	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	22151	1	1

JOB #2
GOLDEN VALLEY COUNTY
NORTH DAKOTA

FEDERAL AID PROJECT
BRO-0017(020)

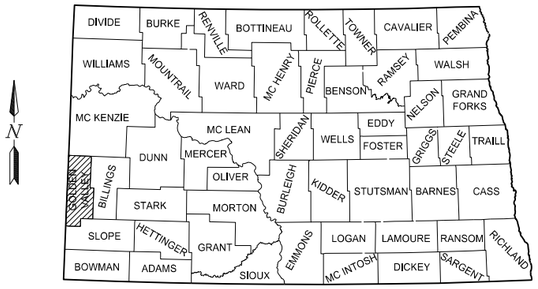
MOSHER ROAD

Removal of Structure, Roadway Obliteration, 28' x 110' Single Span Bridge, Grading & Incidentals

Structure No. 17-109-09.0

20 miles north and 6 miles east of Beach

10.5 miles north of CMC 1711 and 7 miles east of ND 16



STATE COUNTY MAP

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 LENGTH

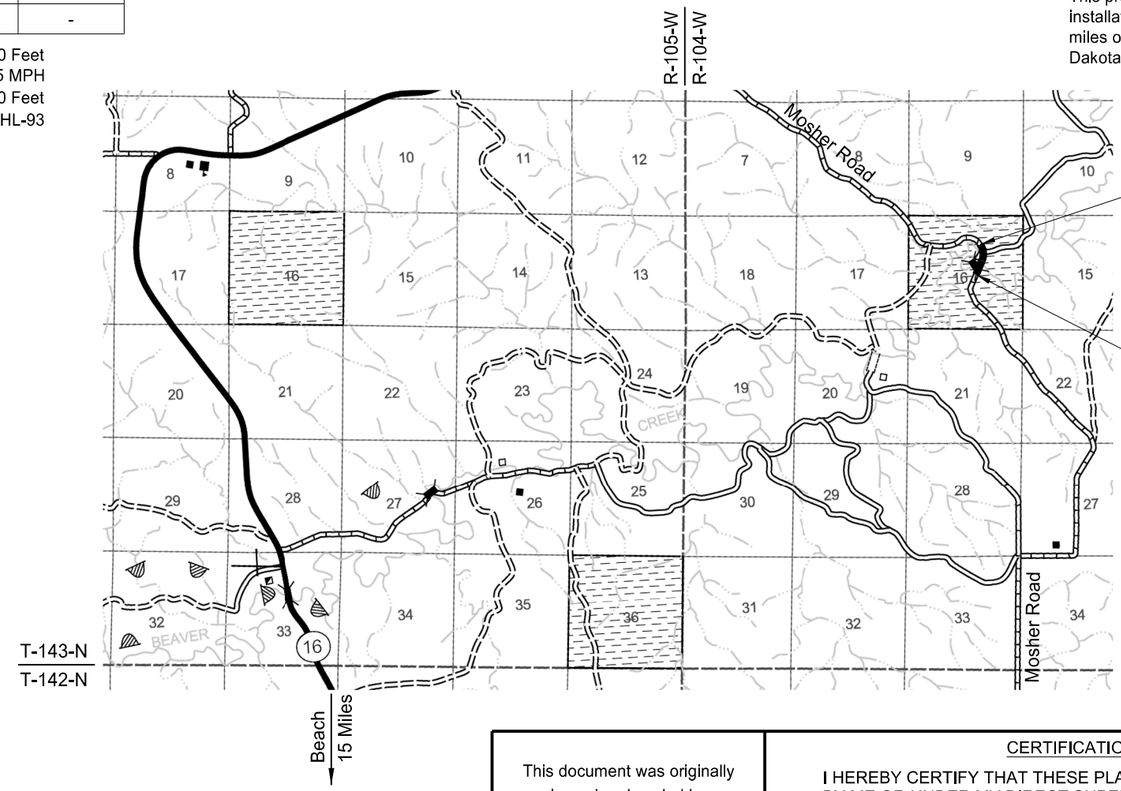
Project	Gross Miles	Net Miles
BRO-0017(020)	0.284	0.284

DESIGN DATA

Traffic ~ BRO-0017(020)		Average Daily			Est. 30th Max. Hr.
		Passenger	Trucks	Total	
Current Traffic	2019	<100	-	<100	-
Forecast Traffic	2039	<100	-	<100	-

Clearzone Distance:	10 Feet
Design Speed:	35 MPH
Minimum Sight Dist. for Stopping:	250 Feet
Structure Design Loading:	HL-93

This project consists of Removal of Structure, the installation of a 28' x 110' Single Span Bridge, and 0.284 miles of grading located in Golden Valley County, North Dakota.



END PROJECT BRO-0017(020):

Sta 119+00.00. A point 1,955.39 feet west and 1,329.07 feet south of the Northeast Corner of Section 16, Township 143 N, Range 104 W of the 5th P.M., Golden Valley County, North Dakota.

BEGIN PROJECT BRO-0017(020):

Sta 104+00.00. A point 1,958.85 feet west and 2,541.39 feet north of the Southeast Corner of Section 16, Township 143 N, Range 104 W of the 5th P.M., Golden Valley County, North Dakota.

SURVEY FIELD BOOK: C-762 Pgs 10-13

DESIGNERS

Andrew Krebs, PE

Wade Thompson, PE

Charlie Bowen, EI

Matt Isley, PE

This document was originally issued and sealed by Andrew J. Krebs Registration Number PE-7876 on May 3, 2019, and the original document is stored at KLJ, Dickinson, ND.

CERTIFICATION

I HEREBY CERTIFY THAT THESE 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 NORTH DAKOTA.

Andrew J. Krebs /s/

ANDREW J. KREBS, P.E.
KADRMAS, LEE & JACKSON, INC.

DATE 5/3/2019 REGISTRATION NUMBER PE-7876

KLJ

I-94 BUSINESS LOOP EAST
DICKINSON, ND 58601-6434
(701) 483-1284, FAX (855) 288-8055

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	2	1

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LIST OF STANDARD DRAWINGS

STANDARD NO.	DESCRIPTION
D-101-1, 2 & 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20 & 21	Line Styles
D-101-30, 31 & 32	Symbols
D-101-40	Cross Section Legend
D-255-2	Erosion and Siltation Control – Erosion Control Blanket Installation
D-261-1	Erosion Control Fiber Roll Placement Details
D-622-1	Pile Splice Details
D-704-7	Breakaway Systems for Construction Zone Signs – Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs – U Channel Post
D-704-9	Construction Sign Details – Terminal and Guide Signs
D-704-10	Construction Sign Details – Regulatory Signs
D-704-11 & 11A	Construction Sign Details – Warning Signs
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-15	Road Closure Layouts
D-704-20	Terminal and Seal Coat Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-30	Windrow Marking
D-704-50	Portable Sign Support Assembly
D-708-6	Erosion and Siltation Controls – Median or Ditch Inlet Protection
D-714-4	Round Corrugated Steel Pipe Culverts and End Sections
D-714-18	Edgedrain Details
D-754-82	Object Markers
D-764-1	W-Beam Guardrail General Details
D-764-6	Flared Energy Absorbing Terminal
D-764-22	Typical Grading at Bridge Ends with W-Beam Guardrail

LIST OF SPECIAL PROVISIONS (SP)

SP #	DESCRIPTION
SP 0003(14)	Temporary Erosion and Sediment Control Measures
SP 0004(14)	Federal Migratory Bird Treaty Act
SP 0896(14)	Winter Suspension
SP 5280(14)	Permits and Environmental Considerations

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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PLAN NOTES

GENERAL NOTES

100-P01 **FENCES:** The County will attend to the removal of existing fences as needed.

202-P01 **SALVAGE EXISTING AGGREGATE SURFACING:** Remove and stockpile the aggregate surfacing on the roadway to the existing low water crossing for reuse. Use the material as a traffic surface gravel upon completion of the newly constructed roadbed, or as deemed necessary by the Engineer. Do not use the salvaged aggregate as foundation fill.

The salvaged material is included in the topsoil quantity. Include the salvaging, stockpiling, re-spreading and laying of the salvaged material in the unit price bid for "TOPSOIL".

202-P02 **REMOVED ITEMS:** The following removal and salvage items will remain County property. Remove without further damage to these items:

- All signs and hazard markers.
- All cattle guards and bases.
- All removed and salvaged items will be reviewed by the Engineer. If the Engineer determines that the item is not salvageable based on the condition, it becomes the Contractor's property.

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.

203-P01 **COMMON EXCAVATION-TYPE B:** In Section 203.04 E.3 insert the following after the 2nd paragraph:

The addition of water or drying of fill material is required when directed by the Engineer. Water will be measured and paid for according to Section 216. Include all costs for drying and manipulation of the fill material in the unit price bid for "COMMON EXCAVATION-TYPE B".

In cut areas, scarify and recompact the finish subgrade to a minimum depth of 12-inches. Manipulate substandard areas by working the soil as needed. Include all costs in the unit price bid for "COMMON EXCAVATION-TYPE B".

203-P02 **CONTRACT QUANTITY PAYMENT:** The quantities of COMMON EXCAVATION-TYPE B to be paid will be those shown in the Contract, provided the Project is constructed to the lines and grades shown on the plans.

When disagreement exists between the Contractor and the Owner as to the accuracy of the Plan quantities, either party may request that the quantities be measured. The party requesting the measurement is responsible for all costs associated with the measurement.

Any additional required excavation will be measured as per Section 203.05 A or 203.05 B of the Standard Specifications.

203-P03 **BACKSLOPE ROUNDING:** Round backslopes on all cut sections as shown on the Typical Sections. Include this work in the unit price bid for "COMMON EXCAVATION-TYPE B".

203-P04 **TOPSOIL:** Include all costs associated with the stabilization of topsoil stockpiles in the unit price bid for "TOPSOIL".

203-P05 **TOPSOIL-WETLAND:** Excavate the Wetland 1b mitigation area to the elevations as specified in Section 75. Place 8 inches of stockpiled topsoil from impacted Wetland 1a and Wetland 1b in the proposed wetland mitigation area. Include all associated costs for the wetland mitigation and any necessary manipulating and drying of material in the unit price bid for "TOPSOIL-WETLAND".

Stockpiled topsoil from impacted Wetlands 1a and 1b spread on the proposed wetland mitigation area will be used as the seed source for the establishment of wetland vegetation. In addition, furnish wetland seed mix according to Section 251.03 F of the Standard Specifications and seed both the temporary wetland impacts and the mitigation area after placing wetland topsoil in the mitigation area. Include all associated costs with seeding temporary wetland impacts and the mitigation area in the unit price bid for "WETLAND SEED".

203-P06 **REMOVE & SALVAGE TOPSOIL:** Two existing topsoil piles are located onsite and the locations are shown on Section 60 Sheet 1. Relocate these piles, to a location within the right-of-way that will be out of the way of the Contractor's operations, prior to beginning grading operations in these areas. Utilize the topsoil piles to restore areas of the project that are short on topsoil such as the existing road and access road to the existing low water crossing. Include all costs for relocating, stockpiling, and spreading the existing topsoil piles in the unit price bid for "REMOVE & SALVAGE TOPSOIL".

203-P07 **BORROW-EXCAVATION:** Density and moisture requirements shall be the same as Common Excavation-Type B. Borrow material shall consist of approved natural compactable soil. The soil shall not be saturated or contain organic material.

251-P01 **SEEDING**: Seeding Class III shall consist of the following mixture:

Species	**Lbs. of PLS/Acre**
Western Wheatgrass	8
Slender Wheatgrass	5
Green Needlegrass	4
Side-Oats Grama	2
Oats	10
Total	**29**

On areas where equipment cannot be used, broadcast seed and rake or drag to cover seed. Where seed is broadcast, double the seeding rate.

251-P02 **WETLAND SEED:** Wetland seeding areas will not be measured for payment unless changes are made in the field. Payment for "WETLAND SEED" will be at plan quantity.

256-P01 **RIPRAP GRADE II:** Riprap Grade II will be paid according to designated length, width, and depth as shown on the plans unless otherwise designated by the Engineer.

261-P01 **FIBER ROLLS:** The temporary erosion control has been provided for placement prior to disturbing the topsoil or as indicated by the Engineer.

Preserve the temporary erosion control throughout the duration of the project. If the erosion control is damaged due to negligence, repair at the Contractor's expense.

Place permanent fiber rolls within the construction limits as construction progresses. Locations are shown in Section 77.

An additional 400 LF of Fiber Rolls 12IN have been provided for locations to be determined by the Engineer. Include all costs for labor, equipment, and materials necessary to complete this work and all costs to relocate fiber rolls as needed for construction related activities in the unit price bid for "FIBER ROLLS 12IN".

BRO-0017(020)

Mosher Road

KLJ

Plan Notes

Golden Valley County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	1803-00372

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	ND	BRO-0017(020)	6	2

PLAN NOTES

302-P01 **AGGREGATE SURFACE COURSE CL 13:** In addition to the specifications set forth for this Aggregate Surface Course CL 13, provide a plasticity index of 4 – 8.

302-P02 **PLACEMENT AND COMPACTION:** Delete the first sentence of Section 302.04 B in its entirely and insert the following:

Haul, place, lay, and compact aggregate on a damp surface in two (2) equal depth lifts.

704-P01 **TRAFFIC CONTROL DEVICES LIST:** The traffic control devices list has been developed using the following layouts on the Standard Drawing for traffic control:

- Standard D-704-15, Type A: For flagging.
- Standard D-704-20, Type G: For project terminal signing.
- Standard D-704-22, Type K: For trucks hauling material.
- Standard D-704-30: For installation of aggregate surfacing.
- Standard Drawings D-704-7, 8, 9, 10, 11, 11a, 13, 14, and 50 are applicable.
- Traffic Control Layouts for construction are in Section 100 of the plans.

704-P02 **TRAFFIC CONTROL:** The existing roadway and bridge will be left in place for traffic while the proposed road and bridge are constructed. Close the proposed roadway by installing three Type III Barricades with a road closed sign on each end. When making the connection into the existing roadway maintain one lane of traffic with flagging at all times during working hours. Open the roadway to two-way traffic during non-working hours and leave the work area free of all hazards. Furnish flagging as specified in Section 704, “Temporary Traffic Control” when needed. All flagging hours shall be incidental to the cost of the project. Remove the traffic control devices for flagging when it is not being used and reinstall when flagging is needed. Obliterate the existing roadway only after the new bridge is completed, the aggregate surfacing has been installed, and the new segment of roadway is opened to traffic.

714-P01 **FLARED END SECTIONS:** Flared end sections shall have no void areas underneath them. Level and compact the material under the flared end sections to grade prior to setting all flared end sections.

714-P02 **DEFLECTION TESTING:** Delete Section 714.04 A.5 in its entirely and insert the following:

5. Deflection Testing.
The Engineer will visually inspect all metal pipe used on the project for deflection a minimum of 30 days after the pipe is installed. If the Engineer sees any deflection, the Engineer will require the Contractor to pass a nine point mandrel or approved object through the pipe to check for deflection. Use a mandrel with a diameter not less than 95 percent of the inside diameter of the pipe. If the mandrel cannot be passed through the pipe, replace the pipe.

Perform the deflection test under the observation of the Engineer.

754-P01 **OBJECT MARKERS - TYPE II:** Provide Object Markers - Type II that consist of markers OM2-2V, which are 6”x12” all-yellow vertical retro-reflective panels. Install the bottom of the OM2-2V one foot higher than the surface of the nearest traffic lane at all mainline cattle guard locations. Include furnishing and installing posts in the unit price bid for “OBJECT MARKERS - TYPE II”.

830-P01 **APPROACH CULVERTS:** Provide culverts installed in approaches that are zinc galvanized and meet the requirements of Section 830.02 B of the Standard Specifications.

980-P01 **CATTLE GUARD:** Paint the New Cattle Guard per NDDOT Standard Specifications 616.04. C.4. Use paint color Carlsbad Canyon (Munsell Soil Color 2.5Y 6/2) for all Cattle Guard steel.

Include all costs for labor, materials, and paint required to install cattle guards and bases at locations shown on the plans or as directed by the Engineer in the unit price bid for “CATTLE GUARD 8FT X 28FT”.

980-P02 **REMOVE CATTLE GUARD:** Include all work required to remove and salvage the existing cattle guard and bases in the unit price bid for “REMOVE CATTLE GUARD”.

This document was originally
issued and sealed by
Andrew J. Krebs
Registration Number
PE-7876
on May 3, 2019,
and the original
document is stored at KLJ,
Dickinson, ND.

BRO-0017(020)

Mosher Road

KLJ

Plan Notes

Golden Valley County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	1803-00372

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): Golden Valley County, the North Dakota Department of Transportation, and the Federal Highway Administration have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1 SPAWNING RESTRICTION: Do not work within Beaver Creek from April 15 to June 1.

EN-2 AQUATIC NUISANCE SPECIES (ANS): Equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the North Dakota Game and Fish Department (NDGFD) website) requires an inspection by NDGFD. Notify the NDGFD at least 10 business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGFD sufficient time to inspect any and all such equipment for ANS. Contact the NDGFD ANS Coordinator, Jessica Howell by e-mail jmhowell@nd.gov for equipment inspections. Supply one of the following to the engineer as proof of compliance prior to work taking place in the water: (1) the NDGFD inspection report, (2) documented NDGFD correspondence (email or signed letter). If an inspection is not required, no follow up documentation is required.

EN-3 MIGRATORY BIRDS: Active migratory bird nests with eggs or chicks are protected by the Federal Migratory Bird Treaty Act. NDDOT's special provision, SP 0004(14) for compliance with the Federal Regulation is to be followed.

EN-4 TEMPORARY WETLAND IMPACT: Temporary impact areas within wetlands are incorporated into the plans for this project. Remove temporary fill placed and sedimentation in wetlands or other waters. Restore these wetlands to preconstruction contours.

EN-5 WETLAND MITIGATION: Wetland mitigation is required for unavoidable natural permanent wetland impacts. The wetland mitigation plan is incorporated into the plans for this project. After completion of the mitigation area, the Engineer will complete the Onsite Mitigation Certification Form SFN 61042. Any sedimentation occurring within the mitigation area will be removed.

NOTIFICATIONS TO BE FILED BY CONTRACTOR:

EN-6 An Asbestos Survey was completed by a certified inspector from KLJ on August 22, 2018. Based on visual inspection of the site, no building or structure materials were determined to contain asbestos. The results from the Asbestos Survey are available upon request from the Engineer. Complete and submit North Dakota Department of Health SFN 17987 Asbestos Notification of Demolition and Renovation.

PERMITS REQUIRED:

United States Army Corp of Engineers – Section 404 Permit
Status: Has been obtained for the project.

North Dakota Department of Health – NDPDES Permit
Status: To be obtained by the contractor prior to construction. Owner is to be listed as Golden Valley County on the permit.

This document was originally issued and sealed by Andrew J. Krebs Registration Number PE-7876 on May 28, 2019, and the original document is stored at KLJ, Dickinson, ND.

BRO-0017(020)

Mosher Road

KLJ

Environmental Notes

Golden Valley County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	1803-00372

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SUMMARY OF QUANTITIES

Spec	Code	Description	Unit	Total Quantities
103	0100	CONTRACT BOND	LSUM	1
201	0330	CLEARING & GRUBBING	LSUM	1
202	0105	REMOVAL OF STRUCTURE	LSUM	1
203	0102	COMMON EXCAVATION-TYPE B	CY	13,185
203	0109	TOPSOIL	CY	4,295
203	0121	TOPSOIL-WETLAND	CY	6
203	0125	REMOVE & SALVAGE TOPSOIL	CY	3,026
203	0140	BORROW-EXCAVATION	CY	2,616
203	0180	ROADWAY OBLITERATION	LF	909
210	0099	CLASS 1 EXCAVATION	LSUM	1
210	0127	CHANNEL EXCAVATION	LSUM	1
210	0201	FOUNDATION PREPARATION	EA	1
216	0100	WATER	MGAL	287
251	0300	SEEDING CLASS III	ACRE	9.3
251	1000	WETLAND SEED	ACRE	0.3
251	2000	TEMPORARY COVER CROP	ACRE	9.3
253	0101	STRAW MULCH	ACRE	18.9
255	0103	ECB TYPE 3	SY	1,152
256	0200	RIPRAP GRADE II	CY	525
261	0112	FIBER ROLLS 12IN	LF	1,220
261	0113	REMOVE FIBER ROLLS 12IN	LF	520
262	0100	FLOTATION SILT CURTAIN	LF	147
262	0101	REMOVE FLOTATION SILT CURTAIN	LF	147
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	1,406
602	1130	CLASS AE-3 CONCRETE	CY	73.8
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	367
604	9750	PRESTRESSED BULB T GIRDER	LF	541.7
612	0115	REINFORCING STEEL-GRADE 60	LBS	7,870
616	5890	STRUCTURAL STEEL	LSUM	1
622	0020	STEEL PILING HP 10 X 42	LF	700
624	0151	RAILING	LF	220
702	0100	MOBILIZATION	LSUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	592
704	1052	TYPE III BARRICADE	EA	6
704	1081	VERTICAL PANELS-BACK TO BACK	EA	10
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	763
714	5015	PIPE CORR STEEL .064IN 18IN	LF	68
714	5810	END SECT CORR STEEL .064IN 18IN	EA	2
754	0802	OBJECT MARKERS -TYPE II	EA	4
764	0131	W-BEAM GUARDRAIL	LF	186.2
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	4
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2
980	0100	CATTLE GUARD 8FT X 28FT	EA	1
980	0171	REMOVE CATTLE GUARD	EA	1

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BRO-0017(020)

Mosher Road

Summary of Quantities

Golden Valley County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	1803-00372

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BASIS OF ESTIMATE AND EARTHWORK SUMMARY

Topsoil
8” Depth

Topsoil-Wetland
8” Depth

Water
10 Gal/CY Common Excavation & Borrow-Excavation
20 Gal/Ton for Installation of Aggregate Surfacing
100 MGal for Dust Control

Temporary Cover Crop with Straw Mulch & Seeding Cl III with Straw Mulch
Estimated Project Areas:
Maximum Area (11.1 acres) = R/W + Easements – Roadtop – Roadway Obliteration Limits
Minimum Area (3.7 acres) = Mainline Limits of Construction – Roadtop
Difference (7.4 acres) = Maximum (11.1 acres) – Minimum (3.7 acres)

Estimated Seeding Acre Range:
Minimum (7.4 acres) = Minimum Area (3.7 acres) + Difference (7.4 acres) x 50%
Maximum (9.3 acres) = Maximum Area (11.1 acres) – Difference (7.4 acres) x 25%

Estimated disturbed area except the newly constructed roadbed and roadway obliteration limits
Minimum 7.4 acres to Maximum 9.3 acres per application

Riprap Grade II
2.0’ Depth; Length and Width as shown on the plans

Aggregate Surface Course Cl 13 @ 1.875 Ton/CY
90 Ton/STA Mainline
40 Ton/Field Drive

Earthwork and Topsoil Summary

Project	Excavation (CY)	Embankment (CY)	Borrow (CY)	Topsoil (CY)	Topsoil-Wetland (CY)	Remove & Salvage Topsoil (CY)
BRO-0017(020)	13,185	15,800	2,616	4,295	6	3,026

Note: Quantity shown for embankment has been increased by 25% to account for shrinkage.

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BRO-0017(020)
Mosher Road

KLJ

Basis of Estimate and Earthwork Summary

Golden Valley County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
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EARTHWORK VALUES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	11	1

BRO-0017(020)						
	End Area (SF)		Adjusted Volume (CY)		Added Volume (CY)	
Station	Exc	Fill	Exc	Fill	Fill	Mass Ordinate
104+00.00	13.16	4.99	0	0	0	0
104+50.00	16.04	10.99	27.0	18.5	0	8.5
105+00.00	28.80	32.80	41.5	50.7	0	-0.6
105+50.00	47.31	73.88	70.5	123.5	0	-53.6
106+00.00	13.40	108.92	56.2	211.6	0	-209.0
106+50.00	37.61	198.47	47.2	355.8	0	-517.5
106+60.00	32.08	227.62	12.9	98.6	0	-603.3
106+93.97	297.15	311.69	207.1	424.1	0	-820.2
107+00.00	283.45	338.65	64.8	90.8	0	-846.2
107+16.01	470.15	397.86	223.4	272.9	0	-895.7
107+42.70	649.78	570.59	553.5	598.3	0	-940.5
107+47.97	681.83	602.57	130.0	143.1	0	-953.7
107+50.00	696.38	612.21	51.8	57.1	0	-958.9
107+65.00	758.36	680.94	404.1	449.0	0	-1003.8
107+88.00	582.86	770.63	571.3	772.8	0	-1205.4
108+00.00	490.66	821.10	238.6	442.1	0	-1409.0
108+05.88	452.83	853.35	102.7	227.9	0	-1534.2
108+38.00	379.81	1118.89	495.3	1466.4	0	-2505.3
108+53.00	226.36	308.71	168.4	495.7	0	-2832.6
109+50.00	144.65	103.47	0.0	0.0	983.8	-3816.4
109+65.00	180.38	1265.39	90.3	475.3	0	-4201.4
109+80.23	251.50	1154.99	121.8	853.3	0	-4932.9
109+96.72	231.84	1066.27	147.6	847.9	0	-5633.2
110+00.00	227.91	1053.75	27.9	161.0	0	-5766.3
110+25.00	236.13	927.77	214.8	1146.7	0	-6698.2
110+50.00	580.53	785.98	378.1	991.8	0	-7311.9
110+54.63	647.94	747.97	105.3	164.4	0	-7371.0
110+59.90	722.56	691.47	133.8	175.6	0	-7412.8

BRO-0017(020)						
	End Area (SF)		Adjusted Volume (CY)		Added Volume	
Station	Exc	Fill	Exc	Fill	Fill	Mass Ordinate
110+86.59	922.43	403.91	813.1	676.8	0	-7276.5
111+00.00	1222.52	296.13	532.7	217.3	0	-6961.1
111+08.63	1375.71	232.94	415.2	105.7	0	-6651.6
111+18.46	1478.76	185.69	519.6	95.3	0	-6227.3
111+42.25	855.51	98.78	1028.4	156.7	0	-5355.6
111+50.00	663.47	95.48	218.0	34.9	0	-5172.5
111+60.00	448.29	96.93	205.9	44.5	0	-5011.1
112+00.00	369.03	101.81	605.4	184.0	0	-4589.7
112+50.00	290.45	112.15	610.6	247.6	0	-4226.7
113+00.00	274.05	109.12	522.7	256.1	0	-3960.1
113+50.00	240.52	113.67	476.5	257.9	0	-3741.5
114+00.00	205.55	107.51	413.0	256.0	0	-3584.5
114+50.00	194.81	93.78	370.7	233.0	0	-3446.8
115+00.00	159.46	67.58	328.0	186.8	0	-3305.6
115+50.00	129.91	36.71	267.9	120.7	250.0	-3408.4
116+00.00	255.58	54.36	356.9	105.4	0	-3156.9
116+50.00	133.98	1.36	360.7	64.5	0	-2860.7
117+00.00	47.98	1.33	168.5	3.1	0	-2695.3
117+50.00	71.36	13.26	110.5	16.9	0	-2601.7
117+97.53	39.80	26.94	97.8	44.2	0	-2548.1
118+00.00	38.72	27.75	3.6	3.1	0	-2547.6
118+21.32	29.71	28.33	27.0	27.7	0	-2548.3
118+50.00	18.65	26.31	25.7	36.3	0	-2558.9
119+00.00	3.21	40.10	20.2	76.9	0	-2615.6
			Volume (CY)			
			Exc	Fill	Added Fill	Mass Ordinate
Totals			13,185	14,566	1,234	-2,616

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BRO-0017(020)

Mosher Road

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Earthwork Values

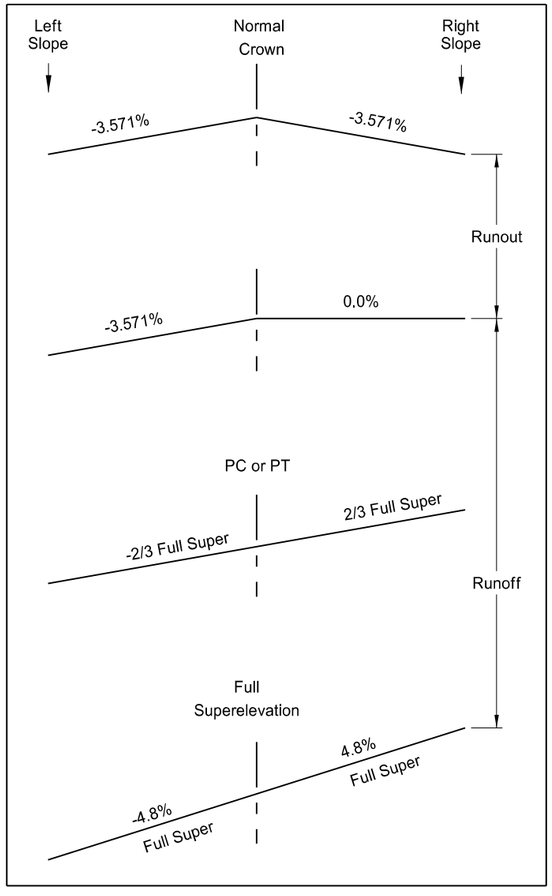
Golden Valley County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	1803-00372

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	20	1

P.C. Station		111+11.28
P.I. Station		114+99.98
Delta	=	54° 47' 30.19" (LT)
Degree	=	7° 38' 21.97"
Tangent	=	388.6943
Length	=	717.2219
Radius	=	750.0000
External	=	94.7386
P.T. Station		118+28.50

Station		Left Slope	Right Slope
109+80.23	PC - 131.05'	-3.571	-3.571
110+49.34	PC - 61.94'	-3.571	0.000
111+11.28	PC		
111+18.46	PC + 7.18'	-3.571	3.571
111+42.25	PC + 30.97'	-4.800	4.800
117+97.53	PT - 30.97'	-4.800	4.800
118+21.32	PT - 7.18'	-3.571	3.571
118+28.50	PT		
118+90.44	PT + 61.94'	-3.571	0.000
119+59.55	PT + 131.05'	-3.571	-3.571



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Note: Calculations based on AASHTO method five. A design speed of 35 mph and maximum superelevation of 6% were used.

BRO-0017(020)

Mosher Road

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Superelevation Table

Golden Valley County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
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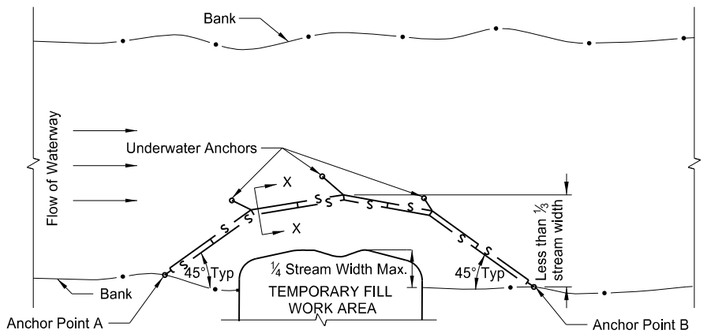
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	20	2

TYPICAL INSTALLATIONS
May vary with conditions

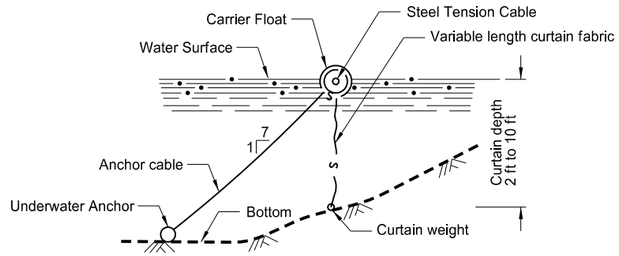


PLAN VIEW

FLOTATION SILT CURTAIN - TYPE WORK AREA

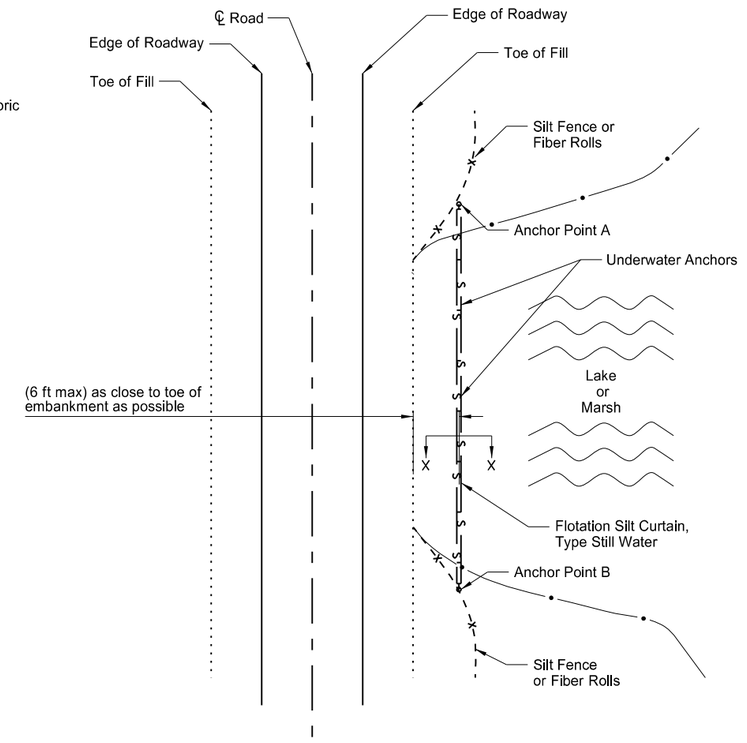
DESIGN GUIDELINES:

When temporary work encroaches less than ¼ of the width of stream.



SECTION X-X
FLOTATION SILT CURTAINS

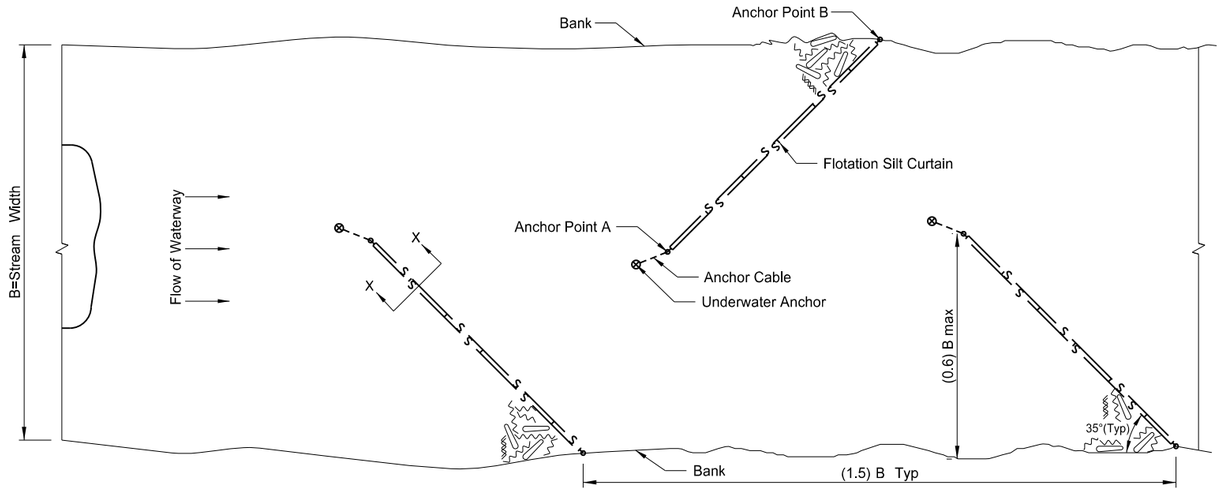
Note:
Maximum water velocity for moving water = 5 ft/sec



PLAN VIEW

FLOTATION SILT CURTAIN - TYPE STILL WATER

The silt curtain shall extend onto shore and shall also be anchored there.



PLAN VIEW

FLOTATION SILT CURTAIN - TYPE HERRING BONE PATTERN

DESIGN GUIDELINES:

When temporary work encroaches more than ⅓ width of the stream
Or where stream width doesn't allow use of Type Moving Water

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Temporary Erosion Control
Flotation Silt Curtain

Golden Valley County, ND

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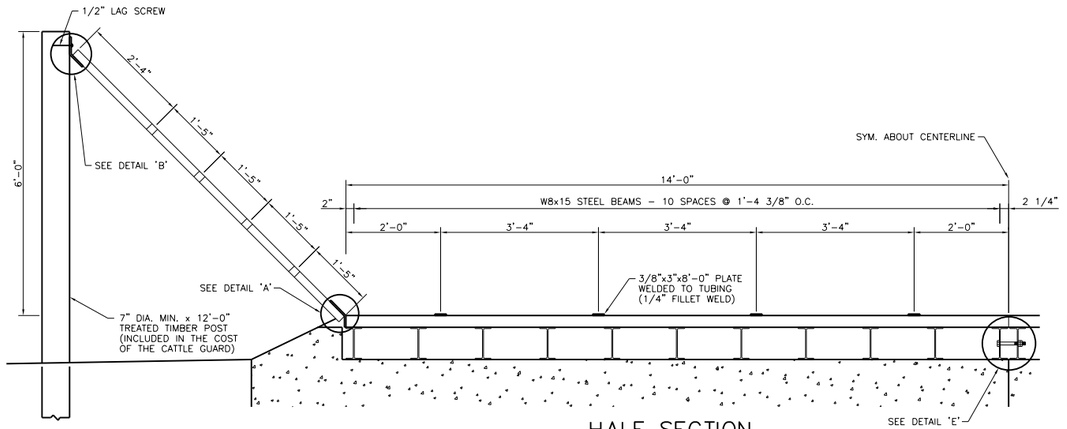
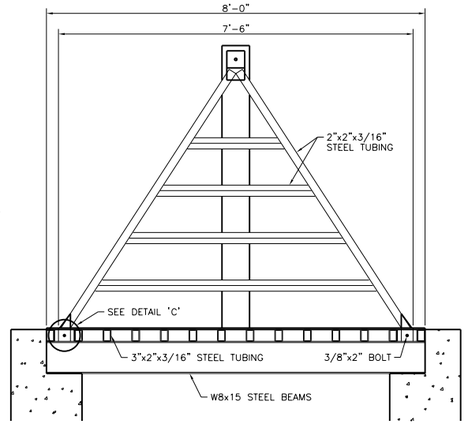
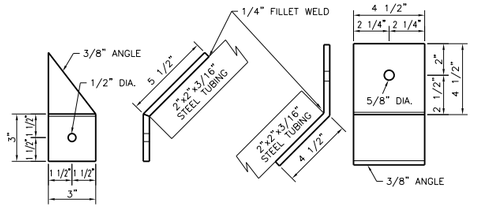
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	20	3



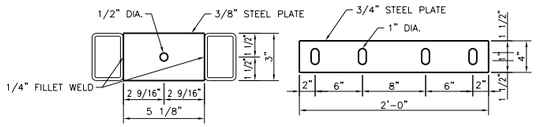
HALF SECTION



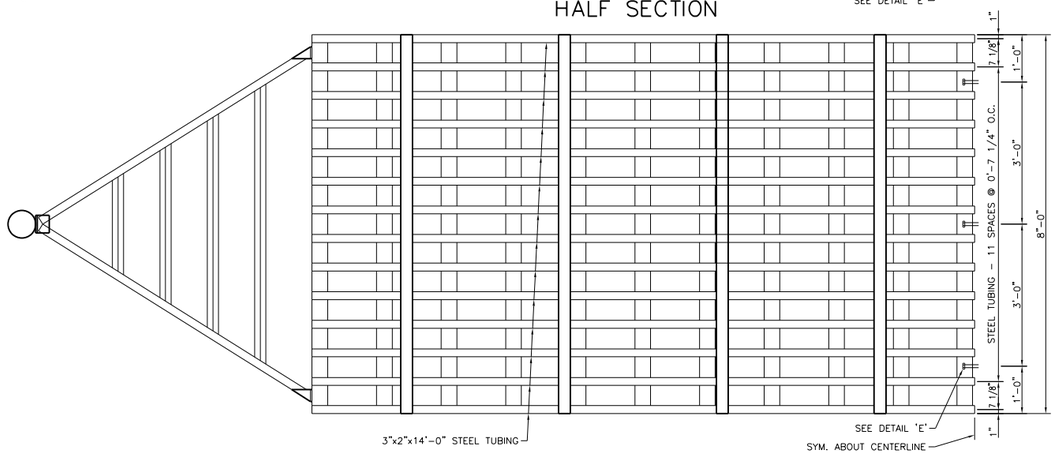
ELEV. SECTION



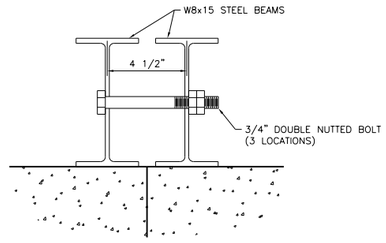
DETAIL 'A' DETAIL 'B'



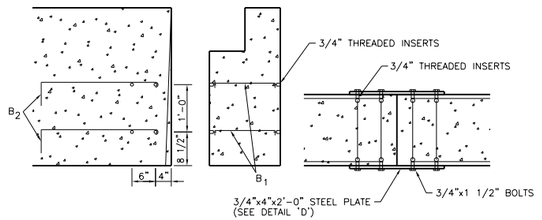
DETAIL 'C' DETAIL 'D'



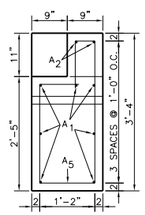
HALF SECTION

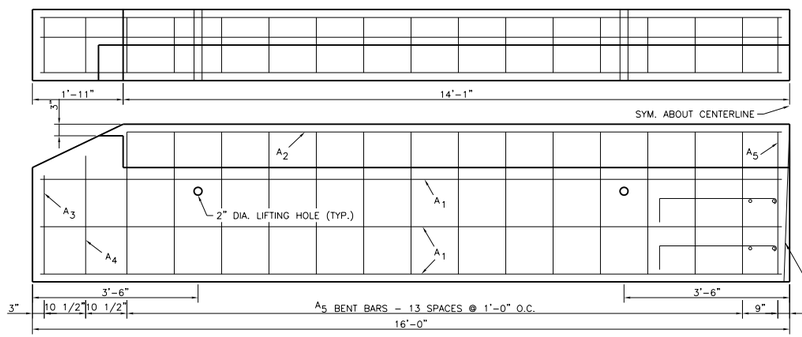


DETAIL 'E'

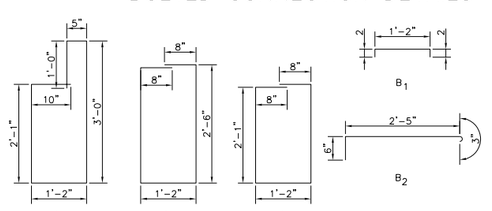


BOLTED CONNECTION DETAILS





HALF SECTION (4 REQUIRED)



BENT BAR DETAILS

BAR LIST (One-Half Base)

MARK	NO.	SIZE	LENGTH	SHAPE
A_1	7	4	15'-8"	Straight
A_2	2	4	13'-10"	Straight
A_3	1	4	6'-8"	Bent
A_4	1	4	7'-6"	Bent
A_5	15	4	8'-6"	Bent
B_1	4	4	1'-6"	Bent
B_2	4	4	3'-2"	Bent

QUANTITIES: (One-Half Base)

REINFORCING STEEL GR. 60	199 LBS.
CLASS AE-3 CONCRETE	2.6 C.Y.

GENERAL NOTES

LOADING: ASTM A36: HS 25, 40,000LB AXLE.
ASTM A572, GRADE 50: HS 37, 59,000LB AXLE.

CONCRETE: THE CONCRETE FOUNDATION IS DESIGNED FOR PRECAST CONSTRUCTION. CAST IN PLACE CONSTRUCTION WILL BE ACCEPTED IF APPROVED BY THE ENGINEER.

THE CONCRETE SHALL BE CLASS AE-3 AND CONFORM TO THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS. SIZE 4 AGGREGATE MAY BE SUBSTITUTED FOR SIZE 3.

ALL EXPOSED CORNERS SHALL HAVE A 1" CHAMFER.

REINFORCING: REINFORCING STEEL SHALL BE AASHTO M 31 GRADE 60 AND SHALL HAVE A MINIMUM COVER NOT LESS THAN TWO (2) INCHES. CUTTING AND BENDING SHALL CONFORM TO ACI 315.

STRUCTURAL STEEL: STRUCTURAL TUBE RAILS SHALL CONFORM TO ASTM A501 OR ASTM A500, GRADE B. ALL OTHER STEEL SHALL CONFORM TO ASTM A36 OR ASTM A572, GRADE 50. NO SPLICING WILL BE PERMITTED.

WELDING: ALL WELDING SHALL CONFORM TO AWS SPECIFICATIONS. TUBE RAILS SHALL BE WELDED TO THE UNDERSTRUCTURE MEMBERS THE FULL WIDTH OF THE TOP OF THE MEMBER ON BOTH SIDES OF THE TUBE RAILS.

PAINTING: COAT AS SPECIFIED BY CUSTOMER.

WORK DRAWINGS: WORK DRAWINGS SHALL BE REVIEWED BY THE ENGINEER PRIOR TO FABRICATION.

FABRICATION: CATTLE GUARD AND BASE ARE TO BE FABRICATED IN TWO (2) SECTIONS.

WING: THE WING MAY VARY IN MATERIAL AND DIMENSION, BUT THE WING DOES NOT AFFECT THE LOAD CARRYING CAPACITY OF THE CATTLE GUARD.

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BRO-0017(020)

Mosher Road

28' Clear Roadway Cattle Guard & Base Details Golden Valley County, ND

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CAM	WMT	1803-00372

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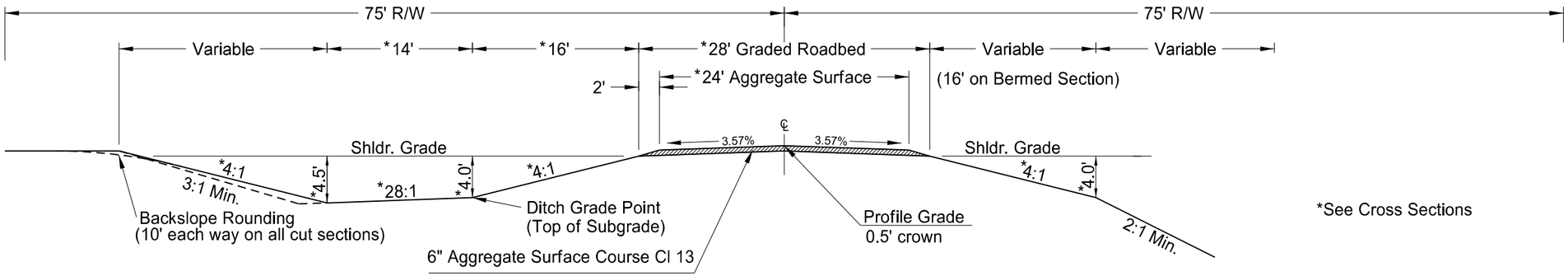
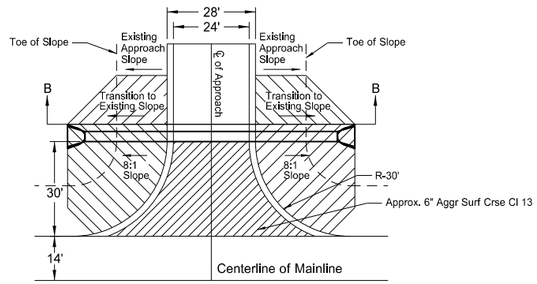
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	30	1



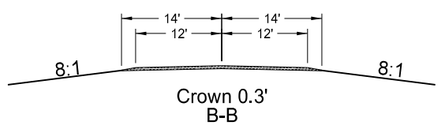
Cut Section

PROPOSED TYPICAL SECTION
Sta 104+00 to Sta 119+00

Fill Section



Field Drive Approach



Crown 0.3'
B-B

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Mosher Road

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Proposed Typical Sections

Golden Valley County, ND

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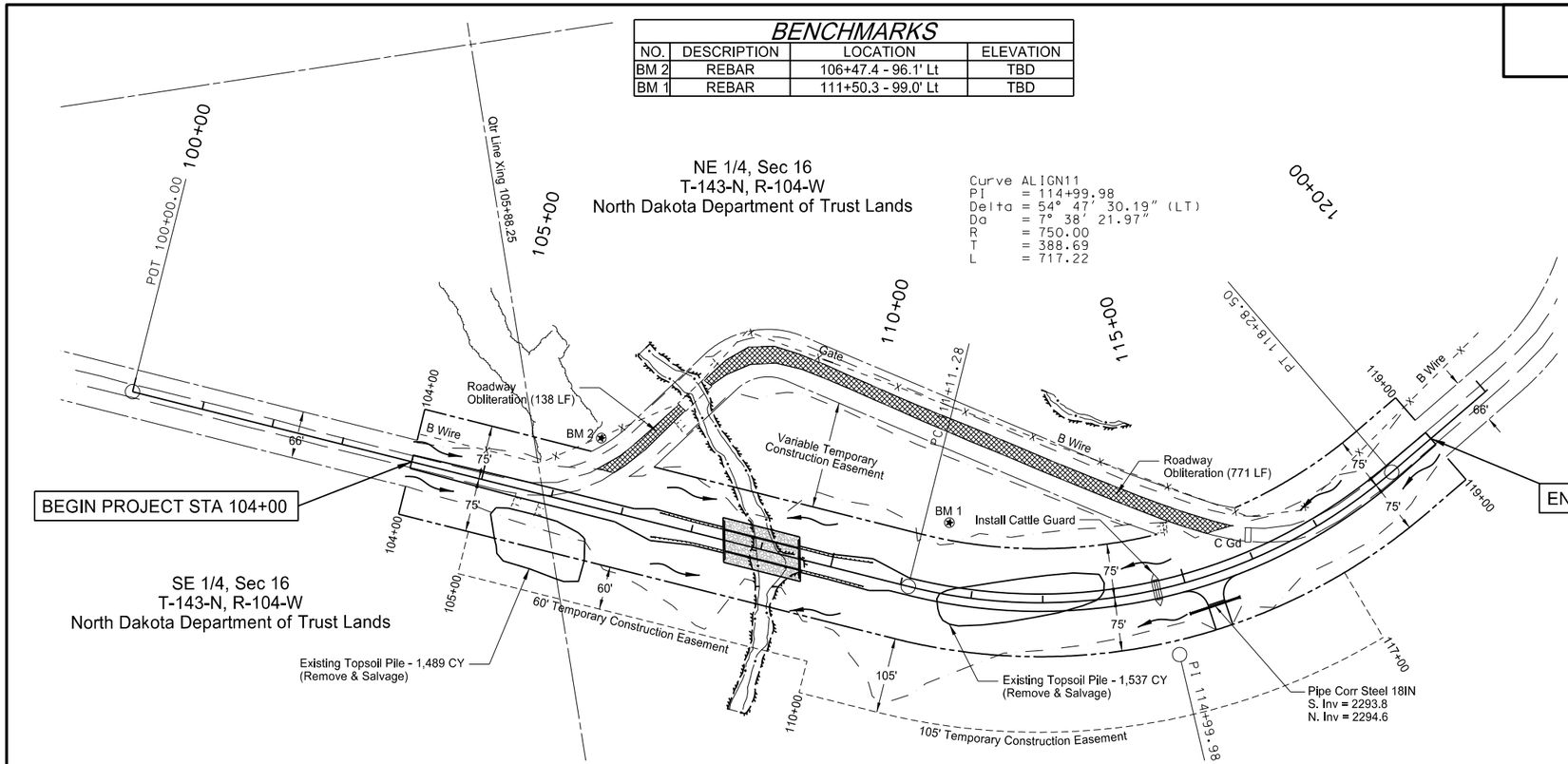
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	60	1

BENCHMARKS

NO.	DESCRIPTION	LOCATION	ELEVATION
BM 2	REBAR	106+47.4 - 96.1' Lt	TBD
BM 1	REBAR	111+50.3 - 99.0' Lt	TBD



ROADWAY OBLITERATION
Sta 106+65 Lt to Sta 115+72 Lt — 909 LF

PIPE CORR STEEL .064IN 18IN
Sta 114+98 Rt to Sta 115+62 Rt — 68 LF

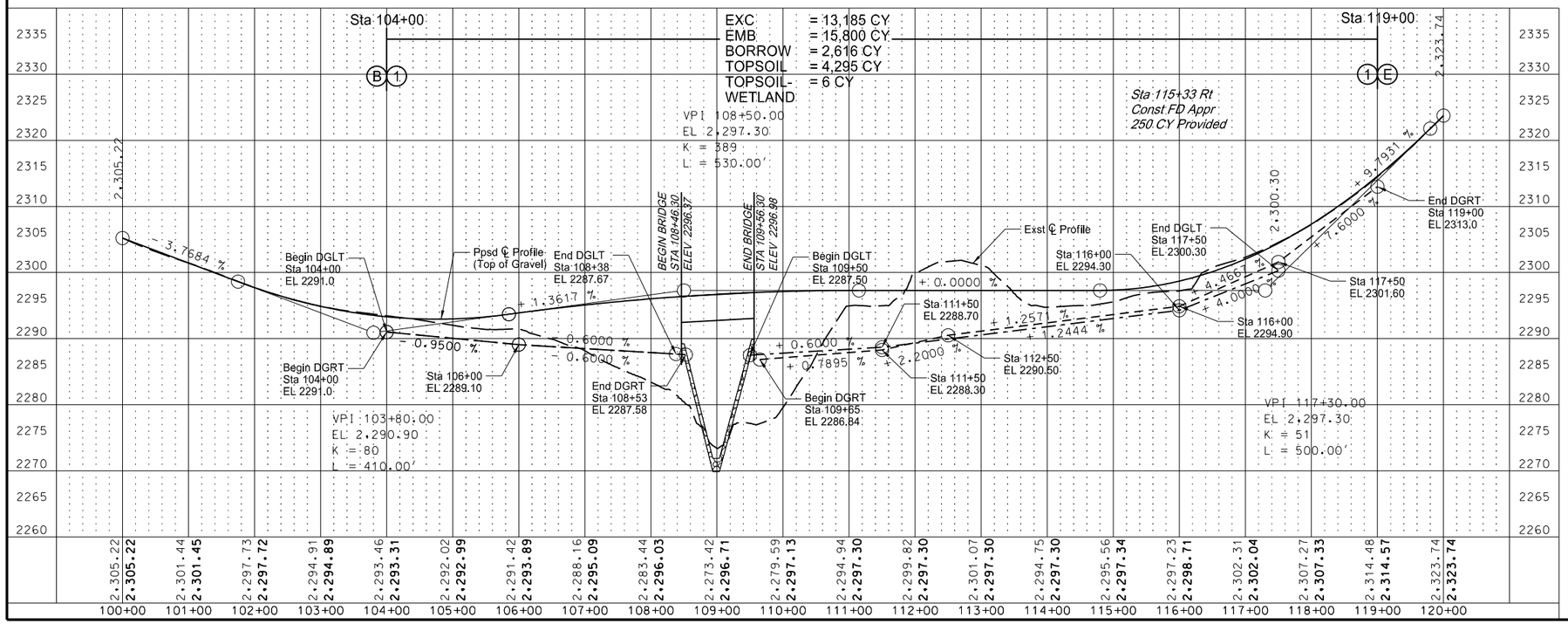
END SECT CORR STEEL .064IN 18IN
Sta 114+98 Rt — 1 EA
Sta 115+62 Rt — 1 EA

OBJECT MARKERS-TYPE II
Sta 114+60 Lt & Rt — 4 EA

CATTLE GUARD 8FT X 28FT
Sta 114+60 Cl — 1 EA

REMOVE CATTLE GUARD
Sta 116+03 Lt — 1 EA

EXC	= 13,185 CY
EMB	= 15,800 CY
BORROW	= 2,616 CY
TOPSOIL	= 4,295 CY
TOPSOIL-WETLAND	= 6 CY



SCALE
Horizontal 1"=200'
Vertical 1"=20'

SURVEY COMPLETED USING NAVD 88 DATUM

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BRO-0017(020)
Mosher Rd

Plan & Profile
Sta 104+00 to Sta 119+00

Golden Valley County, ND

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WETLANDS, MITIGATION AND ENVIRONMENTAL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	75	1

Wetland Impact Table

Wetland Number	Location	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		Onsite			
				Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)	Mitigation Location; Ratio	Acre(s)	Constructed Site #	Constructed Size Acre(s)
1a	Sec.16, T143N, R104W	Natural	Yes	0.009	0.003			Y	N	N							Adjacent to WL1b (1:1)	0.005	Site 1	0.005
1b	Sec.16, T143N, R104W	Natural	Yes	0.009	0.002			Y	N	N										
1c	Sec.16, T143N, R104W	Artificial	Yes	0.003	0.017			N	N	N										
1d	Sec.16, T143N, R104W	Artificial	Yes	0.002	0.006			N	N	N										
1e	Sec.16, T143N, R104W	Natural	Yes	0.000	0.000			N	N	N										
1f	Sec.16, T143N, R104W	Natural	Yes	0.000	0.000			N	N	N										
1g	Sec.16, T143N, R104W	Natural	Yes	0.000	0.000			N	N	N										
				0.023	**0.028**	**0**	**0**					**0**		**0**		**0**		**0.005**		**0.005**

Other Waters Impact Table

Other Waters											Other Water Mitigation				
			Size				Impacts to Other Waters				Mitigation Required				
							Acre(s)		Linear Feet						
Number	Location	Type	Acre(s)	Linear Feet	Feature	USACE Jurisdictional[1]	Temp	Perm	Temp	Perm	EO 11990	USACE	USFWS	Mitigation Location; ratio	Method
OW 1a	Sec.16, T143N, R104W	Creek	0.23	567	Natural	Yes	0.043	0.044	95.00	60.00	N	N	N	NA	NA
OW 1b	Sec.16, T143N, R104W	Creek	0.01	112	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	NA	NA
		Totals	**0.24**	**679**			**0.043**	**0.044**	**95.00**	**60.00**					

[1] A wetland Jurisdictional Determination was issued by the USACE on 1/4/2019; NWO-2018-02068-BIS.

[2] 1199 Mitigation requirements - All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to wetlands require mitigation. USACE Mitigation Requirements - All jurisdictional impacts greater than 0.10 acre to each resource (cumulative. eg 1a ,1b,1c..etc.) requires mitigation. Other Water impact greater than 300 linear feet requires mitigation.

[3] All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), and temporary impacts do not require mitigation.

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Mosher Road

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Wetlands, Mitigation and Environmental Wetlands 1 & OW 1 Golden Valley County, ND

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WETLANDS, MITIGATION AND ENVIRONMENTAL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	75	2

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	0.005	**Temporary JD**	0.023
Natural/Non-JD	0.000	**Non-JD Temporary**	0.000
Artificial/JD	0.023	**Permanent JD > 0.10**	0.000
Artificial /Non-JD	0.000	**Permanent OW**	0.044 ac/60 ft.
Total	**0.028**	**Temporary OW**	0.043 ac/95 ft.

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only					
EO 11990 Only	Onsite	0.005			
USACE/11990					
USFWS					
	Total	**0.005**	**0**	**0**	**0**

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Wetlands, Mitigation and Environmental Wetlands 1 & OW 1 Golden Valley County, ND

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Wetland Delineated Existing

Open Water Delineated Existing

Wetland Impacts Permanent

Wetland Impacts Temporary

Open Water Impacts Permanent

Open Water Impacts Temporary

Proposed Wetland Mitigation

Proposed Riprap

Wetland Mitigation Coordinate Table			
Point	Northing	Easting	Elev
M1	578793.91	1132384.62	2277.0
M2	578793.64	1132386.45	2277.0
M3	578797.92	1132402.48	2277.0
M4	578804.88	1132420.56	2277.0
M5	578807.46	1132431.30	2277.0

NE1/4, Sec 16
T143N, R104W
North Dakota Department of Trust Lands

SE1/4, Sec 16
T143N, R104W
North Dakota Department of Trust Lands

OW 1a
Permanent Impacts = 0.044 Acre/60 LF
Temporary Impacts = 0.043 Acre/95 LF

Wetland 1a
Permanent Impacts = 0.003 Acre
Temporary Impacts = 0.009 Acre

Wetland 1b
Permanent Impacts = 0.002 Acre
Temporary Impacts = 0.009 Acre
Wetland Mitigation = 0.005 Acre

Wetland 1g
Permanent Impacts = 0.000 Acre
Temporary Impacts = 0.000 Acre

OW 1b
Permanent Impacts = 0.000 Acre/0 LF
Temporary Impacts = 0.000 Acre/0 LF

Wetland 1d
Permanent Impacts = 0.006 Acre
Temporary Impacts = 0.002 Acre

Wetland 1c
Permanent Impacts = 0.017 Acre
Temporary Impacts = 0.003 Acre

Wetland 1f
Permanent Impacts = 0.000 Acre
Temporary Impacts = 0.000 Acre

Wetland 1e
Permanent Impacts = 0.000 Acre
Temporary Impacts = 0.000 Acre

Qtr Line Xing 105+88.25
105+00
104+00
110+00
115+00
120+00
117+00
119+00
Exst R/W
Const Limits (Roadway Obliteration)
Exst Rdwy (Obliterate)
Gate
Delineated OW 1b
Delineated Wetland 1g
Existing Cattle Guard (Remove & Salvage)
B Wire
C Gd
Ppsd R/W
66'
Delineated Wetland 1b
Existing Bridge (Remove)
Delineated Wetland 1a
Variable Temporary Construction Easement
PC 111+11.28
Delineated OW 1a
BM 2
BM 1
Const Limits
Ppsd 8'x28' Cattle Guard
Ppsd 18"x68' CSP & End Sections
PC 120+42.78
PT 118+28.50
End Project Sta 119+00
65'
Begin Project Sta 104+00
Delineated Wetland 1b
75'
Delineated Wetland 1c
Ppsd Rdwy Cl
Ppsd Riprap 60'x110'
Ppsd 28' x 110' Single Span Bridge
Delineated Wetland 1d
Const Limits
105'
PI 114+99.98
60'
60' Temporary Construction Easement
Delineated Wetland 1e
Delineated Wetland 1f
105' Temporary Construction Easement

Scale: 1" = 100'

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BRO-0017(020)
Mosher Road

KLJ

Wetlands, Mitigation and Environmental
Wetlands 1 & OW 1
Golden Valley County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	1803-00372

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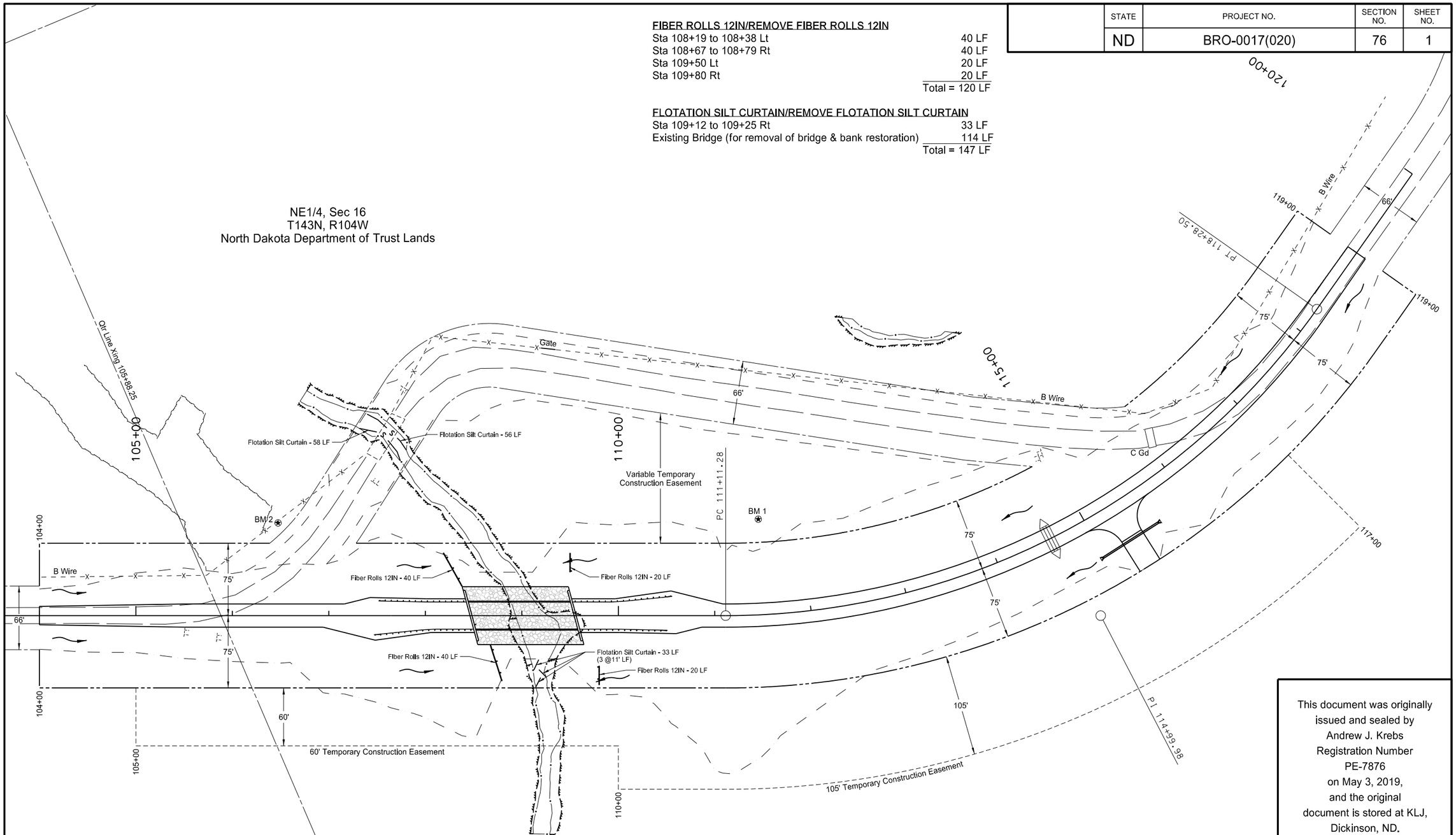
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	76	1

FIBER ROLLS 12IN/REMOVE FIBER ROLLS 12IN

Sta 108+19 to 108+38 Lt	40 LF
Sta 108+67 to 108+79 Rt	40 LF
Sta 109+50 Lt	20 LF
Sta 109+80 Rt	20 LF
	Total = 120 LF

FLOTATION SILT CURTAIN/REMOVE FLOTATION SILT CURTAIN

Sta 109+12 to 109+25 Rt	33 LF
Existing Bridge (for removal of bridge & bank restoration)	114 LF
	Total = 147 LF



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BRO-0017(020)

Mosher Road

KLJ

Temporary Sediment and Erosion Control

Golden Valley County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	1803-00372

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	77	1

Note: The calculations for the estimated seeding and mulching acres are shown in Section 10 Sheet 1.

FIBER ROLLS 12IN

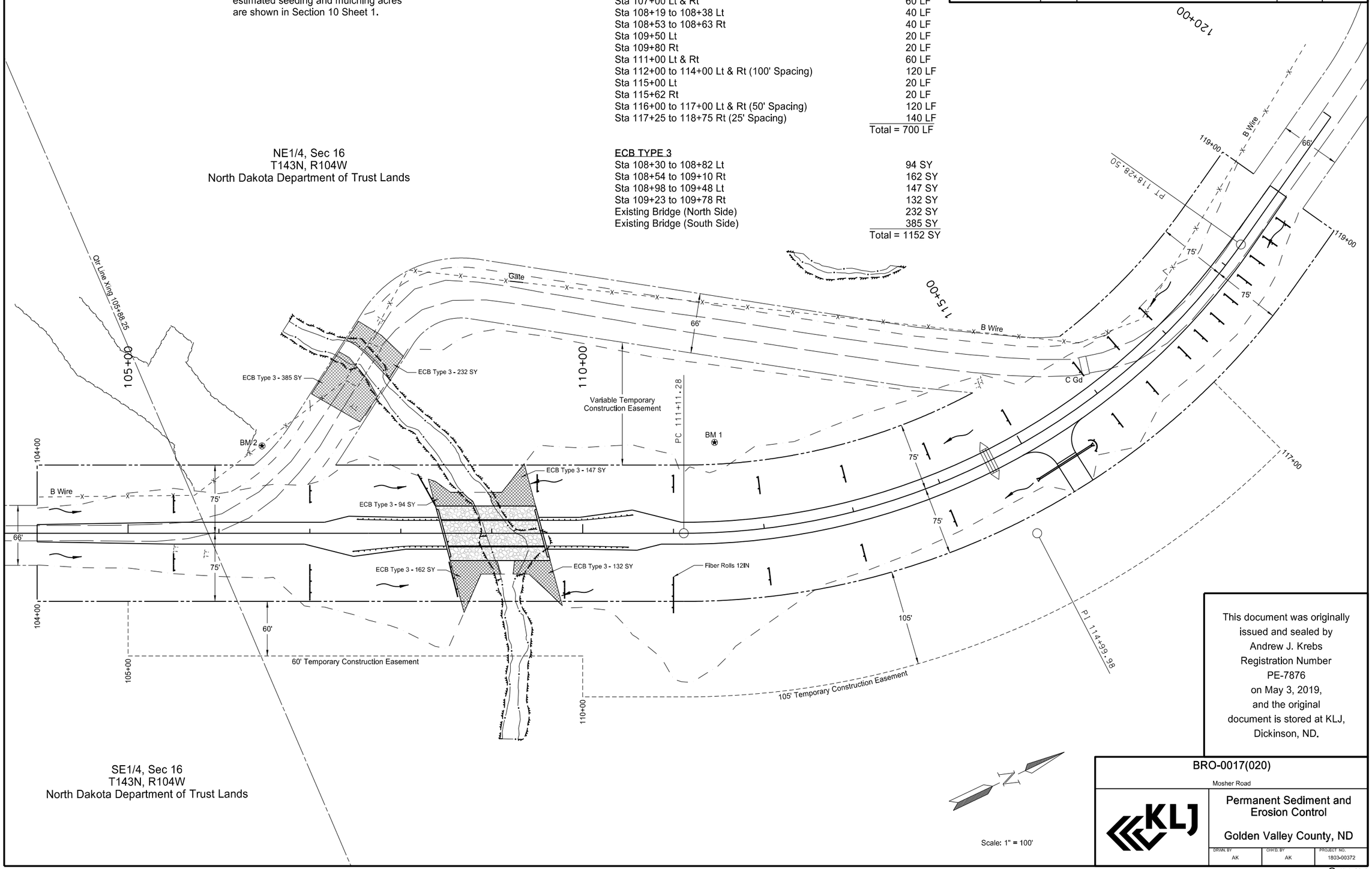
Sta 105+50 Lt & Rt	40 LF
Sta 107+00 Lt & Rt	60 LF
Sta 108+19 to 108+38 Lt	40 LF
Sta 108+53 to 108+63 Rt	40 LF
Sta 109+50 Lt	20 LF
Sta 109+80 Rt	20 LF
Sta 111+00 Lt & Rt	60 LF
Sta 112+00 to 114+00 Lt & Rt (100' Spacing)	120 LF
Sta 115+00 Lt	20 LF
Sta 115+62 Rt	20 LF
Sta 116+00 to 117+00 Lt & Rt (50' Spacing)	120 LF
Sta 117+25 to 118+75 Rt (25' Spacing)	140 LF
	Total = 700 LF

ECB TYPE 3

Sta 108+30 to 108+82 Lt	94 SY
Sta 108+54 to 109+10 Rt	162 SY
Sta 108+98 to 109+48 Lt	147 SY
Sta 109+23 to 109+78 Rt	132 SY
Existing Bridge (North Side)	232 SY
Existing Bridge (South Side)	385 SY
	Total = 1152 SY

NE1/4, Sec 16
T143N, R104W
North Dakota Department of Trust Lands

SE1/4, Sec 16
T143N, R104W
North Dakota Department of Trust Lands



Scale: 1" = 100'

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BRO-0017(020)

Mosher Road

KLJ

Permanent Sediment and Erosion Control

Golden Valley County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	1803-00372

ALIGNMENT SURVEY COORDINATE DATA - MOSHER ROAD

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	81	1

HORIZONTAL ALIGNMENT

POINT	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE	DESCRIPTION
POT	100+00.00	578,044.68	1,132,227.83	47°12'09.205" N	103°51'55.224" W	
PC	111+11.28	579,048.24	1,132,705.14	47°12'19.303" N	103°51'48.940" W	
PI	114+99.98	579,399.25	1,132,872.08	47°12'22.835" N	103°51'46.742" W	
PT	118+28.50	579,738.04	1,132,681.53	47°12'26.095" N	103°51'49.709" W	
POT	120+00.00	579,887.51	1,132,597.46	47°12'27.534" N	103°51'51.018" W	

SURVEY CONTROL POINTS

POINT	NORTHING	EASTING	ELEVATION	LATITUDE	LONGITUDE	DESCRIPTION
1	579,659.87	1,133,952.81	2345.16	47°12'25.861" N	103°51'31.264" W	CP 1
11	579,121.70	1,132,629.46		47°12'19.995" N	103°51'50.080" W	BM 1
12	578,670.56	1,132,419.14		47°12'15.458" N	103°51'52.844" W	BM 2

NOTES: Survey is based upon North Dakota State Plane System, NAD83(96), South Zone, US Survey Feet
Coordinates are grid coordinates. Combined scale factor to go from Grid Distance to Ground Distance = 1.0001915367
Vertical Control Datum: North American Vertical Datum 1988 (NAVD 88), Geoid 12, derived from OPUS Solution

☐ Assumed Coordinates

☒ All coordinates on this sheet are GRID coordinates.
They are dereived from the "North Dakota State Plane Coordinate System of 1983", NAD83(96). Units are in U.S. Survey Feet.

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BRO-0017(020)

Mosher Road

KLJ

Survey Coordinate and Curve Data

Golden Valley County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	JAC	1803-00372

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	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**	**2**	**34**	**68**
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**19**	**38**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		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		32	
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**2**	**5**	**10**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1a-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
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**	**2**	**28**	**56**
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		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		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		35	
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-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.		35	
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)		11	
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**	**4**	**35**	**140**
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.		35	
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
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)		12	
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		35	

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**	**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

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**592**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**6**
704-1060	DELINEATOR DRUMS	EACH	
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	**VERTICAL PANELS - BACK TO BACK**	**EACH**	**10**
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

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/

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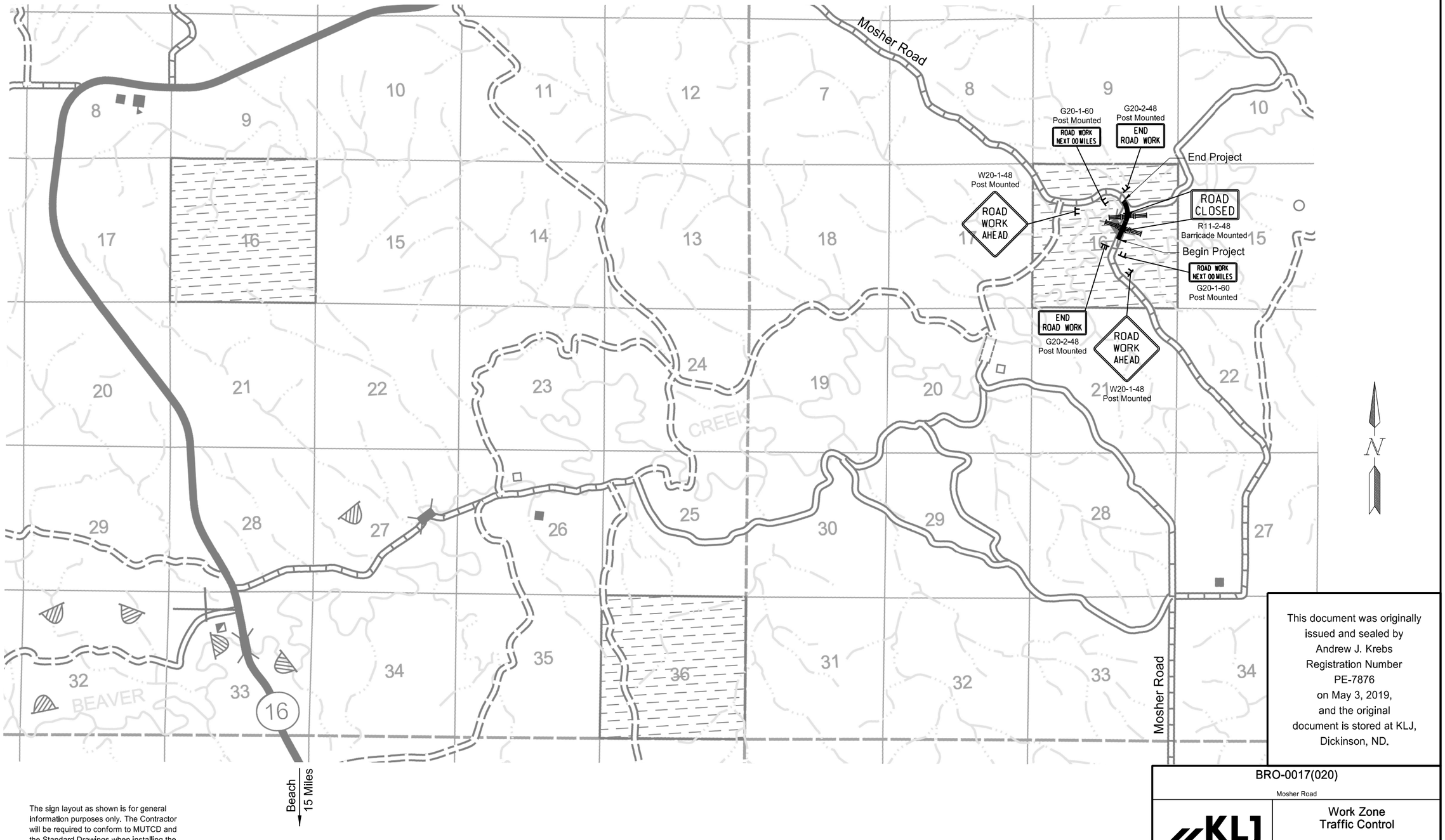
Traffic Control Devices List

Work Zone Traffic Control

Golden Valley County, ND

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	100	2

CONSTRUCTION SIGN LAYOUT



The sign layout as shown is for general information purposes only. The Contractor will be required to conform to MUTCD and the Standard Drawings when installing the traffic control signing.

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BRO-0017(020)

Mosher Road

KLJ

Work Zone Traffic Control

Golden Valley County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	1803-00372

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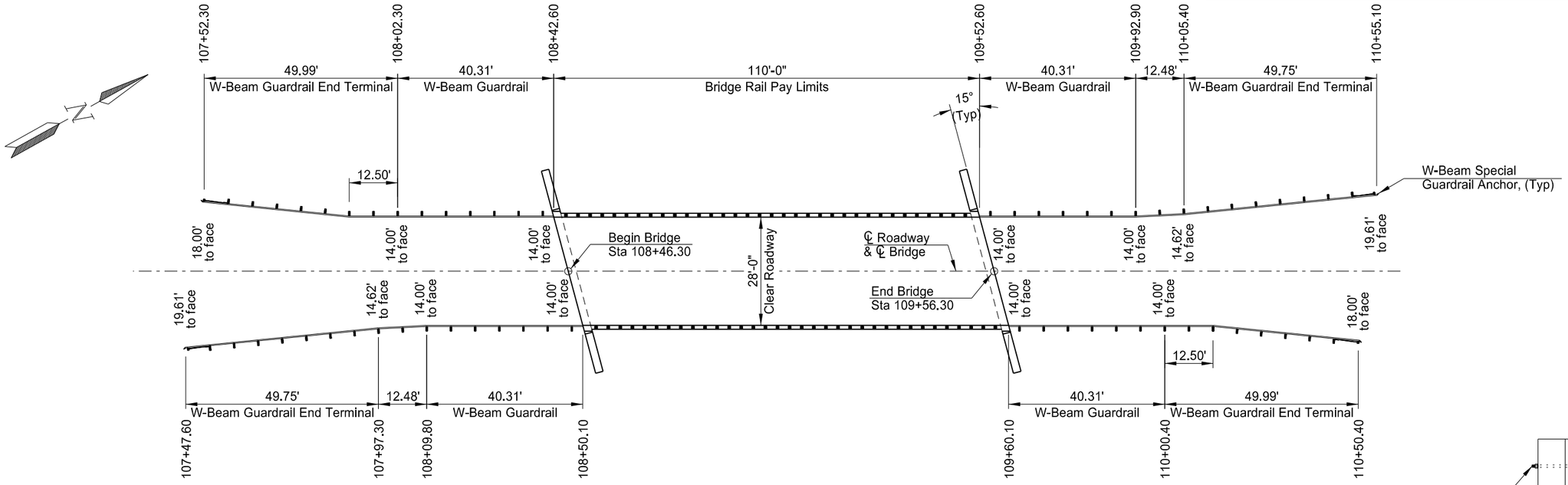
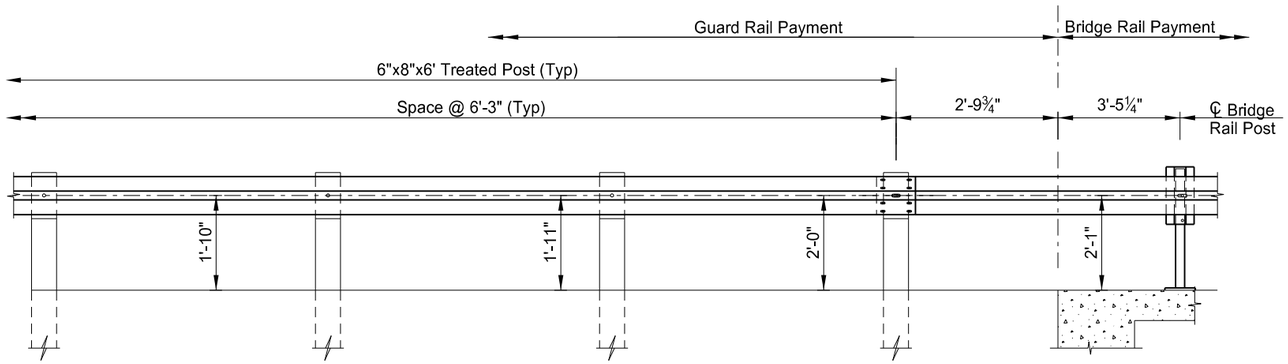
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	130	1

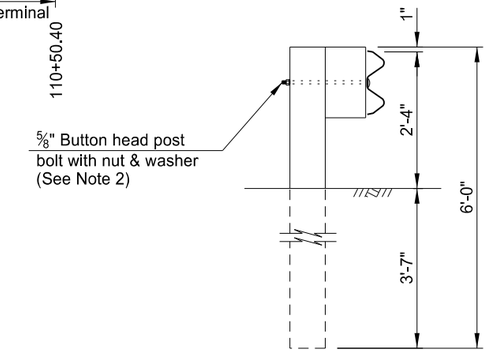


GUARDRAIL STAKING DIAGRAM

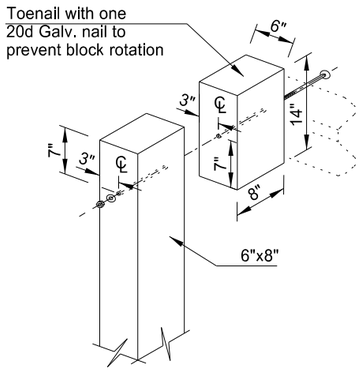


(Typical at Four Locations)

INSIDE ELEVATION OF RAIL



POST DIMENSIONS



POST & BLOCK DETAILS

NOTES:

1. End Terminal will be Special W-Beam Guardrail Anchor, see Standard Drawing D-764-14.
2. Button head "post" bolts (ASTM A307) must be of sufficient length to extend through the full thickness of the nut (ASTM A563) and the Type A 1¾" O.D. washer and not more than 1" beyond it.

   Button head "splice" bolts (ASTM A307) are ⅝"ø with a ⅝"ø recessed nut (ASTM A563).
3. Galvanize all hardware (bolts, nuts, and washers) in accordance with AASHTO M232. Hardware is not to be measured for seperate payment but is to be included in the unit price bid for "W-BEAM GUARDRAIL END TERMINAL".
4. Do not set guardrail posts in concrete.
5. Refer to Standard Drawing D-764-1 for additional details.

QUANTITIES	
W-BEAM GUARDRAIL END TERMINAL	4 EA
W-BEAM GUARDRAIL	186.2 LF

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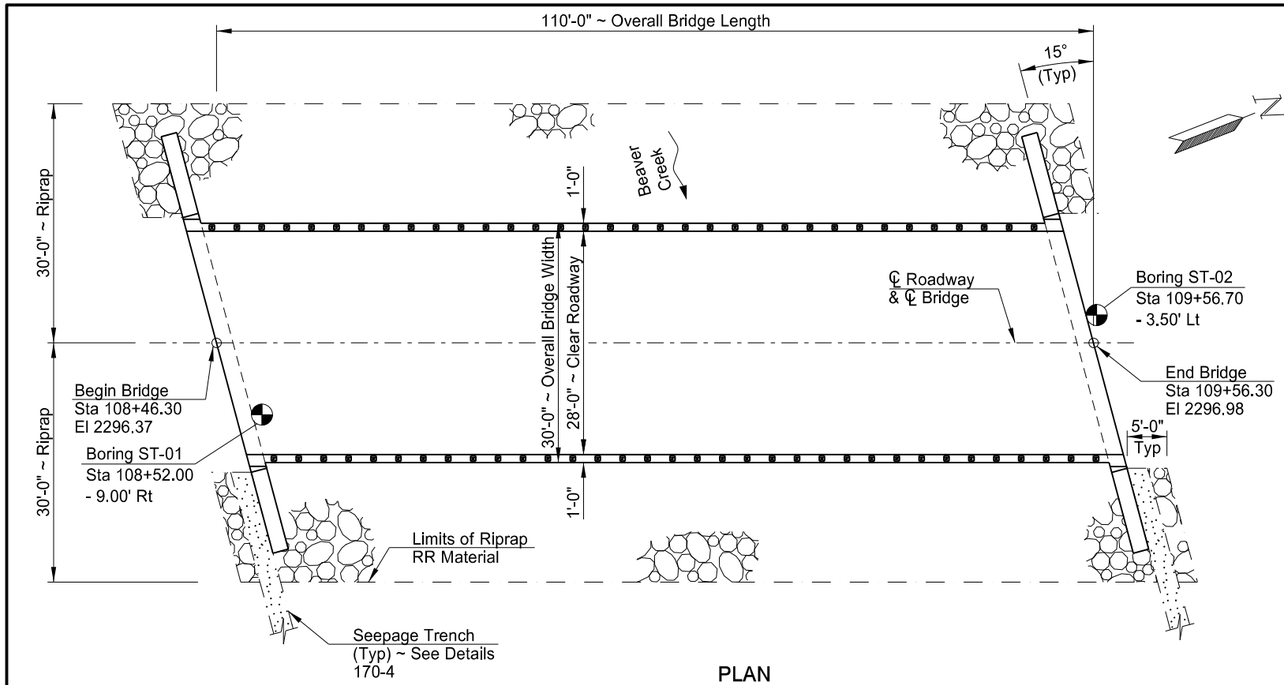
BRO-0017(020)
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

KLJ

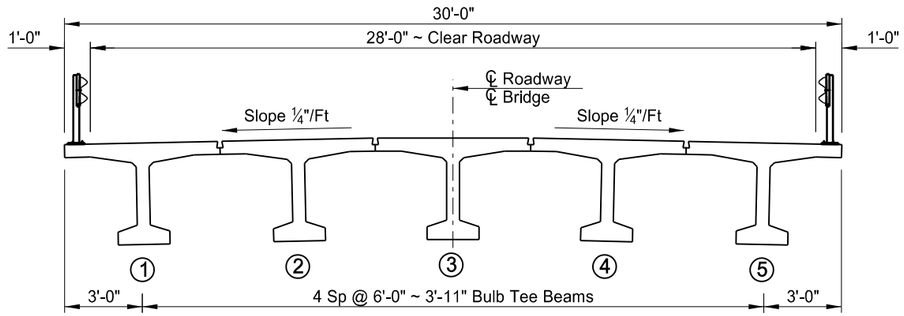
GUARDRAIL LAYOUT

DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

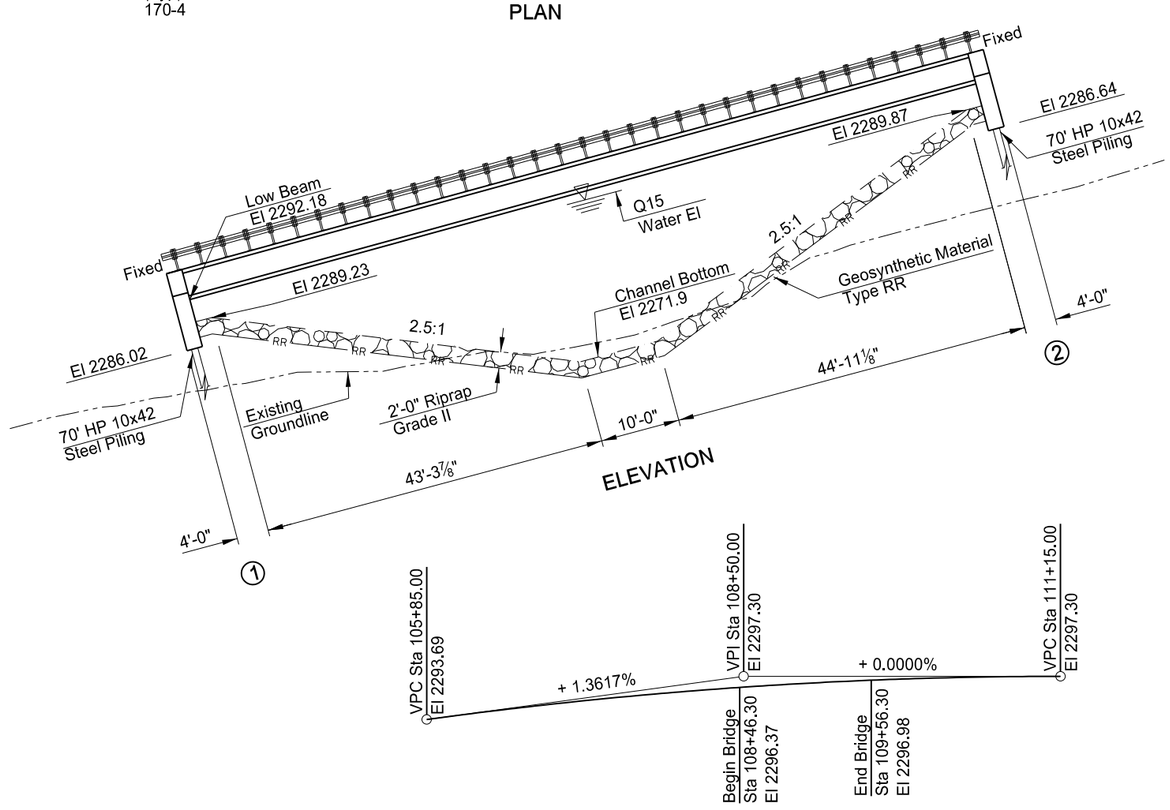
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	170	1



PLAN



TYPICAL SECTION



ELEVATION

VERTICAL CURVE DATA

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0105	REMOVAL OF STRUCTURE	L SUM	1.0
210	0099	CLASS 1 EXCAVATION	L SUM	1.0
210	0127	CHANNEL EXCAVATION	L SUM	1.0
210	0201	FOUNDATION PREPARATION	EA	1.0
256	0200	RIPRAP GRADE II	CY	525
602	1130	CLASS AE-3 CONCRETE	CY	73.8
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	367
604	9750	PRESTRESSED BULB T GIRDER	LF	541.7
612	0115	REINFORCING STEEL GRADE 60	LBS	7,870
616	5890	STRUCTURAL STEEL	L SUM	1
622	0020	STEEL PILING HP 10 X 42	LF	700
624	0151	RAILING	LF	220
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	763
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2.0

HYDRAULIC DATA:

Drainage Area	657	sq mi
Design Frequency	15	yr
Design Discharge	3302	cfs
Design Stage (upstream)	2291.42	ft
Stream Gradient	0.0004	ft/ft
Waterway Provided Below Design Stage	1153.44	sq ft
Waterway Provided Below Clearance Elevation	1257.99	sq ft
Average Velocity of Flow in Natural Channel	3.71	fps
Depth of Flow	19.52	ft
Velocity of Flow Under Bridge	2.86	fps
100-Year Frequency Discharge	6333	cfs
100-Year Frequency Stage	2294.29	ft
Overtopping Stage	2292.99	ft
Overtopping Discharge	756.30	cfs

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BRO-0017(020)
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

BRIDGE LAYOUT

DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	170	2

STRUCTURAL NOTES

100-P01 SCOPE OF WORK: This work consists of removing an existing 50'-0" steel bridge and building a new single span prestressed concrete bulb T girder bridge with an overall bridge length of 110'-0" and a clear roadway width of 28'-0". This new bridge will be on a new alignment approximately 250' East of the existing bridge alignment.

100-P02 GENERAL: Include the cost of furnishing and placing preformed joint filler, concrete inserts, rebar couplers, silicone sealant, waterproof membrane, non-shrink grout, and other miscellaneous items in the price bid for "PRESTRESSED BULB T GIRDER".

105-P01 WORK DRAWINGS: Submit the prestressed bulb T girder work drawings to the Engineer for review. Use the following minimum text sizes on all work drawing sheets.

Dimensions and Notes	0.08"
Detail Subtitles	0.09"
Detail Titles	0.10"

202-P01 REMOVAL OF STRUCTURE: Remove the old bridge consisting of a single span 50' steel truss bridge with timber abutments and timber piles.

The lump sum bid item "REMOVAL OF STRUCTURE" includes all work required to remove all existing bridge components and hazard markers in accordance with the Standard Specifications. All materials removed are the property of the Contractor and will be disposed of off the right-of-way.

203-P01 EMBANKMENT: Site grading and fill placement at the bridge is to be completed a minimum of 8 months prior to pile driving to allow for settlement of the embankment. Finish grading at the bridge is to be completed after settlements have occured.

210-P01 EXCAVATION: Include the excavation costs at the abutments in the lump sum bid item, "CLASS 1 EXCAVATION."

210-P02 CHANNEL EXCAVATION: Dispose of any unsuitable or excess channel excavation material at a location outside the right-of-way determined by the Contractor and acceptable to the Engineer. Include all costs associated with excavating, hauling, depositing, and leveling the material in the unit price bid for "CHANNEL EXCAVATION."

602-P01 ENDWALLS: Place the endwall concrete after placement of beams.

602-P02 SURFACE FINISH "D": Apply Surface Finish "D" on all exposed substructure surfaces, the fascia of the exterior beams, and the exposed endwall. The color will be gray, color number 36424 meeting Federal Standard 595B.

602-P03 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the entire top surface of the Prestressed Bulb T Girders after joints have been grouted.

604-P01 PRESTRESSED BULB T GIRDER: Finish the tops of the Prestressed Bulb T Girders with a rough broom finish.

616-P01 STRUCTURAL STEEL: Use ASTM, Grade 36 structural steel for the intermediate diaphgrams.

622-P01 PILING: The piling shall meet AASHTO M 270, Grade 50.

622-P02 PILING: Drive piles with a diesel hammer capable of producing an energy and ram weight (minimum of 2,750 pounds) not less than 31,952 foot-pound-tons, as computed by the formula:

$W(E-12{,}936) + 0.494E$

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

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

622-P03 CORROSION PROTECTION MATERIAL: A slickcoat silicone epoxy (or equivalent) coating is to be applied to the bottom 15' of each pile. The Contractor will provide material certifications prior to construction for approval by the Engineer. The coating is to be applied per the manufacturers specifications. Include all costs for supplying and installing the corrosion protection material in the unit price bid item "STEEL PILING HP 10 X 42".

DESIGN STRENGTHS:

f'c = 3,000 PSI Class AE-3 Concrete (Required Minimum 28 Day Concrete Strength)
f'c = 7,000 PSI Prestressed Bulb T Girder Concrete
fy = 60,000 PSI Grade 60 Reinforced Steel

Load Resistance and Factor Design (HL-93)
15 PSF Future Wearing Surface

WORK DRAWINGS: Submit the following shop drawings to the Engineer of Record:

Prestressed Bulb T Girders
Railing

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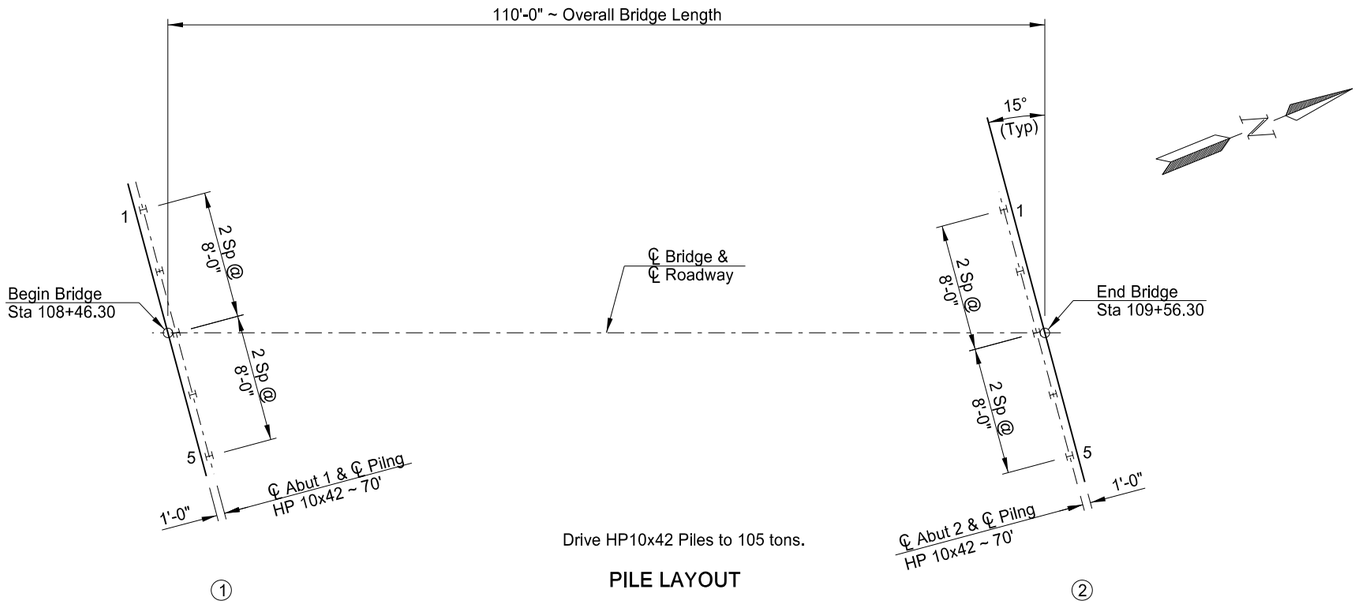
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

KLJ

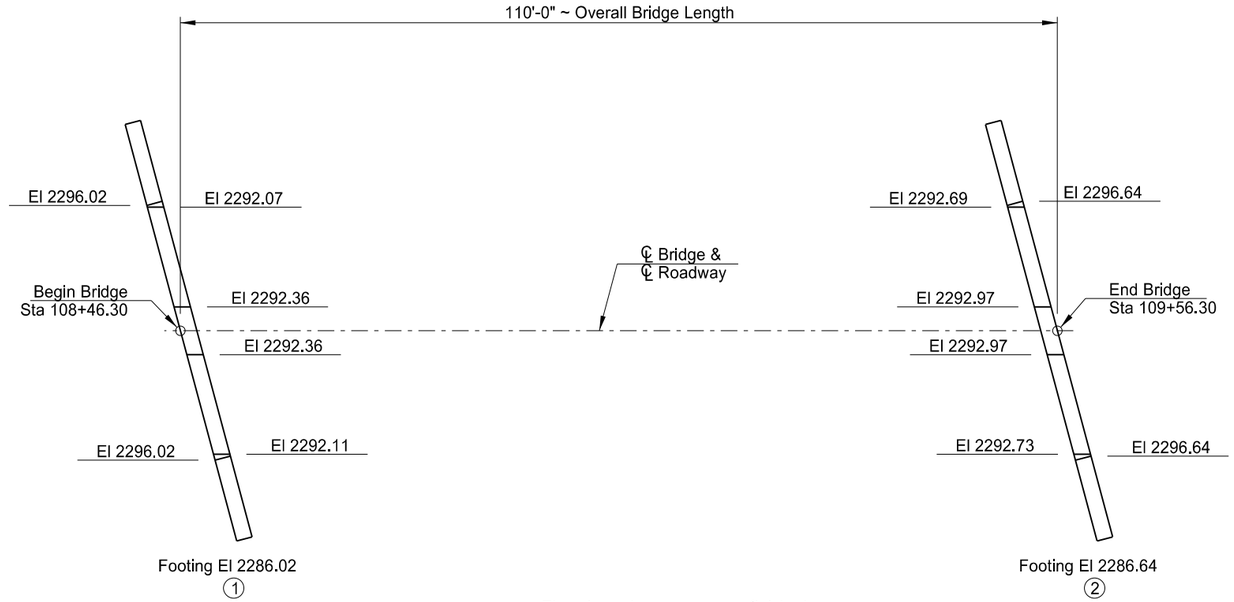
STRUCTURAL NOTES

DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	170	3



PILE LAYOUT



Elevations shown are to top 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).

PILE COORDINATES			
	PILE	NORTHING	EASTING
ABUT 1	1	578,812.77	1,132,576.04
	5	578,806.98	1,132,607.51
ABUT 2	1	578,910.24	1,132,622.39
	5	578,904.44	1,132,653.86

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PILING LAYOUT & BEARING ELEVATIONS

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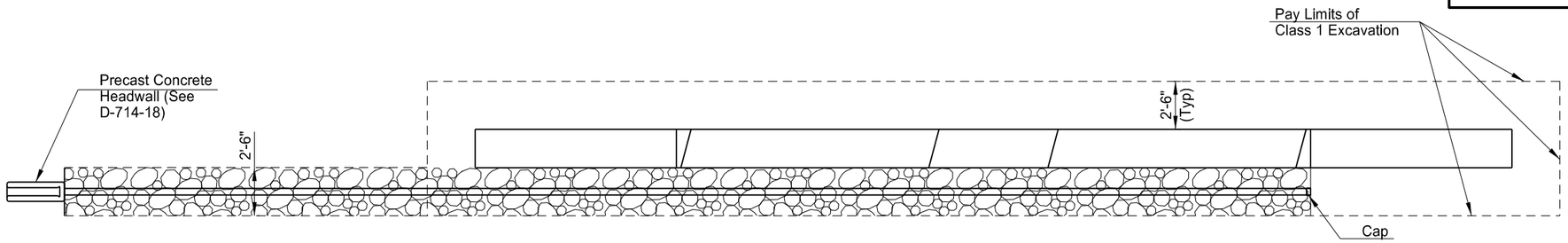
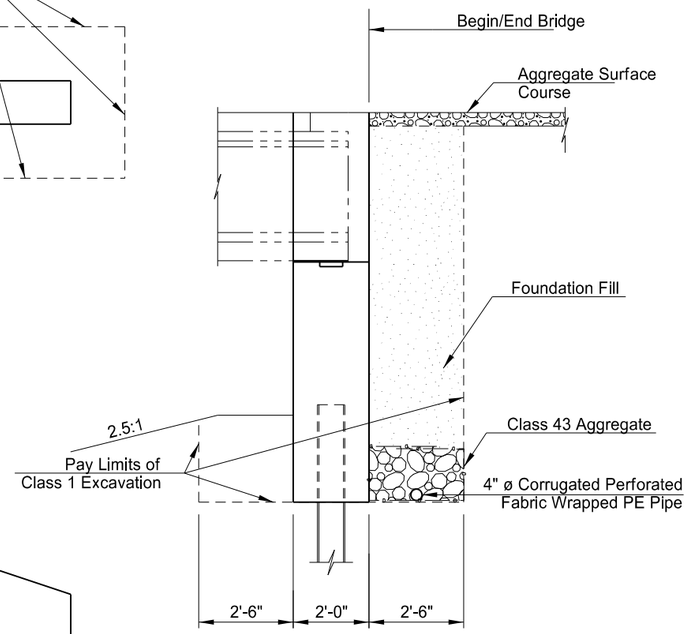
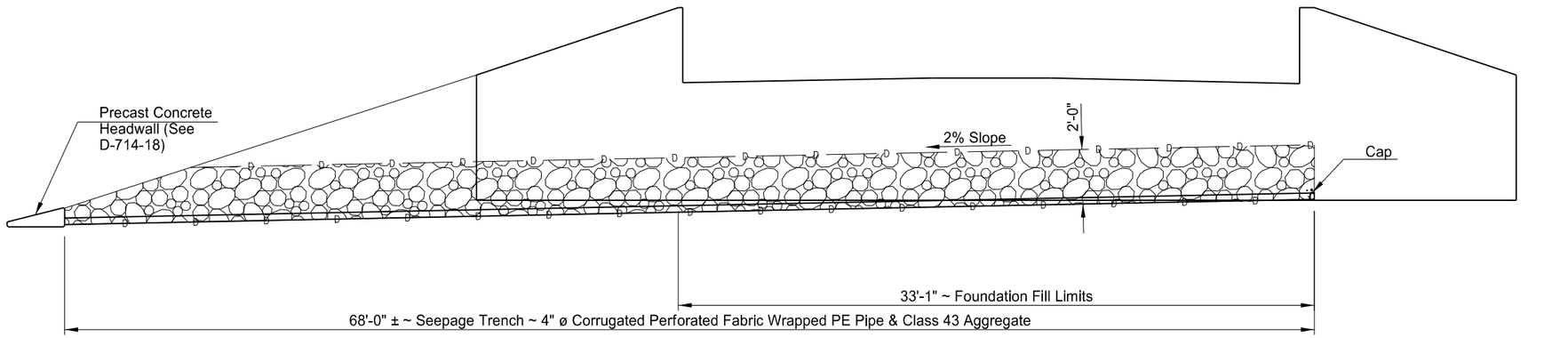
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	170	4



ABUTMENT PLAN



DETAIL AT ABUTMENTS 1 & 2



BACK FACE OF ABUTMENT

NOTES:

Use corrugated perforated fabric wrapped PE pipe that meets the requirements of Section 830.04 A.4. Provide fabric wrapping for the pipe that meets the requirements of Section 858.01 for D3 or D4 drainage fabric. 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 and headwalls in the pay item "Abutment Underdain System."

Abutment 2 shown, Abutment 1 similar with pipe outlet on the downstream side.

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KLJ

(SHOWING DIMENSIONS)
ABUTMENT DETAILS

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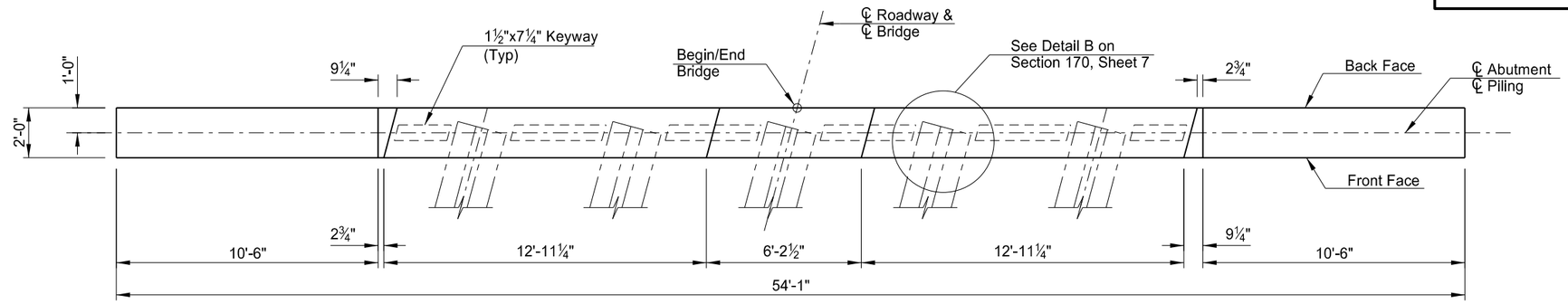
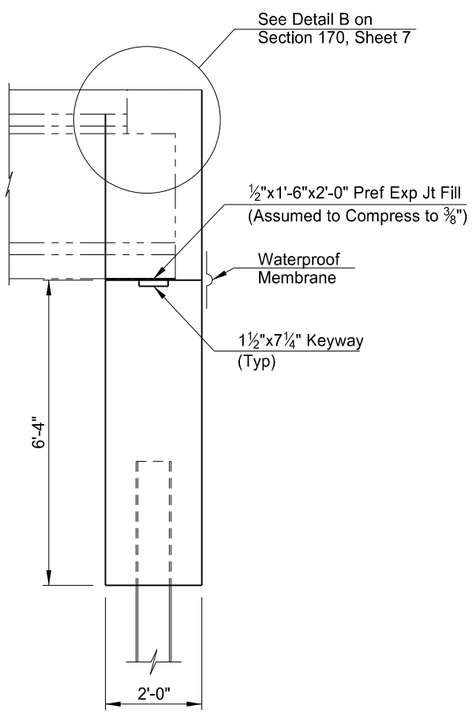
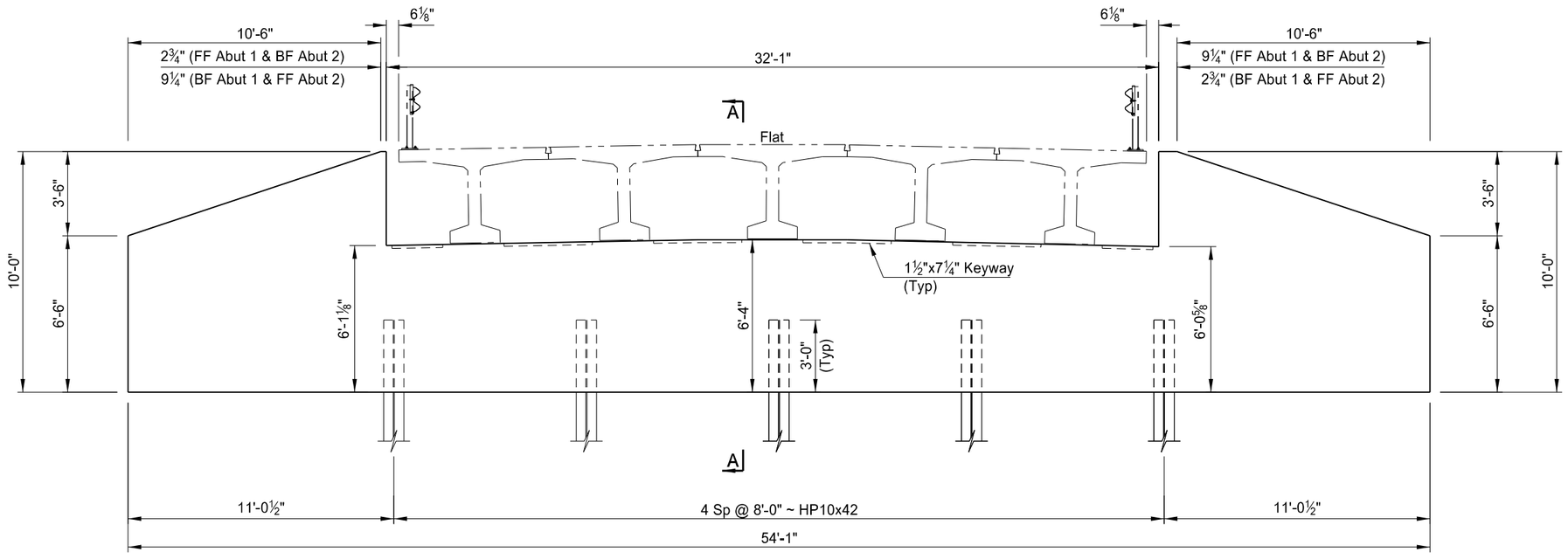


PLAN



A-A



ELEVATION

NOTE:
1. Elevation view shows Front Face of Abutment 1 facing South and the Back Face of Abutment 2 facing South.

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(SHOWING DIMENSIONS)
ABUTMENT DETAILS

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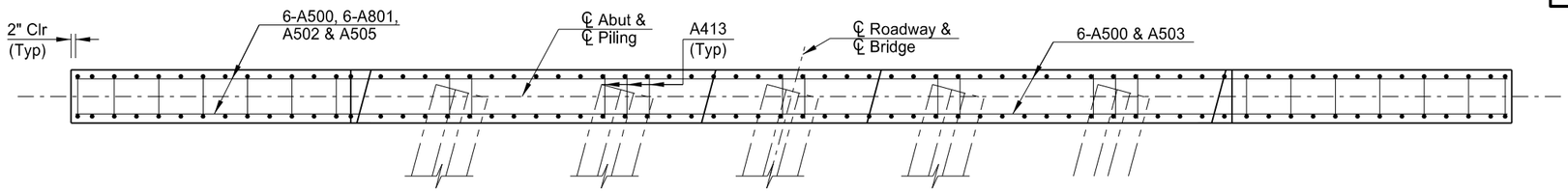
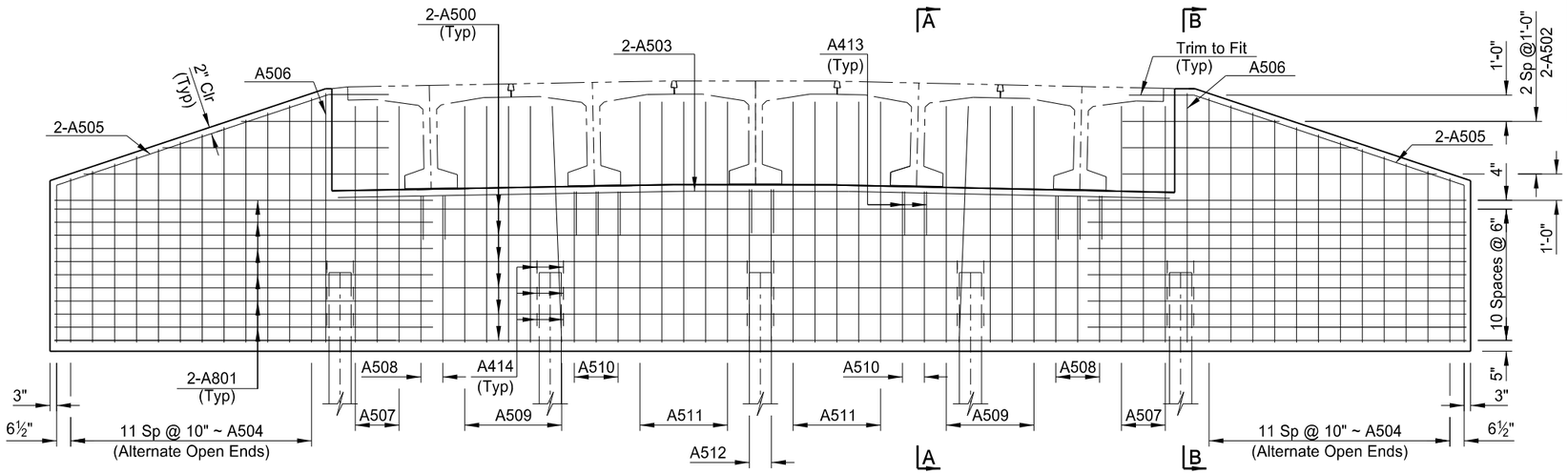
DMW	CDB	1803-00372

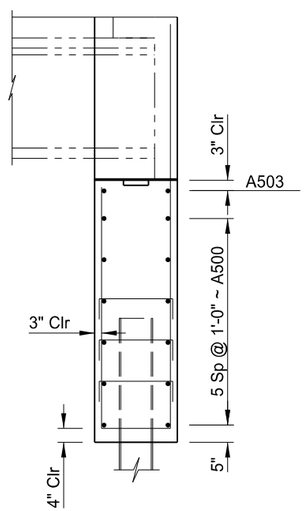
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	170	6



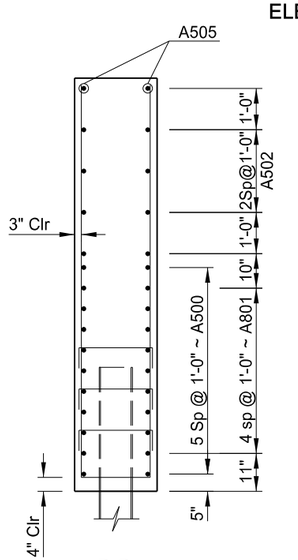
PLAN



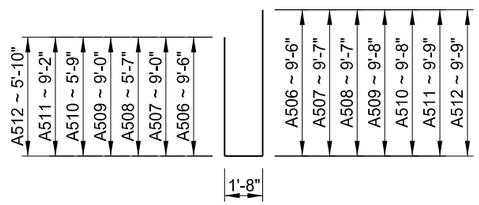
ELEVATION



A-A



B-B



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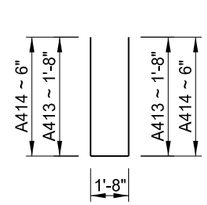

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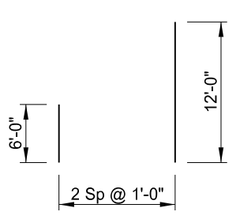

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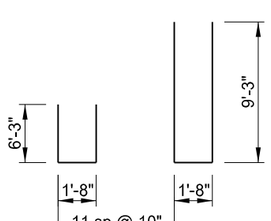

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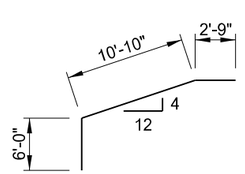

A505

NOTES:

1. Elevation view shows FF of Abutment 1 facing south & BF of Abutment 2 facing south

BAR LIST - ONE ABUTMENT

SIZE	MARK	NO.	LENGTH	SHAPE	LOCATION
5	A500	12	53'-9"	———	Abut Horizontal
8	A801	24	14'-5"	———	Wing Horizontal
5	A502	4	27'-0"	Set	Wing Horizontal
5	A503	2	32'-1"	———	Abut Horizontal
5	A504	2	206'-0"	Set	Wing Vertical
5	A505	4	19'-7"	⌐	Wing
5	A506	2	20'-8"	⌐¬	Wing Vertical
5	A507	6	20'-3"	⌐¬	Abut Vertical
5	A508	5	16'-10"	⌐¬	Abut Vertical
5	A509	10	20'-4"	⌐¬	Abut Vertical
5	A510	5	17'-1"	⌐¬	Abut Vertical
5	A511	10	20'-7"	⌐¬	Abut Vertical
5	A512	2	17'-3"	⌐¬	Abut Vertical
4	A413	12	5'-0"	⌐¬	Beam Seat
4	A414	30	2'-8"	⌐¬	Pile C-Bar

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QUANTITIES (ONE ABUTMENT)

CLASS AE-3 CONCRETE	28.4 CY
REINFORCING STEEL-GRADE 60	3,191 LBS

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(SHOWING REINFORCING) ABUTMENT DETAILS

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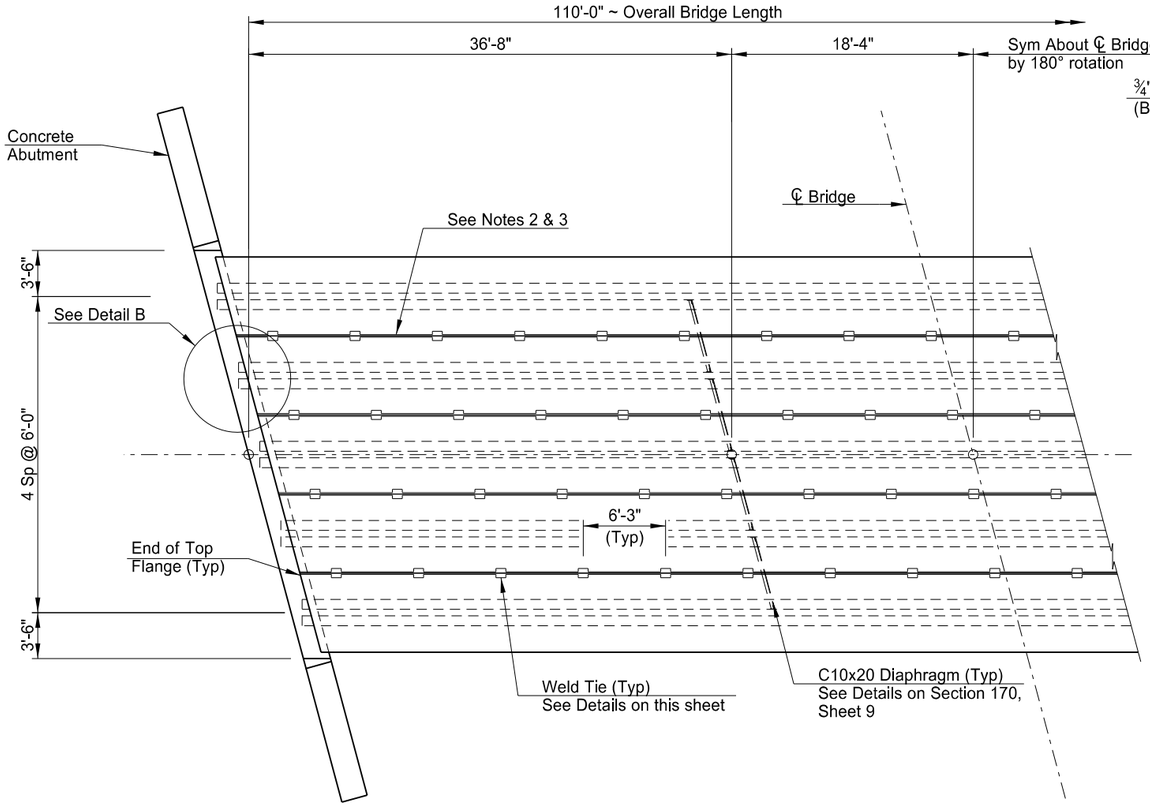
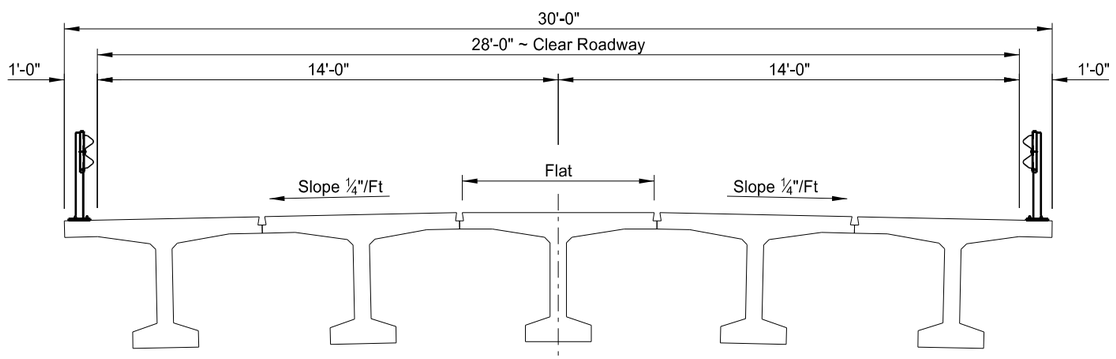
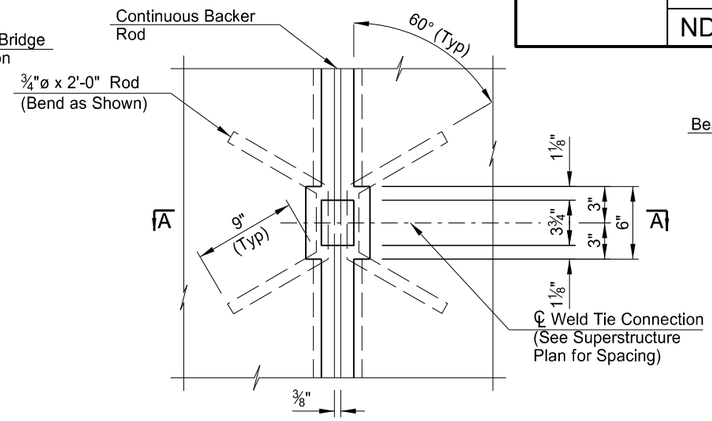


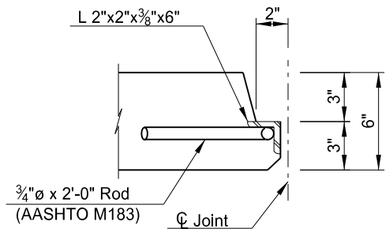
SUPERSTRUCTURE PLAN



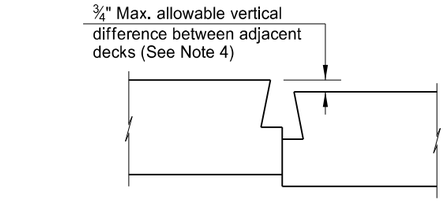
SUPERSTRUCTURE SECTION



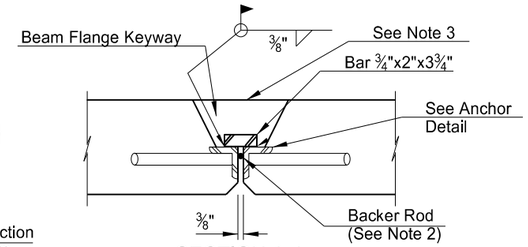
DETAIL A



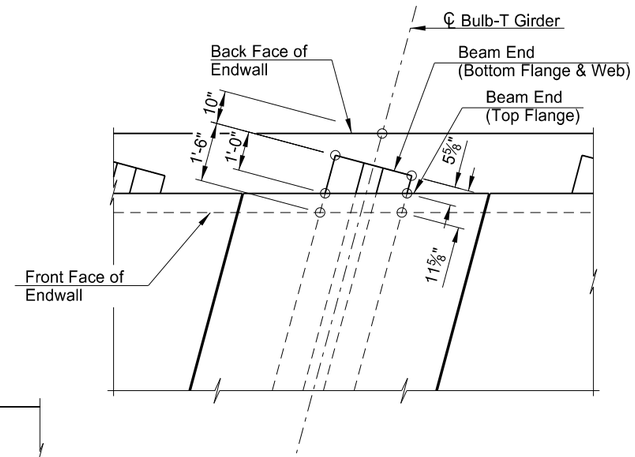
ANCHOR DETAIL



CONNECTION DETAIL



SECTION A-A
WELD TIE CONNECTION DETAIL



DETAIL B

NOTES:

1. See Section 170, Sheet 9 for C10x20 diaphragm connection notes.
2. Install ½" Backer Rod continuous between Abutments.
3. Fill all beam flange keyways continuously with fiber reinforced, non-shrink, non-metallic, non-gaseous, waterproof and freeze/thaw resistant grout with a 28-day compressive strength of at least 7,000 psi. Place grout after the end beam has been cast.
4. If the differential is more than ¾" maximum, this tolerance can be achieved by the contractor by several methods including but not limited to: lifting the end of a deck and stitch welding at points along the deck to meet specifications, loading a deck unit to bring into tolerance prior to welding, or in some situations shimming the end of the deck unit. Application of any method to install deck units to meet this specification is the Contractors responsibility and needs to be approved by the manufacturer and the Project Engineer prior to performing the work.
5. Inlcude all costs to furnish, place and weld ties, rods and angles, grout and other incidentals incorporated in the beam in the contract pay item "PRESTRESSED BULB T GIRDER".

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PRESTRESSED GIRDER DETAILS I

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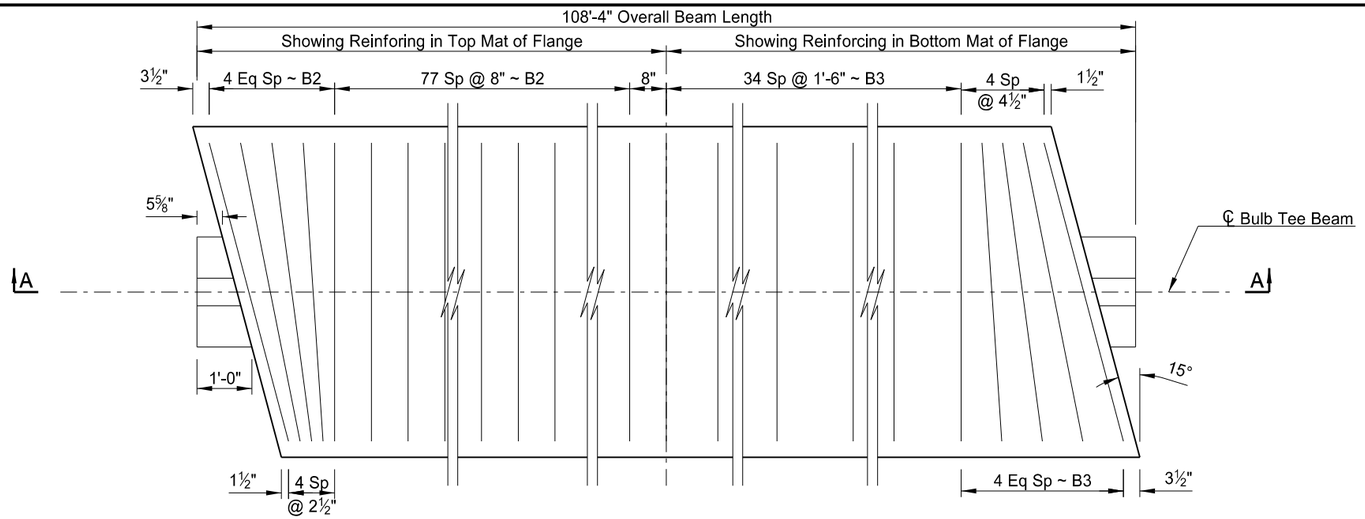
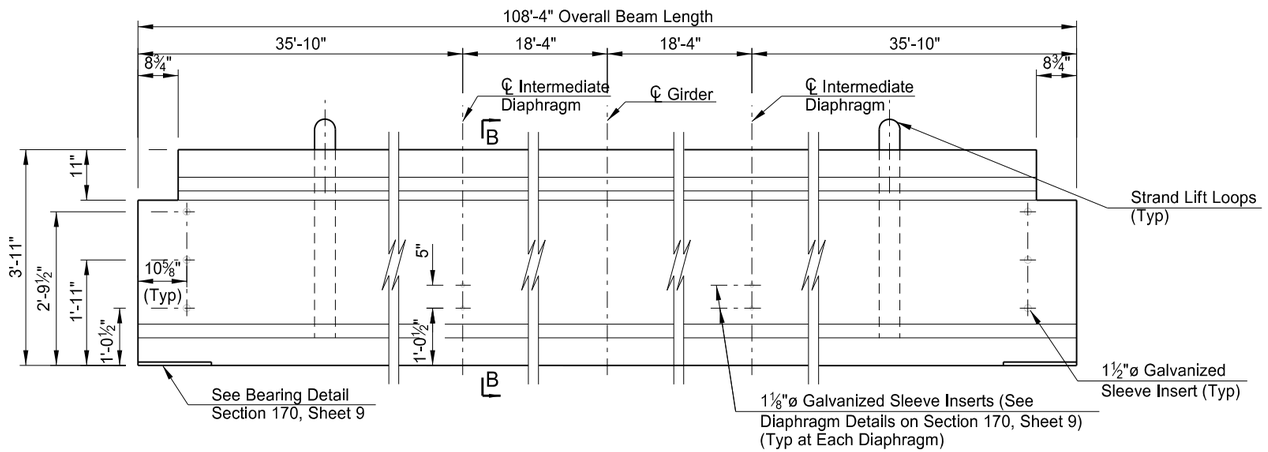
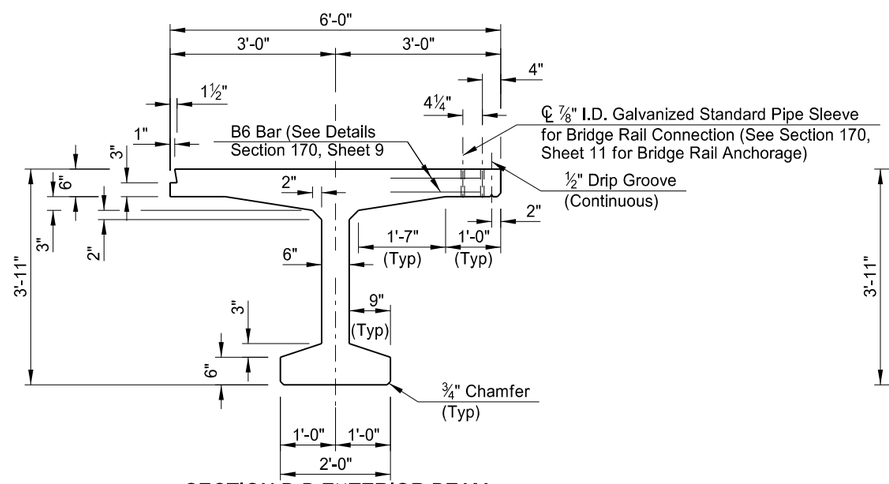
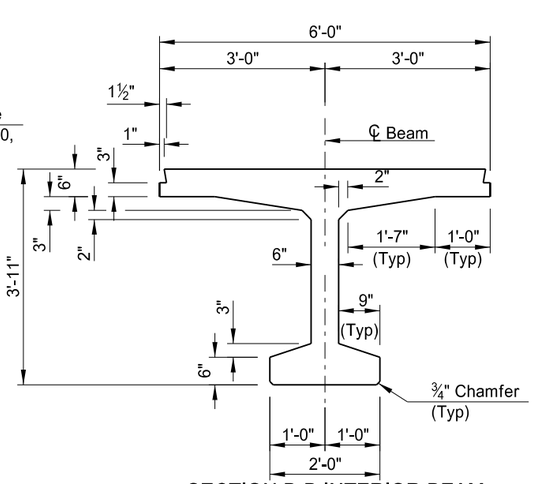




SECTION A-A



SECTION B-B EXTERIOR BEAM



SECTION B-B INTERIOR BEAM

PRESTRESSING DATA					
C.G.	FINAL FORCE	DETENSION STRENGTH	ACCEPTANCE STRENGTH	WEIGHT (TONS)	BEAM LENGTH
5.50"	953.3 k	5000 psi (Min)	7000 psi (Min)	52.0	109'-0"
6.50"	981.9 k				
7.50"	1012.3 k				

NOTES:

Submit the work drawings to the Engineer for review at least 14 days prior to forming or pouring any beams. Include in the work drawings the total initial prestress force and the losses in the prestress due to elastic shortening, shrinking or creeping of concrete, and the relaxation of steel stress as determined by the Contractor for his method of stressing.

Show the strand layout, pull down locations, tensioning forces, elongation, and any proposed changes in the reinforcing steel in the work drawings.

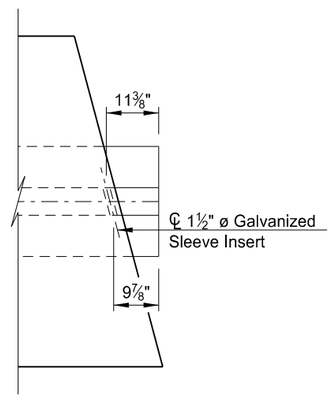
Select the final prestress force (remaining after all losses have been accounted for) and its corresponding center of gravity, from those on a curve determined by the three values shown in the "Prestressing Data" table.

Pour beams in all steel forms.

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

Provide handling hooks or devices as required by the Contractor. Install hooks or devices within 4'-0" of the end of beam. Remove handling hooks or lifting devices to a depth of 1 inch below the surface of concrete and fill holes with a non-shrink grout.

When setting beams, coordinate delivery of beams from the Manufacturer in such a way that provides beams with similar camber to be set adjacent to one another. Trowel grout as needed to smooth the driving surface along the flange joint.



SLEEVE INSERT DETAIL

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GOLDEN VALLEY, NORTH DAKOTA
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PRESTRESSED GIRDER DETAILS II

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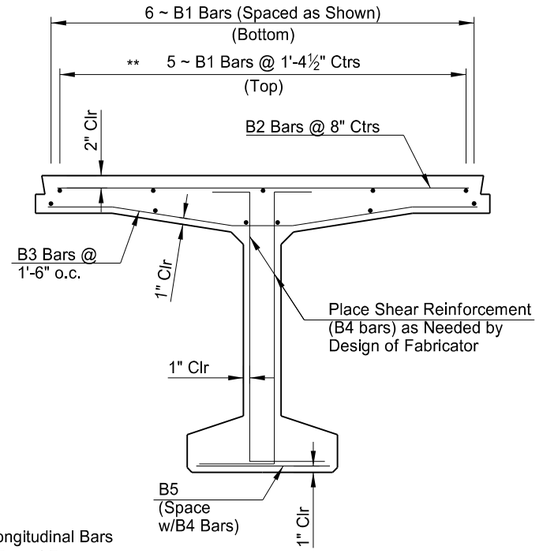
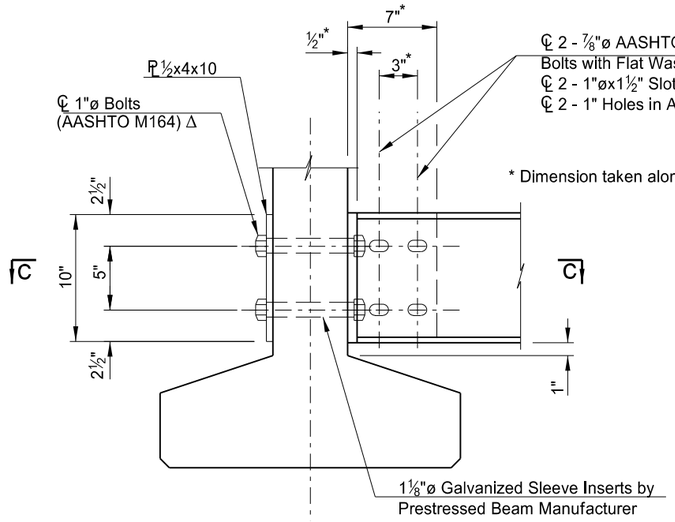
	ND	BRO-0017(020)	170	9

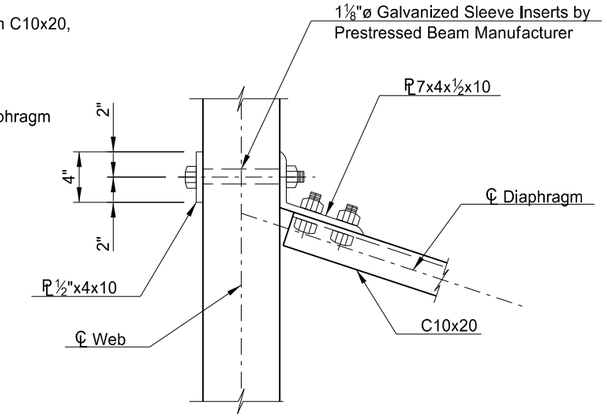


** NOTE:
Extend Top Longitudinal Bars
1'-4" Beyond End of Flange.

REINFORCING PLACEMENT DETAIL

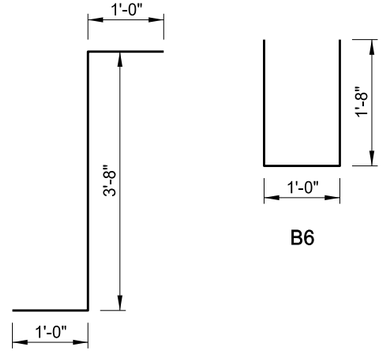


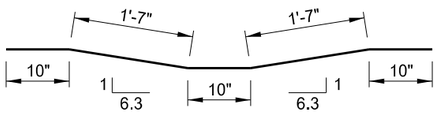
END SECTION



SECTION C-C

DIAPHRAGM DETAILS





B3

BAR LIST - ONE GIRDER (INCIDENTAL)				
MARK	NO.	SIZE	LENGTH	SHAPE
B1	22	4	55'-5"	Str.
B2	164	5	5'-5"	Str.
B3	77	4	5'-8"	Bnt.
*B4	320	4	5'-8"	Bnt.
*B5	160	4	1'-8"	Str.
**B6	68	5	4'-4"	Bnt.

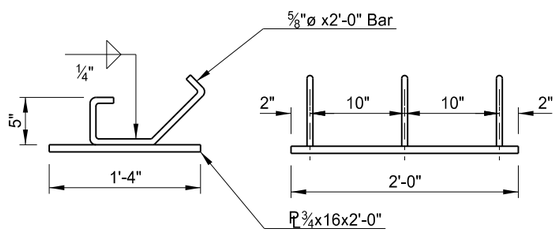
*Actual Number of B4 & B5 bars to be determined by the Manufacturer
**Ext. Beams Only

NOTES:
1. Galvanize steel diaphragms, plates and bolts in accordance with the Standard Specifications.
2. Include all costs associated with furnishing and placing steel diaphragms, channels, plates, angles, and bolts incidental to the diaphragms in the contract pay item "STRUCTURAL STEEL".
3. Use the slotted holes to adjust for the Bulb-T web being out of plumb while the C10 x 20 is level. Provide a minimum ¼" gap between the end of the C10 x 20 and the ∠ 7" x 4" x½". Show assembled detail on the shop drawings.

Δ 4. Tighten bolts to a bolt tension of 25,500 lbs.

ΔΔ 5. Tighten bolts to a bolt tension of 39,000 lbs.

6. Install diaphragms immediately after setting the beams in place. Tighten the bolts through the beam web and hand-tighten the channel to the clip angle bolts. Perform the final tightening of the channel to the clip angle bolts after field leveling and welding the tie connections, but prior to grouting the keyway.



(Bearing plate to be Structural Steel M 270 Grade 36 hot dipped galvanized, and included in the bid price for the girder.)

BEARING DETAIL

BRO-0017(020)
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

KLJ

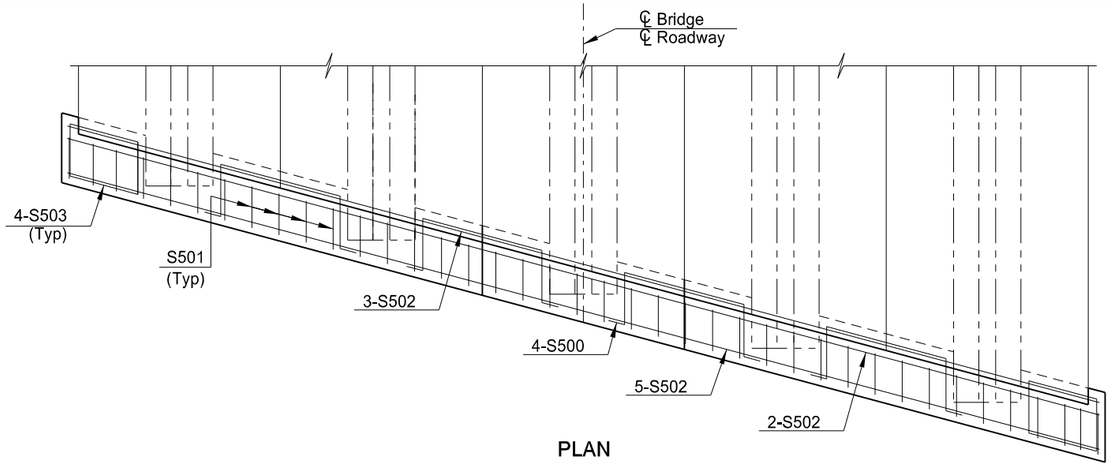
PRESTRESSED GIRDER DETAILS III

DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

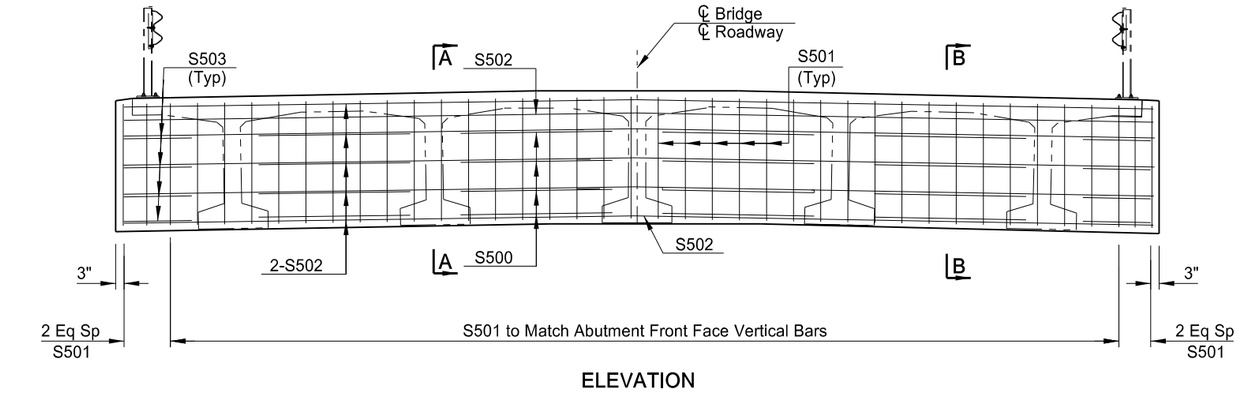
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRO-0017(020)	170	10

BAR LIST - ONE END BEAM

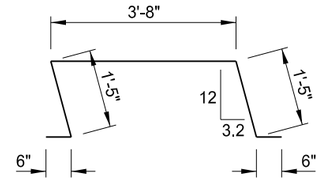
SIZE	MARK	NO.	LENGTH
5	S500	16	7'-6"
5	S501	40	5'-4"
5	S502	10	31'-9"
5	S503	8	7'-10"



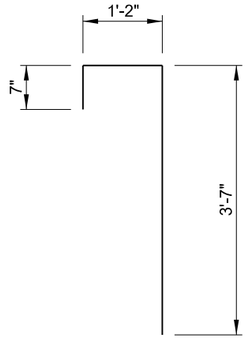
PLAN



ELEVATION



S500



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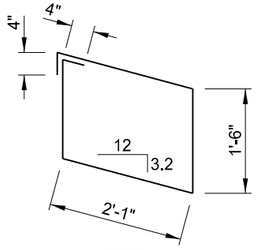

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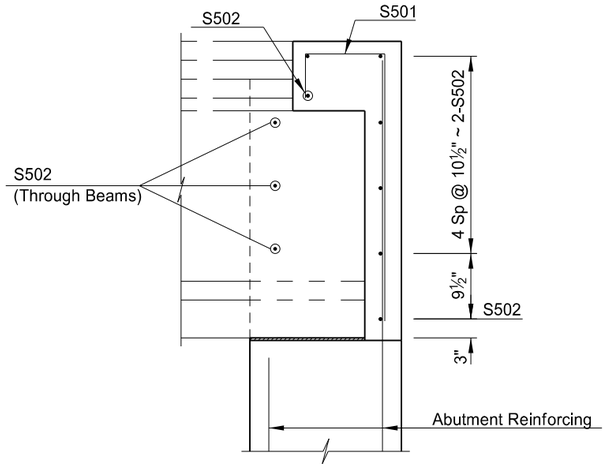
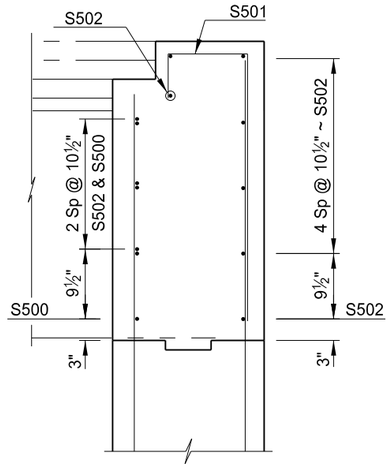


A-A



B-B

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QUANTITIES	(ONE END BEAM)
CLASS AE-3 CONCRETE	8.5 CY
REINFORCING STEEL-GRADE 60	744 LBS

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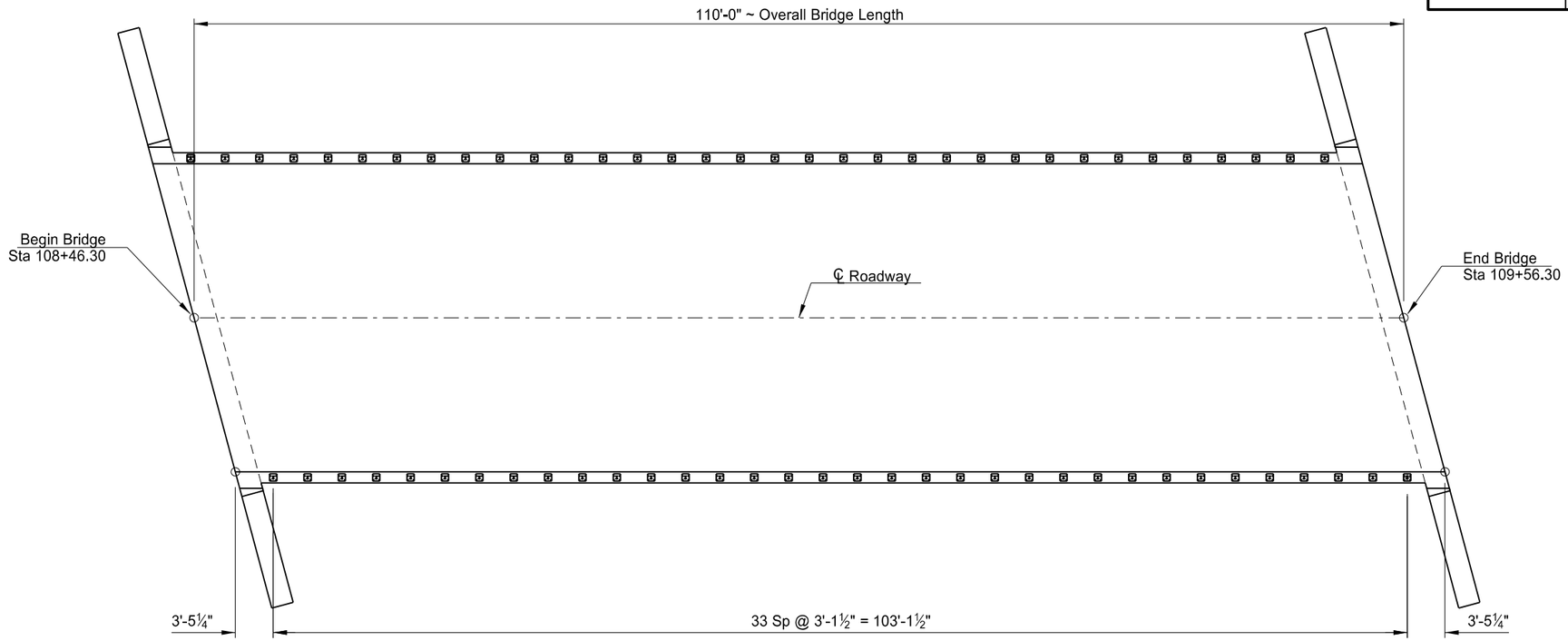
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

KLJ

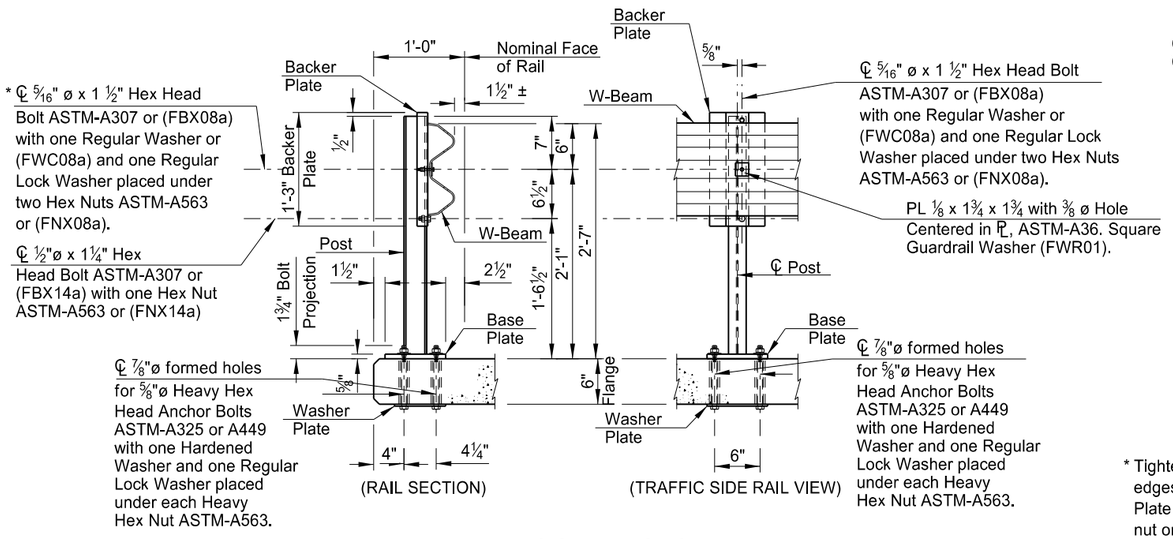
END BEAM DETAILS

DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

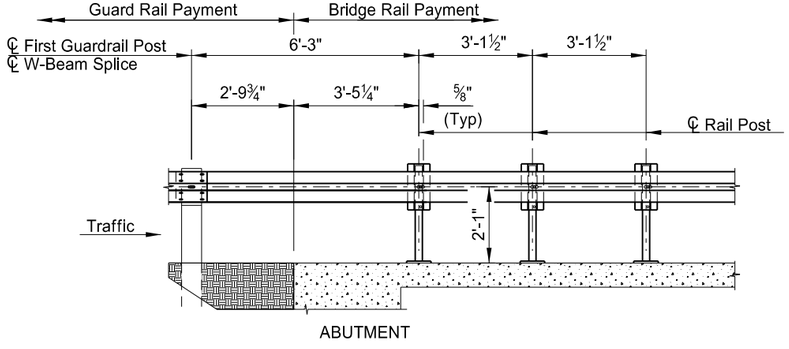
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	170	11



PLAN



RAIL DETAILS ON BRIDGE SLAB



(AT BEGIN BRIDGE)

INSIDE ELEVATION OF RAIL

* Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

NOTE:

1. Bridge Rail Post spacings are measured along nominal face of rail.

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QUANTITIES	
RAILING	220 LF

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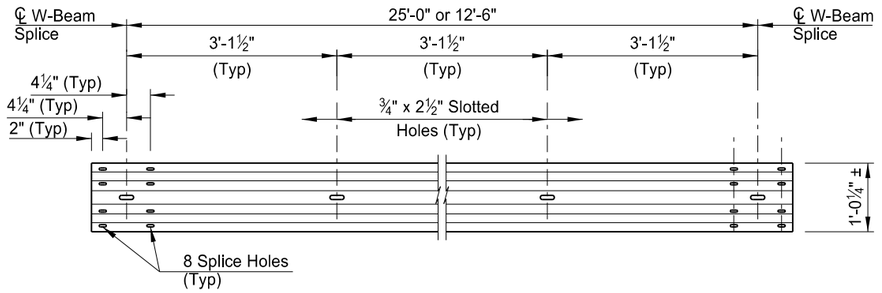
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

BRIDGE RAIL LAYOUT

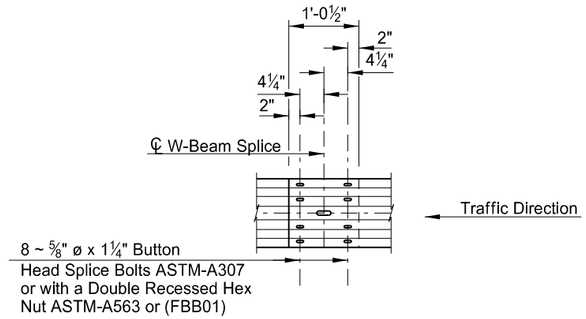
DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

5/2/2019 5:09:51 PM charlesbowen \\dksn-panz01\Data\IP\DKSN\P\County\ND\GoldenValley\1803_00372\CAD\Bridge\170BR_011_RAIL.DGN

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	170	12



W-BEAM ELEVATION



W-BEAM SPLICE ELEVATION

CONSTRUCTION NOTES:

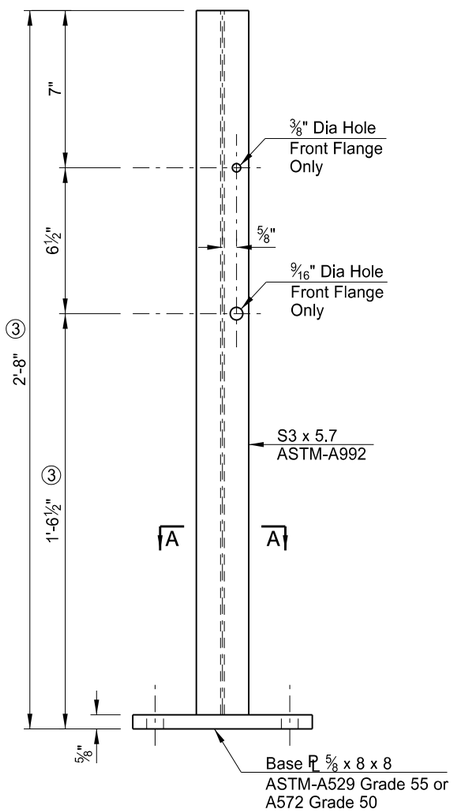
Install post perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding prior to galvanizing. Work drawings are required for this rail.

MATERIAL NOTES:

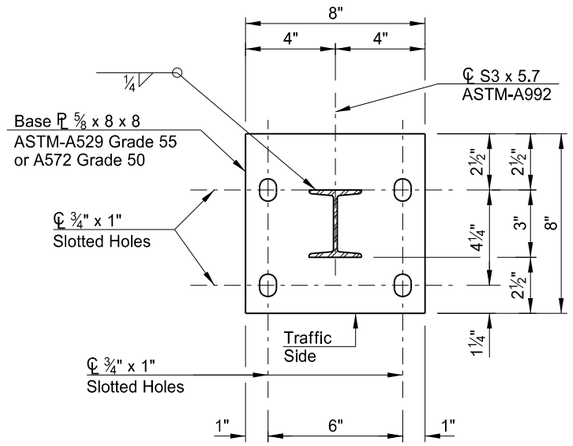
Galvanize all steel components. Use anchor bolts for base plates that are ⅝" Dia ASTM-A325 or A449 bolts with one hardened washer and one regular lock washer placed under each heavy hex nut. Use nuts conforming to A563 requirements.

Use W-beam meeting the requirements of Section 862 of the Standard Specifications except as modified in these plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (Nominal) lengths. Use W-Beams with slotted holes at 3'-1½".

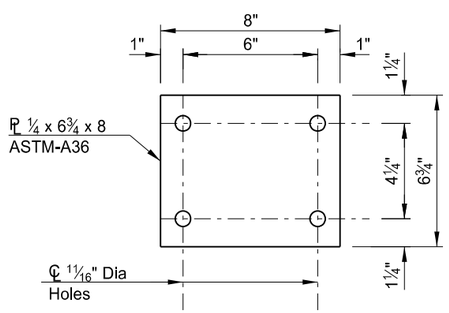


③ Increase 2" for structures with overlay.

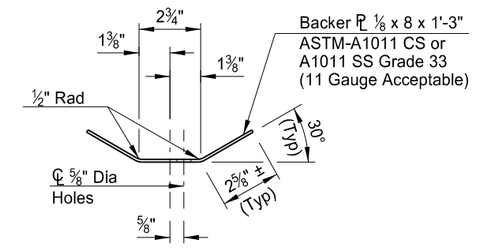
POST ELEVATION



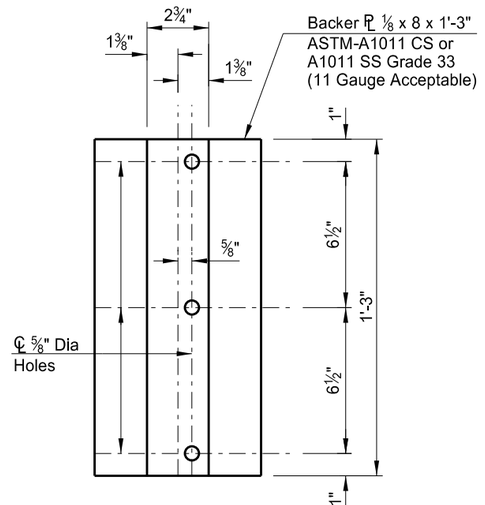
SECTION A-A



WASHER PLATE DETAIL



(PLAN)



(ELEVATION)
BACKER PLATE

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GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

BRIDGE RAIL DETAILS

DRWN. BY	CHK'D. BY	PROJECT NO.
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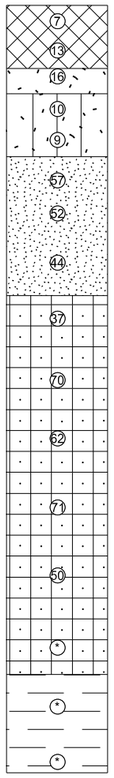
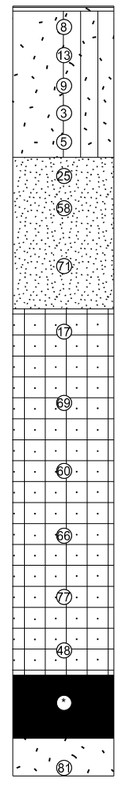
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	175	1

2276.7	0	FILL
2271.7	5.0	POORLY GRADED SAND w/GRAVEL
2269.7	7.0	SILTY SAND w/GRAVEL
2264.7	12.0	TONGUE RIVER FORMATION, SANDSTONE
2253.7	23.0	TONGUE RIVER FORMATION, CLAYSTONE
2223.7	53.0	* 80/10" TONGUE RIVER FORMATION, SILTATION
2215.9	60.8	* 80/10" * 99/10"



ST-01
Sta 108+52.10
9.0' RT
(8/18/2018)

2277.2	0	FILL
2277.1	0.1	SANDY LEAN CLAY
2276.8	0.4	POORLY GRADED SAND w/SILT
2265.2	12.0	TONGUE RIVER FORMATION, SANDSTONE
2253.2	24.0	TONGUE RIVER FORMATION, CLAYSTONE
2224.2	53.0	TONGUE RIVER FORMATION, LIGNITE
2219.2	58.0	* 105/9" TONGUE RIVER FORMATION, SANDSTONE
2216.2	61.0	



ST-02
Sta 109+56.70
3.5' LT
(8/18/2018)

NOTES:

1. The encircled numbers indicate the number of blows delivered by a 140 lb. automatic hammer from a height of 30" to drive a 2" o.d. split-barrel sampler 1'-0".

2. The boring data shown is for Owner's design and estimating purposes only. The boring logs are only representative of the exact location from which the samples were taken and interpretation between sample locations is discouraged. The Owner assumes no responsibility if the soil conditions encountered during construction differ from those shown.

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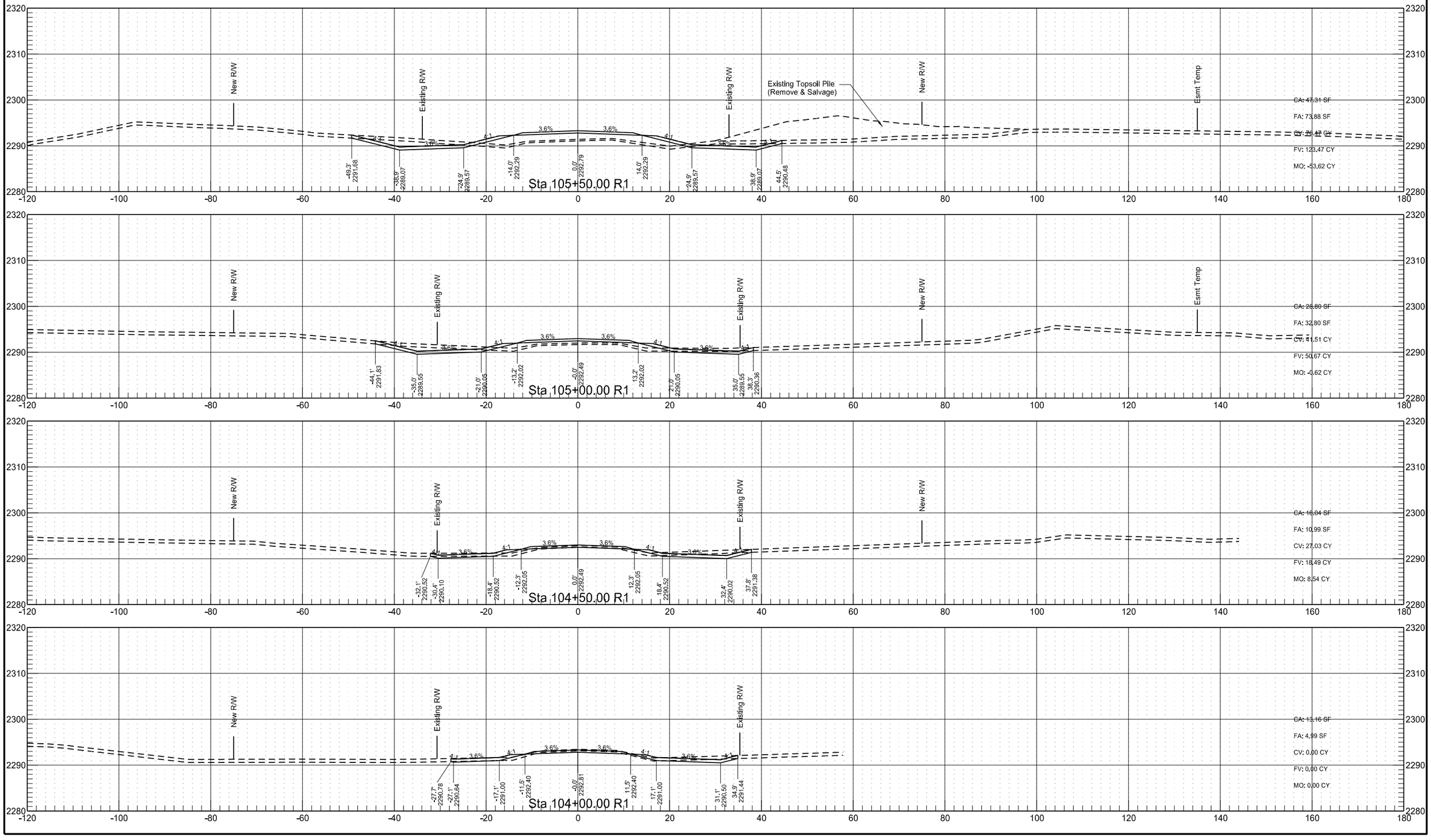
GOLDEN VALLEY, NORTH DAKOTA
STRUCTURE #17-109-09.0

SOIL BORINGS

DRWN. BY	CHK'D. BY	PROJECT NO.
DMW	CDB	1803-00372

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	200	1



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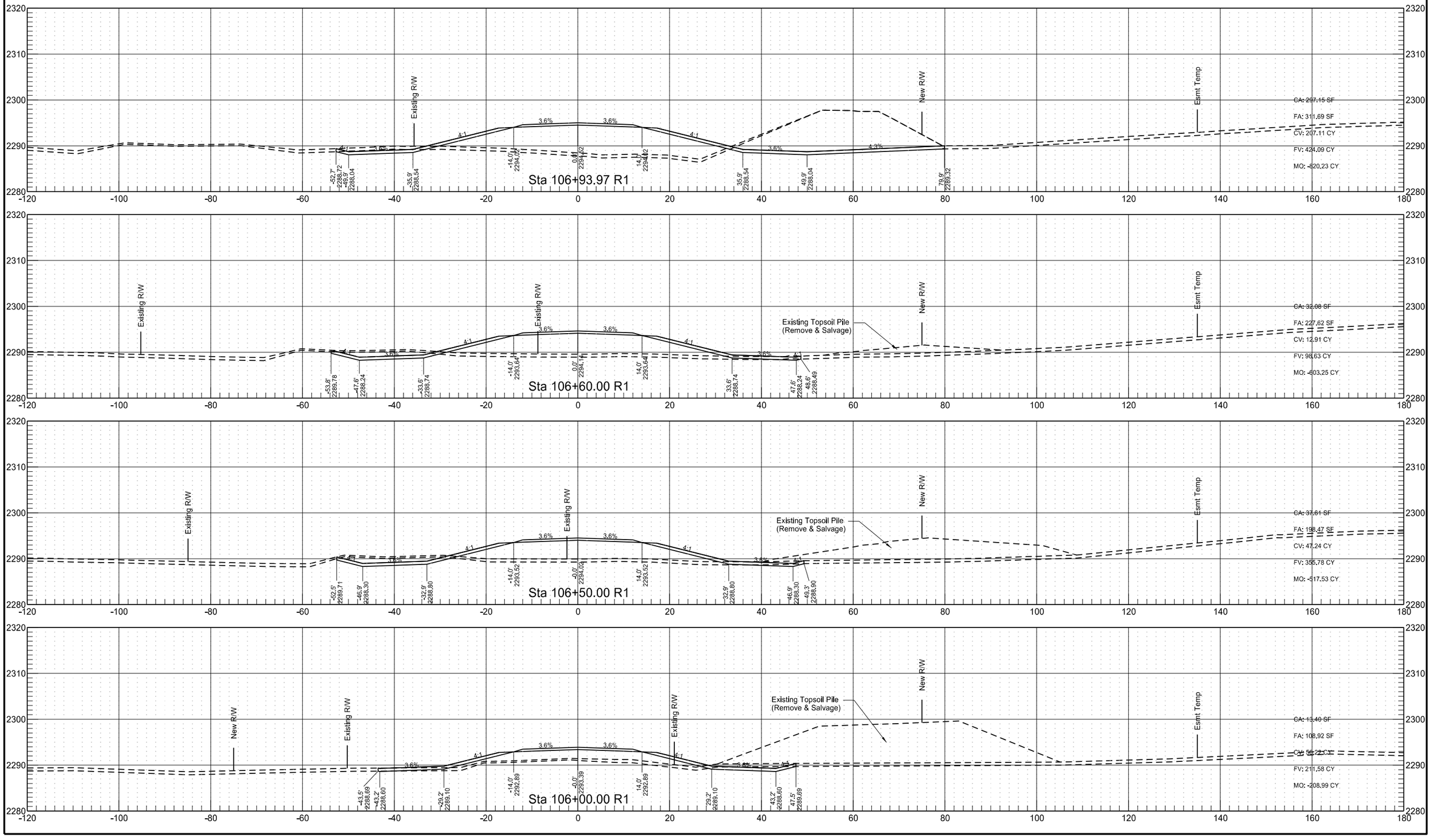
	ND	BRO-0017(020)	200	2



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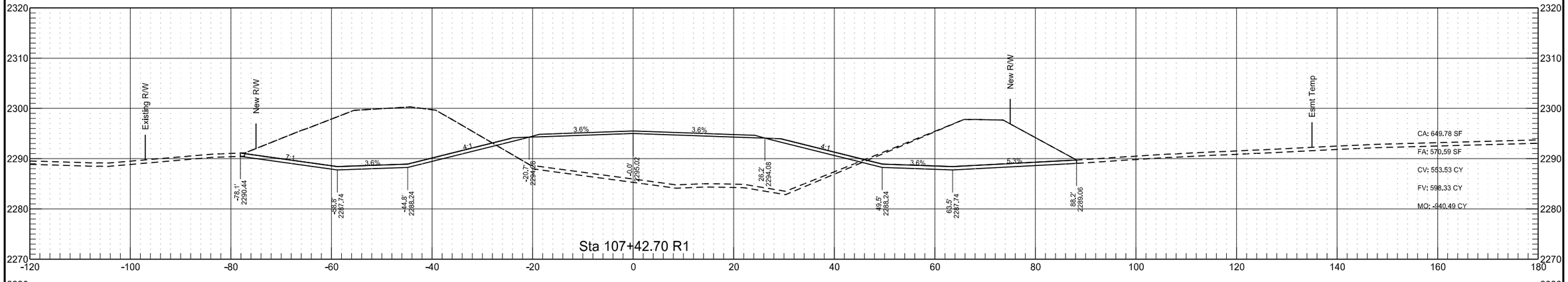
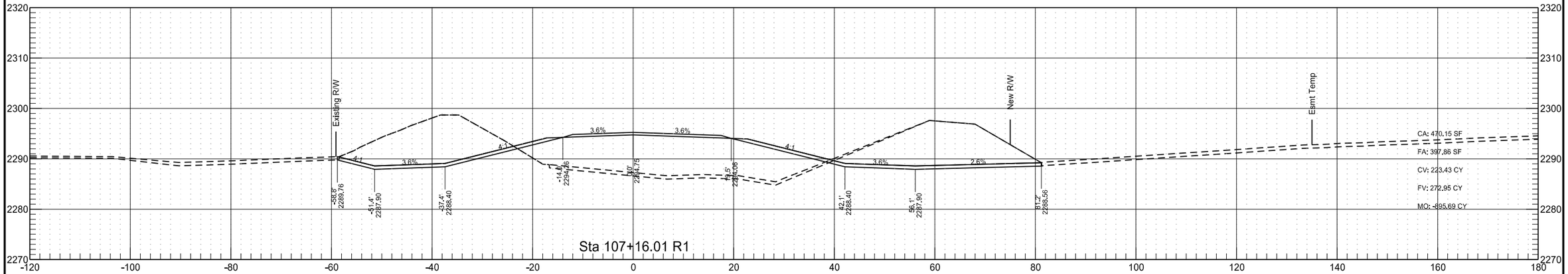
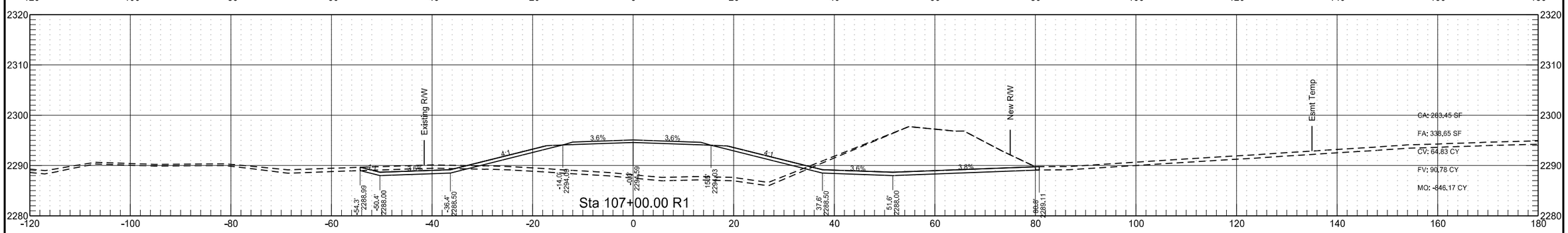
	ND	BRO-0017(020)	200	3







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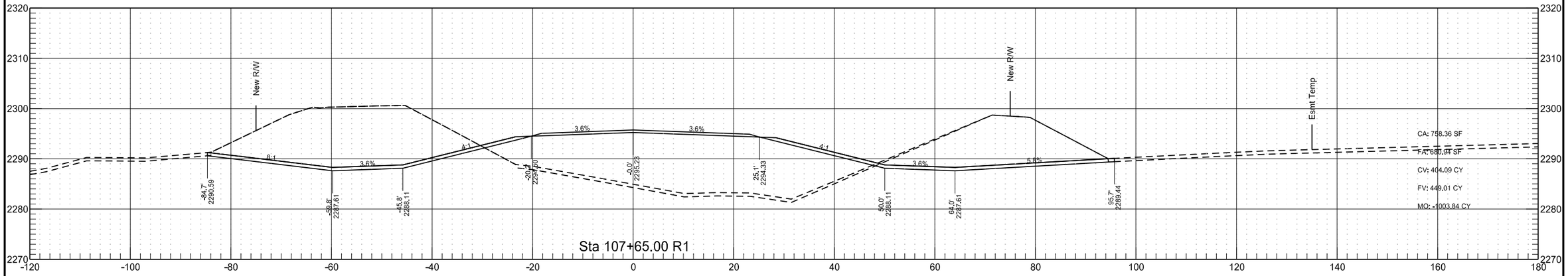
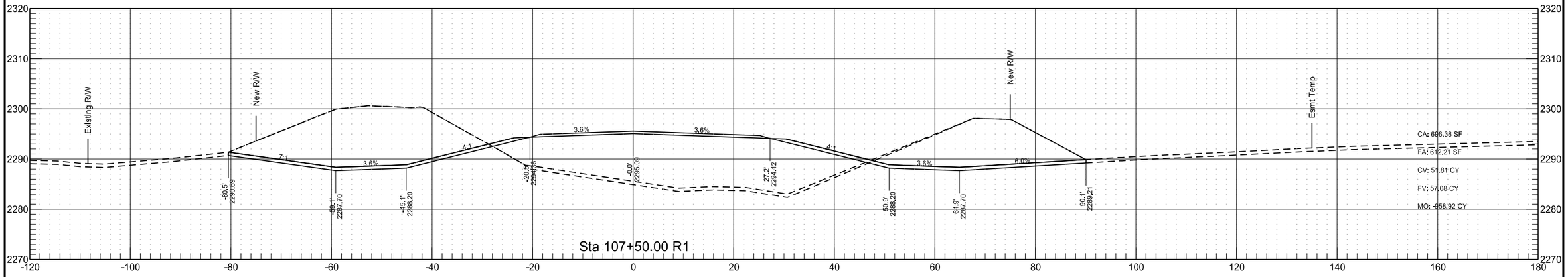
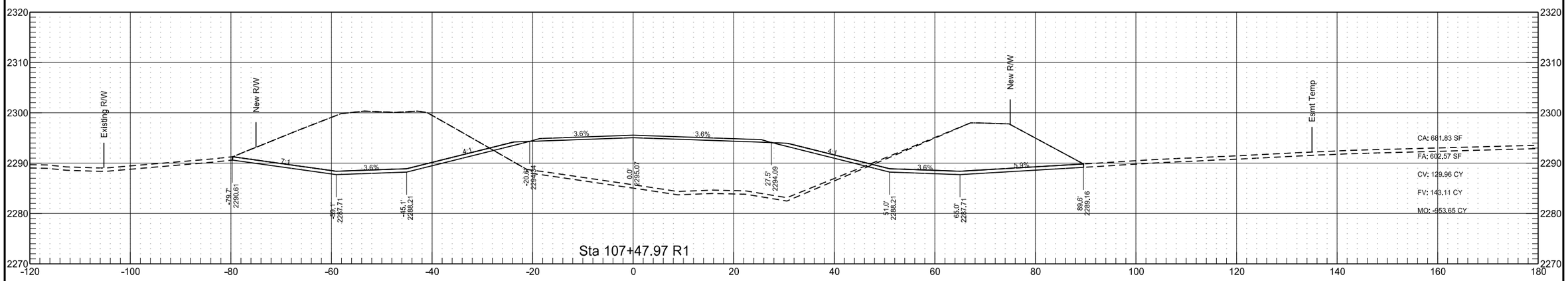
	ND	BRO-0017(020)	200	4







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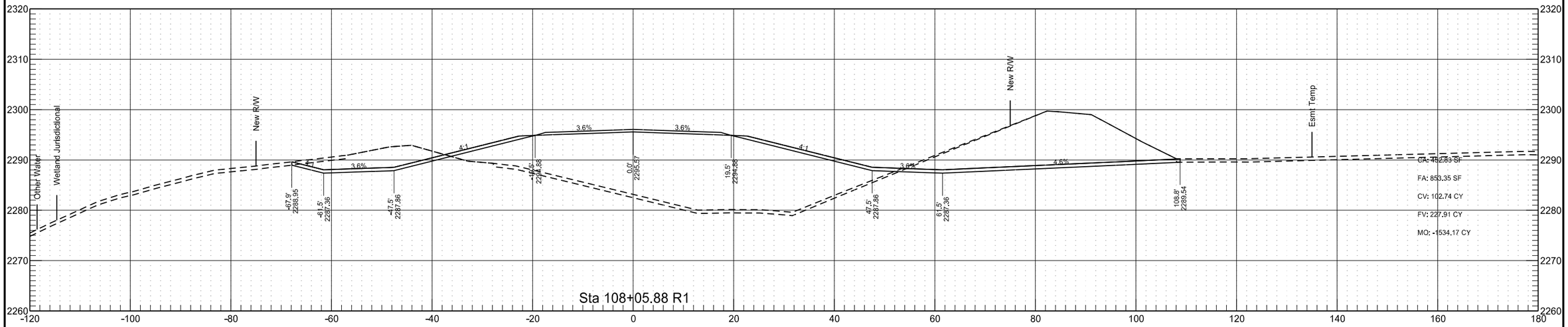
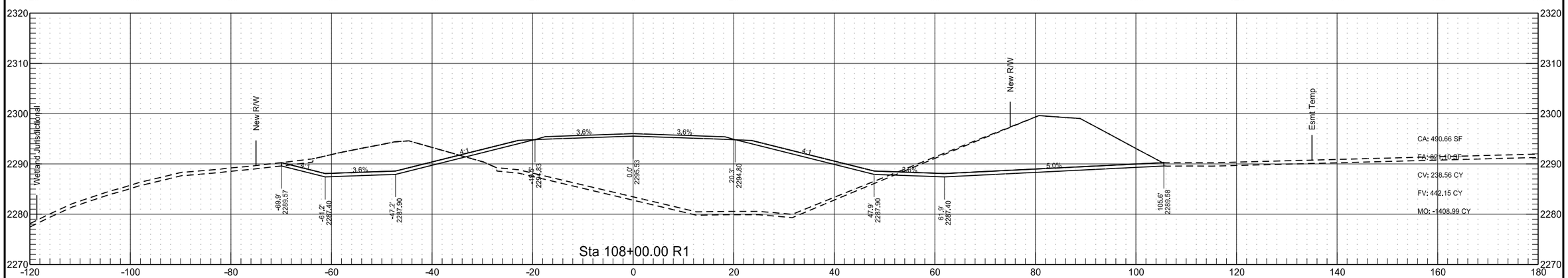
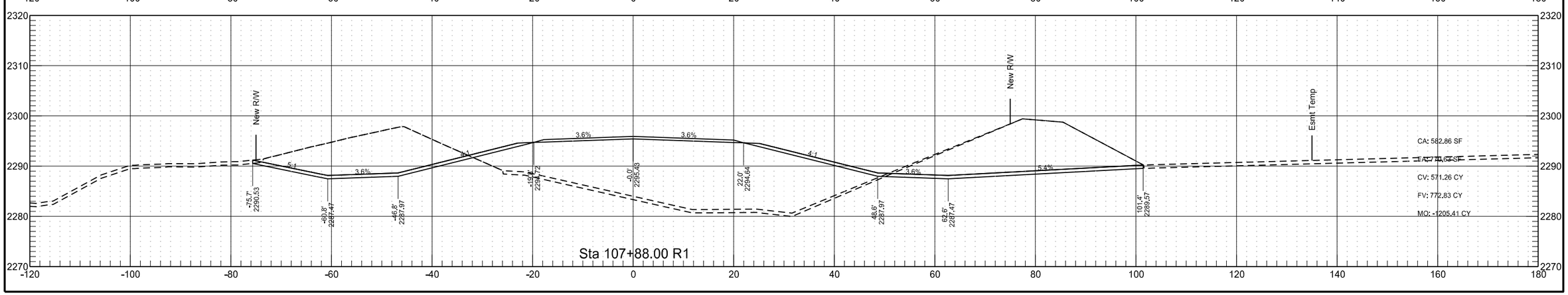
	ND	BRO-0017(020)	200	5







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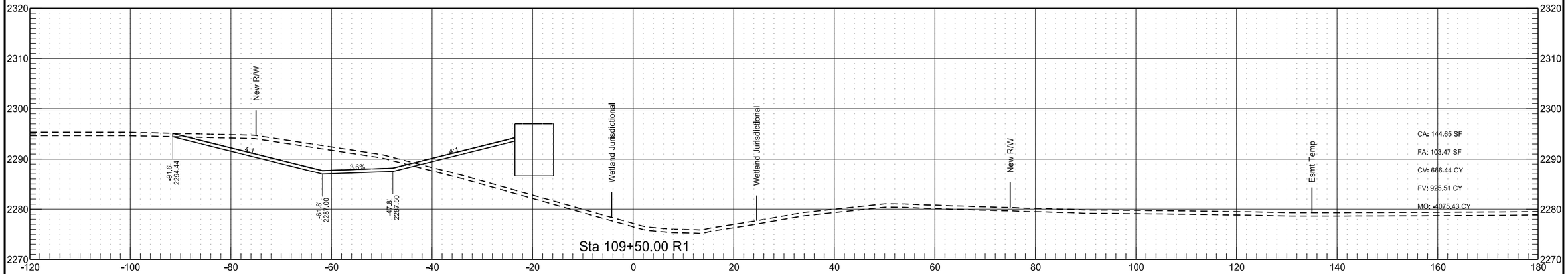
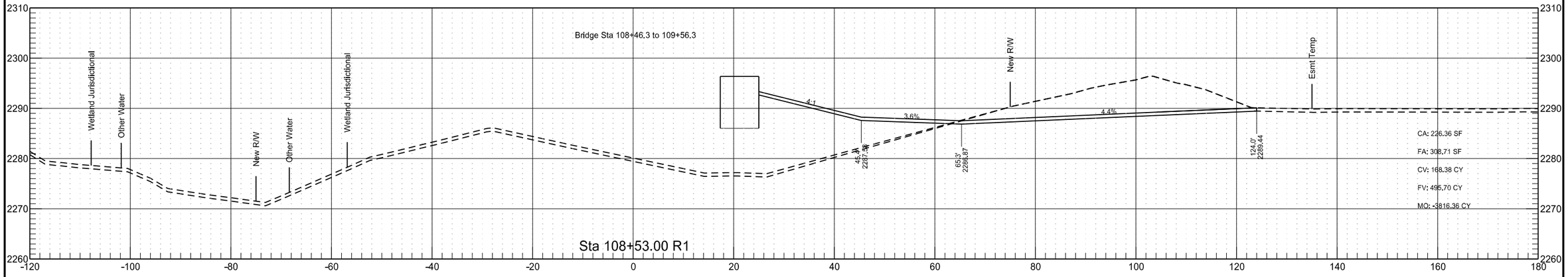
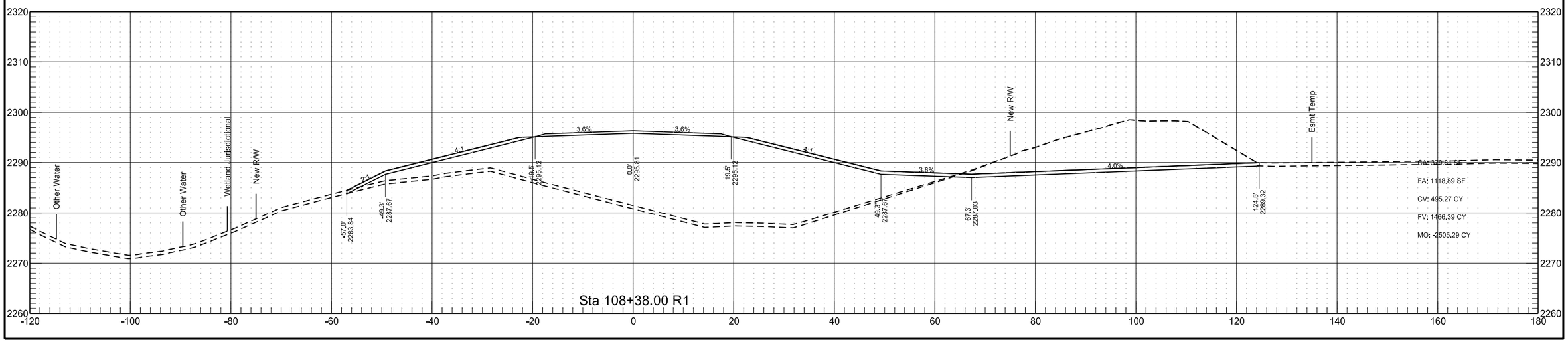
	ND	BRO-0017(020)	200	6







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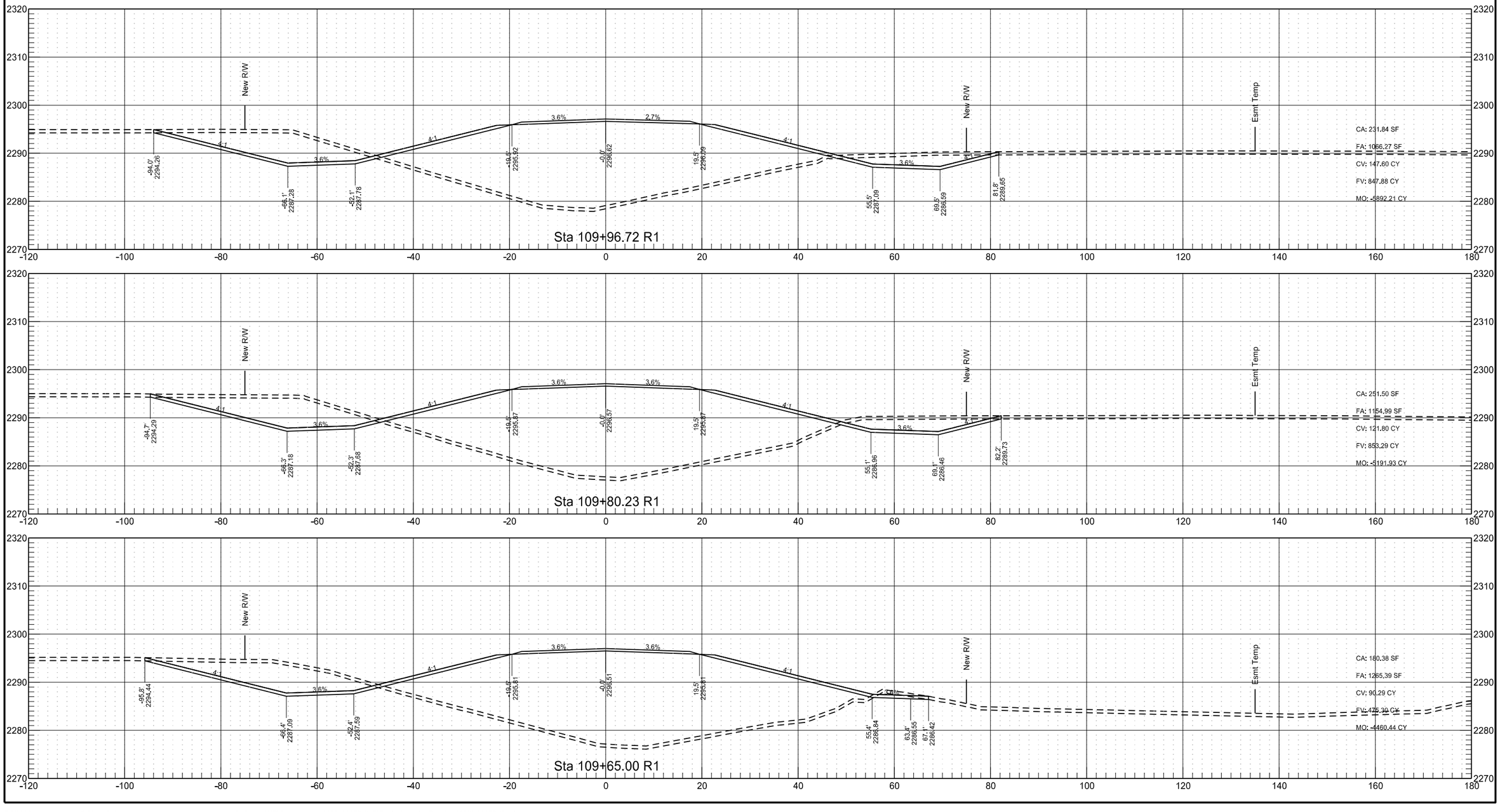
	ND	BRO-0017(020)	200	7



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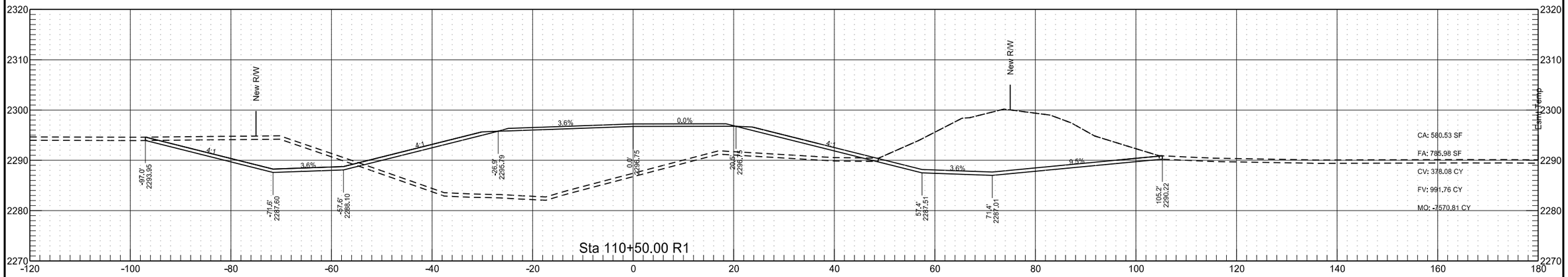
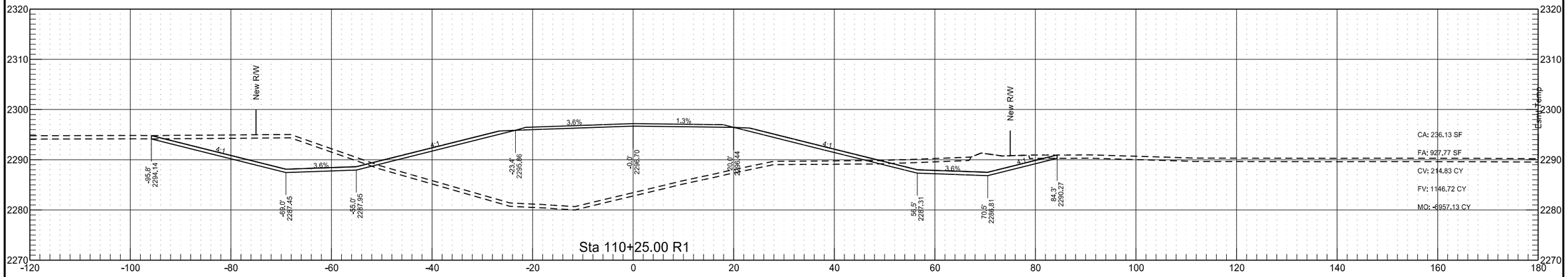
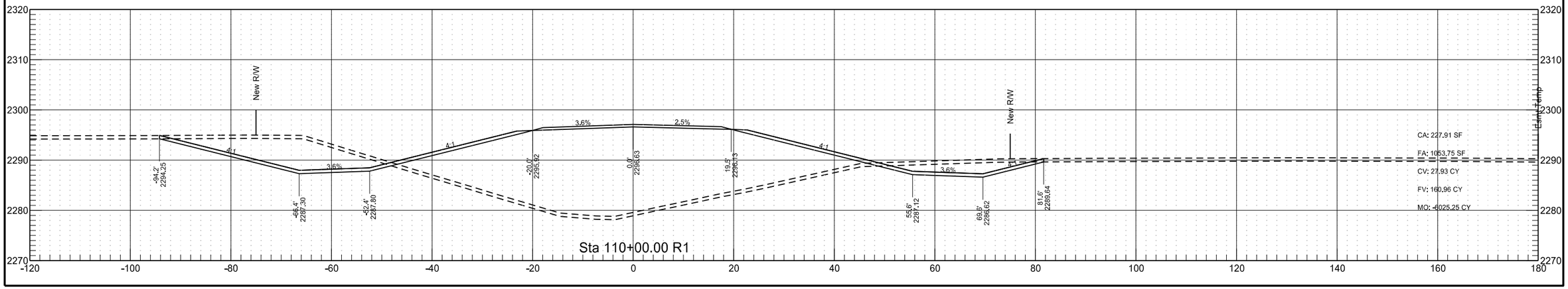
	ND	BRO-0017(020)	200	8







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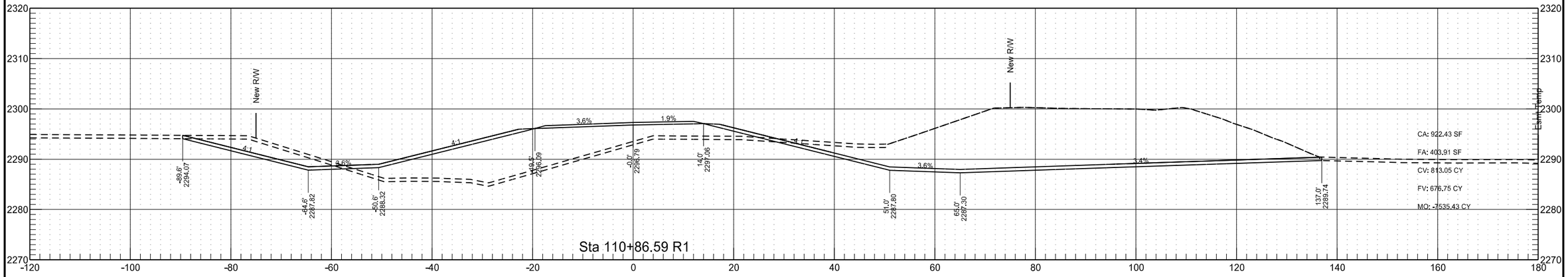
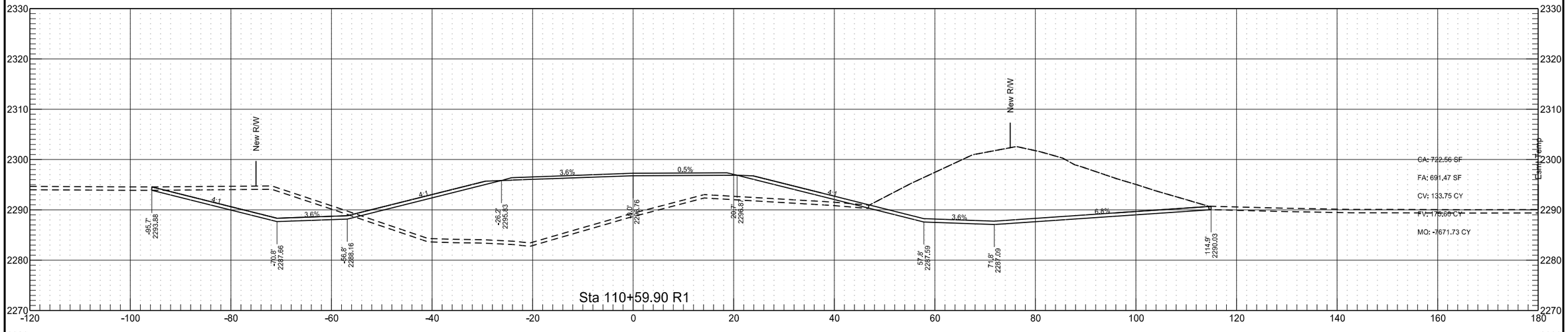
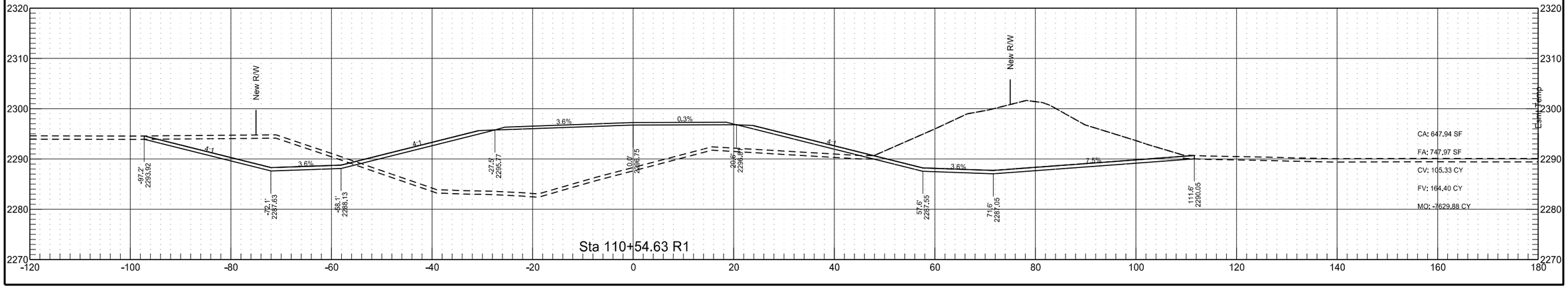
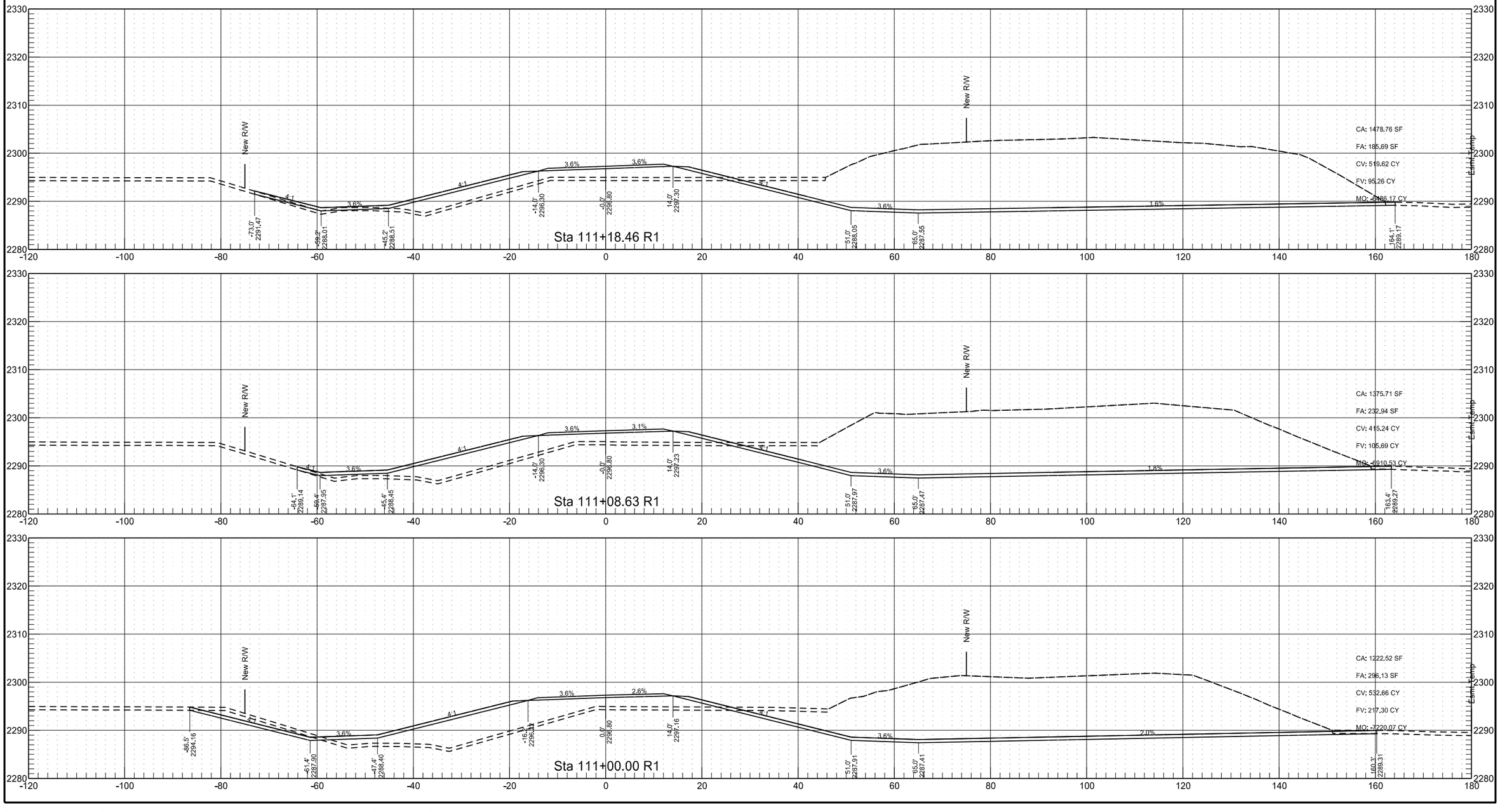
	ND	BRO-0017(020)	200	9







	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	200	10



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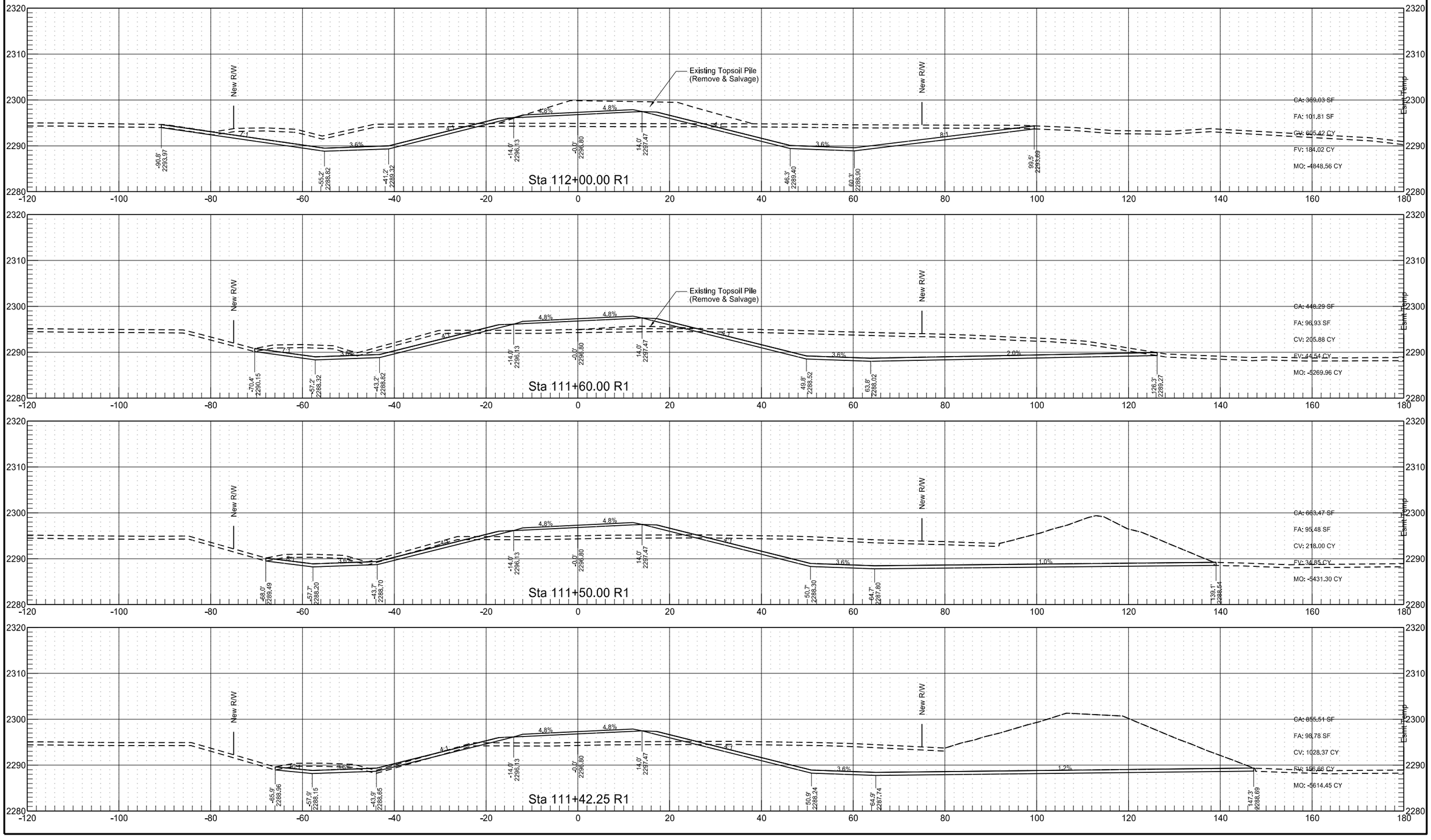

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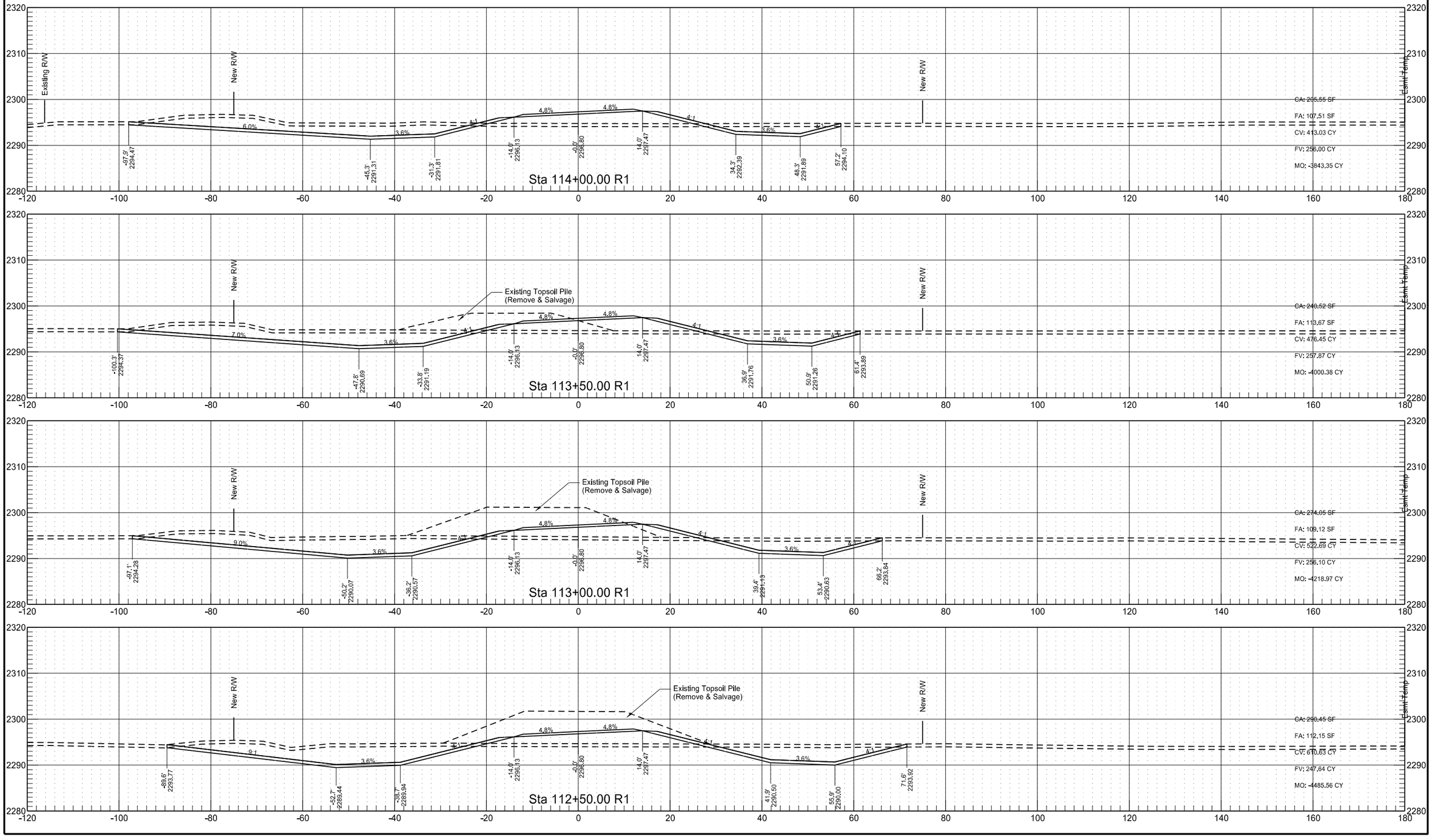

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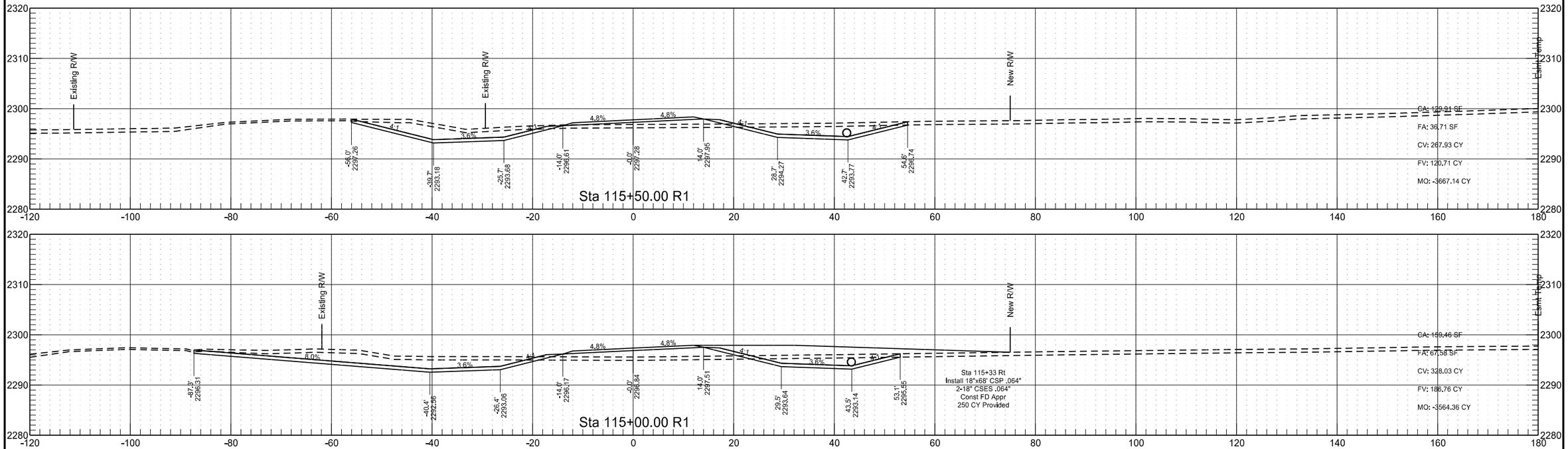
	ND	BRO-0017(020)	200	13



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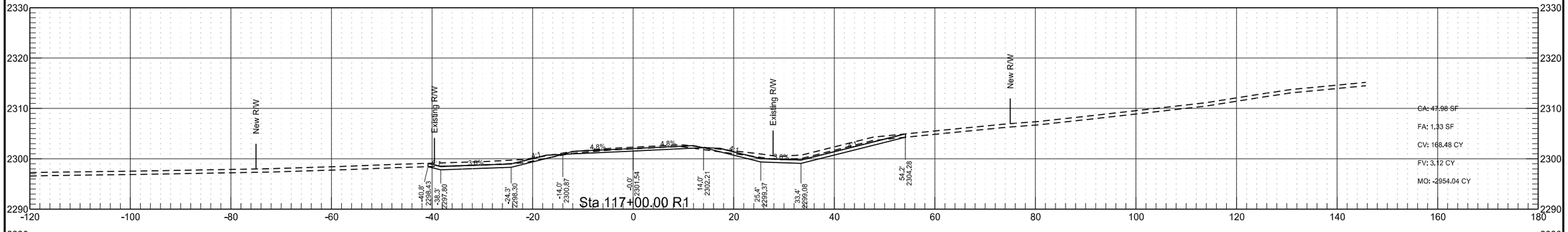
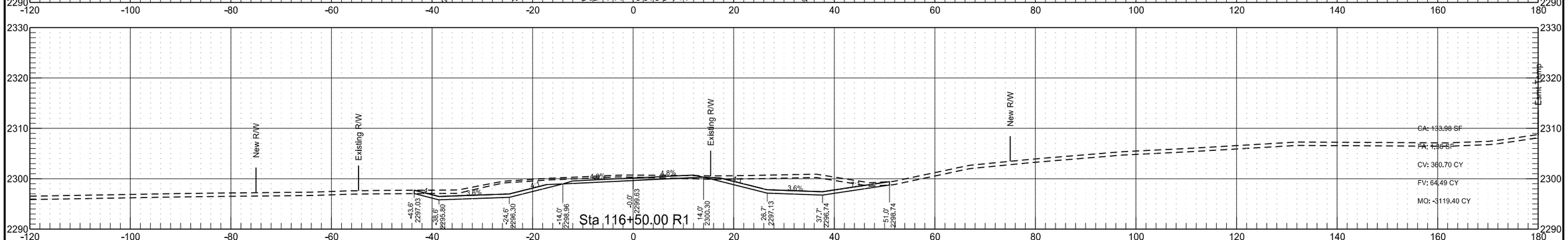
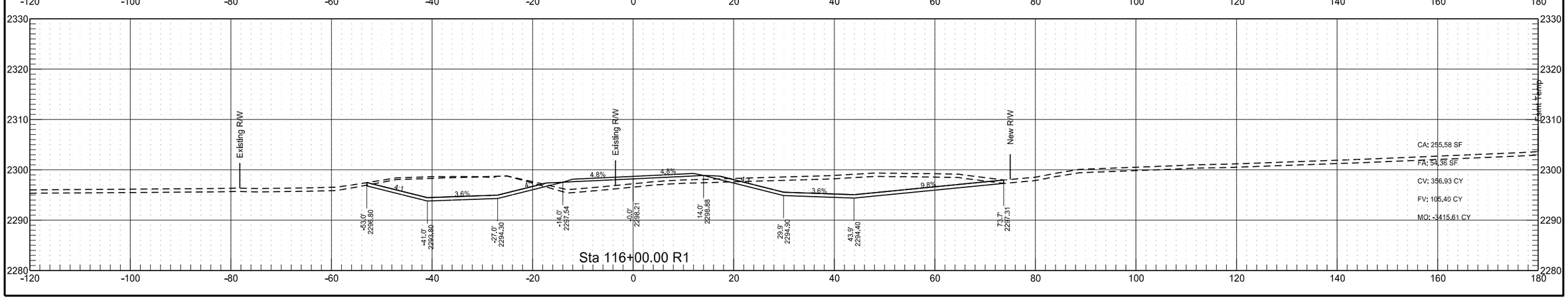
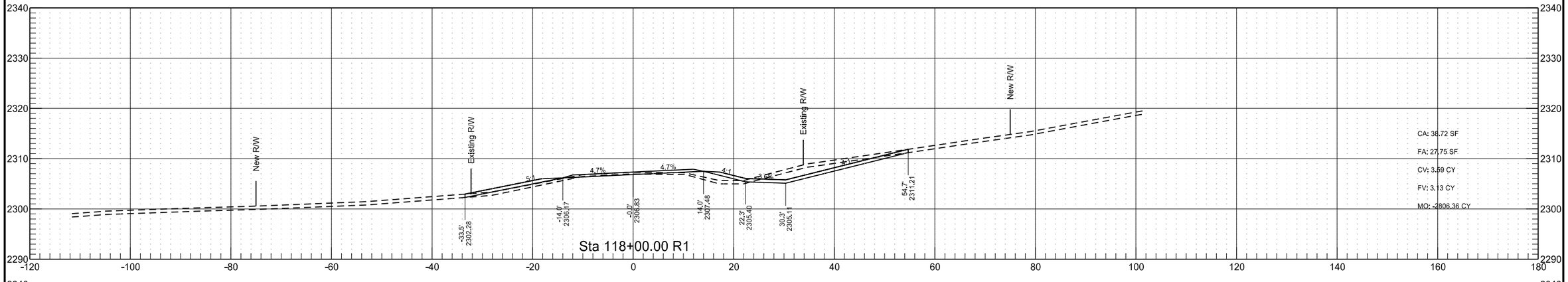
	ND	BRO-0017(020)	200	14

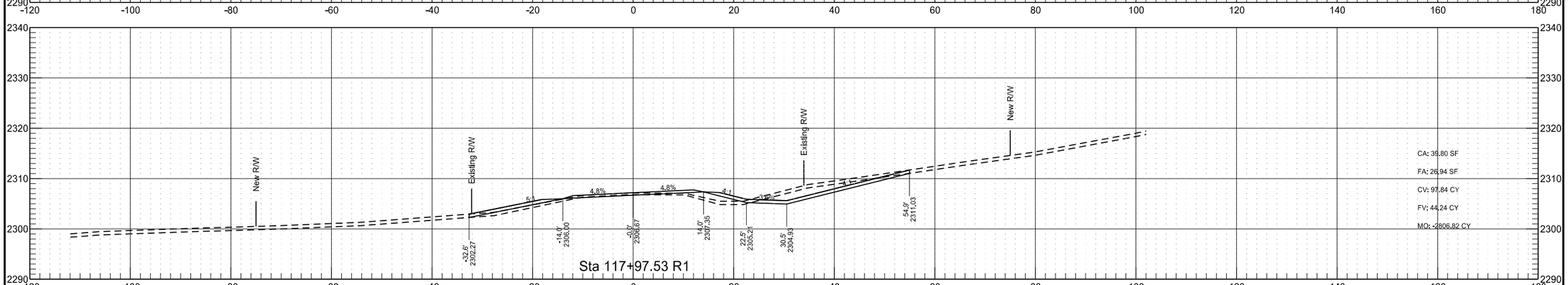


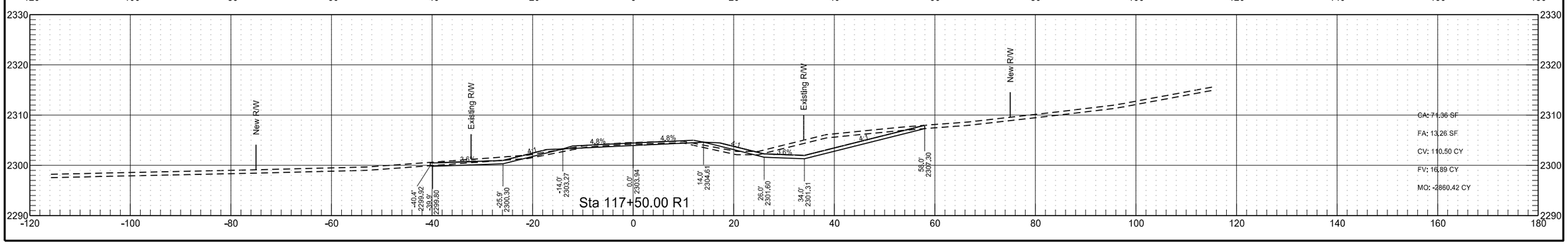




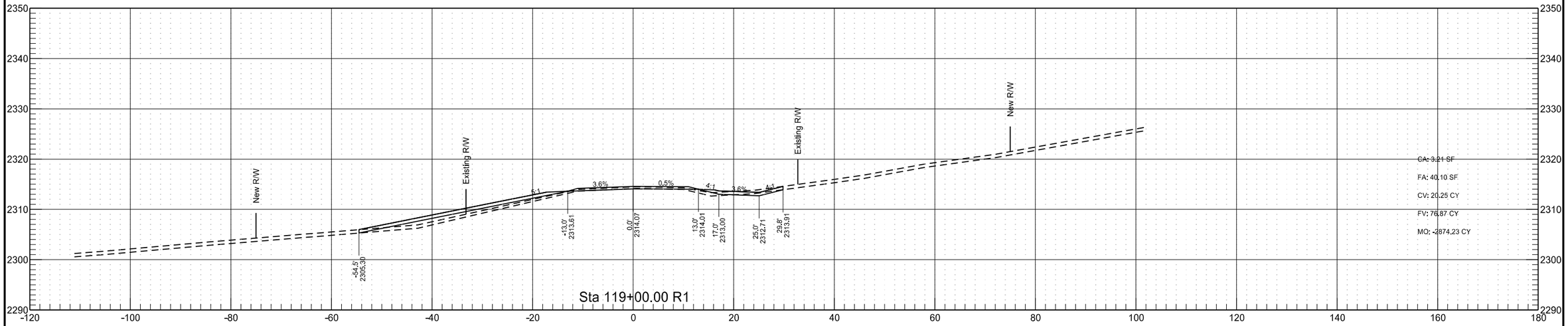
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	200	15

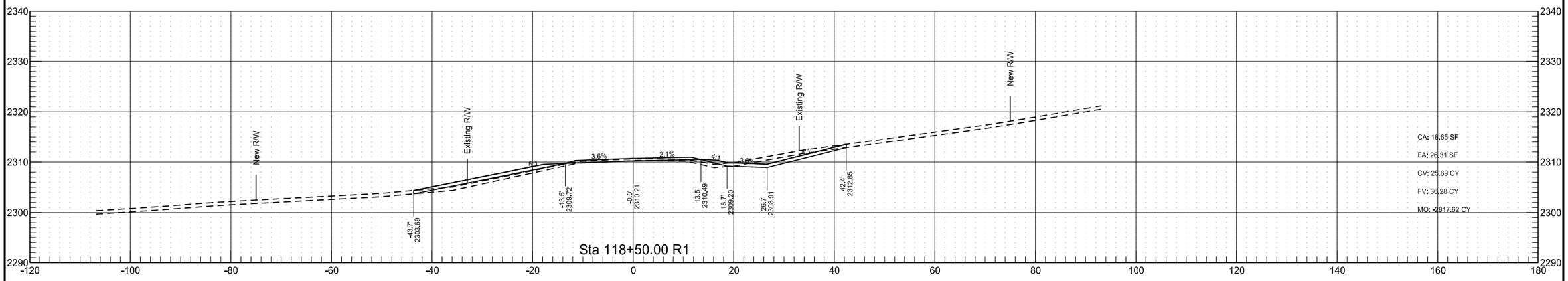


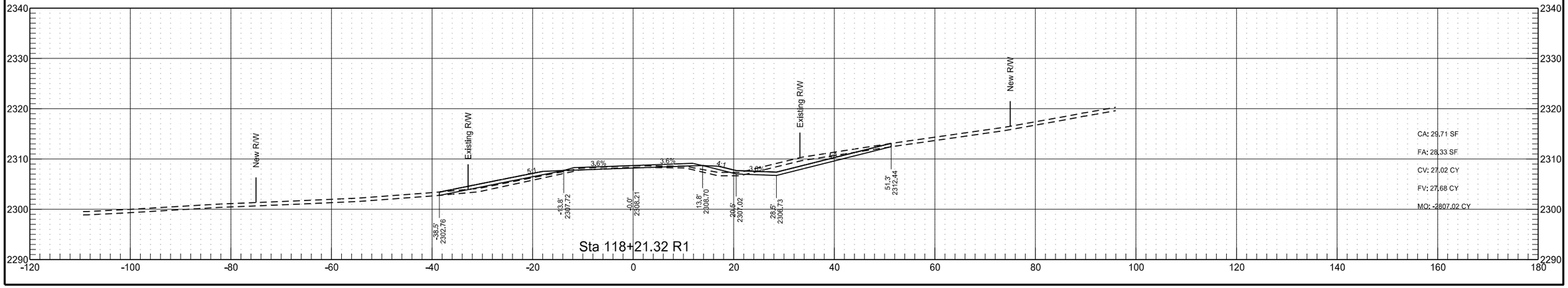




	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0017(020)	200	16







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	
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DATE	CHANGE
08-03-15	General Revisions
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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

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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

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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

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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

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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

Cross Section Legend

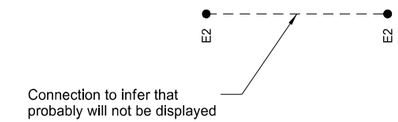
D-101-40

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	CBL1	CBL2
Conduit Line	CDU1	CDU2
Electric Line	E1	E2
Fiber Optic Line	F1	F2
Gas Main Line	GM1	GM2
Gas Service Line	GS1	GS2
Gas Transmission Line	GT1	GT2
Fuel Pipeline	PL1	PL2
Sanitary Sewer Force Main	SSF1	SSF2
Sanitary Sewer	SS1	SS2
Steam Line	STE1	STE2
Storm Drain (Assumed Depth)	SD1	SD2
Telephone Line	T1	T2
TV Line	TV1	TV2
Water Main Line	WM1	WM2
Water Service Line	WS1	WS2

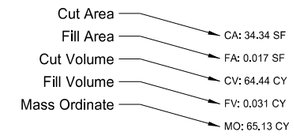
Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Overhead Power Transmission Line	OHT1	OHT2
Overhead Line	OH1	OH2

When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.

* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.



On the right side of most cross sections there is a earthwork table. The following example (values not related to project) details the earthwork table layout.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE

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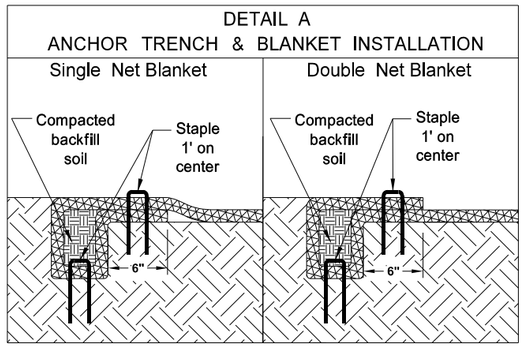
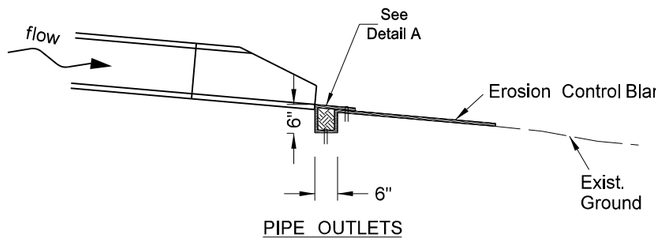
D-255-2

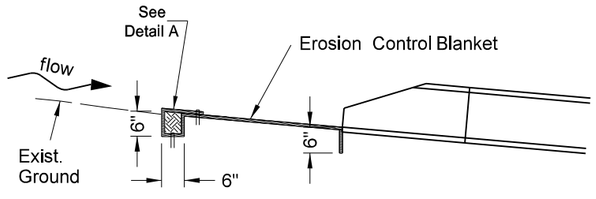
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



NOTE:
If a Single Net Blanket is used the side with the netting should be on the top once the blanket is installed.

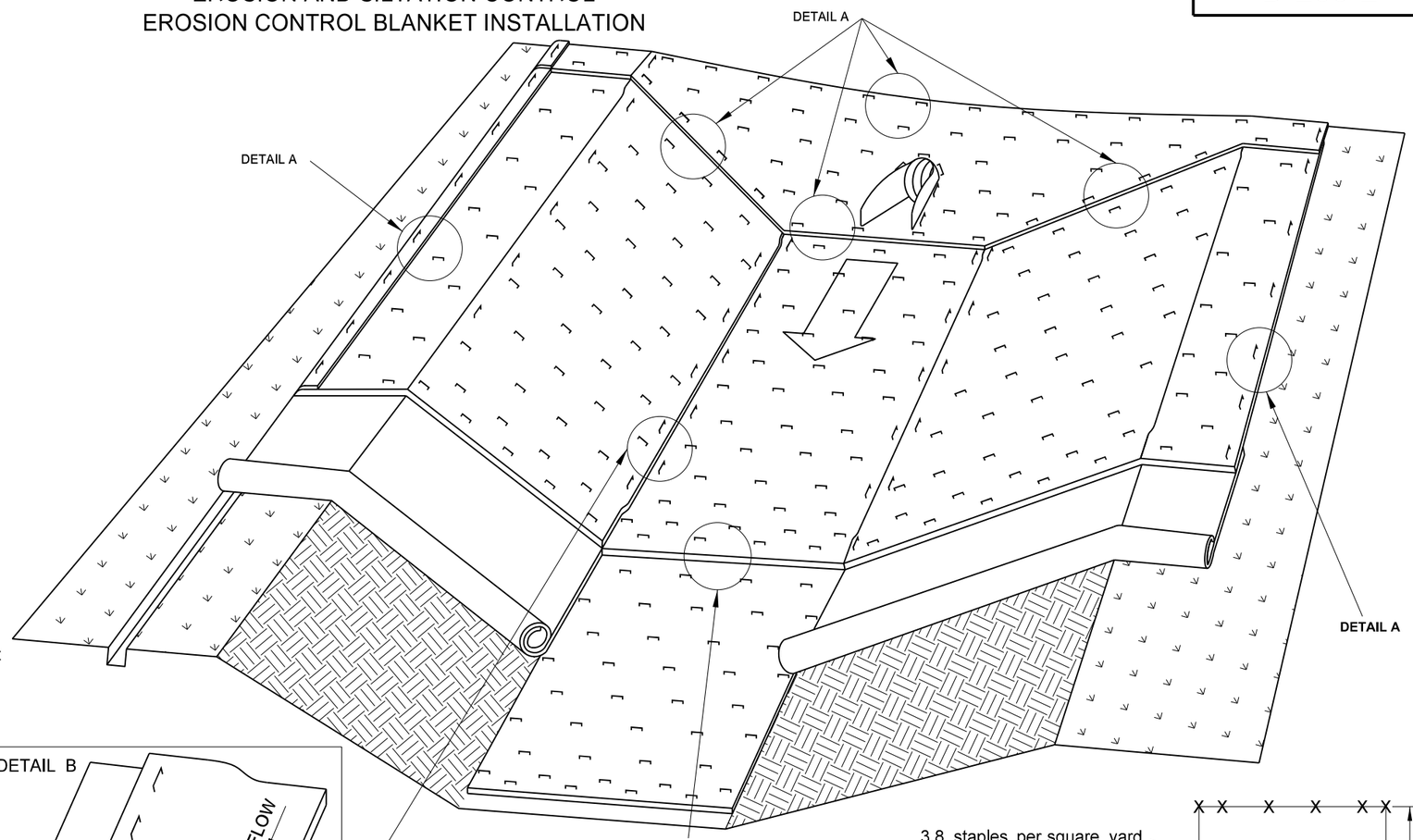


PIPE OUTLETS

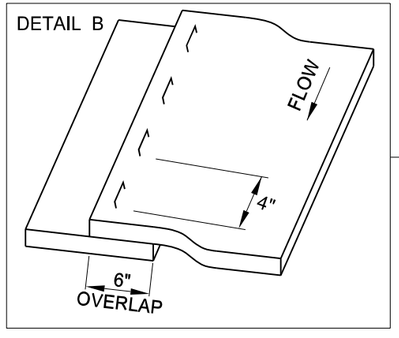


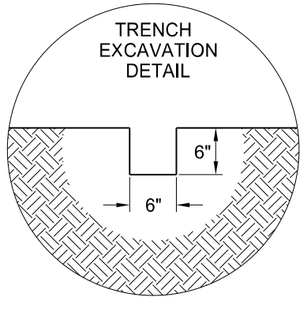
PIPE INLETS

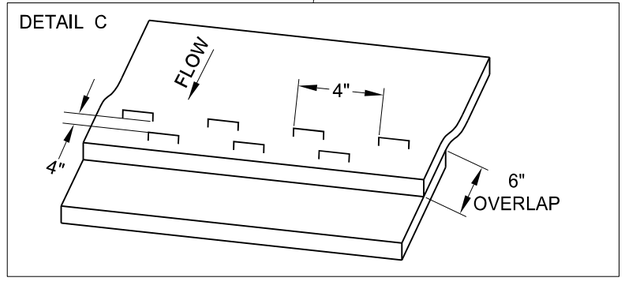
INSTALLATION AT PIPE ENDS



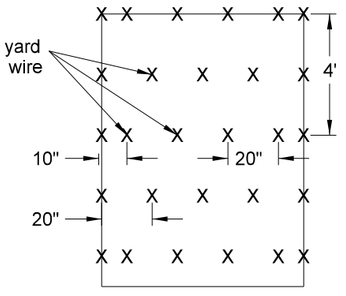
BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION







3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



STAPLE PATTERN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-709-5 to D-255-2.
07-27-15	Changed installation details such as trench depth and overlap dimensions.

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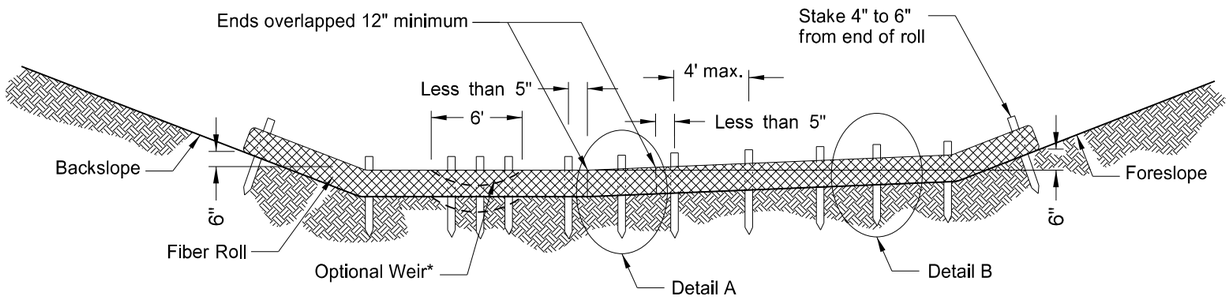
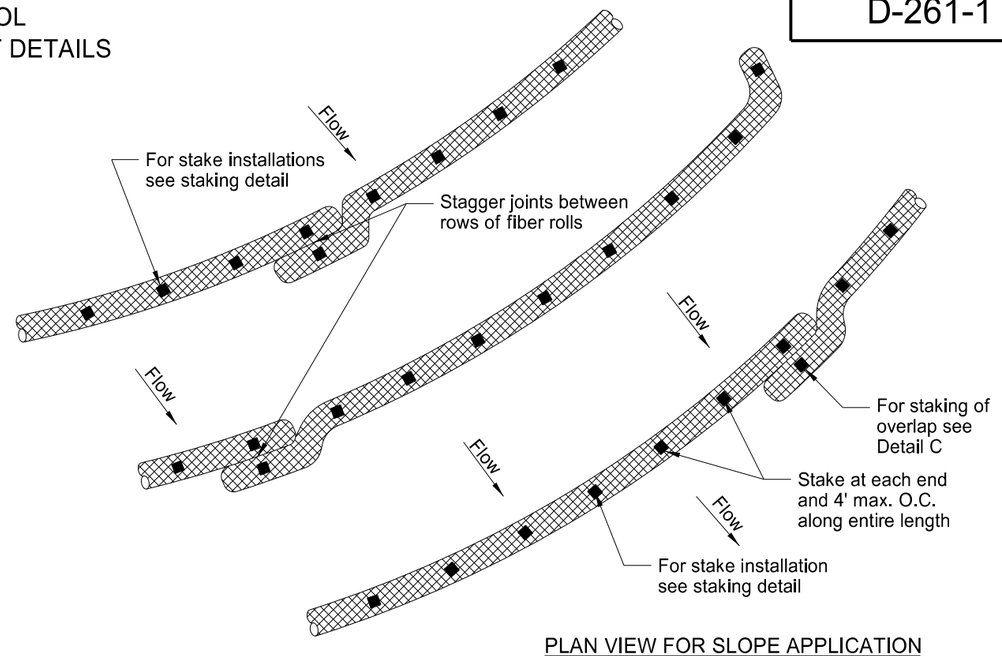
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

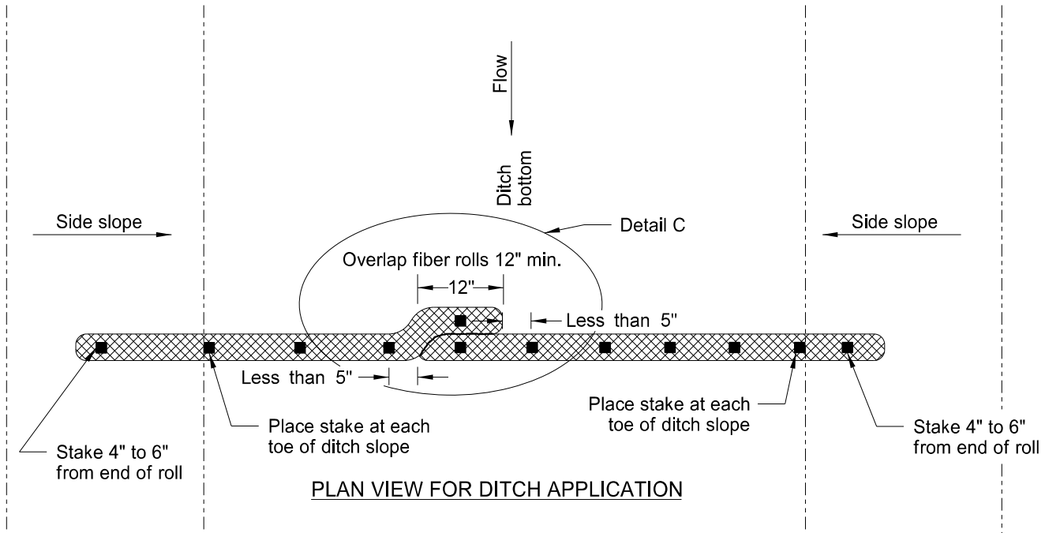


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

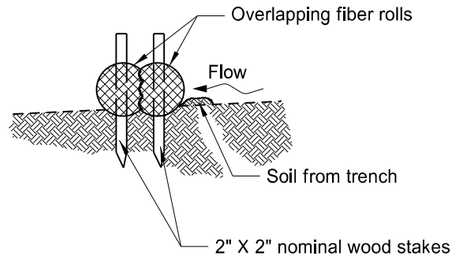
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

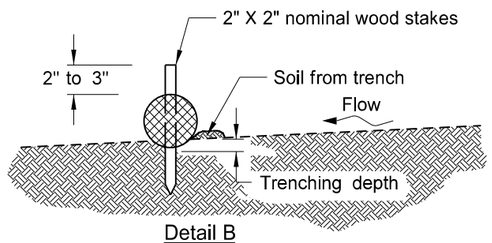


PLAN VIEW FOR DITCH APPLICATION



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

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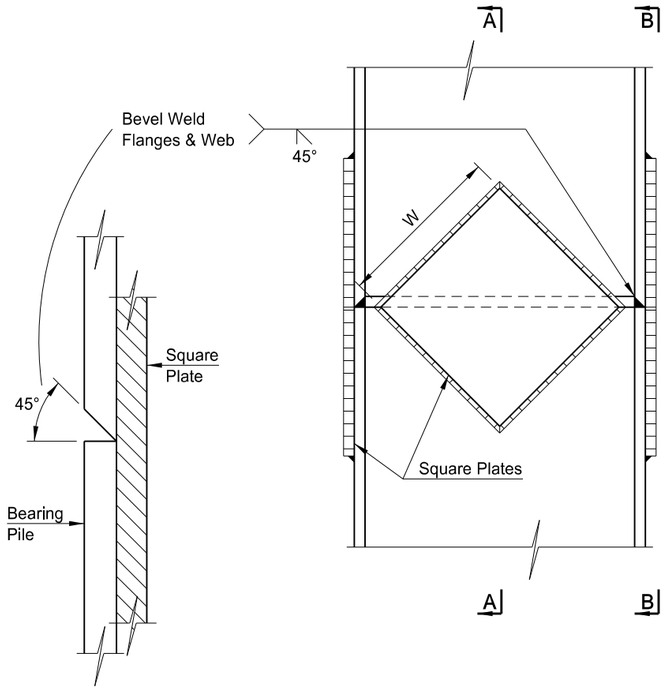
PILE SPLICE DETAILS

D-622-1

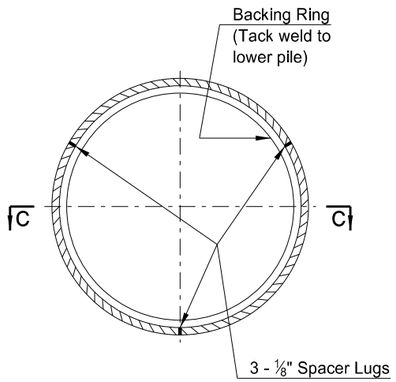


ENLARGED VIEW

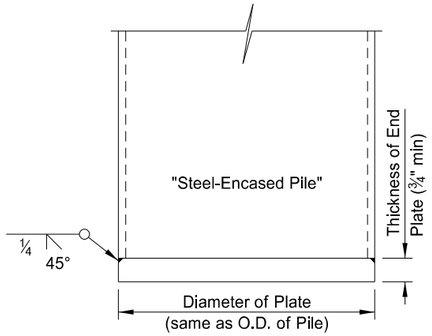
B-B

A-A

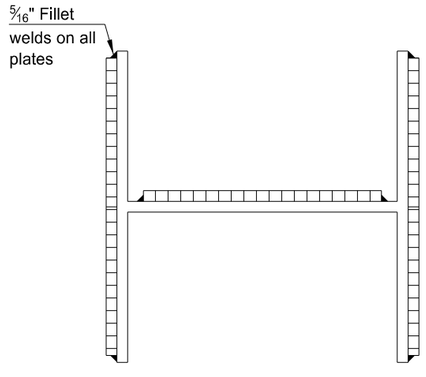
Flame scarf inside of both flanges and one side of web of upper section.



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

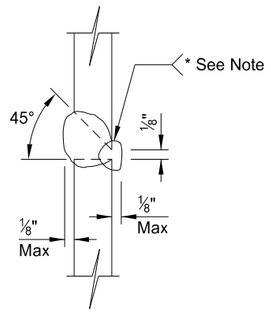


END PLATE DETAIL

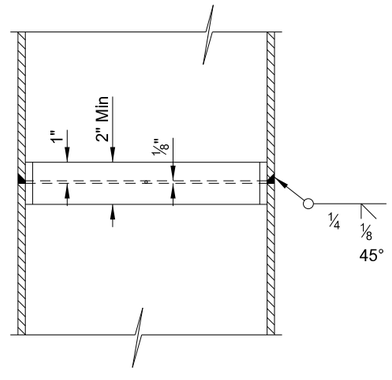


PILE	8"	10"	12"	14"
"F" FLANGE	5"	6½"	8"	10"
"W" WEB	4"	5½"	6½"	8"

H-PILE SPLICE DETAIL

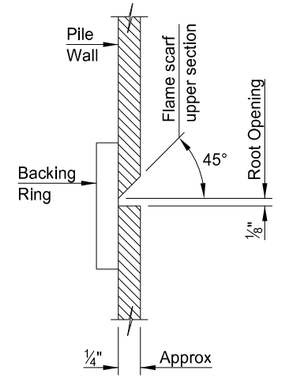


ALTERNATE H-PILE SPLICE DETAIL



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

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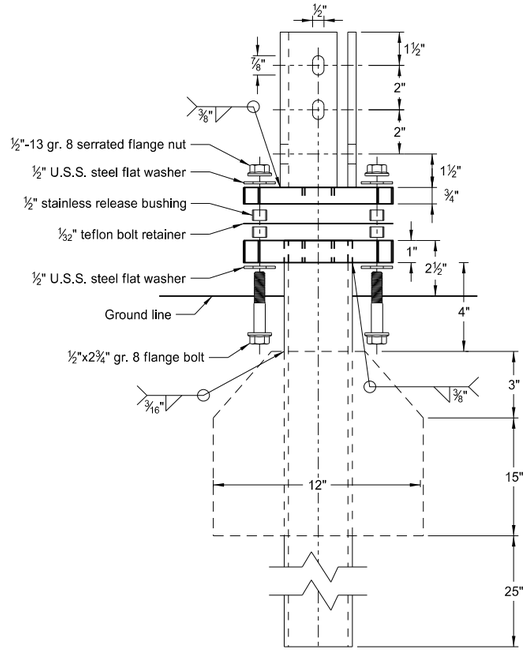
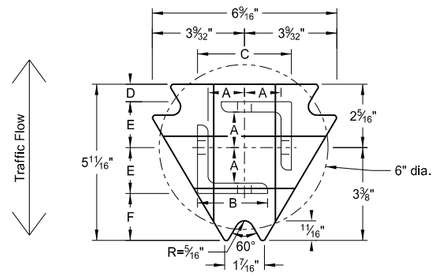
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

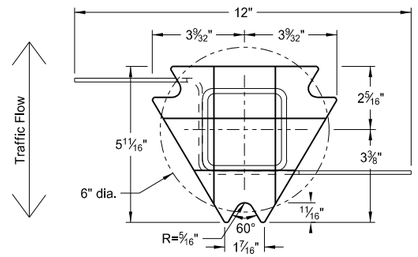
Perforated Tube



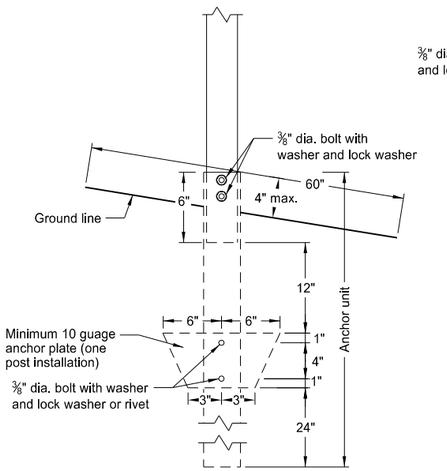
Multi-Directional
Slip Base Assembly



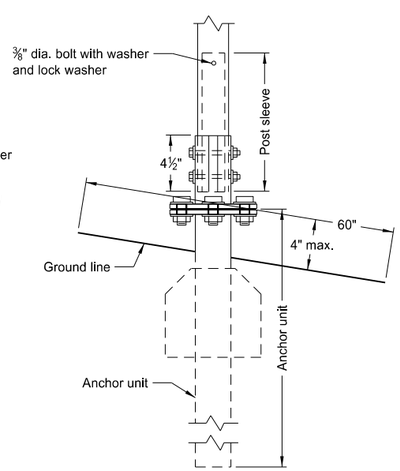
Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



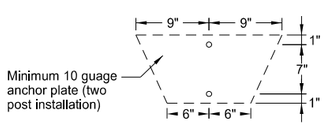
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

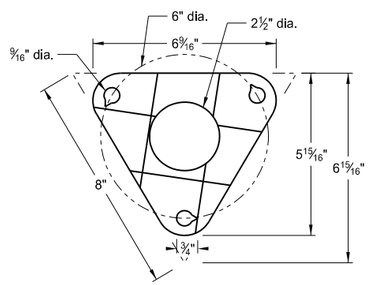


Anchor Unit and Post Assembly



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	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in.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
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	0.785

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2½"	3 1/32"	25/32"	1 33/64"	1⅞"
2½"x10 ga.	1 9/32"	2½"	3 5/16"	⅝"	1 21/32"	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 2 3/16"x10 ga. into 2½"x10 ga.

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

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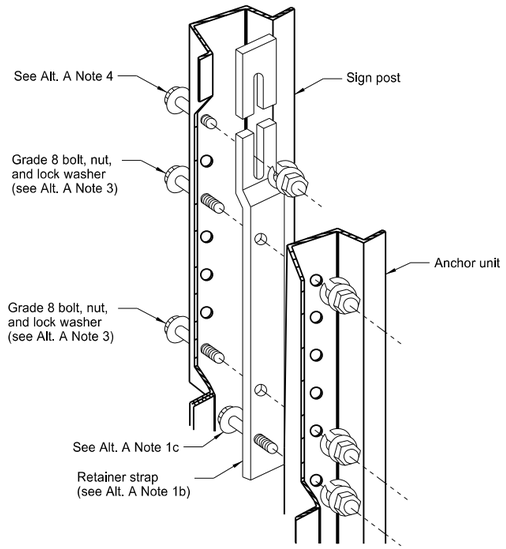
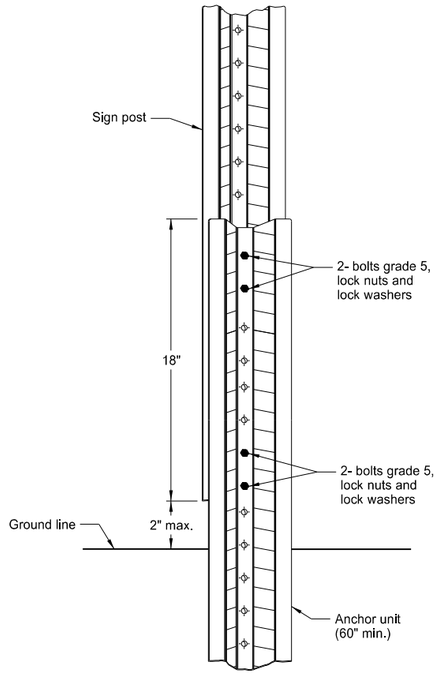
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

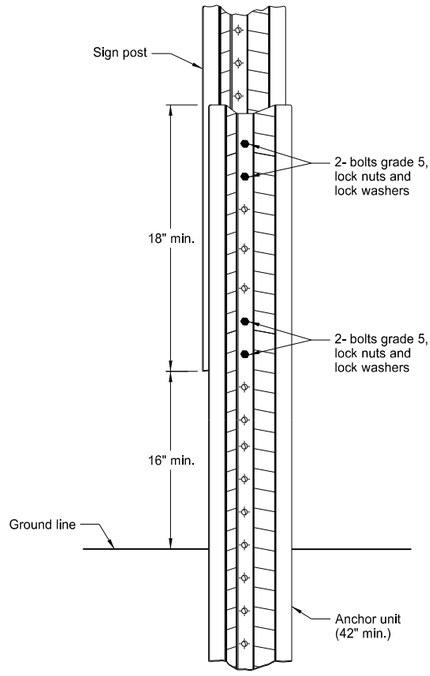


Detail A



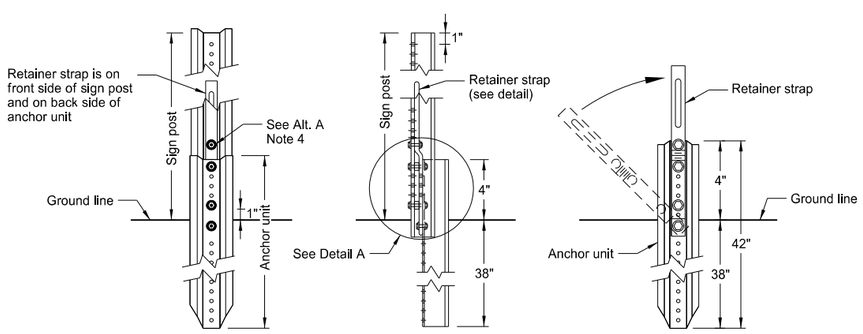
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

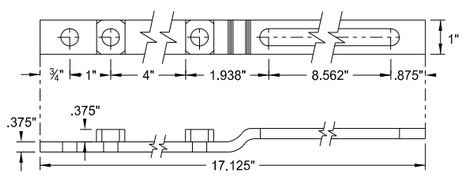
Install a maximum of 3 posts within 7'.



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

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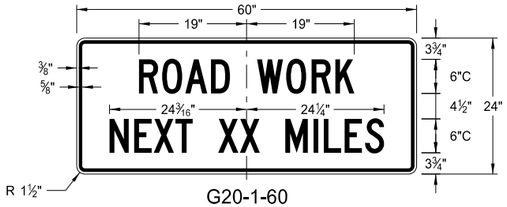
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
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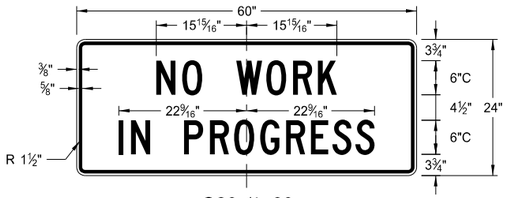
Background: orange



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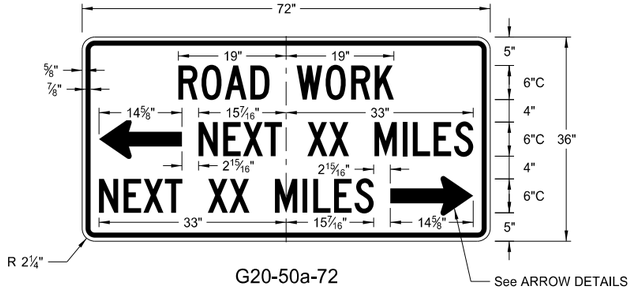

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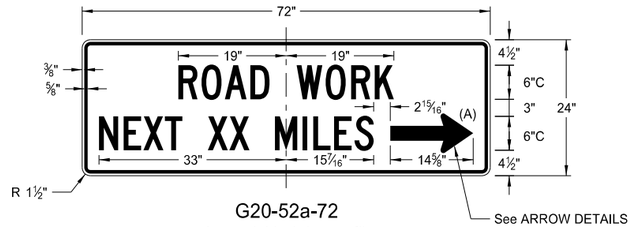

G20-52a-72
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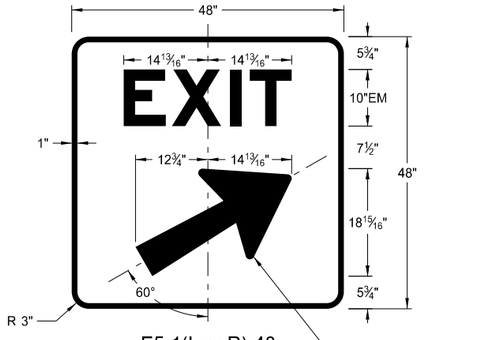

E5-1(L or R)-48
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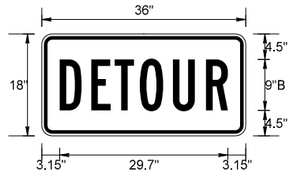
Background: green (orange optional)



M4-8-36
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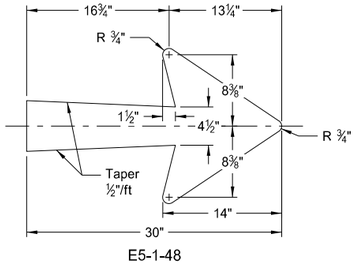
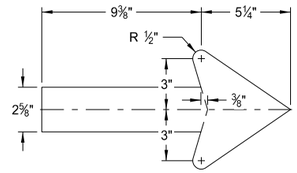
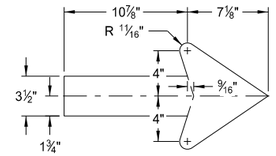


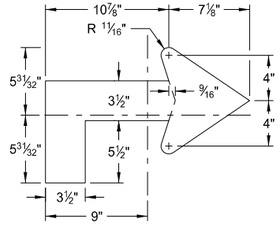
E5-1-48



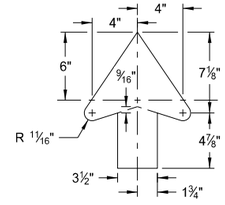
G20-50a-72
G20-52a-72



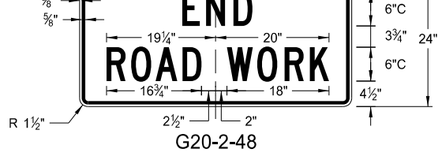
M4-9(L or R)-30
Right or Left



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



M4-9-30
Straight



G20-2-48
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Background: orange

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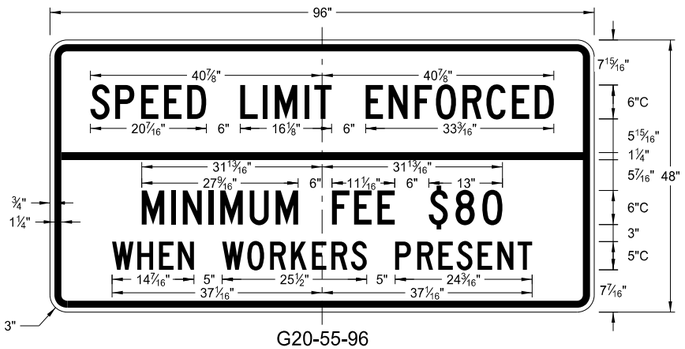

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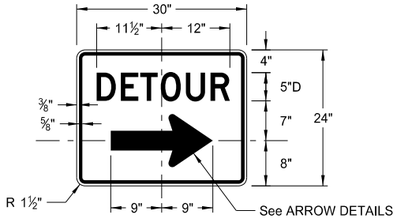

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

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

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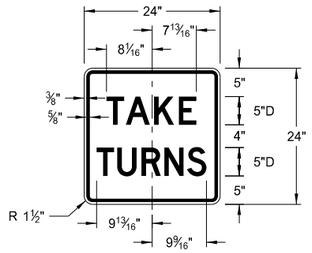
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50P-24
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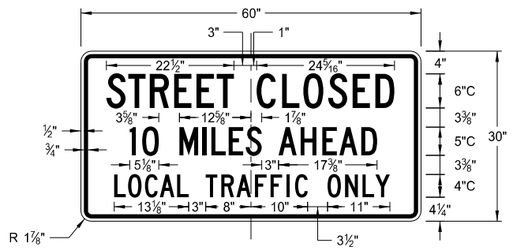
Background: white



R11-3c-60
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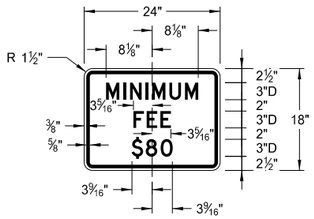
Background: white



R2-1aP-24
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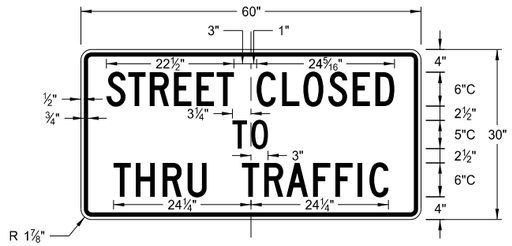

R11-4a-60
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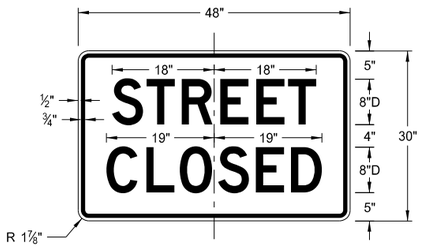

R11-2a-48
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Background: white

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

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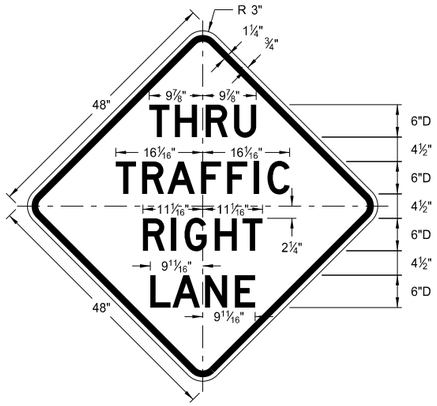
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
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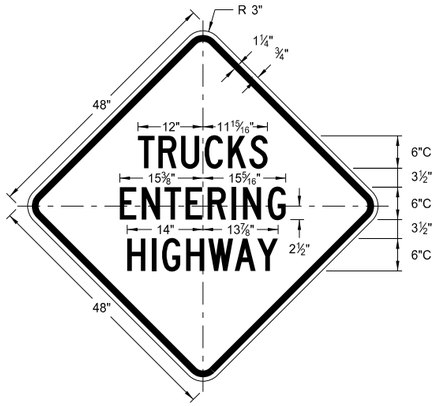

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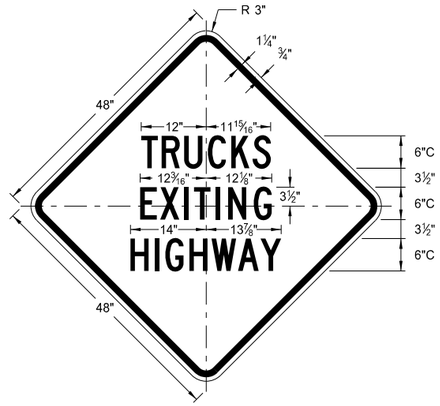

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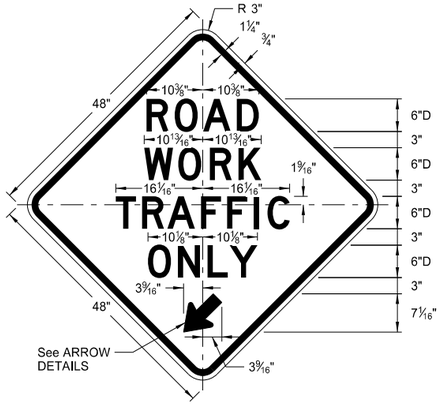
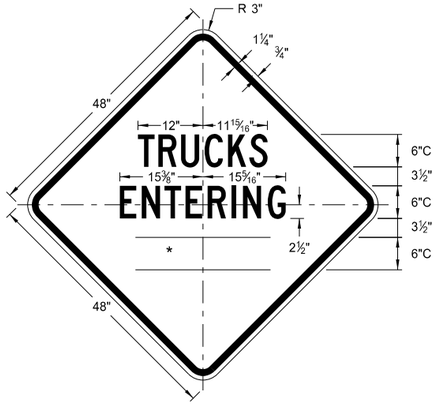
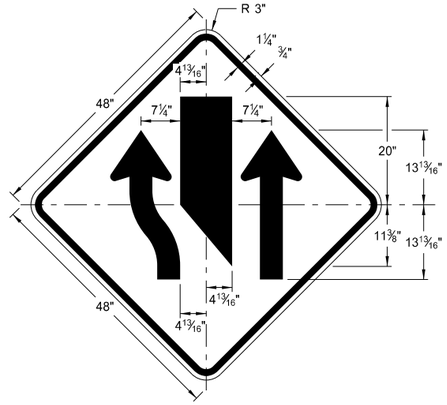
Legend: black (non-refl)
Background: orange



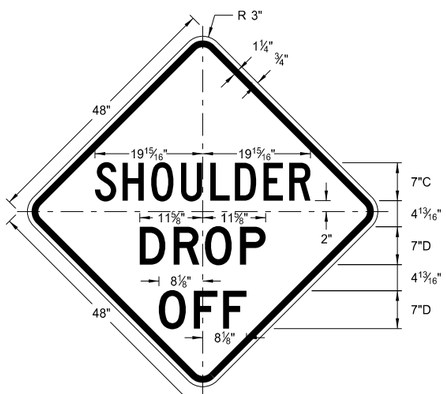
W5-9-48
Legend: black (non-refl)
Background: orange



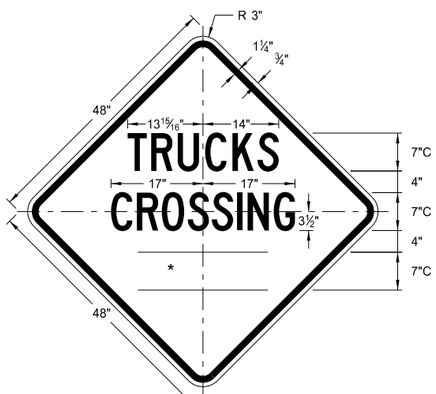
W8-54-48
Legend: black (non-refl)
Background: orange



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



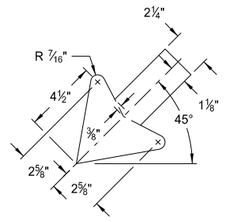
W8-9a-48
Legend: black (non-refl)
Background: orange



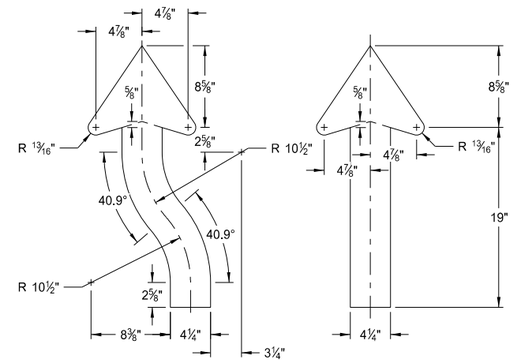
W8-55-48
Legend: black (non-refl)
Background: orange

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

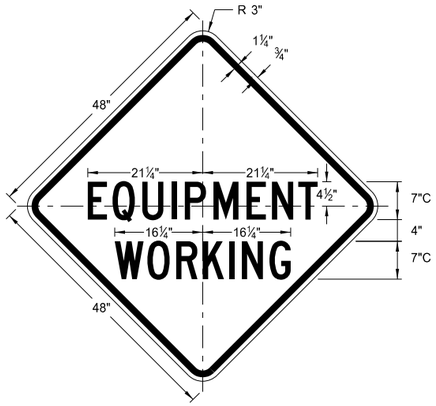
ARROW DETAILS

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

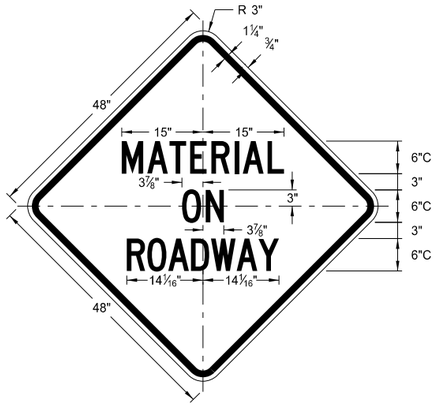
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 5/31/18 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

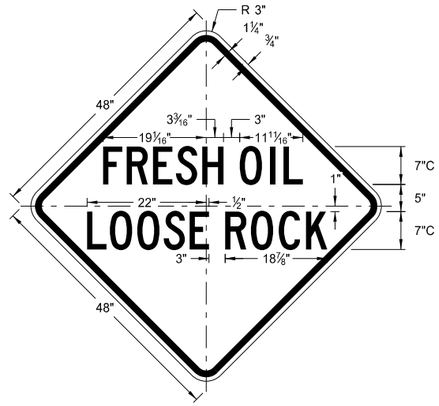
D-704-11A



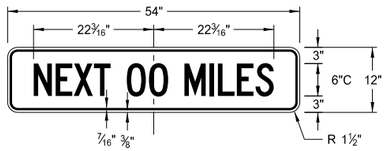
W20-51-48
Legend: black (non-refl)
Background: orange



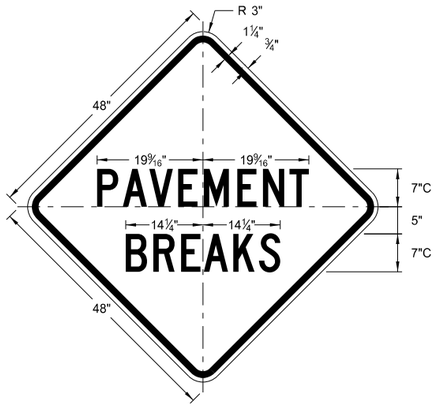
W21-51-48
Legend: black (non-refl)
Background: orange



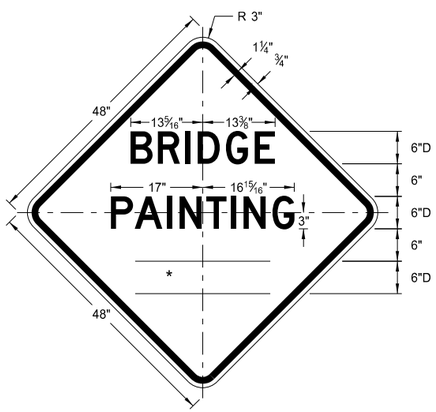
W22-8-48
Legend: black (non-refl)
Background: orange



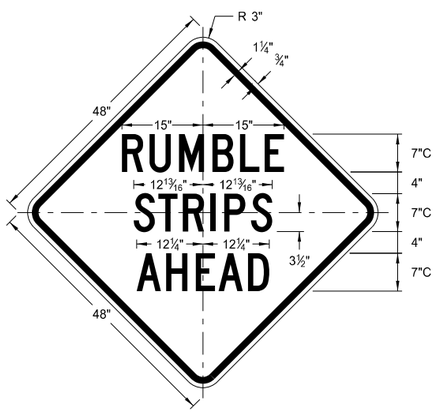
W20-52P-54
Legend: black (non-refl)
Background: orange



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

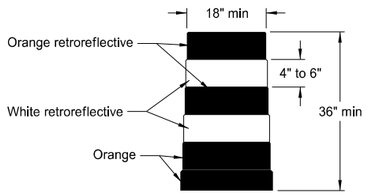
* DISTANCE MESSAGES

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

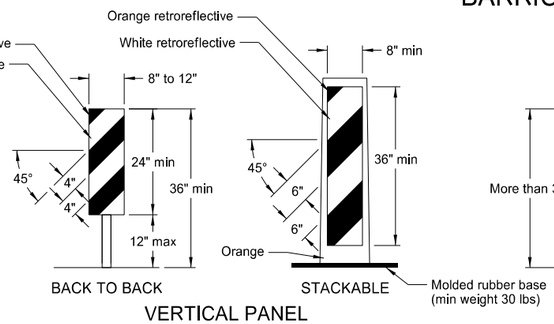
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



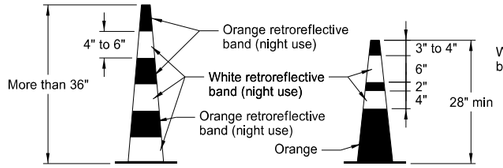
DELINEATOR DRUM

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.



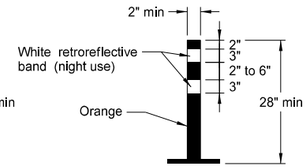
VERTICAL PANEL

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.



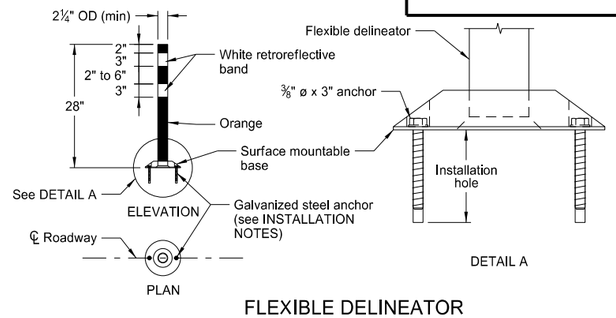
TRAFFIC CONE

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

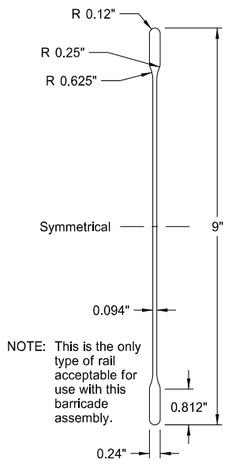
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

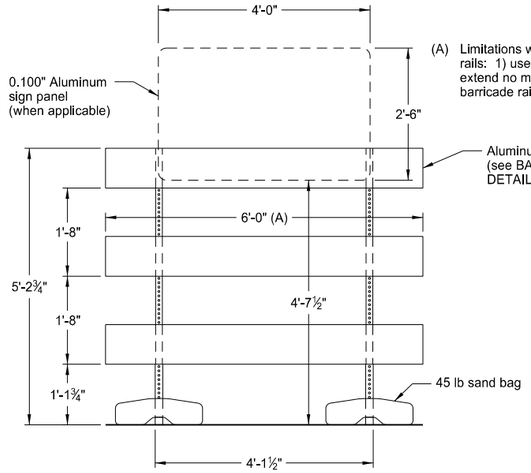
INSTALLATION NOTES:

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.



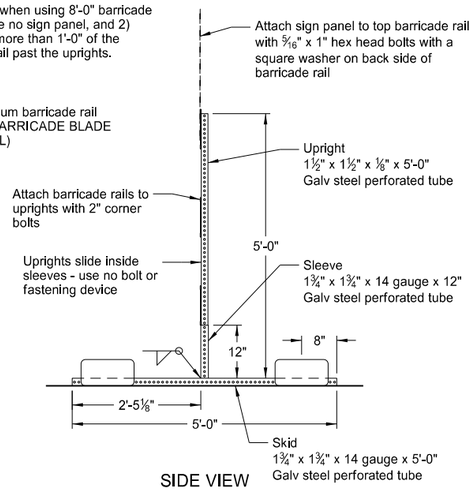
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



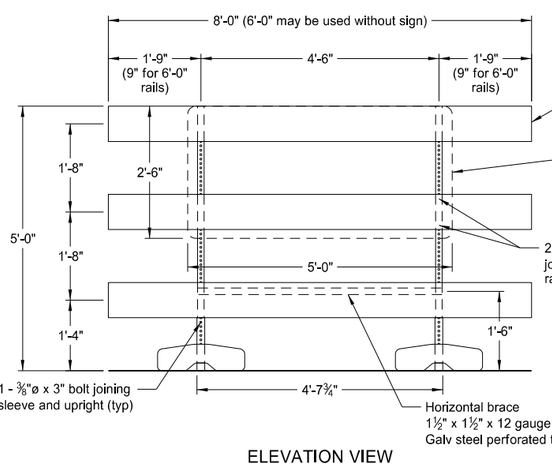
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW

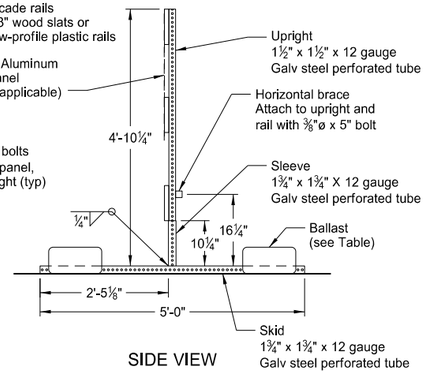


SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)



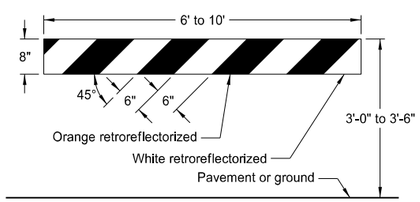
ELEVATION VIEW



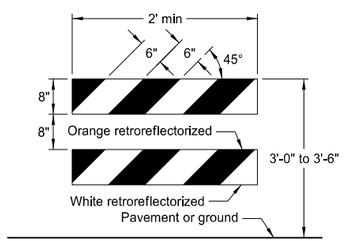
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

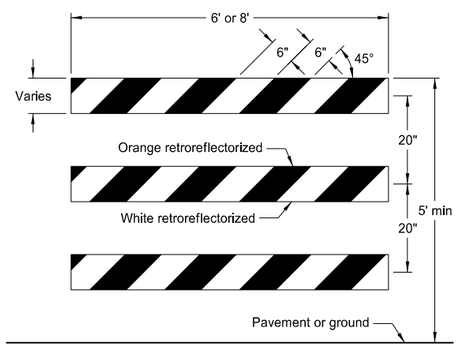
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

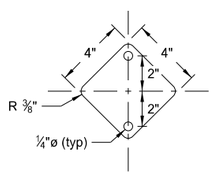


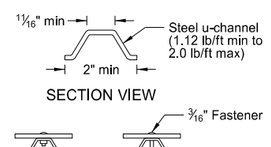
TYPE II BARRICADE

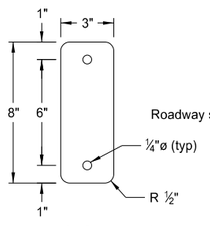


TYPE III BARRICADE

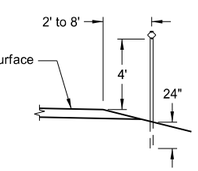
BARRICADE RAIL DETAILS







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.

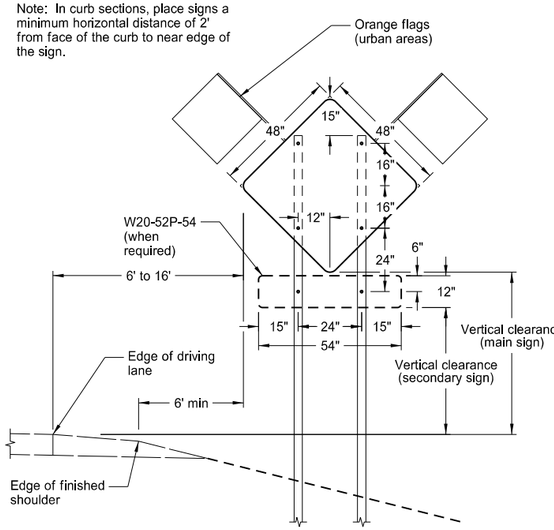
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

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

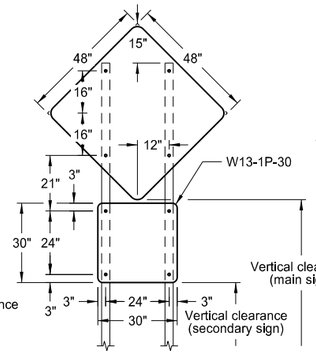
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

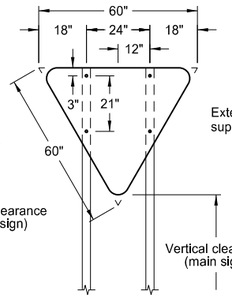
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



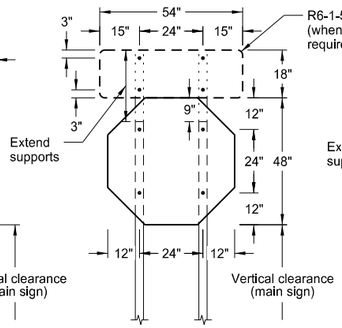
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



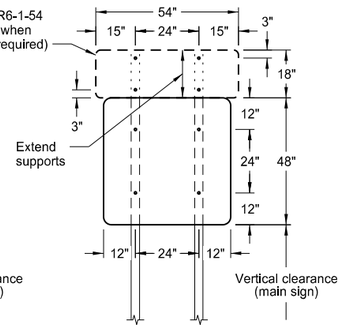
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



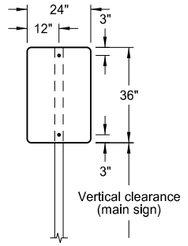
R1-2-60 - YIELD SIGN



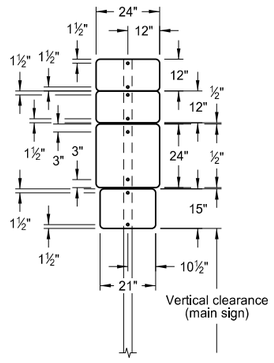
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



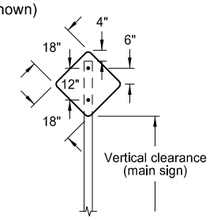
48" x 48" SIGN
(with R6-1-54 sign as required)



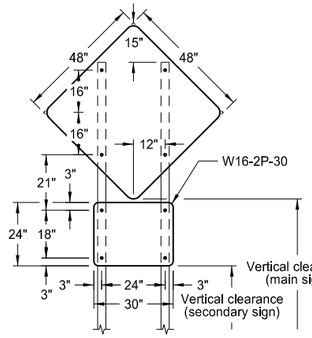
24" x 36" SIGN



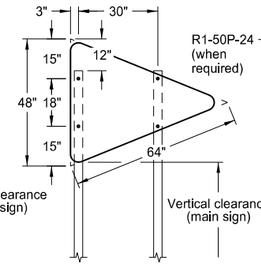
24" x 24"
ROUTE MARKER
ASSEMBLY



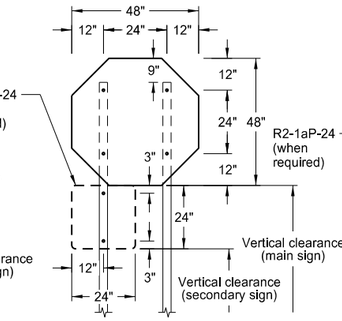
18" x 18"
DIAMOND SIGN



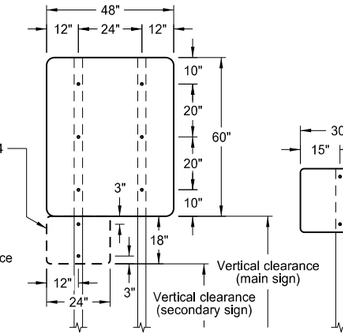
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



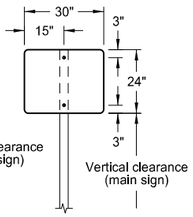
W14-3-64 - PENNANT SIGN



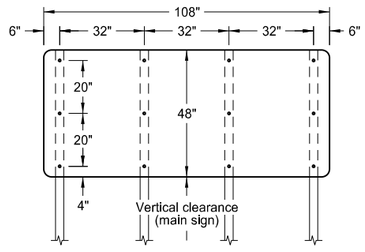
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



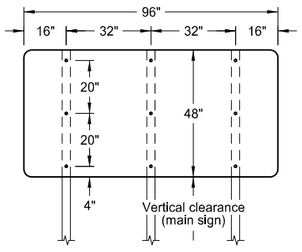
48" x 48" SIGN
(with R2-1aP-24 sign as required)



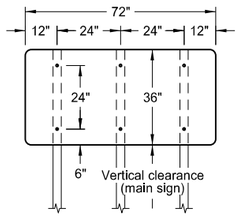
30" x 24" SIGN



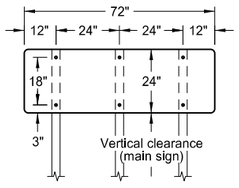
108" x 48" SIGN



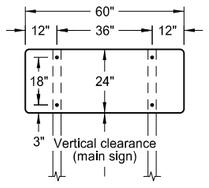
96" x 48" SIGN



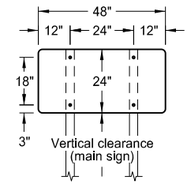
72" x 36" SIGN



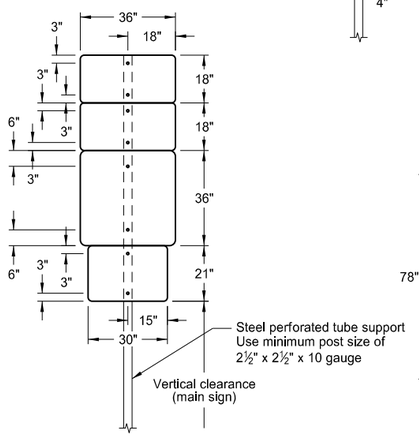
72" x 24" SIGN



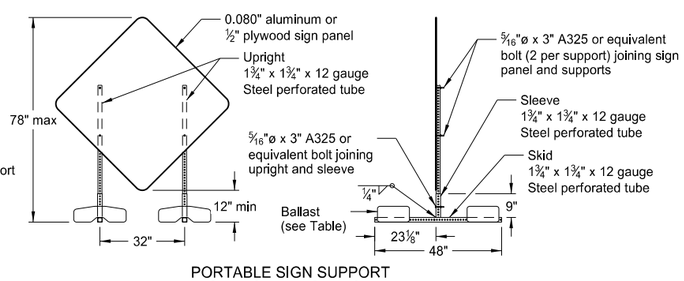
60" x 24" SIGN



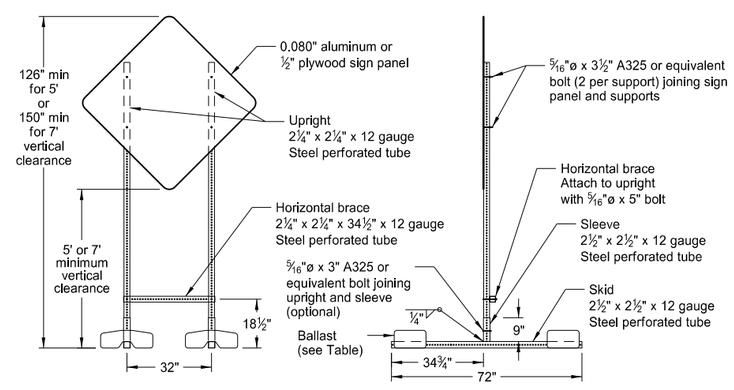
48" x 24" SIGN



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

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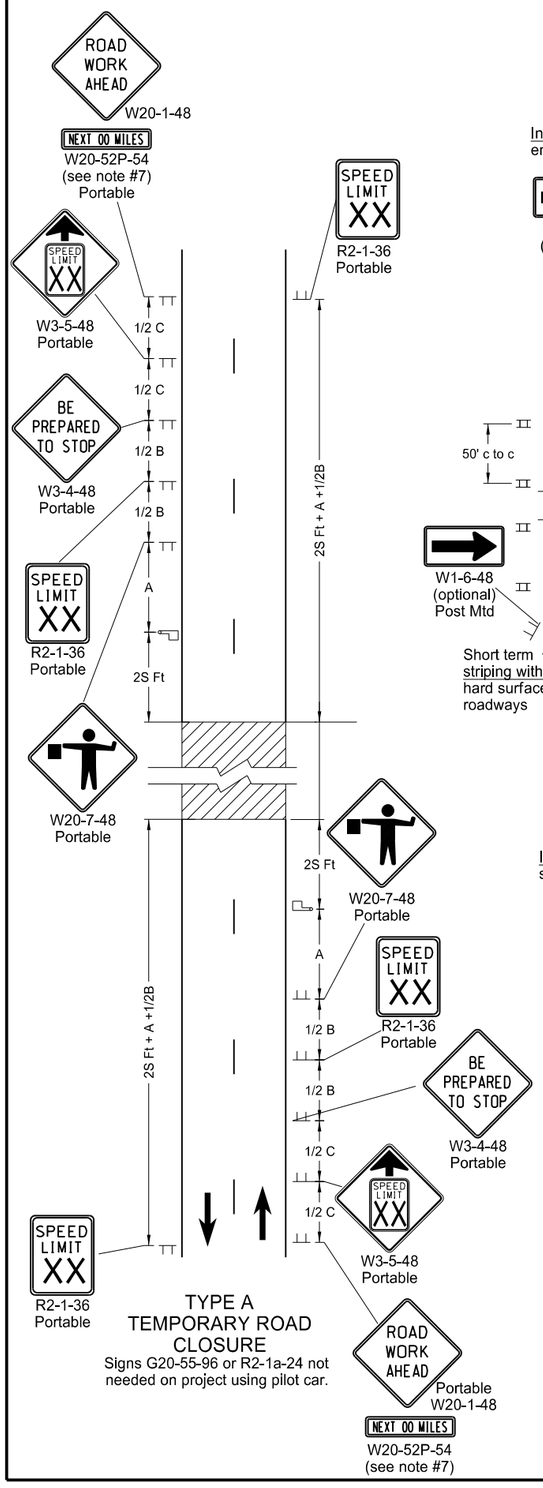
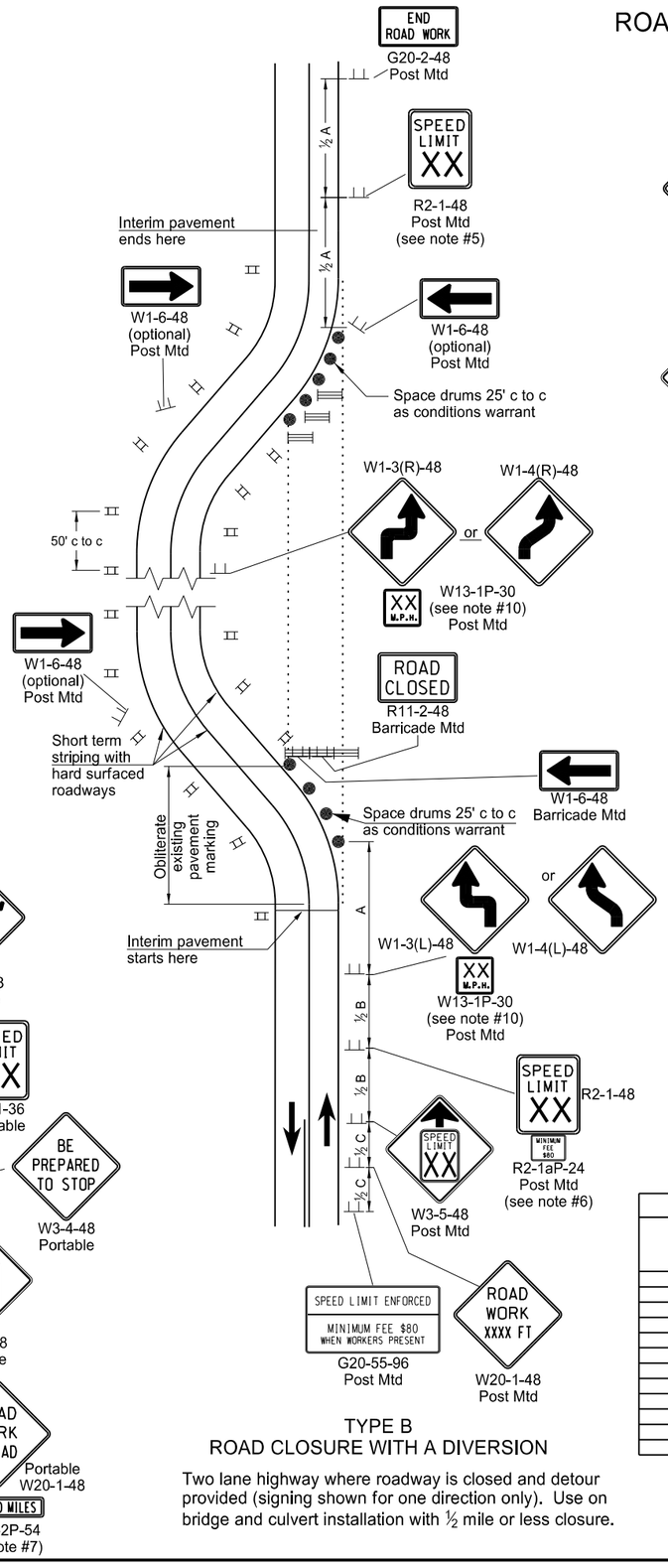
ROAD CLOSURE LAYOUTS

D-704-15



TYPE A
TEMPORARY ROAD CLOSURE

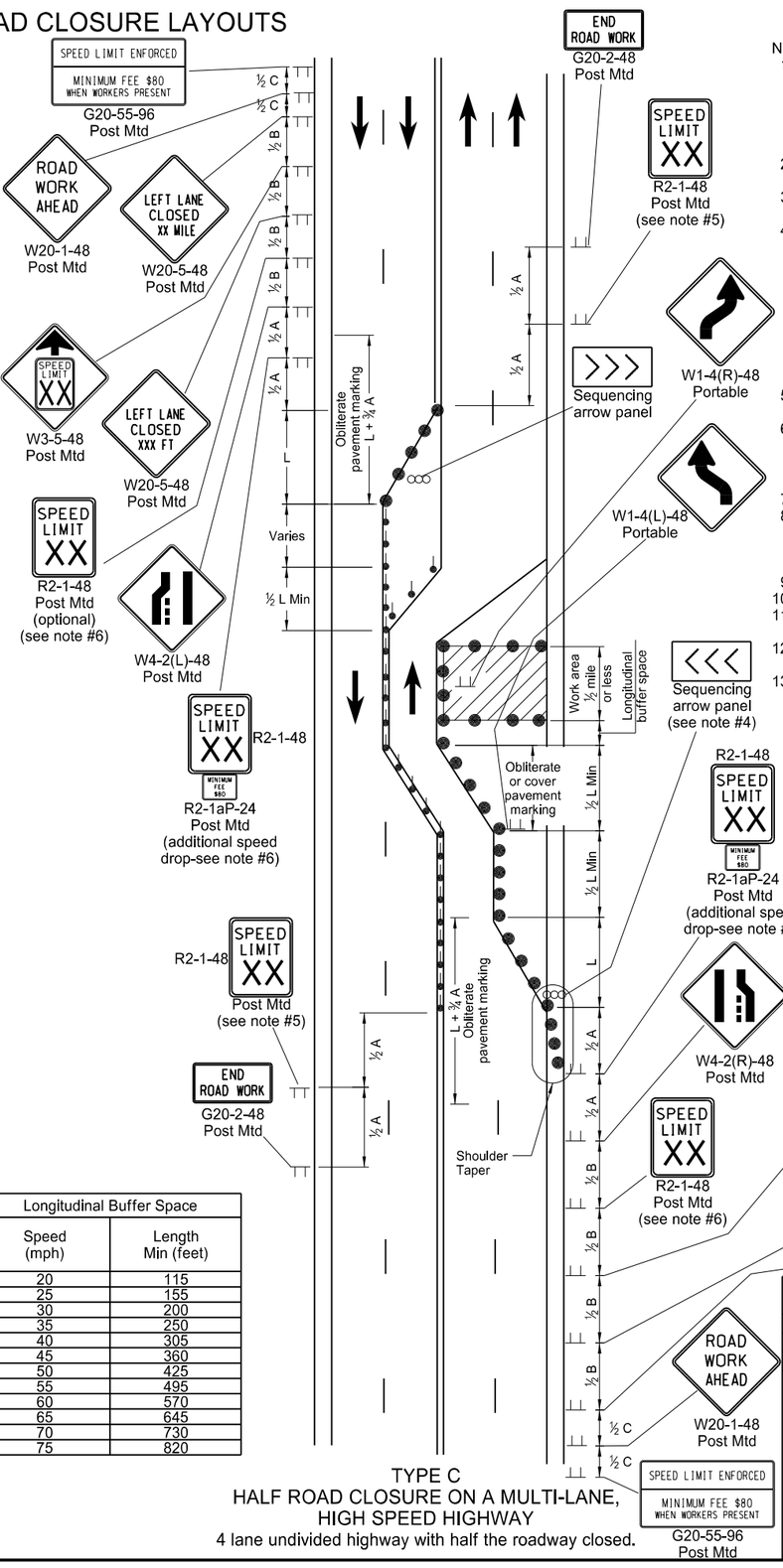
Signs G20-55-96 or R2-1a-24 not needed on project using pilot car.

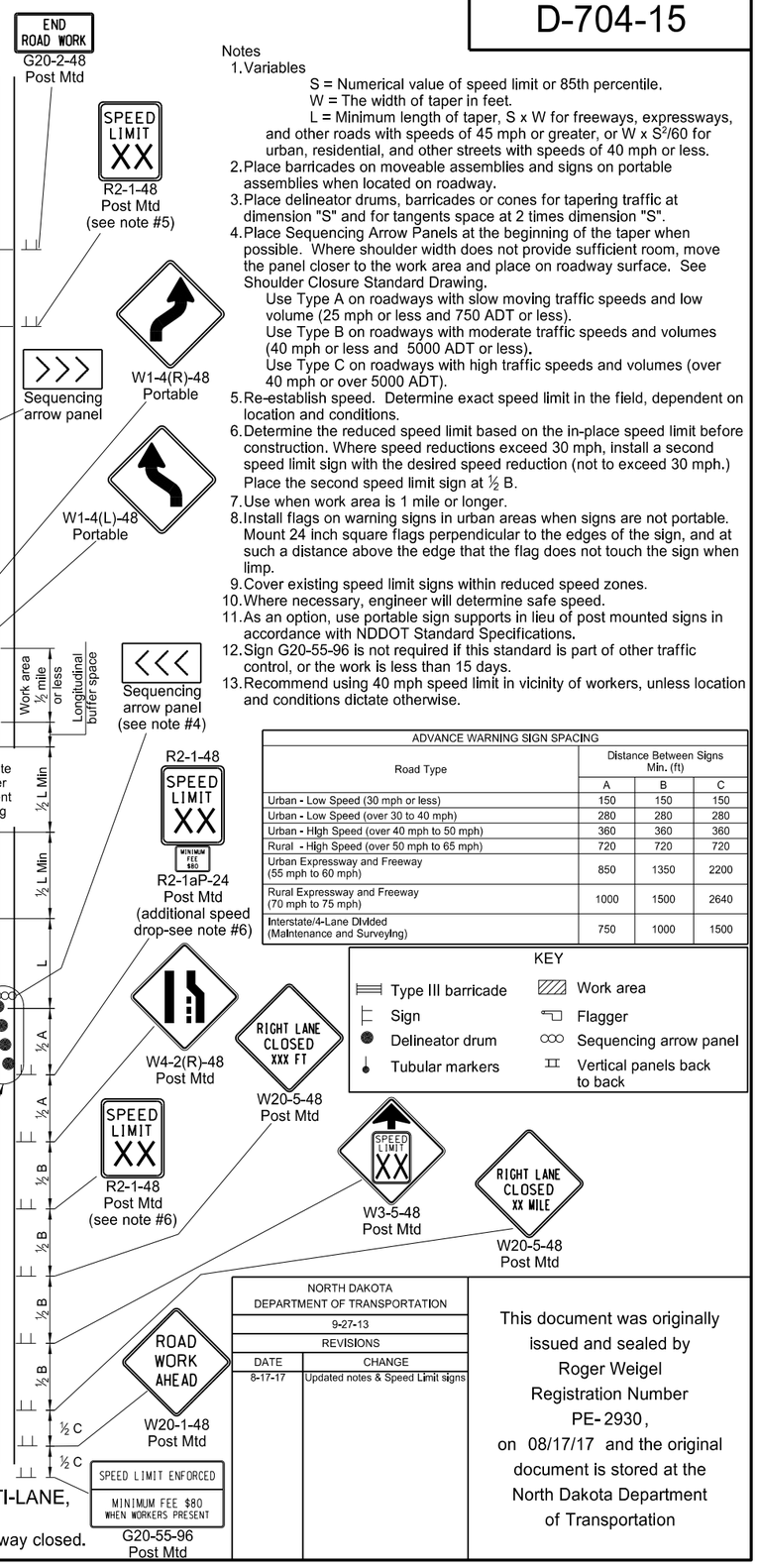


TYPE B
ROAD CLOSURE WITH A DIVERSION

Two lane highway where roadway is closed and detour provided (signing shown for one direction only). Use on bridge and culvert installation with ½ mile or less closure.

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





TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE, HIGH SPEED HIGHWAY

4 lane undivided highway with half the roadway closed.

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 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. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. 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 roadway surface. See Shoulder Closure Standard Drawing.
   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-establish speed. 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. Use when work area is 1 mile or longer.
8. 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.
9. Cover existing speed limit signs within reduced speed zones.
10. Where necessary, engineer will determine safe speed.
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, or the work is less than 15 days.
13. 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

KEY

- Type III barricade
- Sign
- Delineator drum
- Tubular markers
- Work area
- Flagger
- Sequencing arrow panel
- Vertical panels back to back

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

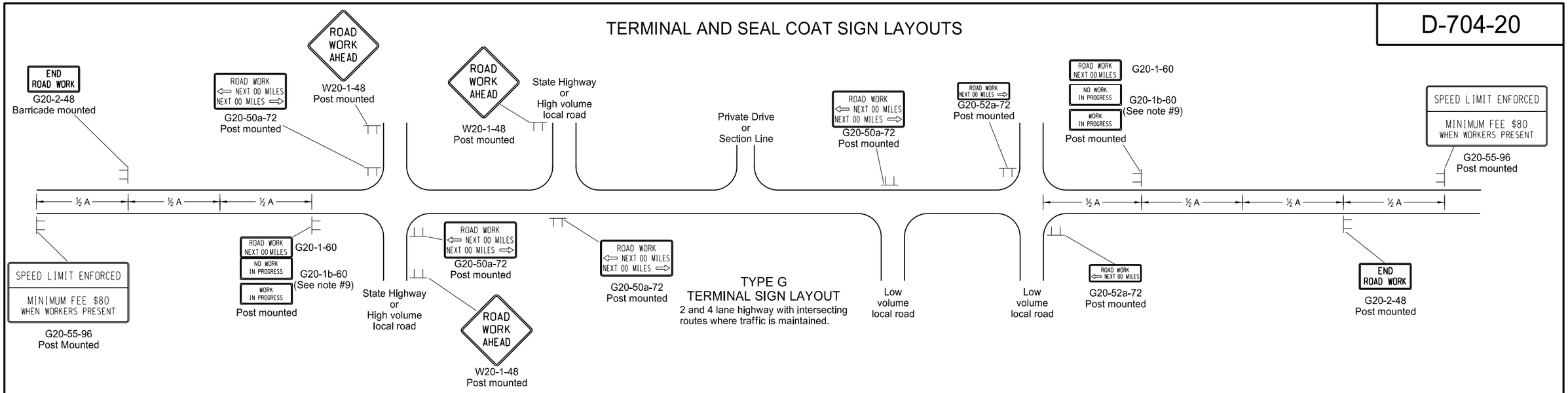
REVISIONS

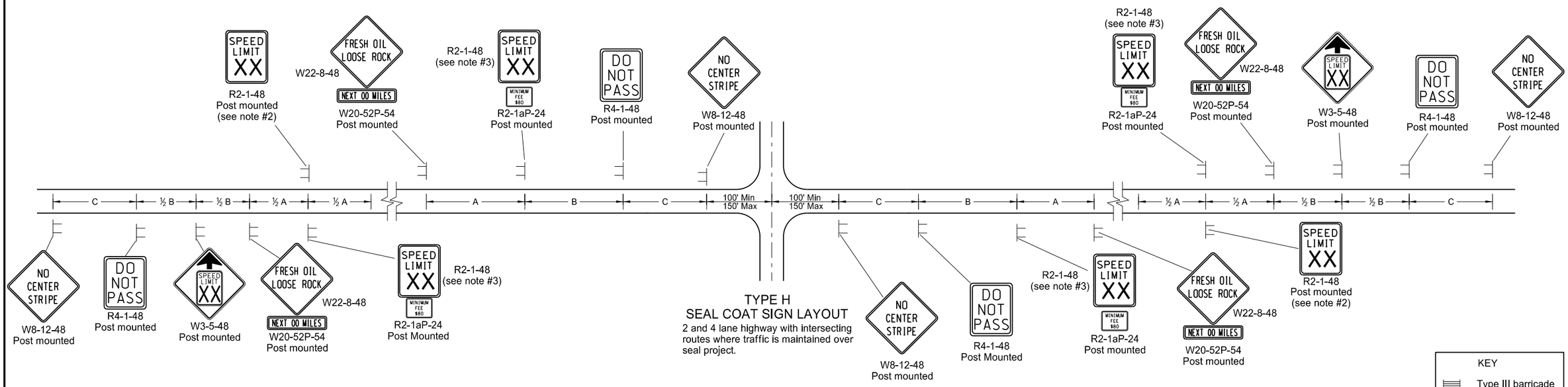
DATE	CHANGE
8-17-17	Updated notes & Speed Limit signs

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

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

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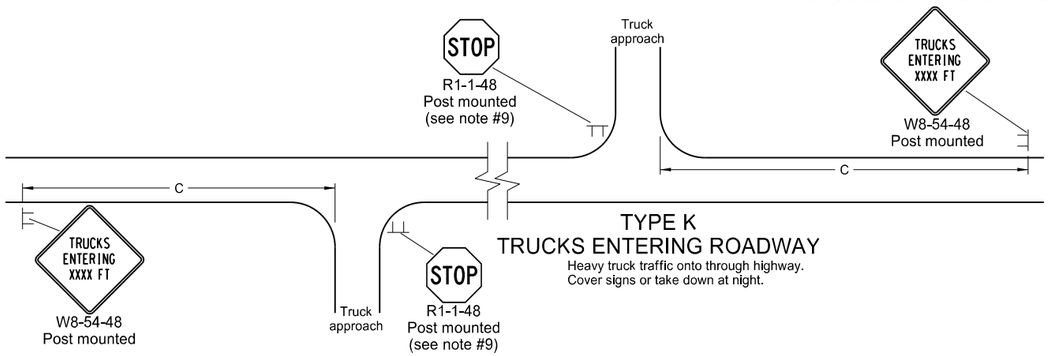
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

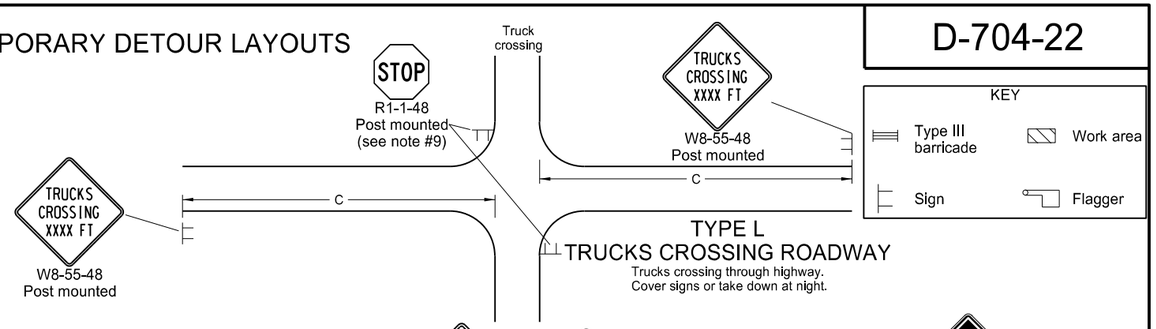
D-704-22

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



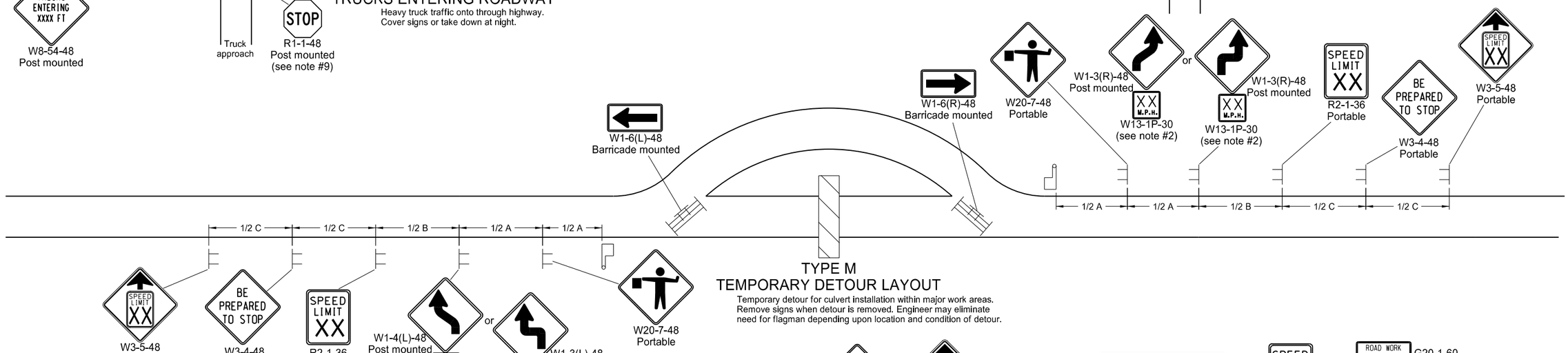
TYPE K
TRUCKS ENTERING ROADWAY

Heavy truck traffic onto through highway.
Cover signs or take down at night.



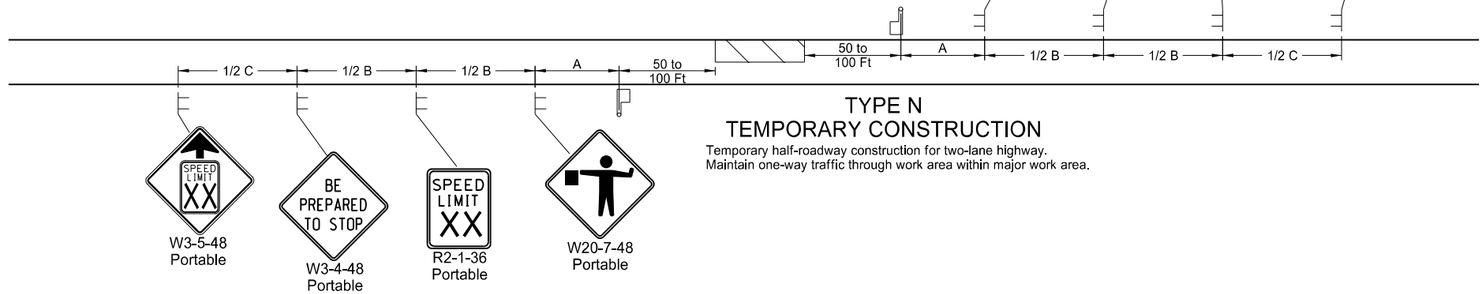
TYPE L
TRUCKS CROSSING ROADWAY

Trucks crossing through highway.
Cover signs or take down at night.



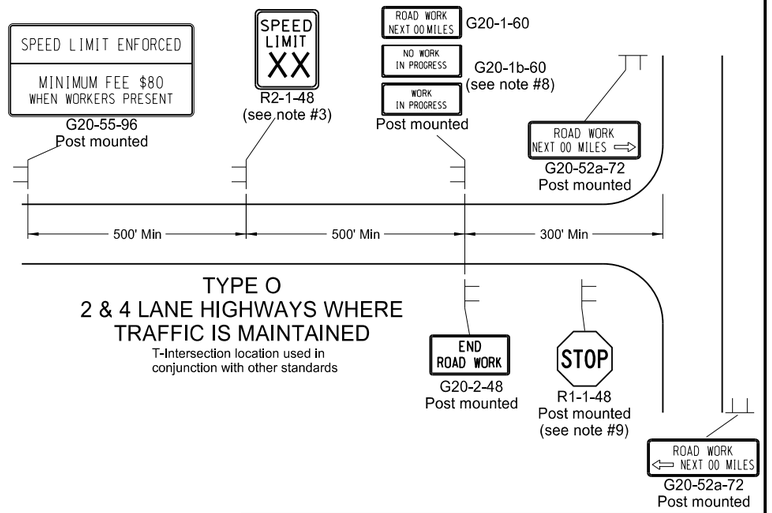
TYPE M
TEMPORARY DETOUR LAYOUT

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

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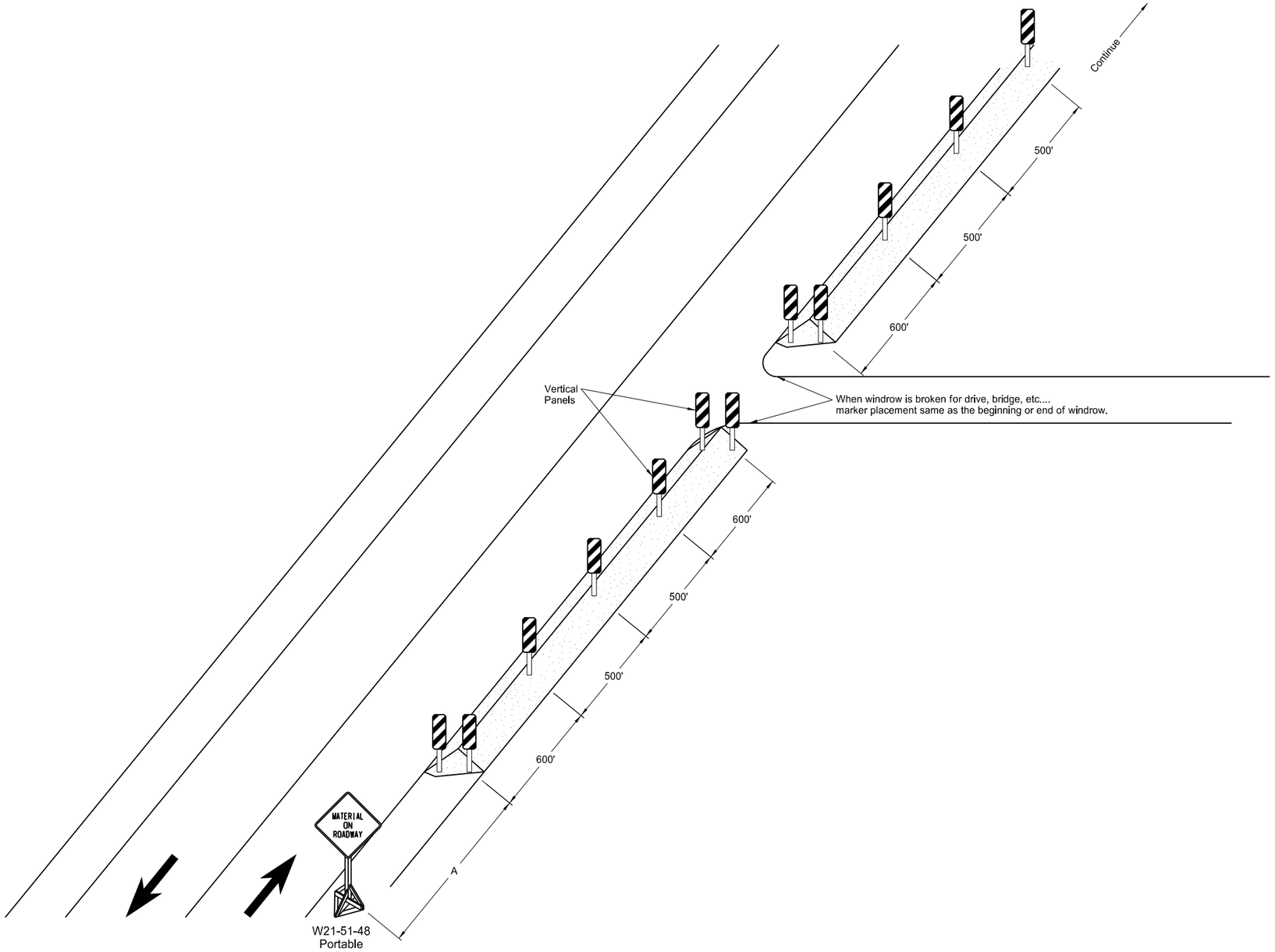
WINDROW MARKING

D-704-30



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 (55 mph to 60 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

Notes:
As an option, use portable sign supports in lieu of post mounted sign in accordance with NDDOT Standard Specifications.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
6-24-14	Revised Note
8-17-17	Updated notes & sign support

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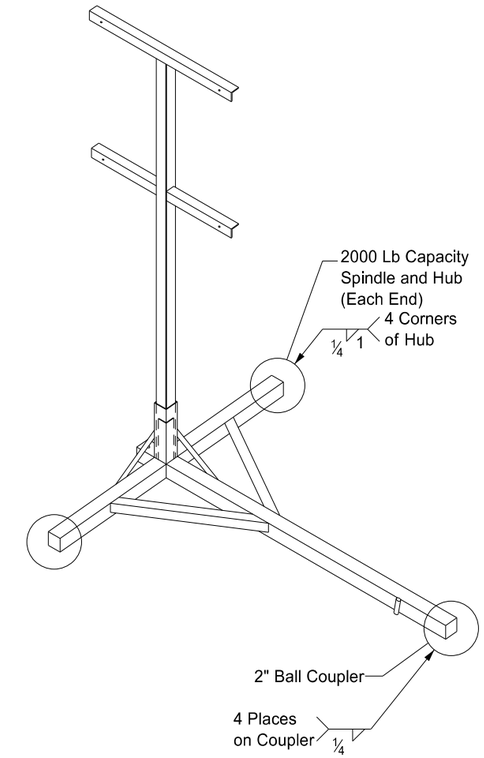
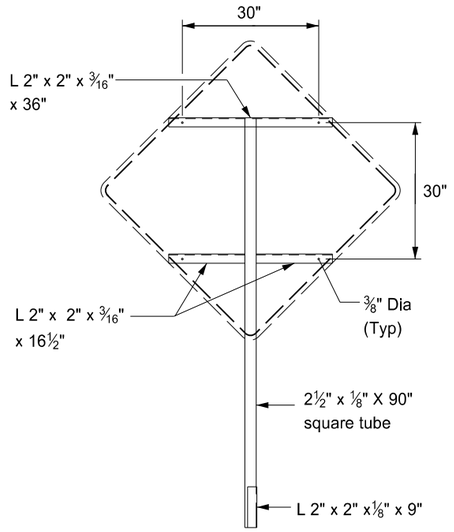
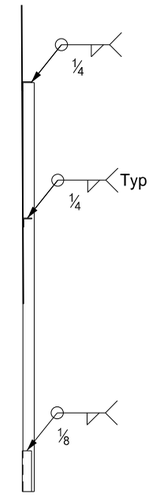
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



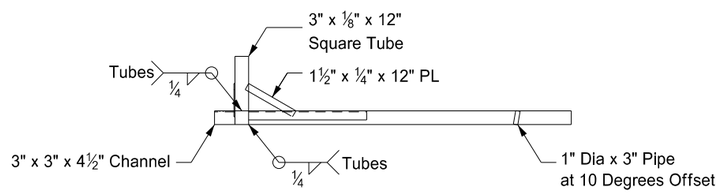


FRONT



RIGHT

SIGN SUPPORT



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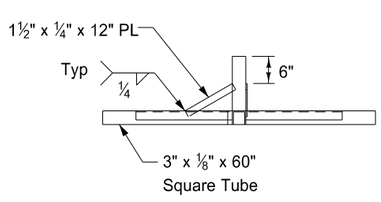

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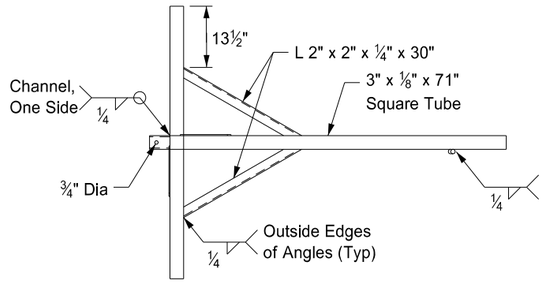

TOP

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

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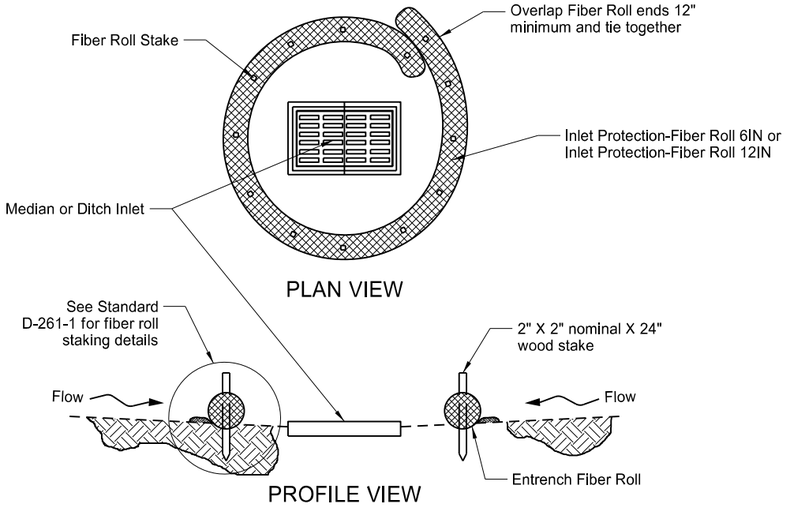
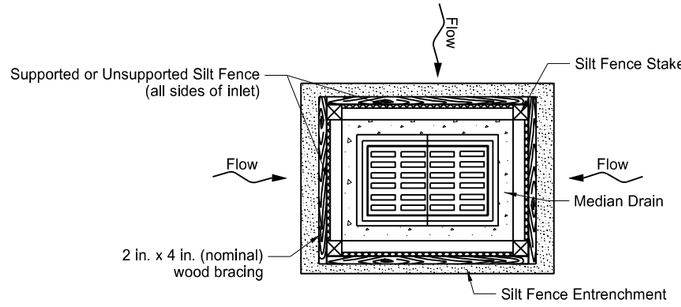
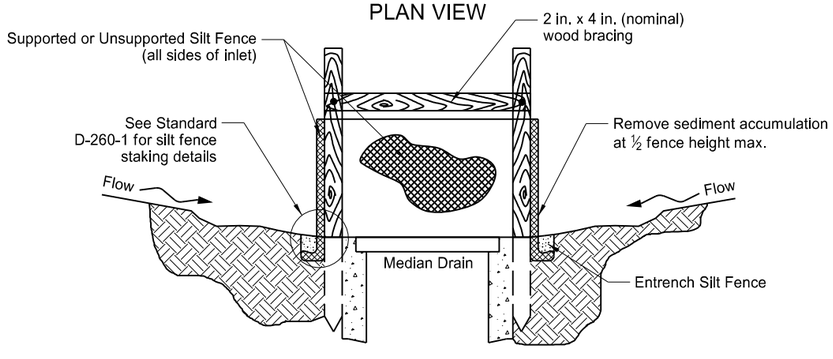
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION

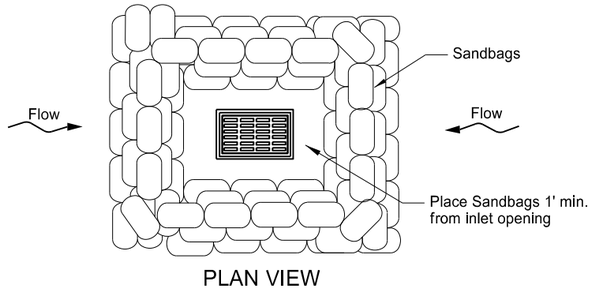


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)





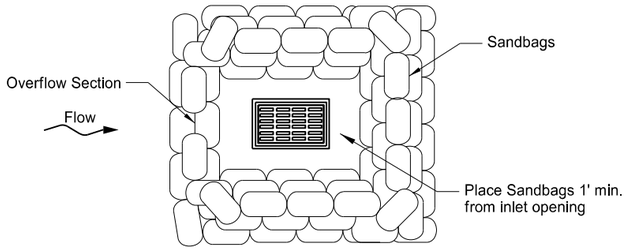
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (LOW POINT)

FIBER ROLL PROTECTION (INLET OF CULVERT)

GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



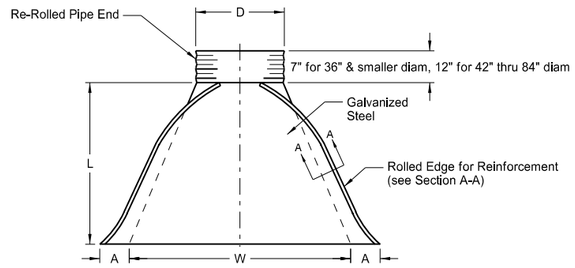
SANDBAG PROTECTION (ON SLOPE)

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.

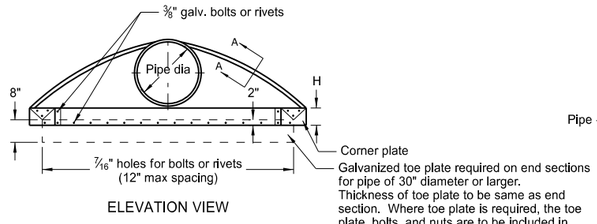
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on10-17-2017and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4

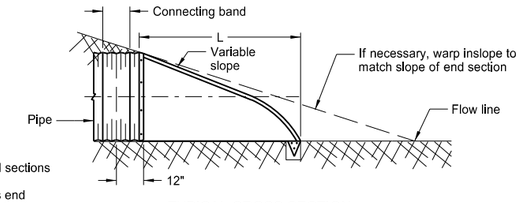


PLAN VIEW



ELEVATION VIEW

Galvanized toe plate required on end sections for pipe of 30" diameter or larger. Thickness of toe plate to be same as end section. Where toe plate is required, the toe plate, bolts, and nuts are to be included in price bid for end sections.



TYPICAL CROSS SECTION
(showing connector section)

* * PIPE DIA. IN	GALV. THICK. IN	END SECTION DIMENSIONS A IN	B IN	H IN	L IN	W IN	APPROX. SLOPE RATE	BODY PIECE
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2½:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1¾:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1¼:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

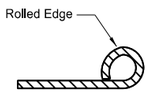
* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

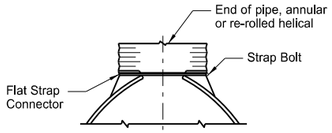
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

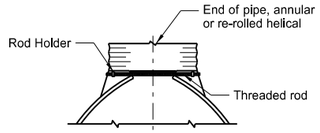
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



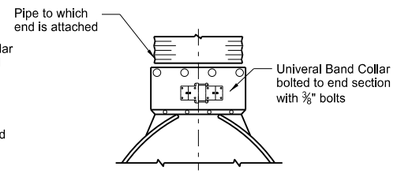
SECTION A-A



TYPE #1
For circular pipes with diameter 24" & smaller



TYPE #2
For circular pipes with diameter 30" through 36"

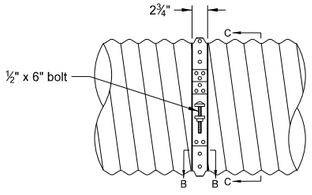


TYPE #3
For all pipe sizes

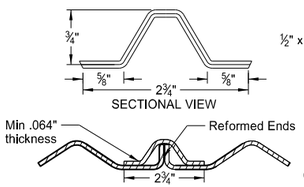
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"	.052"
		78" - 84"	10½"	.079"
	3" x 1" Rerolled End	48" - 120"	10½"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".

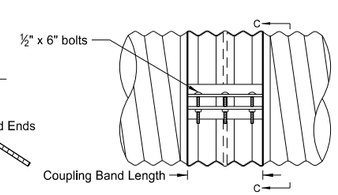


SIDE VIEW

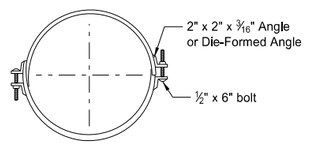


SECTION B-B

HAT BAND FOR FLANGED END PIPE

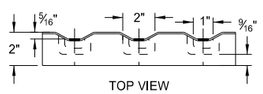


SIDE VIEW



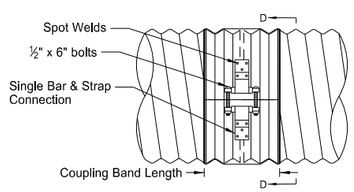
SECTION C-C
Angle Connection

ANNULAR BAND

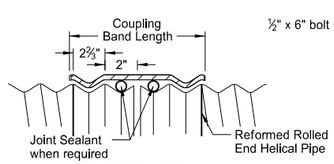


TOP VIEW

Die-Formed Angle Connector

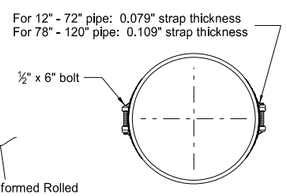


SIDE VIEW

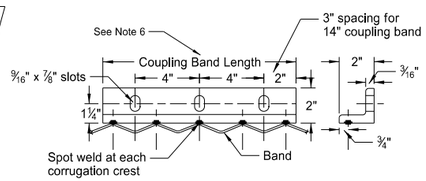


SECTIONAL VIEW

HUGGER COUPLING BAND



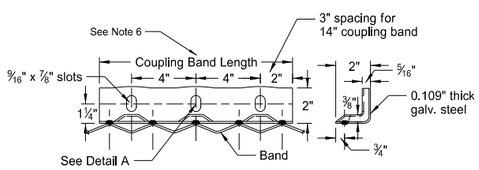
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

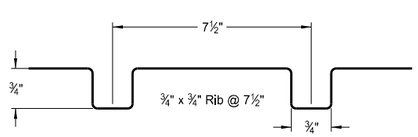
2" x 2" x 3/16" Angle Connector

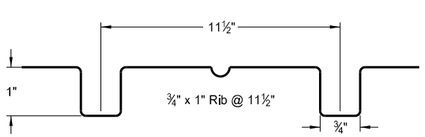


SIDE VIEW

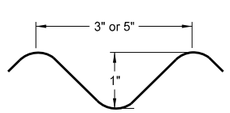
END VIEW

Die-Formed Angle Connector

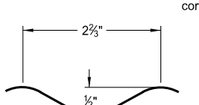




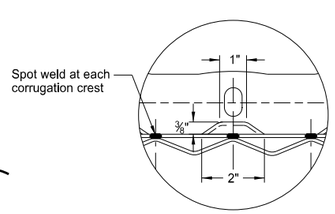
SPIRAL RIB CORRUGATIONS



3" x 1" CORRUGATIONS or
5" x 1" CORRUGATIONS



2⅔" x ½" CORRUGATIONS



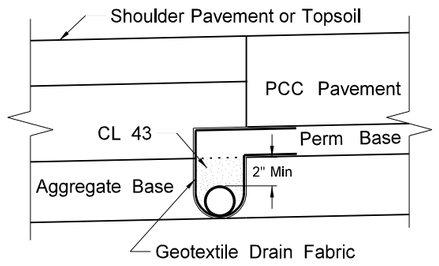
Detail A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail

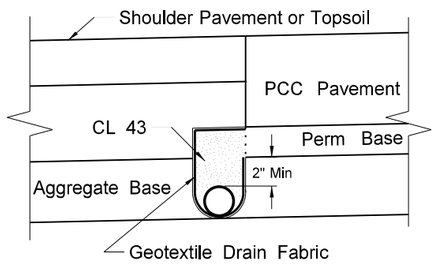
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 02/27/2014 and the original document is stored at the North Dakota Department of Transportation

EDGEDRAIN DETAILS

D-714-18

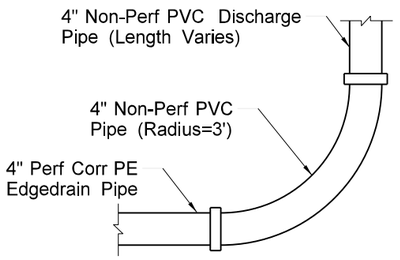


Option #1: Trench before permeable base is placed



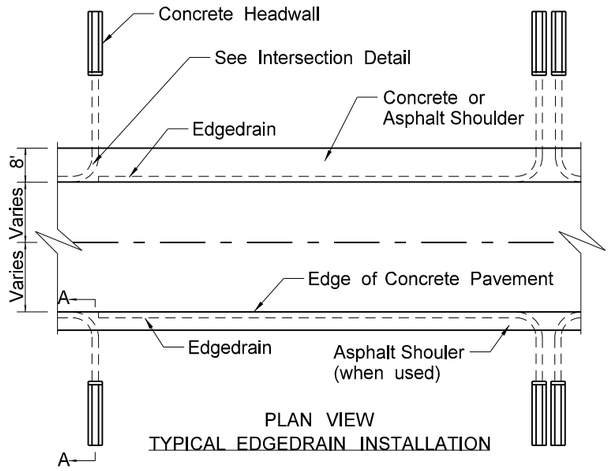
Option #2: Trench after permeable base is placed

TRENCH WRAP DETAILS



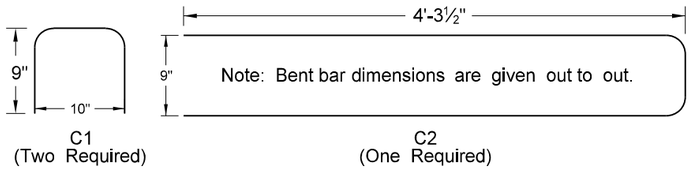
INTERSECTION DETAIL

Edgedrain Pipe to Discharge Pipe Connection



PLAN VIEW

TYPICAL EDGEDRAIN INSTALLATION

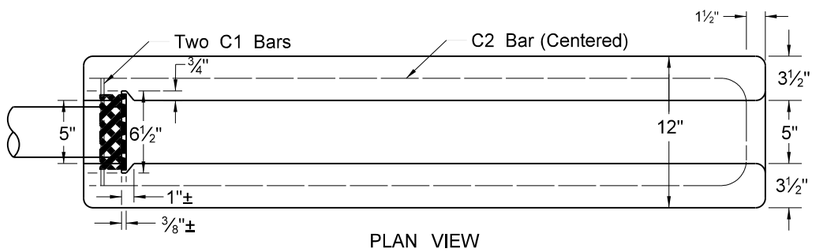


BENT BAR DETAILS

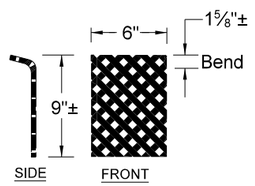
SUPERELEVATED CURVES: The edgedrain, outlets, and headwalls shall be omitted from the high side of superelevated curves.

RODENT SCREEN: The rodent screen shall be fabricated from flattened expanded metal with screen openings of approximately 0.25 square inches. The screen shall be 16 ga metal, hot dip galvanized after fabrication.

REINFORCING BARS: Reinforcing bars shall be No. 4 deformed steel bars.

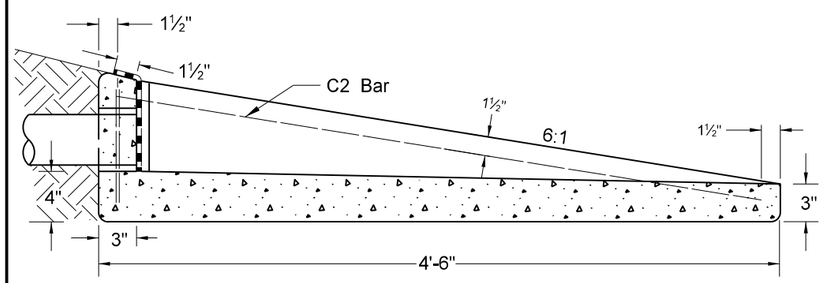


PLAN VIEW



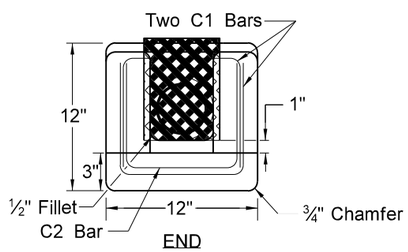
RODENT SCREEN

Dimensions are approximate to allow bend and a snug fit in headwall slot

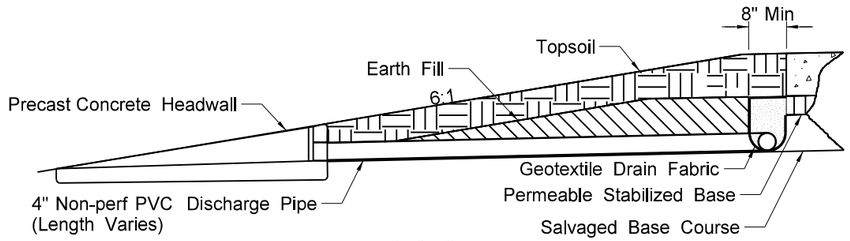


SECTION

PRECAST CONCRETE HEADWALL



END



SECTION A-A

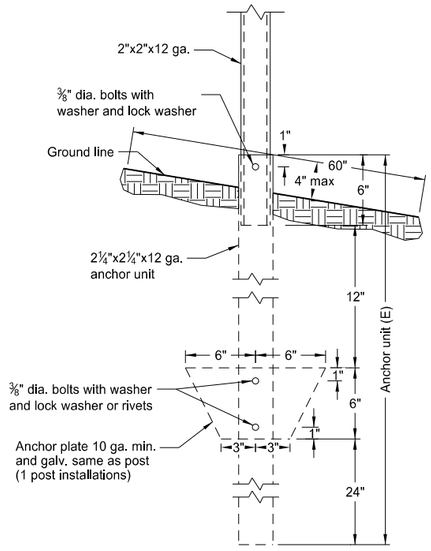
Section A-A shows edgedrain location for median concrete shoulder installations on Interstate highways. For installations where asphalt shoulders will be constructed, or the outside shoulder is to be concrete, the edgedrain is to be trenched adjacent to the roadway concrete pavement, and will be located beneath the shoulder pavement.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-27-2010	
REVISIONS	
DATE	CHANGE

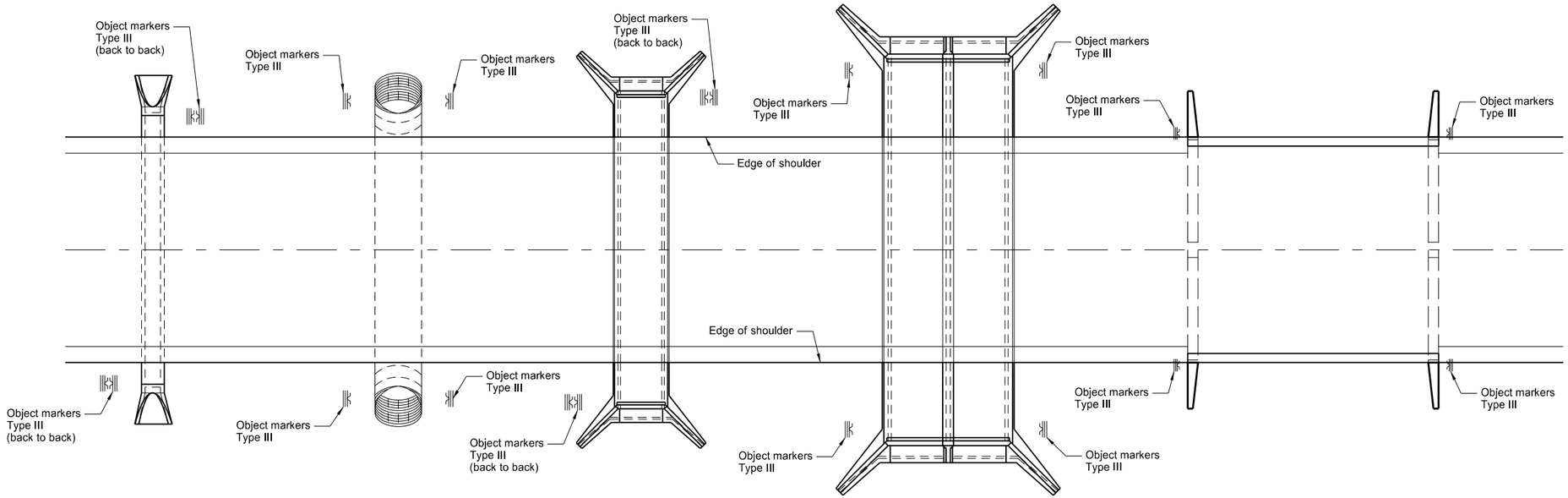
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 10/27/2010 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS

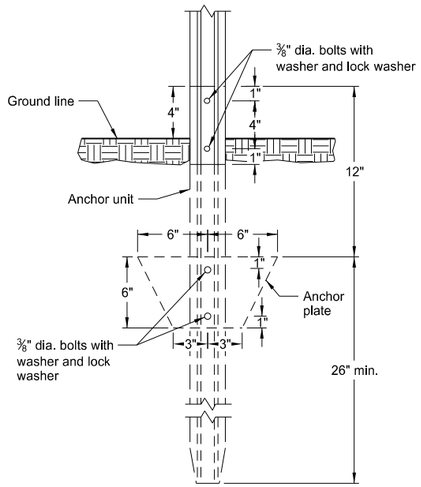
D-754-82



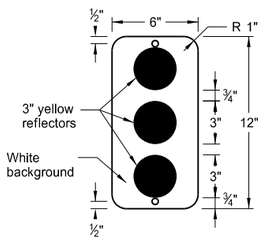
Perforated Tube Anchor Unit Assembly



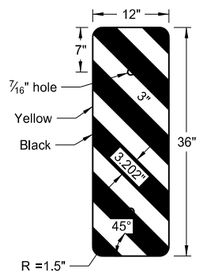
Pipe Culverts 10' max | Pipe Culverts greater than 10' | Box Culverts 10' max | Box Culverts greater than 10' | Bridges (B)



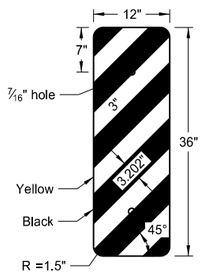
U-Channel Anchor Unit Assembly



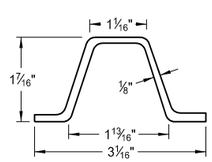
Object Marker
OM2-1V (C)
Type II



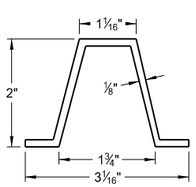
Object Marker Left
OM-3L (C)
Type III



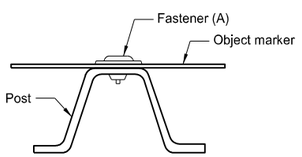
Object Marker Right
OM-3R (C)
Type III



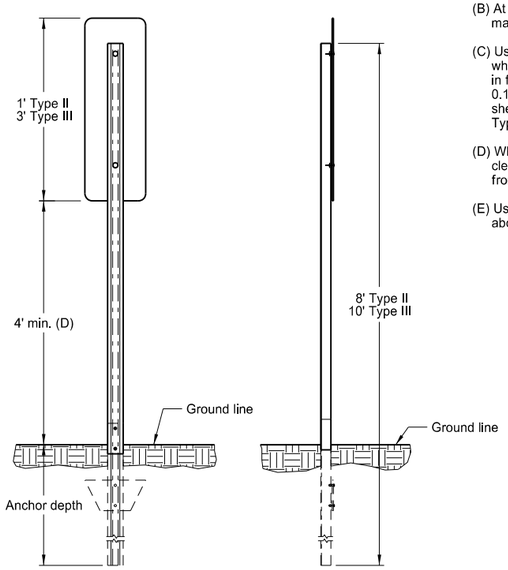
Steel Post Detail
Approx. 2 lb/ft



Aluminum Post Detail
Approx. 0.88 lb/ft



Fastener Detail



Object Marker
Installation Detail

Notes:

(A) Use ⅜" dia. tension pin type or other non-rust vandal resistant fastener with min. outside dia. 13/16" flat washer.

(B) At locations of approach guardrail with reflectors and end terminal with impact head object markers, do not install object markers.

(C) Use two object markers for back to back mountings. On bridges where the distance between wheel guards is less than the approach width, mount object markers vertically on steel posts in front of the bridge railing on each side of highway to mark the horizontal clearance. Use 0.100" minimum thickness sheet aluminum for sign backing material. Use ASTM Type XI sheeting for Type III object markers and ASTM Type IV background sheeting with ASTM Type XI reflectors for Type II object markers.

(D) When object marker is located 8' or less from shoulder or curb, provide 4' minimum vertical clearance from near edge of traveled way to bottom of sign. When located more than 8' from shoulder or curb provide 4' minimum vertical clearance from ground to bottom of sign.

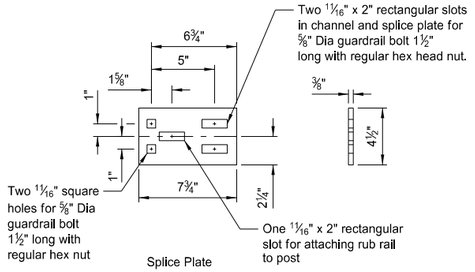
(E) Use 4" vertical clearance for anchor or breakaway base. Provide 4"x60" measurement above and below post location and back and ahead of post.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-18-14 8-30-18	Revised Note C Updated notes to active voice and removed note.

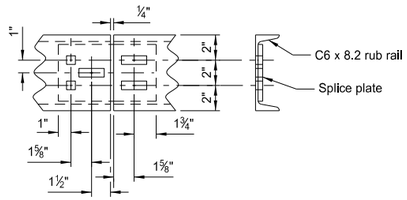
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

W-BEAM GUARDRAIL GENERAL DETAILS

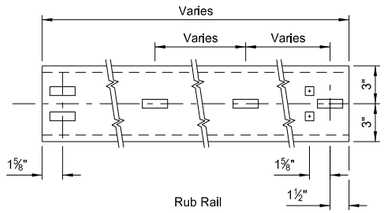
D-764-1



Splice Plate

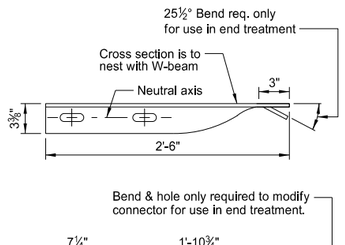


Splice Detail

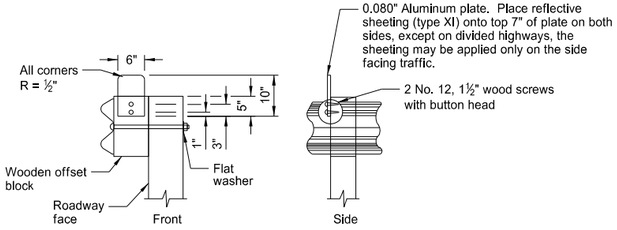


Rub Rail

C6x8 RUB RAIL AND SPLICE PLATE

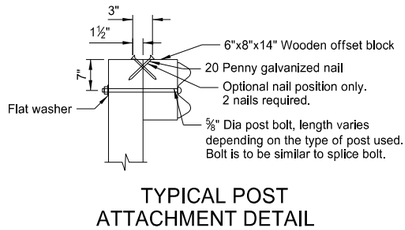


W BEAM TERMINAL CONNECTOR

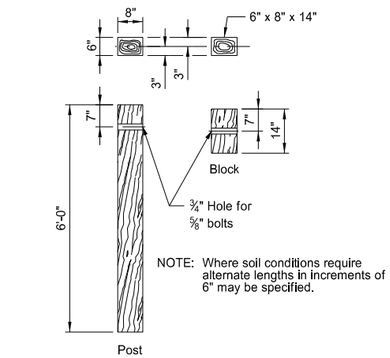


REFLECTORIZED PLATE DETAIL

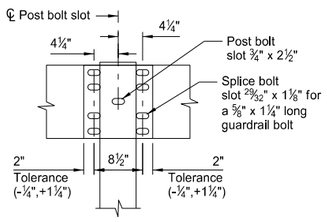
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



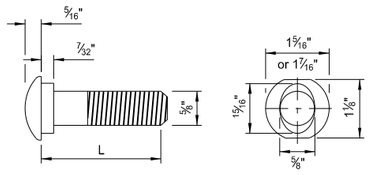
TYPICAL POST ATTACHMENT DETAIL



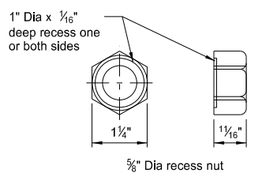
6"x8" TIMBER POST & BLOCK



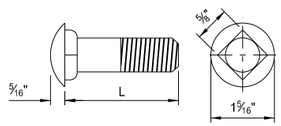
SPLICE DETAIL



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

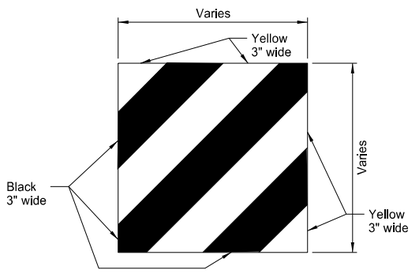


5/8" GUARDRAIL BOLT & RECESS NUT

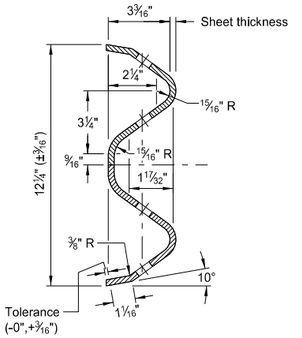


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length

5/8" CARRIAGE BOLT & NUT



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".

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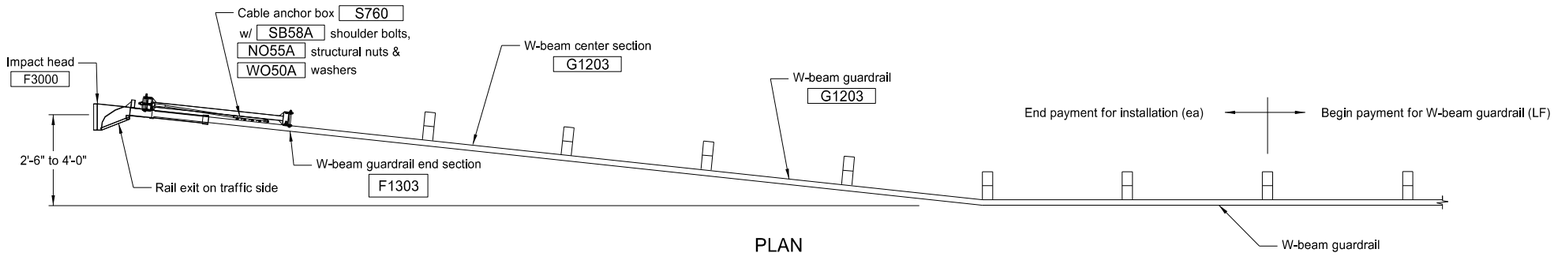
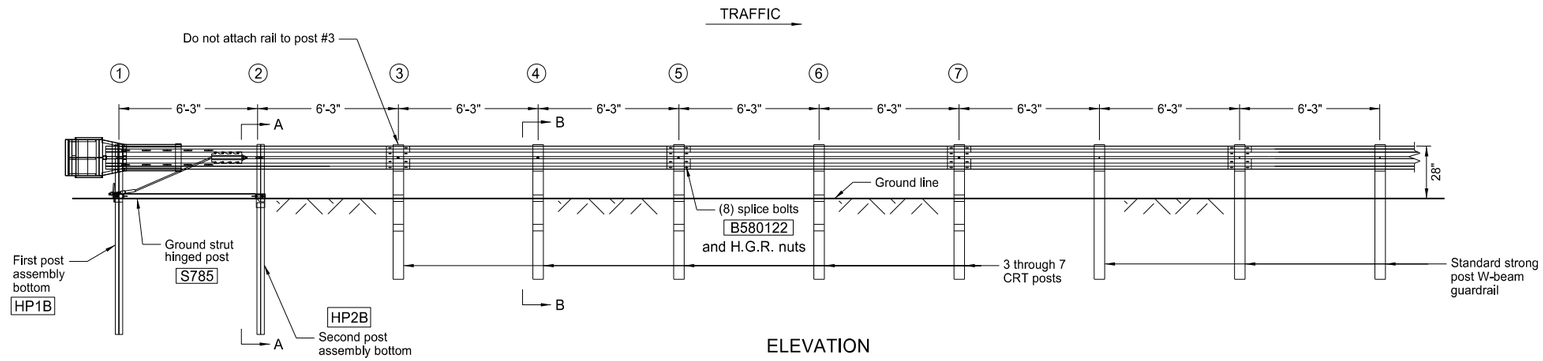
FLARED ENERGY ABSORBING TERMINAL

D-764-6



PLAN

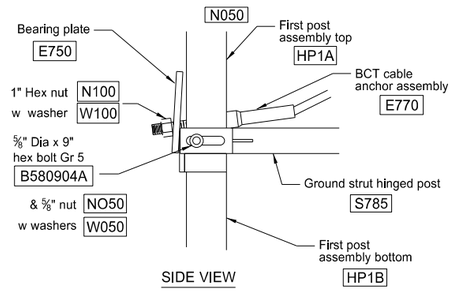


ELEVATION

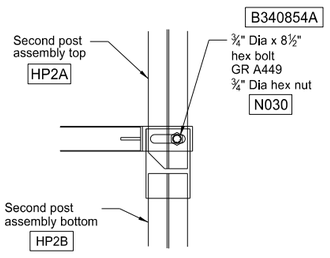
ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
		HARDWARE (ALL DIMENSIONS IN INCHES)
B140404	2	¼ Dia x 4 HEX BOLT
WO14	4	¼ WASHER
N014	2	¼ HEX NUT
B580122	17	⅝ Dia x 1¼ SPLICE BOLT
B581802	4	⅝ Dia x 10 H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	⅝ Dia x 9 HEX BOLT GR 5
W050	5	⅝ WASHER
N050	22	⅝ Dia H.G.R. NUT
B340854A	1	¾ Dia x 8½ HEX BOLT GR A449
NO30	1	¾ Dia HEX NUT
N100	2	1 ANCHOR CABLE HEX NUT
W100	2	1 ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	½ A325 STRUCTURAL NUT
W050A	16	1 1/16 OD x 9/16 ID A325 STR. WASHER

GENERAL NOTES

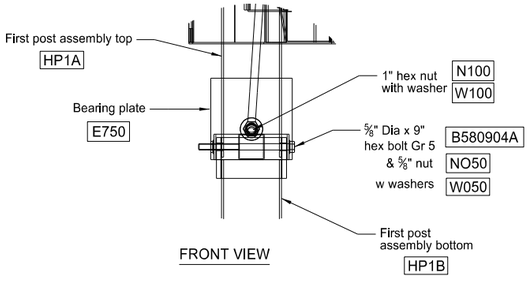
1. Wood posts are required with the Flared Energy Absorbing Terminal except posts #1 and #2.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The lower sections of the posts shall not protrude more than 4 inches above the ground (measured along a 60 inch cord). Site grading may be necessary to meet this requirement.
4. Lower post sections shall not be driven with the upper post attached. If the the post is placed in a drilled hole, the backfill material must be satisfactory compacted to prevent settlement.
5. When rock is encountered during excavation, a 12" diameter post hole 20" deep may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approximately 2½" deep to provide drainage. The soil tubes shall be field cut to length, placed in the hole and back filled with adequately compacted material excavated from the hole.
6. The breakaway cable assembly shall be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
7. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The nail shall be 20 penny and galvanized.
8. The Flared Energy Absorbing Terminal shall be flared only when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, the Flared Energy Absorbing Terminal shall have only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, the Flared Energy Absorbing Terminal shall be turned parallel to the roadway.



SIDE VIEW

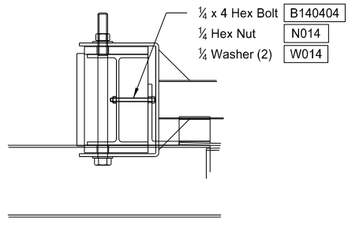


SIDE VIEW DETAIL OF POST #2

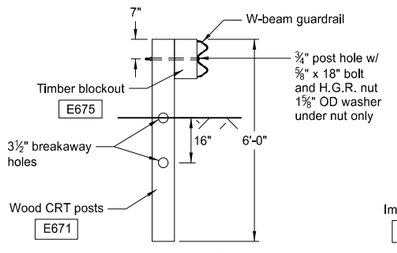


FRONT VIEW

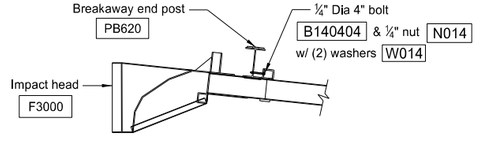
POST #1 CONNECTION DETAILS



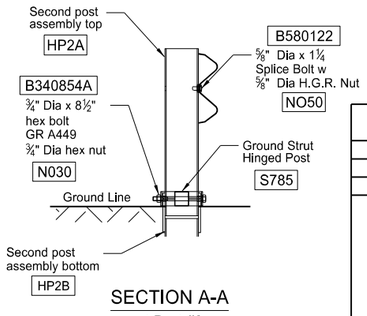
IMPACT HEAD CONNECTION DETAIL



SECTION B-B
POST 3 THRU 7



IMPACT HEAD CONNECTING DETAIL



SECTION A-A
at Post #2

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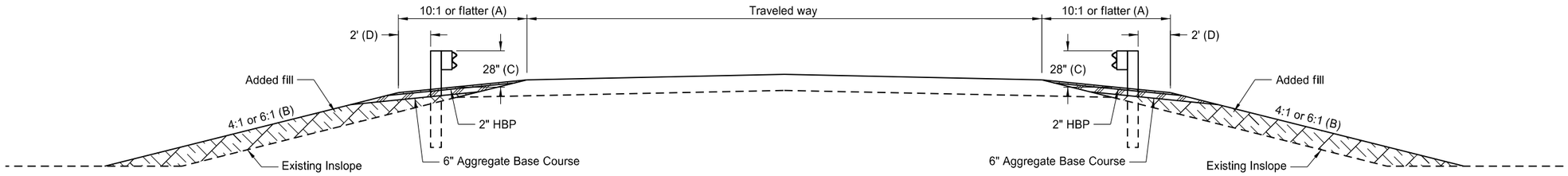
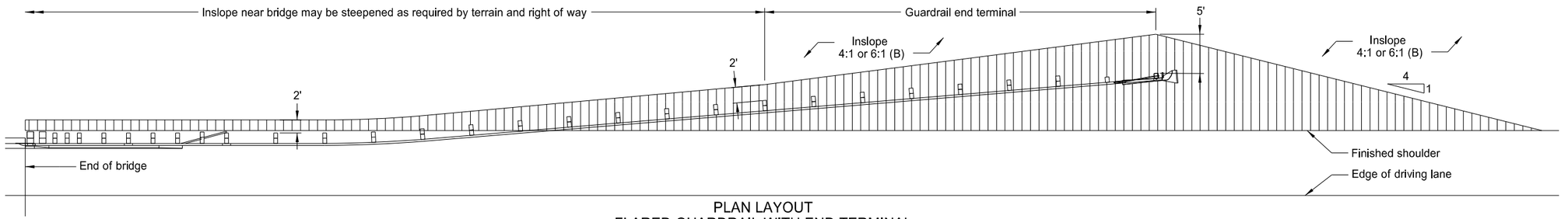
D-764-22

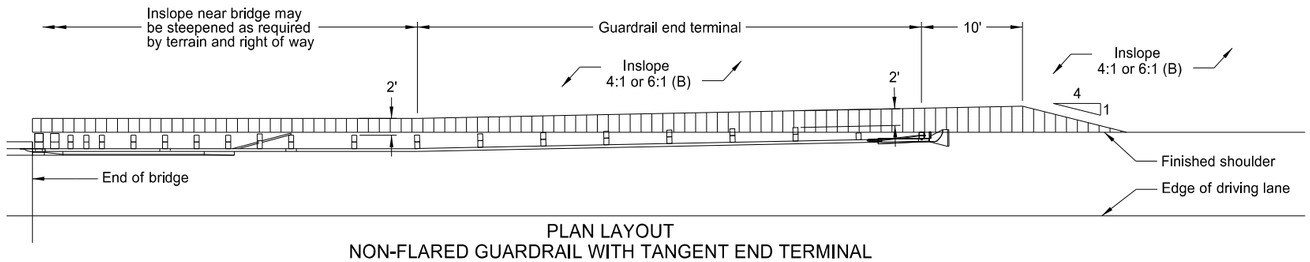
TYPICAL GRADING AT BRIDGE ENDS WITH W-BEAM GUARDRAIL



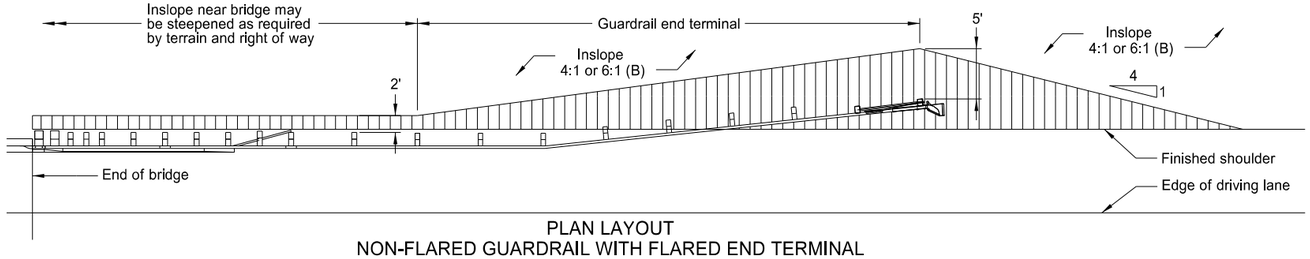
TYPICAL SECTION



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 inslope is 4:1 the added fill shall be 4:1. Where normal inslope 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.

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