

DESIGN DATA				
Traffic	Average Daily			Max.Hr.
Current 2012	Pass: N/A	Trucks: N/A	Total: 100	N/A
Forecast 2032	Pass: N/A	Trucks: N/A	Total: 100	N/A
Clear Zone Distance: 18'		Design Speed: 55 MPH		
Minimum Sight Dist. for Stopping: 495'		Bridges: STA 18+80		
Minimum Sight Dist. for Safe Passing: N/A		Bridge Loading: HL93		
Sight Dist. for No Passing Zone: N/A				
Pavement Design Life (years)				

# JOB# 17

## STEELE COUNTY, NORTH DAKOTA

### PLANS FOR

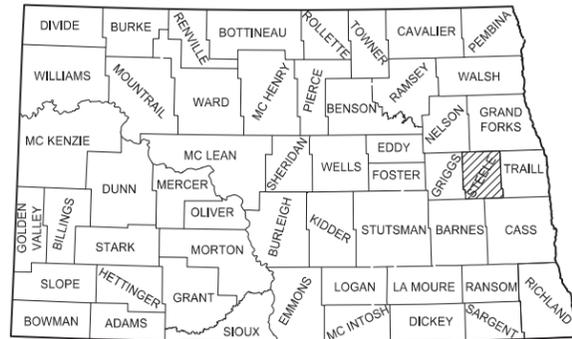
FEDERAL AID PROJECT NUMBER BRC-4613(052)  
STRUCTURE NUMBER 46-112-18.0  
FHWA LIMITED INVOLVEMENT

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	20162	1	1

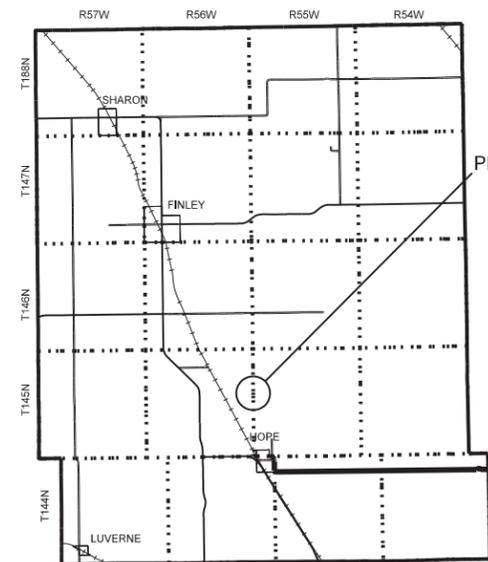
**GOVERNING SPECIFICATIONS:**

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

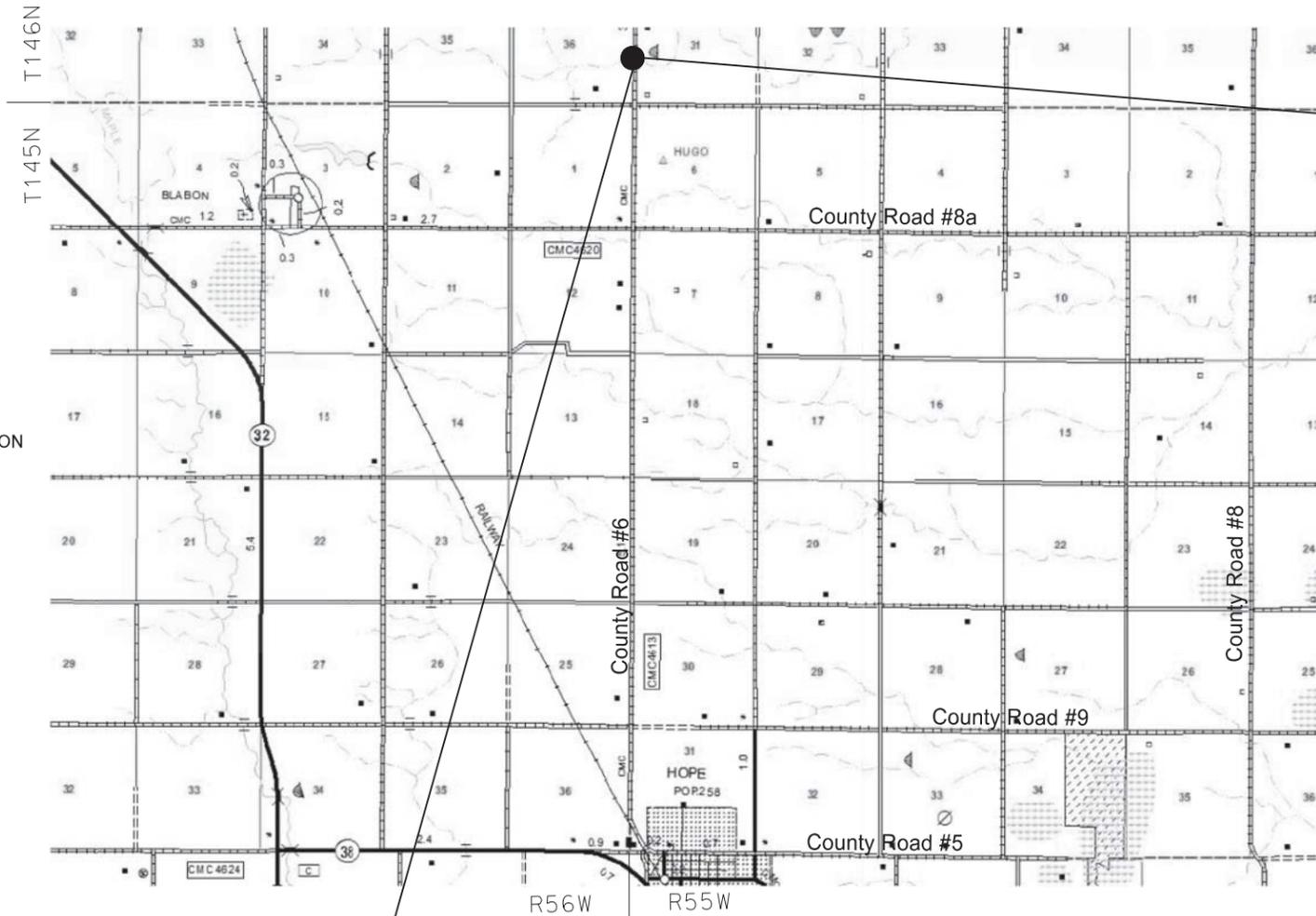
PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
BRC-4613(052)	0.189	0.189



SKETCH MAP OF NORTH DAKOTA SHOWING COUNTIES



SKETCH MAP OF STEELE COUNTY



End Project BRC-4613(052)  
Station 24+00  
N=17151.5731  
E=19911.7347  
2400.00' North of the SE  
Corner of Section 36 T146 R56W

DESIGNERS
Mike Bassingthwaite, PE
Tim Pearson

Begin Project BRC-4613(052)  
Station 14+00  
N=16151.5818  
E=19907.5643  
1400.00' North of the SE  
Corner of Section 36 T146 R56W

P.S.&E. CORRECTIONS MADE DATE 08-13  
SURVEYED DATE 12-12  
DESIGNED DATE 07-13

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 8/28/2013

Michael L. Bassingthwaite  
INTERSTATE ENGINEERING

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	2	1

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D-704-15	Construction Sign and Barricade Location Details
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D-704-22	Construction Sign and Barricade Location Details
D-708-2	Erosion and Siltation Controls
D-708-5	Erosion and Siltation Control Blanket Installation
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D-708-7	Erosion Control Fiber Roll Staking Details
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LIST OF SPECIAL PROVISIONS (SP)

<u>SP #</u>	<u>Description</u>
SP 1010(08)	Temporary Erosion & Sediment Best Management Practices
SP 1101(08)	Split Sampling & Testing Requirements for Aggregate Base
SP 1277(08)	Permits & Environmental Considerations



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## NOTES

### 100-P01 DETOURS:

The contractor shall maintain the roadways used as detours and repair areas damaged by the detoured traffic. These roadways shall be designated as haul roads and the engineer shall conduct a pre haul inspection. Upon completion of the project, the contractor shall restore the roadways to a condition at least equal to that which existed at the time traffic was routed over them. Work shall be as deemed necessary by the engineer. The repair and maintenance of the detours will be paid for in accordance with Section 107.05 B of the Standard Specifications - Haul Roads.

### 105-P01 CONTROL OF WORK:

1. Utility Locations: Utility locations shown on the plans are approximate. It shall be the Contractor's responsibility to contact all utilities for verification of locations prior to construction in any area. **ND One Call 1-800-795-0555.**
2. The Contractor shall confine his activities to the project right-of-way and construction easement areas as shown on the plan and profile sheets. The Contractor shall be responsible for damages incurred if his equipment or construction activities digress from the project right-of-way and construction easement areas.
3. Existing fences will be relocated by others without Federal Aid. The contractor shall notify the Engineer a minimum of three weeks prior to starting work to allow coordination of the relocation.

### 107-P01 HAUL ROADS:

1. Any haul road repair deemed necessary by the Owner or the Engineer to designated haul roads occurring after the pre-haul inspection and as a result of the Contractors hauling and in accordance with the specifications will be paid for according to Section 107.05 B.7. Any repair required because of overload or over speed hauling will be paid for by the Contractor at no additional cost to the Owner.
2. The gross vehicle weight on all county and township roads shall not exceed 80,000 pounds unless approved by the local agency. The contractor shall contact the appropriate State, County, Township, or City officials to determine if there are any No Haul Routes prior to preparing a bid for this project. Contractors may check with the Steele County Highway Superintendent, Tim Lee (701-524-2131) for local roads.

### 202-P01 REMOVAL OF STRUCTURE:

1. The existing structure to be removed at Station 18+80 consists of a single span timber bridge 59 feet in length.
2. All salvaged materials will become the property of the Contractor. The remainder of the structure shall also become the property of the contractor and disposed of off the right-of-way.
3. The Contractor shall arrange for and secure a suitable disposal site. The Contractor shall obtain any permits and site releases for the disposal site(s).
4. Any piling not fully removed shall be cut of a minimum of one foot below the bottom of the channel / class 2 excavation.
5. All costs involved for removal and disposal of the structure shall be included in the price bid for "Removal of Structure".

### 203-P01 EXCAVATION AND EMBANKMENT:

1. The topsoil shall be stripped to its full depth. The topsoil depth was estimated to be 6 inches for the overall average. Topsoil will not be measured separately and will be paid at plan quantity. All costs to salvage, stockpile, and replace the topsoil shall be included in the unit price bid for "Topsoil."
2. Common Excavation: Measurement for Common Excavation shall to be in accordance with Section 203.03B of the Standard Specifications (Contract Quantity). The Contractor shall spread the topsoil evenly over the entire disturbed right-of-way and construction easement areas, except the 32-foot roadbed, approaches, and riprap.
3. After removing topsoil from original ground under all roadbed embankment areas, an additional one-foot shall be scarified and re-compacted. Benching of the existing roadway inslopes shall be required. A standard detail is included however the contractor shall note that all benches shall be deep enough to provide sufficient width to permit placing, spreading, compaction, and compaction equipment to operate and each bench shall be thoroughly compacted before additional embankment is placed. All scarifying, re-compacting, and benching shall be included in price bid for "Common Excavation – Type B."
4. In accordance with Section 107.04 of the Specifications, the Contractor is reminded that the material source approval process applies to all material sources including contractor option borrow sources. Clearance shall be obtained before work begins.
5. Placement of embankment shall be in accordance with Section 203.02H of the Standard Specifications (Compaction Control, Type B). 35% additional volume is included for shrinkage in the embankment.



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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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## NOTES

6. Borrow-Excavation shall be contractor option. Mr. Walter Grotte (701) 238-2992 has indicated that material may be available on his property SW of the project. Mr. Kerry Baldwin (701) 524-1291 has indicated that material shall be available on his landlords property SE of the roadway.
7. Borrow sources shall be stripped of topsoil and vegetation before it is cross sectioned. Erosion and sediment control devised required at contractor option sites shall be included in the price for "Borrow – Excavation".

### **210-P01 STRUCTURAL EXCAVATION, STRUCTURAL FILL, AND FOUNDATION PREPARATION:**

1. **Class 1 Excavation** shall be to the limits shown on the plan typical box culvert layout drawing. The quantity of Class 1 Excavation within the excavation limits is estimated at 440 cubic yards. All material not considered suitable for the roadbed shall be used to fill the road inslopes unless the material is deemed waste excavation by the engineer. It is assumed that this material will be suitable for use in embankment areas. Payment for all Class 1 Excavation to the limits shown on the plans will be Lump Sum. The price bid for Class 1 Excavation shall include the costs for placement of this material in embankment areas. The embankment shall meet the requirements of Section 203.02H Compaction Control Type B.
2. **Class 2 Excavation** shall be to the limits shown on the plan typical box culvert layout drawing. The quantity of Class 2 Excavation within the limits is estimated at 640 cubic yards. All material not considered suitable for the roadbed shall be used to fill the road inslopes unless the material is deemed waste excavation by the engineer. It is assumed that this material will be suitable for use in embankment areas. Payment for all Class 2 Excavation to the limits shown on the plans will be Lump Sum. The price bid for Class 2 Excavation shall include the costs for placement of this material in embankment areas. The embankment shall meet the requirements of Section 203.02H Compaction Control Type B.
3. **Channel Excavation** shall be excavated to the limits shown on the typical box culvert layout drawing. Excavation necessary to place riprap is included in these limits. The quantity of Channel Excavation within the limits is estimated at 160 cubic yards. It is assumed that this material will be suitable for use in embankment areas. All material not considered suitable for the roadbed shall be used to fill the road inslopes unless the material is deemed waste excavation by the engineer. Payment for all Channel Excavation to the limits shown on the plans will be Lump Sum. The price bid for Channel Excavation shall include the costs for placement of this material in embankment areas. The embankment shall meet the requirements of section 203.02H Compaction Control Type B.
4. **Foundation Fill** shall be Class 3 or Course Aggregate size 3, and in accordance with Section 210.02 B.2 of the Standard Specifications. The backfill around the structure shall be placed in lifts not to exceed six (6) inches, compacted with a mechanical tamper. Water shall be added to the fill and shall be included in the price bid for Foundation Fill. Ordinary compaction shall apply to the foundation fill (not specified density).

5. **Select Backfill** adjacent to and over the box culvert shall be Class 3 in accordance with Section 210.02 B.1 and Section 816.03 of the Standard Specifications, placed to the limits shown on the plans. The backfill around the structure shall be placed in lifts not to exceed six (6) inches, compacted with a mechanical tamper. Water shall be added to the fill and shall be included in the price bid for Select Backfill. Moisture and density controls for specified density shall be in accordance with Section 203.02G of the Standard Specifications. AASHTO T180 shall be utilized.
6. **Foundation Preparation:** The contractor shall note that flowing or standing water is present in the channel at this location. The water level fluctuates throughout the year. Bidders shall include all costs generated due to site conditions into associated bid items when bidding this project. No additional compensation nor revisions to the completion date will be made due to fluctuations in the water level.
7. **Waste Excavation:** All material from the structural and channel excavation not useable as embankment material shall be removed and disposed of at a site obtained by the Contractor. The Contractor is responsible for obtaining any and all permits needed for waste disposal and shall full responsibility for complying with the requirements of said permits and with all applicable laws. The Contractor shall be responsible for restoring the waste disposal areas to satisfactory condition and any seeding required. This shall be included in the price bid for excavation with no direct compensation therefore. The Contractor shall be required to obtain a site release for the disposal site.

### **606-P01 PRECAST REINFORCED CONCRETE BOX CULVERT:**

1. The structure shall be one line of precast double cell 12'x11' RCBC. The culvert shall be of 92 feet long from inside of the parapet to inside of the parapet. In addition to the items listed in Section 606.04 of the Standard Specifications, the shop drawings shall show:
  - A. A fence anchor detail for each end section shall be shown. Anchors are required on all four corners. Anchors shall be suitable for supporting a four strand barbed wire fence.
2. The end sections shall include a reinforced concrete parapet on the top of the roof and a reinforced concrete cutoff wall below the floor. The parapet shall be one (1) foot by one (1) foot and shall be as long as the barrel section's outside width. The cutoff walls shall be placed under the end of the end sections and shall be a minimum of one (1) foot thick, and three (3) feet, two (2) inches deep. The cutoff walls shall extend three (3) feet beyond the edges of outside box culvert walls.



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## NOTES

3. A flexible sealant compound shall be placed in every joint of the precast concrete box culvert. A joint sealant compound shall be installed as per the manufacturer's recommendations. The flexible sealant shall be installed in addition to the geotextile fabric required in Section 606.04 of the Standard Specifications. Costs for the material and its installation shall be included in the price bid for the precast reinforced concrete box culvert.
4. Each precast reinforced concrete box culvert section shall be secured with four tie bolts per joint.
5. Box Culvert Design Moments

**MOMENTS DUE TO HL93 TRUCK LOADING IMPACT = 0%**

**12 FT x 11 FT X DOUBLE CELL BOX WITH 10 to 12 ft FT OF OVERFILL**

COMPONENT	LOCATION	Max Mu (KIP-FT/FT)	Min Mu (KIP-FT/FT)
<b>TOP SLAB</b>	<b>EXTERIOR CORNER</b>	<b>4.93</b>	<b>0.01</b>
	<b>MIDSPAN</b>	<b>26.40</b>	<b>9.62</b>
	<b>INTERIOR CORNER</b>	<b>-12.91</b>	<b>-21.44</b>
<b>WALL</b>	<b>TOP CORNER</b>	<b>-6.28</b>	<b>-14.03</b>
	<b>MID HEIGHT</b>	<b>-6.34</b>	<b>-11.62</b>
	<b>BOTTOM CORNER</b>	<b>-7.88</b>	<b>-12.08</b>
<b>BOTTOM SLAB</b>	<b>EXTERIOR CORNER</b>	<b>3.84</b>	<b>1.55</b>
	<b>MIDSPAN</b>	<b>23.02</b>	<b>14.33</b>
	<b>INTERIOR CORNER</b>	<b>-11.96</b>	<b>-22.24</b>

### NOTES

Negative moments at corners are computed at the intersection of the haunch and the regular depth member per AASHTO 12.11.4.2 LRFD Bridge Design Specifications 5<sup>th</sup> Edition.

#### BASIS OF DESIGN

Top slab thickness = 9 inches  
 Bottom thickness = 9 inches  
 Exterior Wall thickness = 9 inches  
 Interior Wall thickness = 8 inches  
 Haunches = 12 inches

### 704-P01 TRAFFIC CONTROL

Construction signing for the project shall be provided and maintained by the Contractor as per Section 704 of the Standard Specifications and the attached Standard Drawings and the MUTCD Manual.

"County Road No. 6" signs for the detour route shall be purchased by the contractor and shall be included under the bid price for "Traffic Control Signs". At the completion of the project, the signs will become property of Steele County. The contractor shall deliver the signs to the County shop in Finley.

### 708-P01 EROSION CONTROL

#### 1. ROCK RIPRAP:

A. Any shaping necessary to prepare for the riprap placement shall be included in the price bid for "Riprap, Loose Rock". Riprap shall be paid for by the Cubic Yard (C.Y.) as shown on the Plans unless otherwise directed by the Engineer in the field. All riprap shall conform to Section 708.04 of the Standard Specifications. Geotextile filter fabric Type RR shall be installed under the Rock Riprap and shall be included in the price bid for "Riprap, Loose Rock."

#### 2. FIBER ROLLS:

After replacement of the topsoil, fiber rolls shall be installed at the locations shown on the Permanent Erosion Control sheet or as designated by the Engineer in the field, and in accordance with plan details and the standard specifications.

#### 3. EROSION CONTROL BLANKET:

An estimated quantity of erosion control blanket has been included in the plans to be placed at erosion critical locations primarily around the structure as directed by the engineer.



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**NOTES**

**4. SEEDING:**

A. Seeding shall cover the entire disturbed right-of-way & construction easement areas except the 32-foot roadbed. Seeding shall be Type B CL V in accordance with Section 708 of the Standard Specifications. Payment for seeding shall be per mile.

TYPE B, CLASS V

GRASS SPECIES	VARIETY	POUNDS PURE LIVE SEED PER ACRE
Western Wheatgrass	Rodan or Rosanna	10
Slender Wheatgrass	Revenue or Primar	4
Pubescent Wheatgrass	Mandan 906 or Greenleaf	10
Alfalfa		6
Total		30

B. Mulching shall be required for the majority of the project limits to be seeded. The estimated quantity for acres of mulch shall be considered advisory only; all disturbed areas to be seeded may not require mulch: (Slopes too steep to property to secure the mulch will either be seeded only or ECB may be used.)

C. A cover crop is required as per Section 708.02C.1.a (4) and shall be included in the price bid for "Seeding-Type B CL V". Should a temporary cover crop (CL VI) need to be seeded during the summer months (June 15<sup>th</sup> to September 1<sup>st</sup>), payment will be made at the bid price per mile for "Temporary Cover Crop CL VI".

**5. TEMPORARY EROSION CONTROL MEASURES:**

A. During the course of the project, the installation of silt fence unsupported will be required according to Standard Drawing D-708-2. This fencing will be placed at various locations along the project as shown in the plans or as required for permit compliance. Silt fence unsupported shall be paid for by the linear foot, complete, in place and accepted by the engineer.

B. The Field Engineer may allow this fencing to be reused as construction advances. If fencing is reused in different locations, the Contractor will be paid the unit price bid for "Silt fence unsupported" each time the fence is relocated. The fencing to be placed shall be on-site before the stripping of topsoil may begin. Approximately 200 lineal feet of fence has been added to the estimated quantities to be used if needed. Payment will be made only for the amount of silt fence actually installed.

C. The Contractor shall be responsible for maintaining the silt fence throughout the duration of the project. This shall include the removal of sediment and the repair of the silt fence as directed by the Engineer. All costs associated with this work shall be included in the price bid for silt fence or as approved by the Engineer from the PS #1 Schedule.

D. A Storm Water Runoff Permit will be required from the ND Department of Health as detailed in the project proposal. Any additional temporary erosion controls required due to this permit, directed by the engineer, or needed due to site conditions shall be installed and paid for under the conditions of Specification 110 unless bid items are used. Devises required for contractor option borrow sites shall be include in the price bid for "Borrow – Excavation".

**709-P01 GEOTEXTILE FABRIC – TYPE R1**

**Box Culvert** - Reinforcement fabric shall be placed parallel to the roadway centerline. If more than one piece of fabric is used to meet the required length, then the joint must be sewn. Adjacent strips of fabric shall be butted. All fabric must be taut and pinned with a 6" (min) pin, peg, or staple every 15' along all edges and on all corners prior to placing fill on the fabric. The required R1 fabric for the box culvert installation shall be included in the price bid for the RCBC.



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## ENVIRONMENTAL COMMITMENTS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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**ENVIRONMENTAL COMMENTS:** Steele County, the North Dakota Department of Transportation, and the Federal Highway Administration have made environmental commitments to various public agencies and the public to secure approval of this project. The environmental commitments are as follows:

**Commitment No. 1:** Avoid creek channel changes and placement of fill in wetlands to the fullest extent possible.

Action taken/required: No channel changes will be constructed. Wetland impacts below the ordinary high water line of the stream channel will be mitigated by placing the structure floor and riprap below the existing channel surface; i.e. the channel will be excavated and the structure and riprap will be placed 1 foot below the existing channel elevation.

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)	
							Temp. Ac.	Perm. Ac.
1	Sec.30, T146N, R55W	R4	Riverene	0.10	Natural	Yes	0.10	0.00
2	Sec.30, T146N, R55W	R4	Riverene	0.15	Natural	Yes	0.15	0.00
<b>Totals</b>				<b>0.25</b>			<b>0.25</b>	<b>0.00</b>

**Commitment No. 2:** A storm discharge permit is required if more than one acre is disturbed.

Action taken/required: The Contractor will be required to obtain a storm water discharge permit from the North Dakota Department of Health and shall comply with the requirements contained in the permit.

**Commitment No. 3:** A US Army Corp of Engineers Section 404 Permit is required.

Action taken/required: A permit has been obtained from the USACE. The Contractor shall comply with all requirements listed in the permit obtained.

**Commitment No. 4:** No work shall be allowed in the channel from April 15<sup>th</sup> to June 1<sup>st</sup>.

Action taken/required: The contractor shall not be allowed to do any construction or demolition activities in the channel during this timeframe.

**Commitment No. 5:** Care is to be taken during construction activity near any water of the state to minimize adverse effect on a water body.

Action taken/required: Best management practices and erosion control devices will be used in accordance with the plans and storm water permit to minimize adverse effects.

**Commitment No. 6:** The structure shall not be removed before July 15 unless the Contractor uses alternative measures to prevent migratory birds from nesting prior to construction

Action taken/required: The Contractor shall comply with this requirement. Netting shall be placed under the structure to prevent nesting if the contractor chooses start the project prior to July 15<sup>th</sup>. This netting shall be placed in early spring prior to the bird's arrival.

**Commitment No. 7:** Aquatic nuisance species (ANS) is a concern of the ND Game and Fish Department.

Action taken/required: The Contractor, including any and all Subcontractors or others involved in the project, will be required to take appropriate and reasonable precautions to prevent the introductions of ANS into the State's waters or the movement of ANS within North Dakota or between North Dakota waters. These ANS precautions extend to any and all vehicles, vessels, trailers, pumps, and such equipment that will be used in the waters of the State. The Contractor will provide the Department a reasonable opportunity to inspect any and all vehicles, vessels, pumps, and equipment that will be used in the waters of the State prior to the those items being launched or placed in the waters of the State. A minimum 72 hour notice must be provided to the Department for scheduling an inspection. The Department's ANS Biologist, Mr. Fred Ryckman, is to be contacted at the Riverdale Office (701-770-0920) for equipment inspections or any additional information regarding ANS prevention protocols.

### PERMITS REQUIRED:

A Section 404 Permit (US Army Corps of Engineers) – See Environmental SP

NDPDES permit from NDDoH – Contractor to obtain – Note that Steele County shall be listed as the owner on the permit. The Highway Superintendent Mr. Tim Lee (701) 524-2131 shall be the owners contact



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## ESTIMATED QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	8	1

SPEC	CODE	DESCRIPTION	UNIT	NO. OF UNITS
103	0100	CONTRACT BOND	L SUM	1
202	0105	REMOVAL OF STRUCTURE	L SUM	1
203	0102	COMMON EXCAVATION-TYPE B	CY	35
203	0109	TOPSOIL	CY	1,198
203	0140	BORROW-EXCAVATION	CY	15,000
210	0101	CLASS I EXCAVATION	L SUM	1
210	0111	CLASS 2 EXCAVATION	L SUM	1
210	0127	CHANNEL EXCAVATION	L SUM	1
210	0200	SELECT BACKFILL	CY	1,200
210	0210	FOUNDATION FILL	CY	800
210	0411	FOUNDATION PREPARATION	L SUM	1
216	0100	WATER	M GAL	100
302	0160	AGGREGATE SURFACE COURSE CL 13	TON	750
606	3211	DBL 12FT X 11FT PRECAST RCB CULVERT	LF	90
606	7211	DBL 12FT X 11FT PRECAST RCB END SECTION	EA	2
702	0100	MOBILIZATION	L SUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	966
704	1052	TYPE III BARRICADE	EA	10
708	1020	RIPRAP-LOOSE ROCK	CY	160
708	1322	SILT FENCE UNSUPPORTED	LF	1,500
708	1332	REMOVAL OF SILT FENCE UNSUPPORTED	LF	1,300
708	1375	FLOTATION SILT CURTIAN	LF	100
708	1376	REMOVAL FLOTATION SILT CURTAIN	LF	100
708	1430	FIBER ROLLS 12IN	LF	1,400
708	1431	REMOVAL FIBER ROLLS 12IN	LF	200
708	2281	SEEDING-TYPE B-CL V	MILE	0.189
708	5201	TEMPORARY COVER CROP CL VI	MILE	0.189
708	5500	MULCHING	ACRE	2.5
708	5650	ECB TYPE 1	SY	400
754	0803	OBJECT MARKER - TYPE III	EA	4

## BASIS OF ESTIMATE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	10	1

**203 BORROW – EXCAVATION**

Plan dimension less structural fill plus 35% for shrinkage.

**210 SELECT BACKFILL**

Plan dimension plus 25% for shrinkage

**216 WATER**

Common Excavation	6 gal/CY
Borrow	6 gal/CY
Dust Palliative	25 Mgal/Mile
Aggregate Surface Course	30 gal/Ton

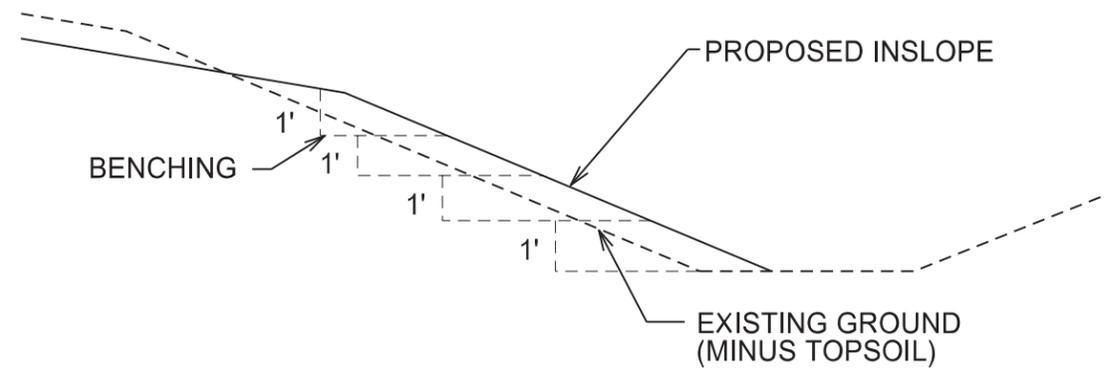
**302 AGGREGATE SURFACE COURSE CL13**

4" Depth, 28' Top Width. 2' Sloughs	1.875 Ton/CY
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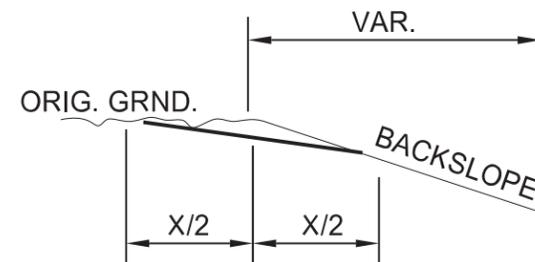


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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	20	1



**BENCHING TYPICAL SECTION**  
N.T.S.



BACKSLOPE ROUNDING WHERE X = 10'  
UNLESS RESTRICTED BY HEIGHT OF BACKSLOPE

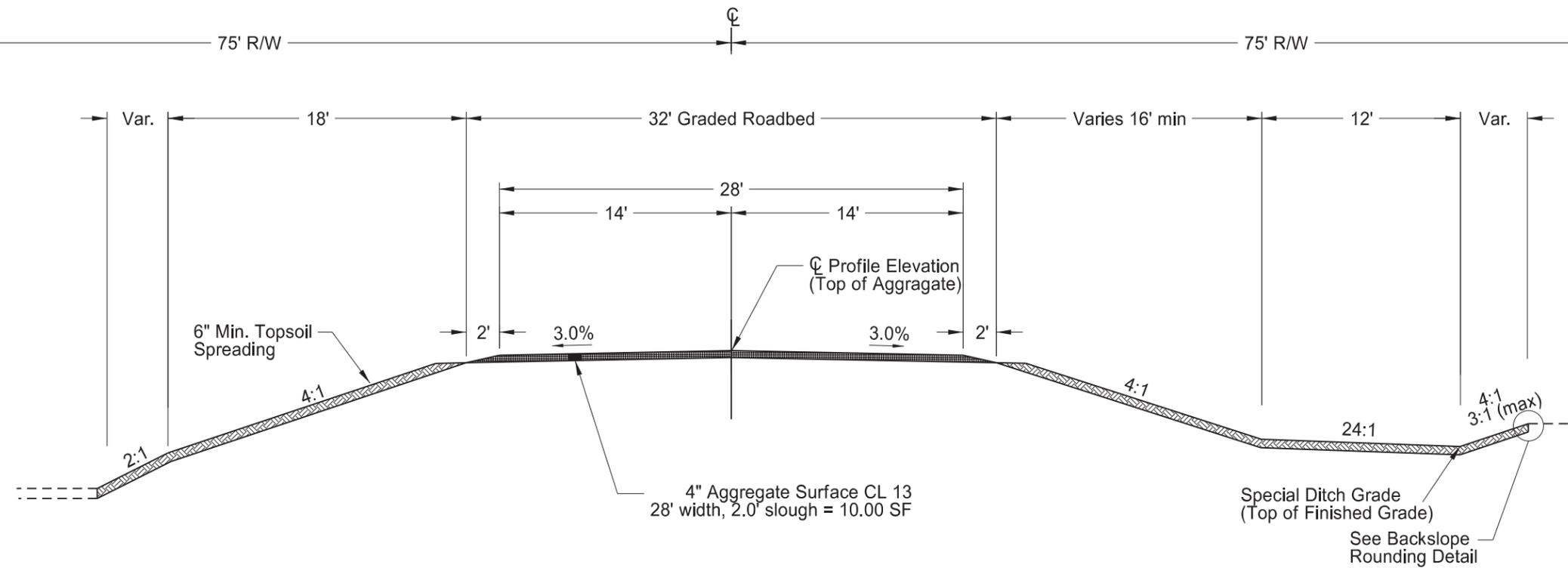
**BACKSLOPE ROUNDING**  
N.T.S.

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Details  
Steele County North Dakota



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(053)	30	1



## Typical Section

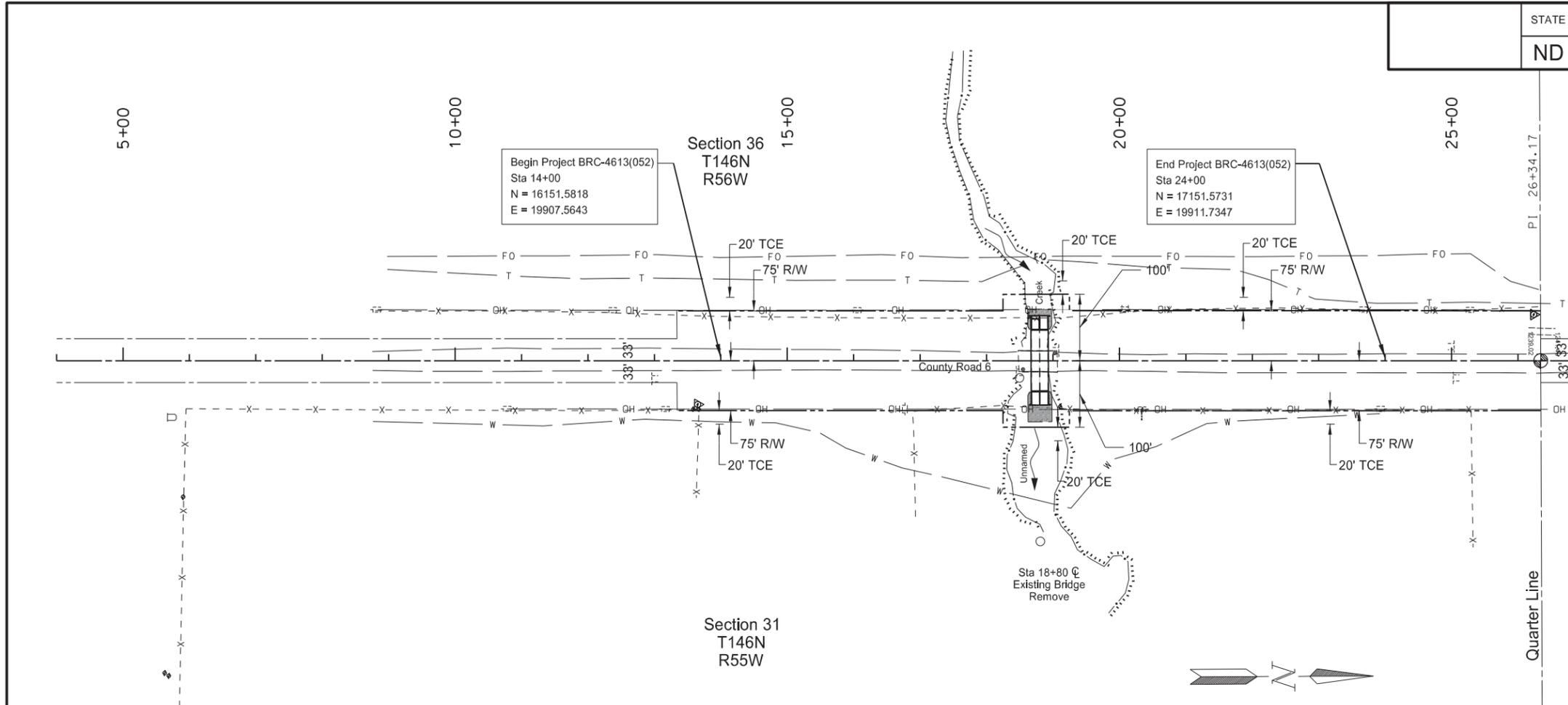
N.T.S.

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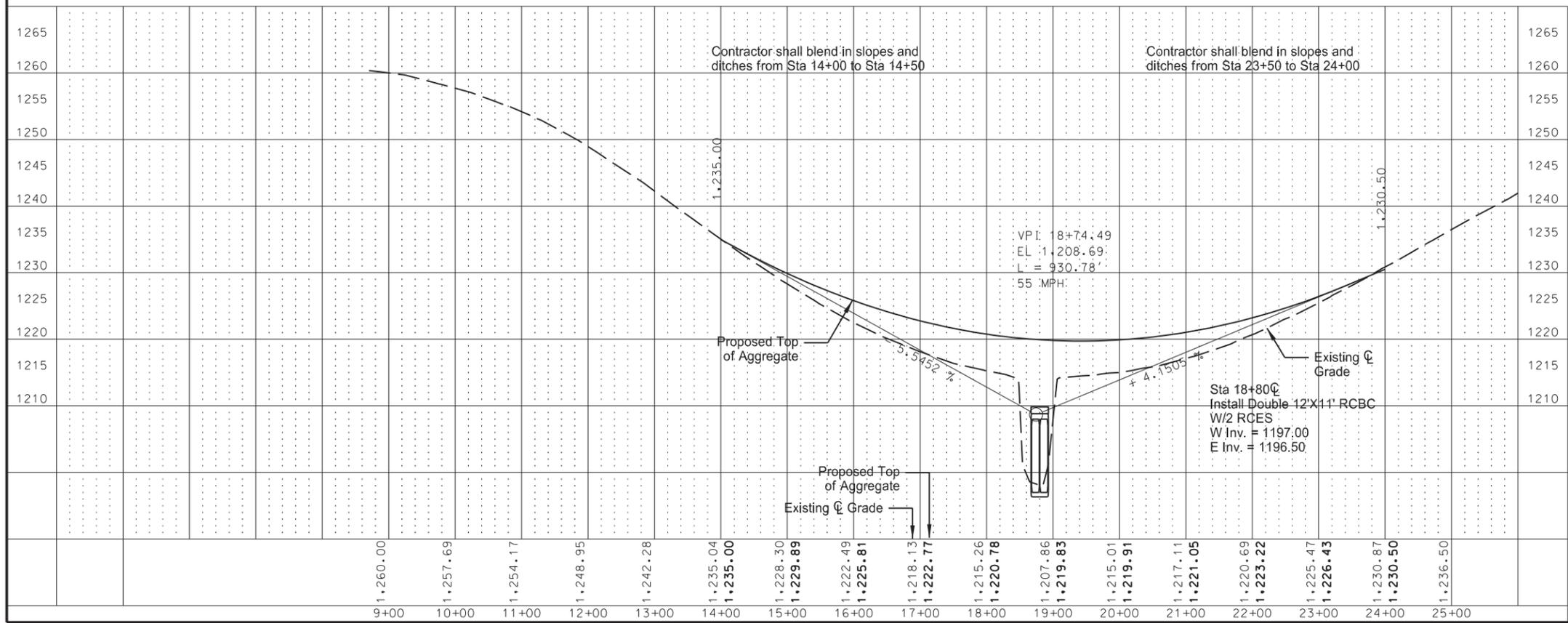


Typical Section  
Steele County North Dakota

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	60	1



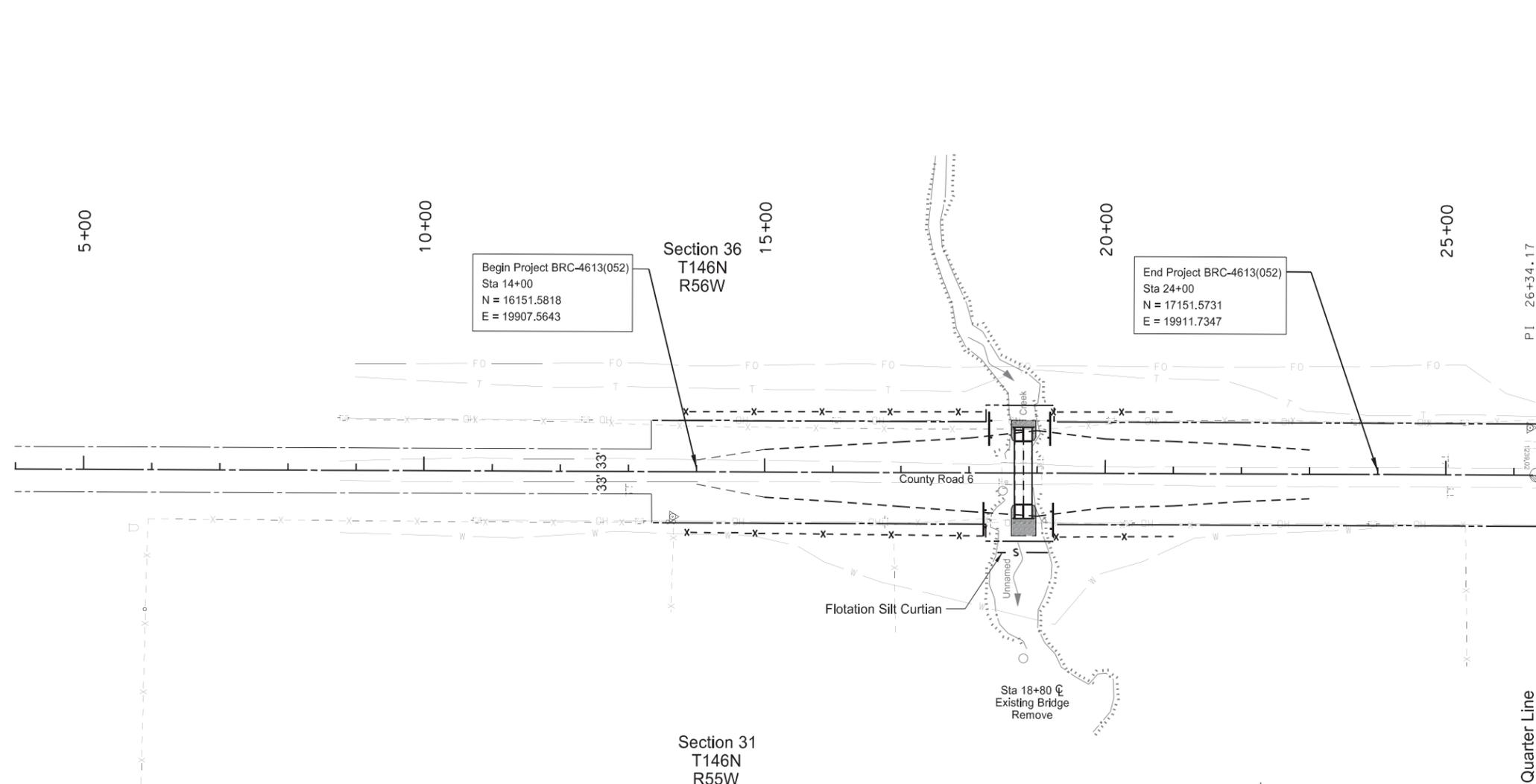
Note:  
Existing fences shall be removed by others.  
Existing signs shall be removed by the Contractor and provided to the County. The Engineer shall verify if the sign requires removal.



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Plan and Profile  
Steele County, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	75	1



<u>Flotation Silt Curtian</u>		
Sta 18+80 - RT		100 LF
<u>Silt Fence Unsupported</u>		
STA 14+00 to 18+50	LT	450 LF
STA 19+00 to 21+00	LT	200 LF
STA 14+00 to 18+50	RT	450 LF
STA 19+00 to 21+00	RT	200 LF
<u>Fiber Rolls 12IN</u>		
Sta 18+50 - LT		50 LF
Sta 18+50 - RT		50 LF
Sta 19+00 - LT		50 LF
Sta 19+00 - RT		50 LF

- Erosion Control Legend**
- x- - - - x- Silt Fence Unsupported
  - Fiber Rolls 12IN
  - s — Flotation Silt Curtian

**Note:**  
 Erosion Control as shown shall be placed after land disturbing activities.  
 Once Box Culvert is complete erosion control will change to complete roadway.  
 All features shown shall be adjusted as needed to comply with ND PES Permit.  
 If erosion control features are to be installed by a subcontractor the prime contractor shall be responsible to coordinate locations so as to facilitate construction activities.

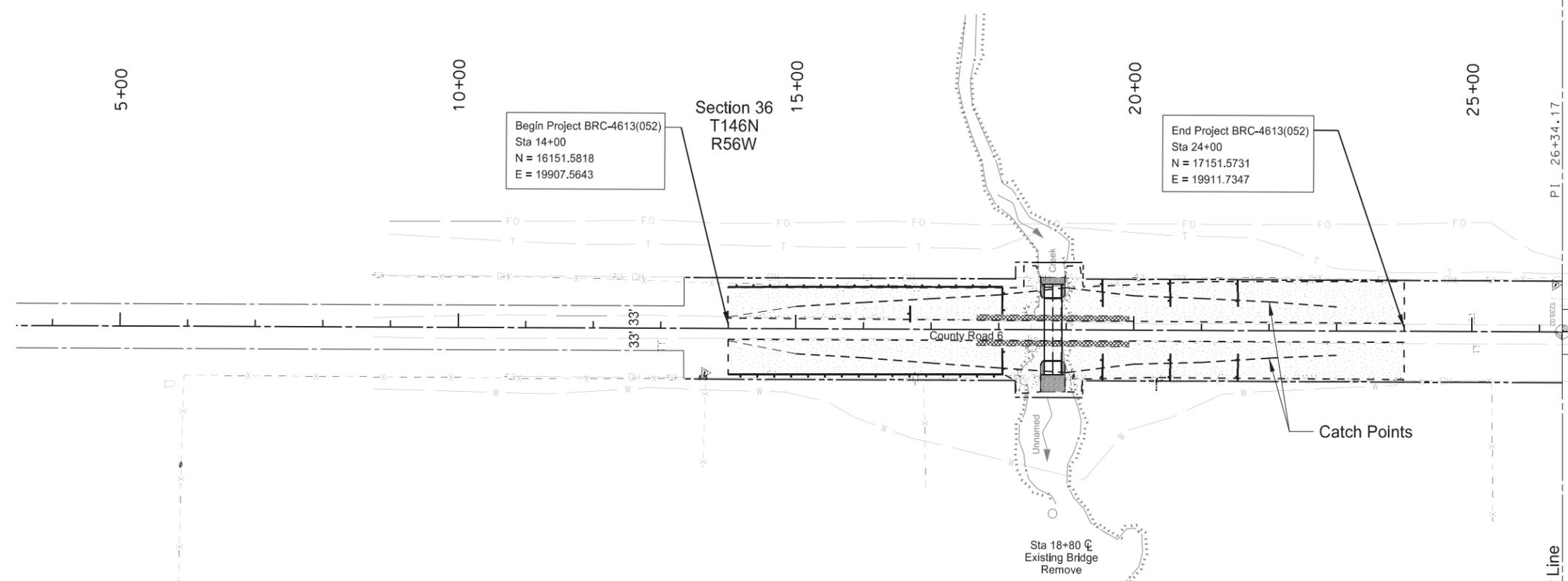


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Temporary Erosion Control  
 Steele County North Dakota

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	75	2

<u>Riprap Loose Rock</u>	
Sta. 18+80 LT	40 CY
Sta. 18+80 RT	100 CY
<u>Fiber Rolls 12in</u>	
Sta. 14+00 to 18+00 - RT	400 LF
Sta. 14+00 to 18+00 - LT	400 LF
Sta. 18+00 - LT	50 LF
Sta. 18+00 - RT	50 LF
Sta. 19+50 - LT	50 LF
Sta. 19+50 - RT	50 LF
Sta. 20+50 - LT	50 LF
Sta. 20+50 - RT	50 LF
Sta. 21+50 - LT	50 LF
Sta. 21+50 - RT	50 LF
<u>Seeding - Type B - CL V</u>	
0.189	Mile
<u>ECB Type 1</u>	
Sta. 17+68 to 19+93 LT	200 SY
Sta. 17+68 to 19+93 RT	200 SY



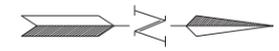
Begin Project BRC-4613(052)  
Sta 14+00  
N = 16151.5818  
E = 19907.5643

End Project BRC-4613(052)  
Sta 24+00  
N = 17151.5731  
E = 19911.7347

Section 31  
T146N  
R55W

Erosion Control Legend

-  Seeding
-  ECB Type 1
-  Fiber Rolls 12IN



Quarter Line



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Note: Permanent Erosion Control features are the items to be installed at project completion

Permanent Erosion Control  
Steele County North Dakota







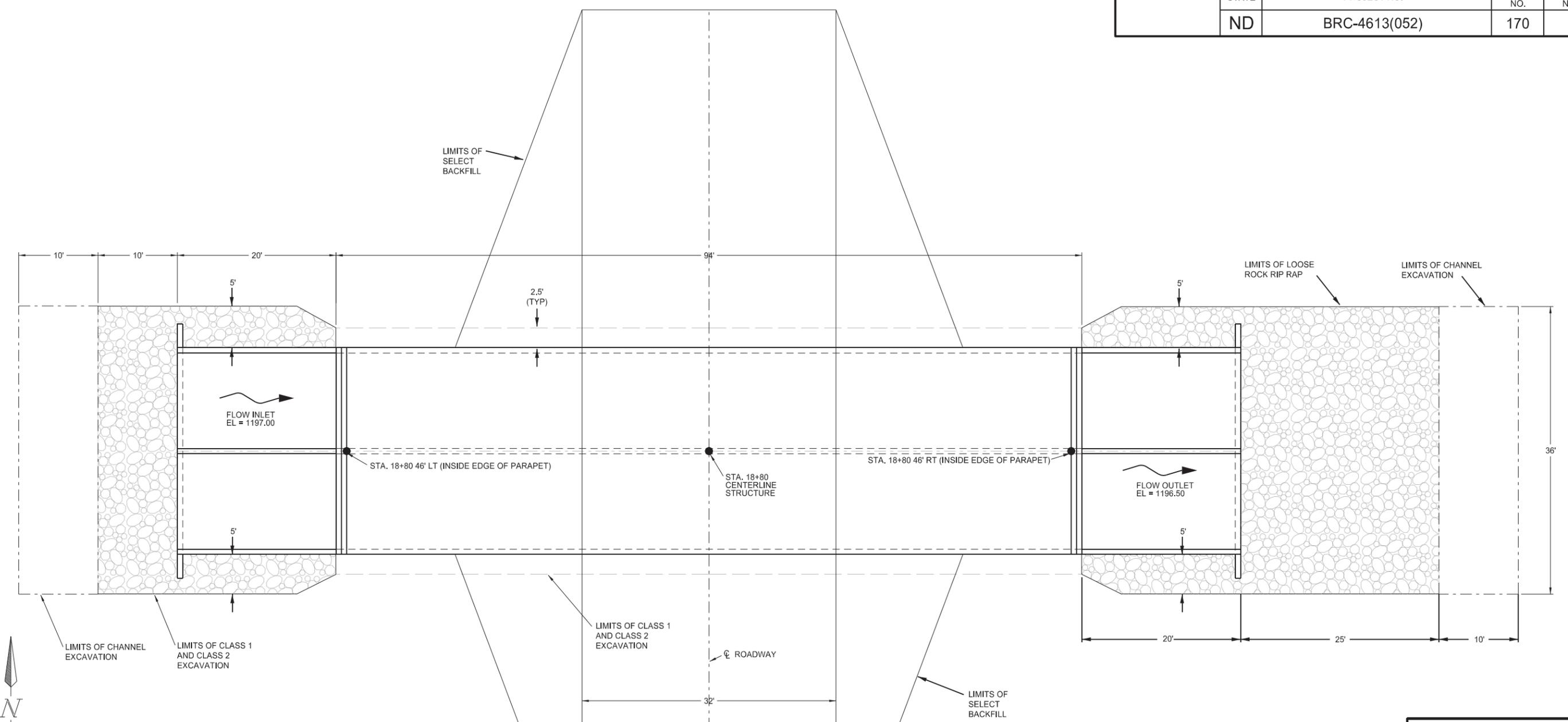
- ① W20-3-48 "Road Closed Ahead" with Type III Barricade Mounted (1 Barricade Postmount)
- ② W20-2-48 "Detour 2000 Feet" Post Mounted
- ③ R11-2-48 "Road Closed" Type III Barricade Mounted (3 Barricades)
- ④ M4-8-24 "Detour" M3-3-24 "South" M1-6-24 "County Road #6" M5-1-21 "←" or "→" Post Mounted
- ⑤ M4-8-24 "Detour" M3-3-24 "South" M1-6-24 "County Road #6" M6-1-21 "←" or "→"
- ⑥ M4-8-24 "Detour" M3-3-24 "North" M1-6-24 "County Road #6" M5-1-21 "←" or "→" Post Mounted
- ⑦ M4-8-24 "Detour" M3-3-24 "North" M1-6-24 "County Road #6" M6-1-21 "←" or "→"
- ⑧ M4-8-24 "Detour" M3-3-24 "North" M1-6-24 "County Road #6" M6-3-21 "↑"
- ⑨ M4-8-24 "Detour" M3-3-24 "South" M1-6-24 "County Road #6" M6-3-21 "↑"

The construction signing layout is for informational purposes only. Traffic control signing shall be installed as per MUTCD manual and/or standard drawings.

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DES.	TRP	DRN.	TRP
CHK.	MLB	CHK.	MLB





HYDRAULIC DESIGN DATA	
DRAINAGE AREA (CONTRIBUTING)	50 SQ MILES
DESIGN FREQUENCY	25 YEARS
DESIGN DISCHARGE	1260 CFS
DESIGN STAGE	1205.73
STREAM GRADIENT	0.001 FT/FT
WATERWAY PROVIDED BELOW DESIGN STAGE	208 SQ FT
AVG. VELOCITY OF FLOW IN NATURAL CHANNEL	1.89 FPS
DEPTH OF FLOW	8.73 FT
VELOCITY OF FLOW THRU CULVERT	6.8 FPS
FREEBOARD PROVIDED	2.27 FT (MIN.)
100 YEAR FREQUENCY DISCHARGE	1960 CFS
100 YEAR FREQUENCY STAGE	1206.66
MAXIMUM OBSERVED STAGE	UNKNOWN
MAXIMUM RECORDED DISCHARGE	UNKNOWN
FREQUENCY OF MAXIMUM FLOOD	UNKNOWN
MINIMUM WATER ELEVATION	1.5 FT

SPEC.	CODE	ITEM DESCRIPTION	UNIT	QUAN.
210	0101	CLASS 1 EXCAVATION	LSUM	1
210	0111	CLASS 2 EXCAVATION	LSUM	1
210	0127	CHANNEL EXCAVATION	LSUM	1
210	0200	SELECT BACKFILL	CY	1200
210	0210	FOUNDATION FILL	CY	800
210	0411	FOUNDATION PREP	LSUM	1
708	1020	RIPRAP - LOOSE ROCK	CY	160

- NOTE:
1. PLACE RIPRAP TO MATCH BOX CULVERTS. TOP OF RIPRAP SHALL BE ONE (1) FOOT BELOW EXISTING CHANNEL ELEVATION.
  2. GEOTEXTILE FILTER FABRIC RR TO BE INCLUDED IN PRICE BID FOR ROCK RIP RAP.
  3. GEOTEXTILE TYPE R1 & S1 FABRIC TO BE INCLUDED IN PRICE BID FOR OTHER ITEMS.
  4. SELECT BACKFILL SHALL MEET CLASS 3 AS SPECIFIED IN SECTION 816 OF THE STANDARD SPECIFICATIONS.
- EXISTING STREAM BED ELEVATION UPSTREAM OF STRUCTURE = ±1198.00

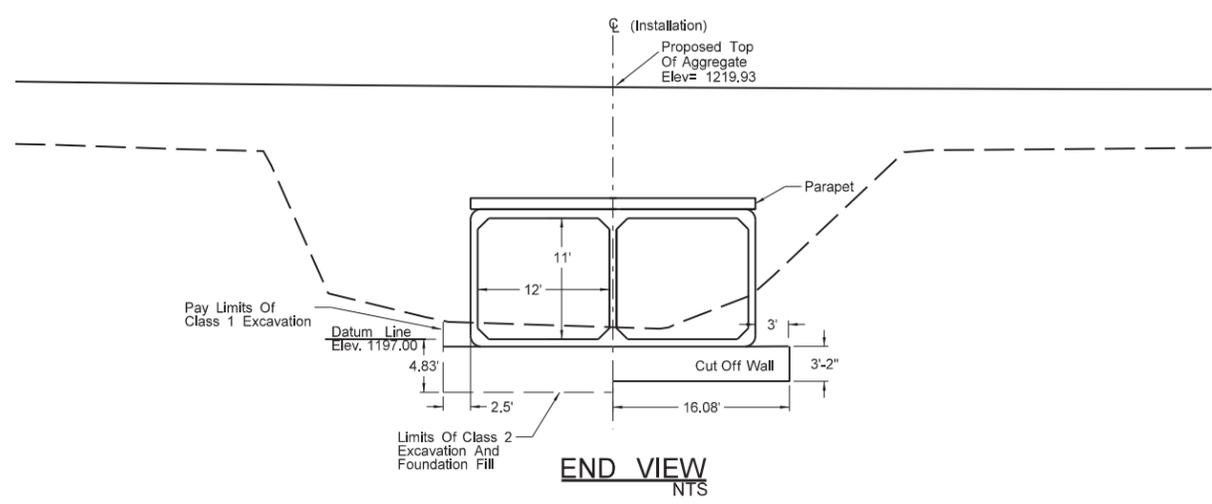
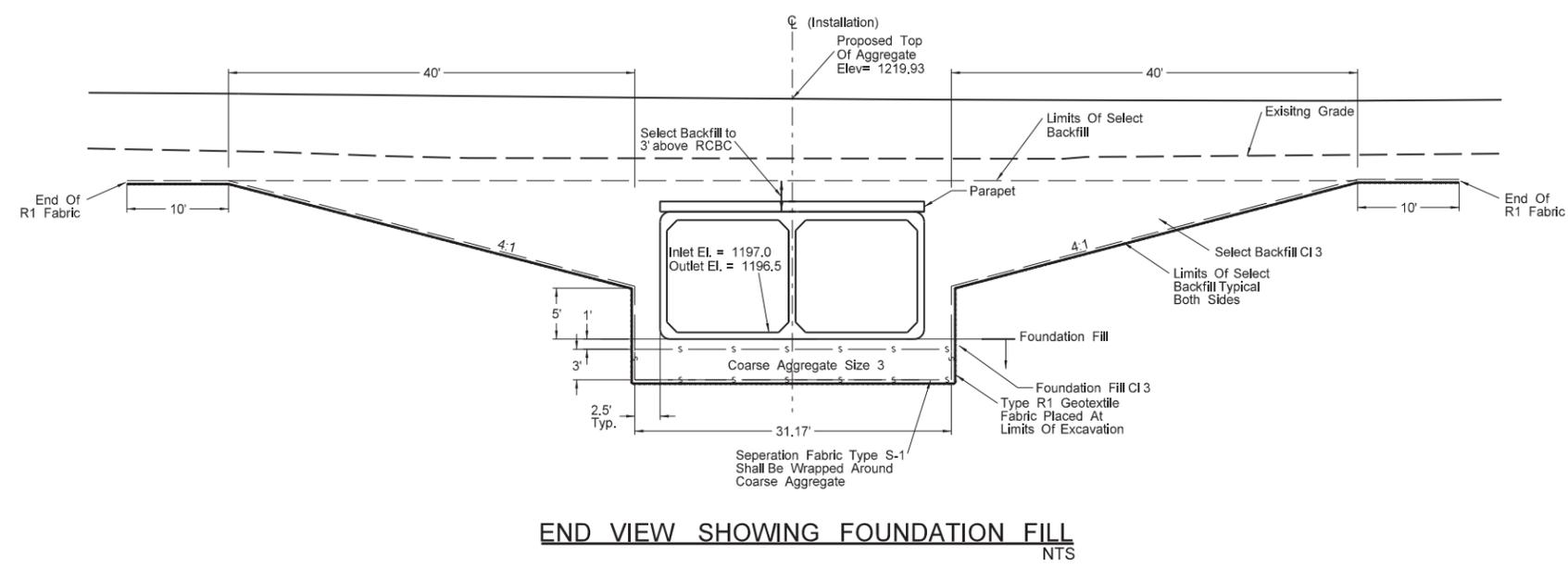
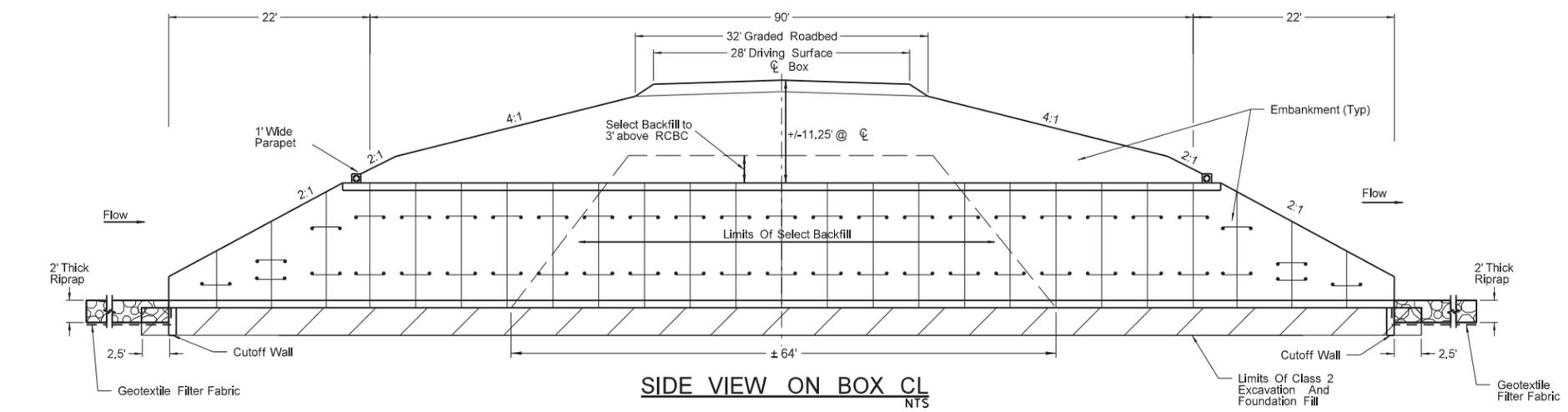
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Box Culvert Layout

Steele County North Dakota

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-4613(052)	170	2



Note:  
 Geotextile Type R1 & S1 fabric to be incidental to the box culvert bid item.  
 Select Backfill shall meet CI 3 as specified in Section 816 of the standard specifications.  
 Foundation Fill shall be coarse aggregate size 3 (concrete rock) for the lower 3 feet. The final 1 foot shall be Class 3 aggregate meeting the same specification as Select Backfill.

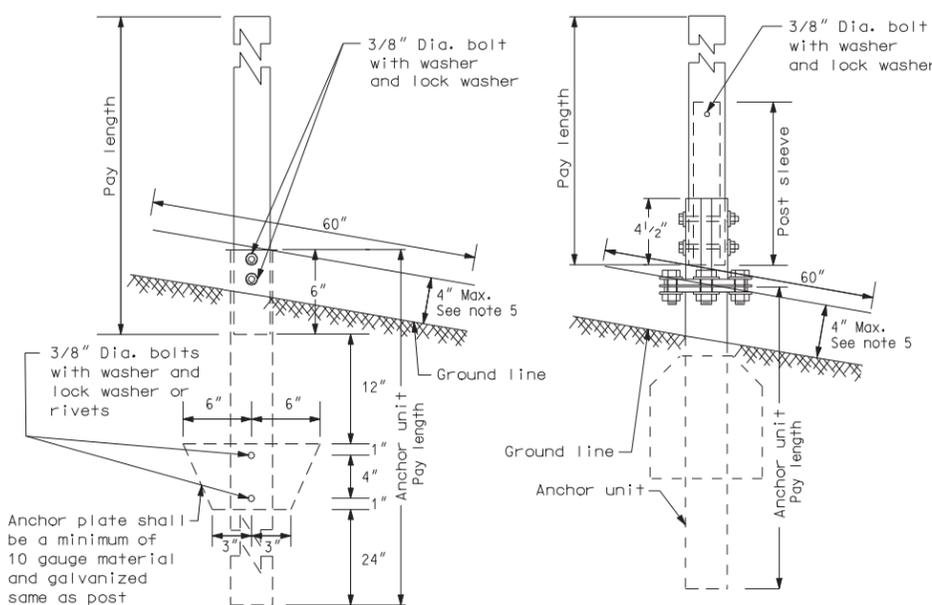


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Excavation Limits & Foundation Fill  
 Steele County North Dakota

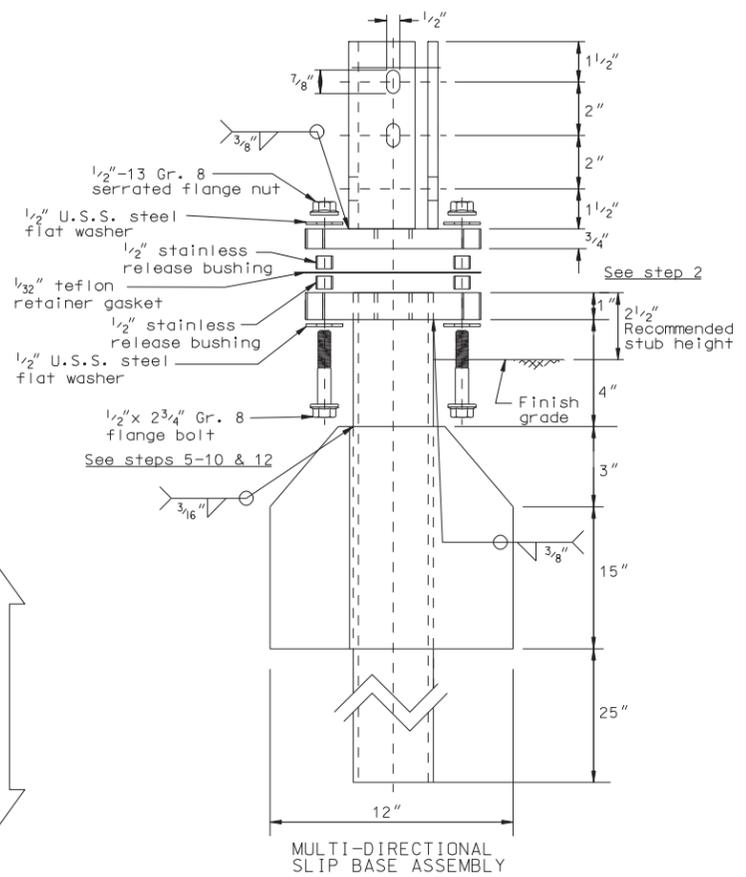
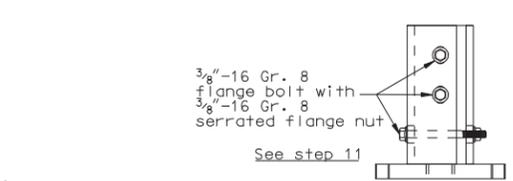
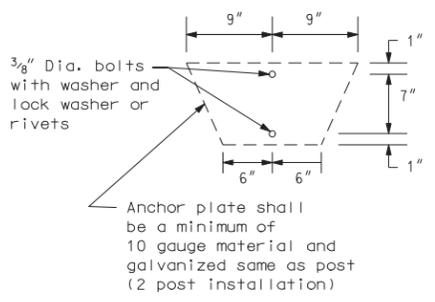
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

## PERFORATED TUBE

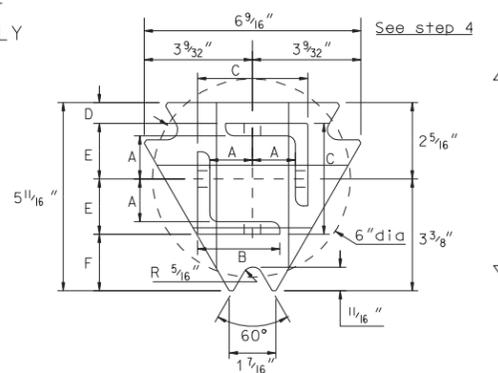


ANCHOR UNIT AND POST ASSEMBLY

SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY



MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

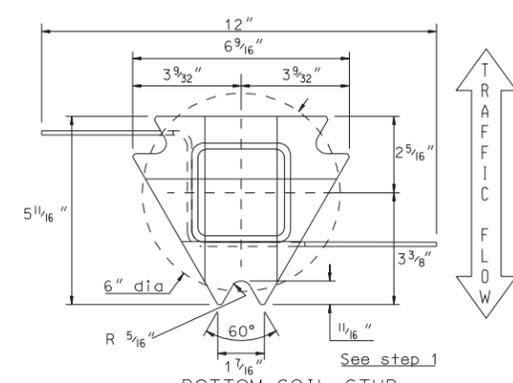


TOP POST RECEIVER

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

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 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

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



BOTTOM SOIL STUB

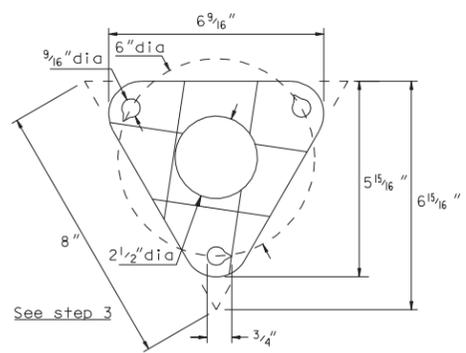
Materials: Tube - 3" x 3" x 7 gauge ASTM A500 Gr B tube  
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A 569  
Plate - ASTM A572 grade 50

- Notes
- 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.

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.

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.



BOLT RETAINER FOR BASE CONNECTION  
Materials: 1/32" reprocessed Teflon

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

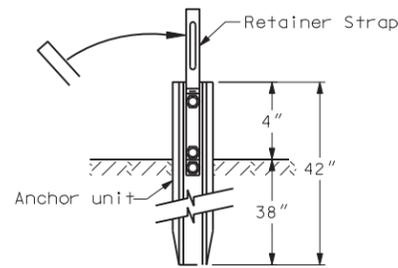
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

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# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

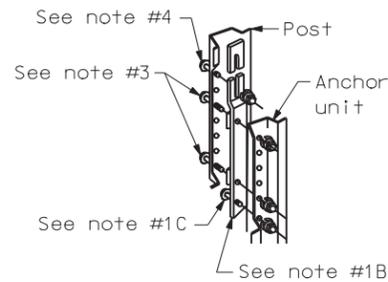
## FLANGED CHANNEL



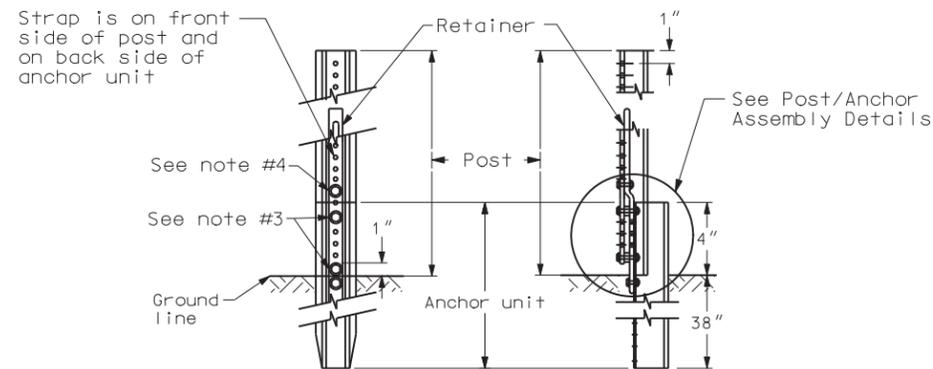
Anchor Unit & Strap Assembly Detail

### STEPS OF INSTALLATION

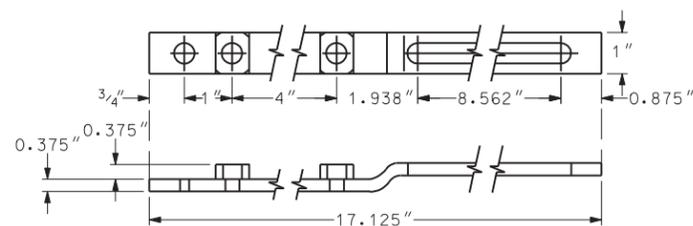
1. A) Drive anchor unit to within 12" of ground level.  
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.  
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.  
D) Rotate strap 90° to left.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



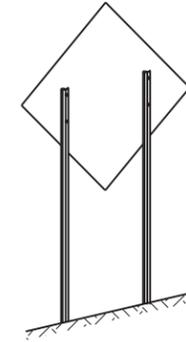
Front View Side View Sign Post Assembly Detail



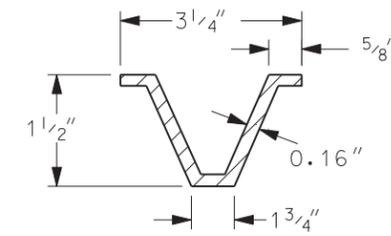
Retainer/Spacer Strap Detail

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

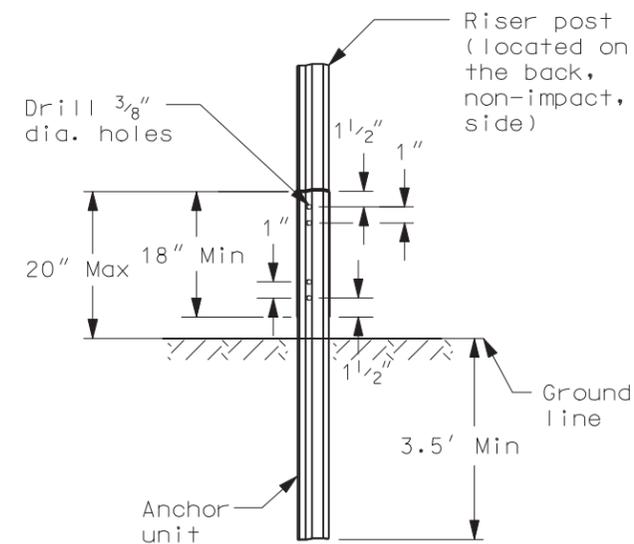
## 3 LB/FT U POSTS



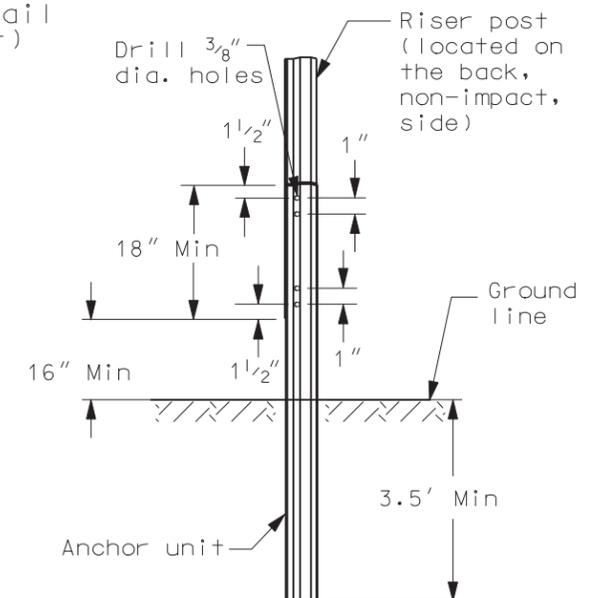
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

### Notes

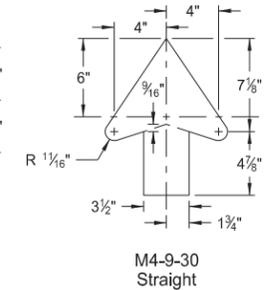
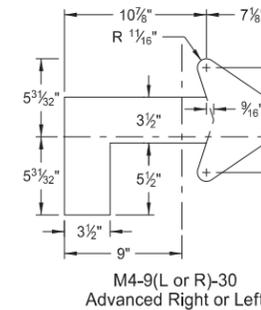
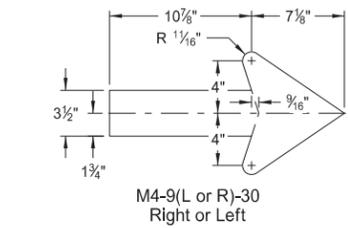
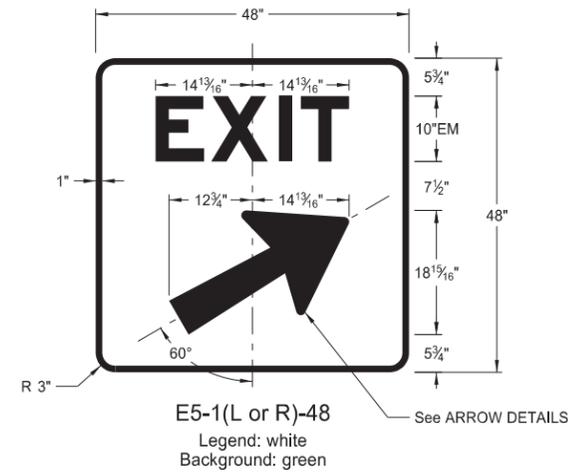
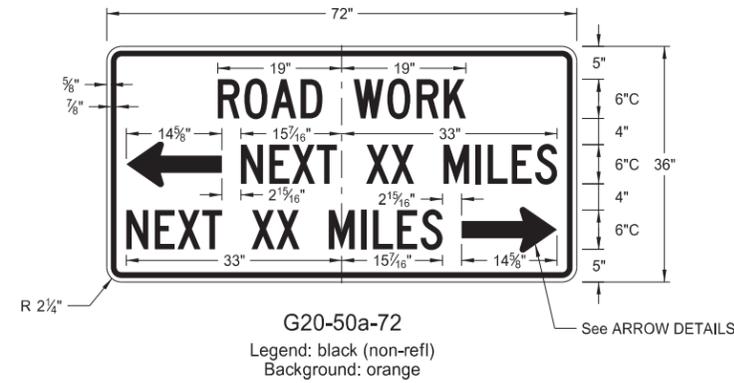
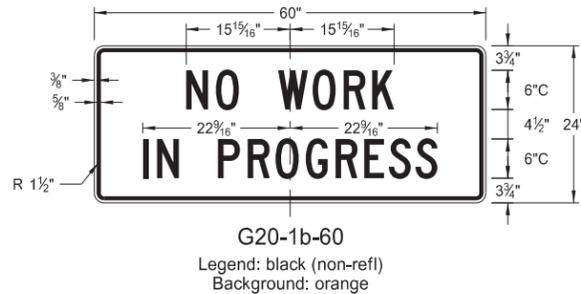
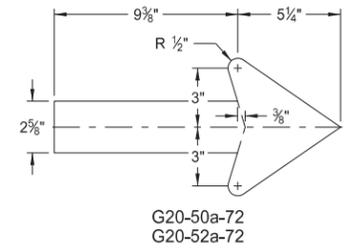
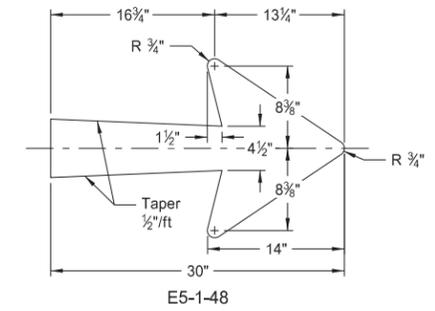
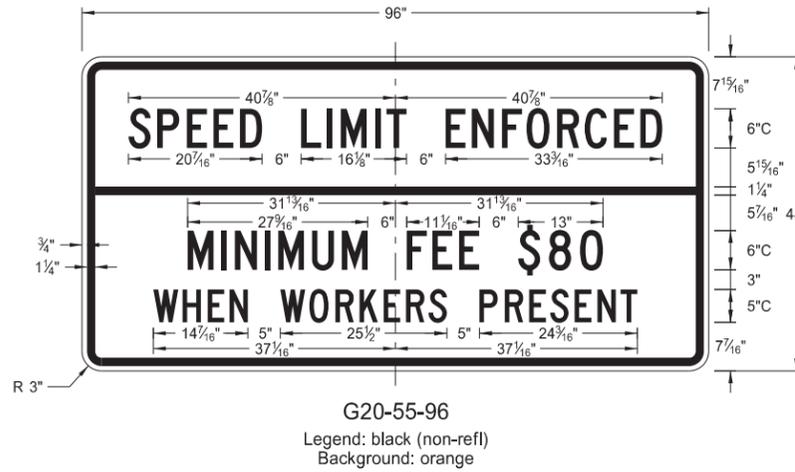
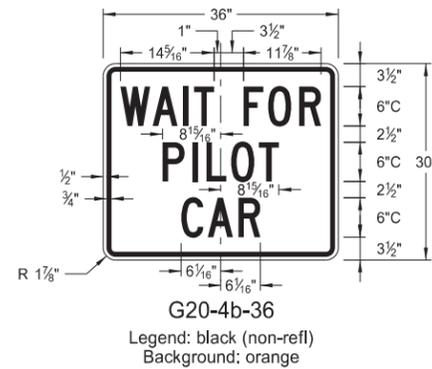
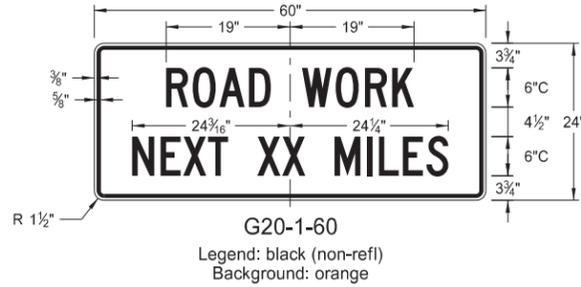
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more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

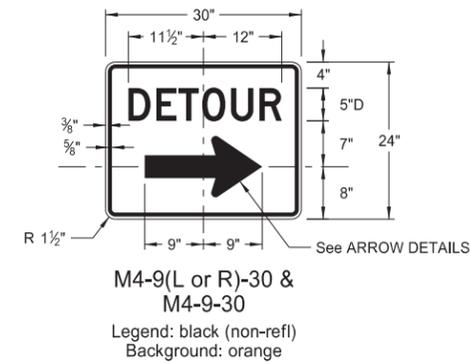
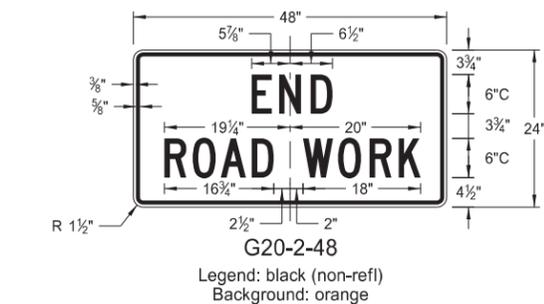
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS  
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

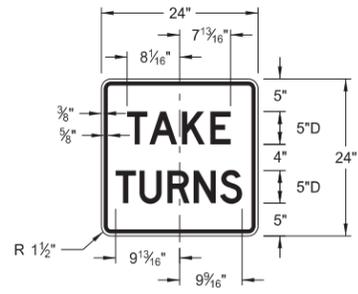
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

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CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS

D-704-10



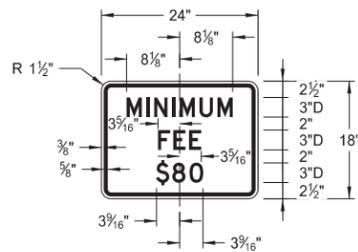
R1-50-24

Legend: black (non-refl)  
Background: white



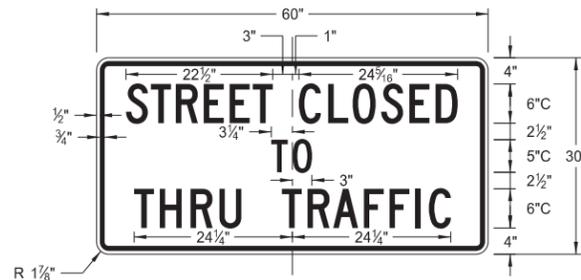
R11-3c-60

Legend: black (non-refl)  
Background: white



R2-1a-24

Legend: black (non-refl)  
Background: white



R11-4a-60

Legend: black (non-refl)  
Background: white



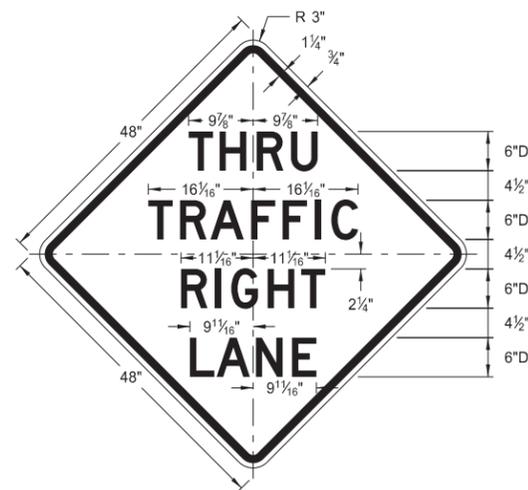
R11-2a-48

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Background: white

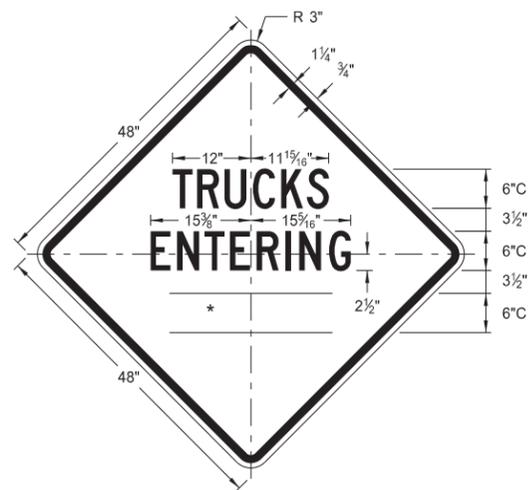
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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

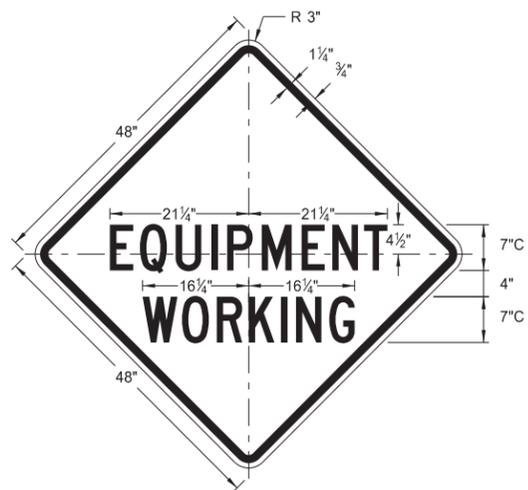
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS



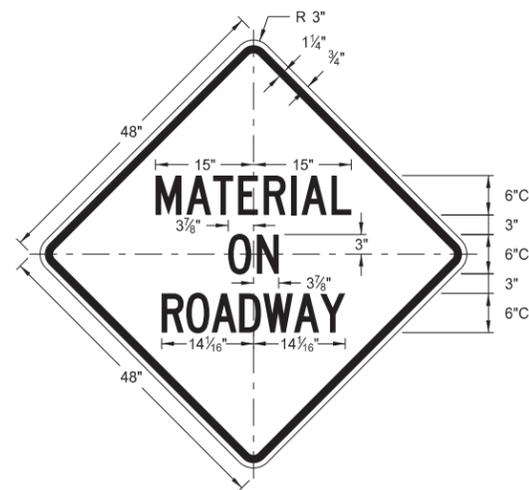
W5-8-48  
Legend: black (non-refl)  
Background: orange



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



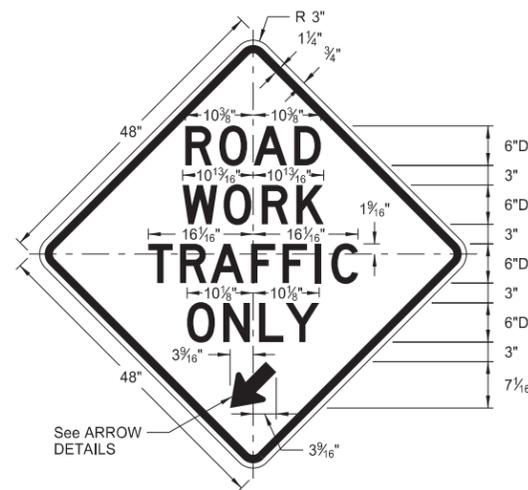
W20-51-48  
Legend: black (non-refl)  
Background: orange



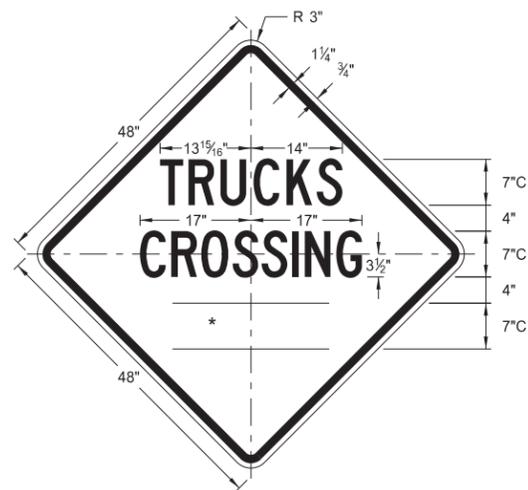
W21-51-48  
Legend: black (non-refl)  
Background: orange

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

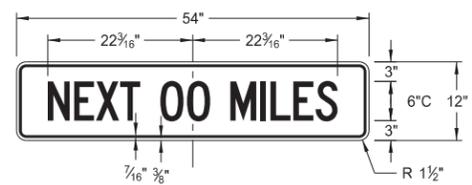
\* DISTANCE MESSAGES



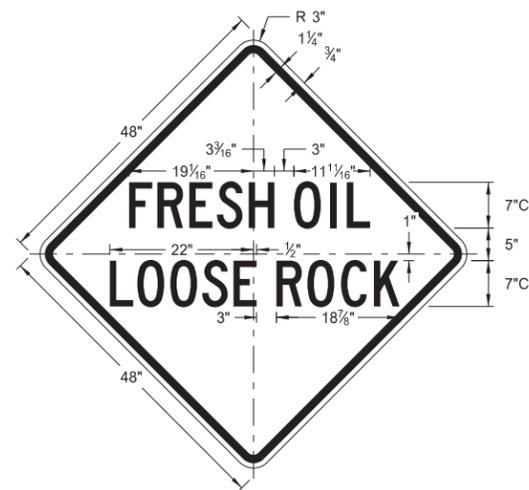
W5-9-48  
Legend: black (non-refl)  
Background: orange



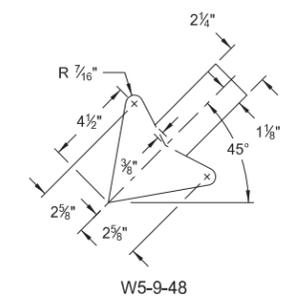
W8-55-48  
Legend: black (non-refl)  
Background: orange



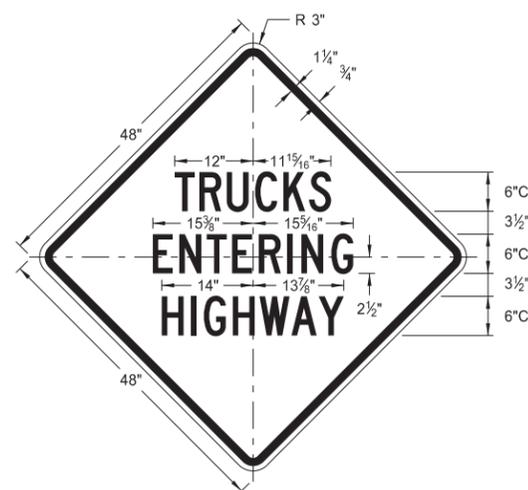
W20-52-54  
Legend: black (non-refl)  
Background: orange



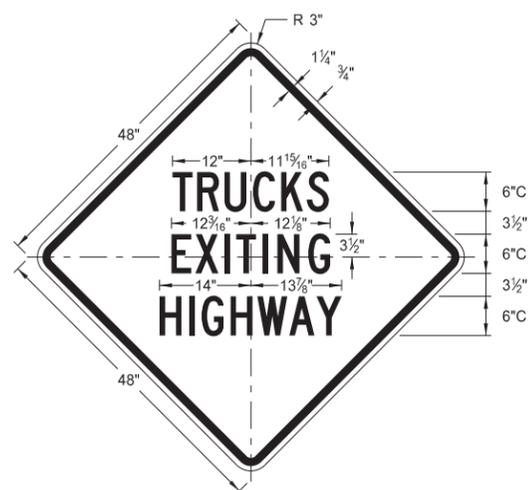
W22-8-48  
Legend: black (non-refl)  
Background: orange



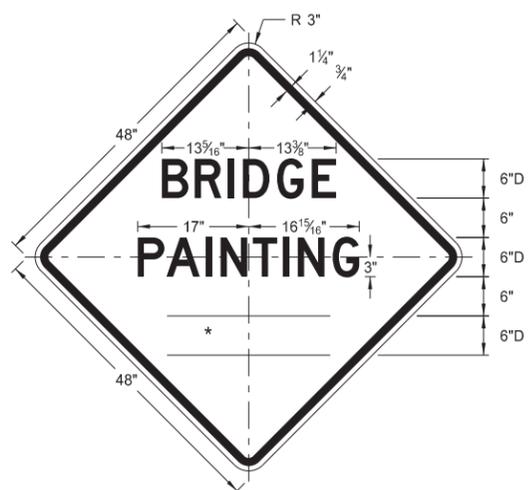
W5-9-48  
ARROW DETAILS



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



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

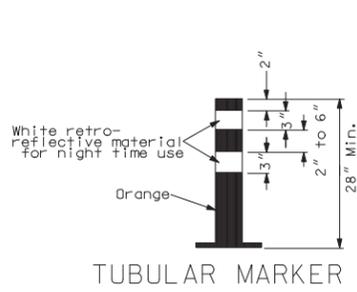


W21-50-48  
Legend: black (non-refl)  
Background: orange

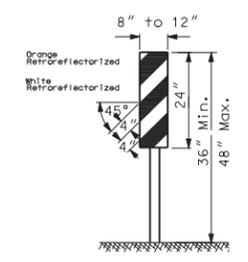
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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BARRICADE DETAILS AND CHANNELIZING DEVICES

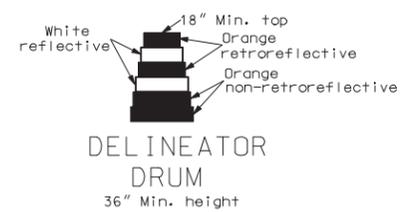


TUBULAR MARKER



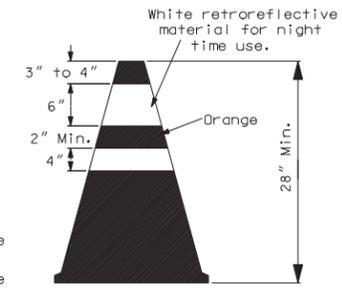
VERTICAL PANEL

(Retro-reflective sheeting shall be placed on both sides)  
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"

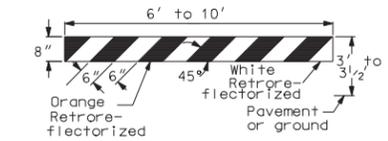


DELINEATOR DRUM

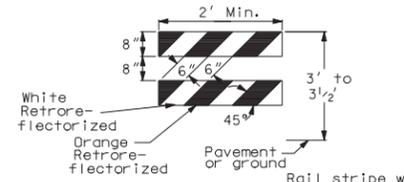
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retro-reflective sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall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



CONE

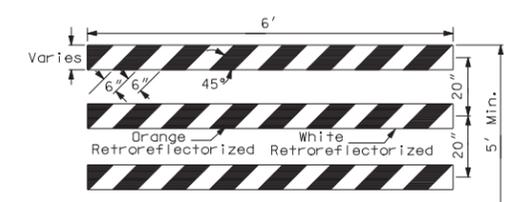


TYPE I BARRICADE



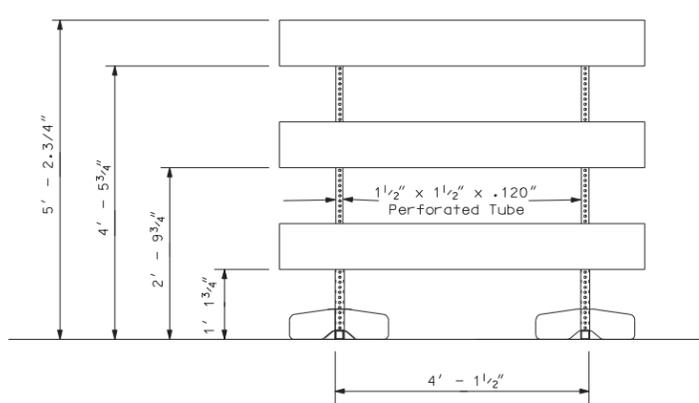
TYPE II BARRICADE

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

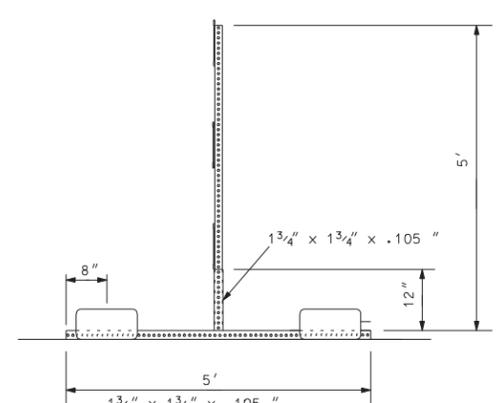


TYPE III BARRICADE

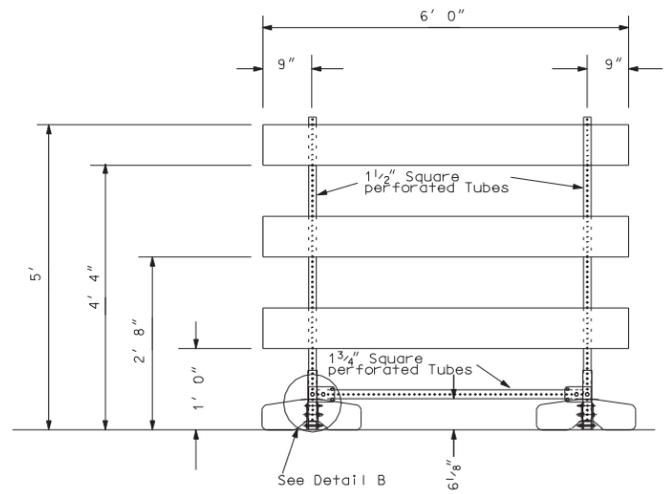
BARRICADES:  
Number of retro-reflective rail faces:  
Type I - 2 (One each direction)  
Type II - 4 (Two each direction)  
Type III - 6 (Three in each direction)



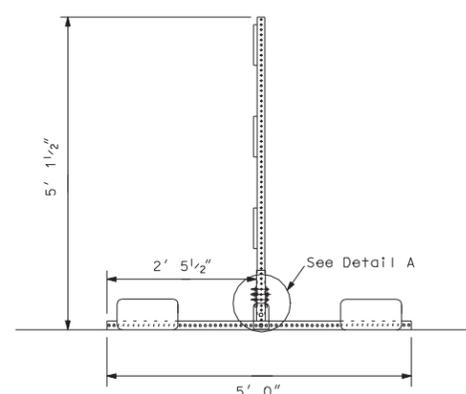
FRONT VIEW



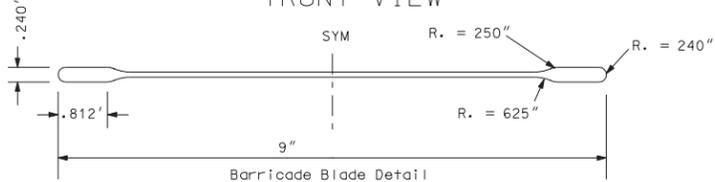
END VIEW



See Detail B



See Detail A



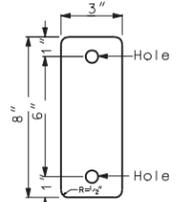
Ballast = 45lb sandbag at the end of each leg.  
Barricade blade fastened to vertical supports with 2" corner bolts.  
Vertical portion of leg is welded to horizontal portion on all four sides.  
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

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



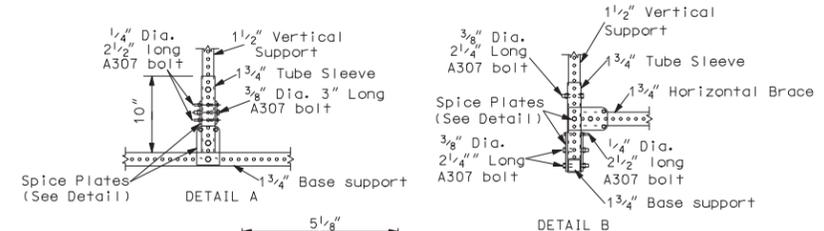
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894



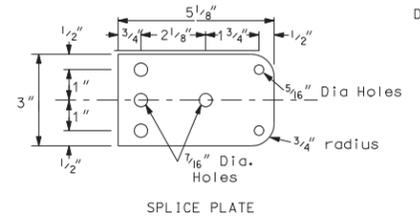
DELINEATOR REFLECTOR

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



DETAIL A

DETAIL B



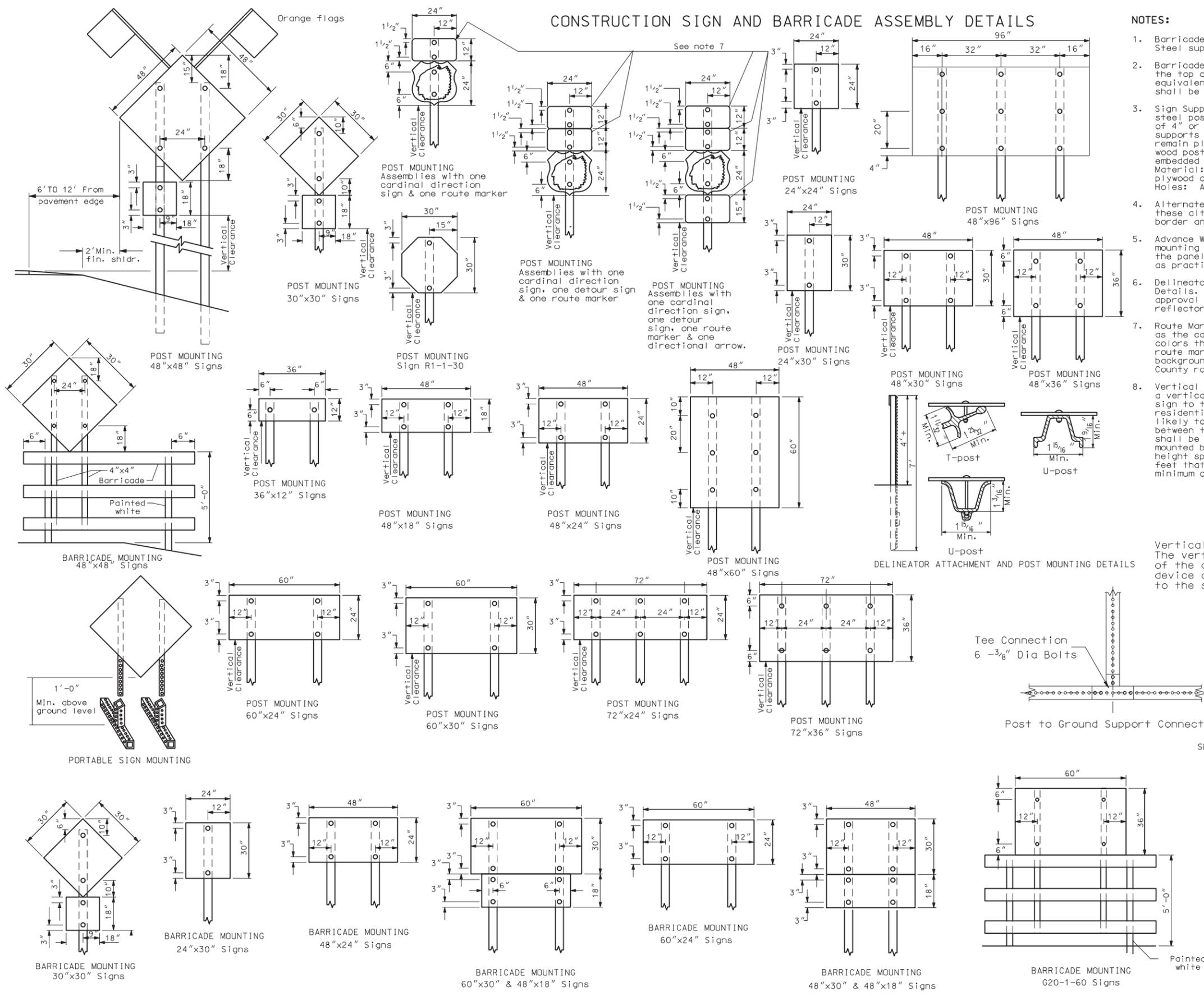
SPLICE PLATE

BARRICADE ASSEMBLY DETAIL  
(Use when Plastic I-Beam w/ 1 1/2" Hollow Core Flanges or 1" x 8" x 72" 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

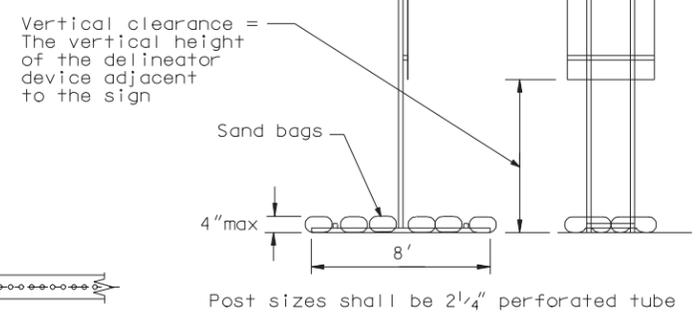
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CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



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.

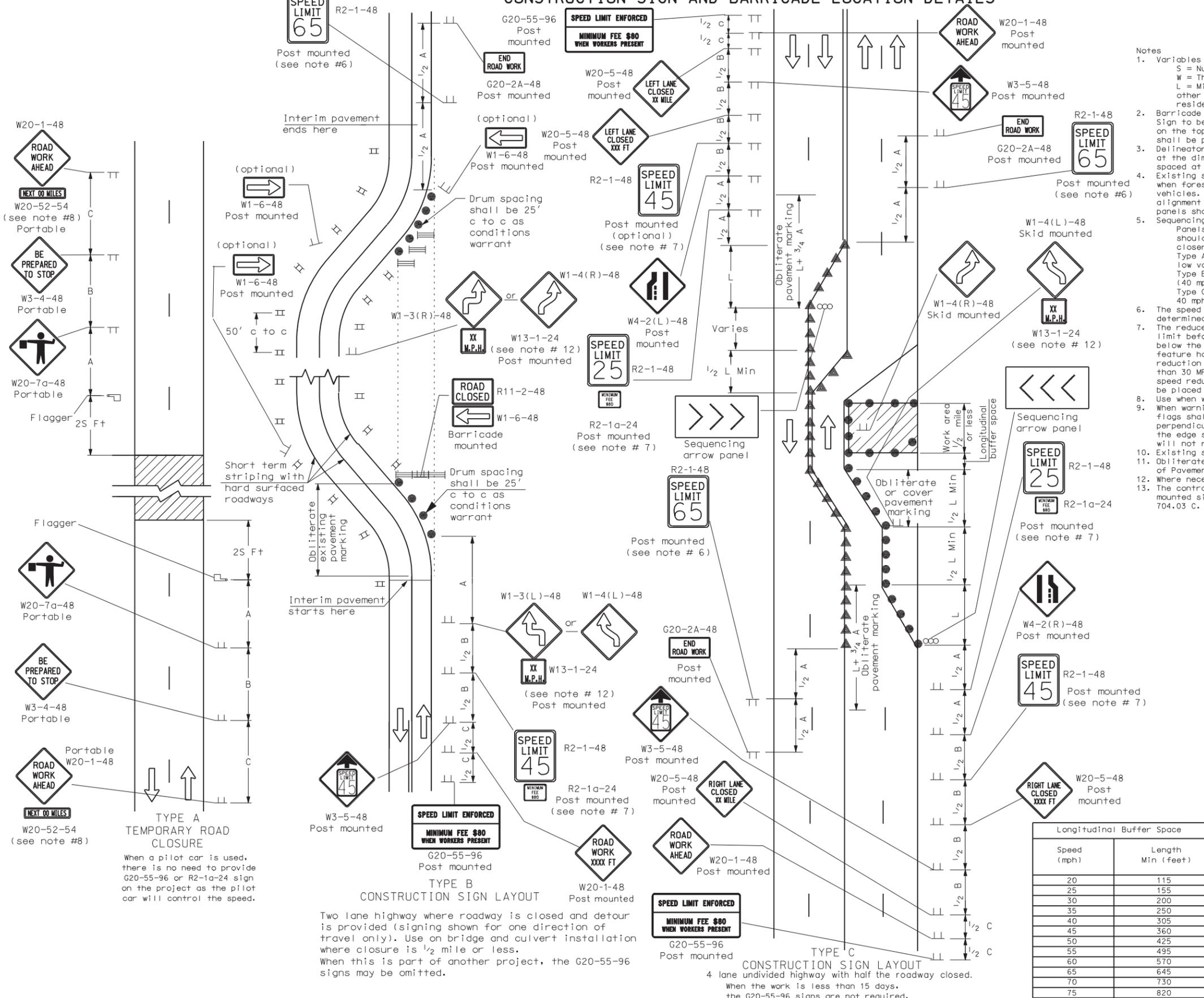


SKID MOUNTED SIGNS

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
01-31-98	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

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CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Notes
- 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<sup>2</sup>/60 for urban, residential, and other streets with speeds of 40 mph or less.
  - 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 roadway shall be placed on skid mounted assemblies.
  - Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
  - Existing striping shall be removed as required. Delineators will only be used when foreslope is 1V:4H or better and roadway alignment is visible to approaching vehicles. Vertical panels shall be used where roadways has steep slopes and alignment is not visible to approaching vehicles. Delineators and vertical panels shall be installed back to back.
  - 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).
  - 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.
  - Use when work area is 1 mile or longer.
  - 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.
  - Existing speed limit signs within a reduced speed zone shall be covered.
  - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
  - 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 sign as shown on the standard drawings as specified in section 704.03 c.

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

KEY

	Type I barricade		Work area
	Type II barricade		Flagger
	Type III barricade		Sequencing arrow panel
	Sign		Type A delineator or vertical panels back to back
	Delineator drum		
	Cones		

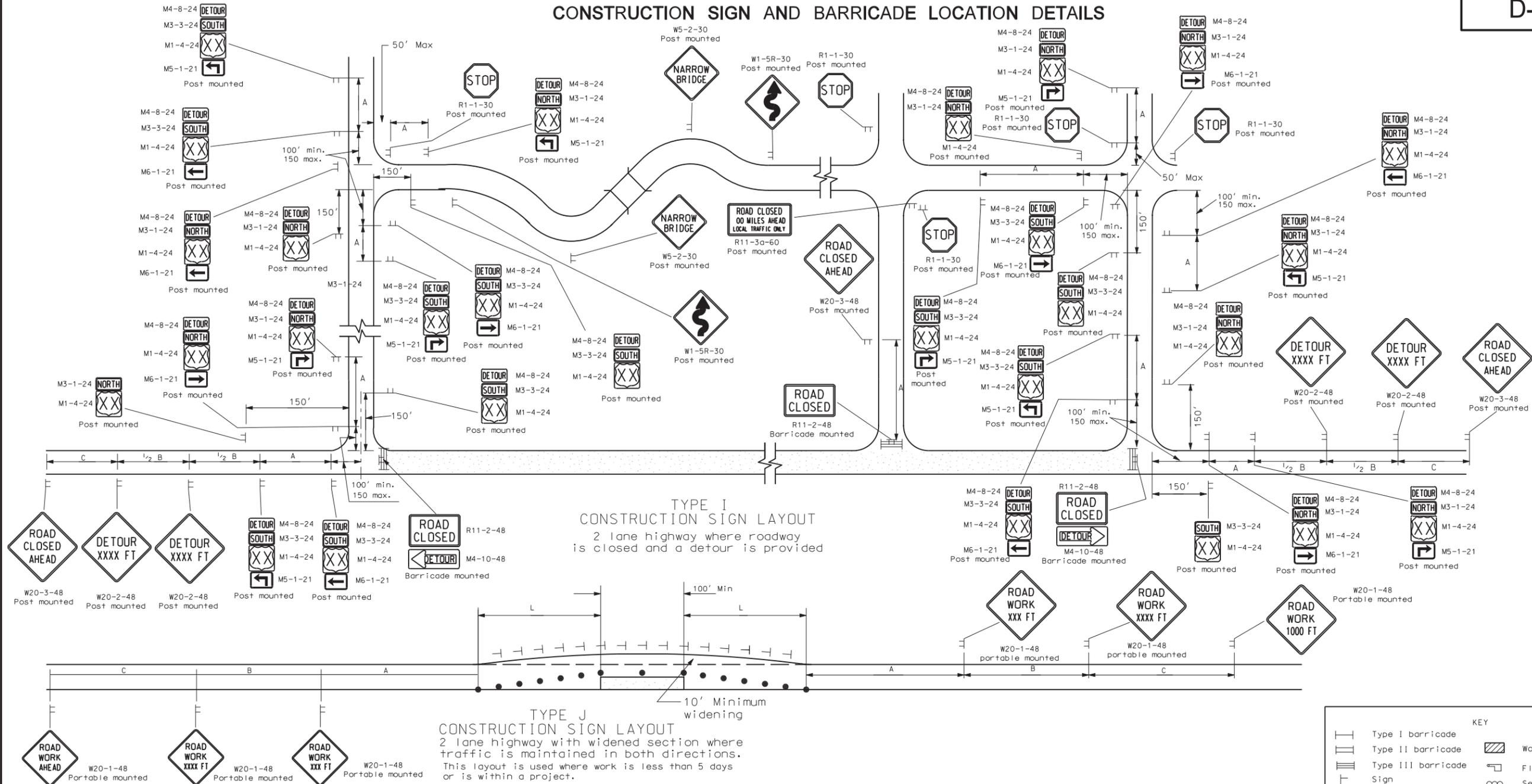
Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
01-05-01	Revised note 3
07-19-02	Reversed End Road Work & Speed Signs
07-25-03	Revised R2-1, R2-1a and W20-1
04-01-04	Change Fee Sign, Warning & Buffer Spacing
12-18-03	Relocated reverse curve
12-01-04	PE stamp added
06-29-05	Revised W4-2, Replaced R2-5a with W3-5, Rev. Adv. Warning Table, Rev. Note 7, Changed W20-7b to W3-4
07-05-05	

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CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



**KEY**

- Type I barricade
- Type II barricade
- Type III barricade
- Sign
- Delineator drum
- Cones
- Work area
- Flagger
- Sequencing arrow panel
- Type A delineator or vertical panels back to back

- Notes**
- 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<sup>2</sup> / 60 for urban, residential, and other streets with speeds of 40 mph or less.
  - 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 shall be placed on skid mounted assemblies.
  - Delineator drums, or cones used for tapering traffic shall be spaced at dimension "S". Delineator drums, or cones used for tangents shall be spaced at 2 times "S".
  - 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 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.
  - Existing speed limit signs within a reduced speed zone shall be covered.
  - Obliterated or covered payment marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.

- All Route Markers shall be furnished by the state and shall be obtained and installed by the contractor unless noted otherwise in the plans.
- 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.

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

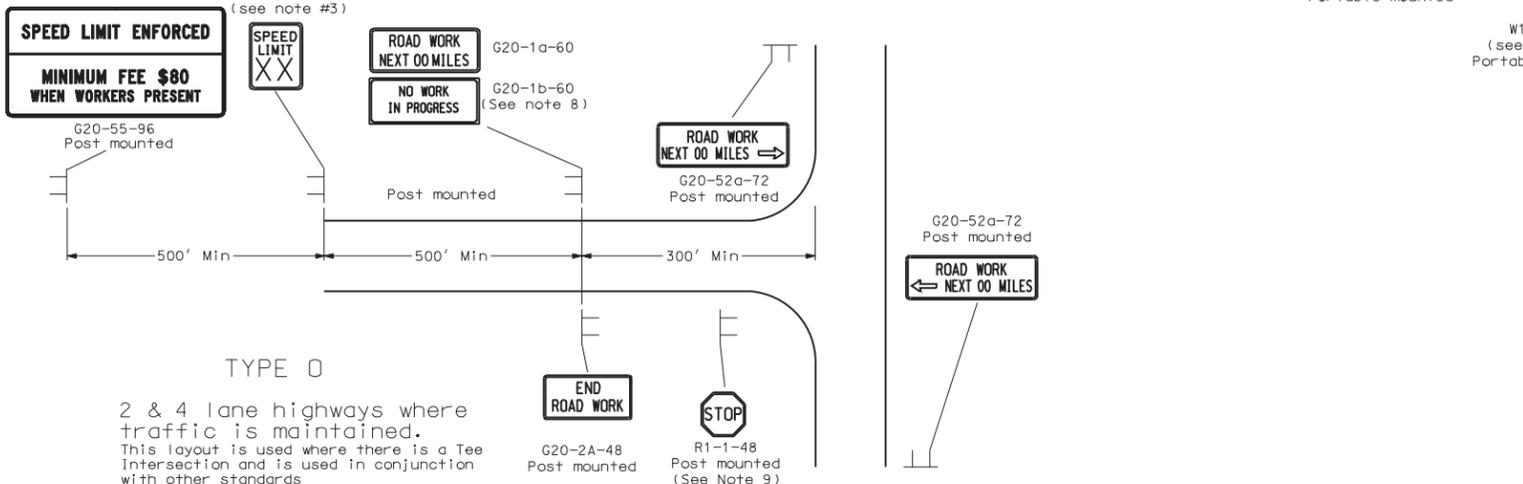
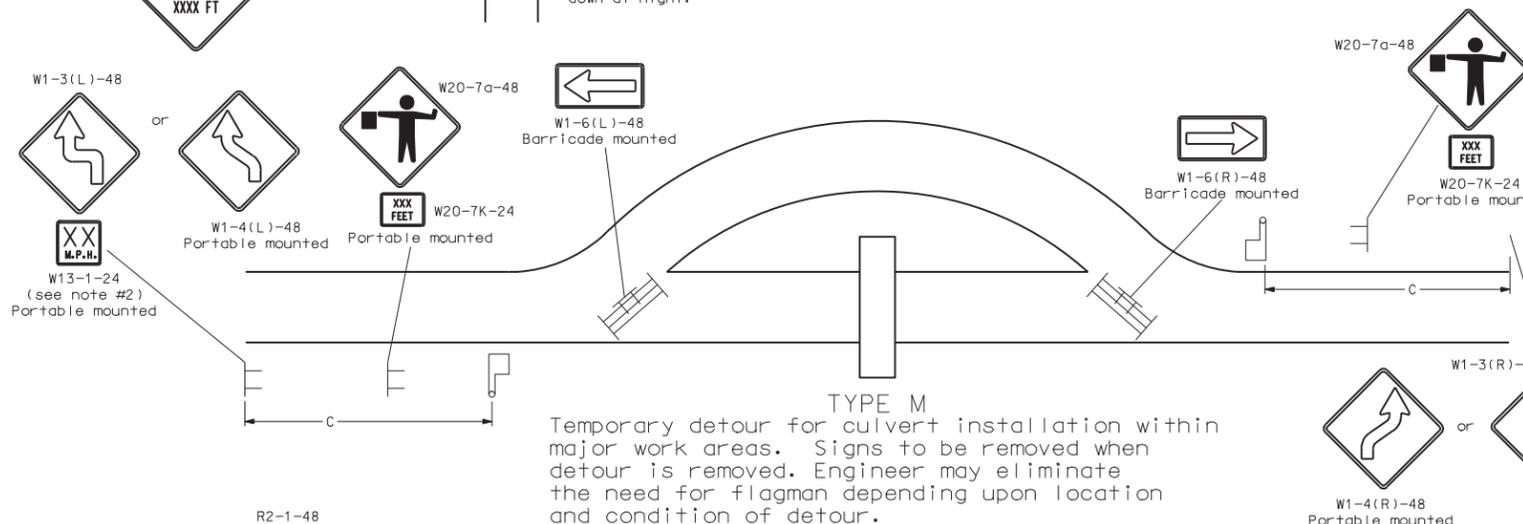
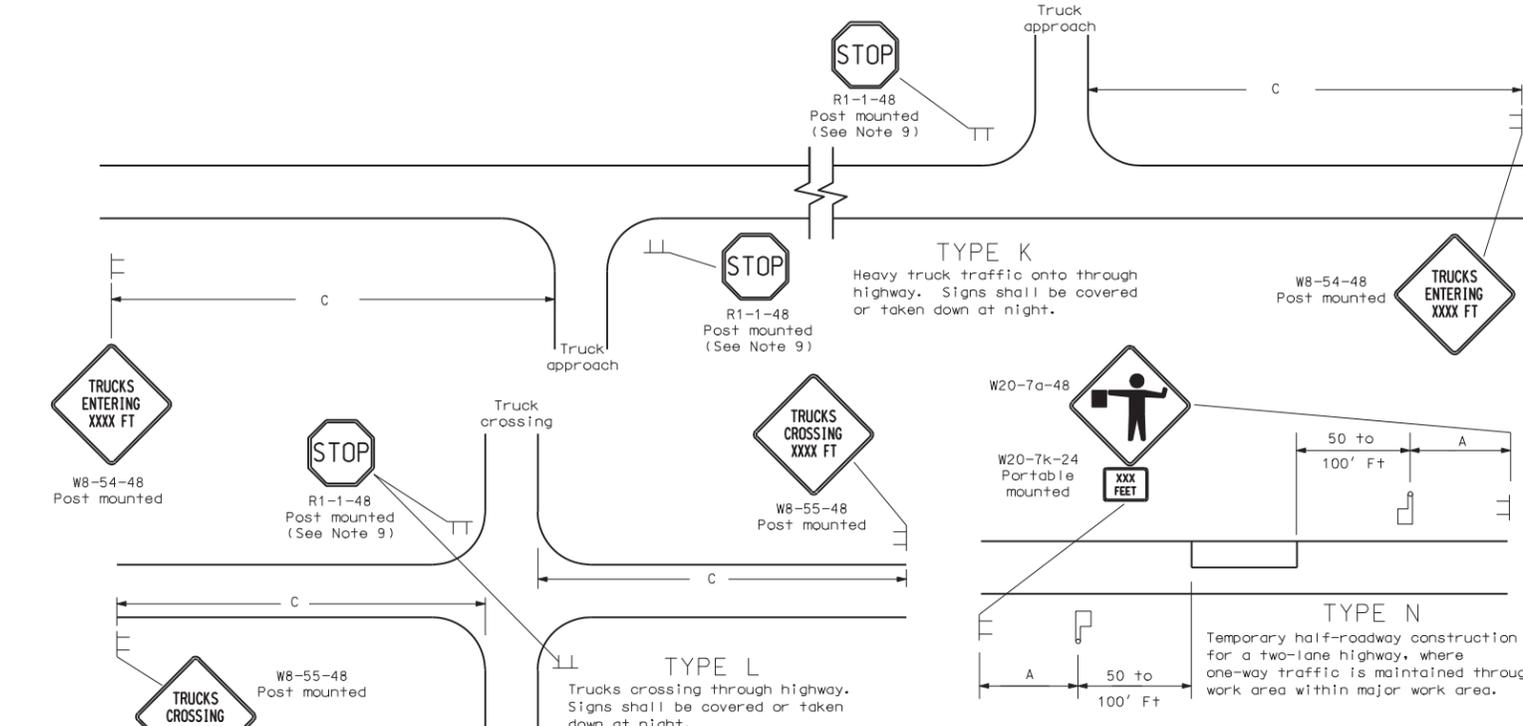
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General Revisions
05-28-96	W21-4-48
08-15-96	Revise flag note
10-01-99	General Revisions
11-15-99	Add Width Taper in note
01-05-01	Revised note 3
04-02-02	Type I sub11111e
07-25-03	Revised W21-4 to W20-1
04-01-04	Rev. Warning sign spacing
12-01-04	PE stamp added
06-29-05	Rev. Adv. Warning Table, Rev. Note 4

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 LOCATION DETAILS

Notes

1. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be placed on top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. 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.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.



KEY

	Type I barricade		Work area
	Type II barricade		Flagger
	Type III barricade		Sequencing arrow panel
	Sign		Type A delineator or vertical panels back to back
	Delineator drum		
	Cones		

ADVANCE WARNING SIGN SPACING

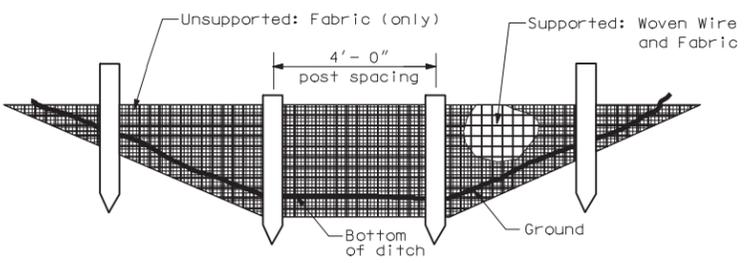
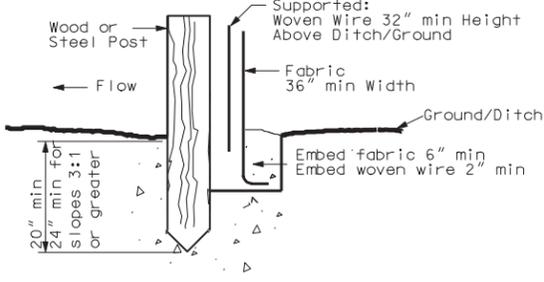
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60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

NORTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
10-1-86

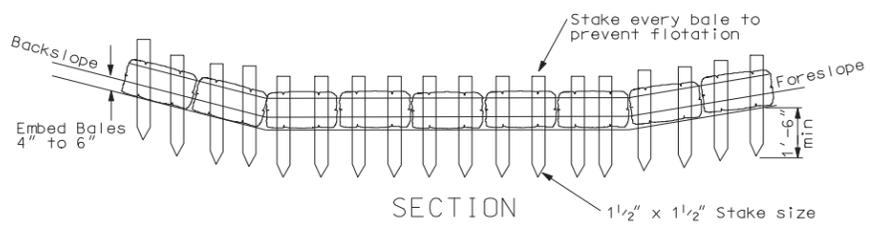
REVISIONS	
DATE	CHANGE
09-30-93	General revisions
06-21-95	General revisions
08-15-96	Revise flag note
10-01-99	General revisions
02-02-00	W8-55-48 Deleted Work In Progress Sign
10-17-02	Revised R2-1a
07-25-03	Revised fee sign & Warning sign spacing.
04-01-04	Revised note 3
12-01-04	PE stamp added.
02-14-05	Added note 9 and revised stop sign size
06-29-05	Rev. Adv. Warning Table, Rev. Note 3

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

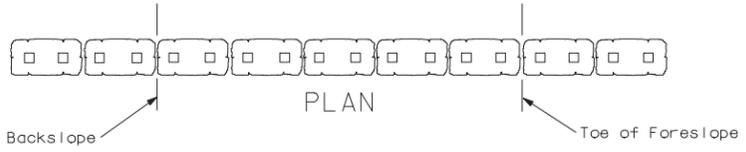
# EROSION AND SILTATION CONTROLS



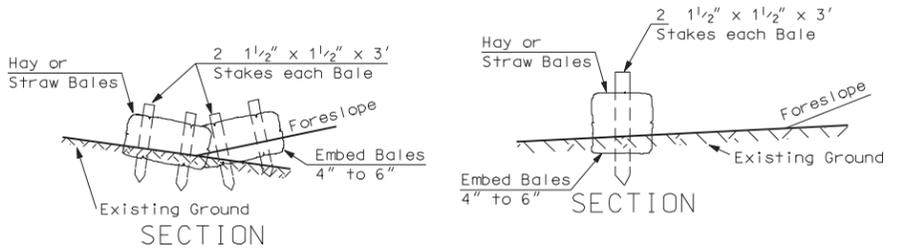
**SILT FENCE**  
Supported and Unsupported



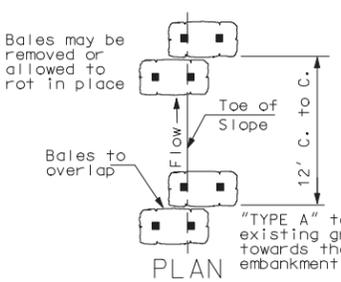
SECTION



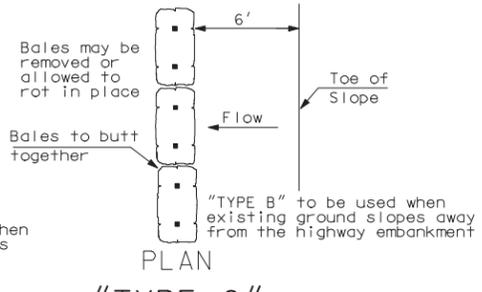
"TYPE A"



SECTION

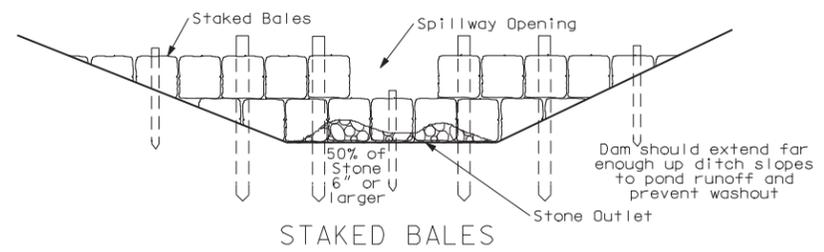


"TYPE B"

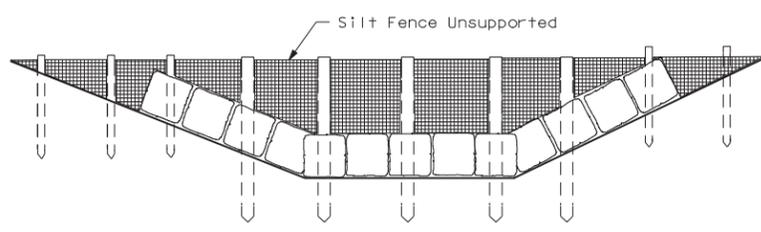


"TYPE C"

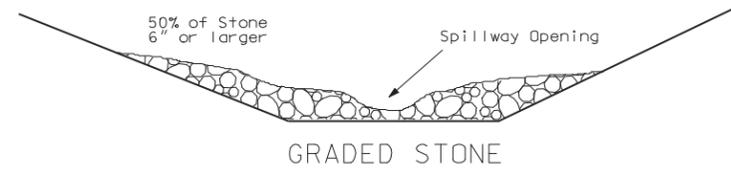
**BALED HAY OR STRAW EROSION CHECKS**



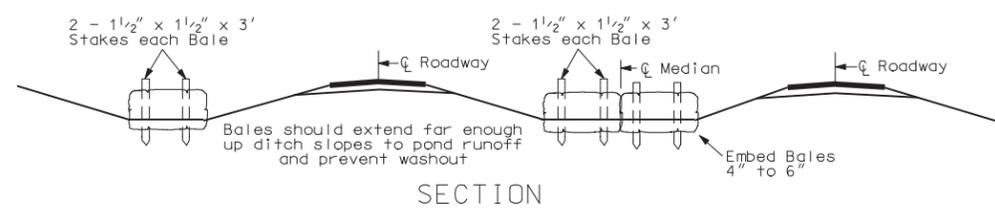
STAKED BALES



FENCE-BACKED BALES

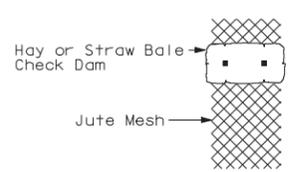


GRADED STONE  
DITCH EROSION DAMS

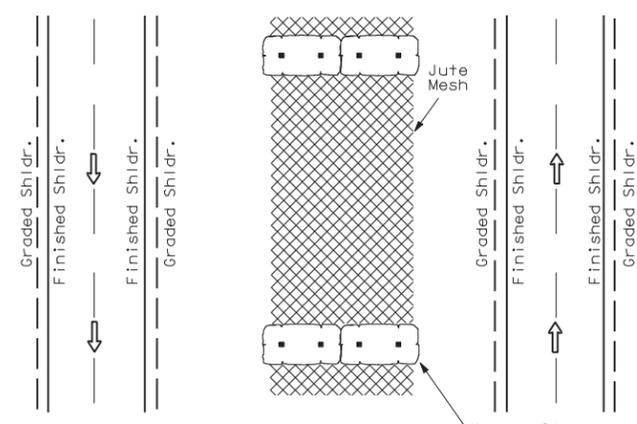


SECTION

**MEDIAN OR DITCH PROTECTION AT STREAM CROSSING**

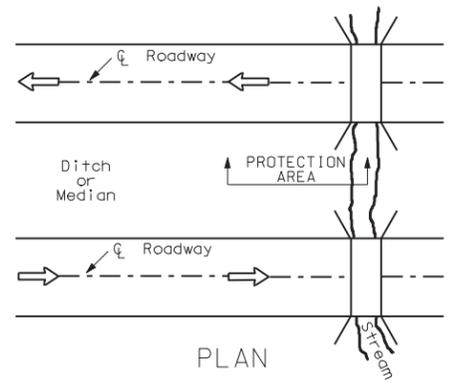


ROADSIDE DITCH

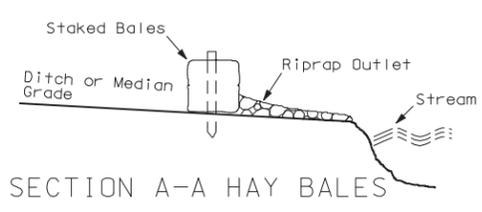


PLAN

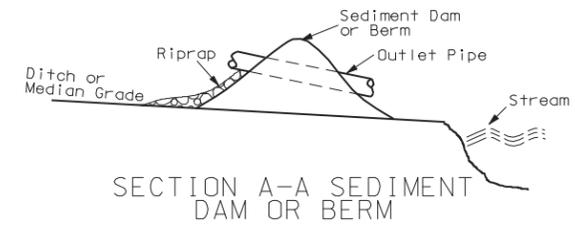
**STONE, JUTE, MESH, OR SOD  
DITCH & MEDIAN EROSION CONTROL**



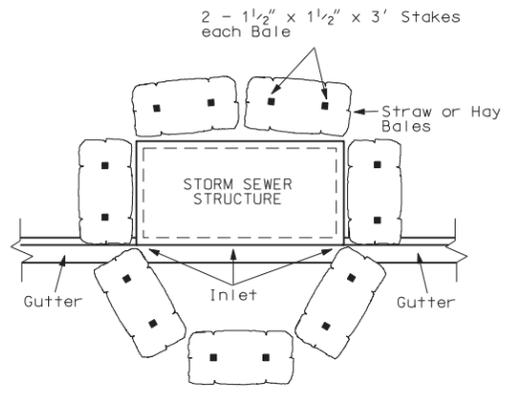
PLAN



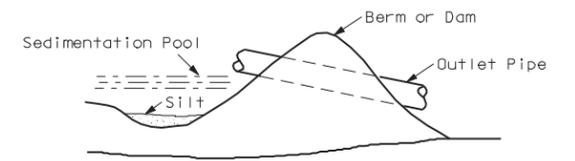
SECTION A-A HAY BALES



SECTION A-A SEDIMENT DAM OR BERM



**STORM SEWER INLET  
EROSION & SILTATION  
BARRIER**



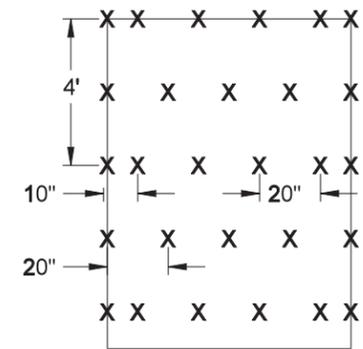
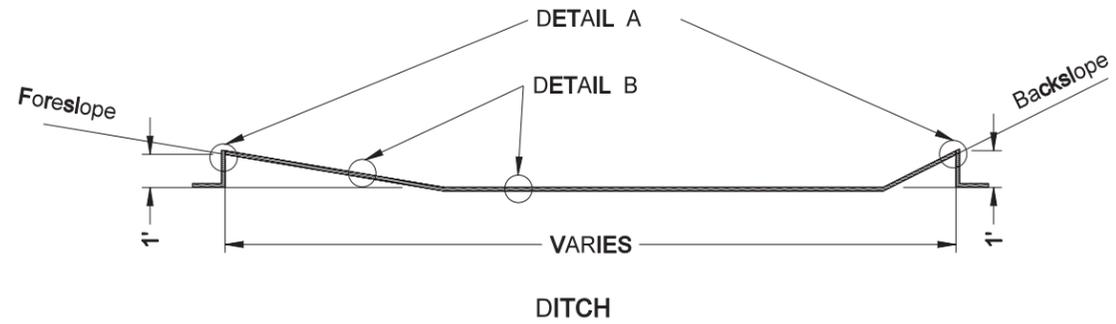
**SMALL SEDIMENT DAM OR BERM**

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
09-04-92	Ditch check
09-16-92	Sediment cont. fencing
01-31-95	General revisions
10-09-02	Sediment fence
01-24-04	Silt fence
02-06-04	Rev silt fence details
12-01-04	PE Stamp added

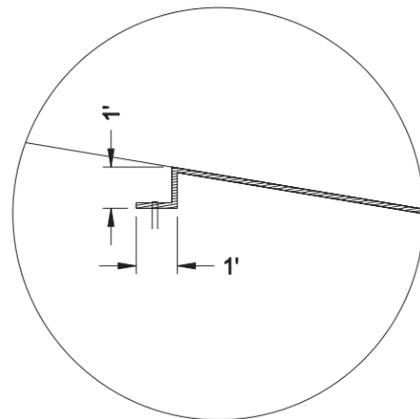
This document was originally issued and sealed by **MARK S GAYDOS**, Registration Number **PE-4518**, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

# EROSION AND SILTATION CONTROL BLANKET INSTALLATION

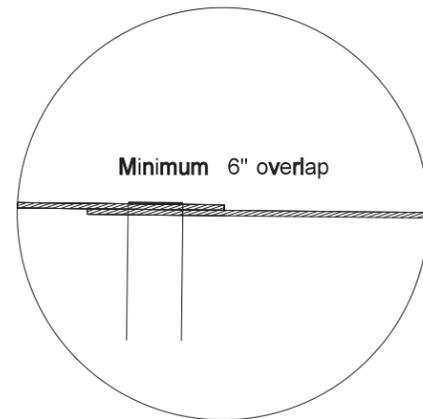
D-708-5



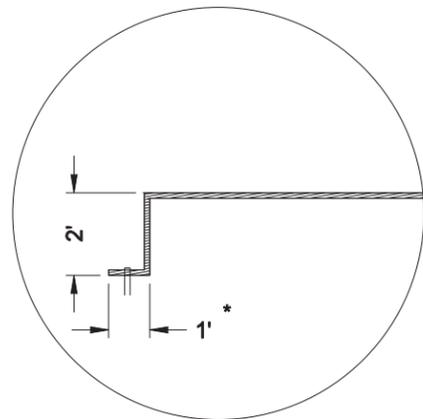
**STAPLE PATTERN:** 3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



DETAIL A

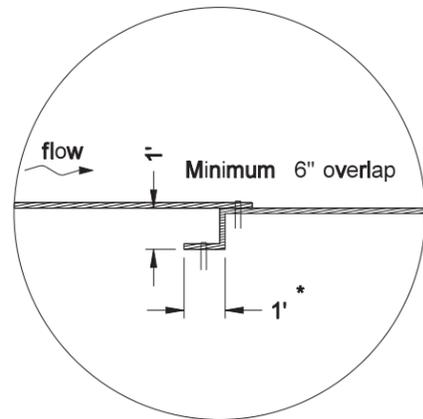


DETAIL B

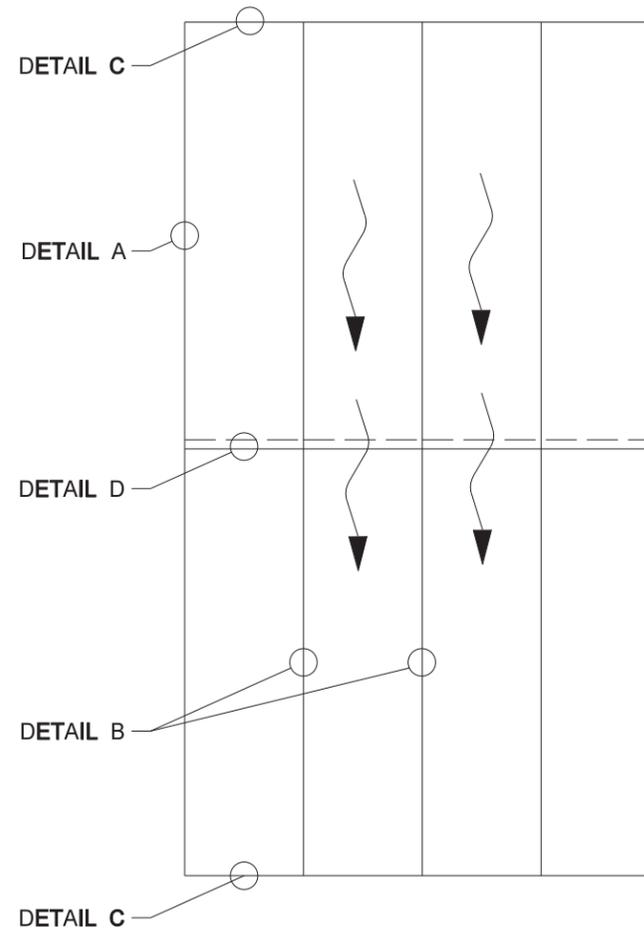


DETAIL C

\* This tie may be placed ahead or back.

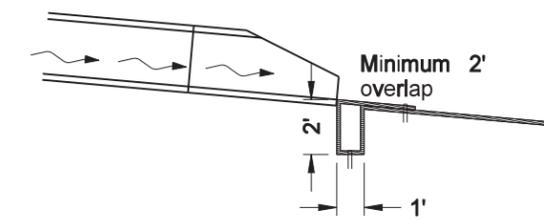


DETAIL D

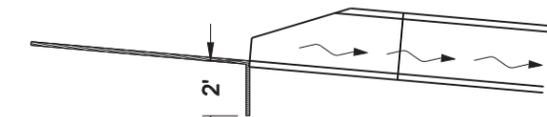


BLANKET LAYOUT

Note: Beginning and ending of erosion control blanket areas shall be installed as DETAIL C.



PIPE OUTLETS



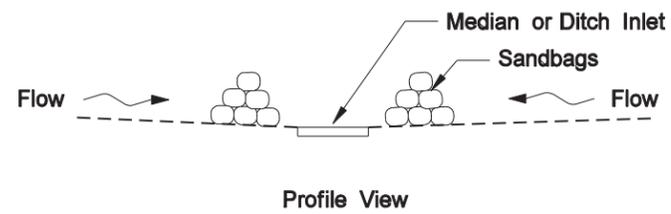
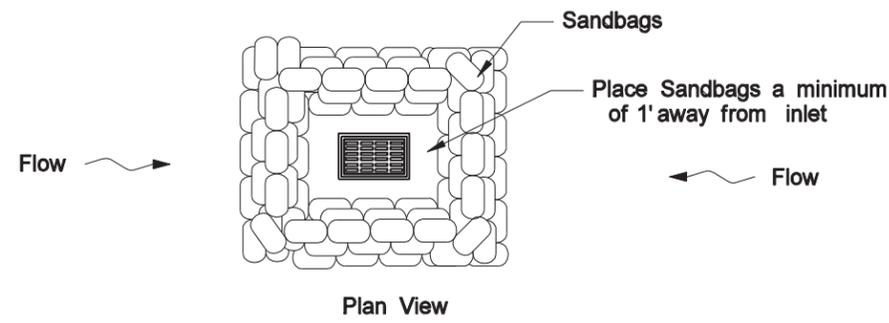
PIPE INLETS  
INSTALLATION AT PIPE ENDS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-13-06	
REVISIONS	
DATE	CHANGE

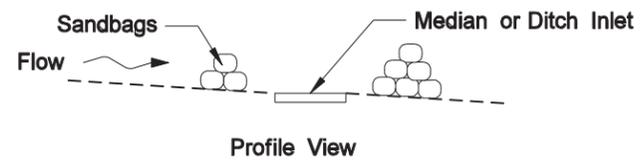
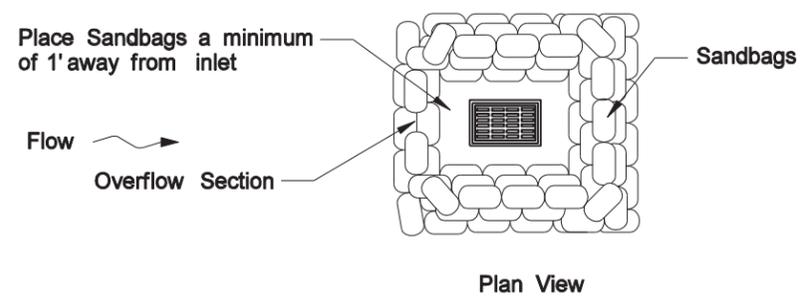
This document was originally issued and sealed by **MARK S. GAYDOS** Registration Number PE- 4518 , on 12/13/06 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL  
MEDIAN OR DITCH INLET PROTECTION

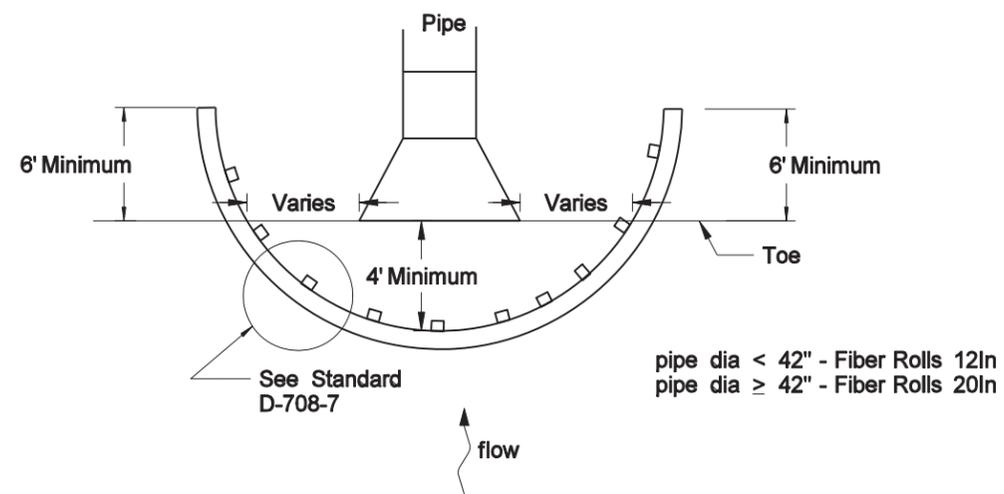
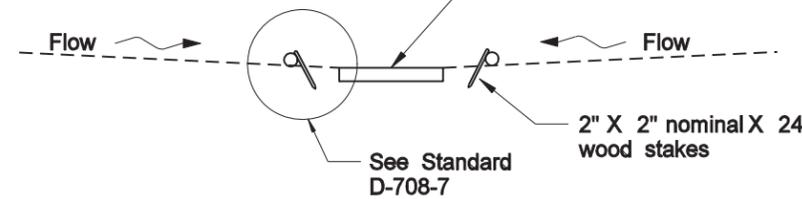
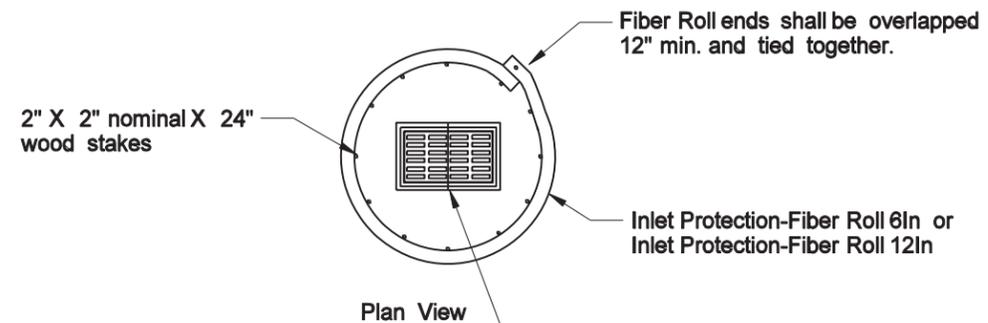
D-708-6



SANDBAG PROTECTION  
LOW POINT



SANDBAG PROTECTION  
ON SLOPE



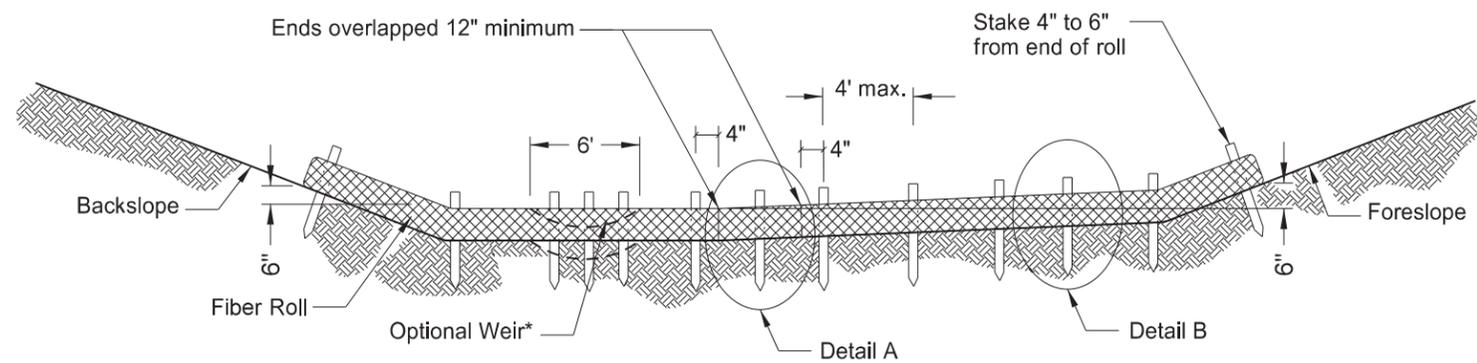
FIBER ROLL PROTECTION  
INLET OF PIPE END

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-13-06	
REVISIONS	
DATE	CHANGE

12-14-07	Added 12" Fiber roll overlap, option of butting fiber roll ends removed.
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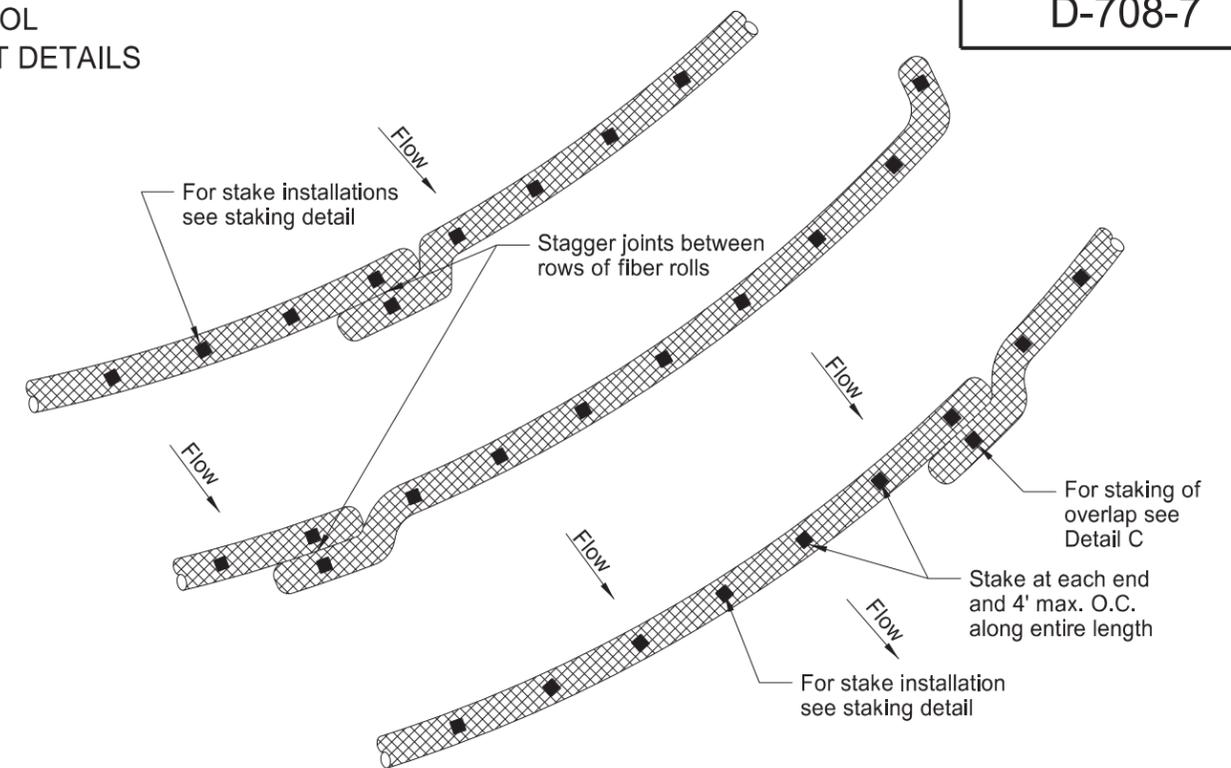
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 12/14/07 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL  
FIBER ROLL PLACEMENT DETAILS

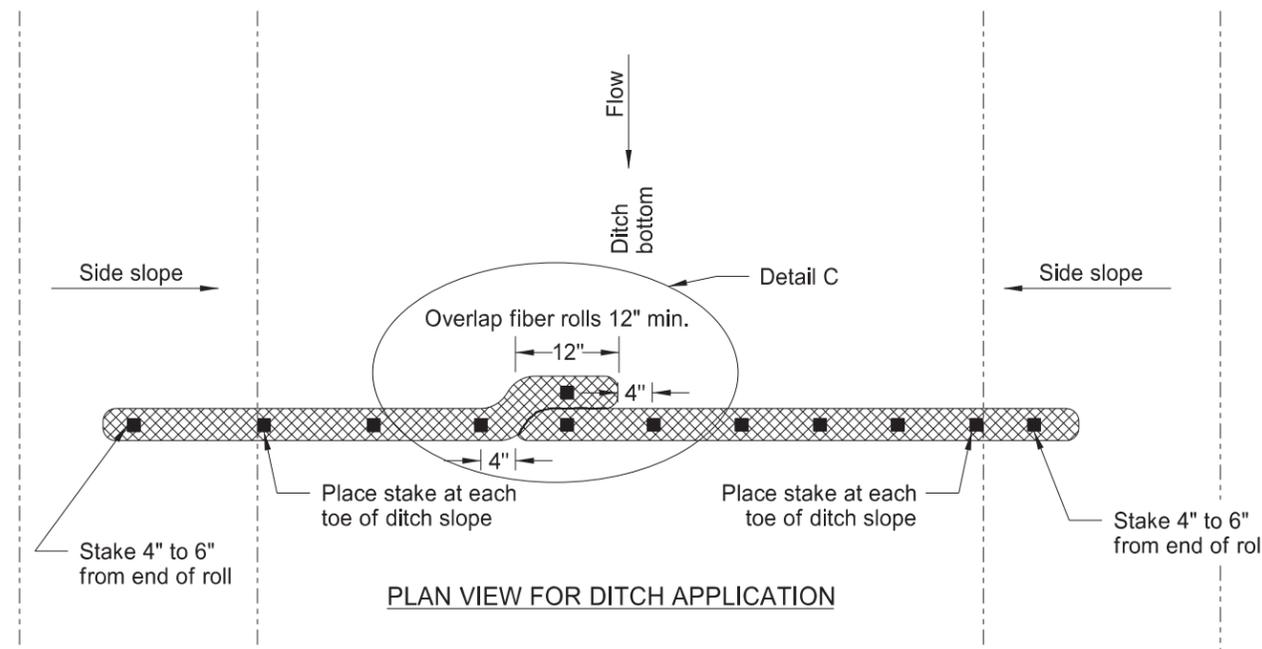


\*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back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

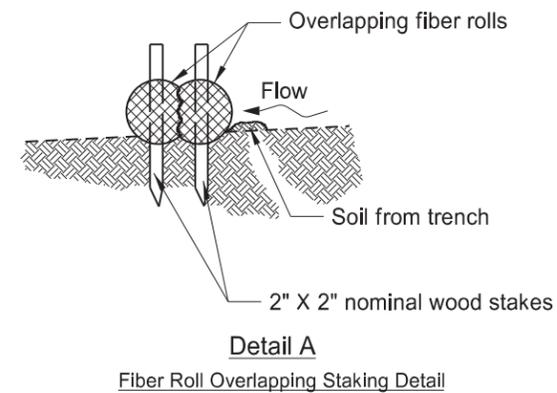
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



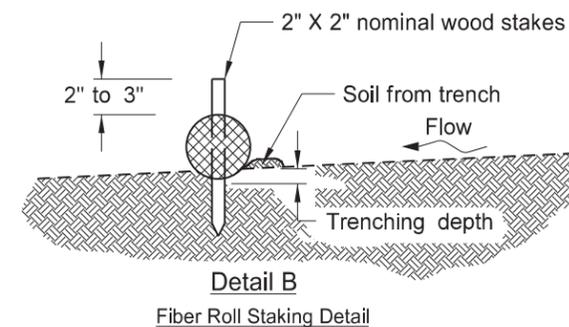
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A  
Fiber Roll Overlapping Staking Detail



Detail B  
Fiber Roll Staking Detail

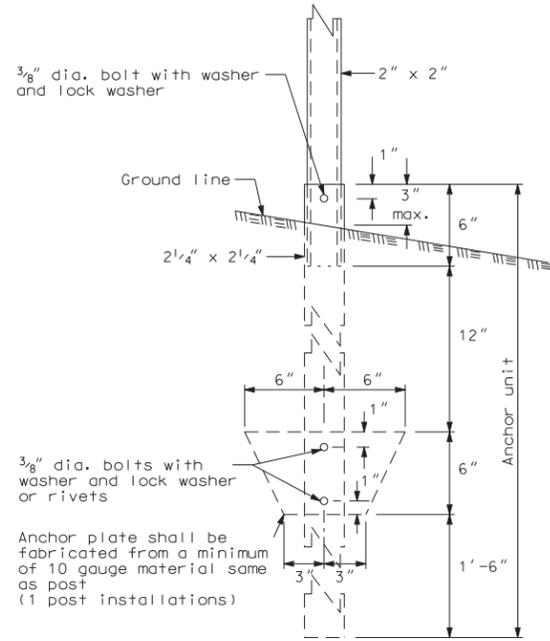
FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

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

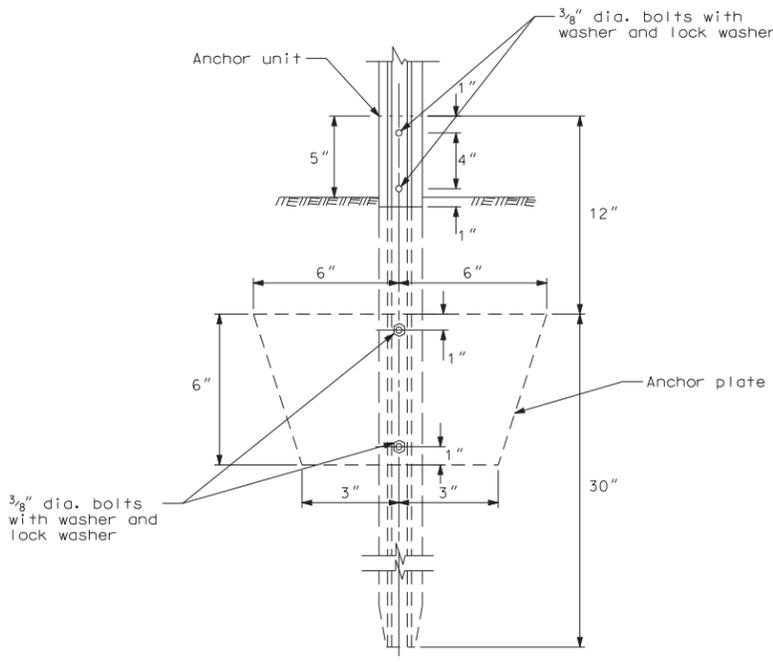
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/10/13 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS

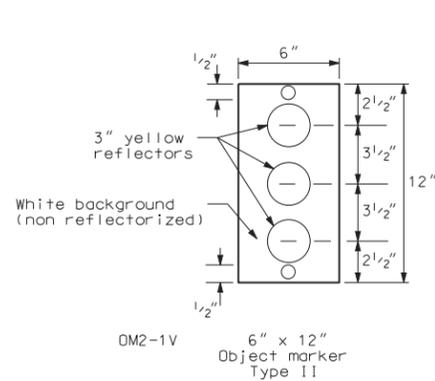


ANCHOR UNIT AND POST PERFORATED TUBE ASSEMBLY

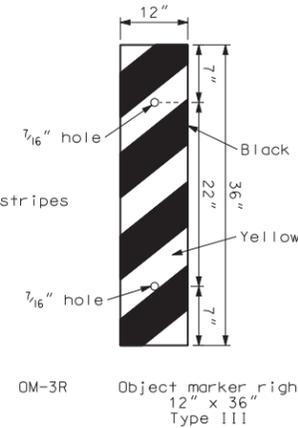
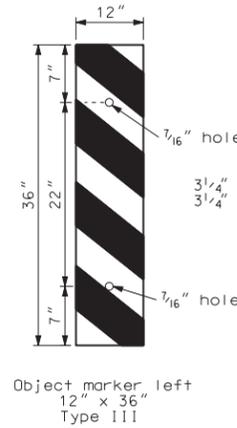


ANCHOR UNIT AND POST ASSEMBLY

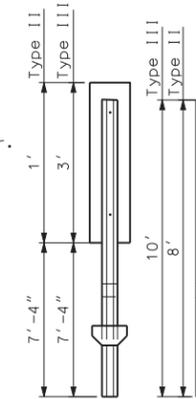
2# post or aluminum 0.88 lb./ft.



OM-3L

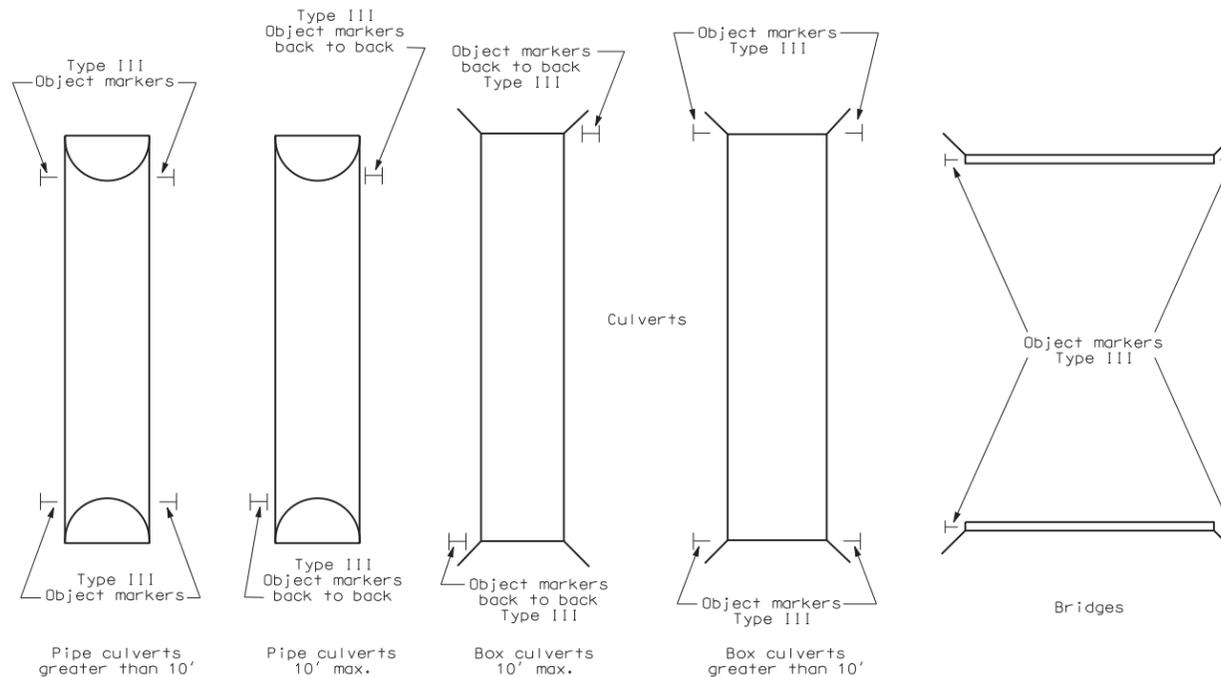
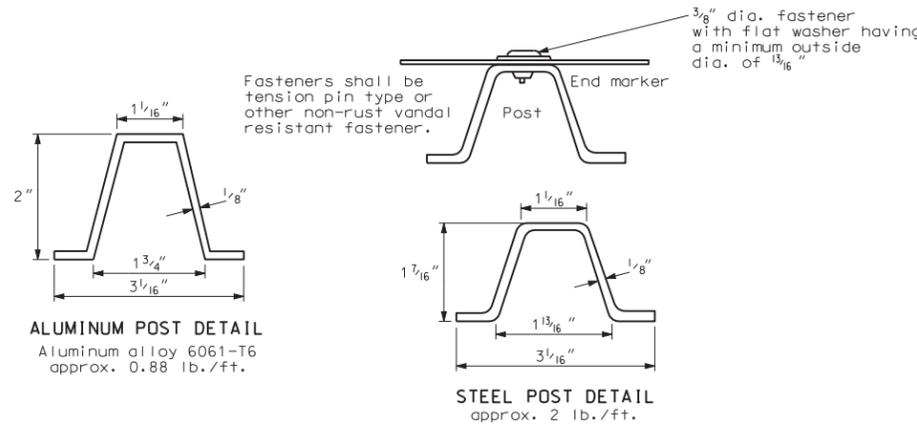


Bottom of marker to be a min. of 4" from ground line at marker.



Notes:

- 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 less 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.
- 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.
- 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.
- 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