

Design Element				Manual Section	Design Criteria		
Design Controls	Design Forecast Year			9.6.2	20 Years		
	Design Year Traffic (ADT)			9.6.3	0 to 400	400 to 2000	Over 2000
	*Design Speed (maximum)	Level		9.5.2	60 mph		
		Rolling			50 mph		
		Mountainous			40 mph		
	Access Control			9.8	Controlled by Regulation		
Level of Service			9.6.4	C			
Cross Section Elements	*Travel Lane Width			13.2.3	11' (1a)	11'	12' (1b)
	*Shoulder Width (2a)			13.2.4	6' (2b)	6' (2b)	8'
	Auxiliary Lanes	Lane Width		13.2.5	11'	11'	12'
		Shoulder Width			6'	6'	8'
	Cross Slope	*Travel Lane		13.2.3.3	2.08%		
		Auxiliary Lane		13.2.5	2.08%		
		*Shoulder		13.2.4.3	8.33%		
TWLTL Width			21.2.7	15'			
Roadway Slopes	Side Slopes	Cut Section	Foreslope	13.3.1	6H:1V to 4H:1V		
			Ditch Type		V-Ditch		
			Back Slope		4H:1V to 2H:1V		
			Rock Cut		0.25H:1V		
		Fill Section	0' – 5'		6H:1V		
			5' – 10'		4H:1V		
			> 10'		2H:1V		
			Clear Zone			14.3	(3)
	Bridges	New and Reconstructed Bridges	*Structural Capacity			HL-93	
*Clear Roadway Width (4)			13.5.1.1	34'	34'	40'	
Existing Bridges to Remain in Place		*Structural Capacity			H-15		
		*Clear Roadway Width		13.5.1.1	22'	24'	28'
*Vertical Clearance (Collector Under) (5a)		New/Replaced Overpassing Bridges (5b)		12.6	16'-0"		
		Existing Overpassing Bridges			16'-0"		
		Pedestrian Bridges			18'-0"		
		Overhead Signs			17'-6"		
Clearance (Collector Over)	*Railroads		12.6	23'-0"			
	Underpass Width		13.5.2	Traveled Way plus Clear Zone			

* Controlling design criteria (see Section 9.2).

GEOMETRIC DESIGN CRITERIA FOR RURAL TWO-LANE COLLECTORS

(New Construction/Reconstruction)

Figure 20.1E

GEOMETRIC DESIGN CRITERIA FOR RURAL TWO-LANE COLLECTORS**(New Construction/Reconstruction)****Footnotes for Figure 20.1E**

- (1) Travel Lane Width.
 - a. Where the design speed is 40 miles per hour or less and the ADT is less than 250 vehicles per day, 10-foot travel lanes may be considered.
 - b. On reconstructed collectors, an existing 22-foot traveled way may be retained based on an engineering study.
- (2) Shoulder Width (Total Width).
 - a. Where guardrail is required, increase the shoulder width an additional 3.5 feet.
 - b. For ADT's less than 1500 vehicles per day, the shoulder width may be reduced to a minimum roadway width of 30 feet.
- (3) Clear Zone. The clear zone will vary according to design speed, traffic volumes, side slopes and horizontal curvature.
- (4) New and Reconstructed Bridges (Clear Roadway Width). Clear roadway bridge widths are measured from face to face of parapets or rails. Bridge widths are normally defined as the sum of the approach traveled way width plus total shoulder width right and left.
- (5) Vertical Clearance (Collector Under).
 - a. The clearance must be available over the traveled way, shoulders, and any anticipated future widening.
 - b. Table value includes allowance for future overlays.

Design Element		Manual Section	Design Speed						
			30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph
*Stopping Sight Distance (1)		10.1	200'	250'	305'	360'	425'	495'	570'
Passing Sight Distance		10.2	1090'	1280'	1470'	1625'	1835'	1985'	2135'
Intersection Sight Distance (2)		10.4	335'	390'	445'	500'	555'	610'	665'
*Minimum Radii	$e_{\max} = 8\%$	11.2.3	—	—	—	—	—	965'	1205'
	$e_{\max} = 6\%$		275'	380'	510'	660'	835'	—	—
*Superelevation Rate (3)		11.3	6%	6%	6%	6%	6%	8%	8%
*Horizontal Sight Distance (4)		11.4	18'	20'	23'	24'	27'	32'	34'
*Vertical Curvature (K-values) (5)	Crest	12.5	19	29	44	61	84	114	151
	Sag		37	49	64	79	96	115	136
*Maximum Grade (6)	Level	12.3.1	7%	7%	7%	7%	6%	6%	5%
	Rolling		9%	9%	8%	8%	7%	7%	6%
	Mountainous		10%	10%	10%	10%	9%	9%	8%
Minimum Grade (7)		12.3.2	0.5%						

*Controlling design criteria (see [Section 9.2](#)).

- (1) Stopping Sight Distance. Table values are for passenger cars on level grade.
- (2) Intersection Sight Distance. Table values are for passenger cars for assumed conditions described in [Figure 10.4C](#).
- (3) Superelevation Rate. See [Section 11.3](#) for superelevation rates based on e_{\max} , design speed and radii of horizontal curves.
- (4) Horizontal Sight Distance. Table values provide the necessary middle ordinate assuming the maximum radii and stopping sight distance.
- (5) Vertical Curvature (K-Value). K-values are based on the level stopping sight distances.
- (6) Maximum Grades. Short lengths of grades (e.g., less than 500 feet), one-way downgrades and low-volume collectors may be up to 2 percent steeper.
- (7) Minimum Grade. Longitudinal gradients of 0 percent may be acceptable on some pavements that have cross slopes that insure adequate drainage. Special ditch grades may be necessary to insure proper project runoff management.

ALIGNMENT CRITERIA FOR RURAL COLLECTORS

Figure 20.1G