DESIGN DATA						
Traffic	Average Daily					Max Hour
Current 2013	Pass:	N/A	Trucks:	N/A	Total: <100	N/A
Forecast 2033	Pass:	N/A	Trucks:	N/A	Total: <100	N/A
Clear Zone Distance: 12'			Design Speed: 55 MPH			
Minimum Sight Distance (Non Passing): 495'			Bridges: HL-93			
Minimum Sight Distance (Safe Passing): N/A						
Sight Distance for No Passing Zone: N/A						
Pavement Design Life: N/A						

LENGTH OF PROJECT		
PROJECT	MILES-GROSS	MILES-NET
BRO-0048(016)	0.129	0.129
TOTALS	0.129	0.129

TOWNER COUNTY

NORTH DAKOTA

FEDERAL AID PROJECT BRO-0048(016)

FHWA LIMITED INVOLVEMENT

STRUCTURE

STRUCTURE #48-108-28.0

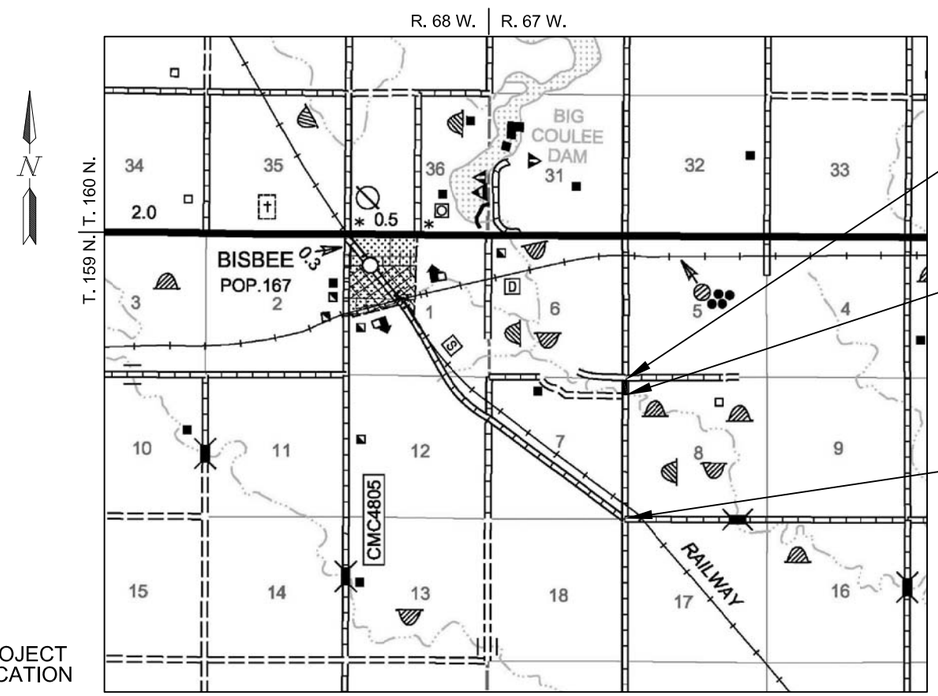
PCN 20131	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0048(016)	1	1

Job 23

GOVERNING SPECIFICATIONS

Standard Specifications for Road and Bridge Construction, adopted by the North Dakota Department of Transportation, October 2008, standard drawings currently in effect, and other contract provisions submitted herein.

THE PROJECT CONSISTS OF REMOVING THE EXISTING BRIDGE AND REPLACING IT WITH A DOUBLE 14 FT SPAN BY 8 FT HIGH PRECAST REINFORCED CONCRETE BOX CULVERT
THE PROJECT IS LOCATED 1 MILES SOUTH AND 2 MILE EAST OF BISBEE, ND

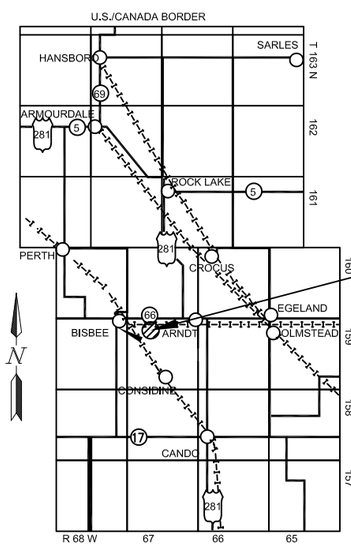


End Project BRO-0048(016)
STA. 52+83.4 = Northwest Corner of S. 8, T. 159 N., R. 67 W.

Begin Project BRO-0048(016)
STA. 46+00 = A point 683.4' South of the Northwest Corner of S. 8, T. 159 N., R. 67 W.

Project BRO-0048(016)
STA. 0+00= Southwest Corner of S. 8, T. 159 N., R. 67 W.

LOCATION MAP



PROJECT LOCATION

SKETCH MAP OF TOWNER COUNTY

SURVEYED & DESIGNED 2/01/2013

PS & E REVISIONS MADE 08/19/2013

Wold Engineering, P.C.
Consulting Engineers & Land Surveyors
915 East 11th Street ~ PO Box 237 ~ Bottineau, ND 58318
316 Eastdale Drive ~ PO Box 1277 ~ Bismarck, ND 58502
110 8th Avenue Southwest ~ Minot, ND 58701

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60	1	Plan & Profile Sheets
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	3	Permanent Erosion Control
80	1	Survey Coordinate and Curve Data
100	1	Traffic Control Devices List
	2	Work Zone Traffic Control
170	1	Precast Box Culvert Details
200	1	Cross Sections

LIST OF STANDARD DRAWINGS

Standard No.	Description
D20-1,2,3	NDDOT Abbreviations
D20-10	NDDOT Utility Company Abbreviations
D20-20,21	Linestyles
D20-30,31,32	Symbols
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D-704-9-11	Construction Sign Details
D-704-13	Barricade Details and Channelizing Devices
D-704-14	Construction Sign and Barricade Assembly Details
D-708-7	Erosion Control – Fiber Roll Staking Details

LIST OF SPECIAL PROVISIONS (SP)

SP #	Description
SP 1256(08)	Permits and Environmental Considerations
SP 1010(08)	Temporary Erosion and Sediment Management Practices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	6	1

NOTES

100-P01 SCOPE OF WORK: The project consists of removing the existing bridge and installing a double 14 feet span by 8 feet high by 56 feet long precast concrete box culvert and approximately 500 feet of approach road regrading. The new precast reinforced concrete box culvert will be installed at Sta. 49+17 with a 10° left ahead skew.

100-P02 UTILITIES: Notice shall be given to the utility companies a minimum of 2 weeks prior to work on the project. Utilities that the engineer has been made aware of are shown on the plans. Other utilities may exist that are not shown. Power lines, telephone cables, rural water lines, and other utilities may be encountered on this project. The contractor shall be responsible to verify the locations and to notify all utility and pipeline companies to have the locations flagged and marked prior to beginning construction. Any charges by the utility companies for locates shall be paid by the contractor. The contractor will be liable for any costs resulting from damage to utilities or pipelines.

Utility companies will move or adjust conflicting facilities in conjunction with or prior to the highway construction. The contractor will not be responsible for costs associated with the moving or adjustment of utilities on the project right of way.

One-Call Service: 1-800-795-0555

100-P03 GENERAL: All work to be done by the County, including fence removal, shall be coordinated to be completed concurrently with or prior to completion of Contractor's work. The contact for the County is Larry Halverson, Highway Superintendent, (701)968-4366.

107-P01 Haul Roads: All paved roads off the state system shall not be designated as haul roads. The contractor shall obtain approval from the local government agency before using any off system road as a haul road.

202-P01 REMOVAL OF STRUCTURE: The existing structure at Station 48+99 to 49+35 shall be removed. The existing structure, built in 1951, is a 36 foot single span bridge with steel beams and a concrete deck and abutments. The bridge has a clear roadway width of 18 feet.

The structure shall be removed by the contractor in accordance with Section 202 of the standard specifications. The bid item "REMOVAL OF STRUCTURE" shall include:

1. Remove and salvage the existing signs for Towner County. The Contractor shall remove the existing signs with care and stockpile as designated by the Engineer. The salvaged signs shall become the property of Towner County.
2. Remove all remaining bridge components. All materials removed shall become property of the contractor and shall be disposed of properly off the right-of-way.
3. Existing piling shall be cut-off a minimum of one foot below the proposed foundation fill limits and backfilled with foundation fill. All materials removed shall become property of the contractor and shall be disposed of properly off the right-of-way.

203-P01 BORROW-EXCAVATION: The Borrow Excavation shall be used to backfill the new box culvert and regrade the existing roadway. Thirty-five percent (35%) shrinkage was used to calculate quantity. The Contractor shall be responsible for obtaining areas to provide suitable "Borrow" material, and shall bear all costs of obtaining, opening and restoring the site, as per Std. Specs. Sec. 203.02 E.3. The final "Borrow" quantity is to be determined by cross sectioning before and after removal or by measured load count. Water may be required to compact the borrow-excavation and shall be incidental to "Borrow-Excavation". All necessary clearing and grubbing cost shall be included in price bid for "Borrow-Excavation".

Compaction of embankment material shall be in accordance with Standard Specifications, Section 203.02 H. the vibratory sheep's foot/pad foot/extended pad foot roller shall be used to obtain compaction on all embankment. On the final lift, the vibratory sheep's foot/pad foot/ extended pad foot roller shall be used until the feet/pads ride up close to the surface of the embankment material. After this, the road top shall be compacted with a pneumatic roller until the surface is tightly bound and shows no sign of rutting or displacement under the compaction operations of traffic. Vibratory sheep's foot/pad foot/extended pad foot and pneumatic tired rollers of the type specified in Section 151 of the Standard Specifications shall be used.

The contractor shall remove and replace approximately 6" of topsoil over the excavation and embankment areas except the 28' roadbed.

All work as described above shall be included in the price bid for "Borrow-Excavation".

210-P01 CLASS 2 EXCAVATION-BOX CULVERT: "Class 2 Excavation-Box Culvert" shall include that excavation needed to install the precast box culvert, the foundation fill, and the riprap excavation (Approximately 244 C.Y.). Pay quantity shall be 1 Each. This material shall become the property of the Contractor and removed from the project unless approved for other uses by the Engineer.

210-P02 FOUNDATION FILL: The quantity for foundation fill was computed to a depth of 1.5' below the box culvert; however, this may vary depending on the soil conditions. If, in the opinion of the engineer, a suitable foundation exists under the culvert site, the foundation fill may be eliminated. If larger rock is required to stabilize the foundation it will be paid for as "foundation fill." The bed for the pre-cast sections shall consist of fine graded material (sand) approximately 4" in depth below the culvert. Grade rails shall be used to establish a uniform bed for the pre-cast sections. This material will be paid for as "Foundation Fill." Material will be accepted by Engineers Statement. No aggregate testing shall be required.

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NOTES

NOTES

210-P03 FOUNDATION PREPARATION: The bidders shall be aware of the possible inundated conditions at this site before the bid opening. The cost of any cofferdams and dewatering the excavation shall be included in the bid for "FOUNDATION PREPARATION."

302-P01 AGGREGATE SURFACE COURSE CLASS 13: Compaction of aggregate surface course shall be in accordance with Section 302.04. The dimensions shown for the aggregate surface course are approximate. Plan quantities shall be placed throughout the project except where the engineer authorizes a change. Water may be required to compact the aggregate surface course and shall be incidental to "Aggregate Surface Course Cl 13". Material will be accepted by Engineers Statement. No aggregate testing shall be required.

708-P01 SEEDING TYPE B – CLASS II: Seeding will be measured by the acre for Type B Class II. Seeding shall cover the entire right-of-way (excluding the 28' roadbed).

708-P02 MULCHING: All seeded areas shall be stabilized with mulch after the completion of the seeding operation.

708-P03 RIPRAP: Final pay quantity for "Riprap-Loose Rock" shall be determined by field measurements in accordance with plan length, width, and depth, or by measured load count.

709-P01 GEOTEXTILE FABRIC – TYPE RR: Geotextile Fabric – Type RR shall be placed below all riprap.

CONTACT PERSON:

Michael Rivinius, P.E.
Wold Engineering, P.C.
316 Eastdale Drive
Bismarck, ND 58502
Phone: (701)258-9227

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NOTES

ENVIRONMENTAL COMMITMENTS

ENVIRONMENTAL COMMITMENTS: Towner County, the North Dakota Department of Transportation, and the Federal Highway Administration have made several environmental commitments to various agencies and the public to secure approval of this project. The environmental commitments are as follows:

Commitment No. 1: Construction shall not affect the fish spawning and migration period between April 15th and June 1st.

Action taken/required: The contractor is not allowed to work in the channel between April 15 and June 1 for this project.

Commitment No. 2: The contractor shall provide the ND Game & Fish Department a reasonable opportunity to inspect all vessels, motors, trailers, and construction equipment prior to these items being launched or placed into the waters of the state.

Action taken/required: A minimum of 72 hours notice must be provided for scheduling an inspection. The department's Nuisance Species Biologist, Mr. Fred Ryckman, can be contacted at 701-770-0920 for equipment inspections or any additional information regarding Aquatic Nuisance Species prevention protocols.

Commitment No. 3: Active migratory bird nests with eggs or chicks are protected by the Federal Migratory Bird Treaty Act. Demolition on bridges or box culverts with active nesting cannot start until nesting season is over unless measures are taken to prevent nesting.

Action taken/required: The contractor will not remove any existing bridge or box culvert if active nests are present. The contractor can legally remove inactive nests prior to the nesting season. After inactive nests are removed the contractor can use nets or tarps secured to the structure to discourage nesting.

Commitment No. 4: Unavoidable wetland impacts will be minimized or mitigated either on-site or at an appropriate mitigation site. Approximately 0.08 jurisdictional acres of potential other waters will be impacted permanently and 0.08 jurisdictional acres of potential other waters will be temporarily impacted.

Action taken/required: The permanent impacts to potential other waters do not require mitigation. To reduce the overall impact to the channel, the proposed inverts of the box culvert and riprap are set 1 foot below the streambed elevation to allow for sedimentation of the box culvert floor and to allow passage of fish and other organisms.

POTENTIAL OTHER WATERS										
				Size				Impacts to Potential Other Waters		
								Acres		
Number	Location	Long/Lat (Dec. Deg.)	Type	Acres	Linear Feet	Feature	USACE Jurisdictional*	Temp	Perm	Linear Feet
POW - 1	Sec.7/8, T159N, R67W	-99.341243 W 48.615977 N	Intermittent Stream	0.44	725	Natural	X	0.08	0.08	204
			Totals	**0.44**	**725**			**0.08**	**0.08**	**204**

* A wetland Jurisdictional Determination was issued by the USACE on 12/07/2012; NWO-2012-2821-BIS.

Required Permits

North Dakota Department of Health — *NDPDES Permit*
Status: To be obtained by the contractor prior to construction
Owner of permit shall be listed as Towner County

United States Army Corps of Engineers — Nationwide Permit 23
Status: Has been obtained for the project

ESTIMATED QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
103	0100	CONTRACT BOND	L SUM	1
202	0104	REMOVAL OF STRUCTURE	EA	1
203	0102	COMMON EXCAVATION-TYPE B	CY	789
203	0140	BORROW-EXCAVATION	CY	2,048
210	0109	CLASS 2 EXCAVATION-BOX CULVERT	EA	1
210	0201	FOUNDATION PREPARATION	EA	1
210	0210	FOUNDATION FILL	CY	194
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	301
606	3408	DBL 14FT X 8FT PRECAST RCB CULVERT	LF	56
606	7408	DBL 14FT X 8FT PRECAST RCB END SECTION	EA	2
702	0100	MOBILIZATION	L SUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	390
704	1052	TYPE III BARRICADE	EA	10
708	1020	RIPRAP-LOOSE ROCK	CY	107
708	1430	FIBER ROLLS 12IN	LF	1009
708	1431	REMOVAL FIBER ROLLS 12IN	LF	800
708	2240	SEEDING-TYPE B-CL II	ACRE	1.8
708	5500	MULCHING	ACRE	1.8
709	0600	GEOTEXTILE FABRIC - TYPE RR	SY	160

BASIS OF ESTIMATE

QUANTITY PER MILE	WIDTH	UNIT	DESCRIPTION
3,179	24'	TON	AGGR. SURF COURSE, CL. 13 (1.875 TON/C.Y.) ~ Mainline
			CL. 13 AGGR. ~ 42 TON PER SECTION LINE (0)
			CL. 13 AGGR. ~ 18 TON PER PRIVATE DRIVE (0)

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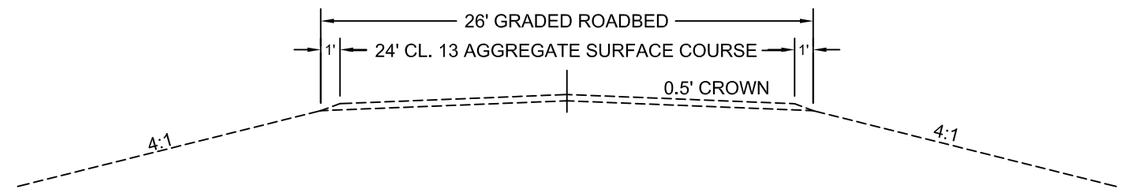
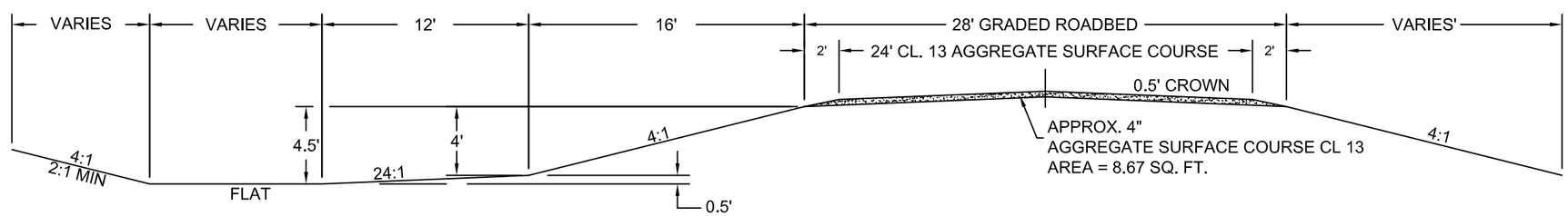
Quantities and Basis of Estimate

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	30	1



EXISTING TYPICAL SECTION



CUT

PROPOSED TYPICAL SECTION

FILL

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Typical Section

REVISED: 00/00/0000

Wold Engineering, P.C.
Consulting Engineers & Land Surveyors
BOTTINEAU ~ BISMARCK ~ MINOT

DRAWN BY: MRR	CHECKED BY: MRR	DATE: 01/18/2013

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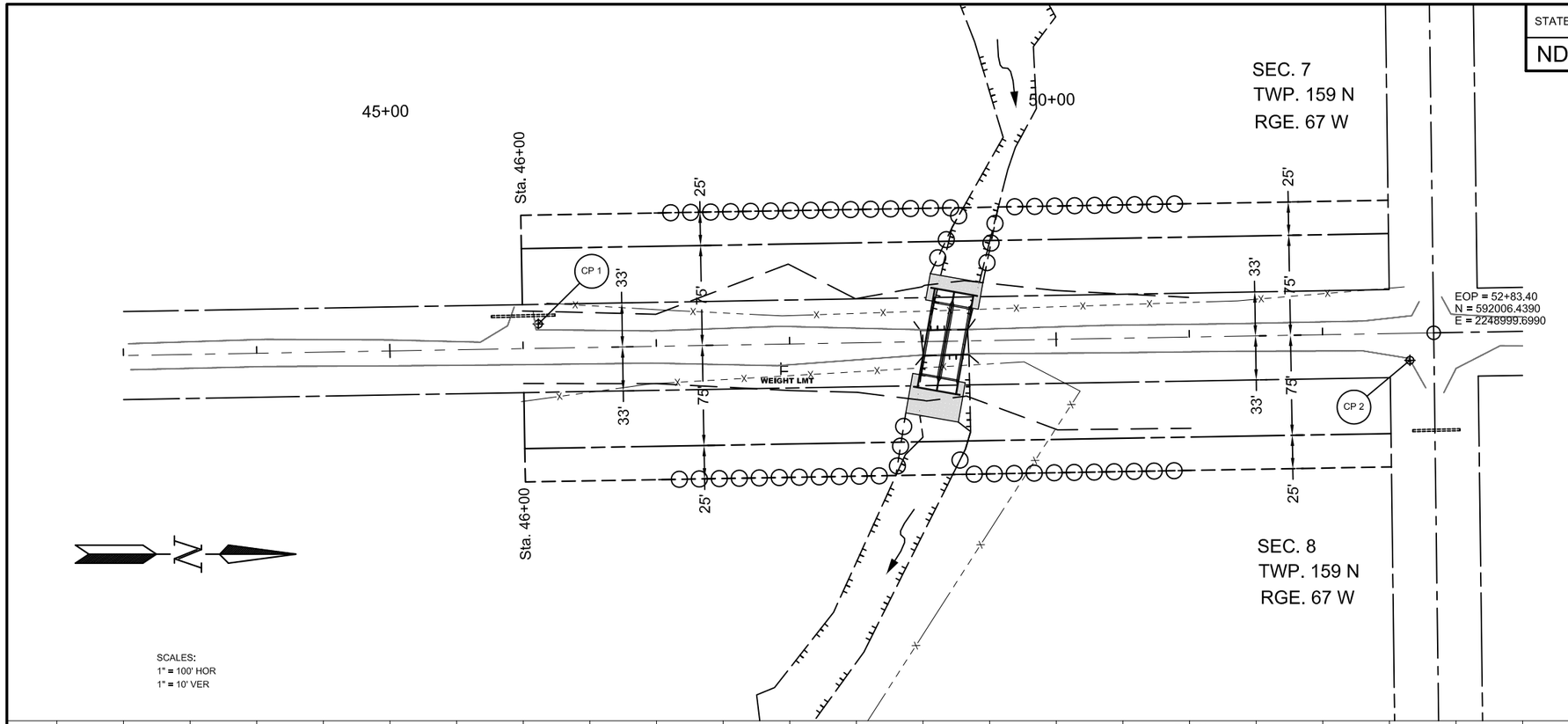
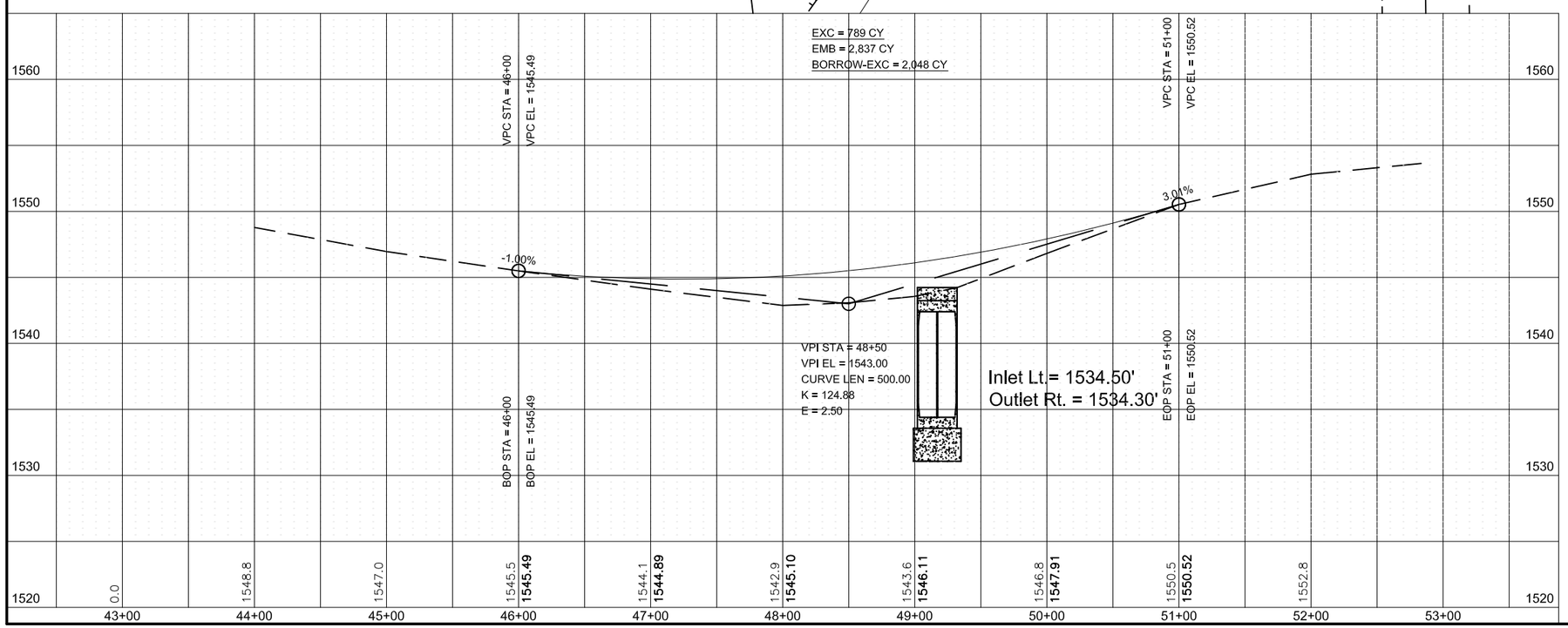
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	060	1





DOUBLE 14FTX8FT PRECAST RCB CULVERT

STA. 49+17 ℄	56 LF

DOUBLE 14FTX8FT PRECAST RCB END SECTION

STA. 49+17 ℄	2 EA

RIPRAP-LOOSE ROCK

STA. 49+03 TO 49+46 LT	36 CY
STA. 48+86 TO 49+31 RT	71 CY

GEOTEXTILE FABRIC-TYPE RR

STA. 49+03 TO 49+46 LT	53 SY
STA. 48+86 TO 49+31 RT	107 SY

REMOVAL OF STRUCTURE

Sta. 49+17℄
Structure No. 48-108-28.0
Deck: Concrete
Beams: Steel
Curb: Precast Concrete
Rail: None
Abutments: Concrete
Overall Length: 36'
Deck Width: 19.4'

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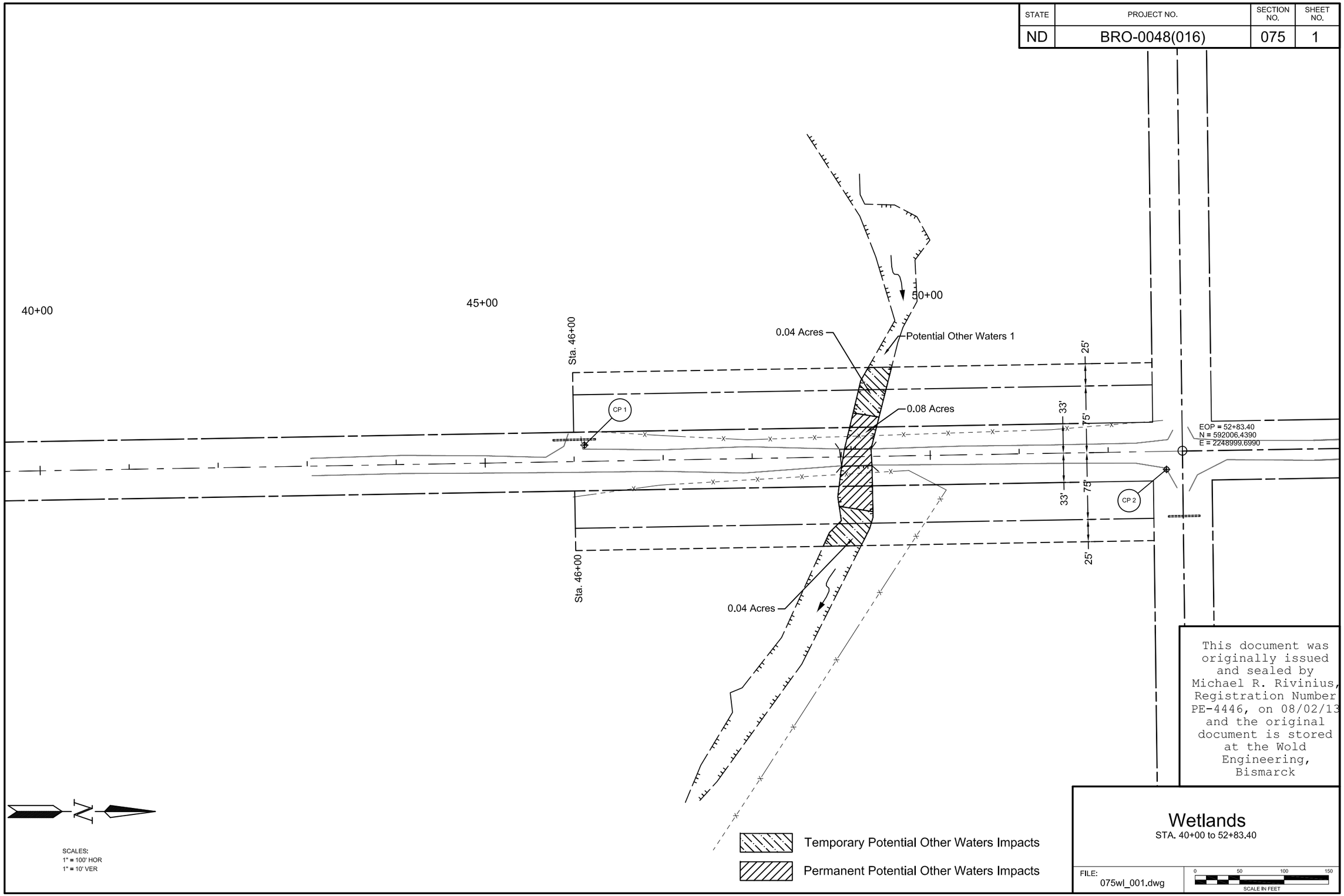
PLAN & PROFILE

STA. 43+00 to 53+00

FILE: 060pp_001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	075	1



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Wetlands

STA. 40+00 to 52+83.40

FILE: 075wl_001.dwg

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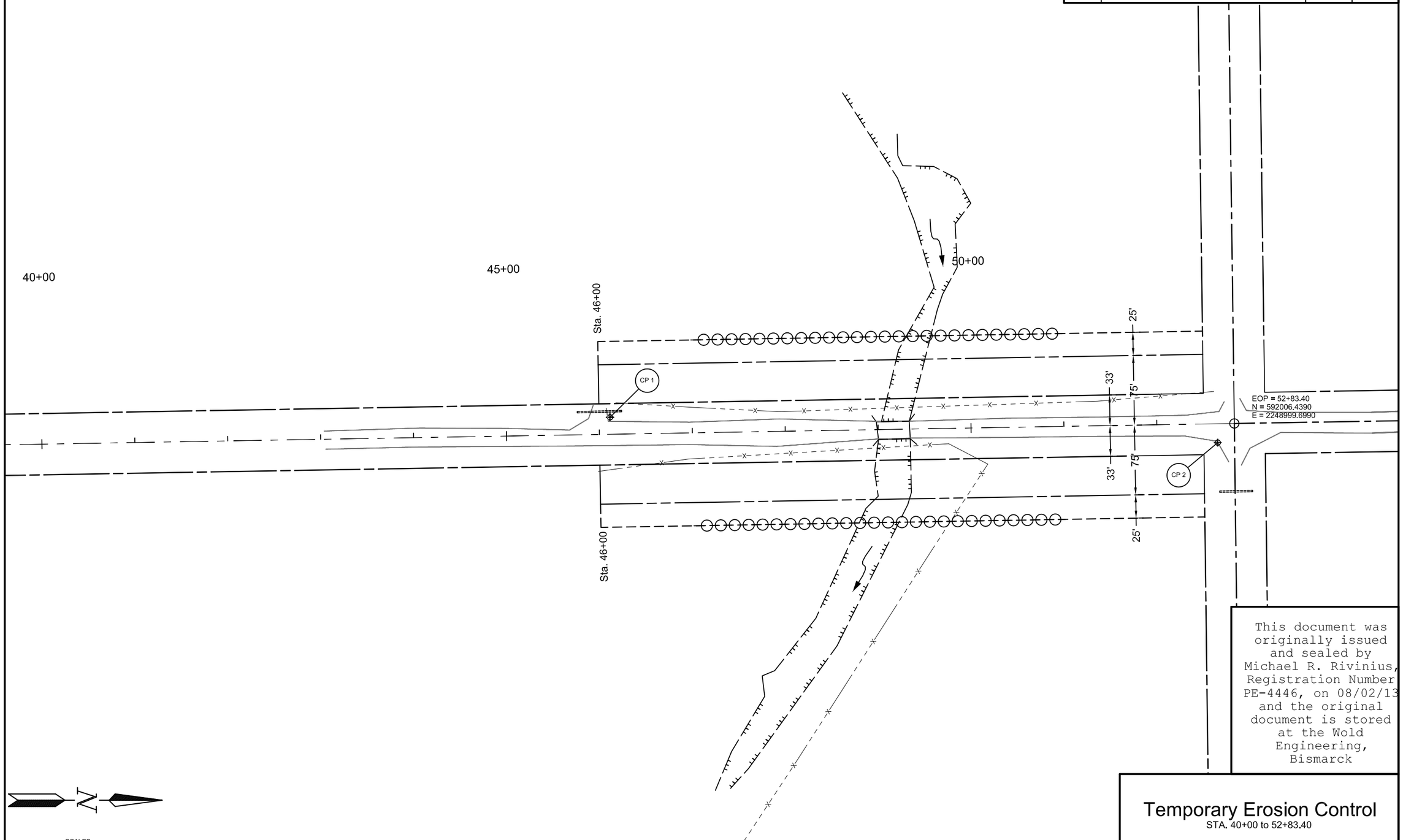
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	075	2

FIBER ROLLS 12IN

STA. 47+00 TO STA. 51+00 ~ 100' LT	400 LF
STA. 47+00 TO STA. 51+00 ~ 100' RT	400 LF



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Note: Temporary erosion control shall be placed prior to the start of construction.

Temporary Erosion Control

STA. 40+00 to 52+83.40

FILE: 075wl_002.dwg

0 50 100 150
SCALE IN FEET

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	075	3

FIBER ROLLS 12IN

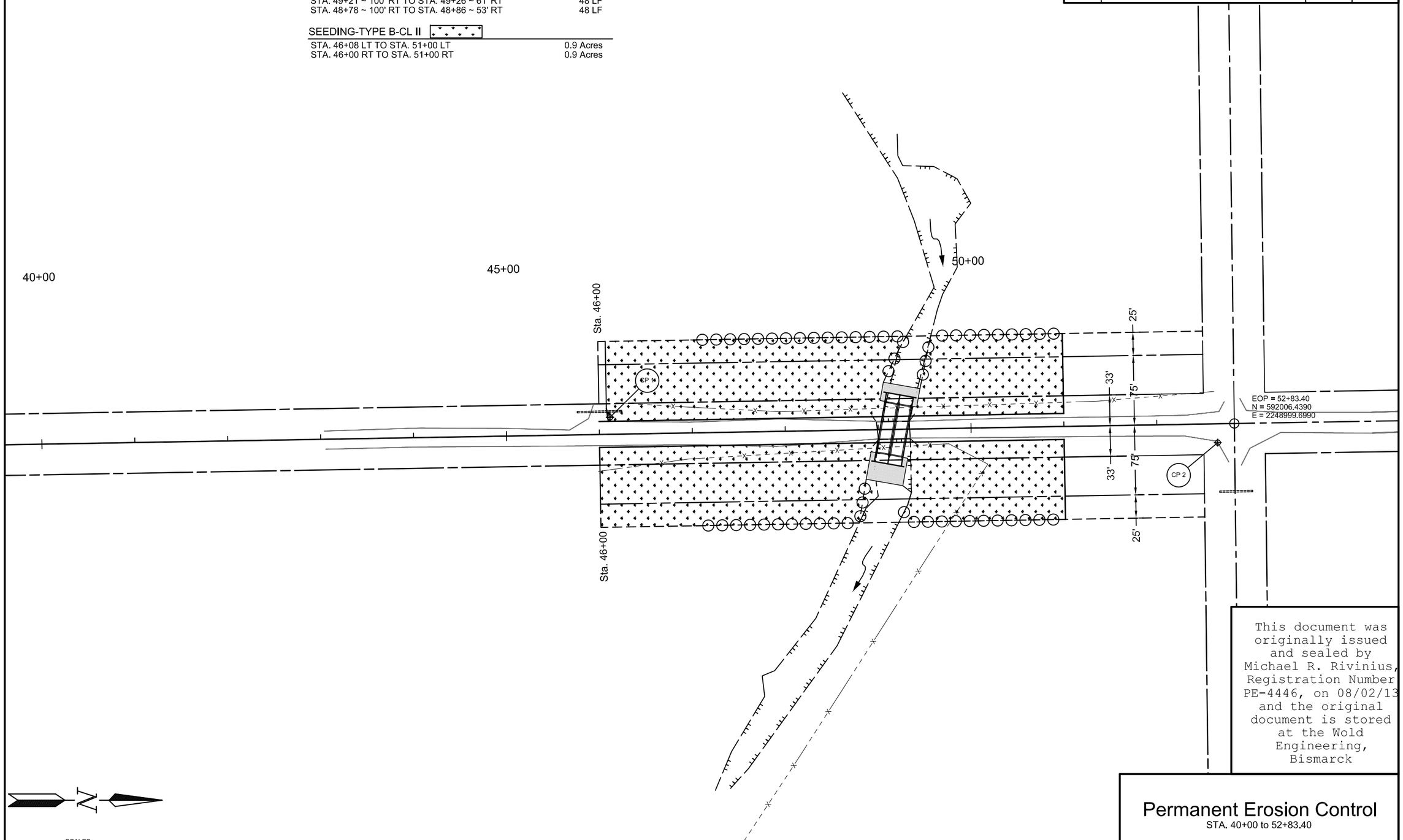
STA. 49+32 ~ 100' LT TO STA. 49+07 ~ 51' LT	55 LF
STA. 49+58 ~ 100' LT TO STA. 49+46 ~ 43' LT	58 LF
STA. 49+21 ~ 100' RT TO STA. 49+26 ~ 61' RT	48 LF
STA. 48+78 ~ 100' RT TO STA. 48+86 ~ 53' RT	48 LF

SEEDING-TYPE B-CL II

STA. 46+08 LT TO STA. 51+00 LT	0.9 Acres
STA. 46+00 RT TO STA. 51+00 RT	0.9 Acres

MULCHING

STA. 46+08 LT TO STA. 51+00 LT	0.9 Acres
STA. 46+00 RT TO STA. 51+00 RT	0.9 Acres



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Permanent Erosion Control

STA. 40+00 to 52+83.40

FILE: 075wl_003.dwg

0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	80	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
107	0+00	586723.83	2249091.41
304	26+41.70	589365.14	2249045.55
BOP	46+00	591323.14	2249011.56
EOP	52+83.40	592006.44	2248999.70

CURVE DATA

ARC DEFINITION

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
SW SEC COR	8-159-67	586723.83	2249091.41
W QTR COR	8-159-67	589365.14	2249045.55
NW SEC COR	8-159-67	592006.44	2248999.70

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
CP1	591334.63	2248993.07	1544.97	46+11.81	18.29 LT
CP2	591988.61	2249020.31	1552.68	52+65.22	20.29 RT

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

INITIALIZING BENCH MARK
CORS SYSTEM

- [X] NAVD-88
- [ ] NGVD-29

- [X] ENGLISH UNITS
- [ ] METRIC UNITS

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NOTES: ALL GPS CONTROL ARE #7 REBAR
ALL CP CONTROL POINTS ARE #5 REBAR

Date Survey Completed 1/14/13

- [ ] Assumed Coordinates
- [X] All coordinates on this sheet are ground coordinates. They are derived from the "North Dakota Coordinate System of 1983", NAD83(CORS), NORTH Zone Use Combination factor (cf) = 0.9999160 to convert Ground Distances to State Plane Distances. NGS OPUS Solution was used to establish state plane coordinates.

Survey Coordinate and Curve Data

REVISED: 00/00/0000

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Consulting Engineers & Land Surveyors
BOTTINEAU ~ BISMARCK ~ MINOT

DRAWN BY: JWM	CHECKED BY: MRR	DATE: 01/23/2013

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	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	
G20-1a-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2a-48	48"x24"	END ROAD WORK		19	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME		18	
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"	ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	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		5	
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**	**4**	**31**	**124**
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	
W3-1a-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		35	
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.		35	
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		35	
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	**48"x48"**	**ROAD or STREET CLOSED AHEAD or __ FT.**	**6**	**35**	**210**
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		35	
W20-7k-24	24"x18"	__ FEET (Mounted of 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"	MEN WORKING SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	
W21-5-48	48"x48"	SHOULDER WORK		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
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**	**390**

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**	**10**
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	
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	
704-1185	PILOT CAR	MHR	
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	
762-1500	OBLITERATION OF PVMT MK	SF	
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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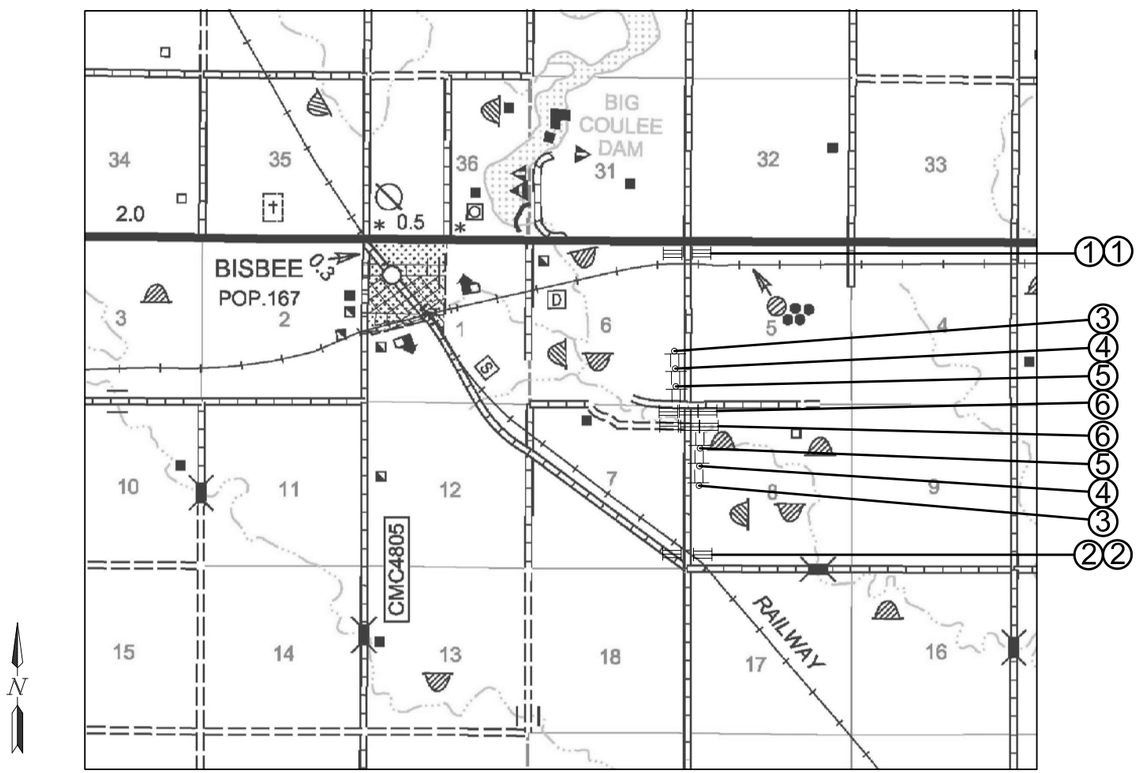
Traffic Control Devices List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	100	2



Traffic Control Layout

LEGEND:

① ROAD CLOSED
1 MILE AHEAD
LOCAL TRAFFIC ONLY

R11-3a-60
BARRICADE POST MOUNTING

② ROAD CLOSED
0.8 MILE AHEAD
LOCAL TRAFFIC ONLY

R11-3a-60
BARRICADE POST MOUNTING

③ ROAD CLOSED AHEAD — W20-3-48 POST MOUNTING

500'

④ ROAD CLOSED 1000 FT — W20-3-48 POST MOUNTING

500'

⑤ ROAD CLOSED 500 FT — W20-3-48 POST MOUNTING

500'

⑥ ROAD CLOSED — R11-2-48 BARRICADE MOUNTING

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Work Zone Traffic Control

REVISED: 00/00/0000

Wold Engineering, P.C.
Consulting Engineers & Land Surveyors
BOTTINEAU ~ BISMARCK ~ MINOT

DRAWN BY: MRR	CHECKED BY: MRR	DATE: 01/18/2013

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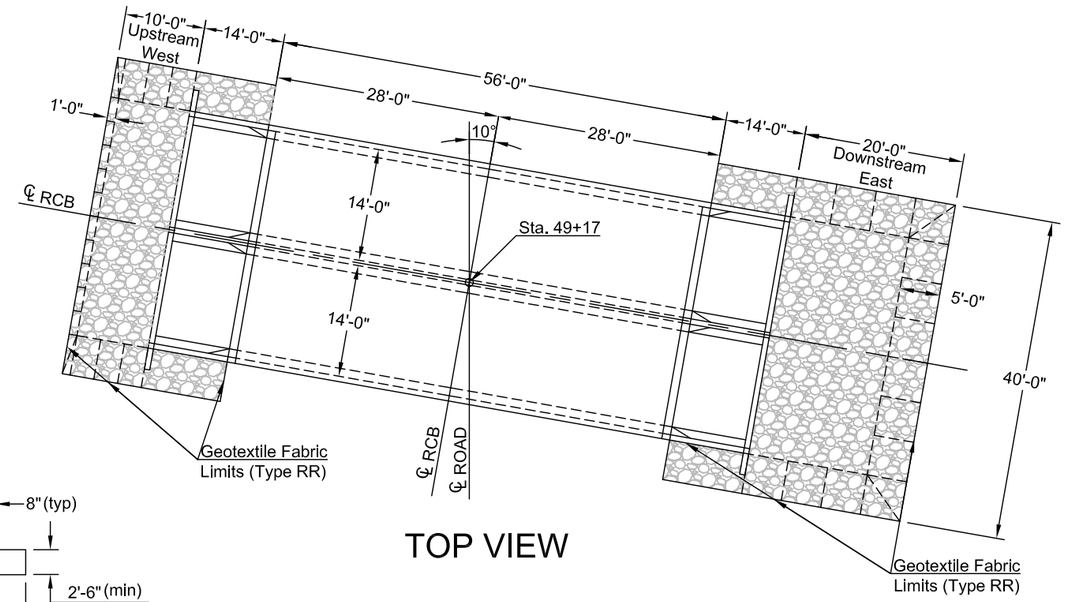
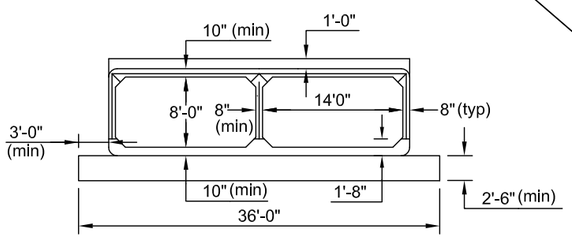
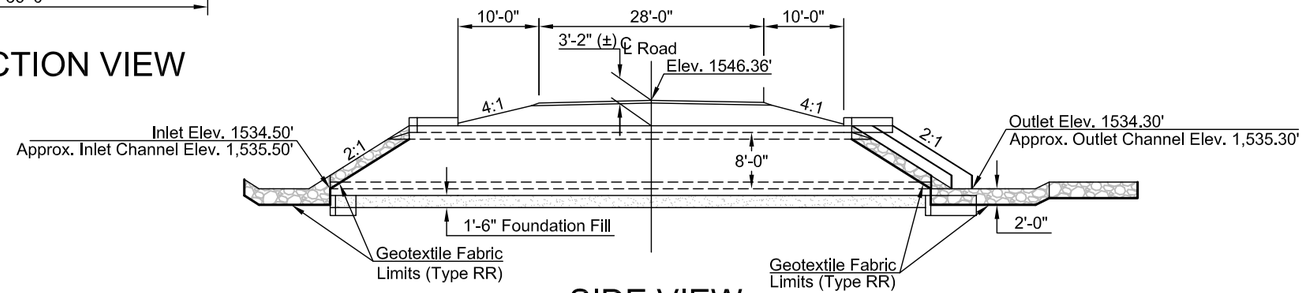
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	170	1



TOP VIEW



END SECTION VIEW



SIDE VIEW

NOTES:

606 - Double 14ft. x 8ft. Precast RCB Culvert
Dimensions: Double 14ft. span x 8ft. rise section

Fill: 0ft. to 4ft.

Design Load: HL-93

Total Length: 52ft./line + sloped ends = 56 ft. total barrel length

Weight: 62,700 lbs/6ft.

Tie Bolts: All sections shall be tied together with a minimum of 2 tie bolts per outside wall. The tie bolts shall be placed at third points of the outside walls. Cost of ties shall be included in price bid for "DBL 14FT X 8FT PRECAST RCB CULVERT". An alternate tie system using pre-cast tubes and an internal cable tie will be allowed but subject to review of shop detail drawings.

End Sections: The sloped end section shall be attached to the last barrel section and the cutoff wall. Holes shall be cast at 3' centers through the end section and into the cutoff wall to receive ¾" diameter reinforcing bars. The end section shall be connected to the last barrel section by the use of galvanized u-bolts or another approved method.

Threaded Inserts for Eye Bolts: One (1) 5/8" Dia. galvanized threaded inserts and one (1) 5/8" Dia. threaded eyebolt shall be provided per wall on each end section to provided anchor points for fencing. The concrete inserts shall be of such design that when installed in concrete they will be capable of developing the full strength of the 5/8" Dia. threaded eye bolt. The insets shall be installed 4'-10", measured along the slope, from the end of the end section.

The "DBL 14FT X 8FT PRECAST RCB END SECTION" shall consist of the sloped end section, the cutoff wall, threaded insert, eyebolt, and the parapet.

Estimated Quantitites
Geotextile Fabric-Type RR: 160 SY
Rip Rap-Loose Rocks: 107 CY

HYDRAULIC DATA	
DRAINAGE AREA	109.5 sq. miles
STREAM SLOPE	0.00133 ft/ft
DESIGN FREQUENCY	15 year
DESIGN DISCHARGE	1,642 cfs
DESIGN HEADWATER STAGE	1,542.50'
DESIGN TAILWATER STAGE	1,540.56'
DESIGN VELOCITY	8.32 fps
100-YEAR FREQUENCY DISCHARGE	3,043 cfs
100-YEAR FREQUENCY HEADWATER	1,545.73'
OVERTOPPING STAGE	1,544.88'
OVERTOPPING DISCHARGE	2,489 cfs

For a box culvert with 10.0 inch thick roof, 10.0 inch thick floor and 8.0 inch thick walls, the following total factored moments would result from the application of the required loads:

LRFD Factored Design Moments and Minimum Reinforcing
(Double Cell)

	Factored Design Moments	Minimum Reinforcing
Wall Moment	1,669 ft.-lbs.	0.192 in^2/ft
Roof Moments		
Corner	13,783 ft.-lbs.	0.337 in^2/ft
Bottom	31,199 ft.-lbs.	0.788 in^2/ft
Top	40,071 ft.-lbs.	1.032 in^2/ft
Floor Moments		
Corner	10,524 ft.-lbs.	0.256 in^2/ft
Top	19,636 ft.-lbs.	0.485 in^2/ft
Bottom	36,494 ft.-lbs.	0.931 in^2/ft

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PRECAST BOX CULVERT

REVISED: 00/00/0000

Wold Engineering, P.C.
Consulting Engineers & Land Surveyors
BOTTINEAU ~ BISMARCK ~ MINOT

DRAWN BY: JAB	CHECKED BY: MRR	DATE: 01/23/2013

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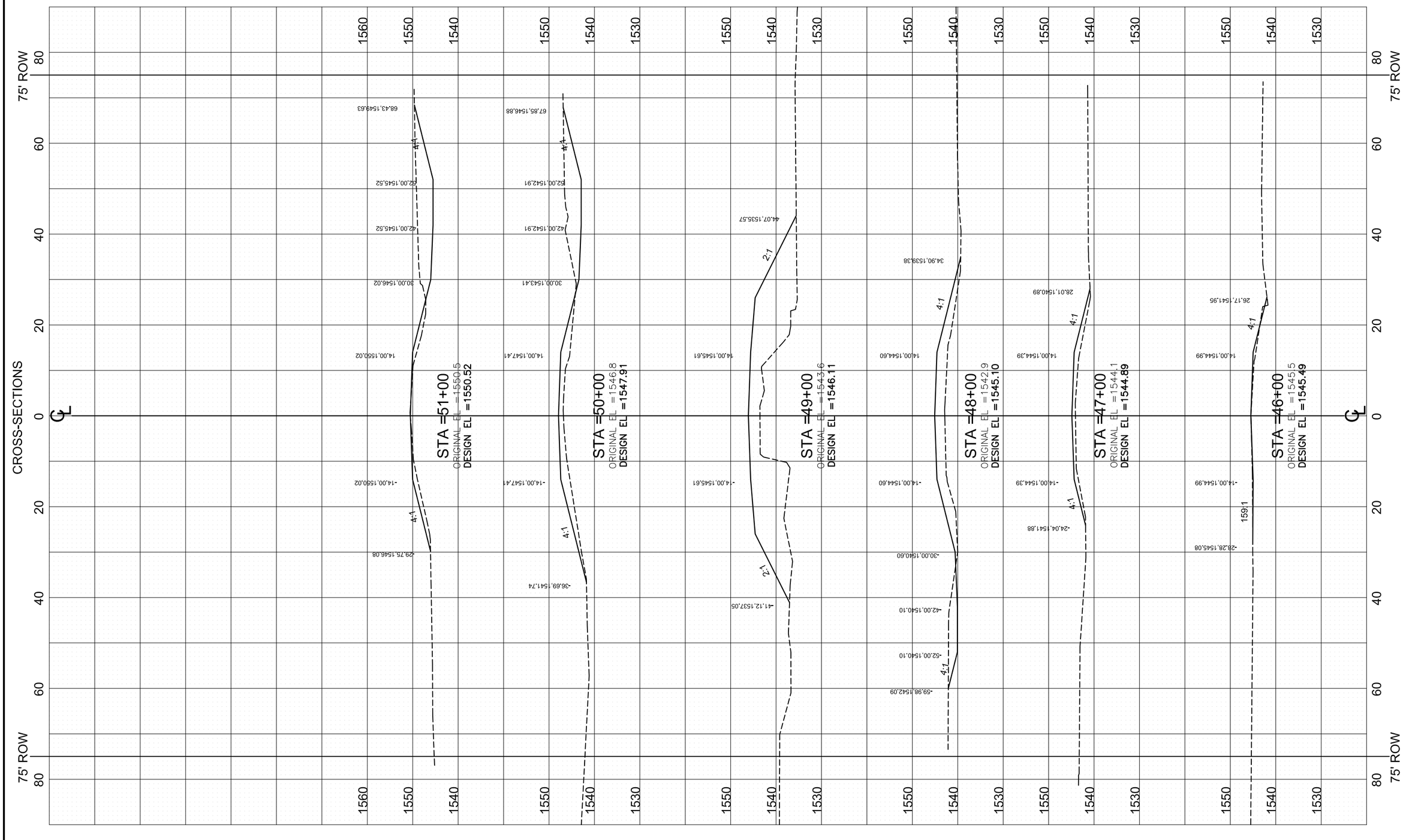
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0048(016)	200	1



Wold Engineering, P.C.

NDDOT ABBREVIATIONS

D-20-1

Abn	abandoned
Abut	abutment
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
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
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
BLM	Bureau of Land Management
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
Cl 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
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
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
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
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	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
Elec	electric/al
EDM	electronic distance meter
Elev or El	elevation
Ellipt	elliptical
Emb	embankment
Emuls	emulsion/emulsified
ES	end section
Engr	engineer
ESS	Environmental Sensor Station
Eq	equal
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
FHWA	Federal Highway Administration
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items

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NDDOT ABBREVIATIONS

D-20-2

F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fs	foresight
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
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
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
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
NDDOT	North Dakota Department of Transportation
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
Pl	plate
Pt	point
PCC	point of compound curve
PC	point of curve
PI	point of intersection
PRC	point of reverse curvature

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

06-15-10

REVISIONS

DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items

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NDDOT ABBREVIATIONS

D-20-3

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	preformed
Prep	preperation
Press.	pressure
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
RPCC	recycled Portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
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	sidewalk
S	siemens
SD	sight distance
Sig	signal
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam
Sgl	single
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
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
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
Trans	transverse
Trav	traverse
TP	traverse point
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	Tribal Employment Rights Ordinance
Tpl	triple
TP	turning point
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VC	vertical curve
VCP	vitrified clay pipe
V	volt
Vol	volume
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
W	watt
Wrng	wearing
Wb	weber
WIM	weigh in motion
W	West
WB	Westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner
WGS	World Geodetic System
Z	zenith

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

06-15-10

REVISIONS

DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items

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NDDOT UTILITY COMPANY ABBREVIATIONS

D-20-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
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
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
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 PWR ELEC	Central Power Electric Cooperative
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
FALK MNG	Falkirk Mining Company
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
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
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 WRD	McKenzie County Water Resource District
MCKNZ ELEC	McKenzie Electric Cooperative
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 W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MRE LBTY TEL	Moore & Liberty Telephone
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MUNICIPAL	City Of '.....'
MUNICIPAL	City Water And Sewer
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
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RAMSEY R SEW	Ramsey Rural Sewer Association
RAMSEY RW	Ramsey Rural Water Association
RAMSEY UTIL	Ramsey County Rural Utilities
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Coop
RRVW	Red River Valley & Western Railroad
RSR ELEC	R.S.R. Electric Cooperative
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
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
STUT RWU	Stutsman Rural Water Users
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
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
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

6-15-10

REVISIONS

DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items

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Line Styles

D-20-20

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Sight Distance Triangle Line
- Small Hidden Object
- Dimension Leader
- Existing Ground
- Existing Topsoil (Cross Section View)
- Large Hidden Object
- Edge Drain
- D — Geotextile Fabric Type D
- E — Existing Electrical
- FO — Existing Fiber Optic Line
- FO — Existing TV Fiber Optic
- G — Existing Gas Pipe
- Geo — Geogrid
- OH — Existing Overhead Utility Line
- P — Existing Power
- PL — Existing Fuel Pipeline
- PL — Existing Undefined Above Ground Pipe Line
- R — Geotextile Fabric Type R
- R — Geotextile Fabric Type R1
- REMOVE — Remove Line
- RR — Geotextile Fabric Type RR
- S — Geotextile Fabric Type S
- S — Floating Silt Curtain
- T — Existing Telephone Line
- TV — Existing TV Line
- Void — Existing Assumed Ground (Not Surveyed)
- Void — Tentative Ground Line
- W — Existing Water or Steam Line
- Existing Under Drain
- Under Drain
- Wall
- Existing Slotted Drain
- Existing Cemetary Boundary
- 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
- Wetland Mitigation
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Easement
- Existing Concrete
- Existing Easement
- Existing Gravel Surface
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Riprap
- Existing Underground Vault or Lift Station
- Tangent Line
- Hidden Object
- Existing Dirt Surface
- Existing Conduit
- Topsoil Profile
- Existing Conductor
- Conductor
- Fiber Optic
- Existing Loop Detector
- Subgrade, Subcut or Ditch Grade
- Existing Asphalt Surface
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar
- Existing Tie Point Line
- Existing State or International Line
- Existing Quarter Section Line
- Existing County
- Existing Section Line
- Existing Township
- Existing Railroad Centerline
- Centerline
- Existing Centerline
- Supplemental Contour
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Failure Line
- Existing Conditions
- Existing Ground (Details)
- Existing Sixteenth Section Line
- Existing Right of Way Not State Owned
- Phantom Object
- Centerline Main
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Excavation Limits
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines

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4-20-11	
REVISIONS	
DATE	CHANGE

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D-20-21

Line Styles

- Subgrade Reinforcement
- Existing Down Guy Wire Down Guy
- Existing Fence
- Existing Railroad
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Fence
- Silt Fence
- Existing Field Line
- Exst Flow
- Flow
- Existing Culvert
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Overhead Sign Structure
- Existing Micro Loop Detector
- Micro Loop Detector
- Existing Overhead Sign Structure Cantilever
- Existing Railroad Switch
- Overhead Sign Structure Cantilever
- 24 Inch Pipe
- Reinforced Concrete Pipe
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm
- Tie Bar at Random Spacing
- 3-Cable w Posts
- Existing 3-Cable w Posts
- Site Boundary
- Fiber Rolls
- Doweled Joint
- Tie Bar 30 Inch 4 Foot Center to Center
- Tie Bar 18 Inch 3 Foot Center to Center
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Depression Contours
- Existing City Corporate Limits or Reservation Boundary
- Gravel Pit - Borrow Area
- Existing Tree Boundary
- Tree Row
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Retaining Wall (Plan View)
- Sheet Piling
- W-Beam w Posts
- Existing W-Beam Guardrail with Posts
- Exst Wet Area-Vegetation Break
- Existing Wetland Delineated

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Symbols

D-20-30

- 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

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Symbols

D-20-31

- 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
- Existing Monument Found
- Existing Monument set
- Existing RW Property Monument Found
- Existing RW PropertyMonument set
- 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

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Symbols

D-20-32

- 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
- Concrete Monument to Be Set
- RW Property Monument to Be Set
- 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
- CSB — Continuous Split Barrel Sample
- FA — Flight Auger Sample
- SB — Split Barrel Sample
- T — Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- N — Standard Penetration Test
- Transformer
- Incl — Inclinometer Tube
- Underdrain Cleanout
- Excavation Unit
- Water Valve

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
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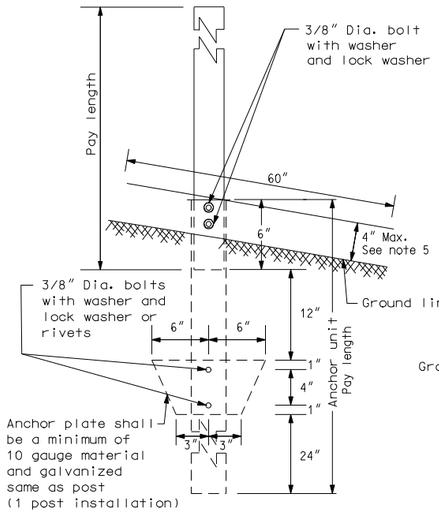
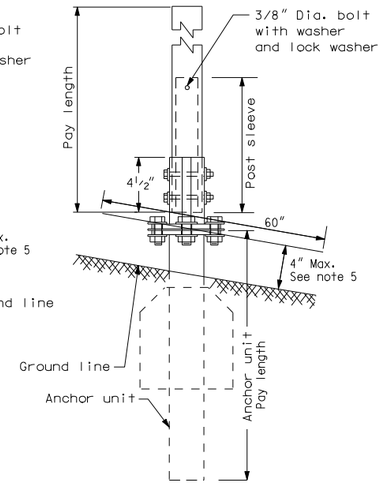
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

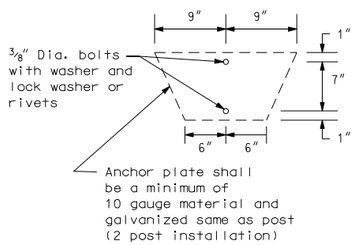
D-704-7

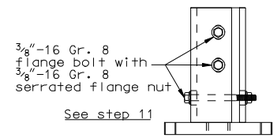


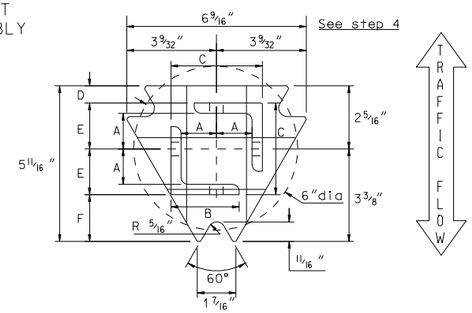
ANCHOR UNIT AND POST ASSEMBLY



SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY





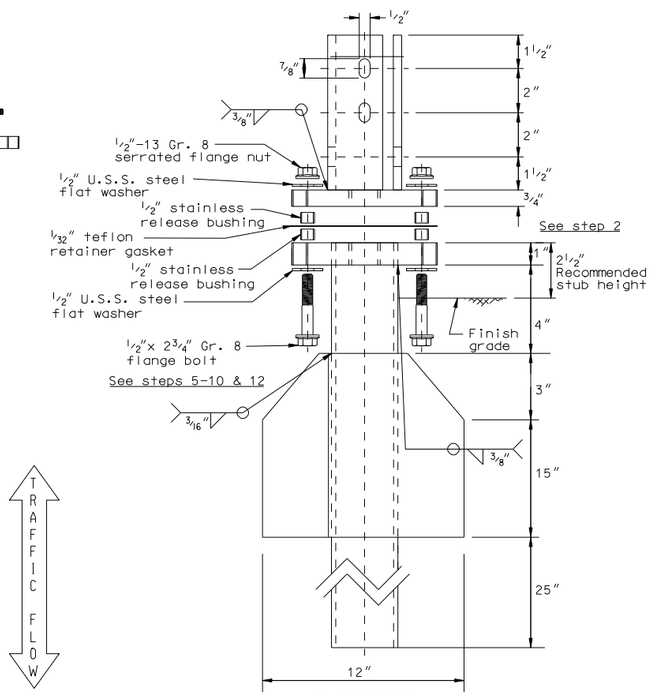


TOP POST RECEIVER

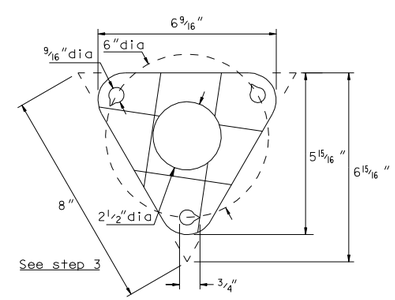
Materials: Plate - ASTM A572 grade 50
Angle receiver - 2 1/2"x 2 1/2"x 3/8" ASTM A36 structural angle

TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 9/64"	2 1/2"	3 1/32"	25/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

2 3/16" x 10 gauge may be inserted into 2 1/2" x 10 gauge for additional wind load.

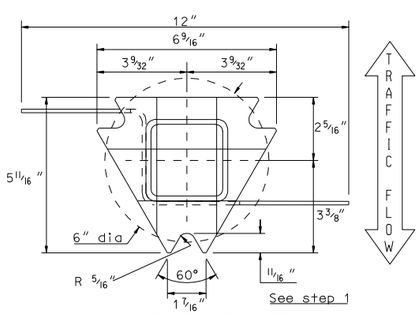


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon



BOTTOM SOIL STUB

Materials: Tube - 3"x 3"x 7 gauge ASTM A500 Gr B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A 569
Plate - ASTM A572 grade 50

Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
2. The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
3. Anchor for 2", 2 1/4", and 2 1/2" posts.
4. Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3"x 3"x 7 gauge ASTM A500 Grade B. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
6. When used in concrete sidewalk, anchor shall be the same except without the wings.
7. Four post signs shall have over 8' between the first and fourth posts.

Number of Posts	Telescoping Perforated Tube					
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	10			Yes	
2	2 1/4	12	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

B - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY	
STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave 2 1/2" from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each 1/2" flat washer on to 1 each inverted 1/2"-13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading 1/2"-13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48", not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8"-16 gr. 8 flange bolts and 3 each 3/8"-16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three 1/2"-13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.

Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.^{4}	Cross Sect. area In.^{2}	Section Modulus In.^{3}
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

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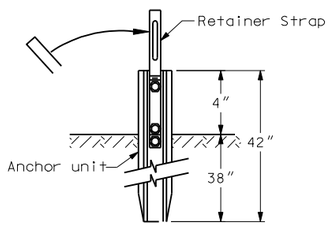
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

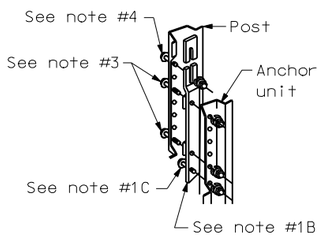
FLANGED CHANNEL



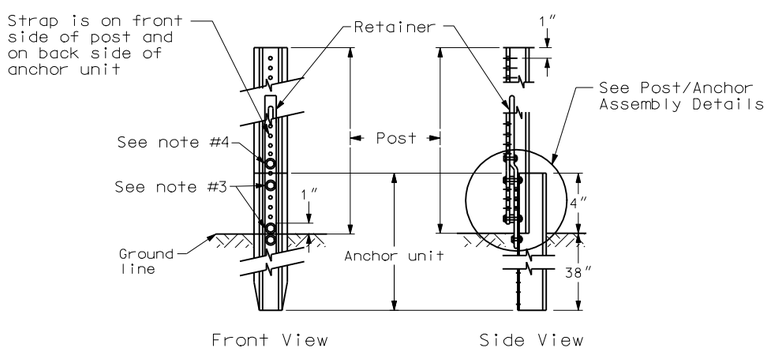
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

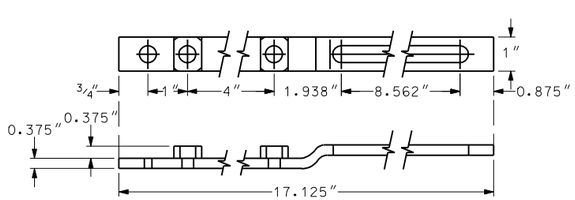
1. A) Drive anchor unit to within 12″ of ground level.
   B) Proper assembly established by lining up the top ¾″ slot of retainer spacer strap with top hole of anchor unit.
   C) Assemble strap to back of anchor unit using ⅜″-16 UNC x 2.0″ long bolt, lock washer and nut.
   D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4″ dimension.
   B) Rotate strap to vertical position.
3. A) Place ⅜″-16 UNC x 2″ bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom ¾″ slot in the strap).
   B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening ⅜″-16 UNC x 2″ long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & sign post shall be properly nested. 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.



Post/Anchor Assembly Details



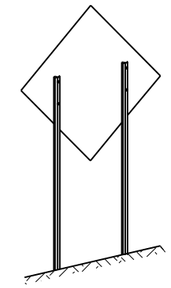
Sign Post Assembly Detail



Retainer/Spacer Strap Detail

CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN. 4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN. 3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560

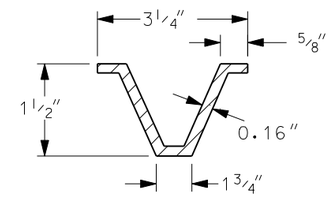
3 LB/FT U POSTS



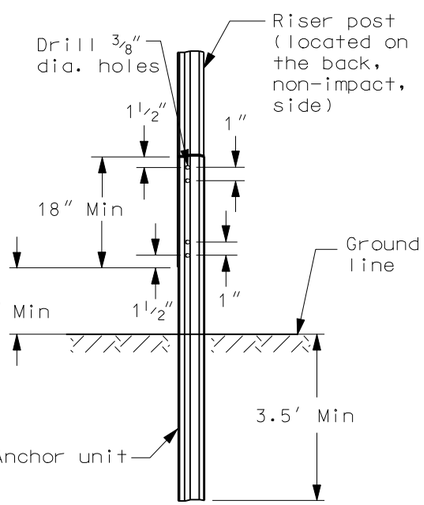
Typical Installation

Notes

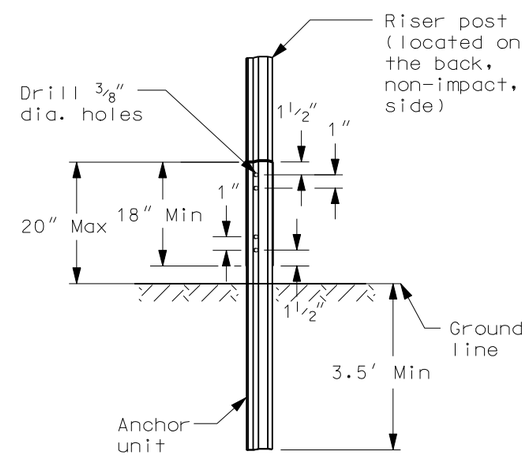
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7′ long and embedded at least 3.5′.
3. A splice shall overlap a minimum of 18″.
4. Use 4 bolts ⅝″ diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4″ above ground and embedded at least 3.5′.



U-Post Detail (3 lb/ft)



U-Channel Splice Option 2



U-Channel Splice Option 1

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

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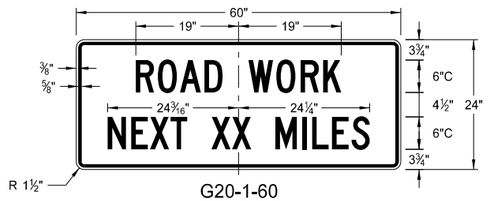
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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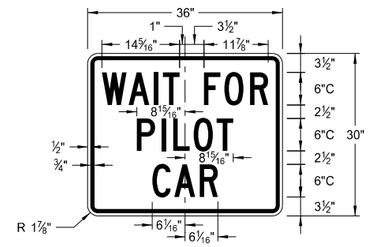

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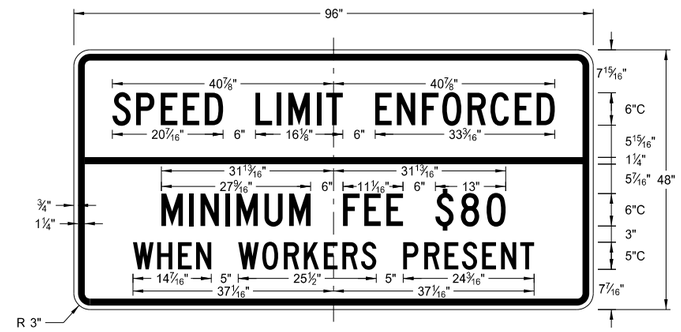

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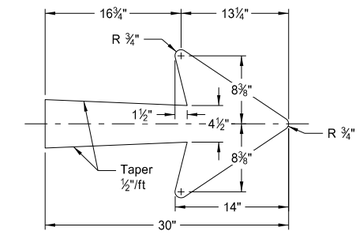
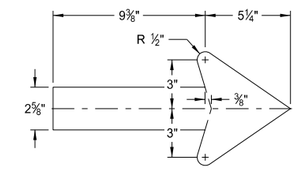
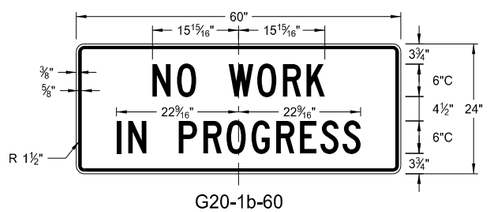


E5-1-48



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



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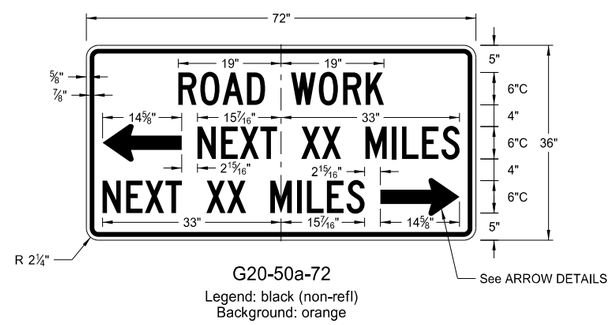

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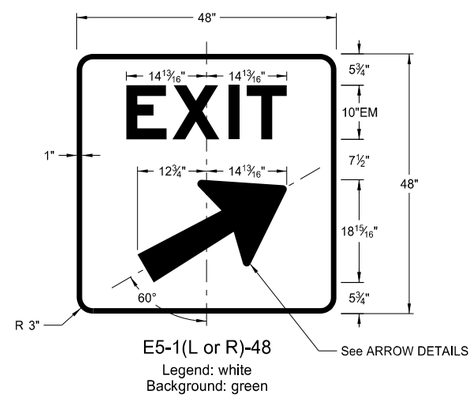

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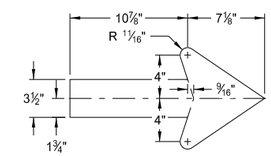

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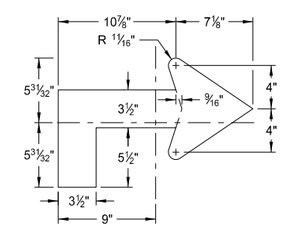
Right or Left



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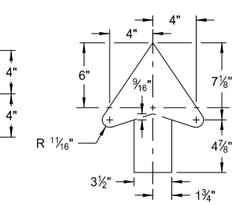
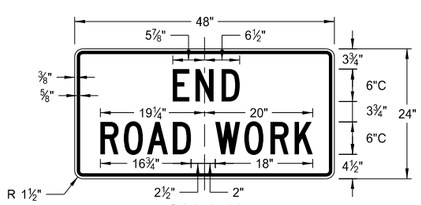
Advanced Right or Left



M4-9-30
Straight

ARROW DETAILS



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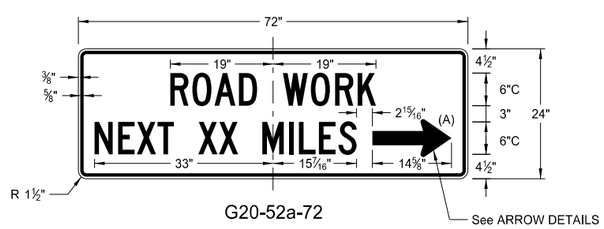

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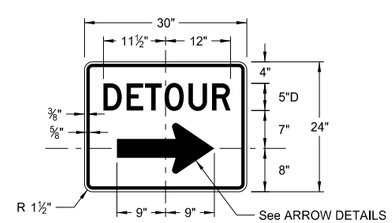

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

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

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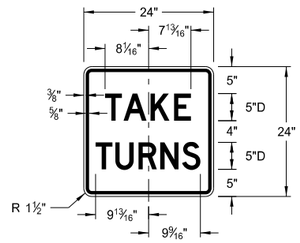
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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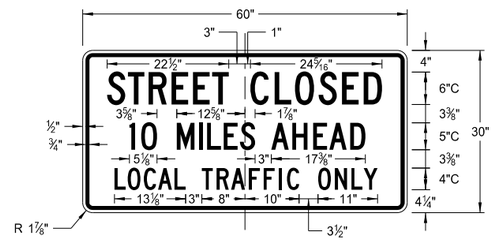

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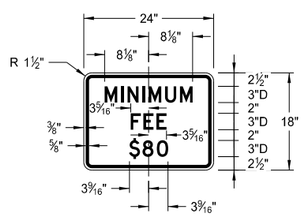

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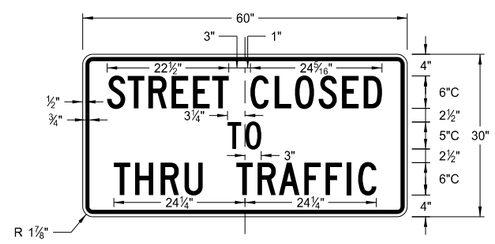

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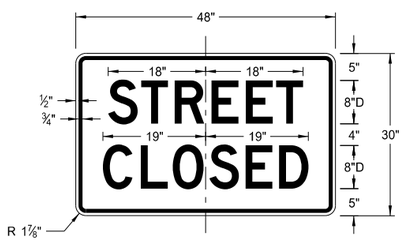

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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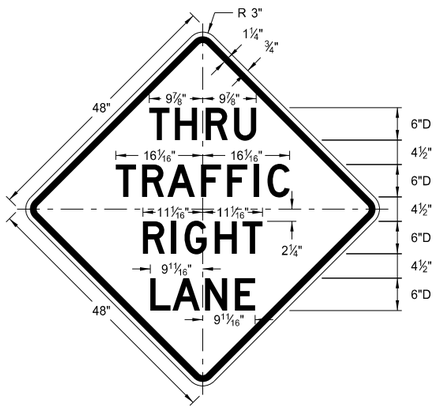
D-704-11

CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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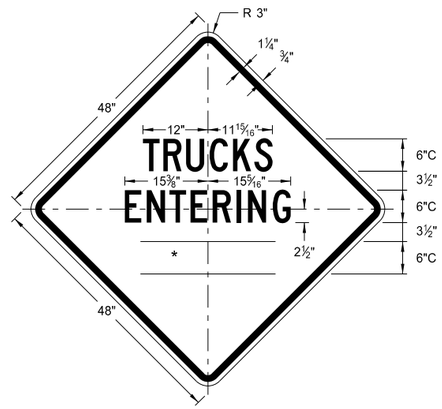

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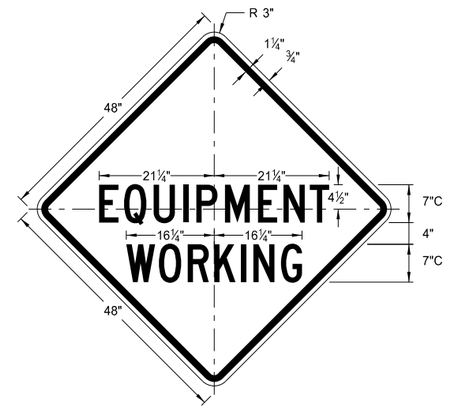

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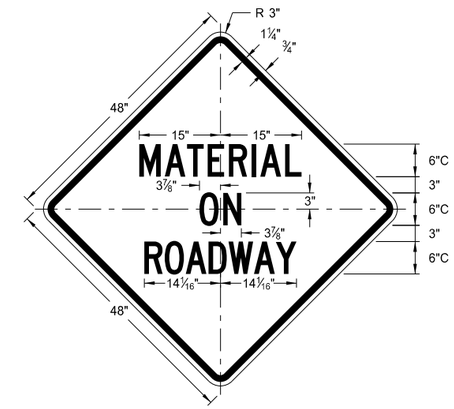

W21-51-48
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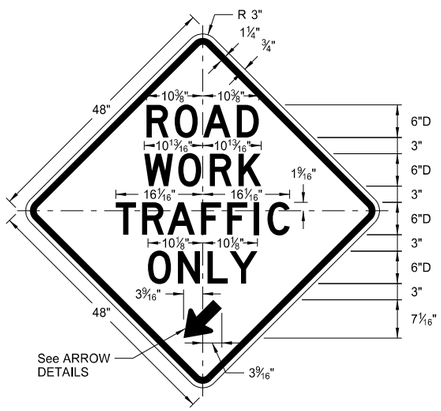
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



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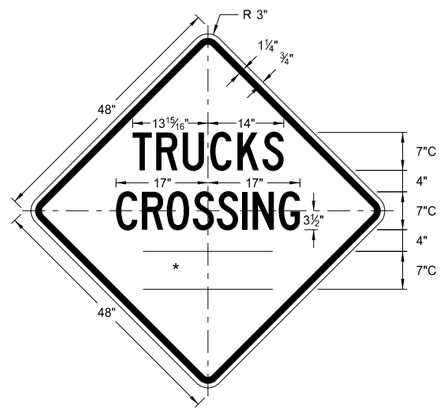

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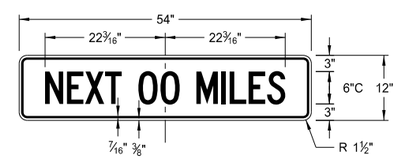

W20-52-54
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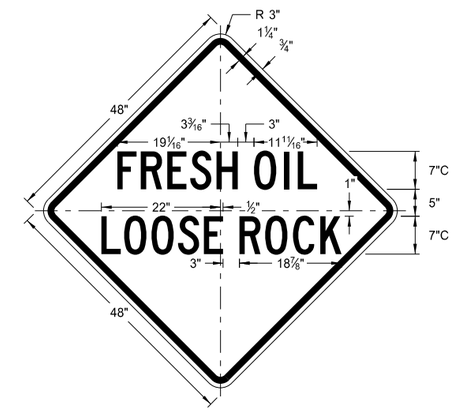
Background: orange



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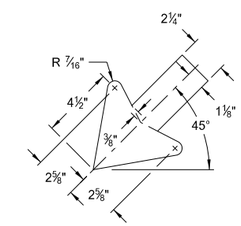
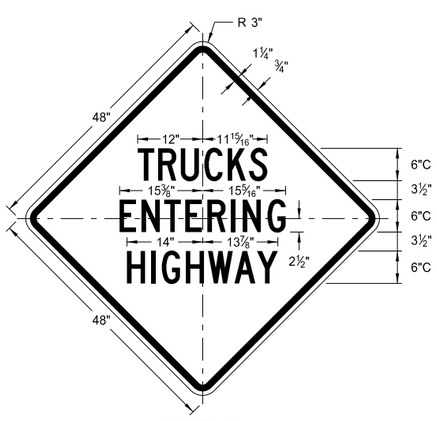


W5-9-48

ARROW DETAILS



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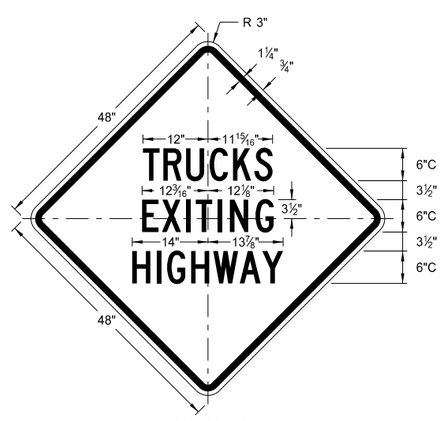

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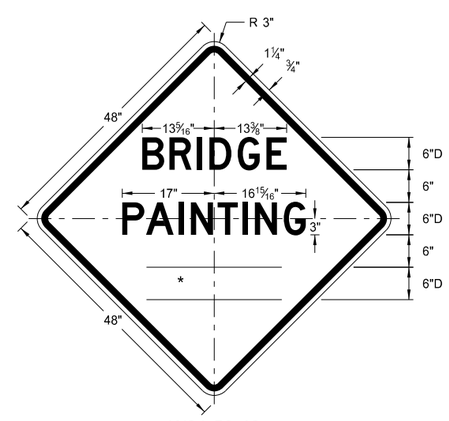


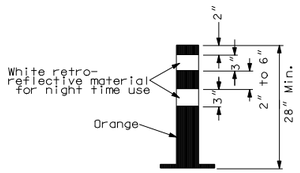
W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

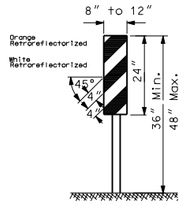
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

BARRICADE DETAILS AND CHANNELIZING DEVICES

D-704-13



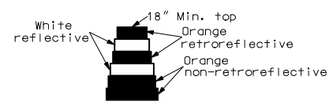
TUBULAR MARKER



VERTICAL PANEL

(Retroreflective sheeting shall be placed on both sides)

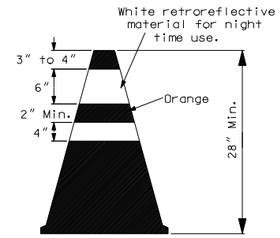
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"



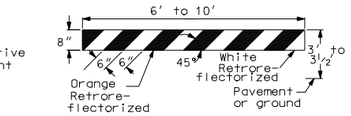
DELINEATOR DRUM

36" Min. height

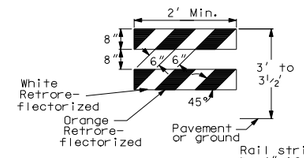
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflectorized sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall be prepared as recommended by the sheeting manufacturer before retro reflective sheeting is applied



CONE

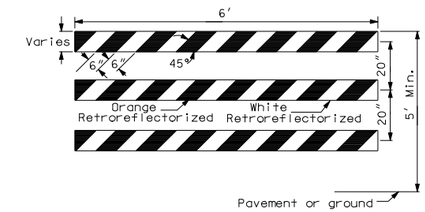


TYPE I BARRICADE



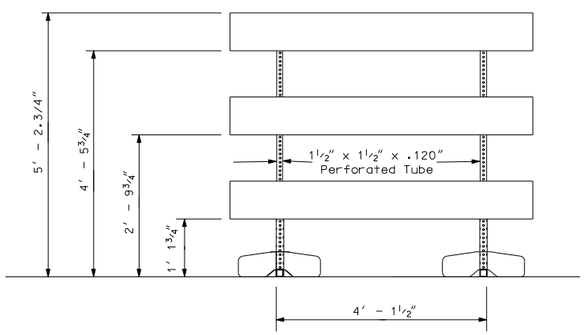
Rail stripe width shall be 4" if barricade length is less than 36".

TYPE II BARRICADE

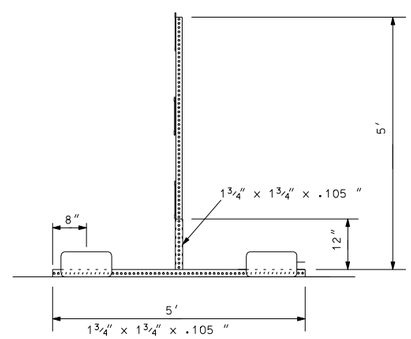


TYPE III BARRICADE

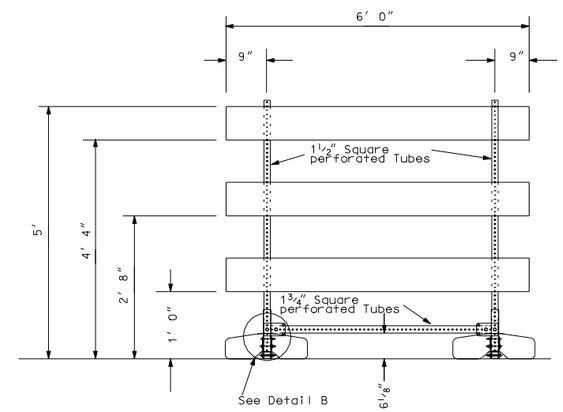
BARRICADES:
Number of retroreflectorized rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III- 6 (Three in each direction)

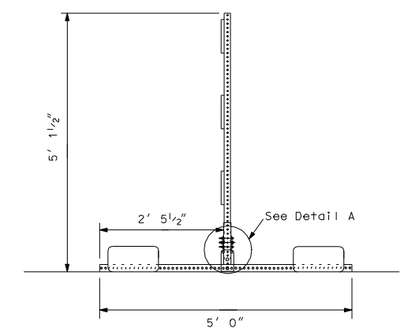


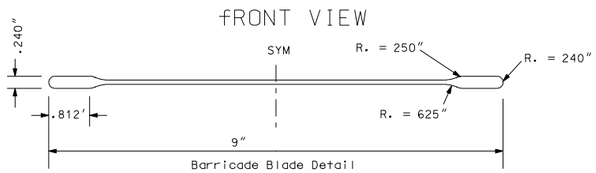
FRONT VIEW



END VIEW







Barricade Blade Detail

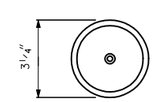
Ballast = 45lb sandbag at the end of each leg.

Barricade blade fastened to vertical supports with 2" corner bolts.

Vertical potion of leg is welded to horizontal portion on all four sides.

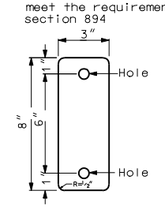
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

BARRICADE ASSEMBLY DETAIL
(Use when aluminum blade as detailed above)



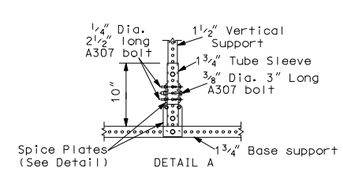
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894

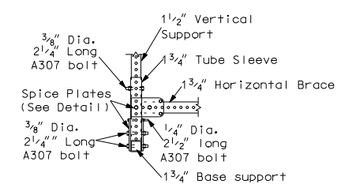


DELINEATOR REFLECTOR

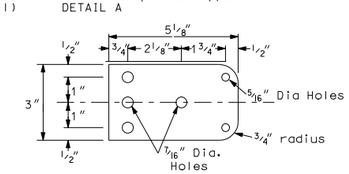
3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retroreflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



DETAIL A



DETAIL B



SPLICE PLATE

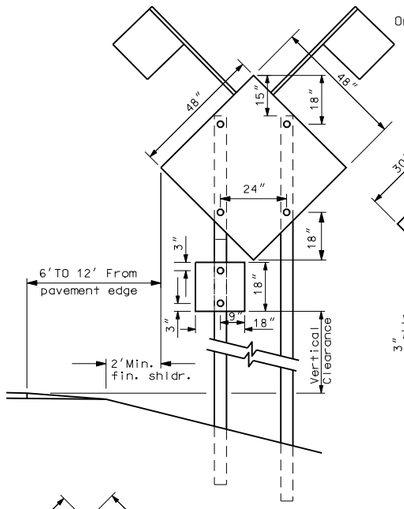
BARRICADE ASSEMBLY DETAIL
(Use when Plastic I-Beam w/ 1½" Hollow Core Flanges or 1" x 8" x72" wood boards.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details
04-01-02	Type III barricade
12-01-04	PE stamp added
06-29-05	Revised Type II barricade stripe

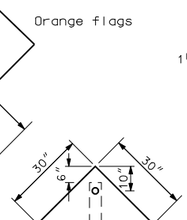
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

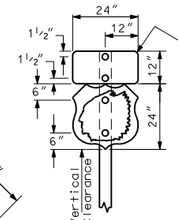
D-704-14



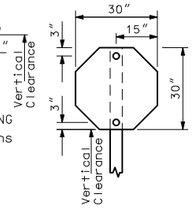
POST MOUNTING 48"x48" Signs



POST MOUNTING 30"x30" Signs

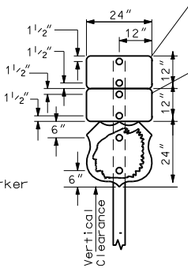


POST MOUNTING Assemblies with one cardinal direction sign & one route marker

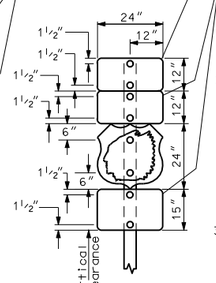


POST MOUNTING Sign R1-1-30

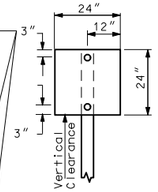
See note 7



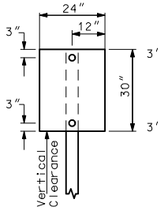
POST MOUNTING Assemblies with one cardinal direction sign, one detour sign & one route marker



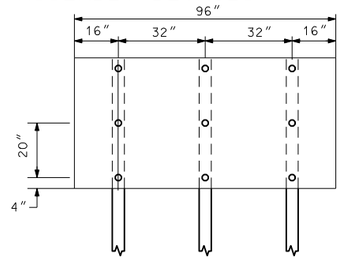
POST MOUNTING Assemblies with one cardinal direction sign, one detour sign, one route marker & one directional arrow.



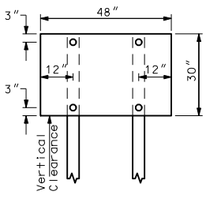
POST MOUNTING 24"x24" Signs



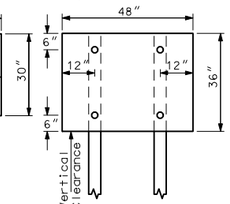
POST MOUNTING 24"x30" Signs



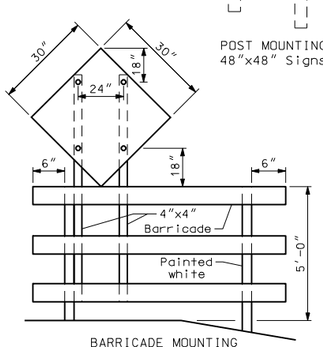
POST MOUNTING 48"x96" Signs



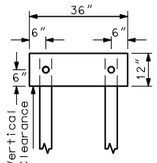
POST MOUNTING 48"x30" Signs



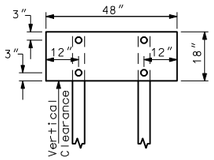
POST MOUNTING 48"x36" Signs



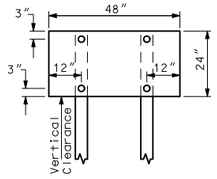
BARRICADE MOUNTING 48"x48" Signs



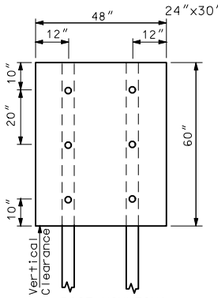
POST MOUNTING 36"x12" Signs



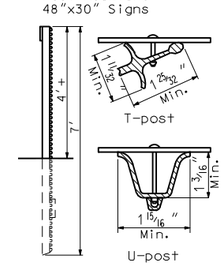
POST MOUNTING 48"x18" Signs



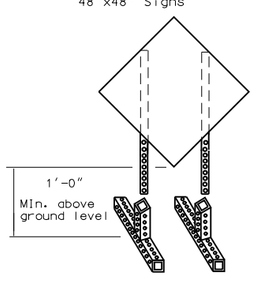
POST MOUNTING 48"x24" Signs



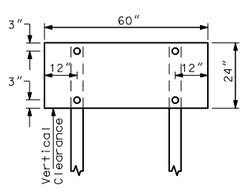
POST MOUNTING 48"x60" Signs



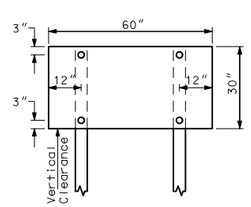
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS



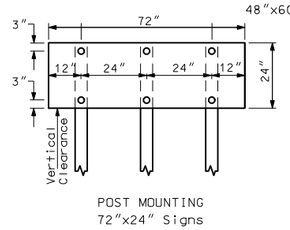
PORTABLE SIGN MOUNTING



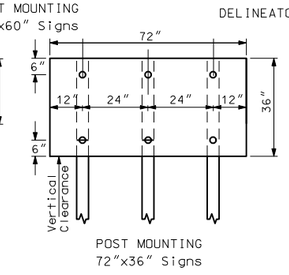
POST MOUNTING 60"x24" Signs



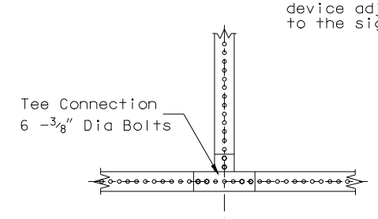
POST MOUNTING 60"x30" Signs



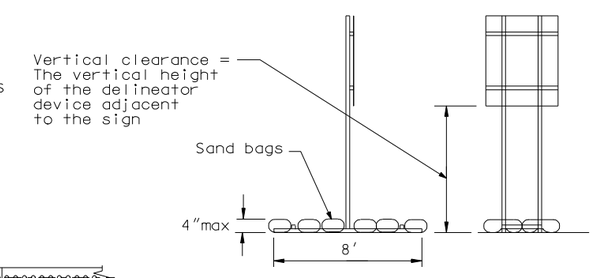
POST MOUNTING 72"x24" Signs



POST MOUNTING 72"x36" Signs

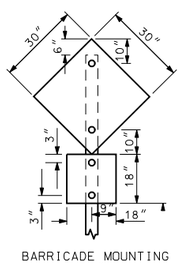


Post to Ground Support Connection

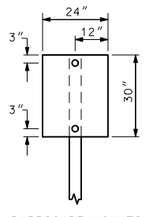


Post sizes shall be 2¼" perforated tube

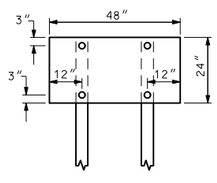
SKID MOUNTED SIGNS



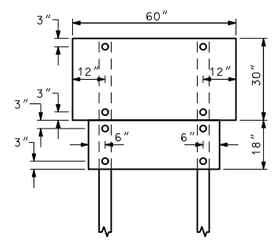
BARRICADE MOUNTING 30"x30" Signs



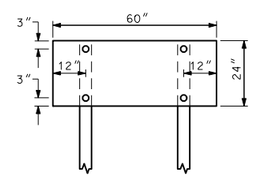
BARRICADE MOUNTING 24"x30" Signs



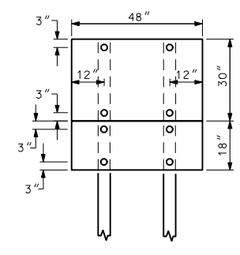
BARRICADE MOUNTING 48"x24" Signs



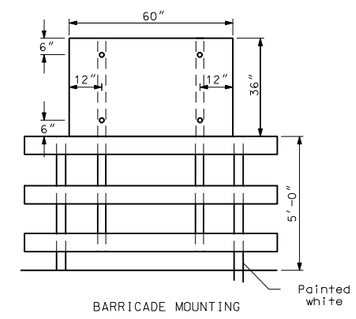
BARRICADE MOUNTING 60"x30" & 48"x18" Signs



BARRICADE MOUNTING 60"x24" Signs



BARRICADE MOUNTING 48"x30" & 48"x18" Signs



BARRICADE MOUNTING G20-1-60 Signs

NOTES:

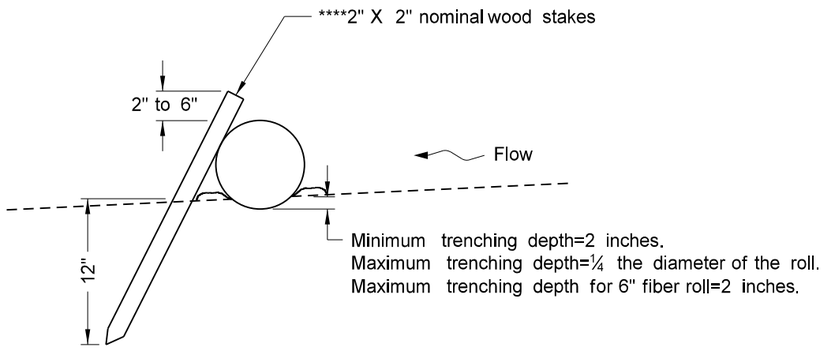
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and barricade mounted signs shall be assembled with 3/8" bolts.
3. Sign Supports: Sign supports shall be 4"x4" min. SFS or equivalent steel post. The anchor for steel supports shall have a stub height of 4" or less. Wood posts more than 4"x4" shall be breakaway. Sign supports shall be imbedded to a sufficient depth so that signs will remain plumb throughout duration of project. It is suggested that wood posts have a min. depth of embedment of 5' and steel posts be embedded a min. 3'-6".
   Material: All signs shall be 0.100" aluminum, 12 gauge steel, ½" plywood or other approved material.
   Holes: All holes to be punched round for 3/8" bolts.
4. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.
5. Advance Warning Flashing or Sequencing Arrow Panels: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.
6. Delineator Posts: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.
7. Route Marker Auxiliary Signs: The route marker auxiliary signs such as the cardinal direction and directional arrows shall have background colors the same as the route marker they are used with (Interstate route markers, blue background, US and State route markers, white background, Interstate Business loop and spur, green background, and County route markers, blue background).
8. Vertical Clearance: Post mounted signs placed in rural areas shall have a vertical clearance of at least 5 feet measured from the bottom of the sign to the near edge of the driving lane. In business, commercial and residential districts where parking and/or pedestrian movement is likely to occur or where other obstructions to view, the distance between the bottom of the sign to the near edge of the driving lane shall be at least 7 feet. The height to the bottom of secondary signs mounted below another sign may be 1 foot less than the appropriate height specified. Large signs having an area exceeding 50 square feet that are installed on multiple breakaway posts shall be mounted a minimum of 7 feet above the ground.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-88	Sign assembly
05-01-92	Sign assembly
03-30-93	Sign supports note
03-04-96	Sign height
08-15-96	Note 8
07-10-97	Note revision
07-31-98	Note & portable sign
10-01-99	Skid mounted sign
02-07-03	Vertical clearance note
11-30-04	Third post added to some signs
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

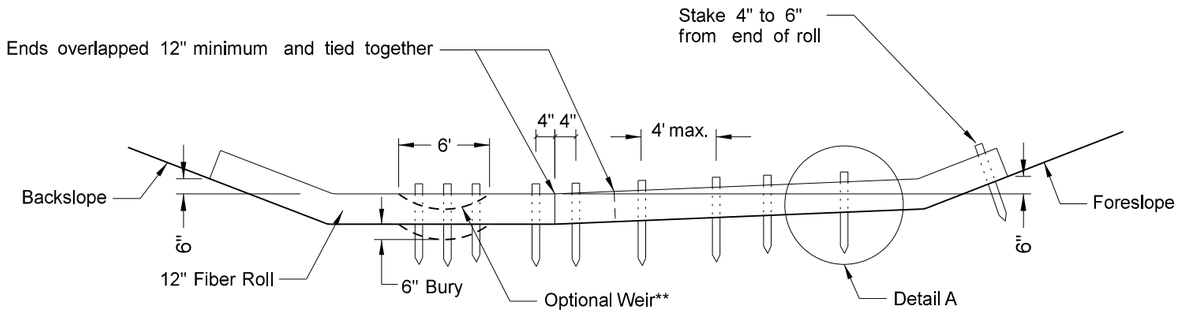
EROSION CONTROL
FIBER ROLL STAKING DETAILS

D-708-7



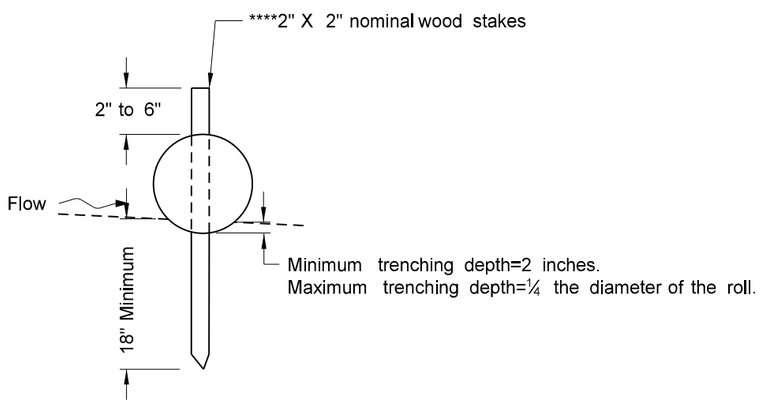
*DETAIL A
6" or 12" Fiber Roll Staking Detail

*Manufacturer may require stake through center of fiber roll.
****Stakes spaced every 3-4 feet.

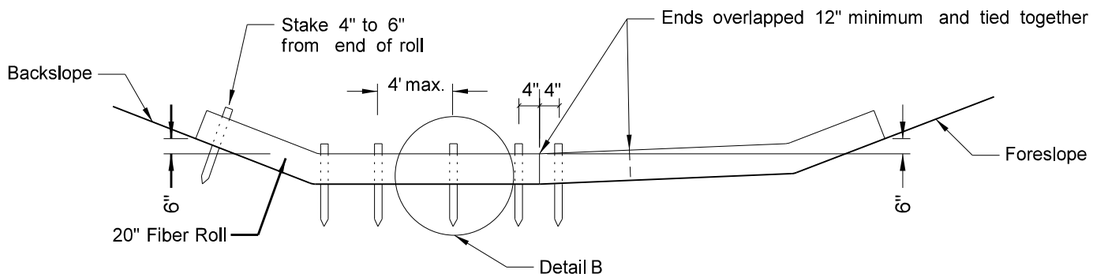


**Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property.

12 INCH FIBER ROLL - DITCH BOTTOM



DETAIL B
20" Fiber Roll Staking Detail



***20 INCH FIBER ROLL - DITCH BOTTOM

***Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/18/10 and the original document is stored at the North Dakota Department of Transportation