202 Speed Management

202.1 General

This chapter describes strategies to achieve desired operating speeds on roadway projects. These strategies are national best practices for low-speed facilities and are allowable on arterials and collectors when consistent with the roadway context classification. Some of these strategies have been modified based on FDOT experience.

202.1.1 Lane Repurposing Projects

Lane repurposing projects are intended to reconfigure the existing roadway cross section to accommodate other uses. This type of project typically reassigns travel lane space while keeping the curblines in place. Lane repurposing alone is not a speed management strategy, but reallocation of lane space may facilitate the use of speed management strategies.

See ***FDM 126*** for information on lane repurposing projects.

202.1.2 High-Speed Roadways

Criteria for high-speed roadways (50 mph or greater) are based on the requirements of high-speed movements, as developed over the course of many decades. High-speed roadways are typically not suitable for the implementation of speed management strategies. Resolve safety and operational concerns on high-speed roadways through strategies appropriate to high-speed design, rather than through speed management.

202.2 Speed Management Concepts

Low-speed areas will typically have characteristics where conventional controls (e.g. horizontal curvature) have limited applicability, such as:

- C6, C5 and C2T segments which may be only a few blocks long and may already be built out, with limited possibility for roadway realignment,
- C4 and C3 segments which are only a few blocks long and where reconstruction is not planned (such as a RRR project),
- Any project where interventions are part of a RRR project rather than a reconstruction or realignment, so curb lines are assumed to be fixed.

The strategies shown in ***Table 202.3.1*** are intended to be implemented on RRR projects but may also be incorporated into new construction and reconstruction projects. For new construction and reconstruction projects, provide a centerline curvature to support the desired lower speed, in addition to the other techniques described in this chapter. Shorter segments with smaller curve radii will generally yield better results, compared to applying speed management strategies to a facility originally designed for high speeds. In town centers, respecting the existing or proposed street grid will help provide frequent intersections for speed management as well as circulation for traffic and pedestrians.

Table 202.3.1 indicates the appropriate context classification, Target Speed range, and potential techniques that may be applicable to achieve the indicated Target Speed. The strategies shown in this table are not exhaustive. Creativity, judgment, and experience in the use of low-speed strategies are encouraged. Successful strategies typically incorporate one or more of the following speed management concepts:

- **Enclosure**: Enclosure is the sense that the roadway is contained in an “outside room” rather than in a limitless expanse of space. Drivers’ sense of speed is enhanced by providing a frame of reference in this space. The same sense of enclosure that provides a comfortable pedestrian experience also helps drivers remain aware of their travel speed. Street trees, buildings close to the street, parked cars, and terminated vistas help to keep drivers aware of how fast they are traveling. This feedback system is an important element of speed management.
- **Engagement**: Engagement is the visual and audial input connecting the driver with the surrounding environment. Low-speed facilities utilize engagement to help bring awareness to the driver, resulting in lower operating speeds. As the cognitive load on a driver’s decision-making increases, drivers need more time for processing and will manage their speed accordingly. Uncertainty is one element of engagement – the potential of an opening car door, for instance, alerts drivers to drive more cautiously. On-street parking and the proximity of other moving vehicles in a narrow-lane are important elements of engagement, as are architectural detail, shop windows, and even the presence of pedestrians.
- **Deflection:** Deflection is the horizontal or vertical movement of the driver from their intended path of travel. Deflection is used to command a driver’s attention and manage speeds. Being a physical sensation, deflection is the most visceral and powerful of the speed management strategies. Whereas enclosure and engagement rely in part on psychology, deflection relies primarily on physics. Examples include roundabouts, splitter medians (horizontal deflection), and raised intersections (vertical deflection). Deflection may not be appropriate if it hinders truck or emergency service vehicle access.

202.2.1 Target Speed

Target Speed is the highest speed at which vehicles should operate on a thoroughfare in a specific context, consistent with the level of multi-modal activity generated by adjacent land uses, to provide both mobility for motor vehicles and a supportive environment for pedestrians, bicyclists, and public transit users.

References:

- **FHWA webpage:** ***https://www.fhwa.dot.gov/planning/css/design/controls/factsheet3_ite.cfm***
- ***Speed Zoning Manual***
- ***Context Classification Guide*** (September 2024)

Ideally, for low-speed and very low-speed roadways, the Target Speed, Posted Speed, and Design Speed should all be the same. Where the Target Speed is high-speed (50 mph or greater), use conventional high-speed design practices, typically setting the Design Speed at 5 mph above the desired Posted Speed.

For RRR projects on low-speed and very low-speed roadways, the Design Speed and Posted Speed may need to be changed incrementally over the course of several projects to achieve the desired Target Speed. In these cases, Target Speed serves as the “target or goal” for Design Speed and Posted Speed on the roadway segment. Establish a Target Speed for any non-limited access project where a Design Speed is also required, per ***FDM 201.5.1***. The district Planning Office should provide a recommended Target Speed along with documentation of the context classification. Record the Target Speed and Target Speed assignment date in the ***Roadway Characteristics Inventory (RCI)*** as Feature 128. Refer to the ***RCI Handbook***. In many cases, the current speed is acceptable and no changes will be required.

Change the Design Speed to match or support the Target Speed per ***FDM 201,*** to the extent practicable given project constraints, including (but not limited to):

- Existing geometry
- Project scope and budget
- Community intent as expressed in the context classification analysis.

Achievement of the Target Speed may need to occur incrementally, especially when there is a large difference (delta) between the current Design Speed and the Target Speed. The strategies in this chapter can assist in determining the amount of speed management that is likely to be achievable on a given project, which in turn will help set the Design Speed for that project (or that roadway segment, on projects with more than one Design Speed). See ***FDM 201*** for criteria on Design Speed and changes in Design Speed on

RRR projects. Conduct speed studies per the Speed Zoning Manual to determine if the implemented speed management strategies were successful and to reset the Posted Speed if the operating speeds change further over time.

202.2.2 Design Speed Selection

Table 202.3.1 is arranged by Design Speed category to facilitate selection of speed management strategies. FDOT recognizes three categories of Design Speed:

1. Very low-speed (25 mph – 35 mph)
2. Low-speed (40 mph – 45 mph)
3. High-speed (50 mph and greater)

Use the current Design Speed as the starting point for lowering the Design Speed of an existing roadway. Consider using a new lower Design Speed that is within the same Design Speed category as the current Design Speed. Staying within the same Design Speed category should make the final operating speed more predictable and should minimize the need for Design Variations or Exceptions. For example, a roadway with a current Design Speed of 45 mph can usually be lowered to 40 mph with minimal need for Design Variations or Design Exceptions.

Setting a new Design Speed outside the current Design Speed category is acceptable but may require additional effort and expense to achieve. FDOT experience has been that roads designed in the low-speed (40 mph to 45 mph) category require significant modifications (such as lane repurposing or frequent horizontal or vertical deflections) to achieve a very low-speed (25-35 mph) condition. These modifications often require a scope and budget beyond a typical RRR project. Consider making such modifications primarily on projects scoped and budgeted for safety or speed management.

Commentary: In some cases, selecting a Design Speed lower than the current category could also create a need for a Design Variation, should the Design Speed be raised at a later time. For instance, if the current Design Speed is 45 mph but is lowered to 35 mph, the minimum lateral offset for trees changes from 4 feet to 1.5 feet. Locating street trees closer to the roadway creates enclosure, which helps to achieve the desired speed of 35 mph. Should the speed ever be raised above 35 mph again, however, a Design Variation would now be required, because the trees would not meet the required lateral offset for the higher speed.

If observed operating speeds are higher than intended, consider what additional elements could be added to the corridor to achieve the Design Speed, rather than immediately raising the speed limits and obtaining Design Variations. Consider design elements, operational elements, education, and enforcement.

202.3 Speed Management Strategies

When selecting strategies from ***Table 202.3.1***, consider:

- Context classification,
- Desired operating speed,
- Community vision,
- Multimodal needs (safety, operations),
- Design and emergency vehicles,
- Access management,
- Project scope and budget,
- Gap between the existing speed and the Target Speed,
- Speed category of the existing roadway, and
- Current Design Speed.

Descriptions of each speed management strategy are provided in the following sections. These strategies are most effective when several are used together. Implementing only one or two of these strategies is likely to produce modest to negligible speed management. Use existing conditions to support speed management. In particular, existing street grids with short blocks and frequent intersections represent excellent speed management opportunities. Accentuate and use such opportunities where they exist.

Experience has shown that speed management features are needed about every 500 feet along a corridor for best results (unless otherwise indicated below).

202.3.1 Roundabouts

Roundabouts are effective as a transition from a higher speed context to a lower speed context, and can also be used in series to maintain a consistent speed along a corridor. Modern roundabouts are fairly common on the State Highway System (SHS), but smaller roundabouts (sometimes referred to as "mini-roundabouts") may be appropriate in contexts where operating speeds of 25 mph or less are desired. See ***FDM 213*** for roundabout design criteria.

When used in series, roundabouts can help maintain a low-speed condition as an alternative to vertical deflection, stop signs, or signalization. To limit the potential for drivers to accelerate between roundabouts in series, spacing should not exceed one half mile on low-speed roadways or one quarter mile on very low-speed roadways.

202.3.2 On-Street Parking

In addition to providing parking supply and separating pedestrians from the travel lane, on-street parking can be used to manage speeds when the parking lane is located directly adjacent to the travel lane. For best effect, the parking lane should be of the standard size for the type of parking used (parallel or reverse angle), and the travel lane should be of the minimum width that will accommodate the design vehicle. Effective speed management can be achieved by maximizing the engagement between the parking lane and the travel lane. Where parking is used for speed management, avoid the following:

- Installing a bicycle lane between the parking lane and the travel lane,
- Travel lanes wider than 11 feet.

Consider providing additional strategies such as curb extensions and shorts blocks with on-street parking.

See ***FDM 210.2.3*** for on-street parking design criteria.

202.3.3 Chicanes

A chicane is a very low-speed treatment using deflection of the roadway centerline to achieve horizontal deflection, typically within the existing curb lines. Chicanes place vertical barriers (e.g., curbs, on-street parking) to require drivers to make frequent horizontal movements. To be effective, the chicane deflection should be the width of a parking lane or no less than half the width of the travel lane. The transition distance between chicanes is typically 100 feet or more.

An example of a chicane strategy is the placement of on-street parking on alternating sides of the street. This alternating on-street parking pattern may be placed from one block to the next, or within a single block (depending on block length and transition distance). This creates a centerline shift, as illustrated in ***Figure 202.3.1***.

To accommodate a WB-62FL Design Vehicle, chicanes should not be shorter than one block. For smaller trucks, buses and emergency vehicles, chicanes should not be shorter than half of one block.

Figure 202.3.1 Concept Sketch - Midblock Chicane

202.3.4 Lane Narrowing

Use of narrow lanes (less than 12 feet wide) alone has limited effect on operating speeds. This effect can, however, enhance engagement as traffic volumes increase. The visible narrowing of travel lanes may be used as a transition device to indicate a change in context or an approach to another speed management feature such as a raised crosswalk. For instance, narrowing two 12-foot lanes to two 11-foot or 10-foot lanes by shifting the lane lines slightly and introducing a hatch or curb line in the newly created edge space has been shown to alert drivers to a change in conditions or context. To maximize effectiveness, lane narrowing should be used in combination with other low-speed strategies (e.g., introduction of parking, creation of a median, beginning a chicane).

See ***FDM 210.2*** for lane width criteria on the SHS.

202.3.5 Horizontal Deflection

Horizontal deflection is the redirection of the driver in the horizontal plane through the introduction of a curve, splitter island, or other redirection device. Horizontal deflection is the operating principle behind roundabouts and chicane treatments. Designers may conceive additional ways to introduce horizontal deflection using these same principles.

FDM 210.8.1 has criteria for horizontal deflection of tangent sections of roadway. ***FDM 212.7*** provides criteria for horizontal deflection through intersections.

202.3.6 Street Trees

To be most effective as a speed management strategy, street trees should be close to the roadway and should form a continuous "wall" effect. When used this way, the street trees reinforce a sense of enclosure. As with most of these strategies, street trees along the roadway will be more effective when used in conjunction with other strategies. For speed management purposes, designers are encouraged to use street trees whenever possible.

See ***FDM 212.11*** and ***FDM 215.2.4*** for criteria on the placement of street trees and clear sight requirements. The installation of street trees may require a maintenance agreement with the local government agency.

202.3.7 Short Blocks

Short blocks of 500 feet or less manage speed by limiting driver acceleration distance between intersections. If used in conjunction with marked crosswalks, short blocks also create engagement. Accentuate the presence of the short blocks to reinforce low-speed and pedestrian-supportive contexts. Creation and enforcement of short blocks can take many forms, from the control of intersections on physically short blocks, to the simulation of short blocks achieved by introducing midblock crosswalks on longer block segments. On reconstruction projects, preserve existing short block networks wherever possible, particularly in established town centers with an existing street grid.

Where physically short blocks already exist, such as most C6 and C5 contexts and many C4 and C2T contexts, consider marking crosswalks at unsignalized intersections to reinforce the presence of the short blocks; see ***FDM 222.2.3.1*** and ***Traffic Engineering Manual (TEM)*** for criteria on marking unsignalized crosswalks. This concept is illustrated in ***Figure 202.3.2***.

Where physically short blocks do not exist, installation of mid-block crosswalks can be used to simulate the short-block effect, as illustrated in ***Figure 202.3.3***.

Figure 202.3.2 Concept Sketch – Mark Crossings to Emphasize Short Blocks

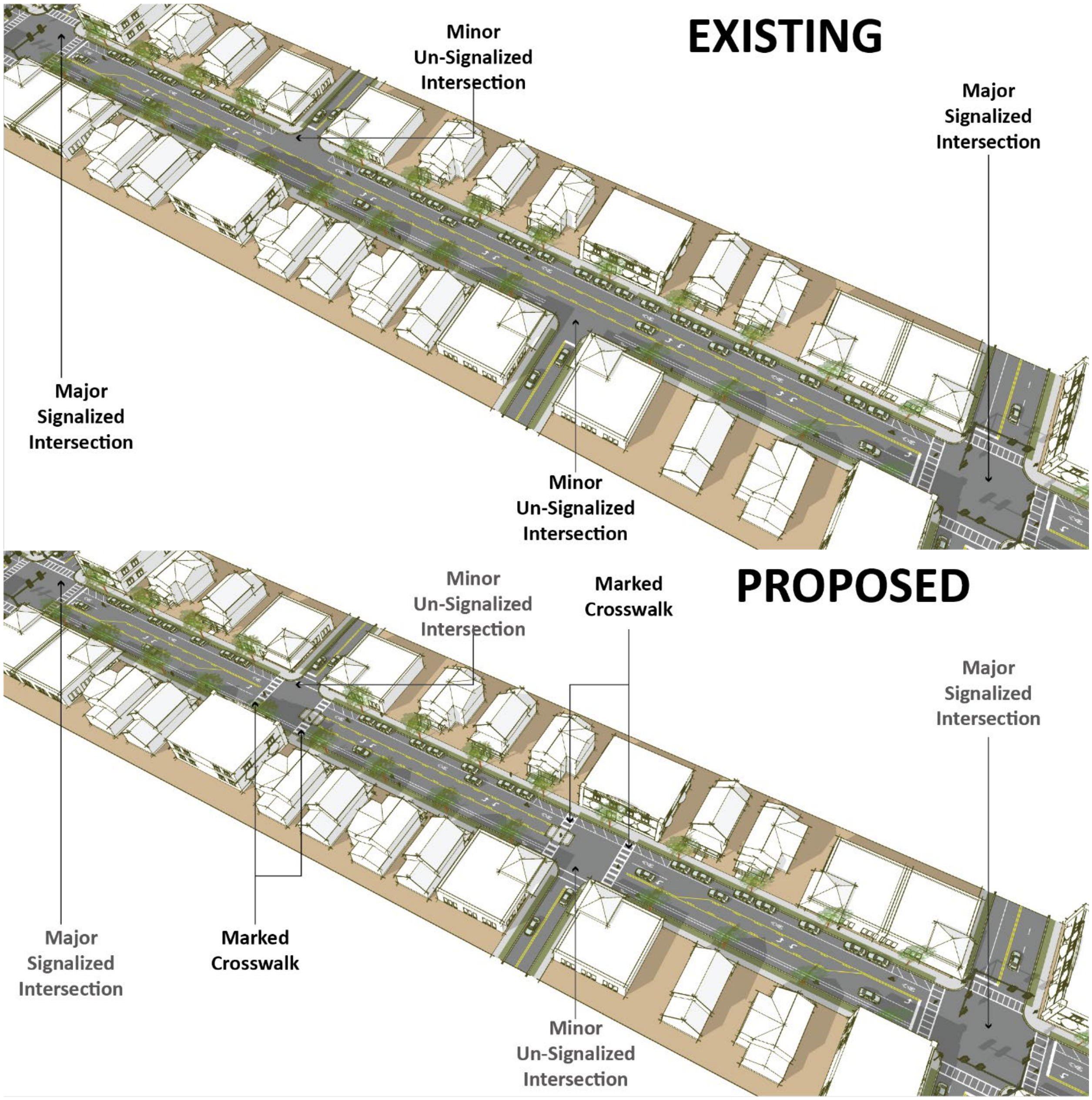
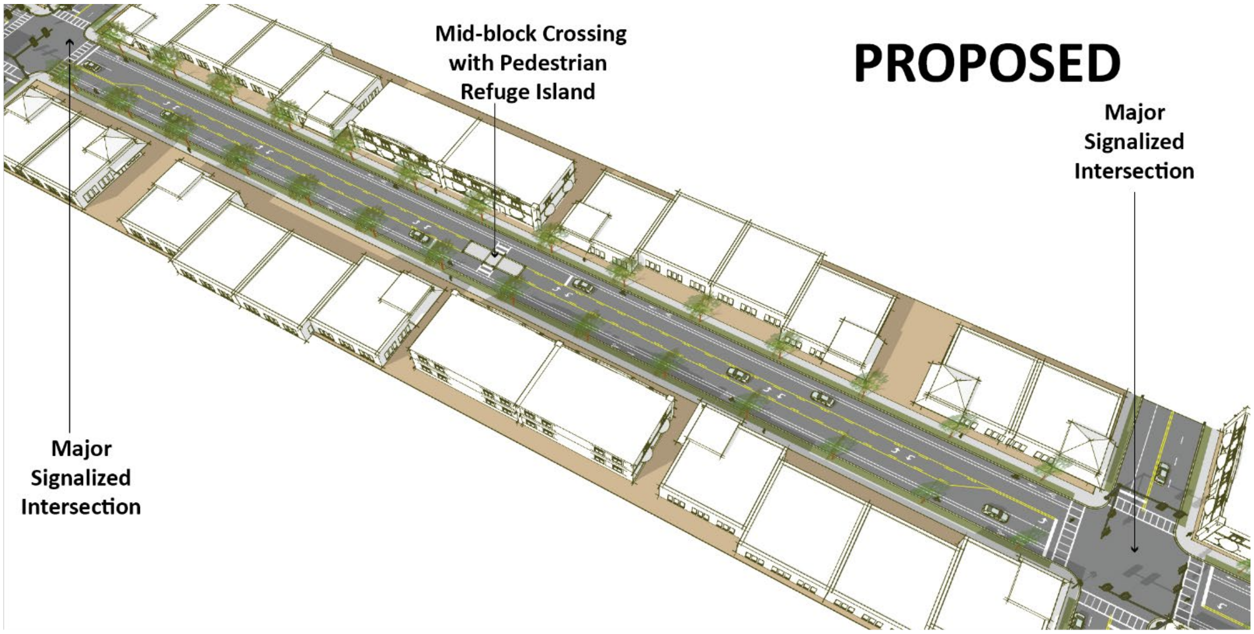


Figure 202.3.3 Concept Sketch- Add a Midblock Crossing to Long Block



202.3.8 Vertical Deflection

Like horizontal deflection, vertical deflection is a proven technique for speed management. When vertical deflection is proposed, coordinate with transit agencies, local public works and emergency services to ensure vehicle operation will not be adversely affected. Vertical deflection strategies include raised crosswalks, raised intersections, and speed tables.

Raised crosswalks (as depicted in ***Developmental Standard Plan D520-030***) may be considered at mid-block crossings for Design Speeds of 35 mph or less. Raised crosswalks are not allowed at intersections within the turning path of the design vehicle. Consider raised intersections for such conditions. Use raised intersections, Type I raised crosswalks, and speed tables for Design Speeds of 25 mph. Use Type II raised crosswalks and speed tables for Design Speeds of 30 mph to 35 mph.

202.3.8.1 Raised Intersections

Raised intersections may be used on very low-speed roadways with Design Speeds of 25 mph, are site specific, and must be designed to meet the needs of each individual intersection. ***Figure 202.3.4*** shows a concept drawing of a simple raised intersection indicating critical design considerations. Design more complex intersections with additional lanes or signalization using the same considerations. Mark all legs of vertically deflected intersections, either raised or with adjacent raised crosswalks, using special emphasis crosswalk markings.

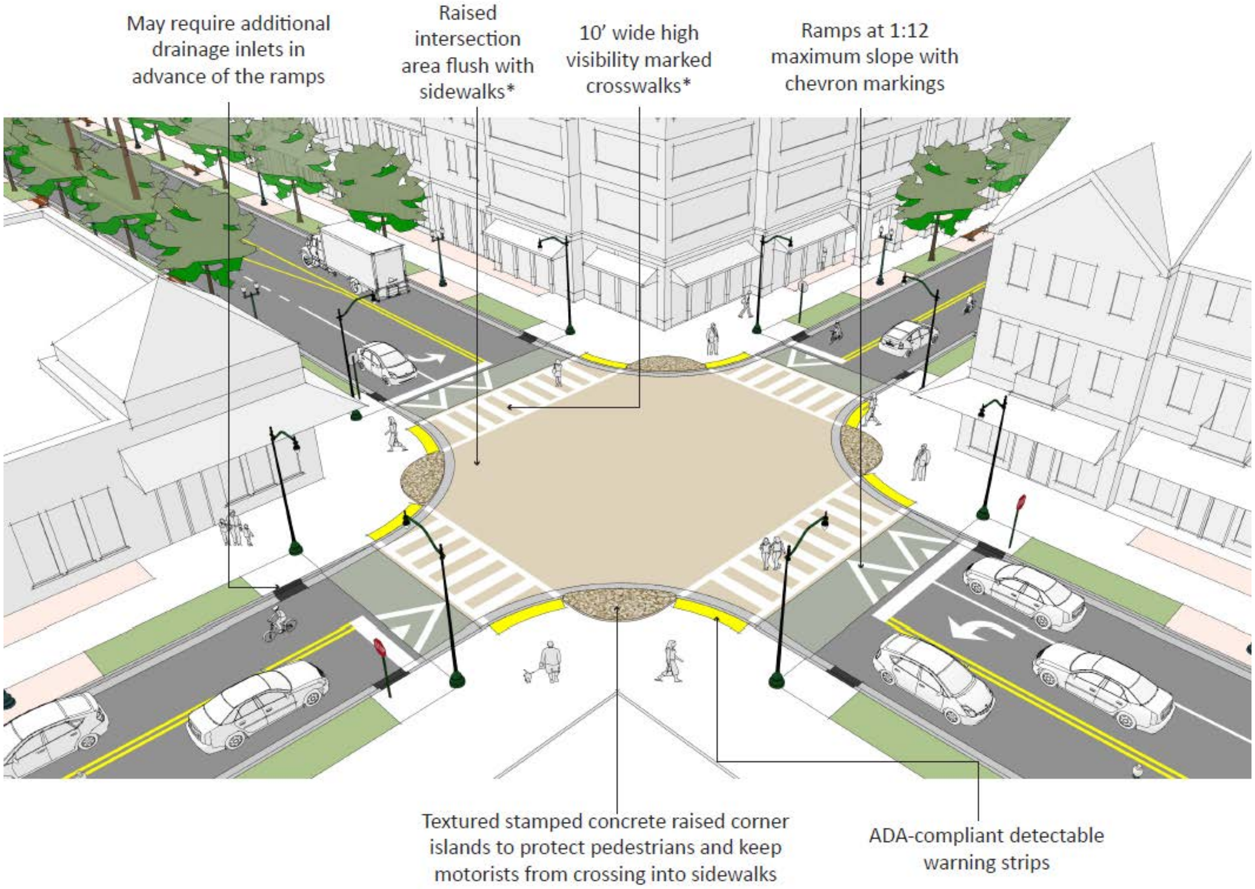
202.3.8.2 Type I Raised Crosswalks and Speed Tables

Design Type I raised crosswalks and speed tables using ***Developmental Standard Plan D520-030*** (Type I option). Create speed tables by modifying these raised crosswalk details to extend the raised crosswalk surface to a width greater than or equal to the axle spacing of the Design Vehicle and omit the crosswalk marking, unless the speed table is also serving as a raised crosswalk. Install these features about every 500 feet to achieve better speed management.

202.3.8.3 Type II Raised Crosswalks and Speed Tables

Design Type II raised crosswalks and speed tables using ***Developmental Standard Plan D520-030*** (Type II option). Create speed tables by modifying the details for raised crosswalks, extending the raised crosswalk surface to a width greater than or equal to the axle spacing of the design vehicle and omitting the crosswalk markings (unless the speed table is also serving as a raised crosswalk). Install these features an average of 500 feet apart to achieve operating speeds of about 35 mph. Closer spacings may result in lower speeds, if desired.

Figure 202.3.4 Concept Sketch - Raised Intersection



*Note: Recommend raised intersection pavement and crosswalks be patterned and colored for increased visibility. Pattern and color should be coordinated with Department and local agencies.

202.3.9 Speed Feedback Signs

Speed feedback signs are a traffic operations strategy that is effective in helping to enforce school zone Posted Speeds. However, this strategy may also require active participation by law enforcement.

The signs provide immediate feedback to drivers when the Posted Speed is exceeded, which may help to reduce unintentional speeding. They are most effective at managing operating speeds for short distances (about 1,000 feet) following the sign and when combined with other measures such as high emphasis crosswalk markings and islands. Coordinate with the District Traffic Operations Engineer on the use of this device.

202.3.10 Posted Speed Pavement Marking

Posted Speed pavement markings placed directly on the pavement adjacent to Posted Speed signs, reinforce a change in Posted Speed (e.g., at transition areas, on approach to a pedestrian crossing). This strategy should be considered when a Posted Speed reduction may be unexpected (e.g., transition from a C1 or C2 context to a C2T context, an approach to a pedestrian crossing in a rural area, or a transition from a low-speed to a very low-speed condition). Coordinate with the District Traffic Operations Engineer on the use of Posted Speed pavement markings.

202.3.11 Islands

Islands at crosswalks can provide deflection as well as engagement to help manage operating speeds. Unlike continuous raised medians, islands are short sections used in specific locations. When combined with a crosswalk, the island may provide refuge for pedestrians as well as speed management. See ***FDM 210*** for island criteria.

Islands on curved roadway sections can prevent lane departures by forcing drivers to stay within the travel lane. These are especially effective in locations where drivers increase speed by overrunning the centerline striping on a shorter-radius curve.

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.

202.3.13 Rectangular Rapid Flashing Beacons and Pedestrian Hybrid Beacons

The Rectangular Rapid Flashing Beacon (RRFB) and Pedestrian Hybrid Beacon (PHB) traffic control devices are “beacons” rather than signals and consequently have a less restrictive warranting process. When combined with marked crosswalks, they can be used to establish shorter block lengths. They may also create engagement and thereby help manage operating speeds. See ***TEM*** and coordinate with the District Traffic Operations Engineer on the application of these devices.

202.3.14 Terminated Vista

The terminated vista creates enclosure by providing an enclosed (terminated) view ahead (vista), indicating a street segment does not extend indefinitely. The terminated vista places a building, tree, artwork, or natural view in the driver’s central vision to indicate that a stop or change of direction is imminent. This is illustrated in ***Figure 202.3.5*** by an oak tree terminating the vista where the roadway bears to the left.

The terminated vista is a valued and well-understood town planning tool to create a sense of place and enclosure for pedestrians. The effect on drivers is similar. Roundabouts are a common type of terminated vista, especially where a tall vertical element is included in the center island of the roundabout. Other terminated vistas can be created at T-intersections, median splitter islands, and off-set block configurations.

Figure 202.3.5 Concept Sketch – Terminated Vista Example

Table 202.3.1 Strategies to Achieve Desired Operating Speed

Context Classification	Existing Speed Category (mph)	Minimum Design Speed (mph)	Target Speed (mph)	Strategies																	
				Roundabouts	On-Street Parking	Chicanes	Lane Narrowing	Horizontal Deflection	Street Trees	Short Blocks	Speed Tables	Raised Intersections	Raised Crosswalks (Type I Or Type II)	Speed Feedback Signs	Pedestrian Refuge Islands	Bulb-Outs	RRFBs	PHBs	Terminated Vistas	Islands in Curved Sections	Speed Pavement Markings
C2T	Low	40	40, 45	X			X	X	X	X				X	X	X		X	X		X
	Very Low	25	35	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			30	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			25	X	X	X	X	X	X	X	X	X	I	X	X	X	X	X	X	X	X
C3R, C3C	Low	40	40. 45	X			X	X	X	X				X	X	X		X	X		X
	Very Low	35	35	X	X	X	X	X	X	X	X			X	X	X	X	X	X		X
C4	Low	40	40, 45	X			X	X	X	X				X	X	X		X	X		X
	Very Low	25	35	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			30	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			25	X	X	X	X	X	X	X	X	X	I	X	X	X	X	X	X	X	X
C5	Very Low	25	35	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			30	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			25	X	X	X	X	X	X	X	X	X	I	X	X	X	X	X	X	X	X
C6	Very Low	25	30	X	X	X	X	X	X	X	X		II	X	X	X	X	X	X	X	X
			25	X	X	X	X	X	X	X	X	X	I	X	X	X	X	X	X	X	X

Notes:

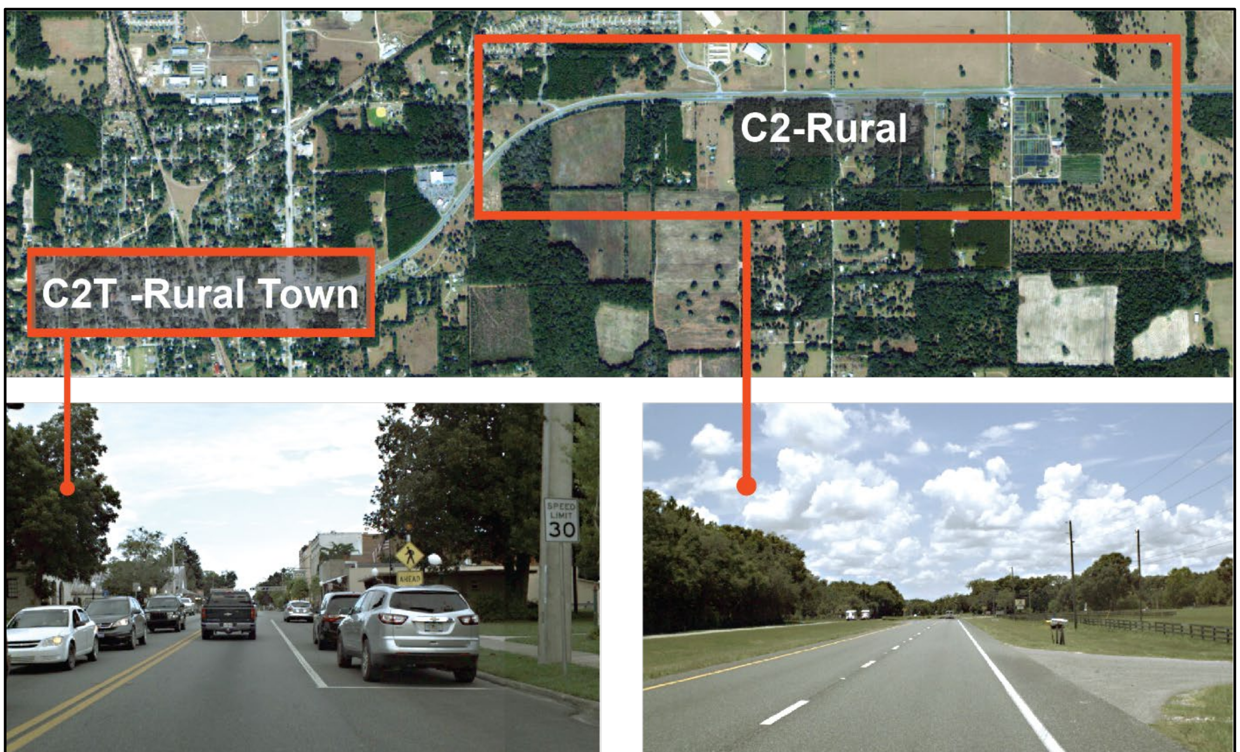
1. Process the necessary Design Variations or Design Exceptions if initial speed category and Design Speed are outside of the Context Classification allowable ranges.
2. For C3R and C3C (50-55 mph): Project-specific; see ***FDM 202.1.2***
3. For greater reductions in Design Speed, a reconstruction or lane repurposing will be needed.

202.4 Transition Zones

Roadways may traverse more than one context classification. As the context changes, the design criteria for the roadway will also change. The transition from a C1 (Natural) or C2 (Rural) context classification to a higher classification such as C2T (Rural Town) provides a potentially abrupt change in the recommended Design Speed and design users.

For example, the land use surrounding SR 26 through Newberry, Florida transitions from C2 (Rural) to C2T (Rural Town) over the course of a few blocks (see ***Figure 202.4.1***). Such conditions require a transition zone to alert drivers to the context change and to notify them to adjust their behavior and expectations accordingly. Changes in Posted Speed as part of transition zones must comply with the requirement of the ***Speed Zoning Manual***.

Figure 202.4.1 Example of Transition Zone (SR 26 through Newberry, FL)



Downtown Newberry, FL C2T-Rural Town

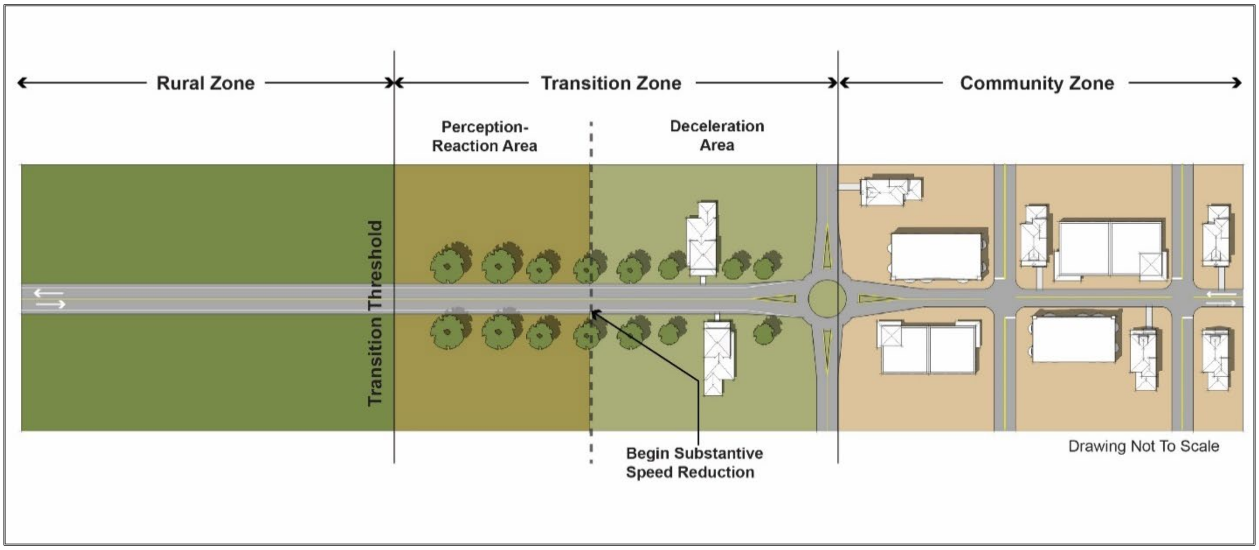
East of Downtown Newberry, FL C2-Rural

Transition zones have two distinct sections, as illustrated in ***Figure 202.4.2***:

(1) Perception-Reaction Area and

(2) Deceleration Area

Figure 202.4.2 Transition Zone from C1/C2 to C2T Context Classification



In the perception-reaction area, drivers are made aware of the need to reduce speed. This section will include visual cues to alert the driver of an upcoming deceleration. These cues may include:

- Signage, including warning signs such as “Reduced Speed Ahead” signs, or gateways signs where appropriate.
- Pavement markings: lane narrowing can be highlighted with the use of a wider outside stripe. The Posted Speed may be placed on the pavement.
- Curb changes: from flush paved shoulders to curbed roadway.
- Architectural elements such as type, location, and spacing of lighting or landscaping.

In the deceleration area, drivers are expected to slow down to an operating speed that matches the context of the community being approached. In the deceleration area, there is a noticeable change in roadway characteristics. The length of the deceleration area is a function of Design Speed, sight distance, and design criteria of the new context classification. Transition from a high-speed to low-speed section can be accomplished through a variety of features, including but not limited to:

- Horizontal deflection (e.g., splitter islands, chicanes, roundabouts)
- Lane narrowing
- Lane repurposing
- Introduction of curb and gutter
- Street enclosure through vertical landscaping
- Signage or gateway treatments, including speed feedback signs
- Posted Speed pavement markings

A combination of strategies is more effective for reducing speed. ***Figures 202.4.3*** and ***202.4.4*** provide an example of horizontal deflection and lane narrowing at the entrance of a rural town.

Figure 202.4.3 Example of a Transition Zone from 60 to 30 mph (SR 636, entrance to town of Wauchula, Florida)

Figure 202.4.4 Section Change Near Transition from 40 to 30 mph (Entrance to Wauchula, FL, showing lane narrowing)

Photo by FDOT District 1