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

	DESIGN SPEED (k/m/h)	MINIMUM RADIUS		(13) STOPPING SIGHT DISTANCE	MIN. WIDTH OF LANE	(1) MINIMUM WIDTH TOTAL SHOULDERS		(2) PAVED SHOULDER WIDTH		(3) MINIMUM WIDTH OR DITCH FRONT SLOPE	(4) SLOPE	(7) NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
		U	ULS	MIN.		FILL W/GR	CUT &FILL	RT.	LT.			
FREEWAYS	110	502	-	220	3.6m	5.2m	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 = 4.2m + PAVE. WIDTH + 4.2m
	100	394	-	185								
	80	230	-	130							CS-4 OR 4E	
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						1.8m		
	60	150	149	85	(5) (6) (12) 3.3m						CS-3 OR CS-3B	2 THRU LANES (DIVIDED) SAME DIRECTION = 1.8m + PAVE. WIDTH + 3.0m
	50	99	94	65								

	DESIGN SPEED (km/h)	MINIMUM RADIUS		STOPPING SIGHT DISTANCE	MIN. WIDTH OF LANE	(8) STANDARD CURB & GUTTER (14)	BUFFER STRIP WIDTH	(9) MINIMUM SIDEWALK WIDTH	(10) SLOPE	(7) NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
		U	ULS	MIN.						
OTHER PRINCIPAL ARTERIAL WITH CURB & GUTTER	100	394	-	185	(12) 3.6m	CG-7	(11)	1.5m	2: 1	SAME AS CURB TO CURB OF APPROACHES
	80	280	-	130						
	70	222	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) (2001 AASHTO Green Book) superelevation based on 8% maximum is to be used for all Freeways and is to be used for all other Principal Arterials with a design speed of 100 km/h.

* Grades 1 percent steeper that 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.

Standard TC-5.01U (M) (Urban) (2001 AASHTO Green Book) 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) (2004 AASHTO Green Book) 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. 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-RM.

For maximum grades relative to terrain and design speed, see AASHTO Green Book, Chapter 7, Exhibit 7-10. For Freeways, see Chapter 8, Exhibit 8-1.

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 is less than 250 DDHV, the minimum width of graded shoulder shall be 4.6m for fills and 3.6m 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 is less than 250 DDHV, the minimum right paved shoulder width shall be 3.0m.

(3) Ditch slopes to be 6:1 - 3.0 m and 3.6 m widths and 4:1 - 1.8 m width. A hydraulic analysis is necessary to determine actual depth requirement.

(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 on bridges may be reduced to 3.6m 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) For buffer strip widths see IIM-LD-55.

(12) Situations having restrictions on trucks may allow the use of lanes 0.3m less in width.

(13) For additional information on sight distance requirements on grades of 3 percent or greater, see Exhibit 3-2 of the 2004 AASHTO, Green Book.

(14) Intersection sight distance requirements see Append. F, Table 2-7.

FIGURE A - 1 - 5M

* Rev. 1/10