

## CHAPTER 18

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## CHAPTER 18

### SIGNING AND MARKING

#### A INTRODUCTION

Signing and pavement markings help improve highway safety by providing guidance information to road users. Both signs and pavement markings should provide sufficient visibility to meet the user's needs. The design of signs and pavement markings should complement the basic highway design. Designers and engineers should also be aware of the capabilities and needs of seniors, and consider appropriate measures to better meet their needs and capabilities.

Sections C and D of this chapter specifically discuss traffic control devices for both signing and pavement marking that accommodate not only the needs of all types of road users, but also the special needs of seniors.

#### B BACKGROUND

[Section 316.0745, F.S.](#), requires ~~FDOT~~the Department to compile and publish a manual of uniform traffic control devices for use on the streets and highways of the state. To comply with this statute, the Federal Highway Administration's (FHWA) [Manual on Uniform Traffic Control Devices \(MUTCD\)](#) has been adopted for use in [Rule 14-15.010, F.A.C.](#): All references in this chapter are in conformance with the **MUTCD**.

The [Manual on Speed Zoning for Highways, Roads, and Streets in Florida \(2019\)](#), is adopted for use by the State of Florida under [Rule 14-15.012, F.A.C.](#) This manual is prepared by ~~FDOT~~the Department in compliance with [Chapter 316, of the Florida Statutes](#), to promote uniformity in the establishment of state, municipal, and county speed and school zones throughout the State.

## C SIGNS

### C.1 Advance Street Name Signs

The use of advance street name signs provides advance notification to road users to assist them in making safe roadway decisions. Signs should be used for signalized or non-signalized intersections that are classified as a minor arterial or higher, or a cross street that provides access to a traffic generator or possesses other comparable physical or traffic characteristics deemed to be critical or significant.

#### C.1.a Standards

The words Street, Boulevard, Avenue, etc., may be abbreviated, deleted, or reduced in size to conserve sign panel length. However, if confusion would result due to similar street names in the area, the deletion should not be made.

Use of the local name is preferred on advance street name signs. When a cross street has a different name on each side of the intersection, both names shall be shown with an arrow beside each name to designate direction. Additional legend such as NEXT SIGNAL or XX FEET may be added.

#### C.1.b Installation

Advance street name signs should be installed in advance of the intersection in accordance with the distances shown in “Condition A” of [\*\*Table 2C-4. Guidelines for Advance Placement of Warning Signs of the MUTCD\*\*](#). These distances are to be considered the minimum for a single lane change maneuver, and should be measured from the begin taper point for the longest auxiliary lane designed for the intersection. The degree of traffic congestion and the potential number of lane change maneuvers that may be required should also be considered when determining the advance placement distance.

### C.1.c Sign Design

Advance street name signs shall be designed in accordance with [Part 2 Signs](#) of the [MUTCD](#). The lettering for the signs shall be composed of a combination of lower case letters with initial upper case letters.

Letter height should conform to Table 18 – 1 Design Guidelines for Advance Street Name Signs. Various layouts for advance street name signs are shown in Figure 18 – 1 Examples of Advance Street Name Signs.

**Table 18 – 1  
Design Guidelines for Advance Street Name Signs**

Posted Speed Limit	Street Name Legend	Next Signal or Intersection
	Letter Size (inches) Series E Modified (EM) Upper/Lower Case Letters	Letter Size (inches) Series D (D) Upper Case Letters
35 mph or less	8 EM	6 D
40 mph or greater	10.67 EM	8 D

**Figure 18 – 1**  
**Examples of Advance Street Name Signs**



## C.2 Advance Traffic Control Signs

Advance Traffic Control signs, i.e., Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3) signs, shall be installed on an approach to a primary traffic control device that is not visible for a sufficient distance to permit the driver to respond to the device. The visibility criteria for traffic signals shall be based on having a continuous view of at least two signal faces for the distance specified in [Table 4D-2. Minimum Sight Distance for Signal Visibility](#) of the [MUTCD](#).

An Advance Traffic Control sign may be used for additional emphasis of the primary traffic control device, even when the visibility distance to the device is satisfactory.

## C.3 Overhead Street Name Signs

Overhead street name signs with mixed-case lettering should be used at major intersections (with multi-lane approaches) as a supplement to post mounted street name signs.

### C.3.a Standards

Overhead street name signs shall only be used to identify cross streets, not destinations such as cities or facilities. To avoid the need for lighting of overhead signs, they should have a minimum maintained retroreflectivity value as shown in [Table 2A-3. Minimum Maintained Retroreflectivity Levels, MUTCD](#). Roadway geometry and forward sight distance will also influence the need for overhead sign lighting.

The words Street, Boulevard, Avenue, etc., may be abbreviated, deleted, or reduced in size to conserve sign panel length. The border should be eliminated on overhead street name signs to minimize sign panel size. When a cross street is known by both a route number and a local name, use of the local name is preferred.

When a cross street has a different name on each side of the intersection, two options are permitted:

- When two sign panels are used, install one sign panel on the left and the other sign panel on the right side of the signal heads; or
- When one sign panel is used, the left name should be displayed over the right name. Arrows should be provided to indicate which side of the

intersection the street name applies.

### **C.3.b Installation**

Due to the possibility of hurricane strength winds, overhead street name signs should not be installed on span wire but should be mounted to the strain pole or mast arm.

The location of the overhead street name sign on a signal strain pole and/or mast arm may vary. However, it shall not interfere with the motorist's view of the signal heads. The preferred location is shown in [FDOT's the Standard Plans](#). In the case of separate street names on each side of the street, where separate signs are used, one sign should be placed to the right of the signal heads and the other sign to the left of the signal heads.

### **C.3.c Sign Design**

On roadways with speeds of 40 mph or above, the sign panel should be at least 24 inches in height with the length determined by text. At a minimum, use 8-inch upper case and 6-inch lower case lettering for the street name. If block numbering text is included, use 6-inch all upper case lettering on the second line. The preferred font is Series E-Modified; however, Series E may be used to accommodate the amount of legend so as not to exceed the 96-inch maximum length.

Where structurally possible, overhead street name signs should be designed in compliance with the FHWA recommendations for older drivers using a minimum lettering size of 10-inch upper case with 9-inch lower case.

### **C.3.d Internally Illuminated Overhead Street Name Signs**

An internally illuminated overhead street name sign may be used to improve night-time visibility. Internally illuminated overhead street name signs should have a standardized height of 24-inches and a length not to exceed 108-inches (nine feet).

A Series E Modified or Series E font, which may vary to accommodate the amount of text on the panel should be used.

The sign design shall be in accordance with the [MUTCD](#). When possible, the text should utilize the following text attributes in descending order to limit the maximum width:

- 10-inch upper case with 8-inch lower case, Type EM font
- 10-inch upper case with 8-inch lower case, Type E font
- 8-inch upper case with 6-inch lower case, Type EM font
- 8-inch upper case with 6-inch lower case, Type E font

Internally illuminated overhead street name signs shall be on [FDOT's](#) [Department's \*Approved Products List \(APL\)\*](#).

#### **C.4 Community Wayfinding Guidance**

Community wayfinding guide signs should be developed and approved through local resolution with criteria for the destinations shown on the community wayfinding guide sign system plan. Any wayfinding guide sign should be used in accordance with [Rule 14-51.030, F.A.C.](#) The intent is to provide guidance and navigation information to local cultural, historical, recreational, and tourist activities. No destination should be displayed for the purpose of advertising.

#### **C.5 DMS Overview**

The main purpose of dynamic message signs (DMS) is to convey timely and important en-route and roadside information to motorists and travelers. Further information on how DMS signs may be used can be found in FDOT's policy on [Displaying Messages on Dynamic Message Signs Permanently Mounted on the State Highway System](#).

#### **C.6 Design Details for Signs**

The [MUTCD](#) shall govern all sign details. At a minimum, the "Conventional Road" size shall be used on signs intended for motor vehicle operators.

Shared use path sign sizing for traffic control shall follow the "Shared-Use Path" sizing and height shown in the MUTCD. See **Chapter 9 – Bicycle Facilities** for additional requirements on the signing of shared use paths.

## D PAVEMENT MARKINGS

### D.1 ~~6-inch~~ Pavement Markings

6-inch pavement markings should be used for all pavement center line, lane separation line and edge line markings. The *FDOT Design Manual, Chapter 230* provides additional information, including material options.

### D.2 Reflective Pavement Markers

To provide greater emphasis and increase visibility to the pavement markings, especially during wet/night conditions., ~~reflective (R) raised (R) pavement M markers (RPMs) may be placed at 40-foot spacings along the centerline markings of roadways.~~ More information on RPM configurations is shown in the FDOT's *Standard Plans, Index 76-001*.

## E AUDIBLE AND VIBRATORY TREATMENTS

### E.1 Longitudinal Audible Vibratory Treatments

Longitudinal ~~A~~audible and ~~V~~vibratory ~~T~~treatments (AVTs) are an effective low-cost countermeasure to reduce the severity and frequency of roadway lane departure crashes. ~~They include cylindrical ground-in rumble strips, sinusoidal ground-in rumble strips and profiled thermoplastic. They are most effective on high speed roadways with flush shoulders. They should not be placed within the limits of intersections or crosswalks.~~

Audible ~~V~~vibratory ~~T~~treatments (AVTs) are ~~designed to improve the opportunity for a safe recovery for distracted, drowsy, or otherwise inattentive drivers who may unintentionally drift over the edge or center line. Due to the difficulty in determining where a driver will depart the lane, it is recommended that treatments be installed system-wide or in corridors. Their use should be determined on the suitability of the cross-section and appropriateness in the surrounding land use context.~~ shall be provided for edge lines and center lines on flush-shoulder roadways with a posted speed of 50 mph or greater and lane widths of 11 feet or greater. Sections where advisory speeds are used due to restricted horizontal or vertical geometry shall not be excluded. AVTs shall not be placed within the limits of crosswalks.

~~Considerations that may limit the acceptability and effectiveness include low speeds, noise for adjacent residences, and pavement width. More information on these types of treatments are shown in the Department's~~ *Standard Plans, Index*

[546-010](#) and [FDOT Design Manual, Chapter 210 Arterials and Collectors](#). AVT options include sinusoidal ground-in rumble strips and profiled thermoplastic. The sinusoidal ground-in rumble strip option provides the most economical and durable solution with less noise pollution.

## E.2 Transverse Rumble Strips

Transverse rumble strips [may be used to](#) alert the driver [in rural](#) areas to upcoming stop conditions or abrupt changes in alignment. Factors influencing their use include crash history, roadway geometry and surrounding land use (noise pollution). They should not be placed in crosswalks or bicycle facilities. [If placed](#) On roadways open to bicycle travel, a minimum clear path of 4 feet on the outside edge should be provided. [Sections 3J.02 Transverse Rumble Strip Markings and 6F.87 Rumble Strips, MUTCD](#) provide further information on the use of transverse rumble strips.

[See Chapter 11 – Work Zone Safety and Mobility](#) for requirements for installation of short term transverse rumble strips during construction activities.

## [F RAILROAD DYNAMIC ENVELOPE PAVEMENT MARKING AND SIGNAGE](#)

[Railroad Dynamic Envelope pavement markings are used to delineate the area around at-grade railroad crossings where vehicles should not stop. See Chapter 7 – Rail-Highway Grade Crossings for guidance on the design and installation of railroad dynamic envelope pavement markings and signage.](#)

## CHAPTER 19

### TRADITIONAL NEIGHBORHOOD DEVELOPMENT

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## CHAPTER 19

### TRADITIONAL NEIGHBORHOOD DEVELOPMENT

#### A INTRODUCTION

Florida is a national leader in planning, design and construction of Traditional Neighborhood Development (TND) communities, and in the renovation of downtown neighborhoods and business districts. TND refers to the development or redevelopment of a neighborhood or town using traditional town planning principles. Projects should include a range of housing types and commercial establishments, a network of well-connected streets and blocks, civic buildings and public spaces, and include other uses such as stores, schools, and worship within walking distances of residences.

They represent patterns of development aligned with the state's growth management, smart growth and sprawl containment goals. This approach, with its greater focus on pedestrian, bicycle and transit mobility; is distinct from Conventional Suburban Development (CSD). CSDs are comprised largely of subdivision and commercial strip development.

TND communities rely on a strong integration of land use and transportation. A TND has clearly defined characteristics and design features that are necessary to achieve the goals for compact and livable development patterns reinforced by a context-sensitive transportation network. The treatment of land use, development patterns and transportation networks necessary for successful TND communities is a major departure from those same elements currently utilized in other Greenbook chapters.

To provide a design that accomplishes the goals set out in this chapter, designers will be guided by the context of the built environment, established or desired, for a portion of the communities because TND communities rely on a stronger integration of land use and transportation than CSD communities. This chapter provides criteria that may be used for the design of streets within a TND when such features are desired, appropriate and feasible. This involves providing a balance between mobility and livability. This chapter may be used in planning and designing new construction, urban infill, and redevelopment projects.

Section B of this chapter discusses the primary objectives of TND in more detail to aid the designer in the selection of proper criteria. Section C sets forth specific design criteria for the transportation system within TND.

The Department's ***Traditional Neighborhood Development Handbook (2011)*** provides designers guidance in the successful application of this Chapter.

## **B APPLICATION**

A project or community plan may be considered a TND when at least the first seven of the following principles are included:

1. Has a compact, pedestrian-oriented scale that can be traversed in a five to ten-minute walk from center to edge.
2. Is designed with low speed, low volume, interconnected streets with short block lengths, 150 to 500 feet, and cul-de-sacs only where no alternatives exist. Cul-de-sacs, if necessary, should have walkway and bicycle connections to other sidewalks and streets to provide connectivity within and to adjacent neighborhoods.
3. Orients buildings at the back of sidewalk, or close to the street with off-street parking located to the side or back of buildings, as not to interfere with pedestrian activity.
4. Has building designs that emphasize higher intensities, narrow street frontages, connectivity of sidewalks and paths, and transit stops to promote pedestrian activity and accessibility.
5. Incorporates a continuous bike and pedestrian network with wider sidewalks in commercial, civic, and core areas, but at a minimum has sidewalks at least five feet wide on both sides of the street. Accommodates pedestrians with short street crossings, which may include mid-block crossings, bulb-outs, raised crosswalks, specialty pavers, or pavement markings.
6. Uses on-street parking adjacent to the sidewalk to calm traffic, and offers diverse parking options, but planned so that it does not obstruct access to transit stops.
7. Varies residential densities, lot sizes, and housing types, while maintaining an average net density of at least eight dwelling units per acre, and higher density in the center.
8. Integrates at least ten percent of the developed area for nonresidential and civic uses, as well as open spaces.
9. Has only the minimum right of way necessary for the street, median, planting strips, sidewalks, utilities, and maintenance that are appropriate to the adjacent land uses and building types.
10. Locates arterial highways, major collector roads, and other high-volume corridors at the edge of the TND and not through the TND.

The design criteria in this chapter shall only be applicable within the area defined as TND.

## **C PLANNING CRITERIA**

Planning for TND communities occurs at several levels, including the region, the city/town, the community, the block, and, finally, the street and building. Planning should be holistic, looking carefully at the relationship between land use, buildings, and transportation in an integrated fashion. This approach, and the use of form based codes, can create development patterns that balance pedestrian, bicycling, and transit with motor vehicle transportation.

### **C.1 LAND USE**

In addition to its importance in calculating trip generation, the Institute of Transportation Engineers (ITE) recognizes land use as fundamental to establishing context, design criteria, cross-section elements, and right of way allocation. The pedestrian travel that is generated by the land uses is also important to the design process for various facilities.

A well-integrated, or “fine grained”, land use mix within buildings and blocks is essential. These buildings and blocks aggregate into neighborhoods, which should be designed with a mix of uses to form a comprehensive planning unit that aggregates into larger villages, towns, and regions. Except at the regional scale, each of these requires land uses to be designed at a pedestrian scale and to be served by “complete streets” that safely and attractively accommodate many modes of travel.

The proposed land uses, residential densities, building size and placement, proposed parking (on-street and off-street) and circulation, the location and use of open space, and the development phasing are all considerations in facility design for TNDs. ITE recommends a high level of connectivity, short blocks that provide many choices of routes to destinations, and a fine-grained urban land use and lot pattern. Higher residential density and nonresidential intensity, as measured by floor area ratios of building area to site area, are required for well-designed TNDs.

### **C.2 NETWORKS**

Urban networks are frequently characterized as either traditional or conventional. Traditional networks are typically characterized by a relatively non-hierarchical pattern of short blocks and straight streets with a high density of intersections that support all modes of travel in a balanced fashion.

**Figure 19 – 1 Traditional Network**



**New York, NY**

**Savannah, GA**

(Source: VHB)

The typical conventional street network, in contrast, often includes a framework of widely-spaced arterial roads with limited connectivity provided by a system of large blocks, curving streets and a branching hierarchical pattern, often terminating in cul-de-sacs.

**Figure 19 – 2 Conventional Network**



**Walnut Creek, CA**

(Source: VHB)

Traditional and conventional networks differ in three easily measurable respects: (1) block size, (2) degree of connectivity and (3) degree of curvature. While the last does not significantly impact network performance, block size and connectivity create very different performance characteristics.

Advantages of traditional networks include:

1. Distribution of traffic over a network of streets, reducing the need to widen roads;
2. A highly interconnected network providing a choice of multiple routes of travel for all modes, including emergency services;
3. More direct routes between origin and destination points, which generate fewer vehicle miles of travel (VMT) than conventional suburban networks;
4. Smaller block sizes in a network that is highly supportive to pedestrian, bicycle, and transit modes of travel;
5. A block structure that provides greater flexibility for land use to evolve over time.

It is important in TND networks to have a highly interconnected network of streets with smaller block sizes than in conventional networks. There are several ways to ensure that these goals are achieved.

One method is based upon the physical dimensions used to layout streets and blocks. The following list identifies those parameters:

1. Limit block size to an average perimeter of approximately 1,320 feet.
2. Encourage an average intersection spacing for local streets of 300-400 feet.
3. Limit maximum intersection spacing for local streets to approximately 600 feet.
4. Limit maximum spacing between pedestrian/bicycle connections to approximately 300 feet (that is, it creates mid-block paths and pedestrian shortcuts).

## D OBJECTIVES

The basic objectives of a Traditional Neighborhood Development are:

1. Safety
2. Mobility of all users (vehicles, pedestrians, bicyclists and transit)
3. Compact and livable development patterns
4. Context-sensitive transportation network

TND features are based upon the consideration of the following concepts. These concepts are not intended as absolute criteria since certain concepts may conflict. The concepts should therefore be used for the layout of proper street systems.

1. Strong integration of land use and transportation.
2. Very supportive of pedestrian, bicycle, and transit modes.
3. Smaller block sizes to improve walkability, and to create a fine network of streets accommodating bicyclists and pedestrians, and providing a variety of routes for all users.
4. On-street parking is favored over surface parking lots.
5. Limited use of one way streets.
6. Speeds for motor vehicles are ideally kept in the range of 20-35 mph through the design of the street, curb extensions, use of on-street parking, the creation of enclosure through building and tree placement.
7. Street geometry (narrow streets and compact intersections), adjacent land use, and other elements within a TND must support a high level of transit, pedestrian and bicycle activity.
8. Provide access to emergency services, transit, waste management, and delivery trucks.
9. Provide access to property.

This approach to street design requires close attention to the operational needs of transit, fire and rescue, waste collection, and delivery trucks. For this reason, early coordination with transit, fire and rescue, waste collection, and other stakeholder groups is essential. For fire and rescue, determination of the importance of that corridor for community access should be determined, e.g. primary or secondary access.

More regular encroachment of turning vehicles into opposing lanes will occur at intersections. Therefore, frequency of transit service, traffic volumes, and the speeds at those intersections must be considered when designing intersections.

When designing features and streets for TND communities, creativity and careful attention to safety for pedestrians and bicyclists must be balanced with the operational needs of motor vehicles.

Finally, it is very important when designing in TND communities to ensure that a continuous network is created for pedestrians, bicyclists, and transit throughout the community to create higher levels of mobility that are less dependent on automobile travel.

## **E DESIGN ELEMENTS**

The criteria provided in this chapter shall require the approval of the maintaining authority's designated Professional Engineer representative with project oversight or general compliance responsibilities. Approval may be given based upon a roadway segment or specific area.

The criteria provided in this chapter are generally in agreement with AASHTO guidelines with a special emphasis on urban, low-speed environments. Design elements within TND projects not meeting the requirements of this chapter are subject to the requirements for Design Exceptions found in **Chapter 14** of this manual.

### **E.1 Design Controls**

#### **E.1.a Design Speed**

The application of design speed for TND communities is philosophically different than for conventional transportation and CSD communities. Traditionally, the approach for setting design speed was to use as high a design speed as practical.

In contrast to this approach, the goal for TND communities is to establish a design speed that creates a safer and more comfortable environment for pedestrians and bicyclists, and is appropriate for the surrounding context.

Design speeds of 20 to 35 mph are desirable for TND streets. Alleys and narrow roadways intended to function as shared spaces may have design speeds as low as 10 mph.

#### **E.1.b Movement Types**

Movement types are used to describe the expected driver experience on a given thoroughfare, and the design speed for pedestrian safety and mobility established for each of these movement types. They are also used to establish the components and criteria for design of streets in TND communities.

**Yield:** Has a design speed of less than 20 mph. Drivers must proceed slowly with extreme care, and must yield to pass a parked car or approaching vehicle. This is the functional equivalent of traffic calming. This type should accommodate bicycle routes through the use of shared lanes.

**Slow:** Has a design speed of 20-25 mph. Drivers can proceed carefully, with an occasional stop to allow a pedestrian to cross or another car to park. Drivers should feel uncomfortable exceeding design speed due to the presence of parked cars, enclosure, tight turn radii, and other design elements. This type should accommodate bicycle routes through the use of shared lanes.

**Low:** Has a design speed of 30-35 mph. Drivers can expect to travel generally without delay at the design speed, and street design supports safe pedestrian movement at the higher design speed. This type is appropriate for thoroughfares designed to traverse longer distances, or that connect to higher intensity locations. This type should accommodate bicycle routes through the use of bike lanes.

Design speeds higher than 35 mph should not normally be used in TND communities due to the concerns for pedestrian and bicyclist safety and comfort. There may be locations where planned TND communities border, or are divided by, existing corridors with posted/design speeds higher than 35 mph. In those locations, coordination with the regulating agency should occur with a goal to re-design the corridor and reduce the speed to 35 mph or less. The increase in motorist travel time due to the speed reduction is usually insignificant because TND communities are generally compact.

When the speed reduction cannot be achieved, measures to improve pedestrian safety for those crossing the corridor should be evaluated and installed when appropriate.

### **E.1.c Design Vehicles**

There is a need to understand that street design with narrow streets and compact intersections requires designers to pay close attention to the operational needs of transit, fire and rescue, waste collection, and delivery trucks. For this reason, early coordination with transit, fire and rescue, waste collection, and other stakeholder groups is essential.

Regular encroachment of turning vehicles into opposing lanes will occur at intersections. Therefore, frequency of transit service, traffic volumes, and the speeds at those intersections must be considered when designing intersections. For fire and rescue, determination of the importance of the street for community access should be determined, e.g. primary or secondary access.

The designer should evaluate intersections using turning templates or turning movement analysis software to ensure that adequate operation of vehicles can occur. Treatment of on-street parking around intersections should be evaluated during this analysis to identify potential conflicts between turning vehicles and on-street parking.

## E.2 Sight Distance

See **Chapter 3 – Geometric Design, C.3 Sight Distance.**

### E.2.a Stopping Sight Distance

See **Chapter 3 – Geometric Design, C.3.a Stopping Sight Distance.**

### E.2.b Passing Sight Distance

Due to the importance of low speeds and concerns for pedestrian comfort and safety, passing should be discouraged or prohibited.

### E.2.c Intersection Sight Distance

Sight distance should be calculated in accordance with **Chapter 3, Section C.9.b**, using the appropriate design speeds for the street being evaluated. When executing a crossing or turning maneuver after stopping at a stop sign, stop bar, or crosswalk, as required in **Section 316.123, F.S.**, it is assumed that the vehicle will move slowly forward to obtain sight distance (without intruding into the crossing travel lane) stopping a second time as necessary.

Therefore, when curb extensions are used, or on-street parking is in place, the vehicle can be assumed to move forward on the second step movement, stopping just shy of the travel lane, increasing the driver's potential to see further than when stopped at the stop bar. The resulting increased sight distance provided by the two step movement allows parking to be located closer to the intersection.

The **MUTCD** requires that on-street parking be located at least 20 feet from crosswalks. The minimum stopping sight distance is 60 feet for low volume (< 400 ADT) streets. Even on slow speed, low volume urban streets, the combination of curb return, crosswalk width and 20-foot setback to the first parking space may not meet the minimum stopping distance. Justification for locating parking spaces 20 feet from crosswalks may be achieved based on community history with existing installations.

### **E.3 Horizontal Alignment**

#### **E.3.a Minimum Centerline Radius**

See **Chapter 3 – Geometric Design, C.4 Horizontal Alignment** and Table 3 – 12 Minimum Radii (feet) for Design Superelevation Rates Low Speed Local Roads ( $e_{\max} = 0.05$ ).

#### **E.3.b Minimum Curb Return Radius**

Curb return radii should be kept small to keep intersections compact. The use of on-street parking and/or bike lanes increases the effective size of the curb radii, further improving the ability of design vehicles to negotiate turns without running over the curb return.

**Table 19 – 1 Curb Return Radii**

<b>Movement Type</b>	<b>Design Speed</b>	<b>Curb Radius w/Parallel Parking*</b>
Yield	Less than 20 mph	5-10 feet
Slow	20-25 mph	10-15 feet
Low	30-35 mph	15-20 feet

\* Dimensions with parking on each leg of the intersection. Both tangent sections adjacent to the curb return must provide for on-street parking or else curb radii must be evaluated using “design vehicle” and either software or turning templates.

## **E.4 Vertical Alignment**

See *Chapter 3 – Geometric Design, C.5 Vertical Alignment.*

## **E.5 Cross Section Elements**

### **E.5.a Introduction**

As discussed earlier in this chapter, TND street design places importance on how the streets are treated since they are part of the public realm. The street portion of the public realm is shaped by the features and cross section elements used in creating the street. For this reason, it is necessary the designer pay more attention to what features are included, where they are placed, and how the cross section elements are assembled.

### **E.5.b Lane Width**

Travel lane widths should be based on the context and desired speed for the area where the street is located. Table 19-2 shows travel lane widths and associated appropriate speeds. It is important to note that in low speed urban environments, lane widths are typically measured to the curb face instead of the edge of the gutter pan. Consequently, when curb sections with gutter pans are used, the motor vehicle and parking lanes include the width of the gutter pan.

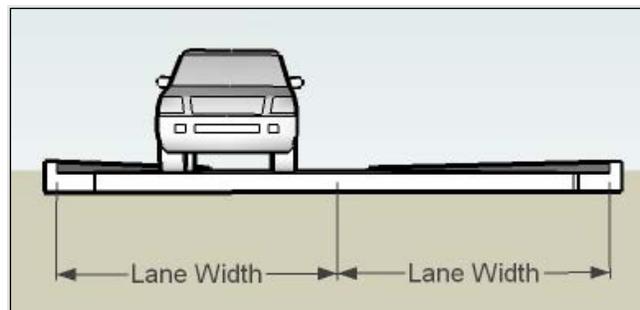
**Table 19 – 2 Minimum Lane Width**

<b>Movement Type</b>	<b>Design Speed</b>	<b>Travel Lane Width</b>
Yield*	Less than 20 mph	N/A
Slow	20-25 mph	9-10 feet
Low	30-35 mph	10-11 feet

\* Yield streets are typically residential two-way streets with parking on one or both sides. When the street is parked both sides, the remaining space between parked vehicles (10 feet minimum) is adequate for one vehicle to pass through. Minimum width for a yield street with parking on both sides should be 24 feet curb face to curb face. Minimum width for a yield street with parking on one side should be 20 feet curb face to curb face, allowing for two 10-foot lanes when the street is not parked.

Figure 19 – 3 Lane Widths shows a typical measurement.

**Figure 19 – 3 Lane Width**



(Source: VHB)

In order for drivers to understand the appropriate driving speeds, lane widths should create some level of discomfort when driving too fast. The presence of on-street parking is important in achieving the speeds shown in Table 19 – 2 Minimum Lane Widths. When bicycle lanes or multi-lane configurations are used, there is more room for vehicles, such as buses, to operate. However car drivers may feel more comfortable driving faster than desired.

Alleys and narrow roadways that act as shared spaces can have design speeds as low as 10 mph, as noted in **Chapter 16 – Residential Street Design**.

Alleys can be designed as either one way or two way. Right of way width should be a minimum of 20 feet with no permanent structures within the right of way that would interfere with vehicle access to garages or parking spaces, access for trash collection, and other operational needs. Pavement width should be a minimum of 12 feet. Coordination with local municipalities on operational requirements is essential to ensure that trash collection and fire protection services can be completed.

### **E.5.c Medians**

Medians used in low-speed urban thoroughfares provide for access management, turning traffic, safety, pedestrian refuge, landscaping, lighting, and utilities. These medians are usually raised with raised curb.

Landscaped medians can enhance the street or help create a gateway entrance into a community. Medians can be used to create tree canopies over travel lanes for multi-lane roadways contributing to a sense of enclosure.

Medians vary in width depending on available right of way and function. Because medians require a wider right of way, the designer must weigh the benefits of a median with the issues of pedestrian crossing distance, speed, context, and available roadside width.

**Table 19 – 3 Recommended Median Width**

<b>Median Type</b>	<b>Minimum Width</b>	<b>Recommended Width</b>
Median for access control	4 feet	6 feet
Median for pedestrian refuge	6 feet	8 feet
Median for trees and lighting	6 feet [1]	10 feet [2]
Median for single left turn lane	10 feet [3]	14 feet [4]

Table Notes:

- [1] Six feet measured curb face to curb face is generally considered the minimum width for the proper growth of small caliper trees (less than 4 inches),
- [2] Wider medians provide room for larger caliper trees and more extensive landscaping,
- [3] A ten foot lane provides for a turn lane without a concrete traffic separator,
- [4] Fourteen feet provides for a turn lane with a concrete traffic separator.

**E.5.d Turn Lanes**

The need for turn lanes for vehicle mobility should be balanced with the need to manage vehicle speeds and the potential impact on the border width, such as sidewalk width. Turn lanes tend to allow through vehicles to maintain higher speeds through intersections, since turning vehicles can move over and slow in the turn lane.

Left turn lanes are considered to be acceptable in an urban environment since there are negative impacts to roadway capacity when left turns block the through movement of vehicles. The installation of a left turn lane can be beneficial when used to perform a road diet such as reducing a four lane section to three lanes with the center lane providing for turning movements. In urban areas, no more than one left turn lane should be provided.

Right turns from through lanes do not block through movements, but do create a reduction in speed due to the slowing of turning vehicles. Right turn lanes are used to maintain speed through intersections, and to reduce the potential for rear end crashes. However, the installation of right turn

lanes increases the crossing distance for pedestrians and the speed of vehicles, therefore the use of exclusive right turn lanes are rarely used except at “T” intersections.

### **E.5.e Parking**

On-street parking is important in the urban environment for the success of those retail businesses that line the street, to provide a buffer for the pedestrian, and to help calm traffic speeds. When angle parking is proposed for on-street parking, designers should consider the use of back in angle parking in lieu of front in angle parking.

**Table 19 – 4 Parking Lane Width**

<b>Movement Type</b>	<b>Design Speed</b>	<b>Parking Lane Width</b>
Slow	20-25 mph	(Angle) 17-18 feet
Slow	20-25 mph	(Parallel) 7 feet
Low	30-35 mph	(Parallel) 7-8 feet

## **E.6 Cul-de-sacs and Turnarounds**

Cul-de-sacs should only be used where no other alternatives exist. Cul-de-sacs should have walkway or bicycle connections to other sidewalks and streets to provide connectivity within and to adjacent neighborhoods.

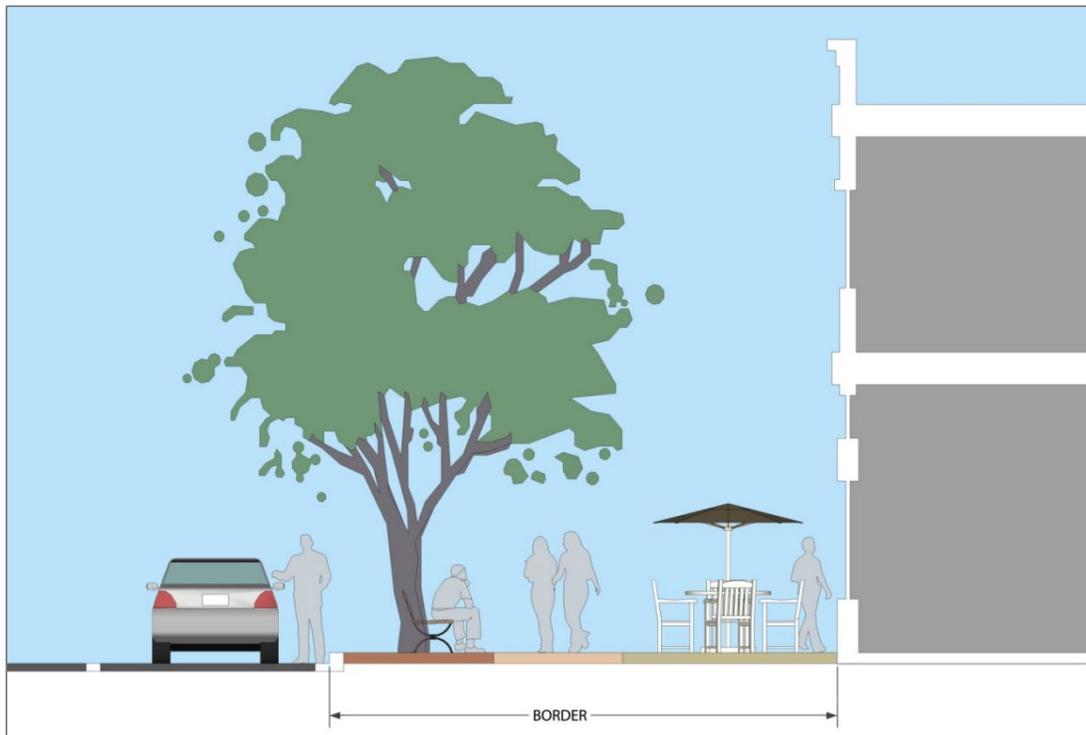
### **E.6.a Turning Area**

A residential street open at one end only should have a special turning area at the closed end. A residential street more than 100 feet long and open at one end only shall have a special turning area at the closed end. This turning area should be circular and have a radius appropriate to the types of vehicle expected. The minimum outside radius of a cul-de-sac shall be 30 feet. In constrained circumstances, other turning configurations such as a “hammerhead” may be considered.

## E.7 Pedestrian Considerations

In urban environments, the “border,” or area between the face of a building or right of way line and the curb face, serves as the pedestrian realm because it is the place for which pedestrian activity is provided, including space to walk, socialize, places for street furniture, landscaping, and outdoor cafes. In an urban environment, the border consists of the furniture, walking and shy zones.

**Figure 19 – 4      Border**



(Source: VHB)

### E.7.a Furniture Zone

The furniture zone can be located adjacent to the building face, but more commonly is adjacent to the curb face. The furniture zone contains parking meters, lighting, tree planters, benches, trash receptacles, magazine and newspaper racks, and other street furniture. The furniture zone is separate from the walking/pedestrian and shy zones to keep the walking area clear for pedestrians, including proper access to transit stops.

### **E.7.b Walking/Pedestrian Zone**

**Chapter 8** addresses considerations for pedestrians. In a properly designed urban environment, where buildings are at the back of the sidewalk and vehicle speeds are low, the separation from traffic is normally provided by on-street parking, which also helps to calm traffic. The width of the walking/pedestrian zone should be at least four feet and should be increased based on expected pedestrian activity.

### **E.7.c Shy Zone**

The shy zone is the area adjacent to buildings and fences that pedestrians generally “shy” away from. A minimum of one foot is provided as part of the sidewalk width. This space should not be included in the normal walking zone of the sidewalk.

### **E.7.d Mid-Block Crossings**

Properly designed TND communities will not normally require mid-block crossings due to the use of shorter block size. When mid-block crossings are necessary, the use of curb extensions or bulbouts should be considered to reduce the crossing distance for pedestrians.

### **E.7.e Curb Extensions**

Curb extensions are helpful tools for reducing the crossing distance for pedestrians, providing a location for transit stops, managing the location of parking, providing unobstructed access to fire and rescue, and increasing space for landscaping and street furniture.

Designers should coordinate with public works staff to ensure that street cleaning can be achieved with their equipment, and adequate drainage can be provided to avoid ponding at curb extensions.

## E.8 Bicyclist Considerations

### E.8.a Bicycle Facilities

**Chapter 9** contains information on bicycle facilities. This section is directed to designing bike facilities in TND communities. Designing for bicycles on thoroughfares in TND communities should be as follows: bicycles and motor vehicles should share lanes on thoroughfares with design speeds of twenty five mph or less. It is important to recognize that the addition of bike lanes does increase roadway widths and can increase the tendency for drivers to speed.

When bicycle lanes are used in TND communities, they should be a minimum of 5 feet wide and designated as bike lanes. On curb and gutter roadways, a minimum 4-foot width measured from the lip of the gutter is required. The gutter width should not be considered part of the rideable surface area, but this width provides useable clearance to the curb face. Drainage inlets, grates, and utility covers are potential problems for bicyclists. When a roadway is designed, all such grates and covers should be kept out of the bicyclists' expected path. If drainage inlets are located in the expected path of bicyclists, they should be flush with the pavement, well seated, and have bicycle compatible grates.

Where parking is present, the bicycle lane should be placed between the parking lane and the travel lane, and have a minimum width of 5 feet. Designers should consider increasing the bicycle lane to 6 feet in lieu of increasing parallel parking width from 7 to 8 feet. This helps encourage vehicles to park closer to the curb, and provides more room for door swing, potentially reducing conflict with bicyclists.

Shared lane markings, or "sharrows," can be used instead of bicycle lanes adjacent to on-street parking. The sharrow allows the bicyclist to occupy the lane and therefore avoids placing bicyclists in the "door zone", and does not require an increase in lane width or ROW width for the thoroughfare. Guidance for use of the shared lane marking is included in **Chapter 9 – Bicycle Facilities** and the **MUTCD**. See Figure 9 –24 – Shared Lane Marking in **Chapter 9** for a detailed drawing of a shared lane marking.

### **E.8.b Shared Use Paths**

Greenways, waterfront walks, and other civic spaces should include shared use paths, and provide for bicycle storage or parking. Bicycle storage or parking should also be included in areas near transit facilities to maximize connectivity between the modes.

### **E.9 Transit**

See [Accessing Transit, Design Handbook for Florida Bus Passenger Facilities, Version III, 2013](#) for information.

### **E.10 Clear Zone**

In urban areas, horizontal clearances, based on clear zone requirements for rural highways, are not practical because urban areas are characterized by lower speed, more dense abutting development, closer spaced intersections and accesses to property, higher traffic volumes, more bicyclists and pedestrians, and restricted right of way. The minimum horizontal clearance shall be 1.5 feet measured from the face of curb.

Streets with curb, or curb and gutter, in urban areas where right of way is restricted do not have roadsides of sufficient widths to provide clear zones; therefore, while there are specific horizontal clearance requirements for these streets, they are based on clearances for normal operation and not based on maintaining a clear roadside for errant vehicles. It should be noted that curb has essentially no redirection capability; therefore, curb should not be considered effective in shielding a hazard.

## F REFERENCES FOR INFORMATIONAL PURPOSES

The following publications were either used in the preparation of this chapter, or may be helpful in designing TND Communities and understanding the flexibility in AASHTO design criteria:

- Designing Walkable Urban Thoroughfares: A Context Sensitive Approach: An ITE Recommended Practice, 2010
- <http://www.ite.org/css/https://www.ite.org/technical-resources/topics/complete-streets/>
- SmartCode 9.2  
<http://www.smartcodecentral.org/>
- A Guide for Achieving Flexibility in Highway Design, AASHTO, May, 2004  
<https://bookstore.transportation.org/>
- Accessing Transit, Design Handbook ~~for Florida Bus Passenger Facilities, 2008~~2017, FDOT Public Transit Office :  
<http://www.dot.state.fl.us/transit/NewTransitPlanning.shtm><https://www.fdot.gov/fdotransit/transitofficehome/transitplanning.shtm/newtransitfacilitiesdesign.shtm>
- Safe Routes to Schools Program, FDOT Safety Office:  
<http://www.dot.state.fl.us/safety/2A-Programs/Programs.shtm>

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