Design Criteria for Rural State Trunk Highways
Functionally Classified As Arterials (Level Terrain)

Traffic Volume		Roadway Width Dimensions				Bridges	
Design Class	**Design AADT**	**Design Speed (mph)**	**Traveled Way Width (feet)**	**Shoulder Width (feet)**	**Roadway Width (feet)[2]**	**Minimum Design Loading**	**Clear Roadway Width of Bridges (feet)[2, 3]**
A1	Under 3500	**60**	**24**	**6**	**36**	[5]	**36**
A2[1] (2 lanes)	3,500–8,700[A] 3,500–15,000[C]	**60**	**24**	**10** (8)	**44** (40)	[5]	**44** (40)
A3[1] (4 lane divided)	8,700[A] - 44,000[A] 8,700[B] - 53,500[B] 15,000[C] - 60,000[C]	**70[4]**	**2 at 24**	**6LT** (4) **10RT[6]**	**2 at 40** (38)	[5]	**2 at 40**
A3[1] (6 lane divided)	44,000[A] - 69,000[A] 53,500[B] - 85,000[B] 60,000[C] - 90,000[C]	**70[4]**	**2 at 36**	**10 LT and RT[7]**	**2 at 56**	[5]	**2 at 56**

[A] For non-freeway Corridors 2020 backbone and connector route, LOS threshold is C/D or 4.0.

[B] For freeway Corridors 2020 backbone route, LOS threshold is C/D or 4.0.

[C] For other principal and minor arterials, LOS threshold is D/E or 5.0.

Desirable values are shown in bold and minimum values are shown in parentheses.

[1] The top of the traffic volume range for design class A2 is 8,700 AADT for a Corridors 2020 route and 15,000 AADT for a non-corridors 2020 route. These volumes are based on the 2000 Highway Capacity Manual assuming; level terrain, 12-foot lanes, ≥ 6-foot shoulders, 80% passing, 10% trucks, K30 design factor, and 60/40 directional split. In cases where a reduced level of service is determined to be acceptable and the use of passing lanes is found to be adequate treatment for the facility, the 8,700 AADT value for C2020 Connector routes may be increased to 12,000 AADT. Design class A3 assumptions: level terrain, 12-foot lanes ≥ 6-foot shoulders, 10% trucks, K30 design factor, 61/39 directional split, 2 access points per mile, except freeway. See FDM 11-5-3 for additional information on level of service thresholds for different facility types and the respective numerical value.

[2] Normally provide full width of approach roadways across all new bridges. Exceptions may be made when the bridge is considered a major structure on which design dimensions are subject to individual economic studies because of high unit cost.
See FDM 11-26-30.5.13.3 for Roadway Width, Clear Roadway Width of Bridges, and Underpasses between Closely Spaced Roundabouts.

[3] Lateral clearance requirements for underpass bridges are included in FDM 11-35-1.

[4] See FDM 11-10-1.

[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

[6] Use a 12 ft paved shoulder (right) on 4-lane freeways if truck traffic >250 DHV, or if the facility experiences a high degree of congestion and incidents. The roadway width and clear roadway width on bridges are increased accordingly.

[7] Use 12 ft paved shoulders (left & right) on 6-lane freeways if truck traffic > 250 DHV or if the facility experiences a high degree of congestion and incidents. The roadway width and clear roadway width on bridges are increased accordingly.

Design Criteria for Rural State Trunk Highways Functionally Classified As Arterials (Rolling Terrain)

Traffic Volume		Roadway Width Dimensions						Bridges[3,4]	
			Traveled Way width Based On Design Speed (feet)			Roadway Width Based On Design Speed (feet)[3]			
Design Class	**Design ADT**	**Design Speed (mph)[2]**	**55 mph or less**	**60 mph or greater**	**Shoulder Width (feet)**	**55 mph or less**	**60 mph or greater**	**Design Loading**	**Bridge Clear Roadway Width (feet)**
A1	0-1500	**60** (50)	**24** (22)	**24**	**6**	**36** (34)	**36**	[5]	**36**
	1500-3500		**24**	**24**	**6**	**36**	**36**	[5]	**36**
A2[1] (2 lanes)	3,500-8,700[A] 3,500-15,000[C]	**60** (50)	**24**	**24**	**10** (8)	**44** (40)	**44** (40)	[5]	**44** (40)
A3[1,B] (4 lane divided)	8,700 - 40,000[A] 15,000 - 55,000[C]	**70**[6] (60)		**2 at 24**	**6 LT** (4) **10 RT**[7]		**2 at 40** (38)	[5]	**2 at 40**
A3[1,B] (6 lane divided)	40,000 – 63,000[A] 55,000 - 82,000[C]	**70** (60)		**2 at 36**	**10 LT & RT**[8]		**2 at 56**	[5]	**2 at 56**

[A] For non-freeway Corridors 2020 backbone and connector route, LOS threshold is C/D or 4.0.
[B] Level terrain standards apply to freeway Corridors 2020 backbone route, LOS threshold is C/D or 4.0.
[C] For other principal and minor arterials, LOS threshold is D/E or 5.0.

Desirable values are shown in bold and minimum values are shown in parentheses.

[1] The top of the traffic volume range for design class A2 is 8,700 AADT for a Corridors 2020 route (LOS threshold of 4.0) and 15,000 AADT for a non-corridors 2020 route (LOS threshold of 5.0). These volumes are based on the 2000 Highway Capacity Manual assuming; rolling terrain, 12-foot lanes, ≥ 6-foot shoulders, 80% passing, 10% trucks, K30 design factor, and 60/40 directional split. In cases where a reduced level of service is determined to be acceptable and the use of passing lanes is found to be adequate treatment for the facility, the 8,700 AADT value for C2020 Connector routes may be increased to12,000 AADT. Design class A3 assumptions: rolling terrain, 12-foot lanes, > 6-foot shoulders, 10% trucks, K30 design factor, 61/39 directional split, 2 access points per mile, except freeway. See FDM 11-5-3 for additional information on level of service thresholds for different facility types and the respective numerical value.
[2] Desirable Design Speed is 5 mph greater than the posted speed. A minimum design speed equal to the posted speed limit is acceptable.
[3] Normally provide full width of approach roadways across all new bridges. Exceptions may be made when the bridge is considered a major structure on which design dimensions are subject to individual economic studies because of high unit cost.
See FDM 11-26-30.5.13.3 for Roadway Width, Clear Roadway Width of Bridges, and Underpasses between Closely Spaced Roundabouts.
[4] Lateral clearance requirements for underpass bridges are included in FDM 11-35-1.
[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.
[6] See FDM 11-10-1.
[7] Use a 12 ft paved shoulder (right) on 4-lane freeways if truck traffic >250 DHV, or if the facility experiences a high degree of congestion and incidents. The roadway width and clear roadway width on bridges are increased accordingly.
[8] Use 12 ft paved shoulders (left & right) on 6-lane freeways if truck traffic > 250 DHV or if the facility experiences a high degree of congestion and incidents. The roadway width and clear roadway width on bridges are increased accordingly.

Design Criteria for Rural State Trunk Highways
Functionally Classified As Collectors (Level Terrain)

Traffic Volume			Roadway Width Dimensions [1,6]						Bridges [3,4]	
				Traveled Way Width Based On Design Speed (feet)			Roadway Width[3] Based On Design Speed (feet)			
Design Class	Current ADT	Design ADT	Design Speed (mph)[2]	50 mph or less	55 mph or greater	Shoulder Width (feet)	50 mph or less	55 mph or greater	Min. Design Loading	Clear Roadway Width of Bridges
C1	0 - 400		**60** (40)	**22-24** (20)	**22-24**	**2-4**	**26-32** (24)	**26-32**	[5]	**26-30**
C2	401 - 750	Under 1500	**60** (50)	**22-24**	**22-24**	**6** (5)	**34-36** (32)	**34-36** (32)	[5]	**28-30**
C3		1500-2000	**60** (50)	**24** (22)	**24**	**6**	**36** (34)	**36**	[5]	**32-34**
		2000-3500	**60**		**24**	**6**		**36**	[5]	**36**
C4		Over 3500	**60**		**24**	**8**		**40**	[5]	**40**

Desirable values are shown in bold and minimum values are shown in parentheses.

[1] Where a range of widths is shown, the smaller number is the minimum desirable width and the larger number is the maximum desirable width eligible for federal or state project participation.

[2] Desirable Design Speed is 5 mph greater than the posted speed. A minimum design speed equal to the posted speed limit is acceptable.

[3] Bridges in Design Classes C3 and C4 with a total length over 100 feet may be designed with a clear roadway with of 30 feet. See FDM 11-26-30.5.13.3 for Roadway Width, Clear Roadway Width of Bridges, and Underpasses between Closely Spaced Roundabouts.

[4] Lateral clearance requirements for roadways under bridges are included in FDM 11-35-1.

[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

[6] Lane widths shall be 12 feet on Federally Designated Long Truck routes (i.e. the "National Network" as defined in 23 CFR Part 658).

Design Criteria for Rural State Trunk Highways
Functionally Classified As Collectors (Rolling Terrain)

Traffic Volume			Roadway Width Dimensions[1,6]						Bridges[3,4]	
				Traveled Way Width Based On Design Speed (feet)			Roadway Width 3 Based On Design Speed (feet)			
Design Class	**Current ADT**	**Design ADT**	**Design Speed (mph)[2]**	**50 mph or less**	**55 mph or greater**	**Shoulder Width (feet)**	**50 mph or less**	**55 mph or greater**	**Design Loading**	**Clear Roadway Width of Bridges**
C1	0-400		**60** (30)	**22-24** (20)	**22-24**	**2-4**	**26-28** (24)	**26-28**	[5]	**26-30**
C2	401-750	Under 1500	**60** (40)	**22-24**	**22-24**	**6** (5)	**34-36** (32)	**34-36** (32)	[5]	**28-30**
C3		1500-2000	**60** (40)	**24** (22)	**24**	**6**	**36** (34)	**36**	[5]	**32-34**
		2000-3500	**60** (50)	**24**	**24**	**6**	**36**	**36**	[5]	**36**
C4		Over 3500	**60** (50)	**24**	**24**	**8**	**40**	**40**	[5]	**40**

Desirable values are shown in bold and minimum values are shown in parentheses.
Approval through the exception to standards process.

[1] Where a range of widths is shown, the smaller number is the minimum desirable width and the larger number is the maximum desirable width eligible for federal or state project participation.

[2] Desirable Design Speed is 5 mph greater than the posted speed. A minimum design speed equal to the posted speed limit is acceptable.

[3] Bridges in Design Classes C3 and C4 with a total length over 100 feet may be designed with a clear roadway with of 30 feet. Bridges in Design Classes C3 and C4 with a total length over 100 feet may be designed with a clear roadway with of 30 feet. See FDM 11-26-30.5.13.3 for Roadway Width, Clear Roadway Width of Bridges, and Underpasses between Closely Spaced Roundabouts.

[4] Lateral clearance requirements for roadways under bridges are included in FDM 11-35-1.

[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

[6] Lane widths shall be 12 feet on Federally Designated Long Truck routes (i.e. the "National Network" as defined in 23 CFR Part 658).truck routes.

Design Criteria for Rural State Trunk Highways
Functionally Classified As Local Roads (Level Terrain)

Traffic Volume			Roadway width Dimensions [1]								Bridges [1,3,4]		
				Traveled Way Width Based On Design Speed (feet)				Roadway Width [3], Based On Design Speed (feet)				Clear Roadway Width of Bridges Based on Design Speed (feet)	
Design Class	Current ADT	Design ADT	Design Speed (mph) [2]	40 mph or less	45-50 mph	55 mph or more	Shoulder Width (feet)	40 mph or less	45-50 mph	55 mph or more	Design Load	50 mph or less	55 mph or more
L1	0-250		**60** (30)	**20-22** (18)	**20-22**	**22**	**2-4**	**24-26** (22)	**24-26**	**26**	[5]	**24-28**	**26-28**
L2	250-400		**60** (40)	**22** (18)	**22** (20)	**22**	**2-4**	**26-30** (22)	**26-30** (24)	**26-30**	[5]	**26-30**	**26-30**
L3	400-750	Under 1500	**60** (50)		**22-24**	**22-24**	**6** (5)		**34-36** (32)	**34-36** (32)	[5]	**28-30**	**28-30**
L4		1500-2000	**60** (50)		**24** (22)	**24**	**6**		**36** (34)	**36**	[5]	**30-34**	**30-34**
		2000-3500			**24**	**24**	**6**		**36**	**36**	[5]	**36**	**36**
L5		Over 3500	**60** (50)		**24**	**24**	**8**			**40**	[5]	**40**	**40**

Desirable values are shown in bold and minimum values are shown in parentheses.

[1] Where a range of widths is shown, the smaller number is the minimum desirable width and the larger is the maximum desirable width eligible for federal or state project participation.

[2] Desirable Design Speed is 5 mph greater than the posted speed. A minimum design speed equal to the posted speed limit is acceptable.

[3] Bridges in Design Classes L4 and L5 with a total length over 100 feet may be designed with a clear roadway width of 30 feet. See FDM 11-26-30.5.13.3 for Roadway Width, Clear Roadway Width of Bridges, and Underpasses between Closely Spaced Roundabouts.

[4] Clearance requirements for underpass bridges are included in FDM 11-35-1.

[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

Design Criteria for Rural State Trunk Highways
Functionally Classified As Local Roads (Rolling Terrain)

Traffic Volume			Roadway width Dimensions [1]								Bridges [1,3,4]		
				Traveled Way Width Based On Design Speed (feet)				Roadway Width [3], Based On Design Speed (feet)				Clear Roadway Width of Bridges Based on Design Speed (feet)	
Design Class	**Current ADT**	**Design ADT**	**Design Speed (mph) [2]**	**40 mph or less**	**45-50 mph**	**55 mph or more**	**Shoulder Width (feet)**	**40 mph or less**	**45-50 mph**	**55 mph or more**	**Design Load**	**50 mph or less**	**55 mph or more**
L1	0-250		**60** (30)	**20-22** (18)	**20-22**	**22**	**2-4**	**24-26** (22)	**24-26**	**26**	[5]	**24-28**	**26-28**
L2	250-400		**60** (40)	**22** (18)	**22** (20)	**22**	**2-4**	**26** (22)	**26** (24)	**26**	[5]	**26-30**	**26-30**
L3	400-750	Under 1500	**60** (40)	**22-24** (20)	**22-24**	**22-24**	**6** (5)	**34-36** (30)	**34-36** (32)	**34-36** (32)	[5]	**28-30**	**28-30**
L4		1500-2000	**60** (40)	**24** (22)	**24** (22)	**24**	**6**	**36** (34)	**36** (34)	**36**	[5]	**30-34**	**30-34**
		2000-3500		**24**	**24**	**24**	**6**	**36**	**36**	**36**	[5]	**36**	**36**
L5		Over 3500	**60** (40)	**24**	**24**	**24**	**8**	**40**	**40**	**40**	[5]	**40**	**40**

Desirable values are shown in bold and minimum values are shown in parentheses.

[1] Where a range of widths is shown, the smaller number is the minimum desirable width and the larger is the maximum desirable width eligible for federal or state project participation.

[2] Desirable Design Speed is 5 mph greater than the posted speed. A minimum design speed equal to the posted speed limit is acceptable.

[3] Bridges in Design Classes L4 and L5 with a total length over 100 feet may be designed with a clear roadway width of 30 feet. See FDM 11-26-30.5.13.3 for Roadway Width, Clear Roadway Width of Bridges, and Underpasses between Closely Spaced Roundabouts.

[4] Clearance requirements for underpass bridges are included in FDM 11-35-1.

[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

Minimum Design Standards for Town Roads
(New Construction Only)

Design Class	Traffic Volume	Roadway							Structure	
	AADT Current	Roadway Width (feet)	Surfacing Width (feet)	Minimum Shoulder Width (feet)	Horizontal Curve (degrees)		% Grade		Highway Load	Clear Roadway Width for Structures (feet)**
					Desired Max	Max	Des. Max	Max		
T1	Local Service Intermittent Traffic	20, 22*	16, 18*	2					*	24
T2	Under 100	24	18	3			9	11	*	24
T3	100 - 250	26	20	3			8	11	*	24
T4	251 - 400	32	22	5	6°	12.25°	6	8	*	26
T5	401 - 1000	34	22	6	5°	12.25°	5	8	*	28
T6	1001-2400	44	24	10	4.5°	7.5°	5	7	*	30
T7	Over 2400	USE STATE TRUNK STANDARDS								

* See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

** For federal-aid funded projects with a design hourly volume greater than 400, the clear roadway width for structures shall equal the approach roadway width.

Source: Section 82.50(1) Wisconsin Statutes Except Maximum

Horizontal Curve Values are from Table V-6, Page 424, GDHS

DESIGN CRITERIA FOR RECONSTRUCTION* OF TOWN ROADS[1]

TRAFFIC		DESIGN SPEED[2] (MPH)	ROADWAY WIDTH DIMENSIONS		
Design Class	**Current AADT**		**Traveled Way Width (feet)**	**Shoulder Width (feet)**	**Roadway Width (feet)**
RT1	**0 - 250**	**40 or less** (30)	**20** (18)	**3** (2)	**26** (22)
		45-50	**20**	**3** (2)	**26** (24)
		55 or greater	**22**	**3** (2)	**28** (26)
RT2	**251 - 400**	(40)	**22** (18)	**4** (2)	**30** (22)
		45-50	**22** (20)	**4** (2)	**30** (24)
		55 or greater	**22**	**4** (2)	**30** (26)
	401 - 750	(50)	**22**	**6**	**34**
		55 or greater	**22**	**6**	**34**
RT3	**Over 750**	(50)	**24** (22)	**6**	**36** (34)
		55 or greater	**24**	**6**	**36**

Desirable values are shown in bold and minimum values are shown in parentheses.

* Note: Reconstruction means total rebuilding of an existing town road to improve maintainability, safety, geometrics and traffic service. Design standards for construction of new town roads are shown on page 1 of this attachment. To avoid confusion in the terminology used to label design classes for the two design criteria, the design classes for town road "Reconstruction" begin with the letter "R".

[1] Source: TRANS 204, Existing Town Road Improvement Standards.

[2] Desirable Design Speed is 5 mph greater than the posted speed. A minimum design speed equal to the posted speed limit is acceptable.

RURAL STATE TRUNK HIGHWAY
PAVED SHOULDER WIDTH REQUIREMENTS [1]

DESIGN CLASS		PAVED SHOULDER WIDTH (resurfacing, restoration, and rehabilitation projects)	PAVED SHOULDER WIDTHS (reconstruction, new construction, or pavement replacement projects)
A1		3 ft.	3 ft. on concrete roadways 5 ft. on asphalt roadways
C3, L4		3 ft.	3 ft. on concrete roadways 5 ft. on asphalt roadways
A2		3 ft.	3 ft. on concrete roadways 5 ft. on asphalt roadways
C4, L5		3 ft.	3 ft. on concrete roadways 5 ft. on asphalt roadways
A3	4 - LANE DIVIDED EXPRESSWAY	R[2] - 8 ft. L - 3 ft.	R[2] - 8 ft. L - 3 ft.
A3	6 - LANE DIVIDED EXPRESSWAY	R - 8 ft. L - 8 ft.	R - 8 ft. L - 8 ft.
A3	4 - LANE INTERSTATE OR FREEWAY	R - 10 ft. L - 4 ft.	R[3] - 10 ft. L - 4 ft.
A3	6 - LANE INTERSTATE OR FREEWAY	R - 10 ft. L - 10 ft.	R[4] - 10 ft. L[4] - 10 ft.
A3	1 - LANE RAMPS	R - 5 ft. L - 3 ft.	R - 5 ft. L - 3 ft.

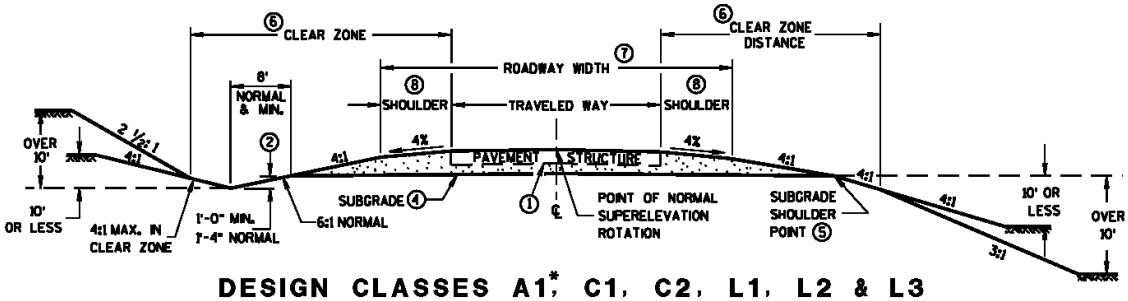
[1] See FDM 11-15-5 for shoulder width criteria for projects on the Great River Road. See FDM 11-46-15 for shoulder criteria to accommodate bicycles.

[2] These shoulder widths also apply to the initial two-lane roadways of ultimate four-lane highways except when construction of the second roadway is not expected for at least six years. In these cases, initially pave only 3 ft R along concrete roadways and 5 ft R along asphaltic roadways.

[3] Use a 12-ft paved shoulder (right) on 4-lane freeways if truck traffic >250 DHV, or if the facility experiences a high degree of congestion and incidents. The roadway width and clear roadway width on bridges are increased accordingly.

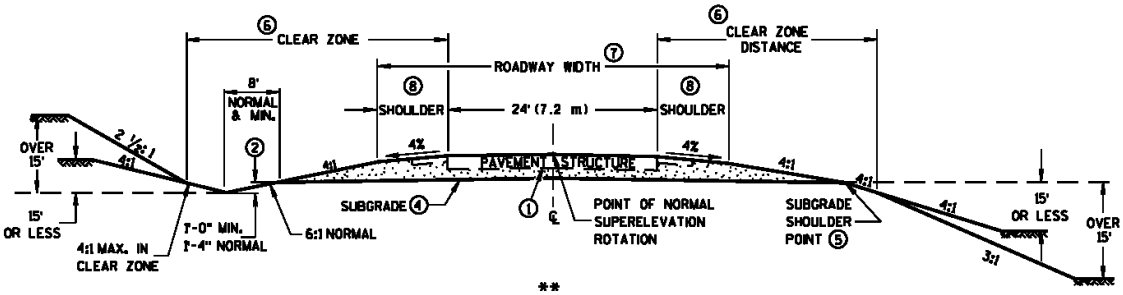
[4] Use 12-ft paved shoulders (left and right) on 6-lane freeways if truck traffic > 250 DHV or if the facility experiences a high degree of congestion and incidents. The roadway width and clear roadway width on bridges are increased accordingly.

TYPICAL SECTIONS FOR TWO LANE RURAL HIGHWAYS



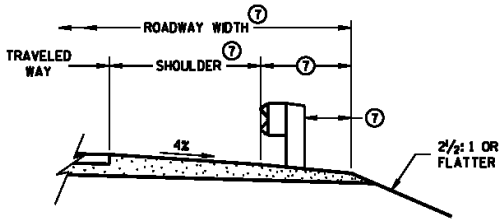
DESIGN CLASSES A1,* C1, C2, L1, L2 & L3

* DESIGN ADT UNDER 1500



DESIGN CLASSES A1, A2, C3, C4, L4 & L5**

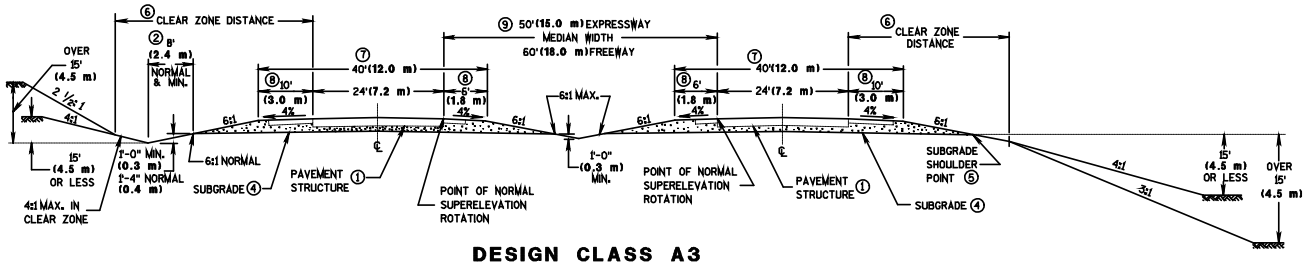
** DESIGN ADT OVER 1500



PARTIAL TYPICAL SECTION WITH A BARRIER SYSTEM AT EDGE OF SHOULDER

Notes:

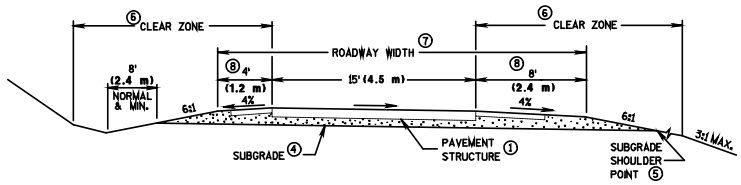
1. The elements of the pavement structure for flexible and rigid pavements will vary according to the individual pavement design.
2. When a special ditch grade or greater ditch capacity is necessary for longitudinal drainage. It may be accomplished by varying the width or slope of the ditch.
3. Earth cuts - backslopes in earth cuts should be blended into the natural topography by using a combination of flat slopes and rounding. Special attention should be given to the design of the transitions for cuts to fills to ensure that slopes are gradually steepened to produce a natural and aesthetically pleasing cross section.
4. Subgrade slope is parallel to pavement structure.
5. Constant width subgrade dimensions should be determined from the typical tangent section. This constant width should generally be carried throughout the project. Exceptions include widening on new construction and reconstruction for steel plate beam guard, turn lanes or auxiliary lanes, or in superelevated segments to avoid foreslopes steeper than 4:1.
6. See FDM 11-15 Attachment 1.9, FDM 11-15 Attachment 1.10 or FDM 11-15 Attachment 1.11 for clear zone distance.
7. Widen the roadway near barrier systems (see above). Additional roadway and shoulder widening is required to accommodate the end terminal, crash cushion or other devices. See other section of FDM for guidance on how much widening is required.
8. See FDM 11-15 Attachment 1.5 and text for paved shoulder width requirements. If the pavement structure is PC concrete 3 foot monolithic shoulders are required.



DESIGN CLASS A3

(FOR UNGRADED MEDIANS, THE MEDIAN SLOPES SHOULD CONFORM TO THE NORMAL CUT OR FILL SLOPES.)

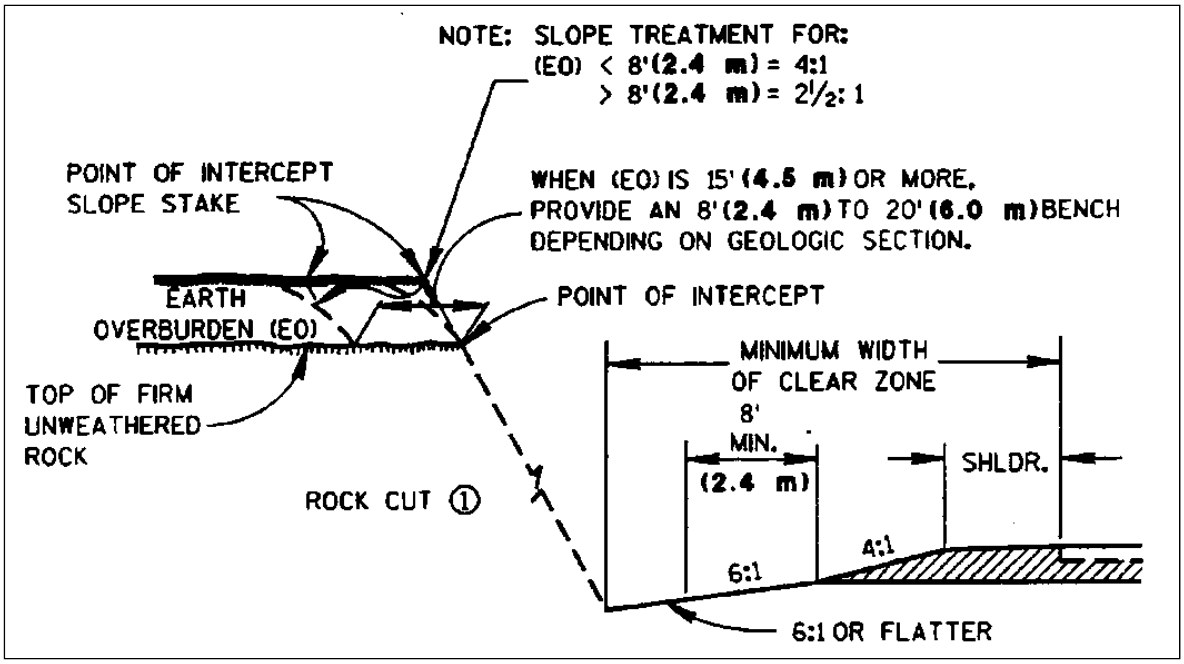
TYPICAL SECTION FOR FOUR LANE DIVIDED HIGHWAY



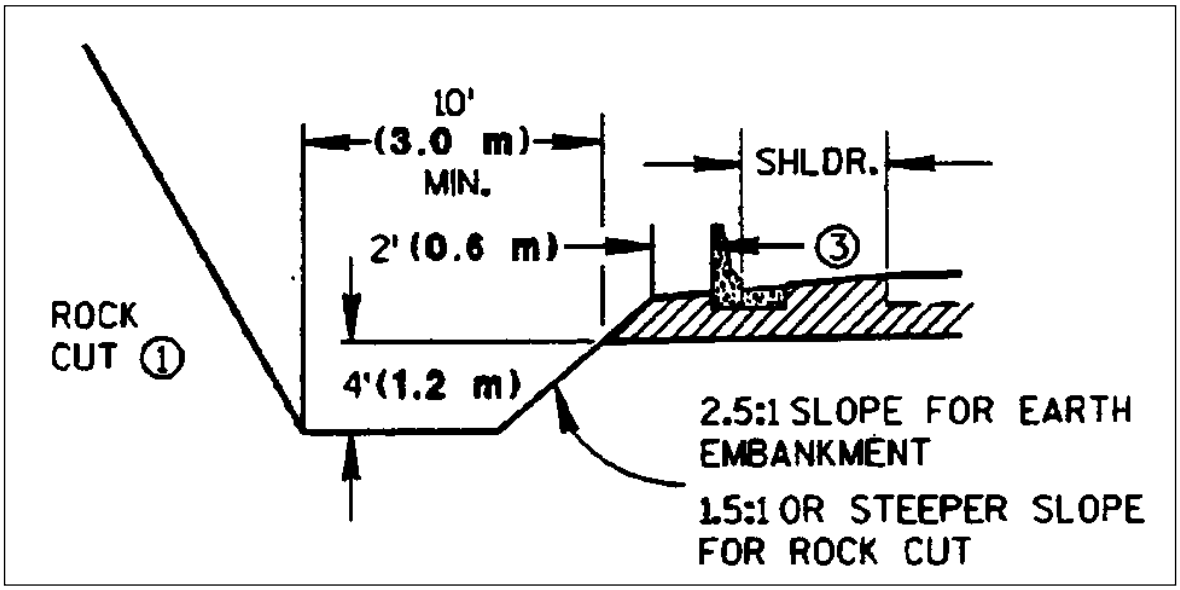
TYPICAL SECTION ONE-LANE RAMP

Notes:

1. The elements of the pavement structure for flexible and rigid pavements will vary according to the individual pavement design.
2. When a special ditch grade or greater ditch capacity is necessary for longitudinal drainage, it may be accomplished by varying the width or slope of the ditch.
3. Earth cuts - backslopes in earth cuts should be blended into the natural topography by using a combination of flat slopes and rounding, special attention should be given to the design of the transitions from cuts to fills to ensure that slopes are gradually steepened to produce a natural and aesthetically pleasing cross section.
4. Subgrade slope is parallel to pavement structure.
5. Constant width subgrade dimensions should be determined from the typical tangent section. This constant width should generally be carried throughout the project. Exceptions include widening on new construction and reconstruction for steel plate beam guard or in superelevated segments to avoid foreslopes steeper than 4:1.
6. See FDM 11-15 Attachment 1.9 or FDM 11-15 Attachment 1.10 for clear zone distance.
7. Widen the roadway by 3 ½ ft where steel plate beam guard is required (see FDM 11-15 Attachment 1.6 for illustration). Additional roadway and shoulder widening is required to accommodate buried end terminal and energy absorbing terminal end (see SDD's for appropriate terminal earthwork requirements).
8. See FDM 11-15 Attachment 1.5 and text for paved shoulder width requirements. If the mainline pavement structure is PC concrete 2 foot monolithic shoulders are required on the right. (excluding ramps).
9. The median width shall be 60 ft. on expressways with a posted speed greater than 55 mph.



ROADWAY SECTION IN ROCK CUT



ALTERNATE DITCH SECTION IN ROCK CUT

NOTES:

1. When rock cut is less than 15', backslopes should generally be treated the same as backslopes in earth cuts. When rock cut is 15' or more, slopes should be as steep as practical for the particular type of rock on the project. A commonly used standard slope for rock cuts is 1/2:1. Consult with district soils engineer when determining roadway cross section in rock cut.
2. Alternate ditch section may be used when warranted on the basis of cost/benefit analysis.
3. A traffic barrier is required to shield the ditch. Steel plate beam guard may be used as an alternative to the concrete shoulder barrier. Removable barrier sections should be provided at approximately 200' intervals for maintenance access to the ditch.

Clear Zone Distance Table (in Feet from Edge of Traveled Way)

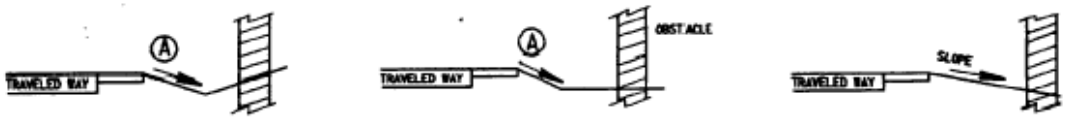
Ref. (2) Table 3.1, pages 3-6

(U.S. Customary Units)

Design Speed	Design ADT	Foreslopes			Backslopes		
		IV:6H or flatter	IV:5H To IV:4H	IV:3H	IV:3H	IV:5H To IV:4H	IV:6H or flatter
40 mph or less	Under 750	7-10	7-10	**	7-10	7-10	7-10
	750-1500	10-12	12-14	**	10-12	10-12	10-12
	1500-6000	12-14	14-16	**	12-14	12-14	12-14
	Over 6000	14-16	16-18	**	14-16	14-16	14-16
45-50 mph	Under 750	10-12	12-14	**	8-10	8-10	10-12
	750-1500	12-14	16-20	**	10-12	12-14	14-16
	1500-6000	16-18	20-26	**	12-14	14-16	16-18
	Over 6000	18-20	24-28	**	14-16	18-20	20-22
55 mph	Under 750	12-14	14-18	**	8-10	10-12	10-12
	750-1500	16-18	20-24	**	10-12	14-16	16-18
	1500-6000	20-22	24-30	**	14-16	16-18	20-22
	Over 6000	22-24	26-32*	**	16-18	20-22	22-24
60 mph	Under 750	16-18	20-24	**	10-12	12-14	14-16
	750-1500	20-24	26-32*	**	12-14	16-18	20-22
	1500-6000	26-30	32-40*	**	14-18	18-22	24-26
	Over 6000	30-32*	36-44*	**	20-22	24-26	26-28
65-70 mph	Under 750	18-20	20-26	**	10-12	14-16	14-16
	750-1500	24-26	28-36*	**	12-16	18-20	20-22
	1500-6000	28-32*	34-42*	**	16-20	22-24	26-28
	Over 6000	30-34*	38-46*	**	22-24	26-30	28-30

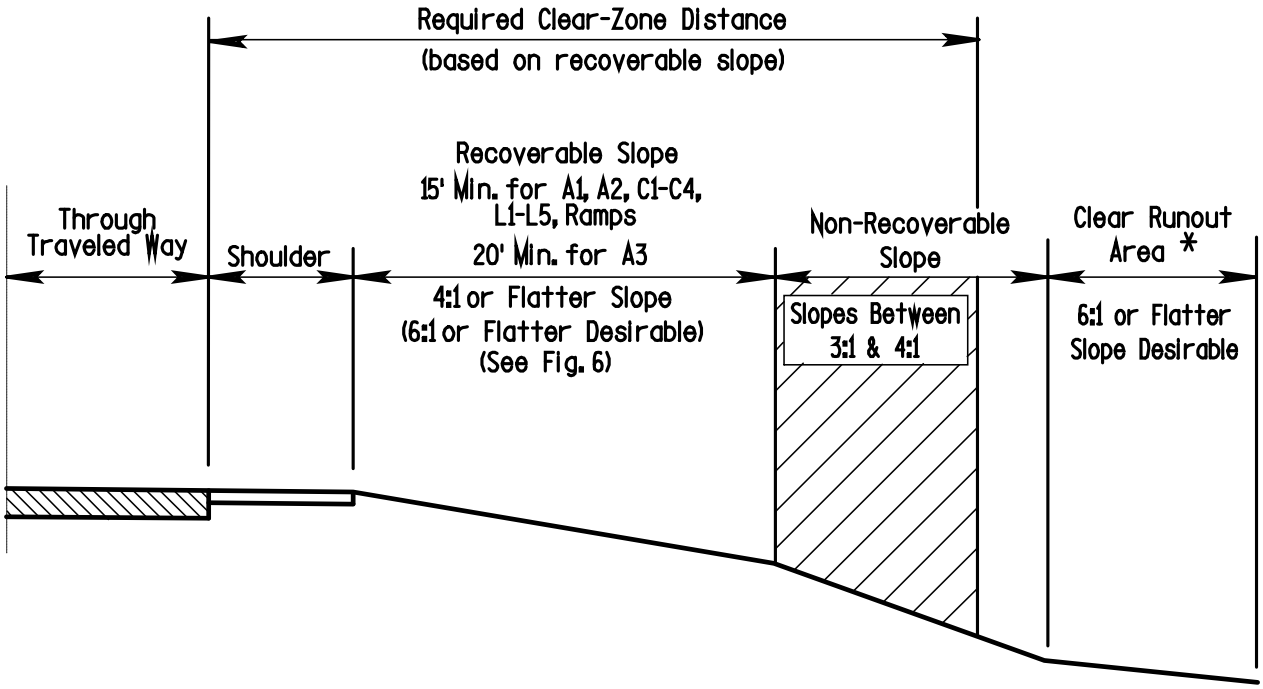
* Clear zone widths greater than 30 feet as indicated are desirable for new construction and major reconstruction and where site-specific investigation indicates a high probability of continuing accidents or such occurrences are indicated by accident history. Clear zones may be limited to 30 feet for practicality and to provide a consistent roadway template if previous experience with similar projects or designs indicates satisfactory performance.

** Since recovery is less likely on unshielded, traversable 3:1 slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicles that encroach beyond the edge of shoulder may be expected to occur beyond the toe of slope. The method for determining the width of recovery is described on page 2 of this Attachment.



SLOPES·SLOPING·TOWARDS·OBSTACLE··(Ⓐ··See·clear·zone·discussion·on·variable·slope·determination)¶

SLOPES·SLOPING·AWAY·FROM·OBSTACLE¶



* The clear runout area is additional clear-zone space that is needed because a portion of the required clear zone (shade area) falls on a non-recoverable slope. This configuration is not desirable because of the difficulty of maintaining the clear runout area. Provide the entire required clear zone width adjacent to the finished shoulder, if at all possible. The width of the clear runout area is equal to that portion of the clear zone distance that is located in the non-recoverable slope, or 10 feet, whichever is greater.

The clear runout area may be reduced in width based on existing conditions or site investigations. Such a variable sloped typical section is often used as a compromise between roadside safety and economics. By providing a relatively flat recovery area immediately adjacent to the roadway, most errant motorists can recover before reaching the steeper slope beyond. Round the slope break points liberally so an encroaching vehicle does not become airborne. Make the steeper slope as smooth as practical and rounded at the bottom.

Kcz (Curve Correction Factor)

Ref. (2) Table 3.2, Page 3-7

Radius (ft)	Design Speed (mph)						
	40	45	50	55	60	65	70
2860	1.1	1.1	1.1	1.2	1.2	1.2	1.3
2290	1.1	1.1	1.2	1.2	1.2	1.3	1.3
1910	1.1	1.2	1.2	1.2	1.3	1.3	1.4
1640	1.1	1.2	1.2	1.3	1.3	1.4	1.5
1430	1.2	1.2	1.3	1.3	1.4	1.4	---
1270	1.2	1.2	1.3	1.3	1.4	1.5	---
1150	1.2	1.2	1.3	1.4	1.5	---	---
950	1.2	1.3	1.4	1.5	1.5	---	---
820	1.3	1.3	1.4	1.5	---	---	---
720	1.3	1.4	1.5	---	---	---	---
640	1.3	1.4	1.5	---	---	---	---
570	1.4	1.5	---	---	---	---	---
380	1.5	---	---	---	---	---	---

Note:

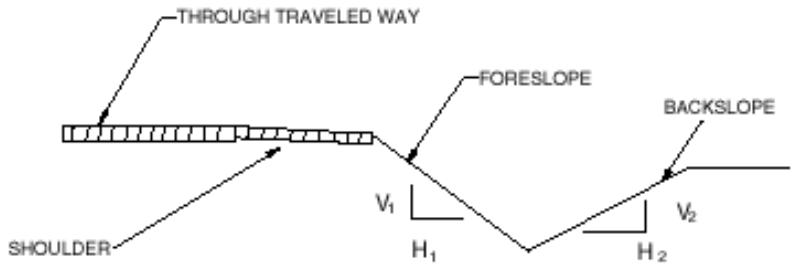
The clear zone correction factor is applied to the outside of curves only. Curves flatter than 2860 ft. do not require an adjusted clear zone.

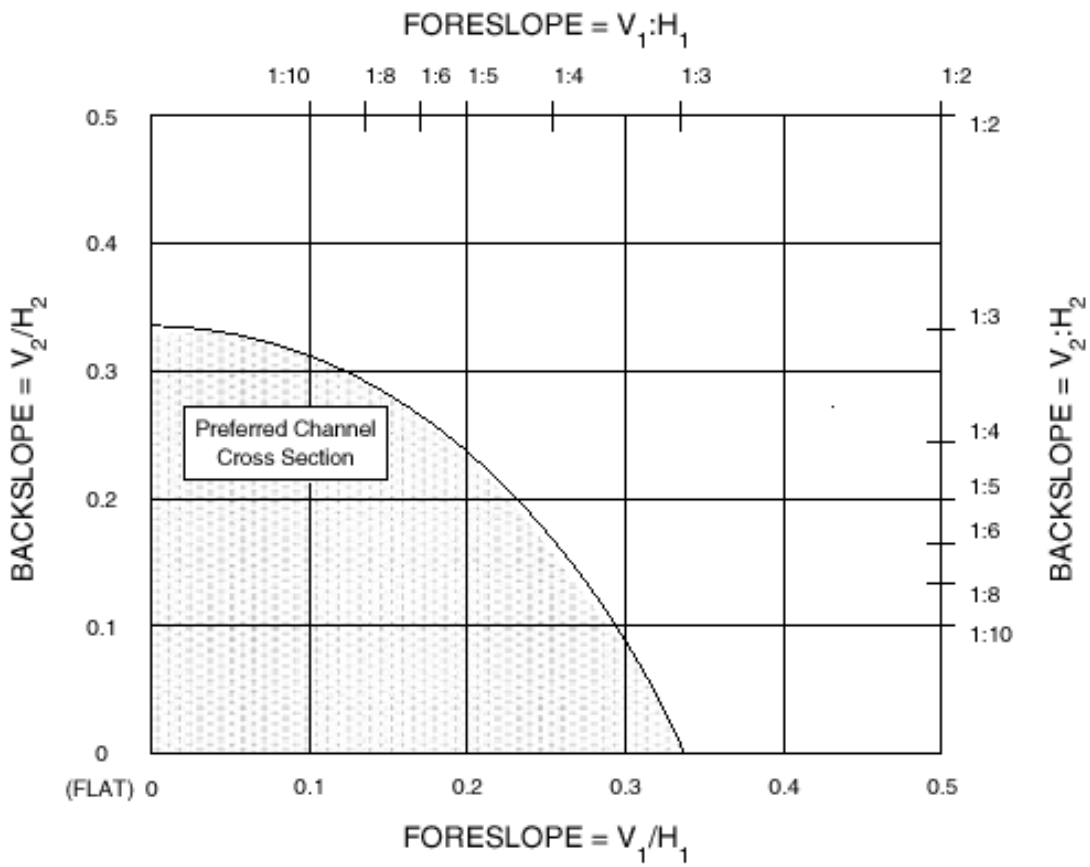
CZc = (Lc) (Kcz)

Where: CZc = clear zone on outside of curvature,

Lc = clear zone tangent section,

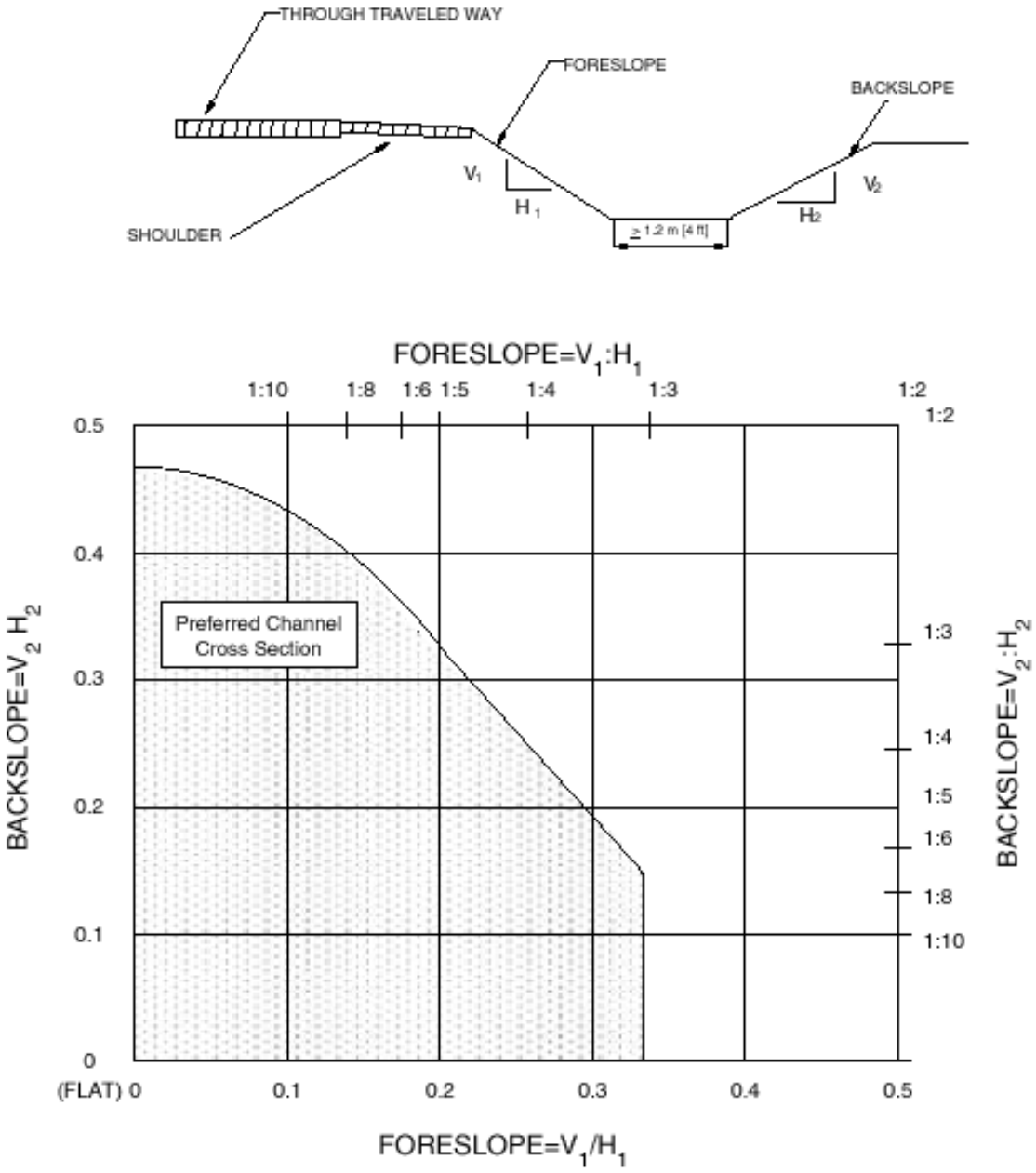
Kcz = curve correction factor





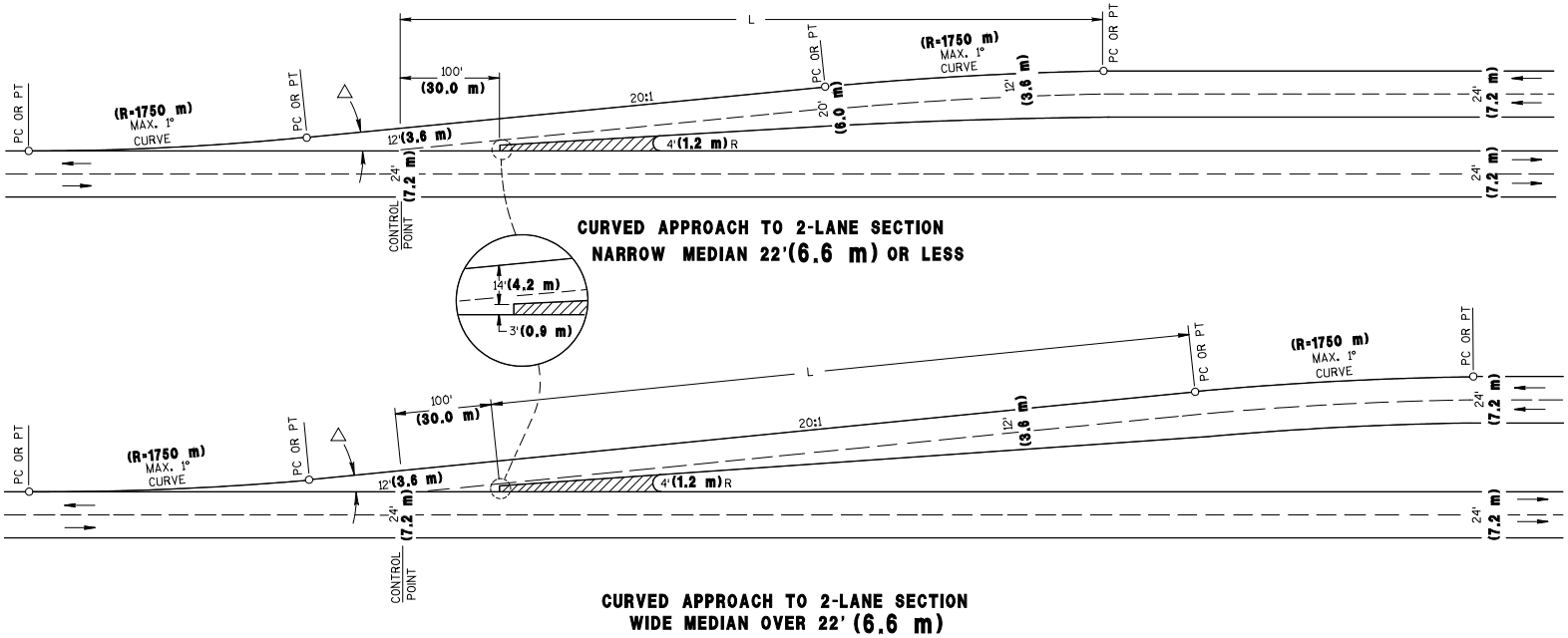
*This chart is applicable to all Vee ditches, rounded channels with a bottom width less than 2.4 m [8 ft] and trapezoidal channels with bottom widths less than 1.2 m [4 ft].

Ref. (2) Figure 3.6, Page 3-11



*This chart is applicable to rounded channels with bottom widths of 2.4 m [8 ft] or more and to trapezoidal channels with bottom widths equal to or greater than 1.2 m [4 ft].

Ref. (2) Figure 3.7, Page 3-12



NOTES

△ CAN VARY BETWEEN 3°-00' AND 5°-00', BUT NOT LESS THAN 2°-30'.

TRANSITIONS BETWEEN TWO-LANE HIGHWAYS AND FOUR-LANE HIGHWAYS SHALL BE DESIGNED TO DIRECT DRIVERS APPROACHING THE DIVIDED SECTION INTO THE INTENDED PATH TO THE RIGHT OF THE MEDIAN WITHOUT ANY APPRECIABLE CHANGE IN DIRECTION. ANY SIGNIFICANT CHANGE IN DIRECTION SHALL BE MADE BY DRIVERS LEAVING THE DIVIDED SECTION.

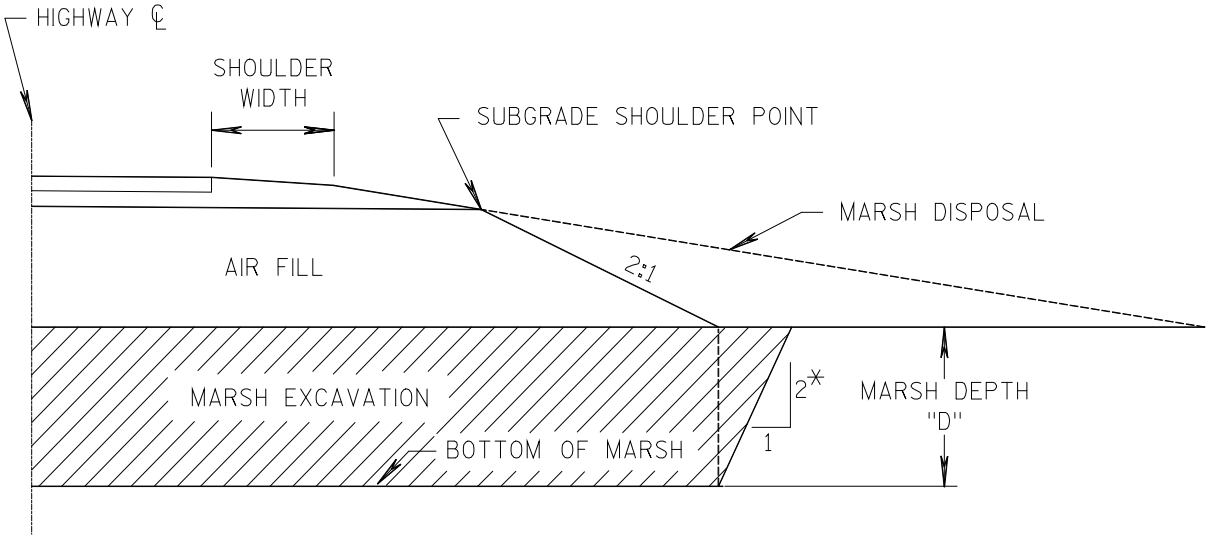
THE LANE DROP SHALL TAKE PLACE ON THE LEFT IN THE DIRECTION OF TRAFFIC. MOST DRIVERS STAY TO THE RIGHT EXCEPT WHEN PASSING AS REQUIRED BY WISCONSIN'S TRAFFIC REGULATION. IT IS ASSUMED, THEREFORE, THAT THERE WILL BE FEWER VEHICLES IN THE LEFT LANE AND DRIVERS USING THE LEFT LANE WILL PROBABLY BE IN A PASSING MANUEVER AND MORE ALERT TO THE CHANGE IN LANE WIDTH.

TRANSITIONS SHALL BE AVOIDED BEFORE INTERCHANGES AND AT LOCATIONS WITH HORIZONTAL AND/OR VERTICAL SIGHT DISTANCE RESTRICTIONS.

SEE 11-30-1 FOR MORE DETAILED INTERCHANGE GEOMETRY.

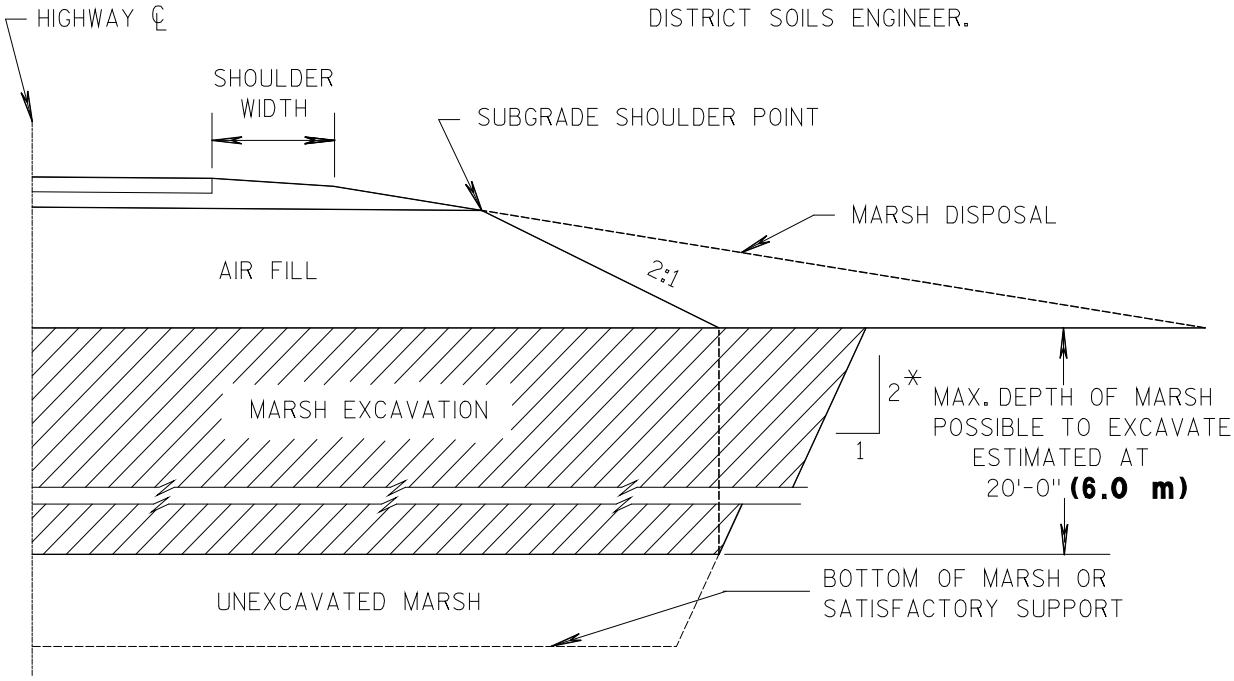
	L	V
L=12V	LENGTH OF VARIABLE WIDTH TRAVELED WAY (ft)	DESIGN SPEED (mph)
L=2.27V	LENGTH OF VARIABLE WIDTH TRAVELED WAY (m)	DESIGN SPEED (km/h)

TYPICAL TWO TO FOUR-LANE TRANSITION



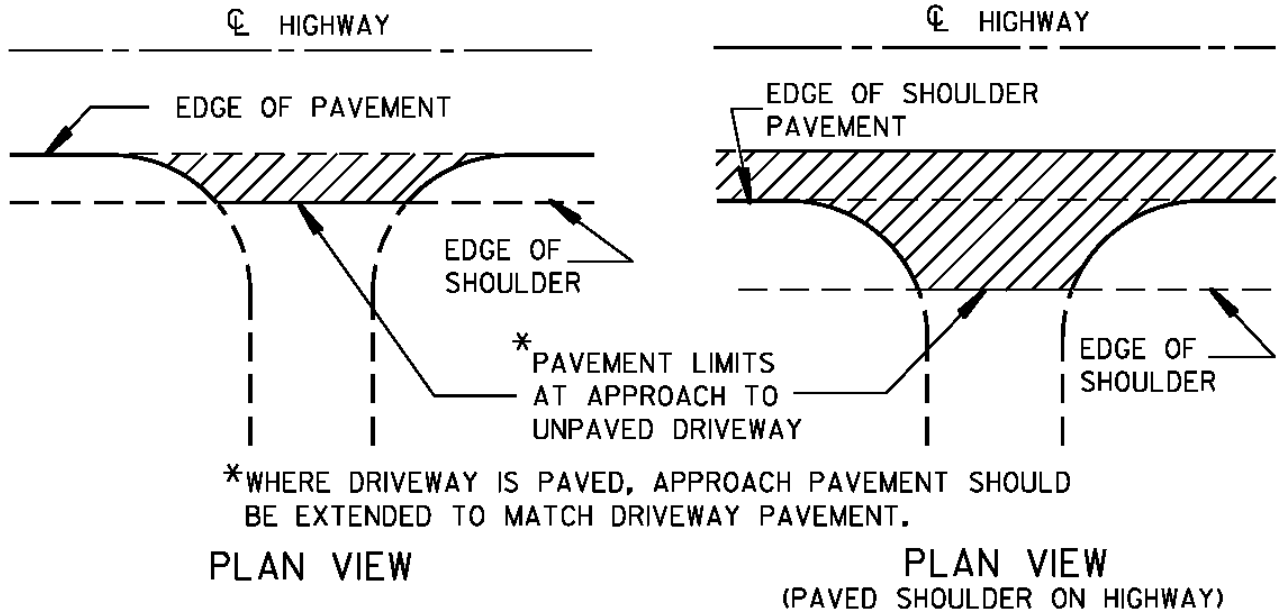
COMPLETE MARSH EXCAVATION

*A FLATTER SLOPE MAY BE NECESSARY FOR STABILITY IN WET MARSHES. CONSULT WITH DISTRICT SOILS ENGINEER.

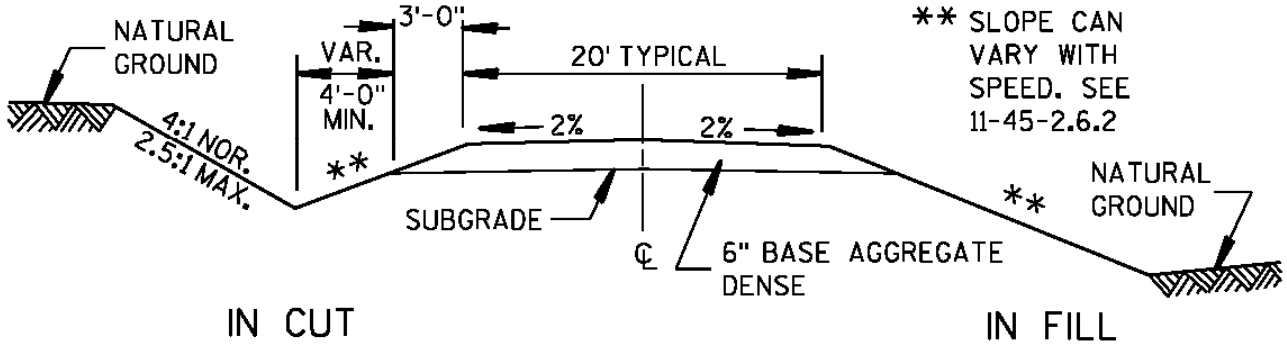


PARTIAL MARSH EXCAVATION

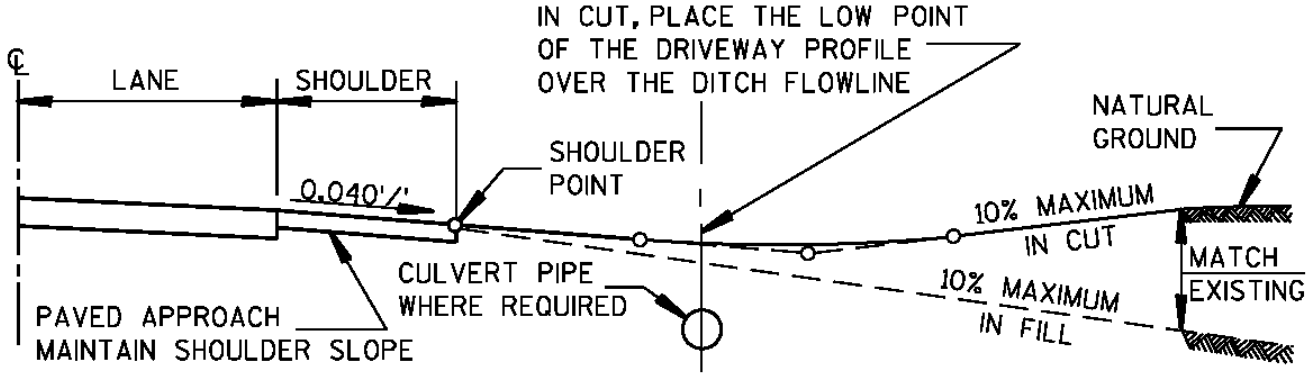
TYPICAL MARSH SECTIONS



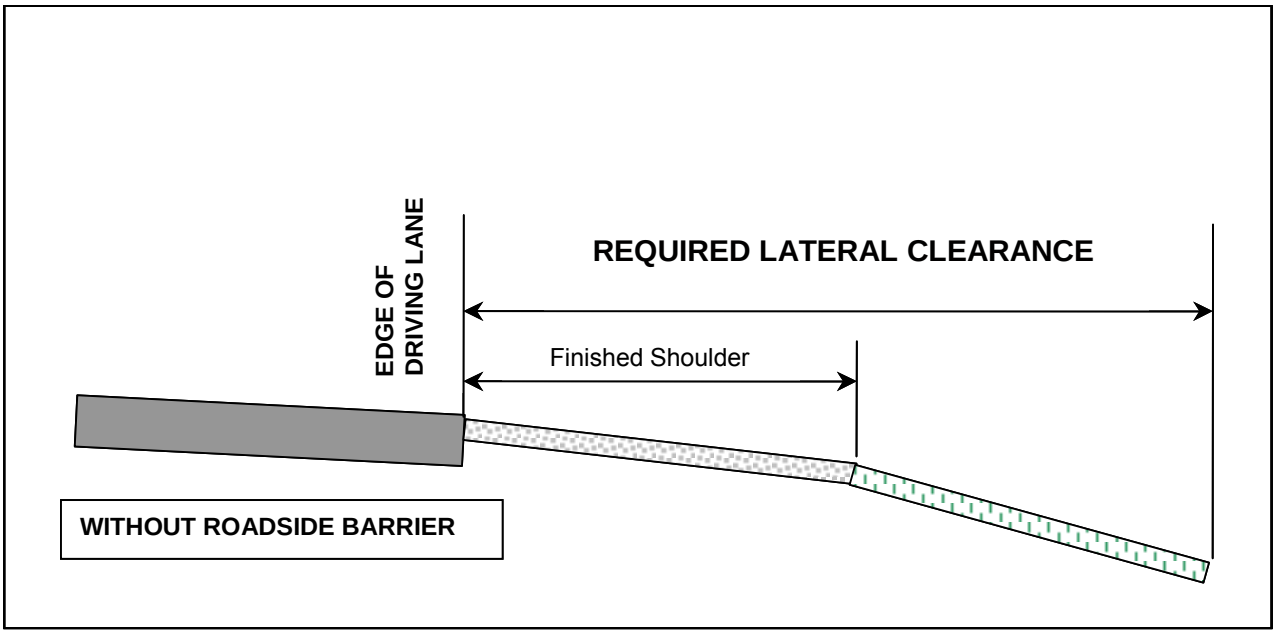
RURAL DRIVEWAY INTERSECTION DETAIL

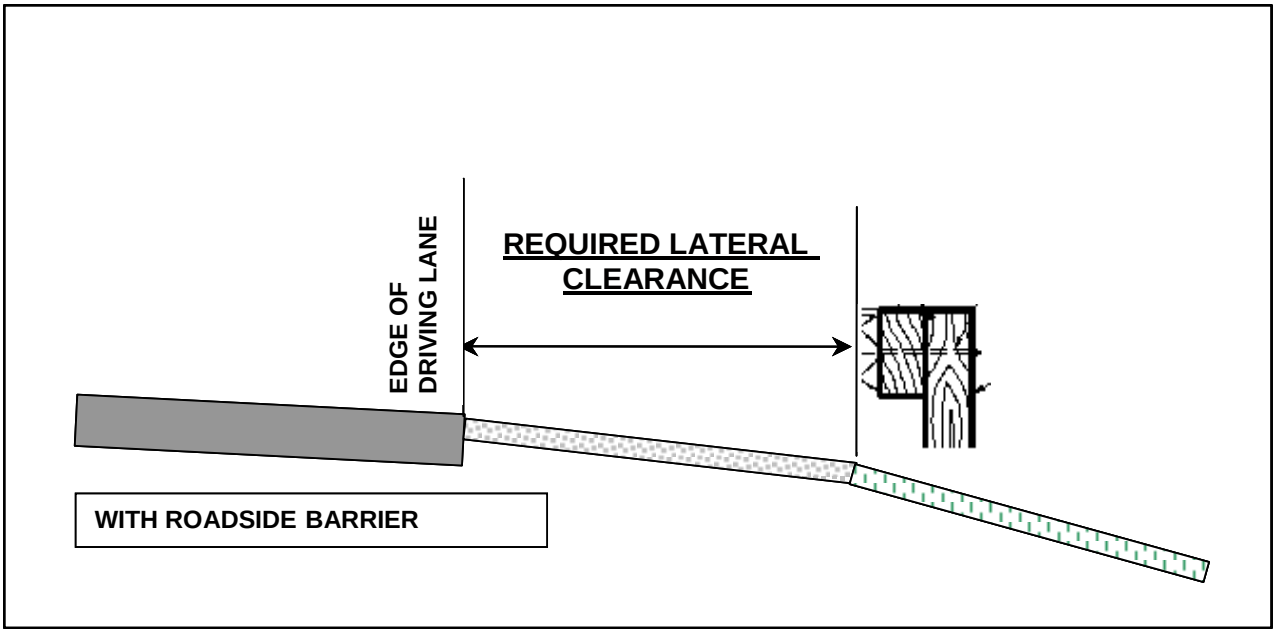


TYPICAL CROSS SECTION FOR PRIVATE DRIVE OR FIELD ENTRANCE



TYPICAL DRIVEWAY PROFILES





Lateral Clearance on Rural Roadways

Design Criteria for County Trunk Highway Functionally Classified as Arterials

TRAFFIC VOLUME		ROADWAY				BRIDGES[2]	
Design Class	Design AADT	Design Speed	Traveled Way Width	Shoulder Width	Roadway Width	Minimum Design Loading	Clear Roadway Width of Bridges[3]
A1	Under 3500	60 mph [4]	24’	6’	36’	[5]	36’
A2[1]	3500-15000	60 mph	24’	10’	44’	[5]	44’
A3	Over 15000	70 mph [6]	24’ (2)	6’L 10’R	40’ (2)	[5]	40’

1 The top of the traffic volume range for design class A2 is 15,000 AADT (LOS trigger of 5.0.) The volume is based on the 2000 Highway Capacity Manual assuming; level terrain, 12-foot lanes, ≥ 6-foot shoulders, 80 percent passing, 10 percent trucks, K30 design factor, and directional split of 60/40. See FDM 11-5-3 for additional information on threshold triggers, level of service for different facility types and the respective numerical value.

2 The full width of approach roadways should normally be provided across all new bridges. Exceptions may be made when the bridge is considered a major structure on which design dimensions should be subject to individual economic studies because of the high unit cost.

3 Lateral clearance requirements for underpass bridges are included in FDM 11-35-1.

4 For County Highways in design class A1 the desirable design speed is 60 mph; however, a minimum design speed of 55 mph is acceptable.

5 See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

6 See discussion in FDM 11-10-1.

Source: For County Trunk Highway Standards see TRANS 205.

Design Criteria for County Trunk Highways Functionally Classified as Collectors

TRAFFIC VOLUME			ROADWAY[1] WIDTH DIMENSIONS					BRIDGES[1,4]
Design Class	**Current ADT**	**Design ADT**	**Design Speed**	**Traveled Way**	**Shoulder**	**Roadway**	**Minimum Design Loading**	**Clear Roadway Width of Bridges**
C1	0-400		40 MPH	22'-24'	2'-4'	26'-32'	[5]	26'-30'
C2	400-750	Under 1500	50 MPH	22'-24'	6'	34'-36'	[5]	28'-30'
C3		1500-3500	60 MPH[3]	24'	6'	36'	[5]	32'-34' [2]
C4		Over 3500	60 MPH	24'	8'	40'	[5]	40' [2]

[1] Where a range of widths is shown, the smaller number is the minimum width and the larger number is the maximum width eligible for federal or state project participation.

[2] Bridges in Design Classes C3 and C4 with a total length over 100 feet may be designed with a clear roadway width of 30 feet.

[3] For County Trunk Highways in design class C3, a design speed of 55 mph is acceptable.

[4] Lateral clearance requirements for roadways under bridges are included in FDM 11-35-1.

[5] See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

Source: Administrative Rule Trans 205, "County Trunk Highway Standards"

Design Criteria for County Trunk Highways Functionally Classified as Local Roads

TRAFFIC VOLUME			ROADWAY[1] WIDTH DIMENSIONS					BRIDGES[1,4]
Design Class	**Current ADT**	**Design ADT**	**Design Speed**	**Traveled Way**	**Shoulder**	**Roadway**	**Minimum Design Loading**	**Clear Roadway Width of Bridges**
L1	0-250		40 MPH	20'-22'	2'-4'	24'-30'	[5]	24'-28'
L2	250-400		40 MPH	22'	2'-4'	26'-30'	[5]	26'-30'
L3	400-750	Under 1500	50 MPH	22'-24'	6'	34'-36'	[5]	28'-30'
L4		1500-3500	60[2] MPH	24'	6'	36'	[5]	30'-34' [3]
L5		Over 3500	60 MPH	24'	8'	40'	[5]	40' [3]

1 Where a range of widths is shown, the smaller number is the minimum width and the larger number is the maximum width eligible for federal or state project participation.

2 For County Trunk Highway is design class L4, a design speed of 55 mph is acceptable.

3 Bridges in Design Classes L4 and L5 with a total length over 100 feet may be designed with a clear roadway width of 30 feet.

4 Clearance requirements for underpass bridges are included in FDM 11-35-1.

5 See WisDOT Bridge Manual and consult with Bureau of Structures for appropriate Bridge Design Loading.

Source: Administrative Rule Trans 205, "County Trunk Highway Standards"