

GEOMETRIC DESIGN STANDARDS FOR URBAN PRINCIPAL ARTERIAL SYSTEM (GS-5M)

	DESIGN SPEED (k/m/h)	MINIMUM RADIUS		(13) STOPPING SIGHT DISTANCE MIN.	MIN. WIDTH OF LANE	(1) MINIMUM WIDTH GRADED SHOULDERS		(2) PAVED SHOULDER WIDTH		(3) WIDTH OR DITCH (FRONT SLOPE)	(4) SLOPE	(7) NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
		U	ULS			FILL W/GR	CUT & FILL	RT.	LT.			
FREEWAYS	110	502	-	220	3.6m	4.5m	3.6m	3.0m	1.2m	3.6m	CS-4 OR CS-4B	2 THRU LANES SAME DIRECTION - 1.8m + PAVE. WIDTH + 3.6m 3 OR MORE THRU LANES SAME DIRECTION - 3.6m + PAVE. WIDTH + 3.6m
	100	394	-	185								
	80	280	-	130								
OTHER PRINCIPAL ARTERIAL WITH SHOULDER DESIGN	100	394	-	185	(12) 3.6m	3.9m	3.0m	2.4m	1.2m	3.0m	CS-4 OR CS-4E	UNDIVIDED & DIVIDED 3 OR MORE THRU LANES SAME DIRECTION - 3.0m + PAVE. WIDTH + 3.0m
	80	280	-	130								
	60	150	149	85	(5) (6) (12) 3.3m	CG-7	3.0m	1.2m	1.8m	CS-3 OR CS-3B	2 THRU LANES (DIVIDED) SAME DIRECTION - 1.8m + PAVE. WIDTH + 3.0m	
	50	99	94	65								
OTHER PRINCIPAL ARTERIAL WITH CURB & GUTTER	100	394	-	185	(12) 3.6m	CG-7	3.0m	1.2m	1.5m	2: 1	(7) NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES	
	80	280	-	130								
	70	215	227	105	(5) (6) (12) 3.3m	CG-6	-----					
	60	150	149	85								
	50	99	94	65								

GENERAL NOTES

Freeways - Urban Freeways should accommodate desired safe operating speeds during non-peak hours, but should not be so high as to exceed the limits of prudent construction, right of way and socioeconomic costs due to the large proportion of vehicles which are accommodated during periods of peak flow when lower speeds are necessary. The design speeds for Freeways should never be less than 80 km/h.

On many Urban Freeways, particularly in suburban areas, a design speed of 100 km/h or higher can be provided with little additional cost above that required for 80 km/h design speed. The corridor of the mainline may be relatively straight and the character and location of interchanges may permit high speed design. Under these conditions, a design speed of 110 km/h is most desirable because the higher design speeds are closely related to the overall quality and safety of the facility.

Other Principal Arterials - Design speeds for Urban Arterials generally range from 60 to 100 km/h, and occasionally may be as low as 50 km/h. The lower (60 km/h and below) speeds apply in the central business district and intermediate areas. The higher speeds are more applicable to the outlying business and developing areas.

Standard TC-5.01R (M) (Rural) superelevation based on 8% maximum is to be used for all Freeways and other Principal Arterials with a design speed greater than or equal to 100 km/h.

* Grades 1 percent steeper than the value shown may be used on Urban Freeways for extreme cases in urban areas where development precludes the use of flatter grades and for one-way downgrades, except in mountainous terrain.

TYPE OF TERRAIN	RELATIONSHIP OF MAXIMUM GRADES TO DESIGN SPEEDS							
	FREEWAYS*				ARTERIALS			
	DESIGN SPEED (km/h)							
	80	100	110	50	60	70	80	100
GRADES (PERCENT)								
LEVEL	4	3	3	8	7	6	6	5
ROLLING	5	4	4	9	8	7	7	6
MOUNTAINOUS	6	6	5	11	10	9	9	8

Standard TC-5.01U (M) (Urban) superelevation based on 4% maximum is to be used on Other Principal Arterials with a design speed less than 100 km/h.

Standard TC-5.04ULS(M) (Urban Low Speed) superelevation based on 2% maximum is to be used on Other Principal Arterials with a design speed less than or equal to 70 km/h (70 km/h = 227 m minimum radius).

Clear Zone and Recoverable Area information can be found in Appendix A(M), Section A-2(M) of the Road Design Manual.

If medians are included, see Section 2E-3 of Chapter 2E of the Road Design Manual.

A minimum 9.2 m width of surfacing or a minimum 9.2 m face to face of curb is to be used within incorporated cities or towns to qualify for maintenance payments.

For guidelines on Interchange Ramp, see Standard GS-R(M).

FOOTNOTES

- (1) shoulder widths shown are for right shoulders and independently graded median shoulders. A 2.4m graded median shoulder will be provided when the mainline is 4 lanes (both directions). For 6 or more lanes, the median shoulder provided will be the same as that shown for independent grading. On Freeways, if truck traffic exceeds 250 DDHV, the minimum width of graded shoulder should be 5.1m for fills and 4.2m for cuts.
- (2) When the mainline is 6 or more lanes, the left paved shoulder width should be the same as the right paved shoulder. On Freeways, if truck traffic exceeds 250 DDHV, the right paved shoulder width should be 3.6 m, and on 6 or more lane Freeways, the left paved shoulder width should also be 3.6 m if truck traffic exceeds 250 DDHV.
- (3) Ditch slopes to be 6:1 - 3.0 m and 3.6 m widths and 4:1 - 1.8 m width.
- (4) Additional or modified slope criteria to apply where shown on typical sections.
- (5) Minimum lane width to be 3.6 m at all interchange locations.
- (6) If heavy truck traffic is anticipated, an additional 0.3 m width is desirable.
- (7) Vertical clearance at roadway underpasses for new and reconstructed bridges is to be 5.05 m (0.3 m additional clearance required for non-vehicular overpasses). 4.2m shoulder may be reduced to 3.0m minimum when truck traffic is less than 250 DDHV.
- (8) Or equivalent City or Town design.
- (9) Width of 2.4 m or more may be needed in commercial areas.
- (10) 3:1 and flatter slopes may be used when the right of way is behind the sidewalk (or sidewalk space) in residential or other areas where slopes will be maintained by the property owner.
- (11) If a buffer strip is used between the back of curb and sidewalk, it should be 0.6 m minimum.
- (12) Situations having restrictions on trucks may allow the use of lanes 0.3m less in width.
- (13) For intersection sight distance requirements, see [Append., Table C-1-5](#).
- (14) Because Urban Principal Arterials are typically free-flowing, with higher operating speeds, Standard CG-7 is recommended for design speeds \geq 45 mph. See current AASHTO "Green Book", Chapter 2.

FIGURE A - 1 - 5M*