



# US 92 CORRIDOR MANAGEMENT PLAN STUDY UPDATE Corridor Assessment Report

Prepared for:  
Florida Department of Transportation District 5, DeLand, FL  
Contract No. C9F27 TWO 93





## TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	IDENTIFICATION OF VIABLE ALTERNATIVES.....	3
2.1	ALTERNATIVES.....	3
2.1.1	Alternative A.....	3
2.1.2	Alternative B.....	4
2.1.3	Alternative C.....	4
2.2	ALTERNATIVE TYPICAL CROSS SECTIONS.....	7
2.2.1	Segment A – Halifax River Bridge to SR 441/Peninsula Drive .....	7
2.2.2	Segment B – SR 441/Peninsula Drive to Grandview Avenue.....	7
2.2.3	Segment C – Grandview Avenue to SR A1A/Atlantic Avenue .....	7
3.0	IDENTIFICATION OF EVALUATION CRITERIA.....	12
4.0	PLANNING-LEVEL COST ESTIMATES.....	14
5.0	COMPARATIVE EVALUATION .....	15
6.0	RECOMMENDED ALTERNATIVE .....	17
6.1	RECOMMENDED ALTERNATIVE .....	17
7.0	DESIGN CRITERIA.....	21

## LIST OF FIGURES

Figure 1:	Study Area.....	2
Figure 2:	Alternative B Concept Plan .....	5
Figure 3:	Alternative C Concept Plan.....	6
Figure 4:	Segment A Typical Cross Sections.....	8
Figure 5:	Segment B Typical Cross Sections.....	9
Figure 6:	Segment C Typical Cross Sections.....	10
Figure 7:	Recommended Alternative C Concept Plan.....	19
Figure 8:	Recommended Alternative C Typical Cross Section.....	20



## LIST OF TABLES

Table 1: Comparison of Alternative Cross Sections .....	11
Table 2: Evaluation Criteria and Measures of Effectiveness.....	13
Table 3: Total Cost Estimates .....	14
Table 4: Evaluation Matrix.....	16
Table 5: Recommended Improvements .....	18
Table 6: Conceptual Design Criteria .....	22

## APPENDICES

Appendix A – Acronyms



## 1.0 INTRODUCTION

United States Highway (US) 92/State Road (SR) 600/International Speedway Boulevard (ISB) (collectively referred to as US 92/SR 600/ISB throughout the study) is a major east-west arterial road linking Interstate (I)-95 to the Atlantic Ocean in Daytona Beach, Florida. This study focuses on the easternmost 0.5 miles of the corridor, between the Halifax River and SR A1A/Atlantic Avenue. Figure 1 depicts the corridor study area.

Building on the *US 92 Corridor Master Management Plan Study*, which was completed in November 2015, this study develops a comprehensive Corridor Management Plan (CMP) for the corridor, including an implementation program, to guide and coordinate Florida Department of Transportation (FDOT) safety, enhancement, transit, congestion management and economic development investments. The CMP is intended to be a community-based evaluation to determine how best to meet the needs of current and future users. It also establishes a long-term plan to guide the evolution of the corridor into a more walkable urban environment utilizing a context-sensitive approach. Coordination with area agencies and stakeholders is vital to the success of the CMP. Both a Project Visioning Team (PVT) and Community Liaison Team (CLT) were assembled to provide feedback throughout the study process and to identify any outstanding issues concerning the study area. Members included representatives from the FDOT, City of Daytona Beach, Volusia County, Volusia County's Public Transit System (Votran), River to Sea Transportation Planning Organization (R2CTPO), Daytona Beach Chamber of Commerce, and other stakeholders in the study area.

Development of the study proceeded through a phased series of tasks, as shown below, which examined existing conditions, future transportation needs and developed conceptual alternative solutions. The project concludes with a management and implementation plan and this technical memorandum summarizes the results of the alternatives evaluation. It also describes the various future conditions alternatives and, based on the traffic operations evaluation, determines future multimodal needs for the US 92/SR 600/ISB study area.

- Existing Conditions Summary
- Future Conditions Summary
- **Corridor Assessment Report**



*A view of the eastern US 92/SR 600/ISB study corridor at SR A1A/Atlantic Ave*



*A view of the US 92/SR 600/ISB study corridor at SR 441/Peninsula Dr*





Source: Ghyabi & Associates. Map Created: 7/7/2016

Figure 1: Study Area



## 2.0 IDENTIFICATION OF VIABLE ALTERNATIVES

Based on the results of FDOT's *US 92 Corridor Master Management Plan* (November 2015), a range of transportation improvements are envisioned so that the existing system will meet the future needs of the US 92/SR 600/ISB corridor. Therefore, this study examines a variety of infrastructure improvements that were recommended as a part of the overall long-range transportation solutions for the corridor. These improvements are based on an understanding of the corridor conditions, needs and goals, as the overall planning process moved from future conditions analyses of initial alternatives to a detailed evaluation of three viable alternative concepts for beachside ISB.

For the purposes of this study, the US 92/SR 600/ISB corridor is illustrated in three sections: Segment A – Halifax River Bridge to SR 441/Peninsula Drive, Segment B – SR 441/Peninsula Drive to Grandview Avenue and Segment C – Grandview Avenue to SR A1A/Atlantic Avenue. Planning-level concept plans, including typical cross sections, were developed for each segment for further evaluation. Evaluation criteria have also been identified to be utilized in the subsequent analyses.

### 2.1 ALTERNATIVES

During the Future Conditions phase of the US 92 Corridor Management Plan Study Update, eleven alternatives were analyzed. Based on a comprehensive review of the future operation of the corridor under each scenario, the Department, with input from the Project Visioning Team (PVT), evaluated the number of alternatives that could advance to the Alternatives Refinement and Evaluation phase. A description of the three alternatives that were selected to advance is provided in the following sections.

#### 2.1.1 Alternative A

Originally designated as Alternative 1, Alternative A is the No Build alternative. This alternative maintains the existing typical four-lane cross section of US 92/SR 600/ ISB through the study corridor. The existing traffic signals at Halifax Avenue, SR 441/Peninsula Drive, Grandview Avenue and SR A1A/Atlantic Avenue also remain. It also includes four-foot bicycle lanes west of Halifax Avenue and sidewalks ranging between six and eight feet in width throughout the corridor. Travel lanes associated with Alternative A, are nine feet in width east of Halifax Avenue. A westbound parallel parking lane is included between Grandview Avenue and SR A1A/Atlantic Avenue.



*Looking west at US 92/SR 600/ISB from the SR 441/Peninsula Dr intersection.*



### 2.1.2 Alternative B

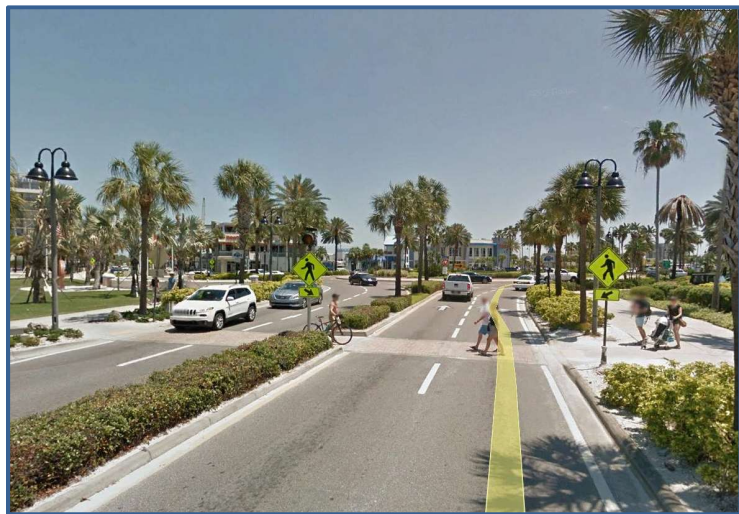
Originally designated as Alternative 7A, Alternative B is considered the “Dog-Bone” Roundabout Concept. Depicted in Figure 2, this alternative consists of a “Dog-Bone” Roundabout at Halifax Avenue and SR 441/Peninsula Drive and traditional roundabouts at Grandview Avenue and SR A1A/Atlantic Avenue. Alternative B’s typical cross section includes a 10-foot wide continuous raised curb median, four 10.5-foot wide travel lanes, five-foot wide bicycle lanes throughout, six-foot wide sidewalk with ADA accessible bus stops and improved crosswalks throughout the study corridor. Due to the design configuration required for the operation of roundabouts, this alternative requires significant right-of-way acquisition for roadway improvements and associated potential stormwater ponds.



*The SW Depot Avenue at 11<sup>th</sup> Street Roundabout, in Gainesville, FL, is an example of a roundabout designed in a “peanut” or “dog bone” configuration. (Google Earth)*

### 2.1.3 Alternative C

Originally designated as Alternative 9, Alternative C is a modified concept consisting of improved signalized intersections at Halifax Avenue, SR 441/Peninsula Drive and Grandview Avenue and a roundabout at SR A1A/Atlantic Avenue. Similar to Alternative B, this concept establishes a consistent typical cross section throughout the corridor with four 10.5-foot wide travel lanes, five-foot wide bicycle lanes and six-foot sidewalks with ADA accessible bus stops. In addition, this concept includes a 15-foot raised curb median to allow for left turn lanes at signalized intersections. Additional right-of-way would be required, primarily along the north side of the corridor for roadway expansion and the south side of the corridor for potential stormwater pond areas. Alternative C is illustrated in Figure 3.



*The SR 60/Clearwater Memorial Causeway at CR 699/Gulfview Blvd Roundabout in Clearwater Beach, FL is an example of roundabout serving as a gateway to a popular tourist oriented destination. (Google Streetview)*



Figure 2: Alternative B Concept Plan

Alternatives are illustrated in concept only. Right-of-way needs, potential pond sizes and locations will be finalized during the design phase.





Figure 3: Alternative C Concept Plan

Alternatives are illustrated in concept only. Right-of-way needs, potential pond sizes and locations will be finalized during the design phase.



## 2.2 ALTERNATIVE TYPICAL CROSS SECTIONS

The alternative cross sections for all segments are described in the sections below. Perspective renderings and cross sections are depicted in Figures 4 through 6 and a comparison included in Table 1. Acronyms associated with Table 1 are identified in Appendix A.

### 2.2.1 Segment A – Halifax River Bridge to SR 441/Peninsula Drive

For Segment A, the existing typical cross section (Alternative A – No-Build) consists of a six-foot sidewalk, four-foot bicycle lane, one 10.75-foot travel lane and one 10.5-foot travel lane in each direction and a twelve-foot continuous two-way left turn lane.

For both Alternatives B and C, Segment A’s typical cross section consists of a six-foot sidewalk, five-foot bicycle lane, one 10.75-foot travel lane and one 10.5-foot travel lane in each direction and a ten-foot raised curb median. Additional right-of-way would be required to accommodate proposed improvements in the vicinity of the Halifax Avenue and SR 441/Peninsula Drive intersections in Alternatives B and C.

### 2.2.2 Segment B – SR 441/Peninsula Drive to Grandview Avenue

For Segment B, the existing typical cross section (Alternative A – No-Build) consists of a six-foot sidewalk, nine-foot verge and two nine-foot travel lanes in each direction, along with a nine-foot continuous two-way left turn lane.

The typical cross section in the segment for Alternative B consists of a six-foot sidewalk, five-foot bicycle lane, two 10.5-foot travel lanes in each direction and a ten-foot raised curb median.

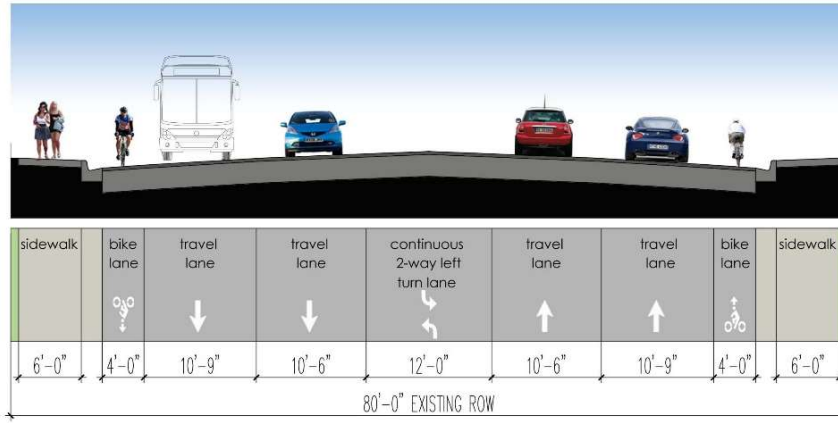
The typical cross section for Alternative C consists of a six-foot sidewalk, five-foot bicycle lane, two 10.5-foot travel lanes in each direction and a fifteen-foot raised curb median to accommodate left turn lane movement at SR 441/Peninsula Drive and Grandview Avenue. Additional right-of-way would be required to accommodate proposed typical cross section and roundabout improvements associated with Alternatives B and C.

### 2.2.3 Segment C – Grandview Avenue to SR A1A/Atlantic Avenue

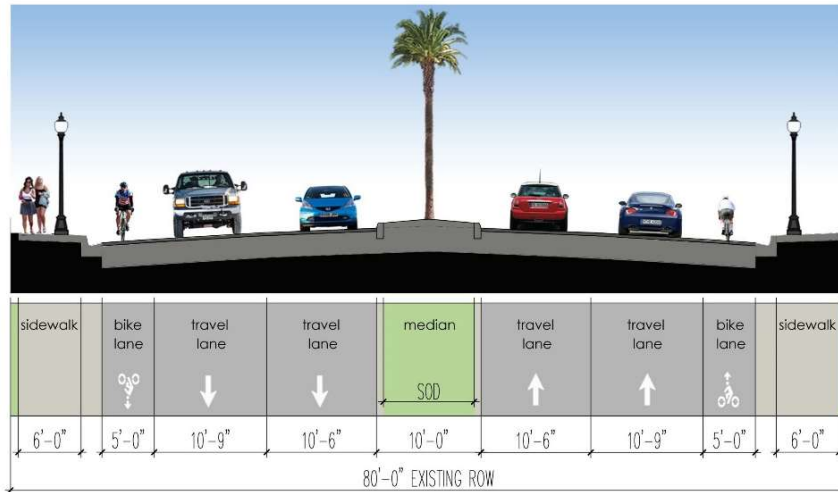
For Segment C, the existing typical cross section (Alternative A – No-Build) consists of an eight-foot sidewalk, two 9-foot travel lanes in each direction, along with a nine-foot continuous two-way left turn lane, eight-foot westbound parallel parking lane and nine-foot eastbound verge.

The typical cross section in the segment for Alternative B consists of a six-foot sidewalk, five-foot bicycle lane, two 10.5 foot travel lanes in each direction and a ten-foot raised curb median.

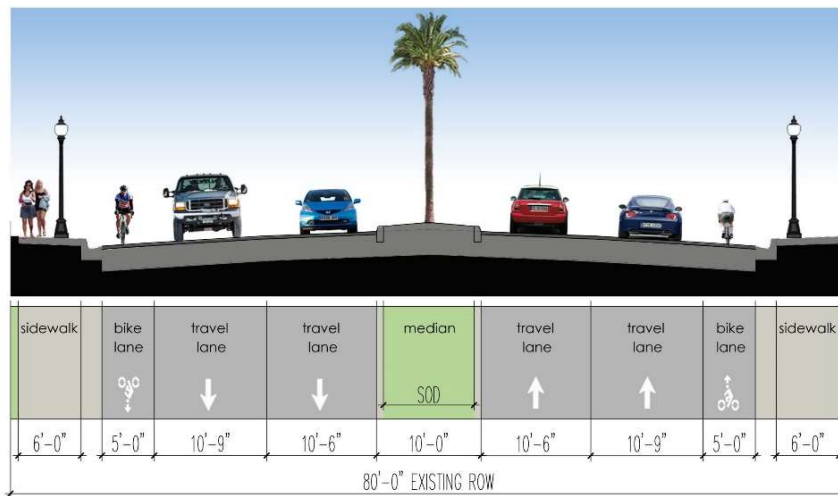
The typical cross section for Alternative C consists of a six-foot sidewalk, five-foot bicycle lane, two 10.5-foot travel lanes in each direction and a fifteen-foot raised curb median to accommodate left turn lane movement at Grandview Avenue and SR A1A/Atlantic Avenue. Additional right-of-way would be required to accommodate proposed typical cross section and roundabout improvements associated with Alternatives B and C.



**ALTERNATIVE A - NO BUILD**

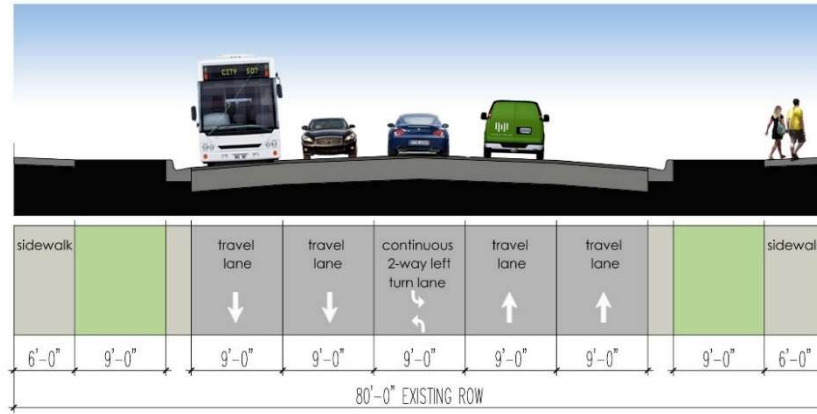


**ALTERNATIVE B - "DOG BONE" ROUNDABOUT CONCEPT**

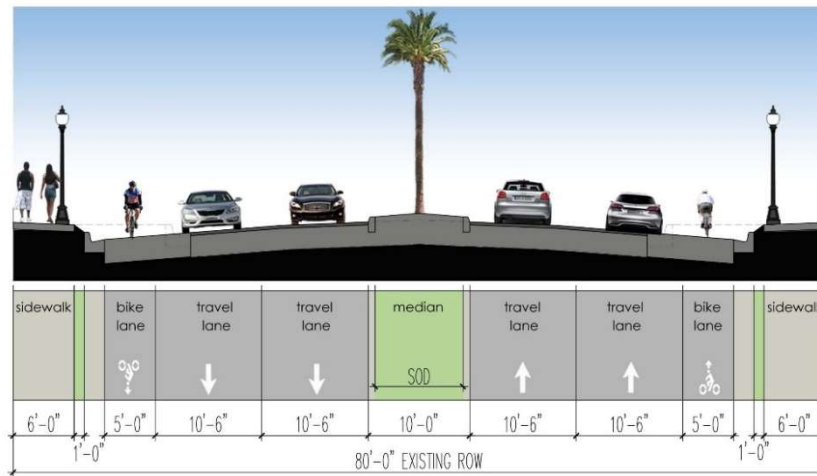


**ALTERNATIVE C - SR A1A ROUNDABOUT CONCEPT**

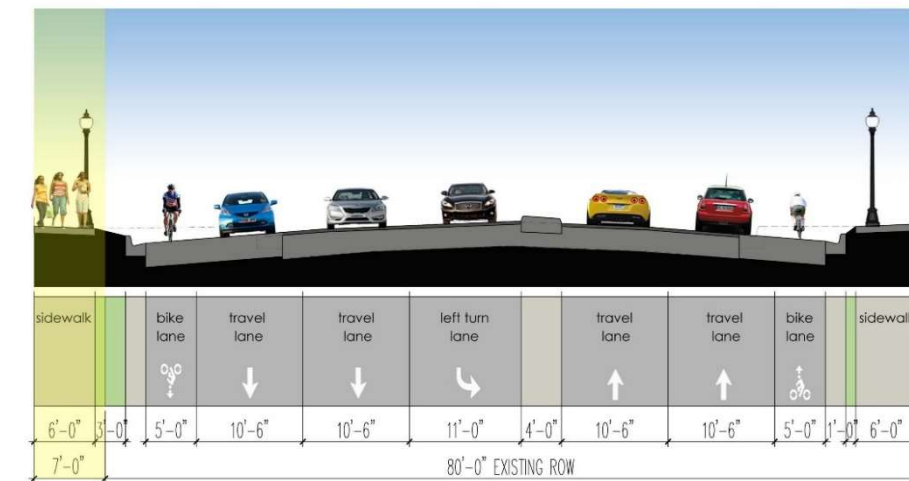
*Figure 4: Segment A Typical Cross Sections*



**ALTERNATIVE A - NO BUILD**



**ALTERNATIVE B - "DOG BONE" ROUNDABOUT CONCEPT**

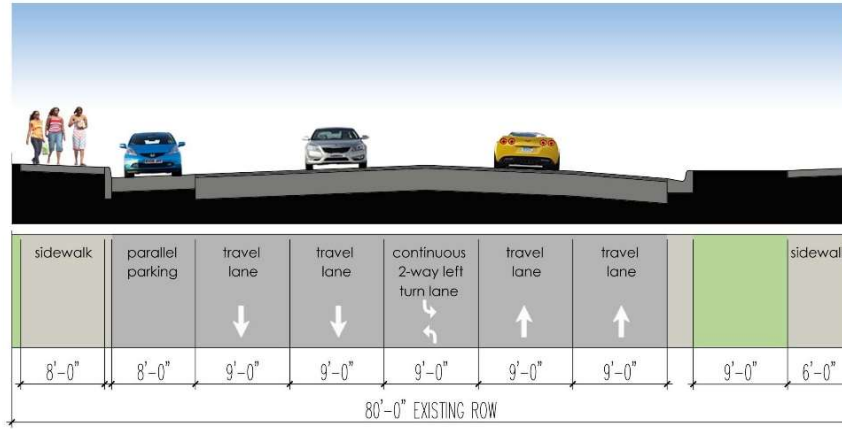


POTENTIAL R/W ACQUISITION

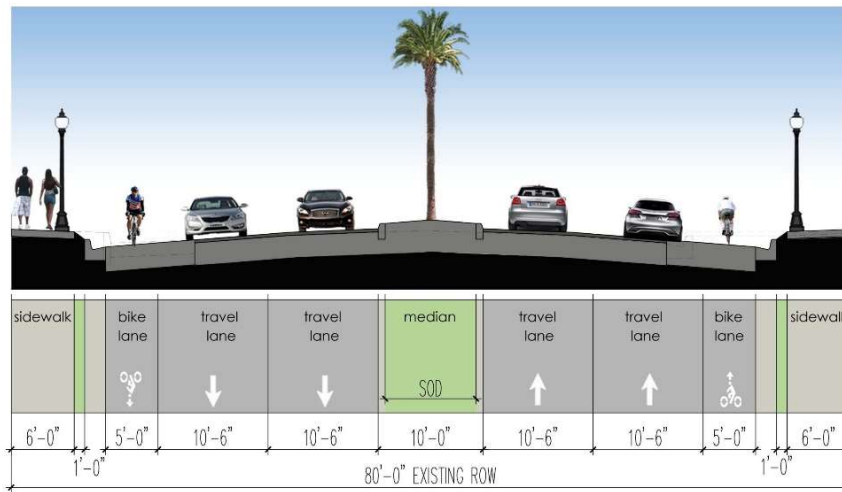
**ALTERNATIVE C - SR A1A ROUNDABOUT CONCEPT**

**Figure 5: Segment B Typical Cross Sections**

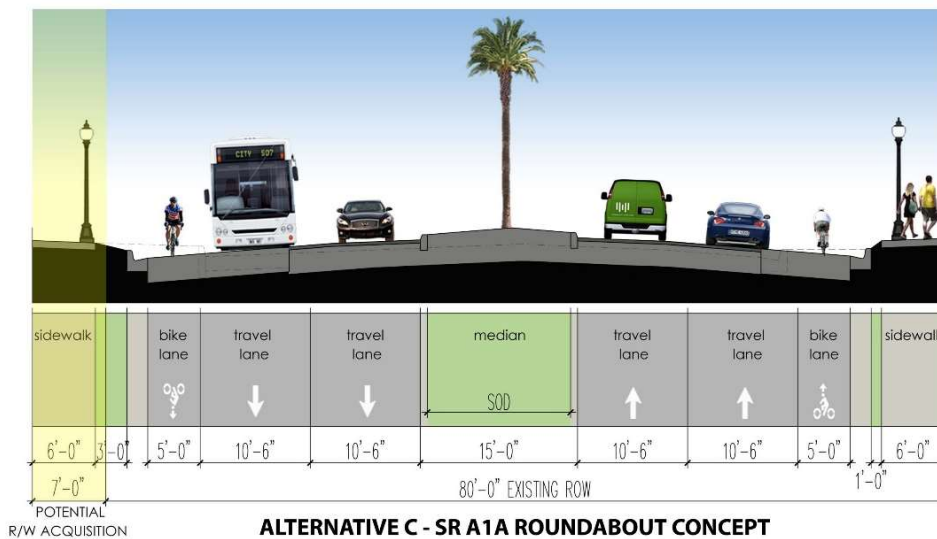
*Alternatives B and C will require additional R/W at the intersections.*



**ALTERNATIVE A - NO BUILD**



**ALTERNATIVE B - "DOG BONE" ROUNDABOUT CONCEPT**



**ALTERNATIVE C - SR A1A ROUNDABOUT CONCEPT**

**Figure 6: Segment C Typical Cross Sections**

*Alternatives B and C will require additional R/W at the intersections.*



**Table 1: Comparison of Alternative Cross Sections**

Roadway Characteristic	Segment A			Segment B			Segment C		
	Alternative A	Alternative B	Alternative C	Alternative A	Alternative B	Alternative C	Alternative A	Alternative B	Alternative C
Lane Width in Linear Feet (LF)	10.75 LF (2 EA)	10.75 LF (2 EA)	10.75 LF (2 EA)	9 LF (4 EA)	10.5 LF (4 EA)	10.5 LF (4 EA)	9 LF (4 EA)	10.5 LF (4 EA)	10.5 LF (4 EA)
	10.5 LF (2 EA)	10.5 LF (2 EA)	10.5 LF (2 EA)						
Bike Lanes	4 LF	5 LF	5 LF		5 LF	5 LF		5 LF	5 LF
Sidewalk	6 LF	6 LF	6 LF	6 LF	6 LF	6 LF	8 LF	6 LF	6 LF
Median		10 LF	10 LF		10 LF	15 LF		10 LF	15 LF
Two-Way Left Turn Lane (TWLTL)	12 LF			9 LF			9 LF		
Verge				9 LF			9 LF (EB)		
On Street Parking							X		
Intersection Control									
Halifax Ave	Signal	Roundabout	Signal						
SR 441/Peninsula Dr				Signal	Roundabout	Signal			
Grandview Ave							Signal	Roundabout	Signal
SR A1A/Atlantic Ave							Signal	Roundabout	Roundabout



### 3.0 IDENTIFICATION OF EVALUATION CRITERIA

In order to score and rank the alternatives, evaluation criteria were developed based on a wide range of objectives. Various measures of effectiveness (MOE) were identified within the categories of Vehicular Needs, Bicycle and Pedestrian Conditions, Transit Conditions, Environmental and Economic Impacts, Planning Considerations, Engineering Considerations and Cost Analysis. The MOE include both quantitative and qualitative criteria intended to complement established community visioning efforts for the corridor, such as the US 92/ISB Corridor Master Management Plan, Daytona Beach Vision Plan, Daytona Beach Land Development Code Update, E-Zone Master Plan and the Daytona Gateway Marina.

Table 2 provides the evaluation criteria used in the matrix with the objectives, measures of effectiveness and descriptions of the rating scales used.



**Table 2: Evaluation Criteria and Measures of Effectiveness**

Policy Goal	Measures of Effectiveness	Rating Scale		
Study Objectives				
<b>Vehicular Needs</b>				
Speed Reduction/Traffic Calming	Speed reduction through traffic calming	Minimal or no traffic calming impact	Moderate traffic calming impact	Significant traffic calming impact
Reduction of Conflict Points	Reduction of conflict points	Minimal or no reduction in conflict points	Moderate reduction in number of conflict points	Significant reduction in number of conflict points
<b>Bicycle/Pedestrian Conditions</b>				
Reduction of Conflict Points	Reduction of conflict points	Minimal or no reduction in conflict points	Moderate reduction in number of conflict points	Significant reduction in number of conflict points
Pedestrian Safety	Improved pedestrian facilities	Negative impact to pedestrian safety	Insignificant or no impact to pedestrian safety	Substantial improvement to pedestrian safety
Bicycle Safety	Improved bicycle facilities	Negative impact to bicycle safety	Insignificant or no impact to bicycle safety	Substantial improvement to bicycle safety
Visually and Mobility Impaired User Safety	Improved visually and mobility impaired user safety	Negative impact on improving safety	Insignificant or no impact on improving safety	Substantial improvement to improving safety
<b>Transit Conditions</b>				
Support and Improve Transit Operations	Improved transit facilities	Minimal or no improvement	Moderate impact	Significant impact
<b>Environmental &amp; Economic Impacts</b>				
Greenhouse Gas Emissions Reduction	Impact on Air Quality or Noise Levels	Significant impact	Moderate impact	Minimal impact
New or Redevelopment Opportunities	Ability to provide development opportunities	Limited new development or redevelopment expected	Moderate level of new development or redevelopment opportunities	Implementation creates opportunities for new development or redevelopment
<b>Planning Considerations</b>				
Aesthetics	Quality of aesthetic improvements	Little or no aesthetic improvement	Moderate level of aesthetic treatment	High level of aesthetic treatment
Ease of Implementation / Funding	Ability to program & obtain funding	No funding available or readily obtainable	Funding not currently available but funding sources identified	Funding currently available or readily obtainable
<b>Engineering Considerations</b>				
Consistency with Design Standards	Remediation of geometric deficiencies	All safety issues addressed, some require Design Exceptions & Variations	All safety issues addressed, some require Design Variations	All safety issues addressed, no Design Exceptions or Variations required
Drainage/Permitting	Complexity of design and permitting issues	Relatively complicated; large scope	Moderately complicated; moderate in scope	Relatively simple; limited scope, easily permissible
Operational Delay	Complexity of maintenance of traffic & constructability	Negative impact in reducing operational delay	Moderate impact in reducing operational delay	Substantial improvement in reducing operational delay
<b>Cost Analysis</b>				
Right-of-Way Costs	Conceptual right-of-way costs	Highest cost option	Middle cost option	Lowest cost option
Construction Costs	Conceptual construction cost	Highest cost option	Middle cost option	Lowest cost option





## 4.0 PLANNING-LEVEL COST ESTIMATES

Planning-level cost estimates were developed by the Department for each alternative using the FDOT Long Range Estimate (LRE) web-based system. The estimates are summarized in Table 3. It should be noted that these planning-level cost estimates cannot accurately account for drainage and utility impacts that might occur with these improvements. Until more detailed design and engineering for the improvements is accomplished, including survey data of the impacted sites, the right-of-way and construction cost estimates are more for comparative purposes between alternatives, rather than estimates used for programming project(s) for construction.

**Table 3: Total Cost Estimates**

<b>Alternative</b>	<b>Total Cost</b>
Alternative A – No Build	N/A
Alternative B	\$33.3 Million
Alternative C	\$23.2 Million

Alternative A is also considered the No-Build Concept. Since this concept maintains existing conditions throughout the corridor, there is no estimate of improvement costs.

Alternative B replaces the existing signalized intersections along the US 92/SR 600/ISB corridor at Halifax Avenue, SR 441/Peninsula Drive, Grandview Avenue and SR A1A/Atlantic Avenue with roundabouts. In addition, this concept includes wider travel lanes, raised curb medians and bicycle lanes. The FDOT LRE was utilized to estimate the cost of Alternative B. Excluding the cost of preliminary engineering (PE) design and CEI, the estimated construction cost for Alternative B is \$7.2 million. The estimated right-of-way cost is \$26.14 million. The combined total construction and right-of-way costs for Alternative B is \$33.3 million.

Alternative C replaces the existing signalized intersection at US 92/SR 600/ISB at SR A1A/Atlantic Avenue with a roundabout and upgrades the signalized intersections at Halifax Avenue, SR 441/Peninsula Drive and Grandview Avenue. In addition, this concept includes wider travel lanes, raised curb medians and bicycle lanes. The FDOT LRE was utilized to estimate the cost for Alternative C. Excluding the cost of PE design and CEI, the estimated construction cost for Alternative C is \$5.4 million. The estimated right-of-way cost is \$17.81 million. The combined total construction and right-of-way cost for Alternative C is \$23.2 million.

The right-of-way costs for Alternatives B and C are estimates and are based on the current design. These estimates may change if the roundabout design changes in the future.



## 5.0 COMPARATIVE EVALUATION

As detailed in Table 4, the evaluation criteria were applied to each alternative and a preliminary score assigned based on the identified measures of effectiveness. These include both quantitative and qualitative criteria with scores based on how the alternative satisfied the criteria for each measure of effectiveness. Within each category (Vehicular Needs, Bicycle/Pedestrian Conditions, Transit Conditions, Environmental and Economic Impacts, etc.), a rating for each category was assigned based upon an average of the individual objectives and measures of effectiveness.



**Table 4: Evaluation Matrix**

Measures of Effectiveness	Alternative A	Alternative B	Alternative C
<b>Vehicular Needs</b>			
Speed Reduction/Traffic Calming	○	●	●
Reduction of Vehicular Conflict Points	○	●	◐
<b>Bicycle/Pedestrian Conditions</b>			
Reduction of Pedestrian Conflict Points	○	●	◐
Pedestrian Safety	○	●	◐
Bicycle Safety	○	●	●
Visually & Mobility Impaired User Safety	◐	◐	●
<b>Transit Conditions</b>			
Support & Improve Transit Operations	○	◐	●
<b>Environmental &amp; Economic Impacts</b>			
Greenhouse Gas Emissions Reduction	○	●	◐
New or Redevelopment Opportunities	○	●	●
<b>Planning Considerations</b>			
Aesthetics/Landscape Opportunities	○	●	◐
Ease of Implementation/Funding	●	○	◐
<b>Engineering Considerations</b>			
Consistency with Design Standards	○	●	●
Drainage/Permitting	○	●	●
Operational Delay	○	●	◐
<b>Cost Analysis</b>			
Right-of-Way Costs	N/A	\$26.14 Million	\$17.81 Million
Construction Costs	N/A	\$7.2 Million	\$5.4 Million

○ *Does Not Meet the Need*

◐ *Partially Meets the Need*

● *Meets the Need*



## 6.0 RECOMMENDED ALTERNATIVE

The recommended alternative was selected based on the results of the evaluation matrix and from input received from Department staff, Project Visioning Team (PVT), Community Liaison Team (CLT), City of Daytona Beach and R2CTPO. Input received from the general public through visioning and public meetings held throughout the course of the study was also taken into consideration.

### 6.1 RECOMMENDED ALTERNATIVE

All of the alternatives detailed in the study were reviewed by the PVT, CLT, community stakeholders and District 5 Planning staff. Additionally, the alternatives were vetted by various internal units within the Department, including Right of Way, Traffic Operations and Design. This review and feedback led to the selection of Alternative C. This alternative was unanimously selected by the Daytona Beach City Commission at the commission meeting on July 19, 2017. A detailed list of recommended improvements associated for each segment of Alternative C is included in Table 5. The concept plan for Alternative C is depicted in Figure 7. The typical cross sections for Alternative C is depicted in Figure 8.

It is recommended that Alternative C be pursued through further concept development to determine right-of-way and utility impacts, design and permitting issues, and to investigate matters such as path/trail maintenance and identification of responsible entities.

With these improvements, automobile, pedestrian and bicycle travel will be significantly enhanced within a relatively constrained right-of-way. Access management, signalization and intersection improvements will provide operational improvements for automobiles. Pedestrian facilities will be significantly improved with wider sidewalks, enhanced crosswalks, pedestrian refuge islands, landscaping, lighting, ADA accessible bus stops, a roundabout at SR A1A/Atlantic Avenue and other streetside enhancements. Bicyclists will have use of bicycle lanes connecting the Beachside with Downtown Daytona Beach. Furthermore, existing bus stops will be upgraded to be ADA accessible.

Together, these improvements, along with the implementation of other strategies and policies to enhance mobility and accessibility, can assist in the transformation of US 92/SR 600/ISB from a substandard auto-based highway into a multimodal thoroughfare that achieves many of the Complete Streets and Context Sensitive Design principles.



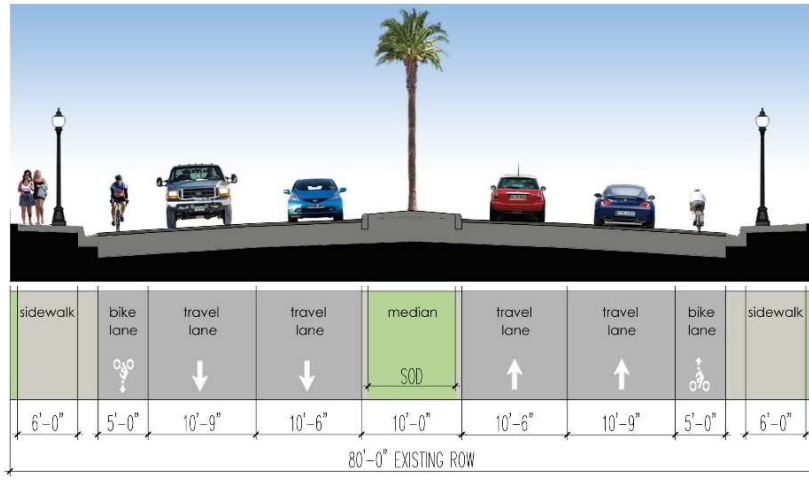
**Table 5: Recommended Improvements**

<b>Segment A - Halifax River to SR 441/Peninsula Drive (Recommended Alt. C)</b>
Expand 4 ft. Bicycle Lane to 5 ft. West of Halifax Avenue
Add 5 ft. Bicycle Lane East of Halifax Avenue
Add 15 ft. Raised Curb Median
Expand 9 ft. Travel Lanes to 10.5 ft. East of Halifax Avenue
Maintain 6 ft. Sidewalks West of Halifax Avenue
Reduce 8 ft. Sidewalk to 6 ft. Sidewalk East of Halifax Avenue (North Side)
Enhanced Crosswalks at Halifax Avenue and SR 441/Peninsula Avenue
Traffic Signal Modifications and Enhancements
ADA Accessible Bus Stops
Add U-Turn Bulb Out at Halifax Avenue
<b>Segment B - SR 441/Peninsula Drive to Wild Olive Avenue (Recommended Alt. C)</b>
Reconstruct 6 ft. Sidewalks
Add 5 ft. Bicycle Lanes
Add 15 ft. Raised Curb Median
Expand 9 ft. Travel Lanes to 10.5 ft
Enhanced Crosswalks at SR 441/Peninsula Avenue
ADA Accessible Bus Stops
Add U-Turn Bulb Out at SR 441/Peninsula Drive
<b>Segment C - Wild Olive Avenue to SR A1A/Atlantic Avenue (Recommended Alt. C)</b>
Reconstruct 6 ft. Sidewalks
Add 5 ft. Bicycle Lanes
Add 15 ft. Raised Curb Median
Expand 9 ft. Travel Lanes to 10.5 ft.
Add U-Turn Bulb Out at Grandview Avenue
Traffic Signal Modifications and Enhancements at Grandview Avenue
Enhanced Crosswalks with Pedestrian Refuges
Add Roundabout at SR A1A/Atlantic Avenue
ADA Accessible Bus Stops
Reconstruct SR A1A/Atlantic Avenue between 5 <sup>th</sup> Avenue and Davis Street

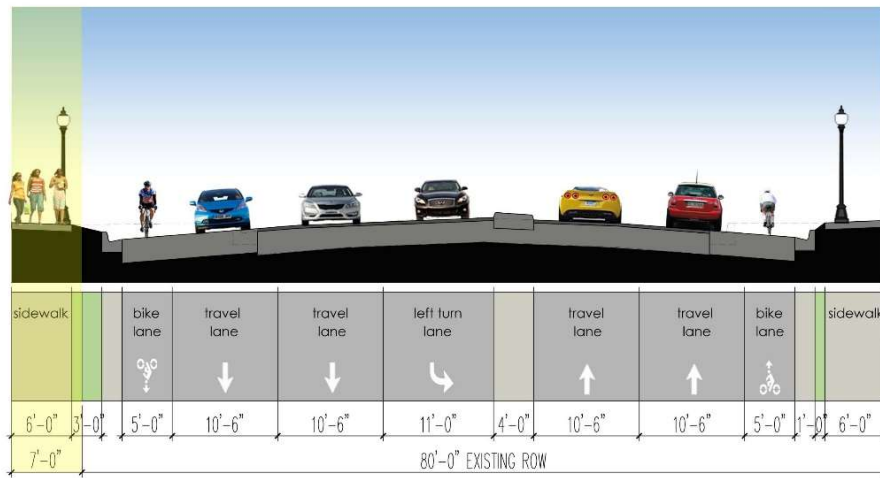


Figure 7: Recommended Alternative C Concept Plan

Recommended alternative is conceptual and subject to change. Right-of-way needs, potential pond sizes and locations will be finalized during the design phase.

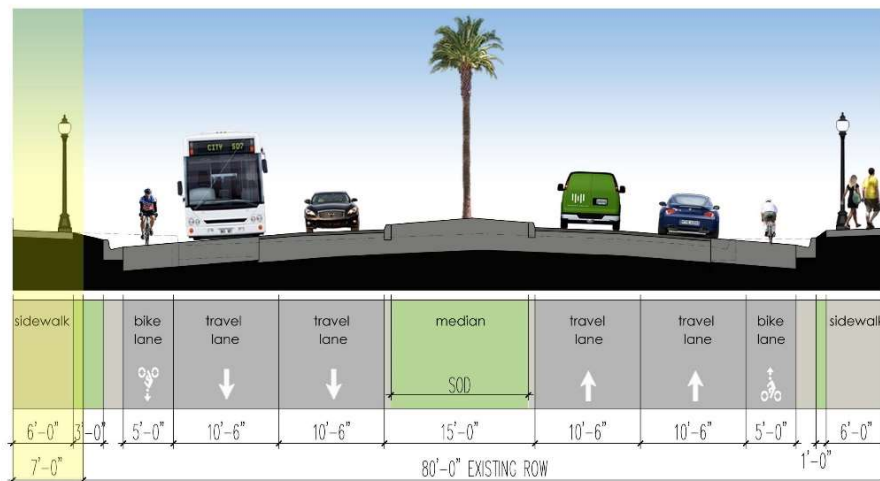


**HALIFAX RIVER BRIDGE TO HALIFAX AVENUE / SR 441/PENINSULA DRIVE**



POTENTIAL R/W ACQUISITION

**HALIFAX AVENUE/ SR 441/PENINSULA DRIVE TO WILD OLIVE AVENUE**



POTENTIAL R/W ACQUISITION

**WILD OLIVE AVENUE TO SR A1A/ATLANTIC AVENUE**

**Figure 8: Recommended Alternative C Typical Cross Section**



## 7.0 DESIGN CRITERIA

In order to establish a consistent methodology for future multi-modal improvements, design criteria are provided in Table 6, which detail design parameters for each type of suggested improvement. Further information for this table can be found in the *Draft 2018 FDOT Design Manual (FDM)*, *FDOT 2017 Plans Preparations Manual (PPM)*, Chapter 8 (Bicycle, Pedestrian and Public Transit Facilities) and Chapter 21 (Transportation Design for Livable Communities). Bus stop information was retrieved from *Votran's 2016 Transit Development Guidelines* and is also consistent with rule chapter 14-20.003 of the Florida Administrative Code.





**Table 6: Conceptual Design Criteria**

Improvement Type	Design Criteria	Source
Sidewalk	6-ft. minimum width	FDOT PPM (2017)
	2% Maximum grade for ADA Compliance	
	2 ft. minimum separation from back of curb	
Bicycle Lane	When providing a bicycle lane on a Resurfacing, Restoration, and Rehabilitation (RRR) project, the options in the order of priority are: <b>Preferred – Bicycle Lane Width</b> 1. 7-ft. buffered bicycle lane 2. 6-ft. buffered bicycle lane <b>Area with Limits – Bicycle Lane Width</b> 3. 5-ft. conventional bicycle lane 4. 4-ft. conventional bicycle lane	FDOT PPM (2017)
	5-ft. minimum width with right turn lane	
	4-ft. paved shoulder can be considered a bicycle lane, with 5-ft. minimum clearance from roadway to gutter face	
Shared-Use Path	10-ft. minimum width	FDOT PPM (2017)
	5% maximum grade, 2% maximum cross-slope	
	8.33% maximum ramp slope	
	Maximum ramp rise 30 inches	
	4-ft. horizontal clearance both sides	
	2-ft. graded area maintained on both sides Minimum 4-ft. roadway separation from curb	
ADA Accessibility	4-ft. minimum clearance in sidewalk from an obstruction	FDOT PPM (2017)
Curb Cuts & Curb Ramps	Curb ramps should be constructed parallel to the crossing	FDOT PPM (2017)
	One curb ramp for each road	
	On shared-use path, curb ramp should be the same width as the path Curb ramps cannot be installed without a curb cut or at-grade sidewalk on the other side of the crossing	
	Same cross-slope and maximum grade conditions as sidewalks apply	
Detection Pads	For concrete surfaces, see FDOT’s Approved Product List (APL)	FDOT PPM (2017)



Improvement Type	Design Criteria	Source
	For asphalt surfaces, engineer should specify an appropriate detection system	
Bus Stop	Bus stops should have a clear length of 96 inches and width of at least 60 inches	Votran Transit Development Guidelines (2016)
	Minimum floor area within a bus shelter is 30 by 48 inches	
	Signs should have a non-glare finish	
	Slope of bus pad must be parallel to roadway	
Intersection Crosswalk	Intersection crosswalks should be supplemented with beacons, curb extensions, raised medians, traffic islands, or overhead lighting, when following conditions exist:	FDOT PPM (2017)
	Posted speeds greater than 40 mph	
	4 or more lanes, AADT greater than 12,000, no median or traffic island	
	4 lanes or more, projected AADT greater than 15,000, raised median and traffic island	
Midblock Crosswalk	Meet all requirements regarding speed limit, AADT, and number of lanes for an intersection crosswalk	FDOT PPM (2017)
	Minimum spacing between intersections is 660 ft. for permission of midblock crosswalk	
	Must be located a minimum of 300 ft. away from nearest intersection	
	Maximum 60 ft. of crossing distance (unless raised median or island)	
	Midblock crosswalks shall not be provided where the sight distance for both the pedestrian and motorist is not adequate	
	Midblock crosswalks shall not be located where ADA cross slope and grade criteria along the crosswalk cannot be met	



# **APPENDIX A**

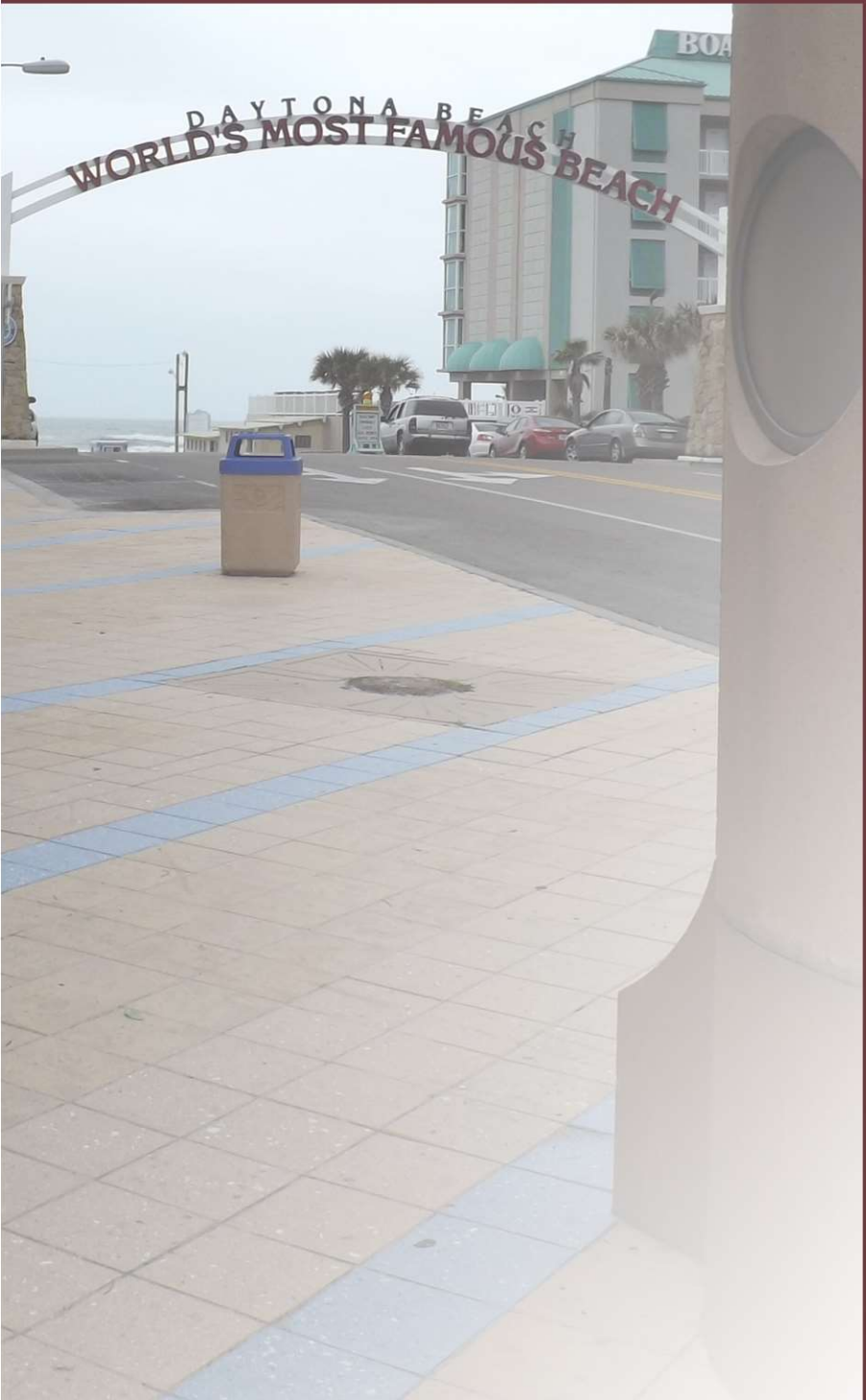
# **ACRONYMS**





## APPENDIX A – ACRONYMS

AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
APL	Approved Product List
CEI	Construction Engineering Inspection
CLT	Community Liaison Team
CMP	Corridor Management Plan
CMMP	Corridor Master Management Plan
E-Zone	Entertainment Zone
FDOT	Florida Department of Transportation
FDM	FDOT Design Manual
I	Interstate
LF	Lane Width in Linear Feet
LRE	Long Range Estimate
MOE	Measure of Effectiveness
PPM	Plans Preparation Manual
PVT	Project Visioning Team
PE	Preliminary Engineering
R2CTPO	River to Sea Transportation Planning Organization
RRR	Resurfacing, Restoration and Rehabilitation
SR	State Road
TWLTL	Two-Way Left Turn Lane
US	United States Highway
Votran	Volusia County Public Transit System



Prepared for:  
Florida Department of Transportation District 5, Deland, FL



Prepared by: Ghyabi & Associates, Inc.