

Design Element			Manual Section	Rural	Urban	
Design Controls	Design Forecast Year		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	45-1.02	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 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	45-1.02	4%	4%	
	Auxiliary Lanes	*Lane Width	45-1.03	45-1.03	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	45-2.0	Desirable: 25 m Minimum: 18 m	Desirable: 18 m Minimum: 7.9 m
		Flush (CMB)			Minimum: 8.0 m	Minimum: 8.0 m
	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 (12)	4:1 (12)
		Fill	45-3.0	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	45-2.02	Desirable: 8:1 Maximum: 5:1	Desirable: 8:1 Maximum: 5:1	
Bridges	New and Reconstructed Bridges	*Structural Capacity	Chp. 60	HS-20 & Alternate Military Loading (13)	HS-20 & Alternate Military Loading (13)	
		*Clear Roadway Width (14)	45-4.01	Full Paved Approach Width	Full Paved Approach Width	
	Existing Bridges to Remain in Place	*Structural Capacity	Chp. 60	HS-20 & Alternate Military Loading (13)	HS-20 & Alternate Military Loading (13)	
		*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 and Replaced Overpassing Bridges (15a)	44-4.0	44-4.0	5.05 m	5.05 m (15b)
		Existing Overpassing Bridges			4.90 m	4.90 m (15b)
		Sign Truss / Pedestrian Bridges (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 criteria (see Section 40-8.0).

**GEOMETRIC DESIGN CRITERIA FOR FREEWAYS
(New Construction / Complete Reconstruction)**

Table 53-1

Design Element			Manual Section	Rural		Urban			
Alignment Elements	Design Speed	---	110 km/h		80 km/h	90 km/h	100 km/h	110 km/h	
	*Stopping Sight Distance	42-1.0	220 m		130	160 m	185 m	220 m	
	Decision Sight Distance (17)	42-2.0	235 m		315	360 m	400 m	430 m	
	*Minimum Radii (e=8%)	43-2.0	502 m		230	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-values)	Crest	44-3.0	95		39	52	74	95
		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 criteria (see Section 40-8.0).

These standards are for use on all freeways including those on the National Highway System. They are to be used for all projects that are classified as new construction/reconstruction regardless of funding source. Therefore, all new construction/reconstruction work, whether Federal-aid funded or not, must meet these standards. Deviations from controlling design criteria should be covered by an approved design exception.

Design exception requests for Level One design criteria on:

- a) Non-exempt FHWA funded projects on the Interstate system require FHWA approval.
- b) Exempt FHWA funded projects on the Interstate system require Chief, Division of Design approval.
- c) Non-FHWA funded projects on the Interstate system require Chief, Division of Design approval with an information copy sent to FHWA.
- d) Projects not on the Interstate system require Chief, Division of Design approval.

GEOMETRIC DESIGN CRITERIA FOR FREEWAYS (New Construction / Complete Reconstruction)

Table 53-1 (Continued)

GEOMETRIC DESIGN CRITERIA FOR FREEWAYS (New Construction/Complete Reconstruction)

Footnotes to Table 53-1

- (1) Design Speed. An 80-km/h design speed may be considered in restrictive urban areas.
- (2) Level of Service. A minimum Level of Service of “D” may be used on urban reconstruction projects.
- (3) Surface Type. The pavement type selection will be determined by the INDOT Pavement Design Engineer.
- (4) Shoulder Width (Right). The following will apply:
 - a. The shoulder is paved to the 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 right shoulder should be used. If the 3.6-m shoulder 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. Typically, 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 left shoulder should be used.
 - c. For left shoulders greater than 1.2 m, 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 existing bridges to remain in place.
- (7) Auxiliary Lane Shoulder Width (Right). On reconstruction projects, a 1.8-m right shoulder may be used.
- (8) Clear Zone. The clear zone will vary according to design speed, traffic volumes, side slopes and horizontal curvature. See Section 49-2.0.
- (9) Side Slopes. Values in the tables are for new construction. See Section 45-3.0 and section 45-8.0 for more information. For reconstruction projects, 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 Widths. In rock cuts, a V ditch should be used. See Section 45-8.0.

- (12) Backslopes. For earth cuts greater than 3.0 m in height, the first 6.0 m horizontally of the backslope will be sloped at a rate of 4:1 and, then, a slope rate of 3:1 is normally used to the natural ground line. See Section 45-3.0 and the INDOT *Standard Drawings*. Backslopes for rock cuts will vary according to the height of cut and geotechnical factors. See the INDOT *Standard Drawings* for typical rock cut sections.
- (13) Structural Capacity (New and Reconstructed Bridges). Other loadings will apply to the Toll Road System and Indiana “Extra Heavy Duty Highways.” See Chapter Sixty for more information.
- (14) Width (New and Reconstructed Bridges). See Section 59-1.0 for more information on bridge widths.
- (15) Vertical Clearance (Freeway Under). The following will apply:
- a. Table values include an additional 150-mm allowance for future overlays.
 - b. A 4.3-m clearance may be used in urban areas where an alternate freeway facility with a 4.9-m clearance is available.
 - c. Vertical clearances apply from usable edge to usable edge of shoulders.
- (16) Vertical Clearance (Freeway Over Railroad). See Chapter Sixty-nine for additional information on railroad clearances under highways.
- (17) Decision Sight Distance. Table values are for the avoidance maneuver (speed/path/direction change). See Section 42-2.0.
- (18) Superelevation Rate. See Section 43-3.0 for values of superelevation based on design speed and radii.
- (19) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance. In some cases, the SSD values for trucks should be considered. See the discussion in Section 43-4.0.
- (20) Maximum Grades. Grades 1% steeper may be used in restricted urban areas where development precludes the use of flatter grades. Grades 1% steeper may also be used for one-way downgrades.
- (21) For bridges longer than 60 m that are to remain in place, the minimum widths of both shoulders may be 1.2 m. This requirement does not apply to bridge deck replacements.