PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	001	1

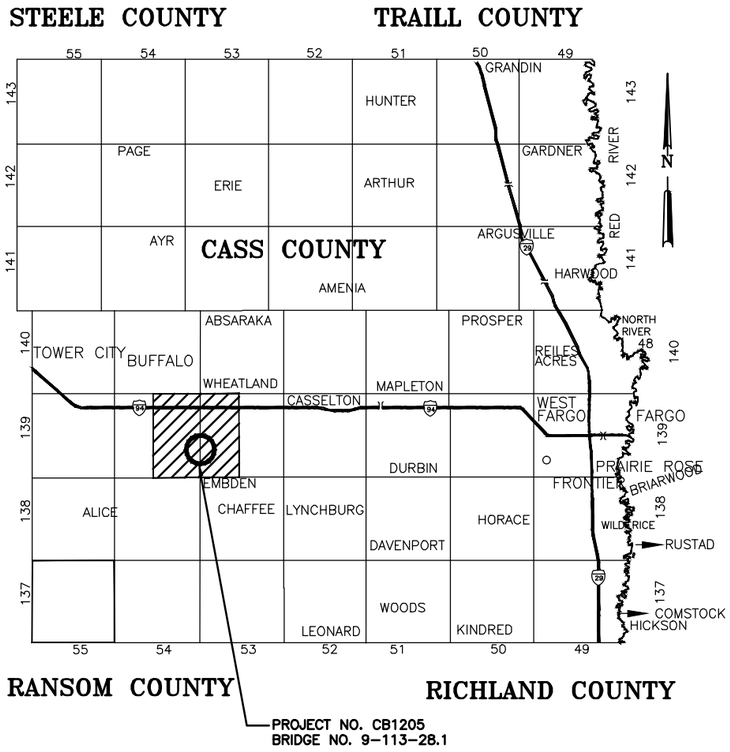
CASS COUNTY HIGHWAY DEPARTMENT

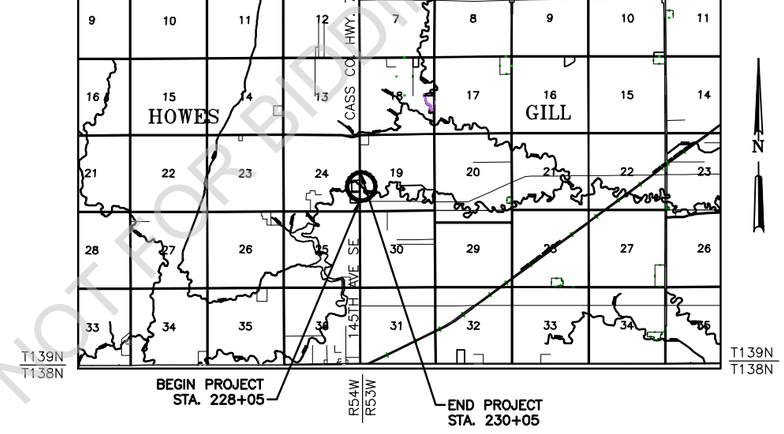
PLANS

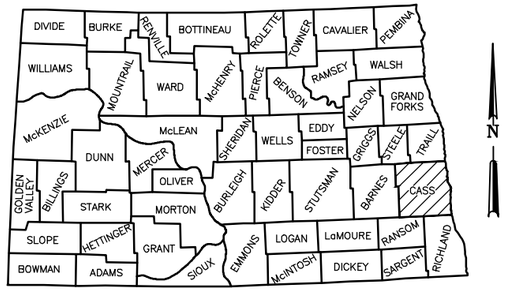
FOR

COUNTY PROJECT NO. CB1205
BRIDGE NO. 9-113-28.1
STRUCTURE

PROJECT CONSISTS OF REMOVAL OF BRIDGE AND REPLACEMENT WITH 2 – SINGLE CELL REINFORCED 12'x9' CONCRETE BOX CULVERTS, PAVING, MINOR GRADING, & INCIDENTALS.







SKETCH MAP OF NORTH DAKOTA
SHOWING COUNTIES

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.

TABLE OF CONTENTS

SECTION NO.	SHEET NO.	DESCRIPTION
1	1	TITLE SHEET
6	1–2	CONSTRUCTION NOTES
8	1	ESTIMATED QUANTITIES
30	1	TYPICAL SECTIONS
60	1	PLAN AND PROFILE SHEET
100	1–2	CONSTRUCTION SIGNING
170	1–4	CO. RD. 7 BOX CULVERT DETAIL SHEETS
200	1–4	CROSS SECTIONS

STANDARD DRAWINGS

D-20-1-3	NDDOT ABBREVIATIONS
D-20-10	NDDOT UTILITY COMPANY ABBREVIATIONS
D-20-20 & 21	LINESTYLES
D-20-30-31	SYMBOLS
D-704-7	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS PERFORATE TUBE
D-704-8	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS
D-704-9,11,12	CONSTRUCTION SIGN DETAIL
D-704-13	BARRICADE DETAILS AND CHANNELIZING DEVICES
D-704-14	CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS
D-704-19	CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS
D-708-2	EROSION AND SILTATION CONTROLS
D-754-82	OBJECT MARKERS

THE STANDARD DRAWINGS ARE INCLUDED IN THE BACK OF THE PLANS

LENGTH OF PROJECT = 0.038 MILES

SURVEY MARCH 2012
DESIGN JUNE 2012

DESIGN DATA FOR BRIDGE 9-113-28.1

Traffic	Average Daily			Max.Hr.
Current 2012	Pass: 250	Trucks:	Total: 250	
Forecast 2032	Pass: 276	Trucks:	Total: 276	
Clear Zone Distance: 14		Design Speed: 50		
Minimum Sight Dist. for Stopping: 305				
Minimum Sight Dist. for Safe Passing:				
Sight Dist. for No Passing Zone: 1,100				
Pavement Design Life (years)				

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APPROVED BY CASS COUNTY ENGINEER:

/s/ Jason P. Benson

JASON P. BENSON N.D. REG. NO. 7490

DATE: 06/12/2012

Houston Engineering Inc.
Fargo
P: 701.237.5065
F: 701.237.5101

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	006	1

100-P01 INDIVIDUAL ITEMS: The cost of those items shown on plans but not listed in the estimate of quantities shall be included in the unit price bid for various pay items.

105-P01 UTILITIES: The contractor shall be responsible for coordinating any utility relocation necessary during construction. The contractor will be responsible for verifying utility locations, contacting the utility companies, and having utilities marked and flagged prior to construction. For the state of North Dakota, the locate number is 1-800-795-0555.

Utility locations as shown on the plans are approximate only. Actual locations shall be verified by the contractor.

107-P01 HAUL ROADS: Section 107.05 B of the standard specifications addresses the use of public roads for hauling materials to the project. It shall be the contractors responsibility to investigate the suitability of routes with the governmental agency or political subdivision having roadway authority prior to submitting the bid.

110-P01 TEMPORARY EROSION AND SITUATION CONTROL: The contractor shall submit a temporary erosion control plan in accordance with section 110 of the standard specifications and standard drawing D-708-2. The plan shall include BMP's that must be implemented prior to the beginning of on-site excavation.

202-P01 REMOVAL OF STRUCTURE: Existing structure shall be disposed of in accordance with section 107.10 of the standard specifications.

203-P01 EMBANKMENT CONSTRUCTION: All channel and roadway embankment shall be compacted to the requirements of section 203.02 F and 203.02 H.

Under all embankment areas excluding roadway embankment, an additional 12" (beyond topsoil stripping) shall be scarified and recompacted. This work shall be included in the bid item for other items.

The suitability of material from on-site excavations for use in embankments will be determined by the field manager.

Embankments will be constructed with materials obtained from TWO sources, common excavation as detailed in the cross sections, and channel excavation material (see note 210-P02). Common and channel excavation bid items shall be plan quantity. Bid quantities are estimated based on the following assumptions noted in the Basis of Estimate.

All costs associated with spoiling excess channel excavation material and additional common excavation shall be included in the unit price for "Common Excavation-Waste".

203-P02 TOPSOIL: All disturbed embankment areas shall require removal and replacement of the topsoil (up to 4" maximum depth). Removed topsoil shall be stockpiled within the right of way at acceptable locations outside the grading limits and respread prior to seeding.

210-P01 FLOWABLE FILL (CONTROL DENSITY FILL) : CDF shall be used between the walls of the individual lines of precast RCB culverts. CDF shall met the following minimum specifications:

Course aggregate - 50%*
Fine aggregates - 50%*
Water - 375 LBS,
Fly-ash - 250 LBS
Cement - 125 LBS.

* Remaining volume of mix will consist of fine and course aggregate divided equally to achieve mix with 10"±1" slump. Final design provided by contractor and approved by engineer prior to construction.

210-P02 CHANNEL EXCAVATION : Material excavated from the channel may be used in transition areas for embankment, but not in the proposed roadbed unless directed otherwise by the engineer in the field. If the material is not suitable for slope areas, the contractor shall waste the material.

Disposal of excess excavated or waste materials shall be in areas arranged by the contractor and approved by the engineer in the field. Plan quantity shall be pay quantity.

210-P03 FOUNDATION PREPARATION :
"Foundation Preparation" shall include those items listed in Section 210.04 B of the Standard Specifications, for the area between Stations 228+76.17 and 229+09.83 unless paid for separately. Roots or other vegetation more than 1" inch in thickness shall be removed to a depth of 6" below the finished surface.

All costs for labor, equipment and material necessary to install the 12" stabilization aggregate and 6" leveling course shall be included in the price bid for "Foundation Preparation"

210-P04 SELECT BACKFILL : Select backfill shall be placed and compacted with mechanical tamping equipment in maximum 6" lifts. Material shall be compacted to 90% of the maximum dry density as determined by AASHTO T-180. Select backfill shall meet the gradation requirements of Section 816.03 for Class 5 material. Material will be paid per ton based on limits on these plans. Plan quantity includes 25% shrinkage factor.

The emulsified asphalt must be applied in accordance with Section 401.04 of the NDDOT Standard Specifications.

408-P02 HOT BITUMINOUS PAVEMENT CL 27 : Contractor shall submit a mix design to engineer for approval; maximum 3" thickness per lift. All cost for labor equipment and material (asphalt cement, prime coat, and tack coat etc.) necessary to complete the work will be included in the price bid for "Hot Bituminous Pavement CL 27".

SS-1H, CSS-1, OR MS-1 Emulsified Asphalt shall be included in the price bid for "Hot Bituminous Pavement CL 27." The approximate quantity required for this project is 36 gallons.

MC70 or 250 Liquid Asphalt shall be included in the price bid for "Hot Bituminous Pavement CL 27." The approximate quantity required for this project is 180 gallons.

PG58-28 asphalt cement shall be included in the price bid for "Hot Bituminous Pavement CL 27." The amount of asphalt cement will be determined in the mix design approved by the project engineer.

708-P01 SEEDING - HYDRO MULCH :
The hydro mulch shall be as specified in the NDDOT Standard Specification Section 708.02. Seed mix shall be as follows:

A-1 Pasture Mix

Meadow Bromegrass - 25%
Intermediate Wheatgrass - 25%
Crested Wheatgrass - 25%
Tetraploid Int. Ryegrass - 10%
Creeping Alfalfa - 15%

80 LBS of Seed and 20 LBS of Rye per acre

Basis of payment for seeding shall be actual field measurements. No adjustment to unit prices will be made for the increase in Seeding - hydro Mulch. All cost for labor, equipment and materials necessary to complete the work will be included in the bid price for "Seeding - Hydro Mulch"

708-P02 GEOTEXTILE FABRIC TYPE RR : Riprap is to be placed as directed by the engineer. Sand and Geotextile fabric will not be a pay item, but shall be included in the bid for riprap.

708-P03 RIPRAP: Riprap shall be placed on prepared slopes. Riprap placement limits shall be as shown in the plans or as directed by the engineer in the field. No salvaged concrete will be allowed as riprap.

710-P01 DETOUR: The bridge will be closed during construction. No official detour will be marked. Temporary local access shall be maintained at all times.

754-P01 SIGNS AND DELINEATORS : Any existing signs and delineators posts will be removed and reset by the contractor. This item of work is not a separate pay item but shall be included in the pay item for traffic control signs. All signs must be in place prior to re-opening of the roadway.

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CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF THE BUFFALO CREEK
BRIDGE NO. 9-113-28.1
GENERAL NOTES

PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	006	2

BOX CULVERT NOTES

Applications of Loads - The RCBs shall be designed for the greater moments and shears resulting from the following two load conditions:

1. Dead Load + Live Load + Balanced Lateral Earth Load
2. .8 x (Dead Load + Live Load + Unbalanced Lateral Earth Load). The unbalanced lateral earth load occurs when one side of the culvert has 40 lbs./sq. ft./ft. of depth.

The precast RCB shall be comprised of barrel sections and end sections. The concrete used to make the sections shall have a minimum compressive strength of 5,000 psi.

Any haunch or fillet at the inside corners of the barrel shall not exceed a triangular shape with 12 inch horizontal and 12 inch vertical legs. The barrel sections joints shall be tongue and groove.

The end sections include a reinforced concrete parapet on the top of the roof, and a reinforced concrete cutoff wall below the floor. The parapet shall be 1' x 1' and shall be as long as the barrel section is wide.

If u-bolts are used, the four u-bolts will be located at the third points of the outside walls. All hardware shall either be hot-dipped galvanized according to Section 854 of the “North Dakota Standard Specifications for Road and Bridge Construction” or mechanically galvanized according to ASTM B695.

The top and two side surfaces of each barrel section joint shall be wrapped with a geotextile fabric that prevents soil from leaking through the joint. In addition, an approved epoxy sealant shall be placed at each interior joint location. The epoxy shall extend across the bottom of each joint and extend up 1/3 of the box culvert height at each side. The geotextile fabric shall be a minimum of 24 inches wide and shall meet the requirements of geotextile separation fabric of Section 709 of the “North Dakota Supplemental Specifications.” Geotextile fabric shall also be required at the outside of each cutoff wall vertical joint, if more than one unit is used. A groove should be made in the bedding 1” deep and 2”-3” wide in front of each joint to prevent sand from being pushed into the joint during installation.

The box culverts shall be backfilled equally on both sides of the box to avoid uneven loading to one side of the culvert.

The costs of providing and installing the ties and the geotextile fabric shall be incidental to the precast RCB.

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CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9–113–28.1
BOX CULVERT NOTES

PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	008	1

BASIS OF ESTIMATE

MATERIAL	*BASIS OF ESTIMATE*
HOT BITUMINOUS PAVEMENT CLASS 27	2 TON/CY
PG58–28*	(TO BE DETERMINED IN MIX DESIGN)
SS–1H, CSS–1, OR MS–1 EMULSIFIED ASPHALT*	0.05 GAL/SY
M–70 OR 250 LIQUID ASPHALT*	0.25 GAL/SY
SELECT BACKFILL SHRINKAGE FOR SELECT BACKFILL AND CL. 5	1.875 TON/CY COMPACTED VOLUME IN PLACE PLUS 25%
AGGREGATE FOR SUBGRADE REINFORCEMENT	1.875 TON/CY
SEEDING	ALL DISTURBED AREAS OUTSIDE OF ROADBED
TOPSOIL QUANTITY BASED ON 4" DEPTH	

WATER FOR COMPACTION	
EMBANKMENT	10 GAL/CY
AGGREGATE BASE CLASS 5	20 GAL/CY
ADDITIONAL INCLUDED AS DUST PALLIATIVE	10 M GAL/MILE

EARTHWORK	***QUANTITY***
TOTAL EMBANKMENT	= 1,451 CY
LOOSE VOLUME REQUIRED	= 1,886 CY (based on 130% compaction)
COMMON EXCAVATION VOLUME	= 2,907 CY
CHANNEL EXCAVATION VOLUME	= 50 CY
USABLE MATERIAL FROM CHANNEL EXC.	= 0 CY
BORROW EXCAVATION REQUIRED	= 0 CY
AMOUNT OF MATERIAL TO BE SPOILED	= 1071 CY (2,907 CY – 1886 + 50)

*NOT A PAY ITEM

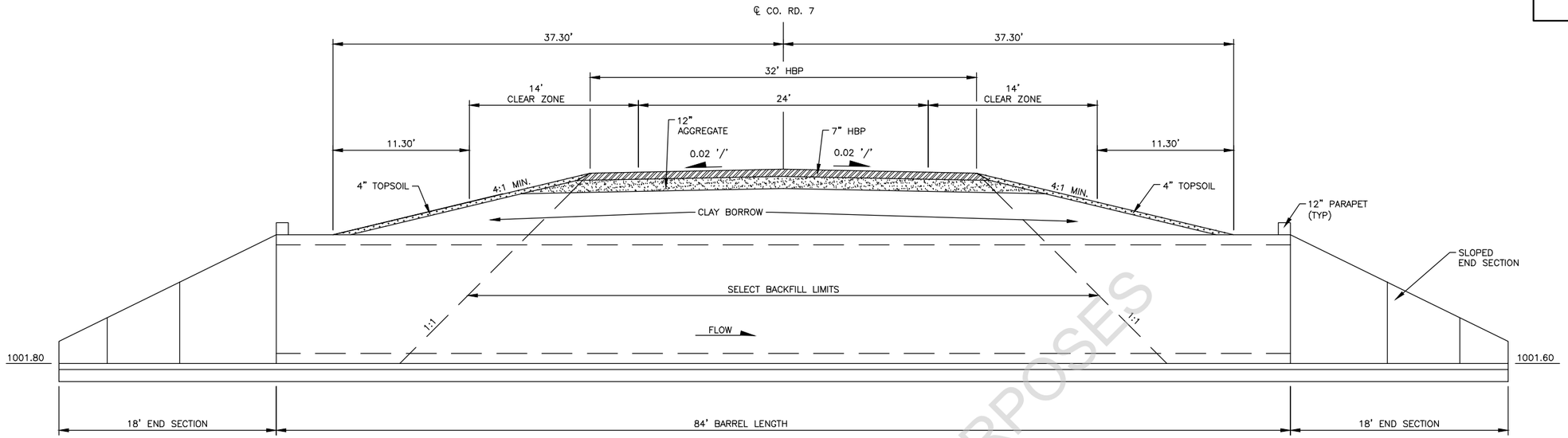
ESTIMATED QUANTITES

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
103	0100	CONTRACT BOND	L SUM	1
202	0103	REMOVAL OF STRUCTURE	L SUM	1
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	533
202	0153	SAW BITUMINOUS SURFACING-FULL DEPTH	LF	48
203	0101	COMMON EXCAVATION-TYPE A (P)	CY	2,907
203	0109	TOPSOIL (P)	CY	191
203	0113	COMMON EXCAVATION-WASTE (P)	CY	730
210	0126	CHANNEL EXCAVATION (P)	CY	50
210	0198	SELECT BACKFILL	TON	1,185
210	0212	FLOWABLE FILL (P)	CY	44
210	0411	FOUNDATION PREPERATION	EA	1
216	0100	WATER	M GAL	12
302	0120	AGGREGATE BASE COURSE CL 5	TON	476
408	0185	HOT BITUMINOUS PAVEMENT CL 27	TON	282
606	1209	12FT X 9FT PRECAST RCB CULVERT	LF	168
606	5209	12FT X 9FT PRECAST RCB END SECTION	EA	4
702	0100	MOBILIZATION	L SUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	413
704	1052	TYPE III BARRICADE	EA	14
708	1020	RIPRAP-LOOSE ROCK	CY	158
708	1430	FIBER ROLLS - 12IN	LF	328
708	2950	SEEDING - HYDRO MULCH	ACRE	0.354
709	0401	GEOTEXTILE FABRIC-TYPE S1	SY	449
709	0701	GEOTEXTILE FABRIC-TYPE R1	SY	1055
754	0803	OBJECT MARKERS - TYPE III	EA	4
762	1104	PVMT MK PAINTED 4IN LINE	LF	450

NOTES:
- WHERE A SPEC AND CODE ITEM DESCRIPTION IS FOLLOWED BY A (P), THE PLAN QUANTITY SHALL BE THE FINAL PAY QUANTITY.

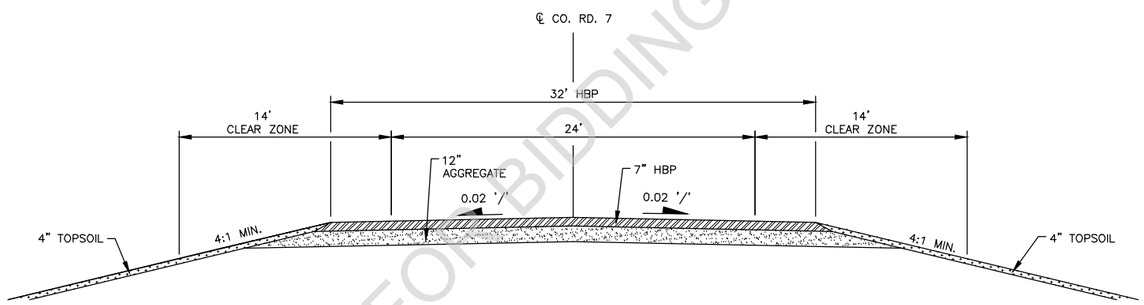
CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9–113–28.1
ESTIMATE OF QUANTITIES & BASIS OF ESTIMATE
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	030	1



PROPOSED TYPICAL SECTION @ ℄ CULVERT

NOT TO SCALE



PROPOSED TYPICAL SECTION

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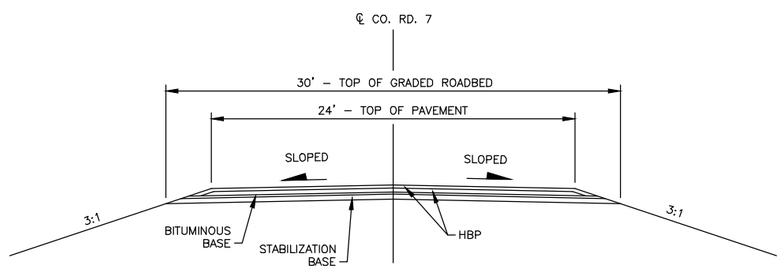

EXISTING TYPICAL SECTION

NOT TO SCALE

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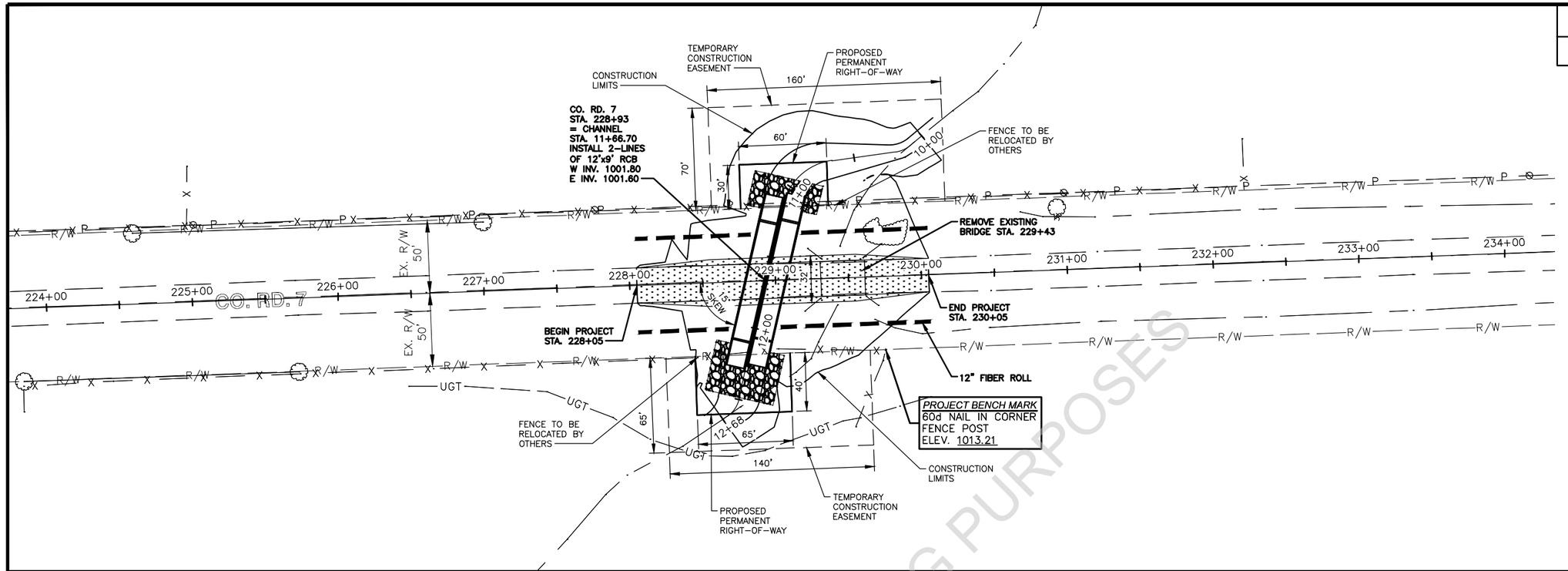
CASS COUNTY
HIGHWAY DEPARTMENT

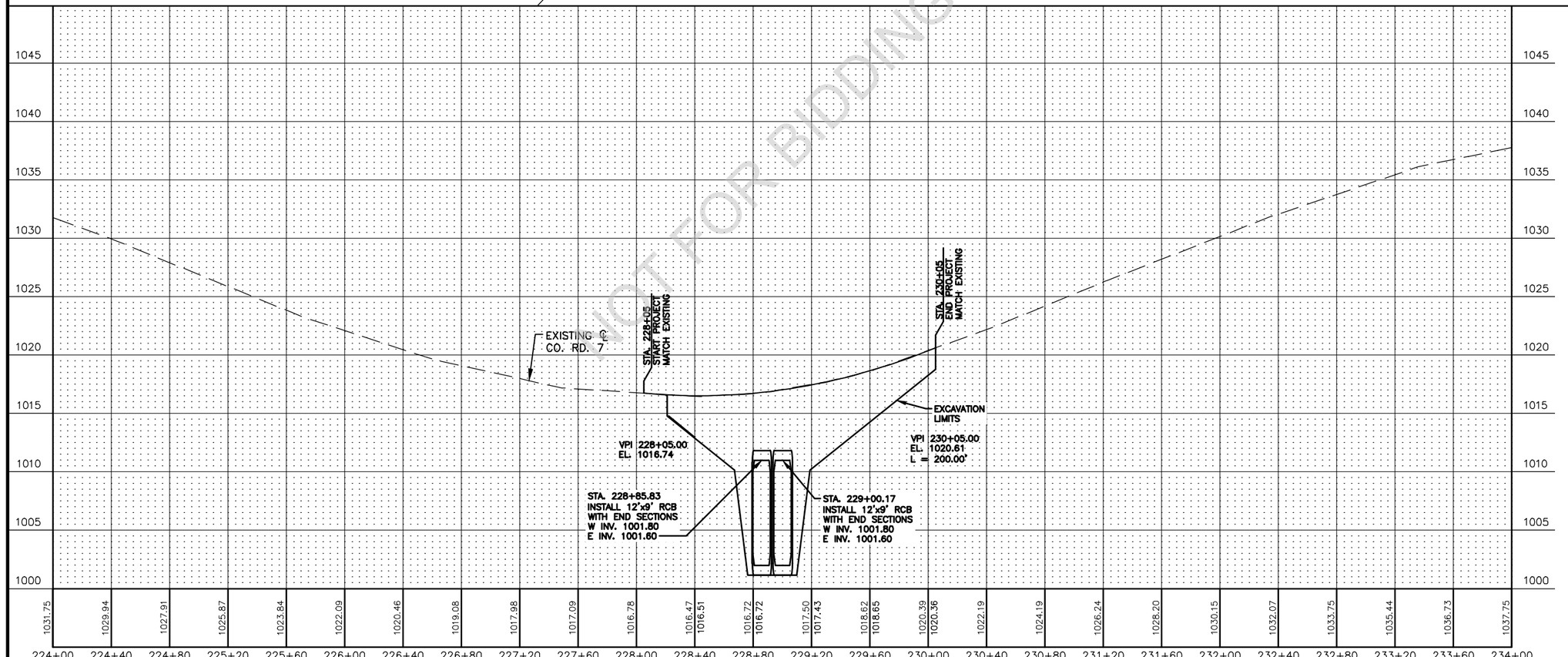
UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9–113–28.1

TYPICAL SECTIONS

PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	060	1





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CASS COUNTY
HIGHWAY DEPARTMENT

UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9-113-28.1

PLAN & PROFILE

PROJECT NO. CB1205
COUNTY ROAD NO. 7
NORTH OF EMBDEN
CASS COUNTY

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PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	100	1

TRAFFIC CONTROL LEGEND

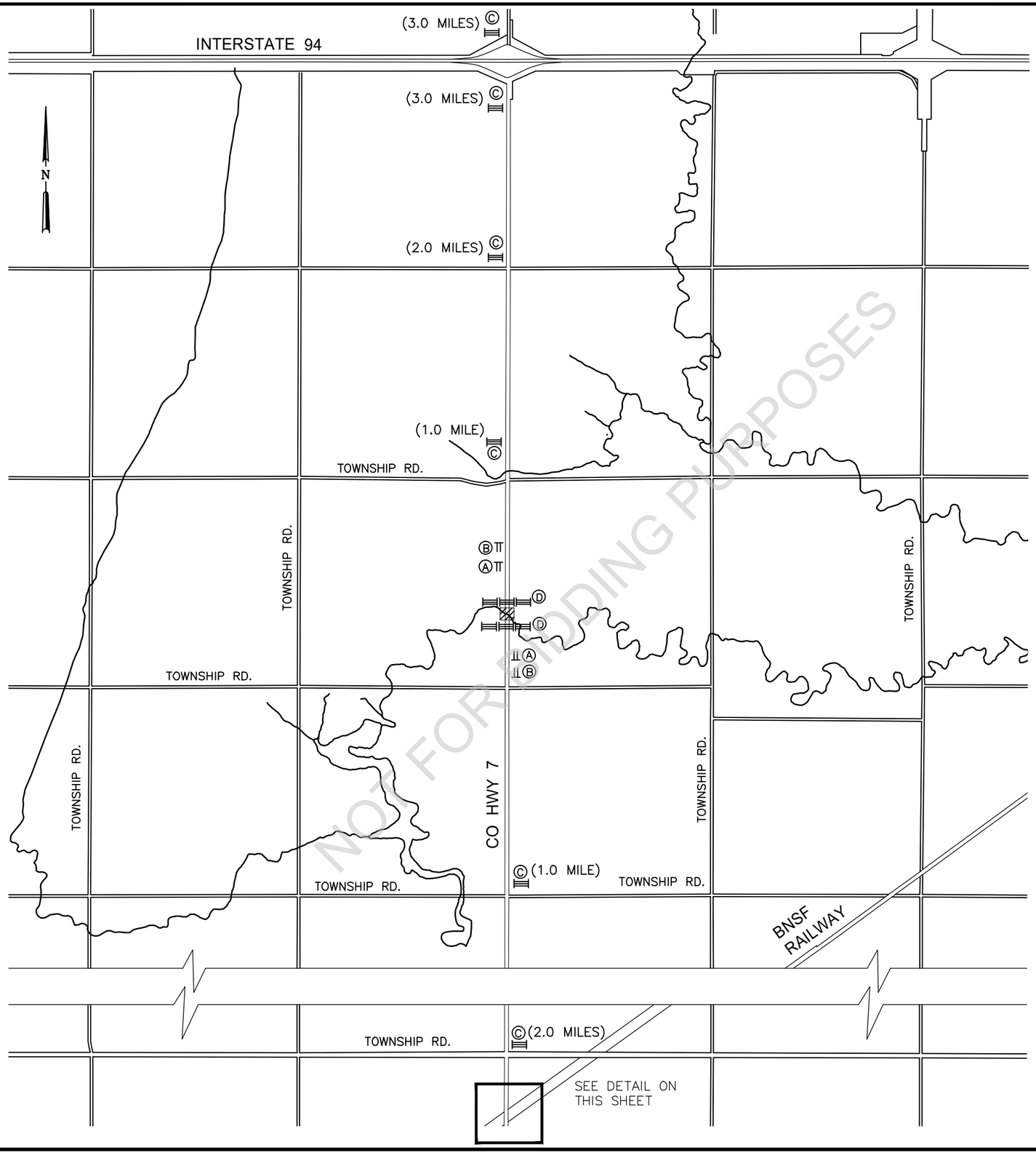
- CONSTRUCTION SITE
- POST–MOUNTED SIGN
- TYPE III BARR.

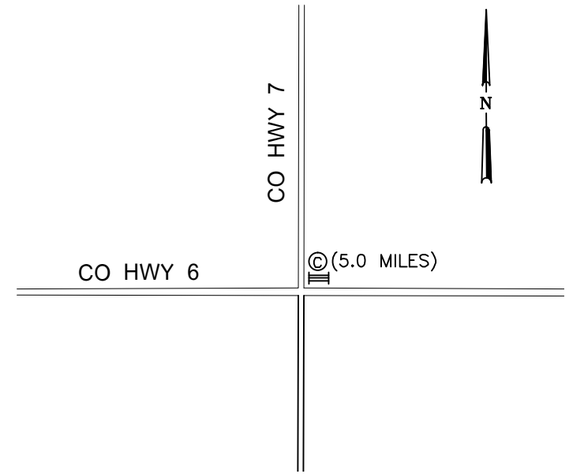
Ⓐ ROAD CLOSED 500 FT — W20–3–48

Ⓑ ROAD CLOSED 1000 FT — W20–3–48

Ⓒ ROAD CLOSED X MILES AHEAD LOCAL TRAFFIC ONLY — R11–3a–60

Ⓓ ROAD CLOSED — R11–2–48





NOTE:
PLACE ROAD CLOSED AHEAD SIGN (R11–3a–60) AT INTERSECTION OF CASS CO. HWY. 7 AND CASS CO. HWY. 6 APPROX. 5 MILES SOUTH OF PROJECT LOCATION.

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CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF THE BUFFALO CREEK
BRIDGE NO. 9–113–28.1
TRAFFIC CONTROL
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	CB1205	100	2

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	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-1a-18	18"x18"	STOP and SLOW PADDLE Back to Back		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		31	
R11-3c-60	**60"x30"**	**STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY**	**7**	**31**	**217**
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		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.**	**4**	**35**	**140**
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 on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
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

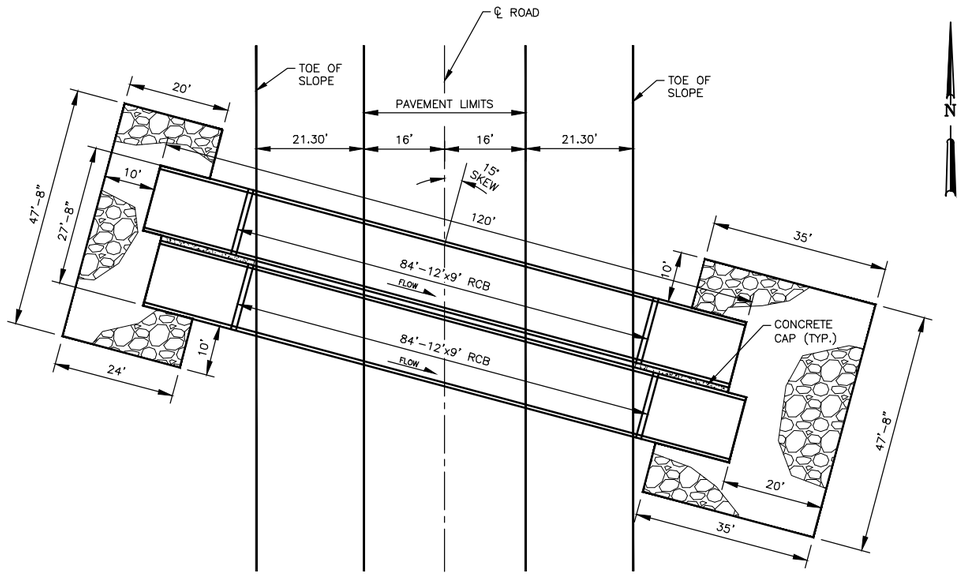
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**413**

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**	**14**
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	
704-3501	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	

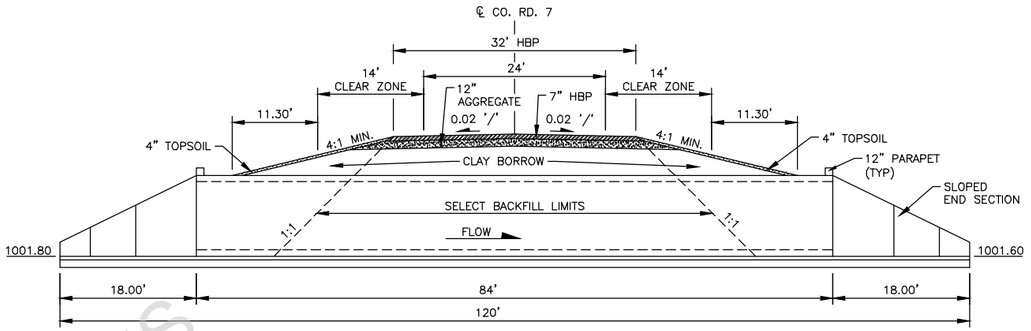
NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

Traffic Control Devices List

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	170	1

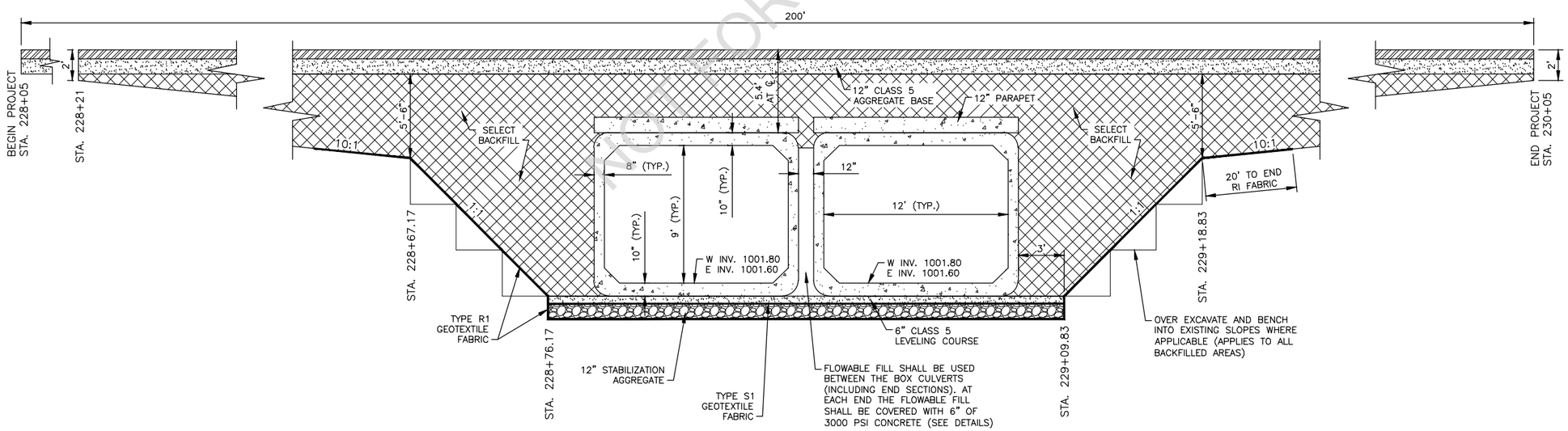


PLAN VIEW
NOT TO SCALE



NOTES:

1. STABILIZATION AGGREGATE SHALL BE COARSE AGGREGATE SIZE NO. 3 PER SECTION 816.02 OF THE NDDOT STANDARD SPECIFICATIONS.
2. GRANULAR LEVELING COARSE TO MEET GRADATION OF AGGREGATE BASE CL. 5.
3. PROVIDE MIN. 12" CLAY CAP OVER ALL SELECT BACKFILL. 4" TOPSOIL (ESTIMATED) TO BE REMOVED AND REPLACED OVER ALL DISTURBED AREAS.
4. CLAY FILL EMBANKMENT OUTSIDE THE ROADBED SHALL BE COMPACTED AS DIRECTED BY THE ENGINEER.
5. SEE SHEET 170-4 FOR CONCRETE CAP DETAILS.



END VIEW
NOT TO SCALE

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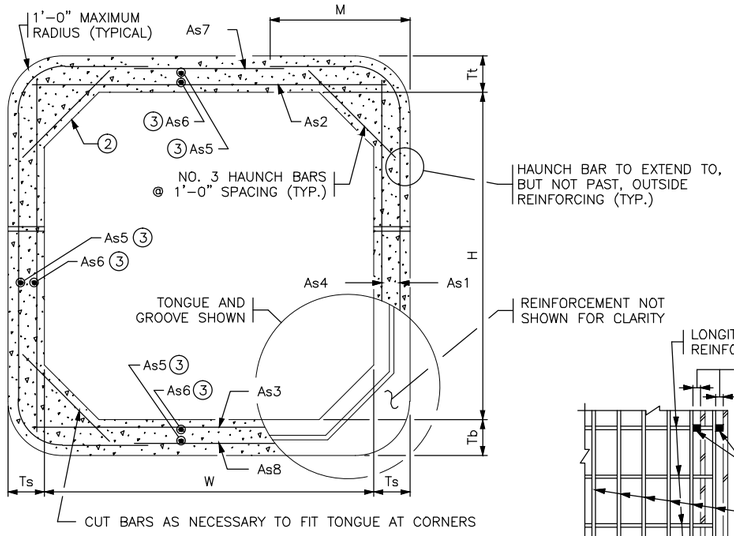
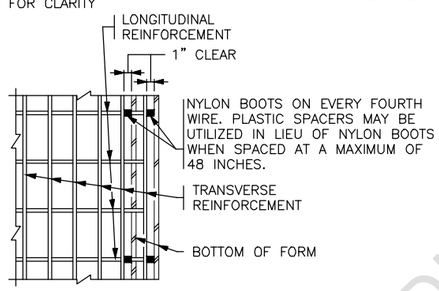
CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF THE BUFFALO CREEK
BRIDGE NO. 9-113-28.1
PRECAST REINFORCED CONC. BOX CULVERT
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	170	2



TRANSVERSE BARREL SECTION

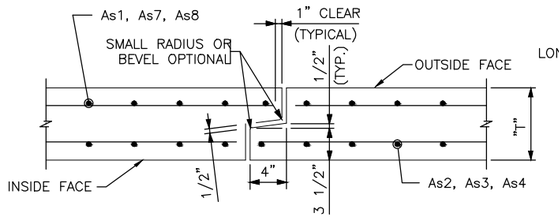
BAR REINFORCEMENT OPTION SHOWN



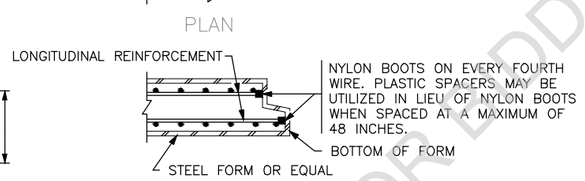
PLAN

LONGITUDINAL BARREL SECTION

BAR REINFORCEMENT OPTION SHOWN

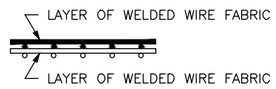


TONGUE AND GROOVE JOINT DETAIL



SECTION

FORMING DETAIL



FABRIC LAYER DETAIL

WHEN MORE THAN ONE LAYER OF WELDED WIRE FABRIC IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, THE WIRES OF THE WELDED WIRE FABRIC SHALL BE PLACED AS SHOWN

CONSTRUCTION NOTES

CULVERTS TO BE CONSTRUCTED AS PER NDDOT STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION OR AS NOTED BELOW.

THE WELDED WIRE FABRIC, SHEAR REINFORCEMENT AND REINFORCEMENT BARS SHALL CONFORM TO APPLICABLE REQUIREMENTS OF AASHTO M259.

1½" MIN. AND 2" MAX. CONCRETE COVER ON ALL REINFORCEMENT, INCLUDING SHEAR REINFORCEMENT, EXCEPT FOR TONGUE AND GROOVE DETAIL.

ANY OF THE FOLLOWING COMBINATIONS OF STEEL REINFORCEMENT MAY BE USED:
- (a) 1 OR 2 LAYERS OF WELDED WIRE FABRIC OR
- (b) 1 LAYER OF WELDED WIRE FABRIC AND 1 LAYER OF REINFORCEMENT BARS OR
- (c) 1 LAYER OF REINFORCEMENT BARS.

THE REINFORCEMENT SHALL BE DEVELOPED IN ACCORDANCE WITH AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS". IF BAR REINFORCEMENT IS SUBSTITUTED FOR WELDED WIRE FABRIC, THE AREAS OF REINFORCEMENT SHALL BE INCREASED BY 8%.

THE MAXIMUM SIZE OF REINFORCEMENT BARS SHALL BE NO. 6. THE MAXIMUM WELDED WIRE FABRIC SIZE SHALL BE A W23 PER LAYER (MAXIMUM OF 2 LAYERS).

THE SPACING CENTER TO CENTER OF THE TRANSVERSE WIRES SHALL NOT BE LESS THAN 2" NOR MORE THAN 4". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL NOT BE MORE THAN 8".

WELDING WILL NOT BE ALLOWED ON REINFORCEMENT BARS OR WELDED WIRE FABRIC, EXCEPT THAT THE ORIGINAL WELDING REQUIRED TO MANUFACTURE WIRE FABRIC IS ACCEPTABLE.

WHEN REINFORCEMENT IS CUT, ADDITIONAL REINFORCEMENT SHALL BE ADDED ON BOTH SIDES OF THE CUT MEMBER TO REPLACE OR EXCEED THE CUT STEEL.

COMPACT THE FIRST 1.5' (LOOSE) OF FILL ABOVE THE BOX WITH LIGHT COMPACTION EQUIPMENT SUCH AS PLATE COMPACTORS OR WALK BEHIND ROLLERS.

TRANSVERSE REINFORCEMENT IS PARALLEL TO THE CULVERT SPAN. LONGITUDINAL REINFORCEMENT IS PERPENDICULAR TO THE CULVERT SPAN.

1. CULVERT TIES ARE TO BE 1" DIAMETER RODS.
2. HAUNCH SIZES ARE TO BE 12" VERTICAL, 12" HORIZONTAL ON ALL BOX SIZES.
3. LONGITUDINAL REINFORCEMENT DENOTED AS As5 AND As6 MUST BE PLACED IN ALL SLABS AND WALLS AND MUST BE 0.06 SQ. IN./FT. MIN.

BARREL INFORMATION TABLE *

BRIDGE NO.	LOCATION	SIZE	CLASS	f'c (P.S.I.)	FILL HEIGHT RANGE (FT.)	DISTRUBUTION SLAB REQUIRED	RECESSED TIE RODS REQUIRED	DIMENSIONS W (FT.)	H (FT.)	Tt (IN.)	Tb (IN.)	Ts (IN.)	WEIGHT (LBS./FT.)	WELDED WIRE FABRIC REINFORCEMENT As1 AREA (IN.²/FT.)	As1 LENGTH (FT.)	As1 M (FT.)	As2 AREA (IN.²/FT.)	As2 LENGTH (FT.)	As3 AREA (IN.²/FT.)	As3 LENGTH (FT.)	As4 AREA (IN.²/FT.)	As4 LENGTH (FT.)	As7 AREA (IN.²/FT.)	As7 LENGTH (FT.)	As8 AREA (IN.²/FT.)	As8 LENGTH (FT.)
09-113-28.1	228+85.83 229+00.17	12X9	3	5000	7-15	NO	NO	12	9	10	10	8	5450	0.82	15'-9"	2'-10"	1.36	12'-6"	1.42	12'-6"	0.20	9'-6"	0.24	10'-7"	0.24	10'-7"

* BOX CULVERTS WITH SPANS FROM 6 TO 14 FT. ARE DESIGNED FOR HL-93 LIVE LOADS (AASHTO LRFD 3.6.2.1) NOT INCLUDING THE DESIGN LANE LOAD. BOXES WITH SPANS OF 16 FT. ARE DESIGNED FOR HL-93 LIVE LOADS INCLUDING THE DESIGN LANE LOAD.

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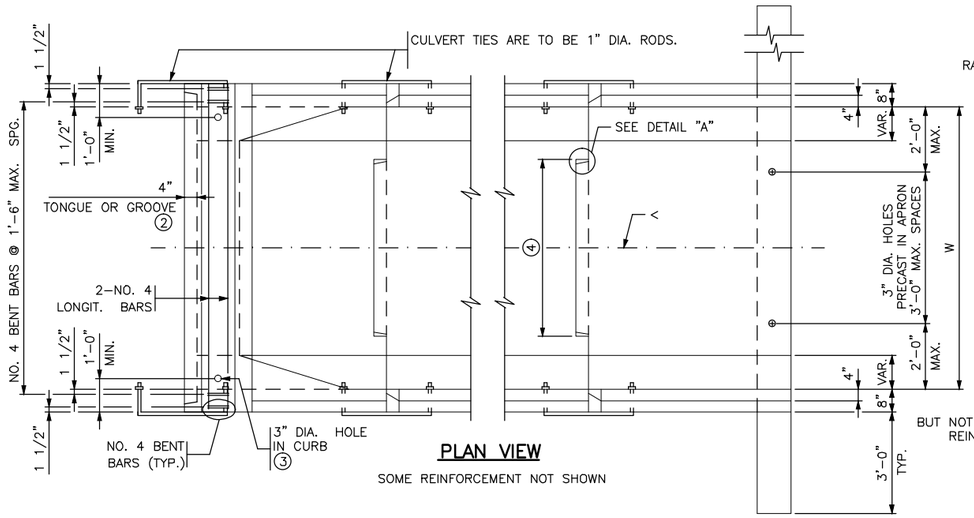
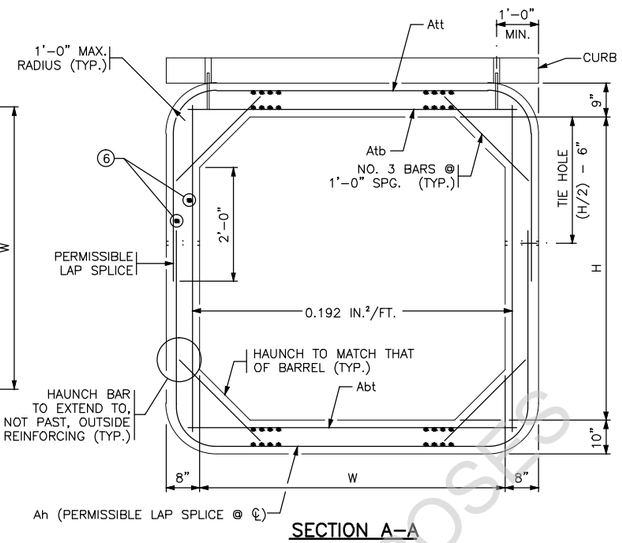
CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF THE BUFFALO CREEK
BRIDGE NO. 9-113-28.1
BOX CULVERT DETAILS
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	170	3



PLAN VIEW

SOME REINFORCEMENT NOT SHOWN



SECTION A–A

CONSTRUCTION NOTES

ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.

ON ALL END SECTIONS FOR WATERWAYS, USE DROPWALLS ON INLET AND OUTLET ENDS.

FINISH ALL EXPOSED EDGES OF CONCRETE WITH 1/2" OR 3/4" CHAMFER OR RADIUS UNLESS OTHERWISE NOTED.

(1) WITH DOUBLE BOXES LOCATE DROPWALL JOINTS BETWEEN END SECTIONS. LIMITS OF EXCAVATION FOR DROPWALL TO BE APPROXIMATELY THE SAME AS DROPWALL DIMENSIONS. FURNISHING AND INSTALLATION OF DROPWALL TO BE INCLUDED IN PRICE BID FOR END SECTIONS.

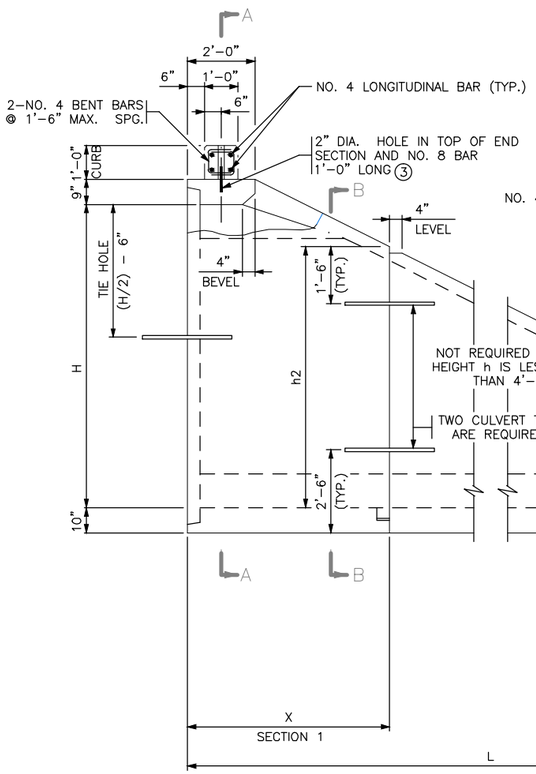
(2) CHECK LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED.

(3) FILL HOLE WITH GROUT. GROUT SHALL CONSIST OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX SHALL HAVE A MAXIMUM SLUMP OF 4".

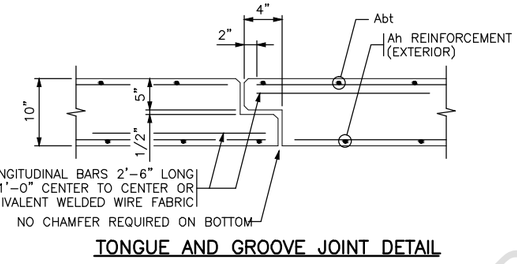
(4) 3'–6" TONGUE AND 3'–7" GROOVE FOR 6'–0" WIDE CULVERTS. 5'–0" TONGUE AND 5'–1" GROOVE FOR CULVERTS OVER 6'–0" WIDE. CENTER TONGUE AND GROOVE ON ℄ OF EACH APRON JOINT.

(5) AS AN ALTERNATE TO THE ONE LAYER WELDED WIRE FABRIC, PROVIDE TWO LAYERS OF REBAR OR WELDED WIRE FABRIC WITH THE STEEL AREA EQUAL TO HALF OF THE TEMPERATURE STEEL PER CODE REQUIREMENTS IN EACH FACE OF THE DROPWALL.

(6) LONGITUDINAL REINFORCEMENT PERPENDICULAR TO THE CULVERT SPAN SHALL HAVE A MINIMUM OF 0.06 SQUARE INCHES PER PERIPHERAL FOOT ON ALL FACES OF THE BARREL.

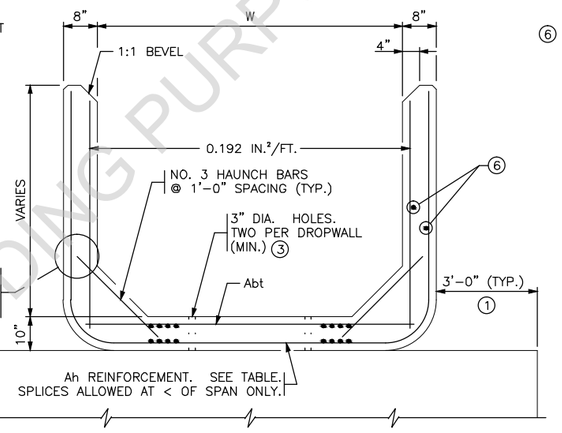


SIDE ELEVATION

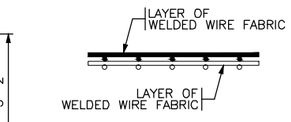


TONGUE AND GROOVE JOINT DETAIL

BETWEEN END SECTIONS

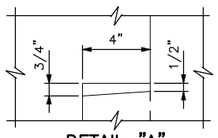


SECTION B–B

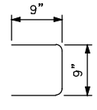


FABRIC LAYER DETAIL

WHEN MORE THAN ONE LAYER OF WELDED WIRE FABRIC IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, THE WIRES OF THE WELDED WIRE FABRIC SHALL BE PLACED AS SHOWN.



DETAIL "A"



NO. 4 BENT BAR

Att, Atb REINFORCEMENT

WIDTH (FT.)	Att (IN²/FT.)	Atb (IN²/FT.)
6	0.27	0.44
8	0.47	0.60
10	0.62	0.74
12	0.88	1.06
14	1.20	1.58
16	1.52	2.09

Abt REINFORCEMENT

WIDTH (FT.)	Abt (IN²/FT.)
6–10	0.20
12	0.30
14	0.39
16	0.39

APRON DIMENSIONS & Ah REINFORCEMENT

H FT.	L FT.	SECTION 1 X	SECTION 1 Ah	h2	SECTION 2 Y	SECTION 2 Ah	h3	SECTION 3 Z	SECTION 3 Ah	h4	SECTION 4 ZZ	SECTION 4 Ah	h5	SECTION 5 ZZZ	SECTION 5 Ah	h6
4	8	8'	0.192	1'–9"												
5	10	6'	0.192	3'–9"	4'	0.192	1'–9"									
6	12	6'	0.192	4'–9"	6'	0.192	1'–9"									
7	14	6'	0.192	5'–9"	8'	0.192	1'–9"									
8	16	6'	0.20	6'–9"	6'	0.192	3'–9"	4'	0.192	1'–9"						
9	18	6'	0.29	7'–9"	6'	0.20	4'–9"	6'	0.192	1'–9"						
10	20	6'	0.42	8'–9"	6'	0.29	5'–9"	8'	0.192	1'–9"						
11	22	6'	0.60	9'–9"	6'	0.42	6'–9"	6'	0.192	3'–9"	4'	0.192	1'–9"			
12	24	6'	0.78	10'–9"	6'	0.60	7'–9"	6'	0.20	4'–9"	6'	0.192	1'–9"			
13	26	6'	1.03	11'–9"	6'	0.78	8'–9"	6'	0.28	5'–9"	8'	0.192	1'–9"			
14	28	6'	1.38	12'–9"	6'	1.03	9'–9"	6'	0.40	6'–9"	6'	0.192	3'–9"	4'	0.192	1'–9"

NOTE: Ah IS AREA OF REINFORCEMENT PER FOOT OF LENGTH (IN!/FT.)

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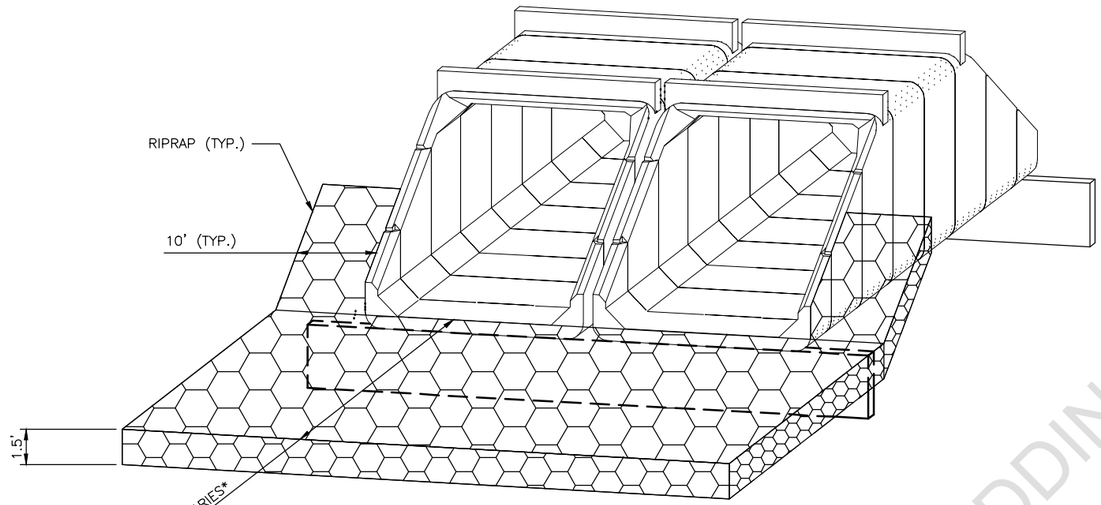
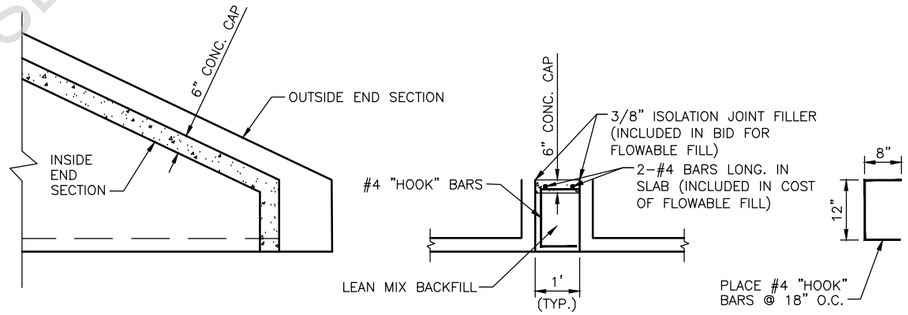
CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF THE BUFFALO CREEK
BRIDGE NO. 9–113–28.1
BOX CULVERT DETAILS
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	170	4



*10' UPSTREAM
20' DOWNSTREAM

RIRRAP DETAIL
NOT TO SCALE



CONCRETE CAP DETAILS
NOT TO SCALE

NOTE:
ALL COSTS ASSOCIATED WITH PLACING CONCRETE CAP (INCLUDING REINFORCEMENT) TO BE INCLUDED IN THE PRICE BID FOR "FLOWABLE FILL".

CONTRACTOR MAY INCREASE THE DEPTH OF THE CONCRETE SLAB USED WITH APPROVAL OF THE ENGINEER. NO INCREASE IN PRICE WILL BE ALLOWED FOR CHANGES IN THE QUANTITY OF CONCRETE USED.

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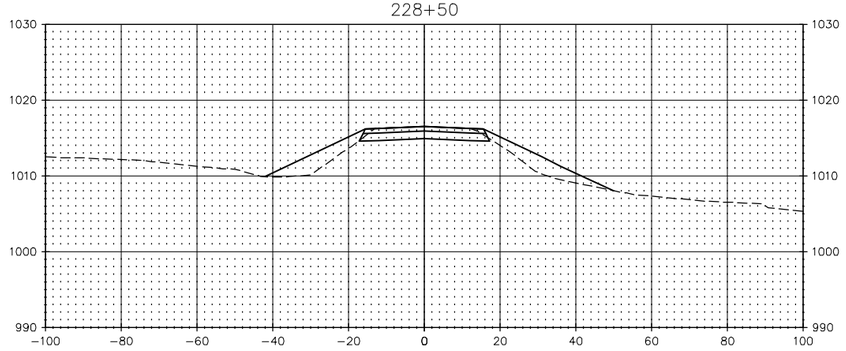
CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF THE BUFFALO CREEK
BRIDGE NO. 9-113-28.1
BOX CULVERT DETAILS
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	200	1

228+50



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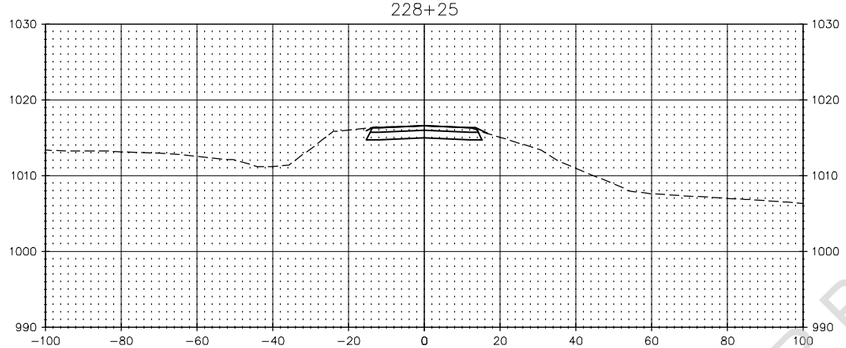
228+25



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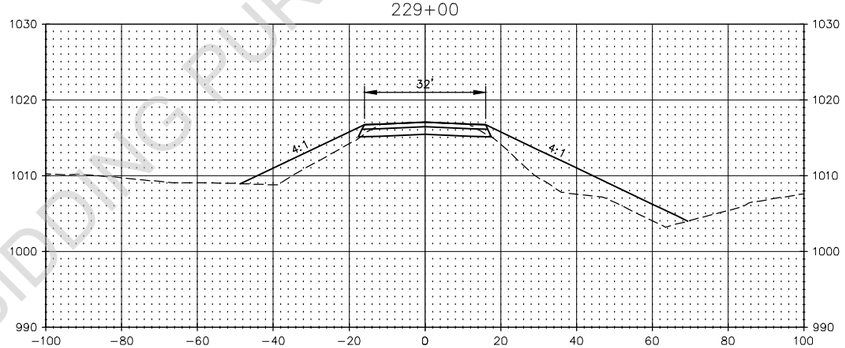

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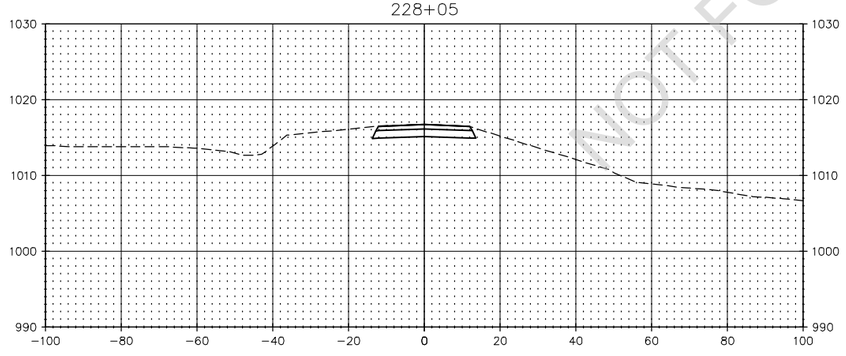

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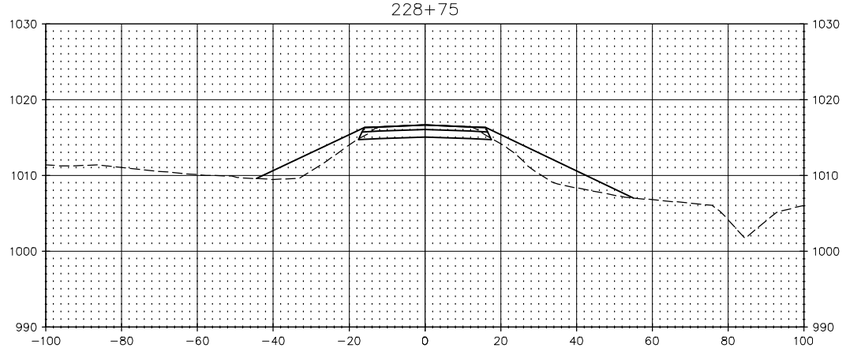

CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9−113−28.1
COUNTY HIGHWAY 7
CROSS SECTIONS
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	200	2

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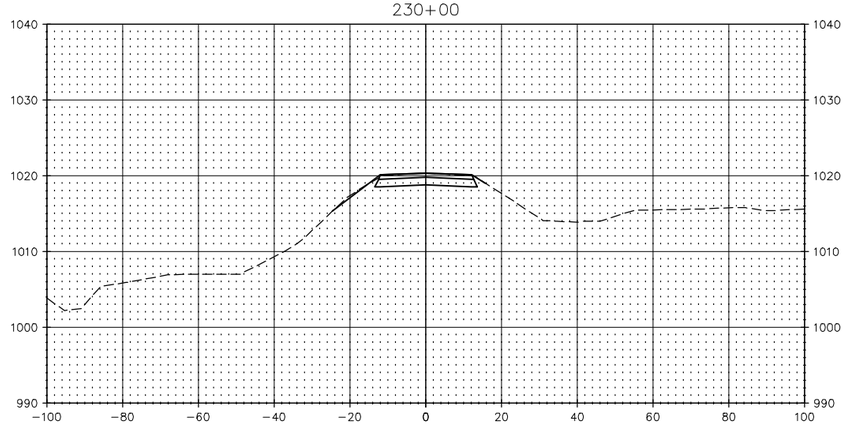

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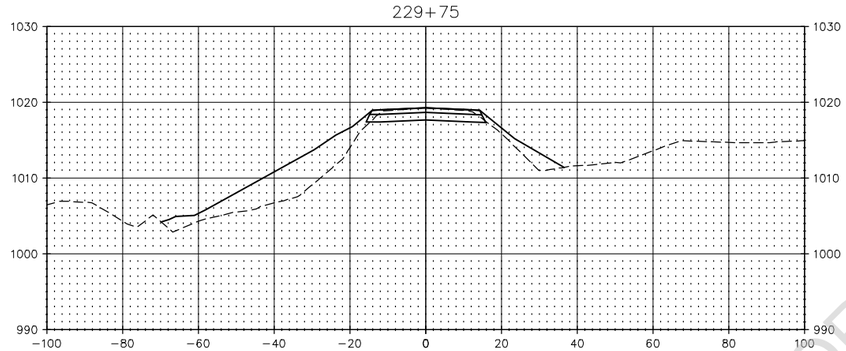

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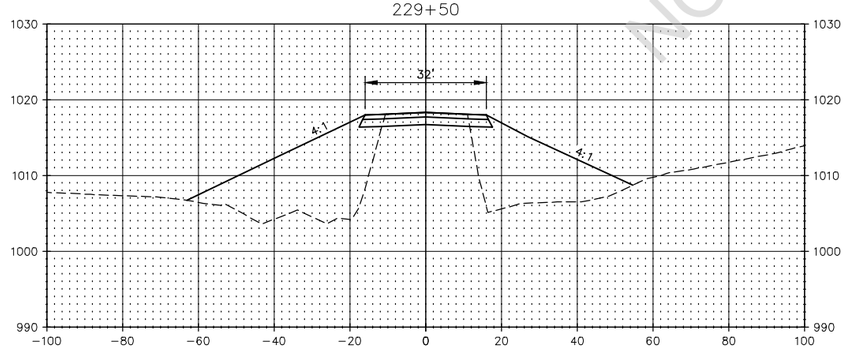

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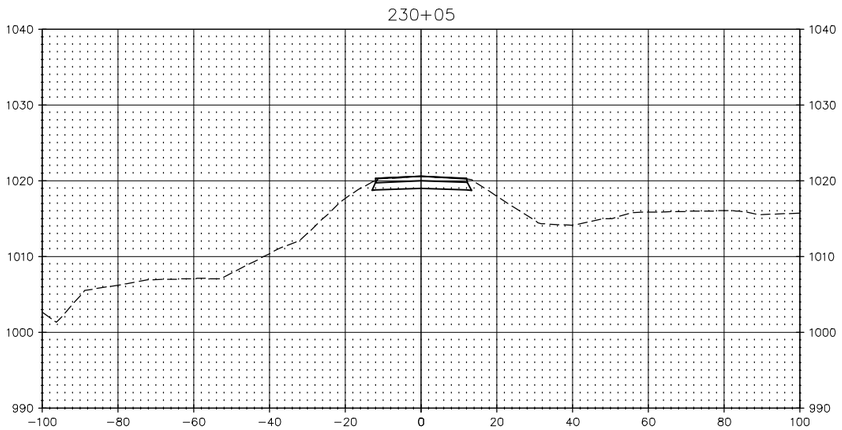
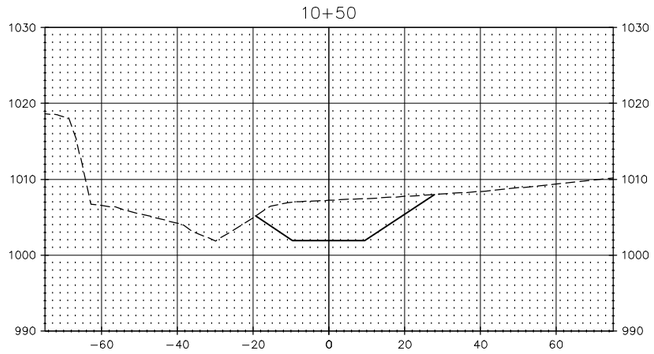
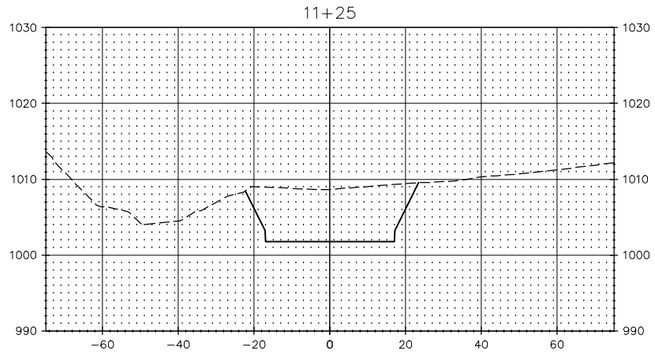
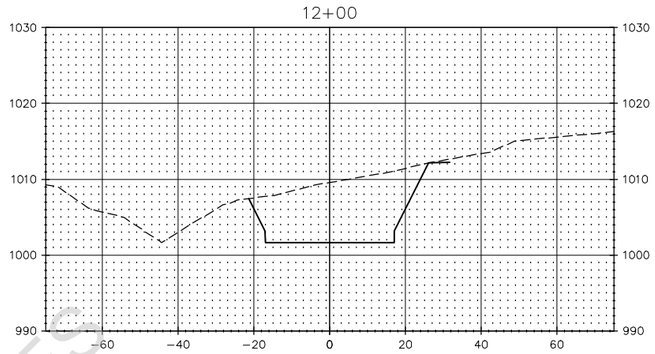


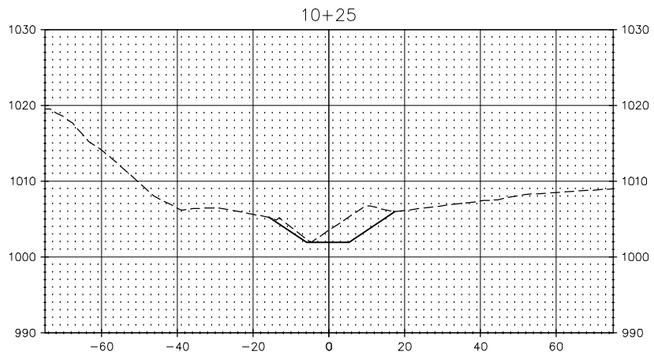
CASS COUNTY
HIGHWAY DEPARTMENT
UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9−113−28.1
COUNTY HIGHWAY 7
CROSS SECTIONS
PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

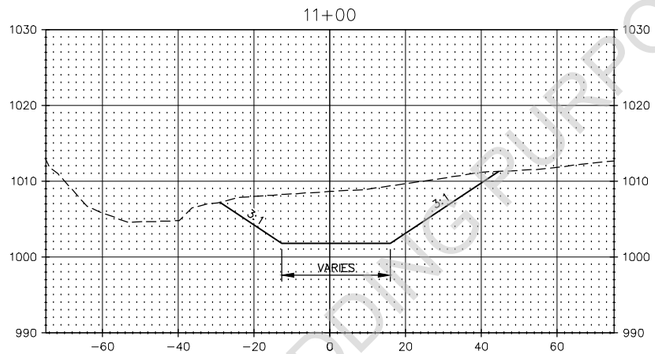
PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	200	3

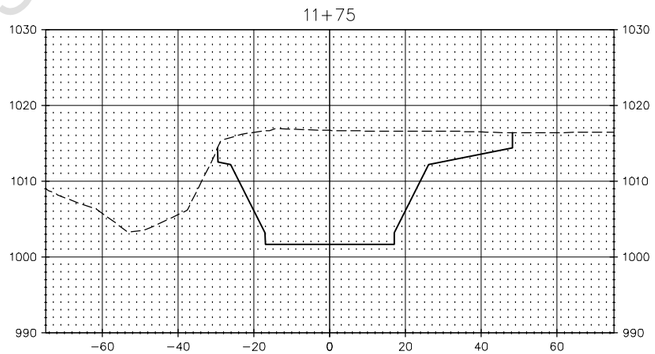


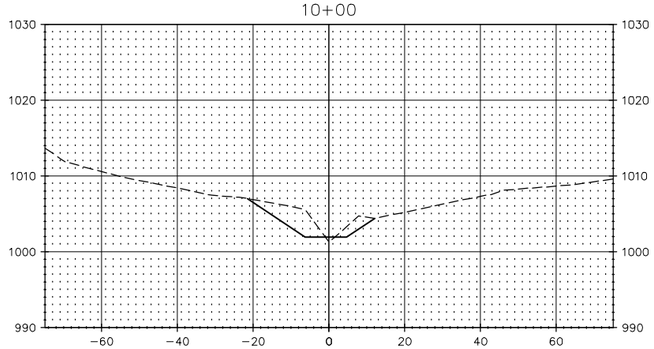


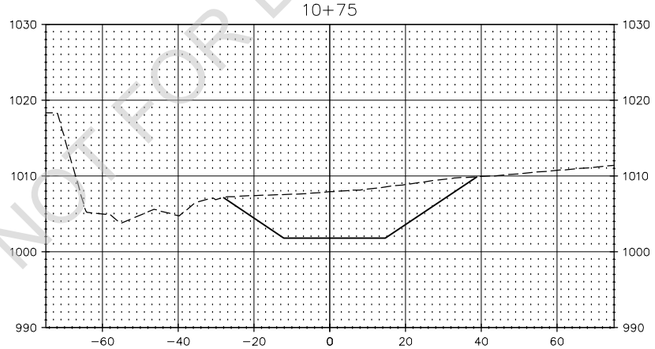












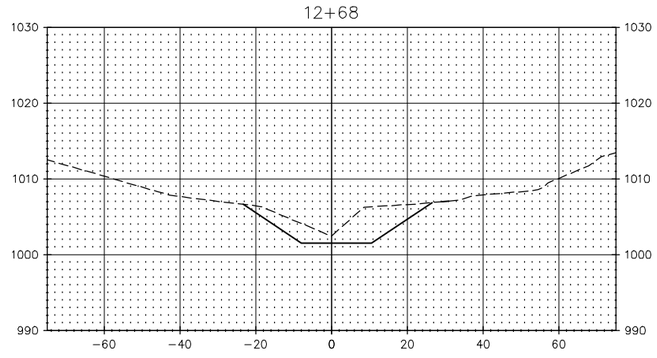
CASS COUNTY
HIGHWAY DEPARTMENT

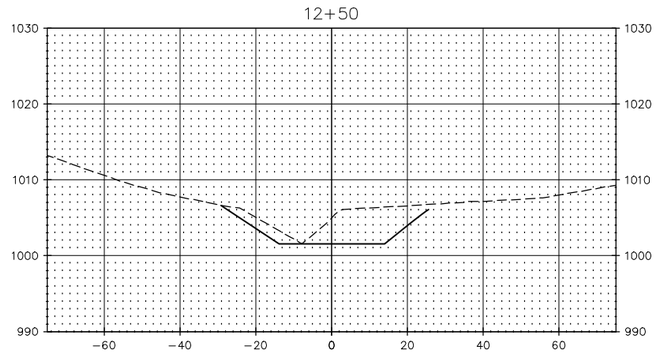
UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9−113−28.1

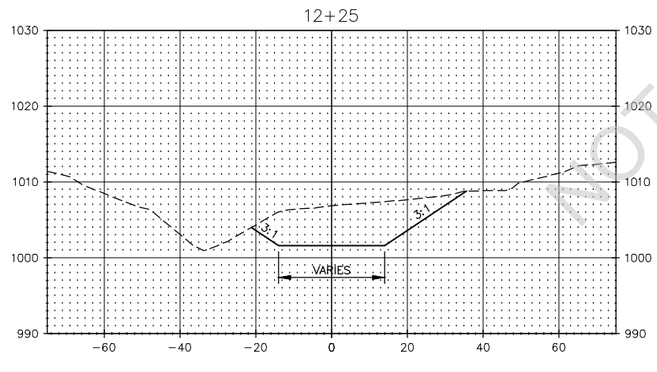
CHANNEL CROSS SECTIONS

PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

PROJECT NO.	SECTION NO.	SHEET NO.
CB1205	200	4







CASS COUNTY
HIGHWAY DEPARTMENT

UNNAMED TRIBUTARY OF
THE BUFFALO CREEK
BRIDGE NO. 9−113−28.1

CHANNEL
CROSS SECTIONS

PROJECT NO. CB1205
COUNTY HIGHWAY NO. 7
NORTH OF EMBDEN
CASS COUNTY

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
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
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
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
F Bcn	flashing beacon
FA	flight auger sample
FL	flow line

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-20-2

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
PT	point of tangent
POC	point on curve
POT	point on tangent

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT ABBREVIATIONS

D-20-3

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
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
W	West
WB	Westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner
WGS	World Geodetic System
Z	zenith

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NDDOT UTILITY COMPANY 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
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	
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DATE	CHANGE
04-20-11	Added Items

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Line Styles

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
Geotextile Fabric Type D
Existing Electrical
Existing Fiber Optic Line
Existing TV Fiber Optic
Existing Gas Pipe
Geogrid
Existing Overhead Utility Line
Existing Power
Existing Fuel Pipeline
Existing Undefined Above Ground Pipe Line
Geotextile Fabric Type R
Geotextile Fabric Type R1
Remove Line
Geotextile Fabric Type RR
Geotextile Fabric Type S

Floating Silt Curtain
Existing Telephone Line
Existing TV Line
Existing Assumed Ground (Not Surveyed)
Tentative Ground Line
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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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

- 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

- 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
- Continuous Split Barrel Sample (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

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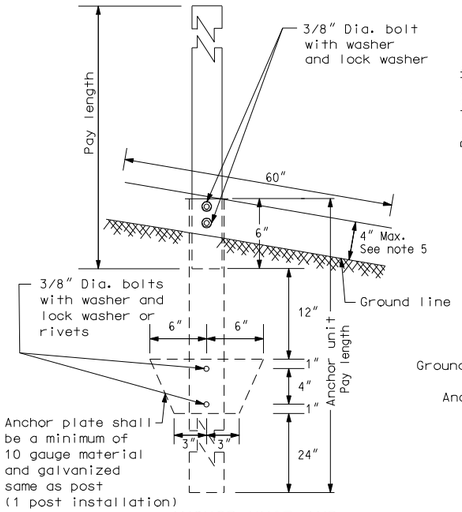
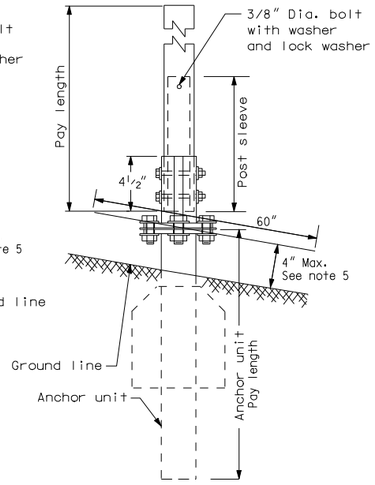
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

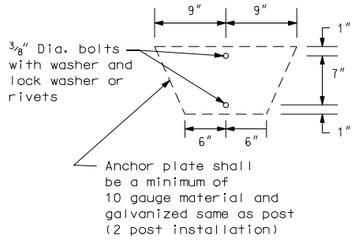
D-704-7

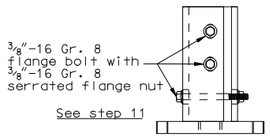


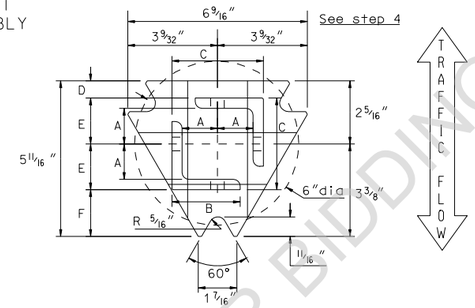
ANCHOR UNIT AND POST ASSEMBLY



SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY





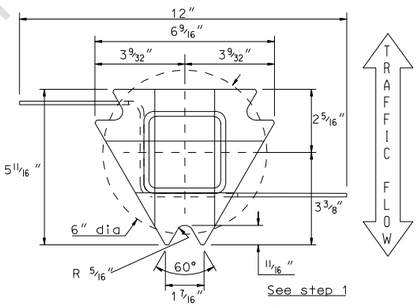


TOP POST RECEIVER

Materials: Plate - ASTM A572 grade 50
Angle receiver - $2\frac{1}{2}$" x $2\frac{1}{2}$" x $\frac{3}{8}$" ASTM A36 structural angle

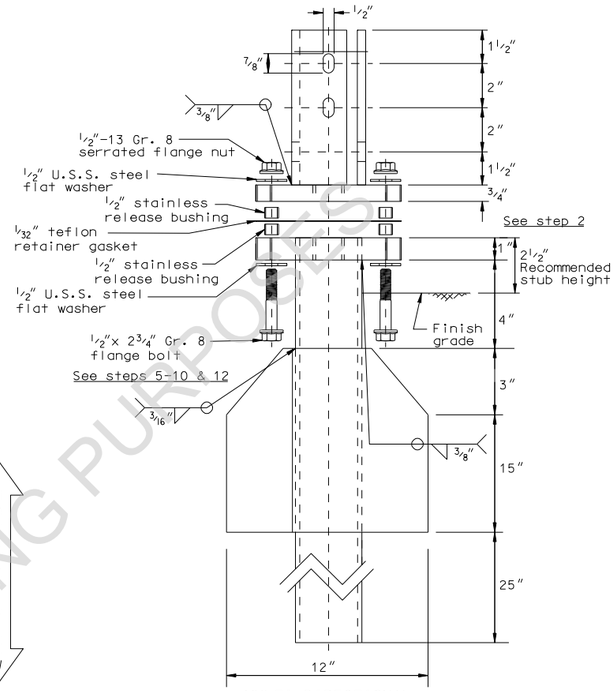
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
$2\frac{3}{16}$" x 10 Ga. Square Post	$1\frac{9}{64}$"	$2\frac{1}{2}$"	$3\frac{1}{32}$"	$\frac{25}{32}$"	$1\frac{33}{64}$"	$1\frac{7}{8}$"
$2\frac{1}{2}$" x 10 Ga. Square Post	$1\frac{9}{32}$"	$2\frac{1}{2}$"	$3\frac{5}{16}$"	$\frac{5}{8}$"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

$2\frac{3}{16}$" x 10 gauge may be inserted into $2\frac{1}{2}$" x 10 gauge for additional wind load.

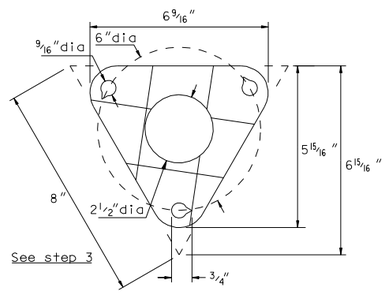


BOTTOM SOIL STUB

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



MULTI-DIRECTIONAL SLIP BASE ASSEMBLY



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon

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 $2\frac{1}{2}$" 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 $\frac{1}{2}$" flat washer on to 1 each inverted $\frac{1}{2}$"-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 $\frac{1}{2}$"-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 $\frac{3}{8}$"-16 gr. 8 flange bolts and 3 each $\frac{3}{8}$"-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 $\frac{1}{2}$"-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.

Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
2. The $2\frac{3}{16}$" size 10 gauge is shown as 2.19" size on the plans. The $2\frac{1}{2}$" size 10 gauge is shown as 2.51" size on the plans.
3. Anchor for 2", $2\frac{1}{4}$", and $2\frac{1}{2}$" 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.

Telescoping Perforated Tube						
Number of Posts	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	$2\frac{1}{4}$
1	$2\frac{1}{4}$	12			No	$2\frac{1}{2}$
1	$2\frac{1}{2}$	12			B	3
1	$2\frac{1}{2}$	10			Yes	
1	$2\frac{1}{4}$	12	2	12	Yes	
1	$2\frac{1}{2}$	12	$2\frac{1}{4}$	12	Yes	
2	2	12			No	$2\frac{1}{4}$
2	$2\frac{1}{4}$	12			No	$2\frac{1}{2}$
2	$2\frac{1}{2}$	12			Yes	
2	$2\frac{1}{2}$	10			Yes	
2	$2\frac{1}{4}$	12	2	12	Yes	
2	$2\frac{1}{2}$	12	$2\frac{1}{4}$	12	Yes	
3 & 4	$2\frac{1}{2}$	12			Yes	
3 & 4	$2\frac{1}{2}$	10			Yes	
3 & 4	$2\frac{1}{2}$	12	$2\frac{1}{4}$	12	Yes	
3 & 4	$2\frac{1}{4}$	12	2	12	Yes	
3 & 4	$2\frac{1}{2}$	10	$2\frac{3}{16}$	10	Yes	

B - The $2\frac{1}{2}$", 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.

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 $In.^3$
$1\frac{1}{2}$ x $1\frac{1}{2}$	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
$2\frac{1}{4}$ x $2\frac{1}{4}$	0.105	12	2.773	0.561	0.695	0.499
$2\frac{3}{16}$ x $2\frac{3}{16}$	0.135	10	3.432	0.605	0.841	0.590
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.105	12	3.141	0.804	0.803	0.643
$2\frac{1}{2}$ x $2\frac{1}{2}$	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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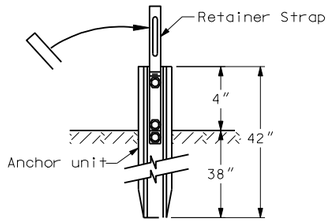
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

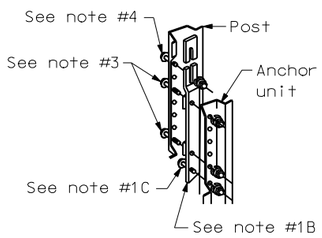
FLANGED CHANNEL



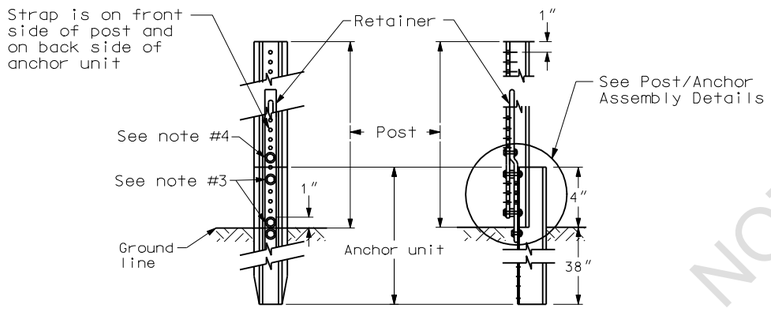
Anchor Unit &
Strap Assembly Detail

STEPS OF INSTALLATION

1. A) Drive anchor unit to within 12″ of ground level.
   B) Proper assembly established by lining up the top 3/4″ slot of retainer spacer strap with top hole of anchor unit.
   C) Assemble strap to back of anchor unit using 3/8″-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 3/8″-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 3/4″ slot in the strap).
   B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8″-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.

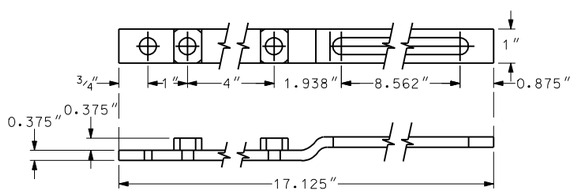


Post/Anchor
Assembly Details



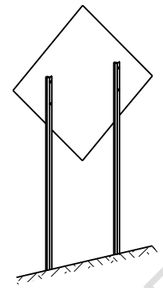
Front View Side View

Sign Post Assembly Detail

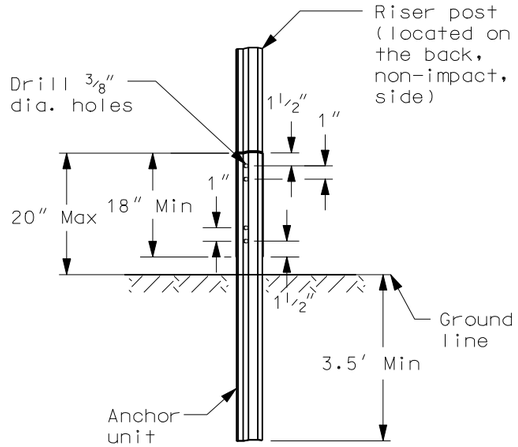


Retainer/Spacer Strap Detail

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



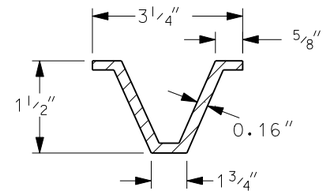
Typical
Installation



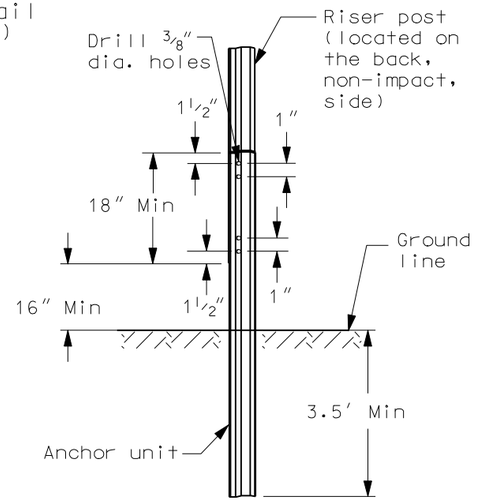
U-Channel Splice
Option 1

3 LB/FT U POSTS

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 5/16″ 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

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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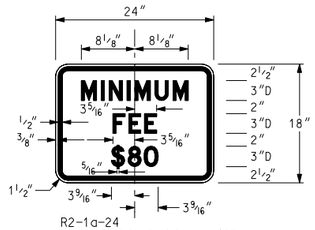
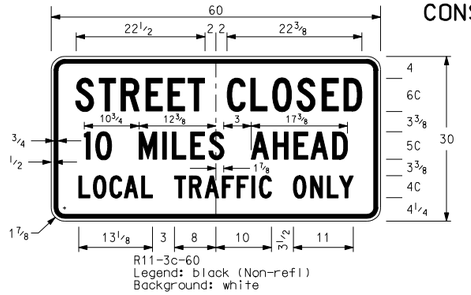
CONSTRUCTION SIGN DETAILS

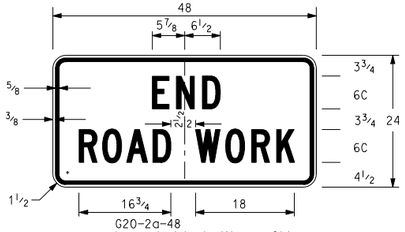
D-704-9



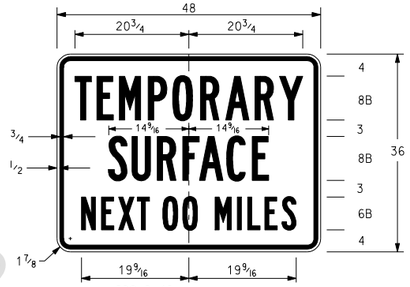
R2-1a-24
Legend: black (Non-refl)
Background: white



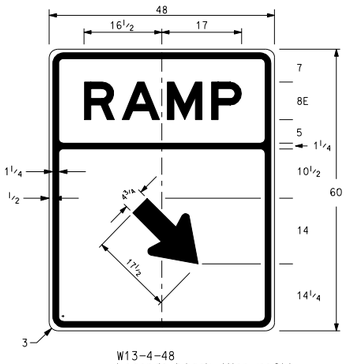
R11-3c-60
Legend: black (Non-refl)
Background: white



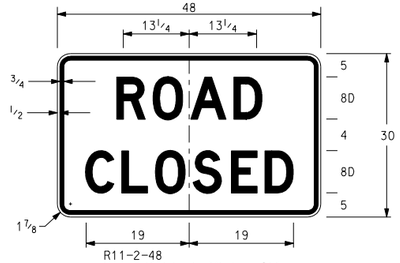
G20-2a-48
Legend: black (Non-refl)
Background: orange



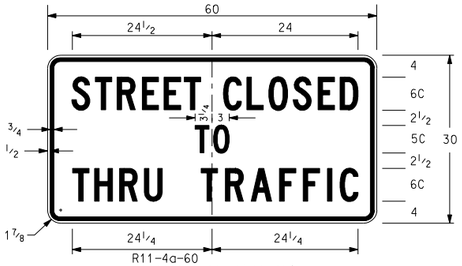
G20-8-48
Legend: black (Non-refl)
Background: orange



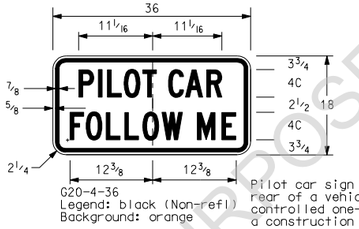
W13-4-48
Legend: black (Non-refl)
Background: orange



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



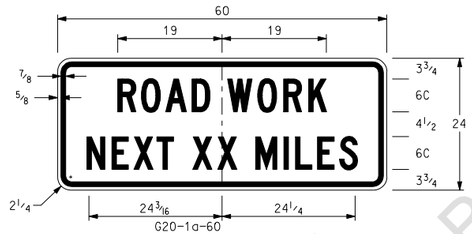
R11-4a-60
Legend: black (Non-refl)
Background: white



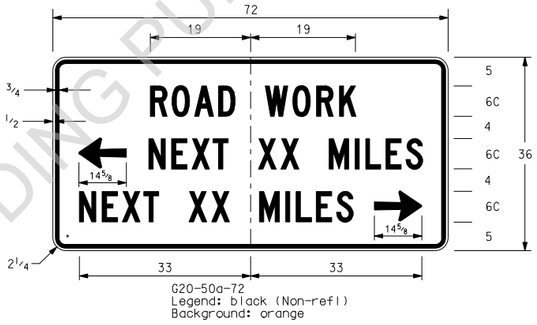
G20-4-36
Legend: black (Non-refl)
Background: orange

Pilot car sign shall be mounted on rear of a vehicle used for guiding controlled one-way traffic through a construction area.

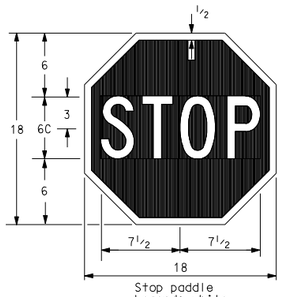
R11-2a-48
Legend: black (Non-refl)
Background: white



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

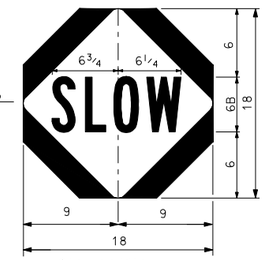


G20-50a-72
Legend: black (Non-refl)
Background: orange

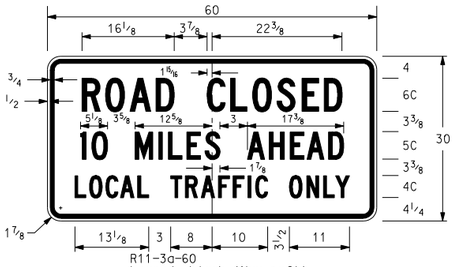


Stop paddle
Legend: white
Background: red
Flag person paddle

Back to Back

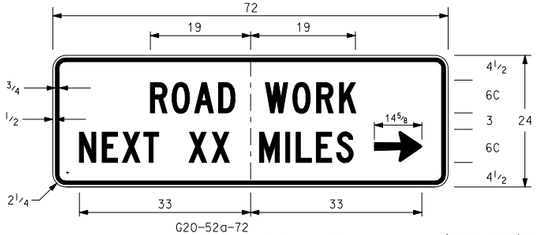


Slow paddle
Legend: black (Non-refl)
Background: orange
Flag person paddle



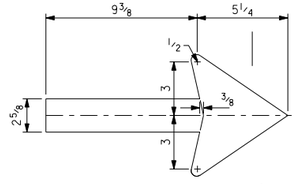
R11-3a-60
Legend: black (Non-refl)
Background: white

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

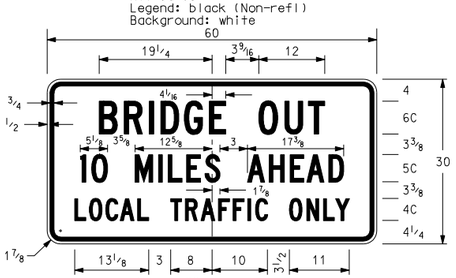


G20-52a-72
Legend: black (Non-refl)
Background: orange

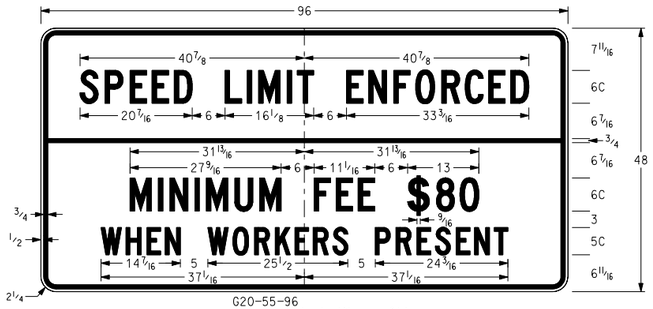
Arrow may be right or left of legend to indicate construction to the right or left.



Arrow detail for sign no's.
G20-50a-72 & G20-52a-72



R11-3b-60
Legend: black (Non-refl)
Background: white



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

G20-54-48
Legend: black (Non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revision
07-26-95	Added signs G20-1a, G20-50a, R2-1a
03-04-96	Remove G20-2-60
10-18-01	G20-1b-60
01-30-03	Pavement end sign
07-25-04	Revised Fee Sign
04-01-04	Revised G20-55-96 sign
08-04-04	Deleted W8-3-48, Added Slow paddle
12-01-04	PE stamp added
07-11-05	Revised G20-4

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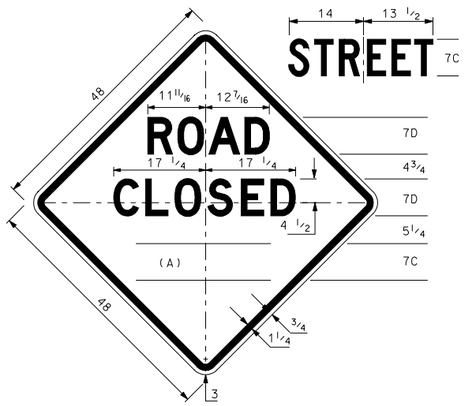
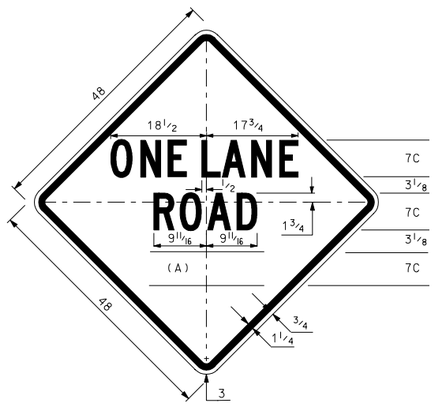
CONSTRUCTION SIGN DETAIL

D-704-11



W20-3-48
Legend: black
(Non-refl)
Background: orange



W20-4-48
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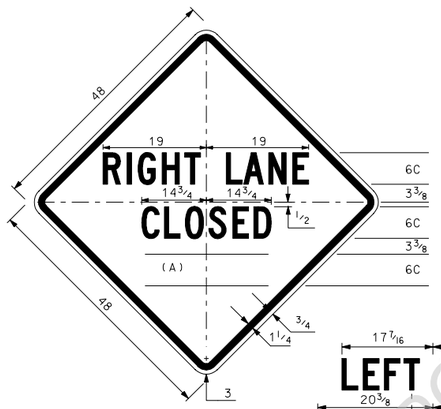
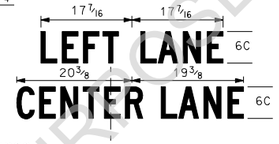
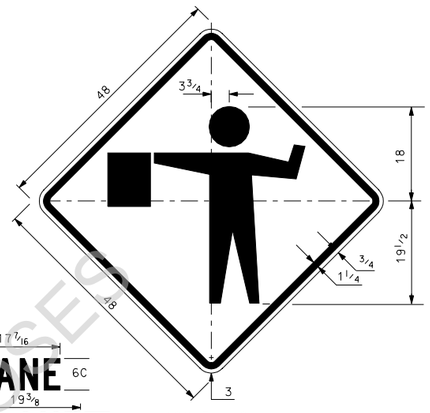
(Non-refl)
Background: orange



W20-5-48
Legend: black
(Non-refl)
Background: orange





W20-7a-48
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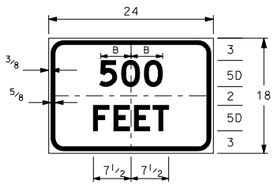
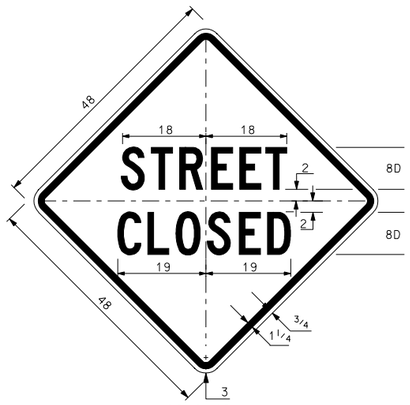
(Non-refl)
Background: orange



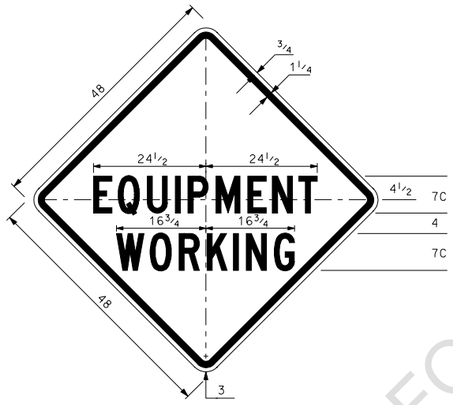
W20-7k-24
Legend: black
(Non-refl)
Background: orange

SIGN	DIMENSION B (INCHES)
500'	6
1000'	7 3/8
1500'	7 3/8

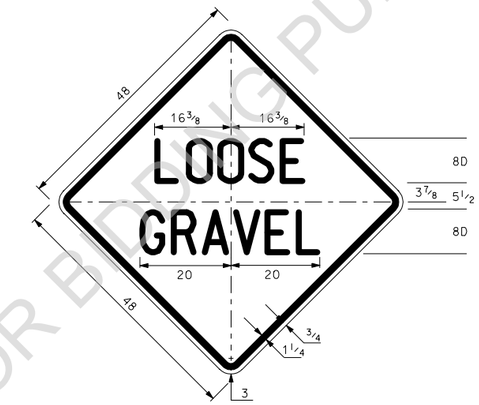
For use with
W20-7a-48 &
W21-1a-48



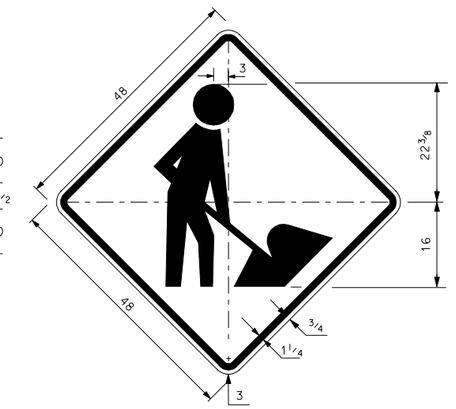
W20-8-48
Legend: black
(Non-refl)
Background: orange



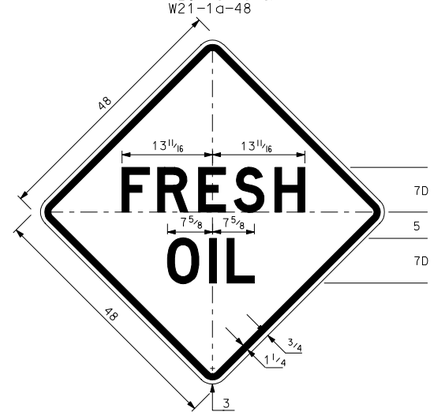
W20-51-48
Legend: black
(Non-refl)
Background: orange



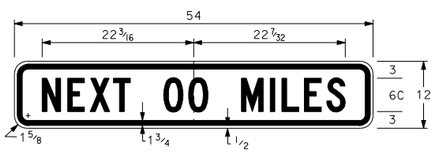
W8-7-48
Legend: black
(Non-refl)
Background: orange



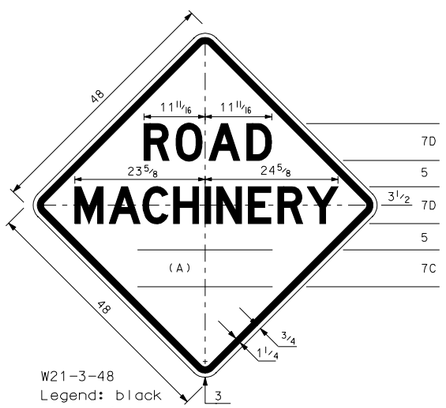
W21-1a-48
Legend: black
(Non-refl)
Background: orange



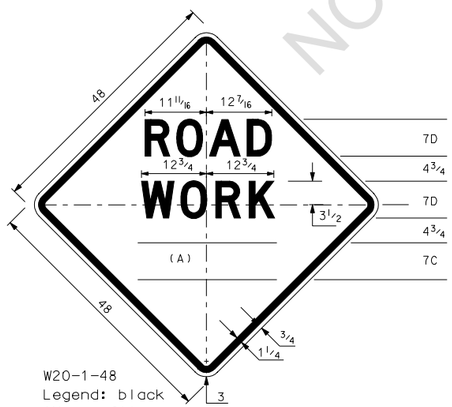
W21-2-48
Legend: black
(Non-refl)
Background: orange



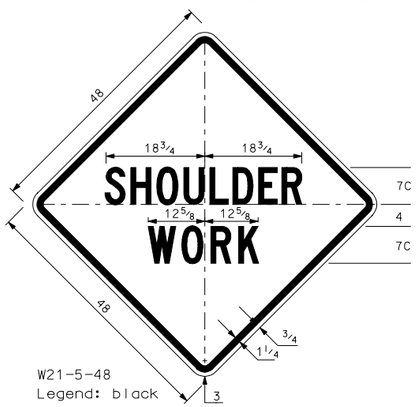
W20-52-54
Legend: black
(Non-refl)
Background: orange



W21-3-48
Legend: black
(Non-refl)
Background: orange



W20-1-48
Legend: black
(Non-refl)
Background: orange



W21-5-48
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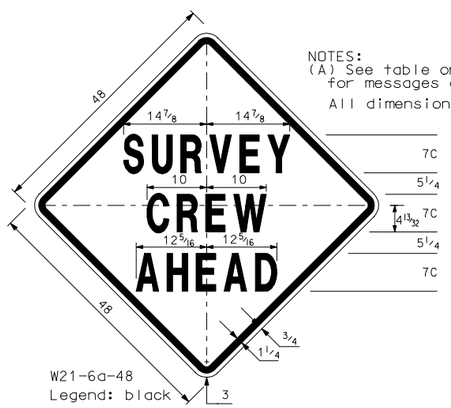
(Non-refl)
Background: orange



W21-6a-48
Legend: black
(Non-refl)
Background: orange

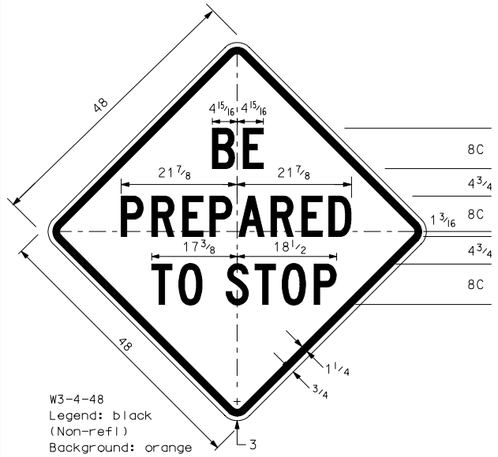
NOTES:
(A) See table on standard D-704-12 for messages and dimensions.
All dimensions are in inches

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revisions
06-09-95	Chg 7D to 7C(Dwg W20-3, W21-3 & W21-4
05-26-98	Add W7-7-48
11-06-00	Rev W20-52-54
01-25-01	W21-6a-48
07-25-03	Rev W21-4 to W20-1
08-05-04	General revisions
12-01-04	PE stamp added
07-11-05	Revised W21-3, W20-1, W20-7a, W21-1a and W20-7k

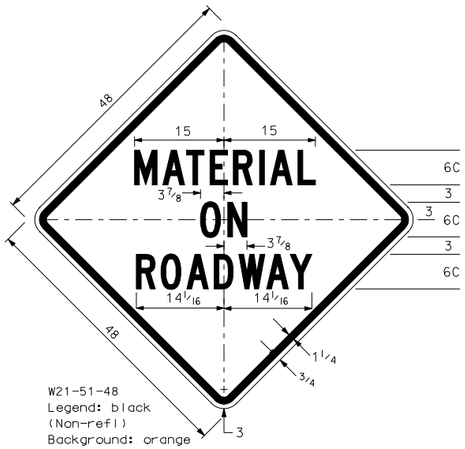
This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 07/11/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAIL

D-704-12



W3-4-48
Legend: black
(Non-refl)
Background: orange



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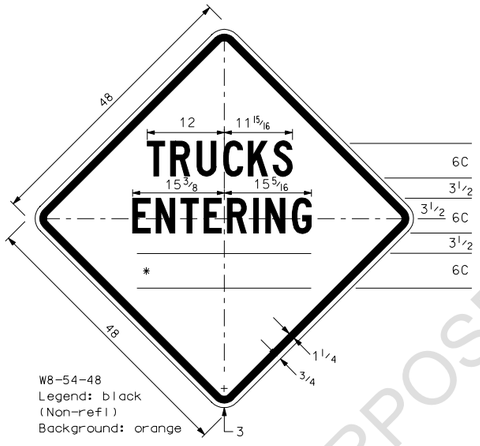

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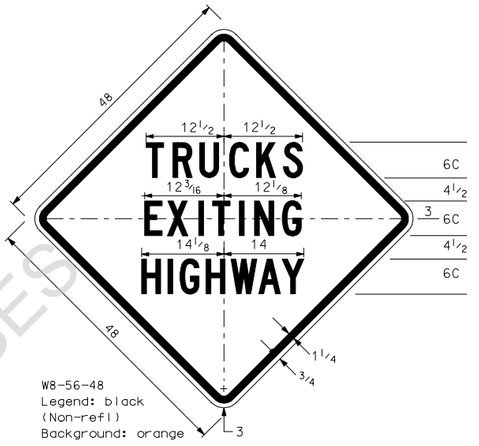

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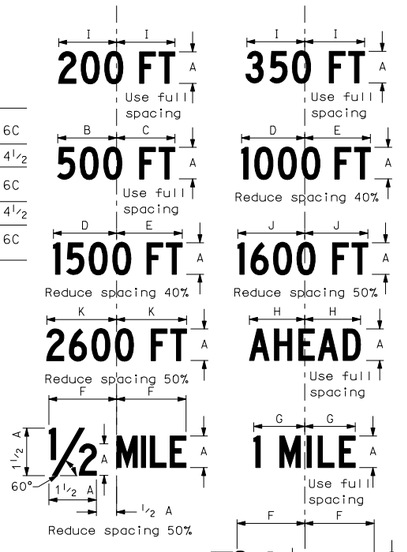

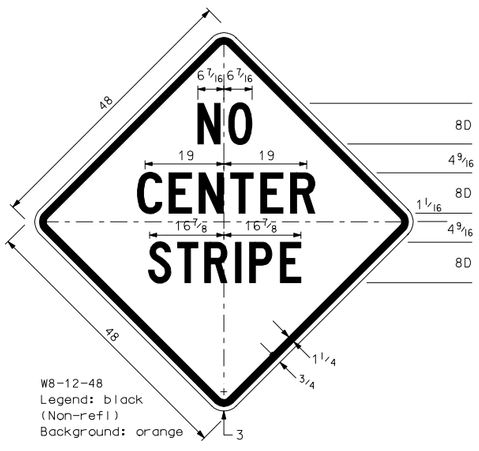

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(Non-refl)
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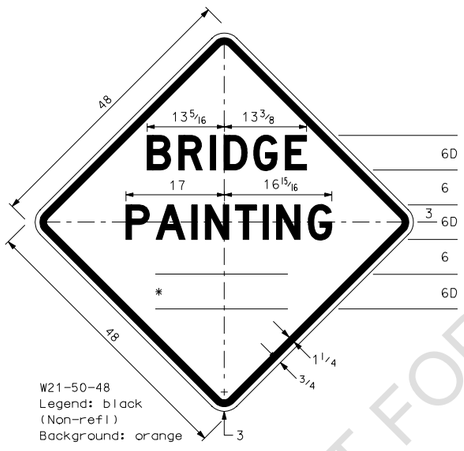

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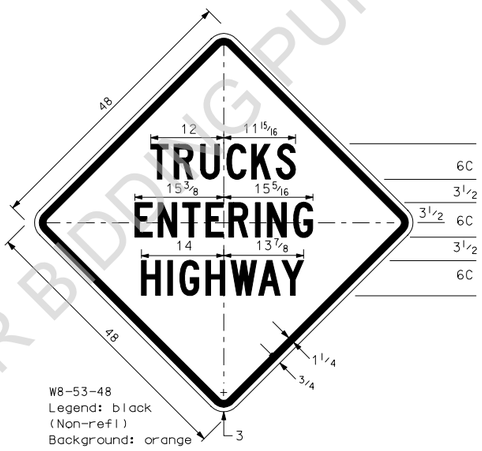

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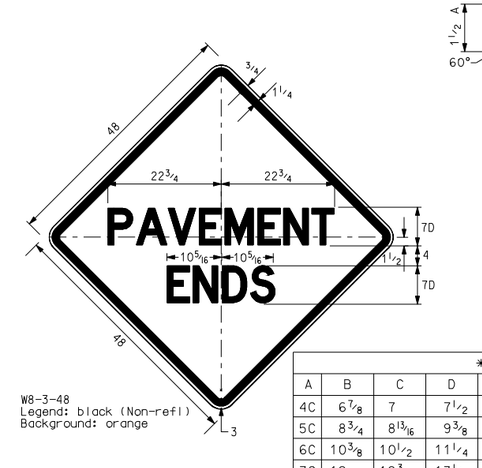

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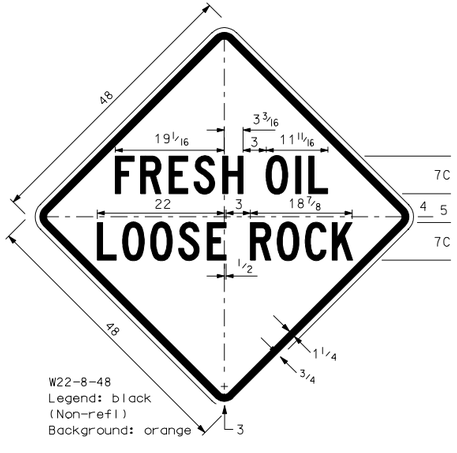
Background: orange



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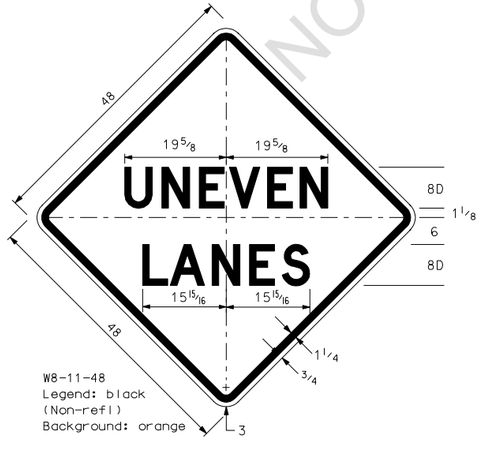

W8-11-48
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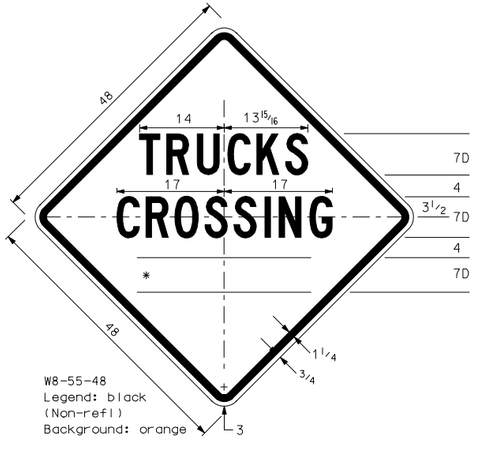
(Non-refl)
Background: orange



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

* DIMENSIONS (INCHES)										
A	B	C	D	E	F	G	H	I	J	K
4C	6 7/8	7	7 1/2	8	8 5/16	6 1/16	7	8 5/16	9 1/8	9 3/4
5C	8 3/4	8 13/16	9 3/8	10	10 7/16	7 5/8	8 3/4	10 7/16	11 7/16	12 3/16
6C	10 3/8	10 1/2	11 1/4	12	12 1/2	9 1/8	10 1/2	12 1/2	13 3/4	14 5/8
7C	12	12 3/16	13 1/8	14	14 9/16	10 5/8	12 1/4	14 9/16	15	15 5/8
8C	13 3/4	14	15	16	16 5/8	12 1/8	14	16 3/4	18 1/4	19 1/2
4D	8 1/8	8 5/8	8 1/2	9	9	7 3/16	8 11/16	9 3/4	10 3/4	11 3/8
5D	10 3/16	10 13/16	11 5/8	11 1/4	11 1/4	9 1/2	10 7/8	12 1/8	13 1/4	14 1/4
6D	12 3/16	12 15/16	12 3/4	13 1/2	13 1/2	11 13/16	13 1/8	14 9/16	14 7/8	15 1/2
7D	14 1/4	15 1/8	14 7/8	15 3/4	15 3/4	13 1/16	15 1/2	15 1/8	15 1/2	16 7/8
8D	16 1/4	17 1/4	17	18	18	14 3/8	17 7/16	19 1/4	17 3/4	19 5/16

Standard signs that are shown in the construction sign and barricade location details shall be fabricated in the shape, color, and dimensions as shown in the standard signs layout booklet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
12-01-88	Uneven pavement
05-01-92	General revisions
01-24-95	W8-12-48
02-03-95	W8-11-48
06-15-95	General revisions
05-19-98	Added ¾ mile
05-26-99	Added W8-56-48
08-05-04	Deleted slow paddle added W8-3-48
12-01-04	PE stamp added
07-11-05	Changed W20-7b to W3-4, Revised W8-11 and W8-12

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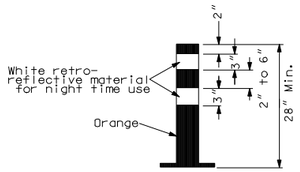
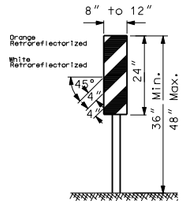
BARRICADE DETAILS AND CHANNELIZING DEVICES



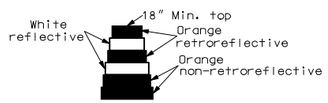
TUBULAR MARKER



VERTICAL PANEL

(Retroreflective sheeting shall be placed on both sides)

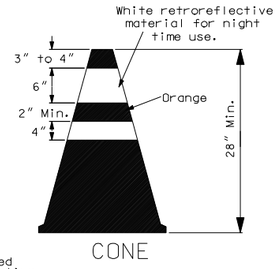
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"



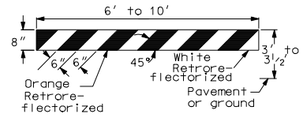
DELINEATOR DRUM

36" Min. height

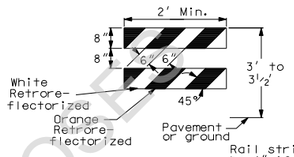
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflectorized sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall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



CONE

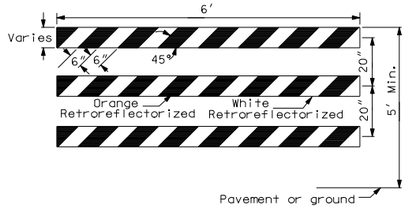


TYPE I BARRICADE



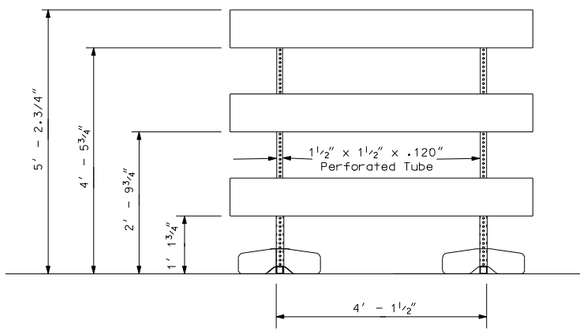
Rail stripe width shall be 4" if barricade length is less than 36".

TYPE II BARRICADE

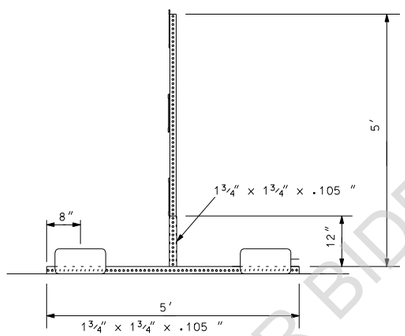


TYPE III BARRICADE

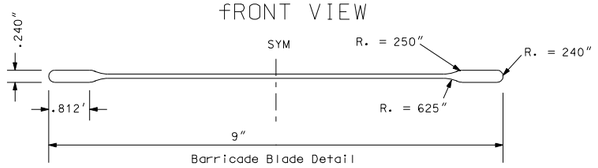
BARRICADES:
Number of retroreflectorized rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III- 6 (Three in each direction)



fRONT VIEW



END VIEW



Barricade Blade Detail

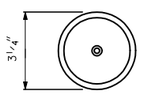
Ballast = 45lb sandbag at the end of each leg.

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

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

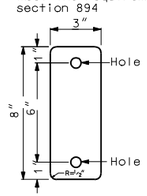
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

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



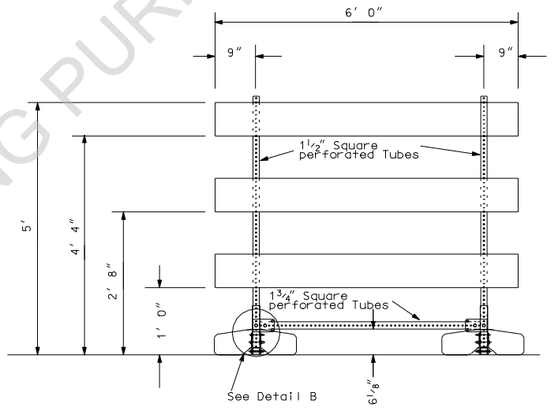
ACRYLIC PLASTIC REFLECTOR

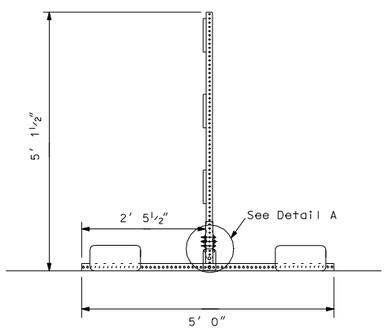
Delineator reflector shall meet the requirements of section 894

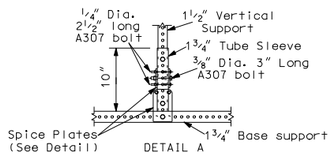


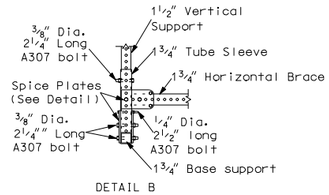
DELINEATOR REFLECTOR

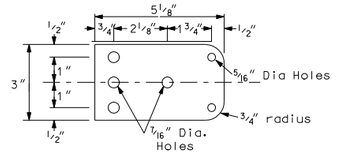
3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retroreflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.











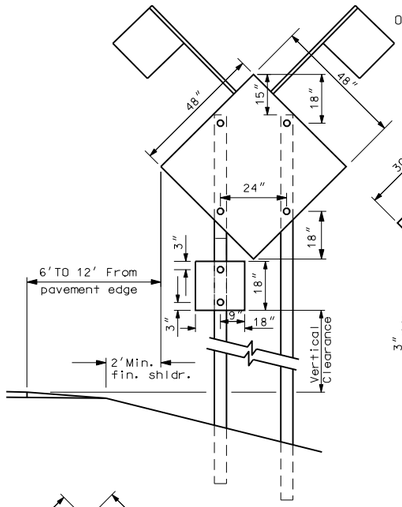
SPLICE PLATE

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

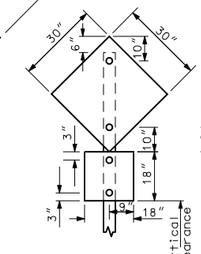
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details
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

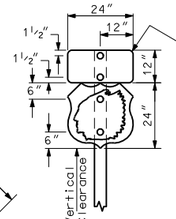
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



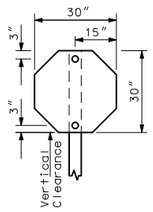
POST MOUNTING
48"x48" Signs



POST MOUNTING
30"x30" Signs

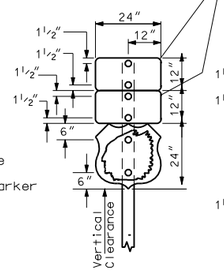


POST MOUNTING
Assemblies with one cardinal direction sign & one route marker

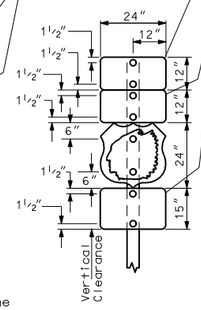


POST MOUNTING
Sign R1-1-30

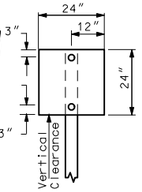
See note 7



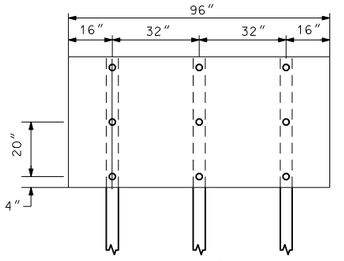
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign & one route marker



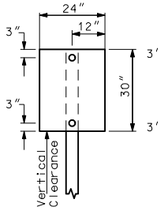
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign, one route marker & one directional arrow.



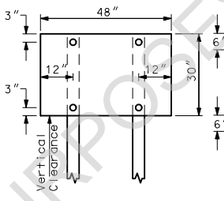
POST MOUNTING
24"x24" Signs



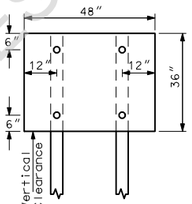
POST MOUNTING
48"x96" Signs



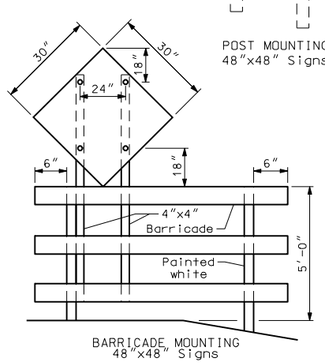
POST MOUNTING
24"x30" Signs



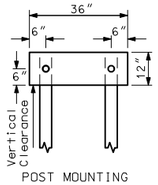
POST MOUNTING
48"x30" Signs



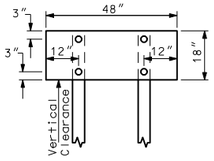
POST MOUNTING
48"x36" Signs



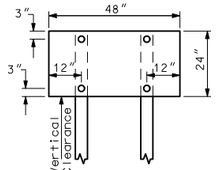
BARRICADE MOUNTING
48"x48" Signs



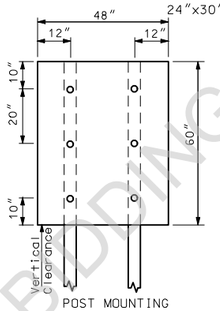
POST MOUNTING
36"x12" Signs



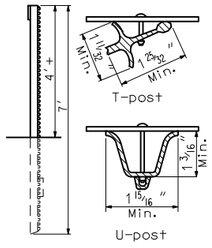
POST MOUNTING
48"x18" Signs



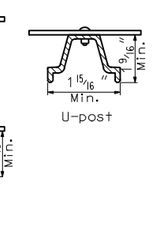
POST MOUNTING
48"x24" Signs

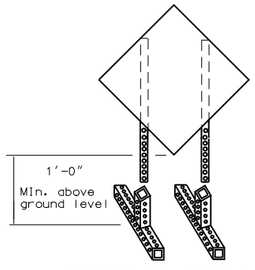


POST MOUNTING
48"x60" Signs

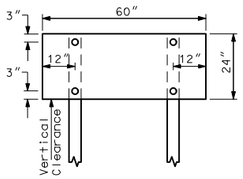


DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS

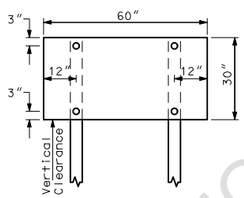




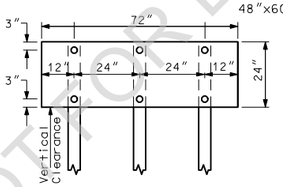
PORTABLE SIGN MOUNTING



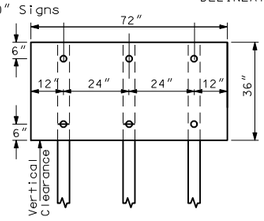
POST MOUNTING
60"x24" Signs



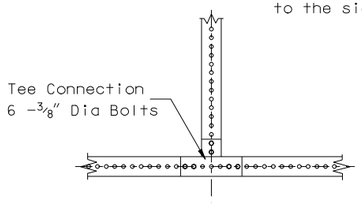
POST MOUNTING
60"x30" Signs



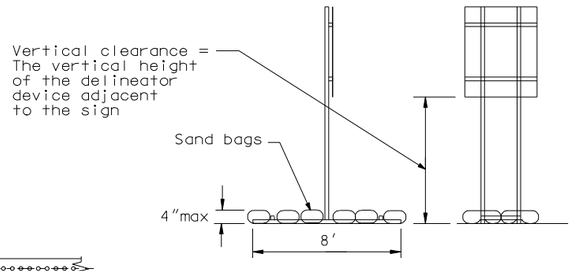
POST MOUNTING
72"x24" Signs



POST MOUNTING
72"x36" Signs

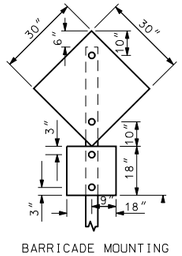


Post to Ground Support Connection

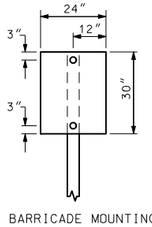


Post sizes shall be 2 1/4" perforated tube

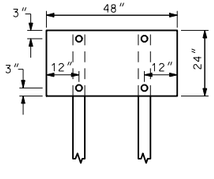
SKID MOUNTED SIGNS



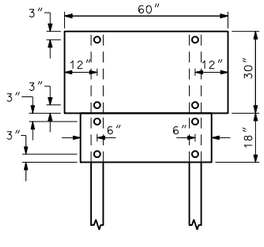
BARRICADE MOUNTING
30"x30" Signs



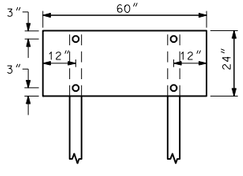
BARRICADE MOUNTING
24"x30" Signs



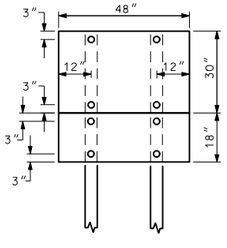
BARRICADE MOUNTING
48"x24" Signs



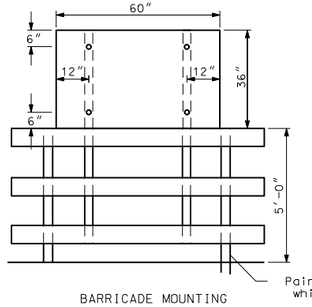
BARRICADE MOUNTING
60"x30" & 48"x18" Signs



BARRICADE MOUNTING
60"x24" Signs



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



BARRICADE MOUNTING
G20-1-60 Signs

NOTES:

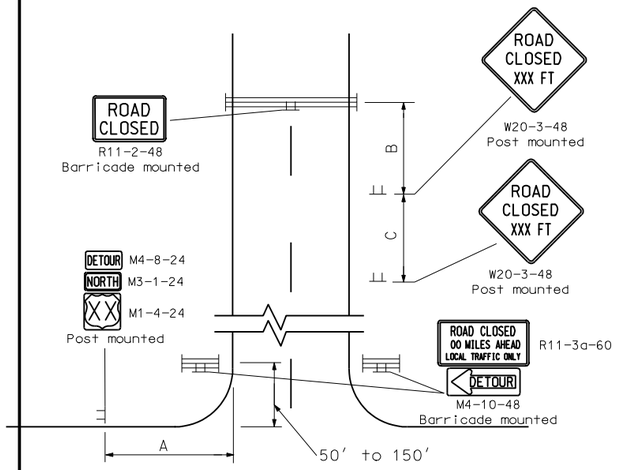
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and 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, 1/2" 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.

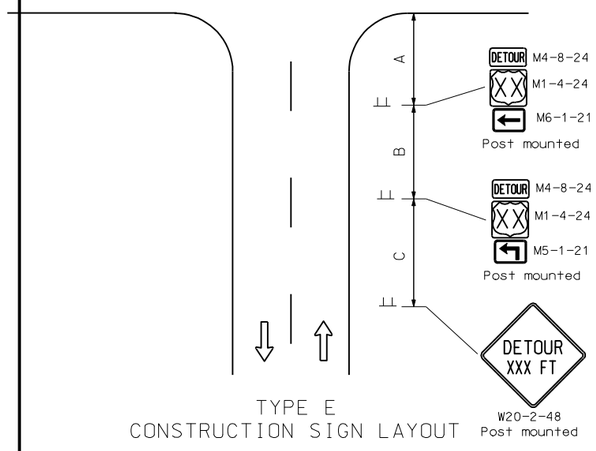
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-88	Sign assembly
05-01-92	Sign assembly
03-30-93	Sign supports note
03-04-96	Sign height
08-15-96	Note 8
07-10-97	Note revision
07-31-98	Note & portable sign
10-01-99	Skid mounted sign
02-07-03	Vertical clearance note
11-30-04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

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

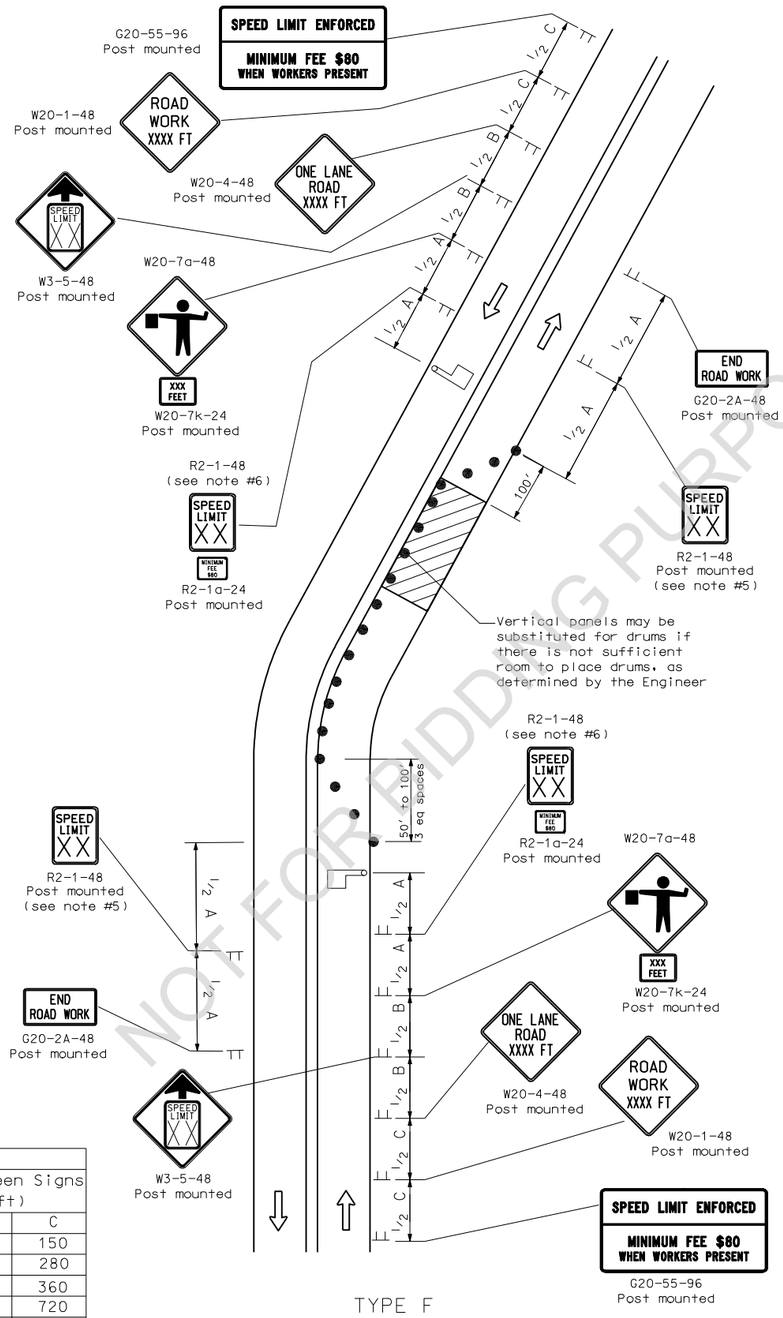
D-704-19





TYPE E
CONSTRUCTION SIGN LAYOUT

Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.



TYPE F
CONSTRUCTION SIGN LAYOUT

Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

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

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
3. Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
7. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
12. G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used.

KEY

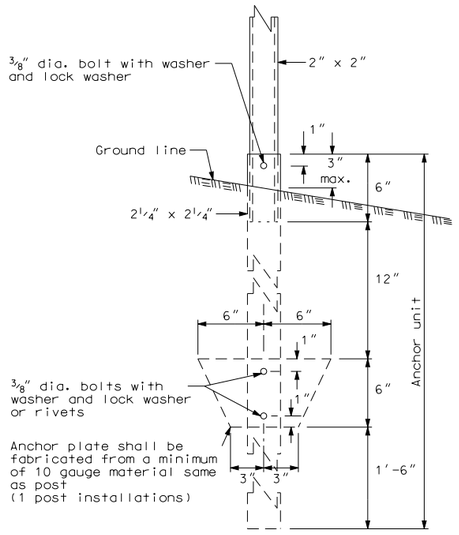
Delineator Drum	Type I Barricade	Flagger
Type A Delineator	Type II Barricade	Sequencing Arrow Panel
Sign	Type III Barricade	Work/Hazard Area
Cone		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
07-19-02	Reversed End Road Work & Speed Limit Signs
07-25-03	Revised R2-1a and W20-1
01-16-04	Revised type F
04-01-04	Revised fee sign & Warning sign spacing. Rev. note 6. add note 12
12-01-04	PE stamp added
06-29-05	Added W3-5 to type F. Rev. Adv. Warning Table. Rev. Note 6
04-05-06	Showed signing for opposite direction
02-16-07	Added W3-5-48 to opposite direction of Type F layout

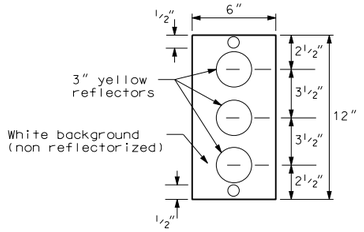
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on02/16/2007and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS

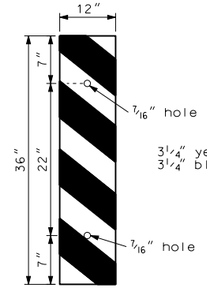
D-754-82



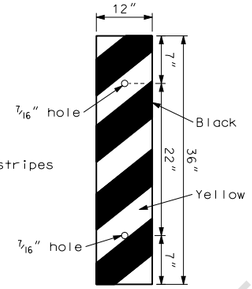
ANCHOR UNIT AND
POST PERFORATED TUBE ASSEMBLY



OM2-1V 6" x 12"
Object marker
Type II

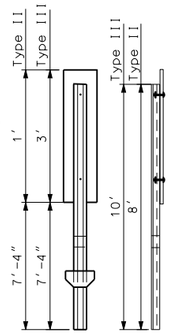


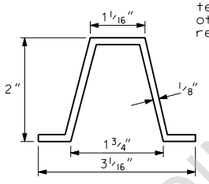
OM-3L Object marker left
12" x 36"
Type III



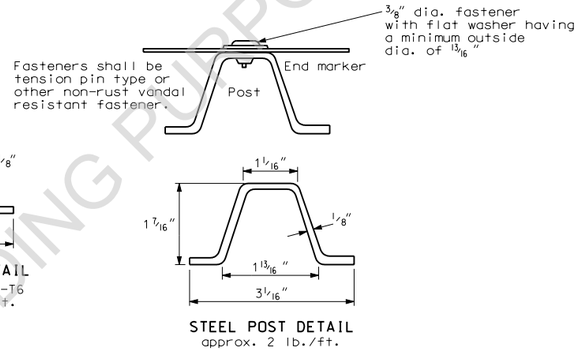
OM-3R Object marker right
12" x 36"
Type III

Bottom of marker to be a min. of 4' from ground line at marker.

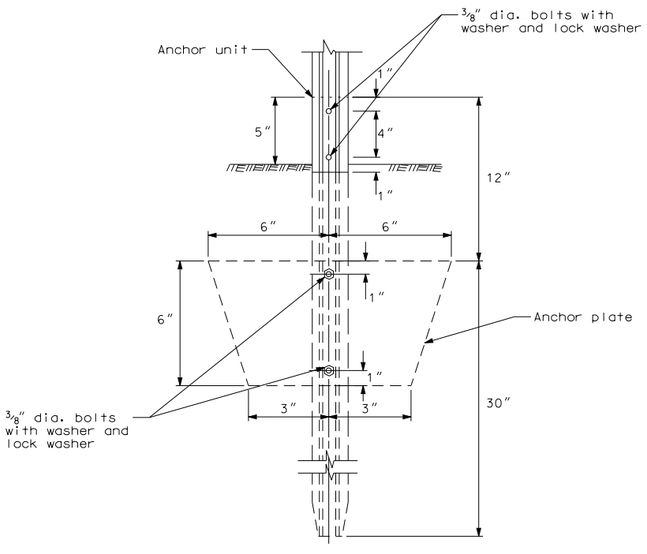




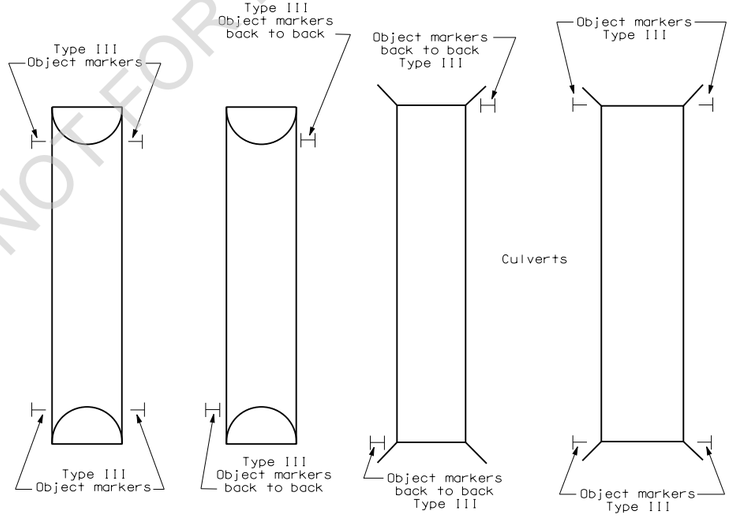
ALUMINUM POST DETAIL
Aluminum alloy 6061-T6
approx. 0.88 lb./ft.



STEEL POST DETAIL
approx. 2 lb./ft.



ANCHOR UNIT AND
POST ASSEMBLY
2# post or aluminum 0.88 lb./ft.

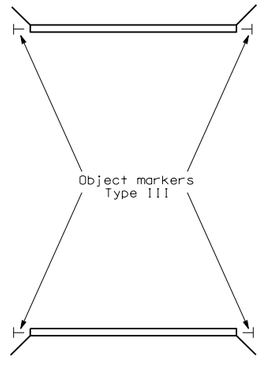


Pipe culverts
greater than 10'

Pipe culverts
10' max.

Box culverts
10' max.

Box culverts
greater than 10'



Bridges

Notes:

1. The white background shall be given two coats of enamel conforming to the requirement of the manufacturer. Sign faces shall be fabricated in conformance to the requirements of Section 754.03 of the Standard Specifications. The reflective sheeting shall be Type III conforming to the requirements of Section 894.02 of the Standard Specifications.
   The item object markers will be measured by the number of sign markers installed complete in place.
   Back to back mountings require two sign markers.
   The 3" yellow reflector shall conform to the requirements of Section 894.06 B.2 of the Standard Specifications.
   Object markers to be mounted vertically on steel posts in front of the bridge railing on each side of highway, to mark the horizontal clearance on all bridges where distance between wheel guards is les than approach width.
   All sign backing material shall be .100 inch sheet aluminum.
   All signs have reflectorized background unless shown otherwise on the plans. In no case is the color black reflectorized.
   In lieu of the white painted background of the Type II object marker, a Type II reflective sheet may be substituted.
2. Posts shall conform to Section 894.05 B of the Standard Specifications. Steel posts shall be galvanized in accordance with AASHTO M-183 and M-232.
3. County Roads: Counties may adjust placement height of object markers based on an engineering review. On low volume county roads, the height of object markers within 8' of the shoulder of the roadway may be as low as 1' measured from the surface of the nearest traffic lane to the bottom of the marker.
4. Object markers are not required if approach guardrail is installed with reflectors and end treatment with delineation.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-89	Type II hazard markers
10-25-89	Note change
09-30-91	Note change
07-08-03	Hazard to object markers
12-01-04	PE Stamp added
02-18-05	Added notes 3 & 4
04-23-07	Revised sign number for object markers

This document was originally issued and sealed by MARK S. GAYDOS Registration Number PE- 4518 , on 04/23/07 and the original document is stored at the North Dakota Department of Transportation