

GUARDRAIL CALCULATIONS-CUY-271-0.00; PID 80418

Road Name: I-271 NB
 PID #: 80418
 DLZ Project #: 1122.1001
 Prepared By: SWC
 Date: 2/26/2014
 Checked By: XXX
 Date: x/x/xxxx



Design Speed	70	NOTES:
Alignment	NB I-271	
sign foundation 140+00 (rt)		
Variables Per Figure 602-1E		
Lr	360	Per Figure 602-1E
a	7	
b	0	0
Lc	30	
Lh	21.75	
L2	14	
L1	0	
Beginning of Run		
Calculations Per Figure 602-1E		
Larger of Lh and Lc		
X	Lh<Lc	Total
	Lh>Lc	Total
X (MAX)	128.3	128.28
Length of Need	137.5	192
Begin of Guardrail	140+12.50	
End of Guardrail	139+00.00	(37.5' of AA Type E used for LON)
y	14	

Design Speed	70	NOTES:
Alignment	NB I-271	
sign foundation 140+00 (lt)		
Variables Per Figure 602-1E		
Lr	360	Per Figure 602-1E
a	7	
b	0	0
Lc	30	
Lh	21.75	
L2	14	
L1	0	
Beginning of Run		
Calculations Per Figure 602-1E		
Larger of Lh and Lc		
X	Lh<Lc	Total
	Lh>Lc	Total
X (MAX)	128.3	128.28
Length of Need	137.5	192
Begin of Guardrail	140+12.50	
End of Guardrail	139+00.00	(37.5' of AA Type E used for LON)
y	14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 185+00 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	185+12.50		
End of Guardrail	184+00.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 185+00 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	185+12.50		
End of Guardrail	184+00.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1010+80 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail	1010+92.50		
End of Guardrail	1009+80.00	(37.5' of AA Type E used for LON)	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1010+80 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail	1010+92.50		
End of Guardrail	1009+80.00	(37.5' of AA Type E used for LON)	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271	will tie into existing GR to the south	
ditch right 1023+76 to 1142+50		ties into ditch protection along	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1023+76.00	
End of Guardrail		1021+76.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271	Included in pier protection	
Median Protection from 1150+08 to 1253+50			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1150+08.00	
End of Guardrail		1148+08.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1137+32 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Included in Ditch Protection
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail	1137+44.50		
End of Guardrail	1135+94.50		
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1137+32 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail	1137+44.50		
End of Guardrail	1136+32.00	(37.5' of AA Type E used for LON)	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271	Extent to impact attenuator to the south	
Bridge Pier EB I-480 Flyover 1148+14 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	34		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	211.76
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1148+14.00	
End of Guardrail		1146+14.00	
y			

Design Speed	70	NOTES:	
Alignment	NB I-271	Extent to impact attenuator to the south	
Bridge Pier EB I-480 Flyover 1149+14 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	20.7		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	116.52
	Lh>Lc	Total	192
X (MAX)		116.5	
Length of Need		125	
End of BTA Type 1		1148+66.00	
Begin of Guardrail		1148+66.00	
End Length of Need		1147+97.48	
End of Guardrail		1148+28.50	(37.5' of AA Type E used for LON)
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
ditch right 1152+58 to 1169+10		Ties into Bridge Protection to the South	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1152+58.00	
End of Guardrail		1150+58.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Protection Alexander Rd 1176+33 (rt)		Ties into guardrail for ditch protection on right	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	33		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	207.27
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1176+33.00	
End of Guardrail		1174+70.50	(37.5' of AA Type E used for LON)
y		15	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Protection Alexander Rd 1176+54 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Included in median protection
a	7		
b	0	0	
Lc	30		
Lh	17		
L2	13		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	84.71
	Lh>Lc	Total	204
X (MAX)		84.7	
Length of Need		87.5	
y		13	

Design Speed	70	NOTES:	
Alignment	NB I-271		
ditch right 1176+50 to 1222+96			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Ditch Protection to South
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail	1176+50.00		
End of Guardrail	1174+50.00		
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1223+00 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Included in Ditch Protection
a	7		
b	0	0	
Lc	30		
Lh	29.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	190.59
	Lh>Lc	Total	192
X (MAX)		190.6	
Length of Need		200	
Begin of Guardrail	1223+12.50		
End of Guardrail	1221+00.00		
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Protection Broadway Rd 1225+78 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Included in median protection
a	7		
b	0	0	
Lc	30		
Lh	16.5		
L2	13		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	76.36
	Lh>Lc	Total	204
X (MAX)		76.4	
Length of Need		87.5	
y		13	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Protection Forbes Rd 1231+76 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Included in median protection
a	7		
b	0	0	
Lc	30		
Lh	16.5		
L2	12.75		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	81.82
	Lh>Lc	Total	207
X (MAX)		81.8	
Length of Need		87.5	
y		13	

Design Speed	70	NOTES:	
Alignment	NB I-271		
ditch right 1231+96 to 1251+01			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail	1231+96.00		
End of Guardrail	1230+33.50	(37.5' of AA Type E used for LON)	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
ditch right 1445+11 to 1469+15			
Variables Per Figure 602-1E		Ties into Tinkers Creek Bridge Protection	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1445+11.00	
End of Guardrail		1443+11.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Tinkers Creek 1469+85 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	7.75		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	267
	Lh>Lc	Total	267
X (MAX)		267.0	
Length of Need		275	
End of BTA Type 1		1469+61.00	
Begin of Guardrail		1469+61.00	
End Length of Need		1467+18.00	
End of Guardrail		1467+48.50	(37.5' of AA Type E used for LON)
y		8	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Tinkers Creek 1469+94 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Ditch Protection
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	4		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	312
	Lh>Lc	Total	312
X (MAX)	312.0		
Length of Need	312.5		
End of BTA Type 1	1469+70.00		
Begin of Guardrail	1469+70.00		
End Length of Need	1466+82.00		
End of Guardrail	1466+70.00		
y	4		

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1482+50 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	GR will connect with parapet of tinkers creek bridge
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1482+62.50		
End of Guardrail	1481+12.50		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
sign foundation 1482+50 (lt)		GR will connect with parapet of tinkers creek bridge	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail		1482+62.50	
End of Guardrail		1481+12.50	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Noise wall 1484+06 (rt) to 1494+00 (rt)		GR will connect with parapet of tinkers creek bridge	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	20		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	108
	Lh>Lc	Total	192
X (MAX)		108.0	
Length of Need		112.5	
Begin of Guardrail		1484+06.00	
End of Guardrail		1482+93.50	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1487+92 (rt)			
Variables Per Figure 602-1E			Included in Noise Barrier protection
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	22		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	130.91
	Lh>Lc	Total	192
X (MAX)		130.9	
Length of Need		137.5	
Begin of Guardrail		1488+04.50	
End of Guardrail		1486+54.50	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1505+10 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail		1505+22.50	
End of Guardrail		1504+10.00	(37.5' of AA Type E used for LON)
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1505+10 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1505+22.50		
End of Guardrail	1504+10.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1531+44 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1531+56.50		
End of Guardrail	1530+44.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1531+44 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1531+56.50		
End of Guardrail	1530+44.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right 1637+50 to 1640+02		ties into GR protecting ditch/ bridge pier for Columbus Road; GR will connect with parapet	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)	192.0		
Length of Need	200		
Begin of Guardrail	1637+50.00		
End of Guardrail	1535+87.50	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Columbus Road 1641+08 (lt)			
Variables Per Figure 602-1E		add 12.5' to GR End station for taper	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	16.25		
L2	12		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	94.15
	Lh>Lc	Total	216
X (MAX)		94.2	
Length of Need		100	
End of BTA Type 1		1640+65.50	
Begin of Guardrail		1640+65.50	
End Length of Need		1640+13.85	
End of Guardrail		1640+28.00	(37.5' of AA Type E used for LON)
Y		12	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Columbus Road 1641+24 (rt)			
Variables Per Figure 602-1E		Impact attenuator ties into barrier protection	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	16		
L2	11.75		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	95.63
	Lh>Lc	Total	219
X (MAX)		95.6	
Length of Need		100	
Y		12	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1654+52 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1654+64.50		
End of Guardrail	1653+52.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1654+52 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1654+64.50		
End of Guardrail	1653+52.00	(37.5' of AA Type E used for LON)	
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right 1658+50 to 1660+68		ties into GR protecting bridge pier to the north and sign protection to the south	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)	192.0		
Length of Need	200		
Begin of Guardrail	1658+50.00		
End of Guardrail	1656+50.00		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier WB I-480 Flyover 1660+82 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	ties into ditch protection
a	7		
b	0	0	
Lc	30		
Lh	19.16		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	96.95
	Lh>Lc	Total	192
X (MAX)	97.0		
Length of Need	100		
End of BTA Type 1	1660+53.00		
Begin of Guardrail	1660+53.00		
End Length of Need	1659+85.05		
End of Guardrail	1659+78.00		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Left 1661+69 to 1662+70			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	ties into GR protecting bridge pier
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail	1661+69.00		
End of Guardrail	1660+06.50	(37.5' of AA Type E used for LON)	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier WB I-480 Flyover 1662+42 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into median protection
a	7		
b	0	0	
Lc	30		
Lh	20.5		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	114.15
	Lh>Lc	Total	192
X (MAX)		114.2	
Length of Need		125	
End of BTA Type 1	1662+12.00		
Begin of Guardrail	1662+12.00		
End Length of Need	1661+27.85		
End of Guardrail	1661+24.50		
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Median Protection from 1662+20 to 1729+50			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into barrier for pier protection
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1662+20.00	
End of Guardrail		1660+20.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Pier Rockside 1668+16 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Median Protection
a	7		
b	0	0	
Lc	30		
Lh	22.19		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	132.87
	Lh>Lc	Total	192
X (MAX)		132.9	
Length of Need		137.5	
Begin of Guardrail		1668+16.00	
End of Guardrail		1666+78.50	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right from 1668+75 to 1672+28			
Variables Per Figure 602-1E		Ties into Ditch Protection to the North	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	240
	Lh>Lc	Total	240
X (MAX)		240.0	
Length of Need		250	
Begin of Guardrail	1668+75.00		
End of Guardrail	1666+62.50	(37.5' of AA Type E used for LON)	
y		10	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right from 1675+28 to 1681+35			
Variables Per Figure 602-1E		Ties into Ditch Protection on Rockside to the North	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	240
	Lh>Lc	Total	240
X (MAX)		240.0	
Length of Need		250	
Begin of Guardrail	1675+28.00		
End of Guardrail	1672+78.00		
y		10	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1680+28 (lt)		Included in Median Protection	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail		1680+40.50	
End of Guardrail		1679+03.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1680+28 (rt)		Included in Ditch Protection	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	17.75		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	157.18
	Lh>Lc	Total	240
X (MAX)		157.2	
Length of Need		162.5	
Begin of Guardrail		1680+28.00	
End of Guardrail		1678+65.50	
y		10	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Aurora Rd 1681+34 (rt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Sign Protection
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	240
	Lh>Lc	Total	240
X (MAX)		240.0	
Length of Need		250	
End of BTA Type 1		1681+09.50	
Begin of Guardrail		1681+09.50	
End Length of Need		1678+94.00	
End of Guardrail		1678+84.50	
y		10	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Aurora Rd 1681+95 (lt)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Median Protection
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
End of BTA Type 1		1681+71.00	
Begin of Guardrail		1681+71.00	
End Length of Need		1680+03.00	
End of Guardrail		1679+96.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right 1684+20 to 1697+68			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Bridge Protection
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)	192.0		
Length of Need	200		
Begin of Guardrail	1684+20.00		
End of Guardrail	1682+20.00		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1694+00 (It)			
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	Ties into Median Protection
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1694+12.50		
End of Guardrail	1692+62.50		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1694+00 (rt)		Included in Ditch Protection	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)	128.3		
Length of Need	137.5		
Begin of Guardrail	1694+12.50		
End of Guardrail	1692+62.50		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Norfolk Southern RR 1697+68 (rt)		Ties in Ditch Protection	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)	192.0		
Length of Need	200		
End of BTA Type 1	1697+44.00		
Begin of Guardrail	1697+44.00		
End Length of Need	1695+76.00		
End of Guardrail	1695+69.00		
y	14		

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Norfolk Southern RR 1698+17(It)			
Variables Per Figure 602-1E		Ties into Median Protection	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
End of BTA Type 1		1697+92.00	
Begin of Guardrail		1697+92.00	
End Length of Need		1696+25.00	
End of Guardrail		1696+17.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right 1701+10 to 1721+59			
Variables Per Figure 602-1E		Ties into Bridge Protection	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
Begin of Guardrail		1701+10.00	
End of Guardrail		1699+10.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1715+16 (rt)		Included in Ditch Protection	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	17.75		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	157.18
	Lh>Lc	Total	240
X (MAX)		157.2	
Length of Need		162.5	
Begin of Guardrail		1715+28.50	
End of Guardrail		1713+53.50	
y		10	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Sign Foundation 1715+16 (lt)		Included in Median Protection	
Variables Per Figure 602-1E			
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	21.75		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	128.28
	Lh>Lc	Total	192
X (MAX)		128.3	
Length of Need		137.5	
Begin of Guardrail		1715+28.50	
End of Guardrail		1713+78.50	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Miles Road 1721+59 (rt)			
Variables Per Figure 602-1E		Ties in Ditch Protection	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	240
	Lh>Lc	Total	240
X (MAX)		240.0	
Length of Need		250	
End of BTA Type 1		1721+35.00	
Begin of Guardrail		1721+35.00	
End Length of Need		1719+19.00	
End of Guardrail		1719+10.00	
y		10	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Bridge Abutment Miles Road 1721+47 (lt)			
Variables Per Figure 602-1E		Ties into Median Protection	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	14		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	192
	Lh>Lc	Total	192
X (MAX)		192.0	
Length of Need		200	
End of BTA Type 1		1721+22.00	
Begin of Guardrail		1721+22.00	
End Length of Need		1719+55.00	
End of Guardrail		1719+47.00	
y		14	

Design Speed	70	NOTES:	
Alignment	NB I-271		
Ditch Right 1723+85 to 1728+05			
Variables Per Figure 602-1E		Will replace existing GR	
Lr	360	Per Figure 602-1E	
a	7		
b	0	0	
Lc	30		
Lh	30		
L2	10		
L1	0		
Beginning of Run			
Calculations Per Figure 602-1E			
Larger of Lh and Lc			
X	Lh<Lc	Total	240
	Lh>Lc	Total	240
X (MAX)		240.0	
Length of Need		250	
Begin of Guardrail	1723+85.00		
End of Guardrail	1721+35.00		
y		10	