APPENDIX C

GUARDRAIL USE GUIDELINES FOR BENEFIT/COST = 4

Severe Slop		· odururu	li oco ouluo	Range		umes Where B		imal
Hazard			Offset to	Range	of france voi	unies where i		
Offset	Curvature	Grade %	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	11.77	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 C1: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

	Table C2	: Guardrail	Use Guidelin	es for Freewa	ay, Benefi	t-Cost Grea	ter Than 4	
	Severe Haz	ard		Range	of Traffic \	/olumes Whe	ere 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 26	2L 2L	-2	8 12			10-91		91-100
26	2L 2L	-2 -2	20			10-91		91-100
32	0	-2	20			10-82		82-100
32	0	0	12			10-100		01.40
32	0	0	20			10-91		91-10
32	0	-2	20			10-82 10-100		82-100
32	0	-2	12			10-100		
32	0	-2	20			10-100		73-100
32	2L	-2	8			10-73		73-100
32	2L 2L	0	12			10-100		
32	2L 2L	0	20			10-100		82-100
32	2L 2L	-2	8	+		10-82		02-100
32	2L	-2	12			10-100		
32	2L 2L	-2	20			10-100		

Noderate	Slope Hazar				vay, Benefit-	Range of Traffic Volumes Where Barrier is Optima					
Hazard			Offset to	No							
Offset	Curvature	Grade %	Slope	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			<u> </u>			
12	2L	0	12		10-100						
12	2L	-2	8		10-100			<u> </u>			
12	2L	-2	12		10-100						
18	0	0	8		10-100						
18	0	0	12		10-100						
18	0	0	20		10-100			<u> </u>			
18	0	-2	8		10-100			<u> </u>			
18	0	-2	12		10-100			<u> </u>			
18	0	-2	20		10-100			<u> </u>			
18	2L	0	8		10-100			<u> </u>			
18	2L	0	12		10-100			<u> </u>			
18	2L	0	20		10-100			<u> </u>			
18	2L	-2	8		10-100			<u> </u>			
18	2L	-2	12		10-100			<u> </u>			
18	2L	-2	20		10-100			<u> </u>			
26	0	0	8		10-100			<u> </u>			
26	0	0	12		10-100			<u> </u>			
26	0	0	20		10-100			<u> </u>			
26	0	-2	8		10-100			<u> </u>			
26	0	-2	12		10-100			<u> </u>			
26	0	-2	20		10-100			<u> </u>			
26	2L	0	8		10-100			<u> </u>			
26	2L	0	12		10-100			<u> </u>			
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	Ŏ	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			<u> </u>			
32	2L	-2	20		10-100						

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18 0 0 12 10-19 19-37, 82-100 18 0 0 20 10-19 19-37, 82-100 18 0 -2 8 10-46, 73-82 82-100 18 0 -2 12 28-46 10-28, 91-100 18 0 -2 20 10-28 28-100 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 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 10 10-38 28-100 18 2L -2 10 10-37 37-100 18 2L -2 20 10-28 28-100 </th <th>91-100</th>	91-100
18 0 0 20 10-100 18 0 -2 8 10-46, 73-82 82-100 18 0 -2 12 28-46 10-28, 91-100 18 0 -2 20 10-100 10-100 18 2L 0 8 10-28 28-100 10-100 18 2L 0 12 10-28 28-100 10-100 18 2L 0 20 10-28 28-100 10-100 18 2L -2 8 10-37 37-100 10-100 18 2L -2 12 10-37 37-100 10-100 18 2L -2 12 10-37 37-100 10-100 10-100 10-100	31-100
18 0 -2 8 10-46, 73-82 82-100 18 0 -2 12 28-46 10-28, 91-100 18 0 -2 20 10-100 10-100 18 2L 0 8 10-28 28-100 10-100 18 2L 0 12 10-28 28-100 10-100 18 2L 0 12 10-28 28-100 10-100 18 2L -2 8 10-37 37-100 10-100 18 2L -2 12 10-37 37-100 10-100 18 2L -2 20 10-28 28-100 10-100 18 2L -2 10 10-37 37-100 10-100 10-100 10-100	
18 0 -2 12 28.46 10-28, 91-100 18 0 -2 20 10-100 10-100 18 2L 0 8 10-28 28-100 10-100 18 2L 0 12 10-28 28-100 10-100 18 2L 0 20 10-28 28-100 10-100 18 2L -2 8 10-37 37-100 10-100 18 2L -2 12 10-37 37-100 10-100 18 2L -2 12 10-28 28-100 10-100 18 2L -2 10 10-28 28-100 10-100 18 2L -2 10 10-28 28-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-100 10-10	46-73
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 12 10-37 37-100 18 2L -2 20 10-28 28-100	46-91
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	
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 12 10-37 37-100 18 2L -2 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	
18 2L -2 12 10-37 37-100 18 2L -2 20 10-28 28-100 10-28	
18 2L -2 20 10-28 28-100	
26 0 8 10-19 19-100 26 0 0 12 10-28 28-100	
26 0 0 12 10-28 28-100 26 0 0 20 10-19 19-100	
26 0 -2 8 10-19 19-100	
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 10-28	
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 C4: Guardrail Use Guidelines for Freeway, Benefit-Cost Greater Than 4

	ely Severe P			ŀ	Range of Traffic Volume	es 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		82-10
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	Ő	-2	20			10-100		
12	2L	0	8		10-19	19-100		
12	2L	0	12		10-10	19-100		
12	2L	0	20		10-19	19-100		
12	2L	-2	8		10-19	19-100		
12	2L	-2	12		10-10	10-100		
12	2L	-2	20			10-100		
18	0	0	8			10-100	28-46, 73-100	46-73
18	0	0	12			10-100	20-40, 73-100	40-70
18	0	0	20		10-19	19-100		
18	0	-2	8		10-13	10-28, 46-82	82-100	28-46
18	0	-2	12		10-19	19-100	02-100	20-40
18	0	-2	20		10-19	19-100		
18	2L	0	8	10-28, 46-55	10-13	28-46, 55-100		
18	2L 2L	0	12	10-20, 40-33	28-37	10-28, 37-100		
18	2L	0	20		10-37	37-100		
18	2L 2L	-2	8	10-28, 46-55	28-46, 55-64	64-100		
18	2L 2L	-2	12	10-26, 46-33	10-28	28-100		
18	2L 2L	-2	20		10-20	37-100		
26	0	-2	8	10-19	19-28			
26	0	0	12	10-19		28-100		40.04
					10-28	28-46, 64-100		46-64
26 26	0	0 -2	20 8		10-28	28-100		
26	0	-2 -2	12		10-19	19-100		
26	0	-2	20		10-19 10-19	19-100		
26		-2	20	10.400	10-19	19-100		
26	2L 2L	0	12	10-100		70.04		
26	2L 2L	0	20	10-73, 91-100 10-28	20.04	73-91 73-100		
26	2L 2L	-2	20		28-64	73-100		
26	2L 2L	-2	12	10-100				
		-2 -2		10-100	40.00.07.04.04.400	64.04		
26 32	2L 0	-2	20 8	28-37	10-28, 37-64, 91-100	64-91		
32		0	12	10-28, 46-100	00.07.55.04	28-46		
	0	0		10-28, 64-73, 91-100	28-37, 55-64	37-55, 73-91		
32	0	0	20	40.400	10-37	37-100		
32	0	-2	8	10-100	10.00	00.100		
32	0	-2	12	28-82	10-28	82-100		04.45
32	0	-2	20	10.100	10-28	28-82	82-91	91-10
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 32	2L	-2	12	10-100				
	2L	-2	20	10-100				

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

Moderatio			aararan 03e	Guidelines for Freew						
	Point Haza		0//	Range of Traffic Volumes Where Barrier is Optimal						
Hazard Offset	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5		
Offset	0	% 0	Slope 8		10.10	10,100				
7	0	0	12		10-19	19-100 10-100				
7	0	0	20			10-100				
7	Ö	-2	8			10-100				
7	Ö	-2	12			10-100				
7	0 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	40.04.00.400	10-19	19-100				
12 12	2L 2L	0	8 12	10-64, 82-100	64-82	00.400				
12	2L 2L	0	20	10-82 10-28, 46-91	28-46, 91-100	82-100				
12	2L 2L	-2	8	10-28, 46-91	28-46, 91-100					
12	2L 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 10, 07 04, 02 100	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 26	0	0	8 12	10-100						
26	0	0	20	10-100 10-100						
26	0	-2	8	10-100						
26	0	-2	12	10-100						
26	Ö	-2	20	10-100	10-46	46-100				
26	2Ľ	0	8	10-100	10 10	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 2L	-2	20 8	10-100						
32 32	2L 2L	0	8 12	10-100						
32	2L 2L	0	20	10-100						
32	2L 2L	-2	20	10-100 10-100						
32	2L 2L	-2	° 12	10-100						
32	2L 2L	-2	20	10-100						
L				10-100	L		L	1		

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

Severe Slo				1		Volumes Where		ptimal
Hazard			Offset to	No				
Offset	Curvature	Grade %	Slope	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		0.5.50	2.5-50		
32 32	0	0	8 12	<u> </u>	2.5-50			
	0	0	20		2.5-50			
32	0	-3	8		2.5-50			
32	0	-3	8		2.5-50			
32 32	0	-3	20		2.5-50	04.50		
32	0 4L	-3	8		2.5-31	31-50		
			12		2.5-50			
32 32	4L	0	20		2.5-50	40.50		
	4L		8		2.5-12	12-50		
32	4L	-3 -3			2.5-50			
32 32	4L 4L	-3	12 20		2.5-50	10.50		
32	4L	-3	20		2.5-12	12-50		

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

					iteriai, Delle	III-Cost Greater I	nan 4	
	I Moderately	Severe Slo	pe Functional					
Class				Ra	nge of Traffic	Volumes Where Ba	arrier is Opti	mal
Hazard		A A B	Offset to	No	-			
Offset	Curvature	Grade %	Slope	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 C8: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

	rial Moderate	Slope Func	tional Class	Ra	nge of Traffic Volum	nes Where B	arrier is Opti	mal
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		1	
18	0	0	12		2.5-5		1	
18	0	0	20		2.5-5		1	
18	Ö	-3	8		2.5-5		1	
18	0	-3	12		2.5-5		-	
18	0	-3	20		2.5-5			
18	4L	0	8		2.5-5		<u> </u>	
18	4L	Ő	12		2.5-5		<u> </u>	
18	4L	ŏ	20		2.5-5		<u> </u>	<u> </u>
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	ŏ	ŏ	12		2.5-5			
26	ő	0	20		2.5-5			
26	ő	-3	8		2.5-5		<u> </u>	
26	0	-3	12		2.5-5			
26	ŏ	-3	20		2.5-5			
26	4L	0	8	2.5-16.75	16.75-50			
26	4L	0	12	7.25-10.75	2.5-7.25, 12-50		<u> </u>	
26	4L	0	20	1.20-12	2.5-7.25, 12-50		<u> </u>	
26	4L	-3	8	2.5-16.75	16.75-50			
26	4L	-3	12	2.0-10.70	2.5-50			
26	4L 4L	-3	20		2.5-50		<u> </u>	
32	4L 0		8	2.5-26.25	26.25-50		<u> </u>	
32	0	0	12	2.5-20.25	20.23-30		<u> </u>	
32	0	0	20		16 75 50			
32	0	-3	20	2.5-16.75	16.75-50			
32	0	-3	° 12	2.5-21.5 2.5-50	21.5-50			
32	0	-3	20	2.5-50	12.50			
32	4L	-3	20		12-50		<u> </u>	
32	4L 4L	0	0 12	2.5-50			<u> </u>	
32	4L 4L	0		2.5-50	01.50		L	
32	4L 4L	-3	20 8	2.5-31	31-50		<u> </u>	
32			8 12	2.5-50			L	
32	4L 4L	-3 -3	12 20	2.5-50	00.05.50		<u> </u>	
32	4L	-3	20	2.5-26.25	26.25-50			

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

		o. ouuru	an ose out	Idelines for Rural Arterial, Benefit-Cost Greater Than 4 Range of Traffic Volumes Where Barrier is Optimal						
Severe Po Hazard	oint Hazard	Grade	Offset to	Range	of Traffic Volume	es Where Barr	rier is Optim	al		
Offset	Curvature	%	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 4L	0	12		2.5-50					
- 5	4L	0	12							
5	4L	0	20		2.5-50					
					2.5-50					
5	4L	-3	8							
5	4L	-3	12		2.5-50					
5	4L	-3	20		2.5-50					
8	0	0	8		2.5-50					
					2.5-50					
8	0	0	12							
8	0	0	20		2.5-50					
8	0	-3	8		2.5-50					
8	0	-3 -3	12 20		2.5-50					
8	4L	-3	20		2.5-50					
8	4L 4L	0	12		2.5-50		<u> </u>			
8	4L 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 12	0	-3 0	20 8	2.5-12	2.5-50 12-50		<u> </u>			
12	4L 4L	0	12	2.5-12	2.5-50		\vdash			
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 20		2.5-50					
18 18	0	-3	20	2.5-50	2.5-50					
18	0	-3	12	2.5-50	2.5-50					
18	0	-3	20		2.5-50					
18	4L	0	8	2.5-50	E.0-00	1				
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 24	0	0	8 12	2.5-50						
24	0	0	14	2.5-50						
24	0	0	20	2.5-12	12-50					
24	0	-3	20	2.5-50						
24	0	-3	12	2.5-50						
24	0	-3	20	2.0-00	2.5-50					
24	4L	0	8	2.5-50	2.0.00					
24	4L	0	12	2.5-50						
24	4L	0	20	2.5-50						
24	4L	-3	8	2.5-50						
24 24	4L 4L	-3	12	2.5-50						
24	4L	~>	20	2.5-50						

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

	Table C11: C	Guardrail	Use Guidelin	nes for Rural Arterial, Benefit-Cost Greater Than 4						
Moderate	ly Severe P	oint Haza	rd	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	Ő	20		2.5-50					
					2.5-50					
5	4L 4L	-3 -3	8 12		2.5-50					
5	4L 4L	-3	20							
8		-3			2.5-50					
8	0	0	8 12		2.5-50					
					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	ŏ	Ő	12		2.5-35.75		35.75-50			
12	0	0	20		2.5-50		00.70-00			
12	0	-3	8		2.5-50					
12	0	-3	12		2.5-30		31-50			
12	0	-3	20		2.5-50		51-50			
12	4L	0	8	2.5-50	2.3-30					
12	4L	0	12	2.5-50						
12	4L	0	20	2.3-30	2.5-50					
12	4L	-3	8	2.5-50	2.5-50					
12	4L	-3	12	2.5-50						
12	4L 4L	-3	20	2.0-00	2.5-50					
12	4L 0	-3	20	2.5-50	2.5-50					
18		0	12		24.50					
	0			2.5-31	31-50					
18	0	0	20	0.5.50	2.5-50					
18	0		8	2.5-50	00.05.55					
18	0	-3	12	2.5-26.25	26.25-50					
18	0	-3	20	0.5.50	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						
24	46		20	2.0-00						

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

			se Guideline	ines for Rural Arterial, Benefit-Cost Greater Than 4 Range of Traffic Volumes Where Barrier is Optimal						
	Point Haza									
Hazard	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5		
Offset 5	0	% 0	Slope 8		0.5.50					
5	0	0	12		2.5-50					
5	0	0	20		2.5-50					
5	0	-3	20							
5	0	-3	12		2.5-50 2.5-50					
5	0	-3	20		2.5-50					
5	4L	0	8	2.5-50	2.5-50					
5	4L	ŏ	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	2.3-30	2.5-50					
8	0	Ő	12		2.5-50					
8	Ö	ŏ	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	2.0-00					
8	4L	0	12	2.5-50						
8	4L	ŏ	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	ŏ	ŏ	20	2.0-00	2.5-50					
12	0	-3	8	2.5-50	2.0-00					
12	0	-3	12	2.5-50						
12	Ö	-3	20	2.0.00	2.5-50					
12	4L	0	8	2.5-50	2.0 00					
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	Ő	Ő	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 C12: Guardrail Use Guidelines for Rural Arterial, Benefit-Cost Greater Than 4

[Range of Traffic Volumes Where Barrier is Optimal					
	Rural LC S	Severe Slop			Range	e of Traffic Vol	umes Where	e Barrier is C	Optimal	
Counter	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	Ő	0	6		0.5-5			<u> </u>	
4	5	ŏ	-6	3		0.5-5			<u> </u>	
5	5	0 0	-6	6		0.5-5			<u> </u>	
7	5	10L	-0	3					<u> </u>	
	5	10L	0	6		0.5-5			<u> </u>	
8						0.5-5			<u> </u>	
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			i — — I	
19	8	10L	0	3		0.5-5			<u>├────</u>	
20	8	10L	0	6		0.5-5			<u> </u>	
21	8	10L	0	12		0.5-5			+	
22	8	10L	-6	3		0.5-5			<u> </u>	
	8	10L	-0	6					<u> </u>	
23						0.5-5			$ \longrightarrow $	
24	8	10L	-6	12		0.5-5			<u> </u>	
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			<u> </u>	
32	12	10L	0	6		0.5-5			<u> </u>	
33	12	10L	0	12		0.5-5			<u> </u>	
34	12	10L	-6	3		0.5-5			<u> </u>	
35	12	10L	-6	6					<u> </u>	
36	12	10L	-6	12		0.5-5			<u> </u>	
						0.5-5			<u> </u>	
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			i — — I	
47	18	10L	-6	6		0.5-5			<u>+ −−− </u>	
48	18	10L	-6	12		0.5-5			<u> </u>	
49	24	0	0	3		0.5-5			+	
49 50	24	0	0	6		0.5-5			<u> </u>	
50	24	0	0	12					────	
						0.5-5			<u> </u>	
52	24	0	-6	3		0.5-5			<u> </u>	
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			i — I	
60	24	10L	-6	12		0.5-5				
50			Ť			0.0-0				

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

Rural LC Mode Class			unctional		f Traffic Volu			Optimal
Hazard Offset	Curryatura	Grade %	Offset to	No	TL-2	TL-3	TL-4	TL-5
			Slope	Treatment	11-2	16-2	16-4	12-5
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	Ŏ	3		0.5-5			
8	10L	0	6		0.5-5			
8	10L	0 O	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	ŏ	6		0.5-5			
12	0	0	12		0.5-5		<u> </u>	
12	0	-6	3		0.5-5			
12	0	-6	6					
12	0	-6	12		0.5-5			
12	10L	-0	3		0.5-5		<u> </u>	
12	10L		6		0.5-5			
12	10L	0	12		0.5-5			
12	10L 10L	-6			0.5-5			
		-b -6	3		0.5-5			
12	10L				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			
	10L	-6	12		0.5-5			

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

Rural LC N	Ioderate Slo	pe Funct	ional Class	Range of	Traffic Volu	mes Where	e 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	0.00 0			
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	0.2 111			
8	0	-6	3	0.5-1.4	1.4-5			
8	0	-6	6	0.5-1.4	1.4-5			
8	Ŏ	-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	Ŏ	-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

Severe P	oint Hazard	010 010.0	vaararan 030	e Guidelines for Rural LC, Benefit-Cost Greater Than 4 Range of Traffic Volumes Where Barrier is Optimal							
Hazard		Grade	Offset to	Range	or marrie volumes wi	lere barrier	s optimal				
Offset	Curvature	Grade %	Slope	No Treatment	TL-2	TL-3	TL-4	TL-5			
5	0		3 3	0.5.1.95	1.95.5						
5	0	0	6	0.5-1.85 0.5-1.4	1.85-5 1.4-5						
5	0	0	12	0.5-1.4	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	ŏ	-6	12	0.5-0.95	0.95-5						
5	10L	0	3	0.5-5	0.85=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 18	0	-6 -6	3	0.5-5							
18	0	-6 -6	12	0.5-5							
18	10L	-6	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							
		<u> </u>		0.0-0	l	1	L				

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

	ly Severe P			Range of Traffic Volumes Where Barrier is Optimal						
Hazard	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5		
Offset		%	Slope					120		
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			L		
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 12	0.5-5						
8	10L	-6	3	0.5-5				L		
8	10L 10L	-6	6	0.5-5						
8	10L	- 0 -6	12	0.5-5						
	0	-6		0.5-5				<u> </u>		
12 12	0	0	3	0.5-5				l		
	0			0.5-5				l		
12 12	0	0 -6	12 3	0.5-5	0.0.005					
12	0	-6	6	0.5-2.3, 3.65-5	2.3-3.65					
12	0	-0	12	0.5-2.3, 3.2-5	2.3-3.2					
12	10L	-0	3	0.5-1.85, 3.2-5	1.85-3.2					
12	10L	0	6	0.5-5						
12	10L	0	12	0.5-5						
12	10L	-6	3	0.5-5				<u> </u>		
12	10L	-6	6	0.5-5				<u> </u>		
12	10L	-6	12	0.5-5						
18	0	0	3	0.5-5						
18	0	0	6	0.5-5						
18	ő	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	ŏ	0	6	0.5-5				<u> </u>		
24	ő	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				<u> </u>		
24	10L	0	6	0.5-5						
24	10L	0	12	0.5-5						
24	10L	-6	3	0.5-5						
	10L	-6	6	0.5-5						
24	1 101									

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

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			rurali Use Gi	Suidelines for Rural LC, Benefit-Cost Greater Than 4							
	Point Haza			Range of Traffic Volumes Where Barrier is Optimal							
Hazard	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5			
Offset		%	Slope								
5	0	0	3	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 12	0.5-5							
5 5	10L 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 -6	3	0.5-5							
8	0	-6 -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 0	-6 0	12 3	0.5-1.4, 3.2-5	1.4-3.2						
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 12	10L	0	3	0.5-5							
12	10L 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 18	0	0 -6	12 3	0.5-5							
18	0	-b -6	6	0.5-5 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 18	10L 10L	-6 -6	3	0.5-5							
18	10L 10L	-6 -6	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 24	10L 10L	0	3	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

Urban Arterial Severe Slope Functional Class Range of Traffic Volumes Where Barrier is O Hazard Offset Curvature % Grade % Offset to Slope No Treatment TL-2 TL-3 TL-4 5 0 0 6 5-80 5 5 5 7	Table C19: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4										
Offset Curvature % Stope Treatment TL-2 TL-3 TL-4 5 0 0 3 5-80 5 5 0 -3 3 5-80 5 5 0 -3 3 5-80 5 5 6L 0 3 5-80 5 5 6L 0 6 5-80 5 5 6L -3 6 5-80 5 6 -3 6 5-80	timal	Barrier is O	imes Where	of Traffic Volu			_	ial Severe Slo			
5 0 0 6 5-80 5 0 -3 3 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 6 -5-80 5-80 5-80 8 0 0 6 5-80 8 0 0 6 5-80 8 0 0 6 5-80 8 0 -3 6 5-80 8 0 -3 6 5-80 8 0 -3 6 5-80 8 6L 0 6 5-80 8 6L 0 6 5-80 8 6L -3 6 5-80 8 6L -3 6 5-80 8 6L -3 6 5-80 12 0 0 6 5-80	TL-5	TL-4	TL-3	TL-2				Curvature			
5 0 -3 3 5 6.80 5 6L 0 6 5-80 5 6L 0 6 5-80 5 6L -3 3 5-80 5 6L -3 3 5-80 8 0 0 3 5-80 8 0 0 3 5-80 8 0 -3 3 5-80 8 0 -3 3 5-80 8 0 -3 3 5-80 8 0 -3 12 5-80 8 0 -3 12 5-80 8 6L 0 3 5-80 8 6L 0 12 5-80 8 6L -3 3 5-80 8 6L -3 6 5-80 12 0 0 6 5-80			5-80			3	0				
5 0 -3 6 5 5-80 5 6L 0 3 5-80 5-80 5 6L -3 3 5-80 5-80 5 6L -3 6 5-80 5-80 8 0 0 3 5-80 5-80 8 0 0 6 5-80 5-80 8 0 -3 3 5-80 5-80 8 0 -3 6 5-80 5-80 8 0 -3 12 5-80 5-80 8 6L 0 3 5-80 5-80 8 6L 0 12 5-80 5-80 8 6L -3 12 5-80 5-80 12 0 0 3 5-80 5-80 12 0 0 12 5-80 5-80 12 0 -3 3			5-80								
5 6L 0 3 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 6 5.80 8 0 -3 3 5.80 8 0 -3 6 5.80 8 0 -3 6 5.80 8 0 -3 12 5.80 8 6L 0 3 5.80 8 6L 0 12 5.80 8 6L -3 6 5.80 8 6L -3 12 5.80 12 0 0 3 5.80 12 0 0 3 5.80 12 0 -3 12 5.80 12			5-80			3	-3	0	5		
5 $6L$ 0 6 $5 \cdot 80$ 5 $6L$ -3 3 $5 \cdot 80$ 8 0 0 3 $5 \cdot 80$ 8 0 0 6 $5 \cdot 80$ 8 0 0 6 $5 \cdot 80$ 8 0 -3 3 $5 \cdot 80$ 8 0 -3 3 $5 \cdot 80$ 8 0 -3 6 $5 \cdot 80$ 8 0 -3 12 $5 \cdot 80$ 8 $6L$ 0 3 $5 \cdot 80$ 8 $6L$ 0 3 $5 \cdot 80$ 8 $6L$ -3 3 $5 \cdot 80$ 12 0 0 6 $5 \cdot 80$ 12 0 0 6 $5 \cdot 80$ 12 0 3 $5 \cdot 80$ $5 \cdot 80$ 12 0 -3 6 $5 \cdot 80$			5-80			6	-3	0	5		
5 $6L$ 0 6 5.80 5 $6L$ -3 3 5.80 8 0 0 3 5.80 8 0 0 6 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 -3 3 5.80 8 6L -3 3 5.80 8 6L -3 12 5.80 8 6L -3 12 5.80 9 0 6 5.80 5.80 12 0 0 6 5.80 12<						3	0	6L	5		
5 6L -3 3 5.80 5 6L -3 6 5.80 8 0 0 3 5.80 8 0 0 12 5.80 8 0 -3 3 5.80 8 0 -3 6 5.80 8 0 -3 6 5.80 8 0 -3 12 5.80 8 6L 0 3 5.80 8 6L 0 3 5.80 8 6L -3 6 5.80 12 0 0 3 5.80 12 0 0 12 5.80 12 0 -3 6 5.80 12 0 -3 12 5.80 12 6L 0 6						6	0	6L	5		
5 6L -3 6 5.80 8 0 0 3 5.80 8 0 0 12 5.80 8 0 -3 3 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 -3 3 5.80 8 6L -3 12 5.80 8 6L -3 12 5.80 12 0 0 3 5.80 12 0 0 12 5.80 12 0 -3 3 5.80 12 0 -3 3 5.80 12 0 -3 3 5.80 12						3	-3	61			
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24 0 0 12 5-12.5 12.5-80				5-12.5							
24 0 -3 3 5-80											
24 0 -3 6 5-80											
24 0 -3 12 5-80			5-80								
24 6L 0 3 5-80											
24 6L 0 6 5-80				5-80							
24 6L 0 12 5-80			5-80			12		6L			
24 6L -3 3 5-80				5-80		3	-3	6L	24		
24 6L -3 6 5-80						6		6L			
24 6L -3 12 5-80			5-80								

Class	I Moderately		ope Functional	Range of Traffic Volumes Where Barrier is Optimal						
Hazard	Currenture	Grade	Offerst to Sland	No	тьр	TL 2	TL-4	TL-5		
Offset	Curvature	%	Offset to Slope	Treatment	TL-2	TL-3	1L-4	11-0		
5	0	0	3			5-80				
5	0	0	6			5-80				
5	0	-3	3			5-80				
5	ŏ	-3	ő			5-80				
5	6L	0	3			5-80	l			
5	6L	0	6					<u> </u>		
5	6L	-3	3			5-80				
		-3	6			5-80		<u> </u>		
5	6L					5-80				
8	0	0	3			5-80		L		
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		0-12.0	5-20		20-80		
8	6L	0	12			5-80		20-00		
8	6L	-3	3		5-12.5					
		-3	6		0-12.0	12.5-80		00.00		
8	6L	-3				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			<u> </u>		
12	6L	0	6		5-27.5			27.5-80		
12	6L	0	12		5-21.5	5-80	<u> </u>	27.0-00		
12	6L	-3	3		E 00	5-60				
		-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	Ő	ő		5-80			1		
18	6L	0	12		5-80					
18	6L	-3	3		5-80			<u> </u>		
18	6L	-3	6				<u> </u>			
		-3			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 -3	6		5-80					
	0	-3	12		5-80					
24		0	3		5-80					
24	61				0-00			1		
24	6L				E 90					
24 24	6L	0	6		5-80					
24 24 24	6L 6L	0	6 12		5-80					
24 24	6L	0	6							

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

	ial Moderate				Traffic Volu			
Hazard		Grade	Offset to	No				
Offset	Curvature	%	Slope	Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	ricutificiti	5.90			
5	0	0	6		5-80 5-80			
5	0	-3	3					
5	0	-3	6		5-80	L	<u> </u>	
	6L	-3			5-80			
5			3		5-80		<u> </u>	
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		<u> </u>	
12	6L	0	12		5-80		<u> </u>	
12	6L	-3	3		5-80			
12	6L	-3	6		5-80	<u> </u>	<u> </u>	
12	6L	-3	12		5-80			
18	0	0	3		5-80		<u> </u>	
18	0	0	6		5-80			
18	0	0	12		5-80		<u> </u>	
18	0	-3			5-80			
18	0	-3	3		5-80		<u> </u>	
18	0	-3	12		5-80			
18	6L	-3	3	5-80	0-00		<u> </u>	
18	6L	0	6	5-00	12.5-80		<u> </u>	
18	6L	0	12	0=12.0	5-80			
18	6L	-3	3	5-80	0-00			
18	6L	-3	6	5-80	12.5-80			
18	6L	-3	12	0-12.0				
24	0	-3	3	E 10 E	5-80			
24	0	0	6	5-12.5	12.5-80		<u> </u>	
24	0	0	12	5-12.5	12.5-80			
				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 C21: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Severe P	oint Hazard	<u>ar o'darar</u>		Range of Traffic Volumes Where Barrier is Optimal						
Hazard		Grade	Offset to	No						
Offset	Curvature	%	Slope	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 5	6L 6L	-3 -3	3		5-80 5-80					
5	6L	-3	12		5-80					
8	0	-3	3		5-50, 72.5-80	50-72.5				
8	0	0	6		5-50, 72.5-80	50-72.5				
8	0	0	12		5-80					
8	0	-3	3		5-42.5	42.5-80				
8	ŏ	-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 12	0	-3 -3	3		5-80					
12	0	-3	12		5-80					
12	6L	-3	3	5-12.5	5-80 12.5-80					
12	6L	0	6	5-12.5	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	E 00	5-80					
18 18	6L 6L	0	3	5-80						
18	6L	0	12	5-80 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 12	5-80						
24	6L	-3	12	5-80						

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

Moderate	ly Severe Po			Range of Traffic Volumes Where Barrier is Optimal						
Hazard	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5		
Offset		% 0	Slope							
5	0	0	3		5-57.5	57.5-80				
5	0	0	12		5-57.5 5-57.5	57.5-80 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	6Ľ	0	3		5-80	42.0-00				
5	6L	Ő	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 3		5-80					
8	6L 6L	-3	6		5-80 5-80					
8	6L	-3	12							
12	0	-3	3		5-80 5-80					
12	0	0	6		5-80					
12	0	0	12		5-80					
12	Ő	-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 18	0	0	12 3	E 40 E	5-80					
18	0	-3 -3	6	5-12.5	12.5-80					
18	0	-3	12		5-80 5-80					
18	6L	-3	3	5-80	0-00					
18	6L	0	6	5-80						
18	6L	Ő	12	5-80				<u> </u>		
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				L		
24 24	6L 6L	-3 -3	3	5-80				l		
24	6L 6L	-3	12	5-80						
<u> </u>		-3	14	5-80				L		

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

	Point Haza		o ourdennie:	Range of Traffic Volumes Where Barrier is Optimal						
Hazard		Grade	Offset to	No						
Offset	Curvature	%	Slope	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	5-20	27.5-80					
5	0	-3	3	5-27.5	12.5-80					
5	0	-3	6	5-12.5	20-80					
5	0	-3	12	5-20	20-80	<u> </u>				
5	6L	0	3	5-20	20-00					
5	6L	0	6	5-80						
5	6L	0	12	5-80						
5	6L	-3	3	5-80				<u> </u>		
5	6L	-3	6	5-80				<u> </u>		
5	6L	-3	12	5-80				<u> </u>		
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	Ő	-3	3	5-80						
8	Ő	-3	6	5-27.5	27.5-80					
8	ŏ	-3	12	5-35	35-80			1		
8	6Ľ	0	3	5-80						
8	6L	0	6	5-80				<u> </u>		
8	6L	Ő	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 C24: Guardrail Use Guidelines for Urban Arterial, Benefit-Cost Greater Than 4

Urban LC Sev	vere Slope Fu	nctional C	lass	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			<u> </u>	
24	0	-6	6		0.5-5				
24	0	-6	12		0.5-5			<u> </u>	
24	10L	0	3		0.5-5				
24	10L	0	6		0.5-5			<u> </u>	
24	10L	0	12		0.5-5			<u> </u>	
24	10L	-6	3		0.5-5			<u> </u>	
24	10L	-6	6		0.5-5			<u> </u>	
24	10L	-6	12		0.5-5			1	

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

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Jrban LC Moderately Severe Slope Functional Class				Range of Traffic Volumes Where Barrier is Optimal					
Hazard	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5	
Offset 5	0	% 0	Slope 3		0.5-5				
5	0	0	6	0.5-0.95	0.95-5			 	
5	0	-6	3	0.0-0.85	0.5-5		<u> </u>	 	
5	0	-6	6		0.5-5		<u> </u>	 	
5	10L	0	3	0.5-5	0.0-0			 	
5	10L	0	6	0.5-5			<u> </u>	<u> </u>	
5	10L	-6	3	0.5-5				 	
5	10L	-6	6	0.5-5			<u> </u>	 	
8	0	0	3	0.5-1.4	1.4-5			<u> </u>	
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			<u> </u>	
8	0	-6	6		0.5-5			 	
8	0	-6	12		0.5-5			<u> </u>	
8	10L	0	3	0.5-5				<u> </u>	
8	10L	Ő	6	0.5-5				<u> </u>	
8	10L	0	12	0.5-5				<u> </u>	
8	10L	-6	3	0.5-5				<u> </u>	
8	10L	-6	6	0.5-5				<u> </u>	
8	10L	-6	12	0.5-5				+	
12	0	0	3	0.5-3.2, 4.55-5	3.2-4.55		<u> </u>	+	
12	Ö	0	6	0.5-2.3	2.3-5		<u> </u>	 	
12	ŏ	0	12	0.5-1.85	1.85-5		<u> </u>	+	
12	0	-6	3	0.5-1.4	1.4-5		<u> </u>	+	
12	0	-6	6	0.5-0.95	0.95-5		<u> </u>	 	
12	0	-6	12	0.5-5	0.85-5		<u> </u>	+	
12	10L	0	3	0.5-5			<u> </u>	+	
12	10L	0	6	0.5-5				+	
12	10L	0	12	0.5-5			<u> </u>	+	
12	10L	-6	3	0.5-5			<u> </u>	+	
12	10L	-6	6	0.5-5			<u> </u>	+	
12	10L	-6	12	0.5-5			<u> </u>	+	
18	0	0	3	0.5-5				+	
18	0	0	6	0.5-5		l	<u> </u>	+	
18	0	0	12	0.5-5		<u> </u>	<u> </u>	 	
18	0	-6	3	0.5-5				+	
18	0	-6	6	0.5-5				+	
18	0	-6	12	0.5-5			<u> </u>	+	
18	10L	0	3	0.5-5			<u> </u>	+	
18	10L	0	6	0.5-5			<u> </u>	+	
18	10L	0	12	0.5-5			<u> </u>	+	
18	10L	-6	3	0.5-5			<u> </u>	+	
18	10L	-6	6	0.5-5			<u> </u>	+	
18	10L	-6	12	0.5-5			<u> </u>	+	
24	0	0	3	0.5-5				+	
24	0	0	6	0.5-5			<u> </u>	+	
24	0	0	12	0.5-5			<u> </u>	+	
24	0	-6	3	0.5-5			<u> </u>	+	
24	0	-6	6	0.5-5			<u> </u>	+	
24	0	-6	12	0.5-5				+	
24	10L	-0	3				<u> </u>	+	
24	10L	0	6	0.5-5			<u> </u>	+	
24	10L	0	12	0.5-5			<u> </u>	+	
24	10L	-6	3	0.5-5			<u> </u>	+	
24	10L	-6	6	0.5-5			<u> </u>	+	
24			12	0.5-5			<u> </u>	 	
24	10L	-6	12	0.5-5					

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

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Hazard	derate Slope F	unctiona	al Class	Range of Tr	raffic Volun	nes Where	Barrier is	Optimal
nazaru	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5
Offset		%	Slope	No freatment	112-2	112-5	16-4	11-5
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 12	10L	0	12	0.5-5				
12	10L 10L	0		0.5-5				
12	10L	-0 -6	3	0.5-5				
12	10L	-0 -6	12	0.5-5				
12	0	-6	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	-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	ŏ	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

Severe P	oint Hazard			Range of Traffic Volumes Where Barrier is Optimal					
Hazard		Grade	Offset to						
Offset	Curvature	%	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	1.05 - 55				
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 0	12	0.5-2.3	2.3-5			L	
8	10L		3	0.5-5					
8	10L	0	6	0.5-5					
8	10L	-6	12 3	0.5-5					
8	10L 10L	-6 -6	6	0.5-5 0.5-5					
8	10L	-0	12						
12	0	-0	3	0.5-5 0.5-5				<u> </u>	
12	0	0	6	0.5-5					
12	0	0	12	0.5-5				<u> </u>	
12	0	-6	3	0.5-5				<u> </u>	
12	ŏ	-6	6	0.5-5					
12	Ő	-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		-6		0.5-5					
24 24	0 10L	-6 0	12 3	0.5-5					
24	10L	0	6	0.5-5					
24	10L 10L	0	12	0.5-5					
24	10L	-6	3						
24	10L	-6	6	0.5-5					
24	10L	-0 -6	12	0.5-5					
<u>_</u>			14	0.5-5		1		L	

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

Moderate	ly Severe P			Range of Traffic Volumes Where Barrier Is Optimal				
Hazard		Grade	Offset to					
Offset	Curvature	%	Slope	No Treatment	TL-2	TL-3	TL-4	TL-5
5	0	0	3	0.5-1.85	1.85-5			
5	Ő	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 18	0	-6	12 3	0.5-5				
18	0	-6	6	0.5-5				
18	0	-6	12	0.5-5				
18	10L	-6	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 10L	-0 -6	6	0.5-5				
18	10L	-0 -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				
24		-0	14	0.5-5			1	

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

			ian ose Guid	delines for Urban LC, Benefit-Cost Greater Than 4						
	Point Haza			Range of Traffic Volumes Where Barrier is Optimal						
Hazard	Curvature	Grade	Offset to	No Treatment	TL-2	TL-3	TL-4	TL-5		
Offset		%	Slope							
5	0	0	3	0.5-5						
5	0	0	6	0.5-5						
5	0	0 -6	12 3	0.5-5						
5	0	-6	6	0.5-5				 		
5	0	-6	12	0.5-5						
5	10L	-6	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	2.5"5.2					
8	0	0	3	0.5-5						
8	0	0	6	0.5-5						
8	Ö	0	12	0.5-1.85, 2.75-5	1.85-2.75					
8	0	-6	3	0.5-5	1.00-2.10					
8	0	-6	6	0.5-5				1		
8	Ö	-6	12	0.5-5				1		
8	10L	0	3	0.5-5				1		
8	10L	0	6	0.5-5				1		
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 12	0.5-5						
18	0	-6 0		0.5-5						
18	10L 10L	0	3	0.5-5						
18	10L 10L	0	12	0.5-5						
18	10L	-6	3							
18	10L	-6	6	0.5-5						
18	10L	-6	12	0.5-5						
24	0	-6	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						
				0.0-0		I	L			

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