APPENDIX D

GUARDRAIL USE GUIDELINES FOR BENEFIT/COST = 1

Table D1: Guardrail Use Guidelines for Freeway								
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				10-19	19-100
7	0	-2	8				10-28	28-100
7	2L	0	8				10-19	19-100
7	2L	-2	8				10-28	28-100
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				10-19	19-100
18	0	0	12				10-19	19-100
18	0	0	20				10-19	19-100
18	0	-2	8					10-100
18	0	-2	12				10-19	19-100
18	0	-2	20				10-19	19-100
18	2L	0	8					10-100
18	2L	0	12					10-100
18	2L	0	20				10-19	19-100
18	2L	-2	8					10-100
18	2L	-2	12				10-19	19-100
18	2L	-2	20				10-19	19-100
26	0	0	8				10-19	19-100
26	0	0	12				10-19	19-100
26	0	0	20				10-19	19-100
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				10-19	19-100
26	2L	0	12				10-19	191-00
26	2L	0	20				10-19	19-100
26	2L	-2	8				10-19	19-100
26	2L	-2	12				10-19	19-100
26	2L	-2	20				10-19	19-100
32	0	0	8			10-19	19-100	
32	0	0	12				10-19	19-100
32	0	0	20				10-28	28-100
32	0	-2	8			10-19		19-100
32	0	-2	12				10-19	19-100
32	0	-2	20				10-19	19-100
32	2L	0	8			10-19		19-100
32	2L	0	12			10-19		19-100
32	2L	0	20				10-28	28-100
32	2L	-2	8			10-19		19-100
32	2L	-2	12			10-19		19-100
32	2L	-2	20				10-19	19-100

Table D2: Guardrail Use Guidelines for Freeway								
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				10-19	19-100
7	0	-2	8				10-19	19-100
7	2L	0	8				10-19	19-100
7	2L	-2	8				10-19	19-100
12	0	0	8				10-19	19-100
12	0	0	12				10-19	19-100
12	0	-2	8				10-19	19-100
12	0	-2	12				10-19	19-100
12	2L	0	8				10-19	19-100
12	2L	0	12				10-19	19-100
12	2L	-2	8			10-19		19-100
12	2L	-2	12				10-19	19-100
18	0	0	8			10-28		28-100
18	0	0	12			10-19		19-100
18	0	0	20			10-19	19-28	28-100
18	0	-2	8			10-19		19-100
18	0	-2	12				10-19	19-100
18	0	-2	20			10-19		19-100
18	2L	0	8			10-19		19-100
18	2L	0	12			10-19		19-100
18	2L	0	20			10-19		19-100
18	2L	-2	8			10-19		19-100
18	2L	-2	12			10-19	19-28	28-100
18	2L	-2	20			10-19		19-100
26	0	0	8			10-28		28-100
26	0	0	12			10-28		28-100
26	0	0	20			10-19	19-28	28-100
26	0	-2	8			10-37		37-100
26	0	-2	12			10-28	28-100	
26	0	-2	20			10-19	19-28	28-100
26	2L	0	8			10-28		28-100
26	2L	0	12			10-37		37-100
26	2L	0	20			10-19	19-28	28-100
26	2L	-2	8			10-37		37-100
26	2L	-2	12			10-37		37-100
26	2L	-2	20			10-19	19-28	28-100
32	0	0	8			10-46		46-100
32	0	0	12			10-37		37-100
32	0	0	20			10-37		37-100
32	0	-2	8			10-46		46-100
32	0	-2	12			10-37		37-100
32	0	-2	20			10-37		37-100
32	2L	0	8			10-46		46-100
32	2L	0	12			10-46		46-100
32	2L	0	20			10-28		28-100
32	2L	-2	8			10-55, 73		55-73, 73-100
32	2L	-2	12			10-46		46-100
32	2L	-2	20			10-37		37-100

Table D3: Guardrail Use Guidelines for Freeway								
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 D4: Guardrail Use Guidelines for Freeway

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			10-73, 91-100	73-91	
7	0	0	12			10, 28-55, 82-91	10-28, 73-82, 91-100	55-73
7	0	0	20			10, 28-100	10-28	
7	0	-2	8			10, 28-64, 82-100	10-19	64-82
7	0	-2	12			10-55, 73-100	55-73	
7	0	-2	20			10-55, 73-82, 100	55-73, 82-100	
7	2L	0	8			10-100		
7	2L	0	12			10-100		
7	2L	0	20			10-100		
7	2L	-2	8			10-64, 82-100	64-82	
7	2L	-2	12			10-100		
7	2L	-2	20			10-100		
12	0	0	8				10-28	37-100
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			10-100		
12	2L	0	12			10-100		
12	2L	0	20			10-64, 82-100	64-82	
12	2L	-2	8			10-100		
12	2L	-2	12			10-91		91-100
12	2L	-2	20			10, 28-91	10-28	91-100
18	0	0	8			10-19, 73	19-28, 64-73, 73-100	28-64
18	0	0	12				10-19, 82-100	19-82
18	0	0	20			10-100		
18	0	-2	8			10-37, 73-82	82-100	37-73
18	0	-2	12			10, 64	10-19, 91-100	19-64, 64-91
18	0	-2	20			10-100		
18	2L	0	8		19-28	10-19, 28-100		
18	2L	0	12			10-100		
18	2L	0	20			10-100		
18	2L	-2	8			10, 28-100		
18	2L	-2	12			10-100		
18	2L	-2	20			10-100		
26	0	0	8			10-100		
26	0	0	12			10-19, 19-55, 91-100	82-91	55-82
26	0	0	20			10-46, 64-100		46-64
26	0	-2	8			10-100		
26	0	-2	12			37-46, 64-100	10-37	46-64
26	0	-2	20			10-100		
26	2L	0	8	10, 28-46, 64, 82-100	10-28, 46-64, 64-82			
26	2L	0	12	10-37, 55, 100	37-55, 91-100	55-91		
26	2L	0	20		10-19	19-100		
26	2L	-2	8	10-19, 37-55, 73-91	19-37, 55-73, 91-100			
26	2L	-2	12	10-19, 64-73	19-28, 55-64, 91-100	28-55, 73-91		
26	2L	-2	20		28-64	10-28, 64-100		
32	0	0	8	73-100	46-55	10-46, 55-73		
32	0	0	12		10-100			
32	0	0	20			10-73, 91-100	73-91	
32	0	-2	8	10-19, 46-64	19-28	28-46, 64-100		
32	0	-2	12		10-37, 73	37-73, 73-100		
32	0	-2	20			10-28, 46-100		28-46
32	2L	0	8	10-100				
32	2L	0	12	10-100				
32	2L	0	20	10-28, 64-82, 100	28-46, 46-64, 82-100			
32	2L	-2	8	10-100				
32	2L	-2	12	10-100				
32	2L	-2	20	28-37, 91-100	37-73	10-19, 73-91		

Table D5: Guardrail Use Guidelines for Freeway

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			10-100		
7	0	0	12			10-28, 46-100	28-46	
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			10-100		
7	2L	0	12			10-100		
7	2L	0	20			10-100		
7	2L	-2	8			10-46, 64-100		46-100
7	2L	-2	12			10-100		
7	2L	-2	20			10-100		
12	0	0	8			10-55, 82-100	55-64	64-82
12	0	0	12			10-100		
12	0	0	20			10-100		
12	0	-2	8			10-46, 64, 82-100	46-64	64-82
12	0	-2	12			10-100		
12	0	-2	20			10-100		
12	2L	0	8			10-100		
12	2L	0	12			10-100		
12	2L	0	20			10-100		
12	2L	-2	8			10-100		
12	2L	-2	12			10-100		
12	2L	-2	20			10-100		
18	0	0	8			10, 28, 46	10-28, 28-46, 73-100	46-73
18	0	0	12			10-100		
18	0	0	20			10-100		
18	0	-2	8				10-19, 73-82, 82-100	19-73
18	0	-2	12			10-19, 37-100	19-37	
18	0	-2	20			10-100		
18	2L	0	8	46-55		10-46, 55-100		
18	2L	0	12			10-100		
18	2L	0	20			10-100		
18	2L	-2	8	10-19, 46-55		19-46, 55-91, 91-100		
18	2L	-2	12			10-100		
18	2L	-2	20			10-100		
26	0	0	8			10-100		
26	0	0	12			28-46, 82-91	10-28, 64-82, 91-100	46-64
26	0	0	20			10-100		
26	0	-2	8			10-100		
26	0	-2	12			10-19, 73-91		19-73, 91-100
26	0	-2	20			10-100		
26	2L	0	8	10-73, 100	73-100			
26	2L	0	12	10-55, 91-100		55-91		
26	2L	0	20		10-28, 46-64	28-46, 64-100		
26	2L	-2	8	10-100				
26	2L	-2	12	10-37, 55-100	37-55			
26	2L	-2	20		10-37, 91-100	37-91		
32	0	0	8	10-28, 46-100		28-46		
32	0	0	12			10-100		
32	0	0	20			10-19, 46-55, 73-82, 10	19-28	28-46, 55-73, 82-100
32	0	-2	8	10-46, 64-100		46-64		
32	0	-2	12	28-37	10-28, 37-55	55-100		
32	0	-2	20			10-37, 55-64	91-100	37-55, 64-91
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 D6: Guardrail Use Guidelines for Freeway								
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			10-100		
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	10-19, 55-64		19-55, 64-100		
7	2L	0	12	10-28, 46-64		28-46, 64-100		
7	2L	0	20	19-37	10-19	37-100		
7	2L	-2	8	10-28, 91-100		28-91		
7	2L	-2	12	28-46, 64-82, 100		10-28, 46-64, 82-100		
7	2L	-2	20	10-28, 55, 82-100		28-55, 55-82		
12	0	0	8			10-100		
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	10-64, 82-100	64-82			
12	2L	0	12	10-73, 100		73-100		
12	2L	0	20	10-28, 46-82		28-46, 82-100		
12	2L	-2	8	10-100				
12	2L	-2	12	28-37	10-28	37-100		
12	2L	-2	20	28-46, 64-73	10-28	46-64, 73-100		
18	0	0	8	10-19		19-100		
18	0	0	12		10-19	19-100		
18	0	0	20			10-100		
18	0	-2	8	37-46, 91-100	28-37	10-28, 46-91		
18	0	-2	12		10-28	28-100		
18	0	-2	20			10-100		
18	2L	0	8	10-100				
18	2L	0	12	10-100				
18	2L	0	20	10-37, 55-100	37-55			
18	2L	-2	8	10-100				
18	2L	-2	12	10-100				
18	2L	-2	20	10-64, 82-100	64-82			
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		10-28, 100	28-100		
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 D7: Guardrail Use Guidelines for Rural Arterial								
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			2.5-50		
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		2.5-26.25, 45.25-50	26.25-45.25		
32	0	0	12			2.5-50		
32	0	0	20			2.5-50		
32	0	-3	8		2.5-31	31-50		
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		2.5-21.5	21.5-50		
32	4L	0	20			2.5-50		
32	4L	-3	8		2.5-50			
32	4L	-3	12		2.5-21.5	21.5-50		
32	4L	-3	20			2.5-50		

Table D8: Guardrail Use Guidelines for Rural Arterial								
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			2.5-50		
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		2.5-50			
26	0	0	12		2.5-50			
26	0	0	20		2.5-16.75	16.75-50		
26	0	-3	8		2.5-50			
26	0	-3	12		2.5-50			
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		2.5-21.5, 31-50	21.5-31		
26	4L	-3	8		2.5-50			
26	4L	-3	12		2.5-50			
26	4L	-3	20		2.5-26.25	26.25-50		
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 D9: Guardrail Use Guidelines for Rural Arterial								
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		2.5-50			
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		2.5-50			
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	2.5-12	12-50			
32	0	0	20		2.5-50			
32	0	-3	8		2.5-50			
32	0	-3	12	7.25-12	2.5-7.25, 12-50			
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 D10: Guardrail Use Guidelines for Rural Arterial								
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		2.5-45.25	45.25-50		
5	4L	0	12		2.5-45.25	45.25-50		
5	4L	0	20		2.5-50			
5	4L	-3	8		2.5-40.5	40.5-50		
5	4L	-3	12		2.5-45.25	45.25-50		
5	4L	-3	20		2.5-45.25	45.25-50		
8	0	0	8			2.5-16.75	16.75-50	
8	0	0	12			2.5-50		
8	0	0	20		2.5-12	12-50		
8	0	-3	8			2.5-12	12-50	
8	0	-3	12			2.5-50		
8	0	-3	20		2.5-12	12-50		
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		7.25-12	2.5-7.25, 12-50		
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		2.5-16.75	16.75-50		
12	4L	0	12		2.5-12	12-50		
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	2.5-31, 50			31-50	
18	0	0	12				2.5-50	
18	0	0	20		2.5-21.5	21.5-50		
18	0	-3	8	2.5-26.25			26.25-50	
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 D11: Guardrail Use Guidelines for Rural Arterial								
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			2.5-50		
8	4L	0	8		2.5-16.75	16.75-50		
8	4L	0	12			2.5-50		
8	4L	0	20			2.5-50		
8	4L	-3	8		2.5-12	12-50		
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		2.5-16.75	16.75-50		
12	0	-3	8			2.5-50		
12	0	-3	12				2.5-50	
12	0	-3	20		2.5-16.75	16.75-50		
12	4L	0	8	2.5-50				
12	4L	0	12	2.5-31		31-50		
12	4L	0	20		2.5-16.75	16.75-50		
12	4L	-3	8	2.5-50				
12	4L	-3	12	2.5-26.25		26.25-50		
12	4L	-3	20		2.5-12	12-50		
18	0	0	8	2.5-50				
18	0	0	12				2.5-50	
18	0	0	20		2.5-31	31-50		
18	0	-3	8	2.5-50				
18	0	-3	12				2.5-50	
18	0	-3	20		2.5-21.5	21.5-50		
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		2.5-40.5	40.5-50		
24	0	-3	8	2.5-50				
24	0	-3	12	2.5-50				
24	0	-3	20		2.5-35.75	35.75-50		
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 D12: Guardrail Use Guidelines for Rural Arterial								
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		2.5-45.25	45.25-50		
5	0	0	20		2.5-50			
5	0	-3	8		2.5-35.75	35.75-50		
5	0	-3	12		2.5-35.75	35.75-50		
5	0	-3	20		2.5-31	31-50		
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		2.5-31	31-50		
8	0	0	12		2.5-50			
8	0	0	20		2.5-26.25	26.25-50		
8	0	-3	8		2.5-26.25	26.25-50		
8	0	-3	12		2.5-21.5	21.5-50		
8	0	-3	20		2.5-21.5	21.5-50		
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		2.5-50			
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	2.5-50				
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 D13: Guardrail Use Guidelines for Rural LC								
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
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	0.5-0.95	0.95-5			
5	10L	0	6	0.5-2.3	2.3-5			
5	10L	-6	3		0.5-5			
5	10L	-6	6	0.5-0.95	0.95-5			
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	0.5-1.85, 2.75-4.1	1.85-2.75, 4.1-5			
8	10L	0	6	0.5-1.85	1.85-5			
8	10L	0	12	0.5-0.95	0.95-5			
8	10L	-6	3	0.5-1.85	1.85-5			
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	0.5-1.4	1.4-5			
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-5				
12	10L	-6	12	0.5-0.95	0.95-5			
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	0.5-0.95	0.95-5			
24	0	0	6	0.5-0.95	0.95-5			
24	0	0	12	0.5-1.4	1.4-5			
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 D14: Guardrail Use Guidelines forRural LC								
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 D15: Guardrail Use Guidelines for Rural LC								
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		0.5-5			
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	0.5-0.95	0.95-5			
5	10L	0	6	0.5-1.85	1.85-5			
5	10L	-6	3		0.5-5			
5	10L	-6	6	0.5-0.95	0.95-5			
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	0.5-2.75, 3.65-5	2.75-3.65			
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 D16: Guardrail Use Guidelines for Rural LC								
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		0.5-5			
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	0.5-0.95	0.95-5			
5	10L	0	6	0.5-1.4	1.85-5			
5	10L	0	12	0.5-1.4	1.4-5			
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		0.5-5			
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	0.5-1.85, 3.2-5	1.85-3.2			
8	10L	0	6	0.5-2.3	2.3-5			
8	10L	0	12	0.5-1.4, 3.65-4.1	1.4-3.65, 4.1-5			
8	10L	-6	3	0.5-0.95, 4.55-5	0.95-4.55			
8	10L	-6	6	0.5-0.95	0.95-5			
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	0.5-1.85, 2.75-5	1.85-2.75			
12	10L	-6	3	0.5-2.3, 3.2-5	2.3-3.2			
12	10L	-6	6	0.5-1.4, 3.65-5	1.4-3.65			
12	10L	-6	12	0.5-0.95, 3.2, 5	0.95-3.2, 3.2-5			
18	0	0	3	0.5-0.95	0.95-5			
18	0	0	6	0.5-0.95	0.95-5			
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	0.5-2.3, 3.2-5	2.3-3.2			
24	0	0	12	0.5-2.3, 3.2-5	2.3-3.2			
24	0	-6	3	0.5-0.95, 2.75	0.95-2.75, 2.75-5			
24	0	-6	6	0.5-0.95	1.4-3.2	3.2-5		
24	0	-6	12	0.5-0.95	0.95-5			
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 D17: Guardrail Use Guidelines for Rural LC								
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		0.5-5			
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	0.5-1.85, 4.55-5	1.85-4.55			
5	10L	0	6		0.5-5			
5	10L	0	12	0.5-0.95	0.95-5			
5	10L	-6	3	0.5-1.4	1.4-5			
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		0.5-5			
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	0.5-1.85, 2.75-5	1.85-2.75			
8	10L	0	6	0.5-2.3, 3.2-3.65, 4.55-5	2.3-3.2, 3.65-4.55			
8	10L	0	12	0.5-2.3, 3.2-3.65, 5	2.3-3.2, 3.65-5			
8	10L	-6	3	0.5-1.85, 2.75-3.65, 4.55-5	1.85-2.75, 3.65-4.55			
8	10L	-6	6	0.5-1.4	1.4-5			
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	0.5-3.2, 4.1-5	3.2-4.1			
12	10L	-6	3	0.5-5				
12	10L	-6	6	0.5-1.85, 2.75-5	1.85-2.75			
12	10L	-6	12	0.5-1.85	1.85-5			
18	0	0	3	0.5-1.4	1.4-5			
18	0	0	6	0.5-0.95	0.95-5			
18	0	0	12	0.5-0.95	0.95-5			
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	0.5-1.85, 3.2-5	1.85-3.2			
24	0	-6	3	0.5-1.85, 2.75-5	1.85-2.75			
24	0	-6	6	0.5-1.4, 3.2-5	1.4-3.2			
24	0	-6	12	0.5-0.95	0.95-5			
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 D18: Guardrail Use Guidelines for Rural LC								
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	0.5-0.95	0.95-5			
5	0	0	12	0.5-0.95	0.95-5			
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	0.5-1.85	1.85-5			
8	0	0	6	0.5-0.95	0.95-5			
8	0	0	12	0.5-0.95	0.95-5			
8	0	-6	3	0.5-0.95	0.95-5			
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	0.5-1.4, 3.2-5	1.4-3.2			
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	0.5-2.3	2.3-5			
12	0	-6	3	0.5-5				
12	0	-6	6	1.4-1.85, 3.2-5	0.5-1.4, 1.85-2.75			
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 D19: Guardrail Use Guidelines for Urban Arterial								
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			2.5-50		
5	0	0	6			2.5-50		
5	0	-3	3			2.5-50		
5	0	-3	6			2.5-50		
5	6L	0	3			2.5-50		
5	6L	0	6			2.5-50		
5	6L	-3	3			2.5-50		
5	6L	-3	6			2.5-50		
8	0	0	3			2.5-50		
8	0	0	6			2.5-50		
8	0	0	12			2.5-50		
8	0	-3	3			2.5-50		
8	0	-3	6			2.5-50		
8	0	-3	12			2.5-50		
8	6L	0	3			2.5-50		
8	6L	0	6			2.5-50		
8	6L	0	12			2.5-50		
8	6L	-3	3			2.5-50		
8	6L	-3	6			2.5-50		
8	6L	-3	12			2.5-50		
12	0	0	3			2.5-50		
12	0	0	6			2.5-50		
12	0	0	12			2.5-50		
12	0	-3	3			2.5-50		
12	0	-3	6			2.5-50		
12	0	-3	12			2.5-50		
12	6L	0	3			2.5-50		
12	6L	0	6			2.5-50		
12	6L	0	12			2.5-50		
12	6L	-3	3			2.5-50		
12	6L	-3	6			2.5-50		
12	6L	-3	12			2.5-50		
18	0	0	3			2.5-50		
18	0	0	6			2.5-50		
18	0	0	12			2.5-50		
18	0	-3	3			2.5-50		
18	0	-3	6		2.5-26.25, 45.25-50	26.25-45.25		
18	0	-3	12			2.5-50		
18	6L	0	3			2.5-50		
18	6L	0	6		2.5-31	31-50		
18	6L	0	12			2.5-50		
18	6L	-3	3			2.5-50		
18	6L	-3	6		2.5-50			
18	6L	-3	12		2.5-21.5	21.5-50		
24	0	0	3			2.5-50		
24	0	0	6		2.5-50			
24	0	0	12		2.5-21.5	21.5-50		
24	0	-3	3			2.5-50		
24	0	-3	6			2.5-50		
24	0	-3	12			2.5-50		
24	6L	0	3			2.5-50		
24	6L	0	6			2.5-50		
24	6L	0	12			2.5-50		
24	6L	-3	3			2.5-50		
24	6L	-3	6			2.5-50		
24	6L	-3	12			2.5-50		

Table D20: Guardrail Use Guidelines for Urban Arterial								
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			5-50, 65-80	50-65	
5	0	0	6			5-72.5	72.5-80	
5	0	-3	3			5-80		
5	0	-3	6			5-72.5	72.5-80	
5	6L	0	3			5-57.5	57.5-80	
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			5-57.5, 72.5-80	57.5-72.5	
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		5-12.5	12.5-80		
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		5-20	20-80		
18	0	-3	3		5-80			
18	0	-3	6		5-80			
18	0	-3	12		5-20	20-80		
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 D21: Guardrail Use Guidelines for Urban Arterial								
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		5-80			
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 D22: Guardrail Use Guidelines for Urban Arterial								
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			5-12.5	12.5-65	65-80
5	0	0	6			5-80		
5	0	0	12			5-80		
5	0	-3	3				12.5-57.5	57.5-80
5	0	-3	6			5-80		
5	0	-3	12			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			5-65	65-80	
8	0	0	6			5-80		
8	0	0	12		5-12.5	12.5-80		
8	0	-3	3			5-65	65-80	
8	0	-3	6			5-42.5, 72.5-80	42.5-72.5	
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		5-50	50-80		
12	0	0	6			5-80		
12	0	0	12		5-20	20-80		
12	0	-3	3		5-42.5	42.5-80		
12	0	-3	6		5-80			
12	0	-3	12		5-12.5	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		5-50	5-80		
18	0	0	12		5-80			
18	0	-3	3		5-80			
18	0	-3	6		5-50	50-80		
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 D23: Guardrail Use Guidelines for Urban Arterial								
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			5-80		
5	0	0	6			5-80		
5	0	0	12			5-80		
5	0	-3	3			5-80		
5	0	-3	6			5-80		
5	0	-3	12			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		5-12.5			12.5-80
8	0	0	6		5-27.5	27.5-80		
8	0	0	12		5-20	20-80		
8	0	-3	3		5-12.5			12.5-80
8	0	-3	6		5-20	20-80		
8	0	-3	12		5-20	20-80		
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		5-65	65-72.5		72.5-80
12	0	0	6		5-12.5		12.5-35, 57.5	35-57.5, 57.5-80
12	0	0	12		5-35	35-80		
12	0	-3	3		5-42.5			42.5-80
12	0	-3	6		5-80			
12	0	-3	12		5-35	35-80		
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 D24: Guardrail Use Guidelines for Urban Arterial								
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		5-80			
5	0	0	6		5-65	65-80		
5	0	0	12		5-57.5	57.5-80		
5	0	-3	3		5-80			
5	0	-3	6		5-57.5	57.5-80		
5	0	-3	12		5-50	50-80		
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	5-12.5	12.5-5			
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	5-35, 50-80	35-50			
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	5-80				
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 D25: Guardrail Use Guidelines for Urban LC

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	0.5-2.3, 5	2.3-5			
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	0.5-2.3	2.3-5			
8	10L	0	6		0.5-5			
8	10L	0	12		0.5-5			
8	10L	-6	3	0.95-1.4, 5	0.5-0.95, 1.4-5			
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	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	0.5-0.95	0.95-5			
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 D26: Guardrail Use Guidelines for Urban LC								
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		0.5-1.85	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		0.5-1.85	1.85-5		
8	0	0	6		0.5-2.3	2.3-5		
8	0	0	12		0.5-3.2, 4.1-5	3.2-4.1		
8	0	-6	3		0.5-0.95	0.95-5		
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		0.5-1.85	1.85-5		
12	0	0	6		0.5-2.75	2.75-5		
12	0	0	12		0.5-5			
12	0	-6	3		0.5-0.95	0.95-5		
12	0	-6	6		0.5-1.4	1.4-5		
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	0.5-0.95	0.95-1.85	1.85-5		
18	0	0	6	0.5	0.5-2.75, 4.55-5	2.75-4.55		
18	0	0	12	0.5	0.5-5			
18	0	-6	3	0.5	0.5-0.95	0.95-5		
18	0	-6	6	0.5	0.5-1.4	1.4-5		
18	0	-6	12		0.5-2.75	2.75-5		
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	0.5-2.3	2.3-5			
24	0	-6	3	0.5-5				
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-0.95	0.95-2.3	2.3-5		
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 D27: Guardrail Use Guidelines for Urban LC								
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	0.5-0.95	0.95-5			
8	0	0	6	0.5-0.95	0.95-5			
8	0	0	12	0.5-0.95	0.95-5			
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	0.5-1.4	1.4-5			
12	0	0	6	0.5-1.4	1.4-5			
12	0	0	12	0.5-1.4	1.4-5			
12	0	-6	3	0.5-0.95	0.95-5			
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	0.5-1.85	1.85-5			
18	0	0	12	0.5-5				
18	0	-6	3	0.5-1.85	1.85-5			
18	0	-6	6	0.5-1.85	1.85-5			
18	0	-6	12	0.5-1.4	1.4-5			
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 D28: Guardrail Use Guidelines for Urban LC								
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		0.5-5			
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	0.5-1.4	1.4-5			
5	10L	0	6	0.5-0.95, 4.55-5	0.95-4.55			
5	10L	0	12	0.5-1.4	1.4-5			
5	10L	-6	3	0.5-0.95	0.95-5			
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		0.5-5			
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	05-2.3, 3.2-5	2.3-3.2			
8	10L	0	12	0.5-2.3, 3.2-5	2.3-3.2			
8	10L	-6	3	0.5-0.95, 1.85-2.3, 3.2-5	0.95-1.85, 2.3-3.2			
8	10L	-6	6	0.5-0.95	0.95-5			
8	10L	-6	12	0.5-0.95	0.95-5			
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	3.65-4.55	0.5-3.65, 4.55-5			
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	0.5-1.4, 2.3, 3.2-5	1.4-2.3, 2.3-3.2			
18	0	0	3	0.5-2.3, 4.1-5	2.3-4.1			
18	0	0	6	0.5-0.95	0.95-5			
18	0	0	12	0.5-0.95	0.95-5			
18	0	-6	3	0.5-0.95	0.95-5			
18	0	-6	6	0.5-0.95	0.95-5			
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	0.5-2.75	2.75-5			
24	0	-6	6	0.5-5				
24	0	-6	12	0.5-1.4, 3.2-3.65, 4.55-5	1.4-3.2, 3.65-4.55			
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 D29: Guardrail Use Guidelines for Urban LC								
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		0.5-5			
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	0.5-1.85, 2.75, 4.55-5	1.85-2.75, 2.75-4.55			
5	10L	0	6	0.5, 2.75, 4.55	0.5-2.75, 2.75-4.55, 4.55-5			
5	10L	0	12	0.5-0.95	0.95-5			
5	10L	-6	3	0.5-1.4	1.4-5			
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		0.5-5			
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	0.5-1.85, 2.75-5	1.85-2.75			
8	10L	0	6	0.5-2.3, 3.2-3.65, 4.55-5	2.3-3.2, 3.65-4.55			
8	10L	0	12	0.5-2.3, 3.2-3.65	2.3-3.2, 3.65-5			
8	10L	-6	3	0.5-1.85, 3.2-3.65, 4.55-5	1.85-3.2, 3.65-4.55			
8	10L	-6	6	0.5-1.4	1.4-5			
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	0.5-3.2, 4.1-5	3.2-4.1			
12	10L	-6	6	0.8-1.85, 2.75-5	1.85-2.75			
12	10L	-6	12	0.5-1.85	1.85-5			
18	0	0	3	0.5-1.4	1.4-5			
18	0	0	6	0.5-0.95	0.95-5			
18	0	0	12	0.5-0.95	0.95-5			
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	0.5-1.85, 3.2-5	1.85-3.2			
24	0	-6	3	0.5-1.85, 2.75-5	1.85-2.75			
24	0	-6	6	0.5-1.4, 3.2-5	1.4-3.2			
24	0	-6	12	0.5-0.95	0.95-5			
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 D30: Guardrail Use Guidelines for Urban LC								
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	2.3-5			
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	0.5-5				
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				