DESIGN DATA				
Traffic	Average Daily			
Current 2015	Pass: 2,040	Trucks: 435	Total: 2,475	
Forecast 2035	Pass: 2,755	Trucks: 715	Total: 3,470	
Clear Zone Distance: 40 ft		Design Speed: 60 mph		
Minimum Sight Dist. for Stopping: 570 ft		Bridges: HL-93		
Limited Access Control: N/A				
Pavement Design Life 20 (years)				
Design Accumulated One-way ESALs: 3,356,568				

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	21399	1	1

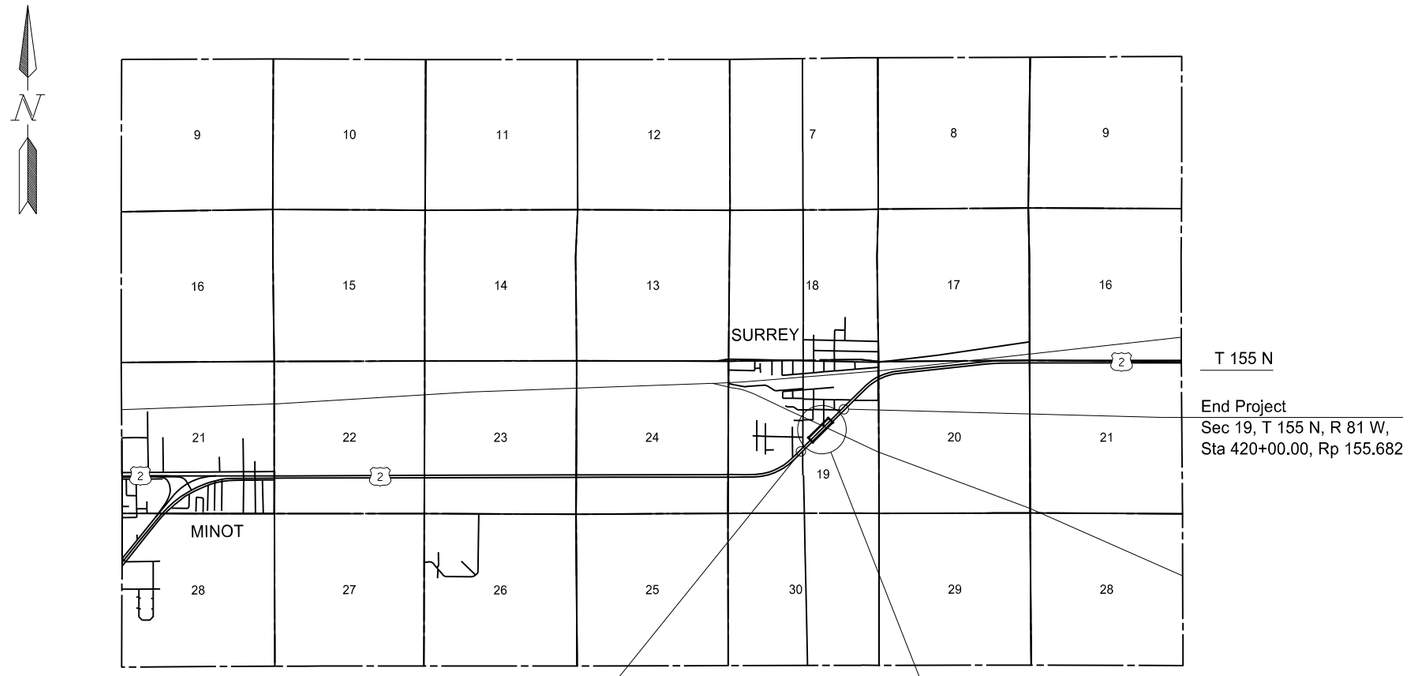
JOB # 20
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

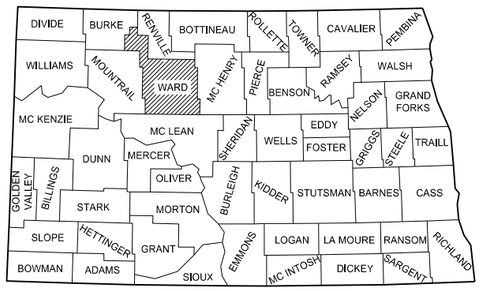
NH-4-002(118)154

Ward County
BNSF
9 West of ND Hwy 41 - WB
Structure Replacement & Turn Lanes

GOVERNING SPECIFICATIONS:
2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-4-002(118)154	2.083	2.083





STATE COUNTY MAP

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 2/15/19

Jon Ketterling
BRIDGE DIVISION

This document was originally issued and sealed by Jon Ketterling, Registration Number PE- 4684 , on 02/15/19 and the original document is stored at the North Dakota Department of Transportation

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	2	1

TABLE OF CONTENTS

PLAN SECTIONS

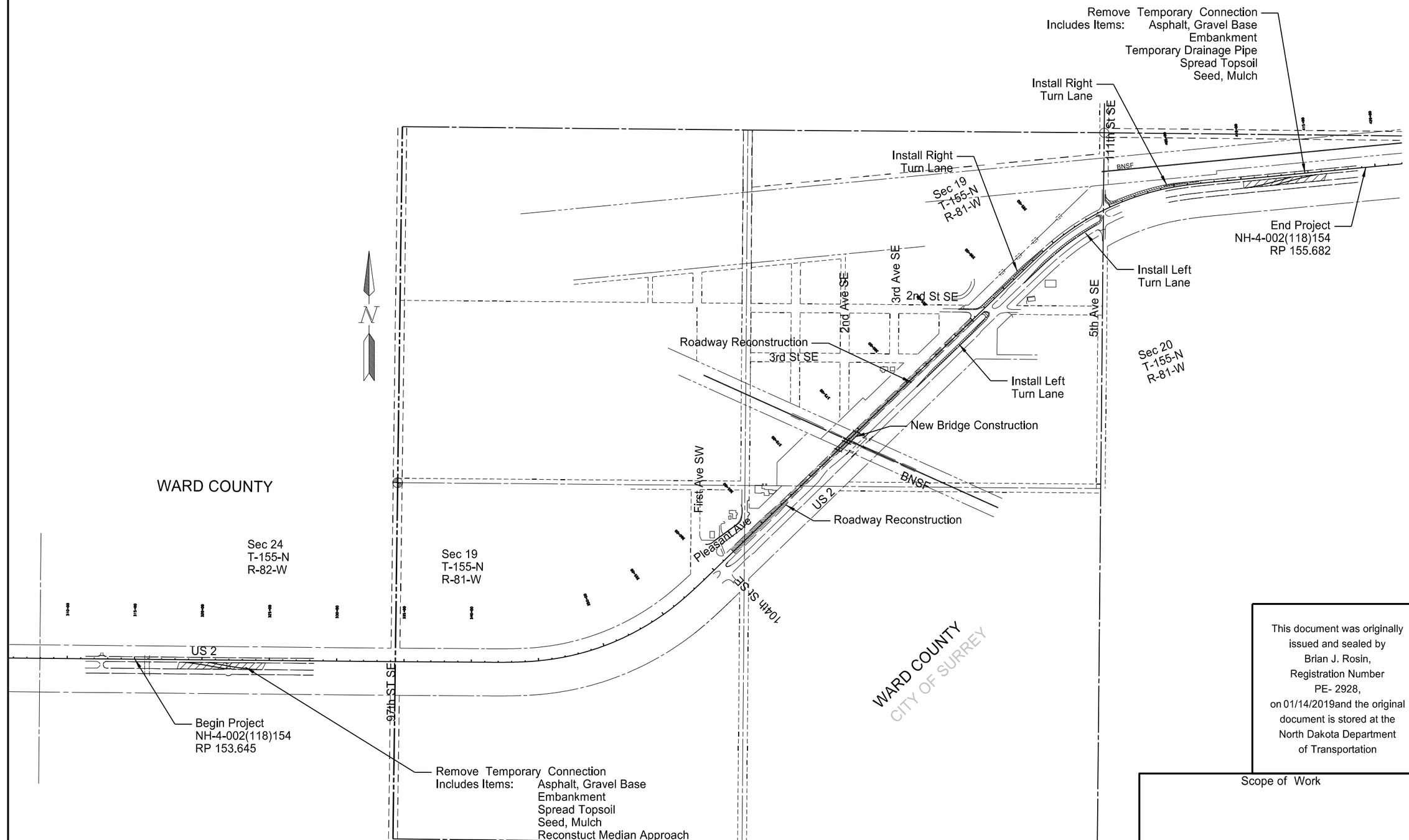
SPECIAL PROVISIONS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	2	2

TABLE OF CONTENTS

LIST OF STANDARD DRAWINGS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	4	1



This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Scope of Work

Bridge Replacement

9 Mi West of ND Hwy 41-WB

1/14/2019 2:53:15 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\004_001_Scope of Work.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	6	1

NOTES

GENERAL NOTES

100-P01 COORDINATION OF PROJECTS: Another project in the vicinity of this project is under contract during the 2019 construction season. This project is NH-4-002(129)150 (PCN 22339) and is located on the WB lanes of Hwy 2 on each side of this project.

105-P01 UTILITIES: The vertical and horizontal utility locations shown in the plans are approximate. Plan locations should not be interpreted as exact for bidding or construction purposes.

105-P02 UTILITIES: The contractor needs to coordinate with the local utility company when the pole at Sta.387+64-44' Lt is to be relocated to Sta. 387+64-54' Lt. The intersection will need to remain lighted during night time hours if the pole is not reset in one day.

Contact Seth Bartholomay the local service rep in Surrey for Otter Tail Power at 701-871-1284 to coordinate. Or contact

Dennis Huffman | Senior Area Engineer
Otter Tail Power Company | 524 5th Ave SE | Devils Lake, ND 58301
Office: (218) 739-8764
Cell: (701) 351-2982
Email: dhuffman@otpco.com

202-P01 REMOVAL OF AGGREGATE BASE & SURFACING: The tonnage of "Removal of Aggregate Base & Surfacing" is based on the existing typical sections shown in section 30. The tonnage includes 100% of the area of existing bituminous surfacing and the area of existing base minus 20%.

203-010 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment.

203-385 AVERAGE HAUL: No average haul has been computed for this project.

261-P01 PERMANENT FIBER ROLLS: If fiber rolls are to remain on the project, use fiber rolls that are composed of 100 percent biodegradable jute netting that has a life expectancy between 6 to 12months.

704-200 PRECAST CONCRETE MEDIAN BARRIERS – STATE FURNISHED: Obtain 80 barriers from the Stanley Section. Return barriers to the Stanley Section.

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 the cost for boards in the contract unit price for "Precast Concrete Median Barrier - State Furnished".

704-500 PORTABLE RUMBLE STRIPS (PRS): Use PRS made of rubber or engineered polymers.

Install PRS that meet the following criteria:

- Have no adhesives or fasteners required for placement;
- Have a manufacture's speed rating that meets or exceeds the posted speed limit; and
- Each strip in the array must weigh a minimum of 100 pounds.

Use individual PRS constructed in one of the following manners:

- A single piece;
- Inter locking segments; or
- Two pieces hinged at the midpoint. An installed array of PRS consists of a minimum of 3 individual strips.

Move rumble strips with the flagging operation. Do not place rumble strips on horizontal curves.

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "Portable Rumble Strips".

This document was originally issued and sealed by Brian j. Rosin, Registration Number PE-2928, on 01/14/2019 and the original document is stored at the North Dakota Department of Transportation.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	6	2

NOTES

704-P01 TRAFFIC CONTROL: Provide traffic control for two-way traffic on the eastbound lanes of Hwy 2 while work is be done on WB structure and roadway.

Traffic control device quantities are based on two-way traffic from Station 315+00 to 415+00. This includes both crossovers.

1. D-704-20: Type G for intersecting roads. As needed.
2. D-704-22: Type K and Type L for construction trucks hauling material. As needed.
3. D-704-23: Short term urban lane closure on a divided highway. 2 instances.
4. D-704-26: Type Y for construction trucks hauling material. As needed.
5. D-704-50: Portable sign support assembly.
6. D-704-38: East median crossover.
7. D-704-39: West median crossover.
8. D-704-63: One road closure Four-Lane divided highway for access to two-way two-lane roadway. 4 instances.

710-P01 REMOVAL OF TEMPORARY CONNECTION: Remove the two temporary connections when no longer needed to maintain traffic.
This work will consist of:
1. Saw cutting the pavement to be removed at the edge of the shoulder of the finished median width or finished roadway width.
2. Constructing an aggregate slough at the edge of the saw cut.
3. Shaping the median approach foreslopes to 8:1 or flatter, shaping the median forslopes to 6:1 and placing topsoil. This includes the topsoil stockpiled in the median and on the backslope.
4. Removal, hauling, and disposal of all materials.
5. Reshaping existing slopes on median approach as shown on the detail in Section 20.
Include all labor and equipment costs for removing, hauling, and disposing of materials, removal and replacement of topsoil, aggregate surface and shaping of median slopes, foreslopes, and approach slopes in the unit price bid for “Removal of Temp Connection”.

714-P01 PLUG PIPE-ALL TYPES & SIZES: At locations designated on the plans for plugging existing culverts, remove designated barrel sections of concrete culvert and plug in accordance with Standard D-714-1. Include all costs for dewatering, excavation of material, and plugging pipe in the unit price bid for “Plug Pipe-All Types & Sizes”. Include all costs for removing barrel sections in the unit price bid for “Removal of Culverts – All Types & Sizes”.

752-P01 SAFETY FENCE: Protect the private landscaping located within the construction area. If damage occurs, repair damage according to Section 107.10. Safety fence has been provided to separate this landscaped area.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	6	3

NOTES

SECTION 100

764-P01 W-BEAM GUARDRAIL END TERMINALS FOR TWO-WAY TRAFFIC: One W-beam guardrail end terminal is required for protection of the median bridge rail end at the Eastbound BNSF Railroad Separation, RP 154.989, during two-way traffic operation.

Install a W-beam terminal connector, a 12'-6" double rail section, two 12’-6” W-beam rail sections and a W-beam guardrail end terminal, as shown in the plans.

The W-beam guardrail end terminal and additional guardrail materials, required for two-way traffic will remain the property of the contractor and be removed when no longer needed for two-way traffic operation. The W-beam guardrail end terminal will be measured and paid for by the number of W-beam guardrail end terminals required and accepted by the Engineer and include all materials, including W-beam terminal connector and W-beam rail sections, and all necessary posts, blocks, hardware, equipment, and labor.

SECTION 130

748-P01 CURB & GUTTER – TYPE 1 SPECIAL: Install curb and gutter at the Westbound BNSF Railroad Separation, RP 154.989, in accordance with Standard Drawing D-748-1, except for height transitions provided on each end, as shown on Standard Drawing D-764-60.

Include all costs for constructing the curb and gutter as described above in the contract unit price bid for the item “Curb & Gutter – Type 1 Special.”

764-P02 MGS W-BEAM GUARDRAIL: Install MGS W-beam guardrail with pre-punched slotted holes at the 3’-1 ½” mark as shown on D-764-40. Do not drill holes in standard W-beam guardrail rail sections to convert to MGS W-beam guardrail

SECTION 140

770-P01 LIGHTING: Coordinate with Ottertail Power for removal of the existing wood pole light standard at Sta 399+26-38’ Lt. Ensure this light remains in place until the new lights are operational.

Contact Ottertail Power to install a meter at Sta 398+17-150’ Lt for the new lighting system.

Seth Bartholomay
Otter Tail Power Company
(701) 871-1284
sbartholomay@otpco.com

770-P02 UTILITY LIGHT POLES: Coordinate with Ottertail Power when relocating the utility owned pole at Sta.387+64-44’ Lt. It is to be relocated to Sta. 387+64-54’ Lt. Ensure the intersection remains lit during night time hours.

Contact Ottertail Power to coordinate this work.

Seth Bartholomay
Otter Tail Power Company
(701) 871-1284
sbartholomay@otpco.com

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
107	0100	RAILWAY PROTECTION INSURANCE	L SUM	1	1
201	0330	CLEARING & GRUBBING	L SUM	1	1
201	0352	REMOVAL OF TREES & BRUSH	L SUM	1	1
201	0370	REMOVAL OF TREES 10IN	EA	6	6
201	0380	REMOVAL OF TREES 18IN	EA	3	3
202	0021	REMOVE AGGREGATE BASE & SURFACING	TON	9,865	9,865
202	0105	REMOVAL OF STRUCTURE	L SUM	1	1
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	10.21	10.21
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	643	643
202	0230	REMOVAL OF INLETS	EA	4	4
203	0101	COMMON EXCAVATION-TYPE A	CY	7,959	7,959
203	0109	TOPSOIL	CY	4,410	4,410
203	0140	BORROW-EXCAVATION	CY	15,180	15,180
210	0099	CLASS 1 EXCAVATION	L SUM	1	1
210	0201	FOUNDATION PREPARATION	EA	1	1
216	0100	WATER	M GAL	455	455
251	0200	SEEDING CLASS II	ACRE	10.38	10.38
251	2000	TEMPORARY COVER CROP	ACRE	10.38	10.38
253	0101	STRAW MULCH	ACRE	20.76	20.76
255	0102	ECB TYPE 2	SY	64	64
255	0202	TRM TYPE 2	SY	265	265
261	0112	FIBER ROLLS 12IN	LF	14,140	14,140
261	0113	REMOVE FIBER ROLLS 12IN	LF	6,215	6,215
302	0120	AGGREGATE BASE COURSE CL 5	TON	15,595	15,595
401	0050	TACK COAT	GAL	1,683	1,683
401	0060	PRIME COAT	GAL	4,875	4,875
430	0045	SUPERPAVE FAA 45	TON	6,174	6,174
430	1000	CORED SAMPLE	EA	51	51
430	5806	PG 58H-28 ASPHALT CEMENT	TON	266	266
602	0130	CLASS AAE-3 CONCRETE	CY	303.6	303.6
602	1130	CLASS AE-3 CONCRETE	CY	289.4	289.4
602	1134	PILE SUPPORTED APPROACH SLAB	SY	214.8	214.8

ESTIMATE NUMBER: 17769 ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 02/19/2019 TIME: 09:17:42

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,065	1,065
604	9620	PRESTRESSED BOX BEAM-33IN	LF	985	985
612	0115	REINFORCING STEEL-GRADE 60	LBS	21,254	21,254
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	68,828	68,828
622	0020	STEEL PILING HP 10 X 42	LF	1,420	1,420
622	0060	STEEL PILING HP 14 X 73	LF	805	805
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	840	840
704	1000	TRAFFIC CONTROL SIGNS	UNIT	5,651	5,651
704	1041	ATTENUATION DEVICE-TYPE B-55	EA	2	2
704	1048	PORTABLE RUMBLE STRIPS	EA	2	2
704	1052	TYPE III BARRICADE	EA	38	38
704	1060	DELINEATOR DRUMS	EA	80	80
704	1067	TUBULAR MARKERS	EA	157	157
704	1072	FLEXIBLE DELINEATORS	EA	21	21
704	1081	VERTICAL PANELS-BACK TO BACK	EA	6	6
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2	2
704	1088	SEQUENCING ARROW PANEL-TYPE C-CROSSOVER	EA	2	2
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	1,750	1,750
704	3510	PRECAST CONCRETE MED BARRIER-STATE FURNISHED	EA	80	80
706	0500	AGGREGATE LABORATORY	EA	1	1
706	0550	BITUMINOUS LABORATORY	EA	1	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	1
710	0410	REMOVAL OF TEMP CONNECTION	EA	2	2
714	0615	PIPE CONC REINF 24IN CL III	LF	20	20
714	0820	PIPE CONC REINF 30IN CL III	LF	18	18
714	5015	PIPE CORR STEEL .064IN 18IN	LF	24	24
714	5810	END SECT CORR STEEL .064IN 18IN	EA	1	1
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA	2	2
714	9680	PLUG PIPE-ALL TYPES & SIZES	EA	2	2
720	0110	RIGHT OF WAY MARKERS	EA	5	5
720	0125	ALIGNMENT MONUMENTS	EA	2	2
720	0130	IRON PIN R/W MONUMENTS	EA	5	5

ESTIMATE NUMBER: 17769 ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 02/19/2019 TIME: 09:17:42

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	8	3

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
720	0135	IRON PIN REFERENCE MONUMENTS	EA	2	2
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	30	30
750	0100	SIDEWALK CONCRETE	SY	12.21	12.21
750	2120	DETECTABLE WARNING PANELS-RETROFIT	SF	76	76
752	0911	TEMPORARY SAFETY FENCE	LF	300	300
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	21	21
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	61	61
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	288	288
754	0592	RESET SIGN PANEL	EA	4	4
754	0593	RESET SIGN SUPPORT	EA	2	2
754	0805	OBJECT MARKERS - CULVERTS	EA	3	3
762	0103	PVMT MK PAINTED-MESSAGE	SF	288	288
762	0200	RAISED PAVEMENT MARKERS	EA	1,137	1,137
762	0420	SHORT TERM 4IN LINE-TYPE R	LF	35,500	35,500
762	1104	PVMT MK PAINTED 4IN LINE	LF	47,250	47,250
762	1108	PVMT MK PAINTED 8IN LINE	LF	765	765
764	0131	W-BEAM GUARDRAIL	LF	991	991
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	3	3
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	316	316
764	2020	REMOVE 3-CABLE GUARDRAIL & POSTS	LF	1,772	1,772
764	2081	REMOVE END TREATMENT & TRANSITION	EA	2	2
770	0008	DESTINATION LIGHTING (TWO OR MORE POLES)	EA	1	1
772	2110	FLASHING BEACON-POST MOUNTED	EA	2	2
930	3000	BRIDGE BENCH MARKS	SET	1	1
930	7012	ROADWAY CANOPY	L SUM	1	1
930	8230	SHORING	EA	1	1
930	8686	AGGREGATE SLOPE PROTECTION	SY	835	835
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2	2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	10	1

Mainline

		Stations		Stations		Stations		Stations		Stations		Stations		Totals
		362+00 to 365+30		365+30 to 366+30		366+30 to 372+55		375+00 to 378+00		378+00 to 384+35		384+35 to 386+75		
		3.3 Sta		1.0 Sta		6.25 Sat		3.0 Sta		6.35 Sta		2.4 Sta		
Material	Unit	Width (Ft)	Quantity	Width (Ft)	Quantity	Width (Ft)	Quantity	Width (ft)	Quantity	Width (Ft)	Quantity	Width (ft)	Quantity	
*Removal of Bituminous Surfacing	TON	56	2275	38		38	1450	38		38	3845	38		7570
Aggregate Base Course Cl 5 @ 1.5 Ton/CY + 25%	TON	67	2315	59	617.64	47	3079	54	1675	50	3290	48	1175	12152
Prime Coat @ 0.25 Gal/SY	GAL	61	560	52	144.44	40	694.4	50	416.67	45	793.75	40	266.67	2876
Tack Coat @ 0.05 Gal/SY (1st Lift)	GAL	57	104.5	49	27.22	37	128.48	38	63.33	38	134.05	38	50.67	508
Tack Coat @ 0.05 Gal/SY (2nd Lift)	GAL	56	102.67	48	26.67	36	125	38	63.33	38	134.05	38	50.67	502
Superpave FAA 45 @ 2.0 Ton/CY (Mainline)	TON	56	775	48	205	36	965	36	462	36	980	36	370	3757
Superpave FAA 45 @ 2.0 Ton/CY (Guardrail)	TON		0		0		0	12	58	6	62		0	120
PG 58H-28 Asphalt Cement @ 6.0%	TON	-	33.325	-	8.815	-	41.495	-	22.36	-	44.806	-	15.91	167

*Based on the existing typical sections shown in section 30. Includes 100% of the area of existing bituminous surfacing and the area of existing base minus 20%

Turnlanes

		2nd Street SE Left Turn		2nd Street SE Right Turn		5th Ave SE Left Turn		5th Ave SE Right Turn		Totals
		380+26 to 388+77		395+00 to 403+23		391+28 to 399+63		408+88 to 417+11		
		8.51 Sta		8.23 Sta		8.35 Sta		8.23 Sta		
Material	Unit	Width (Ft)	Quantity	Width (Ft)	Quantity	Width (Ft)	Quantity	Width (ft)	Quantity	
*Removal of Bituminous Surfacing	TON	5	455	8	695	5	450	8	695	2295
Aggregate Base Course Cl 5 @ 1.5 Ton/CY + 25%	TON	8.5	765	10	962	8.5	751	10	962	3440
Prime Coat @ 0.25 Gal/SY	GAL	21.2	501	22	503	21.2	492	22	503	1999
Tack Coat @ 0.05 Gal/SY (1st Lift)	GAL	18.4	87	18.4	84	18.4	86	18.4	84	341
Tack Coat @ 0.05 Gal/SY (2nd Lift)	GAL	18	85	18	82	18	83	18	82	332
Superpave FAA 45 @ 2.0 Ton/CY (Turn Lane)	TON	16	587	16	567	16	576	16	567	2297
Superpave FAA 45 @ 2.0 Ton/CY										
PG 58H-28 Asphalt Cement @ 6.0%	TON	-	25.241	-	24.381	-	24.768	-	24.381	99

*Based on the existing typical sections shown in setion 30. Includes 100% of the area of existing bituminous surfacing and the area of existing base minus 20%

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Basis Of Estimate

Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	10	2

Borrow and Embankment for Mainline Hwy 2					
Common Excvation-Type A (CY)			Embankment for Inslope (CY) (Includes 25% for Shrinkage)		Borrow Required (CY)
WB - West Side	WB - East Side	Bridge Excavation	WB - West Side	WB - East Side	
A	B	C	D	E	F=(D+E)-(A+B+C)
1883	894	3580	9161	9996	12800
2nd Street SE	5th Ave SE		2nd Street SE	5th Ave SE	
A	B	C	D	E	F=(D+E)-(A+B+C)
726	876	0	1761	2221	2380

Water

25 MGal/Mile for Dust Palliative

10 Gal/CY for Embankment

20Gal/Ton for Aggregate Base

Dust Palliative		
Distance	5000	LF
Distance	0.9470	Mile
Conversion	25	M Gal/Mile
SubTotal	23.67	M Gal
Embankment		
Total Embank.	15180	CY
Conversion	10	Gal/CY
SubTotal	151800	Gal
SubTotal	151.80	M Gal
Aggregate Base		
Total Aggre.	15592	CY
Conversion	20	Gal/CY
SubTotal	311840	Gal
SubTotal	311.84	M Gal
Total	487.31	M Gal

HMA Cored Samples							
	A	B	C	D			
Specification Section	Distance (Ft)/2000	Lanes	Lifts	Sublots (A x B x C)	Quantity (D x 2)	Quantity (1 per mile)	Unit
430.04 I.2.b(1), "General"	1	2	3	6.0	12	N/A	EA
430.04 I.2.b(1), "General"	1	2	3	6.0	12	N/A	EA
430.04 I.2.b(1), "General"	4	1	3	13.0	26	N/A	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	1	EA
				Total	50	1	EA

Short Term 4IN Line-Type R		
Location	Basis	Quantity
Centerline -Mainline Head to Head	Barrier Stripes	21,000 LF
Edgeline-Median	Barrier Stripes	10,500 LF
Edgeline-Crossovers	Barrier Stripes	4,000 LF

Object Markers - Culverts	
Sta	#
378+86 Lt	1
384+41 Lt	1
387+52 Rt	1

Permanent Pavement Marking		
Location - Type	Basis	Quantity
Centerline - Pvmt Mkg 4In Line	Centerline Skips	5,250 LF
Edge Lines - Pvmt Mkg 4In Line	10,560 LF/Mile	42,000 LF

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

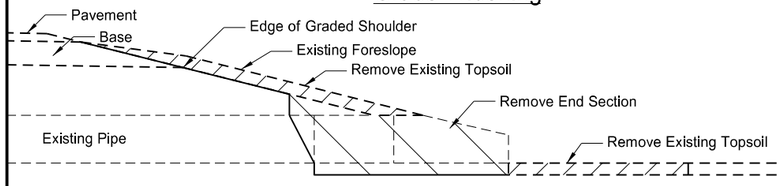
Basis Of Estimate

Bridge Replacement

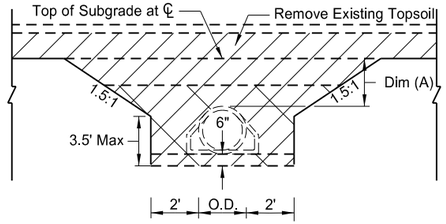
9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	20	1

Grade Widening



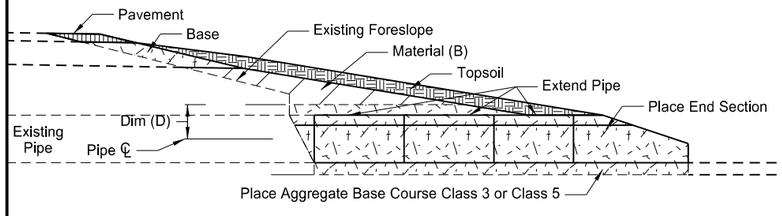
Removal Section
Cross Section View



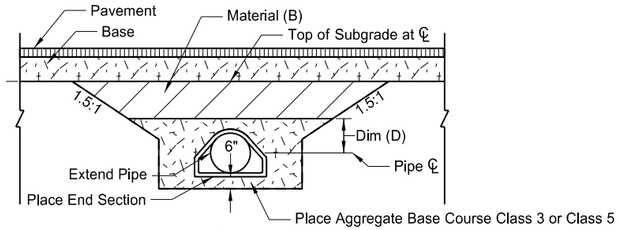
Removal Detail
Side View

Pay Items
1) Pipe*
2) Remove & Relay Pipe - All Types & Sizes (when required)
3) Remove & Reset End Section or new End Section
4) Borrow Excavation or Common Excavation
5) Topsoil
6) Seeding
7) Mulching

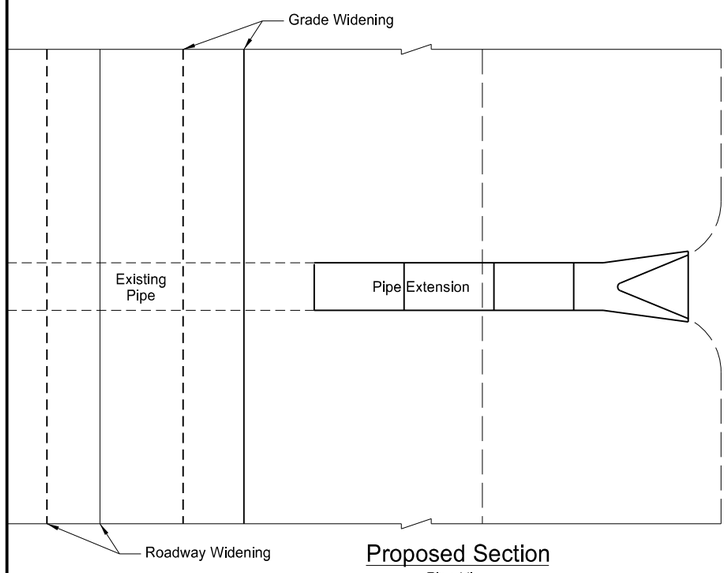
*Included in Pipe Pay Item
1) Pipe
2) Aggregate Base Course Class 3 or Class 5



Proposed Section
Cross Section View



Backfill Detail
Side View (Topsoil not shown)



Proposed Section
Plan View

Pipe Materials	Dim (A)<=4 Feet Material (B)	Backfill Dimension Dim (D)
Concrete	Embank or Aggr	0.5 O.D.
Metal	Embank or Aggr	0.5 O.D.+1 Foot

Pipe Materials	Dim (A)>4 Feet Material (B)	Backfill Dimension Dim (D)
Concrete	Embankment	0.5 O.D.
Metal	Embankment	0.5 O.D.+1 Foot

NOTES:
1. Embankment may be either Borrow Excavation or Common Excavation.
2. Aggregate may be either Class 3 or Class 5 Aggregate Base Course.

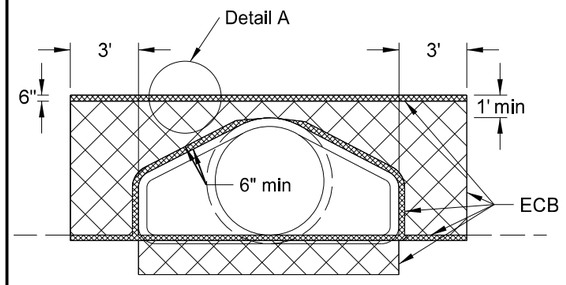
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Mainline Centerline Pipe Extention Detail

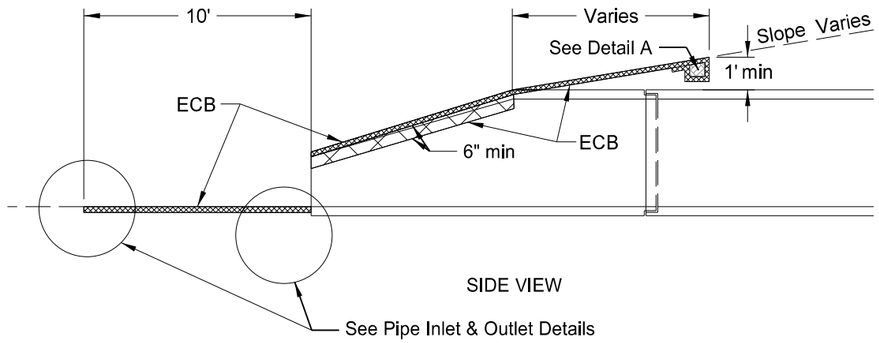
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	20	2

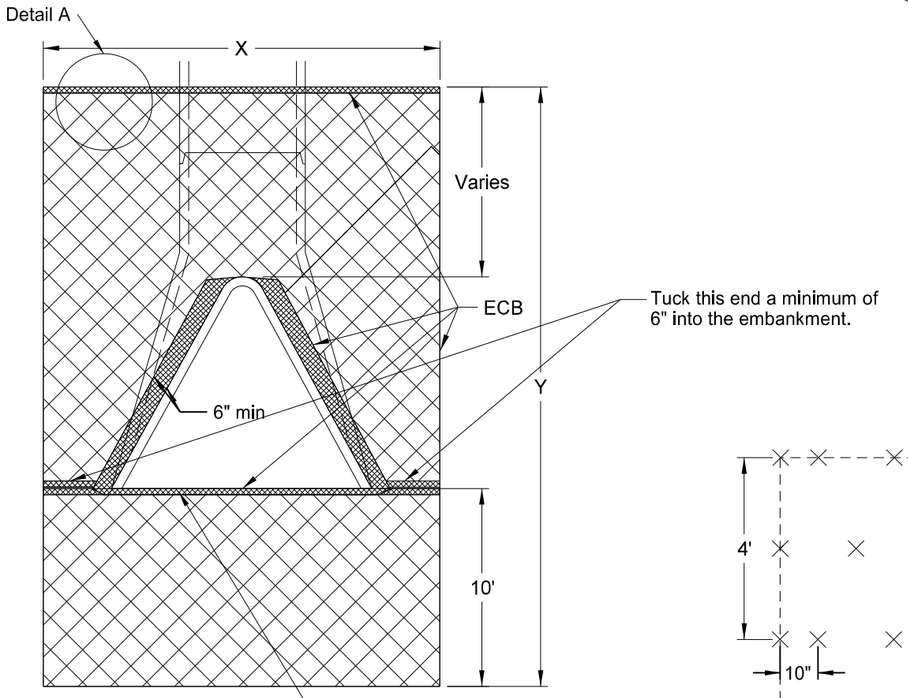


FRONT VIEW



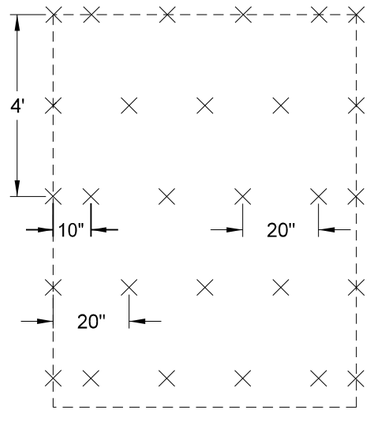
SIDE VIEW

Erosion Control Blanket (ECB)								
Location to be Protected Station	Culvert Type Appr/CL	Pipe Diam (Inch)	No	Unit Quantity (SY)	Total Quantity Type 1 (SY)	Type 2 (SY)	Type 3 (SY)	Type 4 (SY)
378+86 Lt	CL	30	1	22		22		
384+41 Lt	CL	24	1	20		20		
387+54 Rt	Appr	18	1	22		22		
Total (SYs)						64		



TOP VIEW

NOTE: Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.

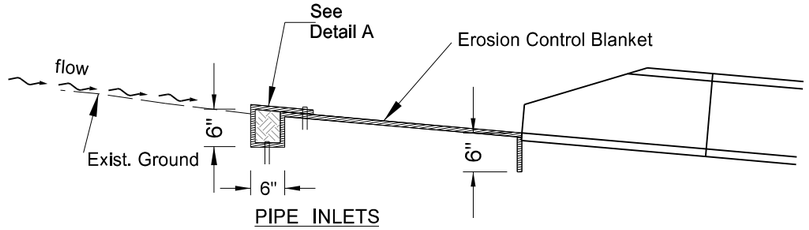


STAPLE PATTERN

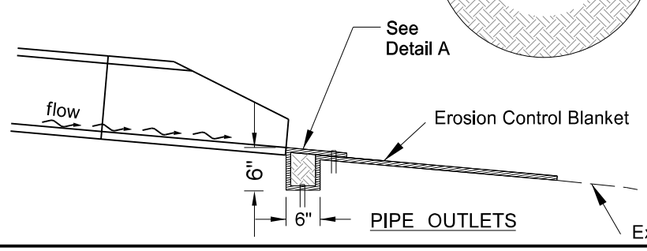
APPROACH CULVERTS				
DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY
15	9.0	20.0	176.0	20
18	9.5	20.7	190.7	22
21	9.5	21.0	190.9	22
24	10.5	21.6	214.1	24
27	11.0	22.0	226.3	25
30	11.6	22.5	241.5	27
36	12.7	23.3	268.8	30
42	13.3	23.3	279.7	31
48	13.8	24.0	293.2	33
54	14.5	23.4	300.6	34
60	15.0	23.0	307.5	35
66	15.6	24.0	325.6	37
72	16.2	24.5	340.6	38
Note: Quantities based on 8:1 slope.				

CENTERLINE CULVERTS				
DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY
24	10.5	19.6	193.1	22
27	11.0	20.0	204.3	23
30	11.6	20.5	218.3	25
36	12.7	21.2	242.1	27
42	13.3	21.2	251.8	28
48	13.8	22.0	265.6	30
54	14.5	21.5	273.7	31
60	15.0	21.0	278.3	31
66	15.6	22.0	295.7	33
72	16.2	22.5	309.2	35
Note: Quantities based on 6:1 slope.				

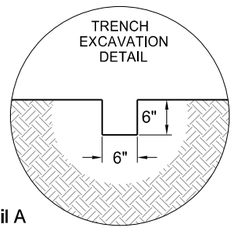
CENTERLINE CULVERTS				
DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY
24	10.5	27.6	172.1	20
27	11.0	18.0	182.3	21
30	11.6	18.5	195.1	22
36	12.7	19.2	216.7	24
42	13.3	19.2	225.2	25
48	13.8	20.0	238.0	27
54	14.5	19.5	244.7	28
60	15.0	19.0	248.3	28
66	15.6	20.0	264.5	30
72	16.2	20.5	276.8	31
Note: Quantities based on 4:1 slope.				

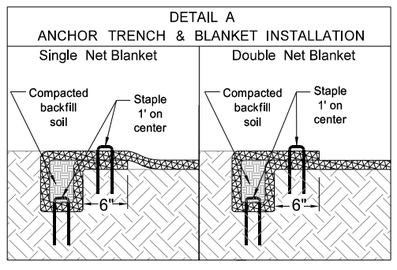


PIPE INLETS



PIPE OUTLETS





This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

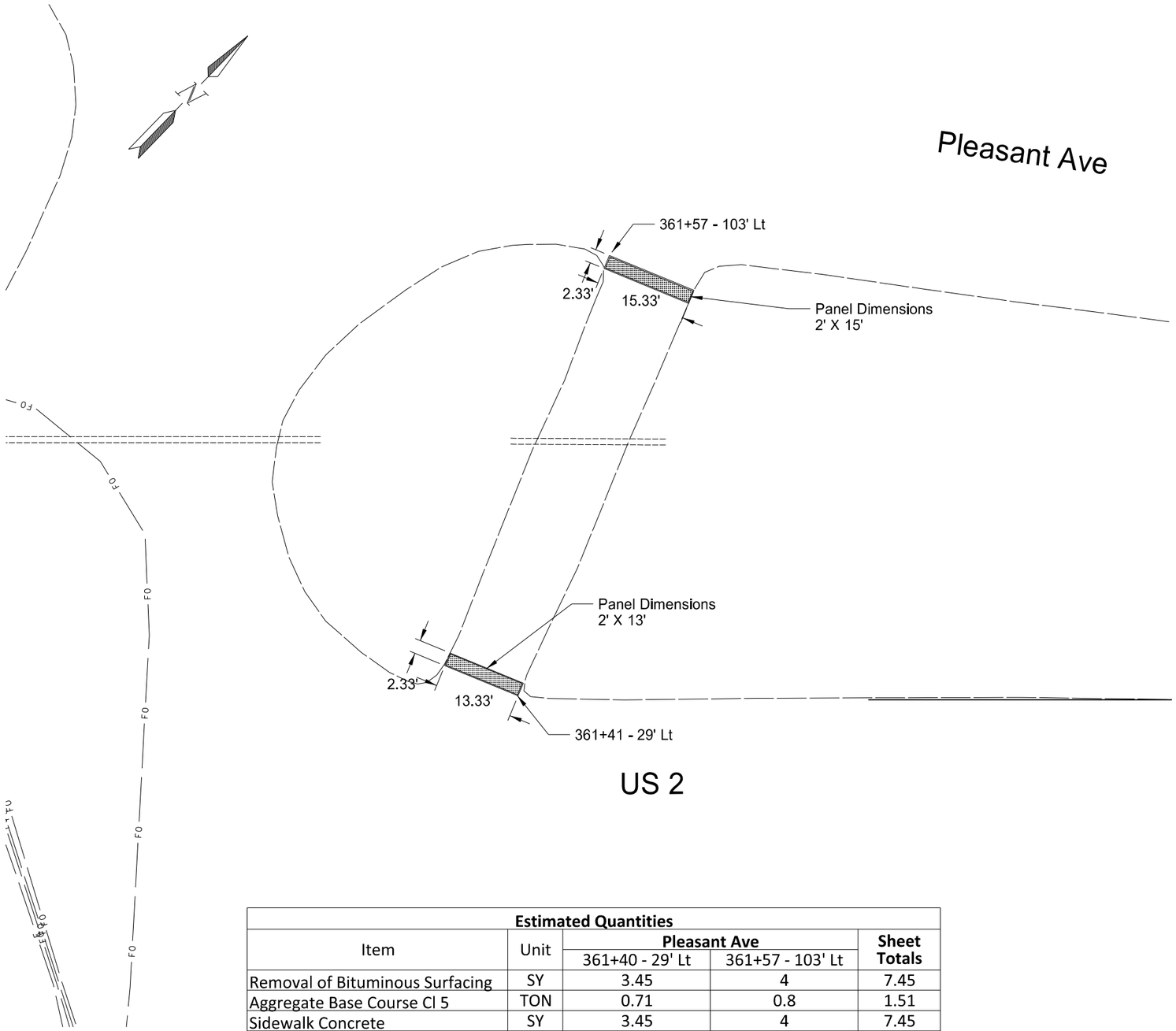
Erosion Control at Culvert Flared End Sections

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:17 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\020GD_002_CULV_END_PROTECTION.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	20	3



Estimated Quantities				
Item	Unit	Pleasant Ave		Sheet Totals
		361+40 - 29' Lt	361+57 - 103' Lt	
Removal of Bituminous Surfacing	SY	3.45	4	7.45
Aggregate Base Course Cl 5	TON	0.71	0.8	1.51
Sidewalk Concrete	SY	3.45	4	7.45
Detectable Warning Panels	SF	26	30	56

Reference Standard D-750-3

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

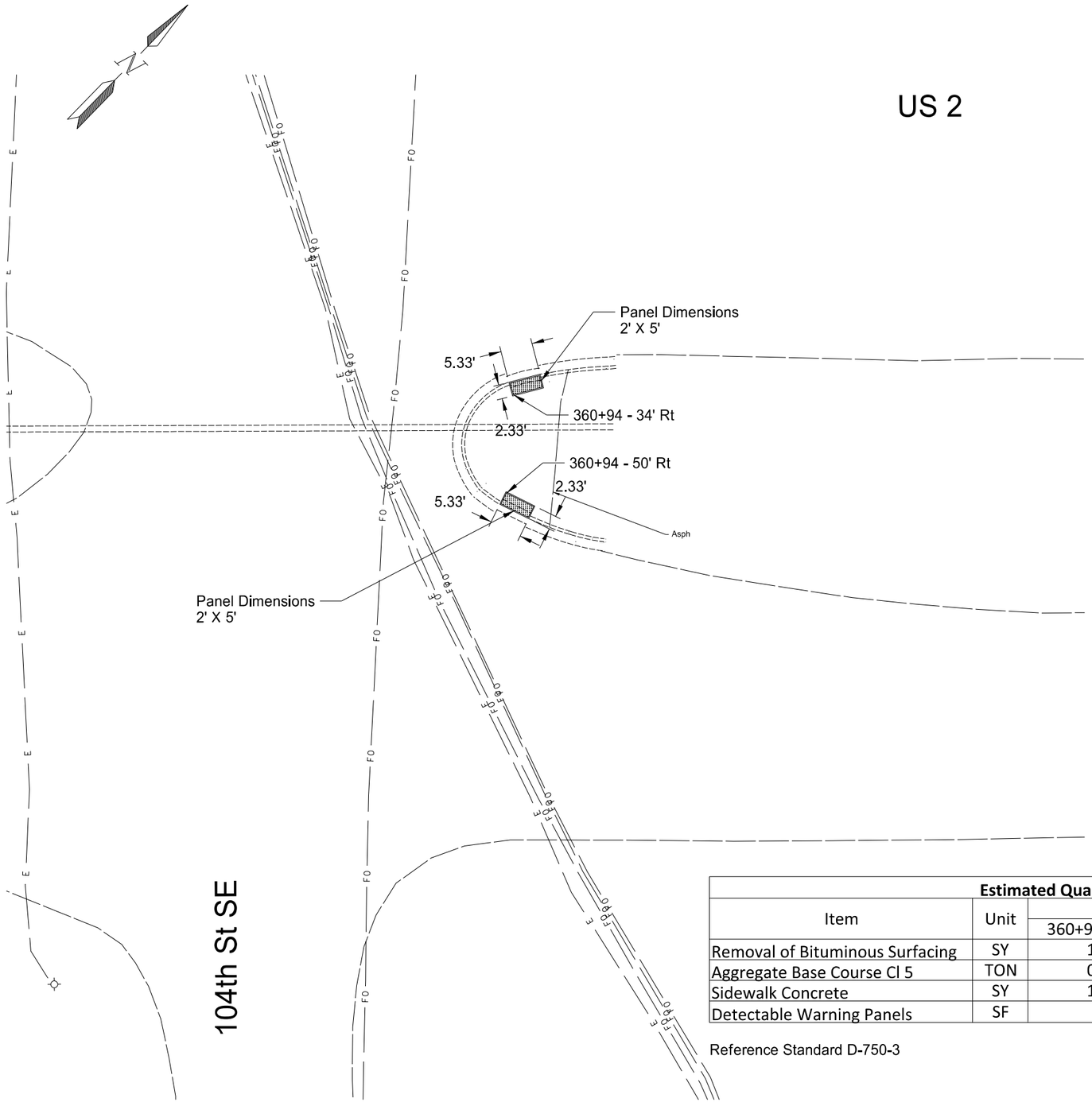
ADA Curb Ramp Layout

Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	20	4

US 2



Estimated Quantities				
Item	Unit	Pleasant Ave		Sheet Totals
		360+94 - 34' Rt	360+94 - 50' Rt	
Removal of Bituminous Surfacing	SY	1.38	1.38	2.76
Aggregate Base Course Cl 5	TON	0.35	0.35	0.7
Sidewalk Concrete	SY	1.38	1.38	2.76
Detectable Warning Panels	SF	10	10	20

Reference Standard D-750-3

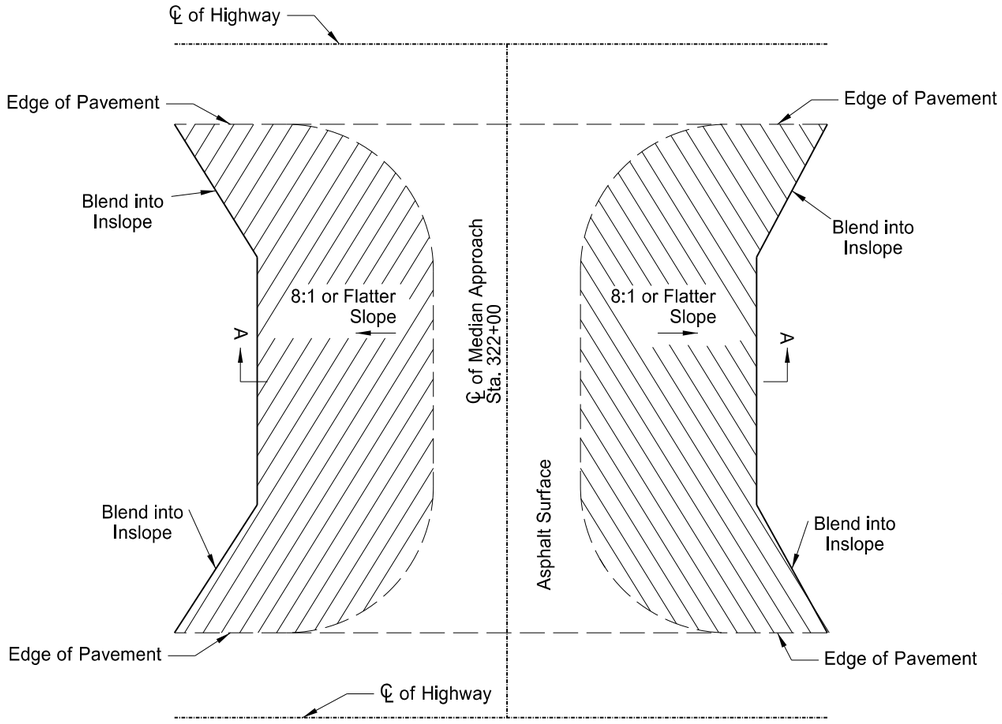
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

ADA Curb Ramp Layout

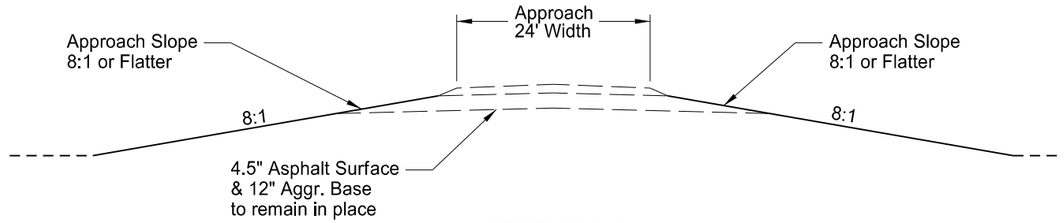
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-(002)118)154	20	5



Approach Slope Detail



SECTION A-A

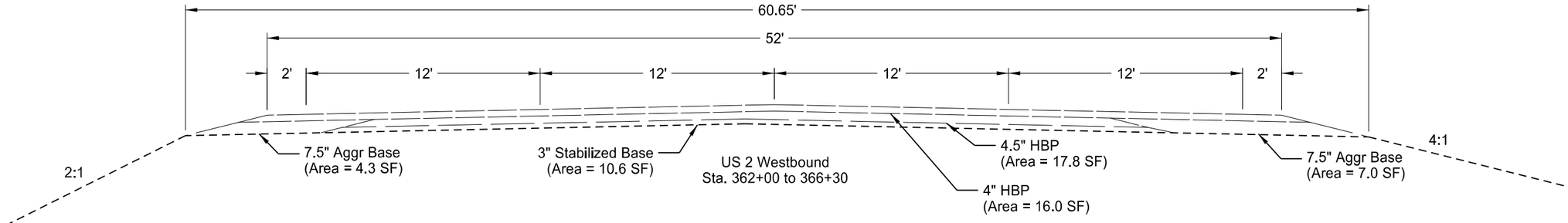
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

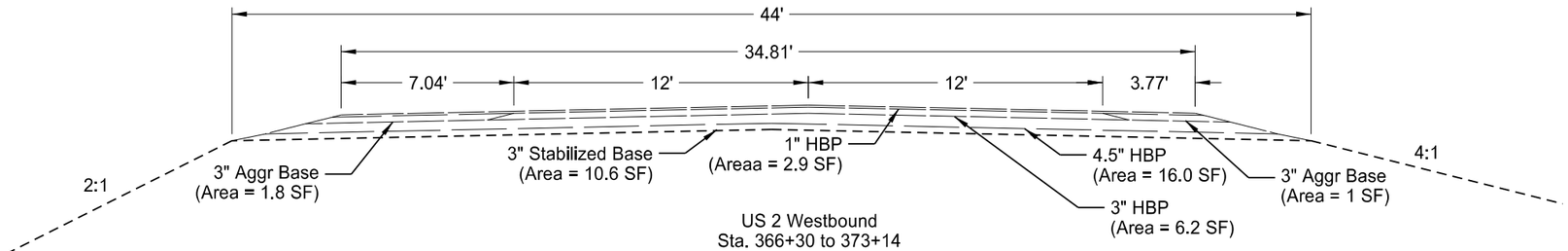
Median Approach Detail

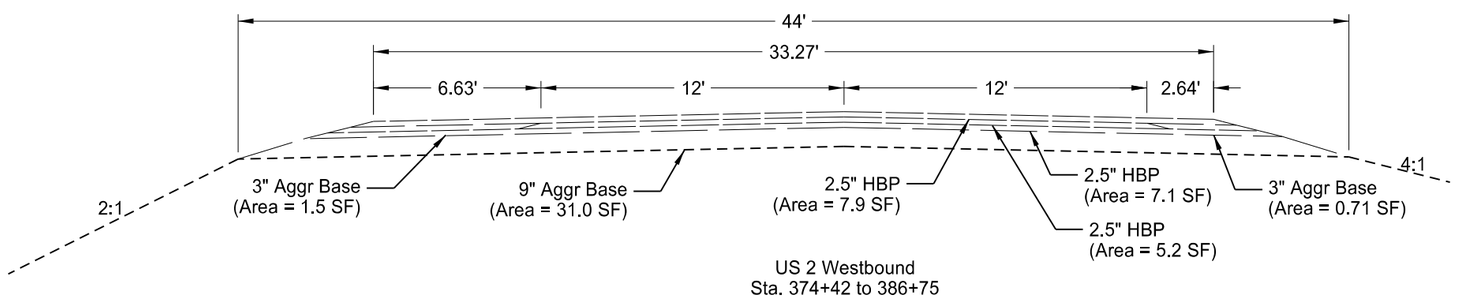
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	30	1







Note: Existing Typical Sections are based on old plans and actual dimensions may vary

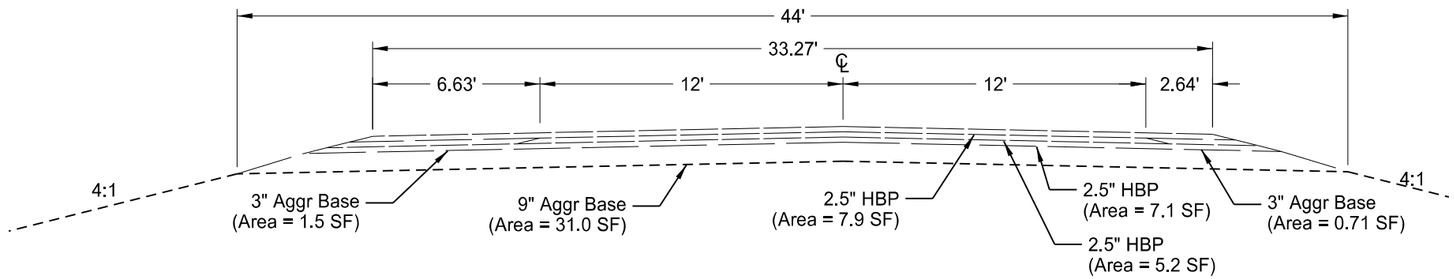
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Existing Typical Sections

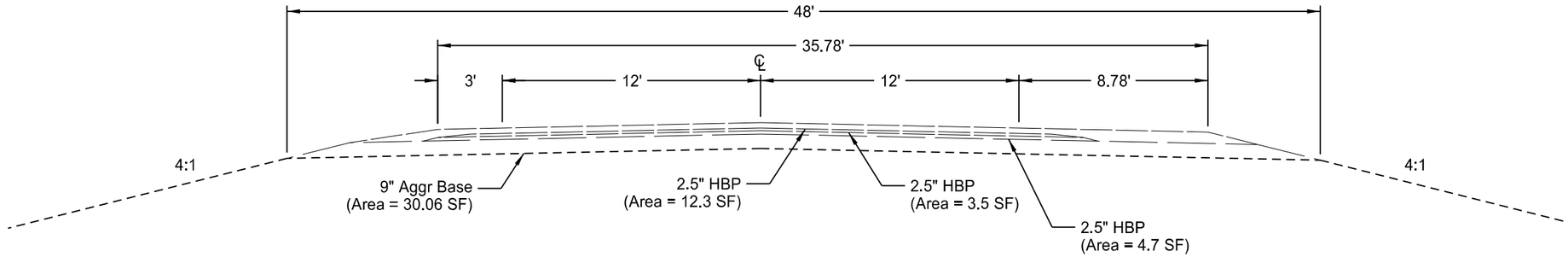
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	30	2



US 2 Westbound
Sta. 386+75 to 415+00



US 2 Eastbound
Sta. 387+00 to 415+00

Note: Existing Typical Sections are based on old plans and actual dimensions may vary

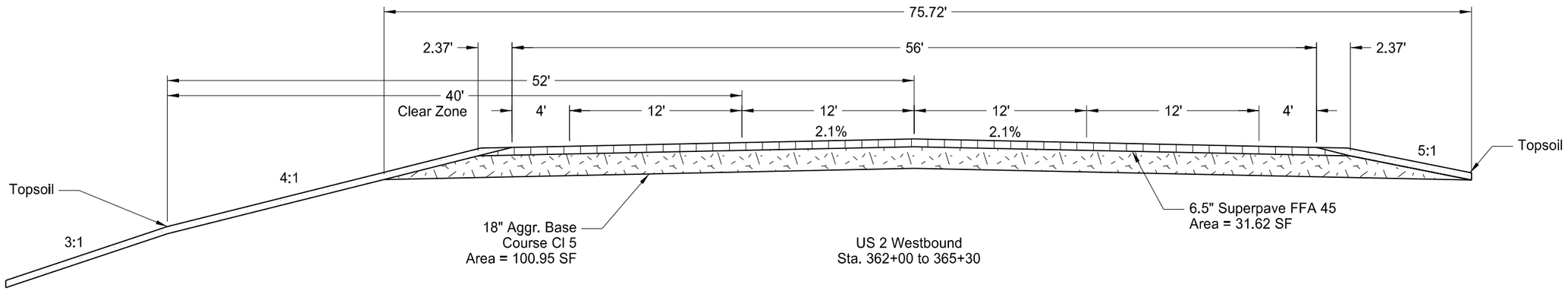
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

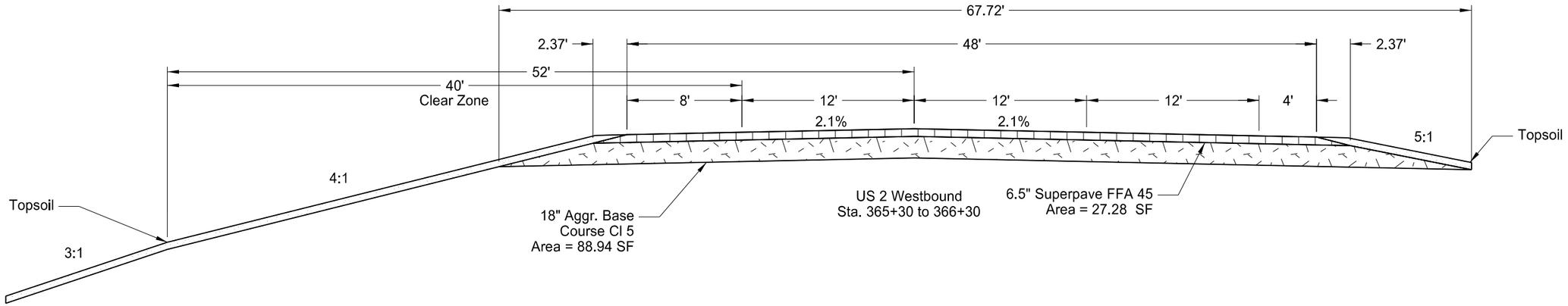
Existing Typical Sections

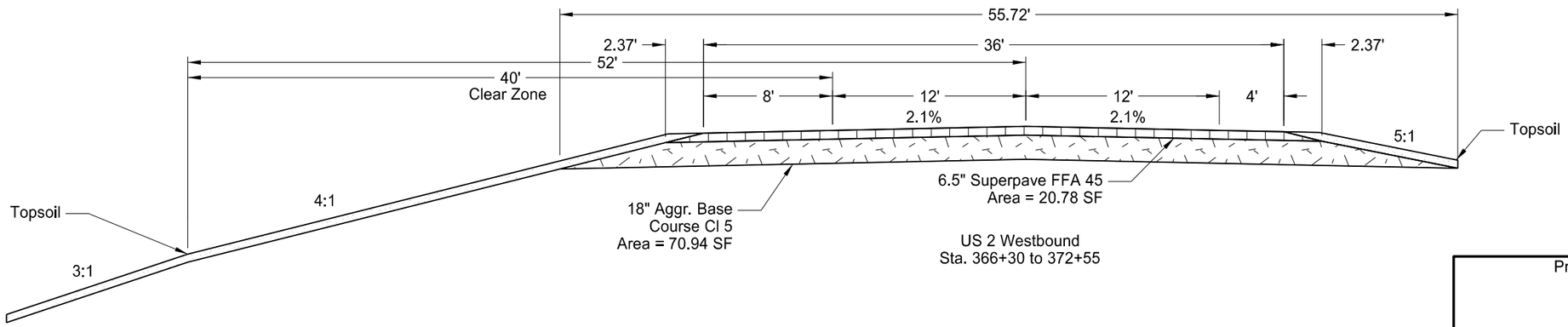
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	30	3







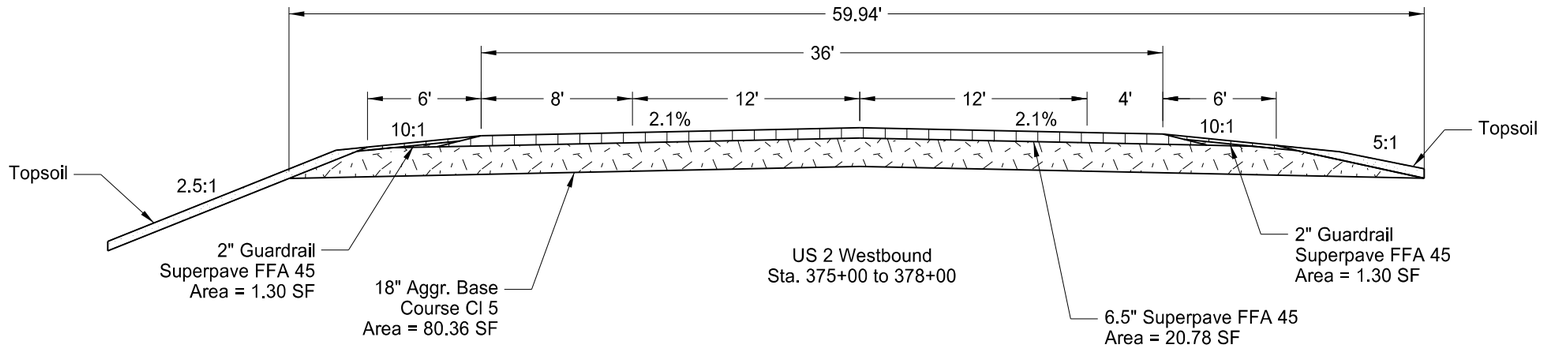
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

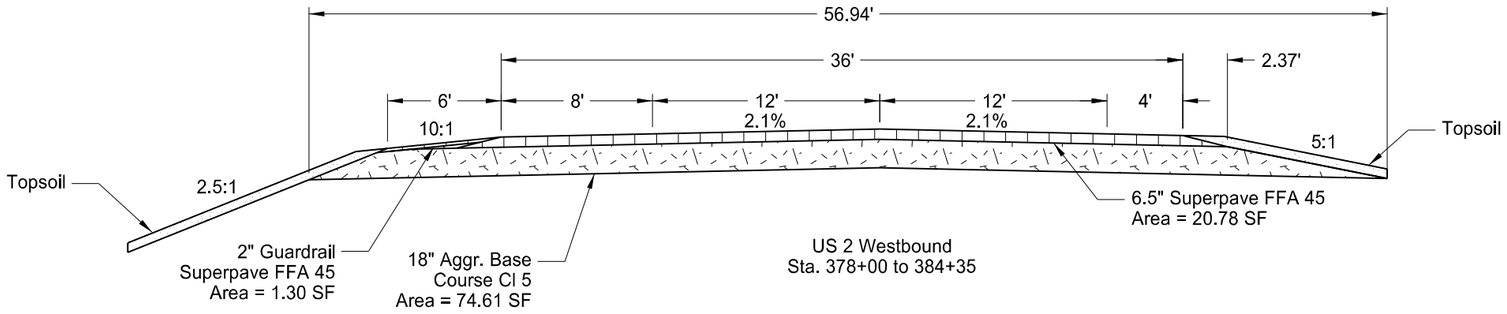
Proposed Typical Sections

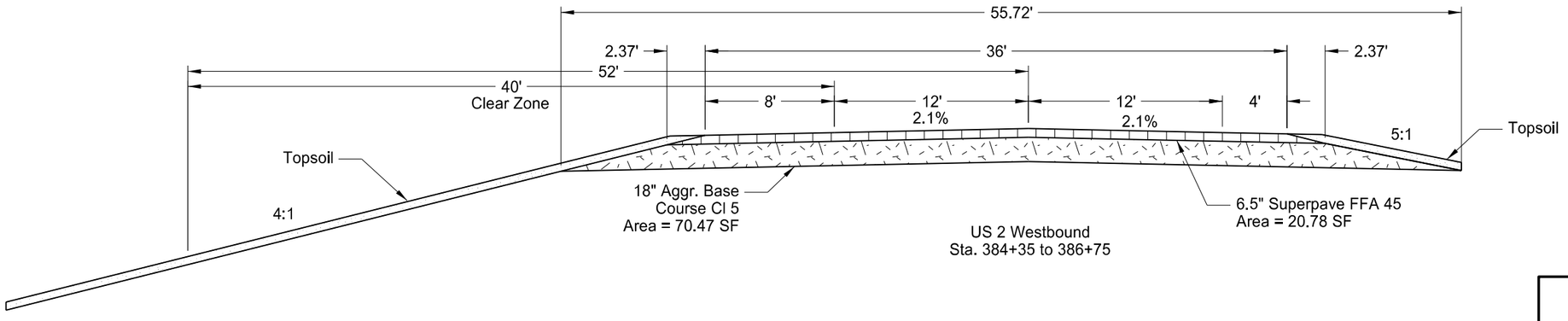
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	30	4







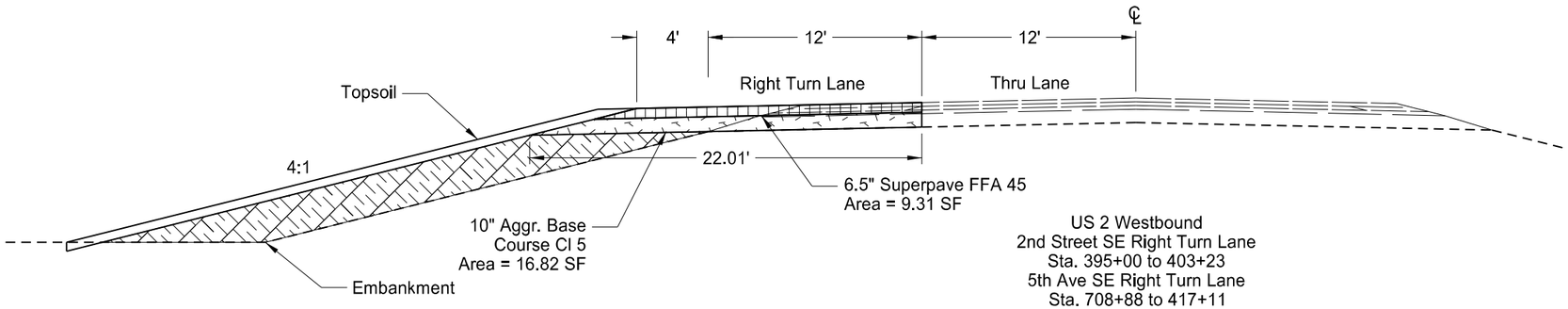
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Proposed Typical Sections

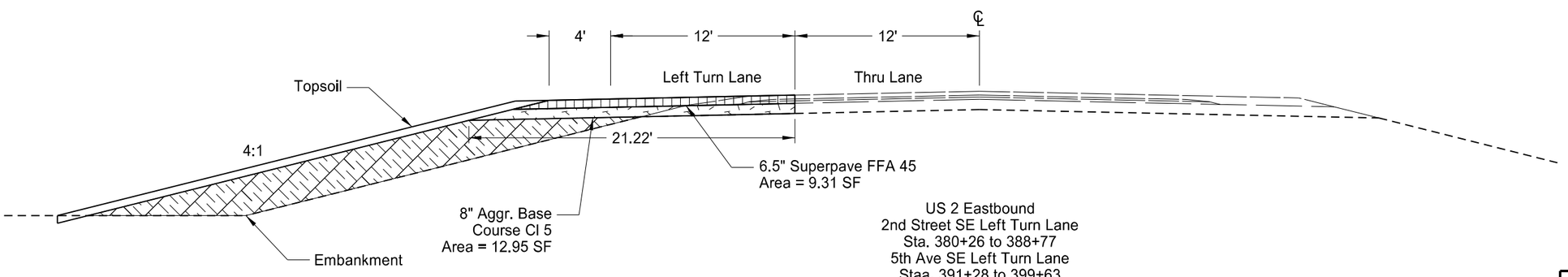
Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	30	5



US 2 Westbound
2nd Street SE Right Turn Lane
Sta. 395+00 to 403+23
5th Ave SE Right Turn Lane
Sta. 708+88 to 417+11



US 2 Eastbound
2nd Street SE Left Turn Lane
Sta. 380+26 to 388+77
5th Ave SE Left Turn Lane
Staa. 391+28 to 399+63

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Proposed Typical Sections

Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation		(Pay Item)	Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	R1 Fabric (Pay Item)	(*) End Sections		Applicable Backfill
				In	Bid Item	LF		In	Type		In	SY	Begin EA	End EA	
378+86	115.5.' Lt	378+86	97.5' Lt	30	Pipe Conc. Reinf. CL III (Extension)	18	Reinforced Concrete Pipe - Class III (barrel length = 18 LF)	30					Remove & Relay		Section 20 Sheet 1
384+41	73.4' Lt	384+41	53.4' Lt	24	Pipe Conc. Reinf. CL III (Extension)	20	Reinforced Concrete Pipe - Class III (barrel length = 20 LF)	24					Remove & Relay		Section 20 Sheet 1
387+52	40.0' Rt	387+76	40.5' Rt	18	Pipe Corrugated Steel (Extension)	24	Corrugated Steel Pipe	18	Z,A,P	2	0.064		TES		Specification 714.04 A

Coatings: Z = Zinc
A = Aluminum
P = Polymeric (over Zinc or Aluminum)

Corrugat 2 = 2-2/3"x1/2"
3 = 3"x1"
5 = 5"x1"

Spiral Ribs: 3/4 = 3/4"x3/4"@7-1/2"
1 = 3/4"x1"@11-1/2"

(*) The price bid for "Pipe Conduit" bid items includes end sections. Pipe Extensions shall pay for end sections separately.
FES = Flared End Section
TES = Traversable End Section

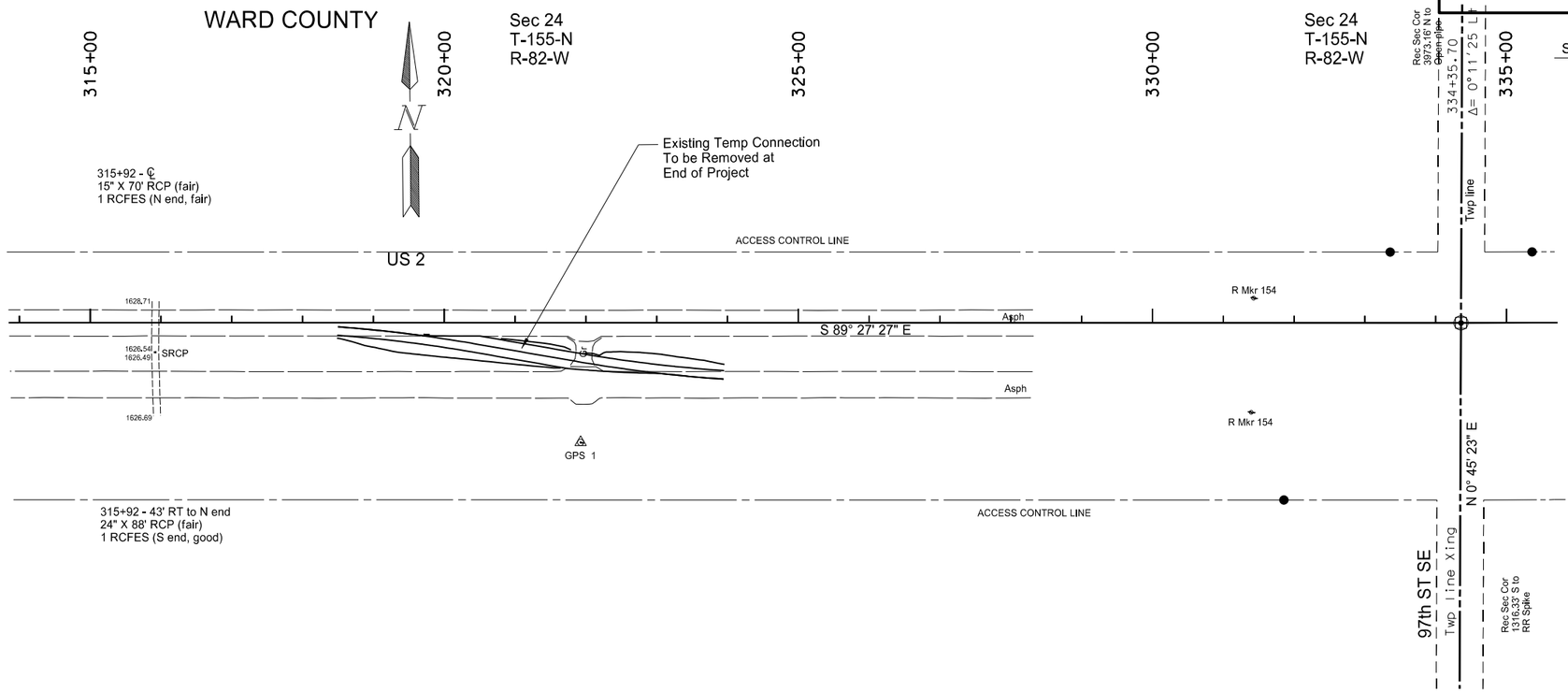
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

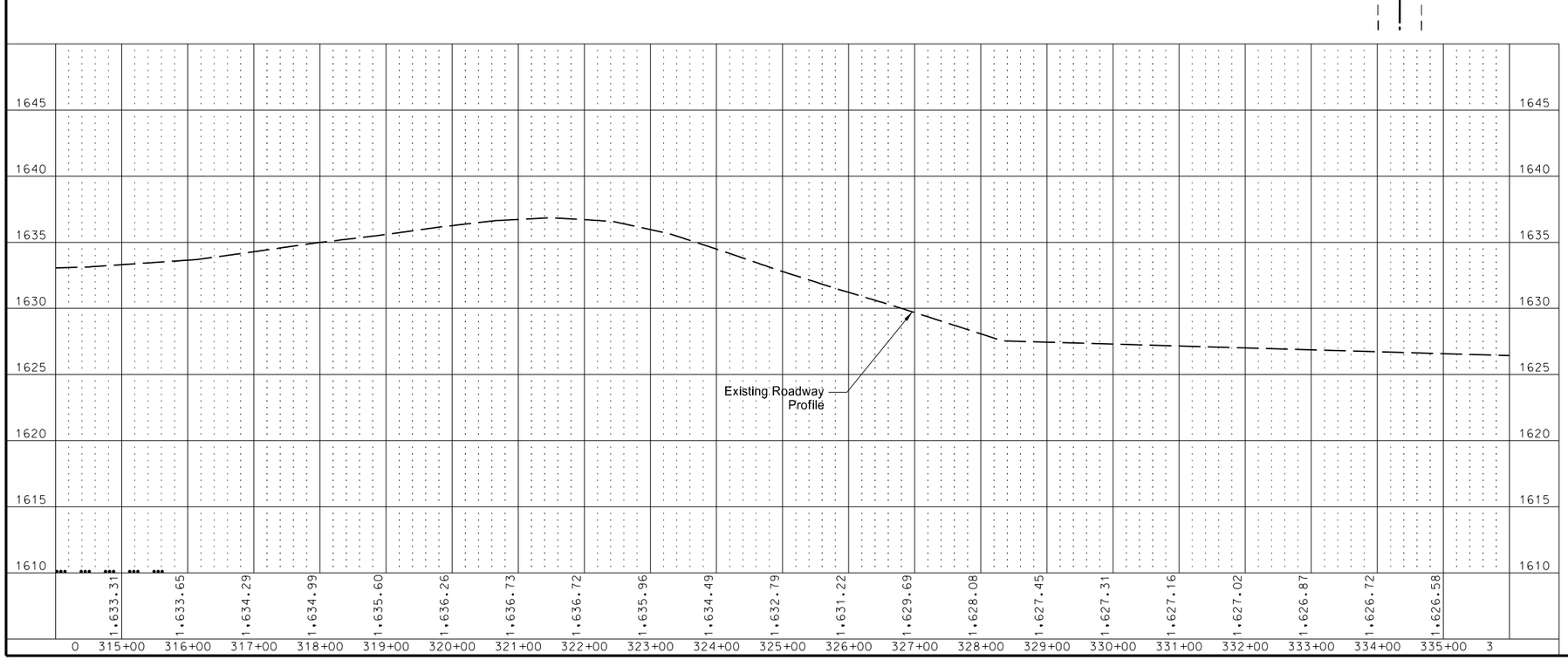
Allowable pipe

Bridge Replacement

9 Mi West of ND Hwy 41-WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	60	1





SPEC	CODE	BID ITEM	UNIT	QUANTITY
710	410	REMOVAL OF TEMP CONNECTION	EA	1

*Estimated removal quantities for Temp Connection		
Embankment Removal	CY	520
Aggregate Removal	TON	680
Asphalt Removal	TON	230
Geotextile Fabric-Type R1 Removal	SY	1560

*For informational purposes only. Include in the price bid for "Removal of Temp Connection".

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

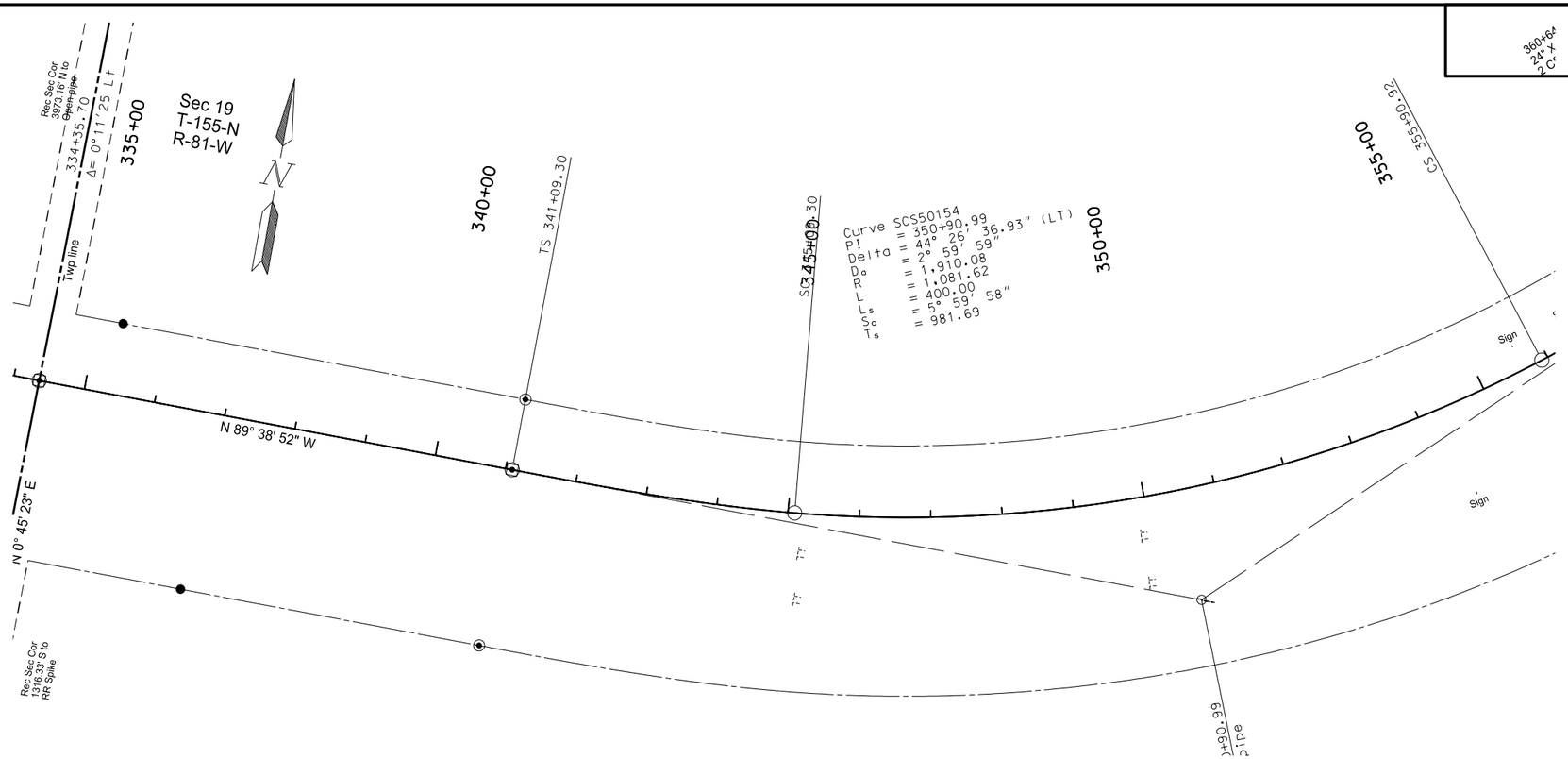
Plan & Profile Sheet

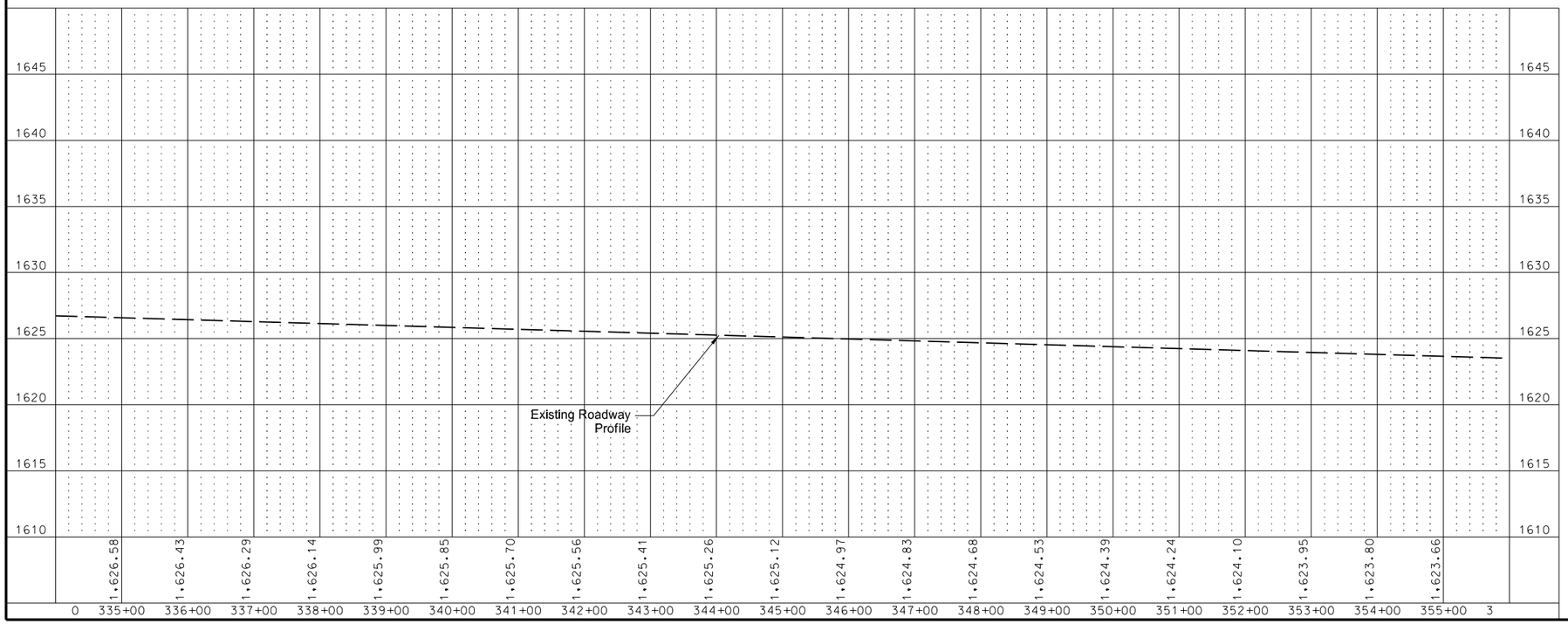
Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:26 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\060_PP_1.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
360+64 24" x 24" C-	ND	NH-4-002(118)154	60	2





This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928 , on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

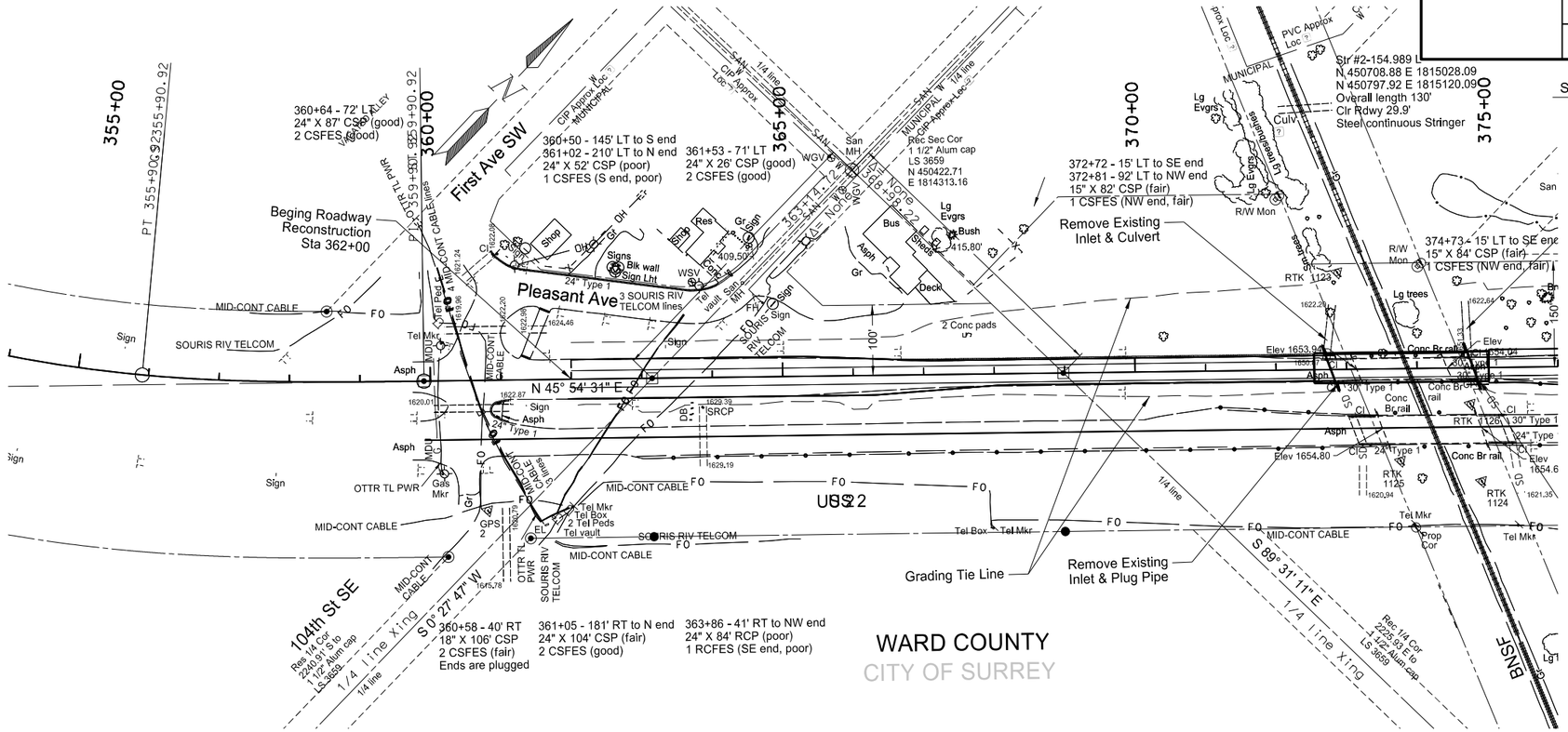
Plan & Profile Sheet

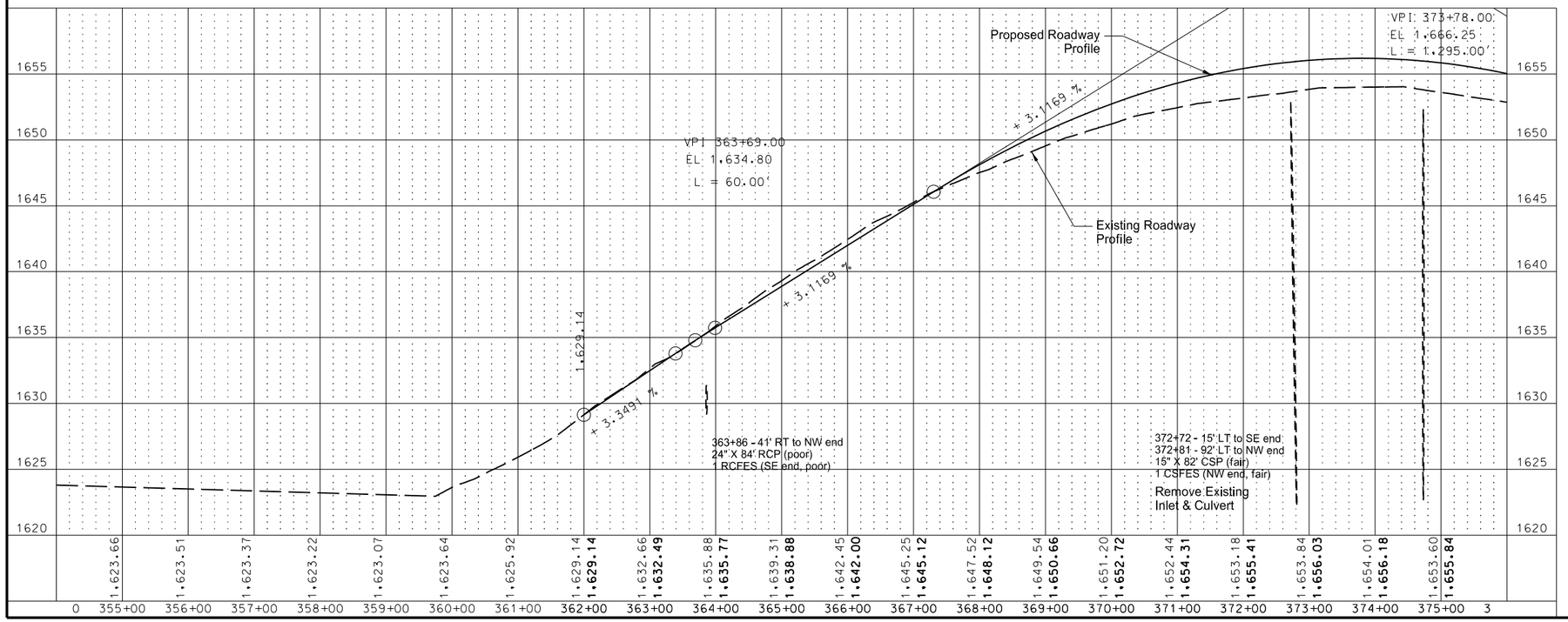
Bridge Replacement

9 MI West of ND Hwy 41-WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	60	3

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	170	REMOVAL OF CULVERTS-ALL TYPES & SIZES		
		372+81 - Lt	LF	82
		372+85 - Rt	LF	42
202	230	REMOVAL OF INLETS		
		372+81 - Lt & Rt	EA	2
714	9680	PLUG PIPE-ALL TYPES & SIZES		
		372+81 Rt	EA	1





This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

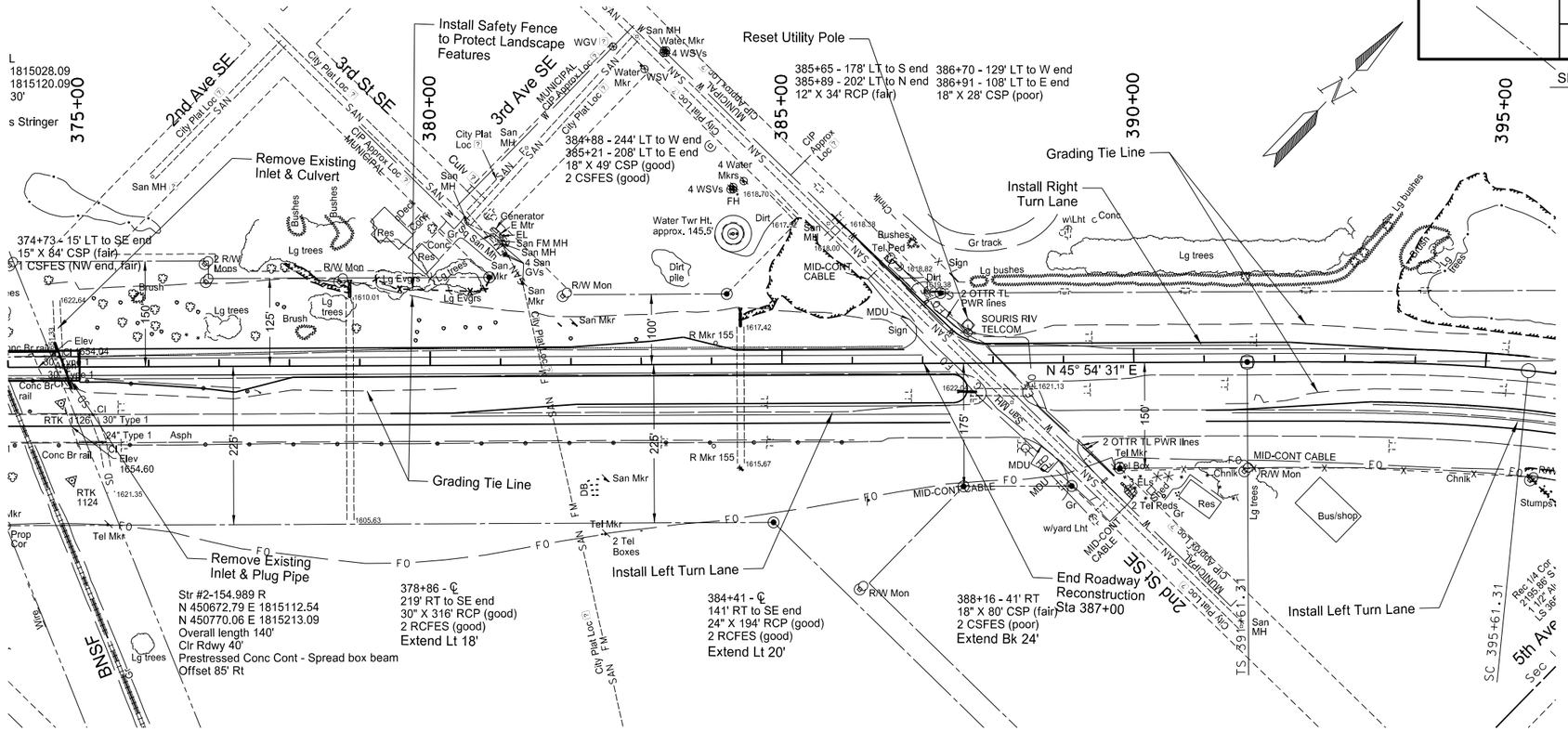
Plan & Profile Sheet

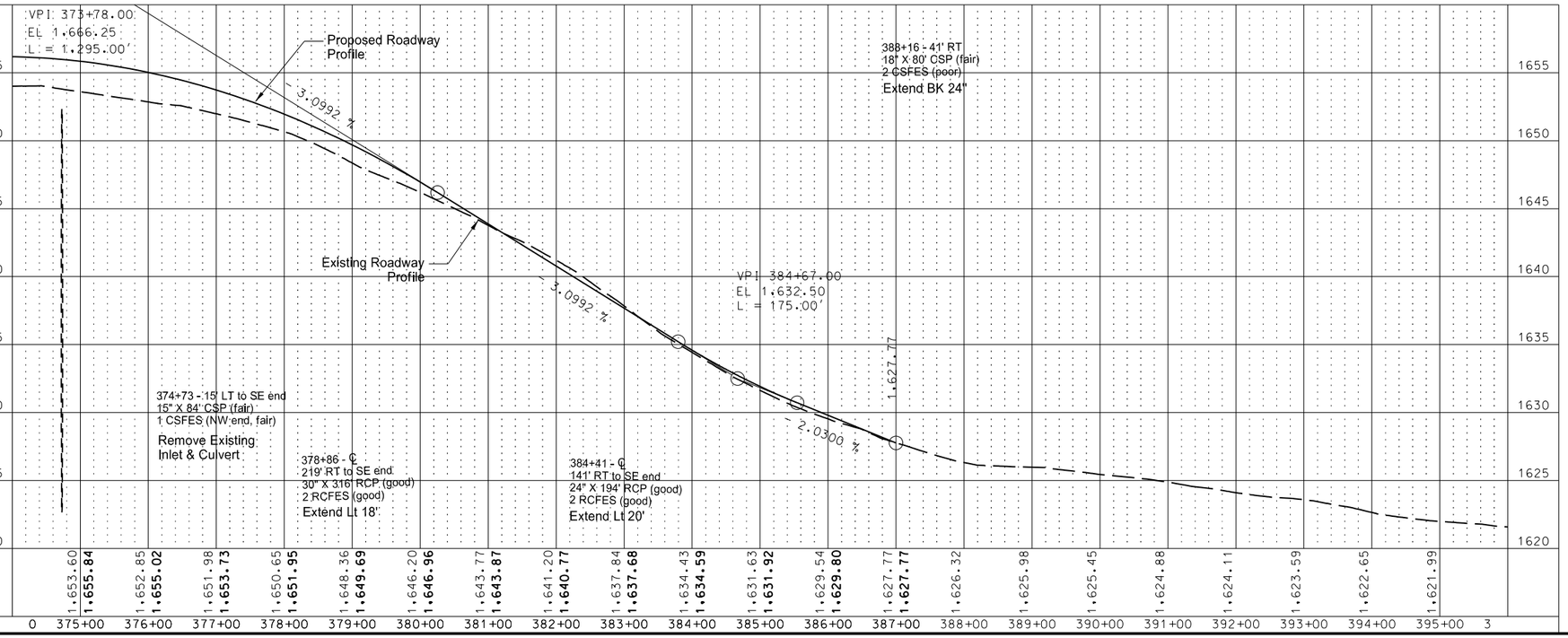
Bridge Replacement

9 MI West of ND Hwy 41-WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	60	4

SPEC	CODE	BID ITEM	UNIT	QUANTITY
201	352	REMOVAL OF TREES & BRUSH 375+00 to 384+00 Lt	L SUM	1
201	370	REMOVAL OF TREES 10IN 375+00 to 384+00 Lt	EA	6
201	380	REMOVAL OF TREES 18IN 375+00 to 384+00 Lt	EA	3
202	170	REMOVAL OF CULVERTS-ALL TYPES & SIZE 374+73 - Lt 374+78 - Rt	LF LF	84 54
202	230	REMOVAL OF INLETS 374+73 - Lt & Rt	EA	2
714	9680	PLUG PIPE-ALL TYPES & SIZES 374+73 - Rt	EA	1
752	911	TEMPORARY SAFETY FENCE 378+00 to 381+00 Lt	LF	300





This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Plan & Profile Sheet

Bridge Replacement

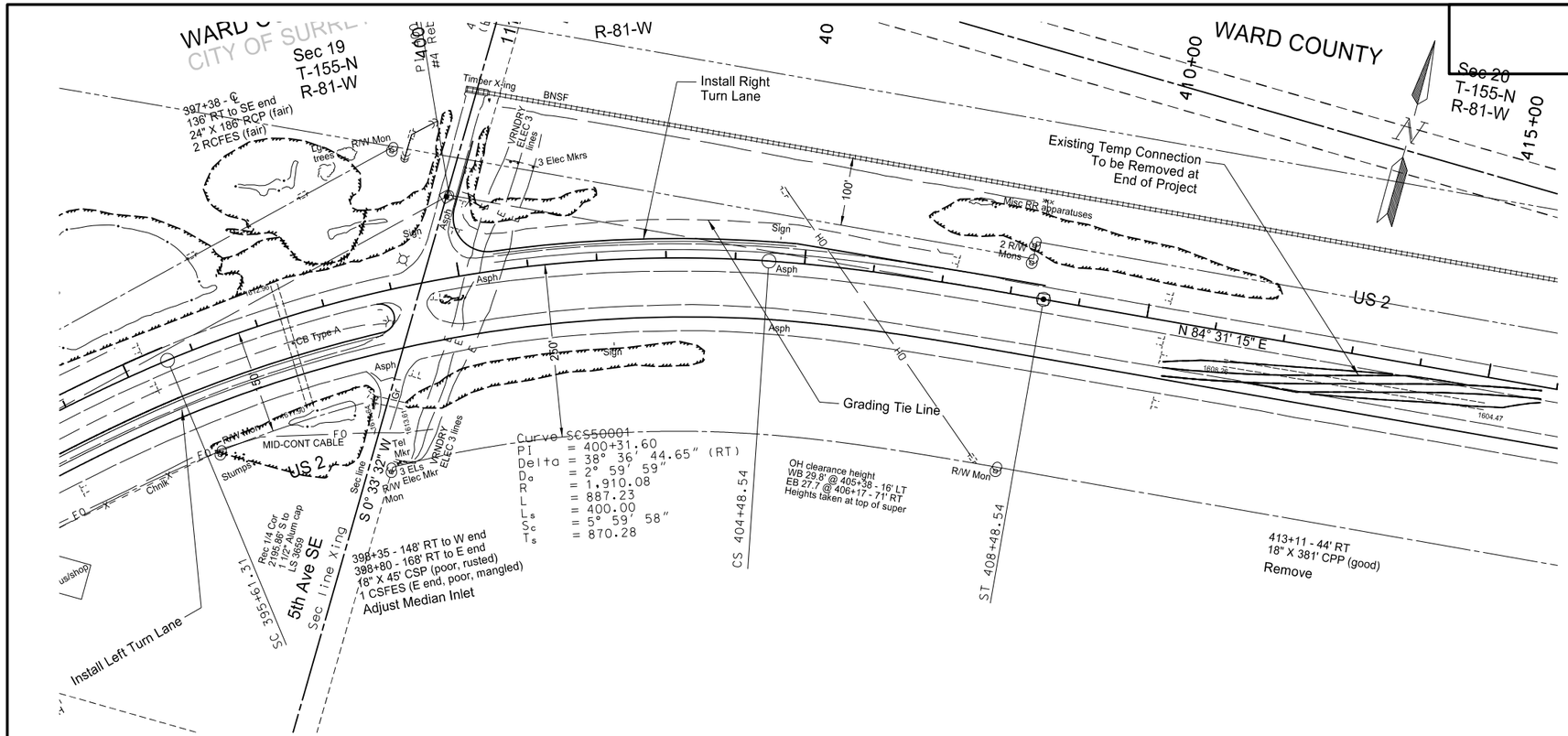
9 MI West of ND Hwy 41-WB

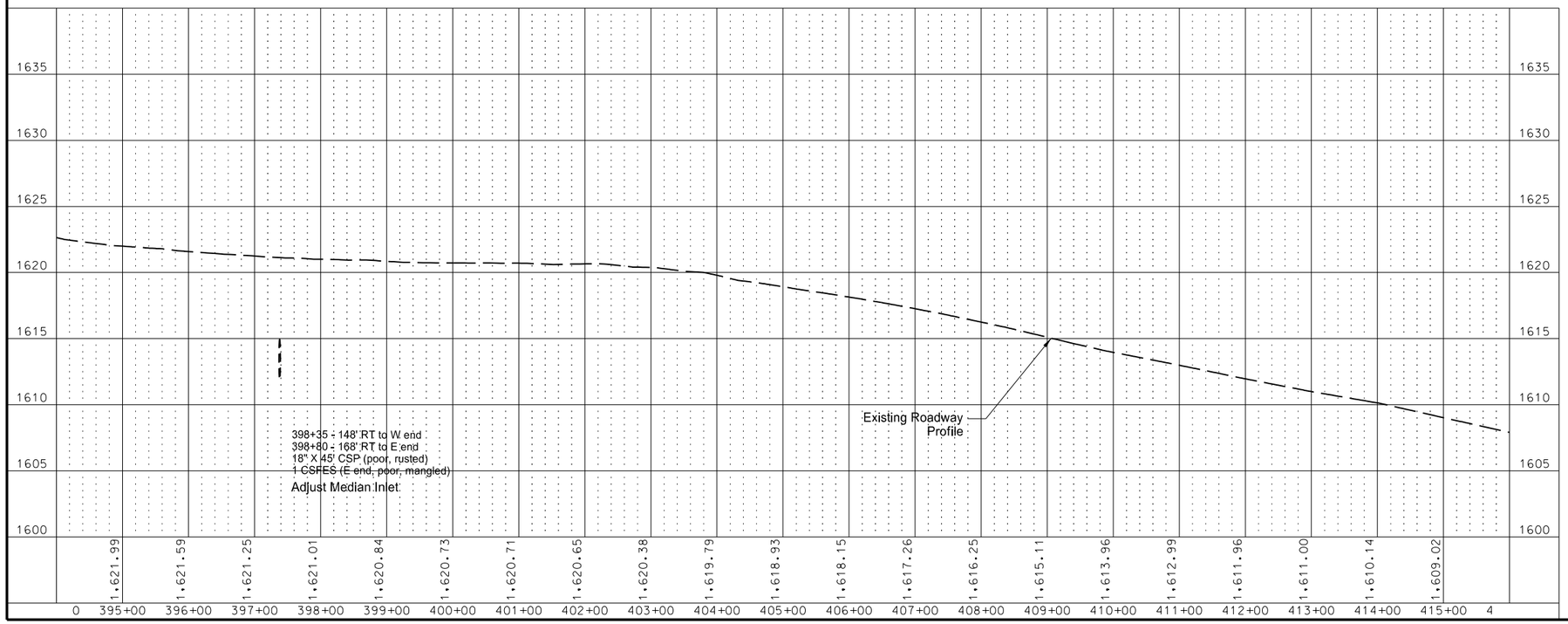
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	60	5

SPEC	CODE	BID ITEM	UNIT	QUANTITY
710	410	REMOVAL OF TEMP CONNECTION	EA	1
202	170	REMOVAL OF CULVERTS-ALL TYPES & SIZES 413+11 - Rt	LF	381
722	6160	ADJUST INLET 397+38 Rt	EA	1

*Estimated removal quantities for Temp Connection		
Embankment Removal	CY	1000
Aggregate Removal	TON	720
Asphalt Removal	TON	240
Geotextile Fabric-Type R1 Removal	SY	1690

*For informational purposes only.
Include in the price bid for "Removal of Temp Connection".





This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928 , on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Plan & Profile Sheet

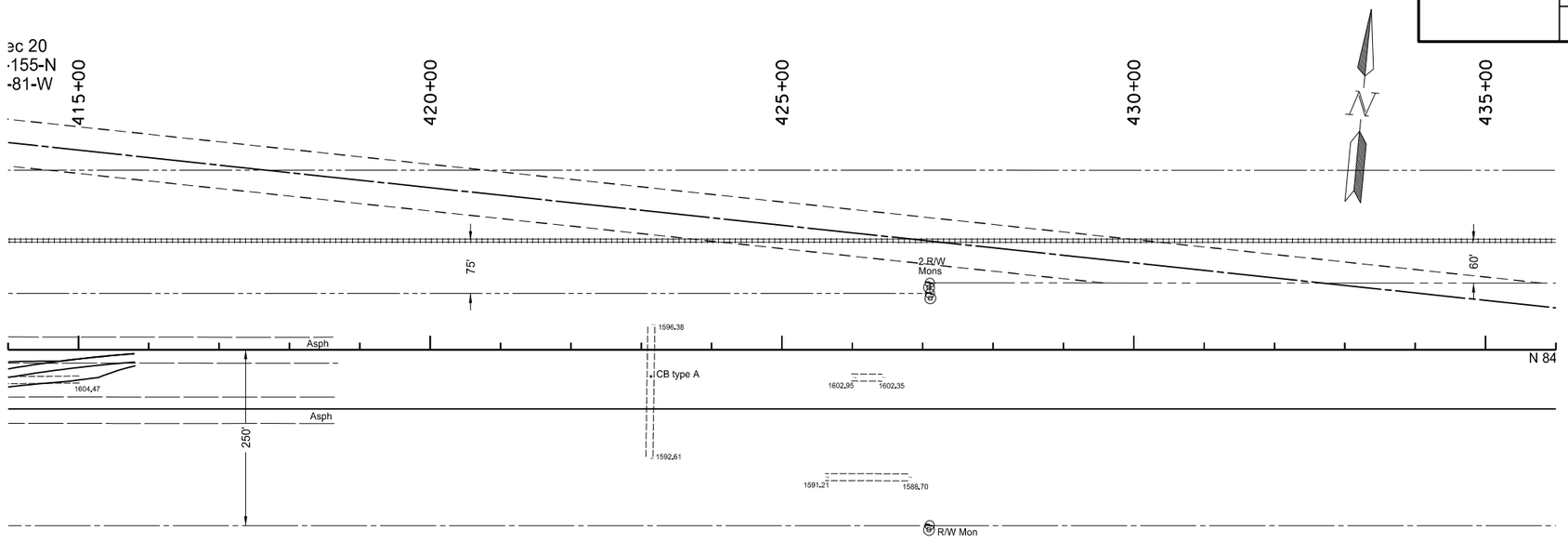
Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:32 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\060_PP_5.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	60	6

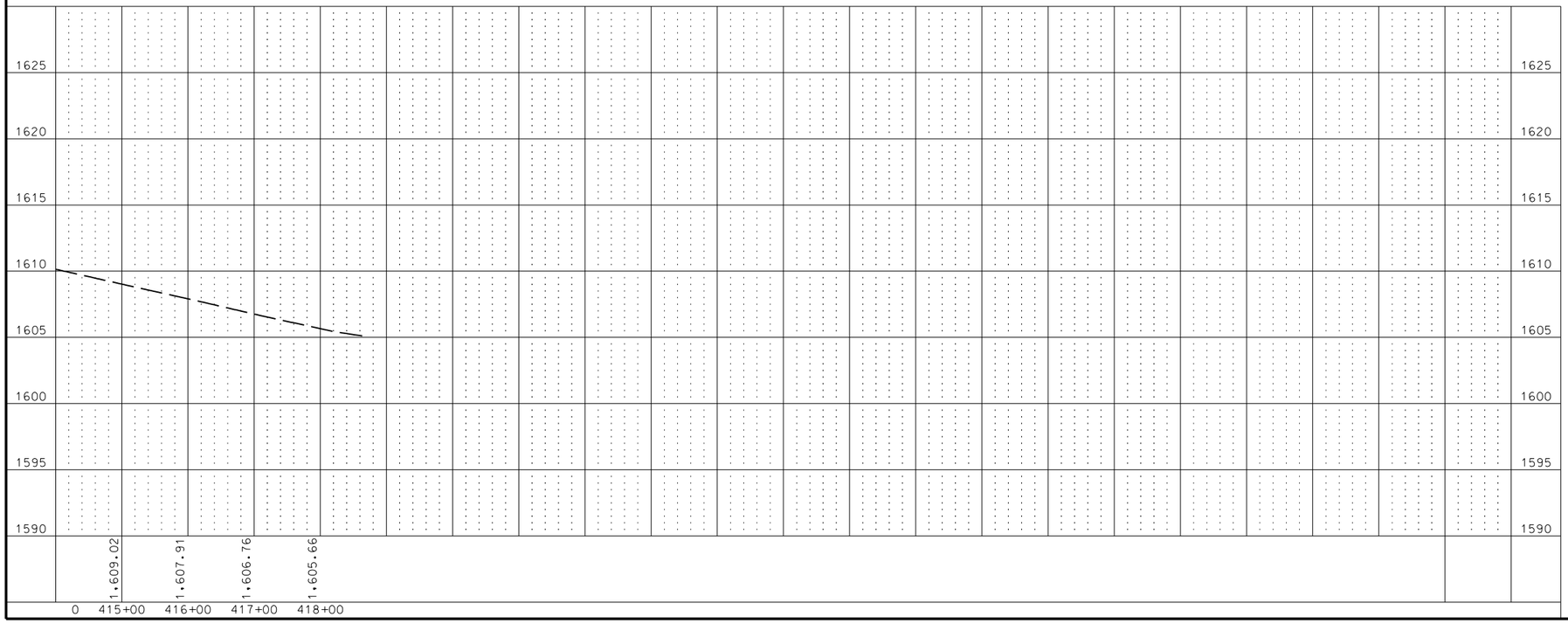
ec 20
·155-N
-81-W



423+11 - ℄
152' RT to S end
24" X 184' RCP (fair)
2 RCFES (fair)

426+20 - 181' RT
24" X 118' CSP (poor)
2 CSFES (poor)
W end rusted
E end Bent & back filled

426+21 - 40' RT
18" X 44' CSP (poor)
2 CSFES (poor, mangled)



This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928 , on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

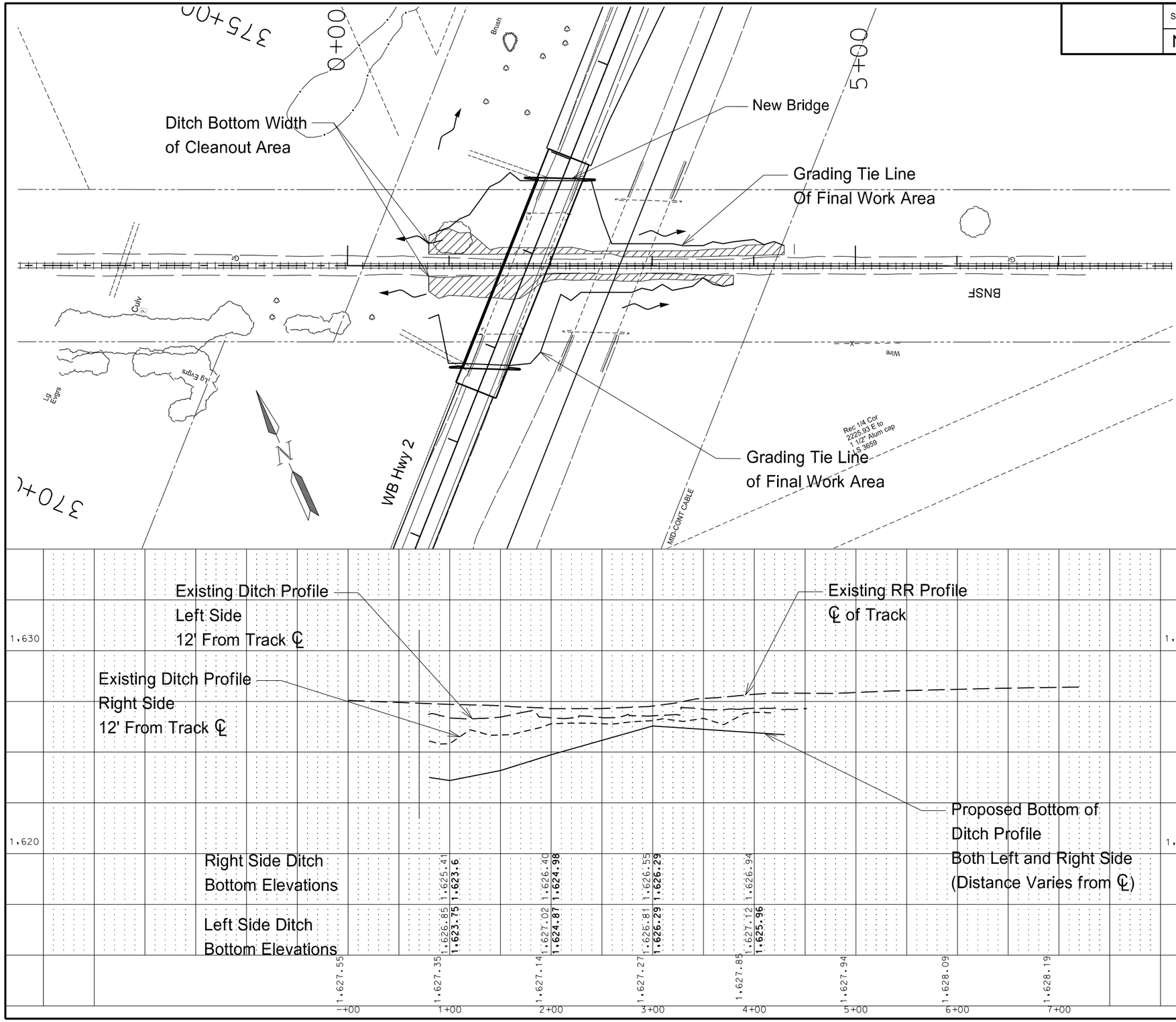
Plan & Profile Sheet

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:33 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\060_PP_6.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	60	7



This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Plan & Profile Sheet

Railroad Drainage

Bridge Replacement

9 MI West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts Acre(s)		USFWS Easement Impacts Acre(s)		Wetland Mitigation								
									Mitigation Required			USACE/11990 Bank		11990 Bank		USFWS Bank	
					Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)
1	Sec. 19, T155N, R81W	Ditch	Artificial	Y	0.01	0.01											
2a	Sec. 19, T155N, R81W	Ditch	Artificial	N	0.01	0.01											
2b	Sec. 19, T155N, R81W	Basin	Natural	N	0.03	0.01								Vollrath 16/17	0.01		
3a	Sec. 19, T155N, R81W	Ditch	Artificial	N	0.01	0											
3b	Sec. 19, T155N, R81W	Basin	Natural	N	0	0											
3c	Sec. 19, T155N, R81W	Ditch	Artificial	N	0	0											
3d	Sec. 19, T155N, R81W	Basin	Natural	N	0	0											
3e	Sec. 20, T155N, R81W	Ditch	Artificial	N	0	0											
4	Sec. 20, T155N, R81W	Ditch	Artificial	Y	0	0											
5	Sec. 20, T155N, R81W	Ditch	Artificial	Y	0.02	0											
6	Sec. 20, T155N, R81W	Ditch	Artificial	Y	0	0											
				Totals	0.08	0.03									0.01		

[1] A wetland Jurisdictional Determination was issued by the USACE on 11/08/2018; NWO-2013-02246-BIS.

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.00	Temporary JD	0.03
Natural/Non-JD	0.01	Non-JD Temporary	0.05
Artificial/JD	0.01	Permanent JD > 0.10	0.00
Artificial /Non-JD	0.01	Permanent OW	0
Total	0.03	Temporary OW	0

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only	Onsite				
EO 11990 Only	Vollrath16/17		0.01		
USACE/11990	Onsite				
USFWS	Vollrath 15/21 UFWS Easement				
	Total	0	0.01	0	0

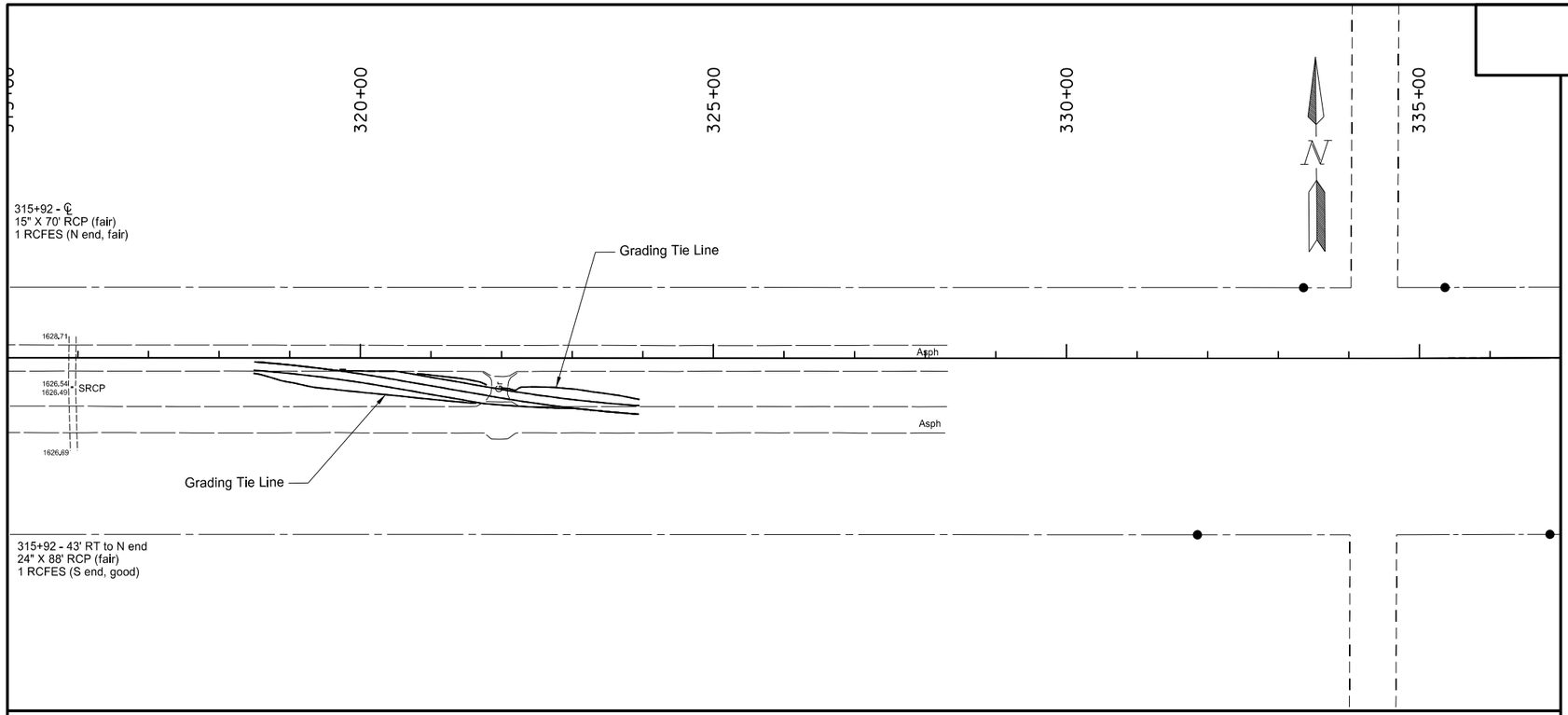
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

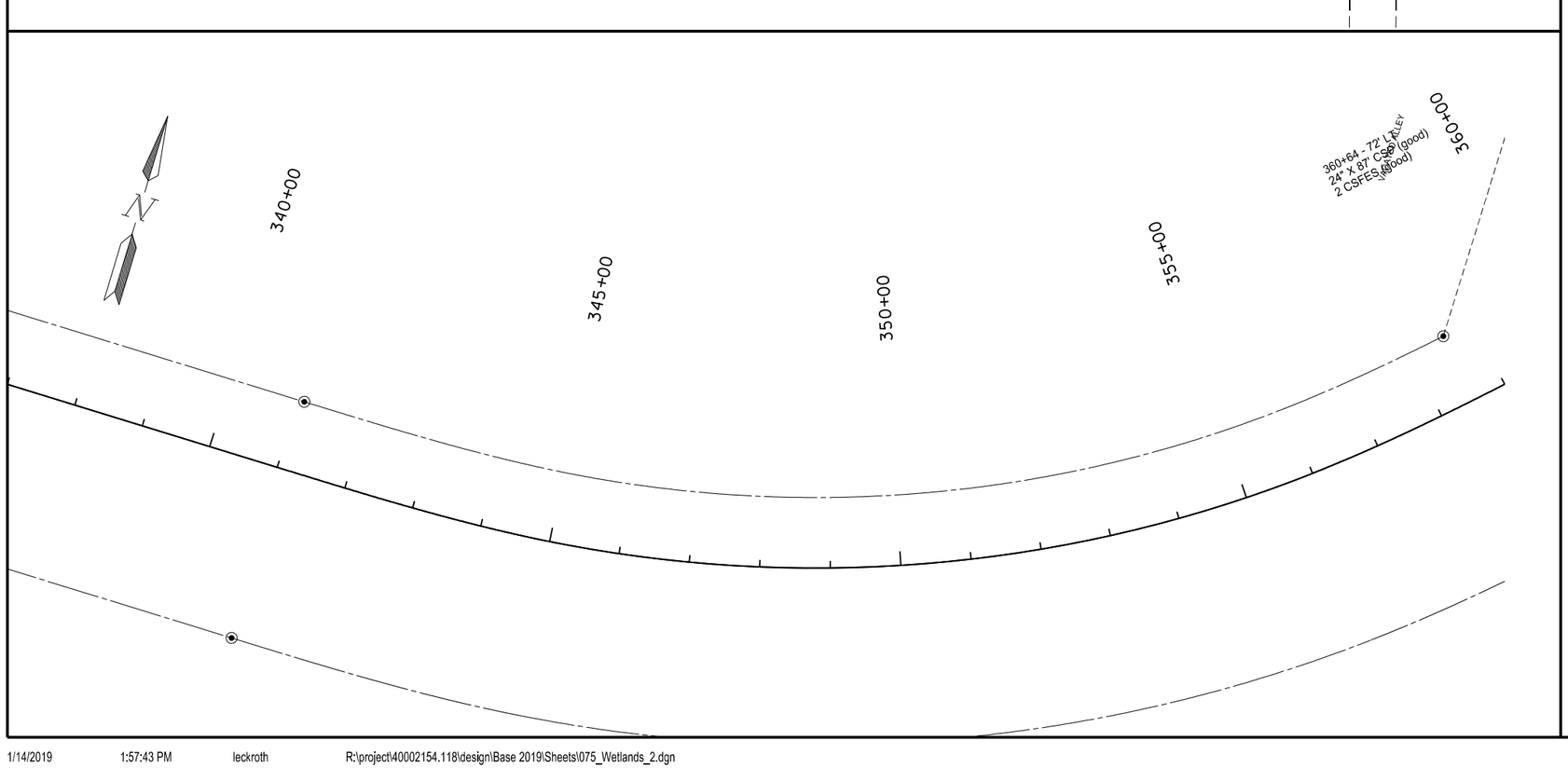
Wetland Impacts

Bridge Replacement

9 MI West of ND Hwy 41-WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	75	2





Temporary Wetland Impact

Permanent Wetland Impact

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Wetland Impacts

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:43 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\075_Wetlands_2.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	75	3

360+50 - 145' LT to S end
361+02 - 210' LT to N end
24" X 52' CSP (poor)
1 CSFES (S end, poor)

361+53 - 71' LT
24" X 26' CSP (good)
2 CSFES (good)

372+72 - 15' LT to SE end
372+81 - 92' LT to NW end
15" X 82' CSP (fair)
1 CSFES (NW end, fair)

374+73 - 15' LT to SE end
15" X 84' CSP (fair)
1 CSFES (NW end, fair)

Wetland 1
Temp = 0.01
Perm = 0.01

Grading Tie Line

360+58 - 40' RT
18" X 106' CSP
2 CSFES (fair)
Ends are plugged

361+05 - 181' RT to N end
24" X 104' CSP (fair)
2 CSFES (good)

363+86 - 41' RT to NW end
24" X 84' RCP (poor)
1 RCFES (SE end, poor)

378+86 - ℄
219' RT to SE end
30" X 316' RCP (go
2 RCFES (good)

385+65 - 178' LT to S end
385+89 - 202' LT to N end
12" X 34' RCP (fair)

386+70 - 129' LT to W end
386+91 - 108' LT to E end
18" X 28' CSP (poor)

397+38 - ℄
136' RT to SE end
24" X 186' RCP (fair)
2 RCFES (fair)

384+88 - 244' LT to W end
385+21 - 208' LT to E end
18" X 49' CSP (good)
2 CSFES (good)

Wetland 2a
Temp = 0.01
Perm = 0.01

Wetland 2b
Temp = 0.03
Perm = 0.01

Wetland 3a
Temp = 0.01
Perm = 0.00

Wetland 5
Temp = 0.02
Perm = 0.00

384+41 - ℄
141' RT to SE end
24" X 194' RCP (good)
2 RCFES (good)

388+16 - 41' RT
18" X 80' CSP (fair)
2 CSFES (poor)

398+35 - 148' RT to W end
398+80 - 168' RT to E end
18" X 45' CSP (poor, rusted)
1 CSFES (E end, poor, mangled)

Temporary Wetland Impact

Permanent Wetland Impact

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

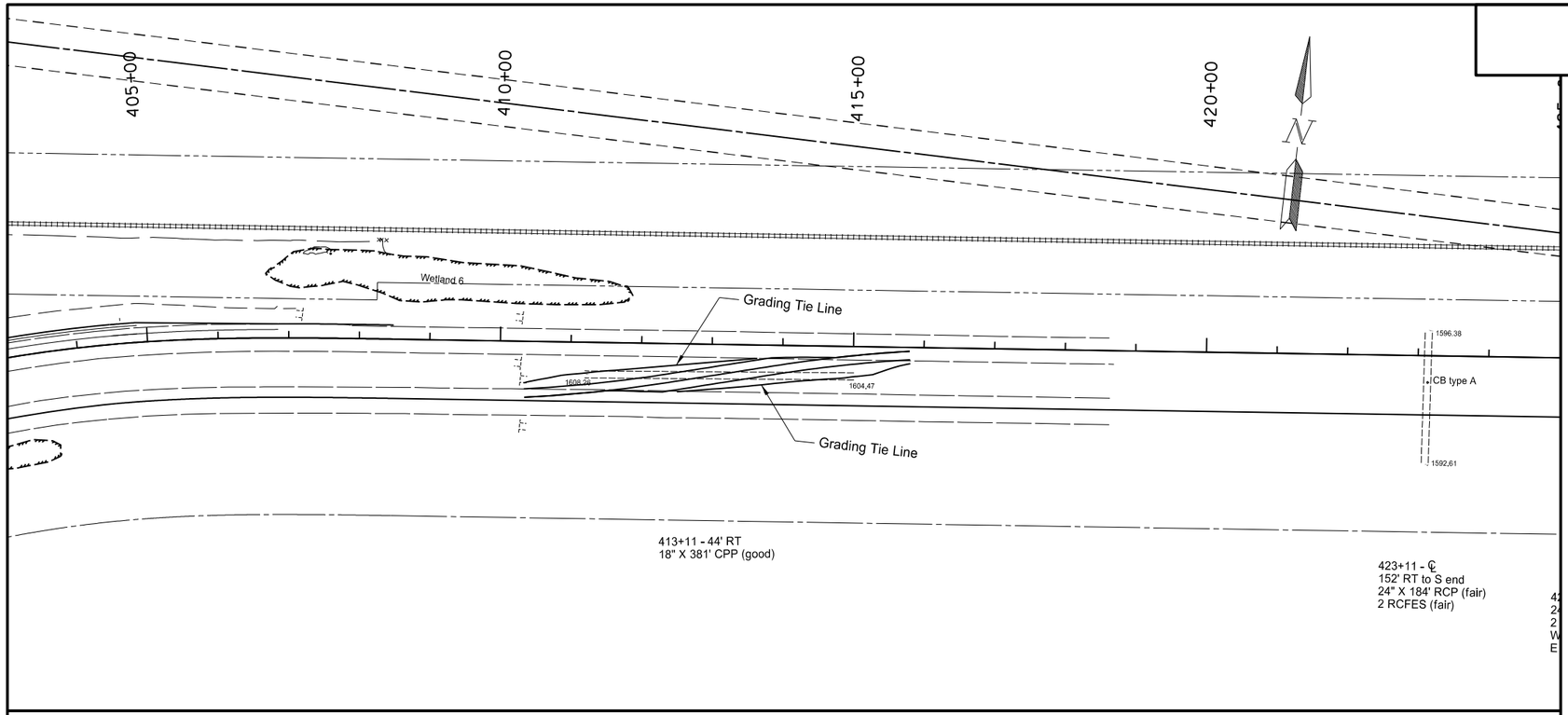
Wetland Impacts

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:44 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\075_Wetlands_3.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	75	4



Temporary Wetland Impact

Permanent Wetland Impact

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

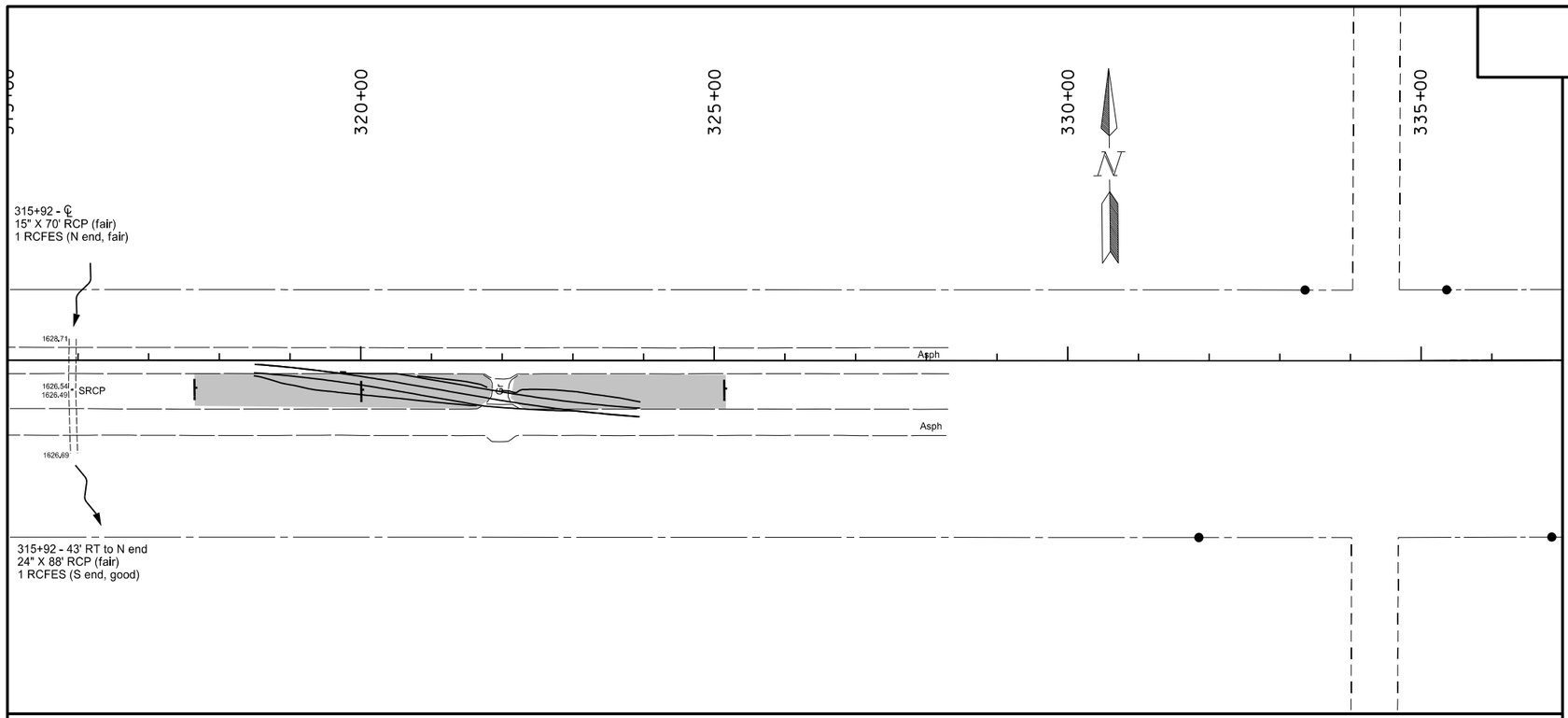
Wetland Impacts

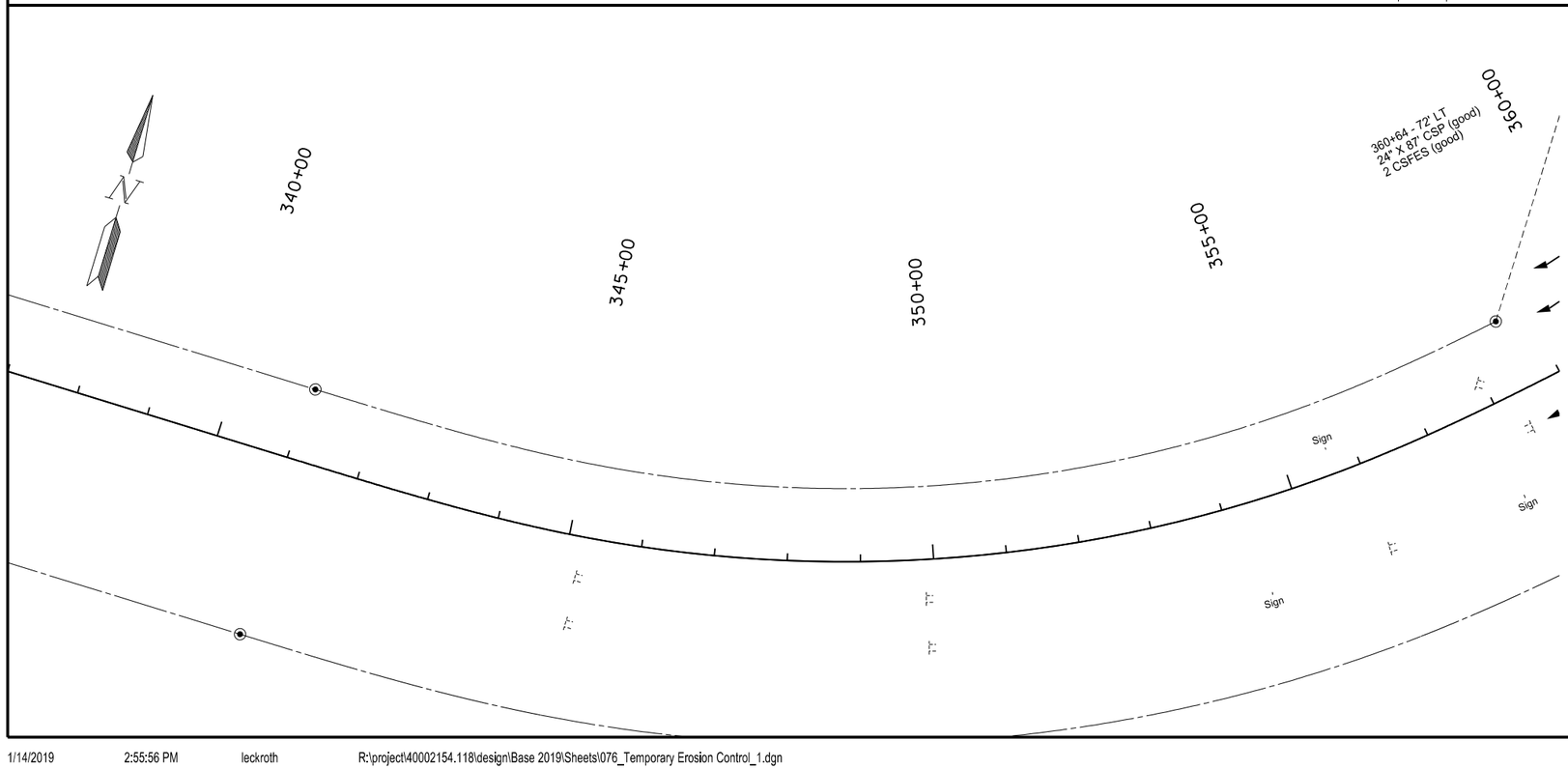
Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:45 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\075_Wetlands_4.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	76	1





SPEC	CODE	BID ITEM	UNIT	QUANTITY
261	112	FIBER ROLLS 12IN	LF	100
261	113	REMOVE FIBER ROLLS 12IN	LF	100

Temp Seeding & Mulch

Fiber Rolls

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Temporary Erosion Control

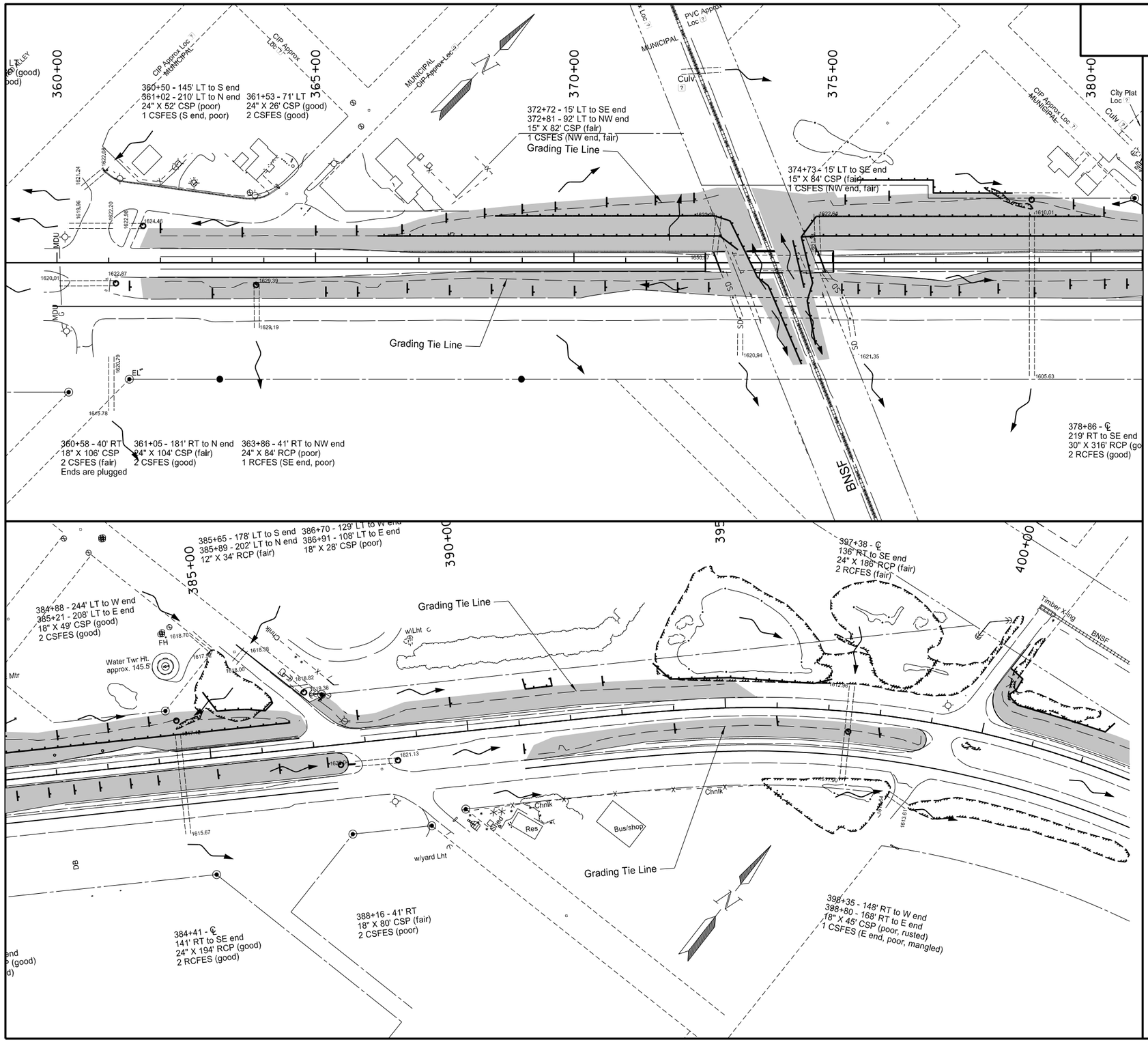
Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 2:55:56 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\076_Temporary Erosion Control_1.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	76	2

SPEC	CODE	BID ITEM	UNIT	QUANTITY
261	112	FIBER ROLLS 12IN	LF	6015
261	113	REMOVE FIBER ROLLS 12IN	LF	6015



This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

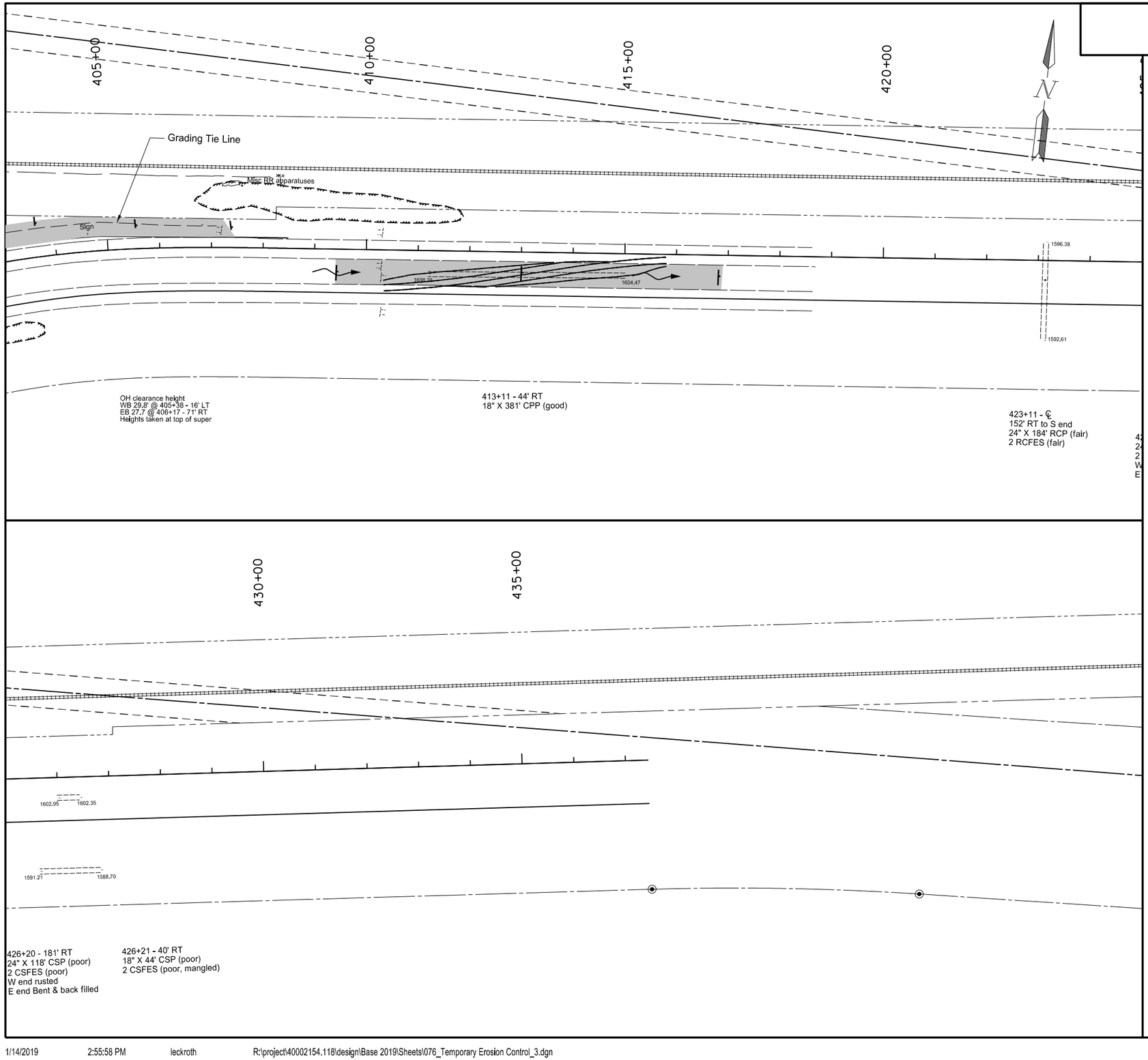
Temporary Erosion Control

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 2:55:57 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\076_Temporary Erosion Control_2.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	76	3



SPEC	CODE	BID ITEM	UNIT	QUANTITY
261	112	FIBER ROLLS 12IN	LF	100
261	113	REMOVE FIBER ROLLS 12IN	LF	100

Temp Seeding & Mulch

Fiber Rolls

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

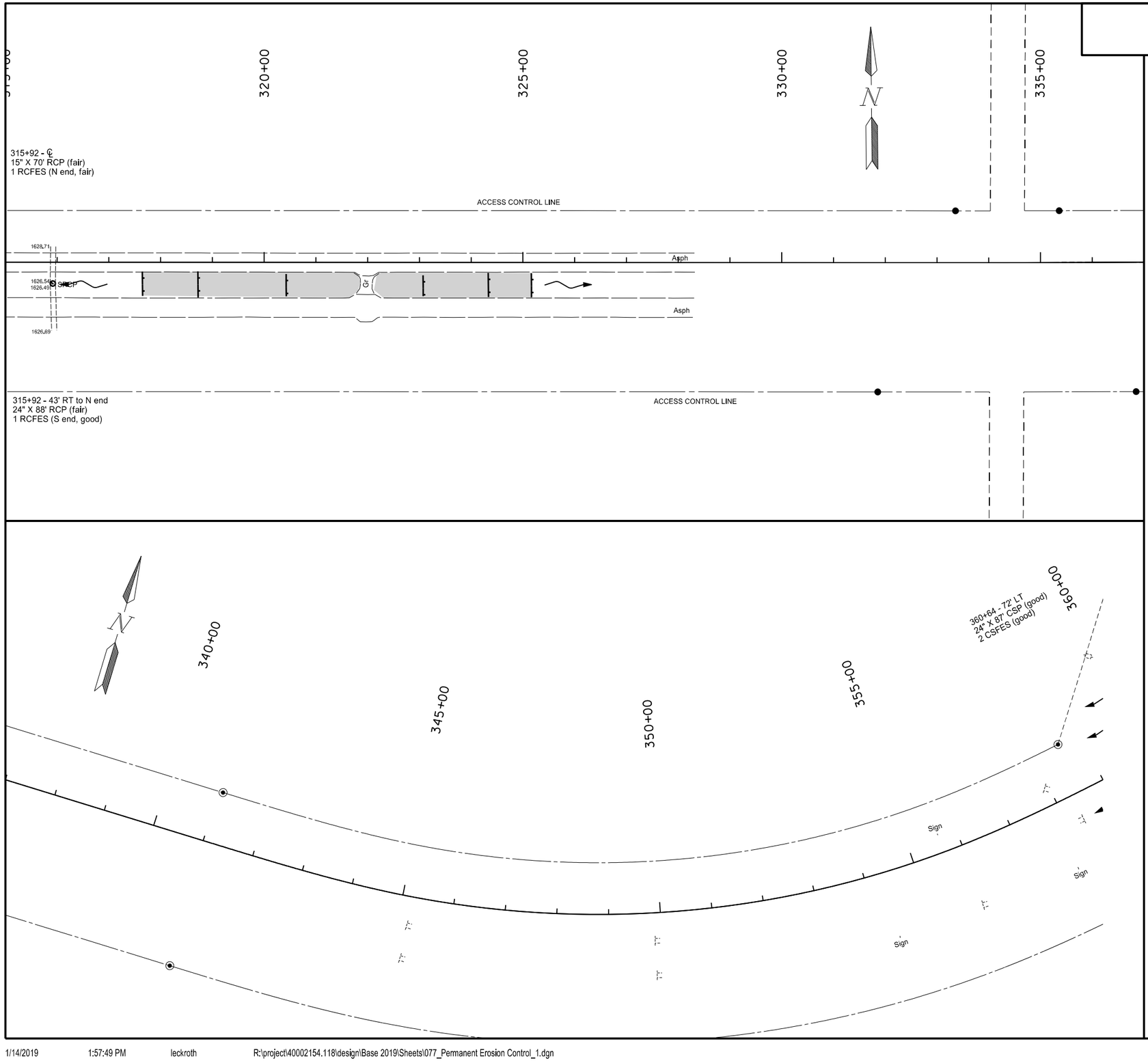
Temporary Erosion Control

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 2:55:58 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\076_Temporary Erosion Control_3.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	77	1



SPEC	CODE	BID ITEM	UNIT	QUANTITY
251	200	SEEDING CLASS II	ACRE	0.8
261	112	FIBER ROLLS 12IN	LF	300

Seeding Class II & Mulch

Fiber Rolls

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:49 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\077_Permanent Erosion Control_1.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	77	2

SPEC	CODE	BID ITEM	UNIT	QUANTITY
251	200	SEEDING CLASS II	ACRE	8.75
255	102	ECB TYPE 2	SY	64
255	202	TRM TYPE 2		
		372+37 Lt & Rt	SY	135
		375+17 Lt & Rt	SY	130
261	112	FIBER ROLLS 12IN	LF	6895

Fiber Rolls

Seeding Class II & Mulch

TRM Type 2

ECB Type 2

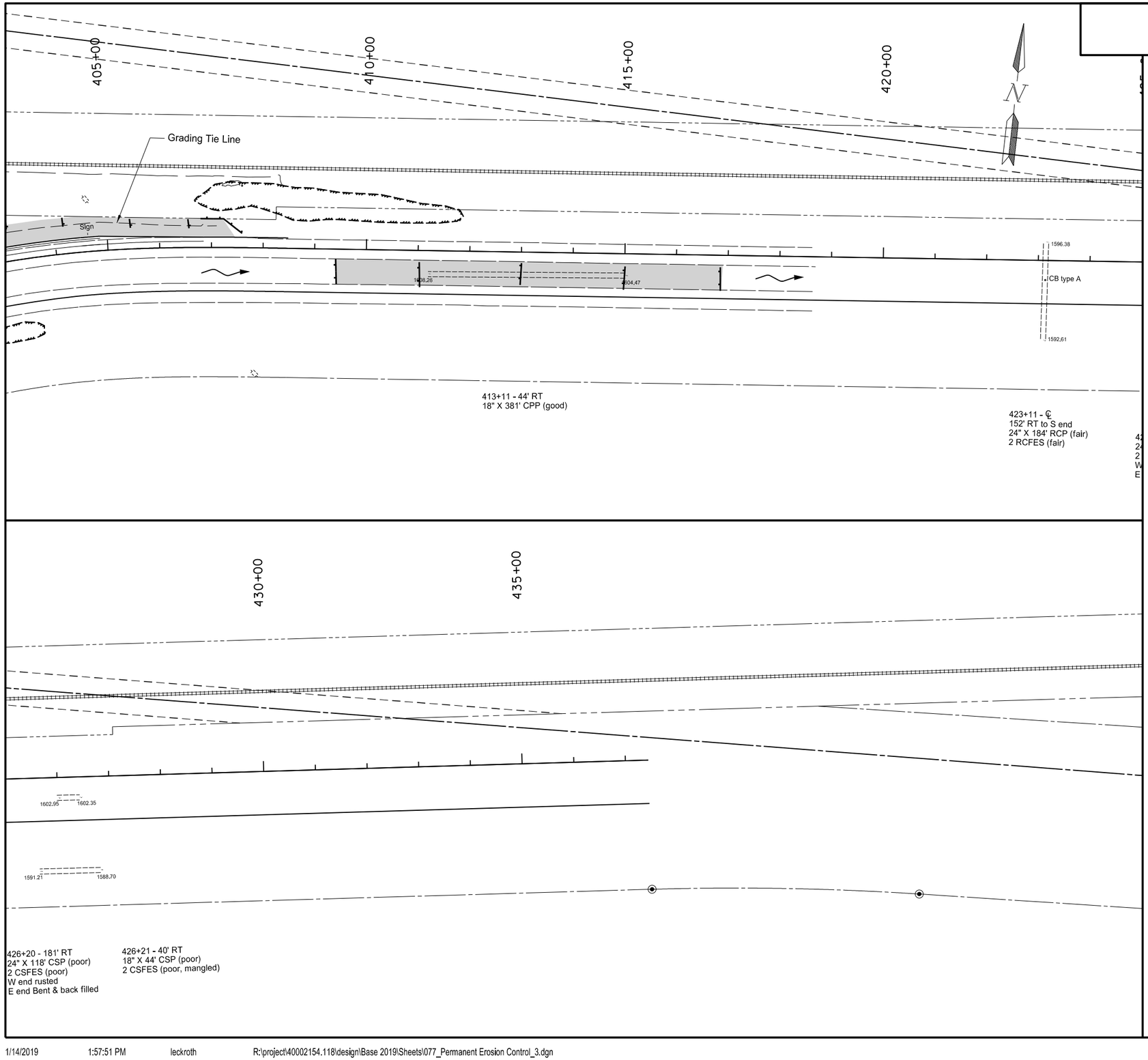
Permanent Erosion Control

Bridge Replacement

9 MI West of ND Hwy 41-WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	77	3

SPEC	CODE	BID ITEM	UNIT	QUANTITY
251	200	SEEDING CLASS II	ACRE	0.83
261	112	FIBER ROLLS 12IN	LF	730



Seeding Class II & Mulch

Fiber Rolls

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

Bridge Replacement

9 MI West of ND Hwy 41-WB

1/14/2019 1:57:51 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\077_Permanent Erosion Control_3.dgn

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - 9 miles west of ND highway 41 - westbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
US 2 (Chain: SCL02			
BEG	286+99.84	449159.86	1806981.31
POT	334+35.70	449115.03	1811716.96
TS	341+09.30	449110.89	1812390.55
SC	345+09.30	449122.39	1812790.18
PI SCS50154	350+90.99	449104.86	1813372.22
CS	355+90.92	449519.93	1813780.61
ST	359+90.92	449787.92	1814077.29
1/4 line	363+14.72	450013.22	1814309.85
1/4 line	368+98.22	450419.23	1814728.94
TS	391+61.31	451993.90	1816354.36
SC	395+61.31	452261.90	1816651.05
Sec line	400+27.11 (Bk Tan)	452596.33	1816976.21
PI SCS50001	400+31.60	452599.45	1816979.43
CS	404+48.54	452630.51	1817449.33
ST	408+48.54	452682.54	1817845.73
PC	437+44.22	452959.03	1820728.17
PI C305	440+14.78	452984.86	1820997.51
PT	442+84.95	452985.20	1821268.07
END	452+66.10	452986.43	1822249.22

CURVE DATA

ARC DEFINITION

SCS50154

PI STA	= 350+90.99
Delta	= 44° 26' 37" LT
D_a	= 2° 59' 59"
R	= 1910.08'
L_s	= 400.00'
S_c	= 5° 59' 58"
T_s	= 981.69'
L	= 1081.62'

SCS50001

PI STA	= 400+31.60
Delta	= 38° 36' 45" RT
D_a	= 2° 59' 59"
R	= 1910.08'
L_s	= 400.00'
S_c	= 5° 59' 58"
T_s	= 870.28'
L	= 887.23'

C305

PI STA	= 440+14.78
Delta	= 5° 24' 26" RT
D_a	= 1° 00' 00"
R	= 5729.65'
T	= 270.57'
L	= 540.73'

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
SE Cor	Sec 19 T-155-N R-81-W	447747.41	1816929.48
S 1/4 Cor	Sec 19 T-155-N R-81-W	447772.38	1814291.74
SW Cor	Sec 19 T-155-N R-81-W	447798.82	1811699.58
E 1/4 Cor	Sec 19 T-155-N R-81-W	450400.57	1816954.79
Center Cor	Cor Sec 19 T-155-N R-81-W	450422.71	1814313.16
W 1/4 Cor	Sec 19 T-155-N R-81-W	450444.23	1811734.51
NE Cor	Sec 19 T-155-N R-81-W	453042.77	1816980.57
N 1/4 Cor	Sec 19 T-155-N R-81-W	453062.88	1814335.00
NW Cor	Sec 19 T-155-N R-81-W	453087.84	1811769.41

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
CONTROL POINT DESCRIPTION					
PRIMARY CONTROL					
GPS 1	448958.00	1810472.28	1632.75	321+93	169' Rt
1 1/2" Alum cap stamped "NDDOT LS 3659"					
GPS 2	449716.74	1814269.43	1623.53	360+79	185' Rt
1 1/2" Alum cap stamped "NDDOT LS 3659"					
SECONDARY CONTROL					
RTK 1123	450789.53	1814913.47	1621.80	372+88	138' Lt
RTK 1125	450657.10	1815162.85	1645.93	373+75	131' Rt
RTK 1126	450783.75	1815179.13	1649.46	374+75	51' Rt
RTK 1124	450715.14	1815266.30	1634.39	374+90	161' Rt

REFERENCE MARKERS

R Mkr #	NORTHING	EASTING	STATION	OFFSET
154	448991.55	1811419.53	331+39	126' Rt
154	449152.74	1811424.38	331+43	35' Lt
155	451382.55	1815890.29	384+03	116' Rt
155	451490.08	1815790.64	384+06	30' Lt

NOTES: Sheet 1 of 1

Date Survey Completed 6/01/16

☐ Assumed Coordinates

☒ All coordinates on this sheet are Ward County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota North Zone Combination Factor (cf) = 0.9998530

All coordinates and measurements on this document derived from the International Foot definition.

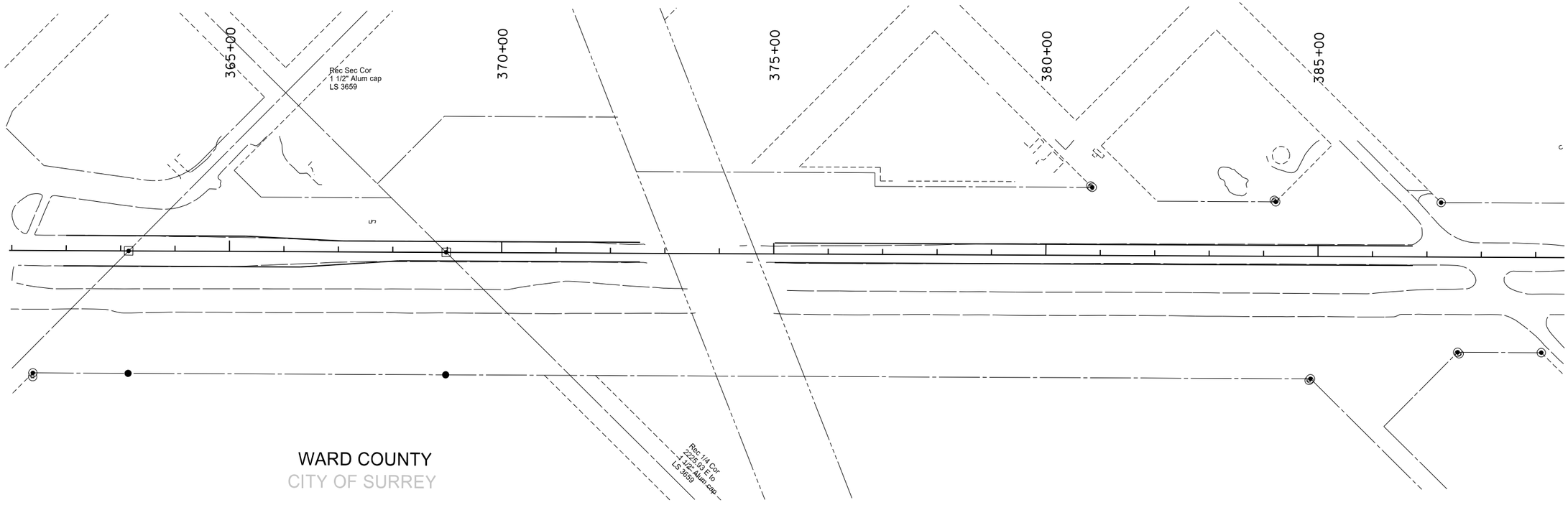
INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88
☐ NGVD-29

☐ GEOID 09 ☐ _____
☒ GEOID 12A

This document was originally issued and sealed by Robert D. Zahn Registration Number LS- 3659 , on 07/17/2017and the original document is stored at the North Dakota Department of Transportation

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	82	1



Point	Northing	Easting	Station	Offset	Alignment Monumnet	Iron Pin R/W Monument	R/W Marker (Witness Post)	Iron Pin Reference Monument
9000	1814340.751	449729.8845	361+39.76	225' Rt		X	X	
9001	1814466.409	449851.6205	363+14.72	225' Rt				X
9002	1814309.353	450013.6444	363+14.65	0	X			
9003	1814728.943	450419.2272	368+98.22	0	X			
9004	1814885.499	450257.6254	368+98.22	225' Rt				X
9005	181549.9823	451334.4212	380+84.49	125' Lt		X	X	
9006	1815753.689	451551.2118	384+21.87	100' Lt		X	X	
9007	1816026.673	451363.1708	384+87.09	225' Rt		X	X	
9008	1816185.998	451587.1371	387+57.36	175' Rt		X	X	

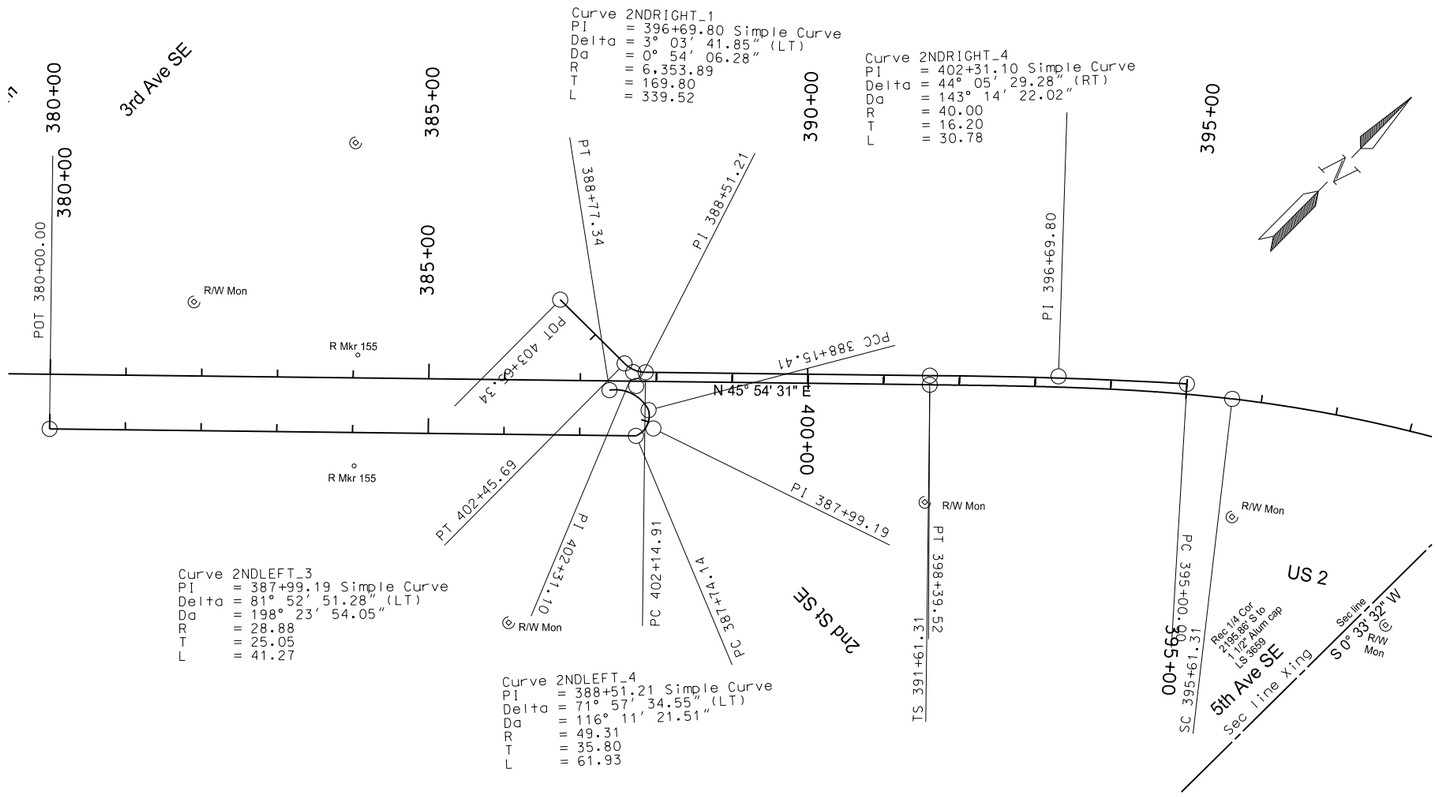
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

R/W Markers

Bridge Replacement

9 MI West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	82	2



Feature: Alignment 4 L
DESCRIBE CHAIN 2NDLEFT

642 CUR 2NDLEFT_3 CUR 2NDLEFT_4
Point 642 N 451,134.1398 E 1,815,570.3723 Sta 380+00.00

Course from 642 to PC 2NDLEFT_3 N 45° 54' 30.72" E Dist 774.1399

Curve Data
Curve 2NDLEFT_3
P.I. Station 387+99.19 N 451,695.9498 E 1,816,135.9352
Delta = 81° 52' 51.28" (LT)
Degree = 198° 23' 54.05"
Tangent = 25.0516
Length = 41.2710
Radius = 28.8792
External = 9.3516
Long Chord = 37.8475
Mid. Ord. = 7.0641
P.C. Station 387+74.14 N 451,672.7909 E 1,816,126.3828
P.T. Station 388+15.41 N 451,708.6772 E 1,816,114.3576
C.C. N 451,683.8028 E 1,816,099.6855
Back = N 22° 24' 53.68" E
Ahead = N 59° 27' 57.60" W
Chord Bear = N 18° 31' 31.96" W

Curve Data
Curve 2NDLEFT_4
P.I. Station 388+51.21 N 451,719.8828 E 1,816,080.3554
Delta = 71° 57' 34.55" (LT)
Degree = 116° 11' 21.51"
Tangent = 35.8010
Length = 61.9331
Radius = 49.3124
External = 11.6255
Long Chord = 57.9421
Mid. Ord. = 9.4076
P.C. Station 388+15.41 N 451,708.6772 E 1,816,114.3576
P.T. Station 388+77.34 N 451,691.0225 E 1,816,059.1706
C.C. N 451,661.8425 E 1,816,098.9230
Back = N 7° 45' 36.48" W
Ahead = S 36° 16' 48.97" W
Chord Bear = S 72° 15' 36.25" W

Feature: Alignment 5 L
DESCRIBE CHAIN 2NDRIGHT

CUR 2NDRIGHT_1 CUR 2NDRIGHT_4 Point 644

Curve Data
Curve 2NDRIGHT_1
P.I. Station 396+69.80 N 452,121.4368 E 1,816,467.2210
Delta = 3° 03' 41.85" (LT)
Degree = 0° 54' 06.28"
Tangent = 169.8019
Length = 339.5230
Radius = 6,353.8893
External = 2.2685
Long Chord = 339.4826
Mid. Ord. = 2.2677
P.C. Station 395+00.00 N 452,233.7114 E 1,816,594.6067
P.T. Station 398+39.52 N 452,002.5189 E 1,816,346.0137
C.C. N 447,467.0125 E 1,820,795.8555
Back = S 48° 36' 28.28" W
Ahead = S 45° 32' 46.43" W
Chord Bear = S 47° 04' 37.36" W
Course from PT 2NDRIGHT_1 to PC 2NDRIGHT_4 S 45° 54' 30.72" W Dist 375.3822

Curve Data
Curve 2NDRIGHT_4
P.I. Station 402+31.10 N 451,730.0550 E 1,816,064.7690
Delta = 44° 05' 29.28" (RT)
Degree = 143° 14' 22.02"
Tangent = 16.1982
Length = 30.7817
Radius = 40.0000
External = 3.1553
Long Chord = 30.0277
Mid. Ord. = 2.9246
P.C. Station 402+14.91 N 451,741.3258 E 1,816,076.4030
P.T. Station 402+45.69 N 451,730.0550 E 1,816,048.5708
C.C. N 451,770.0550 E 1,816,048.5708
Back = S 45° 54' 30.72" W
Ahead = Due West
Chord Bear = S 67° 57' 15.36" W
Course from PT 2NDRIGHT_4 to 644 Due West Dist 119.6515
Point 644 N 451,730.0550 E 1,815,928.9193 Sta 403+65.34

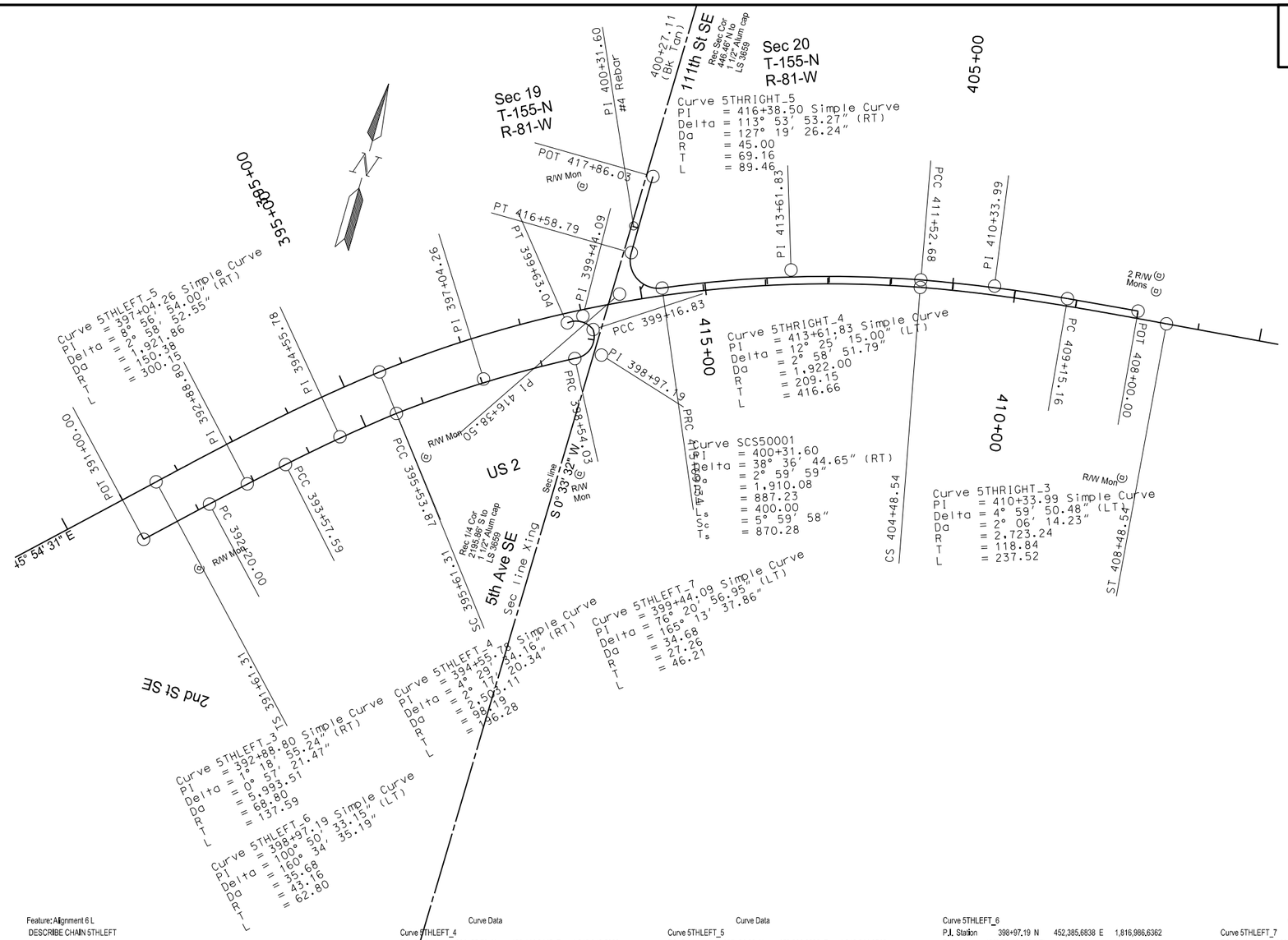
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Survey Data

Bridge Replacement

9 MI West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	82	3



Feature: Alignment 7 L
DESCRIBE CHAIN 5THRIGHT

Point 649 CUR 5THRIGHT_3 CUR 5THRIGHT_4 CUR 5THRIGHT_5 Point 650
Point 649 N 452,689.6931 E 1,817,796.2655 Sta 408+00.00
Course from 649 to PC 5THRIGHT_3 S 84° 07' 30.72" W Dist 115.1571

Curve Data
Curve 5THRIGHT_3
P.I. Station 410+33.99 N 452,665.2100 E 1,817,563.5570
Delta = 4° 59' 50.48" (LT)
Degree = 2° 06' 14.23"
Tangent = 118.8365
Length = 237.5222
Radius = 2,723.2447
External = 2.5916
Long Chord = 237.4469
Mid. Ord. = 2.5892
P.C. Station 409+15.16 N 452,677.9061 E 1,817,681.7133
P.T. Station 411+52.68 N 452,642.2695 E 1,817,446.9558
C.C. N 449,970.2479 E 1,817,972.6575
Back = S 83° 52' 01.08" W
Ahead = S 78° 52' 10.60" W
Chord Bear = S 81° 22' 05.84" W

Curve Data
Curve 5THRIGHT_4
P.I. Station 413+61.83 N 452,600.6530 E 1,817,241.9886
Delta = 12° 25' 15.00" (LT)
Degree = 2° 58' 51.79"
Tangent = 209.1495
Length = 416.6594
Radius = 1,921.9989
External = 11.3462
Long Chord = 415.8440
Mid. Ord. = 11.2796
P.C. Station 411+52.68 N 452,642.2695 E 1,817,446.9558
P.T. Station 415+69.34 N 452,515.9241 E 1,817,050.7701
C.C. N 450,758.7036 E 1,817,829.3944
Back = S 78° 31' 21.73" W
Ahead = S 66° 06' 06.73" W
Chord Bear = S 72° 18' 44.23" W

Curve Data
Curve 5THRIGHT_5
P.I. Station 416+38.50 N 452,487.9069 E 1,816,987.5401
Delta = 113° 53' 53.27" (RT)
Degree = 127° 19' 26.24"
Tangent = 69.1592
Length = 89.4554
Radius = 45.0000
External = 37.5106
Long Chord = 75.4367
Mid. Ord. = 20.4577
P.C. Station 415+69.34 N 452,515.9241 E 1,817,050.7701
P.T. Station 416+58.79 N 452,557.0661 E 1,816,987.5401
C.C. N 452,557.0661 E 1,817,032.5401
Back = S 66° 06' 06.73" W
Ahead = Due North
Chord Bear = N 56° 56' 56.63" W
Course from PT 5THRIGHT_5 to 650 Due North Dist 127.2409
Point 650 N 452,684.3070 E 1,816,987.5401 Sta 417+86.03

Feature: Alignment 6 L
DESCRIBE CHAIN 5THLEFT

Point 646 CUR 5THLEFT_3 CUR 5THLEFT_4 CUR 5THLEFT_5 CUR 5THLEFT_6 CUR 5THLEFT_7
Point 646 N 451,899.5263 E 1,816,360.4253 Sta 391+00.00

Course from 646 to PC 5THLEFT_3 N 45° 54' 30.72" E Dist 120.0000

Curve Data
Curve 5THLEFT_3
P.I. Station 392+88.80 N 452,030.8606 E 1,816,496.0594
Delta = 1° 18' 55.24" (RT)
Degree = 0° 57' 21.47"
Tangent = 68.7997
Length = 137.5934
Radius = 5,993.5076
External = 0.3949
Long Chord = 137.5903
Mid. Ord. = 0.3948
P.C. Station 392+20.00 N 451,983.0229 E 1,816,446.6128
P.T. Station 393+57.59 N 452,077.5506 E 1,816,546.5910
C.C. N 447,675.4731 E 1,820,614.0039
Back = N 45° 56' 50.90" E
Ahead = N 47° 15' 46.14" E
Chord Bear = N 46° 36' 18.52" E

Curve Data
Curve 5THLEFT_4
P.I. Station 394+55.78 N 452,144.3445 E 1,816,618.5628
Delta = 4° 29' 34.16" (RT)
Degree = 2° 17' 20.34"
Tangent = 98.1905
Length = 196.2803
Radius = 2,503.1106
External = 1.9251
Long Chord = 196.2300
Mid. Ord. = 1.9237
P.C. Station 393+57.59 N 452,077.5506 E 1,816,546.5910
P.T. Station 395+53.87 N 452,205.2953 E 1,816,695.5457
C.C. N 450,242.8164 E 1,818,249.3279
Back = N 47° 08' 13.00" E
Ahead = N 51° 37' 47.16" E
Chord Bear = N 49° 23' 00.08" E

Curve Data
Curve 5THLEFT_5
P.I. Station 397+04.26 N 452,296.8392 E 1,816,814.8540
Delta = 8° 56' 54.00" (RT)
Degree = 2° 58' 52.55"
Tangent = 150.3820
Length = 300.1525
Radius = 1,921.8627
External = 5.8746
Long Chord = 299.8475
Mid. Ord. = 5.8567
P.C. Station 395+53.87 N 452,205.2953 E 1,816,695.5457
P.T. Station 398+54.03 N 452,368.7114 E 1,816,946.9492
C.C. N 450,680.5514 E 1,817,865.4655
Back = N 52° 30' 04.88" E
Ahead = N 61° 26' 58.88" E
Chord Bear = N 56° 58' 31.88" E

Curve 5THLEFT_6
P.I. Station 398+97.19 N 452,385.6838 E 1,816,986.6362
Delta = 100° 50' 33.15" (LT)
Degree = 160° 34' 35.19"
Tangent = 43.1639
Length = 62.8003
Radius = 35.6813
External = 20.3212
Long Chord = 55.0027
Mid. Ord. = 12.9474
P.C. Station 398+54.03 N 452,368.7114 E 1,816,946.9492
P.T. Station 399+16.83 N 452,421.4696 E 1,816,962.5012
C.C. N 452,401.5185 E 1,816,932.9190
Back = N 66° 50' 44.29" E
Ahead = N 33° 59' 48.87" W
Chord Bear = N 16° 25' 27.71" E

Curve Data
Curve 5THLEFT_7
P.I. Station 399+44.09 N 452,437.7762 E 1,816,940.6522
Delta = 76° 20' 56.95" (LT)
Degree = 165° 13' 37.86"
Tangent = 27.2632
Length = 46.2086
Radius = 34.6770
External = 9.4339
Long Chord = 42.8649
Mid. Ord. = 7.4163
P.C. Station 399+16.83 N 452,421.4696 E 1,816,962.5012
P.T. Station 399+63.04 N 452,420.3928 E 1,816,919.6498
C.C. N 452,393.6792 E 1,816,941.7603
Back = N 53° 15' 53.62" W
Ahead = S 50° 23' 09.43" W
Chord Bear = S 88° 33' 37.91" W

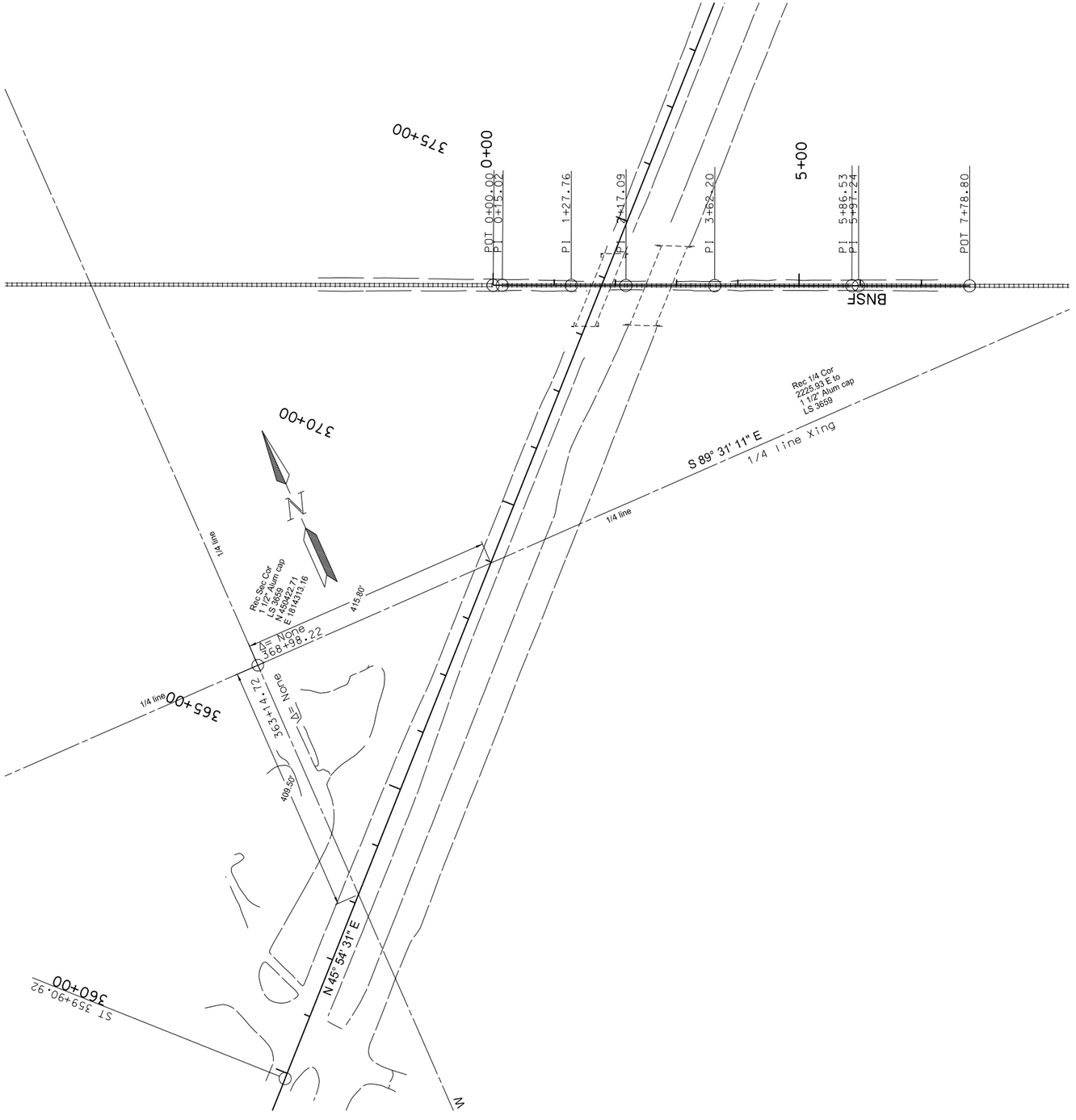
This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Survey Data

Bridge Replacement

9 MI West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	82	4



Feature: Alignment 6 L
Chain RR_EXIST contains:
Point 667 Point 668 Point 669 Point 670 Point 671 Point 672 Point 673 Point 674

Point 667 N 450,832.1041 E 1,814,918.2451 Sta 0+00.00
Course from 667 to 668 S 65° 21' 25.64" E Dist 15.0249 15.0249
Point 668 N 450,825.8393 E 1,814,931.9016 Sta 0+15.02
Course from 668 to 669 S 65° 45' 40.66" E Dist 112.7398 112.7398
Point 669 N 450,779.5552 E 1,815,034.7026 Sta 1+27.76
Course from 669 to 670 S 65° 44' 40.78" E Dist 89.3237 89.3237
Point 670 N 450,742.8607 E 1,815,116.1411 Sta 2+17.09
Course from 670 to 671 S 65° 46' 06.10" E Dist 145.1105 145.1105
Point 671 N 450,683.3035 E 1,815,248.4664 Sta 3+62.20
Course from 671 to 672 S 65° 46' 32.99" E Dist 224.3265 224.3265
Point 672 N 450,591.2606 E 1,815,453.0403 Sta 5+86.53
Course from 672 to 673 S 65° 48' 46.93" E Dist 10.7111 10.7111
Point 673 N 450,586.8721 E 1,815,462.8111 Sta 5+97.24
Course from 673 to 674 S 65° 46' 25.29" E Dist 181.5608 181.5608
Point 674 N 450,512.3701 E 1,815,628.3822 Sta 7+78.80

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Survey Data

Bridge Replacement

9 MI West of ND Hwy 41-WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH4-002(118)154	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**4**	**34**	**136**
G20-1b-60	**60"x24"**	**WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)**	**4**	**26**	**104**
G20-2-48	**48"x24"**	**END ROAD WORK**	**5**	**19**	**95**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**	**64**	**128**
G20-50a-72	**72"x36"**	**ROAD WORK NEXT __ MILES RT & LT ARROWS**	**8**	**37**	**296**
G20-52a-72	**72"x24"**	**ROAD WORK NEXT __ MILES RT or LT ARROW**	**8**	**30**	**240**
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**8**	**59**	**472**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
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 ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	**48"x48"**	**STOP**	**8**	**32**	**256**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**10**	**5**	**50**
R1-2-60	**60"x60"**	**YIELD**	**8**	**29**	**232**
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**20**	**39**	**780**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**4**	**10**	**40**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**6**	**39**	**234**
R4-7-48	**48"x60"**	**KEEP RIGHT SYMBOL**	**2**	**39**	**78**
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	**48"x30"**	**ROAD CLOSED**	**6**	**28**	**168**
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	**48"x48"**	**RIGHT or LEFT REVERSE CURVE ARROW**	**2**	**35**	**70**
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	**48"x24"**	**LARGE ARROW**	**1**	**26**	**26**
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**2**	**35**	**70**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**8**	**35**	**280**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**8**	**35**	**280**
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 SYMBOL**	**6**	**35**	**210**
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT.**	**2**	**35**	**70**
W8-55-48	**48"x48"**	**TRUCKS CROSSING AHEAD or __ FT.**	**2**	**35**	**70**
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	**24"x24"**	**__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)**	**2**	**11**	**22**
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**12**	**35**	**420**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	**48"x48"**	**RIGHT or LEFT LANE CLOSED AHEAD or __ FT.**	**12**	**35**	**420**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	**24"x18"**	**__ FEET (Mounted on warning sign post)**	**2**	**10**	**20**
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	**54"x12"**	**NEXT __ MILES (Mounted on warning sign post)**	**2**	**12**	**24**
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	**48"x48"**	**ROAD MACHINERY AHEAD or __ FT**	**4**	**35**	**140**

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-53-48	**48:x48"**	**RUMBLE STRIPS AHEAD**	**2**	**35**	**70**
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

S1-1-48	**48X48**	**School Crossing**	**1**	**19**	**19**
W11-2-48	**48X48**	**Pedestrian Crossing**	**1**	**19**	**19**
W16-9P-30	**30X18**	**Ahead Sign**	**2**	**21**	**42**

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**5651**

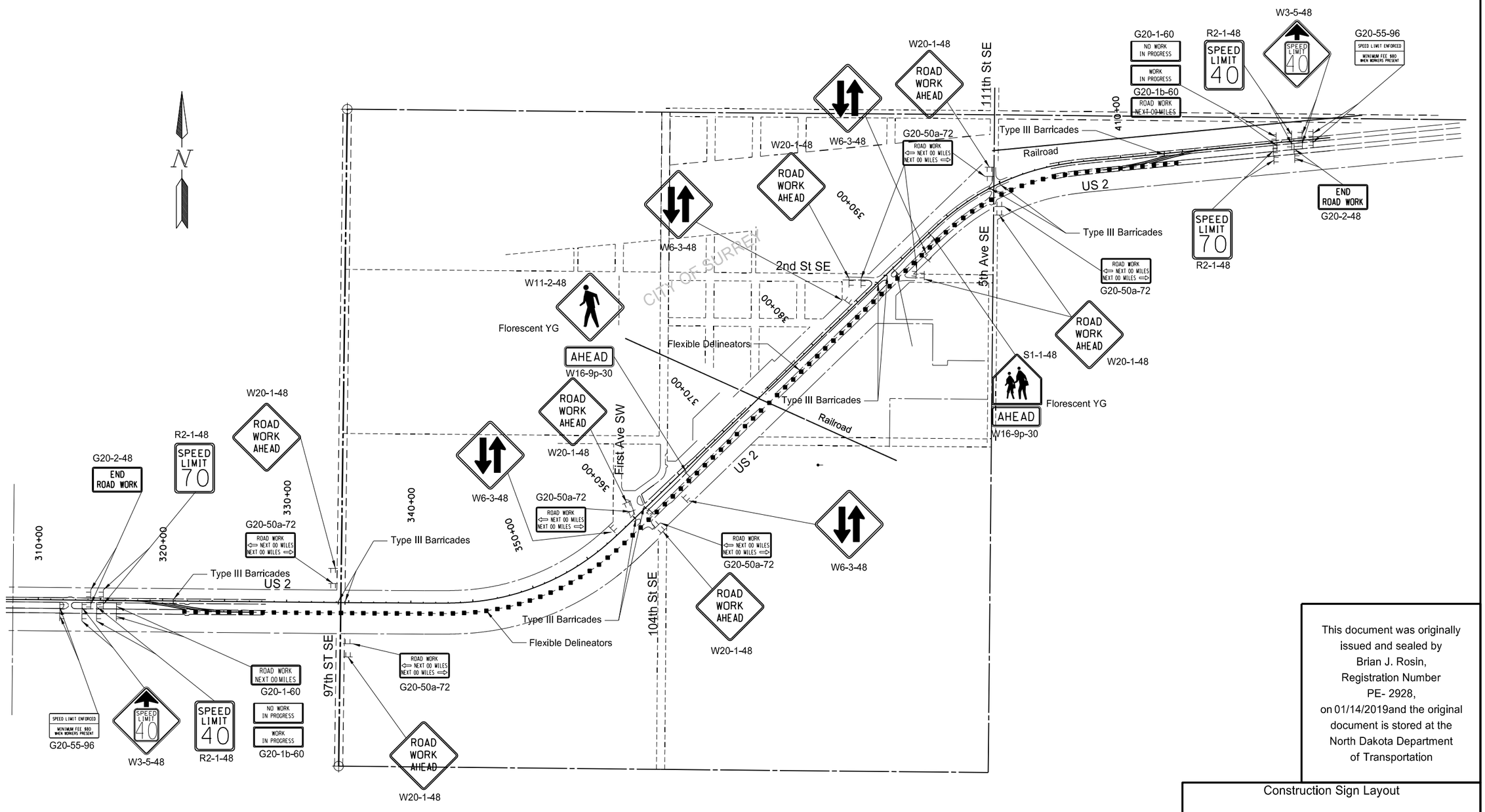
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**840**
704-1041	**ATTENUATION DEVICE-TYPE B-55**	**EACH**	**2**
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1048	**Prortable Rummble Strips**	**EACH**	**2**
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**38**
704-1060	**DELINEATOR DRUMS**	**EACH**	**80**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**157**
704-1070	DELINEATOR	EACH	
704-1072	**FLEXIBLE DELINEATORS**	**EACH**	**21**
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**	**2**
704-1088	**SEQUENCING ARROW PANEL - TYPE C - CROSSOVER**	**EACH**	**2**
704-1095	TYPE B FLASHERS	EACH	
704-1500	**OBLITERATION OF PVMT MK**	**SF**	**1750**
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	**PRECAST CONCRETE MED BARRIER - STATE FURNISHED**	**EACH**	**80**
762-0200	**RAISED PAVEMENT MARKERS**	**EACH**	**1137**
762-0420	**SHORT TERM 4IN LINE - TYPE R**	**LF**	**35500**
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
772-2110	**FLASHING BEACON - POST MOUNTED**	**EACH**	**2**

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

This document was originally issued and sealed by Brian J. Rosin, Registration Number PE-2928, on 1/14/19 and the original document is stored at the North Dakota Department of Transportation.

Traffic Control Devices List

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	100	2



This document was originally issued and sealed by Brian J. Rosin, Registration Number PE- 2928, on 01/14/2019and the original document is stored at the North Dakota Department of Transportation

Construction Sign Layout

Bridge Replacement

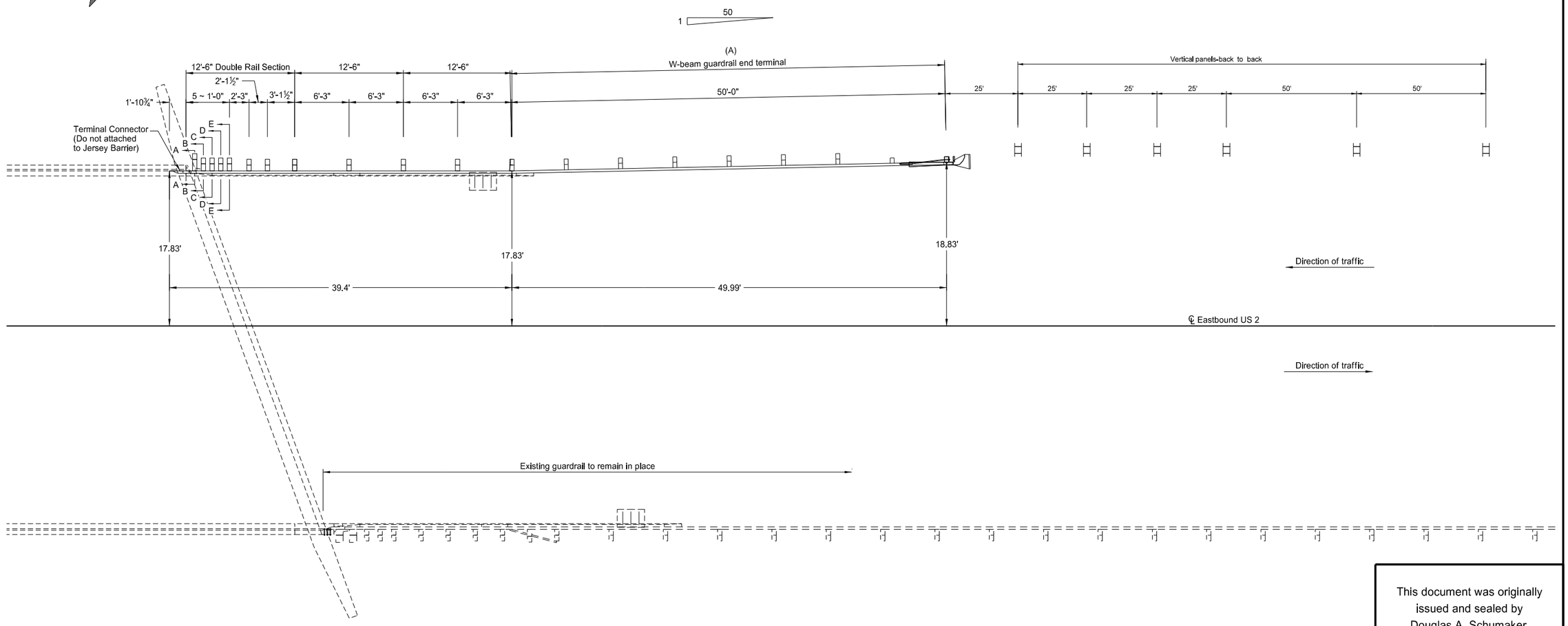
9 MI West of ND Hwy 41-WB

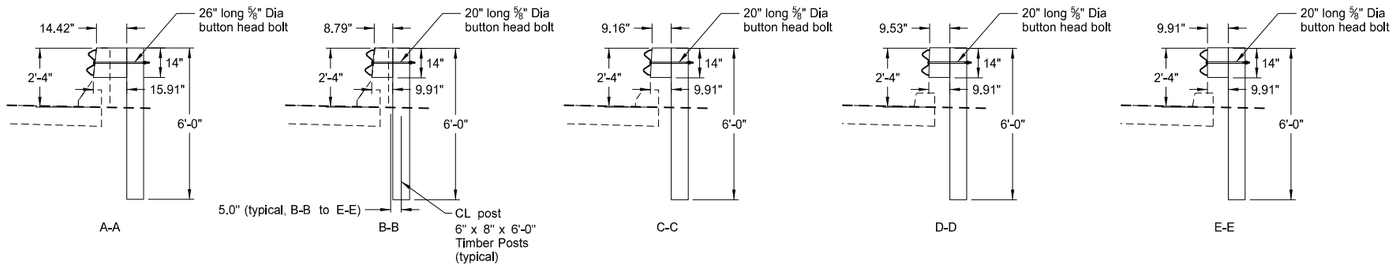
1/14/2019 1:57:58 PM leckroth R:\project\40002154.118\design\Base 2019\Sheets\100WZ_002_Construction Sign Layout.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	100	3

23 USC § 409 Documents
NDDOT Reserves All Objections

SPEC	CODE	BID ITEM	QTY	UNIT
704	1081	VERTICAL PANELS - BACK TO BACK	6	EA
764	0145	W-BEAM GUARDRAIL END TERMINAL	1	EA





(A) Install a Sequential Kinking Terminal at this location.

See Standard D-764-5.

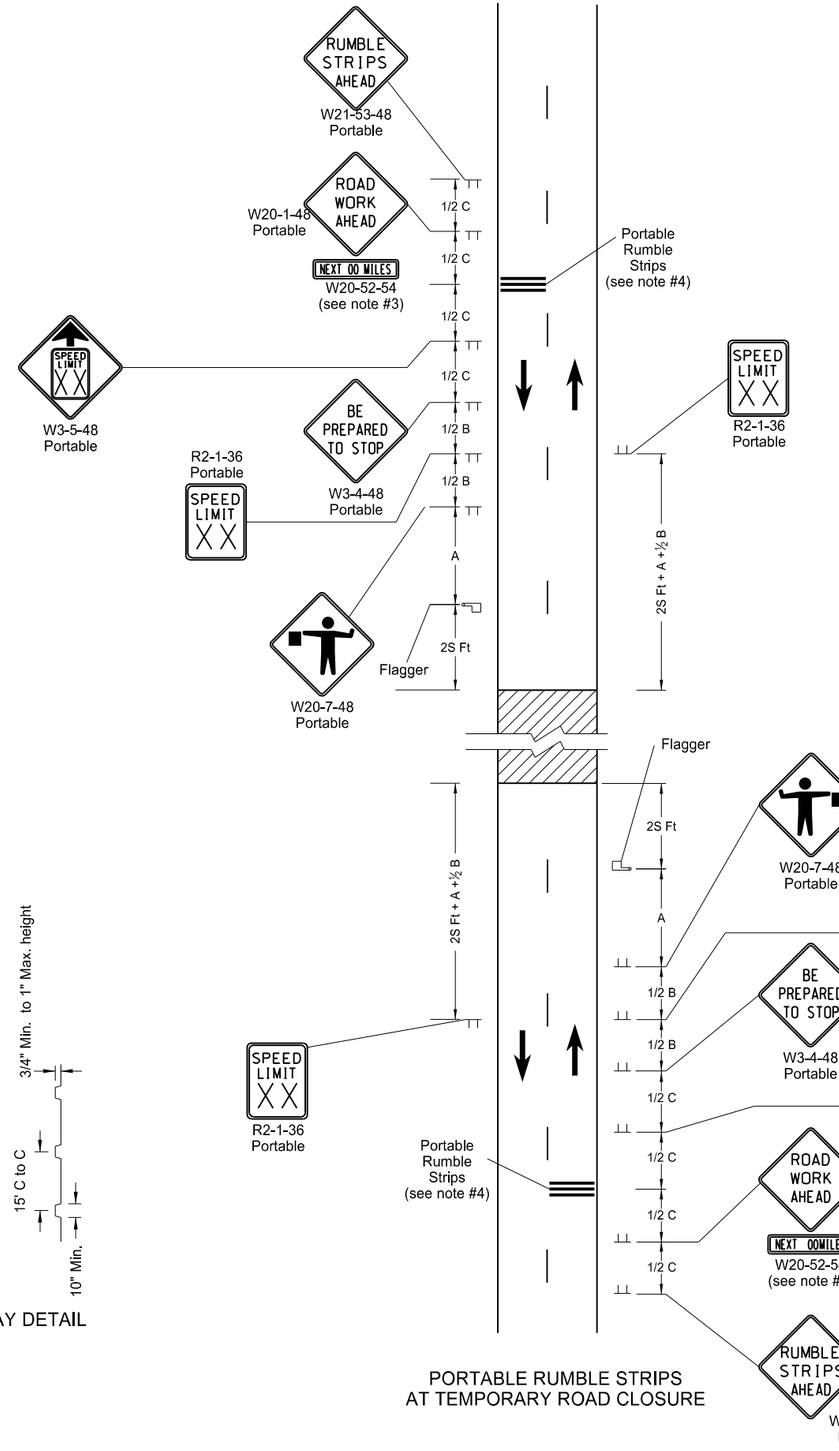
This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

W-Beam Guardrail End Terminal
For Two-Way Traffic

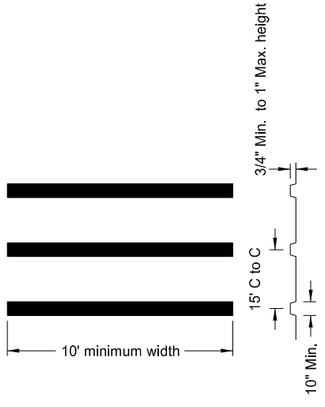
BNSF Railroad Separation
RP 154.989
Eastbound Roadway

US 2

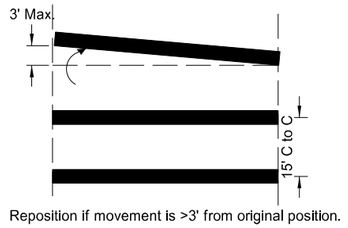
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	100	4



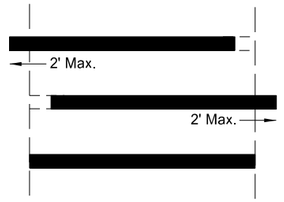
PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE



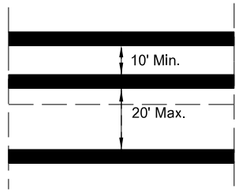
PORTABLE RUMBLE STRIPS ARRAY DETAIL



Reposition if movement is >3' from original position.
Skewing



Reposition if movement is >2' from original position.
Lateral



Reposition if distance between strips is <10' or >20'.
Perpendicular to Travel with or against traffic

PORTABLE RUMBLE STRIPS ARRAY TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

Drawing not to scale.

Notes:
1. Number of devices were calculated using 40 mph. Speed determined in the field based on location and conditions.
2. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
3. Use sign W20-52-54 when work area is 1 mile or longer.
4. Rumble strips are not used on a non paved surface or in a pre-construction speed zone of 25 mph or less.

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

KEY
- Work area
- Flagger
- Sign

S = Numerical value of speed limit or 85th percentile.

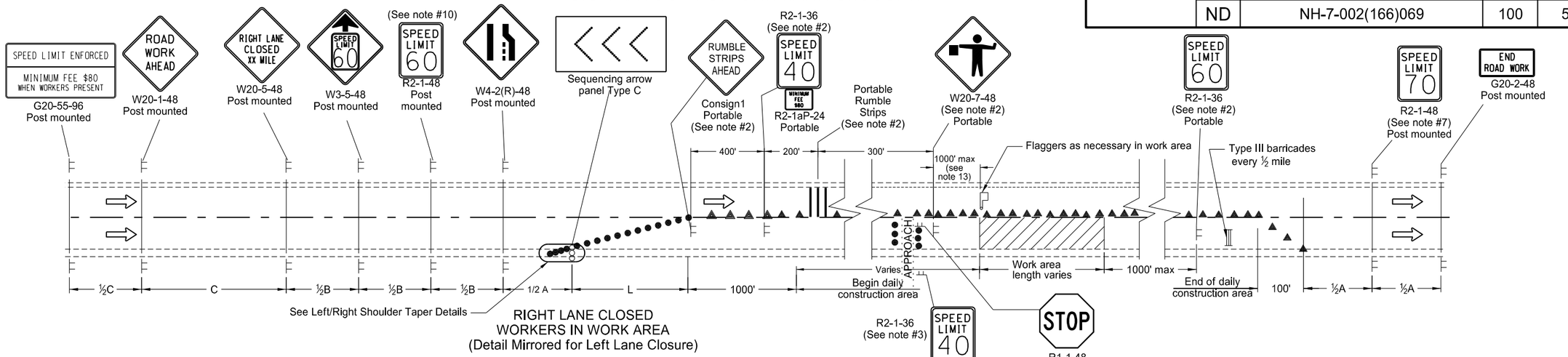
PORTABLE RUMBLE STRIPS

Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-7-002(166)069	100	5

SIGN LAYOUT FOR ONE LANE CLOSURE



RIGHT LANE CLOSED
WORKERS IN WORK AREA
(Detail Mirrored for Left Lane Closure)

Notes:

1. Install advance signs for flagging when flaggers are flagging.

2. Move the portable rumble strips, rumble strips ahead sign, 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. Cover or remove the rumble strips ahead sign, 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. Remove the portable rumble strips upon completion of the work day.

3. Approaches: When the work area encompasses an approach, install a 40 mph speed limit sign to control the approach. Cover the existing stop sign and install a new portable stop sign when the approach is on the side of the lane closure. Remove the approach speed limit sign once the main line 40 mph speed zone is moved past the approach.

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 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).

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. 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.

10. Determine the reduced speed limit dependent on the in place speed limit before construction. Where 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 ½B.

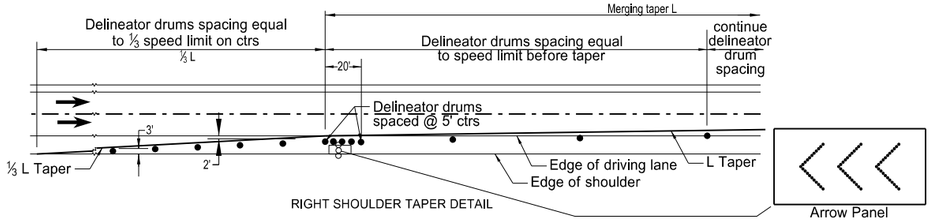
11. As an option use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.

12. Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.

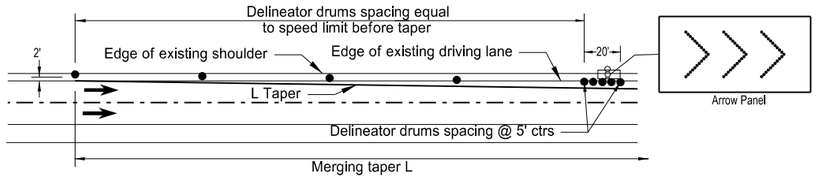
13. For a stationary operation, maximum distance is 1000'. For a moving operation, maximum distance is 3000'.

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

*Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

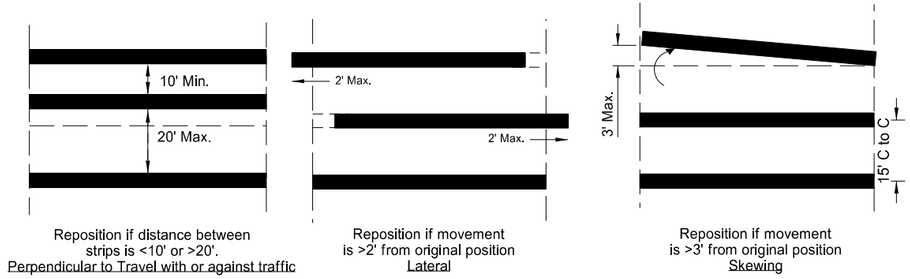


RIGHT SHOULDER TAPER DETAIL



LEFT SHOULDER TAPER DETAIL

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

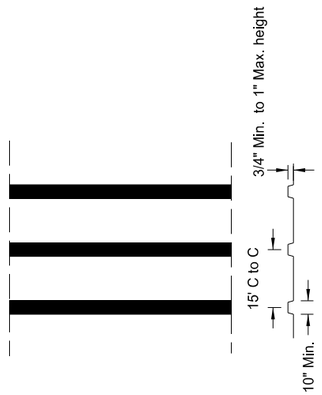


Reposition if distance between strips is <10' or >20'. Perpendicular to Travel with or against traffic

Reposition if movement is >2' from original position Lateral

Reposition if movement is >3' from original position Skewing

PORTABLE RUMBLE STRIPS ARRAY - TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES



PORTABLE RUMBLE STRIPS ARRAY DETAIL

KEY

Type I barricade	Work area
Type II barricade	Flagger
Type III barricade	Sequencing arrow panel
Sign	Tubular markers
Delineator drum	

FOUR LANE PORTABLE RUMBLE STRIPS

Bridge Replacement

9 Mi West of ND Hwy 41-WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	N.D.	NH-4-002(118)154	110	1

Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Vert Clear-ance FT	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
US Hwy 2																							
362+86 Lt mdn		33		6.0	13.9				7.0	2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga				
363+34 Lt	SN 1		27.0		13.6	14.3	15.0	15.6	7.0	2.25 x 2.25 12 ga	17.6	3.1	3.8	4.5	5.1	2 x 2 12 ga	4	16	3 x 3 7 ga			4	
365+02 Lt	S.A.A		17.8		18.1	18.4	18.6		7.0	2.5 x 2.5 10 ga	21.4						3	12	3 x 3 7 ga			3	
366+68 Lt		20		9.0	15.6				7.0	2.5 x 2.5 10 ga	17.4	4.9				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
369+86 Lt									7.0	2 x 2 12 ga										1	1		
369+86 Lt mdn									7.0	2 x 2 12 ga										1	1		
384+79 Rt mdn		33		6.0	13.9				7.0	2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga				
386+84 Rt mdn					14.4				7.0	2.5 x 2.5 10 ga	17.3	3.9				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga	1		1	
391+74 Lt	SN 2		6.0		13.0				7.0	2.5 x 2.5 12 ga	14.0						1	4	3 x 3 7 ga				
404+64 Lt					13.4	14.5			7.0	2.25 x 2.25 12 ga	17.9	2.8	3.9			2 x 2 12 ga	2	8	3 x 3 7 ga	1		2	
407+20 Lt	S.A.B		10.6		15.6				7.0	2.5 x 2.5 12 ga	16.7	5.4				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
Sub Total			61.4	21.0		**Total**	227.9										**Total**	60		4	2	12	
Grand Total			**61.4**	**21.0**		**Total**	**227.9**										**Total**	**60**	**0**	**4**	**2**	**12**	

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE - 5047, on 1/10/2019 and is stored at the North Dakota Department of Transportation.

Sign Summary
Perforated Tube

9 Mi West of ND Hwy 41-WB

US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	110	2

N

Sta 363+34 Lt
Remove

104th St SE
Pleasant Ave

Sta 363+34 Lt

Sign 1

104th St SE
Pleasant Ave

Sta 365+02 Lt
Remove

JCT

WARD
12
COUNTY

Sta 365+02 Lt
Special Assembly A

JCT

M2-1-30
(Yellow legend on
blue background)

WARD
12
COUNTY

M1-6-36

M6-1R-30
(Yellow legend on
blue background)

Sta 366+68 Lt
Remove

Sta 366+68 Lt
Assembly 20

Sta 369+86 Lt
Reset sign
and supports

AHEAD

Sta 369+86 Lt Mdn
Reset sign
and supports

AHEAD

WRONG
WAY

R5-1A-36

Sta 362+86 Lt Mdn
Assembly 33

WRONG
WAY

Sta 362+86 Lt Mdn
Remove

375+00

370+00

365+00

360+00

355+00

350+00

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

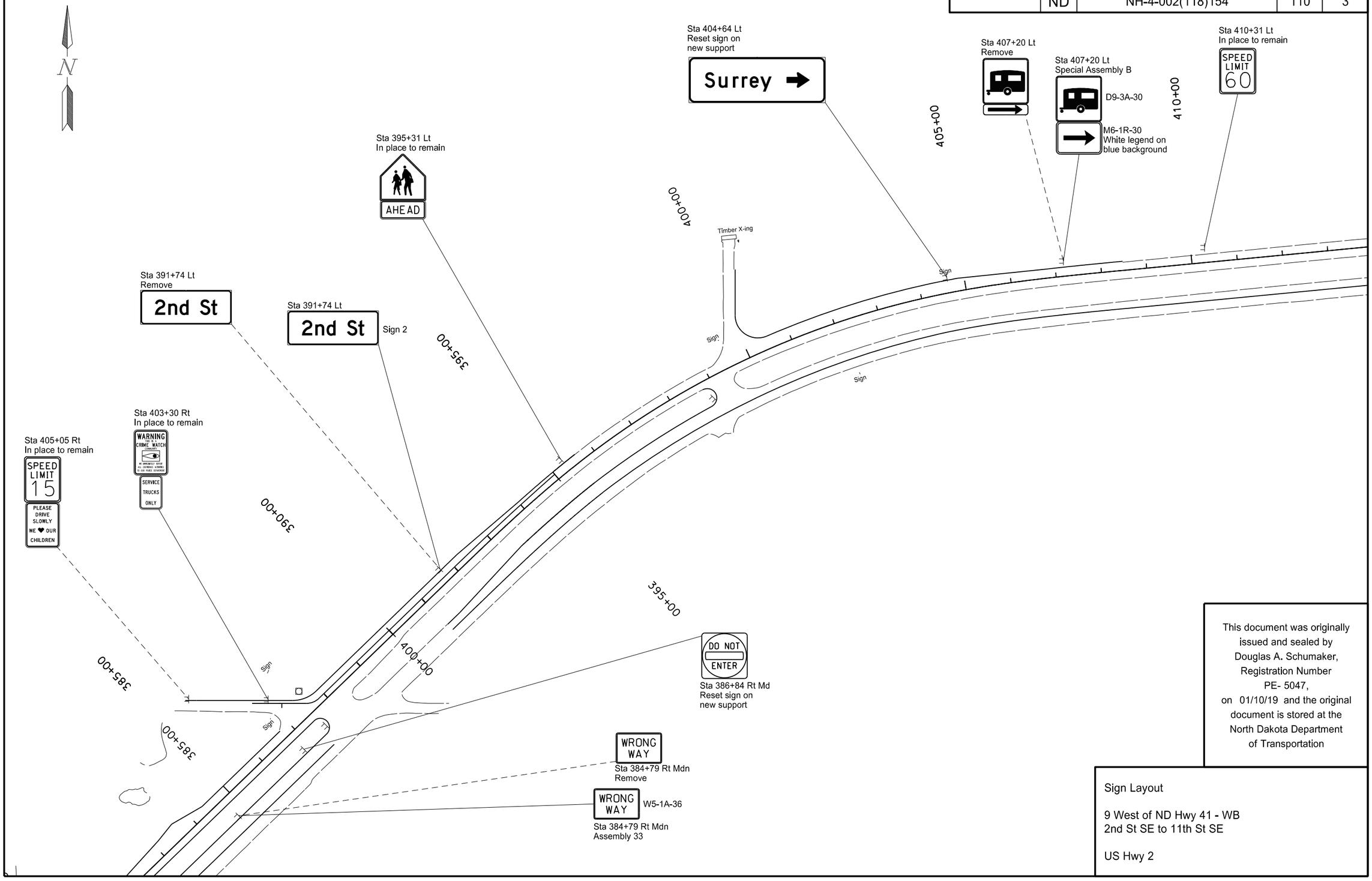
Sign Layout

9 West of ND Hwy 41 - WB
104th St SE

US Hwy 2

1/10/2019 11:27:54 AM kaltepeter R:\project\40002154.118\traffic\2019\110SN_002_LSign_104th St SE.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	110	3



This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Sign Layout

9 West of ND Hwy 41 - WB
2nd St SE to 11th St SE

US Hwy 2

1/10/2019 11:27:55 AM kaltepeter R:\project\40002154.118\traffic\2019\110SN_003_LSign_2nd St SE.dgn

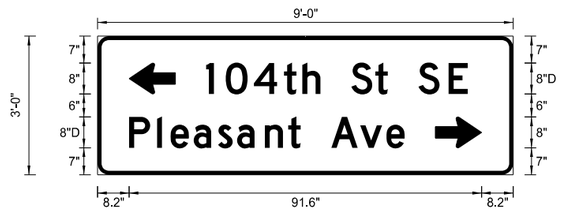
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	110	4

SIGN NUMBER	Sign 1
WIDTH X HEIGHT	9'-0" x 3'-0"
BORDER WIDTH	1" (inset 0")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_8IN_TYPE D	8.2	21	8	12	90
ND_8IN_TYPE D	87.8	7	8	12	270

STATION(S):
363+34 Lt

AREA: 27.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Destination.ssl

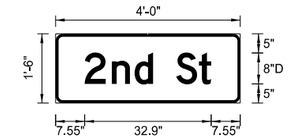
LETTER POSITION (X)																				LENGTH	SIZE	SERIES
1	0	4	t	h		S	t		S	E										68	8/6	D 2000
28.2	33.3	40.7	48.5	53.2	57.9	65.9	72.2	75.4	83.4	91.2												
P	l	e	a	s	a	n	t		A	v	e									71.6	8/6	D 2000
8.2	15.5	19	25	31.3	36.2	43.4	49.6	52.8	60.8	68.3	75.1											

SIGN NUMBER	Sign 2
WIDTH X HEIGHT	4'-0" x 1'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	1.88"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
391+74 Lt

AREA: 6.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Street Name.ssl

LETTER POSITION (X)																				LENGTH	SIZE	SERIES
2	n	d		S	t															32.9	8/6	D 2000
7.6	14.6	20.5	25.3	31.3	37.2																	

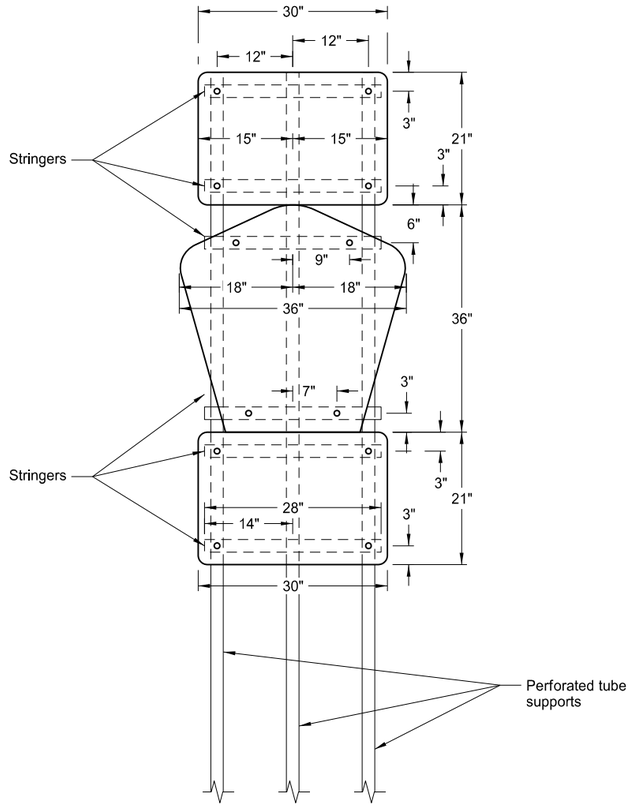
This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047 , on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Sign Details

9 Mi West of ND Hwy 41 - WB

US Hwy 2

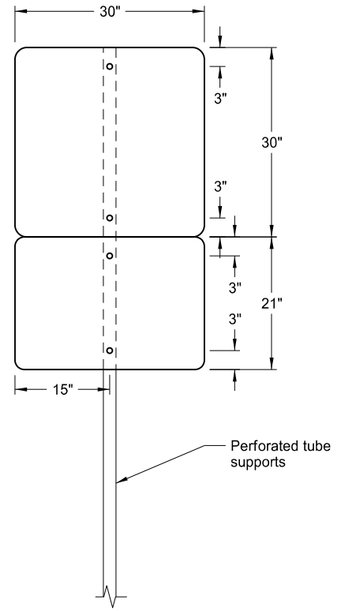
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	110	5



Special Assembly A

Sta 365+02 Lt

Pay Area: 17.8 SF



Special Assembly B

Sta 407+20 Lt

Pay Area: 10.6 SF

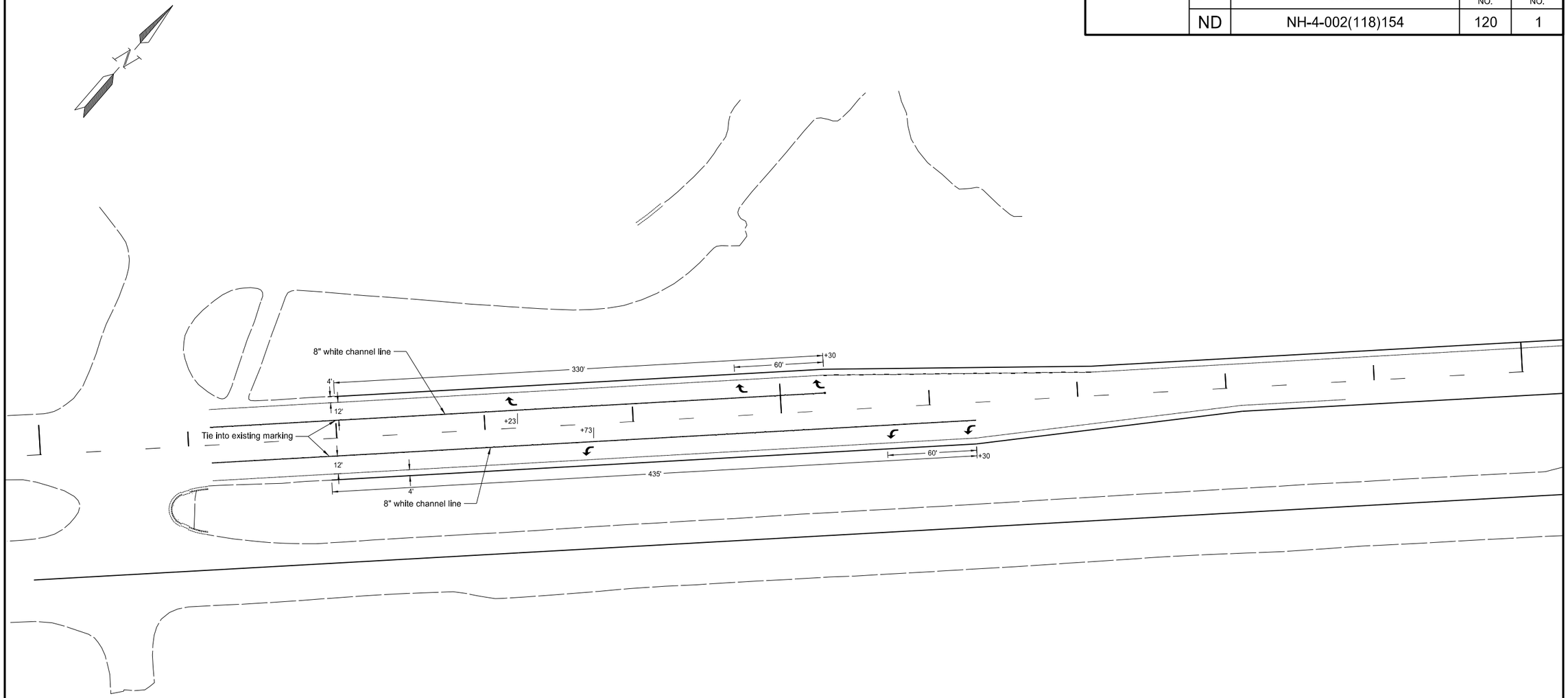
This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Sign Assemblies

9 Mi West of ND Hwy 41 - WB

US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	120	1



SPEC	CODE	BID ITEM		QTY	UNIT
762	0103	PVMT MK PAINTED - MESSAGE			
		Right turn arrow (x3)		48	SF
		Left turn arrow (x3)		48	SF
			Total	96	SF
762	1108	PVMT MK PAINTED 8IN LINE			
		8" white channel line		930	LF

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Layout

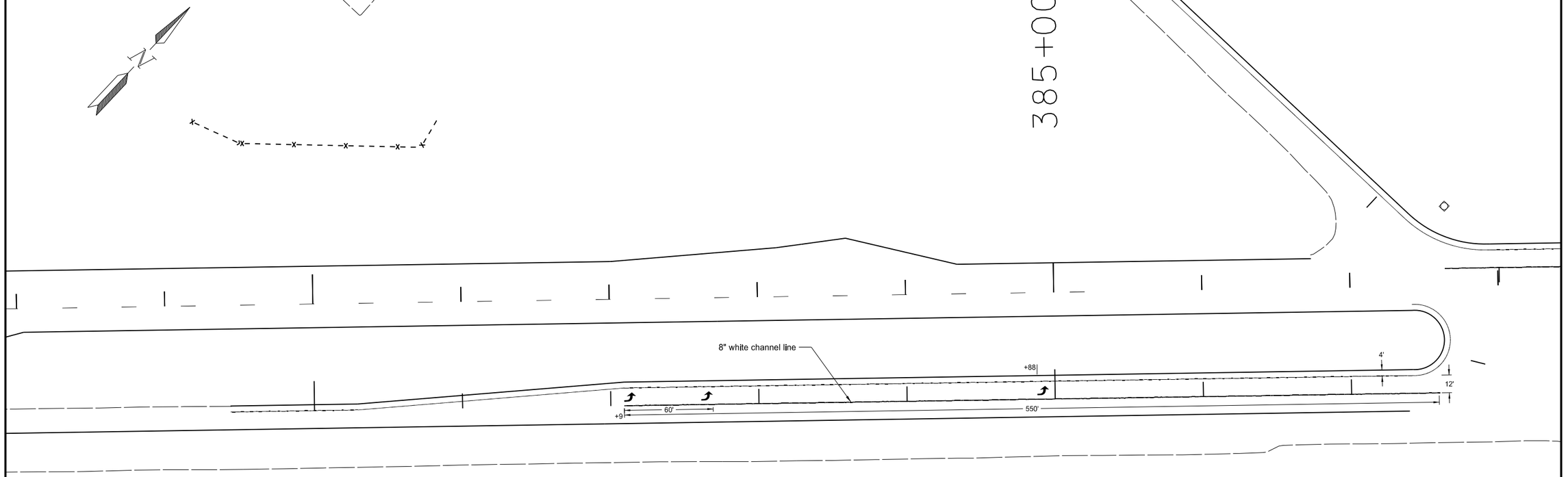
9 West of ND Hwy 41 - WB
104th St SE

US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	120	2

380

385+00



SPEC	CODE	BID ITEM	QTY	UNIT
762	0103	PVMT MK PAINTED - MESSAGE		
		Left turn arrow (x3)	48	SF
762	1108	PVMT MK PAINTED 8IN LINE		
		8" white channel line	550	LF

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Layout

9 West of ND Hwy 41 - WB
2nd St SE - EB

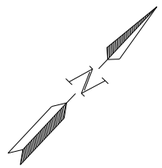
US Hwy 2

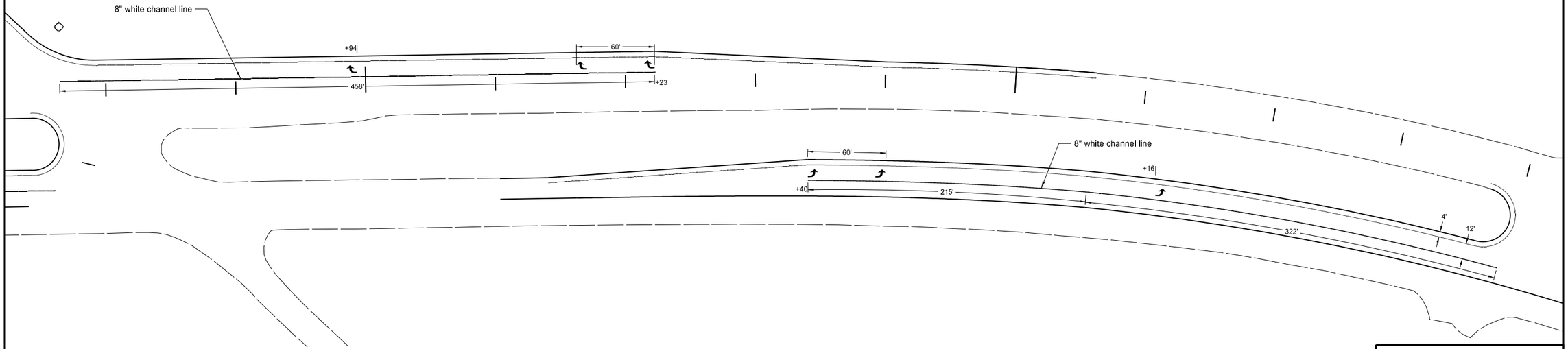
1/10/2019 11:27:59 AM kaltepeter R:\project\40002154.118\traffic\2019\120MK_002_LPvmt_2nd St SE_EB.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	120	3

390

395





SPEC	CODE	BID ITEM		QTY	UNIT
762	0103	PVMT MK PAINTED - MESSAGE			
		Right turn arrow (x3)		48	SF
		Left turn arrow (x3)		48	SF
			Total	96	SF
762	1108	PVMT MK PAINTED 8IN LINE			
		8" white channel line		995	LF

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

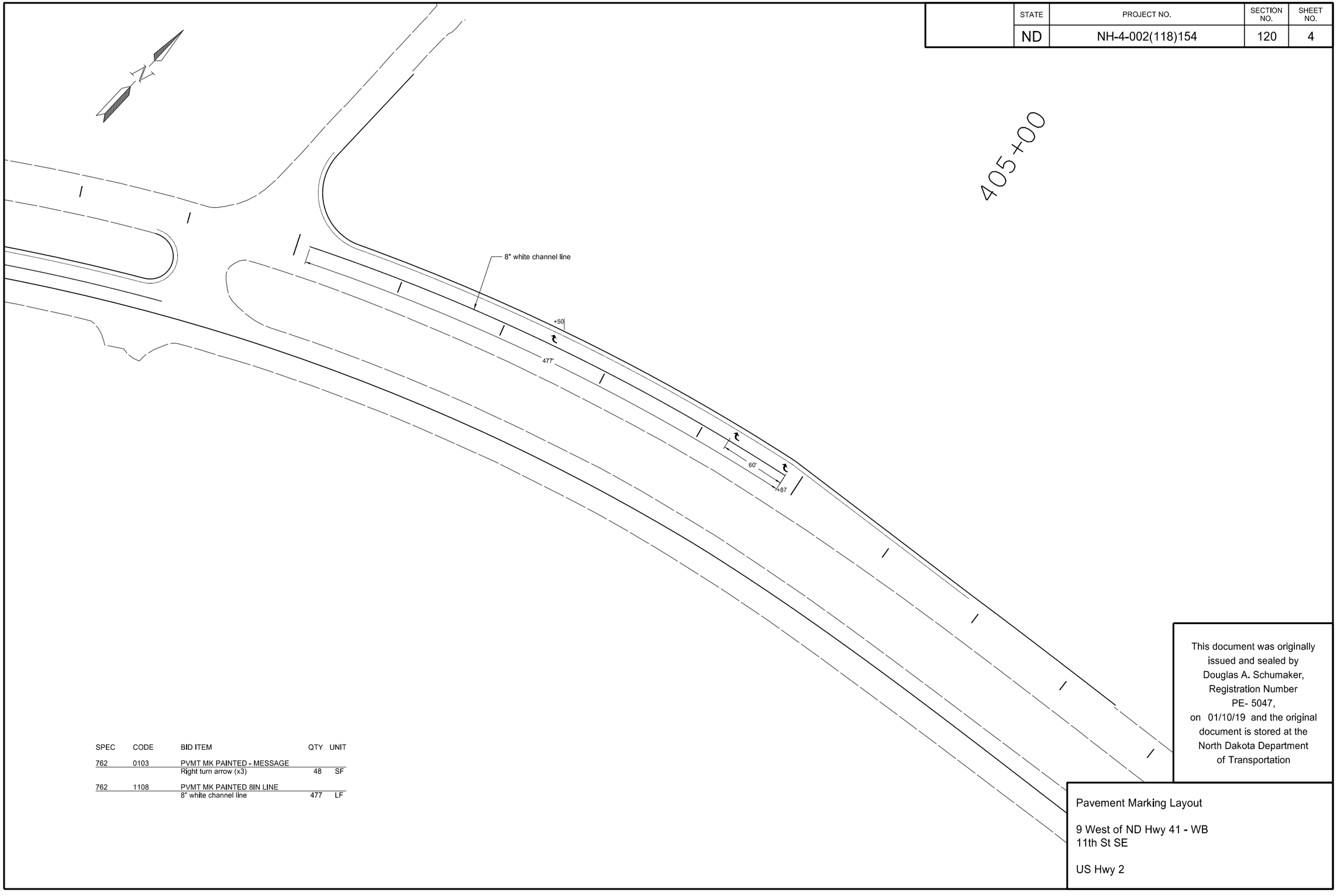
Pavement Marking Layout

9 West of ND Hwy 41 - EB
Between 2nd St SE and 11th St SE

US Hwy 2

1/10/2019 11:28:00 AM kaltepeter R:\project\40002154.118\traffic\2019\120MK_003_LPvmt_2nd St SW - 11th St SW.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	120	4



SPEC	CODE	BID ITEM	QTY	UNIT
762	0103	PVMT MK PAINTED - MESSAGE		
		Right turn arrow (x3)	48	SF
762	1108	PVMT MK PAINTED 8IN LINE		
		8" white channel line	477	LF

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Layout

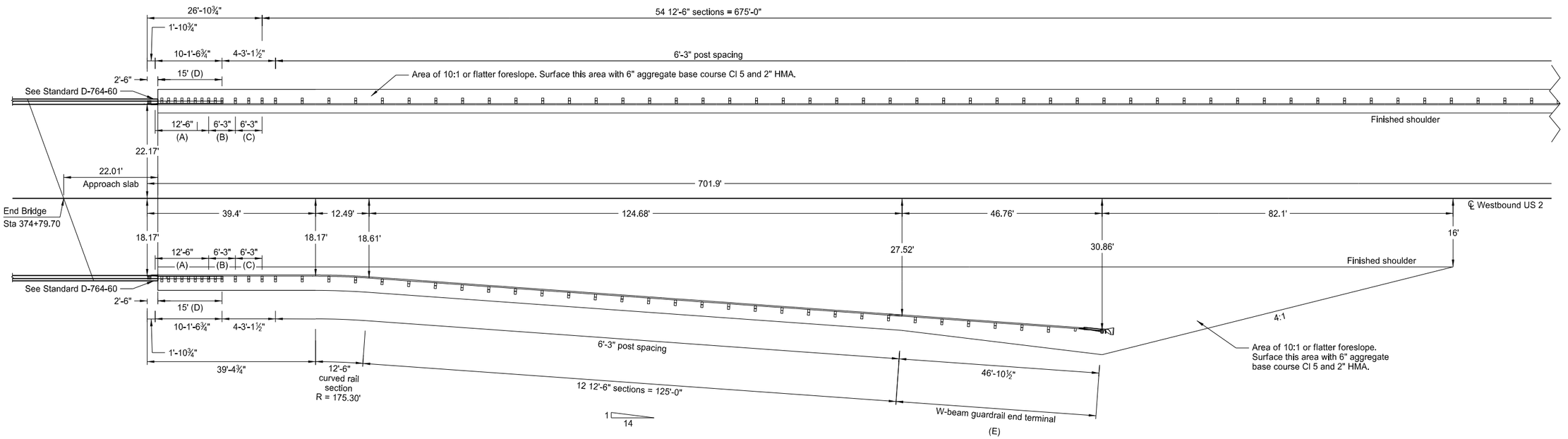
9 West of ND Hwy 41 - WB
11th St SE

US Hwy 2

1/10/2019 11:28:01 AM kaltepeter R:\project\40002154.118\traffic\2019\120MK_004_LPvmt_11th St SE.dgn

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	130	1



(A) Thrie beam rail section (double thickness)

(B) Thrie beam rail section

(C) Asymmetrical W-Thrie beam transition section

(D) Curb & gutter - type 1 special. Install in accordance with Standard Drawing D-748-1, except for height transitions on each end as shown on Standard Drawing D-764-60.

(E) Install a FLEAT end terminal at this location. See Standard D-764-38.

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Thrie/MGS W-Beam Guardrail Layout

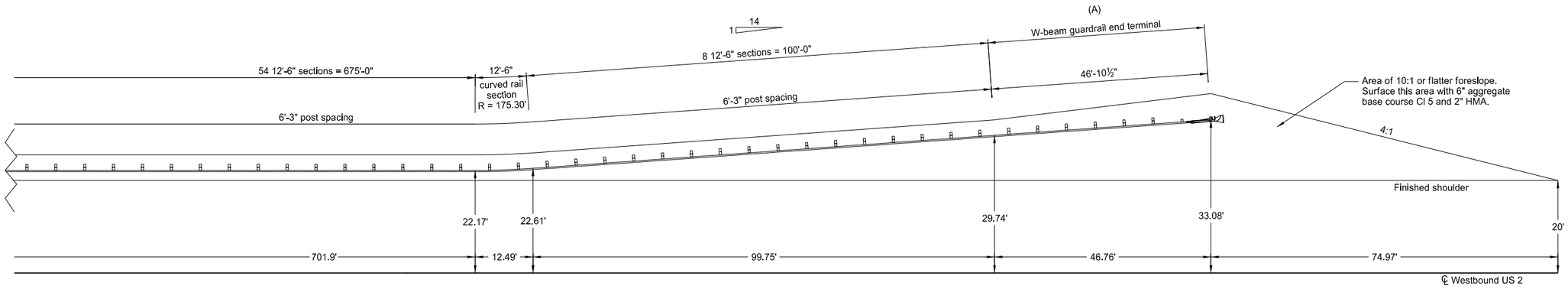
BNSF Railroad Separation
RP 154.989
Westbound Roadway

US 2

1/10/2019 11:27:51 AM kaltepeter R:\project\40002154.118\traffic\130GR_001_LGdrl_002_154.989L.dgn

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	130	2



(A) Install a FLEAT end terminal at this location. See Standard D-764-38.

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Thrie/MGS W-Beam Guardrail Layout

BNSF Railroad Separation
RP 154.989
Westbound Roadway

US 2

1/10/2019 11:27:52 AM kaltepeter R:\project\40002154.118\traffic\130GR_002_LGdrl_002_154.989L.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	130	3

MGS W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

THRIE/MGS W-BEAM GUARDRAIL AT BRIDGE ENDS

LOCATION	(A) 5/8" Ø x 18" LONG GUARD-RAIL BOLT EACH	(A) 6" x 8" x 6'-0" TIMBER POST EACH	(A) 6" x 8" x 14" TIMBER BLOCK EACH	(A) 5/8" Ø x 1 1/4" LONG GUARD-RAIL BOLT EACH	(A) 12'- 6" STRAIGHT W-BEAM RAIL SECTION EACH	(A) 12'- 6" CURVED W-BEAM RAIL SECTION EACH	(A) REFL-ECTOR-IZED PLATES EACH	(A) 6" x 8" x 7' WOOD POST EACH	(A) 6" x 8" x 19" WOOD OFF-SET BLOCK EACH	(A) 6'-3" W-THRIE BEAM TRANS-ITION SECTION EACH	(A) 6'-3" THRIE BEAM SECTION EACH	(A) 12'-6" DOUBLE THRIE BEAM SECTION EACH	(A) 2'-6" THRIE BEAM TERM-INAL CON-NECTOR EACH	(A) 7/8" Ø x 15" LONG HEX HEAD BOLT EACH	(A) SINGLE SLOPE TO THRIE BEAM CONN-ECTOR PLATE EACH
Sta 374+99.20 to 376+75.77 Rt	48	31	25	140	11	1	11	6	12	1	1	1	1	5	1
Sta 374+99.20 to 383+13.34 Lt	150	133	127	548	62	1	19	6	12	1	1	1	1	5	1
TOTAL	198	164	152	688	73	2	30	12	24	2	2	2	2	10	2

(A) Include these items in the contract unit price bid for "W-Beam Guardrail".

SPEC	CODE	BID ITEM	QTY	UNIT
748	0141	CURB & GUTTER - TYPE 1 SPECIAL		
		Sta 351+01.70 to 375+16.70 Rt	15	LF
		Sta 351+01.70 to 375+16.70 Lt	15	LF
		Total	30	LF
764	0131	W-BEAM GUARDRAIL		
		Sta 374+99.20 to 376+75.77 Rt	176.9	LF
		Sta 374+99.20 to 383+13.34 Lt	814.4	LF
		Total	991.3	LF
764	0145	W-BEAM GUARDRAIL END TERMINAL		
		Sta 376+75.77 to 377+22.53 Rt	1	Ea
		Sta 383+13.34 to 383+60.10 Lt	1	Ea
		Total	2	Ea

SPEC	CODE	BID ITEM	QTY	UNIT
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS		
		Sta 374+54.91 to 377+18.83 Rt	264.4	LF
		Sta 374+42.33 to 374+94.23 Lt	51.9	LF
		Total	316.3	LF
764	2020	REMOVE 3-CABLE GUARDRAIL & POSTS		
		Sta 366+83.95 to 372+79.95 Lt	600	LF
		Sta 374+81.73 to 386+53.23 Lt	1171.5	LF
		Total	1771.5	LF
764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 377+18.83 to 377+55.70 Rt	1	Ea
		Sta 374+94.23 to 375+31.45 Lt	1	Ea
		Total	2	Ea

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE-5047, on 1/10/19 and the original document is stored at the North Dakota Department of Transportation

Thrie/MGS W-Beam Guardrail Quantities

BNSF Railroad Separation
RP 154.989
Westbound Roadway

US 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	140	1

(A) Coil 50' of conduit and conductor at right of way line.
Contact Ottertail Power for the service connection.

N

Sta 398+13-164' Lt
Existing utility pole

(A)

2" conduit

10'

HO

Sta 398+17-150' Lt
New pole mounted
feed point (A)

2" conduit

11th St SW

1

Sta 400+25-69' Lt
Wood pole mounted
light standard

400+00

2" conduit

Sta 399+26-38' Lt
Existing utility owned
wood post mounted
light standard

Hwy 2

Hwy 2

Sta 399+14-143' Rt
Wood pole mounted
light standard

2

11th St SW

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Destination Lighting
Lighting Layout

9 West of ND Hwy 41 - WB
11th St SE

US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	140	2

Quantities (A)		
50 ft Wood Pole Class II	EA	2
6 ft Mast Arm - Wood Pole Mounted	LF	2
LED Luminaire	EA	2
2 Inch Diameter Rigid Conduit - bored	LF	301
2 Inch Diameter Rigid Conduit	LF	191
2 Inch Diameter Rigid Conduit - pole mounted	LF	165
Underground Conductor No 8 - Type THW	LF	634
Underground Conductor No 8 - Type RHW	LF	1268
Underground Conductor No 6 - Type THW	LF	76
Underground Conductor No 4 - Type RHW	LF	152
20 ft Wood Pole Class II	EA	1
Feed Point - Type I - Pole Mtd with lighting cabinet, switch box and meter	LF	1

Destination Lighting (two or more poles)	EA	1

(A) Include these quantities in the price bid for "Destination Lighting (two or more poles)".
(B) Wood pole mounted conduit
(C) Bored conduit

Wood Pole Light Standard				
No.	Sta	Circuit	Wood Pole Length	Mast Arm
1	400+25-62' Lt	1	50'	6'
2	399+14-138' Rt	1	50'	6'

Light Std No	Sta	Conduit Runs		Cable Runs	
		LF	Dia	LF	Type
2 to 1	399+14-138' Rt to	43	2" (B)	337	(1) No. 8 THW (2) No. 8 RHW
	400+25-62' Lt	237	2" (C)		
1 to FP	400+25-62' Lt to	86	2" (B)	297	(1) No. 8 THW (2) No. 8 RHW
	398+17-15' Lt	64	2" (C)		
		175	2"		
FP to Utility Pole	398+17-150' Lt to	36	2" (B)	76	(1) No. 6 THW (2) No. 4 RHW
	Utility pole	16	2"		

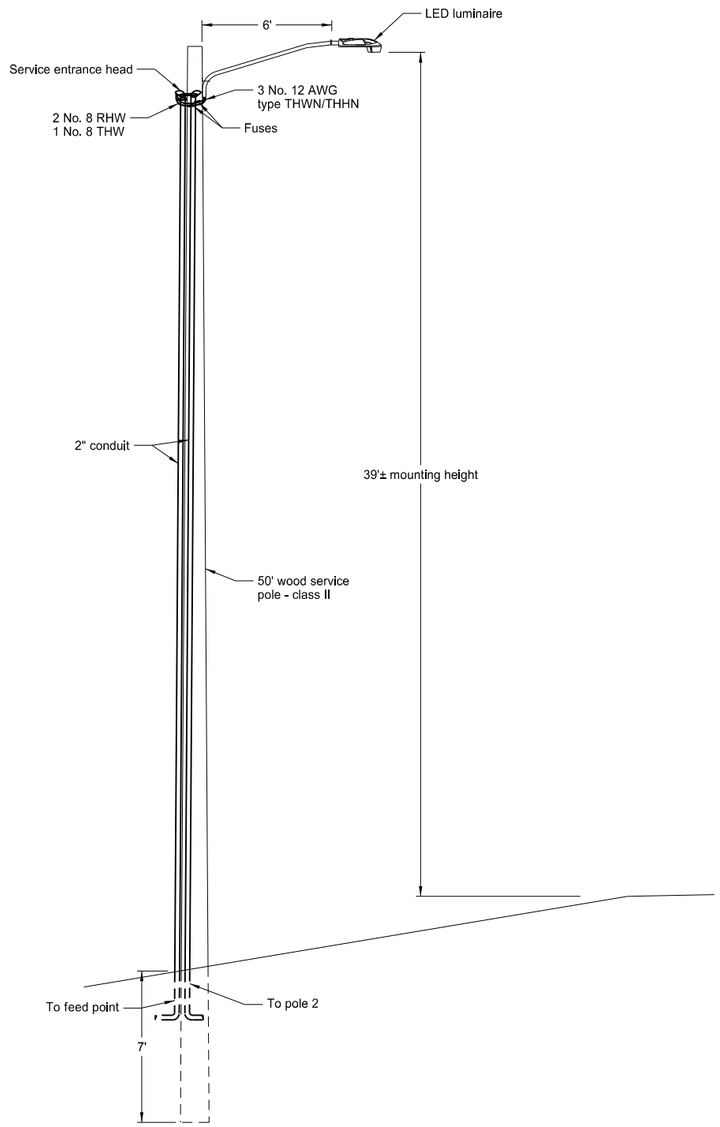
This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

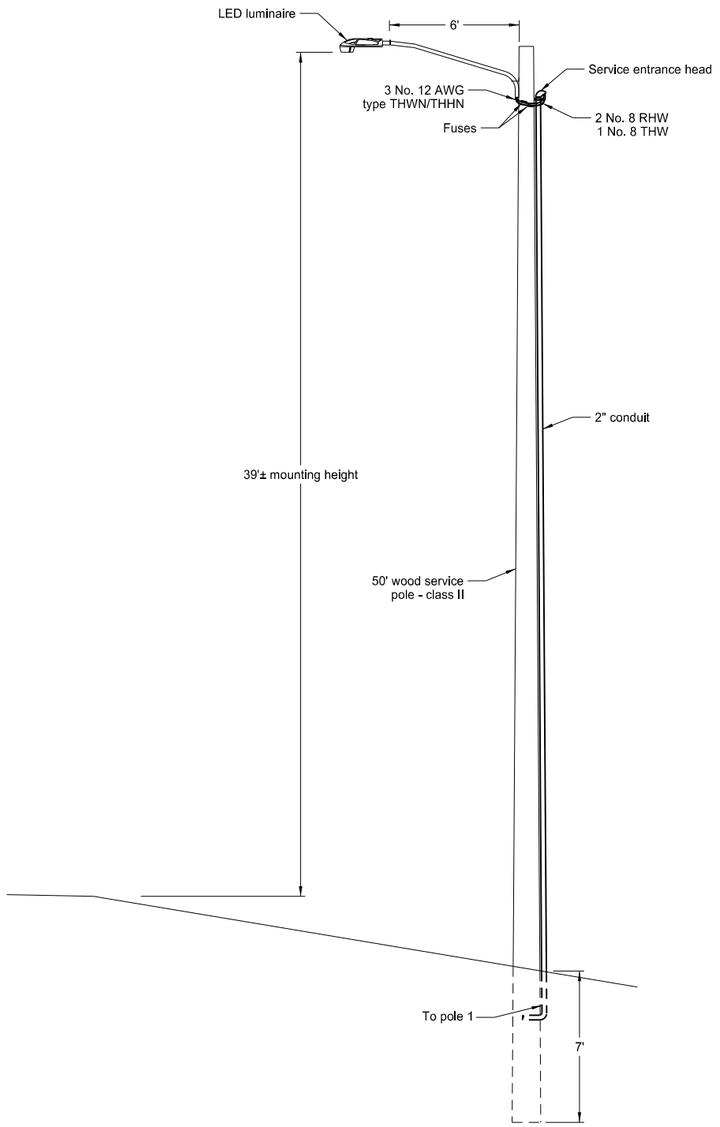
Destination Lighting Tables

9 West of ND Hwy 41 - WB

US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	140	3





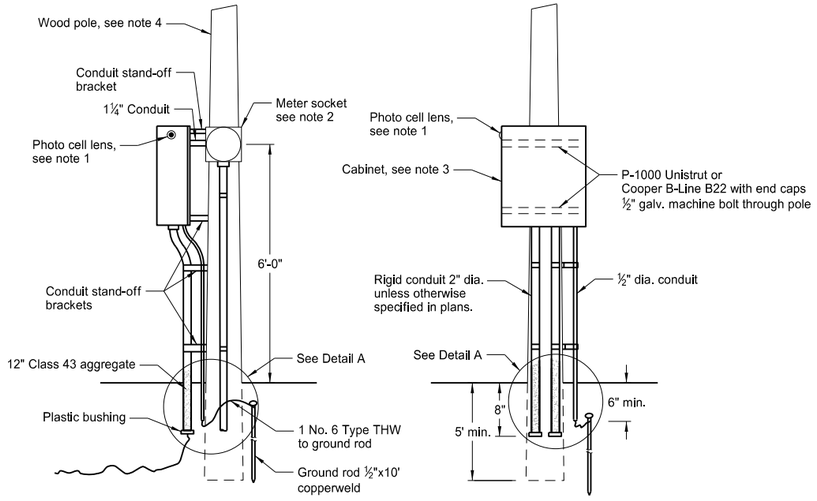
This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Destination Lighting Detail
Pole mounted standard

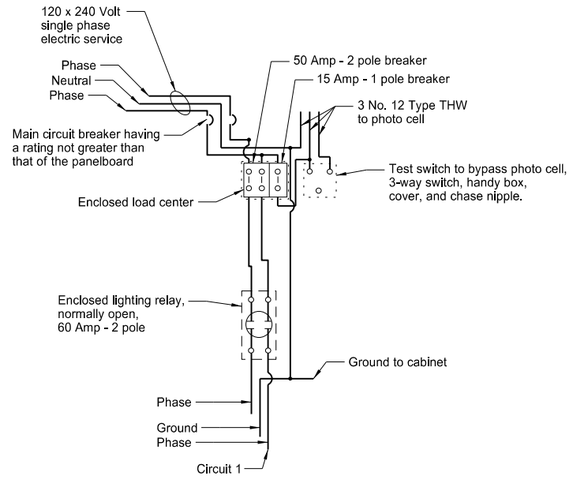
9 West of ND Hwy 41 - WB

US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	140	4



Feed Point Pole Mounted



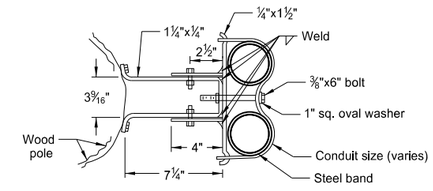
Feed Point Type I

Type I feed point has one electrical circuit, one 50 Amp - 2 pole breakers and one lighting relay, normally open.

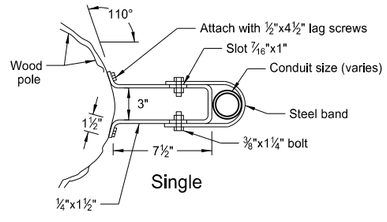
Notes:

1. Photo Cell: Furnish and install the photoelectric cell. Face the photo lens north.
2. Meter Socket: Install the meter socket and trim. Meter to be furnished and installed by Utility Company. Ensure the meter is not mounted on the same side of the cabinet as the photo cell.
3. Pole Mounted Cabinet: Provide cabinet with lock drip shield, factory installed steel backing, stainless steel hardware, and side hinge door. Paint the cabinet with one shop coat of primer and two coats of exterior gray enamel.

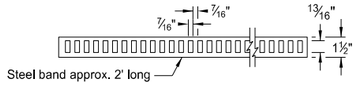
   Type I cabinet is 30" high x 24" wide x 8" deep.
4. Wood Pole: 20' Class VII full length penta pressure treated wood pole.
5. Grounding Grid: The ground resistance not to exceed 25 ohms. Obtain this by using one or more $^{5}/_{8}$"x10' copperweld ground rods in parallel or series at two corners. Provide a minimum distance between ground unit assemblies of 6'0".



Double

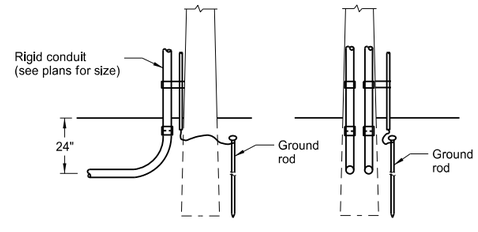


Single



Conduit Standoff Bracket

The conduit standoff brackets may be omitted if not required by the local utility company.



Detail A

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE- 5047, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

Destination Lighting Detail
Wood Pole Mounted Feed Point

9 West of ND Hwy 41 - WB

US Hwy 2

23 U.S.C. 409
NDDOT Reserves All Objections

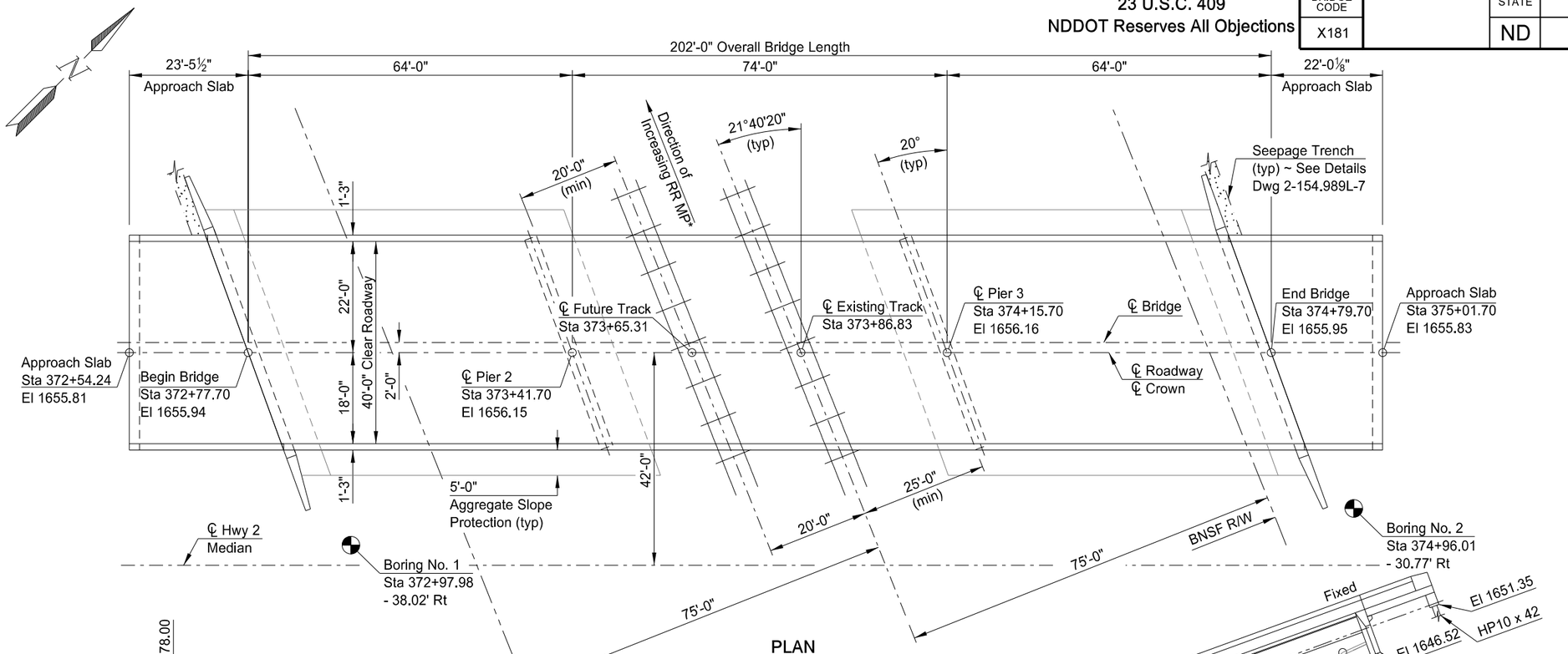
BRIDGE CODE		STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
X181		ND	NH-4-002(118)154	170	1

DESIGN STRENGTHS:

f'c = 3,000 psi ~ Class AE-3 Concrete
f'c = 4,000 psi ~ Class AAE-3 Concrete
f'c = 5,000 psi ~ Prestressed Beam Concrete
f'c = 5,700 psi ~ Prestressed Beam Concrete
fy = 60,000 psi ~ Reinforcing Steel

Load & Resistance Factor Design

* Nearest Railroad Station: Minot Passenger



SURVEY CONTROL POINTS			
POINT	NORTHING	EASTING	ELEVATION
RTK 1123	450,789.53	1,814,913.47	1621.80
RTK 1126	450,783.75	1,815,179.13	1649.46

SPECIAL PROVISIONS	
SP 4(14)	MIGRATORY BIRD TREATY ACT
SP 499(14)	RAILROAD REQUIREMENTS

STANDARD DRAWINGS

D-622-1, D-714-18, D-900-1

F.W.S. 15 PSF

HL-93 DESIGN LOADING

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
BNSF RAILROAD SEPARATION
LS 0034, MP 225.21, K O SUB
LATITUDE 48.2337114, LONGITUDE -101.1303224
BRIDGE LAYOUT

PROJECT: NH-4-002(118)154
STATION: 373+78.70
WARD COUNTY

02/15/19 — Jon Ketterling
DATE — BRIDGE ENGINEER

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/29/19 and the original document is stored at the North Dakota Department of Transportation

NOTES

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	2

100 SCOPE OF WORK: This project consists of building a new 3-span prestressed concrete spread box beam bridge with an overall bridge length of 202'-0" and a clear roadway width of 40'-0".

100 GENERAL: Include the cost of furnishing and placing preformed expansion joint filler, concrete inserts, rebar couplers, silicone sealant, waterproof membrane, and other miscellaneous items in the price bid for Class AE-3 and AAE-3 concrete.

107 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project crosses the BNSF Railway Company at MP 225.210. The type of work that will be performed within the railroad right of way is a bridge replacement. Direct inquiries regarding protective liability insurance to:

Rosa Martinez
Marsh USA Inc.
4400 Comerica Bank Tower
1717 Main Street
Dallas, TX 75201-7357, USA
214-303-8519
Rosa.M.Martinez@marsh.com

Obtain information regarding crossing number DOT 102434V from the Federal Railroad Administration website: http://safetydata.fra.dot.gov/Officeofsafety/

107 HAZARDOUS MATERIAL: The existing structural steel is painted with lead-based paint. Certain Contractor operations could expose employees to hazardous levels of lead. The Contractor shall plan accordingly and shall inform employees of the hazards of lead-based paint. Any loose and peeling paint found on the existing structural steel shall be removed, contained, and disposed of properly, prior to the removal of the existing structure.

202 REMOVAL OF STRUCTURE: The existing structure is a 3-span steel rolled beam bridge, 131'-0" long with a clear roadway width of 30'-0". There are 50'-0" approach slabs on both ends of the bridge, with safety shapes and curb on the entrance end and curbs on the exit end. The original concrete abutments are supported on timber pile. Additional concrete supported by steel piling was placed to buttress the original abutments. The piers are structural steel bents with concrete footings supported on timber piling. Include all work required to remove the bridge, concrete slope protection, approach slabs, safety shapes, and curbs in the contract unit price for "Removal of Structure."

202 CONSTRUCTION SUBMITTALS: The construction submittals, as outlined in the following guidelines, must be reviewed and approved prior to construction activity within BNSF right of way. Construction submittals shall be sent to the Engineer for review. A minimum of seven (7) working days shall be expected for the Engineer's initial review. After initial review, the Engineer will forward the construction submittals to BNSF for final review and approval. A minimum of four (4) weeks shall be expected for the Railroad's review after the complete submittal is received. Operationally critical work activities may take up to six (6) weeks for review. Operationally critical work includes any activities which may impact the safe operation of trains. Revised submittals will follow the same procedure as the initial submittal. All costs associated with the completion of this work shall be included in the price bid for "Removal of Structure – LSUM".

Specific requirements for the construction submittals are included in the following guidelines:

"REQUIRED CONSTRUCTION SUBMITTALS": Railroad Requirements SP 499(14) Exhibit "H" Section 3.01.04

"BNSF RAILWAY COMPANY GUIDELINES FOR PREPARATION OF BRIDGE DEMOLITION & REMOVAL PLAN OVER THE BNSF RAILWAY": Section I-VIII provides all applicable requirements, including but not limited to, coordination of track windows, track protection, demolition and bridge removal which can be found at https://www.bnsf.com/in-the-community/pdf/bnsf-demolition-guideline.pdf.

"UNION PACIFIC RAILROAD-BNSF GUIDELINES FOR RAILROAD GRADE SEPARATION PROJECTS": Section 1-4 provides all applicable requirements, including but not limited to, shoring, falsework, demolition, erection, erosion control, and construction phasing plans which can be found at https://www.up.com/cs/groups/public/documents/document/pdf_rr_grade_sep_projects.pdf

210 EXCAVATION: Include the excavation costs at the abutments and approach slabs, as shown in the "Detail at Abutment", and the excavation costs at the piers in the lump sum bid item, "Class 1 Excavation."

602 DIAPHRAGMS AND ENDWALLS: Place the intermediate diaphragm concrete before the deck concrete and allow the diaphragms to cure at least 72 hours before deck placement. Place the pier diaphragm and endwall concrete at the same time as the deck concrete.

602 DECK PLACEMENT: Place the deck concrete at a minimum rate of 35 CY per hour.

602 DECK FORMS: Remove all deck forms within 14 days from the end of the curing period.

This document was originally issued and sealed by Dustin Wing, Registration Number PE-7128, on 01/22/19 and the original document is stored at the North Dakota Department of Transportation.

NOTES

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	3

602 SURFACE FINISH “D”: Apply Surface Finish “D” on the inside, top, and back surfaces of the bridge and approach slab barrier. Use gray surface finish, color number 36424 meeting Federal Standard 595B.

602 LONGITUDINAL GROOVING: Do not run a metal tine transversely across the deck or approach slab surfaces immediately following the artificial grass drag as per 602.04 D. After the curing of the deck and approach slabs is complete and before the penetrating water repellent is applied, cut longitudinal grooves into the deck and approach slabs using a mechanical cutting device. Perform any required surface correction grinding to the deck and approach slabs prior to grooving it. Cut grooves that are 1/8 inch in width (±1/64 inch) and 1/8 inch in depth (±1/64 inch). Space grooves at ¾ inch center to center. Stop the grooving 2 feet from the face of the barrier/curb and 6 inches from the beginning and end of the deck and approach slabs. Include the price for grooving in the bid item “Class AAE-3 Concrete.”

602 PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution according to Section 602.04 J with the modification that special surface finish, if required, is to be applied prior to penetrating water repellent treatment.

622 PILING: Drive abutment and approach slab piling with a diesel hammer with a rated energy and ram weight (minimum of 2,800 pounds) of at least 31,952 foot-pound-tons computed by the formula:

$$W(E–12{,}936) + 0.494E$$

Drive pier piling with a diesel hammer with a rated energy and ram weight (minimum of 4,000 pounds) of at least 70,471 foot-pound-tons computed by the formula:

$$W(E–22{,}176) + 0.638E$$

W = Weight of the ram (tons)
E = Rated hammer energy

Run the hammers at an energy that produces a penetration at bearing between ½ inch and 3 inches in the last 10 blows.

930 ROADWAY CANOPY: A canopy is required to be constructed above the railroad under the existing structure and under the new structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the Contractor from any responsibility for the safety of the public.

Submit the canopy details, including materials that will be used, to the Engineer for review. The canopy will provide a minimum vertical clearance of 21'-6" above the railroad tracks and traveled roadway. The canopy will be extended a minimum distance of 10'-0" beyond the outside edge of deck of the structure and a minimum distance of 10'-0" beyond the edge of the railroad track beneath the structure.

Construct the canopy before removing the concrete deck. The canopy will also be in place before installing forming for the new deck and remain in place until after the new superstructure is complete. The canopy may be supported from the ground or suspended from the beams. Complete the installation of the canopy in a minimum amount of time and with the least inconvenience to the public.

Once the bridge superstructure is completed, remove the canopy. Roadway canopy will be paid for at the contract unit price for “Roadway Canopy.” Payment for “Roadway Canopy” includes the construction, maintenance, and removal of the canopy system.

930 RAILROAD FLAGGING: Provide a minimum of at least 30 working days notice to the Railways Roadmaster, at telephone (417) 761-1919, in advance of when flagging services will be required to bulletin the flagger’s position and provide 5 working days notice to the Roadmaster to abolish the position per union requirements.

This document was originally issued and sealed by Dustin Wing, Registration Number PE-7128, on 01/29/19 and the original document is stored at the North Dakota Department of Transportation.

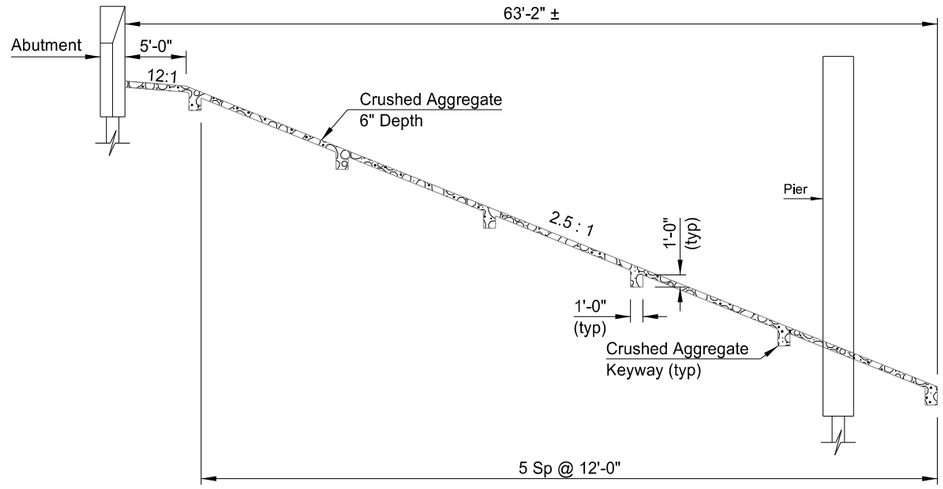
23 U.S.C. 409
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	4

	1'-6" Begin Bridge	10 Eq Sp = 62'-0"											10 Eq Sp = 73'-0"												10 Eq Sp = 62'-0"											1'-6" End Bridge
		End of Beam Abut 1									1'-0" End of Beam Pier 2		End of Beam Pier 2								1'-0" End of Beam Pier 3		End of Beam Pier 3								End of Beam Abut 4						
℄ BEAM 1	1655.48	1655.49	.55	.60	.64	.68	.71	.73	.74	.74	.73	1655.72	1655.72	.78	.83	.87	.90	.91	.91	.88	.85	.81	1655.75	1655.75	.77	.78	.78	.78	.76	.74	.71	.67	.62	1655.57	1655.57
℄ BEAM 2	1655.69	1655.70	.75	.80	.85	.88	.91	.93	.93	.93	.93	1655.92	1655.92	1655.97	1656.02	.06	.09	.10	.09	.07	1656.04	1655.99	1655.94	1655.93	.95	.96	.96	.96	.94	.92	.89	.85	.80	1655.75	1655.74
℄ BEAM 3	1655.89	1655.90	1655.95	1656.00	.05	.08	.11	.12	.13	.13	.12	1656.11	1656.11	.17	.22	.25	.28	.29	.28	.26	.22	.17	1656.12	1656.12	.13	.14	.14	.13	.12	.10	.06	1656.02	1655.97	1655.92	1655.91
℄ BEAM 4	1655.80	1655.81	.86	.91	.96	1655.99	1656.01	.03	.04	.03	.02	1656.01	1656.01	.07	.12	.15	.18	.18	.17	.15	.11	.06	1656.01	1656.01	.02	.03	.03	.02	1656.00	1655.98	.94	.90	.85	1655.80	1655.79
℄ BEAM 5	1655.63	1655.64	.69	.74	.78	.81	.84	.85	.86	.85	.84	1655.83	1655.83	.88	.93	.97	.99	.99	.99	.96	.92	.87	1655.81	1655.81	.82	.83	.83	.82	.81	.78	.74	.70	.65	1655.59	1655.59

Beam 1 is the North beam.

SCREED ELEVATION



AGGREGATE SLOPE PROTECTION DETAIL

NOTE:

AGGREGATE SLOPE PROTECTION: Place aggregate slope protection on the embankment slopes as shown.

Clear the subgrade of rubbish and vegetation before placing the aggregate slope protection. Thoroughly compact all loose material. Excavate or backfill as required to obtain the plan cross-section or lines and grades established in the field.

The gradation of the material used to form the slope protection is given in the following chart:

Sieve Size	% Passing
2"	100%
¾"	5-35%
#4	0-5%

The minimum fractured face requirement of the aggregate is 50% by weight on the portion of the aggregate retained on the No. 4 sieve. To be considered fractured the rock must have at least one fractured face.

Deposit, spread, consolidate, and shape the aggregate by mechanical or hand methods to provide a uniform depth and density and produce a uniform surface appearance. Apply MC-250 that meets the requirements of Section 818.02 C, "Medium-Curing Cutback Asphalt" at an approximate rate of 1.8 gallons per square yard. The bituminous materials are to penetrate to a depth of not less than one-half the required thickness of the aggregate. Protect adjacent structure surfaces against bituminous splatter.

An additional 50 SY was included in the quantities to allow for shaping of the slope protection around the irregular slopes at pier 2.

Include all costs for labor, materials, and equipment to complete this work in the unit price bid for "Aggregate Slope Protection."

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
107	0100	RAILROAD PROTECTION INSURANCE	L SUM	1
202	0105	REMOVAL OF STRUCTURE	L SUM	1
210	0099	CLASS 1 EXCAVATION	L SUM	1
210	0201	FOUNDATION PREPARATION	EA	1
602	0130	CLASS AAE-3 CONCRETE	CY	303.6
602	1130	CLASS AE-3 CONCRETE	CY	289.4
602	1134	PILE SUPPORTED APPROACH SLAB	SY	214.8
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1065
604	9620	PRESTRESSED BOX BEAM-33 IN	LF	985
612	0115	REINFORCING STEEL-GRADE 60	LBS	21,254
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	68,828
622	0020	STEEL PILING HP 10 X 42	LF	1420
622	0060	STEEL PILING HP 14 X 73	LF	805
930	3000	BRIDGE BENCH MARKS	SET	1
930	7012	ROADWAY CANOPY	L SUM	1
930	8230	SHORING	EA	1
930	8686	AGGREGATE SLOPE PROTECTION	SY	835
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2

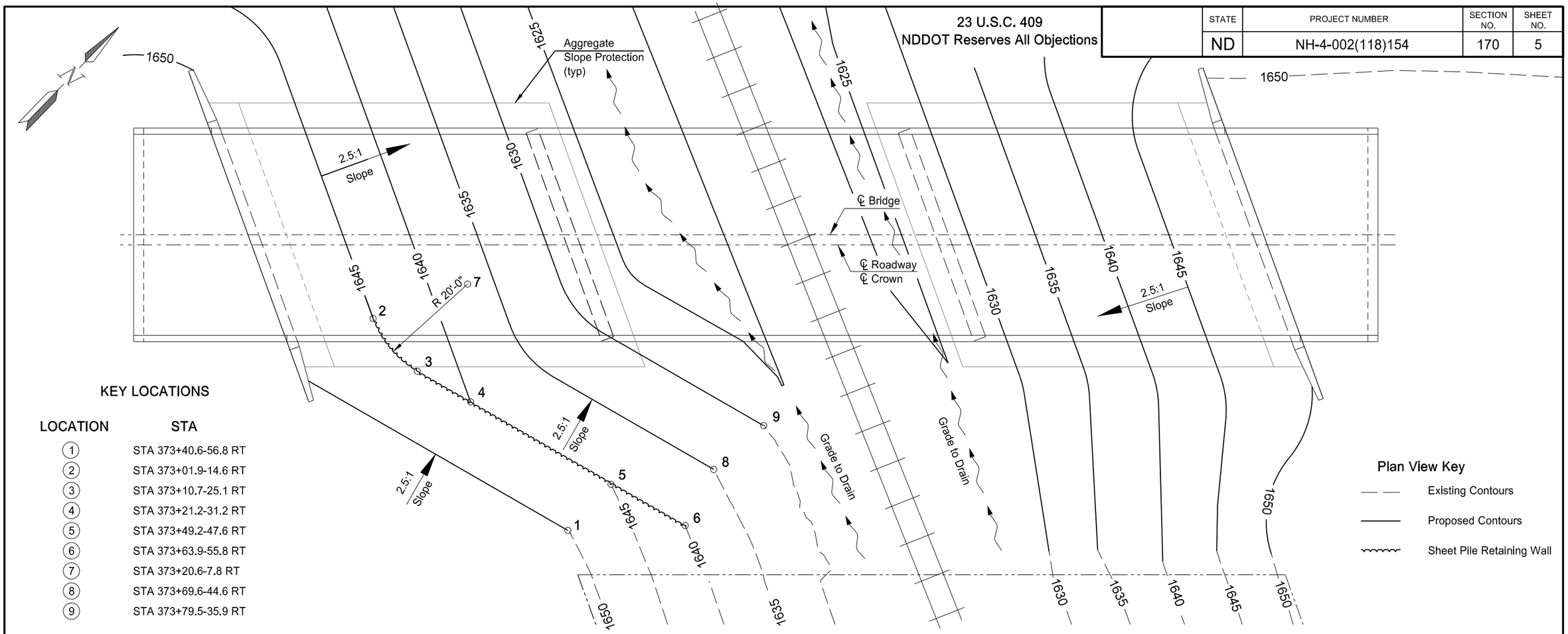
This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/11/19 and the original document is stored at the North Dakota Department of Transportation

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

SCREED ELEVATIONS, BID ITEM QUANTITIES & SLOPE PROTECTION DETAIL

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	5



PLAN

KEY LOCATIONS

LOCATION	STA
①	STA 373+40.6-56.8 RT
②	STA 373+01.9-14.6 RT
③	STA 373+10.7-25.1 RT
④	STA 373+21.2-31.2 RT
⑤	STA 373+49.2-47.6 RT
⑥	STA 373+63.9-55.8 RT
⑦	STA 373+20.6-7.8 RT
⑧	STA 373+69.6-44.6 RT
⑨	STA 373+79.5-35.9 RT

Plan View Key

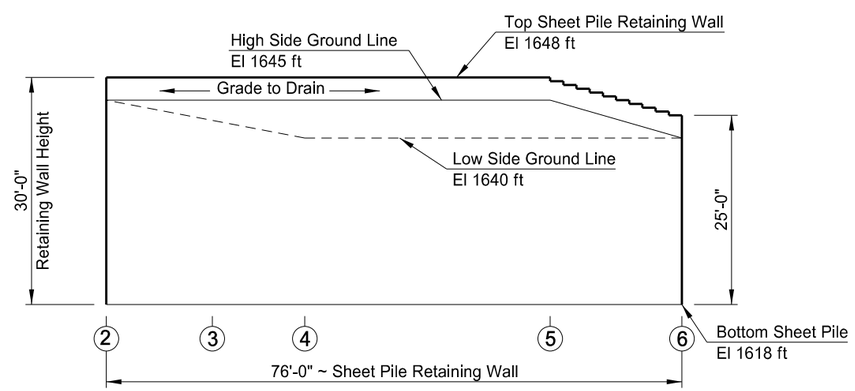
- Existing Contours
- Proposed Contours
- Sheet Pile Retaining Wall

NOTES:

930 SHORING: Install 76 LF of sheet pile retaining wall. Grade the ground elevation on the high side of the retaining wall to elevation 1645 ft from Point 2 to Point 5, and transition the grade down from Point 5 to Point 6. Grade the ground elevation on the low side of the retaining wall to elevation 1640 ft from Point 4 to Point 6, and transition the grade up from Point 4 to Point 2.

Use steel sheet piling that has a minimum section modulus of 18.1 in^3, meets AASHTO M 202, and is galvanized in accordance with Section 854. Drive the sheet pile to a bottom elevation of 1618 ft. Provide a top elevation of 1648 ft for the sheet pile retaining wall from Point 2 to Point 5. Transition the top elevation of the retaining wall from elevation 1648 ft at Point 5 to elevation 1643 ft at Point 6.

Include all costs for material, equipment, and labor to complete the work as specified in the price bid for Shoring. Include costs for any temporary shoring required for the construction of the bridge in the price bid for Foundation Preparation.



RETAINING WALL ELEVATION

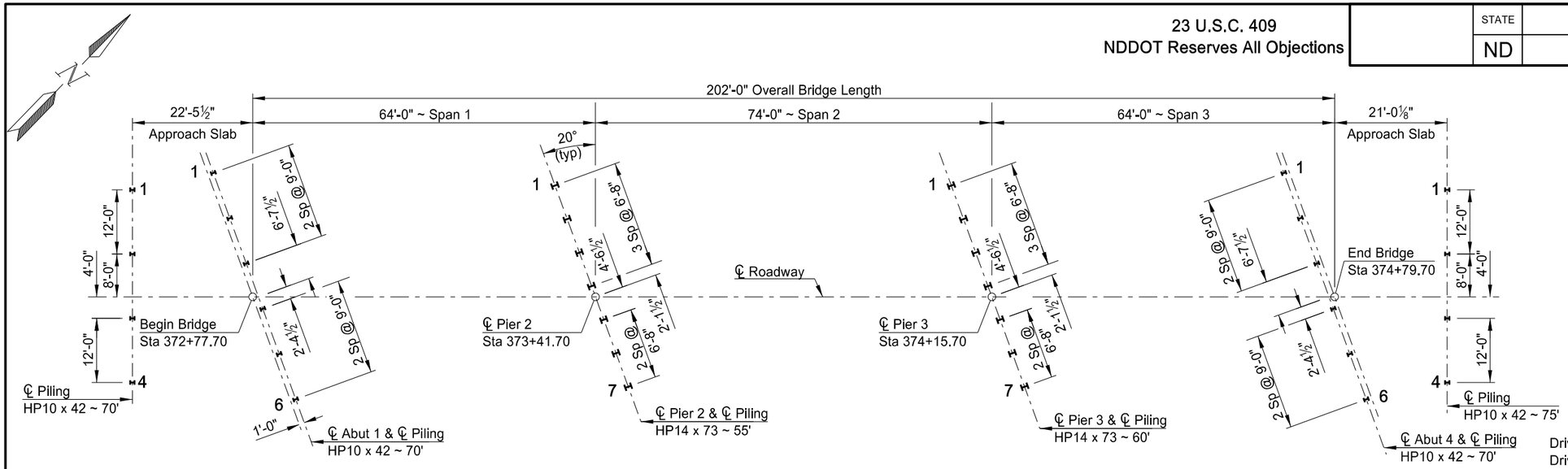
QUANTITIES	
SHORING	1 EA

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

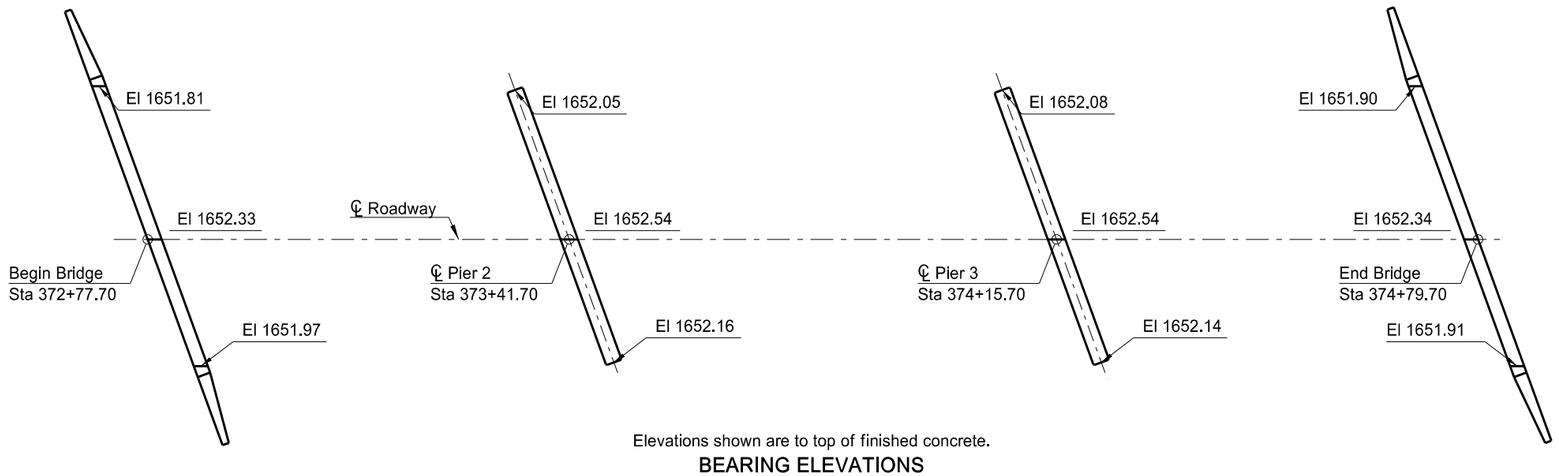
CONTOURS

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	6



PILING LAYOUT



Elevations shown are to top of finished concrete.

BEARING ELEVATIONS

NOTE:

For double acting or single acting diesel hammers, calculate the safe bearing value of piles by the following formula:

$$P = \frac{4.5E}{S + 0.2} \times \frac{W + 0.2M}{W + M}$$

Where:

P = Safe bearing value, in pounds.
W = Weight of striking parts (ram), in pounds.
M = Weight of parts being driven, in pounds. Includes pile weight, anvil (if any), driving cap, etc.
E = Energy per blow, in foot-pounds.
S = Average penetration of pile in inches per blow for last ten blows.

For single acting hammers, calculate E by multiplying observed stroke (ft) and W (lbs).

Drive the HP10 x 42 Pile to a safe bearing value of 105 tons.
Drive the HP14 x 73 Pile to a safe bearing value of 180 tons.

PILE COORDINATES

	PILE	NORTHING	EASTING
APPR	1	450,682.01	1,814,971.45
	4	450,656.15	1,814,996.49
ABUT 1	1	450,694.77	1,814,980.10
	6	450,675.11	1,815,020.58
PIER 2	1	450,737.47	1,815,027.56
	7	450,719.99	1,815,063.54
PIER 3	1	450,788.96	1,815,080.71
	7	450,771.48	1,815,116.69
ABUT 4	1	450,833.84	1,815,123.66
	6	450,814.18	1,815,164.14
APPR	1	450,852.80	1,815,147.75
	4	450,826.95	1,815,172.80

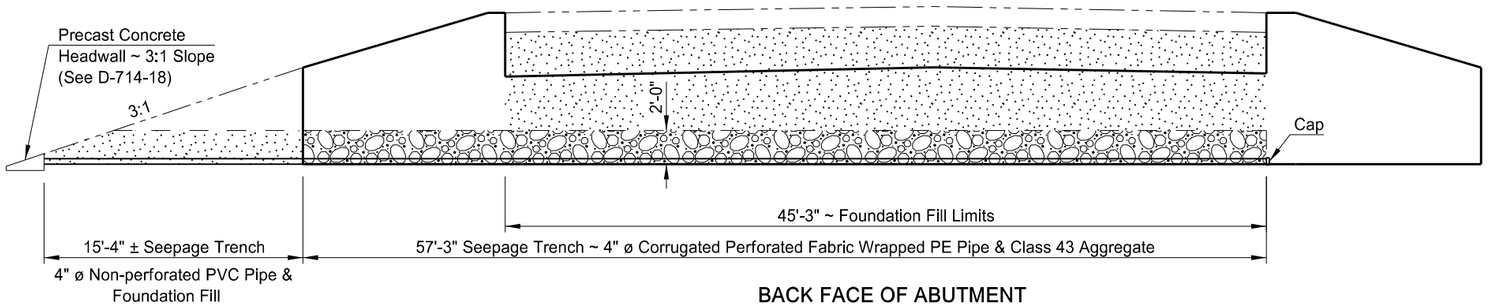
This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/29/19 and the original document is stored at the North Dakota Department of Transportation

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

PILING LAYOUT &
BEARING ELEVATIONS

23 U.S.C. 409
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	7

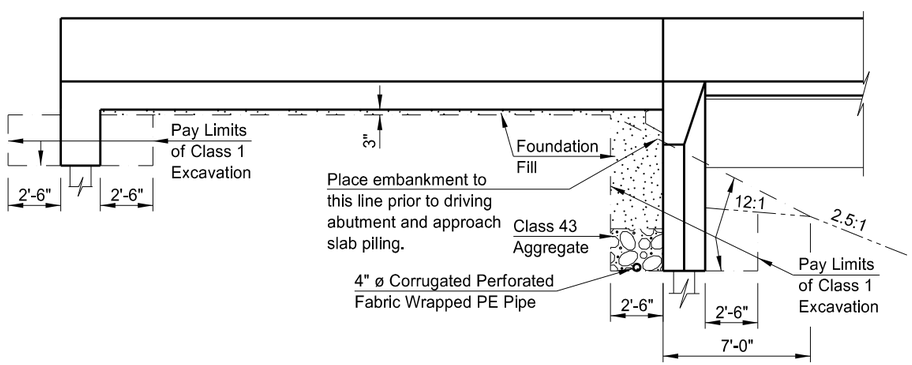


BACK FACE OF ABUTMENT

NOTES:

Use corrugated perforated fabric wrapped PE pipe that meets the requirements of Section 830.03 A.4. Provide fabric wrapping for the pipe that meets the requirements of Section 858.01 for D3 or D4 drainage fabric. Use non-perforated pipe that meets the requirements of Section 830.03 A.3. Provide aggregate that meets the requirements of Section 816.03, Class 43. Provide foundation fill that meets the requirements of Section 210.

Include the cost to furnish and place the foundation fill, aggregate, corrugated perforated pipe, non perforated pipe and headwalls in the pay item "Abutment Underdrain System."



DETAIL AT ABUTMENT

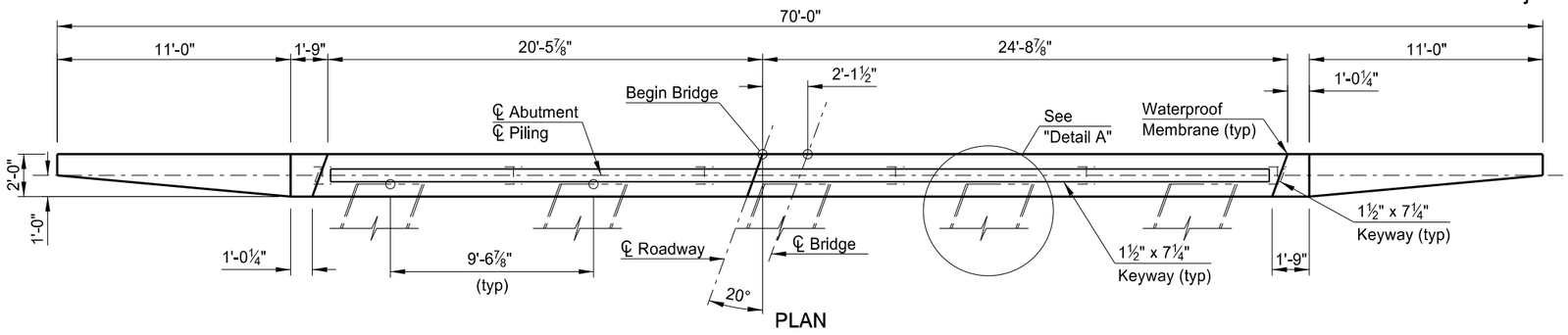
This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

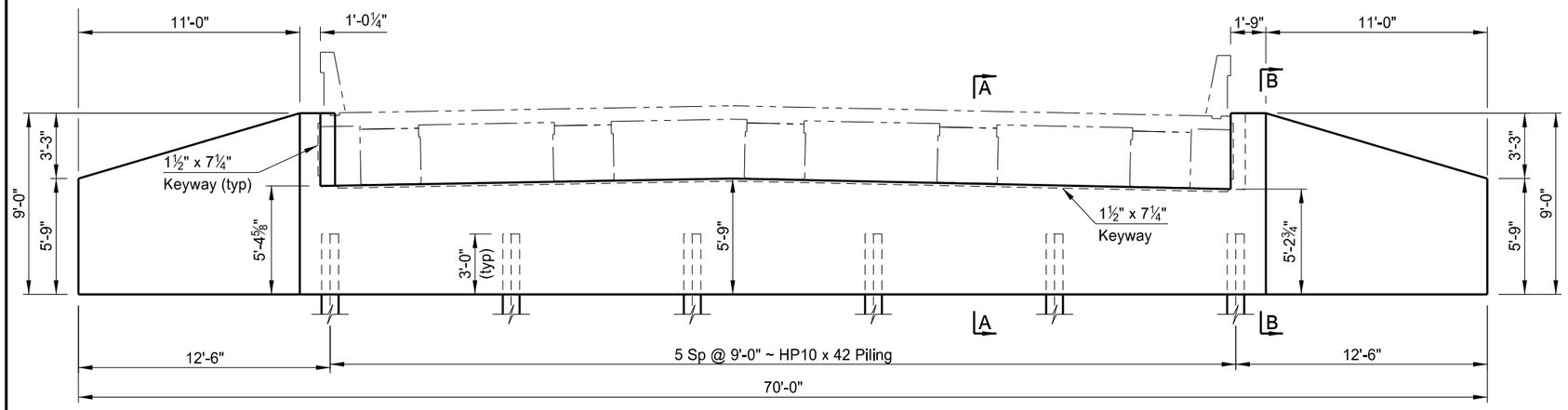
ABUTMENT UNDERDRAIN &
EXCAVATION DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

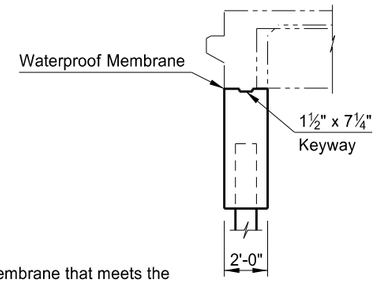
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	8



PLAN

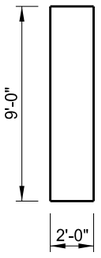


ELEVATION



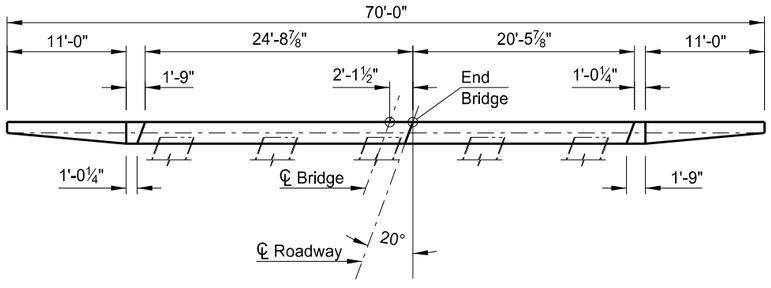
A-A

NOTE:
Use waterproof membrane that meets the requirements of Section 602.03 B. Center the waterproof membrane (1'-0" minimum width) on the joint.

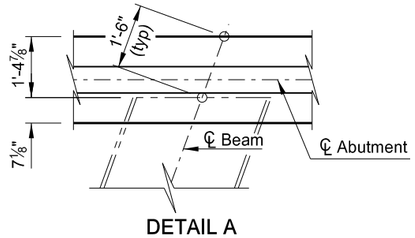


B-B

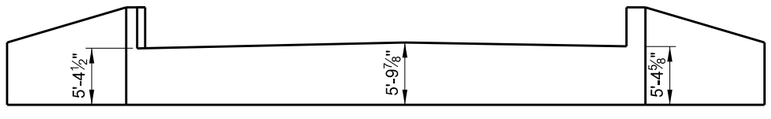
NOTE:
Abutment 1 shown in elevation view, facing southwest.



(SHOWING DIMENSIONS)
ABUTMENT 4 PLAN



DETAIL A



(SHOWING BACKWALL HEIGHTS, FACING NORTHEAST)
ABUTMENT 4 ELEVATION

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES
SEE DWG 2-154.989L-9

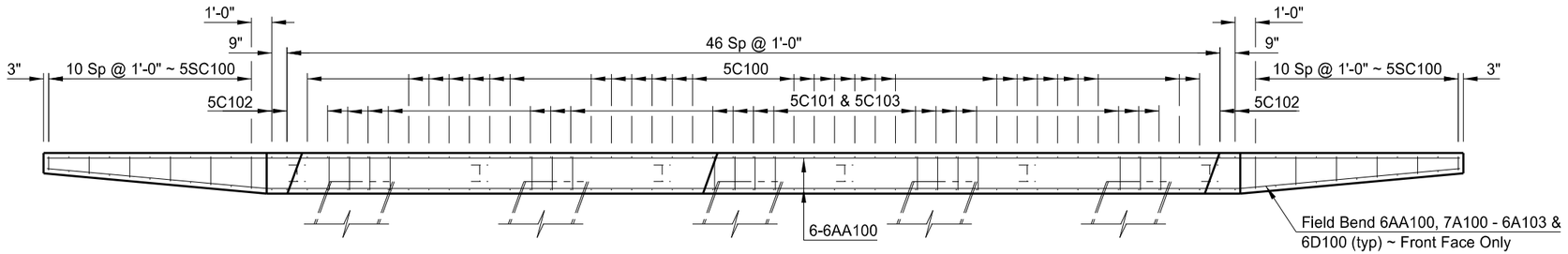
BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

(SHOWING DIMENSIONS)

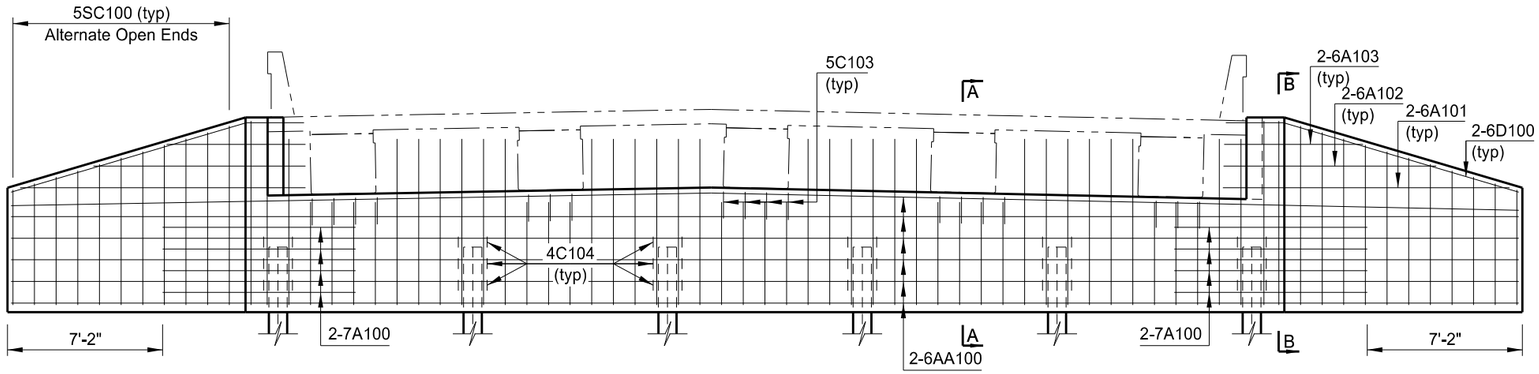
ABUTMENT DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

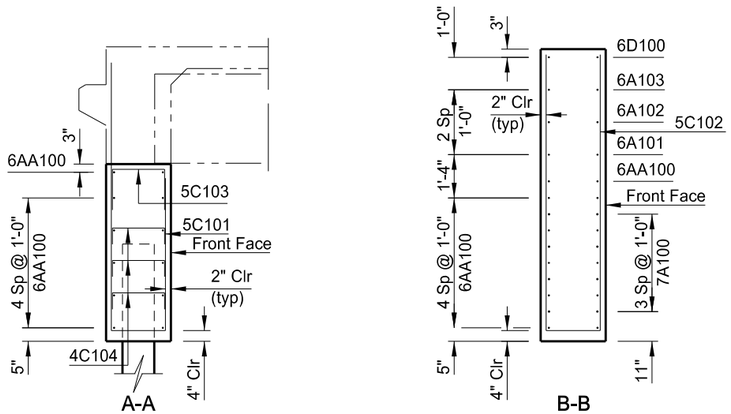
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	9



PLAN



ELEVATION



This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/29/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES	(ONE ABUTMENT)
CLASS AE-3 CONCRETE	29.9 CY
REINFORCING STEEL	3,174 LBS

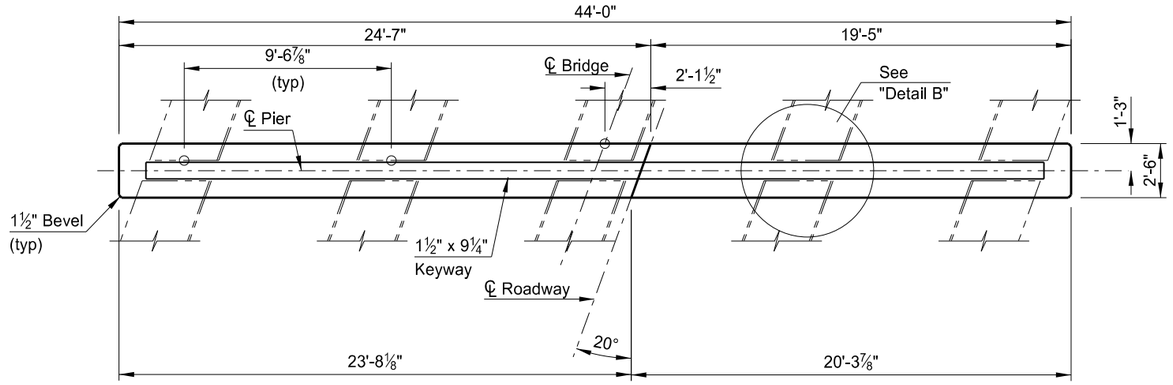
BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

(SHOWING REINFORCING)

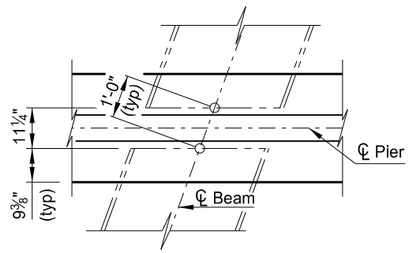
ABUTMENT DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

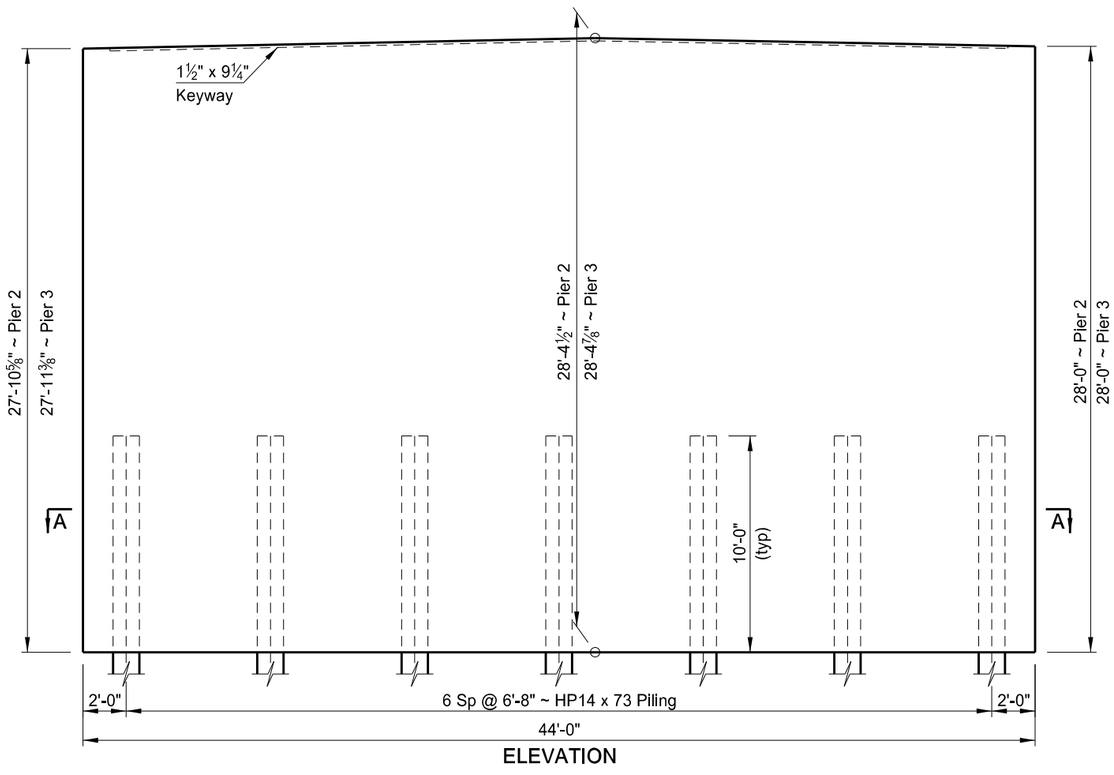
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	10



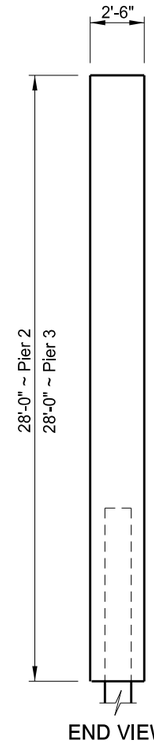
PLAN



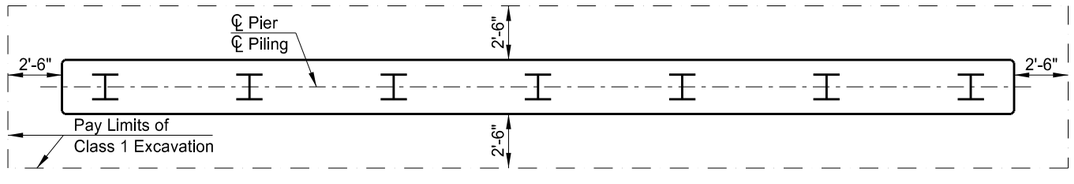
DETAIL B



ELEVATION



END VIEW



A-A

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES

SEE DWG 2-154.989L-11

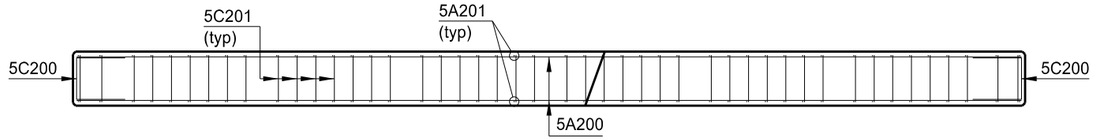
BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

(SHOWING DIMENSIONS)

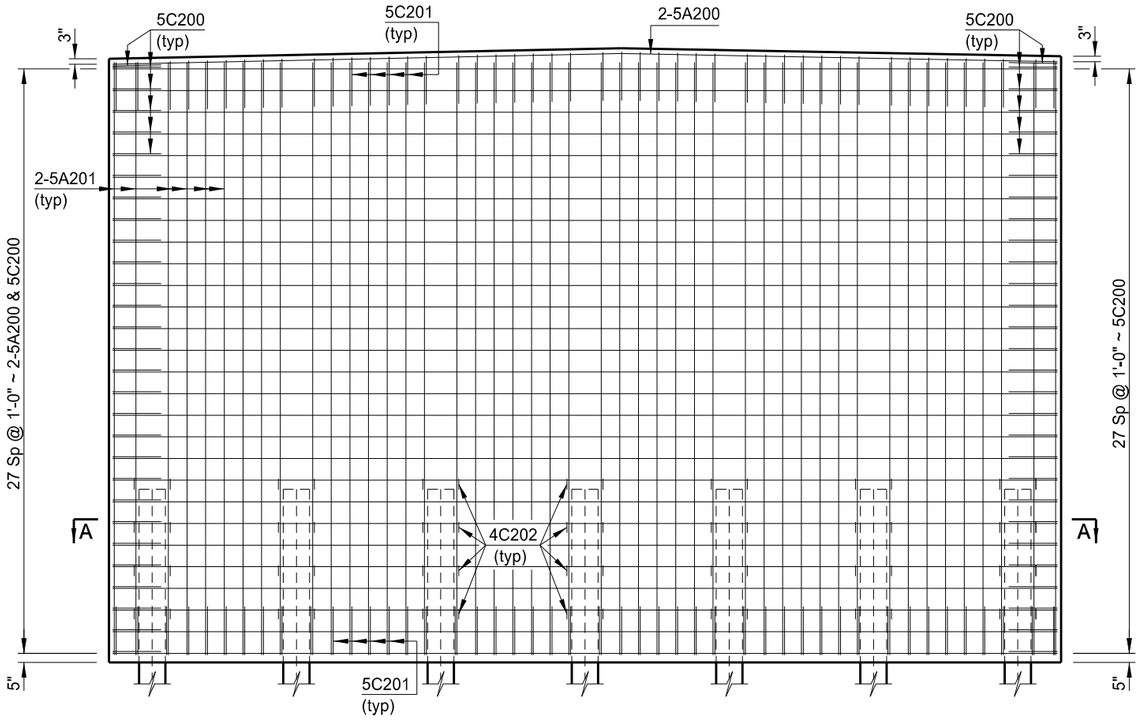
PIER DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

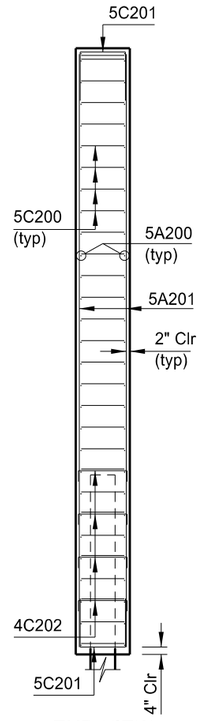
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	11



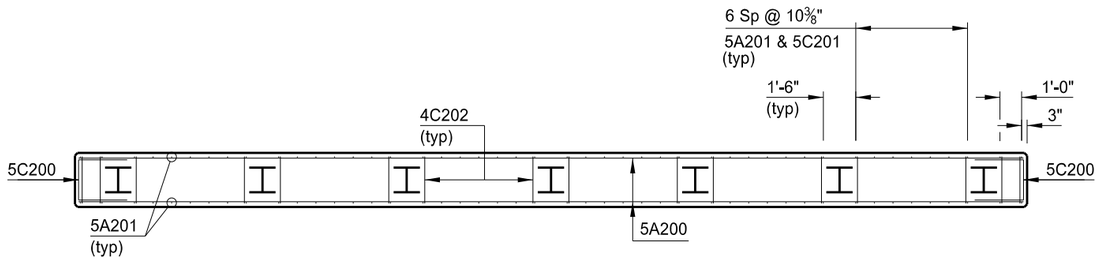
PLAN



ELEVATION



END VIEW



A-A

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES	(ONE PIER)
CLASS AE-3 CONCRETE	114.8 CY
REINFORCING STEEL	6,416 LBS

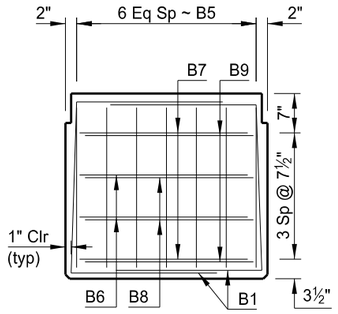
BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

(SHOWING REINFORCING)

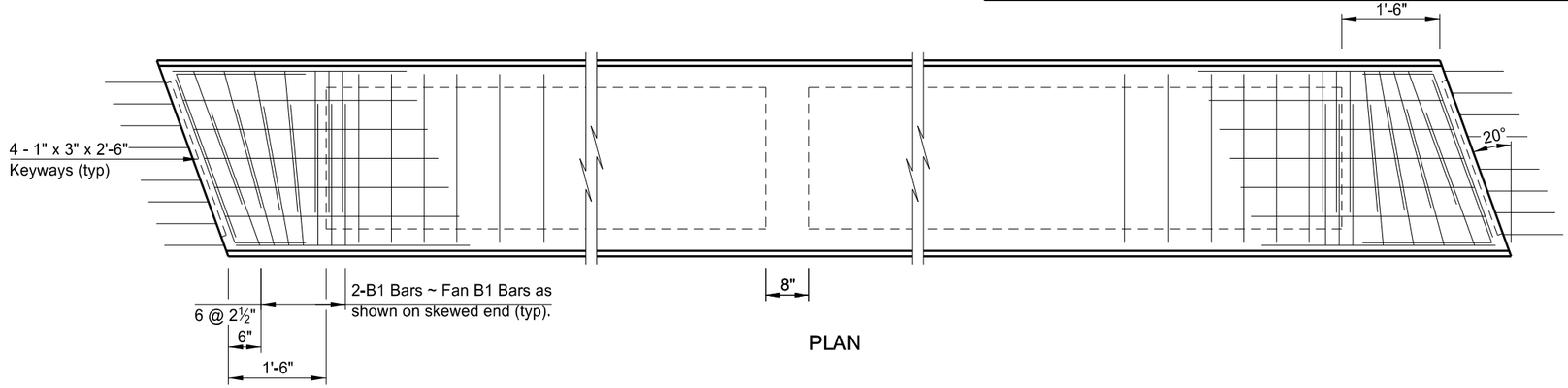
PIER DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

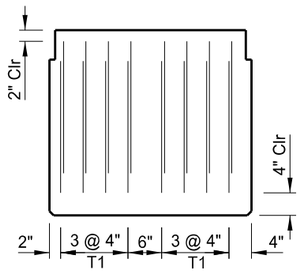
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	12



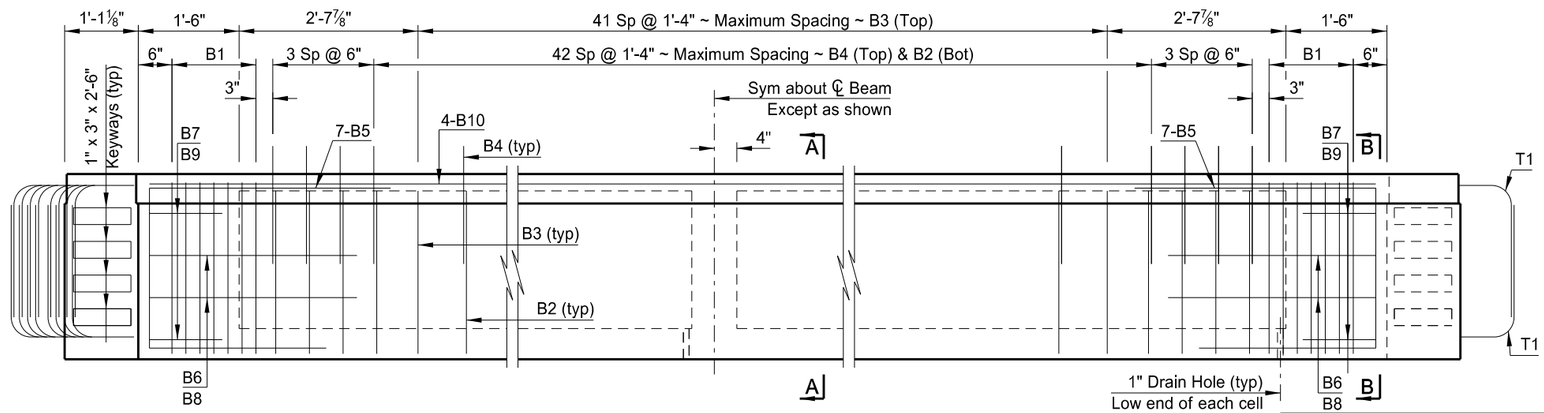
B-B



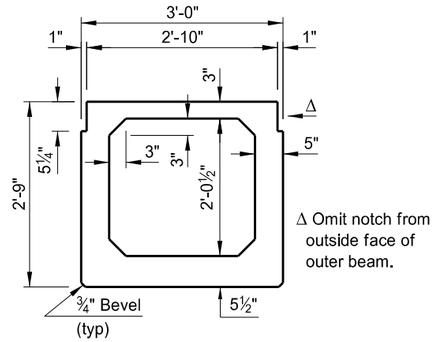
PLAN



END VIEW



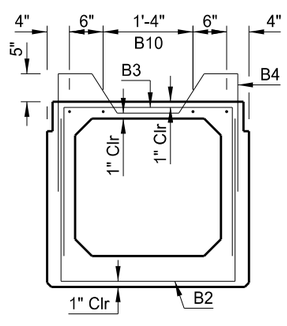
ELEVATION



Δ Omit notch from outside face of outer beam.

(SHOWING DIMENSIONS)

A-A



(SHOWING REINFORCING)

A-A

** Field bend as shown (Grade 40).

* Welded Wire Reinforcing with minimum circumferential steel area of 0.15 sq in per ft may be substituted for B2 and B3 bars.

BAR LIST ~ ONE BEAM

	MARK	SIZE	NO.	LENGTH	SHAPE
	B1	4	28	6'-11"	BENT
*	B2	4	49	7'-5"	BENT
*	B3	4	42	7'-0"	BENT
	B4	4	49	6'-9"	BENT
	B5	5	14	8'-7"	BENT
	B6	4	4	5'-9"	BENT
	B7	4	4	3'-9"	BENT
	B8	4	4	6'-8"	BENT
	B9	4	4	4'-8"	BENT
	B10	4	8	32'-4"	STR
**	T1	4	32	4'-9"	STR

QUANTITIES (ONE BEAM)

BEAM LENGTH	62.0 LF

BEAM SECTION DATA

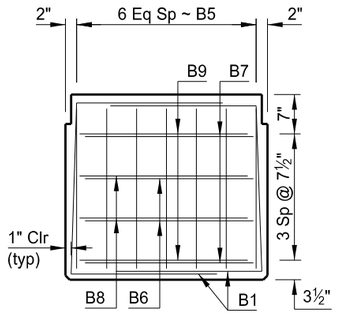
WT = 601.2 LBS/FT + 3171 LBS
CROSS SECTIONAL AREA = 558.5 IN^2
C.G. (FROM BOTTOM) = 14.85 IN
I = 73,708 IN^4
S_B = 4,964 IN^3

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

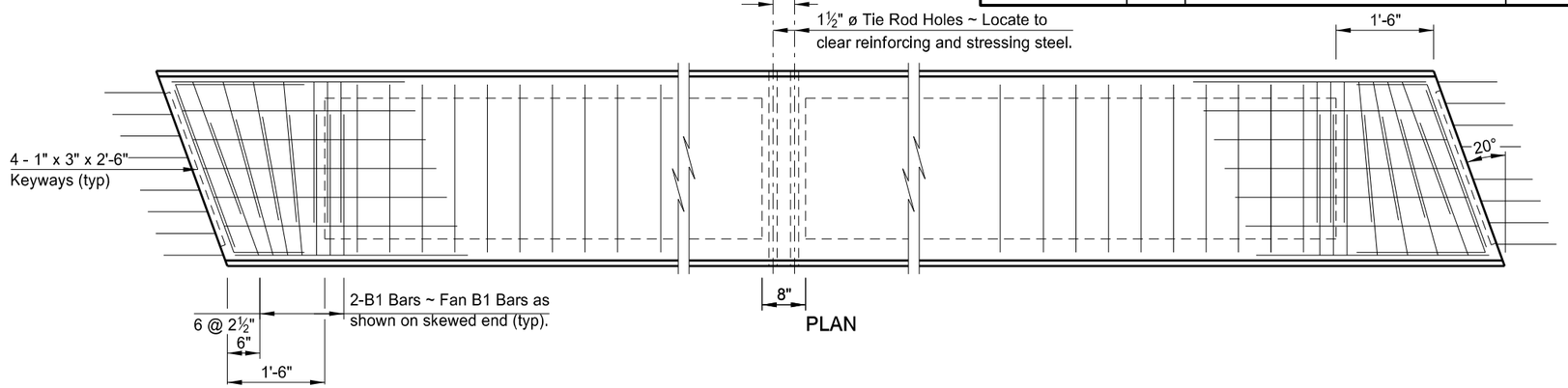
PRE-TENSIONED 33" x 36"
PRESTRESSED SPREAD BOX BEAM

23 U.S.C. 409
NDDOT Reserves All Objections

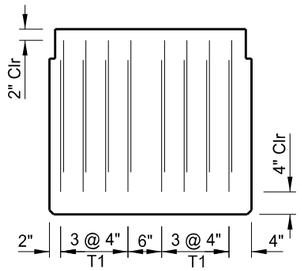
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	13



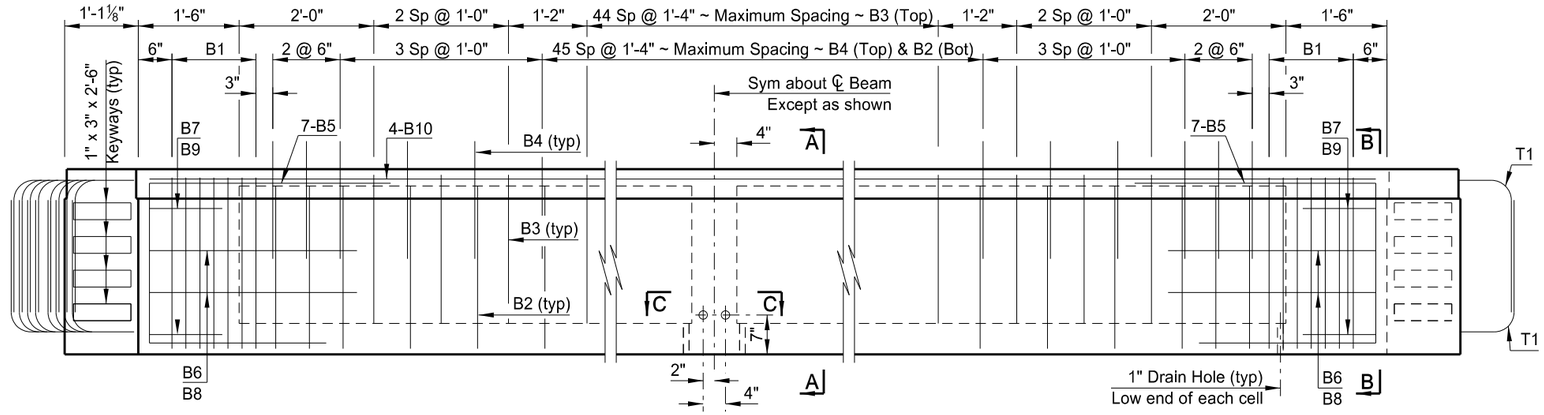
B-B



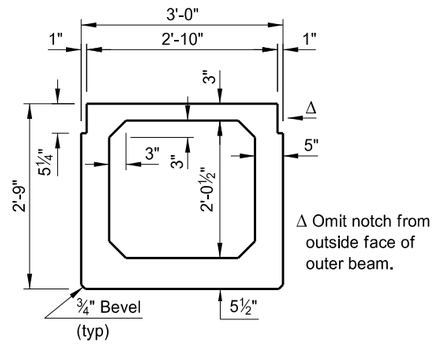
PLAN



END VIEW



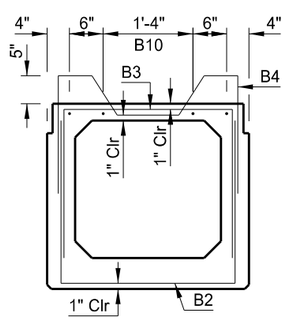
ELEVATION



Δ Omit notch from outside face of outer beam.

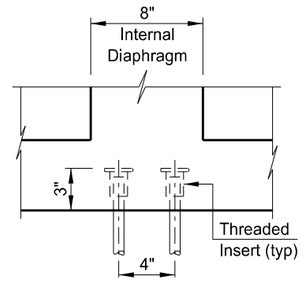
(SHOWING DIMENSIONS)

A-A



(SHOWING REINFORCING)

A-A



(OUTER BEAMS ONLY)

DIAPHRAGM BAR INSERT

C-C

** Field bend as shown (Grade 40).

* Welded Wire Reinforcing with minimum circumferential steel area of 0.15 sq in per ft may be substituted for B2 and B3 bars.

BAR LIST ~ ONE BEAM					
	MARK	SIZE	NO.	LENGTH	SHAPE
	B1	4	28	6'-11"	BENT
*	B2	4	56	7'-5"	BENT
*	B3	4	51	7'-0"	BENT
	B4	4	56	6'-9"	BENT
	B5	5	14	8'-7"	BENT
	B6	4	4	5'-9"	BENT
	B7	4	4	3'-9"	BENT
	B8	4	4	6'-8"	BENT
	B9	4	4	4'-8"	BENT
	B10	4	12	26'-3"	STR
**	T1	4	32	4'-9"	STR

QUANTITIES	(ONE BEAM)
BEAM LENGTH	73.0 LF

BEAM SECTION DATA
WT = 601.2 LBS/FT + 3171 LBS
CROSS SECTIONAL AREA = 558.5 IN^2
C.G. (FROM BOTTOM) = 14.85 IN
I = 73,708 IN^4
S_B = 4,964 IN^3

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

PRE-TENSIONED 33" x 36"
PRESTRESSED SPREAD BOX BEAM

23 U.S.C. 409
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	14

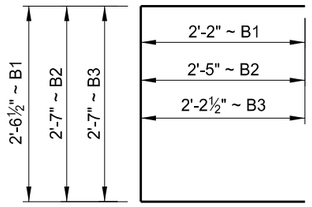
NOTES:

Design beams in accordance with the current AASHTO LRFD Bridge Design Specifications with exceptions as noted in Chapter IV of the NDDOT Design Manual. Calculate prestressed losses using the refined method in AASHTO LRFD specifications published prior to the 2005 Interim.

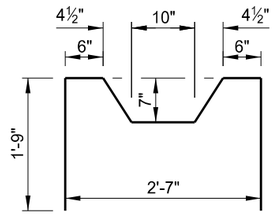
Select the final prestress force (remaining after all losses have been accounted for) and its corresponding center of gravity, from those on a curve determined by the three values shown in the "Prestressing Data" table.

Provide holes and inserts in the beams at locations shown to accommodate the diaphragm bars.

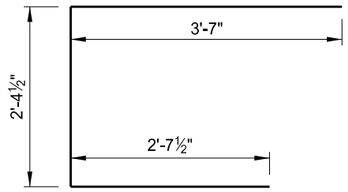
Minor changes to the shape of the beam and to reinforcing steel may be made to accommodate the forms of various contractors and their construction methods with the approval of the Engineer.



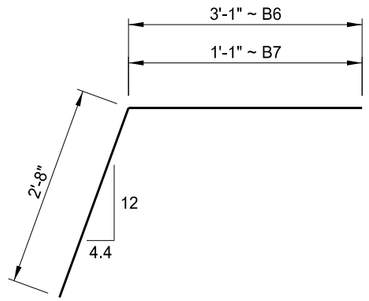
B1, B2 & B3



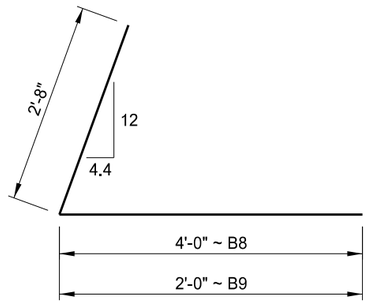
B4



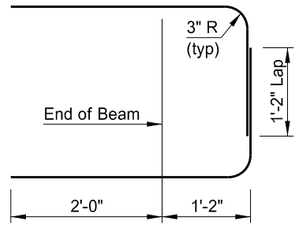
B5



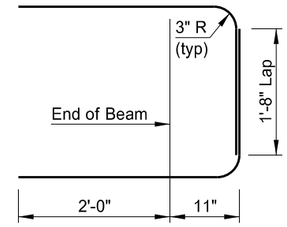
B6 & B7



B8 & B9



(AT ABUTMENTS)

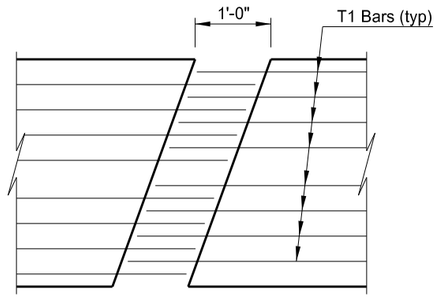


(AT PIERS)

T1

(DIMENSIONS SHOWN ARE OUT TO OUT)

BENT BAR DETAILS



BEAM END PLAN AT PIER

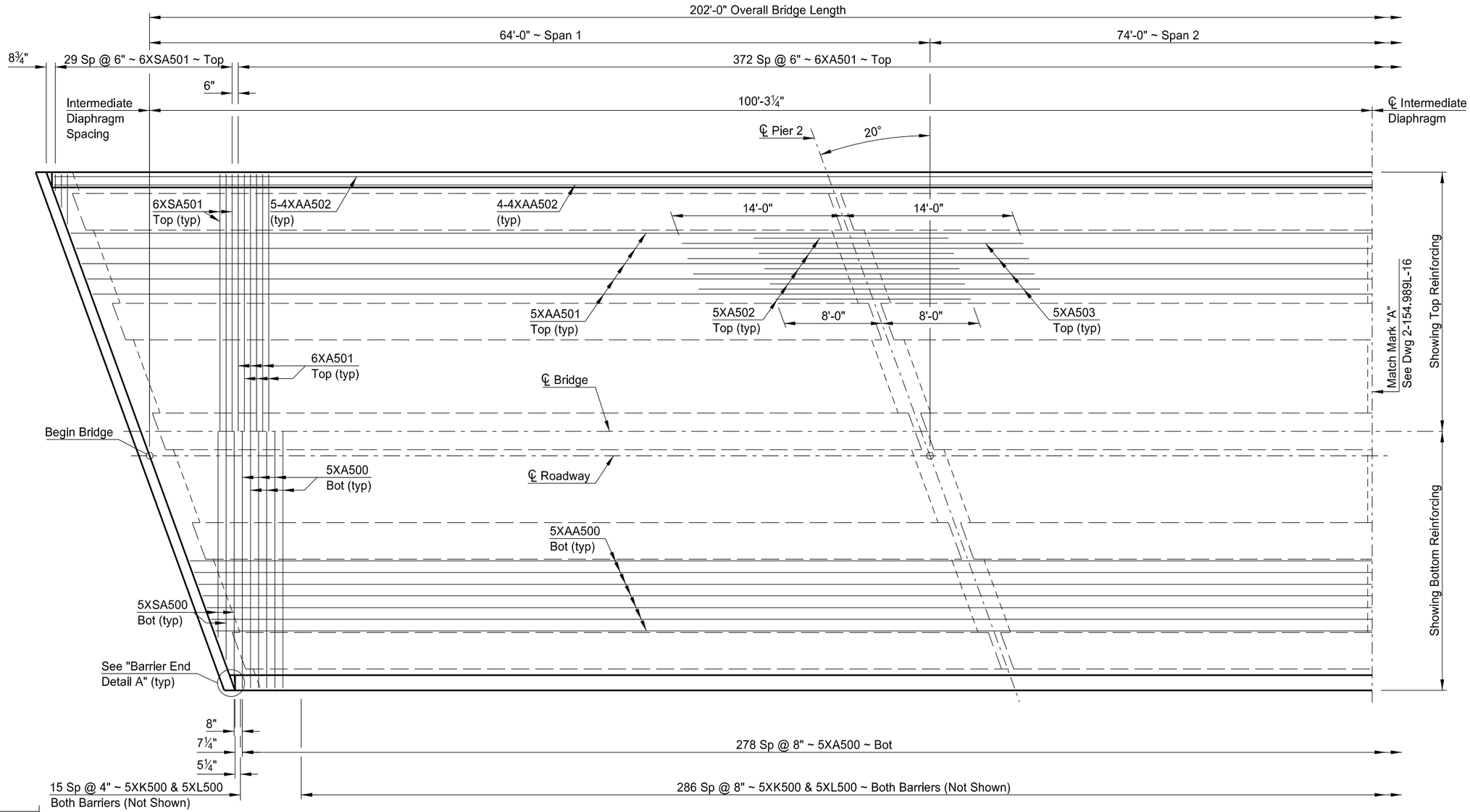
PRESTRESSING DATA					
C.G.	FINAL FORCE	DETENSION STRENGTH	ACCEPTANCE STRENGTH	WEIGHT (TONS)	BEAM LENGTH
4.75"	653.6 k	5000 psi (Min)	5000 psi (Min)	20.2	62'-0"
4.95"	660.5 k				
5.25"	671.3 k				
4.40"	907.6 k	5700 psi (Min)	5700 psi (Min)	23.5	73'-0"
4.64"	919.0 k				
4.80"	926.7 k				

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

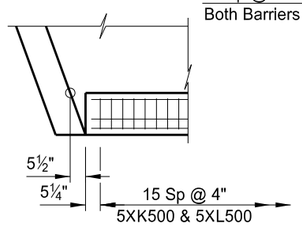
PRE-TENSIONED 33" x 36"
PRESTRESSED SPREAD BOX BEAM

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	15



PLAN



PLAN

BARRIER END DETAIL A

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

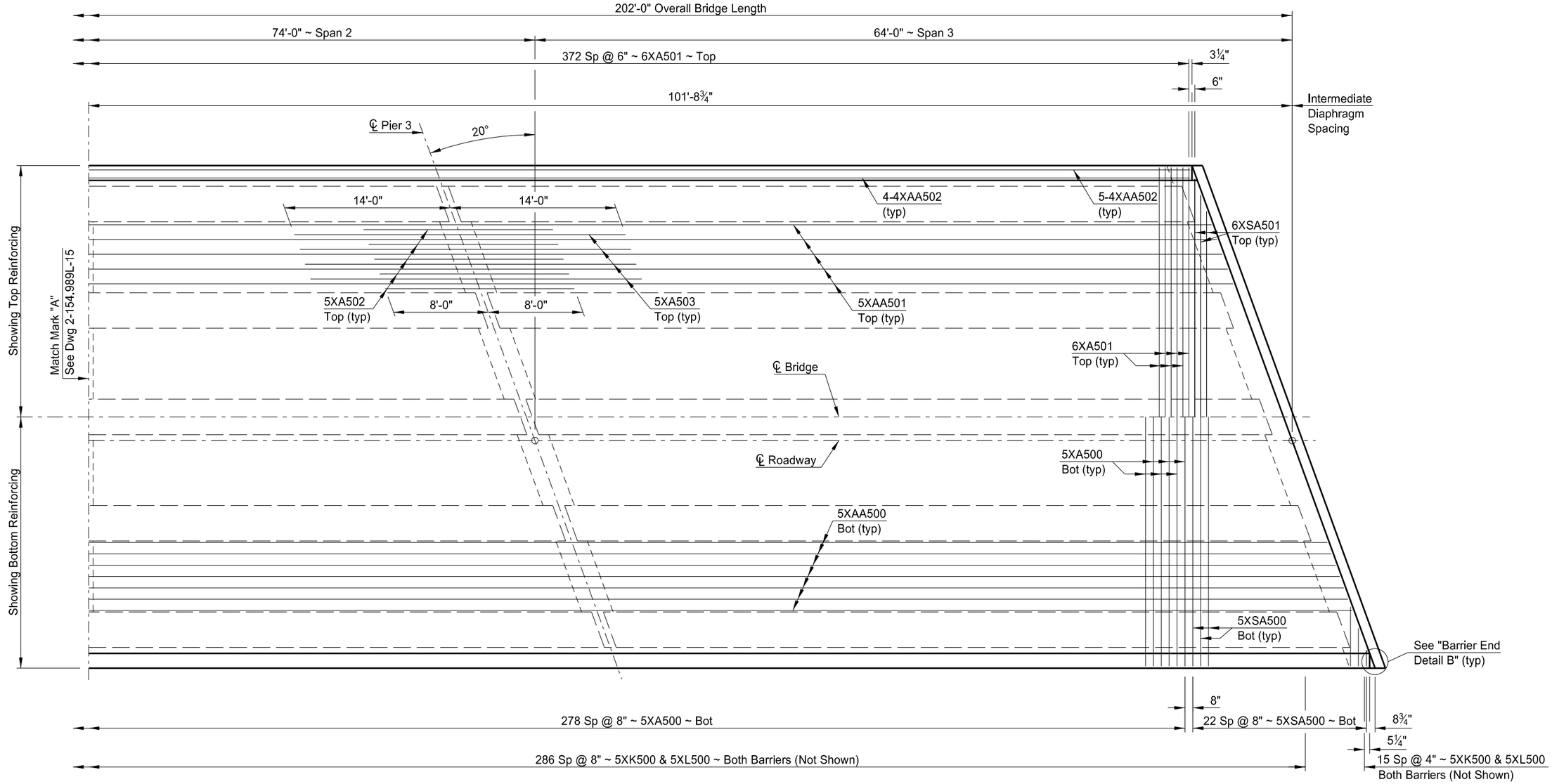
QUANTITIES
SEE DWG 2-154.989L-20

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

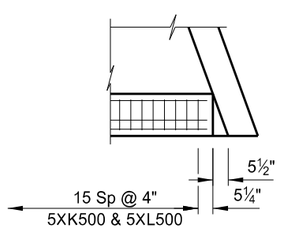
HALF SLAB LAYOUT

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	16



PLAN



PLAN
BARRIER END DETAIL B

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

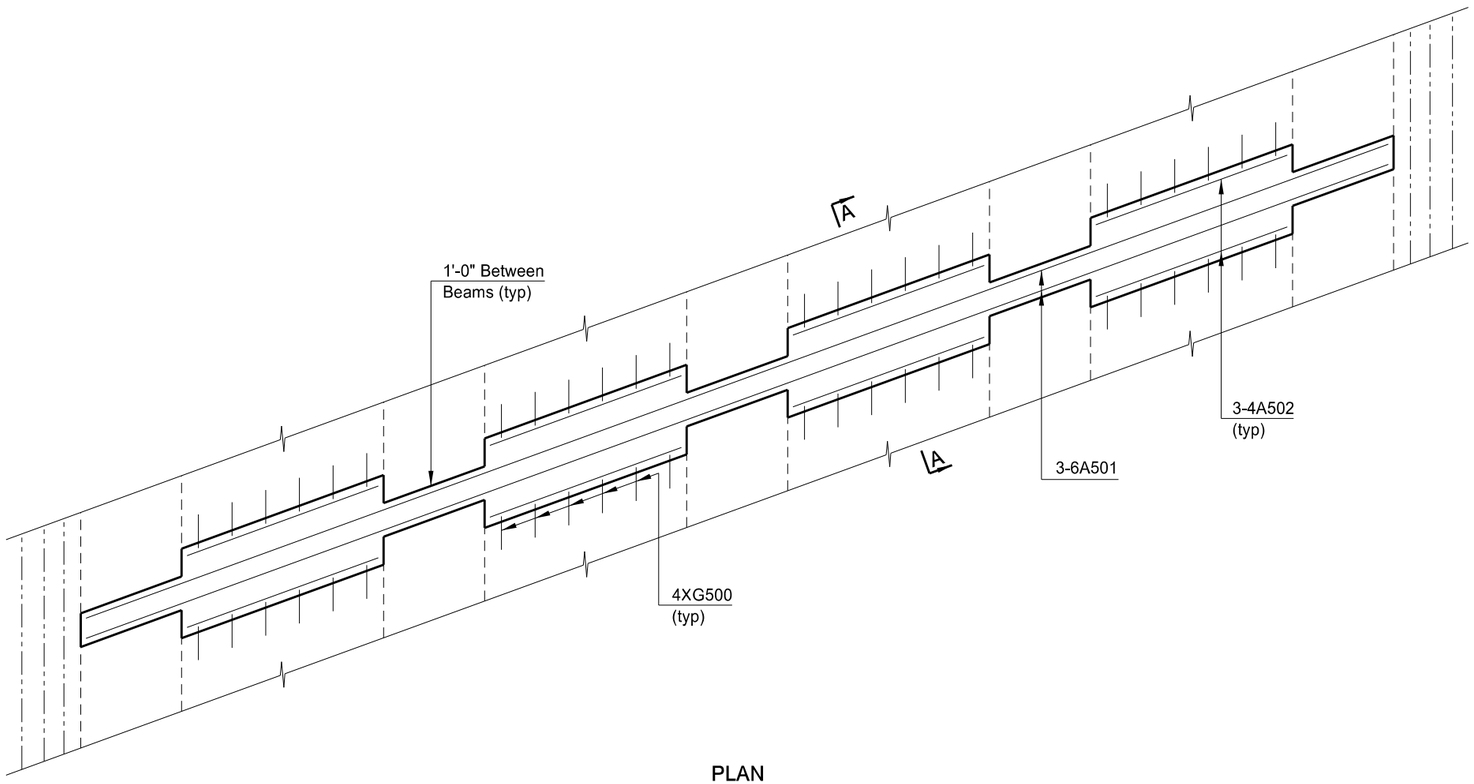
QUANTITIES
SEE DWG 2-154.989L-20

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

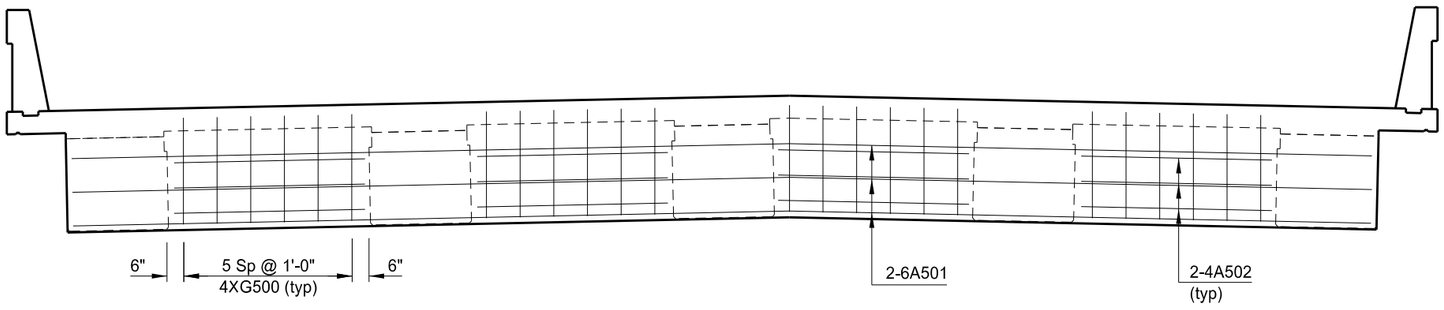
HALF SLAB LAYOUT

23 U.S.C. 409
NDDOT Reserves All Objections

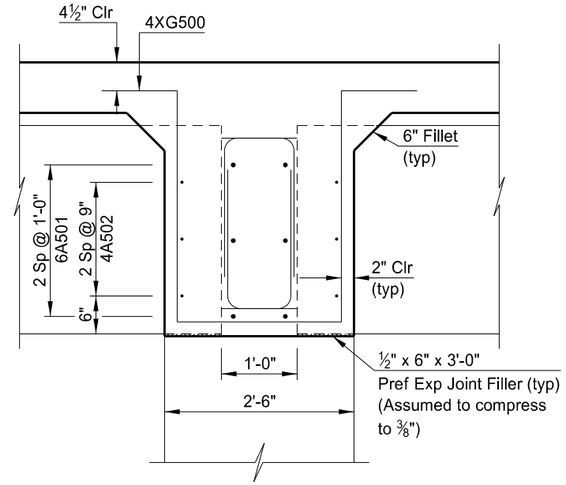
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	17



PLAN



ELEVATION



A-A

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES

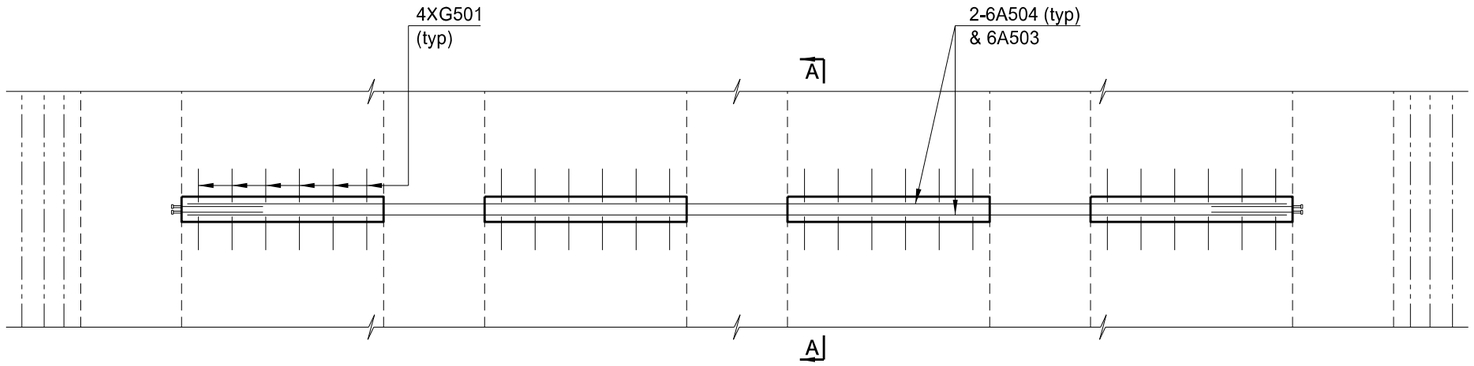
SEE DWG 2-154.989L-20

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

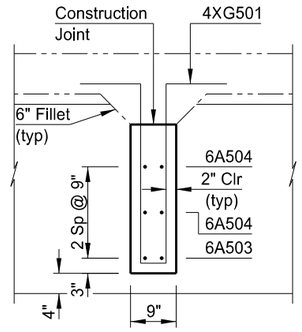
PIER DIAPHRAGM DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

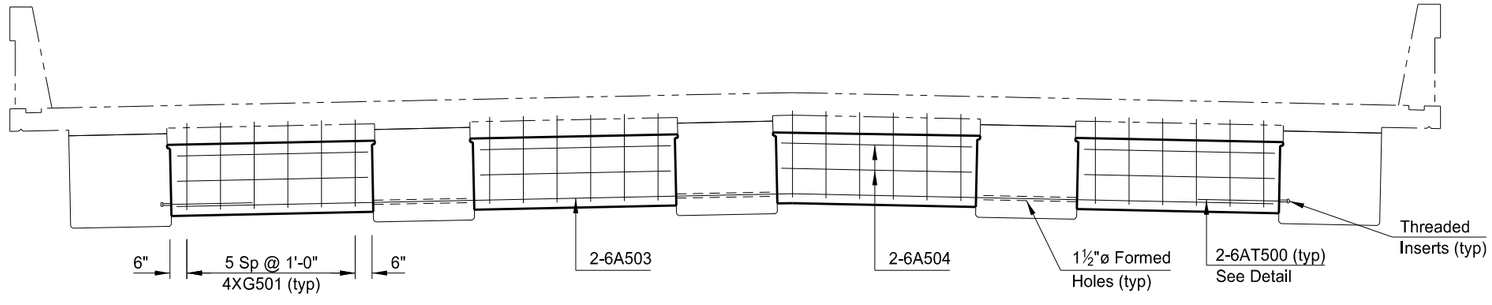
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	18



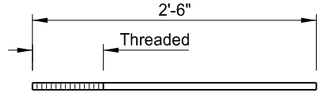
PLAN



A-A



ELEVATION



No. 6 Reinforcing Steel ~ Include in the Prestressed Beam bid item.

6AT500 DETAIL

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

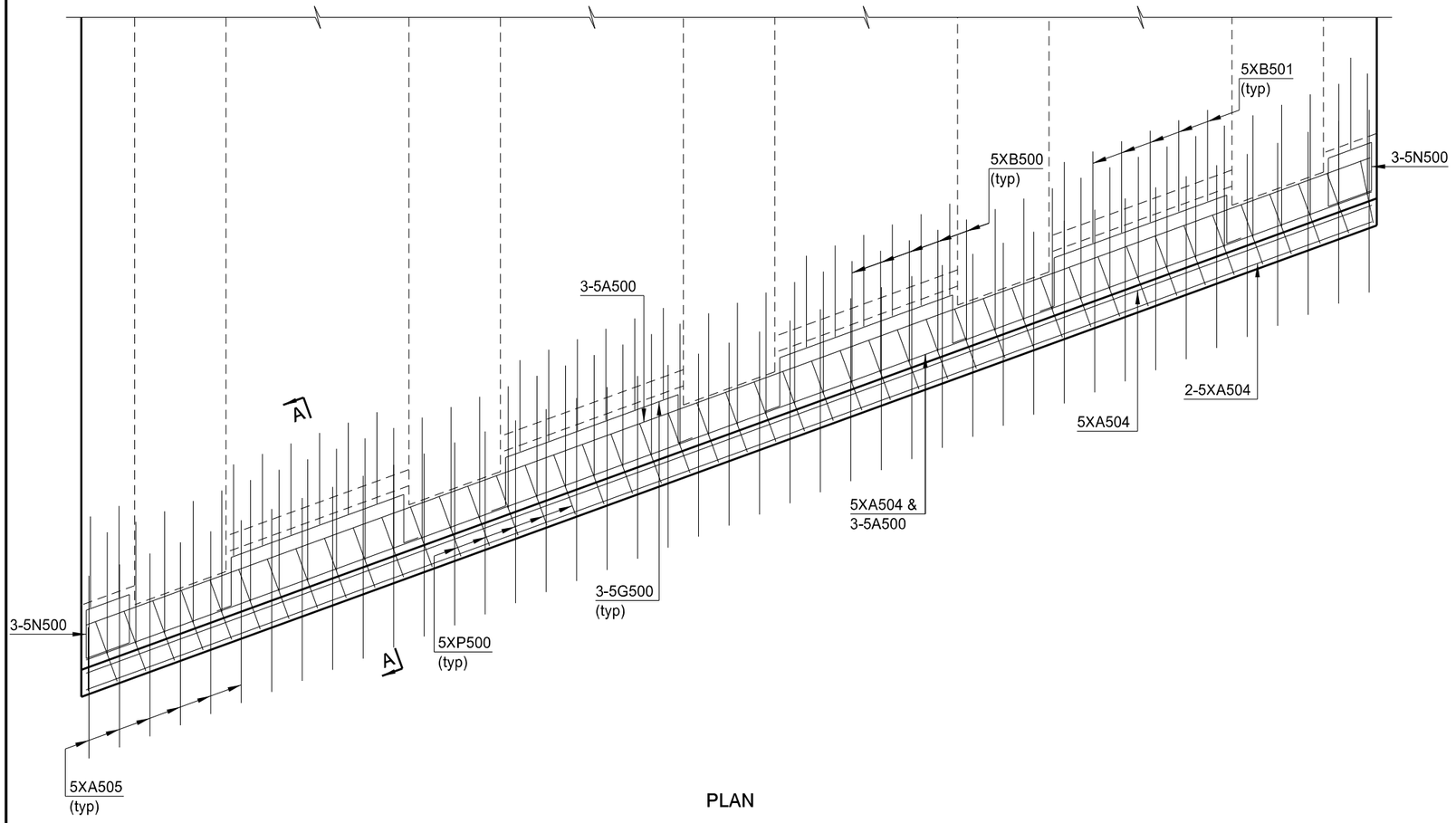
QUANTITIES
SEE DWG 2-154.989L-20

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

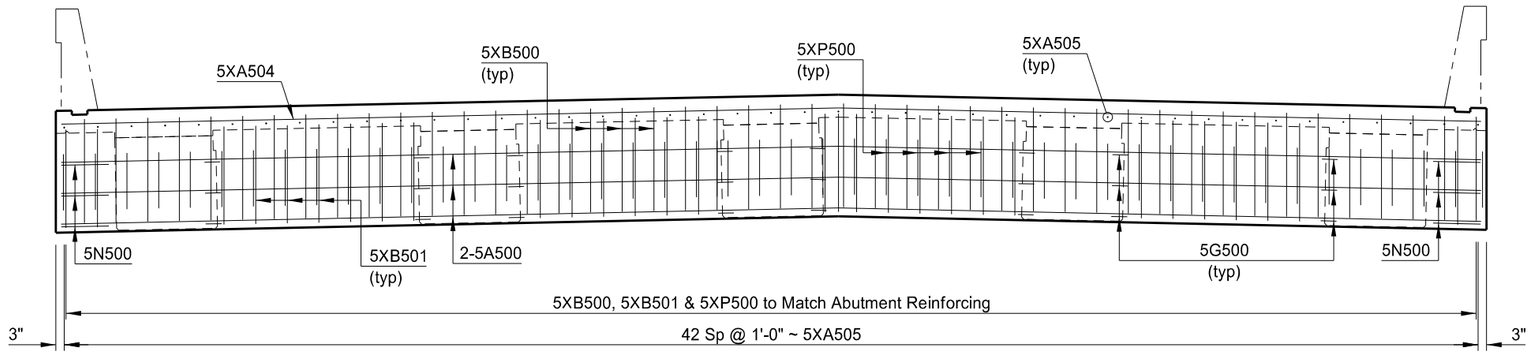
INTERMEDIATE DIAPHRAGM DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

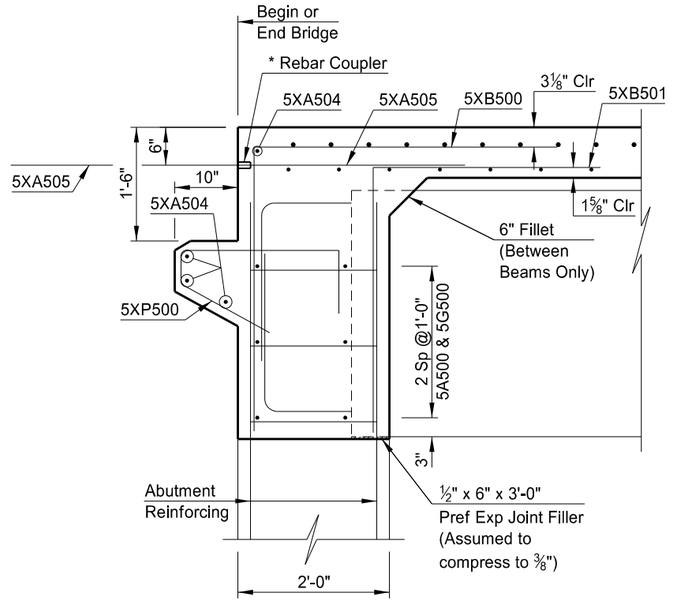
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	19



PLAN



(APPROACH LIP NOT SHOWN)
ELEVATION

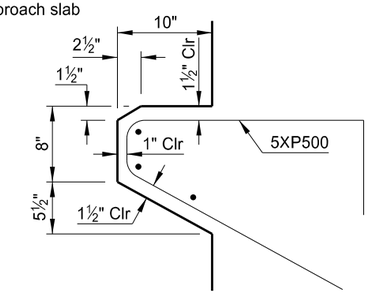


A-A

* Use approved mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.

NOTE:

Do not install the 5XA505 bars into the approach slab until all of the foundation fill is in place.



APPROACH LIP DETAIL

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES

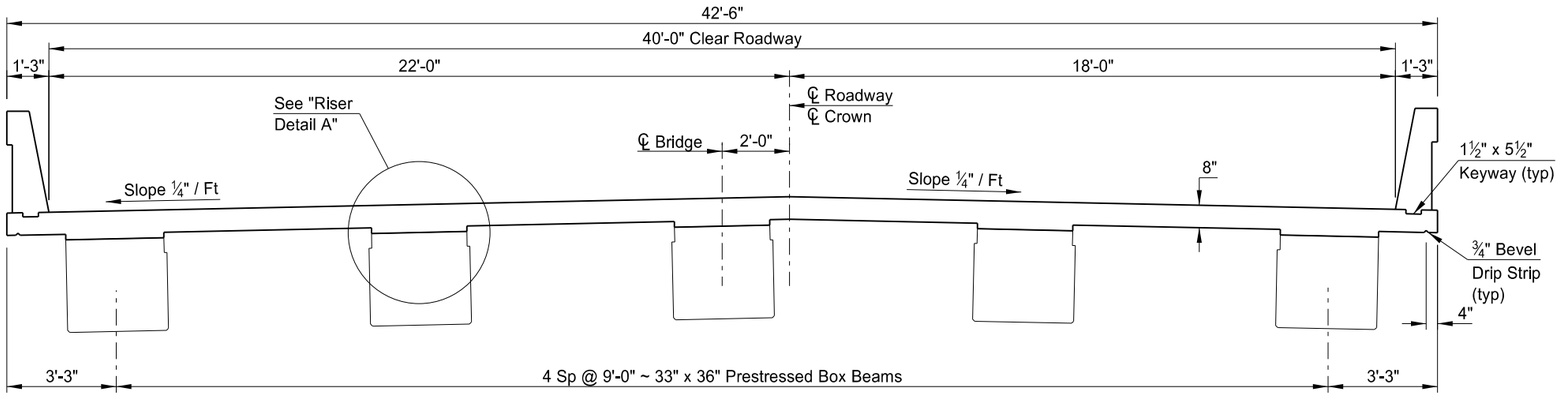
SEE DWG 2-154.989L-20

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

ENDWALL DETAILS

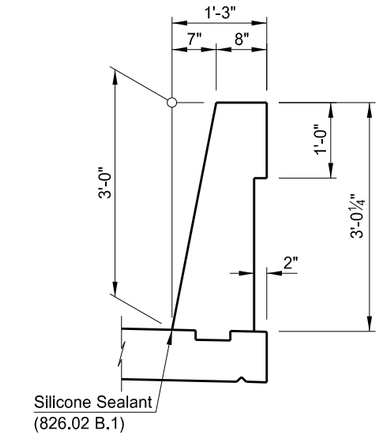
23 U.S.C. 409
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	20

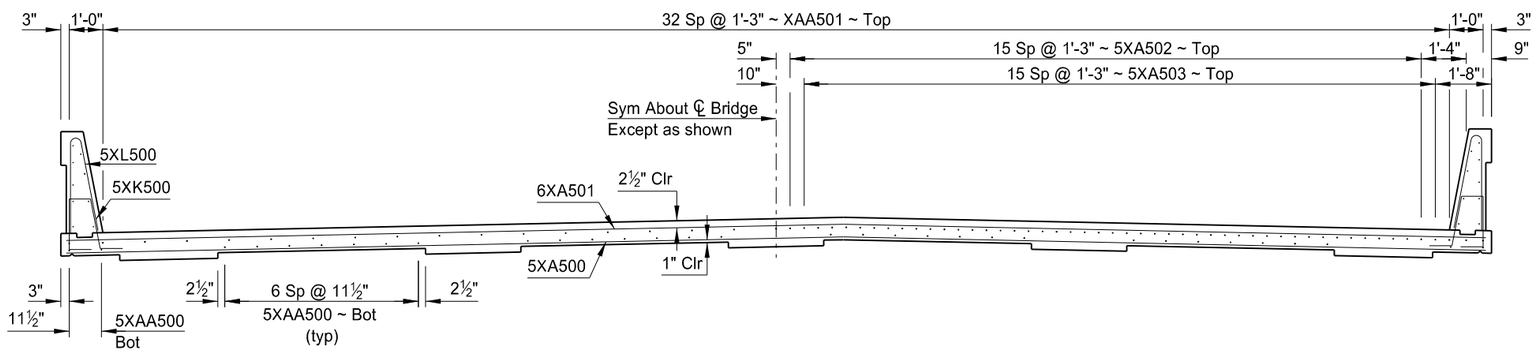


(SHOWING DIMENSIONS)

SLAB SECTION



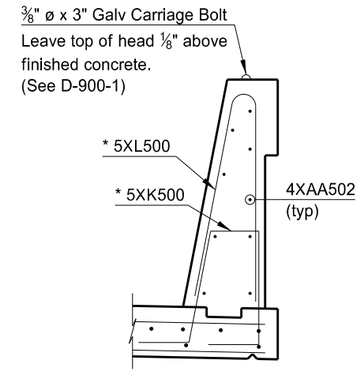
SHOWING DIMENSIONS



(SHOWING REINFORCING BETWEEN SUPPORTS)

(SHOWING REINFORCING OVER PIERS)

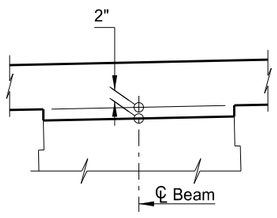
SLAB SECTION



* Provide a 1½" clearance to the barrier reinforcing.

SHOWING REINFORCING

BARRIER DETAIL



RISER DETAIL A

The 2" dimension shown is located at the supports. The anticipated midspan riser is 1½" for spans 1 and 3, and ½" for span 2. Adjust the riser to maintain the 8" slab thickness.

QUANTITIES	
CLASS AAE-3 CONCRETE	303.6 CY
REINFORCING STEEL	2,074 LBS
REINFORCING STEEL (EPOXY)	68,828 LBS

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

SLAB SECTION

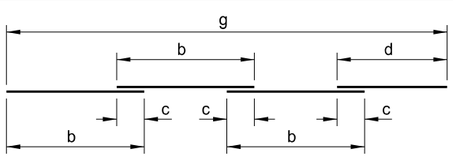
BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	21

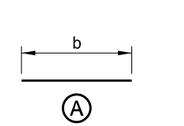
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
ABUTMENTS	7	A100	32	8'-11"		8'-11"							
	6	A101	8	13'-2"		13'-2"							
	6	A102	8	9'-9"		9'-9"							
	6	A103	8	6'-5"		6'-5"							
	5	C100	54	17'-0"		7'-8"	1'-8"	7'-8"					
	5	C101	36	14'-1"		4'-9"	1'-8"	7'-8"					
	5	C102	8	18'-8"		8'-6"	1'-8"	8'-6"					
	5	C103	36	4'-2"		1'-3"	1'-8"	1'-3"					
	4	C104	72	2'-8"		6"	1'-8"	6"					
	6	D100	8	14'-0"		2'-8"	11'-4"					12	3.5
	6	AA100	24	73'-5"		40'-0"	3'-9"	33'-5"	1		69'-8"		
	5	SC100	4	160'-11"	8"	5'-3"	8'-3"	1'-7"	10				
PIERS	5	A200	116	43'-8"		43'-8"							
	5	A201	184	27'-4"		27'-4"							
	5	C200	116	6'-6"		2'-3"	2'-0"	2'-3"					
	5	C201	184	6'-8"		2'-3"	2'-2"	2'-3"					
	4	C202	112	3'-2"		6"	2'-2"	6"					

LOCATION		SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE	REGULAR	5	A500	12	44'-10"		44'-10"							
		6	A501	12	41'-2"		41'-2"							
		4	A502	48	6'-0"		6'-0"							
		6	A503	2	32'-8"		32'-8"							
		6	A504	16	5'-8"		5'-8"							
		5	G500	24	10'-2"	1'-7"	6'-0"	1'-7"	6"				12	4.4
		5	N500	12	7'-2"	1'-6"	1'-7"	6"					4.4	12
	EPOXY	5	XA500	279	42'-2"		42'-2"							
		6	XA501	373	42'-2"		42'-2"							
		5	XA502	68	16'-0"		16'-0"							
		5	XA503	64	28'-0"		28'-0"							
		5	XA504	8	44'-10"		44'-10"							
		5	XA505	172	3'-0"		3'-0"							
		5	XB500	90	7'-2"		3'-2"	4'-0"						
		5	XB501	54	5'-11"		2'-11"	3'-0"						
		4	XG500	48	10'-3"	3'-0"	2'-3"	3'-0"	1'-0"				12	0
		4	XG501	24	7'-7"	2'-7"	5"	2'-7"	1'-0"				12	0
		5	XK500	636	4'-11"	1'-6"	7"			10"		8"	2.3	12
		5	XL500	636	5'-7"	9"	2'-7	5"					2.3	12
		5	XP500	92	5'-6"	5"	2'-1"	2'-2"			1.25"	10"	12	6.5
		5	XAA500	32	210'-8"		60'-0"	3'-0"	30'-8"	3		201'-8"		
		5	XAA501	35	209'-2"		60'-0"	2'-6"	29'-2"	3		201'-8"		
		4	XAA502	18	207'-2"		60'-0"	2'-0"	27'-2"	3		201'-2"		
		5	XSA500	2	491'-8"	1'-3"	41'-6"			22				
		6	XSA501	2	635'-0"	1'-3"	41'-1"			29				

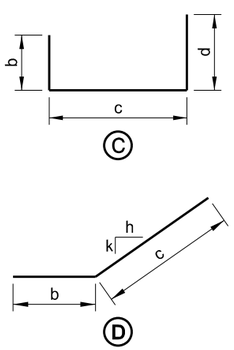


c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d

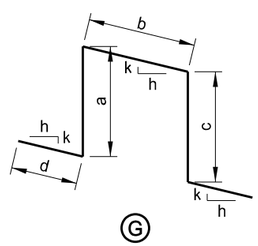
AA



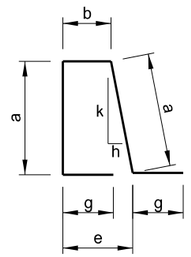
A B



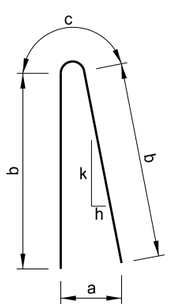
C D



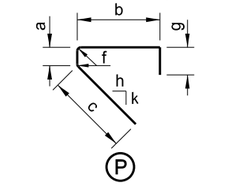
G



K



L



SA

SC

SA

SC

23 U.S.C. 409
NDDOT Reserves All Objections

NOTES:

1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
4. Turn adjacent "AA" bars end for end so that the splice locations are staggered.
5. The "f" dimension indicates the inside radius unless otherwise noted.
6. An "X" preceding a bar designation indicates an epoxy coated bar.

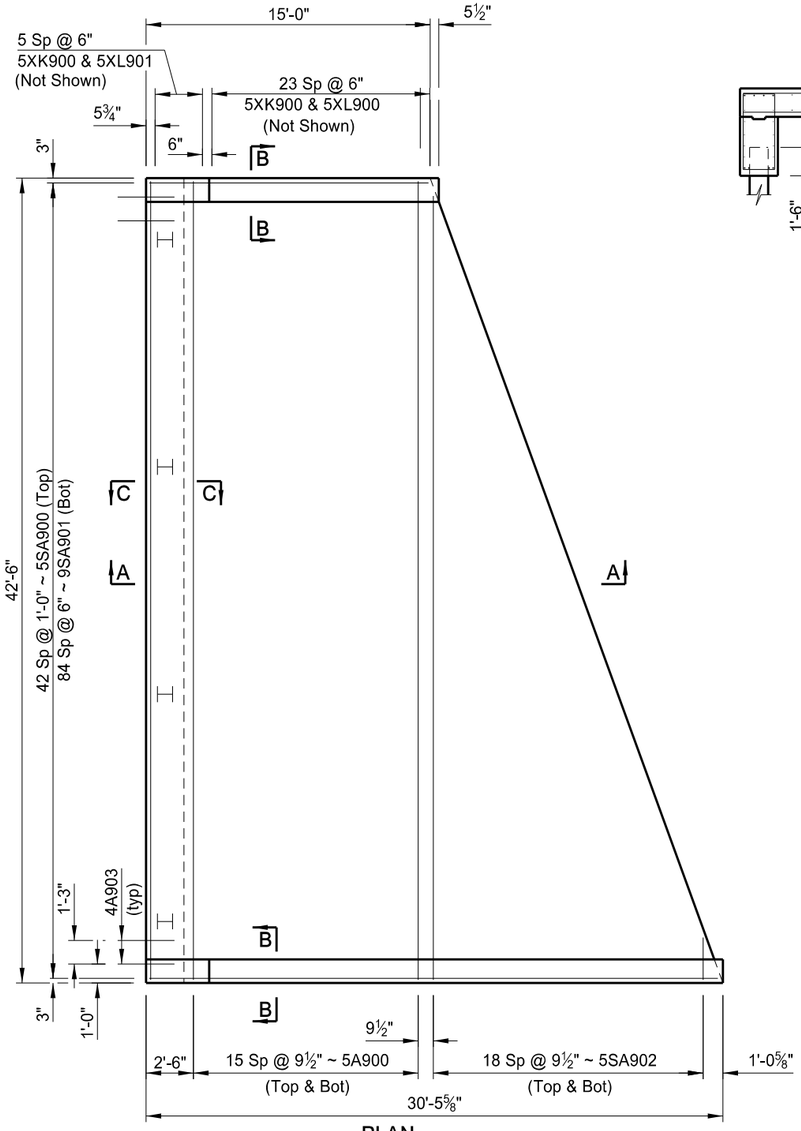
This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

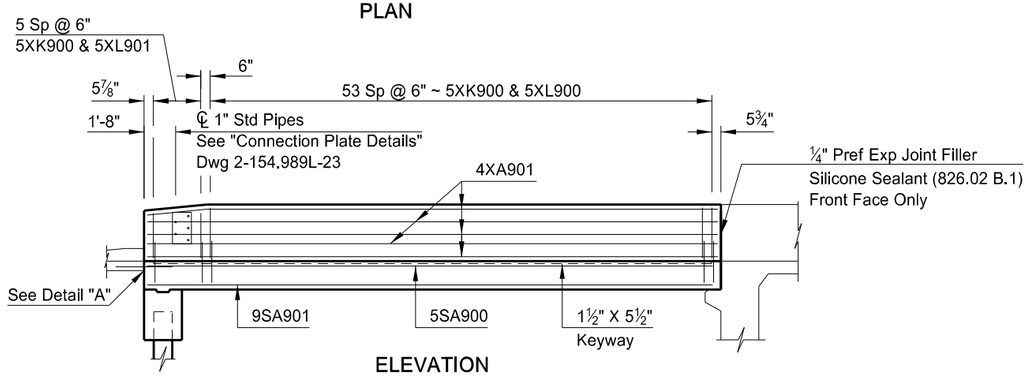
REINFORCING BAR LIST & DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

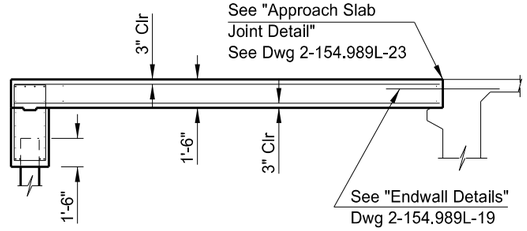
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	170	22



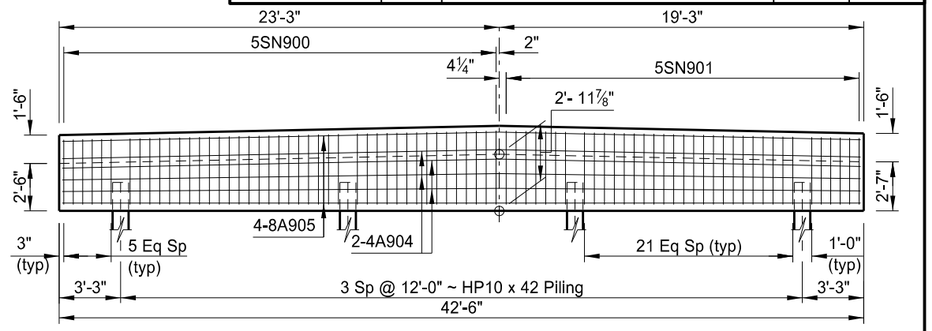
PLAN



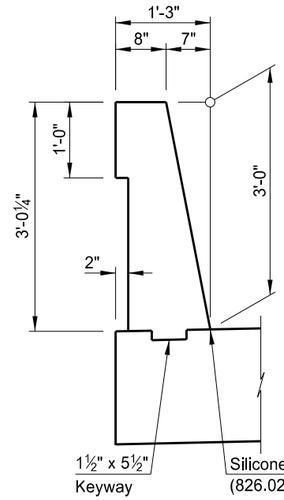
ELEVATION



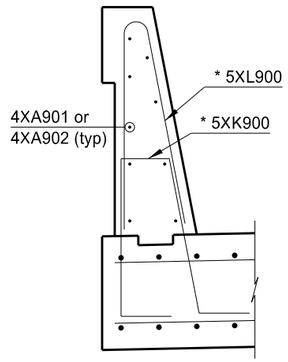
A-A



FOOTING ELEVATION



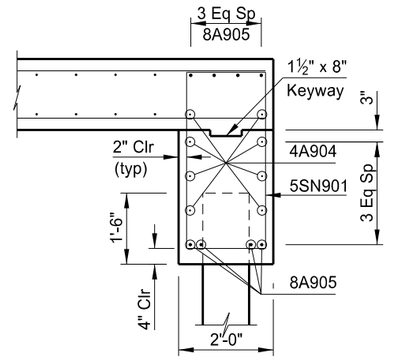
SHOWING DIMENSIONS



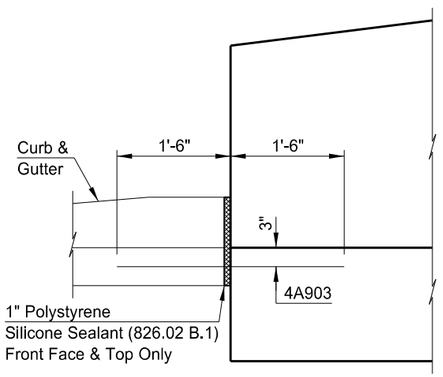
* Provide a 1½" clearance to the barrier reinforcing.

SHOWING REINFORCING

B-B



C-C



DETAIL "A"

This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES

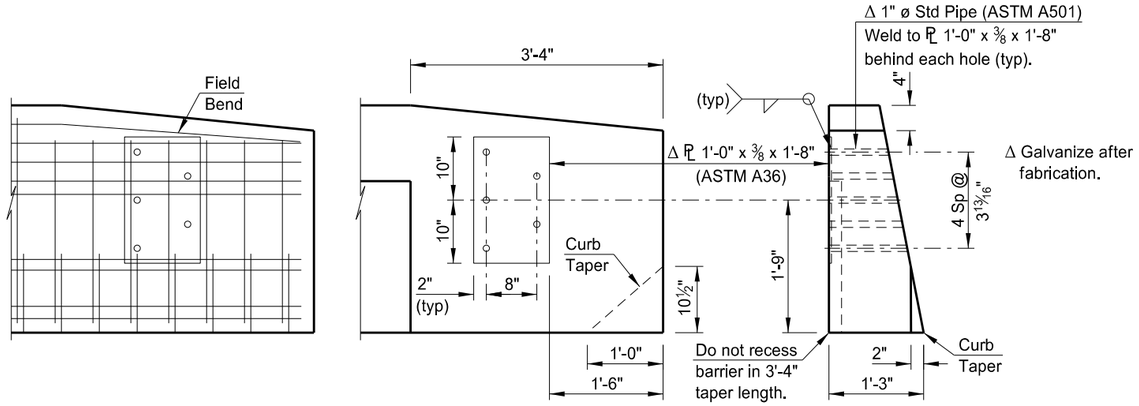
SEE DWG 2-154.989L-23

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

APPROACH SLAB DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-4-002(118)154	170	23



SHOWING REINFORCING

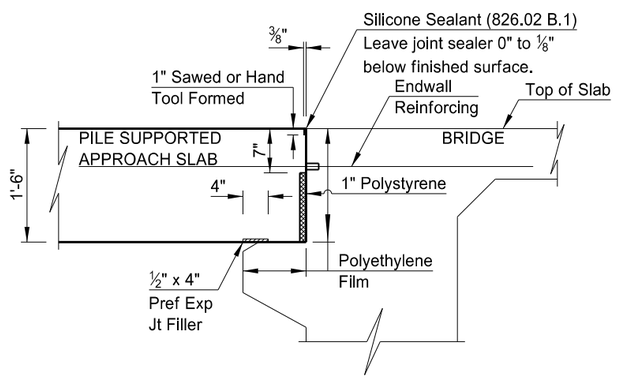
SHOWING DIMENSIONS

(SHOWING BACK FACE)

CONNECTION PLATE DETAILS

NOTES:

Detail shown is for left side of bridge entrance. Mirror for opposite side installation.



APPROACH SLAB JOINT DETAIL

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, connection plates and pipes, and labor required to build the approach slabs and barriers in the pay item "Pile Supported Approach Slab." Use Class AE-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. The dimensions shown in the "Bent Bar Details" are out to out.

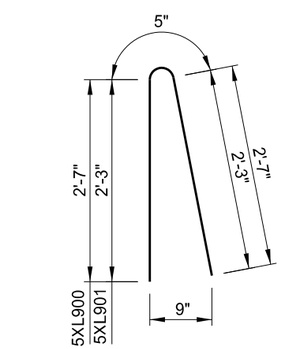
SKEW ANGLE = 20°

BAR LIST - ONE SLAB

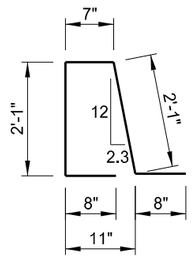
SIZE	MARK	NO.	LENGTH
5	A900	32	42'-2"
4	XA901	9	30'-1"
4	XA902	9	14'-8"
4	A903	4	3'-0"
4	A904	8	42'-2"
8	A905	8	42'-2"
5	XK900	90	6'-1"
5	XL900	78	5'-7"
5	XL901	12	5'-0"
5	SA900	1	960'-4"
9	SA901	1	1,898'-4"
5	SA902	2	413'-3"
5	SN900	1	498'-1"
5	SN901	1	408'-4"

ESTIMATED MATERIAL QUANTITIES

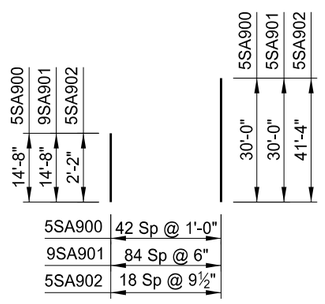
REINFORCING STEEL (LBS)	CONCRETE (CY)
13,162	66.7



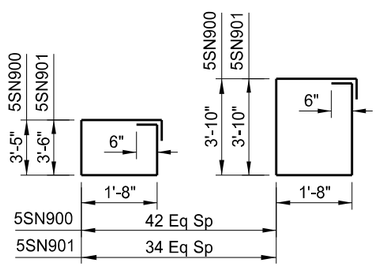
XL900 & XL901



XK900



SA900, SA901 & SA902



SN900 & SN901

BENT BAR DETAILS

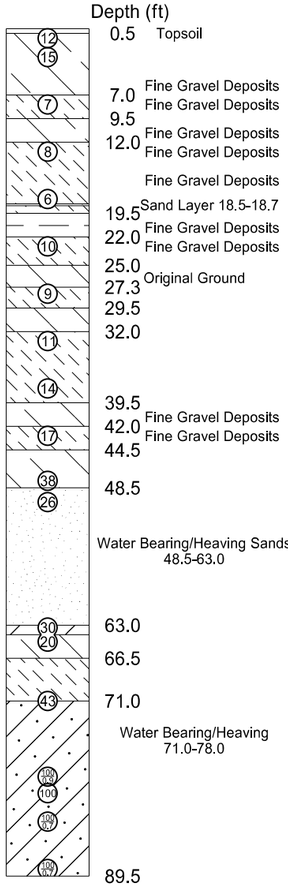
This document was originally issued and sealed by Dustin Wing, Registration Number PE 7128, on 01/10/19 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES	(ONE SLAB)
APPROACH SLAB	107.4 SY

BNSF RAILROAD SEPARATION
9 WEST OF ND HWY41

APPROACH SLAB DETAILS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	175	1



Project Number: NH-4-002(118)154
21399
Bridge Number: 0002-154.989 L
Location: 9 West of ND HWY 41
Boring Number: 1
Dates Drilled: 3/14/2016 - 3/15/2016

RP + Feet: 154+4203
Station:
Offset: Center of Median
Orientation: West of Stucture, Center of Median
Elevation of Boring: 1652.68
Depth to Water Table:

Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	Dry Unit Weight (pcf)
0.0-2.0	CLY LM	A-4(0)	SS	SPT	---	---	---	12	10.6	---
2.0-4.0	CLY LM	A-4(0)	SS	SPT	---	---	---	15	16.6	---
5.0-7.0	CLY LM	A-6(9)	3TW	UU	---	---	3600	---	16.8	120.1
7.0-9.0	CLY	A-6(10)	SS	SPT	---	---	---	7	17.4	---
10.0-12.0	CLY LM	A-6(6)	3TW	M	---	---	---	---	14.2	---
12.0-14.0	CLY	A-6(9)	SS	SPT	---	---	---	8	17.4	---
15.0-17.0	CLY	A-6(9)	3TW	CU	---	34	258	---	17.8	109.9
17.0-19.0	CLY	A-6(9)	SS	SPT	---	---	---	6	18.0	---
20.0-22.0	SLTY LM	A-6(11)	3TW	UC	3040	---	1521	---	19.3	108.9
22.0-24.0	CLY	A-6(9)	SS	SPT	---	---	---	10	20.9	---
25.0-27.0	CLY LM	A-6(5)	3TW	UC	1572	---	786	---	21.4	98.5
27.0-29.0	CLY	A-6(10)	SS	SPT	---	---	---	9	19.4	---
30.0-32.0	CLY LM	A-6(9)	3TW	UU	---	---	2125	---	17.9	112.4
32.0-34.0	CLY	A-6(13)	SS	SPT	---	---	---	11	17.2	---
35.0-37.0	CLY	A-6(14)	3TW	UC	4766	---	2383	---	19.0	111.7
37.0-39.0	CLY	A-6(10)	SS	SPT	---	---	---	14	17.1	---
40.0-42.0	CLY LM	A-6(7)	3TW	UU	---	---	3133	---	16.4	118.1
42.0-44.0	CLY	A-6(10)	SS	SPT	---	---	---	17	17.3	---
45.0-47.0	CLY LM	A-6(10)	3TW	UU	---	---	4252	---	16.9	115.0
47.0-48.5	CLY LM	A-6(4)	SS	SPT	---	---	---	38	16.8	---
48.5-49.0	SND	A-3(0)	SS	SPT	---	---	---	---	19.8	---
49.0-51.0	SND	A-3(0)	SS	SPT	---	---	---	26	18.9	---
63.0-64.0	LM	A-4(0)	SS	SPT	---	---	---	30	14.6	---
64.0-65.0	CLY LM	A-6(7)	SS	SPT	---	---	---	20	15.7	---
68.0-70.0	CLY	A-6(11)	3TW	UU	---	---	3587	---	17.1	116.2
70.0-72.0	SNDY LM	A-2-4(0)	SS	SPT		---	---	43	20.6	---
78.0-79.5	SNDY LM	A-4(0)	SS	SPT	---	---	---	100/0.9	9.3	---
80.0-81.5	SNDY LM	A-2-4(0)	SS	SPT	---	---	---	100	14.7	---
83.0-84.5	SNDY LM	A-4(0)	SS	SPT	---	---	---	100/0.7	8.4	---
88.0-89.5	SNDY LM	A-4(0)	SS	SPT	---	---	---	100/0.7	13.3	---

Notes:

THE BORING DATA SHOWN IS FOR NORTH DAKOTA DEPARTMENT OF TRANSPORTATION'S (NDDOT) DESIGN AND ESTIMATING PURPOSES ONLY. THE BORING LOGS ARE ONLY REPRESENTATIVE OF THE EXACT LOCATION FROM WHICH THE SAMPLES WERE TAKEN AND INTERPRETATION BETWEEN THE SAMPLE LOCATIONS IS DISCOURAGED. THE NDDOT ASSUMES NO RESPONSIBILITY IF THE SOIL CONDITIONS ENCOUNTERED DURING CONSTRUCTION DIFFER FROM THOSE SHOWN. FURTHER SOIL INFORMATION MAY BE AVAILABLE AT:

NDDOT
MATERIALS & RESEARCH DIVISION
300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

SS - Split Spoon
3TW - 3" Thin Wall Shelby Tube
M - Moisture Test
D - Density Test
UC - Unconfined Compression Test
UU - Unconsolidated Undrained Triaxial Test
CU - Consolidated Undrained Triaxial Test
SPT - Standard Penetration Test

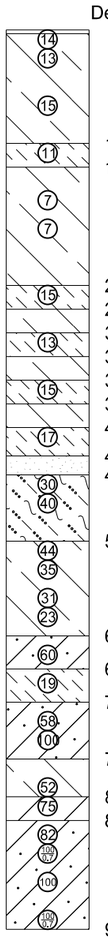
Boring Log

Boring Number: 1

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-002(118)154	175	2

Project Number: NH-4-002(118)154
21399
Bridge Number: 0002-154.989 L
Location: 9 West of ND HWY 41
Boring Number: 2
Dates Drilled: 3/15/2016 - 3/16/2016

RP + Feet: 154+4395
Station:
Offset: Center of Median
Orientation: East of Stucture, Center of Median
Elevation of Boring: 1652.24
Depth to Water Table:



Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	Dry Unit Weight (pcf)
0.0-2.0	CLY LM	A-6(8)	SS	SPT	---	---	---	14	14.2	---
2.0-4.0	CLY LM	A-7-6(15)	SS	SPT	---	---	---	13	17.7	---
5.0-7.0	CLY LM	A-6(8)	3TW	UC	6015	---	3008	---	14.7	121.1
7.0-9.0	CLY LM	A-6(7)	SS	SPT	---	---	---	15	16.8	---
10.0-12.0	CLY LM	A-6(8)	3TW	UC	4730	---	2364	---	15.2	118.5
12.0-14.0	CLY	A-6(9)	SS	SPT	---	---	---	11	15.5	---
15.0-17.0	CLY LM	A-6(9)	3TW	UU	---	---	2442	---	15.0	116.5
17.0-19.0	CLY LM	A-6(8)	SS	SPT	---	---	---	7	17.1	---
20.0-22.0	CLY LM	A-6(10)	3TW	UU	---	---	1371	---	18.5	111.9
22.0-24.0	CLY LM	A-6(9)	SS	SPT	---	---	---	7	17	---
25.0-27.0	CLY LM	A-6(4)	3TW	UC	2431	---	1215	---	17.1	113.0
27.0-29.0	CLY	A-6(9)	SS	SPT	---	---	---	15	18.1	---
30.0-32.0	CLY LM	A-6(10)	3TW	CU	---	32	228	---	17.7	114.7
32.0-34.0	CLY	A-6(10)	SS	SPT	---	---	---	13	17.2	---
35.0-37.0	CLY LM	A-6(8)	3TW	UU	---	---	3555	---	16.9	117.4
37.0-39.0	CLY	A-6(10)	SS	SPT	---	---	---	15	17.0	---
40.0-42.0	CLY LM	A-6(10)	3TW	UU	---	---	4147	---	17.0	115.8
42.0-44.0	CLY	A-6(11)	SS	SPT	---	---	---	17	17.2	---
45.0-47.0	SND	A-1-b(0)	3TW	M	---	---	---	---	5.9	---
47.0-49.0	SNDY CLY LM	A-6(3)	SS	SPT	---	---	---	30	10.5	---
49.0-51.0	SNDY CLY LM	A-6(3)	SS	SPT	---	---	---	40	15.5	---
54.0-56.0	CLY LM	A-6(6)	SS	SPT	---	---	---	44	14.7	---
56.0-58.0	CLY LM	A-6(8)	SS	SPT	---	---	---	35	14.2	---
59.0-61.0	CLY LM	A-6(7)	SS	SPT	---	---	---	31	15.8	---
61.0-63.0	CLY LM	A-6(4)	SS	SPT	---	---	---	23	14.4	---
64.0-65.0	SNDY LM	A-2-4(0)	3TW	NA	---	---	---	---	---	---
65.0-67.0	SNDY LM	A-2-4(0)	SS	SPT	---	---	---	60	21.4	---
68.0-70.0	CLY	A-6(9)	SS	SPT	---	---	---	19	16.5	---
72.0-74.0	SNDY LM	A-4(0)	SS	SPT	---	---	---	58	10.2	---
74.0-75.5	SNDY LM	A-4(0)	SS	SPT	---	---	---	100	10.4	---
79.0-81.0	CLY LM	A-6(4)	SS	SPT	---	---	---	52	15.0	---
81.0-83.0	LM	A-4(0)	SS	SPT	---	---	---	75	10.0	---
84.0-86.0	SNDY LM	A-4(0)	SS	SPT	---	---	---	82	9.9	---
86.0-87.5	SNDY LM	A-4(0)	SS	SPT	---	---	---	100/0.7	9.7	---
89.0-90.7	SNDY LM	A-2-4(0)	SS	SPT	---	---	---	100	8.4	---
94.0-95.0	SNDY LM	A-2-4(0)	SS	SPT	---	---	---	100/0.7	12.4	---

Notes:

THE BORING DATA SHOWN IS FOR NORTH DAKOTA DEPARTMENT OF TRANSPORTATION'S (NDDOT) DESIGN AND ESTIMATING PURPOSES ONLY. THE BORING LOGS ARE ONLY REPRESENTATIVE OF THE EXACT LOCATION FROM WHICH THE SAMPLES WERE TAKEN AND INTERPRETATION BETWEEN THE SAMPLE LOCATIONS IS DISCOURAGED. THE NDDOT ASSUMES NO RESPONSIBILITY IF THE SOIL CONDITIONS ENCOUNTERED DURING CONSTRUCTION DIFFER FROM THOSE SHOWN. FURTHER SOIL INFORMATION MAY BE AVAILABLE AT:

NDDOT
MATERIALS & RESEARCH DIVISION
300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

SS - Split Spoon
3TW - 3" Thin Wall Shelby Tube
M - Moisture Test
D - Density Test
UC - Unconfined Compression Test
UU - Unconsolidated Undrained Triaxial Test
CU - Consolidated Undrained Triaxial Test
SPT - Standard Penetration Test

This document was originally issued and sealed by Matthew C. Kurle, Registration Number PE- 8777, on 09/05/17 and the original document is stored at the North Dakota Department of Transportation

Boring Log

Boring Number: 2

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
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
A	ampere
&	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
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BG	below grade
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
CI or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
C Gr	coarse gravel
CS	coarse sand
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
C	coulomb
Co	County
Crse	course
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	Crossroad
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia or ø	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
DSDS	dynamic speed display sign
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
Eq	equation
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
F	Fahrenheit
FS	far side
F	farad
Fed	Federal
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
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
Fs	foresight

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09/20/18 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-2

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
Gal	gallon
Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Geod	geodetic
GIS	Geographical Information System
G	giga
GPS	Global Positioning System
Gov	government
Grd	graded/grade
Gr	gravel
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ha	hectare
Ht	height
HI	height of instrument
Hel	helical
H	henry
Hz	hertz
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hr	hour(s)
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
In or "	inch
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IM	iron monument
I Pn	Iron Pin
IP	iron Pipe
Jt	joint
J	joule
Jct	junction
K	kelvin
Kn	kilo newton
Kpa	kilo pascal
Kg	kilogram
Kg/m3	kilogram per cubic meter
Km	kilometer
K	Kip(s)
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
Ln	lane
Lg	large
Lat	latitude
Lt	left
L	length of curve
Lens	lenses
Lvl	level
LB	level book
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Lig Co	lignite coal
Lig Sl	lignite slack
LF	linear foot
Liq	liquid
LL	liquid limit
L	litre
Lm	loam
Loc	location
LC	long chord
Long.	longitude
Lp	loop
LD	loop detector
Lm	lumen
Lum	luminaire
L Sum	lump sum
Lx	lux
Mb	mailbox
ML	main line
M Hr	man hour
MH	manhole
Mkd	marked
Mkr	marker
Mkg	marking
MA	mast arm
Matl	material
Max	maximum
MC	meander corner
Meas	measure
Mdn	median
MD	median drain
MC	medium curing
M	mega
Mer	meridian
M	meter
M/s	meters per second
M	mid ordinate of curve
MGS	Midwest Guardrail System
Mi	mile
MM	mile marker
MP	mile post
Ml	milliliter
Mm	millimeter
Mm/hr	millimeters per hour
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Mun	municipal
N	nano
NGS	National Geodetic Survey
NS	near side
Neop	neoprene
Ntwk	network
N	newton
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Obsn	observation
Ocpd	occupied
Ocpy	occupy
Off Loc	office location
O/s	offset
OC	on center
C	one dimensional consolidation
OC	organic content
Orig	original
O To O	out to out
OD	outside diameter
OH	overhead
PMT	pad mounted transformer
Pg	pages
Pntd	painted
Pr	pair
Pnl	panel
Pk	park
PK	Parker-Kalon nail
Pa	pascal
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
P Cap	plastic cap
Pl or ℙ	plate
Pt	point
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
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
Lb or #	pounds
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd or Pref	preformed
Prep	preperation
Press.	pressure

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 04/23/18 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-3

PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box
Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RTP	random traverse point
Rge or R	range
RC	rapid curing
Rec	record
Rcy	recycle
RAP	recycled asphalt pavement
RPCC	recycled portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCTES	reinforced concrete traversable end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
Rs	residence
Ret	retaining
Rev	reverse
Rt	right
R/W	right of way
Riv	river
Rd	road
Rdbd	road bed
Rdwy	roadway
RWIS	roadway weather information system
Rk	rock
Rt	route
Salv	salvage(d)
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
San	sanitary sewer line
Sc	scoria
Sec	seconds
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sh	shale
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw or Sdwk	sidewalk
S	siemens
SD	sight distance
SN	sign number
Sig	signal
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam
Sgl	single
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SC	spiral to curve
ST	spiral to tangent
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
SF	square feet
Km2	square kilometer
M2	square meter
SY	square yard
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Sta	station
Sta Yd	station yards
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SE	superelevation
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical
SI	systems international
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	tesla
T	thinwall tube sample
T/mi	tons per mile
Ts	topsoil
Twp or T	township
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
TB	transit book
Trans	transition
TT	transmission tower
TES	traversable end section
Trans	transverse
Trav	traverse
TP	traverse point
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
TP	turning point
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VC	vertical curve
VCP	vitrified clay pipe
V	volt
Vol	volume
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
W	watt
Wrng	wearing
Wb	weber
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner
WGS	world geodetic system
Z	zenith

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 04/23/18 and the original document is stored at the North Dakota Department of Transportation

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09/20/18 and the original document is stored at the North Dakota Department of Transportation

Line Styles

D-101-20

Existing Topography

- Existing Ground Void
- Existing Cemetary 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
- 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

Proposed Topography

- 3-Cable w Posts
- Flow
- Fence
- Remove Line
- Wall
- Retaining Wall (Plan View)
- W-Beam w 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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

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 Typicals

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

Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

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

- Hidden Object
- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Centerline Main
- Centerline
- Existing Ground (Details)
- Existing Conditions
- Sheet Piling

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

Environmental

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-31

- Existing Light Standard
- Existing High Mast Light Standard 10 Luminaire
- Existing High Mast Light Standard 3 Luminaire
- Existing High Mast Light Standard 4 Luminaire
- Existing High Mast Light Standard 5 Luminaire
- Existing High Mast Light Standard 6 Luminaire
- Existing High Mast Light Standard 7 Luminaire
- Existing High Mast Light Standard 8 Luminaire
- Existing High Mast Light Standard 9 Luminaire
- Existing Overhead Sign Structure Load Center
- Existing Luminaire
- Existing Light Standard Luminaire
- Existing Federal Mailbox
- Existing Private Mailbox
- Existing Meander Section Corner
- Existing Meter
- Existing Electrical Manhole
- Existing Gas Manhole
- Existing Sanitary Manhole
- Existing Sanitary Force Main Manhole
- Existing Sanitary Manhole with Valve
- Existing Storm Drain Manhole
- Existing Force Main Storm Drain Manhole
- Existing Force Main Storm Drain Manhole with Valve
- Existing Telephone Manhole
- Existing Manhole with Valve Water
- Existing Water Manhole
- Existing Mile Post Type A
- Existing Mile Post Type B
- Existing Mile Post Type C
- Existing Reference Marker
- Existing RW Marker
- Existing Utility Marker
- Iron Monument Found
- Iron Pin R/W Monument
- Existing Object Marker Type I
- Existing Object Marker Type II
- Existing Object Marker Type III
- Existing Electrical Pedestal
- Existing Telephone Pedestal
- Existing Fiber Optic Telephone Pedestal
- Existing TV Pedestal
- Existing Fiber Optic TV Pedestal
- Existing Fuel Filler Pipes
- Existing Traverse PI Aerial Panel
- Existing Pole
- Existing Power Pole
- Existing Power Pole with Transformer
- Existing Telephone Pole
- Existing Wood Pole
- Existing Post
- Existing Pedestrian Push Button Post
- Existing Control Point CP
- Existing Control Point GPS-RTK
- Existing Control Point TRI
- Existing Reference Marker Point NGS
- Existing Pull Box
- Existing Intelligent Transportation Pull Box
- Existing Water Pump
- Existing Slotted Reinforced Concrete Pipe
- Existing RR Profile Spot
- Existing Fuel Leak Sensors
- Existing Highway Sign
- Existing Miscellaneous Spot
- Existing Lighting Standard Pole
- Existing Traffic Signal Standard
- Existing Transformer
- Existing Large Evergreen Tree
- Existing Small Evergreen Tree
- Existing Large Tree
- Existing Small Tree
- Existing Tree Trunk
- Existing Pad Mounted Traffic Signal Control Box
- Existing Undefined Manhole
- Existing Undefined Pull Box
- Existing Undefined Pedestal
- Existing Undefined Valve
- Existing Undefined Pipe Vent
- Existing Gas Valve
- Existing Water Valve
- Existing Fuel Pipe Vent
- Existing Gas Pipe Vent
- Existing Sanitary Pipe Vent
- Existing Storm Drain Pipe Vent
- Existing Water Pipe Vent
- Existing Weather Station
- Existing Ground Water Well Bore Hole
- Existing Windmill or Tower
- Existing Witness Corner
- Flashing Beacon
- Flagger
- Pipe Mounted Flasher
- Sanitary Force Main with Valve

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-32

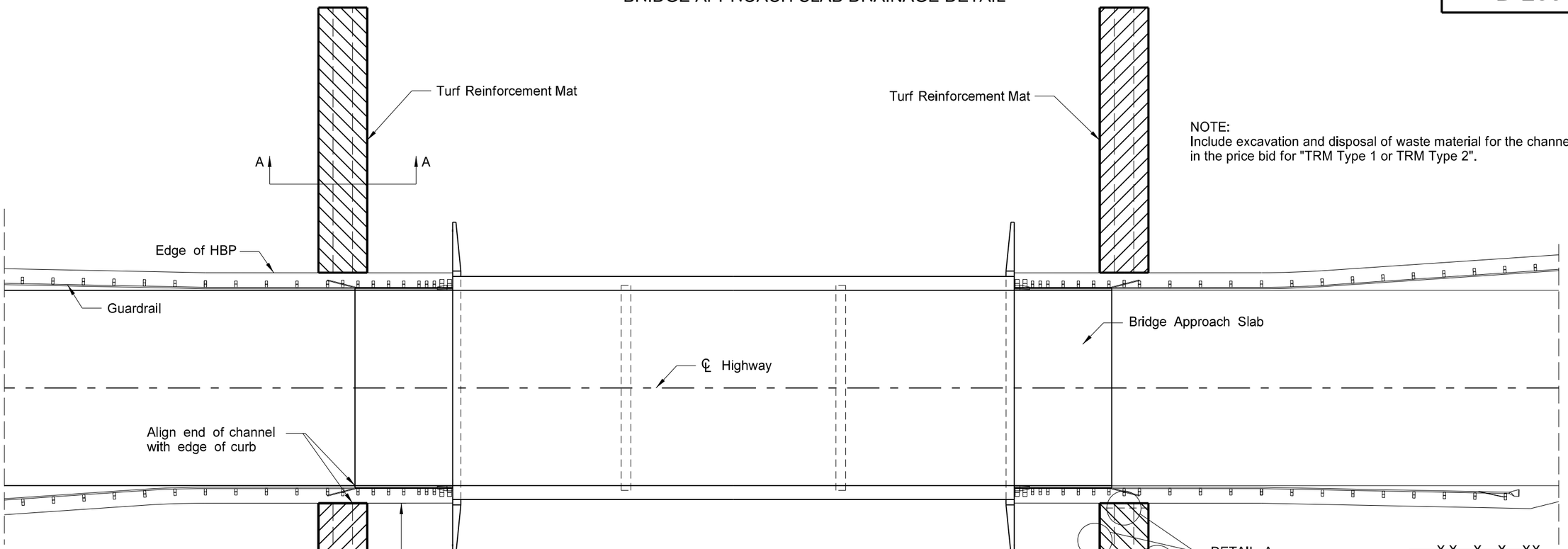
- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate Type 2
- Junction Box
- High Mast Light Standard 10 Luminaire
- High Mast Light Standard 3 Luminaire
- High Mast Light Standard 4 Luminaire
- High Mast Light Standard 5 Luminaire
- High Mast Light Standard 6 Luminaire
- High Mast Light Standard 7 Luminaire
- High Mast Light Standard 8 Luminaire
- High Mast Light Standard 9 Luminaire
- Relocate Light Standard
- Overhead Sign Structure Load Center
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 175 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 200 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 250 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 310 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 50 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 70 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Manhole
- Manhole 48 Inch
- Sanitary Force Main Manhole
- Sanitary Sewer Manhole
- Storm Drain Manhole
- Storm Drain Manhole with Inlet
- Reset Mile Post
- Mile Post Type A
- Mile Post Type B
- Mile Post Type C
- Right of Way Marker
- Tubular Marker
- Alignment Monument
- Iron Pin Reference Monument
- Object Marker Type I
- Object Marker Type II
- Object Marker Type III
- Caution Mode Arrow Panel
- Back to Back Vertical Panel Sign
- Double Direction Arrow Panel
- Left Directional Arrow Panel
- Right Directional Arrow Panel
- Sequencing Arrow Panel
- Truck Mounted Arrow Panel
- Power Pole
- Wood Pole
- Pedestrian Push Button Post
- Property Corner
- Pull Box
- Intelligent Transportation Pull Box
- Sanitary Pump
- Storm Drain Pump
- Reinforced Pavement
- Reinforced Concrete End Section 15 Inch
- Reinforced Concrete End Section 18 Inch
- Reinforced Concrete End Section 24 Inch
- Reinforced Concrete End Section 30 Inch
- Reinforced Concrete End Section 36 Inch
- Reinforced Concrete End Section 42 Inch
- Reinforced Concrete End Section 48 Inch
- Reinforced Concrete End Section 54 Inch
- Reset Right of Way Marker
- Reset USGS Marker
- Right of Way Markers
- Riser 30 Inch
- Continuous Split Barrel Sample (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

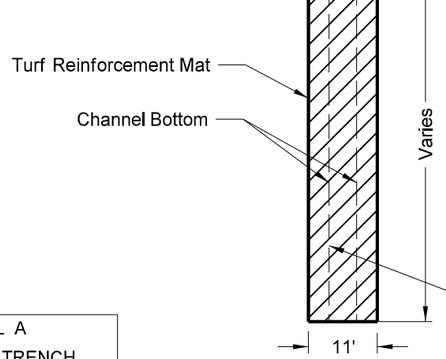
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

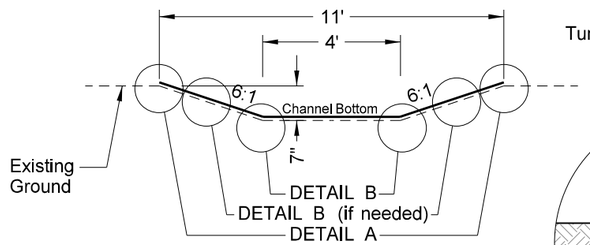
BRIDGE APPROACH SLAB DRAINAGE DETAIL

D-255-1

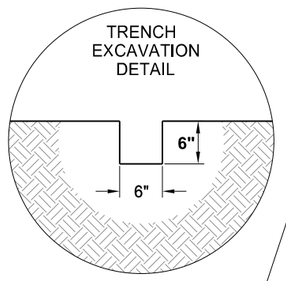


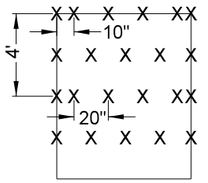
NOTE:
Include excavation and disposal of waste material for the channel in the price bid for "TRM Type 1 or TRM Type 2".



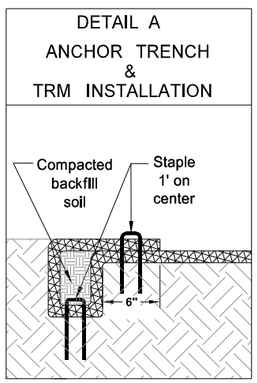


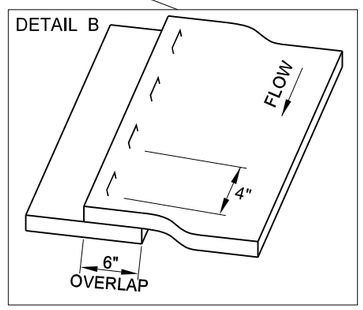
SECTION A-A

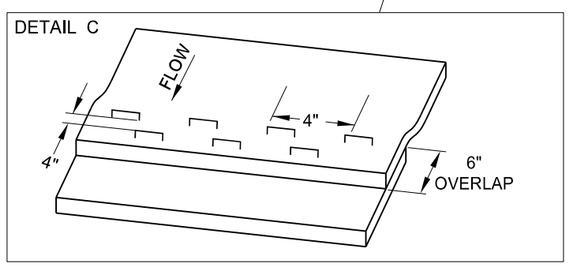




STAPLE PATTERN: 3.8 staples per square yard.







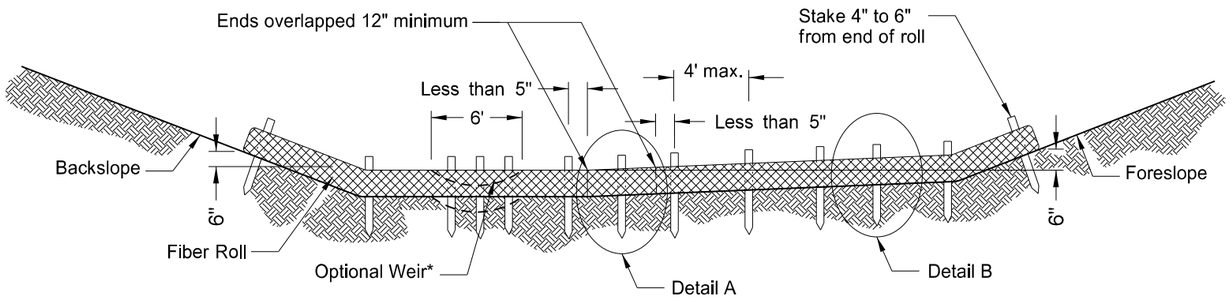
NOTES:
Don't place longitudinal seams along the channel bottom.
Top seam must be minimum 0.5' above the channel bottom.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-4 to D-255-1.
07-27-15	Changed Installation details.

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 07/27/15 and the original document is stored at the North Dakota Department of Transportation

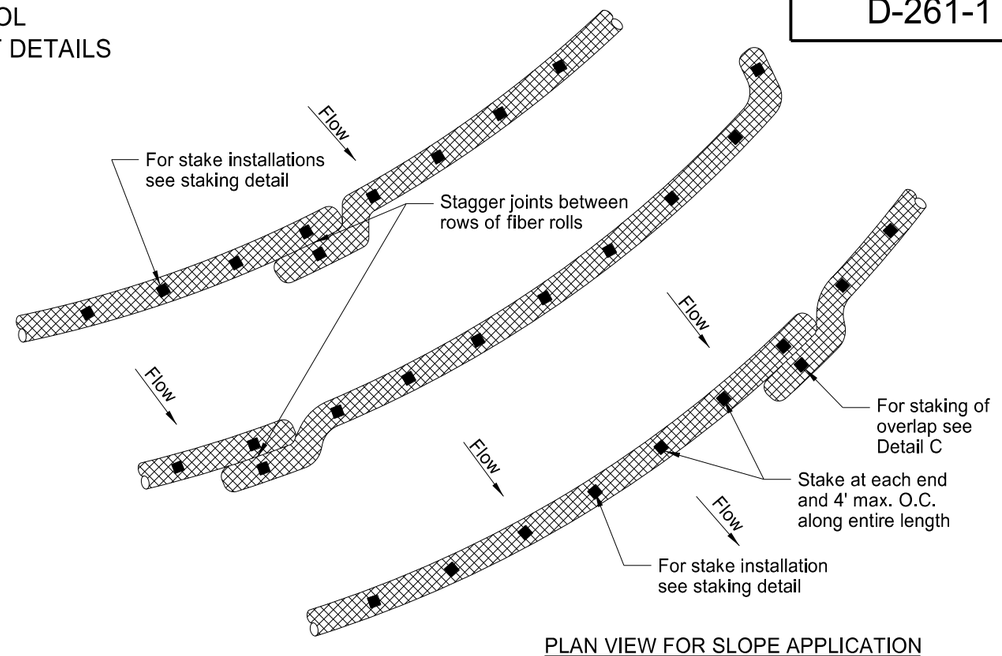
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

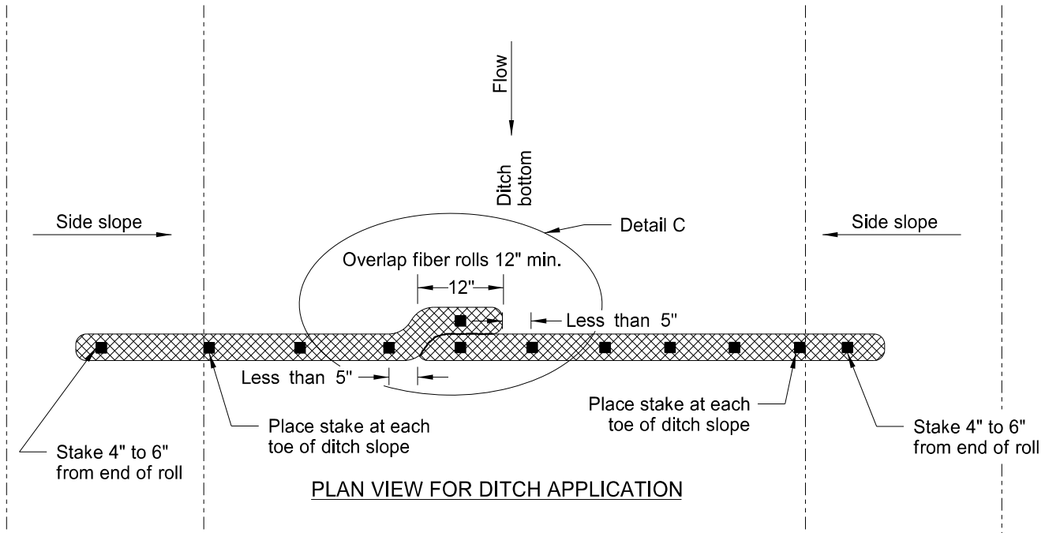


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

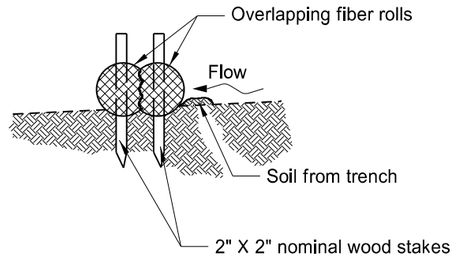
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

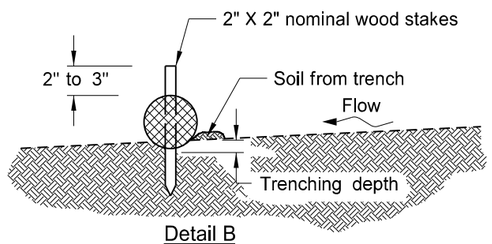


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

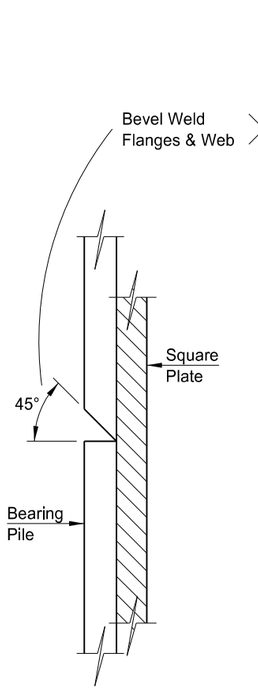
NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1

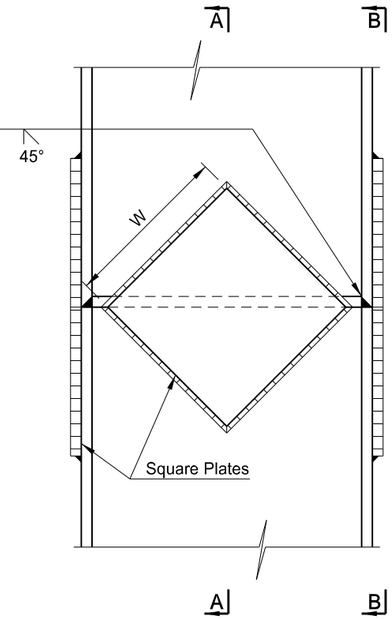
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/26/14 and the original document is stored at the North Dakota Department of Transportation

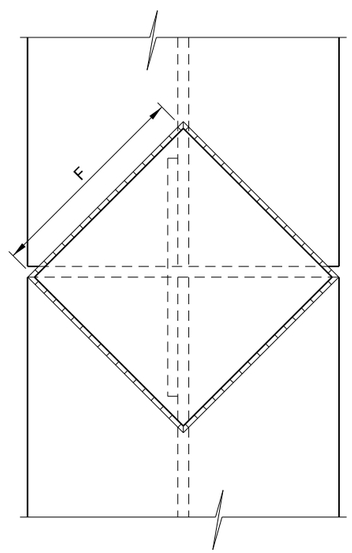
PILE SPLICE DETAILS

D-622-1

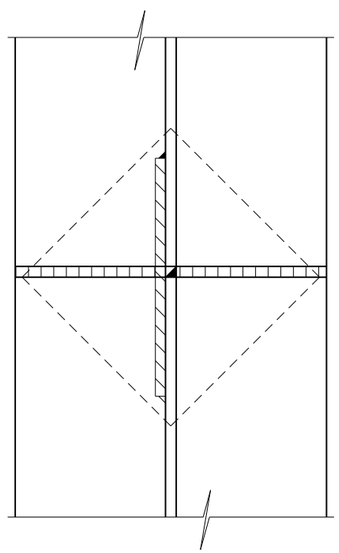


ENLARGED VIEW



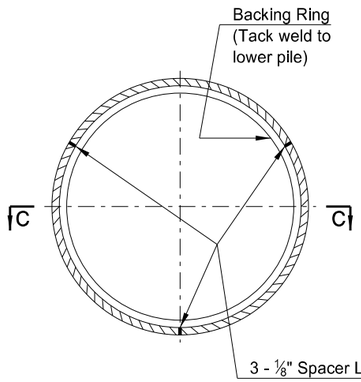


B-B

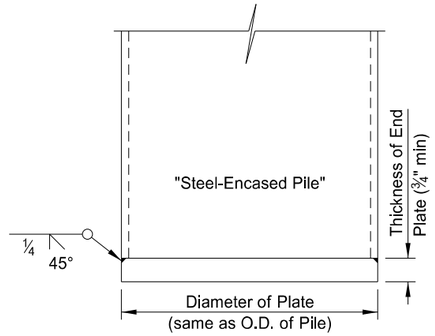


A-A

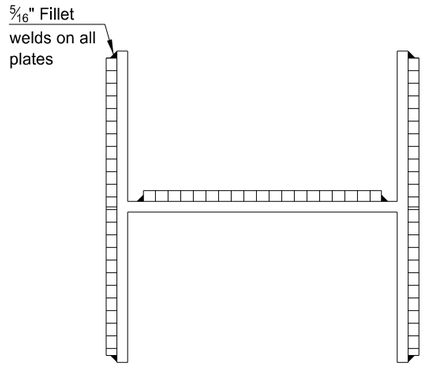
Flame scarf inside of both flanges and one side of web of upper section.



Backing Ring may be made from pile cut-offs or other material of a like quality.

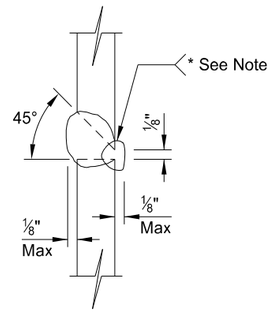


END PLATE DETAIL

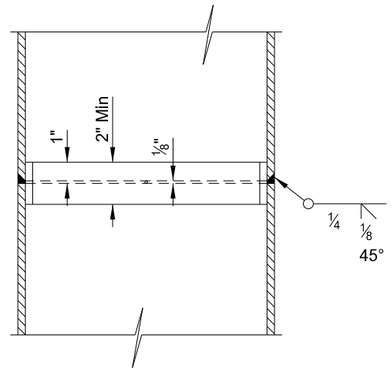


PILE	8"	10"	12"	14"
"F" FLANGE	5"	6½"	8"	10"
"W" WEB	4"	5½"	6½"	8"

H-PILE SPLICE DETAIL

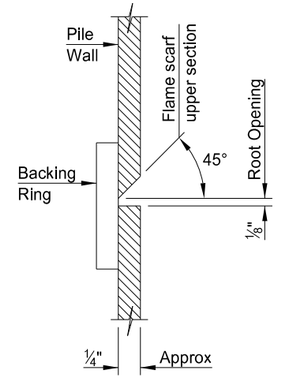


ALTERNATE H-PILE SPLICE DETAIL



C-C

STEEL-ENCASED CONCRETE PILE SPLICE DETAIL



ENLARGED VIEW

NOTES:

Steel H-Pile may be spliced with complete penetration groove welds in both flanges and web in lieu of using the reinforcing plates.

AWS classification E7OXX Low Hydrogen Electrodes shall be used.

* Welds made without the use of backing material shall have the root gouged to sound metal and welded from the second side.

All welding shall conform to the current AASHTO/AWS D1.5 Bridge Welding Code.

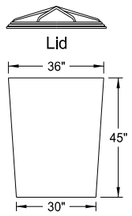
The thickness of the steel square plates shall at a minimum be as thick as the flanges and web of the pile being spliced.

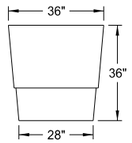
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 09/14/11 and the original document is stored at the North Dakota Department of Transportation

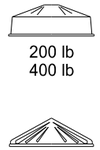
ATTENUATION DEVICE

D-704-1

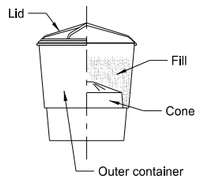




Outer Containers

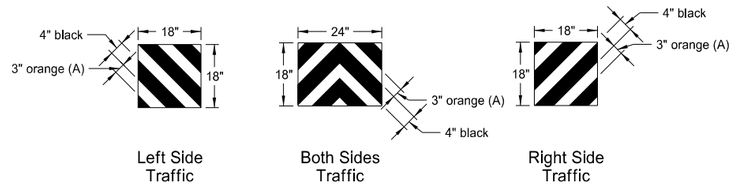


Cones



Typical Assembly

Typical Module
Construction Detail

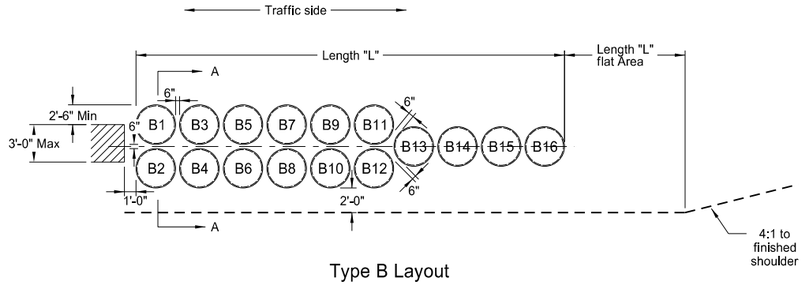


Left Side Traffic | Both Sides Traffic | Right Side Traffic

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.

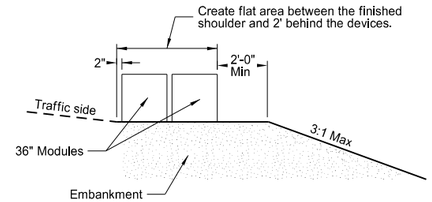
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.



Type B Layout

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

Fill Chart					
	Module Weights (LBS)				
	200	400	700	1400	2100
Distance from top edge	8½"	5"	4"	3"	0"



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
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	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										
2100	1	1	1	1	1	1	1	1	1		
1400	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1

Notes:

1. Materials
   A) Use modules manufactured from frangible polyethylene material which shatters upon impact.
   B) 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.

2. Modules
   Provide modules in two sizes containing volumes of either 2, 4, 7, 14, or 21 cubic feet minimum.
   A) Provide three components for 2, 4, or 7 cubic foot module containers:
      1) A 14 C.F., yellow outer container.
      2) A black lid securely locking over the top lip of the container.
      3) 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.
   B) Provide two components for the 14 cubic foot module container:
      1) A 14 C.F., yellow outer container.
      2) A black lid securely locking over the top lip of the container.
   C) Provide two components for the 21 cubic foot module container:
      1) A 36" height X 36" width yellow outer container.
      2) A black lid which locks securely over the top of the container.

3. 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 3½" maximum thickness pallets to facilitate maintenance.

4. 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.

5. 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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

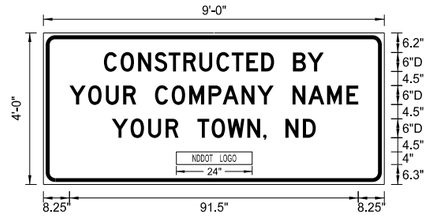
CONSTRUCTION SIGN DETAIL

D-704-5

SIGN NUMBER	G20-10-108
WIDTH x HEIGHT	9'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Refl
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S): AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
C	O	N	S	T	R	U	C	T	E	D		B	Y						69.7	6	D 2000
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7								
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E			91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96					
Y	O	U	R		T	O	W	N	,		N	D							64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2									

Notes:

1. Post mount sign a distance of ½A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)

2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)

3. Do not place sign in urban areas or within city limits.

Advance Warning Sign Spacing (A)			
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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

8-22-12

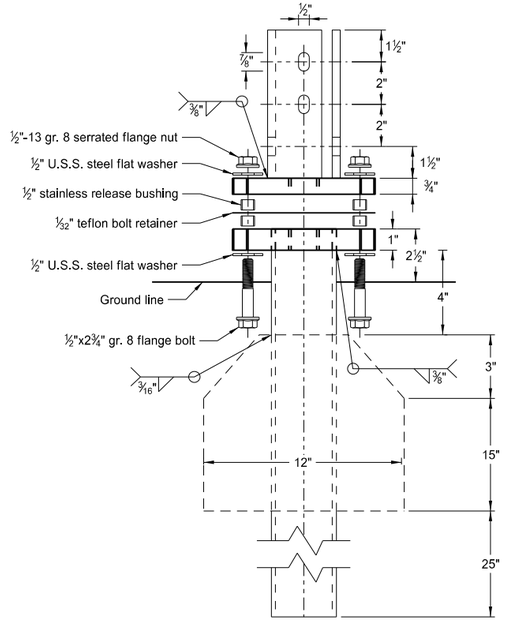
REVISIONS

DATE	CHANGE
7-18-14	Revise sheeting to type IV.
9-27-17	Updated to active voice.
8-30-18	Updated sign number in note 1.

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

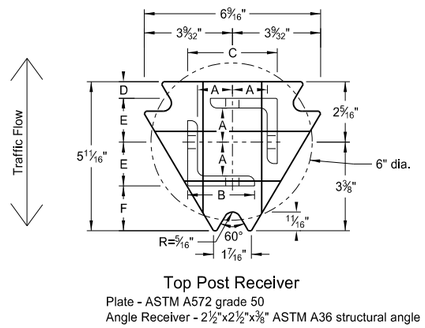
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

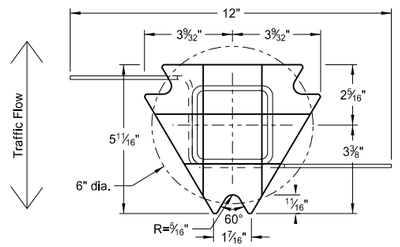


Multi-Directional
Slip Base Assembly

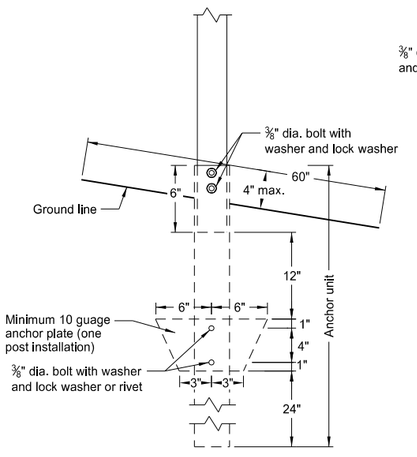
Perforated Tube



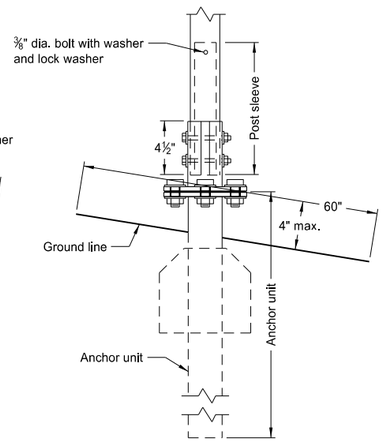
Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



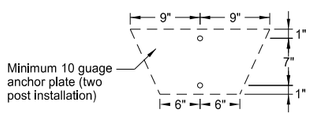
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

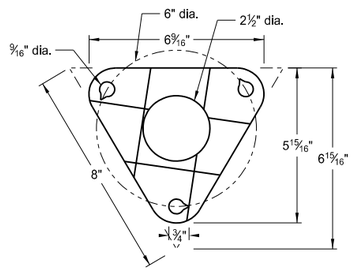


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





Bolt Retainer for Base Connection
Bolt Retainer- 1/32" 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 Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³⁄16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia $in.^4$	Cross Sec. Area $in.^2$	Section Modulus $in.^3$
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³⁄16 x 2³⁄16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	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
2³⁄16"x10 ga.	1⁹⁄64"	2½"	3¹⁄32"	25⁄32"	1³³⁄64"	1⅞"
2½"x10 ga.	1⁹⁄32"	2½"	3⁵⁄16"	⅝"	1²¹⁄32"	1¾"

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

(B) For additional wind load, insert the 2³⁄16"x10 ga. into 2½"x10 ga.

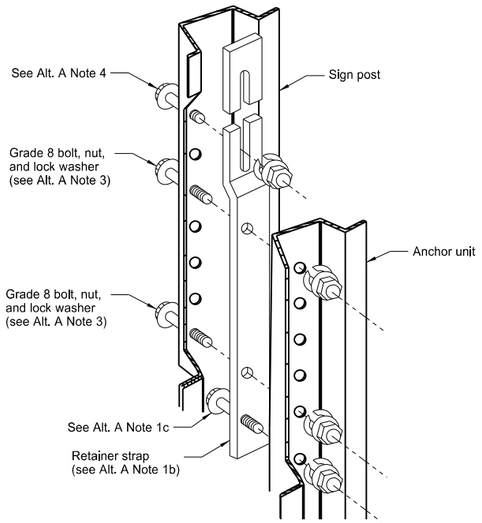
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

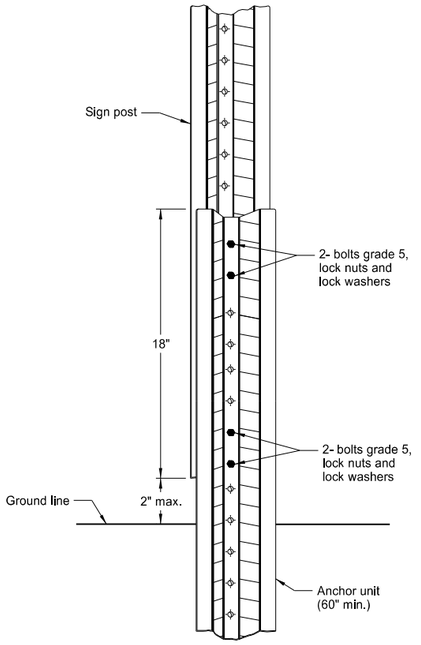
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

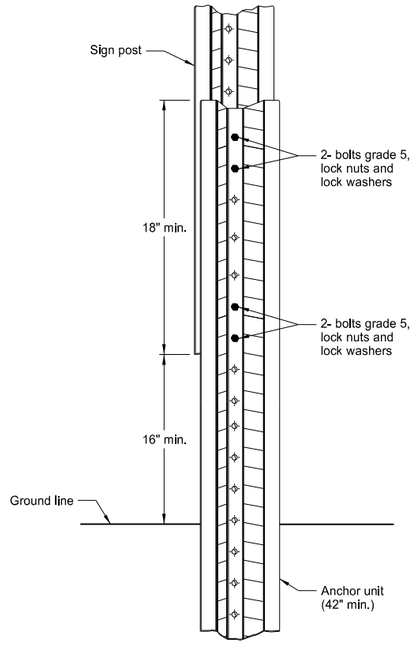


Detail A



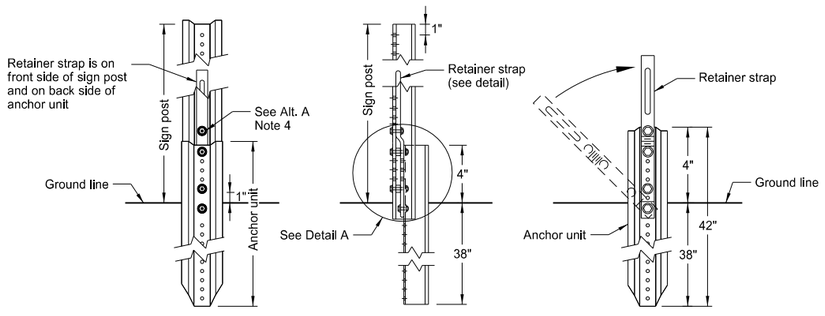
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)

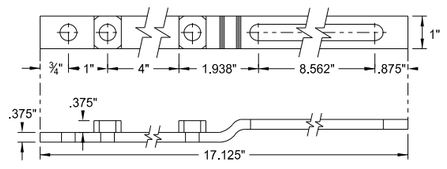
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

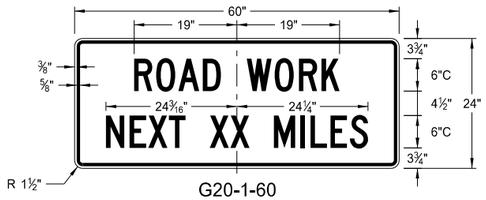
Alternate A Steps of Installation:

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.

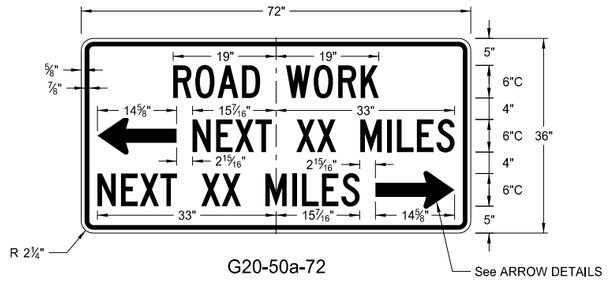
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

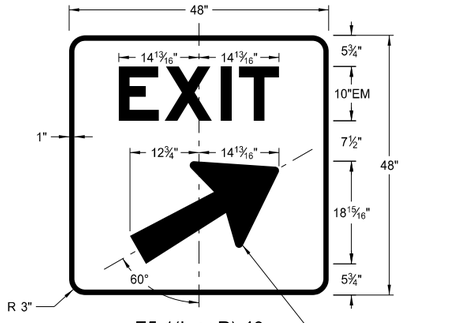
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



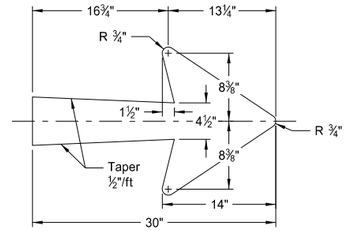
G20-1-60
Legend: black (non-refl)
Background: orange



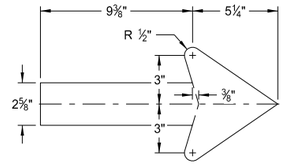
G20-50a-72
Legend: black (non-refl)
Background: orange



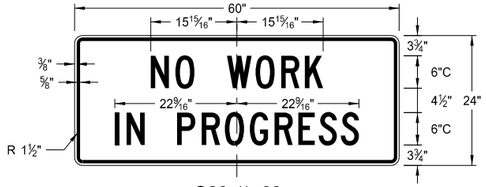
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



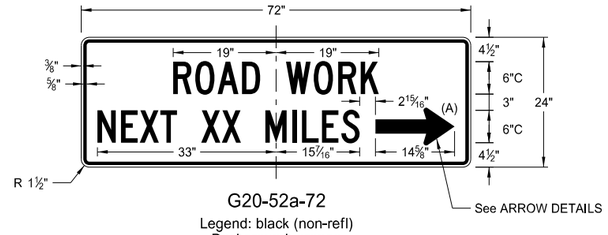
E5-1-48



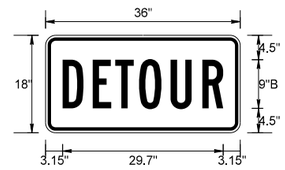
G20-50a-72
G20-52a-72



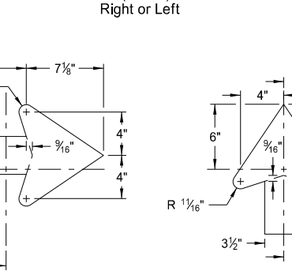
G20-1b-60
Legend: black (non-refl)
Background: orange



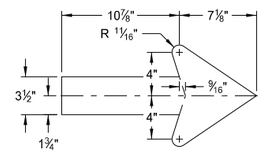
G20-52a-72
Legend: black (non-refl)
Background: orange



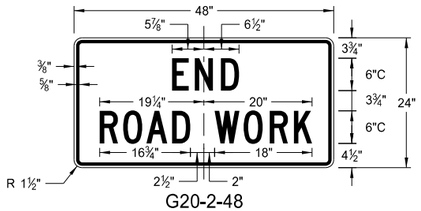
M4-8-36
Legend: black (non-refl)
Background: orange



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

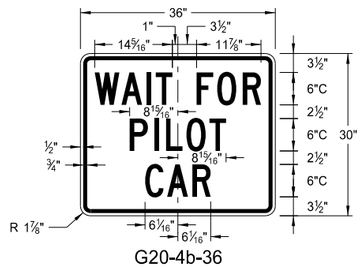


M4-9-30
Straight

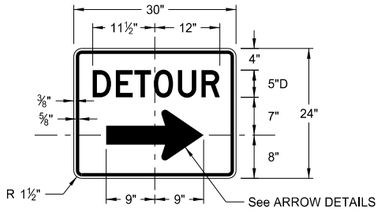


G20-2-48
Legend: black (non-refl)
Background: orange

G20-55-96
Legend: black (non-refl)
Background: orange



G20-4b-36
Legend: black (non-refl)
Background: orange



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

ARROW DETAILS

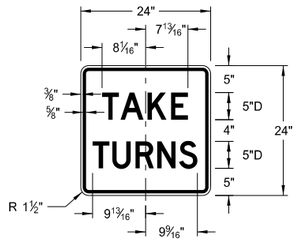
NOTES:

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

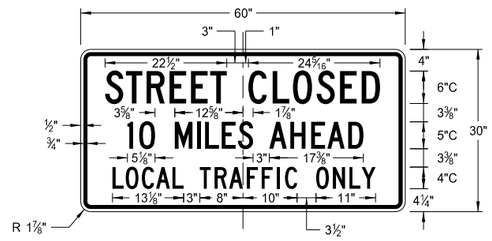
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8/17/17 and the original document is stored at the North Dakota Department of Transportation

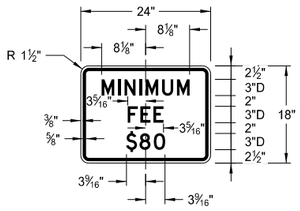
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



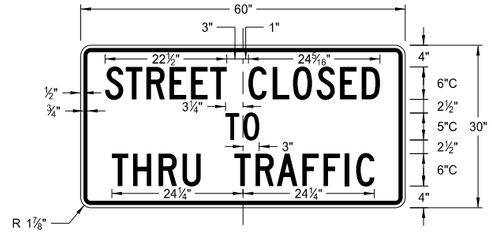
R1-50P-24
Legend: black (non-refl)
Background: white



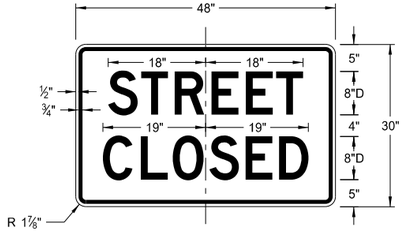
R11-3c-60
Legend: black (non-refl)
Background: white



R2-1aP-24
Legend: black (non-refl)
Background: white



R11-4a-60
Legend: black (non-refl)
Background: white

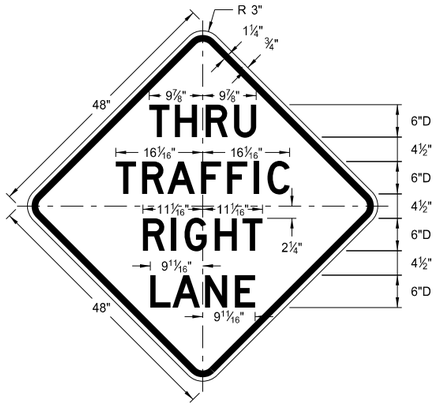


R11-2a-48
Legend: black (non-refl)
Background: white

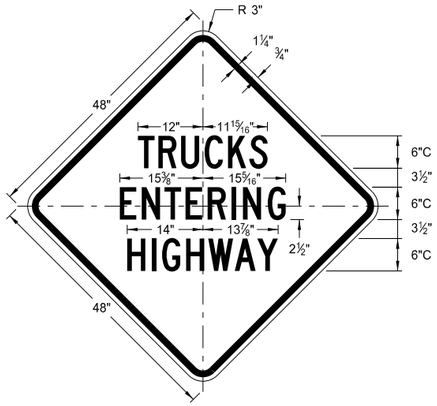
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/17/17 and the original document is stored at the North Dakota Department of Transportation

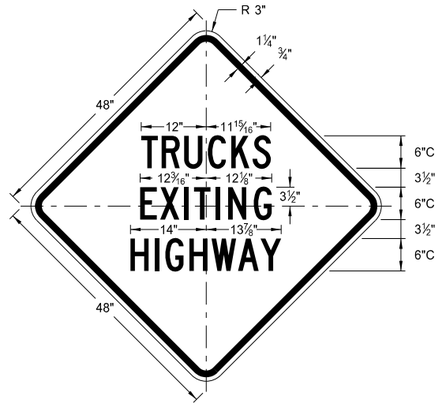
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



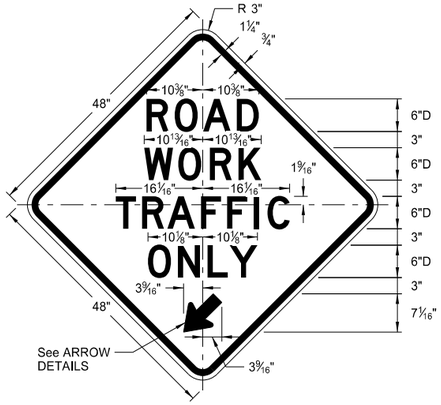
W5-8-48
Legend: black (non-refl)
Background: orange



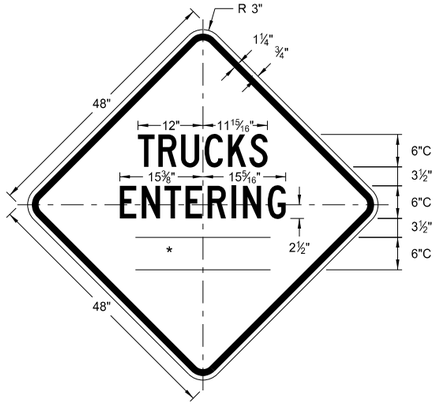
W8-53-48
Legend: black (non-refl)
Background: orange



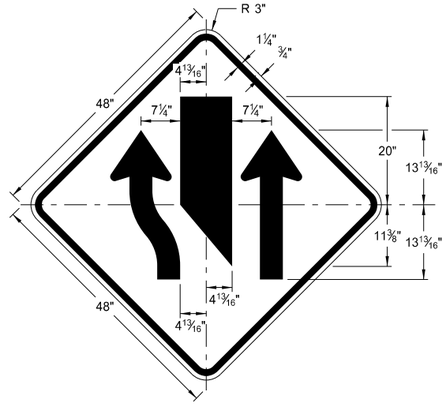
W8-56-48
Legend: black (non-refl)
Background: orange



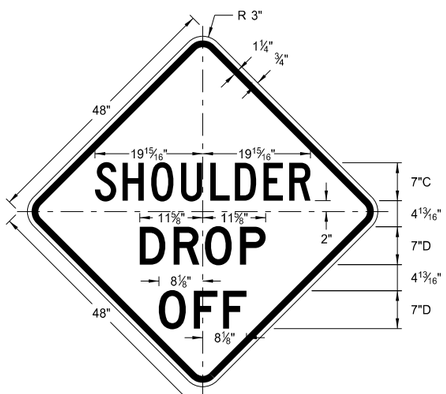
W5-9-48
Legend: black (non-refl)
Background: orange



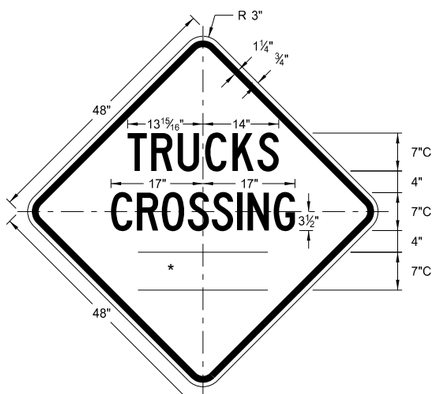
W8-54-48
Legend: black (non-refl)
Background: orange



W9-3a-48
Legend: black (non-refl)
Background: orange



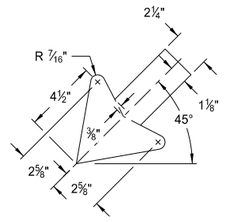
W8-9a-48
Legend: black (non-refl)
Background: orange



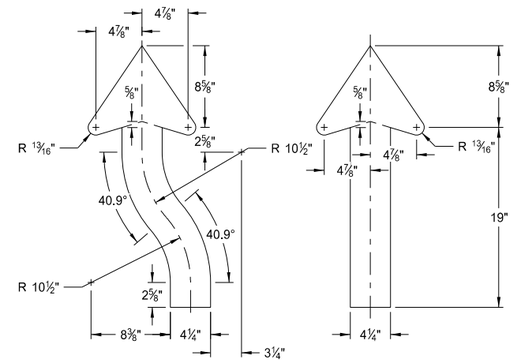
W8-55-48
Legend: black (non-refl)
Background: orange

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



W9-3a-48

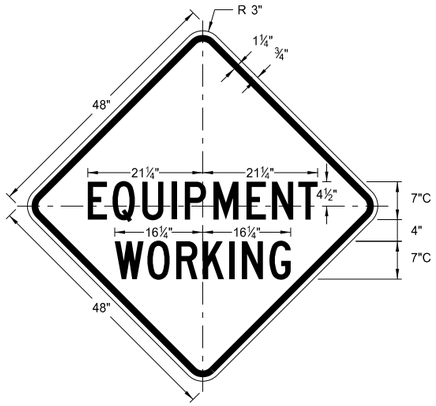
ARROW DETAILS

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

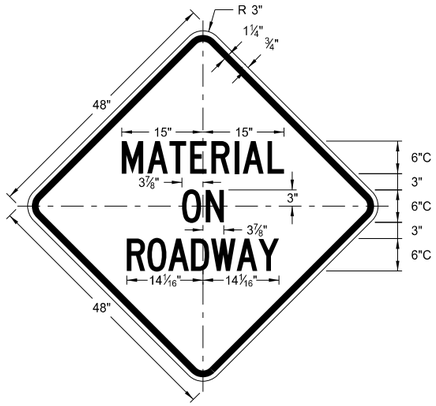
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 5/31/18 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

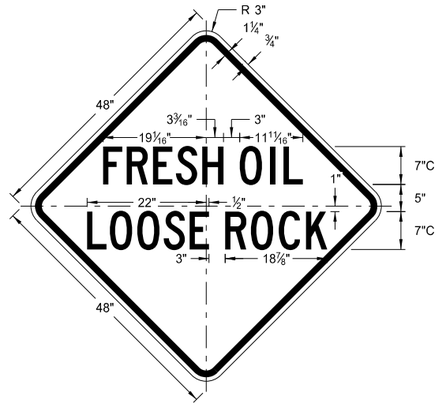
D-704-11A



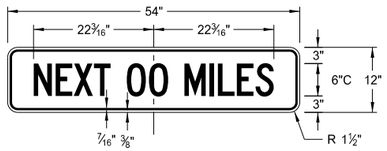
W20-51-48
Legend: black (non-refl)
Background: orange



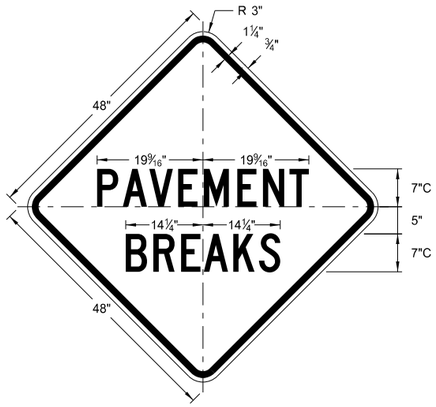
W21-51-48
Legend: black (non-refl)
Background: orange



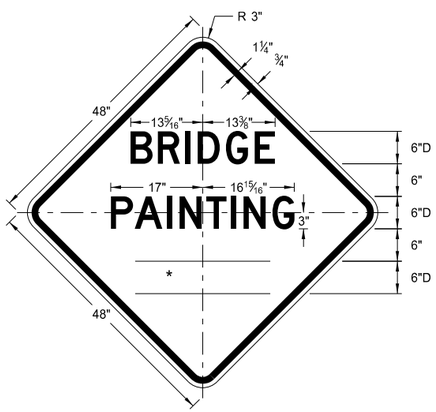
W22-8-48
Legend: black (non-refl)
Background: orange



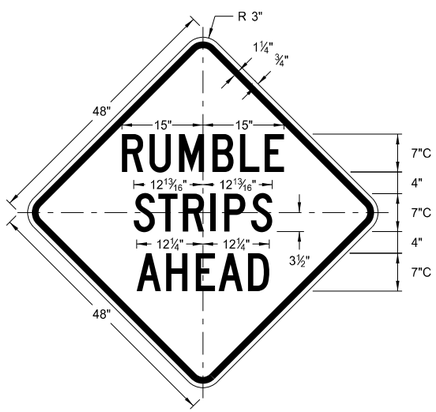
W20-52P-54
Legend: black (non-refl)
Background: orange



W21-52-48
Legend: black (non-refl)
Background: orange



W21-50-48
Legend: black (non-refl)
Background: orange



W21-53-48
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

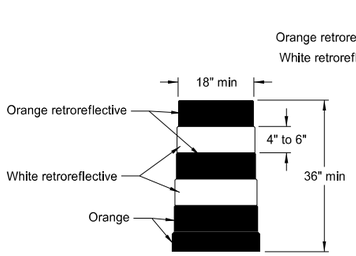
* DISTANCE MESSAGES

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 5/31/18 and the original document is stored at the North Dakota Department of Transportation

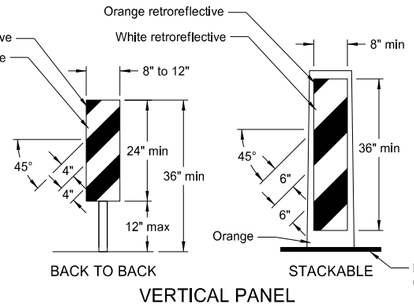
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



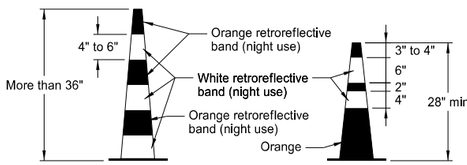
DELINEATOR DRUM

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.



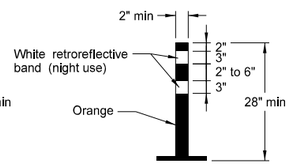
VERTICAL PANEL

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.



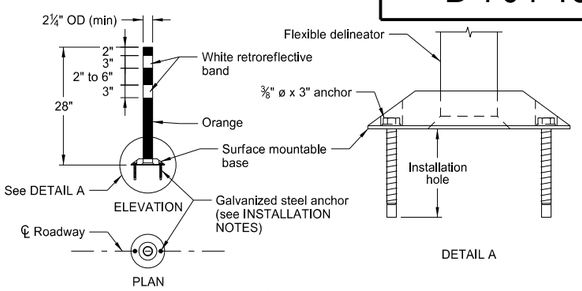
TRAFFIC CONE

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

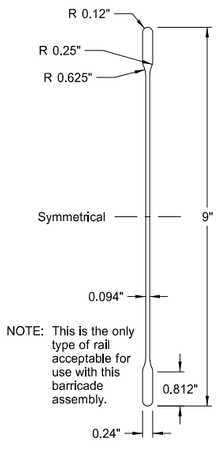
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



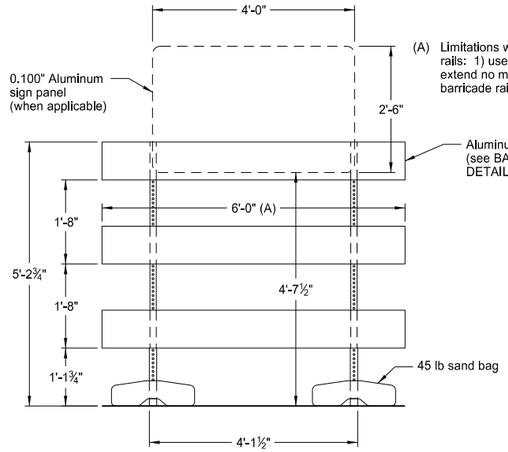
FLEXIBLE DELINEATOR

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.

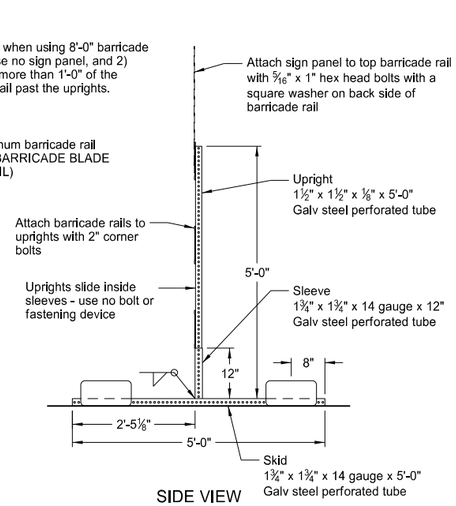


BARRICADE BLADE DETAIL



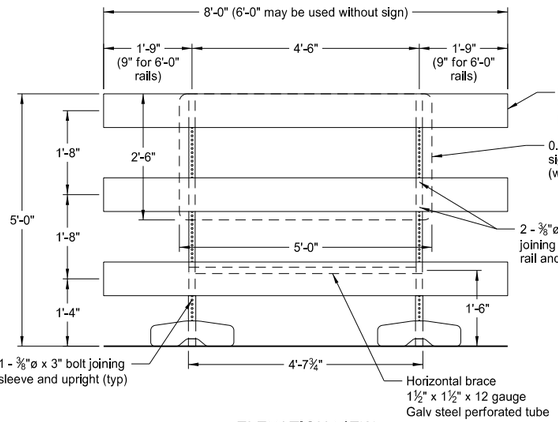
ELEVATION VIEW

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

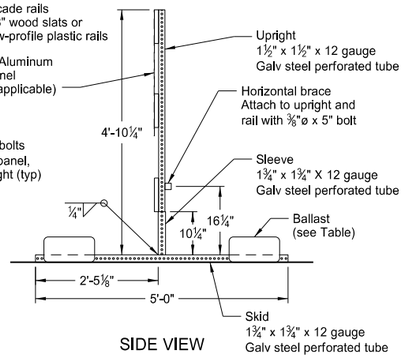


SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)



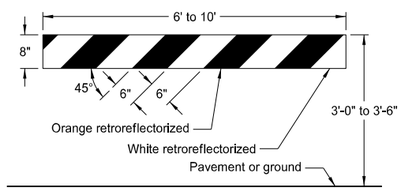
ELEVATION VIEW



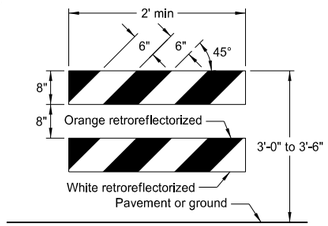
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

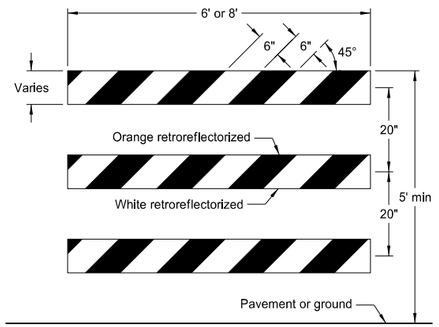
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

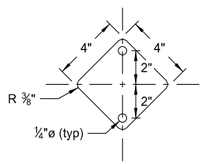


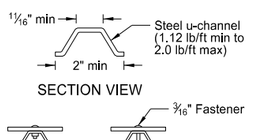
TYPE II BARRICADE

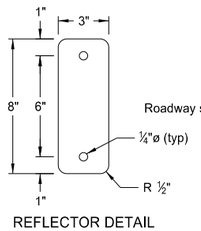


TYPE III BARRICADE

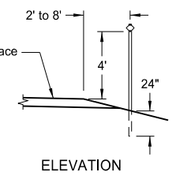
BARRICADE RAIL DETAILS







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.

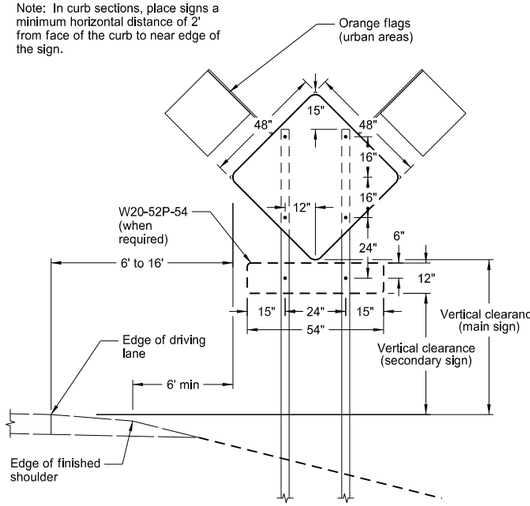
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

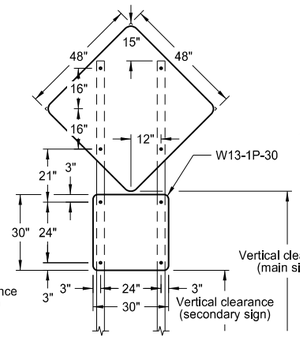
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

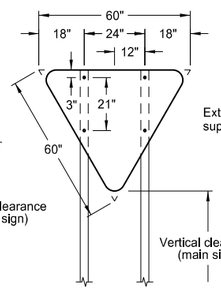
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



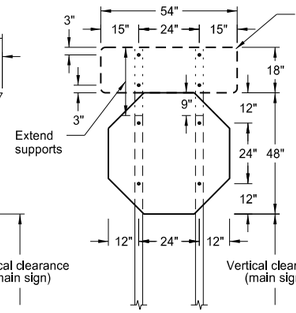
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



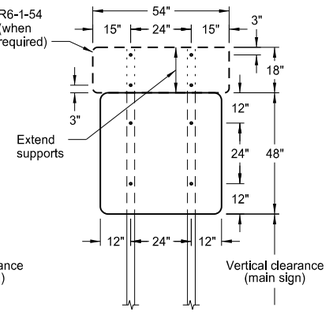
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



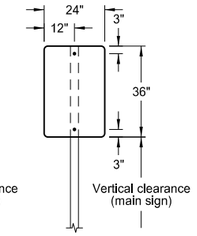
R1-2-60 - YIELD SIGN



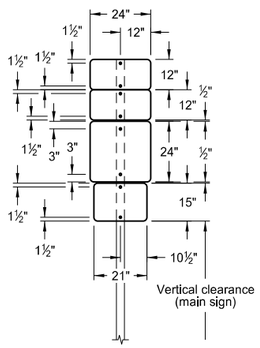
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



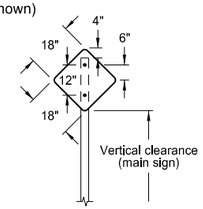
48" x 48" SIGN
(with R6-1-54 sign as required)



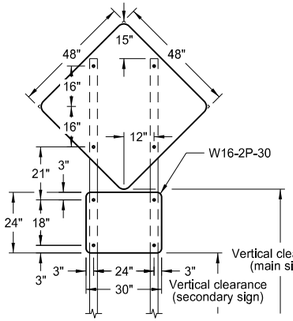
24" x 36" SIGN



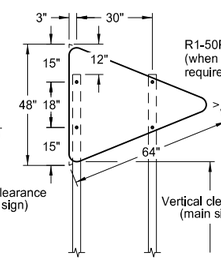
24" x 24"
ROUTE MARKER
ASSEMBLY



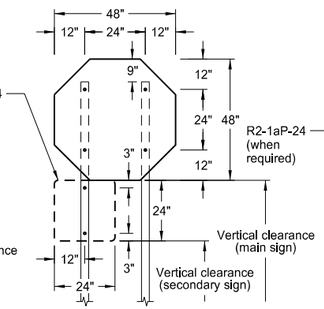
18" x 18"
DIAMOND SIGN



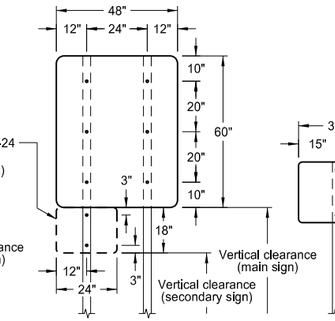
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



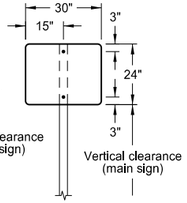
W14-3-64 - PENNANT SIGN



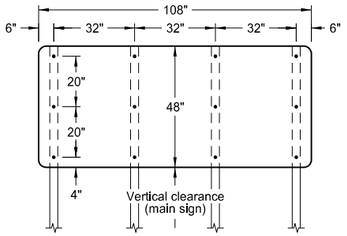
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



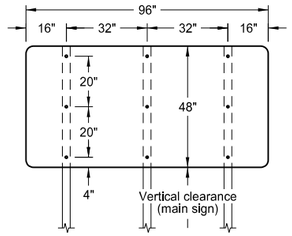
48" x 48" SIGN
(with R2-1aP-24 sign as required)



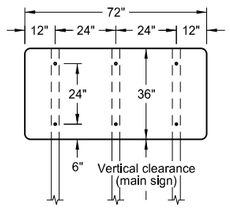
30" x 24" SIGN



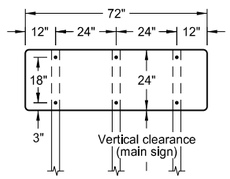
108" x 48" SIGN



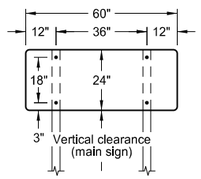
96" x 48" SIGN



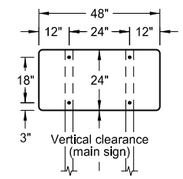
72" x 36" SIGN



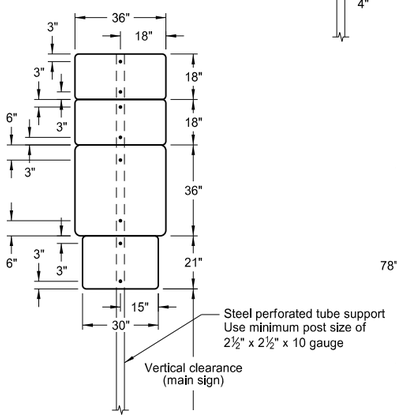
72" x 24" SIGN



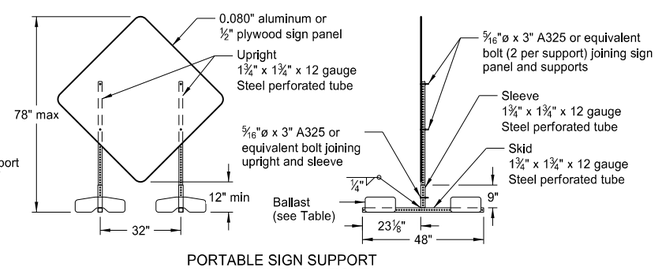
60" x 24" SIGN



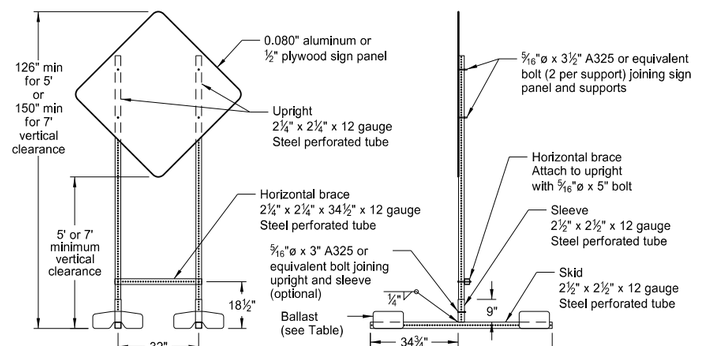
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. 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 2½" x 2½" 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.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅜" bolts.

3. 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)

4. 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

5. 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.

6. 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 unforseen circumstances, such as equipment breakdown, 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

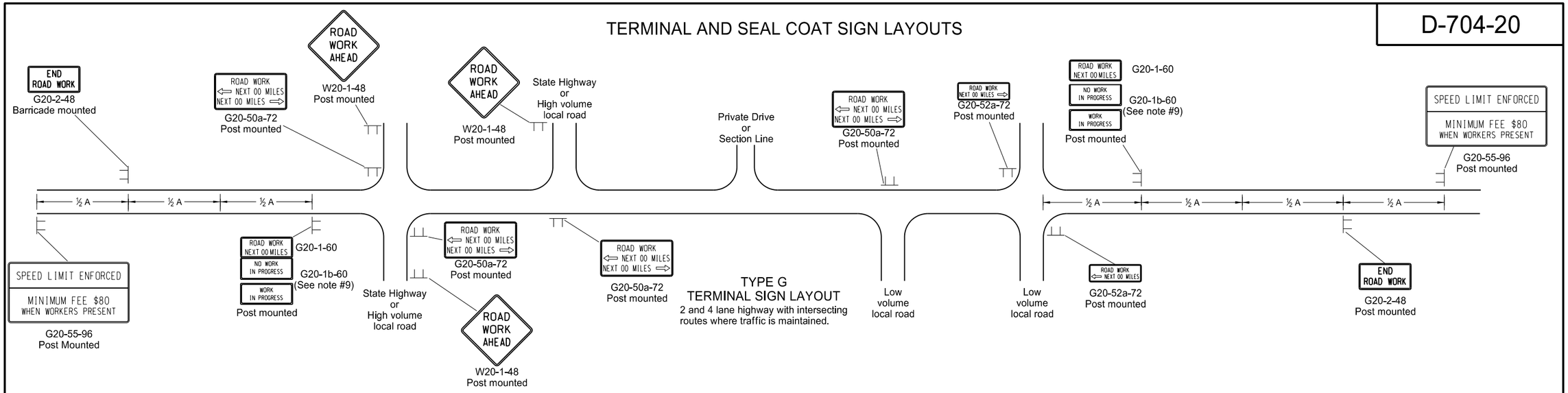
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

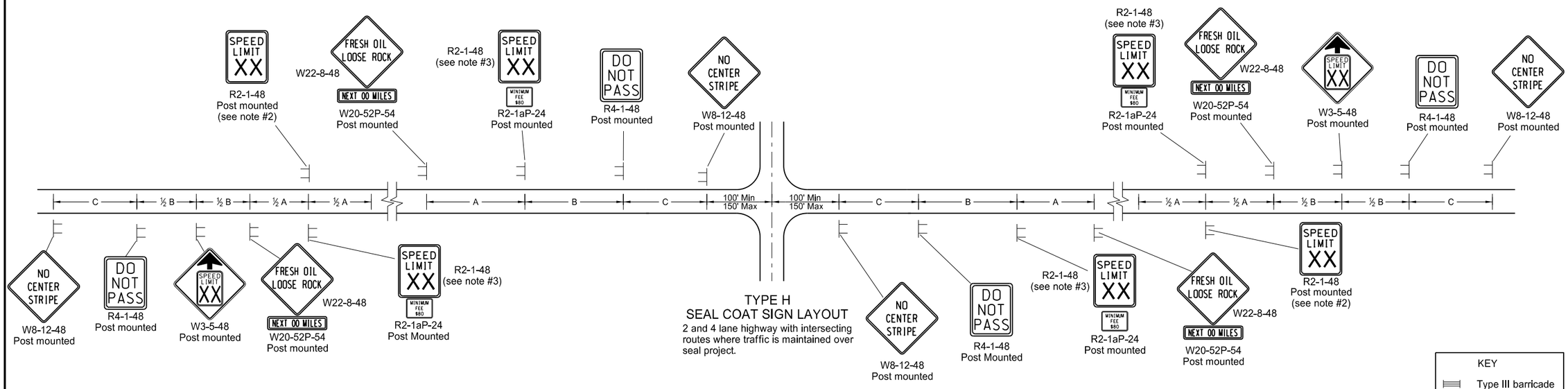
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13 9-27-17	Revised Note 6. Updated to active voice

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20





1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Determine the exact speed limit in the field, based on location and conditions.
3. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit 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 ½ B.
4. 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.
5. Cover existing speed limit signs within a reduced speed zone.
6. On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
9. Install sign G20-1b-60 when work is suspended for winter.
10. Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
11. Sign G20-55-96 is not required if work is less than 15 days.
12. Recommend using 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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
8-17-17	Updated notes & sign numbers

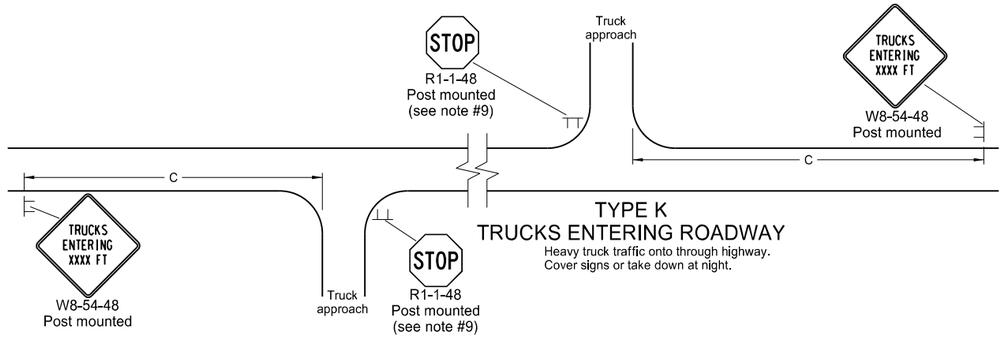
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

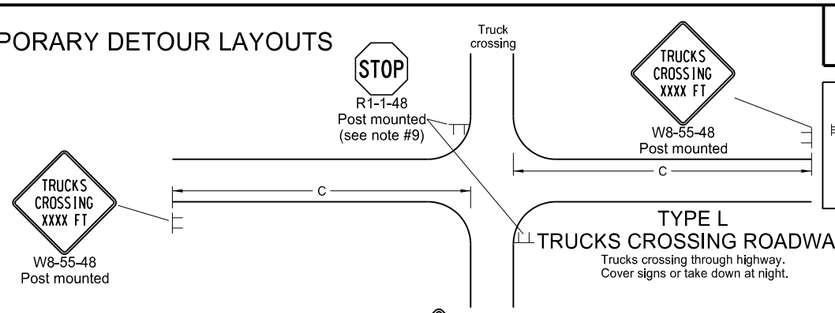
D-704-22

KEY
- Type III barricade
- Work area
- Sign
- Flagger

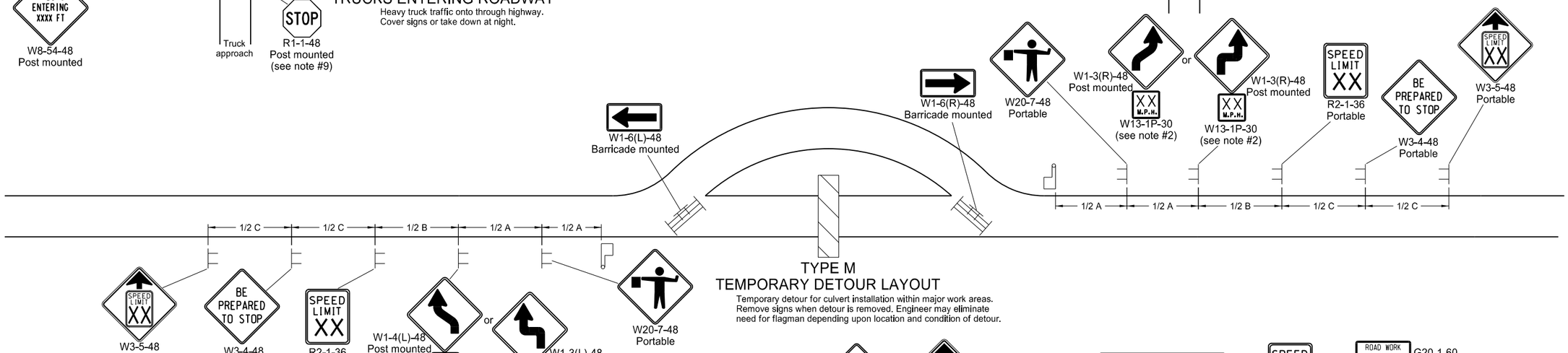
TYPE K
TRUCKS ENTERING ROADWAY
Heavy truck traffic onto through highway.
Cover signs or take down at night.



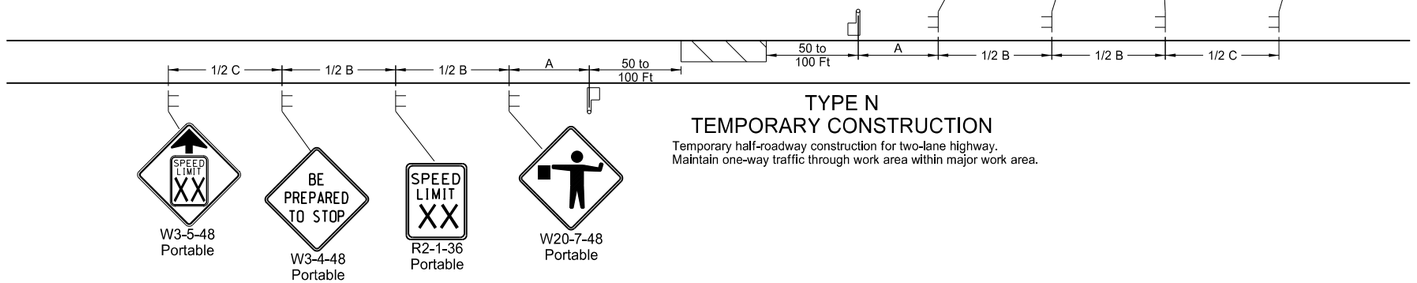
TYPE L
TRUCKS CROSSING ROADWAY
Trucks crossing through highway.
Cover signs or take down at night.



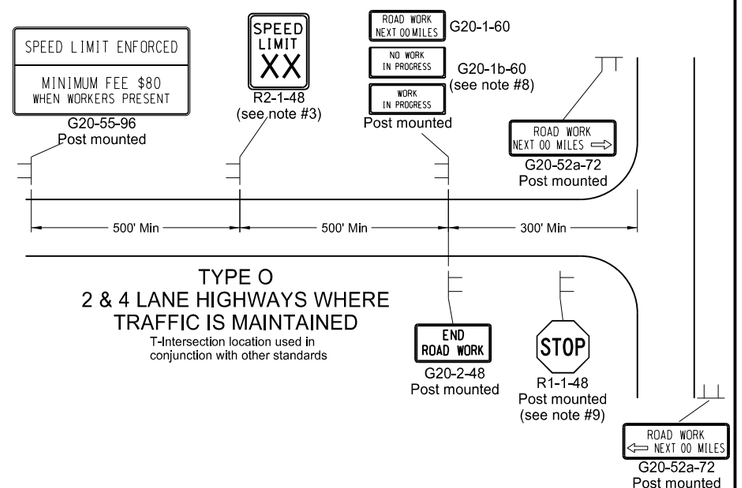
TYPE M
TEMPORARY DETOUR LAYOUT
Temporary detour for culvert installation within major work areas.
Remove signs when detour is removed. Engineer may eliminate need for flagman depending upon location and condition of detour.



TYPE N
TEMPORARY CONSTRUCTION
Temporary half-roadway construction for two-lane highway.
Maintain one-way traffic through work area within major work area.



TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED
T-Intersection location used in conjunction with other standards



Notes
1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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 ½ B.
4. 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.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control or if work is less than 15 days.
11. Recommend using 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 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

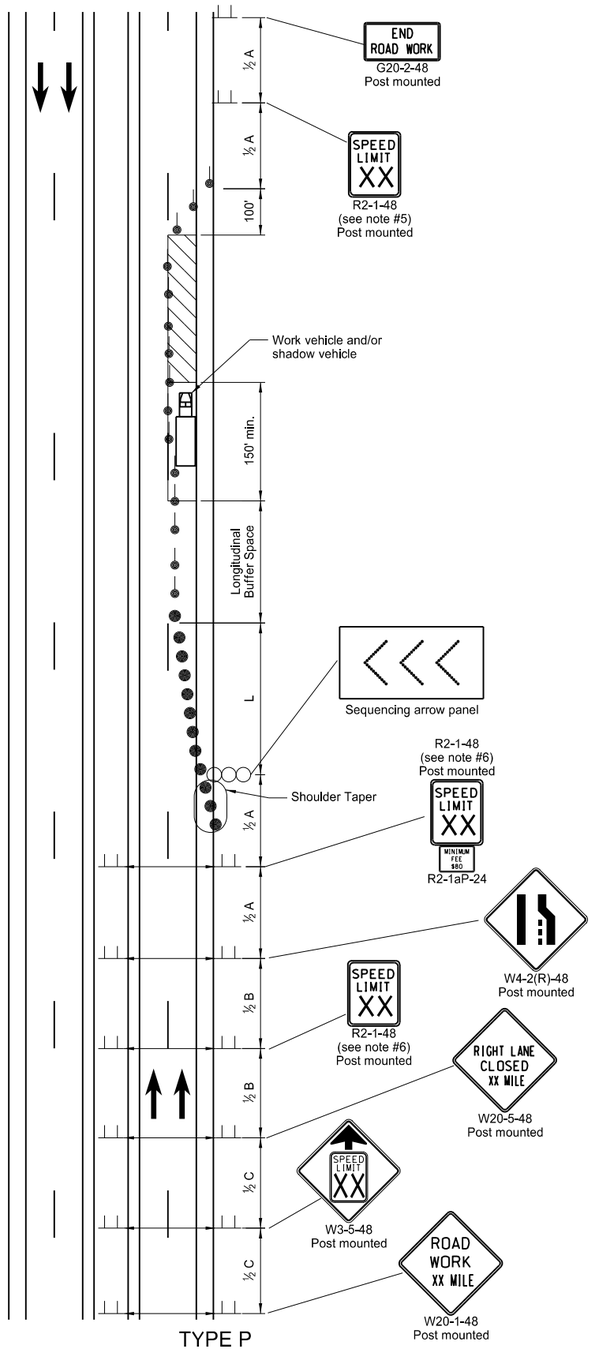
REVISIONS

DATE	CHANGE
8-17-17	Update notes & sign numbers

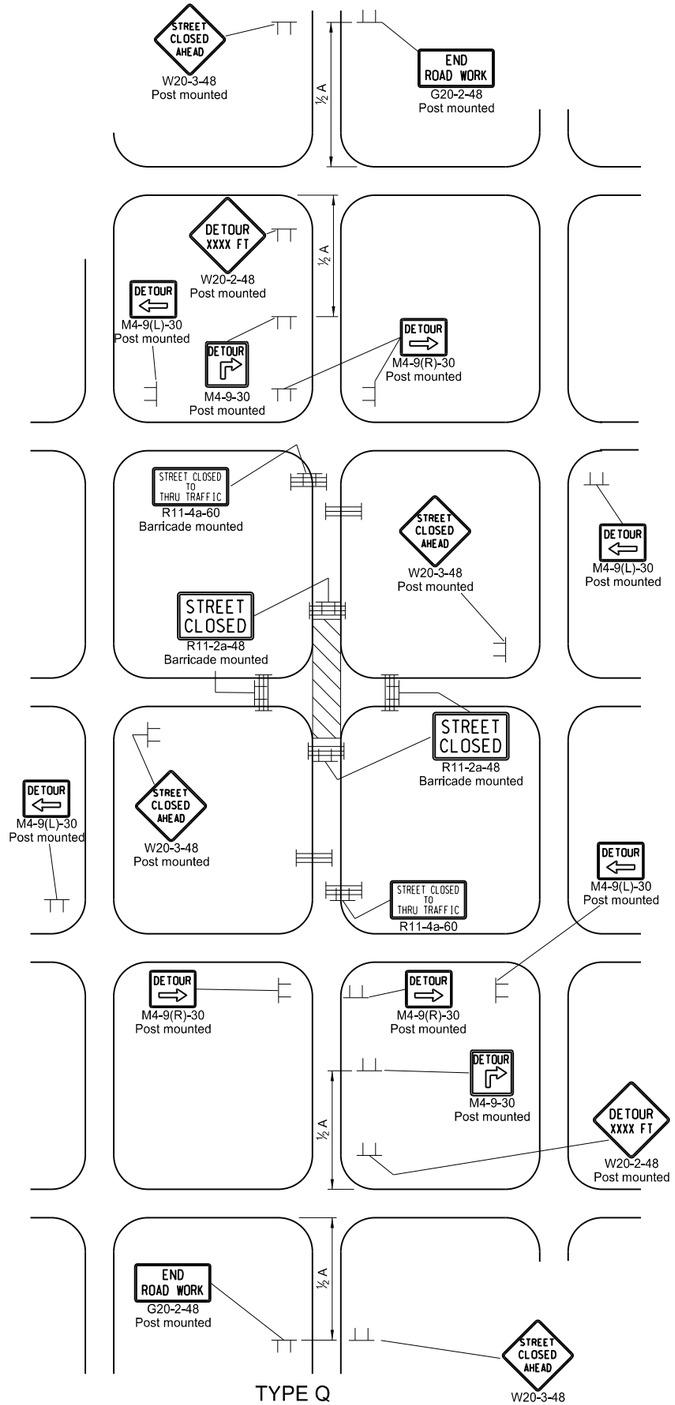
This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23



TYPE P
STATIONARY LANE CLOSURE ON A DIVIDED HIGHWAY
4 lane divided roadway where ½ of roadway is closed.
Short-term (more than 1 hour within a single daylight period.)



TYPE Q
DETOUR FOR A CLOSED STREET
Where city streets are used for detouring traffic.
Urban projects do not require the G20-55-96 and R2-1aP-24 signs.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet
   L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
4. Place Sequencing Arrow Panels at the beginning of taper. Where shoulder width does not provide sufficient room, move panel closer to the work area and place on roadway surface.
   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).
5. Re-established speed limit. Determine exact speed limit in the field, dependent on location and conditions.
6. 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 ½ B.
7. 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.
8. Cover existing speed limit signs within a reduced speed zone.
9. Covered (when approved by engineer) or obliterated payment marking measured as as Obliteration of Pavement Marking.
10. Change intersection control on detour for Type Q when determined necessary by the engineer.
11. Engineer to determine safe speed where necessary. When parking is present, place signs so they are entirely visible above parked vehicles or at the edge of the parking area so they are visible to oncoming traffic.
12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
13. Recommend using 40 mph speed limit in vicinity of workers for Layout Type P, unless location and conditions dictate otherwise.

KEY

Type III barricade	Work area
Sign	Sequencing arrow panel
Delineator Drum	Tubular Markers

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

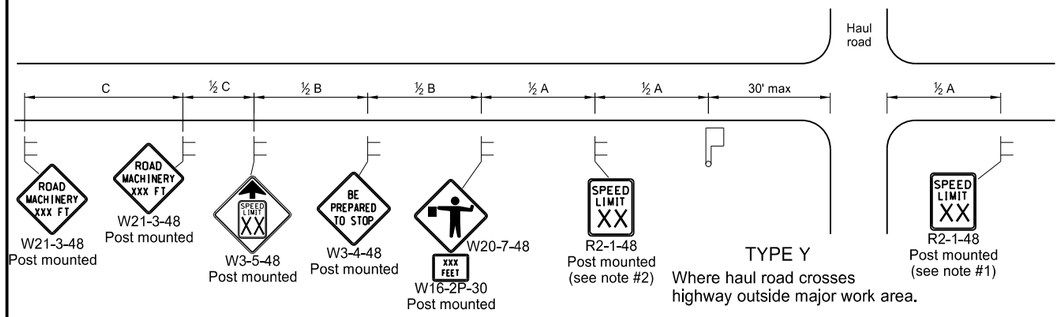
REVISIONS

DATE	CHANGE
8-17-17	Removed Speed limit signs, & updated notes & sign numbers.

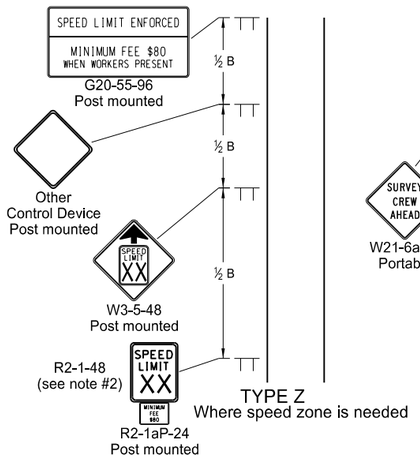
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

MISCELLANEOUS SIGN LAYOUTS

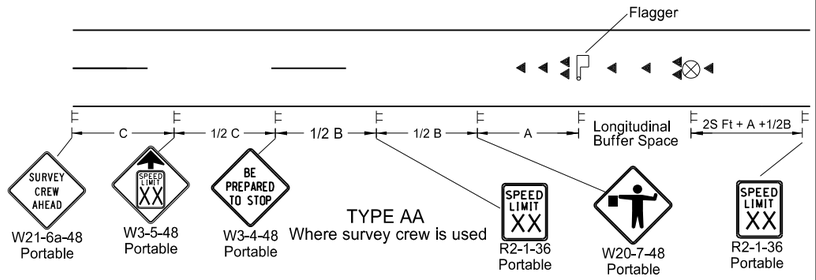
D-704-26



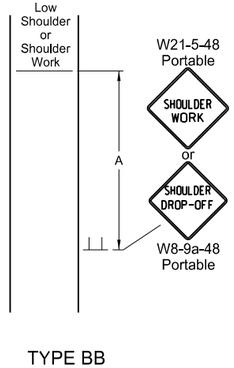
TYPE Y
Where haul road crosses highway outside major work area.



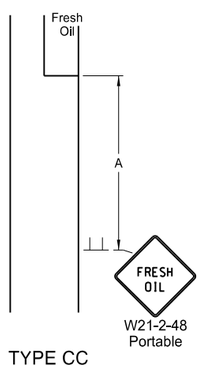
TYPE Z
Where speed zone is needed



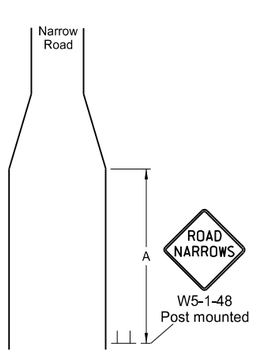
TYPE AA
Where survey crew is used



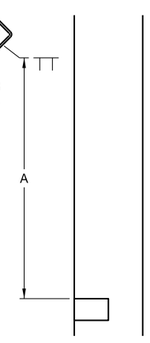
TYPE BB
Within major work area where sign conditions exist



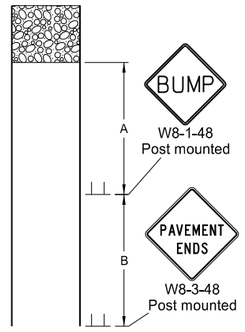
TYPE CC
Where sign conditions exist



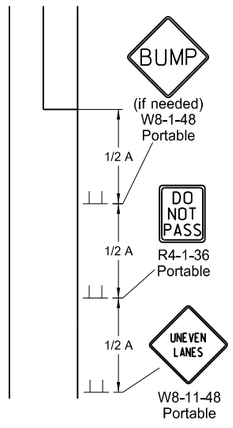
TYPE DD
Where sign conditions exist



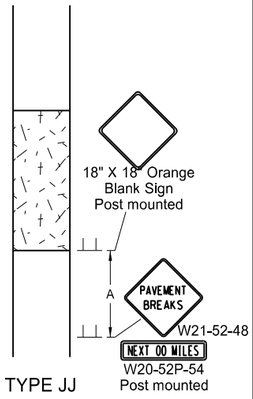
TYPE EE
Where sign conditions exist



TYPE FF
Where sign conditions exist



TYPE GG
Where elevation difference exists between lanes

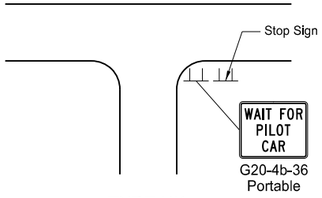


TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.

KEY

Sign Flagger Cones

S = Numerical value of speed limit or 85th percentile.



TYPE KK
At major intersections within pilot car control area

Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
2. Determine reduced speed limit based on 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 ½B.
3. 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.
4. Cover existing speed limit signs within reduced speed zones.
5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
8. 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

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers

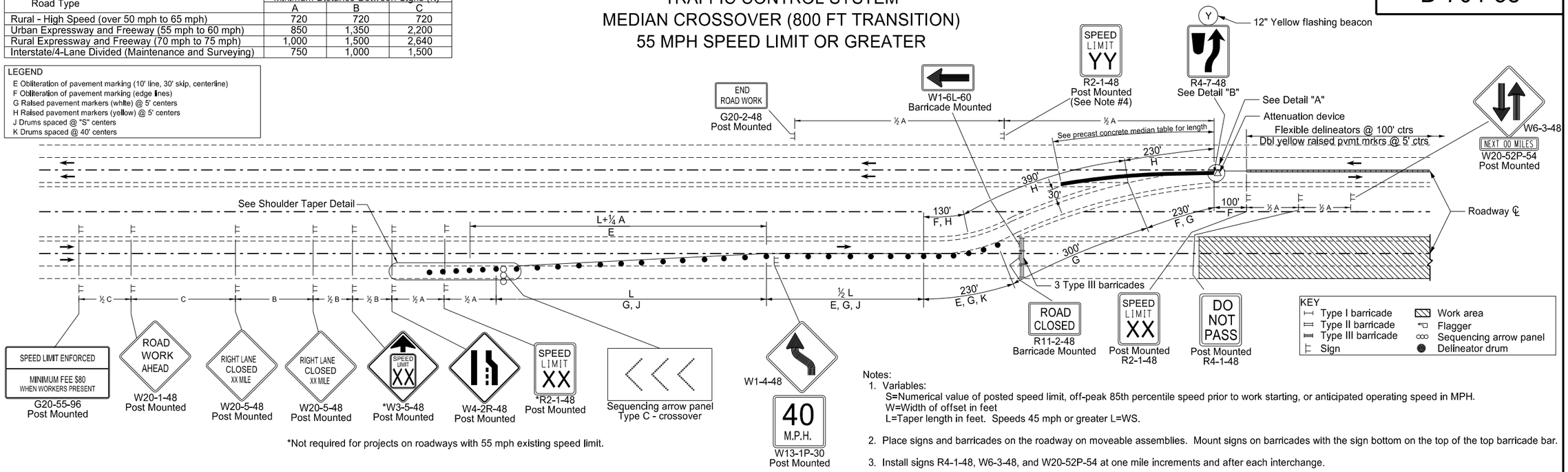
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

D-704-38

TRAFFIC CONTROL SYSTEM
MEDIAN CROSSOVER (800 FT TRANSITION)
55 MPH SPEED LIMIT OR GREATER

ADVANCE WARNING SIGN SPACING			
Road Type	Minimum Distance Between Signs (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	1,350	2,200
Rural Expressway and Freeway (70 mph to 75 mph)	1,000	1,500	2,640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1,000	1,500

LEGEND
- E Obliteration of pavement marking (10' line, 30' skip, centerline)
- F Obliteration of pavement marking (edge lines)
- G Raised pavement markers (white) @ 5' centers
- H Raised pavement markers (yellow) @ 5' centers
- J Drums spaced @ "S" centers
- K Drums spaced @ 40' centers



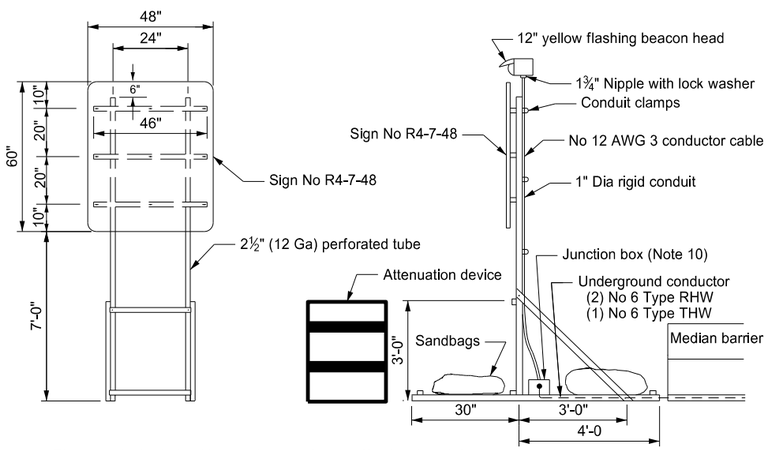
*Not required for projects on roadways with 55 mph existing speed limit.

Notes:
1. Variables:
   S=Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
   W=Width of offset in feet
   L=Taper length in feet. Speeds 45 mph or greater L=WS.
2. Place signs and barricades on the roadway on moveable assemblies. Mount signs on barricades with the sign bottom on the top of the top barricade bar.
3. Install signs R4-1-48, W6-3-48, and W20-52P-54 at one mile increments and after each interchange.
4. Place the speed limit sign only if the crossover is more than 1 mile from an interchange exit ramp.
5. 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)
6. Cover existing speed limit signs within a reduced speed zone.
7. Upon approval, the Engineer will measure obliterated or covered pavement marking as Obliteration of Pavement Marking.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
9. Reduce speed when placing traffic control devices. Place "Minimum Fee $80" signs below speed limit signs in reduced speed areas. Place "Work Zone Speed Limit Enforced" sign in advance of the project at the time traffic control devices are installed.
10. Determine proper size, waterproof junction box, and attach to skid or vertical brace assembly.

SPEED LIMIT SIGNING		
ROADWAY EXISTING SPEED LIMIT	SPEED LIMIT TO BE USED	
	XX	YY
55	50	55
60	50	60
65	55	65
70	60	70
75	65	75

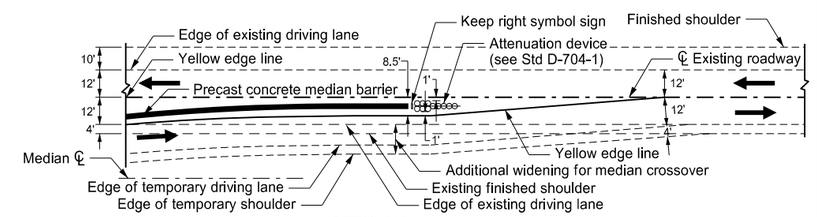
CROSSOVER QUANTITY SUMMARY					
	ROADWAY EXISTING SPEED LIMIT				
	55 MPH	60 MPH	65 MPH	70 MPH	75 MPH
TYPE III BARRICADES	3 Each	3 Each	3 Each	3 Each	3 Each
FLASHING BEACON	1 Each	1 Each	1 Each	1 Each	1 Each
DELINEATOR DRUMS	25 Each	25 Each	25 Each	25 Each	25 Each
SEQUENCING ARROW PANEL TYPE C-CROSSOVER	1 Each	1 Each	1 Each	1 Each	1 Each
PORTABLE PRECAST CONCRETE MEDIAN BARRIER	See "PRECAST CONCRETE MEDIAN BARRIER TABLE"				
ATTENUATION DEVICES	1-Type B-55	1-Type B-60	1-Type B-65	1-Type B-70	1-Type B-75
RAISED PAVEMENT MARKERS (YELLOW)	151 Each	151 Each	151 Each	151 Each	151 Each
RAISED PAVEMENT MARKERS (WHITE)	351 Each	369 Each	387 Each	405 Each	423 Each
OBLITERATION OF PAVEMENT MARKING	310 SF	318 SF	325 SF	338 SF	346 SF

PRECAST CONCRETE MEDIAN BARRIER TABLE	
Roadway ℄ to roadway ℄	Number-median barrier length
75'	48 - 480'
84'	44 - 440'
104'	43 - 430'

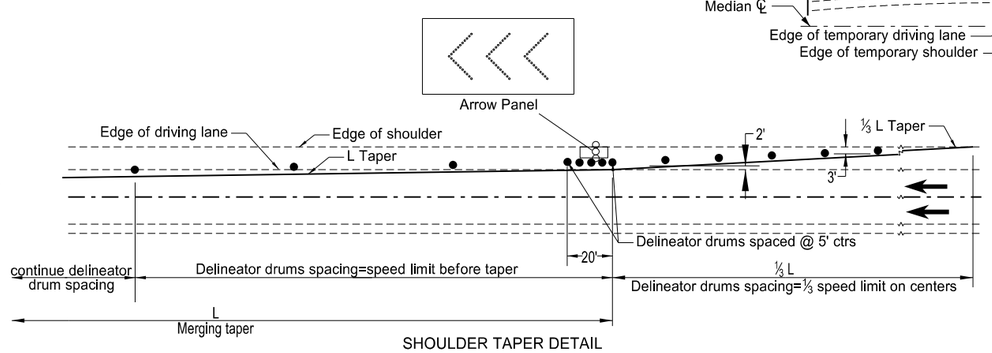


Place conductor behind barricade away from traffic, tie at each barrier connection, and drape above the ground. Place conductors a minimum of 6" underground between the barrier and pole.

DETAIL "B"



DETAIL "A"



SHOULDER TAPER DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-7-2012

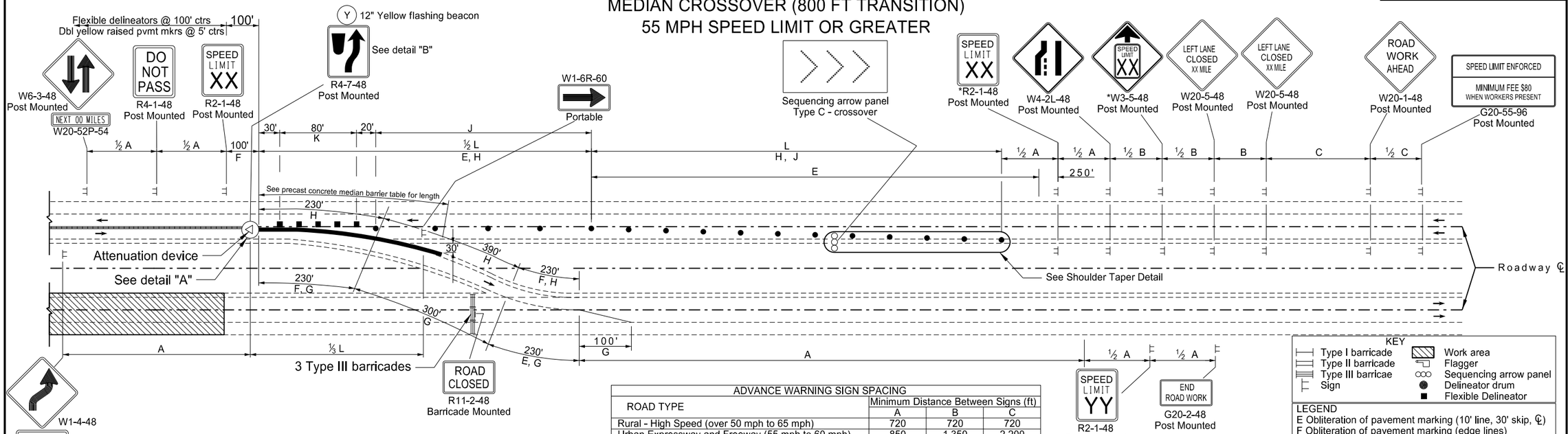
REVISIONS

DATE	CHANGE
6/23/2014	Revised Note 8
3/15/2016	Removed Do Not Pass sign and updated notes
11/14/2016	Revised Attenuation width Termination area and quantities
8/17/2017	Updated note & quantities

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

TRAFFIC CONTROL SYSTEM
MEDIAN CROSSOVER (800 FT TRANSITION)
55 MPH SPEED LIMIT OR GREATER

*Not required for projects on roadways with 55 mph existing speed limit.

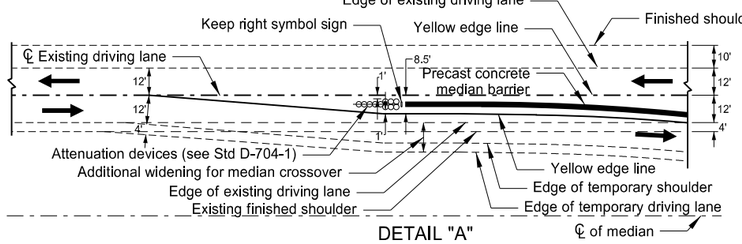


ADVANCE WARNING SIGN SPACING			
ROAD TYPE	Minimum Distance Between Signs (ft)		
	A	B	C
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1,350	2,200
Rural Expressway and Freeway (70 mph to 75 mph)	1,000	1,500	2,640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1,000	1,500

KEY

Type I barricade	Work area
Type II barricade	Flagger
Type III barricae	Sequencing arrow panel
Sign	Delineator drum
	Flexible Delineator

LEGEND
E Obliteration of pavement marking (10' line, 30' skip, ℄)
F Obliteration of pavement marking (edge lines)
G Raised pavement markers (white) 5' centers
H Raised pavement markers (yellow) 5' centers
J Drums spaced @ "S" centers
K Flexible delineators-4 spaces @ 20'

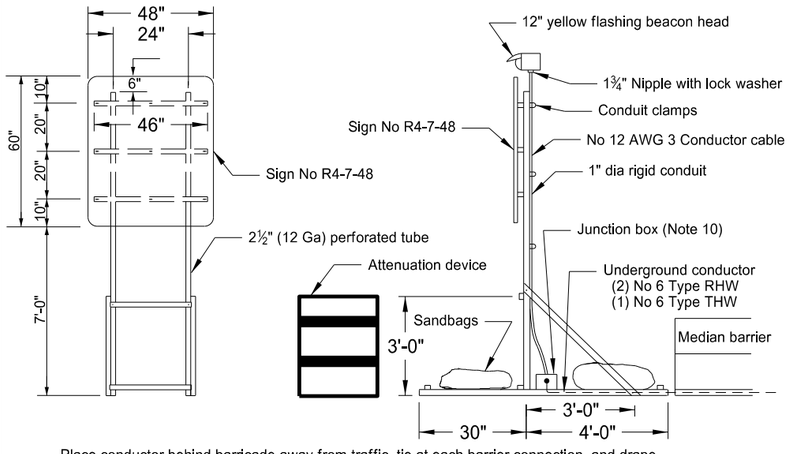


DETAIL "A"

PRECAST CONCRETE MEDIAN BARRIER TABLE	
Roadway ℄ to roadway ℄	Number-median barrier length
75'	37 - 370'
84'	36 - 360'
104'	36 - 360'

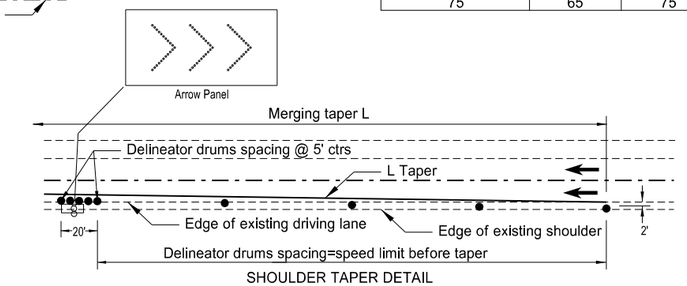
ROADWAY EXISTING SPEED LIMIT	SPEED LIMIT TO BE USED	
	XX	YY
55	50	55
60	50	60
65	55	65
70	60	70
75	65	75

Notes:
1. Variables:
   S=Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
   W=Width of offset in feet
   L=Taper length in feet. Speeds 45 mph or greater L=WS.
2. Place signs and barricades on the roadway on moveable assemblies. Mount signs on barricades with the sign bottom on the top of the top barricade bar.
3. Install signs R4-1-48, W6-3-48, and W20-52P-54 at one mile increments and after each interchange.
4. Place the speed limit sign only if the crossover is more than 1 mile from an interchange exit ramp.
5. 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)
6. Cover existing speed limit signs within a reduced speed zone.
7. Upon approval, the Engineer will measure obliterated or covered pavement marking as Obliteration of Pavement Marking.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
9. Reduce speed when placing traffic control devices. Place "Minimum Fee $80" signs below speed limit signs in reduced speed areas. Place "Work Zone Speed Limit Enforced" sign in advance of the project at the time traffic control devices are installed.
10. Determine proper size, waterproof junction box, and attach to skid or vertical brace assembly.



Place conductor behind barricade away from traffic, tie at each barrier connection, and drape above the ground. Place conductors a minimum of 6" underground between the barrier and pole.

DETAIL "B"



SHOULDER TAPER DETAIL

CROSSOVER QUANTITY SUMMARY					
	ROADWAY EXISTING SPEED LIMIT				
	55 MPH	60 MPH	65 MPH	70 MPH	75 MPH
TYPE III BARRICADES	3 Each	3 Each	3 Each	3 Each	3 Each
FLASHING BEACON	1 Each	1 Each	1 Each	1 Each	1 Each
FLEXIBLE DELINEATORS	5 Each	5 Each	5 Each	5 Each	5 Each
DELINEATOR DRUMS	17 Each	17 Each	17 Each	17 Each	17 Each
SEQUENCING ARROW PANELS TYPE C-CROSSOVER	1 Each	1 Each	1 Each	1 Each	1 Each
PORTABLE PRECAST CONCRETE MEDIAN BARRIERS	See "PRECAST CONCRETE MEDIAN BARRIER TABLE"				
ATTENUATION DEVICES	1-Type B-55	1-Type B-60	1-Type B-65	1-Type B-70	1-Type B-75
RAISED PAVEMENT MARKERS (Yellow)	370 Each	388 Each	406 Each	424 Each	442 Each
RAISED PAVEMENT MARKERS (White)	173 Each	173 Each	173 Each	173 Each	173 Each
OBLITERATION OF PAVEMENT MARKING	298 SF	305 SF	313 SF	332 SF	339 SF

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

5-31-12

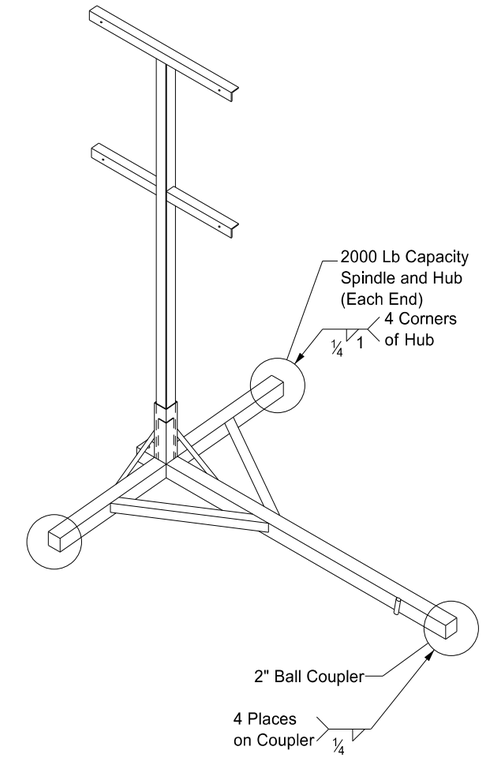
REVISIONS

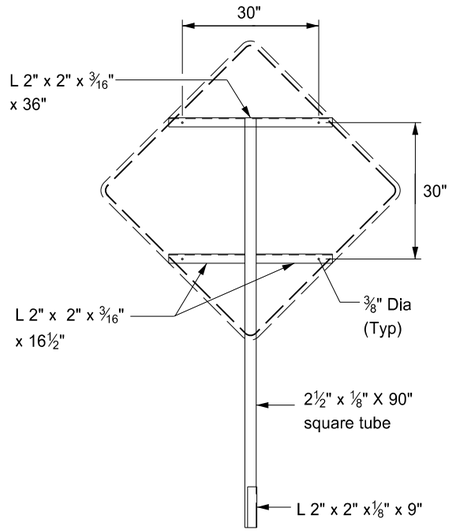
DATE	CHANGE
6/23/2014	Revised Note 8
3/15/2016	Removed Do Not Pass sign and updated notes
11/14/2016	Revised attenuation width Termination area and quantities
8/17/2017	Updated note and quantity

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

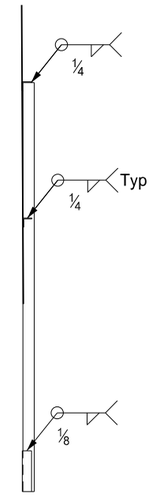
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



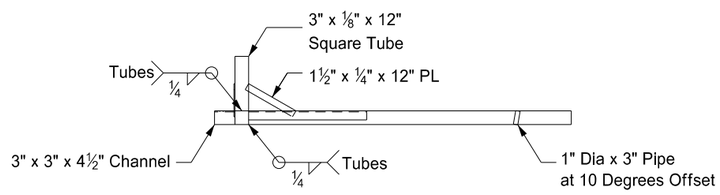


FRONT

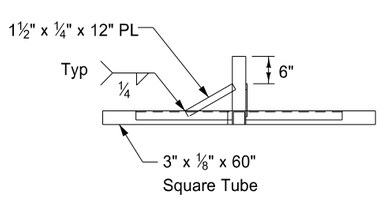


RIGHT

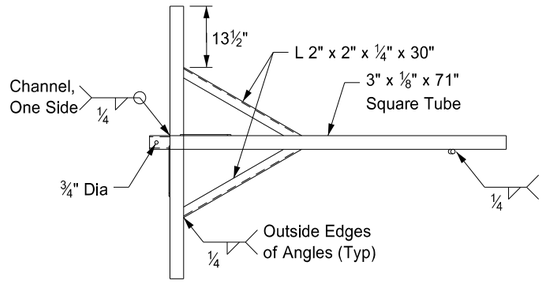
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

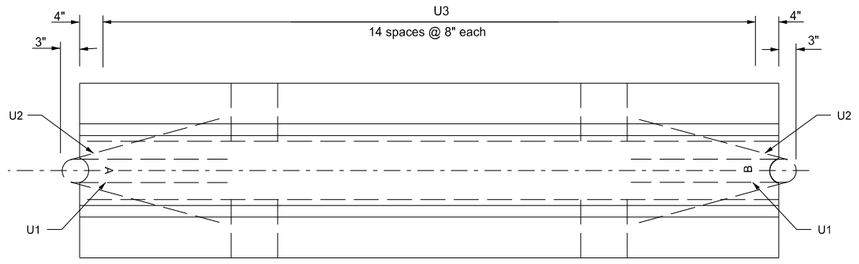
Notes:

1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

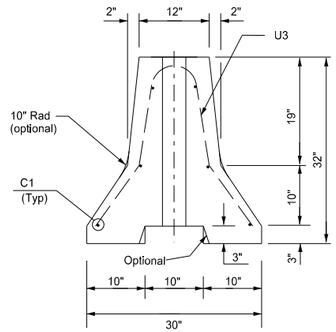
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

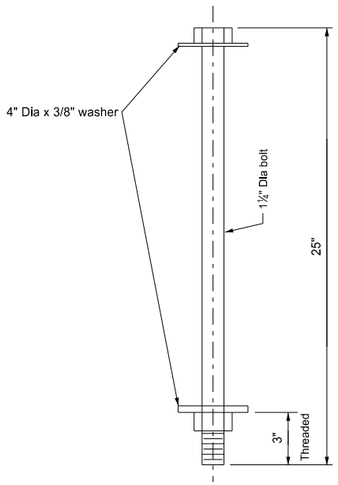
PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)



Plan View



End View

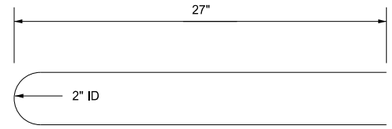


Connecting Bolt Detail

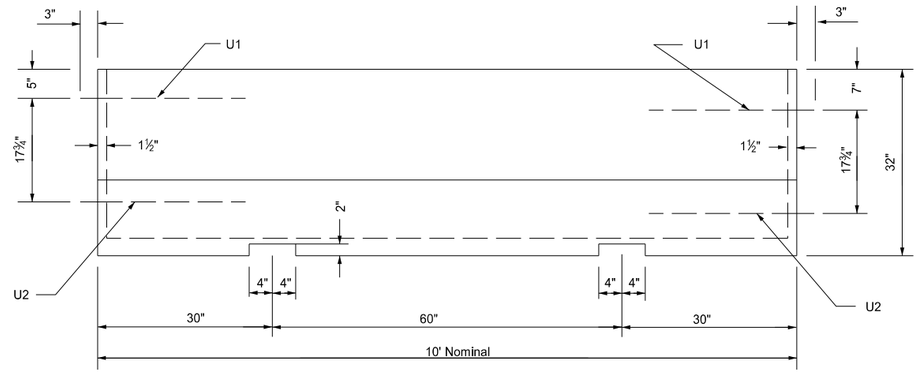
(One per 10 Ft section)

Notes:

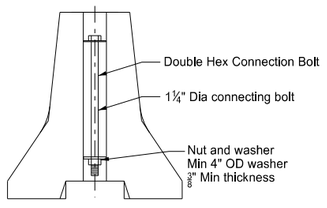
1. Galvanize all exposed hardware as per ASTM A153, except for the loop inserts.
2. Use AAE-3 Concrete.
3. Provide steel in accordance with Section 612 of NDDOT Standard Specifications.
4. Imprint barrier ends A and B as shown with 4 inch letters. Field match A end with B end.
5. Place barrier markers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



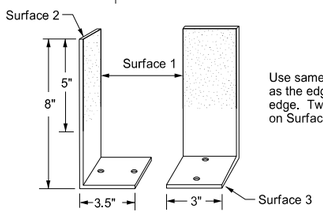
U1 Bar Detail



Side View

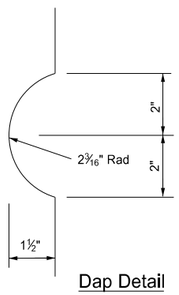


Bolt Connection Detail

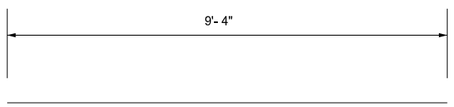


Use same color reflective faces as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

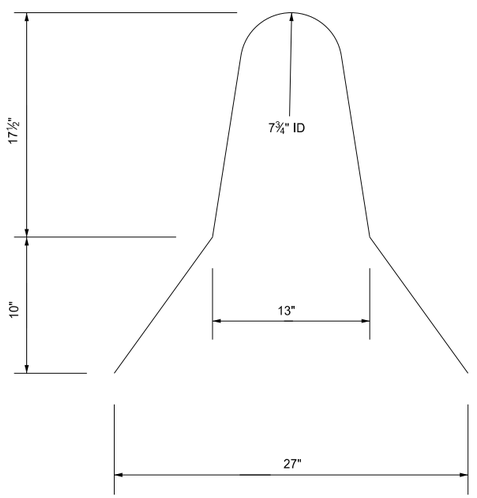
Barrier Marker Detail



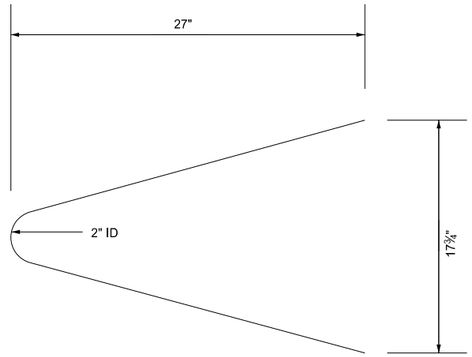
Dap Detail



C1 Bar Detail



U3 Bar Detail



U2 Bar Detail

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 ¼" @ 73°F	8,000	D790
Flexural modulus, PSI ¼" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

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 ⅛" thick, 2" wide on 2¼" wide release paper on surface 3 to temporarily mount markers to portable concrete barrier.

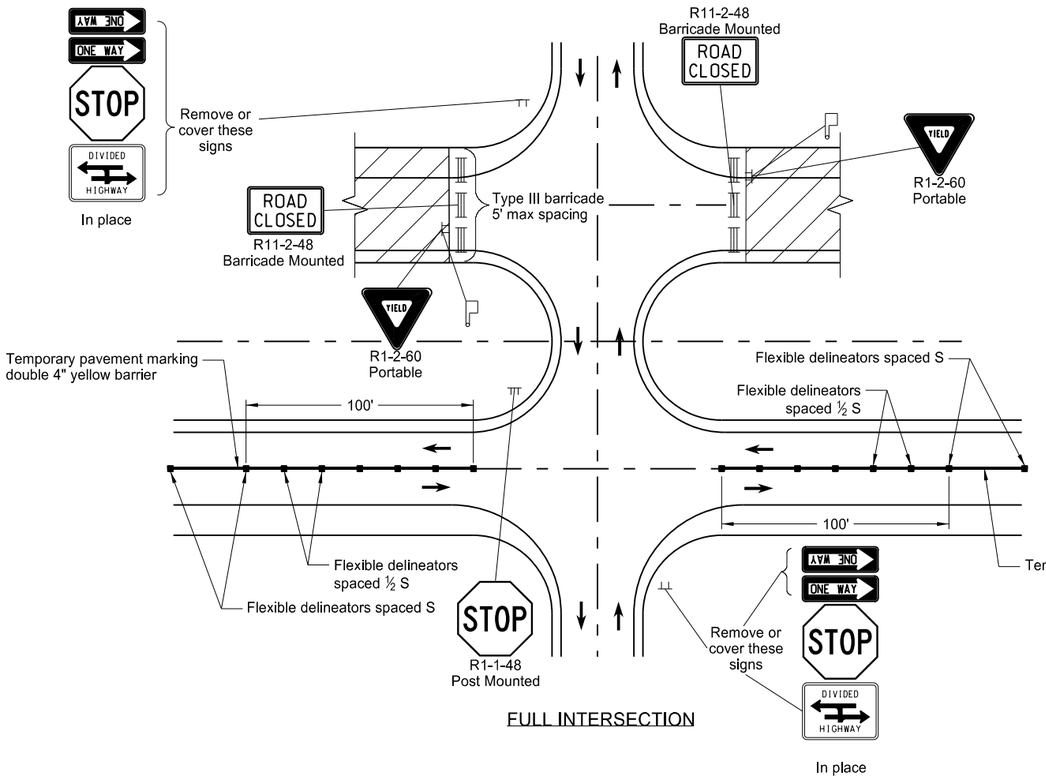
Bar List				
Mark	Size	No.	Length	Shape
C1	4	6	9'- 4"	Straight
U1	4	2	4'- 8"	Bent
U2	4	2	4'- 10¼"	Bent
U3	4	15	5'- 4"	Bent

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

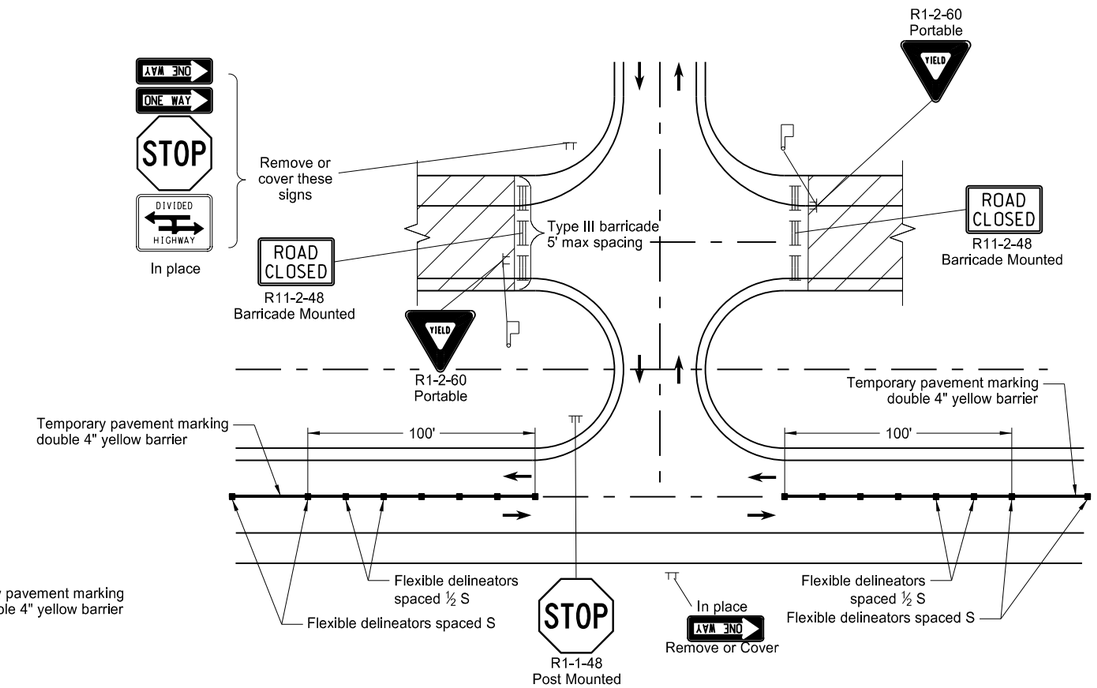
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 09/27/2017 and the original document is stored at the North Dakota Department of Transportation

ONE ROAD CLOSURE FOUR-LANE DIVIDED HIGHWAY FOR ACCESS TO TWO-WAY TWO-LANE ROADWAY

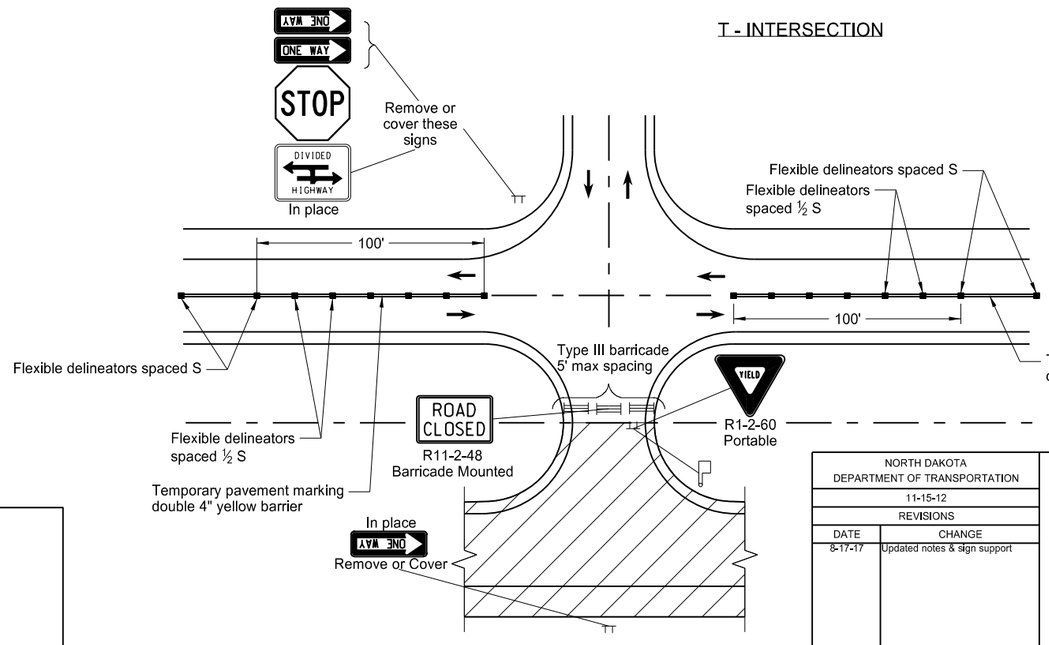
D-704-63



FULL INTERSECTION



T - INTERSECTION



T - INTERSECTION

Notes:

1. Use standard spacing for flexible delineators equal to the speed limit "S" established for the two lane two way roadway.
2. Roadway under construction is expected to be closed to all traffic. If the contractor chooses to use the roadway under construction for access via the cross road or chooses to use the roadway under construction as a haul road, provide the following traffic control: Place yield signs for construction traffic at low volume crossings. Place yield sign and a flagger for construction traffic at high volume crossroads. Do not stop public traffic on the crossroads for construction traffic. Engineer determines which cross roads are low or high volume.
3. Place type of short term pavement markings shown on the plans.
4. To gain access to the closed roadway, possition barricades in a location that will not interfere with the sight distance of haul vehicles. Place barricades in their original position at the end of the work day.

KEY

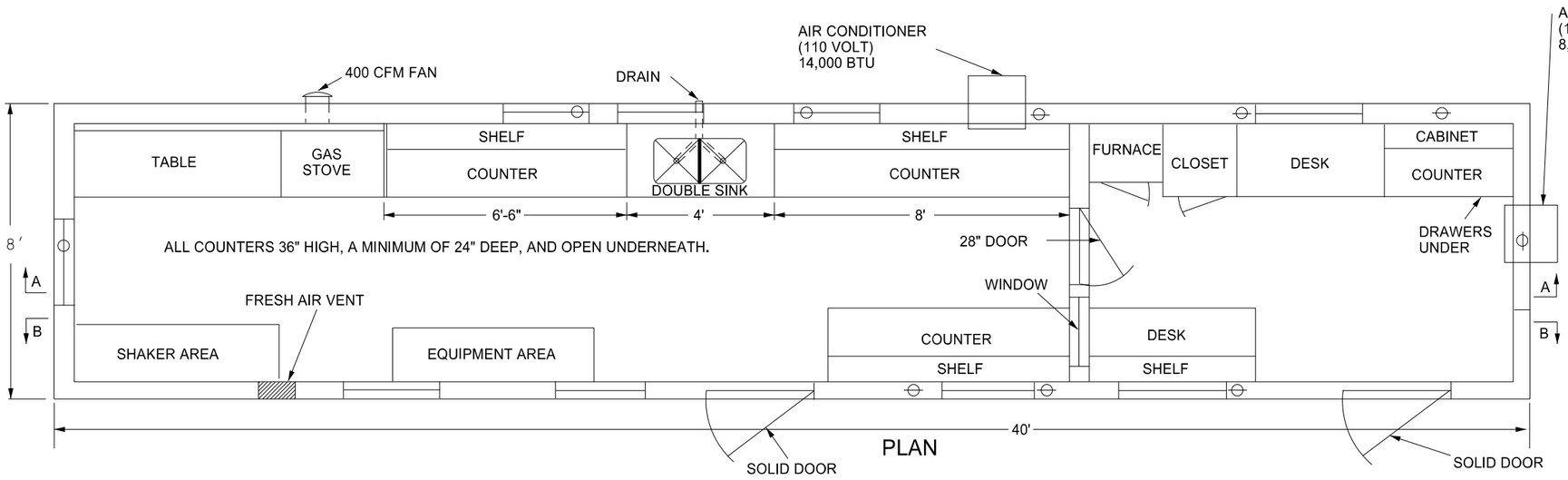
- Work Area
- Flagger
- Type III Barricade
- Sign
- Tubular Markers
- Sequencing Arrow Panel

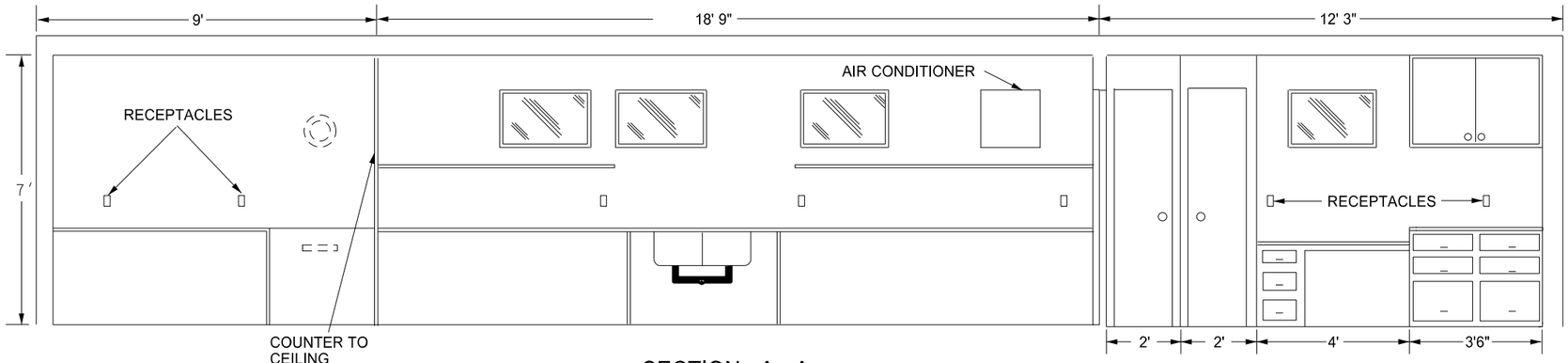
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & sign support

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

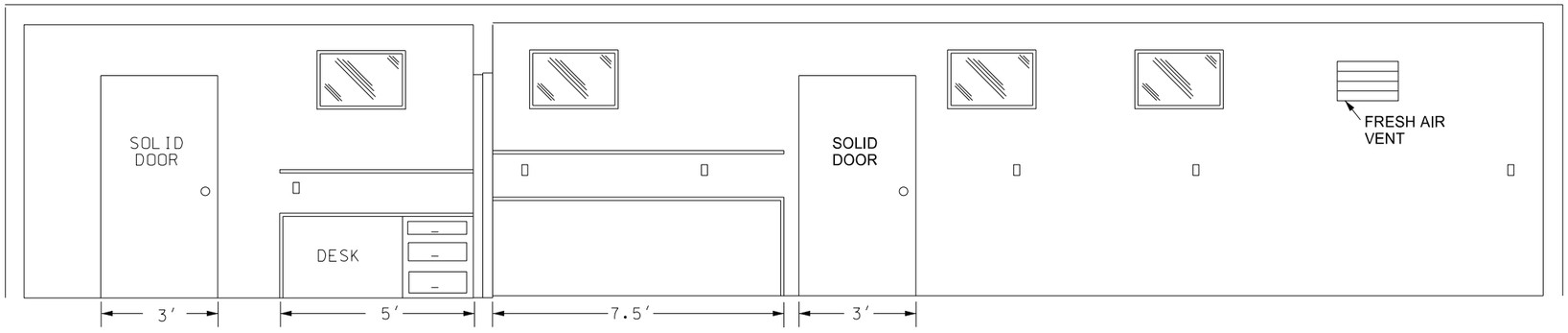
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

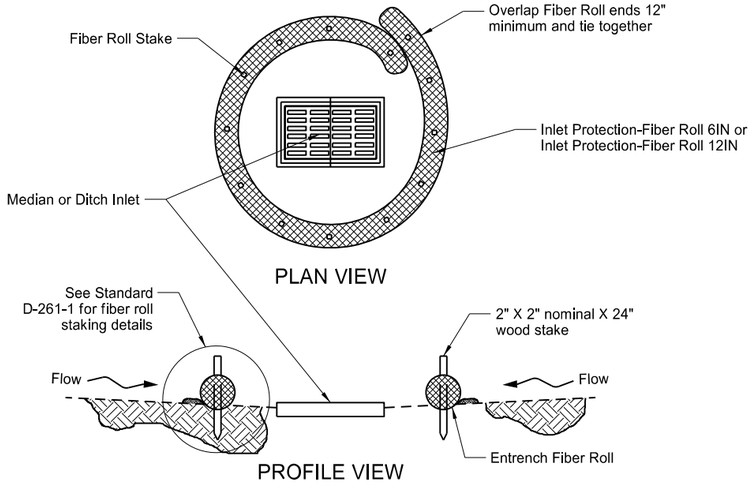
Provide a laboratory with the following:

1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

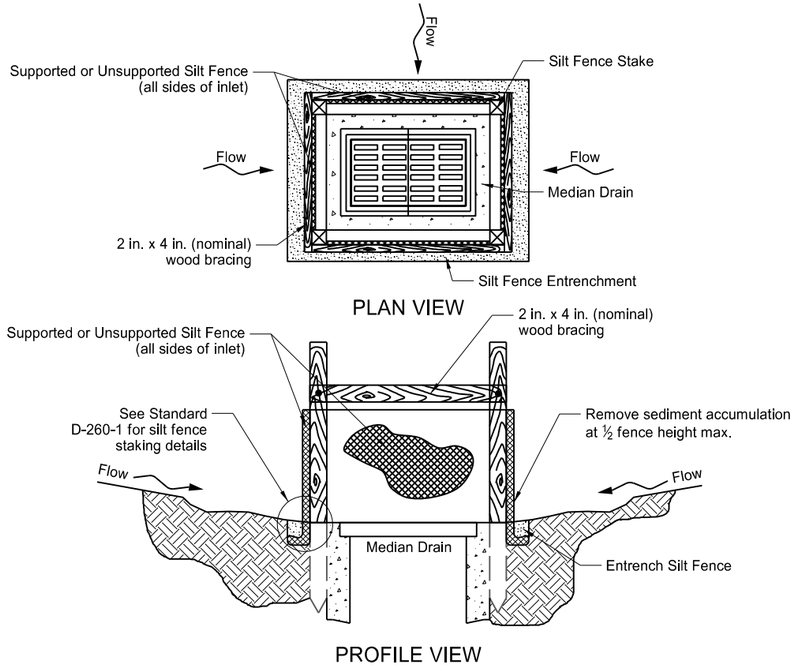
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 01/11/16 and the original document is stored at the North Dakota Department of Transportation

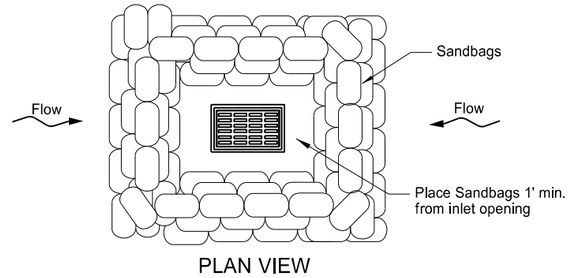
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



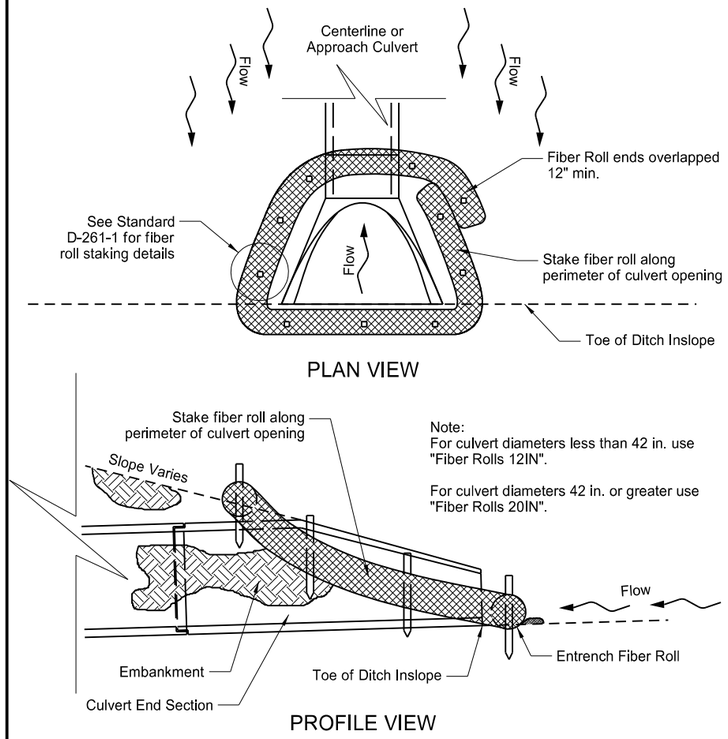
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



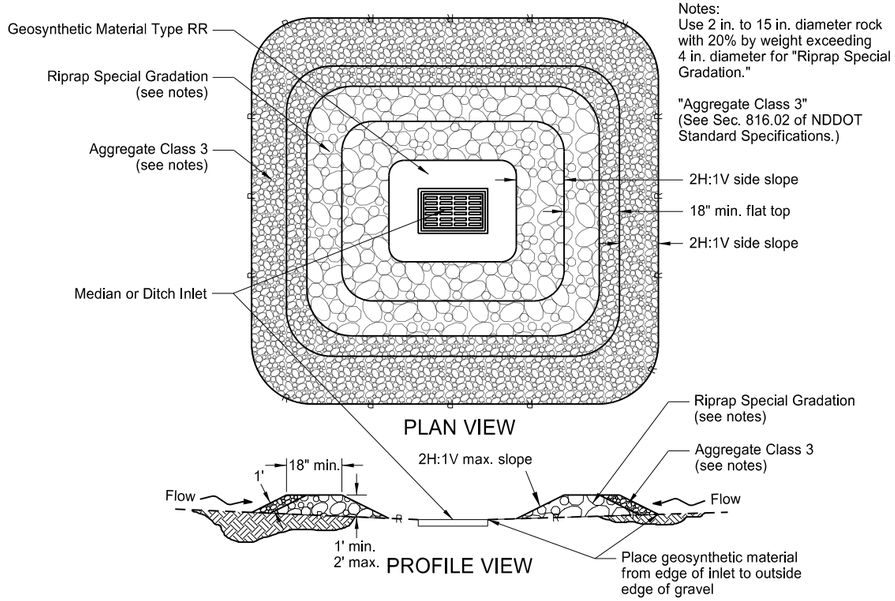
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



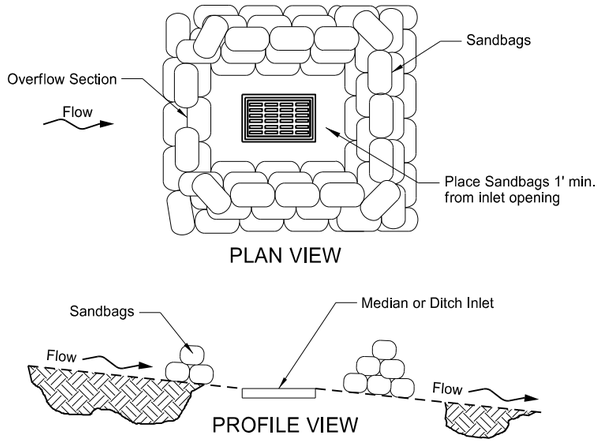
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)

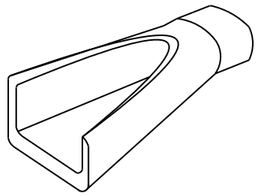


SANDBAG PROTECTION (ON SLOPE)

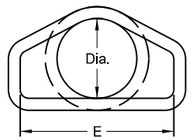
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on10-17-2017and the original document is stored at the North Dakota Department of Transportation

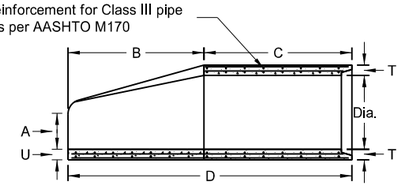
REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)



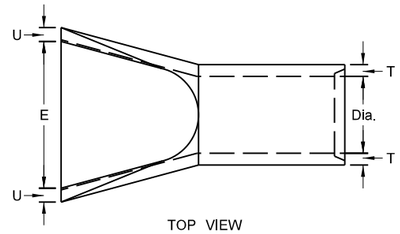
PERSPECTIVE



END VIEW



SIDE VIEW



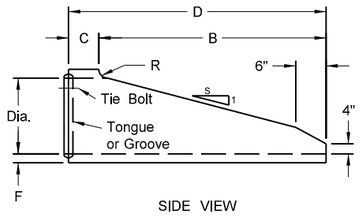
TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION

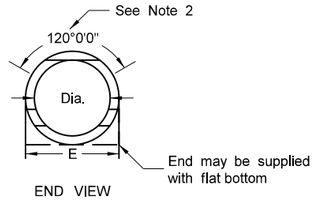
Reinforcement to be equivalent to Class III RCP

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2¼"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	4"	3"	4



SIDE VIEW



END VIEW

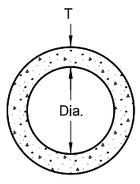
NOTES (Traversable End Section):

1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

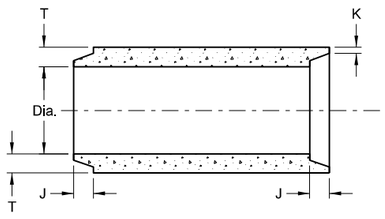
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

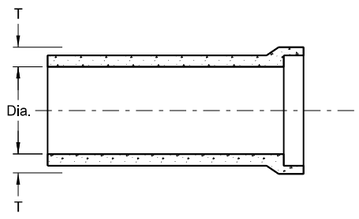
All Classifications of Round Concrete Pipe					
Internal Dia of pipe in Inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)
Dia	Sq. ft.	Lbs.	In.	In.	In.
12	0.79	92	1⅛-2⅛	¾	2
15	1.23	127	1¾-2¾	⅞	2¼
18	1.77	168	1⅞-2⅛	1	2½
21	2.40	214	1⅞-3⅛	1⅛	2¾
24	3.14	265	2⅛-3¼	1⅛	3
27	3.98	322	2¾-4	1¼	3¼
30	4.91	384	3¼-4¼	1¼	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3½-4¼	1½	4
42	9.62	685	3¾-4¾	1¾	4½
48	12.57	685	3⅞-4¾	1⅞	5
54	15.90	1070	4⅛-5¼	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2⅝	6½
72	28.27	1810	5⅝-6¾	2⅝	7
78	33.18	2098	6¼-7¼	2⅝	7½
84	38.48	2410	5⅝-7¾	3⅜	8
90	44.18	2793	6¾-8½	3⅛	8½
96	50.27	3092	7-8¾	3½	9
102	56.75	3466	7-8¾	3½	9½
108	63.62	3864	7¼-8½	3¾	10



END VIEW



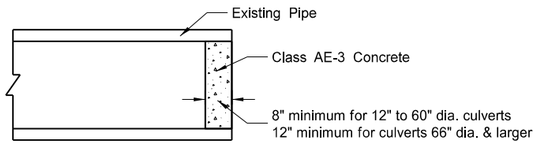
TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

CIRCULAR PIPE

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

NOTES:

1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
   66" to 108" (incl.) = not less than 6 feet
4. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
5. For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

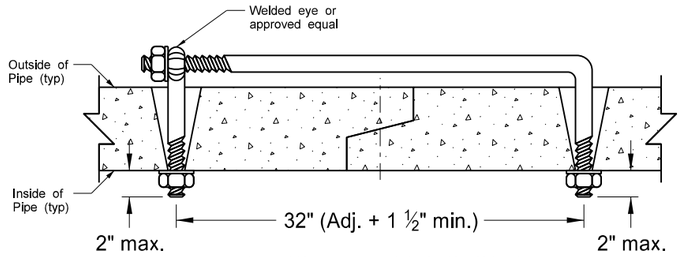
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5
11-21-16	Revised End Section Dimensions

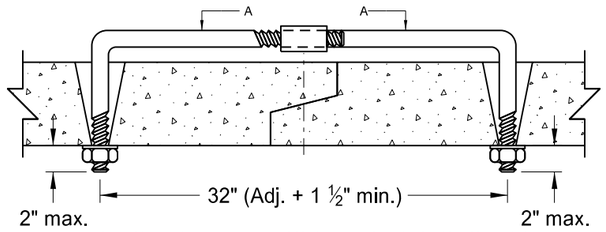
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 11/21/16 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES

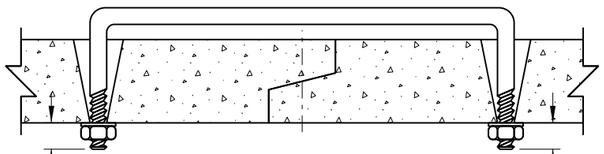
D-714-22



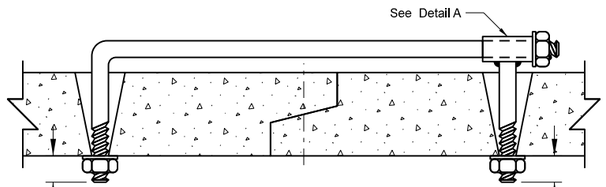
EYE BOLT TIE (PIPES ONLY)



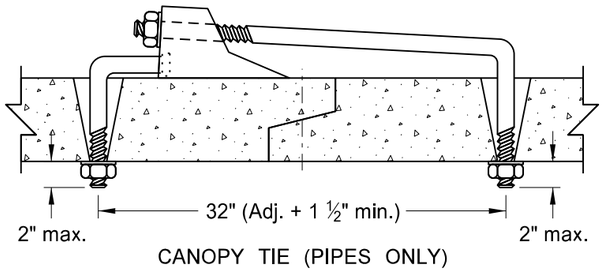
ADJUSTABLE TIE (RCB AND PIPES ONLY)



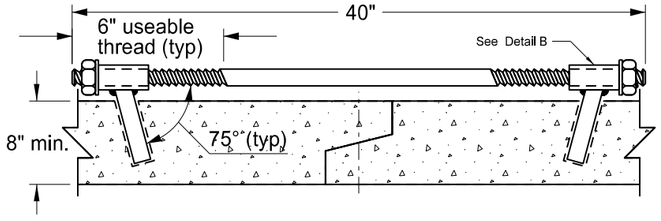
U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



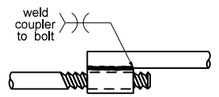
WELDED TIE (RCB AND PIPES ONLY)



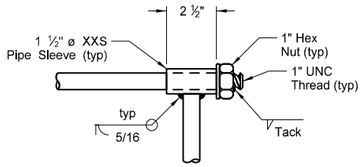
CANOPY TIE (PIPES ONLY)



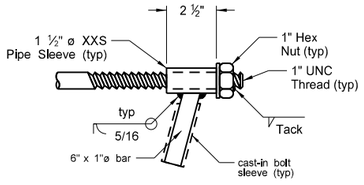
HIDDEN TIE (RCB ONLY)



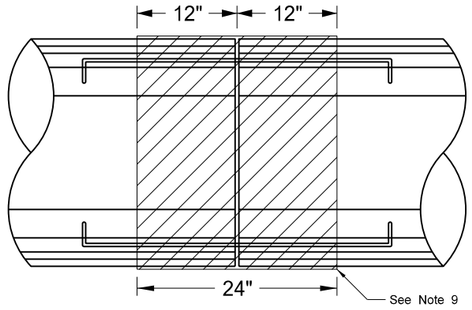
SECTION A-A



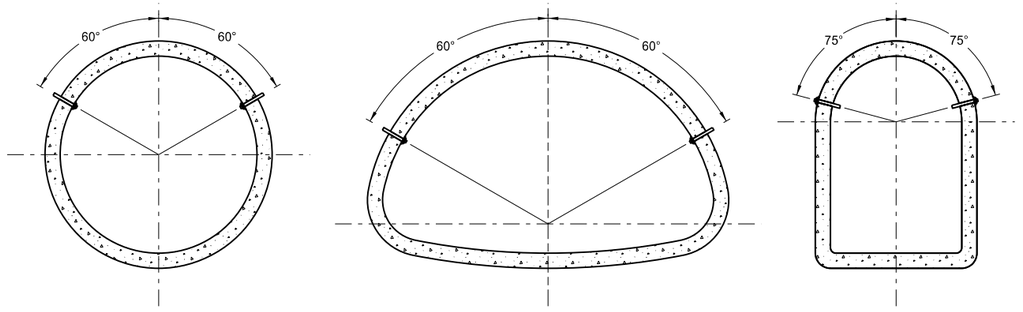
DETAIL A



DETAIL B



PLAN VIEW



END VIEW

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ø	XXS Pipe Sleeve Inner ø
18" - 24"	⅝" See note 2	¾"
30" - 66"	¾"	1"
72" - 78"	1"	1 ¼"
RCB/Cattle Pass		

NOTES:

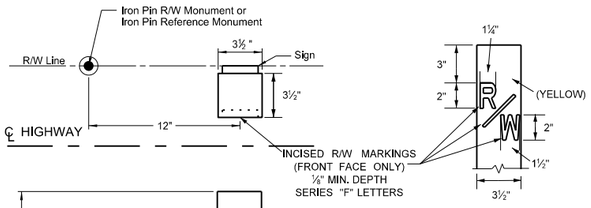
1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
3. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
4. Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
5. Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
6. Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter ¼" larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 ¼".
7. The contractor has the option of selecting the type of tie bolt used from those shown.
8. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
9. All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
10. Place joint wrap prior to installing ties. Overlap the joint by 12" in both directions.
11. Tie bolts shall conform to ASTM A 36. Nuts shall be be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
12. RCB tie locations shall be as shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11, Table, Title, Lables

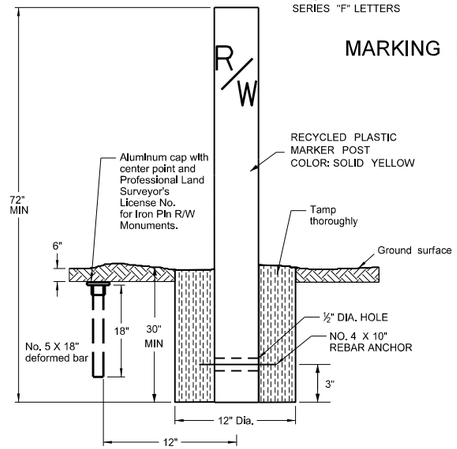
This document was originally issued and sealed by Jonathan David Ketterling, Registration Number PE-4684, on 6/6/2017 and the original document is stored at the North Dakota Department of Transportation

STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

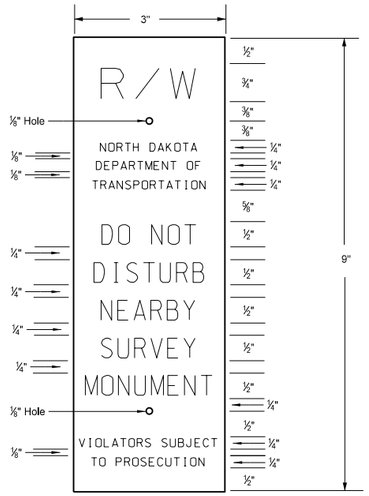
D-720-1



MARKING DETAIL



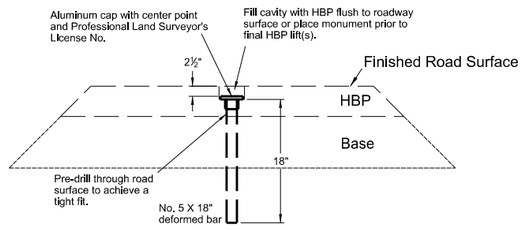
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



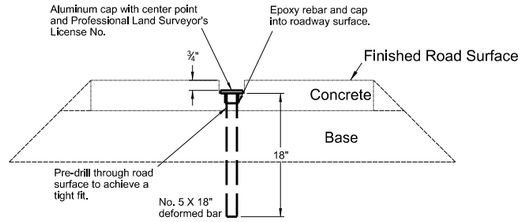
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Attach sign by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Install sign 2" from top of post.

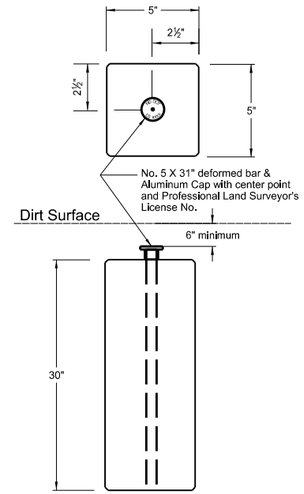
ALIGNMENT MONUMENT DETAILS



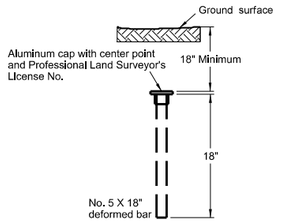
IRON PIN
(Within Finished Roadway Surface)



IRON PIN
(Within Finished Roadway Surface)



PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)

NOTES:

Construct and install Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) according to Section 720 of the Standard Specifications.

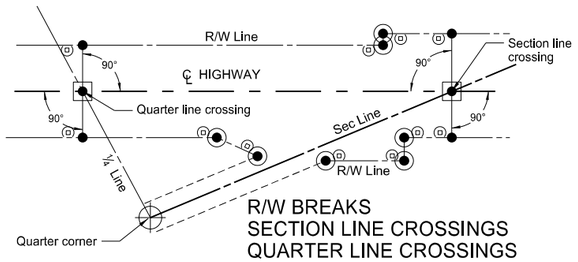
ALIGNMENT MONUMENTS: Place Iron Pin or Precast Concrete Alignment Monuments with aluminum caps on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

IRON PIN R/W MONUMENT: Place Iron Pns with aluminum caps (No. 5 X 18") at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

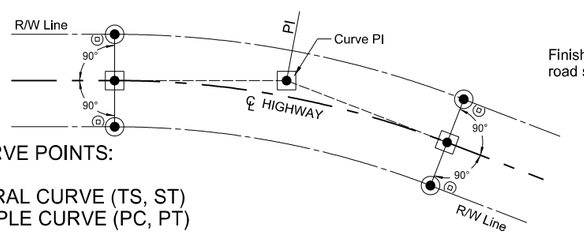
IRON PIN REFERENCE MONUMENT: Place Iron Pins without aluminum caps (No. 5 X 18") as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

R/W MARKERS (WITNESS POST) WITHIN DRIVEWAYS: If a single iron Pin R/W or Reference Monument is within a driveway, place right of way marker (witness post) 50 feet back, in stationing, from the Iron Pin Monument along the R/W line. If R/W break is within a driveway, place right of way markers (witness posts) 50 feet back, or ahead from respective Iron Pin R/W Monuments along the R/W lines. Maintain Iron Pin R/W or Reference Monument original position within driveway.

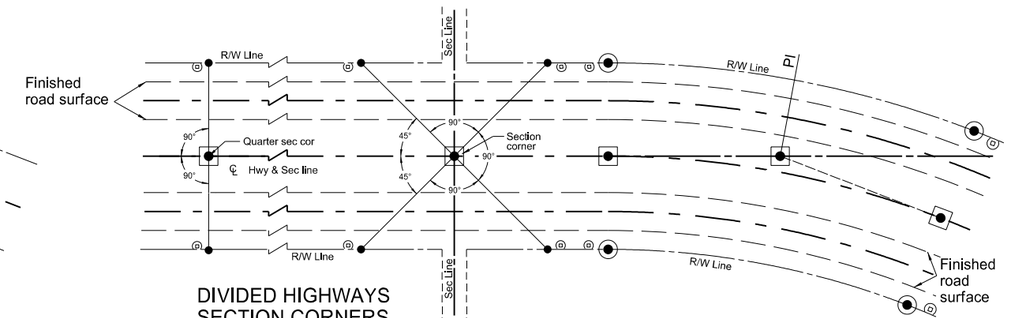
VARIOUS MONUMENT AND MARKER PLACEMENTS



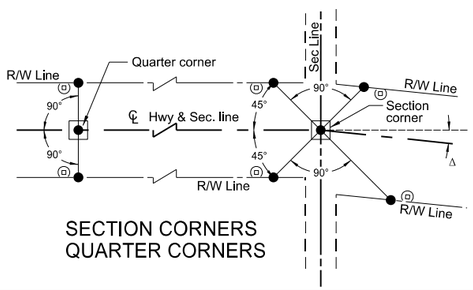
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



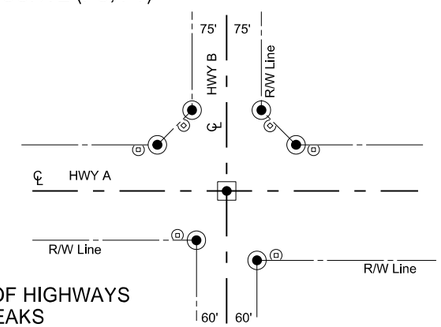
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS



INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

LEGEND

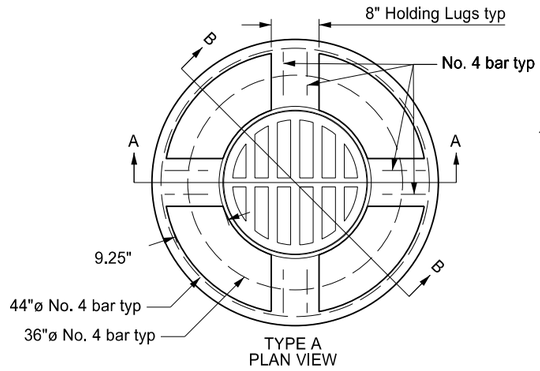
- Iron Pin Reference Monument
- R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38
10/17/17	Updated to active voice.

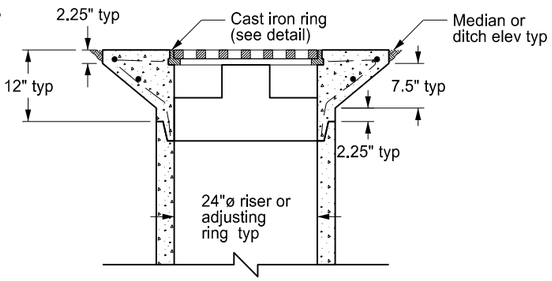
This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

PRECAST CONCRETE MEDIAN DRAIN

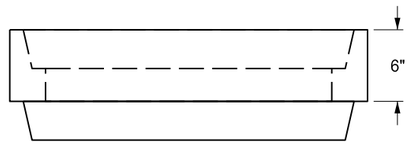
D-722-7



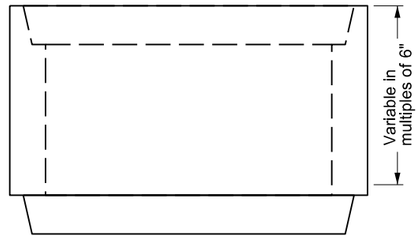
TYPE A
PLAN VIEW



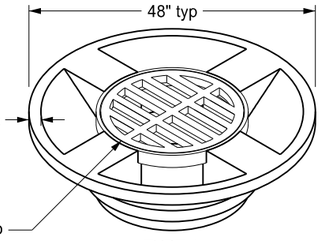
TYPE A
SECTION A-A



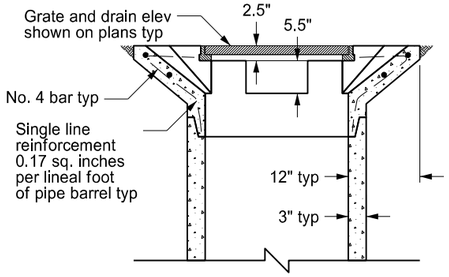
ADJUSTING RING



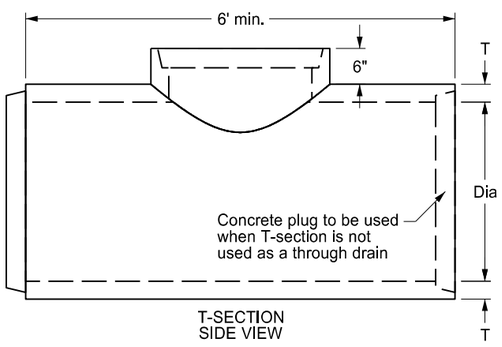
RISER SECTION



TYPE A
ISOMETRIC VIEW

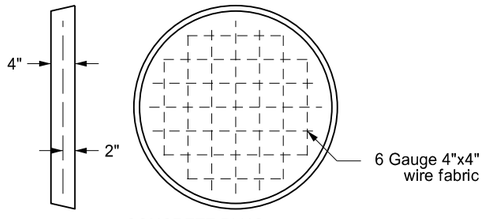


TYPE A
SECTION B-B

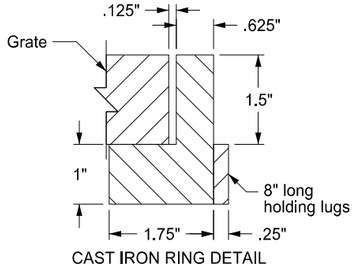


T-SECTION
SIDE VIEW

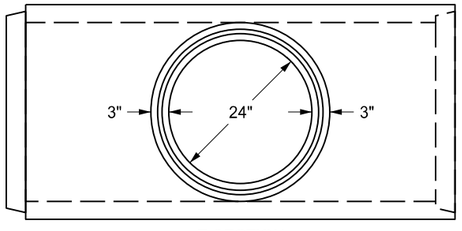
Dia = Diameter of drainage pipe
T = Wall thickness of drainage pipe



CONCRETE PLUG



CAST IRON RING DETAIL



T-SECTION
PLAN VIEW

Notes:

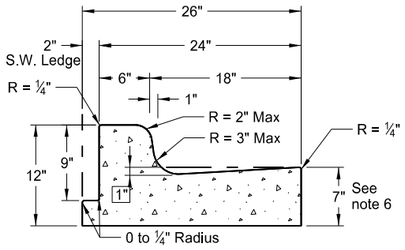
1. Use Neenah R-4370-23G, East Jordan 1310 grate, or equal with a minimum waterway of 1.2 SF. If modifications to the drain are required to facilitate similar castings, the contractor must receive written approval from the Engineer.
2. Castings shall be manufactured in accordance with AASHTO M 306. Metal used in the manufacture of castings shall conform to AASHTO M 105, Class 35B.
3. Precast concrete median drains, adjusting rings, and riser sections shall be constructed in accordance with AASHTO M 199. T-sections shall be constructed in accordance with AASHTO M 170.
4. All reinforcing steel shall be Grade 60 steel. Reinforcing for adjusting rings, riser sections, and T-sections shall be in accordance with AASHTO M170.
5. The cost of furnishing and installing the castings and drains shall be included in the price bid for "Median Drain Precast Concrete-Type A". The cost of furnishing and installing the adjusting rings and riser sections shall be included in the price bid for "Pipe Conc Reinf 24IN (CL _)". The cost of furnishing and installing the T-sections and concrete plugs shall be included in the price bid for "Pipe Conc Reinf (_ IN) (CL _)".
6. Seal all joints with rubber gaskets or with sealer approved by the engineer.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-30-14	
REVISIONS	
DATE	CHANGE

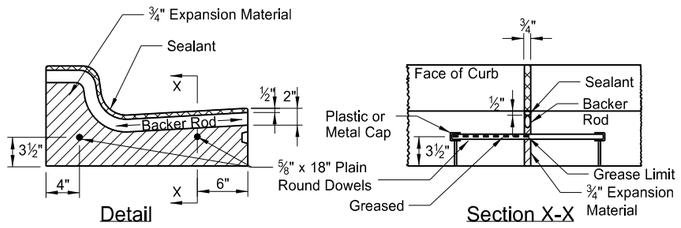
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 06/30/14 and the original document is stored at the North Dakota Department of Transportation

Curb & Gutter and Valley Gutter

D-748-1



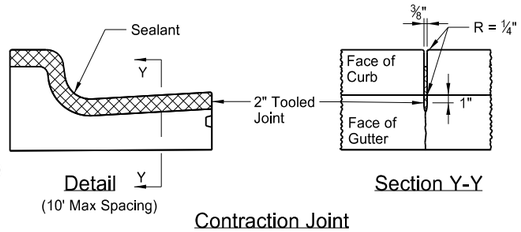
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median, or Parking Lot.
(Sec. A shown. See Sec B for additional details.)



Detail

Section X-X

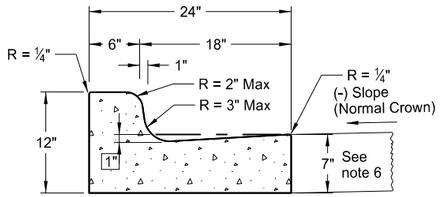
Isolation Joint



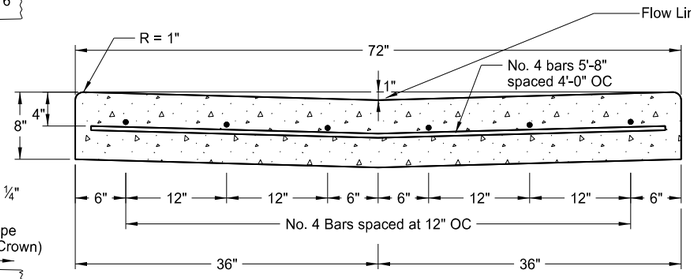
Detail
(10' Max Spacing)

Section Y-Y

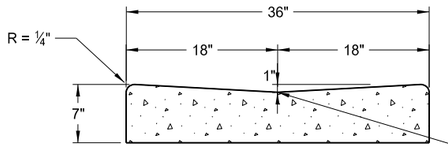
Contraction Joint



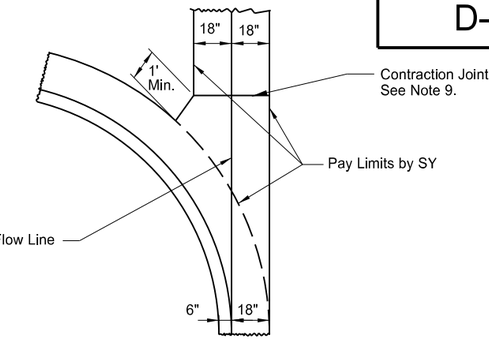
Curb & Gutter Type 1 (Sec. A)



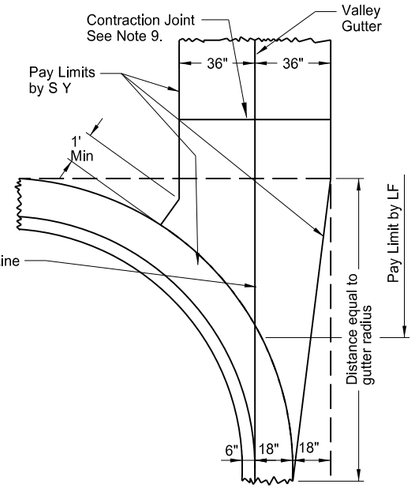
72" Concrete Valley Gutter Detail



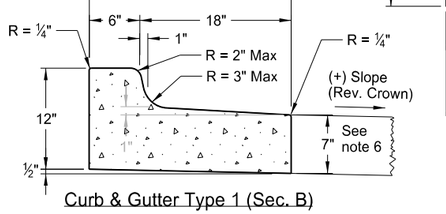
36" Concrete Valley Gutter Detail



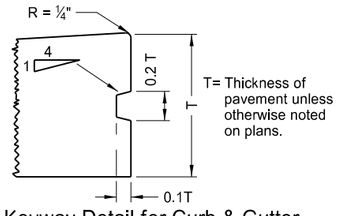
36" Concrete Valley Gutter Plan



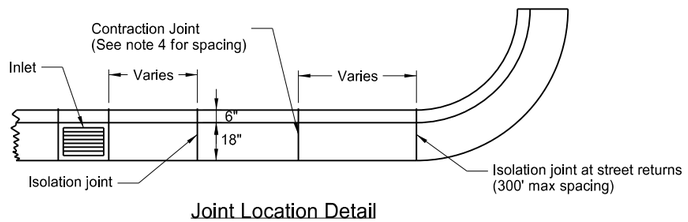
72" Concrete Valley Gutter Plan



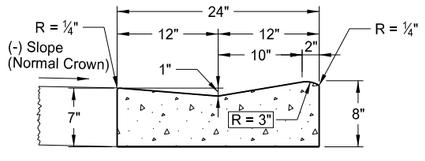
Curb & Gutter Type 1 (Sec. B)



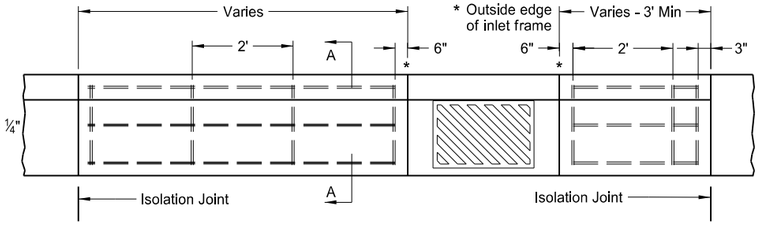
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



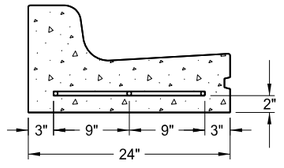
Joint Location Detail



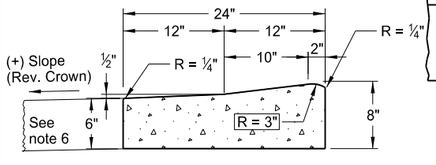
Mountable Curb & Gutter Type 1 (Sec. A)



Curb & Gutter Reinforcing at Inlets



Section A-A



Mountable Curb & Gutter Type 1 (Sec. B)

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 ¾" 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 ⅛" min. to ⅜" 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.

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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

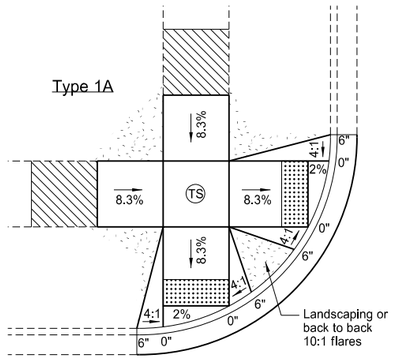
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

CURB RAMP DETAILS

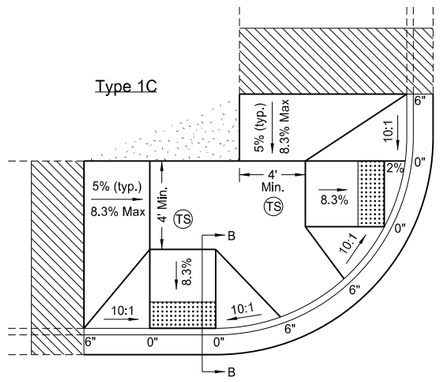
D-750-3

+More Right of Way — Less Right of Way-

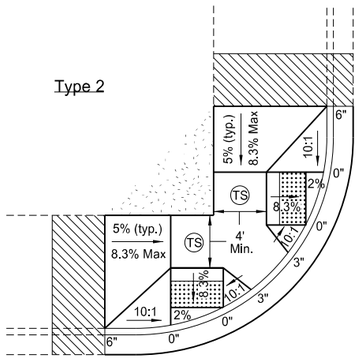
Type 1A



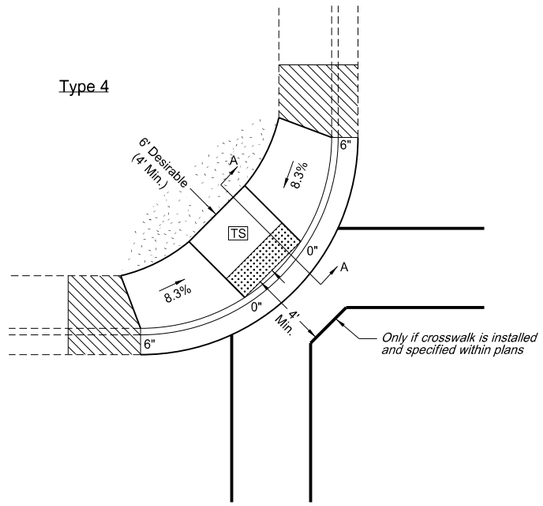
Type 1C



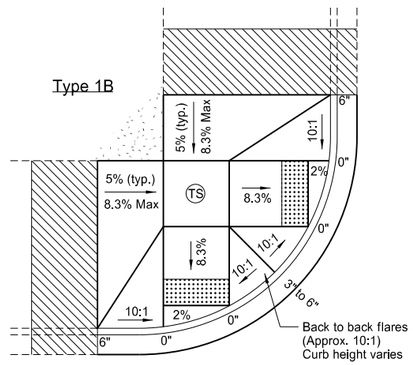
Type 2



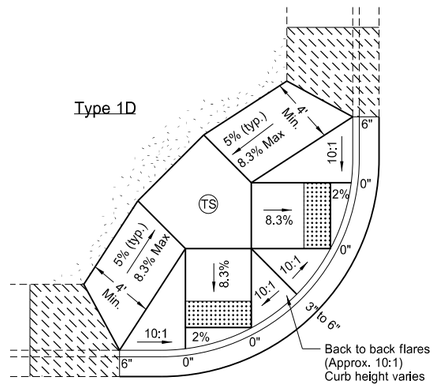
Type 4



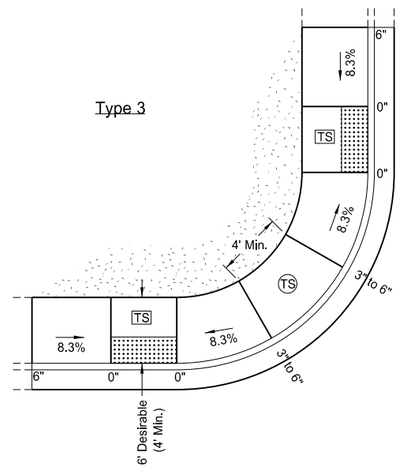
Type 1B



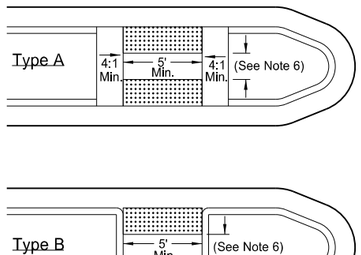
Type 1D

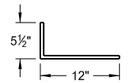


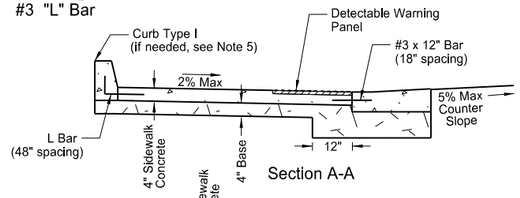
Type 3

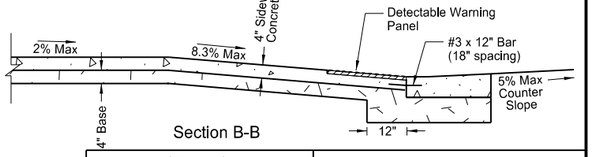


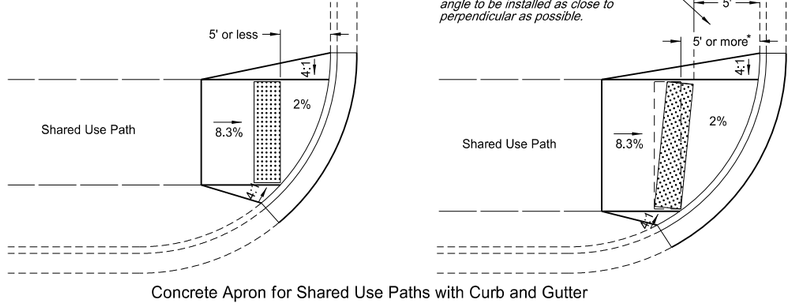
Median Refuge Islands (Cut-Through)



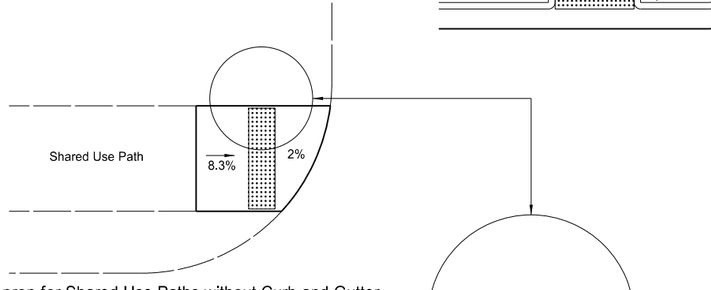




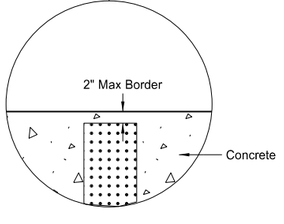


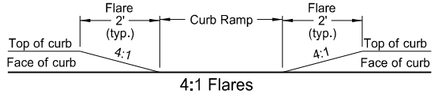


Concrete Apron for Shared Use Paths with Curb and Gutter

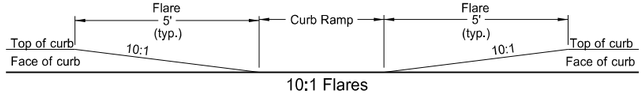


Concrete Apron for Shared Use Paths without Curb and Gutter





4:1 Flares
(To be used when flare is adjacent to landscaping)



10:1 Flares
(To be used when flare is adjacent to sidewalk)

NOTES:

1. Ramp width is the useable portion of the ramp, excluding flares. Match curb ramp width to existing sidewalk width (4' minimum or 5' for island ramps.) Match ramp width to existing shared use path width. Maximum ramp length is 15'.
2. Desirable turning space size is 5' x 5' or larger with a minimum size of 4' x 4'. The maximum slope for turning spaces is 2% in any direction.
3. Match detectable warning panel width to ramp width. Radial panels are allowed. Place detectable warning panel within the lower turning space.
4. Provide a continuous 4' minimum width pedestrian access route with max 2% concrete cross slope, excluding flares.
5. Modify existing ground slope with landscaping, as needed. If not possible, such as adjacent buildings, use a vertical curb as shown in the detail below. The Engineer will measure curb at the unit price bid for "Curb - Type I" per lineal foot.
6. Islands: If the grade of the island curb ramp is less than 2%, provide a minimum distance of 2' between warning panels. If the grade of the island curb ramp is steeper than 2%, provide a turning space between the ramps.

LEGEND:

- : Detectable Warning Panel
- : Landscaping
- : Transitional tie-in segment if needed for retrofits. Max grade slope 8.3%.
- TS : Upper Turning Space
- TS : Lower Turning Space
- 0", 3", or 6" : Curb Height
- 8.3% : All slopes shown are max grades. Flatter slopes may be used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-26-13

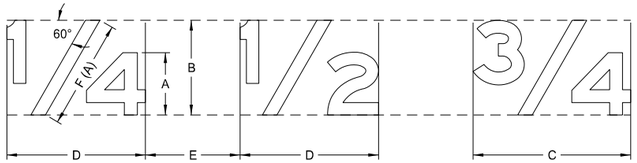
REVISIONS

DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Revised Notes, Revision for Turning Space, Added Passing Space Requirements, Turned Detectable Warning Panel

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09-05-2018 and the original document is stored at the North Dakota Department of Transportation

LETTER AND ARROW DETAILS

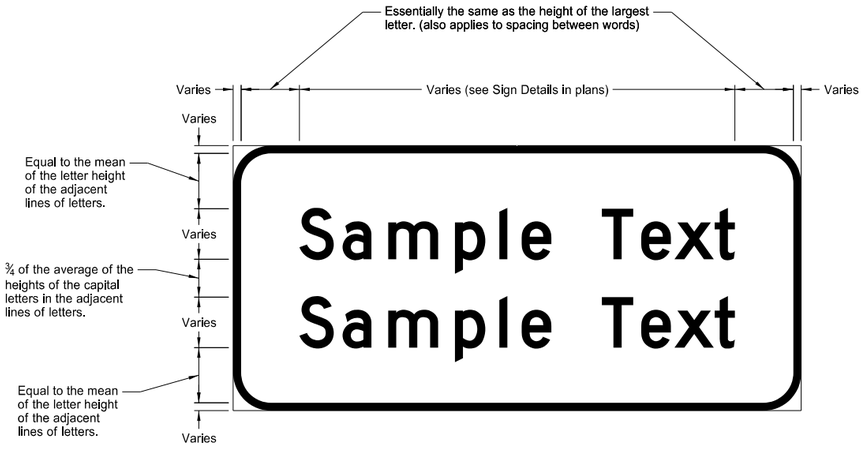
D-754-9



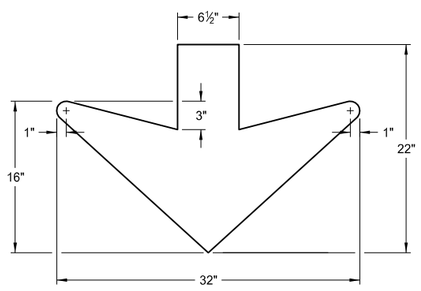
DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

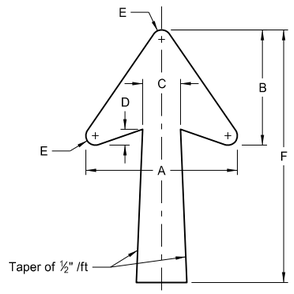
(A) Center diagonal stroke of fraction optically.



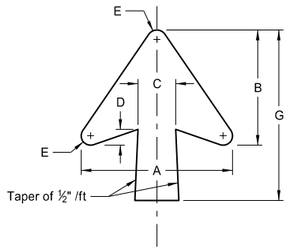
TYPICAL SPACING



DOWN ARROW



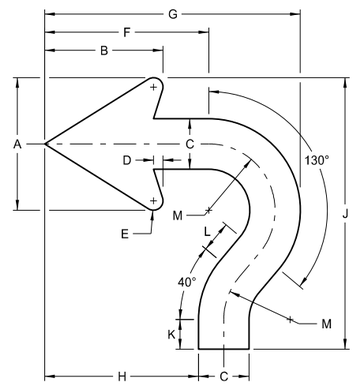
TYPE A



TYPE B

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G
ND_6IN	6"	12"	9.125"	3"	1"	0.625"	20"	13.5"
ND_8IN	8"	15.125"	11.563"	3.75"	1.313"	0.813"	25"	17"
ND_10IN	10"	18.25"	14"	4.5"	1.5"	0.75"	30"	20"
ND_12IN	12"							
ND_13IN	13.3"							
ND_16IN	16"	22.25"	17"	5.375"	1.75"	1"	35"	25"
ND_20IN	20"							

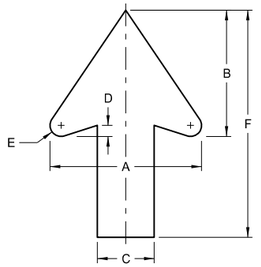
NOTE: Arrow size on gore signs is based on the letter size of "EXIT".



ROUNDABOUT

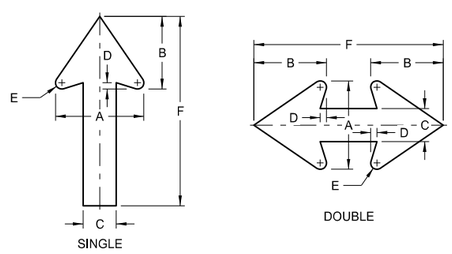
DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G	H	J	K	L	M
ND_6IN	6"	5.25"	4.688"	2"	0.375"	0.375"	6.5"	10.125"	6.094"	10.75"	1.168"	1.25"	2.625"
ND_8IN	8"	7"	5.75"	2.625"	0.5"	0.5"	8.688"	13.5"	8.166"	14.333"	1.557"	1.667"	3.5"

NOTE: Measure rotation angle of arrows counterclockwise from positions shown in details.



TYPE D

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F
ND_2IN	2"	2"	1.625"	0.75"	0.125"	0.125"	3"
ND_4IN	4"	4"	3.313"	1.5"	0.25"	0.25"	6"
ND_6IN	6"	6"	4.875"	2.25"	0.375"	0.375"	9"
ND_8IN	8"	8"	6.625"	3"	0.5"	0.5"	12"
ND_10IN	10"	10"	8.375"	3.75"	0.75"	0.75"	15"
ND_12IN	12"	12"	10"	4.5"	0.875"	0.875"	18"



SPECIAL

DESIGNATION	A	B	C	D	E	F	USES
ND_0.75IN	2"	1.625"	0.75"	0.125"	0.125"	7.75"	Parking Signs (Regulatory)
ND_2.625IN	7"	5.75"	2.625"	0.5"	0.5"	15"	Frontage Road Signs

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-3-11

REVISIONS

DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow
5-4-16	Revised Distance & Destination and Typical Spacing details
4-23-18	Revised arrow details
8-30-18	Updated notes to active voice.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.

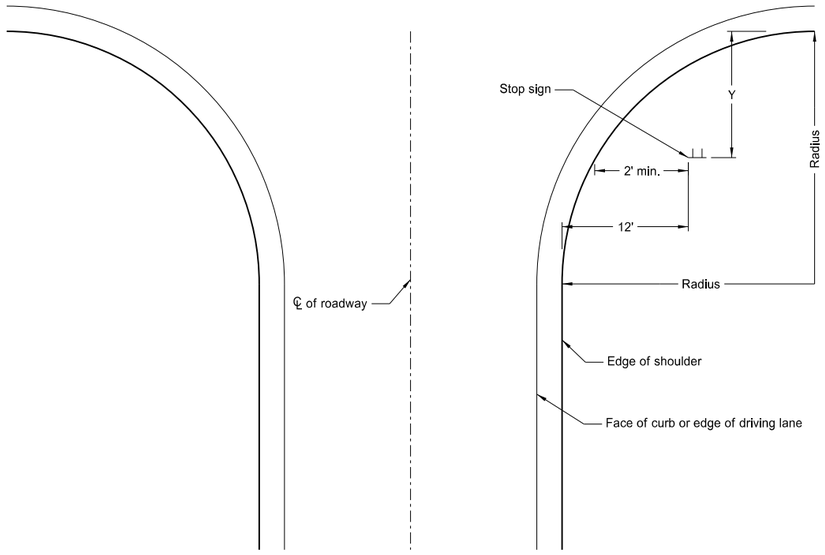
   Install signs on expressways a minimum height of 7'.

   Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.

   Maximum vertical clearance is 6" greater than the minimum vertical clearance.

3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.

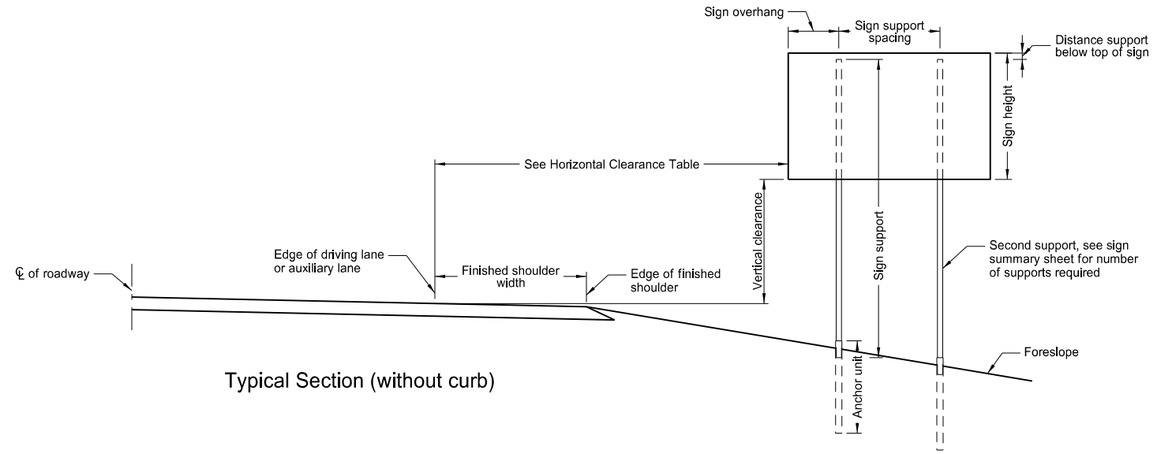
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

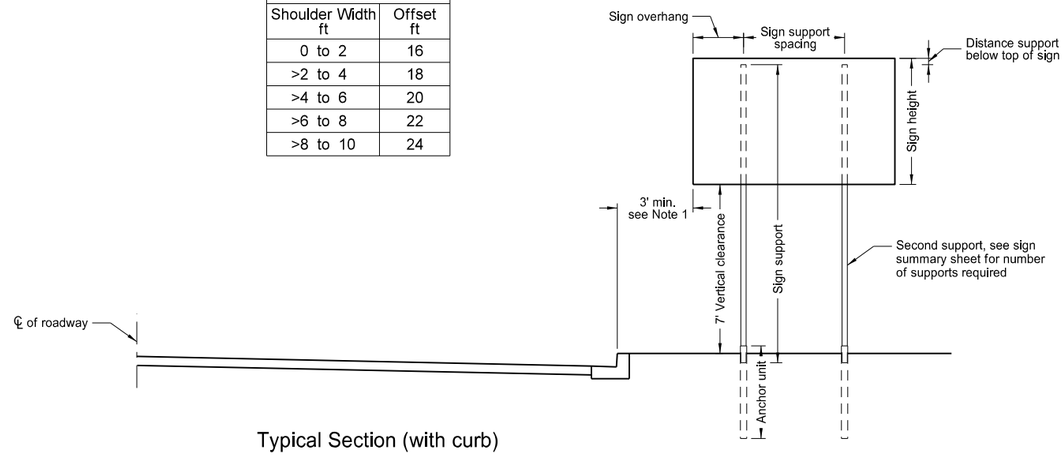
Use layout for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



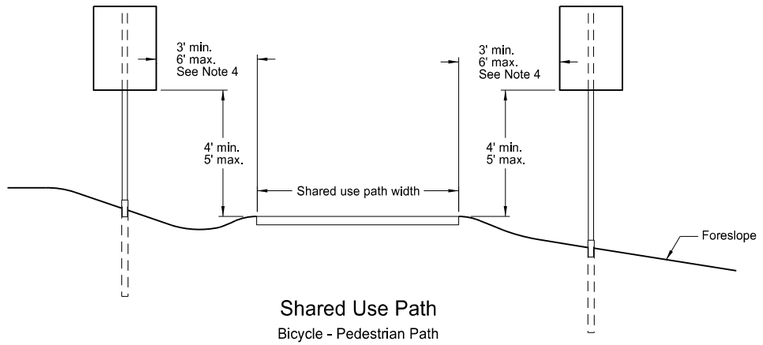
Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14 8-30-18	Revised note 2, added note 4. Updated notes to active voice.

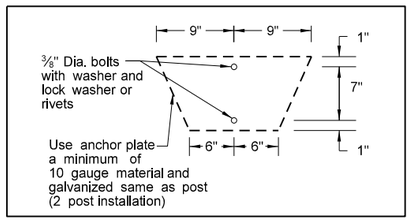
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

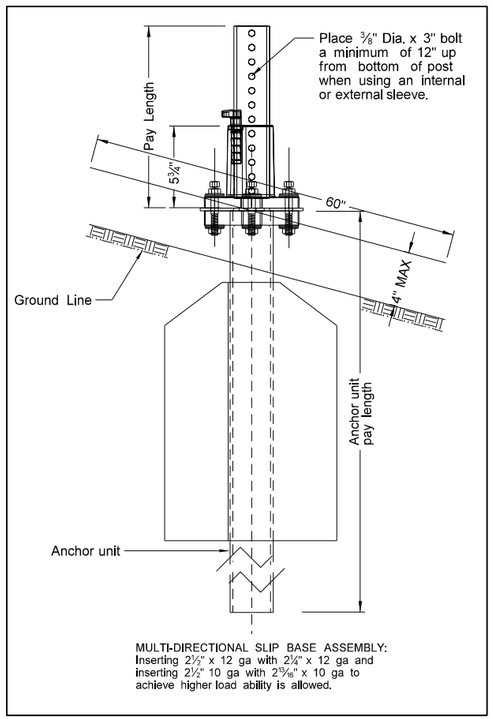
Mounting Details Perforated Tube

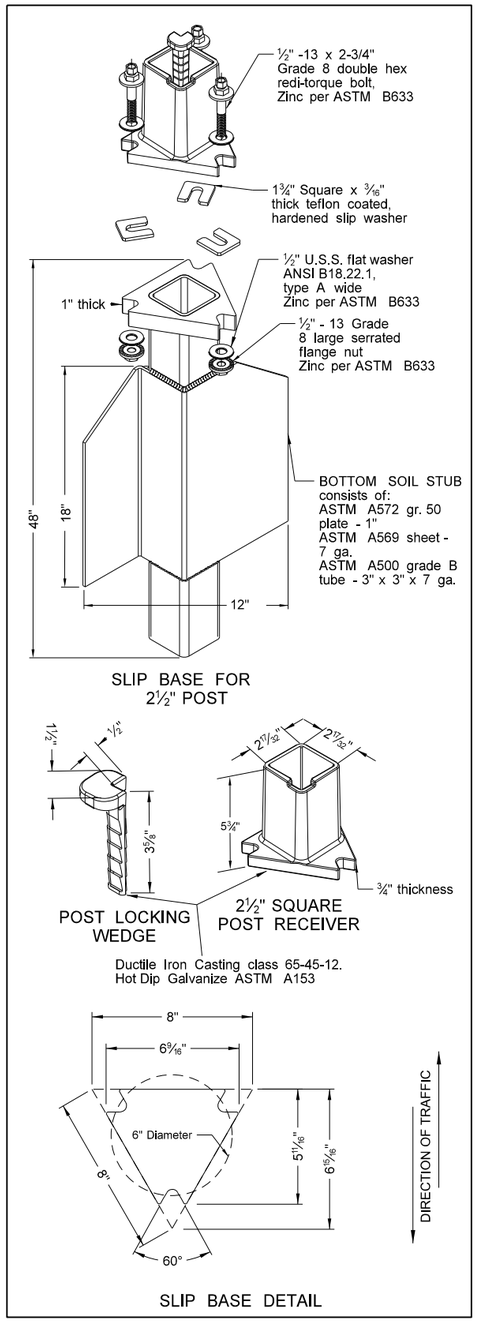
D-754-24

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2⅜	10	Yes		7

(B) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.





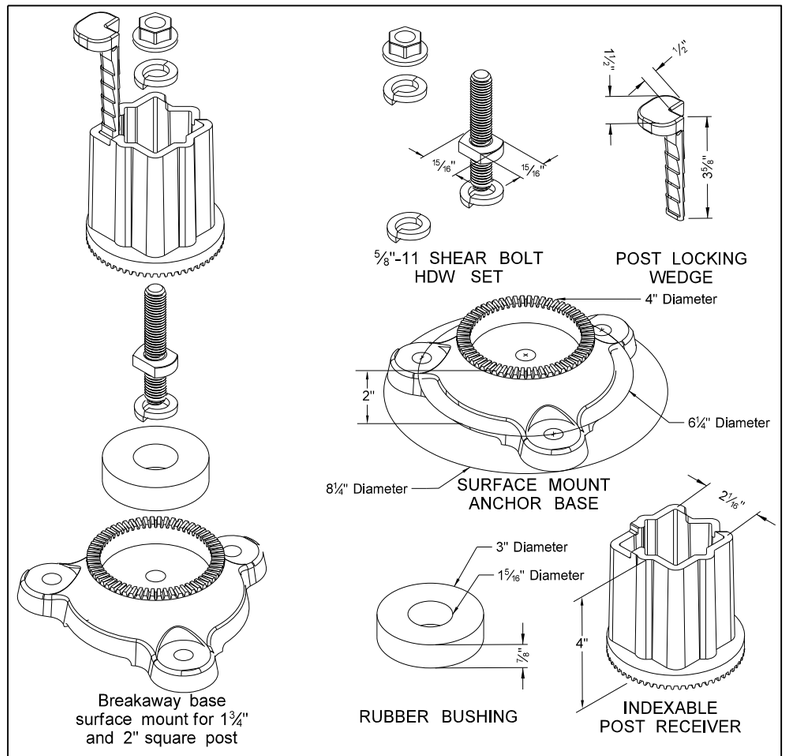


Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulus In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜ x 2⅜	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ¾" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

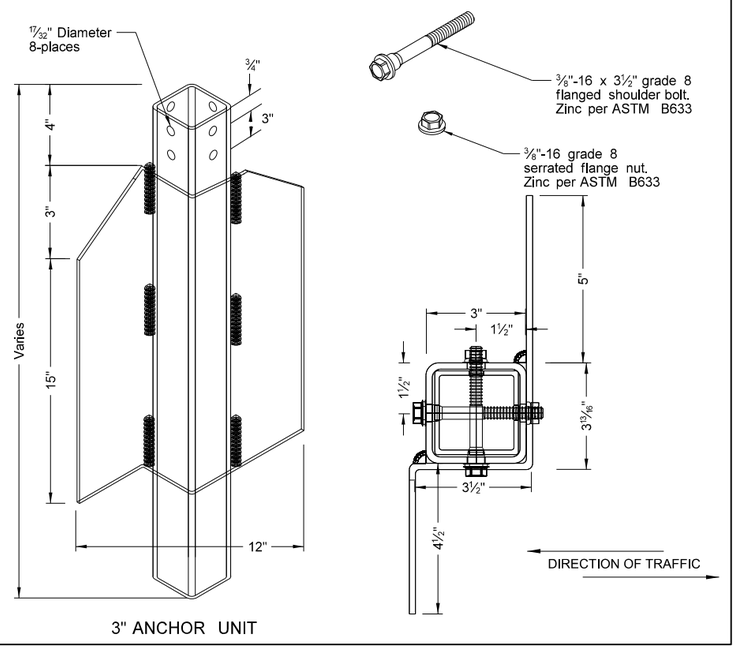
NOTE:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SHOULDER BOLT

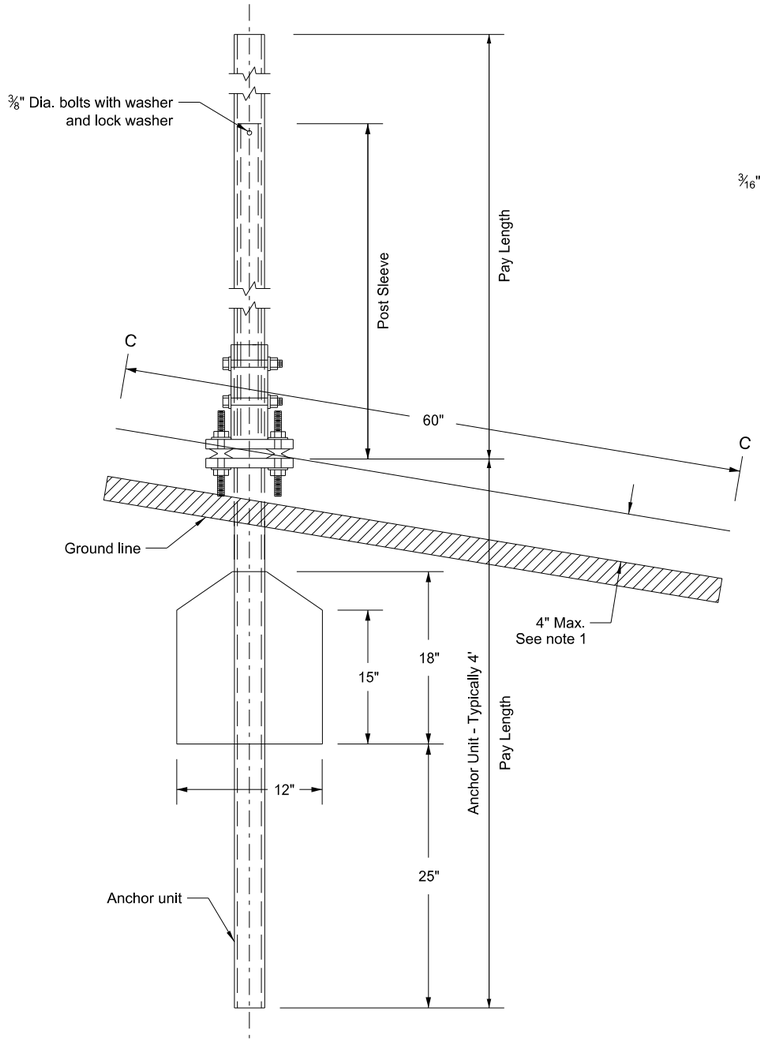
Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(use standard ⅜" diameter grade 8 bolt with proper shim)

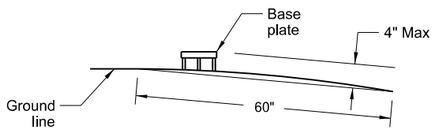


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

D-754-24A

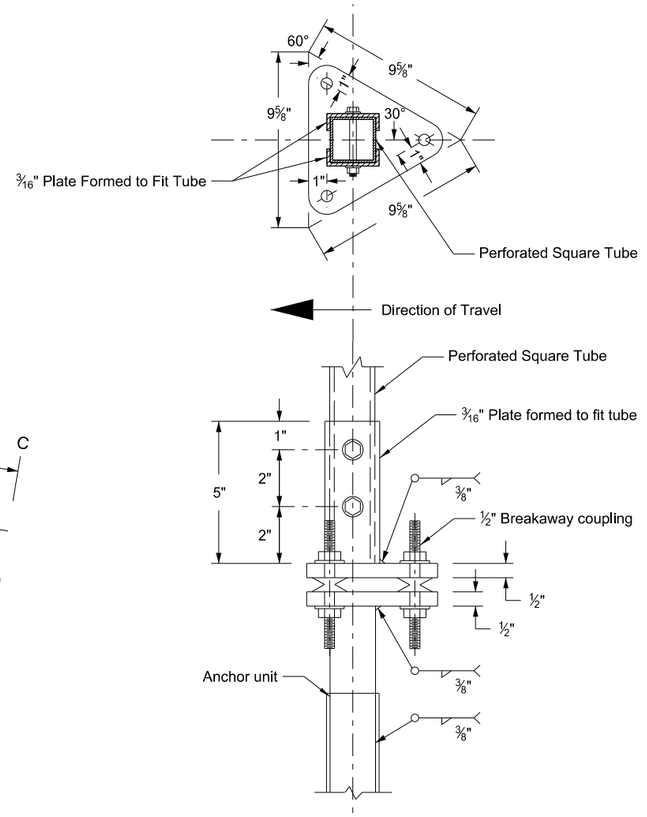




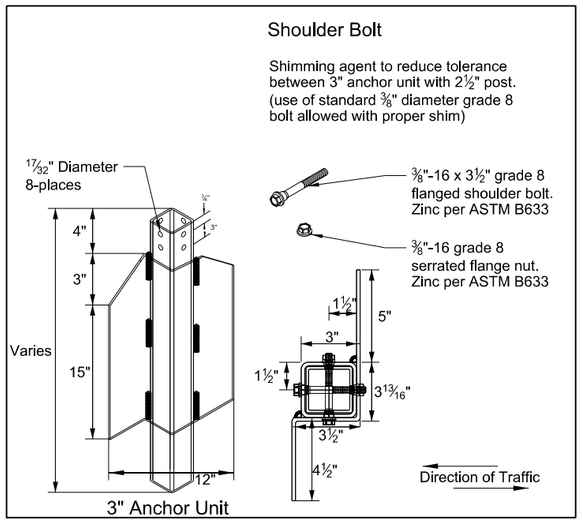
Section C-C

Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.

Breakaway Coupler System for Perforated Tubes



Base Plate with Breakaway Coupler



3" Anchor Unit

Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4. Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

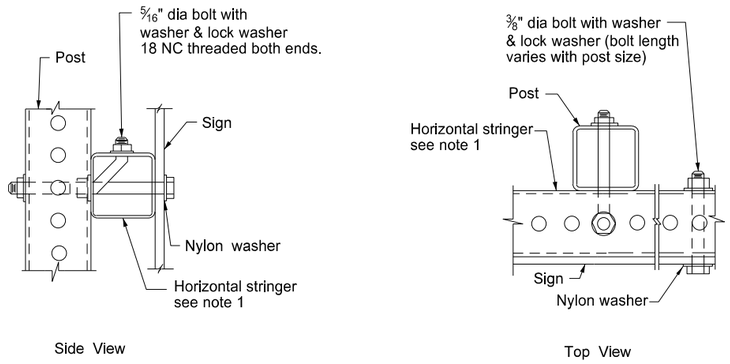
(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

Mounting Details Perforated Tube

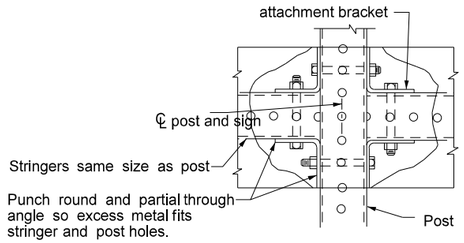
D-754-25



Side View

Top View

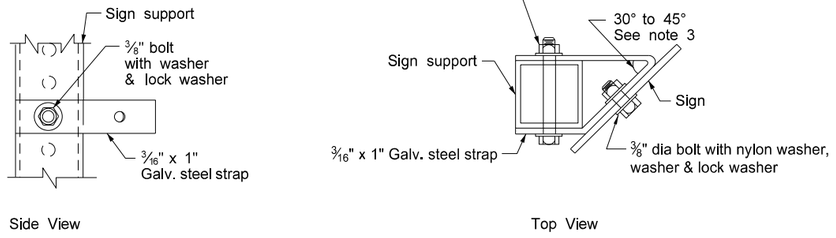
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

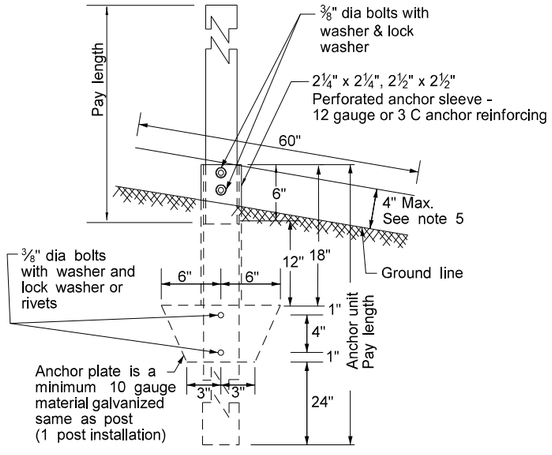
1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.



Side View

Top View

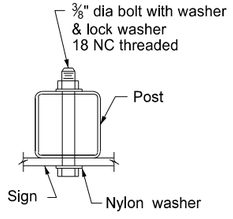
STRAP DETAIL



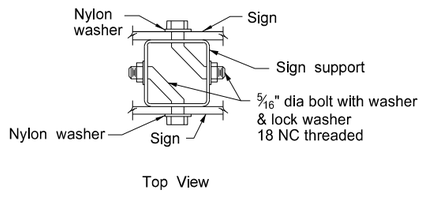
ANCHOR UNIT AND POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - When placing 2½", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

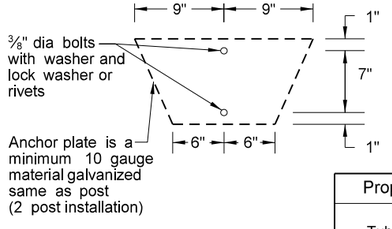


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



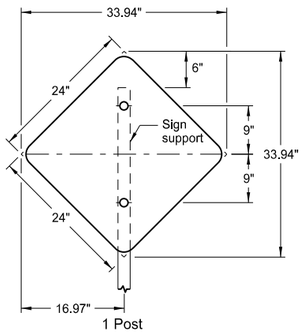
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.^{4}	Cross Sect. area In.^{2}	Section Modulus In.^{3}
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

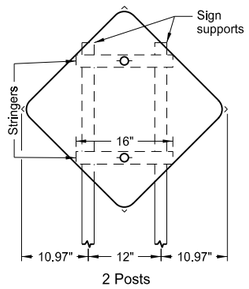
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

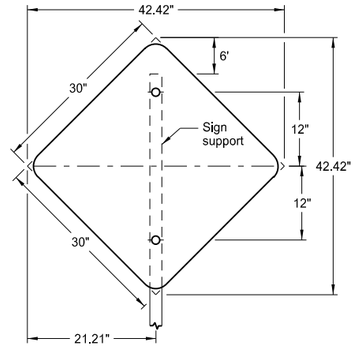


1 Post

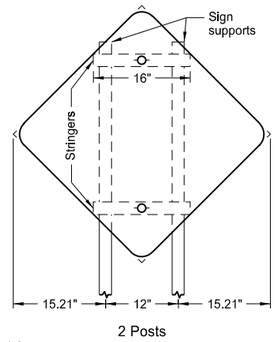


2 Posts

Assembly No. 18

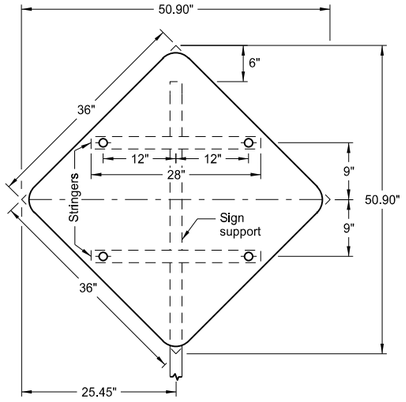


1 Post

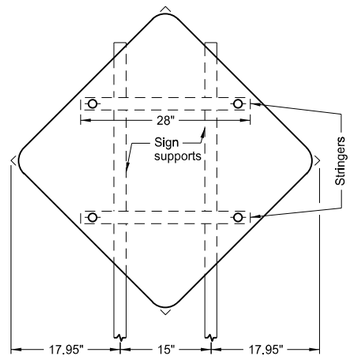


2 Posts

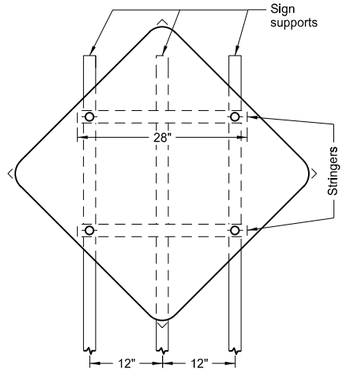
Assembly No. 19



1 Post

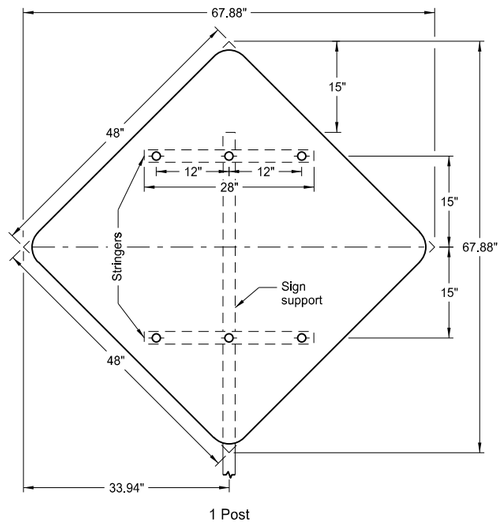


2 Posts

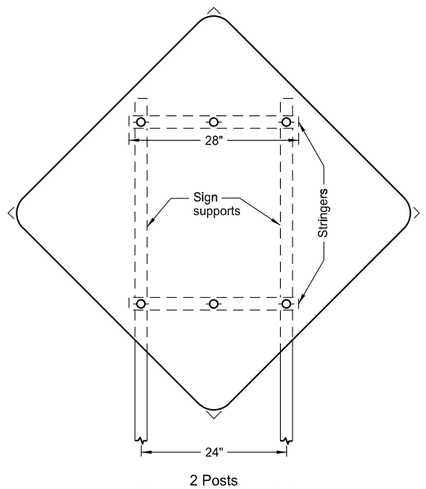


3 Posts

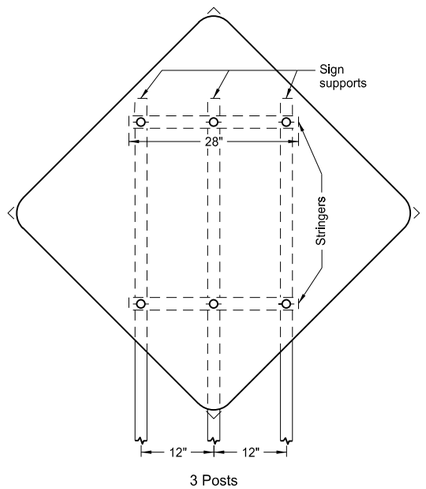
Assembly No. 20



1 Post



2 Posts



3 Posts

Assembly No. 21

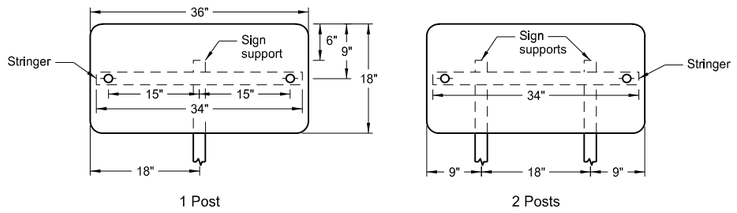
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

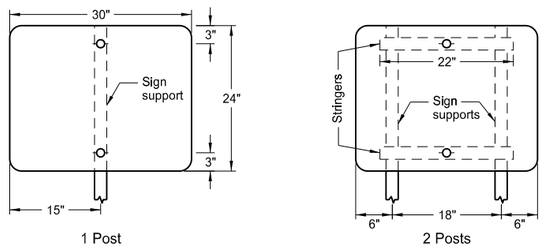
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post 2 Posts

Assembly No. 31

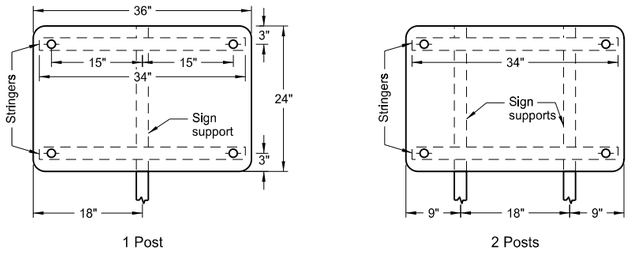


1 Post 2 Posts

Assembly No. 32

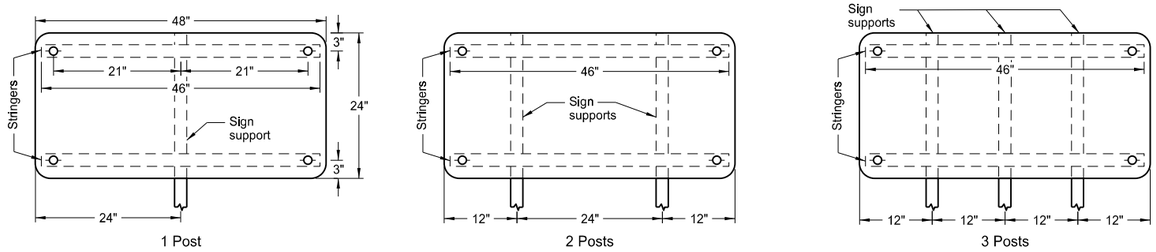
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



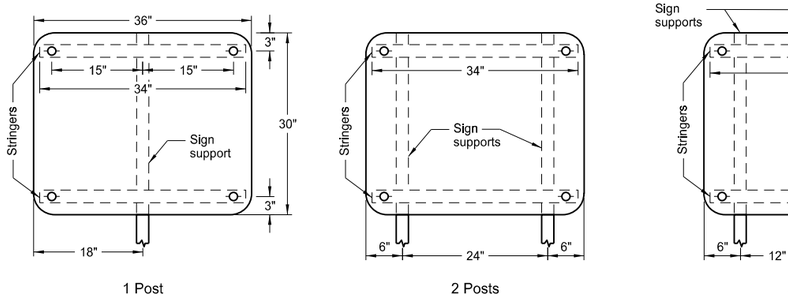
1 Post 2 Posts

Assembly No. 33



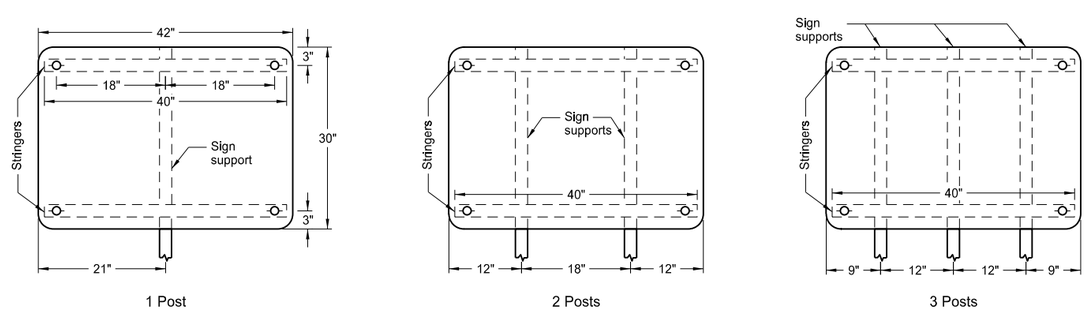
1 Post 2 Posts 3 Posts

Assembly No. 34



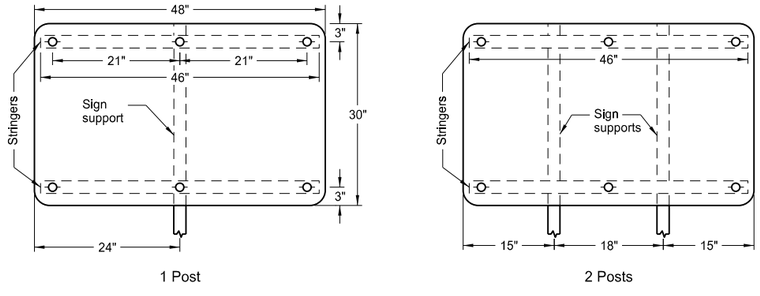
1 Post 2 Posts 3 Posts

Assembly No. 35



1 Post 2 Posts 3 Posts

Assembly No. 36



1 Post 2 Posts 3 Posts

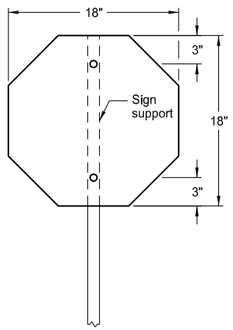
Assembly No. 37

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

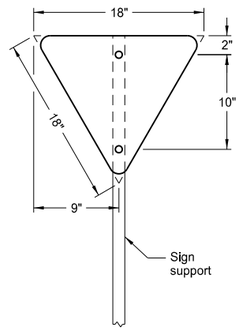
PUNCHING, STRINGER, AND SUPPORT LOCATION DETAILS FOR REGULATORY, WARNING AND GUIDE BIKE ROUTE SIGNS

D-754-46



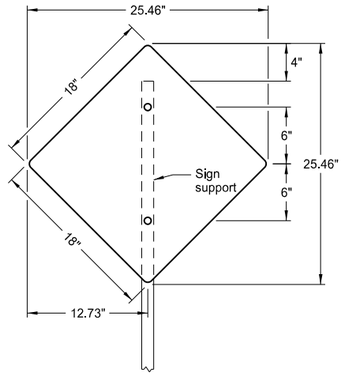
1 Post

Assembly No. 100



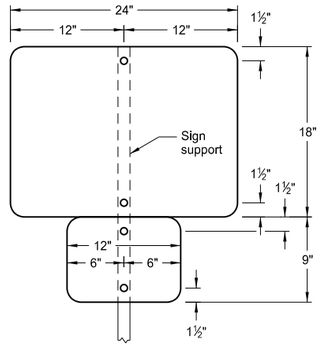
1 Post

Assembly No. 101



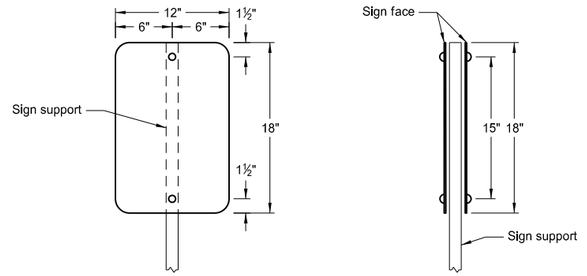
1 Post

Assembly No. 102



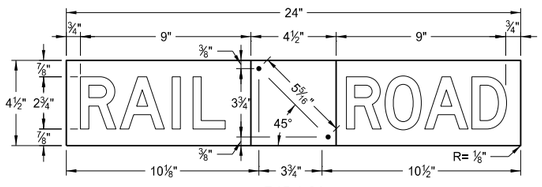
1 Post

Assembly No. 103

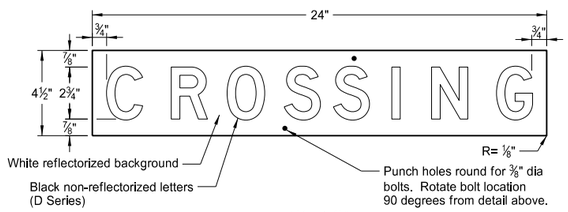


1 Post
back to back

Assembly No. 104

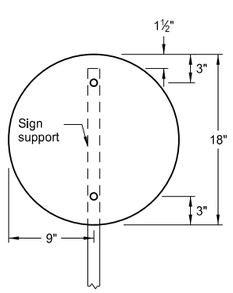


R15-1-24



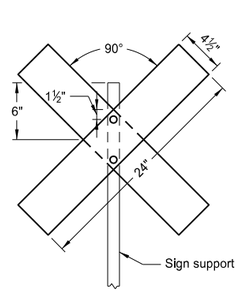
R15-1-24

Railroad Crossing Sign Details



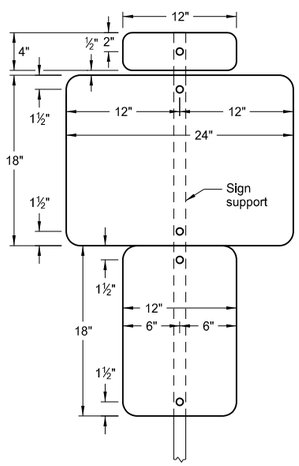
1 Post

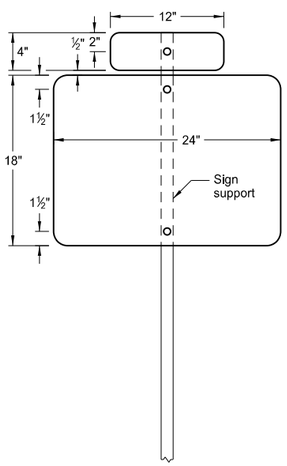
Assembly No. 106



1 Post

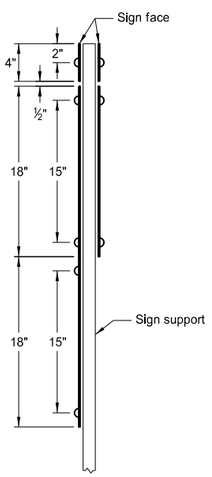
Assembly No. 107

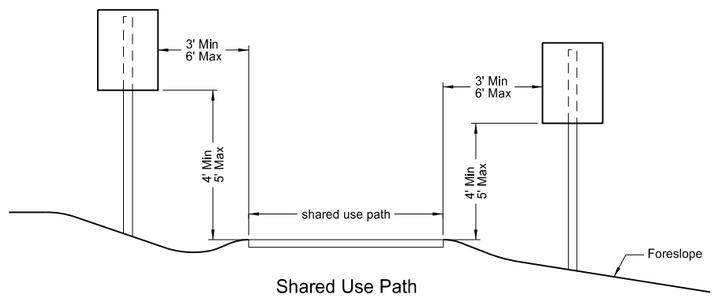




1 Post
back to back

Assembly No. 105





Shared Use Path

Bicycle - Pedestrian Path

Notes:

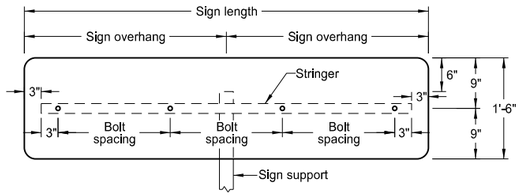
1. Use 0.100 inch minimum thickness sign backing material.

2. Punch holes round for ⅜" bolt.

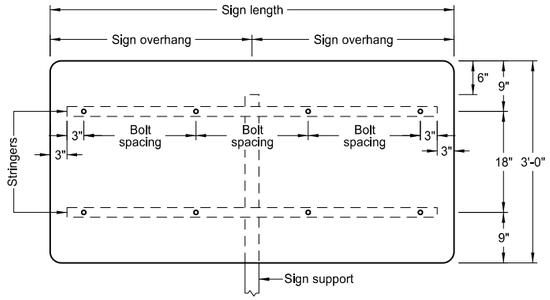
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
9-18-15	Revised Title Name.
8-30-18	Updated notes to active voice.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

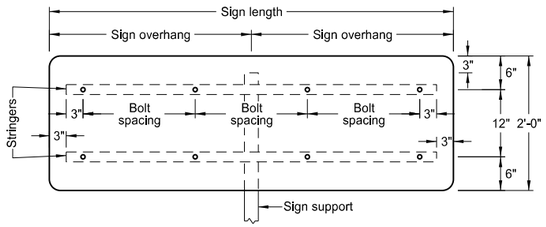
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



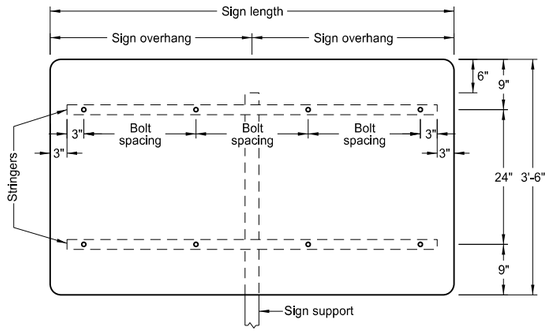
VARIES X 1'-6"



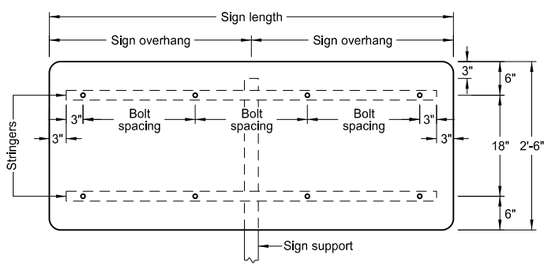
VARIES X 3'-0"



VARIES X 2'-0"



VARIES X 3'-6"



VARIES X 2'-6"

1 POST		
Sign Length	Sign Overhang	Bolt Spacing
4'-0"	2'-0"	18"
4'-6"	2'-3"	21"
5'-0"	2'-6"	24"
5'-6"	2'-9"	18"
6'-0"	3'-0"	20"
6'-6"	3'-3"	22"
7'-0"	3'-6"	24"
7'-6"	3'-9"	2-20" & 2-19"
8'-0"	4'-0"	21"
8'-6"	4'-3"	2-22" & 2-23"
9'-0"	4'-6"	24"
9'-6"	4'-9"	4-20" & 1-22"
10'-0"	5'-0"	2-21" & 3-22"
10'-6"	5'-3"	4-23" & 1-22"
11'-0"	5'-6"	24"
11'-6"	5'-9"	21"
12'-0'	6'-0"	22"

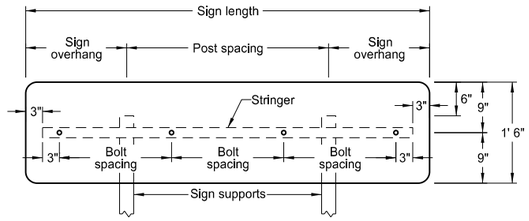
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.
4. Attach single stringer to single post signs with special stringer angle, shown on "Mounting Details Perforated Tube" standard drawing.

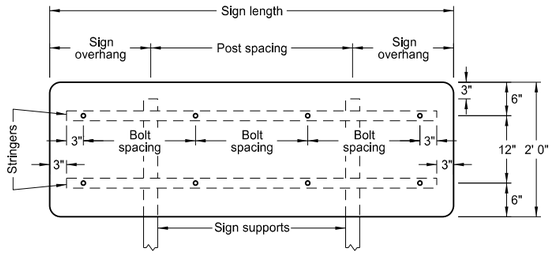
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

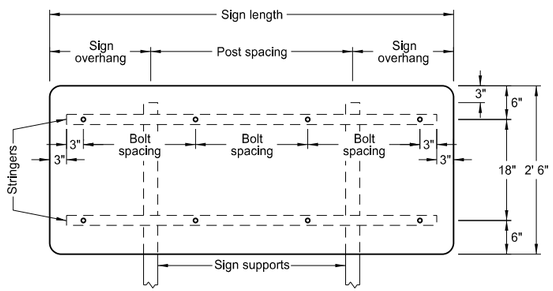
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



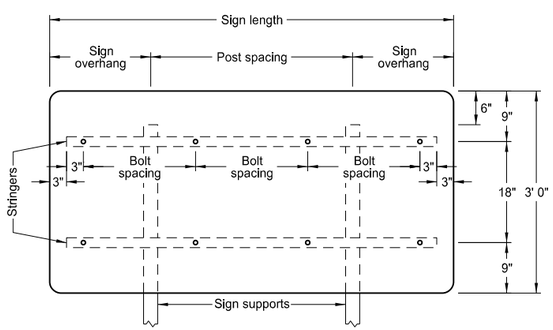
VARIES X 1'-6"



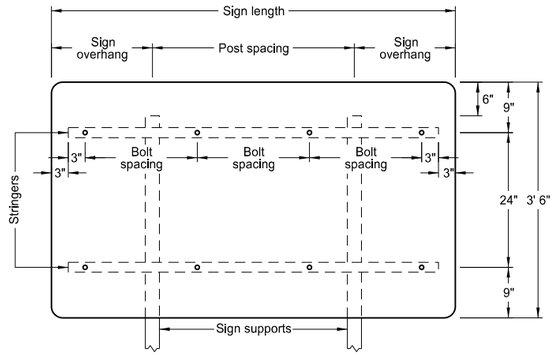
VARIES X 2'-0"



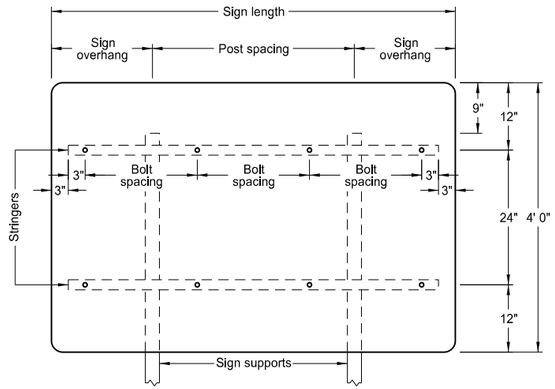
VARIES X 2'-6"



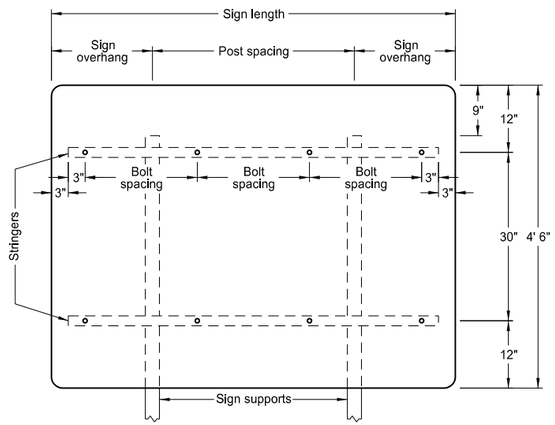
VARIES X 3'-0"



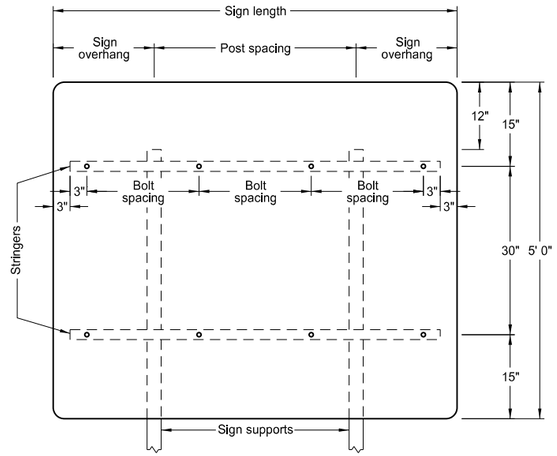
VARIES X 3'-6"



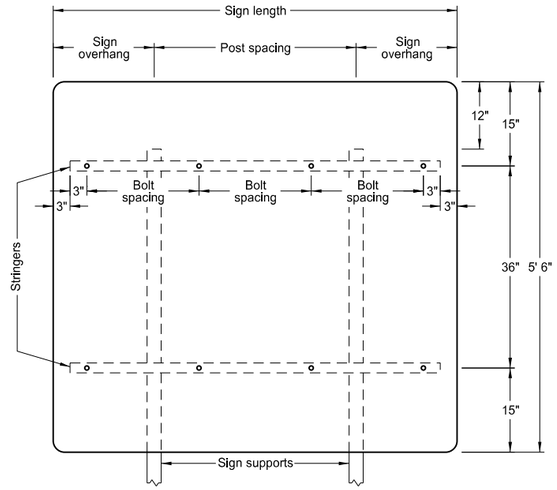
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0'	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	8-23" & 2-22"

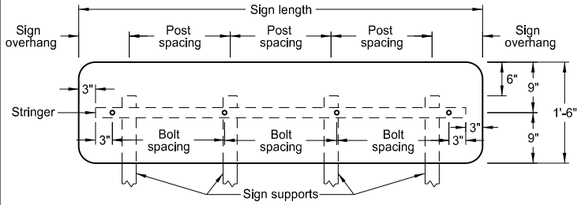
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

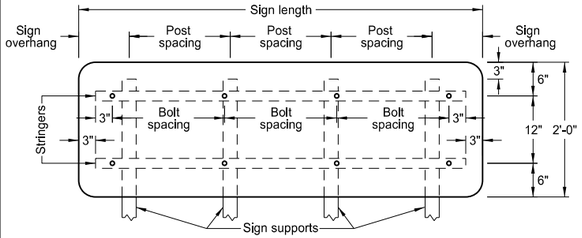
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

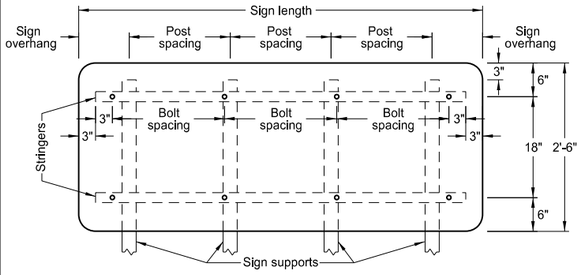
D-754-50



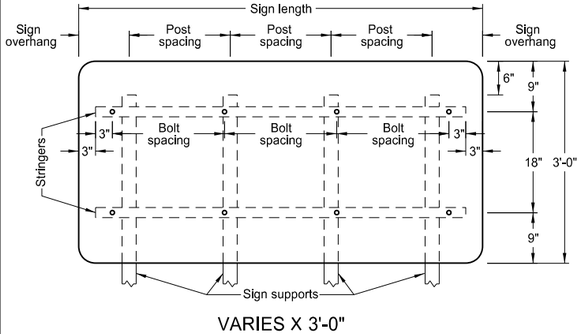
VARIES X 1'-6"



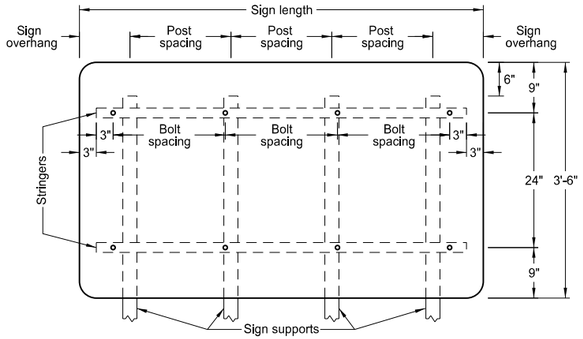
VARIES X 2'-0"



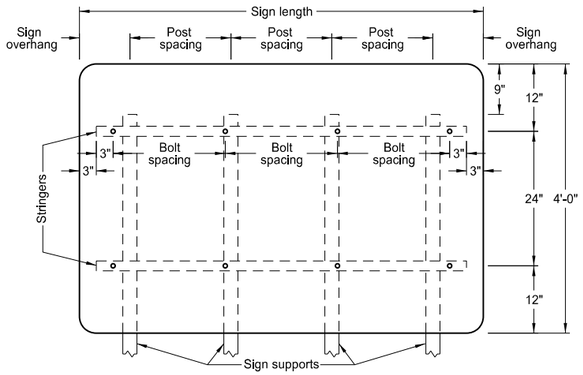
VARIES X 2'-6"



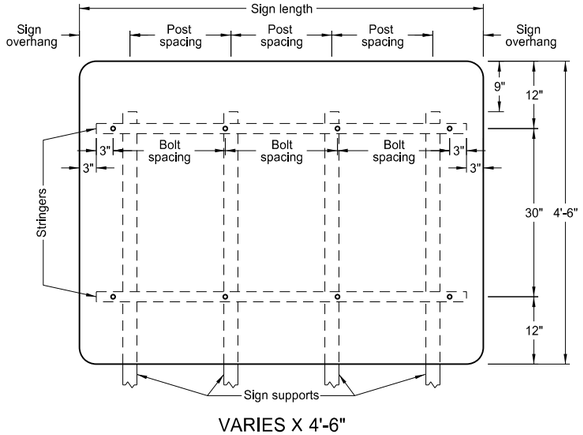
VARIES X 3'-0"



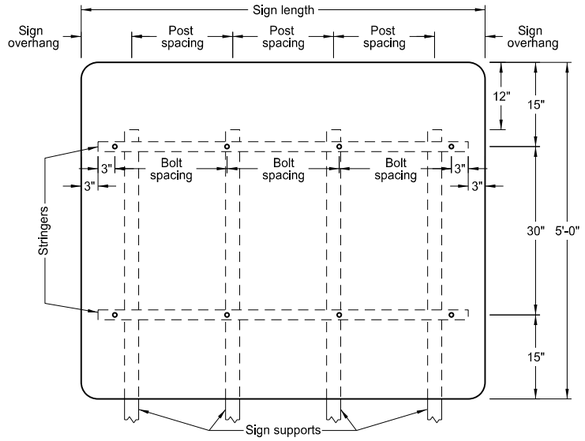
VARIES X 3'-6"



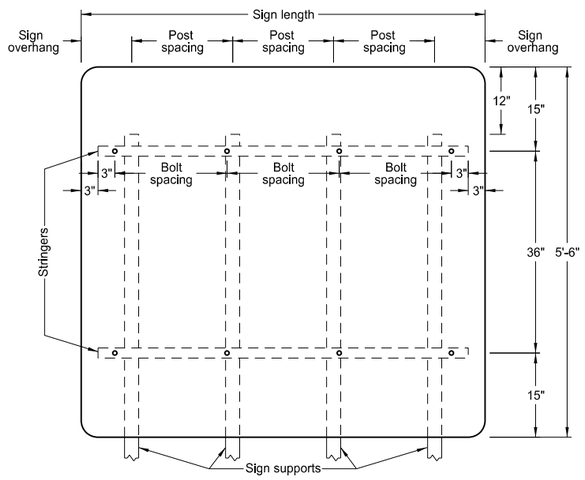
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

4 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
8'-6"	0'-3"	2'-8"	2-22" & 2-23"
9'-0"	0'-6"	2'-8"	24"
9'-6"	0'-9"	2'-8"	4-20" & 1-22"
10'-0"	1'-0"	2'-8"	2-21" & 3-22"
10'-6"	1'-3"	2'-8"	4-23" & 1-22"
11'-0"	1'-0"	3'-0"	24"
11'-6"	0'-6"	3'-6"	21"
12'-0"	0'-6"	3'-8"	22"
12'-6"	0'-6"	3'-10"	23"
13'-0"	0'-6"	4'-0"	24"
13'-6"	1'-3"	3'-8"	3-22" & 4-21"
14'-0'	1'-6"	3'-8"	2-23" & 5-22"
14'-6"	1'-3"	4'-0"	6-23" & 1-24"
15'-0"	1'-6"	4'-0"	24"
15'-6"	1'-0"	4'-6"	6-22" & 2-21"
16'-0"	1'-0"	4'-8"	4-23" & 4-22"
16'-6"	1'-0"	4'-10"	6-23" & 2-24"
17'-0"	1'-0"	5'-0"	24"
17'-6"	0'-6"	5'-6"	22"
18'-0"	2'-0"	4'-8"	6-23" & 3-22"
18'-6"	1'-9"	5'-0"	6-23" & 3-24"
19'-0"	0'-6"	6'-0"	24"
19'-6"	3'-0"	4'-6"	8-22" & 2-23"
20'-0"	3'-0"	4'-8"	8-23" & 2-22"

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-25-12

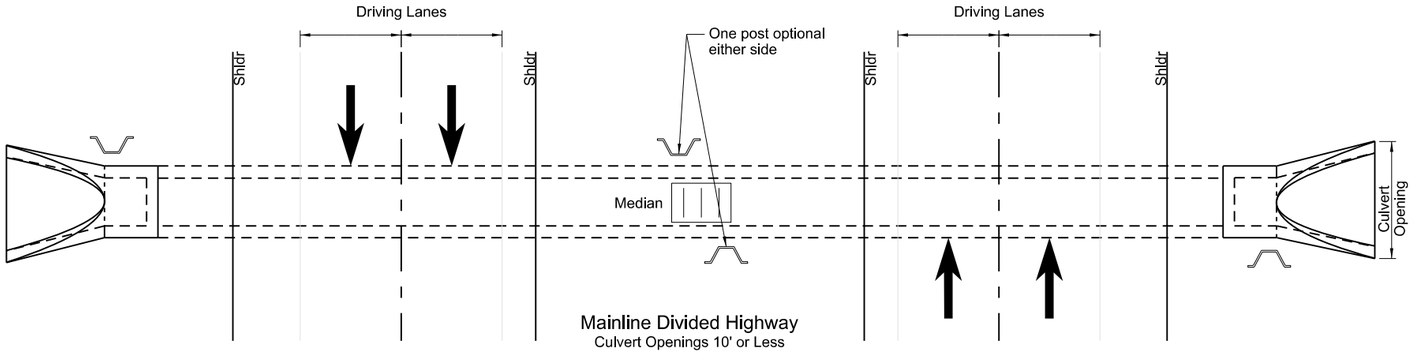
REVISIONS

DATE	CHANGE
8-30-18	Updated notes to active voice.

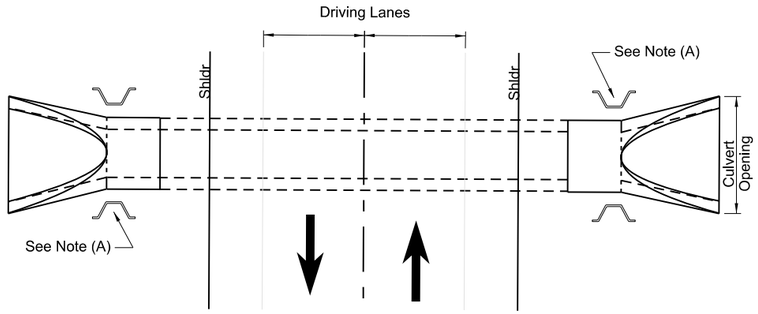
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS - CULVERTS

D-754-83

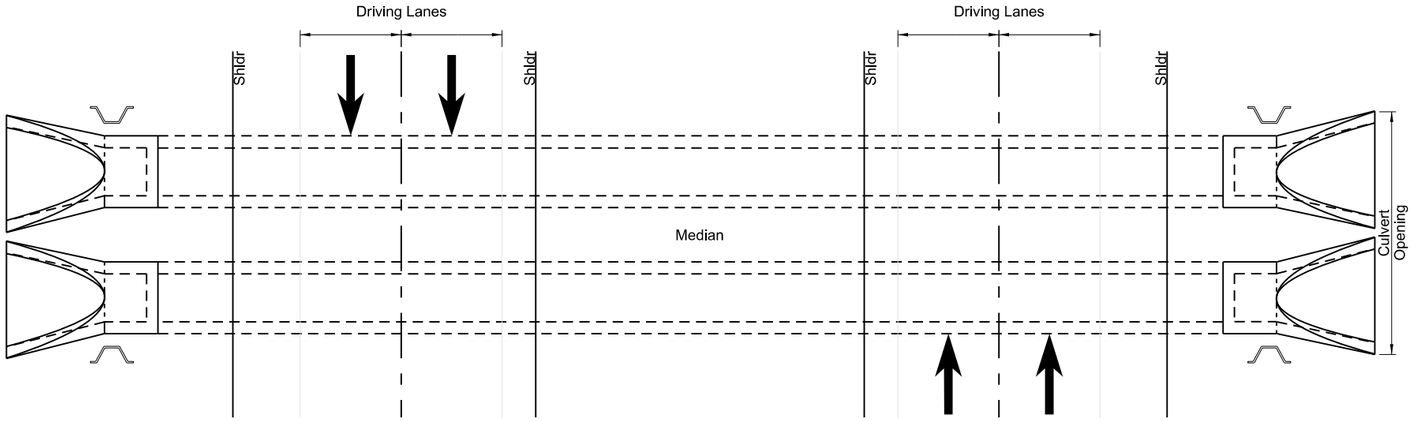


Mainline Divided Highway
Culvert Openings 10' or Less

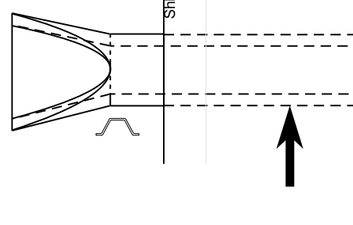


Two-Lane Highway

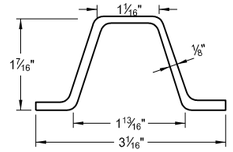
(A) Install additional marker where multiple pipe installations have a width of greater than 10'.



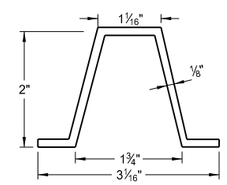
Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations



Ramp



Steel Post Detail
Approx. 2.0 lbs/ft

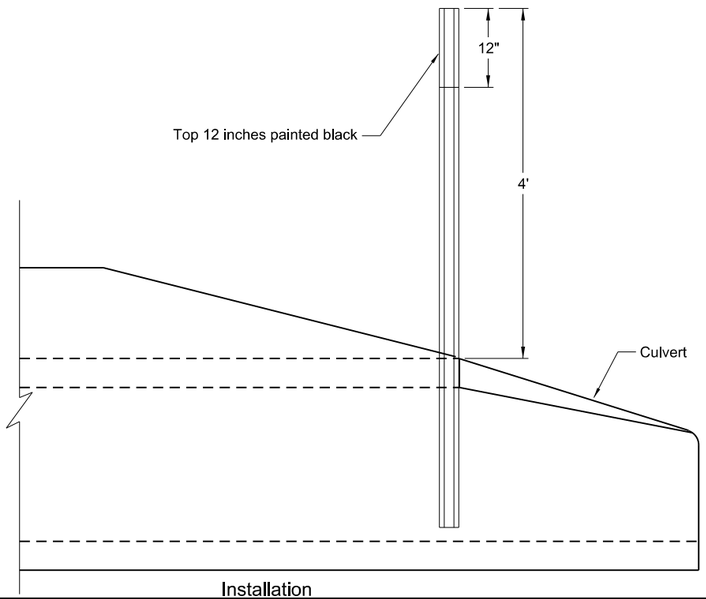


Aluminum Post Detail
Approx. 0.88 lbs/ft

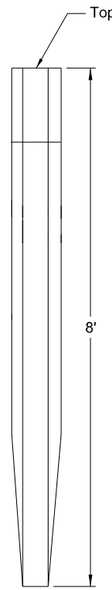
Post Location

Notes:

Mark each end of culverts crossing the roadway within the right-of-way with a post. Install posts in front of culvert in direction of travel along the side of culvert and one foot from culvert opening unless shown otherwise in plans.



Installation



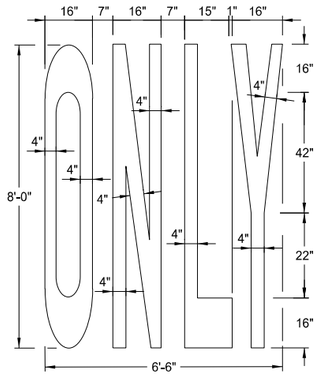
U-Type Post

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14 8-30-18	Revised Notes Updated notes to active voice.

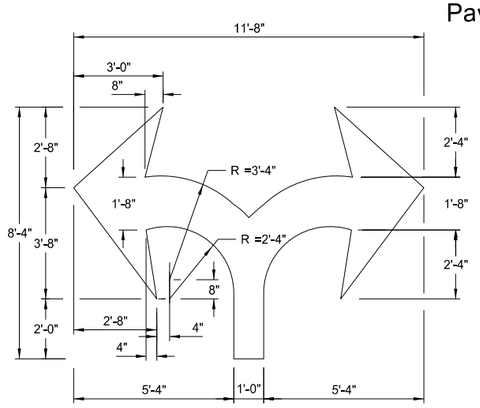
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Message Details

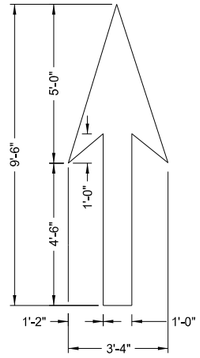
D-762-1



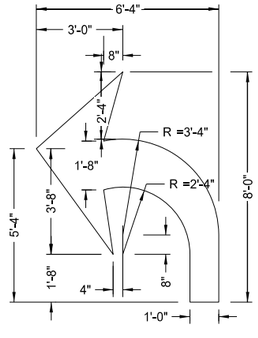
22 S. F.



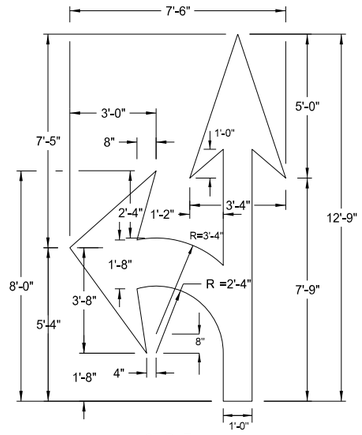
29 S. F.



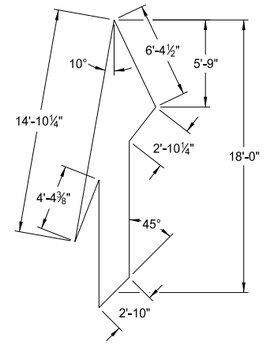
12 S. F.



16 S. F.

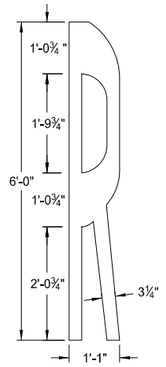


27 S. F.

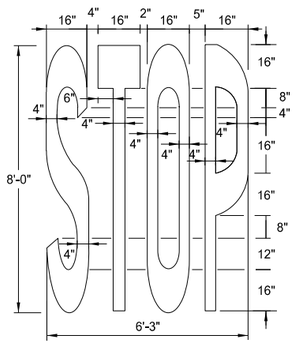


41 S. F.

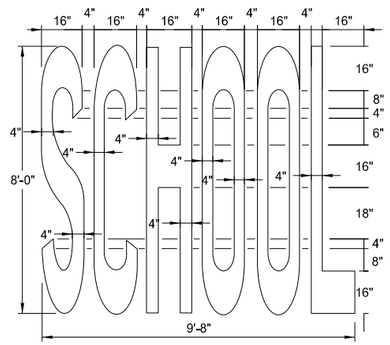
Note: Rotate merge arrow 20° from edge of roadway.



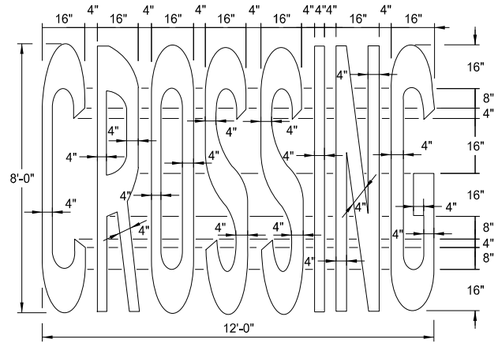
4 S. F.



22 S. F.



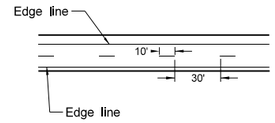
34.5 S. F.



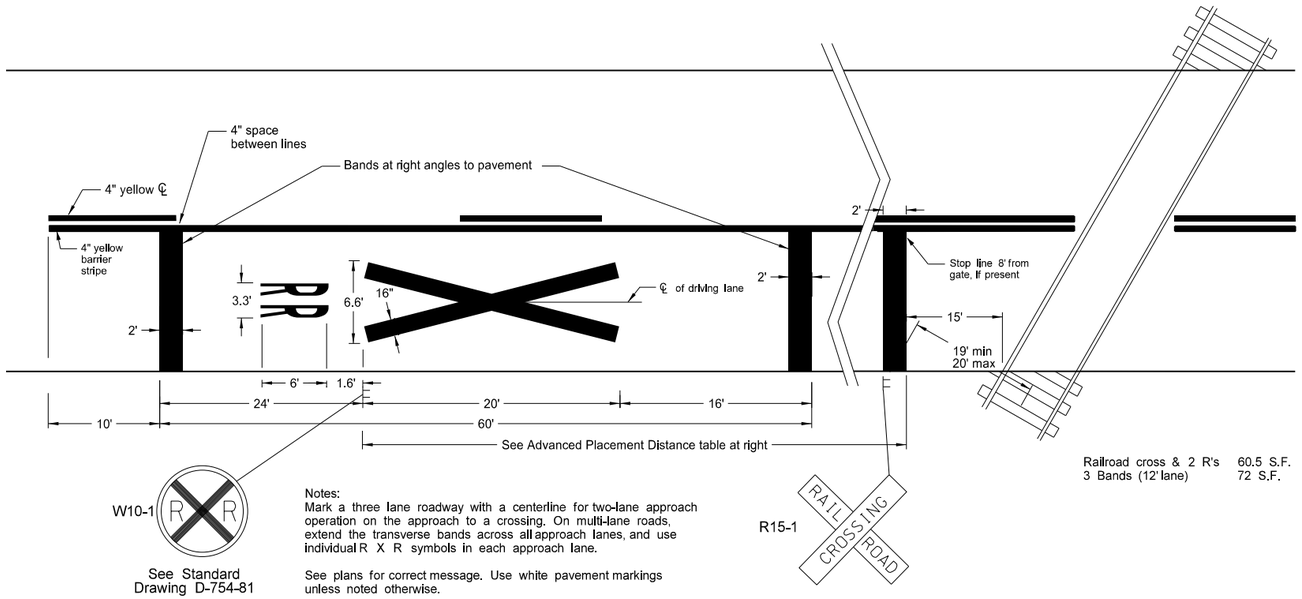
46 S. F.

Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table



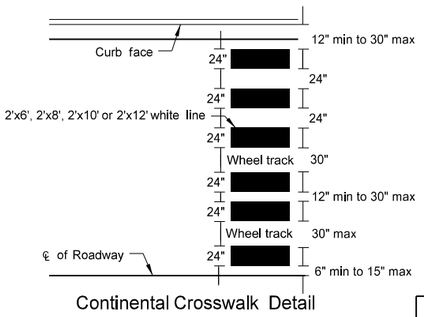
Centerline Pavement Marking Skip Spacing Detail



Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

Notes:
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.

See plans for correct message. Use white pavement markings unless noted otherwise.



Continental Crosswalk Detail

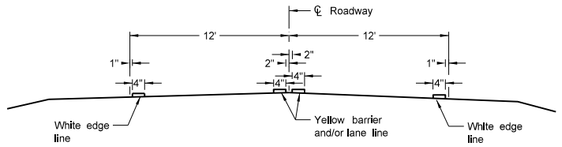
Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

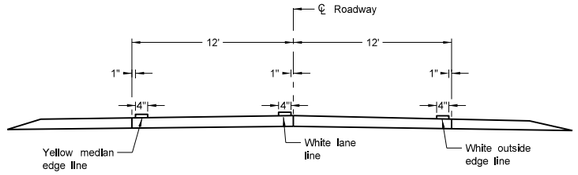
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on10-17-2017and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING

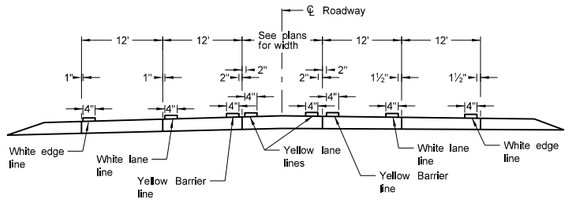
D-762-4



Two Lane Two Way
RURAL ROADWAY



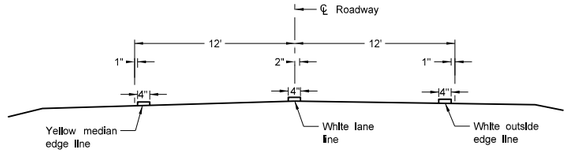
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



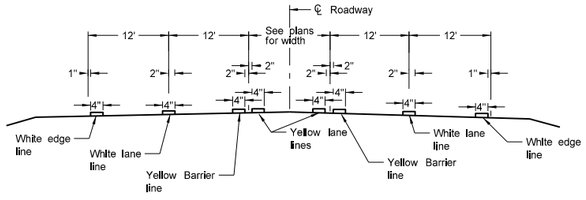
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

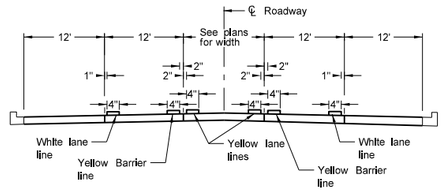
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



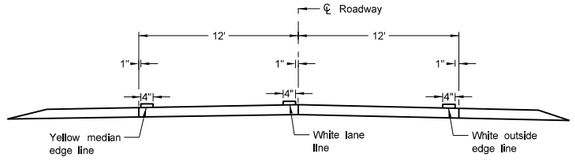
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



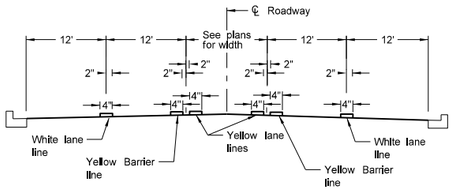
RURAL FIVE LANE ROADWAY
Asphalt Section



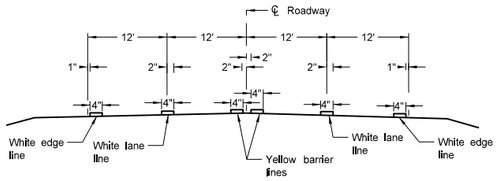
URBAN FIVE LANE SECTION
Concrete Section



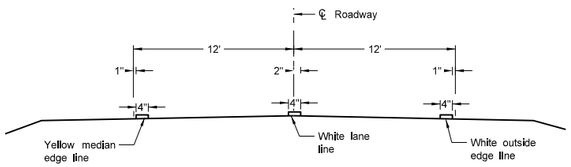
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



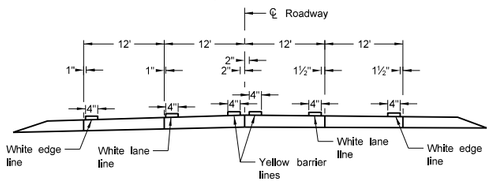
URBAN FIVE LANE SECTION
Asphalt Section



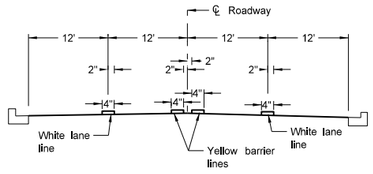
RURAL FOUR LANE ROADWAY
Asphalt Section



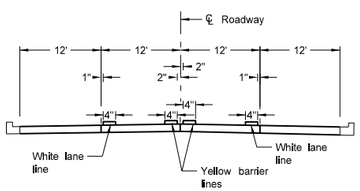
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



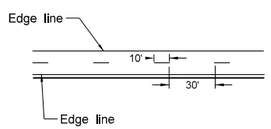
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



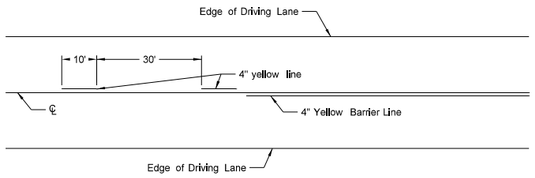
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

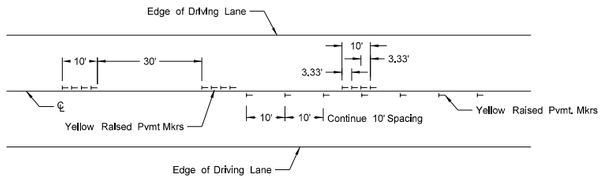
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

SHORT-TERM PAVEMENT MARKING

D-762-11

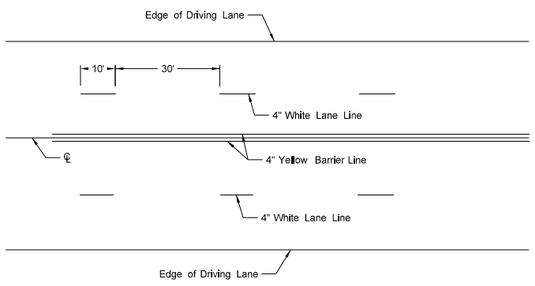


Painted or Tape Lines

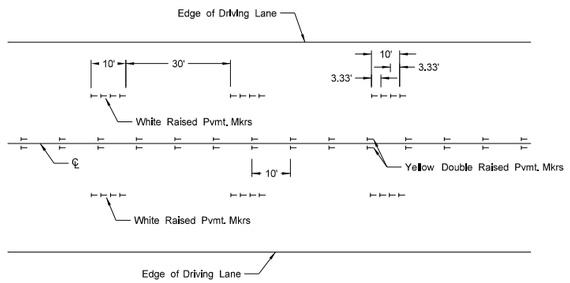


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

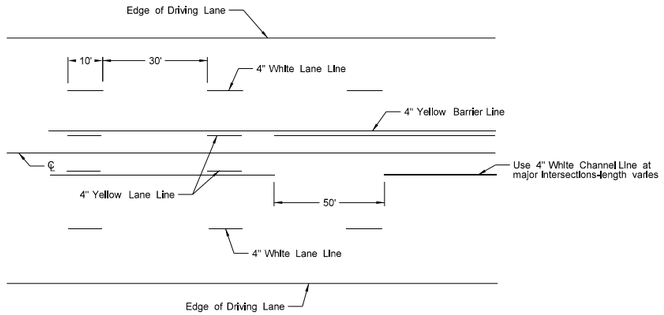


Painted or Tape Lines

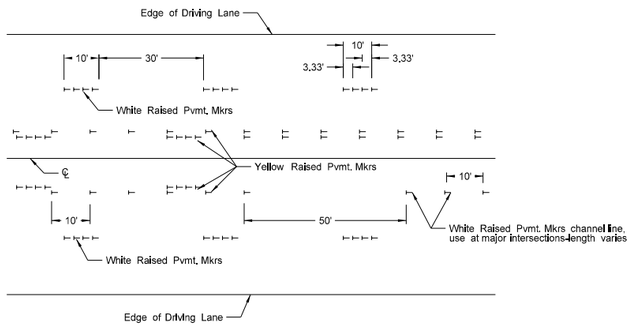


Raised Pavement Markers

FOUR LANE ROADWAY

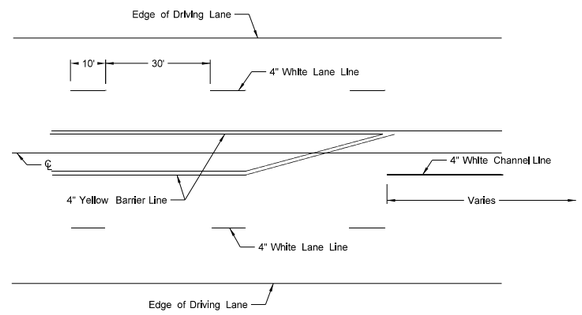


Painted or Tape Lines

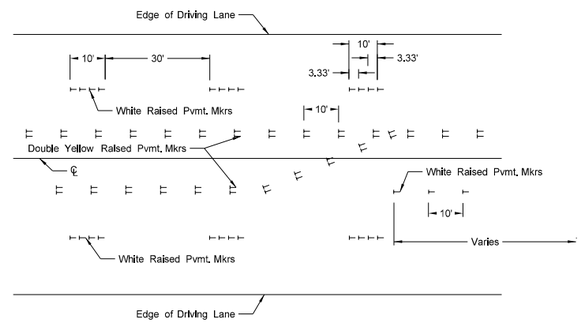


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

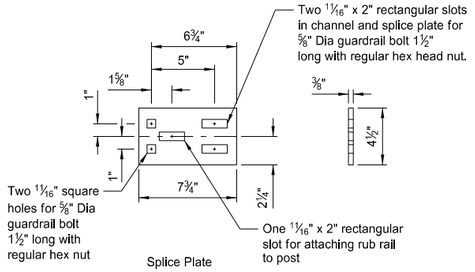
1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.

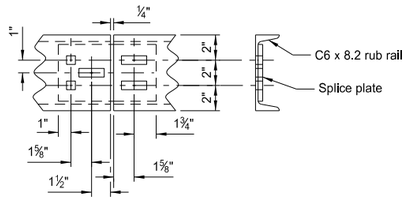
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

W-BEAM GUARDRAIL GENERAL DETAILS

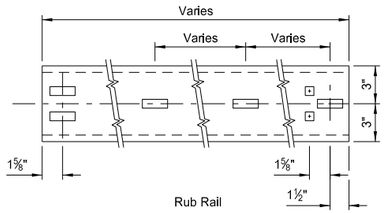
D-764-1



Splice Plate

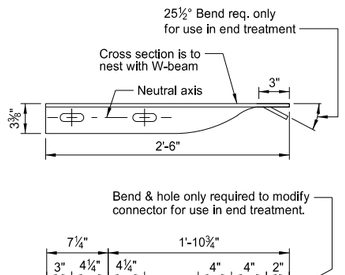


Splice Detail

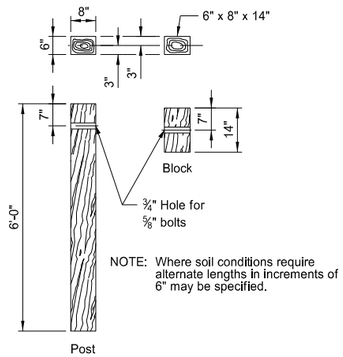


Rub Rail

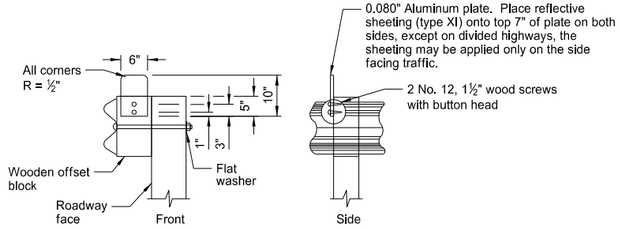
C6x8 RUB RAIL AND SPLICE PLATE



W BEAM TERMINAL CONNECTOR

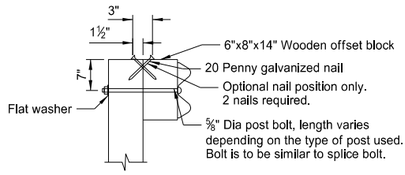


6"x8" TIMBER POST & BLOCK

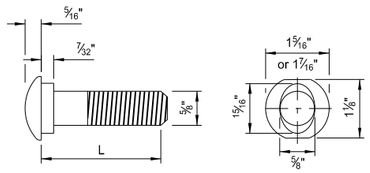


REFLECTORIZED PLATE DETAIL

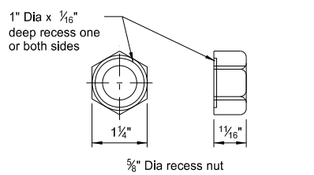
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



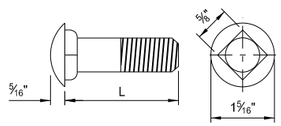
TYPICAL POST ATTACHMENT DETAIL



5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" 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

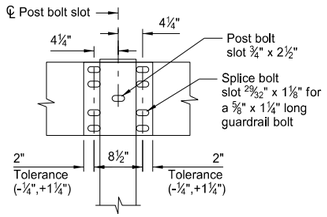


5/8" GUARDRAIL BOLT & RECESS NUT

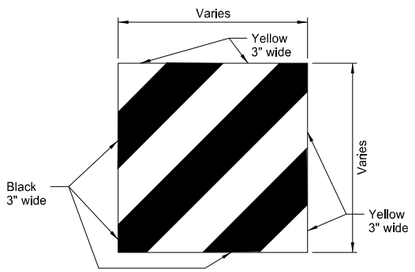


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length

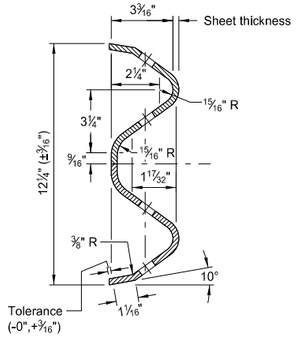
5/8" CARRIAGE BOLT & NUT



SPLICE DETAIL



IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION

NOTES:

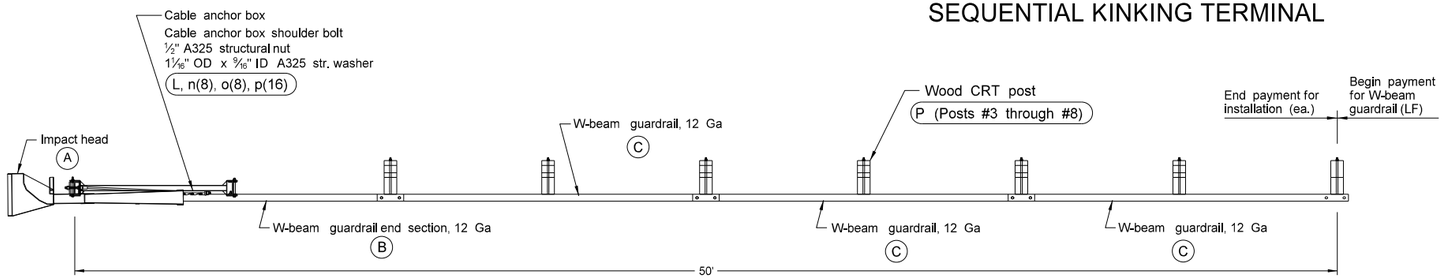
1. Reflectorized plates: Reflector plates shall begin at the first post and be spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. The reflector shall be the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
2. Manner of replacing bituminous material at guardrail post: All excess earth from excavations for guard posts shall be disposed of as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. The Object Marker shall fit within the vertical edges of the Impact Plate. The retroreflective sheeting shall be type XI sheeting meeting the requirements of Section 894.02.B of the standard specifications. The sheeting shall be applied to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. The Object Marker shall attach to the Impact Head Plate with rivets or some other attachment device. The rivets or attachment device shall be non-rust. The stripes shall slope downward toward the roadway side.
4. Guardrail installation height tolerance = - 1/4" , + 1".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE

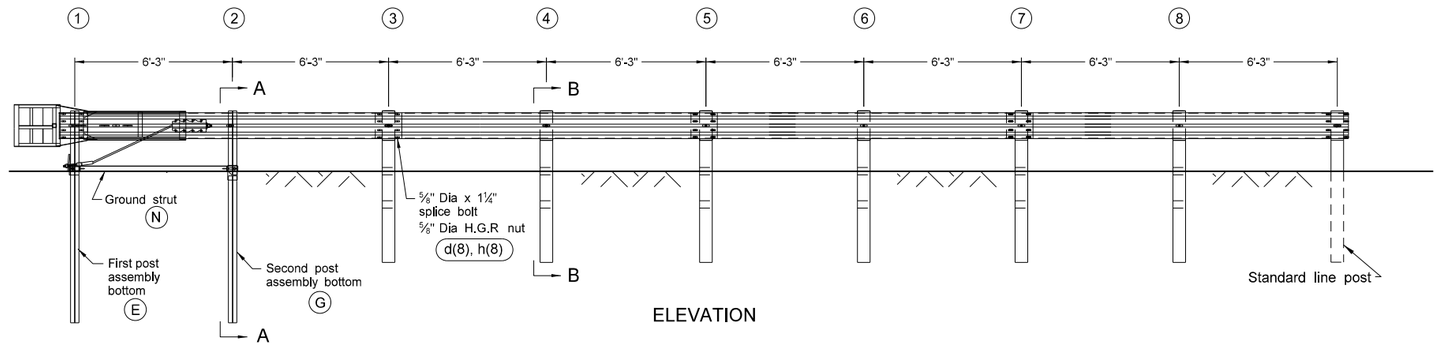
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 10/11/13 and the original document is stored at the North Dakota Department of Transportation

SEQUENTIAL KINKING TERMINAL

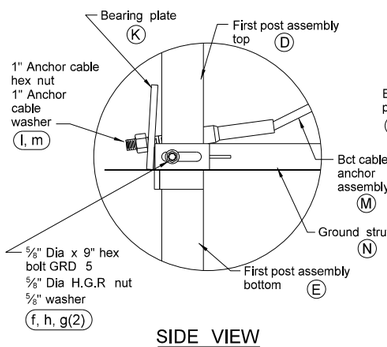
D-764-5



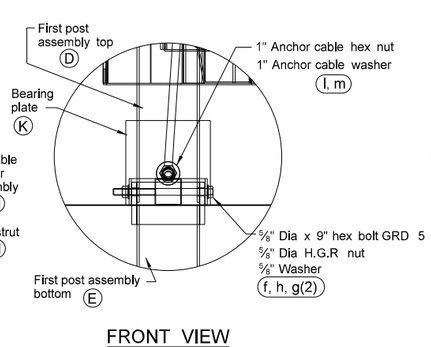
PLAN



ELEVATION

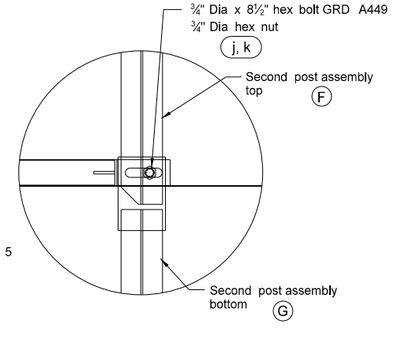


SIDE VIEW

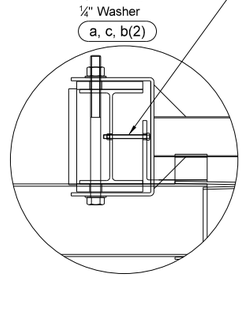


FRONT VIEW

POST #1 CONNECTION DETAILS



SIDE VIEW DETAIL OF POST #2

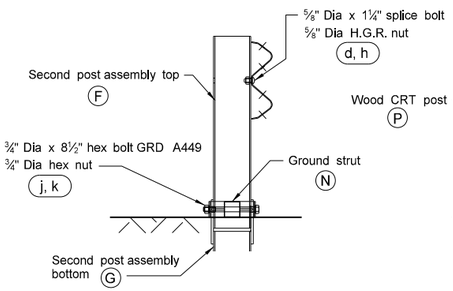


IMPACT HEAD CONNECTION DETAIL

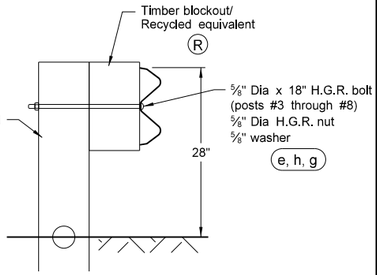
GENERAL NOTES:

1. Breakaway posts are required with the SKT.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The SKT can be flared at a rate of up to 25:1 to prevent the impact head from encroaching on the shoulder.
4. The lower sections of the posts shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
5. The lower section of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
6. When rock is encountered, a 10" diameter post hole, 20" into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Posts 1 & 2 can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
7. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
8. The wood blockouts on post #3 through post #8 should be "toe nailed" with two 20 penny galvanized nails into each rectangular post, to prevent them from turning when the wood shrinks.

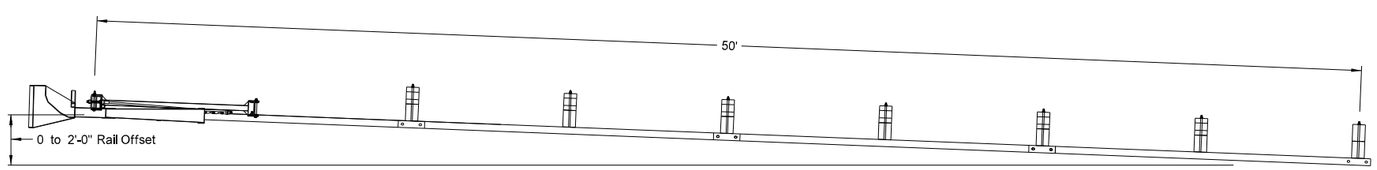
ITEM	QTY	BILL OF MATERIALS
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
		HARDWARE
a	2	¼" x 4" HEX BOLT Grade 5
b	4	¼" WASHER
c	2	¼" HEX NUT
d	25	⅝" Dia x 1¼" SPLICE BOLT, POST #2
e	6	⅝" Dia x 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	⅝" Dia x 9" HEX BOLT GRD 5
g	8	⅝" WASHER
h	32	⅝" Dia H.G.R NUT
j	1	¾" Dia x 8½" HEX BOLT GRD A449
k	1	¾" Dia HEX NUT
l	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	CABLE ANCHOR BOX SHOULDER BOLT
o	8	½" A325 STRUCTURAL NUT
p	16	1⅛" OD x ⅝" ID A325 STR. WASHER



SECTION A-A
Post #2



SECTION B-B
Posts #3 through #8



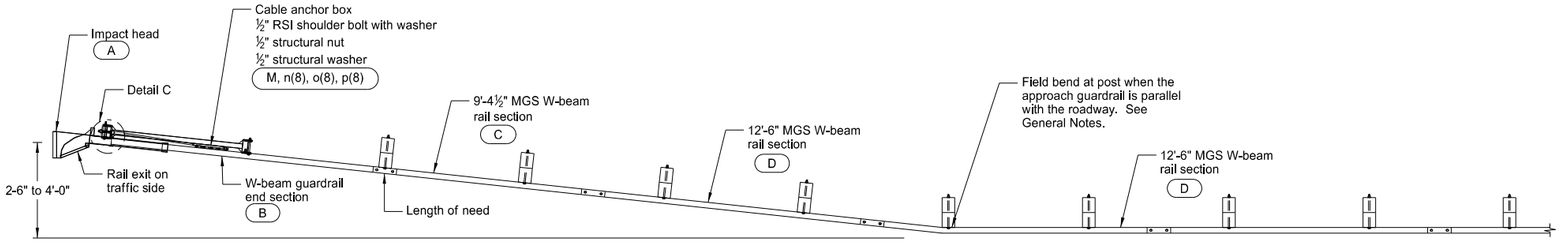
FLARED INSTALLATION
25:1 maximum flare rate

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE

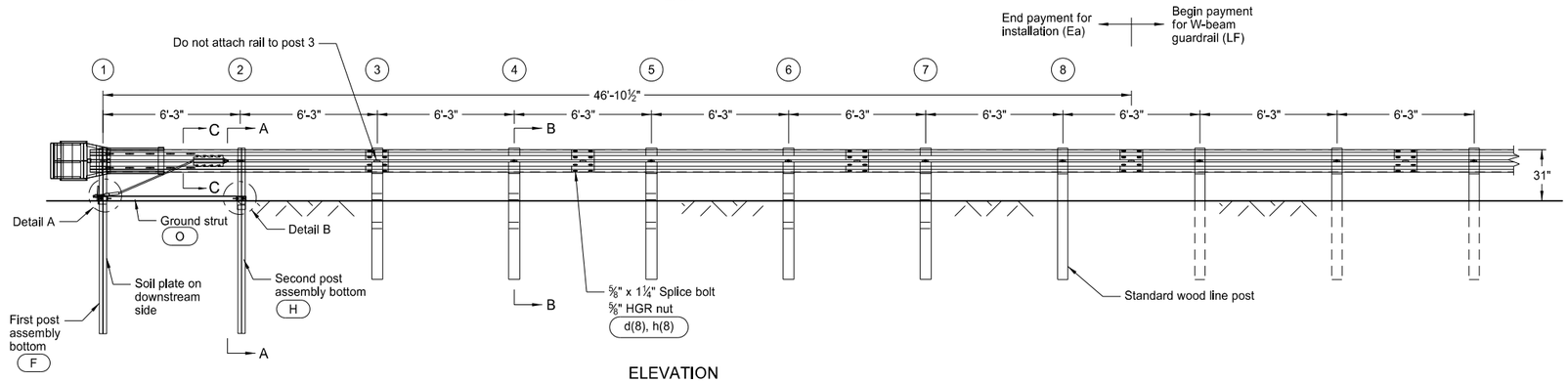
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/11/13 and the original document is stored at the North Dakota Department of Transportation

MGS FLARED ENERGY ABSORBING TERMINAL - WOOD POST

D-764-38



PLAN



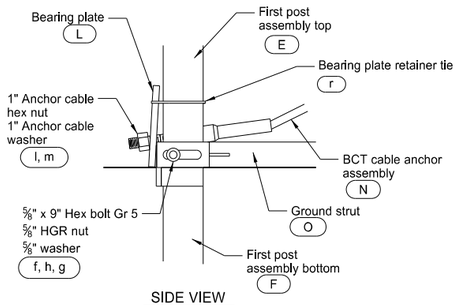
ELEVATION

ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	F3000	IMPACT HEAD	1
B	SF1303	W-BEAM GUARDRAIL END SECTION, 12 Ga	1
C	G12025	9'-4½" MGS W-BEAM RAIL SECTION, 12 Ga	1
D	G1203A	12'-6" MGS W-BEAM RAIL SECTION, 12 Ga	2
E	UHP1A	FIRST POST ASSEMBLY TOP	1
F	HP1B	FIRST POST ASSEMBLY BOTTOM	1
G	UHP2A	SECOND POST ASSEMBLY TOP	1
H	HP2B	SECOND POST ASSEMBLY BOTTOM	1
J	UP671	WOOD CRT POST	5
K	P675	WOOD BLOCKOUT OR RECYCLE EQUIVALENT	5
L	E750	BEARING PLATE	1
M	S760	CABLE ANCHOR BOX	1
N	E770	BCT CABLE ANCHOR ASSEMBLY	1
O	S785	GROUND STRUT HINGED POST	1
		HARDWARE	
a	B5160304A	5/16" x 3" HEX BOLT A325	2
b	W0516	5/16" WASHER	4
c	N0516	5/16" HEX NUT	2
d	B580122	5/8" Dia x 1¼" SPLICE BOLT	33
e	B581802	5/8" Dia X 18" HGR BOLT	5
f	B580904A	5/8" Dia x 9" HEX BOLT GRD 5	1
g	W050	5/8" WASHER	7
h	N050	5/8" Dia HGR NUT	39
j	B340854A	¾" Dia x 8½" HEX BOLT GRD A449	1
k	N030	¾" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	½" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	½" STRUCTURAL NUT	8
p	W012A	½" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1

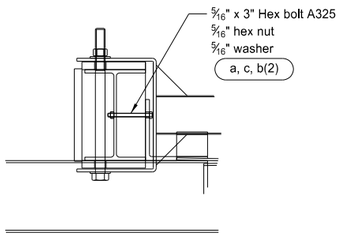
NOTE: Standard wood line post, block, and associated hardware not included in Bill of Materials Table.

GENERAL NOTES:

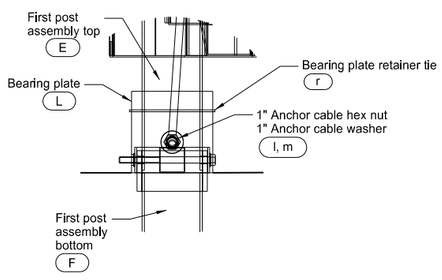
1. Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
2. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, ensure the Flared Energy Absorbing Terminal has only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, ensure the Flared Energy Absorbing Terminal is turned parallel to the roadway.
4. Ensure the lower sections of the posts do not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
5. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, the backfill material must be compacted to prevent settlement.
6. The breakaway cable assembly must be taut. Use a locking device (vice grips or channel lock pliers) to prevent cable from twisting when tightening nuts.
7. "Toe nail" the wood blockouts to the rectangular wood posts. Use two 20 penny galvanized nails.



SIDE VIEW

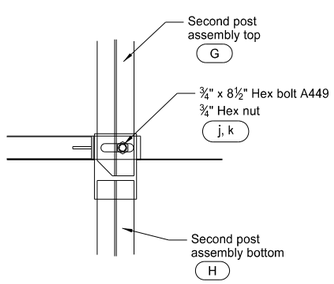


DETAIL C
Post 1 (Impact Head connection)

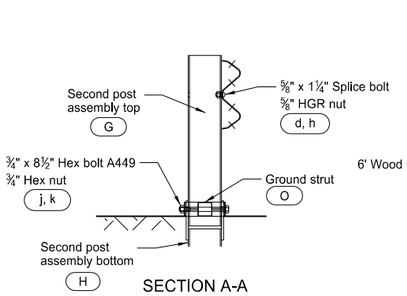


FRONT VIEW

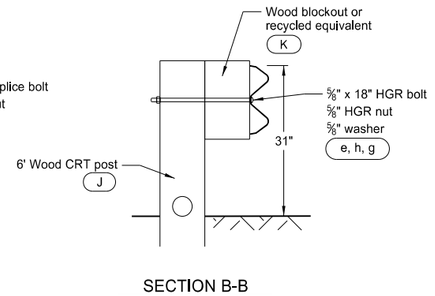
DETAIL A
Post 1



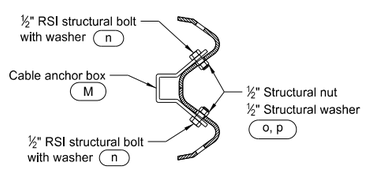
DETAIL B
Post 2



SECTION A-A
Post 2



SECTION B-B
Posts 3 through 7



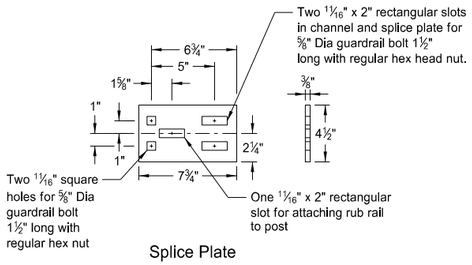
SECTION C-C

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE

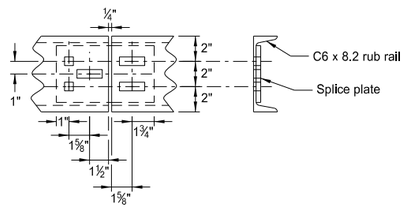
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 7/14/17 and the original document is stored at the North Dakota Department of Transportation

MGS W-BEAM GUARDRAIL GENERAL DETAILS

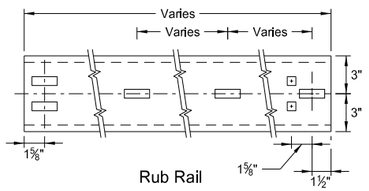
D-764-40



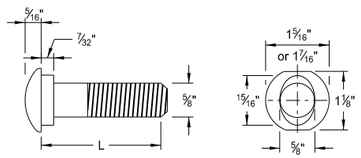
Splice Plate



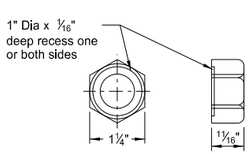
Splice Detail



C6x8.2 RUB RAIL AND SPLICE PLATE

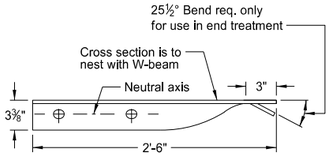


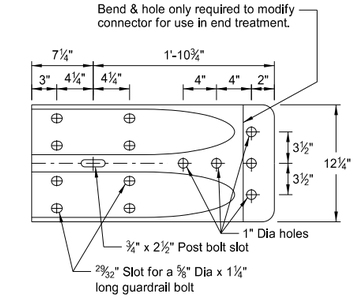
5/8" Diameter Guardrail Bolt	
L	Thread Length
1¼"	Full length thread
2"	1¾" Min thread length
9½"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



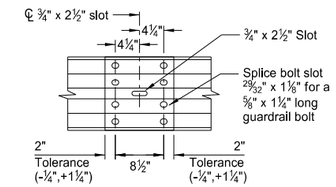
5/8" Dia recess nut

5/8" GUARDRAIL BOLT & RECESS NUT



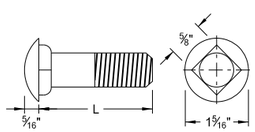


W BEAM TERMINAL CONNECTOR



SPLICE DETAIL

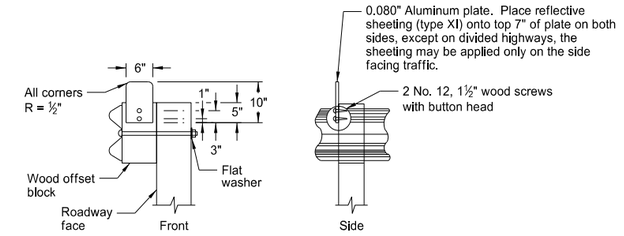
NOTE: Do not install center bolt in the ¾" x 2½" slot at mid span splices.



5/8" Diameter Carriage Bolt	
L	Thread Length
1½"	Full length thread
3"	1½" Min thread length
11"	1¾" Min thread length
13"	1¾" Min thread length

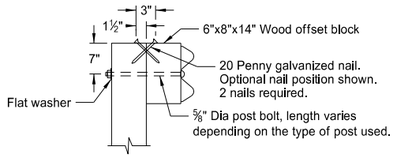
5/8" Dia hex nut

5/8" CARRIAGE BOLT & NUT

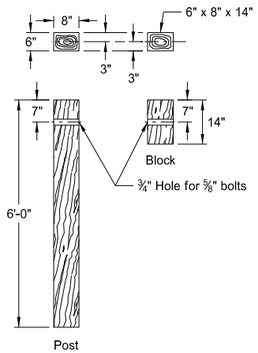


REFLECTORIZED PLATE DETAIL

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

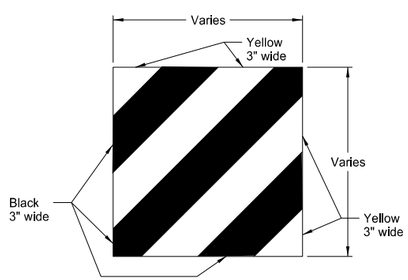


TYPICAL WOOD POST ATTACHMENT DETAIL

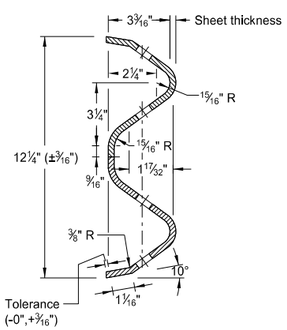


6" x 8" WOOD POST & BLOCK

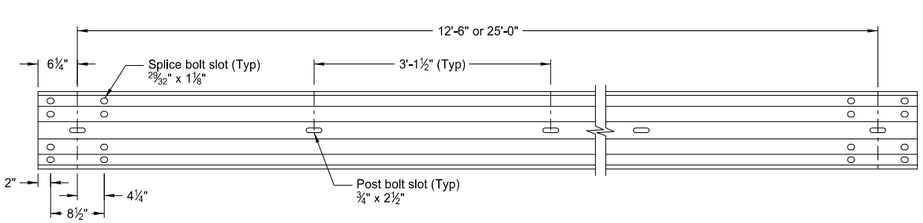
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



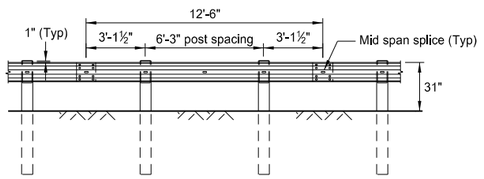
IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION



STANDARD MGS GUARDRAIL PANEL



STANDARD MGS GUARDRAIL SYSTEM

NOTES:

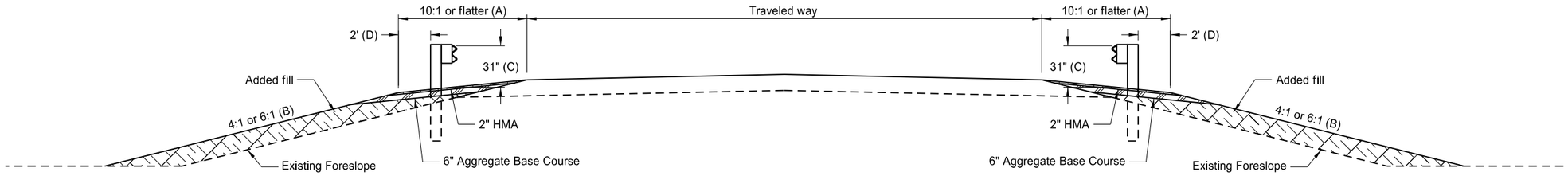
1. Begin reflector plates at the first post and space at 25' centers on guardrail less than 250' length and at 50' centers for guardrail over 250' length. Provide the reflector the same color as the pavement marking adjacent to it unless noted otherwise on the plans.
2. Replacing bituminous material at guardrail post: Dispose all excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. Fit the Object Marker within the vertical edges of the Impact Plate. Provide type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply the sheeting to 0.100 Aluminum sheeting meeting the requirements of Section 894.01.A. Attach the Object Marker to the Impact Head Plate with rivets or other attachment device. Ensure the rivets or attachment device are non-rust. Slope the stripes downward toward the roadway side.
4. Guardrail installation height tolerance = ±1".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE

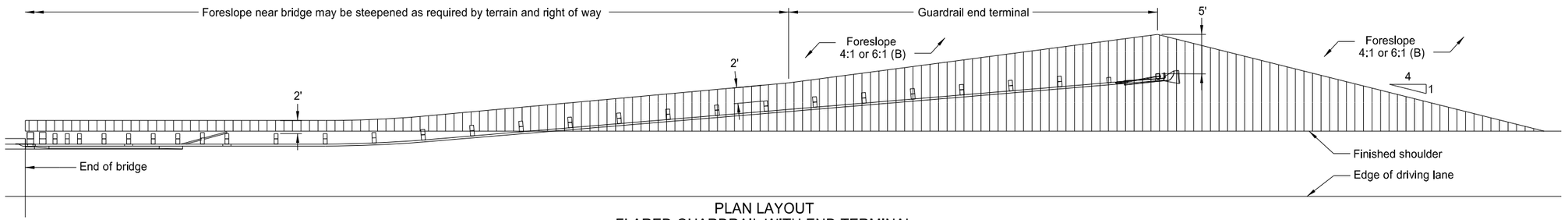
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 7/14/17 and the original document is stored at the North Dakota Department of Transportation

D-764-48

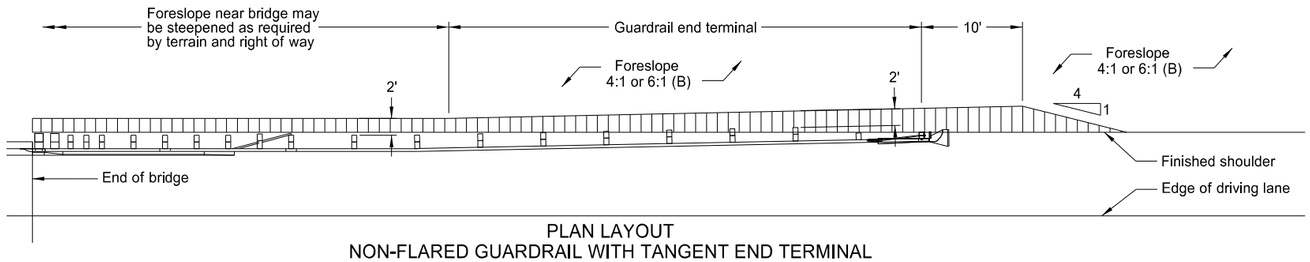
TYPICAL GRADING AT BRIDGE ENDS WITH MGS W-BEAM GUARDRAIL



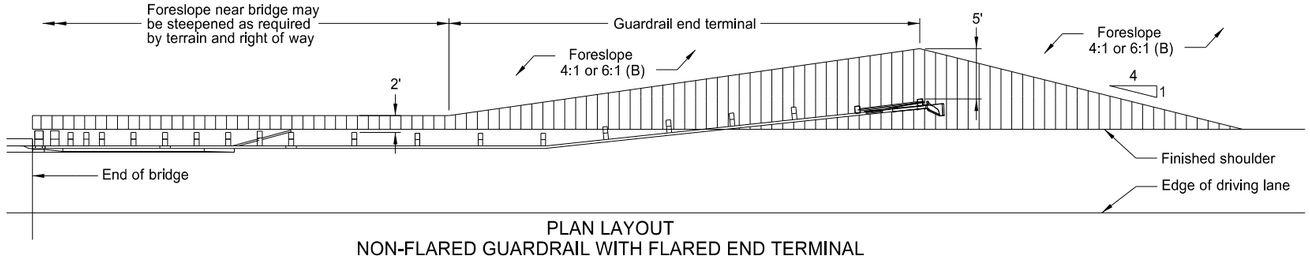
TYPICAL SECTION



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) Slope flatter than 10:1 may be required to provide proper guardrail height.

(B) Where normal foreslope is 4:1 the added fill shall be 4:1. Where normal foreslope is 6:1 the added fill shall be 6:1.

(C) Measured from top of guardrail to top of surfacing at front face of guardrail.

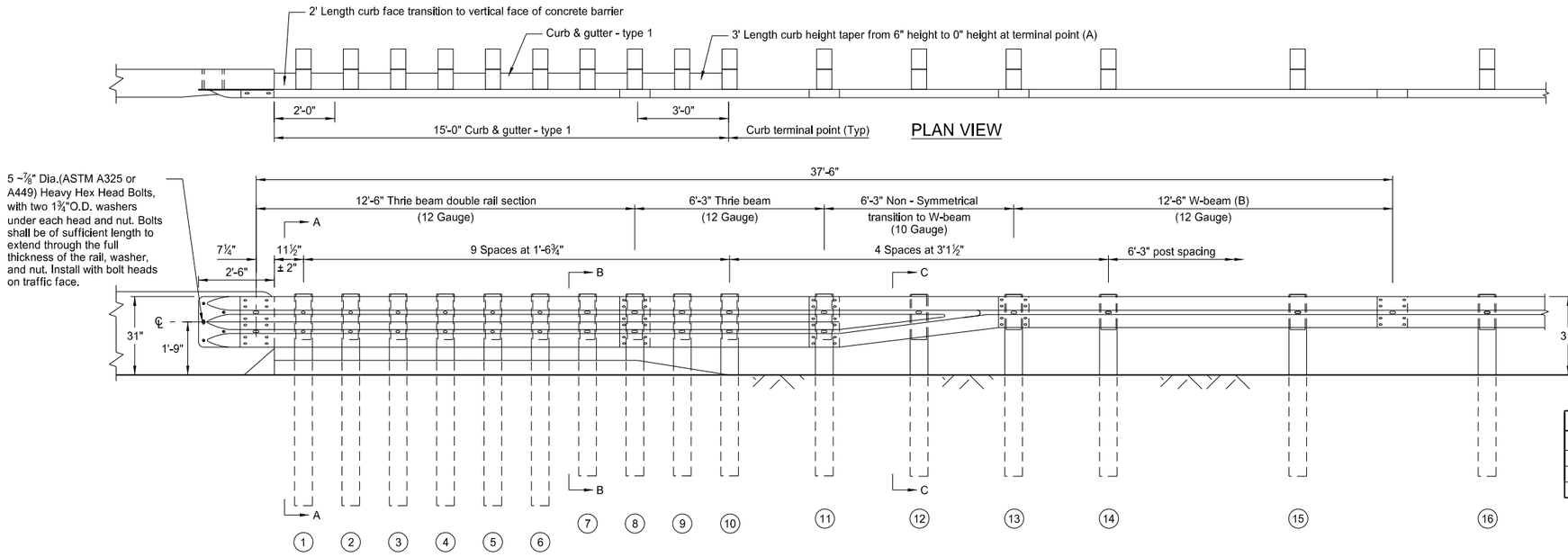
(D) Dimension at end terminals may vary per Plan Layouts shown on this sheet.

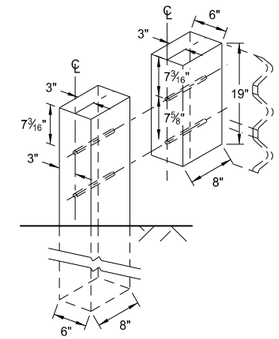
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/14/17 and the original document is stored at the North Dakota Department of Transportation

MGS W-BEAM TRANSITION WITH APPROACH CURB TO CONCRETE SINGLE SLOPE OR JERSEY BARRIER

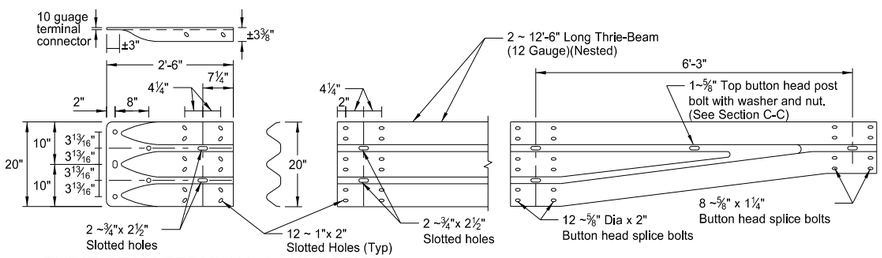
D-764-60





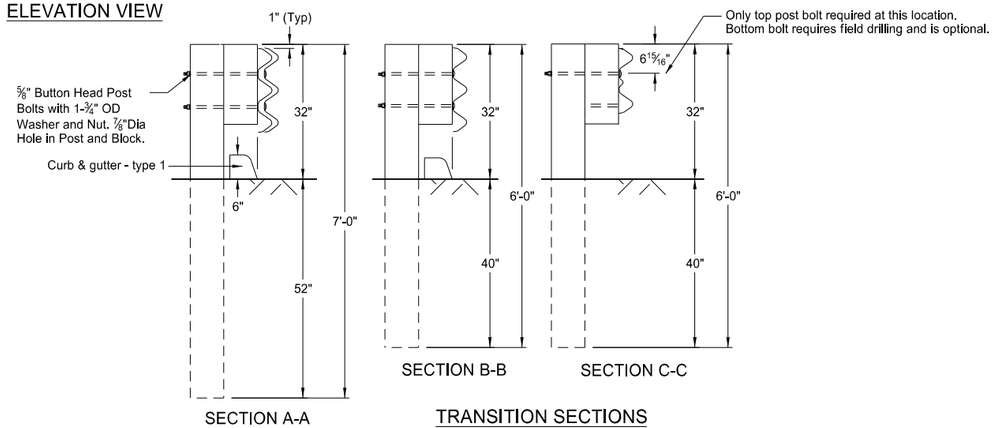
WOOD BLOCK
TO RECTANGULAR WOOD POST
(At posts 1 to 11)

TRANSITION POST AND TIMBER BLOCKOUT SIZING		
POST NO.	POST SIZE	BLOCKOUT SIZE
1-6	6" X 8" X 7'-0" long	6" X 8" X 19"
7-12	6" X 8" X 6'-0" long	6" X 8" X 19"
13-16	6" X 8" X 6'-0" long	6" X 8" X 14"

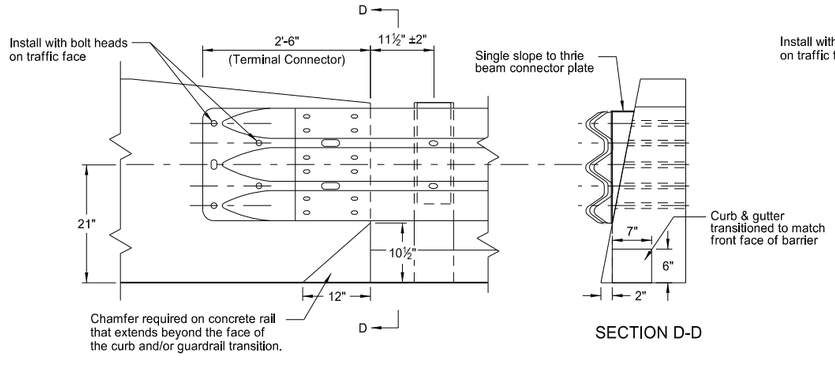


THRIE-BEAM TERMINAL CONNECTION

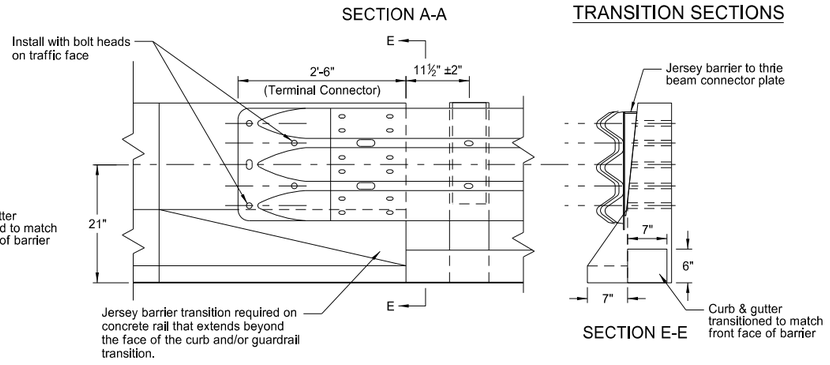
NON - SYMMETRICAL TRANSITION TO W-BEAM (10 GAUGE)



TRANSITION SECTIONS



CONNECTION TO CONCRETE SINGLE SLOPE BRIDGE RAIL AND TRAFFIC BARRIERS



CONNECTION TO CONCRETE JERSEY BARRIER BRIDGE RAIL AND TRAFFIC BARRIERS

(A) Where curb is required to continue past 15' length, taper the curb down to 3" height at the terminal point shown above, instead of 0" height. Between posts 10 and 16 the curb must be 3" height.

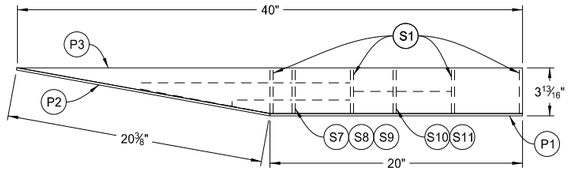
(B) Install a 12'-6" length W-beam double rail section at this location where curb extends past 15' length.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 7/14/17 and the original document is stored at the North Dakota Department of Transportation

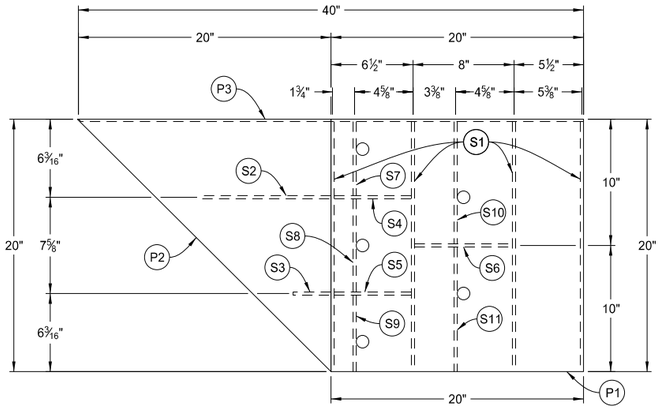
SINGLE SLOPE TO THRIE BEAM CONNECTOR PLATE DETAILS

D-764-61

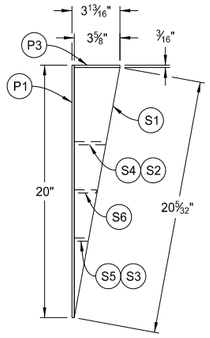


PLAN

NOTE: Assembly Detail is shown for guardrail installation on right hand side of entrance end of bridge barrier. Mirror for opposite side installation.

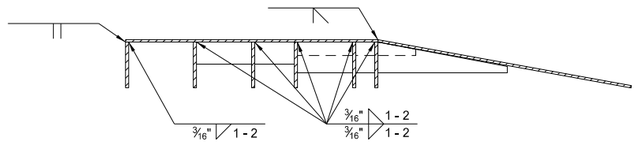


ELEVATION

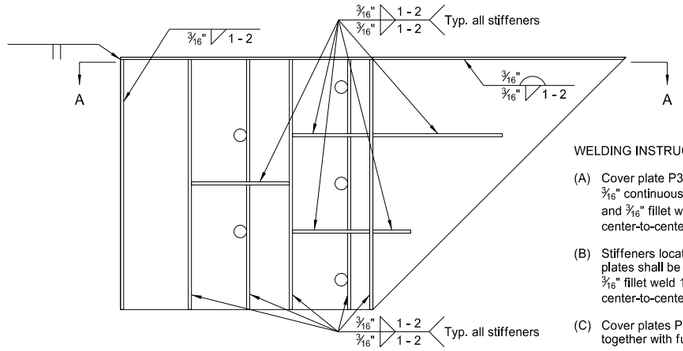


END

ASSEMBLY DETAIL
(Front View)



SECTION A-A



ELEVATION

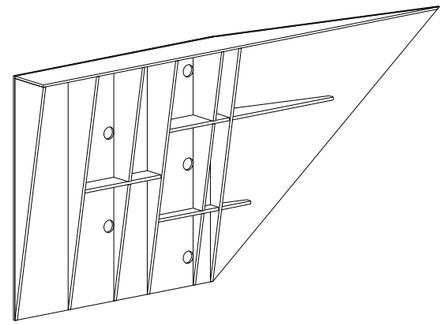
WELDING INSTRUCTIONS:

(A) Cover plate P3 shall be welded as follows: 3/16" continuous back weld on exterior sides and 3/16" fillet weld 1" long spaced at 2" center-to-center on interior sides.

(B) Stiffeners located on the inside of the cover plates shall be welded as follows: 3/16" fillet weld 1" long spaced at 2" center-to-center.

(C) Cover plates P1 and P2 shall be welded together with full penetration groove weld.

WELDING DETAIL
(Back View)



PICTORIAL DRAWING
(Showing Back of Connector Plate)

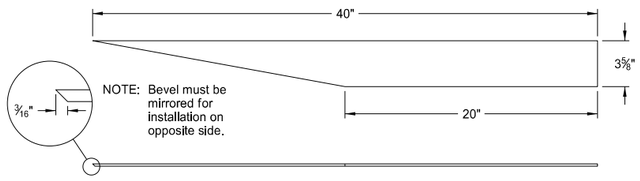


PLATE P3
Quantity: 1

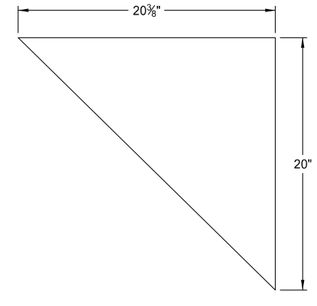


PLATE P2
Quantity: 1

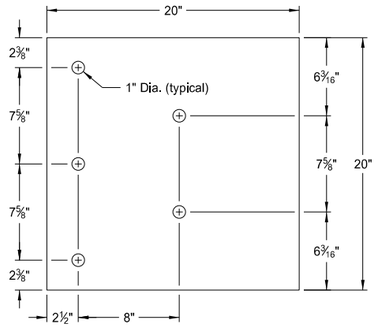
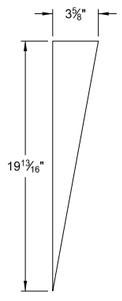
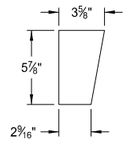


PLATE P1
Quantity: 1

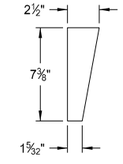
COVER PLATES



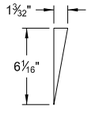
TYPE S1
Quantity: 4



TYPE S7
Quantity: 1

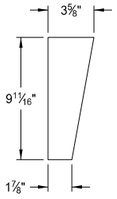


TYPE S8
Quantity: 1

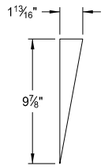


TYPE S9
Quantity: 1

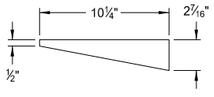
VERTICAL PLATES



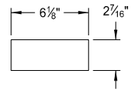
TYPE S10
Quantity: 1



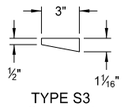
TYPE S11
Quantity: 1



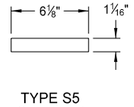
TYPE S2
Quantity: 1



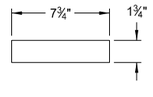
TYPE S4
Quantity: 1



TYPE S3
Quantity: 1



TYPE S5
Quantity: 1



TYPE S6
Quantity: 1

HORIZONTAL PLATES

STIFFENER PLATES

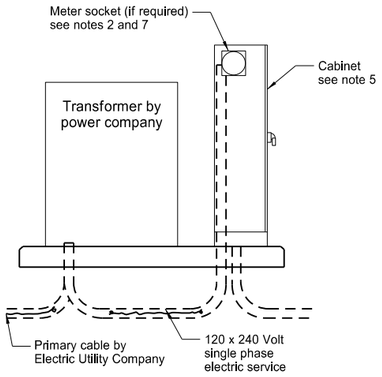
NOTES:

1. Cover plates P1, P2, and P3 shall be fabricated from 3/16" thick ASTM A36 Grade structural steel.
2. Stiffener plates shall be fabricated from 1/4" thick ASTM A36 Grade structural steel.
3. Connector plate shall be galvanized in accordance with AASHTO M111.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/14/17 and the original document is stored at the North Dakota Department of Transportation

FEED POINTS
(ROADWAY LIGHTING)



Elevation

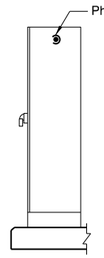
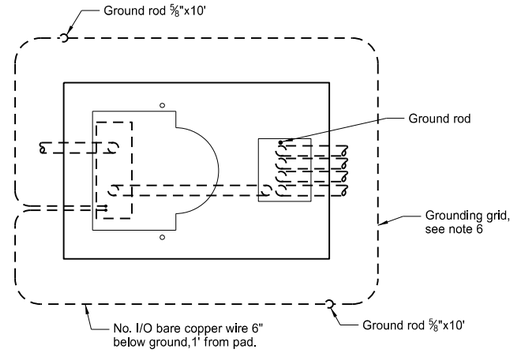
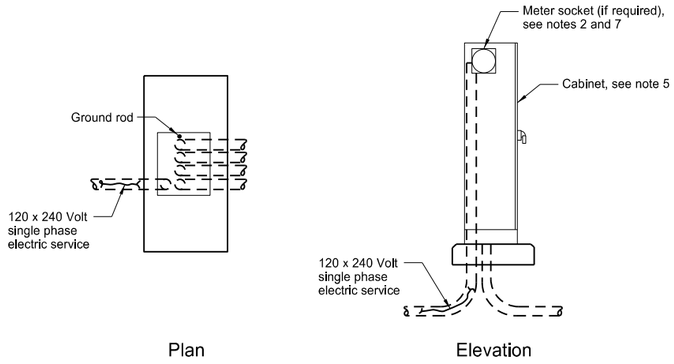


Photo Cell
Mounting Detail



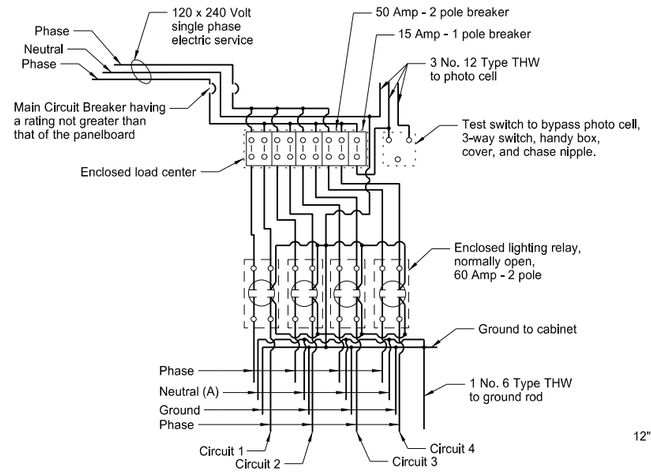
Plan

Transformer and Feed Point Cabinet Pad Mounted



Plan Elevation

Feed Point Cabinet Pad Mounted



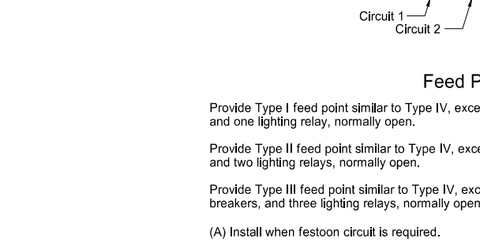
Feed Point Type IV

Provide Type I feed point similar to Type IV, except with one electrical circuit, one 50 Amp - 2 pole breakers, and one lighting relay, normally open.

Provide Type II feed point similar to Type IV, except with two electrical circuit, two 50 Amp - 2 pole breakers, and two lighting relays, normally open.

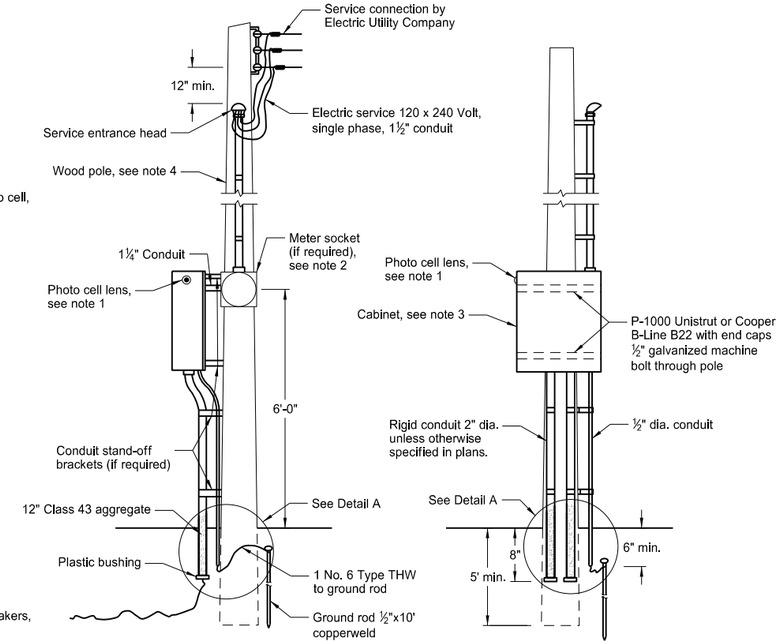
Provide Type III feed point similar to Type IV, except with three electrical circuits, three 50 Amp - 2 pole breakers, and three lighting relays, normally open.

(A) Install when festoon circuit is required.

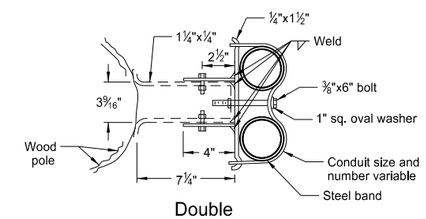


Detail A

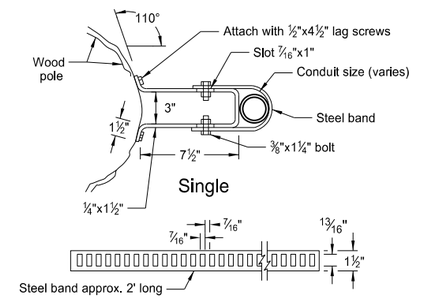
Use this detail for a continuous run of conduit from the feed point to the first light standard.



Feed Point Pole Mounted



Double



Single

Conduit Standoff Bracket

Omission of conduit standoff brackets allowed when not required by local utility company.

Notes:

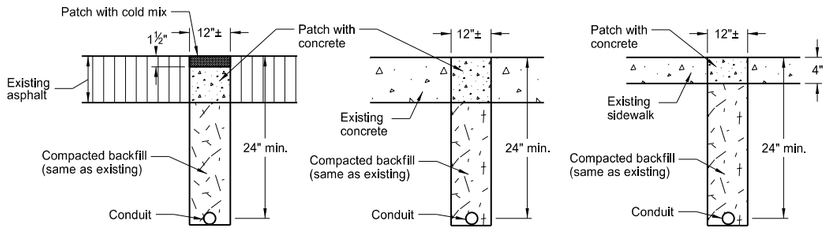
1. Photo Cell: Furnish and install the photoelectric cell. Face photo lens north.
2. Meter Socket: Install meter socket and trim if the meter is required by local Utility Company. Meter furnished and installed by Utility Company.
3. Pole Mounted Cabinet: Provide cabinet with lock drip shield, factory installed steel backing, stainless steel hardware, and side hinge door. Shop coat cabinet with one coat of primer and two coats of exterior gray enamel.

   Provide 30" high x 24" wide x 8" deep Type I and II feed points. Provide 30" high x 42" wide x 10" deep or 36" high x 36" wide x 10" deep Type III and IV feed points.
4. Wood Pole: Provide minimum 20' Class VII full length penta pressure treated wood pole. (if required, see layout sheets)
5. Pad Mounted Cabinet: Provide 56" high x 26" wide x 14" deep weatherproof cabinet. Minimum 12 gauge steel or aluminum with provisions for padlock. Provide steel cabinet with one coat of primer and two coats of exterior dark green enamel.
6. Grounding Grid: Provide grounding grid with a maximum ground resistance of 25 ohms, using one or more ⅝"x10' copperweld ground rods in parallel or series at two corners. Provide a minimum distance between ground unit assemblies of 6'0".
7. Meter Location: Do not mount the meter (if required) on the same side of the cabinet as the photo cell.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
7-8-14 10-17-17	Revised note 3. Updated to active voice.

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

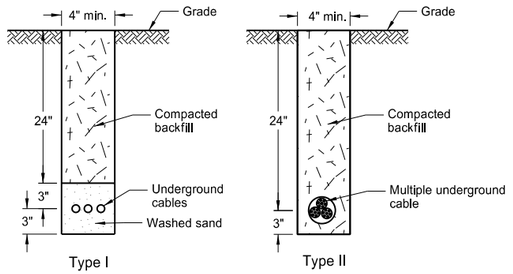
LIGHTING AND SIGNAL DETAILS



Asphalt Patch | Concrete Patch | Sidewalk Patch

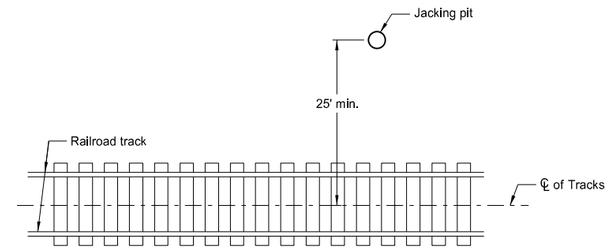
Surface Patch Details

Note: Saw cut trenches. Use PCC pavement for replacement concrete with the coarse aggregate gradation, maximum size and method of curing as approved by the Engineer. Immediately prior to pouring replacement concrete, paint all surfaces with an approved epoxy compound.

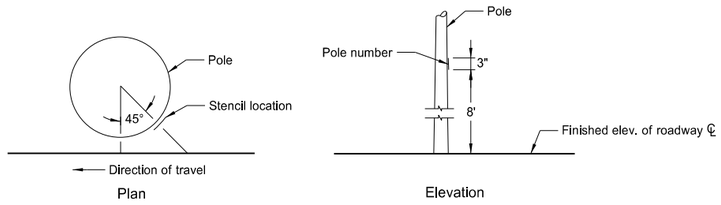


Cable Trench

Note: Sod entire area disturbed by trenching, unless directed otherwise by the Engineer.

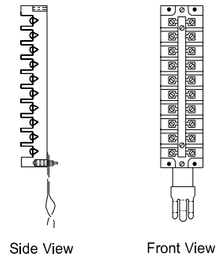


Plan View

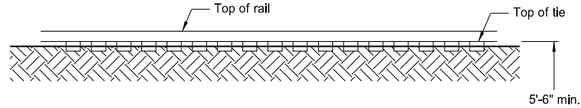


Light Standard Numbering

Note: On the roadway side of each light standard, stencil the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.

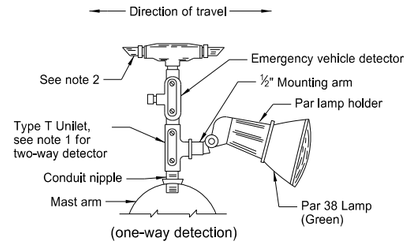


Terminal Block Detail

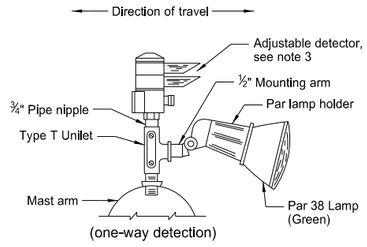


Elevation View

Conduit Placement under Railroad Tracks

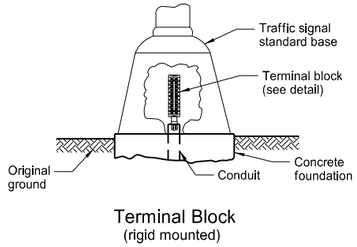


Emergency Vehicle Detector Detail

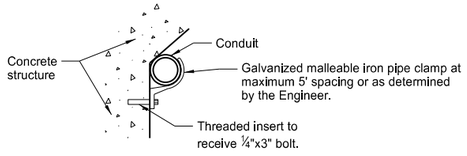


Alternate Emergency Vehicle Detector Detail (adjustable)

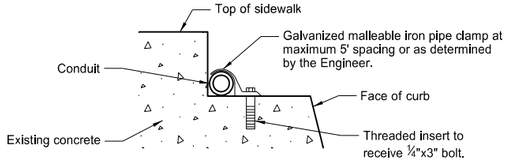
Notes:
1. Use Type X Unilet with two Par lamp holders and lamps for Two-way Detectors. (one in each direction).
2. Plug unused end of One-way Detector with metal pipe plug.
3. Rotate detector lens to face direction of travel on Two-way Detectors.



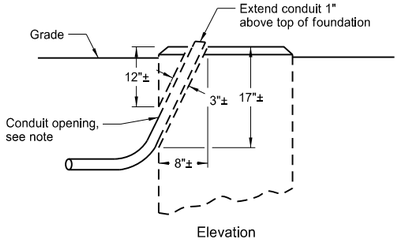
Terminal Block
(rigid mounted)



Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Revise Concrete Foundation

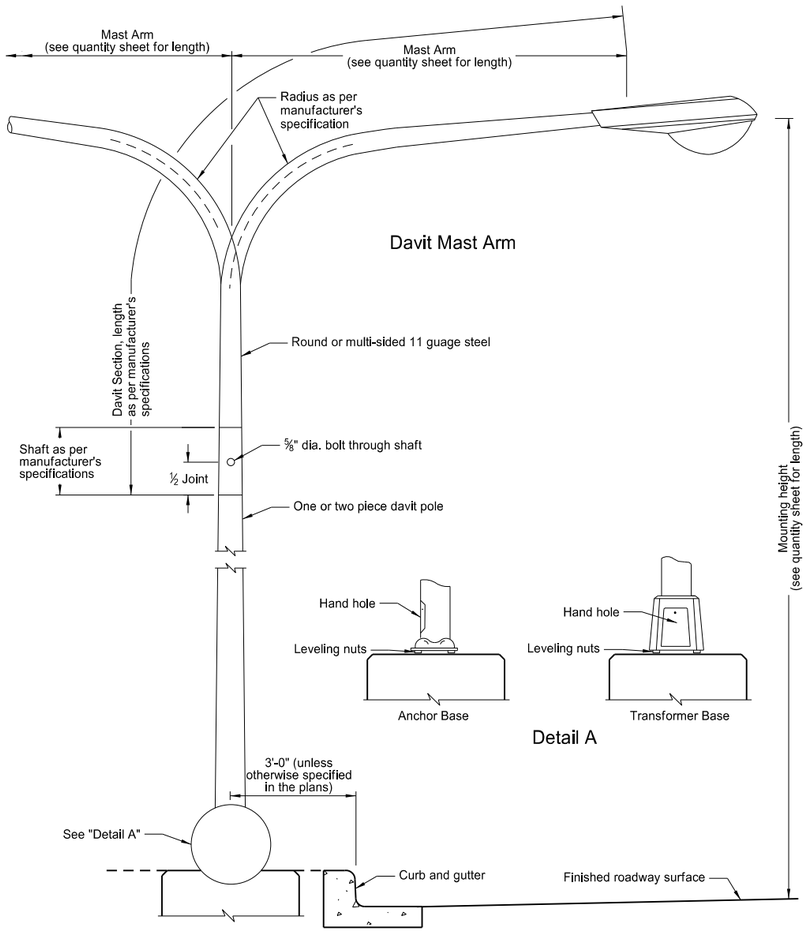
Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

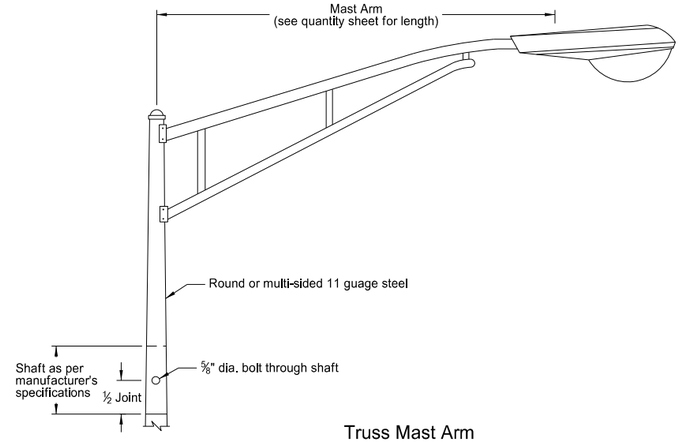
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

LIGHT STANDARD DETAILS

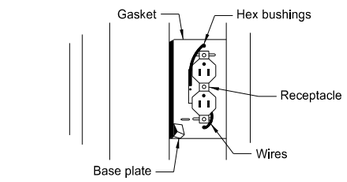
D-770-5



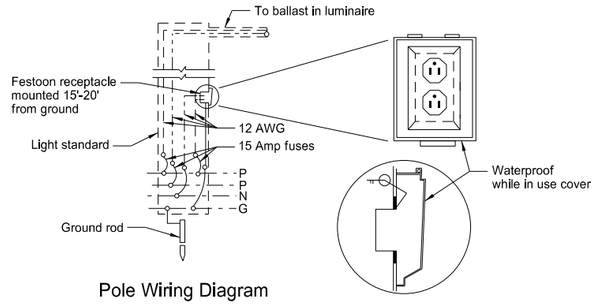
Light Standard Details



Truss Mast Arm



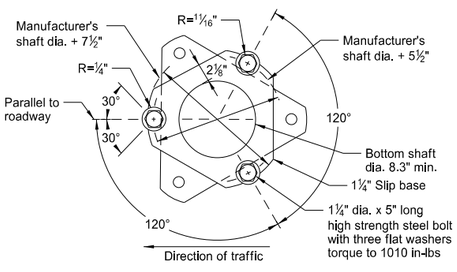
Optional: Festoon receptacle
mounted on multi-sided pole.



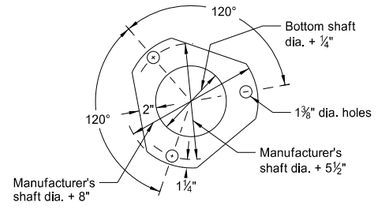
Pole Wiring Diagram

Receptacle Mounting Detail (B)

(B) Mount receptacle on side of pole that faces the street.
Install Festoon Receptacle only when specified in the plans.



Top View



Plan View

Keeper Plate Detail (A)

(A) ASTM A446 Grade "A" 28 gauge keeper plate on top of middle flat washer. Galvanize Keeper plate after fabrication.

Notes:

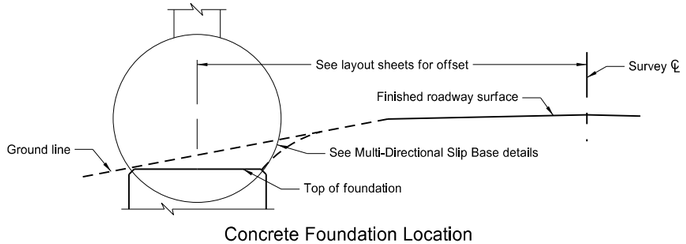
Light Standard Locations: The minimum offset distance from the curb face is 3 feet. Offset light standards at least 3 feet in urban areas and where speeds are less than 30 mph. Where speeds are 30 mph or more, place light standards at least 16 feet from the driving lane.

Steel Standards: Touch up marred or scratched areas after erection.

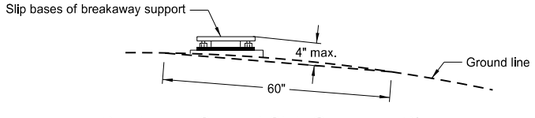
Luminaire: Use internal ballast-constant wattage 120x240 voltage. See layout sheets for type of luminaire, wattage, I.E.S. distribution, and operating system.

Fusing: Fusing in base, see specifications.

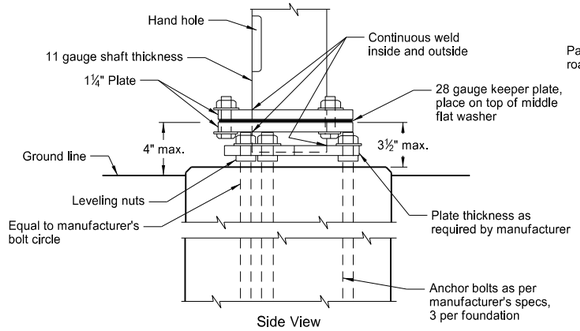
Slip Base Bolt Torque Procedure:
1. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and to clean bolt threads, then loosen.
2. Retighten bolts with a systematic order to prescribed torque.
3. Loosen each bolt and retighten to prescribed torque in the same order as initial retightening.
4. Burr threads of junction with nut using center punch to prevent nut loosening.



Concrete Foundation Location

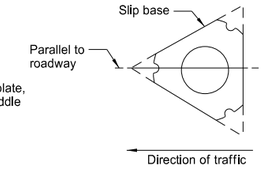


Breakaway Support Stub Clearance Diagram

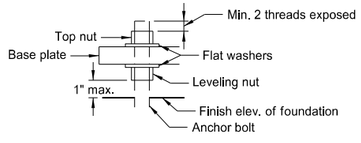


Side View

Steel Base Detail



Slip Base Placement Detail



Anchor Bolt Detail

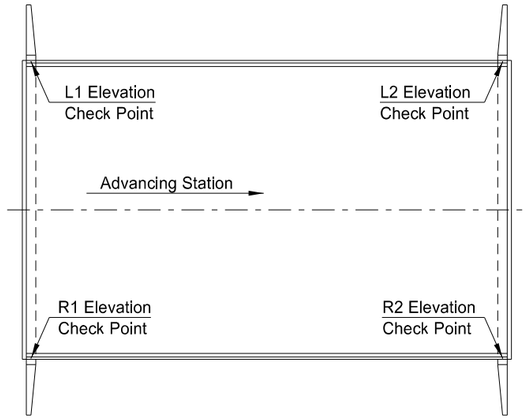
Multi-Directional Slip Base

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

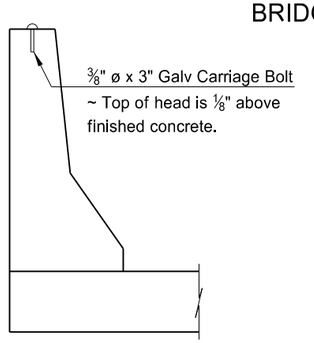
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

BRIDGE BENCH MARKS

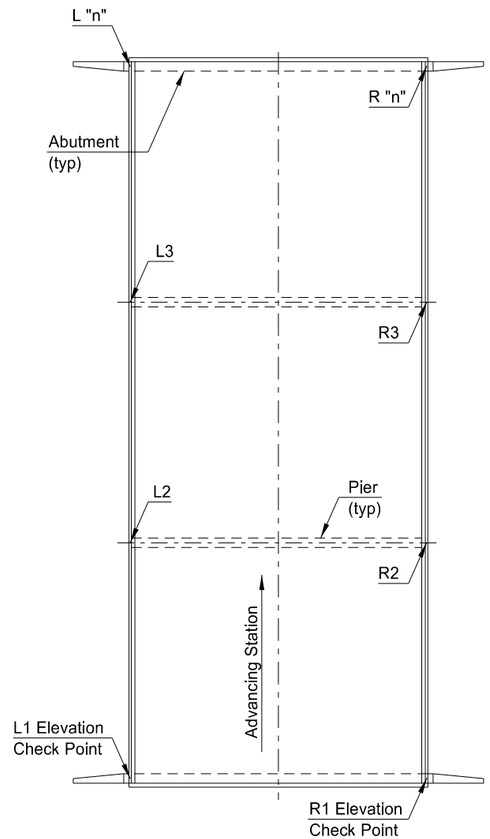
D-900-1



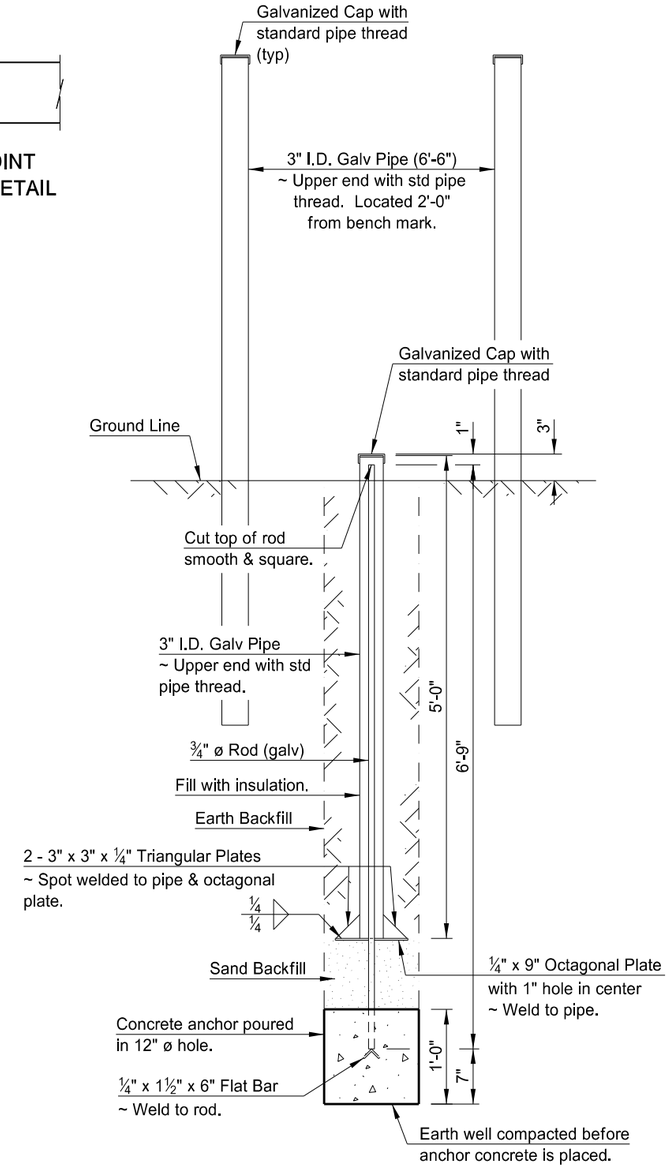
GENERAL LAYOUT FOR
SINGLE SPAN



CHECK POINT
LOCATION DETAIL



GENERAL LAYOUT FOR
MULTIPLE SPAN



BENCH MARK DETAIL

NOTES:

Elevation check points shall consist of ⅜" ø x 3" galvanized carriage bolts (or equal) set in the concrete barrier at the points indicated on the General Layout sketches. The top of the bolt head shall project above the finished concrete ⅛". Elevation check points shall be placed on each barrier over each unit of the substructure for each bridge at a structural location.

Two bench marks as detailed hereon shall be set at diagonal opposite positions away from the structure location and at least 300 feet from the nearest point on the bridge or bridges (if more than one at a location). These bench marks shall be constructed as detailed on this sheet and located near the Highway Right of Way lines. The two pipes shall extend 4'-0" above ground and be painted with two coats of white paint suitable for galvanized steel surfaces.

The Project Engineer shall run a set of levels determining the elevation of each check point on the structure and the two bench marks immediately after the completion of the bridge. Bench Mark #1 can be listed as having elevation 1000 or the actual surveyed elevation. This information shall be recorded on SFN 13420 and submitted to the Bridge Engineer with adequate information locating each check point and bench mark.

All metal parts are to be hot dip galvanized after punching, shearing, welding and fabrication.

Threads of cap and pipe are not to be galvanized. At the time of installation these threads are to be coated with synthetic grease with teflon and cap screwed to a snug fit.

METHOD OF MEASUREMENT:

Each set of Bridge Bench Marks consisting of two bench marks and the required number of elevation check points shall be considered as one unit for bidding purposes and the quantity to be paid for shall be the number of sets of bridge bench marks which have been installed complete in place and accepted by the Engineer.

BASIS OF PAYMENT:

Bridge Bench Marks shall be paid for at the contract price bid for each set of Bridge Bench Marks, which price shall be full compensation for all excavation, backfill and clean-up, and for furnishing, hauling and placing all elevation check points, galvanized pipe, caps, rods, sand backfill, concrete, rock equipment, tools and incidentals, including galvanizing and greasing, necessary to complete this item.

GALVANIZING:

After fabrication the complete assembly shall be hot-dip galvanized.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 09/14/11 and the original document is stored at the North Dakota Department of Transportation