings:
 - East Hillsborough Avenue at 11th Street/12th Street
 - East Hillsborough Avenue at 32nd Street
 - East Hillsborough Avenue at 37th Street
 - East Hillsborough Avenue at 43rd Street
 - East Hillsborough Avenue at 47th Street



Example of a Two-Stage Mid-Block Crossing

Side-Streets

- Provide sidewalks or defined walking path along both sides all side streets, at minimum within first block from East Hillsborough Avenue.
- Enhance lighting along side streets.
- Enhance the approaches along side streets at signalized intersections, by considering:
 - Raised (landscaped) medians or islands.
 - Partial or full traffic diverters where side streets intersect Mohawk and Giddens Avenues.



Streetscape Plan

- Develop a streetscape plan for East Hillsborough Avenue as a tool to incorporate uniform and enhanced sidewalks, lighting, and landscaping along the corridor.



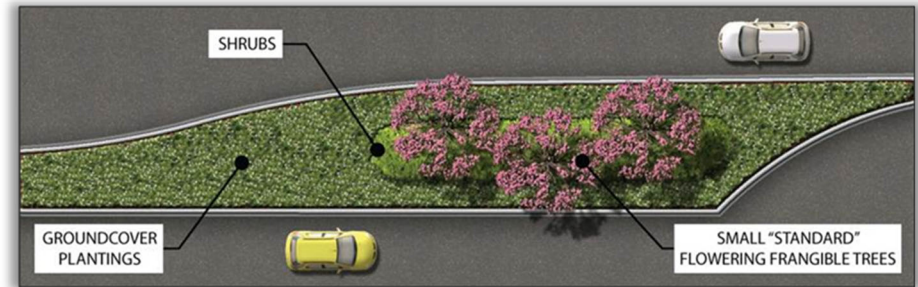
East Hillsborough Avenue with Recommended Streetscape Enhancements

Enhanced Pedestrian Environment

- Provide an enhanced pedestrian environment by better defining sidewalk zones, improving landscaping, and removing/relocating potential impediments within the sidewalk.
 - Use the streetscape plan as the implementing tool.

Landscaping

- Retrofit existing paved medians to accommodate landscaping.
- Explore opportunities to enhance landscaping along the sides of East Hillsborough Avenue (streetscape plan.)



Transit

- Identify opportunities to enhance and/or relocate existing bus stops.
 - Implementing the East-West MetroRapid route should provide an ideal opportunity to assess stop locations and operations along the corridor.



Land Use/Land Development Code

- Apply any land use and/or land development code recommendations from the InVision Tampa Plan to the entire corridor.
- Reduce the number of driveways by encouraging shared driveways and/or rear-access.

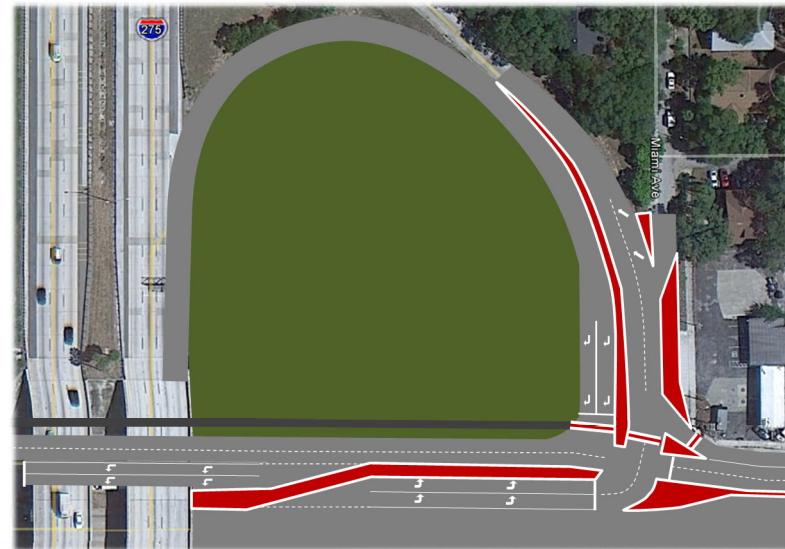
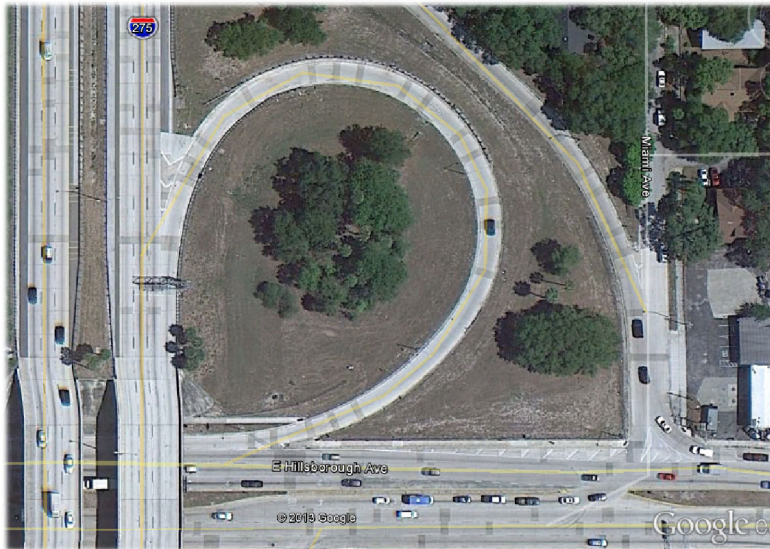
Longer-Term Recommendations (5+ Years)

Strengthen the Street Grid

- Maintain and acquire (through redevelopment activity) the necessary right-of-way to establish any connections identified in the recommended Area-Wide Master Plan.
- Look for opportunities to realign roadways and reestablish the street grid through the redevelopment of properties along the corridor.

I-275 Interchange

- Study traffic operations at the I-275 interchange and look for opportunities to reduce peak hour congestion along Hillsborough Avenue while also increasing safety along Hillsborough Avenue by eliminating free-flow merge movements. The following images show part of the I-275 interchange as it is today and a conceptual representation of some of the changes that could be considered.



Lane Conversion

- An analysis of East Hillsborough Avenue indicates that under the current traffic demand, the roadway could function adequately (LOS “D” or “E”) with only 4 thru lanes west of 40th Street. A principal concern, however, is the fact that East Hillsborough Avenue serves as a reliever route to westbound I-4. This is due to persistent traffic congestion at the Downtown (I-275) Interchange, westbound I-275 between Downtown and Tampa International Airport, and northbound I-275 from Downtown to the Hillsborough River. Ongoing efforts to widen I-275 west of Downtown and potential future managed lanes projects along I-4 and I-275 may reduce the importance of East Hillsborough Avenue as “overflow” relief for the City’s freeway system.
- In this event, it may be possible, depending on future demand projections, to repurpose the travel lanes on East Hillsborough Avenue to provide improved multimodal facilities (such as bike lanes and/or wide sidewalks) as well as infrastructure to improve safety for automobiles like right turn deceleration lanes at traffic signals and bus bays to reduce rear-end and sideswipe crashes.
- The images on the next page provide a graphical representation of what a four-lane East Hillsborough Avenue could look like. The rendering at the top of the page shows a “paint-only” option which provides bus bays, right-turn lanes at signalized intersections, and bicycle lanes. The bottom rendering adds hardscape/landscape improvements to the sidewalk environment. In both scenarios, the right turn lanes at the signalized intersections could incorporate bus queue-jump features if desired.

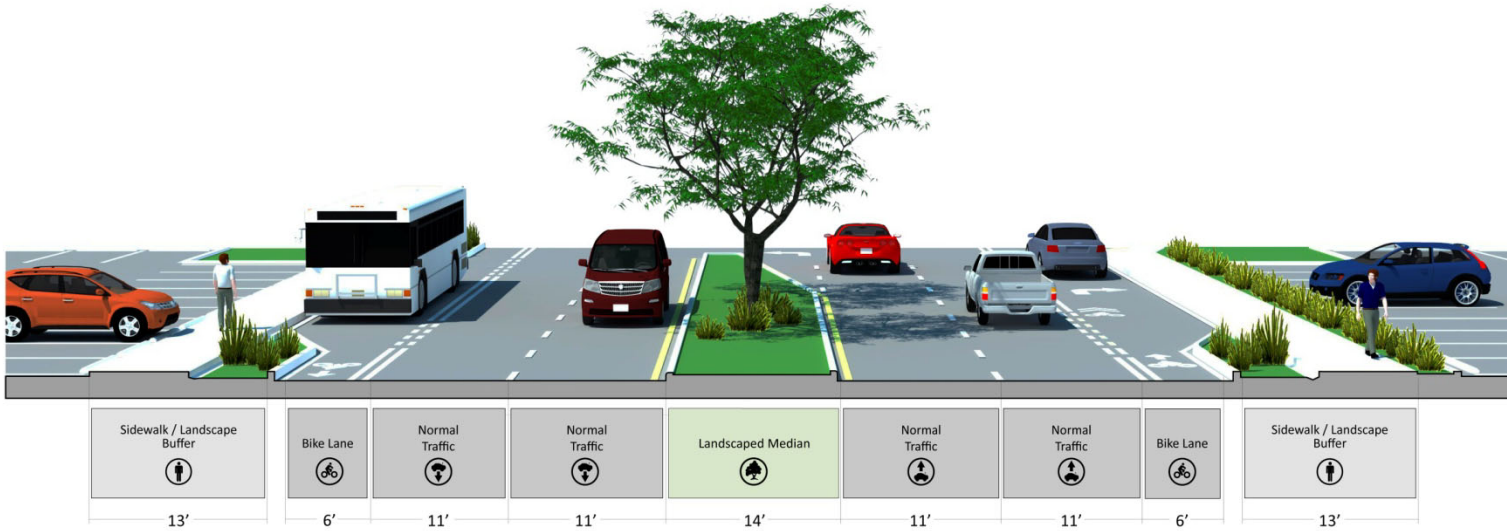
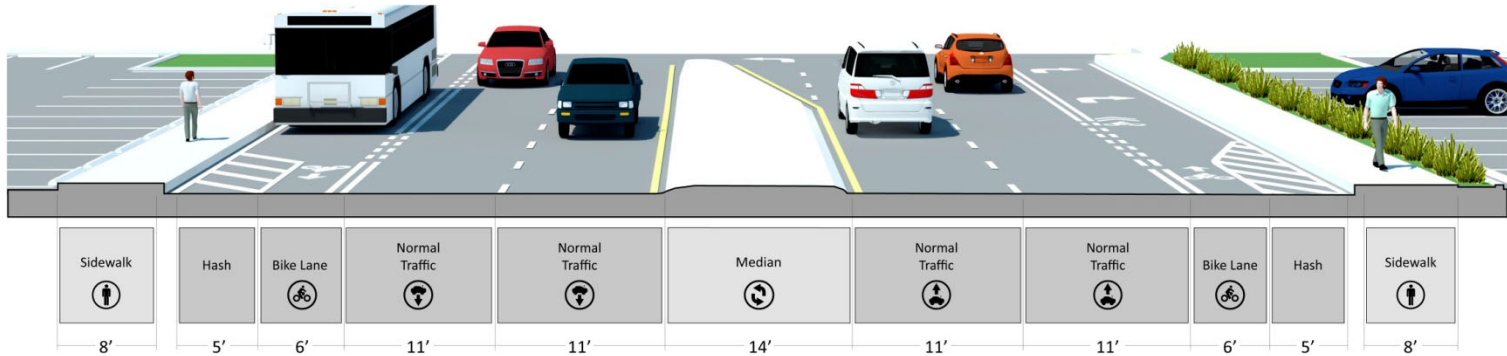


Table of Contents

Section 1: East Hillsborough Avenue Corridor Study	2
Introduction.....	2
Study Purpose.....	3
Goals, Objectives, and Performance Measures	3
Study Process.....	5
Section 2: Document Review.....	8
Section 3: Public Engagement	12
Section 4: Baseline Assessment and Data Collection	14
Traffic Analysis.....	15
Crash History	24
Transit.....	32
Lighting	35
Land Use	38
Section 5: Strategy Development.....	42
Crosswalks	42
Signage	44
Speed Reduction.....	45
Pedestrian Environment.....	48
Bicycle Facilities.....	50
Transit.....	52
Signalized Intersection Strategies	54
Crossing Principles and Strategies.....	57

Lighting 63

Landscaping 64

Section 6: Recommendations 68

 Short-Term Recommendations (0–3 years) 68

 Mid-Term Recommendations (0–5 years)..... 70

 Longer-Term Recommendations (5+ years) 73

 Site Specific Recommendations and Conceptual Illustrations 79

 Cost Estimates 108

Appendix A: Public Engagement 110

Appendix B: Short- Mid-Term Recommendation Cost Estimates 126

List of Tables

Table 1: Performance and Monitoring Measures 4

Table 2: Existing and Historical AADT 15

Table 3: Collected Turning Movement Count Summary 21

Table 4: Observed Pedestrian and Bicycle Crossing Counts 22

Table 5: Existing Pedestrian and Bicycle Level of Service 23

Table 6: Total Crashes by Year and Severity 26

Table 7: Bicycle and Pedestrian Crashes by Year (2008–2012) 28

Table 8: Annual Route Ridership 32

Table 9: Top Daily Ridership Stop Clusters 32

Table 10: Conventional Roadway Lighting Standards 37

Table 11: East Hillsborough Avenue Geometric Constraints and Safety/Mobility Consequences 76

Table 12: Estimated Cost of Recommendations 108

List of Figures

Figure 1: Study Area 2

Figure 2: East Hillsborough Avenue, Typical Cross-Section..... 14

Figure 3: 2011 Hourly Directional Volume – East Hillsborough Ave, West of Nebraska Ave..... 16

Figure 4: 2011 Hourly Directional Volume – East Hillsborough Ave, East of Nebraska Ave 17

Figure 5: 2011 Hourly Directional Volume – East Hillsborough Ave, East of 22nd St 18

Figure 6: 2011 Hourly Directional Volume – East Hillsborough Ave, East of 40th St 19

Figure 7: Total Crashes (2010–2012)..... 24

Figure 8: Severe Injury Crashes (2010–2012)..... 25

Figure 9: Bicycle and Pedestrian Crashes (2008–2012)..... 25

Figure 10: Total Crashes by Year (2010–2012)..... 26

Figure 11: Severe Injury Crashes by Year (2010–2012)..... 27

Figure 12: Fatal Crashes by Year (2010–2012) 27

Figure 13: Annual Distribution of Bicycle and Pedestrian Crashes (2008–2012) 28

Figure 14: Total Crashes by Crash Type..... 29

Figure 15: Severe Injury Crashes by Type..... 29

Figure 16: Fatal Crashes by Type 29

Figure 17: Breakdown of Bicycle and Pedestrian Crashes (5-Year Total, 2008–2012)..... 30

Figure 18: Breakdown of Bicycle and Pedestrian Severe Injury Crashes (5-Year Total, 2008–2012) 30

Figure 19: Median Revision and Total Crashes 31

Figure 20: Median Revision and Severe Injury and Bicycle/Pedestrian Crashes..... 31

Figure 21: Existing Transit Service 33

Figure 22: Existing Transit Stop-Level Average Daily Ridership Clusters..... 33

Figure 23: Proposed East-West MetroRapid Route and Stops..... 34

Figure 24: Existing Lighting Levels 35

Figure 25: Existing Lighting Levels along East Hillsborough Avenue 36

Figure 26: Existing Land Use Breakdown by Land Area..... 38

Figure 27: Existing Land Use Map..... 39

Figure 28: Future Land Use Map 39

Figure 29: Crosswalk Design 43

Figure 30: Examples of Existing Crosswalks 43

Figure 31: Example Signage 44

Figure 32: Probability of Fatality (Joksch 1993) Effect of Change in Speed at Impact on Fatality Risk..... 45

Figure 33: Vehicle Speed and Fatality Probability in Pedestrian Crashes (Pasanen, 1992) 46

Figure 34: Speed and Stopping Distance 47

Figure 35: Defining Sidewalk Zones..... 49

Figure 36: Needed Distance to Avoid Pedestrian-Vehicle Conflict 58

Figure 37: Distance between Existing Controlled Crossings..... 59

Figure 38: Traditional Intersection Lighting Design..... 63

Figure 39: New Intersection Lighting Design..... 63

Figure 40: East Hillsborough Avenue, Conceptual Cross-Section with Streetscape Enhancements..... 72

Figure 41: I-275 Interchange Existing Issues and Potential Design Options..... 74

Figure 42: Conceptual Lane Conversion Design Option 1 78

Figure 43: Conceptual Lane Conversion Design Option 2 78



SECTION 1

EAST HILLSBOROUGH AVENUE CORRIDOR STUDY

Section 1: East Hillsborough Avenue Corridor Study

Introduction

East Hillsborough Avenue is a key arterial roadway that connects the Interstate 4/US 301/Interstate 75 interchanges with Interstate 275, Dale Mabry Highway, the Veterans Expressway, and northern Pinellas County. Hillsborough Avenue (US 92/US 41/SR 600) is one of only a few east-west roads that traverse Hillsborough County between Pinellas and Polk counties. In addition to serving as an essential east-west arterial roadway, East Hillsborough Avenue traverses the northern edge of the East Tampa Community Redevelopment Area (CRA), bisects the Seminole Heights neighborhood, and has been identified as part of the route of HART's planned East-West MetroRapid service.

The study corridor is defined as East Hillsborough Avenue between Interstate 275 and Interstate 4, but the primary focus of this study is on the existing six-lane section of East Hillsborough Avenue between Interstate 275 and 50th Street (see Figure 1).



Figure 1: Study Area

Study Purpose

East Hillsborough Avenue from Interstate 275 to Interstate 4 has been identified through prior Hillsborough County Metropolitan Planning Organization (MPO) studies as an important multimodal corridor with persistent safety and mobility issues.⁴ The purpose of the East Hillsborough Avenue Corridor Study is to assess operational conditions along East Hillsborough Avenue for all transportation modes and develop and evaluate short- and longer-term strategies for the corridor that better balance the transportation mobility needs for all people, reduce the frequency and severity of crashes, support the economic development vision for the corridor, and are consistent with the values of the community.

Goals, Objectives, and Performance Measures

The goals and objectives for the East Hillsborough Avenue Corridor Study are the same as those defined in the Hillsborough County MPO's Congestion Management/Crash Mitigation Process (CM/CMP.) These goals and objectives have been carefully aligned with the goals and objectives found in the Long Range Transportation Plan (LRTP) and other growth management policies and plans. The CM/CMP's goals and objectives are:

- **Goal #1: Improve Reliability of Travel.**
 - *Objective 1.1: Reduce the frequency and severity of crashes focusing on the highest crash areas.*
 - *Objective 1.2: Minimize the effect of unscheduled incidents.*

- **Goal #2: Shift Peak-Hour Trips to Modes of Travel Instead of Single-Occupant Cars**
 - *Objective 2.1: Improve the attractiveness of transit and HOV trips.*
 - *Objective 2.2: Improve the safety and comfort of bicycling and walking trips.*

- **Goal #3: Reduce Peak-Hour Impacts.**
 - *Objective 3.1: Improve peak-hour operations.*
 - *Objective 3.2: Reduce peak-hour demand on our roadways.*

⁴ CM/CMP Feasibility Study on Implementing HOV, Reversible Lanes and Time-of-Day Parking Strategies, November 2012; CM/CMP Crash Severity Reduction Report, March 2013.

Based on these goals and objectives, a list of performance measures was identified. The intent is that each of the performance measures will provide a relative indication of how well the recommendations of this study perform with respect to the defined goals and objectives. In addition to the performance measures, a list of monitoring measures has been provided that correspond to each performance measure. The study will evaluate and attempt to predict how well the recommendations perform using available models and information. The study’s performance and corresponding monitoring measures are listed in Table 1.

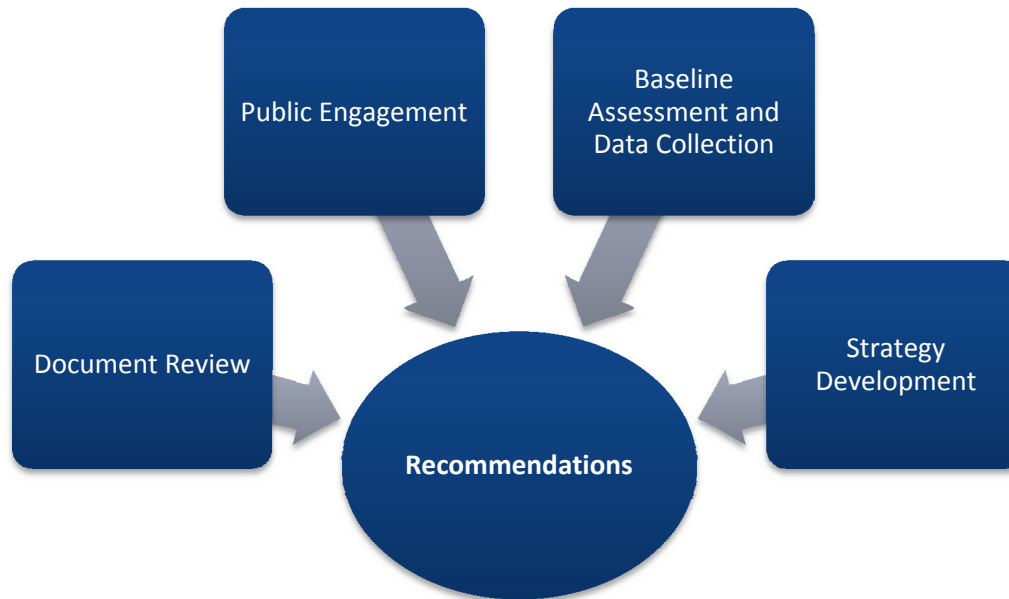
Table 1: Performance and Monitoring Measures

Performance Measures	Monitoring Measures	
Estimated reduction in vehicle delay	Average travel time	-
Reduction in transit-vehicle/automobile conflicts	Number of transit amenities, e.g. bus bays and turnouts	Bus stop placement, e.g., number of near side stops vs. far side stops
Increase in proportion of the identified network with acceptable bicycle and pedestrian facilities	Percent of network with sidewalks and bicycle facilities	Reduction in frequency of bicycle and pedestrian crashes
Reduction in walking distance from transit stops to controlled roadway crossings (signals)	Average distance from transit stop to controlled roadway crossing.	Average distance between controlled roadway crossings
Estimated reduction in total crashes	Reduction in the number of total crashes	Reduction in total crash rate
Estimated reduction in severe injury crashes	Reduction in the number of severe injury crashes	Reduction in severe injury crash rate
Estimated reduction in bicycle and pedestrian crashes	Reduction in the number of bicycle and pedestrian crashes	-
Increase in transit route performance	Transit vehicle on-time performance	Number of transit boarding and alightings.
Increase in economic development	Average taxable value.	Number of permit applications.

Study Process

The East Hillsborough Avenue Corridor Study was organized into five tasks. The first four tasks were used to develop the recommendations (fifth task) for East Hillsborough Avenue. The five sections are:

- Document Review
- Public Engagement
- Baseline Assessment and Data Collection
- Strategy Development
- Recommendations



This page intentionally left blank



SECTION 2

DOCUMENT REVIEW

Section 2: Document Review

A document review was conducted to provide an understanding of past and current plans within the study area and to ensure cohesiveness between this study and previous planning and engineering efforts. This section summarizes some of the documents that were reviewed as part of the study process and identifies some of the key themes from each document as they pertain to this study.

InVision Tampa

The Hillsborough and Nebraska Corridor portion of the InVision Tampa Plan seeks to position the Nebraska and Hillsborough corridors as neighborhoods of livable places, connected people, and collaborative progress. While still under development, the Plan will result in policy and infrastructure investments that will improve the physical condition of parks, streetscapes, and development areas in the neighborhood.

HART MetroRapid East-West PD&E Report

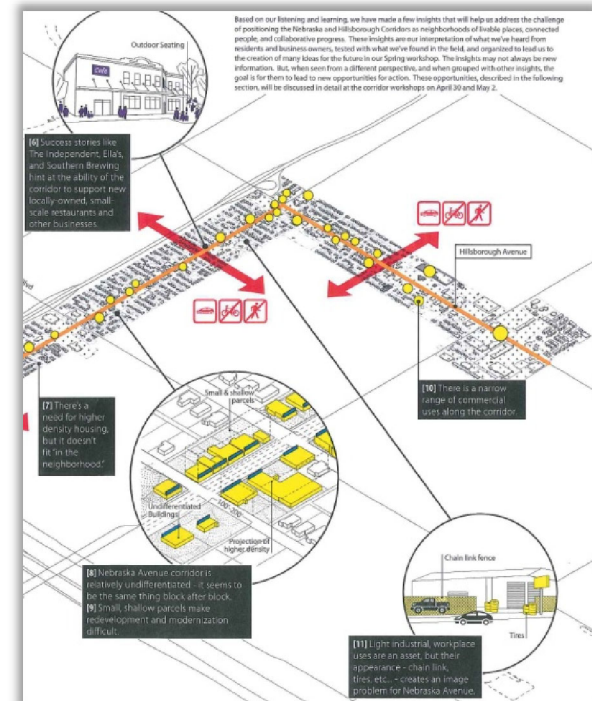
A Preliminary Development and Environmental (PD&E) Study of MetroRapid East-West was completed in August 2012. The PD&E study identifies the potential East-West MetroRapid route alignment and station locations. The PD&E Study identified potential stations along East Hillsborough Avenue at Nebraska Avenue, 15th Street, 22nd Street, 30th Street, and 40th Street.

East Tampa CRA

The East Tampa CRA plan was complete in 2004. The CRA plan identified many roadway enhancements, many of which are related to providing and/or improving pedestrian and bicycle facilities. The CRA Plan specifically highlights the desire for pedestrian and bicycle enhancements along 22nd Street, 15th Street, 29th Street, 34th Street, and Nebraska Avenue.

East Lake Orient Park Community Plan

Adjacent to the study area the East Lake Orient Park Community Plan covers the portion of East Hillsborough Ave east of 50th Street. The community plan seeks to maintain residential streets that are quiet, safe, and suitable for all lifestyles. The plan encourages improved street lighting throughout the community and seeks to improve transit service by improving frequencies and providing additional stops as necessary. The community plan also establishes that new development in the community must include pedestrian and bicycle access when meeting concurrency requirements.



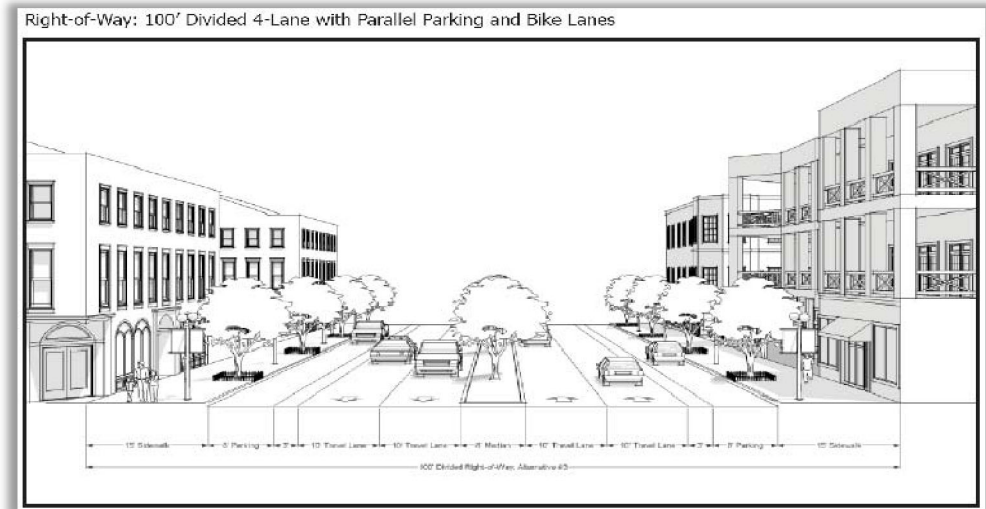
Page from an InVision Tampa Workshop Handout

Greater Seminole Heights Vision Plan

The Greater Seminole Heights Vision Plan includes the Old Seminole Heights, South Seminole Heights, and Southeast Seminole Heights neighborhoods. The Vision Plan discusses the desire to strengthen and maintain the existing street grid while safely integrating pedestrian and bicycle traffic, improving street lighting, improving bus service (route locations, frequency, stops amenities), and implementing traffic calming techniques. The Vision Plan also expresses the desire to establish a pedestrian-friendly environment that includes an enhanced streetscape, connected greenways, and a complete sidewalk system throughout the area.

40th Street Vision Plan

The 40th Street Planning Area Vision Plan was completed by the City of Tampa in June 2010. The 40th Street planning area includes the area north of East Hillsborough Avenue between 22nd Street and 50th Street. The Vision Plan established a goal to provide increased mobility options throughout the planning area and examine opportunities to create safer streets. One of the vision statements from the plan for the area is to create livable neighborhoods for all generations that provide residents with a sense of place and focus on pedestrians as a priority including adequate sidewalks, bicycle lanes and traffic calming elements.



**Conceptual Street Design Graphic from
Greater Seminole Heights Vision Plan**

This page intentionally left blank



SECTION 3
PUBLIC ENGAGEMENT

Section 3: Public Engagement

Recognizing that public input and participation are key components to developing a successful plan, two public open house/workshop events were held as part of the East Hillsborough Avenue Study. In addition to providing the benefit of expanded public awareness and support these events were held to:

- Inform the public about the study and answer two general questions: Why is the Hillsborough County MPO looking at East Hillsborough Avenue? What kinds of recommendations are being considered?
- Engage the public and receive input from those who live and work along or near East Hillsborough Avenue.



The first public open house/workshop was held on March 26, 2013, at the Ragan Community Center. This event was held to introduce the study, present the initial baseline assessment, gain public input about performance measures, gain a sense of the public’s perception of how East Hillsborough Avenue operates today, and solicit ideas about how to make East Hillsborough Avenue a more safe and livable roadway. In addition to collecting oral and written comments, electronic polling equipment was to gain public input on the prioritization of certain performance measures and on the public perception of how East Hillsborough Avenue operates from a transportation viewpoint. Appendix A contains the polling questions along with the complete results.

During the polling question portion of the first event, the audience was asked a series of questions on how well they felt that East Hillsborough Avenue accommodated different modes of transportation, with the response choices ranging from “Agree” to “Disagree.” The general response from these questions was that East Hillsborough Avenue is not very good at accommodating vehicles (autos, trucks, buses) and does a poor job accommodating pedestrians and bicyclists. The next set of questions asked the audience to rank how important it is to address certain performance measures through the study process. In general, the audience felt that it is very important to reduce bicycle, pedestrian, and “severe” injury crashes along the corridor; that it is important to improve transit operations—frequency of buses and reducing bus-traffic conflicts—and to improve the ability for both vehicles and pedestrians to get across East Hillsborough Avenue (both at signalized and non-signalized locations); and that it not as important to maintain or reduce travel times along the corridor and provide complete bicycle and pedestrian facilities directly along East Hillsborough Avenue.

The second public open house/workshop was held at the Cyrus Greene Community Center on May 14, 2013. In addition to gaining further public input, this meeting was held to present the completed baseline assessment and the initial strategy development concepts.



SECTION 4

BASELINE ASSESSMENT AND DATA COLLECTION

Section 4: Baseline Assessment and Data Collection

The baseline assessment and data collection process was completed to establish baseline conditions along the corridor and to assist in the development of strategies to improve safety and mobility along East Hillsborough Avenue. East Hillsborough Avenue from Nebraska Avenue to 50th Street is a six-lane arterial road with approximately 100 feet of right-of-way. Figure 2 illustrates what the typical cross-section of the corridor looks like. As shown, there are six 11-foot lanes, a 14-foot median (sections with raised median and other sections with painted or two-way left turn lanes), and 8-foot sidewalks along both sides. The posted speed limit on East Hillsborough Avenue is 40 mph between Nebraska Avenue and 34th Street and 45 mph between 34th Street and 50th Street.

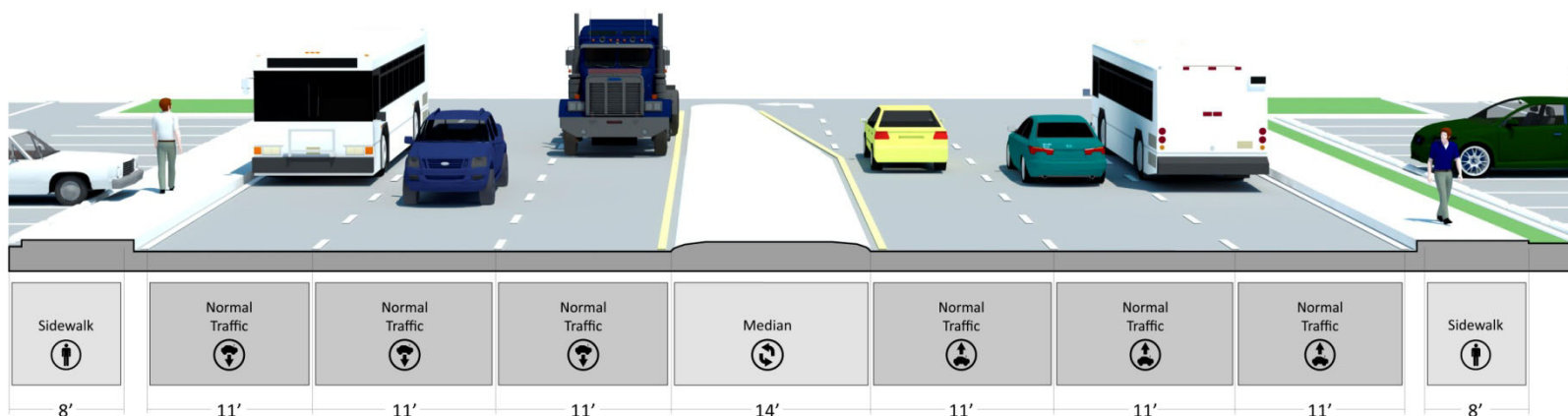


Figure 2: East Hillsborough Avenue, Typical Cross-Section

Traffic Analysis

On average, there are 48,750 vehicles that travel along the corridor each day. Table 2 shows the Annual Average Daily Traffic (AADT) recorded by the Florida Department of Transportation (FDOT) for 2003–2012 at four count stations along East Hillsborough Avenue. Traffic volumes peaked around 2005/2006, then declined, and have remained relatively steady for the past four years. The traffic on East Hillsborough Avenue east of Nebraska Avenue is nearly 20 percent less today than it was in 2005. While 48,750 AADT is significant, according to the 2012 *FDOT Quality/Level of Service Handbook* Generalized Tables (Table 1), level of service (LOS) “D” (typical LOS standard) for a six-lane arterial road is 59,900 vehicles per day, well above East Hillsborough Avenues existing volumes, which means that East Hillsborough Avenue could add more than 10,000 vehicles a day before it would exceed LOS “D” based on daily, generalized LOS analysis.

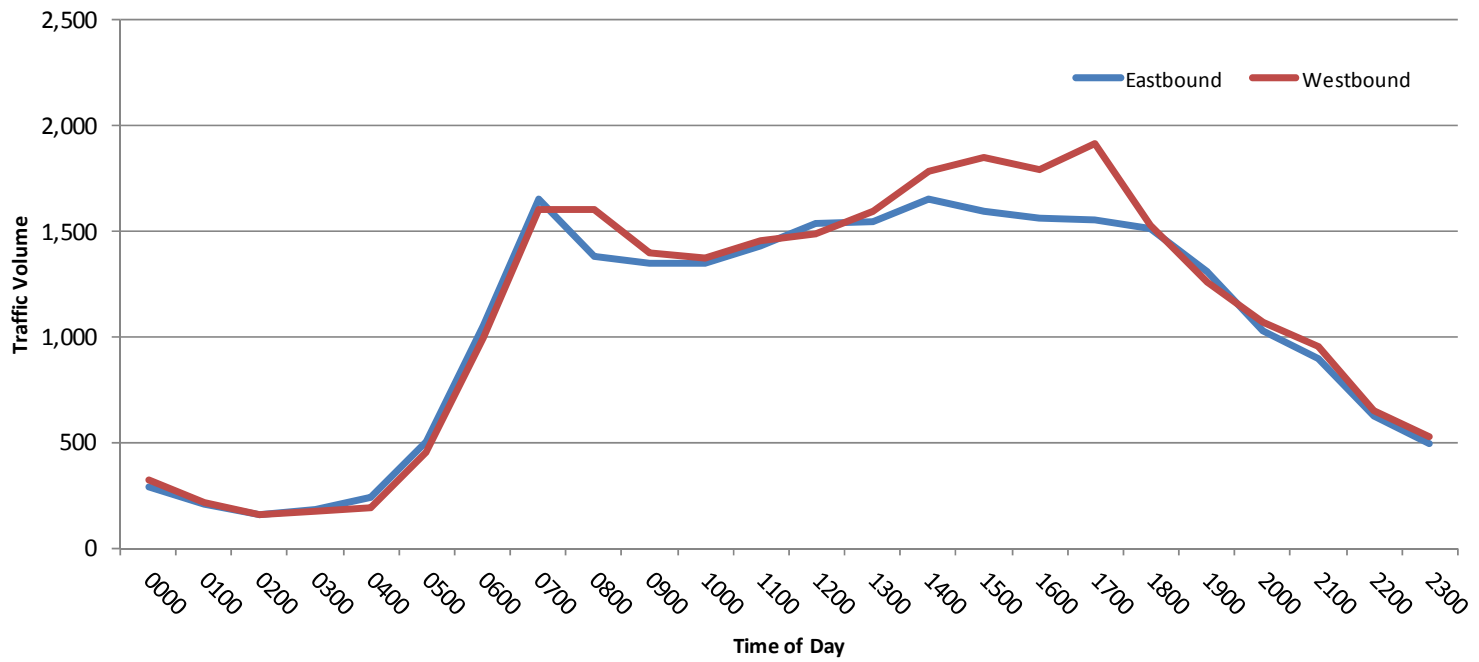
Table 2: Existing and Historical AADT

Count Location	AADT									
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
E. Hillsborough Ave, West of Nebraska Ave	48,500	48,500	47,000	50,000	48,000	48,500	57,800	50,000	47,000	48,500
E. Hillsborough Ave, East of Nebraska Ave	49,500	49,500	49,500	48,000	55,500	54,000	54,500	60,500	55,000	53,500
E. Hillsborough Ave, East of 22nd St	53,500	49,500	51,500	51,500	-	-	-	54,000	52,000	51,000
E. Hillsborough Ave, East of 40th St	45,500	43,500	47,000	45,000	48,500	43,000	54,500	49,500	49,000	50,500
							<i>I-4 Reconstruction</i>			

Source: FDOT Florida Traffic Online (2012)

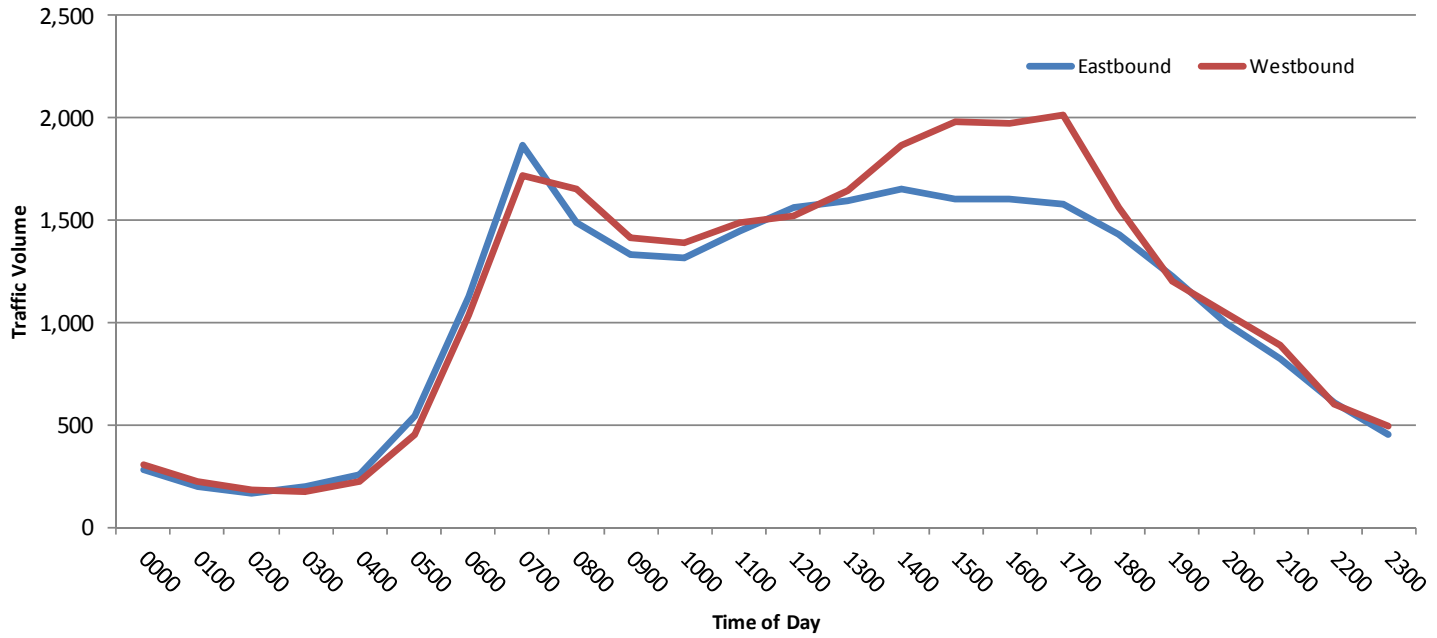
AADT figures provide a general sense of how busy a road is throughout the day, but do not tell the whole story. To understand how traffic fluctuates throughout the day and by direction of travel, hourly directional volumes were reviewed. Figures 3 through 6 show the 2011 annualized detailed hourly directional counts for the roadway segments along East Hillsborough Avenue as available through the FDOT Florida Traffic Online website.⁵ As a point of reference, the peak hour, peak direction LOS “D” capacity for a six-lane arterial is 3,020 vehicles. The highest hourly directional count along East Hillsborough Avenue, shown in Figure 5, was 2,155; this was the westbound direction east of 22nd Street in the 7:00 AM hour.

⁵ <http://www2.dot.state.fl.us/FloridaTrafficOnline/viewer.html>.



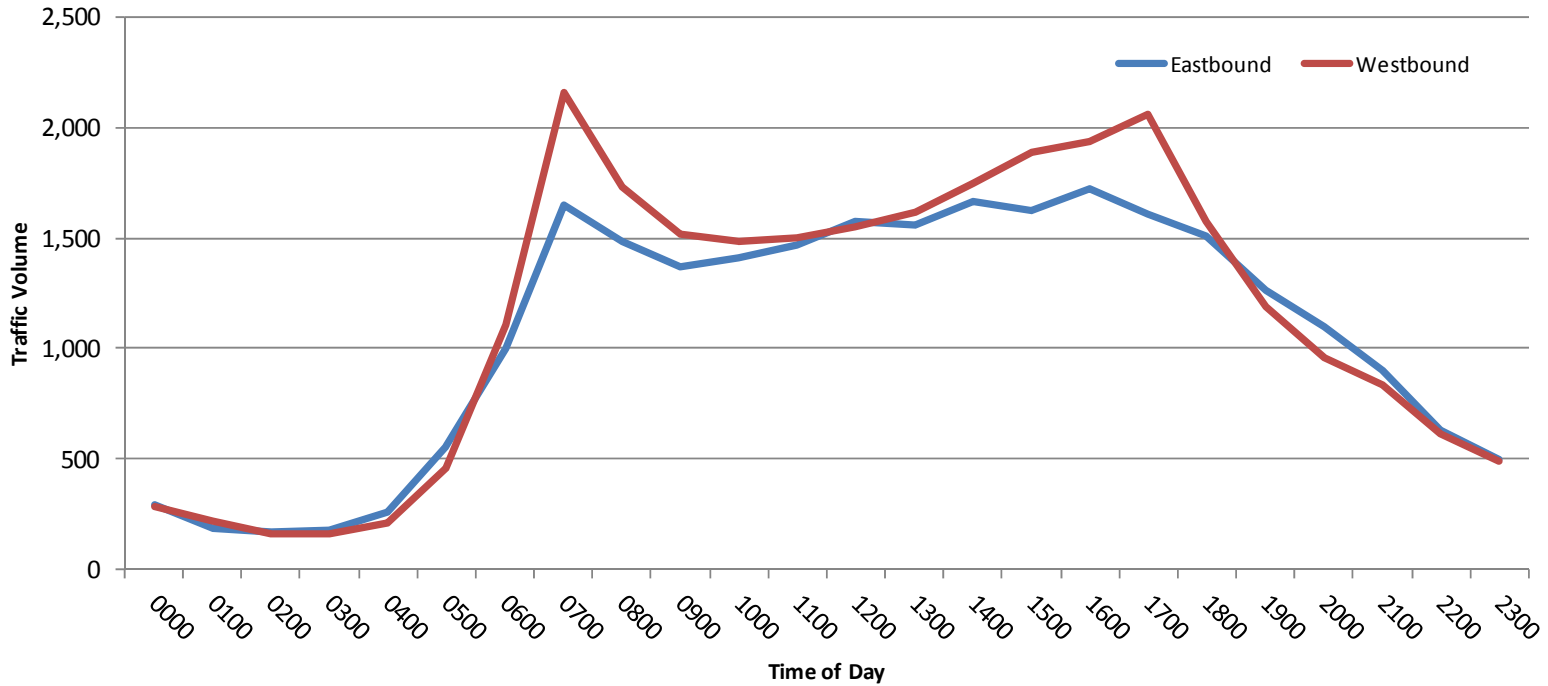
Source: FDOT Florida Traffic Online (2011)

Figure 3: 2011 Hourly Directional Volume – East Hillsborough Ave, West of Nebraska Ave



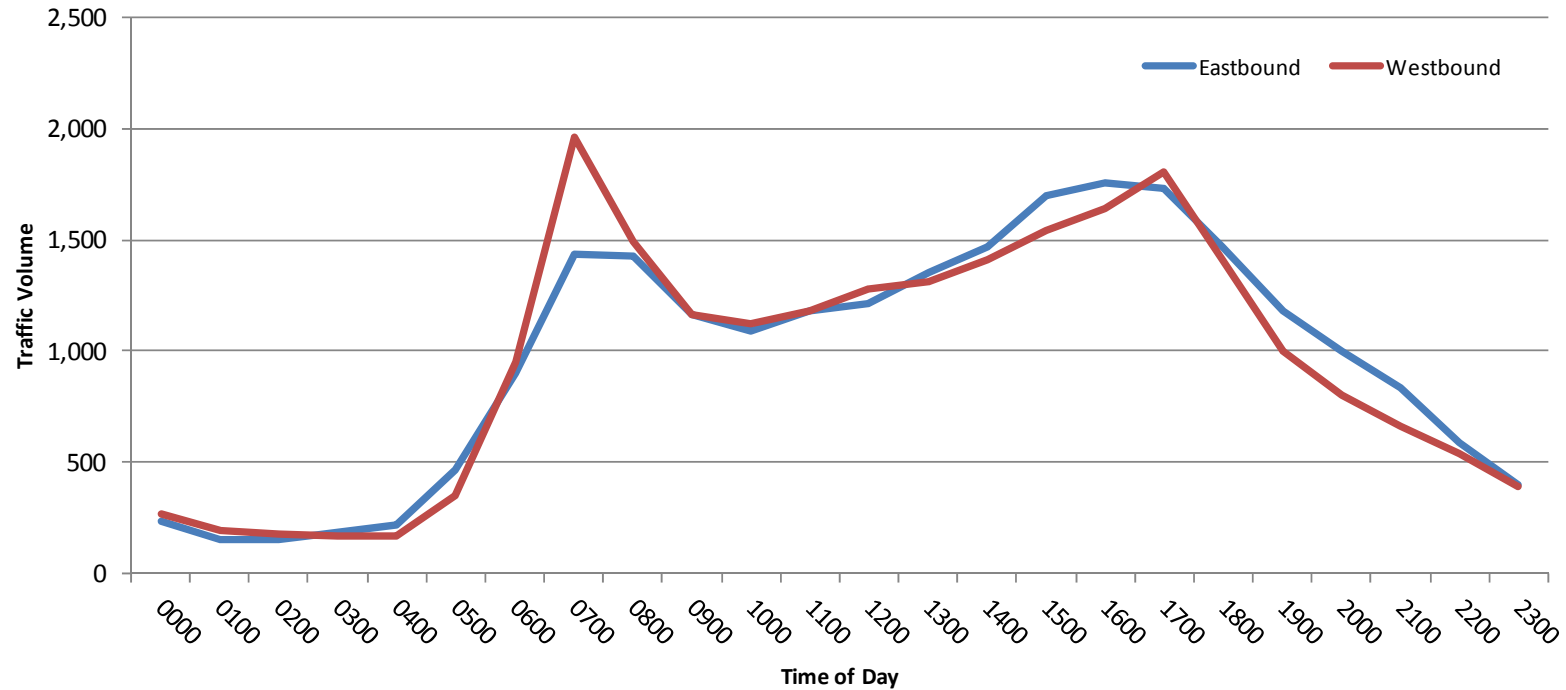
Source: FDOT Florida Traffic Online (2011)

Figure 4: 2011 Hourly Directional Volume – East Hillsborough Ave, East of Nebraska Ave



Source: FDOT Florida Traffic Online (2011)

Figure 5: 2011 Hourly Directional Volume – East Hillsborough Ave, East of 22nd St



Source: FDOT Florida Traffic Online (2011)

Figure 6: 2011 Hourly Directional Volume – East Hillsborough Ave, East of 40th St

In general, the hourly travel demand along East Hillsborough Avenue is more evenly distributed throughout the day than what would be the case on a more suburban roadway with the peak hour accounting for only 6.9 percent of daily volume just west of Nebraska Avenue and generally increasing moving to the east to 7.8 percent of daily volume to the east of 40th Street. If peak hour volumes exceeded the “physical” capacity of the roadway, the “flatness” of the observed hourly volumes would be attributed to capacity constraints. However, because East Hillsborough Avenue does not appear to be capacity constrained (operates at an acceptable LOS based on a generalized level-of-service analysis), the hourly demand pattern observed in the traffic counts is likely indicative of the true hourly demand profile for the roadway. Because demand is spread over the day rather than concentrated during the peak hours, East Hillsborough Avenue operates at a better peak hour LOS than would be assumed from looking at daily volume and capacity ratios alone.

Another observation related to the hourly traffic flows is that the PM peak direction is westbound toward the City Center, and, east of 22nd Street, the AM peak direction is also westbound. While difficult to verify without an origin/destination study, it is likely that this directional peaking is indicative of the Avenue's role as a reliever to Westbound I-4. In the eastbound direction, I-4 congestion is caused by weave movements between the US-301 and I-75 interchanges; however, commuters are impacted by this congestion regardless of whether they choose to travel east on I-4 or along East Hillsborough Avenue. As such, this recurring congestion is less likely to be a factor in route decisions.

Conversely, in the westbound direction, I-4 is constrained by the Downtown Interchange which in turn is impacted by constraints along southbound I-275 (previously the lane-drop at Howard Avenue; currently construction activity and the downtown interchange westbound on-ramp merge) and northbound I-275 (lane drop at Martin Luther King Jr. Boulevard). Commuters with destinations in Seminole Heights, other northwest Tampa neighborhoods, or Carrollwood may find it more expedient to avoid this congestion by travelling along Hillsborough Avenue to reach their destination.

In addition to the hourly traffic volumes obtained from FDOT, turning movement counts and bicycle and pedestrian counts were conducted at various locations along East Hillsborough Avenue. Table 3 provides a summary of the collected turning movement counts, and Table 4 provides a summary of the collected bicycle and pedestrian counts. The turning movement counts were conducted on various weekdays and include a peak-season adjustment factor.

Table 3 shows that the critical intersections along the corridor are Nebraska Avenue and 40th Street. The respective AM peak hour entering volume at these intersections is approximately 4,800 and 5,800 vehicles per hour and the corresponding PM peak hour volumes are approximately 5,200 and 5,400 vehicles per hour. The entering volumes for other intersections shown in Table 3 range from approximately 3,000 to 4,100 vehicles per hour during the AM peak and 3,400 to 4,300 during the PM Peak. This analysis shows that Nebraska Avenue (and the I-275 interchange) to the west and 40th Street toward the eastern end of the corridor are the keys to the overall performance of the corridor. Correspondingly, flexibility is available at the other intersections to improve conditions for pedestrians, cyclists, and transit, without dramatically affecting the overall through-put of the corridor.

Table 3: Collected Turning Movement Count Summary

Location	Date	Time of Day	Northbound			Southbound			Eastbound			Westbound			Total
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
Hillsborough Avenue at Nebraska Avenue	January, 2013	AM Peak Hour	110	180	40	507	811	195	60	1,135	84	103	1,533	109	4,867
		Mid-Day Peak Hour	128	254	75	130	213	150	118	1,048	94	84	1,028	141	3,463
		PM Peak Hour	200	572	78	240	533	105	156	1,094	145	109	1,803	202	5,237
Hillsborough Avenue at 15th Street	January, 2013	AM Peak Hour	52	100	29	57	150	20	28	1,494	30	73	1,584	25	3,642
		Mid-Day Peak Hour	66	68	55	50	60	30	43	1,138	36	62	1,173	26	2,807
		PM Peak Hour	80	217	62	65	140	29	28	1,342	50	65	1,881	66	4,025
Hillsborough Avenue at 22nd Street	January, 2013	AM Peak Hour	141	161	64	155	270	32	60	1,168	151	133	1,618	149	4,102
		Mid-Day Peak Hour	119	140	89	152	139	61	91	1,007	81	126	1,074	84	3,163
		PM Peak Hour	166	219	97	153	206	62	70	1,125	63	149	1,818	122	4,250
Hillsborough Avenue at East Gate Plaza*	June, 2013	AM Peak Hour	3	0	10	17	0	68	35	1,273	9	22	1,820	43	3,300
		Mid-Day Peak Hour	-	-	-	-	-	-	-	-	-	-	-	-	-
		PM Peak Hour	21	1	82	15	1	57	63	1,257	39	75	1,973	31	3,615
Hillsborough Avenue at 30th Street	January, 2013	AM Peak Hour	57	61	9	108	91	74	58	1,294	58	18	1,808	161	3,797
		Mid-Day Peak Hour	54	62	22	103	57	98	79	1,245	78	33	1,169	93	3,093
		PM Peak Hour	54	102	26	169	117	100	82	1,466	78	50	1,930	102	4,276
Hillsborough Avenue at 34th Street	January, 2013	AM Peak Hour	52	77	33	42	111	26	19	1,414	50	65	1,963	52	3,904
		Mid-Day Peak Hour	62	81	53	21	71	20	31	1,176	71	51	1,179	29	2,845
		PM Peak Hour	100	119	71	55	104	30	33	1,511	88	56	2,006	68	4,241
Hillsborough Avenue at 40th Street	January, 2013	AM Peak Hour	291	452	165	232	836	153	146	1,080	266	295	1,823	70	5,809
		Mid-Day Peak Hour	220	338	184	127	295	153	184	936	148	145	902	75	3,707
		PM Peak Hour	342	734	260	162	433	143	288	1,162	202	149	1,445	107	5,427
Hillsborough Avenue at 43rd Street*	June, 2013	AM Peak Hour	10	1	9	14	0	31	35	1,215	1	5	1,650	10	2,981
		Mid-Day Peak Hour	-	-	-	-	-	-	-	-	-	-	-	-	-
		PM Peak Hour	5	0	30	13	0	67	106	1,562	10	10	1,783	40	3,626
Hillsborough Avenue at 47th Street*	June, 2013	AM Peak Hour	5	2	23	4	1	10	6	1,199	15	42	1,670	4	2,981
		Mid-Day Peak Hour	-	-	-	-	-	-	-	-	-	-	-	-	-
		PM Peak Hour	12	6	48	6	5	10	30	1,511	21	26	1,759	19	3,453

*Intersection not signalized.

Table 4: Observed Pedestrian and Bicycle Crossing Counts

Location	8 Hour Pedestrian Crossing Count	8 Hour Bicycle Crossing Count	8 Hour Total Crossing Count	Ped/Bike Crash History
Hillsborough Ave at 11th/12th St	51	20	71	4
Hillsborough Ave at 32nd St	68	39	107	2
Hillsborough Ave at 37th St	21	24	45	1
Hillsborough Ave at 43rd St	23	5	28	3
Hillsborough Ave at 47th St	61	24	85	8
Hillsborough Ave at East Gate Plaza Entrance*	251	38	289	1

Counts conducted June 2013

**Flea market was being held at the FunLan Drive-In the day of the count*

Pedestrian and Bicycle Level of Service

Using FDOT's ARTPLAN multimodal generalized and conceptual planning software, existing pedestrian and bicycle LOS was calculated along East Hillsborough Avenue. Pedestrian and bicycle LOS is based on the user's perception of the roadway or nearby roadside environment. Pedestrian LOS is based on four variables: existence of a sidewalk, lateral separation of pedestrians from motorized vehicles, motorized vehicle volumes, and motorized vehicle speeds. In addition to the presence of a bicycle lane, bicycle LOS is based on five variables: average effective width of the outside through lanes, motorized vehicle volumes, motorized vehicle speeds, heavy vehicle (truck) volumes, and pavement conditions. Based on the input variable a score (ranging from 0.5 to 6.5) and a corresponding LOS letter grade are determined for each roadway segment. Table 5 shows the existing pedestrian and bicycle level of service scores and letter grades.

Table 5: Existing Pedestrian and Bicycle Level of Service

Segment	Existing Condition			
	Pedestrian Segment Score	Pedestrian Segment LOS	Bicycle Segment Score	Bicycle Segment LOS
Nebraska Ave - 15th St	3.66	D	4.7	E
15th St - 22nd St	3.68	D	4.7	E
22nd St - 30th St	3.67	D	4.7	E
30th St - 34th St	3.65	D	4.69	E
34th St - 40th St	3.75	D	4.71	E
40th St - 56th St	3.96	D	5.2	F

Source: FDOT ARTPLAN 2012



Crash History

As mentioned previously, the East Hillsborough Avenue corridor has been identified as one of the top severe injury (fatal and incapacitating injury) crash corridors in Hillsborough County. As such, many of the performance measures, goals and objectives of the study are to reduce the frequency and severity of crashes within the corridor. To understand how best to approach achieving this goal, it is important to understand where crashes are happening and what type of crashes are occurring, especially for those crashes that lead to either an incapacitating injury or a fatality. The tables and figures on the following pages provide an overview of the crash history within the East Hillsborough Avenue corridor.

Figures 7 and 8 show where crashes have occurred grouped by reference intersection while Figure 9 shows clusters of bicycle and pedestrian crashes. Tables 6 and 7 and Figures 10 through 13 show the annual breakdown of total crashes (three-year history) and bicycle/pedestrian crashes (five-year history) by crash severity; and Figures 14 through 18 show the breakdown of crashes by crash type (contributing cause) for total crashes, severe injury crashes and fatal crashes and a breakdown of bicycle vs. pedestrian crashes. It is important to note that while bicycle and pedestrian crashes only make up 8 percent of the total crashes along the corridor, they account for 33 percent of the severe injury crashes and 57 percent of the fatal crashes along the corridor.

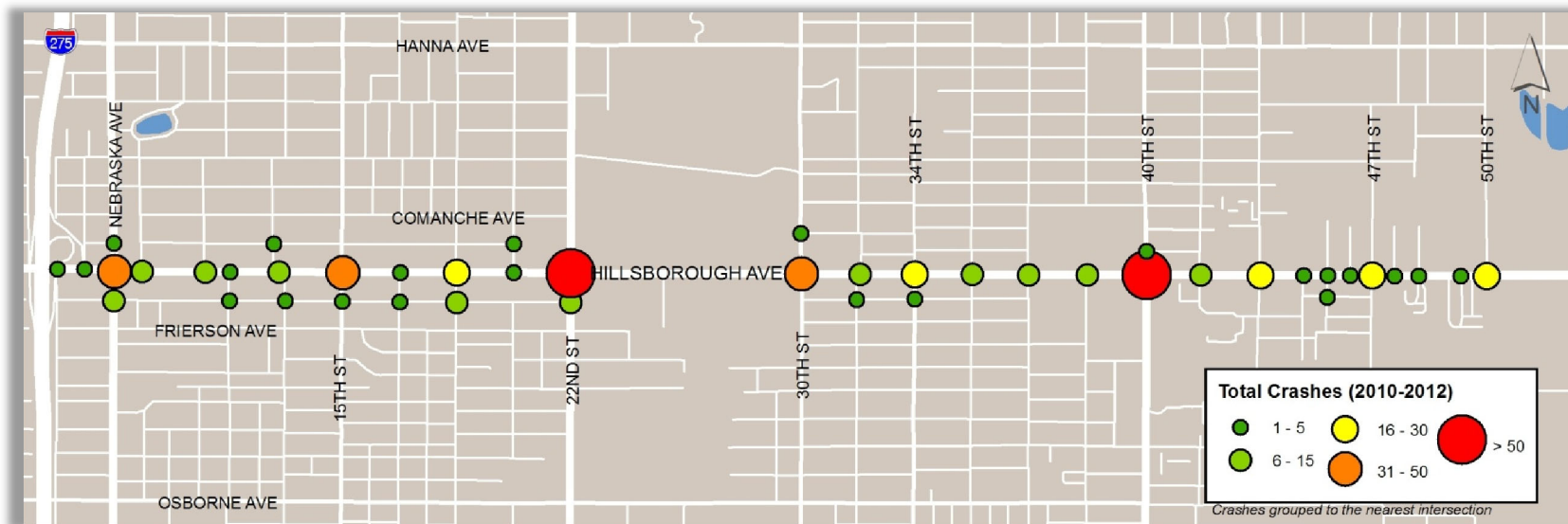


Figure 7: Total Crashes (2010–2012)

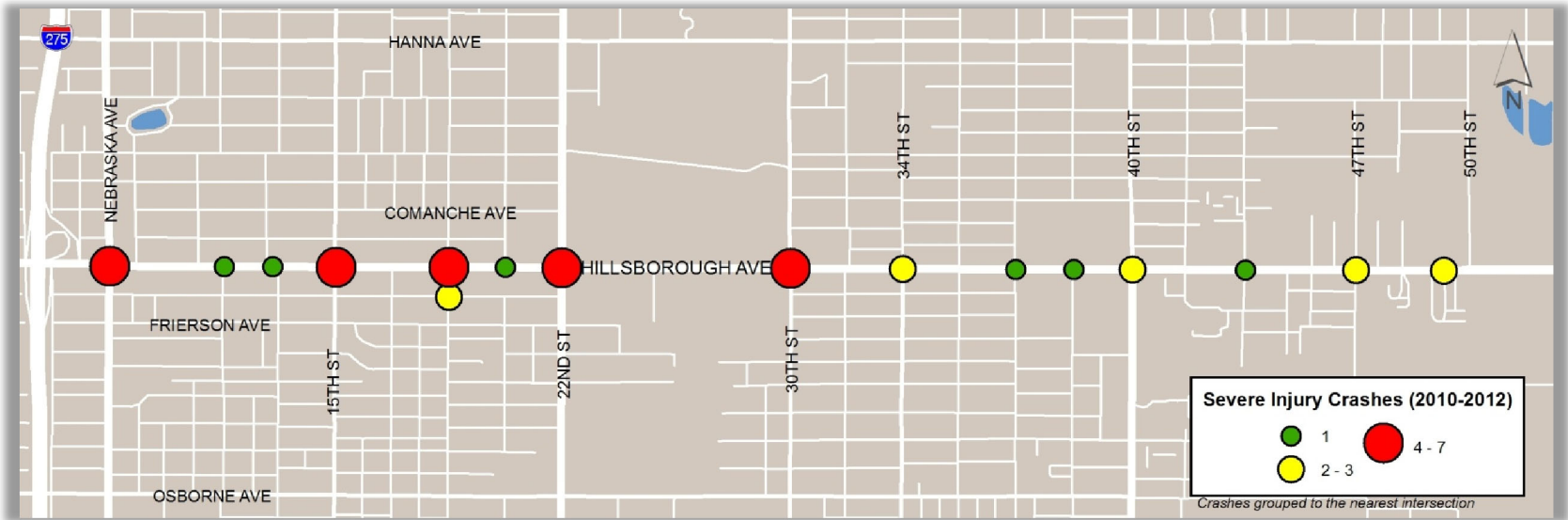


Figure 8: Severe Injury Crashes (2010–2012)

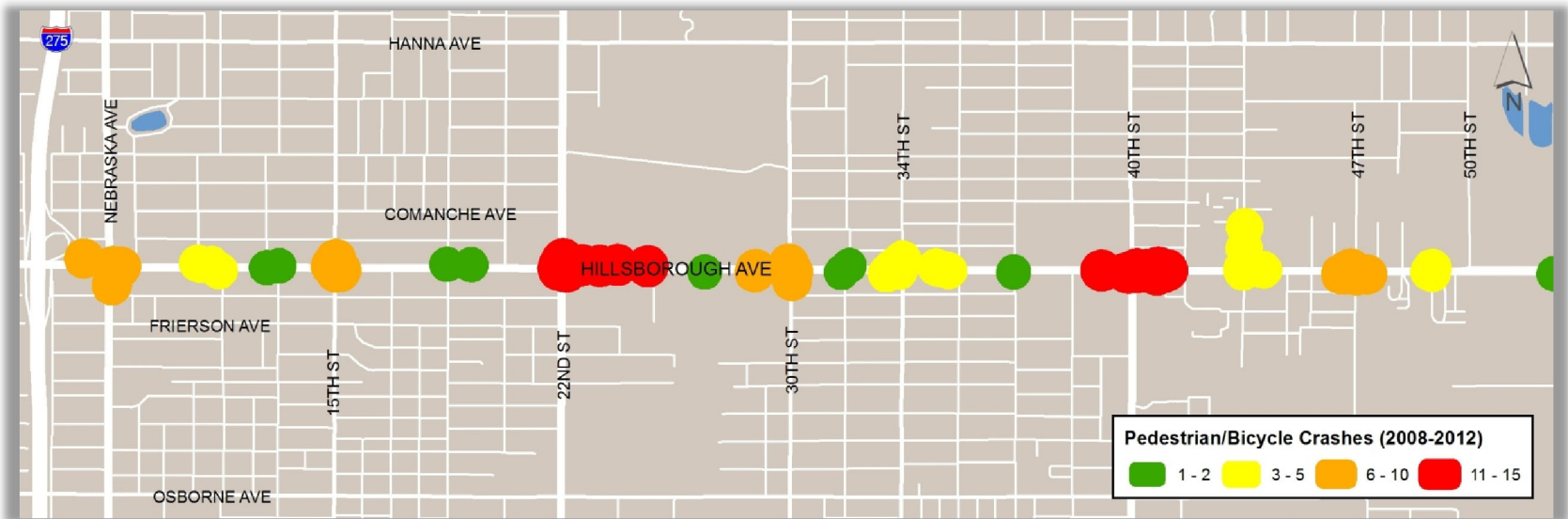


Figure 9: Bicycle and Pedestrian Crashes (2008–2012)

Year	Total Crashes	Fatal Crashes	Incapacitating Injury Crashes	Non-Incapacitating Injury Crashes	Property Damage Only Crashes
2010	195	2	7	114	72
2011	171	4	16	89	62
2012	192	1	12	111	68

Table 6: Total Crashes by Year and Severity

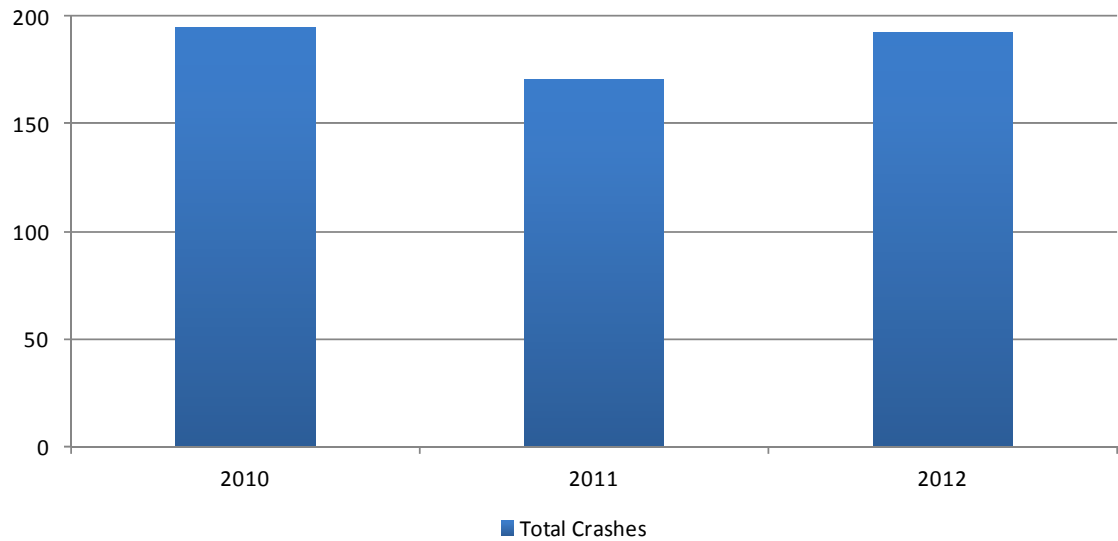


Figure 10: Total Crashes by Year (2010-2012)

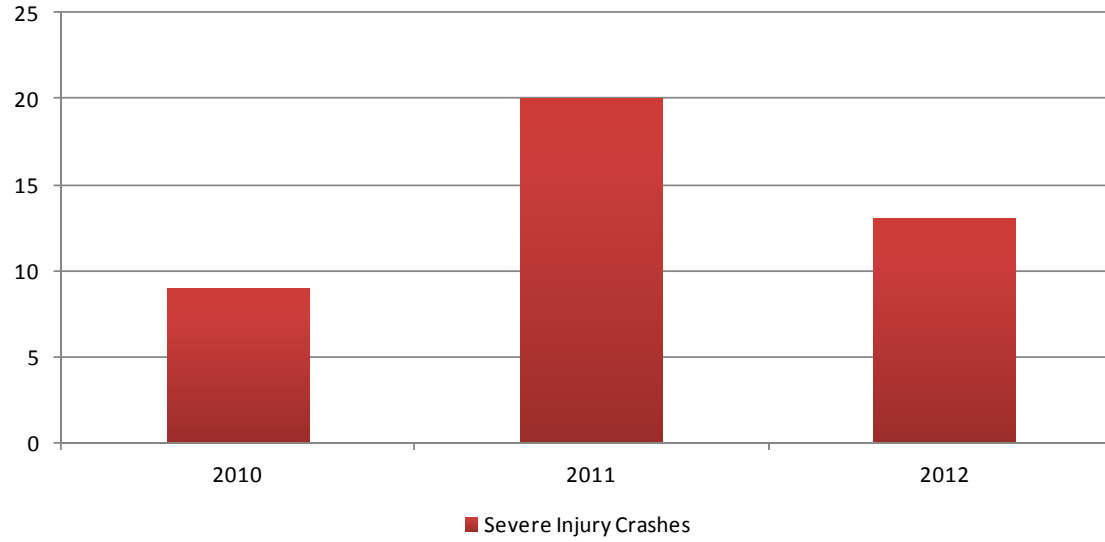


Figure 11: Severe Injury Crashes by Year (2010–2012)

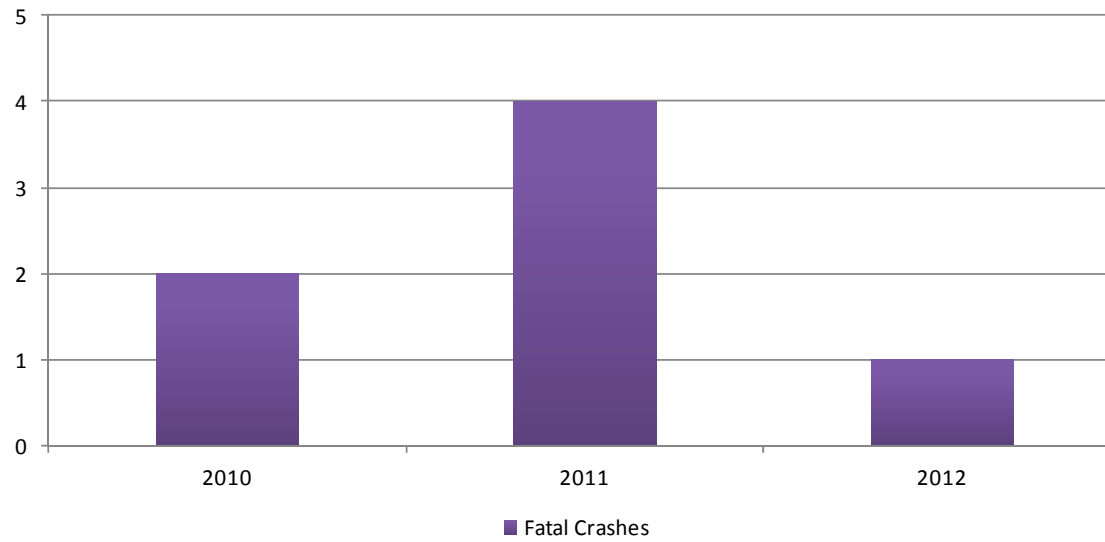


Figure 12: Fatal Crashes by Year (2010–2012)

Table 7: Bicycle and Pedestrian Crashes by Year (2008–2012)

Year	Total Bicycle and Pedestrian Crashes	Fatal Crashes	Incapacitating Crashes	Non-Incapacitating Injury Crashes	Non-Injury Crashes
2008	17	1	3	12	1
2009	24	2	6	15	1
2010	16	1	3	12	0
2011	17	3	3	10	1
2012	20	0	5	15	0

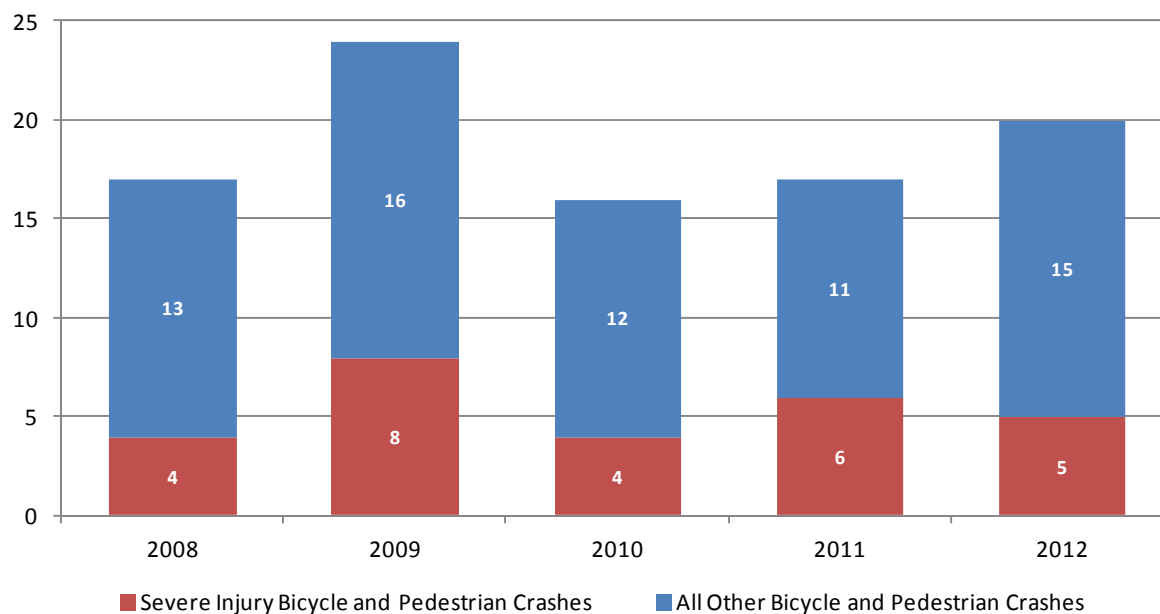


Figure 13: Annual Distribution of Bicycle and Pedestrian Crashes (2008–2012)

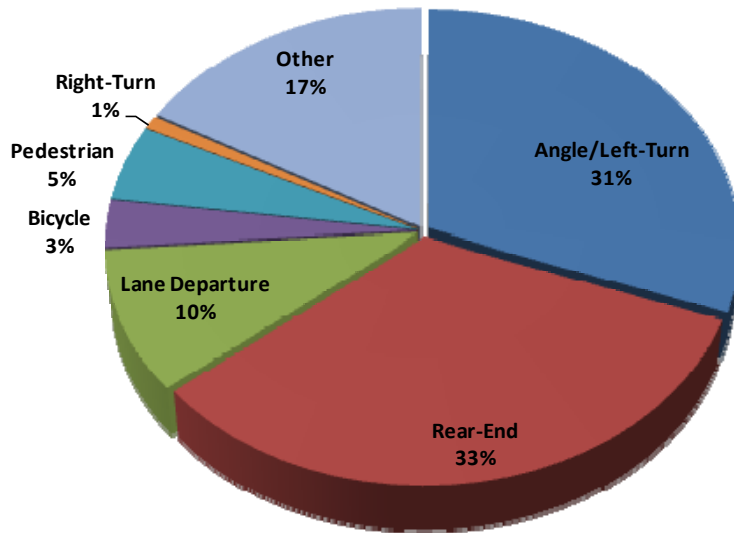


Figure 14: Total Crashes by Crash Type

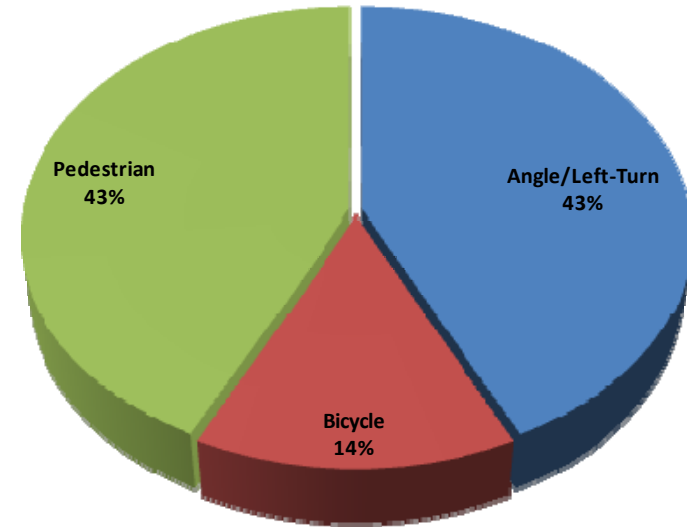


Figure 16: Fatal Crashes by Type

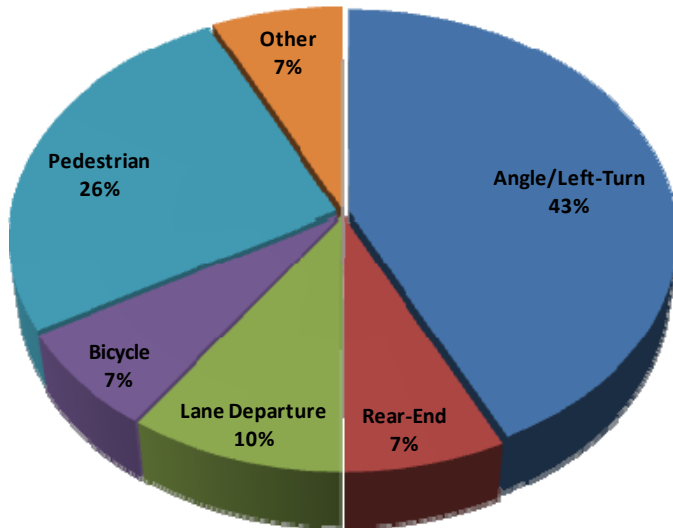


Figure 15: Severe Injury Crashes by Type

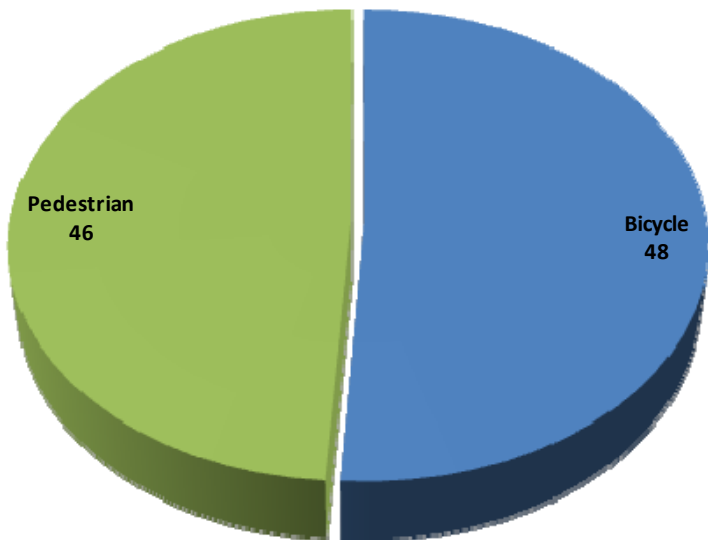


Figure 17: Breakdown of Bicycle and Pedestrian Crashes (5-Year Total, 2008–2012)

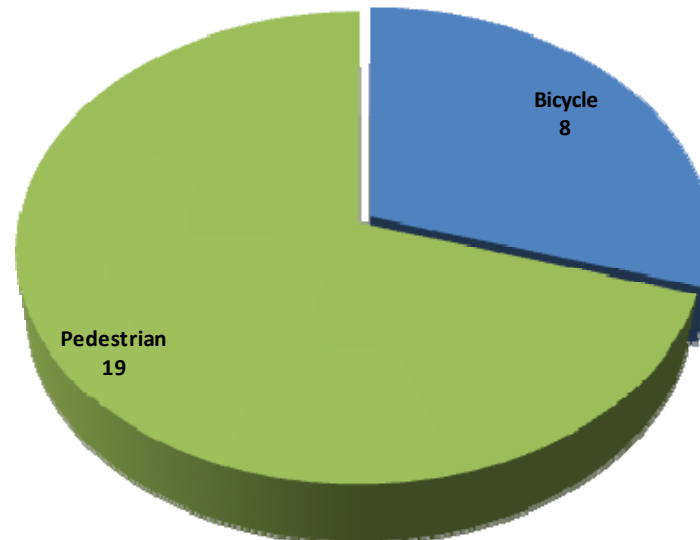


Figure 18: Breakdown of Bicycle and Pedestrian Severe Injury Crashes (5-Year Total, 2008–2012)

One aspect to note that was not displayed within these figures and tables is that in 2007, FDOT completed a median revision project along East Hillsborough Avenue that has led to a substantial decrease in overall crashes and crash rates along the corridor, especially for crashes categorized as left-turn or angle crashes. While overall crashes have decreased along the corridor since the median revision project (Figure 19), severe injury crashes and bicycle and pedestrian crashes have remained steady or have increased (Figure 20) since the median revision project. The fact that pedestrian crashes have not decreased is disappointing since introduction of median refuge is generally shown to reduce pedestrian crashes. That this “go-to” countermeasure has not proven effective on East Hillsborough Avenue suggests further, more aggressive, treatments are necessary.

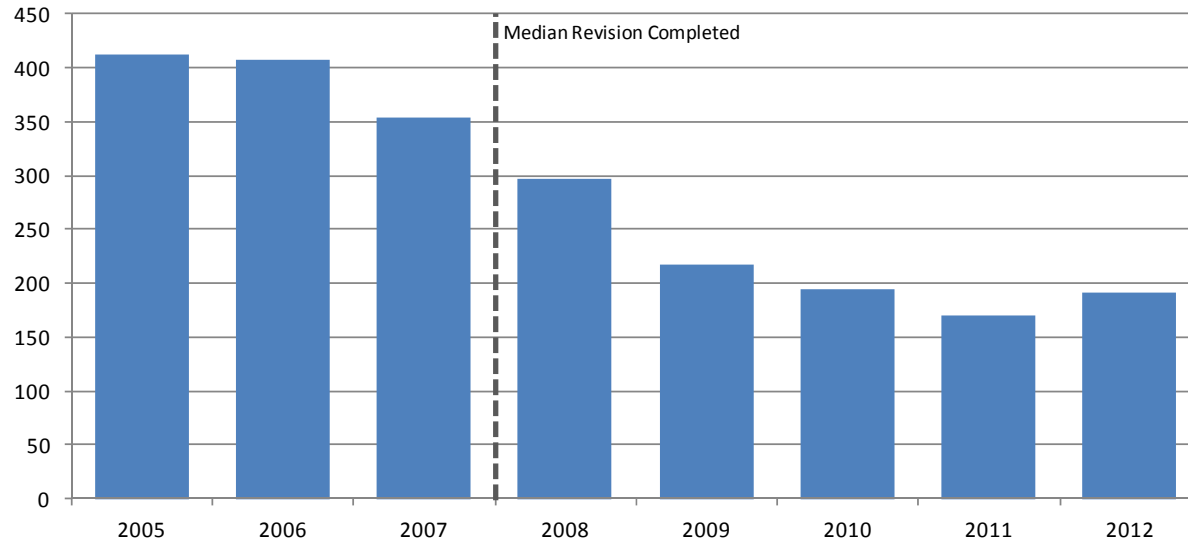


Figure 19: Median Revision and Total Crashes

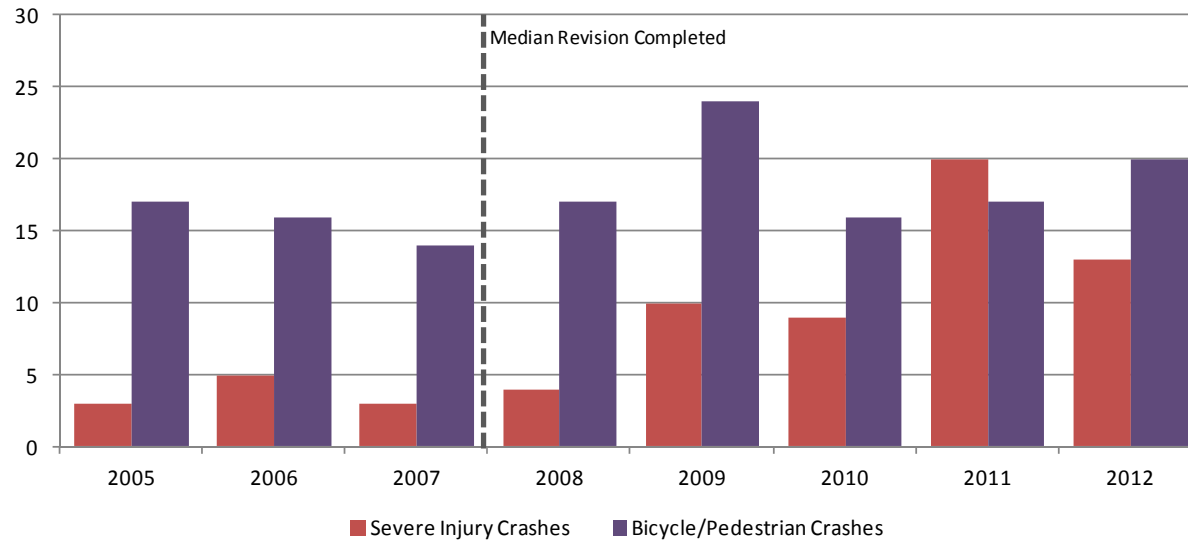


Figure 20: Median Revision and Severe Injury and Bicycle/Pedestrian Crashes

Transit

The East Hillsborough Avenue corridor is one of the highest ridership corridors in the county. On the average day, 3,350 people are either boarding or alighting a bus along the corridor. Transit service is provided by the Hillsborough Area Regional Transit Authority (HART), which operates five local routes within the corridor along with the new MetroRapid North/South route that operates along Nebraska Avenue. Route 34 is the main route that travels along East Hillsborough Avenue with other routes crossing the corridor providing north-south connections to Route 34. Figure 21 shows the alignment of the existing transit routes and Table 8 lists the five local routes and their annual ridership figures from fiscal year 2012. The MetroRapid North/South route (Route 400) is not listed in the annual ridership table since service for this route began in the summer of 2013 and initial ridership data were not available for this study. Table 9 and Figure 22 show average daily stop ridership levels along the corridor. Individual stops were grouped into stop clusters based on the proximity of stops; stops within 200 feet of each other were grouped to form the stop areas. Figure 23 shows the proposed alignment for the MetroRapid East-West route, while currently not funded; the East-West route is expected to become the next MetroRapid route.

Table 8: Annual Route Ridership

Route	FY 2012 Annual Ridership	Systemwide Ridership Rank
2	1,334,178	1
12	852,663	4
34	851,407	5
9	706,379	7
5	515,435	13

Source: Hillsborough Area Regional Transit Authority

Table 9: Top Daily Ridership Stop Clusters

Stop Area	Avg. Daily Boardings & Alightings
Hillsborough Ave at 22nd St	920
Hillsborough Ave at Nebraska Ave	565
Hillsborough Ave at 40th St	375
Hillsborough Ave at 15th St	215
Hillsborough Ave at 30th St	170

Source: Hillsborough Area Regional Transit Authority, March 2013

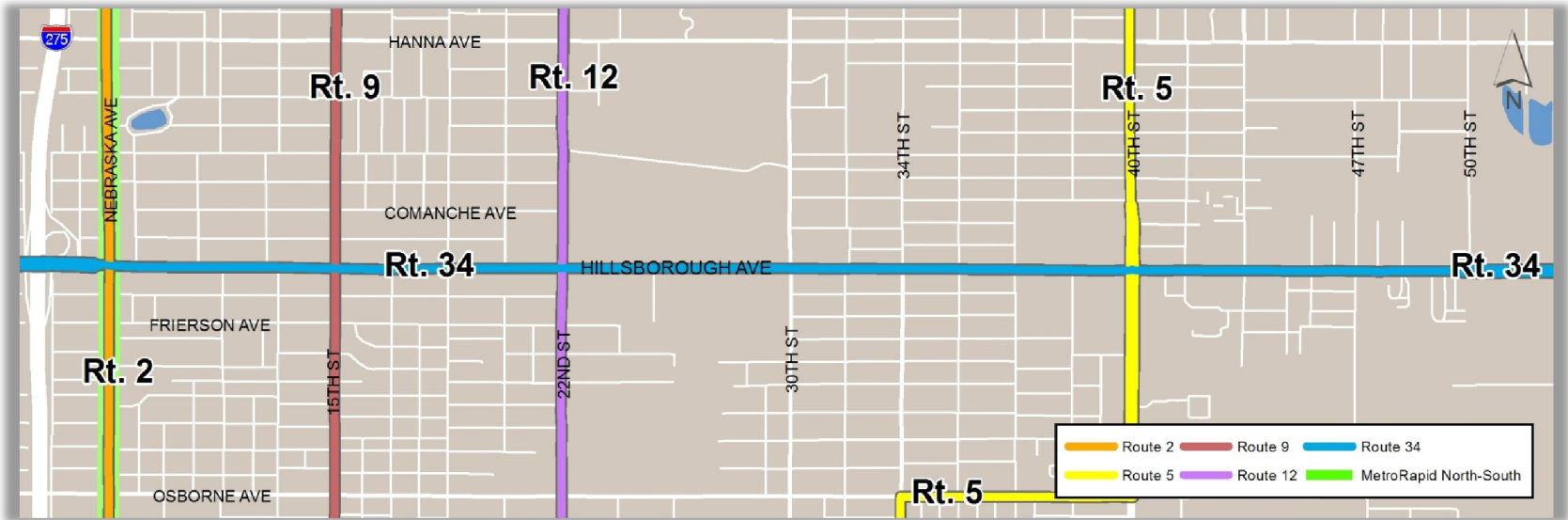
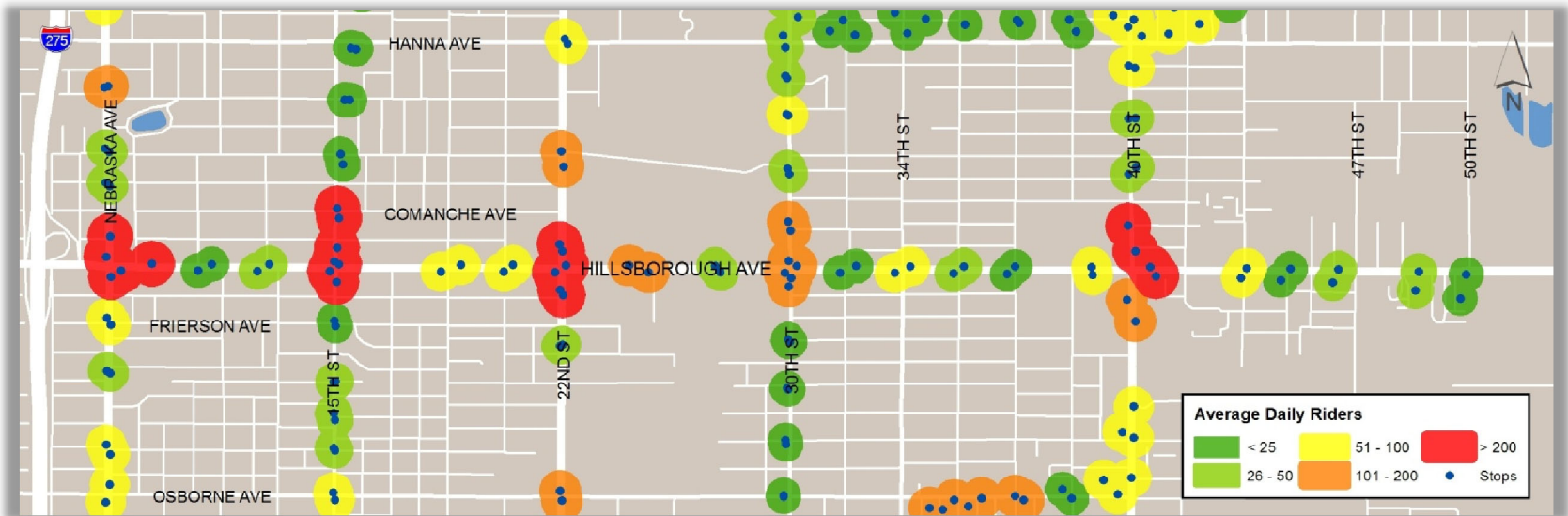
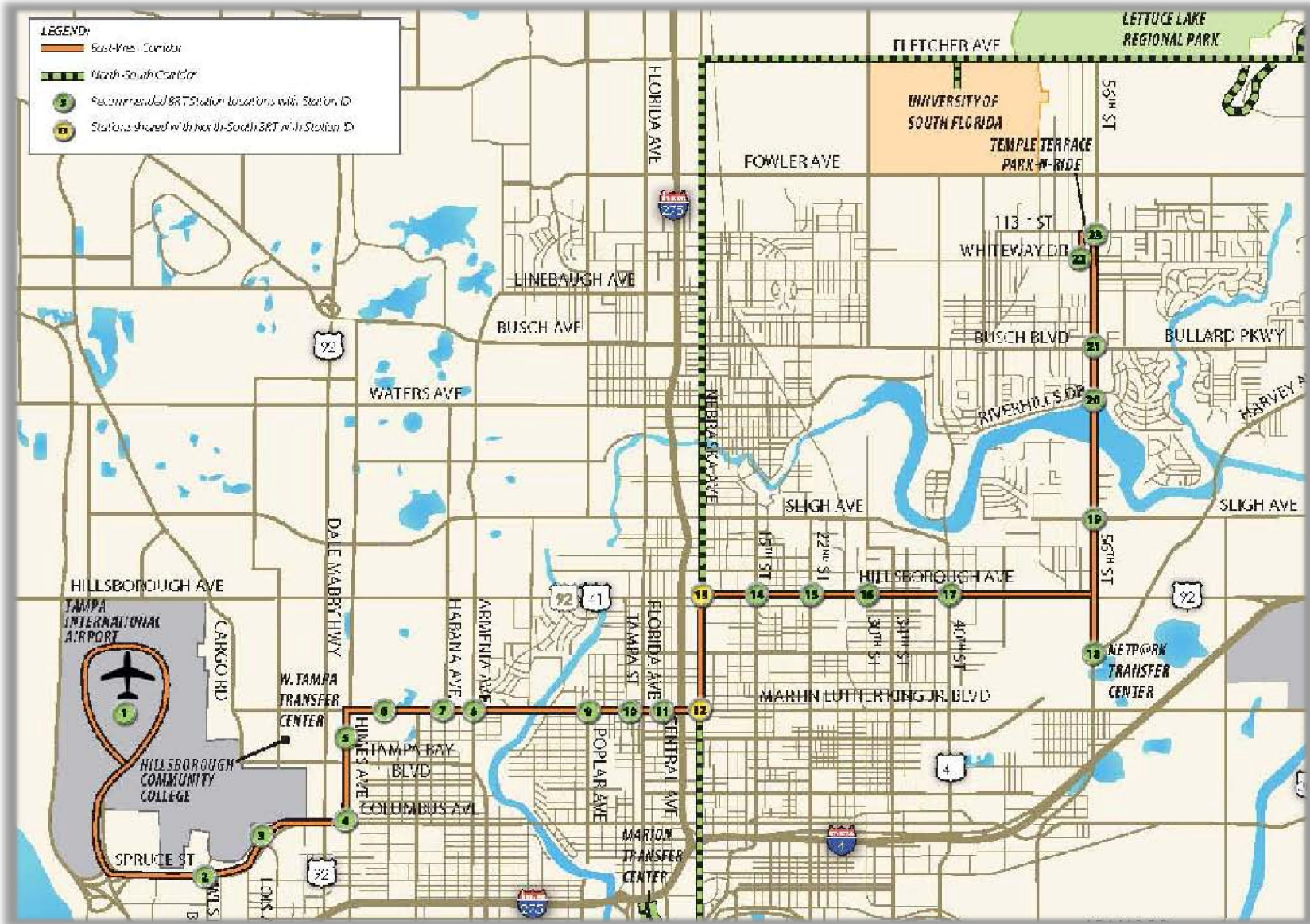


Figure 21: Existing Transit Service



Source: Hillsborough Area Regional Transit (HART), March 2013

Figure 22: Existing Transit Stop-Level Average Daily Ridership Clusters



Source: Hillsborough Area Regional Transit Authority – MetroRapid East-West Preliminary PD&E Report (2012)

Figure 23: Proposed East-West MetroRapid Route and Stops

Lighting

A review of existing street lighting levels and street light placement along the corridor was conducted. The existing street lighting level review was conducted using street lighting illuminance level data collected by the University of South Florida’s Center for Urban Transportation Research (CUTR) for FDOT. Figures 24 and 25 show the average illuminance levels along East Hillsborough Avenue. Table 10 shows the standard illuminance level by roadway type as established in FDOT’s *Plans Preparation Manual*. Note that while the corridor falls below the standard 1.5 Horizontal Foot Candle (H.F.C.), the uniformity ratios, which measure the consistency of lighting, are well within the standard. Enhancing street lighting levels along high-crash corridors—especially related to pedestrian crashes, has emerged as a major initiative for both FDOT and the City of Tampa.

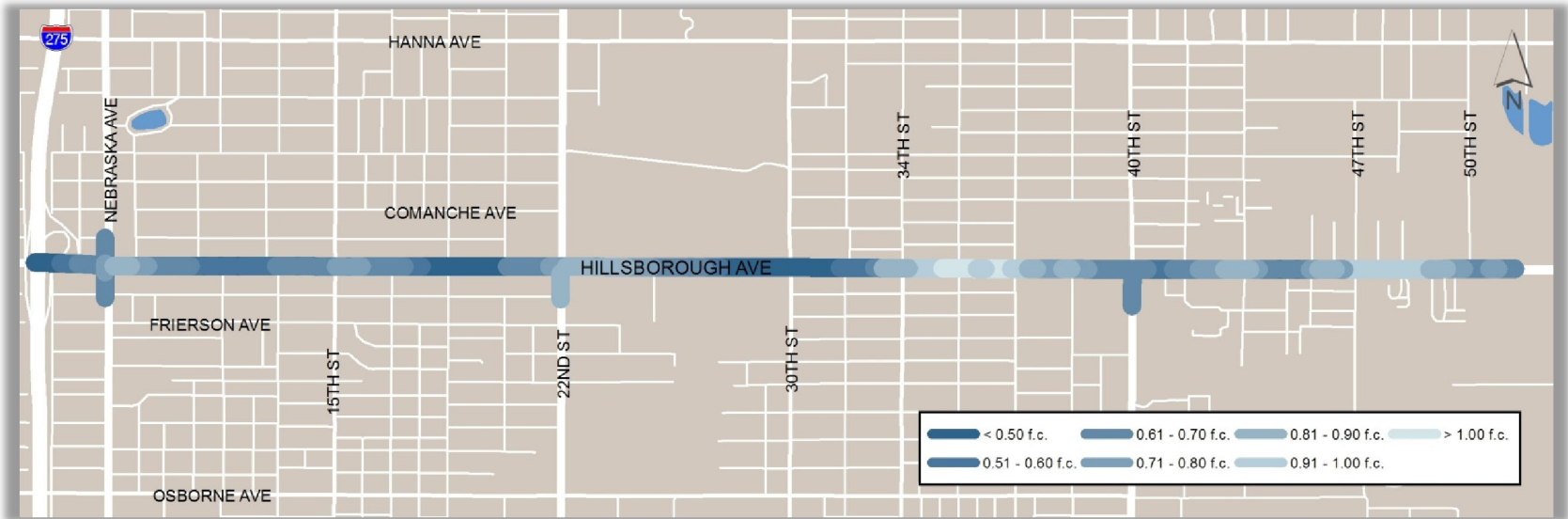


Figure 24: Existing Lighting Levels

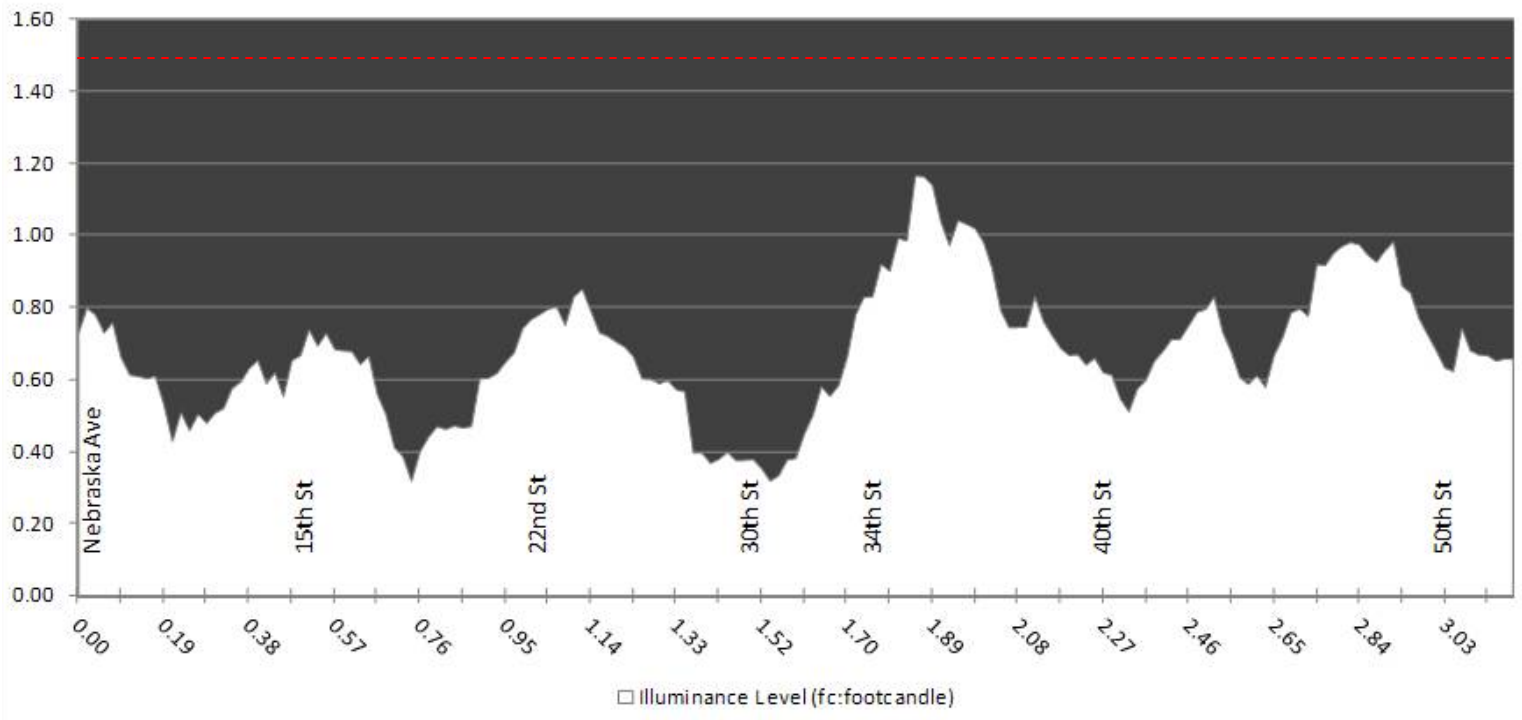


Figure 25: Existing Lighting Levels along East Hillsborough Avenue

Table 10: Conventional Roadway Lighting Standards

Roadway Classification	Illumination Level Average Initial Horizontal Foot Candle (H.F.C.)	Uniformity Ratios		Veiling Luminance Ratio
		Lavg/Lmin	Lmax/Lmin	Lv(max)/Lavg
Interstate, Expressway, Freeway & Major Arterials	1.5	4:1 or Less	10:1 or Less	0.3:1 or Less
All Other Roadways	1	4:1 or Less	10:1 or Less	0.3:1 or Less
*Sidewalks and Shared Used Paths	2.5	4:1 or Less	10:1 or Less	--

Note: These values shall be considered standard, but should be increased if necessary to maintain an acceptable uniformity ratio. The maximum value should be one and one-half values.

**This assumes a separate facility. Facilities within the range of the proposed or existing light poles shall use the levels for that roadway.*

Source: FDOT Plan Preparation Manual/2013 Revised Edition, Table 7.3.1

Land Use

It is important to understand how transportation decisions can affect land use and how land use effects transportation. The transportation system effects how people access goods, services, and other resources and also plays a big role in determining land development demand, choices, and patterns. While the focus of this study is on the transportation system, it is important to recognize that land use and transportation are connected and that investments in transportation need to be consistent with the principles and practices of land use planning. It is important to note here that the City of Tampa has embarked on developing a land use vision for part of the East Hillsborough Avenue corridor through the InVision Tampa Plan, which has recognized the section of East Hillsborough Avenue between Nebraska Avenue and 22nd Street as a future investment corridor. Figure 26 provides a breakdown of the existing land uses by land area, and Figure 27 shows the generalized existing land use within the corridor. Figure 28 shows the designated (City of Tampa) future land use within the corridor.

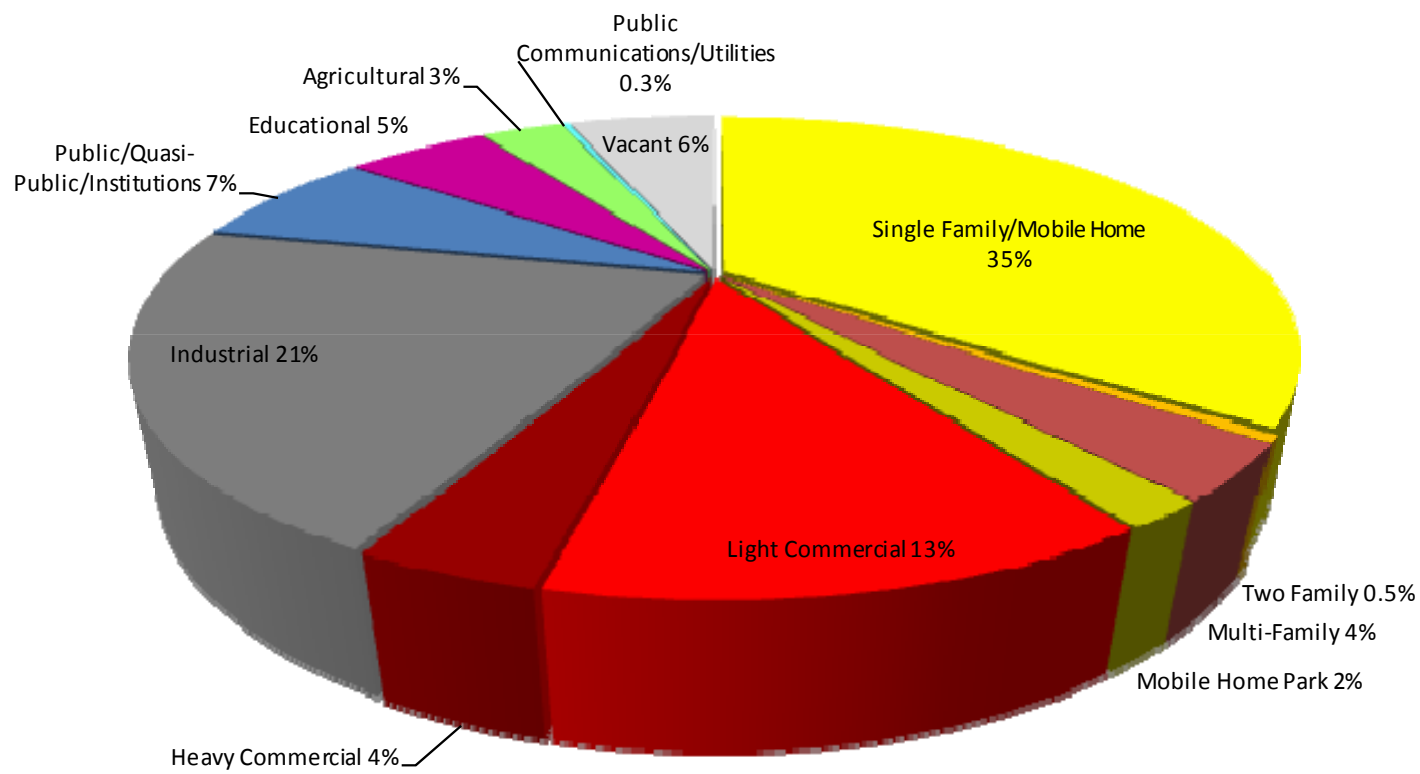


Figure 26: Existing Land Use Breakdown by Land Area

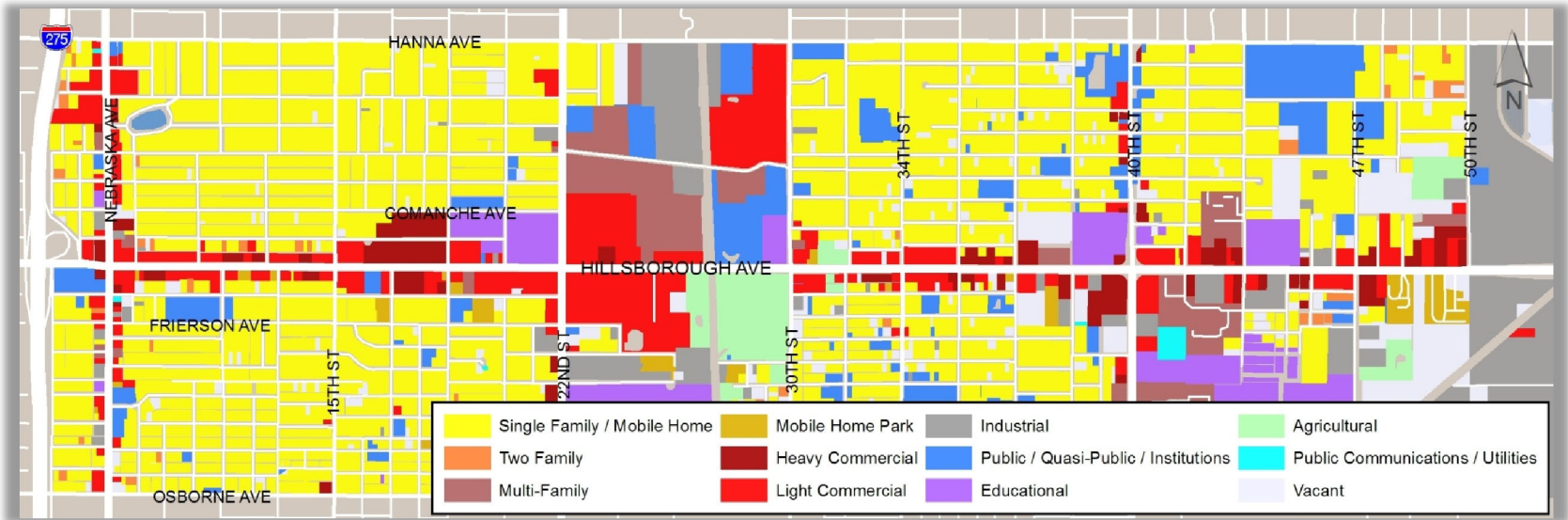


Figure 27: Existing Land Use Map

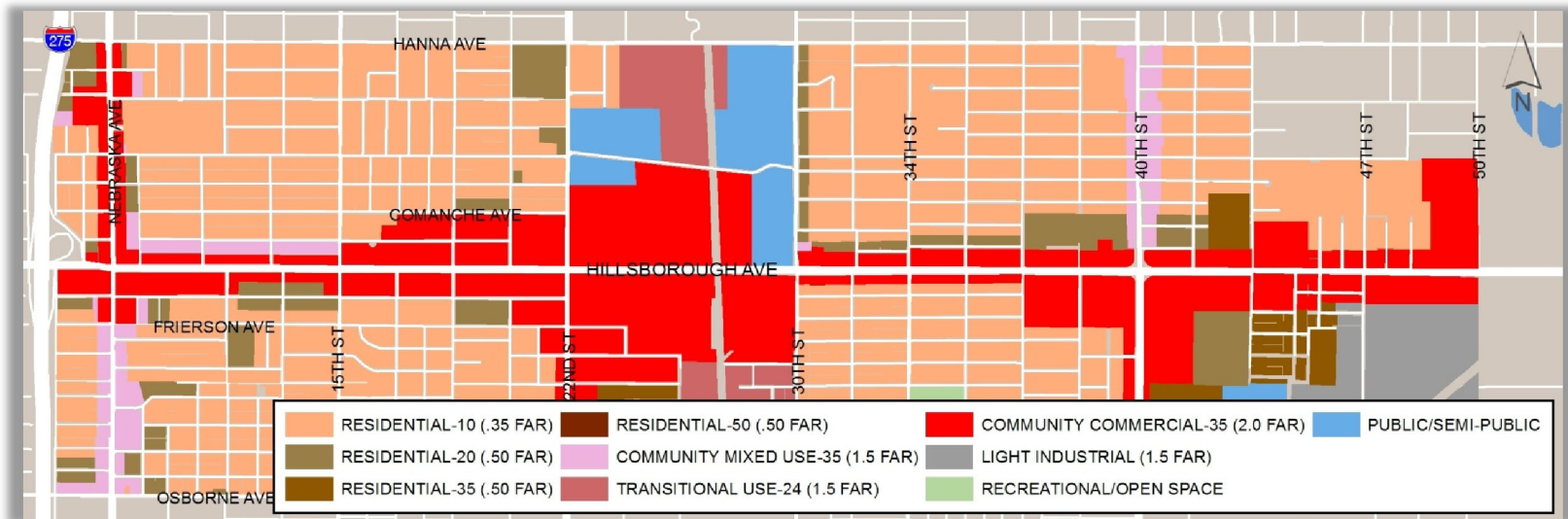


Figure 28: Future Land Use Map

This page intentionally left blank



SECTION 5

STRATEGY DEVELOPMENT

Section 5: Strategy Development

The strategy development portion of the study identified and evaluated a menu of strategies designed to improve safety and mobility along East Hillsborough Avenue. Many of the strategies identified within this section will be used to form the recommendations for East Hillsborough Avenue. This section will provide a summary of the identified strategies and, in some cases, provide examples of how they could be used along the corridor. The identified strategies have been grouped into the following categories:

- Crosswalks
- Signage
- Speed Reduction
- Pedestrian Environment
- Bicycle Facilities
- Transit
- Signalized Intersection Strategies
- Crossing Principles and Strategies
- Lighting
- Landscaping

Crosswalks

Crosswalks are a vital part of the pedestrian network; they define the designated area for pedestrians to use in crossing the street and alert drivers to a crossing location. There are many different types of acceptable crosswalk markings, but the high-emphasis (high-visibility) or ladder crosswalk marking is often the preferred treatment. The high-emphasis or ladder crosswalk design (see Figure 29) includes longitudinal markings in addition to parallel edge line markings. This design with the longitudinal markings provides more surface area to be seen by the driver and is more visible from further distances. Maintenance is an important aspect when dealing with crosswalks, overtime crosswalk markings can become worn from vehicular traffic, which reduces their visibility and effectiveness; to ensure optimal visibility, it is important to make sure that all crosswalk markings are maintained and in good condition. Figure 30 provides some examples of existing crosswalk conditions along East Hillsborough Avenue. Many, but not all, crosswalks along East Hillsborough Avenue have recently been retrofitted to high-visibility designs as part of the District Seven's High-Emphasis Crosswalk Program.

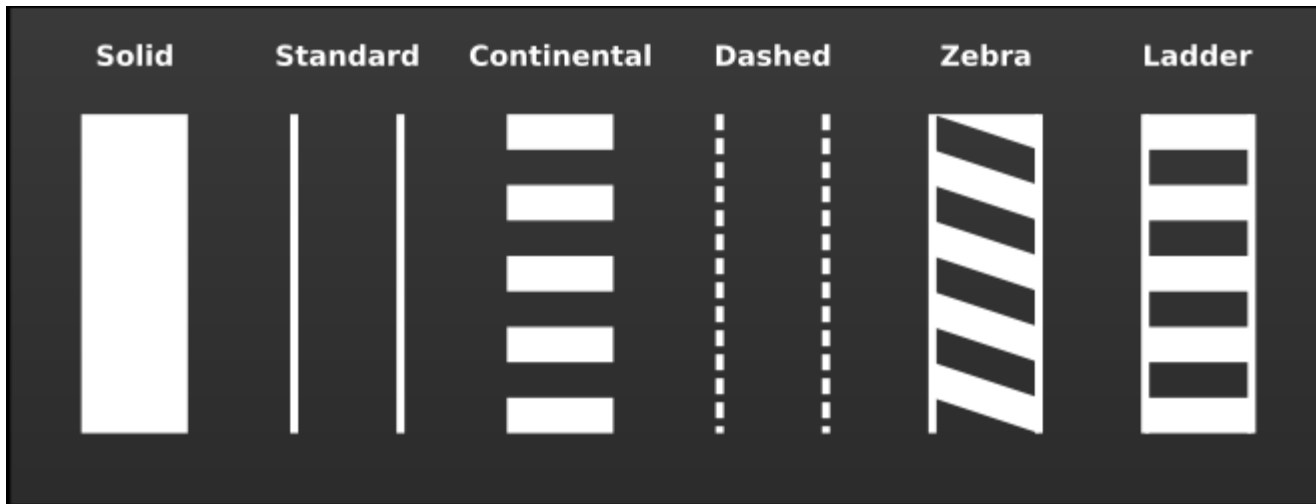


Figure 29: Crosswalk Design



Figure 30: Examples of Existing Crosswalks

Signage

Signs can be used to warn drivers and other road users of threats and can also serve as visual reminders on how drivers are required to act in specific circumstances. For example, the R10-15 sign (see Figure 31) can be used to remind right-turning drivers to yield to pedestrians. Figure 31 shows some of the more common signs that may be used along the corridor. The placement of signs should be done with care; too many or the overuse of signs could result in drivers becoming desensitized and lead to noncompliance. Also, too many signs can create to visual clutter and overstimulation, resulting in driver failure to notice the signage.

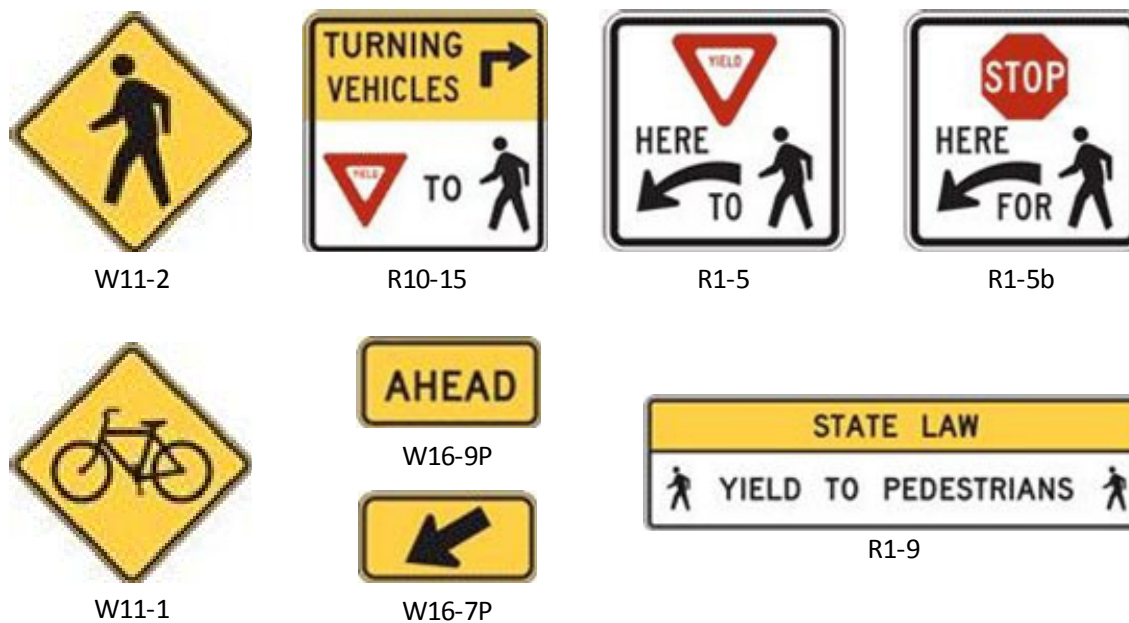


Figure 31: Example Signage

Speed Reduction

While the relationship between vehicle speed and overall crash risk is often complex and unclear, there is data that indicates a relationship between travel speed and the risk of injury and death. In 1993, a study by H. C. Joksch⁶ found a consistent relationship between the fatality risk for a driver in car-car collisions and change in speed. His analysis found that the risk of a fatality begins to rise when the change in speed at the moment of impact exceeds 30 mph. The study's findings indicated that the probability of death from an impact speed of 50 mph is 15 times the probability of death from an impact speed of 25 mph. Figure 32 shows the relationship between change of speed and fatality risk.

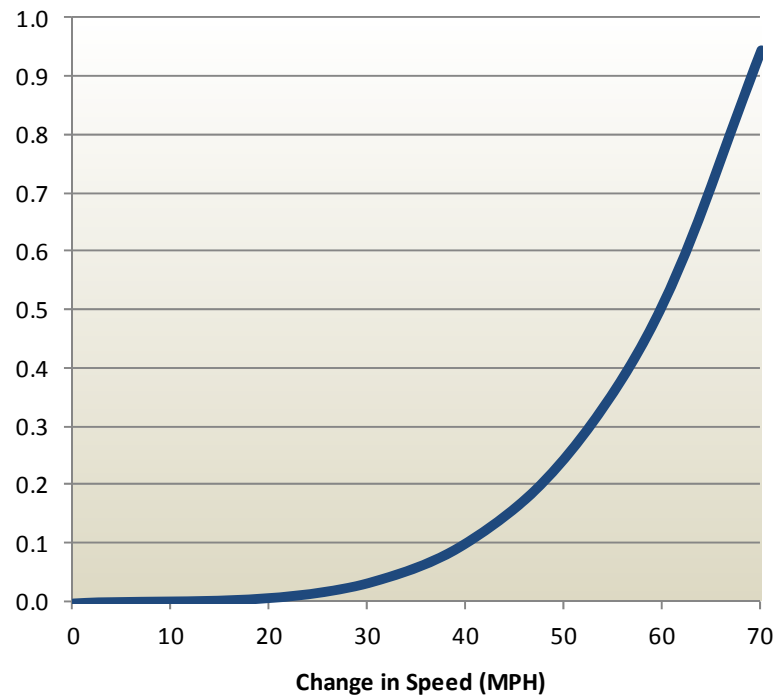


Figure 32: Probability of Fatality (Joksch 1993) Effect of Change in Speed at Impact on Fatality Risk

⁶ Joksch, H.C. *Velocity Change and Fatality Risk in a Crash – A Rule of Thumb*, 1993

The relationship between vehicle speed and injury severity is even more critical for pedestrian and bicycle crashes. Unlike in car-car collisions, a pedestrian or bicyclist does not have the physical or safety features of an automobile. Numerous studies have documented the relationship between vehicle speed and the injury severity sustained by the pedestrian or bicyclist. Figure 33 shows the relationship between vehicle speed and pedestrian injury severity. Research shows that the speed of the motorist and pedestrian detection are directly correlated. As vehicle speeds increase, the ability to see and react to a pedestrian, especially at night, drops significantly.⁷

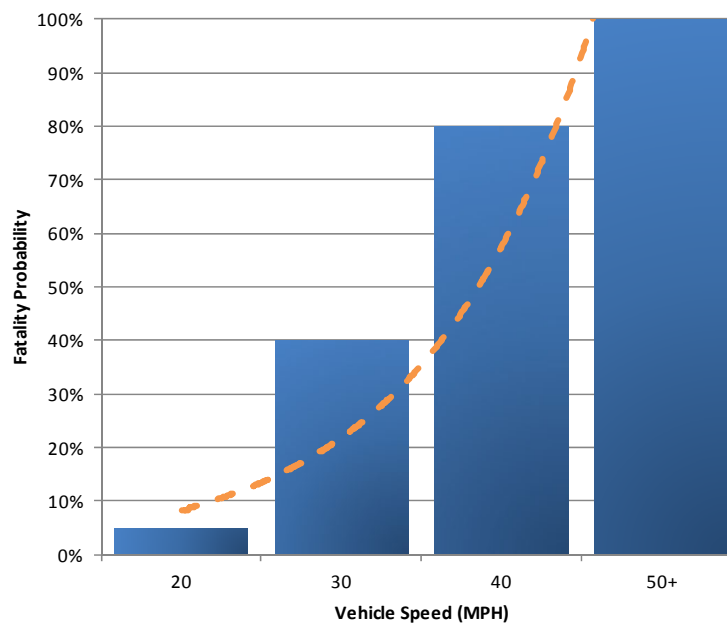


Figure 33: Vehicle Speed and Fatality Probability in Pedestrian Crashes (Pasanen, 1992)

Research has also shown that lower speeds, in addition to reducing pedestrian injury severity, may also reduce overall crashes. This is credited primarily to the relationship between driver reaction, braking distance, and speed. Figure 34 shows the relationship between speed and stopping distance. At 45 mph, the stopping distance is 196 feet; at 40 mph, the stopping distance is 164 feet; and at 35 mph, the stopping distance is 136 feet.

⁷ *Florida Pedestrian Planning and Design Handbook*. Florida Department of Transportation, April 1999.

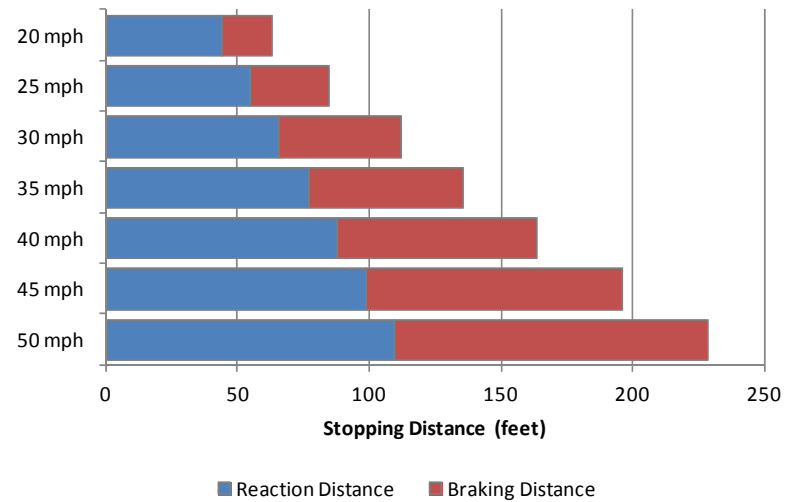


Figure 34: Speed and Stopping Distance

The current speed limit on East Hillsborough Avenue is 40 mph between Nebraska Avenue and 34th Street and 45 mph between 34th Street and 50th Street. The probability of a fatality for all crashes at 45 mph is 16 percent; at 40 mph that probability drops to 10 percent, and at 35 mph that probability is 6 percent (Figure 32). For pedestrian crashes the relationship between speed and survival is even more pronounced; the probability of a fatality for a pedestrian being hit by a vehicle traveling at 45 mph is nearly 90 percent, at 40 mph that risk is 80 percent, and at 35 mph the fatality risk is 55 percent, a nearly 40 percent reduction in (Figure 33).

Pedestrian Environment

Similar to roads, sidewalks should be continuous and be considered part of a transportation system that provides access to employment, homes, services, goods, and transit. The pedestrian environment should be interesting, safe, and well lit, have good sightlines, and should encourage people that have a choice to walk instead of drive. Sidewalks provide people with a dedicated space to travel that is separated from roadway traffic. Similar to the lanes along a road, sidewalks should have dedicated zones for certain types of features; the sidewalk space can be categorized into four zones (see Figure 35):

- **Curb Zone** – the curb zone provides the barrier from the street and is transition from the street to the sidewalk. Along many urban roads the curb zone is an actual curb; in suburban settings or along some urban local streets, this zone may be less pronounced, if noticed at all.
- **Furniture Zone** – the furniture zone is where all of the objects that could potentially block pedestrian traffic should be located. These objects include poles, signs, benches, transit shelters, newspaper racks, controller boxes, and landscaping. In addition to maintaining a consistent theme, having the above-mentioned items in the furniture zone helps to provide a buffer between pedestrians and traffic on the street.
- **Pedestrian Zone** – the pedestrian zone is where pedestrians walk. The pedestrian zones should be at least 5 feet wide and free of any impediments.
- **Frontage Zone** – the frontage zone is the space between pedestrians and buildings. Subconsciously, pedestrians will move away from vertical surfaces, so attention should be given to providing setbacks that provide an adequate buffer between the pedestrian and buildings and/or other structures. When buildings or walls are placed up-to the sidewalk, design techniques, such as discouraging blank walls, should be considered.



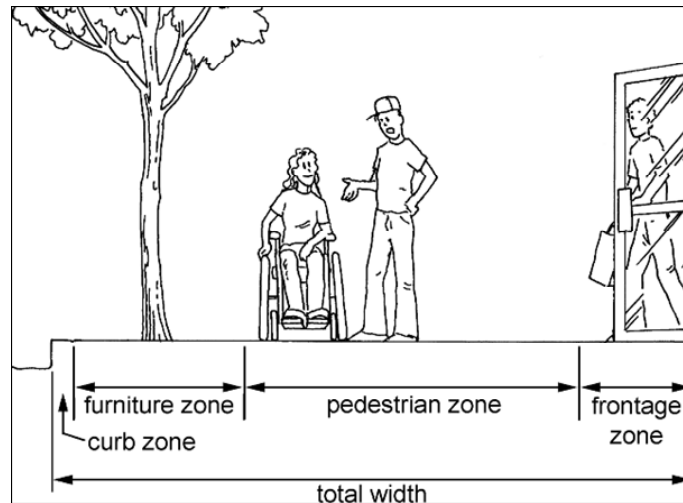


Figure 35: Defining Sidewalk Zones

Understanding and clearly defining the sidewalk zones helps to provide a more enhanced pedestrian environment that is easier to navigate. Fortunately, there are existing sidewalks along East Hillsborough Avenue, but many of the pedestrians along East Hillsborough Avenue are coming from or going to the neighborhoods adjacent to the corridor, and many of the roadways that connect to East Hillsborough Avenue have either no sidewalk, gaps within the sidewalk, and/or a sidewalk along just one side of the street. Having a sidewalk along just one side of a local street is often considered adequate, but it would be preferred if the streets that connect to East Hillsborough Avenue, at least within the first block north and south of the roadway, had either a sidewalk or defined walkway along both sides of the street. Where a sidewalk or separated walkway is not feasible, a well defined pedestrian space, like a paved wide shoulder, should be provided.

Other considerations to enhancing the pedestrian environment are making sure that sidewalks are well defined through driveways and across side streets. This can be accomplished by maintaining a flat concrete sidewalk through all driveway openings along the corridor and marking all crosswalks along the corridor. Another consideration is to ensure that all curb ramps meet Americans with Disabilities Act (ADA) design guidelines.



Bicycle Facilities

Bicycle facilities are a shared or dedicated space intended for use by bicyclists. Whether they are on the street (bicycle lane) or within a physically-separated facility (multi-use trail), bicycle facilities help to create a more predictable environment and may reduce conflicts between bicyclists and both vehicles and pedestrians. East Hillsborough Avenue currently does not have a dedicated bicycle facility. Right now bicyclist must either ride along the street or along the sidewalk; neither of which are favorable options. With an 11 foot outside travel lane, multiple driveways, and a considerable amount of vehicular traffic, including truck traffic, the on-street option is one that requires a great deal of courage from the bicyclist, and while East Hillsborough Avenue has wider than typical sidewalks at eight feet wide, the sidewalks along the corridor, as discussed previously, pose their own set of conflicts ranging from conflicts with pedestrians to obstacles within the sidewalk. This section will look at some bicycle facility options, but it is also important to note that the existing right-of-way and cross-section of East Hillsborough Avenue does not provide many options for bicycle facilities along East Hillsborough Avenue itself, but that there may be opportunities to provide facilities within the corridor by utilizing parallel streets.

Bicycle Lanes

Bicycle lanes are portions of the roadway that has been designated by striping, signing and pavement marking for the preferential or exclusive use by bicyclists. Bicycle lanes make the movements of both motorists and bicyclists more predictable, helps to reduce sidewalk riding (reduces the conflict between bicyclists and pedestrians), and makes bicyclists more visible. Bicycle lanes can also improve the pedestrian environment by providing a buffer between pedestrians and vehicles on the roadway.

Multi-Use Trails or Side Paths

Multi-use trails or side paths are facilities designed for non-motorized forms of transportation. Users may include bicyclists, pedestrians, skaters, and others. Physically separated (by either open space or other barrier) from motorized traffic, multi-use trails often run parallel to the road and are most appropriate along roads with relatively higher traffic volumes and speeds. They are typically between 10 and 12 feet wide (should be a minimum of 8 feet), which provides adequate room to accommodate users traveling in both directions.



One item of note is that multi-use trails are not intended to serve as a substitute for on-street facilities (i.e., bike lanes), but rather a component of the non-motorized network to complement on-street facilities. Also, use of bicycles on multi-use trails (or sidewalks) along roadways (like East Hillsborough Avenue) with frequent side street and driveway conflicts is not advised for safety reasons.

Shared Lane Markings

Shared lane markings/arrows (or sharrows) are pavement markings that indicate where a bicyclist should ride on the roadway and help alert drivers to the likely presence of bicyclist. Research has shown that shared lane markings have been successful in increasing the on-street operating space for bicyclists and in reducing sidewalk riding. Shared lane markings are a lower-cost bicycle treatment, in that they do not require additional right-of-way to implement, but it is recommended that shared lane markings should not be used on roadways with a speed limit above 35 mph.⁸

Bicycle Boulevards

Bicycle boulevards are low-volume, low-speed streets that have design features that encourage bicycle and pedestrian travel by providing a comfortable, convenient, and attractive environment for pedestrians and cyclists of all ages and experience. Bicycle boulevards typically use neighborhood streets and may include traffic calming treatments, special signing and pavement markings, and intersection crossing treatments. These design features are intended to cue drivers to slow-down and recognize that non-motorized users have priority on the street.

One of the intersection crossing treatments that may be considered are the use of diverters, specifically intersection median diverters. Diverters are typically raised islands built at local street intersections that are designed to restrict certain through and/or turning movements. By reducing cut-through traffic, diverter can enhance the pedestrian and bicycle environment of a street by reducing traffic volumes and the number of potential intersection conflicts (fewer turning conflicts).



⁸ FHWA, *Manual on Uniform Traffic Control Devices*, 2009 Edition, Section 9C.07.02.

Transit

Safe, comfortable, and accessible stops along with well-designed transit routes are fundamental to any transit system. In general, transit stops should be designed to provide safe and convenient access and should be comfortable places for people to wait. Transit stops should not block pedestrian travel on the sidewalk, should include sufficient lighting and be placed at convenient intervals. The location of transit stops, intersection near-side or far-side, or mid-block can have an impact on accessibility as well as overall transit route performance. Also, the location of transit stops can affect the timing of transfers between routes, so consideration should be given to help ensure that route connections are as convenient and timely as possible for transferring riders.



While a start date and funding have not yet been established for HART's East-West MetroRapid route, it is likely that East Hillsborough Avenue will be a major part of this enhanced transit service. Similar to what has been and is being done along Nebraska Avenue after the implementation of the North-South MetroRapid route, an assessment of the existing bus stops along East Hillsborough Avenue, with regards to placement and type, should be conducted as part of any further planning for the East-West MetroRapid route. A general overview of stop placement and types is provided, but it will be assumed that continued coordination between HART, FDOT, and the City of Tampa will be necessary to promote safe and efficient transit service within the corridor.

Stop Location

Near-side, far-side, and mid-block stop placement each has advantages and disadvantages. Each stop location should be evaluated individually to decide the best placement for the stop.

- Near-Side Stop Placement – The advantages of near-side bus stops are that they can allow passengers to board and alight while the bus is stopped at a red light, they eliminate the potential of double stopping (bus stops at red light, proceeds through intersection on green, then stops immediately on other side of intersection), they allow passengers to access buses closest to the crosswalk, and they provide the driver with the width of the intersection to pull away from the curb and get back to speed. The disadvantages of near-side bus stops are that they can increase conflicts with right-turning vehicles, they can obscure traffic control devices (traffic signals) and crossing pedestrians, and they may block the through lane.



- Far-Side Stop Placement – The advantages of far-side bus stops are that they minimize the conflict between right-turning vehicles and buses, they encourage pedestrians to cross behind the bus, they create shorter deceleration distances for buses since the bus can use the intersection to decelerate, and they increase the opportunity for bus drivers to re-enter traffic by providing better gaps in traffic that are created at signalized intersections. The disadvantages of far-side stops are that they may result in the intersection being blocked from stopped buses, they may increase the number of rear-end crashes since drivers may not expect the bus to stop after stopping at a red light, and they may increase the potential for double stopping which may impact bus operations and overall traffic.
- Mid-Block Stop Placement – The advantages of mid-block stops are that they can place riders closer to either their origin or destination and, depending on their proximity to driveways, can help reduce the number of conflicts between buses and other vehicles removing the conflict with turning vehicles. Some of the disadvantages of mid-block stops are that they increase the walking distance for users crossing at intersections, which can encourage riders to cross the street at mid-block.

Stop Types

Various roadway configurations are available to accommodate bus service at a street-side stop location. Similar to stop placement, each design presents advantages and disadvantages; two of the more common stop types are the curb-side stop and bus bays, which are discussed below.

- Curb-Side Stops – The advantages of curb-side stops are that they provide easy access for bus drivers and result in minimal delay, they are simple in design, they are easy and inexpensive for agencies to install, and they are easy to relocate if necessary. The disadvantages of curb-side stop locations are that they can cause traffic to queue behind the stopped bus, which may lead to unsafe behavior from other drivers trying to avoid a stopped bus.
- Bus Bays – The advantages of bus bays are that they provide a protected area away from moving traffic for both the bus and riders getting on and off the bus. Bus bays also minimize through traffic delay by allow the bus to move out of the travel lane to stop. Some of the disadvantages of bus bays are that they often present problems to bus drivers when attempting to re-enter traffic, especially during peak traffic periods. Bus bays are also expensive to install, require available right-of-way, and are difficult and expensive to relocate.



Signalized Intersection Strategies

Intersections allow conflicting traffic movements to proceed efficiently and safely through a common space. Traffic signals allow the various traffic movements that occur at an intersection to be separated and controlled by time (signal phasing). Most of the time, these movements are conducted harmoniously with little or no incident, but occasionally a conflict arises. The goal is to minimize the conflict potential at signalized intersections while also reducing average delay for all vehicles. Sometimes these two goals contradict each other, and a compromising balance needs to be reached. This section discusses some strategies that could be considered to help reach the balance of minimizing conflicts while ensuring efficient movement.

Signal Timing and Phasing – Signal timing is a process that controls the operation of signalized intersections. Signal timing enhancements are usually performed to improve traffic flow and reduce overall delay. Coordinating signal timings can have a beneficial effect on the quality of traffic flow by promoting platoons of vehicles that can travel at constant speeds and reducing the number of required stops along a corridor. Better vehicle platoons can have a safety benefit, reducing the number of required stops can help to reduce the number of rear-end, left-turn, and right-turn (from minor streets) crashes by creating better gaps in opposing traffic.

In addition to coordinating signal timings, reducing cycle lengths (the total time to complete one sequence of all movements around an intersection) can help to promote more compact vehicle platoons and can also help to improve operations and reduce delay along the side streets. Reduced cycle lengths also benefit pedestrians by reducing the amount of dwell time for pedestrians waiting to cross the street.

A planning level analysis of reducing the cycle lengths along the corridor from 190 seconds (AM peak) and 180 seconds (PM peak) to 120 seconds and changing all mainline left-turn movements to protected only phasing was conducted and demonstrated that there is a likelihood that significant modifications to the traffic signal timings could be implemented to improve safety and side street operation without unduly compromising operations along East Hillsborough Avenue (especially outside of peak periods). Note that the 120 second cycle length was used to test an “extreme” scenario to demonstrate that a reduced cycle length could work; a detailed engineering review will need to be completed to determine the specific signal timing and phasing parameters.



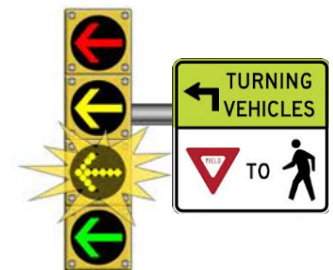
Left-Turn Phasing – The left-turning movement is often one of the most common (31% of all crashes along the corridor) and often most severe (43% of all severe injury crashes along the corridor) conflicts at signalized intersections. Permissive left turn phases, where left turning traffic must yield to oncoming through traffic generally reduces through traffic delay, but can increase the incidence of left-turn crashes—especially when the opposing traffic flow is heavy.



Several strategies can be applied to address left-turning conflicts. Strategies that were considered for East Hillsborough Avenue are protected-only left-turn phases and protected/permissive left-turn phases with a four-head flashing yellow arrow signal.

- **Protected-Only Left-Turn Phases:** A protected-only left-turn phase provides a green arrow for left-turning vehicles while stopping all conflicting automobile and pedestrian traffic. Protected-only left-turn phases are most appropriate for location with relatively high left-turning and pedestrian volumes and locations with a significant history of left-turn related crashes. The disadvantages of a protected-only left-turn phase are that they may lead to an increase in intersection delay or that they may require longer cycle lengths.
- **Protected/Permissive Left-Turn Phases:** A protected-permissive left-turn phase provides left-turning vehicles with a protected (green arrow) phase followed by a permissive phase, traditionally a green ball, which indicates that left-turning vehicles are allowed to proceed if there are sufficient gaps in oncoming traffic. One of the biggest concerns with the permissive phase, especially during periods of congestion, is that it may contribute to less-safe driving habits, such as accepting smaller gaps, turning at higher speeds, and cheating through the intersection during either the yellow or red signal. Another consideration is that a recent report⁹ noted the challenge for drivers to balance multiple tasks, such as assessing oncoming traffic while also noticing pedestrians within the crosswalk (pedestrians have the right-of-way). An interesting note from the study was that during simulated tests, between four and seven percent of the drivers indicated not looking for or noticing pedestrians in the crosswalk while attempt to perform a left turn during a permissive left turn phase. These issues are generally more prevalent on six-lane roadways compared to four-lane roadways.

One option to choosing between protected-only or protected/permissive left-turn phasing is the consideration of the four-head signal that could allow for situational phasing. Four-head signals are similar to the traditional protected left-turn signal (green, yellow, red arrows), but include an additional flashing yellow arrow (FYA) that is activated during the permissive left-turn phase. The four-head signal could allow for variations in the left turn phase either by time of day (during the most congested periods) or when a pedestrian phase has been activated; for example, if the pedestrian phase was activated, drivers would not receive the FYA until after the pedestrian “walk” signal.



⁹ OTREC-RR-13-02 Improved Pedestrian Safety at Signalized Intersections Operating the Flashing Yellow Arrow (April 2013).

Pedestrian Signal Considerations – Where and when pedestrian traffic is regular and frequent, pedestrian phases should be activated automatically and pedestrian pushbutton actuation used when pedestrian crossings are intermittent. For example the City of Boston recently implemented a policy making the pedestrian phase automatic during every cycle at locations where pedestrians are present more than 50 percent of the time during peak hours, or where studies indicated reasonable benefit¹⁰. Pedestrian push-buttons should be well designed, accessible, convenient, and clearly marked. Initiating a quick-response or some form of pushbutton feedback (button illuminates once activated) could be considered; this provides the pedestrian with positive feedback and indicates that their request has been processed. It is estimated that less than half of all pedestrians activate pushbutton devices, so new technology that can detect pedestrians is being installed and tested across the U.S. These automatic pedestrian detectors can be used to stop traffic to activate the pedestrian phase and either shorten or lengthen the pedestrian phase based on the speed and/or number of pedestrians attempting to cross the street. Still considered experimental the use of automatic pedestrian detectors may be an option in the future. Initial research has indicated that automatic pedestrian detectors may improve pedestrian signal compliance and may also help to reduce pedestrian conflicts with vehicles.



Right Turn on Red – Permissible right turn on red (RTOR) was introduced in the 1970s as a fuel-saving measure, but often has had detrimental effects on pedestrians. Drivers are required to come to a complete stop and yield to cross traffic and pedestrians before proceeding, but many drivers do not fully comply with the law and either pull-up into the crosswalk, blocking pedestrian movements, or do not come to a full stop and “roll” through the intersection. In addition to not always complying with the regulations, drivers are often more focused on looking for traffic approaching from their left such that they often do not notice pedestrians to their right. Prohibiting or restricting RTOR should be considered where and when there are high pedestrian volumes. The uses of electronic signs mounted on the signal arm allow for the variable-use of no RTOR, such as during the busiest times of the day or when the pedestrian push-button has been activated.



Leading Pedestrian Interval – A leading pedestrian interval (LPI) gives pedestrians an advance walk signal before motorists get a green signal, allowing the pedestrian to get a several second (typically 3–5 seconds) head start in the crosswalk. A LPI potentially makes pedestrians more visible to motorists by allowing the pedestrian to enter the crosswalk ahead of time, making it more likely that the motorist will yield to them. LPIs have been used successfully in many places and have demonstrated a reduction in conflicts between vehicles and pedestrians.

¹⁰ Boston Complete Streets Guidelines. *Guidelines for marking Crosswalks*. Boston Transportation Department, 2010

Crossing Principles and Strategies

People cross the street because they want or need to get to the other side. Ideally, everyone would cross the street at locations with positive control (e.g., a signalized intersection or signalized mid-block crosswalk), but the reality is that people often cross where it is most convenient, and signals cannot be provided everywhere people want to cross. Instinctively, people will not go far out of their way to a crossing location that may be safer; they just want to get to their destination. Reducing the distance between controlled crossing locations provides people with more options. However, pedestrian behavior varies; some pedestrians will safely cross at controlled locations (signalized intersections and controlled mid-block crossings), while others will safely cross at uncontrolled locations. Therefore, understanding that the rational person wants to safely make it across the road, how do we make that crossing safer?

Crossing Principles:

Crossings can be categorized into a few different categories; this study focuses mainly on intersection and mid-block crossings. Intersection and mid-block crossings will be discussed in further detail on the following pages, but it is important to recognize a few general principles that should be considered when dealing with pedestrian crossings:

- Keep crossings short.
- Reduce the distance between crossings.
- Reduce pedestrian delay.

Keep Crossings Short

Long crossing distances can be challenging for pedestrians; longer crossing distances increase the pedestrian's exposure time, and the more travel lanes a pedestrian has to cross increases the number of vehicle-pedestrian conflict points. Longer crossing distances also contribute to increased vehicle delay, as vehicles must wait longer for pedestrians to cross. Along multi-lane roads, especial roads with six or more lanes, it is important to understand the relationship time and distance. Assuming that the average person walks at a speed of 3.5 feet per second, it would take about 23 seconds to walk across East Hillsborough Avenue. Knowing that it takes a person about 23 seconds to cross the street, and assuming that all vehicles are traveling at 45 mph we can calculate the distance needed between the pedestrian and vehicles on the roadway for the pedestrian to make it safely across the street. Figure 36 is an illustration of the distance needed between a pedestrian and vehicles on a six-lane road with a two-way left turn lane. As shown, for a pedestrian to safely make it across a street, a vehicle in the far outside lane would need to be at a minimum a 1,500 feet away when the pedestrian starts to cross the street.

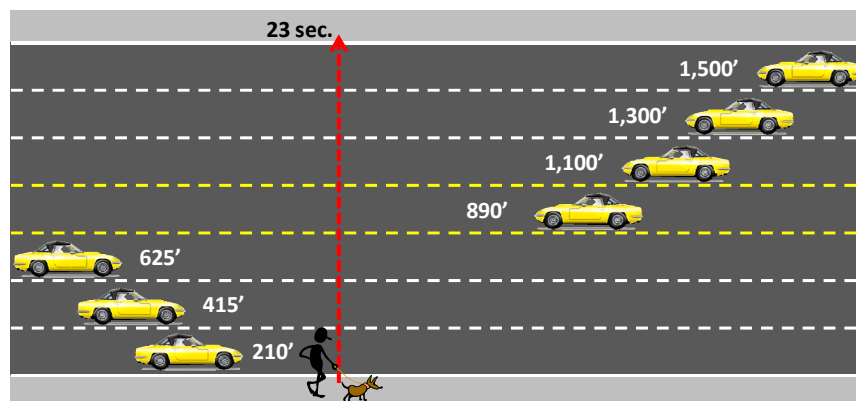


Figure 36: Needed Distance to Avoid Pedestrian-Vehicle Conflict

The 2007 median revision project provided raised median islands along parts of East Hillsborough Avenue, but there are still large stretches with either a two-way left-turn lane or a dedicated left-turn lane, essentially making it necessary to cross seven lanes of traffic. Providing a safe median refuge would give pedestrians an option to break their crossing into two movements, thus reducing the needed distance between the pedestrian and vehicles for a safe crossing from 1,500 feet in the far outside lane to 625 feet.

Reduce the Distance between Crossings

As mentioned, in general, people will not go far out of their way to cross a street; they simply want to reach their destination. The closer the distance between marked crosswalks, signalized intersections, or some other form of traffic-controlled crossing (discussed later), the greater the chances are that people will use them. Of course, some people will still cross wherever they see fit, but that does not reduce the need to provide people with safe crossings options within a reasonable walking distance. Currently, there are six controlled crossings within the corridor, and all are at signalized intersections. Figure 37 shows these locations and the distance between them. Today, if a pedestrian was standing on the north side of East Hillsborough Avenue at 37th Street and they wanted to get to the auto parts store on the south side of East Hillsborough Avenue at 37th Street they would have to walk to either 34th Street (1,270 feet away) or 40th Street (1,300 feet away) to cross at a “protected” crossing; making what would be about a 23 second trip (assuming pedestrian speed of 3.5 feet per second) a 12.5 minute (assuming no wait at the signalized intersections) trip.

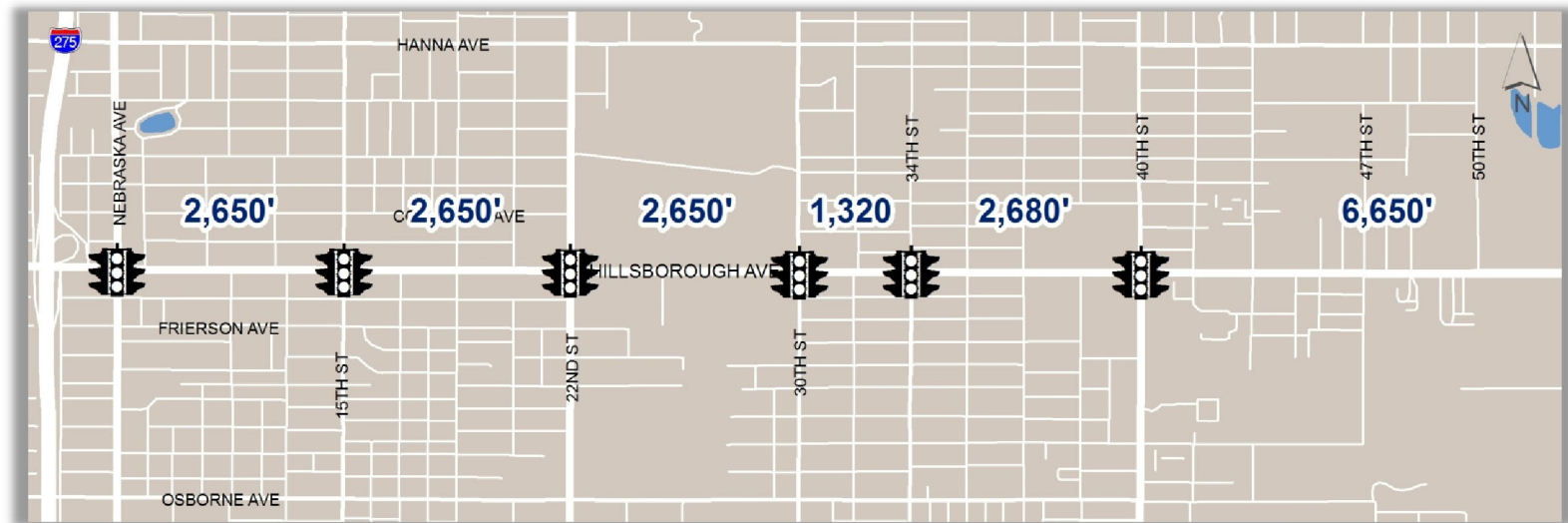


Figure 37: Distance between Existing Controlled Crossings

Reduce Pedestrian Delay

Pedestrian delay is defined as the amount of time between the point at which a pedestrian arrives at the curbside and the point at which he/she steps off the curb. Pedestrians are sensitive to delay; studies indicate that, as a general rule, pedestrians are anxious to get back underway within 30 seconds. If waiting periods are longer, many pedestrians tend to look for a gap that they can use, and if a long wait is anticipated, many pedestrians will choose to cross at other non-signalized locations.¹¹ To reduce pedestrian delay and encourage safety, the signalized intersection crosswalk compliance signal cycle should be kept as short as possible.



¹¹Florida Department of Transportation, *Florida Pedestrian Planning and Design Handbook*, April 1999.

Crossing Strategies

Signalized Intersections

Many of the signalized intersection crossing strategies are discussed in other parts of this document. The following is a brief summary of some of the main concepts:

- *Crosswalks*: Marked crosswalks at signals encourage pedestrians to cross at the signal and discourage drivers from encroaching into the crossing area. High-emphasis crosswalks should be used to improve the visibility of the crosswalk.
- *Lighting*: Intersection lighting should be designed to optimize the visibility of pedestrians within the crosswalk.
- *Pedestrian Signals*: Pedestrian signals and pushbuttons should be provided. Pedestrian signal countdowns may be employed to aid in letting pedestrians know when it is safe to cross; pushbuttons should be convenient and well-marked. Green signal phases should be long enough to provide pedestrians with ample time to safely cross the street.
- *No Right Turn on Red*: Implementing restrictions on right turns on red during the pedestrian crossing phase should be considered.
- *Leading Pedestrian Intervals*: A leading pedestrian interval should be considered to allow pedestrians a few second head start to help minimize potential conflicts.

Mid-Block Crossings

A mid-block crossing is defined as a crossing at a location other than an intersection with traffic controls for both directions of traffic. Mid-block crossings are intended to improve pedestrian connectivity and reduce the likelihood of pedestrians crossing at random, unpredictable locations. Mid-block crossings are best suited for locations with a documented pedestrian demand and when the distance to the nearest signalized intersection would result in significant out-of-direction travel for pedestrians. Mid-block crossings that are located in the right spot and are well-designed can serve as a practical means of improving pedestrian connections, community walkability, and pedestrian safety. The data are inconclusive as to whether it is safer to cross at an intersection or mid-block, especially when a raised median is present. Most of this debate is based on the number of conflict points at each location type, with intersections having a significantly higher number of conflict points.



The use and placement of mid-block crossings should be based on an identified need and not used indiscriminately. Important factors that need to be considered when evaluating the need for mid-block crossings are the proximity to significant generators and attractors, pedestrian demand, pedestrian crash history, and the distance between controlled crossing locations. According to the FDOT *Traffic Engineer Manual* (2012), any location under consideration for a possible mid-block crossing should exhibit a well-defined spatial pattern of pedestrian generators,

attractors, and flow (across a roadway) between them or a well-defined pattern of existing pedestrian crossings, and sufficient demand should exist that meets or exceeds the thresholds for three consecutive days of data collection. Those thresholds are a minimum of 20 pedestrians during an hour (any four consecutive 15-minute periods) and a minimum of 60 pedestrians during any 4 hours of the day, not necessarily consecutive hours.

There are two basic types of mid-block crossings: the single-stage crossing and the two-stage crossing. The following provides a brief summary of these two crossing types.

Single-Stage Mid-Block Crossing: A single-stage mid-block crossing is one in which the pedestrian crosses the street in one movement. If a pedestrian signal or other warranted traffic control device is present, traffic is stopped in all directions for the duration of the pedestrian crossing.

Two-Stage Mid-Block Crossing: A two-staged mid-block crossing is one that is designed to require pedestrians to cross each half of the street independently, with the median serving as a refuge area for pedestrians to wait before completing their crossing. For six-lane roadways or crossing distances exceeding 80 feet, a two-stage pedestrian crossing should be considered where the proposed crossing will be controlled by a warranted pedestrian signal or other type of control. A two-stage pedestrian crossing may have a lesser impact to vehicle delay (compared to a single crossing) since the signal serves each direction independently while the median serves as a refuge area for pedestrians to wait prior to completing their crossing.¹²

Mid-Block Crossing Treatment/Control

All mid-block crossing location should be conducive to providing a minimum level of pedestrian safety and should have some general design treatments including marked crosswalks, signage (advanced warning signage and signage at the actual crossing), and enhanced lighting. All mid-block crossing locations should be marked with a 10-foot-wide high-emphasis crosswalk and supplemented with appropriate signage (side mounted pedestrian crossing sign [W11-2] with down arrow [W16-7P] at the crosswalk and advance pedestrian crossing sign [W11-2] with “Ahead” sign [W16-9P]). For many locations, a marked crosswalk and signage are not considered sufficient. In addition to these treatments consideration should be given to providing advanced “Stop” or “Yield” line markings along with corresponding signage (R1-5 or R1-5b) and to providing some form of pedestrian actuated traffic control. The following provides a brief description of some of the accepted forms of mid-block crossing traffic control treatments.



¹² FDOT, *Traffic Engineering Manual*, January 2012.

- Pedestrian Traffic Control Signal: A pedestrian traffic control signal is a pedestrian-actuated traffic signal. A pedestrian traffic control signal may be used when pedestrian volumes are high enough to meet necessary signal warrants. Considerations for a pedestrian traffic control signal at a mid-block location should include availability of adequate gaps for pedestrians to cross the roadway. In some cases, a pedestrian signal may not be needed if adjacent coordinated traffic signals consistently provide gaps of adequate length for pedestrians to cross.
- Rectangular Rapid Flashing Beacons: Rectangular Rapid Flashing Beacons (RRFB) are rectangular-shaped, high-intensity LED-based flashing indicators that are typically attached to a standard pedestrian crossing sign at non-signalized crossing locations. The flashing lights of a RRFB are used to warn drivers that a pedestrian or bicyclist is about to enter into a marked crosswalk. RRFBs can enhance safety by reducing crashes between vehicles and pedestrians by increasing driver awareness of potential pedestrian conflicts. RRFBs should be used in conjunction with advanced stop/yield lines and proper signage. RRFBs are typically mounted alongside the roadway and in the median on multi-lane roadways, but there is potential to locate RRFBs above the roadway (this type of design has been proposed for some sections of Fletcher Avenue in Hillsborough County).
- Pedestrian Hybrid Beacon/High Intensity Activated Crosswalk (HAWK): High Intensity Activated Crosswalk (HAWK) or pedestrian hybrid beacons are pedestrian-activated warning devices either located on mast arms over mid-block crosswalks or alongside the road. HAWKs are typically used as an intermediate option between RRFBs and a full traffic signal. They provide pedestrians and bicyclists with a full stop controlled crossing, but without the usual traffic delay associated with traffic signals. This is because drivers are not required to remain stopped through the entire crossing phase; they may proceed once the pedestrian or bicyclist has safely crossed. The greatest challenge with HAWKs is that they are an unfamiliar traffic control device to many people, especially in Florida; this unfamiliarity may lead to issues with compliance and/or usage from pedestrians and bicyclists.
- Yellow Flashing Beacon: A yellow flashing beacon can provide additional emphasis to a crossing location when pedestrian signals are not warranted. A flashing yellow beacon that is actuated by a pedestrian is more likely to be noticed by a driver than a continuously flashing yellow beacon.



Lighting

Good quality and well placed lighting can enhance the roadway environment and increase comfort and safety for all users, especially pedestrians and bicyclists. Without sufficient lighting, drivers may not be able to see pedestrians, and pedestrians often assume that drivers can see them at night and are often deceived by their own ability to see oncoming headlights. Street lighting should be provided at a consistent level along the corridor and at pedestrian crossing locations (signalized intersections) should be supplemented with brighter and/or additional lighting.

Traditionally, intersections and crosswalks were lit by lights placed over the actual intersection (Figure 38), but recent research has shown that to achieve the optimal illumination for a driver to detect a pedestrian in a crosswalk, the lights should be placed before the crosswalk on approach to the intersection (Figure 39). Also, to promote a safe and comfortable pedestrian environment, sidewalks should be well-lit, and pedestrian-level lighting should be considered for locations with a higher level of pedestrian activity.

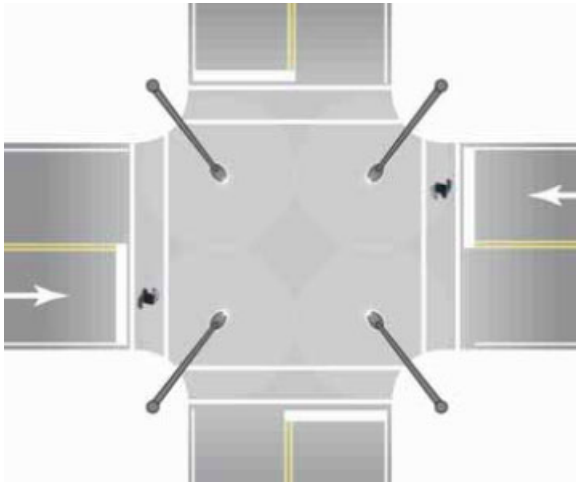


Figure 38: Traditional Intersection Lighting Design

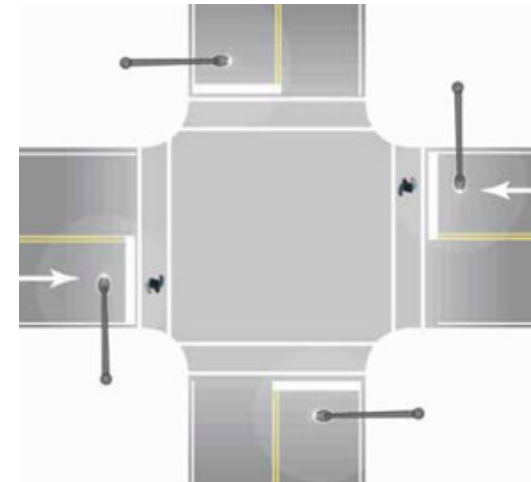


Figure 39: New Intersection Lighting Design

Landscaping

While not necessarily appropriate in all locations due to limited space, sightlines, and various other reasons, street landscaping can provide an enhanced street environment. Renowned urban designer Allan B. Jacobs on the topic of street landscaping said, “Given a limited budget, the most effective expenditure of funds to improve a street would probably be on trees. Moreover, for many people, trees are the most important single characteristic of a good street.” Landscaping can also be an effective way to calm traffic by creating a visual narrowing of the roadway and by changing the character of the street from a thru-route to a place that cues drivers to observe more of their surroundings. While more research is needed to develop a conclusive quantitative relationship between traffic safety and landscaping, recent research has shown that landscaping along urban arterial roads can lead to a significant decrease in crash rates, with one study finding a 46 percent decrease in crash rates along urban arterials after landscaping improvements were made.¹³ Street landscaping has been shown to improve property values and rents for not just the properties directly along the landscaped street, but also for properties up to a half-mile from the landscaped street.¹⁴ Street landscaping can also provide an enhanced pedestrian environment by providing shade and/or a physical separation between pedestrians and the vehicles on the roadway.



Some considerations do need to be taken with the installation of landscaping. Landscaping needs to adhere to rules regarding setbacks and obstructions to sight lines for both drivers and pedestrians. Low-growing shrubs should be used and any trees should be trimmed to at least 8–10 feet to ensure adequate sight lines and clearance. Maintenance is also an issue that needs to be considered from a responsibility of maintenance (who will take care of the landscaping) and from choosing plants and trees that are easily maintained and fit the character of the area. Likewise the crash-worthiness of landscape elements should be considered as well, consistent with FDOT design requirements.



A 2007 FDOT access management project added raised concrete medians to East Hillsborough Avenue, but landscaping was not included at the time. A median retrofit would be needed to provide landscaping to the existing

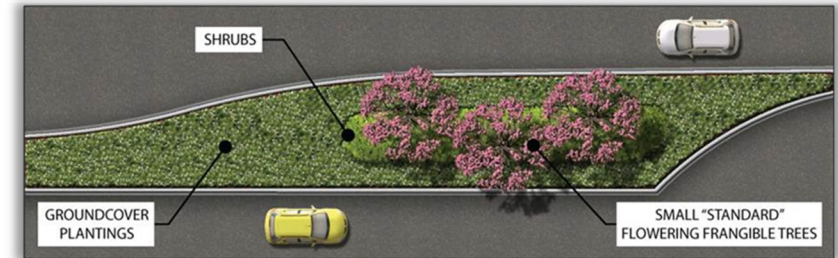
¹³ Mok, J.-H., H.C. Landphair, and J.R. Naderi, Landscape Improvement Impacts on Roadside Safety in Texas, *Landscape and Urban Planning* 78 (2006), 263-274.

¹⁴ Dixon, K. K., and K. L. Wolf. Benefits and Risks of Urban Roadside Landscape: Finding a Livable, Balanced Response. *Proceedings of the 3rd Urban Street Symposium*, 2007. Washington DC: Transportation Research Board of the National Academies of Science.

raised medians along East Hillsborough Avenue. A summary of the process to retrofit the existing concrete medians to landscaped medians is outlined below; the cost for this type of retrofit with landscaping is estimated at around \$200 per linear foot for a 14-foot-wide by 300-foot-long median.

Median retrofit process:

- Remove existing concrete slabs and curbs.
- Construct new median curbing.
- Remove any road rock or other material within the median that will harm plant growth.
- In all planting areas, remove existing soil and prepare with approved planting soil.
- Cluster plantings of trees, shrubs, and groundcover.
- Jack and bore irrigation conduits from side of road and irrigate only plant cluster areas.



In addition to median landscaping, opportunities should be sought to enhance roadside landscaping. While the existing right-of-way and sidewalk configuration limit the extent and type of landscaping that could be provided, opportunities to provide roadside landscaping should be explored and encouraged. An example of how to approach enhancing both median and roadside landscaping along East Hillsborough Avenue can be found in the City of Tampa's Streetscape Plan for the Kennedy Boulevard Overlay District.

This page intentionally left blank



SECTION 6
RECOMMENDATIONS

Section 6: Recommendations

The study provides recommendations for both specific improvements and for more general “best practice” enhancements. The timeframe for these recommendations vary for longer-term (10+ years) to shorter-term projects, some of which may be implementable almost immediately. One important note is that the while work in the field was conducted as part of this study; this work was done primarily to collect data and identify potential “fatal” flaws that would prohibit the type of improvements that are being recommended. It is suggested that necessary engineering, survey, and/or design work be completed prior to commencing the recommended enhancements identified in this document.

The recommendations have been organized into three categories: short-term, mid-term, and longer-term. A summary of the recommendations is provided on the following pages. Following the general recommendations is a series of graphics and tables that discuss many of the site specific recommendations. The provided graphics are for illustrative purposes only and are not necessarily to scale or design standard; they are intended only to provide a graphical representation of some of the recommended strategies.

Short-Term Recommendations (0–3 years)

Pavement Markings (Crosswalks)

Enhance existing crosswalks at the I-275 Interchange, Nebraska Avenue, and 15th Street to high-emphasis (ladder) crosswalks. Provide high-emphasis crosswalks across all side streets along East Hillsborough Avenue. Consider supplementing the marked crossings with appropriate signage (R10-15, W11-2, W11-15, or R1-5).

Speed Limit

If enforceable, reducing the speed limit on East Hillsborough Avenue between 34th Street and 50th Street to 40 mph could reduce the incidence and severity of crashes; however, preliminary analysis using the FHWA USLIMITS2 tool does not support reducing the speed limit in this section. Other short and mid-term recommendations related to signal timing, phasing, and introduction of additional signalized intersections and/or marked, enhanced, mid-block crosswalks may affect travel speeds in the corridor and therefore speeds should be monitored to determine if reducing the speed limit is justified in the future. In the interim, enhanced enforcement activity is recommended, especially at night and during off-peak periods to control drivers exceeding 50 mph.

Signalized Intersections

Complete a detailed signal timing/phasing review to determine appropriate signal timing parameters with the goal of balancing intersection capacity with the following objectives to enhance the safety of pedestrians and motorists:

- Consider the benefits of reduced cycle lengths to provide for more compact “platoons,” thereby providing better/larger “gaps” in traffic for pedestrian crossings and vehicles entering or crossing East Hillsborough Avenue side streets or driveways. This may be accomplished more readily off-peak.
- Consider providing for protected-only left turn phasing during saturated conditions or when a conflicting pedestrian call has been registered. This can be accomplished by retrofitting 5-section signal heads with separate 3-section heads for thru movements and 4-section “flashing-yellow arrow” signal heads to control left turn movements.
- Consider providing no-right-turn-on-red LED signs to prohibit this movement when a conflicting pedestrian call has been registered by the signal controller.
- Consider initiating a leading pedestrian interval when the pedestrian push-button is activated; this would provide pedestrians with a few second head start before parallel traffic is provided with a green light.
- Consider activating the north-south pedestrian signals automatically in locations where the pedestrian interval is less than the thru-green interval.

Area-Wide Master Plan

Develop an area-wide master plan for the East Hillsborough Avenue corridor and surrounding areas. The master plan should look to build-upon and expand the past and recent planning effort in the area, including the East Tampa CRA and InVision Tampa. The area-wide master plan should look to establish a cohesive land use and transportation vision for the entire corridor and identify potential future connections (street, bicycle trails, etc.) that could help to strengthen the existing street grid.

Lighting

Enhance intersection lighting with an emphasis on providing enhanced crosswalk lighting. Consider enhancing overall corridor lighting and lighting within the first block of East Hillsborough Avenue along all side streets. Evaluate the feasibility of providing pedestrian-scale lighting along the corridor (see Streetscape Plan recommendation). This recommendation is consistent with the District’s initiative to improve lighting in high-crash corridors and the City of Tampa’s Bright Lights, Safe Nights program street lighting enhancement program.

Bicycle Facilities

Consider designating either Comanche Avenue or Mohawk Avenue to the north and either Giddens Avenue or Frierson Avenue to the south as parallel bicycle routes to East Hillsborough Avenue. Monitor traffic volumes along these roadways and evaluate their potential as bicycle boulevards and the potential need for some form of traffic calming (e.g., speed cushions, partial diverters, traffic circles, etc.). Currently, there is not sufficient right of way along East Hillsborough Avenue to provide either on-street or off-street bicycle facilities; continue to monitor bicycle traffic along East Hillsborough Avenue and consider providing a facility along East Hillsborough Avenue if the opportunity exists in the future.

Mid-Term Recommendations (0–5 years)

Provide Increased Crossing Opportunities

One of the main objectives of the East Hillsborough Avenue Corridor Study is to reduce the distance between designated pedestrian crossings to no more than one quarter mile. Currently the only designated pedestrian crossings between Nebraska Avenue and 50th Street are at signalized intersections which are spaced an average distance of approximately 2,860 feet (more than one half mile). Preliminary analysis suggests that the following locations may meet the necessary warrant for either a signalized intersection or a marked mid-block crossing with supplemental warning devices:

- East Hillsborough Avenue at 11th Street/12th Street (mid-block)
- East Hillsborough Avenue at East Gate Plaza/Meridian Pointe Apartment entrance (signal/mid-block)
- East Hillsborough Avenue at 32nd Street (mid-block)
- East Hillsborough Avenue at 37th Street (mid-block)
- East Hillsborough Avenue at 43rd Street (mid-block)
- East Hillsborough Avenue at 47th Street (signal/mid-block)

Locations that fail to meet necessary criteria (established in the FDOT Traffic Engineering Manual, Chapter 3.8) should be monitored for future consideration:

Side Streets

Enhance the connections to East Hillsborough Avenue by providing sidewalks (minimum 5 feet) or defined walkway along both sides of all streets that connect to East Hillsborough Avenue through at least the first block, where feasible. Consider providing an enhanced cross-section along the signalized cross-streets (15th Street, 19th Street [future], 22nd Street, 30th Street, and 34th Street). These enhancements could include raised (landscaped) medians, dedicated turn lanes, bus bays, sidewalks, bicycle lanes, multi-use trails, curb and gutter, lighting, landscaping, drainage improvements, signing, pavement markings, bulb-outs, and traffic calming.



22nd Street South of M.L. King Boulevard

Landscaping

Consider retrofitting the existing paved medians along East Hillsborough Avenue to accommodate median landscaping. Explore the opportunity to apply xeriscaping principles along with low maintenance materials. Explore opportunities to provide enhanced landscaping along the sides of East Hillsborough Avenue (see the Streetscape Plan recommendation); due to the limited right-of-way along the corridor, this opportunity may be limited, but opportunities to improve the streetscape may exist during the development/redevelopment of sites along the corridor.

Enhanced Pedestrian Environment

Provide an enhanced pedestrian environment by better defining the sidewalk zones within the existing sidewalks, improving landscaping, and removing/relocating (where possible) potential impediments within the sidewalk (see the Streetscape Plan recommendation). Consider the use of brick inlays within the sidewalk to help define the sidewalk zones and provide a more aesthetically pleasing pedestrian environment. Level and well-defined sidewalk should be maintained through all driveways along the corridor.

Transit

Continue to work with HART to identify opportunities to enhance and/or relocate existing bus stops. In general, bus stops should be placed as close as possible to controlled crossings (signalized intersections or marked mid-block crossings) and be in close proximity to adequate lighting. Implementation of the planned HART East-West MetroRapid route should provide an ideal opportunity to assess existing and future stop locations and operations along the corridor.

Streetscape Plan

Consider developing a streetscape plan for East Hillsborough Avenue as a tool to incorporate uniform and enhanced sidewalks, lighting, and landscaping along the corridor. The streetscape plan should provide provisions that are pedestrian-, bicycle-, and transit-friendly and ensure that all types of new infill development, major renovations, and additions create a sense of interest and promote a physically-attractive, functionally-integrated environment along the corridor. A similar plan was developed by the City of Tampa as part of the Kennedy Boulevard Overlay District. Figure 40 provides a conceptual rendering of what East Hillsborough Avenue could look like with an enhanced streetscape.

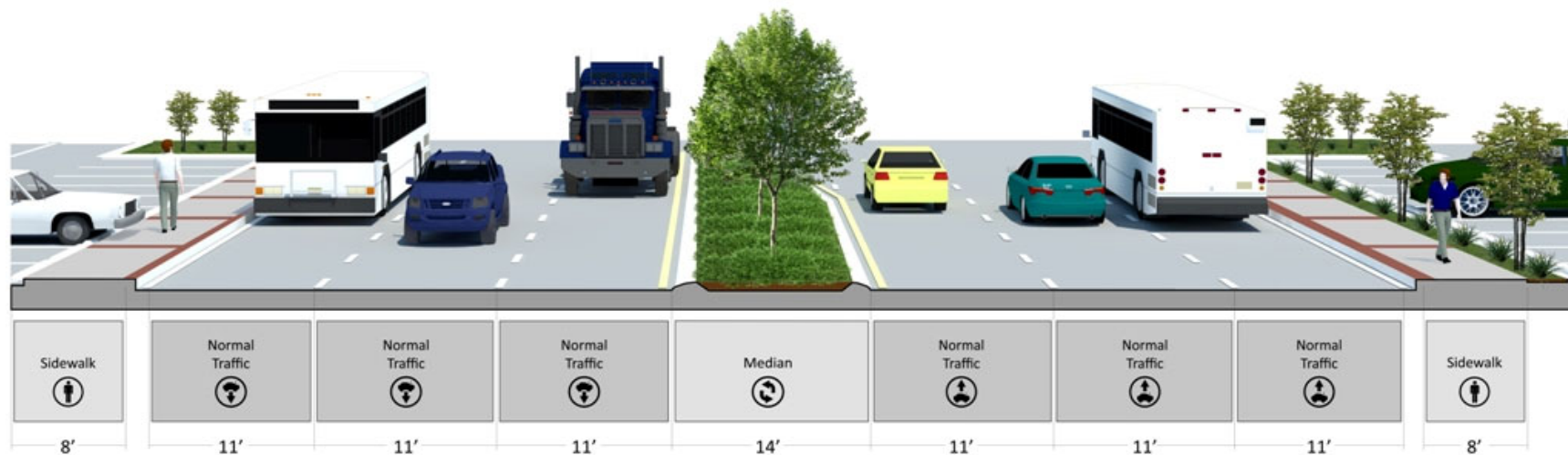


Figure 40: East Hillsborough Avenue, Conceptual Cross-Section with Streetscape Enhancements

Land Use/Zoning/Land Development Code

Consider making any necessary changes within the existing land use plan, zoning, and/or land development code to address the recommendations within this document. Build upon the recommendations from the InVision Tampa Plan, and as fit, apply the InVision recommendations for East Hillsborough Avenue between Nebraska Avenue and 22nd Street to the entire corridor. Evaluate the existing plans and codes as to how they address site-access and parking requirements along the corridor, with a goal of reducing the number of driveways along East Hillsborough Avenue by encouraging shared-use driveways and/or side/rear-access. The current driveway density (driveways per mile, both sides) of East Hillsborough Avenue is approximately 50 driveways per mile; consider setting a longer-term goal to reduce the driveway density along East Hillsborough Avenue to 20–30 driveways per mile.

Longer-Term Recommendations (5+ years)

Establish Future Street Grid Connections

One of the objectives of the recommended area-wide master plan should be to identify potential future connections (street, bicycle trails, etc.) that could help to strengthen the existing street grid. Whenever possible, the City should look to maintain, acquire, or develop right-of-way to establish any of the connections identified within the area-wide master plan.

I-275 Interchange

Field observation and comments from the public indicate that one of the most congested areas along the East Hillsborough Avenue corridor is the I-275 interchange. This interchange is also challenging for pedestrians because of higher-speed free-flow right turn movements including the eastbound to southbound and westbound to northbound on ramps as well as the northbound to westbound off-ramp. Sign, pavement marking, lighting, and signalization modifications discussed as part of short and mid-term recommendations can help to mitigate some of the pedestrian conflicts, but do not address the underlying geometric issues that contribute to congestion at this intersection.

Longer-term, there may be opportunities to modify the design of the I-275/East Hillsborough Avenue interchange to reduce peak hour congestion along Hillsborough Avenue while also increasing safety along Hillsborough Avenue by eliminating free-flow merge movements. The graphic on the left of Figure 41 shows part of the I-275 interchange as it is today and serves as context to describe the following issues:

- The northbound to westbound off-ramp is a high-speed free-flow design. The result is a pedestrian conflict at Point #1 and a merge conflict at Point #2 (since the receiving lane terminates into a right-turn drop at Central Avenue to the immediate west of the interchange).
- The eastbound to northbound on-ramp is not signalized at Point #3. Although the nearby signal at Nebraska Avenue helps to provide gaps for traffic turning left from East Hillsborough Avenue onto I-275 north, the southbound right-turn movement from Nebraska Avenue onto westbound Hillsborough Avenue conflicts with the uncontrolled westbound to northbound left turn movement. This results in the left turn



queue spilling back into the inside thru-lane (Point 4) which in turn results in the inside thru lane serving as a de facto left turn lane through the southbound ramp intersection and to the west past Central Avenue. Because of this, the outside thru lane on the 4-lane section of West Hillsborough Avenue (west of Central Avenue) is made to handle all eastbound (thru) and southbound (right-turn) traffic and can back-up to the intersection at Florida Avenue.

- In the westbound direction, the left turn storage is not sufficient to handle the queue of traffic attempting to travel south on I-275. This condition is most apparent in the AM peak period and results in blockage of the inside thru lane.

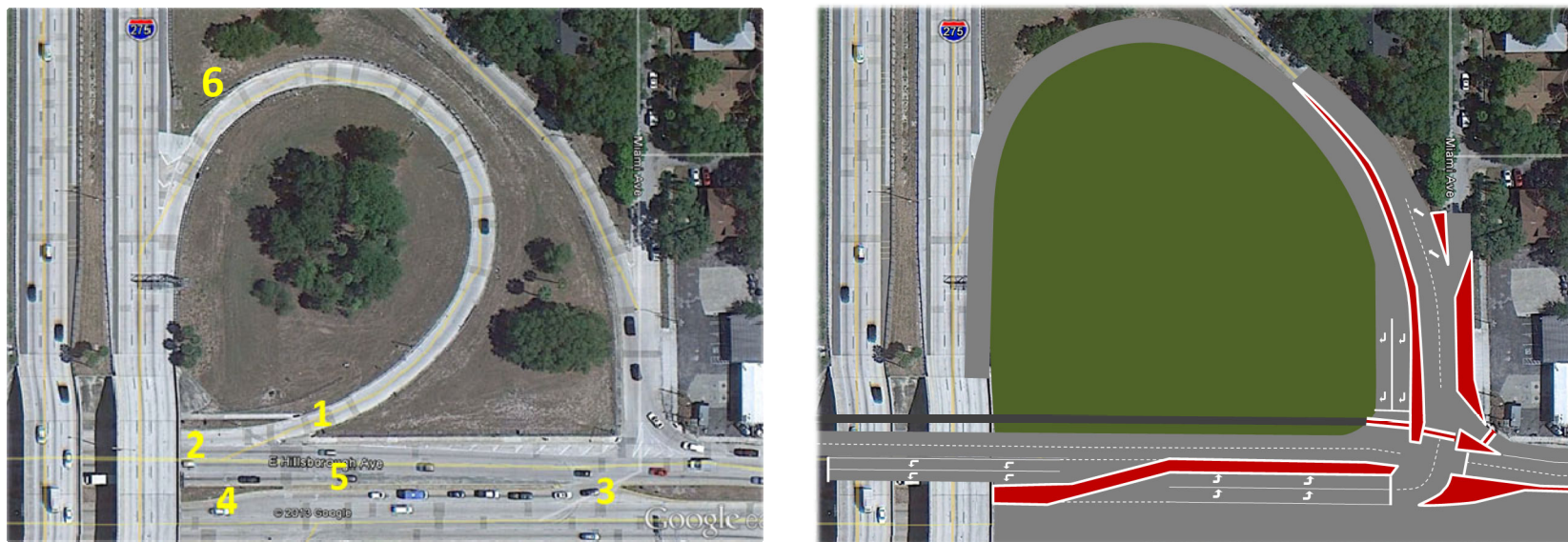


Figure 41: I-275 Interchange Existing Issues and Potential Design Options

The graphic on the right of Figure 41 shows one potential design option that, if feasible, could correct the issues described above. In this design alternative, the free-flow northbound to westbound off ramp and corresponding un-signalized eastbound to northbound on-ramp is replaced by a signal controlled intersection that provides for dual right turns for the off-ramp and dual left turns for both the eastbound to northbound on-ramp and the westbound to southbound on-ramp. The additional cross-section necessary for the dual left turn lanes is provided by harvesting the space currently occupied by the receiving lane for the northbound to westbound free-flow off-ramp.

Additionally, it should be noted that the condition of the guardrail and chevron signs along the subject ramp (point 6) suggest a potential lane-departure crash problem—though many of these crashes may be property-damage-only and therefore not captured in the Department’s crash

database. This apparent issue could be mitigated by increasing the radius of the off-ramp and extending the northbound deceleration lane as suggested in the above design option. In the short term, enhanced curve delineation and warning signage may be considered.

Significant additional analysis beyond the scope of this study is necessary to determine if such a design alternative is feasible and to what extent resolving congestion and pedestrian mobility issues along East Hillsborough Avenue would impact the function of the I-275 main line. Some design/traffic and feasibility issues to be evaluated before this concept could be considered for FHWA approval and funding include:

- The extent to which the proposed design can provide for adequate queuing of northbound to westbound traffic (and whether additional widening of the overpass would be necessary to extend the off-ramp deceleration and storage capacity).
- The extent to which widening of the northbound and southbound on-ramps would be necessary to accommodate merging of the dual left turn lanes into a single ramp lane.
- Adequacy of turning radii for the proposed dual left-turn eastbound to northbound on-ramp and for the proposed dual right-turn northbound to westbound off-ramp.
- Coordination of the proposed I-275 northbound signal with the nearby signal at Nebraska Avenue.
- Consideration of ramp metering to mitigate the impact of the additional northbound and southbound on-ramp capacity on traffic flows on the I-275 main line.
- Consideration of the extent to which the proposed northbound to westbound off-ramp could be constructed without temporarily closing the existing ramp.

Lane Conversion

Because of right-of-way constraints, East Hillsborough Avenue is subject to many design compromises. Table 11 lists some of the roadway's geometric/design issues and summarizes corresponding safety/mobility consequences:

Table 11: East Hillsborough Avenue Geometric Constraints and Safety/Mobility Consequences

Design Constraint	Safety/Mobility Consequence			
	Vehicle Crash Risk	Effective Utilization of Thru Lanes	Turning Vehicle/Pedestrian Conflict	Bicycle & Pedestrian Facilities
No auxillary right turn lanes at signalized intersections	Increases potential of rear-end and sideswipe crashes	Increases friction - outside lane used as defacto right turn lane	Pressure to "get out of the way" may reduce yield to pedestrian compliance	NA
No dual left turn lanes at Nebraska Avenue	Increases potential of left turn crashes (during perm. phase)	Decreases intersection capacity	Limits ability to apply protected-only phases	NA
Tight right turn radii	Increases potential of rear-end, sideswipe, and right turn crashes	Increases friction	Advantage for pedestrians along sidewalks	ADA ramps more difficult
No bike lanes	Increases potential of rear-end, sideswipe, and right turn crashes	Increases friction (in the event cyclists choose to "take" outside lane)	NA	No bike facilities; decreases bicycle and pedestrian Q/LOS
No landscape buffer	NA	NA	NA	Decreases pedestrian Q/LOS
No bus bays	Increases potential of rear-end and sideswipe crashes	Increases friction	NA	NA

The net effect of these design constraints is that East Hillsborough Avenue does not provide the same through-put, multimodal accommodation, or overall safety performance as would be expected from a modern six-lane divided arterial. While it is not likely to be cost-feasible to acquire the necessary right-of-way to correct these design deficiencies, implementing a lane conversion to reduce the number of general-purpose lanes from six lanes to four lanes could address many of these issues within the current roadway profile. Additionally, a four-lane typical section would reduce the risk to pedestrians crossing at un-signalized locations and would help to manage off-peak speeds.

Regardless of how attractive a lane-conversion scenario appears from a multi-modal mobility and traffic safety perspective, the impact of such a strategy on the regional transportation system in both current and future conditions is an important consideration. Under existing traffic demands, a cursory review of signalized intersection level-of-service suggests that East Hillsborough Avenue has the potential to function adequately (LOS "D" or "E") with only 4 through lanes between Nebraska Avenue and 40th Street. This assumes that right-turn lanes are provided at signalized intersections and a right/through lane is preserved at Nebraska Avenue in the westbound direction.

In most future travel demand scenarios, East Hillsborough Avenue exhibits LOS “F” as a six-lane roadway and would therefore exhibit a worse LOS as a four-lane roadway. However, the actual future traffic volumes likely to be experienced by the section of East Hillsborough Avenue between Nebraska Avenue and 40th Street is potentially overstated since these intersections are effectively “built-out” and will serve to “meter” the flow through the subject corridor.

In both the existing and future scenarios, the role of East Hillsborough Avenue as a regional thoroughfare and as a reliever to portions of the area’s freeway system should be better understood. In addition to use of the regional travel demand model to perform “select-link” analysis, use of Bluetooth and other emerging origin-destination analysis tools should be considered to better understand the extent to which East Hillsborough Avenue is used for regional trip-making (e.g. trips that extend from I-4 to beyond the Veterans Expressway) and how trip characteristics along East Hillsborough Avenue correspond with (and may relieve) congestion levels on the interstate system.

Based on these analyses, the potential of ongoing, planned, and potential enhancements of the area’s freeway system to reduce the importance of East Hillsborough Avenue as a regional thoroughfare and “reliever” facility can be better understood. These include completion of I-275 widening from the Hillsborough River to SR-60, completion of the SR-60 interchange, eventual build-out of the downtown interchange, and potential construction of managed lanes projects along I-4 and both legs of I-275. As these projects are constructed or become programmed within the MPO’s cost-affordable plan and as the Department’s lane conversion and context-sensitive design policies continue to be refined, the potential for a lane conversion along East Hillsborough Avenue should be considered.

Two potential lane conversion options are shown in Figure 42 and Figure 43 below. Figure 42 shows a “paint-only” option which provides bus bays, shared right-turn/bike lanes at signalized intersections, and bicycle lanes throughout. Figure 43 adds landscape improvements in the median and curb bulb-outs. Both scenarios could incorporate right-turn lane bus queue-jump features at the signalized intersections if desired.

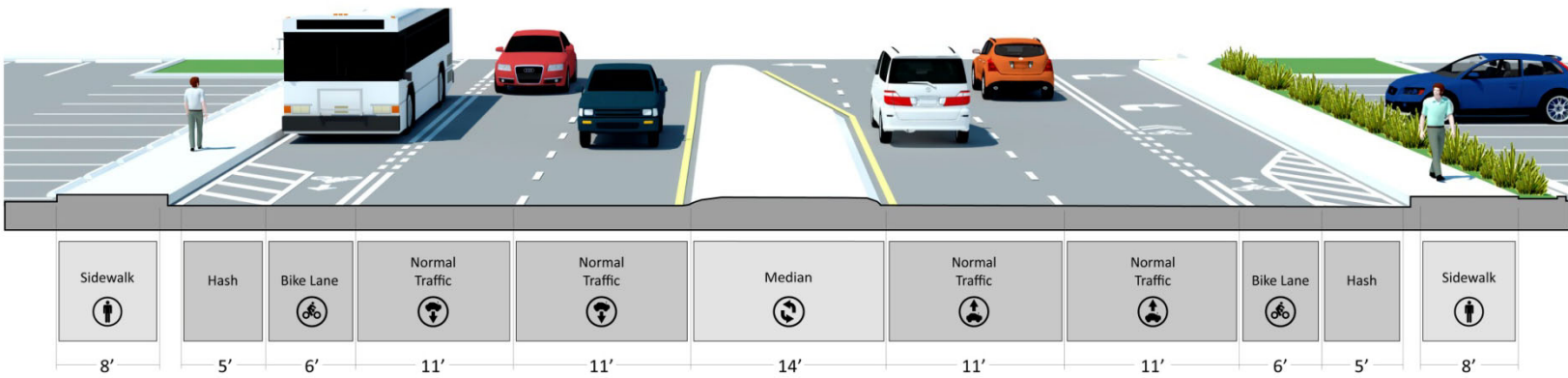


Figure 42: Conceptual Lane Conversion Design Option 1

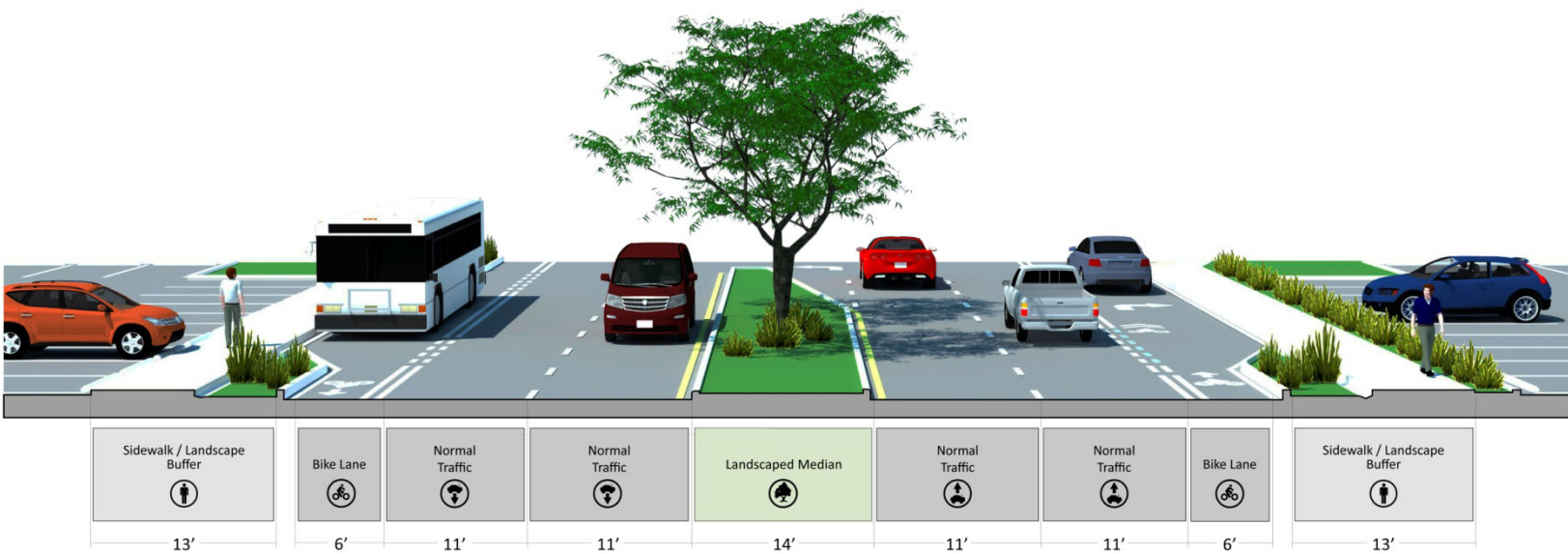


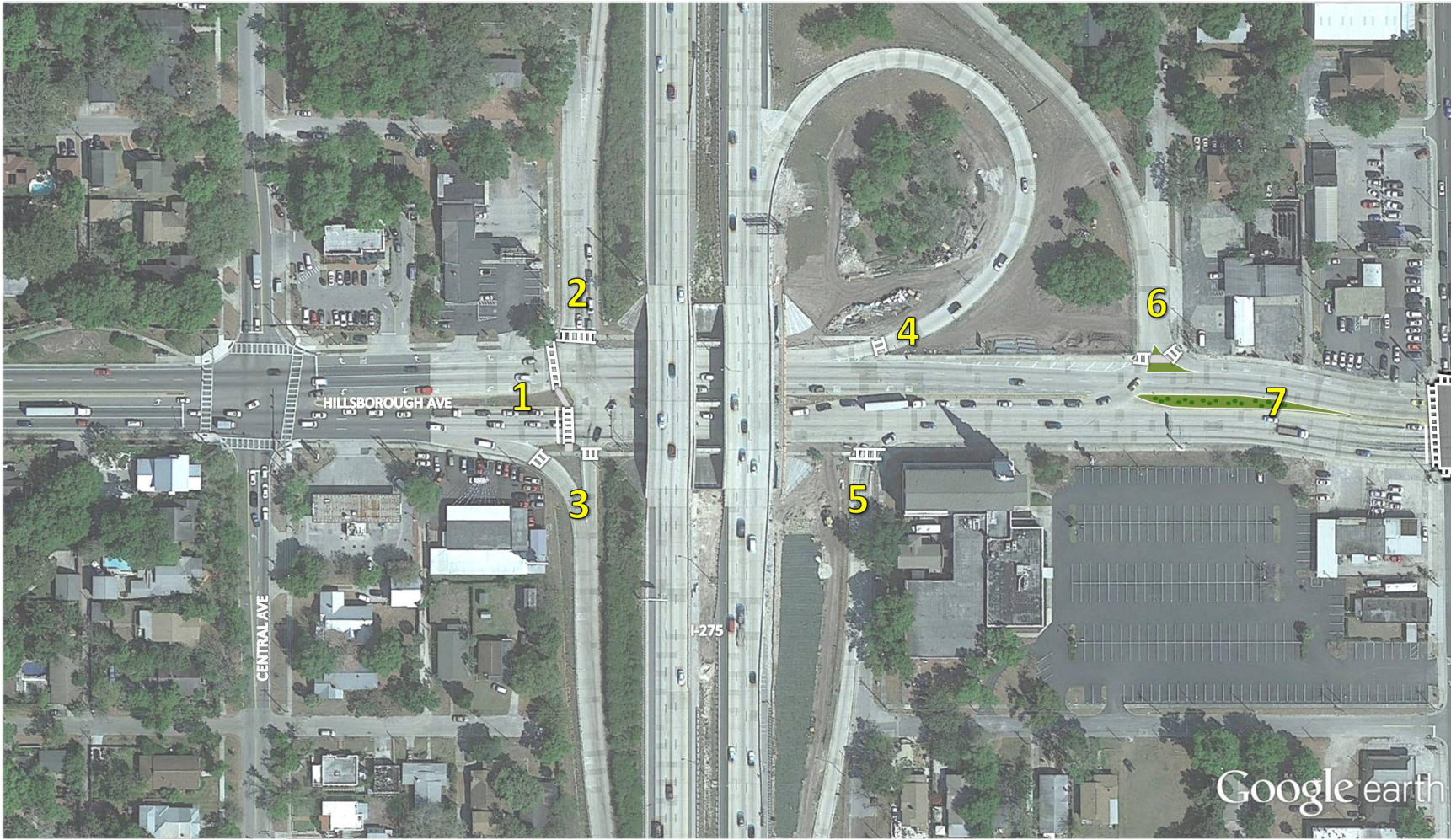
Figure 43: Conceptual Lane Conversion Design Option 2

Site Specific Recommendations and Conceptual Illustrations

The graphics and tables on the following pages are provided to help in the visualization of the study's short and mid-term recommendations. The graphics are for illustrative purposes only and are not intended to be actual representations of the recommendations. On the other hand, the recommendations in the tables are site-specific and should be considered as described. Note that these are planning-level recommendations, meaning that they have been developed using available data sources and the data collected as part of this study, and while an attempt was made to identify any potential "fatal flaws," it is important that these recommendations go through the necessary and appropriate design and engineering reviews and stages. The corridor and the site specific recommendations are shown within 14 sections along the corridor; these sections are:

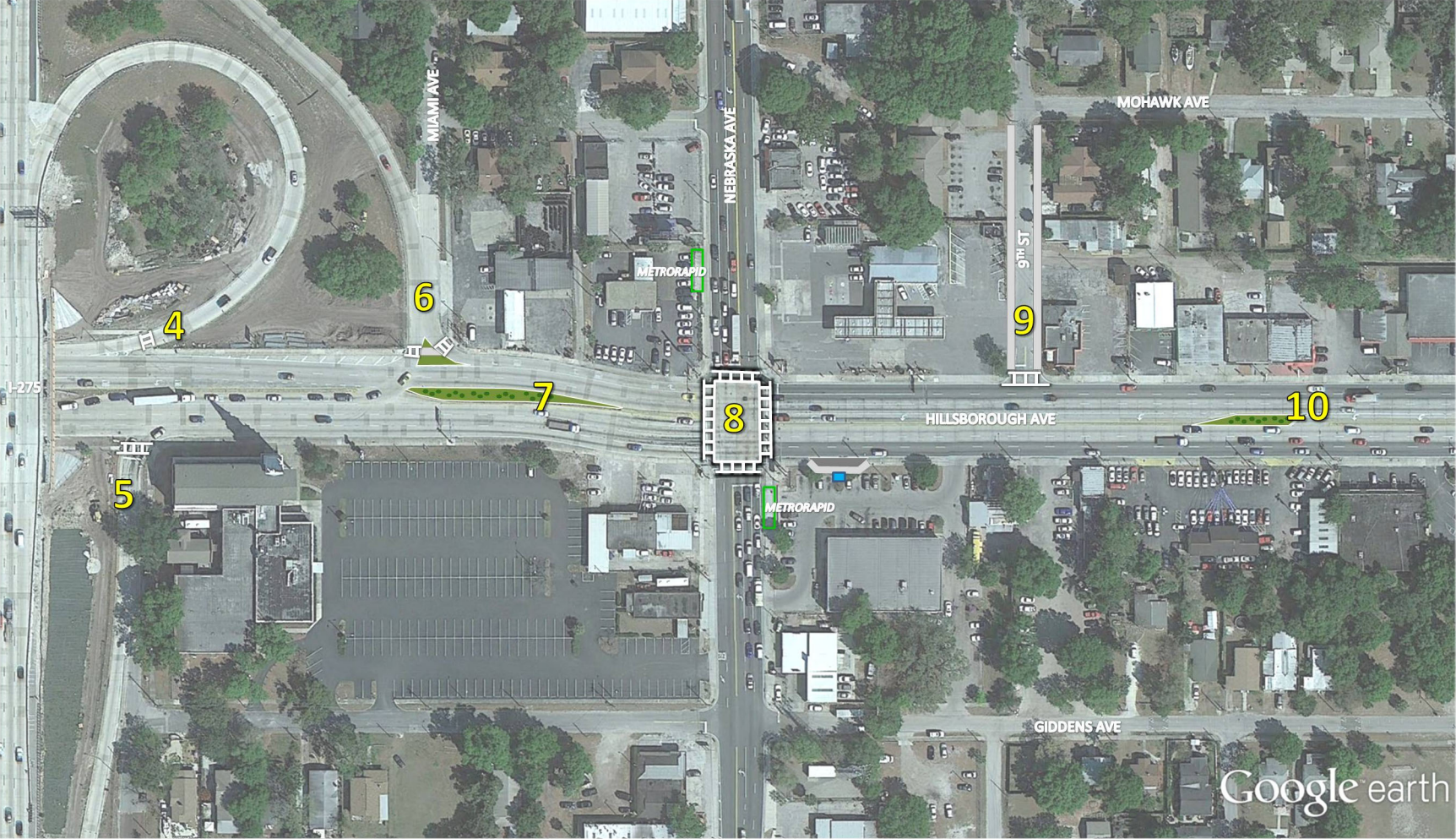
1. Central Avenue to Nebraska Avenue
2. Nebraska Avenue to 10th Street
3. 10th Street to 13th Street
4. 13th Street to 17th Street
5. 17th Street to 20th Street
6. 20th Street to 22nd Street
7. 22nd Street to Railroad Tracks
8. Railroad Tracks to 30th Street
9. 30th Street to 34th Street
10. 34th Street to 37th Street
11. 37th Street to 40th Street
12. 40th Street to 43rd Street
13. 43rd Street to 47th Street
14. 47th Street to 50th Street

1. East Hillsborough Avenue, Central Avenue to Nebraska Avenue



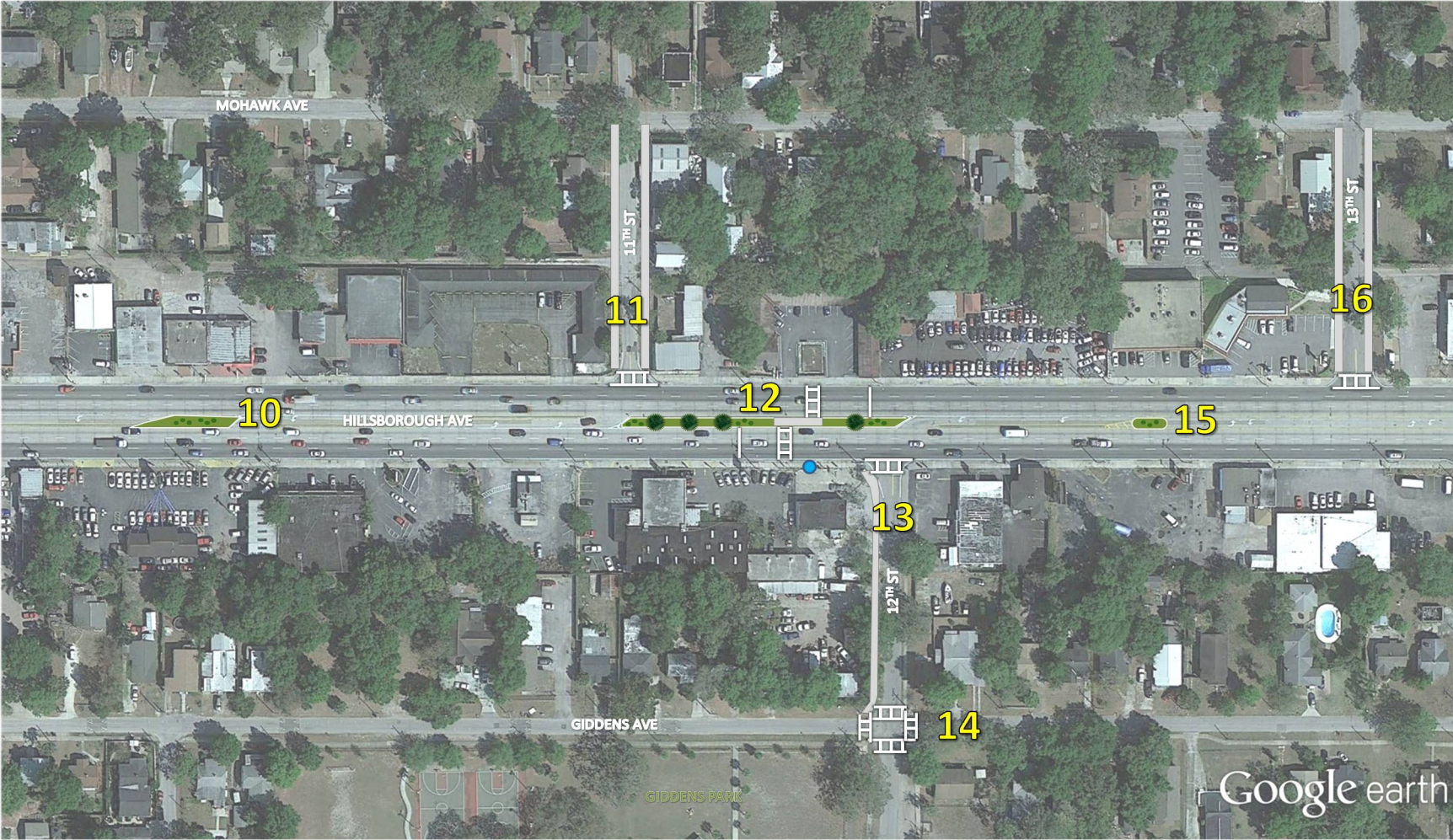
Project ID	Location	Recommendation
1	Hillsborough Ave at I-275 Southbound Ramps	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across Hillsborough Ave • Move the eastbound stop bar back to accommodate the marked crosswalk • Provide signage
2	Hillsborough Ave at I-275 Southbound Off Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Move stop bar back to accommodate the marked crosswalk • Enhance lighting
3	Hillsborough Ave at I-275 Southbound On Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalks across the right-turn and left-turn access lanes • Enhance lighting • Provide signage
4	Hillsborough Ave at I-275 Northbound Westbound Off Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Provide signage
5	Hillsborough Ave at I-275 Northbound Eastbound Off Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Provide signage
6	Hillsborough Ave at I-275 Northbound On Ramp	<ul style="list-style-type: none"> • Consider replacing the painted island with raised island • Install High-Emphasis Crosswalk • Enhance lighting • Provide signage
7	Eastbound Hillsborough Ave left-turn lane at Nebraska Ave	<ul style="list-style-type: none"> • Consider extending the left-turn lane approximately 100' • Consider providing enhanced landscaping to remaining raised median

2. East Hillsborough Avenue, Nebraska Avenue to 10th Street



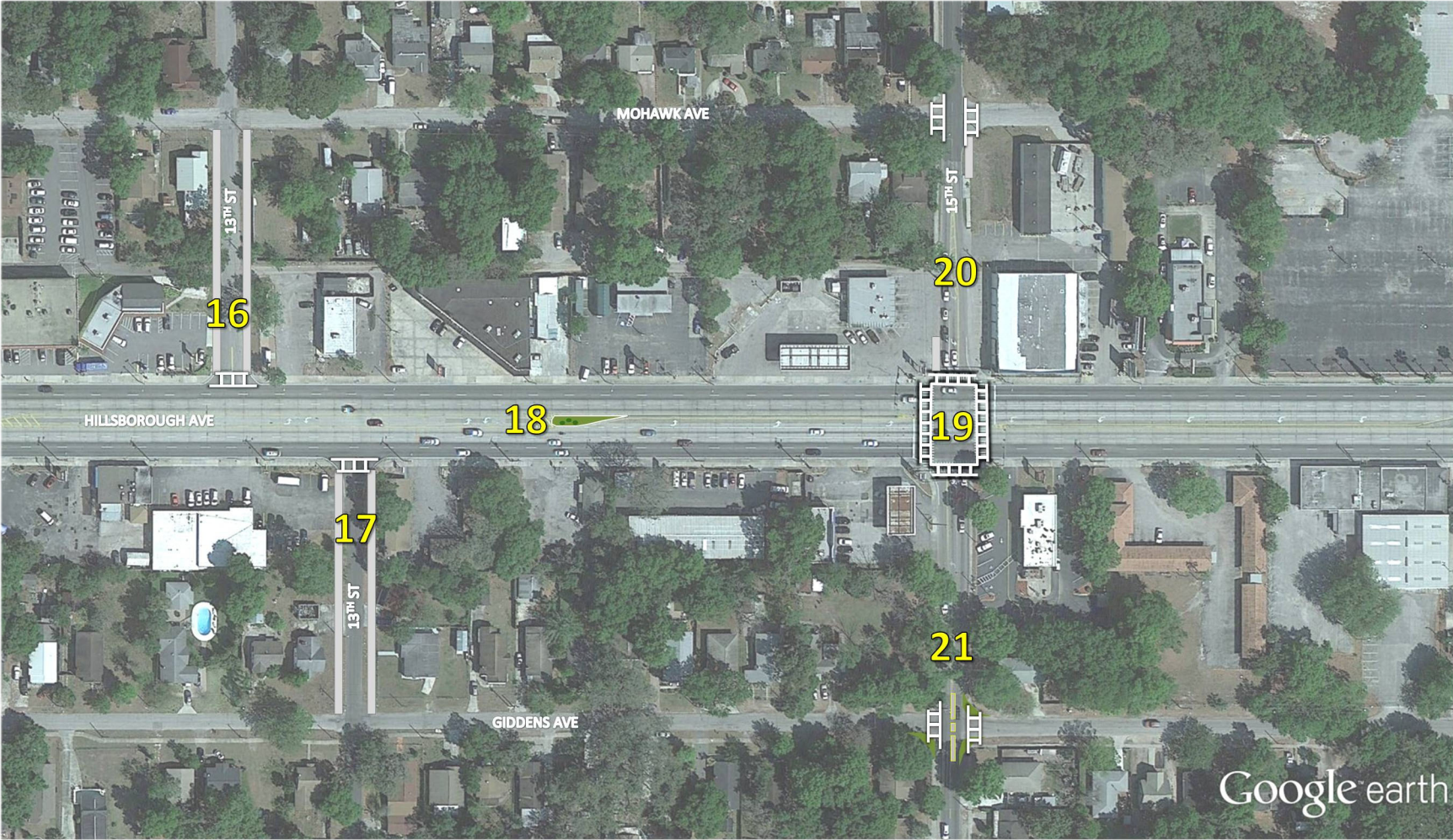
Project ID	Location	Recommendation
8	Hillsborough Ave at Nebraska Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Consider "No Right-Turn On Red" during the pedestrian phase • Consider providing a Leading Pedestrian Interval during the pedestrian phase • Consider providing a bus bay east of Nebraska Ave (south side)
9	Hillsborough Ave at 9th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 9th St at Hillsborough Ave • Provide signage • Install sidewalks along both sides of 9th St from Hillsborough Ave to Mohawk Ave
10	Hillsborough Ave, east of 9th St	<ul style="list-style-type: none"> • Install landscaping within the existing raised median

3. East Hillsborough Avenue, 10th Street to 13th Street



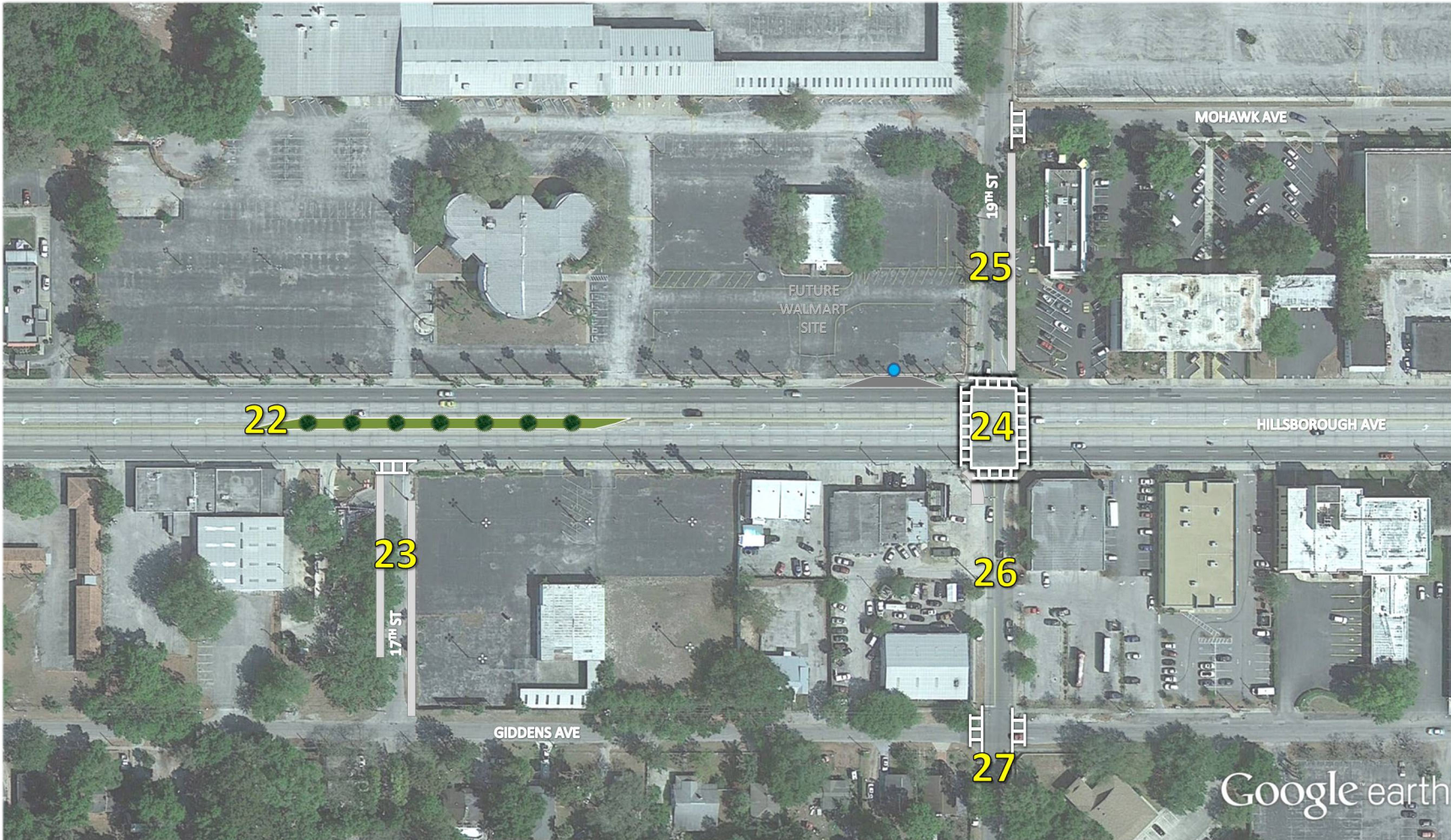
Project ID	Location	Recommendation
11	Hillsborough Ave at 11th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 11th St at Hillsborough Ave • Provide signage • Install sidewalks along both sides of 11th St from Hillsborough Ave to Mohawk Ave • Enhance lighting at the intersection
12	Hillsborough Ave, between 11th St and 12th St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider landscaping the existing raised median • Enhance lighting • Consider moving eastbound bus stop approximately 300' east to the intersection of 12th St
13	Hillsborough Ave at 12th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 12th St at Hillsborough Ave • Provide signage • Install sidewalk along the west side of 12th St to Giddens Ave
14	12th St at Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk at the intersection of 12th St and Giddens Ave
15	Hillsborough Ave, between 12th St and 13th St	<ul style="list-style-type: none"> • Consider installing a raised landscaped median island (approx. 30' long) where the westbound left turn lane begins
16	Hillsborough Ave at 13th St (N)	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 13th St at Hillsborough Ave • Provide signage • Install sidewalk along both sides of 13th St to Mohawk Ave

4. East Hillsborough Avenue, 13th Street to 17th Street



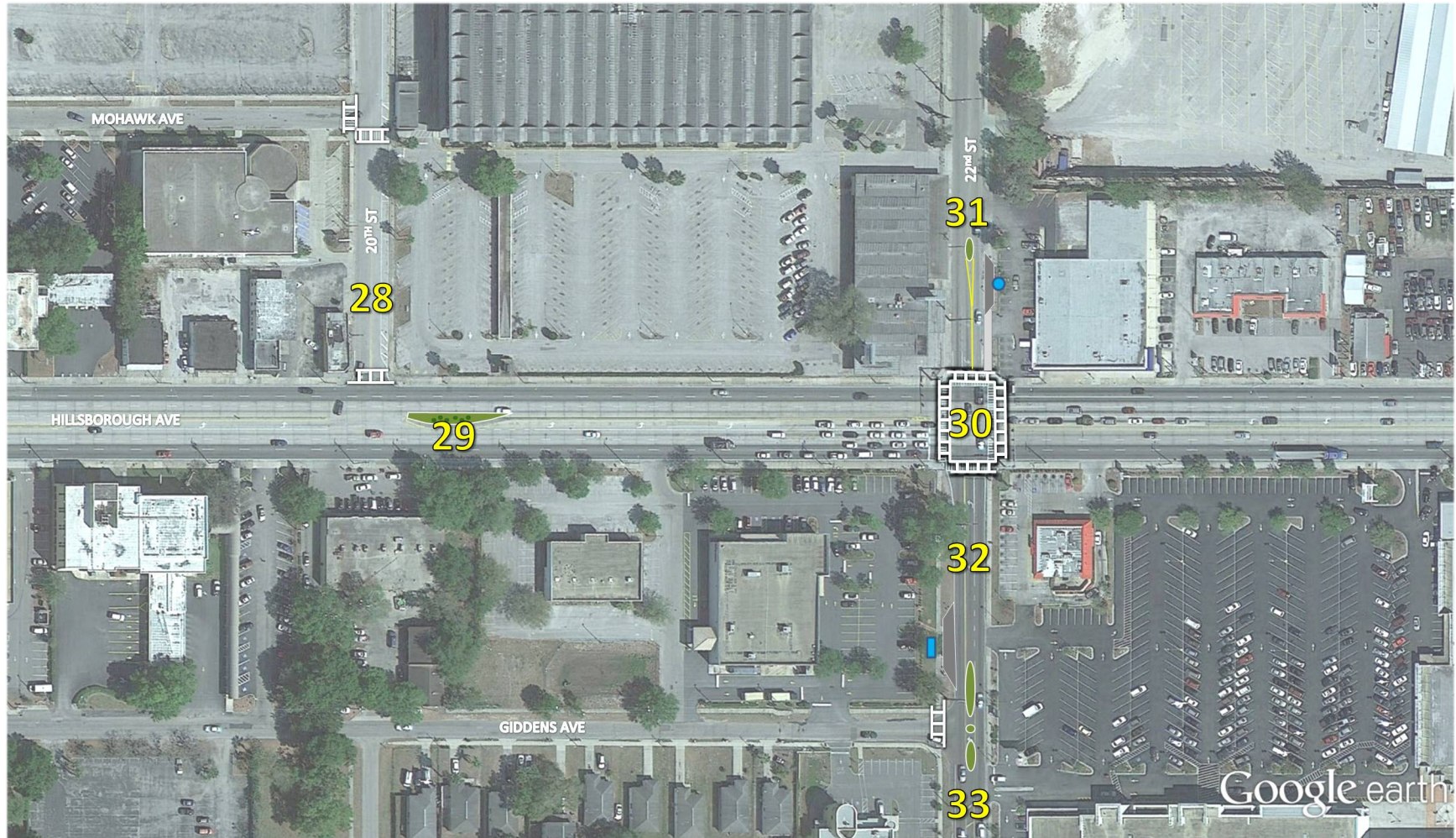
Project ID	Location	Recommendation
17	Hillsborough Ave at 13th St (S)	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 13th St at Hillsborough Ave • Provide signage • Install sidewalk along both sides of 13th St to Giddens Ave
18	Hillsborough Ave, west of 15th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median at the beginning of the eastbound left-turn lane
19	Hillsborough Ave at 15th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider converting the existing permissive only left-turn from Hillsborough Ave to a protected only phase • Consider providing a Leading Pedestrian Interval
20	15th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Complete sidewalks along both sides of 15th St from Hillsborough Ave to Mohawk Ave • Install High-Emphasis Crosswalk along 15th St at the intersection of Mohawk Ave
21	15th St at Giddens Ave	<ul style="list-style-type: none"> • Consider installing a raised median (2') traffic diverter (with bicycle slots) along 15th St • Consider providing curb extensions/bulb-outs on Giddens Ave at 15th St

5. East Hillsborough Avenue, 17th Street to 20th Street



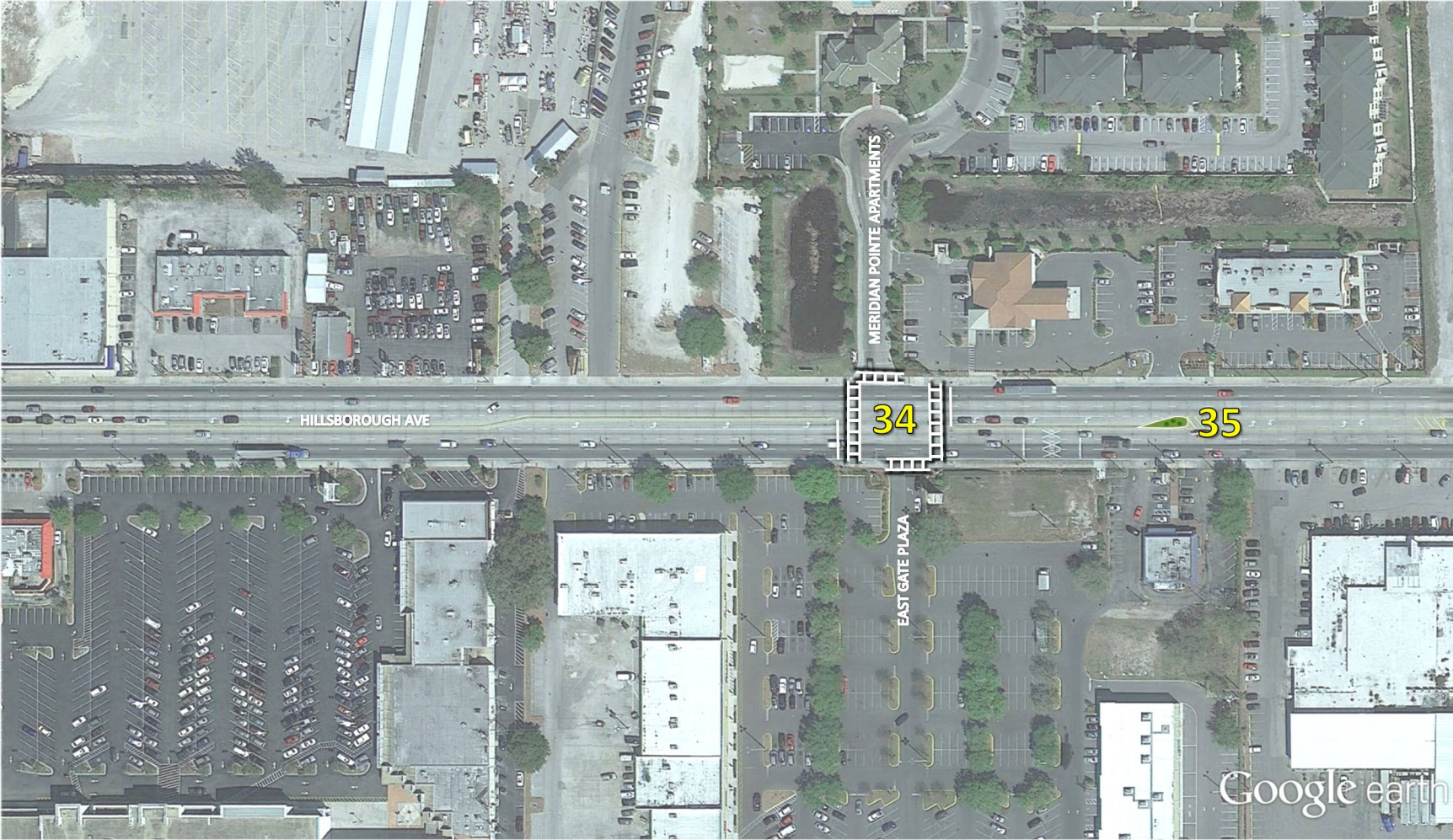
Project ID	Location	Recommendation
22	Hillsborough Ave, west of 19th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median
23	Hillsborough Ave at 17th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 17th St at Hillsborough Ave • Provide signage • Enhance lighting • Complete sidewalks along both sides of 17th St to Giddens Ave
24	Hillsborough Ave at 19th St	<ul style="list-style-type: none"> • A traffic signal is proposed in conjunction with future development of the NW quadrant of the intersection • A bus bay has also been proposed west of 19th St (north side) • Consider "No Right-Turn On Red" during pedestrian phases • Consider providing a Leading Pedestrian Interval
25	19th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Install sidewalk along the east side of 19th St • Install High-Emphasis Crosswalk along 19th St across Mohawk Ave • Provide signage • Enhance lighting
26	19th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Complete/delineate sidewalk along both sides of 19th St • Provide signage • Enhance lighting
27	19th St at Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk along both sides of 19th St at Giddens Ave • Consider providing curb-extensions/bulb-outs along Giddens Ave at 19th St

6. East Hillsborough Avenue, 20th Street to 22nd Street



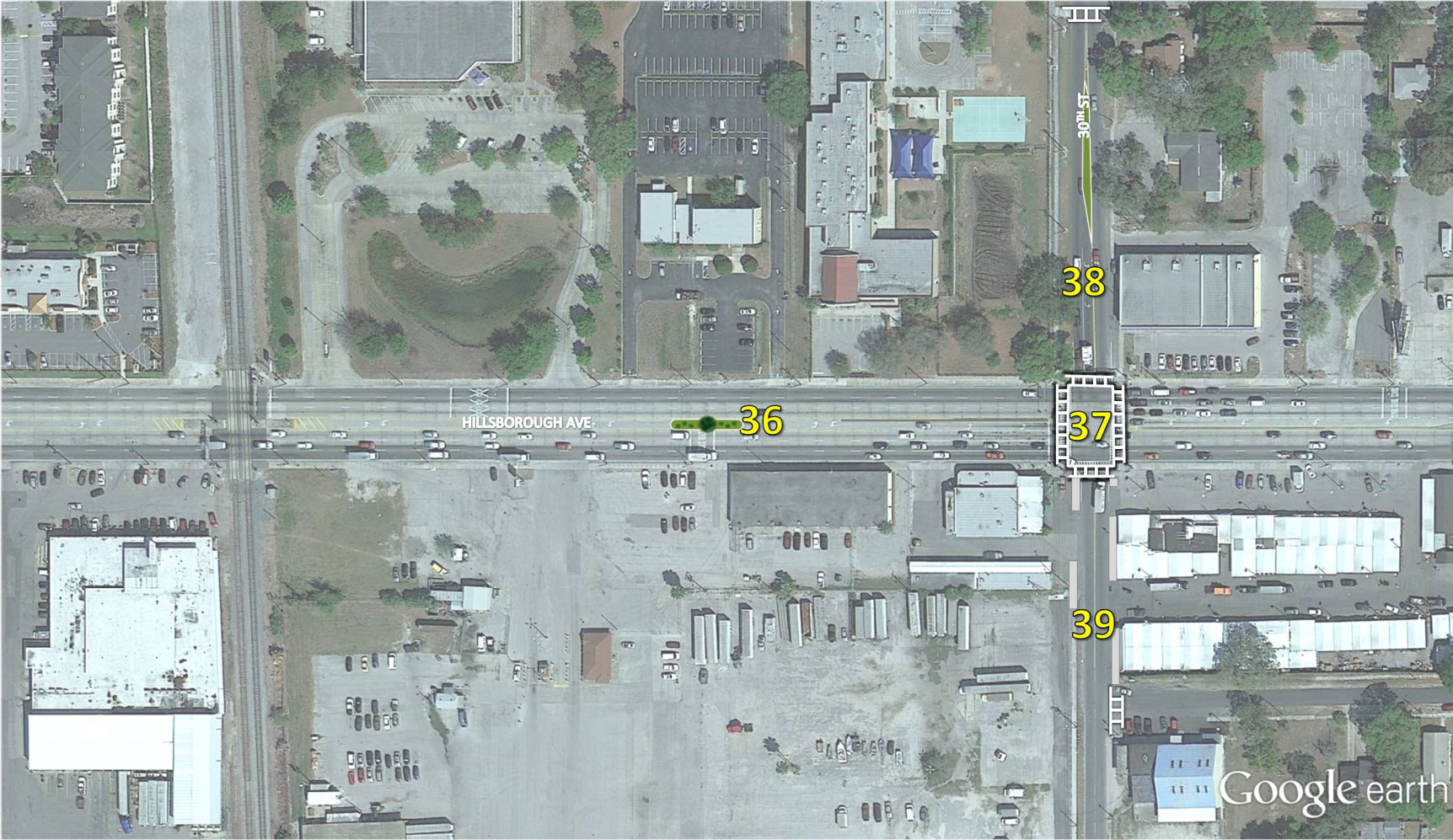
Project ID	Location	Recommendation
28	Hillsborough Ave at 20th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 20th St at Hillsborough Ave • Enhance existing marked crosswalk at 20th St and Mohawk Ave to High-Emphasis Crosswalk
29	Hillsborough Ave, west of 22nd St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median
30	Hillsborough Ave at 22nd St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider converting the Hillsborough Ave left-turn phase from protected-permissive to protected only • Consider "No Right-Turn On Red" during the pedestrian phases • Consider providing a Leading Pedestrian Interval • Consider providing a flashing yellow left-turn arrow for the permissive left-turn phase along 22nd St
31	22nd St, from Hillsborough Ave to Comanche Ave	<ul style="list-style-type: none"> • Enhance sidewalk along the eastside of 22nd St • Enhance lighting • Install a raised landscaped median (approx. 10' x 25') along 22nd St prior to the left-turn lane • Provide signage • Consider providing a bus bay along the east side of 22nd St
32	22nd St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Consider installing a raised landscaped median island prior to the beginning of the left-turn lane • Consider installing a bus bay along southbound 22nd St where existing bus shelter is located • Enhance lighting
33	22nd St at Giddens Ave	<ul style="list-style-type: none"> • Consider installing a raised landscaped median traffic diverter along 22nd St (leave channel for cyclists and pedestrians) • Consider tightening the turn radius/provide curb-extensions along Giddens Ave • Install High-Emphasis Crosswalk across Giddens Ave

7. East Hillsborough Avenue, 22nd Street to Railroad Tracks



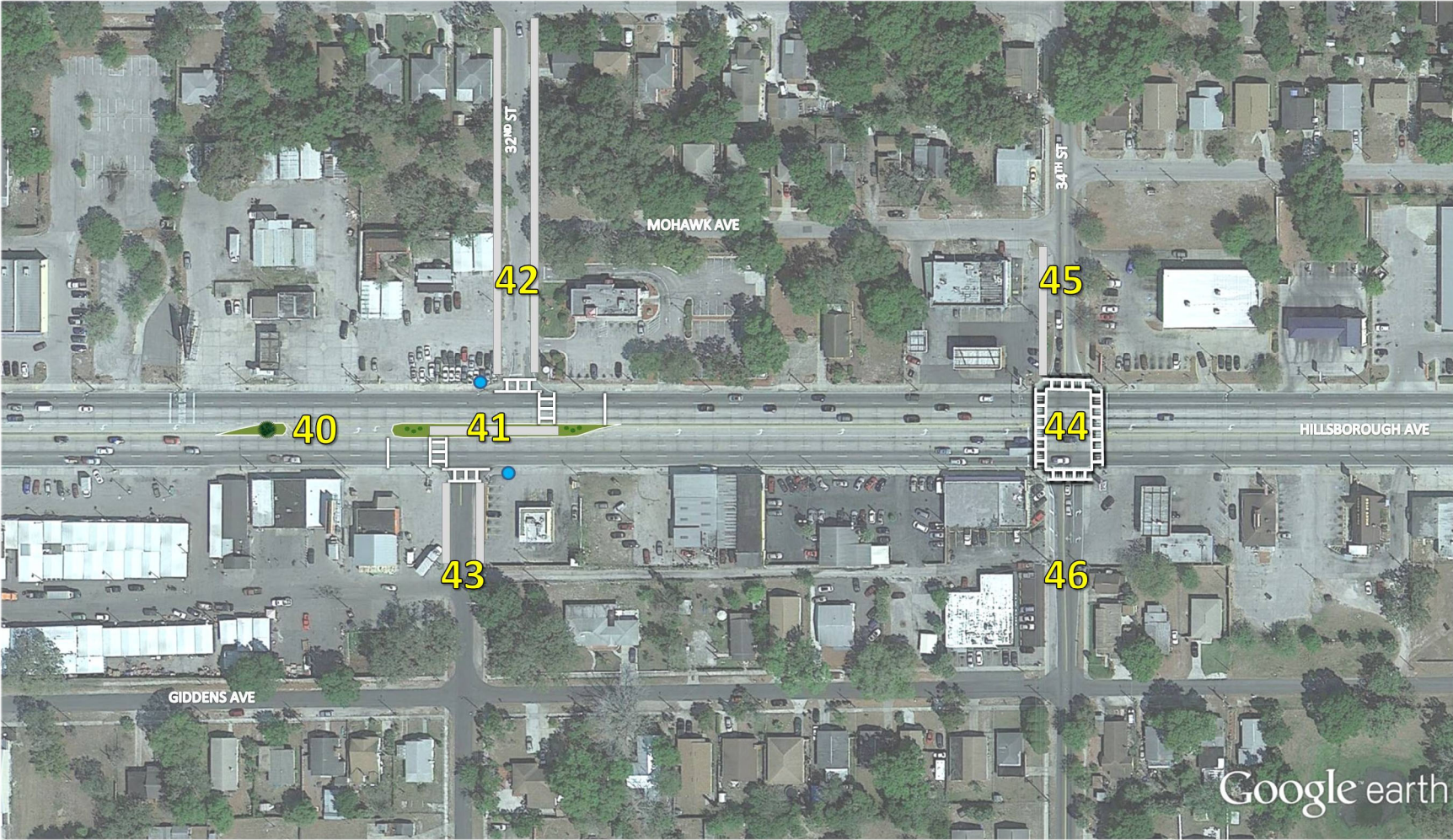
Project ID	Location	Recommendation
34	Hillsborough Ave at Entrance to Meridian Pointe Apartments/Tampa Festival Centre	<ul style="list-style-type: none"> • If necessary warrants are satisfied consider signaling the intersection • Consider "No Right-Turn On Red" during the pedestrian phases • Consider providing a Leading Pedestrian Interval • Install High-Emphasis Crosswalks • Enhance lighting
35	Hillsborough Ave, west of Railroad Tracks	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median

8. East Hillsborough Avenue, Railroad Tracks to 30th Street



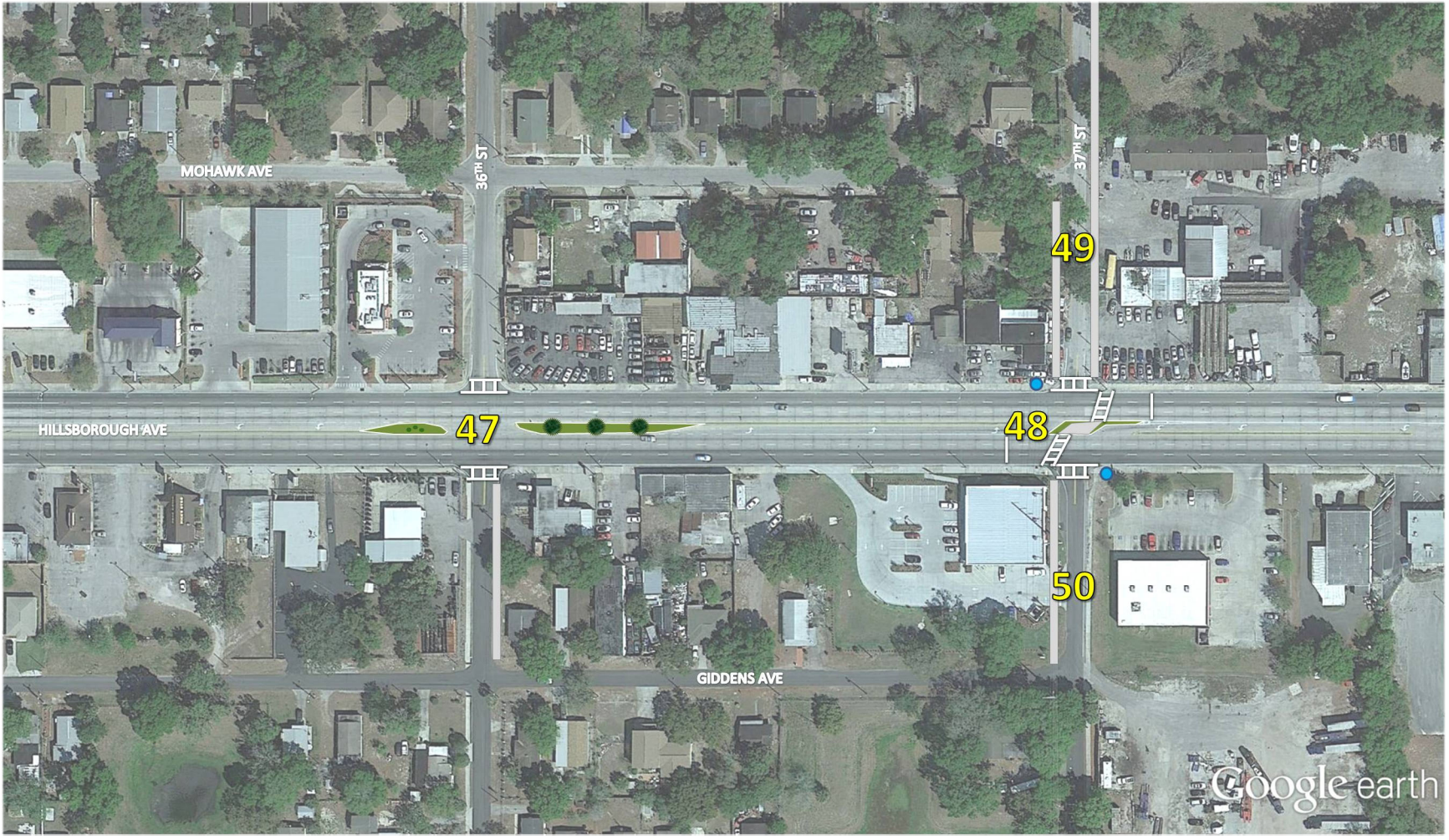
Project ID	Location	Recommendation
36	Hillsborough Ave, west of 30th St	<ul style="list-style-type: none"> • Consider installing a raised landscaped median
37	Hillsborough Ave at 30th St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider converting to a Protected Only Left Turn phase from Hillsborough Ave (consider option of installing a four-head left turn signal to have ability to change phasing based on time-of-day) • Provide a Leading Pedestrian Interval
38	30th St, from Hillsborough Ave to Comanche Ave	<ul style="list-style-type: none"> • Consider installing a raised landscaped median island (approx. 100' long) prior to the left-turn lane (existing painted median) • Provide signage at Hillsborough Ave • Enhance existing crosswalks at Comanche Ave to High-Emphasis Crosswalk, provide additional crosswalk along southern leg of Comanche Ave intersection (near existing bus stops)
39	30th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Complete/delineate sidewalk along both side of 30th St • Enhance lighting • Provide signage at Hillsborough Ave • Provide High-Emphasis Crosswalk across Giddens Ave

9. East Hillsborough Avenue, 30th Street to 34th Street



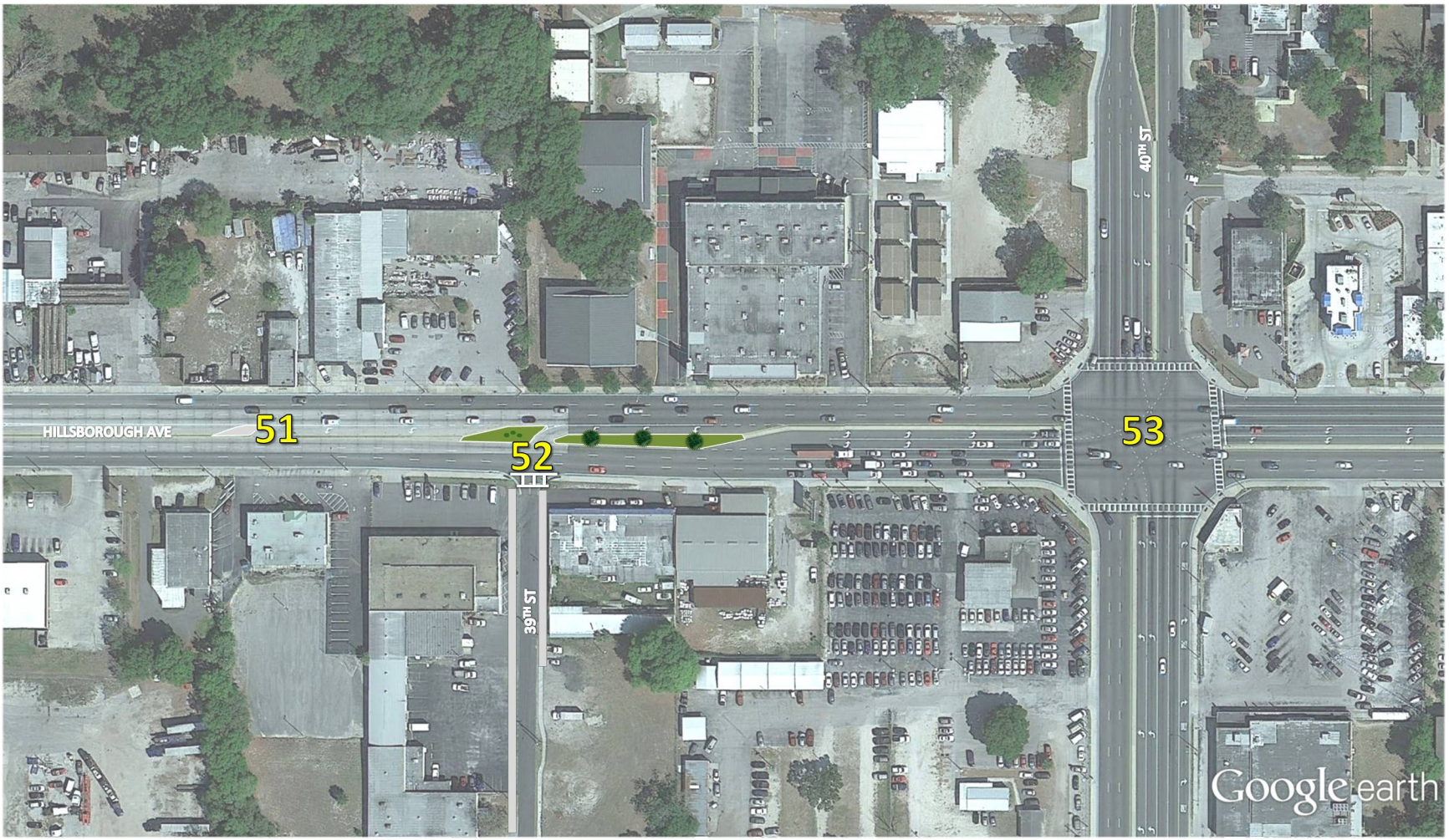
Project ID	Location	Recommendation
40	Hillsborough Ave, west of 32nd St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median
41	Hillsborough Ave at 32nd St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal (proposed crossing for the Green ARtery Perimeter Trail) • Consider installing a raised landscaped median • Enhance lighting • Consider shifting existing bus stops to the far-side of 32nd St
42	32nd St, from Hillsborough Ave to Comanche Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 32nd St • Install sidewalks along both sides of 32nd St • Enhance lighting • Provide signage • Identified as a potential alignment of the Green ARtery Perimeter Trail
43	32nd St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 32nd St • Complete/delineate sidewalks along both sides of 32nd St • Enhance lighting • Provide signage • Identified as a potential alignment of the Green ARtery Perimeter Trail
44	Hillsborough Ave at 34th St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider converting to a Protected Only Left Turn phase from Hillsborough Ave (consider option of installing a four-head left turn signal to have ability to change phasing based on time-of-day/pedestrian phase) • Consider providing a Leading Pedestrian Interval
45	34th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Complete sidewalk along west sides of 34th St • Enhance lighting
46	34th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Enhance lighting • Provide signage

10. East Hillsborough Avenue, 34th Street to 37th Street



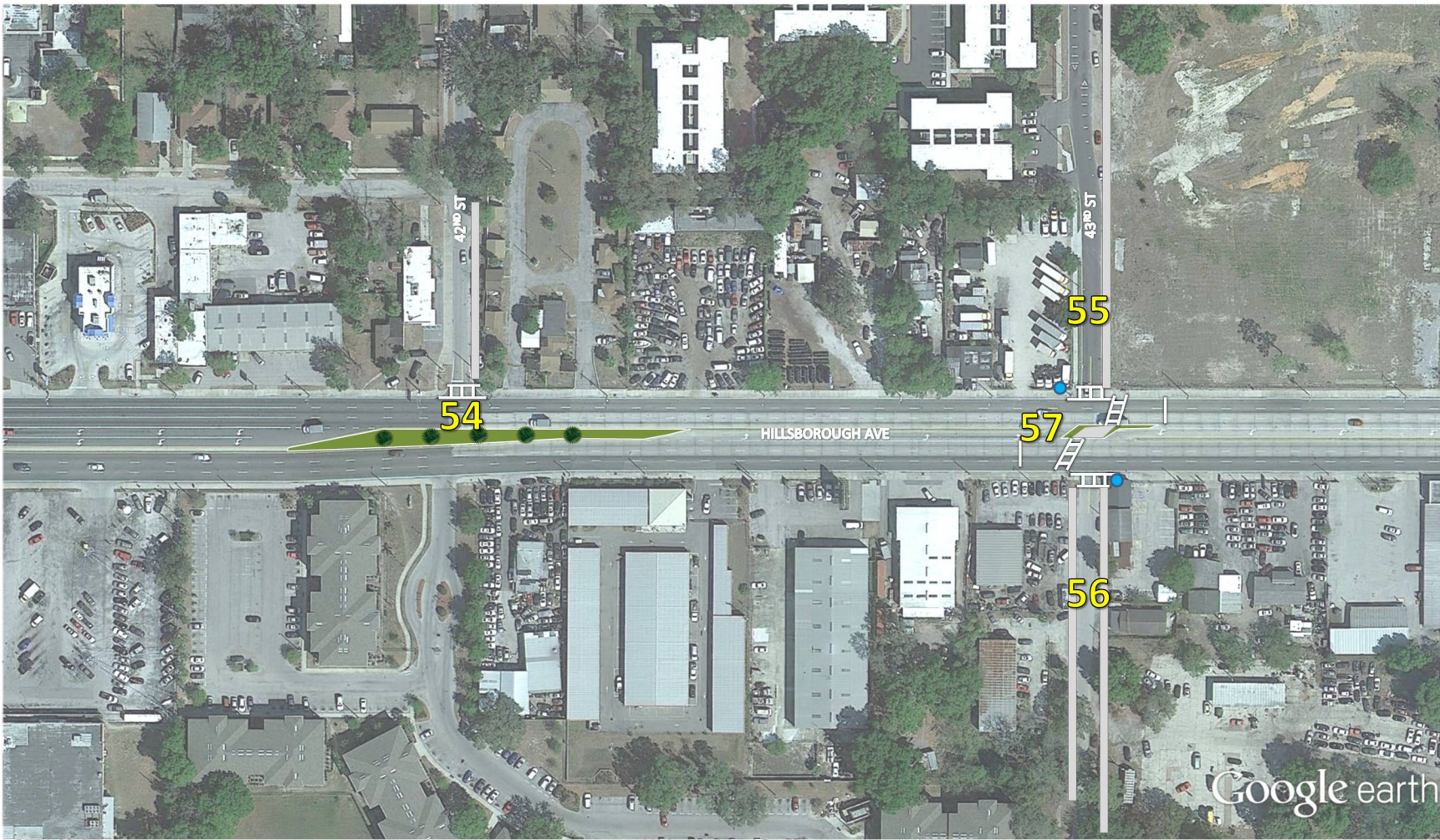
Project ID	Location	Recommendation
47	Hillsborough Ave at 36th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised medians • Install High-Emphasis Crosswalk across 36th St at Hillsborough Ave (both north and south side) • Provide signage
48	Hillsborough Ave at 37th St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider landscaping the existing raised median • Enhance lighting • Consider shifting the existing bus stops to the far-side of 37th St
49	37th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 37th St at Hillsborough Ave • Install sidewalks along both sides of 37th St • Enhance lighting • Provide signage
50	37th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 37th St at Hillsborough Ave • Install sidewalk along the west side of 37th St • Enhance lighting • Provide signage

11. East Hillsborough Avenue, 37th Street to 40th Street



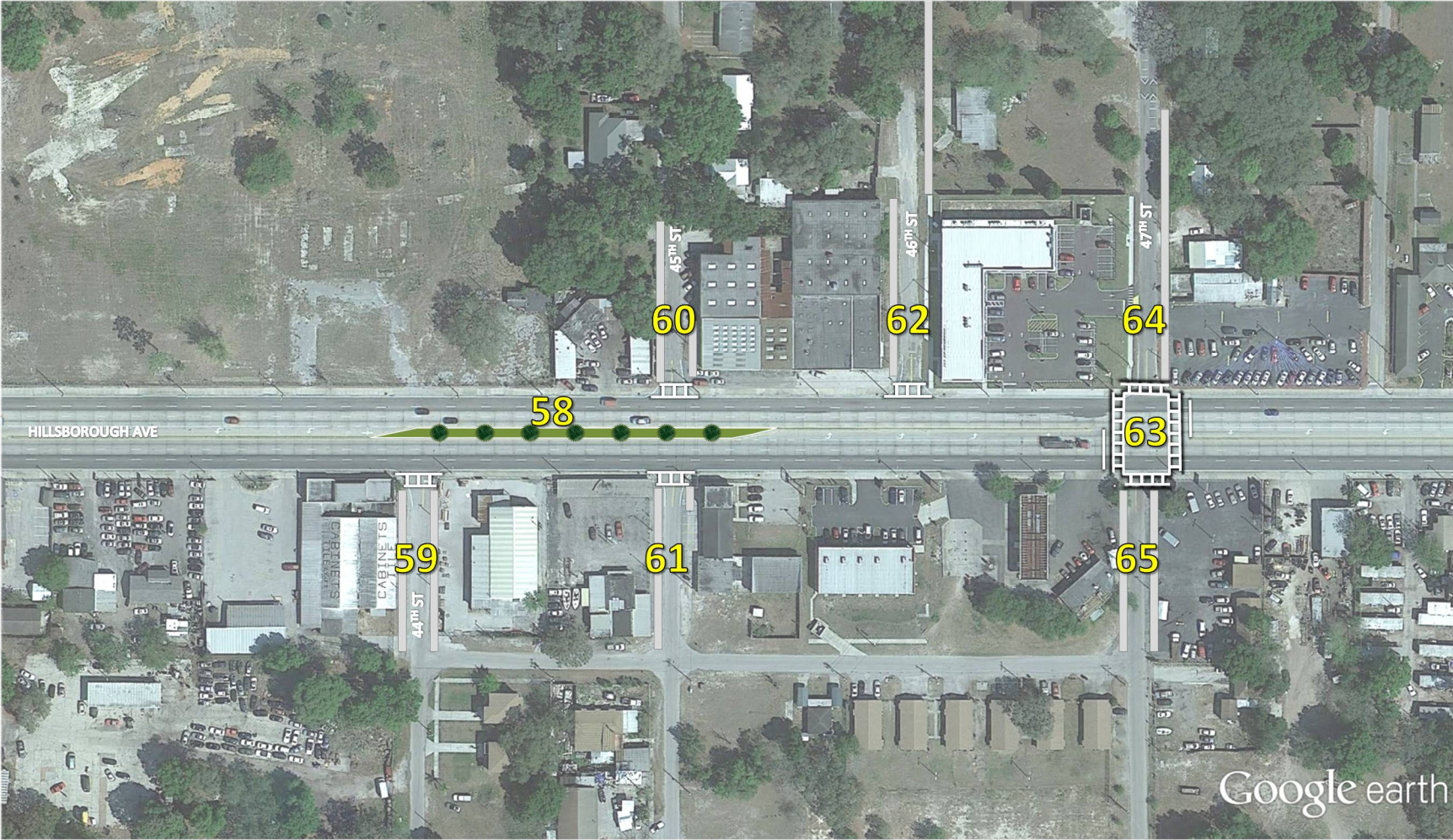
Project ID	Location	Recommendation
51	Hillsborough Ave, east of 37th St	<ul style="list-style-type: none">• Consider installing a raised median west of the existing left-turn opening
52	Hillsborough Ave at 39th St	<ul style="list-style-type: none">• Consider landscaping within the existing raised medians• Install High-Emphasis Crosswalk across 39th St• Install sidewalk/delineate walkway along both sides of 39th St
53	Hillsborough Ave at 40th St	<ul style="list-style-type: none">• Enhance intersection lighting• Consider "No Right-Turn On Red" during pedestrian phases• Consider providing a Leading Pedestrian Interval

12. East Hillsborough Avenue, 40th Street to 43rd Street



Project ID	Location	Recommendation
54	Hillsborough Ave at 42nd St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 42nd St at Hillsborough Ave • Enhance lighting • Provide signage • Consider landscaping the existing raised median
55	43rd St, from Hillsborough Ave to Deleuil Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 43rd St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalk along the eastside of 43rd St
56	43rd St. from Hillsborough Ave to Frierson Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 43rd St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 43rd St
57	Hillsborough Ave at 43rd St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider providing a raised channelized median in conjunction with mid-block crossing • Enhance lighting

13. East Hillsborough Avenue, 43rd Street to 47th Street



Project ID	Location	Recommendation
58	Hillsborough Ave, from 44th St to 45th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median
59	Hillsborough Ave at 44th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 44th St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 44th St
60	Hillsborough Ave at 45th St (north)	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 45th St at Hillsborough Ave • Enhance lighting • Provide signage
61	45th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 45th St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 45th St
62	Hillsborough Ave at 46th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 46th St at Hillsborough Ave • Enhance lighting • Provide signage
63	Hillsborough Ave at 47th St	<ul style="list-style-type: none"> • If necessary warrants are satisfied consider signaling the intersection, otherwise if necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider installing a raised landscaped directional median • Enhance lighting • Provide signage
64	47th St, from Hillsborough Ave to Shipman Ct	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 47th St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 47th St
65	47th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 47th St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of 47th St

14. East Hillsborough Avenue, 47th Street to 50th Street



Project ID	Location	Recommendation
66	Hillsborough Ave at Shipman Ct	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across Shipman Ct at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of Shipman Ct
67	Hillsborough Ave at 48th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 48th St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of 48th St
68	Hillsborough Ave at Rose Ln	<ul style="list-style-type: none"> • Consider landscaping the existing raised median, also consider extending the existing raised median west approx. 100'
69	Hillsborough Ave at 50th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 50th St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of 50th St (to min. 200' north of Hillsborough Ave)
70	Hillsborough Ave, east of 50th St	<ul style="list-style-type: none"> • Consider installing a raised landscaped median east of 50th St (approx. 150' long) • Provide signage (pedestrian crossing warning (flashing beacon) and reduce speed ahead) • Explore opportunities to provide a "gateway" feature

Cost Estimates

Using planning-level cost estimates for the different recommended enhancements outlined on the previous pages, it is estimated that the cost to complete the short- and mid-term study recommendations is in the range of \$4.5–5 million (Table 12). Again, it is important to note that these are planning-level recommendations, meaning that they have been developed using available data sources and the data collected as part of this study, and while an attempt was made to identify any potential “fatal flaws,” it is important that these recommendations go through the necessary and appropriate design and engineering reviews and stages. Appendix B provides a more detailed break-down of the estimated project costs.

Table 12: Estimated Cost of Recommendations

Treatment	Planning Level Unit Cost Estimate	Estimated Units	Estimated Cost
High-Emphasis Crosswalk	\$11 per linear foot	2,500 feet	\$ 27,500
Sidewalks (5')	\$21 per linear foot	12,700 feet	\$ 266,700
Signage	\$265 per sign	70 signs	\$ 18,550
Street Lights	\$5,000 per light	70 lights	\$ 350,000
Signalized Intersection Retiming	\$5,000 per intersection	6 Intersections	\$ 30,000
No Right Turn on Red	\$3,000 per existing signalized intersection (includes LED sign)	6 Intersections	\$ 18,000
Leading Pedestrian Interval	\$2,000 per existing signalized intersection	6 Intersections	\$ 12,000
Median Landscape Retrofit (14' wide)	\$200 per linear foot	2,250 feet	\$ 450,000
New Raised/Landscaped Median (14' wide)	\$800 per linear foot	800 feet	\$ 640,000
New Signalized Intersections	\$300,000 per intersections	2 intersections	\$ 600,000
Mid-Block Crosswalks with Traffic Control	\$100,000 per location	4 crossings	\$ 400,000
Shared Lane Arrows	\$35,000 per mile (includes supplemental signage)	3 miles	\$ 105,000
Median Traffic Diverters (4' wide)	\$25 per linear foot	150 feet	\$ 3,750
Bus Pullout Bays	\$30,000 per location	3 bus bays	\$ 90,000
Sidewalk Brick Inlay	\$30 per linear foot	50,000 feet	\$ 1,500,000
Additional Planning Studies	\$100,000 per study	2 studies	\$ 200,000
Total Estimated Cost of Recommendations			\$ 4,711,500



APPENDIX A
PUBLIC ENGAGEMENT SUMMARY

Appendix A: Public Engagement

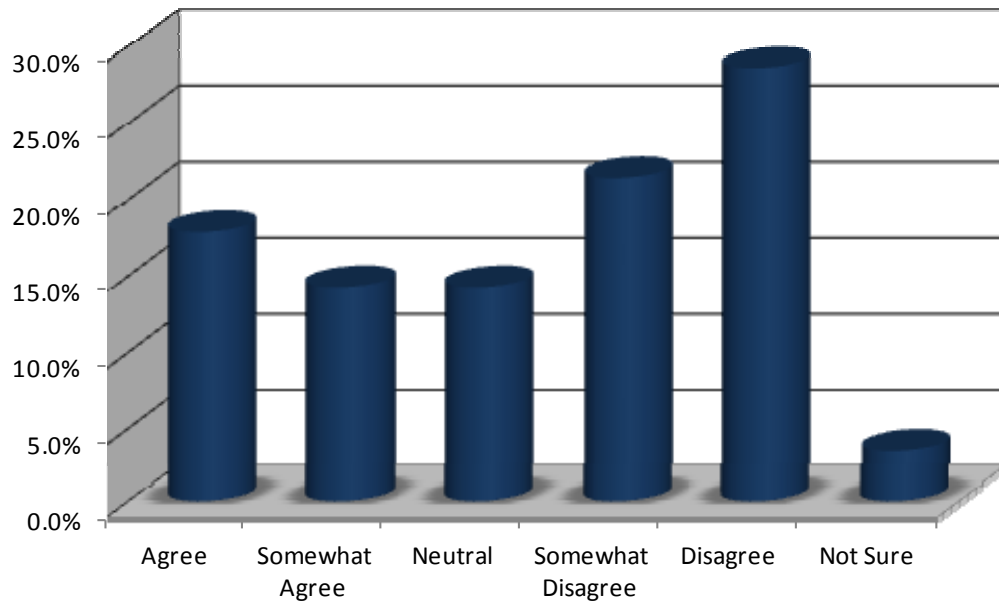
The following pages provide a summary of the polling questions that were asked during the public workshop/open house event that was held on March 26, 2013, at the Ragan Community Center. Following the polling question results is a summarized bulleted list of comments that were provided from the public during both the March 26th event and the public engagement event held on May 14, 2013, at the Cyrus Greene Community Center.



Polling Question Results

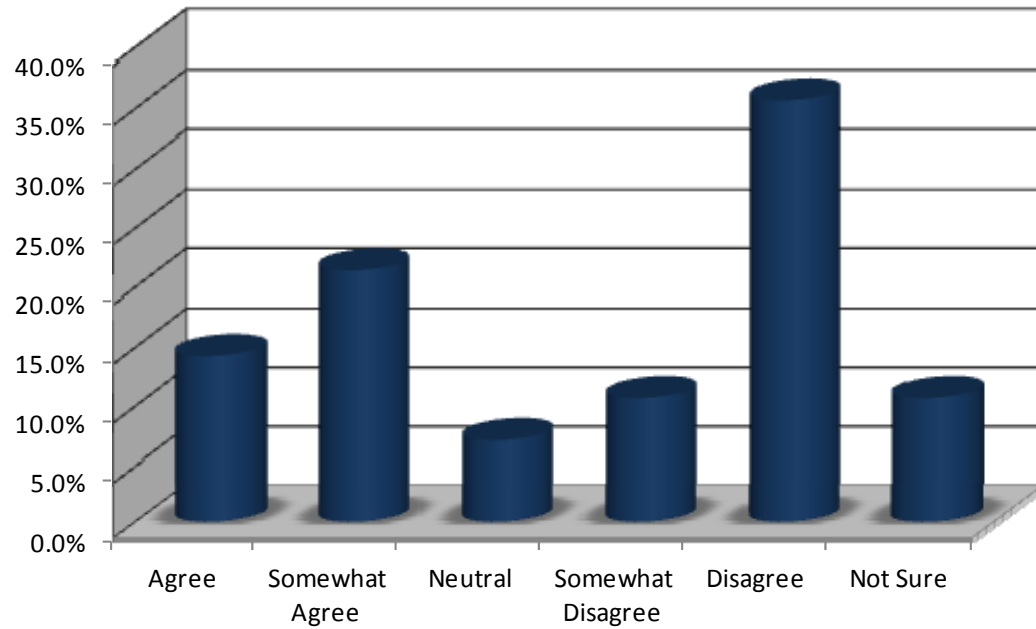
1.

Question	Response	Percent	Count
E. Hillsborough Ave currently does a good job accommodating automobile traffic.	Agree	17.9%	5
	Somewhat Agree	14.3%	4
	Neutral	14.3%	4
	Somewhat Disagree	21.4%	6
	Disagree	28.6%	8
	Not Sure	3.6%	1
	Total	100%	28



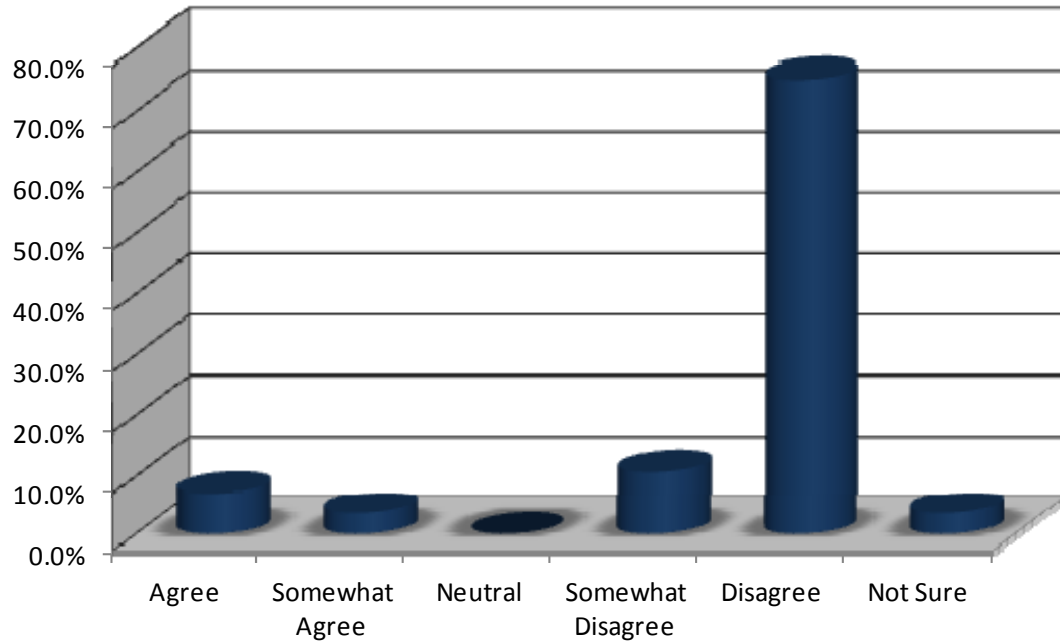
2.

Question	Response	Percent	Count
E. Hillsborough Ave currently does a good job accommodating truck/freight traffic.	Agree	14.3%	4
	Somewhat Agree	21.4%	6
	Neutral	7.1%	2
	Somewhat Disagree	10.7%	3
	Disagree	35.7%	10
	Not Sure	10.7%	3
	Total	100%	28



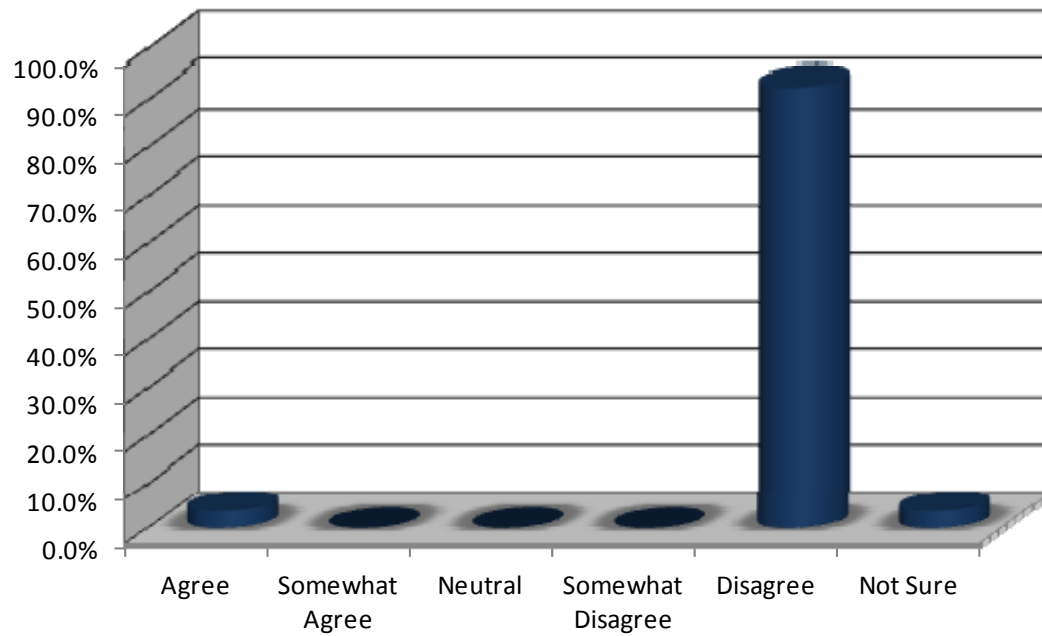
3.

Question	Response	Percent	Count
E. Hillsborough Ave currently does a good job accommodating pedestrian traffic.	Agree	7.1%	2
	Somewhat Agree	3.6%	1
	Neutral	0.0%	0
	Somewhat Disagree	10.7%	3
	Disagree	75.0%	21
	Not Sure	3.6%	1
	Total	100%	28



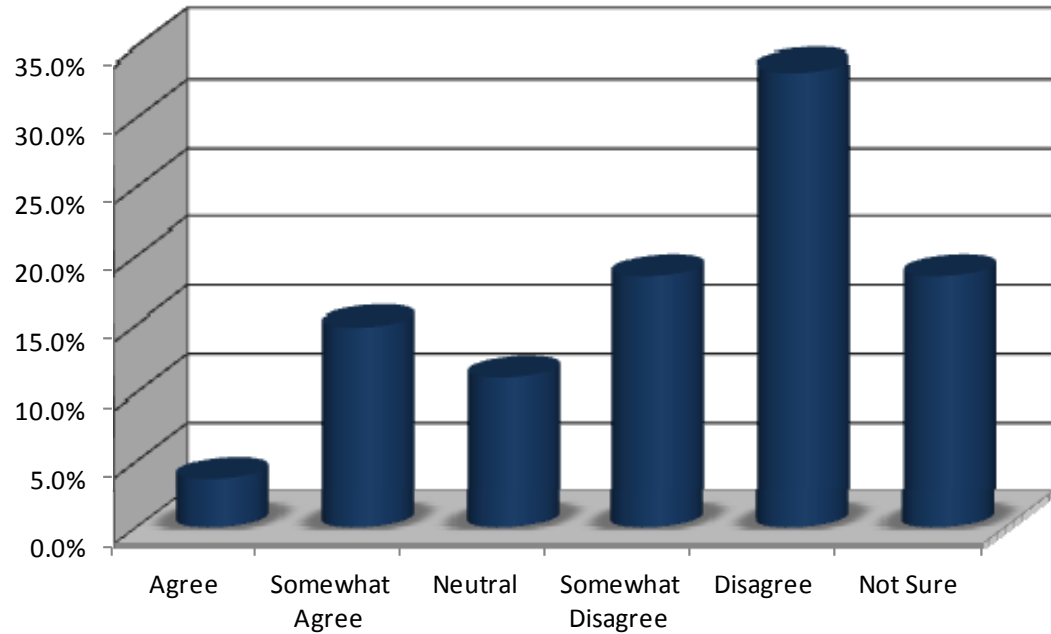
4.

Question	Response	Percent	Count
E. Hillsborough Ave currently does a good job accommodating bicycle traffic.	Agree	3.7%	1
	Somewhat Agree	0.0%	0
	Neutral	0.0%	0
	Somewhat Disagree	0.0%	0
	Disagree	92.6%	25
	Not Sure	3.7%	1
	Total	100%	27



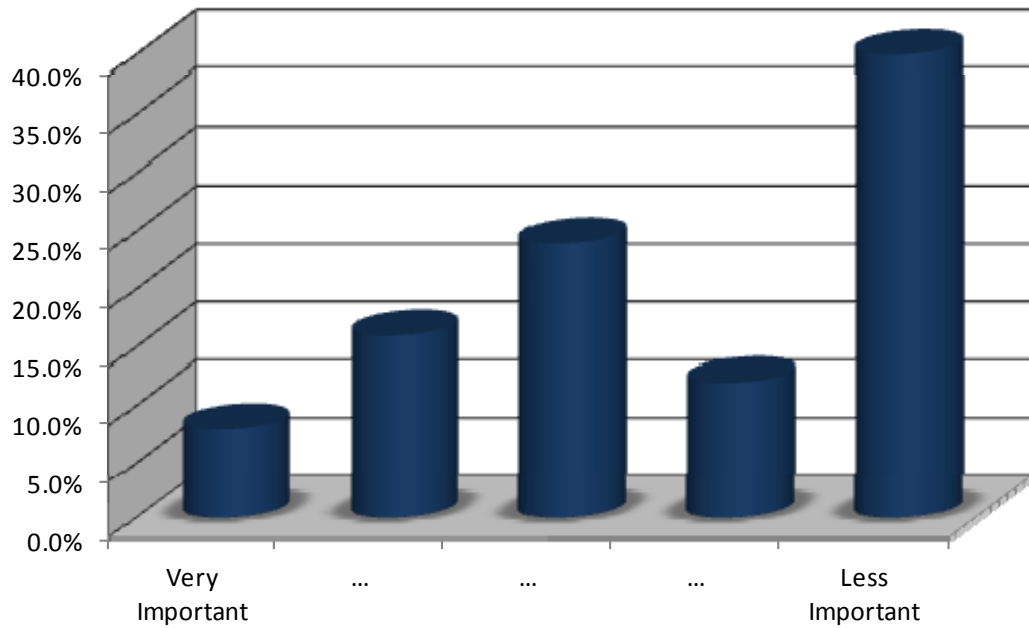
5.

Question	Response	Percent	Count
E. Hillsborough Ave currently does a good job accommodating transit users and service.	Agree	3.7%	1
	Somewhat Agree	14.8%	4
	Neutral	11.1%	3
	Somewhat Disagree	18.5%	5
	Disagree	33.3%	9
	Not Sure	18.5%	5
	Total	100%	27



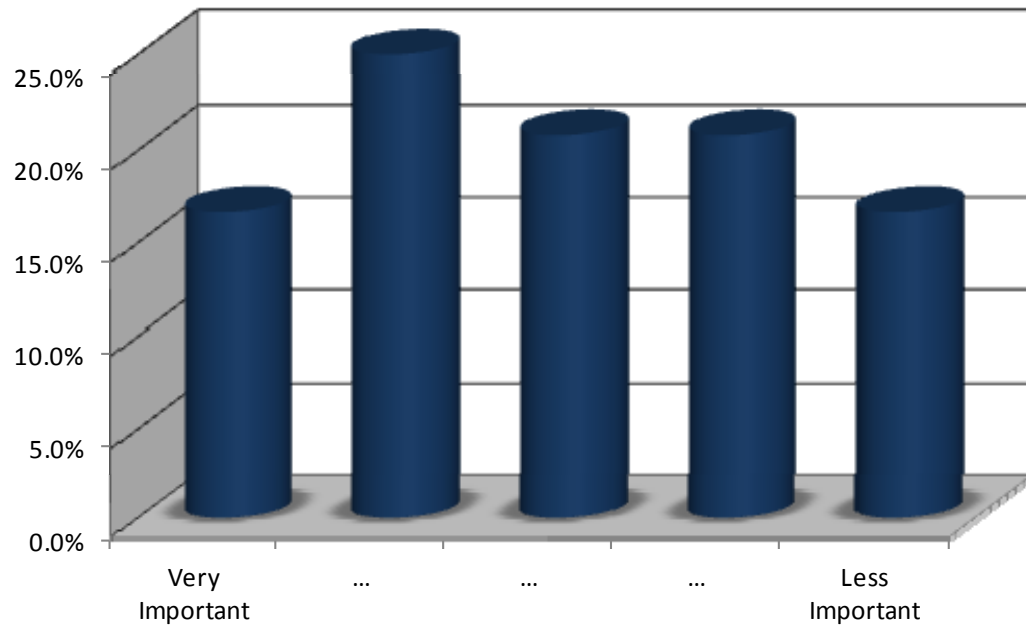
6.

Question	Response	Percent	Count
Maintain/reduce travel times along the corridor.	Very Important	8.0%	2
	...	16.0%	4
	...	24.0%	6
	...	12.0%	3
	Less Important	40.0%	10
	Total	100%	25



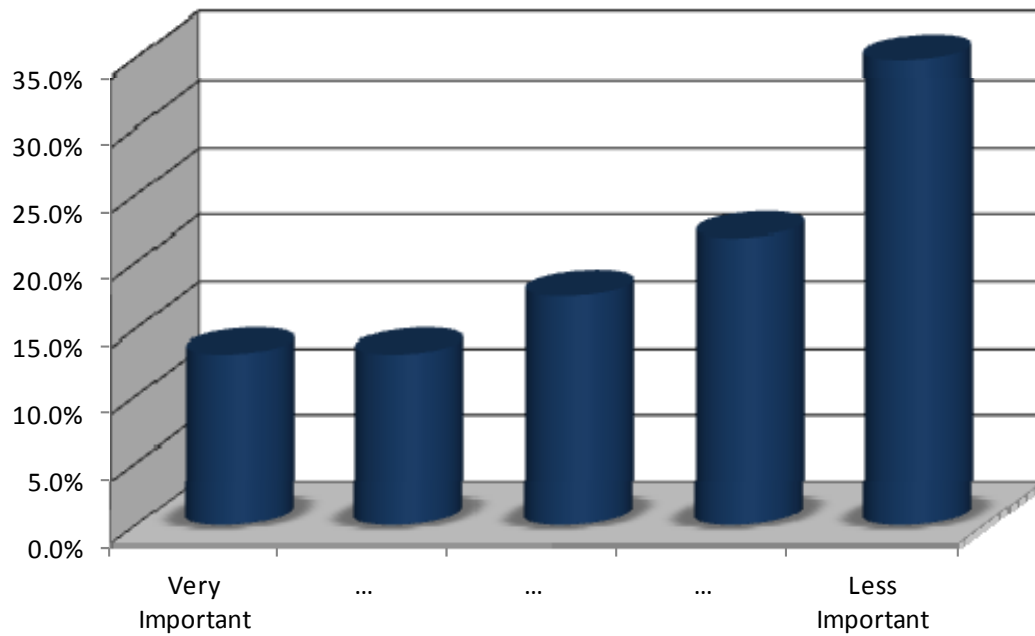
7.

Question	Response	Percent	Count
Maintain/reduce delay for vehicles/pedestrians crossing the corridor.	Very Important	16.7%	4
	...	25.0%	6
	...	20.8%	5
	...	20.8%	5
	Less Important	16.7%	4
	Total	100%	24



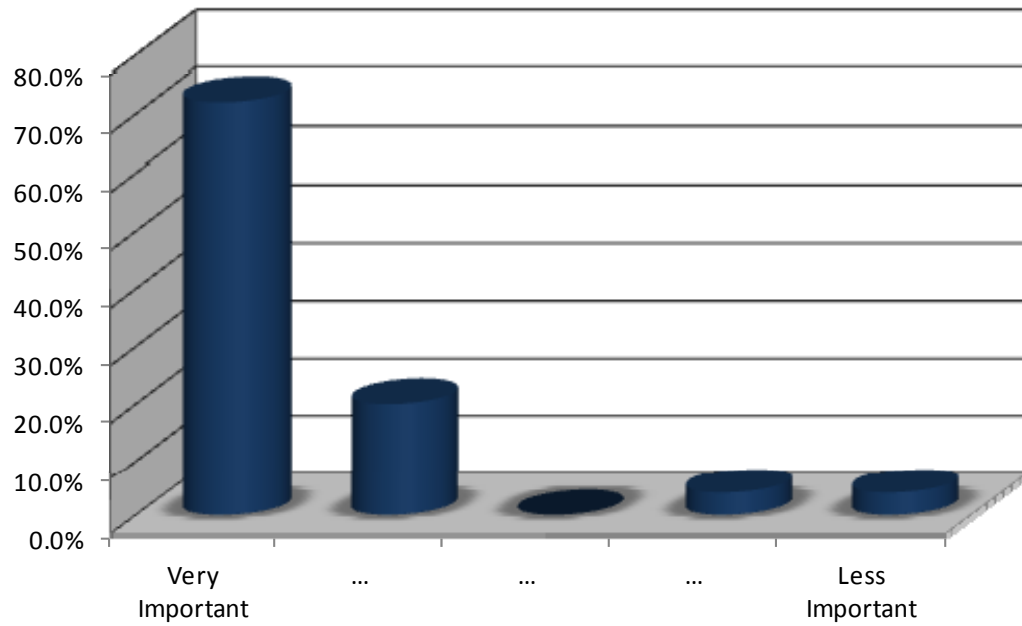
8.

Question	Response	Percent	Count
Completeness of bicycle facilities along the corridor.	Very Important	13.0%	3
	...	13.0%	3
	...	17.4%	4
	...	21.7%	5
	Less Important	34.8%	8
	Total	100%	23



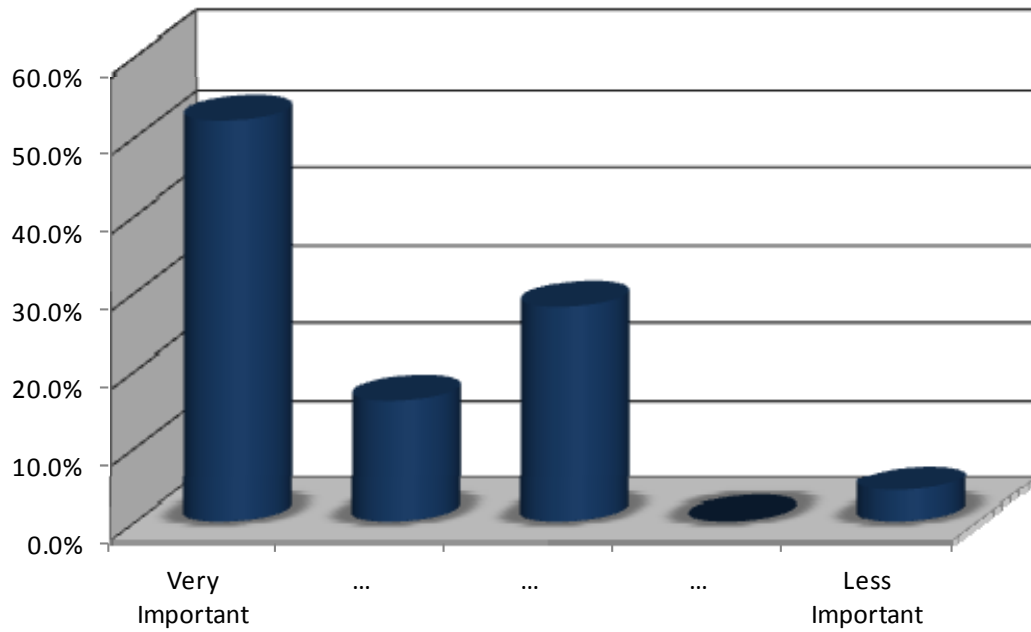
9.

Question	Response	Percent	Count
Reduce pedestrian and bicycle crashes.	Very Important	72.0%	18
	...	20.0%	5
	...	0.0%	0
	...	4.0%	1
	Less Important	4.0%	1
	Total	100%	25



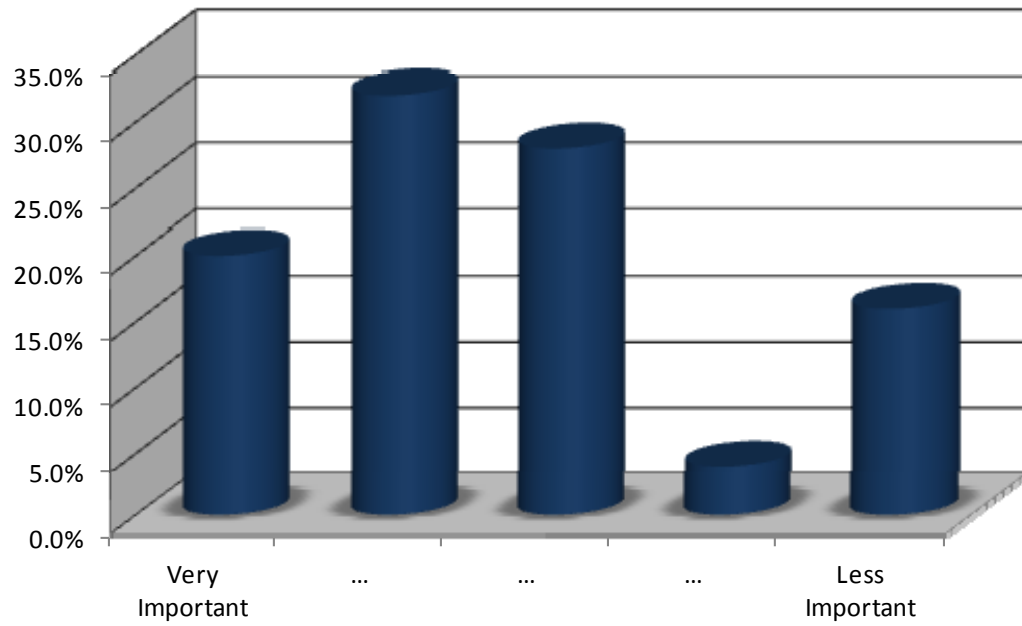
10.

Question	Response	Percent	Count
Reduce severe automobile crashes.	Very Important	52.0%	13
	...	16.0%	4
	...	28.0%	7
	...	0.0%	0
	Less Important	4.0%	1
	Total	100%	25



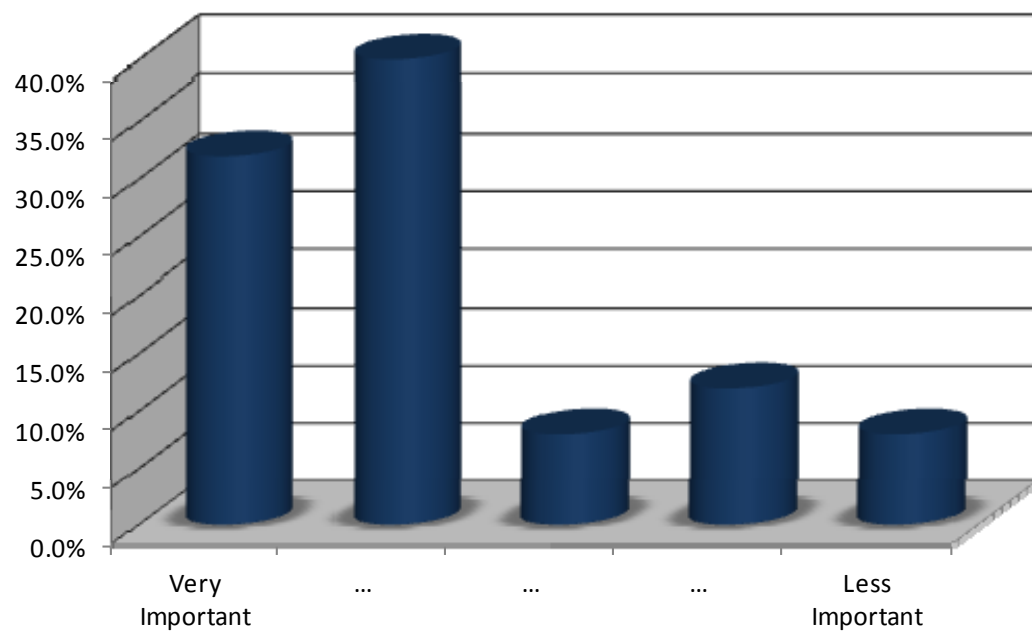
11.

Question	Response	Percent	Count
Reduction in bus/traffic conflicts.	Very Important	20.0%	5
	...	32.0%	8
	...	28.0%	7
	...	4.0%	1
	Less Important	16.0%	4
	Total	100%	25



12.

Question	Response	Percent	Count
Reduce transit vehicle travel times.	Very Important	32.0%	8
	...	40.0%	10
	...	8.0%	2
	...	12.0%	3
	Less Important	8.0%	2
	Total	100%	25



Summary of Public Comments

- Tough to cross the street (all locations).
- Bus bays needed, buses back traffic-up and cars become “trapped” behind the bus.
- Aesthetic improvements needed.
- Promote local (minority) businesses.
- Slow down traffic.
- Reduce traffic fatalities, especially those involving pedestrians and bicyclists.
- Develop more light commercial density along the corridor.
- Promote rear-access and parking for businesses along the corridor.
- Consider complete street design – landscaped medians, more consistent lighting.
- General concerns about the proposed Walmart:
 - Increase in number of people crossing Hillsborough Avenue to access the store.
 - Increase in cut-through traffic.
 - Adverse effects on promoting more density.
 - Competition to local businesses.
- Make crossing Hillsborough Avenue safer.
- Traffic flows quickly, most efficient way to travel by car.
- Not opposed to slowing down traffic to improve safety for pedestrians.
- A lot of people cross to get to and from the McDonald’s (near 19th St).
- Difficult time entering traffic from side streets and driveways (hard to find sufficient gaps).

This page intentionally left blank



APPENDIX B
SHORT- MID-TERM RECOMMENDATION COST ESTIMATES

Appendix B: Short- Mid-Term Recommendation Cost Estimates

Using the planning level cost estimates and the recommendations listed in Section 6 of the report, a detailed cost estimate for the 70 project locations was calculated. The tables on the following pages reference the projects identified in the Site Specific Recommendations and Conceptual Illustrations portion of Section 6. The table below provides the planning level cost estimates that were used in calculating the recommendation cost estimates, again it is worth noting that a detailed engineering/design process should be completed prior to constructing/programming these recommendations and that the cost of the recommendations may vary depending upon factors determined during the detailed engineering and design review. Also, the detailed cost estimates do not include the costs associated with providing shared land arrow markings, sidewalk brick inlays, and the recommended additional planning studies.

Treatment	Planning Level Unit Cost Estimate
High-Emphasis Crosswalk	\$11 per linear foot
Sidewalks (5')	\$21 per linear foot
Signage	\$265 per sign
Street Lights	\$5,000 per light
Signalized Intersection Retiming	\$5,000 per intersection
No Right Turn on Red	\$3,000 per existing signalized intersection (includes LED sign)
Leading Pedestrian Interval	\$2,000 per existing signalized intersection
Median Landscape Retrofit (14' wide)	\$200 per linear foot
New Raised/Landscaped Median (14' wide)	\$800 per linear foot
New Signalized Intersections	\$300,000 per intersections
Mid-Block Crosswalks with Traffic Control	\$100,000 per location
Shared Lane Arrows	\$35,000 per mile (includes supplemental signage)
Median Traffic Diverters (4' wide)	\$25 per linear foot
Bus Pullout Bays	\$30,000 per location
Sidewalk Brick Inlay	\$30 per linear foot
Additional Planning Studies	\$100,000 per study

Project ID	Location	Recommendation	Cost Estimate
1	Hillsborough Ave at I-275 Southbound Ramps	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across Hillsborough Ave • Move the eastbound stop bar back to accommodate the marked crosswalk • Provide signage 	\$ 1,965
2	Hillsborough Ave at I-275 Southbound Off Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Move stop bar back to accommodate the marked crosswalk • Enhance lighting 	\$ 5,850
3	Hillsborough Ave at I-275 Southbound On Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalks across the right-turn and left-turn access lanes • Enhance lighting • Provide signage 	\$ 11,025
4	Hillsborough Ave at I-275 Northbound-Westbound Off Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Provide signage 	\$ 5,750
5	Hillsborough Ave at I-275 Northbound-Eastbound Off Ramp	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Provide signage 	\$ 5,595
6	Hillsborough Ave at I-275 Northbound On Ramp	<ul style="list-style-type: none"> • Consider replacing the painted island with raised island • Install High-Emphasis Crosswalk • Enhance lighting • Provide signage 	\$ 38,765
7	Eastbound Hillsborough Ave left-turn lane at Nebraska Ave	<ul style="list-style-type: none"> • Consider extending the left-turn lane approximately 100' • Consider providing enhanced landscaping to remaining raised median 	\$ 20,000
8	Hillsborough Ave at Nebraska Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Consider "No Right-Turn On Red" during the pedestrian phase • Consider providing a Leading Pedestrian Interval during the pedestrian phase • Consider providing a bus bay east of Nebraska Ave (south side) 	\$ 54,360
9	Hillsborough Ave at 9th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 9th St at Hillsborough Ave • Provide signage • Install sidewalks along both sides of 9th St from Hillsborough Ave to Mohawk Ave 	\$ 17,465
10	Hillsborough Ave, east of 9th St	<ul style="list-style-type: none"> • Install landscaping within the existing raised median 	\$ 20,000

Project ID	Location	Recommendation	Cost Estimate
11	Hillsborough Ave at 11th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 11th St at Hillsborough Ave • Provide signage • Install sidewalks along both sides of 11th St from Hillsborough Ave to Mohawk Ave • Enhance lighting at the intersection 	\$ 16,780
12	Hillsborough Ave, between 11th St and 12th St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider landscaping the existing raised median • Enhance lighting • Consider moving eastbound bus stop approximately 300' east to the intersection of 12th St 	\$ 160,000
13	Hillsborough Ave at 12th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 12th St at Hillsborough Ave • Provide signage • Install sidewalk along the west side of 12th St to Giddens Ave 	\$ 10,830
14	12th St at Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk at the intersection of 12th St and Giddens Ave 	\$ 1,320
15	Hillsborough Ave, between 12th St and 13th St	<ul style="list-style-type: none"> • Consider installing a raised landscaped median island (approx. 30' long) where the westbound left turn lane begins 	\$ 24,000
16	Hillsborough Ave at 13th St (N)	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 13th St at Hillsborough Ave • Provide signage • Install sidewalk along both sides of 13th St to Mohawk Ave 	\$ 16,945
17	Hillsborough Ave at 13th St (S)	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 13th St at Hillsborough Ave • Provide signage • Install sidewalk along both sides of 13th St to Giddens Ave 	\$ 16,945
18	Hillsborough Ave, west of 15th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median at the beginning of the eastbound left-turn lane 	\$ 15,000
19	Hillsborough Ave at 15th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk • Enhance lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider converting the existing permissive only left-turn from Hillsborough Ave to a protected only phase • Consider providing a Leading Pedestrian Interval 	\$ 23,975

Project ID	Location	Recommendation	Cost Estimate
20	15th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Complete sidewalks along both sides of 15th St from Hillsborough Ave to Mohawk Ave • Install High-Emphasis Crosswalk along 15th St at the intersection of Mohawk Ave 	\$ 6,830
21	15th St at Giddens Ave	<ul style="list-style-type: none"> • Consider installing a raised median (2') traffic diverter (with bicycle slots) along 15th St • Consider providing curb extensions/bulb-outs on Giddens Ave at 15th St 	\$ 7,020
22	Hillsborough Ave, west of 19th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median 	\$ 80,000
23	Hillsborough Ave at 17th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 17th St at Hillsborough Ave • Provide signage • Enhance lighting • Complete sidewalks along both sides of 17th St to Giddens Ave 	\$ 16,150
24	Hillsborough Ave at 19th St	<ul style="list-style-type: none"> • A traffic signal is proposed in conjunction with future development of the NW quadrant of the intersection • A bus bay has also been proposed west of 19th St (north side) • Consider "No Right-Turn On Red" during pedestrian phases • Consider providing a Leading Pedestrian Interval 	\$ -
25	19th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Install sidewalk along the east side of 19th St • Install High-Emphasis Crosswalk along 19th St across Mohawk Ave • Provide signage • Enhance lighting 	\$ 11,215
26	19th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Complete/delineate sidewalk along both sides of 19th St • Provide signage • Enhance lighting 	\$ 5,265
27	19th St at Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk along both sides of 19th St at Giddens Ave • Consider providing curb-extensions/bulb-outs along Giddens Ave at 19th St 	\$ 770
28	Hillsborough Ave at 20th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 20th St at Hillsborough Ave • Enhance existing marked crosswalk at 20th St and Mohawk Ave to High-Emphasis Crosswalk 	\$ 1,320
29	Hillsborough Ave, west of 22nd St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median 	\$ 20,000

Project ID	Location	Recommendation	Cost Estimate
30	Hillsborough Ave at 22nd St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider converting the Hillsborough Ave left-turn phase from protected-permissive to protected only • Consider "No Right-Turn On Red" during the pedestrian phases • Consider providing a Leading Pedestrian Interval • Consider providing a flashing yellow left-turn arrow for the permissive left-turn phase along 22nd St 	\$ 21,060
31	22nd St, from Hillsborough Ave to Comanche Ave	<ul style="list-style-type: none"> • Enhance sidewalk along the eastside of 22nd St • Enhance lighting • Install a raised landscaped median (approx. 10' x 25') along 22nd St prior to the left-turn lane • Provide signage • Consider providing a bus bay along the east side of 22nd St 	\$ 57,470
32	22nd St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Consider installing a raised landscaped median island prior to the beginning of the left-turn lane • Consider installing a bus bay along southbound 22nd St where existing bus shelter is located • Enhance lighting 	\$ 40,000
33	22nd St at Giddens Ave	<ul style="list-style-type: none"> • Consider installing a raised landscaped median traffic diverter along 22nd St (leave channel for cyclists and pedestrians) • Consider tightening the turn radius/provide curb-extensions along Giddens Ave • Install High-Emphasis Crosswalk across Giddens Ave 	\$ 3,580
34	Hillsborough Ave at Entrance to Meridian Pointe Apartments/Tampa Festival Centre	<ul style="list-style-type: none"> • If necessary warrants are satisfied consider signaling the intersection • Consider "No Right-Turn On Red" during the pedestrian phases • Consider providing a Leading Pedestrian Interval • Install High-Emphasis Crosswalks • Enhance lighting 	\$ 300,000
35	Hillsborough Ave, west of Railroad Tracks	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median 	\$ 8,000
36	Hillsborough Ave, west of 30th St	<ul style="list-style-type: none"> • Consider installing a raised landscaped median 	\$ 64,000
37	Hillsborough Ave at 30th St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider converting to a Protected Only Left Turn phase from Hillsborough Ave (consider option of installing a four-head left turn signal to have ability to change phasing based on time-of-day) • Provide a Leading Pedestrian Interval 	\$ 21,060

Project ID	Location	Recommendation	Cost Estimate
38	30th St, from Hillsborough Ave to Comanche Ave	<ul style="list-style-type: none"> • Consider installing a raised landscaped median island (approx. 100' long) prior to the left-turn lane (existing painted median) • Provide signage at Hillsborough Ave • Enhance existing crosswalks at Comanche Ave to High-Emphasis Crosswalk, provide additional crosswalk along southern leg of Comanche Ave intersection (near existing bus stops) 	\$ 50,880
39	30th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Complete/delineate sidewalk along both side of 30th St • Enhance lighting • Provide signage at Hillsborough Ave • Provide High-Emphasis Crosswalk across Giddens Ave 	\$ 15,270
40	Hillsborough Ave, west of 32nd St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median 	\$ 9,000
41	Hillsborough Ave at 32nd St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal (proposed crossing for the Green ARtery Perimeter Trail) • Consider installing a raised landscaped median • Enhance lighting • Consider shifting existing bus stops to the far-side of 32nd St 	\$ 100,000
42	32nd St, from Hillsborough Ave to Comanche Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 32nd St • Install sidewalks along both sides of 32nd St • Enhance lighting • Provide signage • Identified as a potential alignment of the Green ARtery Perimeter Trail 	\$ 27,505
43	32nd St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 32nd St • Complete/delineate sidewalks along both sides of 32nd St • Enhance lighting • Provide signage • Identified as a potential alignment of the Green ARtery Perimeter Trail 	\$ 14,850
44	Hillsborough Ave at 34th St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider converting to a Protected Only Left Turn phase from Hillsborough Ave (consider option of installing a four-head left turn signal to have ability to change phasing based on time-of-day/pedestrian phase) • Consider providing a Leading Pedestrian Interval 	\$ 26,060

Project ID	Location	Recommendation	Cost Estimate
45	34th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Complete sidewalk along west sides of 34th St • Enhance lighting 	\$ 8,150
46	34th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Enhance lighting • Provide signage 	\$ 5,000
47	Hillsborough Ave at 36th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised medians • Install High-Emphasis Crosswalk across 36th St at Hillsborough Ave (both north and south side) • Provide signage 	\$ 65,830
48	Hillsborough Ave at 37th St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider landscaping the existing raised median • Enhance lighting • Consider shifting the existing bus stops to the far-side of 37th St 	\$ 100,000
49	37th St, from Hillsborough Ave to Mohawk Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 37th St at Hillsborough Ave • Install sidewalks along both sides of 37th St • Enhance lighting • Provide signage 	\$ 30,600
50	37th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 37th St at Hillsborough Ave • Install sidewalk along the west side of 37th St • Enhance lighting • Provide signage 	\$ 14,960
51	Hillsborough Ave, east of 37th St	<ul style="list-style-type: none"> • Consider installing a raised median west of the existing left-turn opening 	\$ 52,000
52	Hillsborough Ave at 39th St	<ul style="list-style-type: none"> • Consider landscaping within the existing raised medians • Install High-Emphasis Crosswalk across 39th St • Install sidewalk/delineate walkway along both sides of 39th St 	\$ 230,360
53	Hillsborough Ave at 40th St	<ul style="list-style-type: none"> • Enhance intersection lighting • Consider "No Right-Turn On Red" during pedestrian phases • Consider providing a Leading Pedestrian Interval 	\$ 26,060
54	Hillsborough Ave at 42nd St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 42nd St at Hillsborough Ave • Enhance lighting • Provide signage • Consider landscaping the existing raised median 	\$ 90,275

Project ID	Location	Recommendation	Cost Estimate
55	43rd St, from Hillsborough Ave to Deleuil Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 43rd St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalk along the eastside of 43rd St 	\$ 21,260
56	43rd St, from Hillsborough Ave to Frierson Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 43rd St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 43rd St 	\$ 26,930
57	Hillsborough Ave at 43rd St	<ul style="list-style-type: none"> • If necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider providing a raised channelized median in conjunction with mid-block crossing • Enhance lighting 	\$ 100,000
58	Hillsborough Ave, from 44th St to 45th St	<ul style="list-style-type: none"> • Consider providing landscaping within the existing raised median 	\$ 80,000
59	Hillsborough Ave at 44th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 44th St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 44th St 	\$ 12,955
60	Hillsborough Ave at 45th St (north)	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 45th St at Hillsborough Ave • Enhance lighting • Provide signage 	\$ 11,850
61	45th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 45th St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 45th St 	\$ 10,745
62	Hillsborough Ave at 46th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 46th St at Hillsborough Ave • Enhance lighting • Provide signage 	\$ 23,305
63	Hillsborough Ave at 47th St	<ul style="list-style-type: none"> • If necessary warrants are satisfied consider signaling the intersection, otherwise if necessary warrants are satisfied install a two-phased mid-block crossing with either RRFB (supplement with overhead signage/beacons) or Pedestrian Traffic Signal • Consider installing a raised landscaped directional median • Enhance lighting • Provide signage 	\$ 300,000

Project ID	Location	Recommendation	Cost Estimate
64	47th St, from Hillsborough Ave to Shipman Ct	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 47th St at Hillsborough Ave • Enhance lighting • Provide signage • Install/complete sidewalks along both sides of 47th St 	\$ 17,005
65	47th St, from Hillsborough Ave to Giddens Ave	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 47th St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of 47th St 	\$ 18,475
66	Hillsborough Ave at Shipman Ct	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across Shipman Ct at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of Shipman Ct 	\$ 22,395
67	Hillsborough Ave at 48th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 48th St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of 48th St 	\$ 22,395
68	Hillsborough Ave at Rose Ln	<ul style="list-style-type: none"> • Consider landscaping the existing raised median, also consider extending the existing raised median west approx. 100' 	\$ 88,000
69	Hillsborough Ave at 50th St	<ul style="list-style-type: none"> • Install High-Emphasis Crosswalk across 50th St at Hillsborough Ave • Enhance lighting • Provide signage • Install sidewalks along both sides of 50th St (to min. 200' north of Hillsborough Ave) 	\$ 27,615
70	Hillsborough Ave, east of 50th St	<ul style="list-style-type: none"> • Consider installing a raised landscaped median east of 50th St (approx. 150' long) • Provide signage (pedestrian crossing warning (flashing beacon) and reduce speed ahead) • Explore opportunities to provide a "gateway" feature 	\$ 121,060