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 (mph) (2)	Level		40-3.0	35 - 55	50 - 55	50 - 55	60
		Rolling			30 - 55	35 - 55	35 - 55	50 - 55
	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: 12 ft; M: 11 ft	D: 12 ft; M: 11 ft	D: 12 ft; M: 11 ft (20)	12 ft
		Typical Surface Type (3)		Chp. 52	Asphalt / Concrete			
	Shoulder (4)	*Width Usable		45-1.02	4 ft	6 ft	8 ft	10 ft
		*Width Paved		45-1.02	2 ft	4 ft	6 ft	8 ft
		Typical Surface Type (3)		Chp. 52	Asphalt / Concrete			
	Cross Slope	*Travel Lane (5)		45-1.01	2%			
		Shoulder (5A)		45-1.02	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%			
	Auxiliary Lane	Lane Width		45-1.03	Des: Same as Through Lanes; Min: 11 ft			Desirable: 12 ft Minimum: 11 ft
		Shoulder Width (6)			Same as Next to Travel Lane			
	Clear Zone			49-2.0	(7)			
	Side Slopes (8)	Cut	Foreslope	45-3.0	Des: 6:1; Max: 4:1 (9)			
			Ditch Width		4 ft (10)			
			Backslope		4:1 for 20 ft; 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	22 ft	22 ft	24 ft	28 ft
	*Vertical Clearance (Collector Under)	New or Replaced Overpassing Bridge (15)		44-4.0	14.5 ft			
		Existing Overpassing Bridge			14 ft			
	Vertical Clearance (Collector Over Railroad) (16)			Chp. 69	23 ft			

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			40 mph	45 mph	50 mph	55 mph	60 mph
	*Stopping Sight Distance		42-1.0	305 ft	360 ft	425 ft	495 ft	570 ft
	Decision Sight Distance	Speed / path / direction change	42-2.0	600 ft	675 ft	750 ft	865 ft	990 ft
		Stop Maneuver		330 ft	395 ft	465 ft	535 ft	610 ft
	Passing Sight Distance		42-3.0	1470 ft	1625 ft	1835 ft	1985 ft	2135 ft
	Intersection Sight Distance, -3% to +3% (21)		46-10.0	P: 440 ft SUT: 560 ft	P: 500 ft SUT: 630 ft	P: 630 ft SUT: 780 ft	P: 730 ft SUT: 890 ft	P: 840 ft SUT: 1020 ft
	*Minimum Radius (e=8%)		43-2.0	410 ft	590 ft	750 ft	1000 ft	1290 ft
	*Superelevation Rate		43-3.0	e_{max} = 8% (17)				
	*Horizontal Sight Distance		43-4.0	(18)				
	*Vertical Curvature (K-value)	Crest	44-3.0	44	61	84	114	151
		Sag		64	79	96	115	136
	*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
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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 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 2 ft 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.

(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 2-ft 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
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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 15 mi 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 30 ft. 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 6-in. 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 480 ft (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 12 ft if V = 55 mph.

(21) Intersection Sight Distance. For a left turn onto a 2-lane roadway. P = Passenger car; SUT = single unit truck. See Figure 46-10G for values for a combination truck.