

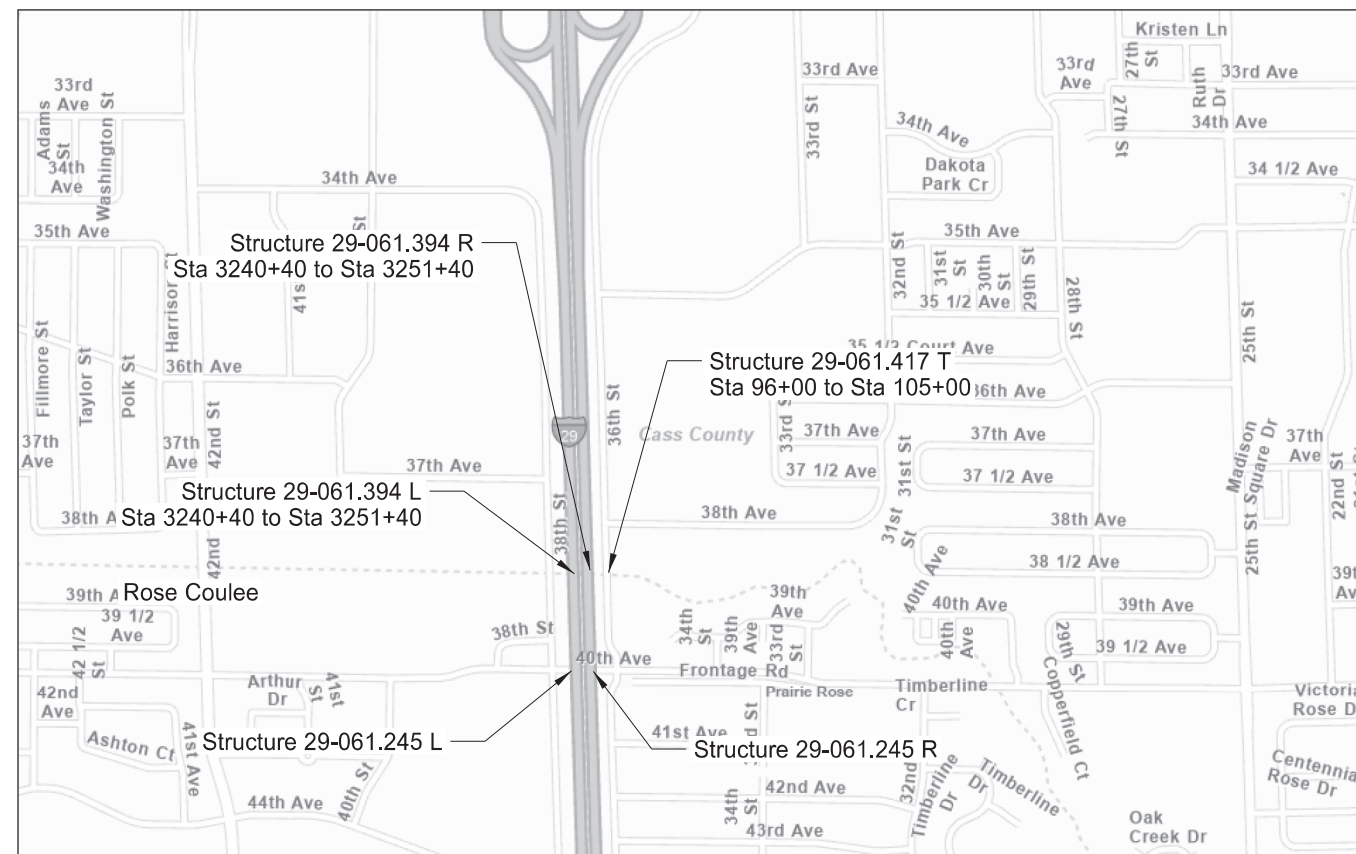
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	23773	1	1

# NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

IM-8-029(215)061  
Cass County  
I-29 & 36th St S at Rose Coulee  
I-29 at 40th Ave S  
Structure Rehabilitation  
Deck Overlay, Approach Slab Replacement  
Spall Repair, Deck Drain Repair  
Guardrail, Rail Retrofit, & Incidentals  
R49W

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2024
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-8-029(215)061	0.235	0.235



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D-764-1	W-Beam Guardrail General Details
D-764-5	Sequential Kinking Terminal
D-764-10	Thrie Beam Transition To Double Box Beam Retrofit
D-764-20	Short Term End Treatment For Bridges (Attenuation Device Method)
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**SPECIAL PROVISIONS**

Number	Description
SSP 2	Federal Migratory Bird Treaty Act
SSP 10	E-Ticketing
SP 196(24)	Commercial Grade Asphalt
SP 197(24)	Hydrodemolition and Overlay of Concrete Bridge Decks
SP 204(24)	Concrete Spall Repair
PSP 17(24)	Permits and Environmental Considerations

**NOTES**

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**GENERAL NOTES**

202-P01 REMOVAL OF PAVEMENT: Remove surfacing and aggregate base at the replacement locations necessary to install guardrail pads.

Remove topsoil. Excavate and dispose existing embankment material to allow for placement of 6 inches aggregate base and 2 inches of Hot Mix Asphalt. Upon completion of this work place the topsoil over the disturbed embankment. Seed the disturbed areas with Temporary Cover Crop and Class III seed mixture and cover with straw mulch. Include the cost of labor and equipment to remove surfacing, aggregate base, any excavated embankment material, topsoil removal and placement, seeding, and mulching in the contract unit price bids for "Removal of Concrete Pavement", "Removal of Bituminous Surfacing", and "Guardrail Embankment."

203-P01 GUARDRAIL EMBANKMENT: The embankment material required for guardrail installation at bridge 0029-061.417 T is not available within the highway right of way. It will be the contractor's responsibility to obtain embankment material.

The excess embankment material at bridge 0029-061.417 T from constructing aggregate/pavement pads will be the contractor's responsibility to remove and dispose of.

Include all costs to locate or remove the embankment material in the contract unit price bid for "Guardrail Embankment."

251-P01 SEEDING CLASS III: Use the following seed mix for all permanent seeding:

<u>Species</u>	<u>Percent by Weight</u>	<u>Purity</u>	<u>Germination</u>
Perennial Ryegrass	40%	90%	85%
Creeping Red Fescue	30%	90%	85%
Annual Ryegrass	15%	90%	85%
Kentucky Bluegrass	15%	90%	85%

Fertilizer will be 12-24-12 at an application rate of 300 pounds per acre (6.25 pounds per 1,000 sq. Ft.).

704-200 STATE FURNISHED MEDIAN BARRIER: Obtain (18) 2' x 10' concrete barriers. They can be picked up from the Steele yard. Contact the Bismarck District office at 701-328-6950 to facilitate the exchanges. They can be returned to the Casselton yard at 15482 37th St SE in Casselton ND 58012. The hardware can be picked up and returned to the Fargo District yard at 503 38th St S in Fargo ND 58103. Contact the Fargo District office at 701-239-8900 to facilitate the exchanges.

Obtain (130) 2' x 10' concrete barriers. They can be picked up from the Casselton yard at 15482 37th St SE in Casselton ND 58012. The hardware can be picked up and returned to the Fargo District yard at 503 38th St S in Fargo ND 58103. Contact the Fargo District office at 701-239-8900 to facilitate the exchanges.

If returning barriers with connection components, coordinate the delivery location for the connecting components with the Engineer. Some 4 inch x 4 inch boards are available at the return location. Provide any additional 4 inch x 4 inch boards necessary to stack barriers. The boards will become property of the Department.

Include all costs associated with median barriers in the contract unit price for "State Furnished Median Barrier".

704-P01 PORTABLE CHANGEABLE MESSAGE SIGN: Install Portable Changeable Message Signs (PCMS) 7 days before work begins on Bridge 29-061.417 T (36<sup>th</sup> St S). The Engineer will determine the locations for PCMS installation. Relocate the PCMS as directed by the Engineer.

Provide an operator trained in the use of the PCMS.

The Engineer will determine the message to be displayed. The operator shall program the message within one hour of the Engineer's request to change the message.

704-P02 TRAFFIC CONTROL DEVICES: The traffic control devices list for each bridge has been developed using the list below and traffic control layouts as shown in the plans. Work can occur for all structures individually or work can occur on all structures at similar time. The traffic control devices needed for each structure are as follows:

BRIDGE 29-061.394 L (I-29 Rose Coulee) & BRIDGE 29-061.245 L (40<sup>th</sup> Ave):

D-704-22, Layouts K & L for Construction Trucks Hauling Material.

D-704-26, Layouts Type BB, EE, and GG as needed.

D-704-35 Layout for one lane closure interstate system.

BRIDGE 29-061.394 R (I-29 Rose Coulee) & BRIDGE 29-061.245 R (40<sup>th</sup> Ave):

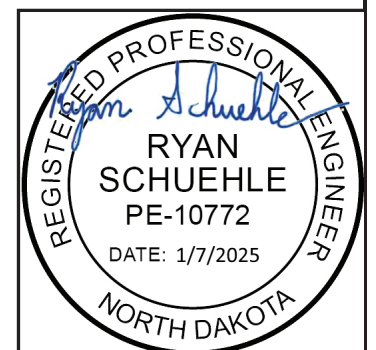
D-704-22, Layouts K & L for Construction Trucks Hauling Material.

D-704-26, Layouts Type BB, EE, and GG as needed.

D-704-35 Layout for one lane closure interstate system.

BRIDGE 0029-061.417 T (36<sup>th</sup> St S):

Provide detour signage per section 100 plan layout for 36<sup>th</sup> St S. Work will be completed and roadway reopened within 45 calendar days of 36<sup>th</sup> St S roadway closure.



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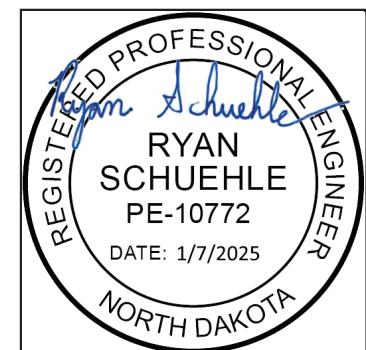
**NOTES**

762-050 PAVEMENT MARKING: If the Engineer and Contractor agree, plan quantity will be used as the measurement for payment for pavement marking items.

764-P01 REMOVED W-BEAM GUARDRAIL MATERIALS: Deliver the removed guardrail materials to the NDDOT Maintenance Storage Yard in Casselton, and neatly stack them at a location designated by the Engineer. The address to the NDDOT Maintenance Storage Yard is:

Casselton NDDOT  
15482 37<sup>th</sup> St SE  
Casselton, ND 58012

Include all costs for delivery of the removed guardrail materials in the contract unit price bid for "Remove End Treatment & Transition."



Estimated Quantities

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	NDDOT	City of Fargo	TOTAL
103	0100	CONTRACT BOND	L SUM	0.8	0.2	1
202	0114	REMOVAL OF CONCRETE PAVEMENT	SY		36	36
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	24	73	97
203	0218	GUARDRAIL EMBANKMENT	EA		1	1
302	0120	AGGREGATE BASE COURSE CL 5	TON	12	127	139
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	4	34	38
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	364.4		364.4
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	2784	283.3	3067.3
602	1260	BRIDGE DECK CRACK SEALING	LF	1079		1079
602	7000	SPECIAL SURFACE FINISH	SF	5170	1195	6365
624	3002	DOUBLE BOX BEAM RAIL RETROFIT - E-RAIL	LF		173.9	173.9
650	0704	OVERLAY CONCRETE	CY	68	27.6	95.6
650	0707	DECK CONCRETE	CY	3.2	1.2	4.4
650	0710	CLASS 1-H REMOVAL	SY	888	283.3	1171.3
650	0720	CLASS 1 REMOVAL	SY	888	283.3	1171.3
650	0723	CLASS 3 REMOVAL	SY	30	10	40
650	0724	CLASS 4 REMOVAL	SY	4	2	6
650	0805	DECK SPALL REPAIR	SF	454		454
702	0100	MOBILIZATION	L SUM	0.8	0.2	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2282	556	2838
704	1043	ATTENUATION DEVICE-TYPE B-65	EA	2		2
704	1052	TYPE III BARRICADE	EA		20	20
704	1060	DELINEATOR DRUMS	EA	68		68
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2		2
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	1458		1458
704	3511	STATE FURNISHED MEDIAN BARRIER	LF	1480		1480
704	4011	PORTABLE CHANGEABLE MESSAGE SIGN	EA		2	2
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF		47	47
762	0113	EPOXY PVMT MK 4IN LINE	LF		1543	1543
762	0422	SHORT TERM 6IN LINE-TYPE R	LF	4694		4694
762	1306	PREFORMED PATTERNED PVMT MK 6IN LINE	LF	4279		4279
764	0131	W-BEAM GUARDRAIL	LF	25	420	445
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA		4	4
764	0150	REMOVE & RESET GUARDRAIL	LF	133		133
764	2081	REMOVE END TREATMENT & TRANSITION	EA		6	6
770	4525	REVISE LIGHTING SYSTEM	EA		1	1
930	8644	SILICONE SEALANT	LF	170		170
930	9534	MODIFY DECK DRAIN	EA	16	8	24
930	9605	SPALL REPAIR - MINOR	SF	79		79
930	9612	SPALL REPAIR	SF	21	14	35
930	9639	APPROACH SLAB LIP REPAIR	LF	179.2		179.2

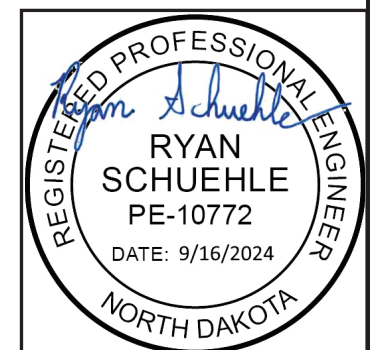
## BASIS OF ESTIMATE

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Permanent Pavement Marking				
Location - Type	Basis	LF	Miles	Quantity (LF)
<b>Structure 0029-061.394 L Sta 3243+70 to 3255+96.58</b>				
6" White line - Preformed patterned	Centerline Skips 1,320 LF/mile	1226.58	0.232306818	307
6" Yellow line - Preformed patterned	10,560 LF/mile	1226.58	0.232306818	2454
<b>Structure 0029-061.394 R Sta 3243+16.46 to 3249+90.57</b>				
6" White line - Preformed patterned	Centerline Skips 1,320 LF/mile	674.11	0.127672348	169
6" Yellow line - Preformed patterned	10,560 LF/mile	674.11	0.127672348	1349
<b>Structure 0029-061.417 T Sta 96+66.45 to 103+51.49</b>				
4" White line - Epoxy	Centerline Skips 1,320 LF/mile	685.04	0.129742424	172
4" Yellow line - Epoxy	10,560 LF/mile	685.04	0.129742424	1371

Spec	Code	Bid Item	QTY	Unit
762	1306	PREFORMED PATTERNED PVMT MK 6IN LINE		
		Structure 0029-061.394 L	2761	LF
		Structure 0029-061.394 R	1518	LF
762	113	EPOXY PVMT MK 4IN LINE		
		Structure 0029-061.417 T	1543	LF

GUARDRAIL SURFACING LOCATION QUANTITIES				Bridge 29-061.394 L Rose Coulee I-29 SB		Bridge 29-061.394 R Rose Coulee I-29 NB		Bridge 29-061.417 T Rose Coulee 36th St				
				NW Quad	NE Quad	SW Quad	SE Quad	SE Quad	SW Quad	NW Quad	NE Quad	
SPEC	CODE	BID ITEM	UNIT	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	TOTAL
202	0114	REMOVAL OF CONCRETE PAVEMENT	SY	0	0	0	0	18	18	0	0	36
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	6	6	6	6	0	0	33	40	97
302	0120	AGGREGATE BASE COURSE CL 5 @ 1.875 TON/CY	TON	3	3	3	3	27	47	35	18	139
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT @ 2 TON/CY	TON	1	1	1	1	7	13	9	5	38





SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			BY PHASE NO.				
			1a	1b			
E5-1-48	48"x48"	EXIT GORE				35	
G20-1-60	60"x24"	ROAD WORK NEXT MILES				28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)				18	
<b>G20-2-48</b>	<b>48"x24"</b>	<b>END ROAD WORK</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>26</b>	<b>52</b>
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)				18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR				18	
G20-50a-72	72"x36"	ROAD WORK NEXT MILES RT & LT ARROWS				43	
G20-52a-72	72"x24"	ROAD WORK NEXT MILES RT or LT ARROW				36	
<b>G20-55-96</b>	<b>96"x48"</b>	<b>SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>59</b>	<b>118</b>
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)				11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)				10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)				10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)				7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)				7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)				7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)				7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)				7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT				15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)				7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT (Mounted on route marker post)				7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT (Mounted on route marker post)				9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)				7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)				9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)				7	
<b>R1-1-48</b>	<b>48"x48"</b>	<b>STOP</b>	<b>2</b>		<b>2</b>	<b>32</b>	<b>64</b>
R1-2-60	60"x60"	YIELD				29	
R2-1-36	36"x48"	SPEED LIMIT (Portable only)				30	
<b>R2-1-48</b>	<b>48"x60"</b>	<b>SPEED LIMIT</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>39</b>	<b>156</b>
<b>R2-1aP-24</b>	<b>24"x18"</b>	<b>MINIMUM FEE \$80 (Mounted on Speed Limit post)</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>10</b>	<b>20</b>
R3-2-48	48"x48"	NO LEFT TURN				35	
<b>R4-1-36</b>	<b>36"x48"</b>	<b>DO NOT PASS (Portable only)</b>	<b>2</b>		<b>2</b>	<b>30</b>	<b>60</b>
R4-1-48	48"x60"	DO NOT PASS				39	
R4-7-48	48"x60"	KEEP RIGHT				39	
R5-1-48	48"x48"	DO NOT ENTER				35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)				14	
R7-1-12	12"x18"	NO PARKING ANY TIME				11	
R10-6-24	24"x36"	STOP HERE ON RED				16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)				12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)				12	
R11-3a-60	60"x30"	ROAD CLOSED MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)				15	
R11-3c-60	60"x30"	STREET CLOSED MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)				15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)				15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT				35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT				35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT				35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW				26	
W3-1-48	48"x48"	STOP AHEAD				35	
W3-3-48	48"x48"	SIGNAL AHEAD				35	
W3-4-48	48"x48"	BE PREPARED TO STOP				35	
<b>W3-5-48</b>	<b>48"x48"</b>	<b>SPEED REDUCTION AHEAD</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
<b>W4-2-48</b>	<b>48"x48"</b>	<b>LANE ENDS RIGHT or LEFT</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W5-1-48	48"x48"	ROAD NARROWS				35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE				35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW				35	
W6-3-48	48"x48"	TWO WAY TRAFFIC				35	
<b>W8-1-48</b>	<b>48"x48"</b>	<b>BUMP</b>	<b>1</b>		<b>1</b>	<b>35</b>	<b>35</b>
W8-3-48	48"x48"	PAVEMENT ENDS				35	
W8-7-48	48"x48"	LOOSE GRAVEL				35	
<b>W8-11-48</b>	<b>48"x48"</b>	<b>UNEVEN LANES</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
W8-12-48	48"x48"	NO CENTER LINE				35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL				35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY				35	
<b>W8-54-48</b>	<b>48"x48"</b>	<b>TRUCKS ENTERING AHEAD or FT or MILE</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
<b>W8-55-48</b>	<b>48"x48"</b>	<b>TRUCKS CROSSING AHEAD or FT or MILE</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY				35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL				35	
W13-1P-30	30"x30"	MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)				14	
W14-3-64	64"x48"	NO PASSING ZONE				28	
W16-2P-30	30"x24"	FEET PLAQUE (Mounted on warning sign post)				10	
<b>W20-1-48</b>	<b>48"x48"</b>	<b>ROAD WORK AHEAD or FT or MILE</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W20-2-48	48"x48"	DETOUR AHEAD or FT or MILE				35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or FT or MILE				35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or FT or MILE				35	
<b>W20-5-48</b>	<b>48"x48"</b>	<b>RIGHT or CENTER or LEFT LANE CLOSED AHEAD or FT or MILE</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W20-7-48	48"x48"	FLAGGER				35	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back				5	
W20-52P-54	54"x12"	NEXT MILES (Mounted on warning sign post)				12	
W21-1-48	48"x48"	WORKERS				35	
W21-2-48	48"x48"	FRESH OIL				35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or FT or MILE				35	
<b>W21-5-48</b>	<b>48"x48"</b>	<b>SHOULDER WORK</b>	<b>1</b>		<b>1</b>	<b>35</b>	<b>35</b>
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED				35	

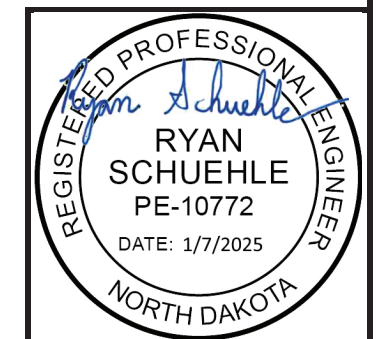
SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			BY PHASE NO.				
			1a	1b			
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or FT or MILE				35	
W21-6-48	48"x48"	SURVEY CREW				35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or FT				35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY				35	
W21-52-48	48"x48"	PAVEMENT BREAKS				35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD				35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK				35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE				35	

SPECIAL SIGNS							
CONSIGN	SIGN	DESCRIPTION	1a	1b	TOTAL AMOUNT	UNITS PER AMOUNT	UNITS SUB TOTAL
Consign 1	144"x72"	I-29 SOUTH 13FT LANE AHEAD WIDE VEHICLES USE ALTERNATE ROUTE	1		1	111	111

SPEC & CODE		TOTAL UNITS
704-1000	TRAFFIC CONTROL SIGNS	1141

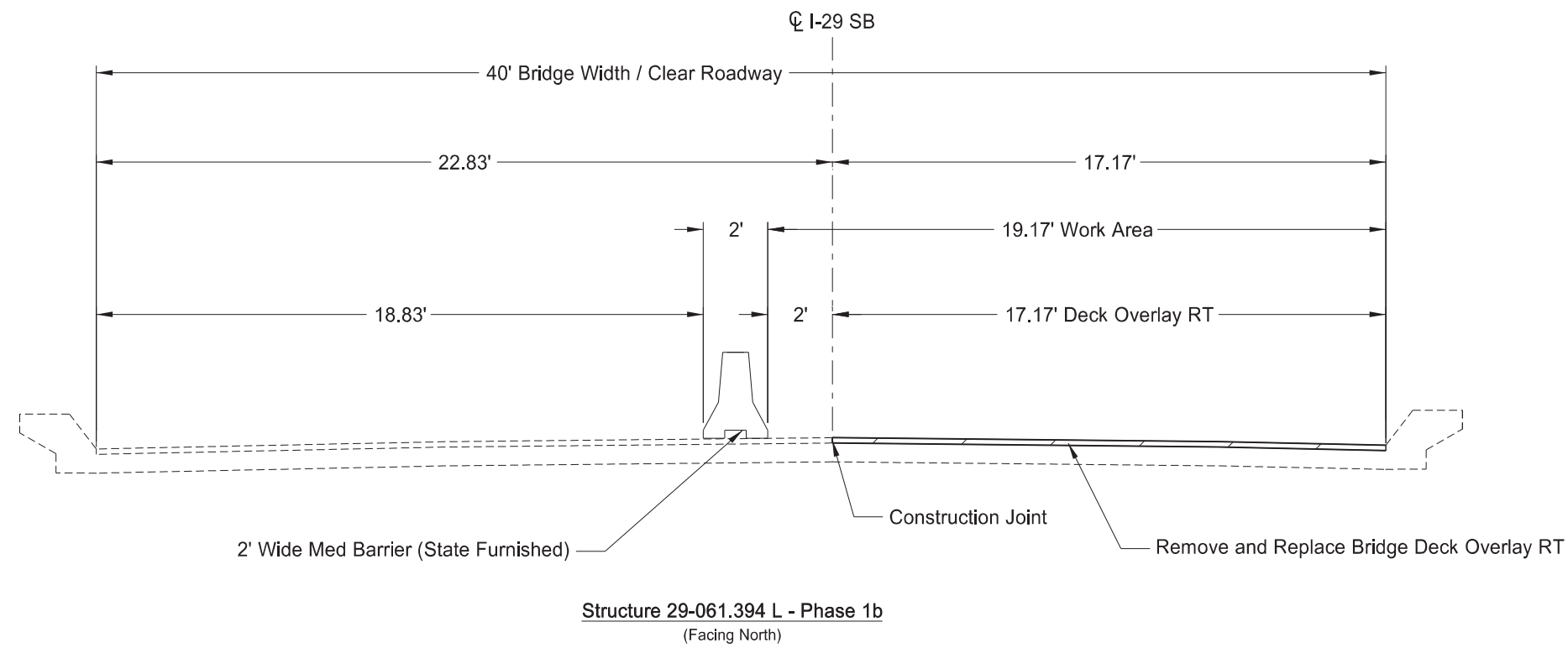
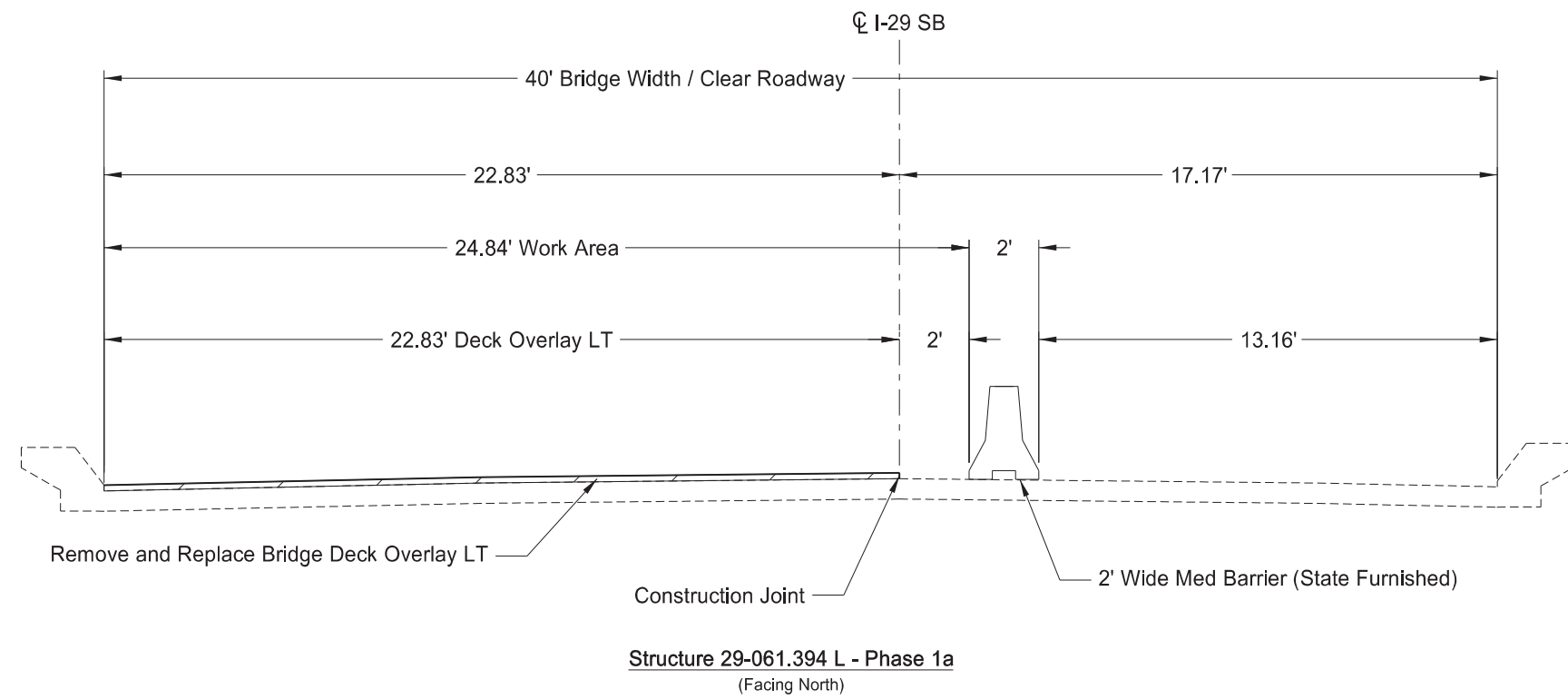
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY		TOTAL QUANTITY
			BY PHASE NO.		
			1a	1b	
704-0100	FLAGGING	MHR			
<b>704-1043</b>	<b>ATTENUATION DEVICE -TYPE B-65</b>	EACH	<b>1</b>	<b>1</b>	<b>1</b>
704-1048	PORTABLE RUMBLE STRIPS	EACH			
704-1050	TYPE I BARRICADES	EACH			
704-1052	TYPE III BARRICADES	EACH			
<b>704-1060</b>	<b>DELINEATOR DRUMS</b>	EACH	<b>47</b>	<b>46</b>	<b>47</b>
704-1065	TRAFFIC CONES	EACH			
704-1067	TUBULAR MARKERS	EACH			
704-1070	DELINEATOR	EACH			
704-1072	FLEXIBLE DELINEATORS	EACH			
704-1080	STACKABLE VERTICAL PANELS	EACH			
704-1081	VERTICAL PANELS - BACK TO BACK	EACH			
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH			
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH			
<b>704-1087</b>	<b>SEQUENCING ARROW PANEL - TYPE C</b>	EACH	<b>1</b>	<b>1</b>	<b>1</b>
<b>704-1500</b>	<b>OBLITERATION OF PVMT MK</b>	SF	<b>484</b>	<b>371</b>	<b>855</b>
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF			
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH			
<b>704-3511</b>	<b>STATE FURNISHED MEDIAN BARRIER</b>	LF	<b>780</b>	<b>780</b>	<b>780</b>
762-0200	RAISED PAVEMENT MARKERS	EACH			
762-0420	SHORT TERM 4IN LINE - TYPE R	LF			
<b>762-0422</b>	<b>SHORT TERM 6IN LINE-TYPE R</b>	LF	<b>1126</b>	<b>1111</b>	<b>2237</b>
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF			

NOTE:  
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.  
<http://www.dot.nd.gov/>

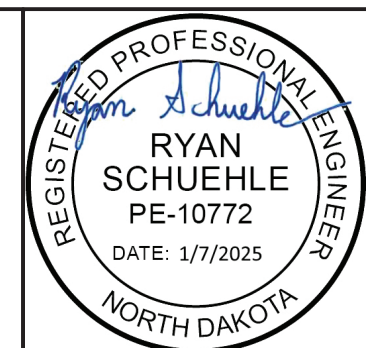


Traffic Control Devices List  
29-061.245 L - I-29 & 40th Ave  
29-061.394 L - I-29 & Rose Coulee

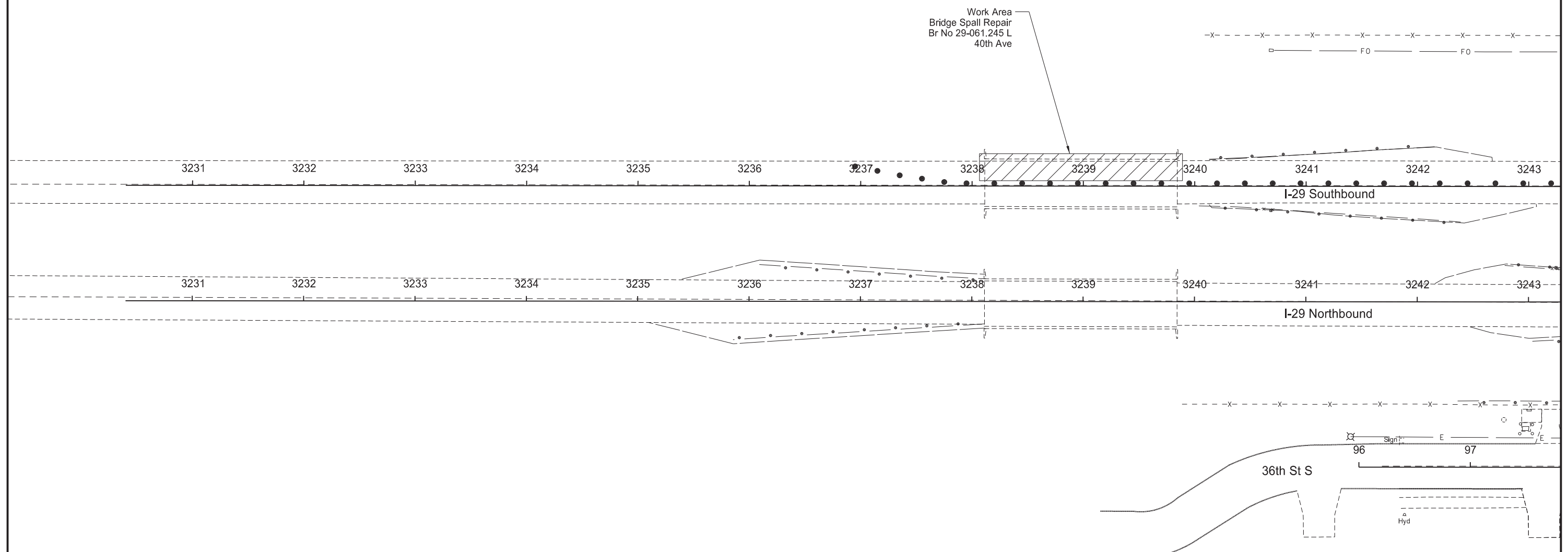
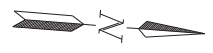
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-029(215)061	100	2



Work Zone Traffic Control  
 Typical Sections for Phase 1  
 Southbound I-29  
  
 Bridge 29-061.394 L  
 I-29 Rose Coulee





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	100	3

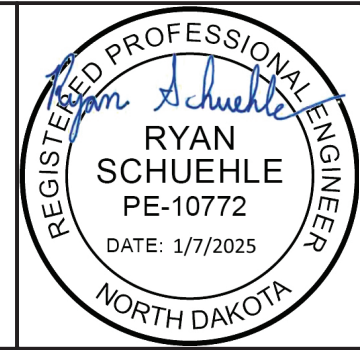


Work Area  
 Bridge Spall Repair  
 Br No 29-061.245 L  
 40th Ave

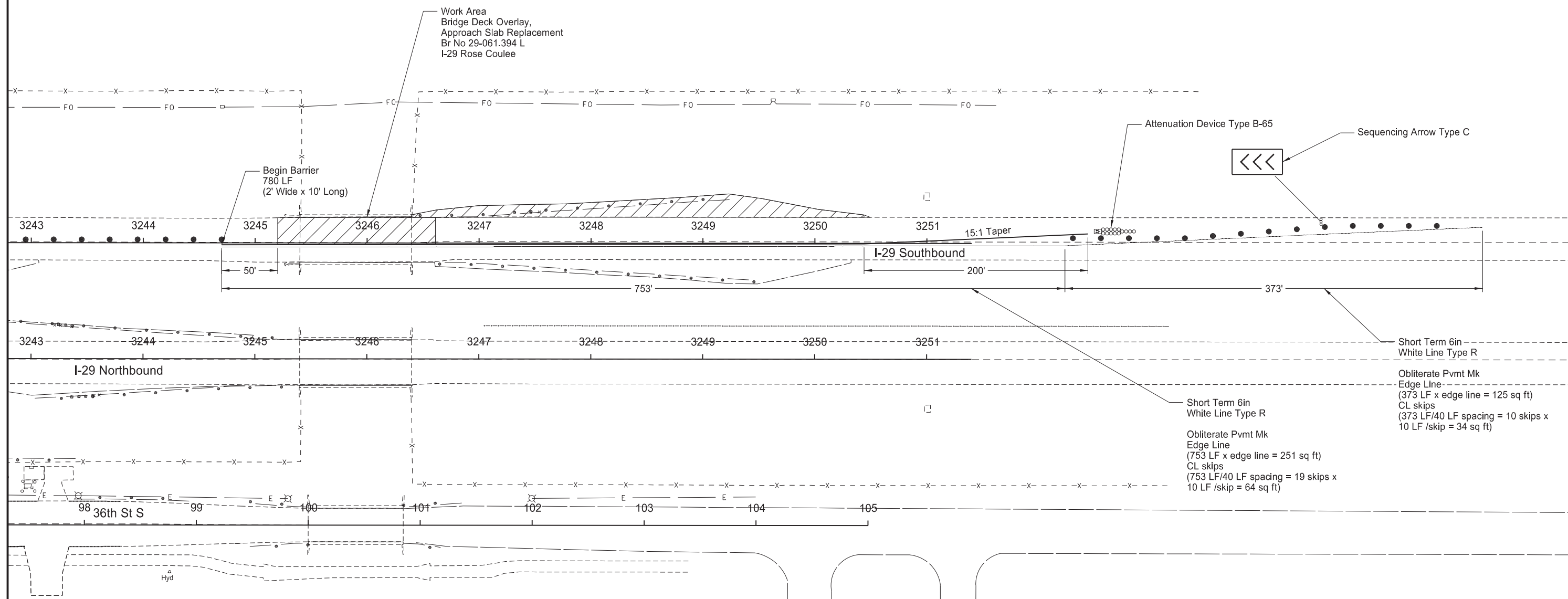
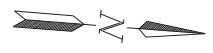
Notes:  
 Layout Shows Phase 1a for 29-061.245 L & 29-061.394 L.  
 See work zone traffic control typical sections for Phase 1a and 1b for Bridge 29-061.394 L (Section 100 sheet 2).  
 Install signs in accordance with D-704-35 with reduced speed limit of 45 MPH.

- Legend
-  Work Area (See Section 170)
  -  Delinator Drums

Work Zone Traffic Control  
 Traffic Control Layout for Phase 1a  
 Southbound I-29  
 Bridge 29-061.245 L  
 40th Ave  
 Bridge 29-061.394 L  
 I-29 Rose Coulee



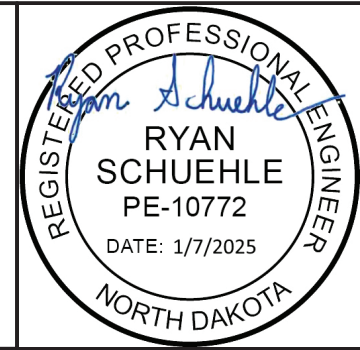
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ND	IM-8-029(215)061	100	4



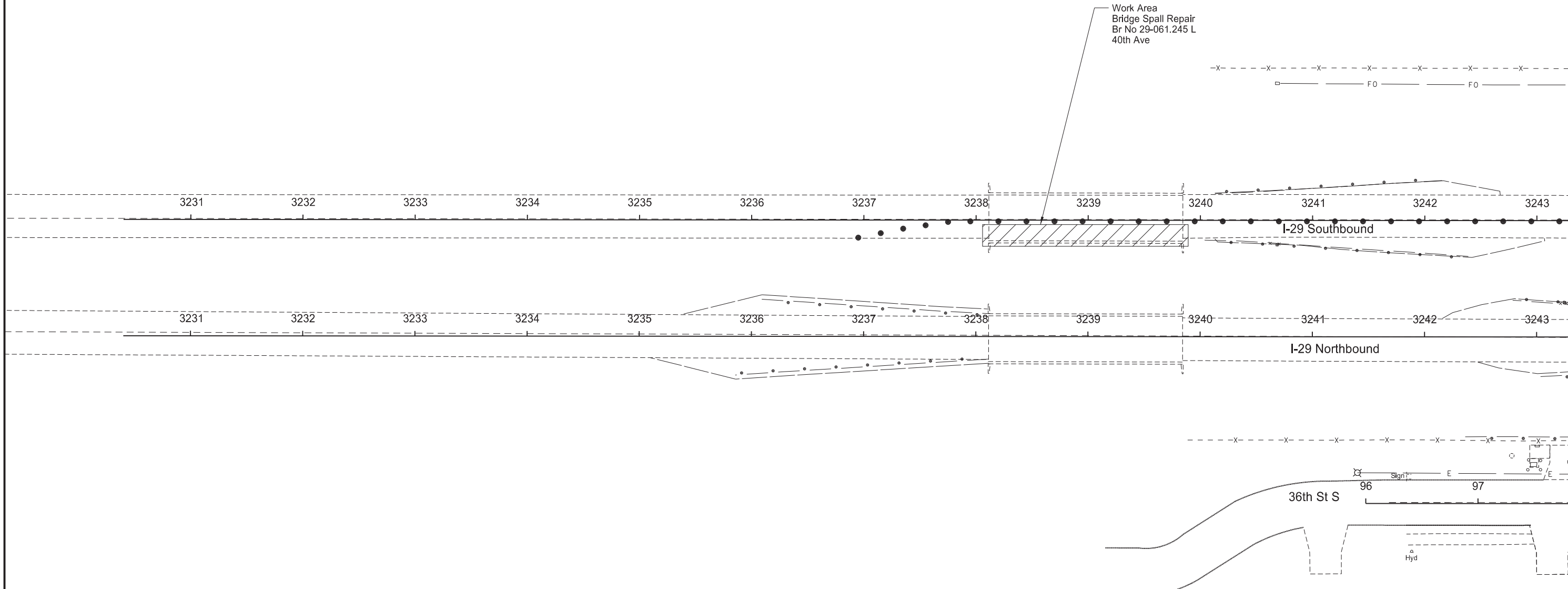
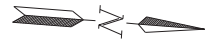
Notes:  
 Layout Shows Phase 1a for 29-061.245 L & 29-061.394 L.  
 See work zone traffic control typical sections for Phase 1a and 1b for Bridge 29-061.394 L (Section 100 sheet 2).  
 Install signs in accordance with D-704-35 with reduced speed limit of 45 MPH.

- Legend
- Work Area (See Section 170)
  - Delinator Drums



Work Zone Traffic Control  
 Traffic Control Layout for Phase 1a  
 Southbound I-29  
 Bridge 29-061.245 L  
 40th Ave  
 Bridge 29-061.394 L  
 I-29 Rose Coulee



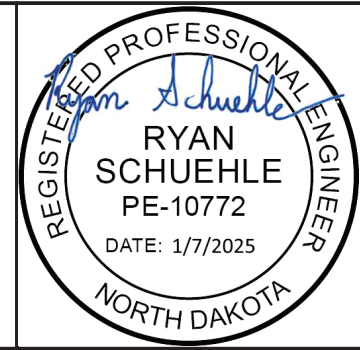
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-029(215)061	100	5



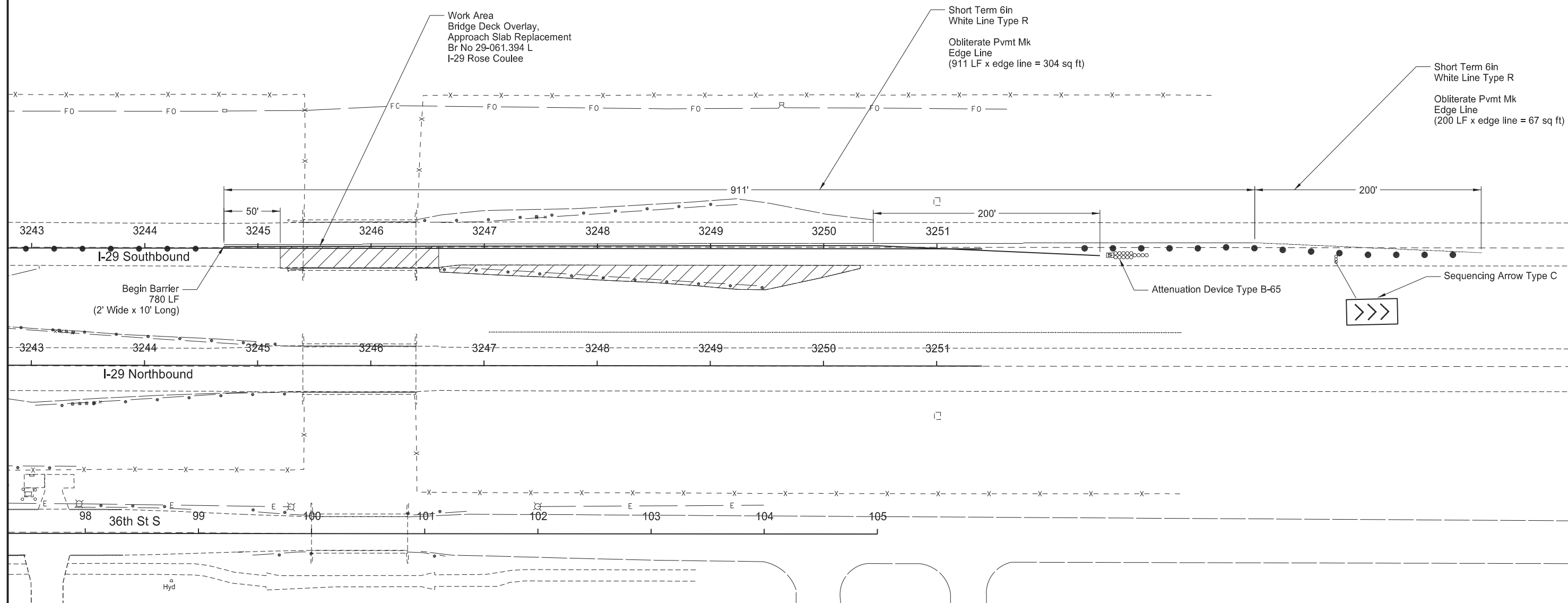
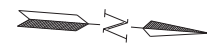
Notes:  
 Layout Shows Phase 1b for 29-061.245 L & 29-061.394 L.  
 See work zone traffic control typical sections for Phase 1a and 1b for Bridge 29-061.394 L (Section 100 sheet 2).  
 Install signs in accordance with D-704-35 with reduced speed limit of 45 MPH.

- Legend
-  Work Area (See Section 170)
  -  Delinator Drums



Work Zone Traffic Control  
 Traffic Control Layout for Phase 1b  
 Southbound I-29  
 Bridge 29-061.245 L  
 40th Ave  
 Bridge 29-061.394 L  
 I-29 Rose Coulee



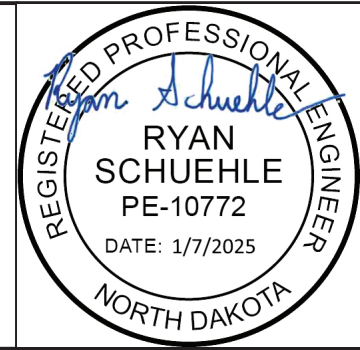
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	100	6



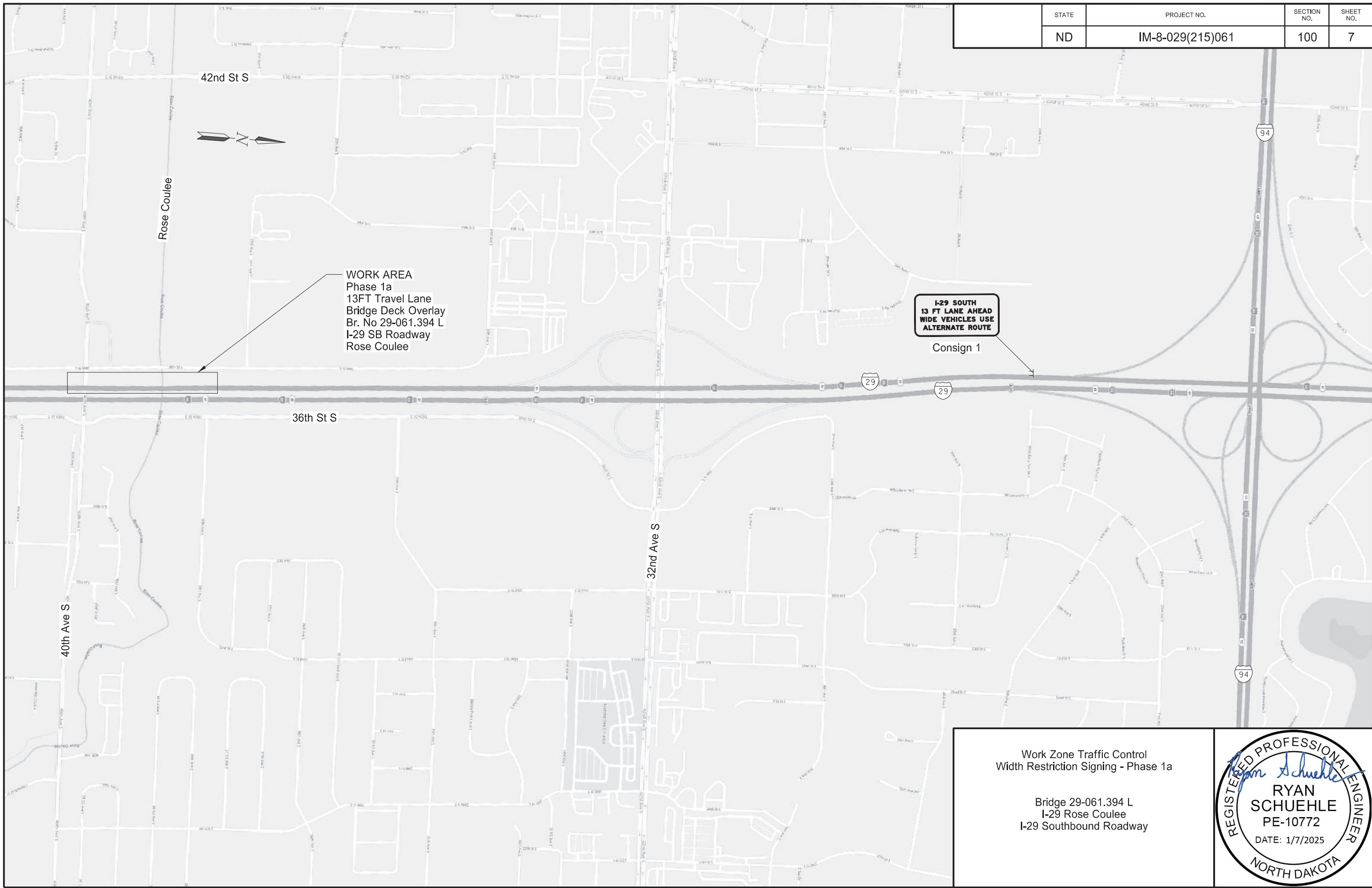
Notes:  
 Layout Shows Phase 1b for 29-061.245 L & 29-061.394 L.  
 See work zone traffic control typical sections for Phase 1a and 1b for Bridge 29-061.394 L (Section 100 sheet 2).  
 Install signs in accordance with D-704-35 with reduced speed limit of 45 MPH.

- Legend
-  Work Area (See Section 170)
  -  Delinator Drums

Work Zone Traffic Control  
 Traffic Control Layout for Phase 1b  
 Southbound I-29  
 Bridge 29-061.245 L  
 40th Ave  
 Bridge 29-061.394 L  
 I-29 Rose Coulee



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	100	7



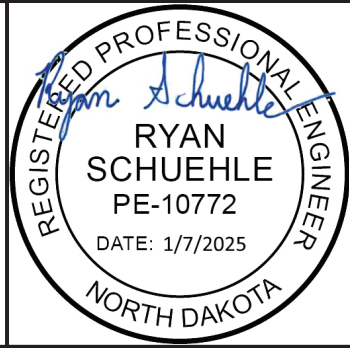
WORK AREA  
Phase 1a  
13FT Travel Lane  
Bridge Deck Overlay  
Br. No 29-061.394 L  
I-29 SB Roadway  
Rose Coulee

**I-29 SOUTH  
13 FT LANE AHEAD  
WIDE VEHICLES USE  
ALTERNATE ROUTE**

Consign 1

Work Zone Traffic Control  
Width Restriction Signing - Phase 1a

Bridge 29-061.394 L  
I-29 Rose Coulee  
I-29 Southbound Roadway



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	100	8

<b>SIGN NUMBER</b>	Consign 1	<div style="text-align: right;">AREA: 72.0 Sq.Ft.</div>
<b>WIDTH X HEIGHT</b>	12'-0" x 6'-0"	
<b>BORDER WIDTH</b>	1.25" (inset 0.75")	
<b>CORNER RADIUS</b>	9"	
<b>MOUNTING</b>	Ground	
<b>BACKGROUND</b>	TYPE: XI Reflective COLOR: Orange	
<b>LEGEND/BORDER</b>	TYPE: IV Non-Reflective COLOR: Black	
<b>SYMBOL</b>	X Y WID HT ANGLE	

Dimensions are in inches.tenths      Letter locations are panel edge to lower left corner

LETTER POSITION (X)																	LENGTH	SIZE	SERIES
I	-	2	9		S	O	U	T	H								68.1	8	EM 2000
36	39	42.9	51.1	57.6	65.6	73.7	82.4	90.3	97.6										
1	3		F	T		L	A	N	E		A	H	E	A	D	118.7	8	EM 2000	
12.6	16.6	23	31	37.8	43.8	51.8	58.2	67.7	76.4	82.3	90.3	99.8	108.6	115.4	124.9				
W	I	D	E		V	E	H	I	C	L	E	S		U	S	E	124.9	8	EM 2000
9.6	19.5	23.3	31.7	37.8	45.6	54.4	62	70.8	74.3	82.5	89.7	97.1	103.6	111.6	120	128.5			
A	L	T	E	R	N	A	T	E		R	O	U	T	E			114.6	8	EM 2000
14.7	24.2	30.6	38	45.6	53.7	61.6	70.4	77.7	83.6	91.6	99.5	108.1	116	123.4					

Work Zone Traffic Control  
Construction Sign Details  
Southbound I-29

Bridge 29-061.394 L  
I-29 Rose Coulee

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			BY PHASE NO.				
			2a	2b			
E5-1-48	48"x48"	EXIT GORE				35	
G20-1-60	60"x24"	ROAD WORK NEXT MILES				28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)				18	
<b>G20-2-48</b>	<b>48"x24"</b>	<b>END ROAD WORK</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>26</b>	<b>52</b>
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)				18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR				18	
G20-50a-72	72"x36"	ROAD WORK NEXT MILES RT & LT ARROWS				43	
G20-52a-72	72"x24"	ROAD WORK NEXT MILES RT or LT ARROW				36	
<b>G20-55-96</b>	<b>96"x48"</b>	<b>SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>59</b>	<b>118</b>
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)				11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)				10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)				10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)				7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)				7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)				7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)				7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)				7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT				15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)				7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT (Mounted on route marker post)				7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT (Mounted on route marker post)				9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)				7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)				9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)				7	
<b>R1-1-48</b>	<b>48"x48"</b>	<b>STOP</b>	<b>2</b>		<b>2</b>	<b>32</b>	<b>64</b>
R1-2-60	60"x60"	YIELD				29	
R2-1-36	36"x48"	SPEED LIMIT (Portable only)				30	
<b>R2-1-48</b>	<b>48"x60"</b>	<b>SPEED LIMIT</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>39</b>	<b>156</b>
<b>R2-1aP-24</b>	<b>24"x18"</b>	<b>MINIMUM FEE \$80 (Mounted on Speed Limit post)</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>10</b>	<b>20</b>
R3-2-48	48"x48"	NO LEFT TURN				35	
<b>R4-1-36</b>	<b>36"x48"</b>	<b>DO NOT PASS (Portable only)</b>	<b>2</b>		<b>2</b>	<b>30</b>	<b>60</b>
R4-1-48	48"x60"	DO NOT PASS				39	
R4-7-48	48"x60"	KEEP RIGHT				39	
R5-1-48	48"x48"	DO NOT ENTER				35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)				14	
R7-1-12	12"x18"	NO PARKING ANY TIME				11	
R10-6-24	24"x36"	STOP HERE ON RED				16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)				12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)				12	
R11-3a-60	60"x30"	ROAD CLOSED MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)				15	
R11-3c-60	60"x30"	STREET CLOSED MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)				15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)				15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT				35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT				35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT				35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW				26	
W3-1-48	48"x48"	STOP AHEAD				35	
W3-3-48	48"x48"	SIGNAL AHEAD				35	
W3-4-48	48"x48"	BE PREPARED TO STOP				35	
<b>W3-5-48</b>	<b>48"x48"</b>	<b>SPEED REDUCTION AHEAD</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
<b>W4-2-48</b>	<b>48"x48"</b>	<b>LANE ENDS RIGHT or LEFT</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W5-1-48	48"x48"	ROAD NARROWS				35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE				35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW				35	
W6-3-48	48"x48"	TWO WAY TRAFFIC				35	
<b>W8-1-48</b>	<b>48"x48"</b>	<b>BUMP</b>	<b>1</b>		<b>1</b>	<b>35</b>	<b>35</b>
W8-3-48	48"x48"	PAVEMENT ENDS				35	
W8-7-48	48"x48"	LOOSE GRAVEL				35	
<b>W8-11-48</b>	<b>48"x48"</b>	<b>UNEVEN LANES</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
W8-12-48	48"x48"	NO CENTER LINE				35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL				35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY				35	
<b>W8-54-48</b>	<b>48"x48"</b>	<b>TRUCKS ENTERING AHEAD or FT or MILE</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
<b>W8-55-48</b>	<b>48"x48"</b>	<b>TRUCKS CROSSING AHEAD or FT or MILE</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY				35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL				35	
W13-1P-30	30"x30"	MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)				14	
W14-3-64	64"x48"	NO PASSING ZONE				28	
W16-2P-30	30"x24"	FEET PLAQUE (Mounted on warning sign post)				10	
<b>W20-1-48</b>	<b>48"x48"</b>	<b>ROAD WORK AHEAD or FT or MILE</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W20-2-48	48"x48"	DETOUR AHEAD or FT or MILE				35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or FT or MILE				35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or FT or MILE				35	
<b>W20-5-48</b>	<b>48"x48"</b>	<b>RIGHT or CENTER or LEFT LANE CLOSED AHEAD or FT or MILE</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W20-7-48	48"x48"	FLAGGER				35	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back				5	
W20-52P-54	54"x12"	NEXT MILES (Mounted on warning sign post)				12	
W21-1-48	48"x48"	WORKERS				35	
W21-2-48	48"x48"	FRESH OIL				35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or FT or MILE				35	
<b>W21-5-48</b>	<b>48"x48"</b>	<b>SHOULDER WORK</b>	<b>1</b>		<b>1</b>	<b>35</b>	<b>35</b>
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED				35	

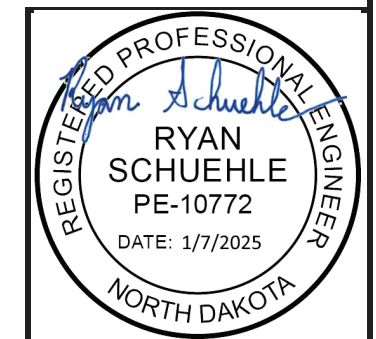
SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			BY PHASE NO.				
			2a	2b			
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or FT or MILE				35	
W21-6-48	48"x48"	SURVEY CREW				35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or FT				35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY				35	
W21-52-48	48"x48"	PAVEMENT BREAKS				35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD				35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK				35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE				35	

SPECIAL SIGNS							
CONSIGN	SIGN	DESCRIPTION	BY PHASE NO.	TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL	
			2a	2b			
Consign 2	144"x72"	I-29 NORTH 13FT LANE AHEAD WIDE VEHICLES USE ALTERNATE ROUTE	1			1	111

SPEC & CODE		TOTAL UNITS
704-1000	TRAFFIC CONTROL SIGNS	1141

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY		TOTAL QUANTITY
			BY PHASE NO.		
			2a	2b	
704-0100	FLAGGING	MHR			
<b>704-1043</b>	<b>ATTENUATION DEVIE-TYPE B-65</b>	EACH	<b>1</b>	<b>1</b>	<b>1</b>
704-1048	PORTABLE RUMBLE STRIPS	EACH			
704-1050	TYPE I BARRICADES	EACH			
704-1052	TYPE III BARRICADES	EACH			
<b>704-1060</b>	<b>DELINEATOR DRUMS</b>	EACH	<b>21</b>	<b>20</b>	<b>21</b>
704-1065	TRAFFIC CONES	EACH			
704-1067	TUBULAR MARKERS	EACH			
704-1070	DELINEATOR	EACH			
704-1072	FLEXIBLE DELINEATORS	EACH			
704-1080	STACKABLE VERTICAL PANELS	EACH			
704-1081	VERTICAL PANELS - BACK TO BACK	EACH			
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH			
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH			
<b>704-1087</b>	<b>SEQUENCING ARROW PANEL - TYPE C</b>	EACH	<b>1</b>	<b>1</b>	<b>1</b>
<b>704-1500</b>	<b>OBLITERATION OF PVMT MK</b>	SF	<b>337</b>	<b>266</b>	<b>603</b>
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF			
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH			
<b>704-3511</b>	<b>STATE FURNISHED MEDIAN BARRIER</b>	LF	<b>700</b>	<b>700</b>	<b>700</b>
762-0200	RAISED PAVEMENT MARKERS	EACH			
762-0420	SHORT TERM 4IN LINE - TYPE R	LF			
<b>762-0422</b>	<b>SHORT TERM 6IN LINE-TYPE R</b>	LF	<b>1224</b>	<b>1233</b>	<b>2457</b>
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF			

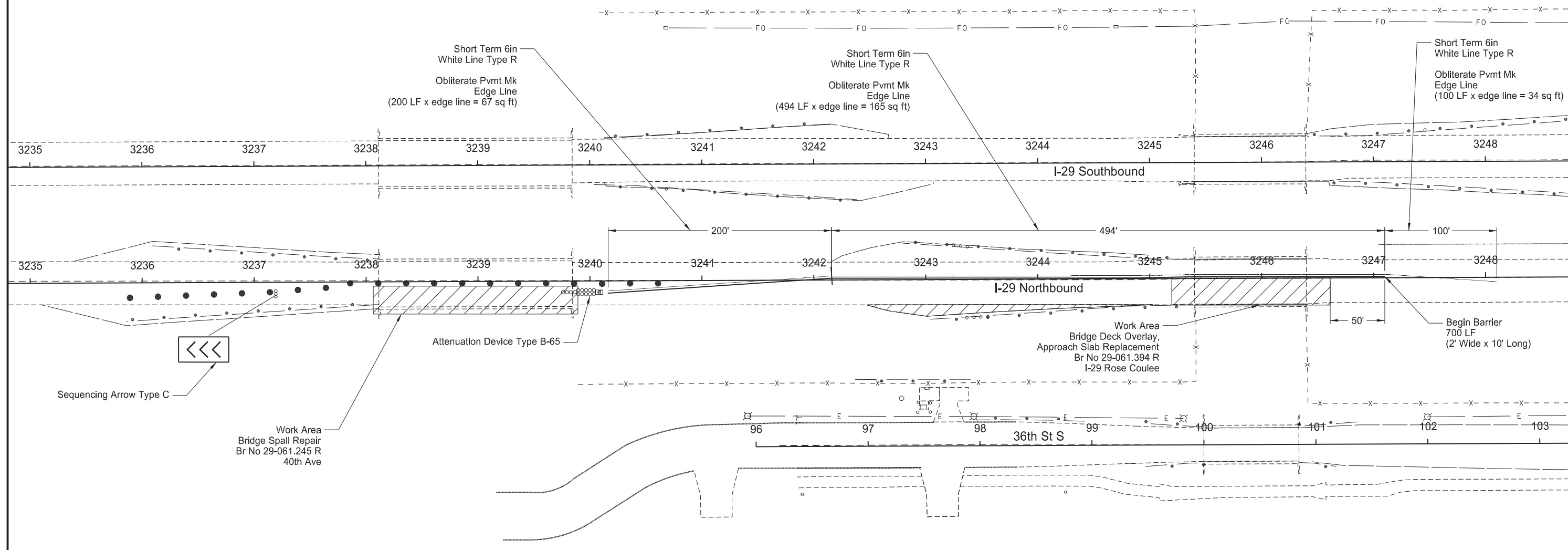
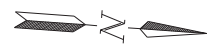
NOTE:  
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.  
<http://www.dot.nd.gov/>





Traffic Control Devices List  
29-061.245 R - I-29 & 40th Ave  
29-061.394 R - I-29 Rose Coulee



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	100	11



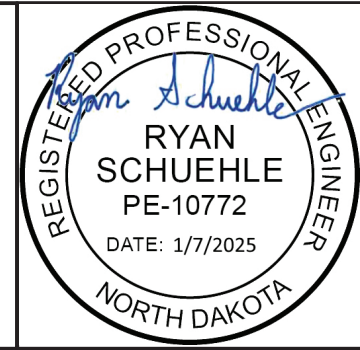
Notes:  
 Layout Shows Phase 2b for 29-061.245 R & 29-061.394 R.  
 See work zone traffic control typical sections for Phase 2a and 2b for Bridge 29-061.394 R (Section 100 sheet 7).  
 Install signs in accordance with D-704-35 with reduced speed limit of 45 MPH.

- Legend
-  Work Area (See Section 170)
  -  Delinator Drums

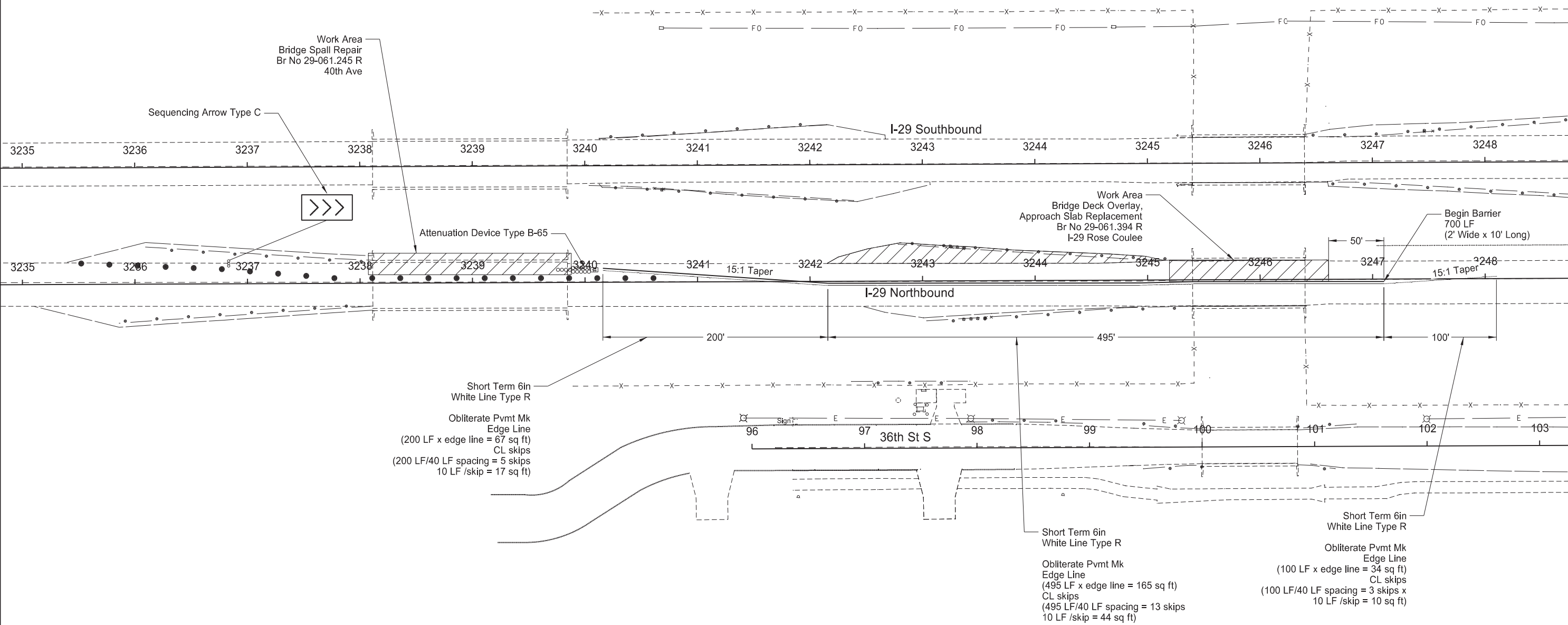
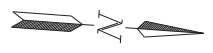
Work Zone Traffic Control  
 Traffic Control Layout for Phase 2a  
 Southbound I-29

Bridge 29-061.245 R  
 40th Ave

Bridge 29-061.394 R  
 I-29 Rose Coulee



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-029(215)061	100	12



Short Term 6in White Line Type R  
 Obliterate Pvmt Mk Edge Line  
 (200 LF x edge line = 67 sq ft)  
 CL skips  
 (200 LF/40 LF spacing = 5 skips  
 10 LF /skip = 17 sq ft)

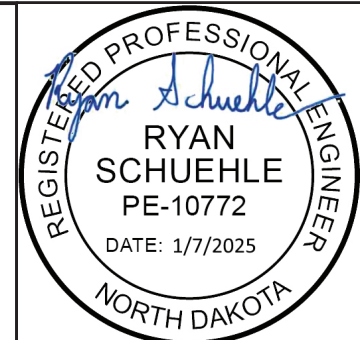
Short Term 6in White Line Type R  
 Obliterate Pvmt Mk Edge Line  
 (495 LF x edge line = 165 sq ft)  
 CL skips  
 (495 LF/40 LF spacing = 13 skips  
 10 LF /skip = 44 sq ft)

Short Term 6in White Line Type R  
 Obliterate Pvmt Mk Edge Line  
 (100 LF x edge line = 34 sq ft)  
 CL skips  
 (100 LF/40 LF spacing = 3 skips x  
 10 LF /skip = 10 sq ft)

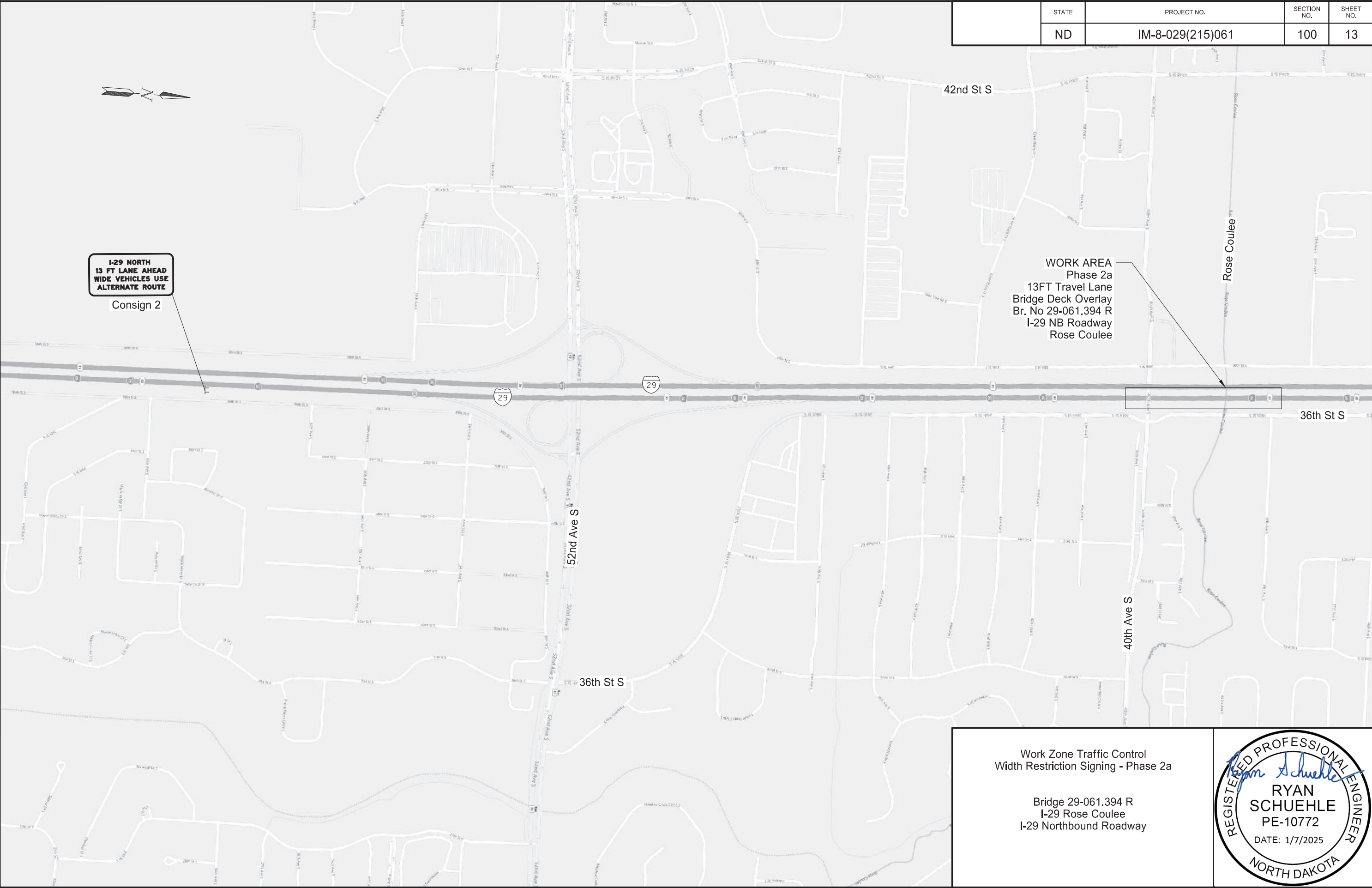
Notes:  
 Layout Shows Phase 2a for 29-061.245 R & 29-061.394 R.  
 See work zone traffic control typical sections for Phase 2a and 2b for Bridge 29-061.394 R (Section 100 sheet 7).  
 Install signs in accordance with D-704-35 with reduced speed limit of 45 MPH.

- Legend
- Work Area (See Section 170)
  - Delinator Drums

Work Zone Traffic Control  
 Traffic Control Layout for Phase 2b  
 Southbound I-29  
 Bridge 29-061.245 R  
 40th Ave  
 Bridge 29-061.394 R  
 I-29 Rose Coulee



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-029(215)061	100	13



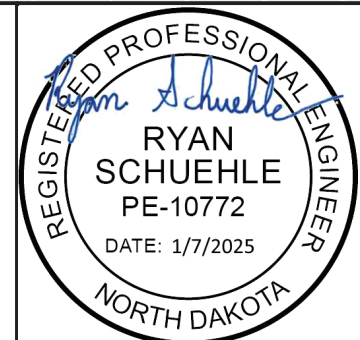
**I-29 NORTH  
13 FT LANE AHEAD  
WIDE VEHICLES USE  
ALTERNATE ROUTE**

Consign 2

**WORK AREA  
Phase 2a  
13FT Travel Lane  
Bridge Deck Overlay  
Br. No 29-061.394 R  
I-29 NB Roadway  
Rose Coulee**

Work Zone Traffic Control  
Width Restriction Signing - Phase 2a

Bridge 29-061.394 R  
I-29 Rose Coulee  
I-29 Northbound Roadway





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
<b>ND</b>	<b>IM-8-029(215)061</b>	<b>100</b>	<b>15</b>

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT MILES		28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	48"x24"	END ROAD WORK		26	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR		18	
G20-50a-72	72"x36"	ROAD WORK NEXT MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT MILES RT or LT ARROW		36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
<b>M4-8-24</b>	<b>24"x12"</b>	<b>DETOUR (Mounted on route marker post)</b>	<b>9</b>	<b>7</b>	<b>63</b>
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
<b>M6-1-30</b>	<b>30"x21"</b>	<b>DIRECTIONAL ARROW RT or LT (Mounted on route marker post)</b>	<b>8</b>	<b>9</b>	<b>72</b>
<b>M6-3-21</b>	<b>21"x15"</b>	<b>DIRECTIONAL ARROW UP (Mounted on route marker post)</b>	<b>1</b>	<b>7</b>	<b>7</b>
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	36"x48"	SPEED LIMIT (Portable only)		30	
R2-1-48	48"x60"	SPEED LIMIT		39	
R2-1aP-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)		10	
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-36	36"x48"	DO NOT PASS (Portable only)		30	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
<b>R11-2-48</b>	<b>48"x30"</b>	<b>ROAD CLOSED (Mounted on barricade)</b>	<b>2</b>	<b>12</b>	<b>24</b>
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	60"x30"	ROAD CLOSED MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-3c-60	60"x30"	STREET CLOSED MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
<b>R11-4a-60</b>	<b>60"x30"</b>	<b>STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)</b>	<b>1</b>	<b>15</b>	<b>15</b>
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD		35	
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or FT or MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or FT or MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	48"x48"	ROAD WORK AHEAD or FT or MILE		35	
<b>W20-2-48</b>	<b>48"x48"</b>	<b>DETOUR AHEAD or FT or MILE</b>	<b>4</b>	<b>35</b>	<b>140</b>
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or FT or MILE		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or FT or MILE		35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or FT or MILE		35	
W20-7-48	48"x48"	FLAGGER		35	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back		5	
W20-52P-54	54"x12"	NEXT MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or FT or MILE		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	

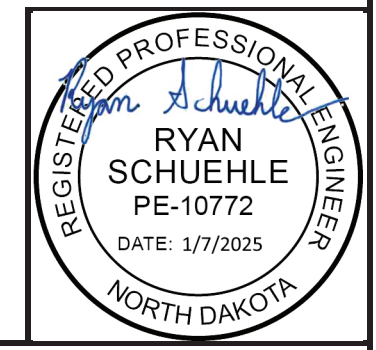
SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or FT or MILE		35	
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE		35	

SPECIAL SIGNS	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
Consign 3 48"x12" 36th ST S	9	21	189
Consign 4 36"x18" FLEET FARM	1	22	22
M4-8a-24 24"x12" END DETOUR	2	12	24

SPEC & CODE	TRAFFIC CONTROL SIGNS	TOTAL UNITS
704-1000	TRAFFIC CONTROL SIGNS	556

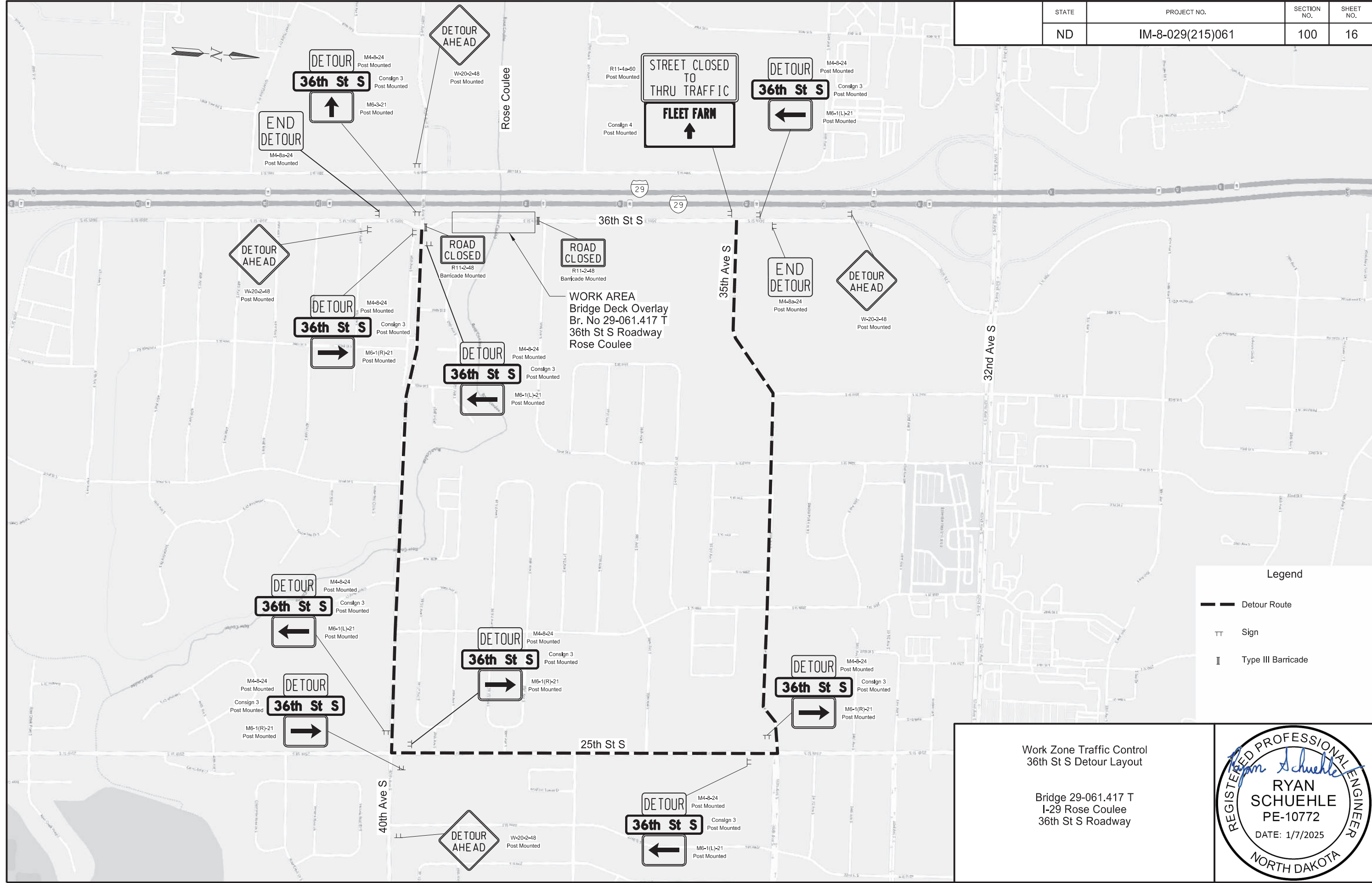
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EACH	
704-1037	ATTENUATION DEVICE-TYPE B-35	EACH	
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
<b>704-1052</b>	<b>TYPE III BARRICADES</b>	<b>EACH</b>	<b>20</b>
704-1060	DELINEATOR DRUMS	EACH	
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	STACKABLE VERTICAL PANELS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
704-3511	STATE FURNISHED MEDIAN BARRIER	LF	
<b>704-4011</b>	<b>PORTABLE CHANGEABLE MESSAGE SIGN</b>	<b>EACH</b>	<b>2</b>
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0426	SHORT TERM 24IN LINE-TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	

NOTE:  
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.  
<http://www.dot.nd.gov/>



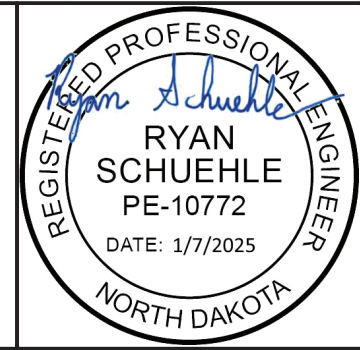
Traffic Control Devices List  
29-061.417 T  
36th St S

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	100	16



Work Zone Traffic Control  
 36th St S Detour Layout

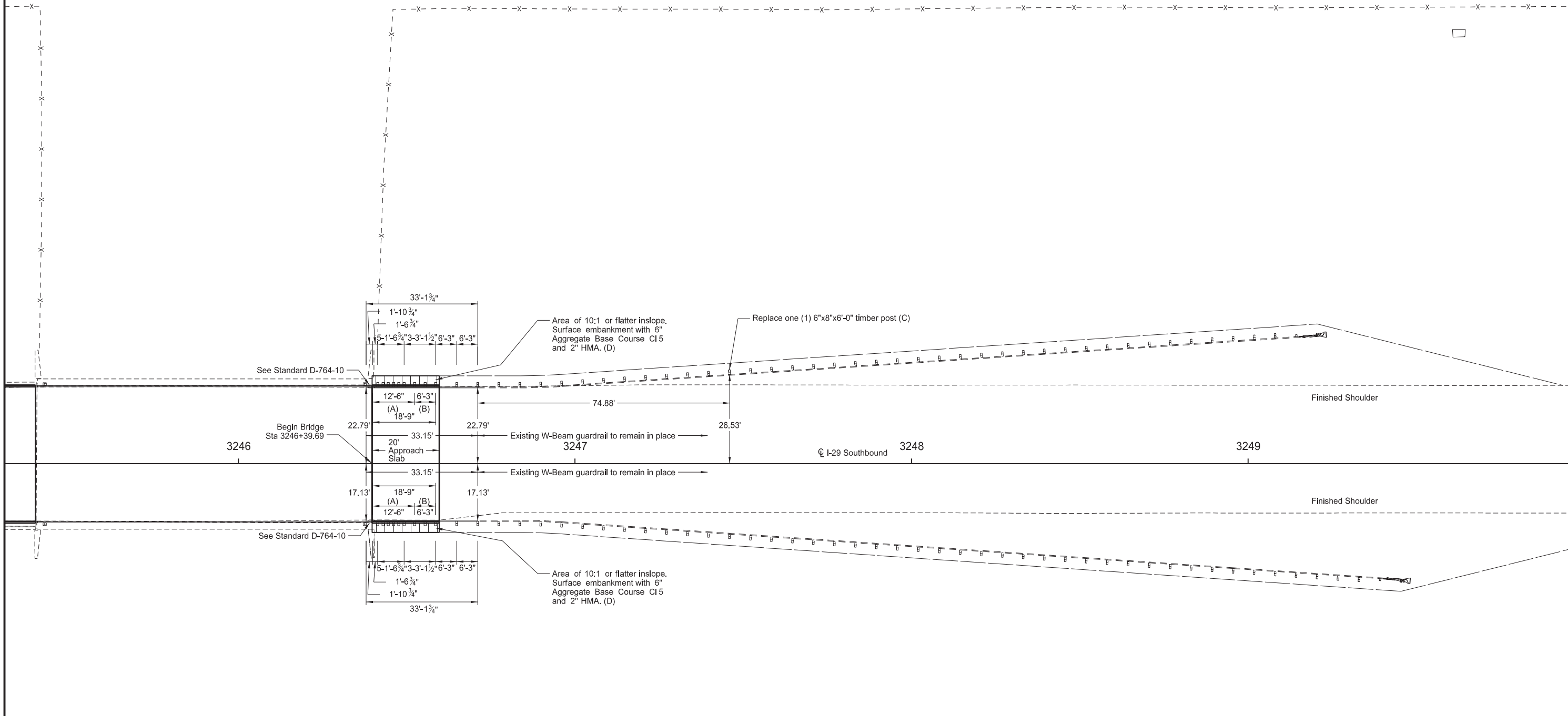
Bridge 29-061.417 T  
 I-29 Rose Coulee  
 36th St S Roadway





23 USC § 407 Documents  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	1



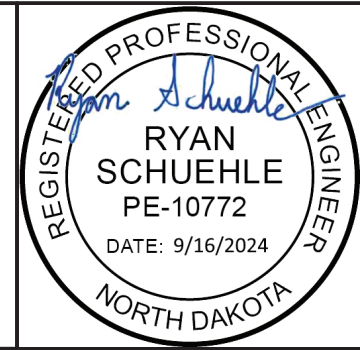
- (A) Thrie beam rail section (double thickness)
- (B) Symmetrical W-Thrie beam transition section (double thickness)
- (C) Replacement of timber post to be included in the price bid for "Remove & Reset Guardrail"
- (D) See Section 10 for guardrail pad surfacing quantities and for the removal of bituminous surfacing (SY).

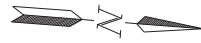
SPEC	CODE	BID ITEM	QTY	UNIT
764	0150	REMOVE & RESET GUARDRAIL		
		Sta 3246+37.94 to Sta 3246+71.19 Lt	33.2	LF
		Sta 3246+37.94 to Sta 3246+71.19 Rt	33.2	LF
		Total	66.4	LF

Thrie/W-Beam Guardrail Layout

Bridge 29-061.394 L  
I-29 Rose Coulee

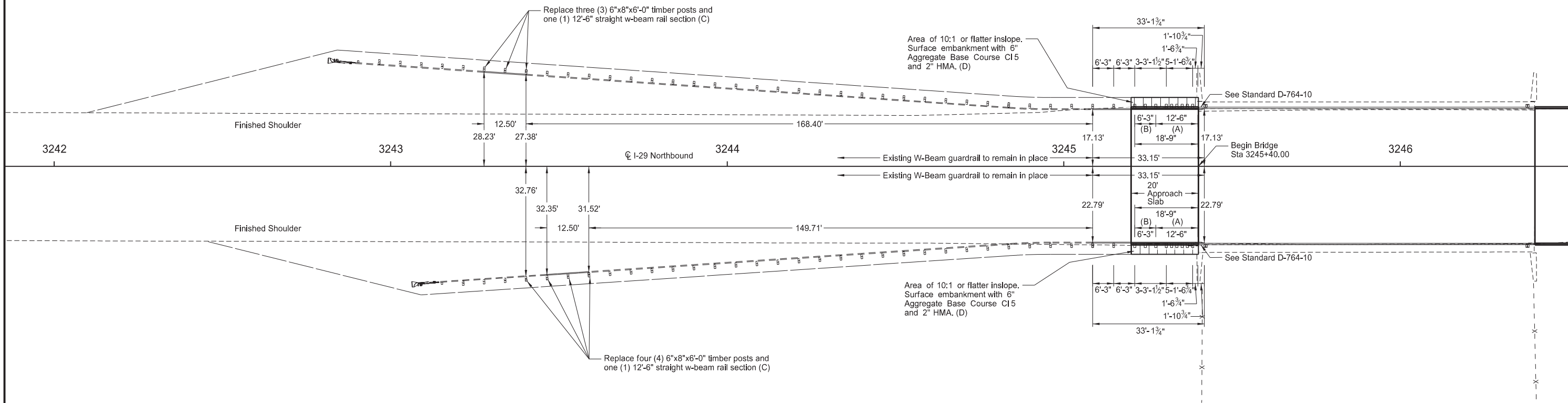
Southbound I-29





23 USC § 407 Documents  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	2



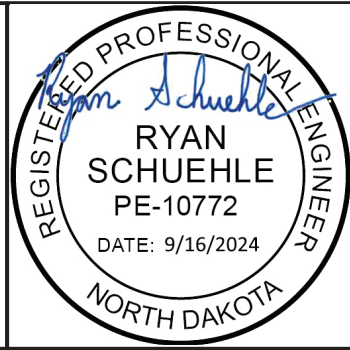
- (A) Thrie beam rail section (double thickness)
- (B) Symmetrical W-Thrie beam transition section (double thickness)
- (C) Replacement of timber posts to be included in the price bid for "W-Beam Guardrail"
- (D) See Section 10 for guardrail pad surfacing quantities and for the removal of bituminous surfacing (SY).

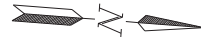
SPEC	CODE	BID ITEM	QTY	UNIT
764	0131	W-BEAM GUARDRAIL		
		Sta 3243+27.73 to Sta 3243+40.20 Lt	12.5	LF
		Sta 3243+46.42 to Sta 3243+58.89 Rt	12.5	LF
		Total	25.0	LF
764	0150	REMOVE & RESET GUARDRAIL		
		Sta 3245+08.50 to Sta 3245+41.75 Lt	33.2	LF
		Sta 3245+08.50 to Sta 3245+41.75 Rt	33.2	LF
		Total	66.4	LF

Thrie/W-Beam Guardrail Layout

Bridge 29-061.394 R  
I-29 Rose Coulee

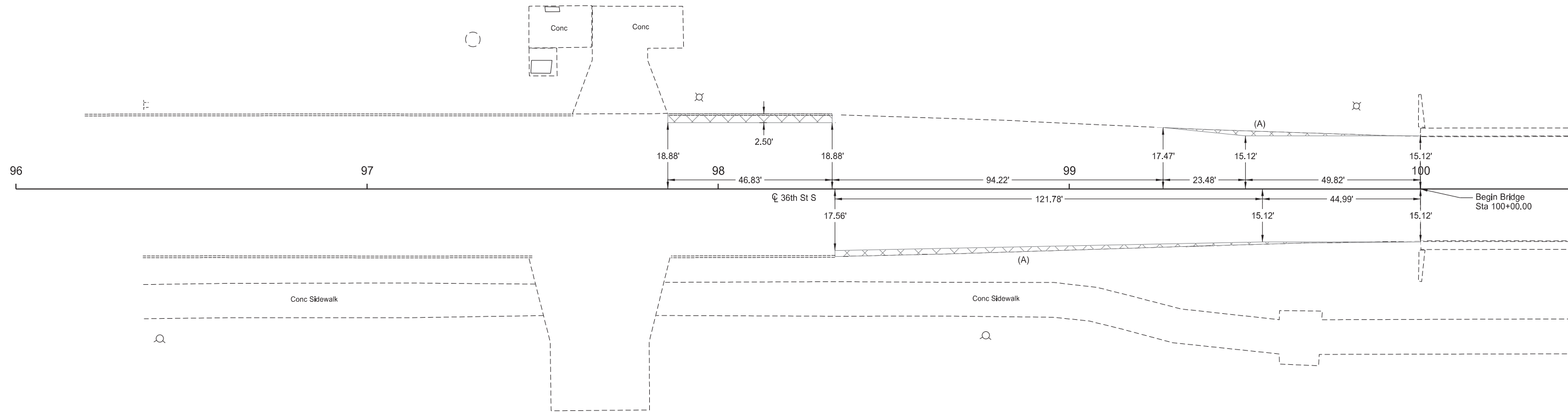
Northbound I-29





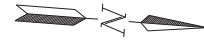
23 USC § 407 Documents  
 NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	3



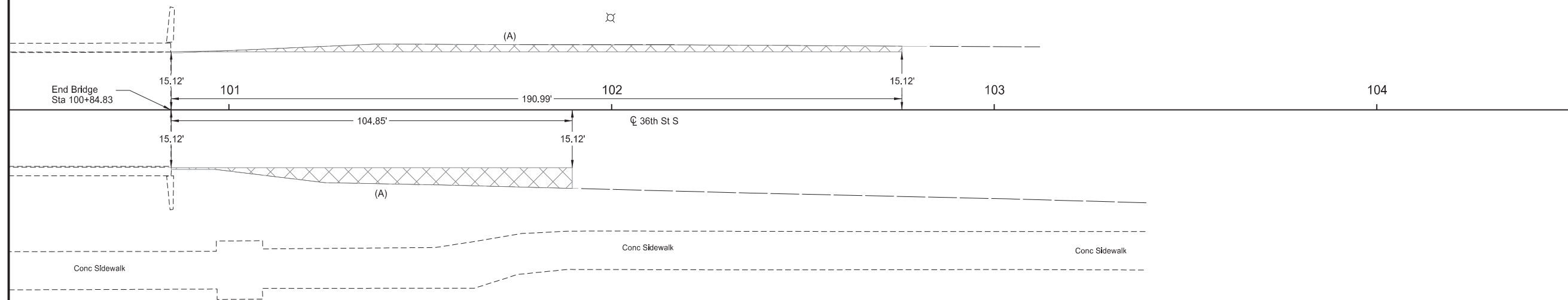
(A) Remove existing concrete at a 6" offset from the front face of post.  
 See Section 10 for the removal of concrete (SY).

<p>Thrie/W-Beam Guardrail Layout          Pavement Removals          At Beginning of Bridge</p> <p>Bridge 29-061.417 T          I-29 Rose Coulee</p> <p>36th St S</p>	
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23 USC § 407 Documents  
 NDDOT Reserves All Objections

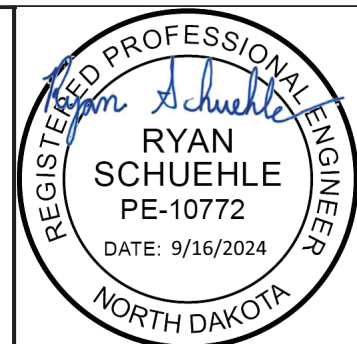
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	4

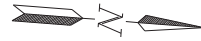


(A) Remove existing asphalt at a 6" offset from the front face of post.  
 See Section 10 for the removal of bituminous surfacing (SY).

Thrie/W-Beam Guardrail Layout  
 Pavement Removals  
 At End of Bridge  
 Bridge 29-061.417 T  
 I-29 Rose Coulee

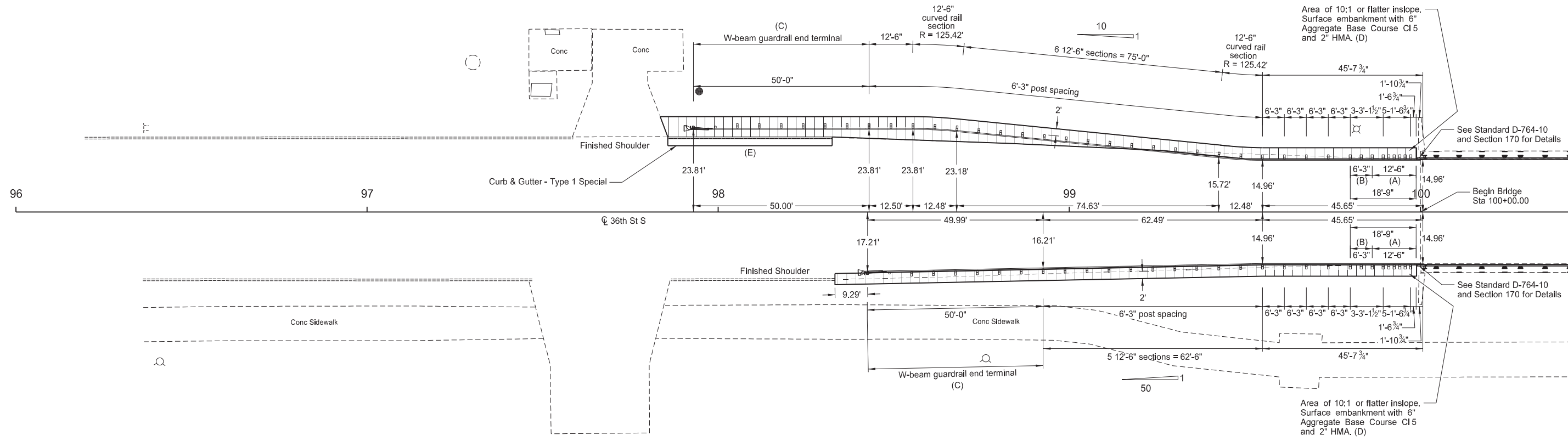
36th St S





23 USC § 407 Documents  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	5

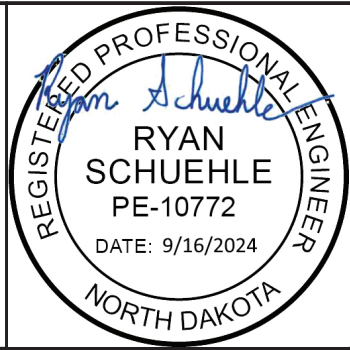


- (A) Thrie beam rail section (double thickness)
- (B) Symmetrical W-Thrie beam transition section (double thickness)
- (C) Install a SKT End Terminal at this location. See Standard D-764-5.
- (D) See Section 10 for guardrail pad surfacing quantities.
- (E) Install and tie curb and gutter to adjacent PCC pavement in accordance with Standard Drawing D-748-1, except with a 3" curb height and 24" gutter pan.  
Include all costs for constructing the curb and gutter as described above in the contract unit price bid for "Curb & Gutter - Type 1 Special."

Thrie/W-Beam Guardrail Layout  
At Beginning of Bridge

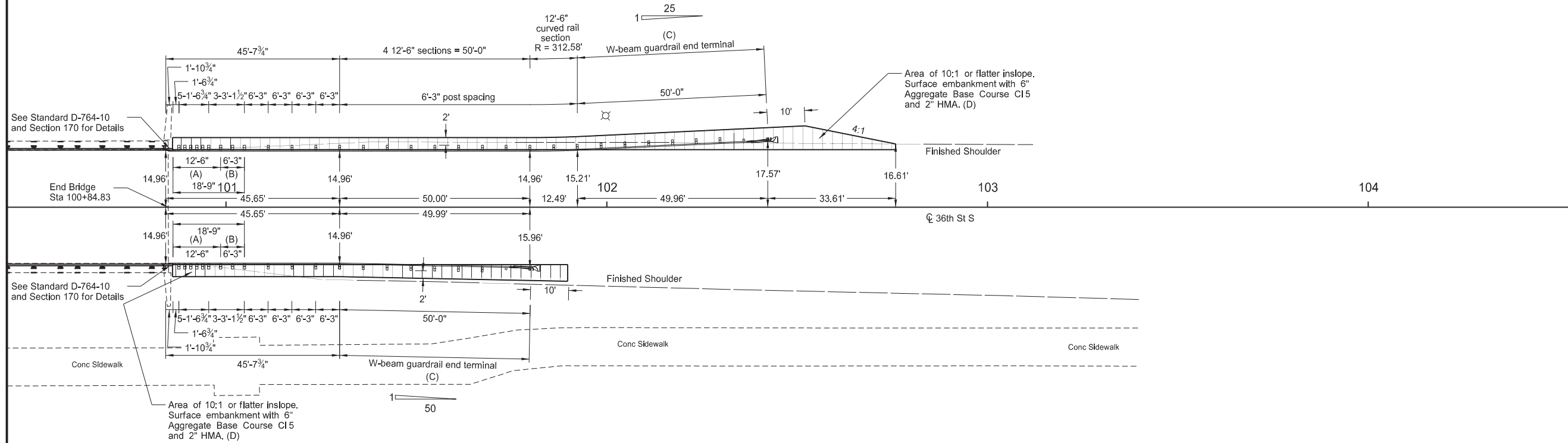
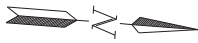
Bridge 29-061.417 T  
I-29 Rose Coulee

36th St S



23 USC § 407 Documents  
 NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	6

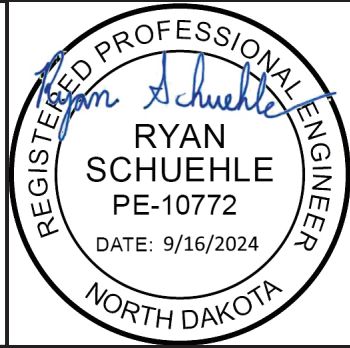


- (A) Thrie beam rail section (double thickness)
- (B) Symmetrical W-Thrie beam transition section (double thickness)
- (C) Install a SKT End Terminal at this location. See Standard D-764-5.
- (D) See Section 10 for guardrail pad surfacing quantities.

Thrie/W-Beam Guardrail Layout  
 At End of Bridge

Bridge 29-061.417 T  
 I-29 Rose Coulee

36th St S



23 USC § 407 Documents  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	130	7

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES																
THRIE/W-BEAM GUARDRAIL AT BRIDGE ENDS																
LOCATION	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(B)
	5/8" DIA. x 18" LONG GUARD-RAIL BOLT	6" x 8" x 6'-0" TIMBER POST	6" x 8" x 14" ROUTED TIMBER BLOCK	5/8" DIA. x 1-1/4" LONG GUARD-RAIL BOLT	12'-6" STRAIGHT W-BEAM RAIL SECTION	12'-6" CURVED W-BEAM RAIL SECTION	REFLECTORIZED PLATES	8" x 8" x 6'-0" TIMBER POST	8" x 8" x 22" TIMBER OFFSET BLOCK	8" x 8" x 18" TIMBER OFFSET BLOCK	8" x 8" x 14" TIMBER OFFSET BLOCK	6'-3" DOUBLE W-THRIE BEAM TRANSITION SECTION	12'-6" DOUBLE THRIE BEAM SECTION	2'-6" THRIE BEAM TERMINAL CONNECTOR	7/8" DIA. x 3/4" LONG HEX HEAD BOLT	EMBANKMENT
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY
Sta 98+42.53 to Sta 100+00.77 Rt	31	14	14	64	7		8	9	7	1	1	1	1	1	5	
Sta 97+92.96 to Sta 100+00.77 Lt	39	22	22	96	9	2	10	9	7	1	1	1	1	1	5	
Sta 100+84.06 to Sta 101+79.81 Rt	21	4	4	24	2		5	9	7	1	1	1	1	1	5	
Sta 100+84.06 to Sta 102+42.27 Lt	31	14	14	64	6	1	8	9	7	1	1	1	1	1	5	38
<b>TOTAL</b>	<b>122</b>	<b>54</b>	<b>54</b>	<b>248</b>	<b>24</b>	<b>3</b>	<b>31</b>	<b>36</b>	<b>28</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>20</b>	<b>38</b>

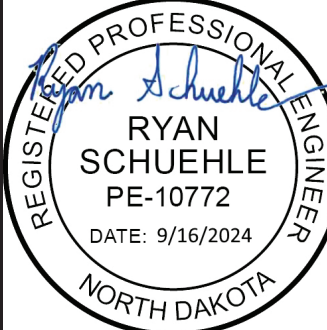
SPEC CODE BID ITEM	QTY	UNIT	SPEC CODE BID ITEM	QTY	UNIT
203 0218 GUARDRAIL EMBANKMENT			764 0145 W-BEAM GUARDRAIL END TERMINAL		
Sta 100+85.93 to Sta 102+75.88 Lt	1	EA	Sta 98+42.53 to Sta 98+92.53 Rt	1	EA
			Sta 97+92.96 to Sta 98+42.96 Lt	1	EA
748 0141 CURB & GUTTER-TYPE 1 SPECIAL			Sta 101+29.81 to Sta 101+79.81 Rt	1	EA
Sta 97+85.64 to Sta 98+32.47 Lt	47	LF	Sta 101+92.31 to Sta 102+42.27 Lt	1	EA
			Total	4	EA
764 0131 W-BEAM GUARDRAIL			764 2081 REMOVE END TREATMENT & TRANSITION		
Sta 98+92.53 to Sta 100+00.77 Rt	108.2	LF	Sta 99+47.79 to Sta 100+01.83 Rt	1	EA
Sta 98+42.96 to Sta 100+00.77 Lt	158.2	LF	Sta 97+90.65 to Sta 98+93.64 Lt	2	EA
Sta 100+84.06 to Sta 101+29.55 Rt	45.7	LF	Sta 99+47.90 to Sta 100+01.83 Lt	1	EA
Sta 100+84.06 to Sta 101+92.30 Lt	108.2	LF	Sta 100+83.00 to Sta 101+18.25 Rt	1	EA
Total	420.3	LF	Sta 100+83.00 to Sta 101+37.06 Lt	1	EA
			Total	6	EA

- (A) Include these items in the contract unit price bid for "W-Beam Guardrail".
- (B) The volume balance of embankment (cubic yards) is for informational purposes only.

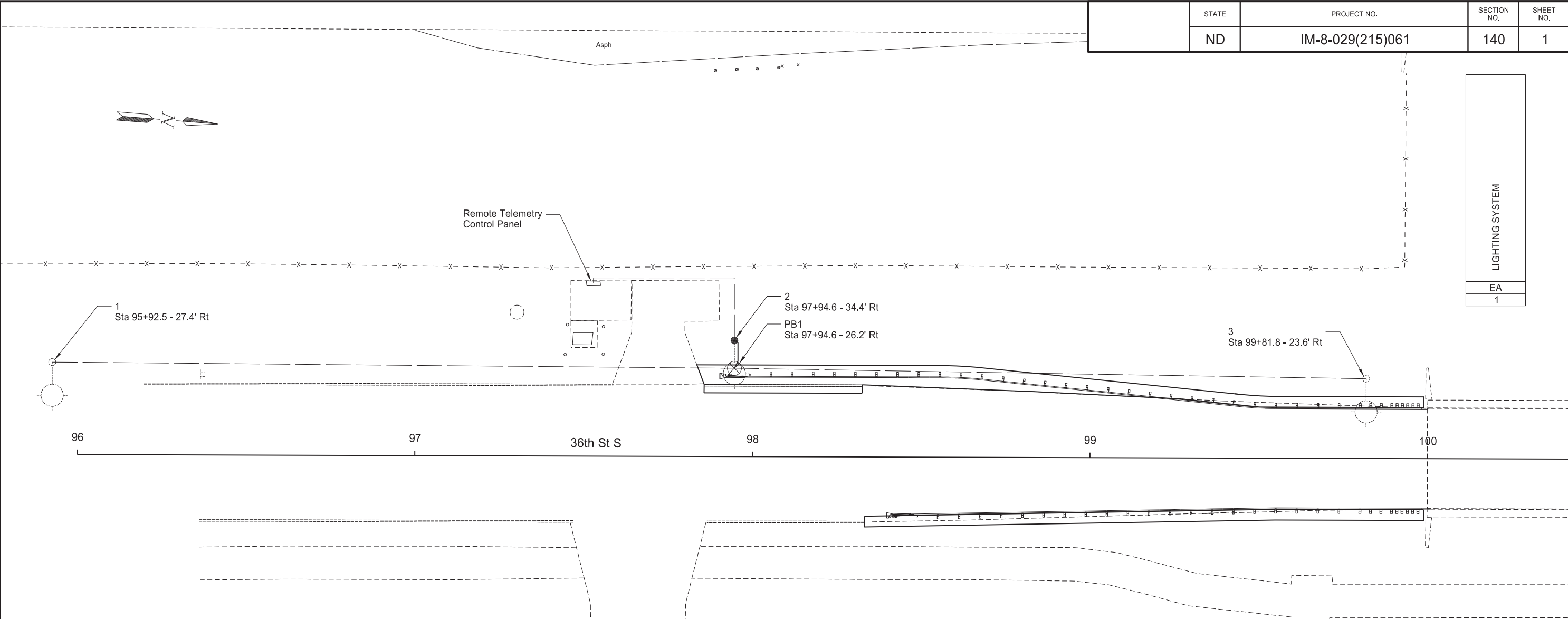
Thrie/W-Beam Guardrail Quantities

Bridge 29-061.417 T  
I-29 Rose Coulee

36th St S



REGISTERED PROFESSIONAL ENGINEER  
**RYAN SCHUEHLE**  
PE-10772  
DATE: 9/16/2024  
NORTH DAKOTA



LIGHTING SYSTEM

EA
1

Lighting - Existing							
No.	Station	Offset	Wattage	Circuit	Pole Ht.	Mast Arm	Note
1	95+92.5	27.4' Rt		1			Note 1
2	97+94.6	34.4' Rt		1			Note 2
3	99+81.8	23.6' Rt		1			Note 1

Lighting - Existing Notes:  
 1. Existing Lighting Unit.  
 2. Existing Lighting Unit to be relocated.

Notes:  
 Feed Point Cabinet is located in the northwest corner of 40th Ave S and 36th St S.

**LEGEND**

- Concrete Light Foundation
- Conduit
- Pull Box
- Existing Lighting Unit
- Existing Concrete Light Foundation
- Existing Conduit

Relocate Street Light Shall consist of:  
 The removal and re-installation of the existing street light and the removal and disposal of the existing concrete base, the installation of a new 2" dia. by 6' deep concrete base (the contractor will verify the new location of the street light with the project engineer).

Incidental to this work, the contractor will extend the existing underground street light conductor (use the approved City of Fargo underground splice requirements). Coordinate with installation of the guardrail, existing wiring from light #2 to light #3 may be impacted. If impacted, furnish and install new conduit and wire.

The contractor will also be responsible for the existing MDS antenna that is mounted to the street light standard. The underground 2" PVC conduit will need to be shortened and reconnected to the PVC coated exposed conduit that is attached to the outside of the street light standard. The existing coax cable connecting the antenna and the telemetry control panel will be reused. Strap conduit to light pole a minimum every 5'.

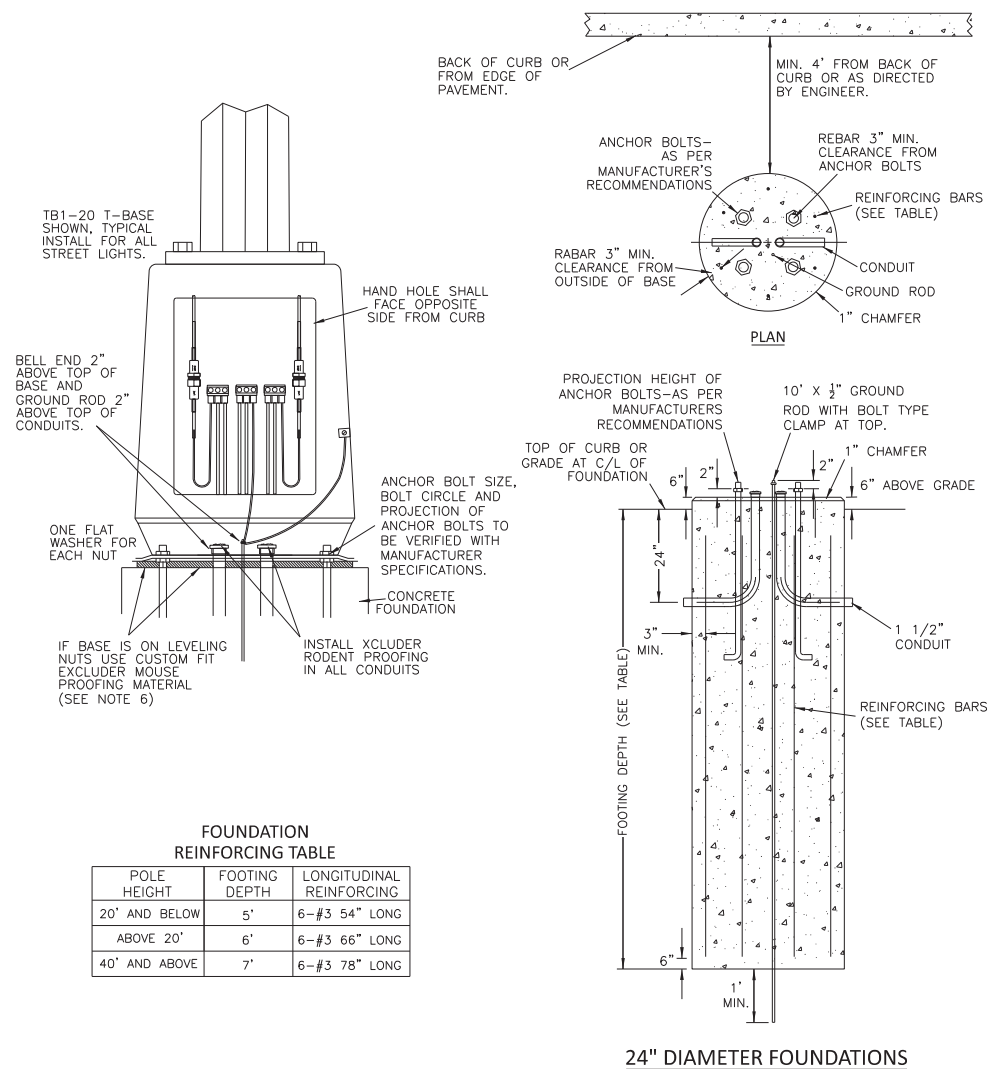
All labor and materials needed to perform the above items and other items not mentioned to complete the relocation of the street light are incidental to the price bid for "Relocate Street Light System."

Point	Station	Conduit Runs		Cable Trench Length (ft)	Cable Runs	
		Length (ft)	Size		Length (ft)	Type
1 TO PB1	95+92.5 - 27.4' Rt 97+94.6 - 26.2' Rt				4	3 No 4 STYLE USE
PB1 TO 3	97+94.6 - 26.2' Rt 99+81.8 - 23.6' Rt				4	3 No 4 STYLE USE
PB1 TO 2	97+94.6 - 26.2' Rt 97+94.6 - 34.4' Rt	10	2"		20	3 No 6 STYLE USE

Lighting Layout

Bridge 29-061.417 T  
 I-29 Rose Coulee  
 36th St S

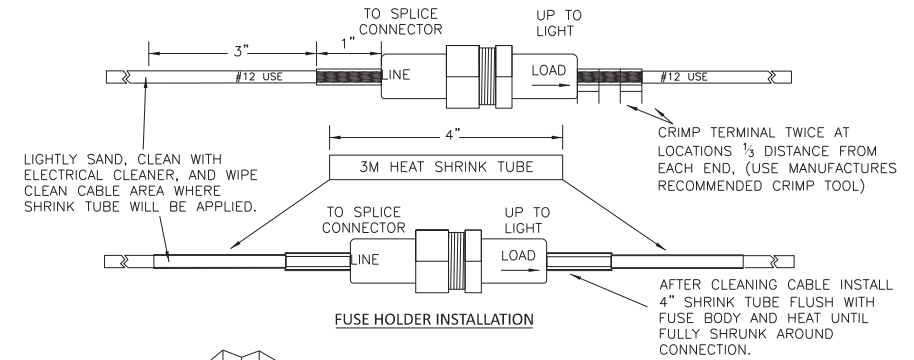




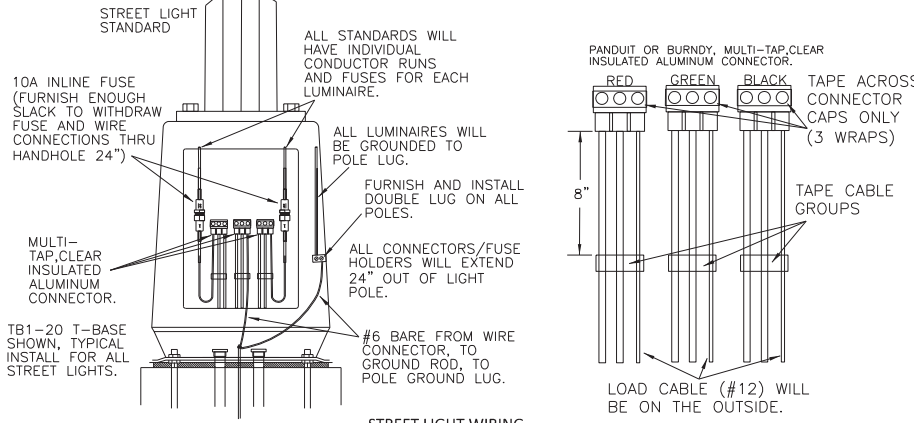
- NOTES:**
- SEE PLANS FOR CORRECT LOCATION OF FOUNDATION. THE GRADE AND EXACT LOCATION SHALL BE ESTABLISHED BY THE ENGINEER IN THE FIELD.
  - ANCHOR BOLT SIZE, BOLT CIRCLE AND PROJECTION OF ANCHOR BOLTS TO BE VERIFIED WITH MANUFACTURER SPECIFICATIONS.
  - THE FOUNDATION SHALL PROVIDE A MINIMUM OF 3" OF CONCRETE COVER FROM THE ANCHOR BOLTS TO THE REBAR, AND A MINIMUM OF 3" OF CONCRETE COVER OVER THE REBAR TO THE OUTSIDE OF THE FOUNDATION.
  - GROUND ROD SHALL BE PLACED PRIOR TO CONCRETE PLACEMENT. THE ROD SHALL PROJECT 4" ABOVE THE FINISHED FOUNDATION AND SHALL EXTEND A MINIMUM OF 12" BELOW THE FOUNDATION BOTTOM.
  - CONDUIT BENDS SHALL BE 90°. CONDUIT SHALL BE LOCATED 24" MINIMUM BELOW GROUND LEVEL. BASES AT THE END OF CIRCUIT WILL HAVE A SPARE CAPPED CONDUIT.
  - T-BASES XCLUDER LIGHT POLE GASKET 2800G ITEM#162728, (2) MAY BE NEEDED FOR PROPER SEAL.
  - ALL REINFORCING STEEL TO BE GRADE 40 OR 60.
  - SEE PLANS FOR CONDUIT SIZE, NUMBER OF BENDS AND CORRECT POSITIONING FOR EACH FOUNDATION.
  - THE TOP OF THE FOUNDATION SHALL BE CIRCULAR. IF APPROVED BY THE ENGINEER A SQUARE CASING MAY BE USED. PRIOR TO FINAL GRADING OR SIDEWALK PLACEMENT THE CASING TUBES SHALL BE REMOVED TO A POINT 6" BELOW GRADE.
  - IF FOUNDATIONS NEED TO BE INSTALLED NEAR EXISTING LOCATES SUCH AS, WATER OR SEWER PIPE, SHORING SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT. IF VOIDS ARE CREATED DUE TO DRILLING FOUNDATIONS VOIDS SHALL BE FILLED WITH A CONCRETE FLOWABLE FILL.

- CONCRETE NOTES:**
- CONCRETE USED IN THE WORK SHALL BE PORTLAND CEMENT CONCRETE MIXED AND PROPORTIONED AS SPECIFIED IN SECTION 2100 OF THE CITY OF FARGO STANDARD SPECIFICATIONS FOR CONSTRUCTION.
  - CONTRACTOR IS RESPONSIBLE FOR CALLING OR NOTIFYING ENGINEER BEFORE CONCRETE IS ORDERED, NO CONCRETE SHALL BE INSTALLED UNTIL CONCRETE IS TESTED.
  - CONCRETE SHALL MEET THE FOLLOWING TESTS:
    - AIR CONTENT BETWEEN 5% TO 8%
    - SLUMP BETWEEN 2" TO 4"
    - MAX TEMP OF 90 DEGREES
  - CONCRETE SHALL ATTAIN A COMPRESSIVE STRENGTH OF 3500 PSI BEFORE STREET LIGHT STANDARD IS INSTALLED AND SHALL ATTAIN A COMPRESSIVE STRENGTH OF 4500 PSI WITHIN 28 DAYS TO BE ACCEPTED.
  - IF FOUNDATION IS DRILLED/EXCAVATED IN AN AREA THAT IS CAVING IN, THE AREA NEEDS TO BE SHORED TO A DEPTH THAT PREVENTS ANY CAVING IN. CONTRACTOR SHALL FILL AND COMPACT CAVED IN AREA AROUND FOUNDATION TO ENGINEER'S SATISFACTION. IF CONTRACTOR IS NOT ABLE TO COMPACT TO 90% COMPACTION, FLOWABLE FILL SHALL BE USED.

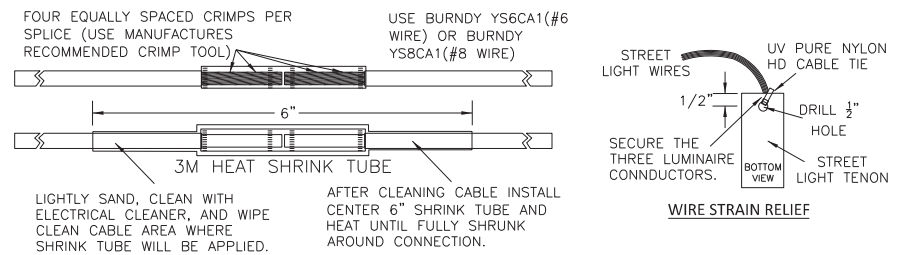
CONCRETE BASE DETAIL



FUSE HOLDER INSTALLATION



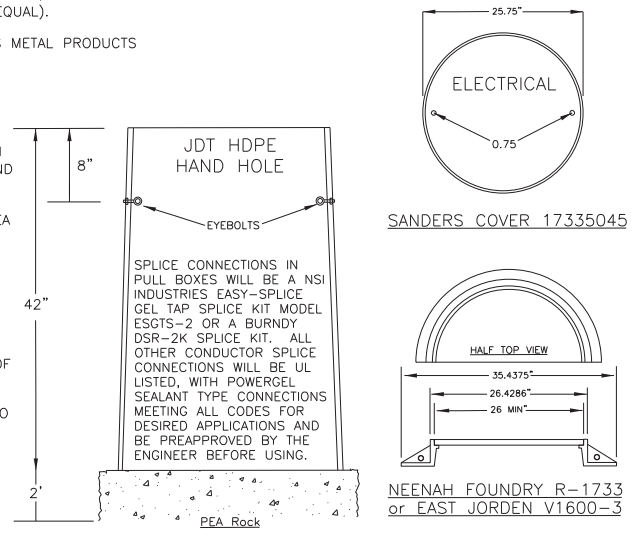
STREET LIGHT WIRING



CIRCUIT EXTENSION SPLICE  
STANDARD WIRING, SPLICES, STRAIN RELIEF

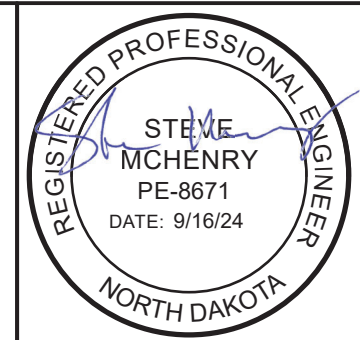
- MATERIAL NOTES:**
- ALL CASTINGS ARE GRAY IRON AS PER SPEC. 3321 CLASS 35B.
  - ALL PULL BOXES IN CONCRETE SHALL USE: JDT HDPE BOX, NEENAH FOUNDRY R-1733 CASTING AND COVER(OR APPROVED EQUAL).
  - ALL COVERS SHALL BE PN: 17335045 FROM SANDERS METAL PRODUCTS AND HAVE "ELECTRIC" ON THEM.
- INSTALLATION NOTES:**
- TWO STAINLESS/GALVANIZED TYPE 2 SHOULDER EYEBOLTS, 3/8" DIA. X 1 1/4" SHANK LENGTH, WITH HEX. NUTS AT 180° APART (FOR LIFTING HANDHOLES AND SUPPORTING ELECTRICAL CABLES)
  - PLACE COMPACTED 2'-0" AGGREGATE DRAIN BED(PEA ROCK) BELOW BOTTOM OF HANDHOLE, TO THE SATISFACTION OF THE ENGINEER.
  - CONDUIT HOLES DIAMETER LOCATED IN THE BARREL SECTION ARE SIZED NO LARGER THAN THE CONDUIT OUTSIDE DIAMETER USED.
  - AFTER HANDHOLE AND CONDUIT INSTALLATION, SEAL ALL INSIDE WALLS WATER TIGHT TO THE SATISFACTION OF THE ENGINEER.
  - ALL CONDUITS SHALL EXTEND A MAXIMUM OF 3" INTO PULL BOX.
  - ALL PULL BOXES AND COVERS SHALL BE A MINIMUM OF 12" FROM BACK OF CURB UNLESS APPROVED BY ENGINEER.

PULL BOX, METAL FRAME AND COVER DETAIL

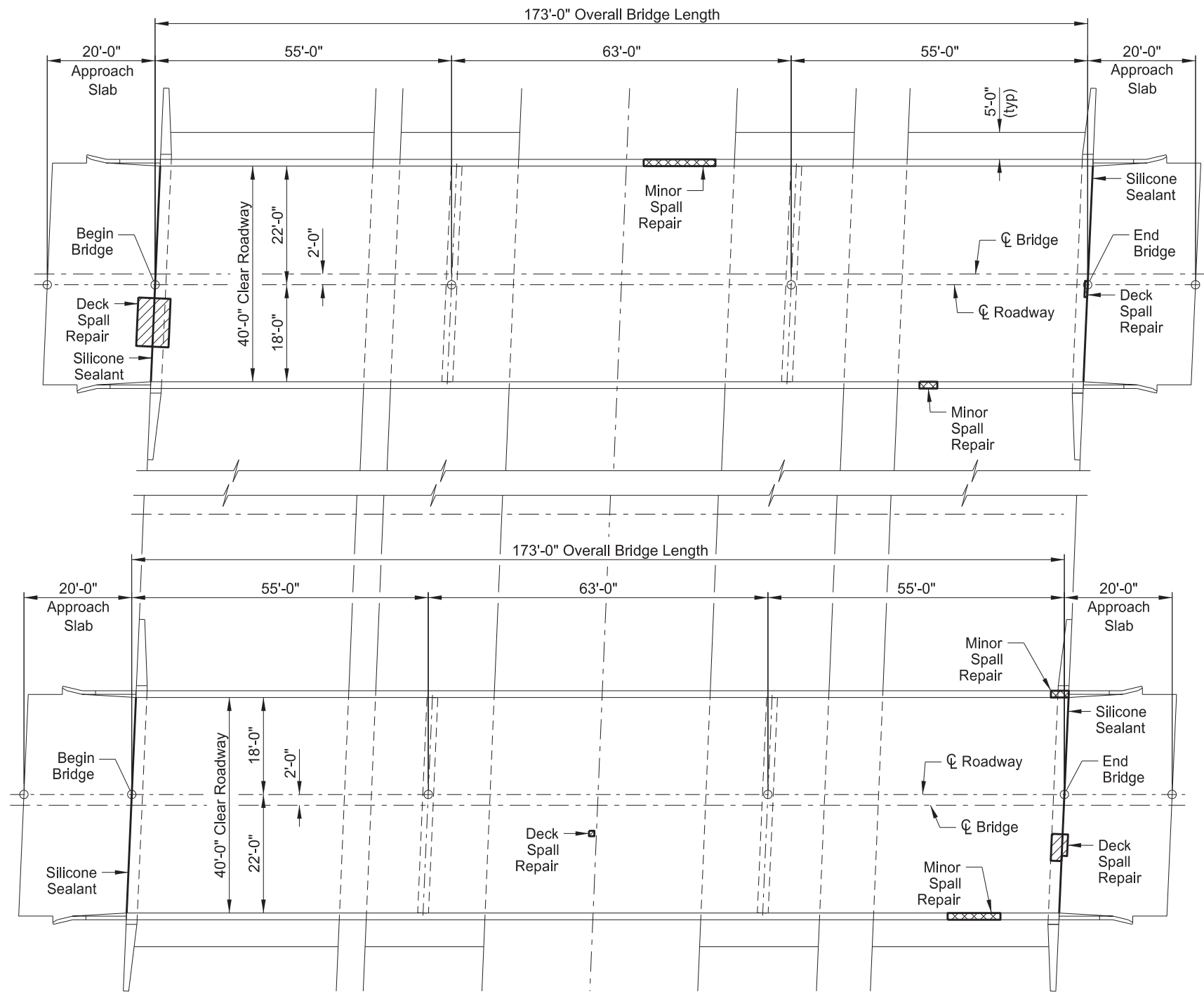
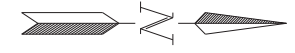


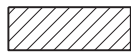
Street Lighting Detail

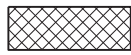
Bridge 029-061.417 T  
I-29 Rose Coulee  
36th St S



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 Hatched area indicates deck spall repair.

 Indicates minor spall repair area.

PLAN



40TH AVENUE SW SEPARATION  
FARGO

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION  
BRIDGE DIVISION

*Jason Thorenson* Jason Thorenson  
09/18/24

DRAWING NO. 29-061.245L&R-1

BRIDGE BID ITEMS (29-061.245L)				BRIDGE BID ITEMS (29-061.245R)					
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY	SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	770	602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	770
602	1260	BRIDGE DECK CRACK SEALING	LF	644	602	1260	BRIDGE DECK CRACK SEALING	LF	435
602	7000	SPECIAL SURFACE FINISH	SF	1,185	602	7000	SPECIAL SURFACE FINISH	SF	1,185
650	0805	DECK SPALL REPAIR	SF	144	650	0805	DECK SPALL REPAIR	SF	310
930	8644	SILICONE SEALANT	LF	85	930	8644	SILICONE SEALANT	LF	85
930	9605	SPALL REPAIR - MINOR	SF	20	930	9605	SPALL REPAIR - MINOR	SF	12

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	2

**NOTES**

- 100 SCOPE OF WORK: This project consists of deck spall repair, minor spall repair, joint sealing, crack sealing, penetrating water repellent treatment, and applying special surface finish to the barriers.
- 602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.
- 602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the driving surface of the bridge deck, approach panels, and the raised median curb on the bridge and approach panels. Apply penetrating water repellent solution prior to sealing any bridge deck cracks. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- 602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck and approach slabs to determine the need for crack sealing. Mark and seal all visible cracks appearing on the top surface 0.02" or greater at its widest segment or as directed by the Engineer.
- Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.02" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.
- 602 SPECIAL SURFACE FINISH: After the repairs to the concrete barriers have been completed, clean the exposed surfaces of the barrier using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, laitance, and loose or flaking coatings. Fill cracks larger than 0.02" with Tex-Cote Skim Cote or an approved crack sealer compatible with Tex-Cote XL Bridge Cote.
- Apply Tex-Cote XL 70 Bridge Cote with Silane to the top and inside faces of the barriers on the bridge deck and approach slabs. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.
- 650 DECK SPALL REPAIR: The bridge deck and/or approach slabs have surface spall areas. The actual limits of the surface spall area to be repaired will be determined by the Engineer in the field by sounding areas with visible surface spalls and/or locations designated in the plans for deck spall repairs.
- Complete the deck spall repairs in accordance with the construction requirements of Section 650.04 and the following.
- Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete, whichever is greater.
  - Complete removals using mechanical equipment, with the exception that a milling machine specified for Class 1 removals will not be required.
  - Use Class AE concrete meeting 602.03 B to restore the full depth of the repair area. Place, finish and cure per Section 650.04 F.1.
  - Concrete placement using a buggy or pump is not required.
  - Section 650.04 E "Mixing of Materials" is waived. Use of a mobile mixer is not required.
  - Perform grooving according to Section 602.04 D.2 "Approach Slab Tining".
- Include all labor, equipment, and materials required to remove the concrete and repair the bridge deck and/or approach slab spall areas in the bid item "Deck Spall Repair."

- 930 SILICONE SEALANT: Remove and replace the silicone sealant in the joint between the approach slabs and deck at both ends of the bridge. Clean the joint of all foreign material and sand blast before the new silicone sealant is installed. Include all materials, labor, and equipment required to remove and replace the silicone sealant in the bid item "Silicone Sealant."
- 930 SPALL REPAIR – MINOR: Repair the areas of minor spalling using a two-part neat epoxy (no sand) compound meeting ASTM C 881, Type I or IV. Follow the repair procedure outlined below.

Surface Preparation:

- Remove any damaged or loose concrete using hand tools or power-driven chipping hammers (15 lb. max size).
- Sand blast clean any rust on the exposed reinforcing steel.
- Clean the existing concrete surface by light sand blasting or high pressure water blasting.

Mixing:

- Measure and mix the proper quantity of each component per the manufacturer's recommendations.
- Mix the components thoroughly using a low-speed electric drill and a clean "Jiffy" type mixing paddle. Do not mix the components by hand.

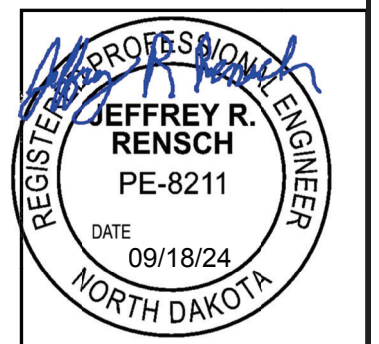
Application:

- Ensure the surface of the substrate is clean and dry prior to applying the epoxy compound.
- Ensure the surface temperature of the substrate, and the ambient air temperature, are within the range specified by the manufacturer.
- Brush, roll, or scrub the epoxy compound into the substrate to ensure all small voids are filled.
- Cover the entire repair area, including any exposed reinforcing steel, with a minimum thickness of 20 mils of epoxy compound.

Curing:

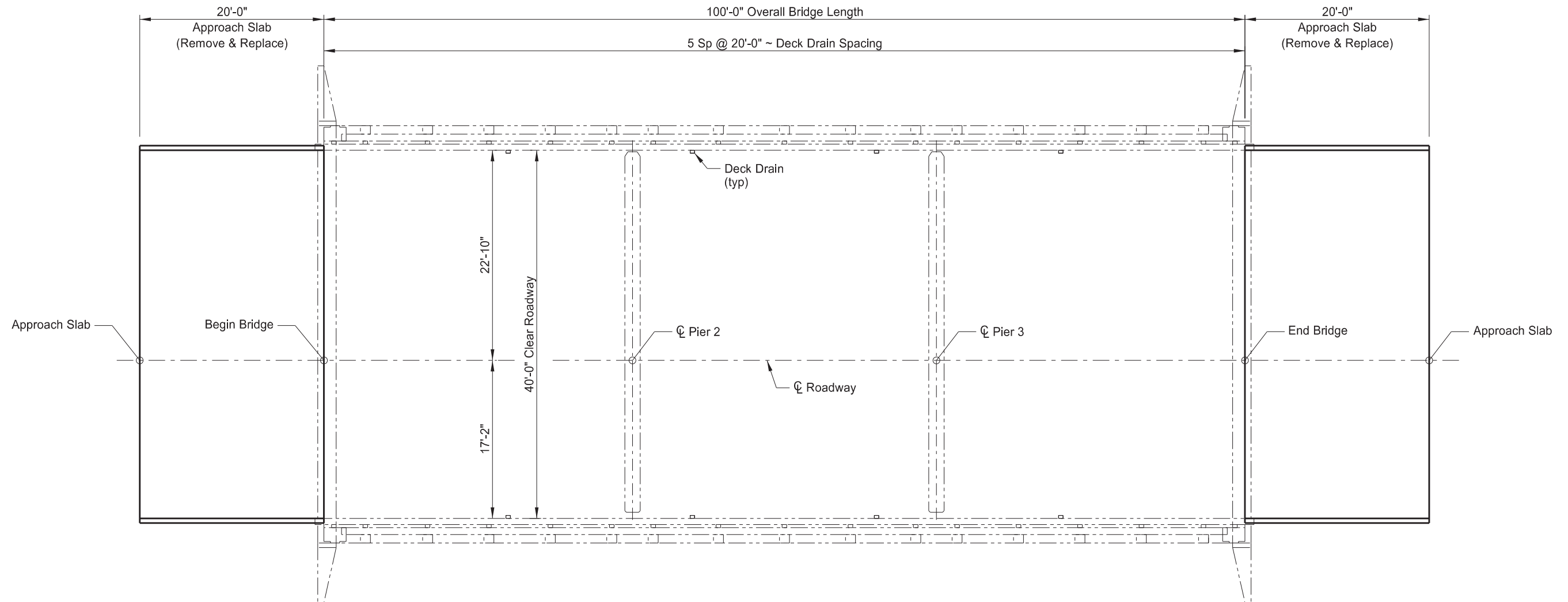
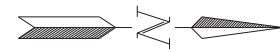
- Follow the manufacturer's recommendations for curing after application of the epoxy compound.

The estimated spall repair areas and locations are shown in Dwg 29-061.245L&R-1. The actual limits of the spall repairs will be determined by the Engineer. A minimum area of 1 SF will be paid at each spall repair location. Include all labor, equipment, and materials needed to repair the spall areas in the unit price bid for "Spall Repair – Minor".



23 U.S.C. 407  
NDDOT Reserves All Objections

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PLAN

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	182.2
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	622
602	7000	SPECIAL SURFACE FINISH	SF	1400
650	0704	OVERLAY CONCRETE	CY	34.0
650	0707	DECK CONCRETE	CY	1.6
650	0710	CLASS 1-H REMOVAL	SY	444
650	0720	CLASS 1 REMOVAL	SY	444
650	0723	CLASS 3 REMOVAL	SY	15
650	0724	CLASS 4 REMOVAL	SY	2
930	9534	MODIFY DECK DRAIN	EA	8
930	9605	SPALL REPAIR - MINOR	SF	19
930	9612	SPALL REPAIR	SF	17
930	9639	APPROACH SLAB LIP REPAIR	LF	89.6



SPECIAL PROVISIONS

SP 197(24)	HYDRODEMO & DECK OVERLAY
SP 204(24)	CONCRETE SPALL REPAIR

ROSE COULEE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION  
BRIDGE DIVISION

*Jason Thorenson*

Jason Thorenson  
09/18/24

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	4

**NOTES**

100 SCOPE OF WORK: Work at this site consists of placing a deck overlay; removing and replacing approach slabs; repairing spalls on the curbs, posts, rails, and underside of the deck; extending deck drains; crack sealing; applying special surface finish; and applying penetrating water repellent treatment.

602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.

602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent solution to the top of the bridge deck overlay and approach slabs. Do not apply crack sealant, pavement marking, or allow traffic until the solution has completely penetrated and the entire driving surface is dry.

602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck overlay and approach slabs to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.02" or greater in width at its widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.02" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all labor, equipment, and materials associated with the bridge deck crack sealing in the bid item "Overlay Concrete," and all costs to seal the approach slabs in the price bid for "Bridge Approach Slab-Remove & Replace."

602 SPECIAL SURFACE FINISH: Clean the exposed surfaces of the posts and rails, as well as the top and inside surfaces of the curbs, using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, laitance, and loose or flaking coatings. Fill cracks larger than 0.02" with Tex-Cote Skim Cote or an approved crack sealer compatible with Tex-Cote XL Bridge Cote.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the exposed surfaces of the concrete posts and rails, and to the top and inside surfaces of the curb. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.

650 OVERLAY CONCRETE: An additional 1/2" depth of overlay concrete was included in the overlay concrete quantity to account for the irregular surface profile from hydrodemolition.

930 MODIFY DECK DRAIN: Extend the existing deck drains in accordance with Section 616. Provide HSS tubing meeting ASTM A500 Grade B. Include all labor, equipment, and materials required to extend the deck drains as shown in the plans in the bid item "Modify Deck Drain".

930 SPALL REPAIR – MINOR: Repair the areas of minor spalling on the concrete bridge curb, posts and rails using a two-part neat epoxy (no sand) compound meeting ASTM C 881, Type I or IV. Follow the repair procedure outlined below.

Surface Preparation:

- Remove any damaged or loose concrete using hand tools or power-driven chipping hammers (15 lb. max size).
- Sand blast clean any rust on the exposed reinforcing steel.
- Clean the existing concrete surface by light sand blasting or high pressure water blasting.

Mixing:

- Measure and mix the proper quantity of each component per the manufacturer's recommendations.
- Mix the components thoroughly using a low-speed electric drill and a clean "Jiffy" type mixing paddle. Do not mix the components by hand.

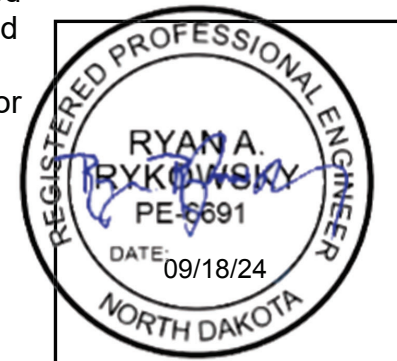
Application:

- Ensure the surface of the substrate is clean and dry prior to applying the epoxy compound.
- Ensure the surface temperature of the substrate, and the ambient air temperature, are within the range specified by the manufacturer.
- Brush, roll, or scrub the epoxy compound into the substrate to ensure all small voids are filled.
- Cover the entire repair area, including any exposed reinforcing steel, with a minimum thickness of 20 mils of epoxy compound.

Curing:

- Follow the manufacturer's recommendations for curing after application of the epoxy compound.

Photos of typical spall repair areas are provided in the supplemental bid information. The actual limits and number of repair locations are to be determined by the Engineer in the field. A minimum area of 1 SF will be paid at each spall repair location. Include all labor, equipment, and materials needed to repair the spall areas in the unit price bid for "Spall Repair – Minor".



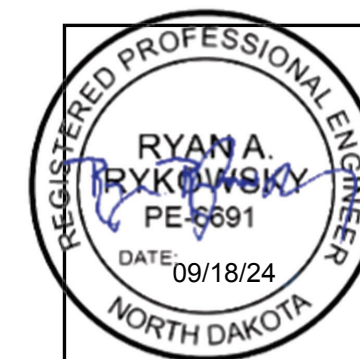
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	5

**NOTES**

SPALL REPAIR - MINOR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#1 & 2	WEST SIDE, CURB NEAR POSTS 8S & 9S	3
#3	WEST SIDE, CURB BETWEEN POSTS 14S & 15S	3
#4	WEST SIDE, POSTS 4S, 7S, 10S	3
#5	WEST SIDE, RAIL S OF POST 1S	1
#6-8	EAST SIDE, POSTS 3S, 7S, 9S & 14S	4
#9	EAST SIDE, RAIL FACE BETWEEN POSTS 3S & 4S	2
#10	EAST SIDE, RAIL FACE BETWEEN POSTS 9S & 10S	2
#11	EAST SIDE, RAIL UNDERSIDE BETWEEN POSTS 14S & 15S	1

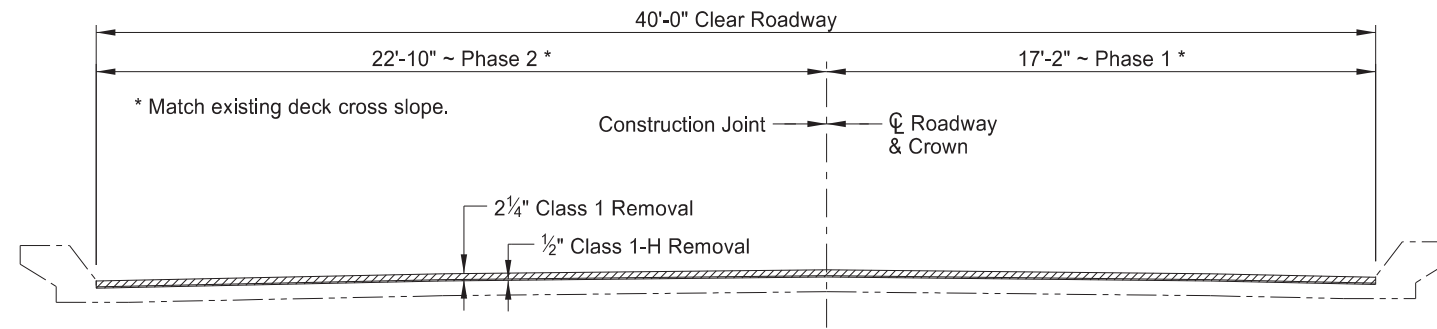
930 SPALL REPAIR: The deck overhangs exhibit spalling on the undersides at the locations shown below. The extents of repairs as shown in the "Spall Repair" table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. At the identified locations, remove all unsound concrete and replace it with new material to the original constructed section. See supplemental bid information for photos. Include all labor, equipment and materials needed for these repairs in the bid item "Spall Repair."

SPALL REPAIR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#12 & 13	WEST SOFFIT, SPAN 2S S OF PIER 3	11
#14	WEST SOFFIT, SPAN 3S	6

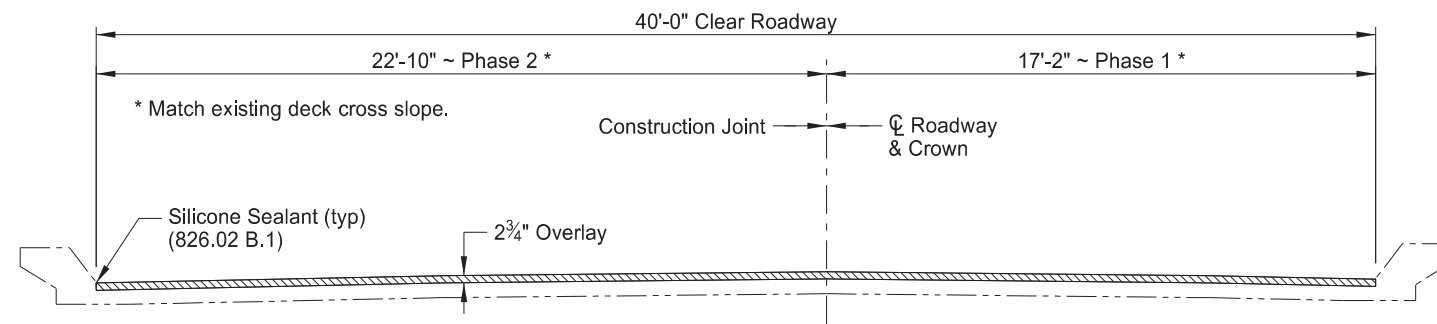


23 U.S.C. 407  
NDDOT Reserves All Objections

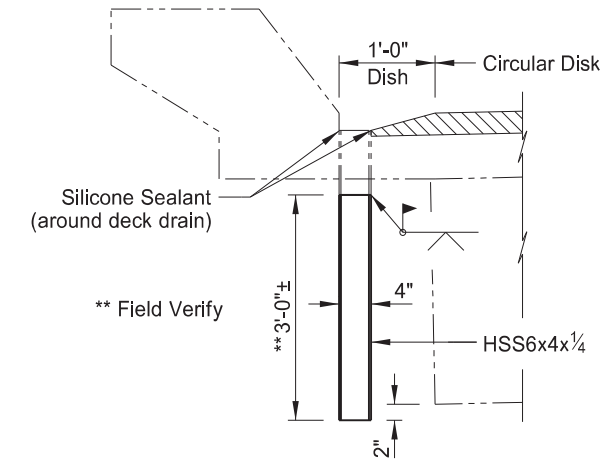
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	6



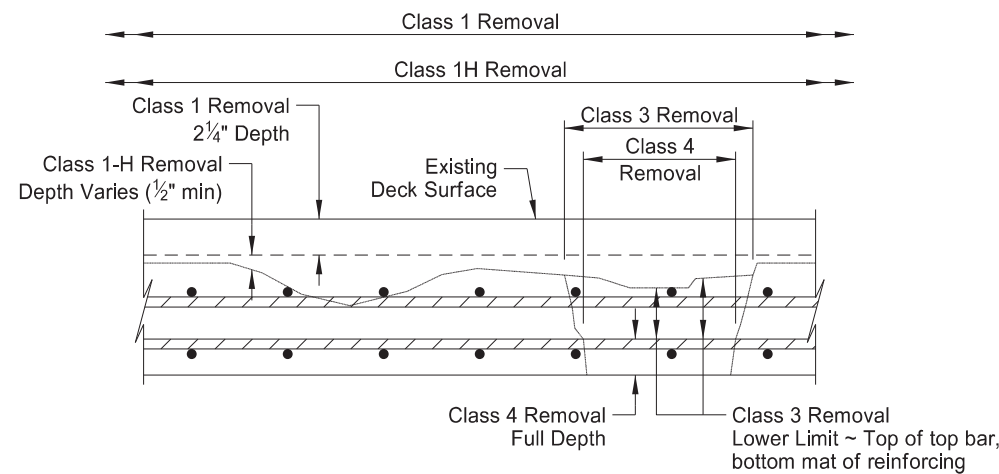
(SHOWING REMOVAL)  
TYPICAL DECK SECTION



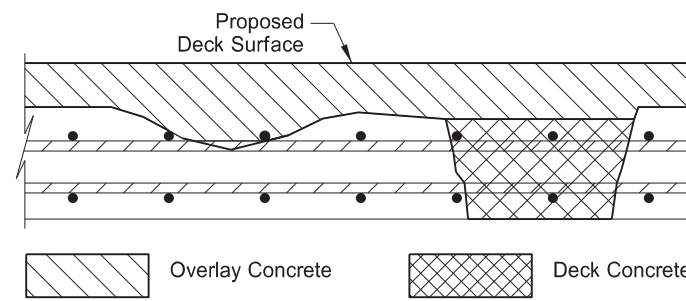
(SHOWING OVERLAY)  
TYPICAL DECK SECTION



DECK DRAIN DETAIL



(SHOWING REMOVALS)  
EXISTING BRIDGE DECK SECTION



(SHOWING DECK & OVERLAY CONCRETE)  
PROPOSED BRIDGE DECK SECTION

QUANTITIES	
OVERLAY CONCRETE	34.0 CY
DECK CONCRETE	1.6 CY
CLASS 1 REMOVAL	444 SY
CLASS 1-H REMOVAL	444 SY
CLASS 3 REMOVAL	15 SY
CLASS 4 REMOVAL	2 SY

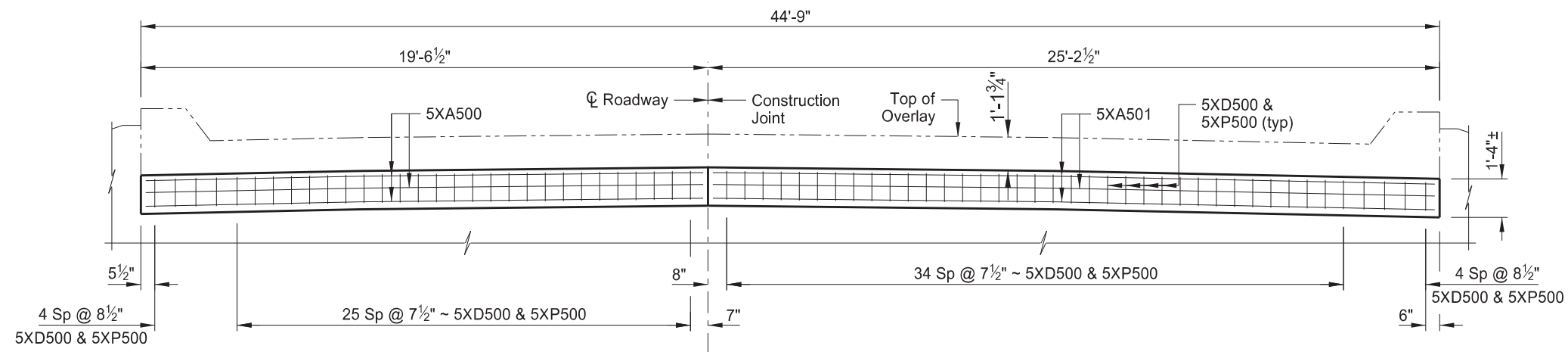


ROSE COULEE

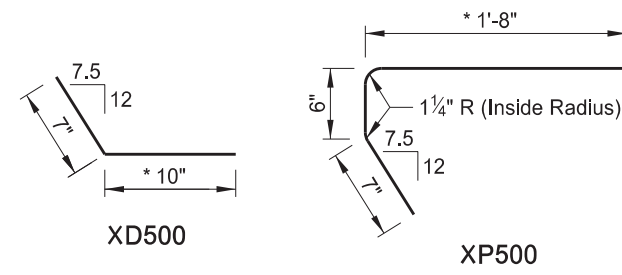
DECK OVERLAY DETAILS

23 U.S.C. 407  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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(SHOWING ONLY NEW REINFORCING)  
**ELEVATION**



(DIMENSIONS SHOWN ARE OUT TO OUT)  
**BENT BAR DETAILS**

SKEW ANGLE = 0°			
<b>BAR LIST - ONE APPROACH LIP</b>			
SIZE	MARK	NO.	LENGTH
5	XA500	3	19'-2"
5	XA501	3	24'-10"
5	*XD500	69	1'-5"
5	*XP500	69	2'-9"
<b>ESTIMATED MATERIAL QUANTITIES</b>			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
438		1.3	

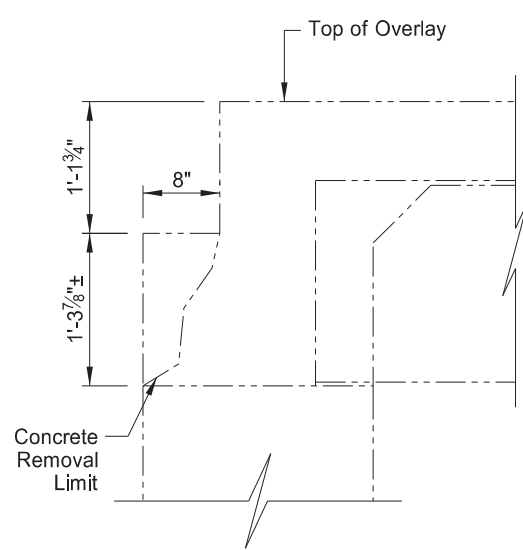
**NOTES:**

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, labor and equipment required to build the approach slab lip in the bid item "Approach Slab Lip Repair". Use Class AAE-3 concrete in accordance with Section 602 and Grade 60 reinforcing steel that meets the requirements of Section 612.

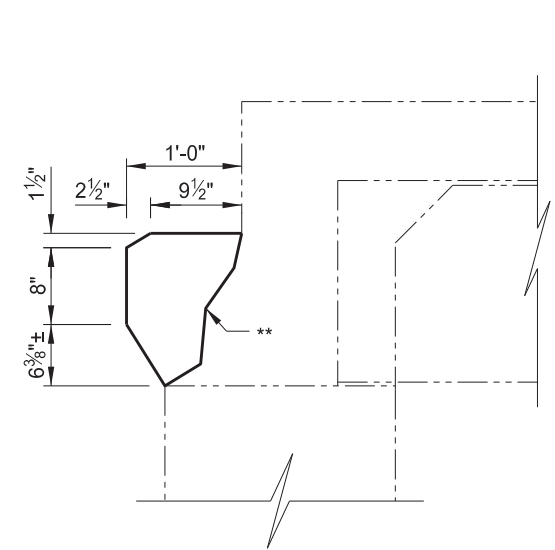
The bar marks beginning with an "X" indicate an epoxy coated bar.

\* Install according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout), and that meets the requirements of Section 806.02. Length may vary depending on manufacturer's recommendations for anchorage. Provide a minimum anchorage length of 9 inches.

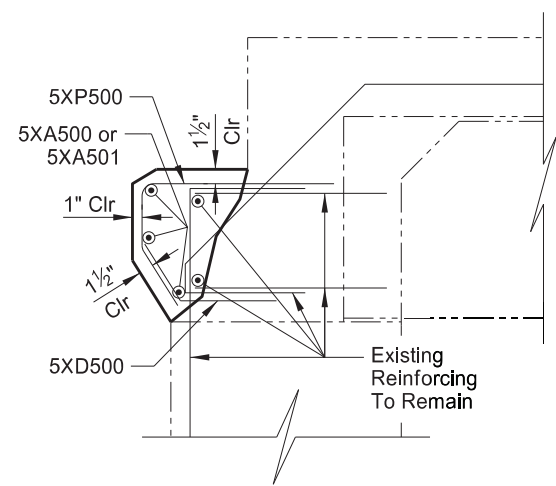
\*\* Bush Hammer Finish: Before any concrete is placed against the existing concrete, prepare surface with a bush hammer to produce a clean rough finish. After the bush hammer finish, prepare the concrete surface in accordance with Section 602.04 H "Construction Joints."



(SHOWING REMOVAL)  
**EXISTING APPROACH SLAB LIP**



(SHOWING DIMENSIONS)  
**NEW APPROACH SLAB LIP**



(SHOWING REINFORCING)  
**NEW APPROACH SLAB LIP**



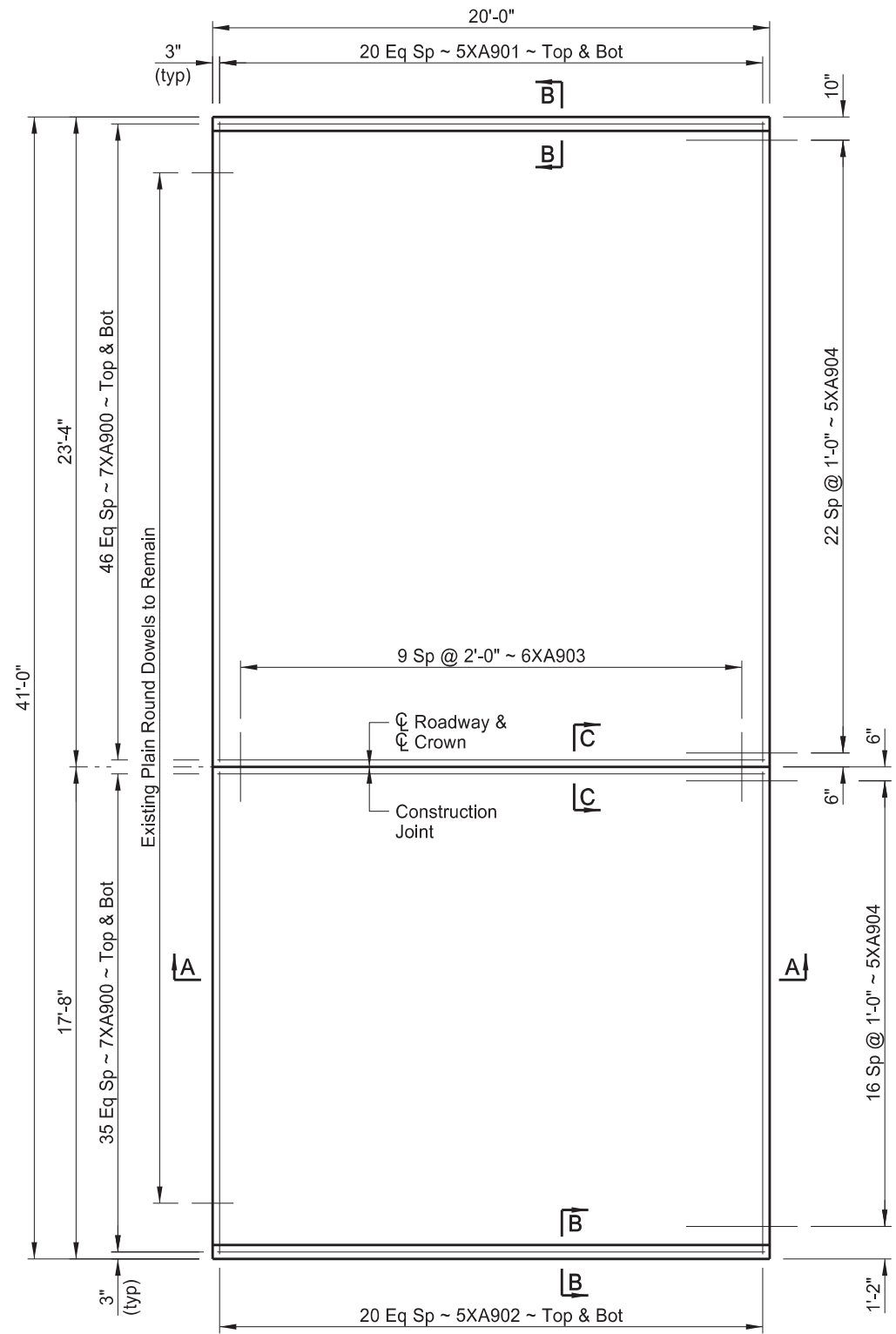
<b>QUANTITIES</b>	(ONE APPROACH LIP)
APPROACH SLAB LIP REPAIR	44.8 LF

ROSE COULEE

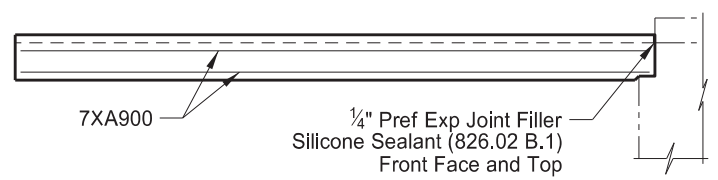
(SHOWING NORTH END, SOUTH END SIMILAR)  
**APPROACH SLAB LIP REPAIR DETAILS**

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NDDOT Reserves All Objections

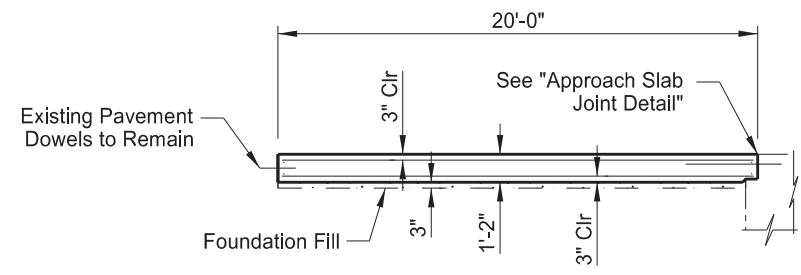
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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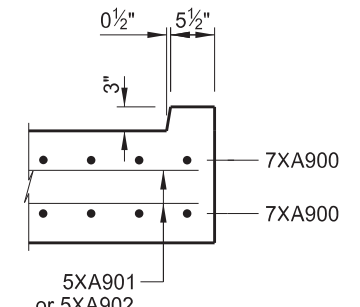
PLAN



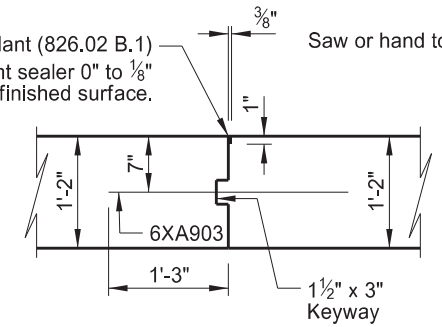
ELEVATION



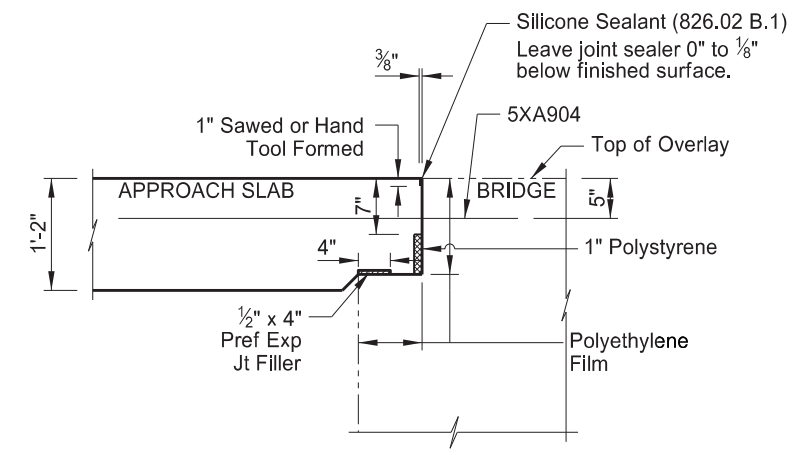
A-A



B-B



C-C



APPROACH SLAB JOINT DETAIL



SKEW ANGLE = 0°

BAR LIST - ONE SLAB			
SIZE	MARK	NO.	LENGTH
7	XA900	166	19'-8"
5	XA901	42	23'-0"
5	XA902	42	17'-4"
6	XA903	10	2'-6"
5	XA904	40	* 4'-0"

ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
8,644	35.4

\* Install 5XA904 bars according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout), and that meets the requirements of Section 806.02. Length may vary depending on manufacturer's recommendations for anchorage. Length based on 1 foot minimum anchorage length.

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, foundation fill, and labor required to build the approach slabs and curbs in the pay item "Bridge Approach Slab-Remove and Replace." Use Class AAE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

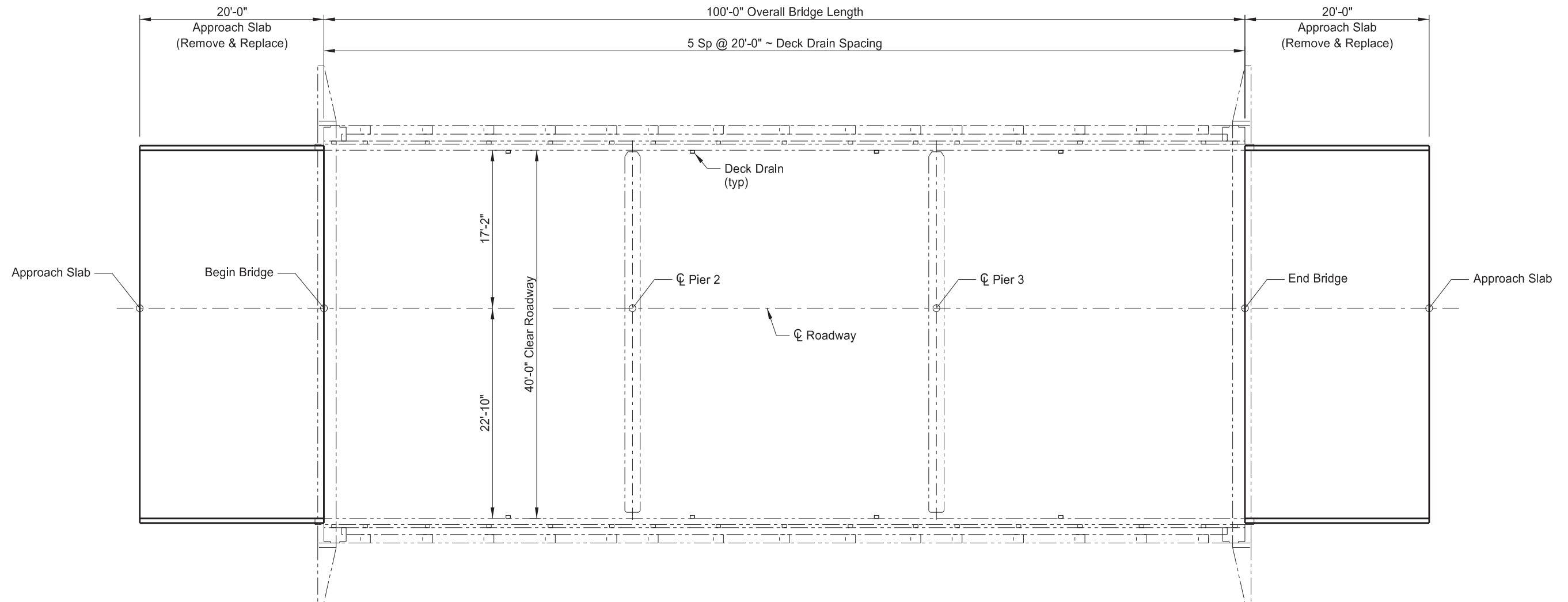
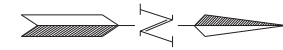
The bar marks beginning with an "X" indicate an epoxy coated bar.

QUANTITIES	(ONE SLAB)
APPROACH SLAB-REMOVE & REPLACE	91.1 SY

ROSE COULEE  
(SHOWING SOUTH END, NORTH END SIMILAR)  
APPROACH SLAB DETAILS

23 U.S.C. 407  
NDDOT Reserves All Objections

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PLAN

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	182.2
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	622
602	7000	SPECIAL SURFACE FINISH	SF	1400
650	0704	OVERLAY CONCRETE	CY	34.0
650	0707	DECK CONCRETE	CY	1.6
650	0710	CLASS 1-H REMOVAL	SY	444
650	0720	CLASS 1 REMOVAL	SY	444
650	0723	CLASS 3 REMOVAL	SY	15
650	0724	CLASS 4 REMOVAL	SY	2
930	9534	MODIFY DECK DRAIN	EA	8
930	9605	SPALL REPAIR - MINOR	SF	28
930	9612	SPALL REPAIR	SF	4
930	9639	APPROACH SLAB LIP REPAIR	LF	89.6

SPECIAL PROVISIONS

SP 197(24)	HYDRODEMO & DECK OVERLAY
SP 204(24)	CONCRETE SPALL REPAIR

ROSE COULEE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION  
BRIDGE DIVISION

*Jason Thorenson* Jason Thorenson  
09/18/24



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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**NOTES**

100 SCOPE OF WORK: Work at this site consists of placing a deck overlay; removing and replacing approach slabs; repairing spalls on the curbs, posts, rails, and underside of the deck; extending deck drains; crack sealing; applying special surface finish; and applying penetrating water repellent treatment.

602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.

602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent solution to the top of the bridge deck overlay and approach slabs. Do not apply crack sealant, pavement marking, or allow traffic until the solution has completely penetrated and the entire driving surface is dry.

602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck overlay and approach slabs to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.02" or greater in width at its widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.02" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all labor, equipment, and materials associated with the bridge deck crack sealing in the bid item "Overlay Concrete," and all costs to seal the approach slabs in the price bid for "Bridge Approach Slab-Remove & Replace."

602 SPECIAL SURFACE FINISH: Clean the exposed surfaces of the posts and rails, as well as the top and inside surfaces of the curbs, using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, laitance, and loose or flaking coatings. Fill cracks larger than 0.02" with Tex-Cote Skim Cote or an approved crack sealer compatible with Tex-Cote XL Bridge Cote.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the exposed surfaces of the concrete posts and rails, and to the top and inside surfaces of the curb. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.

650 OVERLAY CONCRETE: An additional 1/2" depth of overlay concrete was included in the overlay concrete quantity to account for the irregular surface profile from hydrodemolition.

930 MODIFY DECK DRAIN: Extend the existing deck drains in accordance with Section 616. Provide HSS tubing meeting ASTM A500 Grade B. Include all labor, equipment, and materials required to extend the deck drains as shown in the plans in the bid item "Modify Deck Drain".

930 SPALL REPAIR – MINOR: Repair the areas of minor spalling on the concrete bridge curb, posts and rails using a two-part neat epoxy (no sand) compound meeting ASTM C 881, Type I or IV. Follow the repair procedure outlined below.

Surface Preparation:

- Remove any damaged or loose concrete using hand tools or power-driven chipping hammers (15 lb. max size).
- Sand blast clean any rust on the exposed reinforcing steel.
- Clean the existing concrete surface by light sand blasting or high pressure water blasting.

Mixing:

- Measure and mix the proper quantity of each component per the manufacturer's recommendations.
- Mix the components thoroughly using a low-speed electric drill and a clean "Jiffy" type mixing paddle. Do not mix the components by hand.

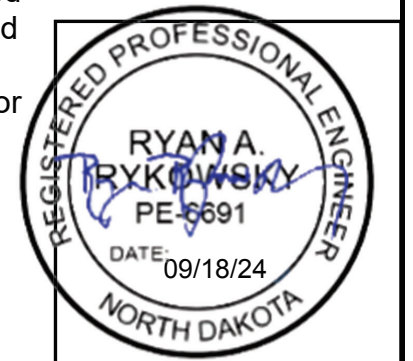
Application:

- Ensure the surface of the substrate is clean and dry prior to applying the epoxy compound.
- Ensure the surface temperature of the substrate, and the ambient air temperature, are within the range specified by the manufacturer.
- Brush, roll, or scrub the epoxy compound into the substrate to ensure all small voids are filled.
- Cover the entire repair area, including any exposed reinforcing steel, with a minimum thickness of 20 mils of epoxy compound.

Curing:

- Follow the manufacturer's recommendations for curing after application of the epoxy compound.

Photos of typical spall repair areas are provided in the supplemental bid information. The actual limits and number of repair locations are to be determined by the Engineer in the field. A minimum area of 1 SF will be paid at each spall repair location. Include all labor, equipment, and materials needed to repair the spall areas in the unit price bid for "Spall Repair – Minor".



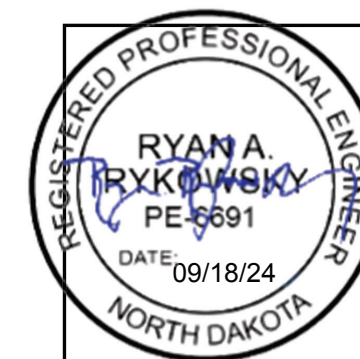
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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**NOTES**

SPALL REPAIR - MINOR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#1-5	WEST SIDE, POSTS 1S, 9S, 13S & 14S	5
	WEST SIDE, RAIL S OF POST 2S	1
#6	WEST SIDE, RAIL TOP BETWEEN POSTS 6S & 7S	2
#7	WEST SIDE, RAIL FRONT FACE BETWEEN POSTS 11S & 12S	6
#8-13	EAST SIDE, POSTS 4S, 5S, 11S, 13S, 14S & N END POST	8
#14	EAST SIDE, RAIL FRONT FACE BETWEEN POSTS 9S & 10S	4
#15	EAST SIDE, RAIL UNDERSIDE AT POST 13S	2

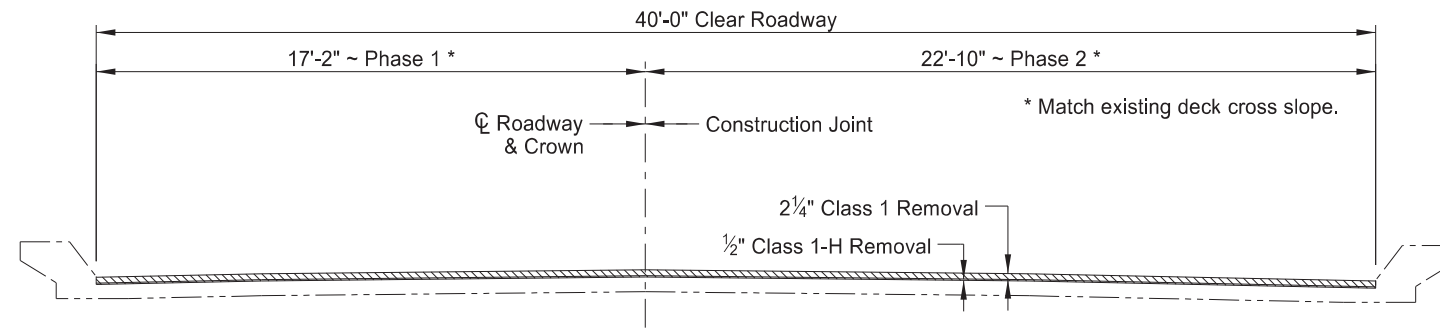
930 SPALL REPAIR: The deck underside has spalling at a deck drain location. The extents of repairs as shown in the "Spall Repair" table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. At the identified locations, remove all unsound concrete and replace it with new material to the original constructed section. See supplemental bid information for photos. Include all labor, equipment and materials needed for these repairs in the bid item "Spall Repair."

SPALL REPAIR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#16	WEST SOFFIT, SPAN 2S N OF PIER 2	4

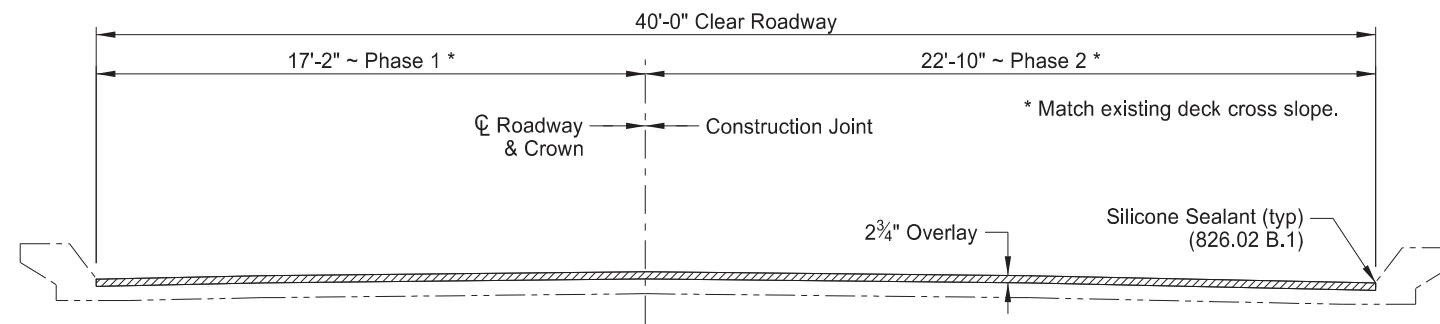


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NDDOT Reserves All Objections

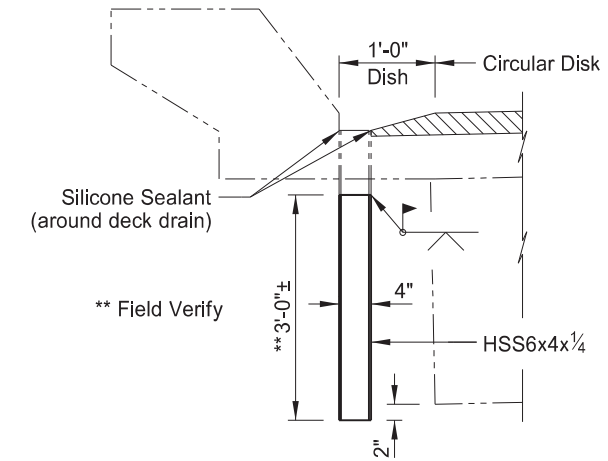
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	12



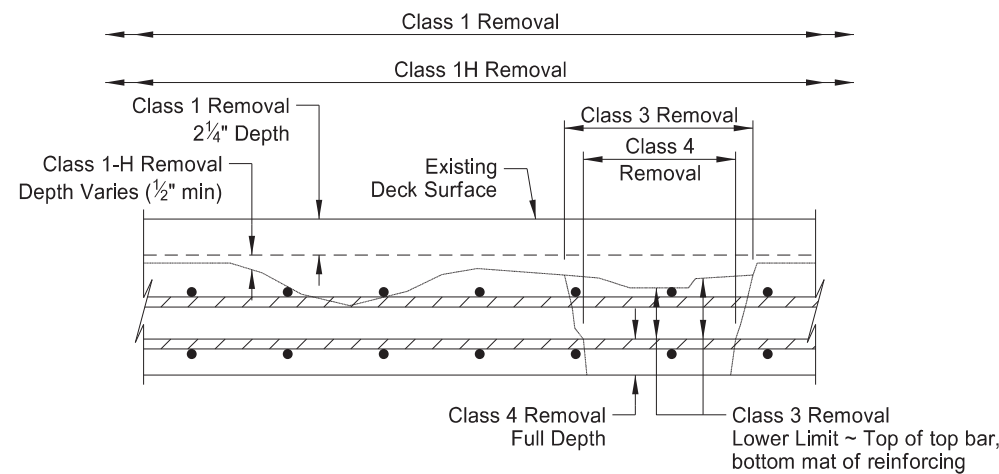
(SHOWING REMOVAL)  
TYPICAL DECK SECTION



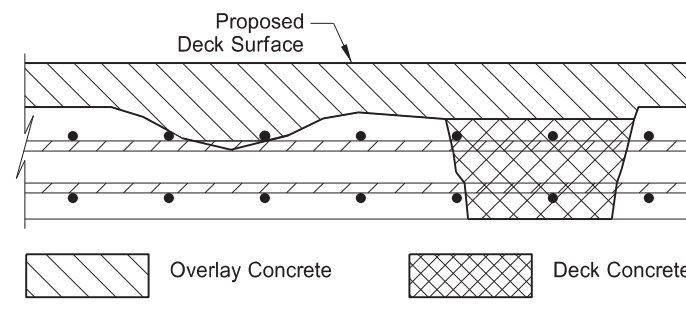
(SHOWING OVERLAY)  
TYPICAL DECK SECTION



DECK DRAIN DETAIL



(SHOWING REMOVALS)  
EXISTING BRIDGE DECK SECTION



(SHOWING DECK & OVERLAY CONCRETE)  
PROPOSED BRIDGE DECK SECTION

QUANTITIES	
OVERLAY CONCRETE	34.0 CY
DECK CONCRETE	1.6 CY
CLASS 1 REMOVAL	444 SY
CLASS 1-H REMOVAL	444 SY
CLASS 3 REMOVAL	15 SY
CLASS 4 REMOVAL	2 SY

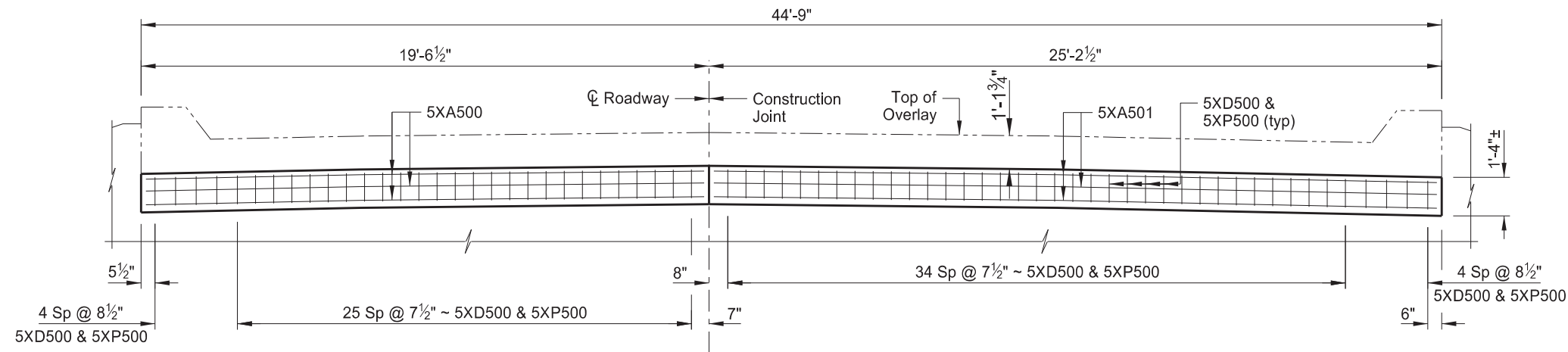


ROSE COULEE

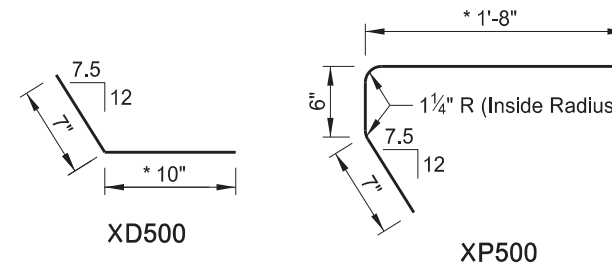
DECK OVERLAY DETAILS

23 U.S.C. 407  
NDDOT Reserves All Objections

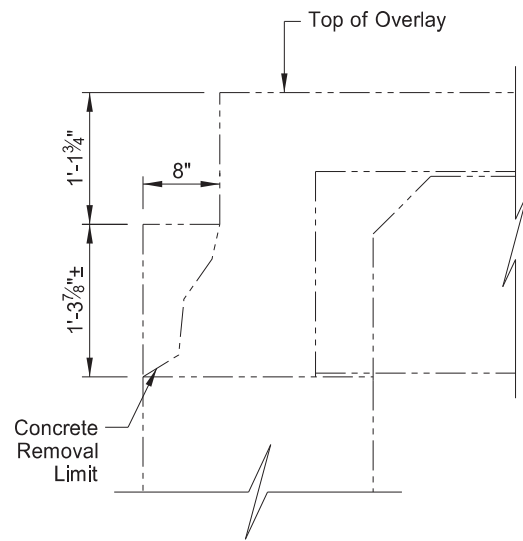
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	13



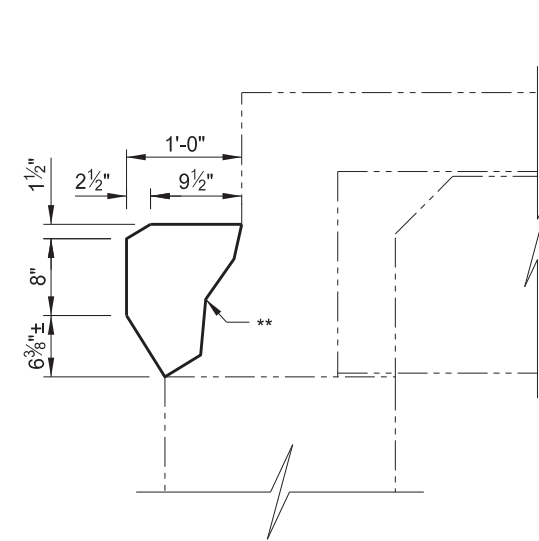
(SHOWING ONLY NEW REINFORCING)  
**ELEVATION**



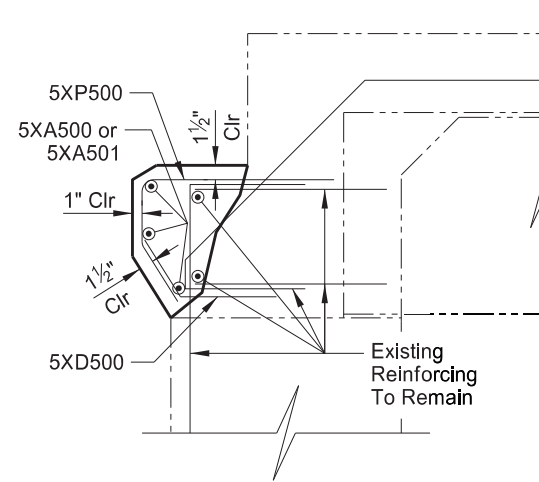
(DIMENSIONS SHOWN ARE OUT TO OUT)  
**BENT BAR DETAILS**



(SHOWING REMOVAL)  
**EXISTING APPROACH SLAB LIP**



(SHOWING DIMENSIONS)  
**NEW APPROACH SLAB LIP**



(SHOWING REINFORCING)  
**NEW APPROACH SLAB LIP**

SKEW ANGLE = 0°			
<b>BAR LIST - ONE APPROACH LIP</b>			
SIZE	MARK	NO.	LENGTH
5	XA500	3	19'-2"
5	XA501	3	24'-10"
5	*XD500	69	1'-5"
5	*XP500	69	2'-9"
<b>ESTIMATED MATERIAL QUANTITIES</b>			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
438		1.3	

**NOTES:**  
The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, labor and equipment required to build the approach slab lip in the bid item "Approach Slab Lip Repair". Use Class AAE-3 concrete in accordance with Section 602 and Grade 60 reinforcing steel that meets the requirements of Section 612.  
  
The bar marks beginning with an "X" indicate an epoxy coated bar.  
  
\* Install according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout), and that meets the requirements of Section 806.02. Length may vary depending on manufacturer's recommendations for anchorage. Provide a minimum anchorage length of 9 inches.  
  
\*\* Bush Hammer Finish: Before any concrete is placed against the existing concrete, prepare surface with a bush hammer to produce a clean rough finish. After the bush hammer finish, prepare the concrete surface in accordance with Section 602.04 H "Construction Joints."

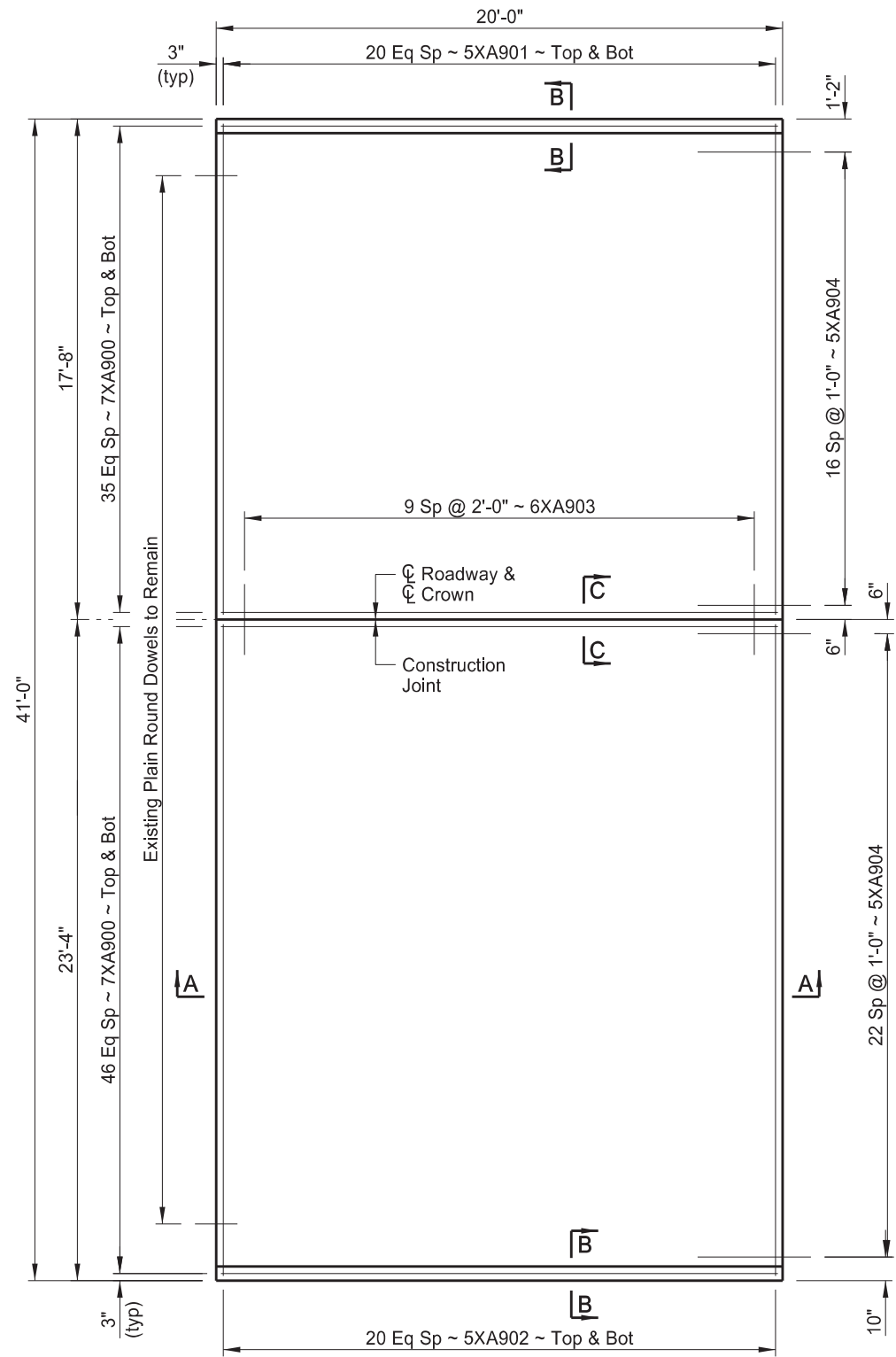


<b>QUANTITIES</b>	(ONE APPROACH LIP)
APPROACH SLAB LIP REPAIR	44.8 LF

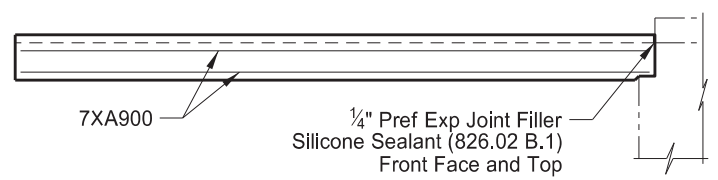
ROSE COULEE  
(SHOWING SOUTH END, NORTH END SIMILAR)  
**APPROACH SLAB LIP REPAIR DETAILS**

23 U.S.C. 407  
NDDOT Reserves All Objections

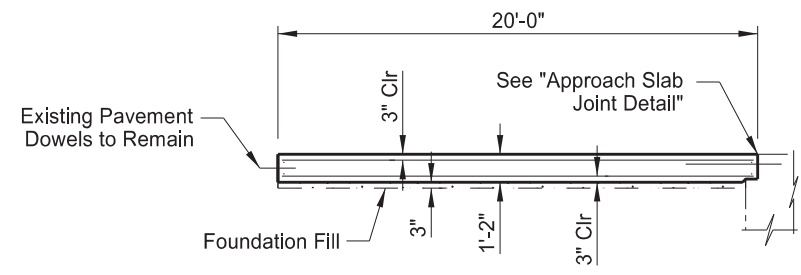
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	14



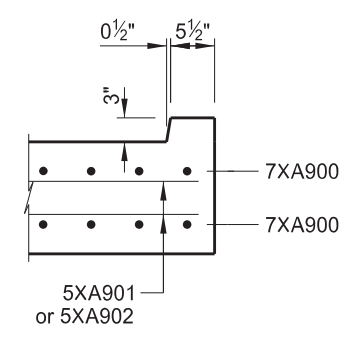
PLAN



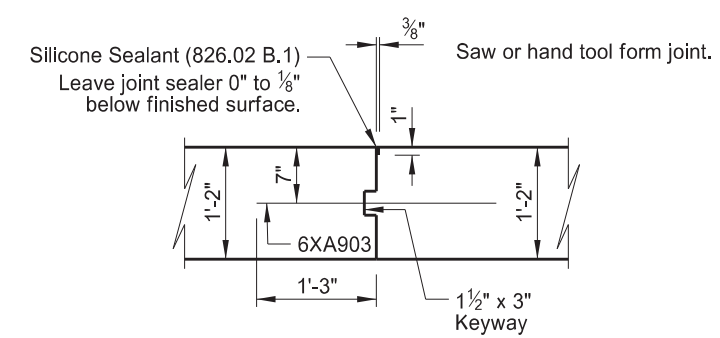
ELEVATION



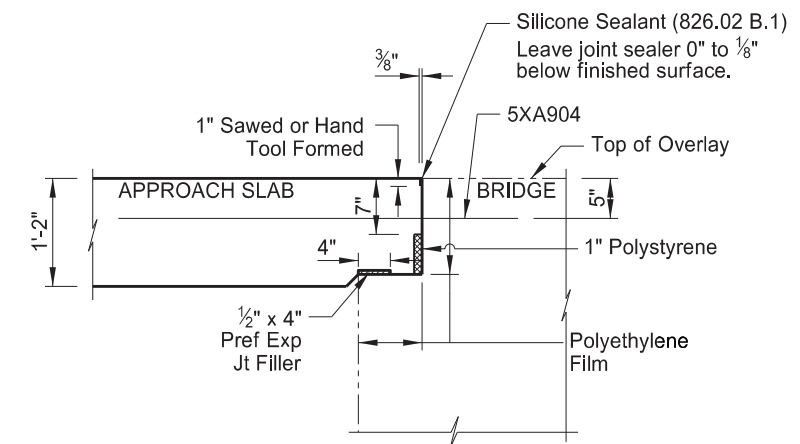
A-A



B-B



C-C



APPROACH SLAB JOINT DETAIL



SKEW ANGLE = 0°

BAR LIST - ONE SLAB

SIZE	MARK	NO.	LENGTH
7	XA900	166	19'-8"
5	XA901	42	23'-0"
5	XA902	42	17'-4"
6	XA903	10	2'-6"
5	XA904	40	* 4'-0"

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS)	CONCRETE (CY)
8,644	35.4

\* Install 5XA904 bars according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout), and that meets the requirements of Section 806.02. Length may vary depending on manufacturer's recommendations for anchorage. Length based on 1 foot minimum anchorage length.

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, foundation fill, and labor required to build the approach slabs and curbs in the pay item "Bridge Approach Slab-Remove and Replace." Use Class AAE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

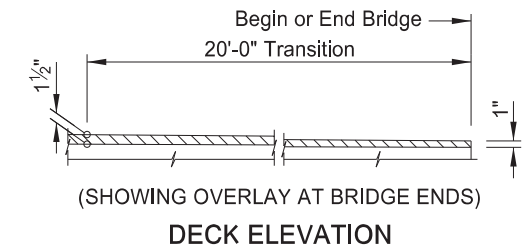
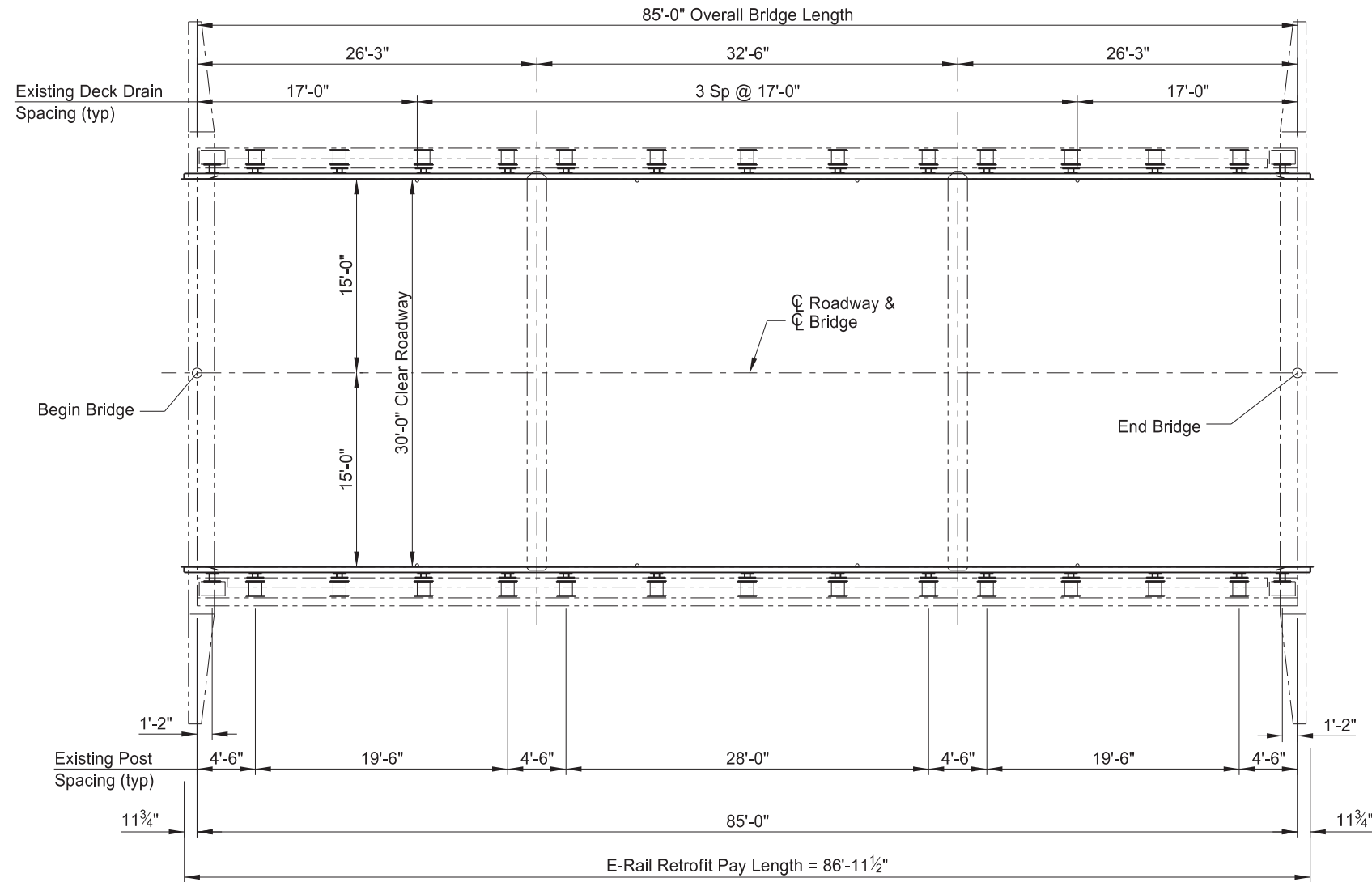
The bar marks beginning with an "X" indicate an epoxy coated bar.

QUANTITIES	(ONE SLAB)
APPROACH SLAB-REMOVE & REPLACE	91.1 SY

ROSE COULEE  
(SHOWING SOUTH END, NORTH END SIMILAR)  
APPROACH SLAB DETAILS

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 NDDOT Reserves All Objections

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PLAN

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	283.3
602	70000	SPECIAL SURFACE FINISH	SF	1195
624	3002	DOUBLE BOX BEAM RAIL RETROFIT - ERAIL	LF	173.9
650	0704	OVERLAY CONCRETE	CY	27.6
650	0707	DECK CONCRETE	CY	1.2
650	0710	CLASS 1-H REMOVAL	SY	283.3
650	0720	CLASS 1 REMOVAL	SY	283.3
650	0723	CLASS 3 REMOVAL	SY	10
650	0724	CLASS 4 REMOVAL	SY	2
930	9534	MODIFY DECK DRAIN	EA	8
930	9612	SPALL REPAIR	SF	14



SPECIAL PROVISIONS	
SP 197(24)	HYDRODEMO & DECK OVERLAY
SP 204(24)	CONCRETE SPALL REPAIR
ROSE COULEE	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
<i>Jason Thorenson</i>	Jason Thorenson 09/18/24

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	16

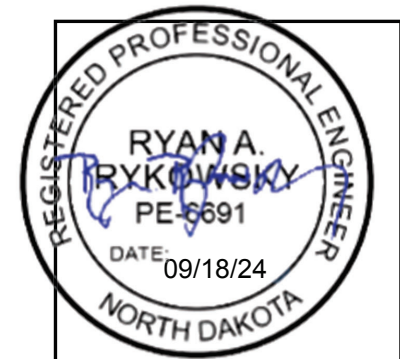
**NOTES**

- 100 SCOPE OF WORK: Work at this site consists of placing a deck overlay, crack sealing, applying penetrating water repellent treatment, repairing spalls, and installing an e-rail retrofit.
- 602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.
- 602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent solution to the top of the bridge deck overlay. Do not apply crack sealant, pavement marking, or allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- 602 SPECIAL SURFACE FINISH: Before the installation of the rail retrofit, clean the exposed surfaces of the posts and rails, as well as the top and inside surfaces of the curbs using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, laitance, and loose or flaking coatings. Fill cracks larger than 0.02" with Tex-Cote Skim Cote or an approved crack sealer compatible with Tex-Cote XL Bridge Cote.  
  
Apply Tex-Cote XL 70 Bridge Cote with Silane to the exposed surfaces of the concrete posts and rails, and to the top and inside surfaces of the curb. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.
- 650 CLASS 1-H REMOVAL: Monitor the depth of concrete removal while operating the hydrodemolition equipment on the bridge. Stop operating the hydrodemolition equipment and consult with the Engineer if the Class 1-H removal depth extends deeper than the existing top mats of reinforcing steel over any single area larger than 4 square feet.
- 650 OVERLAY CONCRETE: An additional 1/2" depth of overlay concrete was included in the overlay concrete quantities to account for the irregular surface profile from hydrodemolition.
- 650 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck to determine the need for crack sealing. Mark and repair all visible cracks on the top surface measuring 0.02" or greater in width at the widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to the limits of the crack, including those portions that are narrower than 0.02" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer. Include all work and materials associated with the bridge deck crack sealing in the bid item "Overlay Concrete."

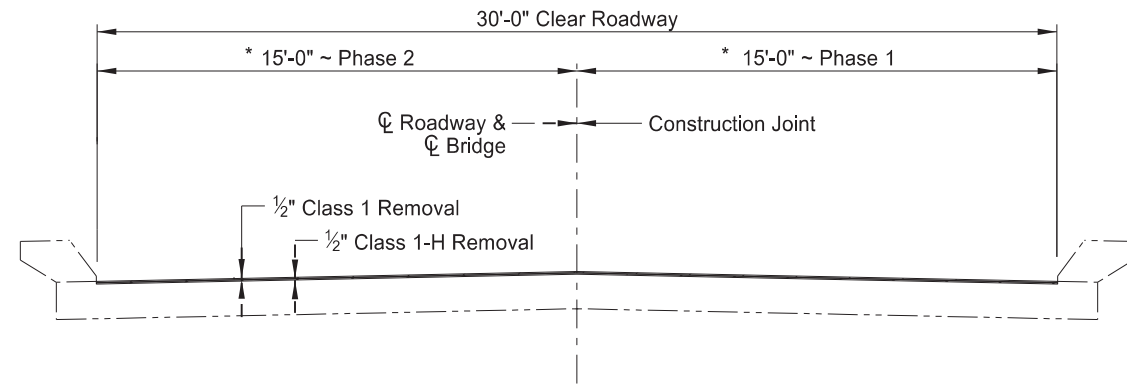
- 930 MODIFY DECK DRAIN: Extend the existing deck drains in accordance with Section 616. Provide HSS tubing meeting ASTM A500 Grade B. Include all labor, equipment, and materials required to extend the deck drains as shown in the plans in the bid item "Modify Deck Drain".
- 930 SPALL REPAIR: The concrete bridge railing and bridge deck underside at drains exhibit spalling at several isolated locations. The extents of repairs as shown in the "Spall Repair" table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. At the identified locations, remove all unsound concrete and replace it with new material to the original constructed section. See supplemental bid information for photos. Include all labor, equipment and materials needed for these repairs in the bid item "Spall Repair."

SPALL REPAIR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#1 & 2	DECK UNDERSIDE, WEST SOFFIT, SPAN 2S @ DRAINS	8
#3 & 4	WEST SIDE, CURB S & N ENDS	2
#5-7	WEST SIDE, POST 2S, 5S & 12S	3
#8	EAST SIDE, CURB S END	1



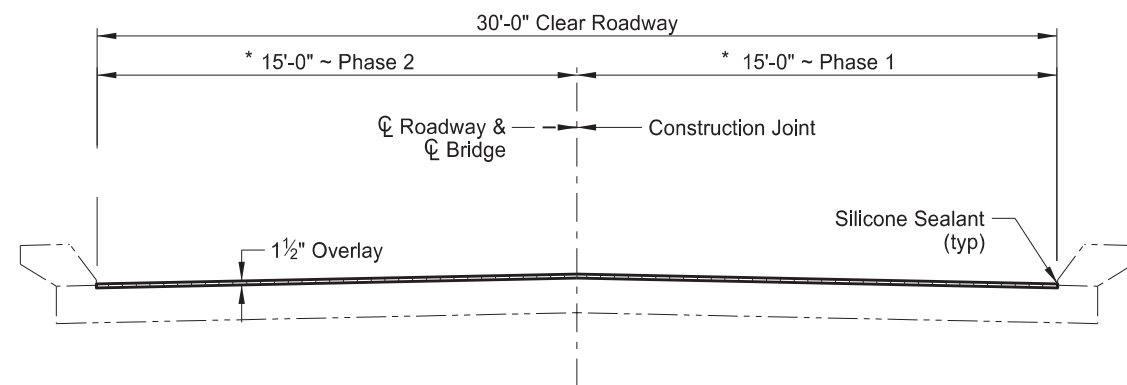
23 U.S.C. 407  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	17

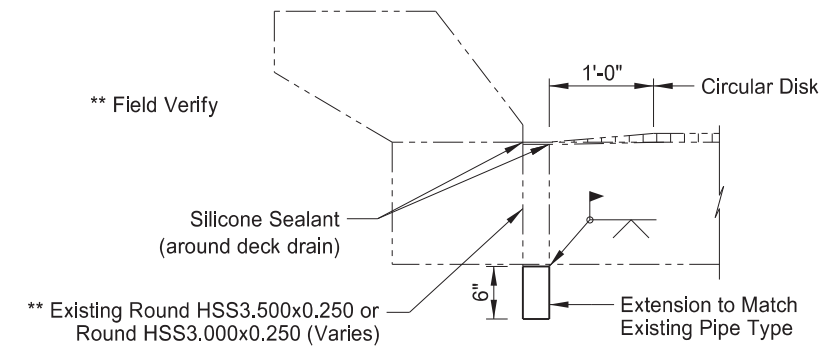


(SHOWING REMOVAL)  
TYPICAL DECK SECTION

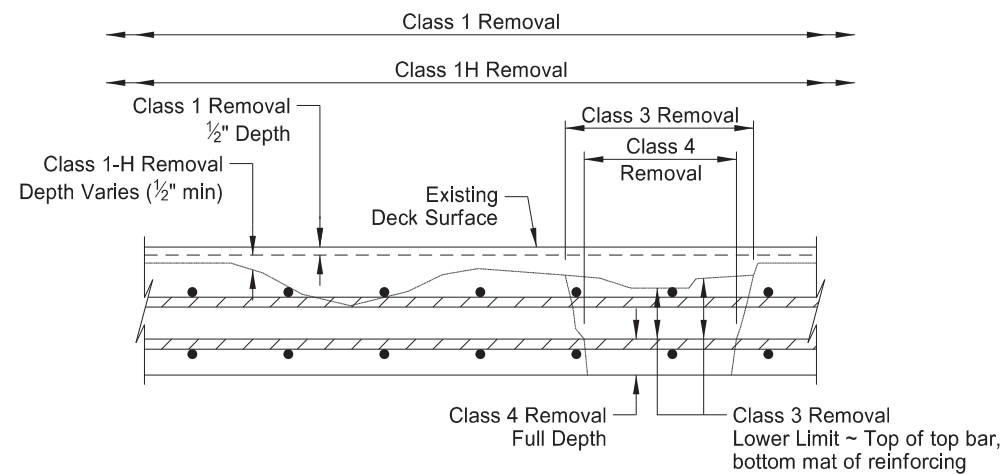
\* Match existing deck cross slope.



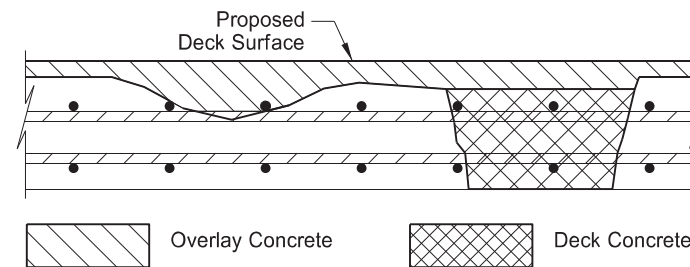
(SHOWING OVERLAY)  
TYPICAL DECK SECTION



MODIFY DECK DRAIN DETAIL



(SHOWING REMOVALS)  
EXISTING BRIDGE DECK SECTION



(SHOWING DECK & OVERLAY CONCRETE)  
PROPOSED BRIDGE DECK SECTION



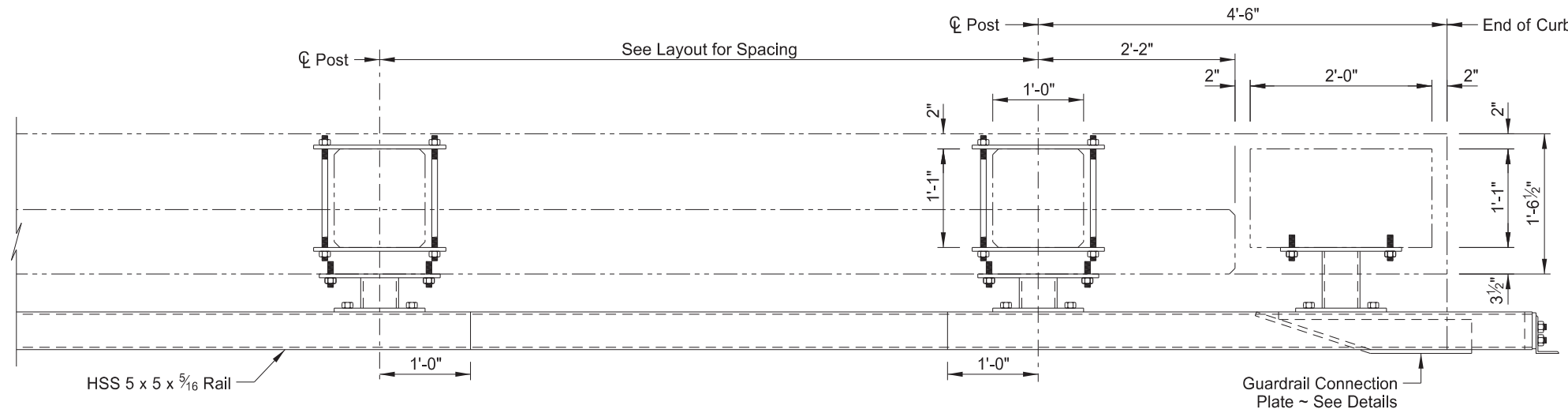
QUANTITIES	
OVERLAY CONCRETE	27.6 CY
DECK CONCRETE	1.2 CY
CLASS 1 REMOVAL	283.3 SY
CLASS 1-H REMOVAL	283.3 SY
CLASS 3 REMOVAL	10 SY
CLASS 4 REMOVAL	2 SY

2 SOUTH I94  
ROSE COULEE

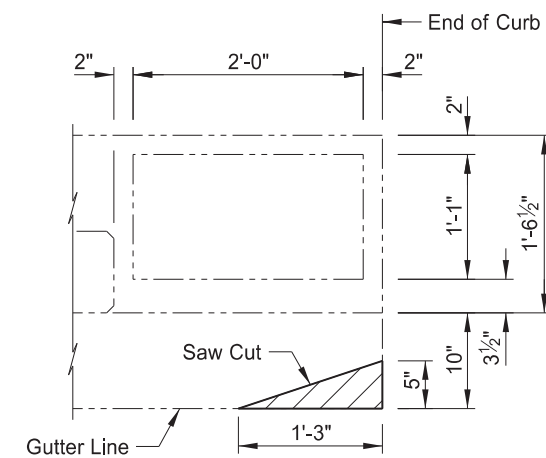
DECK OVERLAY DETAILS

23 U.S.C. 407  
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	18



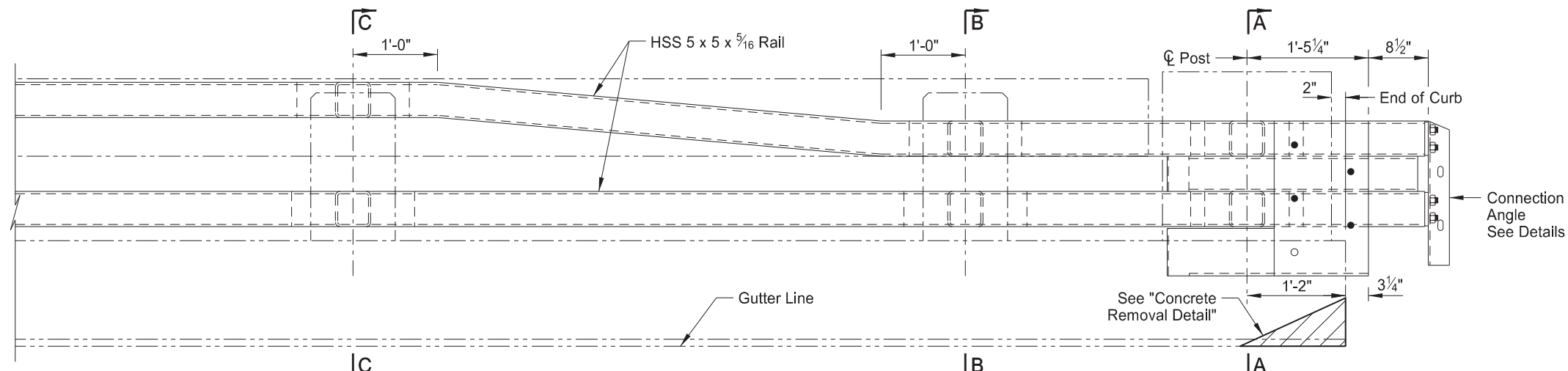
PART RAIL RETROFIT PLAN



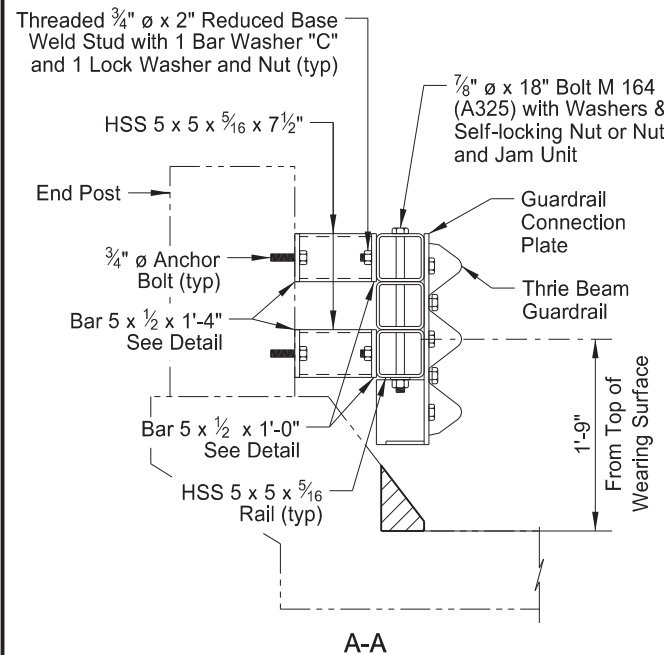
PLAN  
CONCRETE REMOVAL DETAIL

 Indicates Concrete Removal

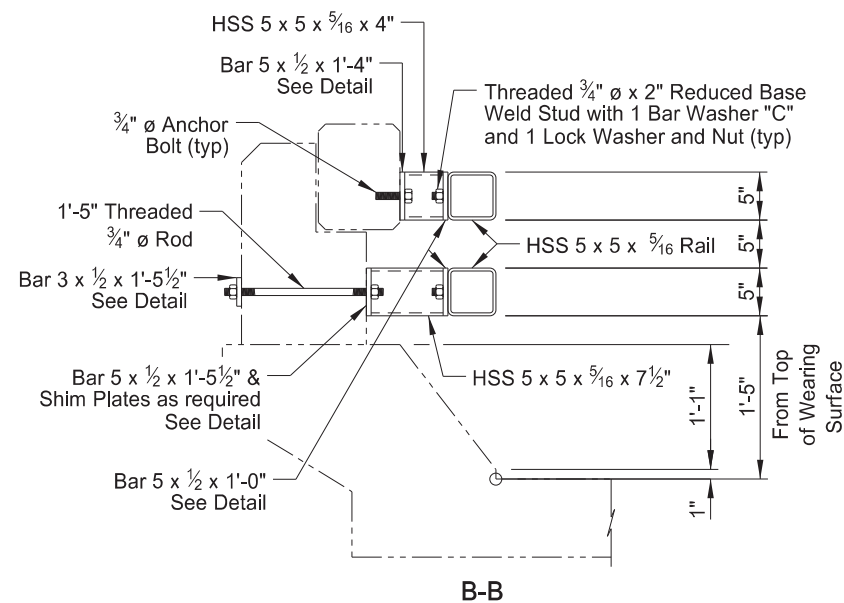
**NOTE:**  
See Dwg 29-061.417T-5 for notes and details not shown on this drawing.



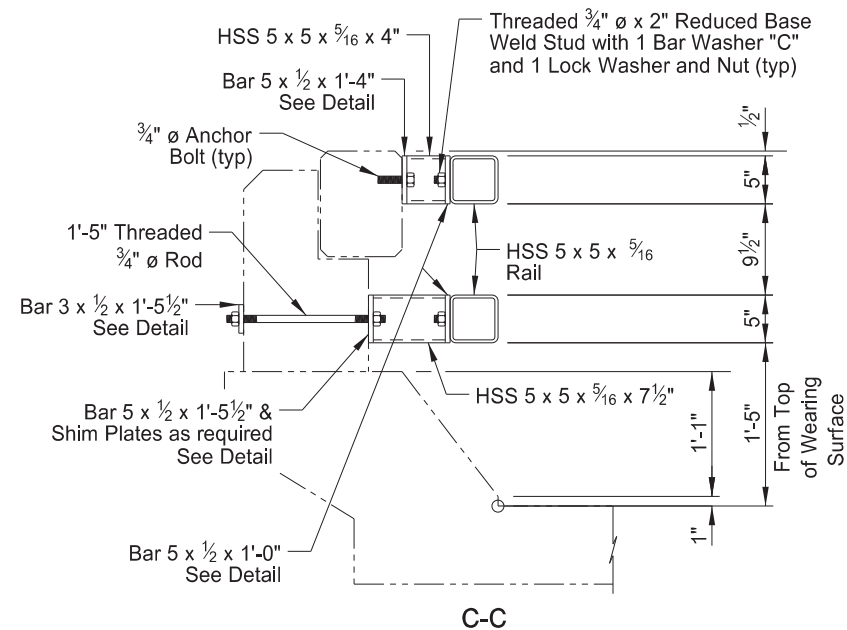
PART RAIL RETROFIT ELEVATION



A-A



B-B



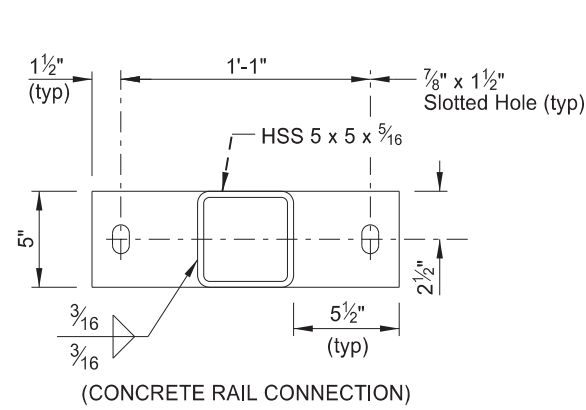
C-C



<b>QUANTITIES</b>
SEE DWG 29-061.417T-5
2 SOUTH I94 ROSE COULEE
<b>DOUBLE BOX BEAM E-RAIL RETROFIT DETAILS</b>

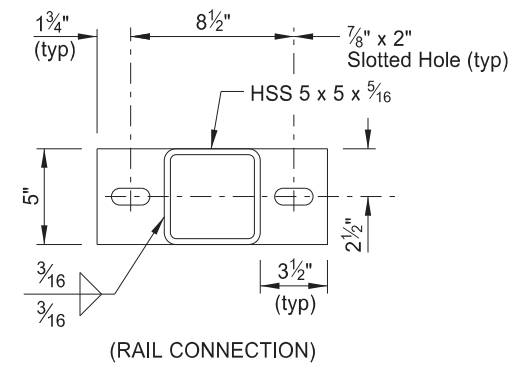
23 U.S.C. 407  
 NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-029(215)061	170	19



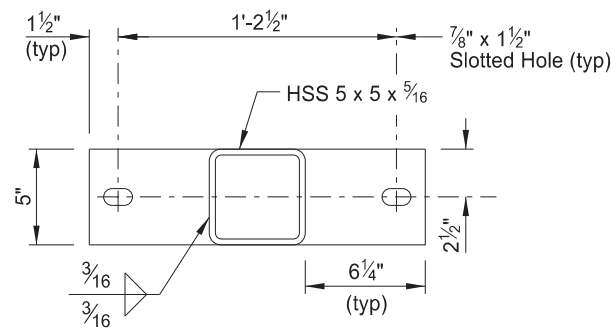
(CONCRETE RAIL CONNECTION)

BAR 5 X 1/2 X 1'-4" DETAIL



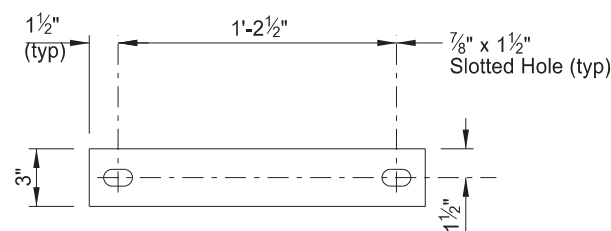
(RAIL CONNECTION)

BAR 5 X 1/2 X 1'-0" DETAIL



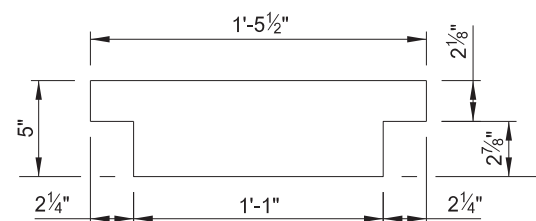
(CONCRETE POST CONNECTION)

BAR 5 X 1/2 X 1'-5 1/2" DETAIL



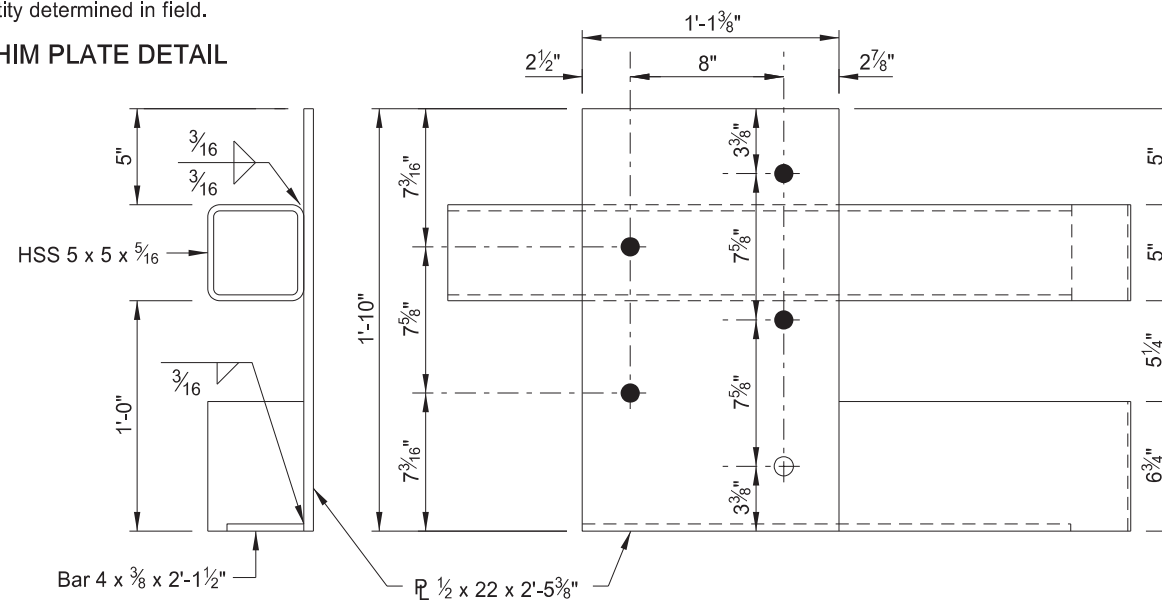
(CONCRETE POST CONNECTION)

BAR 3 X 1/2 X 1'-5 1/2" DETAIL



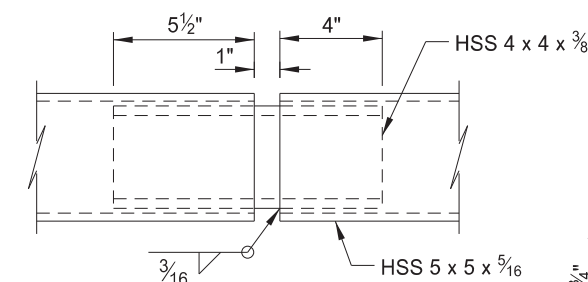
1/4" & 1/8" Thickness  
 Quantity determined in field.

SHIM PLATE DETAIL

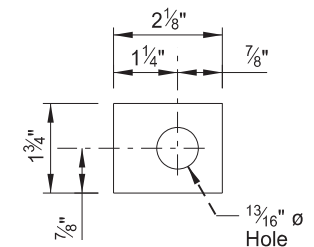


The filled circles indicate drilled and tapped holes for 7/8" ø bolts M 164 (A325). See Detail "B."

The open circle indicates a drilled hole through the 1/2" plate for a 7/8" ø bolt M 164 (A325).

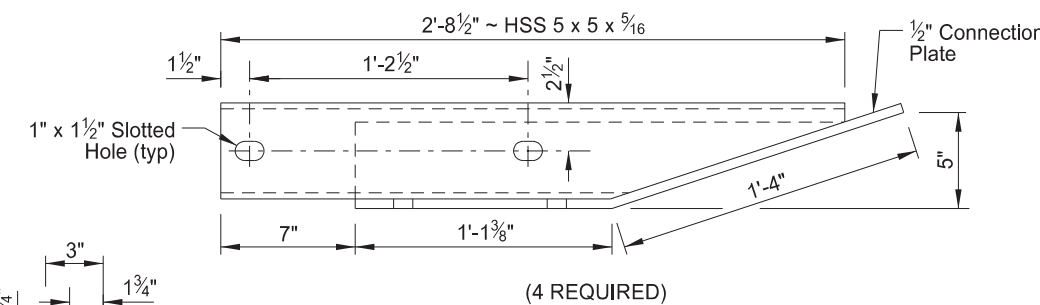


RAIL SPLICE DETAIL

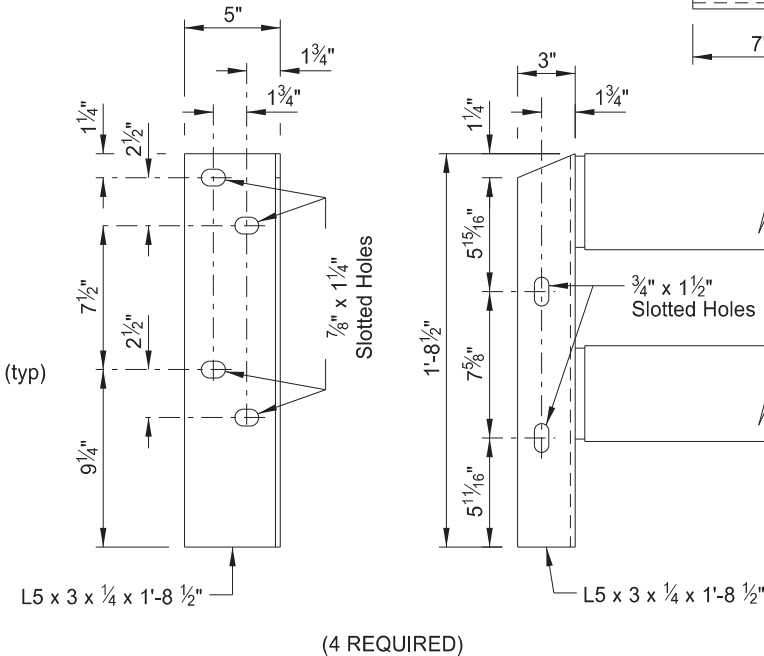


Position washers to completely cover slotted holes.

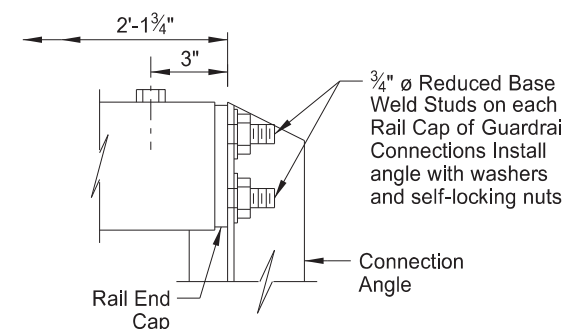
1/4" BAR WASHER "C"



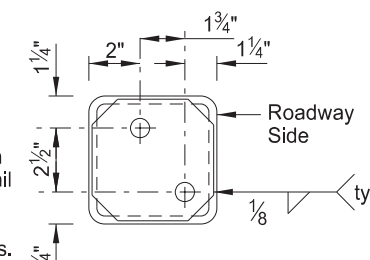
GUARDRAIL CONNECTION PLATE DETAILS



CONNECTION ANGLE DETAILS

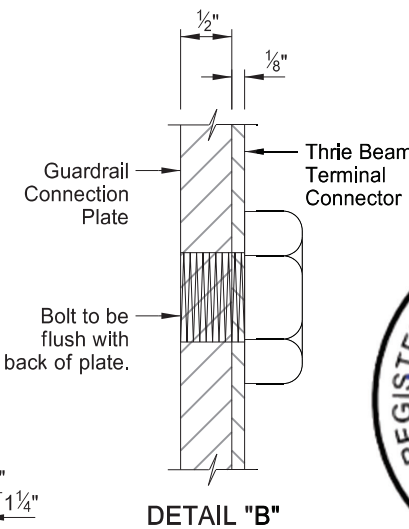


RAIL CAP DETAIL



RAIL CAP END VIEW

Cope corners 1" to provide zinc drains.



DETAIL "B"



QUANTITIES	
E-RAIL RETROFIT	173.9 LF
2 SOUTH I94 ROSE COULEE	
DOUBLE BOX BEAM E-RAIL RETROFIT DETAILS	

NDDOT ABBREVIATIONS

D-101-1

? This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.

Abn abandoned  
 Abut abutment  
 Adj adjusted  
 Aggr aggregate  
 Ahd ahead  
 ARV air release valve  
 Align alignment  
 Al alley  
 Alt alternate  
 Alum aluminum  
 ADA Americans with Disabilities Act  
 & and  
 Appr approach  
 Approx approximate  
 ACP asbestos cement pipe  
 Asph asphalt  
 AC asphalt cement  
 Assmd assumed  
 @ at  
 Atten attenuation  
 ATR automatic traffic recorder  
 Ave Avenue  
 Avg average  
 ADT average daily traffic

Bk back  
 BF back face  
 Balc balcony  
 B Wire barbed wire  
 Barr barricade  
 Btry battery  
 BI beehive inlet  
 Beg begin  
 BG below grade  
 BM bench mark  
 Bkwy bikeway  
 Bit bituminous  
 Blk block  
 BH bore hole  
 Bot bottom  
 Blvd Boulevard  
 Bndry boundary  
 Brkwy breakaway  
 Br bridge  
 Bldg building  
 Bus. business  
 BV butterfly valve  
 Byp bypass

C Gdrl cable guardrail  
 Calc calculate  
 CIP cast iron pipe  
 CB catch basin  
 CRS cationic rapid setting  
 C Gd cattle guard  
 C To C center to center  
 CL or  $\text{C}$  centerline  
 Ch chain  
 Chnlk chain-link  
 Ch Blk channel block  
 Ch Ch channel change  
 Chk check  
 Chsld chiseled  
 Cir circle  
 Cl class  
 Clnt clean-out  
 Clr clear  
 Cl&gr clearing & grubbing  
 Comb. combination  
 Coml commercial  
 Compr compression  
 CADD computer aided drafting & design  
 Conc concrete  
 CECB concrete erosion control blanket  
 Cond conductor  
 Const construction  
 Cont continuous  
 CSB continuous split barrel sample  
 Contr contraction  
 Contr contractor  
 CP control point  
 Coord coordinate  
 Cor corner  
 Corr corrected  
 CAES corrugated aluminum end section  
 CAP corrugated aluminum pipe  
 CMES corrugated metal end section  
 CMP corrugated metal pipe  
 CPVCP corrugated poly-vinyl chloride pipe  
 CSES corrugated steel end section  
 CSFES corrugated steel flared end section  
 CSP corrugated steel pipe  
 CSTES corrugated steel traversable end section  
 Co County  
 Crse course  
 Ct Court  
 Xarm cross arm  
 Xbuck cross buck  
 Xsec cross sections  
 Xing crossing  
 Xrd crossroad  
 Crn crown

Culv culvert  
 C&G curb & gutter  
 CI curb inlet  
 CR curb ramp  
 C cut  
 Dd Ld dead load  
 Defl deflection  
 Defm deformed  
 DInt delineate  
 DIntr delineator  
 Depr depression  
 Desc description  
 Det detail  
 DWP detectable warning panel  
 Dtr detour  
 Dia or  $\emptyset$  diameter  
 Dir direction  
 Dist distance  
 DM disturbed material  
 DB ditch block  
 DG ditch grade  
 Dbl double  
 Dn down  
 Dwg drawing  
 Dr drive  
 Drwy driveway  
 DI drop inlet  
 D dry density

Ea each  
 Esmt easement  
 E East  
 EB Eastbound  
 Elast elastomeric  
 EL electric locker  
 E Mtr electric meter  
 Elec electric/al  
 EDM electronic distance meter  
 Elev or El elevation  
 Ellipt elliptical  
 Emb embankment  
 Emuls emulsion/emulsified  
 ES end section  
 Engr engineer  
 ESS environmental sensor station  
 Eq equal  
 Evgr evergreen  
 Exc excavation  
 Exst existing  
 Exp expansion  
 Expy Expressway  
 E external of curve  
 Extru extruded

FOS factor of safety  
 Fed Federal  
 FP feed point  
 Fn fence  
 Fn P fence post  
 FO fiber optic  
 FD field drive  
 F fill  
 FAA fine aggregate angularity  
 FH fire hydrant  
 Fl flange  
 Flrd flared  
 FES flared end section  
 F Bcn flashing beacon  
 FA flight auger sample  
 FL flow line  
 Ftg footing  
 FM force main  
 Fnd found  
 Fdn foundation  
 Frac fractional  
 Frwy freeway  
 Frt front  
 FF front face  
 F Disp fuel dispenser  
 FFP fuel filler pipes  
 FLS fuel leak sensor  
 Furn furnish/ed

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
05-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



NDDOT ABBREVIATIONS

Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	Lvng	leveling	OC	organic content	Rlwy	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Recy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location			RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	PMT	pad mounted transformer	Ref	reference
Gdrl	guardrail	Lp	loop	Pg	pages	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pntd	painted	RM	reference monument
		Lum	luminaire	Pr	pair	RP	reference point
				Pnl	panel	Refl	reflectorized
H Plg	H piling			Pk	park	RCB	reinforced concrete box
Hdwl	headwall	Mb	mailbox	PSD	passing sight distance	RCES	reinforced concrete end section
Ht	height	ML	main line	Pvmt	pavement	RCFES	reinforced concrete flared end section
Hel	helical	MH	manhole	Ped	pedestal	RCP	reinforced concrete pipe
HDPE	high density polyethylene	Mkd	marked	Ped	pedestrian	RCPS	reinforced concrete pipe sewer
HM	high mast	Mkr	marker	PPP	pedestrian pushbutton post	RCTES	reinforced concrete traversable end section
HP	high pressure	Mkg	marking	Pen.	penetration	Reinf	reinforcement
HPS	high pressure sodium	MA	mast arm	Perf	perforated	Res	reservation
HTCG	high tension cable guardrail	Matl	material	Per.	perimeter	Res	residence
Hwy	highway	Max	maximum	Perm	permanent	Ret	retaining
Hor	horizontal	MC	meander corner	PL	pipeline	Rev	reverse
HBP	hot bituminous pavement	Meas	measure	PI	place	Rt	right
HMA	hot mix asphalt	Mdn	median	P&P	plan & profile	R/W	right of way
Hyd	hydrant	MD	median drain	PL	plastic limit	Riv	river
Ph	hydrogen ion content	MC	medium curing	Pl or $\bar{P}$	plate	Rd	road
		MGS	Midwest Guardrail System	Pt	point	Rdbd	road bed
		MM	mile marker	PE	polyethylene	Rdwy	roadway
Id	identification	MP	mile post	PVC	polyvinyl chloride	RWIS	roadway weather information system
Incl	inclinometer tube	Min	minimum	PCC	Portland Cement concrete	Rk	rock
IMH	inlet manhole	Misc	miscellaneous	PP	power pole	Rt	route
ID	inside diameter	Mon	monument	Preempt	preemption		
Inst	instrument	Mnd	mound	Prefab	prefabricated		
Intchg	interchange	Mtbl	mountable	Prfmd or Pref	prefomed		
Intmdt	intermediate	Mtd	mounted	Prep	preperation		
Intscn	intersection	Mtg	mounting	Press.	pressure		
Inv	invert	Mk	muck	PRV	pressure relief valve		
IP	iron pipe			Prestr	prestressed		
				Pvt	private		
				PD	private drive		
Jt	joint	Neop	neoprene	Prod.	production/produce		
Jct	junction	Ntwk	network	Prog	programmed		
		N	North	Prop.	property		
		NE	North East	Prop Ln	property line		
		NW	North West	Ppsd	proposed		
		NB	Northbound	PB	pull box		
		No. or #	number				

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08-16-22	General Revisions

KIRK J. HOFF  
REGISTERED  
PROFESSIONAL  
ENGINEER  
PE-4683  
NORTH DAKOTA  
08/16/22

NDDOT ABBREVIATIONS

D-101-3

Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	South East	TERO	tribal employment rights ordinance
SW	South West	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike	VG	valley gutter
SB	split barrel sample	Vap	vapor
SH	sprinkler head	Vert	vertical
SV	sprinkler valve	VCP	vitrified clay pipe
Sq	square	Vol	volume
Stk	stake	VSFS	vehicle speed feedback sign
Std	standard		
N	standard penetration test	Wkwy	walkway
Std Specs	standard specifications	W	water content
Stm L	steam line	WGV	water gate valve
SEC	steel encased concrete	WL	water line
SMA	stone matrix asphalt	WM	water main
SSD	stopping sight distance	WMV	water main valve
SD	storm drain	W Mtr	water meter
St	street	WSV	water service valve
SPP	structural plate pipe	WW	water well
SPPA	structural plate pipe arch	Wrng	wearing
Str	structure	WIM	weigh in motion
Subd	subdivision	W	west
Sub	subgrade	WB	westbound
Sub Prep	subgrade preparation	Wrng	wiring
Ss	subsoil	W/	with
SS	supplement specification	W/o	without
Supp	supplemental	WC	witness corner
Surf	surfacing		
Surv	survey		
Sym	symmetrical		

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**MEASUREMENTS**

ac acres  
 A ampere  
 Bd Ft board feet  
 Cd candela  
 cm centimeter  
 C coulomb  
 CF cubic feet  
 m3 cubic meter  
 m3/s cubic meters per second  
 CY cubic yard  
 CY/mi cubic yards per mile  
 D or Deg degree  
 F Fahrenheit  
 F farad  
 ft feet/foot  
 Gal gallon  
 G giga  
 Ha hectare  
 H henry  
 Hz hertz  
 hr hour(s)  
 in inch  
 J joule  
 K kelvin  
 kN kilo newton  
 kPa kilo pascal  
 kg kilogram  
 kg/m3 kilogram per cubic meter  
 km kilometer  
 K Kip(s)  
 LF linear foot  
 L litre  
 Lm lumen  
 L sum lump sum  
 Lx lux  
 M Hr man hour  
 M mega  
 m meter  
 m/s meters per second  
 mi mile  
 mL milliliter  
 mm millimeter  
 mm/hr millimeters per hour  
 n nano  
 N newton  
 Pa pascal  
 lb pounds  
 sec seconds  
 S siemens  
 SF square feet  
 km2 square kilometer  
 m2 square meter  
 SY square yard  
 Sta Yd station yards  
 SI Systems International

T tesla  
 T/mi tons per mile  
 V volt  
 W watt  
 Wb weber

**SURVEY DESCRIPTIONS**

Az azimuth  
 Bs backsight  
 Brg bearing  
 BP Cap blue plastic cap  
 BS both sides  
 BC brass cap  
 CS curve to spiral  
 Eq equation  
 E external of curve  
 FS far side  
 FB field book  
 Fs foresight  
 Geod geodetic  
 GIS Geographical Information System  
 GPS Global Positioning System  
 HI height of instrument  
 IM iron monument  
 I Pn iron pin  
 LS Land Surveyor (licensed)  
 LSIT Land Surveyor In Training  
 L length of curve  
 LC long chord  
 LB level book  
 Mer meridian  
 M mid ordinate of curve  
 NGS National Geodetic Survey  
 NS near side  
 Obsn observation  
 Off Loc office location  
 OP Cap orange plastic cap  
 PK Parker-Kalon nail  
 P Cap plastic cap  
 PP Cap pink plastic cap  
 PCC point of compound curve  
 PC point of curve  
 PI point of intersection  
 PRC point of reverse curvature  
 PT point of tangent  
 POC point on curve  
 POT point on tangent  
 RTP random traverse point  
 Rge range  
 RP Cap red plastic cap  
 SC spiral to curve  
 ST spiral to tangent  
 Sta station  
 SE superelevation  
 Tan tangent  
 T tangent (semi)  
 TS tangent to spiral  
 Twp township  
 TB transit book  
 TP traverse point  
 TP turning point  
 USC&G US Coast & Geodetic Survey  
 USGS US Geologic Survey  
 VC vertical curve  
 WGS World Geodetic System  
 YP Cap yellow plastic cap  
 Z zenith

**SOIL TYPES**

Cl clay  
 Cl F clay fill  
 Cl Hvy clay heavy  
 Cl Lm clay loam  
 Co S coal slack  
 C Gr coarse gravel  
 CS coarse sand  
 FS fine sand  
 Gr gravel  
 Lig Co lignite coal  
 Lig Sl lignite slack  
 Lm loam  
 Rk rock  
 Sd sand  
 Sdy Cl sandy clay  
 Sdy Cl Lm sandy clay loam  
 Sdy Fl sandy fill  
 Sdy Lm sandy loam  
 Sc scoria  
 Sh shale  
 Si Cl silt clay  
 Si Cl Lm silty clay loam  
 Si Lm silty loam

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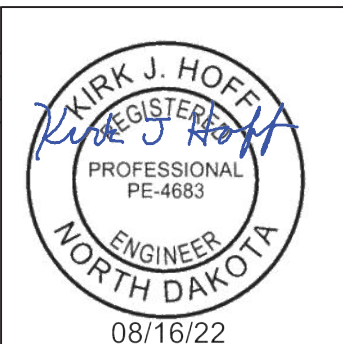


NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RED RIV COMM	Red River Rural Communications
ACCENT	Accent Communications	HALS TEL	Halstad Telephone Company	RESVTN TEL	Reservation Telephone
AGASSIZ WU	Agassiz Water Users Incorporated	IDEA1	Idea1	ROBRTS TEL	Roberts Company Telephone
AGC	Associated General Contractors of America	INT-COMM TEL	Inter-Community Telephone Company	R-RIDER ELEC	Roughrider Electric Cooperative
ALL PL	Alliance Pipeline	KANEB PL	Kaneb Pipeline Company	RRVW	Red River Valley & Western Railroad
ALL SEAS WU	All Seasons Water Users Association	KEM ELEC	Kem Electric Cooperative Incorporated	S CENT REG WD	South Central Regional Water District
AMOCO PI	Amoco Pipeline Company	KOCH GATH SYS	Koch Gathering Systems Incorporated	S E W U	South East Water Users Incorporated
AMRDA HESS	Amerada Hess Corporation	LKHD PL	Lakehead Pipeline Company	SCOTT CABLE	Scott Cable Television Dickinson
AT&T	AT&T Corporation	LNGDN RWU	Langdon Rural Water Users Incorporated	SHERDN ELEC	Sheridan Electric Cooperative
B PAW	Bear Paw Energy Incorporated	LWR YELL R ELEC	Lower Yellowstone Rural Electric	SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
BAKER ELEC	Baker Electric	MCKNZ CON	McKenzie Consolidated Telcom	SKYTECH	Skyland Technologies Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated	MCKNZ ELEC	McKenzie Electric Cooperative	SLOPE ELEC	Slope Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative	MCKNZ WRD	McKenzie County Water Resource District	SOURIS RIV TELCOM	Souris River Telecommunications
BELLE PL	Belle Fourche Pipeline Company	MCLEOD	McLeod USA	ST WAT COMM	State Water Commission
BLM	Bureau of Land Management	MCLN ELEC	McLean Electric Cooperative	STATE LN WATER	State Line Water Cooperative
BNSF	Burlington Northern Santa Fe Railway	MCLN-SHRDN R WAT	McLean-Sheridan Rural Water	STER ENG	Sterling Energy
BOEING	Boeing	MDU	Montana-dakota Utilities	STUT RWU	Stutsman Rural Water Users
BRNS RWD	Barnes Rural Water District	MIDCO	MidContinent Communications	SW PL PRJ	Southwest Pipeline Project
BURK-DIV ELEC	Burke-Divide Electric Cooperative	MIDSTATE TEL	Midstate Telephone Company	T M C	Turtle Mountain Communications
BURL WU	Burleigh Water Users	MINOT CABLE	Minot Cable Television	TCI	TCI of North Dakota
CABLE ONE	Cable One	MINOT TEL	Minot Telephone Company	TESORO GHG PLNS PL	Tesoro High Plains Pipeline
CABLE SERV	Cable Services	MISS VALL COMM	Missouri Valley Communications	TRI-CNTY WU	Tri-County Water Users Incorporated
CAP ELEC	Capital Electric Cooperative Incorporat	MISS W W S	Missouri West Water System	TRL CO RWU	Traill County Rural Water Users
CASS CO ELEC	Cass County Electric Cooperative	MNKOTA PWR	Minnkota Power	UNTD TEL	United Telephone
CASS RWU	Cass Rural Water Users Incorporated	MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative	UPPR SOUR WUA	Upper Souris Water Users Association
CAV ELEC	Cavalier Rural Electric Cooperative	MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative	US SPRINT	U.S. Sprint
CBLCOM	Cablecom Of Fargo	MRE LBTY TEL	Moore & Liberty Telephone	USAF MSL CABLE	U.S.A.F. Missile Cable
CENEX PL	Cenex Pipeline	MUNICIPAL	City Water And Sewer	USFWS	US Fish and Wildlife Service
CENT PL WATER DIST	Central Pipe Line Water District	MUNICIPAL	City Of '.....'	USW COMM	U.S. West Communications
CENT PWR ELEC	Central Power Electric Cooperative	N CENT ELEC	North Central Electric Cooperative	VRNDRY ELEC	Verendrye Electric Cooperative
CENTURYLINK	CenturyLink	N VALL W DIST	North Valley Water District	W RIV TEL	West River Telephone Incorporated
COE	Corps of Engineers	ND PKS & REC	North Dakota Parks And Recreation	WAPA	Western Area Power Administration
CONS TEL	Consolidated Telephone	ND TEL	North Dakota Telephone Company	WAWSA	Western Area Water Supply Authority
CONT RES	Continental Resource Inc	NDDOT	North Dakota Department of Transportation	WEB	W. E. B. Water Development Association
CPR	Canadian Pacific Railway	NDSU SOIL SCI DEPT	NDSU Soil Science Department	WILLI RWA	Williams Rural Water Association
D O E	Department Of Energy	NEMONT TEL	Nemont Telephone	WILSTN BAS PL	Williston Basin Interstate Pipeline Company
DAK CARR	Dakota Carrier Network	NODAK R ELEC	Nodak Rural Electric Cooperative	WLSH RWD	Walsh Water Rural Water District
DAK CENT TEL	Dakota Central Telephone	NOON FRMS TEL	Noonan Farmers Telephone Company	WOLVRTN TEL	Wolverton Telephone
DAK RWD	Dakota Rural Water District	NPR	Northern Plains Railroad	XLENER	Xcel Energy
DGC	Dakota Gasification Company	NSP	Northern States Power	YSVR	Yellowstone Valley Railroad
DICKEY R NET	Dickey Rural Networks	NTH PRAIR RW	Northern Prairie Rural Water Association		
DICKEY RWU	Dickey Rural Water Users Association	NTHN BRDR PL	Northern Border Pipeline		
DICKEY TEL	Dickey Telephone	NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated		
DNRR	Dakota Northern Railroad	NTHWSTRN REF	Northwestern Refinery Company		
DOME PL	Dome Pipeline Company	NW COMM	Northwest Communication Cooperation		
DVELEC	Dakota Valley Electric Cooperative	NWRWD	Northwest Rural Water District		
DVMW	Dakota, Missouri Valley & Western	ONEOK	Oneok gas		
ENBRDG	Enbridge Pipelines Incorporated	OSHA	Occupational Safety and Health Administration		
ENVENTIS	Enventis Telephone	OTTR TL PWR	Otter Tail Power Company		
EQUINOR	Equinor Pipeline	PAAP	Plains All American Pipeline		
FALK MNG	Falkirk Mining Company	P L E M	Prairielands Energy Marketing		
FHWA	Federal Highway Administration	POLAR COM	Polar Communications		
G FKS-TRL WD	Grand Forks-traill Water District	PVT ELEC	Private Electric		
GETTY TRD & TRAN	Getty Trading & Transportation	QWEST	Qwest Communications		
GLDN W ELEC	Golden West Electric Cooperative	R&T W SUPPLY	R & T Water Supply Association		
GRGS CO TEL	Griggs County Telephone				
GTR RAMSEY WD	Greater Ramsey Water District				

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# LINE STYLES

D-101-20

## Existing Topography

- Existing Ground Void
- Existing Cemetery Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter

## Proposed Topography

- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts
- 3-Cable w Posts
- Flow
- Fence
- Remove Line
- Wall
- Retaining Wall (Plan View)
- W-Beam w Posts
- High Tension Cable Guardrail with Posts

## Existing Utilities

- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Existing Culvert
- Existing Telephone Line
- Existing TV Line
- Existing Water or Steam Line
- Existing Under Drain
- Existing Slotted Drain
- Existing Conduit
- Existing Conductor
- Existing Down Guy Wire Down Guy
- Existing Underground Vault or Lift Station

## Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

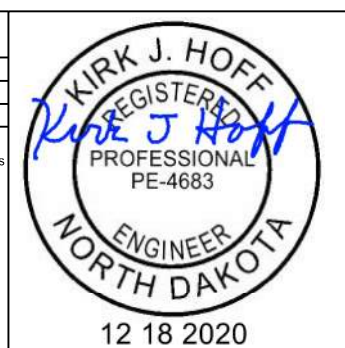
## Traffic Utilities

- Conductor
- Fiber Optic
- Existing Loop Detector
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Micro Loop Detector
- Micro Loop Detector
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm

## Sign Structures

- Existing Overhead Sign Structure
- Existing Overhead Sign Structure Cantilever
- Overhead Sign Structure Cantilever

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# LINE STYLES

D-101-21

### Right Of Way

- Easement
- Existing Easement
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Existing Right of Way Not State Owned
- Existing Government Lot Line
- ..... Existing Adjacent Block Lines
- ..... Existing Adjacent Lot Lines
- ..... Existing Adjacent Property Line
- ..... Existing Adjacent Subdivision Lines
- ..... Sight Distance Triangle Line
- Dimension Leader

### Boundary Control

- ////// Existing City Corporate Limits or Reservation Boundary
- Existing State or International Line
- Existing Township
- Existing County
- Existing Section Line
- Existing Quarter Section Line
- Existing Sixteenth Section Line
- Existing Centerline
- Tangent Line

### Cross Sections and Typical

- Existing Ground
- Existing Topsoil (Cross Section View)
- void - void - void - v Existing Ground Void (Not Surveyed)
- Existing Concrete
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar

### Geotechnical

- D ----- D ----- Geotextile Fabric Type D
- **Geo** ----- **Geo** ----- Geogrid
- R ----- R ----- Geotextile Fabric Type R
- R ----- R ----- Geotextile Fabric Type R1
- RR ----- RR ----- Geotextile Fabric Type RR
- S ----- S ----- Geotextile Fabric Type S
- ..... Subgrade Reinforcement

### Countours

- Depression Contours
- Supplemental Contour

### Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

### Striping

- Centerline Pavement Marking
- ===== Barrier with Centerline Pavement Marking
- ===== Barrier Pavement Marking
- - - - - Stripe 4 IN Dotted Extension White
- - - - - Stripe 8 IN Dotted Extension White
- - - - - Stripe 8 IN Lane Drop

### Pavement Joints

- ===== Doweled Joint
- +++++ Tie Bar 30 Inch 4 Foot Center to Center
- +++++ Tie Bar 18 Inch 3 Foot Center to Center
- +++++ Tie Bar at Random Spacing

### Bridge Details

- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Existing Conditions Object
- Centerline Main
- Centerline Secondary
- Excavation Limits
- Proposed Ground
- Sheet Piling

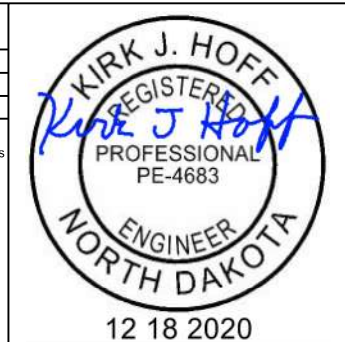
### Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- s ----- s ----- Floating Silt Curtain
- SF ----- SF ----- Silt Fence
- Excavation Limits
- Fiber Rolls

### Environmental

- Wetland Mitigation
- Existing Wetland Easement USFWS
- Existing Wetland Jurisdictional
- Existing Wetland
- Tree Row

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SYMBOLS



North Arrow (Half Scale)



Alignment Data Point



Alignment Monument



Spot Elevation



Existing Miscellaneous Spot



Existing Access Control Arrow



Existing Benchmark



Reset USGS Marker



Iron Monument Found



Iron Pin R/W Monument



Property Corner



Iron Pin Reference Monument



Right of Way Marker (Exst, Ppsd, Reset)



Existing Federal Reference Corner



Existing Section Corner (Full, Quarter, Sixteenth, Meander)



Existing Witness Corner



Existing Control Point (CP, GPS-RTK, TRI)



Existing Traverse PI Aerial Panel



Existing Reference Marker Point NGS



Existing EFB Misc



Existing Bush or Shrub



Existing Large Evergreen Tree



Existing Small Evergreen Tree



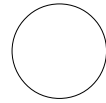
Existing Large Tree



Existing Small Tree



Existing Tree Trunk



Cairn or Stone Circle



Existing Artifact



Existing Satellite Dish



Existing Weather Station



Existing Windmill or Tower



Reinforced Pavement



Continuous Split Barrel Sample



Flight Auger Sample



Split Barrel Sample



Thinwall Tube Sample



Standard Penetration Test



Inclinometer Tube



Excavation Unit










































































Existing Ground Water Well Bore Hole

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Professional Engineer Seal for Kirk J. Hoff, North Dakota, PE-4683, dated 12 18 2020.

SYMBOLS

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





































































































































































			Flexible Delineator				Highway Sign (Exst, Ppsd)	
			Flexible Delineator Type A (Exst, Ppsd)				Mile Post Type A (Exst-Ppsd-Reset)	
			Flexible Delineator Type B (Exst, Ppsd)				Mile Post Type B (Exst, Ppsd)	
			Flexible Delineator Type C (Exst, Ppsd)				Mile Post Type C (Exst, Ppsd)	
			Flexible Delineator Type D (Exst, Ppsd)				Object Marker Type I (Exst, Ppsd)	
			Flexible Delineator Type E (Exst, Ppsd)				Object Marker Type II (Exst, Ppsd)	
				Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)			Object Marker Type III (Exst, Ppsd)	
				Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)			Existing Reference Marker	
				Delineator Type C (Exst, Ppsd, Diamond Grade)				
				Delineator Type D (Exst, Ppsd, Diamond Grade)			Road Closure Gate 18 Ft (Exst, Ppsd)	
				Delineator Type E (Exst, Ppsd, Diamond Grade)			Road Closure Gate 28 Ft (Exst, Ppsd)	
							Road Closure Gate 40 Ft (Exst, Ppsd)	
								Existing Railroad Battery Box
					Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)			Existing RR Profile Spot
					Attenuation Device			Existing Railroad Crossbuck
					Truck Mounted Attenuator			Existing Railroad Frog
					Delineator Drums			Existing Mailbox (Private, Federal)
					Flagger			
					Tubular Marker			
					Traffic Cone			
					Back to Back Vertical Panel Sign			

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

**KIRK J. HOFF**  
REGISTERED  
*Kirk J Hoff*  
PROFESSIONAL  
PE-4683  
ENGINEER  
NORTH DAKOTA  
12 18 2020

# SYMBOLS

D-101-32

	Existing Luminaire									Existing Traffic Signal Standard
	Luminaire LED									Pull Box (Exst-Ppsd-Undefined)
	Existing Light Standard Luminaire									Intelligent Transportation Pull Box (Exst, Ppsd)
	Relocate Light Standard									Transformer (Exst, Ppsd)
	Light Standard Light LED Luminaire									Power Pole (Exst-Ppsd-with Transformer)
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire									Wood Pole (Exst, Ppsd)
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire									Pedestrian Push Button Post (Exst, Ppsd)
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire									Existing Pole
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire									Existing Telephone Pole
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire									Existing Post
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire									Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire									Concrete Foundation (Exst, Ppsd)
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire									Pipe Mounted Flasher (Exst, Ppsd)
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire									Pad Mounted Feed Point (Exst, Ppsd)
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire									Pipe Mounted Feed Point with Pad (Exst, Ppsd)
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire									Pole Mounted Feed Point (Exst, Ppsd)
	Emergency Vehicle Detector									Existing Pedestrian Head with Number
	Video Detection Camera									Existing Signal Head
										Existing Lighting Standard Pole

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

12 18 2020

# SYMBOLS

D-101-33

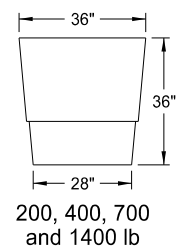
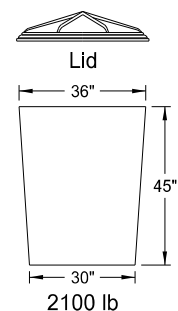
○	○	○	Existing Manhole (Electrical, Gas, Telephone)	⌋	⌋	⌋	⌋	⌋	Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
		⊗	Water Manhole (Exst, Exst with Valve)						
		⊗	Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)						
		⊕	Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)	□	□	□	□	□	⊠
○	○	⊗	⊗	Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined					
		⊗	Force Main Storm Drain Manhole (Exst, Exst with Valve)	⌋	⌋	⌋	⌋	⌋	⌋
	○	⊗	Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)	Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined					
		⊗	Existing Water Appurtenance	⊗	⊗	⊗	⊗	⊗	⊗
		⊗	Sprinkler Head (Exst, Ppsd)	Pump Sanitary, Storm Drain, Exst Water					
		⊗	Fire Hydrant (Exst, Ppsd)	⊗	⊗	⊗			
		⊗	Cleanout (Exst Sanitary, Underdrain)	Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)					
		⊗	Existing Catch Basin Inlet (Round, Square)	⌋	⌋	⌋	⌋	⌋	⌋
		⊗	Existing Curb Inlet (Round, Square)	Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)					
		⊗	Existing Slotted Reinforced Concrete Pipe	⌋	⌋	⌋	⌋	⌋	⌋
○	○	○	Catch Basin (Riser 30 Inch, Beehive, Type A)	Existing Utility Marker					
		○	Inlet Mountable Curb (Type A, Type B)	Existing Meter					
		⊗	Inlet Saddle Base (Type 1, Type 2)	Existing Fuel Dispensers					
		⊗	Inlet Special (Catch Basin, Type 1, Type A)	Existing Fuel Filler Pipes					
○	○	⊗	⊗	Existing Fuel Leak Sensors					
		⊗	Inlet (Tee, Type 1, Type 2, Type 2 Double)						
		⊗	Median Drain						
				Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)					

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
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12-18-20	General Revisions Sheet added - Continued from D-101-32



12 18 2020

ATTENUATION DEVICE



Outer Containers



200 lb

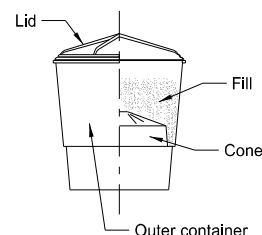


400 lb

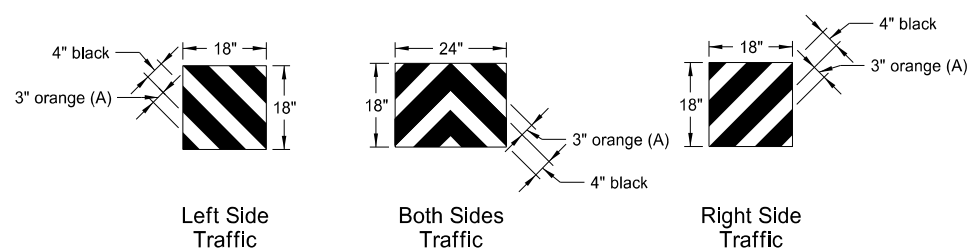


700 lb

Typical Module Construction Detail



Typical Assembly

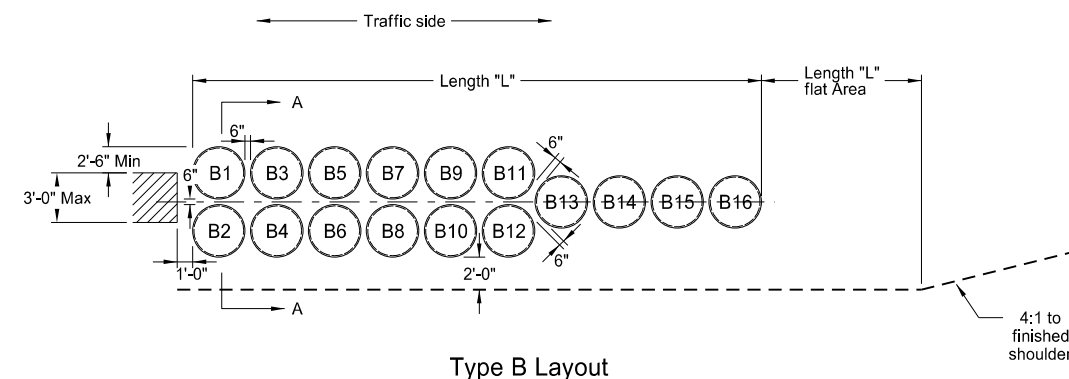


Reflective Sheet Detail

Note:  
Apply Type IV reflective sheeting (as specified in the NDDOT Standard Specifications) directly to the outer container of the last attenuation device facing traffic, following the details above. Or apply the sheet to a metallic sheet and attach it to the container with approved fasteners.

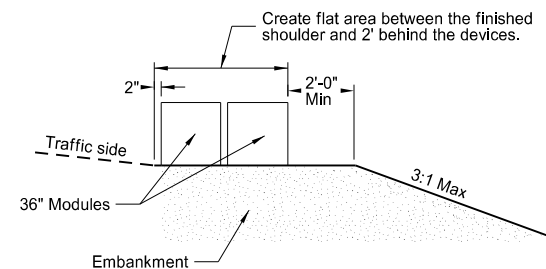
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

	Fill Chart				
	Module Weights (LBS)				
Distance from top edge	8 1/2"	5"	4"	3"	0"



Type B Layout

Note:  
Angle attenuation devices 10 degrees towards traffic when placed at piers offset from roadway.



Section A-A (Type B Layout)

Type B Attenuation Device												
Module Number	Dash Number											
	75	70	65	60	55	50	45	40	35	30	25	
Module Weights (LBS)												
B1	2100											
B2	2100											
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100			
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100			
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200	200
Length (L)	34.2'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	27.2'	27.2'	
Module Weights (LBS)	Replacement Module											
	1	1	1	1	1	1	1	1	1	1	1	1
2100	1	1	1	1	1	1	1	1	1	1	1	1
1400	1	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1	1

Notes:

- Materials
  - Use modules manufactured from frangible polyethylene material which shatters upon impact.
  - Fill modules with class 43 aggregate meeting NDDOT Standard Specifications aggregate requirements. Use fill with a unit weight of at least 100 pounds per cubic foot. Use fill with a moisture content of 2% or less when left over winter.
- Modules
 

Provide modules in two sizes containing volumes of either 2, 4, 7, 14, or 21 cubic feet minimum.

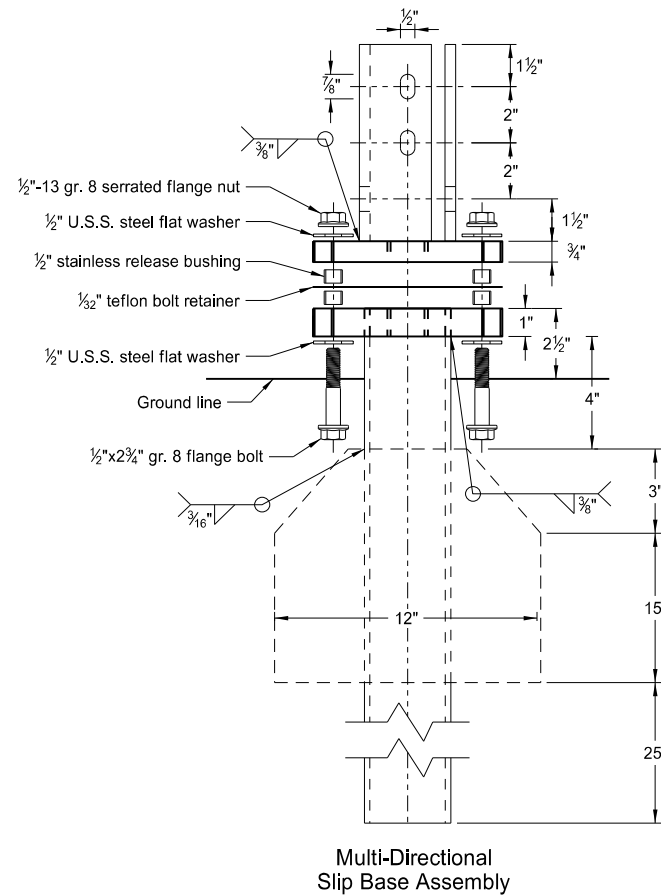
  - Provide three components for 2, 4, or 7 cubic foot module containers:
    - A 14 C.F., yellow outer container.
    - A black lid securely locking over the top lip of the container.
    - A variable cone-shaped supporting insert capable of supporting 200, 400, or 700 pounds of sand mass to allow for three sizes of modules. Place cone inserts inside the 14 cubic foot container.
  - Provide two components for the 14 cubic foot module container:
    - A 14 C.F., yellow outer container.
    - A black lid securely locking over the top lip of the container.
  - Provide two components for the 21 cubic foot module container:
    - A 36" height X 36" width yellow outer container.
    - A black lid which locks securely over the top of the container.
- For temporary installations use Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal modules. As an option, place attenuation devices on 3 1/2" maximum thickness pallets to facilitate maintenance.
- For permanent installations use Barrel Attenuation Device consisting of one-piece outer sand container modules with separate detachable lid. Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal meet these requirements.
- The Typical Module Construction Detail and Type B Layout are based on the Energite Crash Cushion manufactured by Energy Absorption. Provide any required layouts and details from other sand filled attenuation module manufacturers which differ from those shown here.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised sheeting in reflective sheet detail
9-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp

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 of Transportation

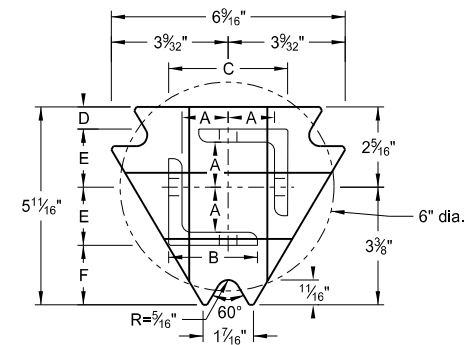
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

Perforated Tube



Multi-Directional Slip Base Assembly

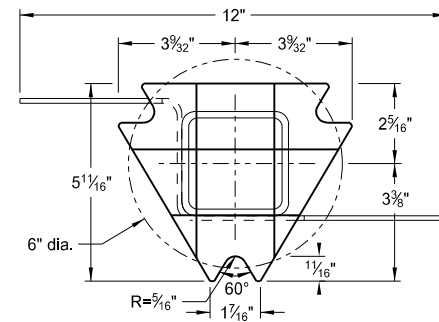
Traffic Flow



Top Post Receiver

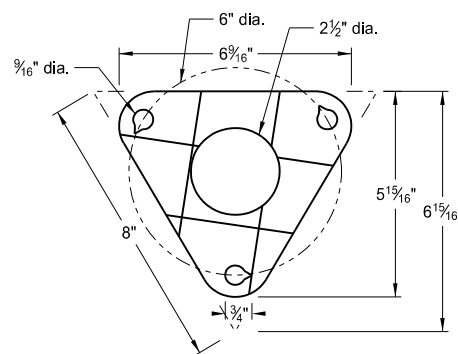
Plate - ASTM A572 grade 50  
Angle Receiver - 2 1/2" x 2 1/2" x 3/8" ASTM A36 structural angle

Traffic Flow



Bottom Soil Stub

Tube - 3"x3"x7 gauge ASTM A500 grade B tube  
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011  
Plate - ASTM A572 grade 50



Bolt Retainer for Base Connection  
Bolt Retainer- 1/2" Reprocessed Teflon

Notes:

1. Torque slip base bolts as specified by manufacturer.
2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
4. In concrete sidewalk, use same anchor without wings.
5. Provide more than 7' between the first and fourth posts of a four post sign.

Telescoping Perforated Tube

Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/2	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube

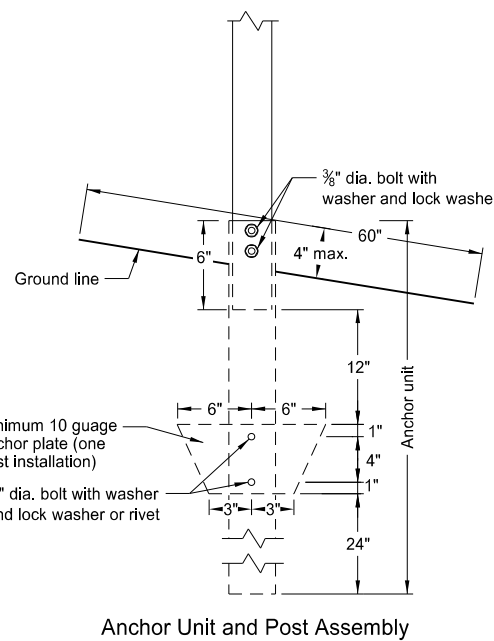
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. <sup>4</sup>	Cross Sec. Area in. <sup>2</sup>	Section Modulus in. <sup>3</sup>
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

Top Post Receiver Data Table

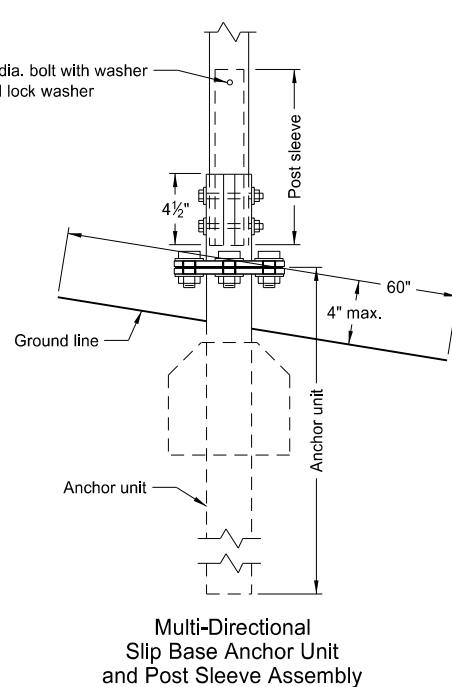
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16" x 10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 33/64"	1 7/8"
2 1/2" x 10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

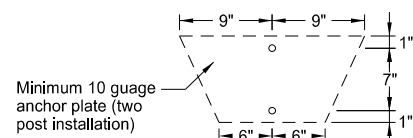
(B) For additional wind load, insert the 2 3/16" x 10 ga. into 2 1/2" x 10 ga.



Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly

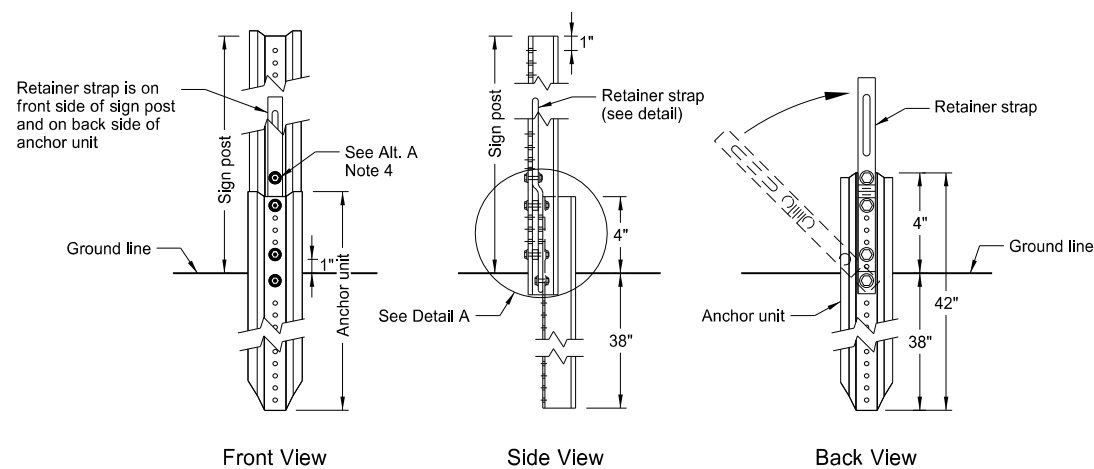
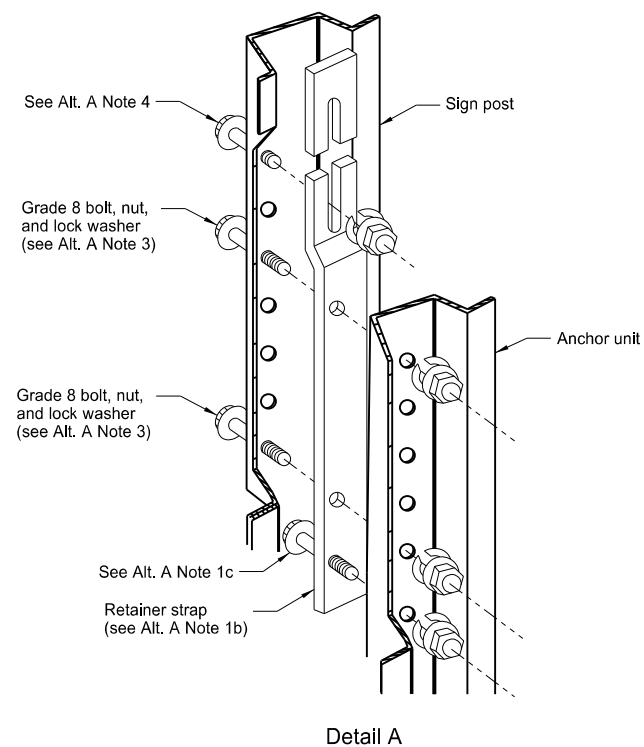


Minimum 10 gauge anchor plate (two post installation)

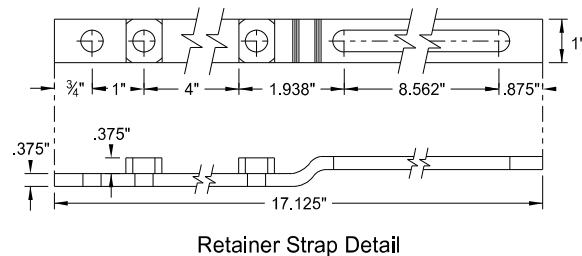
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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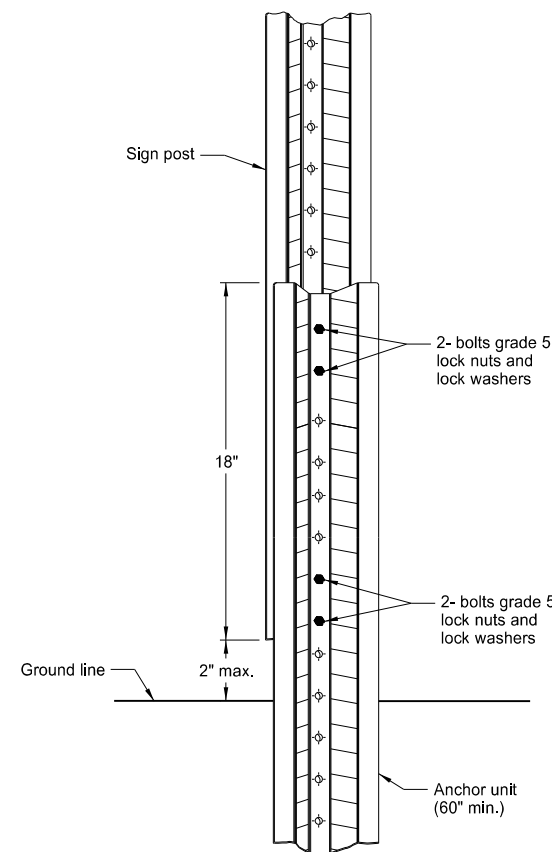
U-Channel Post



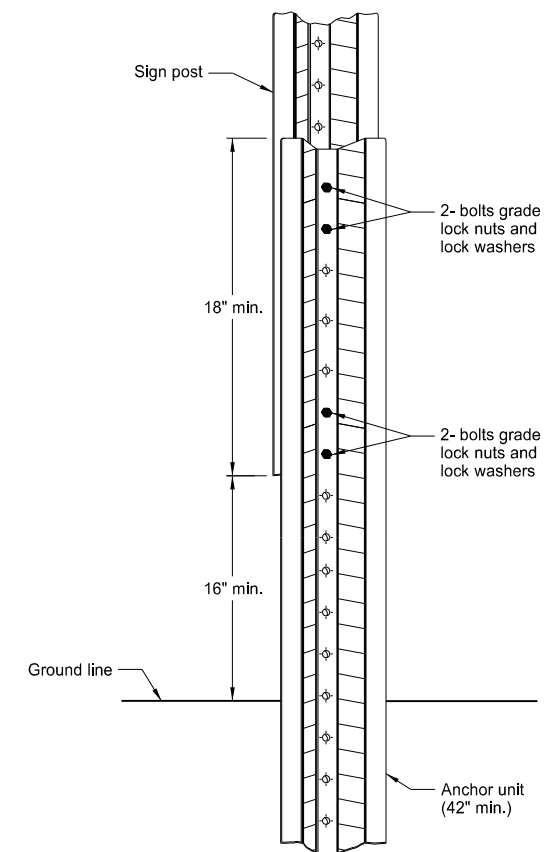
Breakaway U-Channel Detail Alternate A  
Install a maximum of 2 posts within 7'.



Retainer Strap Detail



Breakaway U-Channel Splice Detail Alternate B  
(2.5 and 3 lb/ft)  
Install a maximum of 3 posts within 7'.



Breakaway U-Channel Splice Detail Alternate C  
(2.5 and 3 lb/ft)  
Install a maximum of 3 posts within 7'.

Alternate A Steps of Installation:

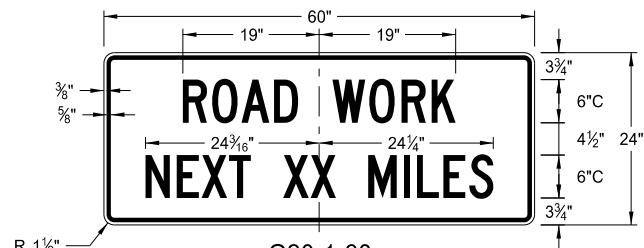
1. a) Drive anchor unit to within 12" of ground level.  
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.  
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.  
d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.  
b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.  
b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17 10-03-19	Updated to active voice New Design Engr PE Stamp

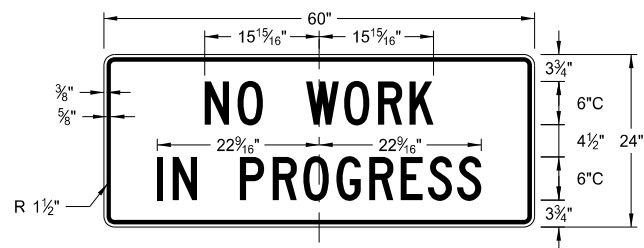
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CONSTRUCTION SIGN DETAILS  
 TERMINAL AND GUIDE SIGNS

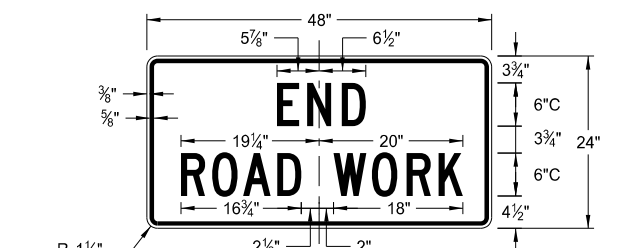
D-704-9



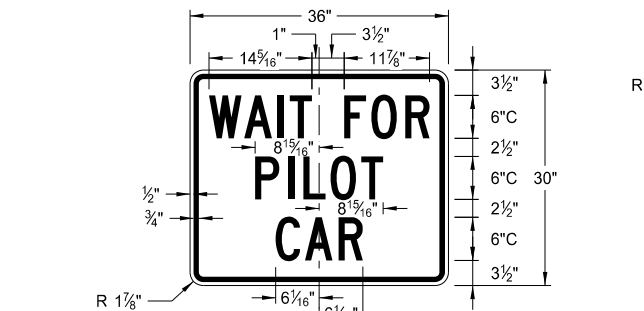
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 Background: orange



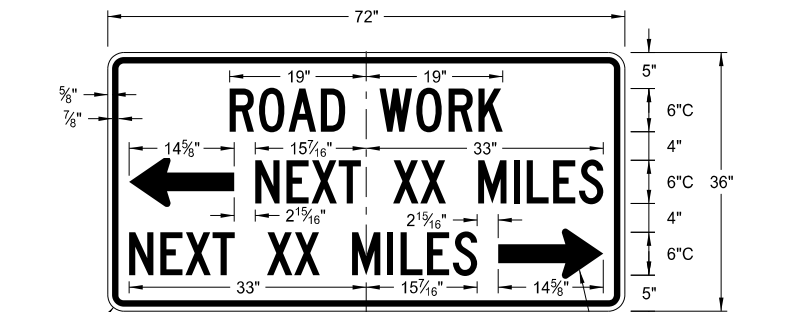
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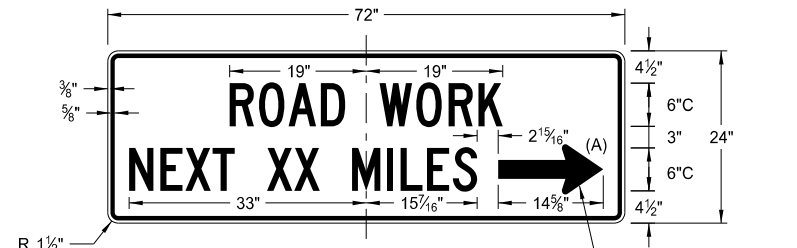
G20-2-48  
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 Background: orange



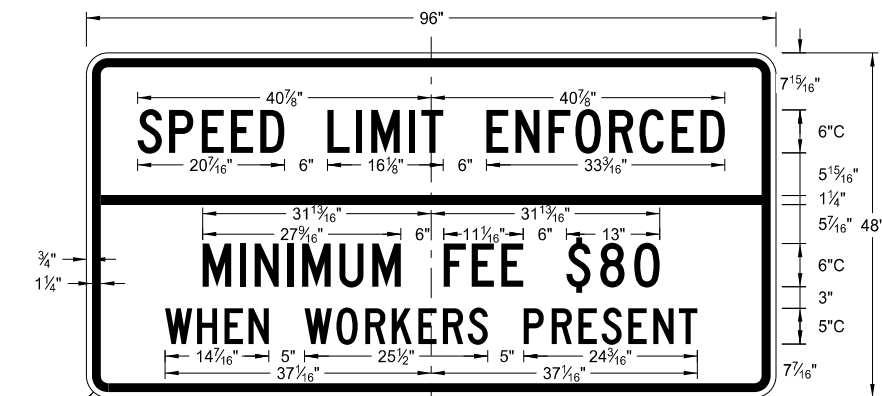
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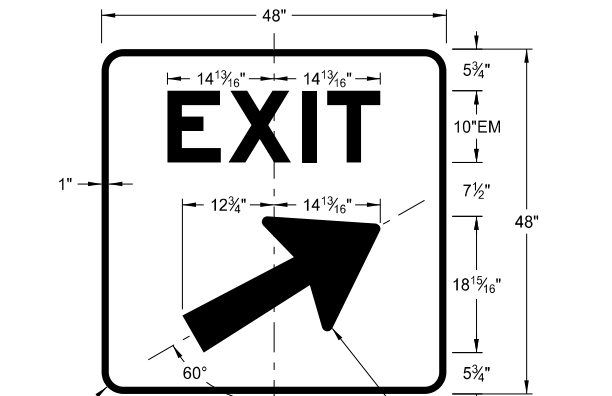
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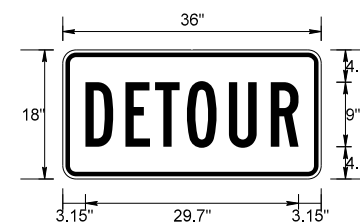
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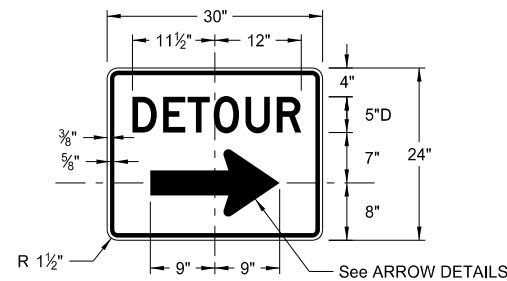
G20-55-96  
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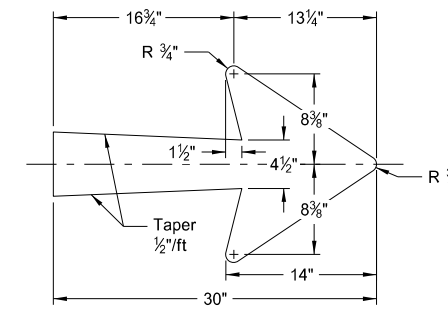
E5-1(L or R)-48  
 Legend: white  
 Background: green (orange optional)



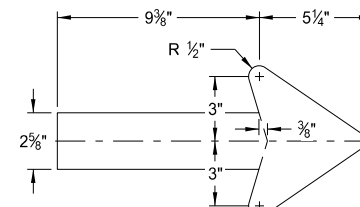
M4-8-36  
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 Background: orange



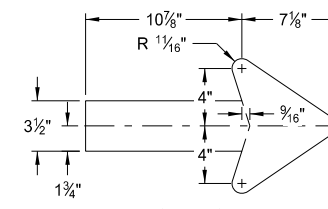
M4-9(L or R)-30 &  
 M4-9-30  
 Legend: black (non-refl)  
 Background: orange



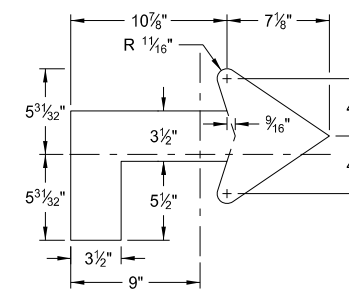
E5-1-48



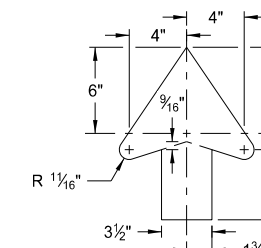
G20-50a-72  
 G20-52a-72



M4-9(L or R)-30  
 Right or Left



M4-9(L or R)-30  
 Advanced Right or Left



M4-9-30  
 Straight

ARROW DETAILS

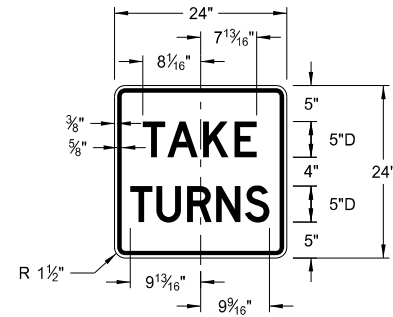
NOTES:

(A) Arrow may be right or left of the legend to indicate construction to the right or left.

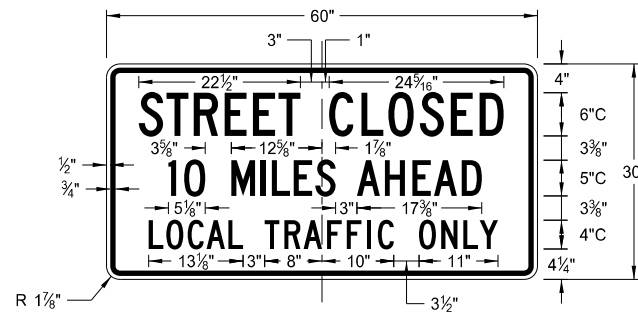
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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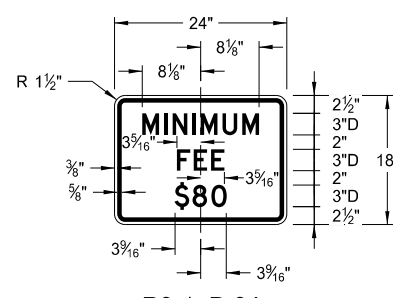
CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS



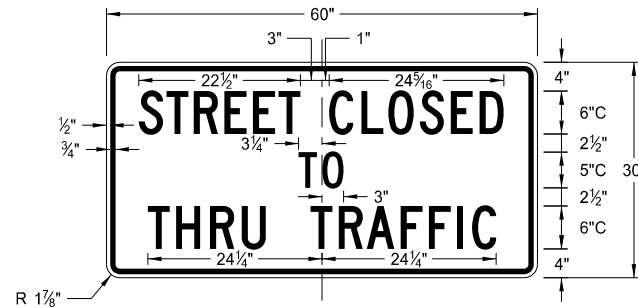
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Background: white



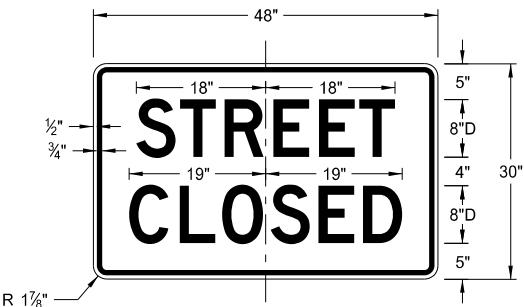
R11-3c-60  
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Background: white



R2-1aP-24  
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Background: white



R11-4a-60  
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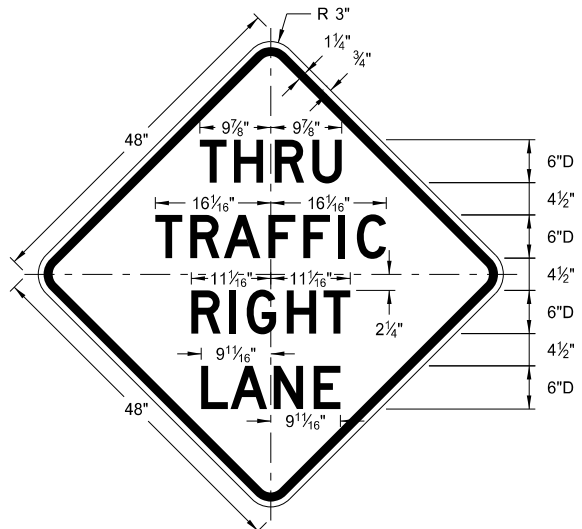


R11-2a-48  
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

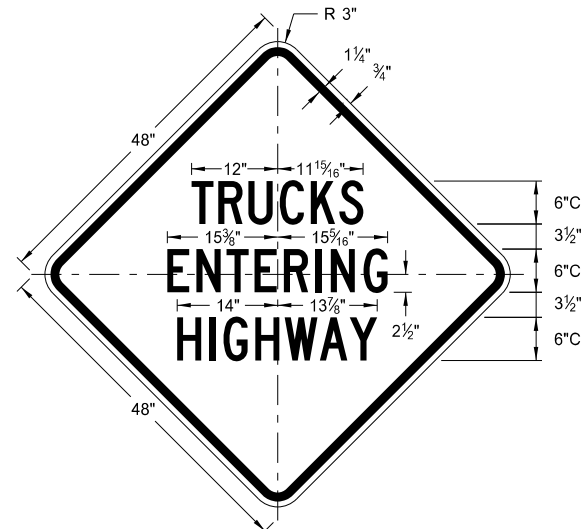
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CONSTRUCTION SIGN DETAILS  
WARNING SIGNS



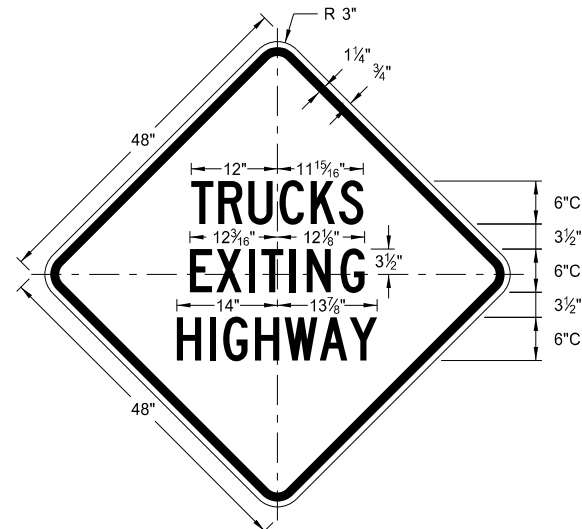
W5-8-48

Legend: black (non-refl)  
Background: orange



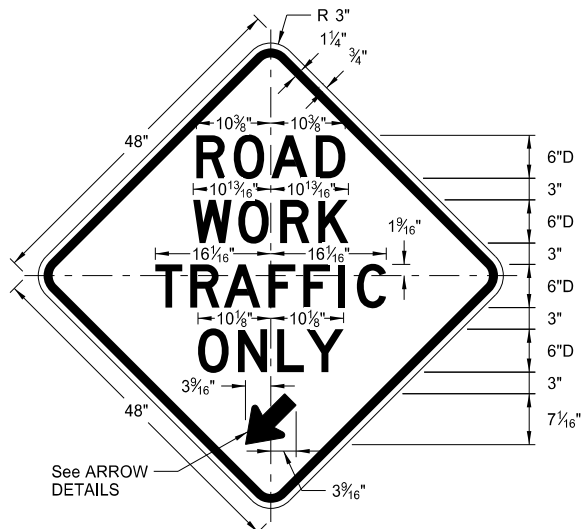
W8-53-48

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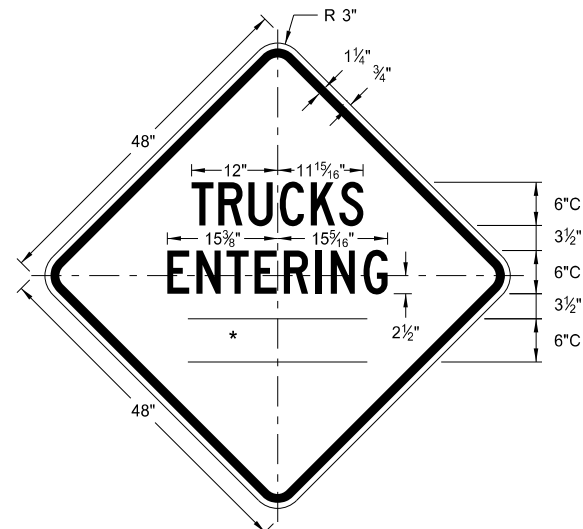
W8-56-48

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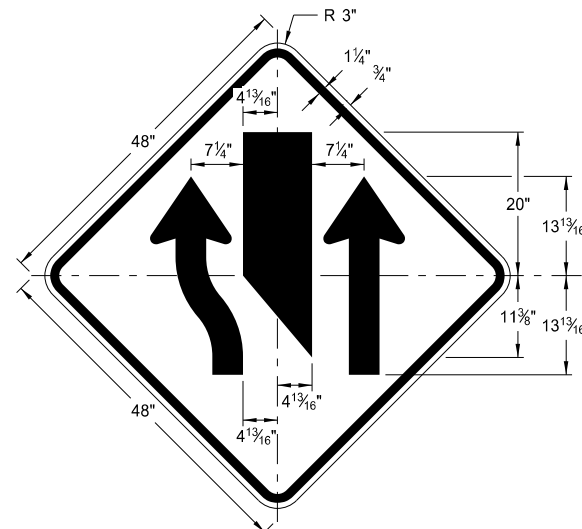
W5-9-48

Legend: black (non-refl)  
Background: orange



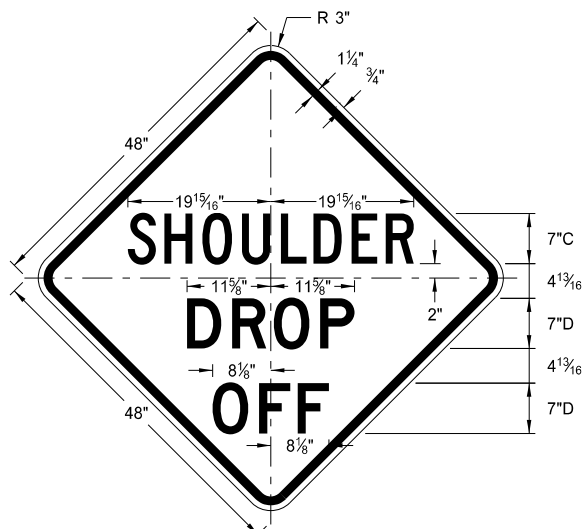
W8-54-48

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Background: orange



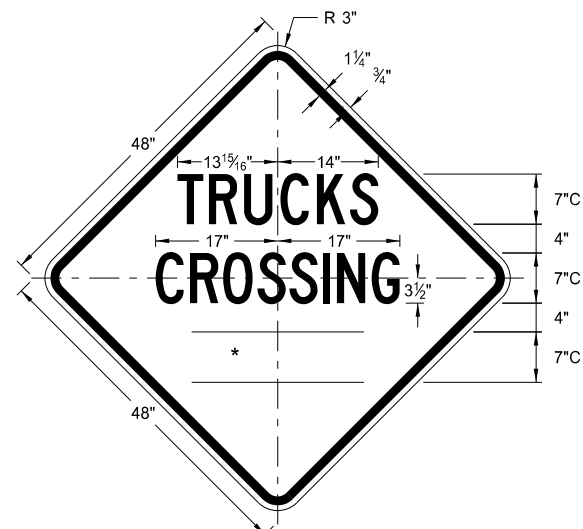
W9-3a-48

Legend: black (non-refl)  
Background: orange



W8-9a-48

Legend: black (non-refl)  
Background: orange

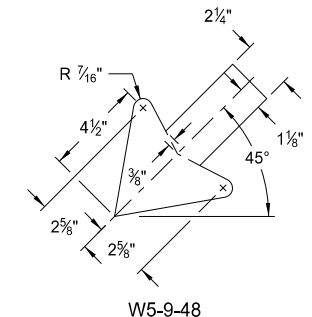


W8-55-48

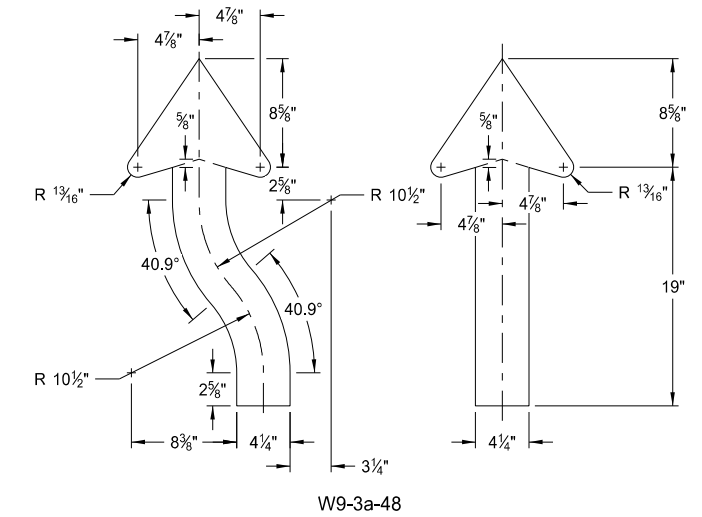
Legend: black (non-refl)  
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

\* DISTANCE MESSAGES



W5-9-48



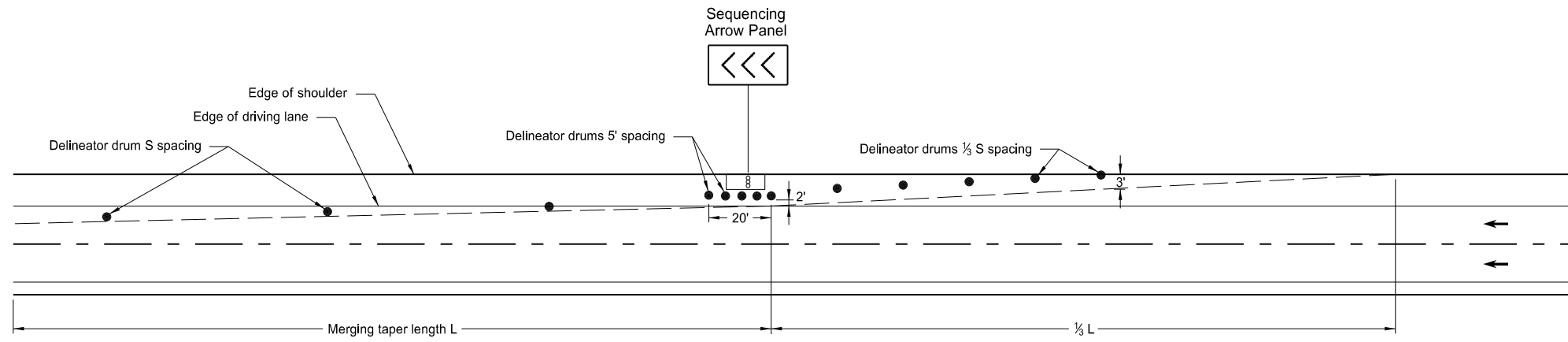
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ARROW DETAILS

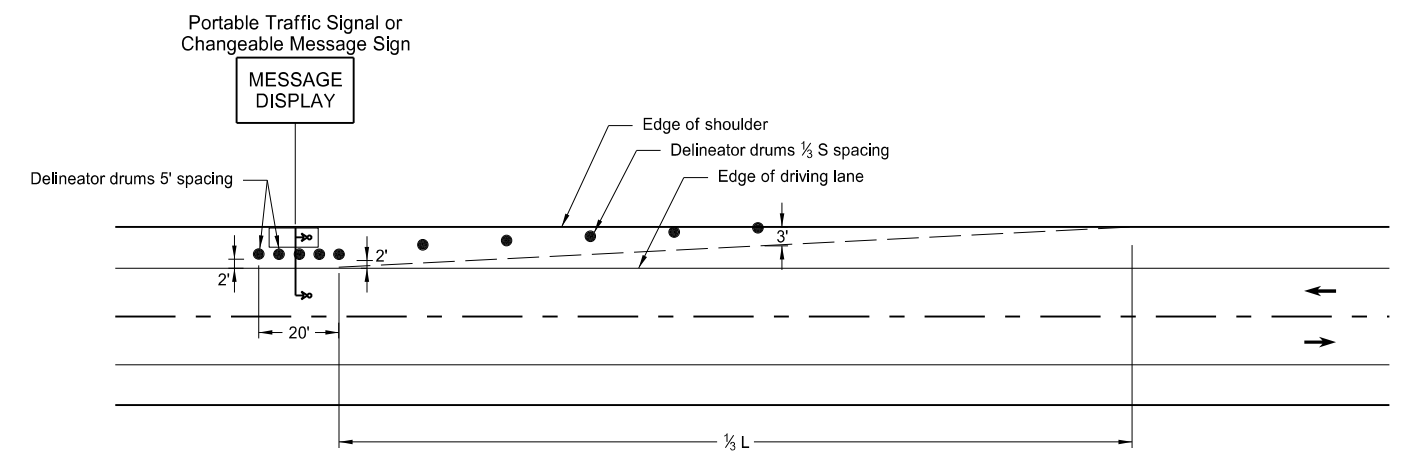
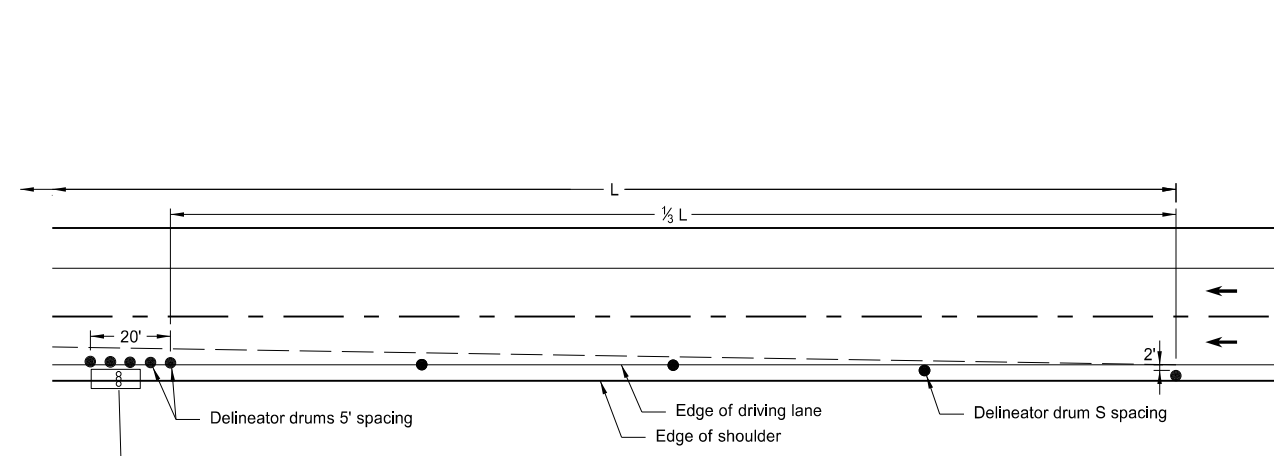
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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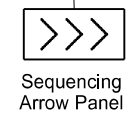
SHOULDER CLOSURE TAPERS



SHOULDER CLOSURE WITH LANE CLOSURE  
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE  
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY	
● Delineator Drum	∞ Sequencing Arrow Panel
• Message Display	☒ Portable Traffic Signal

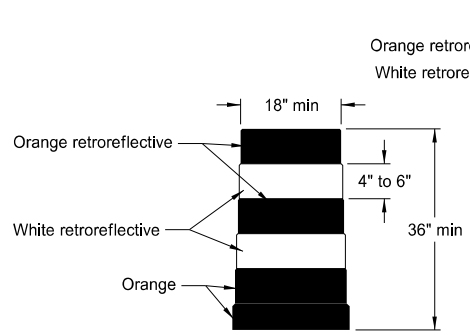
Notes:

- S = Posted Speed Limit in mph  
W = Width of offset in feet  
L = Taper length in feet  
L =  $WS^2/60$  (40mph or less)  
L = WS (45mph or more)
- If a shoulder taper is used, use a length of approximately  $1/3L$ . If a shoulder is used as a travel lane, use a normal merging or shifting taper.
- When paved shoulders of 8 foot width or more are closed, use channelizing devices to close shoulder in advance, to delineate beginning of work space, and to direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-25-19	Added L dimension to detail

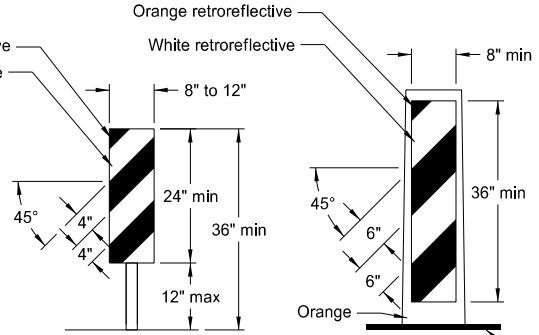
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on 10/25/19 and the original document is stored at the North Dakota Department of Transportation

BARRICADE AND CHANNELIZING DEVICE DETAILS



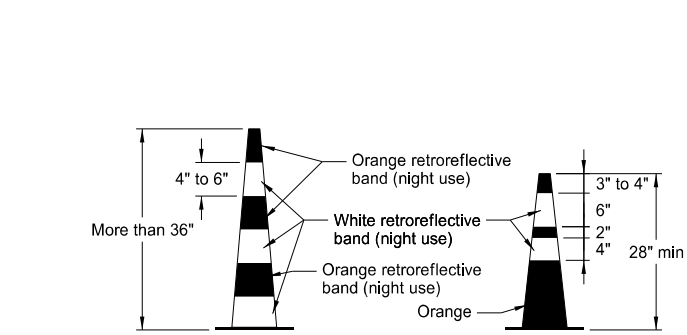
DELINEATOR DRUM

Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and white stripes. Avoid placement of stripes on drum ribs or indentations. Use closed top drums that will not allow collection of debris. Do not place ballast on the top of drum.



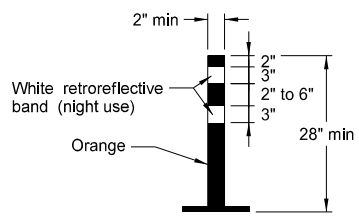
BACK TO BACK VERTICAL PANEL

Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, use a stripe width of 6 inches.



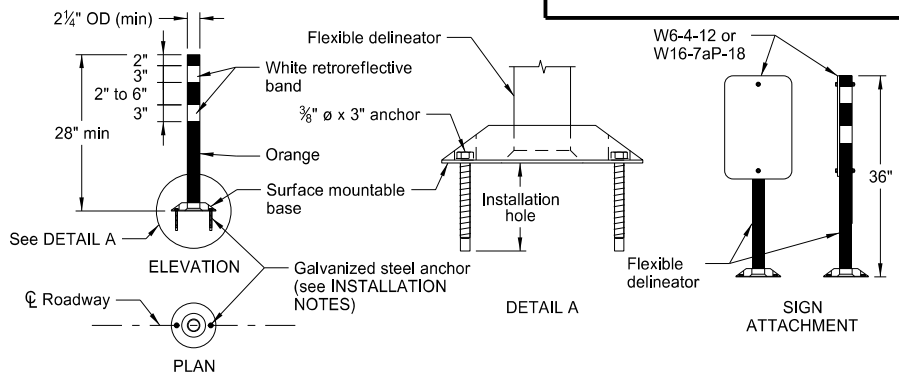
TRAFFIC CONE

Provide retroreflectORIZATION of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectORIZED space between the orange and white stripes.



TUBULAR MARKER

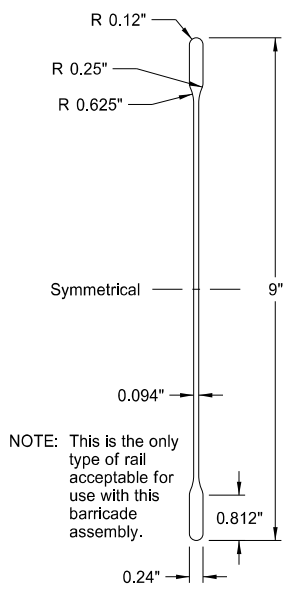
Provide retroreflectORIZATION of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

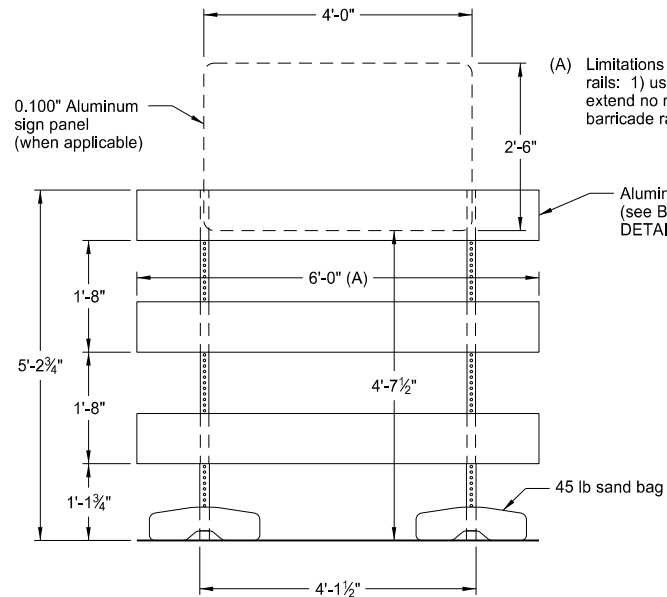
INSTALLATION NOTES:

1. Drill installation holes to diameter and depth required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close as possible to pavement surface.



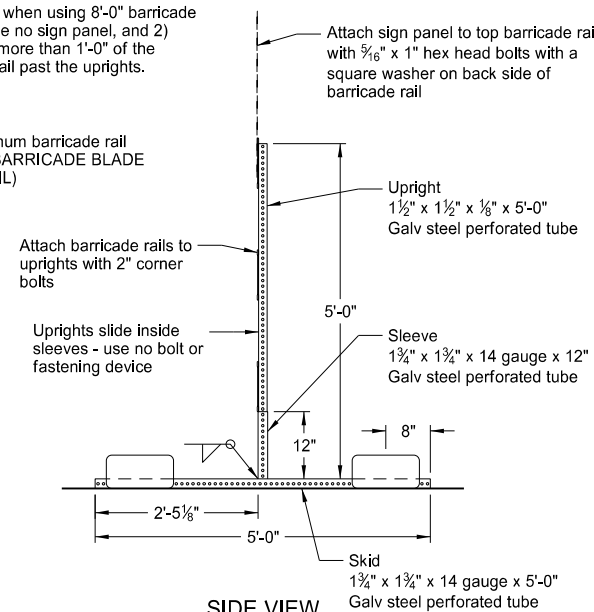
BARRICADE BLADE DETAIL

NOTE: This is the only type of rail acceptable for use with this barricade assembly.



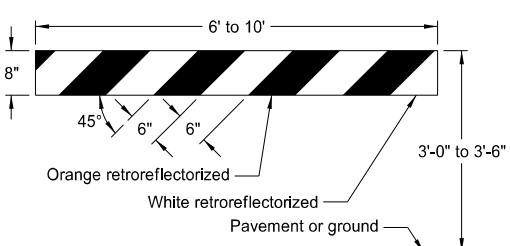
ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

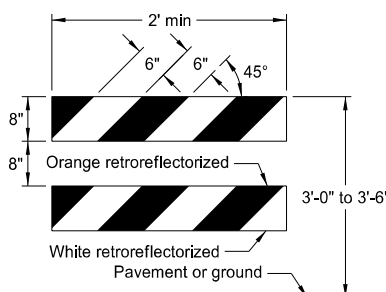


SIDE VIEW

NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", use a rail stripe width of 4".

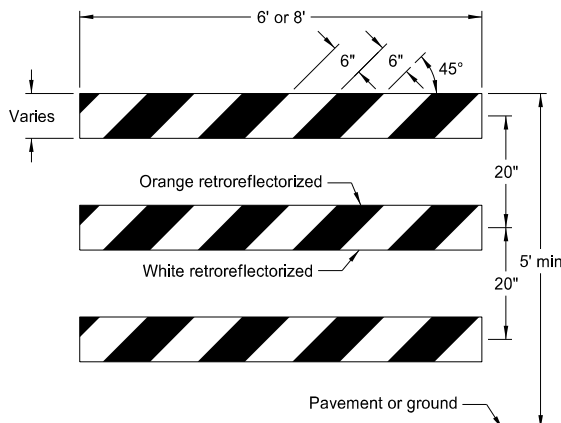


TYPE I BARRICADE

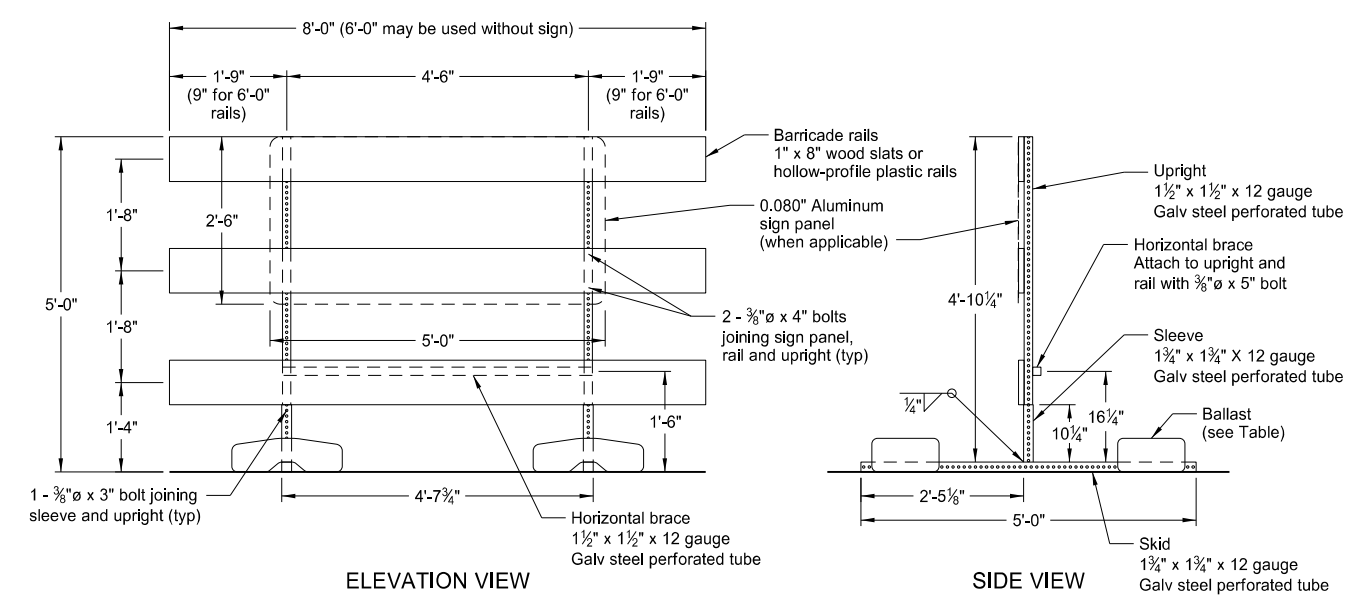


TYPE II BARRICADE

BARRICADE RAIL DETAILS



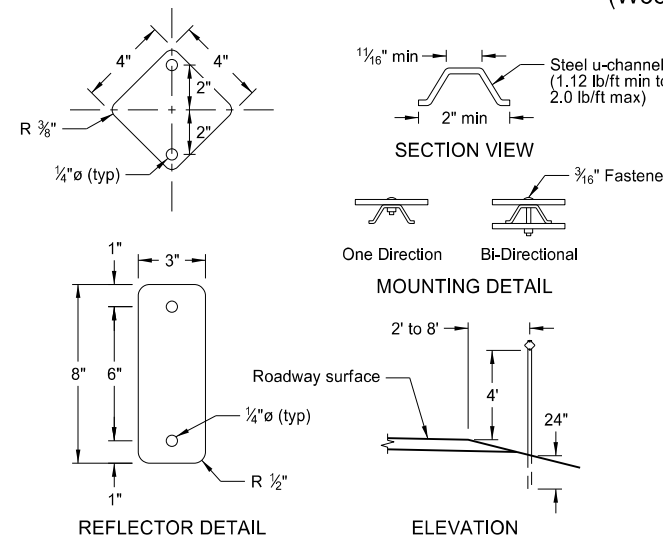
TYPE III BARRICADE



ELEVATION VIEW

SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

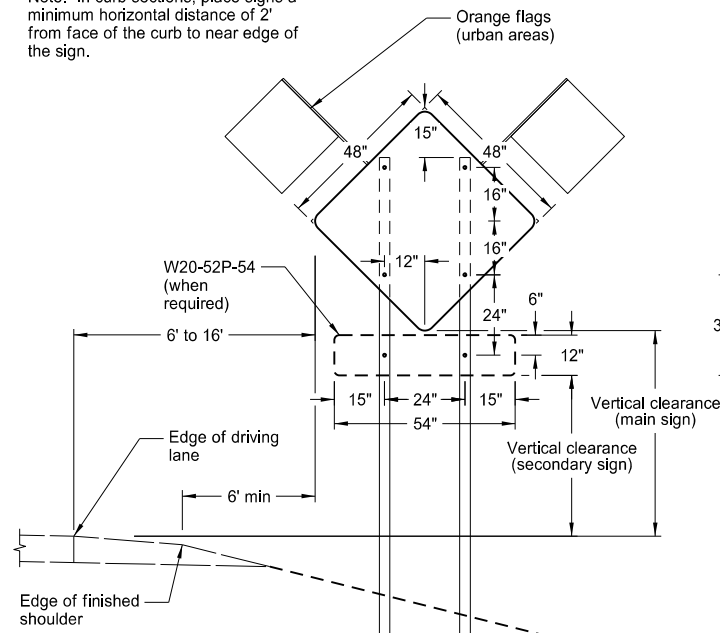
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

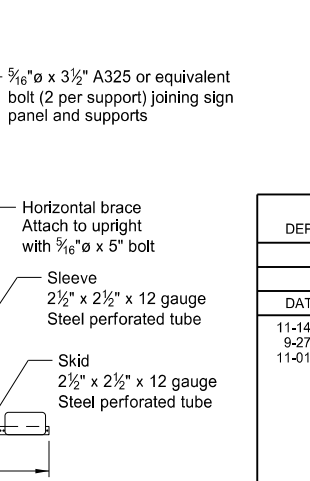
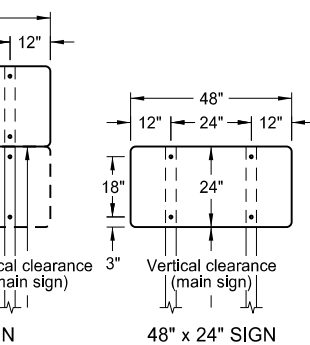
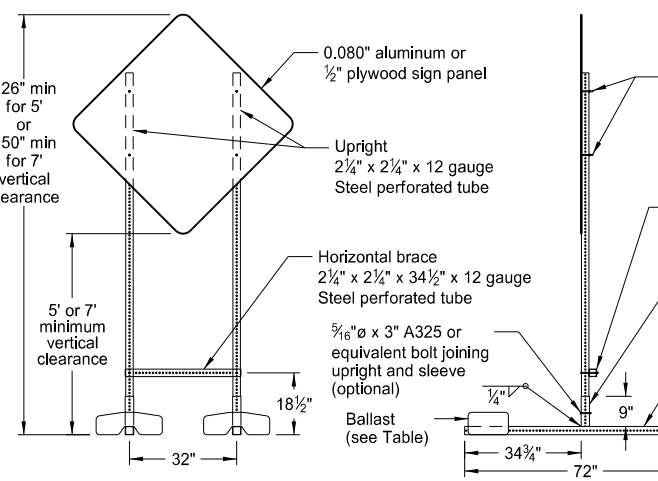
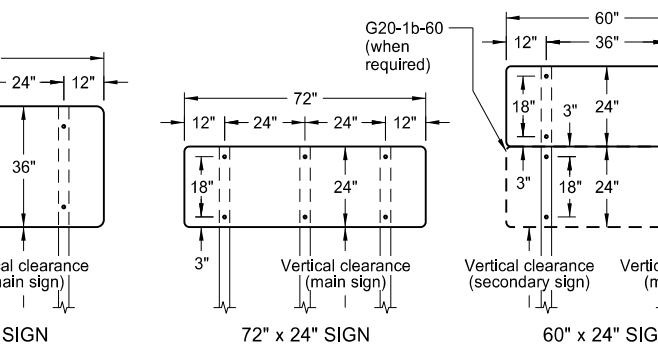
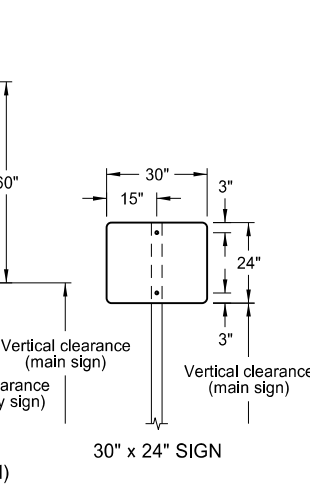
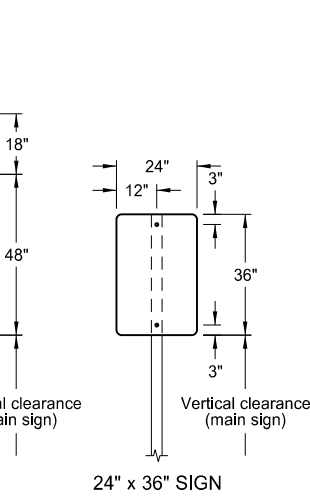
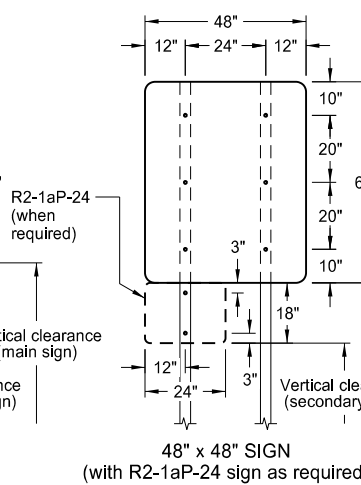
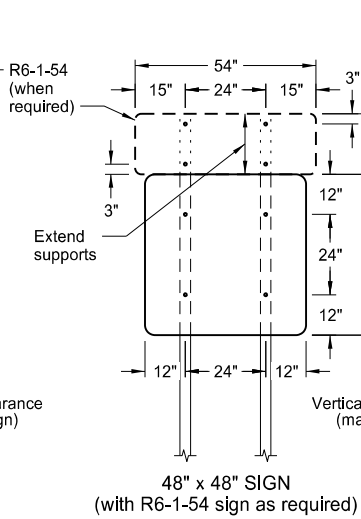
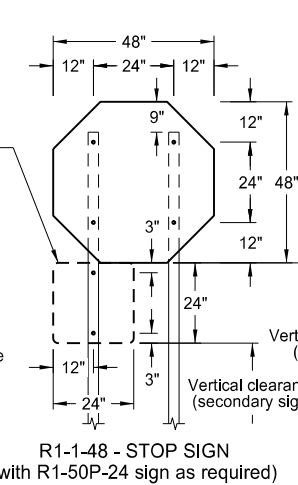
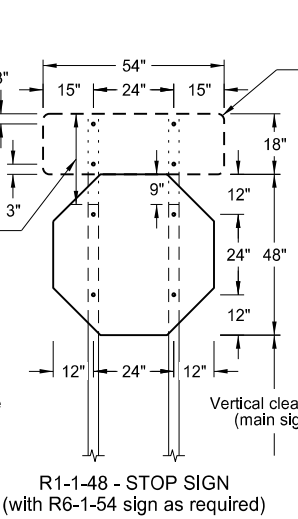
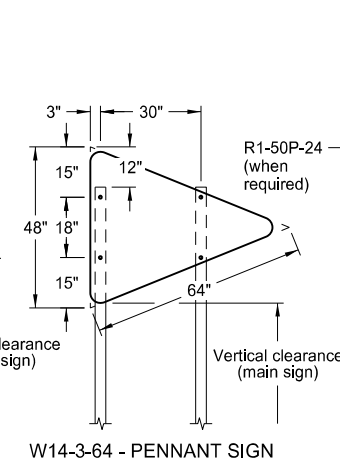
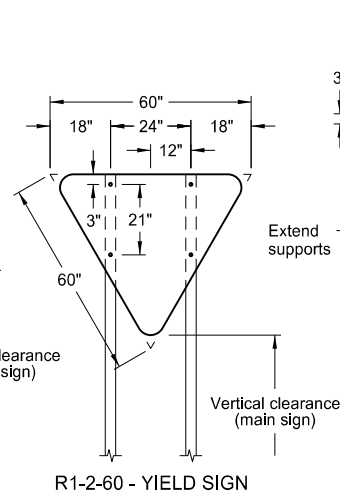
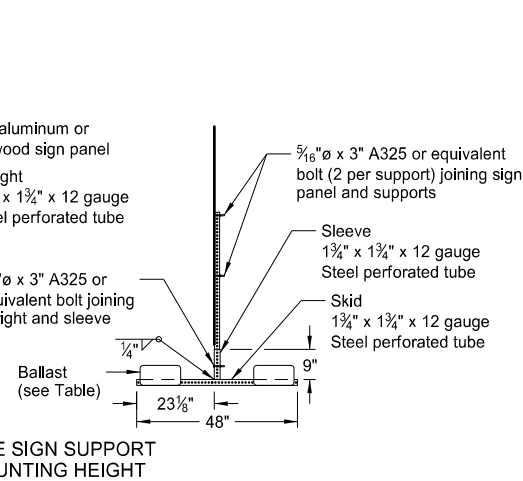
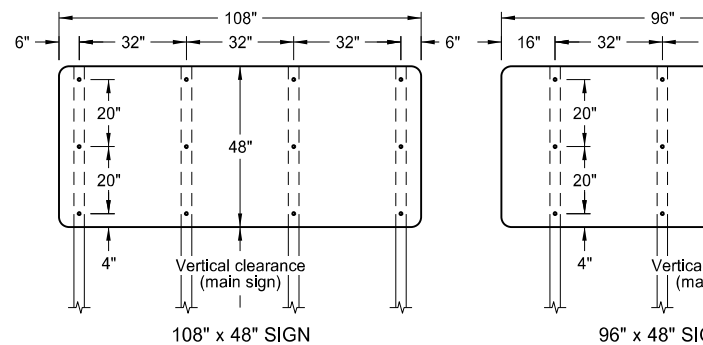
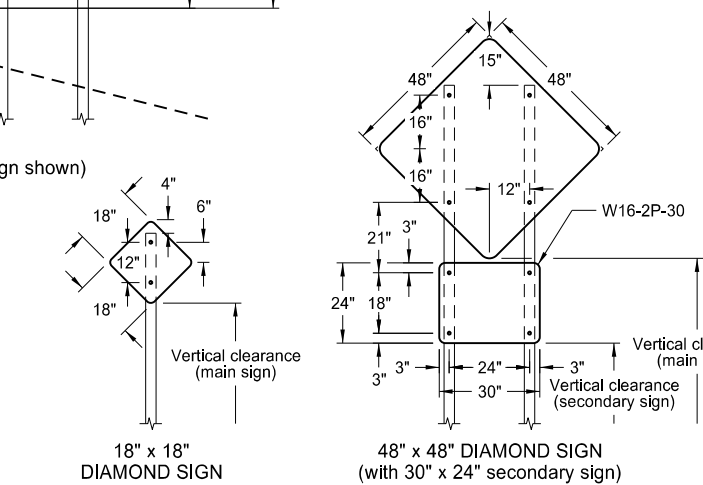
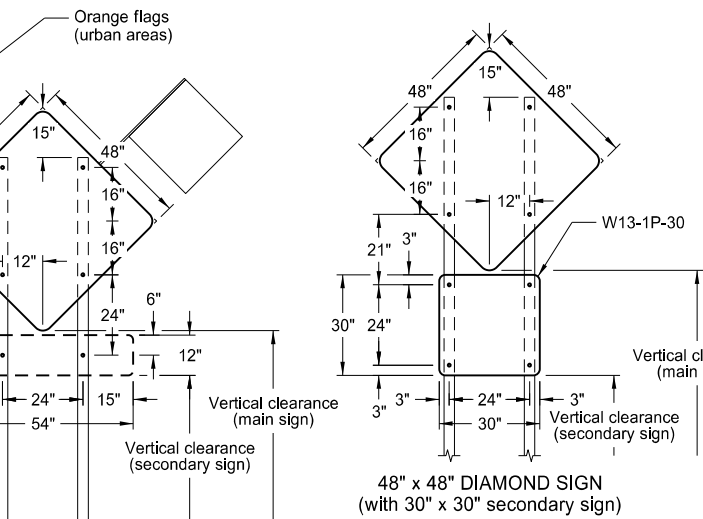
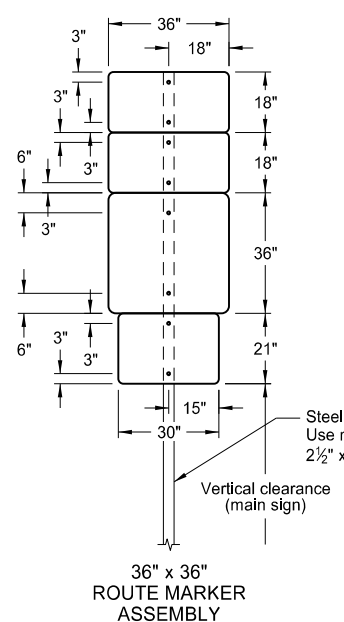
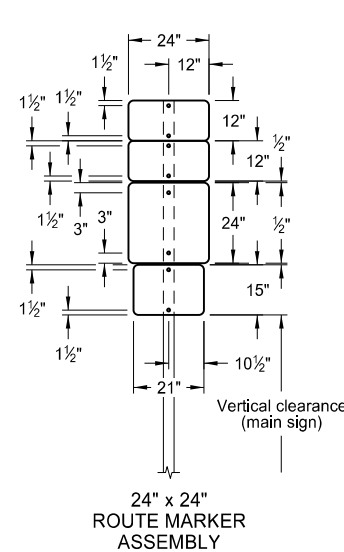
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



TYPICAL SECTION  
(48" x 48" diamond warning sign shown)



NOTES:

- Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.  
  
Place signs over 50 square feet on 2 1/2" x 2 1/2" perforated tube supports as a minimum.  
  
Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 3/8" bolts.
- Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
- Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background  
Interstate Business Loop - white legend on green background  
US and State - black legend on white background  
County - yellow legend on blue background

- Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION). In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

The vertical clearance to secondary signs is 1'-0" less than the vertical clearance stated above.

Provide a minimum clearance of 7'-0" from the ground at the post for signs with an area exceeding 50 square feet.

- Portable Signs: Provide portable signs that meet the vertical clearance stated above when it is necessary to place signs within the pavement surface.

Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdowns, rain, subgrade failures, etc., will not accrue towards the 5 day period. Use of R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 is allowed for longer than 5 days.

Restrict signs mounted on portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT details to a maximum surface area of 16 square feet.

MINIMUM BALLAST  
(For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

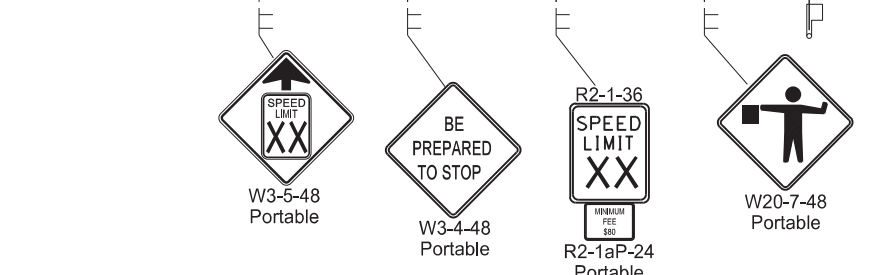
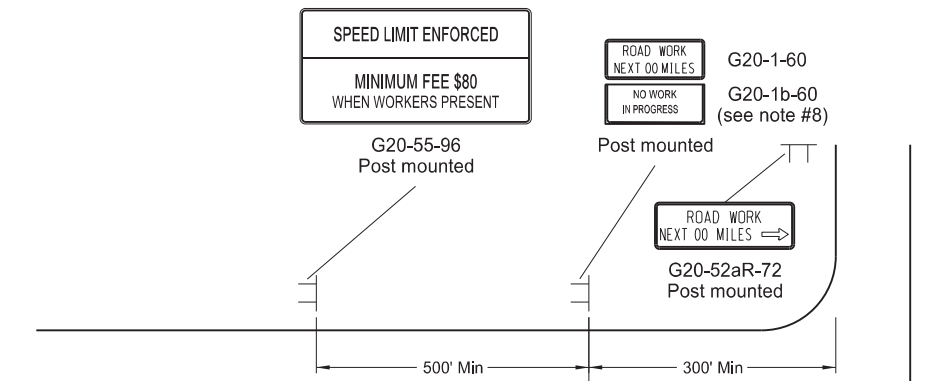
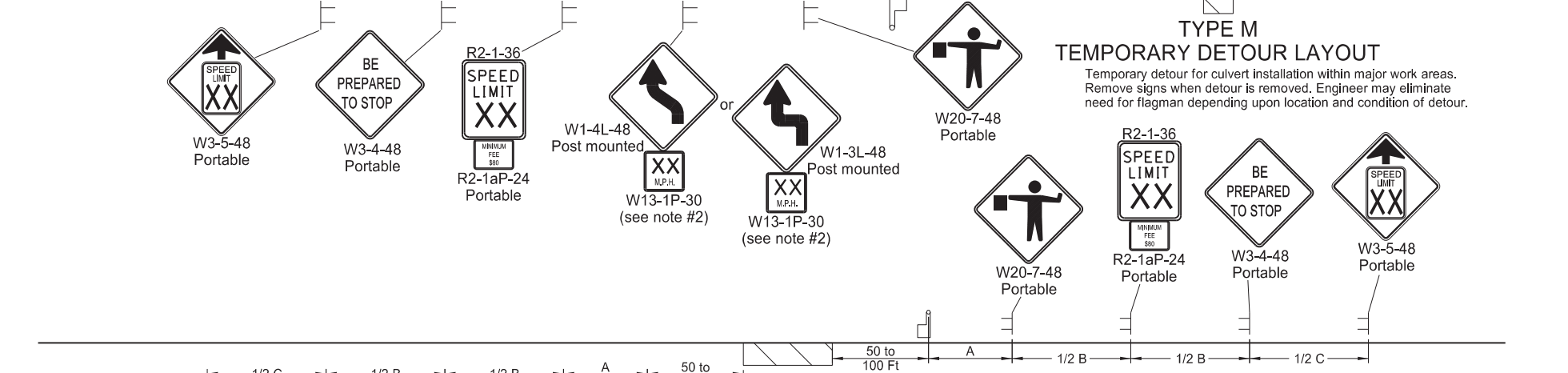
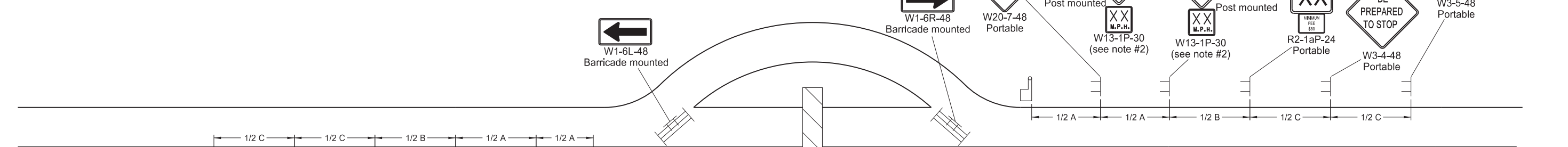
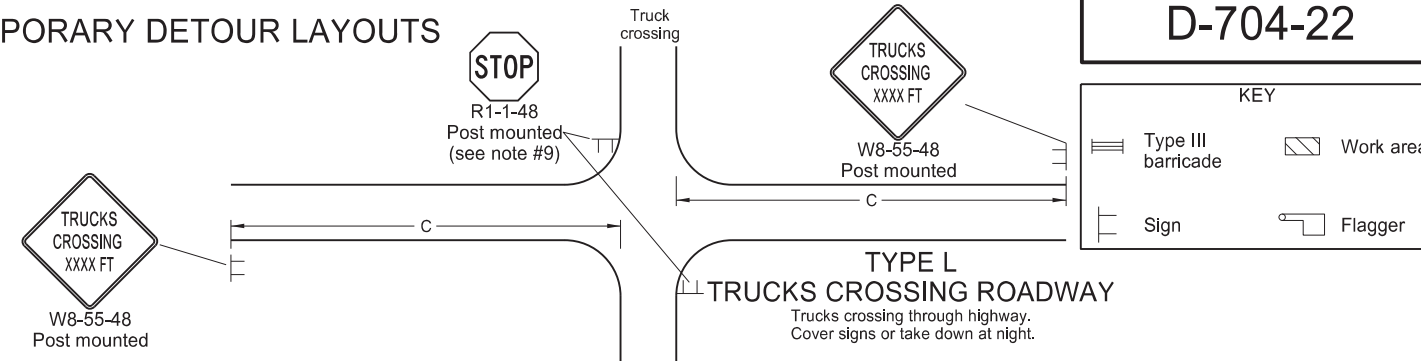
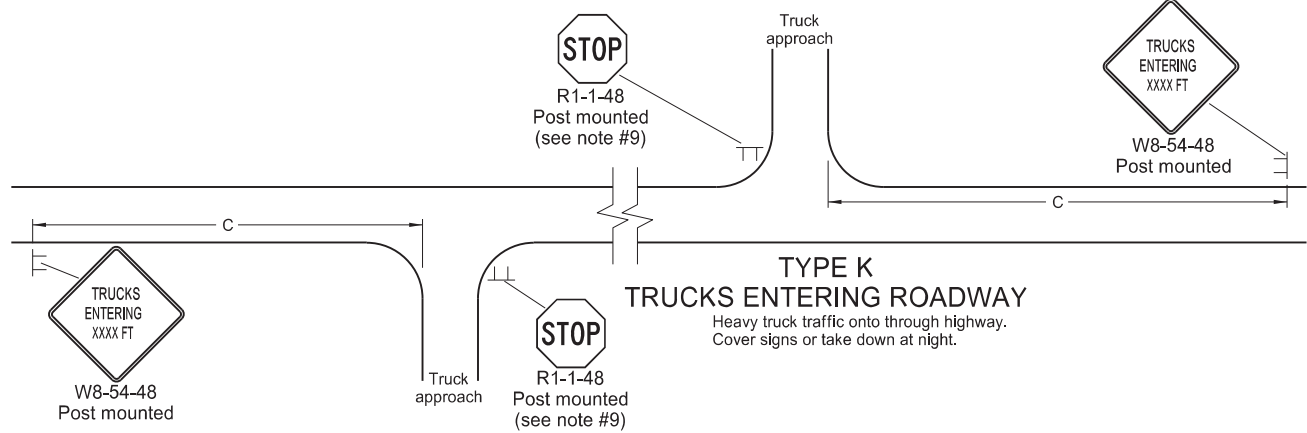
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Registration Number  
**PE-4683,**  
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# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

**KEY**

- Type III barricade
- Sign
- Work area
- Flagger



- Notes:**
- Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
  - Where necessary, safe speed to be determined by the Engineer.
  - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
  - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
  - Cover existing speed limit signs within a reduced speed zone.
  - Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
  - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
  - Install sign G20-1b-60 when work is suspended for winter.
  - If existing stop sign is in place, a 48" stop sign is not required.
  - Sign G20-55-96 is not required if layout is part of other traffic control that contains this sign, or if work is less than 15 days.
  - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

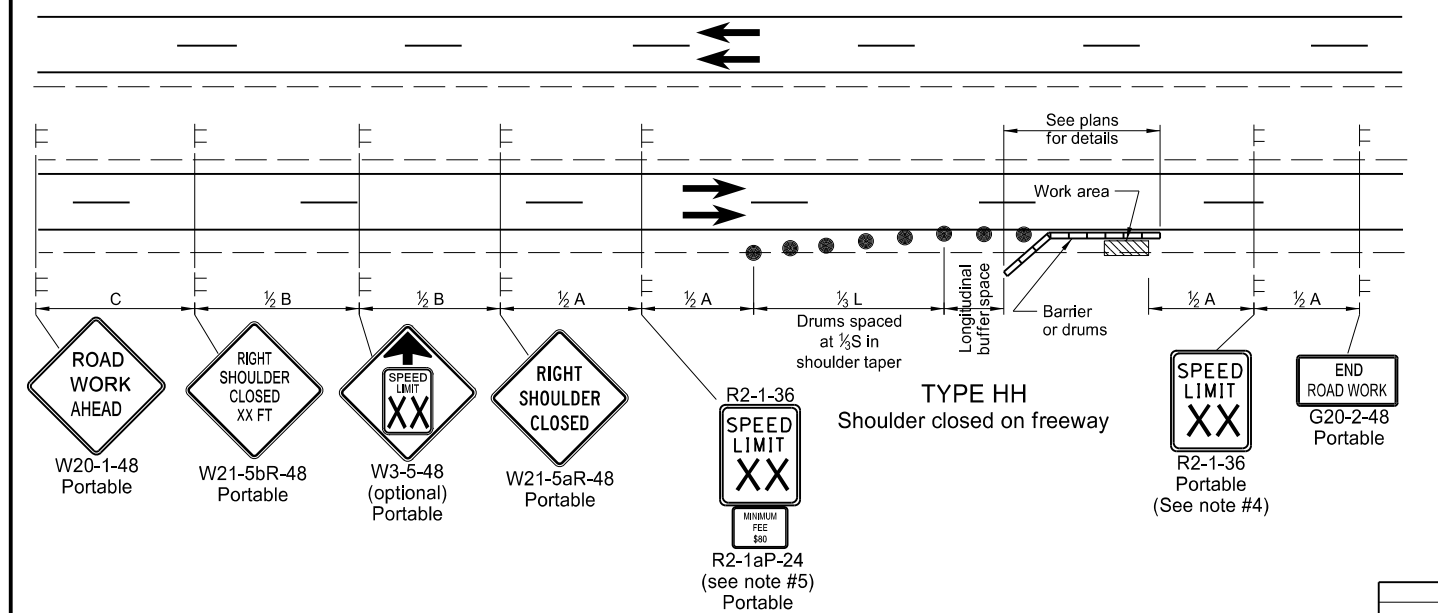
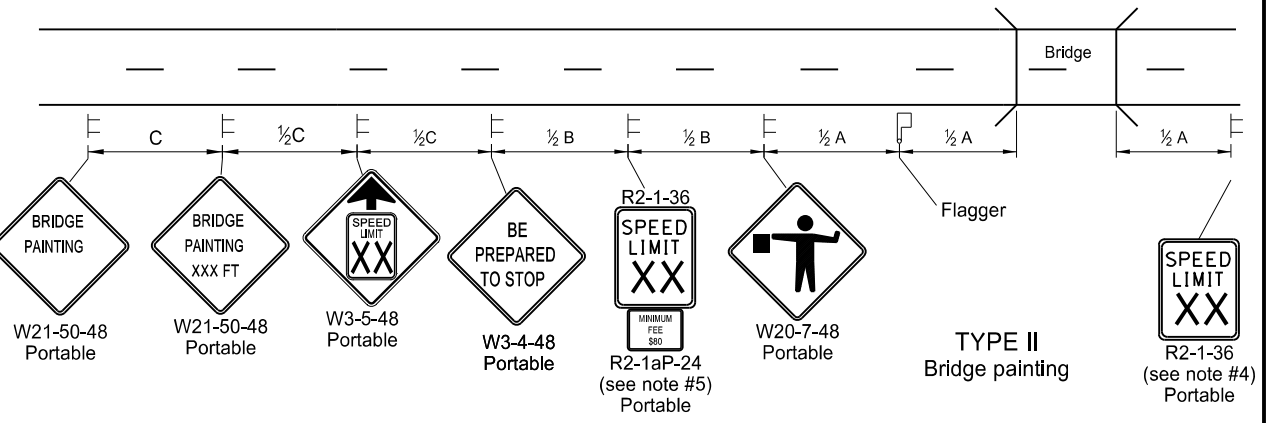
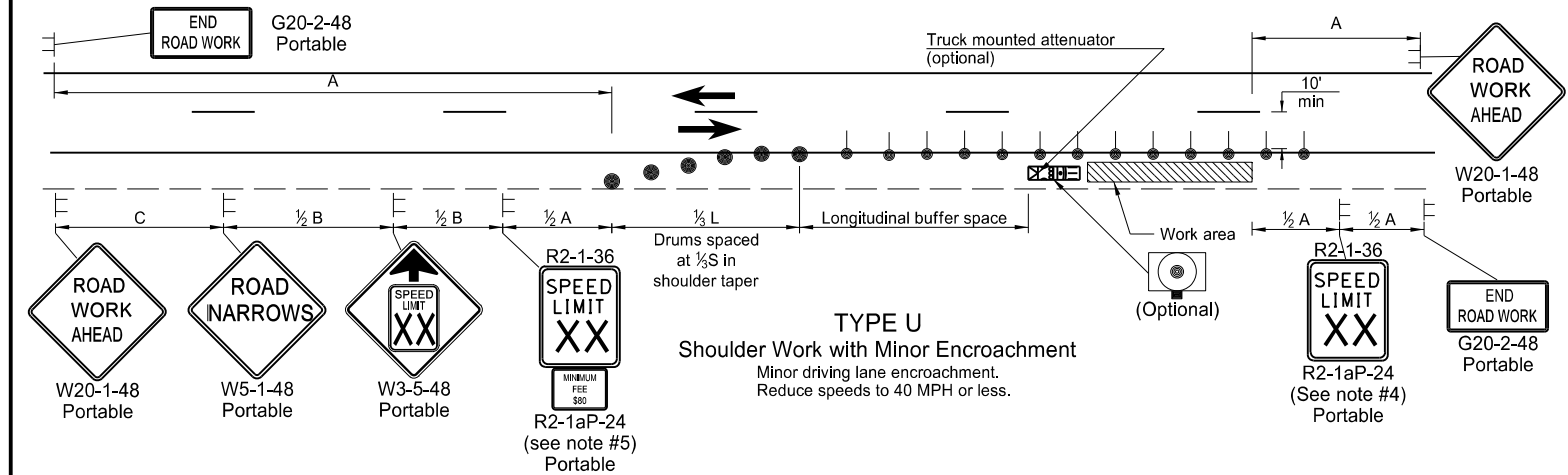
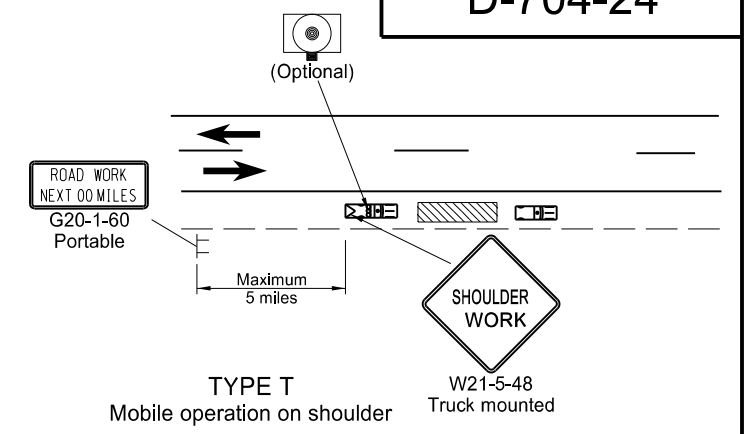
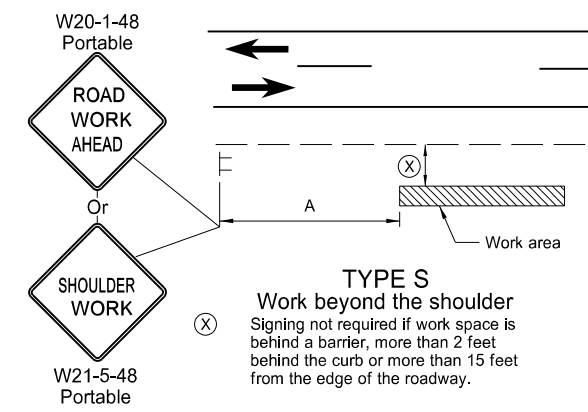
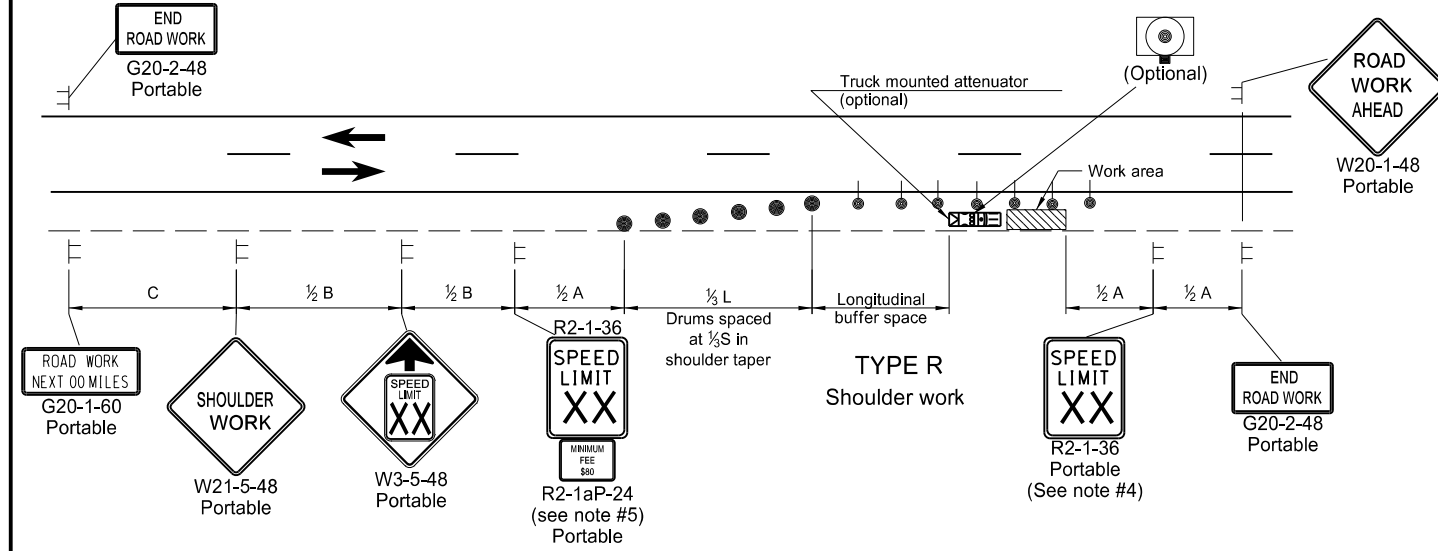
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work

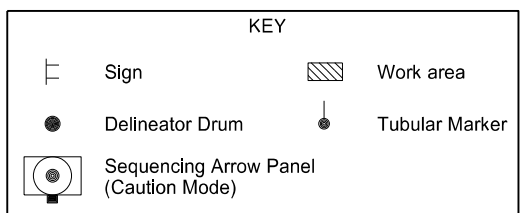


11/29/22

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS



- Notes
- Variables
    - S = Numerical value of speed limit or 85th percentile.
    - W = The width of the taper in feet.
    - L = Minimum length of taper,  $S \times W$  for freeways, expressways, and all other roads with speeds of 45 mph or greater, or  $W \times S^2 / 60$  for urban, residential, and other streets with speeds of 40 mph or less.
  - Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
  - Sequencing Arrow Panels
    - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
    - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
    - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
  - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
  - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
  - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
  - Cover existing speed limit signs within a reduced speed zone.
  - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
  - Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

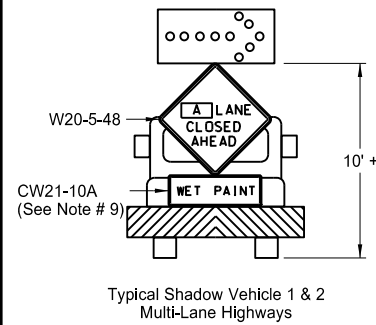
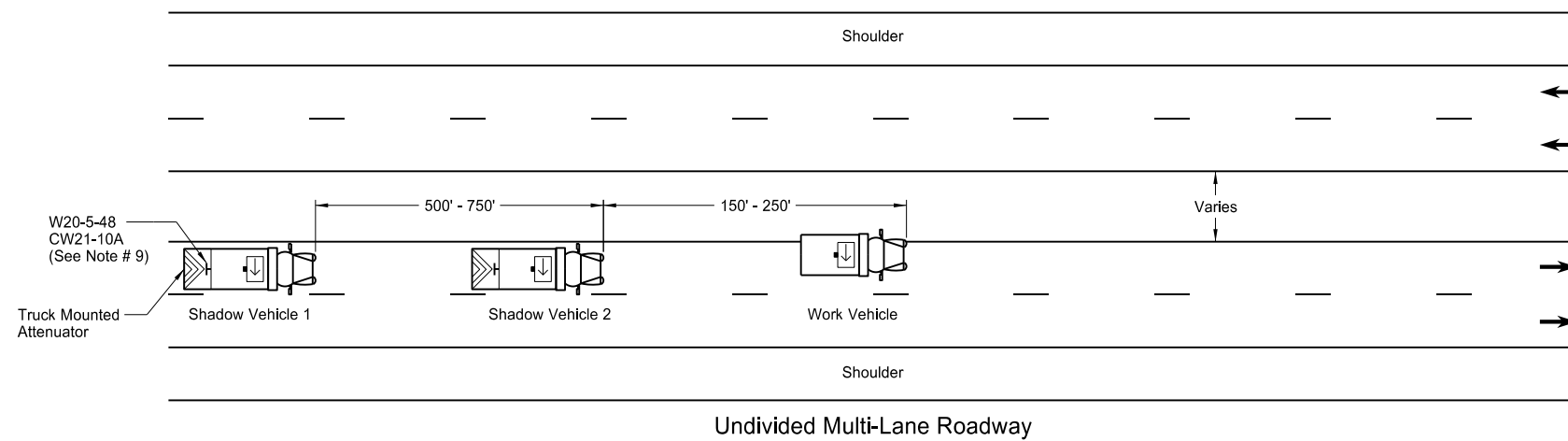
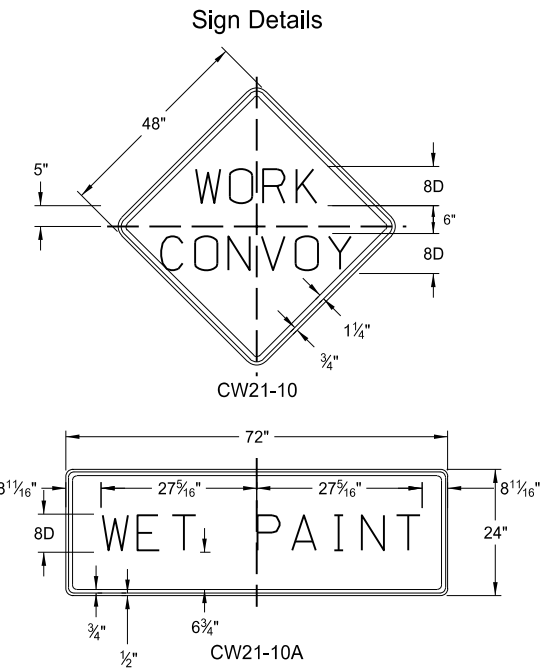
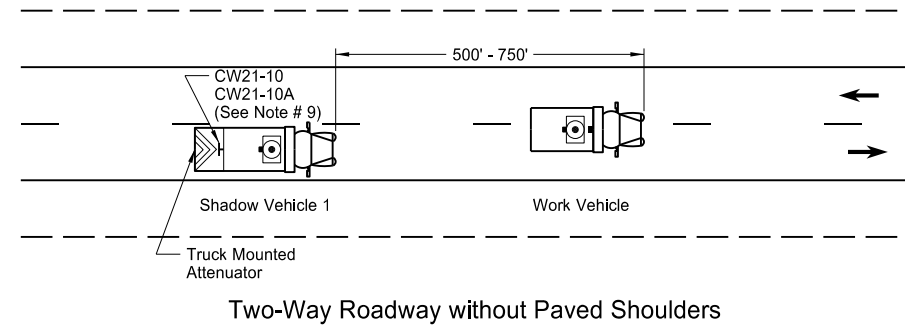
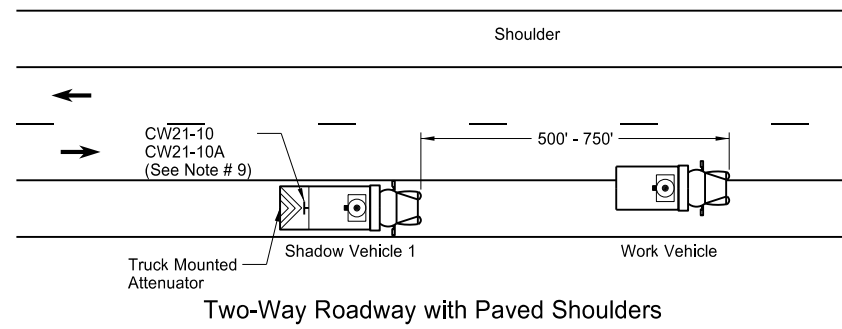
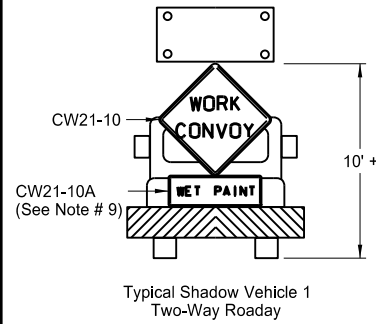
Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17 11-01-19	Updated notes & revised signs Revised drum spacing & signs nos.

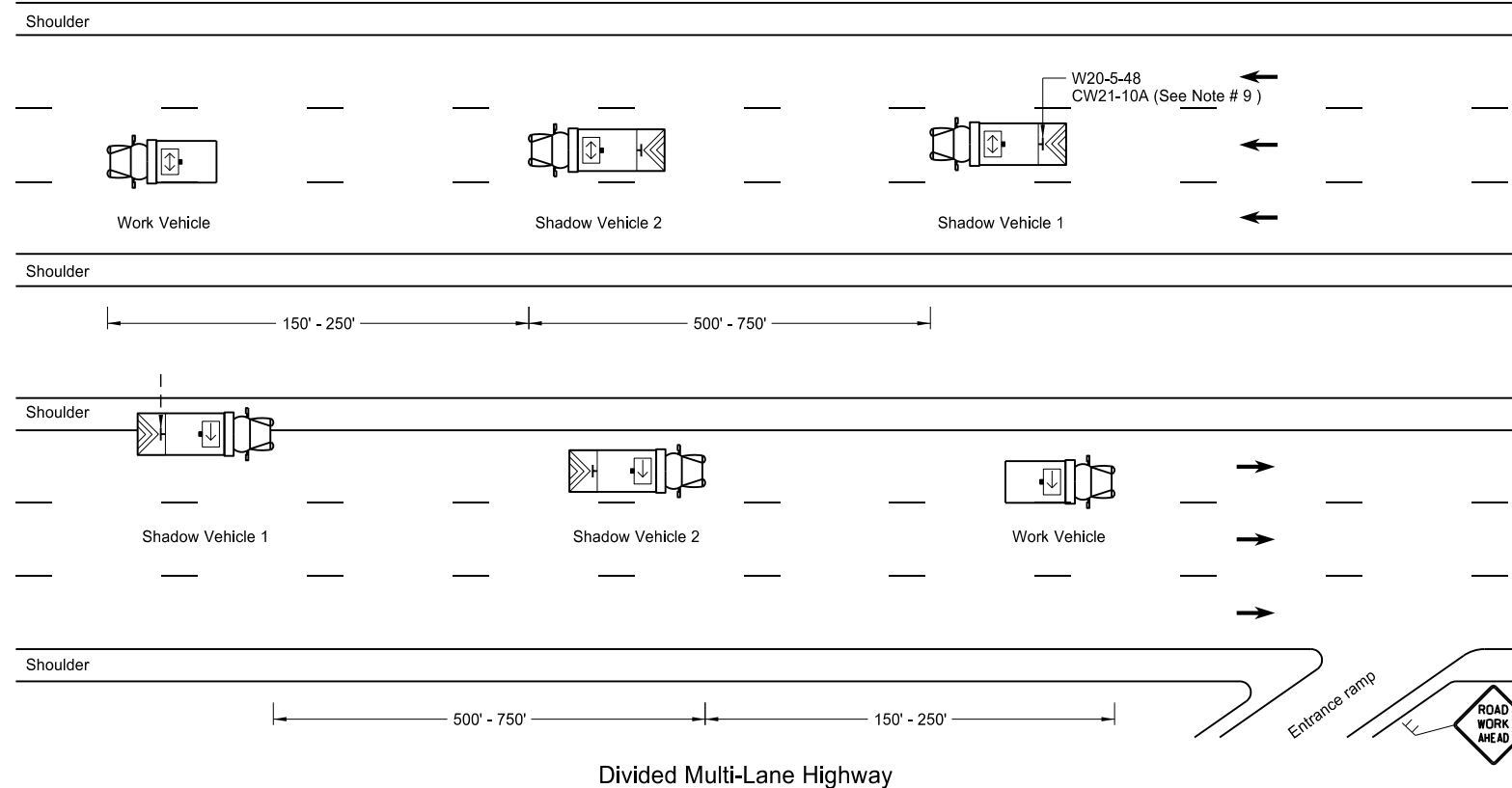
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MOBILE OPERATION  
(PAVEMENT MARKING)

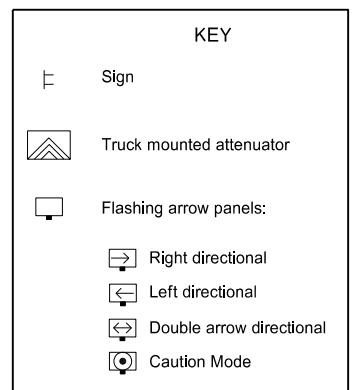


A = Left Right Center



Notes

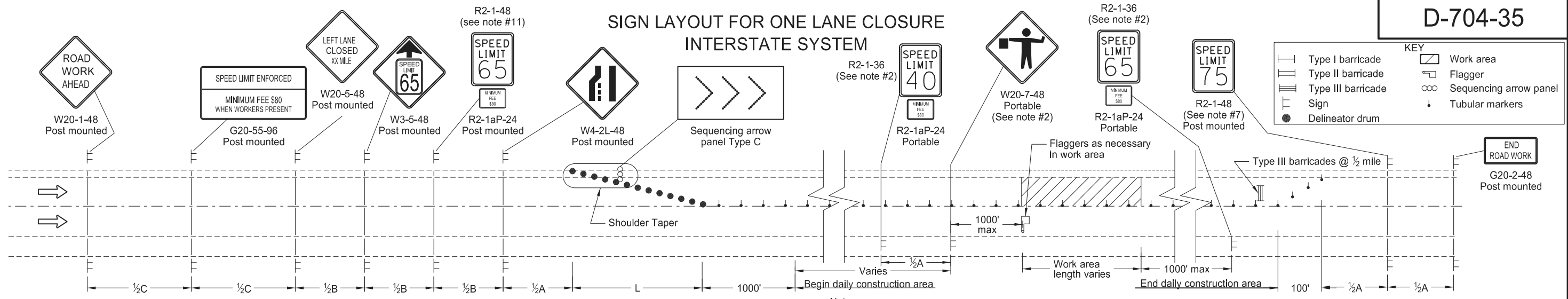
- Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
- Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
- Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
- Provide each vehicle with two-way electronic communication capability.
- Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
- Vary vehicle spacing between shadow vehicle 1 and shadow vehicle 2 based on sight distance restrictions. Motorists approaching the work convoy need to see trail vehicle in time to slow down and/or change lanes as they approach shadow vehicle.
- Sign Colors  
Letters = Black  
Border = Black  
Background = Orange
- As an option, use shadow vehicle 2 the paint tender vehicle.
- Use sign CW21-10A only during painting operation.
- Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading

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North Dakota Department  
of Transportation

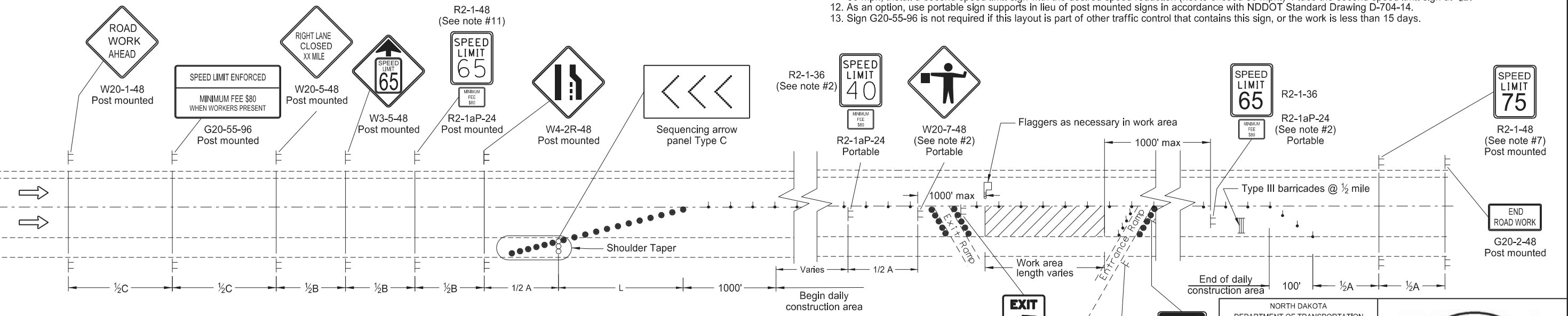
SIGN LAYOUT FOR ONE LANE CLOSURE  
INTERSTATE SYSTEM



LEFT LANE CLOSED  
WORKERS IN WORK AREA

- Notes:
1. Install advance signs for flagging when flaggers are flagging.
  2. Move the advanced flagger sign and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Space the 40 mph speed limit sign at 1/2A in advance of the flagger sign and move the 65 mph speed limit sign. Cover or remove the 40 mph speed limit and Minimum Fee \$80 signs and the 65 mph speed limit sign upon completion of the work day or when workers are not present.
  3. RAMP: When the work area encompasses an entrance ramp, install a 40 mph speed limit sign on the ramp and cover any existing yield sign. Install new yield sign as necessary. Remove the ramp speed limit sign when the main line 40 mph speed zone is moved past the ramp.
  4. Variables:  
 S=Numerical value of speed limit or 85th percentile  
 W=The width of taper.  
 L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or WxSxS/60 for urban, residential, and other streets with speeds of 40 mph or less.
  5. Space delineator drums for tapering traffic at the dimension "S". Space tubular markers used for tangents at 2 times dimension "S".
  6. Place sequencing arrow panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface.  
 Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
  7. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
  8. Cover existing speed limit signs within a reduced speed zone.
  9. Upon approval, the Engineer will measure obliterated or covered pavement marking as Obliteration of Pavement Marking.
  10. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the diamond sign, and at such a distance above the edge that the flag does not touch the sign when limp.
  11. Determine the reduced speed limit dependent on the in place speed limit before construction. When speed limits are to be reduced more than 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2B.
  12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
  13. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500



RIGHT LANE CLOSED  
WORKERS IN WORK AREA

EXIT  
E5-1-48  
Portable

SPEED LIMIT ENFORCED  
MINIMUM FEE \$80  
WHEN WORKERS PRESENT  
G20-55-96  
Post mounted  
Install this sign only when ramp volume is 1000 ADT or more

SPEED LIMIT 40  
R2-1aP-24  
Portable  
(see notes #2 & #3)

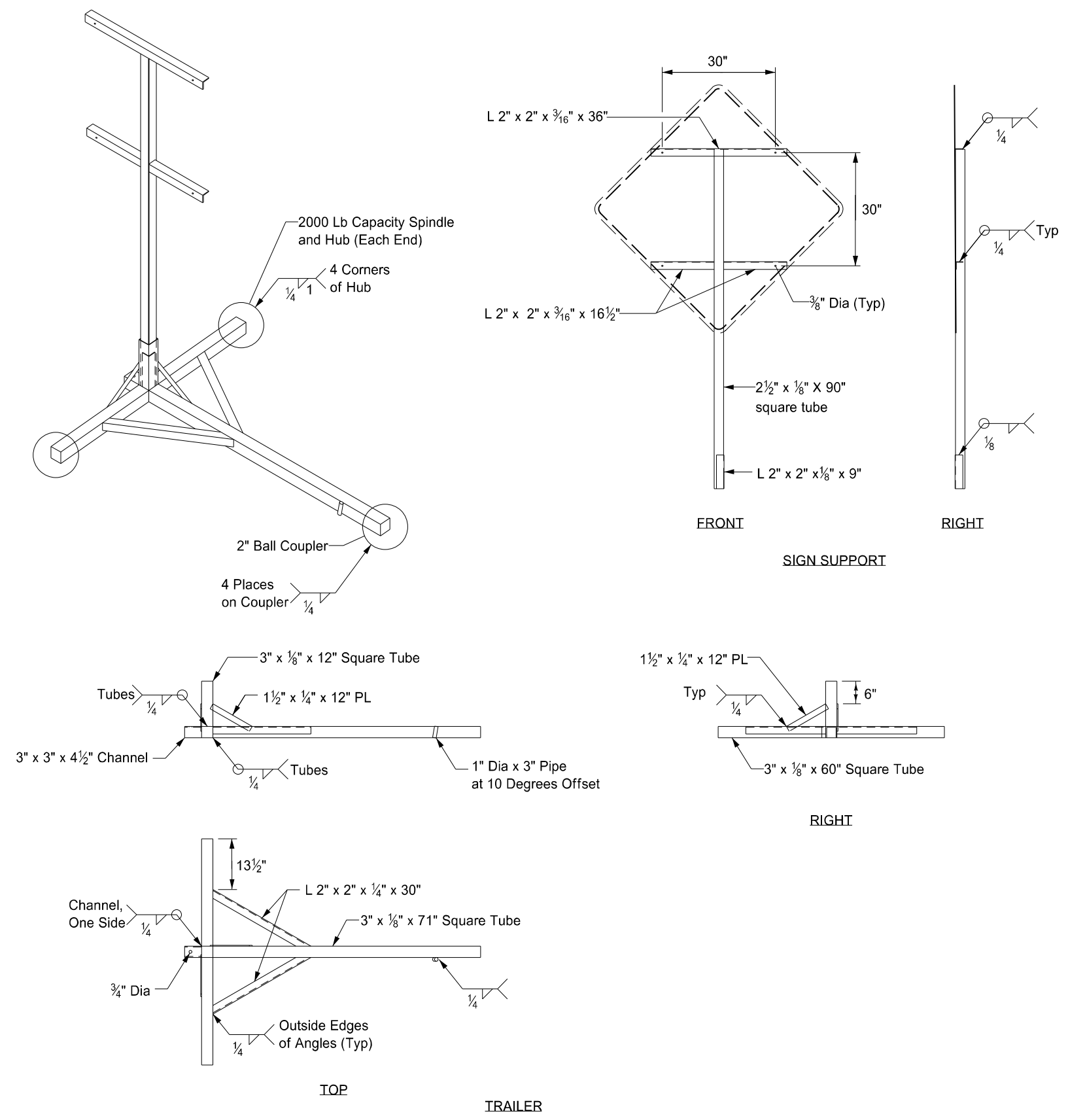
YIELD  
R1-2-60  
Portable

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-7-2012	
REVISIONS	
DATE	CHANGE
06-23-14	Revised Note 12
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Moved speed signs & added note
10-17-17	Corrected spelling of "shoulder"
11-01-19	Revised tubular Mkrs symbols
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced, added Dollars At Work, & removed table
11-29-22	Removed Dollars At Work

KIRK J. HOFFA  
REGISTERED  
PROFESSIONAL  
PE-4683  
ENGINEER  
NORTH DAKOTA  
11/29/22

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



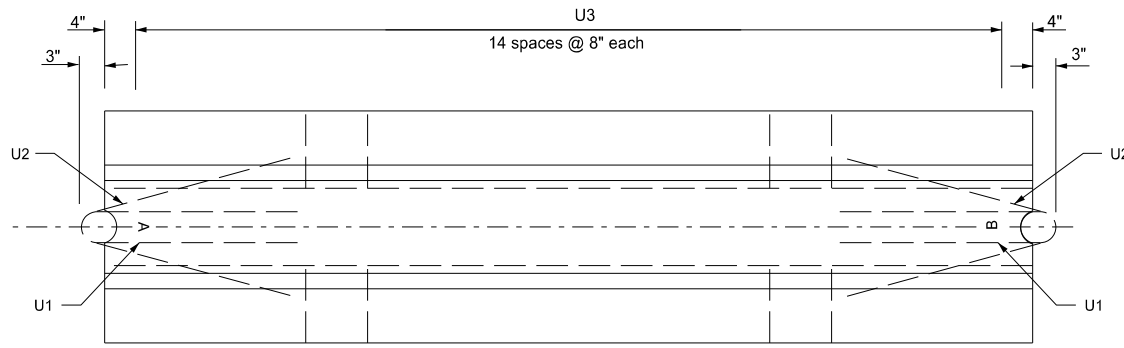
Notes:

- ① Maximum 250 pound weight of assembly.
- ② Use a 14" wheel and tire.
- ③ Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
- ④ Other NCHRP 350 or MASH crash tested assemblies are acceptable.

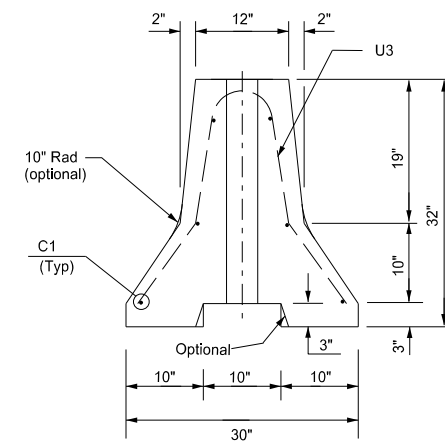
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

KIRK J. HOFF  
REGISTERED  
PROFESSIONAL  
PE-4683  
ENGINEER  
NORTH DAKOTA  
12 02 2020

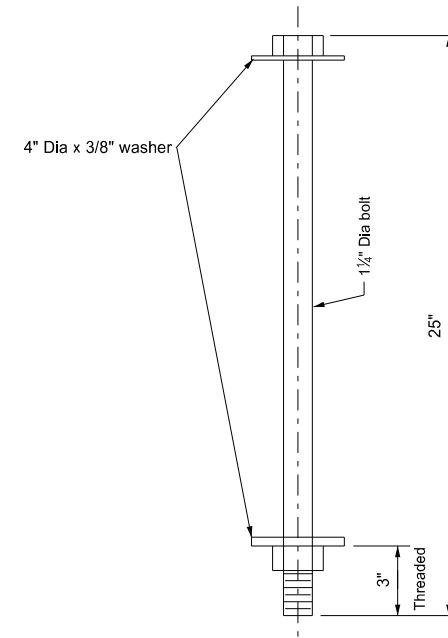
PORTABLE PRECAST CONCRETE MEDIAN BARRIER  
(TEMPORARY USAGE)



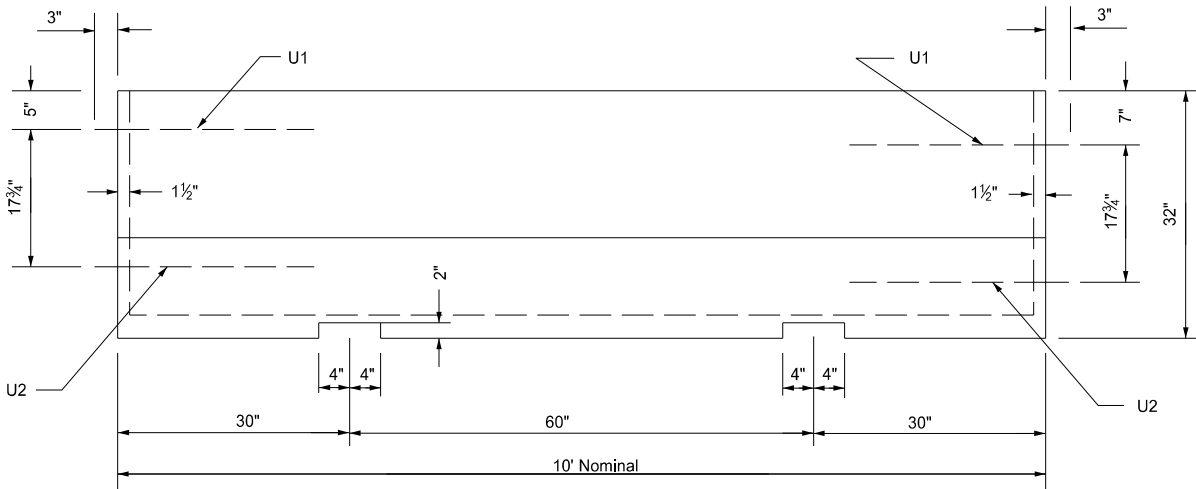
Plan View



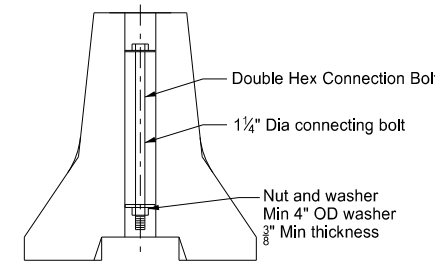
End View



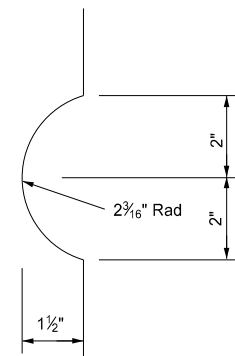
Connecting Bolt Detail  
(One per 10 Ft section)



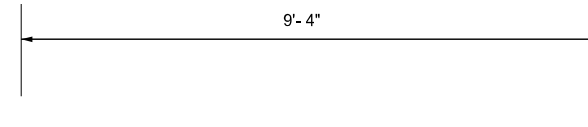
Side View



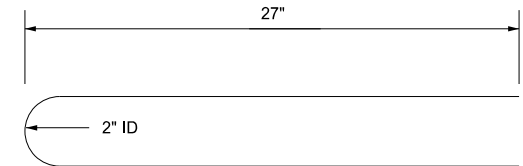
Bolt Connection Detail



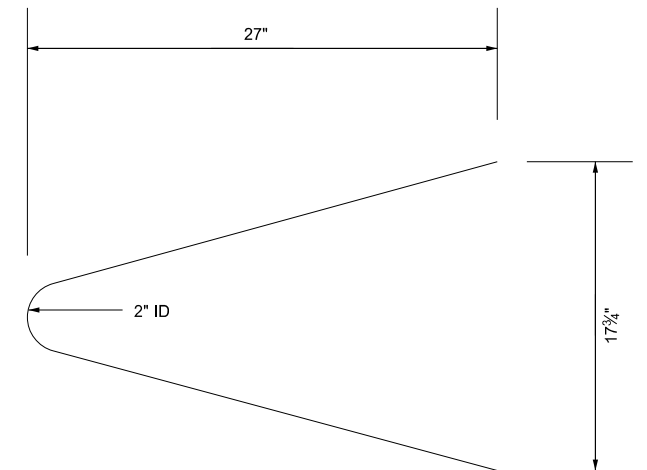
Dap Detail



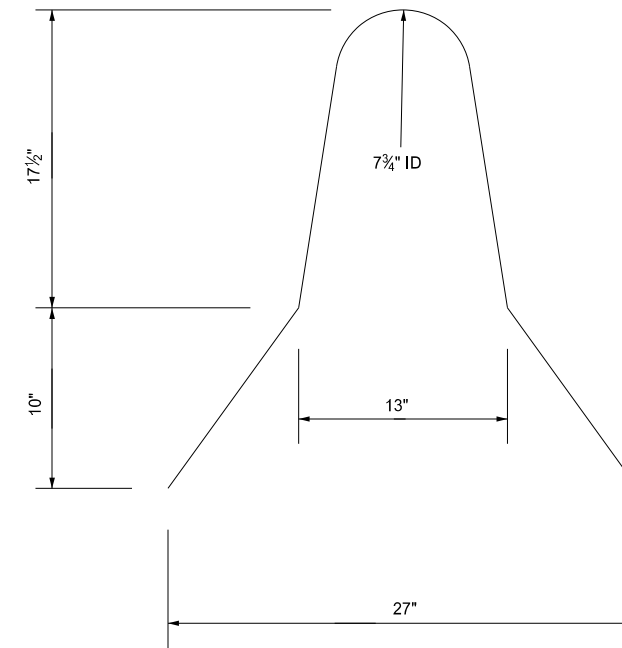
C1 Bar Detail



U1 Bar Detail



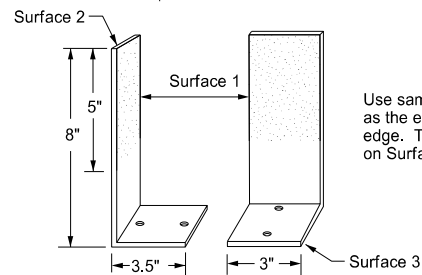
U2 Bar Detail



U3 Bar Detail

Notes:

- Galvanize all exposed hardware as per ASTM A153, except for the loop inserts.
- Use AAE-3 Concrete.
- Provide steel in accordance with Section 612 of NDDOT Standard Specifications.
- Imprint barrier ends A and B as shown with 4 inch letters. Field match A end with B end.
- Place barrier markers at the center of the barrier at 20' centers.
- Connect barrier sections with 1 1/4" Dia A-307 double hex connecting bolt. Maintain bottom nut and washer connection for duration of barrier installation.
- Place barrier to minimize openings between individual sections.



Barrier Marker Detail

Use same color reflective faces as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

**Reflective Tape**  
Use retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1° measured in candlepower for the reflector:

Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

**Adhesive**  
Use factory applied solid butyl rubber 1/8" thick, 2" wide on 2 1/4" wide release paper on surface 3 to temporarily mount markers to portable concrete barrier.

Bar List				
Mark	Size	No.	Length	Shape
C1	4	6	9'-4"	Straight
U1	4	2	4'-8"	Bent
U2	4	2	4'-10 1/4"	Bent
U3	4	15	5'-4"	Bent

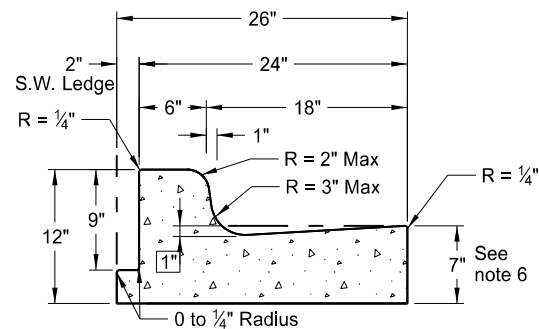
**Marker Body**  
Use high impact, weatherable engineering thermo-plastic material conforming to the following:

Property	Result	ASTM Test Method
Thickness (min)	.090"	—
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI 1/4" @ 73°F	8,000	D790
Flexural modulus, PSI 1/4" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

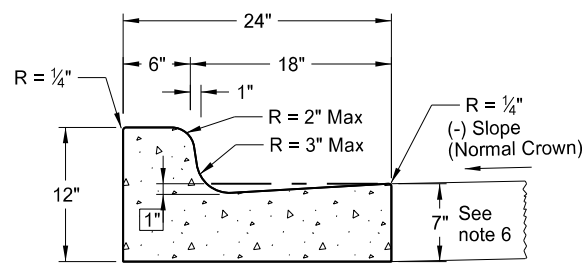
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice New Design Engr PE Stamp

This document was originally issued and sealed by  
Kirk J Hoff,  
Registration Number  
PE-4683,  
on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

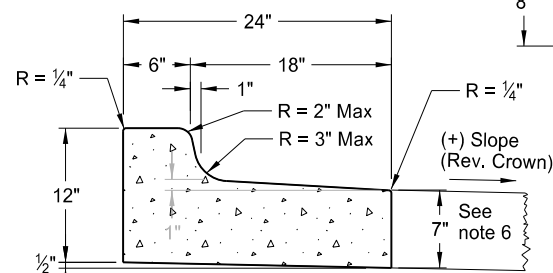
Curb & Gutter and Valley Gutter



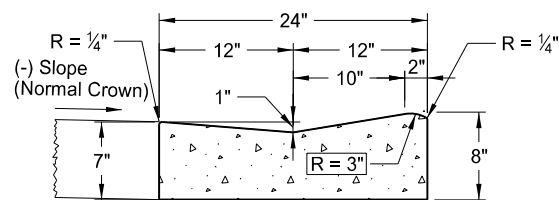
**Curb & Gutter Type 1 (Sec. A & B)**  
Adjacent to Concrete Sidewalk,  
Median, or Parking Lot.  
(Sec. A shown. See Sec B for  
additional details.)



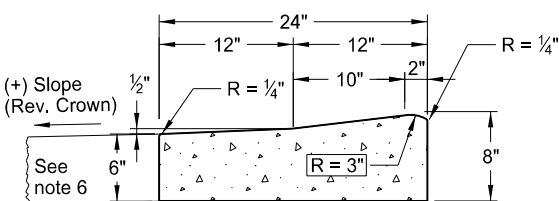
**Curb & Gutter Type 1 (Sec. A)**



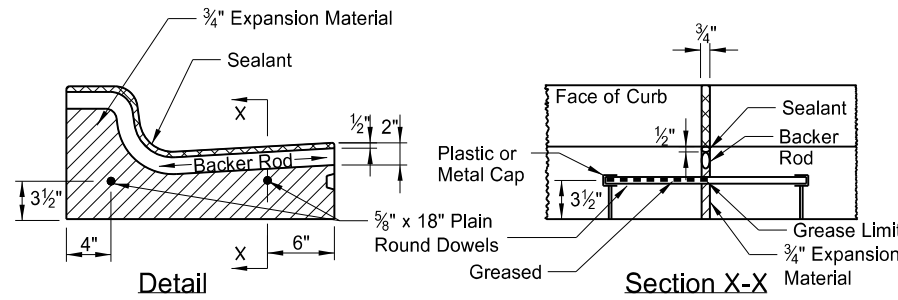
**Curb & Gutter Type 1 (Sec. B)**



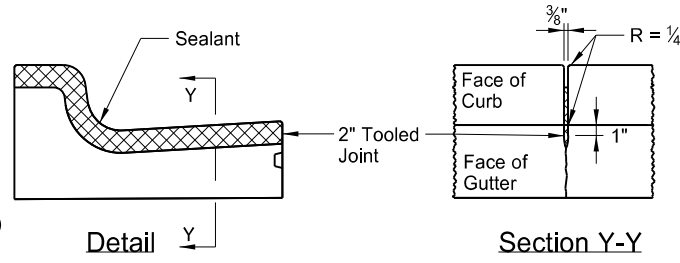
**Mountable Curb & Gutter Type 1 (Sec. A)**



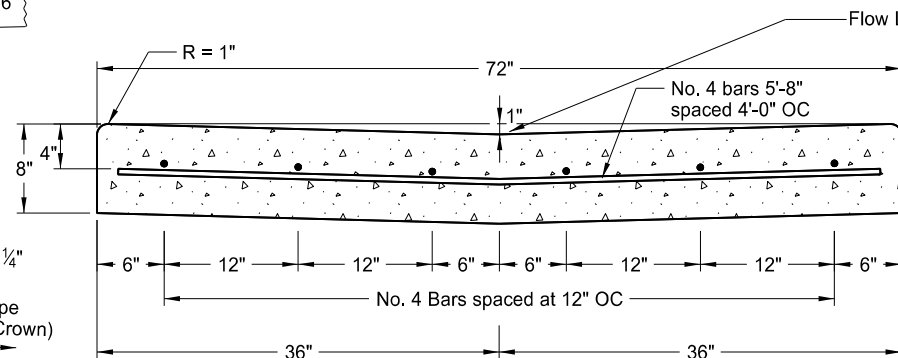
**Mountable Curb & Gutter Type 1 (Sec. B)**



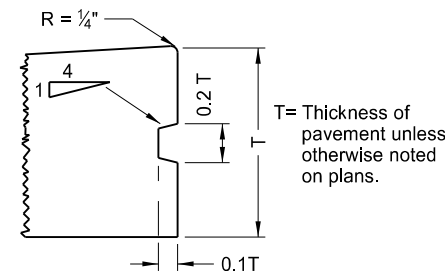
**Isolation Joint**



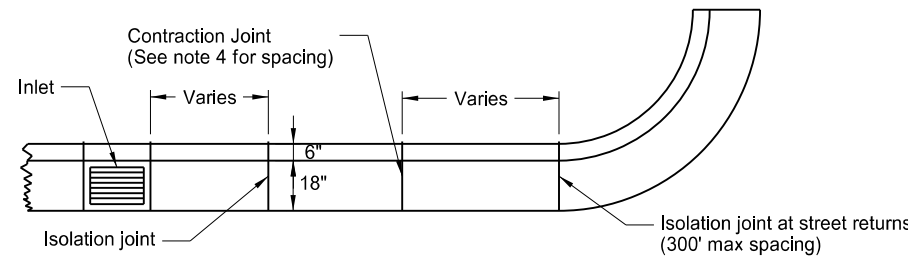
**Contraction Joint**  
(10' Max Spacing)



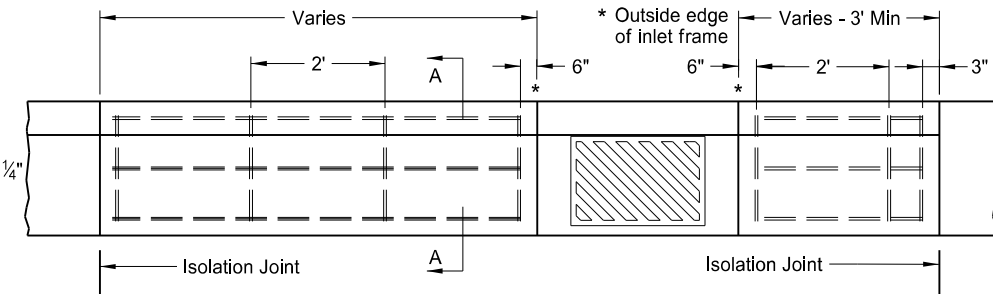
**72" Concrete Valley Gutter Detail**



**Keyway Detail for Curb & Gutter**  
(To be used with PCC Pavement and Drives)

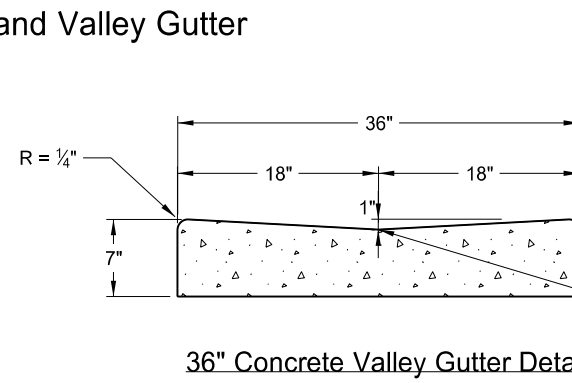


**Joint Location Detail**

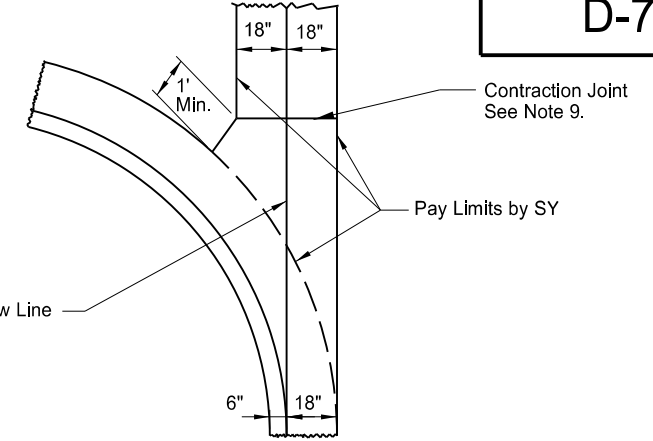


**Curb & Gutter Reinforcing at Inlets**

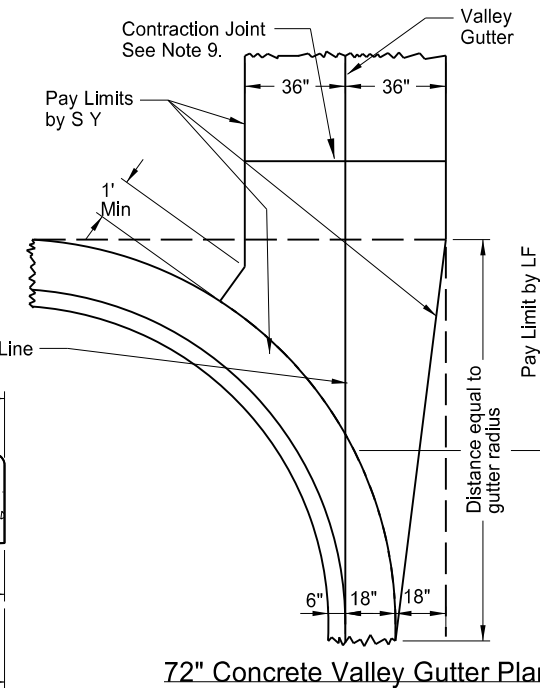
NOTE: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlet locations (even inlets located on radii) in the price bid for "Curb and Gutter - Type 1." Extend reinforcement to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.



**36" Concrete Valley Gutter Detail**



**36" Concrete Valley Gutter Plan**



**72" Concrete Valley Gutter Plan**

**NOTES:**

1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use 3/4" expansion joint filler for isolation joint material. Form the backer rod and joint sealant opening with a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint. Install plastic or metal caps and greased dowels in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements use a 10' max joint spacing for the curb and gutter with panels on each side of the inlets. For concrete pavements match the joint spacing for the curb and gutter to the pavement joint on PCC Pavements (approximately 15' spacing.)
5. Joint sealing: Seal contraction and isolation joints as shown in the details. Use joint sealant for contraction joints that conforms to section 826.02B. Use sealant for expansion joints specified in note 3 above. Tool and install sealant in accordance with the manufacturer's recommendations.
6. Face of Gutter Depth: For hot bituminous pavement use 7" gutter depth as shown. For PCC pavements, match the gutter depth to the depth of adjacent PCC pavement or to construct a 7" depth as shown.
7. Tie curb and gutter to abutting PCC pavement with No. 3 bars, 1'-6" in length, spaced at 4' centers.
8. On street returns and other locations where new curb and gutter ends and does not abut existing curb and gutter, taper the last two (2) feet of the curb from 6" in height to 0". Install a 1/2" premolded full depth isolation joint, the same shape as the curb and gutter just ahead of the taper. Install an 18" tie bar across the joint.
9. Valley Gutter Joints: Form, saw, or score 1/8" min. to 3/8" max. width contraction joints (a minimum 2" depth) at approx 10' intervals. Seal the joints with hot poured elastic type joint sealer (Section 826.02A.2 of the Standard Specifications.) Include all costs for the joint and sealant in the price bid for Valley Gutter.

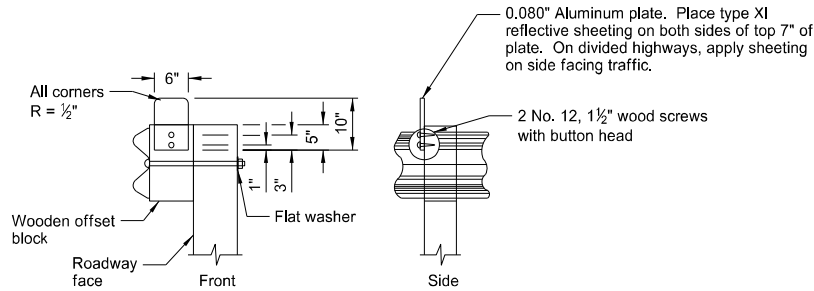
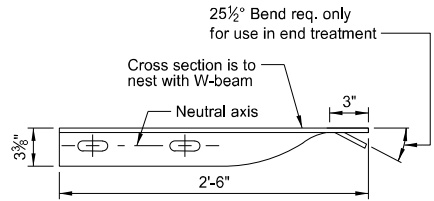
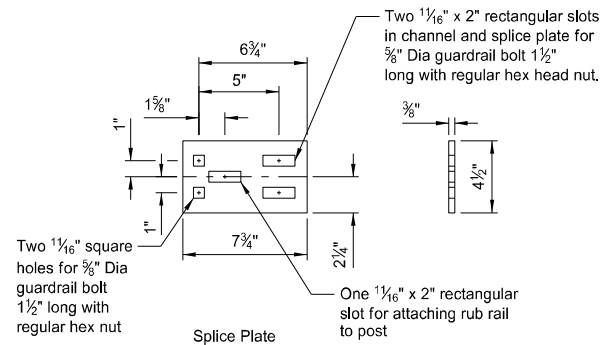
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.

This document was originally issued and sealed by  
Kirk J Hoff,  
Registration Number  
PE-4683,  
on 8-27-19 and the original document is stored at the North Dakota Department of Transportation

W-BEAM GUARDRAIL GENERAL DETAILS

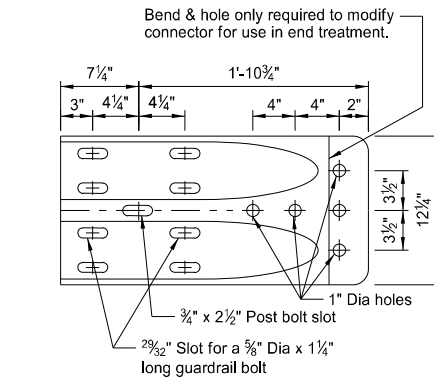
NOTES:

- Place reflector plates at the first post and spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. Use reflector the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
- Dispose of excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material where guardrail is installed after mat is placed. Include cost of excavation and replacing of bituminous material in the price bid for other items.
- Place Object Marker within the vertical edges of the Impact Plate. Use type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply sheeting to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. Attach the Object Marker to the Impact Head Plate with non-rust rivets or some other non-rust attachment device. Slope stripes downward toward the roadway side.
- Guardrail installation height tolerance =  $- \frac{1}{4}"$ ,  $+ 1"$ .
- Standard W-Beam rail post bolt slot spacing is 6'-3". Post bolt slot spacing of 3'-1 1/2" is acceptable.

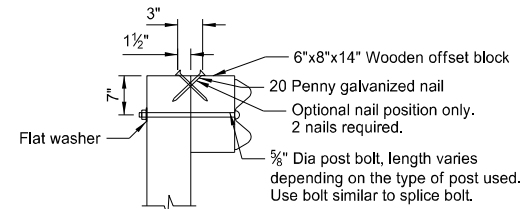


REFLECTORIZED PLATE DETAIL

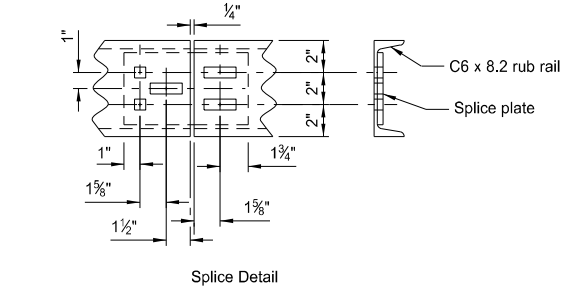
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



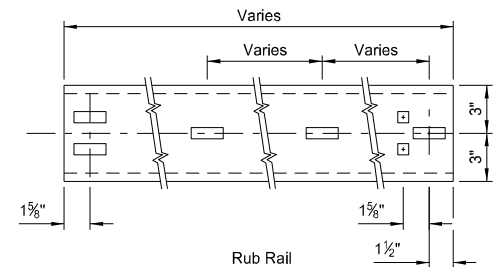
W BEAM TERMINAL CONNECTOR



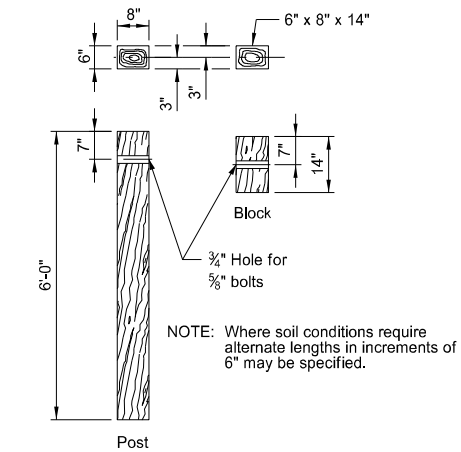
TYPICAL POST ATTACHMENT DETAIL



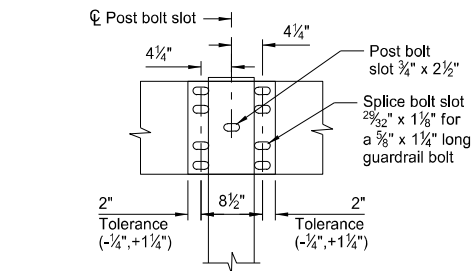
Splice Detail



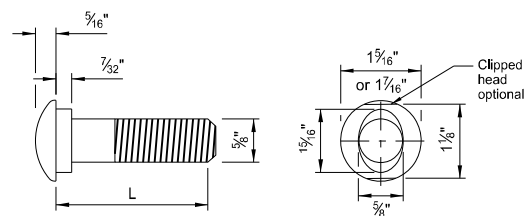
C6x8 RUB RAIL AND SPLICE PLATE



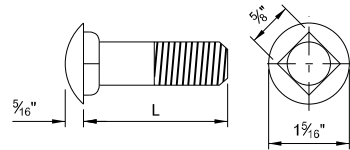
6"x8" TIMBER POST & BLOCK



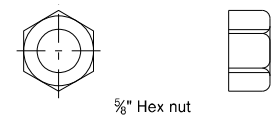
SPLICE DETAIL



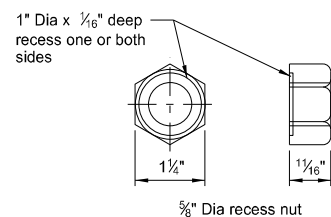
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 1/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



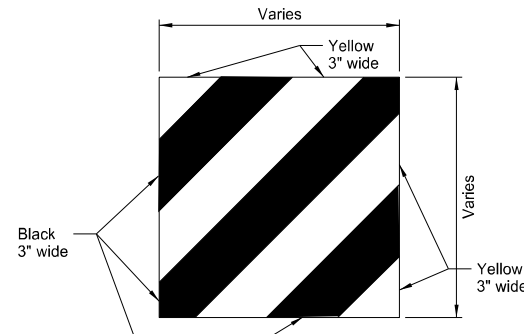
5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



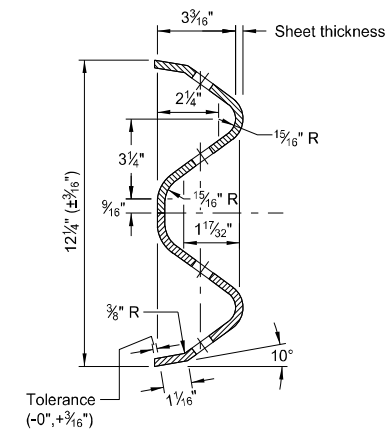
5/8" CARRIAGE BOLT & NUT



5/8" GUARDRAIL BOLT & RECESS NUT



IMPACT HEAD OBJECT MARKER

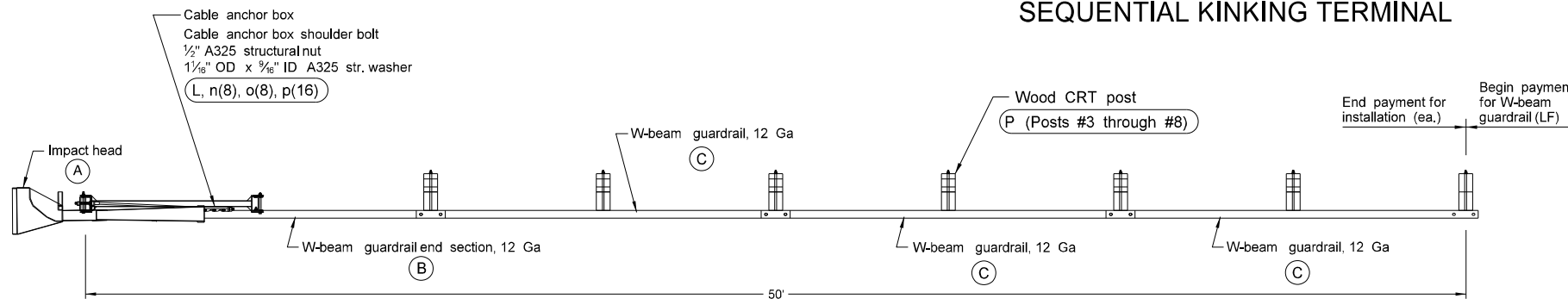


W-BEAM CROSS SECTION

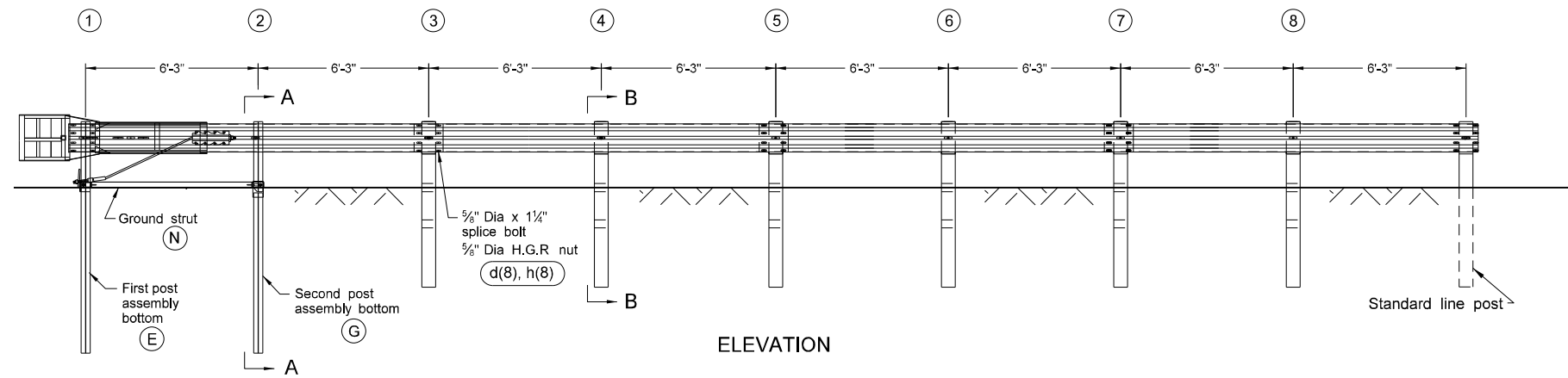
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
10-25-19	Updated notes to active voice and added Note 5.
12-02-20	Updated clipped head to optional

# SEQUENTIAL KINKING TERMINAL

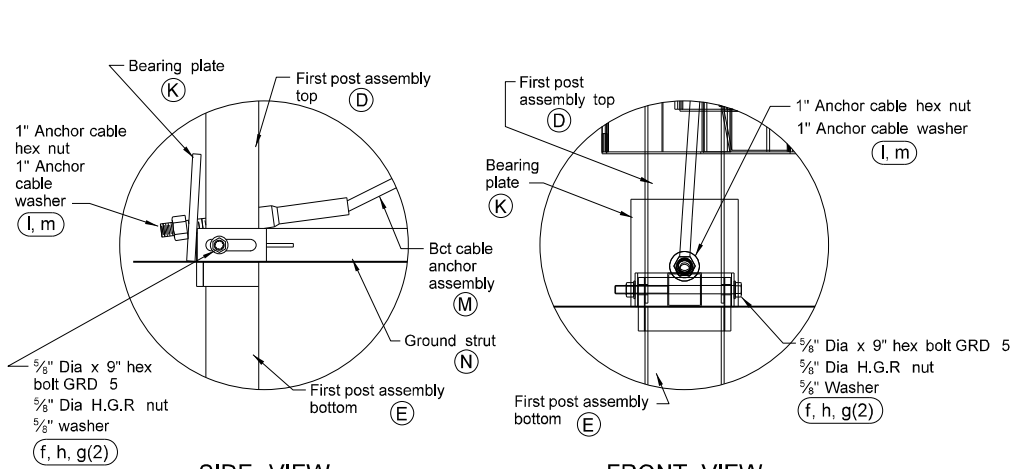
D-764-5



PLAN



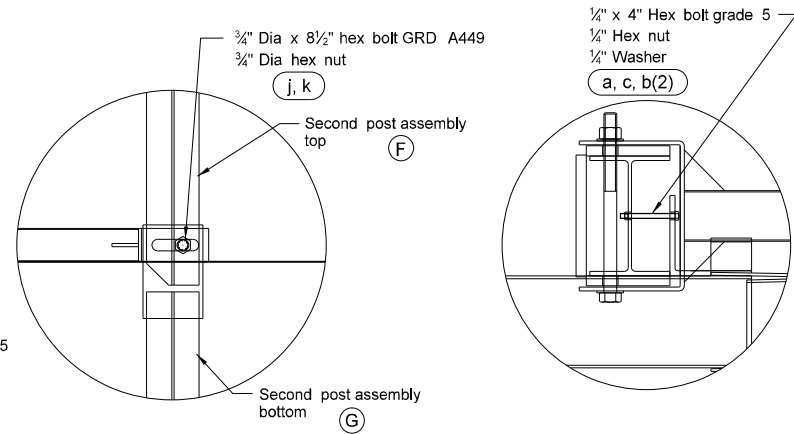
ELEVATION



SIDE VIEW

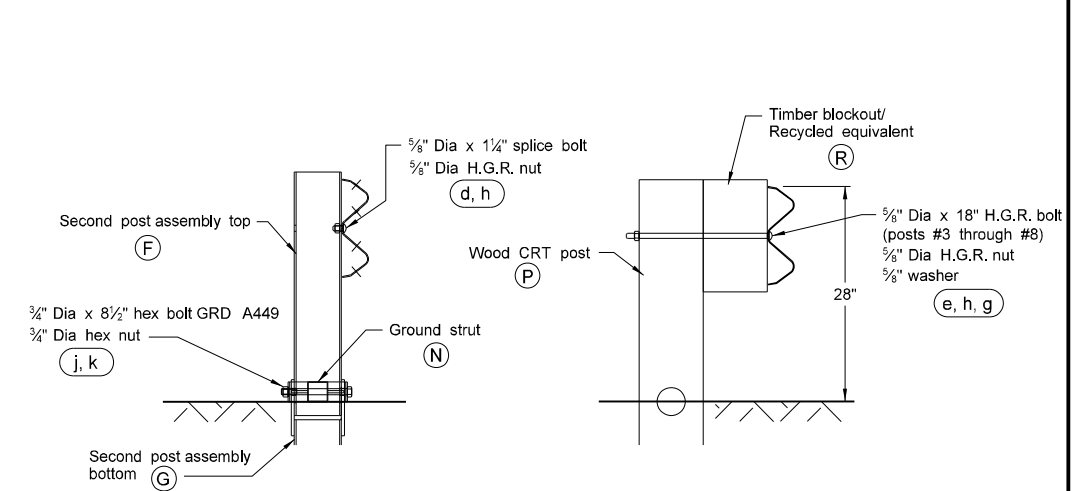
FRONT VIEW

POST #1 CONNECTION DETAILS



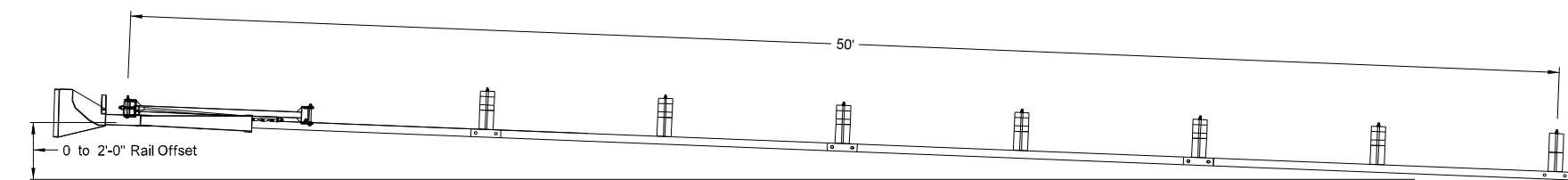
SIDE VIEW DETAIL OF POST #2

IMPACT HEAD CONNECTION DETAIL



SECTION A-A  
Post #2

SECTION B-B  
Posts #3 through #8



FLARED INSTALLATION  
25:1 maximum flare rate

GENERAL NOTES:

- Use breakaway posts with the SKT.
- Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
- Flare the SKT at a rate of up to 25:1 to prevent shoulder encroachment by the impact head.
- Grade site as needed to prevent lower sections of the posts from protruding more than 4" above ground (measured along a 5' cord).
- Drive the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material satisfactorily to prevent settlement.
- When rock is encountered during excavation, use a 10" diameter post hole, 20" into the rock surface, if approved by the engineer. Place granular material in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Field cut posts 1 & 2 to length, place in the hole, and backfill with adequately compacted material excavated from the hole.
- Place the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
- "Toe nail" the wood blockouts on post #3 through post #8 with two 20 penny galvanized nails in each rectangular post, to prevent them from turning when the wood shrinks.

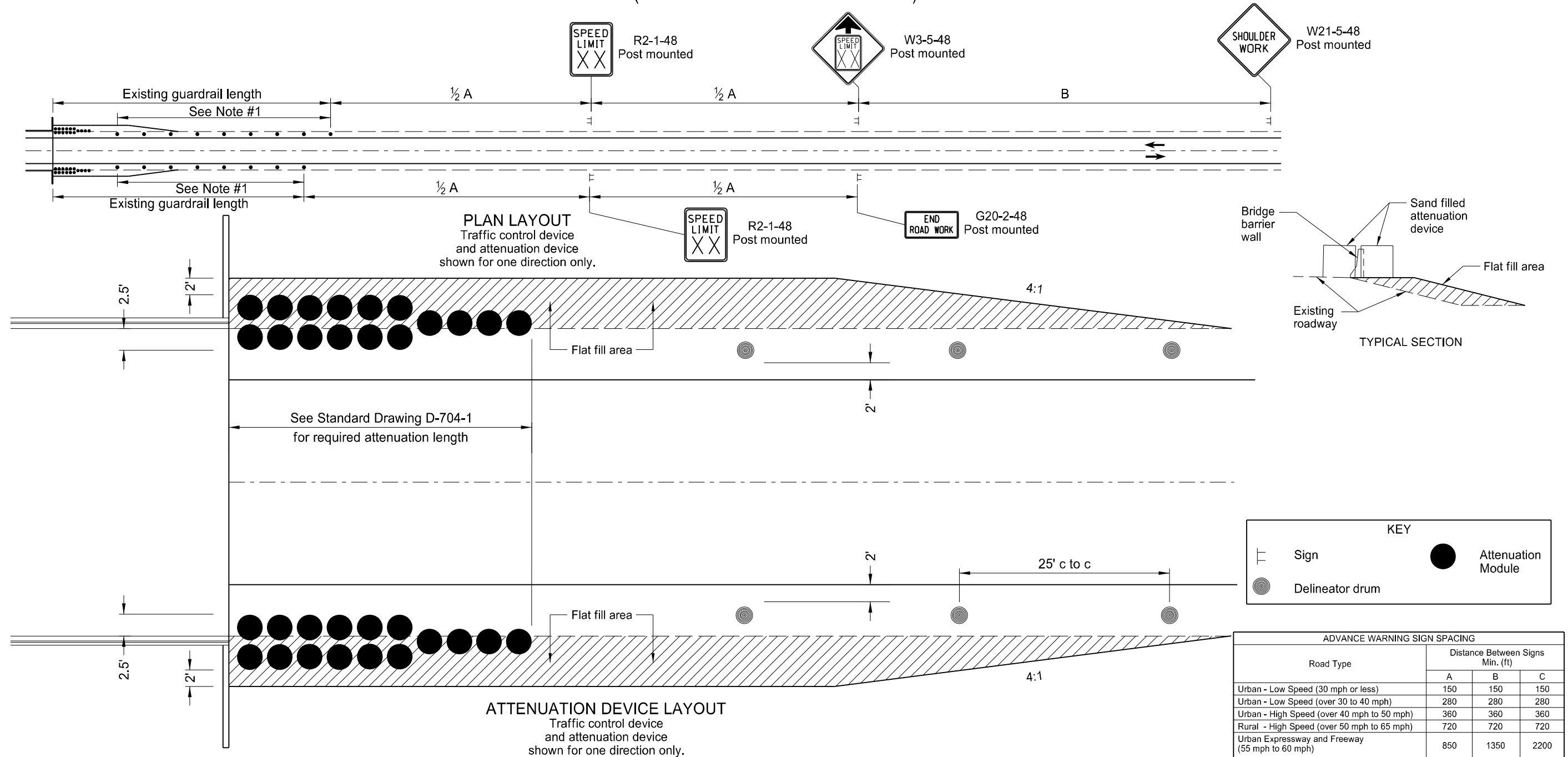
BILL OF MATERIALS		
ITEM	QTY	
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
HARDWARE		
a	2	1/4 " x 4" HEX BOLT Grade 5
b	4	1/2" WASHER
c	2	1/4" HEX NUT
d	25	5/8" Dia X 1 1/4" SPLICE BOLT, POST #2
e	6	5/8" Dia X 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	5/8" Dia X 9" HEX BOLT GRD 5
g	8	5/8" WASHER
h	32	5/8" Dia H.G.R. NUT
j	1	3/4" Dia X 8 1/2" HEX BOLT GRD A449
k	1	3/4" Dia HEX NUT
l	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	GROUND STRUT HINGED POST
o	8	1/2" A325 STRUCTURAL NUT
p	16	1 1/8" OD X 5/8" ID A325 STR. WASHER

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.





SHORT TERM END TREATMENT FOR BRIDGES  
(ATTENUATION DEVICE METHOD)



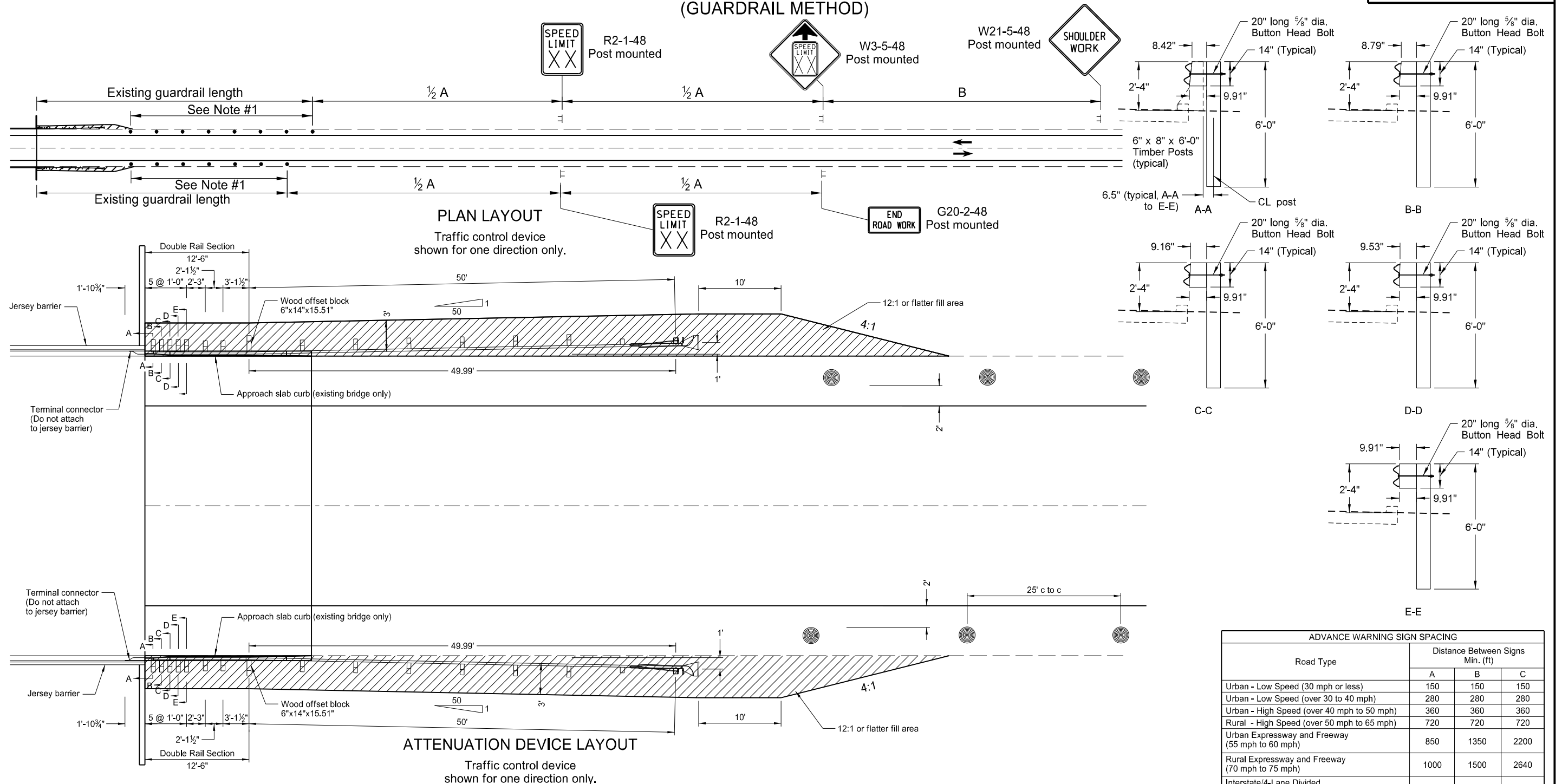
Notes

- When the shoulder width is less than 3', use vertical panels placed as far from the driving lane as possible on the finished shoulder. When there is no shoulder, place vertical panels as near as possible to the driving lane on the foreslope of the shoulder.
- When the bridge is within the construction zone signing, eliminate the reduced speed ahead sign.
- Determine the reduced speed limit dependent on the in place speed limit before construction. Where total speed reduction exceed 30 mph, reduce the speed limit in two stages with each reduction not exceeding 30 mph. Place the second speed limit sign at 1/2 B.
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- Cover existing speed limit signs within a reduced speed zone.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

**KIRK J. HOFF**  
REGISTERED  
PROFESSIONAL  
PE-4683  
ENGINEER  
NORTH DAKOTA  
12 02 2020

SHORT TERM END TREATMENT FOR BRIDGES  
(GUARDRAIL METHOD)



Notes

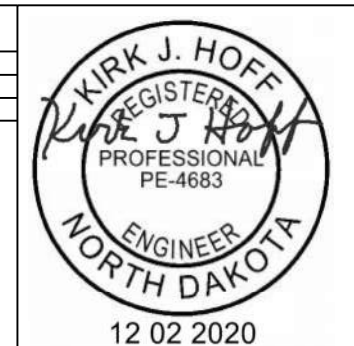
1. If the shoulder width is less than 3', use vertical panels placed as far from the driving lane as possible and still be on the finished shoulder. When there is no shoulder, place vertical panels as near as possible to the driving lane on the foreslope of the shoulder.
2. If the bridge is within construction zone signing, eliminate the reduced speed ahead sign.
3. Determine the reduced speed limit dependent on the in place speed limit before construction. Where total speed reduction exceed 30 mph, reduce the speed limit in two stages with each reduction not exceeding 30 mph. Place the second speed limit sign at 1/2 B.
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. Cover existing speed limit signs within a reduced speed zone.

**KEY**

	Sign
	Delineator drum

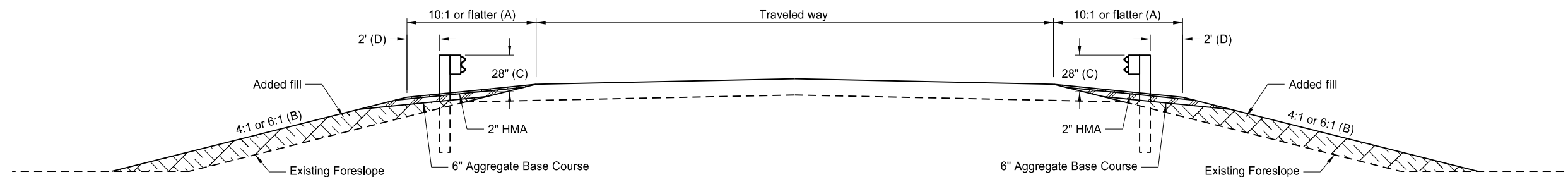
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

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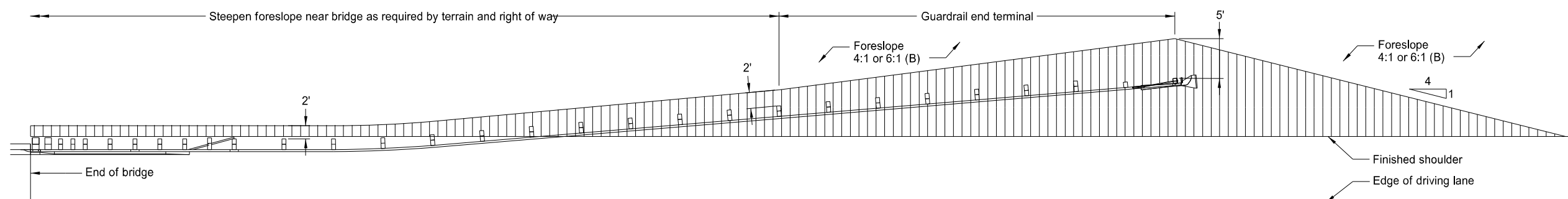


TYPICAL GRADING AT BRIDGE ENDS  
WITH W-BEAM GUARDRAIL

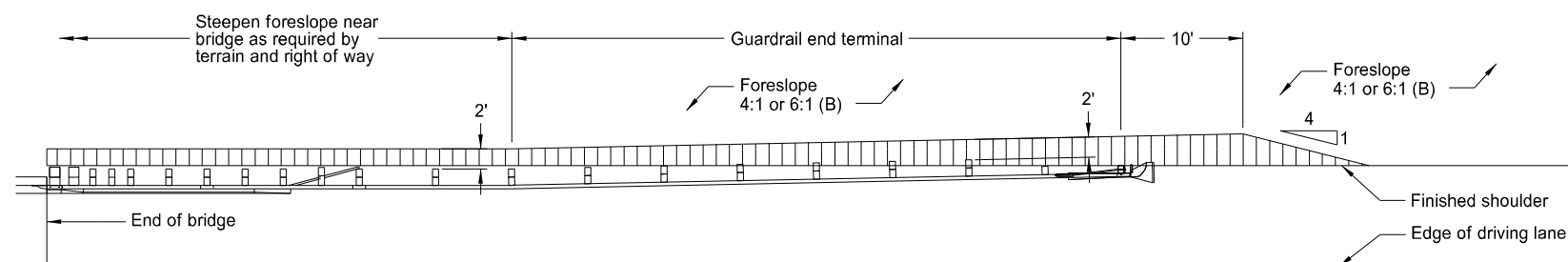
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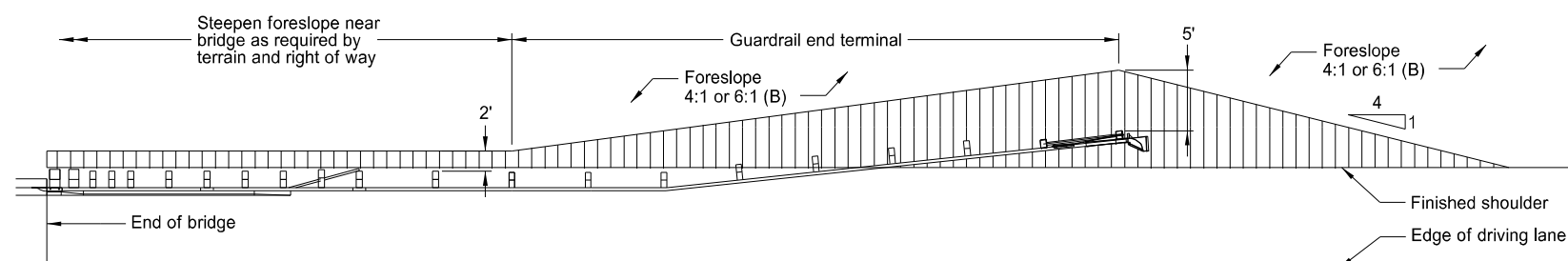
TYPICAL SECTION



PLAN LAYOUT  
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT  
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT  
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

- (A) Use slope flatter than 10:1 when necessary to provide proper guardrail height.
- (B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.
- (C) Measure from top of guardrail to top of surfacing at front face of guardrail.
- (D) Dimension at end terminals vary per Plan Layouts shown on this sheet.

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DATE	CHANGE
12-02-20	Updated notes to active voice.

