

 June 19 - 20, 2025

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## Fowler Avenue Pedestrian and Bicycle Intersection Safety Improvements

### FPIN: 447696-1

Tina Russo, LCI 395 – D7 Bicyclist and Pedestrian Program Manager  
 Allie Caldwell – FDOT Complete Streets Coordinator  
 Andrew Gray, EI, RSP2I – D7 Bicyclist and Pedestrian Safety Consultant

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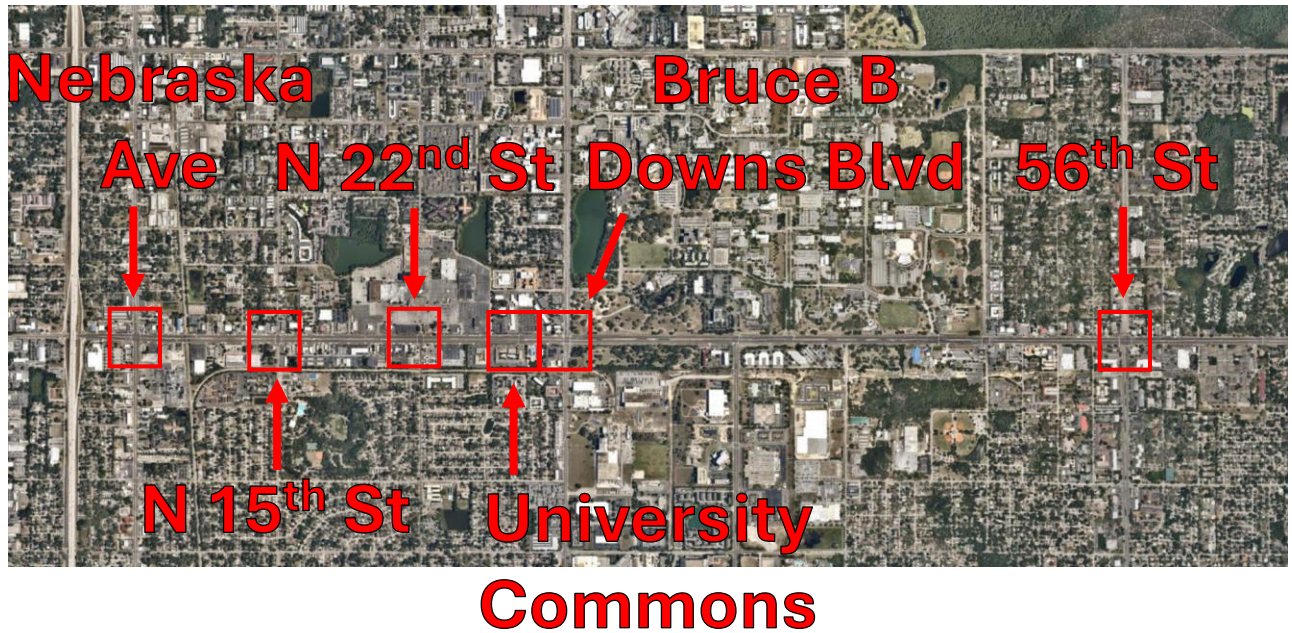
## Agenda

- Project Overview
- Tight Right Turn Channelization
- Bulb Outs
- Median Refugee Islands
- Missing Crosswalks
- LED Lighting Retrofit
- Buffered Bike Lanes
- Leading Pedestrian Interval
- Other D7 Projects Using Fowler Avenue Designs

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Cross Street	Bicycle & Pedestrian Crash Severity	Bicycle & Pedestrian Crashes Before Construction (2016 - 2020)
<b>Nebraska Avenue (US 41)</b>	Fatal & Serious Injury	5
	Other Severity	6
<b>N 15th Street</b>	Fatal & Serious Injury	3
	Other Severity	19
<b>N 22nd Street</b>	Fatal & Serious Injury	2
	Other Severity	8
<b>University Commons</b>	Fatal & Serious Injury	0
	Other Severity	2
<b>Bruce B Downs Boulevard/30th Street</b>	Fatal & Serious Injury	0
	Other Severity	6
<b>56th Street (SR 583)</b>	Fatal & Serious Injury	1
	Other Severity	10

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# Tight Right Turn Channelization



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## FDM 212.12.2

### 212.12.2 Turning Roadways with Corner Islands

Consider providing a corner island at an intersection where paved areas are excessively large or do not establish proper channelization of traffic. Corner islands can provide delineation for through and turning traffic. In addition, corner islands shorten crosswalks and give pedestrians and bicyclists a refuge area. See **FDM 210.3.2** for island requirements.

Channelized right-turn lanes can be designed with a flat or near perpendicular angle of entry to the cross street (see **Figure 212.12.3**). The flat angle of entry is most appropriate for higher-speed turning movements with no pedestrian accommodations. Large turning radii and angles of entry into the cross street allow higher turning speeds, reduced traffic delays, and the turning movement of large trucks. The higher speeds, angle of entry and large radii adversely impact pedestrian safety at the crosswalk.

The near perpendicular angle of entry is preferred where pedestrian facilities are provided. Tight turning radii and angles of entry into the cross street accommodate the following:

- Slower turning speeds,
- Reduced cross walk length,
- Improved pedestrian visibility,
- Improved sight distance,
- Decreased angle of driver head turning,
- Reduced right-of-way impacts.

Consider the near perpendicular right-turn lane design in **Figure 212.12.4** when the following conditions are met:

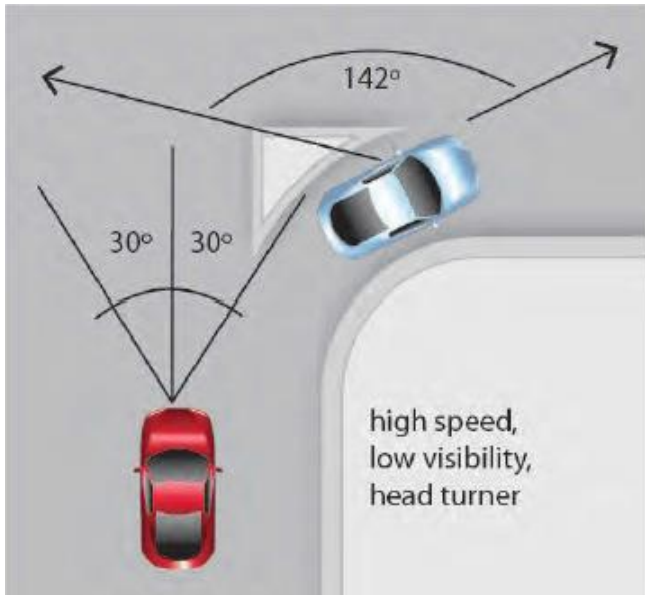
- Context Classifications C2T, C3, C4, C5 and C6
- Low-speed roadway (design speeds of 45 mph and less)
- Pedestrian traffic is expected
- No acceleration lane is provided

This design includes the previously-mentioned benefits to passenger cars and pedestrians with striping and a scalene triangle shaped corner island. An approaching deceleration lane is preferred to provide vehicles additional time to stop for crossing pedestrians. The crosswalk is set back 20 feet minimum from the end of the island to allow room for a passenger car to wait for a gap in traffic without blocking the crosswalk. As shown in **Figure 212.12.4**, the outside curb radii can be designed to accommodate over-tracking of large vehicles such as single-unit trucks, transit, or Florida Interstate Semi-trailers (WB-62FL).

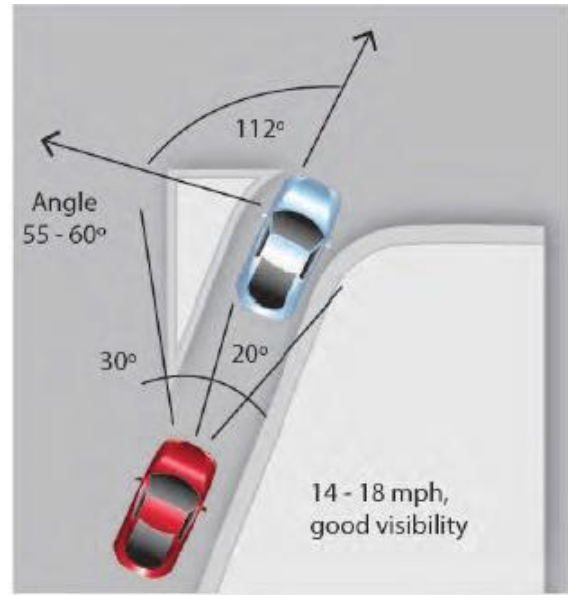
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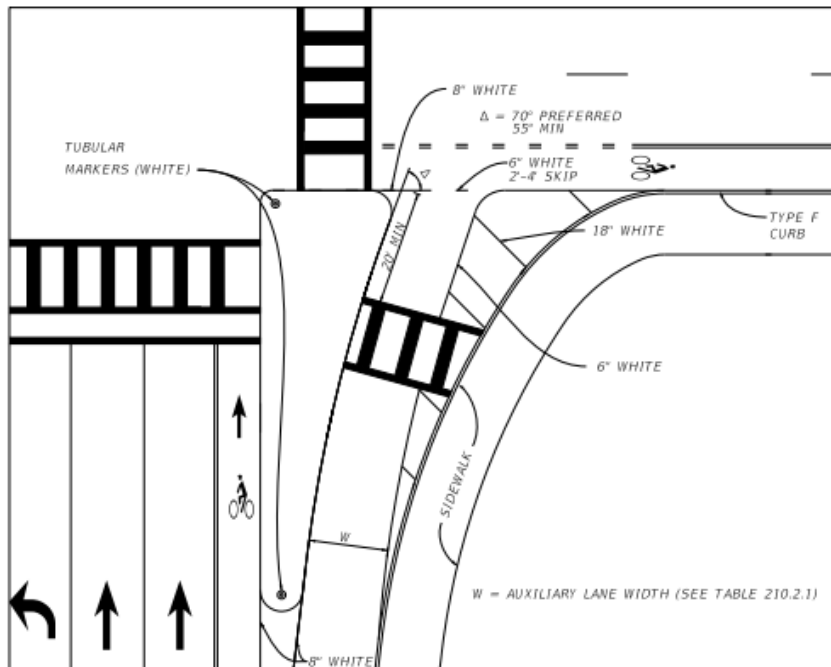
**Traditional Wide Design**



**New Tight Design**

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**Figure 212.12.4 Near Perpendicular Right-Turn Lane**



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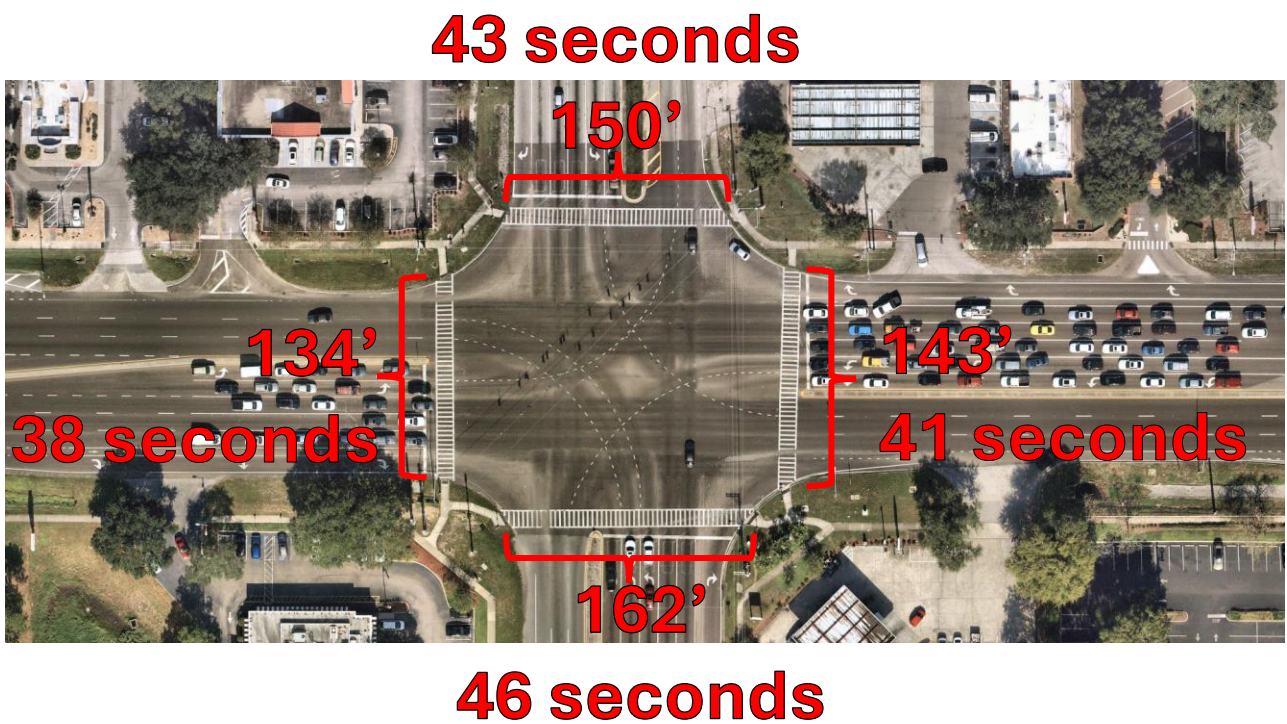
# 56<sup>th</sup> Street

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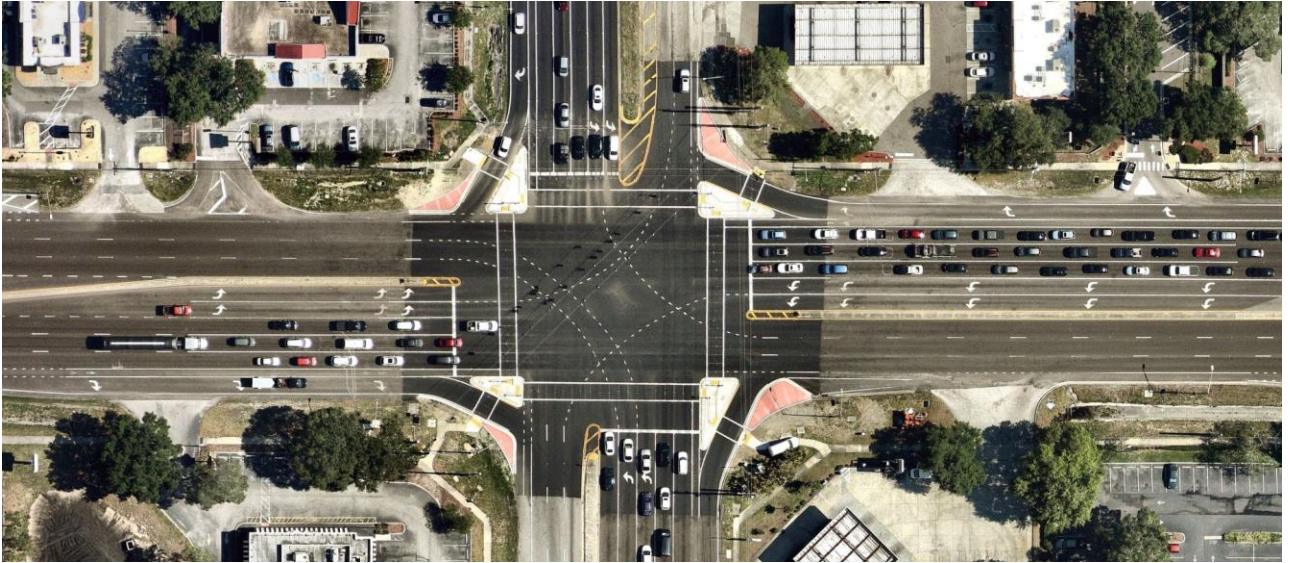


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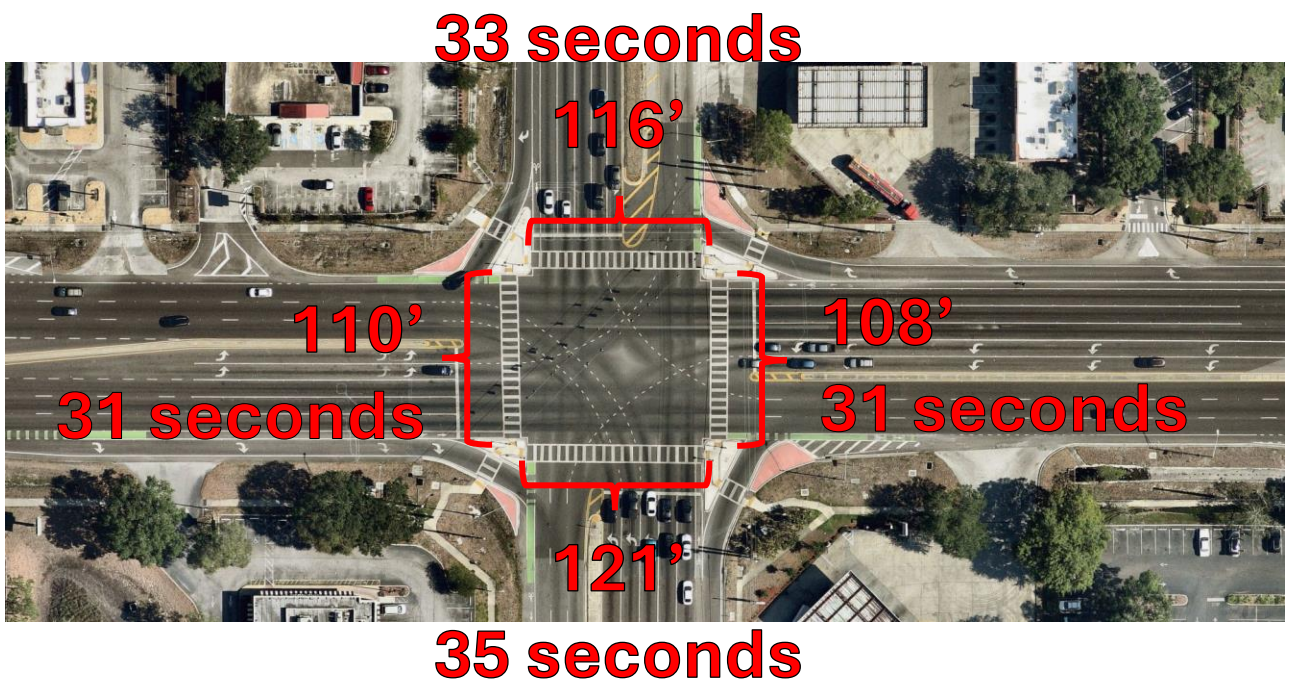
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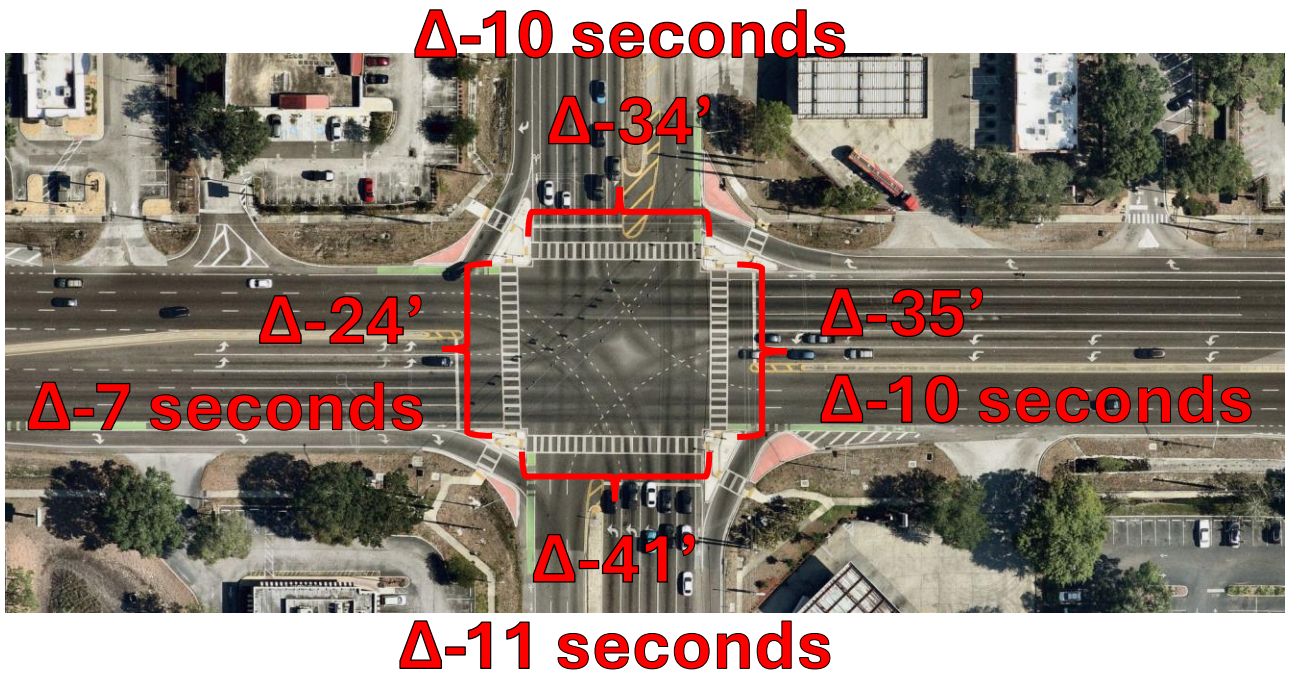
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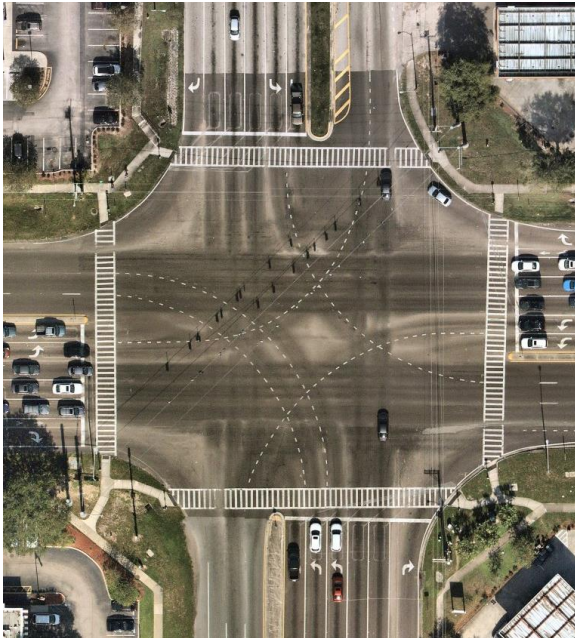
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# Bruce B Downs Boulevard/30<sup>th</sup> Street

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# Tight Right Turn Channelization Before and After Study

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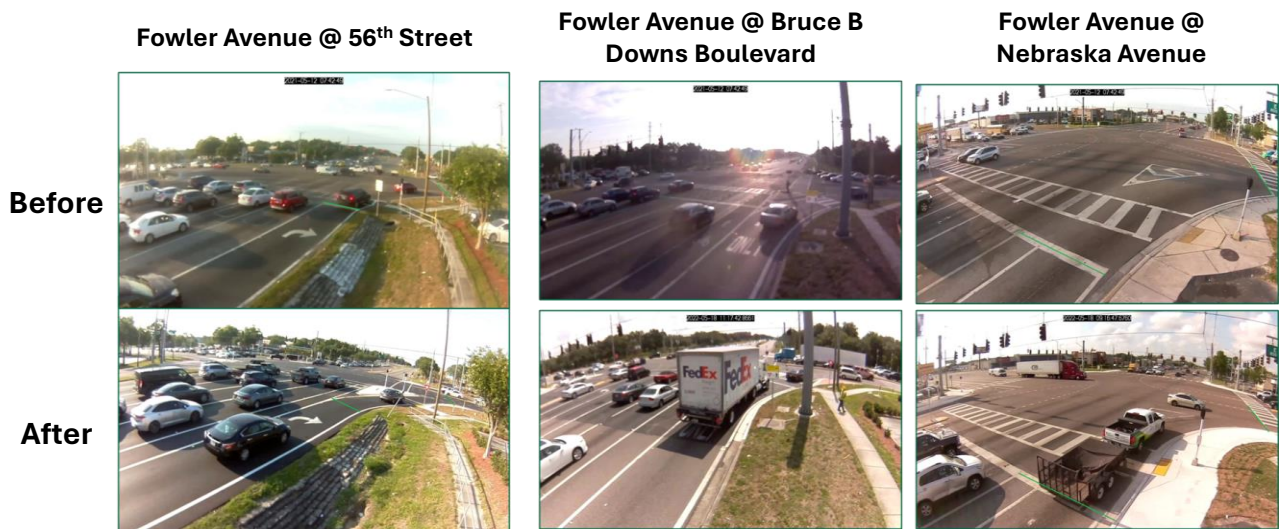
# Methodology

- Data Collection Dates
  - Before: Wednesday, May 12<sup>th</sup>, 2021
  - After: Wednesday, May 18<sup>th</sup>, 2022
- Three Intersections
  - Fowler Avenue @ 56<sup>th</sup> Street
  - Fowler Avenue @ Bruce B Downs Boulevard (30<sup>th</sup> Street)
  - Fowler Avenue @ Nebraska Avenue (US 41)
- Behavioral Analysis
  - Right Turning Vehicle Speed
  - Drivers Yielding to Pedestrians

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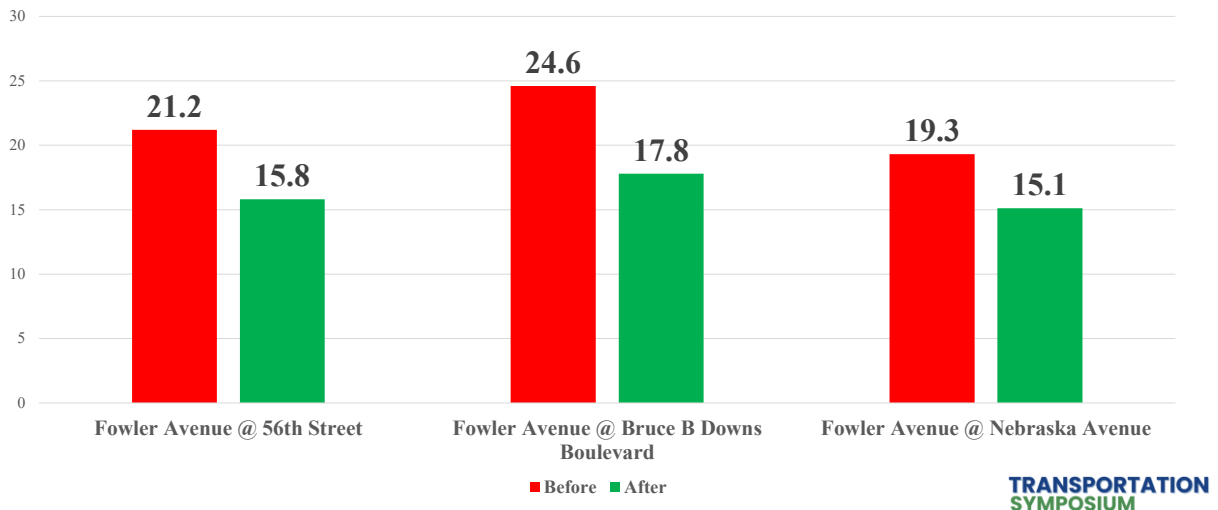


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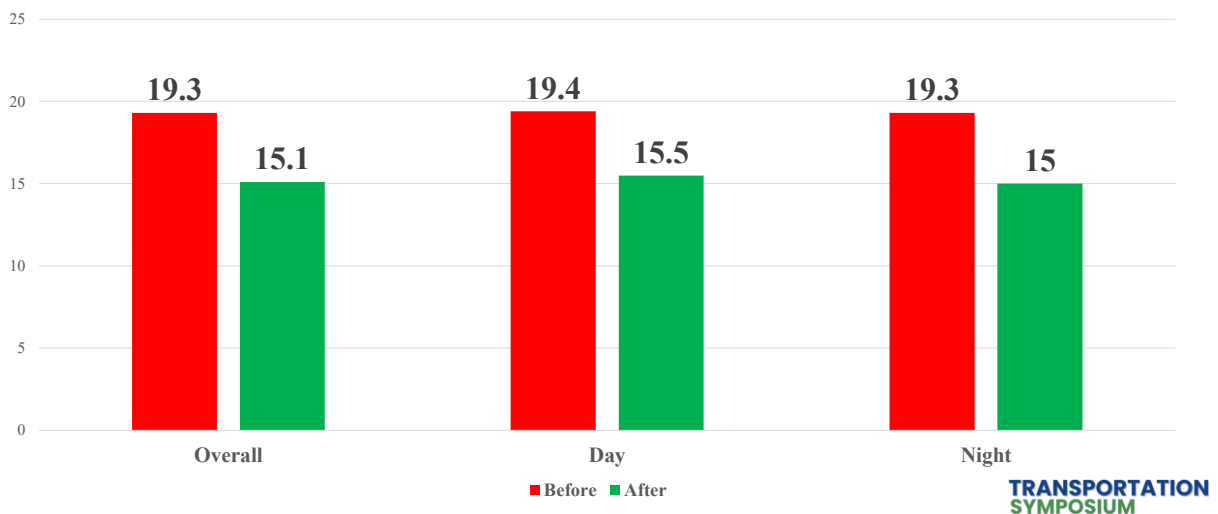
## Right-Turn Speed (mph) by Intersections



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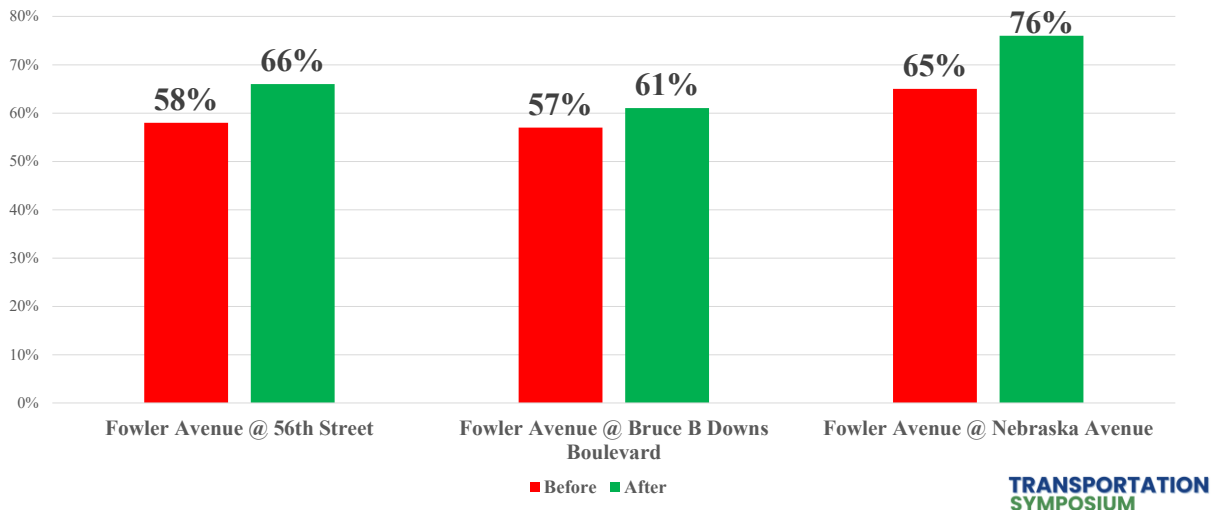
## Overall Right Turning Speeds (mph)



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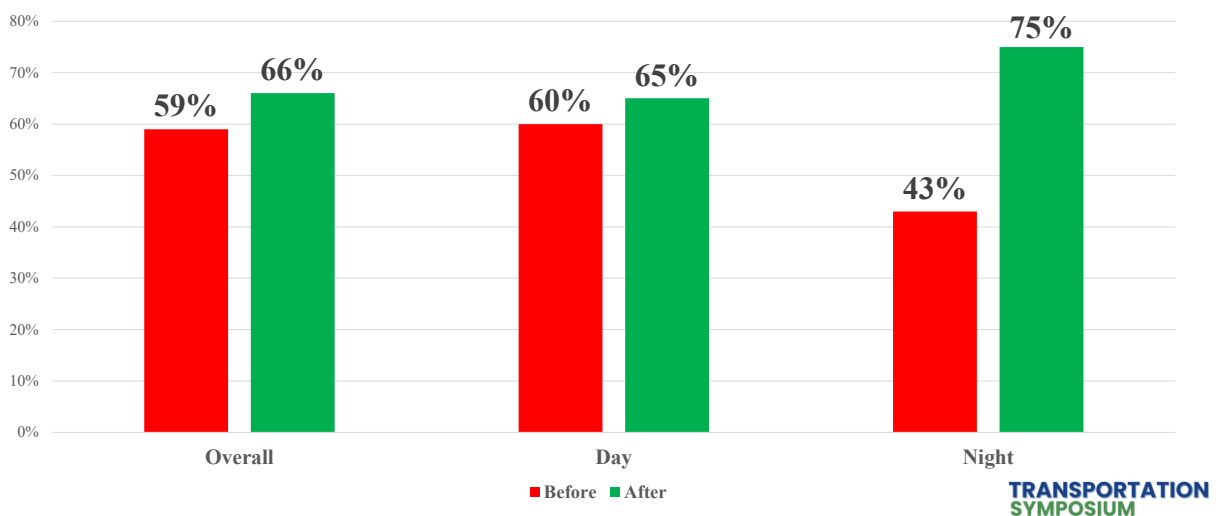
## Rate of Drivers Yielding to Pedestrians by Intersection



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## Rate of Drivers Yielding to Pedestrians by Time of Day



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## Conclusions

- Reduced right-turn speeds by **21.8%**
  - More significant at night (**22.3%**)
- Increased driver yielding-to-pedestrian rate by **7%** (From 59% to 63%)
  - More significant at night (**32%** increase from 43% to 75%)
- New tight right-turn design **significantly improves pedestrian safety**

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# Bulb Outs Nebraska Avenue

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## FDM 202.3.12

### 202.3.12 Curb Extensions (Bulb-Outs)

Curb extensions are portions of the curb line extended out into the roadway to provide engagement and deflection. Curb extensions are commonly used at either end of a parking lane. They also shorten the crossing distance for pedestrians and may provide space for landscaping or community aesthetic features.

Curb extensions create engagement by extending the curb line to be adjacent to the travel lane. When used at the beginning of a parking lane or as part of a chicane, the curb extension also provides deflection. In some instances, longitudinally extended bulb-outs inside the existing curb lines may be used to narrow the entire length of a roadway segment. In this case, the existing drainage system is preserved, and drainage is provided through the new curb extensions to existing inlets. Curb extensions at intersections should be designed using a CADD-based vehicle turning path (e.g., AutoTurn) to verify the appropriate design and control vehicles are accommodated.

See **FDM 222.2.6** for curb extension criteria.

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## FDM 202.3.12

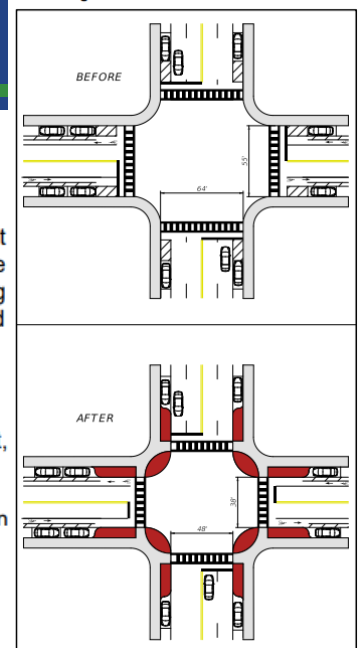
### 222.2.6 Curb Extensions (Bulb-Outs)

Consider the use of curb extensions (a.k.a., bulb-outs) in conjunction with on-street parking at intersections or midblock locations where there is a crosswalk, provided there is adequate width for existing traffic movements. Curb extensions shorten the crossing distance, and provide additional space at intersections, allowing pedestrians to see and be seen before entering a crosswalk.

The design of curb extensions must take into consideration the needs of transit, emergency vehicles, commercial trucks, drainage, and bicyclists.

Consult with District drainage staff on drainage accommodations for the curb extension during Phase I of the design. See the **Drainage Design Guide** and **Figure 222.2.1**.

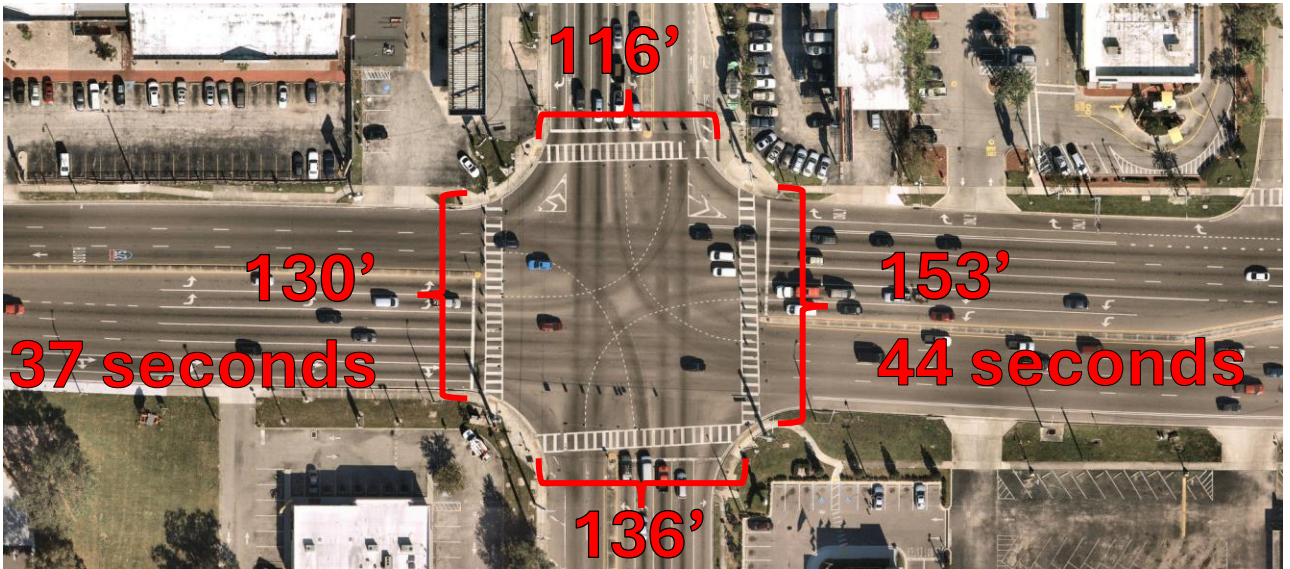
Figure 222.2.1 Curb Extension



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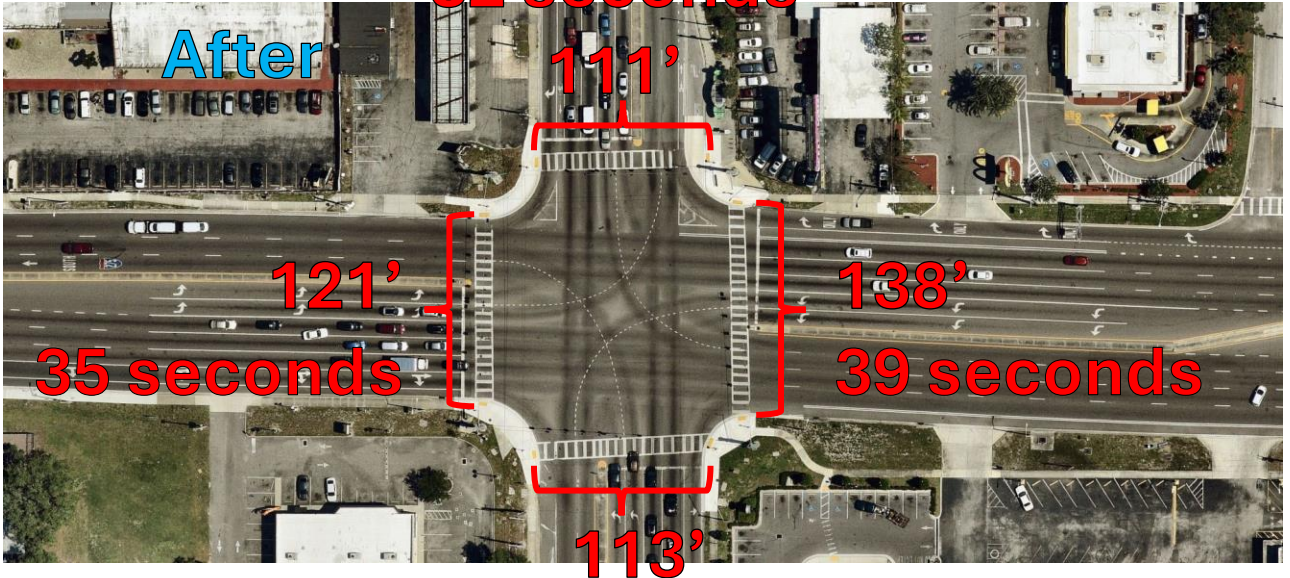
**33 seconds**



**39 seconds**

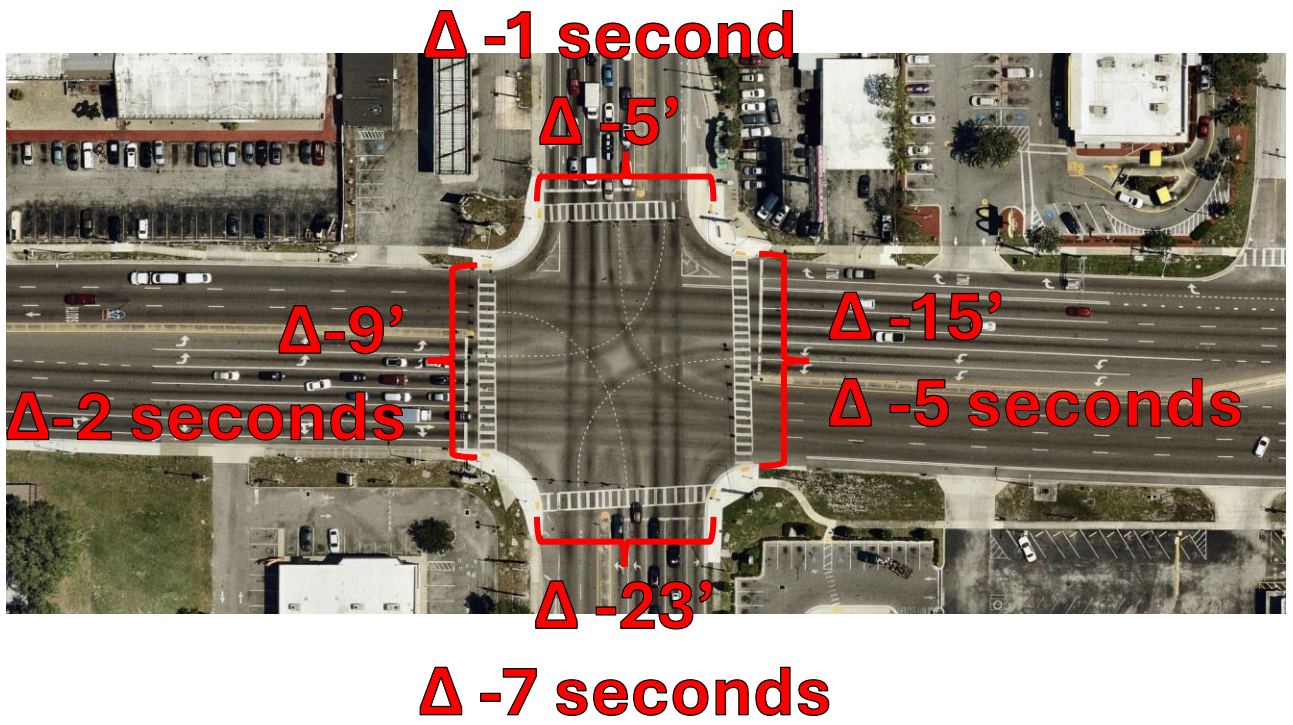
37

**32 seconds**



**32 seconds**

38



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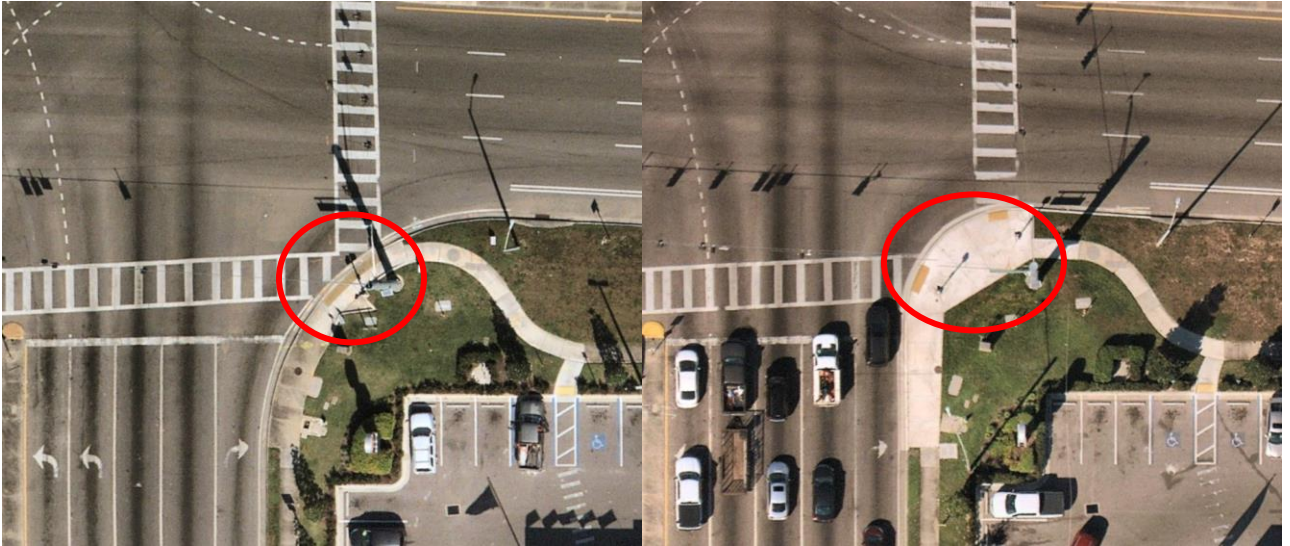
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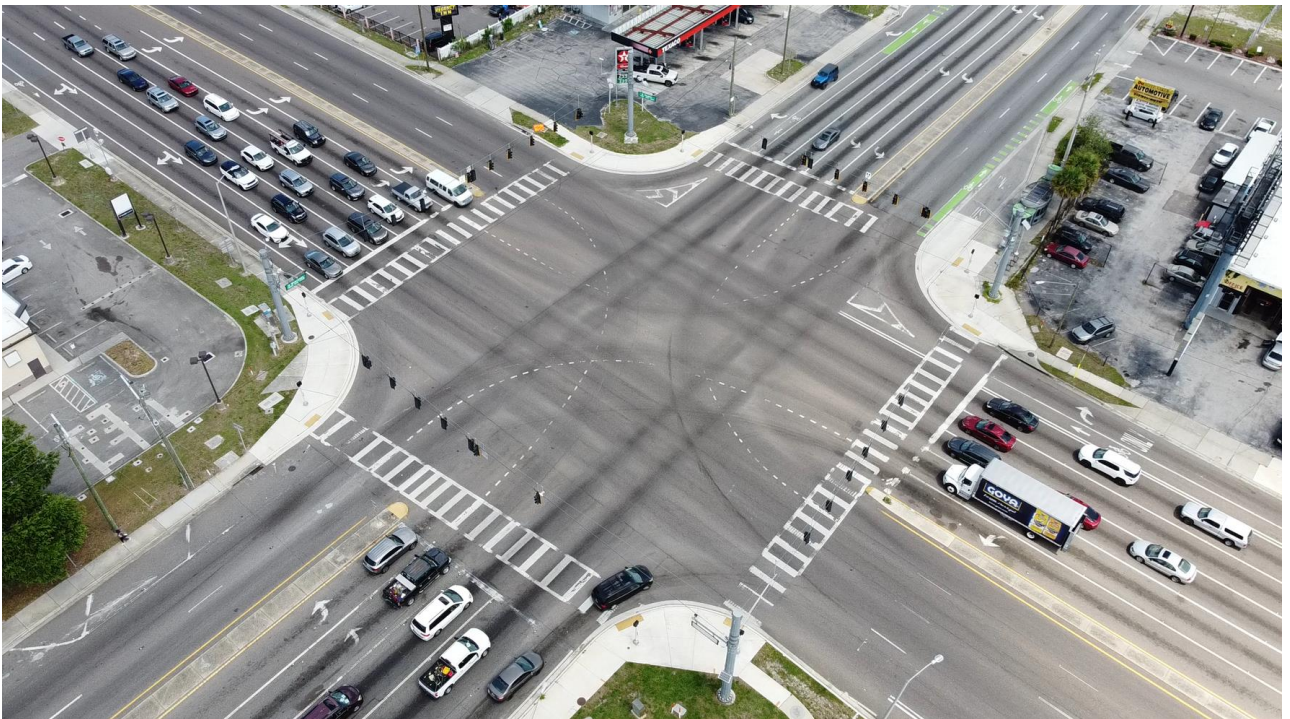
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# Bulb Outs North 15<sup>th</sup> Street

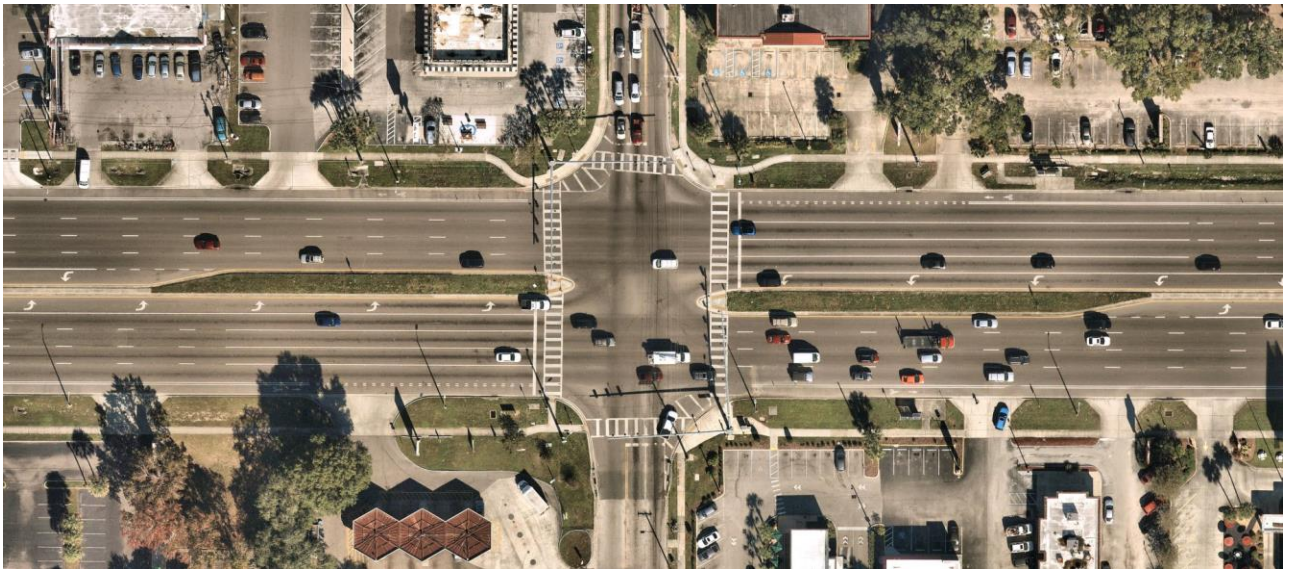
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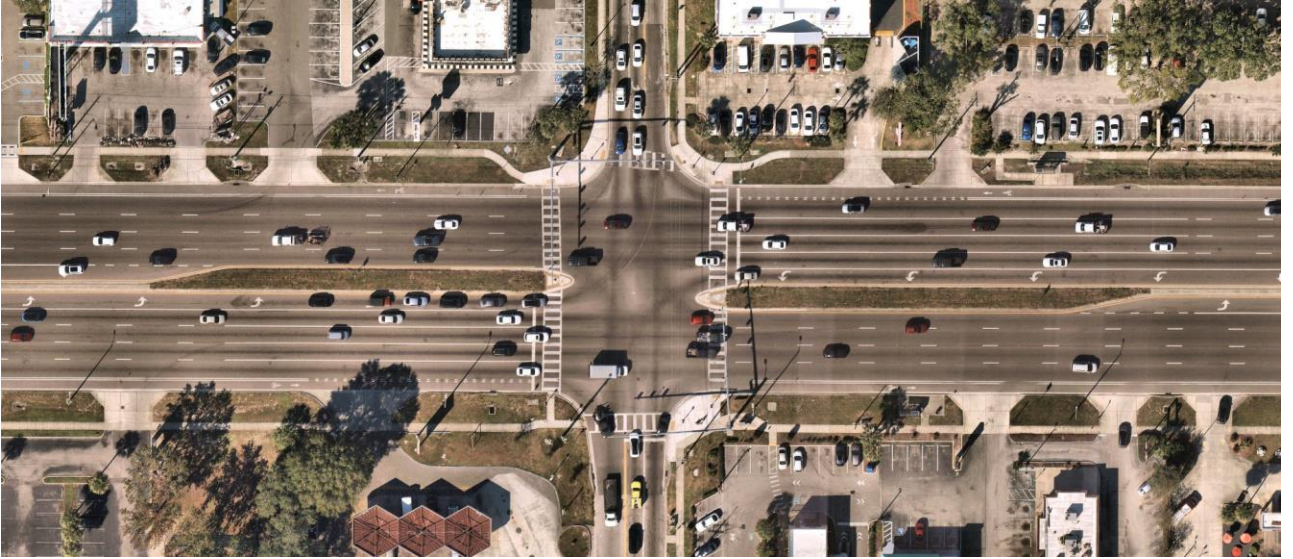
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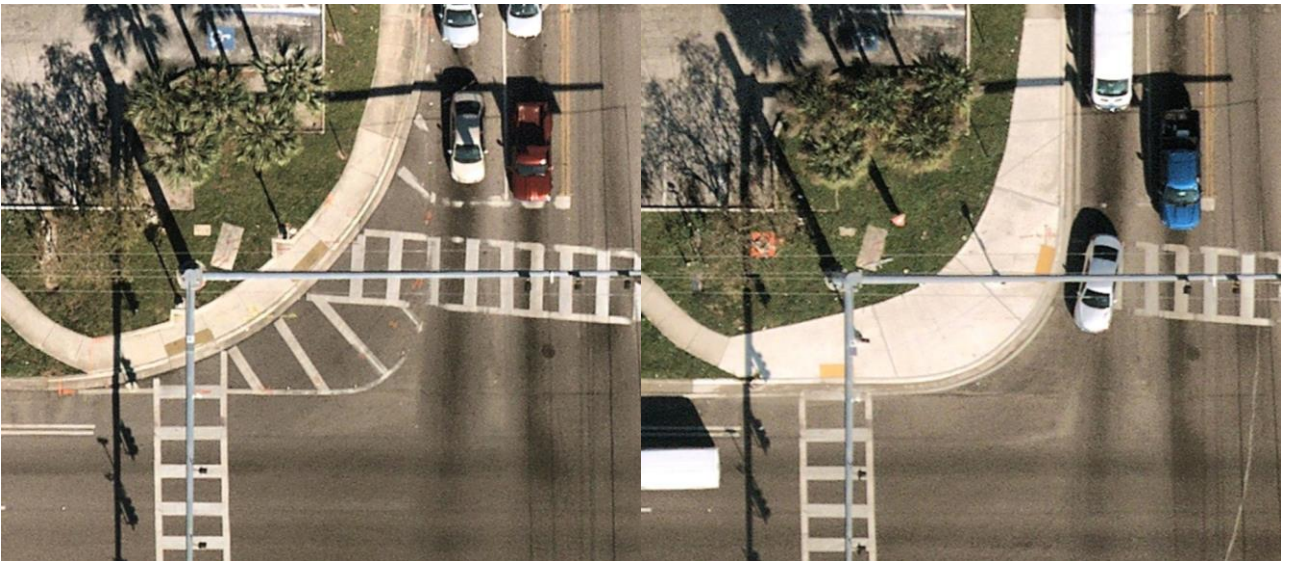
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# Hardened Centerline and Median Refuge North 22<sup>nd</sup> Street

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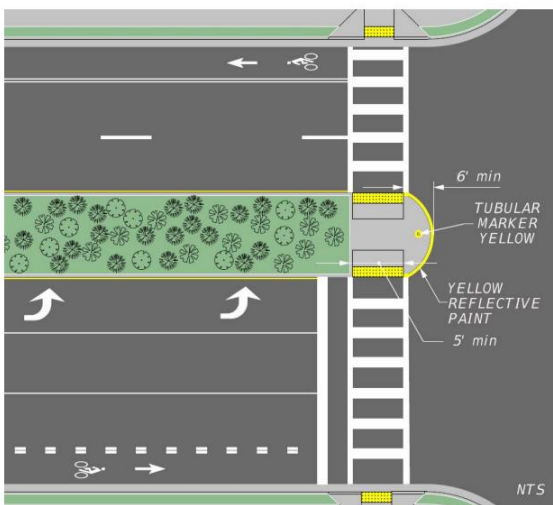
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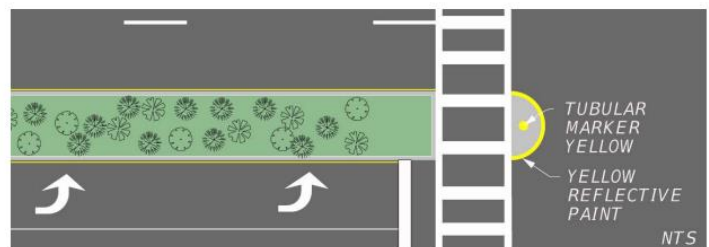
Figure 210.3.3 Intersection Refuge Island (Cont.)

Figure 210.3.3 Intersection Refuge Island

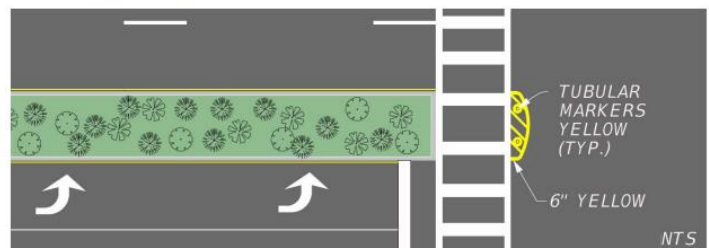
For New and Reconstruction Projects with Raised Crossings:



For New and Reconstruction Projects with Depressed Crossings:



For RRR Projects Where Concrete Median Nose is Not Constructible in Constrained Conditions:



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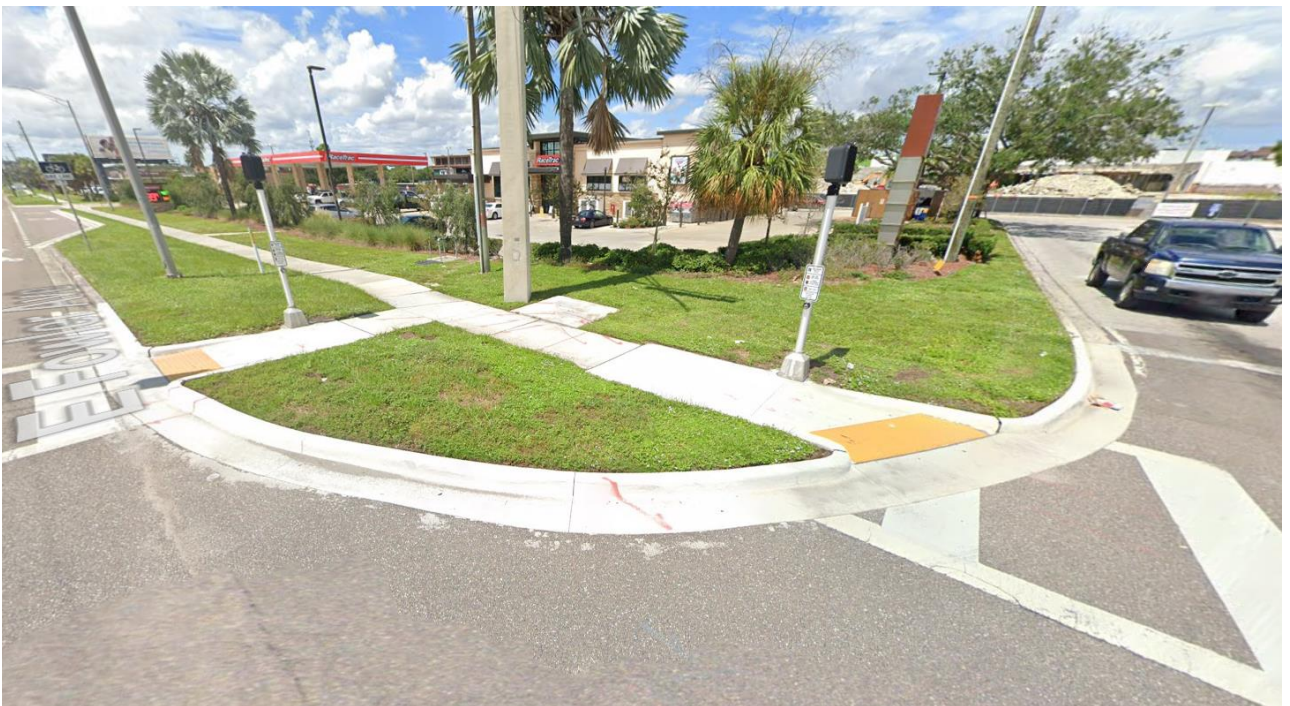
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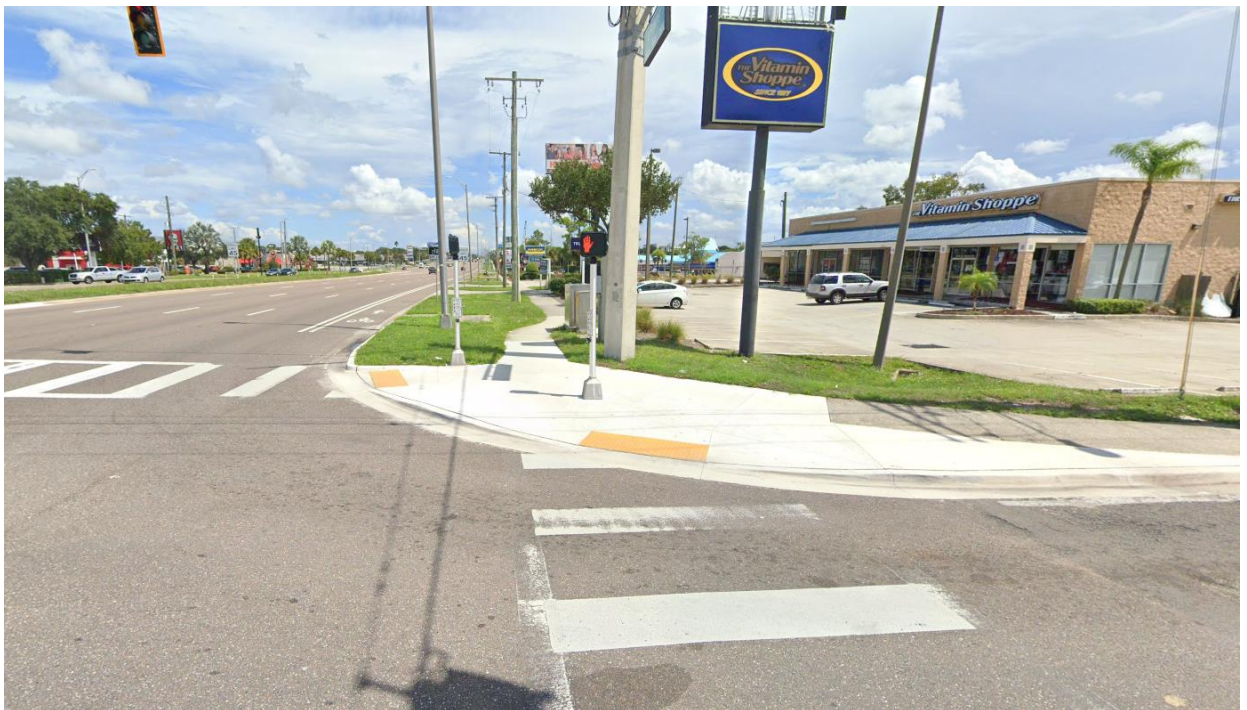
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# Missing Crosswalk University Collection

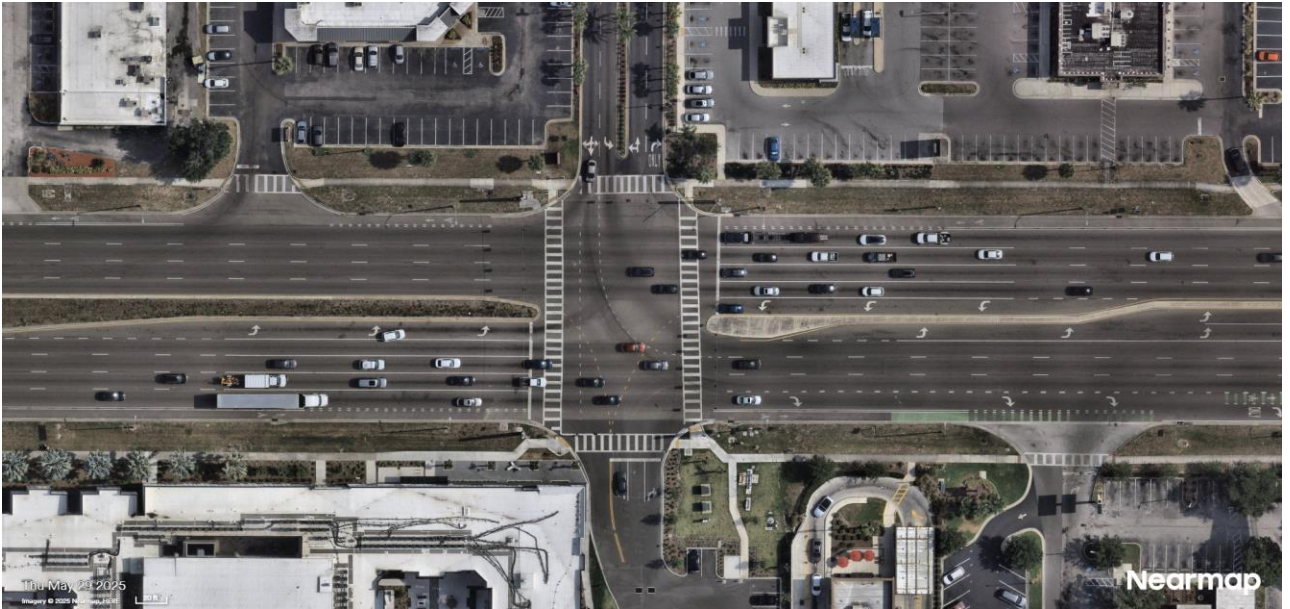
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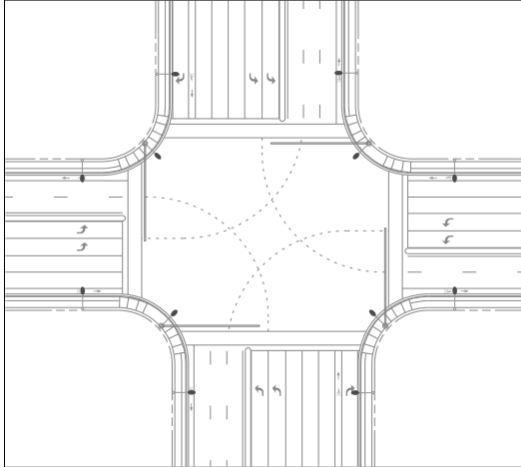
# LED Street Lighting Retrofit

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Figure 231.3.4 Typical Lighting Layout for Large Intersection



### 231.3.2.1.1 Intersection Lighting Retrofit

For existing signalized intersections where a full signal upgrade is not occurring, the existing infrastructure may restrict the placement of additional lighting structures necessary to meet the New and Reconstructed criteria of **Table 231.2.1**. With these challenges considered, **Table 231.2.1** provides reduced illumination requirements which may be used for Intersection Lighting Retrofit designs. These retrofits provide safety benefits of improved lighting without the full reconstruction of light and signal structures.

Lighting retrofits should be considered for use at existing signalized intersections that have a history of nighttime pedestrian crashes. Lighting retrofits may be included with

RRR and minor intersection improvement projects that do not include full signal reconstruction. An Intersection Lighting Retrofit operation may include replacing older luminaire types with LED luminaires, adding additional light poles, adding luminaire support arms to existing structures, and any other minor modifications needed to meet the Lighting Retrofit requirements of **Table 231.2.1**. Lighting retrofits generally do not include removing or replacing existing structures such as light poles and signal structures.

For Intersection Lighting Retrofit designs, the vertical illuminance requirement of **Table 231.2.1** only applies to crosswalks for the near side movement (see **Figure 231.3.1**) as well as any channelized right-turn lanes per **FDM 231.3.4**.

Existing, low-mounted sidewalk lighting is generally not intended to meet the lighting requirements of **Table 231.2.1**. To prevent increased glare, do not increase light output at existing luminaire locations with mounting heights less than 30 feet.

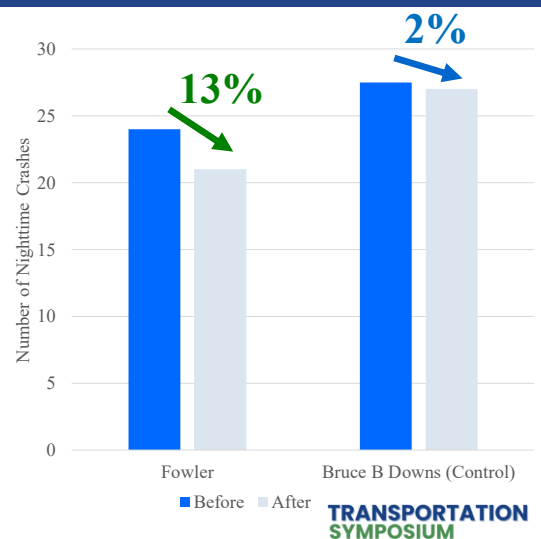
Evaluate new and existing structures in accordance with **FDM 261**.

Independent maintenance operations that update existing fixtures to LED fixtures are not considered Intersection Lighting Retrofits for design and planning purposes.

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## LED Street Lighting Retrofit

- From 2021-2022, D7 retrofitted streetlights with LEDs along 3.5 miles of Fowler Avenue.
- The project area saw a **13% reduction in nighttime crashes**, while the control area saw only a **2% reduction**.



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# Buffered Bike Lane



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### 223.2.1.1 Bicycle Lane Width

The width of the bicycle lane is measured from the edge of travel lane to the edge of pavement. For new construction projects when a bicycle lane has been selected as the bicycle facility, a 7-foot buffered bicycle lane is the standard. A buffered bicycle lane has a double-6-inch white edge line separating the bicycle lane and the adjacent travel lane.

Buffered bicycle lanes are depicted in **Exhibit 223-1**. A buffered bicycle lane should not exceed 7 feet in width (including the buffer). Any additional pavement width that results from restricting the buffered bicycle lane to 7 feet in width should be applied to the outside travel lane.

For projects where a bicycle lane is needed and it is not practical to move the existing curb (e.g., RRR), the width of the bicycle lane depends on the width of the available roadway pavement. For these types of projects, the options in the order of priority are:

- (1) 7-foot buffered bicycle lane
- (2) 6-foot buffered bicycle lane
- (3) 5-foot bicycle lane
- (4) 4-foot bicycle lane

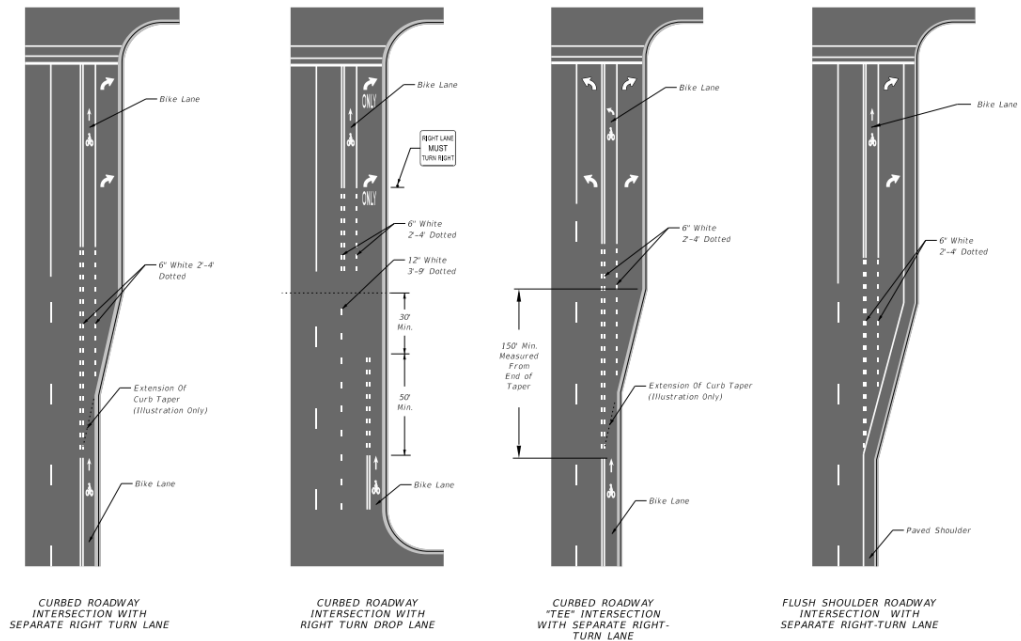
Do not place a bicycle lane with less than 5 feet of width adjacent to a 10-foot traffic lane.

When roadway pavement is continuous to the face of guardrail or barrier, the minimum bicycle lane width is 5 feet. See **FDM 223.2.1.3** when the bicycle lane is adjacent to a right-turn lane or bus bay.

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## TYPICAL KEYHOLE LANES



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## Buffered Bike Lane



- FDOT added flex post delineators on Fowler Avenue near the University Mall in late 2019.
- This increased drivers' awareness of bicyclists and reduced bike related crashes.

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# Leading Pedestrian Interval



- Gives pedestrians the opportunity to **establish their presence** in the crosswalk at an intersection **3-7 seconds** before vehicles are given a green indication.
  - Enhanced safety for pedestrians who may be slower to start into the intersection
  - Increased visibility
  - Reduced conflicts
- **Can reduce pedestrian-vehicle crashes by 13% at intersections**
- Low implementation cost



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## Fowler Avenue Design Applied at Another Intersection SR 54 at Little Road

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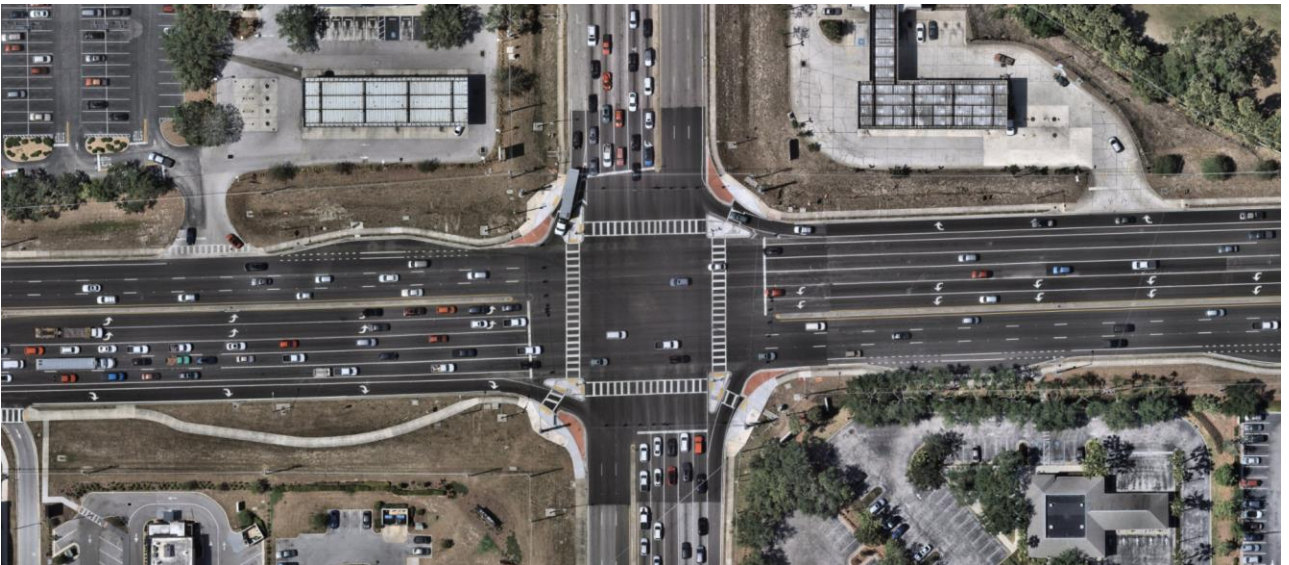


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## Key Takeaways

- Tight Right Turn
  - Increased pedestrian visibility and reduced exposure
  - Speed management
- Bulb Outs
  - Shorter crosswalk distance
  - Speed management
- Median Refugee
- Corridor LED streetlight retrofit
  - Low cost, high return on investment
- Value of Evaluation
- Successful Design is Used in Other Projects

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## Safety Message



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