Design Element				Manual Section	2 Lanes			4 or More Lanes	
Design Controls	Design-Year Traffic (AADT)			40-2.01	< 400	400 ≤ AADT < 2000	≥ 2000	**Undivided	Divided
	Design Forecast Period			40-2.02	20 Years			20 Years	
	*Design Speed (km/h) (1)			40-3.0	Level: 100 – 110; Rolling: 80 – 100			100	110
	Access Control			40-5.0	Partial Control / None			Partial Control / None	
	Level of Service			40-2.0	Desirable: B; Minimum: C			Desirable: B; Minimum: C	
Cross Section Elements**	Travel Lane	*Width		45-1.01	3.6 m			3.6 m	
		Typical Surface Type (2)		Chp. 52	Asphalt / Concrete			Asphalt / Concrete	
	Shoulder (3)	*Width Usable		45-1.02	1.8 m	2.4 m	3.3 m (3b)	3.3 m (3b)	Right: 3.3 m (3b) Left: 1.2 m (3e)
		*Width Paved		45-1.02	1.2 m	1.8 m	3.0 m (3b)	3.0 m (3b)	Right: 3.0 m (3b) Left: 1.2 m (3e)
		Typical Surface Type (2)		Chp. 52	Asphalt / Concrete			Asphalt / Concrete	
	Cross Slope	*Travel Lane (4)		45-1.01	2%			2%	
		Shoulder (4A)		45-1.02	Paved Width ≤ 1.2 m: 2%; Paved Width > 1.2 m: 4%			Paved Width ≤ 1.2 m: 2%; Paved Width > 1.2 m: 4%	
	Auxiliary Lane	Lane Width (5)		45-1.03	Desirable: 3.6 m; Minimum: 3.3 m			Desirable: 3.6 m; Minimum: 3.3 m	
		Shoulder Width (6)			Same as Next to Travel Lane			Same as Next to Travel Lane	
	Median Width			45-2.0	N/A			0.0 m	Desirable: 25 m Minimum: 4.8 m (7)
	Clear Zone			49-2.0	(8)			(8)	
	Side Slopes (9)	Cut	Foreslope	45-3.0	6:1 (10)			6:1 (10)	
			Ditch Width		1.2 m (11)			1.2 m (11)	
			Backslope		4:1 for 6 m; 3:1 Max. to Top (12)			4:1 for 6 m; 3:1 Max. to Top (12)	
		Fill		45-3.0	6:1 to Clear Zone; 3:1 Max. to Toe			6:1 to Clear Zone; 3:1 Max. to Toe	
	Median Slopes			45-2.02	N/A			Desirable: 8:1; Maximum: 5:1	
Bridges***	New or Reconstructed Bridge	*Structural Capacity		Chp. 60	HL-93 (13)				
		*Clear-Roadway Width(14)		45-4.01	Full Paved Approach Width				
	Existing Bridge to Remain in Place	*Structural Capacity		Chp. 72	HS-20				
		*Clear-Roadway Width		45-4.01	Travelway Plus 0.6 m on Each Side				
	*Vertical Clearance (Arterial Under)	New or Replaced Overpassing Bridge (15)		44-4.0	5.05 m				
		Existing Overpassing Bridge			4.30 m				
		Sign Truss / Pedestrian Bridge (15)			New: 5.35 m; Existing: 5.20 m				
	Vertical Clearance (Arterial Over Railroad) (16)			Chp. 69	7.00 m				

* Controlling design criterion. ** An arterial of 4 or more lanes on a new location should be designed as Divided.
*** 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 ARTERIAL
(New Construction or Reconstruction)

Figure 53-2

Design Element			Manual Section	Rural Arterial			
Alignment Elements	Design Speed		---	80 km/h	90 km/h	100 km/h	110 km/h
	*Stopping Sight Distance		42-1.0	130 m	160 m	185 m	220 m
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	230 m	270 m	315 m	330 m
		Stop Maneuver		140 m	170 m	200 m	235 m
	Passing Sight Distance		42-3.0	540 m	615 m	670 m	730 m
	Intersection Sight Distance, -3% to +3% (20)		46-10.0	P: 190 m; SU: 235 m	P: 230 m; SU: 280 m	P: 265 m; SU: 320 m	P: 310 m; SU: 370 m
	*Minimum Radius (e=8%)		43-2.0	230 m	305 m	395	505 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	26	39	52	74
		Sag		30	38	45	55
	*Maximum Grade (19)	Level	44-1.02	4%	3.5%	3%	3%
		Rolling		5%	4.5%	4%	4%
	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.

These criteria apply to a route either on or off the National Highway System, regardless of funding source.

GEOMETRIC DESIGN CRITERIA FOR RURAL ARTERIAL
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Figure 53-2 (continued)

GEOMETRIC DESIGN CRITERIA FOR RURAL ARTERIAL
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Footnotes to Figure 53-2

(1) Design Speed. The minimum design speed should equal the minimum value from the table or the anticipated posted speed limit after construction, whichever is greater. The legal speed limit is 60 mph (96 km/h) on a divided highway.

(2) Surface Type. The pavement-type selection will be determined by the INDOT Office of Pavement Engineering.

(3) Shoulder. The following will apply.
- a. If there are 3 or more lanes in each direction and there is a median barrier, a 3.0-m paved shoulder and a 0.6-m offset is required.
- b. On a reconstruction project, the usable-shoulder width may be 3.0 m, and the paved-shoulder width may be 2.4 m.
- c. 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.
- d. Usable-shoulder width is defined as the distance from the edge of the travel lane to the shoulder break point.
- e. If there are 3 or more lanes in each direction, a full-width shoulder, 3.3 m usable and 3.0 m paved, is desirable.

(4) Cross Slope (Travel Lanes). Cross slopes of 1.5% are acceptable on an existing bridge to remain in place. Where three or more lanes are sloped in the same direction, each successive pair of lanes may have an increased sideslope.

(4A) Cross Slope (Shoulder). See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.

(5) Auxiliary Lane (Lane Width). Truck climbing-lane width is 3.6 m.

(6) Auxiliary Lane (Shoulder Width). At a minimum, a 0.6-m shoulder may be used adjacent to an auxiliary lane. At a minimum, the shoulder adjacent to a truck climbing lane is 1.2 m.

(7) Median Width (Flush). Value is for new construction. A median of 8 m or narrower should be avoided at an intersection. A median wider than 18 m is undesirable at a signalized intersection, or an intersection that may become signalized in the foreseeable future. On a reconstruction project, the minimum flush-median width is 4.2 m for a roadway with left-turn lanes, or 6.6 m for a roadway with concrete median barrier.

(8) Clear Zone. The clear zone will vary according to design speed, traffic volume, side slopes, and horizontal curvature. See Section 49-2.0.

GEOMETRIC DESIGN CRITERIA FOR RURAL ARTERIAL
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Footnotes to Figure 53-2 (continued)

(9) 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.

(10) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.

(11) Ditch Width. A V-ditch should be used in a rock cut. See Section 45-8.0.

(12) 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.

(13) 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.

(14) Width (New or Reconstructed Bridge). See Section 59-1.0 for more information on bridge width.

(15) Vertical Clearance (Arterial 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 (Arterial 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. Sometimes, the stopping-sight-distance value for a truck will apply. See the discussion in Section 43-4.0.

(19) Maximum Grade. A grade of 1% or steeper may be used for a downgrade on a one-way roadway.

(20) Intersection Sight Distance. For a left turn onto a 2-lane road: P = Passenger car; SU = single unit truck. See Figure 46-10G for value for a combination truck.