

JOB # 23
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	20296	1	1

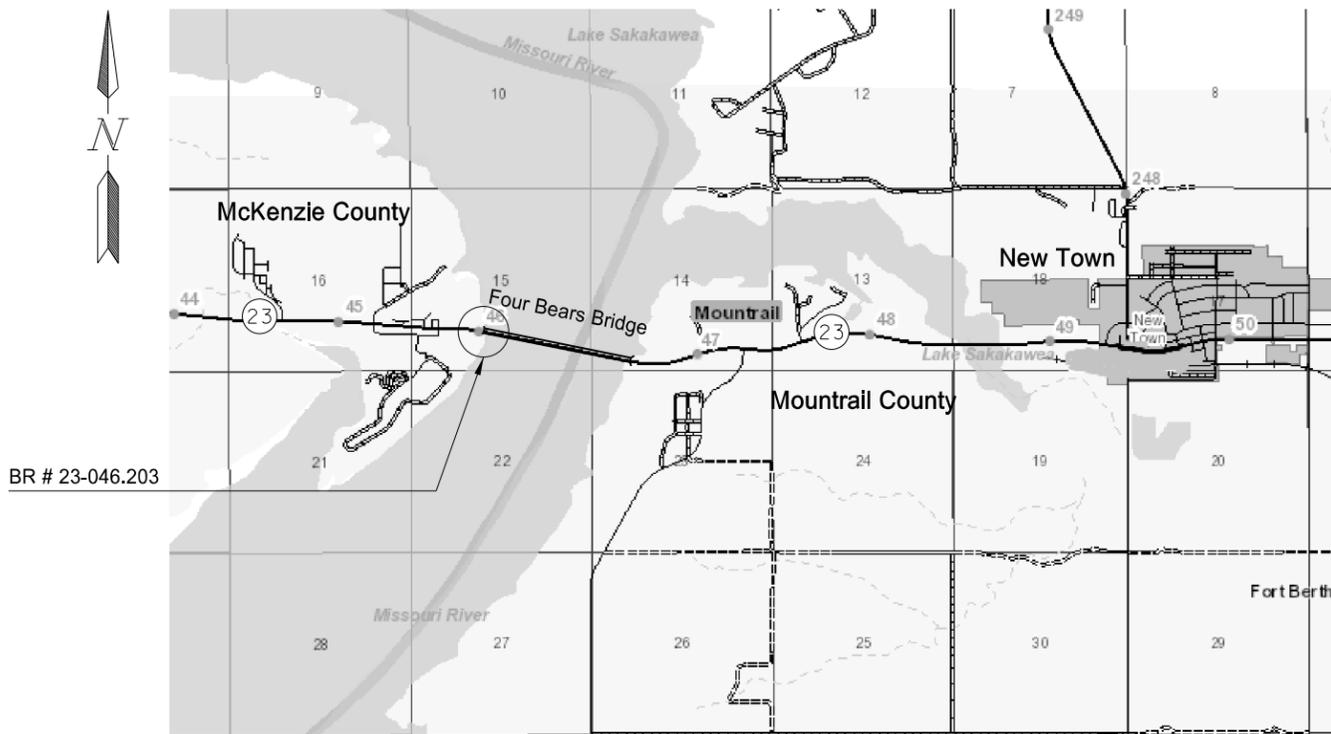
NH-7-023(046)046

McKenzie & Mountrail Counties
 Four Bears Bridge
 3 Miles West of ND 1804
 Mudjacking, Shotcrete, Riprap, and Curb and Gutter

GOVERNING SPECIFICATIONS:

Standard Specifications adopted by the North Dakota Department of Transportation October 2008; Standard Drawings currently in effect; and other Contract Provisions submitted herein.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-7-023(046)046	0.0500	0.0500



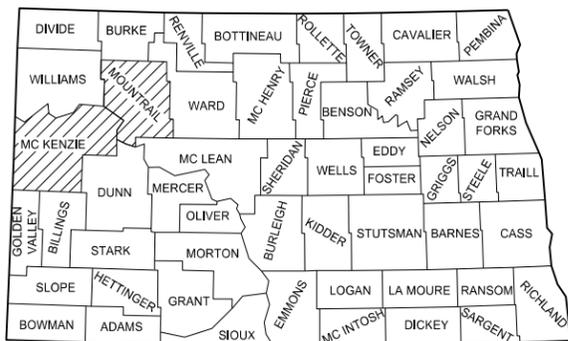
BR # 23-046.203

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STATE COUNTY MAP

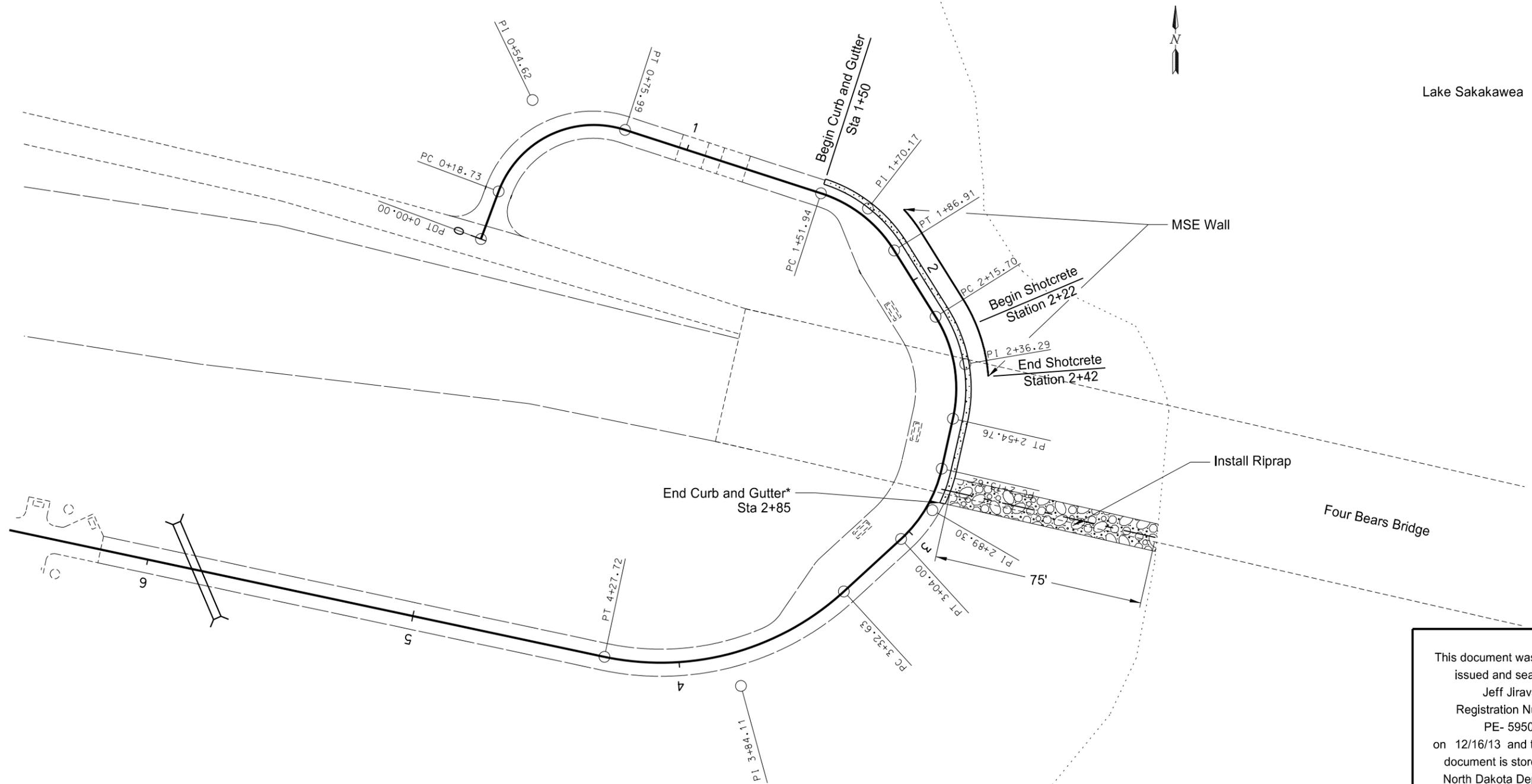
I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 12/17/2013

Terrence R. Udland
 NDDOT BRIDGE DIVISION

This document was originally issued and sealed by Terrence R. Udland Registration Number PE- 2674 , on 12/17/13 and the original document is stored at the North Dakota Department of Transportation

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	4	1



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 Registration Number
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Scope of Work

*The curb and gutter should be transitioned from Sta 2+75 to Sta 2+85 to allow the water to enter the riprap at Sta 2+80.

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRN-7-023(046)046	6	1

200-PO1 REMOVE AGGREGATE BASE AND SURFACING: The removal of aggregate base, bituminous surfacing, topsoil and excavation required to construct the curb and gutter shall be included in the unit price bid for "Remove Aggregate Base and Surfacing" and shall be paid for as Lump Sum.

708-PO1 RIPRAP – LOOSE ROCK: All labor, materials and equipment to complete the excavation and the placement of riprap shall be included in the unit price bid for "Riprap – Loose Rock".

708-PO2 SHOTCRETE: The shotcrete shall be pneumatically applied to the location shown in the plans. The shotcrete shall be constructed according to this note and the applicable sections of the America Concrete Institute's "Guide to Shotcrete" (ACI 506).

The materials shall meet ASTM C1436 Standard Specifications for Materials for Shotcrete. The contractor shall submit a mix design seven days prior to construction to be approved by the engineer. The design shall meet 3 day compressive strength of 1800 psi.

Before applying shotcrete to MSE wall surface, remove all loose materials and vegetation. The thickness of the shotcrete shall be a minimum of 2" and be monitored by installing noncorrosive pins, nails, or other gaging devices normal to the face on a maximum of 5 foot square pattern.

The shotcrete shall remain a natural gun finish.

All labor, equipment and materials required to place the shotcrete shall be included in the unit price bid for "Shotcrete".

748 PO1 CURB & GUTTER – TYPE 1: All labor, equipment, and materials, including the aggregate base course, required to construct the curb and gutter – type 1, shall be included in the unit price bid for "Curb & Gutter – Type 1".

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NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	6	2

GENERAL NOTES

704-P01 OBLITERATE PAVEMENT MARKING: It will not be necessary to Obliterate any pavement markings as shown on Standard D-704-17.

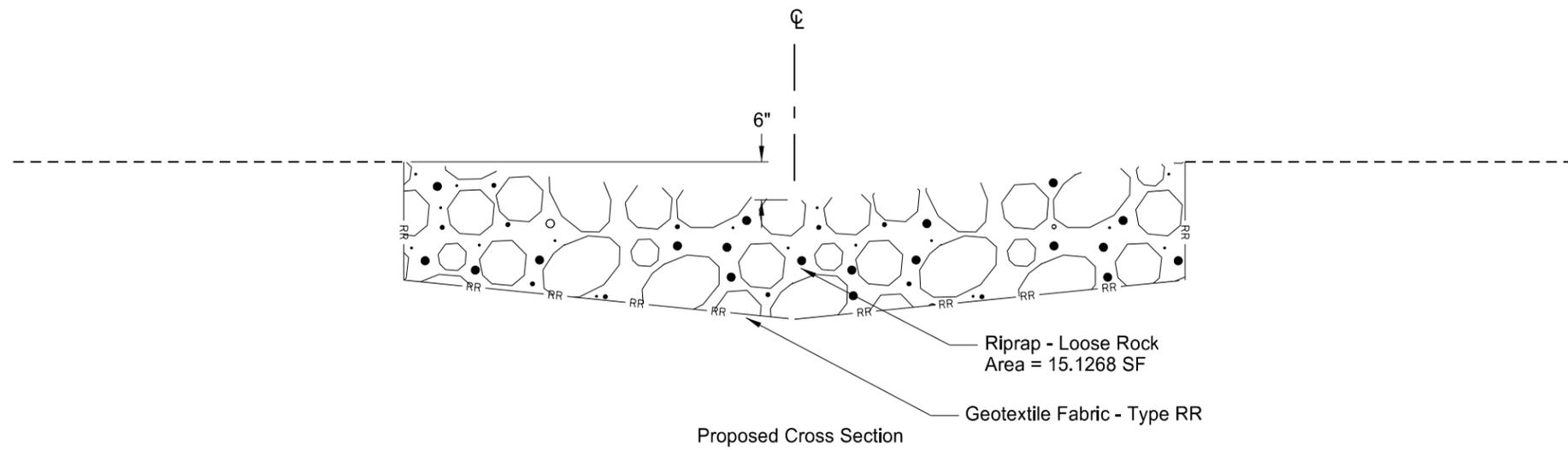
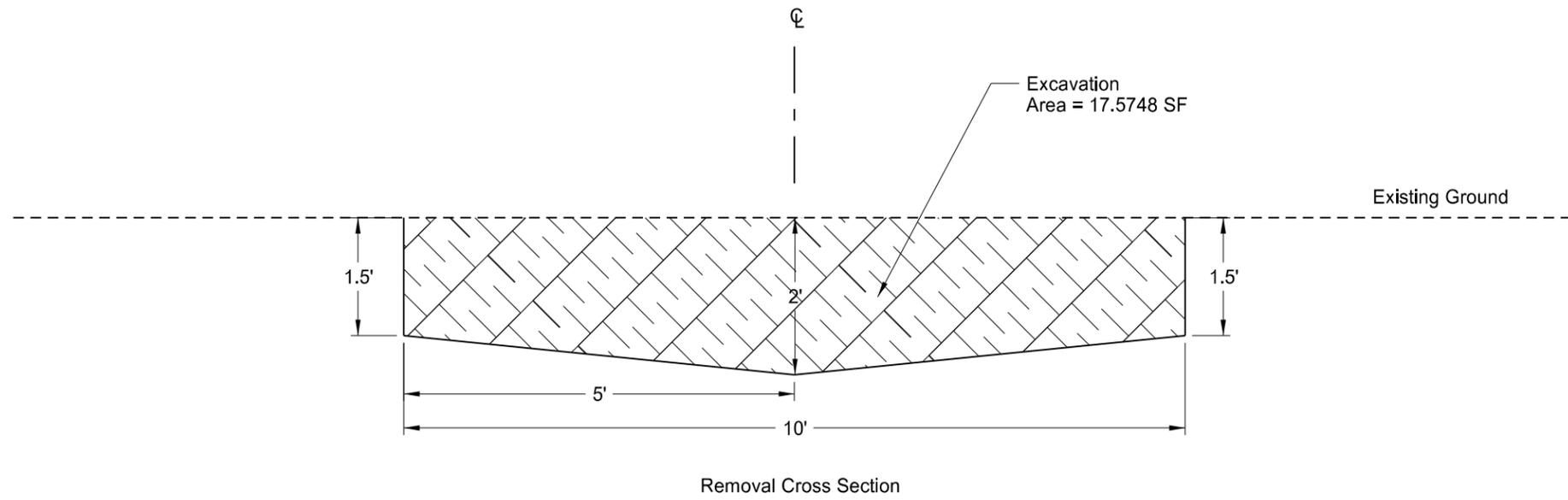
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ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
202	0120 REMOVE AGGREGATE BASE & SURFACING	L SUM	1	1
202	0153 SAW BITUMINOUS SURFACING-FULL DEPTH	LF	135	135
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	150	150
704	1000 TRAFFIC CONTROL SIGNS	UNIT	862	862
704	1035 ATTENUATION DEVICE-TYPE B-25	EA	2	2
704	1050 TYPE I BARRICADE	EA	2	2
704	1052 TYPE III BARRICADE	EA	4	4
704	1060 DELINEATOR DRUMS	EA	10	10
708	1020 RIPRAP-LOOSE ROCK	CY	42	42
708	1107 SHOTCRETE	SF	115	115
709	0600 GEOTEXTILE FABRIC-TYPE RR	SY	125	125
748	0140 CURB & GUTTER-TYPE I	LF	130	130
930	3631 POLYURETHANE FOAM	LBS	529	529

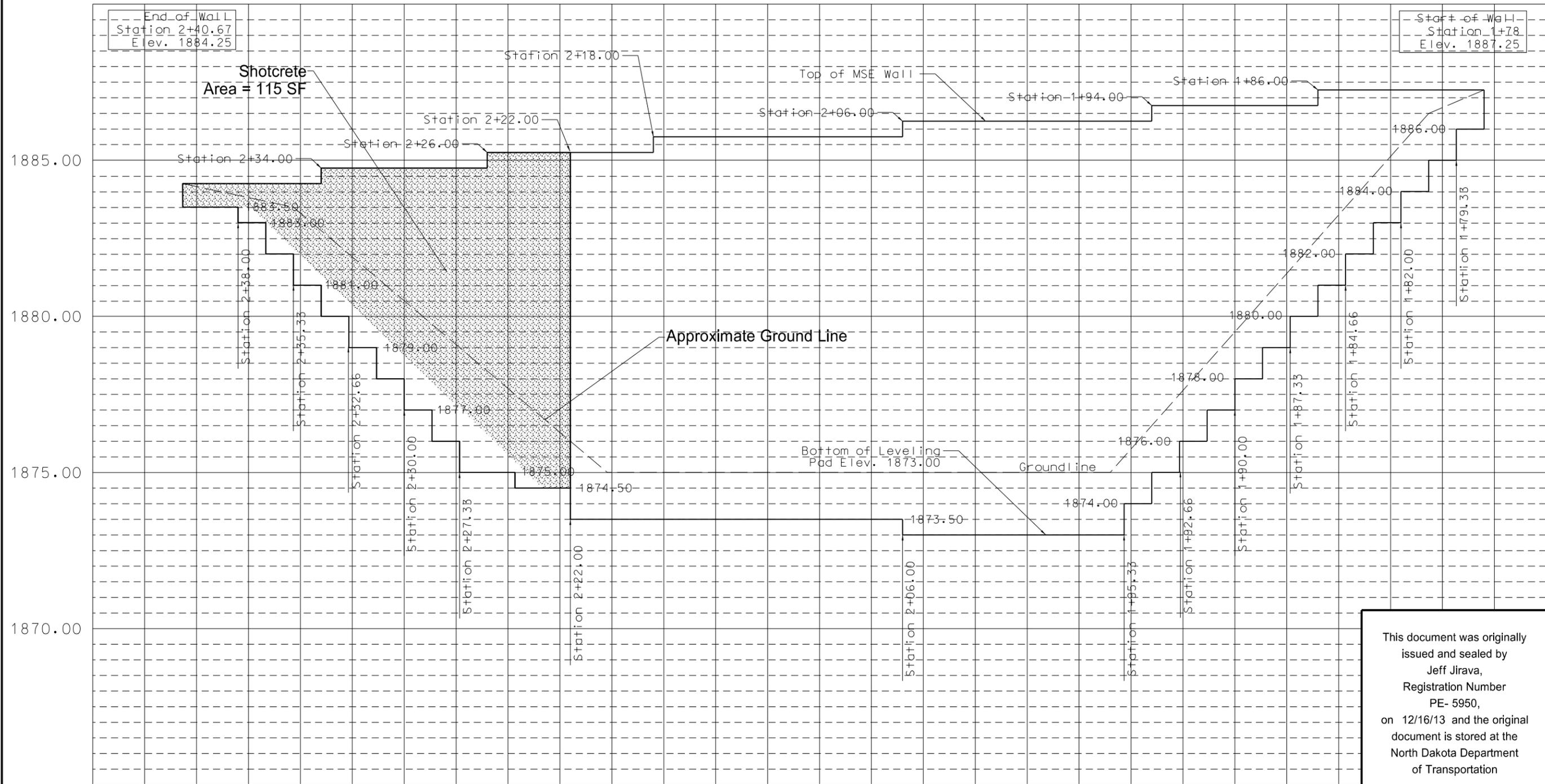
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	20	1



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Riprap Detail

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ND	NH-7-023(046)046	20	2

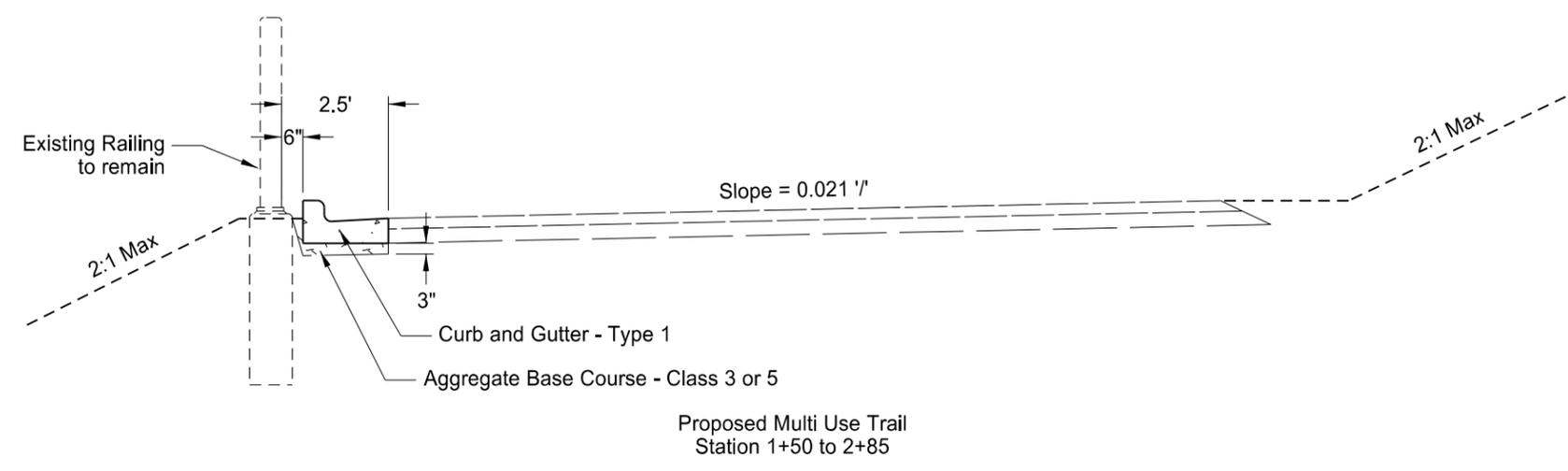
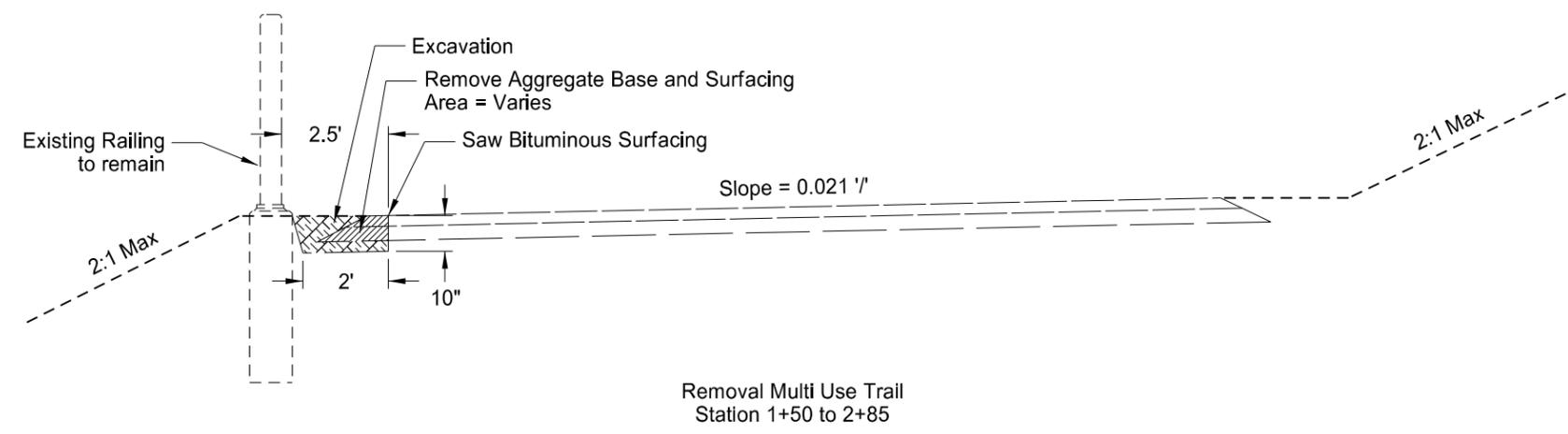
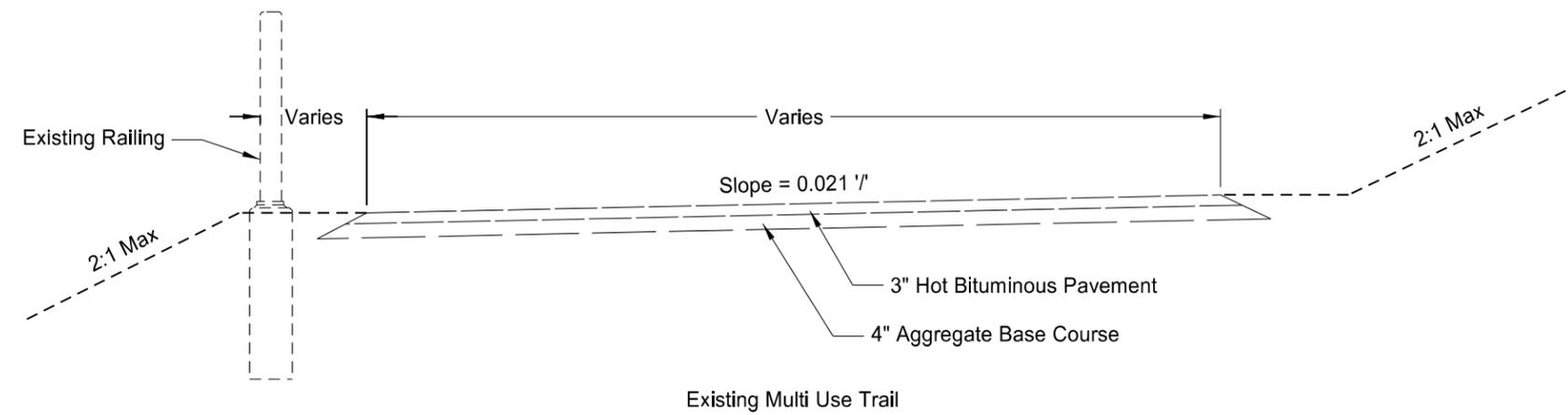


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MSE Wall Shotcrete Location

All stations and elevations are approximate and should be verified in the field

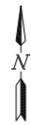
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	30	1



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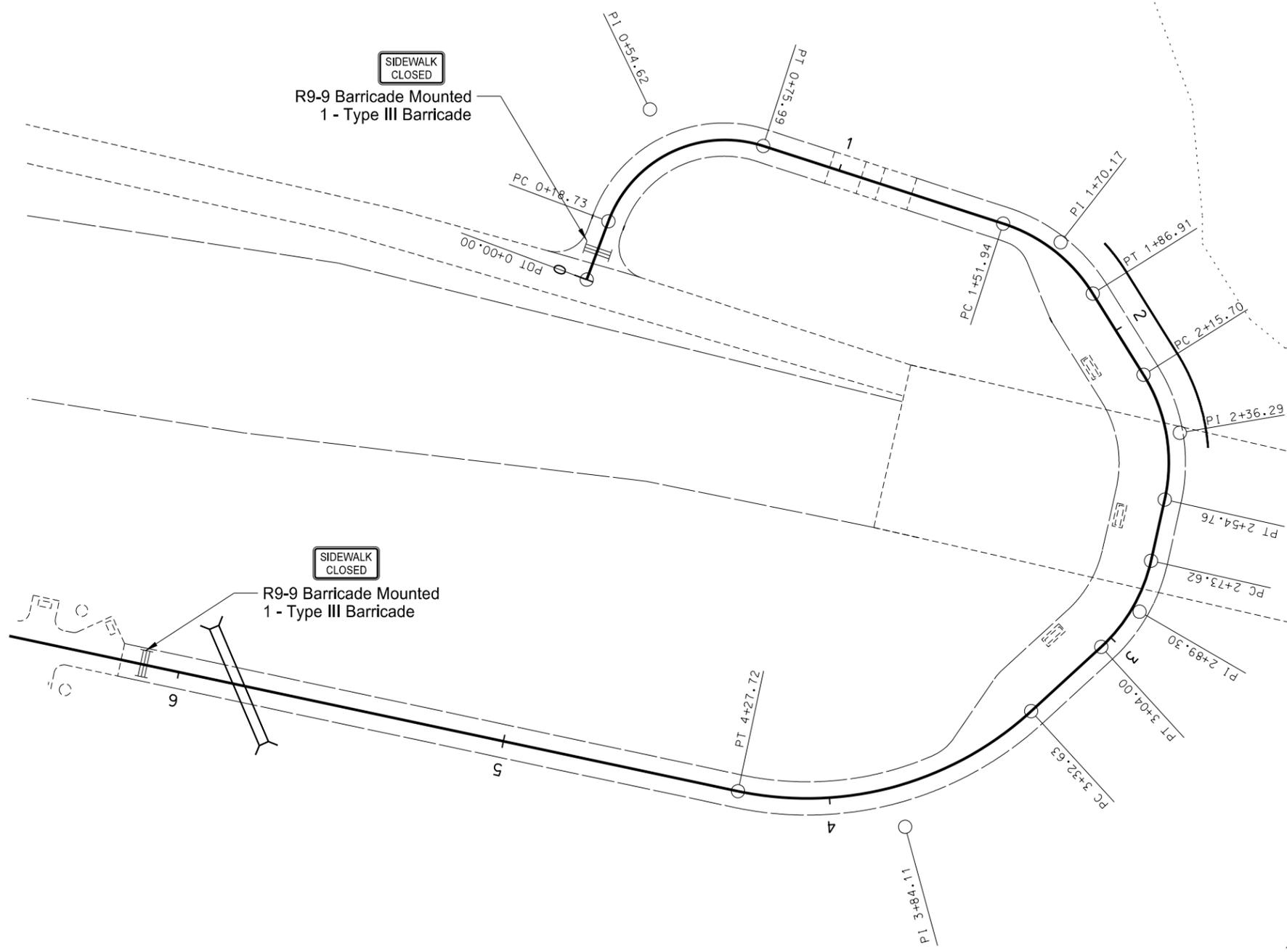
Curb and Gutter Installation

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	100	2



Lake Sakakawea

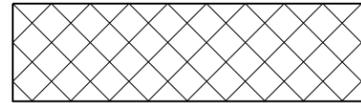
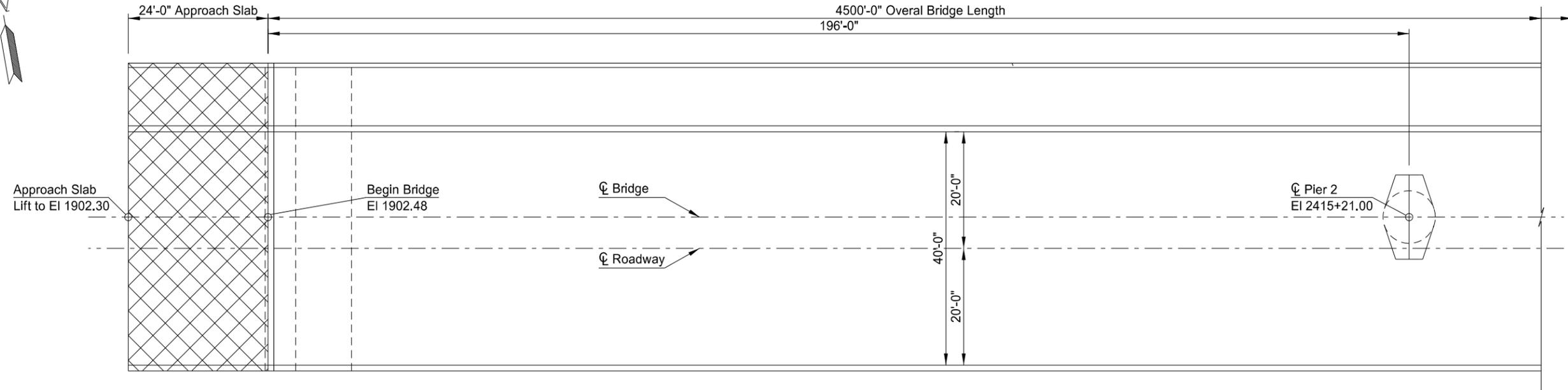
Four Bears Bridge



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Multi Use Traffic Control

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-023(046)046	170	1



Indicates Area to be Lifted

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BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
930	3631	POLYURETHANE FOAM	LBS	529

NORTH DAKOTA
 DEPARTMENT OF TRANSPORTATION
 ND23 OVER LAKE SAKAKAWEA
 FOUR BEARS BRIDGE

BRIDGE LAYOUT

PROJECT: BRN-7-023(046)046
 STATION: 2413+18.67
 MOUNTRAIL COUNTY

12/17/2013 Terrence R. Udland
DATE BRIDGE ENGINEER

NOTES

100 SCOPE OF WORK: Work at this site consists of lifting and leveling bridge approach slabs.

930 POLYURETHANE FOAM: This work shall consist of lifting and leveling the existing concrete bridge approach panels by a polyurethane foam system. Lifting and leveling of the concrete panels shall be performed by drilling injection holes, injecting polymer, verifying elevations to control lift of panel and cleanup as approved by the Project Engineer.

The medium used to lift and level the approach slabs shall be a water blown high-density polyurethane. The material shall be hydrophobic. The high density, closed cell, polyurethane system shall exhibit the following physical characteristics and properties:

Density, Lb/Cu Ft (ASTM 1622)	Compressive Strength (ASTM 1621)
3.0	40 psi
3.5	50 psi
4.0	60 psi
6.0	110 psi

The polyurethane foam system will have a free-rise density of 3.0 – 3.2 lb/ft³, with a minimum compressive strength of 40 psi. The expansion of the polyurethane foam under pressure increases the foam density above the original free rise density value.

The high density formulation shall reach 90% of full compressive strength within 15 minutes of injection, at which time the Contractor may allow traffic on the treated areas, as approved by the Project Engineer.

The Contractor shall submit, to the Project Engineer, manufacturer’s certification stating that all materials and methods meet requirements. The Contractor shall also submit all warranties and guarantees, which shall be transferred to the Department upon acceptance by the Project Engineer.

A list of the lifting and undersealing equipment shall be submitted to the Project Engineer for review. The minimum list of equipment required shall be as listed below. This list shall not preclude the use of additional equipment.

- a. A pneumatic drill and an electric drill capable of drilling 5/8-inch diameter holes to the required depths.
- b. A truck-mounted pumping unit capable of injecting the high-density polyurethane formulation between the concrete pavement and the underlying surface. The pumping unit shall be equipped with a dial gauge in increments of 45 grams (1/10 pound), and shall be capable of controlling the rate of flow of the material as well as of the rise of the pavement.

c. A laser leveling unit it ensure that the concrete is raised to an even plane and to the required elevations.

All equipment provided by the Contractor shall be in excellent condition and kept clean at all times. All stored materials shall be sealed and protected from contamination of dust or any foreign material.

The Contractor shall have prior experience using high-density polyurethane to raise and underseal concrete slabs.

A series of 5/8 inch holes shall be drilled at the locations required for the proper raising of the surface. The exact locations and spacing shall be determined by the Contractor. The pumping unit shall be calibrated daily, or at the Project Engineer’s request, to ensure consistent accuracy of injected material.

The high density polyurethane formulation is injected under the slab. The amount of rise shall be controlled, using the pumping unit, by regulating the rate of injection of the raising/undersealing polymer. When the nozzle is removed from the hole, any excessive polyurethane material shall be removed from the area and the hole sealed with a nonexpansive cementitious grout. All removed material shall be disposed of in an environmentally acceptable manner conforming to Federal, State and local regulations. Final elevations shall be within ¼” of the elevations proposed by profile. A tight string line may be used to monitor and verify elevations for slab lengths of 50 foot or less. For longer sections, a laser level will be used to monitor and verify elevations. The Contractor shall be responsible for any pavement blowouts or excessive pavement lifting which may result from the process and shall repair the damaged area to the satisfaction of the Project Engineer without additional cost.

The slab shall not be raised more than ¼ inch while pumping in any one hole at any one time. Pavement raised above specified tolerances shall be brought to grade by grinding. If over jacking is greater than 0.10 foot, full-depth removal and replacement of the affected area shall be required, at no cost to the Owner.

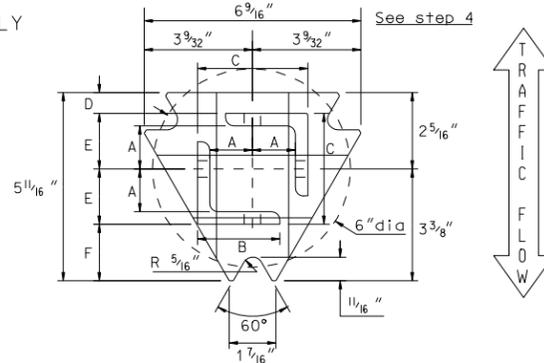
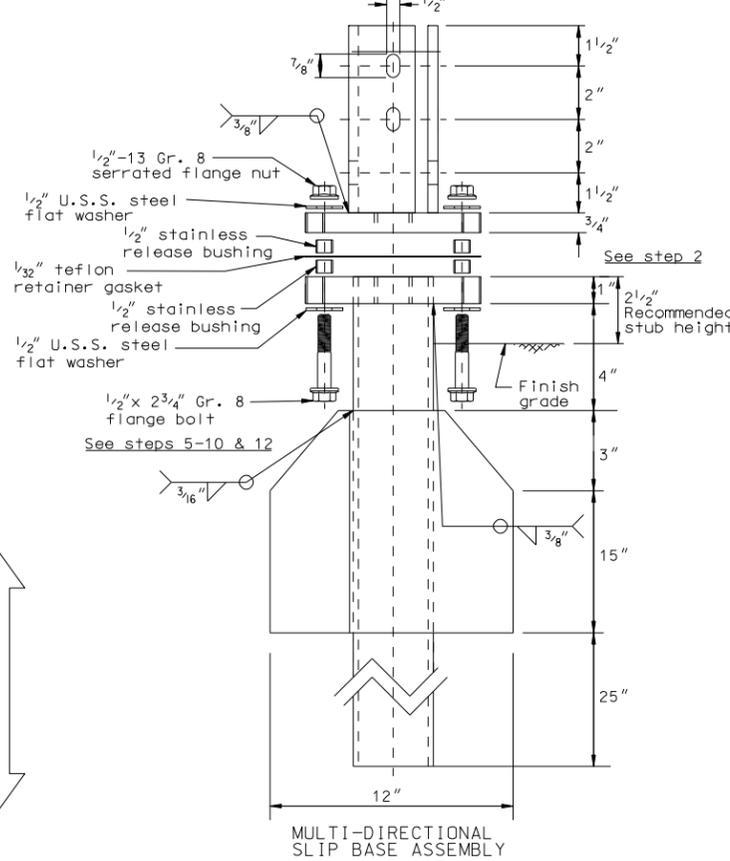
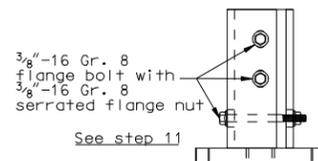
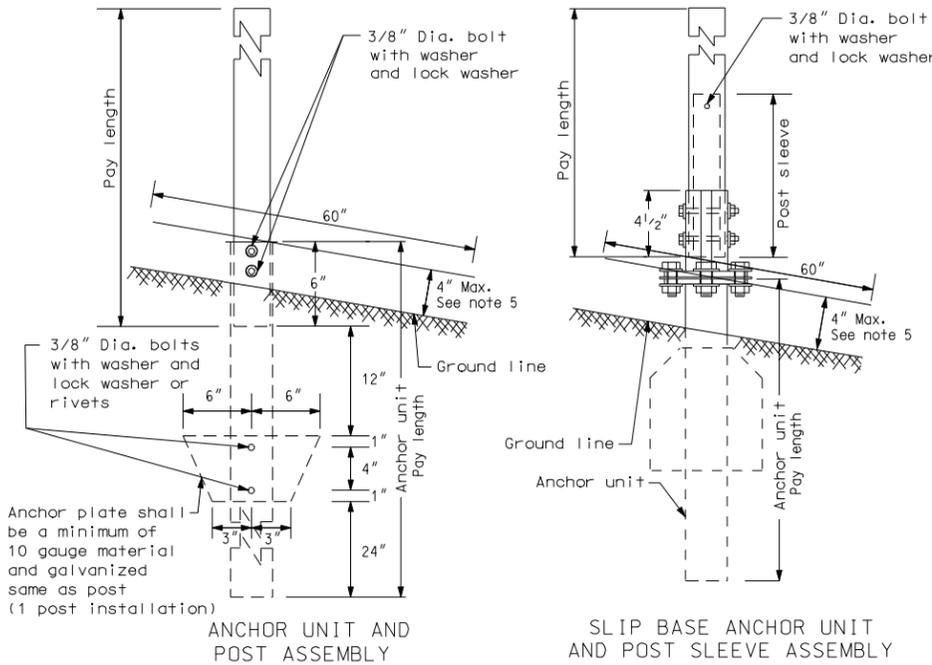
The price bid for the item “Polyurethane Foam” shall include full compensation for furnishing all labor, supervision, materials tools, equipment, and incidentals for all work called for in this note. Daily material usage shall be verified by the Inspector and the Contractor and reported on a field production report.

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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

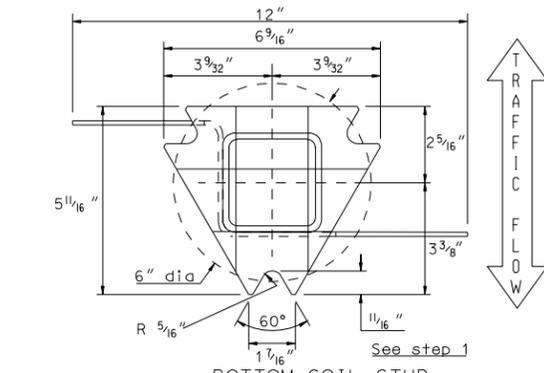
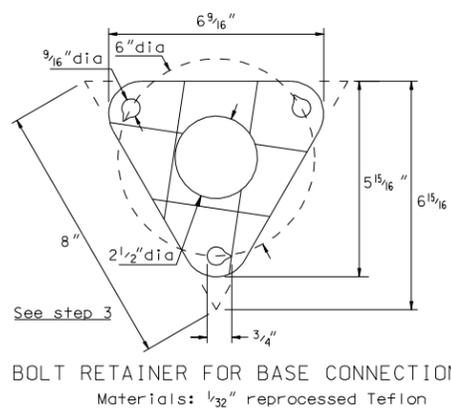
PERFORATED TUBE



TOP POST RECEIVER DATA TABLE

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

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



- Notes
- Slip base bolts shall be torqued as specified by the manufacturer.
 - The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
 - Anchor for 2", 2 1/4", and 2 1/2" posts.
 - 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.
 - 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.
 - When used in concrete sidewalk, anchor shall be the same except without the wings.
 - Four post signs shall have over 8' between the first and fourth posts.

Telescoping Perforated Tube

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

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

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

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

Telescoping Perforated Tubes

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 11-21-02
REVISIONS

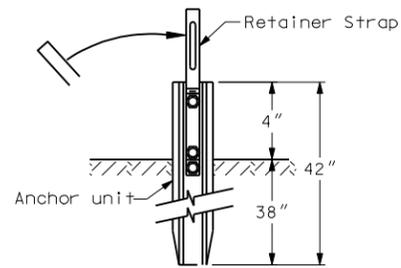
DATE	CHANGE
12-01-04	PE stamp added

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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

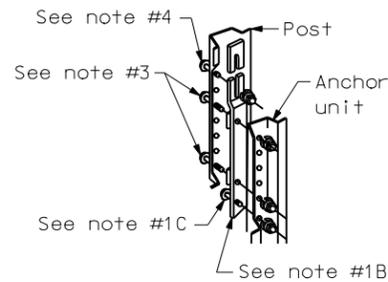
FLANGED CHANNEL



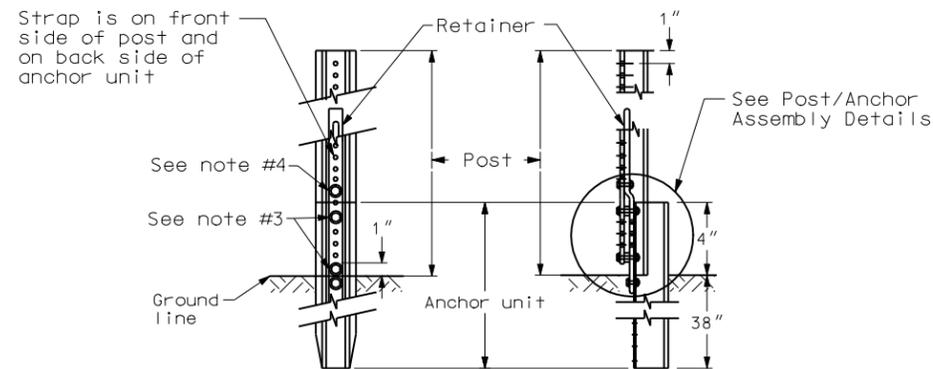
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

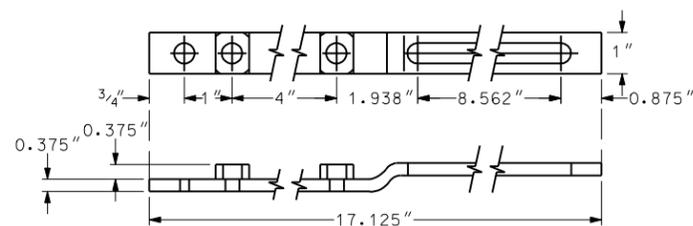
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2. 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



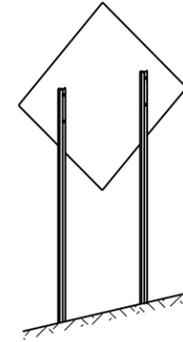
Front View Side View Sign Post Assembly Detail



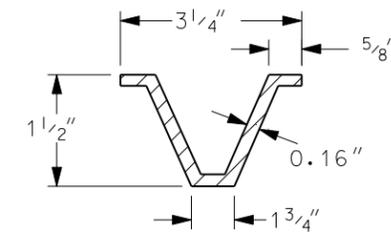
Retainer/Spacer Strap Detail

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

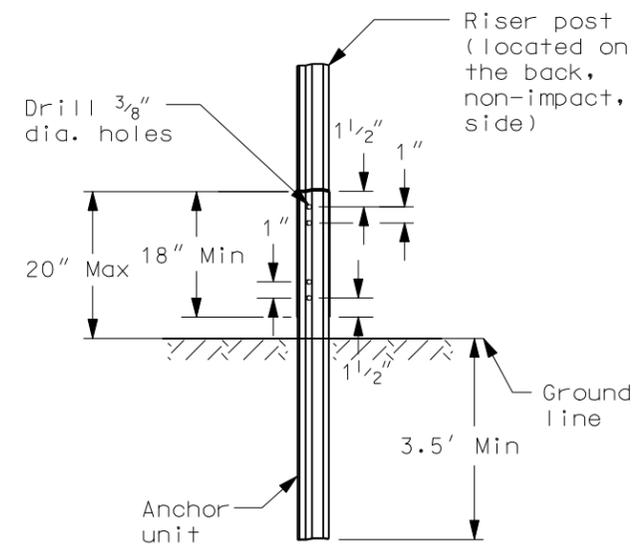
3 LB/FT U POSTS



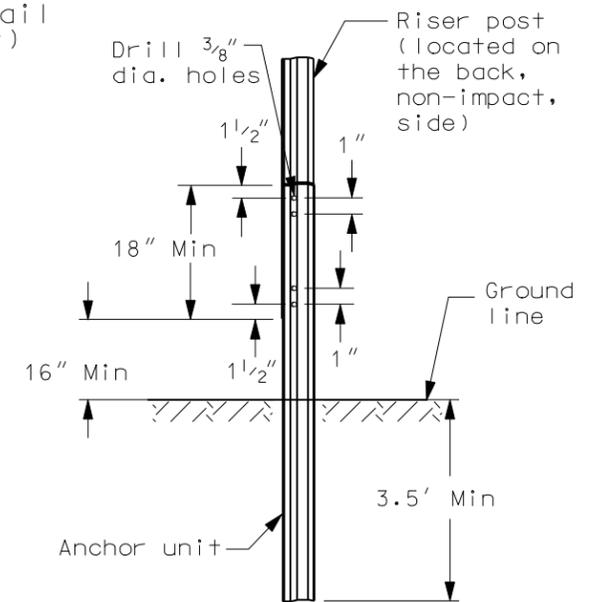
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

Notes

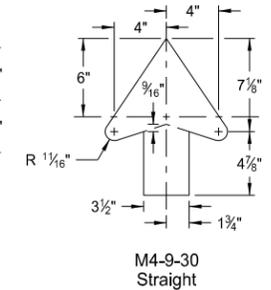
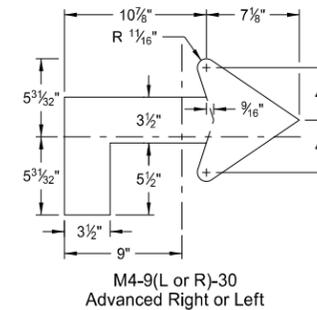
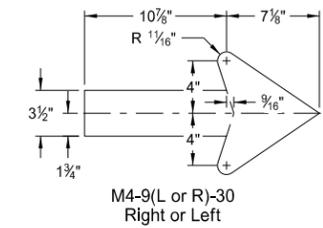
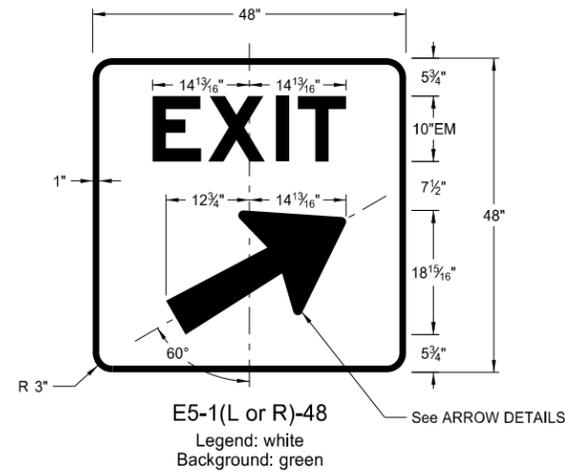
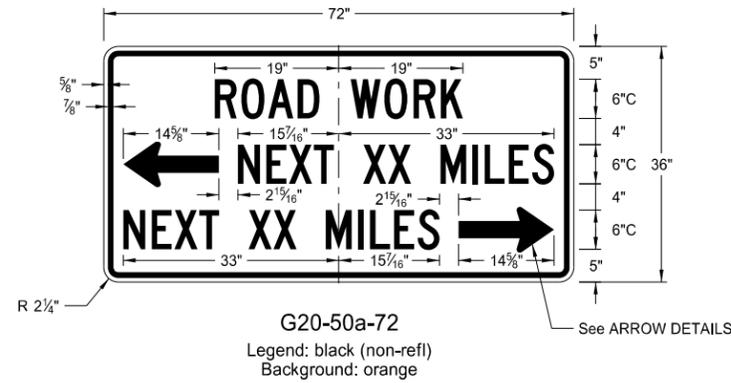
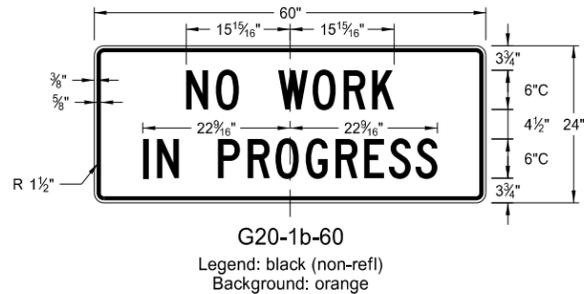
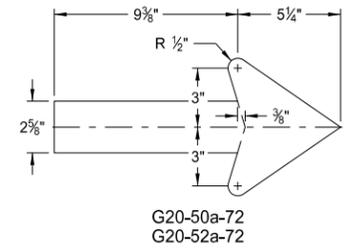
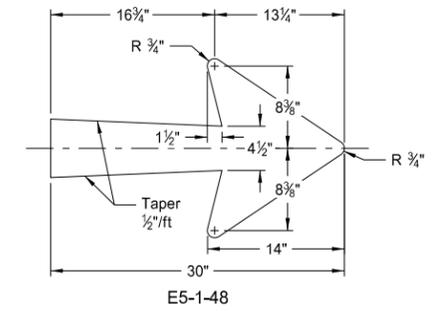
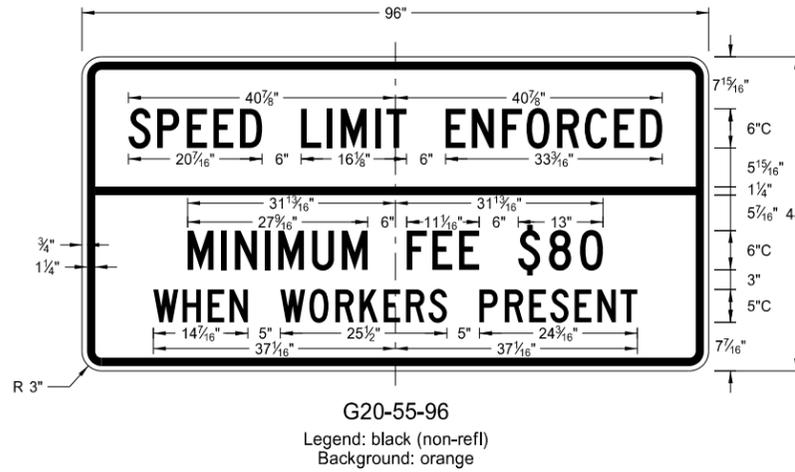
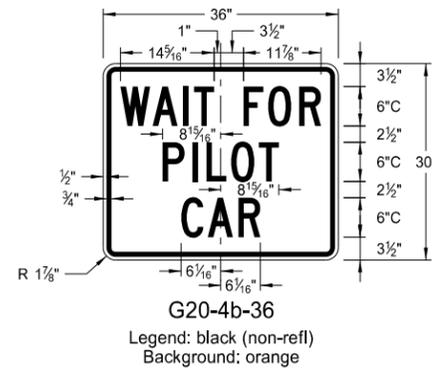
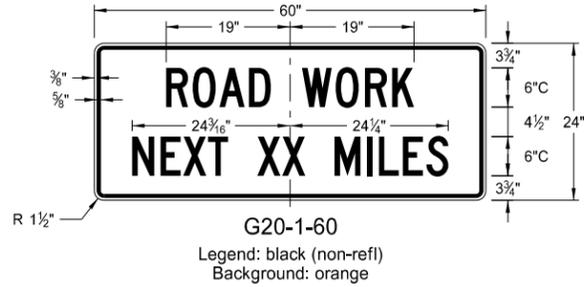
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4" above ground and embedded at least 3.5'.

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

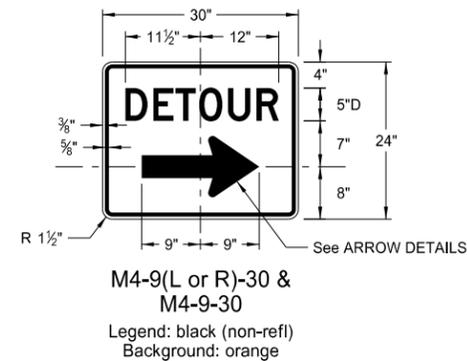
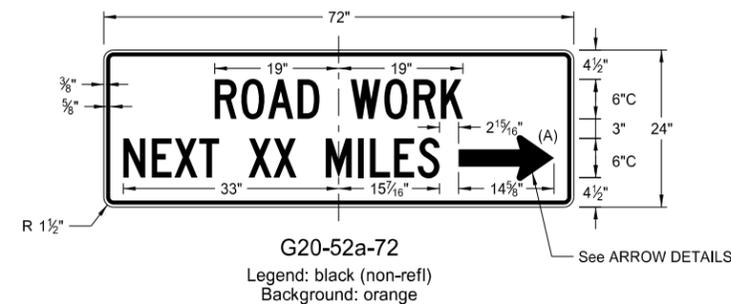
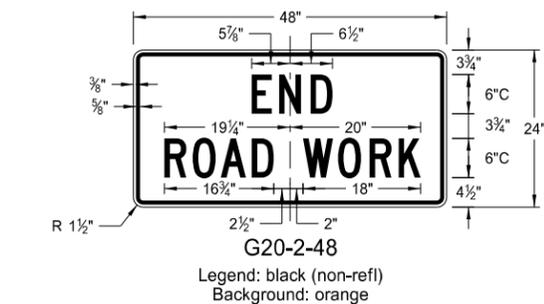
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

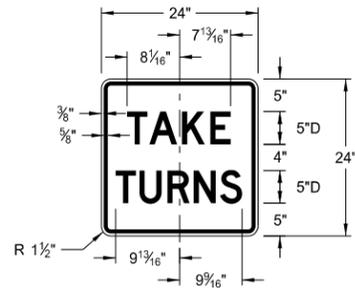
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

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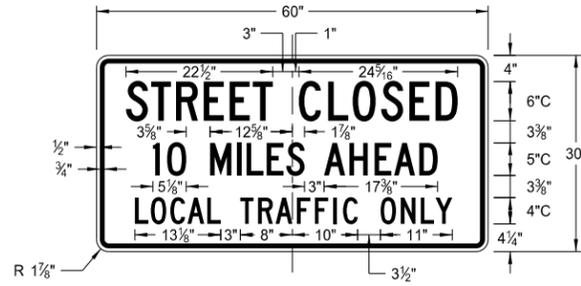
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



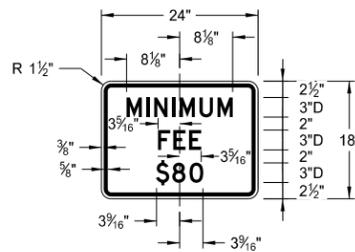
R1-50-24

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Background: white



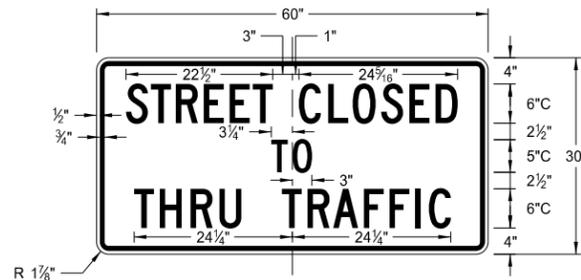
R11-3c-60

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Background: white



R2-1a-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white



R11-2a-48

Legend: black (non-refl)
Background: white

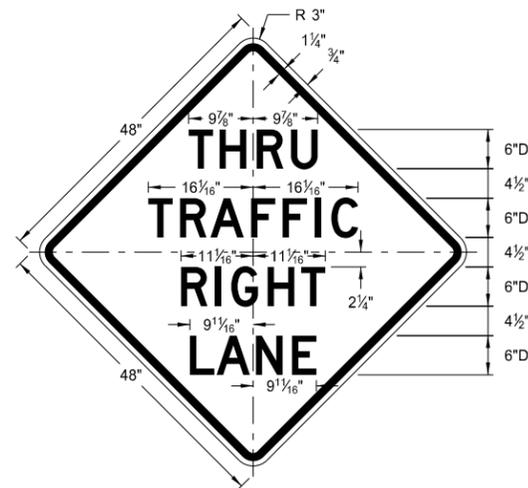
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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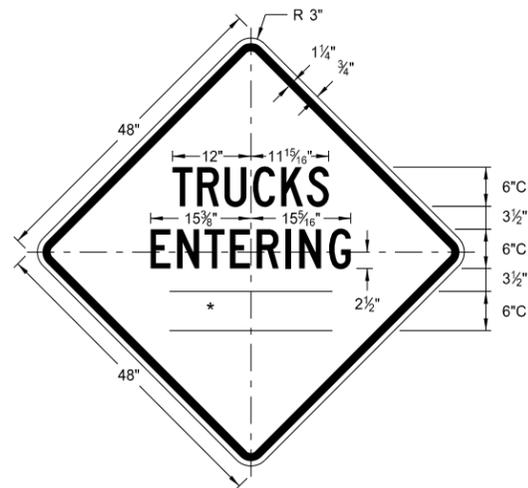
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

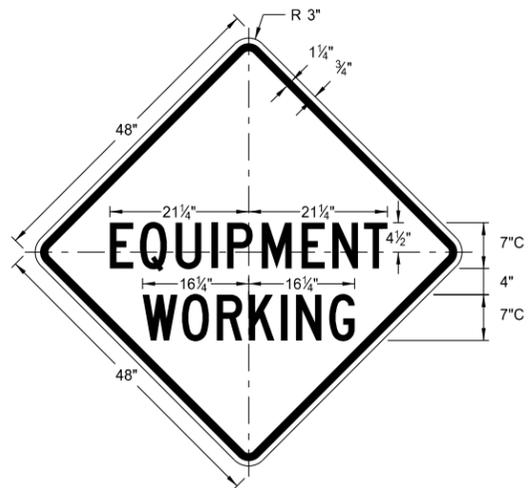
* DISTANCE MESSAGES



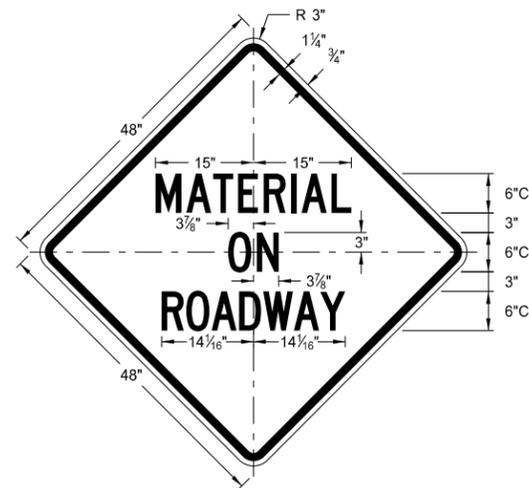
W5-8-48
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Background: orange



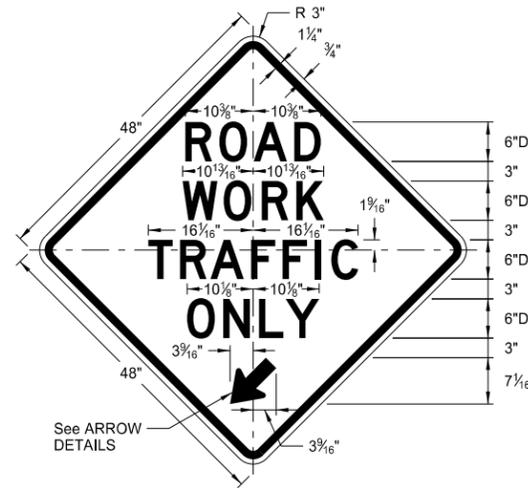
W8-54-48
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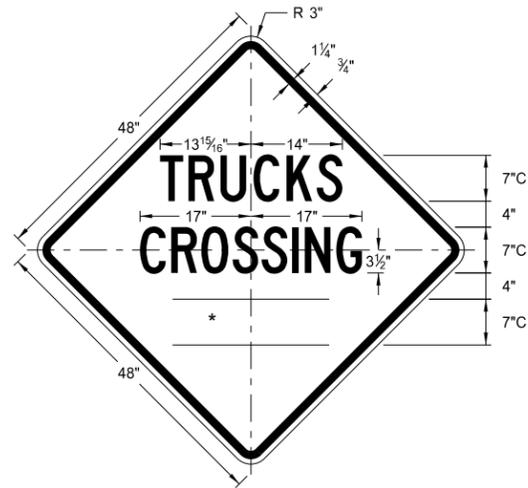
W20-51-48
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Background: orange



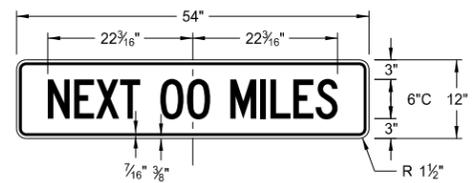
W21-51-48
Legend: black (non-refl)
Background: orange



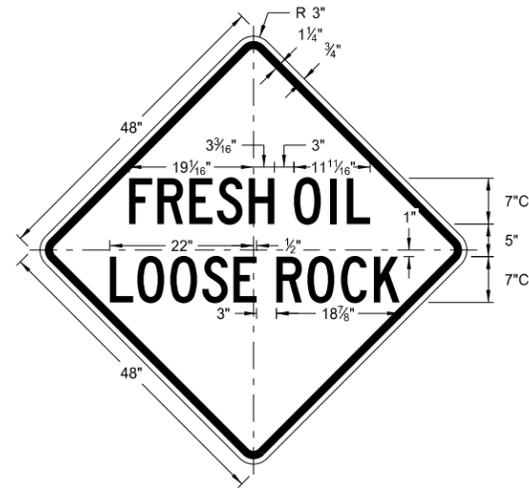
W5-9-48
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Background: orange



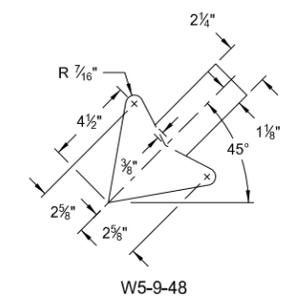
W8-55-48
Legend: black (non-refl)
Background: orange



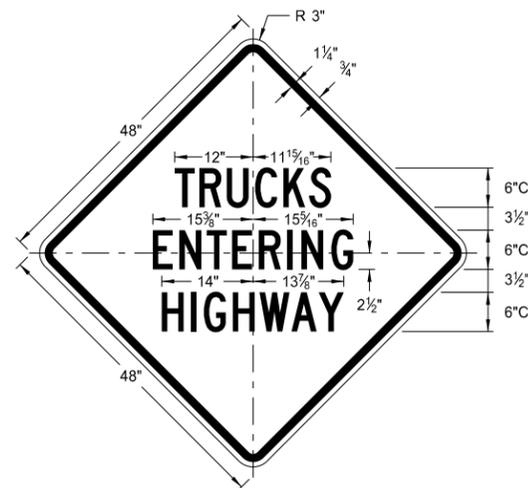
W20-52-54
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Background: orange



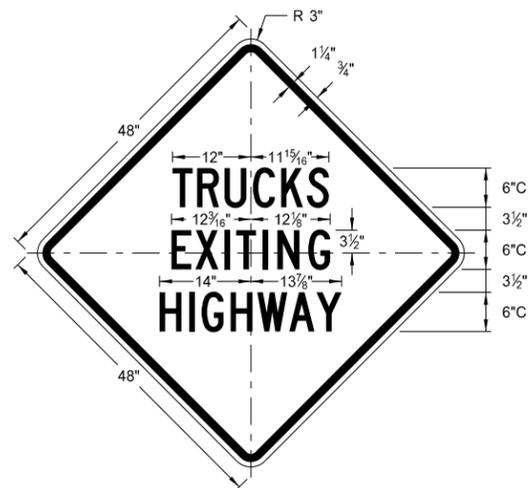
W22-8-48
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Background: orange



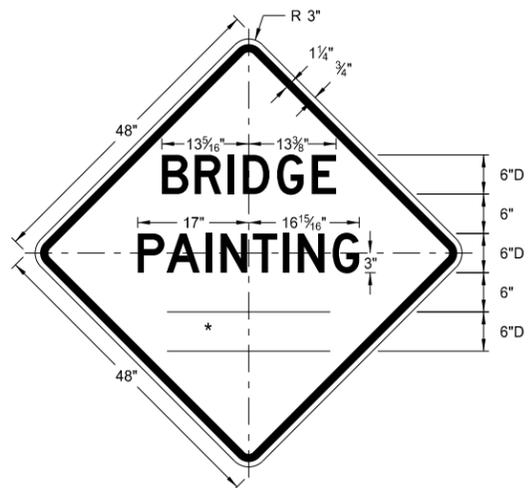
W5-9-48
ARROW DETAILS



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



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

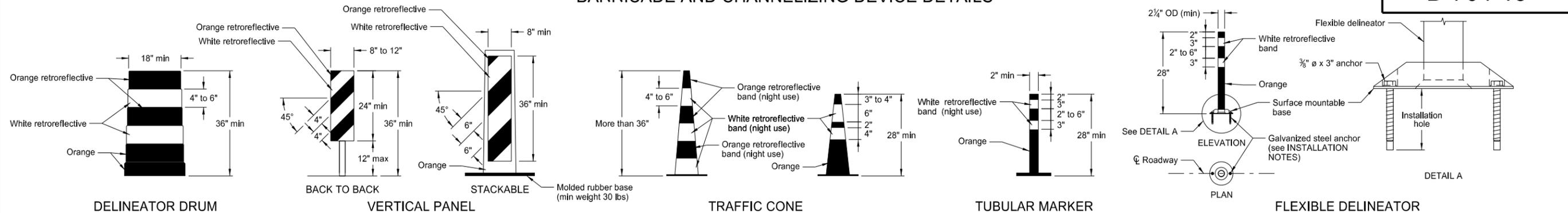


W21-50-48
Legend: black (non-refl)
Background: orange

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

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BARRICADE AND CHANNELIZING DEVICE DETAILS



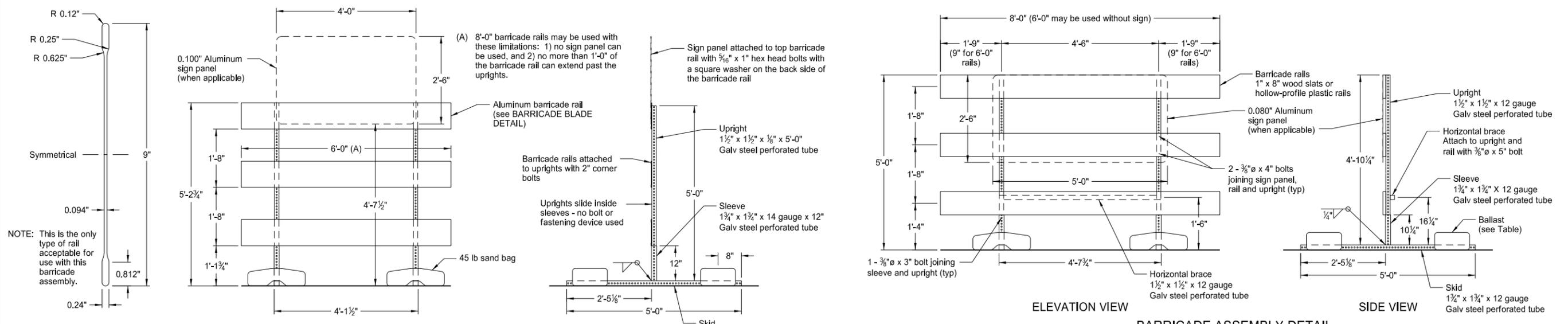
The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.

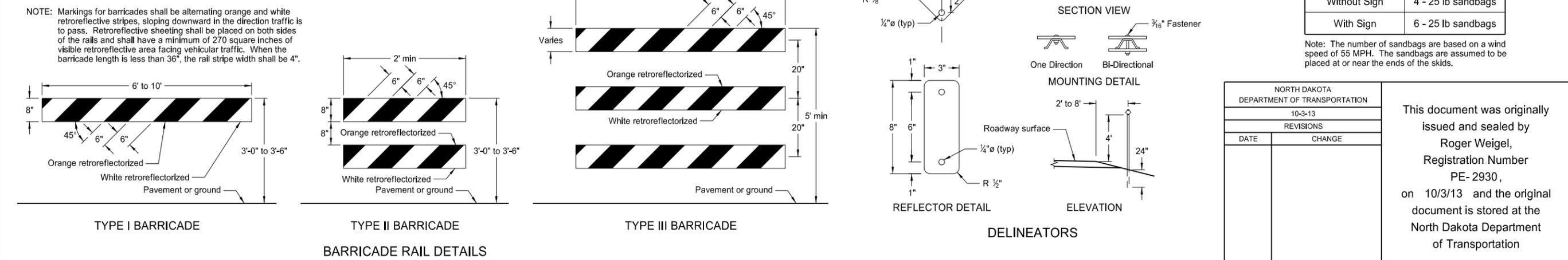
RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall not exceed 3" wide.

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

- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.



NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".



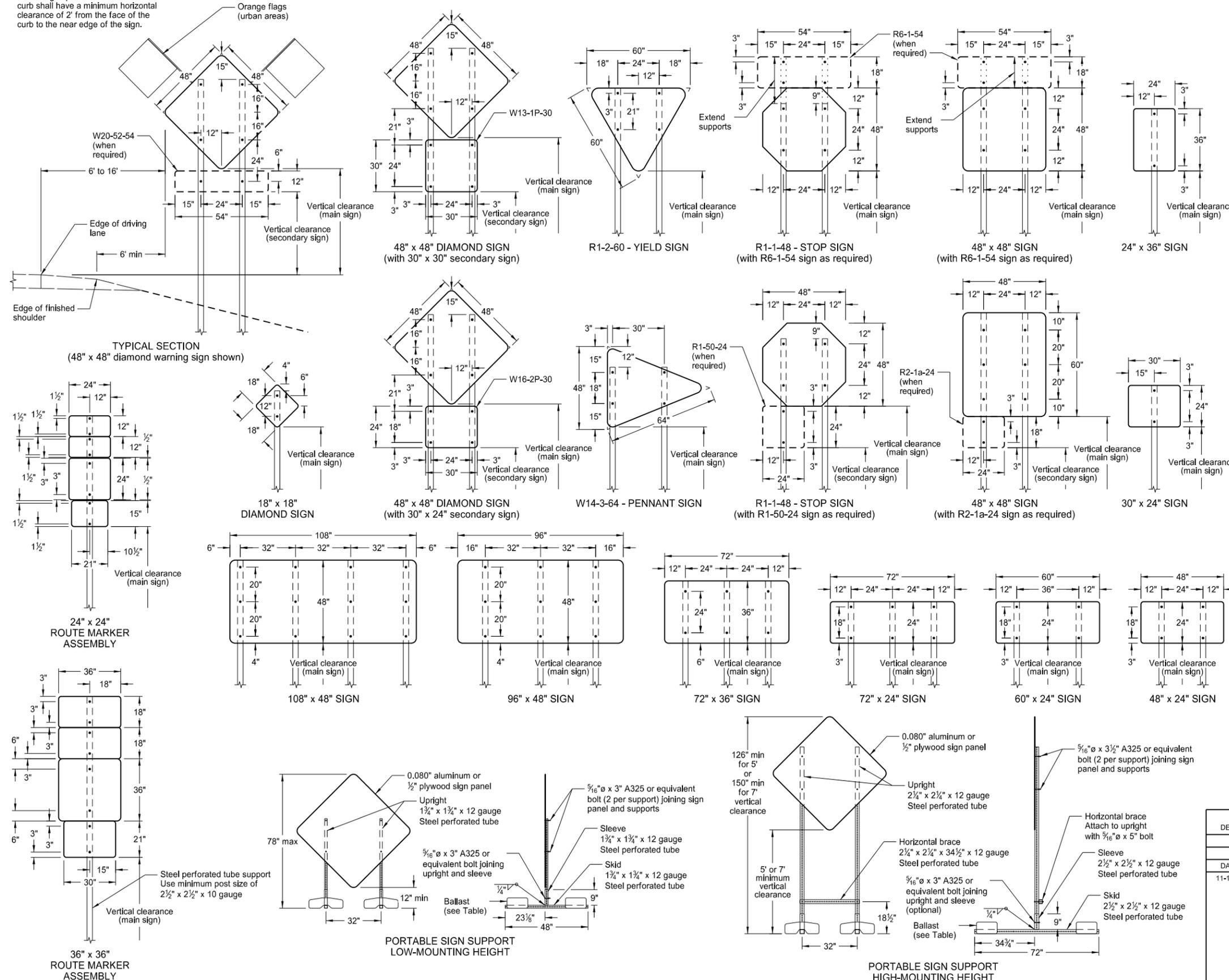
NORTH DAKOTA
 DEPARTMENT OF TRANSPORTATION
 10-3-13
 REVISIONS

DATE	CHANGE

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 Registration Number
 PE-2930,
 on 10/3/13 and the original document is stored at the
 North Dakota Department
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



- NOTES:
- Sign Supports:** Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
 - Sign Panels:** Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.
 - Alternate Messages:** The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
 - Route Marker Auxiliary Signs:** Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
 - Vertical Clearance:** Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

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

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
 - Portable Signs:** Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.
- Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

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

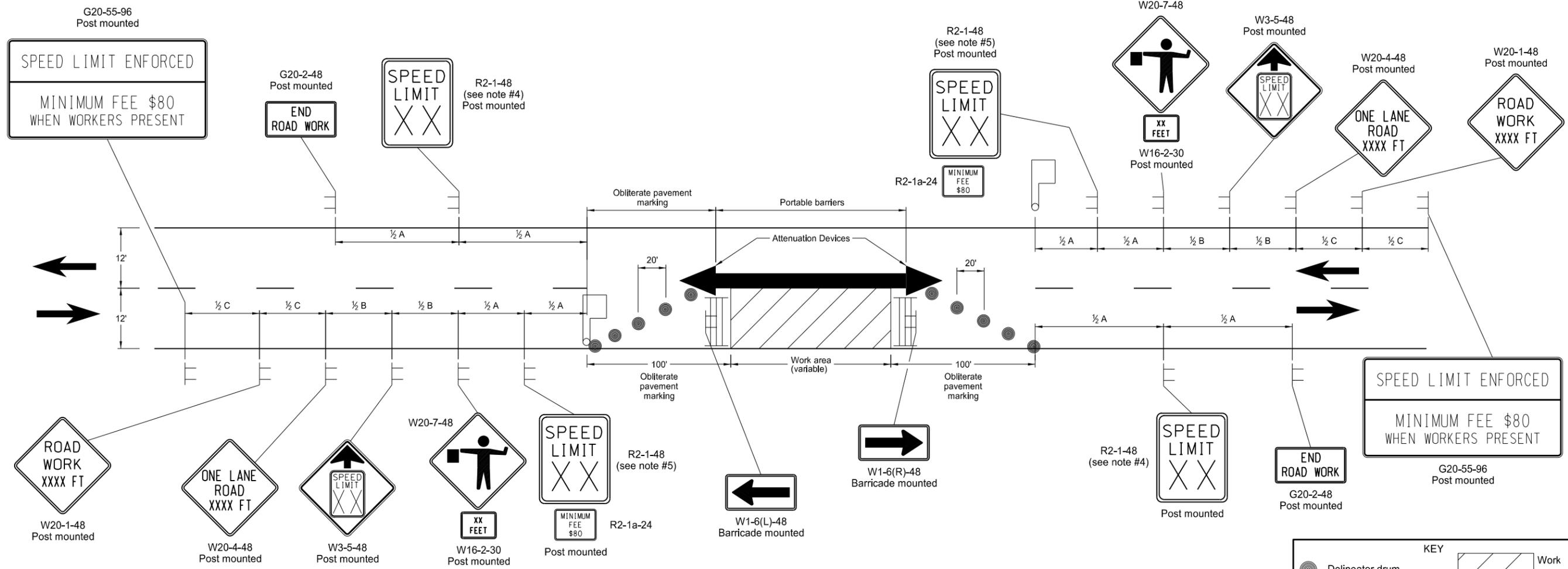
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

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SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



Notes

- Floodlights shall be provided to mark flagger stations at night. The lighting shall not create a disabling glare for drivers. Placement and elimination of potential glare can best be determined by driving through and observing the floodlighted area from each direction on the main roadway after lighting is set up.
- Barricades placed on roadway shall be on a movable assembly. Signs placed on the roadway shall be placed on skid mounted assembly.
- Existing striping shall be removed as required. Delineators will only be used when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Vertical panels shall be used where roadways have steep slopes and alignment is not visible to approaching vehicles. Delineators and vertical panels shall be installed back to back.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- 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.
- 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.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Existing speed limit signs within a reduced speed zone shall be covered. G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
-

KEY

- Delineator drum
- Sign
- Type III barricade
- Work area
- Flagger

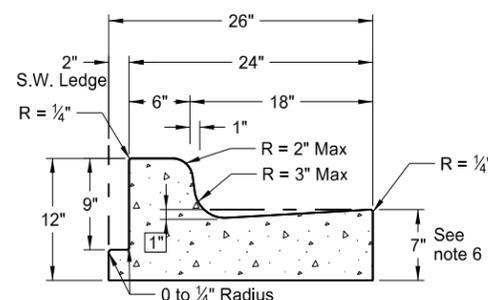
Road Type	Distance Between Signs (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13

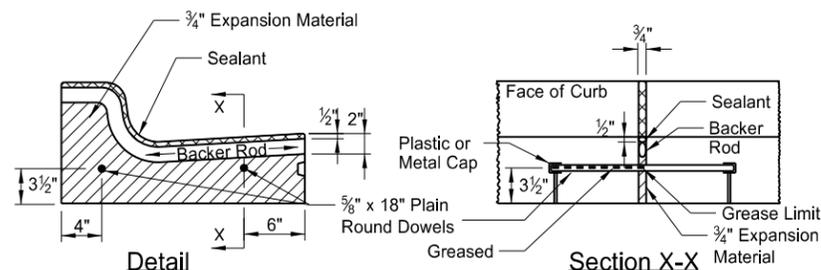
REVISIONS	
DATE	CHANGE

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Registration Number
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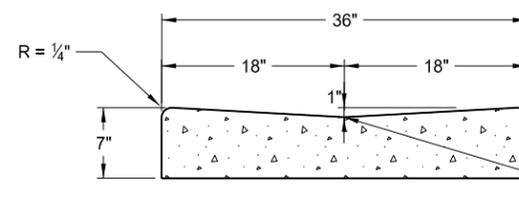
Curb & Gutter and Valley Gutter



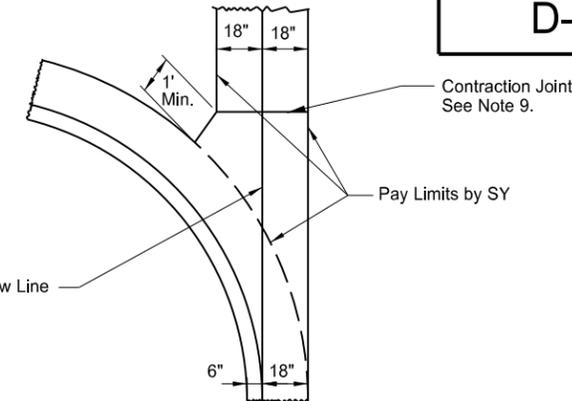
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk,
Median, or Parking Lot.
(Sec. A shown. See Sec B for
additional details.)



Isolation Joint



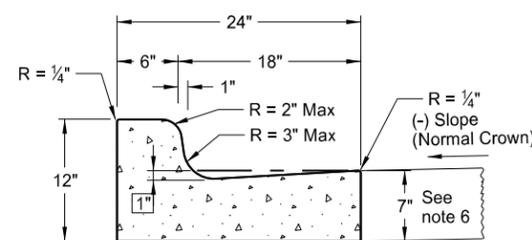
36" Concrete Valley Gutter Detail



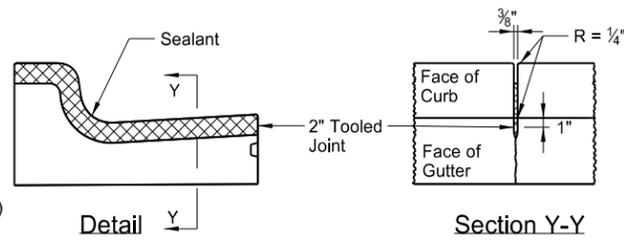
36" Concrete Valley Gutter Plan

NOTES:

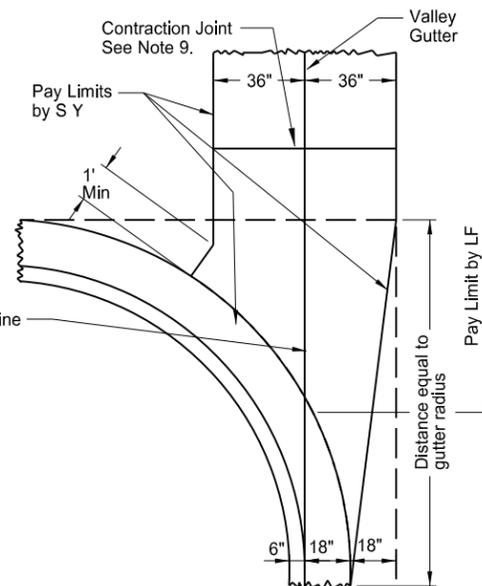
1. Curb and Gutter Type 1 (Sec. A & B) to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Isolation joint material shall be 3/4" preformed expansion joint filler conforming to the standard specifications. The opening for the backer rod and joint sealant shall be formed by a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint, plastic or metal caps and greased dowels shall be installed in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements the joint spacing for the curb and gutter shall be 10' max. with the panels on each side of the inlets. For concrete pavements the joint spacing for the curb and gutter shall match the pavement joint on PCC Pavements of approximately 15' spacing.
5. Joint sealing: All contraction and isolation joints shall be sealed as shown in the details. The joint sealant for contraction joints shall conform to section 826.02B. The sealant for expansion joints shall be as specified in note 3 above. The sealant shall be tooled and installed in accordance with the manufacturer's recommendations.
6. Depth of Face of Gutter: For hot bituminous pavement the depth of gutter shall be 7" as shown. For PCC pavements, the Contractor has the option to match the depth of gutter to the depth of the adjacent PCC pavement or to construct a 7" depth as shown.
7. When the curb and gutter abuts PCC pavement, it shall be tied to the PCC pavement. The tie bar shall consist of a No. 3 bar, 1'-6" in length spaced 4' center to center.
8. On street returns and other locations where the new curb and gutter ends and does not abut existing curb and gutter, the end two (2) feet of the curb shall be tapered from 6" in height to 0". A 1/2" preformed isolation joint which is full depth and the same shape as the curb and gutter shall be installed just ahead of the taper. An 18" tie bar shall be installed across the joint.
9. Valley Gutter Joints: Contraction joints are required at approx. 10' intervals. The contraction joints shall be 1/8" min. to 3/8" max. in width. The joints shall be formed by sawing or scoring to a minimum depth of 2". The joint sealant shall be a hot poured elastic type joint sealer in accordance with Section 826.02A.2 of the Standard Specifications. The joint and sealant shall be included in the price bid for Valley Gutter.



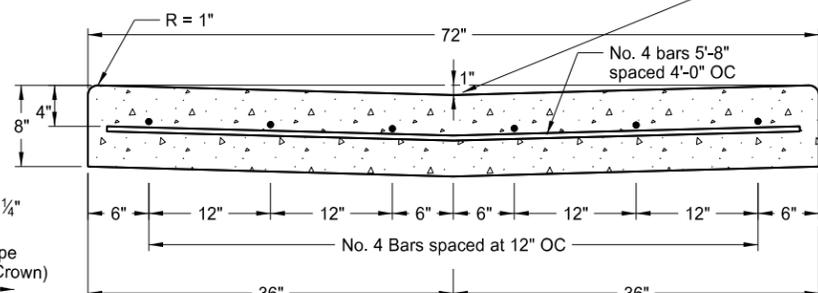
Curb & Gutter Type 1 (Sec. A)



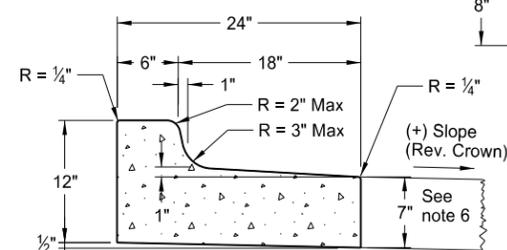
Contraction Joint



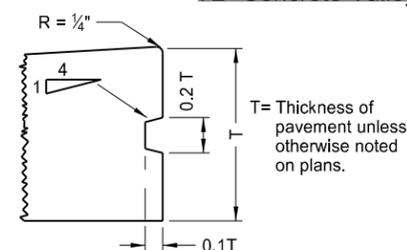
72" Concrete Valley Gutter Plan



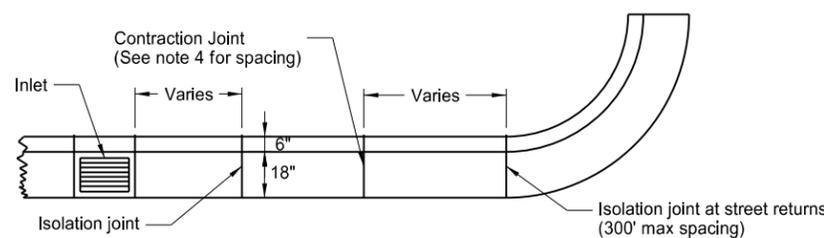
72" Concrete Valley Gutter Detail



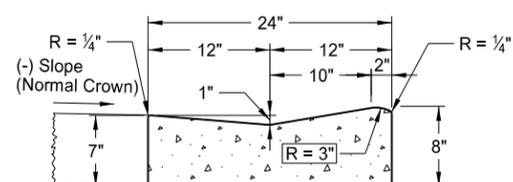
Curb & Gutter Type 1 (Sec. B)



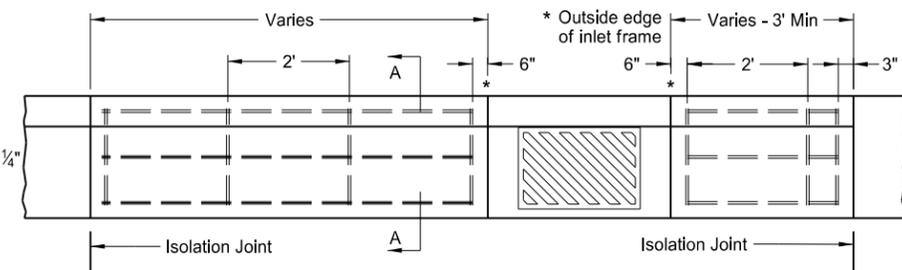
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



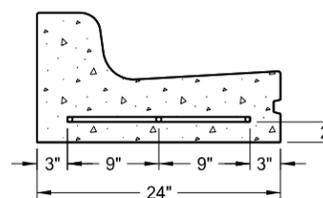
Joint Location Detail



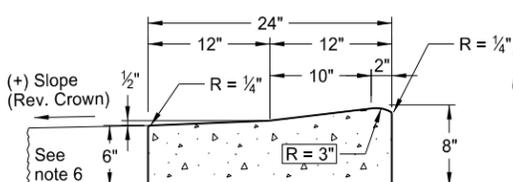
Mountable Curb & Gutter Type 1 (Sec. A)



Curb & Gutter Reinforcing at Inlets



Section A-A



Mountable Curb & Gutter Type 1 (Sec. B)

NOTE: All bars shall be #4 deformed reinforcing bars. Splices will not be permitted. Reinforcing bars at inlet locations will not be paid for separately, but shall be included in the price bid for "Curb and Gutter - Type 1." This includes inlets located on radii. The reinforcement shall be extended to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE

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