

Florida Department of Transportation - District Five

# PEDESTRIAN SAFETY AUDIT REPORT

SR 424/Edgewater Drive from  
SR 423/Lee Road to SR 434/Forest City Road

October 2012

Prepared for:

**Florida Department of Transportation  
District Five**

719 South Woodland Avenue  
DeLand, Florida 32720-6800

Prepared by:

**Kittelson & Associates, Inc.**

225 E. Robinson Street  
Suite 450  
Orlando, Florida 32801  
407.540.0555  
kittelson.com



FLORIDA DEPARTMENT OF TRANSPORTATION  
DISTRICT FIVE



# **Pedestrian Safety Audit Report**

**SR 424/Edgewater Drive from  
SR 423/Lee Road to SR 434/Forest City Road**

Section Number: 75260000  
Mile Post: 4.188 to 4.854  
Orange County

Continuing Services Contract for Growth Management, District 5  
Contract No. C-8R18  
Task Work Order No. 46  
FPN No.: 405854-1-12-05

prepared for:



Florida Department of Transportation – District Five  
719 South Woodland Boulevard  
DeLand, FL 32720-6800

**October 2012**



## SR 424/Edgewater Drive

**Project Title: SR 424/Edgewater Drive from SR 423/Lee Road to SR 434/Forest City Road**

**Field Review Date:** July 19, 2012

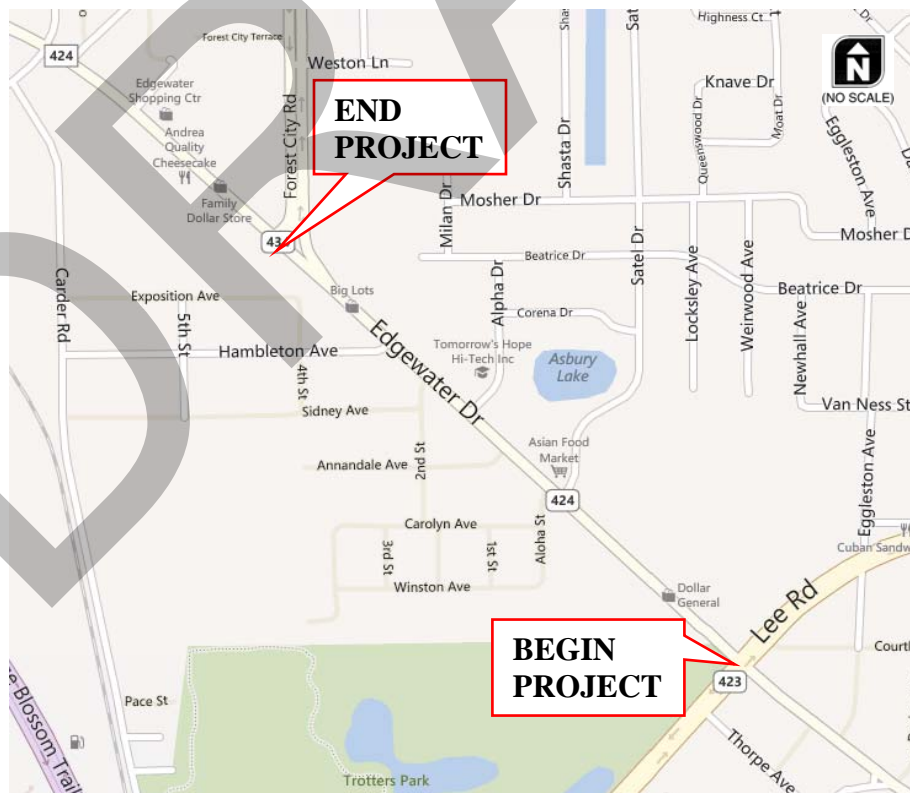
### **Participants:**

John R. Freeman, Jr., P.E., PTOE - Kittelson and Associates, Inc – Team Leader  
Anthony R. Nosse, C.P.M., P.E. – Florida Department of Transportation, District 5  
Christopher Cairns, P.E., PTOE – Florida Department of Transportation, District 5  
Mighek Wilson – MetroPlan Orlando  
Krista Barber – Orange County Public Works Department, Traffic Engineering Division  
Adam M. Burghdoff, P.E. – Kittelson and Associates, Inc.

### **Project Characteristics:**

Audit Type: Pedestrian, Existing Road  
Adjacent Land Use: Urban; Commercial  
Posted Speed Limit: 45 MPH  
Opposite Flow Separation: Divided by Two-Way Left-Turn Lane or Striped Median  
Service Function (Urban): Arterial  
Terrain: Flat  
Climatic Conditions: Sunny, Warm

**SR 424/Edgewater Drive from SR 423/Lee Road to SR 434/Forest City Road**



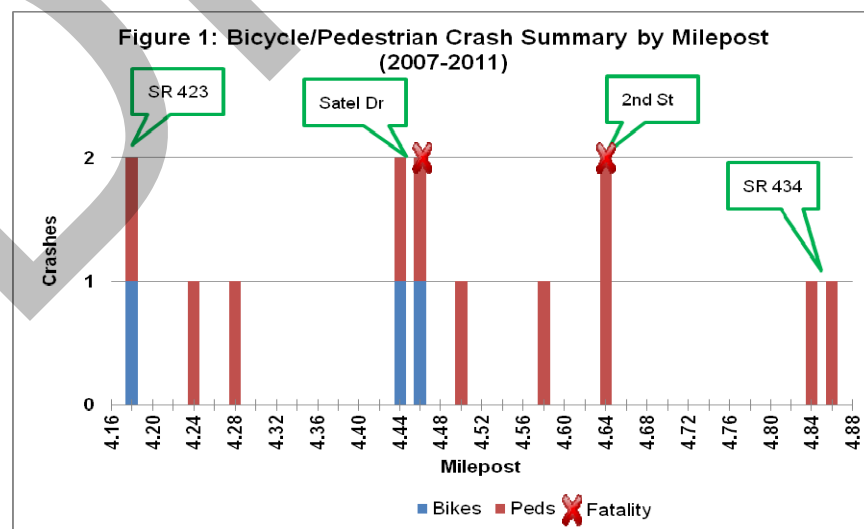


### Background:

This pedestrian safety audit was commissioned by FDOT District Five to develop immediate, near-term, and long-term recommendations to improve the safety of pedestrians and bicyclists within the study limits. This safety audit is limited in scope and should not be construed as a comprehensive safety study; nor is it a formal Road Safety Audit. It is intended to identify apparent operational and safety related issues related to pedestrians and bicyclists to be considered by district staff and partner agencies (i.e. Orange County, MetroPlan Orlando). Some issues presented in this report may warrant immediate action while other suggested safety improvements may be considered for future study by the District. Each recommendation identified in this study is classified into one of three categories: immediate maintenance, near-term improvement, or long-term improvement. It is anticipated that issues identified for immediate maintenance may be addressed by public agency staff on a short timeframe and at a relatively low cost. Near-term improvements are activities that may be incorporated into an upcoming construction project in the area, including 3R milling and resurfacing projects. Finally, long-term improvements are activities that may be incorporated into upcoming construction projects and may need to be programmed for funding as separate projects.

Crash data utilized for this assessment was obtained from FDOT's Crash Analysis Reporting System (CARS) database and limited to bicycle and pedestrian-related crashes reported between 2007 and 2011. Kittelson and Associates, Inc. (KAI) created a crash diagram to summarize the bicycle/pedestrian-related crash history. This two-thirds-mile stretch of SR 424/Edgewater Drive is bookended by two signalized intersections (SR 423/Lee Road and SR 434/Forest City Road). 14 crashes were reported over the five-year study period. The CARS database indicated that all of the bicycle/pedestrian-related crashes were crashes with pedestrians; however, upon further review of the long-form crash reports, five of the 14 involved bicyclists and not pedestrians. The crashes resulted in 12 injuries and two fatalities. Eight of the crashes occurred during daylight hours. The two fatalities occurred at night. The most frequent contributing cause was the failure to yield right-of-way (ROW).

The crashes are summarized by milepost in Figure 1. As illustrated in Figure 1, eight of the 14 crashes occurred mid-block between SR 423/Lee Road and SR 434/Forrest City Road. Of the two crashes that occurred at the SR 423/Lee Road intersection, one involved a bicycle. One of the two crashes that occurred at SR 434 involved a motorized wheelchair. The crash diagram, along with other pertinent crash data and intersection signal timing data, is provided in the Appendix.



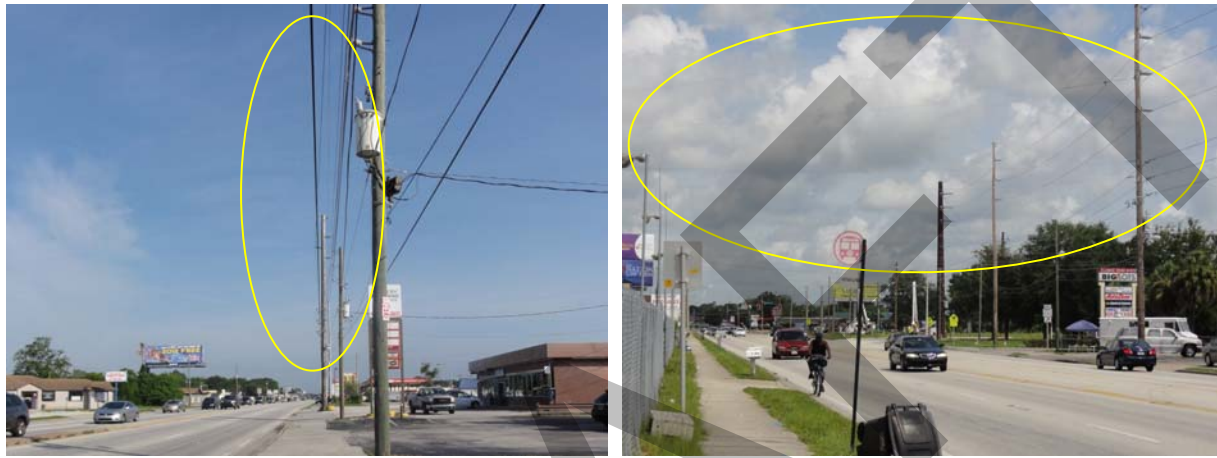




## PEDESTRIAN SAFETY ASSESSMENT FINDINGS

**Location: Corridor Wide**

### Issue: Absence of Roadway Lighting



#### **Description of Safety Issue:**

The study corridor does not have street lighting. The 2010 Highway Safety Manual, 1<sup>st</sup> Edition (HSM), provides an equation for crash modification factors (CMF) of roadways with street lighting. The CMF equation is:

$$CMF_{4r} = 1.0 - (p_{nr} \times (1.0 - 0.72 \times p_{inr} - 0.83 \times p_{pnr}))$$

Where :

$CMF_{4r}$  = crash modification factor for the effect of roadway segment lighting on total crashes;

$p_{inr}$  = proportion of total nighttime crashes for unlighted roadway segments that involve a fatality or injury;

$p_{pnr}$  = proportion of total nighttime crashes for unlighted roadway segments that involve property damage only; and

$p_{nr}$  = proportion of total crashes for unlighted roadway segments that occur at night.

Six of the 14 total crashes occurred at night ( $p_{nr} = 6/14 = 0.429$ ). All of the six nighttime crashes involved a fatality or injury ( $p_{inr} = 6/6 = 1.000$ ). None of the six nighttime crashes involved property damage only ( $p_{pnr} = 0/6 = 0.000$ ). Therefore, per the 2010 HSM, the crash modification factor (CMF) associated with implementing street lighting on this roadway would be 0.88. This indicates a 12-percent reduction in total crashes expected along the corridor.

#### **Suggestion for Long-Term Improvement:**

Install street lighting along the corridor.



**Location: SR 424/Edgewater Drive & SR 423/Lee Road**

**Issue: Detectable Warning Surface Orientation**



**Description of Safety Issue:**

Where detectable warning surfaces exist, the majority are improperly oriented to lead pedestrians into the crosswalk.

**Suggestion for Near-Term Improvement:**

If / when major construction or expansion occurs, orient detectable warning surfaces with direction of crosswalk.

**Issue: Periodical Publication Distribution Boxes Obstructing View of Wheelchairs**



**Description of Safety Issue:**

The periodical publication distribution boxes on the northeast corner of the intersection obstruct motorist's view of pedestrians and wheelchairs.



**Suggestion for Immediate Maintenance:**

Relocate or remove periodical publication distribution boxes.

**Issue:** High WB right-turn Volume Not Yielding to Pedestrians in Crosswalk



**Description of Safety Issue:**

The Pedestrian RSA team noted a high volume of westbound right-turning vehicles not yielding to pedestrians crossing the northern leg of the intersection. The pedestrian shown in the photo above is visually impaired.

**Suggestion for Near-Term Improvement:**

Consider the installation of "Yield to Pedestrian" signage to raise awareness at this intersection. Internally illuminated signage that is activated during appropriate pedestrian phases is recommended. Signs should be placed according to future study considering turning volumes and enforcement.





**Location: SR 424/Edgewater Drive & Satel Drive**

**Issue: Fencing Obstructing Motorist View of Sidewalk Users**



**Description of Safety Issue:**

At the intersection of SR 424/Edgewater Drive & Satel Drive there was fencing recently installed less than two feet behind the curb line on Satel Drive. The fencing, accompanied by the vehicles parked in the lot that is protected by the fencing, obstruct a westbound approaching motorist's view of the sidewalk along the east side of SR 424/Edgewater Drive. This obstructed view may have contributed to a crash with a bicyclist traveling southbound on the sidewalk and a motorist traveling westbound at this location in November 2011.

**Suggestion for Immediate Maintenance:**

The original recommendation for this safety issue was to check the sight triangle at this intersection and zoning compliance of fence installation. During the time that this document was under production, the fence was relocated to provide added sight distance at the intersection. Pictures of the relocated fence are provided below:







**Location: SR 424/Edgewater Drive & Aloha Street**

**Issue: Mid-Block Crash History**



**Description of Safety Issue:**

As depicted in Figure 1, over one third of the pedestrian and bicycle crashes along the study corridor occurred between Milepost 4.440 and 4.520, near Satel Drive and Aloha Street. Several factors contribute to the higher pedestrian activity in the area and, consequently, the concentration of crashes. This particular area has a residential development located to the west of SR 424 and a restaurant/nightclub/bar on the east of SR 424. In addition to the interaction between the residential and restaurant land uses, a transit stop is located approximately midway between Aloha Street and Annandale Avenue. The Pedestrian RSA team also observed a pedestrian stumble and fall within the two-way left-turn lane. The pedestrian then laid down in the two-way left-turn lane until passing motorists and law enforcement stopped and helped him to safety.

**Suggestion for Near-Term Improvement:**

Consider the installation of a median island that could serve as a pedestrian refuge near Lynx stop 5066, approximately 200 feet south of Satel Drive. If the median island is constructed as part of a mid-block crossing, then Chapter 3B18 of the 2009 Manual of Uniform Traffic Control Devices (MUTCD) should be consulted in regard to whether crosswalk striping should be provided. Additionally, Section 3.8 of the FDOT Traffic Engineering Manual should be consulted to aid in identifying applicable crosswalk treatments for consideration.



**Location: SR 424/Edgewater Drive & 2<sup>nd</sup> Street**

**Issue: Mid-Block Crash History**



**Description of Safety Issue:**

As depicted in Figure 1, two crashes occurred near 2<sup>nd</sup> Street. One of the two crashes occurred in low light conditions. The commercial land uses on the east side of SR 424 near this location are set back further from the roadway than in other places along the corridor resulting in the lower availability of ambient lighting. There are also two Lynx transit stops near this location which contribute to a higher level of mid-block crossing at this location.

**Suggestion for Near-Term Improvement:**

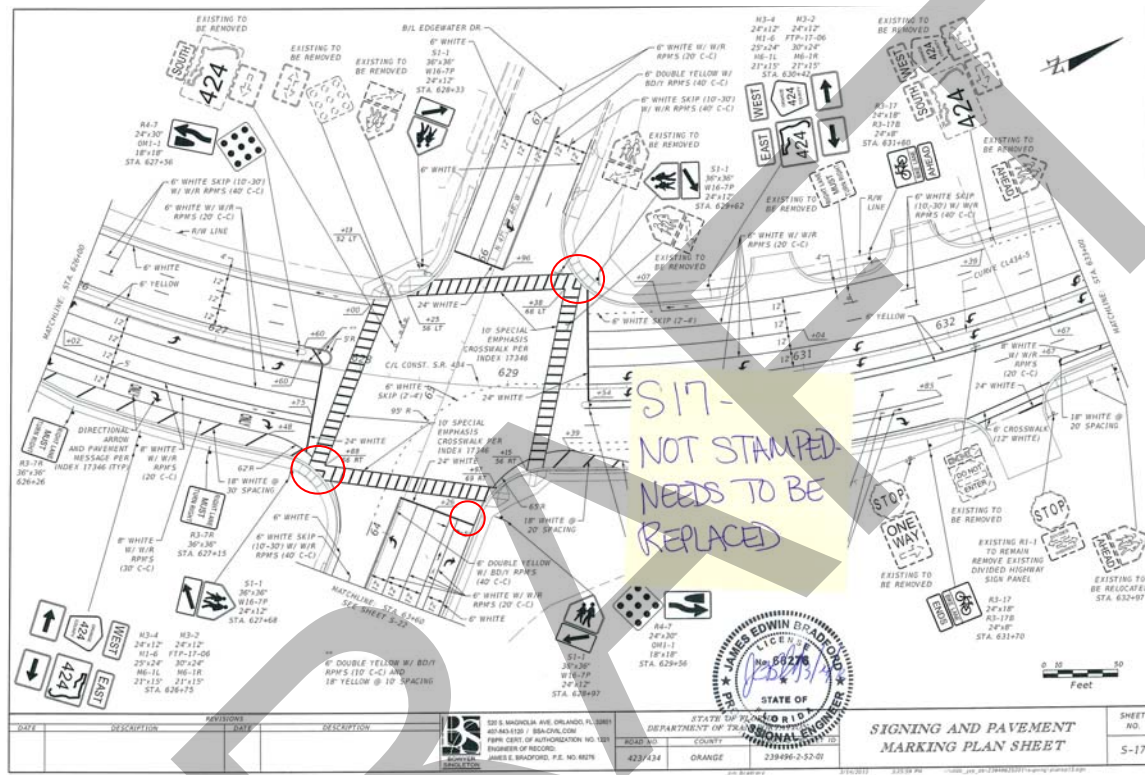
Consider the consolidating transit stops at this location such that they are more directly across from each other if Lynx ridership data indicates high transit boardings and alightings at this location. A potential location to consider for the transit stops is just south of 2<sup>nd</sup> Street. Consider installation of a median island on SR 424 on the north side of 2<sup>nd</sup> Street. If the median island is constructed as part of a mid-block crossing, then Chapter 3B18 of the 2009 Manual of Uniform Traffic Control Devices (MUTCD) should be consulted in regard to whether crosswalk striping should be provided. Additionally, Section 3.8 of the FDOT Traffic Engineering Manual should be consulted to aid in identifying applicable crosswalk treatments for consideration.



**PEDESTRIAN SAFETY AUDIT REPORT**  
**SR 424/Edgewater Drive**  
**ORANGE COUNTY, FLORIDA**

**Location: SR 424/Edgewater Drive & SR 434/Forest City Road**

**Issue: Potential Design-Plan Issues**



**Description of Safety Issue:**

This intersection is currently under construction to facilitate the Forest City Road extension. The original design showed crosswalks intersecting within the intersection and a single ADA ramp for both intersecting crosswalks. The use of a single ADA ramp for multiple crosswalks imposes difficulty in aligning detectable warning surfaces with the crosswalk direction.

Additionally, the Forest City Road approaches were originally designed with a single stop bar location for all approach lanes. Due to the skew of this intersection, the single stop bar could cause some vehicles to stop further from the crosswalk than others. This introduces the potential for vehicles to disregard the stop bar and potentially block the crosswalk.

**Suggestion for Design Update:**

Consider providing two separate ADA ramps on each corner serving two crosswalks. Place detectable warning surfaces in line with the crosswalk direction.

Consider moving selected stop bars closer to the crosswalks to create a staggered stop bar that allows for enhanced vehicular visibility. Per FDOT Standard Index No. 17346, stop bars shall be installed no less than four feet from the crosswalk.





## SUMMARY OF RECOMMENDATIONS

This pedestrian safety audit considers operational and safety related issues for pedestrians and bicyclists on SR 424/Edgewater Drive from SR 423/Lee Road to SR 434/Forest City Road. This study was commissioned by FDOT District Five to develop immediate, near-term, and long-term recommendations to improve the safety of pedestrians and bicyclists within the study limits. The recommendations of this study, detailed in the report, are summarized in the table below by priority (immediate, near-term, or long-term).

Location	Issue	Suggestion
<b>Immediate Priority</b>		
SR 423	Periodical Publication Distribution Boxes Obstructing View of Wheelchairs	Relocate or remove periodical publication distribution boxes.
Satel Drive	Fencing Obstructing Motorist View of Sidewalk Users	Check sight triangle at this intersection and zoning compliance of fence installation. Clear necessary sight triangle if zoning/setback violation is present. <b>RESOLVED</b>
Forest City Road	Single ADA ramp serving two crosswalks	Consider one ADA ramp per crosswalk and orient detectable warning surfaces aligned with crosswalk.
Forest City Road	Stop bar alignment	Stagger stop bar locations to improve vehicular sight distance.
<b>Near-Term Priority</b>		
SR 423	High WBR-turn Volume Not Yielding to Pedestrians in Crosswalk	Consider the installation of "Yield to Pedestrian" signage to raise awareness at this intersection. Internally illuminated signage that is activated during appropriate pedestrian phases is recommended. Signs should be placed according to future study considering turning volumes and enforcement.
SR 423	Detectable Warning Surface Orientation	If / when major construction or expansion occurs, orient detectable warning surfaces with direction of crosswalk.
Aloha Street	Mid-Block Crash History	Consider the installation of a median island that could serve as a pedestrian refuge near Lynx stop 5066, approximately 200 feet south of Satel Drive. If the median island is constructed as part of a mid-block crossing, then Chapter 3B18 of the 2009 Manual of Uniform Traffic Control Devices (MUTCD) should be consulted in regard to whether crosswalk striping should be provided. Additionally, Section 3.8 of the FDOT Traffic Engineering Manual should be consulted to aid in identifying applicable crosswalk treatments for consideration.
2nd Street	Mid-Block Crash History	Consider the consolidating transit stops at this location such that they are more directly across from each other if Lynx ridership data indicates high transit boardings and alightings at this location. A potential location to consider for the transit stops is just south of 2nd Street. Consider installation of a median island on SR 424 on the north side of 2nd Street. If the median island is constructed as part of a mid-block crossing, then Chapter 3B18 of the 2009 Manual of Uniform Traffic Control Devices (MUTCD) should be consulted in regard to whether crosswalk striping should be provided. Additionally, Section 3.8 of the FDOT Traffic Engineering Manual should be consulted to aid in identifying applicable crosswalk treatments for consideration.
<b>Long-Term Priority</b>		
Corridorwide	Absence of Roadway Lighting	Install street lighting along corridor.

DRAFT

## Appendix