

Metric		US Customary														
Design speed of highway (km/h)	Deceleration lanes					Acceleration lanes					Design speed of highway (mph)	Deceleration lanes				
	Ratio of length on grade to length on level for design speed of turning curve (km/h) <sup>a</sup>					Ratio of length on grade to length of level for design speed of turning curve (km/h) <sup>a</sup>						Ratio of length on grade to length on level for design speed of turning curve (mph) <sup>a</sup>				
	40	50	60	70	80	40	50	60	70	80	20	30	40	50	All speeds	
All speeds	3 to 4% upgrade					3 to 4% upgrade					3 to 4% upgrade					
All speeds	0.9					1.2					0.9					
All speeds	0.8					1.35					0.8					
Design speed of highway (km/h)	Deceleration lanes					Acceleration lanes					Acceleration lanes					
	Ratio of length on grade to length of level for design speed of turning curve (km/h) <sup>a</sup>					Ratio of length on grade to length of level for design speed of turning curve (km/h) <sup>a</sup>					Ratio of length on grade to length of level for design speed of turning curve (mph) <sup>a</sup>					
60	1.3	1.4	1.4	1.4	—	1.3	1.3	1.3	1.3	—	1.3	1.3	1.3	—	3 to 4% downgrade	
70	1.3	1.4	1.4	1.5	—	1.3	1.3	1.4	1.4	—	1.3	1.35	1.4	—	1.2	
80	1.4	1.5	1.5	1.5	1.6	1.4	1.5	1.5	1.6	1.6	1.3	1.4	1.4	—	5 to 6% downgrade	
90	1.4	1.5	1.5	1.5	1.6	1.4	1.5	1.5	1.6	1.6	1.35	1.45	1.45	—	1.35	
100	1.5	1.6	1.7	1.7	1.8	1.4	1.5	1.5	1.6	1.6	1.4	1.5	1.5	1.6	0.6	
110	1.5	1.6	1.7	1.7	1.8	1.5	1.6	1.7	1.7	1.8	1.45	1.55	1.6	1.7	0.6	
120	1.5	1.6	1.7	1.7	1.8	1.5	1.6	1.7	1.7	1.8	1.5	1.6	1.7	1.8	0.6	
60	3 to 4% upgrade					3 to 4% upgrade					3 to 4% upgrade					
70	1.5					1.5					1.5					
80	1.6					1.6					1.6					
90	1.7					1.7					1.7					
100	1.8					1.8					1.8					
110	2.0					2.0					2.0					
120	2.3					2.3					2.3					
60	5 to 6% upgrade					5 to 6% upgrade					5 to 6% upgrade					
70	1.5					1.5					1.5					
80	1.6					1.6					1.6					
90	1.7					1.7					1.7					
100	1.8					1.8					1.8					
110	2.0					2.0					2.0					
120	2.5					2.5					2.5					
60	3 to 4% downgrade					3 to 4% downgrade					3 to 4% downgrade					
70	0.6					0.6					0.6					
80	0.6					0.6					0.6					
90	0.55					0.55					0.55					
100	0.5					0.5					0.5					
110	0.5					0.5					0.5					
120	0.5					0.5					0.5					

<sup>a</sup> Ratio from this table multiplied by the length in Exhibit 10-70 or Exhibit 10-73 gives length of speed change lane on grade.

**Exhibit 10-71. Speed Change Lane Adjustment Factors as a Function of Grade**