

Design Element			Manual Section	2 Lanes			
Design Controls	Design-Year Traffic (AADT)		40-2.01	< 400	400 ≤ AADT < 1500	1500 ≤ AADT < 2000	> 2000
	Design Forecast Period		40-2.02	20 Years (1)			
	*Design Speed (km/h) (2)	Level	40-3.0	60 – 90	80 – 90	80 – 90	100
		Rolling		50 – 90	60 – 90	60 – 90	80 – 90
	Access Control		40-5.0	None			
Level of Service		40-2.0	Desirable.: B; Minimum: C				
Cross Section Elements**	Travel Lane	*Width	45-1.01	D: 3.6 m; M: 3 m	D: 3.6 m; M: 3.3 m	D: 3.6 m; M: 3.3 m (20)	3.6 m
		Typical Surface Type (3)	Chp. 52	Asphalt / Concrete			
	Shoulder (4)	*Width Usable	45-1.02	1.2 m	1.8 m	2.4 m	3.0 m
		*Width Paved	45-1.02	0.6 m	1.2 m	1.8 m	2.4 m
		Typical Surface Type (3)	Chp. 52	Asphalt / Concrete			
	Cross Slope	*Travel Lane (5)	45-1.01	2%			
		Shoulder (5A)	45-1.02	Paved Width ≤ 1.2 m: 2%; Paved Width > 1.2 m: 4%			
	Auxiliary Lane	Lane Width	45-1.03	Des: Same as Through Lanes; Min: 3.3 m			Desirable: 3.6 m
		Shoulder Width (6)		Same as Next to Travel Lane			Minimum: 3.3 m
	Clear Zone		49-2.0	(7)			
	Side Slopes (8)	Cut	Foreslope	45-3.0	Des: 6:1; Max: 4:1 (9)		
			Ditch Width		1.2 m (10)		
Backslope			4:1 for 6 m; 3:1 Max. to Top (11)				
Fill		45-3.0	Des: 6:1 to Clear Zone; Max: 3:1 to Toe				
Bridges**	New or Reconstructed Bridge	*Structural Capacity	Chp. 60	HL-93 (12)			
		*Clear-Roadway Width (13)	45-4.01	Full Paved Approach Width			
	Existing Bridge to Remain in Place	*Structural Capacity	Chp. 72	HS-15			
		*Clear-Roadway Width (14)	45-4.01	6.6 m	6.6 m	7.2 m	8.4 m
	*Vertical Clearance (Collector Under)	New or Replaced Overpassing Bridge (15)	44-4.0	4.45 m			
		Existing Overpassing Bridge		4.30 m			
Vertical Clearance (Collector Over Railroad) (16)		Chp. 69	7.00 m				

D or Des: Desirable; M or Min: Minimum

* Controlling design criterion.

** Selection of the cross section and bridge elements is based on the design-year traffic volume irrespective of the design speed.

**GEOMETRIC DESIGN CRITERIA FOR RURAL COLLECTOR, STATE ROUTE
(New Construction or Reconstruction)**

Figure 53-3

Design Element		Manual Section	2 Lanes					
Alignment Elements	Design Speed		60 km/h	70 km/h	80 km/h	90 km/h	100 km/h	
	*Stopping Sight Distance	42-1.0	85 m	105 m	130 m	160 m	185 m	
	Decision Sight Distance	Speed / path / direction change	42-2.0	170 m	200 m	230 m	270 m	315 m
		Stop Maneuver		95 m	115 m	140 m	170 m	200 m
	Passing Sight Distance	42-3.0	410 m	485 m	540 m	615 m	670 m	
	Intersection Sight Distance, -3% to +3% (21)	46-10.0	P: 125 m SU: 160 m	P: 150 m SU: 185 m	P: 190 m SU: 235 m	P: 230 m SU: 280 m	P: 265 m SU: 320 m	
	*Minimum Radius (e=8%)	43-2.0	125 m	180 m	230 m	305 m	395 m	
	*Superelevation Rate	43-3.0	e _{max} = 8% (17)					
	*Horizontal Sight Distance	43-4.0	(18)					
	*Vertical Curvature (K-value)	Crest	44-3.0	11	17	26	39	52
		Sag		18	23	30	38	45
	*Maximum Grade (19)	Level	44-1.02	7%	6.5%	6%	5.5%	5%
		Rolling		8%	7.5%	7%	6.5%	6%
Minimum Grade	44-1.03	Desirable: 0.5% Minimum: 0.0%						

* Controlling design criterion. A deviation from such is a design exception, and is subject to approval. See Section 40-8.0.

A deviation from a controlling design criterion should be addressed in an approved design exception.

These criteria apply to each project regardless of funding source.

**GEOMETRIC DESIGN CRITERIA FOR RURAL COLLECTOR, STATE ROUTE
(New Construction or Reconstruction)**

Figure 53-3 (continued)

GEOMETRIC DESIGN CRITERIA FOR RURAL COLLECTOR, STATE ROUTE
(New Construction or Reconstruction)

Footnotes to Figure 53-3

- (1) Design Forecast Year. If the DHV is less than 100 (based on a 20-year projection), the current AADT may be used for design.
- (2) Design Speed. The minimum design speed should equal the minimum value from the table or the anticipated posted speed limit after construction, whichever is higher. The legal speed limit is 55 mph (88 km/h) on a non-posted highway.
- (3) Surface Type. The pavement-type selection will be determined by the INDOT Office of Pavement Engineering.
- (4) Shoulder Width. The following will apply:
 - a. The shoulder is paved to the front face of guardrail. The desirable guardrail offset is 0.6 m from the effective usable-shoulder width. See Section 49-5.0 for more information.
 - b. Usable-shoulder width is defined as the distance from the edge of the travel lane to the shoulder break point.
 - c. If curbs are to be used, the criteria described in Figure 53-8 should be applied.
- (5) Cross Slope (Travel Lanes). Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.
- (5A) Cross Slope (Shoulder). See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.
- (6) Auxiliary Lane (Shoulder Width). At a minimum, a 0.6-m width may be used adjacent to an auxiliary lane.
- (7) Clear Zone. The clear zone will vary according to design speed, traffic volume, side slopes, and horizontal curvature. See Section 49-2.0.
- (8) Side Slope. Value is for new construction. See Sections 45-3.0 and 45-8.0 for more information. For a reconstruction project, see Section 49-3.0
- (9) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.
- (10) Ditch Width. A V-ditch should be used in a rock cut. See Section 45-8.0.
- (11) Backslope. The backslope for a rock cut will vary according to the height of the cut and the geotechnical requirements. See Section 45-8.0 for typical rock-cut sections.

**GEOMETRIC DESIGN CRITERIA FOR RURAL COLLECTOR, STATE ROUTE
(New Construction or Reconstruction)**

Footnotes to Figure 53-3 (continued)

- (12) Structural Capacity (New or Reconstructed Bridge). The following will apply:
- a. HS-25 loading with Alternate Military Loading should be applied for each project with notice to proceed with design beginning September 1, 2004, through December 31, 2005.
 - b. A State highway bridge within 25 km of a Toll-Road gate must be designed for Toll-Road loading.
 - c. A bridge on an Extra-Heavy-Duty Highway must be designed for the Michigan Train truck-loading configuration.
 - d. See Chapter Sixty for additional information on the loading configurations.
- (13) Width (New or Reconstructed Bridge). Minimum clear-roadway width is 9 m. See Section 59-1.0 for more information on bridge width.
- (14) Width (Existing Bridge to Remain in Place). Clear width will be at least equal to the approach traveled way width or the table value, whichever is greater.
- (15) Vertical Clearance (Collector Under). Value includes an additional 150-mm allowance for future pavement overlays. Vertical clearance applies from usable edge to usable edge of shoulders.
- (16) Vertical Clearance (Collector Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.
- (17) Superelevation Rate. See Section 43-3.0 for value of superelevation rate based on design speed and radius.
- (18) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance which applies at the site. See Section 43-4.0.
- (19) Maximum Grade. For a grade along a longitudinal distance of less than 150 m (PVT to PVC), a one-way downgrade, or a road with AADT < 400, the maximum grade may be up to 2% steeper than the table value.
- (20) Use 3.6 m if $V = 90$ km/h.
- (21) Intersection Sight Distance. For a left turn onto a 2-lane roadway. P = Passenger car; SU = single unit truck. See Figure 46-10G for values for a combination truck.