

Culvert and Drainage Item Type and/or Size	Face Side Both	40 MPH		50 MPH		60 MPH		70 MPH	
		Range	Avg	Range	Avg	Range	Avg	Range	Avg
Parallel Slope Culverts									
w/End Dia. $\leq$ 3 ft.	Both	1.6 -2.8	2.2	1.8 -3.2	2.5	2.2 -3.8	3.0	2.6 -4.4	3.5
w/End Dia. $>$ 3 ft.	Both	2.8 -4.0	3.4	3.2 -4.6	3.9	3.8 -5.4	4.6	4.4 -6.2	5.3
w/Grated Box End Section w/Approved Metal Safety End Section	Both	<--- USE VALUES FOR APPROPRIATE PARALLEL SLOPE --->							
	Both	<--- USE VALUES FOR APPROPRIATE PARALLEL SLOPE --->							
Transverse Slope Culverts									
w/End Dia. $\leq$ 3 ft.	Side	1.8 -3.0	2.4	2.0 -3.4	2.7	2.4 -4.0	3.2	2.8 -4.6	3.7
w/End Dia. $>$ 3 ft.	Side	3.0 -4.2	3.6	3.4 -4.8	4.1	4.0 -5.6	4.8	4.6 -6.4	5.5
w/Grated Box End Section w/Approved Metal Safety End Section	Both	<--- USE VALUES FOR APPROPRIATE PARALLEL SLOPE --->							
	Both	<--- USE VALUES FOR APPROPRIATE PARALLEL SLOPE --->							
Raised Inlet w/Grate	Both	<--USE VARIABLE HEIGHT VALUES WITH APPROPRIATE HEIGHT-->							
Rip-rap									
Average Dia. $<$ 6"	Both	0.4 -1.0	0.7	1.0 -1.8	1.4	1.4 -2.4	1.9	1.8 -3.0	2.4
Average Dia. $\geq$ 6" $\leq$ 10"	Both	1.0 -2.6	1.8	1.4 -3.2	2.3	1.8 -3.8	2.8	2.2 -4.4	3.3
Average Dia. $>$ 10"	Both	2.6 -5.0	3.8	3.2 -6.0	4.6	3.8 -7.2	5.5	4.4 -8.6	6.5
Permanent Stream/Pond									
Depth $\leq$ 3 ft.	Both	1.0 -5.0	3.0	1.6 -5.6	3.6	2.2 -6.2	4.2	3.0 -7.0	5.0
Depth $>$ 3 ft.	Both	5.0 -6.0	5.5	5.6 -6.8	6.2	6.2 -7.6	6.9	7.0 -8.6	7.8

**FACTORS THAT AFFECT SEVERITY RANGE:**

*Low Range: Flat recoverable area between culvert opening and traveled way, smaller diameter culvert pipe, tapered culvert end section (18" or less), no erosion, properly maintained and clear of debris.*

*Mid Range: Recoverable cross-section between obstacle and traveled way, projecting 24" (or less) culvert end section, minor erosion at opening or inlet.*

*High Range: Steeper cross-section between obstacle and traveled way, projecting culvert end section, large culvert diameter, erosion at opening or inlet.*

**SEVERITY INDICES  
(Culverts and Miscellaneous Drainage Items)**

**Figure 49-10N**