Chapter 14

LOCAL ROADS AND STREETS

SOUTH CAROLINA ROADWAY DESIGN MANUAL

February 2021

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Chapter 14
LOCAL ROADS AND STREETS

Local roads and streets primarily serve as access roads to farms, residences, businesses and other abutting properties. They distribute traffic to highways in the higher functional classification network.

This chapter discusses the criteria used in the design of local roads and streets. Information that is also applicable to the design of local rural roads and local urban streets is included in the following chapters:

- Chapters 3 “Basic Design Controls,” Chapter 4 “Sight Distance,” Chapter 5 “Horizontal Alignment,” Chapter 6 “Vertical Alignment” and Chapter 7 “Cross Section Elements” provide guidance on the geometric design elements.

- Chapter 9 “Intersections” provides information on the design of intersections, including intersection alignment, left- and right-turn lanes and curb radii.

14.1 GENERAL

14.1.1 Descriptions

1. Rural A major part of the rural highway system consists of two-lane local roads. These roadways should be designed to accommodate the highest practical criteria compatible with traffic and topography.

2. Urban A local urban street is a public roadway for vehicular travel including public transit and refers to and includes the entire area within the right of way. The street also serves pedestrian and bicycle traffic and usually accommodates public utility facilities within the right of way. The development or improvement of these streets should be based on a functional street classification that is part of a comprehensive community development plan. The design criteria should be appropriate for the planned development. The two major design controls are (1) the type and extent of urban development with its limitations on right of way, and (2) zoning or regulatory restrictions. Local streets primarily serve to provide access to adjacent residential development areas. The overriding consideration is to foster a safe and pleasant environment whereas the convenience of the motorist is secondary. Other local streets not only provide access to adjacent development, but also serve limited through traffic. Traffic service features may be an important concern on these streets (e.g., traffic signals, left-turn lanes).

14.1.2 State Highway Local Roads and Streets

Local roads and streets are divided into the following categories:

1. Group 1 Group 1 roads and streets are typically located in subdivisions or residential areas.

2. Group 2 A Group 2 road or street:

   - is ½ mile or less in length;
   - is not a major connector (e.g., to a major traffic generator);
   - does not dead-end; and
   - has an AADT of less than 250.

3. Group 3 A Group 3 road or street:

   - is between ½ and 1 mile in length,
   - is not a connecting road or street, and
   - has an AADT of 500 or less.

4. Group 4 Group 4 roads and streets are all other local rural roads and local urban streets, except subdivision streets.

The geometric design criteria presented in Section 14.3 for Groups 1 through 4 is the minimum criteria for State local rural road and local urban street projects.

14.2 DESIGN ELEMENTS

The design criteria discussed in this section applies to all local roads and streets included in the State Highway System. For roads and streets maintained by local governments, additional guidance can be found in the AASHTO publications *A Policy on Geometric Design of Highways and Streets* and *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*.

14.2.1 Traffic Volume

Traffic volume is not usually a major factor in determining the geometric design criteria to be used in designing residential streets. Traditionally, these streets are designed with a standard two-lane cross section, but a four-lane cross section may be appropriate in certain urban areas, as governed by traffic volume, administrative policy or other community considerations (e.g., pedestrians, bicyclists). However, to provide the requisite traffic mobility and safety together with the essential economy in construction, maintenance and operation, these roads and streets must be planned, located and designed to be suitable for predictable traffic operations for all modes of travel and must be consistent with the development and culture abutting the right of way.

For streets serving industrial or commercial areas, traffic volume may be a major factor. For these streets, the AADT projected to 20 years is desirable.

14.2.2 Design Speed

The design speed establishes the range of design values for many of the geometric elements of the highway (e.g., sight distance, horizontal alignment, vertical alignment). The selected design speed should be high enough so that an appropriate regulatory speed limit will be less than or equal to it. Desirably, the speed at which drivers are operating comfortably will be close to the posted speed limit. See Section 3.5.2 and the FHWA publication *Mitigation Strategies for Design Exceptions* for additional guidance on the selection of design speeds.

Design speeds for rural local roads are based on terrain, traffic volumes, driver expectancy and alignment, and may range from 20 to 60 miles per hour. Urban design speeds for local streets can range from 20 to 30 miles per hour, depending on available right of way, terrain, adjacent development, likely pedestrian presence and other site controls. Lower speeds apply in CBD and in more developed areas, while higher speeds are more applicable to outlying suburban and developing areas.

The geometric design tables in Section 14.3 provide the applicable design speeds for local roads and streets.

14.2.3 Sight Distances

See Chapter 4 “Sight Distance” for guidance on stopping, decision, passing and intersection sight distances. Section 14.3 provides specific sight distance values for local roads and streets.

14.2.4 Alignment

The horizontal and vertical alignment should complement each other and should be considered in combination to achieve appropriate safety, capacity and appearance for the type of improvement proposed. Proper combinations of curvature, tangents, grades, variable median widths and separate roadway elevations all combine to enhance safety and aesthetics of local roads and streets. When designing the horizontal and vertical alignments, the designer should provide the most favorable alignment practical consistent with the environmental impact, topography, terrain, design traffic volume and reasonably obtainable right of way. Consider the following:

1. Low-Speed Urban Streets Where superelevation is required on low-speed urban streets ($V_d \leq 45$ mph), use AASHTO Method 2 to determine the design superelevation. See Section 5.3.3 for minimum radii and superelevation rates for low-speed urban streets.

2. Horizontal and Vertical Combinations Consider the relationship between horizontal and vertical alignments simultaneously to obtain a desirable condition. Section 6.2.2 discusses this relationship in detail and its effect on aesthetics and safety.

3. Minimum Grades Desirably, the longitudinal grade should be a minimum of 0.5 percent. For curbed facilities and bridges, it is necessary to provide a minimum longitudinal grade of 0.3 percent to facilitate drainage. For curbed sections, ensure curb profiles provide positive drainage. For uncurbed facilities, a minimum longitudinal grade of 0.0 percent may be considered if adequate cross slopes are provided. Ensure superelevation transitions are not developed in areas with 0 percent grade. Special ditch grades may be necessary to ensure proper drainage.

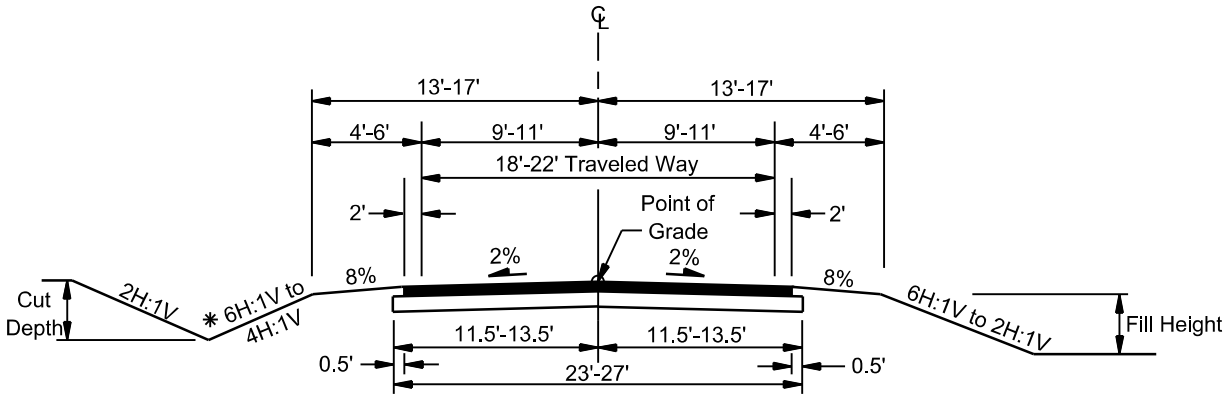
14.2.4.1 Typical Sections

The following figures present typical sections for local roads and streets:

- Figure 14.2-A – Typical Local Rural Road or Local Urban Street with Shoulders
- Figure 14.2-B – Typical Local Rural Road or Local Urban Street with Valley Gutters

14.2.4.2 Number of Lanes

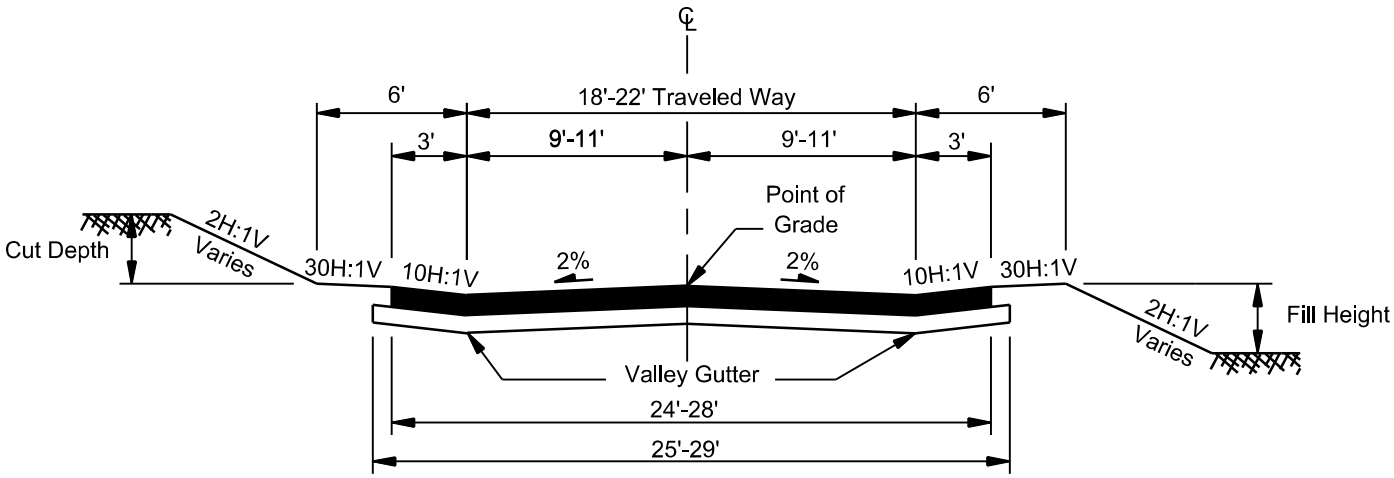
Two lanes usually accommodate rural local roads. A large majority of urban residential streets provide two travel lanes with or without parking lanes on one or both sides.



*This slope may vary between a minimum slope of 6H:1V to a maximum slope of 4H:1V. Where a deeper ditch than provided by a 4H:1V slope is necessary for drainage purposes, continue the 4H:1V slope until the necessary depth has been obtained. This will place the ditch further from the roadway. Provide a separate profile for special ditch grades.

Note: See Section 14.3 for specific road group criteria.

TYPICAL LOCAL RURAL ROAD OR LOCAL URBAN STREET
(With Shoulders)
Figure 14.2-A



Note: See Section 14.3 for specific road group criteria.

TYPICAL LOCAL RURAL ROAD OR LOCAL URBAN STREET
(With Valley Gutter)
Figure 14.2-B

14.2.4.3 Travel Lane and Shoulder Widths

Travel lane widths may be 9 feet to 11 feet depending upon the road group type.

For rural roads, provide a minimum 4-foot shoulder or a 6-foot shoulder for Group 4 roads. The shoulder width includes a minimum paved width of 2 feet. Where bicycles are to be accommodated on the shoulder, the designer should provide a minimum paved shoulder width of 4 feet.

In constrained urban areas with low speeds, the shoulder width may be just the 3-foot valley gutter width. The use of curb and gutter and valley gutter sections are common on urban streets to reduce right-of-way requirements.

For specific lane and shoulder width criteria for local roads and streets, see the geometric design tables in Section 14.3.

14.2.4.4 Cross Slopes

Use a cross slope of 2.00 percent for up to two lanes plus one half the width of the flush median or TWLTL. Crown the pavement at the center of the TWLTL and use a cross slope of 2.00 percent away from the centerline for all lanes on three- and five-lane highways. If a roadway profile grade is less than 2.00 percent, the designer may consider using a cross slope of 2.50 percent for the outside lane to improve drainage. See Section 7.2.3.3.

For paved shoulders greater than 4 feet, provide a shoulder cross slope of 4.00 percent. For paved shoulders less than or equal to 4 feet, the cross slope should match the adjacent travel lane slope. For earth shoulders, provide a shoulder cross slope of 8.00 percent.

For bridge cross slopes, see the *SCDOT Bridge Design Manual*.

14.2.4.5 Auxiliary Lanes

Auxiliary lanes (e.g., passing lanes, parking lanes, turn lanes) are lanes beyond the through travel lanes intended for use by vehicular traffic for specific functions. Desirably, auxiliary lanes will have the same width and cross slope as the adjacent through lanes, although in many cases a lesser width may be appropriate. The geometric design tables in Section 14.3 present lane and shoulder widths for auxiliary lanes.

14.2.4.6 Bicycle Accommodations

For accommodation of bicyclists, the designer should review the guidance provided in Section 13.2.

14.2.4.7 Medians

Medians are generally not provided on local roads and streets. If a median is considered on an urban street, they may be one of the following median types:

1. Flush Medians Flush medians provide an area for left-turn movements and permit direct access to adjoining properties. This allows for numerous unrestricted conflict points. The flush median may serve as refuge for disabled vehicles and as a temporary lane for emergency vehicles. The two-way, left-turn lane (TWLTL) is considered a flush median. Desirably, the roadway cross section with a flush median will allow development of a TWLTL, if applicable.

2. Raised Medians Raised medians restrict left-turn movements to select locations, which allows for better access management. This median may provide a refuge area for pedestrians and an open space for aesthetic considerations.

For guidance on medians and TWLTL, see Chapter 7 “Cross Section Elements.”

14.2.4.8 Right of Way

Providing right-of-way widths that accommodate construction, drainage and proper maintenance of a highway is an important part of the overall design. Wider right of way allows for gentler side slopes, which results in reduced crash severity potential and easier maintenance operations. Right of way is typically configured to accommodate all proposed cross section elements throughout the project (e.g., travel lanes, shoulders, medians, parking lanes, bike lanes, sidewalks, ditches, outer slopes). In developed areas, it may be necessary to limit the right-of-way width. A uniform right-of-way width is preferred; however, do not base the width on the critical point of the project. A critical point may occur where the side slopes extend beyond the normal right of way, for clear areas at the bottom of traversable slopes, for wider clear areas on the outside of curves, where greater sight distance is desirable, at intersections and junctions with other roads, at railroad-roadway grade crossings, for environmental considerations and for maintenance access.

14.2.5 Roadside Safety

The designer should provide adequate horizontal clearance between the traveled way and roadside obstructions on local roads and streets. The designer should provide roadside clear zones as discussed in the AASHTO *Roadside Design Guide*.

14.2.6 Bridges

In general, bridge widths should match the approach roadway width (traveled way plus shoulders). See Section 7.5.1.1 for additional information on bridge widths.

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14.3 TABLES OF DESIGN CRITERIA

The geometric design tables in this section present the Department's design and alignment criteria for local rural roads and local urban streets. The designer should consider the following when using these tables:

1. Functional Classification To determine the latest functional classification of a facility, the designer should contact Road Data Services. Designers should use the information from Road Data Services and engineering judgement to determine the context of the highway when determining if a project is considered rural or urban.

2. Applicability Note that some of the cross-section elements included in the figures (e.g., TWLTL) are not automatically warranted in the project design. The values in the figures only apply after the decision has been made to include the design element in the highway cross section.

3. Manual Section References These figures are intended to provide a concise listing of design values for easy use. However, the designer should review section references for more information on the design elements.

4. Footnotes The figures include many footnotes, which are identified by a number in parentheses (e.g., **(3)**). The information in the footnotes is critical to the proper use of the design tables.

The following design tables are provided for local rural roads and urban local streets:

- Figure 14.3-A — "Geometric Design Criteria for Local Rural Roads (New Construction/ Reconstruction)"
- Figure 14.3-B — "Alignment Criteria for Local Rural Roads (New Construction/ Reconstruction)"
- Figure 14.3-C — "Geometric Design Criteria for Local Urban Streets (New Construction/ Reconstruction)"
- Figure 14.3-D — "Alignment Criteria for Local Urban Streets (New Construction/ Reconstruction)"

Design Element				Manual Section	Design Criteria			
					Group 1	Group 2	Group 3	Group 4
Design Controls	Design Forecast Year **(1)**			14.2.1	20 Years	20 years	20 years	20 years
	Minimum Design Speed			14.2.2	**(2)**	20 mph	30 mph	35 mph
	Access Control			3.8	Controlled by Regulation			
	Level of Service			3.6.4	N/A	N/A	N/A	N/A
Cross Section Elements	Travel Lane Width			14.2.4	Min.: 9 ft	Des.: 10 ft Min.: 9 ft	Des.: 11 ft, Min.: 10 ft	11 ft
	Shoulder Width **(3)**	Total		14.2.4	4 ft	Des.: 6 ft Min.: 4 ft		6 ft
		Paved			2 ft	2 ft	2 ft	2 ft
	Auxiliary Lanes	Lane Width		14.2.4	N/A	N/A	N/A	Min. 11 ft **(4)**
		Shoulder Width	Total		N/A	N/A	N/A	6 ft
			Paved		N/A	N/A	N/A	2 ft
	Cross Slope	Travel Lane		14.2.4	2.00%			
		Auxiliary Lane		14.2.4	N/A	N/A	N/A	2.00%
		Shoulder	Paved **(5)**	14.2.4	2.00%			
			Unpaved		8.00%			
	Bicycle	Bike Lane Width **(6)**		13.2	4 ft			
		Shared Lane Width			N/A	N/A	N/A	14 ft Outside TL
	Sidewalk Width			13.3	5 ft			
	Median	Width (TWLTL)		7.4	N/A	N/A	N/A	15 ft
		Flush/TWLTL Slopes			N/A	N/A	N/A	2.00%
	Right-of-Way Width			14.2.4	Project Specific			
Roadway Elements	Side Slopes	Cut Section	Foreslope	7.3.2	6H:1V to 4H:1V			
			Ditch Type		V-Ditch			
			Back Slope		2H:1V			
		Fill Section	0 ft – 5 ft		6H:1V			
			5 ft – 10 ft		4H:1V			
			> 10 ft		2H:1V			
	Clear Zone				**(7)**			

GEOMETRIC DESIGN CRITERIA FOR LOCAL RURAL ROADS
(New Construction/Reconstruction)
Figure 14.3-A

(Continued on next page)

Design Element			Manual Section	Rural	
Structures	New Bridges	Structural Capacity	7.5.1	HL-93	
		Clear Roadway Width	14.2.6	**(8)**	
	Existing Bridges to Remain in Place	Structural Capacity	14.2.6	**(9)**	
		Clear Roadway Width		**(8)**	
	Vertical Clearance (Local Road Under) **(10a)**	New and Replaced Overpassing Bridges **(10b)**	6.6	16 ft – 0 in	
		Existing Overpassing Bridges		14 ft – 0 in	
		Pedestrian Bridges		18 ft – 0 in	
		Overhead Signs		17 ft – 6 in	
		Overhead Utilities		Coordinate with Utilities Office	
	Vertical Clearance (Local Road Over)	Railroads	6.6	23 ft – 0 in	
		Underpass Width	7.5.2	Approach Roadway Width Including Sidewalks, where applicable	Traveled Way plus Clear Zone
	Vertical Clearance (Over Water)	Navigable Water	6.6	Coordinate with Environmental Services Office	
		Major Lakes & Reservoirs (with boat traffic)		8 ft – 0 in above the high water mark	
		Rivers		2 ft – 0 in above the design high water. Freeboard may be increased to a maximum of 7 ft – 0 in for large rivers.	
		Tidal Waters		2 ft above the 10-year high water elevation including wave height.	

GEOMETRIC DESIGN CRITERIA FOR LOCAL RURAL ROADS
(New Construction/Reconstruction)
Figure 14.3-A

(Continued on next page)

Footnotes for Figure 14.3-A

(1) Design Forecast Year Table values are desirable. For rural roads, the design year may be current traffic volumes.

(2) Minimum Design Speed Design speed is not a major factor for Group 1 roads and streets. Select a design speed based on available right of way, terrain, likely pedestrian presence, adjacent development and other area controls.

(3) Shoulder Width Shoulders should be increased by 3.75 feet where guardrail is used.

(4) Auxiliary Lane Width The auxiliary lane width should be the same as the adjacent travel lane.

(5) Shoulder Cross Slope For paved shoulders wider than 4 feet, use a 4.00 percent shoulder cross slope.

(6) Bicycle Facilities Lane Width 4-foot bicycle lane width is measured exclusive of curb & gutter or rumble strips/stripes. For design speeds greater than 45 miles per hour, increase the bike lane width in accordance with AASHTO *Guide for the Development of Bicycle Facilities*.

(7) Clear Zones See the AASHTO *Roadside Design Guide* for the applicable clear zones.

(8) Bridge Widths Bridge width is equal to the width of roadway section (outside shoulder to outside shoulder). See Section 7.5.1.1 for bridge widths.

(9) Structural Capacity (Existing Bridges) Consult with the State Bridge Maintenance Engineer to determine the allowable structural capacity of bridges to remain in place.

(10) Vertical Clearance (Local Roads Under)

a. Provide the vertical clearance over the entire traveled way, shoulders and any anticipated future widening.

b. Table value includes allowance for future overlays.

GEOMETRIC DESIGN CRITERIA FOR LOCAL RURAL ROADS
(New Construction/Reconstruction)
Figure 14.3-A
(Continued)

Design Element		Manual Section	Design Speed								
			20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph
Stopping Sight Distance **(1)**		4.1	115 ft	155 ft	200 ft	250 ft	305 ft	360 ft	425 ft	495 ft	570 ft
Passing Sight Distance		4.2	400 ft	450 ft	500 ft	550 ft	600 ft	700 ft	800 ft	900 ft	1000
Decision Sight Distance **(2)**		4.3	-	-	220 ft	275 ft	330 ft	395 ft	465 ft	535 ft	610 ft
Intersection Sight Distance **(3)**		4.4	225 ft	280 ft	335 ft	390 ft	445 ft	500 ft	555 ft	610 ft	665 ft
Minimum Radii	e_{max} = 8%	5.2							758 ft	960 ft	1200
	e_{max} = 6%		81 ft	144 ft	231 ft	340 ft	485 ft	643 ft	833 ft		
Superelevation Rate **(4)**		5.3	6%	6%	6%	6%	6%	6%	6 / 8%	8%	8%
Horizontal Sight Line Offset **(5)**		5.4	20 ft	20 ft	21 ft	23 ft	24 ft	25 ft	27 ft 30 ft	32 ft	34 ft
Min. Vertical (K-values) **(6)**	Crest	6.5	7	12	19	29	44	61	84	114	151
	Sag		17	26	37	49	64	79	96	115	136
Maximum Grade	Level	6.3.1	8%	7%	7%	7%	7%	6%	6%	6%	5%
	Rolling		11%	11%	10%	10%	9%	8%	7%	7%	6%
	Mountain		16%	15%	14%	13%	12%	10%	10%	10%	n/a
Minimum Grade **(7)**		6.3.2	Des.: 0.5% Min.: 0.0%								

Footnotes

(1) Stopping Sight Distance. Table values are for passenger cars on level grade.

(2) Decision Sight Distance. Table values are for stop on a rural road, Avoidance Maneuver A. See Section 4.3 for other maneuvers.

(3) Intersection Sight Distance. Table values are for passenger cars for assumed conditions described in Figure 4.4-C. See Section 4.4 for other conditions.

(4) Superelevation Rate. See Section 5.3 for superelevation rates based on e_{max}, design speed and radii of horizontal curves.

(5) Horizontal Sight Line Offset. Table values provide the necessary middle ordinate assuming the design speed, stopping sight distance and minimum radii based on an e_{max} = 6 percent for design speeds 20 to 50 miles per hour and e_{max} = 8 percent for design speeds of 50 miles per hour or greater.

(6) Vertical Curvature (K-Value). K-values are based on the level stopping sight distances.

(7) Minimum Grade. The minimum grade of 0.0 percent can only be used on ditch sections where there is an adequate roadway cross slope and ditch grade. Ensure superelevation transitions are not developed in areas with 0.0 percent grade. Special ditch grades may be necessary to ensure proper project runoff management.

ALIGNMENT CRITERIA FOR LOCAL RURAL ROADS
(New Construction/Reconstruction)
Figure 14.3-B

Design Element				Manual Section	Design Criteria			
					Group 1	Group 2	Group 3	Group 4
Design Controls	Design Forecast Year **(1)**			14.2.1	20 Years	20 years	20 years	20 years
	Minimum Design Speed			14.2.2	**(2)**	20 mph	20 mph	30 mph
	Access Control			3.8	Controlled by Regulation			
	Level of Service			3.6.4	N/A	N/A	N/A	N/A
Cross Section Elements	Travel Lane Width			14.2.4	Min.: 9 ft	Des.: 10 ft Min.: 9 ft	Des.: 11 ft, Min.: 10 ft	Min.: 11 ft
	Shoulder Width **(3)**	Total		14.2.4	4 ft or C/G	Des.: 6 ft Min.: 4 ft or C/G		6 ft or C/G
		Paved			2 ft or C/G	2 ft or C/G	2 ft or C/G	2 ft or C/G
	Auxiliary Lanes	Lane Width		14.2.4	N/A	N/A	N/A	Min. 11 ft **(4)**
		Shoulder Width	Total		N/A	N/A	N/A	6 ft or C/G
			Paved		N/A	N/A	N/A	2 ft or C/G
	Parking Lane Width			7.2.7	8 ft – 10 ft			
	Cross Slope	Travel Lane		14.2.4	2.00%			
		Auxiliary Lane		14.2.4	N/A	N/A	N/A	2.00%
		Shoulder	Paved **(5)**	14.2.4	2.00%			
			Unpaved		8.00%			
	Bicycle	Bike Lane Width **(6)**		13.2	4 ft			
		Shared Lane Width			N/A	N/A	N/A	14 ft Outside TL
	Curb & Gutter	Type **(7)**		7.2.8	Vertical, Sloping or Valley Gutter			
		Width			2 ft			
	Sidewalk Width			13.3	5 ft			
	Median	Width (TWLTL)		7.4	N/A	N/A	N/A	15 ft
		Flush/TWLTL Slopes			N/A	N/A	N/A	2.00%
	Right of Way Width			14.2.4	Project Specific			
Roadway Elements	Side Slopes	Cut Section	Foreslope	7.3.2	6H:1V to 4H:1V			
			Ditch Type		V-Ditch			
			Back Slope		2H:1V			
		Fill Section	0 ft – 5 ft		6H:1V			
			5 ft – 10 ft		4H:1V			
			> 10 ft		2H:1V			
	Clear Zone				**(8)**			

GEOMETRIC DESIGN CRITERIA FOR LOCAL URBAN STREETS
(New Construction/Reconstruction)
Figure 14.3-C

(Continued on next page)

Design Element			Manual Section	Rural	
Structures	New Bridges	Structural Capacity	7.5.1	HL-93	
		Clear Roadway Width	14.2.6	**(9)**	
	Existing Bridges to Remain in Place	Structural Capacity	14.2.6	**(10)**	
		Clear Roadway Width		**(9)**	
	Vertical Clearance (Local Road Under) **(11a)**	New and Replaced Overpassing Bridges **(11b)**	6.6	16 ft – 0 in	
		Existing Overpassing Bridges		14 ft – 0 in	
		Pedestrian Bridges		18 ft – 0 in	
		Overhead Signs		17 ft – 6 in	
		Overhead Utilities		Coordinate with Utilities Office	
	Vertical Clearance (Local Road Over)	Railroads	6.6	23 ft – 0 in	
		Underpass Width	7.5.2	Approach Roadway Width Including Sidewalks, where applicable	Traveled Way plus Clear Zone
	Vertical Clearance (Over Water)	Navigable Water	6.6	Coordinate with Environmental Services Office	
		Major Lakes & Reservoirs (with boat traffic)		8 ft – 0 in above the high water mark	
		Rivers		2 ft – 0 in above the design high water. Freeboard may be increased to a maximum of 7 ft – 0 in for large rivers.	
		Tidal Waters		2 ft above the 10-year high water elevation including wave height.	

GEOMETRIC DESIGN CRITERIA FOR LOCAL URBAN STREETS
(New Construction/Reconstruction)
Figure 14.3-C

(Continued on next page)

Footnotes for Figure 14.3-C

(1) Design Forecast Year. Table values are desirable. For urban streets, the minimum design year is 10 years.

(2) Minimum Design Speed. Design speed is not a major factor for Group 1 roads and streets. Select a design speed based on available right of way, terrain, likely pedestrian presence, adjacent development and other area controls.

(3) Shoulder Width. Shoulders should be increased by 3.75 feet where guardrail is used.

(4) Auxiliary Lane Width. The auxiliary lane width should be the same as the adjacent travel lane.

(5) Shoulder Cross Slope. For paved shoulders wider than 4 feet, use a 4.00 percent shoulder cross slope.

(6) Bicycle Facilities Lane Width. 4-foot bicycle lane width is measured exclusive of curb & gutter or rumble strips/stripes. For design speeds greater than 45 miles per hour, increase the bike lane width in accordance with AASHTO *Guide for the Development of Bicycle Facilities*.

(7) Curb and Gutter (Type). If curb and gutter is used on streets with design speeds greater than 45 miles per hour, place the curb and gutter outside of the shoulder and use a sloping curb. In some residential areas, an OGEE curb and gutter may be used.

(8) Clear Zones. See the AASHTO *Roadside Design Guide for the applicable clear zones.*

(9) Bridge Widths. Bridge width is equal to width of roadway section (outside shoulder to outside shoulder). See Section 7.5.1.1 for guidance.

(10) Structural Capacity (Existing Bridges). Consult with the State Bridge Maintenance Engineer to determine the allowable structural capacity of bridges to remain in place.

(11) Vertical Clearance (Local Roads Under).

a. Provide the vertical clearance over the entire traveled way, shoulders and any anticipated future widening.

b. Table value includes allowance for future overlays.

GEOMETRIC DESIGN CRITERIA FOR LOCAL URBAN STREETS
(New Construction/Reconstruction)
Figure 14.3-C
(Continued)

Design Element		Manual Section	Design Speed								
			20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph
Stopping Sight Distance **(1)**		4.1	115 ft	155 ft	200 ft	250 ft	305 ft	360 ft	425 ft	495 ft	570 ft
Decision Sight Distance **(2)**		4.3	-	-	490 ft	590 ft	690 ft	800 ft	910 ft	1030	1150
Intersection Sight Distance **(3)**		4.4	225 ft	280 ft	335 ft	390 ft	445 ft	500 ft	555 ft	610 ft	665 ft
Minimum Radii	e_{max} = 4%		86 ft	154 ft	250 ft	371 ft	533 ft	711 ft	926 ft	1190	1500
Superelevation Rate **(4)**		5.3	4%	4%	4%	4%	4%	4%	4%	4%	4%
Horizontal Sight Line Offset **(5)**		5.4	19 ft	19 ft	20 ft	21 ft	22 ft	23 ft	24 ft	26 ft	27 ft
Min. Vertical (K-values) **(6)**	Crest	6.5	7	12	19	29	44	61	84	114	151
	Sag		17	26	37	49	64	79	96	115	136
Maximum Grade **(7)**	Level	6.3.1	8%	7%	7%	7%	7%	6%	6%	6%	5%
	Rolling		11%	11%	10%	10%	9%	8%	7%	7%	6%
	Mountain		15%	15%	14%	13%	12%	10%	10%	10%	n/a
Minimum Grade **(8)**		6.3.2	Des.: 0.5% Min.: 0.3%								

Footnotes

(1) Stopping Sight Distance. Table values are for passenger cars on level grade.

(2) Decision Sight Distance. Table values are for stop on an urban road, Avoidance Maneuver B. See Section 4.3 for other maneuvers.

(3) Intersection Sight Distance. Table values are for passenger cars for assumed conditions described in Figure 4.4-C. See Section 4.4 for other conditions.

(4) Superelevation Rate. See Section 5.3 for superelevation rates based on e_{max}, design speed and radii of horizontal curves.

(5) Horizontal Sight Line Offset. Table values provide the necessary middle ordinate assuming the design speed, stopping sight distance and minimum radii based on an e_{max} = 4 percent.

(6) Vertical Curvature (K-Value). K-values are based on the level stopping sight distances.

(7) Maximum Grades. For urban streets in commercial and industrial areas, limits grades to 8 percent or less.

(8) Minimum Grade. The minimum for curb and gutter is 0.3 percent and for valley gutter it is 0.4 percent. Special ditch grades may be necessary to ensure proper project runoff management.

ALIGNMENT CRITERIA FOR LOCAL URBAN STREETS
(New Construction/Reconstruction)
Figure 14.3-D

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14.4 REFERENCES

1. *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2011.

2. *Highway Safety Design and Operations Guide*, AASHTO, 1997.

3. *Roadside Design Guide*, AASHTO, 2011.

4. *Highway Capacity Manual (HCM) 2010*, Transportation Research Board, 2010.

5. *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT $\leq$ 400)*, AASHTO, 2001.

6. *Guide for the Development of Bicycle Facilities*, AASHTO, 2012.

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