

DESIGN DATA					
Traffic	Average Daily				Max Hour
Current 2014	Pass: N/A	Trucks: N/A	Total: <100	N/A	
Forecast 2034	Pass: N/A	Trucks: N/A	Total: <100	N/A	
Clear Zone Distance: 14'	Design Speed: 45				
Minimum Sight Distance (Non Passing): 360'	Bridges: HL-93				
Minimum Sight Distance (Safe Passing): N/A					
Sight Distance for No Passing Zone: N/A					
Pavement Design Life: N/A					

LENGTH OF PROJECT		
PROJECT	MILES-GROSS	MILES-NET
BRO-0005(032)	0.340	0.340
TOTALS	0.340	0.340

BOTTINEAU COUNTY
NORTH DAKOTA
FHWA PARTIAL INVOLVEMENT
FEDERAL AID PROJECT BRO-0005(032)
STRUCTURE

Job #1

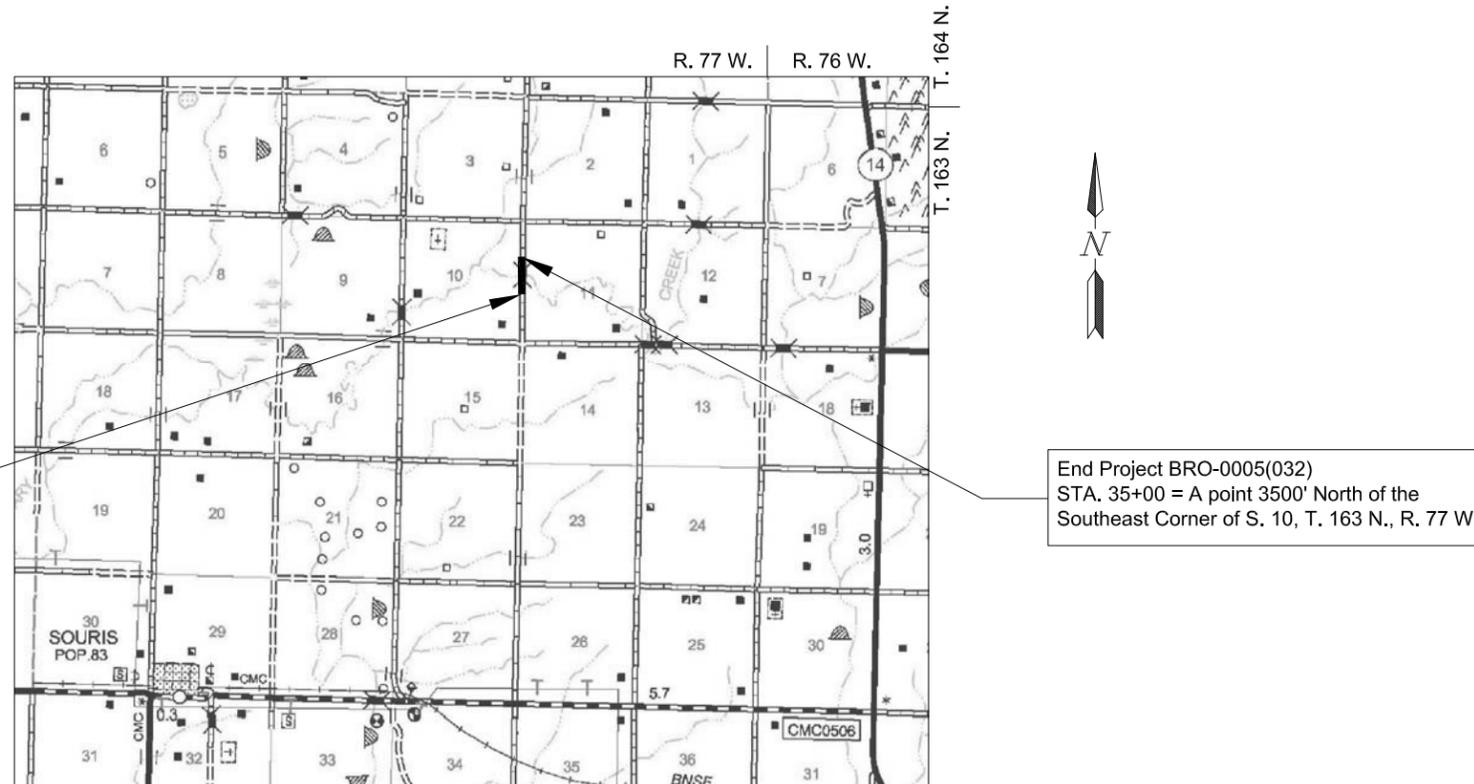
PCN 20226	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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GOVERNING SPECIFICATIONS

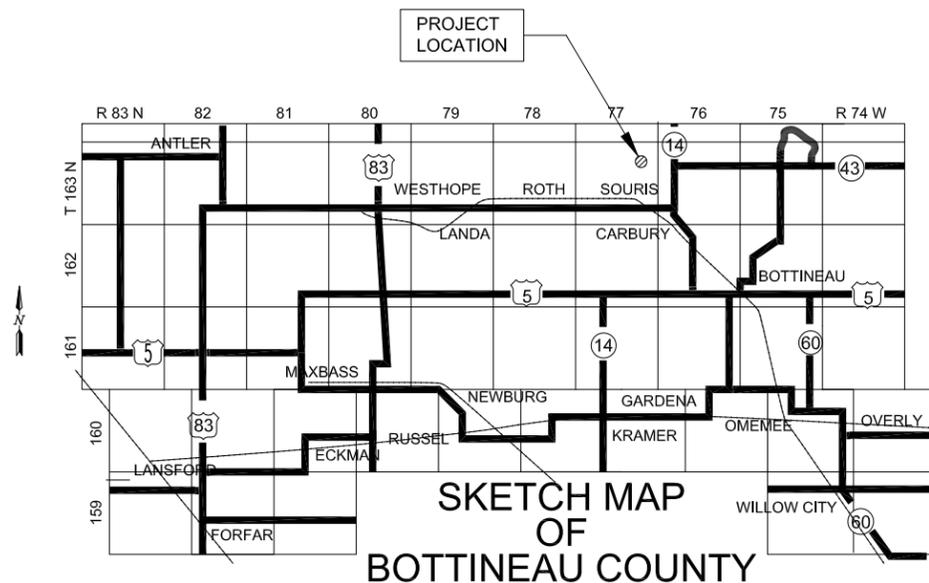
Standard Specifications for Road and Bridge Construction, adopted by the North Dakota Department of Transportation, October 2014, standard drawings currently in effect, and other contract provisions submitted herein.

STRUCTURE #05-140-04.0

THE PROJECT CONSISTS OF REMOVING THE EXISTING BRIDGE AND REPLACING IT WITH A DOUBLE 12 FT SPAN BY 12 FT HIGH PRECAST REINFORCED CONCRETE BOX CULVERT AND A 1800 FT OF ROAD GRADING. THE PROJECT IS LOCATED 3.5 MILES NORTH AND 3 MILE EAST OF SOURIS, ND



LOCATION MAP



SURVEYED & DESIGNED 08/1/2014

PS & E REVISIONS MADE 08/29/2014

Wold Engineering, P.C.
 Consulting Engineers & Land Surveyors

915 East 11th Street ~ PO Box 237 ~ Bottineau, ND 58318
 316 Eastdale Drive ~ PO Box 1277 ~ Bismarck, ND 58502
 110 8th Avenue Southwest ~ Minot, ND 58701

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LIST OF STANDARD DRAWINGS

<u>Standard No.</u>	<u>Description</u>
D101-1,2,3	NDDOT Abbreviations
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D-704-7, 8	Breakaway Systems for Construction Zone Signs
D-704-9-11	Construction Sign Details
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D-704-14	Construction Sign and Barricade Assembly Details
D-754-23	Perforated Tube Assembly Details
D-754-24, 25	Mounting Details Perforated Tube
D-754-27	Sign Punching, Stringer, and Support Location Details Regulatory, Warning, and Guide Signs

LIST OF SPECIAL PROVISIONS (SP)

<u>SP #</u>	<u>Description</u>
SP 3(14)	Temporary Erosion and Sediment Best Management Practices
SP 4(14)	Federal Migratory Bird Treaty Act to these plans
SP 5016(14)	Permits and Environmental Considerations

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NOTES

100-P01 SCOPE OF WORK: The project consists of removing the existing bridge and installing a double 12 feet span by 12 feet high by 115 feet long precast concrete box culvert skewed 30 degrees right ahead and approximately 1,800 feet of approach road regrading.

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

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

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

100-P03 GENERAL: All work to be done by the County, including fence removal, shall be coordinated to be completed concurrently with or prior to completion of Contractor's work.

107-P01 HAUL ROADS: All paved roads off the state system shall not be designated as haul roads. 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.

107-P02 RESPONSIBILITY TO PUBLIC: The Contractor shall provide access to and from all adjacent, private, and field drives during construction.

202-P01 REMOVAL OF STRUCTURE: The existing structure shall be removed. The existing structure, built in 1935, is a 54 foot, three span bridge with a timber deck, superstructure, and substructure. There are remnants of steel pile abutments beneath the structure. The bridge has a clear roadway width of 22.6 feet.

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

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

203-P01 CLEARING AND GRUBBING: Clearing and grubbing includes the removal and disposal of shrubs, stumps, roots, brush, and other surface objects from the excavation and embankment areas along this project.

203-P02 BORROW-EXCAVATION: The Contractor shall be responsible for obtaining areas to provide suitable "Borrow" material, and shall bear all costs of obtaining, opening and restoring the site. The final "Borrow" quantity is to be determined by cross sectioning before and after removal. Compaction of embankment material shall be in accordance with Standard Specifications, Section 203.04 E.3.

203-P03 COMMON EXCAVATION: Placement of embankment material shall be in accordance with Section 203.04 E.3 of the Standard Specifications (Compaction Control, Type B). Payment for Common Excavation shall be contract quantity, provided the Project is constructed to the lines and grades shown on the Plans. Measurement will not be required unless the engineer determines that an insufficient amount of Common Excavation has been removed or the Contractor requests measurement. The Contractor shall provide written notice to the engineer explaining the reason for measurement. Likewise, the Engineer shall provide written notice to the Contractor explaining the reason for measurement. Once the Common Excavation has been measured the contractor forfeits the contract quantity of Common Excavation and shall be paid the measured quantity.

203-P04 TOPSOIL: Quantities for topsoil in excavation and embankment areas are based upon an average depth of four (4) inches. Payment for Topsoil shall be contract quantity. Measurement will not be required unless the engineer determines that an insufficient amount of Topsoil has been removed or the Contractor requests measurement. The Contractor shall provide written notice to the engineer explaining the reason for measurement. Likewise, the Engineer shall provide written notice to the Contractor explaining the reason for measurement. Once the Topsoil has been measured the contractor forfeits the contract quantity of Topsoil and shall be paid the measured quantity.

203-P05 SHRINKAGE: Twenty-five percent (25%) additional volume in yardage computed by the end area method is allowed for shrinkage in earth embankment.

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NOTES

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210-P01 CLASS 2 EXCAVATION-BOX CULVERT: All box culvert excavation, foundation fill excavation, channel excavation, riprap excavation, placement of ordinary backfill, compaction, water, and shaping of roadway inslopes and channel slopes shall be included in the unit price bid for "CLASS 2 EXCAVATION-BOX CULVERT" (Approximately 310 C.Y.). Class 2 Excavation-Box Culvert shall be performed according to Section 210 of the standard specifications.

The suitability of material from on-site excavations for use as ordinary backfill will be determined by the engineer. The contractor shall remove and replace approximately 4" of topsoil over the excavation and embankment areas, except the 28' roadbed. Backfill shall be placed and compacted in accordance with Section 203.04 E.3 of the Standard Specifications. If the excavated material is deemed not suitable for ordinary backfill, it shall become property of the contractor and disposed of outside of the road right-of-way, not adjacent to the construction site, and at a site approved by the engineer. All costs associated with excavation, hauling, depositing and leveling the waste material shall be included in the unit price bid for "CLASS 2 EXCAVATION-BOX CULVERT".

210-P02 FOUNDATION FILL: The quantity for foundation fill was computed to a depth of 1.5' below the box culvert; however, this may vary depending on the soil conditions. If, in the opinion of the engineer, a suitable foundation exists under the culvert site, the foundation fill may be eliminated. If larger rock is required to stabilize the foundation it will be paid for as "FOUNDATION FILL." The larger rock shall be wrapped completely with Geosynthetic Material Type S1. The bed for the pre-cast sections shall consist of fine graded material (sand) approximately 4" in depth below the culvert. Grade rails shall be used to establish a uniform bed for the pre-cast sections. All material described above shall be included in the price bid for "FOUNDATION FILL." Material will be accepted by Engineers Statement. No aggregate testing shall be required unless deemed necessary by the Engineer.

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

251-P01 SEEDING CLASS II: Seeding will be measured by the acre for Seeding Class II. Seeding shall cover the entire disturbed area (excluding the 28' roadbed).

253-P01 STRAW MULCH: All seeded areas shall be stabilized with mulch after the completion of the seeding operation. All costs shall be included in the unit price bid for "Straw Mulch."

256-P01 RIPRAP GRADE II: Final pay quantity for "RIPRAP GRADE II" shall be determined by field measurements in accordance with plan length, width, and depth, or by measured load count.

261-P01 TEMPORARY EROSION CONTROL: Temporary erosion and siltation control has been provided for placement prior to disturbing the topsoil. Locations of sediment control and ditch checks are typically at pipe outlets, where drainage leaves the R/W, and other areas approved by the engineer. The temporary erosion and siltation control shall be installed according to Standard D-261-1, or as directed by the engineer.

302-P01 AGGREGATE SURFACE COURSE CLASS 13: Compaction of aggregate surface course shall be in accordance with Section 302.04. The dimensions shown for the aggregate surface course are approximate. Plan quantities shall be placed throughout except where the engineer authorizes a change.

709-P01 GEOSYNTHETIC MATERIAL TYPE RR: Geosynthetic Material Type RR shall be placed below all riprap.

754-P01 FLAT SHEET FOR SIGNS: All signs and sign assemblies shall conform to the Manual on Uniform Traffic Control Devices for Streets and Highways and Std. Specs. 754. The cost of two inch (2") perforated tubular galvanized steel posts, all bolt ties and fittings shall be considered as included in either "Flat Sheet for Signs – Type IV Refl. Sheeting" or "Flat Sheet for Signs – Type XI Refl. Sheeting" and shall not be paid for directly.

754-P02 REMOVAL OF SIGNS: All signs and posts within the right-of-way shall be removed and salvaged. The removed signs and posts shall become the property of Bottineau County. The cost for removing and salvaging of signs shall be included in bid price for either "Flat Sheet for Signs – Type IV Refl Sheeting" or "Flat Sheet for Signs – Type XI Refl Sheeting".

894-100 RETROREFLECTIVE SHEETING: Provide Type IV retroreflective sheeting that meets ASTM D 4956, Type IV. Provide Type XI retroreflective sheeting that meets ASTM D 4956, Type XI.

CONTACT PERSON: Michael Rivinius, P.E.
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NOTES

ENVIRONMENTAL COMMITMENTS

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

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

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

Commitment No. 2: Wetland impacts will be mitigated either on-site or at an appropriate mitigation site. Approximately 0.09 jurisdictional acres of potential other waters will be impacted permanently and 0.03 jurisdictional acres of potential other waters will be temporarily impacted.

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

POTENTIAL OTHER WATERS										
Number	Location	Long/Lat (Dec. Deg.)	Type	Size		Feature	USACE Jurisdictional*	Impacts to Potential Other Waters		
				Acres	Linear Feet			Acres		Linear Feet
								Temp	Perm	
POW - 1	Sec. 19, T146N, R95W	-100.621260W 48.95796N	Boundary Creek	>1.00	>500	Natural	X	>1.00	>1.00	>500
Totals				>1.00	>500			1.00	1.00	>500

* A wetland Jurisdictional Determination was issued by the USACE on 7/19/2013; NWO-2013-1274-BIS.

Commitment No. 3: The contractor shall provide the ND Game & Fish Department a reasonable opportunity to inspect all vessels, motors, trailers, and construction equipment prior to these items being launched or placed into the waters of the state.

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

Commitment No. 4: Active migratory bird nests with eggs or chicks are protected by the Federal Migratory Bird Treaty Act. Demolition on bridges or box culverts with active nesting cannot start until nesting season is over unless measures are taken to prevent nesting.

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

Commitment No. 5: Any disruption or displacement of the streambed and banks other than the planned alterations must be restored to pre-project conditions.

Action taken/required: The contractor shall restore all disruptions and displacements of the streambed and banks to pre-project conditions. This does not include planned alterations.

Commitment No. 6: The reinforced concrete box culvert (RCB) and riprap shall be sunk one foot below the stream grade line.

Action taken/required: The RCB invert elevations shown in the plans are one foot below the stream grade line. The riprap shall also be placed one foot below the stream grade line.

Commitment No. 7: A concrete structure or bridge will be demolished as a part of this project. SFN 17987 Asbestos Notification of Demolition and Renovation is required.

Action taken/required: The contractor will complete and submit SFN 17987 to the North Dakota Department of Health 10 days prior to beginning the activity.

Required Permits

North Dakota Department of Health — *NDPDES Permit*
Status: To be obtained by the contractor prior to construction
Owner of permit will be Bottineau County

United States Army Corps of Engineers — *404 Permit*
Status: Has been obtained for the project

North Dakota Department of Health — *Asbestos Notification of Demolition and Renovation SFN 17987*
Status: To be submitted by the contractor 10 days prior to bridge removal

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ESTIMATED QUANTITIES

SPEC.	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
103	0100	CONTRACT BOND	L SUM	1
201	0330	CLEARING & GRUBBING	L SUM	1
202	0104	REMOVAL OF STRUCTURE	EA	1
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	29
203	0102	COMMON EXCAVATION-TYPE B	CY	10,901
203	0109	TOPSOIL	CY	1,645
203	0140	BORROW-EXCAVATION	CY	1,971
210	0109	CLASS 2 EXCAVATION-BOX CULVERT	EA	1
210	0210	FOUNDATION FILL	CY	234
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
216	0100	WATER	MGAL	85
251	0200	SEEDING CLASS II	ACRE	5
253	0101	STRAW MULCH	ACRE	5
256	0200	RIPRAP GRADE II	CY	122
261	0112	FIBER ROLLS 12IN	LF	1643
261	0113	REMOVE FIBER ROLLS 12IN	LF	873
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	1,042
606	3212	DBL 12FT X 12FT PRECAST RCB CULVERT	LF	115
606	7212	DBL 12FT X 12FT PRECAST RCB END SECTION	EA	2
702	0100	MOBILIZATION	L SUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	390
704	1052	TYPE III BARRICADE	EA	10
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	184
714	5015	PIPE CORR STEEL .064IN 18IN	LF	60
714	5810	END SECT CORR STEEL .064IN 18IN	EA	2
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	20

BASIS OF ESTIMATE

AGGREGATE SURFACE COURSE

3179 Ton/Mile Aggregate Surface Course-Cl 13 (1.5 Ton/CY +25%)

Cl. 13 Aggregate ~ 42 Ton per Section Line (0)

Cl. 13 Aggregate ~ 18 Ton per Private Drive (1)

WATER

25 MGal/Mile for Dust Palliative

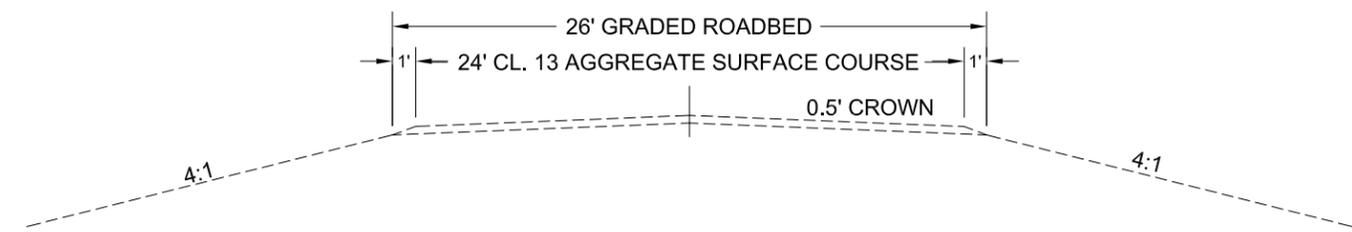
40 MGal/Mile for Aggregate Surface Course

5 Gal/CY for Embankment

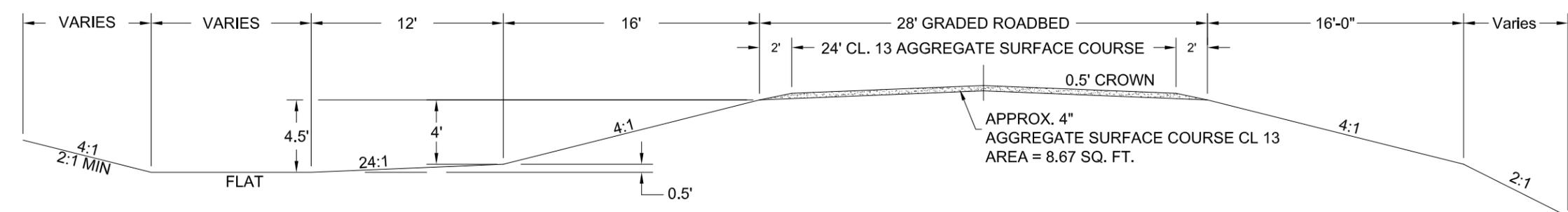
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Quantities and Basis of Estimate

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EXISTING TYPICAL SECTION



PROPOSED TYPICAL SECTION

Typical Section

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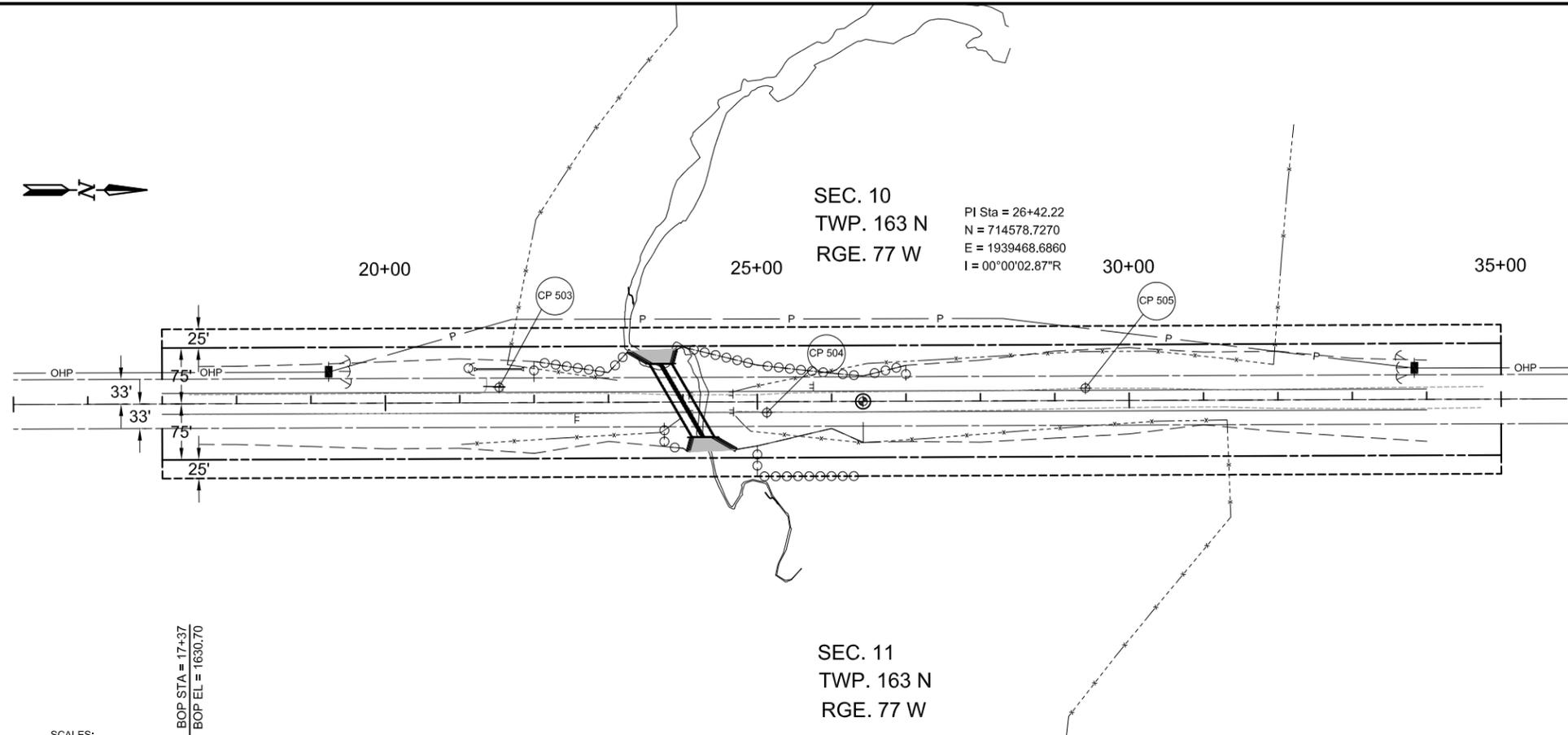
REVISED: 00/00/0000

Consulting Engineers & Land Surveyors
 BOTTINEAU - BISMARCK - MINOT

DRAWN BY: JWM	CHECKED BY: MRR	DATE: 08/29/2014
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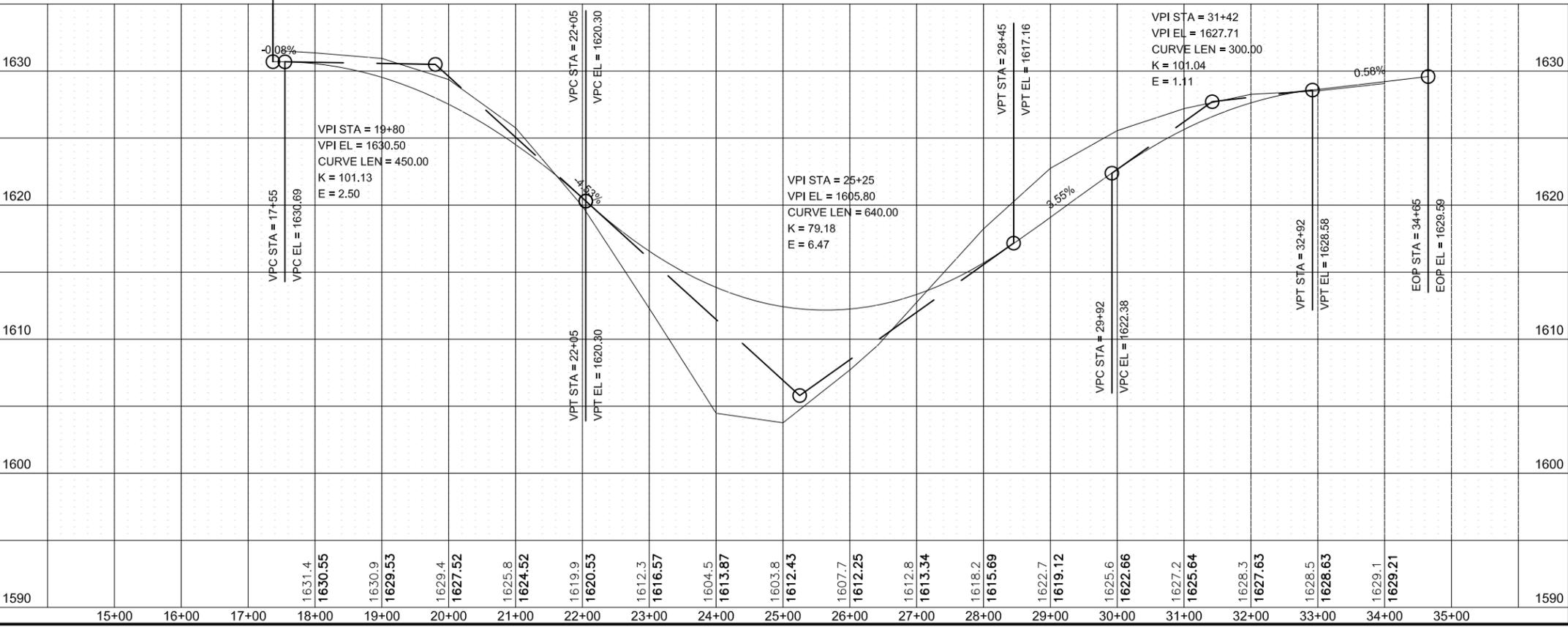
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SCALES:
1" = 200' HOR
1" = 10' VER

COMMON EXCAVATION - TYPE B	STA. 17+00 TO STA. 34+00	10,901 CY
TOPSOIL	STA. 17+00 TO STA. 34+00	1,645 CY
BORROW-EXCAVATION	STA. 17+00 TO STA. 34+00	1,971 CY
REMOVAL OF CULVERTS - ALL TYPES & SIZES	STA. 21+46 LT	29 LF
PIPE CORR STEEL .064IN 18IN	STA. 21+46 LT	60 LF
END SECT CORR STEEL .064IN 18IN	STA. 21+46 LT	2 EA
DOUBLE 12FTX12FT PRECAST RCB CULVERT	STA. 24+00 CL	115 LF
RIPRAP GRADE II	STA. 23+27 TO STA. 23+90 LT STA. 24+07 TO STA. 24+71 RT	61 CY 61 CY
GEOSYNTHETIC MATERIAL TYPE RR	STA. 23+27 TO STA. 23+90 LT STA. 24+07 TO STA. 24+71 RT	92 SY 92 SY
REMOVAL OF STRUCTURE	STA. 24+38 CL STRUCTURE NO. 5-140-04.0 DECK/BEAMS: TIMBER CURB: NONE RAIL: NONE ABUTMENTS: TIMBER OVERALL LENGTH: 54.13' DECK WIDTH: 22.6'	1 EA

FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	STA. 12+30 RT (R2-1-24) (45 MPH) STA. 12+30 LT (R2-1-24) (55 MPH) STA. 37+95 RT (R2-1-24) (55 MPH) STA. 37+95 LT (R2-1-24) (45 MPH)	5 SF 5 SF 5 SF 5 SF
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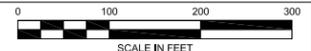


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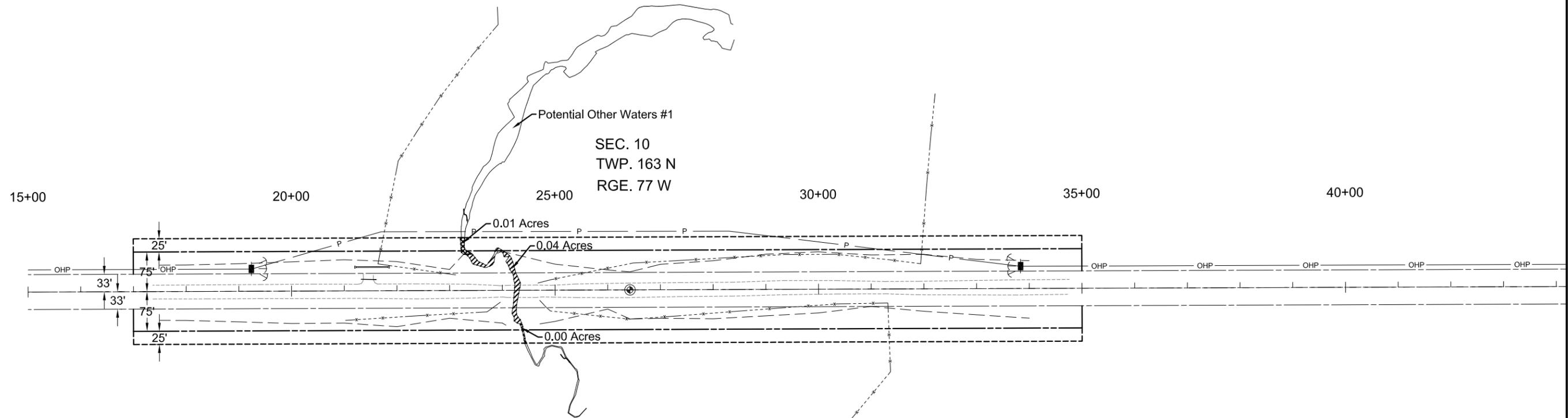
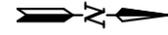
PLAN & PROFILE

STA. 15+00 to 35+00

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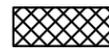
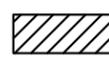


SEC. 10
TWP. 163 N
RGE. 77 W

SEC. 11
TWP. 163 N
RGE. 77 W

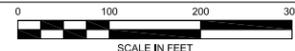
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1" = 10' VER

-  Temporary Other Waters Impact
-  Permanent Other Waters Impact

Wetlands
STA. 17+00 to 35+00

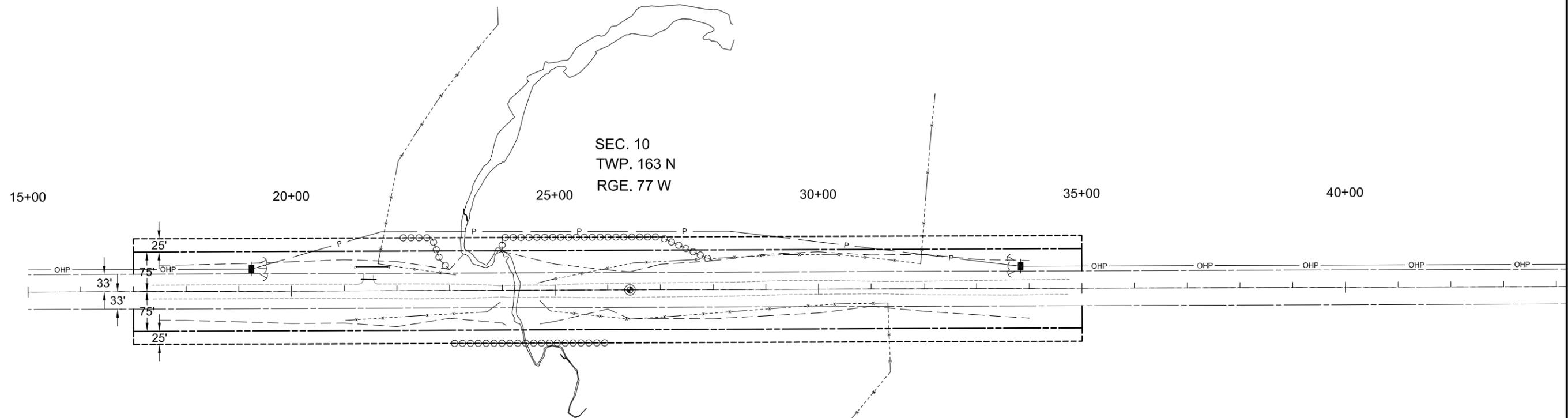
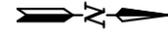
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SCALE IN FEET

FIBER ROLLS 12IN -ooooooooooooooooo
 STA. 22+00 TO STA. 23+00 LT 137 LF
 STA. 24+00 TO STA. 28+00 LT 436 LF
 STA. 23+00 TO STA. 26+00 RT 300 LF

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Temporary Erosion Control
 STA. 17+00 to 35+00

FILE: 075wl_002.dwg

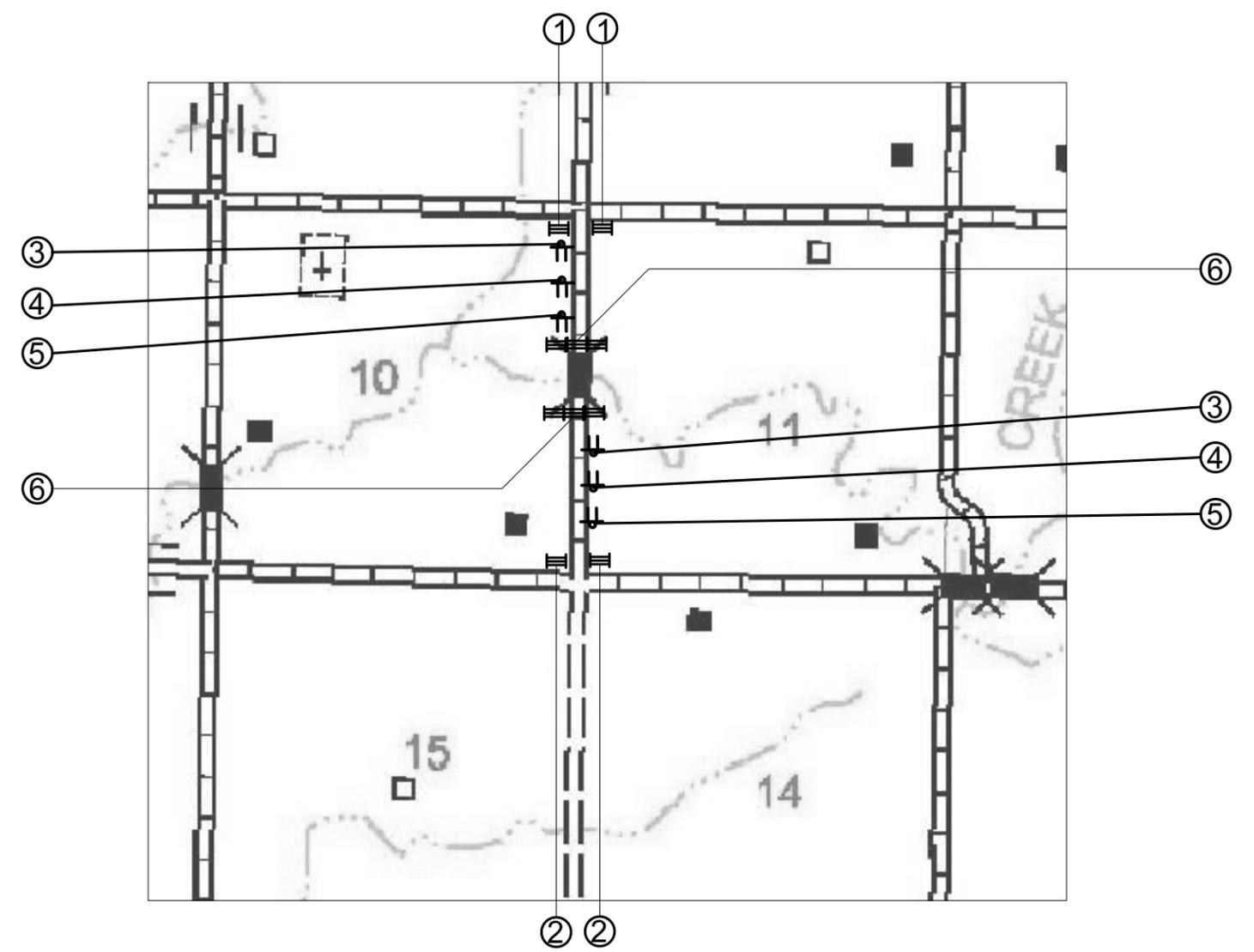
SCALE IN FEET

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

SCALES:
 1" = 200' HOR
 1" = 10' VER

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LEGEND:



- ① ROAD CLOSED
0.3 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3a-60
BARRICADE POST MOUNTING
- ② ROAD CLOSED
0.5 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3a-60
BARRICADE POST MOUNTING
- ③ ROAD CLOSED
AHEAD
500'
W20-3-48
POST MOUNTING
- ④ ROAD CLOSED
1000 FT
500'
W20-3-48
POST MOUNTING
- ⑤ ROAD CLOSED
500 FT
500'
W20-3-48
POST MOUNTING
- ⑥ ROAD CLOSED
500'
R11-2-48
BARRICADE MOUNTING

Traffic Control Layout

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Work Zone Traffic Control

REVISED: 00/00/0000



Consulting Engineers & Land Surveyors
BOTTINEAU - BISMARCK - MINOT

DRAWN BY: JAB CHECKED BY: MRR DATE: 08/29/2014

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0005(032)	170	1

For a single box culvert with 9.0 inch thick roof, 9.0 inch thick floor and 8.0 inch thick walls, the following total factored moments would result from the application of the required loads:

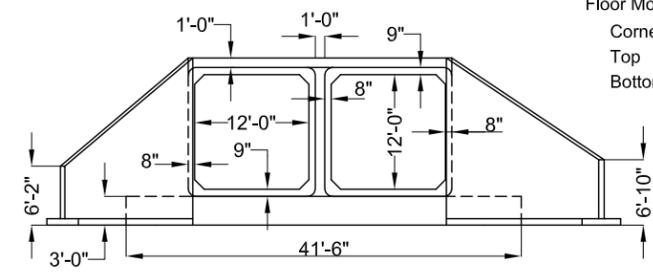
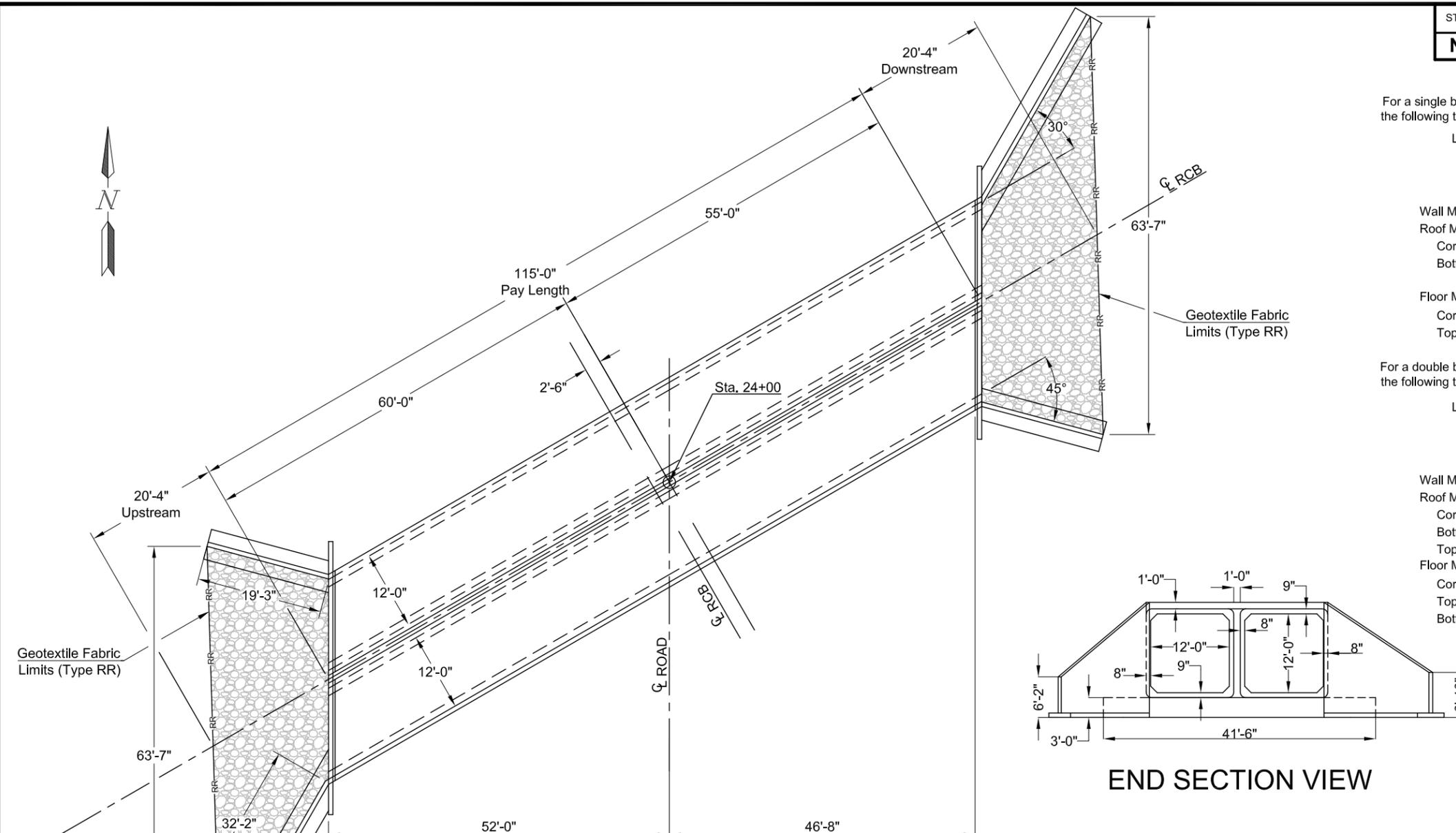
LRFD Factored Design Moments and Minimum Reinforcing (Single Cell)

	Factored Design Moments	Minimum Reinforcing
Wall Moment	2,999 ft.-lbs.	0.192 in ² /ft
Roof Moments		
Corner	17,234 ft.-lbs.	0.484 in ² /ft
Bottom	26,871 ft.-lbs.	0.773 in ² /ft
Floor Moments		
Corner	22,126 ft.-lbs.	0.629 in ² /ft
Top	29,225 ft.-lbs.	0.847 in ² /ft

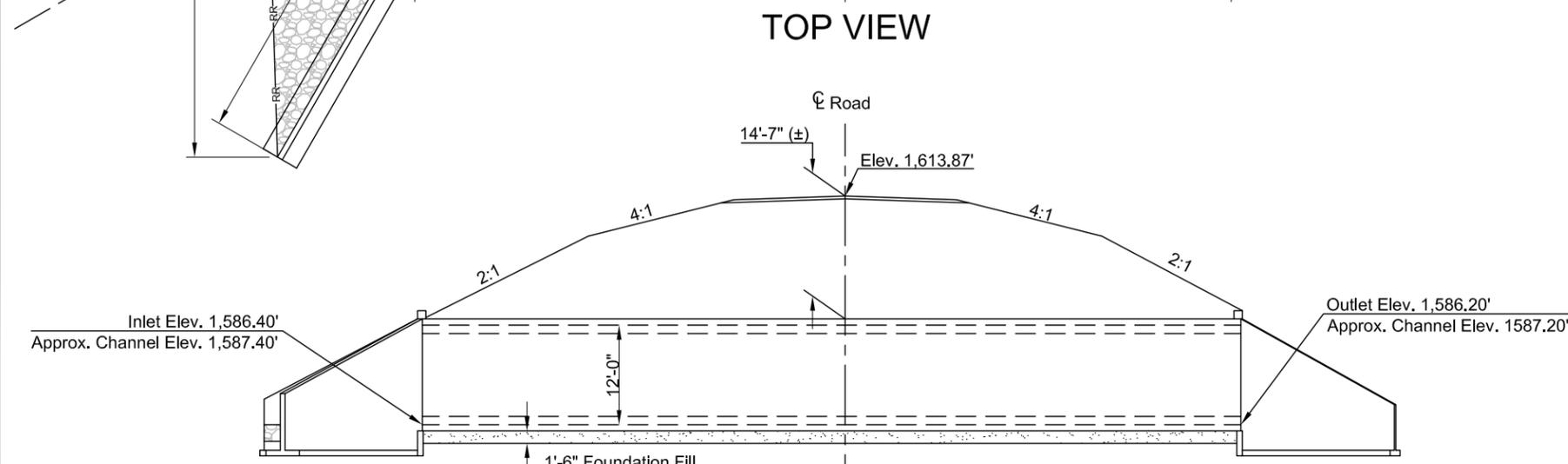
For a double box culvert with 9.0 inch thick roof, 9.0 inch thick floor and 9.0 inch thick walls, the following total factored moments would result from the application of the required loads:

LRFD Factored Design Moments and Minimum Reinforcing (Double Cell)

	Factored Design Moments	Minimum Reinforcing
Wall Moment	4,288 ft.-lbs.	0.216 in ² /ft
Roof Moments		
Corner	16,962 ft.-lbs.	0.476 in ² /ft
Bottom	19,434 ft.-lbs.	0.548 in ² /ft
Top	35,248 ft.-lbs.	1.039 in ² /ft
Floor Moments		
Corner	20,311 ft.-lbs.	0.574 in ² /ft
Top	19,982 ft.-lbs.	0.565 in ² /ft
Bottom	38,259 ft.-lbs.	1.138 in ² /ft



END SECTION VIEW



SIDE VIEW

HYDRAULIC DATA	
DRAINAGE AREA	33.5 sq. miles
STREAM SLOPE	0.00125 ft/ft
DESIGN FREQUENCY	15 year
DESIGN DISCHARGE	1,285 cfs
DESIGN HEADWATER STAGE	1,594.62'
DESIGN TAILWATER STAGE	1,593.01'
DESIGN VELOCITY	8.13 fps
100-YEAR FREQUENCY DISCHARGE	2,775 cfs
100-YEAR FREQUENCY HEADWATER	1,599.69'
OVERTOPPING STAGE	1,613.51'
OVERTOPPING DISCHARGE	6,843 cfs

PRECAST BOX CULVERT

This document was originally issued and sealed by Michael R. Rivinius, Registration Number PE-4446, on 08/29/14 and the original document is stored at the Wold Engineering, Bismarck

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NOTES

606-P01 PRECAST RCB CULVERT

606 – Double 12ft. x 12ft. Precast RCB Culvert
Dimensions: Two Single 12ft. span x 12ft. rise section

Fill: 17ft.

Design Load: HL-93

Total Length: 115ft. total barrel length

Weight: 35,700 lbs/6ft.

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

Threaded Inserts for Eye Bolts: Three (3) 5/8" Dia. galvanized threaded inserts and 5/8" Dia. threaded and eyebolts shall be provided per wall on each end section to provided anchor points for fencing. The concrete inserts shall be of such design that when installed in concrete, will be capable of developing the full strength of the 5/8" Dia. threaded eye bolt. The Insets shall start 15" from the ground and be spaced at 15" intervals.

End Sections: Holes shall be cast at 3' centers through the floor of the last barrel section and into the cutoff wall to receive 3/4" diameter reinforcing bars. The wings shall be connected to the last barrel section by the use of galvanized u-bolts or another approved method.

The "PRECAST RCB END SECTION" shall consist of the threaded inserts, eye bolts, two wing sections, one cutoff wall, and one parapet.

All bolts, plates, angles, and studs shall meet ASTM A 36. Nuts shall be ASTM A 563 and washers shall be ASTM F 436, Type 1. Welded pipe sleeves shall conform to ASTM A 53, Grade B. All hardware shall be galvanized according to AASHTO M 232. Structural steel shall be galvanized after fabrication according to AASHTO M 111. Welders shall be properly certified for all shop and field welds. Field welds shall be coated with galvanizing paint.

Joints: All joints shall have one (1) inch joint mastic installed in the center of the tongue and groove. This shall be installed on the bottom and up each side, 12" above the haunch on each side. The joints shall be wrapped with 24" wide filter fabric on all sides, including the top, bottom, and sides. This filter fabric shall be centered on the joint maintaining 12" overlap on either side of the joint.

Single or Multiple Span Substitution

The Contractor may substitute one double span precast box culverts section for the two single span precast box culvert sections shown in the plans. The contractor shall install the two single span precast box culverts sections with a space between barrel lines of 1'-0". This space shall be filled with grout with the following mix design:

MIX DESIGN

3/4" minus Rock	800 lbs
Sand	2,300 lbs
Fly Ash	100 lbs
Cement	560 lbs
Air	5%
Slump	5" to 6"

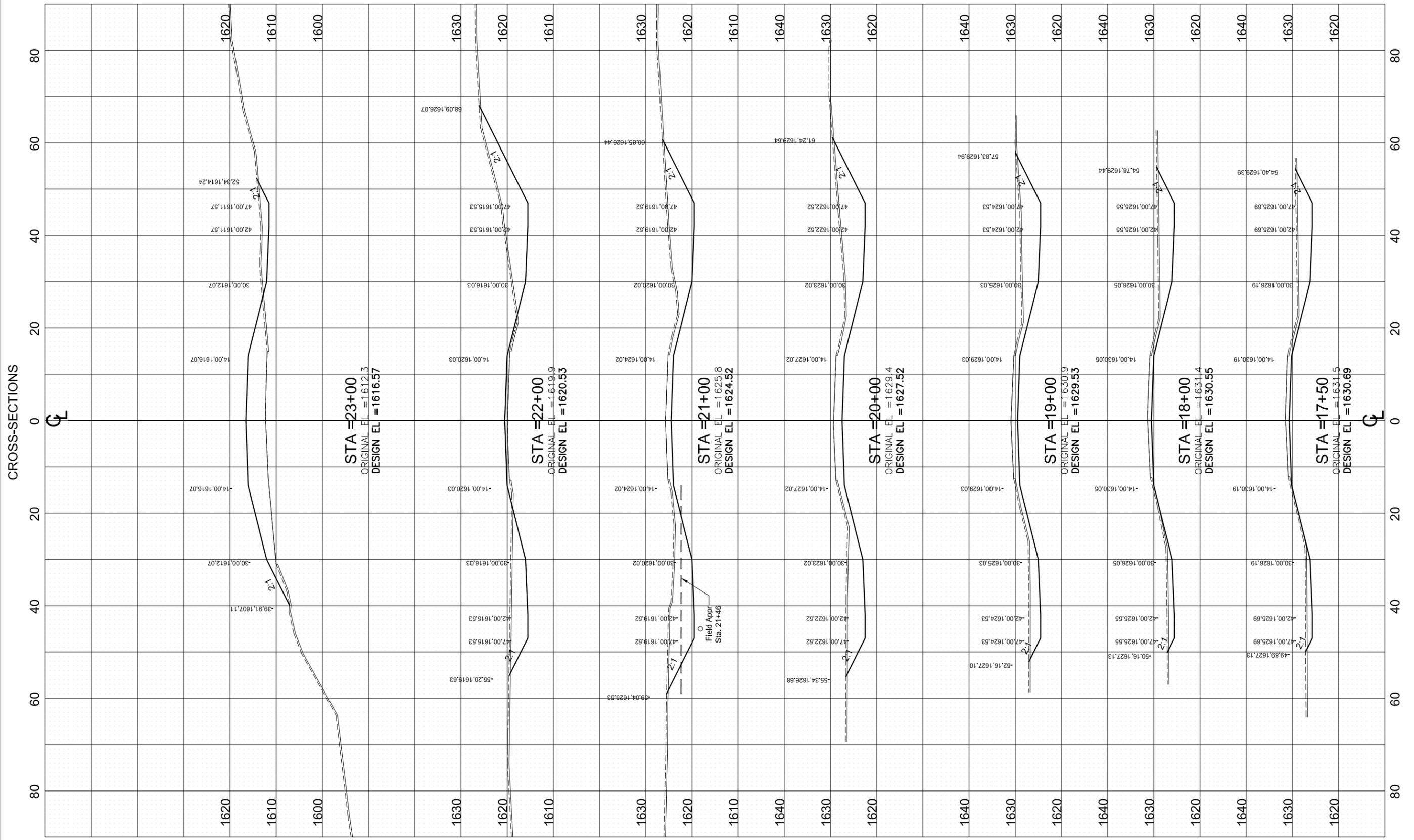
The grout shall be fluid on placement to flow around and fill voids in the backfill area. The grout shall be included in price bid for precast units.

Payment shall be limited to the price bid for the Double Precast Box Sections and End Sections.

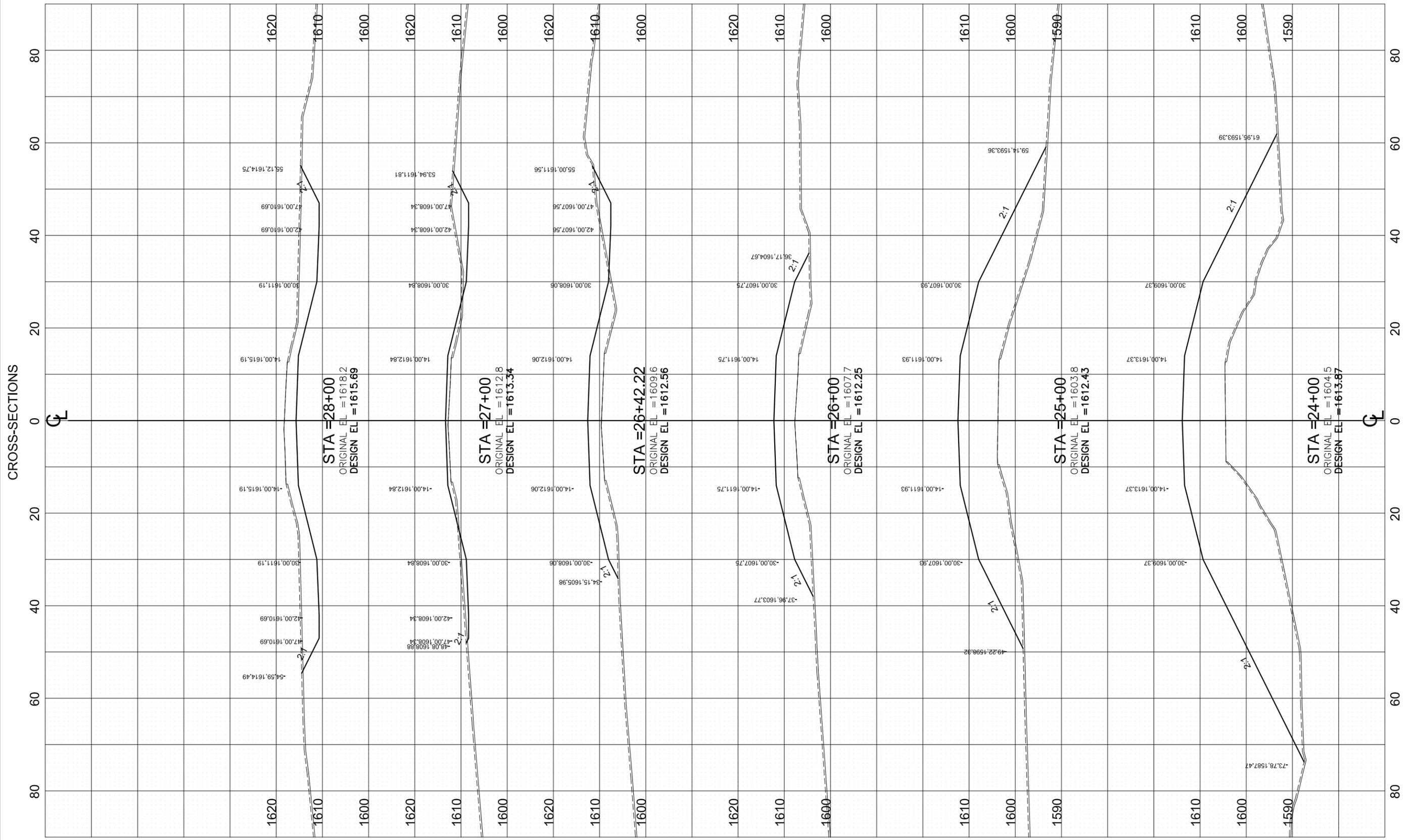
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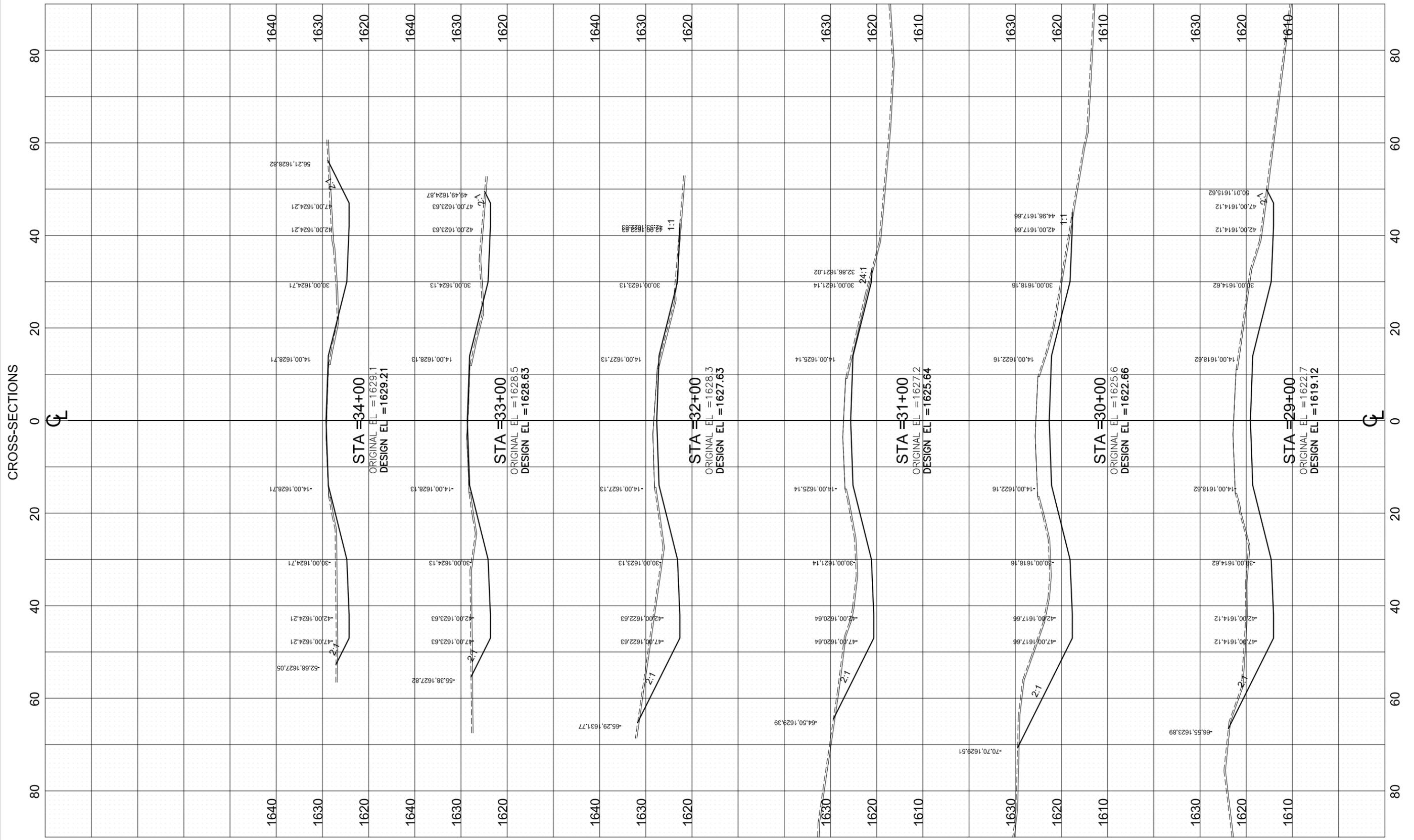
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NDDOT ABBREVIATIONS

? This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.

Abn abandoned
 Abut abutment
 Ac acres
 Adj adjusted
 Aggr aggregate
 Ahd ahead
 ARV air release valve
 Align alignment
 Al alley
 Alt alternate
 Alum aluminum
 ADA Americans with Disabilities Act
 A ampere
 & and
 Appr approach
 Approx approximate
 ACP asbestos cement pipe
 Asph asphalt
 AC asphalt cement
 Assmd assumed
 @ at
 Atten attenuation
 ATR automatic traffic recorder
 Ave Avenue
 Avg average
 ADT average daily traffic
 Az azimuth
 Bk back
 BF back face
 Bs backsight
 Balc balcony
 B Wire barbed wire
 Barr barricade
 Btry battery
 Brg bearing
 BI beehive inlet
 Beg begin
 BM bench mark
 Bkwy bikeway
 Bit bituminous
 Blk block
 Bd Ft board feet
 BH bore hole
 BS both sides
 Bot bottom
 Blvd Boulevard
 Bndry boundary
 BC brass cap
 Brkwy breakaway
 Br bridge
 Bldg building

BV butterfly valve
 Byp bypass
 C Gdrl cable guardrail
 Calc calculate
 Cd candela
 CIP cast iron pipe
 CB catch basin
 CRS cationic rapid setting
 C Gd cattle guard
 C To C center to center
 Cl or C centerline
 Cm centimeter
 Ch chain
 Chnlk chain-link
 Ch Blk channel block
 Ch Ch channel change
 Chk check
 Chsld chiseled
 Cir circle
 Cl class
 Cl clay
 Cl F clay fill
 Cl Hvy clay heavy
 Cl Lm clay loam
 Clnt clean-out
 Clr clear
 Cl&gr clearing & grubbing
 Co S coal slack
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 Cond conductor
 Const construction
 Cont continuous
 CSB continuous split barrel sample
 Contr contraction
 Contr contractor
 CP control point
 Coord coordinate
 Cor corner
 Corr corrected
 CAES corrugated aluminum end section
 CAP corrugated aluminum pipe
 CMES corrugated metal end section
 CMP corrugated metal pipe
 CPVCP corrugated poly-vinyl chloride pipe
 CSES corrugated steel end section
 CSP corrugated steel pipe
 C coulomb
 Co County
 Crse course
 C Gr course gravel
 CS course sand

Ct Court
 Xarm cross arm
 Xbuck cross buck
 Xsec cross sections
 Xing crossing
 Xrd Crossroad
 Crn crown
 CF cubic feet
 M3 cubic meter
 M3/s cubic meters per second
 CY cubic yard
 Cy/mi cubic yards per mile
 Culv culvert
 C&G curb & gutter
 CI curb inlet
 CR curb ramp
 CS curve to spiral
 C cut
 Dd Ld dead load
 Defl deflection
 Defm deformed
 Deg or D degree
 DInt delineate
 DIntr delineator
 Depr depression
 Desc description
 Det detail
 DWP detectable warning panel
 Dtr detour
 Dia diameter
 Dir direction
 Dist distance
 DM disturbed material
 DB ditch block
 DG ditch grade
 Dbl double
 Dn down
 Dwg drawing
 Dr drive
 Drwy driveway
 DI drop inlet
 D dry density
 Ea each
 Esmt easement
 E East
 EB Eastbound
 Elast elastomeric
 EL electric locker
 E Mtr electric meter
 Elec electric/al
 EDM electronic distance meter
 Elev or El elevation
 Ellipt elliptical
 Emb embankment
 Emuls emulsion/emulsified

ES end section
 Engr engineer
 ESS environmental sensor station
 Eq equal
 Eq equation
 Evgr evergreen
 Exc excavation
 Exst existing
 Exp expansion
 Expy Expressway
 E external of curve
 Extru extruded
 FOS factor of safety
 F Fahrenheit
 FS far side
 F farad
 Fed Federal
 FP feed point
 Ft feet/foot
 Fn fence
 Fn P fence post
 FO fiber optic
 FB field book
 FD field drive
 F fill
 FAA fine aggregate angularity
 FS fine sand
 FH fire hydrant
 Fl flange
 Flrd flared
 FES flared end section
 F Bcn flashing beacon
 FA flight auger sample
 FL flow line
 Ftg footing
 FM force main
 Fs foresight
 Fnd found
 Fdn foundation
 Frac fractional
 Frwy freeway
 Frt front
 FF front face
 F Disp fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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NDDOT ABBREVIATIONS

D-101-2

FFP	fuel filler pipes	IP	iron Pipe	M	mega	Ped	pedestrian
FLS	fuel leak sensor	Jt	joint	Mer	meridian	PPP	pedestrian pushbutton post
Furn	furnish/ed	J	joule	M	meter	Pen.	penetration
Gal	gallon	Jct	junction	M/s	meters per second	Perf	perforated
Galv	galvanized	K	kelvin	M	mid ordinate of curve	Per.	perimeter
Gar	garage	Kn	kilo newton	Mi	mile	PL	pipeline
Gs L	gas line	Kpa	kilo pascal	MM	mile marker	PI	place
G Reg	gas line regulator	Kg	kilogram	MP	mile post	P&P	plan & profile
GMV	gas main valve	Kg/m3	kilogram per cubic meter	MI	milliliter	PL	plastic limit
G Mtr	gas meter	Km	kilometer	Mm	millimeter	PI	plate
GSV	gas service valve	K	Kip(s)	Mm/hr	millimeters per hour	Pt	point
GVP	gas vent pipe	LS	Land Surveyor (licensed)	Min	minimum	PCC	point of compound curve
GV	gate valve	LSIT	Land Surveyor In Training	Misc	miscellaneous	PC	point of curve
Ga	gauge	Ln	lane	Mon	monument	PI	point of intersection
Geod	geodetic	Lg	large	Mnd	mound	PRC	point of reverse curvature
GIS	Geographical Information System	Lat	latitude	Mtbl	mountable	PT	point of tangent
G	giga	Lt	left	Mtd	mounted	POC	point on curve
GPS	Global Positioning System	L	length of curve	Mtg	mounting	POT	point on tangent
Gov	government	Lens	lenses	Mk	muck	PE	polyethylene
Grd	graded/grade	Lvl	level	Mun	municipal	PVC	polyvinyl chloride
Gr	gravel	LB	level book	N	nano	PCC	Portland Cement concrete
Grnd	ground	LvIng	leveling	NGS	National Geodetic Survey	Lb or #	pounds
GWM	ground water monitor	Lht	light	NS	near side	PP	power pole
Gdrl	guardrail	LP	light pole	Neop	neoprene	Preempt	preemption
Gtr	gutter	Ltg	lighting	Ntwk	network	Prefab	prefabricated
H Plg	H piling	Lig Co	lignite coal	N	newton	Prfmd	performed
Hdwl	headwall	Lig Sl	lignite slack	N	North	Prep	preparation
Ha	hectare	LF	linear foot	NE	North East	Press.	pressure
Ht	height	Liq	liquid	NW	North West	PRV	pressure relief valve
HI	height of instrument	LL	liquid limit	NB	Northbound	Prestr	prestressed
Hel	helical	L	litre	No. or #	number	Pvt	private
H	henry	Lm	loam	Obsc	obscure(d)	PD	private drive
HZ	hertz	Loc	location	Obsn	observation	Prod.	production/produce
HDPE	high density polyethylene	LC	long chord	Ocpd	occupied	Prog	programmed
HM	high mast	Long.	longitude	Ocpy	occupy	Prop.	property
HP	high pressure	Lp	loop	Off Loc	office location	Prop Ln	property line
HPS	high pressure sodium	LD	loop detector	O/s	offset	Ppsd	proposed
Hwy	highway	Lm	lumen	OC	on center	PB	pull box
Hor	horizontal	Lum	luminaire	C	one dimensional consolidation		
HBP	hot bituminous pavement	L Sum	lump sum	OC	organic content		
Hr	hour(s)	Lx	lux	Orig	original		
Hyd	hydrant	ML	main line	O To O	out to out		
Ph	hydrogen ion content	M Hr	man hour	OD	outside diameter		
Id	identification	MH	manhole	OH	overhead		
In or "	inch	Mkd	marked	PMT	pad mounted transformer		
Incl	inclinometer tube	Mkr	marker	Pg	pages		
IMH	inlet manhole	Mkg	marking	Pntd	painted		
ID	inside diameter	MA	mast arm	Pr	pair		
Inst	instrument	Matl	material	Pnl	panel		
Intchg	interchange	Max	maximum	Pk	park		
Intmdt	intermediate	MC	meander corner	PK	Parker-Kalon nail		
Intscn	intersection	Meas	measure	Pa	pascal		
Inv	invert	Mdn	median	PSD	passing sight distance		
IM	iron monument	MD	median drain	Pvmt	pavement		
IPn	Iron Pin	MC	medium curing	Ped	pedestal		

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NDDOT ABBREVIATIONS

Qty	quantity	Sig	signal	TS	tangent to spiral	WB	Westbound
Qtr	quarter	Si Cl	silt clay	Tel	telephone	Wrng	wiring
Rad or R	radius	Si Cl Lm	silty clay loam	Tel B	Telephone Booth	W/	with
RR	railroad	Si Lm	silty loam	Tel P	telephone pole	W/o	without
Rlwy	railway	Sgl	single	Tv	television	WC	witness corner
Rsd	raised	SC	slow curing	Temp	temperature	WGS	World Geodetic System
RTP	random traverse point	SS	slow setting	Temp	temporary	Z	zenith
Rge or R	range	Sm	small	TBM	temporary bench mark		
RC	rapid curing	S	South	T	tesla		
Rec	record	SE	South East	T	thinwall tube sample		
Rcy	recycle	SW	South West	T/mi	tons per mile		
RPCC	recycled Portland cement concrete	SB	Southbound	Ts	topsoil		
Ref	reference	Sp	spaces	Twp or T	township		
R Mkr	reference marker	Spcl	special	Traf	traffic		
RM	reference monument	SA	special assembly	TSCB	traffic signal control box		
Refl	reflectorized	SP	special provisions	Tr	trail		
RCB	reinforced concrete box	G	specific gravity	Transf	transformer		
RCES	reinforced concrete end section	Spk	spike	TB	transit book		
RCP	reinforced concrete pipe	SC	spiral to curve	Trans	transition		
RCPS	reinforced concrete pipe sewer	ST	spiral to tangent	TT	transmission tower		
Reinf	reinforcement	SB	split barrel sample	Trans	transverse		
Res	reservation	SH	sprinkler head	Trav	traverse		
Ret	retaining	SV	sprinkler valve	TP	traverse point		
Rev	reverse	Sq	square	Trtd	treated		
Rt	right	SF	square feet	Trmt	treatment		
R/W	right of way	Km2	square kilometer	Qc	triaxial compression		
Riv	river	M2	square meter	TERO	tribal employment rights ordinance		
Rd	road	SY	square yard	Tpl	triple		
Rdbd	road bed	Stk	stake	TP	turning point		
Rdwy	roadway	Std	standard	Typ	typical		
RWIS	Roadway Weather Information System	N	standard penetration test	Qu	unconfined compressive strength		
Rk	rock	Std Specs	Standard Specifications	Ugrnd	underground		
Rt	route	Sta	station	USC&G	US Coast & Geodetic Survey		
Salv	salvage(d)	Sta Yd	station yards	USGS	US Geologic Survey		
Sd	sand	Stm L	steam line	Util	utility		
Sdy Cl	sandy clay	SEC	steel encased concrete	VG	valley gutter		
Sdy Cl Lm	sandy clay loam	SSD	stopping sight distance	Vap	vapor		
Sdy Fl	sandy fill	SD	storm drain	Vert	vertical		
Sdy Lm	sandy loam	St	street	VC	vertical curve		
San	sanitary sewer line	SPP	structural plate pipe	VCP	vitrified clay pipe		
Sc	scoria	SPPA	structural plate pipe arch	V	volt		
Sec	seconds	Str	structure	Vol	volume		
Sec	section	Subd	subdivision	Wkwy	walkway		
SL	section line	Sub	subgrade	W	water content		
Sep	separation	Sub Prep	subgrade preparation	WGV	water gate valve		
Seq	sequence	Ss	subsoil	WL	water line		
Serv	service	SE	superelevation	WM	water main		
Sh	shale	SS	supplement specification	WMV	water main valve		
Sht	sheet	Supp	supplemental	W Mtr	water meter		
Shtng	sheeting	Surf	surfacing	WSV	water service valve		
Shldr	shoulder	Surv	survey	WW	water well		
Sw	sidewalk	Sym	symmetrical	W	watt		
S	siemens	SI	Systems International	Wrng	wearing		
SD	sight distance	Tan	tangent	Wb	weber		
SN	sign number	T	tangent (semi)	WIM	Weigh In Motion		
				W	West		

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 All PI Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BAKER ELEC Baker Electric
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BLM Bureau of Land Management
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 Cable One Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporat
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PL WATER DIST Central Pipe Line Water District
 CENT PWR ELEC Central Power Electric Cooperative
 COE Corps of Engineers
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 ENVENTIS Enventis Telephone
 FALK MNG Falkirk Mining Company
 FHWA Federal Highway Administration
 G FKS-TRL WD Grand Forks-traill Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone

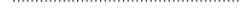
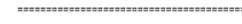
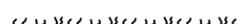
GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 IDEA1 Idea1
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company
 KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKENZIE ELEC McKenzie Electric Cooperative
 MCKNZ WRD McKenzie County Water Resource District
 MCLEOD McLeod USA
 MCLN ELEC McLean Electric Cooperative
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MID-CONT CABLE Mid-Continent Cable
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MRE LBTY TEL Moore & Liberty Telephone
 MUNICIPAL City Water And Sewer
 MUNICIPAL City Of '.....'
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT NDSU Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 ONEOK Oneok gas
 OSHA Occupational Safety and Health Administration
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 PVT ELEC Private Electric
 QWEST Qwest Communications
 R&T W SUPPLY R & T Water Supply Association
 RAMSEY R SEW Ramsey Rural Sewer Association
 RAMSEY RW Ramsey Rural Water Association
 RAMSEY UTIL Ramsey County Rural Utilities

RED RIV TEL Red River Rural Telephone
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Coop
 RRVW Red River Valley & Western Railroad
 RSR ELEC R.S.R. Electric Cooperative
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative Incorporated
 SOURIS RIV TELCOM Souris River Telecommunications
 ST WAT COMM State Water Commission
 STATE LN WATER State Line Water Cooperative
 STER ENG Sterling Energy
 STUT RWU Stutsman Rural Water Users
 SW PL PRJ Southwest Pipeline Project
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 TESORO GHG PLNS PL Tesoro High Plains Pipeline
 TRI-CNTY WU Tri-County Water Users Incorporated
 TRL CO RWU Traill County Rural Water Users
 UNTD TEL United Telephone
 UPPR SOUR WUA Upper Souris Water Users Association
 US SPRINT U.S. Sprint
 USAF MSL CABLE U.S.A.F. Missile Cable
 USFWS US Fish and Wildlife Service
 USW COMM U.S. West Communications
 VRNDRY ELEC Verendrye Electric Cooperative
 W RIV TEL West River Telephone Incorporated
 WEB W. E. B. Water Development Association
 WILLI RWA Williams Rural Water Association
 WILSTN BAS PL Williston Basin Interstate Pipeline Company
 WLSH RWD Walsh Water Rural Water District
 WOLVRTN TEL Wolverton Telephone
 XLENER Xcel Energy
 YSVR Yellowstone Valley Railroad

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Line Styles

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

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Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad
	Cairn or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E		
	Signal Controller		Existing Access Control Arrow		Existing Delineator Type A		
	Pad Mounted Signal Controller		Existing Artifact		Existing Delineator Type B		
	Alignment Data Point		Existing Flashing Beacon		Existing Delineator Type C		
	Emergency Vehicle Detector		Existing Benchmark		Existing Delineator Type D		

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Symbols

	Existing Light Standard		Existing Manhole with Valve Water		Existing Telephone Pole		Existing Undefined Manhole
	Existing High Mast Light Standard 10 Luminaire		Existing Water Manhole		Existing Wood Pole		Existing Undefined Pull Box
	Existing High Mast Light Standard 3 Luminaire		Existing Mile Post Type A		Existing Post		Existing Undefined Pedestal
	Existing High Mast Light Standard 4 Luminaire		Existing Mile Post Type B		Existing Pedestrian Push Button Post		Existing Undefined Valve
	Existing High Mast Light Standard 5 Luminaire		Existing Mile Post Type C		Existing Control Point CP		Existing Undefined Pipe Vent
	Existing High Mast Light Standard 6 Luminaire		Existing Reference Marker		Existing Control Point GPS-RTK		Existing Gas Valve
	Existing High Mast Light Standard 7 Luminaire		Existing RW Marker		Existing Control Point TRI		Existing Water Valve
	Existing High Mast Light Standard 8 Luminaire		Existing Utility Marker		Existing Reference Marker Point NGS		Existing Fuel Pipe Vent
	Existing High Mast Light Standard 9 Luminaire		Iron Monument Found		Existing Pull Box		Existing Gas Pipe Vent
	Existing Overhead Sign Structure Load Center		Iron Pin R/W Monument		Existing Intelligent Transportation Pull Box		Existing Sanitary Pipe Vent
	Existing Luminaire		Existing Object Marker Type I		Existing Water Pump		Existing Storm Drain Pipe Vent
	Existing Light Standard Luminaire		Existing Object Marker Type II		Existing Slotted Reinforced Concrete Pipe		Existing Water Pipe Vent
	Existing Federal Mailbox		Existing Object Marker Type III		Existing RR Profile Spot		Existing Weather Station
	Existing Private Mailbox		Existing Electrical Pedestal		Existing Fuel Leak Sensors		Existing Ground Water Well Bore Hole
	Existing Meander Section Corner		Existing Telephone Pedestal		Existing Highway Sign		Existing Windmill or Tower
	Existing Meter		Existing Fiber Optic Telephone Pedestal		Existing Miscellaneous Spot		Existing Witness Corner
	Existing Electrical Manhole		Existing TV Pedestal		Existing Lighting Standard Pole		Flashing Beacon
	Existing Gas Manhole		Existing Fiber Optic TV Pedestal		Existing Traffic Signal Standard		Flagger
	Existing Sanitary Manhole		Existing Fuel Filler Pipes		Existing Transformer		Pipe Mounted Flasher
	Existing Sanitary Force Main Manhole		Existing Traverse PI Aerial Panel		Existing Large Evergreen Tree		Sanitary Force Main with Valve
	Existing Sanitary Manhole with Valve		Existing Pole		Existing Small Evergreen Tree		
	Existing Storm Drain Manhole		Existing Power Pole		Existing Large Tree		
	Existing Force Main Storm Drain Manhole		Existing Power Pole with Transformer		Existing Small Tree		
	Existing Force Main Storm Drain Manhole with Valve				Existing Tree Trunk		
	Existing Telephone Manhole				Existing Pad Mounted Traffic Signal Control Box		

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Symbols

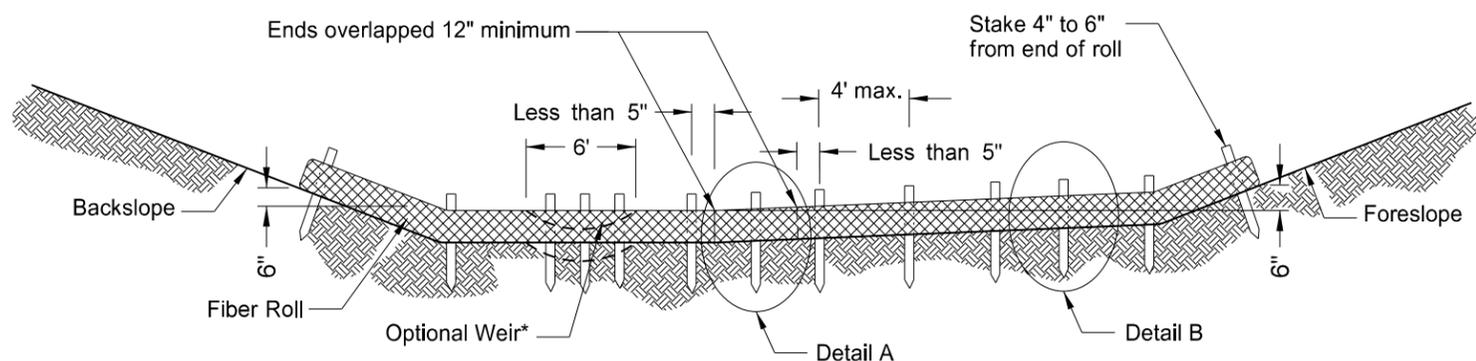
D-101-32

 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Alignment Monument  Iron Pin Reference Monument	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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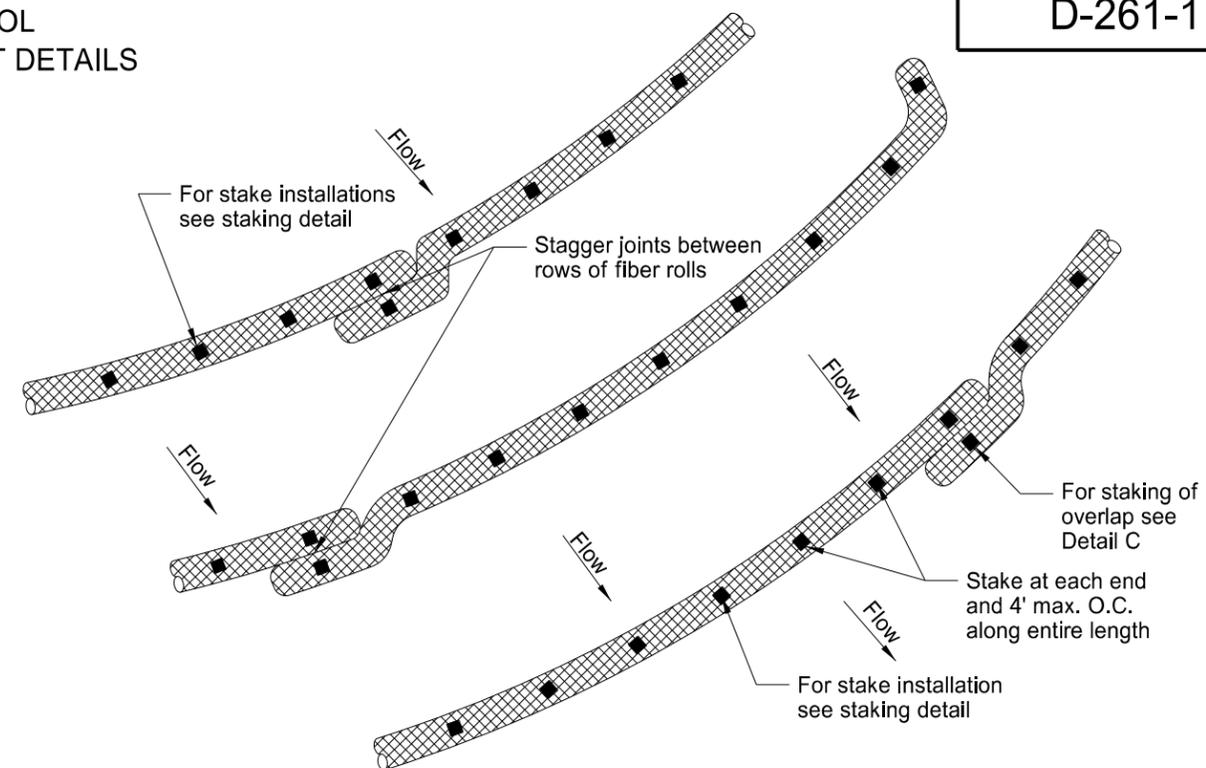
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

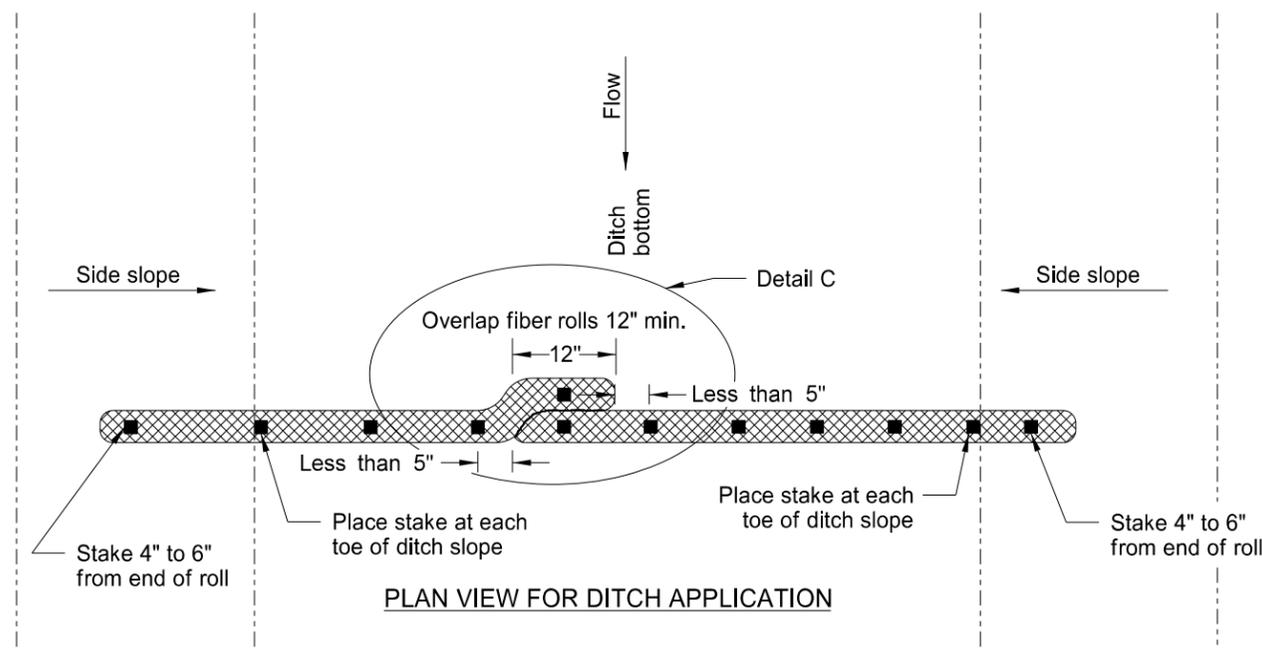


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

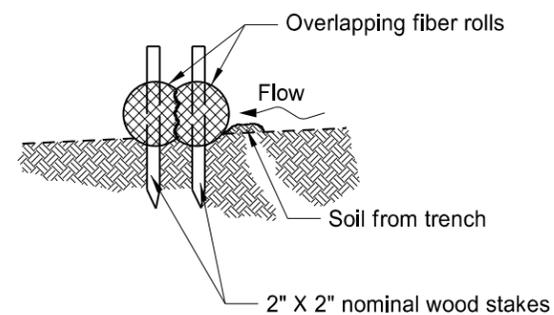
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



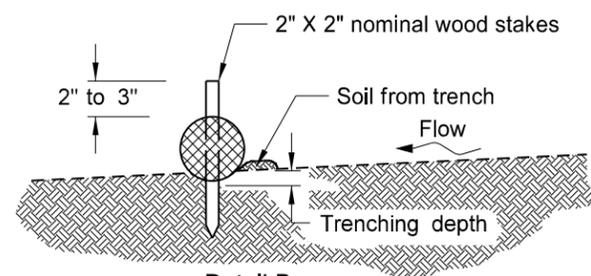
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



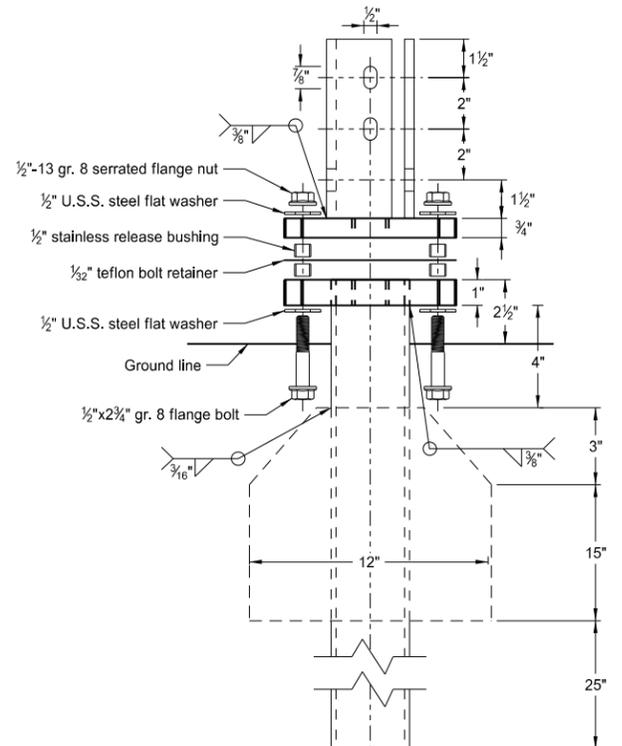
Detail B
Fiber Roll Staking Detail

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

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

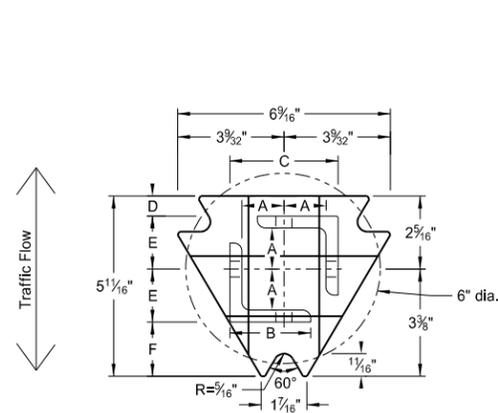
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1

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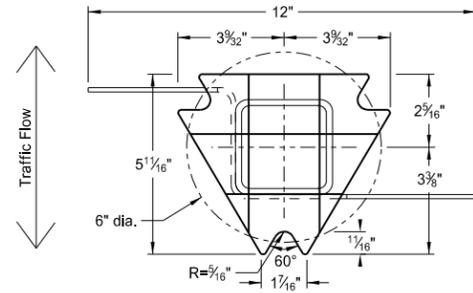


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" ASTM A36 structural angle



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

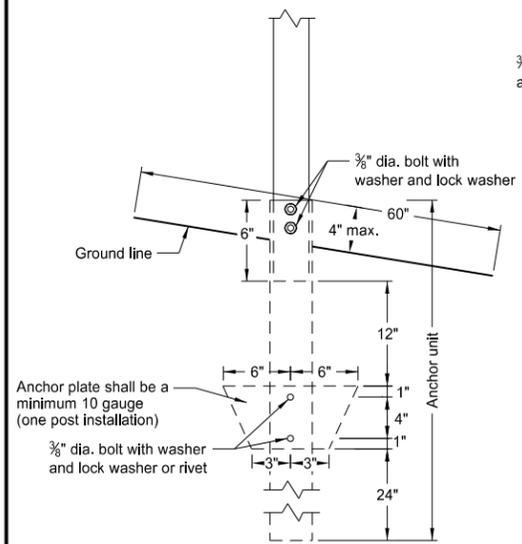
Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

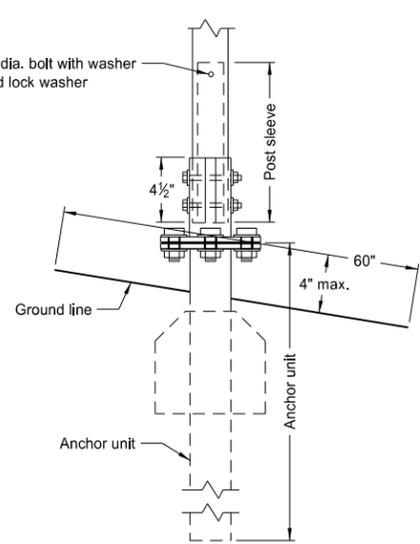
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	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	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
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

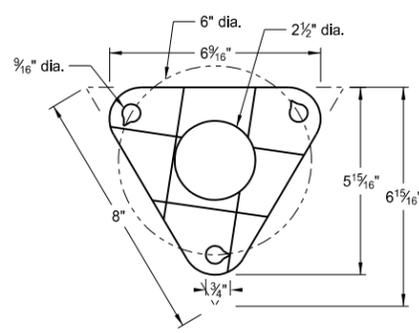
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



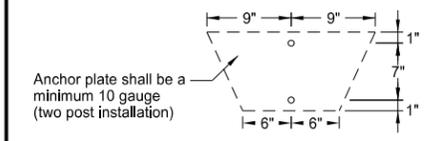
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



Bolt Retainer for Base Connection
Bolt Retainer - 1/32" Reprocessed Teflon



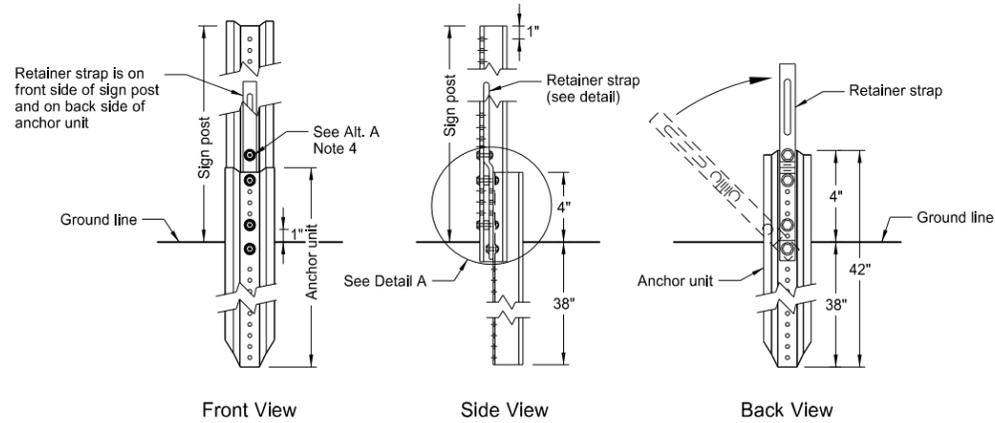
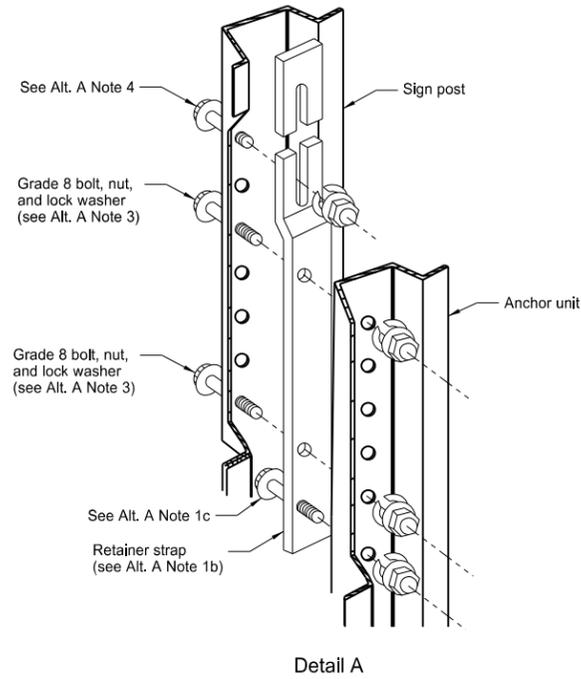
Anchor plate shall be a minimum 10 gauge (two post installation)

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
 (B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

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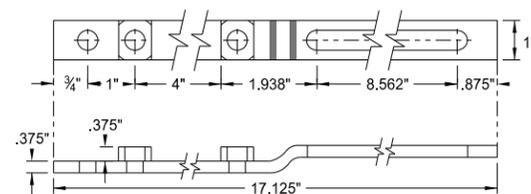
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U-Channel Post

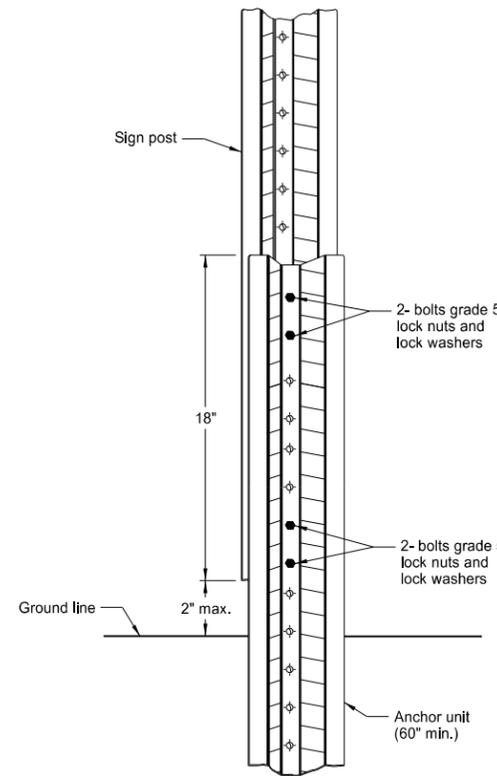


Breakaway U-Channel Detail Alternate A

A maximum of 2 posts shall be installed within 7'.

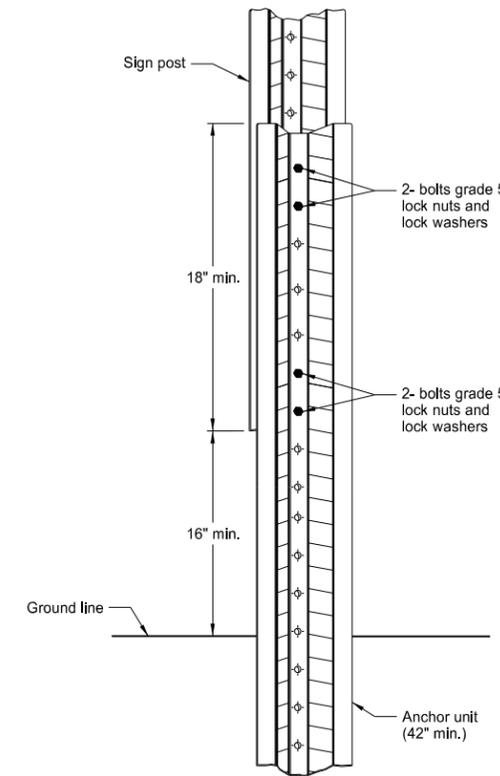


Retainer Strap Detail



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

A maximum of 3 posts shall be installed within 7'.



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

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

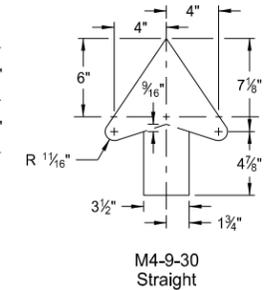
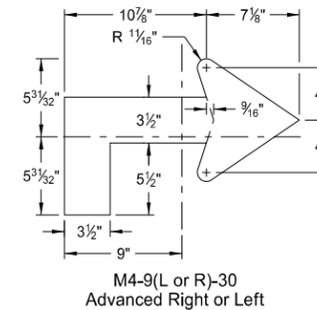
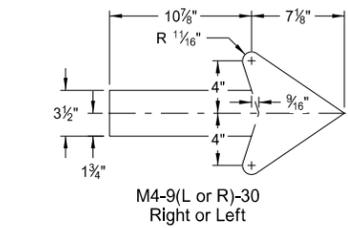
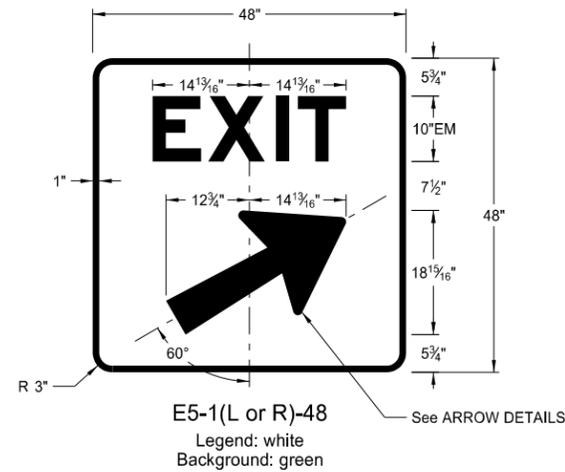
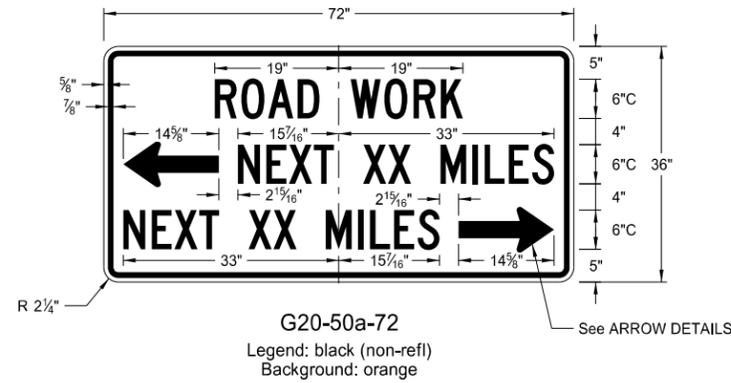
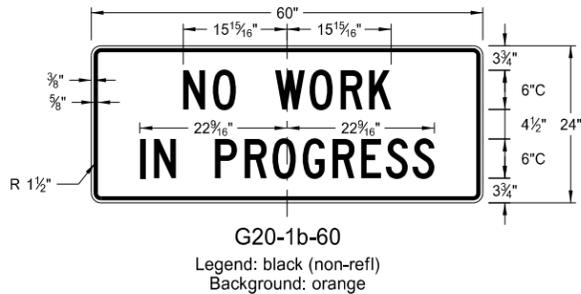
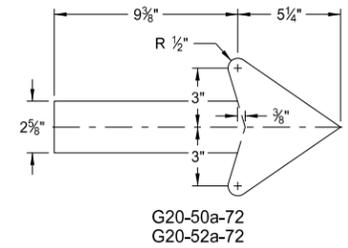
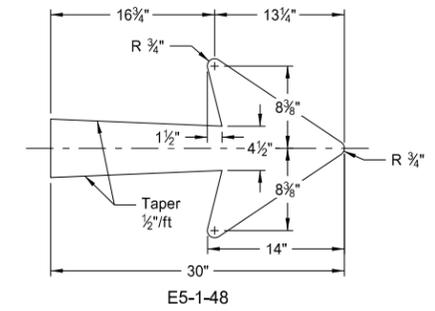
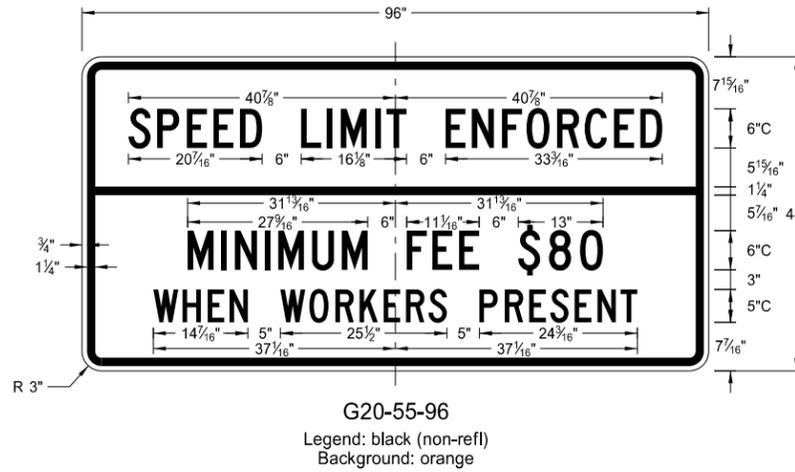
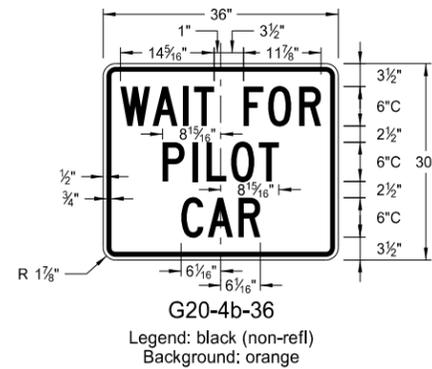
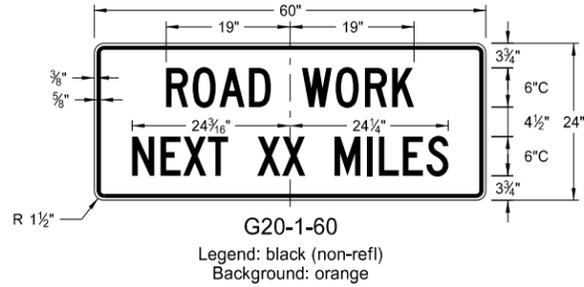
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. The base post, strap and 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.

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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



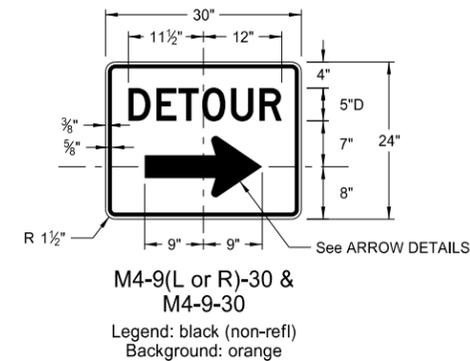
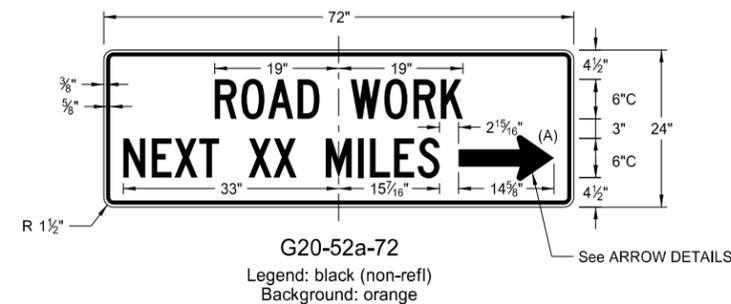
ARROW DETAILS

NOTES:

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

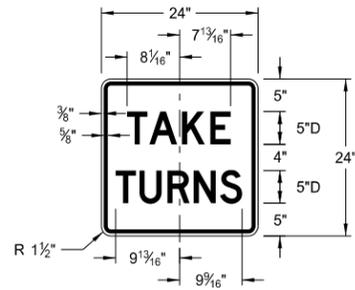
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8-13-13	
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 PE- 2930,
 on 8/13/13 and the original document is stored at the
 North Dakota Department
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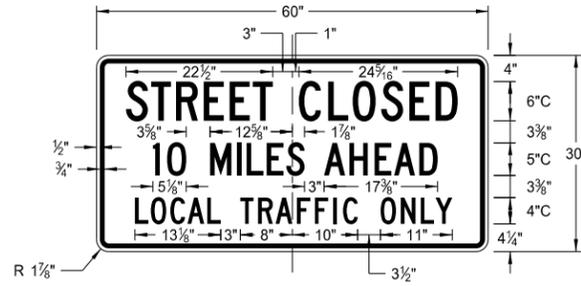
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



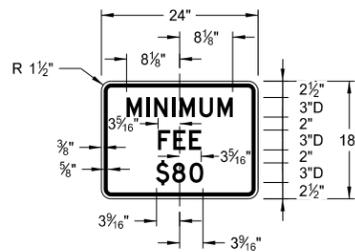
R1-50-24

Legend: black (non-refl)
Background: white



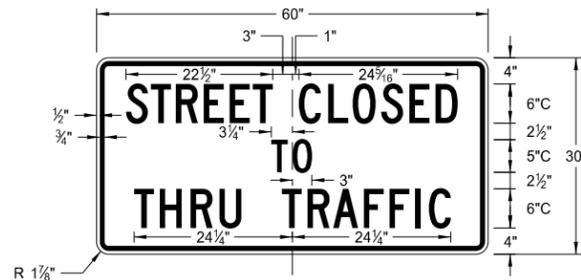
R11-3c-60

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

Legend: black (non-refl)
Background: white

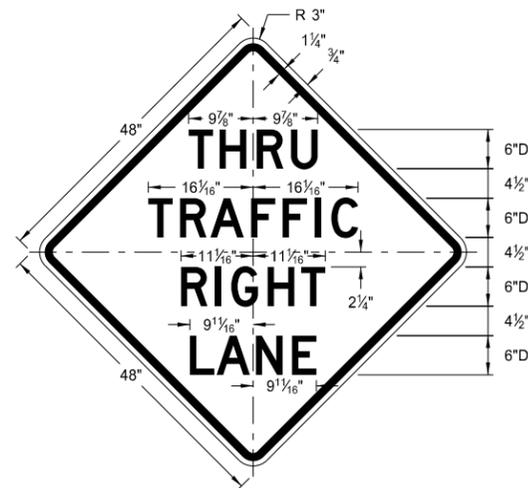
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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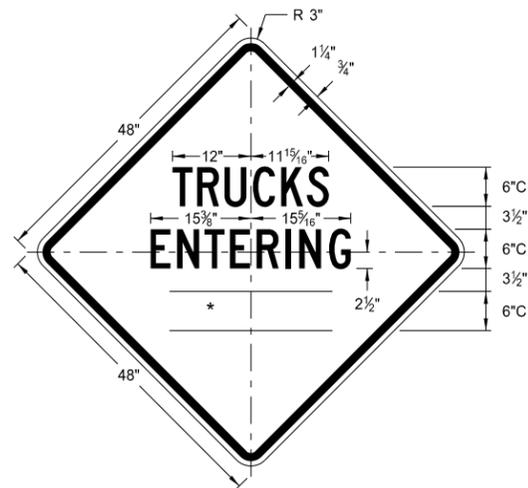
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

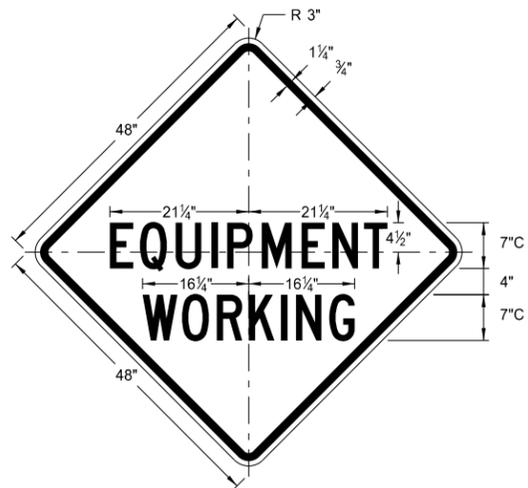
* DISTANCE MESSAGES



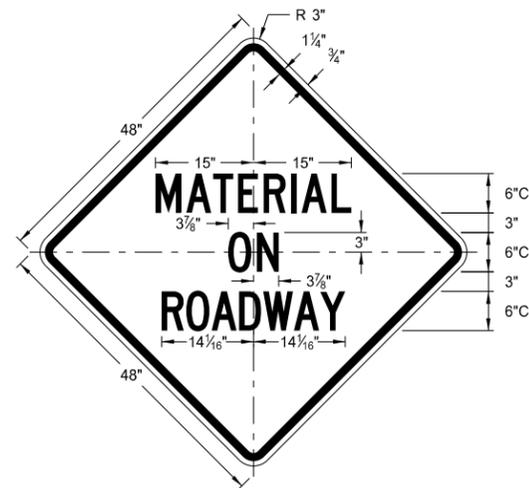
W5-8-48
Legend: black (non-refl)
Background: orange



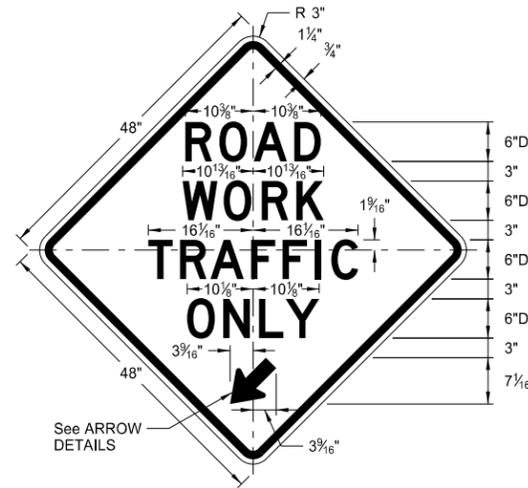
W8-54-48
Legend: black (non-refl)
Background: orange



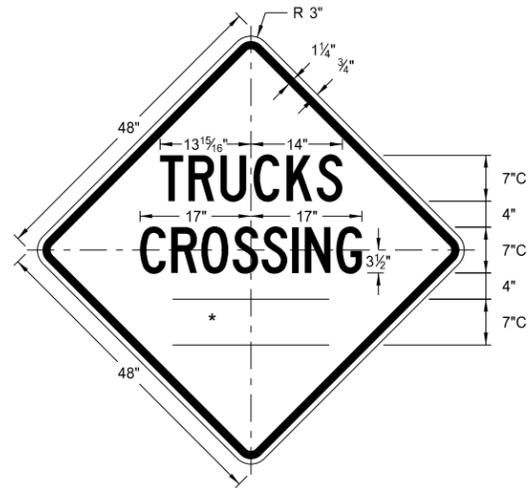
W20-51-48
Legend: black (non-refl)
Background: orange



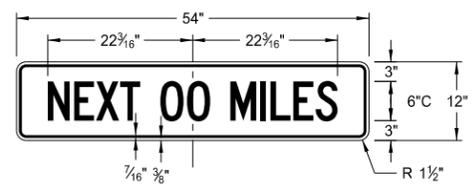
W21-51-48
Legend: black (non-refl)
Background: orange



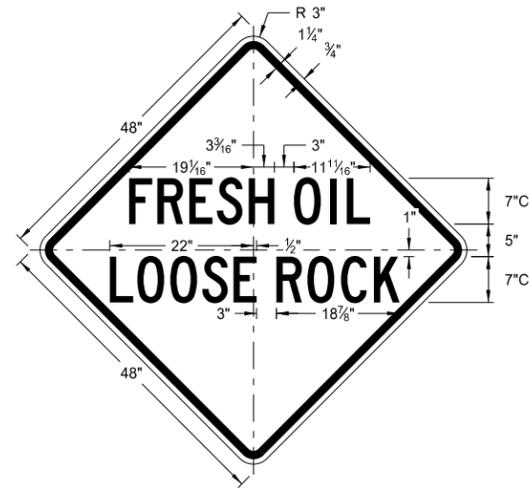
W5-9-48
Legend: black (non-refl)
Background: orange



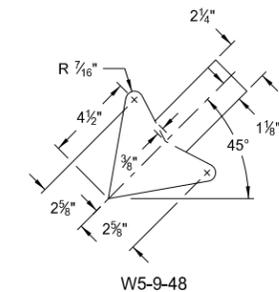
W8-55-48
Legend: black (non-refl)
Background: orange



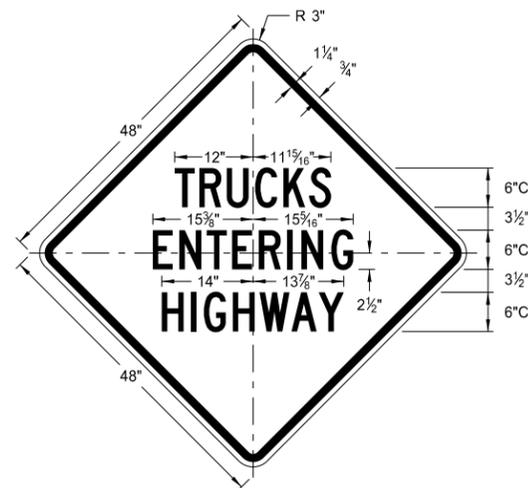
W20-52-54
Legend: black (non-refl)
Background: orange



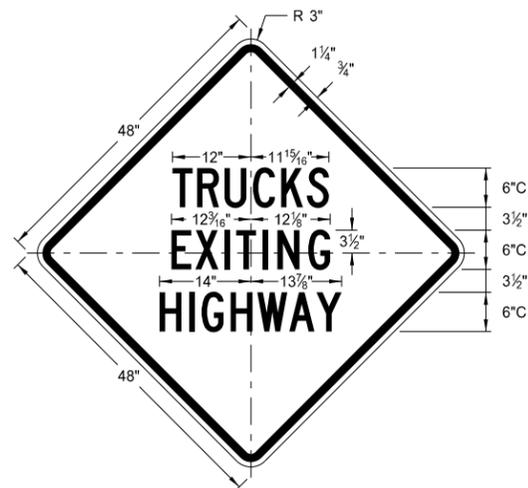
W22-8-48
Legend: black (non-refl)
Background: orange



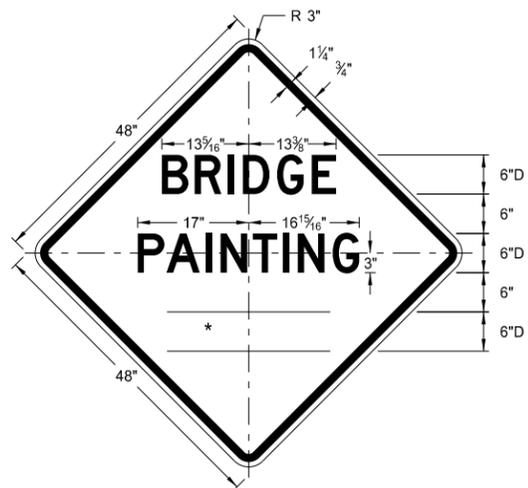
W5-9-48
ARROW DETAILS



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



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

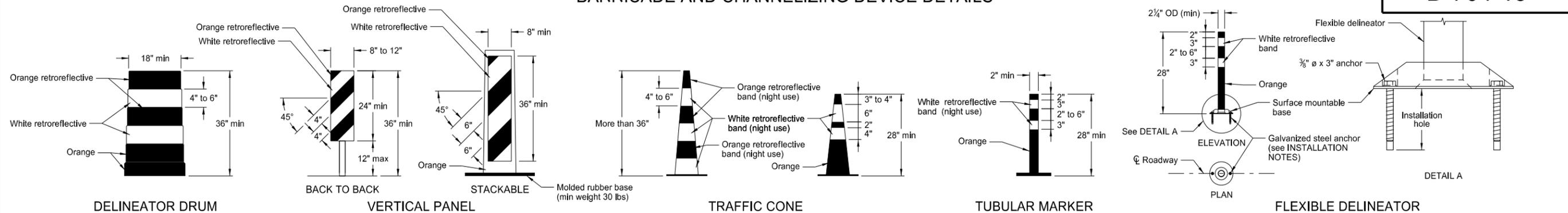


W21-50-48
Legend: black (non-refl)
Background: orange

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

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BARRICADE AND CHANNELIZING DEVICE DETAILS



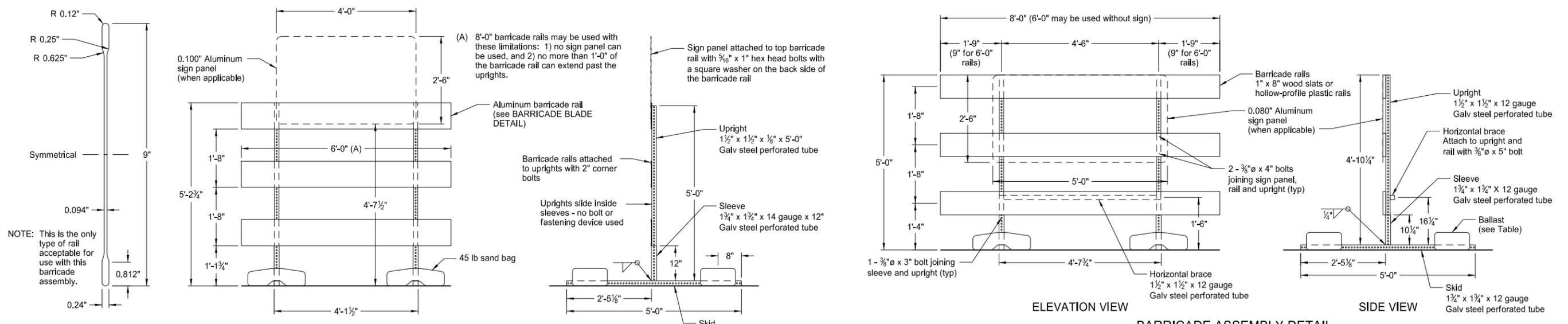
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl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

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

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

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

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



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

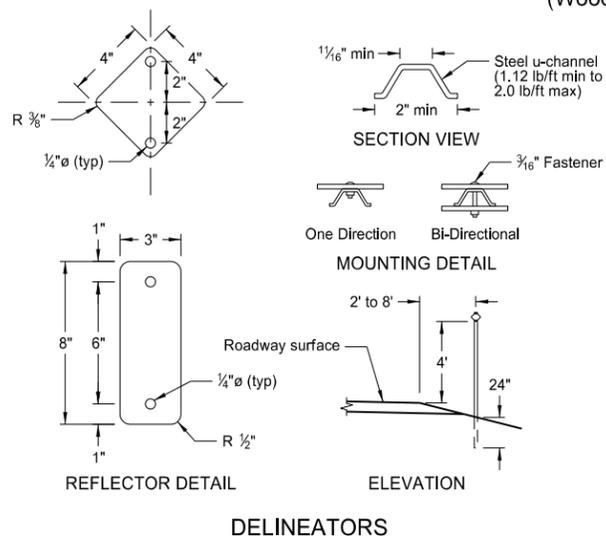
MINIMUM BALLAST
 (For each side of barricade support)

Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

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

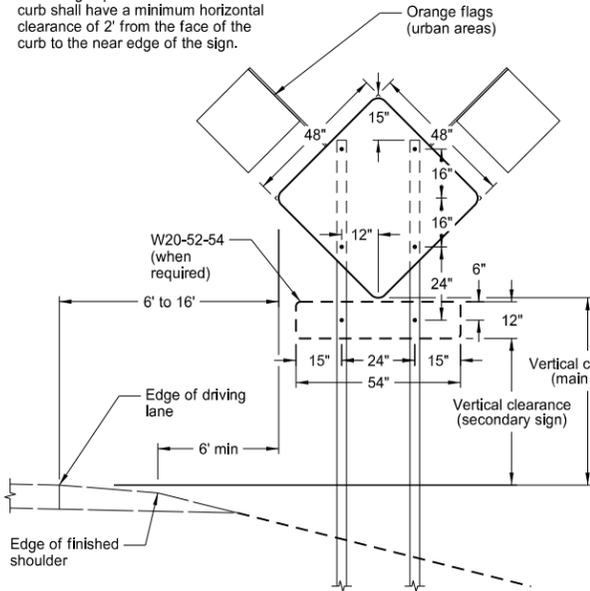
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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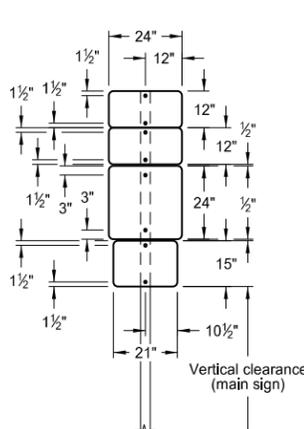


CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

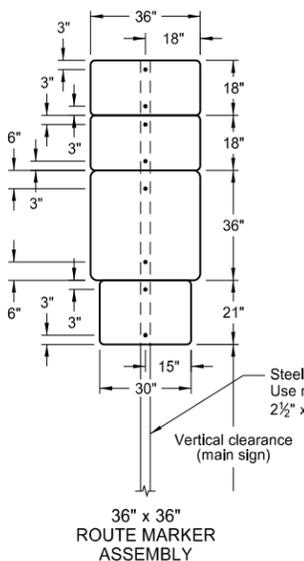
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



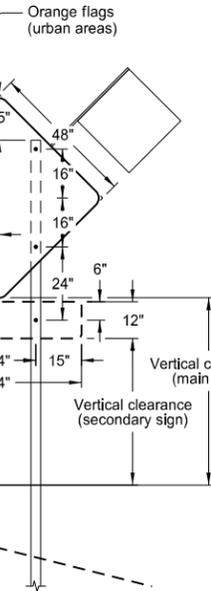
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



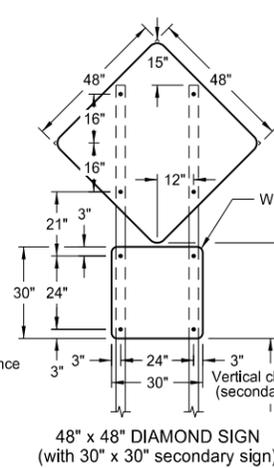
24" x 24" ROUTE MARKER ASSEMBLY



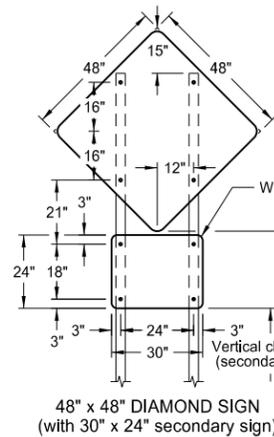
36" x 36" ROUTE MARKER ASSEMBLY



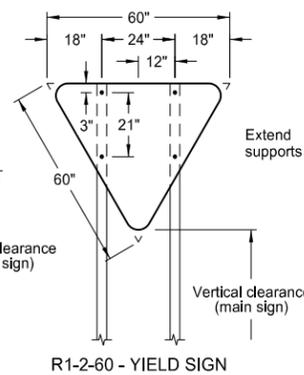
18" x 18" DIAMOND SIGN



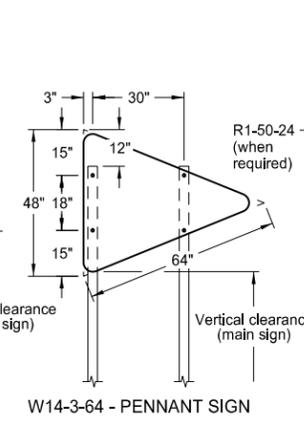
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



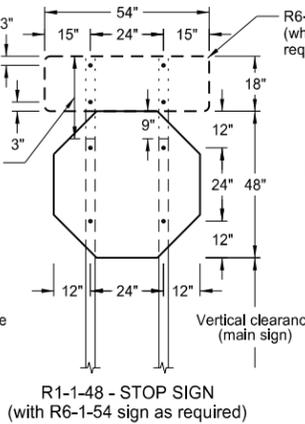
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



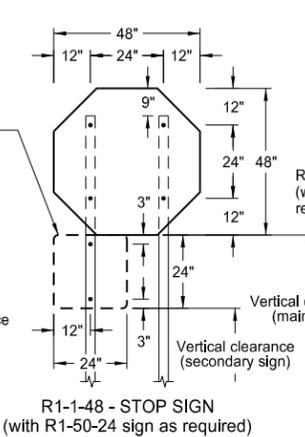
R1-2-60 - YIELD SIGN



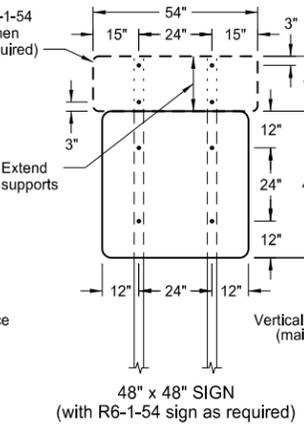
W14-3-64 - PENNANT SIGN



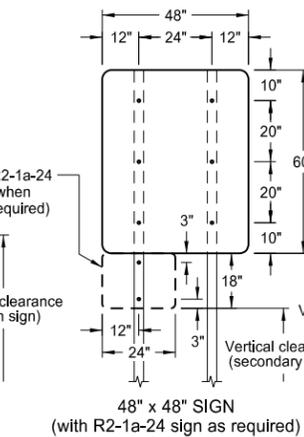
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



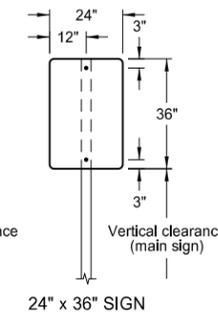
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



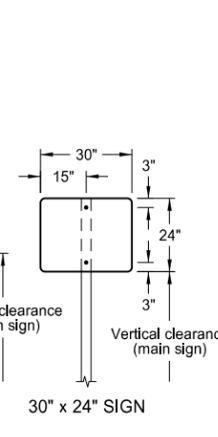
48" x 48" SIGN
(with R6-1-54 sign as required)



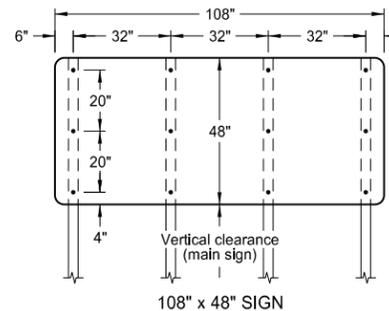
48" x 48" SIGN
(with R2-1a-24 sign as required)



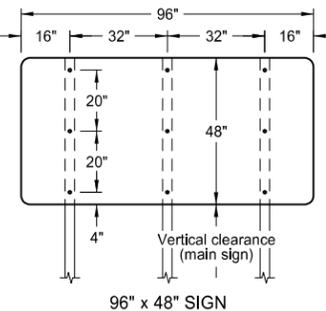
24" x 36" SIGN



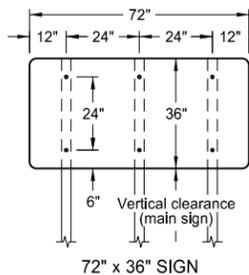
30" x 24" SIGN



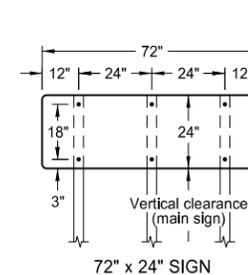
108" x 48" SIGN



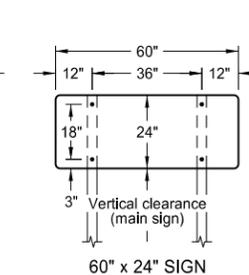
96" x 48" SIGN



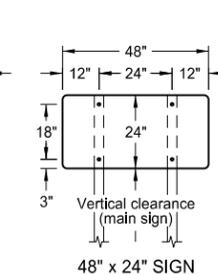
72" x 36" SIGN



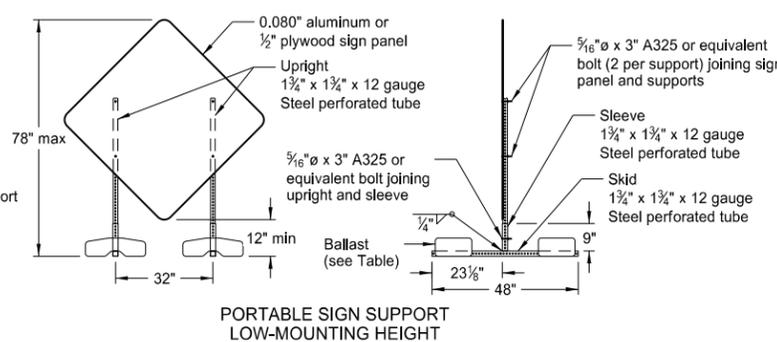
72" x 24" SIGN



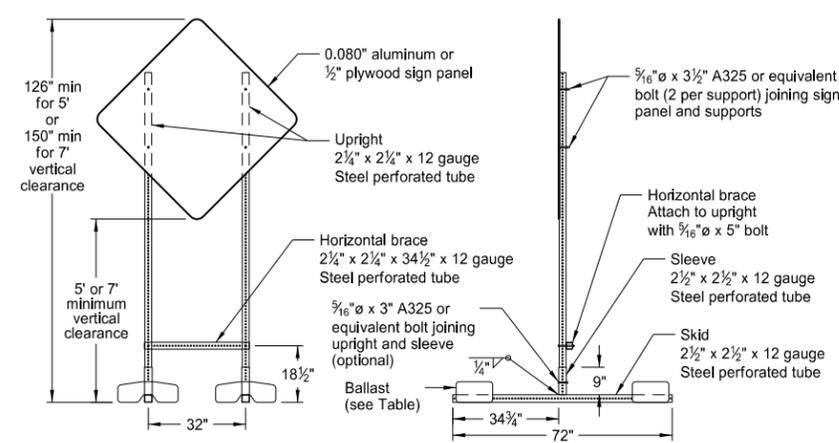
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

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

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

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

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

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

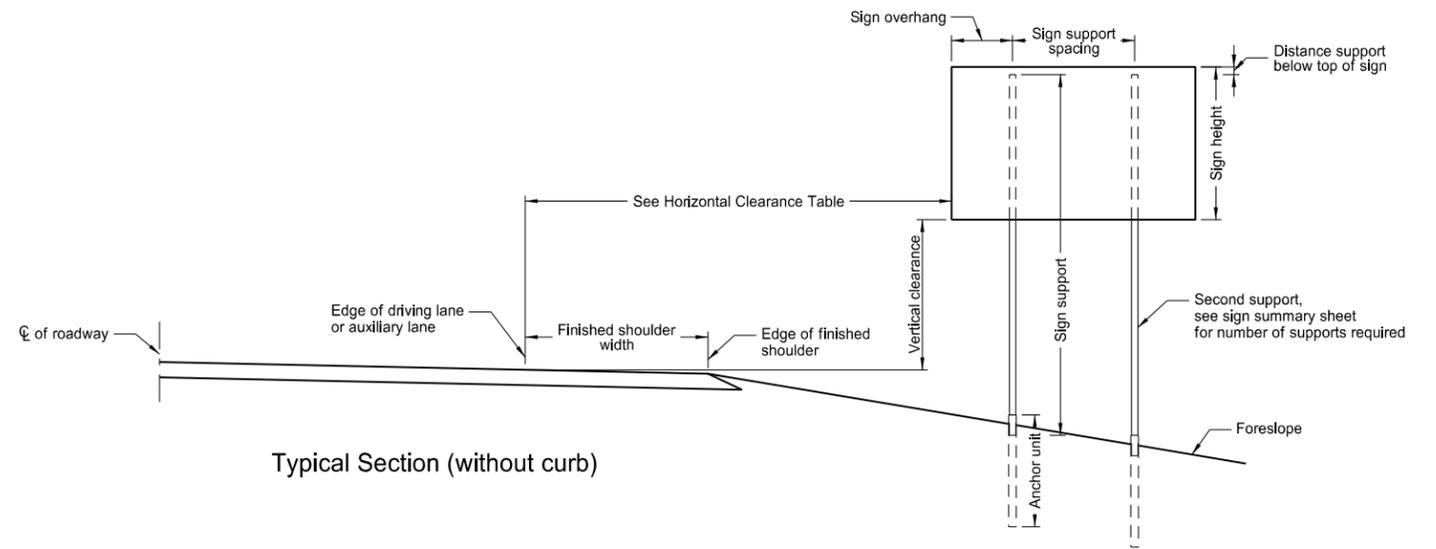
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

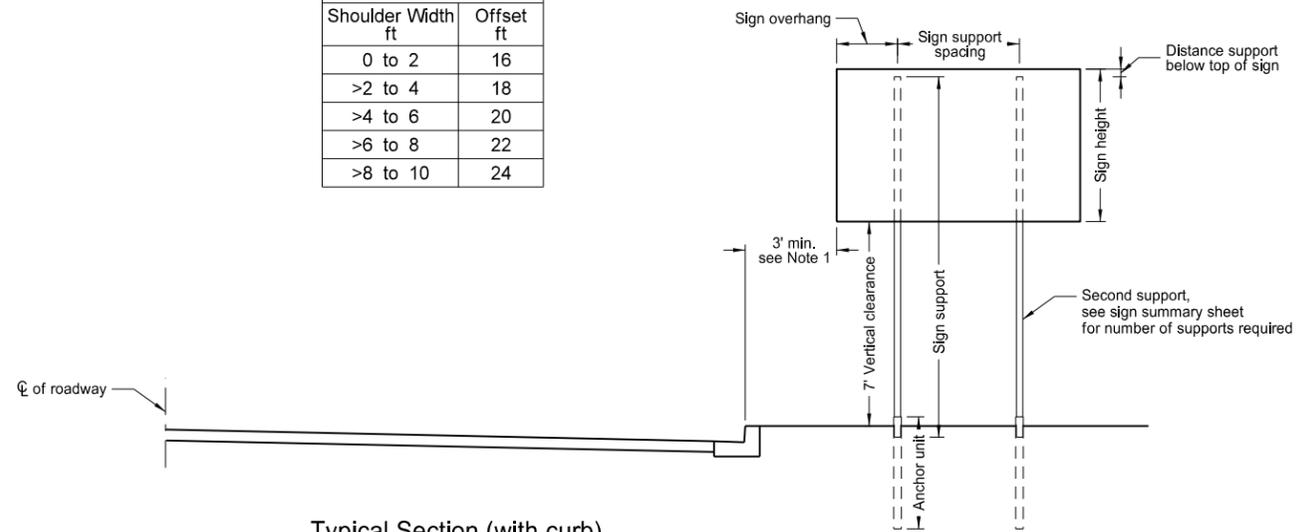
Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Signs on expressways shall be installed with a minimum height of 7'.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.

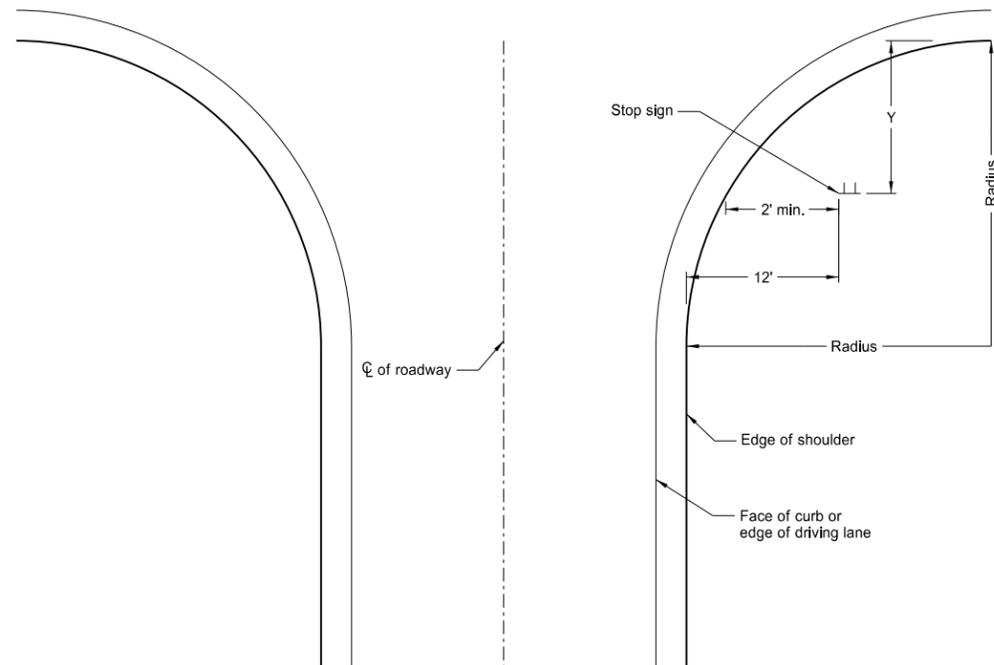


Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



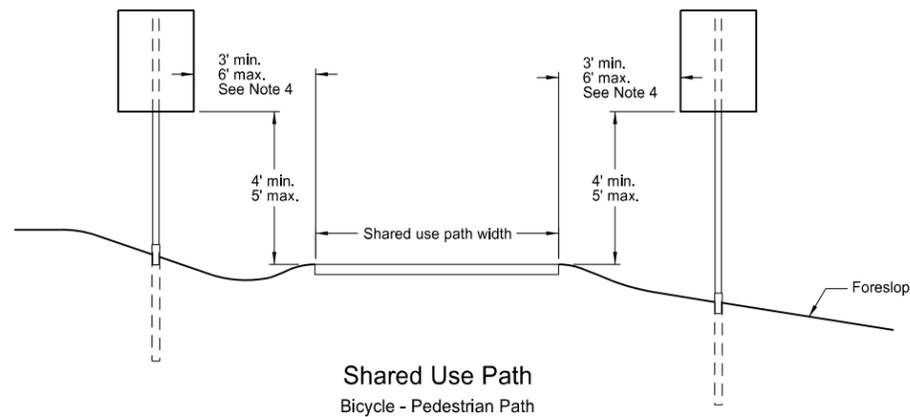
Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection

This layout is to be used for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



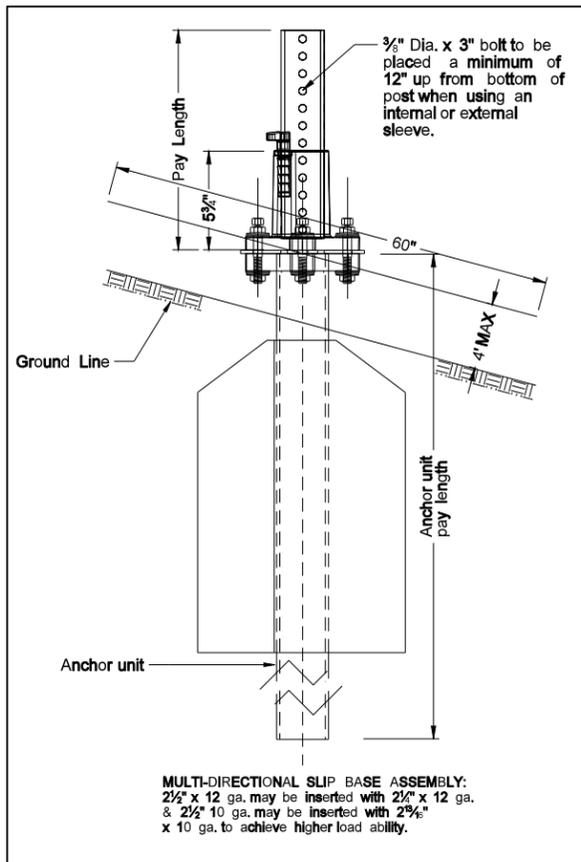
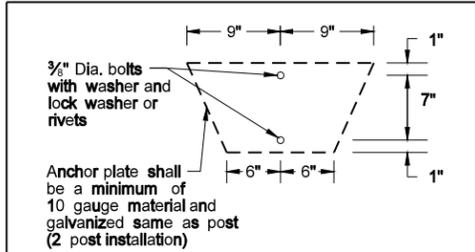
Shared Use Path
Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.

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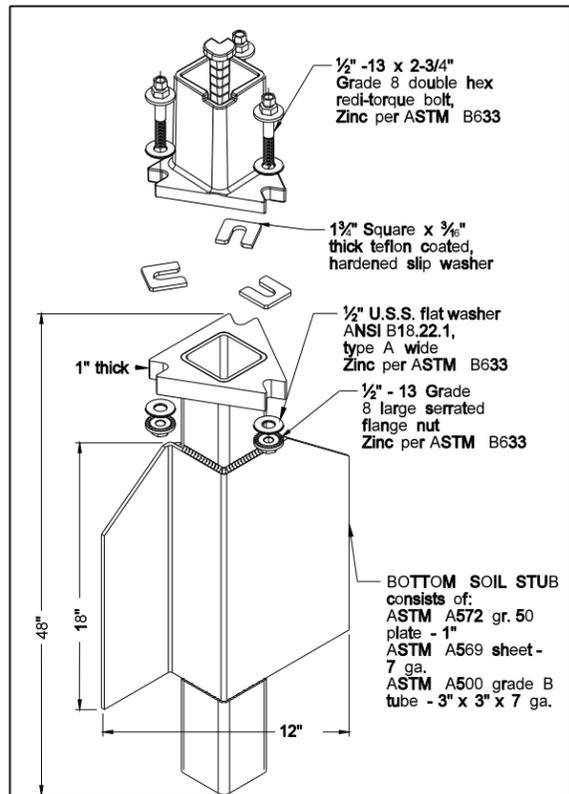
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/2	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/2	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/2	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/2	12	Yes		7
3 & 4	2 1/2	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 1/2	10	Yes		7

(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.
 (C) - 3" anchor unit
 (D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

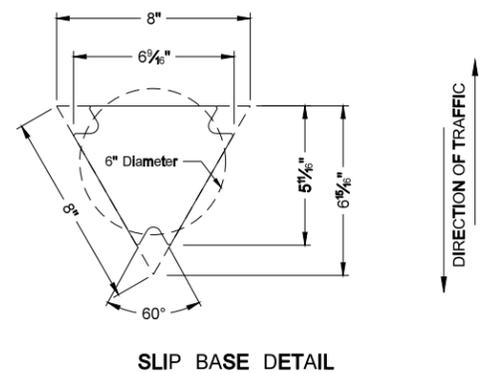
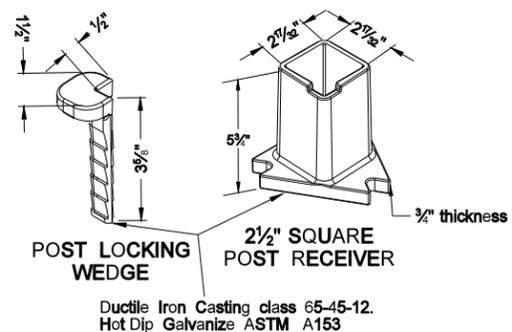


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube



SLIP BASE FOR 2 1/2" POST

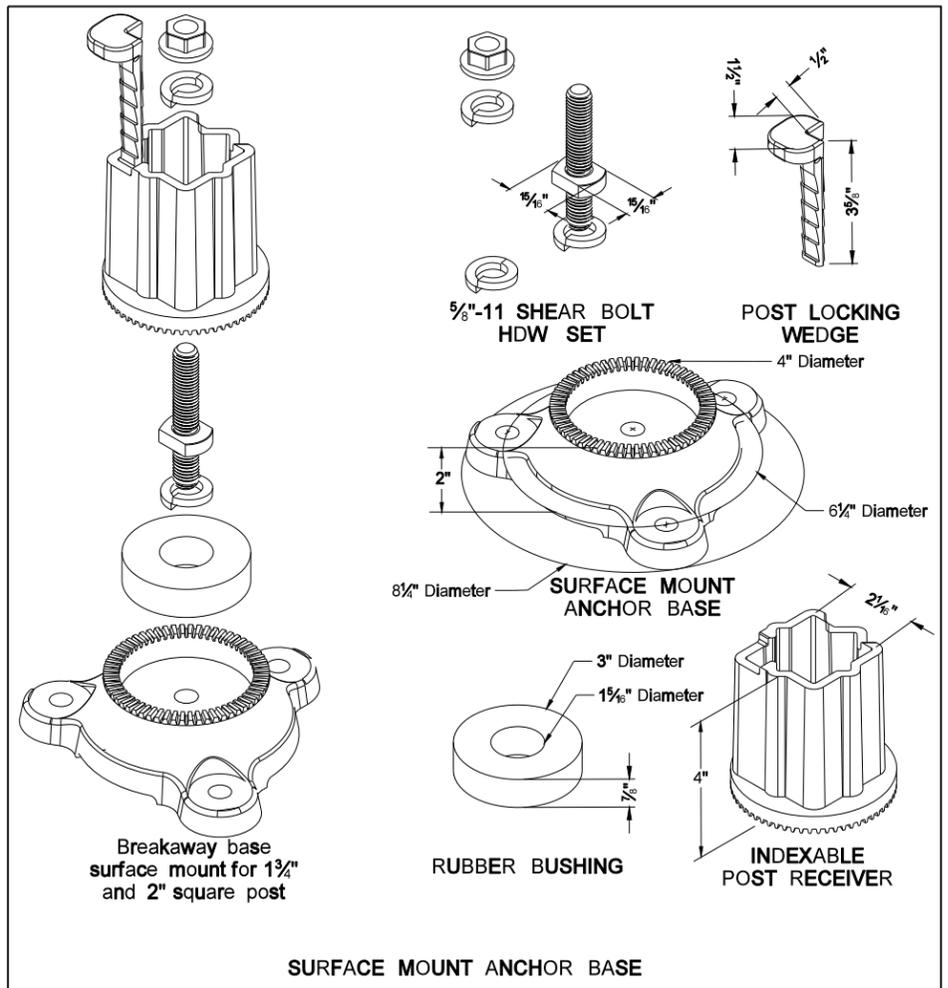


SLIP BASE DETAIL

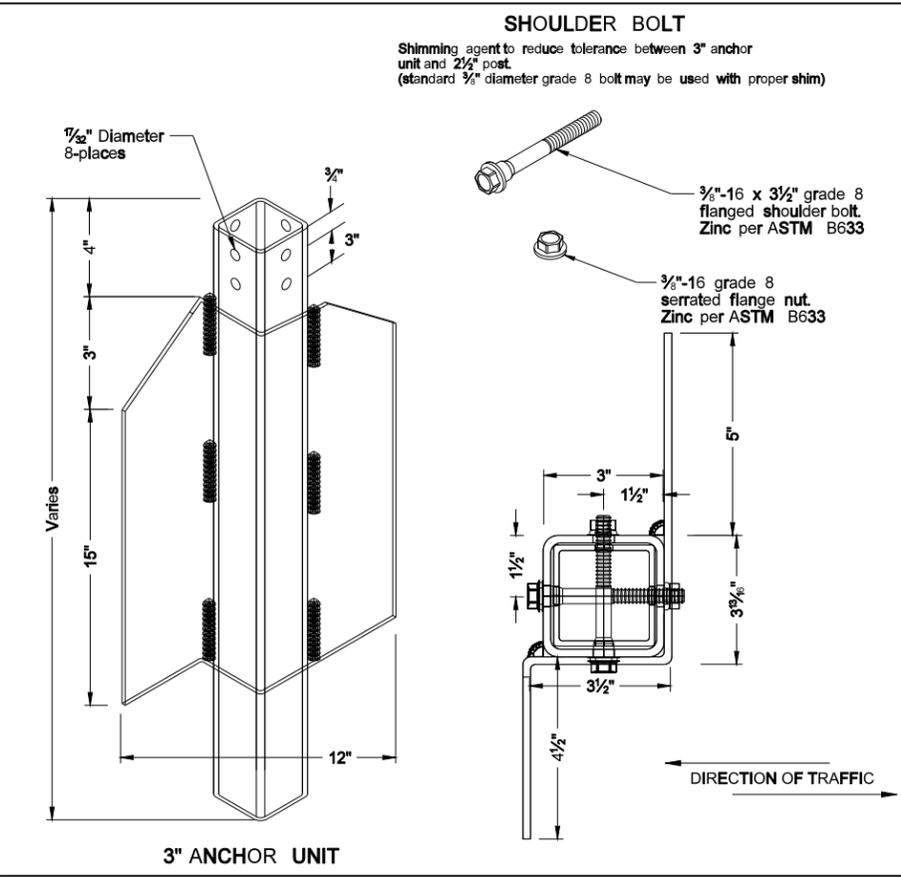
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/2 x 2 1/2	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	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	0.783

The 2 3/8" size 10 gauge is shown as 2.19" size on the plans; The 2 1/2" size is shown as 2.51" size on the plans.

- NOTE:
- 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.
 - 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 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
 - When used in concrete sidewalk, anchor shall be the same concept without the wings.
 - Four post signs shall have over 8" between the first and fourth posts.
 - Installation procedures as per manufacturers recommendation.
 - Concrete fasteners for surface mount breakaway base shall be a minimum 1/2" diameter x 4" grade 8.



SURFACE MOUNT ANCHOR BASE



3" ANCHOR UNIT

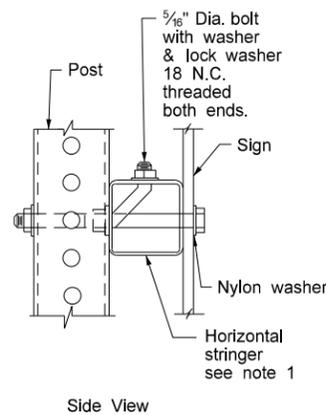
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

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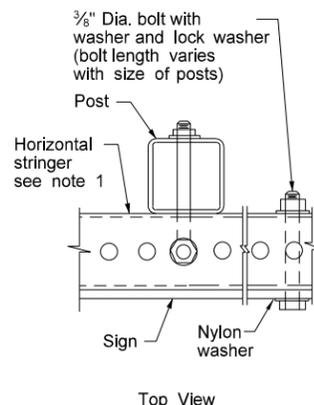
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/16" ± 1/65" and 10 gauge thickness.
- No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers.
- In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
- 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.

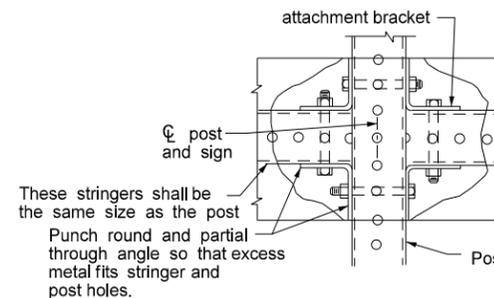


Side View



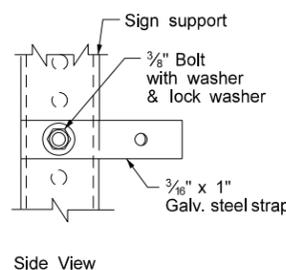
Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

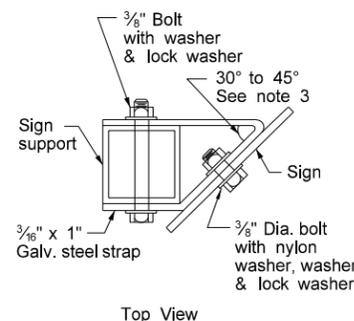


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING

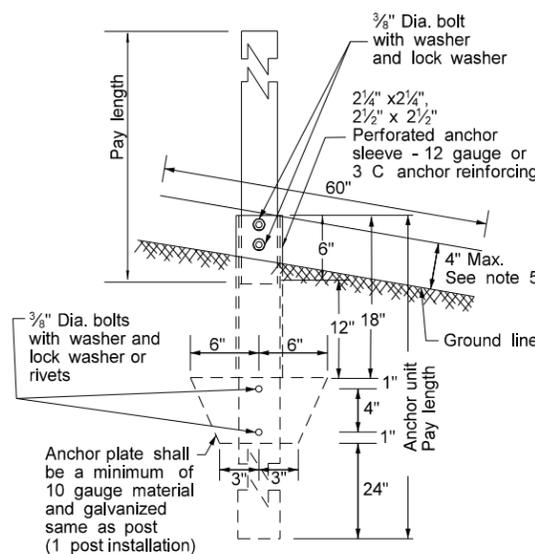


Side View

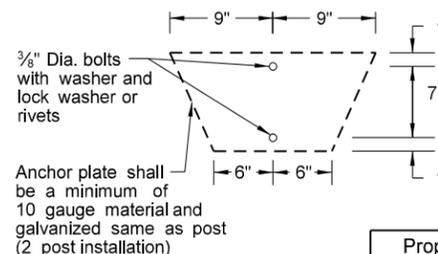


Top View

STRAP DETAIL



ANCHOR UNIT AND
POST ASSEMBLY



Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/8 x 2 3/8	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	0.783	

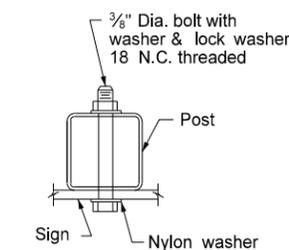
The 2 3/8" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size is shown as 2.51" size on the plans.

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.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/8	10	Yes		7

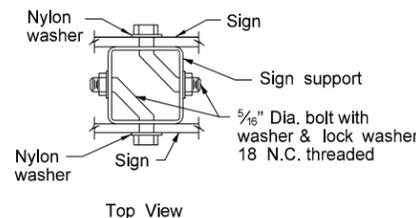
(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3

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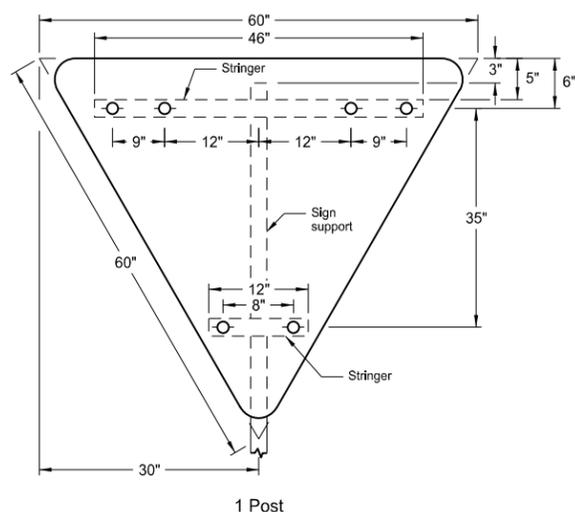
BOLT MOUNTING



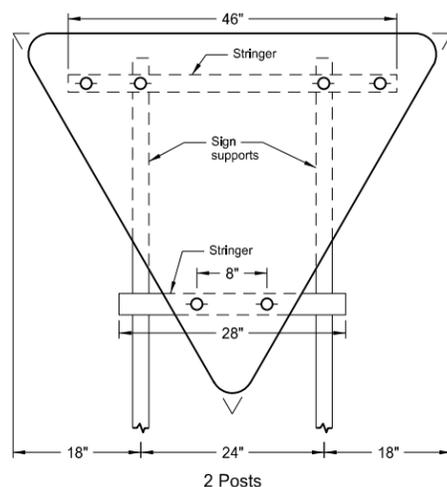
Top View

BACK TO BACK
MOUNTING

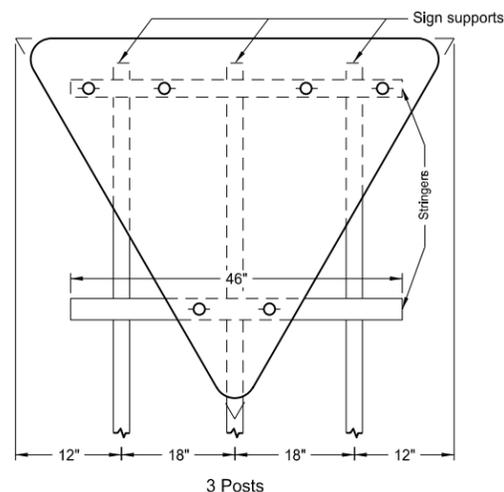
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

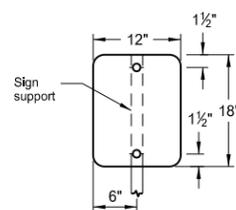


3 Posts

Assembly No. 6

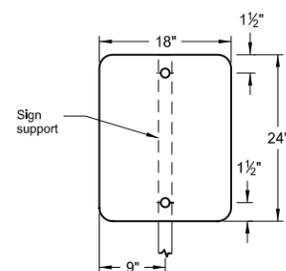
Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



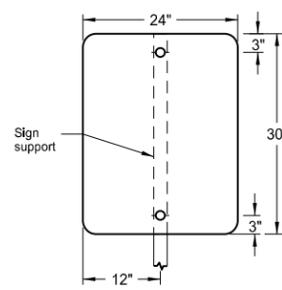
1 Post

Assembly No. 7



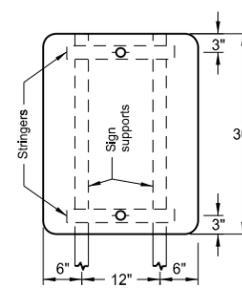
1 Post

Assembly No. 8

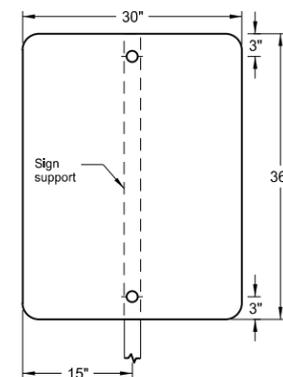


1 Post

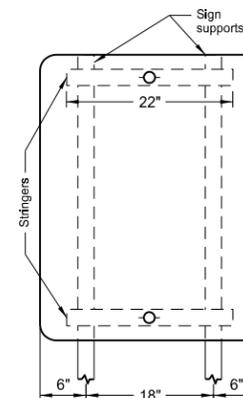
Assembly No. 9



2 Posts

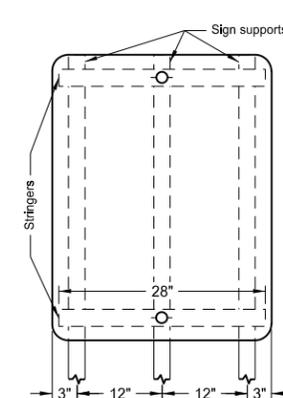


1 Post

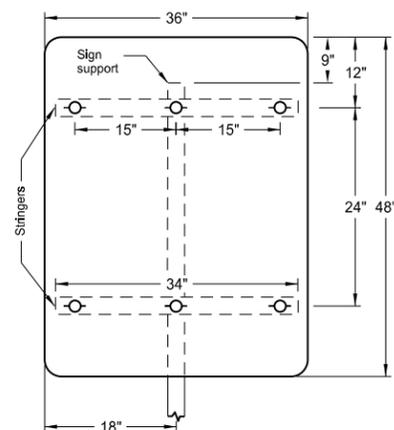


2 Posts

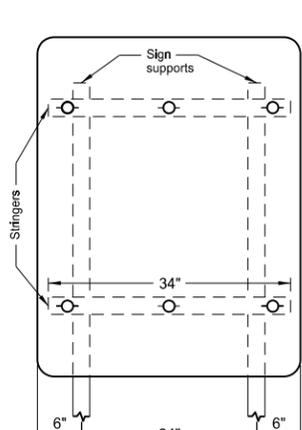
Assembly No. 10



3 Posts

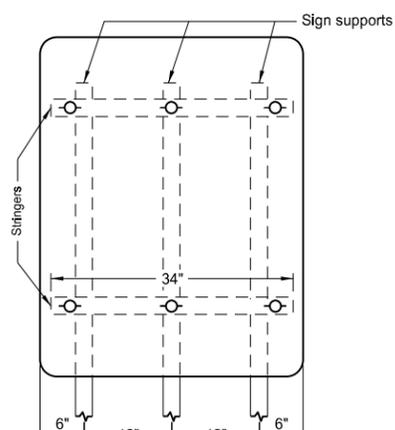


1 Post



2 Posts

Assembly No. 11



3 Posts

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12-1-10	
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