

George Road Complete Streets Study



Hillsborough MPO
Metropolitan Planning
for Transportation

April 2016

GEORGE ROAD COMPLETE STREETS STUDY



PREPARED FOR:

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Metropolitan Planning
for Transportation

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EXECUTIVE SUMMARY

The purpose of this study is to evaluate the improvements necessary to provide a safe bicycle/pedestrian corridor between the Town 'N' Country (TNC) Greenway and the Courtney Campbell Trail (CCT). The George Road Complete Streets Study Team was specifically tasked with the investigation of a proposed north-south connection between the existing TNC Greenway and the north end of the U-path Trail at Skyway Park, which connects to the CCT. The U-path, on the west side of the Veterans Expressway, runs south to the City of Tampa's Cypress Point Park and the Westshore area.

The ultimate goal for the project is to provide a safe and pleasant bicycle/pedestrian facility that is an asset to the local community and strengthens the regional trails network. This study was tasked specifically with identifying:

- A north/south connector corridor between the TNC Greenway and the Courtney Campbell Trail.
- Opportunities to improve connectivity to existing and future community assets/facilities.
- Conceptual design elements to improve safety for pedestrians and bicyclists.

The study area is urban in character with very few opportunities for construction of a shared-use path that is separate from the roadway. Because of the built-out nature of the environment, the proposed bicycle/pedestrian routes must consider the full spectrum of possible bicycle-pedestrian infrastructure improvements including:

- Widened sidewalks or sidepaths (typically a maximum of 8 feet wide)
- Shared Lane Markings (Sharrows) designated by pavement markings
- Expanding roadway pavement for adding bike lanes
- Widened road shoulders
- Installation of traffic calming elements and refuge areas
- Safety devices such as pedestrian/bicycle signals and signing

The figure on this page lists the some of the recommended improvements for each of the three segments defined for the corridor. Additional discussion and details, as well as "Before" and "After" photographs of the recommended improvements for the George Road corridor are provided within the body of this report. As part of these bicycle/pedestrian recommendations consideration should be given to provide for the following elements:

- Safe transitions between all types of improvements
- Wayfind/direction signs
- Improved pavement conditions, including roadway resurfacing to eliminate irregularities
- Bike friendly grates and manholes
- Signal optimization and actuated for bicycle/pedestrian

The George Road corridor proved to be a very challenging environment for bicycle and pedestrian safety. However, it is the most direct route between the TNC Greenway and the U-path

Sports Complex for access to the CCT. The process of the study entailed looking at existing conditions, reviewing research of available information, on-site observations, performing a pedestrian overpass warrant analysis, and performing traffic operational analyses. The George Road improvements identified in this study would achieve the desired connection between the existing TNC Greenway and the U-path for a safer and aesthetically pleasant experience as a bicycle/pedestrian route for persons of all abilities.

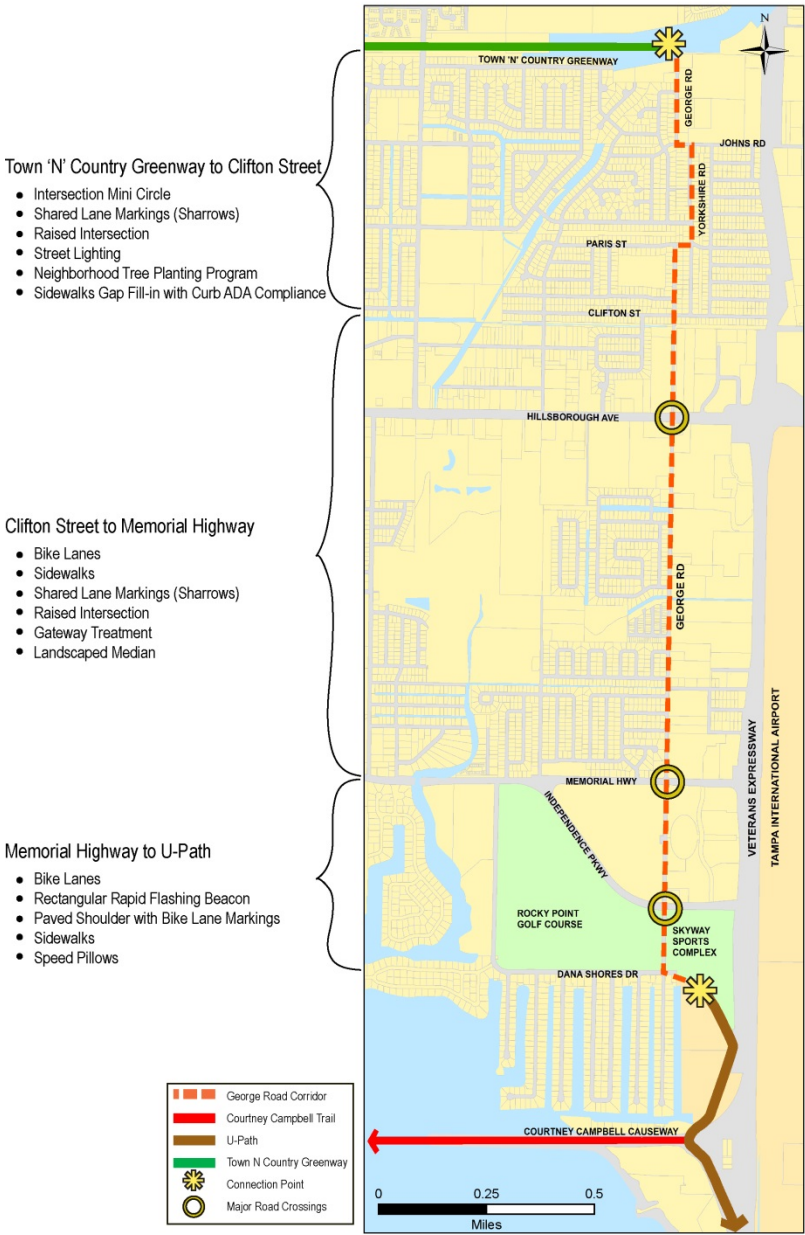
During the course of this study the Hillsborough and Pinellas Counties portions of the CCT have been completed and are proving to be very popular with pedestrians and bicyclists. In addition, the two remaining northernmost segments of the Upper Tampa Bay Trail (UTBT) along with a trailhead at Lutz Lake Fern Road are being constructed, so a connection can be made to the Suncoast Trail.

It is hoped that this study will ultimately assist with the development of the appropriate connection between the TNC community and the Tampa Bay area's existing trails for the recreational and multi-modal transportation benefits for all users.

The preliminary design for the proposed improvements contained herein are generally consistent with the type of traffic calming measures and standards contained in the Neighborhood Traffic Calming (NTC) Manual published by Hillsborough County Public Works Department in 2003.

None of the proposed improvements will cause a degradation of the vehicular levels of service of the corridor. Prior to the final design and construction phase, all appropriate processes and coordination procedures associated contained in the NTC will be followed.

POTENTIAL IMPROVEMENTS



INTRODUCTION

The purpose of the George Road Complete Streets Study is to prepare a preliminary plan with the specific goal of providing a safe connection for bicyclists and pedestrians between the Town 'N' Country (TNC) Greenway and the Courtney Campbell Trail (CCT). The ultimate goal for this plan is to provide safe and pleasant pedestrian and bicycle facilities to the local community and to strengthen the regional trails network. This study was tasked specifically with identifying:

- A north/south connector corridor between the TNC Greenway and the CCT
- Opportunities to improve connectivity to existing and future community assets/facilities
- Identification of potential improvements to enhance bicycle/pedestrian connectivity
- Ranking and prioritization of proposed enhancements

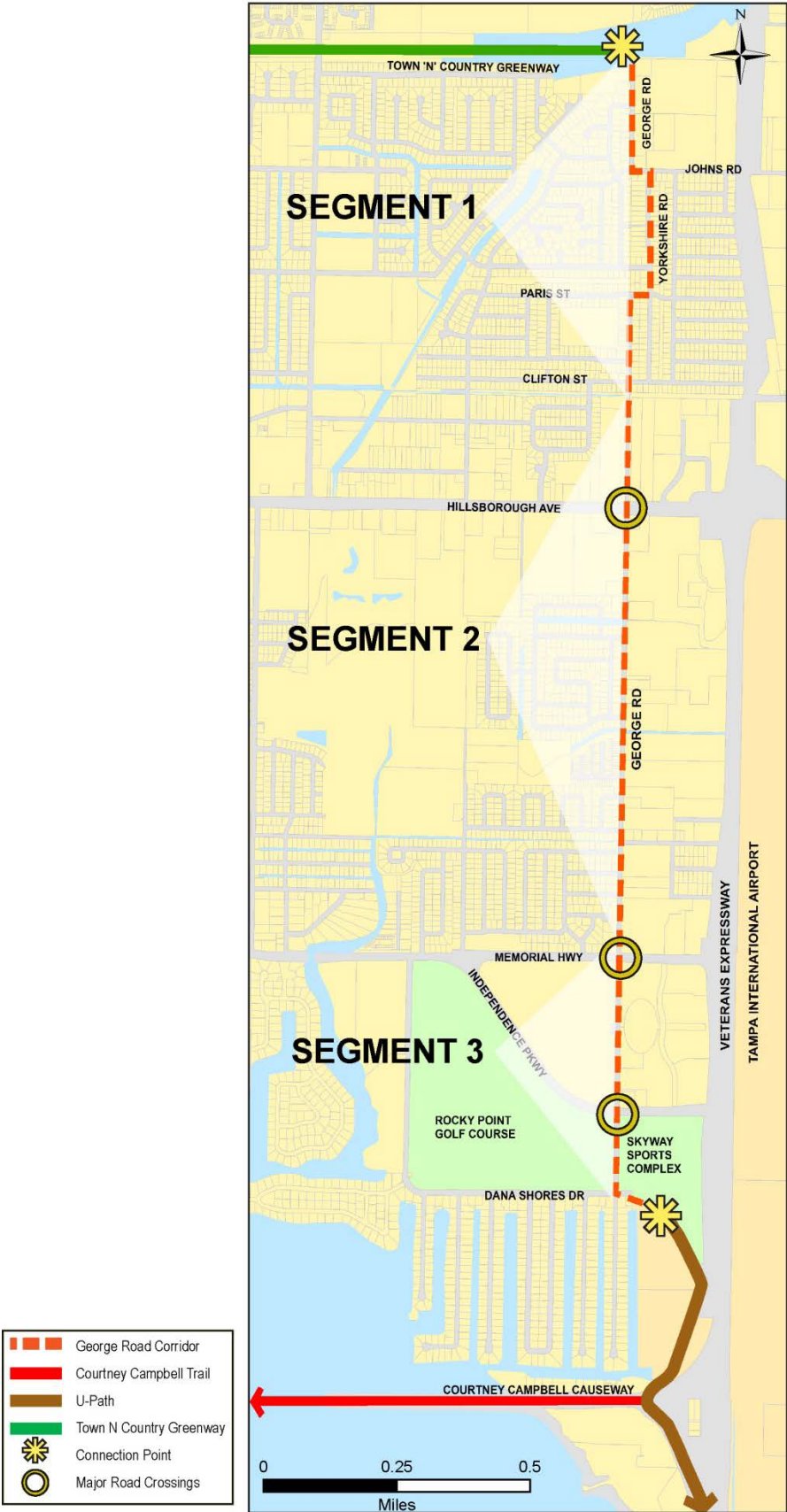
The study area is urban in character with very few opportunities for construction of an exclusive shared-use path, separated from the roadway. Because of the built-out nature of the environment, proposed bicycle/pedestrian routes must consider the full spectrum of possible bicycle-pedestrian infrastructure improvements including:

- Sidewalk gap fill-in
- Mill and resurface roadway
- Widened road shoulders
- Expanding roadway pavement for adding bike lanes
- Shared Lane Markings (Sharrows)
- Installation of traffic calming elements and refuge areas
- Safety devices such as bicycle/pedestrian signals and signing

In addition to the above, and based on feedback from the community, other improvements were considered and are included in this study. These included limited vehicular capacity improvements at the intersection of George Road and Hillsborough Avenue, recommendations for signal timing enhancements, and a study of the potential implementation of a grade separated bicycle/pedestrian crossing at Hillsborough Avenue.

For the purpose of this evaluation, the George Road corridor was broken into three segments as shown in the figure on this page. The segments are as follows:

- Segment 1 –TNC Greenway to Clifton Road
- Segment 2 –Clifton Road to Memorial Highway
- Segment 3 - Memorial Highway to U-Path at Skyway Sports Complex

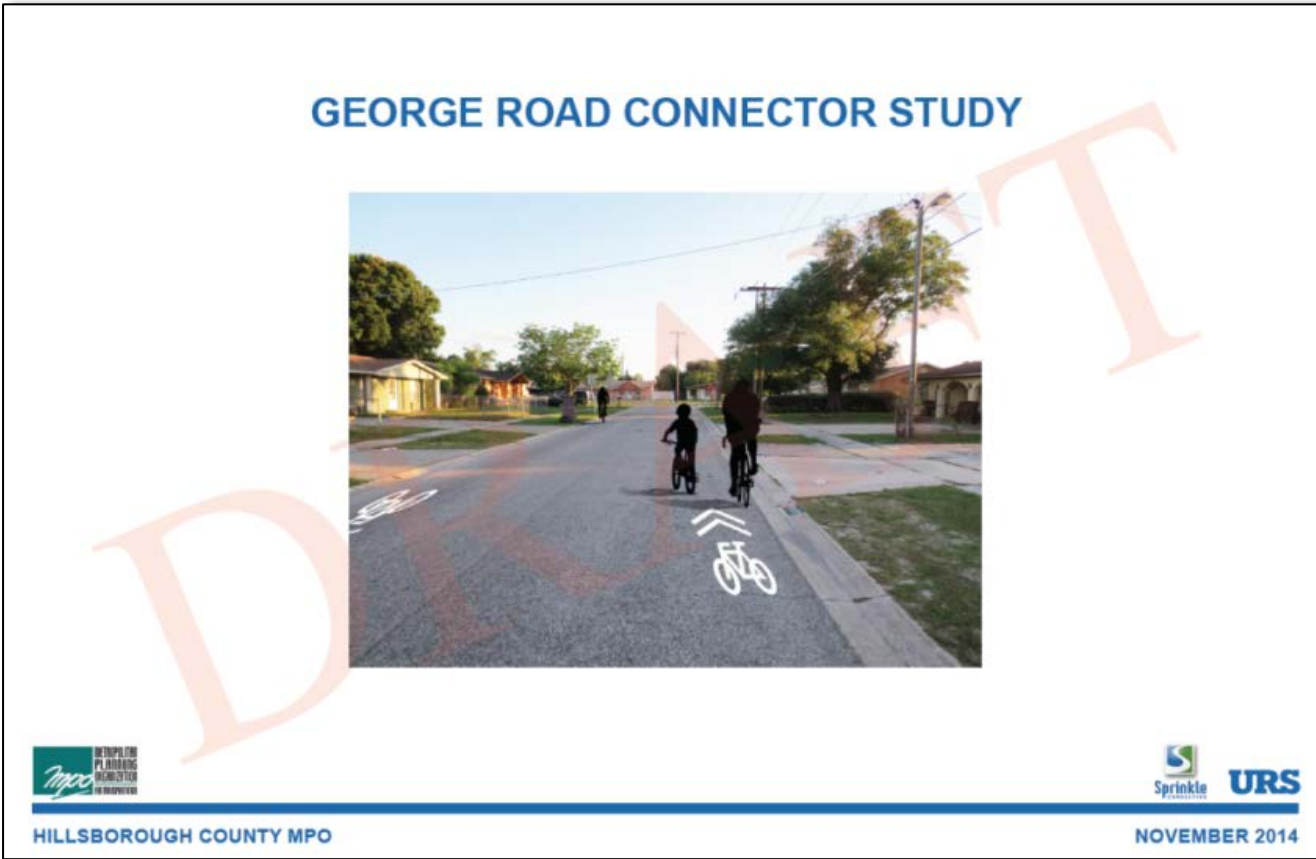


BACKGROUND

In January 2013, AECOM (formerly URS) was retained by the Hillsborough County Metropolitan Planning Organization (MPO) to assist them with planning for a preferred route through the TNC area to connect the existing Upper Tampa Bay Trail (UTBT) with the then under construction CCT. The TNC area has an existing east/west greenway running from Sheldon Road to George Road. The TNC Greenway provides the community access to the UTBT via Sheldon Road bike lanes and a neighborhood bike route. Since the most direct north/south route between the UTBT/TNC Greenway and the CCT is via George Road, this study became known as the George Road Connector Study.

During the course of this study the scope was broadened, from considering only George Road, the study's namesake, as the route for the desired connector, to looking at additional route alternatives through the TNC community. Based on feedback received from stakeholders and from two public meeting as documented in earlier versions of the study, George Road was deemed the most feasible option.

The next sections of this report provide the details of the existing conditions field review that was conducted for the evaluation of potential improvements, the proposed recommended improvement, as well as the preliminary estimated construction costs for the enhanced bicycle/pedestrian route along the George Road corridor.



IMPROVEMENT RECOMMENDATIONS

This chapter provides a detailed assessment of the George Road corridor and expands on the proposed recommendations for bicycling and pedestrian accommodations, while using the existing infrastructure to the fullest extent possible and avoiding the need for right-of-way acquisition.

As in the initial study, this follow-up analysis identifies required bicycle improvements including the combined use of Shared Lane Markings (Sharrows) and the construction of a shared use pathway adjacent to the roadway (commonly referred to as a “sidepath”) as potential measures to make the corridor more comfortable to a broad range of bicyclists. The potential modifications proposed by this study can be made within the existing right-of-way of George Road.

Traffic calming measures are also recommended. Hillsborough County's Neighborhood Traffic Calming (NTC) Manual identifies a toolbox of measures which can be considered on collector and minor arterial roads, including mini circles and raised intersections. George Road has characteristics which could make it a priority for NTC treatments, including a major park or greenway at each end; bicycles sharing the road; discontinuous sidewalks (at present); residences fronting the road; and peak-hour cut-through traffic avoiding the nearby, heavily congested Veteran's Expressway. The NTC program calls for robust public involvement, including a minimum of two public meetings, and the approval of 75% of residents in the affected area by signature on a petition. While the George Road Complete Streets Feasibility Study has held an initial public meeting to hear concerns and a second public meeting to present recommendations, no petition process has been initiated. The Appendix provides more details on the required process for the traffic calming elements of this study's recommendations.

General Comments

All sidewalks along the designated pedestrian path should be audited for Americans with Disabilities Act (ADA) compliance. Where deficiencies are found they should be corrected.

Although it is not encouraged for bicyclists to use the sidewalks as bicycle facilities, it is recognized that some people will ride on sidewalks. It is therefore recommended that the sidewalks along this corridor be modified to make enhance accommodations for pedestrians, as well as, for bicyclists who may choose to use them. Such modifications might include replacing 90-degree angle turns with a more reasonable radii and protecting the ends of obstructions immediately adjacent to the sidewalk. New sidewalks should be located where obstructions or drop-offs are not next to sidewalk.

All traffic signal detection loops should be tested to confirm they will detect bicycles. If they do not they should be replaced. The “sweet spot” on the loops should be marked with Bicycle Detector Pavement Markings and supplemented with a “TO REQUEST GREEN WAIT ON SYMBOL” (R10-22) sign.

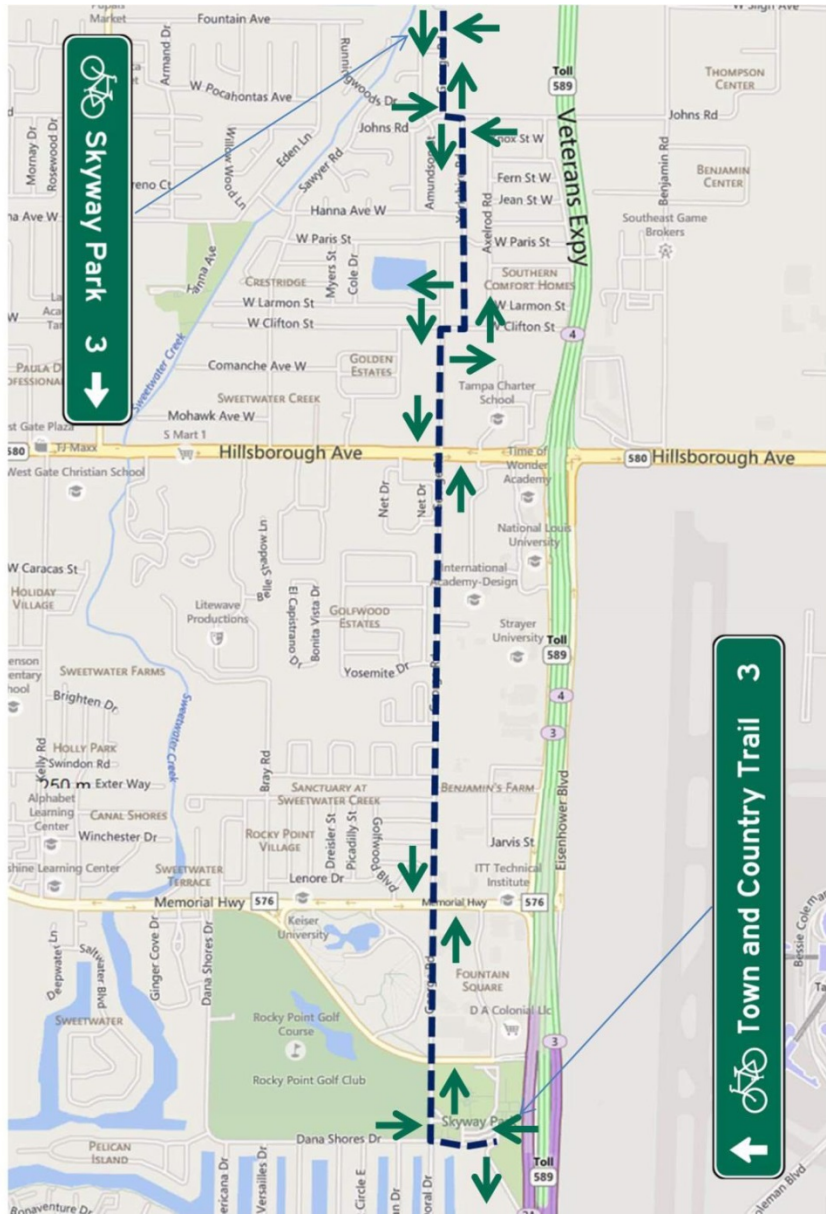
Where Shared Lane Markings (Sharrows) are used, they should be supplemented with “BICYCLES MAY USE FULL LANE” (R4-11) signs.



Signal cycle lengths along the corridor are quite long. Consideration should be given to reducing traffic signal cycle lengths along this corridor, at least during off-peak periods.

Wayfinding should be provided to direct path users between the path south of Skyway Park and the continuation of the path north of George Road. These can be in the form of BIKE GUIDE (D11-1c) signs or horizontal signing (pavement markings mimicking the signs but elongated for better viewing by bicyclists. In addition, BICYCLE DESTINATION (D1-1C) signs should be installed at the existing trail termini to inform path users of how far it is to the continuation of the path network. These signs could possibly also serve as pedestrian guidance to the paths at either end of the connector; however, additional wayfinding for pedestrians may be needed. If horizontal signing is used for bikes, similar markings should be placed on the sidewalk for pedestrians.

There is likely to be some night-time demand for this bicycle/pedestrian connection. For instance, the parks at either end of the corridor have lighted playing fields and users may use the corridor to access those parks. Consequently, improved lighting should be considered along this corridor to reduce potential for evening crashes and increase bicycle/pedestrian use of the George Road corridor.



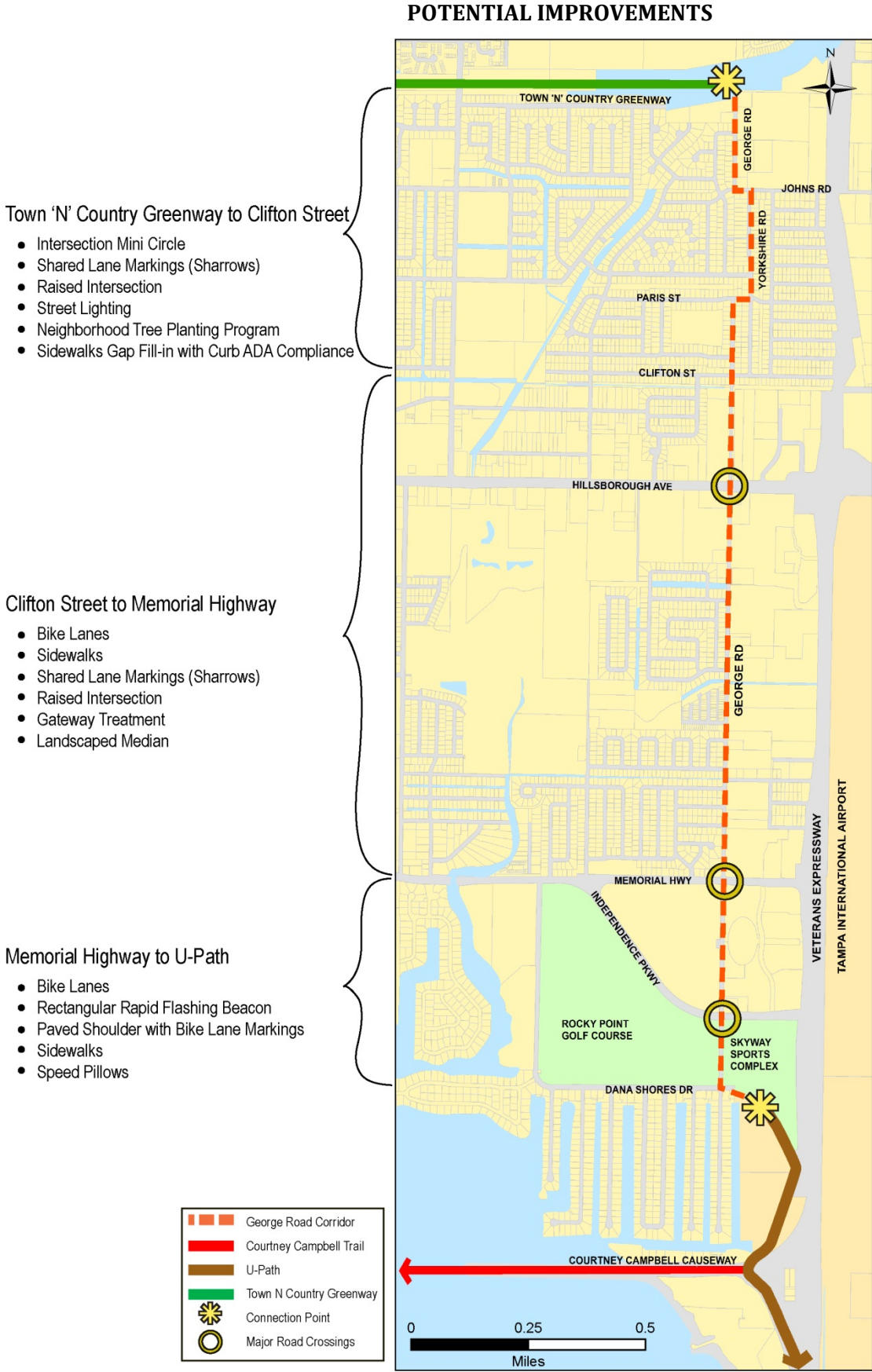
Summary of Potential Improvements

Improvement recommendations vary according to the specific conditions along the George Road corridor. Recommendations include the following types of modifications:

- Provide paved shoulders
- Narrow traffic lanes to provide space for bike lanes
- Resurface where needed to install Shared Lane Markings (Sharrows)
- Eliminate irregularities in pavement such as raised manholes or depressions and make drainage grates bike friendly
- Sidewalk gap fill-in
- Adjust signal cycle lengths at least at off-peak periods
- Traffic signal cycle loop for bicycle detection
- Add wayfinding signs for the length of the corridor
- Add traffic calming such as speed pillows, small traffic circles in residential area and trees to soften treeless streets
- Adjust existing speed humps to make them more visible and bicycle friendly
- Install pedestrian crossings where needed
- Install lighting improvements on the corridor

A graphic showing the locations of the potential improvements including shared lane markings (sharrows), bike lanes, and paved shoulders with bike lane markings is provided here and a set of improvement plans on aerial base is included in the appendix.

Detailed improvement recommendations are provided in the next section of this report.



Findings and Recommendations

George Road is the most direct route between the TNC Greenway and the U-path at Skyway Park; however, it contains a mix of issues that must be overcome. Due to limited right-of-way, the location and abundance of utilities and stormwater drainage facilities along the corridor, the recommendations presented in this report are anticipated to be implemented within the existing right-of-way. The recommendations are presented as a list of improvements which could be implemented as a single improvement project in the short to midterm horizon (0 to 2 years) and other for recommendations (mostly capacity oriented) which can be identified as longer term priorities as they may incur significant improvement costs.

A description of the proposed corridor is provided below, starting at the north limit, the TNC Greenway, and proceeding to the south end at Skyway Park and the U-Path.

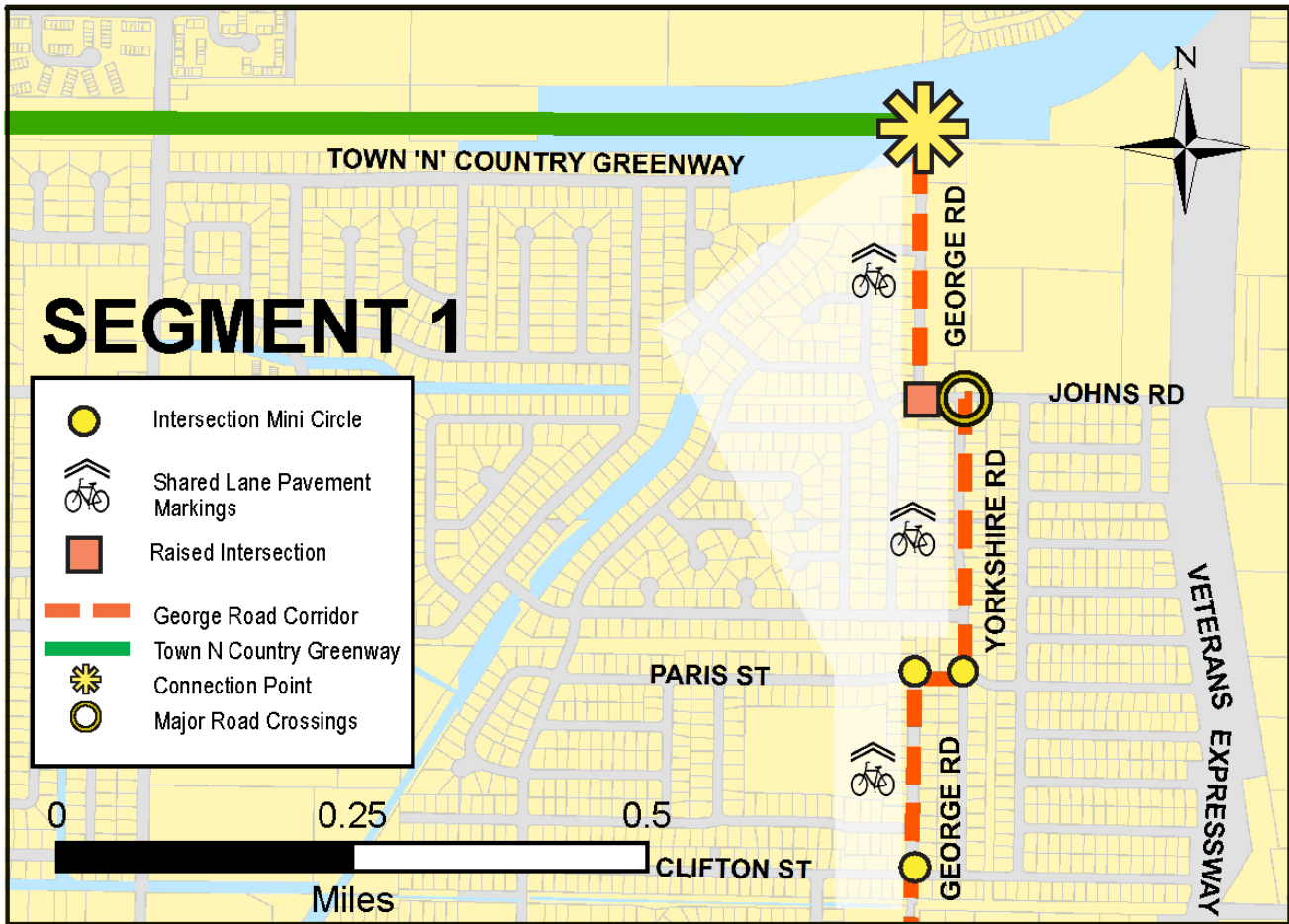
Segment 1 from TNC Greenway to Clifton Street (0.83 mile(s)/4,400 feet)

The north limit of this route connects with the eastern end of the TNC Greenway where George Road dead ends at Channel G. For the first 1,250 feet, south of Channel G, George Road has approximately 50 feet of right-of-way with an existing sidewalk on the east side. The existing sidewalk could be expanded for a sidepath approximately 8 to 10 feet wide.

After the first 1,250 feet, the corridor must be diverted to the east on Johns Road and then utilize Yorkshire Road for approximately 1,500 feet to proceed south because George Road is not continuous between Johns Road and W. Paris Street. The section of George Road north of the Clifton Street drainage channel is in a residential subdivision with many driveways. The right-of-way varies between 50 and 55 feet wide with 24 feet of paved road. There are typically sidewalks with lawn buffers on both sides of the road and mailboxes at the curb edge with valley gutters. This segment of roadway lacks roadway pavement markings delineating the travel lanes. The posted speed is 25 MPH on George Road and Yorkshire Road except near the existing speed humps where 15 MPH is the posted speed. This area would have to utilize sharrows due to limited right-of-way to install bike lanes. Key intersections for Segment 1 include:

- **Yorkshire Road at Johns Road:** The T-intersection is currently controlled by a stop sign for the northbound approach to the intersection (Yorkshire Road). Yorkshire Road is a two-lane undivided roadway with a posted speed limit of 25 mph. Johns Road is a two-lane undivided roadway with yellow-painted lane striping and a posted speed limit of 25 mph. Johns Road is the only east-west access into the Northwest Park residential community. The closest signalized intersection is Benjamin Road at Johns Road, located approximately 0.50 mile(s) to the east, on the east side of the Veterans Expressway. The north side of Johns Road is primarily commercial and industrial commerce park with the south side being residential. Sidewalks are present at the intersection. There is a speed hump with advanced pavement markings but no sign located 100 feet east of the intersection. To the northwest of the intersection is the northern limit of the corridor, where George Road ends at Channel G.

- **At Paris Street and Yorkshire Road:** This road is a 2-lane undivided roadway with a speed limit

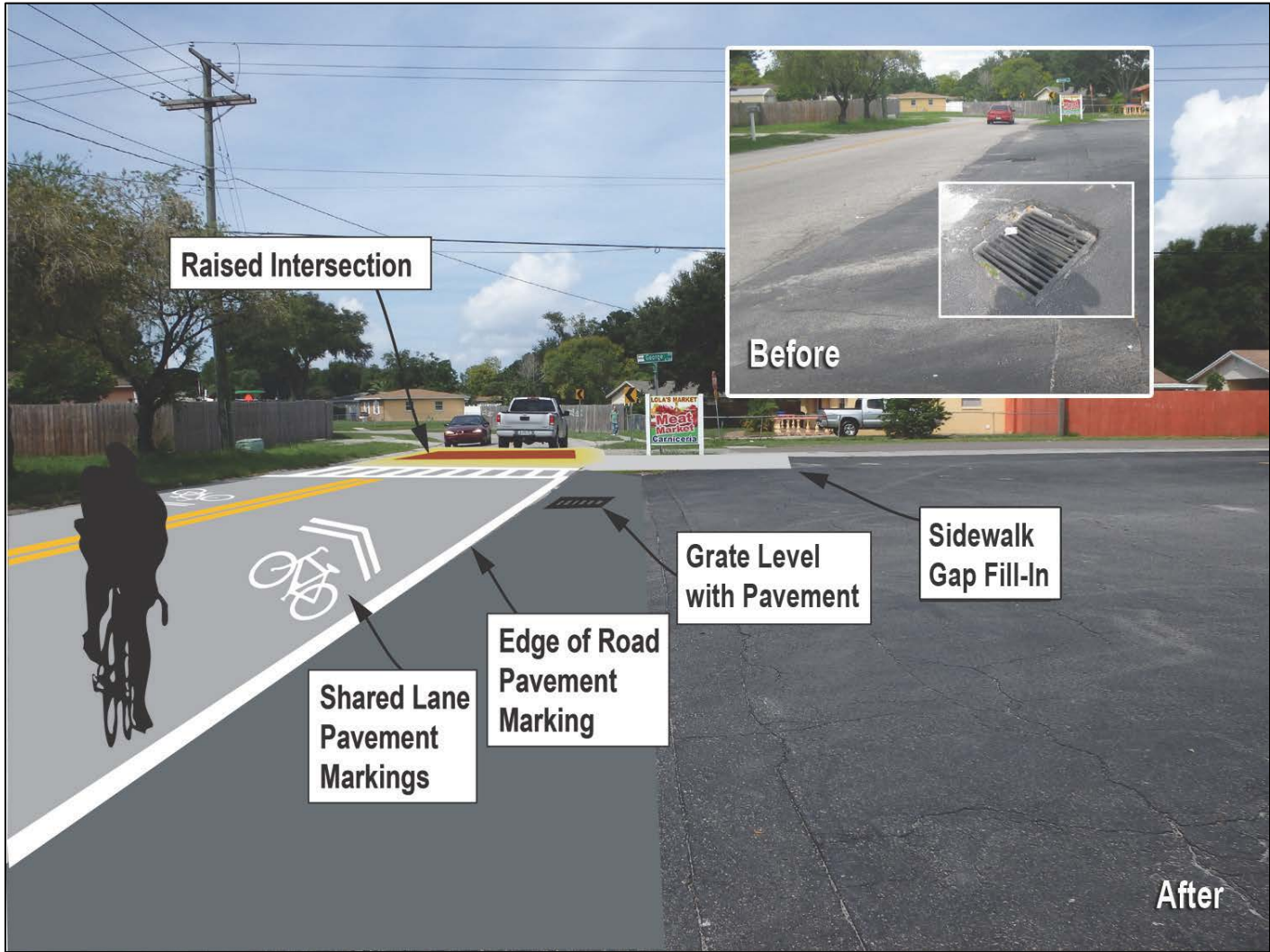


of 25 mph. The intersection is stop sign controlled for the westbound approach of Paris Street. There are speed humps with no signs or advance pavement markings located approximately 250 feet north and south of the Paris Street and Yorkshire Road T-intersection.

- **At Paris Street and George Road Intersection:** This T-intersection is controlled by a stop sign for the northbound approach of George Road. There is a speed hump with 15 mph sign located 100 feet from northbound approach. Paris Street is a two-lane undivided roadway with a posted speed limit of 20 mph. The intersection eastbound and westbound approaches have sidewalks on both sides of the roadway. There is a speed hump with painted marking approximately 150 feet west of the intersection.
- **At Clifton Street and George Road Intersection:** The intersection is currently controlled by a stop sign for the northbound and southbound approaches to the intersection (George Road). George Road is a two-lane undivided roadway with a posted speed limit of 25 mph. Clifton Street is a two-lane undivided roadway with a posted speed limit of 25 mph. This intersection is a one of two north-south access points to the Northwest Park residential community. The closest signalized intersection is SR 580 (Hillsborough Avenue) at George Road, located approximately

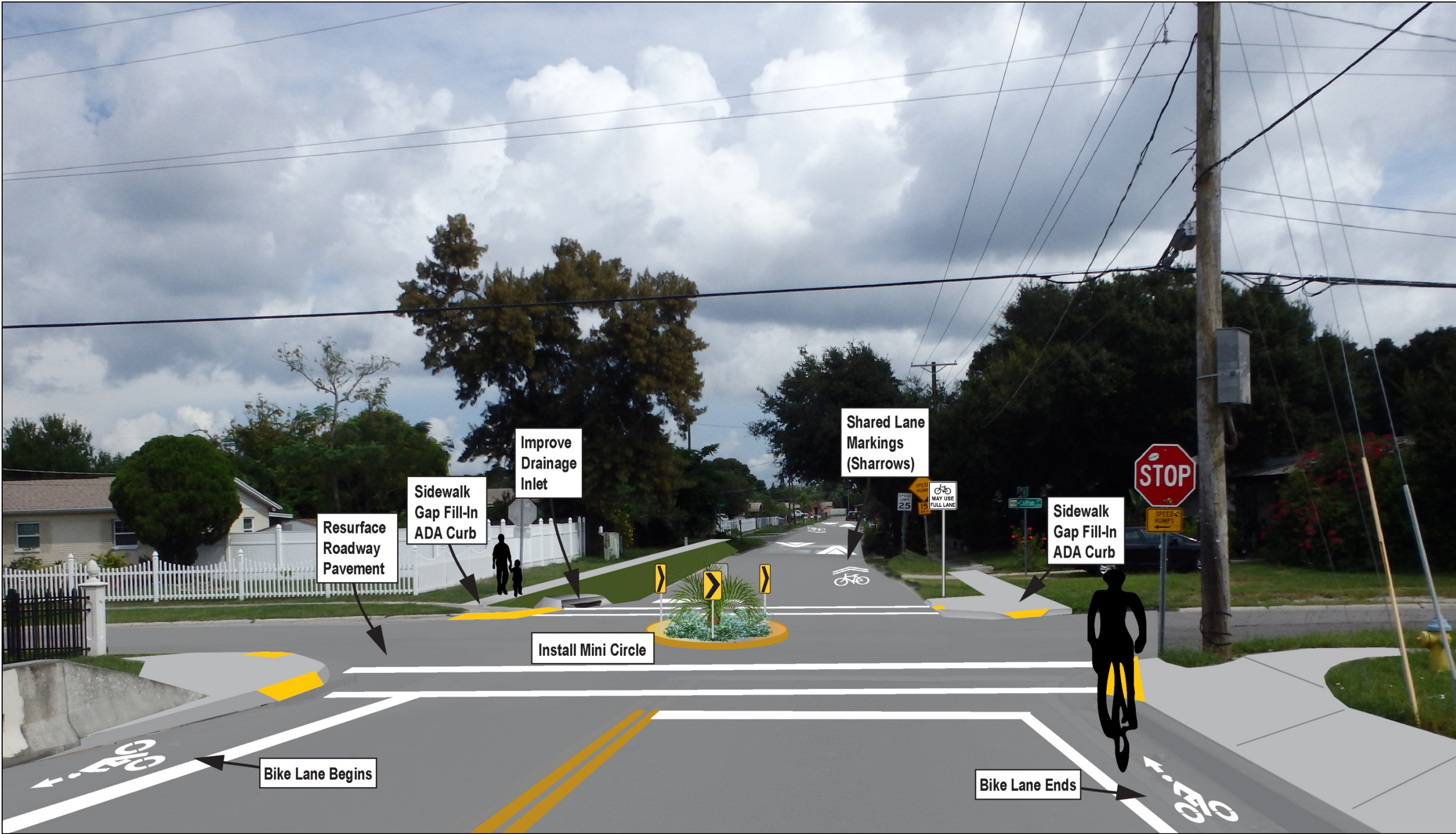
0.28 mile(s) to the south. The George Road northbound approach has a sidewalk, which is behind barrier walls due to a bridge on the east and west sides. The George Road southbound approach has sporadic sidewalks. There is a stop sign but no painted stop bar. This portion of Clifton Street eastbound approach has sidewalk with a lawn buffer on the north side of the street only. The westbound approach has sidewalk with lawn buffer on both sides. Valley gutter shoulders exist on Clifton Street. No roadway pavement markings delineating the lanes on Clifton Street were present. There is no street lighting in the area.

5. Drainage inlets, grates and utility covers should be maintained smooth, flushed with grade and well seated.
6. Install mini circles at Yorkshire Road and Paris Street, Paris Street and George Road, and Clifton Road and George Road intersections.
7. Sidewalk Gap Fill-ins.
8. Paint pavement edge of road marking in front of the grocery store along Johns Road.
9. Resurface roadway pavement.
10. Repaint existing speed humps.
11. Implement Street Tree Program from Clifton to Johns Road.
12. Install street lights.



Improvement Recommendations

1. Keep debris from accumulating on sidewalks on the east side of George Road near Channel G.
2. Improve and secure guardrail and fencing to the pond (as per Design Standards Index 850 or 860 series) on the east side of George Road near Channel G.
3. Regular maintenance of trees and foliage along the east side of George Road near Channel G.
4. Install Shared Lane Markings (Sharrows) immediately after intersections and at a maximum spacing of 250 as per Design Standards, Index 17347 and the MUTCD.





Segment 2 from south of Clifton Street to Memorial Highway (1.23 mile(s)/6,500 feet)

South of W. Clifton Street, George Road crosses the drainage channel and then traverses vacant wooded land and wetlands as it extends south to Hillsborough Avenue. The right-of-way width is approximately 60 feet wide and there is a 10-foot wide multi-use path behind a guardrail on the east side of the road. This existing 10-foot wide path is between the guardrail and a fence or wall at the private property edge.

Commercial properties border the four corners of the intersection of George Road and W. Hillsborough Avenue. There are recently improved crosswalks with high emphasis markings and pedestrian signal lights on all legs of the intersection.

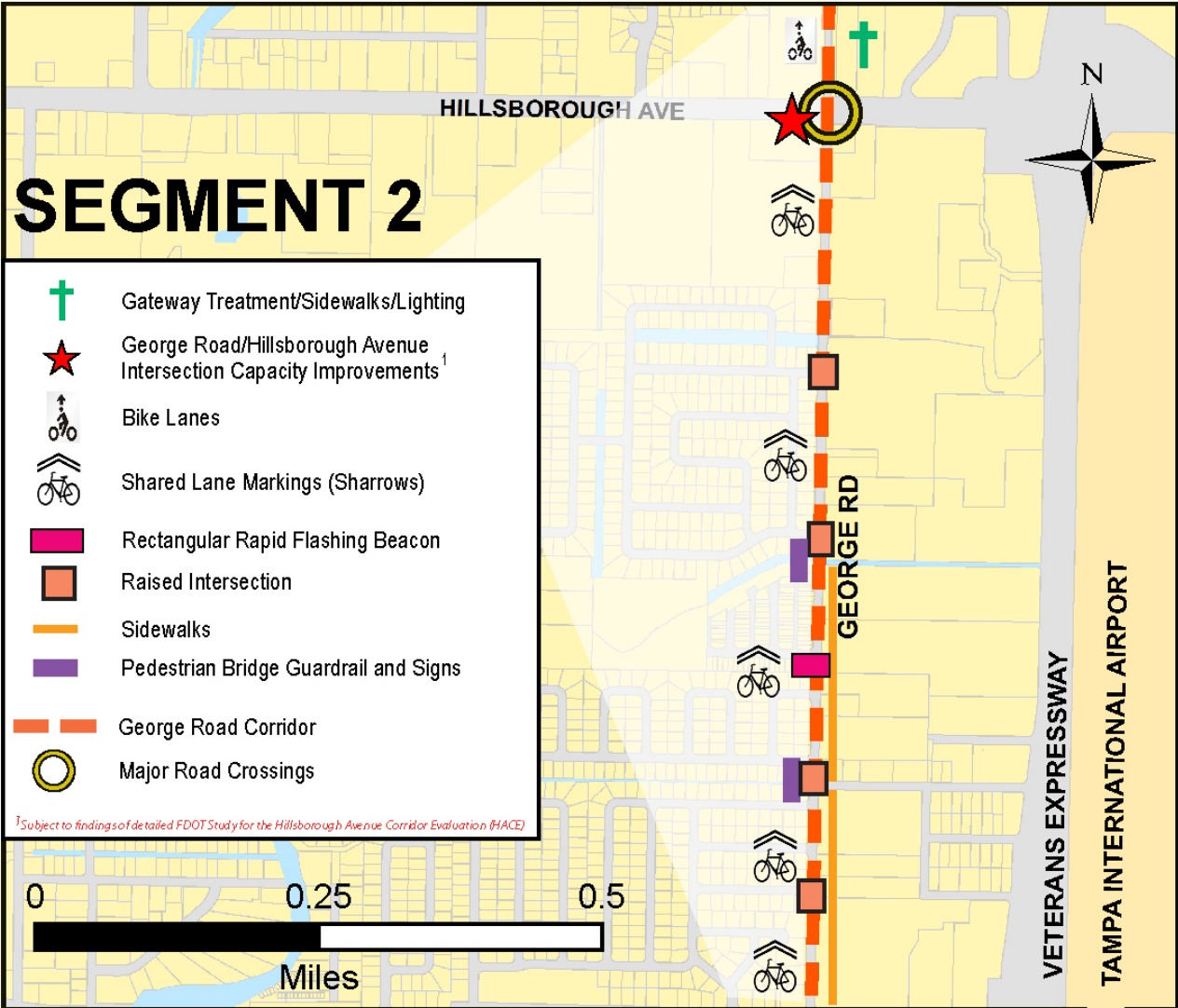
In the segment of George Road between Hillsborough Avenue and Memorial Highway the right-of-way width varies between 60 and 70 feet wide. There are varying conditions of sidewalk, rural type drainage ditches and roadway paving widths typically ranging from 22 to 26 feet wide but expanding to 36 feet wide approaching the north side of the intersection of George Road and Memorial Highway. The land use is generally office and commercial on the east side which generates high volumes of peak hour traffic, and mostly residential on the west side of the roadway. This segment of George Road is a collector road that runs parallel to Eisenhower Boulevard and the Veterans Expressway.

- South of Clifton Street to Hillsborough Avenue:** This segment of George Road is approximately 1500 feet in length. Just south of Clifton Street, a bridge approximately 120 feet long with approximately 5-foot wide sidewalks and a 3-foot tall concrete wall exists on both sides of the roadway, crossing an existing drainage channel. On the west side, the sidewalk continues 5 feet wide with a 4-foot grass buffer and with one driveway access to Hillsborough Avenue. On the east side, the sidewalk varies from 5 to 12 feet wide and a typical roadside guardrail. This section of sidewalk was retrofitted by replacing grass buffer with a gravel-type pavement, instead of concrete sidewalk pavement. Although the sidewalk is continuous and level, there are irregularities in the surface of the path. The guardrail is in good condition with the exception of the end point, near Hillsborough Avenue, where damage is evident from a collision or high impact.
 

- George Road at Hillsborough Avenue:** One of the key issues commented by the public during the several workshops for the project dealt with congested traffic conditions and the ability of bicyclists and pedestrians to cross the Hillsborough Avenue and George Road intersection. This is the most traveled of all intersections within the corridor, so this section provides a summary of existing and future conditions for this specific location.
 

Based on public feedback about traffic congestion and

safety for this location, an evaluation of existing and future traffic conditions was conducted for this intersection. A traffic operations analysis was performed using currently adopted procedures outlined in the 2010 Highway Capacity Manual (HCM) methodology module of Synchro Version 8 software for both existing geometry, existing with improvements and future conditions. The capacity analysis details for existing and future conditions have been provided in the Appendix.



George Road at Hillsborough Avenue Intersection Operational Analysis

Table 1 shows the results of the existing operations analysis. The results indicate that under the existing condition with no additional improvements, the intersection is not operating at an acceptable level of service (LOS) of D or better.

**TABLE 1
EXISTING YEAR (2015) INTERSECTION LOS**

Intersection	Control Type	Lane Group/ Approach	AM/PM Peak			
			Existing Geometry		Additional Improvements	
			Average Delay	LOS	Average Delay	LOS
Hillsborough Avenue and George Road	Signal	Eastbound	45.0/56.4	D/E	50.0/44.2	D/D
		Westbound	50.9/52.0	D/D	49.1/42.7	D/D
		Northbound	117.0/193.8	F/F	58.0/90.5	E/F
		Southbound	251.7/171.9	F/F	106.0/151.1	F/F
		Overall	69.1/80.4	E/F	54.9/55.0	D/D

The results for the intersection with additional improvements are also shown in Table 1. The intersection was analyzed using existing geometry and signal timings and phasing with incremental potential improvements in order to reduce the overall delays and improve the overall LOS. As shown, the intersection is expected to operate within the acceptable LOS standard with the following improvements considered:

- signal phasing converted to split phase for northbound/southbound approaches;
- a shared northbound left turn;
- an exclusive northbound right turn; and
- an additional exclusive southbound (dual) left turn.

For future conditions, the No Build alternative was analyzed using existing geometry and signal timings and phasing. **As shown in Table 2**, the results of the future year (2040) operations analysis indicate that under the future conditions with no additional improvements, the intersection is not expected to operate at an acceptable LOS.

**TABLE 2
FUTURE YEAR (2040) INTERSECTION LOS**

Intersection	Control Type	Lane Group/ Approach	AM/PM Peak			
			No Build (Existing Geometry)		Build (Additional Improvements)	
			Average Delay	LOS	Average Delay	LOS
Hillsborough Avenue and George Road	Signal	Eastbound	58.1/60.6	E/E	53.1/43.7	D/D
		Westbound	56.6/66.1	E/E	48.3/53.0	D/D
		Northbound	129.0/208.4	F/F	44.9/71.0	D/E
		Southbound	267.9/181.4	F/F	91.4/107.8	F/F
		Overall	79.3/90.5	E/F	54.0/54.9	D/D

The results for the future conditions with additional improvements are also shown in Table 2. Additional improvements needed were determined in order to achieve a better LOS than under the No-Build alternative at the intersection. The intersection was analyzed using optimized

timings and phasing with. As shown, the intersection is expected to operate within the acceptable LOS standard with the following improvements considered for year 2040:

- an additional westbound left turn lane;
- an additional northbound left turn lane;
- an exclusive northbound right turn lane;
- an additional southbound left turn lane; and
- an additional southbound receiving lane on George Road, south of Hillsborough Avenue.

It should be noted that this intersection is part of the Hillsborough Avenue Corridor Evaluation being conducted by FDOT District 7. Findings from that study will provide a more detailed assessment of long term future needs for this location.

Evaluation of Pedestrian and Bicycle Activity at Hillsborough Avenue

One of the issues raised by the public during earlier phases of the study dealt with the potential for a grade-separated pedestrian/bike crossing at Hillsborough Avenue. In order to address this issue, counts of pedestrian and bicycle activity at George Road and Hillsborough Avenue were conducted. The total pedestrian count was 111 pedestrians and 62 bicycles during the 7:00 - 10:00 AM, 11:00 AM -1:00 PM and the 3:00 - 6:00 PM peak periods. Of these totals, **Table 3** provides a summary of the pedestrians and bicycles counted that crossed from one side of the roadway to the other side along Hillsborough Avenue and George Road.

**TABLE 3
PEDESTRIAN AND BICYCLE TRAFFIC CROSSING GEORGE ROAD AND HILLSBOROUGH AVENUE**

Date/Time	Pedestrians and Bicycles Crossing George Road		Pedestrians and Bicycles Crossing Hillsborough Avenue		
	Pedestrian	Bicycle	Pedestrian	Bicycle	
09/03/15	AM	16	7	24	10
	Midday	17	10	15	10
	PM	16	13	23	12
	Total	49	30	62	32

The study did not identify major safety issues relating to pedestrian and bicycle flows, as most cyclists and pedestrians stopped, used the push-buttons and waited for the pedestrian signals before entering the crosswalk.

Further analysis of a grade-separated pedestrian crossing was conducted as a potential improvement for pedestrian safety based on the public feedback received. Pedestrian and vehicle data for the corridor was used in the warrant analysis. **Table 4** summarizes warrants for a potential pedestrian overpass facility. To determine if a grade-separated crossing is warranted, several sources were referenced including the FDOT Florida Pedestrian Facilities Planning and Design Handbook. The data required to evaluate the overpass facility warrants include:

- Warrant 1 - Volume of Pedestrian and Bicycle Traffic

- Warrant 2 – Volume of Vehicle Traffic
- Warrant 3 – Proximity of “Safe” Alternative Crossings

**TABLE 4
PEDESTRIAN OVERPASS FACILITY WARRANTS HILLSBOROUGH AVENUE AND GEORGE ROAD**

Warrant	Description	Pedestrian Zone 1					Met	
		Volume Threshold		Average Hourly	4-Hour	Conclusion		
		Hourly	4-Hour			Hourly		4-Hour
1	The projected hourly pedestrian and bicycle volume should be greater than 50 per hour, or 100 in four hours. Other factors such as pedestrian safety and the proximity to a school may warrant a lower pedestrian / bicycle volume threshold.	50	100	21.35		No	No	
		4-Hour Period	ADT, if over 40 mph	4-Hour Period	ADT, if over 40 mph	4-Hour Period	ADT, if over 40 mph	
2	Vehicle volumes on the roadway that would be spanned by the overpass should be more than 10,000 in the same four-hour period as the pedestrian volume, or have an ADT greater than 35,000 vehicles if vehicle speed is over 40 mph, and the proposed site is in an Urban area.	10,000	35,000		61,200		Yes	
		Nearest "safe" crossing (feet)		West Nearest "safe" crossing (feet)		East Nearest "safe" crossing (feet)		
3	The proposed site is located more than 600 feet from the nearest alternative "safe" crossing. A "safe" crossing is defined as a location where a traffic signal stops vehicles to create adequate gaps for the pedestrians to cross.	Greater than 600 feet		600		600		

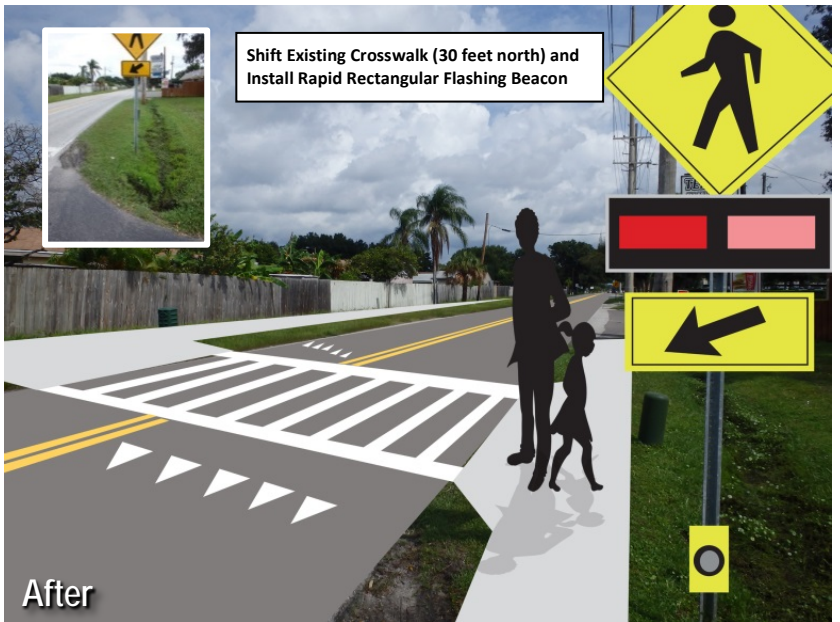
The overpass analysis **warrants were not met**; consequently, a grade-separated pedestrian crossing is not justified at this time.

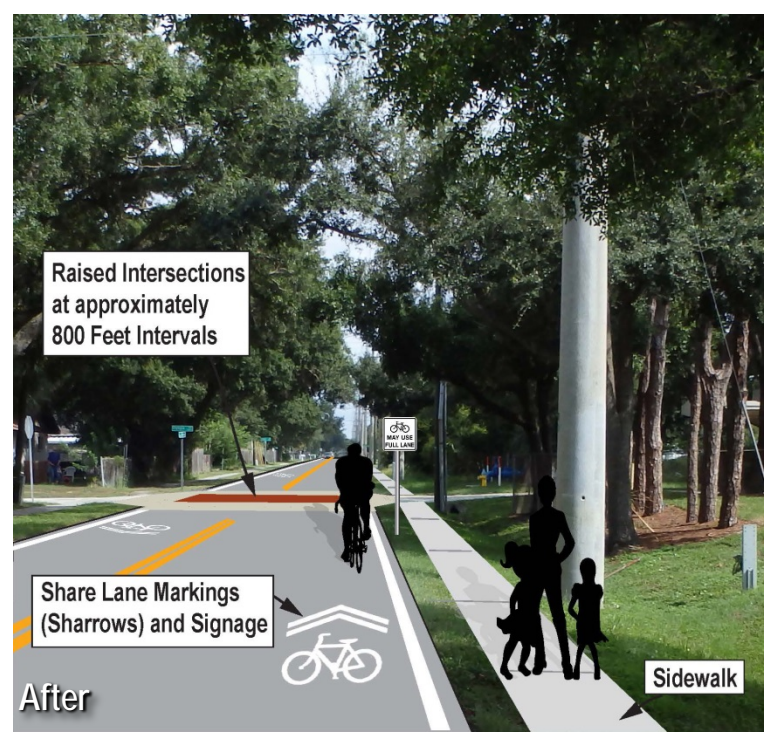
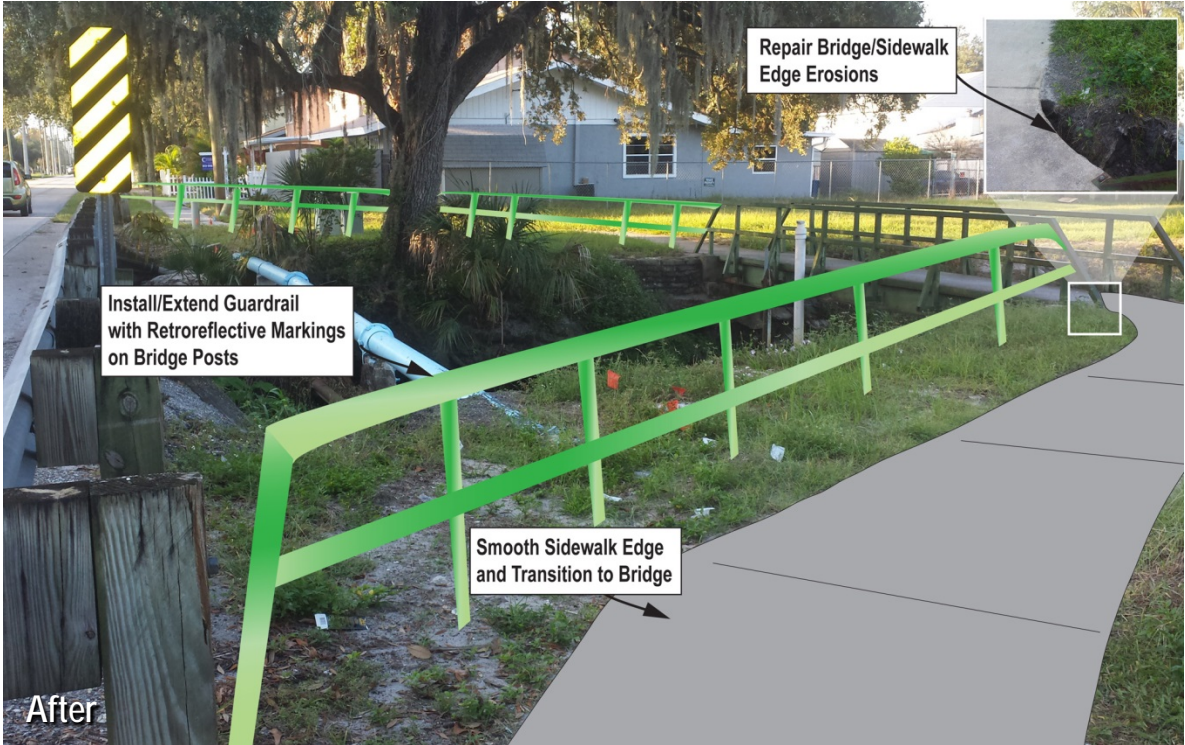
George Road between Hillsborough Avenue and Memorial Highway: As noted previously, this section of George Road includes various land uses. The land use to the east are predominately commercial including a small local grocery store, convenience gas station/store, two churches, dialysis center, and medical supply facility. The sidewalks existing on the west side include gaps where there are existing driveways and large drainage ditches. To the west side the land use is predominately single-family residential. There is existing continuous sidewalk on the west side with two bridge crossing over drainage channels. The conditions at both bridges include overgrowth grass, shrubs and trees and some erosion of landside was noted. There were no signs or lighting directing pedestrians to the bridges. Approximately, 0.4 mile(s) south of Hillsborough Avenue, a pedestrian crossing which does not meet the minimum standard for a crosswalk as it is located

directly within an existing driveway as well as does not provide sidewalk access on either side of the roadway.

Improvement Recommendations

1. Install Shared Lane Markings (Sharrows) immediately after intersections and at a maximum spacing of 250 as per Design Standards, Index 17347 and the MUTCD from Hillsborough Avenue to Memorial Highway.
2. Replace guardrails with pedestrian friendly railing with decorative lighting on both sides of the roadway from Clifton Street to Hillsborough Avenue.
3. Install customized gateway treatment as an entry point to TNC near the George Road and Hillsborough Avenue intersection.
4. Pedestrian bridges should be inspected for erosion and programmed maintenance of overgrowth.
5. Improve guardrail with retroreflective markings on bridge posts and secure fencing to the pond (as per Design Standards Index 850 or 860 series) on the two bridges located on the west side of George Road between Hillsborough Avenue and Memorial Highway.
6. Install raised intersection treatments at Alta Monte Drive, Yosemite Drive, Chelsea Street and Olympia Avenue. Raised intersection provides a traffic calming effect for drivers to slow down as well as provide for a pedestrian crossing area when signed W11-2 and W16-7P per MUTCD standard for non-vehicular warning signing.
7. Existing pedestrian crossing should be relocated north approximately 30 feet to the north, outside of the driveway opening. The crossing should be illuminated, marked and signed in accordance with the MUTCD, Traffic Engineering Manual (Section 3.8) and Index 17346, Design Standards.
8. Repainting of all faded crosswalks identified within the corridor is recommended.
9. Install Bike Lane Markings and Striping between Clifton Street and Hillsborough Avenue.
10. Resurface roadway pavement.
11. Install landscape medians just south of Hillsborough Avenue.





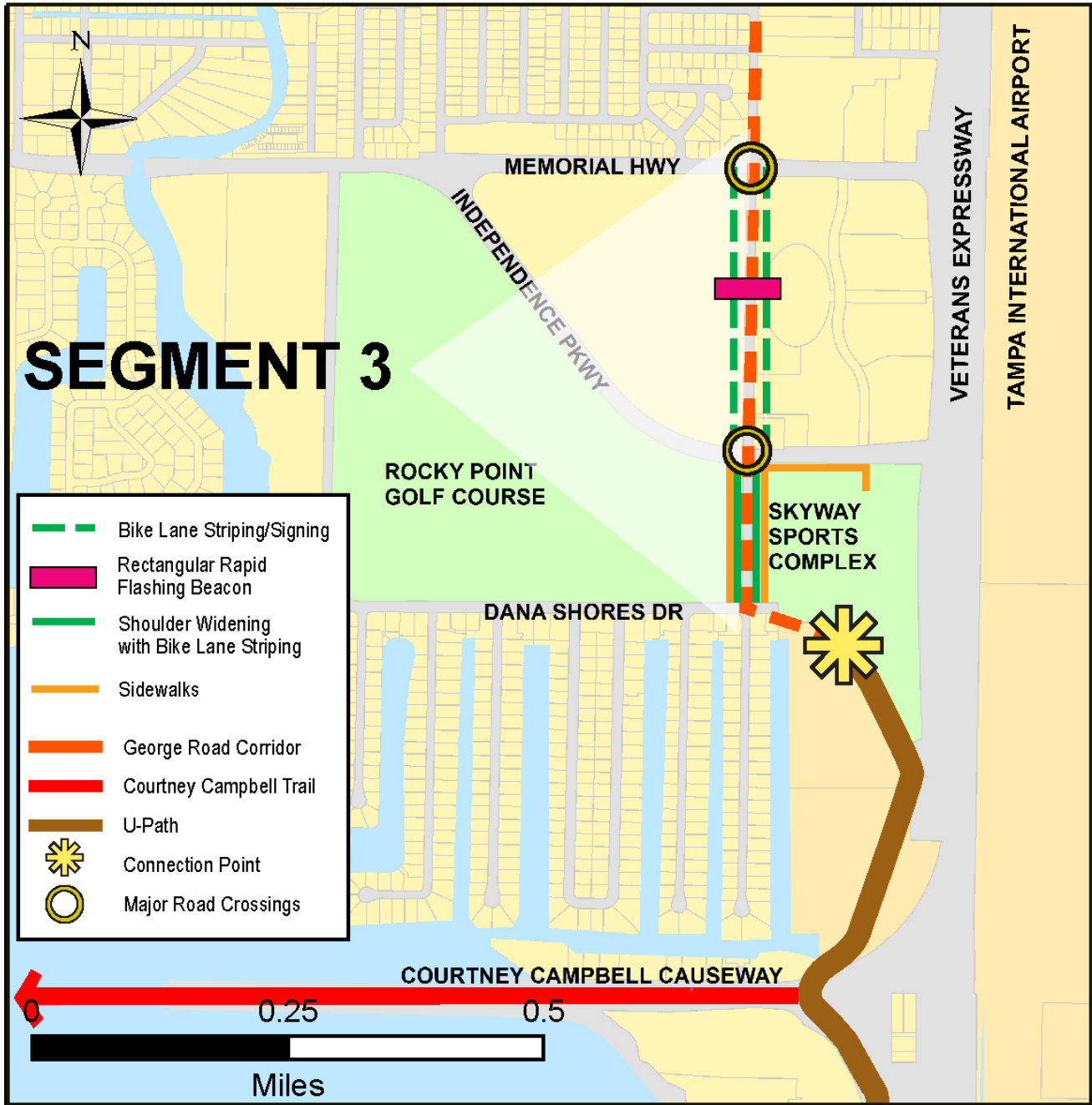
Segment 3 from Memorial Highway to U-Path at Skyway Sports Complex (0.57 mile(s)/3,000 feet)

Between Memorial Highway and Independence Parkway, George Road becomes a four-lane roadway with center turn lanes and sidewalks on both sides of the roadway. A marked midblock pedestrian crossing is located approximately 750 feet south of Memorial Highway with a raised concrete median. Just south of the pedestrian crossing, the open median area (350 feet) includes a two-way left turn lane (TWLTL) providing access to parking lots on both sides of the George Road followed by raised concrete islands (90 feet). Large power transmission poles limit the space somewhat on the east side for this segment. Both Memorial Highway and Independence Parkway are signalized with existing pedestrian signal lights and crosswalks on all legs of the intersection. Memorial Highway and Independence Parkway provide direct east-west access the Veterans Expressway.

- George Road at Memorial Highway:** Memorial Highway is a 4-lane divided roadway with a speed limit of 45 mph. For George Road, the north approach is 2-lane undivided roadway and the south approach is 4-lanes undivided with a posted speed limit of 35 mph. All approaches include exclusive left-turn lanes. The intersection is signal controlled with fading marked crosswalks and pedestrian signals. There are existing sidewalks which do not meet ADA compliance standards. In the northwest quadrant, there a gasoline/ convenience store. In the northeast quadrant, the sidewalk along Memorial Highway drops off with no continuous sidewalk on the east side of George Road.



- George Road at Independence Parkway:** Independence Parkway is a 4-lane divided roadway with a speed limit of 40 mph and exclusive left turn lanes. On George Road, the north approach is 4-lane undivided and the south approach is 2-lanes undivided with a posted speed limit of 35 mph and exclusive left and right turns lanes. The intersection is signal controlled with ladder-type crosswalk markings but there are no additional pedestrian warning signs near the intersection. There are slabbed concrete pads at the south approach which do not meet ADA compliance standards. In the northeast quadrant is an electrical power substation. The Rocky Point Golf Course and Skyway Sports Complex are located in the southwest and southeast quadrant, respectively. South of Independence Parkway, there are no existing sidewalks or paved shoulders along George Road.



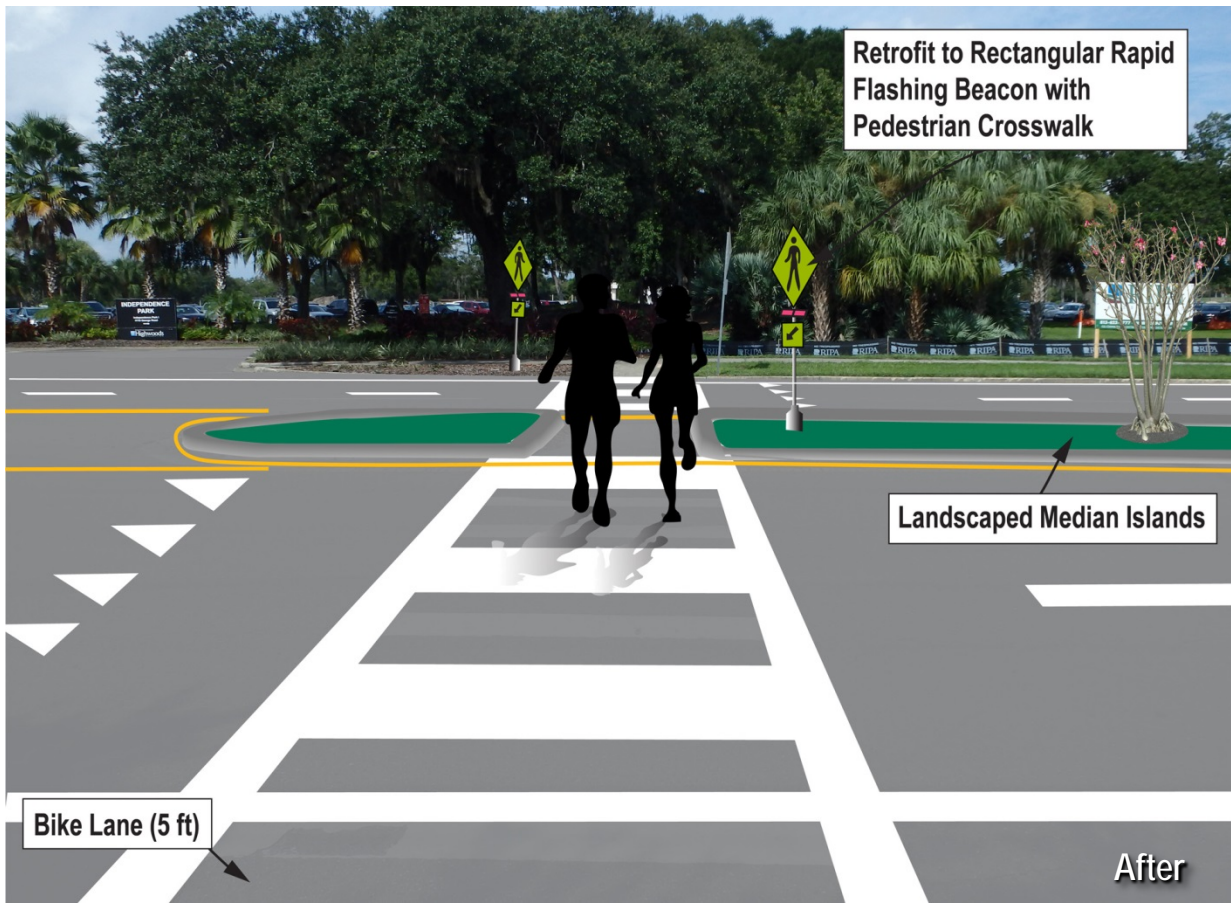
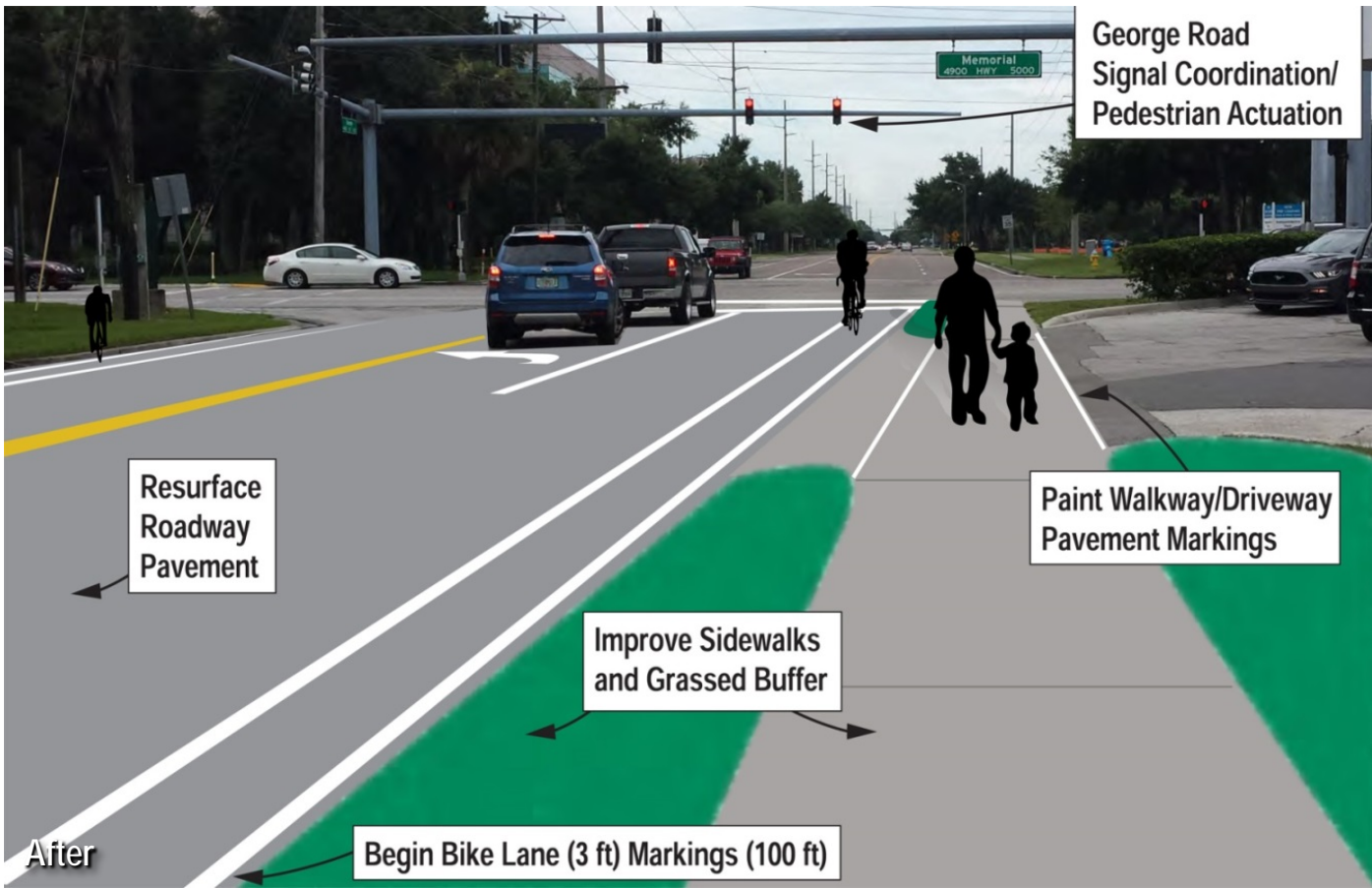
- George Road from Independence Parkway to the Sky Sports Complex:** This section of George Road includes the Skyway Sports Complex on the east side, Rocky Point Gulf Course to the west and the Dana Shores Community to the south. George Road is a 2-lane undivided roadway with no sidewalks, open ditches on both sides and a 3-foot paved shoulder on the west side. Just south of the Skyway Sports Complex is the proposed connection to the U-path.
- U-Path Connection south of the project area within Skyway Sports Complex:** The bollards at the west end of Bayport Road are very close together and vegetation along the side of the path

encroaches on the trail and effectively narrows the path considerably. The U-path Trail from the south enters an ungated derelict road from the southeast corner of the parking lot. From this point there is no clear bike route through the park or access to Dana Shores Drive or George Road. The sports complex has a gated split driveway out to George Road and a gated driveway to Dana Shores Drive. The perimeter outside the baseball fields includes swales.

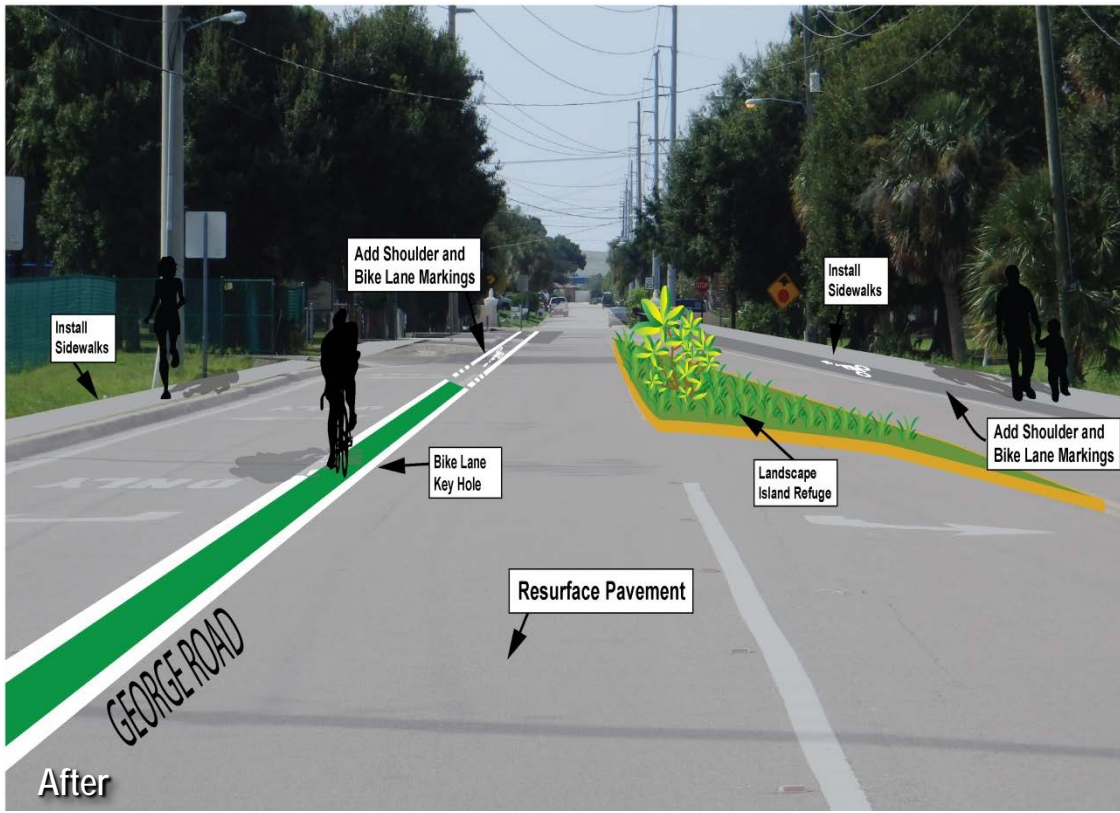
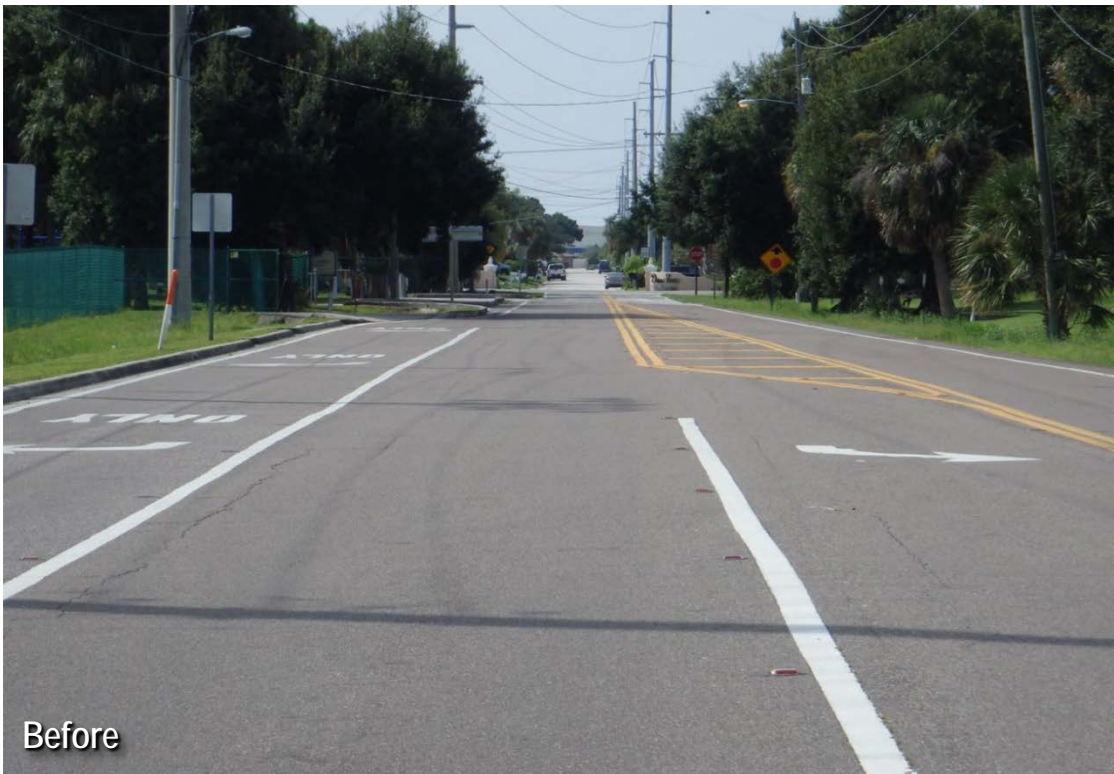
Improvement Recommendations

1. Retrofit both sides of George Road to include bike lanes between Memorial Highway and Independence Parkway.
2. At Memorial Highway intersection all crosswalks should be restriped with high emphasis markings.
3. At Memorial Highway intersection sidewalks are in need of repair near the gas station and should meet ADA compliance standards.
4. Retrofit existing midblock pedestrian crossing, between Memorial Highway and Independence Parkway, to a high emphasis crosswalk with Rectangular Rapid Flashing Beacon and landscaping.
5. Install new high emphasis crosswalk with Rectangular Rapid Flashing Beacon and 120-foot raised landscaped island median within the center lane. Provide approximately 150-foot exclusive left turn lane into Independence Park parking lot.
6. Retrofit raised median at Fountain Square II with landscaping.
7. At Independence Parkway intersection south approach, install bike keyhole.
8. Install 800 feet of new sidewalk on the south side of Independence Parkway, east of George Road. Provide for gated opening to the Skyway Sports Complex.
9. Install 5-foot paved shoulders and stripe for bike lanes on both sides of George Road between Dana Shores Drive and Independence Parkway.
10. Install raised median with landscaping, replacing the painted striped area near Skyway Sport Complex entrance/exit.
11. Provide new path via Dana Shores into Skyway Sports Complex to connect with the U-path. Existing park gates may need to be moved.
12. Install bollards to internal pathway connecting at the parking lot inside the Skyway Sports Complex to prevent vehicles from this area. Yellow striping should be provided around the bollards per MUTCD standards.
13. Consideration should be given to removing the bollards or at least all but the central bollard at the west end of Bayport Road. Yellow striping should be provided around the bollard per MUTCD standards.
14. Signal upgrades for the George Road intersections with Memorial Highway and with Independence Parkway should be considered by Hillsborough County Public Works in order to allow detection of bicyclists. Signals should all have full pedestrian detection features and count down timers.
15. Resurface roadway pavement.
16. Install landscape medians between Memorial Highway and Independence Parkway.









COST ESTIMATES

Costs allowance covers typical upgrades and modifications for selected potential improvements including but not limited to lane modifications, signal cycle length adjustments, providing bike sweet spots on traffic signal detection loops, supplemental bicycle signing, wayfinding signing, receiver sidewalks and bike lanes, pavement repairs to adjust drainage gates and manhole heights. NOTE: These costs are generic in nature and not based on actual construction drawings. They are for reference purposes only. The costs also do not take into account any right-of-way taking or additional drainage improvements that may be required based on a comprehensive drainage analysis.

**TABLE 5
COST ESTIMATES**

SEGMENT 1 FROM TOWN 'N' COUNTRY GREENWAY TO CLIFTON STREET (0.83 MILE(S)/4,400 FEET)

Recommended Improvement	Quantity/Length	Cost	MOT 15%	Mobilization 15%	Subtotal	Scope Contingency 25%	PE/CEI 30%	Total Construction Cost
Shared Lane Markings (Sharrows)	4,300 linear feet	\$21,500	\$3,225	\$3,709	\$28,434	\$7,108	\$10,663	\$46,205
Mini Circles	3 intersections	\$45,000	\$6,750	\$7,763	\$59,513	\$14,878	\$22,317	\$96,708
Raised Intersection	1 intersection	\$30,800	\$4,620	\$5,313	\$40,733	\$10,183	\$15,275	\$66,191
Street Lighting	16 lamps/poles	\$78,100	\$11,715	\$13,472	\$103,287	\$25,822	\$38,733	\$167,842
Sidewalk Gap Fill-In	100 feet	\$3,000	\$450	\$518	\$3,968	\$992	\$1,488	\$6,447
Curb Ramps at Clifton St (ADA Compliant)	4 curbs	\$14,400	\$2,160	\$2,484	\$19,044	\$4,761	\$7,142	\$30,947
Mill and Resurface Roadway	0.83 mile(s)	\$326,830	\$49,024	\$56,378	\$432,233	\$108,058	\$162,087	\$702,378
SEGMENT 1 TOTAL CONSTRUCTION COST								\$1,116,717

SEGMENT 2 FROM CLIFTON STREET TO MEMORIAL HIGHWAY (1.23 MILE(S)/6,500 FEET)

Recommended Improvement	Quantity/Length	Cost	MOT 15%	Mobilization 15%	Subtotal	Scope Contingency 25%	PE/CEI 30%	Total Construction Cost
Shared Lane Markings (Sharrows)	5,100 linear feet	\$25,500	\$3,825	\$4,399	\$33,724	\$8,431	\$12,646	\$54,801
Bike Lanes (Clifton St to Hillsborough Ave)	1,200 linear feet	\$30,264	\$4,540	\$5,221	\$40,024	\$10,006	\$15,009	\$65,039
Sidewalk/Guardrail with Lighting (2 sides)	2,120 linear feet	\$173,245	\$25,987	\$29,885	\$229,117	\$57,279	\$85,919	\$372,314
Raised Landscaped Medians	1 medians	\$5,000	\$750	\$863	\$6,613	\$1,653	\$2,480	\$10,745
Raised Intersections	4 intersections	\$123,200	\$18,480	\$21,252	\$162,932	\$40,733	\$61,100	\$264,765
Intersection Crosswalk Striping	8 intersections	\$21,160	\$3,174	\$3,650	\$27,984	\$6,996	\$10,494	\$45,474
Rectangular Rapid Flashing Beacon	1 crosswalk	\$22,500	\$3,375	\$3,881	\$29,756	\$7,439	\$11,159	\$48,354
Pedestrian Bridge Railings/Warning Signs	2 pedestrian bridges	\$10,000	\$1,500	\$1,725	\$13,225	\$3,306	\$4,959	\$21,491
Gateway Treatment	1 structure	\$20,000	\$3,000	\$3,450	\$26,450	\$6,613	\$9,919	\$42,981
Sidewalks (Hillsborough Ave to Memorial Hwy east side only)	3,000 linear feet	\$90,000	\$13,500	\$15,525	\$119,025	\$29,756	\$44,634	\$193,416
Mill and Resurface Roadway	1.23 mile(s)	\$467,440	\$70,116	\$80,633	\$618,189	\$157,547	\$231,821	\$1,004,558
SEGMENT 2 TOTAL CONSTRUCTION COST								\$2,123,938

SEGMENT 3 FROM MEMORIAL HIGHWAY TO U-PATH AT SKYWAY SPORTS COMPLEX (0.57 MILE(S)/3,000 FEET)

Recommended Improvement	Quantity/Length	Cost	MOT 15%	Mobilization 15%	Subtotal	Scope Contingency 25%	PE/CEI 30%	Total Construction Cost
Bike Lanes (2 sides)	3,500 linear feet	\$88,275	\$13,241	\$15,227	\$116,744	\$29,186	\$43,779	\$189,708
Sidewalks/Landscaping (1 side 12 feet wide)	850 linear feet	\$35,000	\$5,250	\$6,038	\$46,288	\$11,572	\$17,358	\$75,217
Rectangular Rapid Flashing Beacon	1 crosswalks	\$22,500	\$3,375	\$3,881	\$29,756	\$7,439	\$11,159	\$48,354
Raised Landscaped Medians	2 medians	\$10,000	\$1,500	\$1,725	\$13,225	\$3,306	\$4,959	\$21,491
Shoulders with Bike Lane Markings (2 sides)	1,700 linear feet	\$38,250	\$5,738	\$6,598	\$50,586	\$12,646	\$18,970	\$82,202
Speed Cushions	2 locations	\$4,800	\$720	\$828	\$6,348	\$1,587	\$2,381	\$10,316
U-Path/Skyway Sports Complex Miscellaneous	lump sum	\$25,000	\$ -	\$ -	\$25,000	\$ -	\$ -	\$25,000
Sidewalks (Independence Parkway to Dana Shores Drive (2 sides)	1,900 linear feet	\$57,000	\$8,550	\$9,833	\$75,383	\$18,846	\$28,268	\$122,497
Mill and Resurface Roadway	0.57 mile(s)	\$228,020	\$34,203	\$39,333	\$301,556	\$75,389	\$113,084	\$490,029
SEGMENT 3 TOTAL CONSTRUCTION COST								\$1,064,813

GEORGE ROAD AT HILLSBOROUGH AVENUE INTERSECTION IMPROVEMENTS¹

Recommended Improvement	Quantity/Length	Cost	MOT 15%	Mobilization 15%	Subtotal	Scope Contingency 25%	PE/CEI 30%	Total Construction Cost
Northbound Exclusive Right Turn	1 Right Turn Lane	\$283,996	\$42,599	\$48,989	\$375,585	\$93,896	\$140,844	\$610,325
Additional Southbound Left Turn (Dual)	1 Left Turn Lane	\$135,418	\$20,313	\$23,360	\$179,090	\$44,773	\$67,159	\$291,022
Right of Way Needs plus Lost Parking Spaces	5,040 sq. feet 13 spaces	173,913.04 \$20,000 per space	x	3.0				\$521,739 \$260,000
INTERSECTION INCREASE CAPACITY COST								\$1,683,086

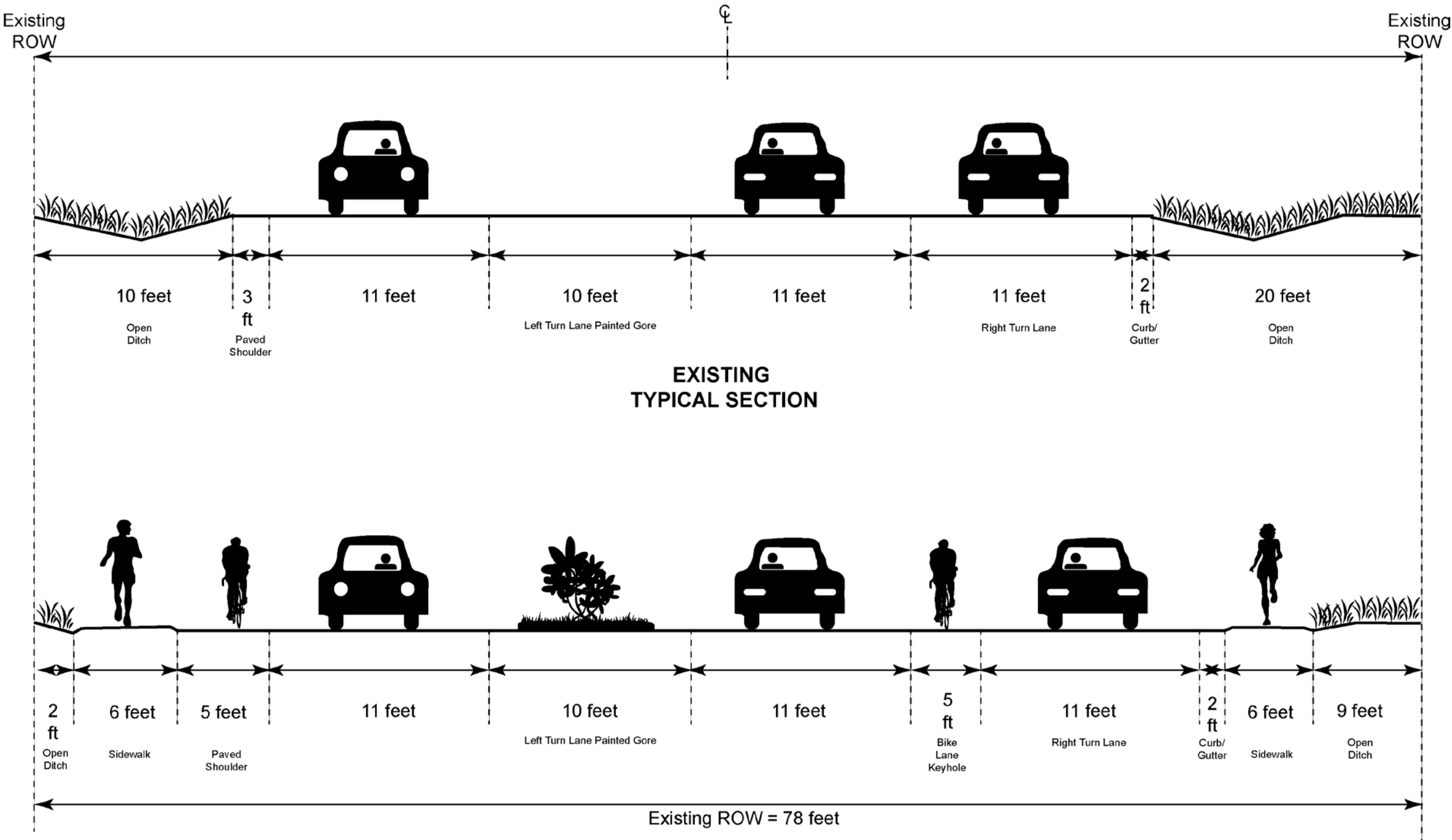
¹Subject to detailed analysis from on-going FDOT Study – Hillsborough Avenue Corridor Evaluation.

RANKING

It is recommended that all improvements listed above be conducted simultaneously. If funding is not immediately available for the entire effort, it is recommended that the southernmost segment (from U Path to Memorial Highway) be completed first, followed by the segment from Memorial Highway to Clifton Street and lastly the Clifton Street to TNC Greenway. Coordination with FDOT and their ongoing Hillsborough Avenue Corridor Study is recommended in order to ensure prioritization of short and long term improvement needs for the Hillsborough Avenue and George Road intersection.

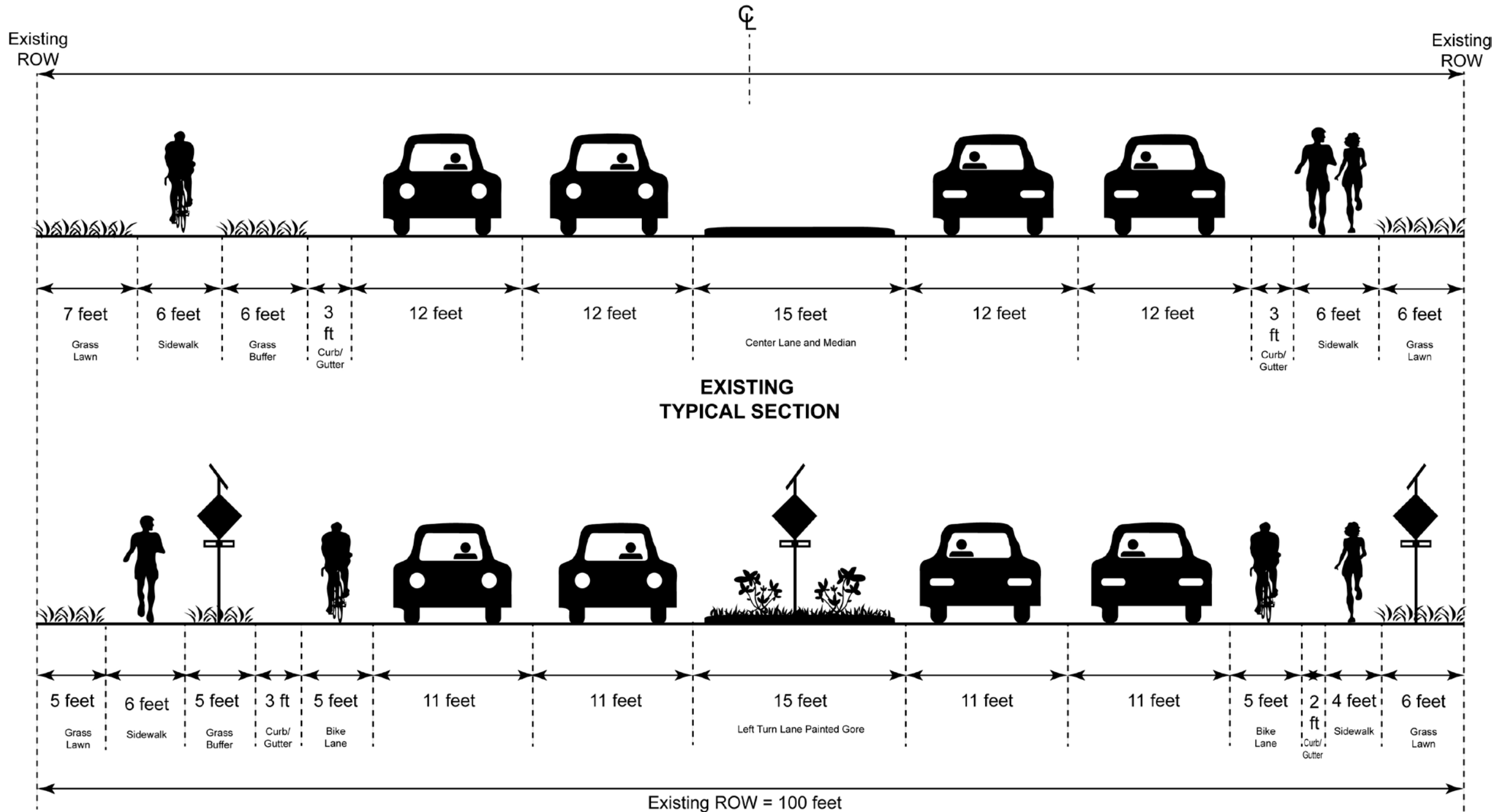
TYPICAL SECTIONS

GEORGE ROAD
FROM SKYWAY SPORTS COMPLEX TO INDEPENDENCE PARKWAY



RETROFITTED WITH 5-FOOT PAVED SHOULDER, 6-FOOT SIDEWALKS AND BIKE LANE KEYHOLE
TYPICAL SECTION

GEORGE ROAD
FROM INDEPENDENCE PARKWAY TO MEMORIAL HIGHWAY



RETROFITTED WITH 5-FOOT BIKE LANES
AND RECTANGULAR RAPID FLASHING BEACON
TYPICAL SECTION

