DESIGN DATA				
Traffic	Average Daily			Max.Hr.
Current 2013	Pass: NA	Trucks: NA	Total: <100	NA
Forecast 2033	Pass: NA	Trucks: NA	Total: <100	NA
Clear Zone Distance: 18'	Design Speed: 55 MPH			
Minimum Sight Dist. for Stopping: 495 FT				
Minimum Sight Dist. for Safe Passing: NA				
Sight Dist. for No Passing Zone: NA				

SHERIDAN COUNTY
NORTH DAKOTA

Job 14

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SC-4211(063)	17627	1	1

Federal Aid Project

SC-4211(063)

FHWA Limited Involvement

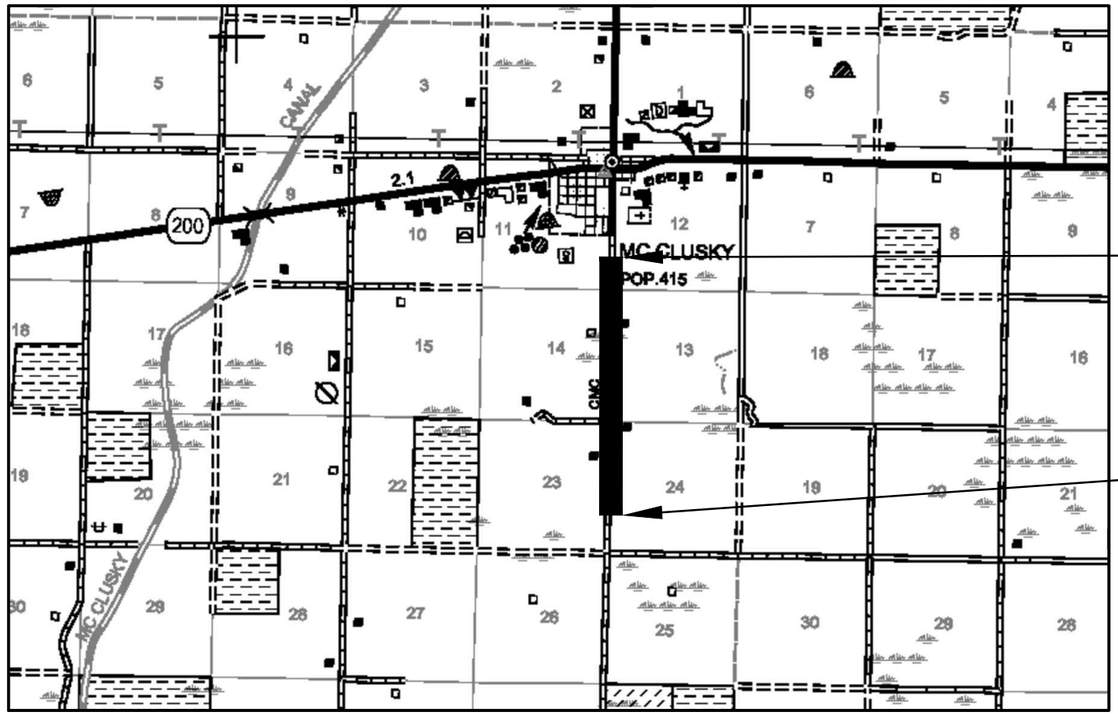
GRADING, AGGREGATE SURFACING & INCIDENTALS

From McClusky, Thence South 2.2 Miles

GOVERNING SPECIFICATIONS:

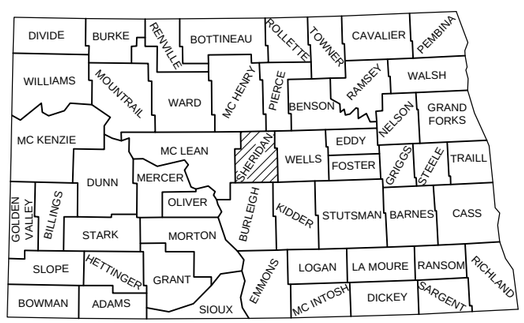
Standard Specifications adopted by the North Dakota Department of Transportation October 2008; Standard Drawings currently in effect; and other Contract Provisions submitted herein.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SC-4211(063) - GRADING, AGGR SURF & INCIDENTALS	2.234	2.234



End Project SC-4211(063)
STA. 290+00 - A Point 1833.51 North of the SE Cor. of Sec. 11, Twp. 146 N., Rge. 77 W.

Begin Project SC-4211(063)
STA.172+00 - A Point 630.5' North of the SW Cor of Sec. 24, Twp. 146 N., Rge. 77 W.



STATE COUNTY MAP

DESIGNERS

Herbert Bargmann, PE

Brad Robertson, PLS

CONTACT INFO:
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Wold Engineering, P.C.
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Bismarck ND 58502
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Fax: 701-258-9228

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

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

APPROVED DATE 09-03-13

Herbert W. Bargmann, P.E.

Wold Engineering, P.C.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	2	1

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SP-1010(08)	Temporary Erosion and Sediment Best Management Practices
SP-1101(08)	Split Sampling and Testing Requirements for Aggregate Base

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

100-P01 **GENERAL:** 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 or 811 in North Dakota.

West River Telecommunication Cooperative
101 Main St W
PO Box 467
Hazen ND 58545
(701) 748-2211

Capital Electric
4111 State St
PO Box 730
Bismarck ND 58202-0730
(701) 223-1513

McLean Sheridan Rural Water
987 17th Ave NW
Turtle Lake ND 58575
(701) 448-2315

100-P02 **GENERAL:** All work to be done by the County shall be coordinated to be completed concurrently with or prior to completion of Contractor's work – (Fence Removal)

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

201-P01 **CLEARING AND GRUBBING:** Clearing and grubbing includes the removal and disposal of trees (all sizes), shrubs, stumps, roots, brush, and other surface objects from the excavation and embankment areas along this project.

202-P01 **REMOVAL OF CULVERT:** All removed culverts shall become the property of the Contractor.

203-P01 **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, as per Std. Specs. Sec. 203.02 E.3. 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 203.02 H.

203-P02 **COMPACTION:** Whenever the finished subgrade lies within three (3) feet of the existing roadway, the existing roadway shall be scarified and recompacted to a depth of one (1) foot. All scarifying and recompaction shall be included in the price bid for "Common Excavation – Type B".

203-P03 **COMMON EXCAVATION:** Placement of embankment material shall be in accordance with Section 203.02H of the Standard Specifications (Compaction Control, Type B). Payment for Common Excavation shall be in accordance with Sec. 203.03B of the Standard Specifications.

203-P04 **TOPSOIL:** Quantities for topsoil in excavation and embankment areas are based upon an average depth of six (6) inches. The topsoil for water areas and roadway obliteration shall be field measured.

203-P05 **SHRINKAGE:** Thirty percent (30%) additional volume in yardage computed by the end area method is allowed for shrinkage in earth embankment.

203-P06 **INSLOPE & DITCH FINISHING:** The contractor shall finish the inslopes and ditch bottom with a motor grader to the design line and grade. The inslopes and ditch bottoms shall be smooth and free of irregularities.

216-P01 **WATER:** The application of water for compaction and for use as a dust palliative, as required, shall be included in the quantity for the bid item "WATER".

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.

302-P02 **SALVAGE & RELAY AGGREGATE SURFACE COURSE:** The existing gravel surfacing shall be salvaged from the road surface and stockpiled at convenient locations. This material shall be placed as the roadtop is finished to plan lines and grade, and used as temporary traffic surfacing until Aggregate Surface Course Class 13 can be placed.

704-P01 **TYPE III BARRICADES:** Post mounted Type III Barricades and signs shall be installed as shown on the Sign Placement Layout Map. The project roadway shall remain open to local traffic and maintained according to Sec. 107.05A. Temporary Detours for culvert installation shall be signed according to Std. Dwg. D-704-22, Type M.

708-P01 **SEEDING TYPE B –CLASS II:** Seeding will be measured by the mile for Type B Class II. Seeding shall cover the entire disturbed right-of-way (excluding the 32' roadbed) and the disturbed construction easement areas. Seasonal limitations may be waived by the Engineer if moisture and weather conditions are acceptable.

714-P01 **PIPE CONDUIT:** Aggregate Surface Course Class 13 shall be used for pipe backfill. The AASHTO T-180 compaction testing requirements will be waived and the compaction will be approved by the Field Engineer.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

714-P02 **PIPE CONDUIT:** All concrete pipe shall be tied.

714-P03 **PLASTIC PIPE:** All plastic pipe shall have fire resistant end sections.

754-P01 **RESET SIGN PANEL:** The item “Reset Sign Panel” shall consist of removing the existing sign(s) and hardware from the existing support and reinstalling the sign(s) and hardware on new two inch (2”) perforated tubular galvanized steel posts and anchor unit. The Contractor shall provide the necessary brackets and hardware needed to attach the flat sheet sign and stringers to the new posts. The cost of furnishing and installing the brackets and hardware and the cost of the two inch (2”) perforated tubular galvanized steel posts and anchor unit, all bolt ties and fittings shall be included in the price bid for “Reset Sign Panel”.

ENVIRONMENTAL COMMITMENTS

ENVIRONMENTAL COMMITMENTS: Sheridan 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:

A. COMMITMENTS:

Comment #1 – Unavoidable impacts to wetlands will be mitigated on-site, adjacent to the project or at an approved location prior to or at the time of construction. Appropriate avoidance, minimization, and mitigation measures have been determined in cooperation with the USACE and USFWS.

Commitment #1: Sheridan County mitigated the 1.427 acres of non-easement wetland impacts on-site on a one to one basis under Federal Aid Project SC-4211(062). The 0.0667 acres of easement wetland impacts were mitigated at the Vallrath Easement Replacement Bank in Towner County on a one to one basis under the Federal Aid Project SC-4211(062).

Wetland Number	Location	Cowardin Classification	Wetland Type	Wetland Feature	Wetland Size (acres)	USACE Jurisdictional Wetlands*	USFWS Easement Impacts		Wetland Impacts (Acres)		WETLAND MITIGATION				
											Mitigation Required				
							Temp.	Perm.	Temp.	Perm.	11990	USACE	Location	Onsite Mitigation Acres	Offsite Mitigation Acres
1	Sec. 23, T 146 N, R 77 W	PEM/ABF	Freshwater Emergent	Natural	0.25	N/A	0.000		0.000	0.025	Y	N	Onsite	0.025	0.000
2	Sec. 23, T 146 N, R 77 W	PEM/ABF	Freshwater Emergent	Natural	0.73	N/A	0.000	0.008	0.000	0.024	Y	N	Onsite/USFW Bank	0.024	0.008
3	Sec. 24, T 146 N, R 77 W	PEM/ABF	Freshwater Emergent	Natural	16.29	N/A	0.000	0.028	0.000	0.344	Y	N	Onsite/USFW Bank	0.344	0.028
4	Sec. 23, T 146 N, R 77 W	PEMCx	Freshwater Emergent	Natural	0.10	N/A	0.000	0.013	0.000	0.000	Y	N	Onsite/USFW Bank	0.000	0.013
5	Sec. 13, T 146 N, R 77 W	PEMC	Freshwater Emergent	Natural	31.80	N/A	0.000	0.000	0.000	0.495	Y	N	Onsite	0.495	0.000
6	Sec. 14, T 146 N, R 77 W	PEMC	Freshwater Emergent	Natural	27.66	N/A	0.000	0.000	0.000	0.075	Y	N	Onsite	0.075	0.000
7	Sec. 14, T 146 N, R 77 W	PEM/ABF	Freshwater Emergent	Natural	8.95	N/A	0.000	0.000	0.000	0.026	Y	N	Onsite	0.026	0.000
8	Sec. 13, T 146 N, R 77 W	PEMC	Freshwater Emergent	Natural	0.6	N/A	0.000	0.000	0.000	0.146	Y	N	Onsite	0.146	0.000
9	Sec. 11, T 146 N, R 77 W	PEMF	Freshwater Emergent	Natural	0.74	N/A	0.000	0.012	0.000	0.119	Y	N	Onsite/USFW Bank	0.119	0.012
10	Sec. 12, T 146 N, R 77 W	PEMF	Freshwater Emergent	Natural	0.34	N/A	0.000	0.005	0.000	0.174	Y	N	Onsite/USFW Bank	0.174	0.005
Subtotal 1					87.46		0.000	0.067	0.000	1.427				1.427	0.067

* A wetland Jurisdictional Determination was issued by the USACE on 04/03/2009; NWO-2009-0095-BIS.

ENVIRONMENTAL COMMITMENTS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Comment #2 – All disturbed vegetation shall be seeded upon completion of construction.

Commitment #2: All disturbed vegetation shall be seeded upon completion of construction.

Comment #3 – Erosion and sedimentation into adjacent habitat should be minimized.

Commitment #3: The Contractor shall install and maintain erosion control devices as shown in the plans and directed by the Engineer.

Comment #4 – A NDPDES Permit is required.

Commitment #4: The Contractor shall obtain a NDPDES (North Dakota Pollutant Discharge Elimination System) Permit form the North Dakota Department of Health and shall comply with all requirements contained in the permit.

Comment #5 – All borrow and aggregate stockpile areas and sources shall be environmentally and culturally cleared.

Commitment #5: The Contractor shall meet Section 107.04 of the NDDOT Supplemental Specifications.

Comment #6 – Maintain existing drainage patterns.

Commitment #6: The existing drainage patterns shall be maintained.

Comment #7 – A U.S. Army Corps of Engineers – Section 404 Permit Application should be submitted.

Commitment #7: Sheridan County submitted a U.S. Army Corps of Engineers – Section 404 Permit Application. The U.S. Army Corps of Engineers determined that a Section 404 Permit is not required based on their jurisdictional determination.

Comment #8 – All identified cultural sites shall be avoided.

Commitment #8: The identified cultural sites are shown on the plans and shall be avoided.

PERMITS REQUIRED:

1. North Dakota Department of Health – NDPES Permit

   Status:
   To be obtained by the contractor prior to construction.
   The owner of the permit shall be listed as Sheridan County

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	8	1

ESTIMATE OF QUANTITIES

SPEC	*CODE*	*DESCRIPTION*	*UNIT*	QUANTITY
103	0100	CONTRACT BOND	LSUM	1
201	0330	CLEARING & GRUBBING	LSUM	1
202	170	REMOVAL OF CULVERTS - ALL TYPES & SIZES	LF	554
203	0102	COMMON EXCAVATION - TYPE B	CY	79,206
203	0109	TOPSOIL	CY	22,863
203	0110	ROCK EXCAVATION	CY	100
203	0140	BORROW - EXCAVATION	CY	206,948
216	0100	WATER	MGAL	1,520
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	7,460
302	0402	SALVAGE & RELAY AGGREGATE SURFACE	MILE	2.234
702	0100	MOBILIZATION	LSUM	1
704	0100	FLAGGING	MHR	180
704	1000	TRAFFIC CONTROL SIGNS	UNIT	877
704	1052	TYPE III BARRICADE	EA	4
704	1081	VERTICAL PANELS - BACK TO BACK	EA	40
708	1375	FLOTATION SILT CURTAIN	LF	1,975
708	1430	FIBER ROLLS 12IN	LF	8,140
708	1431	REMOVAL FIBER ROLLS 12IN	LF	1,350
708	2241	SEEDING - TYPE B - CL II	MILE	2.234
709	0701	GEOTEXTILE FABRIC - TYPE R1	SY	2,899
714	4099	PIPE CONDUIT 18IN - APPROACH	LF	466
714	4105	PIPE CONDUIT 24IN	LF	160
714	4106	PIPE CONDUIT 24IN - APPROACH	LF	56
714	4115	PIPE CONDUIT 36IN	LF	344
714	5035	PIPE CORR. STEEL .064IN 24IN	LF	18
714	9660	REMOVE & RELAY END SECTION - ALL TYPES & SIZES	EA	2
754	0592	RESET SIGN PANEL	EA	1
766	0100	MAILBOX-ALL TYPES	EA	3

BASIS OF ESTIMATE

QUANTITY PER MILE	WIDTH	UNIT	DESCRIPTION
40		M GAL	WATER FOR AGGREGATE SURFACE COURSE
			5 GALLONS PER C.Y. EMBANKEMENT
80		M HRS	FLAGGING
3,193	26'	TON	AGGR SURF CRSE CL 13 (1.4 TON/CY + 25%)
			18 TON PER FIELD APPROACH (4)
			42 TON PER SECTION LINE & PRIVATE DRIVE (6)
1		MILE	SEEDING ALL DISTURBED R/W, WATER AREAS, AND CONSTRUCTION EASEMENTS EXCEPT GRADED ROADBED APPROXIMATELY 46 ACRES

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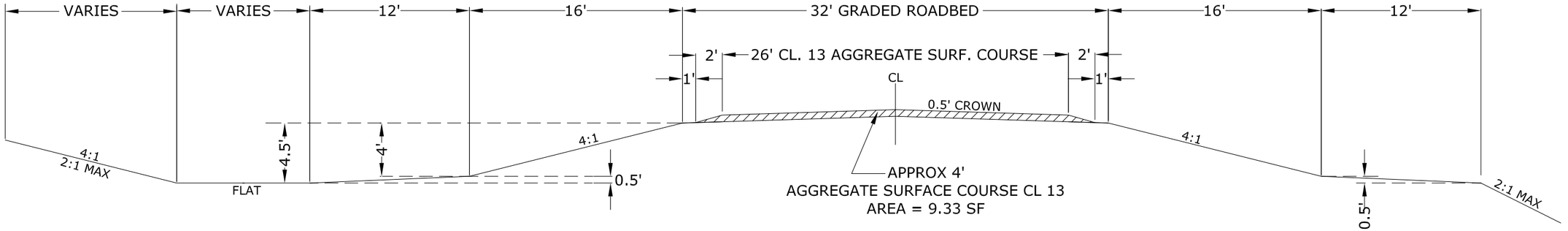
ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	30	1



CUT *FILL*

NO SCALE

TYPICAL SECTION

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PROPOSED
TYPICAL SECTION

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	51	1

Begin Station/ Location	Begin Offset	End Station/ Location	End Offset	Length	Pipe Conduit Pay Size	Pipe Conduit Approach Pay Size	Pipe Conduit Storm Drain Pay Size	Allowable Material	Required Diameter	Minimum Thickness	R1 Fabric (Pay Item)	End Sections		Applicable Backfill Detail
												Begin	End	
				LF	IN	IN	IN		IN	IN	SY	EA	EA	
173+62	6' LT	173+62	12' RT	18	24			Corrugated Steel Pipe 0.064 IN	24		N/A	N	N	N/A
194+58	RT	195+14	RT	56		24		Reinforced Concrete Pipe - Class III (barrel length = 52 LF)	24			Y	Y	N/A
								Zinc Coated Corrugated Steel	24	0.064				
								Aluminum Coated Steel (Type 2)	24	0.064				
								Polymeric Coated Steel (A)	24	0.064				
								Aluminum Alloy	24	0.060				
								HDPE (A)	24					
202+68	LT	203+32	LT	64		18		Reinforced Concrete Pipe - Class III (barrel length = 60 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.064				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
206+92	55' LT	206+92	55' RT	110	36			Reinforced Concrete Pipe - Class III (barrel length = 104 LF)	36		784	Y	Y	D-714-25
								Aluminum Coated Steel (Type 2)	36	0.109				
								Polymeric Coated Steel (A)	36	0.064				
216+50	RT	217+30	RT	80		18		Reinforced Concrete Pipe - Class III (barrel length = 76 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.109				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
218+34	LT	219+04	LT	70		18		Reinforced Concrete Pipe - Class III (barrel length = 66 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.064				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
229+65	52' LT	229+65	58' RT	110	36			Reinforced Concrete Pipe - Class III (barrel length = 104 LF)	36		784	Y	Y	D-714-25
								Aluminum Coated Steel (Type 2)	36	0.109				
								Polymeric Coated Steel (A)	36	0.064				

(A) - Sheridan County reserves the right to allow burning in their ditches. Plastic coated metal or plastic pipe must have approved segments and end treatments that are nonflammable.

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ALLOWABLE PIPE LIST

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	51	2

Begin Station/ Location	Begin Offset	End Station/ Location	End Offset	Length	Pipe Conduit Pay Size	Pipe Conduit Approach Pay Size	Pipe Conduit Storm Drain Pay Size	Allowable Material	Required Diameter	Minimum Thickness	R1 Fabric (Pay Item)	End Sections		Applicable Backfill Detail
												Begin	End	
				LF	IN	IN	IN		IN	IN	SY	EA	EA	
235+18	RT	235+82	RT	64		18		Reinforced Concrete Pipe - Class III (barrel length = 60 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.064				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
242+69	62' LT	242+69	62' RT	124	36			Reinforced Concrete Pipe - Class III (barrel length = 118 LF)	36		727	Y	Y	D-714-25
								Aluminum Coated Steel (Type 2)	36	0.109				
								Polymeric Coated Steel (A)	36	0.064				
256+95	RT	257+59	RT	64		18		Reinforced Concrete Pipe - Class III (barrel length = 60 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.064				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
268+95	37' LT	268+95	37' RT	74	24			Reinforced Concrete Pipe - Class III (barrel length = 70 LF)	24		254	Y	Y	D-714-25
								Aluminum Coated Steel (Type 2)	24	0.109				
								Polymeric Coated Steel (A)	24	0.064				
271+35	LT	271+97	LT	62		18		Reinforced Concrete Pipe - Class III (barrel length = 58 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.109				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
271+35	RT	271+97	RT	62		18		Reinforced Concrete Pipe - Class III (barrel length = 58 LF)	18			Y	Y	N/A
								Zinc Coated Corrugated Steel	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.109				
								Polymeric Coated Steel (A)	18	0.064				
								Aluminum Alloy	18	0.060				
								HDPE (A)	18					
282+31	44' LT	282+31	42' RT	86	24			Reinforced Concrete Pipe - Class III (barrel length = 82 LF)	24		350	Y	Y	D-714-25
								Aluminum Coated Steel (Type 2)	24	0.109				
								Polymeric Coated Steel (A)	24	0.064				

(A) - Sheridan County reserves the right to allow burning in their ditches. Plastic coated metal or plastic pipe must have approved segments and end treatments that are nonflammable.

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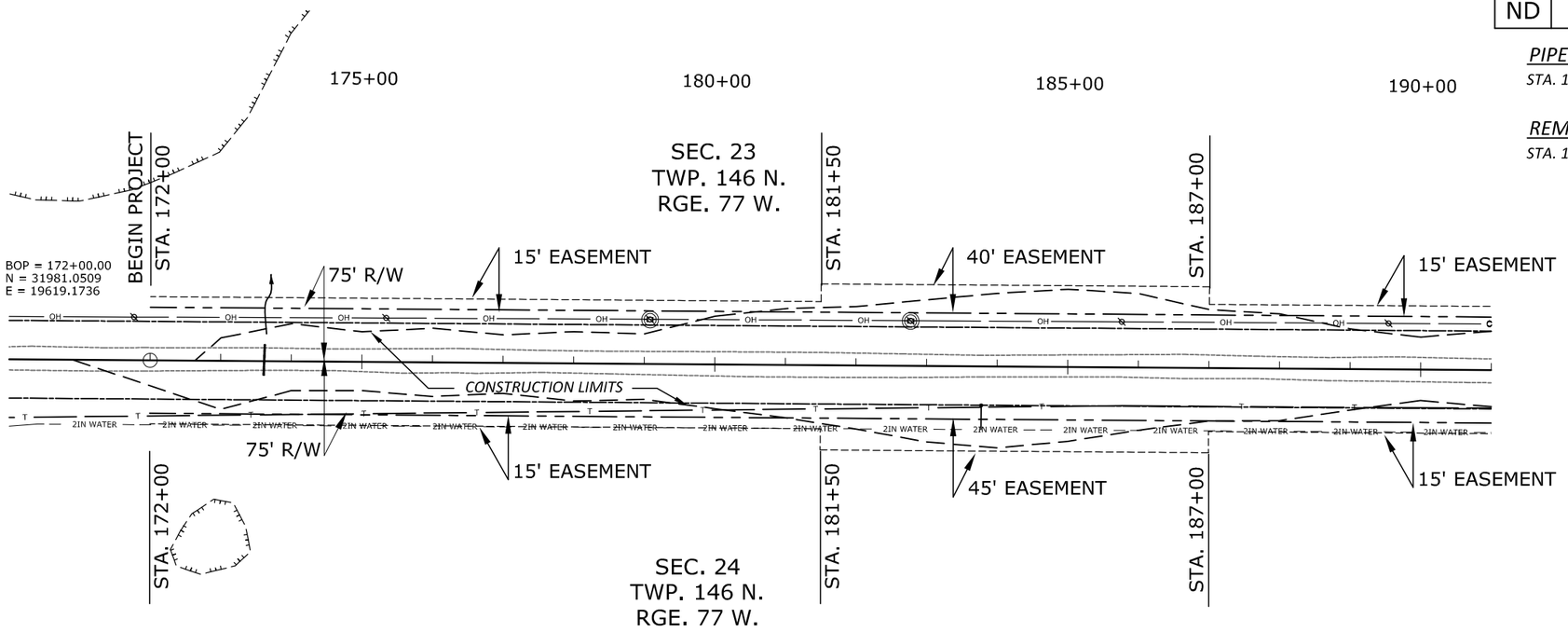
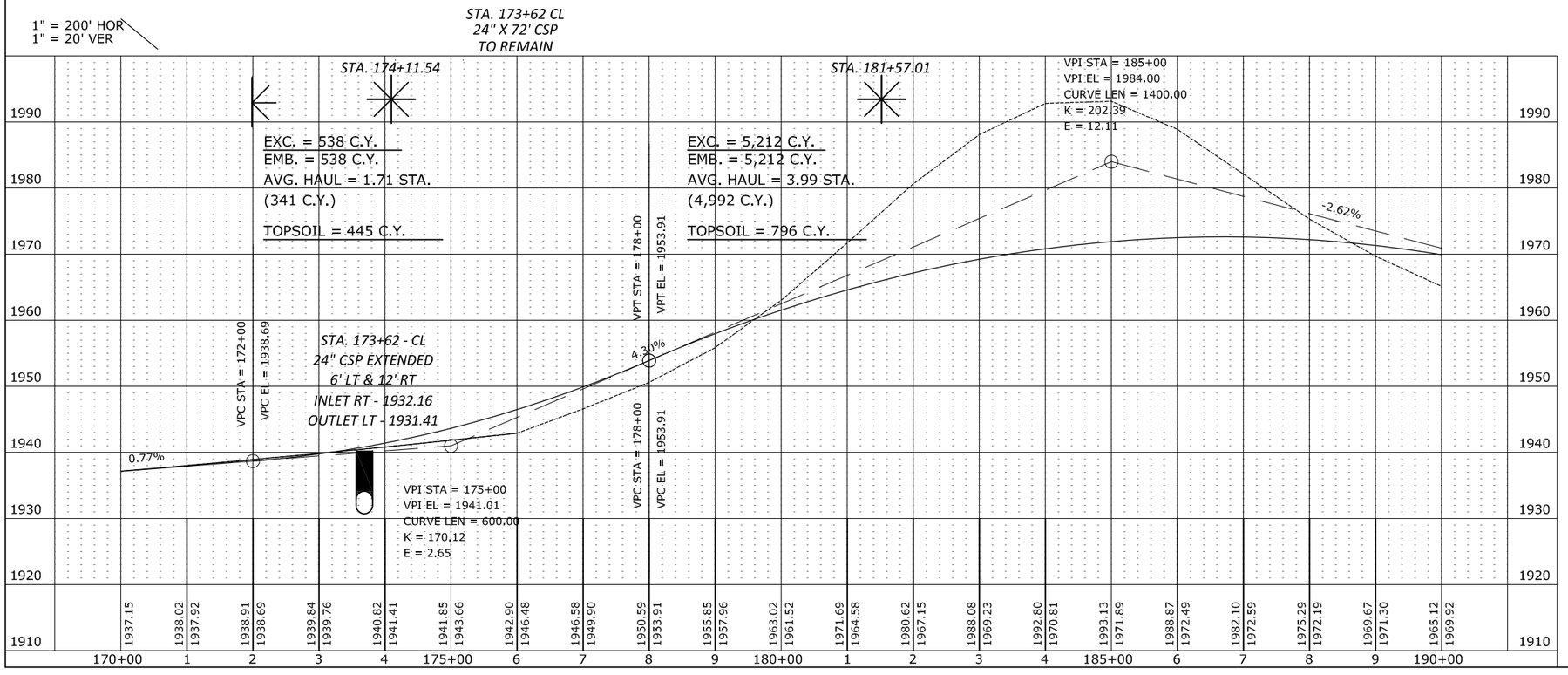
ALLOWABLE PIPE LIST

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	60	1

PIPE COOR. STEEL .064IN 24IN
STA. 173+62 CL *18 LF*

REMOVE & RELAY END SECTION - ALL TYPES & SIZES
STA. 173+62 LT & RT *2 EA*





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Consulting Engineers & Land Surveyors

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BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PLAN & PROFILE
B.O.P. TO STA. 190+00

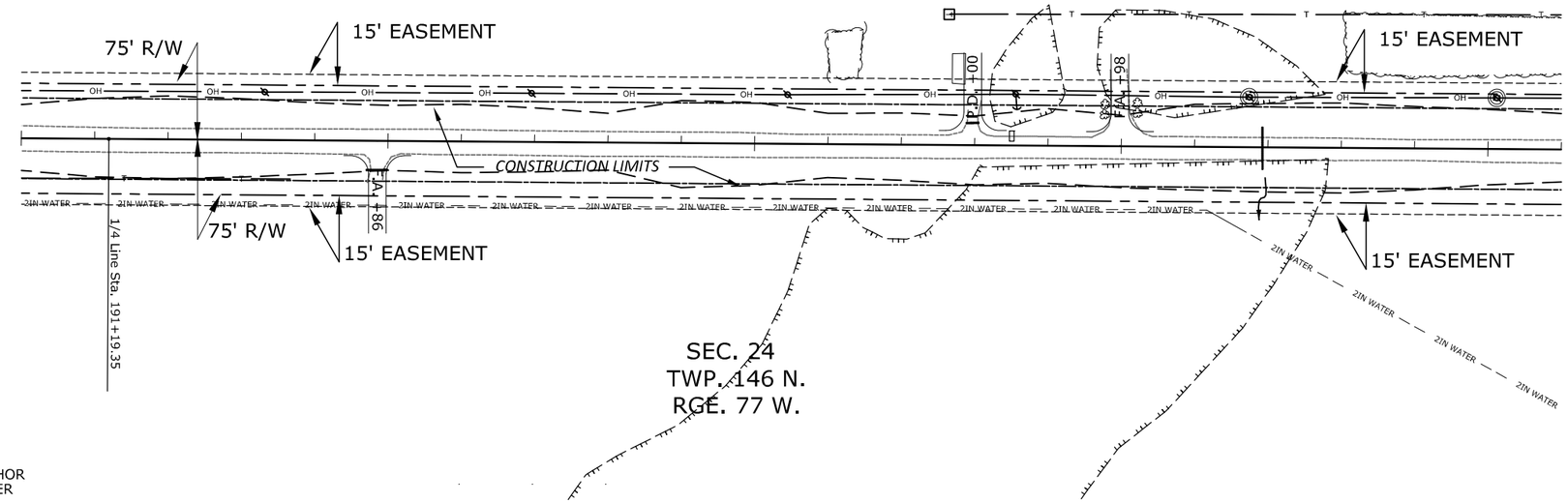
FILE: RCp01001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	60	2

190+00 195+00 200+00 205+00 210+00

SEC. 23
TWP. 146 N.
RGE. 77 W.

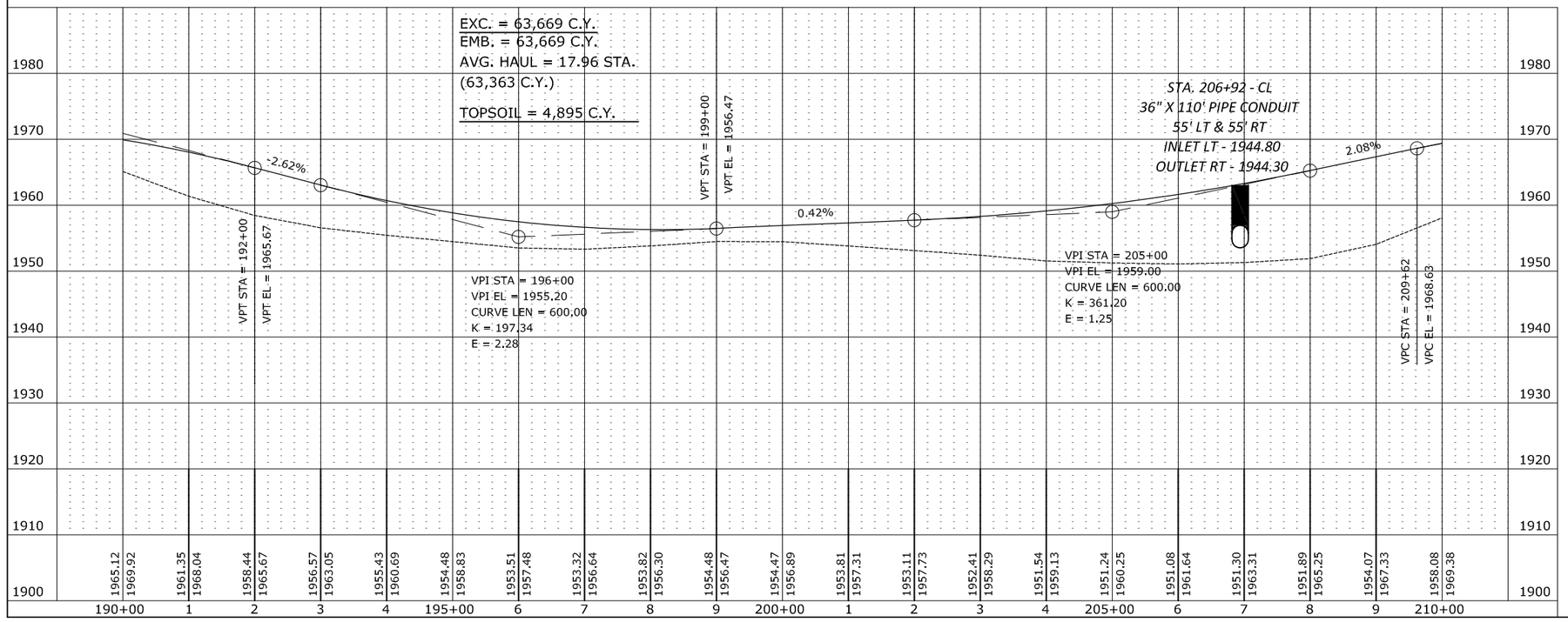


SEC. 24
TWP. 146 N.
RGE. 77 W.

SCALES:
1" = 200' HOR
1" = 20' VER

EXC. = 63,669 C.Y.
EMB. = 63,669 C.Y.
AVG. HAUL = 17.96 STA.
(63,363 C.Y.)

TOPSOIL = 4,895 C.Y.



PIPE CONDUIT 36IN

STA. 206+92 CL	*110 LF*

PIPE CONDUIT 24IN APPROACH

STA.194+86 RT	*56 LF*

PIPE CONDUIT 18IN APPROACH

STA. 203+00 LT	*64 LF*

MAILBOX - ALL TYPES

STA. 203+50 LT (7"X19")	*1 EA*

REMOVAL OF CULVERTS - ALL TYPES & SIZES

STA. 194+86 RT - 12" CSP	*28 LF*
STA. 194+86 RT - 18" CSP	*28 LF*
STA. 203+00 LT - 18" CSP	*16 LF*
STA. 206+92 CL - 15" CSP	*56 LF*

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BENCH MARKS

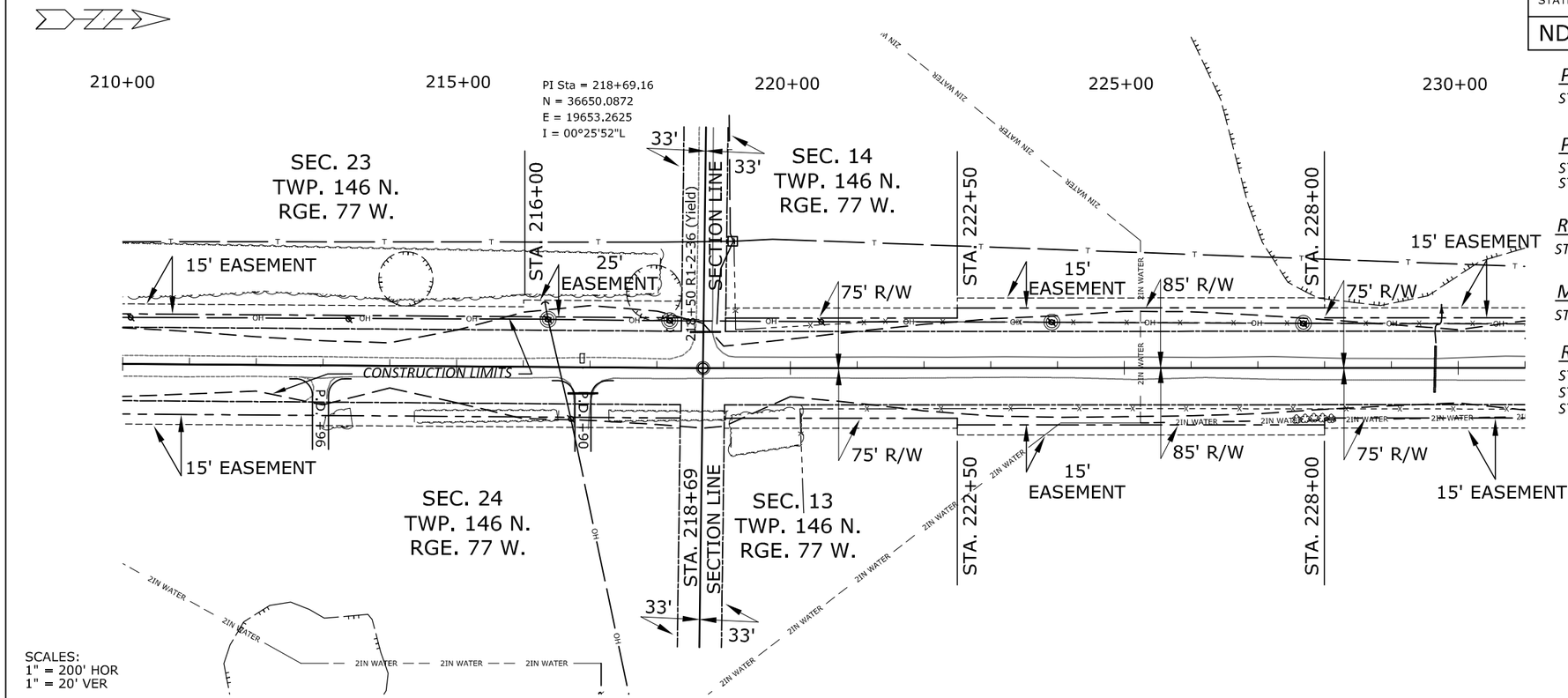
NO.	DESCRIPTION	LOCATION	ELEV.

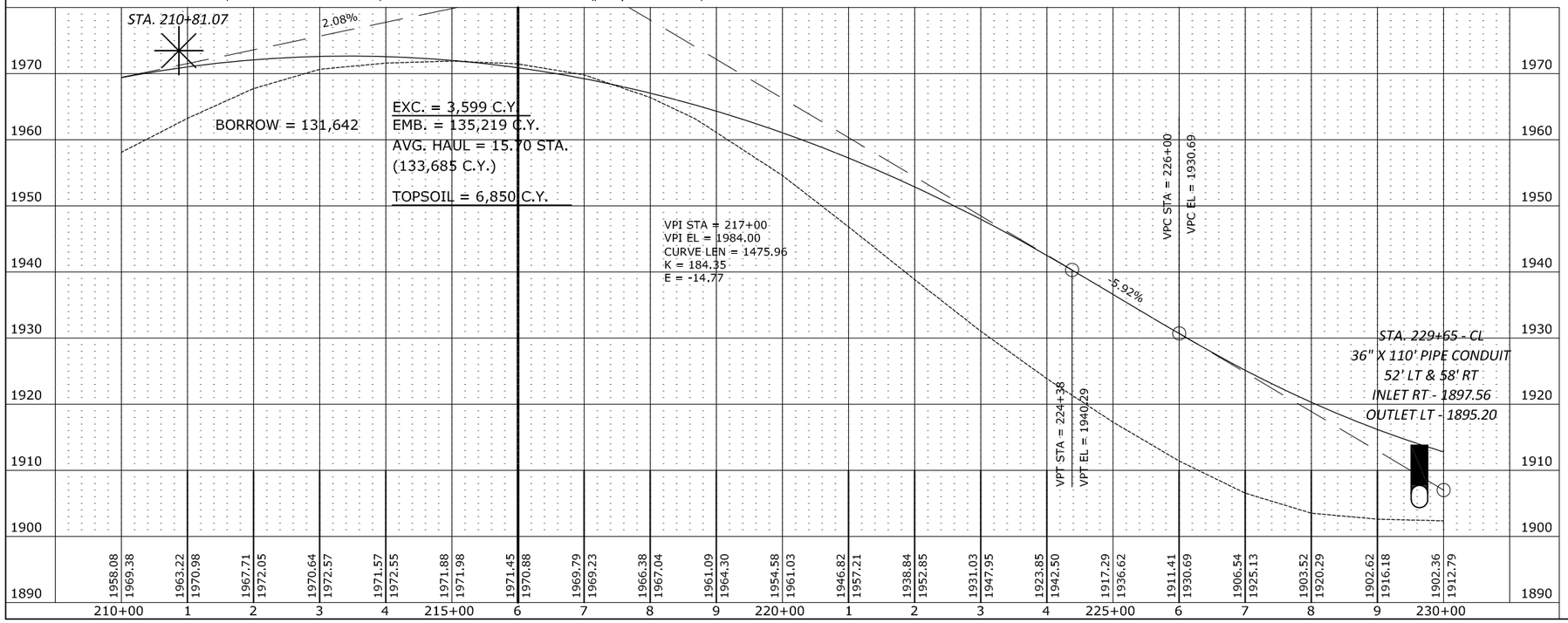
PLAN & PROFILE
STA. 190+00 TO STA. 210+00

FILE: RCp02001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	60	3





PIPE CONDUIT 36 IN

STA.229+65 CL	110 LF

PIPE CONDUIT 18IN APPROACH

STA. 216+90 RT	80 LF
STA. 218+69 LT	70 LF

RESET SIGN PANEL

STA. 218+50 LT - R1-2-36 (YIELD)	1 EA

MAILBOX - ALL TYPES

STA. 216+90 LT (8"X21")	1 EA

REMOVAL OF CULVERTS - ALL TYPES & SIZES

STA. 216+90 RT - 18" CSP	44 LF
STA. 218+69 LT - 18" CSP	44 LF
STA. 229+65 CL - 24" CSP	68 LF

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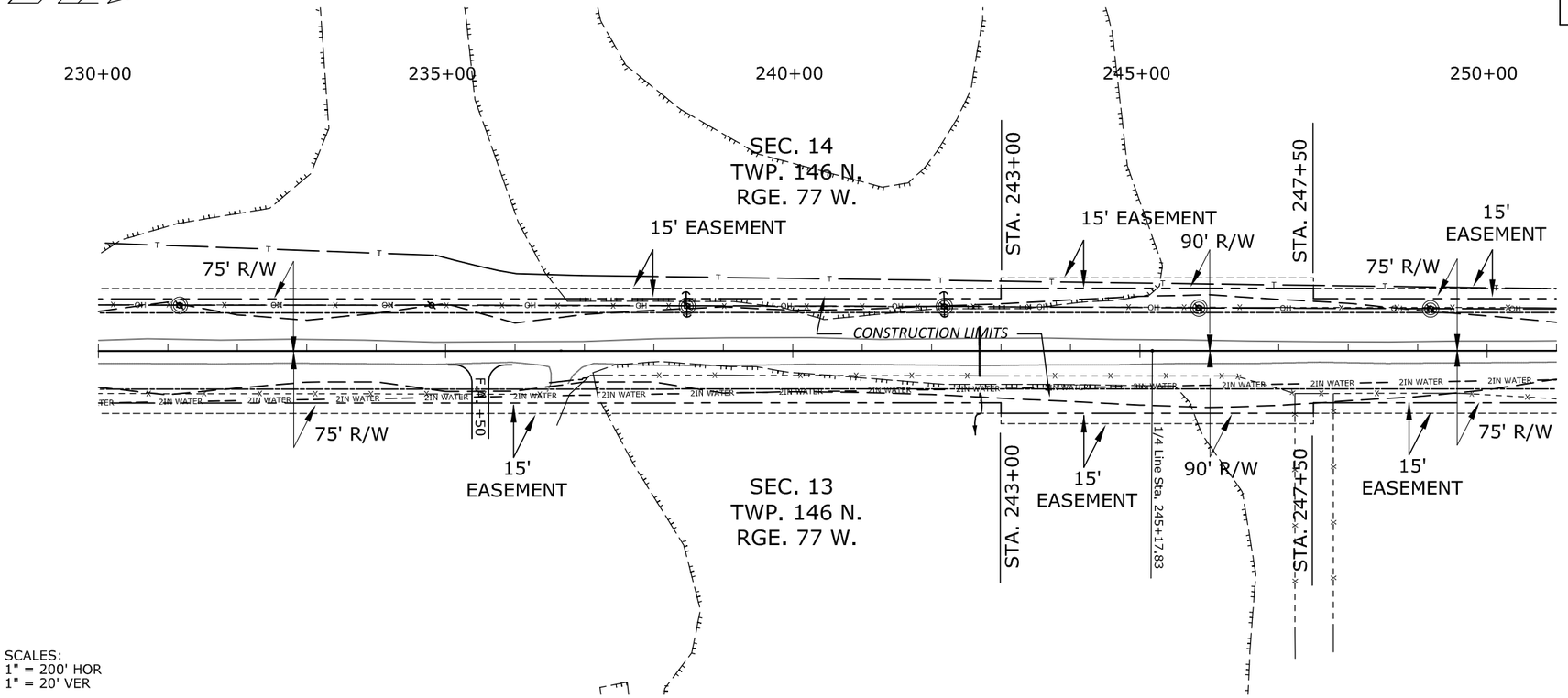
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PLAN & PROFILE
STA. 215+00 TO STA. 235+00

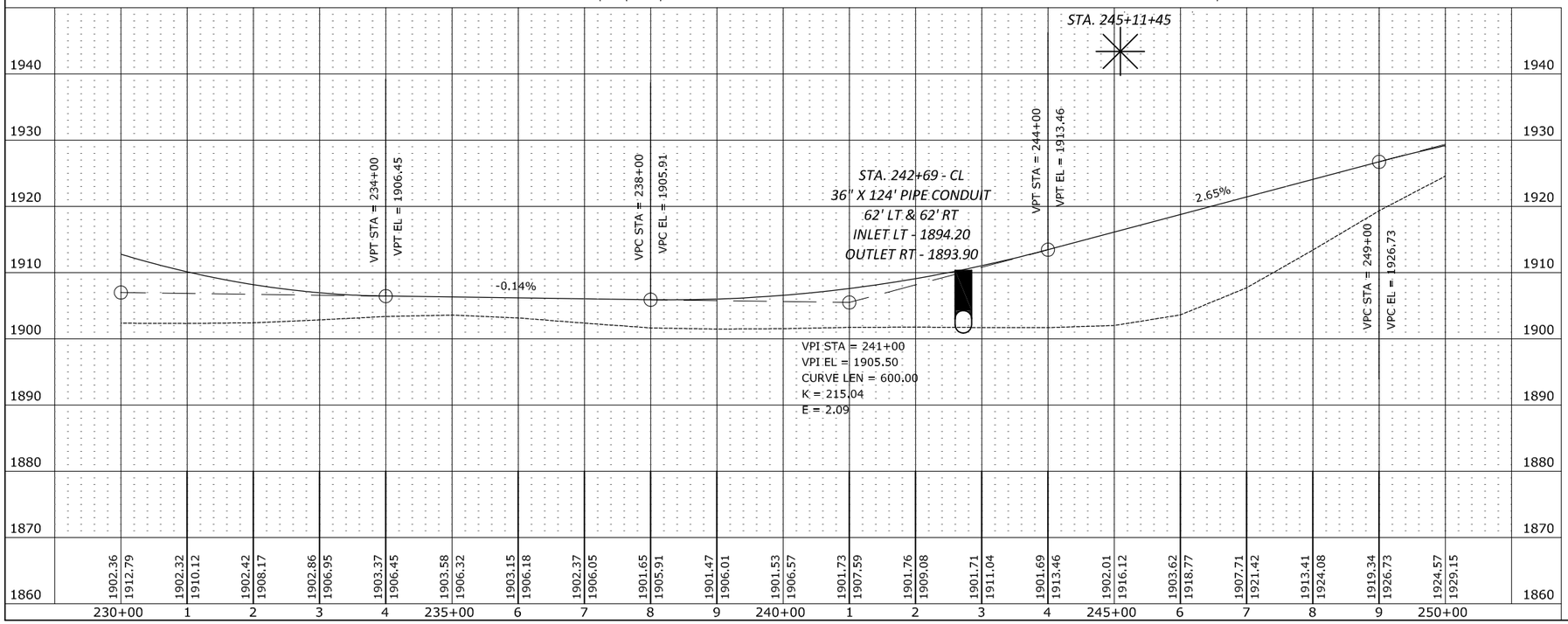
FILE: RCp03001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	60	4



SCALES:
1" = 200' HOR
1" = 20' VER



PIPE CONDUIT 36IN

STA. 242+69 CL	124 LF

PIPE CONDUIT 18IN APPROACH

STA. 235+50 RT	64 LF

REMOVAL OF CULVERTS - ALL TYPES & SIZES

STA. 236+67 RT - 18" CSP	34 LF
STA. 242+69 CL - 24" CSP	70 LF

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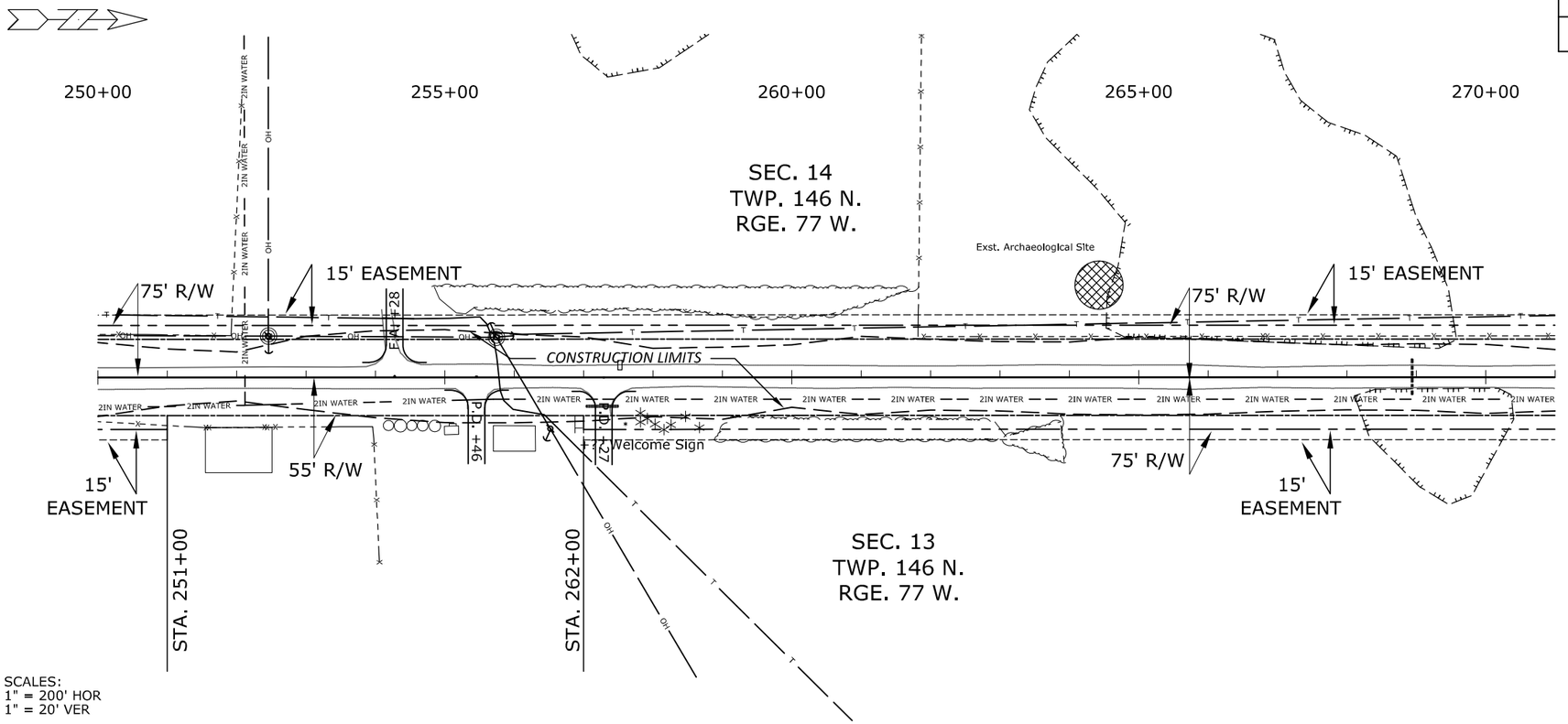
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PLAN & PROFILE
STA. 230+00 TO STA. 250+00

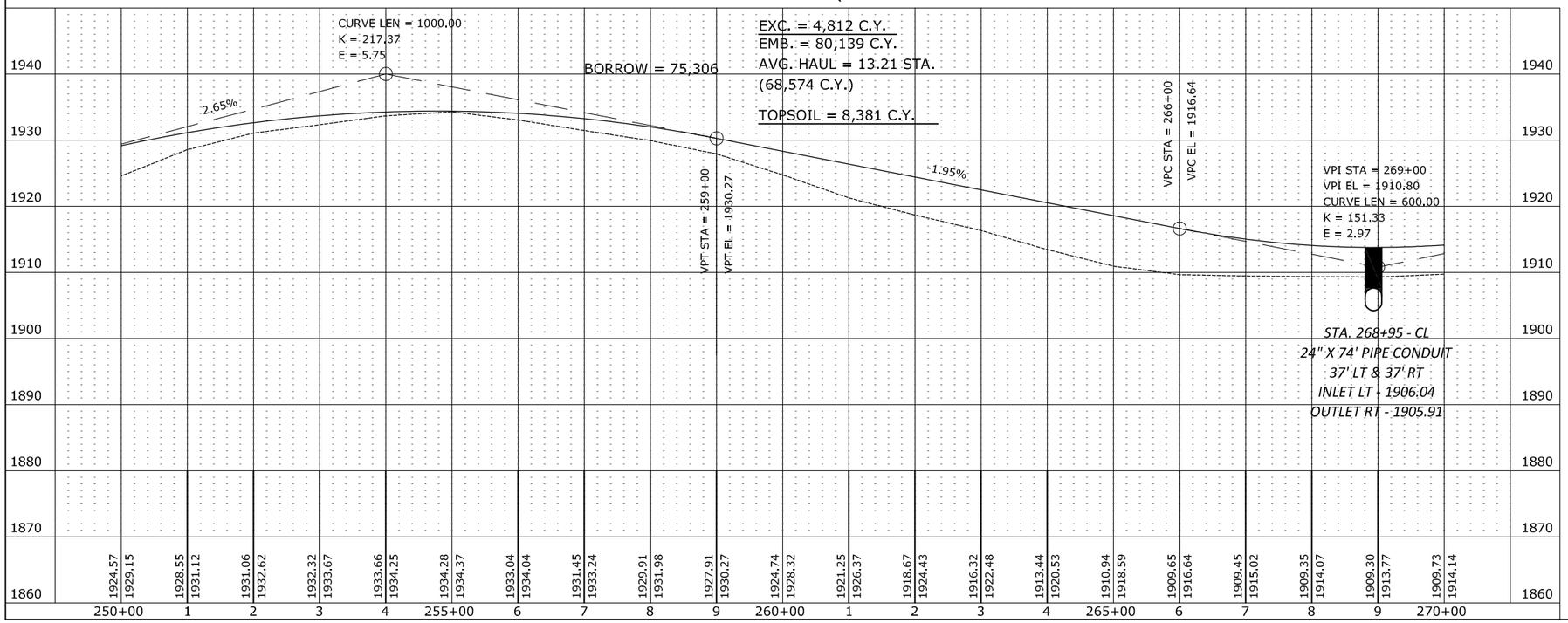
FILE: RCp04001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	60	5



SCALES:
1" = 200' HOR
1" = 20' VER



PIPE CONDUIT 24IN
STA. 268+95 CL — *74 LF*

PIPE CONDUIT 18IN APPROACH
STA. 257+27 RT — *64 LF*

MAILBOX - ALL TYPES
STA. 257+50 LT (10 1/2" X 19") — *1 EA*

REMOVAL OF CULVERTS - ALL TYPES & SIZES
STA. 268+95 CL - 24" CSP — *50 LF*

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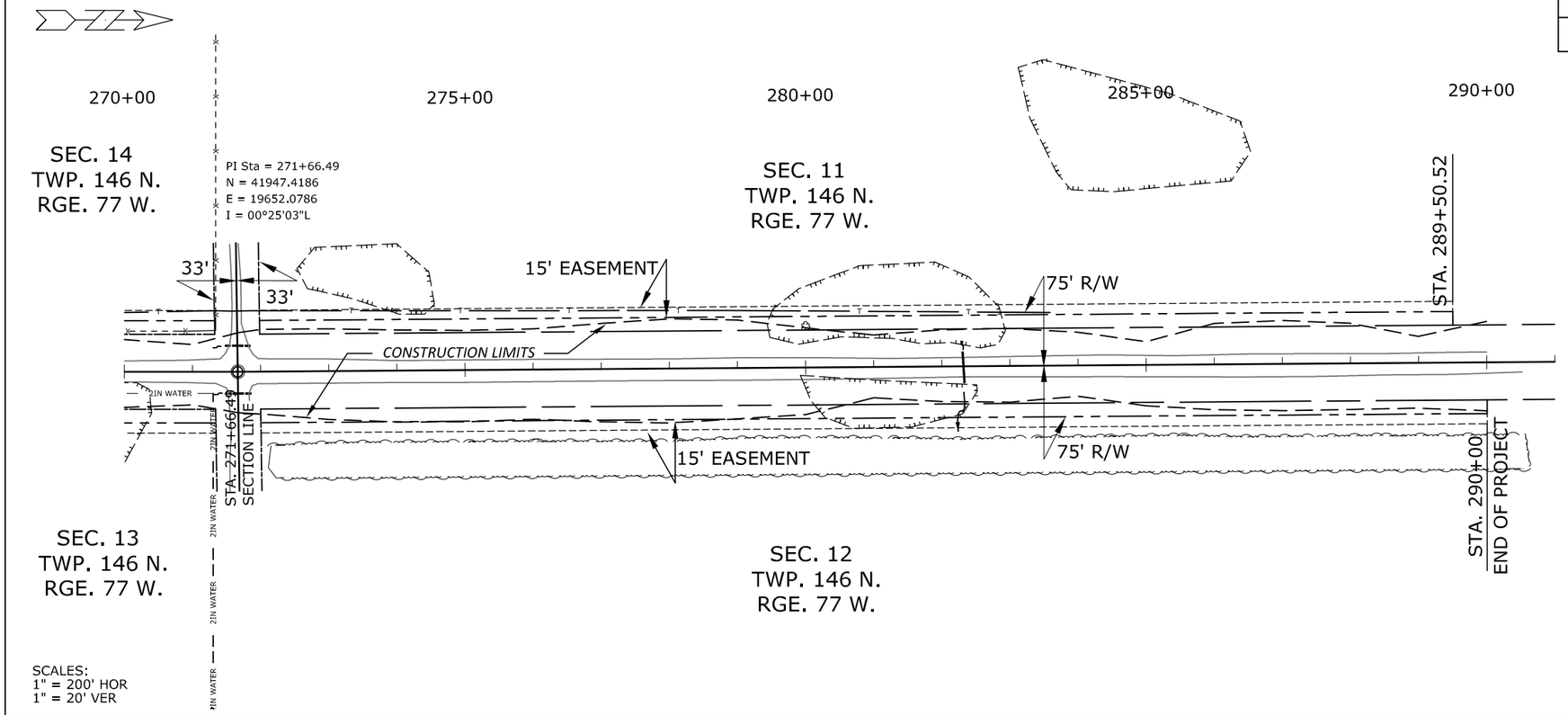
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

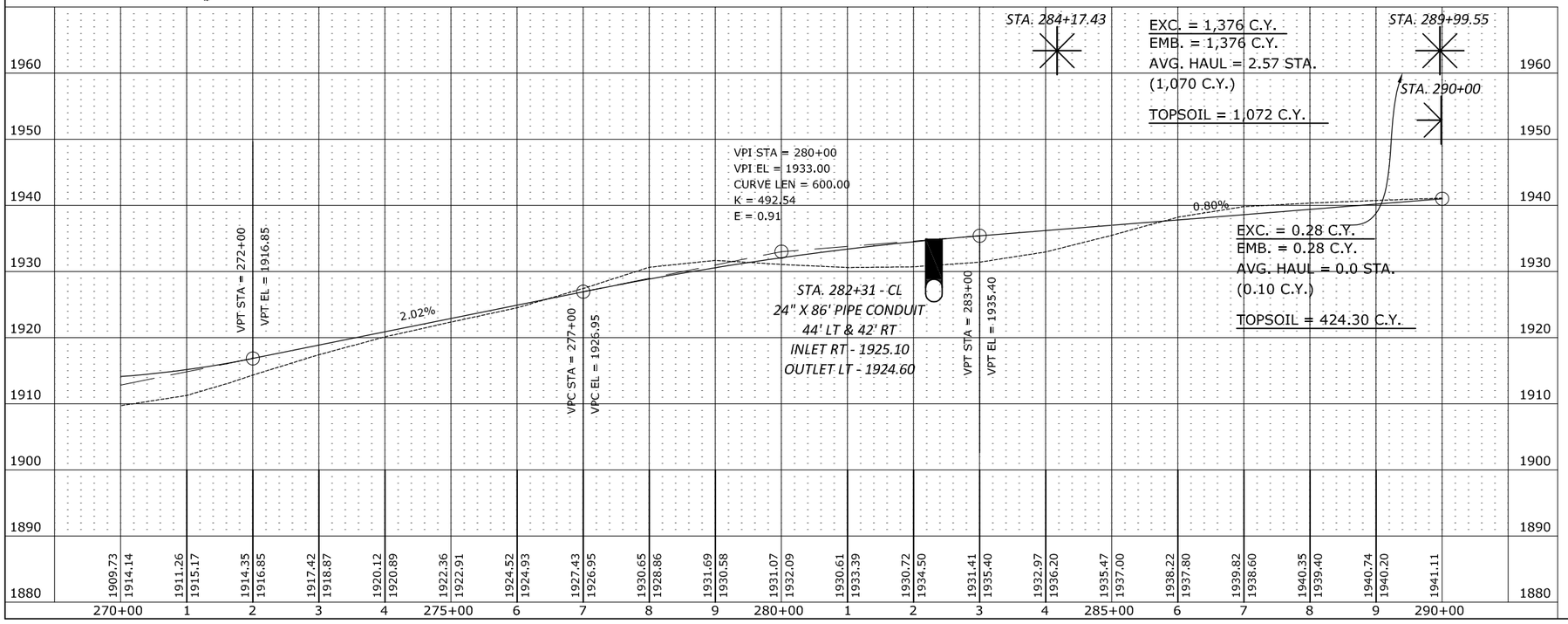
PLAN & PROFILE
STA. 250+00 TO STA. 270+00

FILE: RCp05001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	60	6





PIPE CONDUIT 24IN

STA. 282+31 CL	*86 LF*

PIPE CONDUIT 18IN APPROACH

STA. 271+66 LT	*62 LF*
STA. 271+66 RT	*62 LF*

REMOVAL OF CULVERTS - ALL TYPES & SIZES

STA. 271+66 LT - 18" CSP	*36 LF*
STA. 271+66 RT - 18" CSP	*36 LF*
STA. 282+31 CL - 18" CSP	*44 LF*

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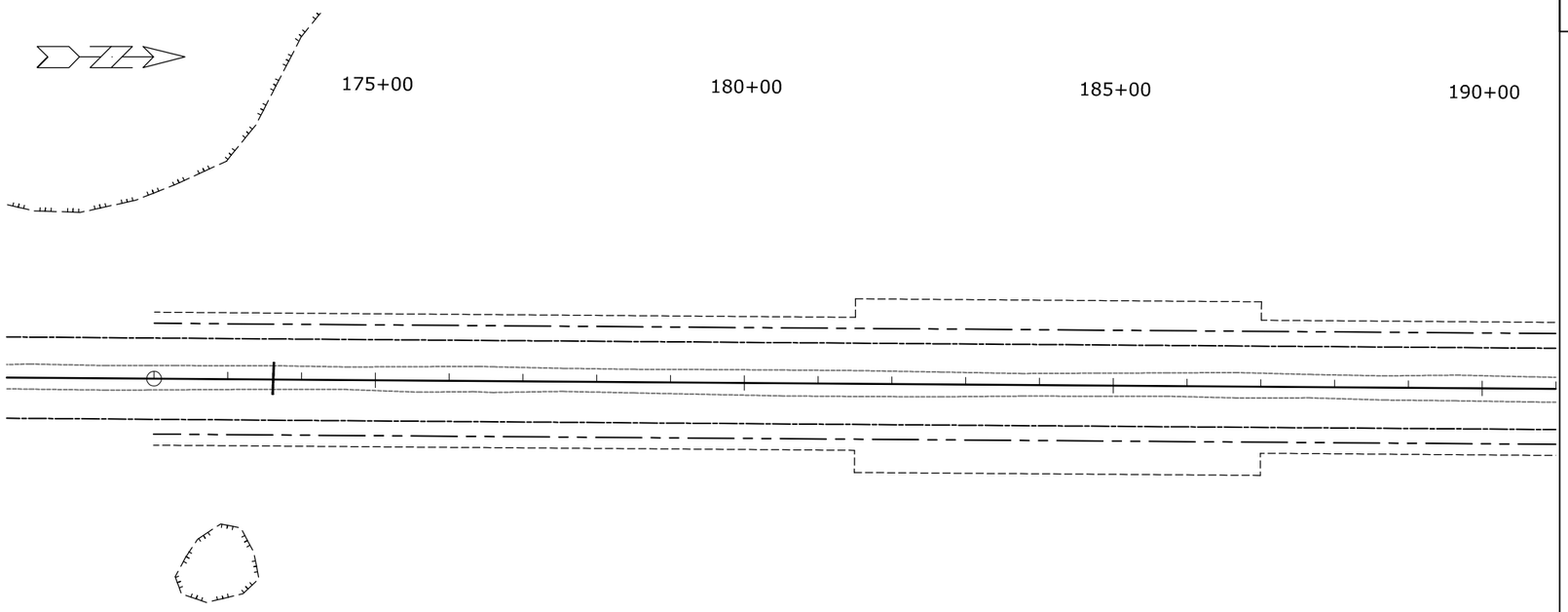
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PLAN & PROFILE
STA. 270+00 TO E.O.P.

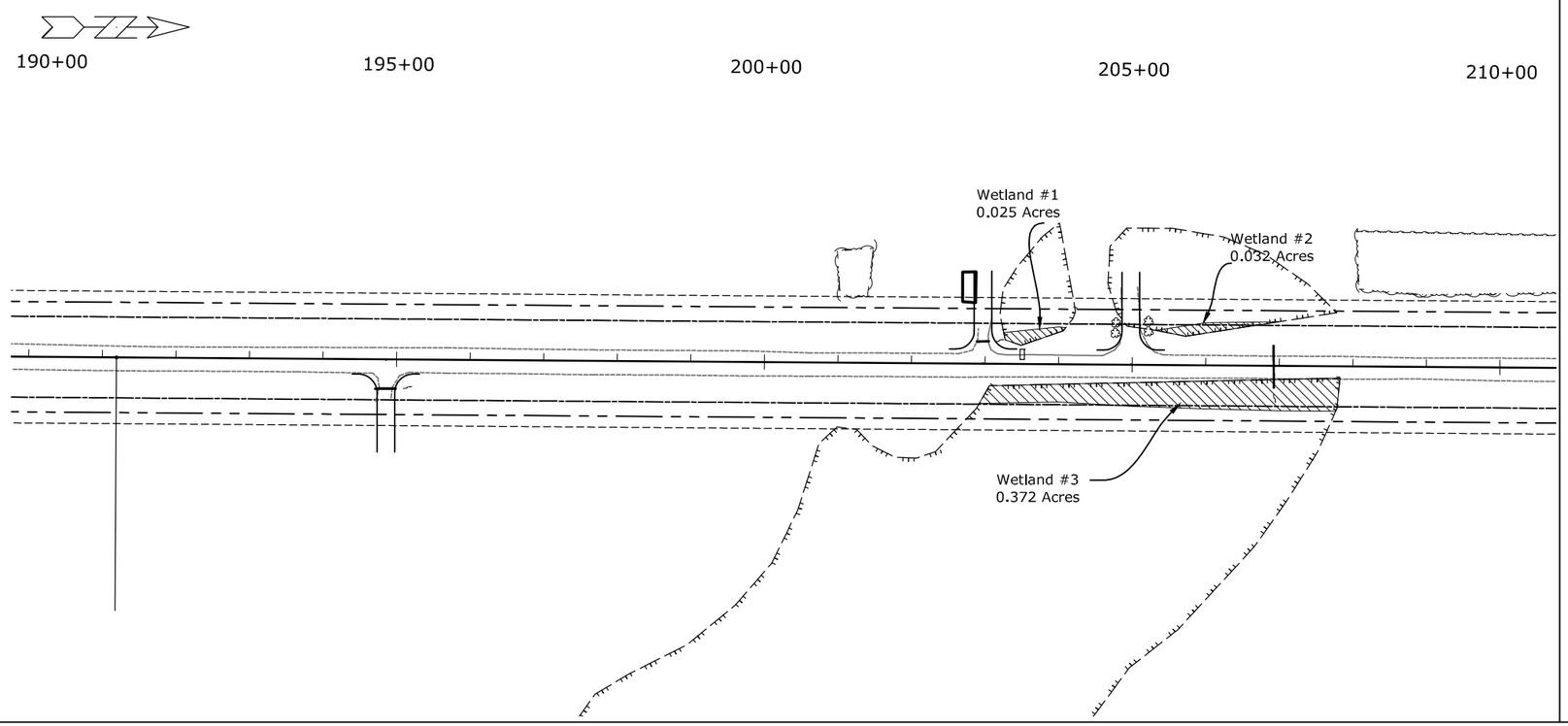
FILE: RCp06001.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	1



Permanent Wetland Impact



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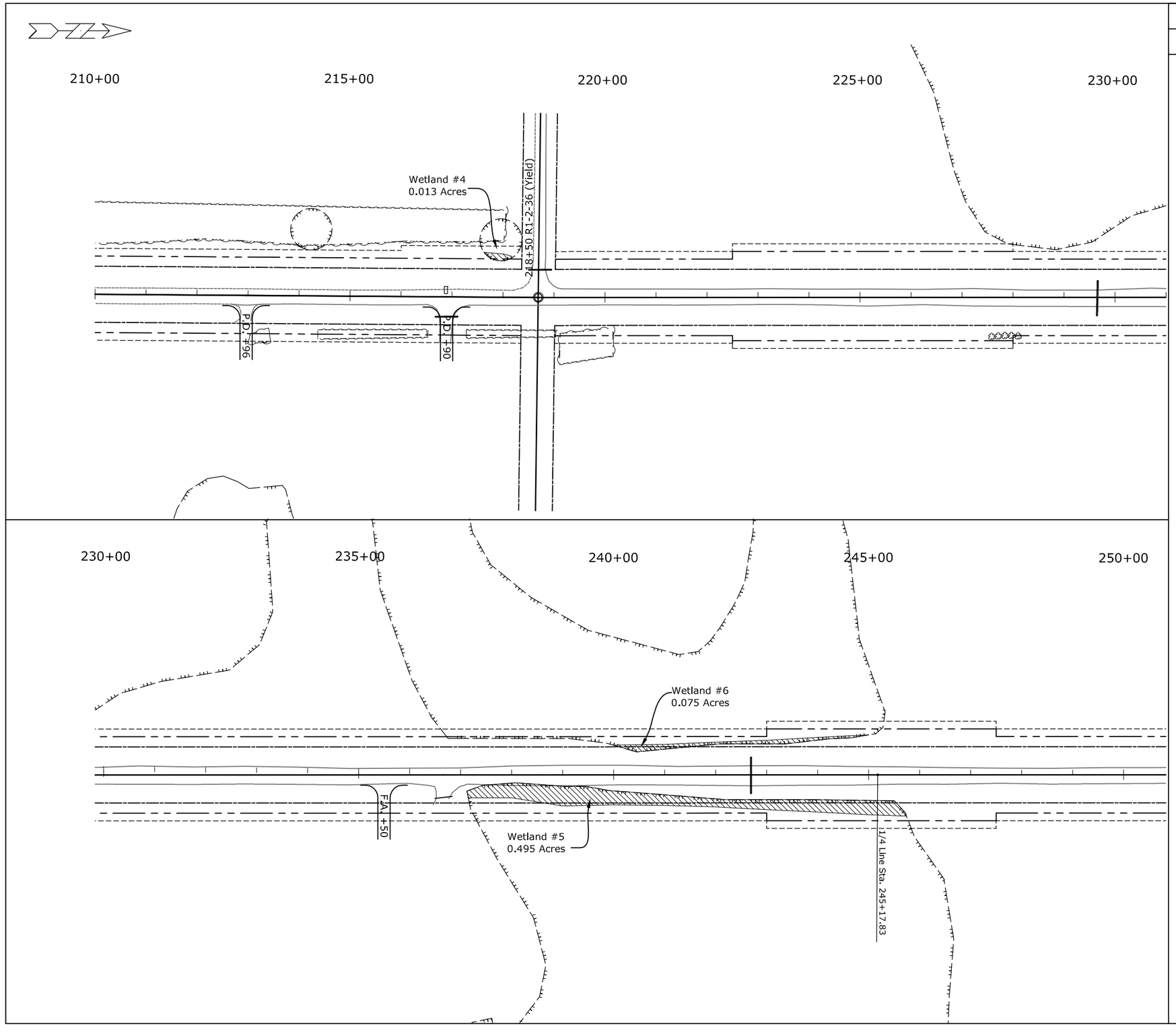
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

WETLANDS
B.O.P. TO STA. 210+00

FILE: 075WL_001_Wetlands.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	2



Permanent Wetland Impact

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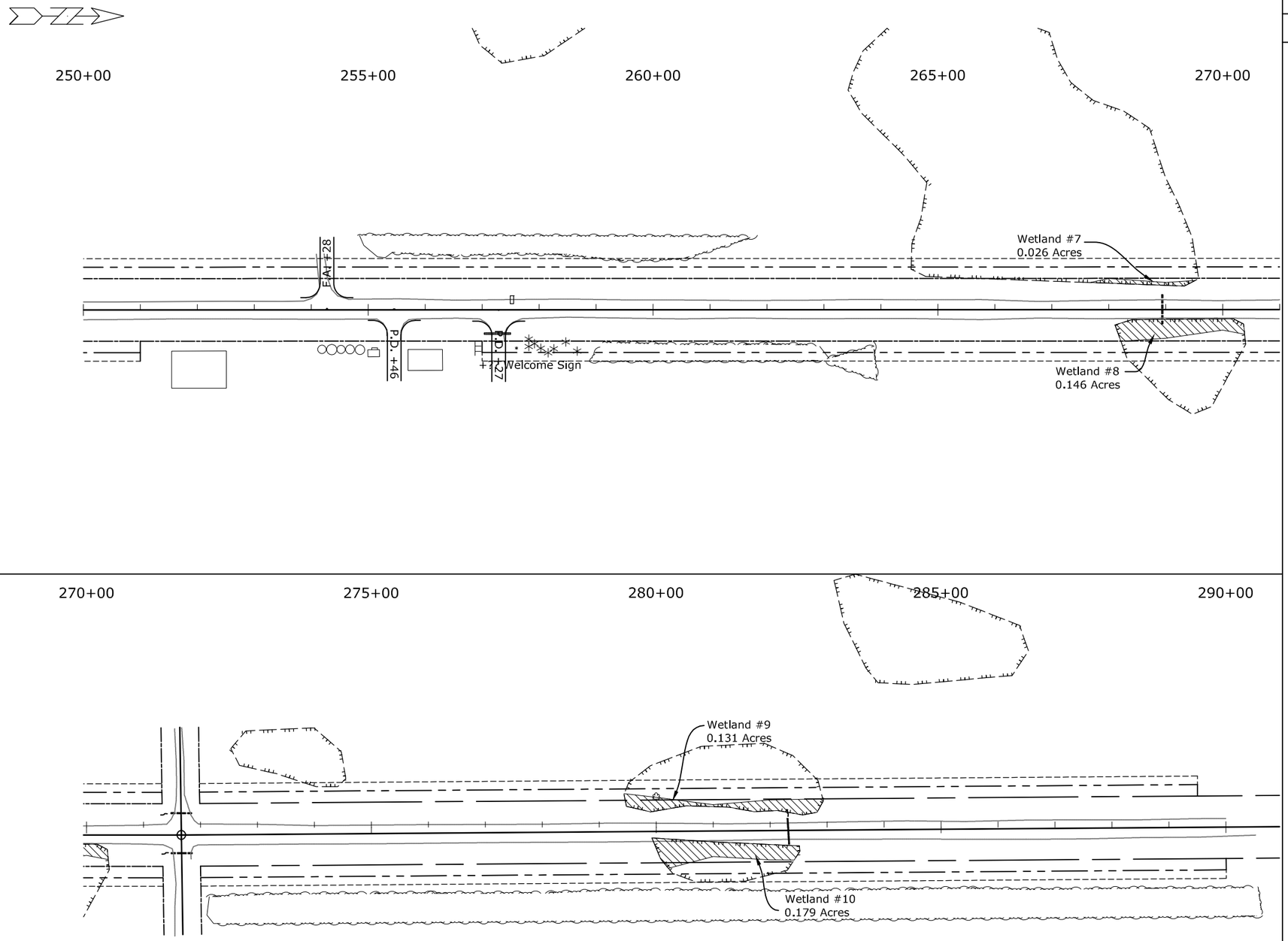
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

WETLANDS
STA. 210+00 TO STA. 250+00

FILE: 075WL_002_Wetland.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	3



Permanent Wetland Impact

Wold Engineering, P.C.
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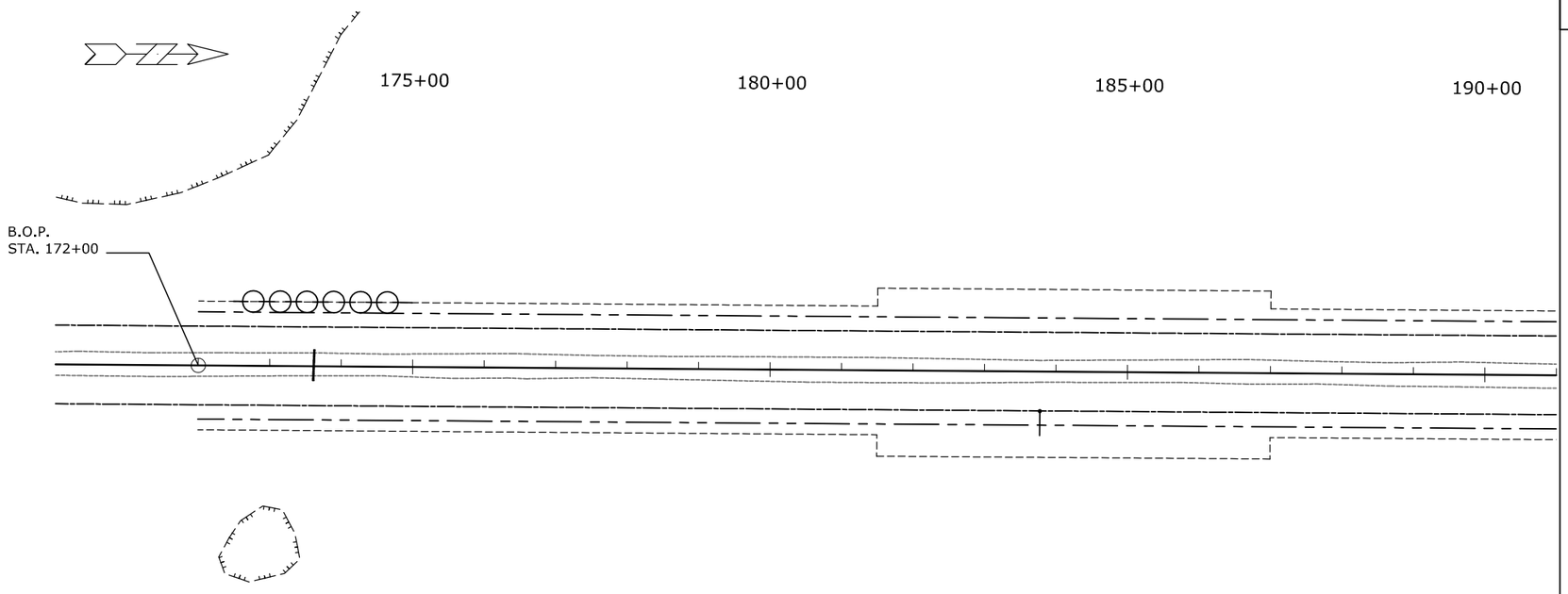
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

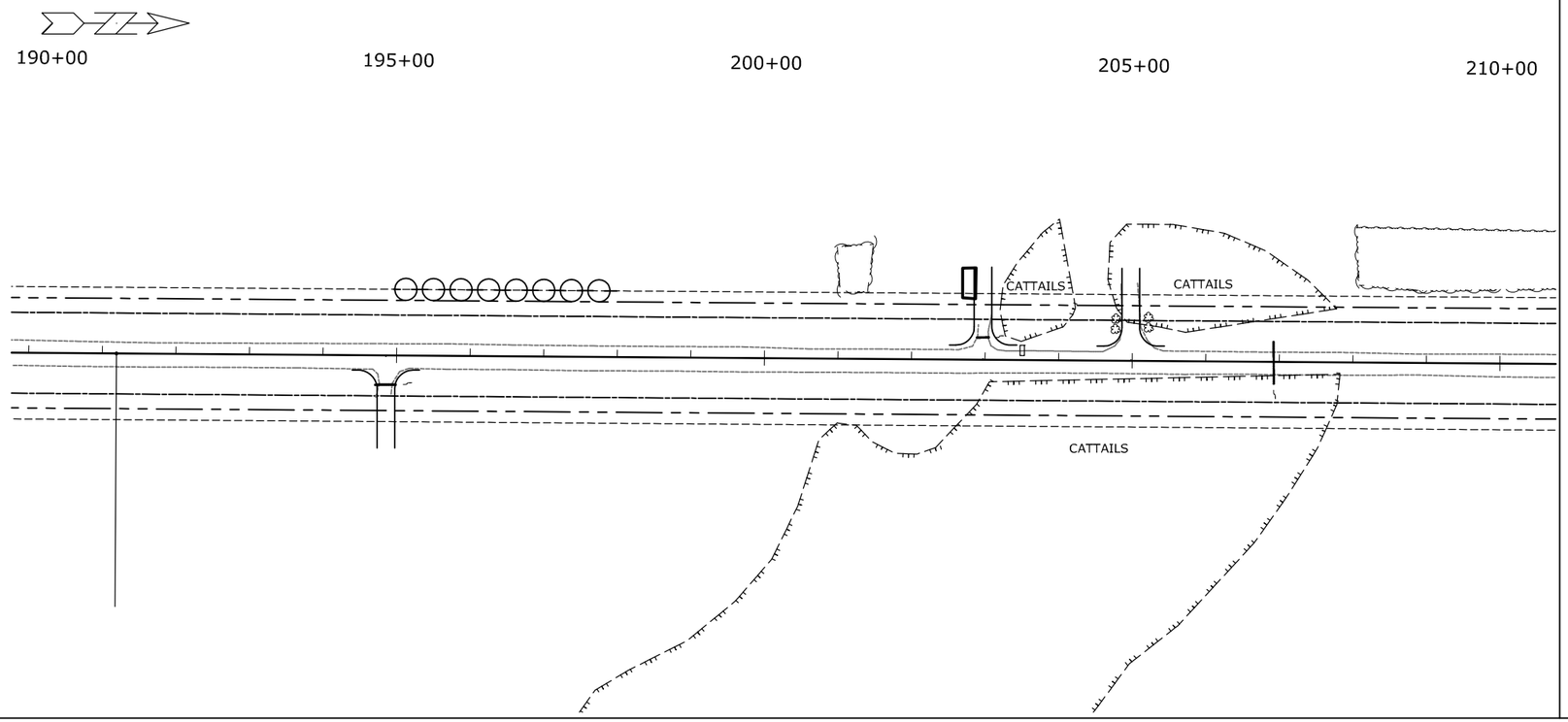
WETLANDS
STA. 250+00 TO STA. 290+00

FILE: 075WL_003_Wetland.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	4





FIBER ROLLS 12IN

STA. 172+50 TO 175+00 LT	*250 LF*
STA. 195+00 TO 198+00 LT	*300 LF*

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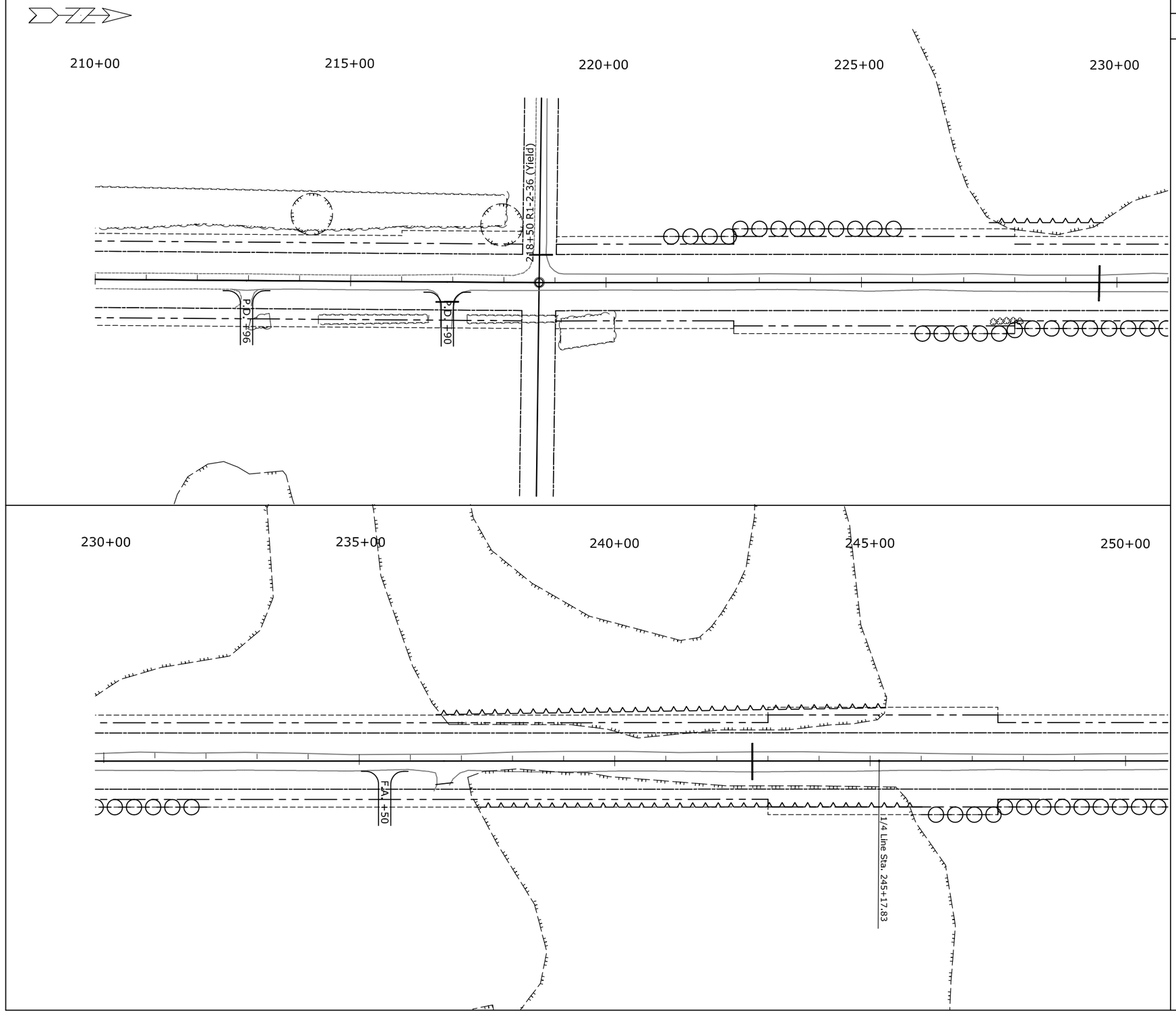
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

TEMPORARY EROSION CONTROL
B.O.P. TO STA. 210+00

FILE: 075WL_004_TEC.dwg

0 100 200 300
SCALE IN FEET



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	5

FIBER ROLLS 12IN

STA. 221+00 TO 226+00 LT	*500 LF*
STA. 226+00 TO 232+00 RT	*600 LF*
STA. 246+00 TO 250+00 RT	*400 LF*

FLOTATION SILT CURTAIN

STA. 227+50 TO 229+75 LT	*225 LF*
STA. 236+50 TO 245+25 LT	*875 LF*
STA. 237+25 TO 246+00 RT	*875 LF*

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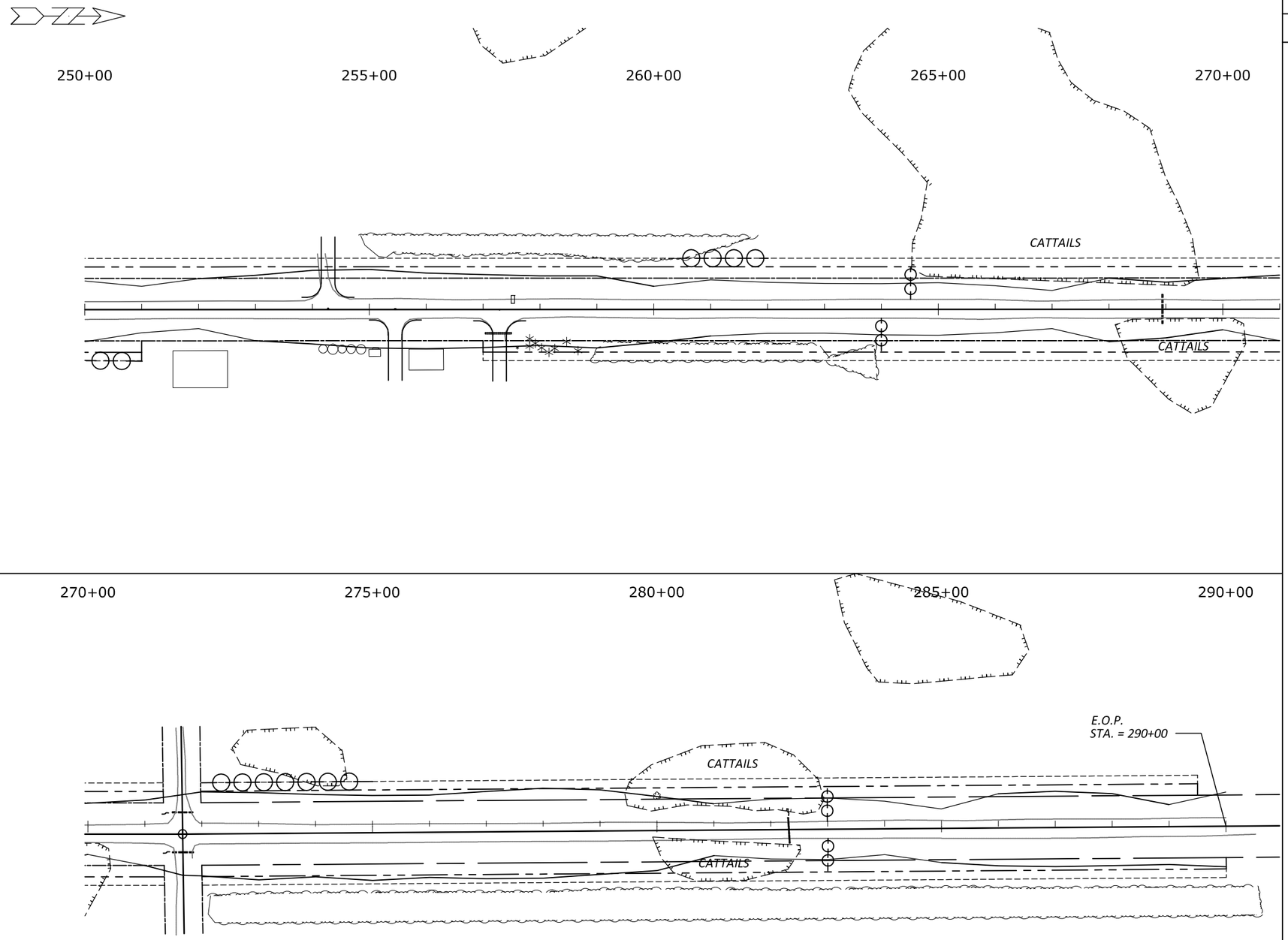
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

TEMPORARY EROSION CONTROL
STA. 210+00 TO STA. 250+00

FILE: 075WL_005_TEC.dwg

0 100 200 300
SCALE IN FEET



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	6

FIBER ROLLS 12IN

STA. 250+00 TO 251+00 RT	*100 LF*
STA. 260+50 TO 262+00 LT	*150 LF*
STA. 264+50 LT	*25 LF*
STA. 264+00 RT	*25 LF*
STA. 272+00 TO 275+00 LT	*300 LF*
STA. 283+00 LT & RT	*50 LF*

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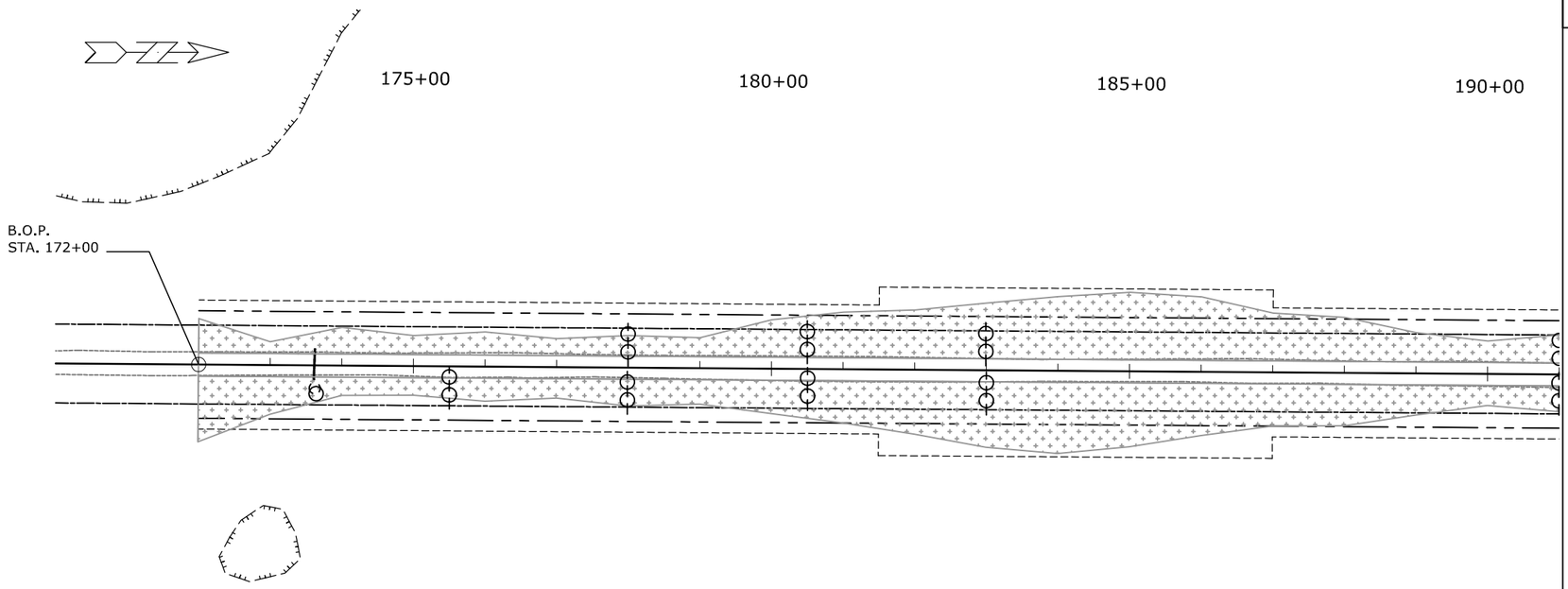
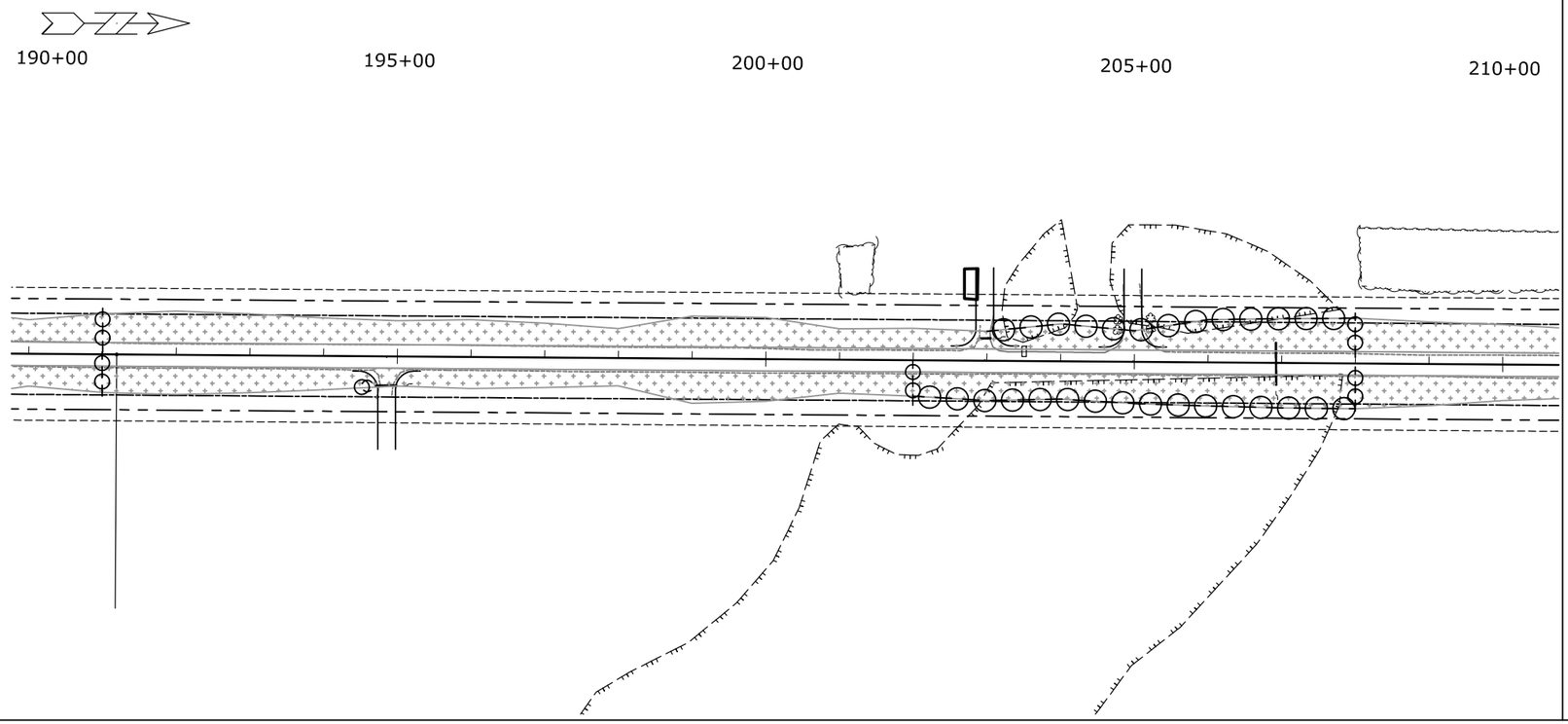
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

TEMPORARY EROSION CONTROL
STA. 250+00 TO STA. 290+00

FILE: 075WL_006_TEC.dwg

0 100 200 300
SCALE IN FEET





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	7

FIBER ROLLS 12IN

STA. 173+62 RT	*30 LF*
STA. 175+50 LT & RT	*50 LF*
STA. 178+00 LT & RT	*50 LF*
STA. 180+50 LT & RT	*50 LF*
STA. 183+00 LT & RT	*50 LF*
STA. 191+00 LT & RT	*50 LF*
STA. 194+86 RT	*30 LF*
STA. 202+00 RT	*25 LF*
STA. 203+00 LT	*30 LF*
STA. 203+00 TO 208+00 LT	*500 LF*
STA. 208+00 LT & RT	*50 LF*
STA. 202+00 TO 208+00 LT & RT	*600 LF*

SEEDING - TYPE B - CL II

STA. 172+00 TO 210+00 LT & RT	*0.720 MILE*

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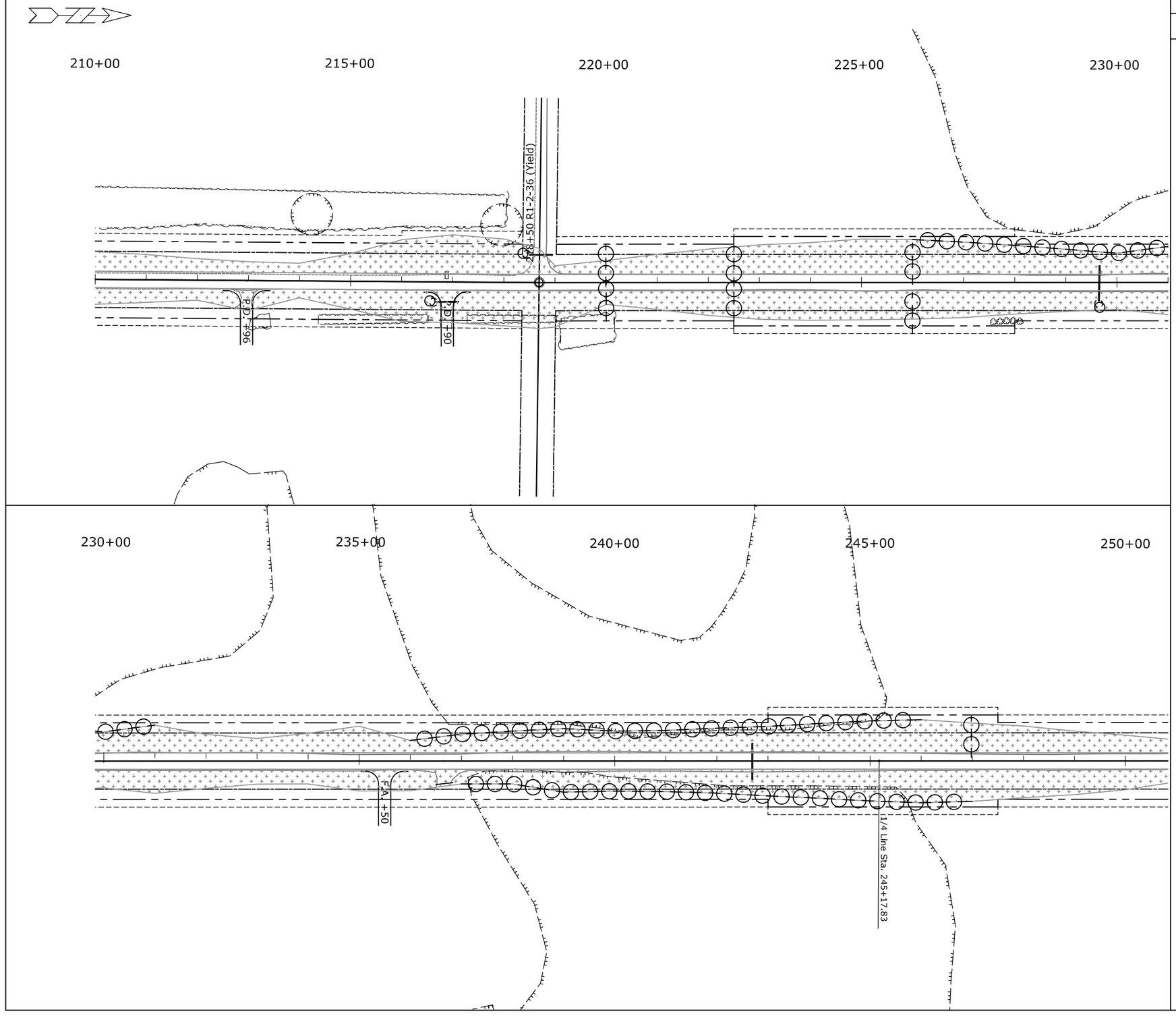
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PERMANENT EROSION CONTROL
B.O.P. TO STA. 210+00

FILE: 075WL_007_PEC.dwg

0 100 200 300
SCALE IN FEET



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	8

FIBER ROLLS 12IN

STA. 216+90 RT	30 LF
STA. 218+69 LT	30 LF
STA. 220+00 LT & RT	50 LF
STA. 222+50 LT & RT	50 LF
STA. 226+00 LT & RT	50 LF
STA. 226+00 TO 231+00 LT	500 LF
STA. 229+65 RT	30 LF
STA. 236+00 TO 246+00 LT	1000 LF
STA. 237+00 TO 246+00 RT	900 LF
STA. 247+00 LT	25 LF

SEEDING - TYPE B - CL II

STA. 210+00 TO 250+00 LT & RT	0.758 MILE

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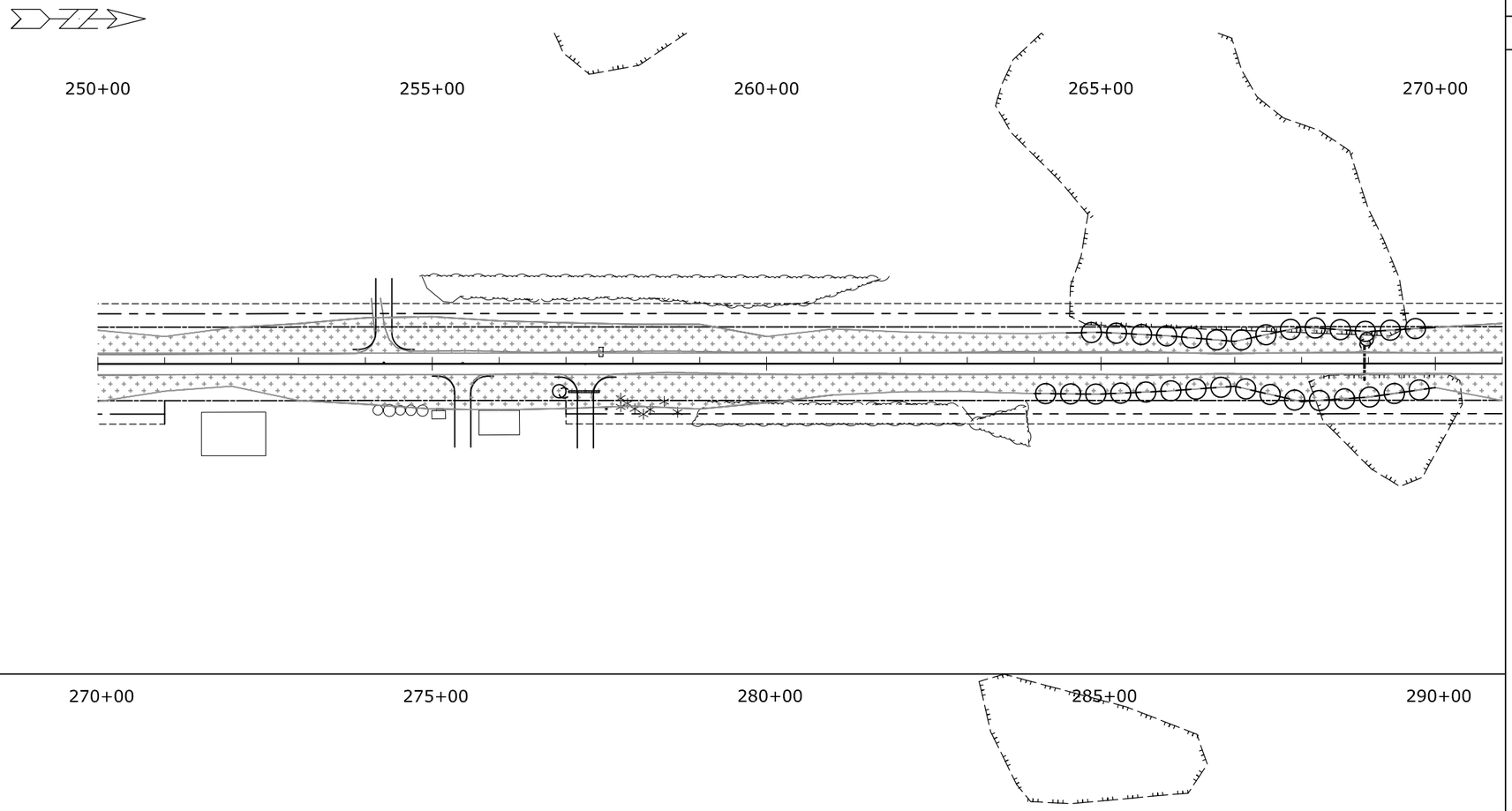
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PERMANENT EROSION CONTROL
STA. 210+00 TO STA. 250+00

FILE: 075WL_008_PEC.dwg

0 100 200 300
SCALE IN FEET



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	75	9

FIBER ROLLS 12IN

STA. 257+27 RT	*30 LF*
STA. 264+00 RT	*25 LF*
STA. 264+50 LT	*25 LF*
STA. 264+00 TO 270+00 RT	*600 LF*
STA. 264+50 TO 270+00 LT	*550 LF*
STA. 268+65 LT	*30 LF*

SEEDING - TYPE B - CL II

STA. 250+00 TO 290+00 LT & RT	*0.758 MILE*

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BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.

PERMANENT EROSION CONTROL
STA. 250+00 TO STA. 290+00

FILE: 075WL_009_PEC.dwg

0 100 200 300
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO
ND	SC-4211(063)	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1a-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**4**	**34**	**136**
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2a-48	**48"x24"**	**END ROAD WORK**	**4**	**19**	**76**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	**72"x36"**	**ROAD WORK NEXT __ MILES RT & LT ARROWS**	**1**	**37**	**37**
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**2**	**5**	**10**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1a-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	**60"x30"**	**ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY**	**4**	**31**	**124**
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	**48"x48"**	**RIGHT or LEFT SHARP REVERSE CURVE ARROW**	**2**	**35**	**70**
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	**48"x24"**	**LARGE ARROW**	**2**	**26**	**52**
W3-1a-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**2**	**35**	**70**
W3-5-48	48"x48"	SPEED REDUCTION AHEAD		35	
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT.**	**2**	**35**	**70**
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT.		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	**24"x24"**	**__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)**	**2**	**11**	**22**
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**2**	**35**	**70**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.		35	
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	24"x18"	__ FEET (Mounted of warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	MEN WORKING SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	**48"x48"**	**MATERIAL ON ROADWAY**	**2**	**35**	**70**
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

SPEC & CODE		TOTAL UNITS	
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**877**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**180**
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**4**
704-1060	DELINEATOR DRUMS	EACH	
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	**VERTICAL PANELS - BACK TO BACK**	**EACH**	**40**
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
762-1500	OBLITERATION OF PVMT MK	SF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

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

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Bismarck, North Dakota

Traffic Control Devices List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SC-4211(063)	100	2

2 - TYPE III BARRICADES

ROAD WORK
NEXT 2.1 MILES

G20-1a-60

ROAD CLOSED
1/2 MILE AHEAD
LOCAL TRAFFIC ONLY

R11-3a-60

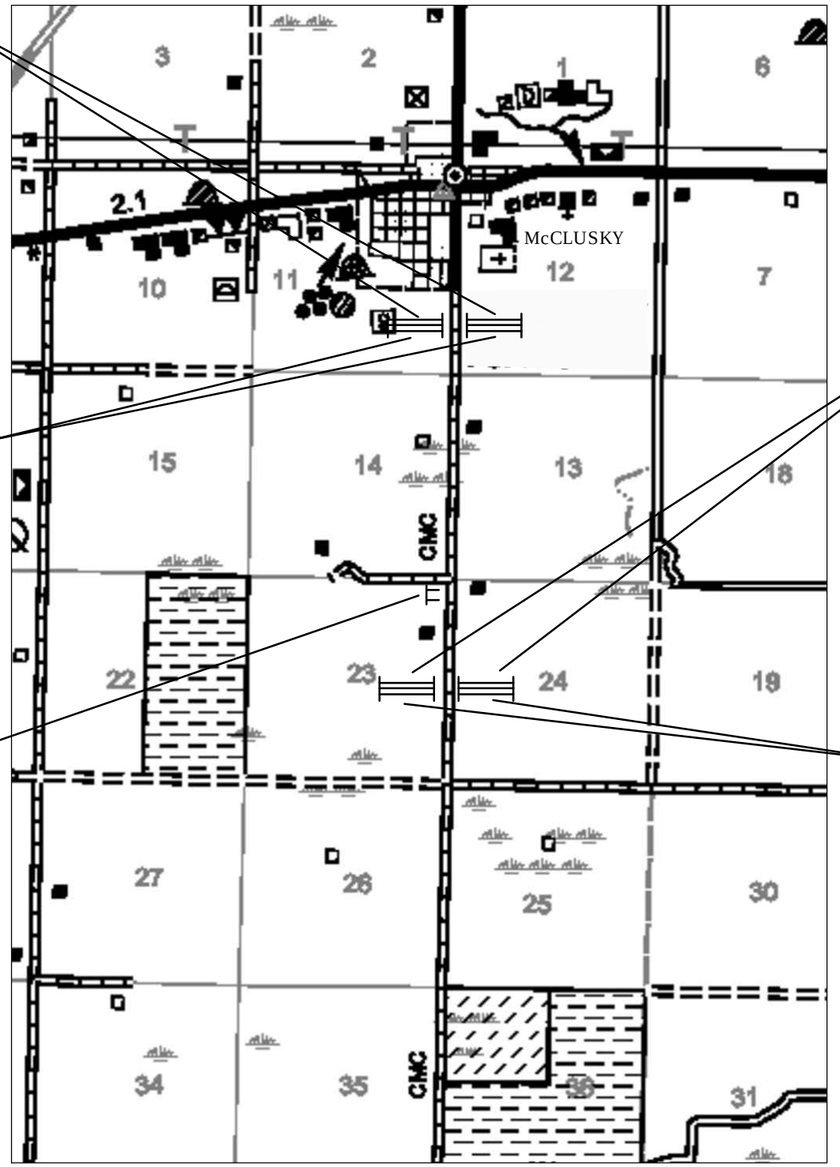
TYPE III BARRICADES - POST MTD.

END
ROAD WORK

G20-2a-60

ROAD WORK
NEXT 1/2 MILE ⟵ NEXT 2 MILES

G20-50a-72
POST MTD.



T-146-N

R-77-W

TYPE III BARRICADES - POST MTD.

END
ROAD WORK

G20-2a-60

2 - TYPE III BARRICADES

ROAD WORK
NEXT 2.1 MILES

G20-1a-60

ROAD CLOSED
1/2 MILE AHEAD
LOCAL TRAFFIC ONLY

R11-3a-60

N

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

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TRAFFIC CONTROL LAYOUT

NDDOT ABBREVIATIONS

D-20-1

Abn	abandoned
Abut	abutment
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
A	ampere
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	Automatic Traffic Recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BLM	Bureau of Land Management
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	Crossroad
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
Elec	electric/al
EDM	electronic distance meter
Elev or El	elevation
Ellipt	elliptical
Emb	embankment
Emuls	emulsion/emulsified
ES	end section
Engr	engineer
ESS	Environmental Sensor Station
Eq	equal
Eq	equation
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
F	Fahrenheit
FS	far side
F	farad
Fed	Federal
FHWA	Federal Highway Administration
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
FH	fire hydrant
Fl	flange
Flrd	flared
FES	flared end section

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

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NDDOT ABBREVIATIONS

D-20-2

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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04-20-11	Added Items
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NDDOT ABBREVIATIONS

D-20-3

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT UTILITY COMPANY ABBREVIATIONS

D-20-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
All PI	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BNSF	Burlington Northern Santa Fe Railway
BOEING	Boeing
BRNS RWD	Barnes Rural Water District
BURK-DIV ELEC	Burke-Divide Electric Cooperative
BURL WU	Burleigh Water Users
Cable One	Cable One
CABLE SERV	Cable Services
CAP ELEC	Capital Electric Cooperative Incorporat
CASS CO ELEC	Cass County Electric Cooperative
CASS RWU	Cass Rural Water Users Incorporated
CAV ELEC	Cavalier Rural Electric Cooperative
CBLCOM	Cablecom Of Fargo
CENEX PL	Cenex Pipeline
CENT PWR ELEC	Central Power Electric Cooperative
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
FALK MNG	Falkirk Mining Company
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ WRD	McKenzie County Water Resource District
MCKNZ ELEC	McKenzie Electric Cooperative
MCLEOD	Mcleod USA
MCLN ELEC	Mclean Electric Cooperative
MCLN-SHRDN R WAT	Mclean-Sheridan Rural Water
MDU	Montana-dakota Utilities
MID-CONT CABLE	Mid-Continent Cable
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MRE LBTY TEL	Moore & Liberty Telephone
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MUNICIPAL	City Of '.....'
MUNICIPAL	City Water And Sewer
N CENT ELEC	North Central Electric Cooperative
N VALL W DIST	North Valley Water District
ND PKS & REC	North Dakota Parks And Recreation
ND TEL	North Dakota Telephone Company
NDDOT	North Dakota Department of Transportation
NDSU SOIL SCI DEPT	Ndsu Soil Science Department
NEMONT TEL	Nemont Telephone
NODAK R ELEC	Nodak Rural Electric Cooperative
NOON FRMS TEL	Noonan Farmers Telephone Company
NPR	Northern Plains Railroad
NSP	Northern States Power
NTH PRAIR RW	Northern Prairie Rural Water Association
NTHN BRDR PL	Northern Border Pipeline
NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated
NTHWSTRN REF	Northwestern Refinery Company
NW COMM	Northwest Communication Cooperation
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RAMSEY R SEW	Ramsey Rural Sewer Association
RAMSEY RW	Ramsey Rural Water Association
RAMSEY UTIL	Ramsey County Rural Utilities
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Coop
RRVW	Red River Valley & Western Railroad
RSR ELEC	R.S.R. Electric Cooperative
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STUT RWU	Stutsman Rural Water Users
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TRI-CNTY WU	Tri-County Water Users Incorporated
TRL CO RWU	Traill County Rural Water Users
UNTD TEL	United Telephone
UPPR SOUR WUA	Upper Souris Water Users Association
US SPRINT	U.S. Sprint
USAF MSL CABLE	U.S.A.F. Missile Cable
USW COMM	U.S. West Communications
VRNDRY ELEC	Verendrye Electric Cooperative
W RIV TEL	West River Telephone Incorporated
WEB	W. E. B. Water Development Association
WILLI RWA	Williams Rural Water Association
WILSTN BAS PL	Williston Basin Interstate Pipeline Company
WLSH RWD	Walsh Water Rural Water District
WOLVRTN TEL	Wolverton Telephone
XLENER	Xcel Energy
YSVR	Yellowstone Valley Railroad

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 3/15/13 and the original document is stored at the North Dakota Department of Transportation

Line Styles

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Sight Distance Triangle Line
- Small Hidden Object
- Dimension Leader
- Existing Ground
- Existing Topsoil (Cross Section View)
- Large Hidden Object
- Edge Drain
- Geotextile Fabric Type D
- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Geogrid
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Geotextile Fabric Type R
- Geotextile Fabric Type R1
- Remove Line
- Geotextile Fabric Type RR
- Geotextile Fabric Type S
- Floating Silt Curtain
- Existing Telephone Line
- Existing TV Line
- Existing Assumed Ground (Not Surveyed)
- Tentative Ground Line
- Existing Water or Steam Line
- Existing Under Drain
- Under Drain
- Wall
- Existing Slotted Drain
- Existing Cemetary Boundary
- Centerline Pavement Marking
- Barrier with Centerline Pavement Marking
- Barrier Pavement Marking
- Stripe 4 IN Dotted Extension White
- Stripe 8 IN Dotted Extension White
- Stripe 8 IN Lane Drop
- Wetland Mitigation
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Easement
- Existing Concrete
- Existing Easement
- Existing Gravel Surface
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Riprap
- Existing Underground Vault or Lift Station
- Tangent Line
- Hidden Object
- Existing Dirt Surface
- Existing Conduit
- Topsoil Profile
- Existing Conductor
- Conductor
- Fiber Optic
- Existing Loop Detector
- Subgrade, Subcut or Ditch Grade
- Existing Asphalt Surface
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar
- Existing Tie Point Line
- Existing State or International Line
- Existing Quarter Section Line
- Existing County
- Existing Section Line
- Existing Township
- Existing Railroad Centerline
- Centerline
- Existing Centerline
- Supplemental Contour
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Failure Line
- Existing Conditions
- Existing Ground (Details)
- Existing Sixteenth Section Line
- Existing Right of Way Not State Owned
- Phantom Object
- Centerline Main
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Excavation Limits
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

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

Line Styles

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

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Symbols

D-20-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

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Symbols

D-20-31

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
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DATE	CHANGE

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Symbols

D-20-32

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

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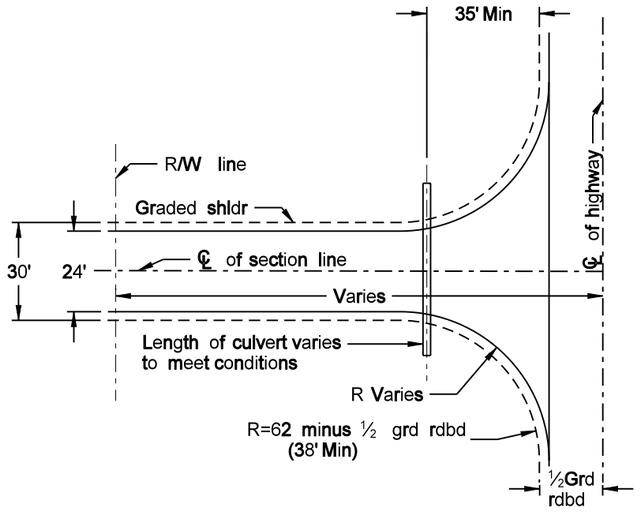
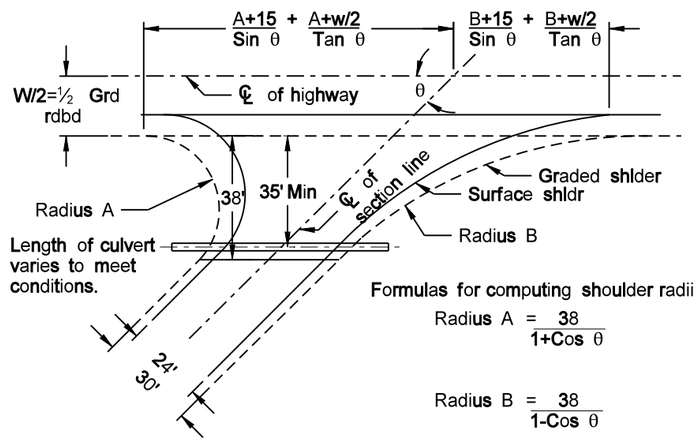
SECTION LINE & PRIVATE DRIVE APPROACHES (RURAL)



PLAN VIEW SECTION LINE APPROACH (WITHOUT SKEW)

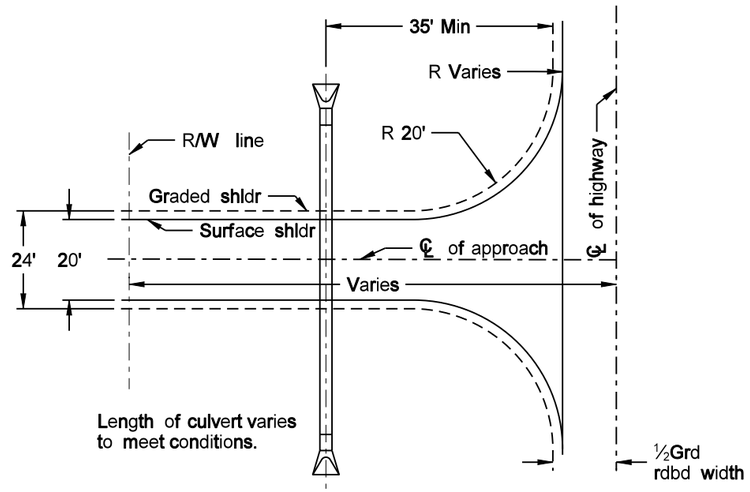


Formulas for computing shoulder radii

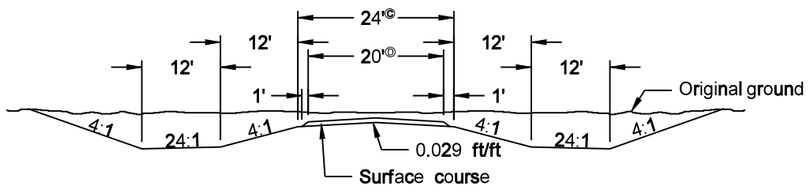
$$\text{Radius A} = \frac{38}{1+\cos\theta}$$

$$\text{Radius B} = \frac{38}{1-\cos\theta}$$

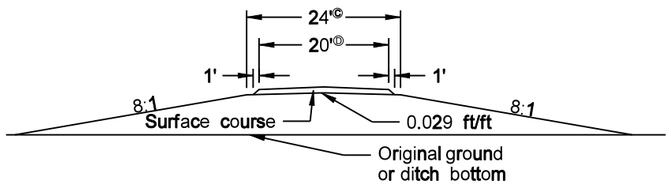
PLAN VIEW SECTION LINE APPROACH (SKEWED)



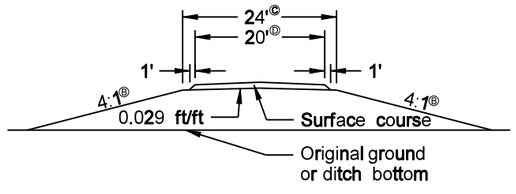
PLAN VIEW PRIVATE DRIVE APPROACH



SECTION A-A



SECTION B-B



SECTION C-C

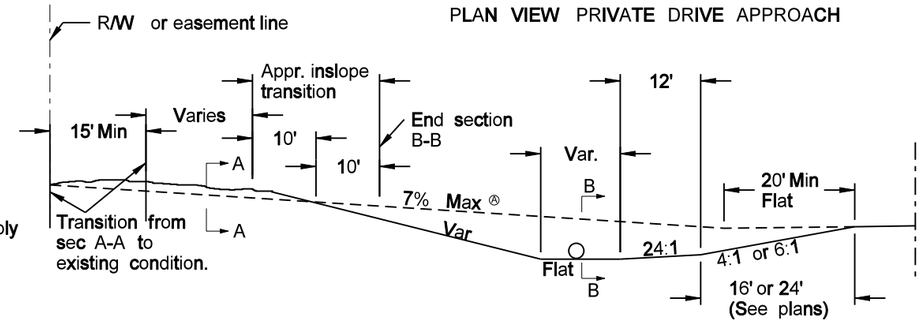
NOTES:

1. Dimensions shown for surfacing are for aggregate surface course or bituminous surface constructed with grading contract.
2. Approach grades and typical sections apply to both private drives and section line approaches.
3. Pipes shall be installed per Manufacturer's recommendations. Deflection testing may be performed at the discretion of the Engineer.

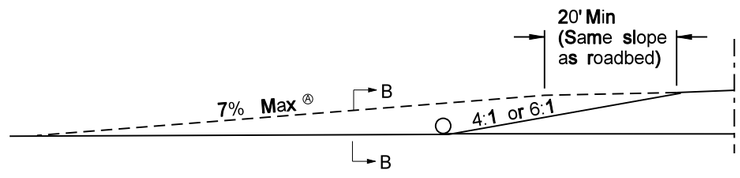
FOOT NOTES

Ⓐ 10% Max on field drives
Ⓑ 3:1 Slope - 20' to 30' fill
2:1 Slope on fills over 30'
Ⓒ 30' on sec. line approaches
Ⓓ 24' on sec line approaches

APPROACH GRADE ON FILL SECTION OVER 12 FEET



APPROACH GRADE ON CUT SECTION



APPROACH GRADE ON FILL SECTION 12 FEET OR LESS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
06-03-03	Revised roadway crown
12-01-04	PE Stamp added
04-05-06	General revisions
12-08-08	Format revisions/added Note 3

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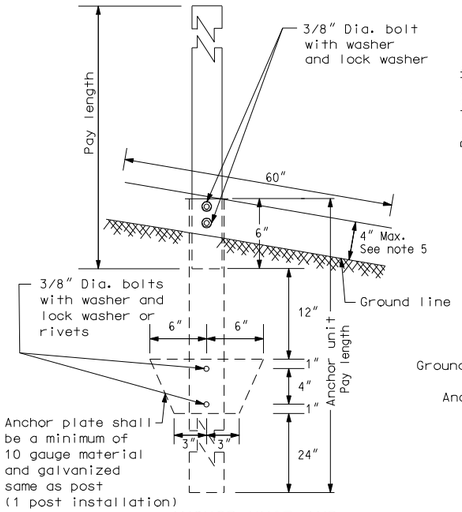
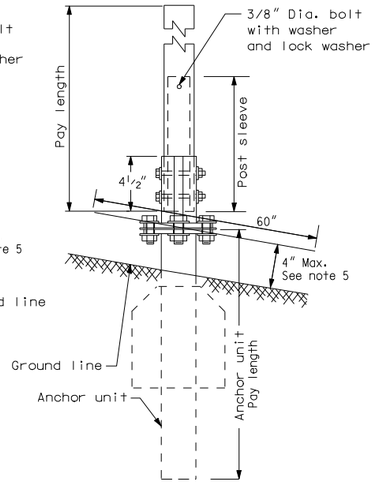
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

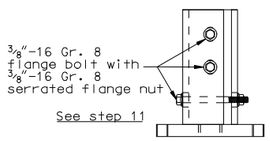
D-704-7

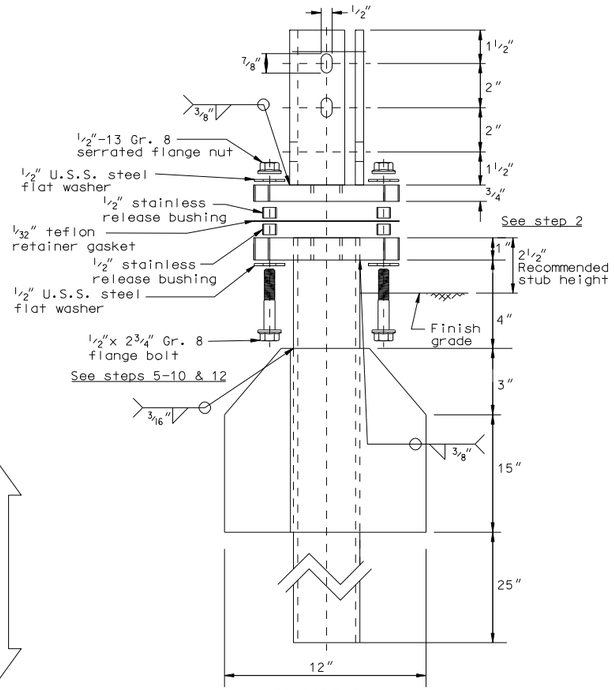


ANCHOR UNIT AND POST ASSEMBLY

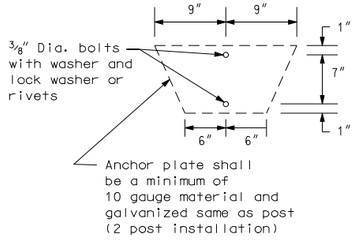


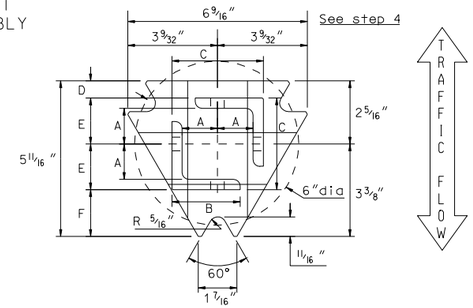
SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY





MULTI-DIRECTIONAL SLIP BASE ASSEMBLY



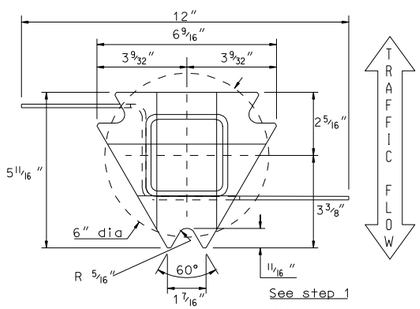


TOP POST RECEIVER

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

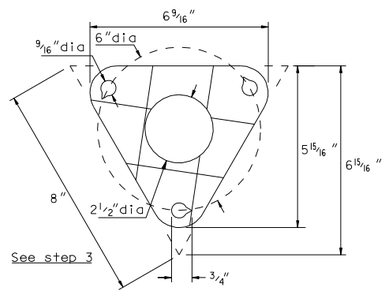
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
$2\frac{3}{16}$" x 10 Ga. Square Post	$1\frac{9}{64}$"	$2\frac{1}{2}$"	$3\frac{1}{32}$"	$\frac{25}{32}$"	$1\frac{33}{64}$"	$1\frac{7}{8}$"
$2\frac{1}{2}$" x 10 Ga. Square Post	$1\frac{9}{32}$"	$2\frac{1}{2}$"	$3\frac{5}{16}$"	$\frac{5}{8}$"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

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



BOTTOM SOIL STUB

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



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon

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

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

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

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

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

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

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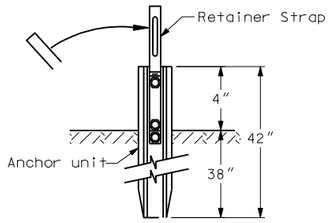
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

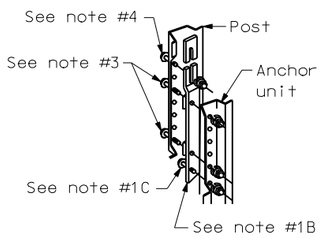
FLANGED CHANNEL



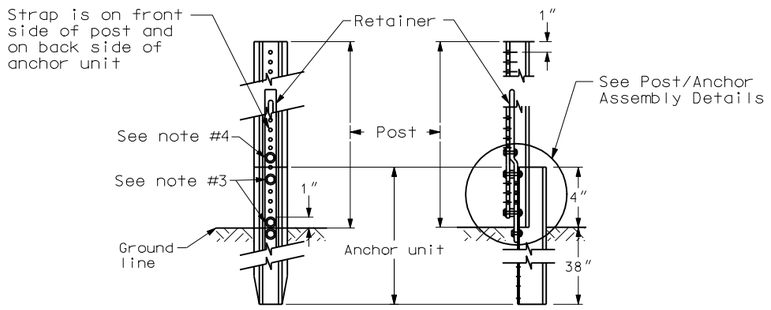
Anchor Unit &
Strap Assembly Detail

STEPS OF INSTALLATION

1. A) Drive anchor unit to within 12″ of ground level.
   B) Proper assembly established by lining up the top 3/4″ slot of retainer spacer strap with top hole of anchor unit.
   C) Assemble strap to back of anchor unit using 3/8″-16 UNC x 2.0″ long bolt, lock washer and nut.
   D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4″ dimension.
   B) Rotate strap to vertical position.
3. A) Place 3/8″-16 UNC x 2″ bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4″ slot in the strap).
   B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8″-16 UNC x 2″ long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap and sign post at the bolts have full contact across the entire width.

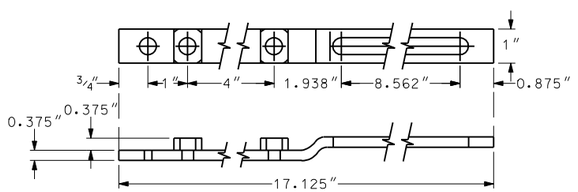


Post/Anchor
Assembly Details



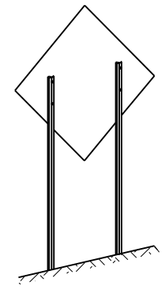
Front View Side View

Sign Post Assembly Detail

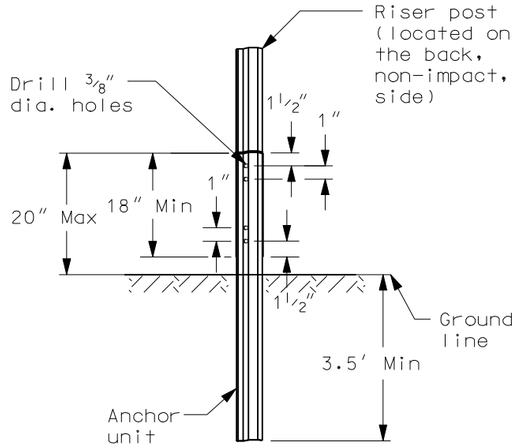


Retainer/Spacer Strap Detail

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



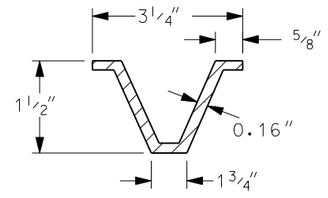
Typical
Installation



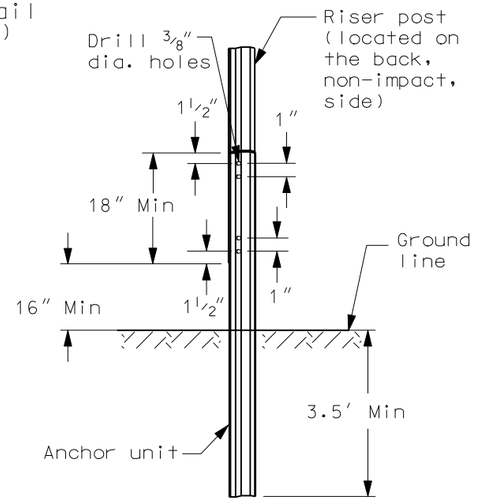
U-Channel Splice
Option 1

3 LB/FT U POSTS

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



U-Post Detail
(3 lb/ft)



U-Channel Splice
Option 2

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

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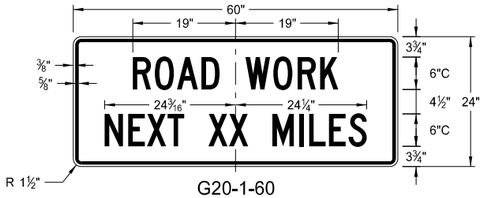
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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Background: orange

G20-4b-36
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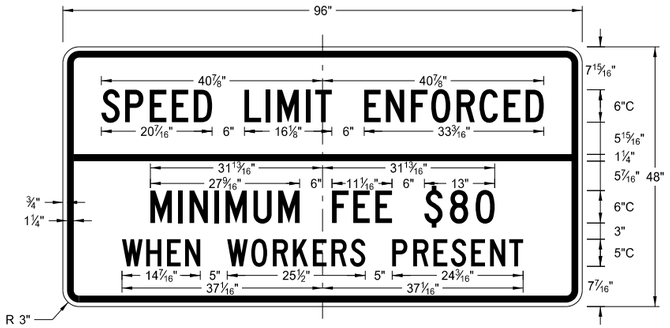
Background; orange



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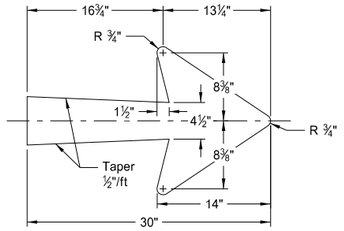
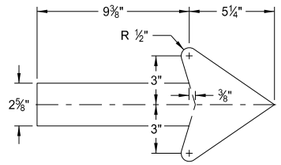
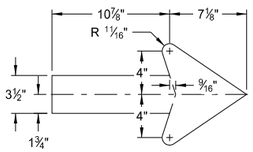


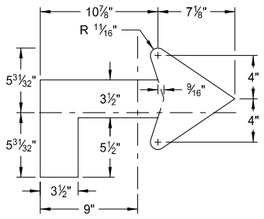
E5-1-48



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



M4-9(L or R)-30
Right or Left



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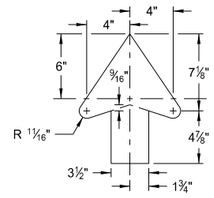
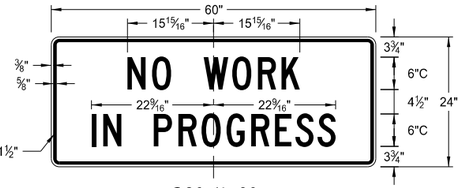
Advanced Right or Left



M4-9-30
Straight



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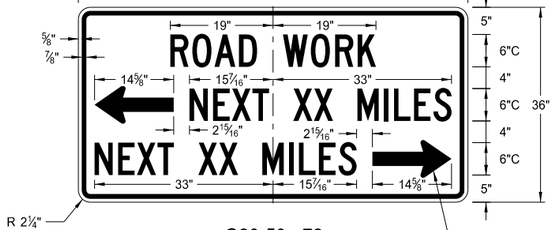

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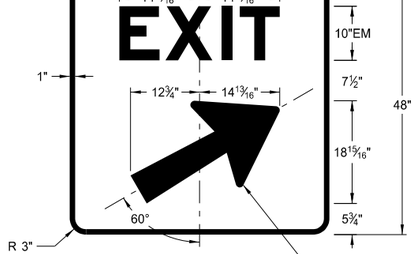

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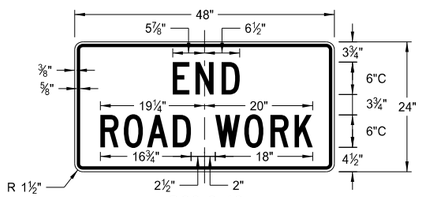

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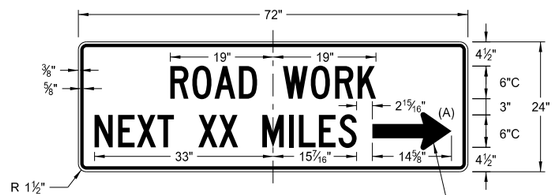

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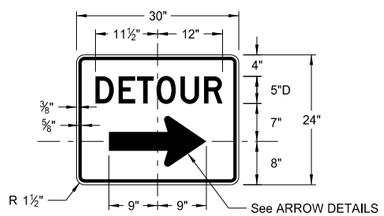

M4-9(L or R)-30 &
M4-9-30
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Background: orange

ARROW DETAILS

NOTES:

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

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

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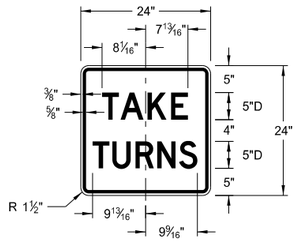
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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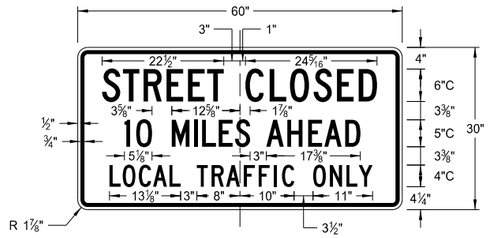

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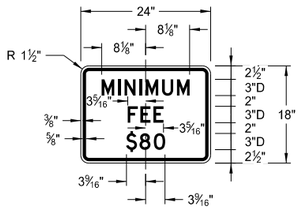

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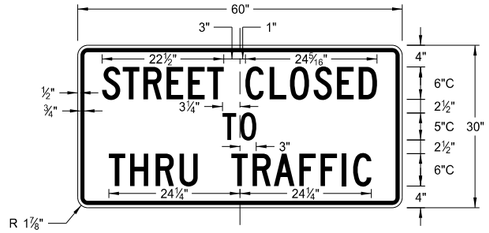

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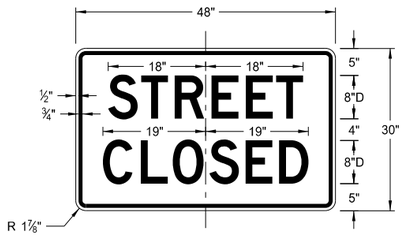

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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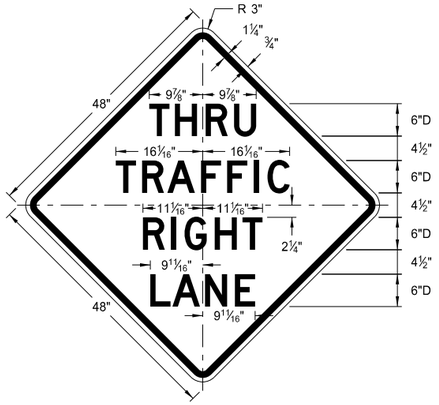
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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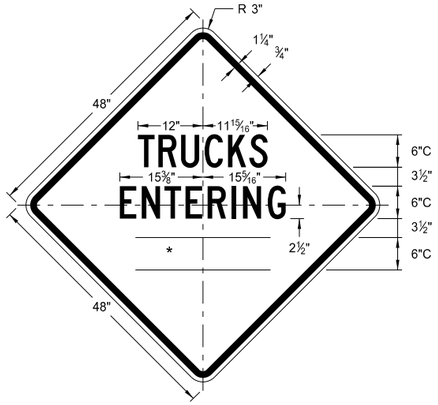

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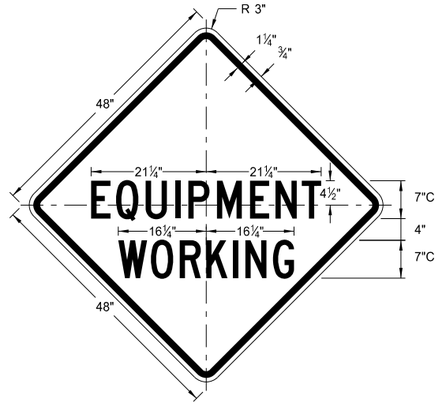

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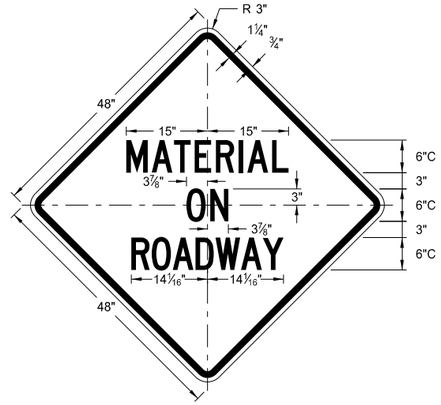
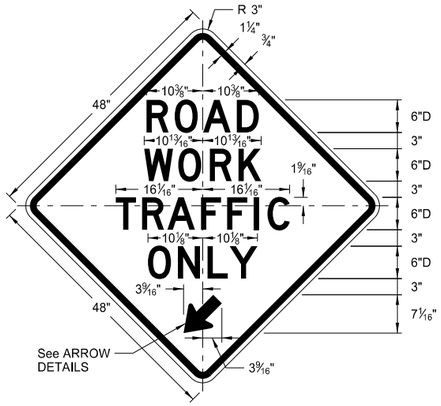


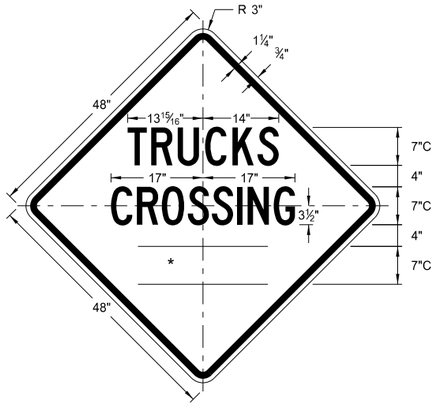
W21-51-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES

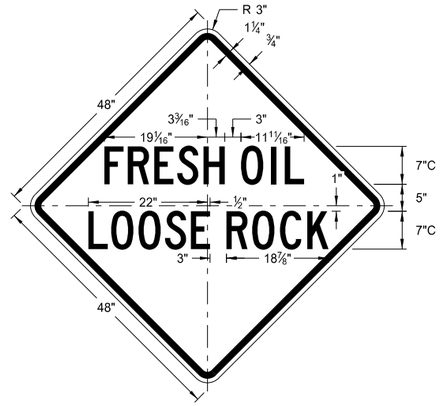


W5-9-48
Legend: black (non-refl)
Background: orange



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

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



W22-8-48
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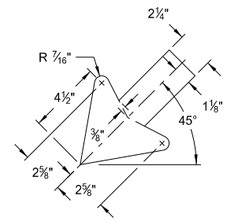
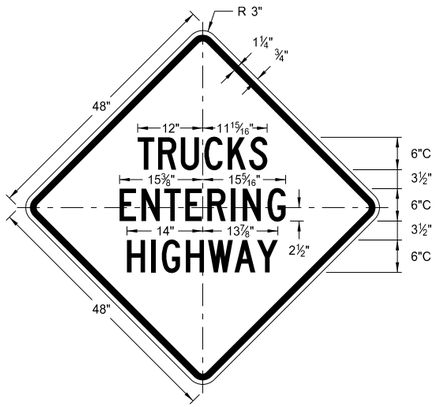
Background: orange

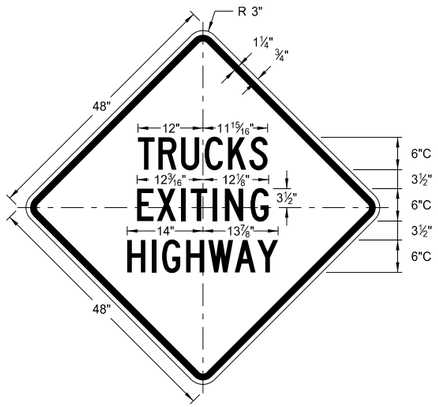


W5-9-48

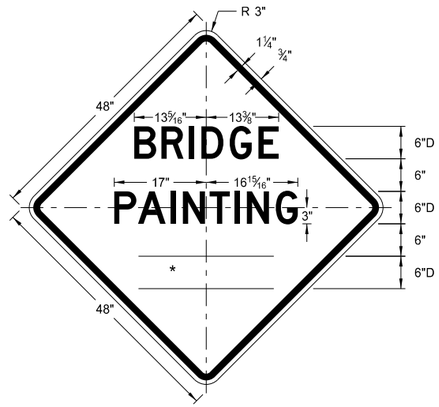
ARROW DETAILS



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



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

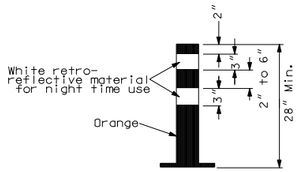


W21-50-48
Legend: black (non-refl)
Background: orange

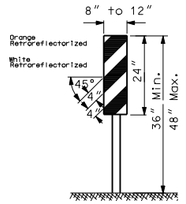
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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

BARRICADE DETAILS AND CHANNELIZING DEVICES



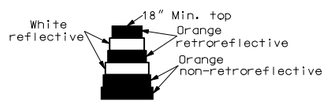
TUBULAR MARKER



VERTICAL PANEL

(Retroreflective sheeting shall be placed on both sides)

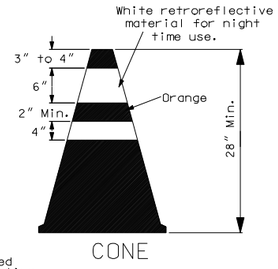
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"



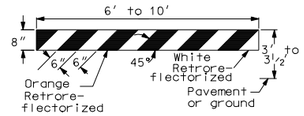
DELINEATOR DRUM

36" Min. height

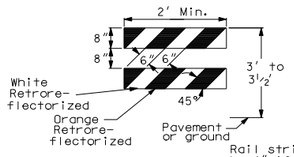
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflectorized sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall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



CONE

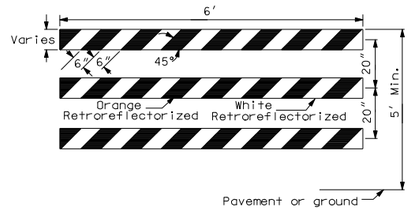


TYPE I BARRICADE



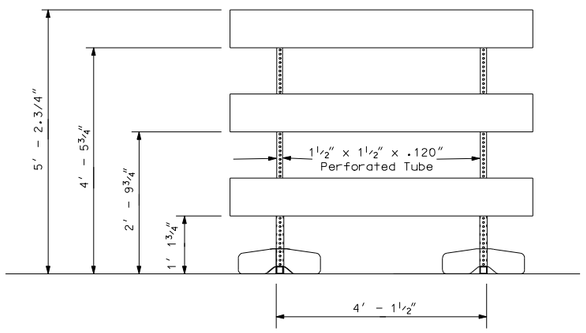
Rail stripe width shall be 4" if barricade length is less than 36".

TYPE II BARRICADE

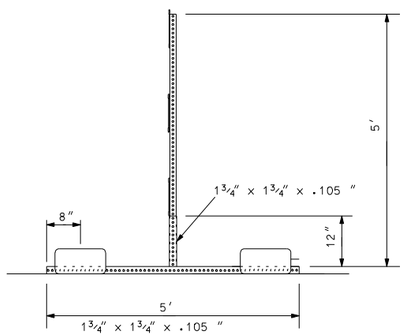


TYPE III BARRICADE

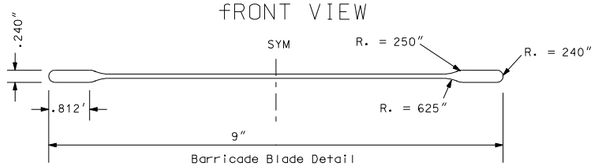
BARRICADES:
Number of retroreflectorized rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III- 6 (Three in each direction)



FRONT VIEW



END VIEW



Barricade Blade Detail

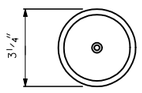
Ballast = 45lb sandbag at the end of each leg.

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

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

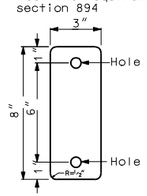
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

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



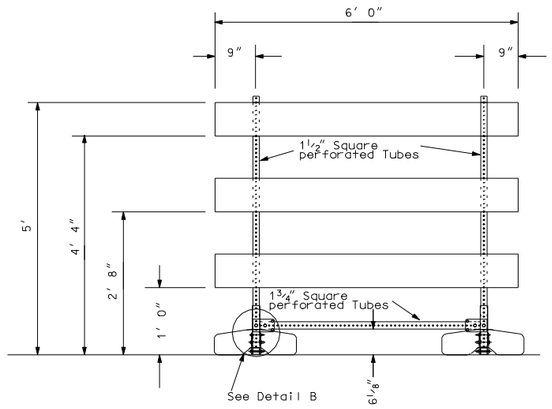
ACRYLIC PLASTIC REFLECTOR

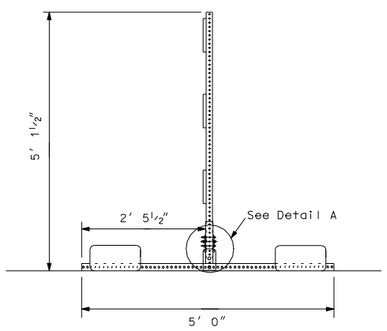
Delineator reflector shall meet the requirements of section 894

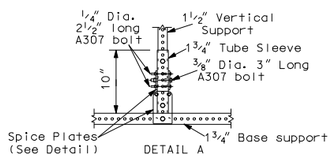


DELINEATOR REFLECTOR

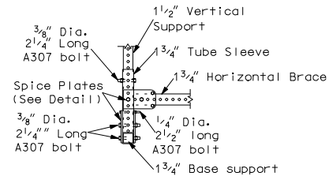
3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retroreflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



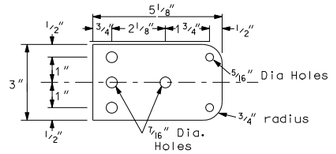




DETAIL A



DETAIL B



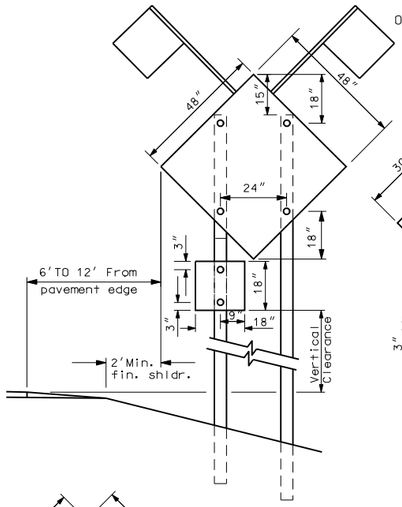
SPLICE PLATE

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

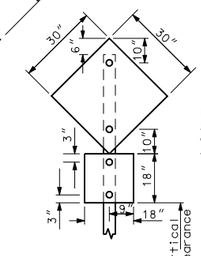
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details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

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

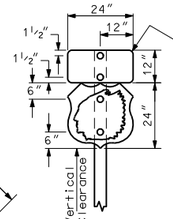
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



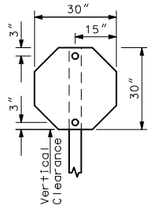
POST MOUNTING
48"x48" Signs



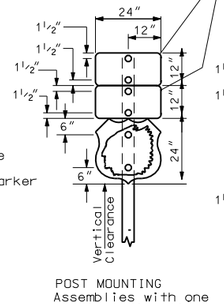
POST MOUNTING
30"x30" Signs



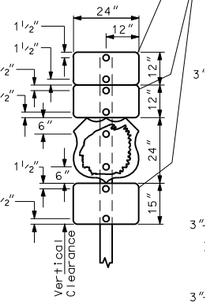
POST MOUNTING
Assemblies with one cardinal direction sign & one route marker



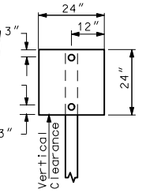
POST MOUNTING
Sign R1-1-30



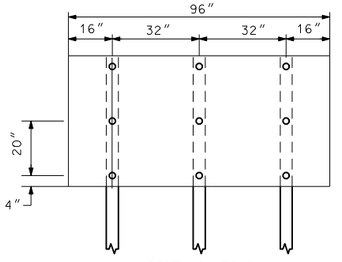
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign & one route marker



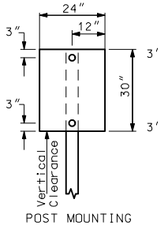
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign, one route marker & one directional arrow.



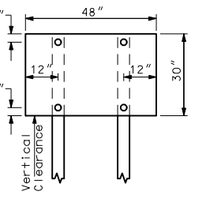
POST MOUNTING
24"x24" Signs



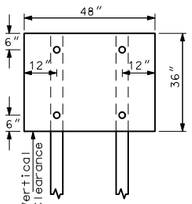
POST MOUNTING
48"x96" Signs



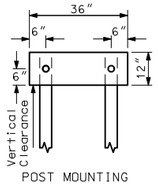
POST MOUNTING
24"x30" Signs



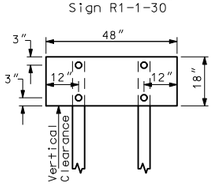
POST MOUNTING
48"x30" Signs



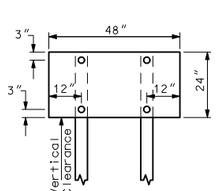
POST MOUNTING
48"x36" Signs



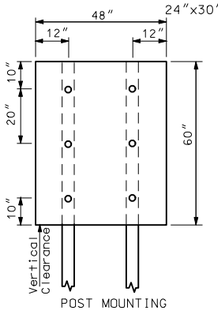
POST MOUNTING
36"x12" Signs



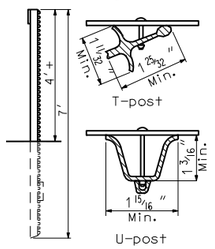
POST MOUNTING
48"x18" Signs



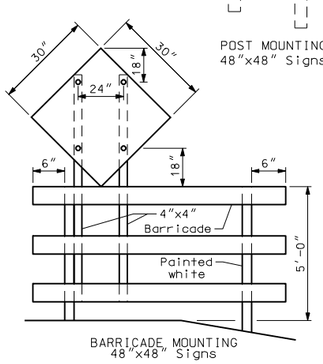
POST MOUNTING
48"x24" Signs



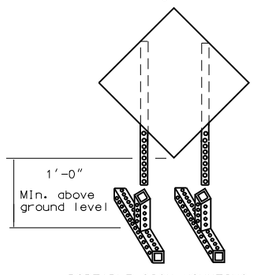
POST MOUNTING
48"x60" Signs



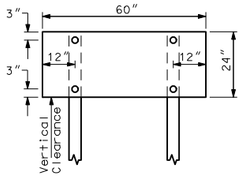
T-post
U-post
U-post
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS



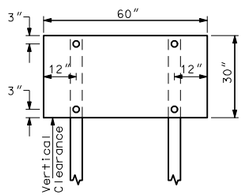
BARRICADE MOUNTING
48"x48" Signs



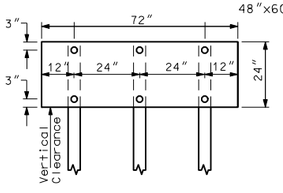
PORTABLE SIGN MOUNTING



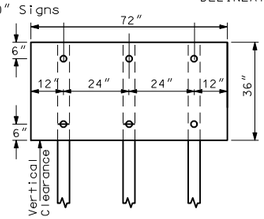
POST MOUNTING
60"x24" Signs



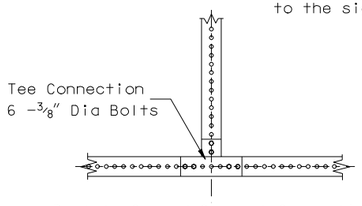
POST MOUNTING
60"x30" Signs



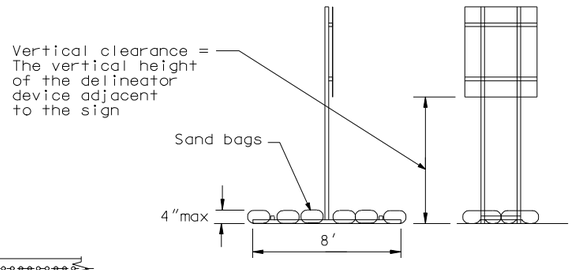
POST MOUNTING
72"x24" Signs



POST MOUNTING
72"x36" Signs

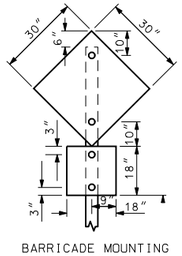


Post to Ground Support Connection

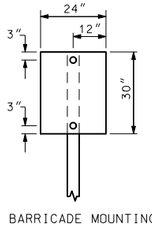


Post sizes shall be 2 1/4" perforated tube

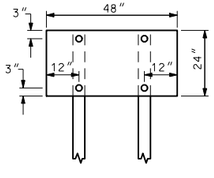
SKID MOUNTED SIGNS



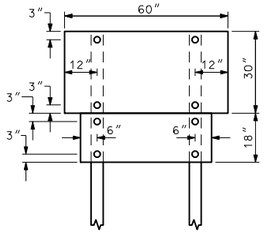
BARRICADE MOUNTING
30"x30" Signs



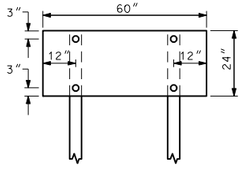
BARRICADE MOUNTING
24"x30" Signs



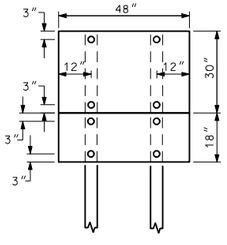
BARRICADE MOUNTING
48"x24" Signs



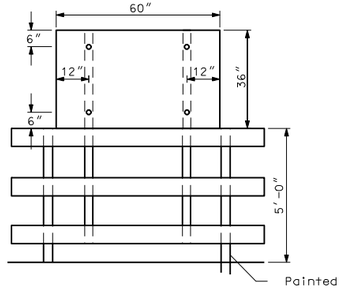
BARRICADE MOUNTING
60"x30" & 48"x18" Signs



BARRICADE MOUNTING
60"x24" Signs



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



BARRICADE MOUNTING
G20-1-60 Signs

NOTES:

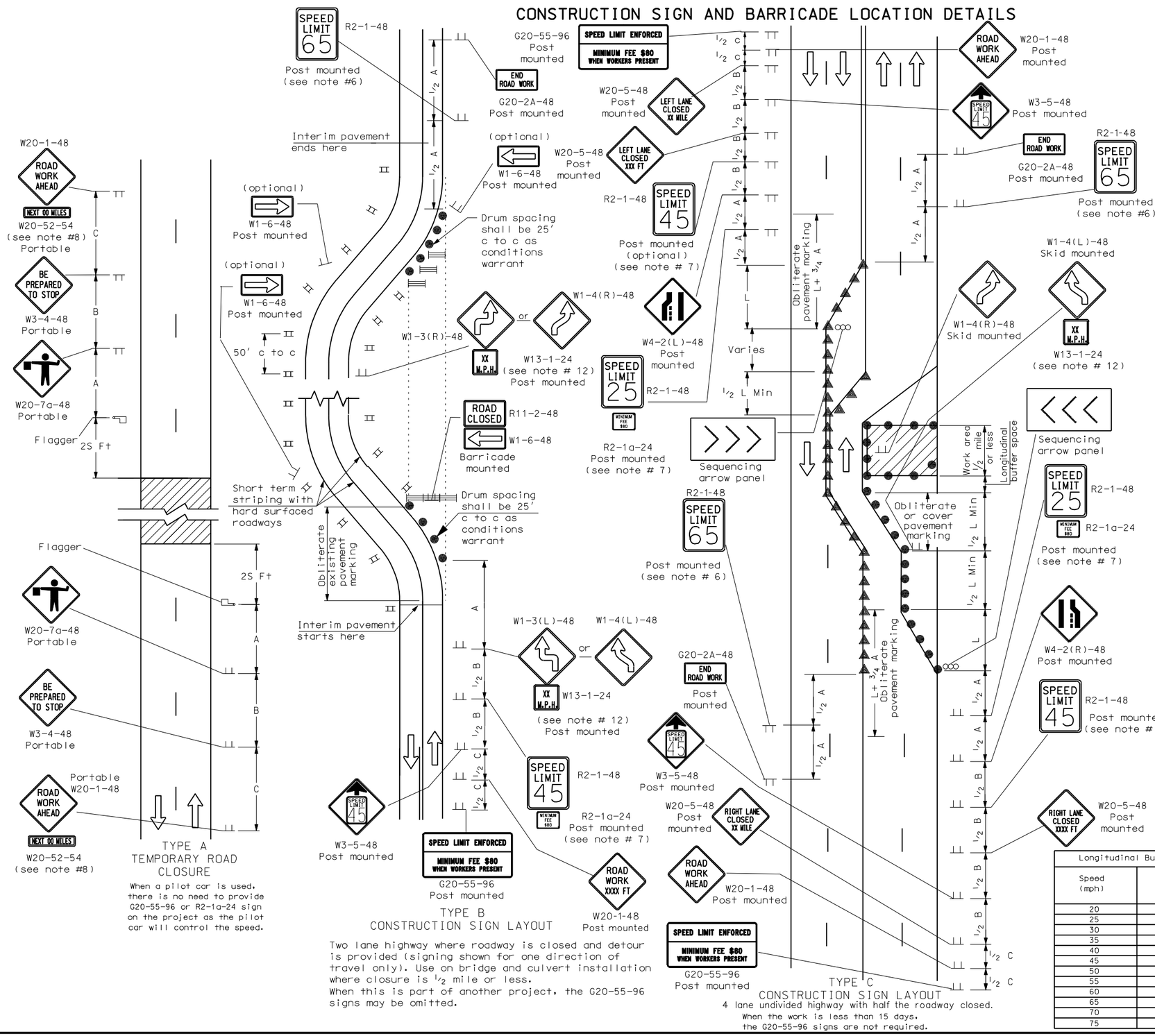
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and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

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

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

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-15



Notes

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

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

KEY

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

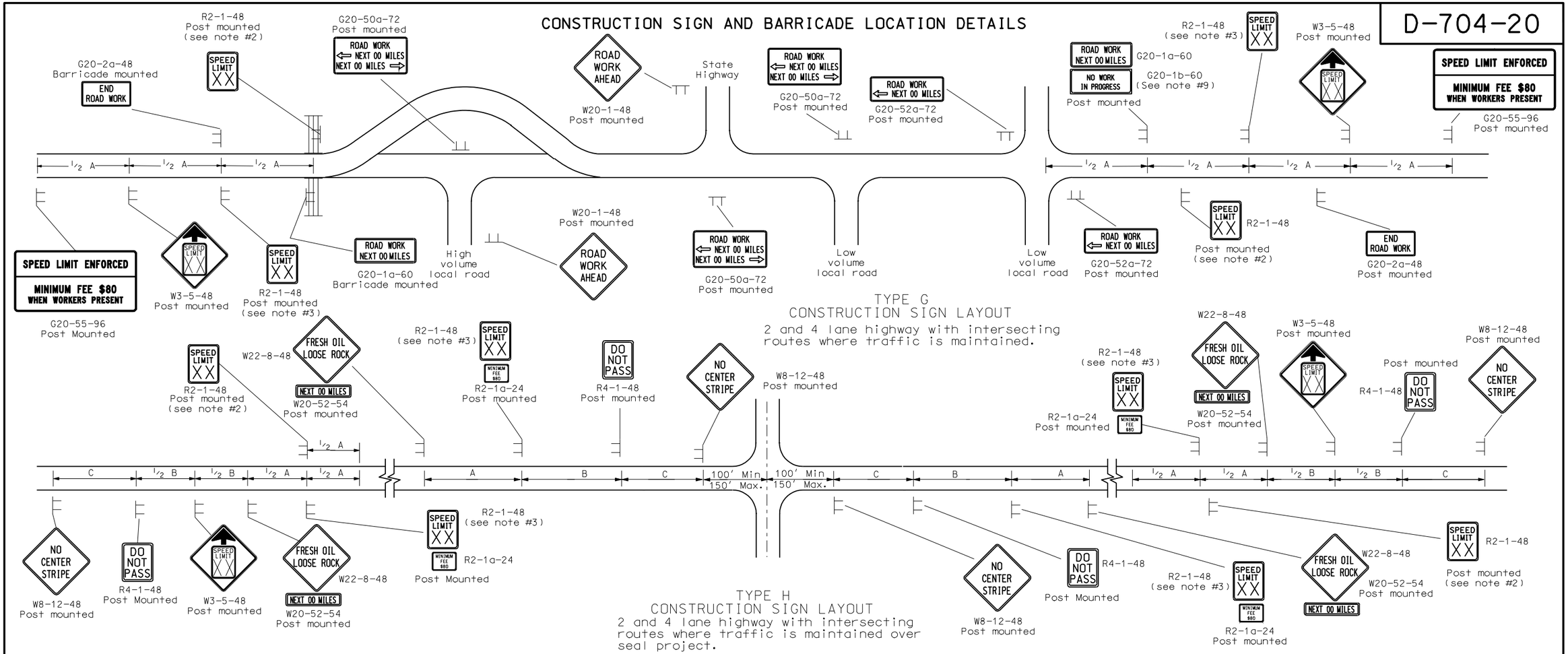
REVISIONS

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

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

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-20



1. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
2. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Sign no. R2-1-48, R2-1a-24, R4-1-48, W22-8-48, W20-52-54, and W8-12-48 shall be placed just after all important intersections and every five miles in either direction. Sign no W8-12-48 shall be placed when traffic volumes are 750 ADT or less. No short term markings are placed when this condition exists.
7. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
8. Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
9. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
10. The layouts show the signs needed before work begins. The requirements at the actual work areas will require the use of other standards. If the speed limit is reduced in the work areas, the speed limit signs shall have the R2-1a-24 sign placed below.

KEY

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

REVISIONS

DATE	CHANGE
08-15-96	Revise flag note
10-01-99	General revisions
10-18-01	Added note 8 & 9
07-19-02	Rev. end road work & speed limit sign
07-25-03	Rev. R2-1a & W20-1
04-01-04	Rev. fee sign & warning sign spacing Rev note 3, add note 10
12-01-04	PE Stamp added
06-29-05	Added W3-5 to Type H and Type G. Rev. Adv. Warning Table. Rev. Note 3
04-05-06	Corrected sign W3-5

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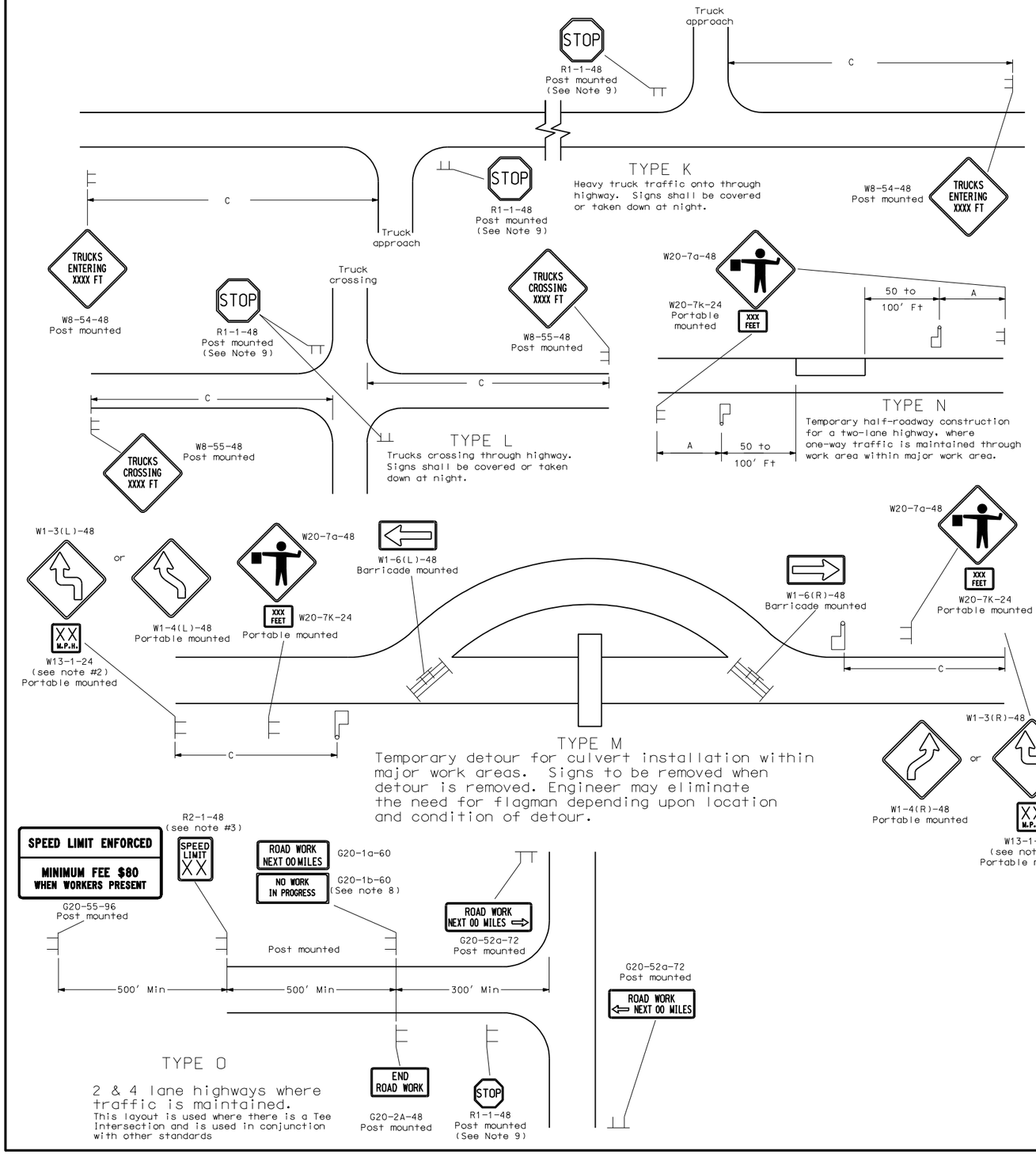
CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

D-704-22



Notes

1. Barricade shown to be placed on roadway shall be on a moveable assembly. on the top of the top barricade bar. Sign shown to be placed on the roadway Sign to be mounted on barricades shall be mounted with the sign bottom shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}$ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.

KEY

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

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

REVISIONS

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

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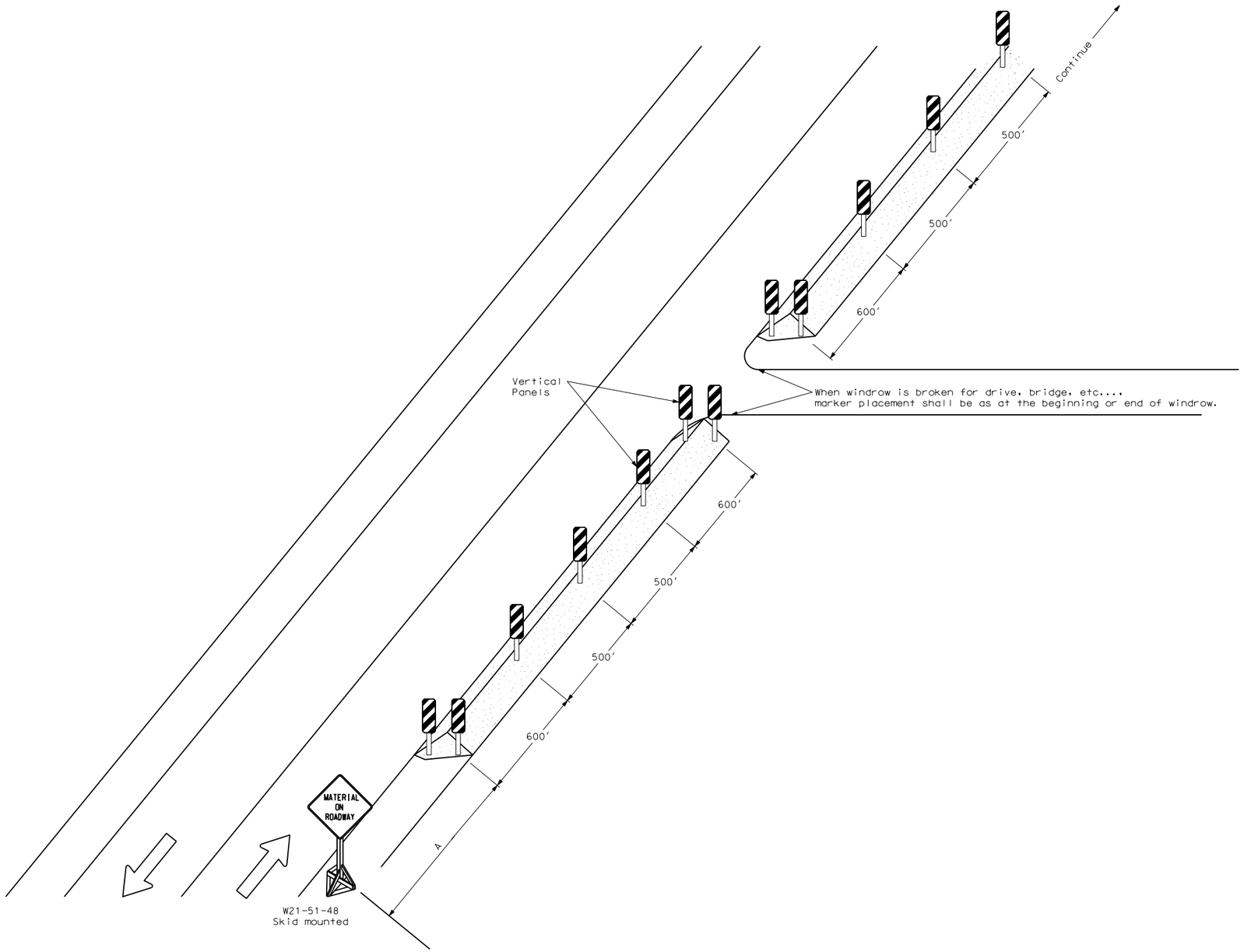
WINDROW MARKING

D-704-30

Notes

The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.



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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

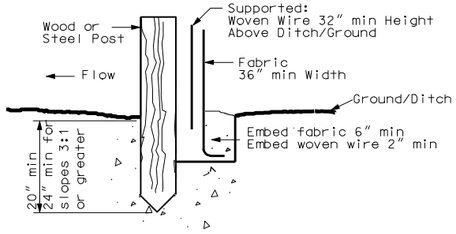
REVISIONS

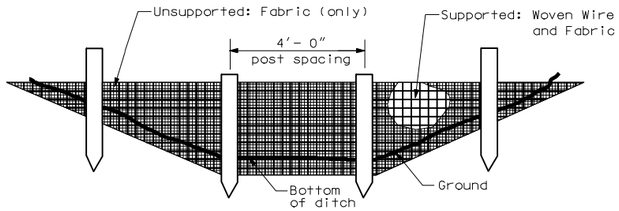
DATE	CHANGE
05-01-92	General revisions
10-01-99	General revisions
12-01-04	PE stamp added
06-29-05	Rev. Adv. Warning Table

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

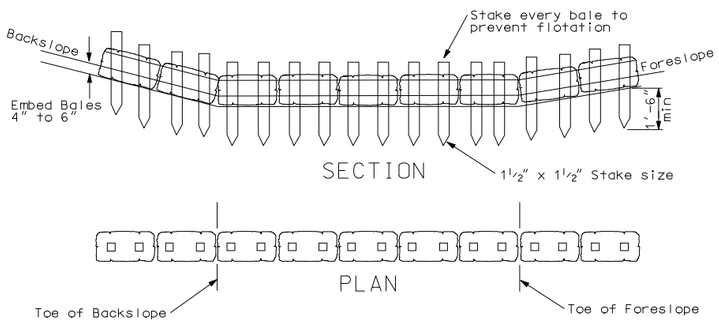
EROSION AND SILTATION CONTROLS

D-708-2

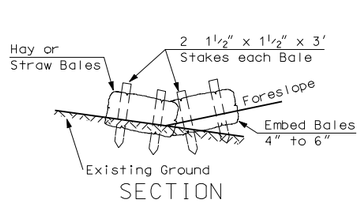


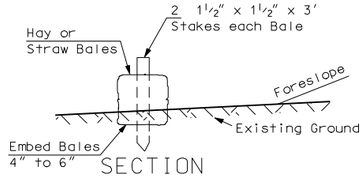


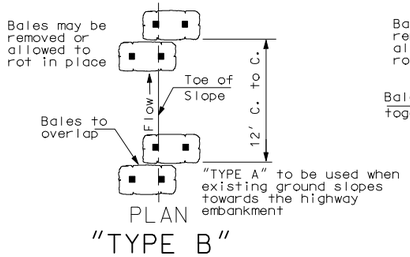
SILT FENCE
Supported and Unsupported



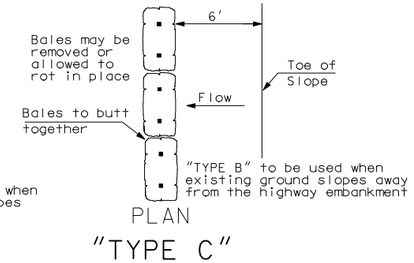
"TYPE A"







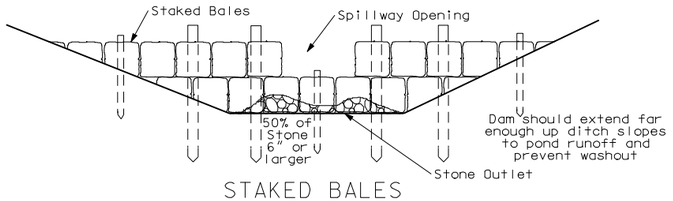
"TYPE B"



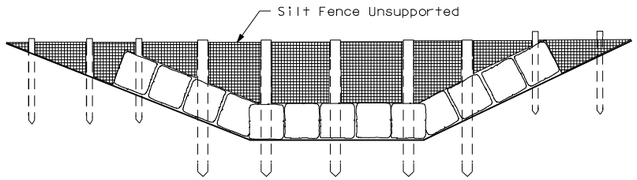
"TYPE A" to be used when existing ground slopes towards the highway embankment

"TYPE C"

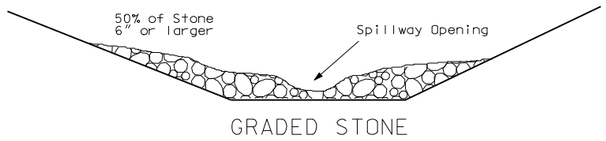
BALED HAY OR STRAW EROSION CHECKS



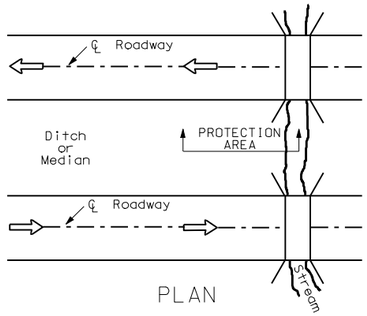
STAKED BALES



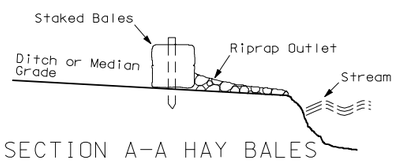
FENCE-BACKED BALES



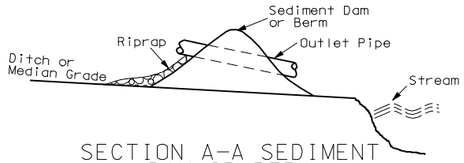
DITCH EROSION DAMS



PLAN

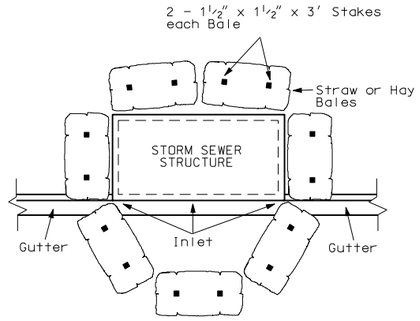


SECTION A-A HAY BALES

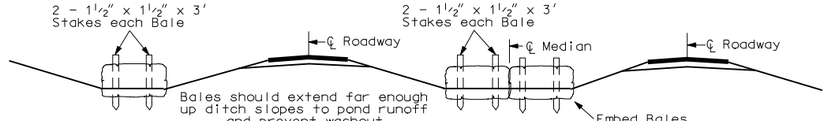


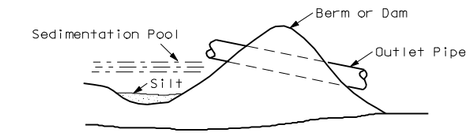
SECTION A-A SEDIMENT DAM OR BERM

MEDIAN OR DITCH PROTECTION AT STREAM CROSSING

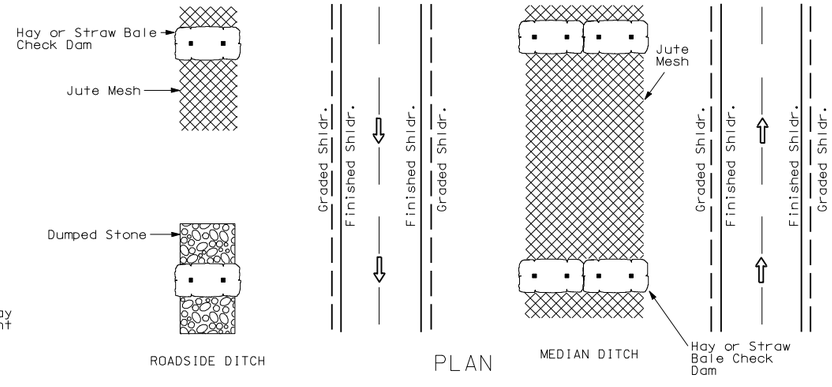


STORM SEWER INLET EROSION & SILTATION BARRIER





SMALL SEDIMENT DAM OR BERM



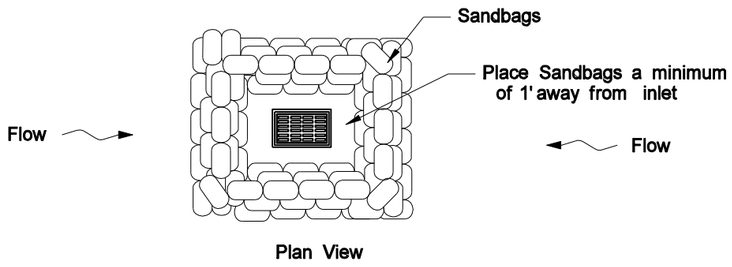
STONE, JUTE, MESH, OR SOD DITCH & MEDIAN EROSION CONTROL

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

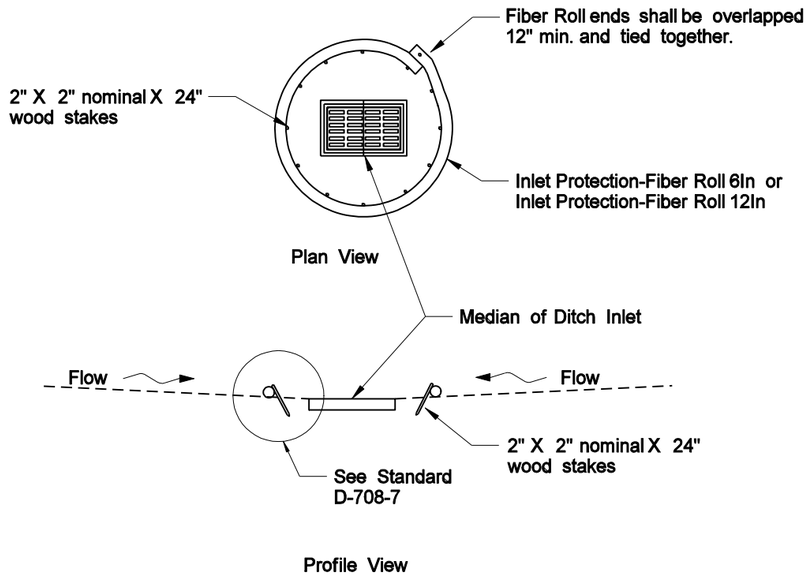
This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

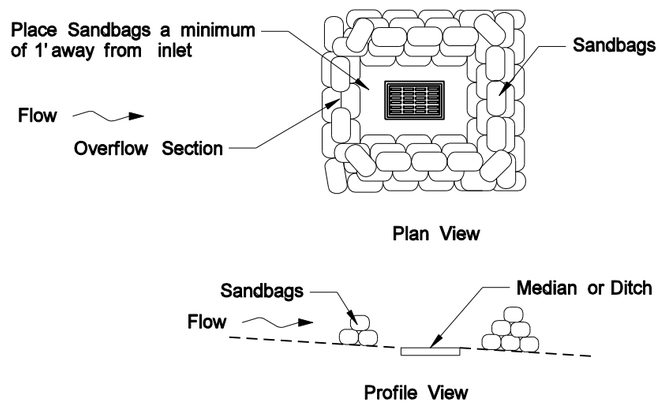
EROSION CONTROL
MEDIAN OR DITCH INLET PROTECTION

D-708-6

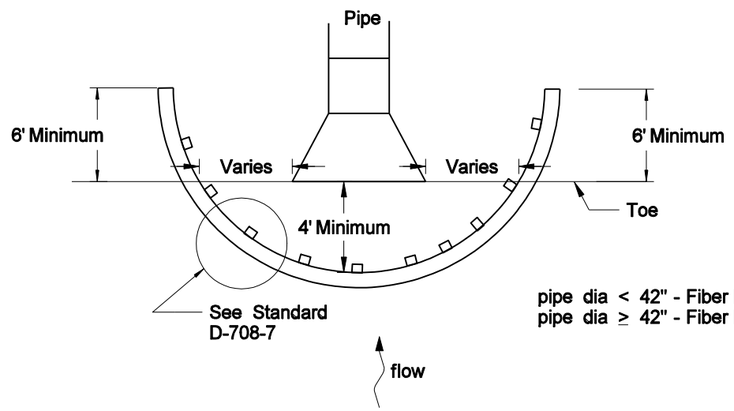


SANDBAG PROTECTION
LOW POINT





SANDBAG PROTECTION
ON SLOPE



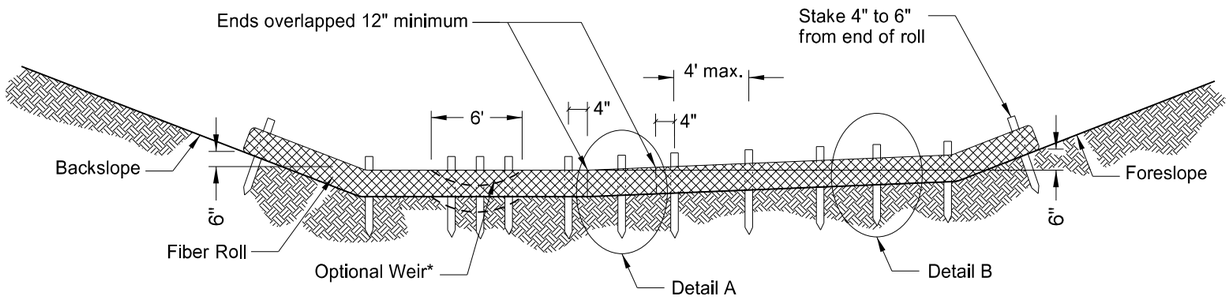
pipe dia < 42" - Fiber Rolls 12In
pipe dia ≥ 42" - Fiber Rolls 20In

FIBER ROLL PROTECTION
INLET OF PIPE END

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-13-06	
REVISIONS	
DATE	CHANGE
12-14-07	Added 12" Fiber roll overlap, option of butting fiber roll ends removed.

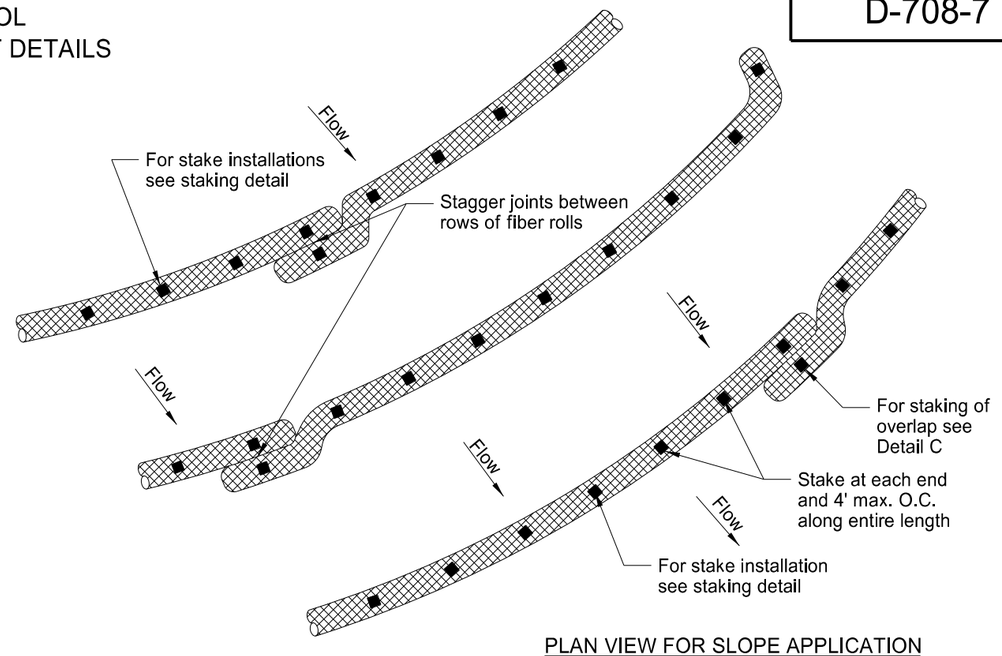
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 12/14/07 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

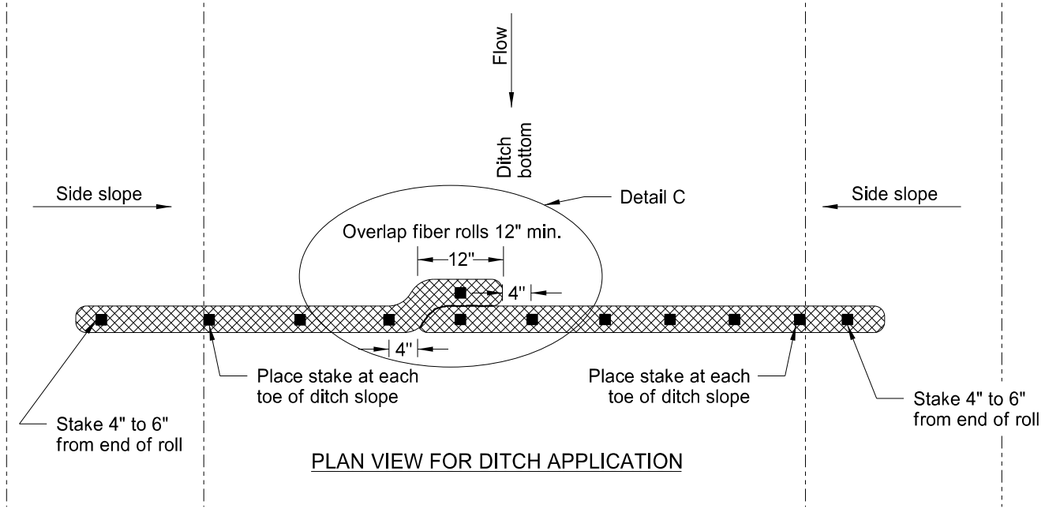


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

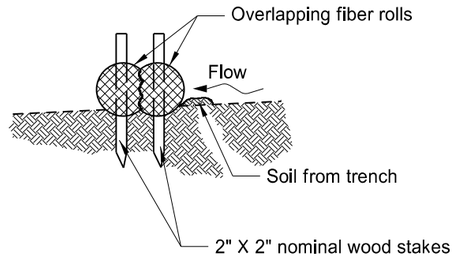
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

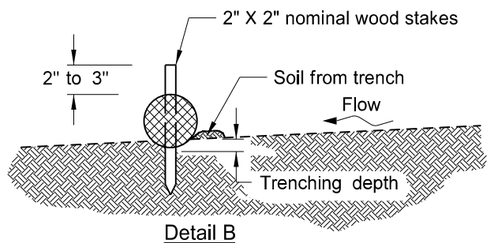


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

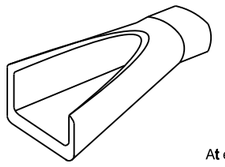
NOTE: Runoff must not be allowed to run under or around roll.

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

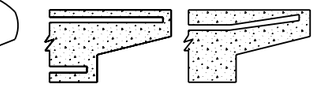
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/10/13 and the original document is stored at the North Dakota Department of Transportation

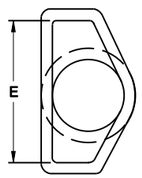
REINFORCED CONCRETE PIPE CULVERT AND END SECTIONS

D-714-01

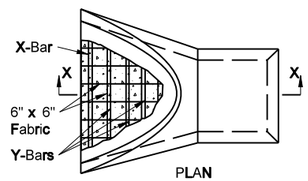


PERSPECTIVE

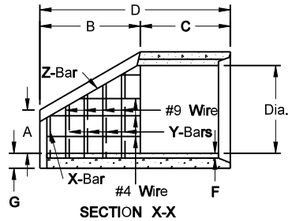




END VIEW



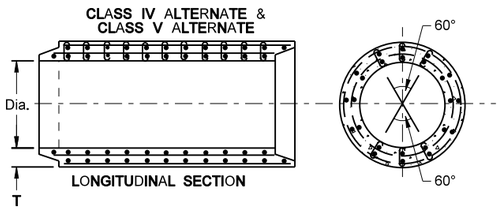
PLAN

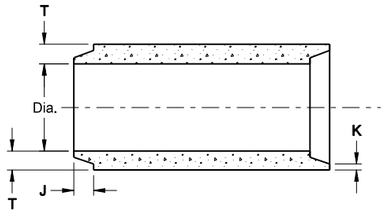


SECTION X-X
END SECTION
Equivalent to Class III Pipe

END SECTION

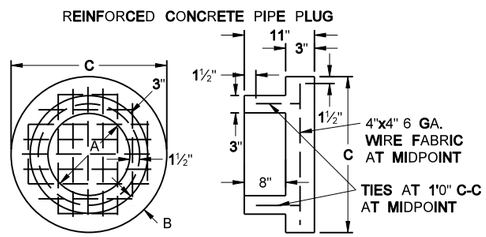
TERMINAL DIMENSIONS								REINFORCING STEEL		
DIA	A	B	C	D	E	F	G	X	Y	Z
12	0'-4"	2'-0"	4'-0⅛"	6'-0⅛"	2'-0"	2"	2"	2-1/4" x 2'	6-1/4"x 2' @ 6"c.c.	2-1/4"x 4'
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"	2¼"	2-1/4" x 2½'	6-1/4"x 2½' @ 6"c.c.	2-3/8"x 4'
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"	2½"	2-3/8" x 3'	6-1/4"x 3' @ 6"c.c.	2-3/8"x 4'
21	0'-9"	3'-0"	3'-1½"	6'-1½"	3'-6"	2¾"	2¾"	2-3/8" x 3½'	8-1/4"x 3½' @ 6"c.c.	2-3/8"x 5'
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"	3"	2-1/2" x 4'	8-3/8"x 4' @ 8"c.c.	2-3/8"x 6'
27	0'-10½"	4'-1½"	2'-0"	6'-1½"	4'-6"	3¼"	3¼"	2-1/2 " x 5'	8-3/8"x 5' @ 9"c.c.	2-3/8"x 6'
30	1'-0"	4'-6"	1'-7½"	6'-1¾"	5'-0"	3½"	3½"	2-1/2 " x 5'	12-3/8"x 5' @ 8"c.c.	2-1/2"x 6'
36	1'-3"	5'-3"	2'-10¼"	8'-1¾"	6'-0"	4"	4"	2-1/2 " x 6'	12-3/8"x 6' @ 6"c.c.	2-1/2"x 8'
42	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	4½"	4½"	2-1/2" x 7'	12-1/2"x 7' @ 9"c.c.	2-1/2"x 8'
48	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	5"	5"	2-1/2" x 8'	16-1/2"x 8' @ 8"c.c.	2-1/2"x 8'
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"	5½"	2-1/2" x 8'	16-1/2"x 8' @ 7"c.c.	2-1/2"x 8'
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	6"	5"	2-1/2" x 9'	16-1/2"x 9' @ 6"c.c.	2-1/2"x 9'
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	6½"	5½"	2-1/2" x 9'	22-1/2"x 9' @ 6"c.c.	2-1/2"x 9'
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	7"	6"	2-1/2" x 10'	24-1/2"x 10' @ 6"c.c.	2-1/2"x 9'
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	7½"	6½"	2-1/2" x 10'	28-1/2"x 10' @ 6"c.c.	2-1/2"x 10'
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	8"	6½"	4-1/2" x 10'	28-1/2"x 10' @ 6"c.c.	4-1/2"x 10'
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	8½"	6½"	4-1/2" x 11'	28-1/2"x 11' @ 6"c.c.	4-1/2"x 10'



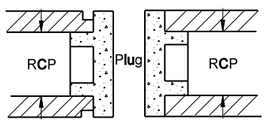


REINFORCED CONCRETE PIPE PLUG

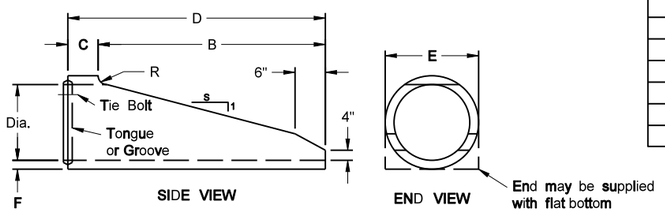
CONCRETE PIPE PLUG			
DIMENSIONS (in inches)			
PIPE DIAMETER	A	B	C
15	8	2.25	19.5
18	11	3.0	23.0
21	14	3.25	26.5
24	17	3.50	30.0
27	20	3.75	33.5
30	23	4.0	37.0
33	26	4.25	40.5
36	29	4.50	44.0
42	35	5.0	51.0
48	41	5.50	58.0



CONCRETE SHALL CONFORM TO STRENGTH REQUIREMENTS FOR REINFORCED CONCRETE PIPE CULVERTS, CL. II.



TRAVERSABLE END SECTION



SIDE VIEW

END VIEW

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-6"	15"	7'-3"	3'-8"	4"	3"	4

NOTES (Traversable End Section):

1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per class II RCP with double reinforcement in the upper 120° of the full barrel portion.

NOTES:

1. All reinforcement shall be electrically welded cold drawn steel wire fabric.
2. Circular reinforcement shall lap in accordance to AASHTO M170.
3. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
4. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
   66" to 108" (incl.) = not less than 6 feet
5. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
6. Welded steel wire fabric may be substituted for the reinforcing steel bars but must match the area of steel provided by the bars and the lap of the fabric must be in accordance with AASHTO specifications
7. All Reinforcing Steel shall meet AASHTO M170 requirements.

	CLASS IV ALTERNATE								CLASS V ALTERNATE						
	D-LOAD TO PRODUCE A 0.01 INCH CRACK														
	2000								3000						
	All Classifications of Round Concrete Pipe					3000							D-LOAD TO PRODUCE ULTIMATE LOAD						
						5000 P.S.I.							3750						
									Shear Steel							Shear Steel			
Internal Dia of pipe in inches	Cross-Sectional Water Area	Weight per lin. ft. Circ. Wall Std. Wall	Joint L End Groove Min./Max.	Joint K, Tongue Min.	Minimum Wall Thickness (T)	Inner Cage	Ellip Cage	Outer Cage	N	S	Ar	Height of Fill Normal Backfill		Inner Cage	Ellip Cage	Outer Cage	N	S	Ar	Height of Fill Normal Backfill
						Ai	Ae	Ao						Ai	Ae	Ao				
Dia	Sq. ft.	Lbs.	In.	In.	In.	Sq.in	Sq.in	Sq.in	No.	In.	Sq.in	Ft.		Sq.in	Sq.in	Sq.in	No.	In.	Sq.in	Ft.
12	0.79	92	1⅛-2⅜	¾	2															
15	1.23	127	1¼-2¼	⅞	2¼															
18	1.77	168	1⅜-2⅛	1	2½															
21	2.40	214	1⅜-3⅛	1⅛	2¾															
24	3.14	265	2¾-3¾	1⅛	3															
27	3.98	322	2⅛-4	1¼	3¼															
30	4.91	384	3¼-4¼	1¼	3½															
33	5.94	452	3¼-4¼	1½	3¾															
36	7.07	524	3¼-4¼	1½	4															
42	9.62	685	3¾-4¾	1¾	4½															
48	12.57	685	3⅛-4¾	1⅞	5									.66	.33	.50	8	4	.22	24-35
54	15.90	1070	4⅛-5¼	2	5½									.74	.37	.56	9	4	.22	24-35
60	19.63	1296	4½-5½	2¼	6	.54	.27	.41	7	6	.22	16-24		.82	.41	.62	7	6	.22	24-35
66	23.76	1542	5-6	2⅝	6½	.60	.30	.45	8	6	.22	16-24		.88	.44	.66	8	6	.22	24-35
72	28.27	1810	5⅛-6¾	2⅞	7	.64	.32	.48	8	6	.23	16-24		.96	.48	.72	8	6	.23	24-35
78	33.18	2098	6¼-7¼	2⅞	7½	.70	.35	.53	9	6	.25	16-24		1.04	.52	.78	9	6	.25	24-35
84	38.48	2410	5⅛-7¾	3⅛	8	.76	.38	.57	10	6	.28	16-24		1.12	.56	.84	10	6	.28	24-35
90	44.18	2793	6¾-8½	3⅛	8½	.82	.43	.62	11	6	.31	16-24		1.20	.65	.90	11	6	.31	24-35
96	50.27	3092	7-8¼	3½	9	.88	.46	.66	11	6	.34	16-24		1.32		.99	11	8	.34	24-35
102	56.75	3466	7-8¼	3½	9½	.94	.52	.71	12	6	.37	16-24		1.42		1.07	12	8	.37	24-35
108	63.62	3864	7½-8½	3¾	10	1.02	.57	.76	12	6	.40	16-24								

Ai, Ae, Ao = Minimum circumferential reinforcement required in square inches per lineal foot of pipe.
Ar = Minimum radial reinforcement required in square inches per square foot of pipe.
N = Minimum number of rows of radial reinforcement at top and bottom of pipe.
S = Maximum circumferential spacing of rows of radial reinforcing.

SEE STANDARD D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

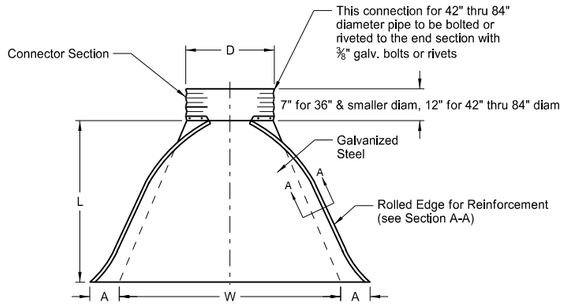
REVISIONS

DATE	CHANGE
11-05-86	Note added
07-17-87	Added pipe plug detail
09-01-88	Reinforcement cage
03-10-95	General revisions
12-23-98	Note # 6, 30° FES
12-01-04	PE stamp added
12-08-08	Major Revisions

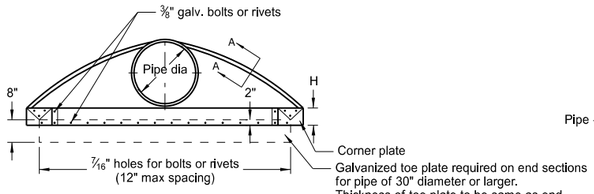
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 12/18/2008 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

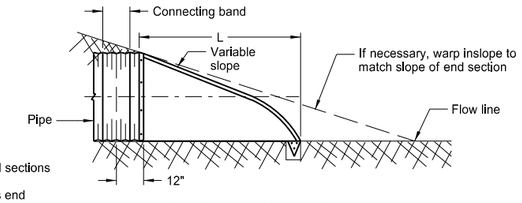
D-714-4



PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)

* * PIPE DIA. IN	GALV. THICK. IN	END SECTION DIMENSIONS A IN	B IN	H IN	L IN	W IN	APPROX. SLOPE RATE	BODY PIECE
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2½:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1¾:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1¼:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

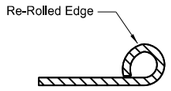
* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

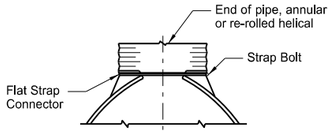
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

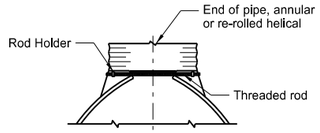
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



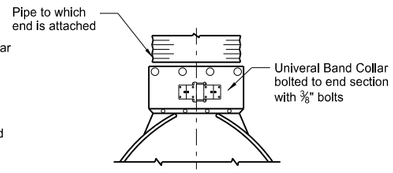
SECTION A-A



TYPE #1
For circular pipes with diameter 24" & smaller



TYPE #2
For circular pipes with diameter 30" through 36"

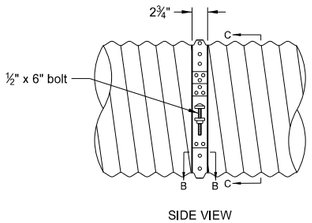


TYPE #3
For all pipe sizes

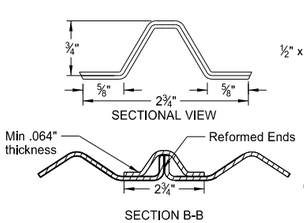
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"	.052"
		78" - 84"	10½"	.079"
	3" x 1" Rerolled End	48" - 120"	10½"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".



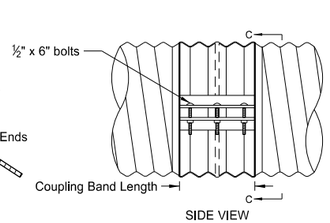
SIDE VIEW



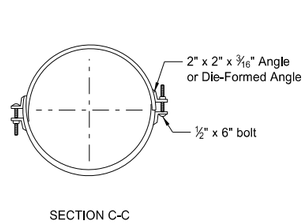
SECTIONAL VIEW

SECTION B-B

HAT BAND FOR FLANGED END PIPE

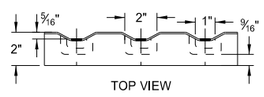


SIDE VIEW

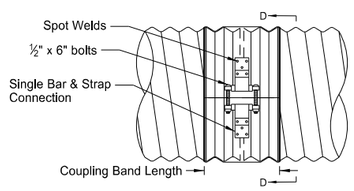


SECTION C-C
Angle Connection

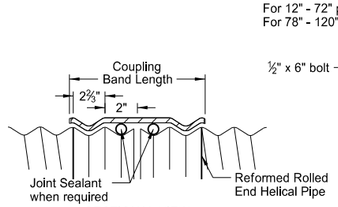
ANNULAR BAND



TOP VIEW
Die-Formed Angle Connector

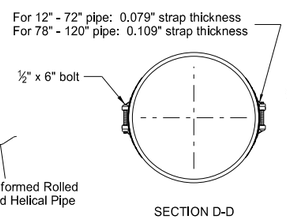


SIDE VIEW

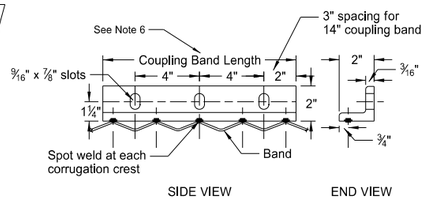


SECTIONAL VIEW

HUGGER COUPLING BAND



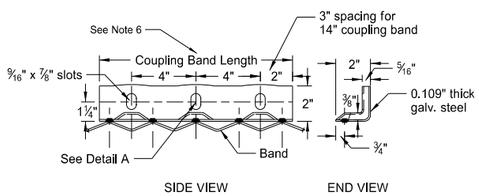
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

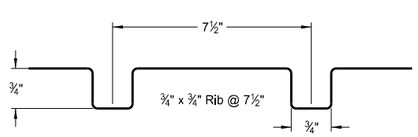
2" x 2" x 3/16" Angle Connector

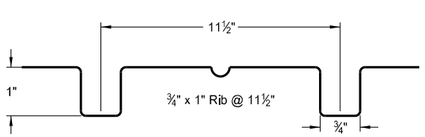


SIDE VIEW

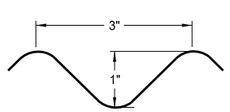
END VIEW

Die-Formed Angle Connector

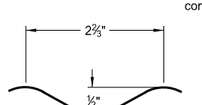




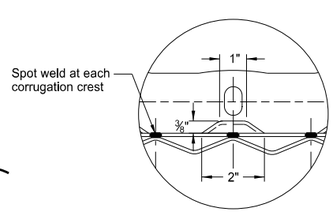
SPIRAL RIB CORRUGATIONS



3" x 1" CORRUGATIONS
(5"X1" corrugation may be used in lieu of 3"x1")



2⅔" x ½" CORRUGATIONS



Detail A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE

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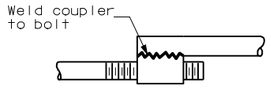
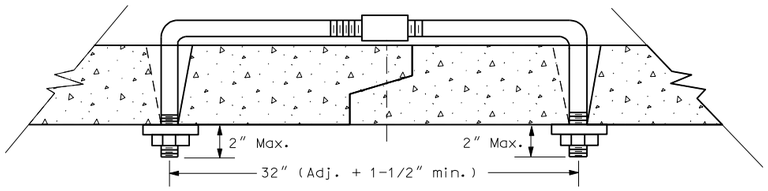
D-714-22

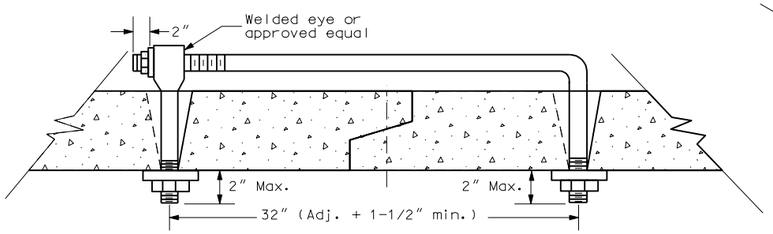
CONCRETE PIPE TIES



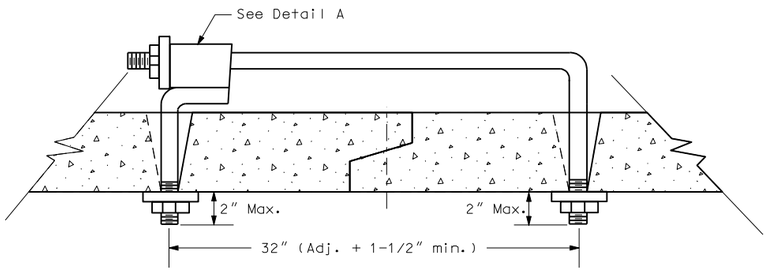
TOP VIEW



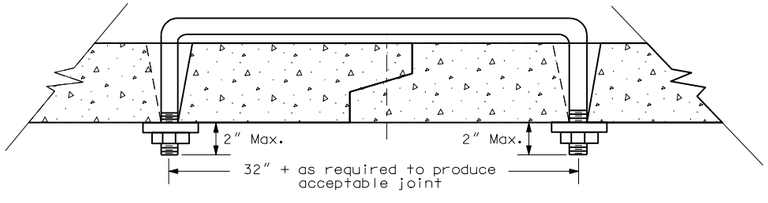
ADJUSTABLE TIE



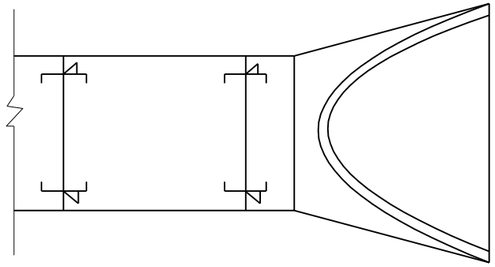
EYE BOLT TIE

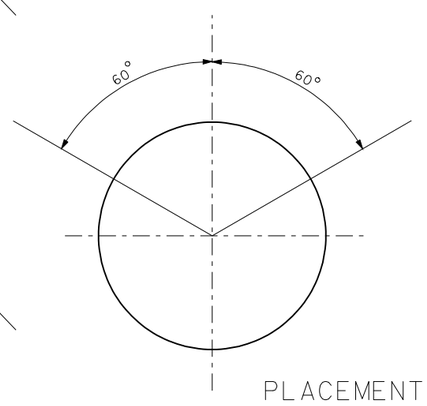


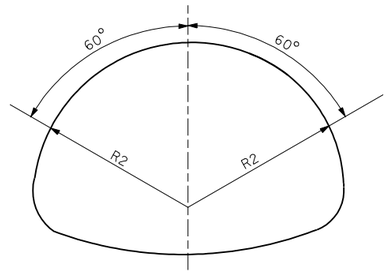
WELDED PIPE TIE



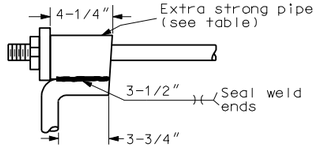
U BOLT TIE





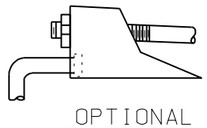


PLACEMENT OF HOLES



DETAIL A

Thread Dia.	E.S. Pipe I.D.
5/8"	3/4"
3/4"	1"
1"	1-1/4"



OPTIONAL
CANOPY TIE

REQUIRED SIZE OF TIE BOLTS					
Pipe Size (Inches)	Thread Dia.	Pipe Size (Inches)	Thread Dia.	Pipe Size (Inches)	Thread Dia.
12	5/8" (See note 2)	30	3/4"	72	1"
15		33		78	
18		36		84	
21		42		90	
24		48		96	
27		54		102	
		60		108	
		66		120	
				132	

NOTES:

1. Pipe size listed is inside diameter of round pipe or equivalent diameter of pipe arch.
2. Nuts and washers are not required on inside of 21" diameter pipe or less.
3. Ties to be used only to hold pipe sections together, not for pulling sections tight.
4. Tie bolts shall be painted after fabrication with one coat of zinc chromate iron oxide paint. Threaded portion of rods do not have to be painted.
5. Holes in pipe to accommodate the tie bolts can be precast or drilled. Tapered holes will be permitted when precast. When existing pipe are extended or salvaged and relayed, the contractor will be required to drill the necessary holes.
6. The contractor has the option of selecting the type of tie bolt to be used. The type selected shall be approved by the engineer.
7. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for reinforced concrete pipe culverts.
8. All concrete pipe joints will be tied including the end section joints. Tie bolts are not required on storm sewer pipe unless specifically noted in the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
12-09-94	Notes
06-26-03	Layout revisions
12-01-04	PE Stamp added

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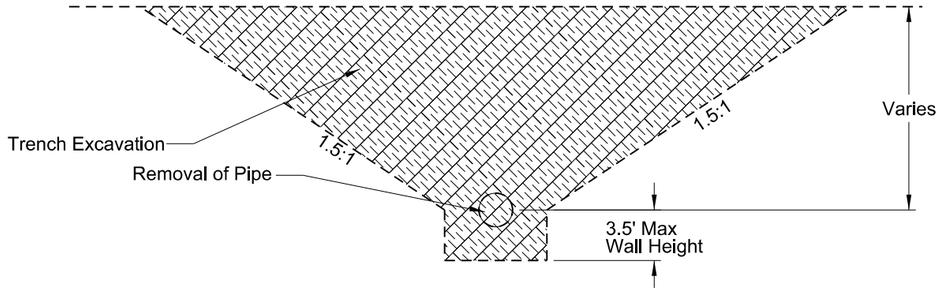
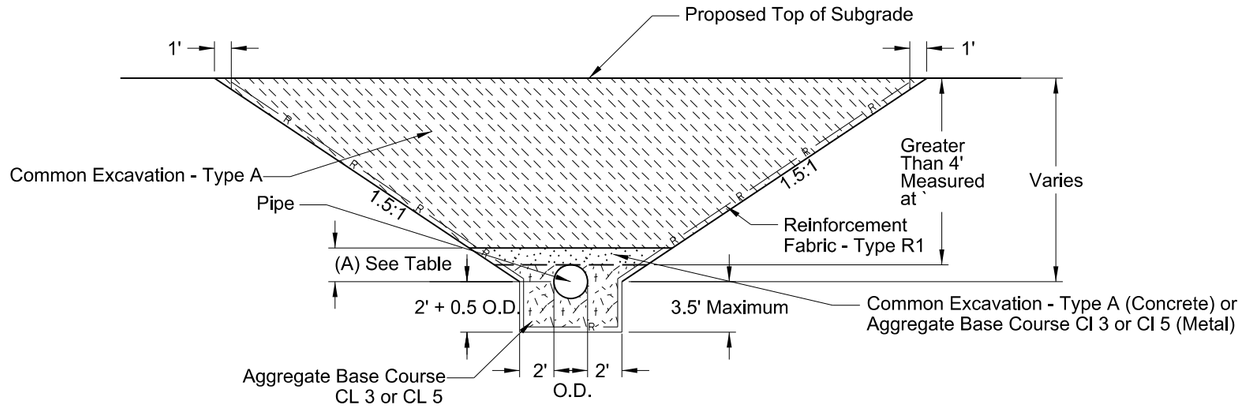
TRANSVERSE MAINLINE PIPE EXCAVATION AND INSTALLATION DETAIL FOR PIPES MORE THAN 4 FEET BELOW THE TOP OF PROPOSED SUBGRADE

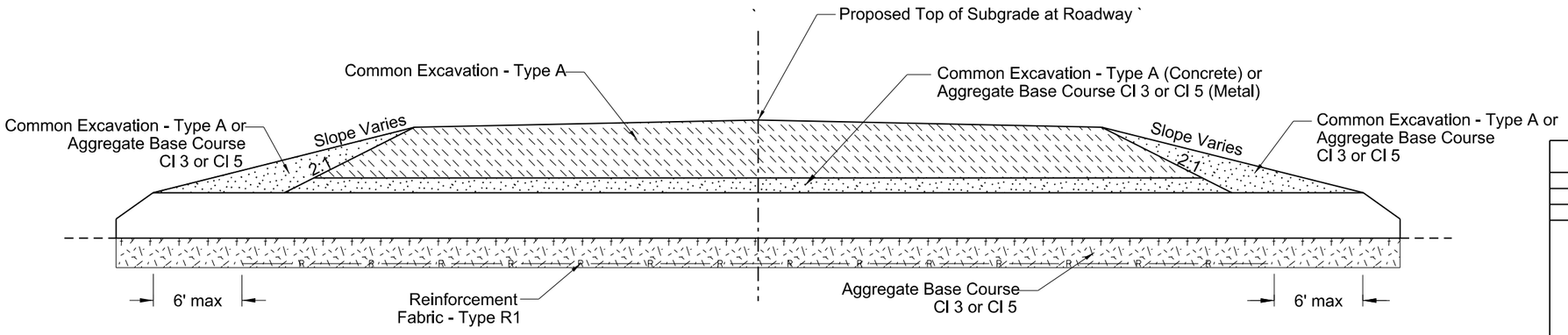
D-714-25



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items
1) Pipe*
2) Reinforcement Fabric - Type R1
3) Removal of Pipe (if required)

*Included in Pipe Pay Item
1) Pipe
2) Trench excavation
3) Aggregate Base Course CL 3 or CL 5
4) Common Excavation - Type A

NOTES:

1) This drawing applies to new/replaced mainline and paved intersection roadways (including ramps). It does not include pipes in approaches.

Backfill Dimensions	
Pipe Materials	Dimension (A)
Concrete	0.5 O.D.
Metal	0.5 O.D. + 1 Foot

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE

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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.

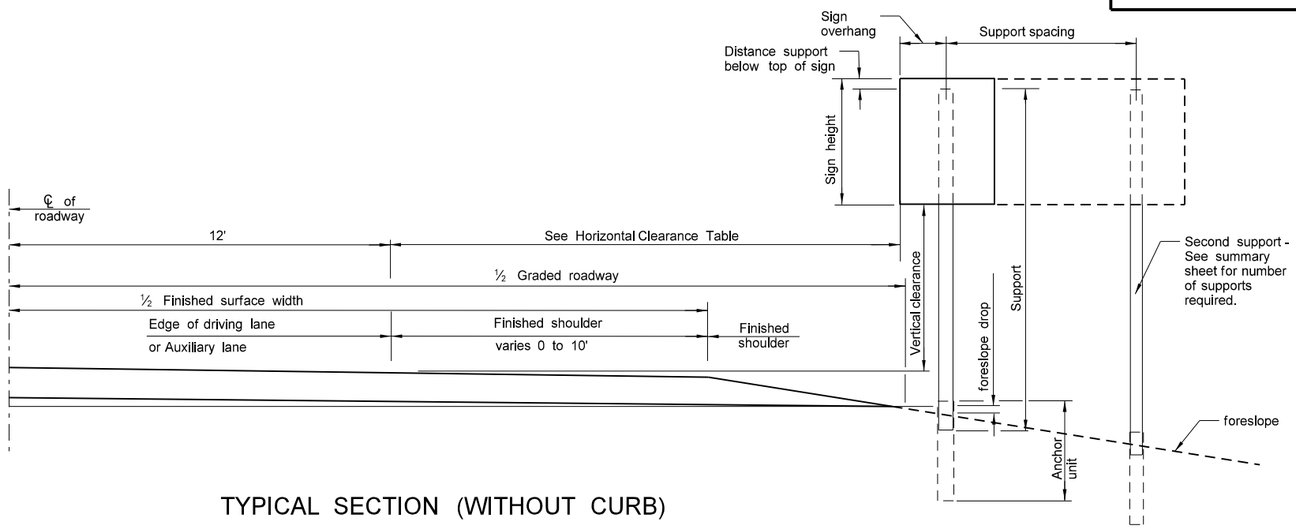
2. Minimum Vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxillary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.

Directional signs on expressways and freeways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane. All route signs, warning signs, and regulatory signs on expressways and freeways shall be at least 7' above the edge of the driving lane. 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.

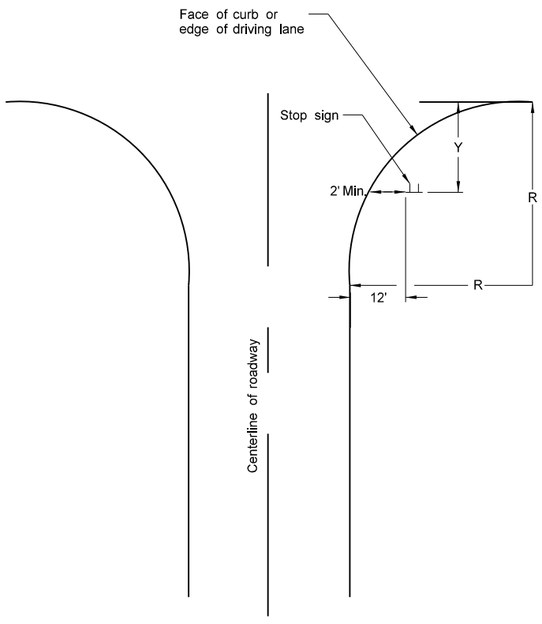
The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.

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

ASSEMBLY DETAILS



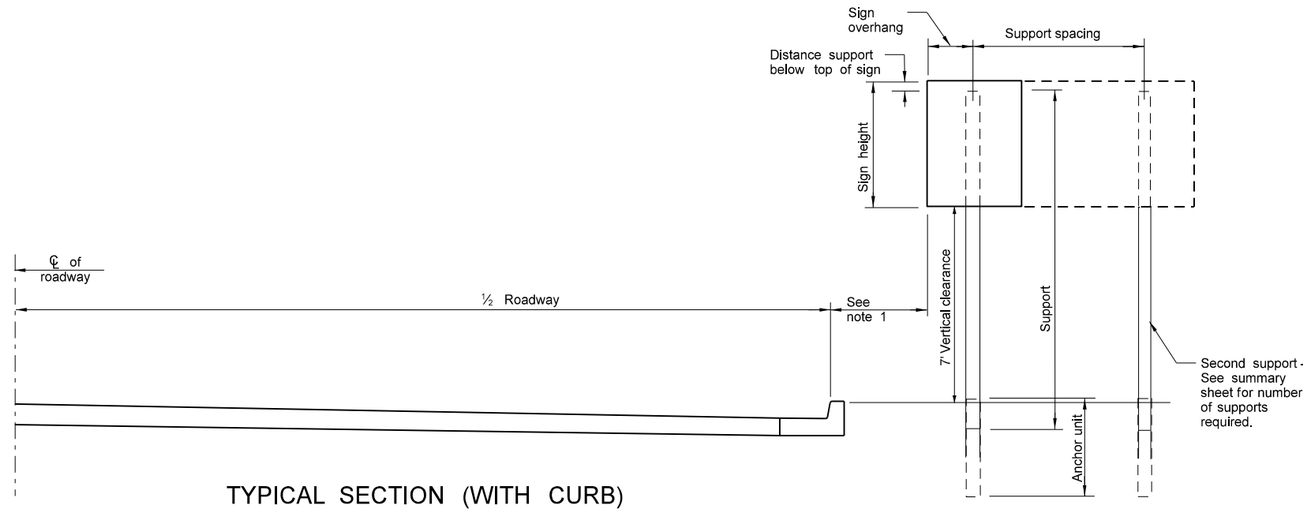
TYPICAL SECTION (WITHOUT CURB)



R=Radius	Y-Max	Y-Min
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'

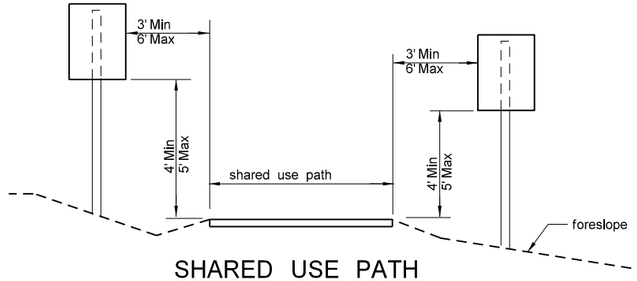
STOP SIGN LOCATION WIDE THROAT INTERSECTION

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



TYPICAL SECTION (WITH CURB)

Residential or Business District



SHARED USE PATH

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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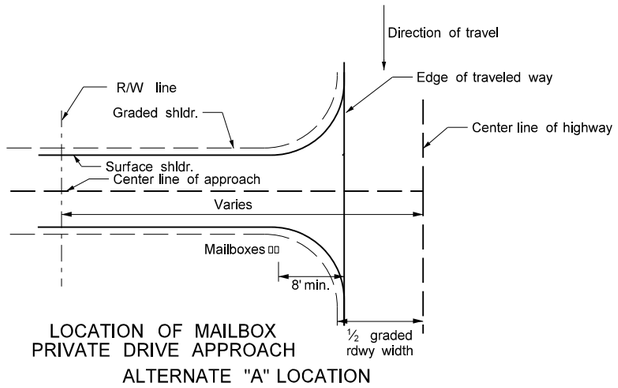
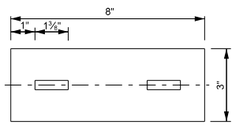
MAILBOX LOCATION DETAILS

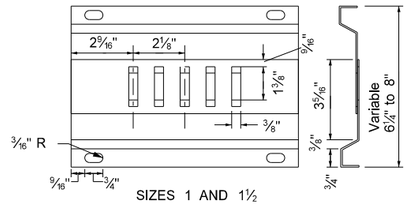
D-766-1



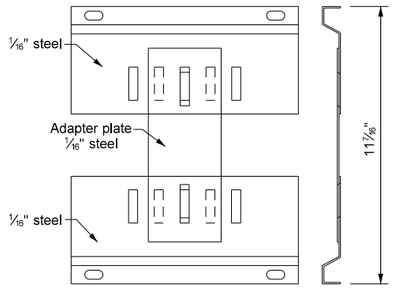
LOCATION OF MAILBOX
PRIVATE DRIVE APPROACH
ALTERNATE "A" LOCATION



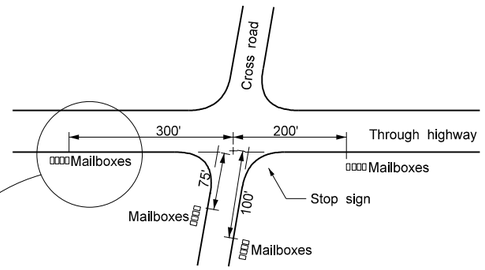
ADAPTOR PLATE



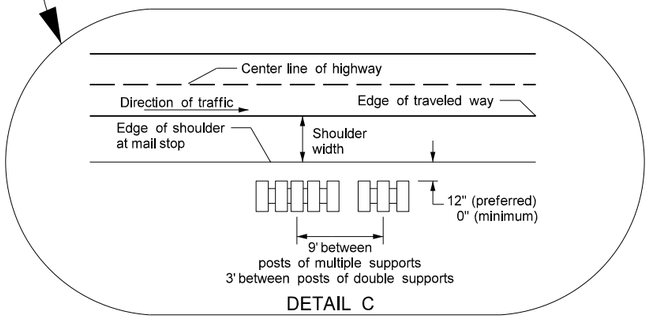
SIZES 1 AND 1½
MOUNTING BRACKET



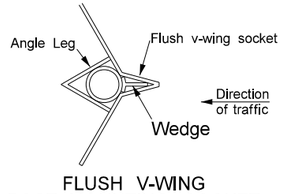
SIZE 2 WITH ADAPTOR PLATE
MOUNTING BRACKET



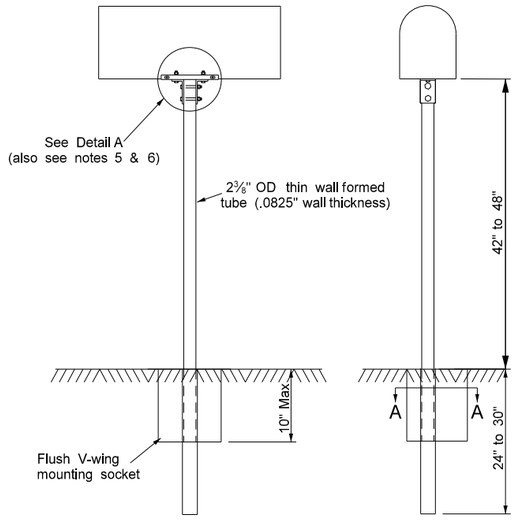
MINIMUM CLEARANCE DISTANCE TO NEAREST
MAILBOX ALONG ROADWAY AT INTERSECTIONS
ALTERNATE "B" LOCATION



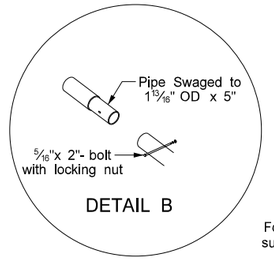
DETAIL C



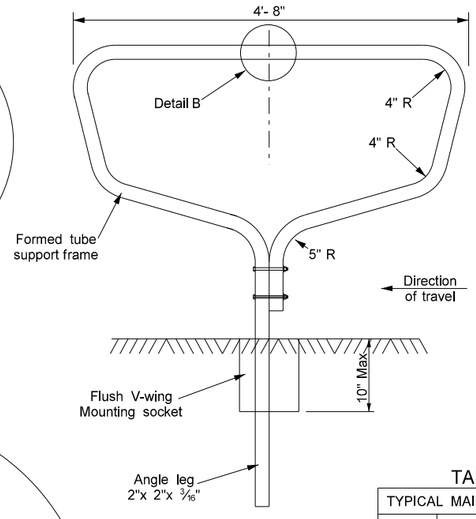
FLUSH V-WING
POST MOUNTING SOCKET
SECTION A-A



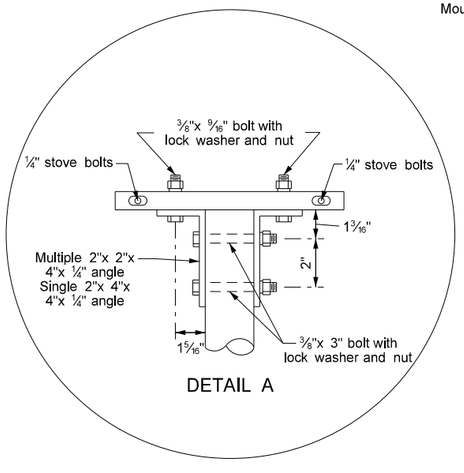
SIDE FRONT
SINGLE SUPPORT



DETAIL B



FRONT



DETAIL A

Notes:

1. The mailbox support and hardware details shall consist of the "V-Loc Mailbox Support System" manufactured by:

   Tapco
   Traffic & Parking Control Co. Inc.

   Any other equal support system meeting the requirements of NCHRP Report 350, which has been crash tested, and approved by the Federal Highway Administration may be used. Approved alternate mailbox assemblies shall be installed in the manner and arrangement crash tested.

2. The preferred location for all mailboxes is the Alternate "A" location. However, the Engineer may approve the Alternate "B" location if warranted by existing field conditions.

3. Postal regulations require that mailboxes must be located on the right-hand side of the road in the direction traveled by the carrier. Therefore, the Engineer shall contact the local carrier or postmaster before installing new mailboxes to verify the direction of travel.

4. Mailboxes installed on private drive approaches must always be located on the downstream side of the approach.

5. Install angle connection parallel to traffic flow for size 2 mailbox mounted on single posts.

6. Size 2 mailbox mounted on multiple support requires 2 each, ⅜" by ⁹⁄₁₆" bolts with lock washers and nuts to attach the adapter plate to mounting bracket. The unit will then require 4 angle connections to attach to the formed tube support frame. See Detail A.

7. Space multiple support frames a minimum of 4 feet apart. Space single support frames a minimum of 3 ft apart. Do not place more than five No. 1 mailboxes, three No. 2 mailboxes, or any combination of four No. 1-A and No. 2 mailboxes on multiple support frames.

TABLE A

TYPICAL MAILBOX DIMENSIONS			
Size	Width	Height	Length
1	6.5"	8.5"	19"
1A	8"	10.5"	21"
2	11.5"	13.5"	23.5"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 9/15/2010 and the original document is stored at the North Dakota Department of Transportation