Final

CR A1A Sidewalk Feasibility Study Daytona Beach Shores, Florida

October 2008

Prepared for:
Volusia County MPO

Volusia County MPO

Transportation Planning

Kimley-Horn and Associates, Inc.

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October 2008

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INTRODUCTION

The Volusia County Metropolitan Planning Organization (VCMPO) recognizes the importance of developing an integrated transportation network that provides safe, efficient and accessible pedestrian and bicycle facilities. The strategy to implement this goal includes expanding the existing bicycle and pedestrian facility network by completing feasibility studies of prioritized projects.

The County Road (C.R.) A1A (aka South Atlantic Avenue) corridor in the City of Daytona Beach Shores is identified and supported as a target bicycle and pedestrian facility as part of the following initiatives:

- VCMPO Feasibility Studies
- VCMPO Bicycle/Pedestrian Plan
- Volusia County Trails Plan - Enhanced Bicycle/Pedestrian Corridor
- Volusia County Trails Plan - Showcase Multi-Use Trail Corridor

STUDY PURPOSE

The intent of this study was to determine the feasibility of constructing a meandering sidewalk along both sides of C.R. A1A (South Atlantic Avenue), south of Dunlawton Avenue to Marcelle Avenue, a distance of approximately 6,100 feet in length (see **Figure 1**). The proposed paths would eventually connect to the northern extension of the Ponce Inlet shared-use path south of Major Street.

OBJECTIVES

The City of Daytona Beach Shores is a resort and retirement community. The City has no schools or manufacturing industry, but caters to visitors year-round. According to the City, the population is currently about 4,300 residents.

Goals of increasing multi-modal transportation within the City include:

- Increase connections to beach access and the commercial district.
- Integrate a linear parks plan
- Improve aesthetics of the currently underutilized right-of-ways
- Provide connector paths to adjacent residential neighborhoods, commercial shopping centers, and public beach access points
- Supplement trail amenities along the trail such as benches, interpretive signs and information kiosks illustrating the points of interest.
- Achieve intermodal links with transit
- Encourage off beach parking
- Create safe and effective links between neighborhoods
- Reduce complex and costly parking problems
- Incorporate greenways development, urban redevelopment and resource preservation
- Complete travel network for all users

Source: Microsoft Streets and Trips, 2006

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LOCATION MAP

CR A1A SIDEWALK FEASIBILITY STUDY
DAYTONA BEACH SHORES
VOLUSIA COUNTY, FLORIDA

SCALE: NTS	PROJECT NO 149288000	09/24/08	FIGURE 1

There are existing bicycle and pedestrian related policies that support facility development within the study area. The Volusia County MPO 2025 Long Range Transportation Plan (LRTP) has the following policy support to consider alternative modes of transportation to the automobile:

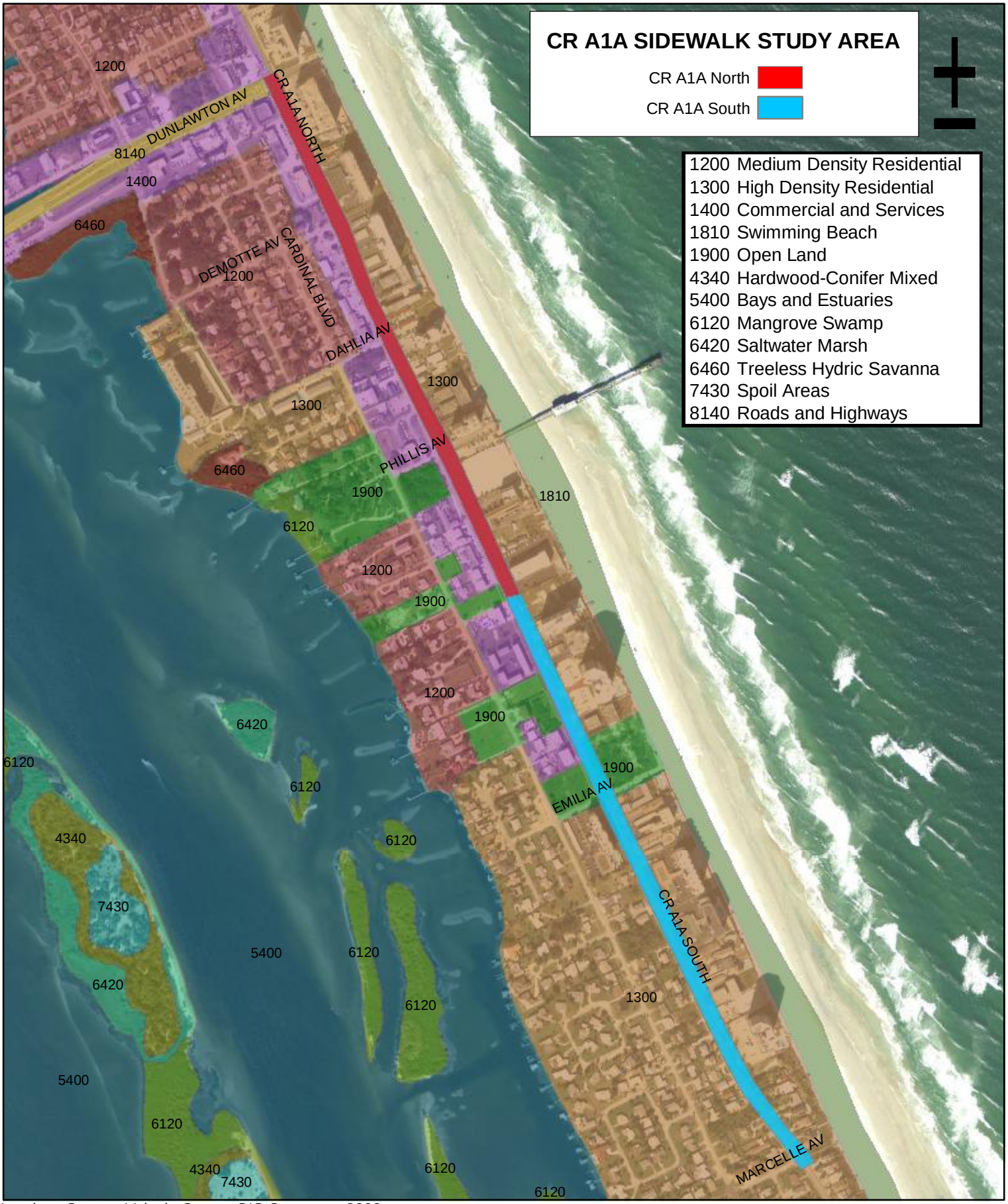
> **Goal B: The LRTP will strive to reduce dependence on automobiles by promoting alternative modes of transportation.**
>
> *Objective B1* – New transportation facilities shall be evaluated based on provision of mode choice and not simply based on relieving automobile congestion.
>
> *Objective B2* – Enhancement funds will be allocated primarily to bicycle and pedestrian projects.
>
> *Objective B3* – The project prioritization methodology and process will include pedestrian, bicycle and transit system projects and improvements.
>
> *Objective B4* – The LRTP will consider, promote, improve, and increase, as appropriate, the use of public transportation.

The Volusia County Council has recognized the importance of bicycle and pedestrian facility development and has included the following policies in the Transportation Element of the Volusia County Comprehensive Plan.

> *2.1.10.1* - Volusia County shall use the Volusia Trails Plan, as accepted by the Volusia County Council, as a guide to supplement Volusia County's transportation network with interconnected non-motorized bicycling and walking corridors.
>
> *2.1.10.2* - Volusia County shall develop pedestrian and bicycle ways to connect public uses such as schools, libraries, parks, and inter-modal *transit nodes where feasible.*
>
> *2.1.10.3* - Volusia County shall develop bicycle-compatible design standards in the Land Development Code for all new and reconstructed collector and arterial roads.
>
> *2.1.10.4* - Volusia County shall include sidewalks alongside all roadways as consistent with the requirements of the Land Development Code.
>
> *2.1.10.5* - Volusia County shall integrate bicycle (i.e., bicycle racks on buses, secure bicycle storage lockers, and park and ride lots), and pedestrian features into transit planning**.**

Policy Support for Bicycle and Pedestrian Facilities

The Comprehensive Plan provides the policy framework for transportation and land use development, however the land development code provides specific requirements to implement transportation and land use policies. Land uses within the corridor are primarily residential and commercial (see **Figure 2**). The study area has two general concentrations of land uses: commercial land uses focused in the northern segment and residential land uses focused in the southern segment (see **Figure 3**).



Landuse Source: Volusia County GIS Coverage, 2000

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EXISTING LANDUSE MAP

CR AIA SIDEWALK FEASIBILITY STUDY
DAYTONA BEACH SHORES
VOLUSIA COUNTY, FLORIDA

Scale:	Project Number:		
1 inch equals 650 feet	149288000	SEPTEMBER 2008	FIGURE 2

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PROJECT OVERVIEW

CR AIA SIDEWALK FEASIBILITY STUDY
DAYTONA BEACH SHORES
VOLUSIA COUNTY, FLORIDA

Scale:	Project Number:		
1 inch equals 650 feet	149288000	SEPTEMBER 2008	FIGURE 3

The Volusia County Land Development Code applies to requirements for transportation infrastructure within Volusia County right-of-way; C.R. A1A/South Atlantic Avenue. The City of Daytona Beach Shores Land Development Code applies to those properties that abut South Atlantic Avenue within the study area.

In general the Volusia County LDC requires the construction of 5' sidewalks within the right of way. The City of Daytona Beach Shores requires a 7' paved concrete walkway from the sidewalk to the beach within a 10' dedicated breezeway/visual corridor for all oceanfront properties.

Commercial properties with exterior sales shall maintain a minimum 5' sidewalk clearance; however the City's code only requires the construction of 4' sidewalks on both sides of all streets. For constrained locations within the study area, the City has a requirement for a 15' utility easement where sidewalks are permitted.

The following land development code requirements support pathway development within the study area.

Volusia County Land Development Code

Article IV Design and Construction Standards of Improvements

Sec. 405. Easements
405.04. Pedestrian and Bicycle Easements. Pedestrian and bicycle easements or walkways may be provided on site. Pedestrian and bicycle easements shall be at least two (2) feet beyond the edge of the facility.

Sec. 410. Sidewalks.
Pedestrian access. Neighborhood and community commercial facilities shall have an efficient and direct pedestrian way connection to the residential areas the facilities are intended to serve. The design of local commercial facilities shall allow pedestrians direct access from adjacent neighborhood areas, with due consideration to the elimination of points of conflict between pedestrians and vehicles.

410.01. Sidewalks.
(1) Paved sidewalks, a minimum of five (5) feet in width, shall be installed on one (1) side of all local streets within a new development, except in a subdivision classified single-family or duplex where the minimum lot sizes are one (1) acre or larger, in which case sidewalks shall not be required. Provided, however, said sidewalks shall be installed on both sides of all streets within a new development that intersect with a thoroughfare. Alternative path systems within a new development may be approved by the DRC instead of sidewalks.

(2) Sidewalks along thoroughfares. Paved sidewalks a minimum of five (5) feet in width shall be installed along the abutting side of all existing and proposed thoroughfares which abut a new development and along both sides of all thoroughfares which are required to be constructed within a new development where the property is designated as any urban category in the Comprehensive Plan.

(3) Location. Sidewalks shall be located in the right-of-way or adjacent easements of said street(s) within and abutting the development, but not closer than one (1) foot to the

abutting property line. Sufficient distance from obstacles such as fire hydrants, drainage inlets, manholes, utility structures and trees shall be maintained for the safety of the sidewalk users. No sidewalk shall be located within the appropriate recovery area of the traveled way of said street. Where the sidewalk is curved, there shall be no unsafe curves or sudden elevation changes in the sidewalk which would present a hazard to the users.

(4) Pedestrian barriers. The DRC may require fences, hedges, berms, other landscaping, or other barriers in order to discourage pedestrians from crossing hazardous streets at unsafe points or at numerous points. When possible, developments shall be designed so as to promote pedestrian street crossings only at traffic-control signals, crosswalks or intersections.

City of Daytona Beach Shores Land Development Code

Sec. 14-28. Sidewalks.
Each development or structure to be constructed south of Dunlawton Avenue, within the city limits of the City of Daytona Beach Shores, abutting the east or west side of South Atlantic Avenue shall place a sidewalk on portions of that private property abutting the existing right-of-way of Atlantic Avenue for the length of the property being developed.

Sec. 12-6. Street construction standards
12-6.6. Sidewalks.
1. Four-foot wide sidewalks shall be constructed along both sides of all streets. Double frontage lots shall have sidewalks constructed on both frontages. Sidewalks shall be constructed within the right-of-way.

Sec. 14-18. RMF-1 Multi-Family Residential District (high density).
14-18.4. Dimensional Requirements
Breezeway/visual corridor:
There shall be a breezeway/visual corridor across the full depth of all oceanfront properties which shall be reserved to ensure the movement of ocean breezes, and to provide visual access to the ocean. Thirty (30) percent of the total frontage dimensions running the full length of the property from S. Atlantic Avenue to the mean high water line of the Atlantic Ocean shall be developed as an open breezeway/visual corridor. Rail fences and pool facilities no higher than forty-eight (48) inches above finished grade may encroach into the breezeway/visual corridor provided their placement is clearly subordinate to and coordinated with the breezeway's predominate open space function. In no instances may any such encroachment extend the entire width of the corridor. The breezeway/visual corridor shall include a seven-foot dedicated concrete public walkway, constructed by the applicant, from the sidewalks to the beach. An irrigated landscape area of no less than three (3) feet in depth shall be provided along the entire length of the walkway.

Sec. 14-21. T Hotel/Motel District.
14-21.4. Dimensional Requirements
Site Design Standards for Oceanfront Lots:
3. The entire perimeter of the property adjacent to Atlantic Avenue and the first fifteen (15) feet inside the property shall be heavily landscaped such that the primary view toward the property from Atlantic Avenue shall include conspicuous and lush

landscaping. Driveway accesses, walkways and fountains may be placed within this landscape area provided their size and location does not conflict with the purpose of this landscape area.

Sec. 14-22. GC-1 Tourist Oriented Commercial District.
14-22.3. Restriction of Exterior Sales and Services.
All retail sales and services shall be within a completely enclosed structure which does not create any noise, vibration, glare, fumes, odors or electrical interference detectable to the normal senses off the lot.
1. Items displayed outdoors shall not impede walking traffic and shall maintain a minimum five (5) foot sidewalk clearance.

Sec. 14-23. GC-2 Retail/Service Commercial District
14-23.5.1. Utility Easements.
Existing overhead utilities within the public rights-of-way shall be relocated to and buried within a fifteen-foot wide utility easement, unless a project involving burying utilities is planned in the City's five-year Capital Improvement Schedule (CIP).

The fifteen-foot easement shall be dedicated to the City or its designee, prior to the issuance of a certificate of Occupancy. Landscaping, signage, driveways, sidewalks, light fixtures and utility appurtenances may be located within the easement. All other encroachments within the easement shall be prohibited. The easement shall run north-south along the entire length of the property.

GENERAL DESIGN PRINCIPLES

Geographic Information System (GIS) parcel data were collected from Volusia County (see **Figures 4a – 4d**). This data along with the corridor specific survey, as provided by the City of Daytona Beach Shores, provided all the right-of-way information used to draw the conclusions for this evaluation. Members of the evaluation team also conducted several field evaluations of the study area to take measurements and locate potential constraints and opportunities associated with the proposed project.

Together, this information serves as the foundation for the recommendations included in this report. The design recommendations are based on the planning and engineering judgment of the consultant, the American Association of Highway Transportation Officials (AASHTO) design criteria for bicycle and pedestrian facilities, Institute of Transportation Engineers (ITE) reference materials, Florida Department of Transportation (FDOT) guidelines, and other industry standards for non-motorized transportation facilities. Recommendations are also based, in part, on the following industry-standard manuals for bicycle and pedestrian facility development.

AASHTO Guide for the Development of Bicycle Facilities - 1999

The American Association of State Highway and Transportation Officials (AASHTO) has published a set of recommended guidelines for designing bicycle facilities to provide detailed information for local, regional and state transportation officials concerning the development of infrastructure that could enhance and encourage safe bicycle travel. Many of the recommended practices outlined in the AASHTO guidelines are referenced and/or serve as the foundation for local standards and guidelines related to bicycle facilities. Minimum criteria for the placement, width, and general design of two-way, shared use paths contained within the AASHTO guidelines are used for determining the feasibility of constructing a two-way, multiuse path.

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PARCEL MAP

CR AIA SIDEWALK FEASIBILITY STUDY
DAYTONA BEACH SHORES
VOLUSIA COUNTY, FLORIDA

Scale:	Project Number:		
1 inch equals 161 feet	149288000	SEPTEMBER 2008	FIGURE 4a

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VOLUSIA COUNTY, FLORIDA

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PARCEL MAP

CR AIA SIDEWALK FEASIBILITY STUDY
DAYTONA BEACH SHORES
VOLUSIA COUNTY, FLORIDA

Scale:	Project Number:		
1 inch equals 161 feet	1491288000	SEPTEMBER 2008	FIGURE 4c

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PARCEL MAP

CR AIA SIDEWALK FEASIBILITY STUDY
DAYTONA BEACH SHORES
VOLUSIA COUNTY, FLORIDA

Scale:	Project Number:		
1 inch equals 161 feet	149288000	SEPTEMBER 2008	FIGURE 4d

AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities - 2004

The American Association of State Highway and Transportation Officials (AASHTO) has published a set of recommended guidelines on the planning, design and operation of pedestrian facilities along streets and highways. The guide focuses on identifying effective measures for accommodating pedestrians on pubic rights-of-way. The primary audience for this manual is planners, roadway designers, and transportation engineers.

Institute of Transportation Engineers Innovative Bicycle Treatments – An Informational Report - 2002

In March 1999, the Institute of Transportation Engineers (ITE) initiated the formation of a Pedestrian and Bicycle Task Force to develop better information for transportation professionals on pedestrian and bicycle facilities. One of the issues identified by the Task Force members was the need to provide better information on bicycle innovations. This report summarizes approximately 50 treatments for bicycle facilities, including on-street innovations such as contra-flow bike lanes, shared bike/bus lanes, bike boulevards, raised bike lanes and colored bike lanes.

FDOT Bicycle Facilities Planning and Design Handbook - 2000

The FDOT publishes this Handbook to provide guidelines and criteria to state and local government officials for the planning, design, construction, operation and maintenance of safe on-street bicycle facilities and shared use paths.

FDOT Pedestrian Planning and Design Handbook - 2000

The FDOT also publishes this Handbook as a general guideline for the development of safe, friendly, and convenient streets, walkways and public plazas within the State. As part of this handbook, the FDOT recommends minimum width, placement and crosswalk criteria for safe sidewalks and shared use paths.

FDOT Plans Preparation Manual - 2008

The FDOT provides this manual to ensure uniform design of all state facilities. In Chapter Eight of this manual, FDOT provides the general design criteria for bicycle and pedestrian facilities.

FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (FDOT Green Book) – 2007

This FDOT manual provides the minimum design criteria for all state bicycle and pedestrian facilities. This manual is particularly useful for paths adjacent to constrained facilities.

Manual on Uniform Traffic Control Devices (MUTCD)

The MUTCD serves as a unified standard for road managers nationwide to install and maintain traffic control devices on all streets and highways within their jurisdiction. As part of this manual, specific rules and guidelines are adopted for traffic control pertaining to bicycle facilities and shared-use paths.

STUDY AREA DESCRIPTION

The C.R. A1A (South Atlantic Avenue) corridor can be described in two segments; the north and south based on roadway characteristics.

C.R. A1A North (Dunlawton Avenue to approximately 750 feet south of Phillis Avenue)

- Contains an 80-foot public right-of-way (Volusia County)
- Concrete sidewalks on east and west sides, ranging in width from 3-5 feet
- Numerous driveway cuts and poorly designated driveway entrances to adjacent parcels along the corridor (both concrete and asphalt surfaces)
- Five-lane typical section with curb and gutter and landscaped center median or center turn lane
- Roadway section is approximately 63 feet measured from curb to curb
- Travel lanes are approximately 12 feet wide and the turn lane/landscaped median is approximately 13 feet wide
- Land uses on east side generally consist of oceanfront hotel/condo/motel
- Land uses on west side generally consist of commercial north of the pier then hotel/condo/motel
- Power poles at edge of right-of-way on both sides of South Atlantic Avenue
- Approximately three unsignalized mid block crossings pedestrian refuge islands in median
- VOTRAN transit route with bus stops on east and west side (buses have bike racks)
- VOTRAN bus stops typically consist of signs and benches
- Approximately seven VOTRAN bus stops are located within the segment
- Four public beach access points, one has marked pedestrian crossing.

C.R. A1A South (Approximately 750 feet south of Phillis Avenue to Marcelle Avenue)

- Contains an 80-foot public right-of-way (Volusia County)
- Just south of Phillis Avenue: three-lane section is approximately 33 feet wide from outside edges of asphalt, including center turn lane (no curb and gutter)
- Travel lanes are approximately 11 feet wide and the two-way turn lane is approximately 12 feet wide
- Unpaved shoulders are approximately 20 feet wide with natural swales, stormwater inlets, utilities and utility poles
- Concrete sidewalks are located on the east and west side, ranging in width from 4-5 feet
- Numerous driveway cuts and points of conflict
- Concrete power poles at edge of ROW on both sides of project
- Land uses on east side generally consist of oceanfront hotel/condo/motel
- Land uses on west side generally consist of condo/motel/hotel until Emilia Avenue, then west side is generally single family residential
- Southern end of segment is primarily single family residential on the west and east sides of the segment
- VOTRAN transit route with bus stops on east and west side (buses have bike racks)
- VOTRAN bus stops typically consist of signs and benches
- Approximately four VOTRAN bus stops are located within the segment
- Four public beach access points, one has marked pedestrian crossing.

STUDY AREA ISSUES AND CONCERNS

The following issues and concerns were developed based on meetings with the Volusia County MPO, the City of Daytona Beach Shores, field observations, GIS analysis, aerial photo evaluations, and field

inventories (see **Figures 5 – 8**). The following issues represent findings for the study area and are presented as support for study recommendations.

- Substandard sidewalk widths
- Inconsistent sidewalk alignments
- Inconsistent alignment of crosswalks at intersections
- Lack of bicycle lanes
- Obstacles on or adjacent to sidewalks, such as utility poles, fire hydrants
- Lack of sidewalks across driveway aprons
- Lack of marked crosswalks
- Non-ADA compliant bus stops (no sidewalk connection from bus stop to the edge of roadway
- Lack of clearly defined pedestrian realm at street edge along parking lots and driveway entrances
- No clearly defined and consistent bicycle or pedestrian facilities within entire corridor on east and west side
- Sidewalk gaps located throughout the corridor
- Abrupt end to sidewalk at Marcelle Avenue beach access crosswalk
- Limited and inconsistent pedestrian crossings at beach access points
- Inconsistent curb and gutter infrastructure throughout northern segment
- Non-ADA compliant pedestrian facilities
- Several excessively-wide, shallow driveway throats

RECOMMENDATIONS

The following focus points have been developed to address three main principles for bicycle and pedestrian facility development along C.R. A1A/South Atlantic Avenue within the City of Daytona Beach Shores:

I. Address existing pedestrian facility infrastructure within the study area that does not comply with the Americans with Disabilities Act (ADA) minimum requirements to reduce potential non-ADA compliant liability
II. Develop a consistent and continuous sidewalk facility on both sides of the study area corridor that connects to existing east/west beach access pedestrian facilities
III. Include design recommendations that recognize regional bicycle and pedestrian facilities, efforts, and network goals

The design recommendations listed below address each of the three points above:

C.R. A1A North (Dunlawton Avenue to approximately 750 feet south of Phillis Avenue)

1) Remove the outer lanes of the five-lane roadway to provide a three-lane roadway with eight-foot wide meandering sidewalks on both sides (see **Figure 9** and **Figure 10**). The design/construction of this facility should incorporate the following:
    a. Address the level of pedestrian activity in the study area.
    b. Provide sufficient width to connect with the required seven-foot dedicated concrete beach access breezeway/visual corridor along oceanfront properties.
    c. Provide an eight-foot concrete pad for bus stops and associated benches (recommended dimension by FDOT).
    d. Provide a consistent sidewalk facility within the regional bicycle and pedestrian network
    e. Allow for adequate lateral clearance from obstacles near the path.
        i. To provide adequate clearance from any obstructions that may abut the right-of-way line, the path should be placed at least three feet from the right-of-way line.

STUDY AREA ISSUES

CR A1A SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FL

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SCALE: NTS	PROJECT NO. 149288000	September 2008	FIGURE 5

STUDY AREA ISSUES

CR A1A SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FL

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SCALE: NTS	PROJECT NO. 149288000	September 2008	FIGURE 6

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STUDY AREA ISSUES

CR A1A SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FL

SCALE: NTS	PROJECT NO. 149288000	September 2008	FIGURE 7

STUDY AREA ISSUES

CR A1A SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FL

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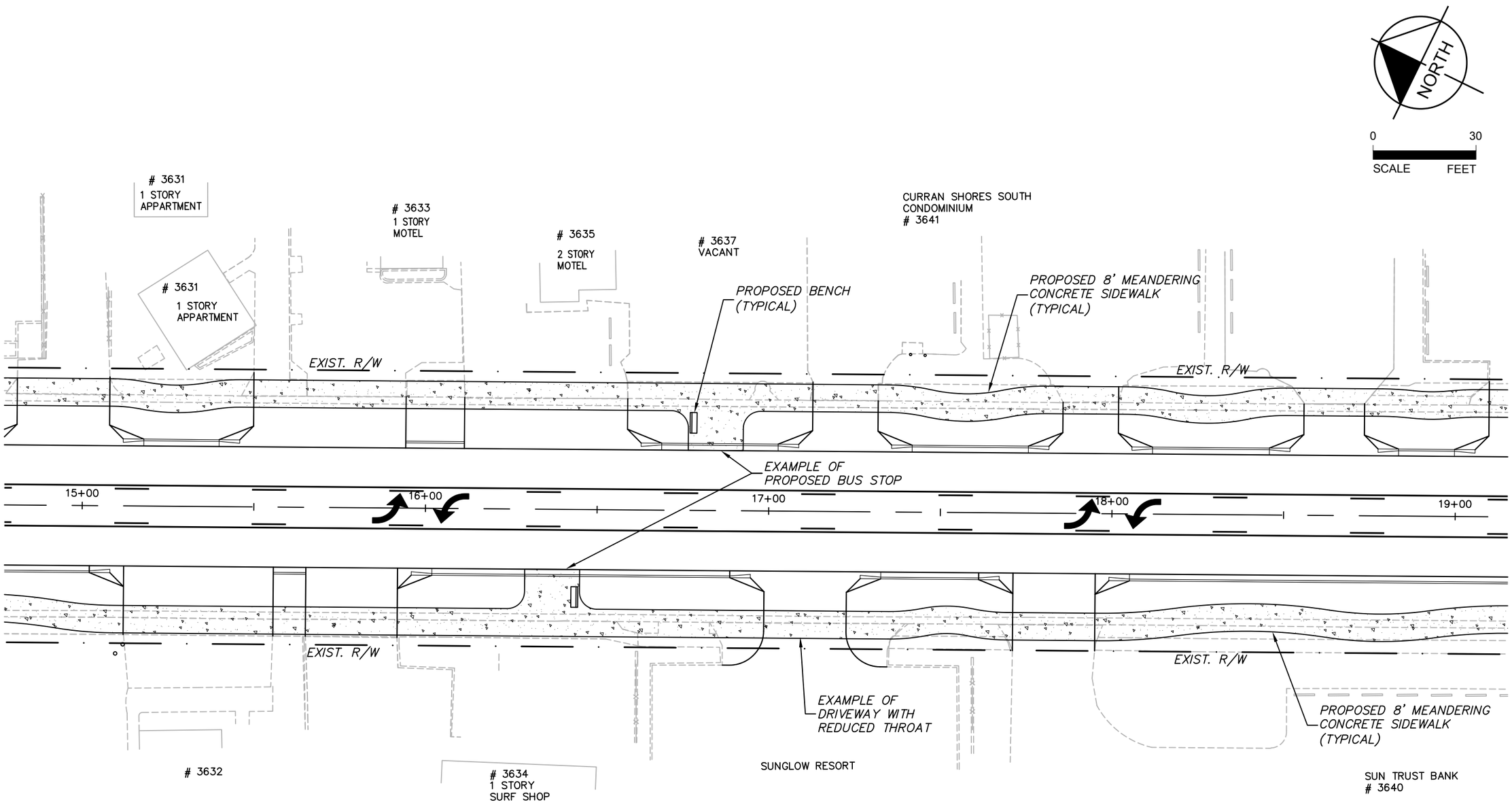
SCALE: NTS	PROJECT NO. 149288000	September 2008	FIGURE 8



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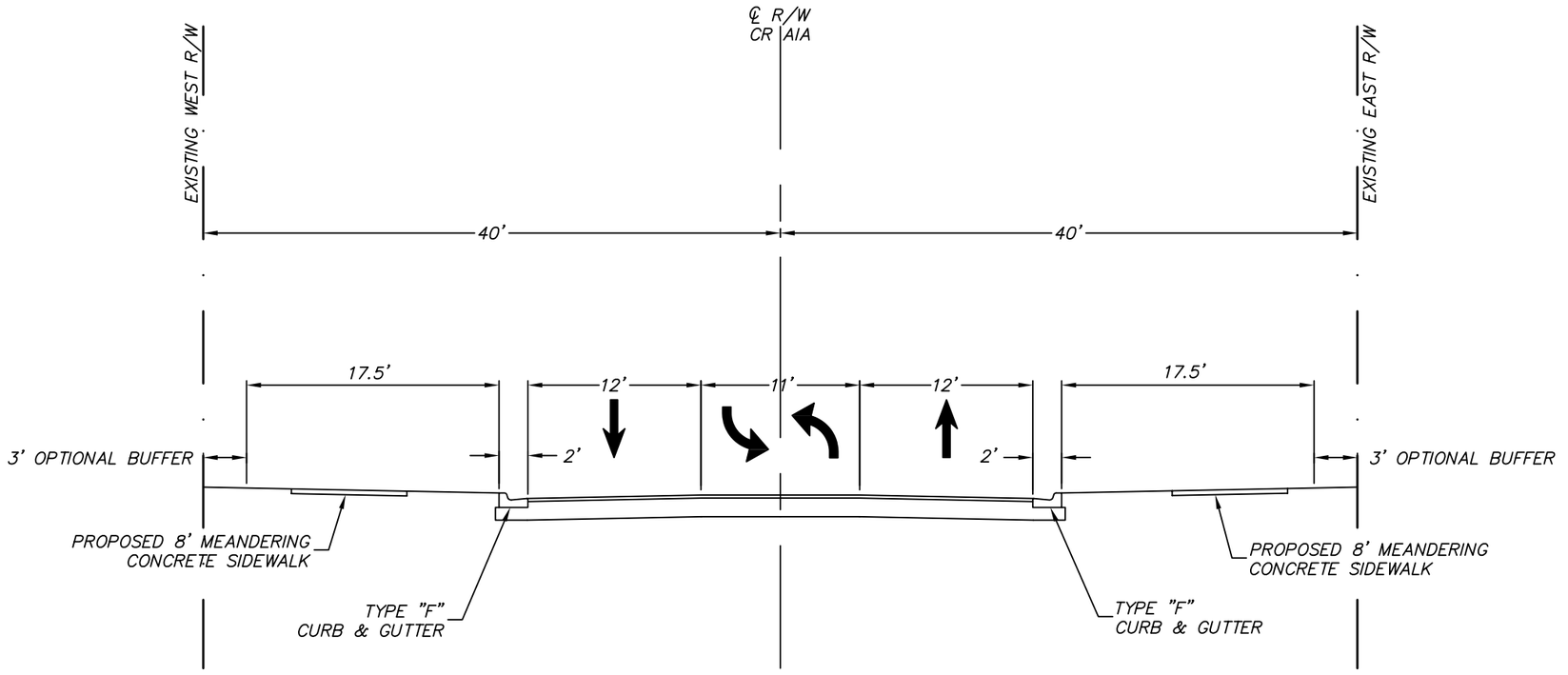
URBAN ALIGNMENT PLAN

CR A1A
SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FLORIDA

SCALE: 1"=30'	PROJECT NO. 149288000	SEPTEMBER 2008	FIGURE 9



URBAN TYPICAL SECTION

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URBAN TYPICAL SECTION

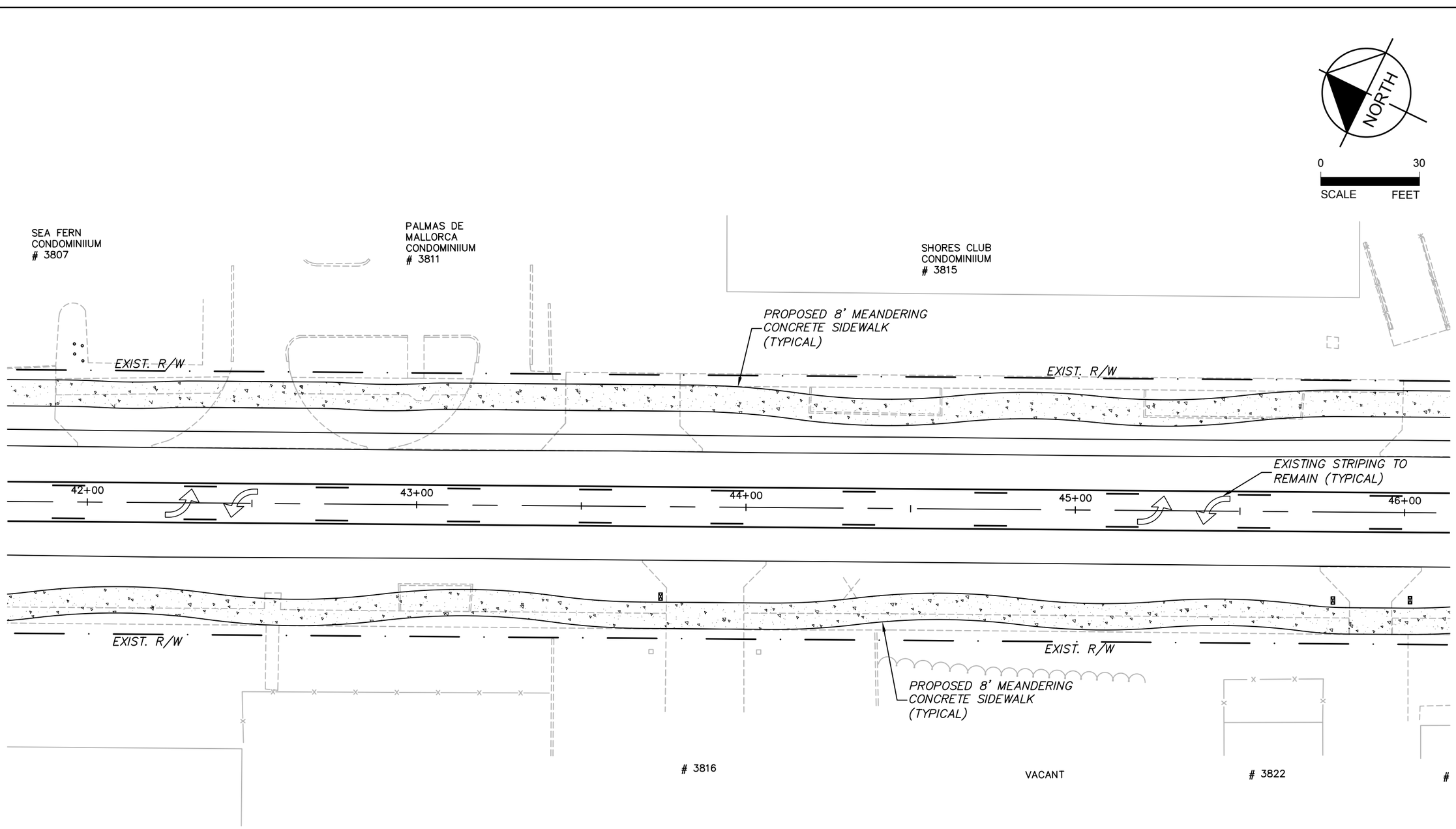
CR A1A
SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FLORIDA

SCALE: NTS	PROJECT NO. 149288000	SEPTEMBER 2008	FIGURE 10

2) Eliminate the existing raised medians that primarily serve as decorative pedestrian-crossing refuge areas as the conversion of the five-lane section to a three-lane section effectively eliminates the need for these refuge areas due to the shorter crossing distance. Though it may have been possible with the five-lane section, the alterations to the roadway, due to the installation of the sidewalk, create an operational hazard for vehicles attempting to make a U-turn within the tighter three-lane section. The elimination of the medians will discourage all U-turns throughout the corridor.
3) Modify the southerly leg of the Dunlawton Avenue intersection to one southbound departure lane, one northbound left-turn lane, and one northbound shared through/right-turn lane to provide the necessary area to extend the eight-foot wide sidewalks to Dunlawton Avenue.
4) Replace existing asphalt driveway entrance ramps with concrete driveway ramps and aprons, where applicable.
5) In an effort to provide an ADA-compliant maximum two percent pathway cross-slope at each individual driveway entrance, there are some instances where driveway ramps may require slopes in excess of the County's maximum allowable slope of eight percent.
    a. County approval would be needed to allow slopes in excess of eight percent.
6) Where feasible, reduce existing driveway throat widths to standard two-lane widths.
7) Consolidate consecutive driveways, where feasible, to reduce conflict points with the path.
8) Install eight-foot wide curb ramps, excluding aprons, at all east/west intersecting roadways (if curbs exist on intersecting streets).
9) Install eight-foot wide longitudinal crosswalk markings ('ladder crosswalks') at all east/west intersections.
10) Require the construction of seven-foot breezeway/visual corridor dedicated concrete pathways on oceanfront properties per land development code (14-18.4) to connect the beach to the recommended eight-foot meandering sidewalk along C.R. AIA/South Atlantic Avenue.

C.R. A1A South (Approximately 750 feet south of Phillis Avenue to Marcelle Avenue)

1) Construct an eight-foot wide meandering sidewalk beginning at the three-lane typical section just south of Phillis Avenue (see **Figure 11** and **Figure 12**).
2) The recommended minimum separation between the road and the sidewalk should be at least five feet. It is important to note that there are not specific clearance guidelines as stated by FDOT; however, the recommended minimum separation between a rural roadway and a shared-use path is five feet. Ultimately, however, the placement of the path shall be determined using the following Florida Greenbook Standards:
    a. *Pedestrian facilities should be placed at least as far from the rural roadway, particularly those with flush shoulders, as stipulated by the following criteria, which are given in a sequence of desirability:*
        i. *Outside of the highway right of way in a separately dedicated corridor.*
        ii. *At or near the right of way line (ideally, 3 feet width should be provided behind the sidewalk for above ground utilities).*
        iii. *Outside the designed roadside clear zone.*
        iv. *Outside the minimum required roadside clear zone.*
        v. *As far from the edge of the driving lane as possible.*
3) Use 15-foot utility easements adjacent to public right-of-way in highly constrained areas, or areas with considerable permanent obstacles, to construct portions of recommended sidewalks, if necessary, and if utility easements have been previously dedicated to the City of Daytona Beach Shores for GC-2 Retail/Service Commercial District properties.
4) Install eight-foot wide longitudinal crosswalk markings ('ladder crosswalks') at all east/west intersections.



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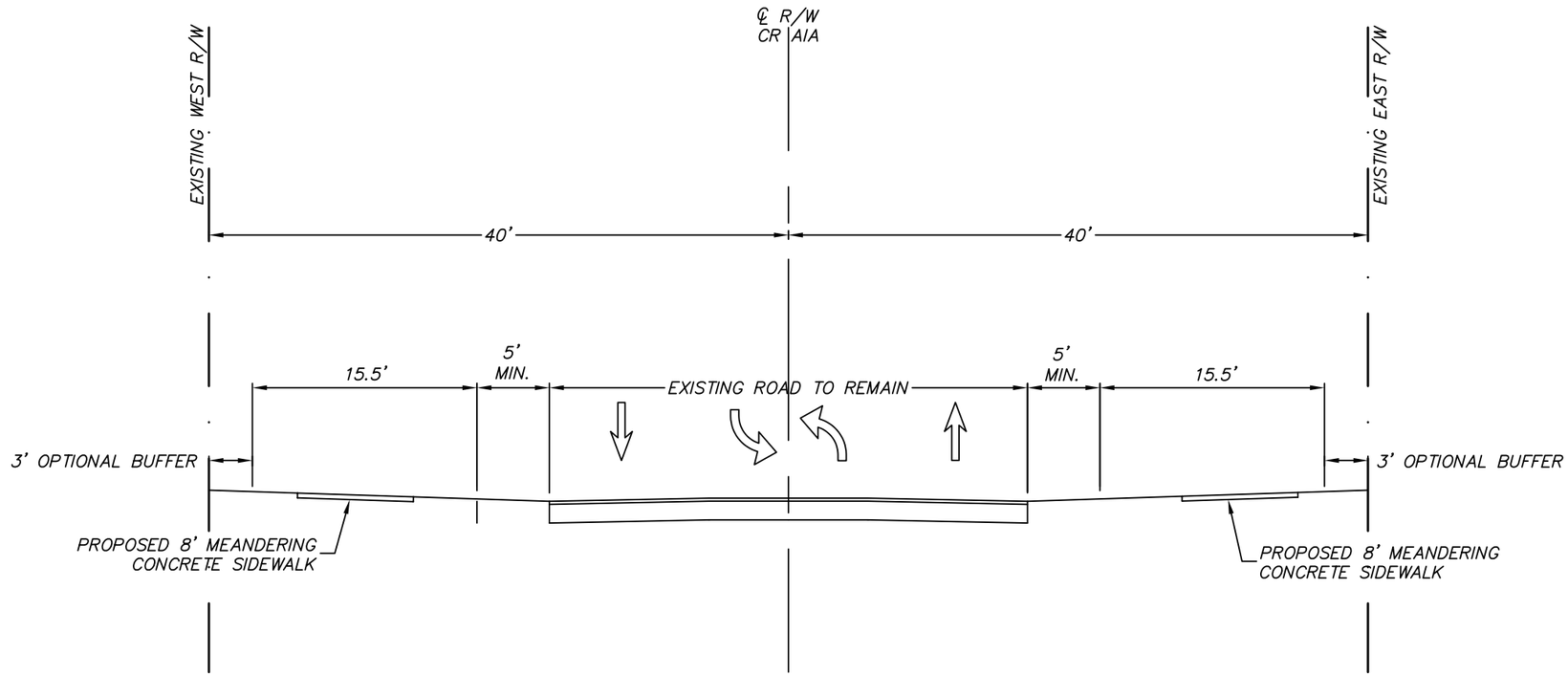
Volusia County MPO
Transportation Planning

RURAL ALIGNMENT PLAN

CR A1A
SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FLORIDA

SCALE: 1"=30'	PROJECT NO. 149288000	SEPTEMBER 2008	FIGURE 11



RURAL TYPICAL SECTION

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Volusia County MPO
Transportation Planning

RURAL TYPICAL SECTION

CR A1A
SIDEWALK FEASIBILITY STUDY
CITY OF DAYTONA BEACH SHORES, FLORIDA

SCALE: NTS	PROJECT NO. 149288000	SEPTEMBER 2008	FIGURE 12

5) Maintain minimum 3-foot horizontal clearance from all lateral obstructions, the tops of slopes with a grade greater than 1:6, and right-of-way lines. Where the path is adjacent to slopes steeper than 1:3, a wider separation should be considered. If the provision of adequate clearance from lateral obstructions is not feasible, provide aluminum pedestrian railings to prevent a fall hazard.
6) Construct curbing along the roadway where there are steep-sided ditches and maintaining a three-foot separation from the path is infeasible.

DUNLAWTON AVENUE AT C.R. A1A (S. ATLANTIC AVENUE) INTERSECTION ANALYSIS

The proposed alteration to the northern section from five lanes to three lanes will require alterations to the southerly leg of the Dunlawton Avenue intersection. To identify recommended changes, an analysis of the C.R. A1A/Dunlawton Avenue intersection was conducted. For this analysis, AM and PM peak-hour turning movement counts were obtained during a typical weekday. Then, to account for the time of year that the counts were taken, the Volusia countywide seasonal factor was obtained from FDOT's FTI 2007 software and applied to each of the intersection movements. Following, the adjusted counts were factored up to the 2025 design year using historical annual growth rates. Because the historical traffic volume data indicates that the growth in recent years has been relatively stagnant a default minimum two-percent annual growth rate was applied to the approach and departure volumes at the intersection to provide a conservatively high estimate of the future turning movement volumes for year 2025.

The intersection was then analyzed, using the proposed intersection geometry and future volumes, with *Synchro 7*'s HCM Methodology. The proposed geometry is consistent with the existing geometry with the exception that one southbound departure lane and one northbound left-turn lane were removed to accommodate the sidewalk. Based on the Highway Capacity Manual 2000 (HCM2000), the level of service is a qualitative measure with letters ranging from A to F and each representing a range of operating conditions and driver's perception of those conditions. The specific level of service for signalized intersections is defined in terms of control delay. More expansive descriptions for each level of service (LOS) grade, as obtained from the HCM2000, are provided below:

> LOS A – Describes operations with low control delay, up to 10 seconds per vehicle. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
>
> LOS B – Describes operations with control delay greater than 10 and up to 20 seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.
>
> LOS C – Describes operations with control delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.
>
> LOS D – Describes operations with control delay greater than 35 and up to 55 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high volume-

to-capacity (v/c) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E – Describes operations with control delay greater than 55 and up to 80 seconds per vehicle. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.

LOS F – Describes operations with control delay in excess of 80 seconds per vehicle. This level, considered unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

Another measure used in evaluating the operating conditions of signalized intersections is the volume-to-capacity (v/c) ratio. The capacity is given for each movement and is effectively defined as the maximum flow of vehicles that can be processed by the specific movement. V/c ratios in excess of 1.0 indicate that the demand exceeds the capacity. However, values below 1.0 indicate that all vehicles can be accommodated.

Based on the Synchro analysis, the intersection is projected to operate well at an overall level of service (LOS) of "C" in both the AM and PM peak hours in 2025 with the proposed configuration of the southerly leg. In fact, all intersection turning movements are projected to operate at LOS "D" or better and exhibit v/c ratios well below 1.0. The Synchro printouts are included in Appendix A.

Other Considerations for Enhanced Bicycle and Pedestrian Facility Improvements

Bus/Bike/Right Turn Only Lanes

One consideration for the C.R. A1A North segment of the study area is to convert the existing outside travel lanes within the five-lane section to Bus/Bike/Right Turn Only lanes. Due to the number of bus stops within the corridor, tourist mobility needs, and the comparable speeds of buses and bicycles this option may provide a viable multimodal function. This type of facility has been successfully implemented in U.S. cities such as Philadelphia, PA and Santa Cruz, CA (*ITE Innovative Bicycle Treatments*). Level of service may be affected by such a facility, however transit currently operates in the corridor and level of service is affected when vehicles must stop behind buses (the corridor does not have dedicated bus pull-outs or paved shoulders).

Volusia County Scenic Roadway Designation

Volusia County has criteria set forth in their Comprehensive Plan (*Chapter 94, Article II, Section 94-31*) to designate corridors as "Scenic Roadways." Scenic roadway designation could provide the County and City of Daytona Beach Shores additional opportunities for funding C.R. A1A corridor improvements. The designation may also provide additional local recognition of the corridor and generate additional beautification, public access, tourism and recreational facility improvement-related initiatives.

FINANCIAL FEASIBILITY

Table 1 provides an **Engineer's Opinion of Probable Cost (EOPC)** to construct the proposed corridor, as described above, based on the FDOT 2008 Basis of Estimates Manual. This estimate is based upon the Area 6 FDOT Item Average Unit Cost (FIAUC) report for the year 2007. The unit costs from the FIAUC report were then increased based on an inflation factor of five percent to bring them to year 2008 costs. As shown in **Table 1**, the projected total estimated cost for design and construction of the sidewalks, and the design and reconstruction costs for three-laning the northern section of C.R. A1A during the year 2008 is **$3,624,312**.

To further understand the costs associated with the design and construction of the sidewalks only, another EOPC was developed which assumes that the three-laning of C.R. A1A is in place. The projected cost for this scenario during the year 2008, as indicated in **Table 2**, is **$1,150,044**.

Table 1

ENGINEER'S OPINION OF PROBABLE COSTS FOR AN 8-FOOT WIDE MEANDERING SIDEWALK ALONG C.R. A1A (S. ATLANTIC AVENUE)
DAYTONA BEACH SHORES, FL

THIS OPC IS NOT BASED ON DESIGN AND UTILIZES THE 2007 FDOT AREA 06 ITEM AVERAGE UNIT COSTS
ACTUAL CONSTRUCTION COSTS WILL VARY

Item Number	Description	Estimated Quantity	Unit of Measure	2007 Unit Price	Inflation Factor	Extended Cost Year 2008	2009	2010	2011
	CONSTRUCTION ITEMS								
110-1-1	CLEARING & GRUBBING	6.6	AC	$ 9,353.34	5%	$ 64,819	$ 68,060	$ 71,463	$ 75,036
110-3	REMOVAL OF EXISTING STRUCTURE	30	EA	$ 10.42	5%	$ 328	$ 345	$ 362	$ 380
110-4	REMOVAL OF EXISTING CONCRETE PAVT	12,910	SY	$ 15.39	5%	$ 208,619	$ 219,050	$ 230,003	$ 241,503
120-6	EXCAVATION AND EMBANKMENT	10,000	CY	$ 8.00	5%	$ 84,000	$ 88,200	$ 92,610	$ 97,241
160-4	TYPE B STABILIZATION	2,380	SY	$ 2.60	5%	$ 6,497	$ 6,822	$ 7,163	$ 7,522
285-7-01	OPTIONAL BASE, BASE GROUP 01	13,730	SY	$ 6.54	5%	$ 94,284	$ 98,998	$ 103,948	$ 109,145
285-7-09	OPTIONAL BASE, BASE GROUP 09	2,380	SY	$ 8.97	5%	$ 22,416	$ 23,537	$ 24,714	$ 25,949
286-1	TURNOUT CONSTRUCTION	8,200	SY	$ 20.44	5%	$ 175,988	$ 184,788	$ 194,027	$ 203,729
327-70-1	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	11,600	SY	$ 1.99	5%	$ 24,238	$ 25,450	$ 26,723	$ 28,059
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	262	TN	$ 74.24	5%	$ 20,423	$ 21,445	$ 22,517	$ 23,643
337-7-33	ASPH CONC FC, TRAFFIC C, FC-12.5, RUBBER	638	TN	$ 92.46	5%	$ 61,939	$ 65,036	$ 68,288	$ 71,702
425-1311	INLETS, CURB, TYPE P-1, <10'	34	EA	$ 3,615.70	5%	$ 129,080	$ 135,535	$ 142,311	$ 149,427
430-171-101	PIPE CULV OPT MATL, ROUND, 0-24", SS	4,410	LF	$ 51.00	5%	$ 236,156	$ 247,963	$ 260,361	$ 273,380
520-1-10	CONCRETE CURB & GUTTER, TYPE F	6,300	LF	$ 17.47	5%	$ 115,564	$ 121,342	$ 127,409	$ 133,780
522-1	SIDEWALK CONC, 4" THICK	7,300	SY	$ 53.05	5%	$ 406,628	$ 426,960	$ 448,308	$ 470,723
522-2	SIDEWALK CONC, 6" THICK	3,690	SY	$ 43.96	5%	$ 170,323	$ 178,839	$ 187,781	$ 197,170
570-1-2	PERFORMANCE TURF, SOD	10,530	SY	$ 2.53	5%	$ 27,973	$ 29,372	$ 30,840	$ 32,382
	MISCELLANEOUS TRAFFIC CONTROL								
	MODIFY EXISTING SIGNAL AT DUNLAWTON	1	LS	$ 75,000	5%	$ 78,750	$ 82,688	$ 86,822	$ 91,163
	SIGNING AND PAVEMENT MARKINGS	1	LS	$ 20,000	5%	$ 21,000	$ 22,050	$ 23,153	$ 24,310
	SUBTOTAL BEFORE MOT					$ 1,949,027	$ 2,046,478	$ 2,148,802	$ 2,256,242
102-1	MAINTENANCE OF TRAFFIC		LS	15%	5%	$ 292,354	$ 306,972	$ 322,320	$ 338,436
	SUBTOTAL BEFORE MOBILIZATION					$ 2,241,381	$ 2,353,450	$ 2,471,122	$ 2,594,678
102-2	MOBILIZATION		LS	10%	5%	$ 224,138	$ 235,345	$ 247,112	$ 259,468
	SUBTOTAL BEFORE DESIGN/CONTINGENCY					$ 2,465,519	$ 2,588,795	$ 2,718,234	$ 2,854,146
	DESIGN		LS	15%	5%	$ 369,828	$ 388,319	$ 407,735	$ 428,122
	CEI		LS	12%	5%	$ 295,862	$ 310,655	$ 326,188	$ 342,498
999-25	INITIAL CONTINGENCY*		LS	20%	5%	$ 493,104	$ 517,759	$ 543,647	$ 570,829
					TOTAL COST	**$ 3,624,312**	**$ 3,805,528**	**$ 3,995,804**	**$ 4,195,595**

*AN INITIAL CONTINGENCY OF 20% WAS APPLIED TO ACCOUNT FOR THE UNCERTAIN MISCELLANEOUS COSTS THAT MAY ARISE DURING CONSTRUCTION

THIS OPC DOES NOT INCLUDE THE COSTS FOR ANY RIGHT-OF-WAY OR EASEMENT ACQUISITIONS.

THIS OPC DOES NOT INCLUDE THE COSTS ASSOCIATED WITH THE RELOCATION OF OVERHEAD POWER POLES OR GUY WIRES.

THIS OPC DOES NOT INCLUDE THE COSTS ASSOCIATED WITH OBTAINING PERMITS.

THIS OPC DOES NOT INCLUDE THE COSTS FOR LANDSCAPING OR STREETSCAPING.

THE COSTS FOR YEARS 2008 THROUGH 2011 WERE GENERATED USING A 5% INFLATION RATE.

THE ENGINEER HAS NO CONTROL OVER THE COST OF LABOR, MATERIALS, EQUIPMENT, OR OVER THE CONTRACTOR'S METHODS OF DETERMINING PRICES OR OVER COMPETITIVE BIDDING OR MARKET CONDITIONS. OPINIONS OF PROBABLE COSTS PROVIDED HEREIN ARE BASED ON THE INFORMATION KNOWN TO ENGINEER AT THIS TIME AND REPRESENT ONLY THE ENGINEER'S JUDGMENT AS A DESIGN PROFESSIONAL FAMILIAR WITH THE CONSTRUCTION INDUSTRY. THE ENGINEER CANNOT AND DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL CONSTRUCTION COSTS WILL NOT VARY FROM ITS OPINIONS OF PROBABLE COSTS.

Table 2

ENGINEER'S OPINION OF PROBABLE COSTS FOR AN 8-FOOT WIDE MEANDERING SIDEWALK ALONG C.R. A1A (S. ATLANTIC AVENUE)
(SIDEWALK ONLY)
DAYTONA BEACH SHORES, FL

THIS OPC IS NOT BASED ON DESIGN AND UTILIZES THE 2007 FDOT AREA 06 ITEM AVERAGE UNIT COSTS
ACTUAL CONSTRUCTION COSTS WILL VARY

Item Number	Description	Estimated Quantity	Unit of Measure	2007 Unit Price	Inflation Factor	Extended Cost Year 2008	2009	2010	2011
CONSTRUCTION ITEMS									
110-1-1	CLEARING & GRUBBING	3.6	AC	$ 9,353.34	5%	$ 35,356	$ 37,039	$ 38,723	$ 40,406
110-4	REMOVAL OF EXISTING CONCRETE PAVT	100	SY	$ 15.39	5%	$ 1,616	$ 1,693	$ 1,770	$ 1,847
120-6	EXCAVATION AND EMBANKMENT	1,500	CY	$ 8.00	5%	$ 12,600	$ 13,200	$ 13,800	$ 14,400
160-4	TYPE B STABILIZATION	11,100	SY	$ 2.60	5%	$ 30,303	$ 31,746	$ 33,189	$ 34,632
286-1	TURNOUT CONSTRUCTION	1,000	SY	$ 20.44	5%	$ 21,462	$ 22,484	$ 23,506	$ 24,528
520-1-10	CONCRETE CURB & GUTTER, TYPE F	500	LF	$ 17.47	5%	$ 9,172	$ 9,609	$ 10,045	$ 10,482
522-1	SIDEWALK CONC, 4" THICK	7,300	SY	$ 53.05	5%	$ 406,628	$ 425,992	$ 445,355	$ 464,718
522-2	SIDEWALK CONC, 6" THICK	3,700	SY	$ 43.96	5%	$ 170,785	$ 178,917	$ 187,050	$ 195,182
570-1-2	PERFORMANCE TURF, SOD	5,000	SY	$ 2.53	5%	$ 13,283	$ 13,915	$ 14,548	$ 15,180
SUBTOTAL BEFORE MOT						$ 701,204	$ 734,594	$ 767,985	$ 801,376
102-1	MAINTENANCE OF TRAFFIC		LS	5%	5%	$ 35,060	$ 36,730	$ 38,399	$ 40,069
SUBTOTAL BEFORE MOBILIZATION						$ 736,264	$ 771,324	$ 806,384	$ 841,444
102-2	MOBILIZATION		LS	10%	5%	$ 73,626	$ 77,132	$ 80,638	$ 84,144
SUBTOTAL BEFORE DESIGN/CONTINGENCY						$ 809,890	$ 848,456	$ 887,023	$ 925,589
	DESIGN		LS	15%	5%	$ 121,484	$ 127,268	$ 133,053	$ 138,838
	CEI		LS	12%	5%	$ 97,187	$ 101,815	$ 106,443	$ 111,071
999-25	INITIAL CONTINGENCY*		LS	15%	5%	$ 121,484	$ 127,268	$ 133,053	$ 138,838
					TOTAL COST	**$ 1,150,044**	**$ 1,204,808**	**$ 1,259,572**	**$ 1,314,336**

*AN INITIAL CONTINGENCY OF 15% WAS APPLIED TO ACCOUNT FOR THE UNCERTAIN MISCELLANEOUS COSTS THAT MAY ARISE DURING CONSTRUCTION

THIS OPC DOES NOT INCLUDE THE COSTS FOR ANY RIGHT-OF-WAY OR EASEMENT ACQUISITIONS.

THIS OPC DOES NOT INCLUDE THE COSTS FOR ANY DRAINAGE MODIFICATIONS

THIS OPC DOES NOT INCLUDE THE COSTS ASSOCIATED WITH THE RELOCATION OF OVERHEAD POWER POLES OR GUY WIRES.

THIS OPC DOES NOT INCLUDE THE COSTS ASSOCIATED WITH OBTAINING PERMITS.

THIS OPC DOES NOT INCLUDE THE COSTS FOR LANDSCAPING OR STREETSCAPING.

THE COSTS FOR YEARS 2008 THROUGH 2011 WERE GENERATED USING A 5% INFLATION RATE.

THE ENGINEER HAS NO CONTROL OVER THE COST OF LABOR, MATERIALS, EQUIPMENT, OR OVER THE CONTRACTOR'S METHODS OF DETERMINING PRICES OR OVER COMPETITIVE BIDDING OR MARKET CONDITIONS. OPINIONS OF PROBABLE COSTS PROVIDED HEREIN ARE BASED ON THE INFORMATION KNOWN TO ENGINEER AT THIS TIME AND REPRESENT ONLY THE ENGINEER'S JUDGMENT AS A DESIGN PROFESSIONAL FAMILIAR WITH THE CONSTRUCTION INDUSTRY. THE ENGINEER CANNOT AND DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL CONSTRUCTION COSTS WILL NOT VARY FROM ITS OPINIONS OF PROBABLE COSTS.

DATA COLLECTION REFERENCES

Data collection consisted of referencing readily available information including:

- City of Daytona Beach Shores Comprehensive Plan, April 2000
- Volusia County MPO, http://www.volusiacountympo.com/
- The Volusia County MPO Bicycle/Pedestrian Plan, January 25, 2005
- Volusia County, http://www.volusia.org/
- Florida Department of Transportation (FDOT), http://www.dot.state.fl.us/Safety/ped_bike/brochures/ped_bike_brochures.htm; http://www.dot.state.fl.us/
- Volusia County Land Development Code, http://www.municode.com
- City of Daytona Beach Shores Land Development Code, http://www.municode.com
- Florida Pedestrian Planning and Design Handbook, FDOT, April 1999
- Florida Bicycle Facilities Planning and Design Handbook, FDOT, April 2000
- Manual of Uniform Minimum Standards for Design, Construction and maintenance for Streets and Highways, May 2008
- American Association of State Highway Officials Guide for the Planning, Design, and Operation of Pedestrian Facilities, July 2004
- Institute of Transportation Engineers Innovative Bicycle Treatments, May 2002
- Florida Department of Transportation Plans and Preparation Manual, May 2008
- Florida Department of Transportation Basis of Estimates Manual, 2008
- Florida Department of Transportation Pay Item Cost History, January 2007-December 2007

Appendix A – Intersection Analysis

C.R. A1A (S. Atlantic Ave.) at Dunlawton Avenue

Accurate Traffic Counts, Inc

Phone: 407-678-0605/Fax: 407-678-3299

info@accuratetraffic.com

Counter: 1896
Counted By: Nino
Weather: Clear
Other:Dunlawton Ave@CR A1A

File Name : kha1896-0909
Site Code : 00001896
Start Date : 9/9/2008
Page No : 1

Groups Printed- General Traffic - Trucks

	SR A1A Southbound				Dunlawton Ave Westbound				CR A1A Northbound				Dunlawton Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	39	7	1	47	0	1	0	1	0	36	42	78	23	0	27	50	176
07:15 AM	33	8	0	41	0	1	0	1	0	27	71	98	31	4	48	83	223
07:30 AM	37	16	1	54	1	0	0	1	1	38	60	99	42	3	69	114	268
07:45 AM	41	22	0	63	1	0	3	4	1	24	44	69	51	1	55	107	243
Total	150	53	2	205	2	2	3	7	2	125	217	344	147	8	199	354	910
08:00 AM	49	25	0	74	0	1	1	2	2	27	54	83	54	2	60	116	275
08:15 AM	43	13	0	56	0	2	0	2	0	27	47	74	41	1	43	85	217
08:30 AM	60	24	0	84	0	0	1	1	0	32	66	98	37	1	64	102	285
08:45 AM	39	17	0	56	0	0	0	0	0	26	28	54	60	4	55	119	229
Total	191	79	0	270	0	3	2	5	2	112	195	309	192	8	222	422	1006
*** BREAK ***																	
04:00 PM	92	45	2	139	0	4	1	5	1	39	60	100	69	0	44	113	357
04:15 PM	68	46	4	118	0	0	0	0	1	37	57	95	50	4	58	112	325
04:30 PM	82	28	0	110	2	3	0	5	0	28	72	100	64	2	52	118	333
04:45 PM	79	46	1	126	0	0	0	0	0	35	53	88	61	5	55	121	335
Total	321	165	7	493	2	7	1	10	2	139	242	383	244	11	209	464	1350
05:00 PM	75	49	0	124	4	2	1	7	0	29	62	91	69	7	43	119	341
05:15 PM	79	54	1	134	2	1	1	4	0	38	41	79	73	3	85	161	378
05:30 PM	59	48	1	108	1	2	1	4	1	29	41	71	74	3	70	147	330
05:45 PM	55	46	2	103	4	2	2	8	2	33	37	72	78	6	83	167	350
Total	268	197	4	469	11	7	5	23	3	129	181	313	294	19	281	594	1399
Grand Total	930	494	13	1437	15	19	11	45	9	505	835	1349	877	46	911	1834	4665
Apprch %	64.7	34.4	0.9		33.3	42.2	24.4		0.7	37.4	61.9		47.8	2.5	49.7		
Total %	19.9	10.6	0.3	30.8	0.3	0.4	0.2	1	0.2	10.8	17.9	28.9	18.8	1	19.5	39.3	
General Traffic	904	477	13	1394	15	18	11	44	9	491	810	1310	842	44	880	1766	4514
% General Traffic	97.2	96.6	100	97	100	94.7	100	97.8	100	97.2	97	97.1	96	95.7	96.6	96.3	96.8
Trucks	26	17	0	43	0	1	0	1	0	14	25	39	35	2	31	68	151
% Trucks	2.8	3.4	0	3	0	5.3	0	2.2	0	2.8	3	2.9	4	4.3	3.4	3.7	3.2

	SR A1A Southbound				Dunlawton Ave Westbound				CR A1A Northbound				Dunlawton Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	41	22	0	63	**1**	0	**3**	**4**	1	24	44	69	51	1	55	107	243
08:00 AM	49	**25**	0	74	0	1	1	2	**2**	27	54	83	**54**	**2**	60	**116**	275
08:15 AM	43	13	0	56	0	**2**	0	2	0	27	47	74	41	1	43	85	217
08:30 AM	**60**	24	0	**84**	0	0	1	1	0	**32**	**66**	**98**	37	1	**64**	102	**285**
Total Volume	193	84	0	277	1	3	5	9	3	110	211	324	183	5	222	410	1020
% App. Total	69.7	30.3	0		11.1	33.3	55.6		0.9	34	65.1		44.6	1.2	54.1		
PHF	.804	.840	.000	.824	.250	.375	.417	.563	.375	.859	.799	.827	.847	.625	.867	.884	.895
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	75	49	0	124	**4**	**2**	1	7	0	29	**62**	**91**	69	**7**	43	119	341
05:15 PM	**79**	**54**	1	**134**	2	1	1	4	0	**38**	41	79	73	3	**85**	161	**378**
05:30 PM	59	48	1	108	1	2	1	4	1	29	41	71	74	3	70	147	330
05:45 PM	55	46	**2**	103	4	2	**2**	**8**	**2**	33	37	72	**78**	6	83	**167**	350
Total Volume	268	197	4	469	11	7	5	23	3	129	181	313	294	19	281	594	1399
% App. Total	57.1	42	0.9		47.8	30.4	21.7		1	41.2	57.8		49.5	3.2	47.3		
PHF	.848	.912	.500	.875	.688	.875	.625	.719	.375	.849	.730	.860	.942	.679	.826	.889	.925

Accurate Traffic Counts, Inc

Phone: 407-678-0605/Fax: 407-678-3299

info@accuratetraffic.com

Counter: 1896
Counted By: Nino
Weather: Clear
Other:Dunlawton Ave@CR A1A

File Name : kha1896-0909
Site Code : 00001896
Start Date : 9/9/2008
Page No : 1

Groups Printed- Trucks

	SR A1A Southbound				Dunlawton Ave Westbound				CR A1A Northbound				Dunlawton Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	1	2	0	3	0	0	0	0	0	2	2	4	3	0	1	4	11
07:15 AM	1	1	0	2	0	0	0	0	0	1	2	3	0	0	1	1	6
07:30 AM	1	1	0	2	0	0	0	0	0	0	0	0	4	0	3	7	9
07:45 AM	2	2	0	4	0	0	0	0	0	1	1	2	2	0	4	6	12
Total	5	6	0	11	0	0	0	0	0	4	5	9	9	0	9	18	38
08:00 AM	3	1	0	4	0	1	0	1	0	1	1	2	4	1	6	11	18
08:15 AM	3	2	0	5	0	0	0	0	0	0	2	2	4	0	3	7	14
08:30 AM	2	0	0	2	0	0	0	0	0	1	2	3	5	0	4	9	14
08:45 AM	3	0	0	3	0	0	0	0	0	0	0	0	4	1	2	7	10
Total	11	3	0	14	0	1	0	1	0	2	5	7	17	2	15	34	56
*** BREAK ***																	
04:00 PM	1	0	0	1	0	0	0	0	0	1	1	2	1	0	2	3	6
04:15 PM	0	2	0	2	0	0	0	0	0	2	3	5	3	0	1	4	11
04:30 PM	2	1	0	3	0	0	0	0	0	0	5	5	1	0	2	3	11
04:45 PM	3	0	0	3	0	0	0	0	0	0	2	2	1	0	0	1	6
Total	6	3	0	9	0	0	0	0	0	3	11	14	6	0	5	11	34
05:00 PM	1	2	0	3	0	0	0	0	0	2	3	5	1	0	0	1	9
05:15 PM	1	1	0	2	0	0	0	0	0	0	1	1	0	0	0	0	3
05:30 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	0	1	1	3
05:45 PM	1	2	0	3	0	0	0	0	0	2	0	2	2	0	1	3	8
Total	4	5	0	9	0	0	0	0	0	5	4	9	3	0	2	5	23
Grand Total	26	17	0	43	0	1	0	1	0	14	25	39	35	2	31	68	151
Apprch %	60.5	39.5	0		0	100	0		0	35.9	64.1		51.5	2.9	45.6		
Total %	17.2	11.3	0	28.5	0	0.7	0	0.7	0	9.3	16.6	25.8	23.2	1.3	20.5	45	

Historical Growth Rate Calculations
C.R. A1A at Dunlawton Ave.

Roadway Segment	Historical AADT												Historical Growth Rate	Applied Growth Rate
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007		
Dunlawton Avenue/S.R. A1A														
U.S. 1 to C.R. A1A/Atlantic Ave.	26,000	32,000	34,000	32,000	35,000	33,000	32,500	27,500	28,000	28,500	29,000	29,500	1.82%	2.00%
Beach Ramp	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.00%
C.R. A1A/Atlantic Ave.														
Simpson Ave. to Dunlawton Ave. (SR A1A)	19,500	14,000	19,700	19,000	18,000	17,000	17,500	19,000	23,500	17,400	18,800	13,000	-8.79%	2.00%
SR A1A/Dunlawton Ave. to DeMotte Ave.	12,248	12,962	14,682	18,580	16,485	-	14,590	13,870	13,670	13,010	17,620	14,180	1.67%	2.00%

C.R. A1A at Dunlawton Ave. Future Volume Projections

AM Peak Hour

2025

Existing TMCs and Background Approach and Departure Volumes

		Eastbound			Westbound			Northbound			Southbound		
		L	T	R	L	T	R	L	T	R	L	T	R
Existing Count	Date:09/09/2008	222	5	183	5	3	1	211	110	3	0	84	193
Seasonal Factor	1.05	233	5	192	5	3	1	222	116	3	0	88	203

	Eastbound	Westbound	Northbound	Southbound
Existing Approach Volume	410	9	324	277
Existing Departure Volume	8	407	333	272
Applied Growth	2.00%	2.00%	2.00%	2.00%

	Eastbound	Westbound	Northbound	Southbound
Calculated Approach Growth	139	3	110	94
Calculated Departure Growth	3	138	113	92

	Eastbound Future Background			Westbound Future Background			Northbound Future Background			Southbound Future Background		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Based	76	2	61	1	1	1	60	49	1	1	37	56
Departure Based	46	1	37	1	2	2	60	49	1	1	37	55
Average Growth	61	2	49	1	2	1	60	49	1	1	37	55

	Eastbound Future Total			Westbound Future Total			Northbound Future Total			Southbound Future Total		
	L	T	R	L	T	R	L	T	R	L	T	R
TOTAL FUTURE VOLUME	**294**	**7**	**232**	**6**	**5**	**2**	**271**	**159**	**4**	**1**	**121**	**248**

PM Peak Hour

2025

Existing TMCs and Background Approach and Departure Volumes

		Eastbound			Westbound			Northbound			Southbound		
		L	T	R	L	T	R	L	T	R	L	T	R
Existing Count	Date:09/09/2008	281	19	294	5	7	11	181	129	3	4	197	268
Seasonal Factor	1.05	295	20	309	5	7	12	190	135	3	4	207	281

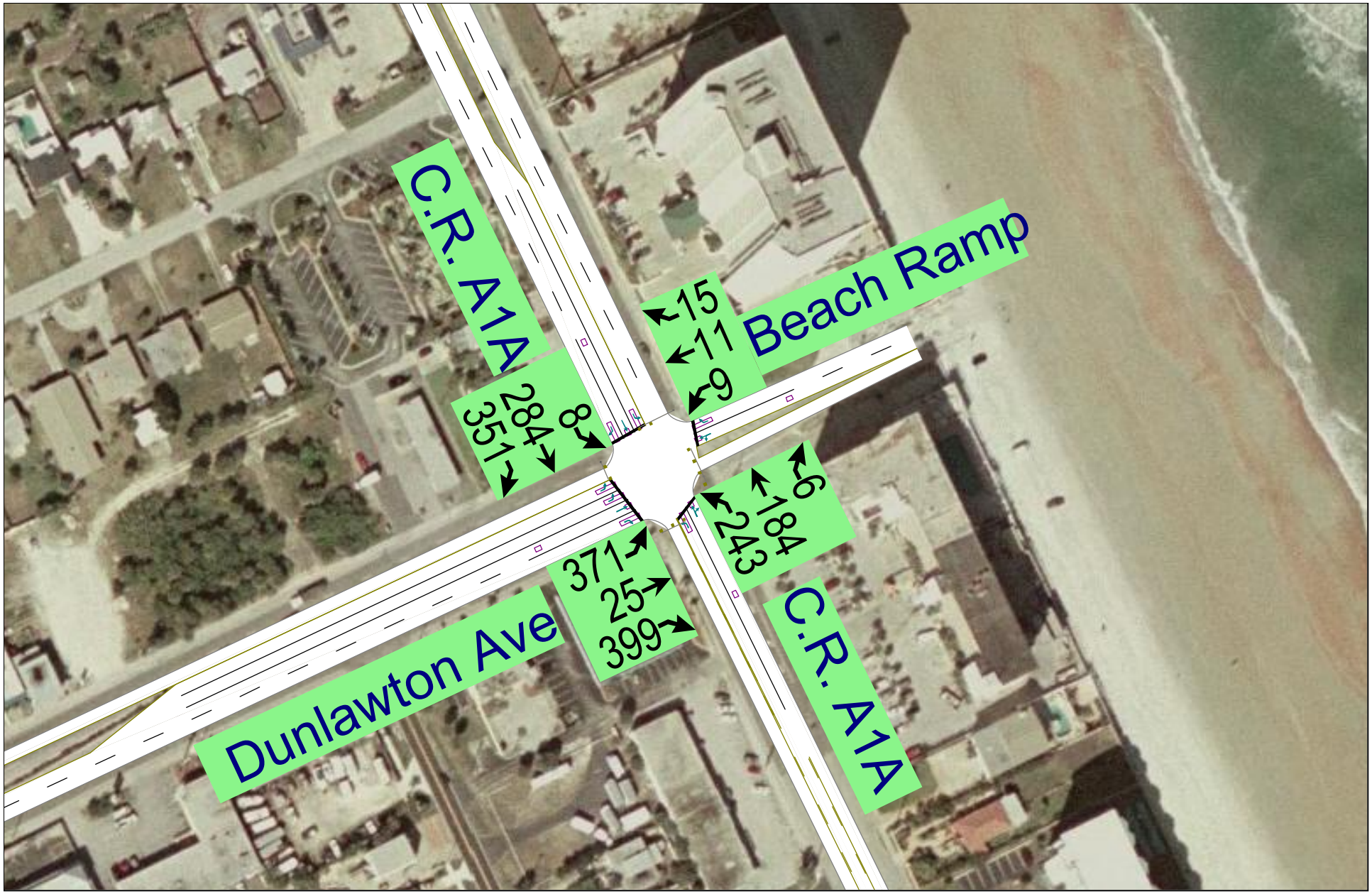
	Eastbound	Westbound	Northbound	Southbound
Existing Approach Volume	594	23	313	469
Existing Departure Volume	26	456	421	496
Applied Growth	2.00%	2.00%	2.00%	2.00%

	Eastbound	Westbound	Northbound	Southbound
Calculated Approach Growth	202	8	106	159
Calculated Departure Growth	9	155	143	169

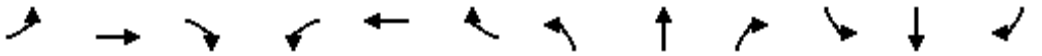
	Eastbound Future Background			Westbound Future Background			Northbound Future Background			Southbound Future Background		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Based	90	6	106	3	3	2	54	49	3	4	81	74
Departure Based	62	4	73	5	5	4	52	48	3	4	73	67
Average Growth	76	5	90	4	4	3	53	49	3	4	77	70

	Eastbound Future Total			Westbound Future Total			Northbound Future Total			Southbound Future Total		
	L	T	R	L	T	R	L	T	R	L	T	R
TOTAL FUTURE VOLUME	**371**	**25**	**399**	**9**	**11**	**15**	**243**	**184**	**6**	**8**	**284**	**351**

Dunlawton Ave at C.R. A1A (S. Atlantic Ave.)



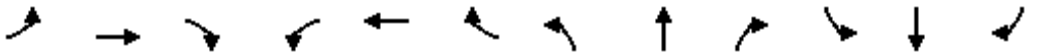
2025 Intersection Geometry
Kimley-Horn and Associates, Inc.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	294	7	232	6	5	2	271	159	4	1	121	248
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3242	1583	1495		1598	1615	1752	1832		1805	1792	1538
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.44	1.00		0.63	1.00	1.00
Satd. Flow (perm)	3242	1583	1495		1598	1615	803	1832		1206	1792	1538
Peak-hour factor, PHF	0.87	0.63	0.85	0.42	0.38	0.25	0.80	0.86	0.38	0.25	0.84	0.80
Adj. Flow (vph)	338	11	273	14	13	8	339	185	11	4	144	310
RTOR Reduction (vph)	0	0	0	0	0	8	0	2	0	0	0	137
Lane Group Flow (vph)	338	11	273	0	27	0	339	194	0	4	144	173
Heavy Vehicles (%)	8%	20%	8%	0%	33%	0%	3%	3%	0%	0%	6%	5%
Turn Type	Split		Prot	Split		Prot	pm+pt			pm+pt		pt+ov
Protected Phases	6	6	6	5	5	5	7	4		3	8	8 6
Permitted Phases							4			8		
Actuated Green, G (s)	42.8	42.8	42.8		4.9	4.9	46.3	40.1		19.1	17.9	60.7
Effective Green, g (s)	42.8	42.8	42.8		4.9	4.9	46.3	40.1		19.1	17.9	60.7
Actuated g/C Ratio	0.39	0.39	0.39		0.04	0.04	0.42	0.37		0.18	0.16	0.56
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1273	622	587		72	73	545	674		218	294	856
v/s Ratio Prot	0.10	0.01	c0.18		c0.02	0.00	c0.13	0.11		0.00	0.08	0.11
v/s Ratio Perm							c0.13			0.00		
v/c Ratio	0.27	0.02	0.47		0.38	0.00	0.62	0.29		0.02	0.49	0.20
Uniform Delay, d1	22.4	20.2	24.6		50.6	49.7	22.8	24.4		37.2	41.4	12.1
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1	2.6		3.3	0.0	2.2	0.2		0.0	1.3	0.1
Delay (s)	23.0	20.3	27.2		53.8	49.7	25.0	24.6		37.2	42.7	12.2
Level of Service	C	C	C		D	D	C	C		D	D	B
Approach Delay (s)		24.8			52.9			24.8			22.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	109.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	371	25	399	9	11	15	243	184	6	8	284	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	1900	1599		1850	1615	1770	1813		1805	1845	1599
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.23	1.00		0.61	1.00	1.00
Satd. Flow (perm)	3467	1900	1599		1850	1615	428	1813		1167	1845	1599
Peak-hour factor, PHF	0.83	0.68	0.94	0.63	0.88	0.69	0.73	0.85	0.38	0.50	0.91	0.85
Adj. Flow (vph)	447	37	424	14	12	22	333	216	16	16	312	413
RTOR Reduction (vph)	0	0	0	0	0	21	0	3	0	0	0	162
Lane Group Flow (vph)	447	37	424	0	26	1	333	229	0	16	312	251
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	2%	4%	0%	0%	3%	1%
Turn Type	Split		Prot	Split		Prot	pm+pt			pm+pt		pt+ov
Protected Phases	6	6	6	5	5	5	7	4		3	8	8 6
Permitted Phases							4			8		
Actuated Green, G (s)	41.7	41.7	41.7		4.7	4.7	47.6	39.9		27.3	24.6	66.3
Effective Green, g (s)	41.7	41.7	41.7		4.7	4.7	47.6	39.9		27.3	24.6	66.3
Actuated g/C Ratio	0.38	0.38	0.38		0.04	0.04	0.44	0.37		0.25	0.23	0.61
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1326	727	612		80	70	409	664		308	416	973
v/s Ratio Prot	0.13	0.02	c0.27		c0.01	0.00	c0.13	0.13		0.00	0.17	0.16
v/s Ratio Perm							c0.22			0.01		
v/c Ratio	0.34	0.05	0.69		0.32	0.01	0.81	0.35		0.05	0.75	0.26
Uniform Delay, d1	23.9	21.2	28.3		50.6	49.9	23.4	25.1		30.9	39.3	9.9
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	6.3		2.4	0.1	11.8	0.3		0.1	7.4	0.1
Delay (s)	24.5	21.3	34.6		53.0	50.0	35.2	25.4		31.0	46.8	10.1
Level of Service	C	C	C		D	D	D	C		C	D	B
Approach Delay (s)		29.1			51.6			31.1			26.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	109.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group