APPENDIX C

GUARDRAIL USE GUIDELINES FOR BENEFIT/COST = 4

Table C1: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

Severe Slope Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8				10-46	46-100
7	0	-2	8				10-46	46-100
7	2L	0	8				10-46	46-100
7	2L	-2	8			10-19	19-55	55-100
12	0	0	8			10-19	19-37	37-100
12	0	0	12			10-19	19-37	37-100
12	0	-2	8			10-19	19-37	37-100
12	0	-2	12			10-19	19-37	37-100
12	2L	0	8			10-28	28-37	37-100
12	2L	0	12			10-19	19-37	37-100
12	2L	-2	8			10-28	28-37	37-100
12	2L	-2	12			10-19	19-37	37-100
18	0	0	8			10-28	28-37	37-100
18	0	0	12			10-19	19-37	37-100
18	0	0	20			10-19	19-37	37-100
18	0	-2	8			10-28	28-37	37-100
18	0	-2	12			10-28	28-37	37-100
18	0	-2	20			10-19	19-46	46-100
18	2L	0	8			10-37		37-100
18	2L	0	12			10-28	28-46	46-100
18	2L	0	20			10-28	28-46	46-100
18	2L	-2	8			10-37		37-100
18	2L	-2	12			10-28	28-46	46-100
18	2L	-2	20			10-19	19-46	46-100
26	0	0	8			10-46		46-100
26	0	0	12			10-46		46-100
26	0	0	20			10-28	37-55	55-100
26	0	-2	8			10-46		46-100
26	0	-2	12			10-37	37-46	46-100
26	0	-2	20			10-28	28-55	55-100
26	2L	0	8			10-46		46-100
26	2L	0	12			10-46		46-100
26	2L	0	20			10-37	37-55	55-100
26	2L	-2	8			10-46		46-100
26	2L	-2	12			10-46		46-100
26	2L	-2	20			10-46	46-55	55-100
32	0	0	8			10-55		55-100
32	0	0	12			10-46		46-100
32	0	0	20			10-37	37-55	55-100
32	0	-2	8			10-55		55-100
32	0	-2	12			10-55		55-100
32	0	-2	20			10-37	37-55	55-100
32	2L	0	8			10-64		64-100
32	2L	0	12			10-55		55-100
32	2L	0	20			10-55		55-100
32	2L	-2	8			10-64		64-100
32	2L	-2	12			10-64		64-100
32	2L	-2	20			10-55		55-100

Table C2: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4								
Moderately Severe Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8			10-46		46-55
7	0	-2	8			10-37		37-100
7	2L	0	8			10-46		46-100
7	2L	-2	8			10-46		46-100
12	0	0	8			10-55		55-100
12	0	0	12			10-46		46-100
12	0	-2	8			10-55		55-100
12	0	-2	12			10-46		46-100
12	2L	0	8			10-55		55-100
12	2L	0	12			10-55		55-100
12	2L	-2	8			10-55		55-100
12	2L	-2	12			10-55		55-100
18	0	0	8			10-64		64-100
18	0	0	12			10-64		64-100
18	0	0	20			10-64		64-100
18	0	-2	8			10-64		64-100
18	0	-2	12			10-64		64-100
18	0	-2	20			10-55		55-100
18	2L	0	8			10-64		64-100
18	2L	0	12			10-64		64-100
18	2L	0	20			10-64		64-100
18	2L	-2	8			10-64		64-100
18	2L	-2	12			10-64		64-100
18	2L	-2	20			10-55		55-100
26	0	0	8			10-73		73-100
26	0	0	12			10-82		82-100
26	0	0	20			10-73		73-100
26	0	-2	8			10-91		91-100
26	0	-2	12			10-64	64-82	82-100
26	0	-2	20			10-73		73-100
26	2L	0	8			10-91		91-100
26	2L	0	12			10-91		91-100
26	2L	0	20			10-73		73-100
26	2L	-2	8			10-91		91-100
26	2L	-2	12			10-91		91-100
26	2L	-2	20			10-82		82-100
32	0	0	8			10-100		
32	0	0	12			10-91		91-100
32	0	0	20			10-82		82-100
32	0	-2	8			10-100		
32	0	-2	12			10-100		
32	0	-2	20			10-73		73-100
32	2L	0	8			10-100		
32	2L	0	12			10-100		
32	2L	0	20			10-82		82-100
32	2L	-2	8			10-100		
32	2L	-2	12			10-100		
32	2L	-2	20			10-100		

Table C3: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

Moderate Slope Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8		10-100			
7	0	-2	8		10-100			
7	2L	0	8		10-100			
7	2L	-2	8		10-100			
12	0	0	8		10-100			
12	0	0	12		10-100			
12	0	-2	8		10-100			
12	0	-2	12		10-100			
12	2L	0	8		10-100			
12	2L	0	12		10-100			
12	2L	-2	8		10-100			
12	2L	-2	12		10-100			
18	0	0	8		10-100			
18	0	0	12		10-100			
18	0	0	20		10-100			
18	0	-2	8		10-100			
18	0	-2	12		10-100			
18	0	-2	20		10-100			
18	2L	0	8		10-100			
18	2L	0	12		10-100			
18	2L	0	20		10-100			
18	2L	-2	8		10-100			
18	2L	-2	12		10-100			
18	2L	-2	20		10-100			
26	0	0	8		10-100			
26	0	0	12		10-100			
26	0	0	20		10-100			
26	0	-2	8		10-100			
26	0	-2	12		10-100			
26	0	-2	20		10-100			
26	2L	0	8		10-100			
26	2L	0	12		10-100			
26	2L	0	20		10-100			
26	2L	-2	8		10-100			
26	2L	-2	12		10-100			
26	2L	-2	20		10-100			
32	0	0	8		10-100			
32	0	0	12		10-100			
32	0	0	20		10-100			
32	0	-2	8		10-100			
32	0	-2	12		10-100			
32	0	-2	20		10-100			
32	2L	0	8		10-100			
32	2L	0	12		10-100			
32	2L	0	20		10-100			
32	2L	-2	8		10-100			
32	2L	-2	12		10-100			
32	2L	-2	20		10-100			

Table C4: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8			10-100		
7	0	0	12			10-64, 82-100	64-82	
7	0	0	20			10-100		
7	0	-2	8			10-64, 82-100		64-82
7	0	-2	12			10-100		
7	0	-2	20			10-82		82-100
7	2L	0	8			10-100		
7	2L	0	12			10-100		
7	2L	0	20			10-100		
7	2L	-2	8			10-100		
7	2L	-2	12			10-100		
7	2L	-2	20			10-100		
12	0	0	8			10-19	19-28	28-100
12	0	0	12			10-100		
12	0	0	20			10-100		
12	0	-2	8				10-28	28-100
12	0	-2	12			10-100		
12	0	-2	20			10-100		
12	2L	0	8		10-19	19-100		
12	2L	0	12			10-100		
12	2L	0	20		10-19	19-100		
12	2L	-2	8		28-37	10-28, 37-100		
12	2L	-2	12			10-91		91-100
12	2L	-2	20			10-91		91-100
18	0	0	8		10-19	37-55	19-37, 55-91	91-100
18	0	0	12			10-19	19-37, 82-100	
18	0	0	20			10-100		
18	0	-2	8			10-46, 73-82	82-100	46-73
18	0	-2	12			28-46	10-28, 91-100	46-91
18	0	-2	20			10-100		
18	2L	0	8		10-28	28-100		
18	2L	0	12		10-28	28-100		
18	2L	0	20		10-28	28-100		
18	2L	-2	8		10-37	37-100		
18	2L	-2	12		10-37	37-100		
18	2L	-2	20		10-28	28-100		
26	0	0	8		10-19	19-100		
26	0	0	12		10-28	28-100		
26	0	0	20		10-19	19-100		
26	0	-2	8		10-28	28-100		
26	0	-2	12		10-28	28-100		
26	0	-2	20		10-37	37-100		
26	2L	0	8	10-100				
26	2L	0	12	10-37, 55-64	37-55	64-100		
26	2L	0	20	10-19	19-46	46-100		
26	2L	-2	8					
26	2L	-2	12	10-46, 64-73, 91-100	46-64	73-91		
26	2L	-2	20	10-28	28-73	73-100		
32	0	0	8	10-46, 73-100	46-55	55-73		
32	0	0	12	28-37	10-28	37-100		
32	0	0	20		10-28	28-100		
32	0	-2	8	10-28, 46-91		28-46, 91-100		
32	0	-2	12	10-19, 46-55	19-46	55-100		
32	0	-2	20		10-28	28-100		
32	2L	0	8					
32	2L	0	12					
32	2L	0	20					
32	2L	-2	8					
32	2L	-2	12					
32	2L	-2	20	10-73	91-100	73-91		

Table C5: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

Moderately Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8		10-19	19-100		
7	0	0	12			10-100		
7	0	0	20			10-73, 91-100		73-91
7	0	-2	8			10-100		
7	0	-2	12			10-100		
7	0	-2	20			10-100		
7	2L	0	8		10-19	19-100		
7	2L	0	12			10-100		
7	2L	0	20			10-100		
7	2L	-2	8			10-100		
7	2L	-2	12			10-100		
7	2L	-2	20			10-100		
12	0	0	8			10-64		82-100
12	0	0	12			10-100		
12	0	0	20			10-100		
12	0	-2	8			10-100		
12	0	-2	12			10-100		
12	0	-2	20			10-100		
12	2L	0	8		10-19	19-100		
12	2L	0	12		10-19	19-100		
12	2L	0	20		10-19	19-100		
12	2L	-2	8		10-19	19-100		
12	2L	-2	12			10-100		
12	2L	-2	20			10-100		
18	0	0	8			10-28	28-46, 73-100	46-73
18	0	0	12			10-100		
18	0	0	20		10-19	19-100		
18	0	-2	8			10-28, 46-82	82-100	28-46
18	0	-2	12		10-19	19-100		
18	0	-2	20		10-19	19-100		
18	2L	0	8	10-28, 46-55		28-46, 55-100		
18	2L	0	12		28-37	10-28, 37-100		
18	2L	0	20		10-37	37-100		
18	2L	-2	8	10-28, 46-55	28-46, 55-64	64-100		
18	2L	-2	12		10-28	28-100		
18	2L	-2	20		10-37	37-100		
26	0	0	8	10-19	19-28	28-100		
26	0	0	12		10-28	28-46, 64-100		46-64
26	0	0	20		10-28	28-100		
26	0	-2	8		10-19	19-100		
26	0	-2	12		10-19	19-100		
26	0	-2	20		10-19	19-100		
26	2L	0	8	10-100				
26	2L	0	12	10-73, 91-100		73-91		
26	2L	0	20	10-28	28-64	73-100		
26	2L	-2	8	10-100				
26	2L	-2	12	10-100				
26	2L	-2	20	28-37	10-28, 37-64, 91-100	64-91		
32	0	0	8	10-28, 46-100		28-46		
32	0	0	12	10-28, 64-73, 91-100	28-37, 55-64	37-55, 73-91		
32	0	0	20		10-37	37-100		
32	0	-2	8	10-100				
32	0	-2	12	28-82	10-28	82-100		
32	0	-2	20		10-28	28-82	82-91	91-100
32	2L	0	8	10-100				
32	2L	0	12	10-100				
32	2L	0	20	10-100				
32	2L	-2	8	10-100				
32	2L	-2	12	10-100				
32	2L	-2	20	10-100				

Table C6: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

Moderate Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8		10-19	19-100		
7	0	0	12			10-100		
7	0	0	20			10-100		
7	0	-2	8			10-100		
7	0	-2	12			10-100		
7	0	-2	20			10-100		
7	2L	0	8	10-37, 55-91	37-55	91-100		
7	2L	0	12	10-64		64-100		
7	2L	0	20	10-46, 64-73, 91-100		46-64, 73-91		
7	2L	-2	8	10-64, 91-100		64-91		
7	2L	-2	12	10-46, 64-82		46-64, 82-100		
7	2L	-2	20	10-28, 46-100		28-46		
12	0	0	8		10-19	19-100		
12	0	0	12		10-19	19-100		
12	0	0	20		10-19	19-100		
12	0	-2	8		10-19	19-100		
12	0	-2	12		10-19	19-100		
12	0	-2	20		10-19	19-100		
12	2L	0	8	10-64, 82-100	64-82			
12	2L	0	12	10-82		82-100		
12	2L	0	20	10-28, 46-91	28-46, 91-100			
12	2L	-2	8	10-100				
12	2L	-2	12	10-37, 73-100		37-73		
12	2L	-2	20	10-82		82-100		
18	0	0	8	10-19, 37-64, 82-100		19-37, 64-82		
18	0	0	12		10-28	28-100		
18	0	0	20		10-28	28-100		
18	0	-2	8	10-73, 91-100		73-91		
18	0	-2	12	10-19	19-28	28-100		
18	0	-2	20		10-37	37-100		
18	2L	0	8	10-100				
18	2L	0	12	10-100				
18	2L	0	20	10-100				
18	2L	-2	8	10-100				
18	2L	-2	12	10-100				
18	2L	-2	20	10-100				
26	0	0	8	10-100				
26	0	0	12	10-100				
26	0	0	20	10-100				
26	0	-2	8	10-100				
26	0	-2	12	10-100				
26	0	-2	20		10-46	46-100		
26	2L	0	8	10-100				
26	2L	0	12	10-100				
26	2L	0	20	10-100				
26	2L	-2	8	10-100				
26	2L	-2	12	10-100				
26	2L	-2	20	10-100				
32	0	0	8	10-100				
32	0	0	12	10-100				
32	0	0	20	10-91	91-100			
32	0	-2	8	10-100				
32	0	-2	12	10-100				
32	0	-2	20	10-100				
32	2L	0	8	10-100				
32	2L	0	12	10-100				
32	2L	0	20	10-100				
32	2L	-2	8	10-100				
32	2L	-2	12	10-100				
32	2L	-2	20	10-100				

Table C7: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

Severe Slope Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8			2.5-50		
7	0	-3	8			2.5-50		
7	4L	0	8			2.5-50		
7	4L	-3	8			2.5-50		
12	0	0	8			2.5-50		
12	0	0	12			2.5-50		
12	0	-3	8			2.5-50		
12	0	-3	12			2.5-50		
12	4L	0	8			2.5-50		
12	4L	0	12			2.5-50		
12	4L	-3	8			2.5-50		
12	4L	-3	12			2.5-50		
18	0	0	8			2.5-50		
18	0	0	12			2.5-50		
18	0	0	20			2.5-50		
18	0	-3	8			2.5-50		
18	0	-3	12			2.5-50		
18	0	-3	20			2.5-50		
18	4L	0	8			2.5-50		
18	4L	0	12			2.5-50		
18	4L	0	20			2.5-50		
18	4L	-3	8			2.5-50		
18	4L	-3	12			2.5-50		
18	4L	-3	20			2.5-50		
26	0	0	8		2.5-12	12-50		
26	0	0	12		2.5-12	12-50		
26	0	0	20		2.5-12	12-50		
26	0	-3	8		7.25-12	2.5-7.25, 12-50		
26	0	-3	12		2.5-12	12-50		
26	0	-3	20		2.5-12	12-50		
26	4L	0	8			2.5-50		
26	4L	0	12			2.5-50		
26	4L	0	20			2.5-50		
26	4L	-3	8			2.5-50		
26	4L	-3	12			2.5-50		
26	4L	-3	20			2.5-50		
32	0	0	8		2.5-50			
32	0	0	12		2.5-50			
32	0	0	20		2.5-50			
32	0	-3	8		2.5-50			
32	0	-3	12		2.5-50			
32	0	-3	20		2.5-31	31-50		
32	4L	0	8		2.5-50			
32	4L	0	12		2.5-50			
32	4L	0	20		2.5-12	12-50		
32	4L	-3	8		2.5-50			
32	4L	-3	12		2.5-50			
32	4L	-3	20		2.5-12	12-50		

Table C8: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

Rural Arterial Moderately Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8			2.5-50		
7	0	-3	8			2.5-50		
7	4L	0	8			2.5-50		
7	4L	-3	8			2.5-50		
12	0	0	8		2.5-12	12-50		
12	0	0	12		7.25-12	2.5-7.25, 12-50		
12	0	-3	8			2.5-50		
12	0	-3	12			2.5-50		
12	4L	0	8			2.5-50		
12	4L	0	12			2.5-50		
12	4L	-3	8			2.5-50		
12	4L	-3	12			2.5-50		
18	0	0	8		2.5-50			
18	0	0	12		2.5-31	31-50		
18	0	0	20		2.5-26.25	26.25-50		
18	0	-3	8		2.5-35.75	35.75-50		
18	0	-3	12		2.5-26.25	26.25-50		
18	0	-3	20		2.5-16.75	16.75-50		
18	4L	0	8		2.5-50			
18	4L	0	12		2.5-21.5	21.5-50		
18	4L	0	20			2.5-50		
18	4L	-3	8		2.5-50			
18	4L	-3	12		2.5-16.75	16.75-50		
18	4L	-3	20			2.5-50		
26	0	0	8		2.5-50			
26	0	0	12		2.5-50			
26	0	0	20		2.5-50			
26	0	-3	8		2.5-50			
26	0	-3	12		2.5-50			
26	0	-3	20		2.5-50			
26	4L	0	8		2.5-50			
26	4L	0	12		2.5-50			
26	4L	0	20		2.5-50			
26	4L	-3	8		2.5-50			
26	4L	-3	12		2.5-50			
26	4L	-3	20		2.5-50			
32	0	0	8		2.5-50			
32	0	0	12		2.5-50			
32	0	0	20		2.5-50			
32	0	-3	8		2.5-50			
32	0	-3	12		2.5-50			
32	0	-3	20		2.5-50			
32	4L	0	8		2.5-50			
32	4L	0	12		2.5-50			
32	4L	0	20		2.5-50			
32	4L	-3	8		2.5-50			
32	4L	-3	12		2.5-50			
32	4L	-3	20		2.5-50			

Table C9: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

Rural Arterial Moderate Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
7	0	0	8		2.5-5			
7	0	-3	8		2.5-5			
7	4L	0	8		2.5-5			
7	4L	-3	8		2.5-5			
12	0	0	8		2.5-5			
12	0	0	12		2.5-5			
12	0	-3	8		2.5-5			
12	0	-3	12		2.5-5			
12	4L	0	8		2.5-5			
12	4L	0	12		2.5-5			
12	4L	-3	8		2.5-5			
12	4L	-3	12		2.5-5			
18	0	0	8		2.5-5			
18	0	0	12		2.5-5			
18	0	0	20		2.5-5			
18	0	-3	8		2.5-5			
18	0	-3	12		2.5-5			
18	0	-3	20		2.5-5			
18	4L	0	8		2.5-5			
18	4L	0	12		2.5-5			
18	4L	0	20		2.5-5			
18	4L	-3	8		2.5-5			
18	4L	-3	12		2.5-5			
18	4L	-3	20		2.5-5			
26	0	0	8		2.5-5			
26	0	0	12		2.5-5			
26	0	0	20		2.5-5			
26	0	-3	8		2.5-5			
26	0	-3	12		2.5-5			
26	0	-3	20		2.5-5			
26	4L	0	8	2.5-16.75	16.75-50			
26	4L	0	12	7.25-12	2.5-7.25, 12-50			
26	4L	0	20		2.5-50			
26	4L	-3	8	2.5-16.75	16.75-50			
26	4L	-3	12		2.5-50			
26	4L	-3	20		2.5-50			
32	0	0	8	2.5-26.25	26.25-50			
32	0	0	12	2.5-50				
32	0	0	20	2.5-16.75	16.75-50			
32	0	-3	8	2.5-21.5	21.5-50			
32	0	-3	12	2.5-50				
32	0	-3	20	2.5-12	12-50			
32	4L	0	8	2.5-50				
32	4L	0	12	2.5-50				
32	4L	0	20	2.5-31	31-50			
32	4L	-3	8	2.5-50				
32	4L	-3	12	2.5-50				
32	4L	-3	20	2.5-26.25	26.25-50			

Table C10: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	8		2.5-50			
5	0	0	12		2.5-50			
5	0	0	20		2.5-50			
5	0	-3	8		2.5-50			
5	0	-3	12		2.5-50			
5	0	-3	20		2.5-50			
5	4L	0	8		2.5-50			
5	4L	0	12		2.5-50			
5	4L	0	20		2.5-50			
5	4L	-3	8		2.5-50			
5	4L	-3	12		2.5-50			
5	4L	-3	20		2.5-50			
8	0	0	8		2.5-50			
8	0	0	12		2.5-50			
8	0	0	20		2.5-50			
8	0	-3	8		2.5-50			
8	0	-3	12		2.5-50			
8	0	-3	20		2.5-50			
8	4L	0	8		2.5-50			
8	4L	0	12		2.5-50			
8	4L	0	20		2.5-50			
8	4L	-3	8		2.5-50			
8	4L	-3	12		2.5-50			
8	4L	-3	20		2.5-50			
12	0	0	8		2.5-45.25	45.25-50		
12	0	0	12		2.5-31		31-50	
12	0	0	20		2.5-50			
12	0	-3	8		2.5-40.5	40.5-50		
12	0	-3	12		2.5-26.25		26.25-50	
12	0	-3	20		2.5-50			
12	4L	0	8	2.5-12	12-50			
12	4L	0	12		2.5-50			
12	4L	0	20		2.5-50			
12	4L	-3	8	2.5-12	12-50			
12	4L	-3	12		2.5-50			
12	4L	-3	20		2.5-50			
18	0	0	8	2.5-50				
18	0	0	12		2.5-50			
18	0	0	20		2.5-50			
18	0	-3	8	2.5-50				
18	0	-3	12		2.5-50			
18	0	-3	20		2.5-50			
18	4L	0	8	2.5-50				
18	4L	0	12	2.5-50				
18	4L	0	20	2.5-50				
18	4L	-3	8	2.5-50				
18	4L	-3	12	2.5-50				
18	4L	-3	20	2.5-50				
24	0	0	8	2.5-50				
24	0	0	12	2.5-50				
24	0	0	20	2.5-12	12-50			
24	0	-3	8	2.5-50				
24	0	-3	12	2.5-50				
24	0	-3	20		2.5-50			
24	4L	0	8	2.5-50				
24	4L	0	12	2.5-50				
24	4L	0	20	2.5-50				
24	4L	-3	8	2.5-50				
24	4L	-3	12	2.5-50				
24	4L	-3	20	2.5-50				

Table C11: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

Moderately Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	8		2.5-50			
5	0	0	12		2.5-50			
5	0	0	20		2.5-50			
5	0	-3	8		2.5-50			
5	0	-3	12		2.5-50			
5	0	-3	20		2.5-50			
5	4L	0	8		2.5-50			
5	4L	0	12		2.5-50			
5	4L	0	20		2.5-50			
5	4L	-3	8		2.5-50			
5	4L	-3	12		2.5-50			
5	4L	-3	20		2.5-50			
8	0	0	8		2.5-50			
8	0	0	12		2.5-50			
8	0	0	20		2.5-50			
8	0	-3	8		2.5-50			
8	0	-3	12		2.5-50			
8	0	-3	20		2.5-45.25	45.25-50		
8	4L	0	8		2.5-50			
8	4L	0	12		2.5-50			
8	4L	0	20		2.5-50			
8	4L	-3	8		2.5-50			
8	4L	-3	12		2.5-50			
8	4L	-3	20		2.5-50			
12	0	0	8		2.5-50			
12	0	0	12		2.5-35.75		35.75-50	
12	0	0	20		2.5-50			
12	0	-3	8		2.5-50			
12	0	-3	12		2.5-31		31-50	
12	0	-3	20		2.5-50			
12	4L	0	8	2.5-50				
12	4L	0	12	2.5-50				
12	4L	0	20		2.5-50			
12	4L	-3	8	2.5-50				
12	4L	-3	12	2.5-50				
12	4L	-3	20		2.5-50			
18	0	0	8	2.5-50				
18	0	0	12	2.5-31	31-50			
18	0	0	20		2.5-50			
18	0	-3	8	2.5-50				
18	0	-3	12	2.5-26.25	26.25-50			
18	0	-3	20		2.5-50			
18	4L	0	8	2.5-50				
18	4L	0	12	2.5-50				
18	4L	0	20	2.5-50				
18	4L	-3	8	2.5-50				
18	4L	-3	12	2.5-50				
18	4L	-3	20	2.5-50				
24	0	0	8	2.5-50				
24	0	0	12	2.5-50				
24	0	0	20	2.5-31	31-50			
24	0	-3	8	2.5-50				
24	0	-3	12	2.5-50				
24	0	-3	20	2.5-26.25	26.25-50			
24	4L	0	8	2.5-50				
24	4L	0	12	2.5-50				
24	4L	0	20	2.5-50				
24	4L	-3	8	2.5-50				
24	4L	-3	12	2.5-50				
24	4L	-3	20	2.5-50				

Table C12: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

Moderate Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	8		2.5-50			
5	0	0	12		2.5-50			
5	0	0	20		2.5-50			
5	0	-3	8		2.5-50			
5	0	-3	12		2.5-50			
5	0	-3	20		2.5-50			
5	4L	0	8	2.5-50				
5	4L	0	12	2.5-50				
5	4L	0	20	2.5-50				
5	4L	-3	8	2.5-50				
5	4L	-3	12	2.5-50				
5	4L	-3	20	2.5-50				
8	0	0	8		2.5-50			
8	0	0	12		2.5-50			
8	0	0	20		2.5-50			
8	0	-3	8		2.5-50			
8	0	-3	12		2.5-50			
8	0	-3	20		2.5-50			
8	4L	0	8	2.5-50				
8	4L	0	12	2.5-50				
8	4L	0	20	2.5-50				
8	4L	-3	8	2.5-50				
8	4L	-3	12	2.5-50				
8	4L	-3	20	2.5-50				
12	0	0	8	2.5-50				
12	0	0	12	2.5-50				
12	0	0	20		2.5-50			
12	0	-3	8	2.5-50				
12	0	-3	12	2.5-50				
12	0	-3	20		2.5-50			
12	4L	0	8	2.5-50				
12	4L	0	12	2.5-50				
12	4L	0	20	2.5-50				
12	4L	-3	8	2.5-50				
12	4L	-3	12	2.5-50				
12	4L	-3	20	2.5-50				
18	0	0	8	2.5-50				
18	0	0	12	2.5-50				
18	0	0	20	2.5-21.5	21.5-50			
18	0	-3	8	2.5-50				
18	0	-3	12	2.5-50				
18	0	-3	20	2.5-16.75	16.75-50			
18	4L	0	8	2.5-50				
18	4L	0	12	2.5-50				
18	4L	0	20	2.5-50				
18	4L	-3	8	2.5-50				
18	4L	-3	12	2.5-50				
18	4L	-3	20	2.5-50				
24	0	0	8	2.5-50				
24	0	0	12	2.5-50				
24	0	0	20	2.5-50				
24	0	-3	8	2.5-50				
24	0	-3	12	2.5-50				
24	0	-3	20	2.5-50				
24	4L	0	8	2.5-50				
24	4L	0	12	2.5-50				
24	4L	0	20	2.5-50				
24	4L	-3	8	2.5-50				
24	4L	-3	12	2.5-50				
24	4L	-3	20	2.5-50				

Table C13: Guardrail Use Guidelines for Rural LC, Benefit-Cost Greater Than 4

Counter	Rural LC Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
	Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
1	5	0	0	3		0.5-5			
2	5	0	0	6		0.5-5			
4	5	0	-6	3		0.5-5			
5	5	0	-6	6		0.5-5			
7	5	10L	0	3		0.5-5			
8	5	10L	0	6		0.5-5			
10	5	10L	-6	3		0.5-5			
11	5	10L	-6	6		0.5-5			
13	8	0	0	3		0.5-5			
14	8	0	0	6		0.5-5			
15	8	0	0	12		0.5-5			
16	8	0	-6	3		0.5-5			
17	8	0	-6	6		0.5-5			
18	8	0	-6	12		0.5-5			
19	8	10L	0	3		0.5-5			
20	8	10L	0	6		0.5-5			
21	8	10L	0	12		0.5-5			
22	8	10L	-6	3		0.5-5			
23	8	10L	-6	6		0.5-5			
24	8	10L	-6	12		0.5-5			
25	12	0	0	3		0.5-5			
26	12	0	0	6		0.5-5			
27	12	0	0	12		0.5-5			
28	12	0	-6	3		0.5-5			
29	12	0	-6	6		0.5-5			
30	12	0	-6	12		0.5-5			
31	12	10L	0	3		0.5-5			
32	12	10L	0	6		0.5-5			
33	12	10L	0	12		0.5-5			
34	12	10L	-6	3		0.5-5			
35	12	10L	-6	6		0.5-5			
36	12	10L	-6	12		0.5-5			
37	18	0	0	3		0.5-5			
38	18	0	0	6		0.5-5			
39	18	0	0	12		0.5-5			
40	18	0	-6	3		0.5-5			
41	18	0	-6	6		0.5-5			
42	18	0	-6	12		0.5-5			
43	18	10L	0	3		0.5-5			
44	18	10L	0	6		0.5-5			
45	18	10L	0	12		0.5-5			
46	18	10L	-6	3		0.5-5			
47	18	10L	-6	6		0.5-5			
48	18	10L	-6	12		0.5-5			
49	24	0	0	3		0.5-5			
50	24	0	0	6		0.5-5			
51	24	0	0	12		0.5-5			
52	24	0	-6	3		0.5-5			
53	24	0	-6	6		0.5-5			
54	24	0	-6	12		0.5-5			
55	24	10L	0	3		0.5-5			
56	24	10L	0	6		0.5-5			
57	24	10L	0	12		0.5-5			
58	24	10L	-6	3		0.5-5			
59	24	10L	-6	6		0.5-5			
60	24	10L	-6	12		0.5-5			

Table C14: Guardrail Use Guidelines forRural LC, Benefit-Cost Greater Than 4

Rural LC Moderately Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3		0.5-5			
5	0	0	6		0.5-5			
5	0	-6	3		0.5-5			
5	0	-6	6		0.5-5			
5	10L	0	3		0.5-5			
5	10L	0	6		0.5-5			
5	10L	-6	3		0.5-5			
5	10L	-6	6		0.5-5			
8	0	0	3		0.5-5			
8	0	0	6		0.5-5			
8	0	0	12		0.5-5			
8	0	-6	3		0.5-5			
8	0	-6	6		0.5-5			
8	0	-6	12		0.5-5			
8	10L	0	3		0.5-5			
8	10L	0	6		0.5-5			
8	10L	0	12		0.5-5			
8	10L	-6	3		0.5-5			
8	10L	-6	6		0.5-5			
8	10L	-6	12		0.5-5			
12	0	0	3		0.5-5			
12	0	0	6		0.5-5			
12	0	0	12		0.5-5			
12	0	-6	3		0.5-5			
12	0	-6	6		0.5-5			
12	0	-6	12		0.5-5			
12	10L	0	3		0.5-5			
12	10L	0	6		0.5-5			
12	10L	0	12		0.5-5			
12	10L	-6	3		0.5-5			
12	10L	-6	6		0.5-5			
12	10L	-6	12		0.5-5			
18	0	0	3		0.5-5			
18	0	0	6		0.5-5			
18	0	0	12		0.5-5			
18	0	-6	3		0.5-5			
18	0	-6	6		0.5-5			
18	0	-6	12		0.5-5			
18	10L	0	3		0.5-5			
18	10L	0	6		0.5-5			
18	10L	0	12		0.5-5			
18	10L	-6	3		0.5-5			
18	10L	-6	6		0.5-5			
18	10L	-6	12		0.5-5			
24	0	0	3		0.5-5			
24	0	0	6		0.5-5			
24	0	0	12		0.5-5			
24	0	-6	3		0.5-5			
24	0	-6	6		0.5-5			
24	0	-6	12		0.5-5			
24	10L	0	3		0.5-5			
24	10L	0	6		0.5-5			
24	10L	0	12		0.5-5			
24	10L	-6	3		0.5-5			
24	10L	-6	6		0.5-5			
24	10L	-6	12		0.5-5			

Table C15: Guardrail Use Guidelines for Rural LC, Benefit-Cost Greater Than 4

Rural LC Moderate Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-1.85	1.85-5			
5	0	0	6	0.5-2.3	2.3-5			
5	0	-6	3	0.5-0.95	0.95-5			
5	0	-6	6	0.5-0.95	0.95-5			
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-5				
8	0	0	3	0.5-2.75, 4.55-5	2.75-4.55			
8	0	0	6	0.5-3.2, 4.1-5	3.2-4.1			
8	0	0	12	0.5-5				
8	0	-6	3	0.5-1.4	1.4-5			
8	0	-6	6	0.5-1.4	1.4-5			
8	0	-6	12	0.5-1.4	1.4-5			
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-5				
12	0	-6	6	0.5-5				
12	0	-6	12	0.5-5				
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C16: Guardrail Use Guidelines for Rural LC, Benefit-Cost Greater Than 4

Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-1.85	1.85-5			
5	0	0	6	0.5-1.4	1.4-5			
5	0	0	12	0.5-1.85	1.85-5			
5	0	-6	3	0.5-0.95	0.95-5			
5	0	-6	6	0.5-0.95	0.95-5			
5	0	-6	12	0.5-0.95	0.95-5			
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	0	12	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-5				
5	10L	-6	12	0.5-5				
8	0	0	3	0.5-2.3, 4.1-5	2.3-4.1			
8	0	0	6	0.5-1.85, 3.2-4.1	1.85-3.2, 4.1-5			
8	0	0	12	0.5-2.3, 3.65-5	2.3-3.65			
8	0	-6	3	0.5-1.4	1.4-5			
8	0	-6	6	0.5-0.95	0.95-5			
8	0	-6	12	0.5-1.4	1.4-5			
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-1.4, 2.3-5	1.4-2.3			
12	0	-6	6	0.5-3.2, 4.55-5	3.2-4.55			
12	0	-6	12	0.5-2.3	2.3-5			
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C17: Guardrail Use Guidelines for Rural LC, Benefit-Cost Greater Than 4

Moderately Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-1.85	1.85-5			
5	0	0	6	0.5-1.85	1.85-5			
5	0	0	12	0.5-1.85	1.85-5			
5	0	-6	3	0.5-0.95	0.95-5			
5	0	-6	6	0.5-0.95	0.95-5			
5	0	-6	12	0.5-0.95	0.95-5			
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	0	12	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-5				
5	10L	-6	12	0.5-5				
8	0	0	3	0.5-5				
8	0	0	6	0.5-1.85, 2.75-3.2, 4.1-5	1.85-2.75, 3.2-4.1			
8	0	0	12	0.5-5				
8	0	-6	3	0.5-1.4	1.4-5			
8	0	-6	6	0.5-1.4	1.4-5			
8	0	-6	12	0.5-1.4	1.4-5			
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-2.3, 3.65-5	2.3-3.65			
12	0	-6	6	0.5-2.3, 3.2-5	2.3-3.2			
12	0	-6	12	0.5-1.85, 3.2-5	1.85-3.2			
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C18: Guardrail Use Guidelines for Rural LC, Benefit-Cost Greater Than 4

Moderate Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-5				
5	0	0	6	0.5-5				
5	0	0	12	0.5-5				
5	0	-6	3	0.5-5				
5	0	-6	6	0.5-5				
5	0	-6	12	0.5-5				
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	0	12	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-5				
5	10L	-6	12	0.5-5				
8	0	0	3	0.5-5				
8	0	0	6	0.5-5				
8	0	0	12	0.5-1.4, 3.2-5	1.4-3.2			
8	0	-6	3	0.5-5				
8	0	-6	6	0.5-5				
8	0	-6	12	0.5-5				
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-2.3, 3.2-5	2.3-3.2			
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-1.4, 3.2-5	1.4-3.2			
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-5				
12	0	-6	6	0.5-5				
12	0	-6	12	0.5-5				
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C19: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Urban Arterial Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3			5-80		
5	0	0	6			5-80		
5	0	-3	3			5-80		
5	0	-3	6			5-80		
5	6L	0	3			5-80		
5	6L	0	6			5-80		
5	6L	-3	3			5-80		
5	6L	-3	6			5-80		
8	0	0	3			5-80		
8	0	0	6			5-80		
8	0	0	12			5-80		
8	0	-3	3			5-80		
8	0	-3	6			5-80		
8	0	-3	12			5-80		
8	6L	0	3			5-80		
8	6L	0	6			5-80		
8	6L	0	12			5-80		
8	6L	-3	3			5-80		
8	6L	-3	6			5-80		
8	6L	-3	12			5-80		
12	0	0	3			5-80		
12	0	0	6			5-80		
12	0	0	12			5-80		
12	0	-3	3			5-80		
12	0	-3	6			5-80		
12	0	-3	12			5-80		
12	6L	0	3			5-80		
12	6L	0	6			5-80		
12	6L	0	12			5-80		
12	6L	-3	3			5-80		
12	6L	-3	6			5-80		
12	6L	-3	12			5-80		
18	0	0	3		5-12.5	12.5-80		
18	0	0	6		5-12.5	12.5-80		
18	0	0	12		5-12.5	12.5-80		
18	0	-3	3		5-12.5	12.5-80		
18	0	-3	6		5-12.5	12.5-80		
18	0	-3	12		5-12.5	12.5-80		
18	6L	0	3			5-80		
18	6L	0	6			5-80		
18	6L	0	12			5-80		
18	6L	-3	3			5-80		
18	6L	-3	6			5-80		
18	6L	-3	12			5-80		
24	0	0	3			5-80		
24	0	0	6			5-80		
24	0	0	12		5-12.5	12.5-80		
24	0	-3	3			5-80		
24	0	-3	6			5-80		
24	0	-3	12			5-80		
24	6L	0	3		5-80			
24	6L	0	6		5-80			
24	6L	0	12			5-80		
24	6L	-3	3		5-80			
24	6L	-3	6		5-80			
24	6L	-3	12			5-80		

Table C20: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Urban Arterial Moderately Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3			5-80		
5	0	0	6			5-80		
5	0	-3	3			5-80		
5	0	-3	6			5-80		
5	6L	0	3			5-80		
5	6L	0	6			5-80		
5	6L	-3	3			5-80		
5	6L	-3	6			5-80		
8	0	0	3			5-80		
8	0	0	6			5-80		
8	0	0	12			5-80		
8	0	-3	3			5-80		
8	0	-3	6			5-80		
8	0	-3	12			5-80		
8	6L	0	3		5-12.5	12.5-80		
8	6L	0	6			5-20		20-80
8	6L	0	12			5-80		
8	6L	-3	3		5-12.5	12.5-80		
8	6L	-3	6			5-20		20-80
8	6L	-3	12			5-80		
12	0	0	3		5-50	50-80		
12	0	0	6		5-35	35-80		
12	0	0	12		5-35	35-80		
12	0	-3	3		5-35	35-80		
12	0	-3	6		5-42.5, 57.5-72.5	42.5-57.5, 72.5-80		
12	0	-3	12			5-80		
12	6L	0	3		5-80			
12	6L	0	6		5-27.5			27.5-80
12	6L	0	12			5-80		
12	6L	-3	3		5-80			
12	6L	-3	6		5-20			20-80
12	6L	-3	12			5-80		
18	0	0	3		5-80			
18	0	0	6		5-80			
18	0	0	12		5-80			
18	0	-3	3		5-80			
18	0	-3	6		5-80			
18	0	-3	12		5-80			
18	6L	0	3		5-80			
18	6L	0	6		5-80			
18	6L	0	12		5-80			
18	6L	-3	3		5-80			
18	6L	-3	6		5-80			
18	6L	-3	12		5-80			
24	0	0	3		5-80			
24	0	0	6		5-80			
24	0	0	12		5-80			
24	0	-3	3		5-80			
24	0	-3	6		5-80			
24	0	-3	12		5-80			
24	6L	0	3		5-80			
24	6L	0	6		5-80			
24	6L	0	12		5-80			
24	6L	-3	3		5-80			
24	6L	-3	6		5-80			
24	6L	-3	12		5-80			

Table C21: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Urban Arterial Moderate Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3		5-80			
5	0	0	6		5-80			
5	0	-3	3		5-80			
5	0	-3	6		5-80			
5	6L	0	3		5-80			
5	6L	0	6		5-80			
5	6L	-3	3		5-80			
5	6L	-3	6		5-80			
8	0	0	3		5-80			
8	0	0	6		5-80			
8	0	0	12		5-80			
8	0	-3	3		5-80			
8	0	-3	6		5-80			
8	0	-3	12		5-80			
8	6L	0	3		5-80			
8	6L	0	6		5-80			
8	6L	0	12		5-80			
8	6L	-3	3		5-80			
8	6L	-3	6		5-80			
8	6L	-3	12		5-80			
12	0	0	3		5-80			
12	0	0	6		5-80			
12	0	0	12		5-80			
12	0	-3	3		5-80			
12	0	-3	6		5-80			
12	0	-3	12		5-80			
12	6L	0	3		5-80			
12	6L	0	6		5-80			
12	6L	0	12		5-80			
12	6L	-3	3		5-80			
12	6L	-3	6		5-80			
12	6L	-3	12		5-80			
18	0	0	3		5-80			
18	0	0	6		5-80			
18	0	0	12		5-80			
18	0	-3	3		5-80			
18	0	-3	6		5-80			
18	0	-3	12		5-80			
18	6L	0	3	5-80				
18	6L	0	6	5-12.5	12.5-80			
18	6L	0	12		5-80			
18	6L	-3	3	5-80				
18	6L	-3	6	5-12.5	12.5-80			
18	6L	-3	12		5-80			
24	0	0	3	5-12.5	12.5-80			
24	0	0	6	5-12.5	12.5-80			
24	0	0	12	5-12.5	12.5-80			
24	0	-3	3	5-12.5	12.5-80			
24	0	-3	6	5-12.5	12.5-80			
24	0	-3	12	5-12.5	12.5-80			
24	6L	0	3	5-80				
24	6L	0	6	5-80				
24	6L	0	12	5-80				
24	6L	-3	3	5-80				
24	6L	-3	6	5-80				
24	6L	-3	12	5-80				

Table C22: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3		5-42.5	42.5-80		
5	0	0	6		5-50	50-80		
5	0	0	12		5-50	50-80		
5	0	-3	3		5-35	35-80		
5	0	-3	6		5-42.5	42.5-80		
5	0	-3	12		5-42.5	42.5-80		
5	6L	0	3		5-80			
5	6L	0	6		5-80			
5	6L	0	12		5-80			
5	6L	-3	3		5-80			
5	6L	-3	6		5-80			
5	6L	-3	12		5-80			
8	0	0	3		5-50, 72.5-80	50-72.5		
8	0	0	6		5-80			
8	0	0	12		5-80			
8	0	-3	3		5-42.5	42.5-80		
8	0	-3	6		5-72.5	72.5-80		
8	0	-3	12		5-80			
8	6L	0	3		5-80			
8	6L	0	6		5-80			
8	6L	0	12		5-80			
8	6L	-3	3		5-80			
8	6L	-3	6		5-80			
8	6L	-3	12		5-80			
12	0	0	3		5-80			
12	0	0	6		5-80			
12	0	0	12		5-80			
12	0	-3	3		5-80			
12	0	-3	6		5-80			
12	0	-3	12		5-80			
12	6L	0	3	5-12.5	12.5-80			
12	6L	0	6		5-80			
12	6L	0	12		5-80			
12	6L	-3	3		5-80			
12	6L	-3	6		5-80			
12	6L	-3	12		5-80			
18	0	0	3		5-80			
18	0	0	6		5-80			
18	0	0	12		5-80			
18	0	-3	3		5-80			
18	0	-3	6		5-80			
18	0	-3	12		5-80			
18	6L	0	3	5-80				
18	6L	0	6	5-80				
18	6L	0	12	5-80				
18	6L	-3	3	5-80				
18	6L	-3	6	5-80				
18	6L	-3	12	5-80				
24	0	0	3	5-20	20-80			
24	0	0	6	5-12.5	12.5-80			
24	0	0	12		5-80			
24	0	-3	3	5-12.5	12.5-80			
24	0	-3	6	5-12.5	12.5-80			
24	0	-3	12		5-80			
24	6L	0	3	5-80				
24	6L	0	6	5-80				
24	6L	0	12	5-80				
24	6L	-3	3	5-80				
24	6L	-3	6	5-80				
24	6L	-3	12	5-80				

Table C23: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Moderately Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3		5-57.5	57.5-80		
5	0	0	6		5-57.5	57.5-80		
5	0	0	12		5-57.5	57.5-80		
5	0	-3	3		5-50	50-80		
5	0	-3	6		5-42.5	42.5-80		
5	0	-3	12		5-42.5	42.5-80		
5	6L	0	3		5-80			
5	6L	0	6		5-80			
5	6L	0	12		5-80			
5	6L	-3	3		5-80			
5	6L	-3	6		5-80			
5	6L	-3	12		5-80			
8	0	0	3		5-80			
8	0	0	6		5-80			
8	0	0	12		5-80			
8	0	-3	3		5-80			
8	0	-3	6		5-80			
8	0	-3	12		5-80			
8	6L	0	3	5-12.5	12.5-80			
8	6L	0	6		5-80			
8	6L	0	12		5-80			
8	6L	-3	3		5-80			
8	6L	-3	6		5-80			
8	6L	-3	12		5-80			
12	0	0	3		5-80			
12	0	0	6		5-80			
12	0	0	12		5-80			
12	0	-3	3		5-80			
12	0	-3	6	5-20	20-80			
12	0	-3	12		5-80			
12	6L	0	3	5-80				
12	6L	0	6	5-20	20-80			
12	6L	0	12		5-80			
12	6L	-3	3	5-42.5, 57.5-80	42.5-57.5			
12	6L	-3	6	5-12.5	12.5-80			
12	6L	-3	12		5-80			
18	0	0	3	5-20	20-80			
18	0	0	6		5-80			
18	0	0	12		5-80			
18	0	-3	3	5-12.5	12.5-80			
18	0	-3	6		5-80			
18	0	-3	12		5-80			
18	6L	0	3	5-80				
18	6L	0	6	5-80				
18	6L	0	12	5-80				
18	6L	-3	3	5-80				
18	6L	-3	6	5-80				
18	6L	-3	12	5-80				
24	0	0	3	5-42.5, 57.5-65	42.5-57.5, 65-80			
24	0	0	6	5-27.5	27.5-80			
24	0	0	12		5-80			
24	0	-3	3	5-35	35-80			
24	0	-3	6	5-20	20-80			
24	0	-3	12		5-80			
24	6L	0	3	5-80				
24	6L	0	6	5-80				
24	6L	0	12	5-80				
24	6L	-3	3	5-80				
24	6L	-3	6	5-80				
24	6L	-3	12	5-80				

Table C24: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Moderate Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	5-20	20-80			
5	0	0	6	5-20	20-80			
5	0	0	12	5-27.5	27.5-80			
5	0	-3	3	5-12.5	12.5-80			
5	0	-3	6	5-20	20-80			
5	0	-3	12	5-20	20-80			
5	6L	0	3	5-80				
5	6L	0	6	5-80				
5	6L	0	12	5-80				
5	6L	-3	3	5-80				
5	6L	-3	6	5-80				
5	6L	-3	12	5-80				
8	0	0	3	5-80				
8	0	0	6	5-35	35-80			
8	0	0	12	5-42.5	42.5-80			
8	0	-3	3	5-80				
8	0	-3	6	5-27.5	27.5-80			
8	0	-3	12	5-35	35-80			
8	6L	0	3	5-80				
8	6L	0	6	5-80				
8	6L	0	12	5-80				
8	6L	-3	3	5-80				
8	6L	-3	6	5-80				
8	6L	-3	12	5-80				
12	0	0	3	5-80				
12	0	0	6	5-80				
12	0	0	12	5-65	65-80			
12	0	-3	3	5-80				
12	0	-3	6	5-80				
12	0	-3	12	5-42.5	42.5-80			
12	6L	0	3	5-80				
12	6L	0	6	5-80				
12	6L	0	12	5-80				
12	6L	-3	3	5-80				
12	6L	-3	6	5-80				
12	6L	-3	12	5-80				
18	0	0	3	5-80				
18	0	0	6	5-80				
18	0	0	12	5-80				
18	0	-3	3	5-80				
18	0	-3	6	5-80				
18	0	-3	12	5-80				
18	6L	0	3	5-80				
18	6L	0	6	5-80				
18	6L	0	12	5-80				
18	6L	-3	3	5-80				
18	6L	-3	6	5-80				
18	6L	-3	12	5-80				
24	0	0	3	5-80				
24	0	0	6	5-80				
24	0	0	12	5-80				
24	0	-3	3	5-80				
24	0	-3	6	5-80				
24	0	-3	12	5-80				
24	6L	0	3	5-80				
24	6L	0	6	5-80				
24	6L	0	12	5-80				
24	6L	-3	3	5-80				
24	6L	-3	6	5-80				
24	6L	-3	12	5-80				

Table C25: Guardrail Use Guidelines for Urban LC, Benefit-Cost Greater Than 4

Urban LC Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3		0.5-5			
5	0	0	6		0.5-5			
5	0	-6	3		0.5-5			
5	0	-6	6		0.5-5			
5	10L	0	3		0.5-5			
5	10L	0	6		0.5-5			
5	10L	-6	3		0.5-5			
5	10L	-6	6		0.5-5			
8	0	0	3		0.5-5			
8	0	0	6		0.5-5			
8	0	0	12		0.5-5			
8	0	-6	3		0.5-5			
8	0	-6	6		0.5-5			
8	0	-6	12		0.5-5			
8	10L	0	3		0.5-5			
8	10L	0	6		0.5-5			
8	10L	0	12		0.5-5			
8	10L	-6	3		0.5-5			
8	10L	-6	6		0.5-5			
8	10L	-6	12		0.5-5			
12	0	0	3		0.5-5			
12	0	0	6		0.5-5			
12	0	0	12		0.5-5			
12	0	-6	3		0.5-5			
12	0	-6	6		0.5-5			
12	0	-6	12		0.5-5			
12	10L	0	3		0.5-5			
12	10L	0	6		0.5-5			
12	10L	0	12		0.5-5			
12	10L	-6	3		0.5-5			
12	10L	-6	6		0.5-5			
12	10L	-6	12		0.5-5			
18	0	0	3		0.5-5			
18	0	0	6		0.5-5			
18	0	0	12		0.5-5			
18	0	-6	3		0.5-5			
18	0	-6	6		0.5-5			
18	0	-6	12		0.5-5			
18	10L	0	3		0.5-5			
18	10L	0	6		0.5-5			
18	10L	0	12		0.5-5			
18	10L	-6	3		0.5-5			
18	10L	-6	6		0.5-5			
18	10L	-6	12		0.5-5			
24	0	0	3		0.5-5			
24	0	0	6		0.5-5			
24	0	0	12		0.5-5			
24	0	-6	3		0.5-5			
24	0	-6	6		0.5-5			
24	0	-6	12		0.5-5			
24	10L	0	3		0.5-5			
24	10L	0	6		0.5-5			
24	10L	0	12		0.5-5			
24	10L	-6	3		0.5-5			
24	10L	-6	6		0.5-5			
24	10L	-6	12		0.5-5			

Table C26: Guardrail Use Guidelines for Urban LC, Benefit-Cost Greater Than 4

Urban LC Moderately Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3		0.5-5			
5	0	0	6	0.5-0.95	0.95-5			
5	0	-6	3		0.5-5			
5	0	-6	6		0.5-5			
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-5				
8	0	0	3	0.5-1.4	1.4-5			
8	0	0	6		0.5-5			
8	0	0	12	0.5-1.4	1.4-5			
8	0	-6	3		0.5-5			
8	0	-6	6		0.5-5			
8	0	-6	12		0.5-5			
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-3.2, 4.55-5	3.2-4.55			
12	0	0	6	0.5-2.3	2.3-5			
12	0	0	12	0.5-1.85	1.85-5			
12	0	-6	3	0.5-1.4	1.4-5			
12	0	-6	6	0.5-0.95	0.95-5			
12	0	-6	12	0.5-5				
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C27: Guardrail Use Guidelines for Urban LC, Benefit-Cost Greater Than 4

Urban LC Moderate Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-5				
5	0	0	6	0.5-5				
5	0	-6	3	0.5-5				
5	0	-6	6	0.5-5				
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-5				
8	0	0	3	0.5-5				
8	0	0	6	0.5-5				
8	0	0	12	0.5-5				
8	0	-6	3	0.5-5				
8	0	-6	6	0.5-5				
8	0	-6	12	0.5-5				
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-5				
12	0	-6	6	0.5-5				
12	0	-6	12	0.5-5				
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C28: Guardrail Use Guidelines for Urban LC, Benefit-Cost Greater Than 4

Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-5				
5	0	0	6	0.5-3.2, 4.55-5	3.2-4.55			
5	0	0	12	0.5-1.4	1.4-5			
5	0	-6	3	0.5-2.3, 3.2-5	2.3-3.2			
5	0	-6	6	0.5-1.4	1.4-5			
5	0	-6	12	0.5-1.4	1.4-5			
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	0	12	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-1.4, 3.2-5	1.4-3.2			
5	10L	-6	12	0.5-5				
8	0	0	3	0.5-5				
8	0	0	6	0.5-5				
8	0	0	12	0.5-5				
8	0	-6	3	0.5-1.85, 4.55-5	1.85-4.55			
8	0	-6	6	0.5-1.85	1.85-5			
8	0	-6	12	0.5-2.3	2.3-5			
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-5				
12	0	-6	6	0.5-5				
12	0	-6	12	0.5-5				
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C29: Guardrail Use Guidelines for Urban LC, Benefit-Cost Greater Than 4

Moderately Severe Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-1.85	1.85-5			
5	0	0	6	0.5-1.85	1.85-5			
5	0	0	12	0.5-1.85	1.85-5			
5	0	-6	3	0.5-0.95	095-5			
5	0	-6	6	0.5-0.95	0.95-5			
5	0	-6	12	0.5-0.95	0.95-5			
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	0	12	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-0.95, 3.2-5	0.95-3.2			
5	10L	-6	12	0.5-5				
8	0	0	3	0.5-5				
8	0	0	6	0.5-1.85, 2.75-3.2, 4.1-5	1.85-2.75, 3.2-4.1			
8	0	0	12	0.5-5				
8	0	-6	3	0.5-1.4	1.4-5			
8	0	-6	6	0.5-1.4	1.4-5			
8	0	-6	12	0.5-1.4	1.4-5			
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-2.3, 3.65-5	2.3-3.65			
12	0	-6	6	0.5-2.3, 3.2-5	2.3-3.2			
12	0	-6	12	0.5-1.85, 2.75-5	1.85-2.75			
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				

Table C30: Guardrail Use Guidelines for Urban LC, Benefit-Cost Greater Than 4

Moderate Point Hazard				Range of Traffic Volumes Where Barrier is Optimal				
Hazard Offset	Curvature	Grade %	Offset to Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-5				
5	0	0	6	0.5-5				
5	0	0	12	0.5-5				
5	0	-6	3	0.5-5				
5	0	-6	6	0.5-5				
5	0	-6	12	0.5-5				
5	10L	0	3	0.5-5				
5	10L	0	6	0.5-5				
5	10L	0	12	0.5-5				
5	10L	-6	3	0.5-5				
5	10L	-6	6	0.5-2.3, 3.2-5	2.3-3.2			
5	10L	-6	12	0.5-5				
8	0	0	3	0.5-5				
8	0	0	6	0.5-5				
8	0	0	12	0.5-1.85, 2.75-5	1.85-2.75			
8	0	-6	3	0.5-5				
8	0	-6	6	0.5-5				
8	0	-6	12	0.5-5				
8	10L	0	3	0.5-5				
8	10L	0	6	0.5-5				
8	10L	0	12	0.5-5				
8	10L	-6	3	0.5-5				
8	10L	-6	6	0.5-5				
8	10L	-6	12	0.5-5				
12	0	0	3	0.5-5				
12	0	0	6	0.5-5				
12	0	0	12	0.5-5				
12	0	-6	3	0.5-5				
12	0	-6	6	0.5-5				
12	0	-6	12	0.5-5				
12	10L	0	3	0.5-5				
12	10L	0	6	0.5-5				
12	10L	0	12	0.5-5				
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-5				
18	0	0	3	0.5-5				
18	0	0	6	0.5-5				
18	0	0	12	0.5-5				
18	0	-6	3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	0	3	0.5-5				
18	10L	0	6	0.5-5				
18	10L	0	12	0.5-5				
18	10L	-6	3	0.5-5				
18	10L	-6	6	0.5-5				
18	10L	-6	12	0.5-5				
24	0	0	3	0.5-5				
24	0	0	6	0.5-5				
24	0	0	12	0.5-5				
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-5				
24	10L	0	3	0.5-5				
24	10L	0	6	0.5-5				
24	10L	0	12	0.5-5				
24	10L	-6	3	0.5-5				
24	10L	-6	6	0.5-5				
24	10L	-6	12	0.5-5				