

Volusia County MPO



Transportation Planning
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BICYCLE AND PEDESTRIAN SAFETY REVIEW STUDY

ASSESSMENT REPORT

**PATHWAYS ELEMENTARY SCHOOL
ORMOND BEACH, FLORIDA**

MARCH 2007

HOKE DESIGN, INC.

Volusia County MPO

Bicycle and Pedestrian Safety Review Study Assessment Report

Pathways Elementary School Ormond Beach, Florida

March 2007

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For project contact information, see Appendix A.

Throughout the year long study, several project coordination meetings were held:

- October 31, 2006: Coordination meeting with school principal, City staff and the crossing guard supervisor
- July 6, 2006: Volusia County School District Staff
- August 16, 2006: Votran Staff
- September 11, 2006: Volusia County Staff (Public Works, Transportation Engineering, Leisure Services)
- November 2, 2006: Florida Department of Transportation, District Five Staff
- December 19, 2006: Volusia County School District Staff and Volusia County Transportation Engineering Staff

In addition, details about this project were presented in meetings for public comment:

- September 12, 2006: School Crossing Guard Supervisors
- September 13, 2006 and October 11, 2006: Bicycle and Pedestrian Advisory Committee (BPAC)

- September 19, 2006: Technical Coordinating Committee (TCC) (also scheduled for April 2007)
- September 19, 2006: Citizens Advisory Committee (CAC) (also scheduled for April 2007)
- September 26, 2006: Volusia County MPO Board (also scheduled for April 2007).

We owe special thanks to those who gave detailed comments during these meetings and presentations.

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Section 1: Executive Summary

Executive Summary

This report is one of a series of *Bicycle and Pedestrian Safety Review Study: Assessment Reports* authorized by the Volusia County Metropolitan Planning Organization (MPO) as part of its efforts to develop and expand a network of safe pedestrian and bicycle facilities. Five school sites were evaluated in separate Assessment Reports and ten school walk zone areas were developed further into Implementation Reports.

The Assessment Reports include a description of safety, operational and policy procedures that impact students living within the designated school walk zone area. The scope for the Assessment Reports did not include the creation of a bicycle and pedestrian master plan or the selection of priority projects. To better plan and communicate walk zone area needs, Hoke Design provided master plans for each of the five schools selected for the Assessment phase.

The primary goal of the Assessment Report is to analyze bicycle and pedestrian safety issues for elementary school students and to provide recommendations for improvement. This Study recognizes the specific needs of elementary age students and emphasizes improvement measures that can be implemented both immediately and over time to better serve these children.

A secondary goal of this report is to encourage planning efforts that include analysis of long-term cost tradeoffs related to bicycle and pedestrian safety.

A third goal of this report is to provide a general understanding of costs associated with constructing sidewalks and to suggest funding methods. Efforts to procure funding under this program have already been successful. As part of this Study, the Volusia County MPO submitted several projects for Safe Routes to School funding consideration. Two projects in the City of Edgewater, totaling an estimated \$420,000, were combined and approved for funding through this program.

Priority Projects – Assessment Reports

Although priority projects were not specifically identified on the master plans, they are discussed in the written section of each report. Listed below are the schools selected and sidewalk/trail projects that may serve the students within the walk zone areas and are recommended for further review and development.

- **Freedom Elementary School, DeLand**
 - Blue Lake Avenue Wide Sidewalk (Volusia County MPO Feasibility Study will be completed in March 2007)
- **Manatee Cove Elementary School, Orange City**
 - Blue Springs Avenue Wide Sidewalk or WESH TV Trail connection (Volusia County has made considerable effort to implement this sidewalk over the past few years and will construct portions of sidewalk where right of way is available)
- **Pathways Elementary School, Ormond Beach**
 - Airport Road Wide Sidewalk
 - Black Pine Way Connector and Sidewalk Extension

- Circle Creek Way/Briargate Subdivision Connector
- **Sugar Mill Elementary School, Port Orange**
 - Madeline Avenue Wide Sidewalk
 - McDonald Road Sidewalk
 - Charles Street Sidewalk
 - Herbert Street Sidewalks (constrained right of way)
- **Turie T. Small Elementary School, Daytona Beach**
 - Bellevue Avenue Sidewalk, Park Connector and Crosswalk Relocation
 - South Street Wider Sidewalks/Traffic Calming (Engineering Study required)

Priority Projects - Implementation Reports

The Implementation Reports have resulted in a list of potential projects for future funding. Recommended priority projects within the school walk zones were identified and highlighted within each of the Implementation Reports. These recommended projects are:

- **DeBary Elementary School, DeBary**
 - Highbanks Road Sidewalk
 - Naranja Road Sidewalk
- **Friendship Elementary School, Deltona**
 - Florida Drive/Greynolds Street Sidewalk
 - Kimberly Drive/Beal Street Connector
- **Holly Hill Elementary School, Holly Hill**
 - Flomich Street Sidewalks
 - Canal Trail and Sidewalk Connector
 - Alabama Avenue Trail
- **Indian River Elementary School, Edgewater**
 - 30th Street Wide Sidewalk
 - Mango Tree Drive Trail (Received SRTS funding)
 - 27th Street Sidewalk (Received SRTS funding)
- **McInnis Elementary School, unincorporated Volusia County**
 - Baxter Street Sidewalks (Will be submitted for SRTS funding by West Volusia County Community Traffic Safety Team (CTST) in March, 2007)
 - Ponce DeLeon Trail
 - Central Avenue Sidewalks
- **Palm Terrace Elementary School, Daytona Beach**
 - Bill France Blvd. Sidewalk Improvement
- **South Daytona Elementary School, South Daytona**
 - Big Tree Road Sidewalk (Will be submitted for SRTS funding by West Volusia County Community Traffic Safety Team (CTST) in March, 2007)
 - Garfield Drive Sidewalk
 - Magnolia Avenue Sidewalk
- **Spruce Creek Elementary School, Port Orange**
 - Spruce Creek Road Sidewalk
- **Sunrise Elementary School, Deltona** (no recommended projects)
- **Woodward Avenue Elementary School, unincorporated Volusia County/DeLand.**

- Woodward Avenue Sidewalk
- Roanoke Avenue Trail Improvement
- Beresford Avenue Sidewalks (constrained right of way)

Of the projects listed above, two within the City of Edgewater have received Safe Routes to School funding through FDOT. The Volusia County CTSTs are submitting two additional projects for funding; one in South Daytona and one in unincorporated Volusia County near the DeLeon Springs area. The MPO has also authorized a Feasibility Study for the Blue Lake Bike Path (wide sidewalk) in the DeLand area. Other projects listed above are receiving agency review or may be considered for future funding.

Consideration of long-term safety-related financial impacts, careful interagency coordination, continued safety education and enforcement are all required to maximize bicycle and pedestrian safety while minimizing overall costs.

Pathways Elementary School Assessment Report: Findings and Recommendations

This study provides the City of Ormond Beach, Florida and other agencies with guidelines for improving bicycle and pedestrian safety for students attending Pathways Elementary School. Observations from site visits and coordination with the school principal and City of Ormond Beach resulted in this Assessment Report and the accompanying GIS mapped Bicycle and Pedestrian Master Plan.

The area surrounding Pathways Elementary School is comprised of multiple, unconnected developments, many that are part of the same DRI. All students are provided courtesy busing due to lack of pedestrian connectivity and the fragmented sidewalk system. However, some students choose to walk or ride bicycles to school.

Most subdivisions within the two mile area surrounding the school are gated, with no access except through a limited number of controlled entrances. This arrangement precludes potential construction or use of what could be the most direct pedestrian routes to schools.

Recommendations to improve pedestrian and bicycle safety include sidewalk connections, new sidewalks, and modification to the school sidewalk system. School staff is recommended to cross students at the bus entrance. A trail or a sidewalk should be constructed on school property to connect to the existing sidewalk to the subdivision located directly south of the school.

Extensive effort, coordination and partnership will be required to connect the existing and new communities with bicycle and pedestrian facilities. This study recommends that the City of Ormond Beach take a lead role in connecting these communities to each other and to the Pathways Elementary School with trails and pedestrian/bicycle only access points.

Organizations involved in planning or implementing measures to improve safety may want to use the best practices section included in this report as a checklist for review and implementation of appropriate safety improvement measures.

Section 2: Introduction

Introduction

Background

The Volusia County Metropolitan Planning Organization is mandated with developing pedestrian walkways and bicycle transportation facilities that will function as elements of an inter-modal transportation system within the MPO's jurisdictional planning area (see Appendix B). As part of its efforts to develop and expand a network of safe pedestrian and bicycle facilities, the Volusia County MPO has authorized the 2006/2007 Bicycle and Pedestrian School Safety Review Study using Florida Department of Transportation (FDOT) funding.

In 2005, the Volusia County MPO was awarded an FDOT Safety Grant to analyze bicycle and pedestrian safety for ten elementary school sites. The 2006/2007 Study is a continuation of the 2005 study and provides an Implementation Report for each of the ten elementary school sites included in the original Study. Implementation Reports include a Bicycle and Pedestrian Master Plan in GIS map format, specific findings and recommendations and a "Best Practices" section, outlining frequently found safety issues and recommendations. The schools selected for Implementation Reports include the following:

- DeBary Elementary School, DeBary
- Friendship Elementary School, Deltona
- Holly Hill Elementary School, Holly Hill
- Indian River Elementary School, Edgewater
- McInnis Elementary School, unincorporated Volusia County/DeLeon Springs
- Palm Terrace Elementary School, Daytona Beach
- South Daytona Elementary School, South Daytona
- Spruce Creek Elementary School, Port Orange
- Sunrise Elementary School, Deltona
- Woodward Avenue Elementary School, unincorporated Volusia County/DeLand.

This Report provides an assessment of bicycle and safety related issues for Pathways Elementary School and the surrounding walk zone area. This school was one of five schools selected for new Assessment Reports. The five schools selected include the following:

- Freedom Elementary School, DeLand
- Manatee Cove Elementary School, Orange City
- Pathways Elementary School, Ormond Beach
- Sugar Mill Elementary School, Port Orange
- Turie T. Small Elementary School, Daytona Beach.

The selection of these five schools was guided by Volusia County School District staff, and based on the schools' low numbers of eligible walkers and higher numbers of students provided courtesy transportation. The BPAC (Bicycle and Pedestrian Advisory Committee) approved this selection of schools for Assessment Reports at their September, 2006 meeting.

To facilitate planning and communication and to increase the potential for the implementation of recommendations, Hoke Design, Inc. exceeded scope requirements by providing a Master Plan for the Pathways Elementary walk zone area. Additionally, the Best Practices section developed for the Implementation Reports has been included as part of this Assessment Report package.

The School Board has created "walk zone" areas around each school, identifying which students live within the State of Florida mandated two mile radius (see Appendix B). This radius is calculated using the distance from students' homes to the school. The walk zone is often reduced to reflect barriers to students walking or riding bicycles to school. Students living within the two mile radius of the school but outside of the designated walk zone are provided with School Board bus transportation.

Transportation costs are reimbursed by the State of Florida if conditions are considered "hazardous". Safety conditions determined to be "unique" are not reimbursed by the State of Florida and become an operational cost to the Volusia County School District. Transportation for unique conditions is referred to as "courtesy transportation".

Barriers to walking within the walk zone are reviewed by the Hazardous and Unique Conditions Committee (School District staff, County staff, etc.) which determines whether a safety issue merits bus transportation. Florida State Statute S.1006.23 outlines the parameters for determining these safety issues, with current criteria for hazardous walking conditions summarized as follows:

- For walkways parallel to the road, conditions are hazardous if:
 - there is not an area at least 4 feet wide adjacent to the road or
 - the surface is not walkable or
 - the road is uncurbed and has a posted speed limit of 55 miles per hour, and the walk area is set off from the road by less than 3 feet.

These criteria for walkways parallel to the road do not apply in low traffic residential areas with fewer than 180 vehicles per hour, per direction or if the posted speed limit is 30 miles per hour or less.

- For walkways perpendicular to the road, conditions are hazardous if:
 - traffic volume on the road exceeds the rate of 360 vehicles per hour, per direction and the site is uncontrolled or
 - total traffic volume on the road exceeds 4,000 vehicles per hour through a controlled crossing, without a crossing guard.

If passed, Florida HB 147 would expand these criteria substantially. The proposed bill would:

- lower the speed limit from 55 to 35 for walkways parallel to uncurbed roads
- make the need to cross any road with six or more lanes a hazardous condition
- add the residence of any sexual predators (or sexual offenders whose victims include a minor) along any road which students must walk in order to walk to and from school as a hazardous condition.

These potential changes are likely to greatly increase the number of students living within walk zones offered bus transportation, thus increasing School Board costs. For additional information on hazardous walking conditions, see Appendix B.

Observations from site visits and coordination with the school principal, City of Ormond Beach, School District staff and Volusia County staff resulted in this Assessment Report and the accompanying Bicycle and Pedestrian Master Plan.

Purpose of this Assessment Report

The primary goal of this Assessment Report is to provide recommendations for safe, connected and well-maintained pedestrian and bicycle facilities to encourage students to walk or ride their bicycles to school. A safe walking environment for students who walk or ride bicycles to school benefits students, the School Board and the community.

Student benefits include:

- More choices for transportation
- Increased physical activity and health
- Improved mental health and attitude
- Opportunities to learn bicycle and pedestrian safety
- Increased independence
- Safety in numbers; the more children that walk or ride together, the more visible they are to traffic and the less approachable they are to those who might wish to cause them harm.

Community benefits include:

- Reduced road trips
- Reduced cost of bus transportation
- Reduced car drop off and pick up lines at school, decreasing school area congestion
- Increased community cohesiveness and livability
- Better facilities for all residents, including persons with disabilities, the elderly, those without cars, and those who choose alternative transportation for exercise or to improve their lives and the environment
- Increased use of facilities increases visibility and motorist awareness.

The reasons some students within walk zones choose not to walk or ride bicycles to and from school may include:

- Parents' concerns about potential problems with sexual predators, bullies or lack of adult supervision

- Parents' assessment that their children are unable to observe proper bicycle or pedestrian rules, and are unable to make safe decisions when crossing traffic or facing similar motorist conflicts.
- Parents who drop children off at school on the way to work value the convenience and extra time with their children
- Many students stay at the school site for aftercare or take a bus to a local daycare provider
- Some students may convince their parents that the only "cool" mode of transportation is Mom or Dad's car.

Although these factors play a role in the number of students participating in walking or bicycle riding as transportation, this Study emphasizes improvements to the physical environment and provides recommendations for removing physical deterrents to students walking or riding bicycles to school. These physical deterrents may include:

- Lack of a safe, continuous system of sidewalks between home and school
- Long distances to school - most parents do not expect their children to walk or ride two miles to school, especially with heavy backpacks.
- Road crossings without crossing guards
- Railroad crossings
- Multiple conflict points with motorists.

To provide local agencies with a starting point for planning an expanded sidewalk and trail system, and for ease of communication during interagency coordination, this Assessment Report includes a Master Plan.

The Master Plan provides the locations of the walk zone and areas where students are provided bus transportation due to hazardous or unique conditions. Existing and planned sidewalk and trail facilities were determined by site visits, discussions with City and County staff and existing mapping information. The Master Plan also provides proposed sidewalk facilities, trails and other recommended improvements. The Master Plan and supplemental Assessment Report provide guidelines for sidewalk and trail planning and should not be used as an engineering document.

A secondary goal of this report is to encourage planning efforts that include analysis of long term cost tradeoffs related to bicycle and pedestrian safety. While safety is the primary concern, the lack of safe routes to school has a financial impact as well.

A financial cost/benefit analysis related to bicycle and pedestrian safety should be included in early planning efforts for all facility improvement and development projects. This will require further interagency coordination, but may be more cost-effective overall and in the long run.

Some examples of cost/benefit tradeoffs and considerations are:

- Smaller neighborhood schools cost more per student to operate and construct, but would increase the percentage of walkers, thereby reducing school district transportation costs but increasing school operational costs.

- Larger roadways may be more efficient for vehicular traffic, but also may create barriers to bicycle and pedestrian traffic. This may increase school system courtesy transportation costs and sheriff's department crossing guard costs.
- Planning, engineering and construction costs for a mile-long 5' wide sidewalk are approximately \$400,000. This one-time cost may be offset by the following ongoing costs:
 - Volusia County School Board - bus transportation for students unable to walk/ride bicycles to school due to "unique conditions" is \$586/student/year, costing the School Board \$322,866 in 2006/2007.
 - Volusia County School Board - additional pay to teachers who assist with morning and afternoon safety is approximately \$1300/teacher/year
 - Volusia County Sheriff's Office - one crossing guard, with partial benefits, costs approximately \$10,000/year
 - The Volusia County Sheriff's Office and many of the cities also provide a traffic policeman to direct morning and afternoon traffic at the school. Many of these officers simultaneously direct students across school entranceways.

Consideration of long-term safety-related financial impacts, careful interagency coordination continued safety education and enforcement are all required to maximize bicycle and pedestrian safety while minimizing overall costs.

A third goal of this report is to provide general understanding of costs associated with constructing sidewalks. Although there is not enough funding available for implementation of most of the sidewalks recommended in the Master Plan, there are some funding sources available.

With the recent passage of the "Safe Routes to School" program, one potential source of funding is the federal funds the State of Florida will receive annually for five years to make it safer for children to walk or bicycle to school (see Appendix D).

Estimates from the Federal Highway Administration of funding for the FDOT District 5 area are as follows:

2007 -- \$1.5 million (with money rolled over from 2006)
2008 -- \$1.3 million
2009 -- \$1.6 million
2010 -- \$1.6 million
2011 -- \$1.7 million.

The FDOT State Safety Office anticipates that one "Safe Routes to School" project will be programmed within Volusia County every other year. Efforts to procure funding under this program have already been successful. As part of this Study, the Volusia County MPO submitted several projects for Safe Routes to Schools funding consideration. Two projects in the City of Edgewater, totaling an estimated \$420,000, were combined and approved for funding through this program.

This report includes information that may be critical for successful funding through state or federal programs. Please note that the Florida Department of Transportation requires agencies to follow federal guidelines for right of way acquisition and requires certification of right of way prior to project funding (see Appendix E).

Report Overview

This study provides the City of Ormond Beach, Florida and other agencies with guidelines for improving bicycle and pedestrian safety for students attending Pathways Elementary School.

Section 1 is an Executive Summary of this Assessment Report, and Section 2 provides an Introduction.

Section 3 contains a summary of specific findings and recommendations for the school's walk zone.

Section 4 details "best practices" for facility planning and coordination, modifications and maintenance of existing facilities, and interim measures. Organizations involved in planning or implementing measures to improve safety may want to use this section as a checklist for review and implementation of appropriate best practices.

In Section 5, the Bicycle and Pedestrian Master Plan emphasizes critical sidewalk or trail plans recommended for further development, adoption and implementation in the City of Ormond Beach. The Master Plan will assist the City with prioritization of projects and can serve as a guide for inclusion of priority projects in other public works or private development projects.

Section 3: Findings and Recommendations

Findings and Recommendations

Pathways Elementary School – Fact Sheet

- **Number of Students:** 650 (capacity is 740 before class size amendment. Currently constructing 9 new classrooms)
- **Number of Walkers/Bicycle Riders (observed from site visit):** Due to construction on Airport Road, all students are offered bus transportation. Nine students rode their bicycles or walked home.
- **Number of Bicycle and Pedestrian Crash Events (2000-2004):** 1 outside of walk zone
- **Year School Opened:** 1996
- **Number of School Buses:** 10
- **Number of Students for School Site Aftercare:** not obtained
- **Number of Aftercare Buses/Vans:** 6
- **Number of Students for Breakfast:** 200
- **Number Bicycles:** 5
- **Number of Bicycle Helmets:** 2
- **Backpack Policy:** No policy, students are allowed rolling backpacks
- **Teachers Assisting in Arrival and Dismissal Safety:** 3 or more assist with car loading and unloading

Existing Safety Education: They give students helmets through the Volusia County MPO program and cover safety basics during PE and on their website.

Summary of Principal Comments: Interested in connecting to adjacent neighborhood and supports an on campus connection.

Summary of Crossing Guard Supervisor Comments: There are currently no crossing guards in place. A guard is expected to return to the intersection of Airport Road and Tymber Creek Road when construction along Airport Road is complete, estimated for January, 2007.

Crossing Guard Locations: (none until January due to construction)

- Tymber Creek Road and Airport Road

Findings and Recommendations

Pathways Elementary School is ten years old, and was part of the Breakaway Trails Development of Regional Impact (DRI) approved in the late 1980's. The area surrounding the school is comprised of multiple independent, unconnected developments, many of which are part of the Breakaway Trails DRI. Most students are provided courtesy busing due to lack of pedestrian connectivity and the fragmented sidewalk system.

Most subdivisions within the two-mile area surrounding the school are gated, with no access except through a limited number of controlled entrances. This arrangement precludes potential construction or use of what could be the most direct pedestrian routes to the school.

The main roadways connecting the neighborhoods to the school include:

- SR40 (recently widened without sidewalks)
- Tymber Creek Road (fragmented sidewalk system, planned for widening and sidewalks, phase 1 – 2008, phase 2 – 2015)
- Airport Road (fragmented sidewalk system, possibly planned for widening)

The school is located on the south side of Airport Road, which has sidewalks on the north side from the school site west to beyond the county line. There are also sidewalks on the south side of the road along the section in front of Pathways Elementary School. These sections will connect to Tymber Creek Road when construction of Airport Road and Tymber Creek is complete early in 2008.

The Hunter's Ridge DRI, located north of Airport Road and extending into Flagler County, is currently under construction and is expected to add approximately 500 students upon completion of the planned 360 homes. Pathways Elementary School is currently expanding with the addition of 9 classrooms on the south side of the school property. The school will likely reach capacity as soon as the addition is complete. According to the school's Principal, a new Volusia County School Board rule prohibits students living in Flagler County from attending Volusia County Schools. Flagler County students currently attending Volusia County schools are grandfathered in.

Airport Road extends west into Flagler County and connects to additional housing south of Flagler County. All housing in this area is part of the Hunter's Ridge DRI. The lots located in Flagler County have not yet been developed and the roadway in this section is not officially opened but is in use. Sidewalks are in place in this area, and could be used as bicycle and pedestrian routes to Pathways Elementary School. However, due to lack of sidewalks along Airport Road, these students would need to cross Airport Road twice to stay on a sidewalk to reach school or home.

Planned Sidewalk Improvements

Tymber Creek Road has a fragmented sidewalk system that will be improved with the 2008 expansion of Tymber Creek Road from SR 40 to Peruvian Lane. Phase 2 of the expansion of Tymber Creek from Peruvian Lane north to Airport Road is planned for 2015. A sidewalk currently exists on the west side of the roadway from Peruvian Lane to Saddler's Run.

The developer of the “Enclave” will construct a sidewalk on the east side of Tymber Creek, connecting to the existing sidewalk at Crossvine Drive. Another developer, constructing the “Marshside” development will complete this section of sidewalk along the east side of Tymber Creek to the intersection of Airport Road.

Extensive effort, coordination and partnership will be required to connect the existing and new communities with bicycle and pedestrian facilities. This study recommends that the City of Ormond Beach take a lead role in connecting these communities to each other and to the Pathways Elementary School with trails and pedestrian/bicycle only access points. Critical partners include the School Board, several homeowners associations, Volusia County, Flagler County and the Volusia County MPO.

Off-campus

Issue: Lack of connectivity between housing developments and lack of connectivity to Airport Road.

Recommendation: Provide a trail or wide sidewalk connecting Circle Creek Way to the Briargate subdivision using the existing maintenance connection. Construct a connecting wide sidewalk to Airport Road.



A wide sidewalk connection is recommended through the Briargate subdivision

School-Site

Issue: A diagonal crosswalk connects a sidewalk ramp to the handicapped parking spaces.

Recommendations: Remove the crosswalk and paint a crosswalk connecting handicapped parking spaces to the flush sidewalk area located directly across the exit drive. A second crosswalk may be needed for parents who park in the parking lot and walk their student(s) to class. This crosswalk should connect to the existing ramp in the sidewalk and connect to a painted space in the parking area for greater visibility.



The existing curb ramp is not directly connected to handicapped parking spaces

Issue: Although all students are provided bus transportation, several students choose to ride their bicycle or walk to/from Pathways Elementary School. During the morning of Hoke Design's site survey, nine students were observed heading east on the sidewalk along Airport Road from the bike rack area.

The students had a difficult time crossing the bus entrance/exit area. Although they waited for each other to ride together, they were separated when crossing the school bus entrance.



Due to heavy vegetation and speed of bicyclists using the sidewalk, bus drivers have reduced visibility of approaching students

The sidewalk is located adjacent to a heavily vegetated area. As bus drivers approach Airport Road, they may not be able to clearly see students using the sidewalk, especially the faster-moving bicyclists.

Some students crossed in front of a bus while a few of the remaining students had to wait while several buses passed before they could cross.

Recommendations: As an interim measure, Hoke Design notified School District staff of this situation after the site visit and suggested review of this crossing for bus driver sight distance along the sidewalk. Hoke Design also suggested the school provide staff to cross students at the bus entrance. The School District staff responded immediately and will review the situation and advise bus drivers of the situation. Pruning the understory vegetation near the bus entrance should be reviewed to determine if sight distance for bus drivers could be improved.

Issue: There is no sidewalk along the bus entrance drive and students wishing to use a sidewalk must cross the bus entrance drive and enter the campus using the sidewalk connection on the west side of the school.

Recommendation: The School Board should plan to add a sidewalk along the east side of the bus entrance to connect to the bus loading area and office. The existing fence will need to be modified to provide a pedestrian gate.



A sidewalk along the east side of the bus entrance would increase safety for pedestrians and bicyclists living east of the school

Issue: Students currently use a short cut through private property to avoid construction on Airport Road and to shorten the route to and from school.

Interim Recommendation: The students waited for one another to walk or ride in groups. This practice should be continued and encouraged, especially since the use of the short cut will most likely continue after construction is completed.



Students use private property as a shortcut home

Long Term Recommendations:

School Board staff may also wish to provide a trail along the western edge of the school property to connect to the subdivision located directly south of the school. To connect to the internal roadway system of this development, an easement will be required. The possibility of extending this trail along the western border of the subdivision should also be reviewed.

Issue: There is an existing sidewalk constructed between two houses on Black Pine Way that connects directly to school property. The connection is not developed on the school campus. At least one homeowner adjacent to the walkway is not in favor of the opening of this connection.

Recommendation: The sidewalk could be extended to connect to Pathways Elementary School using the cleared area at the south side of the school and an area along the retention pond fence to connect to the existing sidewalk located in front of the greenhouse.



An existing sidewalk was constructed by the developer that extends to school property

The school principal is working with interested neighbors and the City of Ormond Beach to develop and open this connection.



A sidewalk connection will be need to be designed and constructed on school property

Section 4: Best Practices

Best Practices

This section contains a set of best practices to improve bicycle and pedestrian safety for students. The best practices are applicable to any school walk zone. Observations made during site visits showed an inconsistent use of these practices across school walk zone areas. Organizations involved in planning or implementing measures to improve safety may want to use this section as a checklist for review and implementation of appropriate best practices. Any recommendations made in this report that involves traffic movement or control should be reviewed by an engineer to determine engineering recommendations for that specific situation.

These best practices are divided into the following sections:

- **Agency and Project Coordination**
- **Sidewalk Design –
Recommendations for New Roadways and Developments**
- **Retro-fit Development –
Adding Sidewalks to the Built Environment**
- **Improving Existing Roadway Conditions**
- **Sidewalk Maintenance**
- **Crosswalk and Lane Markings**
- **Signals**
- **School Board Considerations**
- **Enforcement and Education**

A general best practice for all agencies, organizations and situations is to conduct public workshops to better understand the needs and desires of residents and to gain project support. Consider revising and adopting the Bicycle and Pedestrian Master Plans for walk zones according to input from these workshops.

Agency and Project Coordination

Findings

Interagency and intra-agency coordination on bicycle and pedestrian safety issues for school walk zones is inconsistent across jurisdictions and projects in Volusia County. Improved coordination could:

- Build consensus on measures to improve safety;
- Highlight and minimize conflicting plans, policies and procedures; and
- Facilitate overall best use of funding by combining projects



*South Daytona Elementary:
New street trees in walk area*

(e.g. combining safety projects with stormwater projects).

For instance, the right of way area most suitable for sidewalk placement may also be the best location for street lighting, street trees or landscaping. Local governments should consider the existing usage of the right of way by pedestrians and allow for future sidewalk construction.

Best Practices

- Consider coordination meetings once or twice a year to plan and coordinate bicycle and pedestrian safety improvement projects. Meeting agendas should include improvements involving modification of policies or procedures, in addition to those involving funding and construction. These meetings will allow agencies and stakeholders to communicate concerns, discuss upcoming projects and coordinate public works efforts, planned development and school development plans. Key decision makers will also be reminded to consider existing or future pedestrian facilities while planning unrelated projects.
- Coordination meetings typically include the following departments or organizations:



Coordination Meeting: Volusia County MPOs', Stephan Harris with City of Daytona Beach Staff

- ♦ City Manager or Assistant Manager
- ♦ City/County Public Works (roads, stormwater) staff
- ♦ City/County Engineering staff
- ♦ City/County Planning/DRC staff
- ♦ City/County Parks and Recreation staff
- ♦ City/County Police or Sheriff staff
- ♦ School Principal and School District staff (if applicable)
- ♦ Volusia County MPO Bicycle and Pedestrian Coordinator
- ♦ Crossing Guard Supervisor
- ♦ Votran staff
- ♦ Developer (if applicable)
- ♦ County staff (if the area involves unincorporated County or County-maintained roadways)

- In addition to the regular coordination meetings discussed above, coordinate bicycle and pedestrian facility plans on an ongoing basis among FDOT, the Volusia County MPO, Volusia County Engineering and Leisure Services, the Volusia County School District and adjacent municipalities to increase efficiency, communication and regional efforts. Coordinate with the State Office of Greenways and Trails for trail development. Provide and maintain information using Geographical Information



Palm Terrace Elementary Vicinity:
Votran users with no sidewalk access

Systems (GIS) whenever possible. Provide GIS data to Volusia County.

- Votran serves some students and school staff and should be integrated into the sidewalk system. Provide Votran bus stop locations with waiting and accessory pads to improve accessibility for persons with disabilities and to increase user safety and comfort. Conflicts between bicycle and pedestrian traffic and Votran onloading and offloading should be minimized to maintain through traffic on sidewalks. Votran routes should be considered when prioritizing sidewalk construction projects (see Appendix G for details).

The Bicycle and Pedestrian Master Plan provided with this Report is meant as a starting point for continued coordination and prioritization. The Master Plan should be used as a working document, evolving as opportunities for coordinated efforts develop.

The Bicycle and Pedestrian Master Plan should be periodically reviewed and updated, possibly in conjunction with local comprehensive plans or local ordinances.

Sidewalk Design – Recommendations for New Roadways and Developments

Findings

Sidewalk planning efforts for new roadways and developments are inconsistent across jurisdictions and walk zones. Planning efforts do not always result in the best possible bicycle and pedestrian routes to schools.

New sidewalks do not always meet current ADA guidelines or requirements.

In many recent developments, the local agency has required a turn lane without obtaining additional right of way from the developer. The addition of a turn lane in the right of way reduces the available area for sidewalks, sidewalk buffer and bicycle lanes. Sometimes this practice has made the sidewalk in this section less usable and also made future continuous sidewalks difficult to construct.



Orange Camp Road: Turn lane narrows available right of way



Sidewalks with sharp angles are difficult for bicyclists

Best Practices

- Provide pedestrian and bicycle connectivity, safety and ADA compliance training for staff who review proposed school, roadway or new development plans. Train field staff who construct or repair sidewalks.
- Require sidewalks on both sides of the roadway for all new development.
- Separate the sidewalk from the roadway as much as possible, especially on roadways without curbing.
- Create sidewalk facilities to accommodate bicycle use. Students (and their parents if students are escorted) riding bicycles frequently use sidewalks. To address multi-function use, the sidewalk should be as wide as possible (8' preferred), without any sudden changes in direction. Obstacles such as encroaching landscaping, guy wires and power poles should be eliminated or avoided.
- Require all private, public or church properties to construct sidewalk along the property perimeter.
- When the boundary of a development is next to school property, require the developer to locate common areas or amenities (ponds, parks, etc.) immediately adjacent to the school. Require the developer to build and integrate sidewalks

into these common areas. Require pedestrian interconnectivity between neighborhoods. Do not allow exceptions for sidewalk construction within developments at retention ponds, parks or public areas.

To increase connectivity among neighborhoods and schools, developers should be required to construct sidewalk systems and connections to adjacent communities and schools before lots are sold. This eliminates gaps in the sidewalk system and ensures that buyers are aware of intended connections adjacent to their properties. Multiple connections are preferred. This should reduce the likelihood of parents using any one connection as a major student drop off area to avoid the car line.



Pathways Elementary: Sidewalk connection to school from adjacent neighborhood



Freedom Elementary Vicinity: Sidewalk connection between housing developments at Victoria Park

- Consider adopting sidewalk corridor design guidelines describing sidewalk width, placement of street furniture, placement of signage and landscaping and other guidelines to increase pedestrian comfort, convenience and safety.
- Consider adding language to Development Orders to allow the local agency to review site plans for additional requirements if the project has not been constructed within five years. This provides for opportunities to connect to new or future schools, neighborhoods, roadways or other development that occurred after the initial Development Order was approved.
- Require developers to dedicate right of way to match the width of the loss of the turn lane and require them to construct bike lanes, sidewalks and crosswalks.
- Encourage developers to design site plans to provide the most direct sidewalk/trail route to the surrounding schools. Sidewalks with the fewest number of street crossings are preferred.

Retro-fit Development – Adding Sidewalks to the Built Environment

Findings

Most walk zones include sections of roadways with no sidewalks on either side of the street. Often, this is not a problem if the road is located in a residential neighborhood with little traffic and low vehicle speeds.

However, there are some roadways with high traffic volumes and no sidewalks that provide the only viable route to and from school.

Some streets have a sidewalk on one side only, which encourages students to cross roadways at random points to reach the sidewalk on the opposite side of the street. This also causes students riding bicycles on the sidewalk to ride against traffic during one of their trips to or from school.

Sidewalks located on alternating sides (switching back and forth across the roadway) present a significant safety issue by encouraging students to cross the roadway more than one time to reach their destination.

The primary obstacles to retrofitting sidewalks within walk zones are:

- Lack of right of way



Manatee Cove Elementary Vicinity:
Student rides against traffic in roadway along Blue Springs Avenue



Holly Hill Elementary:
Narrow right away along Riverside Drive

- Location of drainage swales or ditches in rights of way



Holly Hill Elementary:
Drainage in right of way along 15th Street

- Steep grade conditions and wetlands



Manatee Cove Elementary:
*Student walks bicycle on steep grade along
Blue Springs Avenue*

- Structures (buildings, bridges, headwalls, etc.)



Indian River Elementary:
*A headwall along 26th Street creates a barrier to
sidewalk construction*

- Right of way encroachments



Holly Hill Elementary Vicinity:
Parking encroaches into road right of way

The following best practices are meant to address these obstacles.

Cities or the County may be able to provide interim measures to improve safety conditions if right of way is limited, funding is unavailable or a situation cannot be addressed. Possible interim measures are listed following the best practices.

Best Practices

- Prioritize projects where roadways with heavy traffic have no sidewalks on either side, then those with sidewalks on alternating sides.
- Local agencies should follow all Federal, State and County requirements for obtaining right of way for projects that may be submitted for Federal funding at a future date. Right of way acquisition can take two years or more and add substantial cost to any project.

Additionally, FDOT is now requiring the maintaining agency to “certify” right of way to reduce the possibility of problems during the development or construction stage (see Appendix E).

Alternatives to acquiring right of way include:

- Narrowing the existing roadway pavement;
- Reducing the number of travel lanes;
- Creating one-way traffic;
- Removing the center turn lane or shifting the roadway bed to one side of the right of way to allow for placement of a sidewalk on the other side; and
- Claiming right of way through surveying and documentation of maintenance maps for four years to establish limits of right of way to record.

The local agency may also be able to obtain easements to construct sidewalk facilities on adjacent property.

In many situations, a ditch or swale is located in the only available right of way, creating undesirable walking or bicycle riding conditions. The maintaining agency should consider developing a drainage master plan that identifies critical pedestrian routes that may be improved by providing culverts along roadways where there is insufficient room to co-locate a ditch and a sidewalk. Combining sidewalk improvements with drainage improvements may cut costs and increase funding options.

If there is sufficient right of way in a situation with steep grade conditions, the area between the edge of the road and the right of way line should be re-graded to provide a level area for sidewalk construction. New sidewalk construction that ties into an existing sidewalk should align smoothly (for bicycle users) and match the grade of the existing sidewalk.

Interim Measures

- Re-grade steep banks to provide a level area as far away from the road as possible.
- Increase roadside maintenance (or enforcement of maintenance) such as mowing and trimming of encroaching landscaping to provide a better surface for pedestrians and bicyclists. Remove newspaper stands, trash receptacles, debris and other movable objects from the path of travel.
- To increase connectivity between neighborhoods and to schools, where easements are not available, consider buying a lot or lots to provide a connection, building the connection and then re-selling the properties. Purchasing a parcel for a connection may pay for itself in a few years if enough students are able to be removed from the school bus system (estimated \$586/student/year).
- Research the possibility of obtaining easements to build sidewalks for routes commonly used as a short cut by students. Review these routes for sexual predators and sexual offenders. Inform parents of potential hazards.



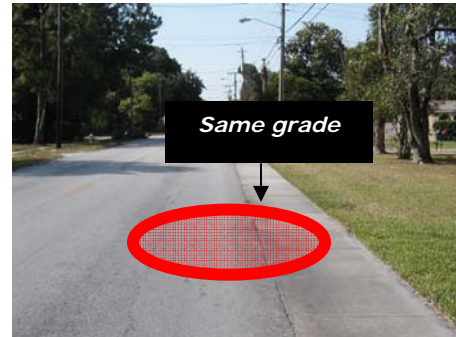
Students take a short cut through private property

Existing Sidewalks That Do Not Meet Current Recommendations

Findings

Many existing sidewalks do not provide optimum conditions for students walking or riding their bicycles to school.

Some sidewalks are adjacent to and flush with the roadway, and this encourages motorists to use the sidewalk as an extension of the roadway. This design reduces the buffer between the motorist and the pedestrian, and decreases safety and comfort for the sidewalk user.



Sidewalk flush with road

In multiple school walk zones throughout Volusia County, motorists park on sidewalks, blocking bicycle and pedestrian traffic and decreasing visibility.

Many sidewalks do not meet current ADA guidelines.

It is difficult to obtain funding for reconstruction of sidewalks; the local agencies will most likely need to absorb the cost to correct these facilities. Relocation or widening of the sidewalk may be possible in many areas where there is sufficient right of way but will be complicated and costly in areas that involve drainage ditches, swales or utilities. The best practices listed below will need to be implemented as funding and right of way allow.



Sidewalk abuts roadway

Best Practices

- Sidewalks that were constructed adjacent to the roadway and flush to the roadway pavement should be replaced.
- Sidewalks should be modified or replaced to meet current ADA guidelines. This includes:
 - ♦ A minimum of a five foot wide sidewalk when there is a five foot separation from the roadway.
 - ♦ Curbed sidewalks adjacent to the roadway should be a minimum of six feet wide (from back of curb).
 - ♦ Truncated domes should be placed at curb ramps to crosswalks or where the sidewalk terminates into a roadway or entrance drive.

- ♦ A four foot clearance from all obstacles should be provided.
- Regardless of separation from the roadway, a minimum width of eight feet is preferred to properly serve students walking or riding their bicycles, especially within one mile of the school.
- Local agencies may wish to “bundle” similar projects to reduce costs and to increase the potential number of construction bids. Projects may also be combined or divided further to meet grant application requirements.
- Local agencies may wish to distribute sidewalk funds among several less expensive projects that would have a greater overall impact on an area’s accessibility, instead of consuming all allotted funds on one ideal but very expensive sidewalk improvement.
- Motorists who park on sidewalks in school walk zones should be warned and/or ticketed, especially during the first two weeks of the school year.

Interim Measures

- Where sidewalks are adjacent to and/or flush with roadways, mark the outside lane to provide a buffer between the sidewalk area and the roadway, and to provide a paved area for bicyclists.
- For critical conflict areas, consider adding flexible bollards to mark the edge of pavement to direct motorists away from the sidewalk. These bollards are not attractive and often need to be replaced frequently when damaged by vehicles.
- If the sidewalk is adjacent to the roadway because the area was filled in to reduce maintenance, consider removing the infill asphalt and replacing it with sod.

Improving Existing Roadway Conditions

Findings

Roadway design in school walk zones does not always maximize bicycle and pedestrian safety. Vehicles travel at high speeds, sidewalks and bike lanes are narrow or non-existent and cars pulling out from parking areas endanger bicyclists and pedestrians.

Some land uses, especially older developments, were constructed to include the road right of way as part of their parking. Vehicles often park in the “walk area” and create conflict with pedestrians and bicyclists. In addition, some businesses use the public right of way as storage or for display signs.



Back-out parking crosses walk area



Cars park on undefined trail along Big Tree Road

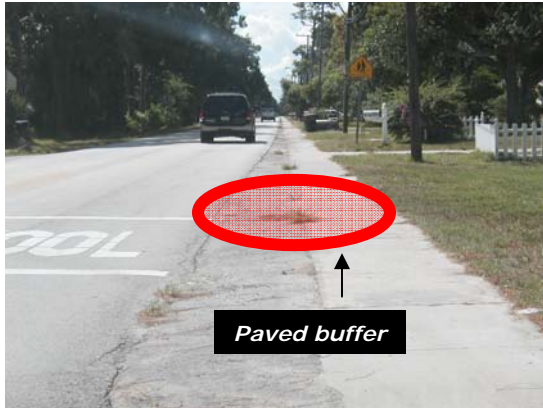
Best Practices

- Provide traffic calming measures near schools to reduce speeds and encourage bicycle use and improve walking conditions. Where possible, consider reducing traffic lane width to provide for designated bike lanes or shoulders.
- According to recent studies, four lane roadways with fewer than 14,000 ADT's (Average Daily Traffic) can be reduced to a two lane road with wider sidewalks and bike lanes without significantly reducing traffic efficiency.
- Roadways that are converted from two way to one way traffic can usually accommodate the addition of bike lanes and wider sidewalks and may accommodate parallel parking or landscaping.
- If shoulders are used as sidewalks and there are no sidewalks, ADA conditions must be met.
- Work with businesses to eliminate back out parking along streets. Do not allow private use on public right of way, such as parking, storage, displays, temporary signs, etc.
- Where parallel parking is used, provide curb bulb outs to define pedestrian areas and decrease crosswalk distances.

Sidewalk Maintenance

Finding

Sidewalks require ongoing maintenance to keep up surface quality, reduce trip hazards, and stay current with ADA standards and recommendations. Sidewalks in some of the school walk zones studied are in poor condition and/or don't meet current ADA standards. Maintenance projects are typically funded by the local agency.



Buffer area paved with asphalt



Crumbling sidewalk

Best Practices

- A review of sidewalks within the walk zone should take place each year to determine if safety hazards are present. Maintenance and safety hazards that are identified in a review of sidewalks should be addressed immediately.
- Local agencies may wish to set up a maintenance program for sidewalks that has a set budget amount each year.

Crosswalk and Lane Markings

Findings

Crosswalk markings and outside lane markings are faded or missing in many school walk zones reviewed in this Study. Clearly defined crosswalks increase motorist's awareness of pedestrians and provide school children with a designated area for crossing. Clearly marked outside lanes define the roadway edge for motorists and increase the distance between the moving vehicle and the sidewalk user.

Crossing guards are not provided for all crosswalks on heavily traveled roadways in walk zones.

Some commercial sites have undefined vehicular access points. Wide expanses of asphalt or concrete increase the exposure of pedestrians and bicyclist using these areas as part of their routes to school.



Diagonal Crosswalk connects alternating sidewalks



Single ramp places pedestrians crossing closer to traffic along 17-92

Best Practices

- Use "ladder" style crosswalks with thermoplastic paint to increase crosswalk visibility for the motorist and the pedestrian. Consider adding green fluorescent paint to crosswalks where crossing guards are located.
- Provide illumination at crosswalks when lighting conditions are poor. (The number of days students will arrive in the dark will increase in 2007 due to changes in daylight savings time.)
- Provide crosswalks that align with the sidewalk layout to increase convenience and encourage proper use.
- Provide the shortest crosswalk possible to limit exposure time in the crossing.

- Align sidewalk ramps with the crosswalk and widen to match crosswalk width. If the sidewalk is less than 8' wide, center the sidewalk and ramp with the crosswalk.
- Implement the most recent guidelines for crosswalk signage and placement.
- If the crosswalk crosses a middle turn lane or median, provide a raised median with flush access through the median to provide a refuge area.
- Use an "advance yield line" before crosswalks to increase motorists distance from the crosswalk. Provide signage for this line and additional signage for the crosswalk location.
- Paint outside lane markings to allow for the widest shoulder possible to provide for bicyclists. The maximum width for the outside travel lane should be twelve feet.
- Increase the frequency of painting road markings to better define roadway shoulders, edge of pavement and crosswalks.
- Local agencies may wish to remove the crosswalks that encourage students to cross in areas where traffic is heavy and no crossing guard can be provided.
- Provide painted crosswalks over access driveways for subdivisions, commercial and industrial sites, and schools. With new construction or when retro-fitting, provide sidewalk material (typically concrete) through access drives to emphasize the sidewalk.



Recommended crossing detail

Signals

Finding

Signal design is inconsistent across school walk zones, and does not always maximize bicycle and pedestrian safety.

Students sometimes cross an intersection that has a pedestrian signal but no crossing guard.

Some pedestrian signal buttons are not accessible to all users. Some signals are also placed incorrectly and there is confusion as to which street or section of street the button controls.

Many agencies are updating their pedestrian signals to the “count down” type of pedestrian signal. Students using crosswalks with this type of signal may be less able to determine when it is safe to cross. Many elementary aged children can not estimate the number of seconds that it will take to cross or finish crossing a roadway.

One proposed crossing requires students to cross one direction of traffic and then another direction of traffic in two separate cycles. The “walk” signals are aligned directly across the roadway and may confuse the user of the crosswalk.



Access to pedestrian push button is not paved



Push button is located away from the walkway

Best Practices

- When pedestrian signals are present, provide accessible buttons with arrows indicating direction of crossing. Consider specifying push buttons that light up when activated. Consider painting arrows on the sidewalk to further clarify the direction of crossing in relation to the push button.
- For the first two weeks of the school year, observe potentially dangerous crossings that do not have a crossing guard. If children use these crossings, redirect them to a crossing where a guard is located.
- Educate students on pedestrian signals, including count down signals. Provide signs near the buttons with picture diagrams. Determine elementary aged students' ability to understand and use count down pedestrian signals before installing them in walk zone areas.
- Consider providing protected walk phases at intersections with student crossings to prevent conflict with right and left turning movements. Providing a protected left turn can substantially reduce crashes involving pedestrians.
- Provide the longest possible walk phase to accommodate children's needs.
- Consider prohibiting "right turn on red" and/or U-turns at intersections with students crossing.
- Provide a paved area to the pole where the push button is located. Locate the push button nearest to the corresponding curb ramp.
- Provide transportation to students who must cross wide, busy roadways in two separate cycles to get across. Research possible attendance rezoning that would allow these children to walk to a different school. Consider applying for grants to provide an overhead walkway to span the roadway. Research the possibility of relocating the crossing away from the intersection to reduce turning movement conflicts. Consider extending the time that guards are located at this type of intersection to reduce the possibility of a late arriving student crossing unaided.

School Board Considerations

Findings

Some attendance zone layouts discourage walking to school. Some schools have neighborhoods next to their property that are zoned for other, more distant schools.

Not all schools are located in dense or fairly dense residential areas, reducing the potential number of students eligible to walk or ride their bicycles to school. The two mile radius walk limits determined by the State of Florida are often unrealistic for elementary age children. If there are several roadway crossings or if the walk/ride is stressful, many parents will drive their children to school.

School policies regarding backpack use, bicycle use, configuration of drop-off areas, etc. are typically set by the principal at each school, and may negatively affect the number of children walking or biking to school. Specific considerations include:

- Banning backpacks means students have to juggle books, papers, lunch boxes, jackets, etc., while riding bikes or walking up to two miles.
- Banning rolling backpacks means that students often carry backpacks weighing in excess of 10 pounds. This could discourage elementary students from riding bikes or walking up to two miles to school.
- At least one school does not allow students to ride bicycles to school because of bicycle theft problems. Students who could easily ride a bicycle to school may find the distance too long to walk.



Backpacks are not allowed for some students

Many schools were and are still designed with only one sidewalk connecting to the main area of campus. This typically means that students must cross a car line entrance or a bus entrance to reach the school. Many of these entrances are staffed by teachers (supplementals) who are paid to cross students safely.

Many school parking areas continue to be designed without connected sidewalks, crosswalks and ramps. Many crosswalks that terminate in a raised sidewalk provide an accessible ramp only on one end of the sidewalk, making travel difficult for those with strollers, wheeled carts or backpacks, bicyclists and persons using wheelchairs or walkers.

Best Practices

- Create attendance zones that encourage walking or bicycle riding to school.

- When locating future schools, work with the local agency to analyze existing pedestrian and bicycle facilities. Plan a logical network of sidewalks and prioritize for funding. Provide interim measures for critical walking/bicycling routes that will be without sidewalks when the school is opened (see interim measures under Retrofit Development and Crosswalk and Lane Markings sections).
- School site plans should be designed and reviewed in the context of the area in which they will be located. Planning should include sidewalk connectivity for at least ¼ mile out or to logical points in the existing environment. For example, a sidewalk may be difficult to add to a nearby roadway (often due to lack of right of way), but it may be possible to include an alternative route for a sidewalk on school property. In addition, it may be cost-effective to purchase a vacant lot to provide a neighborhood connection to a school if this removes courtesy busing for a substantial number of students.
- School site plans should balance security with school access. Multiple pedestrian/bicycle entrance points to a school campus decrease the travel distance for many students and may increase the number of walkers and bicycle riders. Some principals prefer to allow only one access point to reduce supervision requirements.
- The School Board should consider whether to institute uniform, system-wide policies that will encourage students to walk or ride bicycles to school. Any school-wide policy decisions must be weighed against the benefits of the specific knowledge and judgment an individual principal brings to each school's bicycle, pedestrian and general safety situation.
- The School Board, in partnership with Volusia County, FDOT and the Volusia County MPO, should develop uniform criteria for determining when school safety staff is needed, when a crossing guard is needed and when courtesy transportation should be provided.
- Consider a school-wide policy on allowing rolling backpacks to encourage walking and reduce the weight students must carry to and from school. Alternatively, provide students who walk or ride their bicycles with a second set of text books for home.
- The School Board should analyze whether additional sidewalks on the campus will reduce or eliminate the need for students to cross school entranceways.
- The School District staff should review site plans for clearly defined accessible pedestrian routes from the points of entry to the school sidewalk system. Sidewalks should be provided from parking areas to the school sidewalk system. Locate sidewalks to provide the most direct route from the external sidewalk system to the typical point of entry or entrances. Locate the sidewalk away from the access drive when possible.
- The School Board should implement a district-wide policy requiring the use of bicycle helmets on all school campuses.

- The School Board should require every school to participate in bicycle and pedestrian safety events such as the International Walk to School Day.
- The School Board and Sheriff's Office should require school-based law enforcement officers (School Resource Officers) to enforce violations of bicycle and pedestrian laws on and around school grounds (School Resource Officers work for the sheriff's department and their responsibilities are assigned by the Volusia County Sheriff's Office).
- The School Board should require all teachers assisting students with crossing vehicular traffic to wear green or orange safety vests.

Enforcement and Education

Findings

Some schools have few students who walk to school even though the sidewalk facilities are adequate.

Many agencies that provide traffic assistance and enforcement for the elementary schools do not have an active bicycle police unit.

Many local agencies do not notice obstacles blocking sidewalks or ticket motorists who park on sidewalks.

Students are sometimes slow to adapt to changes in sidewalks, crosswalks or crossing guard locations.

Despite current bicycle helmet laws and helmet give-away and education programs, many students ride their bicycles without helmets.



Sign blocks sidewalk near Freedom Elementary



A parent creates a personal parking space



Students without helmets near Manatee Cove Elementary

Best Practices

- The schools with few students participating in walking or bicycle riding to school may wish to implement an incentive program to encourage more students to use non-vehicular transportation to school. The school and volunteers could assist with the following planning efforts or incentives:
 - ♦ "Walking school bus" planning or pairing students for walking/riding
 - ♦ Providing parents with a sidewalk map
 - ♦ Bicycle or bicycle helmet giveaways
 - ♦ Bicycle gear, stickers or reflective bands as rewards
 - ♦ Second set of text books for home
 - ♦ Rolling backpacks

- Consider delivering flyers to parents in neighborhoods near the school stating the benefits of walking/riding to and from school and asking for volunteers to act as chaperones.
- Consider starting/expanding the duties of bicycle police units to include monitoring the safety of the routes to schools for students who ride their bicycles or walk to and from school. Bicycle police can also assist with safety training and provide recommendations for safety improvements through "hands-on" experience.
- Crossing guard supervisors and schools should consider awareness campaigns after any changes in routes to schools. In addition to flyers and in-school presentations, this may require crossing guards to re-direct students for a two week period immediately after any changes are made, and sporadic efforts afterwards. Consider rewarding students who use new sidewalks, crosswalks or routes.
- Consider tougher enforcement on helmet wearing. Crossing guards should continue their efforts to increase bicycle helmet use and give warnings to the students the first week of school and thereafter give student names to the school for them to send a note home to parents. See the 2005 Bicycle and Pedestrian School Safety Study for further discussion and ideas.

Section 5 – Bicycle and Pedestrian Master Plan

Bicycle and Pedestrian Master Plan

The following Bicycle and Pedestrian Master Plan specifies a network of sidewalks and trails that, if implemented, will greatly increase the convenience and safety of travel for pedestrians and bicyclists. The Bicycle and Pedestrian Master Plan includes the following information:

Existing Conditions:

- Walk zone area (shaded pink) (RGB= 255, 204, 204)
- Courtesy Transportation zone (shaded blue)
- Existing Trails (solid green line, source: field review and aerial photographs) (RGB= 11, 81, 11)
- Existing Wide Sidewalk 6-8' (solid blue line, source: field review) (RGB=0, 51, 204)
- Existing Sidewalks 3-5' (solid red line, source: field review) (RGB=210,0,0)
- Existing Crossing Guard Locations (green ring, source: crossing guard supervisors, 2005 and 2006)
- Bicycle or Pedestrian Crash Event Locations from 2000-2004, during school transportation times, within walk zone. Number of crash events listed in the Legend (yellow star, source: Volusia County GIS)
- Bicycle or Pedestrian Crash Event Locations from 2000-2004, during school transportation times, outside of walk zone. Number of crash events listed in the Legend (red star, source: Volusia County GIS)
- Existing Votran Routes and Transit Stops (dashed yellow lines with squares, source: State of Florida GIS).

Planned Conditions:

- Planned State of Florida sidewalk and roadway improvements (medium blue roadway line, source: FDOT website, State or County GIS) (RGB=153, 204, 255)
- Planned Volusia County sidewalk and roadway improvements (medium green roadway line, source: Volusia County website, GIS, County staff) (RGB=51, 204, 51)
- Planned City sidewalk improvements (violet roadway line, source: city/Volusia County staff) (RGB=169, 80, 176)

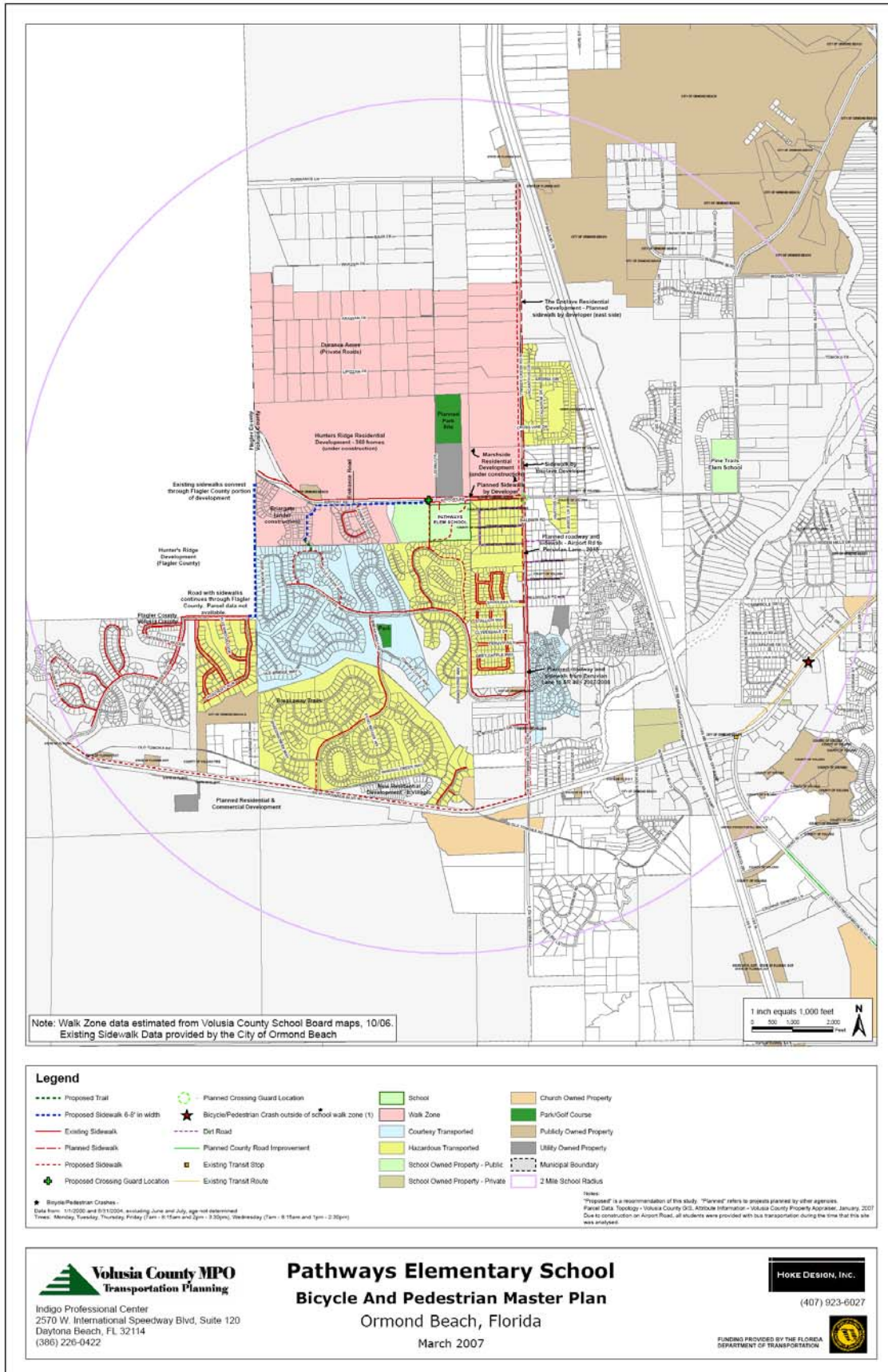
Recommendations of this Study:

- Proposed Trails (dashed dark green line)
- Proposed Sidewalks 6-8' wide (dashed blue line)
- Proposed Sidewalks 5' (dashed red line)
- Proposed Crossing Guard Locations (green cross)

A 24"x36" fold-out map is included in the pocket of this notebook, with a reduced version provided as a reference on the following page.

This Master Plan and supplemental information supplied within the Assessment Report are meant as a guideline for sidewalk and trail planning. The Master Plan is not an engineering document.

Note: The RGB color specification is provided for GIS users who wish to match colors.



Appendices

| | |
|-------------------|--|
| Appendix A | - Project Contact Information |
| Appendix B | - Policies and Mandates - Summary |
| Appendix C | - General Costs, Funding and Assistance Resources |
| Appendix D | - Safe Routes to Schools Program Summary |
| Appendix E | - Right of Way Regulations |
| Appendix F | - Crash Event Summary |
| Appendix G | - Votran Coordination |
| Appendix H | - Americans with Disabilities Act (ADA) and Design References |

Appendix A – Project Contact Information

A. Project Contact Information

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Appendix B – Policies and Mandates - Summary

B. Policies and Mandates – Summary

The Volusia County MPO takes its bicycle and pedestrian safety and school transportation planning mandates from various federal, state and local statutes, codes and plans. In addition, these documents lay out the guidelines and procedures relevant to school walk zone safety. This appendix is meant as a high level summary and introduction to these policies and mandates. Links to the full text of documents are provided for further information.

Federal Code

Federal Aid Highway Act (23 USC Sec. 134) - specifies that urbanized areas with populations of 50,000 or more establish Metropolitan Planning Organizations to “provide for the development and integrated management and operation of transportation systems and facilities (including pedestrian walkways and bicycle transportation facilities) that will function as an intermodal transportation system for the metropolitan area.....”

(Available at [http://uscode.house.gov/uscode-
cgi/fastweb.exe?getdoc+uscview+t21t25+3930+0++ %28Federal%20Aid%20Highw
ay%20Act%29%20AND%20%28%2823%29%20ADJ%20USC%29%3ACITE%2
0AND%20%28USC%20w%2F10%20%28134%29%29%3ACITE%20%20%20%20%20
20%20%20%20%20](http://uscode.house.gov/uscode/cgi/fastweb.exe?getdoc+uscview+t21t25+3930+0++%28Federal%20Aid%20Highway%20Act%29%20AND%20%28%2823%29%20ADJ%20USC%29%3ACITE%20AND%20%28USC%20w%2F10%20%28134%29%29%3ACITE%20%20%20%20%20%20%20%20%20%20))

The Federal Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (23 USC 402) –signed into law in 2005. Known as SAFETEA-LU, the act established and funded the [Federal Safe Routes to School Program](#) to make it safer for children to walk or bicycle to primary or middle school. Section 1404 of SAFETEA-LU lays out the purposes of the Act and prescribes apportionment of funds. Projects eligible for funding are described in the following excerpt from Section 1404:

(f) Eligible Projects and Activities.—(1) *Infrastructure-related projects.*—

(A) In general.--Amounts apportioned to a State under this section may be used for the planning, design, and construction of infrastructure-related projects that will substantially improve the ability of students to walk and bicycle to school, including sidewalk improvements, traffic calming and speed reduction improvements, pedestrian and bicycle crossing improvements, on-street bicycle facilities, off-street bicycle and pedestrian facilities, secure bicycle parking facilities, and traffic diversion improvements in the vicinity of schools.

(B) Location of projects.--Infrastructure-related projects under subparagraph (A) may be carried out on any public road or any bicycle or pedestrian pathway or trail in the vicinity of schools.

(2) Non-infrastructure-related activities.—

(A) In general.--In addition to projects described in paragraph (1), amounts apportioned to a State under this section may be used for non-infrastructure-related activities to encourage walking and bicycling to school, including public awareness campaigns and outreach to press and community leaders, traffic education and enforcement in the vicinity of schools, student sessions on bicycle and pedestrian safety, health, and environment, and funding for training, volunteers, and managers of safe routes to school programs.
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ059.109

Florida Statutes

- **S.163.3177 Required and optional elements of comprehensive plan; studies and surveys** - requires every comprehensive plan to include a "traffic circulation element consisting of the types, locations, and extent of existing and proposed major thoroughfares and transportation routes, including bicycle and pedestrian ways."
http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0163/SEC3177.HTM&Title=-%3e2006-%3eCh0163-%3eSection%203177#0163.3177
- **S.206.60 County tax on motor fuel** – authorizes use of the proceeds from the county fuel tax for acquisition of rights-of-way, construction and maintenance of transportation facilities including bicycle paths and pedestrian pathways.
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0206/SEC60.HTM&Title=-%3e2006-%3eCh0206-%3eSection%2060#0206.60
- **S.260 Florida Greenway and Trails Act**
 - S.260.014 – Describes conditions for designating land as part of the Florida Greenways and Trails System
 - S.260-0125 – Describes limits on liability of private landowners whose property is designated as part of the statewide system of greenways and trails.
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&URL=Ch0260/titl0260.htm&StatuteYear=2006&Title=%2D%3E2006%2D%3EChapter%20260
- **S. 355.066 Safe Paths to Schools Program** – establishes the Safe Paths to Schools Program within the Florida Department of Transportation.
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0335/SEC066.HTM&Title=-%3e2006-%3eCh0335-%3eSection%20066#0335.066
- **S. 335.067 Conserve by Bicycle Program** – establishes the Conserve by Bicycle program within the Florida Department of Transportation.
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0335/SEC067.HTM&Title=-%3e2006-%3eCh0335-%3eSection%20067#0335.067

- **S. 339.175 Metropolitan planning organization** – assigns responsibility to Metropolitan Planning Organizations (MPO's) for developing transportation plans and programs which “provide for the development and integrated management and operation of transportation systems and facilities, including pedestrian walkways and bicycle transportation facilities that will function as an intermodal transportation system for the metropolitan area....”
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0339/SEC175.HTM&Title=-%3e2006-%3eCh0339-%3eSection%20175#0339.175
- **S.375.251 Limitation on liability of persons making available to public certain areas for recreational purposes without charge** – describes limits on liability for persons making available land, water areas and park areas for public outdoor recreational purposes.
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0375/SEC251.HTM&Title=->2006->Ch0375->Section%20251#0375.251
- **S.1013.36 Educational Facilities - Site Planning and Selection** – allows school boards to request county and municipal governments to construct and maintain sidewalks and bicycle trails within a two mile radius of each school.
http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&URL=C/h1013/ch1013.htm
- **S.1006.23 – Hazardous Walking Conditions** - lays out requirements for reporting, investigating and correcting any hazards within the two mile radius of school walk zones, or for providing precautions to safeguard students. Defines criteria for hazardous walking conditions in the excerpt below:
(a) Walkways parallel to the road.--
 1. It shall be considered a hazardous walking condition with respect to any road along which students must walk in order to walk to and from school if there is not an area at least 4 feet wide adjacent to the road, having a surface upon which students may walk without being required to walk on the road surface. In addition, whenever the road along which students must walk is uncurbed and has a posted speed limit of 55 miles per hour, the area as described above for students to walk upon shall be set off the road by no less than 3 feet from the edge of the road.
 2. The provisions of subparagraph 1. do not apply when the road along which students must walk:
 - a. Is in a residential area which has little or no transient traffic;
 - b. Is a road on which the volume of traffic is less than 180 vehicles per hour, per direction, during the time students walk to and from school; or
 - c. Is located in a residential area and has a posted speed limit of 30 miles per hour or less.

(b) Walkways perpendicular to the road.--It shall be considered a hazardous walking condition with respect to any road across which students must walk in order to walk to and from school:

1. If the traffic volume on the road exceeds the rate of 360 vehicles per hour, per direction (including all lanes), during the time students walk to and from school and if the crossing site is uncontrolled. For purposes of this subsection, an "uncontrolled crossing site" is an intersection or other designated crossing site where no crossing guard, traffic enforcement officer, or stop sign or other traffic control signal is present during the times students walk to and from school.

2. If the total traffic volume on the road exceeds 4,000 vehicles per hour through an intersection or other crossing site controlled by a stop sign or other traffic control signal, unless crossing guards or other traffic enforcement officers are also present during the times students walk to and from school.

Traffic volume shall be determined by the most current traffic engineering study conducted by a state or local governmental agency.

http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch1006/SEC23.HTM&Title=-%3e2006-%3eCh1006-%3eSection%2023

HB 147, if passed, would substantially expand these criteria, amending S.1006.23 as defined in the excerpt below, with relevant changes underlined:

(a) Walkways parallel to the road.—

1. It shall be considered a hazardous walking condition with respect to any road along which students must walk in order to walk to and from school if there is not an area at least 4 feet wide adjacent to the road, having a surface upon which students may walk without being required to walk on the road surface. In addition, whenever the road along which students must walk is uncurbed and has a posted speed limit of 35 miles per hour, the area as described above for students to walk upon shall be set off the road by no less than 3 feet from the edge of the road.

2. The provisions of subparagraph 1. do not apply when the road along which students must walk:

a. Is in a residential area which has little or no transient traffic;

*b. Is a road on which the volume of traffic is less than 180 vehicles per hour, per direction, during the time students walk to and from school;
or*

c. Is located in a residential area and has a posted speed limit of 30 miles per hour or less.

(b) Walkways perpendicular to the road.--It shall be considered a hazardous walking condition with respect to any road across which students must walk in order to walk to and from school:

1. If the traffic volume on the road exceeds the rate of 360 vehicles per hour, per direction (including all lanes), during the time students walk to and from school and if the crossing site is uncontrolled. For purposes of this subsection, an "uncontrolled crossing site" is an intersection or other designated crossing site where no crossing guard, traffic enforcement officer, or stop sign or other traffic control signal is present during the times students walk to and from school.

2. If the total traffic volume on the road exceeds 4,000 vehicles per hour through an intersection or other crossing site controlled by a stop sign or other traffic control signal, unless crossing guards or other traffic enforcement officers are also present during the times students walk to and from school.

3. If the road has six or more lanes whether the intersection or crossing site is controlled or uncontrolled.

(c) Residents designated as sexual predators or sexual offenders.--It shall be considered a hazardous walking condition with respect to any road along which students must walk in order to walk to and from school if a resident on the road has been designated as a sexual predator under s. 775.21 or a sexual offender under s. 943.0435 whose victims include a minor.

County Plans and Code

- **The Volusia County Comprehensive Plan, Transportation Element (Chapter 2) - Bicycle and Pedestrian (Section G)** – describes goals, objectives and efforts to improve bicycle and pedestrian safety. <http://volusia.org/growth/02%20Transportation.pdf>
- **The Volusia County Comprehensive Plan, Transportation Element (Chapter 2) - Goals, Objectives and Policies (Section J)** – puts efforts to develop a County-wide Bicycle and Pedestrian Systems Plan within the context of the County's goal to provide a coordinated multimodal transportation system. <http://volusia.org/growth/02%20Transportation.pdf>
- **The Volusia County Comprehensive Plan, Conservation Element (Chapter 12), Air Quality (Section 3)** – outlines County policy to encourage alternative modes of transportation to improve air quality. Gives implementation details for this effort. <http://volusia.org/growth/12%20Conservation.pdf>
- **The Volusia County Comprehensive Plan, Recreation and Open Space Element (Chapter 13)** – lists the County's goals and objectives for a parks and recreation system, and establishes a mandate for the County to work with the

MPO to maintain a County-wide bicycle facilities plan.
<http://volusia.org/growth/13%20Recreation.pdf>

- **The Volusia County Comprehensive Plan, Intergovernmental Coordination Element (Chapter 14)** - describes the agreement between the County and the School Board on the joint planning process for school facilities and supporting land use, services and infrastructure.
<http://volusia.org/growth/14%20Intergov.pdf>
- **The Volusia County Land Development Code, (Appendix A of The Code of Ordinances)**

General Provisions (Chapter 1), Section 105.13 Availability of Pedestrian and Bicycle Circulation Facilities – establishes Volusia County Sidewalk Improvement Trust Fund for purpose of constructing pedestrian and bicycle facilities and procedures for developers to pay into the trust fund in lieu of construction of sidewalks [as required by section 410].
<http://municode.com/resources/gateway.asp?pid=11665&sid=9>

Section 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. <http://municode.com/resources/gateway.asp?pid=11665&sid=9>

Section 405.05 No County Expense - All easements shall be granted at no expense to the county.
<http://municode.com/resources/gateway.asp?pid=11665&sid=9>

Section 410 Sidewalks – lists requirements and specifications for sidewalk construction in neighborhoods and community commercial facilities.
<http://municode.com/resources/gateway.asp?pid=11665&sid=9>

Additional reference: Volusia County MPO 2025 Long Range Transport Plan, Chapter 10 – Bicycle and Pedestrian.

<http://www.volusiacountympo.com/documents/LRTP2025Final/2025%20LRTP%20Chapters/14%20-%20Chapter%2010%20-%20Bicycle%20&%20Pedestrian.pdf>

Appendix C – General Costs, Funding and Assistance Resources

C. General Costs, Funding and Assistance Resources

For budgeting and planning purposes, local agencies may use the following chart to estimate general costs of different bicycle and pedestrian facilities. Costs are provided by the linear foot. Shorter facilities typically cost more to construct per linear foot than longer facilities. Right of way costs, if applicable, are not included.

| Estimated Linear Foot Costs for Bicycle and Pedestrian Facilities (Cost includes survey, engineering and construction) | | |
|---|---|--------------------------------|
| Description | Conditions | Cost Range |
| 5' wide concrete sidewalk | Minor drainage impacts, fewer than 10 driveway cuts requiring pipe and mitered end sections, minimal clearing and grading | \$78 to \$89 per linear foot |
| 5' wide concrete sidewalk | Same as above but includes major drainage impacts | \$145 to \$190 per linear foot |
| 6' wide concrete sidewalk | Minor drainage impacts, fewer than 10 driveway cuts requiring pipe and mitered end sections, minimal clearing and grading | \$90 to \$100 per linear foot |
| 8' wide concrete sidewalk | Minor drainage impacts, fewer than 10 driveway cuts requiring pipe and mitered end sections, minimal clearing and grading | \$115 to \$125 Per linear foot |
| 12' asphalt trail (4" lime-rock base and 2" asphalt) | Minor drainage impacts, fewer than 10 driveway cuts requiring pipe and mitered end sections, minimal clearing and grading | \$158 to \$173 per linear foot |
| 5' wide asphalt bike lanes | Minor drainage impacts, fewer than 10 driveway cuts requiring pipe and mitered end sections, minimal clearing and grading | \$80 to \$100 per linear foot |

Note: Survey and engineering were factored at 20% of cost. Site access, extended side slopes, barriers, retaining walls and railings are not included in the above cost ranges. Overall size of the project will impact linear foot costs. Costs are based on FY 2006 cost averages.

The following charts provide sources for grants and assistance. Funding amounts, matching requirements and submittal dates frequently change and should be verified yearly.

| Grant Name | Submission Date | Funding Range | Match Req. | Project Type | Contact |
|--|---|---|---|--|---|
| Recreational Trails Program | Annually-- usually scheduled for 1st Qtr. each calendar year. | Maximum grants for mixed-use and non-motorized projects is \$200,000. Maximum grant for motorized project is \$437,420. | Choose either 50:50, 60:40, 80:20. Higher match equals higher points for overall grant score. | Projects that construct, renovate or maintain recreational trails, trailhead and trailside facilities and the purchase of trail construction or maintenance equipment | http://www.dep.state.fl.us/gwt/grants/ Alexandra Weiss (850) 245-2052 alexandra.weiss@dep.state.fl.us |
| Safe Routes to Schools (SAFETEA LU) | Infrastructure projects - February. Non-infrastructure projects - call for information. | Florida's projection for 2007 is \$6,133,717 | No match required | Eligible applicants are Community Traffic Safety Teams, School Boards (for public schools), and private schools. Partnership with government agency sponsor typically required. Non-infrastructure projects such as Education, Encouragement, Enforcement, and Evaluation. Infrastructure projects such as bicycle or pedestrian facilities, traffic calming and traffic control devices. Policy development, planning and implementation of strategies such as improvement to streets and sidewalks, education and encouragement of children and parents and increased enforcement of traffic laws. | http://www.dot.state.fl.us/safety/SRTS_files/SRTS%20Guidelines%2011-20-06.pdf Infrastructure - Tony Nosse, anthony.nosse@dot.state.fl.us 386-943-5334 Non-infrastructure - Joan Carter Pedestrian/Bicycle Coord. joan.carter@dot.state.fl.us 386-943-5335 |
| XU Funding | Annually, 1st quarter | Varies | 50% match | Bicycle and pedestrian facilities. | Stephan Harris, Volusia County MPO 386-226-0422 Ext. 34 scharris@co.volusia.fl.us |
| Transportation Enhancement Program - Statewide | Generally follows the annual updating of the FDOT five year work program - call for information | \$13 million for FY 2008/2009 and FY 2009/2010 | No match required | Bicycle and pedestrian facilities, safety and educational activities for pedestrians and bicyclists | http://www.dot.state.fl.us/emo/enhance/enhance.htm Bob Crim (850) 487-3982 bob.crim@dot.state.fl.us or Florida Department of Transportation (850) 414-5269 |
| Transportation Enhancement Program - Local | Annually, 1st quarter | \$45-\$50 Million allocated among 7 FDOT districts, no cap | No match required | Bicycle and pedestrian facilities | www.dot.state.fl.us/emo/enhance/mpoma.pdf Stephan Harris, Volusia County MPO 386-226-0422 Ext. 34 scharris@co.volusia.fl.us |
| Rivers, Trails and Conservation Assistance Program | Annually by August | Technical assistance only, no direct funds are available | Technical assistance only, no direct funds are available. | Provides staff assistance for river, trail and conservation projects. Selected projects have included conceptual plans for trail corridors, river corridor plans, and statewide river assessments | http://www.nps.gov/nrcr/programs/rtca/ Jaime Doubek-Racine (941) 330-8047 jaime_doubek-racine@nps.gov |

| Grant Name | Submission | Funding Range | Match Req'd. | Project Type | Contact |
|---|---|---|--|--|---|
| Community Development Block Grant | Annually by August | Formula based on community needs | No match required | Funding for property acquisition, improvements to neighborhood parks and facilities, new and resurfaced streets, sidewalk installation, wastewater collection improvements, and economic development projects. | http://www.volusia.org/community_assistance/cdbg.htm Paula Szabo at pszabo@co.volusia.fl.us or (386) 943-7039 ext. 2308 |
| Urban & Community Forestry Grant | January | Maximum grant is \$10,000 to \$25,000, depending on type of project | 50:50 match ratio | Tree ordinance development or revision, tree inventories, management plans, master plans, in-house training, staffing, student interns, and equipment purchases | http://www.fl-dof.com/forest_management/cfa_urban_grants.html Charlie Marcus (850) 921-0300 or marcus@doacs.state.fl.us |
| Florida Rails-to-Trails | N/A | No direct funding | N/A | Helps make funding opportunities available for trail projects and assists in learning about funding opportunities | (850) 488-3701 or jessicat@railstrails.org |
| Florida Greenways & Trails Acquisition Program | Annually, typically in fall - need notification of funding | \$4.5 Million (no cap) | No match required | Acquisition of land for greenways and trails | Cindy Radford (850) 488-3701 cynthia.radford@dep.state.fl.us |
| Florida Communities Trust Program | May 10, 2006 | One application not to exceed 15% of funds available/Multiple applications not to exceed 10% of funds available | | Acquisition of land for community-based parks, open spaces and greenways that further the outdoor recreation and natural resource protection needs identified in local government comprehensive plans. | Ken Reedy (850) 922-2207 or ken.reedy@dca.state.fl.us |
| Florida Recreation Development Assistance Program (FRDAP) | Fall | \$11.5 Million, max award \$200,000 divided among acquisition, development, trails | 0% match-\$50,000 or less 25% match-\$50,001-\$150,000 50% match- over \$150,000 | Acquisition or development of land for public outdoor recreation | http://www.dep.state.fl.us/parks/OIRS/default.htm Leylani Velez@dep.state.fl.us (850) 245-2501 |
| Florida Highway Beautiful Council Grant | Fall | Total funding is \$3 million—no single grant to exceed 10% of total funding; however, may apply for more than one grant | | Landscape beautification projects on Florida's roadways | http://www.dot.state.fl.us/emo/beauty/council.htm christine.webb@dot.state.fl.us 386-943-5298 |
| Land and Water Conservation Fund Program | Probably not accepting applications in 2007 - call for information. | Announced prior to submission period | 50:50 match ratio | Acquisition or development of lands for outdoor recreational purposes | http://www.dep.state.fl.us/parks/OIRS/facilities/wcf.htm RitaVentry (850) 245-2501 |
| Grant Name | Submission Date | Funding Range | Match Req'd. | Project Type | Contact |
| Volusia County Sidewalk Funding | | \$500,00 to \$600,000 per year total | None | Sidewalk construction | Jerry Brinton, Volusia County |

| Grant Name | Submission Date | Funding Range | Match Req. | Project Type | Contact |
|---|---|---|--|--|---|
| Volusia ECHO Grants-In-Aid Program | Applicants must attend workshop, typically in July. Application for Technical Completeness Review due in September. Final application deadline December. | Minimum of \$12,500. Standard \$500,000 annually or Exceptional over \$500,000 annually | Standard program requires minimum of 1:1, exceptional program requires 4:1 | Acquisition, restoration, construction, or improvements of facilities to be used for environmental/ecological, cultural, historical, or outdoor recreation purposes that must be open for public use. Exceptional program means a project of paramount and crucial county-wide importance and receives more than the standard funding range. | volusiaforever-echo.com Rob Walsh 386-736-5902 |
| Bikes Belong Coalition | Applications reviewed on a quarterly cycle. | up to \$10,000 each | | Bicycle facilities | Elizabeth Train (303) 449-4893 or Elizabeth@bikesbelong.org |
| Conservation Technology Support Program | January, each year | Packages of equipment and software donated by vendors to non profit organizations | | Grant packages of computers, printers, software and training for tax-exempt conservation organizations building GIS capacity. | www.cfsdp.org |
| American Greenways Kodak Awards Program | June 1, each calendar year | \$500 to \$2500 | | Seed money to stimulate greenway planning and design | http://www.conservationfund.org/?article=2372 (703) 525-6300 or emeyers@conservationfund.org |
| National Trails Endowment - American Hiking Society | November of calendar year | \$500 to \$10,000- Maximum of \$10,000 per project | | Acquisition, developing, building constituencies | Ivan Levin (301) 565-6704 x 208 or llevin@AmericanHiking.org |
| The Trust for Public Land Conservation Services Program | N/A | No direct funding | N/A | Helps communities and governments identify funds to protect land. Also, helps ensure completion of the transaction. | kevin.mooney@tpl.org |

Appendix D – Safe Routes to School Program Summary

D. Safe Routes to School Program Summary

(Source: Florida Department of Transportation, March 2007)



Florida's



Application Guidelines

Walking or biking to school gives children a sense of freedom and responsibility, allows them to enjoy the fresh air, and provides opportunities to get to know their neighborhood while arriving at school alert, refreshed, and ready to start their day. Yet most American children are denied this experience. In fact, only 13 percent of American children walk or bike to school. Communities and community-based organizations are devoting increased attention to pedestrian and bicycle safety issues in an effort to reduce the dangers usually associated with walking or biking to school.

A successful Safe Routes to School (SRTS) Program integrates health, fitness, traffic relief, environmental awareness, and safety under one program. The Safe Routes to School program encompasses routes and techniques used to encourage children in Kindergarten through eighth grade, to walk to or from school. While SRTS funds will not cover all the identified needs, they can help communities get started on addressing their school transportation needs and encourage more students to walk or bike to school. School principals, school district officials, private school officials, local transportation officials, and Community Traffic Safety Teams are encouraged to cooperate to apply for these funds.

Note: Guidelines, Applications, and District Contact Information sheets will be updated periodically. Check edition dates at the bottom of each document with our website: www.srtsfl.org

Program Purpose

SRTS is a new federal reimbursement program to enable and encourage children in grades K-8, including those with disabilities, to walk and bicycle to school; to make walking and bicycling to school safer and more appealing; and to facilitate the planning, development, and implementation of projects that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools. In addition to encouraging more children to walk or bike to school, the program also seeks to address the safety needs of children already walking or bicycling in less than ideal conditions.

Eligible Schools, Applicants and Sponsors

Eligible schools are public and private schools serving Kindergarten through 8th grade. Eligible applicants are Community Traffic Safety Teams (**Chair or Vice-Chair**), School Boards (**Chair, Vice-Chair or their designee**, for public schools), and private schools (**Headmaster, Assistant Headmaster or their designee**). However, most applicants will also have to partner with a sponsor (a government agency which is able to enter into a legal agreement with Florida Department of Transportation and provide the initial funding before being reimbursed). **Examples of legal agreements which might be used are Local Area Program (LAP) Agreements, Local Funding Agreements, or Joint Participatory Agreements (JPAs, for non-infrastructure activities only).** Sponsors would not be needed in the following cases:

- If the proposed infrastructure project could be done by the FDOT District on a state road; or
- If the applicant for the proposed non-infrastructure activity is prepared to (1) enter into a legal agreement with the Florida Department of Transportation and (2) fund the activity until reimbursed by FDOT, as described below

Every applicant is encouraged to enlist the assistance of other relevant participants in the development

and submittal of an application. Examples are elected officials, Metropolitan Planning Organizations, appropriate county and city agencies, and non-profit organizations.

Funding

Florida's SRTS Program is 100 percent federally funded and managed through the Florida Department of Transportation (FDOT), by a cost-reimbursement process. Projects will be awarded through a District-wide competitive process. Seventy to ninety percent of each District's SRTS funds will be dedicated to infrastructure (Engineering or construction) projects, with the remaining funds going toward non-infrastructure activities (Education, Encouragement, Enforcement, and Evaluation). Infrastructure projects may be located on or off the state highway system; however, they must be on public property, within a two-mile radius of the school. Important points to remember:

- Due to the limited SRTS funding, applicants are encouraged to be as cost effective as possible in order for funds to stretch as far as possible.
- SRTS funds may not be used to supplant existing funds.

Comprehensive Program

The SRTS Program is unique in its overriding emphasis on community participation in the development and implementation of a project. By involving the public, schools, parents, teachers, children, local agencies, the businesses community, key professionals, and others in the development of a project proposal, a comprehensive and integrated solution to improving safety is likely to develop and be sustained beyond the life of the project. Projects and activities that have the best chance of being selected for funding under the SRTS program are those that incorporate all of the key elements referred to as the five E's – Education, Encouragement, Enforcement, Evaluation, and Engineering. The five E's are explained further in the sections that follow. **Applicants are required to summarize in their application what they have already done and what they plan to do to address each of the E's.**

Evaluation is an integral part of the SRTS process, and is required both in the application phase and the implementation phase, for projects and activities selected. The pre-application data-gathering requested includes such information as:

- How students currently travel to and from school
- What conditions in the school zone or immediately around the school site discourage children from walking or bicycling to or from school
- What conditions within a two-mile radius of the school discourage children from walking or bicycling to or from the school
- Opinions of parents about these conditions and allowing children to walk or bicycle to or from school
- What solutions the evaluators recommend to solve identified problems

A process for gathering this information, as well as implementation suggestions, are presented in the Safe Ways to School Toolkit, which can be downloaded from:

www.dcp.ufl.edu/centers/trafficSafetyEd/html_safe-ways.html

If your project or activity is selected for funding, you will be required to collect evaluation data using the two national SRTS surveys (student transportation survey and parents' survey) a few months before and after the project or activity is implemented. These forms may also be used as part of the application process, and can be found at: www.saferoutesinfo.org/resources/index.cfm

FDOT SRTS Contacts:

Pat Pieratte, Safe Routes to School
Coordinator
605 Suwannee St, M.S. 17
Tallahassee, FL 32399-0450
Phone: 850-245-1529 (SC 205-1529)
email: pat.pieratte@dot.state.fl.us

Tony Nosse, P.E., Safety Engineer
District-5 Traffic Operations
Phone: (386) 943-5334
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Appendix E – Right of Way Regulations

E. Right of Way Regulations

The Florida Department of Transportation (FDOT) has overall responsibility to the Federal Highway Administration (FHWA) for right of way acquisition on any project in Florida using federal funds, or on which federal funds are anticipated to be utilized, on any phase of the project. In practical terms, this means that the Florida Department of Transportation requires local governments and agencies to follow federal guidelines for right-of way acquisition in any project using federal funds, including Safe Routes to School funds.

The federal guidelines stem from the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as amended. These guidelines must be followed regardless of whether a project's federal funding is directly used for right of way acquisition or whether that project will become part of the state highway system. As part of federal guideline compliance, *FDOT requires both local agency pre-qualification and right of way project authorization prior to project start.*

FDOT representatives also wish to emphasize the need for temporary easements or rights of entry for construction activity that may extend outside of the right of way.

Local Agency Program Pre-Qualification

Under federal guidelines, local Florida agencies wishing to acquire right of way for a project using federal funds must pre-qualify with FDOT *before* initiating right of way activities. To pre-qualify, agencies must submit the following:

1. Documentation showing the adequacy both in quantity and experience of the staff and organization to provide services in conformance with all applicable laws and regulations.
2. A statement detailing the process and identifying the agency official or entity with authority for:
 - (a) Establishing just and full compensation (normally a qualified review appraiser(s);
 - (b) Approval of administrative and legal settlements and settlements of attorney fees and costs (a separate agency official or entity from that named in (a);
 - (c) Granting final agency acceptance of purchase agreements, as applicable;
 - (d) Reviewing relocation assistance appeals; and
 - (e) Executing deeds, easements, leases and contracts.
3. A Project Assurance Statement, pursuant to the 49 CFR 24.4(a) wherein the local agency provides assurances that it will conduct its right of way acquisition and relocation assistance programs in compliance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and in compliance with 49 CFR Part 24. The Project Assurance Statement must also provide an assertion that the local agency is fully empowered to comply with these requirements under state and local law.
4. A signed statement detailing the acceptance of responsibility for reporting real estate transactions to I.R.S. pursuant to 26 CFR Part 1.6045.

During the local agency program pre-qualification process, the agency may also request right of way pre-qualification in certain areas. However, organization, staffing level and expertise must be pre-certified on a project by project basis.

Further requirements for prequalification are listed in FDOT's "Right Of Way Procedures," available at <http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/525010300/Ch02s05.pdf>.

Right of Way Project Authorization

After pre-qualification, local agencies must also obtain right of way project authorization from FDOT. To obtain authorization, agencies must submit two copies of the following to the FDOT District Local Agency Program Administrator:

1. A Project Information Summary
2. Final right of way maps
3. A Statement of Topographic Field Review
4. The Right of Way Project Cost Estimate
5. Form FHWA-37, Federal Project Status Report

Additional requirements for right of way acquisition, including compliance with various other federal regulations, are listed in "Right of Way Procedures," available at <http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/525010300/Ch02s05.pdf>.

References:

1. FDOT Local Agency Program (LAP) Manual, available at http://www.dot.state.fl.us/projectmanagementoffice/lap/LAPManual/LAP_TOC.htm
2. FHWA's Real Estate Acquisition Guide for Local Public Agencies, (Chapter VI, Acquisition); <http://www.fhwa.dot.gov/REALESTATE/lpaguide/index.htm>
3. FHWA's Real Estate Services, Project Development Guide; <http://www.fhwa.dot.gov/realestate/pdg.htm>

FDOT Right of Way Contact:

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FDOT District 5 Right of Way Administrator – Acquisition
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Appendix F - Crash Event Summary

F. Crash Event Summary

Crash Data is shown for the entire two mile radius and may be outside of the school walk zone area. Crash events are identified by stars on the master plan, with a yellow star indicating that the crash occurred within the known or assumed walk zone during school travel times. Red stars indicate a crash event outside of the known walk zone during school travel times and are most likely not related to students traveling to the selected school. Red stars may or may not be located in the school attendance zone of the school included in the Study.

Crash events include all bicycle or pedestrian crashes reported between January 1, 2000 and August 28, 2004 from 7:00am – 8:30am and 2:00pm – 3:30pm (until 2:30 on Wednesdays). June and July are not included and ages of the crash victims were not available.

Crash Events Outside of Walk Zone of PATHWAYS ELEMENTARY School

| Crash ID | Date | Time | Weather | Lighting | Vehicle Type | Vehicle Direction | Road Surface Type | Road Surface Condition | Number of Fatalities | Number of Vehicles | Number of Injuries |
|----------|-----------|-----------|---------|----------|--------------|-------------------|-------------------|------------------------|-----------------------------|--------------------|--------------------|
| 425140 | 8/1/2001 | 1338 P | Clear | Daylight | Automobile | S | Blacktop | Dry | 0 | 2 | 1 |
| | Street 1: | SR 40 GRA | | | | | | Accident Description | Collision with Bicycle | | |
| | Street 2: | SEMINOLE | | | | | | Pedestrian Action | N/A | | |
| | | | | | | | | Alcohol Drug Status | Not Drinking or Using Drugs | | |

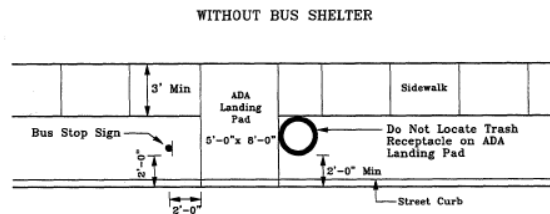
Appendix G - Votran Coordination

G. Votran Coordination

Votran provides over three million rides per year to Volusia County citizens, including transportation to and from school for some public school students. The design and location of Votran bus stops directly affects those students using Votran to get to school, but also has an impact on overall school walk zone safety.

Ensuring students have safe routes between bus stops and schools is a primary concern. In addition, bus stops of all types create secondary concerns:

- Votran bus stops and middle school and high school bus stops add pedestrian traffic in concentrated bursts to roadways and sidewalks, affecting all traffic within an elementary school walk zone
- Bus stops can create conflicting uses of sidewalks in school walk zones (i.e. students bicycling to school might ride through a group of people waiting for a bus).



Hoke Design Inc. recommends that local government agencies, the MPO and the School District coordinate with Votran on planning and construction issues that affect bicycle and pedestrian safety.

School Board Considerations

The School District may wish to consider providing cities, the County, the MPO and Votran with a list of elementary school, middle school and high school bus stops to provide for increased coordination when planning sidewalk facilities. This will allow planners to minimize any conflicts between Votran and school bus stops, and prioritize sidewalk construction projects that meet multiple needs. For example, the same sidewalk may serve students walking to a middle school bus stop and patrons walking to Votran stops along with elementary students walking or bicycling to school.

The School District may also wish to consider notifying Votran of any removals of Hazardous or Unique Conditions status within school walk zones. This will allow Votran to better respond to any increased use of their services by students, including alteration of routes or schedules to accommodate students.

Considerations for Cities, the County and the MPO

Cities, County departments, and the MPO may wish to coordinate with Votran and the School District to ensure both school bus and Votran stops are considered when planning sidewalks, trails and transit. Within elementary school walk zones, the first step in these efforts should be to map middle school, high school and Votran bus stop locations. This will allow planners to take into account pedestrian traffic from both school bus and public transit systems when prioritizing sidewalk construction efforts.

Local government agencies should work with Votran to optimize public transit stop locations. Best practices for location of bus stops include:

- Locate stops where there is a safe place to stand or sit away from the road while waiting
- Place stops in the shade when possible (provide shelters whenever feasible)
- Locate stops along areas with existing sidewalks and provide a paved connection to the waiting area.
- Provide safe connections from area trails and bike lanes, and pedestrian connections to nearby destinations (schools, shopping, parks, offices, etc.)
- Review routes for hazards
 - In rights of way where sidewalks not provided
 - In areas not well-lit
 - For small children, elderly, stroller use, and those with disabilities.

If a bus stop location must be provided in areas where there are no sidewalks, government agencies should coordinate sidewalk planning and construction efforts with all players to find funding sources.

Best practices for enhancing bus patron comfort and safety include:

- Where right of way is available, add paved waiting or accessory pads at stops
- Add bicycle racks to bus stops
- Provide benches and trash receptacles at stops
- Construct shelters whenever feasible.

Most new Votran routes evolve from the 5 Year Development Plan (TDP) adopted by the County Council after input from the public, elected officials and local leaders, Votran staff and Votran's Service Development Committee. City or county personnel, as well as private citizens, can also request changes in bus routes by sending a written request to Votran for review by the Service Development Committee.

Detailed information on planning for the comfort, safety and convenience of bus stop patrons is contained in two resource documents:

1. "TCRP 19: Guidelines for the Location and Design of Bus Stops"
TCRP (Transit Cooperative Research Program)

(see Chapter 4, Curb-Side Factors)

(Available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_19-a.pdf)

2. "From Bus Shelters to Transit Oriented Development"
Florida Department of Transportation

Available at

<http://www.dot.state.fl.us/transit/Pages/FromBusShelterstoTODLiteratureReview.pdf>

Additional information is available from Votran. Please contact:

Gary Willoughby

Assistant General Manager of Planning, Marketing, and Customer Service

386-756-7496 ext. 4112

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<http://www.votran.org>

Appendix H – American with Disabilities Act (ADA) and Design References

H. Americans with Disabilities Act (ADA) and Design References (Source: FDOT)

FDOT manuals and design standards

- *Plans Preparation Manual (esp. Vol. 1, chapters 2, 8, 10, 21, 25).*
<http://www.dot.state.fl.us/rddesign/PPMManual/PPM.htm>
- *Design Standards (esp. Indexes 304, 310, 544, 546, 600, 820-860, 17344, 17352, 17359, 17784).*
<http://www.dot.state.fl.us/rddesign/DesignStandards/Standards.htm>
- *Manual on Uniform Traffic Control Devices*
http://mutcd.fhwa.dot.gov/kno_2003.htm
- *Manual on Uniform Traffic Studies ("MUTS Manual"), chapters 9, 10.*
<http://www.dot.state.fl.us/TrafficOperations//Operations/Studies/MUTS/MUTS.h>
- *Project Design and Environment Manual, Part 2, Chap. 14.*
<http://www.dot.state.fl.us/emo/pubs/pdeman/pt2ch14.pdf>
- *Traffic Engineering Manual (esp. sections 2.11, 3.7, 3.8, 3.9, 4.1).*
<http://www.dot.state.fl.us/TrafficOperations//Operations/Studies/TEM/TEM.htm>
- *Florida Greenbook (Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways)–standards and criteria for counties, cities, and other road authorities (except FDOT)*
<http://www.dot.state.fl.us/rddesign/FloridaGreenbook/FGB.htm>

ADA Accessibility Guidelines

- for adopted FDOT standards and policy, see *Design Standards (esp. Indexes 310, 17784)*, *Plans Preparation Manual (esp. sections 8.3 and 25.4.19)*, and
<http://www.dot.state.fl.us/structures/ada/default.htm>
- *Revised Draft Guidelines for Accessible Public Rights of Way*, US Access Board 2005.
<http://www.access-board.gov/prowac/draft.htm>
- FHWA accessibility guidance (see below)
- *ADA Accessibility Guidelines for Buildings and Facilities* (de facto current minimum standards for public right-of-way, except insofar as superseded by more stringent FDOT standards)
<http://www.access-board.gov/adaag/html/adaag.htm>

FHWA Bicycle & Pedestrian Program Guidance

- Legislative overview and regulations
<http://www.fhwa.dot.gov/environment/bikeped/overview.htm>

- Program, design, and accessibility guidance
<http://www.fhwa.dot.gov/environment/bikeped/guidance.htm>

FDOT handbooks and guidelines

- *Accessing Transit Handbook*.
<http://www.dot.state.fl.us/transit/Pages/AccessingTransitHandbookLow.pdf>
- *Bicycle Facilities Planning and Design Handbook*.
http://www.dot.state.fl.us/safety/ped_bike/ped_bike_standards.htm
- *Pedestrian Planning and Design Handbook*.
http://www.dot.state.fl.us/safety/ped_bike/ped_bike_standards.htm
- *Intersection Design Guide*.
<http://www.dot.state.fl.us/rddesign/FIDG-Manual/FIDG.htm>
- *Quality/Level of Service Handbook*, research papers,
<http://www.dot.state.fl.us/planning/systems/sm/los/default.htm>
- *Trail Intersection Design Handbook*.
http://www.dot.state.fl.us/safety/ped_bike/handbooks_and_research/TRAILINT.PDF
- *Transit Facilities Guidelines*.
<http://www.dot.state.fl.us/transit/Pages/TRANSIT%20FACILITIES%20GUIDELINES.PDF>

Other guidance publications

- *Bicycle Parking Guidelines*, APBP.
<http://www.bicyclinginfo.org/pdf/bikepark.pdf>
- *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*, a proposed Recommended Practice, ITE, 2006.
<http://www.ite.org/bookstore/RP036.pdf>
- *Designing Trail Termini*, report for FDOT.
http://www.dot.state.fl.us/safety/ped_bike/handbooks_and_research/termini.pdf
- *Guide for the Development of Bicycle Facilities*, AASHTO, 1999 (much of the guidance is essentially repeated in the FDOT *Bicycle Facilities Handbook*). Available from AASHTO,
https://bookstore.transportation.org/item_details.aspx?ID=119
- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, AASHTO, 2004. Available from AASHTO,
https://bookstore.transportation.org/item_details.aspx?ID=119
- *Implementing Bicycle Improvements at the Local Level*, Report No. FHWA-98-105, http://safety.fhwa.dot.gov/ped_bike/docs/localbike.pdf

- *Pedestrian- and Transit-Friendly Design*, prepared for FDOT Public Transit Office, 1996. <http://www.dot.state.fl.us/planning/systems/sm/los/pdfs/pedtran.pdf>
- *Pedestrian Facilities Users Guide*, Report No. FHWA-RD-01-102, FHWA. <http://www.walkinginfo.org/pdf/peduserguide/peduserguide.pdf>

Safety studies and analysis & countermeasure selection resources

- *BIKESAFE*, Bicycle Safety Countermeasure Selection System, <http://www.bicyclinginfo.org/bikesafe/>
- *PEDSAFE*, Pedestrian Safety Countermeasure Selection System, <http://www.walkinginfo.org/pedsafe/>
- *PBCAT 2.0*, Pedestrian & Bicycle Crash Analysis Tool, crash database development, analysis and countermeasure selection software application, description and download at <http://www.walkinginfo.org/pc/pbcats.htm> or <http://www.bicyclinginfo.org/bc/pbcats.htm>
- *A Guide for Reducing Collisions Involving Pedestrians*, Volume 10 of NCHRP Report 500 (*Guidance for Implementation of the AASHTO Strategic Highway Safety Plan*), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v10.pdf
- *A Review of Pedestrian Safety Research in the United States and Abroad*, Publication FHWA-HRT-04-100, 2004. <http://www.walkinginfo.org/rd/safety.htm#pedsynth>
- *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines*, Report No. FHWA-RD-01-075. http://www.walkinginfo.org/pdf/r&d/crosswalk_021302.pdf

References included separately include the following:

- CD of "Bicycle Safer Journey", Publication FHWA-SA-03-013
- Book "How to Develop a Pedestrian Safety Action Plan", Publication FHWA-SA-05-12

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