

Design Element			Manual Section	Rural	Urban	
Design Controls	Design Forecast Period		40-2.02	20 Years	20 Years	
	*Design Speed (km/h)		40-3.0	110	80 – 110 (1)	
	Access Control		40-5.0	Full Control	Full Control	
	Level of Service		40-2.0	Desirable: B Minimum: C	Desirable: B Minimum: C (2)	
Cross Section Elements	Travel Lane	*Width	45-1.01	3.6 m	3.6 m	
		Surface Type(3)	Chp. 52	Asphalt / Concrete	Asphalt / Concrete	
	Shoulder	*Right Width(4)	45-1.02	Chp. 52	Usable: 3.3 m Paved: 3.0 m	Usable: 3.3 m Paved: 3.0 m
		*Left Width(5)			2 Ln: D 2.4 m, M: 1.2 m Paved; 3 Ln: 3.0 m Paved	2 Lanes: 1.2 m Paved 3 Lanes: 3.0 m Paved
		Surface Type(3)	Chp. 52	Asphalt / Concrete	Asphalt / Concrete	
	Cross Slope	*Travel Lane (6)	45-1.01	2%	2%	
		Shoulder (6A)	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	45-1.03	Chp. 52	3.6 m	3.6 m
		*Shoulder Width			Right: 3.0 m (7) Left: 1.2 m	Right: 3.0 m (7) Left: 1.2 m
	Median Width	Depressed	45-2.0	Chp. 52	Desirable: 30 m Minimum: 16.5 m	Desirable: 18 m Minimum: 3 m for 4 lanes Minimum: 16.5 m for 6 lanes
		Flush (CMB)			Desirable: 9.3 m Minimum: 8.0 m	Minimum: 8 m ft
	Clear Zone		49-2.0	Chp. 52	(8)	(8)
	Side Slopes (9)	Cut	Foreslope	45-3.0	6:1 (10)	6:1 (10)
			Ditch Width		4 ft (11)	4 ft (11)
Backslope			4:1 (12)		4:1 (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	Chp. 52	Desirable: 8:1 Maximum: 5:1	Desirable: 8:1 Maximum: 5:1	
Bridges	New or Reconstructed Bridge	*Structural Capacity	Chp. 60	HL-93 (13)	HL-93 (13)	
		*Clear-Roadway Width (14)	45-4.01	Full Paved Approach Width	Full Paved Approach Width	
	Existing Bridge to Remain in Place	*Structural Capacity	Chp. 72	HS-20	HS-20	
		*Clear-Roadway Width	45-4.01	Travelway Plus 3.0 m Rt. & 1.2 m Lt. Shoulders	Travelway Plus 3.0 m Rt. & 1.2 m Lt. Shoulders	
	*Vertical Clearance (Freeway Under) (15c)	New or Replaced Overpassing Bridge (15a)	44-4.0	Chp. 69	5.05 m	5.05 m (15b)
		Existing Overpassing Bridge			4.90 m	4.90 m (15b)
Sign Truss / Pedestrian Bridge (15a)		New: 5.35 m Existing: 5.20 m			New: 5.35 m Existing: 5.20 m	
Vertical Clearance (Freeway over Railroad) (16)		Chp. 69	Chp. 69	7.00 m	7.00 m	

* Controlling design criterion.

**GEOMETRIC DESIGN CRITERIA FOR FREEWAY
(New Construction or Complete Reconstruction)**

Figure 53-1

Design Element		Manual Section	Rural	Urban				
Alignment Elements	Design Speed	---	110 km/h	80 km/hh	90 km/h	100 km/h	110 km/h	
	*Stopping Sight Distance	42-1.0	220 m	130 m	160 m	185 m	220 m	
	Decision Sight Distance (17)	42-2.0	235 m	315 m	360 m	400 m	430 m	
	*Minimum Radius (e=8%)	43-2.0	502 m	230 m	305 m	395 m	505 m	
	*Superelevation Rate	43-3.0	e _{max} =8% (18)		e _{max} =8% (18)			
	*Horizontal Sight Distance	43-4.0	(19)		(19)			
	*Vertical Curvature (K-value)	Crest	44-3.0	74	25	39	52	74
		Sag		55	30	38	45	55
	*Maximum Grade (20)	Level	44-1.02	3%	4%	3.5%	3%	3%
		Rolling		4%	5%	4.5%	4%	4%
Minimum Grade	44-1.03	Desirable: 0.5% Minimum: 0.0%		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 FREEWAY
(New Construction or Complete Reconstruction)**

Figure 53-1 (continued)

GEOMETRIC DESIGN CRITERIA FOR FREEWAY
(New Construction or Complete Reconstruction)

Footnotes to Figure 53-1

- (1) Design Speed. An 80 km/h design speed may be considered in a restricted urban area.
- (2) Level of Service. A minimum Level of Service of D may be used on an urban reconstruction project.
- (3) Surface Type. The pavement-type selection will be determined by the INDOT Office of Pavement Engineering.
- (4) Shoulder Width (Right). 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. Where the number of trucks exceeds 250 DDHV, a 3.6-m width should be used. If the 3.6-m width is used, the usable-shoulder width will be 3.9 m.
 - c. Usable-shoulder width is defined as the distance from the edge of the travel lane to the shoulder break point.
- (5) Shoulder Width (Left). The following will apply.
 - a. The usable-shoulder width is equal to the paved-shoulder width. The desirable guardrail offset is 0.6 m from the usable-shoulder width. See Section 49-5.0 for more information.
 - b. Where there are 3 or more lanes in one direction and the volume of trucks exceed 250 DDHV, a 3.6-m width should be used.
 - c. For a left shoulder of 1.2 m or wider, the usable-shoulder width will be 0.3 m more than the paved-shoulder width.
- (6) Cross Slope (Travel Lane). Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.
- (6A) Cross Slope (Shoulder). See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.
- (7) Auxiliary-Lane Shoulder Width (Right). On a reconstruction project, a 1.8-m width may be used.
- (8) Clear Zone. The clear zone will vary according to design speed, traffic volume, side slopes, and horizontal curvature. See Section 49-2.0.
- (9) Side Slopes. 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.

**GEOMETRIC DESIGN CRITERIA FOR FREEWAY
(New Construction or Complete Reconstruction)**

Footnotes to Figure 53-1 (continued)

- (11) Ditch Width. A V-ditch should be used in a rock cut. See Section 45-8.0.
- (12) Backslope. For an earth cut of 3 m or deeper, the first horizontal 6 m of the backslope will be sloped at a rate of 4:1. Then, a slope rate of 3:1 is used to the natural ground line. See Section 45-3.0 and the INDOT *Standard Drawings*. The backslope for a rock cut will vary according to the height of cut and the geotechnical requirements. See the INDOT *Standard Drawings* for typical rock-cut sections.
- (13) Structural Capacity (New or Reconstructed Bridge). 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. Other loadings will apply to the Toll Road system or an Extra-Heavy-Duty Highway. See Chapter Sixty for more information.
- (14) Width (New or Reconstructed Bridge). See Section 59-1.0 for more information on bridge width.
- (15) Vertical Clearance (Freeway Under). The following will apply.
- a. Table value includes an additional 150 mm allowance for future overlays.
 - b. A 4.30-m clearance may be used in an urban area where an alternate freeway facility with a 4.90-m clearance is available.
 - c. Vertical clearance applies from usable edge to usable edge of shoulders.
- (16) Vertical Clearance (Freeway Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.
- (17) Decision Sight Distance. Value is for the avoidance maneuver (speed/path/direction change). See Section 42-2.0.
- (18) Superelevation Rate. See Section 43-3.0 for value of superelevation rate based on design speed and radius.
- (19) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance. Sometimes, the stopping-sight-distance value for a truck should be considered. See the discussion in Section 43-4.0.
- (20) Maximum Grade. A grade of 1% or steeper may be used in a restricted urban area where development precludes the use of a flatter grade. A grade of 1% or steeper may also be used for a one-way-roadway downgrade.
- (21) For a bridge of 60 m or longer that is to remain in place, the minimum width of each shoulder is 1.2 m. This requirement does not apply to a bridge-deck replacement.