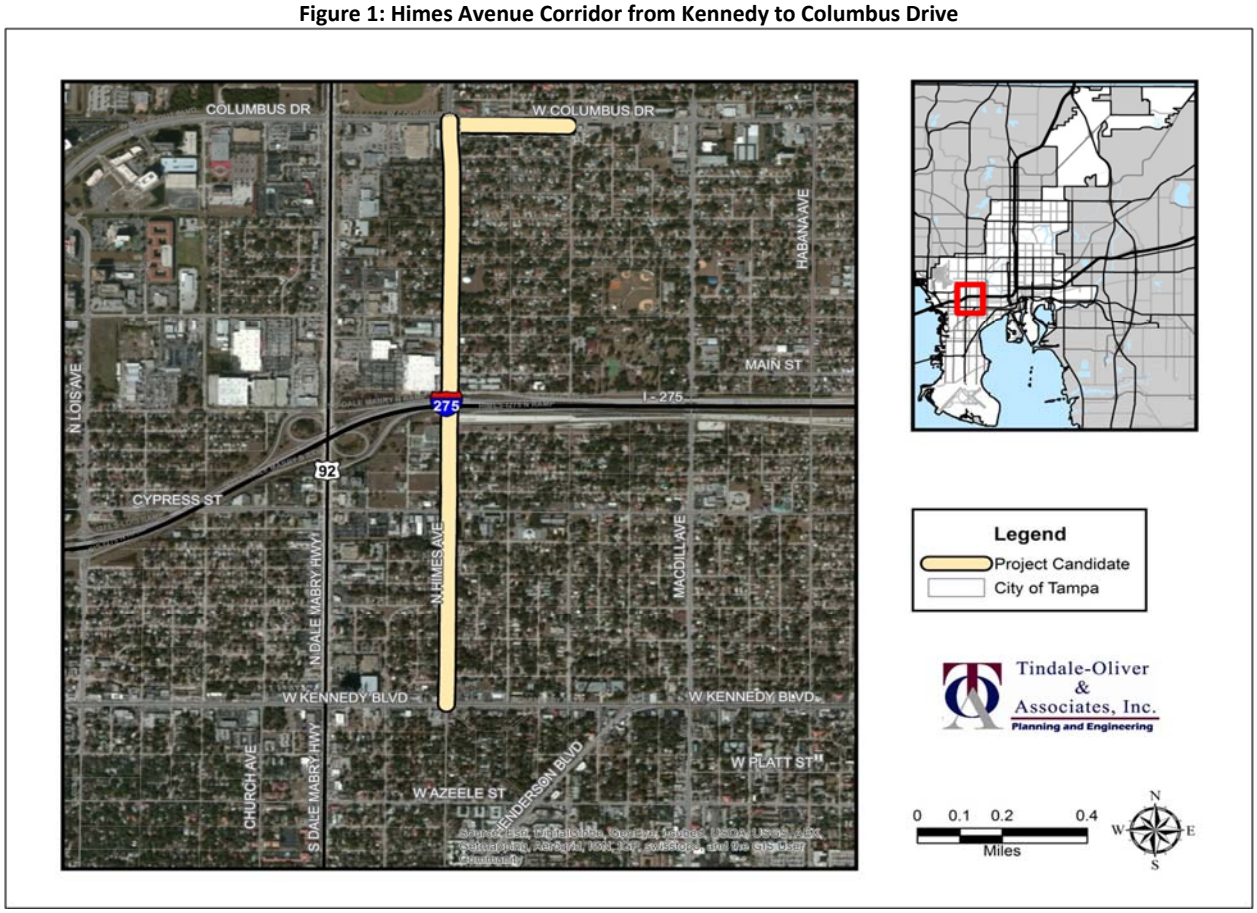
SI.2 – Himes Avenue from Kennedy to Columbus Drive

Summary

This project is for the conversion of a 5-lane section with a two-way-left-turn lane of Himes Avenue from Kennedy to Columbus to a 4-lane section with raised median separators, turn lanes, and bikes lanes. It is estimated that the improvement will cost approximately $1,441,816 and will mitigate 7.82 crashes per year and approximately 0.64 severe injury crashes per year. This project has an estimated B:C ratio of **5.09** and a Net Present Value of **$5,389,000**.

Figure 1: Himes Avenue Corridor from Kennedy to Columbus Drive



Introduction

Himes Avenue is a north/south collector roadway that runs parallel to Dale Mabry Highway and extends south to north from MacDill Air Force Base to Busch Boulevard on the north end. The study corridor is 1.7 miles. The segment of Himes Avenue from Kennedy Boulevard to Columbus Drive is a 5 lane section (two travel lanes in each direction and a two-way left-turn lane) with a posted speed of 40 mph and serves the neighboring residential developments and commercial uses at the signalized intersections, as shown in Figure 2, this segment is bisected by I-275. This section of Himes Avenue also includes an interchange at I-275, as shown in Figure 3. The project also includes improvements at Columbus Avenue on approach to Himes Avenue from Lincoln Avenue at the northern project limits.

In a review of city-wide fatal and incapacitating injury crashes from 2011 through 2013, this section of roadway was identified as exhibiting a cluster (7) of these types of crashes. As such, this section of roadway was analyzed for countermeasures to improve safety and apply as a candidate for Highway Safety Improvement Program (HSIP) Off-System Funds**.** Appendix A: Photo Log contains all the field review photographs taken.

Figure 2: Himes between Kennedy and Columbus

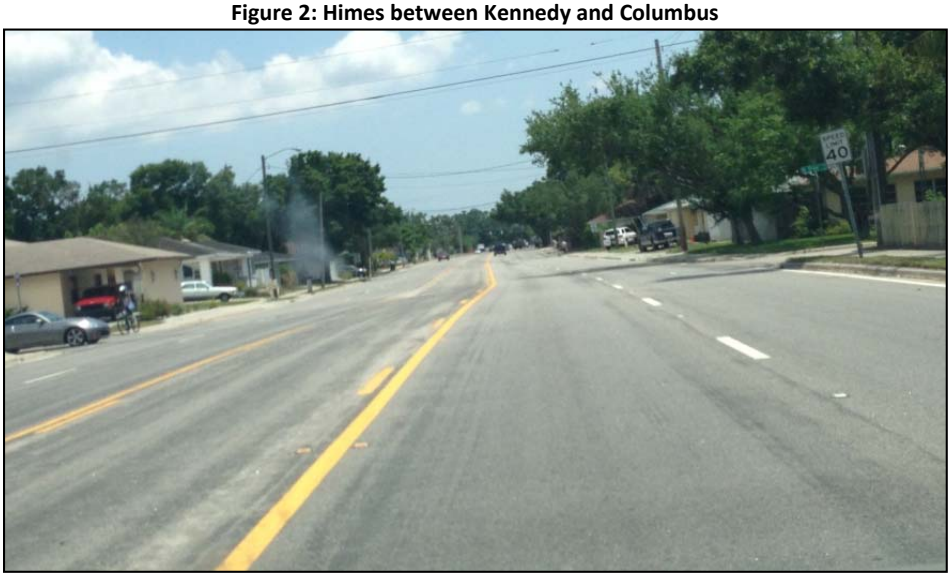
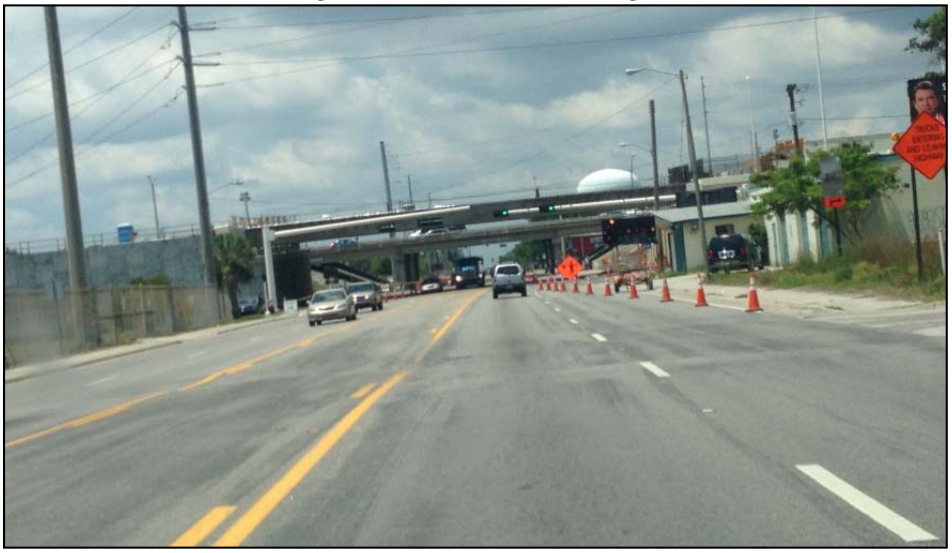


Figure 3: Himes at I275 Interchange



Crash Analysis

A safety analysis for the corridor was conducted. Crash data from January 2011 through December 2013 was reviewed. The data was collected from the City of Tampa Crash Data Management Systems

(CDMS), and the FDOT Crash Analysis Reporting System (CARS). The FDOT (CARS) consists only of the Long Form of the Florida Traffic Crash Report, while the City of Tampa Database consists of both the Long and Short Forms reports.

The crashes were reviewed and the following patterns were identified:

- A high incident of angle and left-turn crashes
    - 32 of 86 total, 37% of total
- A high number of vulnerable road user crashes
    - 1 pedestrian crashes
    - 2 bicycle crashes
- A high number of midblock crashes
    - 31 at intersection, 36% of total
    - 51 mid-block crashes, 59% of total
- 31 rear-end, 36% of total
- 7 incapacitating Injury, 8% of total
- 5 hit fixed object, 6% of total
- 6 head-on, 7% of total

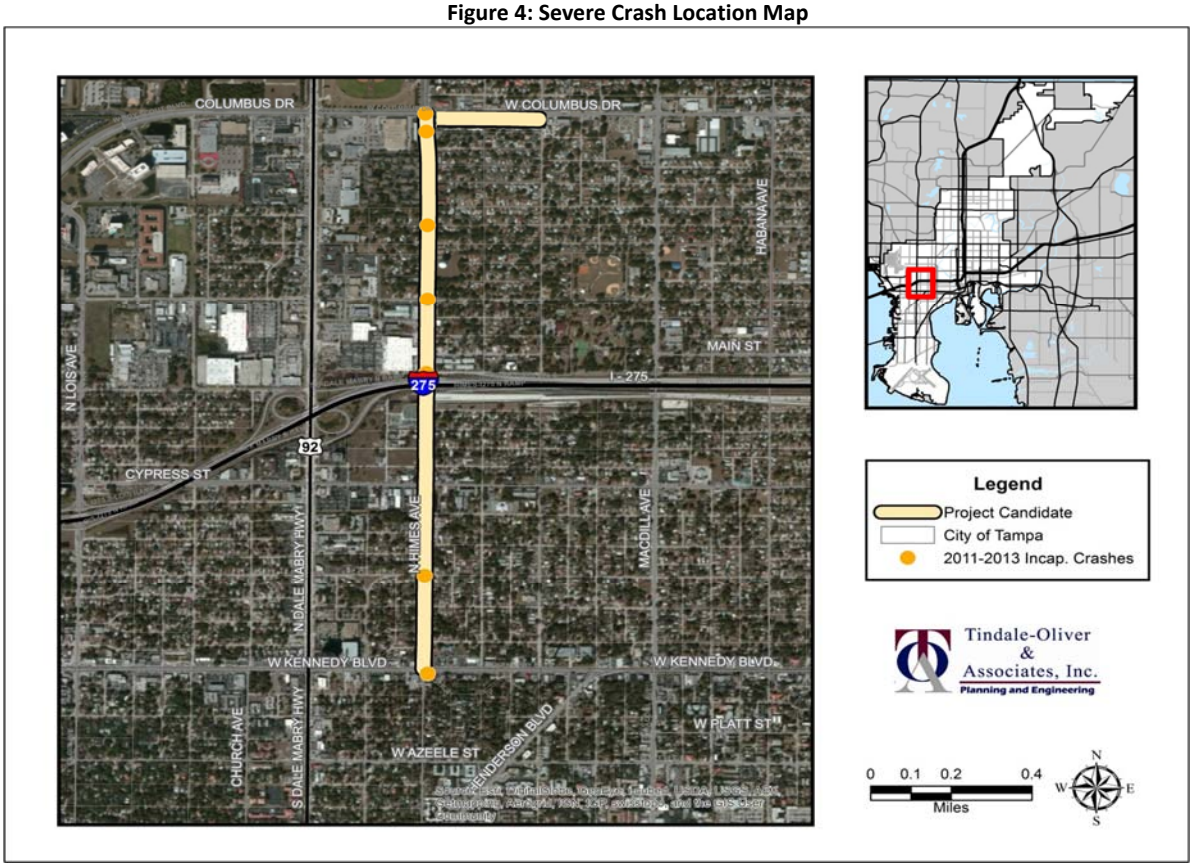
From 2011 through 2013, Himes Avenue from Kennedy Boulevard to Columbus Drive exhibited the following key crash characteristics listed in Table 1.

Table 1: Crash Attributes Himes Avenue

Himes Ave. Corridor from Kennedy Blvd. to Columbus Dr.	Intersection Crashes	Percent of Total
All Crashes	86	
Fatal	-	0%
Incapacitating	7	8%
Rear-End	31	36%
Angle	32	37%
Sideswipe	7	8%
Hit Fixed Object	5	6%
Head-On	6	7%
Ped	1	1%
Bike	2	2%
Night	33	38%
Wet	6	7%
At Intersection	31	36%

Figure 4 illustrates the location of incapacitating injury crashes (severe injury) along the corridor over the three year period between 2011 and 2013**.** Appendix B: Crash Table contains crash data attributes for all the reviewed crashes along the corridor.

Figure 4: Severe Crash Location Map



Proposed Improvement

Based on the geometrics of this roadway, the crash patterns, and field reviews, it is recommended to **replace the two-way left turn lane with a raised separator islands and dedicated bike lanes throughout**, as shown in Figure 5. The improvement will limit access along the corridor except at the major intersections.

Replacing the existing two-way-left-turn lane with raised separators will reduce the number of angle, side-swipe, rear-end, and fixed object crashes, per the Federal Highway Administration's Crash Modification Factors Clearinghouse, by greatly reducing the number of possible conflict points. The regularly spaced raised median islands will help facilitate pedestrian crossings between signalized intersections by providing refuge locations for a two-stage crossing. Additionally, the proposed bicycle lanes proposed will reduce the number of bicycle crashes. Bicycles lanes have the added benefit of increasing the sight distance for vehicles attempting turns from the side streets by pushing the travel lanes away from the curb. Figure 6 shows the proposed treatment locations throughout the entire corridor.

Figure 5: Typical – Median Islands with Painted Separators and Bike Lanes

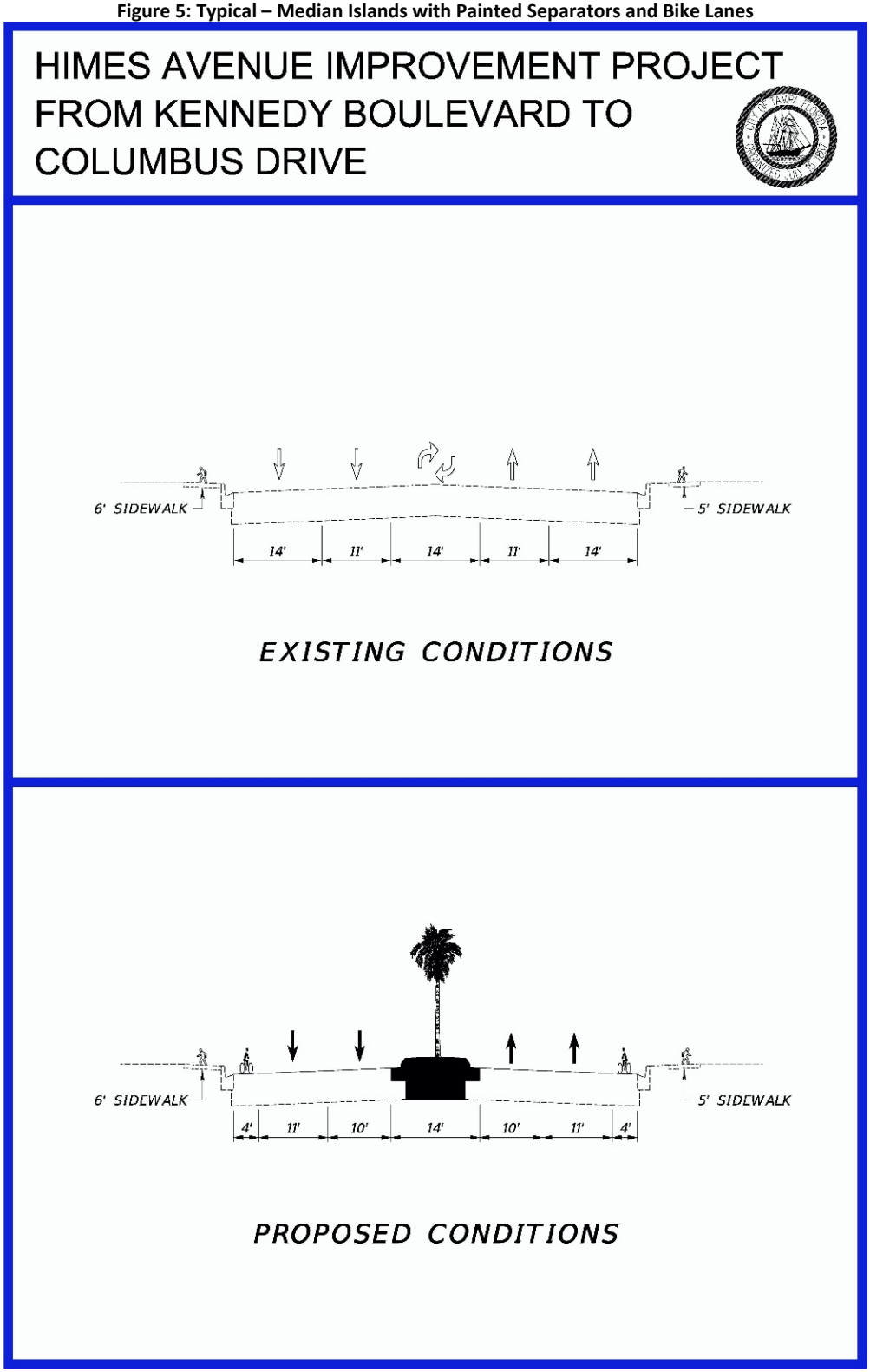
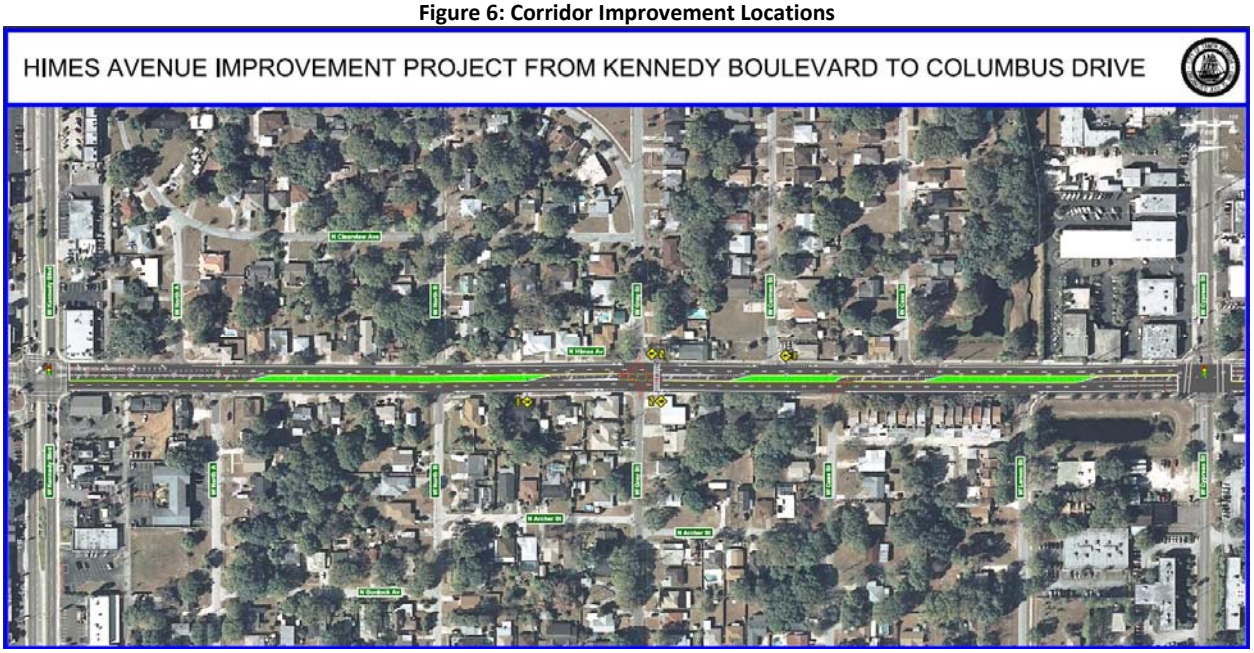
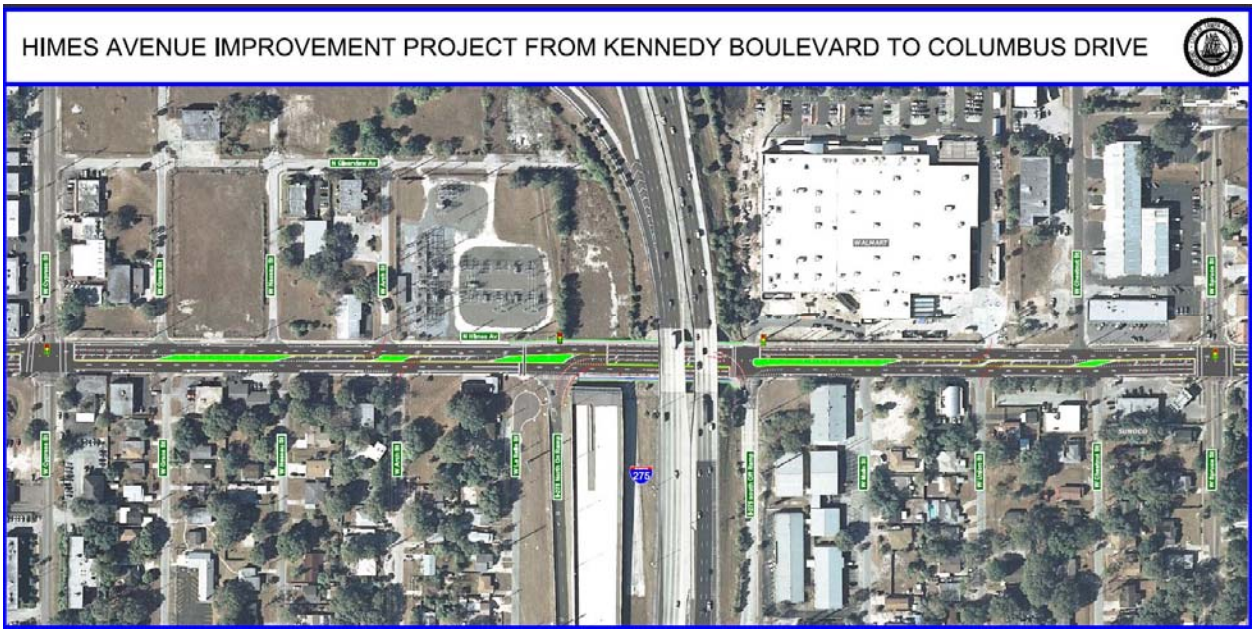
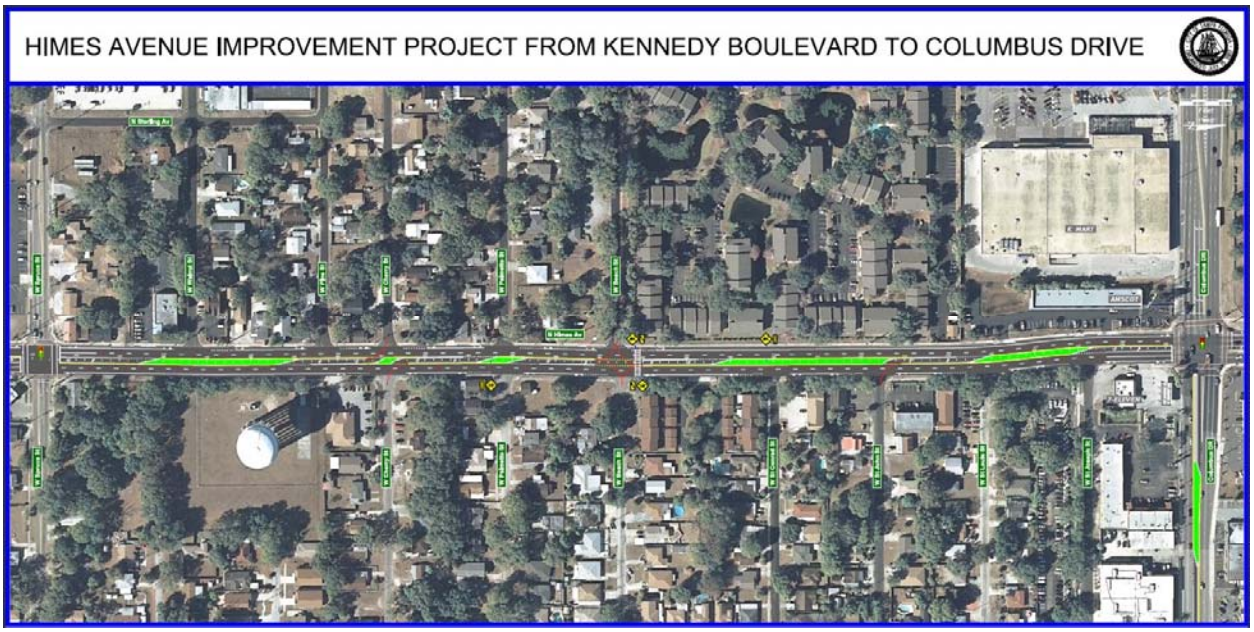
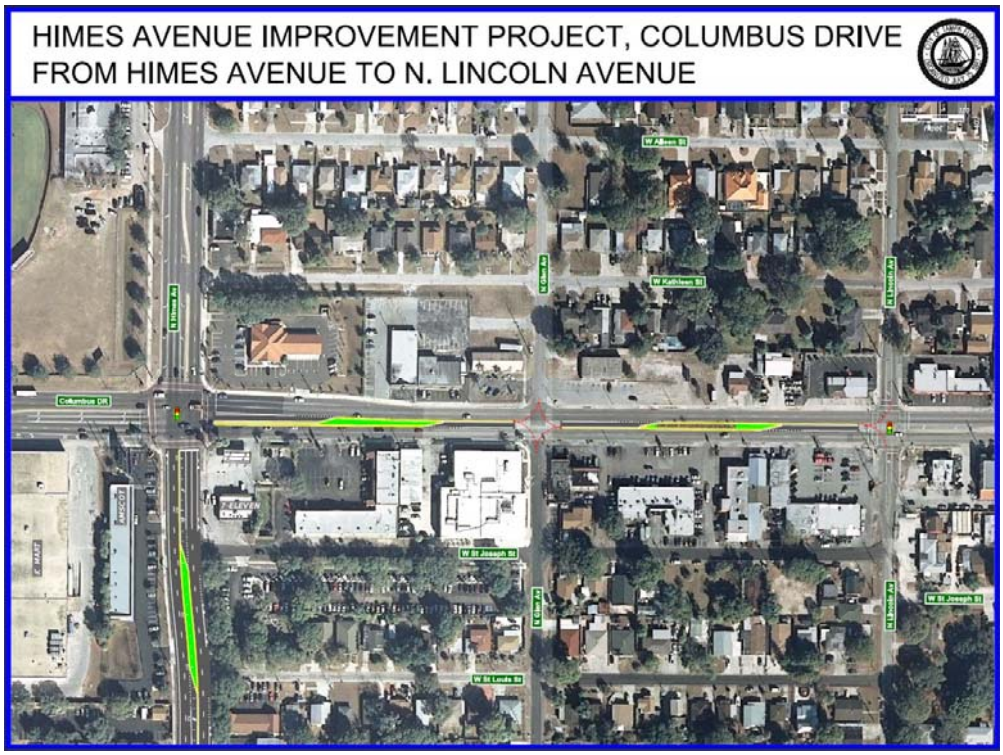


Figure 6: Corridor Improvement Locations









<u>Construction and Design Considerations</u>

Improvements to Himes Avenue have been previously discussed in the Walk-Bike Plan Phase 1 from Kennedy Boulevard to Columbus, which overlaps with this candidate improvement corridor (Hillsborough County Metropolitan Planning Organization (MPO) and City of Tampa). It was noted that this segment of roadway has a 64' pavement section and could accommodate both raised medians and bike lanes (4'/11'/10'/14'/10'/11'/4').

As raised medians are being proposed, during design, it is important to have public involvement early in the design phase. It is likely the improvements will impact existing driveway access. **A public meeting was conducted on June 6, 2014**, at the Barksdale Senior Center at Macfarland Park, 1801 North Lincoln Avenue between 5:30PM and 8:00PM.

This project is being proposed fully within the existing roadway cross section. Therefore no impacts to the right or way (ROW) are anticipated. Available ROW information is provided in Appendix C: Right of Way.

Benefit and Cost Estimation

Based on a review of the crash data and information from the Crash Modification Factor (CMF) Clearinghouse, the project benefit:cost was calculated. Detailed calculations and forms are summarized below. Figure 7 lists crash reduction factors from the CMF for replacing a two-way-left-turn-lane (TWLTL) with raised medians. Figure 8 lists the CRF for providing bike lanes.

Figure 7: CMF Clearinghouse Countermeasure: Replace TWLTL with Raised Medians

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Roadway Type	Area Type	Reference
0.77	23	★★★☆☆	Angle,Fixed object,Head on,Rear end,Run off road,Sideswipe,Single vehicle	All	All	Urban	Mauga and Kaseko, 2010
0.65	36	★★★☆☆	Angle	All	All	Urban	Mauga and Kaseko, 2010
0.81	19	★★★☆☆	Rear end	All	All	Urban	Mauga and Kaseko, 2010
0.79	21	★★★☆☆	Sideswipe	All	All	Urban	Mauga and Kaseko, 2010
0.53	47	★★★☆☆	Head on	All	All		Mauga and Kaseko, 2010
0.79	21	★★★☆☆	Angle,Fixed object,Head on,Rear end,Run off road,Sideswipe,Single vehicle	Serious injury,Minor injury	All	Urban	Mauga and Kaseko, 2010
0.67	33	★★★☆☆	Angle,Fixed object,Head on,Rear end,Run off road,Sideswipe,Single vehicle	Property damage only (PDO)	All	Urban	Mauga and Kaseko, 2010

Figure 8: CMF Clearinghouse Countermeasure: Provide Bike Lanes

CMF	CRF (%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
0.65	35	★★☆☆☆	Vehicle/bicycle	Fatal,Serious injury,Minor injury		Rodegerdts et al., 2004	

Table 2 illustrates the number of crashes and their associated crash reduction factor used for the CMF countermeasure. Utilizing a crash cost of $69549 (1/2 of $139,097 for statewide 3yr average for undivided 4-5 lane urban roadways), an estimated annual **benefit of $543,637 per year** was calculated.

Table 2: Benefit Calculations

11. CRASH TYPES	NO. OF CRASHES			CRF %	TOTAL TO BE PREVENTED
A. FATAL AND SERIOUS INJURY	**2011**	**2012**	**2013**		
					0.00
					0.00
					0.00
					0.00
SUBTOTAL: CORRECTED SEVERE INJURY CRASHES:					***0.00***
B. MINOR INJURY CRASH TYPES	NO. OF CRASHES			CRF	PREVENTED
Bicycle	-	1.0	1.0	35%	0.70
					0.00
					0.00
					0.00
SUBTOTAL: CORRECTED MINOR INJURY CRASHES:					***0.70***
C. ALL OTHER CRASHE TYPES	NO. OF CRASHES			CRF	PREVENTED
Angle	12.0	14.0	6.0	36%	11.52
Sidesipe or Fixed Object	3.0	5.0	4.0	21%	2.52
Head-On	-	2.0	4.0	47%	2.82
Rear-End	7.0	15.0	9.0	19%	5.89
SUBTOTAL: CORRECTED ALL OTHER CRASHES:					***22.75***
D. TOTAL CRASHES (ALL TYPES)	22.00	37.00	24.00		
12. TOTAL TO BE PREVENTED	6.28	10.23	6.94		**23.45**
13. BENEFIT					
A. TOTAL CRASH BENEFIT					$ 1,630,912
B. TOTAL ANNUAL BENEFIT:					**$ 543,637**

Table 3 illustrates the average annual cost for the improvement. Based on a review of the proposed improvements, this project had an estimated cost of $1,441,816 (with bike lanes) and a life cycle of 20 years. This calculates to an average **project cost of $106,873 per year**. Appendix D: Cost Estimate details the assumptions.

Table 3: Improvement Cost

15. ANNUAL COST OF IMPROVEMENTS				
TYPE	COST	LIFE (YR)	CRF	COST/YR
A. MOT	$ 86,347	20	0.0736	$ 6,354
B. MOB	$ 94,981	20	0.07358175	$ 6,989
C. PU	$ 156,719	20	0.074	$ 11,532
D. ROADWAY:	$ 764,674	20	0.074	$ 56,266
E. PAVEMENT:	$ 98,792	20	0.0736	$ 7,269
F. DESIGN	$ 240,303	20	0.07358175	$ 17,682
G. LIGHTING:				
H. SUBTOTAL:	*$1,441,816*	*20*		$ 106,091
I. CHANGE IN MAINTENANCE:				$ -
J. CRASH CLEANUP:				$ 782
K. TOTAL ANNUAL COST:				**$ 106,873**
16. BENEFIT/COST:				**5.09**

Benefit:Cost and Net Present Value (NPV)

Based on the Benefit and Cost information discussed above, the B:C ratio for this project is estimated at **5.09**. At the end of the projects life (20 years) the project is estimated to have a **NPV of $5,389,000.** The calculation steps for the NPV calculations are shown in Table 4.

Table 4: Net Present Value Calculations

17. NET PRESENT VALUE	
A. CURRENT YEAR	2014
B. PROJECT COMPLETION	2017
C. NPV	**$ 5,389,000**

Conclusion

This project has an estimated B:C ratio of **5.09**. Additionally it is estimated that this project will mitigate **7.82** total crashes per year and approximately 0.64 severe injury crashes per year. **Based on this report, this project meets the qualifying criteria to be eligible for HSIP project funds.**