

Vanderbilt Drive Bicycle and Pedestrian Safety Improvement Study

Prepared for:
**The Collier County
Transportation Planning Department**

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December 2013

Sign-off Sheet



Stantec

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VANDERBILT DRIVE BICYCLE AND PEDESTRIAN SAFETY IMPROVEMENT STUDY

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Executive Summary

For the past several years, Collier County has pursued the planning and design of what has become known as the Vanderbilt Drive Greenway, a multi-use pathway to be located along the west side of Vanderbilt Drive extending from Bonita Beach Road on the north to 111th Avenue North/Bluebill Avenue on the south. As a result of funding made available through a developer Settlement Agreement between Collier County and Lodge Abbott Associates in June 2008, the County initiated a planning process that incorporated an extensive public involvement/participation process to help define the scope and purpose of the corridor improvements.

During the public involvement/participation process intended to define the “greenway” improvement, ancillary concerns were raised about the safety of cyclists traveling within the roadway along the southern 1.25 miles of the 4-mile long corridor (where no bike lanes exist), and the safety of pedestrians (and cyclists) wishing to cross Vanderbilt Drive in an effort to access the new pathway to/from developments located along the east side of Vanderbilt Drive. As a result of preliminary work done by Transportation Planning Staff, a number of potential locations for crosswalks were identified. Stantec was asked to conduct a planning-level evaluation of the corridor in consideration of the pending Greenway project for potential improvements that might enhance safety for bicyclist and pedestrians within the corridor. Stantec was asked to focus on potential crosswalk locations, the types of crosswalks and related improvements (e.g., signage, lighting, connecting sidewalks, etc.), and also to consider the need to add bike lanes or paved shoulders to Vanderbilt Drive south of the Cocohatchee River.

In addition to the evaluations, Stantec was asked to facilitate one or more public participation opportunities in order to gauge interest in the additional improvements being contemplated. During the course of this study effort, the team was invited to make a presentation on potential safety improvements at a gathering of the leadership representatives from most of the developments within the corridor. This was followed up by an advertised public workshop at which a formal presentation was made and the public was invited to engage in discussions with County Staff and the Consultant Team about the proposed greenway and the ancillary safety improvements.

After a thorough evaluation and consideration of all of the public input, the Consulting Team, in consultation with Collier County Transportation Staff, proposed a set of recommendations, in priority sequence, including:

- Adding 5' bike lanes to the southern segment of the corridor
- Conduct a Detailed Engineering Study/Warrant Analysis to determine the location of the recommended cross-walk improvements
- Implementing four (4) enhanced crosswalks in the northern segment of the corridor
- Implementing one (1) enhanced crosswalk with connecting sidewalks in the southern segment of the corridor

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Purpose

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1.0 Purpose

For the past several years, Collier County has pursued the planning and design of what has become known as the Vanderbilt Drive Greenway, a multi-use pathway to be located along the west side of Vanderbilt Drive extending from Bonita Beach Road on the north to 111th Avenue North/Bluebill Avenue on the south. As a result of funding made available through a Developer Settlement Agreement between Collier County and Lodge Abbott Associates in June 2008, the County initiated a planning process that incorporated an extensive public involvement/participation process to help define the scope and purpose of the corridor improvements.

During the public involvement/participation process intended to define the “Greenway” improvement, ancillary concerns were raised about the safety of cyclists traveling within the roadway along the southern 1.25 miles of the 4-mile long corridor (where no bike lanes exist), and the safety of pedestrians (and cyclists) wishing to cross Vanderbilt Drive in an effort to access the new pathway to/from developments located along the east side of Vanderbilt Drive. As a result of preliminary work done by Transportation Planning Staff, a number of potential locations for crosswalks were identified.

Stantec was asked to conduct a planning-level evaluation of the corridor in consideration of the pending Greenway project for potential improvements that might enhance safety for bicyclists and pedestrians within the corridor. Stantec was asked to focus on potential crosswalk locations, the types of crosswalks and related improvements (e.g., signage, lighting, connecting sidewalks, etc.), and also to consider the need to add bike lanes or paved shoulders to Vanderbilt Drive south of Wiggins Pass Road to 111th Avenue North/Bluebill Avenue.

In addition to the evaluations, Stantec was asked to facilitate one or more public participation opportunities in order to gauge interest in the additional improvements being contemplated. The remainder of this report summarizes the study efforts and conclusions/recommendations.

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Study Area

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2.0 Study Area

The Study Area is comprised of the Vanderbilt Drive roadway corridor which extends from Bonita Beach Road on the north to 111th Avenue North/Bluebill Avenue on the south. Vanderbilt Drive is intersected by Woods Edge Parkway and Wiggins Pass Road. See **Figure 1**.

It should be noted that along the northernmost one 1-mile of the corridor, the Vanderbilt Drive right-of-way is located along the county-line between Collier and Lee Counties, with lands along the east side being in Lee County.

Lands adjacent to the corridor define many of the users of the corridor, although there is assumed to be a portion of the users that are “passing through” with neither an origin nor a destination within lands immediately adjacent to the roadway itself. This user base, like the users that “occupy” (reside or work within) the corridor, include motorists who travel through all or parts of the area using Vanderbilt Drive as an alternative route, preferred over US 41, as well as pedestrians and bicyclists that pass through, or otherwise take advantage of the corridor’s pedestrian/cycling and park facilities.

Although the corridor is shared by a variety of users, both motorized and non-motorized, one target audience for this study effort is the pedestrian and bicyclist residing on the east side of Vanderbilt Drive, that might want to take advantage of the facilities on the west side of the road. Due to the absence of sidewalks on the east side of the road and lack of crosswalks to facilitate safe movements across Vanderbilt Drive, these residents have no convenient and safe way to leave their communities except by motor vehicle. To facilitate safe access to the new Greenway on the west side of Vanderbilt Drive, the County conducted this study of potential crosswalk locations to serve the residents of the corridor living on the east side of the road.

The County also recognized a deficiency exists in the roadway cross section of approximately the southern 1.25 miles of the corridor, a rural roadway cross section that has 10’ travel lanes, and no paved shoulders or designated bike lanes. The need to improve safety for cyclists and motorists traveling through the southern part of the corridor is also considered an important facet of this study effort.

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Study Area

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Figure 1: Study Area



3.0 Considerations

At the onset of the study, the County provided Stantec with details about potential locations for crosswalks that had been developed over the past year. Stantec was asked to conduct a planning-level evaluation of the identified locations and to consider the possibility of alternative locations. Stantec was also instructed to give additional consideration as to the importance of adding bike lanes or paved shoulders to the southern 1.25 miles of the corridor where such facilities are absent today. It has been recognized that although many bicyclists will use the existing off-road (and future multi-use) pathway, a lot of cyclists prefer to ride on the roadway, and the absence of a designated bike lane or paved shoulder forces these cyclists to use the travel lane, resulting in motorists and cyclists having to deal with the potential conflicts.

3.1 COMPLETED AND PLANNED IMPROVEMENTS

Vanderbilt Drive is a 2-lane Urban Collector designed with a “rural” cross section with roadside stormwater swales. Within the Vanderbilt Drive corridor, a continuous 5-6’ asphalt pathway/concrete sidewalk exists along the west side of the roadway from Bonita Beach Road to 111th Avenue/Bluebill Avenue. Designated bike lanes exist along the outside edge of each travel lane between Bonita Beach Road and the Cocohatchee River Bridge, just south of Wiggins Pass Road. No bike lanes or paved shoulders exist south of the bridge. Travel lanes between 111th Avenue/Blue Bill Avenue and Wiggins Pass Road are 10’ wide in this segment, with a posted speed limit of 35 mph. North of Wiggins Pass Road the travel lanes are 11’ wide and a 45 m.p.h. speed limit is maintained north through this segment to just south of Bonita Beach Road at 9th Street where the posted speed limit changes to 40 m.p.h.

Urban development lines both sides of Vanderbilt Drive from Bonita Beach Road south for a distance of 2 miles. South of the existing developed area for a distance of approximate 2080 feet, vacant land approved for future development lines the corridor. South of this vacant area, existing development located along the west side of Vanderbilt Drive extends for a distance of 2800 feet, ending south of the Cocohatchee River. From that point south, no development exists on either side of the roadway for a distance of about 3,300 feet. The remaining southernmost 2,365 foot segment is lined with urban development. This combination of built and un-built urban landscape within the corridor, and the safety issues and challenges unique to each area, are the subjects of this study effort.

Over the past several years, the County has made a substantial investment in the corridor, including the construction of two new pedestrian bridges, a new bridge (with integrated sidewalk and bike lanes) over the Cocohatchee River, a preliminary design alternatives study of the two remaining bridge structures (full design services are imminent), and the planning and design of the “Greenway” multi-use pathway. As part of the planning phase of the Greenway, the County undertook a significant public involvement effort, one that continues today with the related

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Considerations

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improvements discussed in this report and a reconsideration of the scope of the planned Greenway improvement.

Additional improvements are planned, including the replacement of the two remaining bridge structures south of the river following the design phase. Once completed, all three bridge structures south of Wiggins Pass Road will include on-road bike lane/paved shoulders and either component or ancillary pedestrian sidewalk features.

The opportunity to implement the safety improvements discussed in this report must be considered as an integral part of the overall plan to make improvements in the corridor, and need to be dealt with in the context of all of the planned improvements, to ensure timelines and consistency, and to position the improvements to take advantage of cost-saving measures and other potential funding opportunities in the future.

3.2 PRELIMINARY IDENTIFICATION OF POTENTIAL IMPROVEMENTS PROVIDED BY COUNTY

The County provided Stantec with a preliminary identification of potential cross-walk locations for consideration and evaluation. Stantec was asked to specifically evaluate these locations as well as identify any alternative locations. For the purposes of evaluating potential locations, the study area was divided into two regions, one north of Wiggins Pass Road and the other south of Wiggins Pass Road. The southern region also encompassed the segment of the roadway along which new bike lanes/paved shoulders would be considered.

The initial set of potential crosswalk locations provided by the County Transportation Planning Department included locations at opposing entrance road intersections of major developments, and at the intersection of Woods Edge Parkway and Vanderbilt Drive. The locations included:

- The Dunes/North Shore Lakes or Vanderbilt Villas
- Arbor Trace/Glen Eden
- Emerald Bay/The Retreat
- Audubon/Audubon
- Woods Edge Parkway Intersection

These locations are discussed in more detail in the following sections.

The County also provided direction concerning the need to consider adding bike lanes/paved shoulders to the segment of the corridor south of the Cocohatchee River Bridge. North of the bridge, designated bike lanes extend to Bonita Beach Road. Due to the narrow cross section of the roadway south of the bridge it is especially challenging for both motorists and “on-road” cyclists.

4.0 Identification of Options & Alternatives

A planning-level evaluation of the locations identified by the County was coupled with an identification of alternative locations and features intended to fulfill the same goal of providing safe and convenient access from developments on the east side of the road to the new Greenway to be constructed on the west side of the road. The following sections discuss the various options examined and provide a summary of the recognized advantages and disadvantages.

It should be noted that nationally, the design and implementation of crosswalks is guided by the provisions of the Manual of Uniform Traffic Control Devices (MUTCD). While providing general guidance as to minimum (or maximum) standards, the manual also recognizes the unique characteristics of each potential location and the importance of conducting a detailed engineering analysis of each location before implementing any crosswalk improvement.

4.1 LOCATIONS

The crosswalk studies were conducted in two distinct areas; the developed area south of Woods Edge Parkway, and the developed area just north of 111th Avenue North/Bluebill Avenue. Several additional potential crosswalk locations were identified north of Woods Edge Parkway serving Lee County residents but were not otherwise considered in this evaluation.

4.1.1 Crosswalk Locations North of Wiggins Pass Road – Option 1

North of Wiggins Pass Road is the most highly developed region of the two, with nearly continuous developments lining both sides of the roadway. This segment of Vanderbilt Drive also includes the two east-west intersecting corridors of Wiggins Pass Road and Woods Edge Parkway, and therefore affords good east-west connectivity to US 41.

Along the west side of Vanderbilt Drive, an off road pathway (predominantly asphalt surface) exists the entire length from Bonita Beach Road to Wiggins Pass. Designated bike lanes exist on both sides of the travel way. With the exception of a few segments of sidewalks in front of developments along the east side of the roadway in Lee County north of Woods Edge Parkway, along the Collier County portion of the roadway south of Woods Edge Parkway, there are no sidewalks on the east side of the roadway.

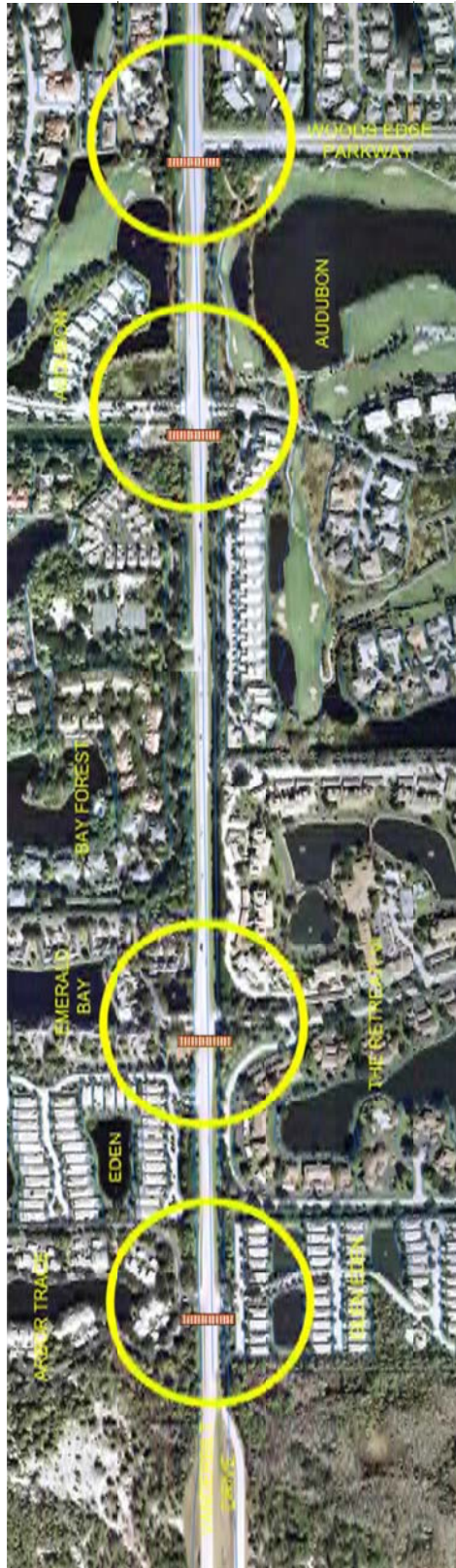
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Figure 2: North Crosswalk Locations - Option 1



The locations, shown in **Figure 2**, included:

- Woods Edge Parkway Intersection
- Audubon/Audubon
- Emerald Bay/The Retreat
- Arbor Trace/Glen Eden

Since all of the existing developments along the east side of Vanderbilt Drive south of Woods Edge Parkway would have direct access to one of these four crosswalk locations, implementation would not require the construction of any interconnecting sidewalks except for what would be needed to connect from the crosswalks to pedestrian systems inside the adjacent developments. While the County would construct those portions of the interconnecting sidewalks within the right-of-way, the adjacent developments would be responsible for the portion of the interconnection from the edge of right-of-way to the internal sidewalk/roadway system.

4.1.1.1 Advantages

- No north-south interconnecting sidewalks are required between the crosswalks (all development served directly by location)
- Four (4) locations may provide additional “traffic calming” impedance effects.
- Locations have approach-end neutral areas (diagonally striped medians associated with turn lanes) that could provide areas to create pedestrian refuge areas.

4.1.1.2 Disadvantages

- The three locations at development entrances would require pedestrians to cross the greatest number of travel lanes and therefore have to negotiate the greatest number of potential conflicts.
- The three locations at development entrances would require motorists entering/exiting from the developments to deal with potential conflicts with pedestrians in the roadway, while at the same time dealing with other entering/exiting traffic and thru traffic.

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Identification of Options & Alternatives

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- No sidewalks on the east side of Vanderbilt Drive limit mobility between developments.

4.1.2 Crosswalk Locations North of Wiggins Pass Road – Option 2

During the evaluation of the initial set of potential crosswalk locations provided by the County, a set of optional locations was developed that included the same locations at Arbor Trace/Glen Eden on the south and Woods Edge Parkway on the north, but substituted a single “mid-block” crosswalk location, mid-way between the other two, that was not adjacent to any development entrance. The locations, shown in **Figure 3**, included:

- Woods Edge Parkway Intersection
- Mid-Block Location
- Arbor Trace/Glen Eden

Since The Retreat and Audubon along the east side of Vanderbilt Drive would not have direct access to one of these crosswalk locations at their project entrances, implementation would require the construction of north-south interconnecting sidewalks between each development’s access drive and the adjacent crosswalk locations. In order to be most effective in reducing the likelihood of pedestrians/cyclists crossing at a non-crosswalk location, sidewalks would need to be constructed along the entire length between all of the three crosswalk locations to provide convenient access to an adjacent crosswalk.

Also, as in Option 1, interconnections would also be needed to connect from the crosswalks/sidewalks to pedestrian systems inside each of the adjacent developments. The County would construct interconnecting sidewalks within the right-of-way, while the adjacent developments would be responsible for the interconnection from the edge of right-of-way to the internal sidewalk/roadway system.

4.1.2.1 Advantages

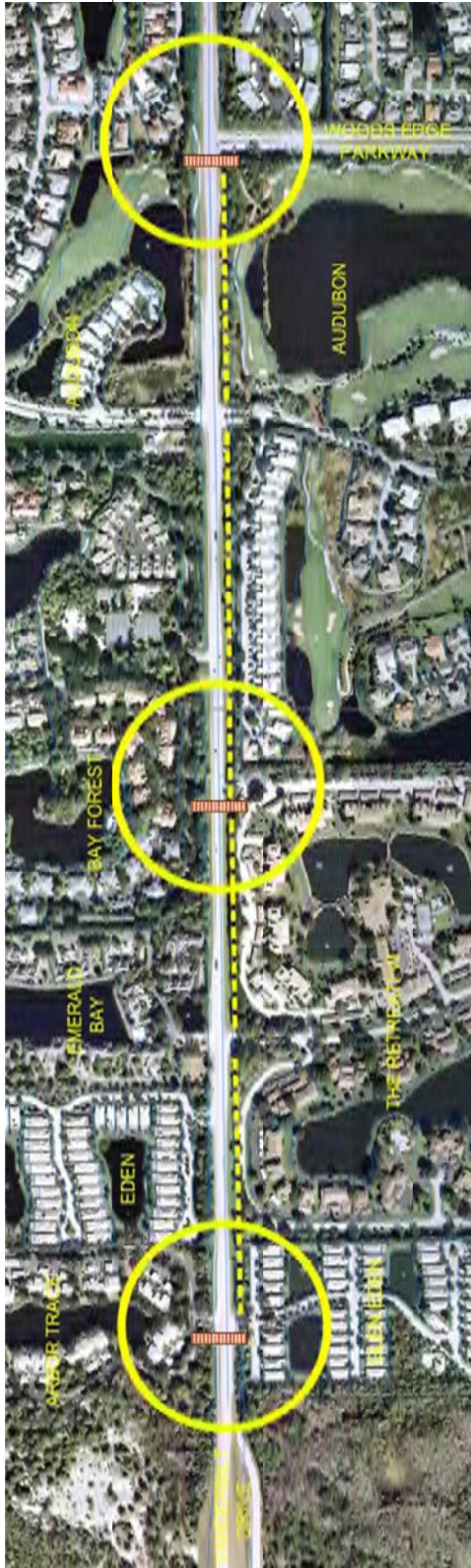
- This option eliminates two of the three locations at development entrances that would otherwise require pedestrians to cross the greatest number of travel lanes and therefore have to negotiate the greatest number of potential conflicts.
- This option eliminates two of the three locations at development entrances that would otherwise require motorists entering/exiting from the developments to deal with potential conflicts with pedestrians in the roadway, while at the same time they are dealing with other entering and exiting traffic and thru traffic.

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Identification of Options & Alternatives

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FIGURE 3: North Crosswalk Locations – Option 2



- The single “mid-block” crossing affords the shortest distance for pedestrian’s to cross, and there are no other conflicting movements for pedestrians or motorists to deal with at that location.

- Mid-block location might allow sufficient space for a pedestrian refuge area (in between the travel lanes) without having to add additional pavement to one or more of the outside roadway edges, by narrowing the travel lanes. This would encourage motorists to reduce speed through the crosswalk area.

- Adding sidewalks between the crosswalks creates a connected sidewalk system between developments on the east side that can be used without the need to cross Vanderbilt Drive.

- Cost savings related to one less crosswalk location installation.

4.1.2.2 Disadvantages

- Adding sidewalks on the east side of the road create new potential conflicts between pedestrians and motorists (entering/exiting the developments), that generally don’t exist today.

- Three (3) locations may provide less “traffic calming” impedance effects (than four locations).

- Costs associated with 4,900 linear feet of interconnecting sidewalks required between crosswalks to ensure convenient access to a crosswalk from adjacent developments. Implementation costs could be exacerbated by difficult/challenging construction conditions.

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Identification of Options & Alternatives

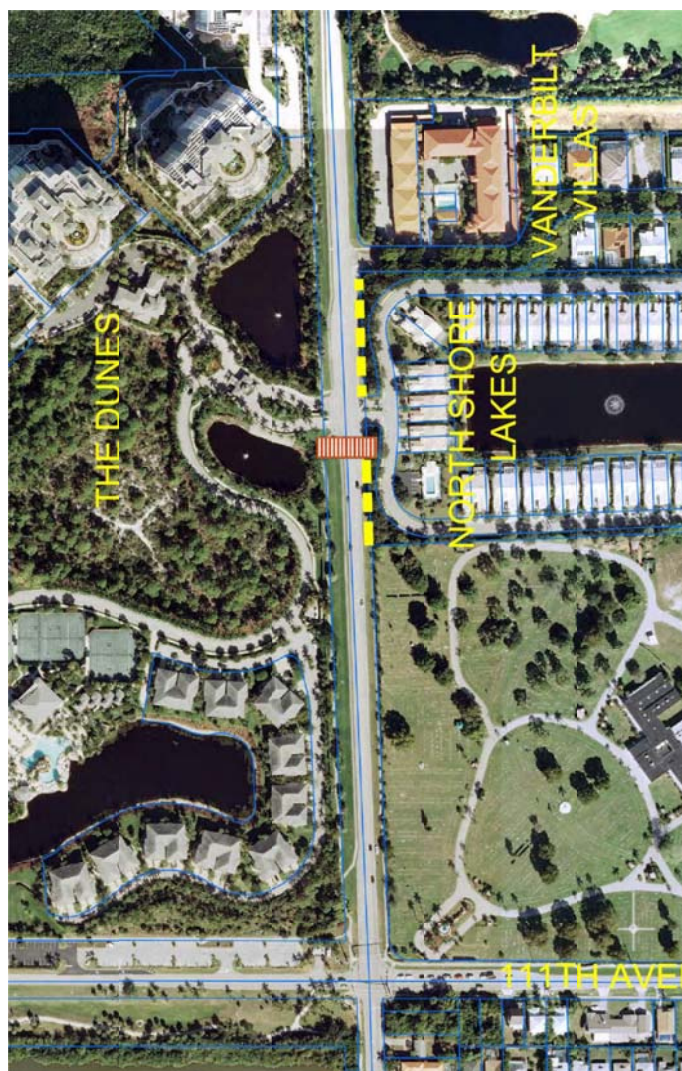
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4.1.3 Crosswalk Locations South of Wiggins Pass Road – Option 1

In the south region of the corridor there is generally only one location that necessitates consideration of a crosswalk; near the southernmost end of the corridor serving the North Shore Lakes and Vanderbilt Villas. This location is opposite The Dunes development. The first option, shown in **Figure 4**, places the crosswalk immediately adjacent to the intersecting entrance roads of The Dunes and North Shore Lakes. In order to facilitate safe access to the crosswalk from the Vanderbilt Villas project, a short segment of interconnecting sidewalk, approximately 330 feet in length would be needed from the Vanderbilt Villas entrance to the crosswalk.

As in all cases, a connecting sidewalk from the crosswalk/sidewalk into each development would be required. The County would construct interconnecting sidewalks within the right-of-way, while the adjacent developments would be responsible for the interconnection from the edge of right-of-way to the internal sidewalk/roadway system.

FIGURE 4: South Crosswalk Locations Option 1



Additionally, it would be appropriate to consider extending the sidewalk a distance of approximately 365 feet south of the North Shore Lakes crosswalk to the northern terminus of the existing sidewalk on the east side of Vanderbilt Drive fronting the Naples memorial Gardens. Although not absolutely necessary, extending the sidewalk would provide safe and convenient access to facilities to the south without having to cross Vanderbilt Drive first.

4.1.3.1 Advantages

- Provides increased mobility though the addition of interconnected sidewalks (especially if extended south to connect to the existing sidewalk).
- Existing narrow approach-end neutral zone (diagonally striped median associated with a turn lane) that could provide an opportunity to create pedestrian refuge area by further narrowing the travel lanes, and provide traffic calming effects.

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Identification of Options & Alternatives

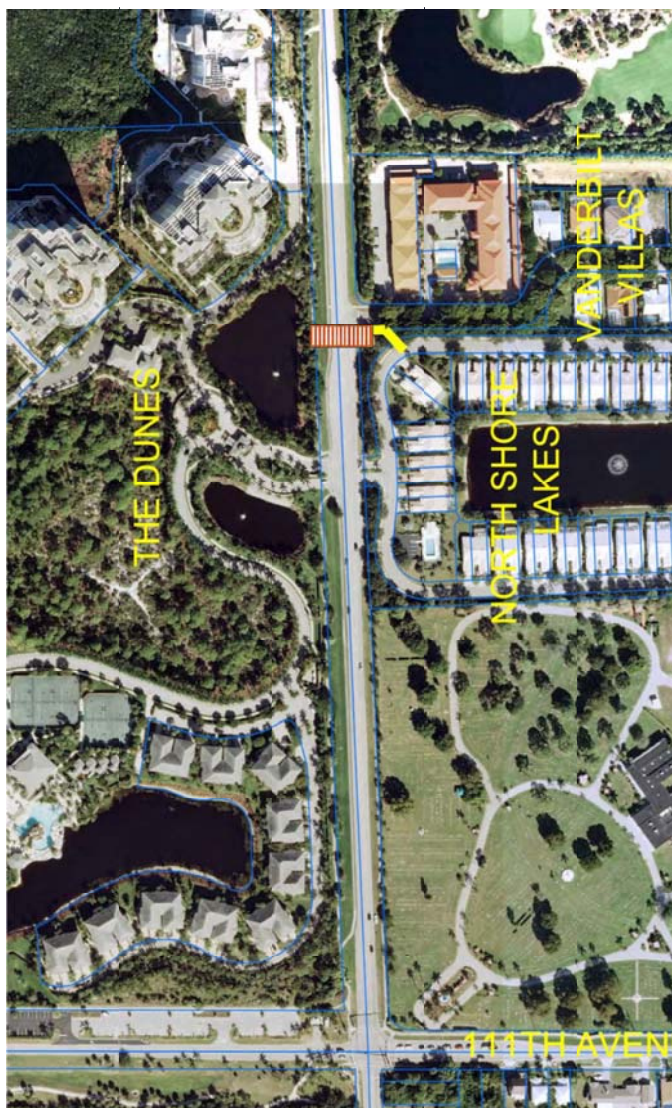
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4.1.3.2 Disadvantages

- The location at either side of the development entrances would require pedestrians to cross the greatest number of travel lanes (4 or 5 lanes).
- Pedestrians have a greater number of potential conflicts with thru and turning vehicles.
- The locations at either side of the development entrances would require motorists entering/exiting from the developments to deal with potential conflicts with pedestrians in the roadway, while at the same time they are dealing with other entering/exiting traffic and thru traffic.

4.1.4 Crosswalk Locations South of Wiggins Pass Road – Option 2

FIGURE 5: South Crosswalk Locations Option 2



An alternative location for the crosswalk would be to locate it north of the Option 1 location, and immediately north or south of the Vanderbilt Villas entrance road. This location, shown in **Figure 5**, would require a short interconnecting sidewalk to connect the North Shore Lakes internal system to the crosswalk at the northwest corner of the development. No sidewalk along the east side of Vanderbilt Drive would be necessary, although it would be appropriate to consider constructing a sidewalk as described in Option 1 to facilitate convenient access to the existing sidewalk that terminates at the northwest corner of the Naples Memorial Gardens.

4.1.4.1 Advantages

- No Interconnecting sidewalks required along Vanderbilt Drive between crosswalks (all development served directly by location with internal interconnections)
- Existing approach-end neutral zone (diagonally striped median associated with a turn lane) could provide an opportunity to create a pedestrian refuge area.

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Identification of Options & Alternatives

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- Shorter distance (fewer lanes) for pedestrians and cyclists to cross (3 lanes instead of 4 or 5 in Option 1).
- Fewer potential conflicts for pedestrians.
- Fewer potential conflicts for motorists entering/exiting developments.

4.1.4.2 Disadvantages

- North Shore Lakes required to provide more extensive interconnection to internal system (through landscaped berm area)
- North Shore Lakes pedestrians required to cross Vanderbilt Villas entrance drive introducing pedestrian conflicts with entering/exiting vehicles that do not presently exist.

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Identification of Options & Alternatives

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FIGURE 6: Southern Segment Bike Lanes or Paved Shoulders



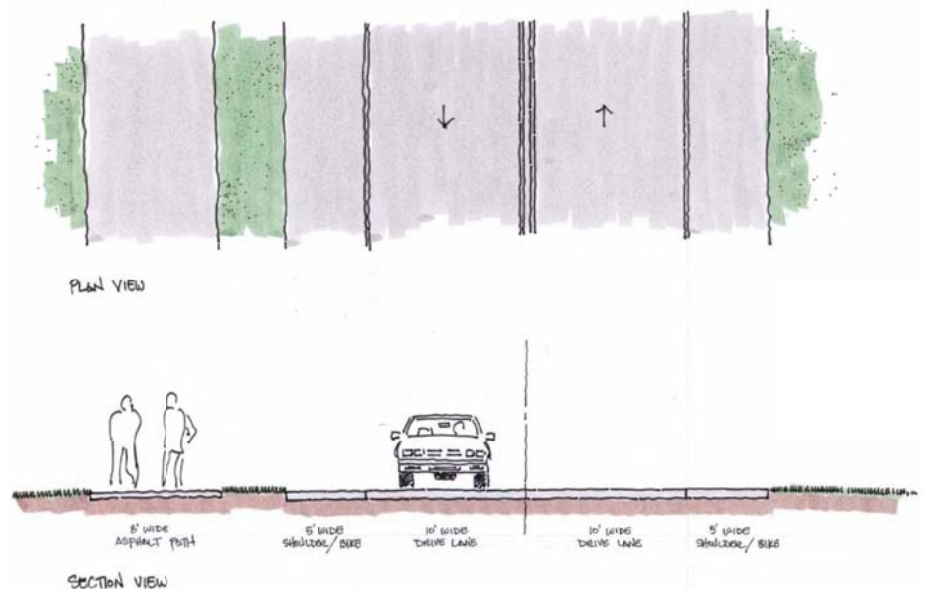
4.1.5 Bike Lanes/Paved Shoulders South of the Cocohatchee River Bridge

The portion of the Vanderbilt Drive corridor north of Cocohatchee River Bridge to Bonita Beach Road, consists of a 2-lane rural cross section with 11' travel lanes, with the occasional 11' wide left- and right-turn lanes at approaches to developments, and designated 5' bike lanes. In contrast, the 1.25 mile segment of the corridor south of the Cocohatchee River Bridge consists of a 2-lane rural cross section with 10' travel lanes and no bike lanes or paved shoulders (**Figure 6**). The existing 6' paved pathway meanders along the west shoulder, often only 6' or less from the outside edge of the travel lane. In order to improve safety for motorists and on-road cyclists, the County has expressed an interest in constructing bike lanes/paved shoulders along this segment of the corridor (**Figure 7**).

This improvement will be discussed in greater detail in the section that follows. It should be noted that the preliminary design evaluation concepts developed to replace the two existing bridge structures south of the Cocohatchee River include on-road bike lanes/paved shoulders.

FIGURE 7

South Corridor – Paved Shoulders



5.0 Identification of Improvements

Crosswalks, while important for pedestrian safety, should not be used indiscriminately. The MUTCD provides that *“An engineering study should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.”*

During the engineering study for a new marked crosswalk, consideration should be given to the need for measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence. This is especially true for new non-intersection pedestrian crossings which are generally unexpected by motorists.

5.1 IMPROVEMENTS

5.1.1 Crosswalks

A variety of crosswalk options have been explored as part of this study effort. Options include signing and marking, painting and surface treatments, the use of various types of warning beacons and activation options, the use of pedestrian refuge areas, and lighting options.

5.1.1.1 Signing and Marking

The style of marking, and the associated signing, of crosswalks is guided by the Manual of Uniform Traffic Control Devices (MUTCD) and the FDOT Roadway Design Index, which dictates the minimum design requirements for both intersection and mid-block locations.

Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, on approaches to other intersections where traffic stops, and at mid-block locations. In conjunction with signs and other measures, crosswalk markings help to alert road users of a designated pedestrian crossing point across roadways at locations that are not controlled by traffic signals, STOP or YIELD signs. At non-intersection locations, crosswalk markings legally establish the crosswalk.

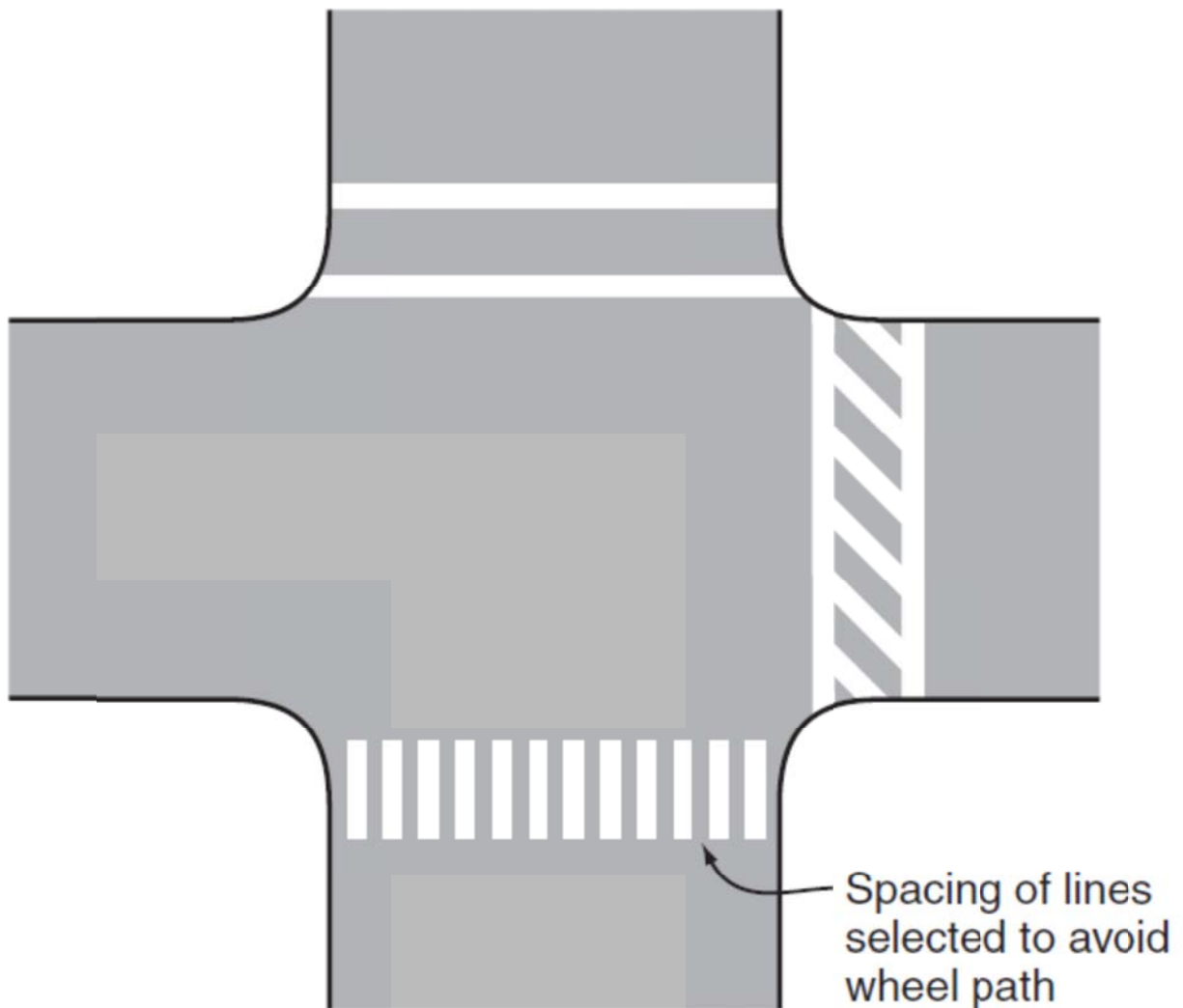
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The style of crosswalk marking may vary according to established guidance as shown in **Figure 8**. High visibility crosswalks, e.g., the “piano key” style are encouraged where maximum visibility is advised. Surface treatments, discussed later in this section, can further enhance the visibility of the crosswalk.

FIGURE 8: Examples of Crosswalk Markings (Source: MUTCD Figure 3B-19)



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Identification of Improvements

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In Florida, motorists are required by law to stop for pedestrians in crosswalks. The appropriate signs for unsignalized crosswalk locations are shown below. In certain instances, in-road signs (**Figure 9**), with or without associated pedestrian refuge islands, may be placed between the travel lanes to help identify the crosswalk location and to remind motorists of the law that requires them to stop for pedestrians in the crosswalk. Stop lines are located in advance of the crosswalk, and are marked with the appropriate sign (**Figure 10**).

The marking of crosswalk at mid-block locations also includes stop lines or stop bars located 20'-50' in advance of the crosswalk markings. These stop lines are punctuated by the appropriate "Stop Here for Pedestrians" signs (**Figure 11**).

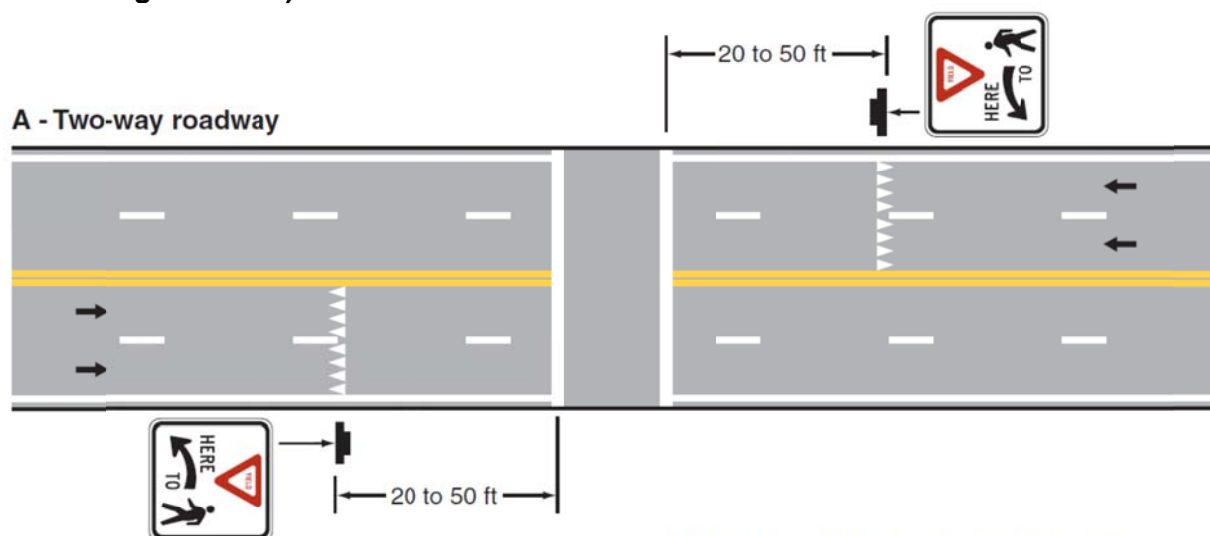
FIGURE 9



FIGURE 10



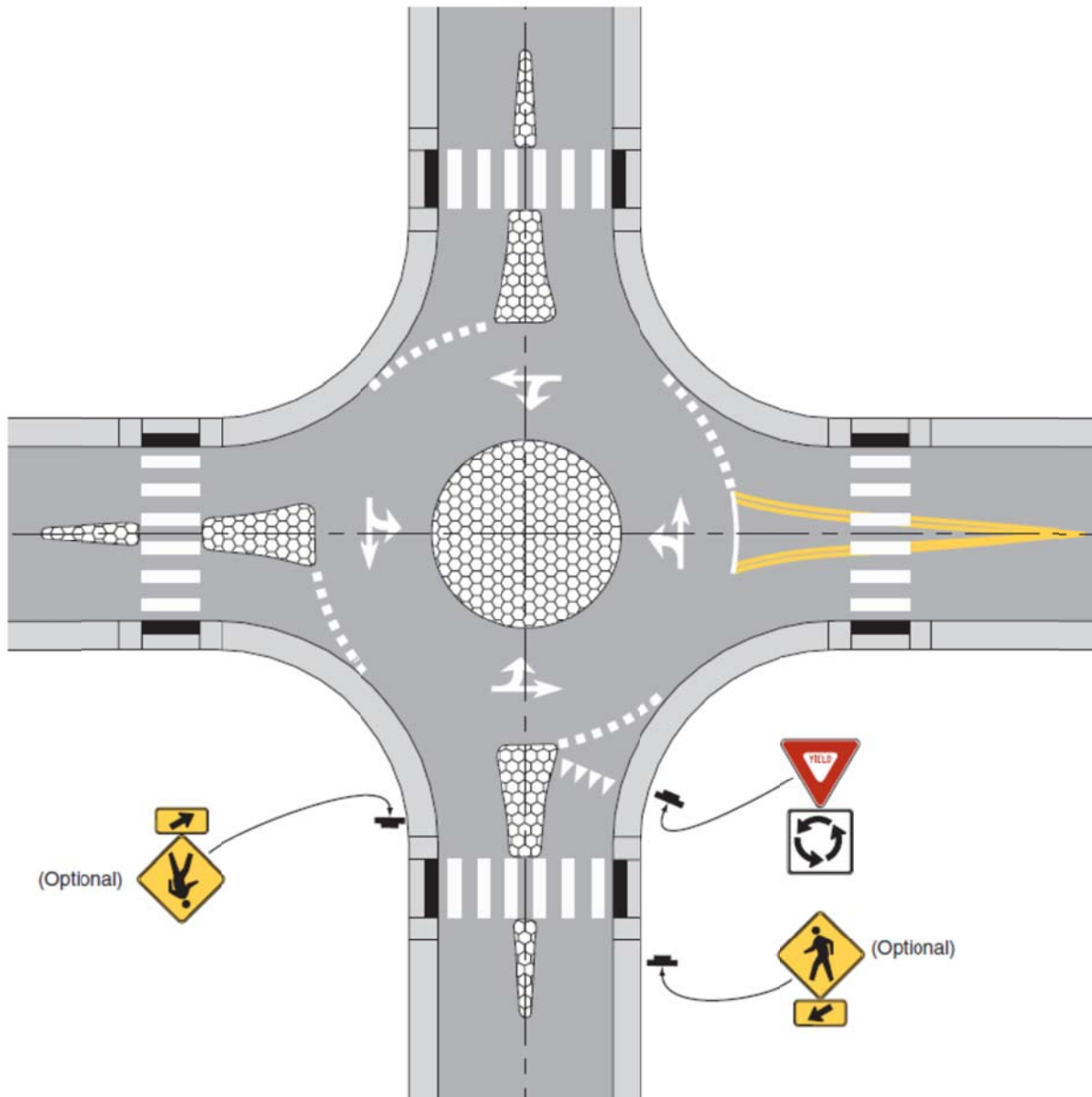
FIGURE 11: Example of Yield Lines at an Unsignalized Midblock Crossing (Source: MUTCD Figure 3B-17)



Note: If Stop Here for Pedestrians signs are used instead of Yield Here to Pedestrians signs, stop lines shall be used instead of yield lines.

The use of roundabouts also facilitates the marking of crosswalks, and frequently may include the use of refuge islands that offer pedestrians an area to wait for an acceptable gap before proceeding across the travel lane (**Figure 12**).

FIGURE 12: Example of Marking & Signing for a Mini-Roundabout (Source: MUTCD Figure 2B-21)



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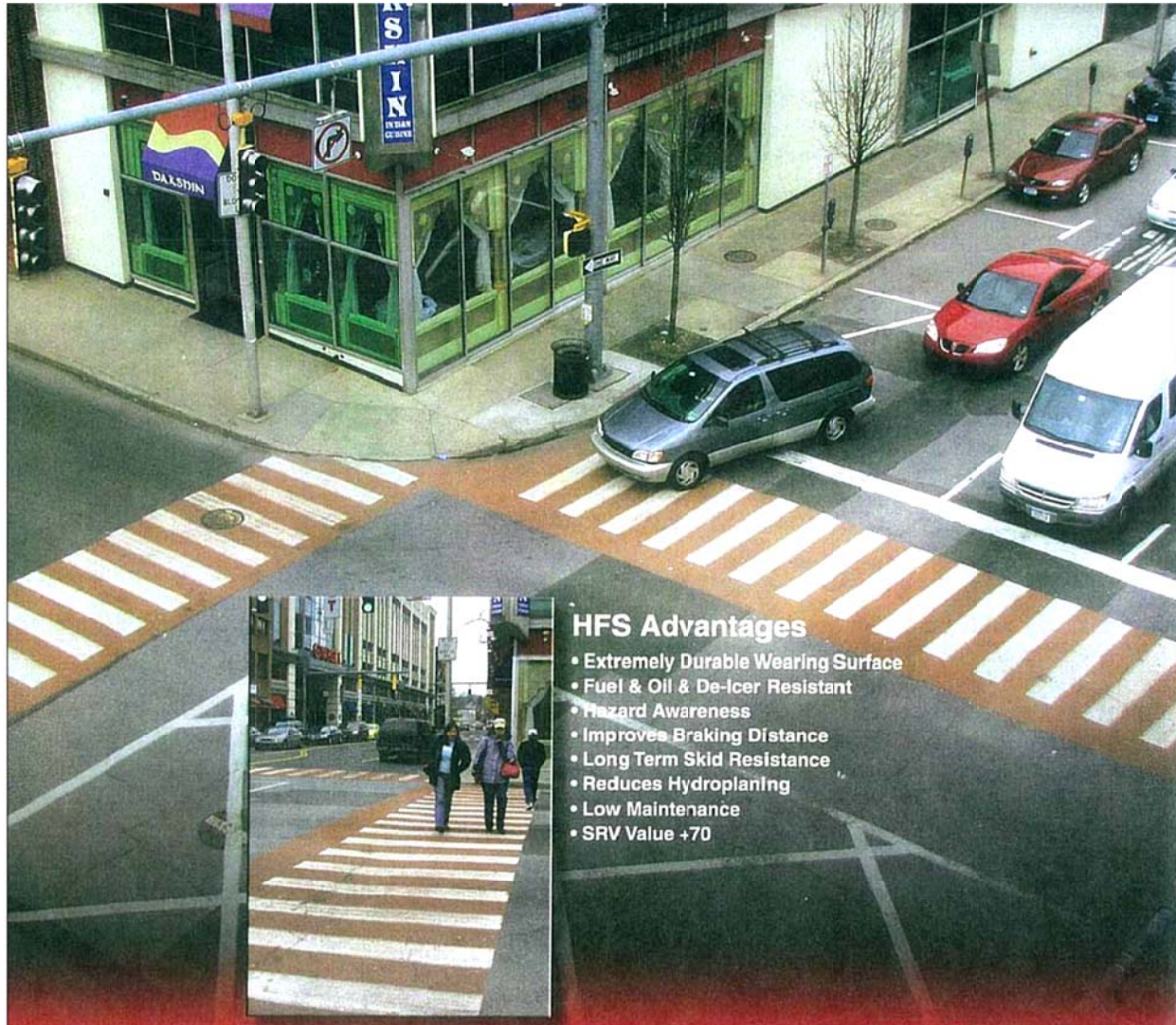
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5.1.1.2 Surface Treatments

The surface of the crosswalk can be enhanced to provide both visual and tactile feedback to motorists. Colored and contrasting surfaces (**Figure 13**) increase visual attention to the location, making it easier for motorist to recognize the crosswalk location as they approach.

FIGURE 13: Example of Color-Contrasting High Friction Surface Treatment Crosswalk



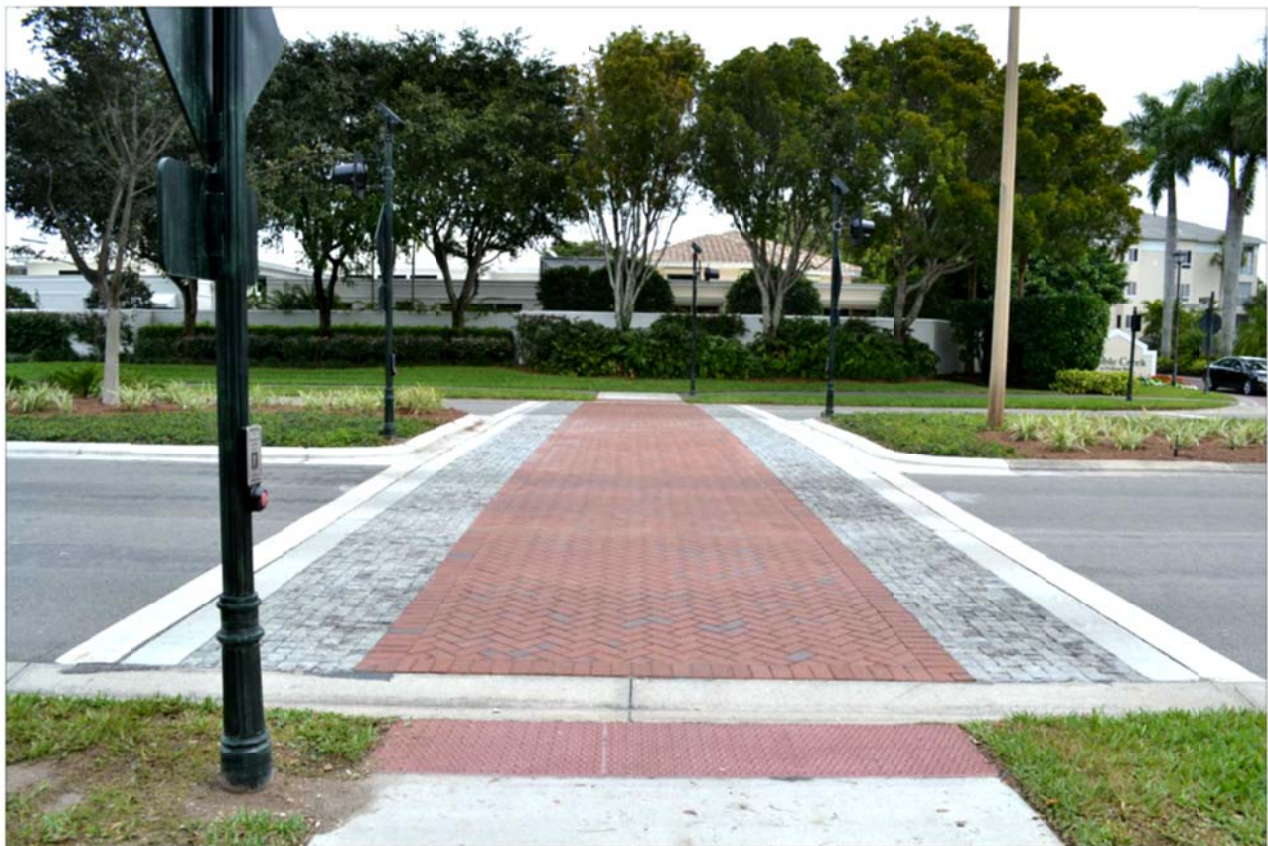
More robust surface treatments such as brick pavers or cobbles (**Figure 14**) add yet another level of awareness as a driver passes over the crosswalk, sensitizing the motorists to the crosswalks both visually and through a tactile response. While painted surfaces can be relatively inexpensive, brick pavers and cobbles bring an increased cost to the improvement. Stamped asphalt and bonded aggregate offer less expensive alternative treatments.

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FIGURE 14: Paver/Cobble Crosswalk Treatment



PAVER CROSSWALK WITH COBBLE BANDS

5.1.1.3 Lighting

Proper lighting will be necessary to enhance the visibility of the crosswalks at night. There are currently no publicly maintained streetlights along Vanderbilt Drive corridor and most of the existing development entrance road intersections lack sufficient roadside lighting to illuminate a crosswalk. Any new mid-block crossing locations would also require the installation of roadside lighting.

5.1.1.4 Crosswalk Refuge Islands

To further enhance the crosswalks, consideration was given to creating pedestrian refuge islands as part of each crosswalk location. Some locations explored have approach-end markings as part of the lane transition areas at intersections used to accommodate turn lanes. As part of a crosswalk installation, these diagonal striped zones could be used to create pedestrian refuge areas approximately mid-way across the road, allowing pedestrians to cross one direction of travel lanes and then safely wait within the refuge area for a gap in opposing traffic stream before proceeding the remaining distance across the travel way.

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Some of these existing intersection areas, including the turn lanes can be 4 lanes (plus bike lanes) wide, a total distance over 55'. At a pace of 3-4 feet per second, walking the entire distance can take up to 18 seconds, during which time a car traveling at 45 mph will have traveled approximately 1,200 feet, almost ¼-mile. Simply crossing to the center of the travel way could take up to 10 seconds, during which time a car traveling at 45 mph will have traveled 660'. For a pedestrian, having to negotiate a 40 second gap in two opposing lanes of through traffic (plus turning vehicles) can be an exceptionally difficult task. Refuge islands can narrow the distance and thus reduce the gap needed to safely cross the travel way. They also allow the pedestrian to focus on traffic approaching from one direction at a time, making gap acceptance easier.

The placement of pedestrian refuge areas can be done permanently, or in a “temporary” fashion as for a trial period. Permanent installations would normally involve the construction of a raised median island using concrete curbing (**Figure 15**) necessitating a significant construction and maintenance of traffic effort.

FIGURE 15: Example Mid-Block Pedestrian Refuge Island



The implementation of “temporary” refuge islands involves the use of pre-fabricated products that can be installed quickly without incurring a lot of maintenance of traffic “down time”. Recently, Lee County installed temporary refuge islands at new crosswalk installations using pre-fabricated curbing called **Qwick Kurb** to form the outer perimeter of the refuge “islands” (**Figure 16**). Another type of pre-fabricated product, called **Redipave**, uses recycled rubber to create raised island components that are pieced together in the desired size/shape. Both types of products can be installed (or removed) quickly and economically by agency road crews (**Figure 17**), minimizing the impact to the movement of traffic during installation and offering a more economical alternative to the construction of permanent raised median island refuges.

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FIGURE 16: Example Mid-Block Pedestrian Refuge Island – Qwick Kurb (Estero Blvd., Fort Myers Beach, FL)



FIGURE 17: Example Mid-Block Pedestrian Refuge Island – RediPav (Images courtesy of Professional Pavement Products, Inc., Jacksonville, FL)



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5.1.1.5 Edge Treatments

While roundabouts and pedestrian refuge areas may offer levels of traffic calming effects within the travel way, edge treatments can also be incorporated into the overall implementation plan to further enhance the crosswalk area in ways to help manage the speeds of vehicles in the corridor. Narrowing the travel lane, both visually and physically, will help to further reduce speeds expected through the crosswalk area. Restriping (to narrow) the travel lane approaching the crosswalk, coupled with hardscape edge treatments, e.g., curb extensions, bulb-outs, etc., will reduce vehicle speeds and at the same time, shorten the distance that pedestrians have to cross to reach the other side of the roadway (or pedestrian refuge area).

5.1.1.6 Actuated Warning Beacons & Signals

Proper signing and marking when associated with the appropriate flashing beacon assembly can provide effective enhancement for any crosswalk installation. Actuated crosswalk signal systems include those installations that deploy amber flashing lights, "warning" motorists to yield/stop for pedestrians in the crosswalk, and those that stop traffic with a red signal indication (e.g., full signal or "HAWK" hybrid signal). Actuation is controlled by the pedestrian using either a pole-mounted push button (Figure 18) or sensors embedded into bollards (Figure 19).

5.1.1.7 Rectangular Rapid Flashing Beacons (RRFB)

The RRFB uses rectangular-shaped high-intensity LED-based indications (Figure 18), flashes rapidly in a wig-wag "flickering" flash pattern, and is mounted immediately between the crossing sign and the sign's supplemental arrow plaque. Research data from an extensive study of RRFB installations in St. Petersburg show an 80-100% rate of motorist "yield to pedestrians" compliance, in comparison to far lower rates (in the 15 to 20 percent range) for standard beacons. The St. Petersburg data also shows that drivers exhibit yielding behavior much further in advance of the crosswalk with RRFBs than with standard round yellow flashing beacons.

Additional studies in Dade County reported a significant reduction (to negligible levels) of evasive conflicts between drivers and pedestrians and the percentage of pedestrians trapped in the center of an undivided road because of a non-yielding driver in the second half of the roadway.

Equally important, the very high yielding rates were sustained even after 2 years in operation, and no identifiable negative effects have been found. The RRFB's very high compliance rates

FIGURE 18: RRFB w/Push Button Actuator



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are previously unheard of for any device other than a full traffic signal and a high-intensity activated crosswalk ("HAWK") hybrid signal, both of which stop traffic with steady red signal indications.

The RRFB offers significant potential safety and cost benefits because it achieves very high rates of compliance at a very low relative cost in comparison to other more restrictive devices that provide comparable results, such as full midblock signalization.

5.1.1.8 Flashing Amber Beacons (CAUTION)

Similar to RRFBs, traditional flashing beacons (Figure 19) include one or two pole-mounted round amber light assemblies actuated by the pedestrian by push button or by sensors. In addition to locating the caution beacon assemblies at the crosswalk, in some instances it may be appropriate to install supplemental assemblies in advance of the crosswalks to notify motorists of the crosswalk location ahead.

5.1.1.9 Steady Red Signal Indication (STOP)

Although Florida Law requires motorists to stop for pedestrians in a crosswalk, the amber caution signals described above do not indicate how long a motorist (in either lane direction) must remain stopped. A fully signalized or hybrid signal installation includes a steady red, STOP indication which controls the length of time during which the motorists traveling in both directions must remain stopped.

Operationally, a fully controlled signal (Figure 20) operates the same way at a mid-block location as it does at an intersection, including green, amber and red indications with pedestrian output displays (the "Walk/Don't Walk" sign) indicating when it is appropriate for the

FIGURE 19: Amber Beacon w/Bollard Sensor Actuator



FIGURE 20: Fully Signalized Crosswalk



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pedestrians to cross. A hybrid “HAWK” (high-intensity activated crosswalk) signal (**Figure 21**) is designed to function in a manner similar to a conventional pedestrian signal by providing a protected street crossing for the pedestrian, but at a location that does not have traditional signal control and operation.

The "HAWK" is used at mid-block locations or un-signalized intersections to provide a cost-effective method of protecting a pedestrian movement. Until activated by the pedestrian, the "HAWK" signal rests in a dark state for the vehicle, allowing normal flow through the mid-block area/un-signalized intersection while displaying a constant “Don’t Walk” indication for the pedestrian crossing. Activation by a pedestrian causes the amber (CAUTION) indication to flash. This is then followed by solid amber, followed by a solid red (STOP) indication, followed by a flashing red indication during which time motorist may proceed with caution (after stopping), once the pedestrians have cleared the crosswalk. The signal once again goes dark after the flashing red phase. Throughout this cycle, the pedestrian output identifies when it is safe for pedestrians to proceed.

FIGURE 21: HAWK Signal



A full signal installation at the suggested crosswalk locations at intersections with project entrance roads would mean having to fully signalize all approaches to the intersection in order to avoid driver uncertainty and confusion. In addition to the detailed engineering study required for all crosswalk locations, a signal warrant analysis would be necessary to support such an improvement.

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5.1.2 Sidewalk Connections

As mentioned previously, some of the optional locations would require the construction of interconnecting concrete sidewalks in order to be fully accessible. The mid-block option would require the construction of sidewalks running parallel to the roadway, interconnecting with developments at project entrance roads. At project access roads, sidewalk interconnections perpendicular to Vanderbilt Drive would be needed to interface with the pedestrian facilities within each development. A portion of that interconnection would be within the public right-of-way with the remaining part being on private property, and therefore construction of that portion outside of the public right-of-way would be the responsibility of the adjacent land owner (e.g., developer or homeowner association).

The County Land Development Code (LDC) provides that sidewalks constructed along roadways with a functional classification as an arterial or collector be 6' wide and be constructed of concrete, a minimum of 6" thick over a compacted subgrade.

5.1.2.1 Within Public R/W

Within the rural cross section drainage swales generally consume all of the right-of-way between the edge of pavement and the right-of-way/private property line (**Figure 22**). Adding a 6' sidewalk within this area is likely to be especially challenging in many areas, resulting in higher construction costs. Preliminary survey data indicates a significant amount of alteration to many of the swale areas would be required in order to retain the required side slopes and maintain required drainage designs.

FIGURE 22: Roadway Drainage Swale



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5.1.2.2 To/From Developments

Generally, the County is prohibited from using public funds to construct infrastructure on private property for the benefit of the landowner. Therefore, constructing the connection between the crosswalk/sidewalk and the pedestrian facilities within each development would likely be a shared responsibility, the County constructing the portion within the public right-of-way and the adjoining land owner (e.g., developer, master home owners association, etc.) constructing the remaining portion to connect to the internal pedestrian system.

5.1.3 Modern Roundabouts

Consideration was given to the installation of modern roundabouts as an additional measure of “traffic calming” at intersection locations and at mid-block crosswalk locations. The modern roundabout is characterized by the following:

- A central island of sufficient diameter to accommodate vehicle tracking and to provide sufficient deflection to promote lower speeds
- Entry is by gap acceptance through a yield condition at all legs
- Speeds through the intersection are 25 mph or less

In addition to being a physical speed-impedance device, roundabouts also have the design characteristic of providing opportunities for pedestrian refuge areas as part of the facility. Additionally, the roundabout provides a central core area for landscaping or other hardscape treatment.

Modern roundabouts, when correctly designed, are a proven safety countermeasure to conventional intersections, both stop controlled and signalized. In addition, when constructed in appropriate locations, drivers will experience less delay with modern roundabouts. FHWA has adopted *NCHRP Report 672 Roundabouts: An Informational Guide* which establishes criteria and procedures for the justification, operational and safety analysis of modern roundabouts in the United States.

During the initial consideration of the roundabout option, it was understood by the planning/engineering team and the County Staff that any roundabout option to be considered would need a thorough engineering design review in order to determine the optimum size and shape/configuration. It is unclear at this point as to whether or not there would be sufficient right-of-way at select locations to facilitate the implementation of a roundabout; however the concept was considered to be an option that deserved further consideration in a public forum.

5.1.4 Bike Lanes/Paved Shoulders

The southern 1.25 miles of the corridor, south of the Cocohatchee River Bridge to 111th Avenue North/Bluebill Avenue, is a narrow 2-lane rural cross section with 10 ‘ travel lanes and no bike lanes or paved shoulders. The existing 6’ off-road asphalt pathway that meanders along the

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west shoulder of the roadway frequently coming within 6' of the edge of pavement. This roadway segment has a posted 35 mph speed limit.

The corridor is a favorite of cyclists, both “on-road” and “off-road pathway” enthusiasts. For those cyclists preferring to use the travel way, the 10' travel lanes make this portion of the corridor a challenge for the cyclist and the motorist. As travel volumes increase along the corridor, opposing traffic makes it difficult for motorists to overtake a cyclist while giving the proper amount of clearance. This can frustrate drivers and cause a dangerous condition when motorist and cyclist are forced to share a single 10' wide travel lane.

The County has recognized the need to improve this section of the corridor with either designated bike lanes or un-marked paved shoulders (**Figure 23**). Either solution is acceptable and would yield a marked improvement in the travel characteristics of the roadway.

FIGURE 23: Rendering of Additional Paved Shoulders



As mentioned previously, a review of the existing condition of the corridor revealed that for the majority of distance in this segment, the existing off-road asphalt pathway is frequently located 6' or less from the edge of the travel way. A review of the design plans for the Greenway indicates that throughout much of the segment of the corridor, the new Greenway will be 4' off the edge of pavement. This condition (existing and future) would prohibit the adding the additional bike lane/paved shoulder improvement to the west side of the roadway, requiring all of the additional asphalt to be placed along the east edge of the existing roadway, necessitating at a minimum the restriping of the travel lanes, and at a maximum a complete overlay of the roadway. If the County reconsiders the design of the Greenway improvement based upon recent public input, this may offer an opportunity to relocate the proposed Greenway further away from the travel way and allow the additional bike lanes/paved shoulders to be added to both sides of the existing roadway.

6.0 Public Involvement & Participation

The Collier County Transportation Planning Department has made a commitment to provide continuing public involvement/participation opportunities at all stages of project development; from “concept to completion”. The following section summarizes this on-going effort as it relates to the development of future project improvements in the Vanderbilt Drive corridor.

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6.1 PREVIOUS EFFORTS

The public involvement efforts employed as part of this planning study are a continuation of previous efforts related to the Greenway. The County Transportation Planning Department conducted an extensive public involvement effort as part of the planning and design of the 4 mile long multi-use pathway along the west side of Vanderbilt Drive extending from Bonita Beach Road to 111th Avenue North/Bluebill Avenue. After considering the options and public input garnered through a series of workshops and public outreach efforts, a preliminary design for an 8'wide multi-use pathway was prepared.

It was during this initial stage of public involvement/input, that the issues of bicycle and pedestrian safety arose, suggesting that an ancillary effort to examine additional public safety countermeasures would be in order. As a result of a raised awareness of the safety issue, the County Transportation Planning Department undertook this supplemental study effort to evaluate potential options for improving bicycle and pedestrian safety within the corridor.

6.2 PRESENTATION AT A GATHERING OF MASTER HOA LEADERSHIP REPRESENTATIVES

Following the development of a set of options and alternatives, draft exhibits illustrating the concepts and alternatives were prepared for use in presenting the options/alternatives at an advertised public workshop. As a preview to the public workshop, the County Transportation Planning Department and Stantec were invited to a gathering of the leadership (board members, etc.) of most of the residential communities along Vanderbilt Drive (within Collier County). At that meeting, held at the Cocohatchee River Park Coast Guard Station on April 9, 2013, the draft exhibits were presented and discussed. Those in attendance were encouraged to help get the word out to members of their associations, encouraging them to attend the public workshop scheduled for April 16, 2013, in the ballroom at Saint John the Evangelist Catholic Church.

6.3 PUBLIC WORKSHOP

On April 16, 2013, Stantec helped to facilitate an advertised public workshop to present the concepts and alternatives generated during the first phase of the study. The early evening workshop, held at Saint John the Evangelist Catholic Church Ball Room, included a 30-minute "open house" format to allow attendees to view the exhibits and speak with the staff and the consultant team. Following the "open house", introductory remarks by the staff were followed by a PowerPoint presentation illustrating the concepts and alternatives that were on display. Following the presentation, the staff and the consultants entertained questions and comments from those in attendance. Additionally, attendees were encouraged to provide written comments on the comment cards provided, and to recommend a set of three priority items they wished to see accomplished in the corridor.

Of the 112 attendees that signed in upon arriving at the workshop, 58 comment cards were completed and returned to staff, or subsequently provided either directly to staff or through the

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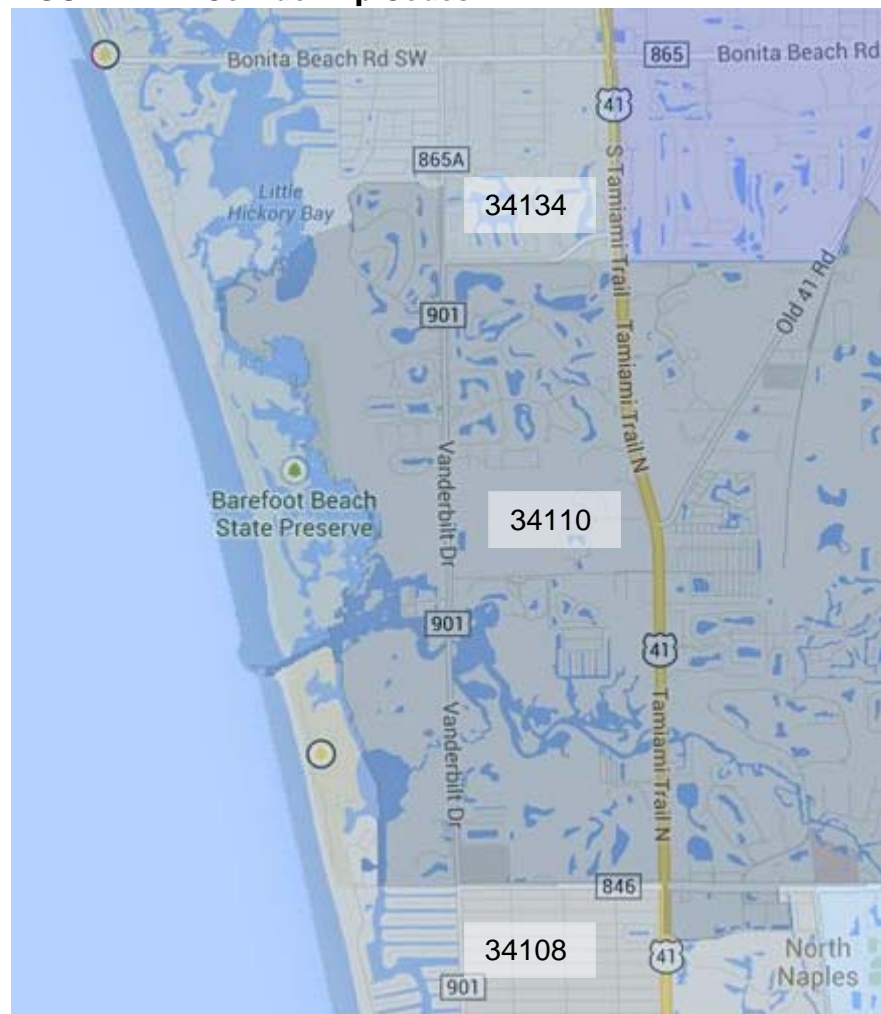
project website via e-mail and/or written form during the 30-day comment period following the workshop.

6.3.1 Review of Public Comments/Input

Following the 30-day comment period, all of the comments were compiled into a database spreadsheet, reviewed by the project team. Attendees at the public information meeting were invited to provide contact information on the sign-in sheet. Participants were also encouraged to fill out a comment/survey form after the presentation to provide any written comments as well as to identify three top priority improvements they would like to see in the corridor. During the team's follow-up review, due to concerns raised by some attendees that non-corridor attendees might disproportionately influence the priorities, the improvements identified were tabulated for the entire group of respondents, and for those in attendance who identified with an address being within the three selected zip codes that surround the corridor. The three zip codes used include 34108, 34110, and 34134, as shown in

Figure 24.

FIGURE: 24 – Corridor Zip Codes



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Of the 112 attendees that signed in, 54 did not provide written comments or suggest any priorities for potential improvements. A summary of the comments from the remaining 58 attendees that provided public input follows in **Table 1**. The input from the 40 attendees that were identified with an address within the zip codes surrounding the corridor has been isolated separately as a subset of the responses shown in **Table 1**. Additionally, 9 non-attendees provided public comments, with 6 of those responses coming from respondents that identified with an address within the corridor zip codes. Those responses are also summarized below.

Table 1: Summary of Public Input

	<i>All Attendees Providing Comments</i>	<i>Attendees Providing Comments from Corridor Zip Codes</i>	<i>All Non-Attendees Providing Comments</i>	<i>Non-Attendees Providing Comments from Corridor Zip Codes</i>
<i>Total Count of Respondents</i>	58	40	9	6
<i>8 ft. Multi-Use Pathway (West Side of Roadway)</i>	8	7	0	0
<i>>8ft. Multi-Use Pathway (West Side of Roadway)</i>	37	23	1	0
<i>Paved Shoulders/Bike Lanes (111th Ave. N. to Cochatchee Br.)</i>	32	20	7	5
<i>Sidewalks on East Side of Roadway</i>	13	11	2	2
<i>Crosswalks</i>	25	19	2	2
<i>Roundabouts</i>	18	16	2	1
<i>Reduce Speed Limit (N. of Wiggins Pass Rd.)</i>	18	16	5	4

Although not technically an “improvement”, reducing the speeds and/or reducing the speed limit on Vanderbilt Drive north of Wiggins Pass Road, was a frequent comment, often associated with one of the identified improvements, e.g., roundabouts, etc. Additionally, while **Table 1** is intended to quantify the recommended priorities suggested by the respondents, the team noted many of the comments included “do not...” remarks, e.g., “No roundabouts”, or “No cobbles or bricks in the crosswalks”, etc. While very few respondents discussed the number or locations of potential crosswalks in the north segment, two respondents commenting on the southern segment specifically suggested that crosswalks be located on the north side of The Dunes entrance point to minimize conflicts with the majority of motorists exiting or entering The Dunes, which do so to/from the south (the intersection of Vanderbilt Drive and 111th Avenue North).

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While technically “not on the table” as part of this study effort, the other compelling observation from the public information meeting data suggests that the debate about the width of the future multi-use pathway along the west side of the roadway is not yet over. From those respondents with an address within the zip code corridor, the majority clearly favor a pathway width greater than 8 feet by more than a 3:1 margin. Given all the respondents, the margin of support was over 4.5:1 in favor of a wider pathway. It was also noted that one respondent didn’t think the existing pathway should be widened at all.

Of the 40 respondents that included an address within the adjacent zip codes, 47.5% ($n=19$) included crosswalks as a needed improvement. 50% ($n=20$) suggested that bike lanes or paved shoulders were important. Only 27.5% ($n=11$) of the respondents suggested that sidewalks along the east side of the roadway were an important priority. 40% ($n=16$) of the respondents favored the use of roundabouts, and while not specifically included in the discussion as a priority improvement, 40% ($n=16$) also made it a point to either specifically recommend lowering the speed limit, or suggested that speeding was a problem that needed to be dealt with in some manner (e.g., using roundabouts and crosswalks, etc.).

There is an obvious consensus among all of the respondents that safety within the corridor, for cyclists and pedestrians, is a major issue. The recommendations resulting from this study have taken into consideration all of the input received from the public and from agency staff responsible for not only making improvements, but for the perpetual operations and maintenance of the facilities.

7.0 Costs and Available Funding

As part of the planning effort, it will be important to understand the relative cost of different improvement options in order to properly evaluate their implementation potential given the limited amount of funding that is available for such improvements. It is important to understand that as a planning study, “planning level” estimates of potential costs are provided in order to compare options to available funding, and these costs should not be construed as engineer’s estimates of probable costs which would be expected as part of the required detailed engineering analyses of a specific improvement. The development of engineer’s opinions of probable costs requires a significant level of effort based upon a particular design (i.e., construction plans), not only to evaluate specific material and labor costs, but also to evaluate the added costs associated with challenges related to stormwater management, maintenance of traffic, etc. Each option will be different, as will each location; therefore for the purposes of this study, our planning level estimates are based upon a range of values that might reasonably be anticipated.

In addition to planning level cost estimates, we have also explored the funding that is likely to be available for any improvements, understanding that much of the existing developer contribution fund has already been expended or is committed to complete any needed redesign and construction of the Greenway improvements. Additionally, we have explored other funding options that might be available in the future to help fund subsequent phases of improvements.

7.1 PLANNING LEVEL IMPROVEMENT COSTS

A range of planning level costs has been developed for each type of improvement mentioned in this report. It is assumed that the “basic” crosswalk installation will include for all locations, striping, signing and marking, an actuated flashing system, and arterial-level street lighting.

7.1.1 Crosswalk Improvements

The cost of a “basic” crosswalk installation, including a flashing warning system, will range in costs from \$26,500 to \$42,000, including the cost of new arterial-level lighting. A range of costs has been developed using a variety of sources, including public agency guidance, vendor prices, and standard FDOT Unit prices. The cost of sidewalks needed to interconnect the three crosswalks in *Option 2* is based upon planning level estimates provided by the County Transportation Planning Department.

A breakdown of unit costs for individual components for the basic installation and “enhancements” is provided in **Tables 2** and **3**.

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TABLE 2: Planning Level Costs for Basic Crosswalk & Sidewalk Installations

Basic Crosswalk – Signing, Marking & Lighting	Cost Range
<i>Crosswalk Design, Survey, Engineering (25% of CST)</i>	<i>\$6,600 – \$10,500</i>
<i>High Visibility Striping, ADA compliant tiles, Signing and Marking</i>	<i>\$1,500 - \$2,000</i>
<i>Flashing Warning System – Actuated</i>	<i>\$15,000 - \$20,000</i>
<i>Arterial-Level Lighting</i>	<i>\$10,000 - \$20,000</i>
<i>CEI (Construction Engineering and Inspection) (25% of CST)</i>	<i>\$6,600 – \$10,500</i>
<i>Total</i>	<i>\$39,700 - \$63,000</i>
Sidewalks (6' Concrete)	Cost Range
<i>Sidewalk Design, Survey, Engineering (25% of CST)</i>	<i>\$15.42 per LF</i>
<i>Construction (6' wide)</i>	<i>\$61.68 per LF</i>
<i>CEI (Construction Engineering and Inspection) (25% of CST)</i>	<i>\$15.42 per LF</i>
<i>Total</i>	<i>\$92.52 per LF</i>

TABLE 3: Planning Level Costs for Enhancements

Enhanced Alternatives (ADA Compliant, Signing & Marking)	Cost Range
<i>High Visibility Striping w/Color Aggregate Additive</i>	<i>\$3,500 - \$4,500</i>
<i>Brick Pavers, Signing and Marking</i>	<i>\$18,000 - \$25,000</i>
<i>Median Refuge – Quick Kurb, Signing, Marking, etc.</i>	<i>\$10,000 - \$15,000</i>
<i>Median Refuge – RediPave, Signing, Marking, etc.</i>	<i>\$5,000 - \$10,000</i>
<i>High-Intensity Activated Crosswalk ("HAWK") Hybrid Signal</i>	<i>\$60,000 - \$70,000</i>
<i>Traffic Signal (Mast Arm Assembly)</i>	<i>\$300,000 - \$500,000</i>
<i>Edge Treatments – Restriping, Curb Extensions, etc.</i>	<i>Various</i>
<i>Roundabout</i>	<i>\$110,000 - \$150,000</i>

7.1.2 Basic Costs

Assuming the basic costs, outlined above, the range of costs associated with crosswalk and sidewalk improvements for the various options throughout the corridor are detailed in **Tables 4 and 5**.

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TABLE 4: North Crosswalk Locations

Option 1	Per Location	Cost Range
<i>4 Basic Crosswalk – Signing, Marking & Lighting</i>	<i>\$39,700 - \$63,000</i>	<i>\$158,800 - \$252,000</i>
<i>Total</i>		<i>\$158,800 - \$252,000</i>
Option 2		Cost Range
<i>3 Basic Crosswalk – Signing, Marking & Lighting</i>	<i>\$39,700 - \$63,000</i>	<i>\$119,100 - \$189,000</i>
<i>4,900 Feet of Sidewalk</i>	<i>\$92.52 per LF</i>	<i>\$453,400</i>
<i>Total</i>		<i>\$572,500 - \$642,400</i>

TABLE 5: South Crosswalk Locations

Option 1	Per Location	Cost Range
<i>1 Basic Crosswalk – Signing, Marking & Lighting</i>	<i>\$39,700 - \$63,000</i>	<i>\$39,700 - \$63,000</i>
<i>330 feet of Sidewalk</i>	<i>\$92.52 per LF</i>	<i>\$30,500</i>
<i>Total</i>		<i>\$70,200 - \$93,500</i>
Sidewalk Ext. to Naples Memorial Gardens Sidewalk	Per Location	Cost Range
<i>365 feet of Sidewalk</i>	<i>\$92.52 per LF</i>	<i>\$33,770</i>
Option 2	Per Location	Cost Range
<i>1 Basic Crosswalk – Signing, Marking & Lighting</i>	<i>\$39,700 - \$63,000</i>	<i>\$39,700 - \$63,000</i>

7.1.3 Bike Lanes/Paved Shoulders

Adding paved shoulders or bike lanes to the existing segment of Vanderbilt Drive south of the Cocohatchee Bridge should be included as a component of a complete overlay (milling and resurfacing) of the existing roadway in order to avoid uneven edges which could prove dangerous to cyclists. Additionally, with the existing and future multi-use pathway located along the western edge of the roadway, there is insufficient space to add a paved shoulder/bike lane to the west edge of the pavement, requiring most, if not all, of the new pavement to be added to the east side of the existing roadway. To simply add the additional asphalt to the east side of the road would require removal and replacement of all existing lane striping. The incremental cost for the additional asphalt has been isolated in the cost estimates in **Table 6**, since the cost of resurfacing the existing travel lanes would be funded by County roadway maintenance funds, and not by the funds provided through the developer settlement agreement.

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TABLE 6: Paved Shoulders/Bike Lanes Unit Costs

Paved Shoulders/Bike Lanes	Cost Range
<i>8' of Asphalt for 2 Paved Shoulders (added cost as part of resurfacing)</i>	<i>\$9.50 - \$14.75 per LF</i>
<i>10' of Asphalt for 2 Bike lanes (added cost as part of resurfacing)</i>	<i>\$12.25 - \$18.50 per LF</i>

Source: Ranges developed by Stantec using FDOT District 3 2012 Annual Roadway Construction Costs for Milling & Resurfacing 2-Lane Rural Roadway with 5' Paved Shoulders and represents the additional cost associated with adding additional width for paved shoulders/bike lanes; the range is +/- 80% to 120% of paving-only costs.

These estimates below do not include the 3,100' of paved shoulders that are being constructed as a component of the replacement bridge structure projects.

TABLE 7: Paved Shoulders/Bike Lanes Improvement Costs

Paved Shoulders/Bike Lanes	Cost Range
<i>3,500 ' of 4' Paved Shoulders (as a component of resurfacing the roadway)</i>	<i>\$33,250 - \$51,625</i>
<i>3,500' of 5' Bike Lanes (as a component of resurfacing the roadway)</i>	<i>\$42,875 - \$64,750</i>

7.2 FUNDING COMPONENT

Original Settlement amount \$3,000,000

The following improvements have been funded from the original Settlement Agreement fund:

- Cocohatchee River Bridge Replacement \$1,300,000
- Greenway – Planning & Design Services \$200,000
- Miscellaneous.....\$65,000
- Total.....\$1,565,000

Of the remaining balance of \$1,565,000, a \$1,000,000 set-aside is considered essential to see the Vanderbilt Drive Greenway project through construction, leaving \$565,000 available to consider funding some of the additional bicycle and pedestrian safety improvements considered in the study effort. Although it is possible that there may not be sufficient funds from the developer settlement agreement to fund all of the desired improvements, there are additional sources of revenues that should be considered to help fund improvements beyond those that are ultimately funded through the developer settlement agreement.

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7.3 ALTERNATIVE FUNDING OPPORTUNITIES

While the initial source of funding for bicycle and pedestrian improvements within the corridor is the fund established through a developer settlement agreement, additional sources of funding for bike/ped improvements are available for future improvements.

A number of State and federal programs exist to support improvements to non-motorized transportation modes. Although administered through the Florida Department of Transportation' (FDOT) annually developed 5-Year Work Program, most of the programs are channeled through the Collier Metropolitan Planning Organization (MPO) for application processing and prioritization. The MPO has developed a Comprehensive Pathways Plan that establishes a basis for identifying and prioritizing future bike/ped pathway improvements.

Sources of potential funding include:

- 5-year Work Program Pathway “Box” Funds – This source consists of a minimum set-aside of federal urbanized area transportation funds that are specifically dedicated to bike/ped improvements. Priorities are established each year through the MPO planning process. Although candidate projects are most frequently selected from the Comprehensive Pathways Plan, there is nothing to preclude other important bicycle/pedestrian projects from being implemented with these funds.
- Federal Highway Administration (FHWA) Transportation Alternative (TA) Funds – Formerly known as the “Enhancement Funds” program, this newly renamed program is a competitive process administered by FDOT with applications accepted annually and processed and ranked by through the MPO planning process.
- Safety Funds – This is a competitive process administered annually by FDOT through the Community Traffic Safety Team planning process.
- Other County Transportation Funds – Consisting of a mixture of motor fuel tax revenues, impact fee revenues, payment-in-lieu sidewalk funds, and general fund revenues, although generally limited, some of these funds can be used to enhance and maintain non-motorized infrastructure.
- Municipal Service Taxing District Funds – Generally available to support community-based infrastructure improvements through the formation of Beautification or Lighting Districts, etc. These districts provide for on-going maintenance as well as the initial capital investments.

Generally, it is necessary for a public agency to sponsor a project for any of these funds, since the initial capital expenditure in most cases comes with a perpetual maintenance responsibility. It is therefore incumbent upon non-governmental entities to conceptually develop and promote particular projects through the respective agencies administering the particular funding programs in order to advance their particular projects.

8.0 Recommended Alternatives

The alternatives were considered and evaluated based upon the advantages and disadvantages discussed previously in this report. The overall goal of the project is to identify selected improvements that will enhance bicycle and pedestrian movements in the corridor. Clearly, enhancing the visibility of the proposed crosswalks and thus increasing driver awareness of users is of prime importance. Adding bike lanes or paved shoulders to the southern segment of the corridor has long been recognized as a critical need, and born out through this study and previous public involvement efforts. When considering the level of funding immediately available to make improvements in the corridor, it is important to try to maximize the improvement value for the funds expended.

8.1 RECOMMENDED IMPROVEMENTS

The recommended improvements extend to both type of installation and location, and total planning level costs have been tabulated for each recommended Option.

8.1.1 Recommended Crosswalk Installations

Research has shown that “visibility” is a key factor in the effectiveness of a crosswalk installation. In order to enhance the visibility of the proposed crosswalks, it is recommended that each installation include the following components:

- Basic High Visibility Striping, Signing and Marking
- RRFB Flashing Warning System w/ Push Button Actuation
- Median Refuge – RediPave, Signing and Marking
- Arterial Level Street Lighting

8.1.2 North Segment: OPTION 1 – Four Crosswalk Locations

In order to provide the greatest degree of driver awareness of pedestrian movements through this part of the corridor, it is recommended that basic crosswalks with associated enhancements (**Table 8**) be installed at four locations as described in Option 1. In addition to enhancing driver awareness, the frequency of the crosswalk may help to reduce the speed of motor vehicles traveling through this part of the corridor.

TABLE 8: North Segment – OPTION 1 Costs

Enhanced Crosswalk	Cost Range/ Crosswalk	Option 1 Four Locations
4 Basic Crosswalk – Signing, Marking & Lighting	\$39,700 - \$63,000	\$158,800 - \$252,000
Median Refuge – RediPave, Signing, Marking, etc.	\$5,000 - \$10,000	\$20,000 - \$40,000
Total	\$44,700 - \$73,000	\$178,800 - \$292,000

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8.1.3 South Segment: OPTION 1 - One Crosswalk Location Plus Sidewalks

In order to improve the overall access and mobility of those residents living on the east side of Vanderbilt Drive at the south end of the corridor, Option 1 is the recommended solution with the enhanced crosswalk located on the north side of the Dunes/North Shore Lakes intersection, coupled and associated sidewalk connecting the North Shore Lakes entrance to the Vanderbilt Villas entrance. Additionally, it is recommended that the optional sidewalk extension to the Naples Memorial Gardens sidewalk be constructed, thereby allowing residents complete access to 111th Avenue north without having to cross Vanderbilt Drive. The associated costs are shown in **Table 9**.

TABLE 9: South Segment – OPTION 1 Costs

Basic Crosswalk	Cost Range/ Crosswalk	Option 1 One Location
1 Basic Crosswalk – Signing, Marking & Lighting	\$39,700 - \$63,000	\$39,700 - \$63,000
Median Refuge – RediPave, Signing, Marking, etc.	\$5,000 - \$10,000	\$5,000 - \$10,000
Sidewalks - 330 Feet (Required)	\$30,500	\$30,500
Total	\$75,200 - \$103,500	\$75,200 - \$103,500
Sidewalk Ext. to Naples Memorial Gardens Sidewalk	Cost Range	Option 1
Sidewalks - 365 Feet (Optional)	\$33,700	\$33,700
Optional Total	\$108,900 - \$137,200	\$108,900 - \$137,200

8.1.4 South Segment: 5' Bike lanes

Given the narrow existing pavement (+/- 10' travel lanes), it is recommended that funds be set aside and earmarked to pay for the additional construction costs related to adding 5' bike lanes to the routine costs associated with resurfacing the southern segment. Even in the event the travel lanes are widened to 11' as part of a future resurfacing project, the additional width of the 5' bike lanes over the 4' paved shoulders would provide an extra measure of clearance between users of the bike lanes and motor vehicles in the adjacent travel lane. The costs associated with this improvement do not include the +/- 3,100 of the bike lanes that are assumed to be included in the roadway resurfacing that will be incorporated into the bridge replacement project. In the event the planned resurfacing adjacent to the bridges does not include the bike lanes, the cost to complete the entire 6,600' of bike lane improvements would increase substantially.

TABLE 10: South Segment – Bike Lanes Costs

Paved Shoulders/Bike Lanes	Cost Range
3,500' of 10' of Asphalt for 2 Bike lanes	\$42,875 - \$64,750
6,600' of 10' of Asphalt for 2 Bike lanes	\$80,850 - \$122,100

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8.2 SUMMARY OF RECOMMENDED IMPROVEMENTS

Table 11 provides a summary of the recommended solutions with a range of planning level costs associated with each recommendation.

TABLE 11: Summary of Recommended Improvements

Improvement	Option 1 Four Locations
<i>South Segment 3,500' of Bike Lanes (as a Component of Future Resurfacing)¹</i>	\$42,875 - \$64,750
<i>North Segment - 4 Enhanced Crosswalks (Option 1)</i>	\$178,800 - \$292,000
<i>South Segment - 1 Enhanced Crosswalk (Option 1) w/ Optional Sidewalk Ext.</i>	\$108,900 - \$137,200
<i>Total</i>	\$330,575 - \$483,950

¹ 3,500' of assumes the northernmost 3,100' will be incorporated (and paid for) in the resurfacing associated with the bridge replacement project.

9.0 Next Steps

This report recommends consideration of a set of cost effective solutions to improve bicycle and pedestrian safety within the Vanderbilt Drive Corridor. There are three important “next steps” in this process, including:

- Detailed Engineering Study/Warrant Analysis of Selected Alternatives – Before proceeding to implementation, the County will need to conduct a detailed engineering analysis of the selected improvements, to evaluate the operations, constructability, and costs associated with the improvements.
- Public Involvement and Consensus Building – It is important to vet the proposed recommended improvements with the public in an effort to build a community consensus on a selected set of improvements, and to ensure the viability and success of the projects. It is recommended that this be done as part of a County Commission hearing.
- Coordination with the Greenway Project and Vanderbilt Drive Resurfacing – The need for the crosswalk improvements is directly related to improving accessibility to the new Greenway Project. It is important to coordinate the recommended improvements with the Greenway Project and the future resurfacing of Vanderbilt Drive in order to implement the most cost effective solutions.