DESIGN DATA				
Traffic	Average Daily			
Current 2012	Pass: 4845	Trucks: 1295	Total: 6140	
Forecast 2032	Pass: 7990	Trucks: 2346	Total: 10336	
Clear Zone Distance: 34, 32, 24, 22		Design Speed: 70, 60, 55 ,50		
Minimum Sight Dist. for Stopping: 730, 570, 495, 425		Bridges: None		
Limited Access Control: Yes				
Pavement Design Life 20 (years)				
Design Accumulated One-way flexible ESALs: 423675				

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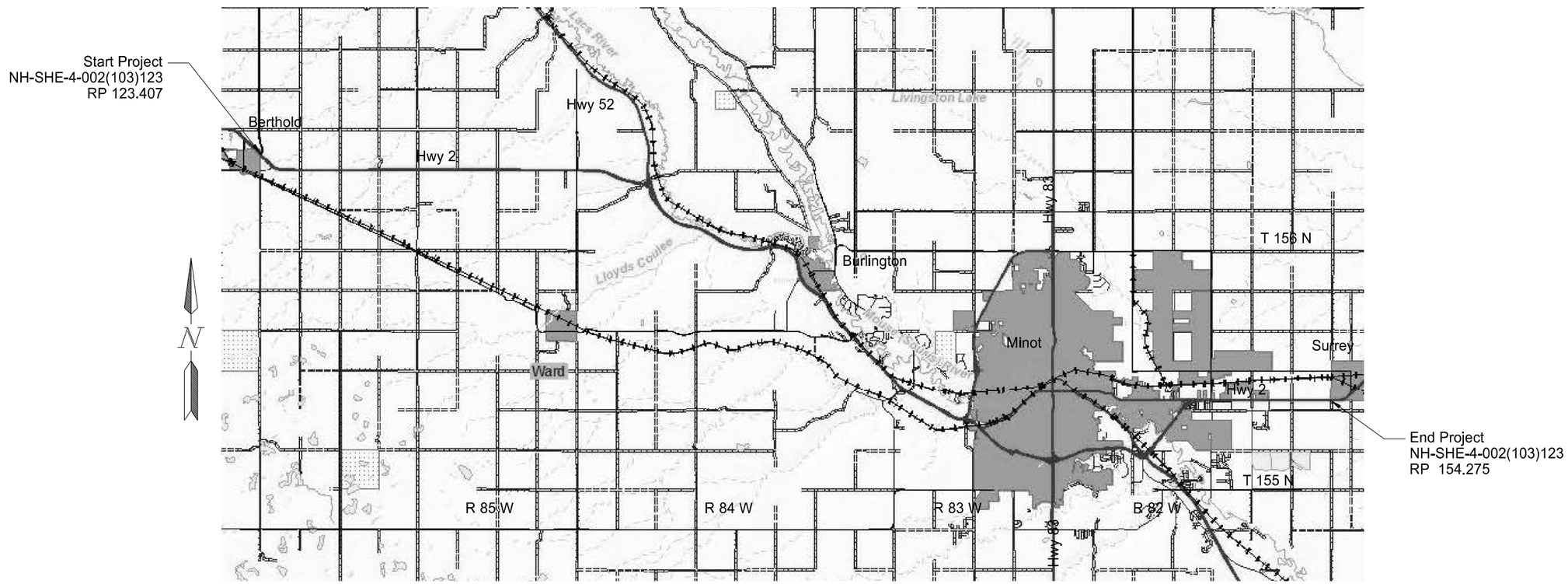
JOB # 17
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

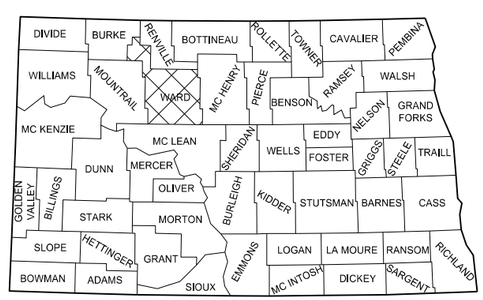
NH-SHE-4-002(103)123

FHWA Limited Involvement
Ward County
District Boundry to 1 Mile West
of Surrey - EB/WB
Turn Lanes, Pipe Jacking or Boring

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-SHE-4-002(103)123 Dist Bndry to 1 M W of Surrey-EB/WB	2.628	30.868





STATE COUNTY MAP

DESIGNERS

Leon Eckroth /s/

Travis Cork /s/

APPROVED DATE 1/22/2014

Roger Weigel /s/
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

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 1/22/2014

James Douglas Rath /s/
NDDOT DIVISION DIVISION

This document was originally issued and sealed by James Douglas Rath Registration Number PE- 4288 , on 1/22/2014 and the original document is stored at the North Dakota Department of Transportation

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STANDARD NO.	DESCRIPTION
D-20-1, 2, 3	NDDOT Abbreviations
D-20-10	NDDOT Utility Company Abbreviations
D-20-20, 21	Linestyles
D-20-30, 31, 32	Symbols
D-704-5	Contractor Sign Detail
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D-704-9	Construction Sign Details - Terminal And Guide Signs
D-704-10	Construction Sign Detail - Regulatory Signs
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D-704-12	Shoulder Closure Tapers
D-704-13	Barricade And Channelizing Device Details
D-704-14	Construction Sign Punching And Mounting Details
D-704-15	Road Closure Layouts
D-704-20	Terminal And Seal Coat Sign Layouts
D-704-22	Construction Truck And Temporary Detour Layouts
D-704-24	Shoulder Closures And Bridge Painting Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-34	Sign Layout For One Lane Closure
D-704-50	Portable Sign Support Assembly
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D-708-7	Erosion Control Fiber Roll Placement Details
D-714-1	Reinforced Concrete Pipe Culvert And End Section
D-714-4	Round Corrugated Steel Pipe Culverts And End Sections
D-714-16	Jacked And Bored Pipe
D-714-22	Concrete Pipe Ties
D-714-27	Pipe Excavation And Installation Detail For Longitudinal Mainline Pipe Or Pipe Not Under The Roadway
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LIST OF STANDARD

STANDARD NO.	DESCRI
D-754-9	Letter And Arrow Details For Variable Length Signs
D-754-20	(Expressway-Freeway Use) Mile Posts
D-754-21	Reflectorized Delineators
D-754-23	Perforated Tube Assembly Details
D-754-24	Mounting Details Perforated Tube
D-754-24A	Breakaway Coupler System For Perforated Tubes
D-754-25	Mounting Details Perforated Tube
D-754-28	Sign Punching, Stringer And Support Location Details Regulatory, Warning, And Guide Signs
D-754-29	Sign Punching, Stringer And Support Location Details Regulatory, Warning, And Guide Signs
D-754-31	Sign Punching, Stringer And Support Location Details Regulatory, Warning, And Guide Signs
D-754-32	Sign Punching, Stringer And Support Location Details Regulatory, Warning, And Guide Signs
D-754-48	Sign Punching, Stringer And Support Location Details For Variable Length Signs
D-754-49	Sign Punching, Stringer And Support Location Details For Variable Length Signs
D-754-87	Sign Punching, Stringer & Support Location Details-Street Name & 911 Signs
D-762-1	Pavement Marking Message Details
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D-770-4	Lighting & Signal Details
D-770-5	Light Standard Details

Special Provisions

SP 1010(08)	Temporary Erosion and Sediment Best Management Practices
SP 1101(08)	Split Sampling and Testing Requirements for Aggregate Base
SP 1275(08)	Weather Limitations for Hot Bituminous Mix

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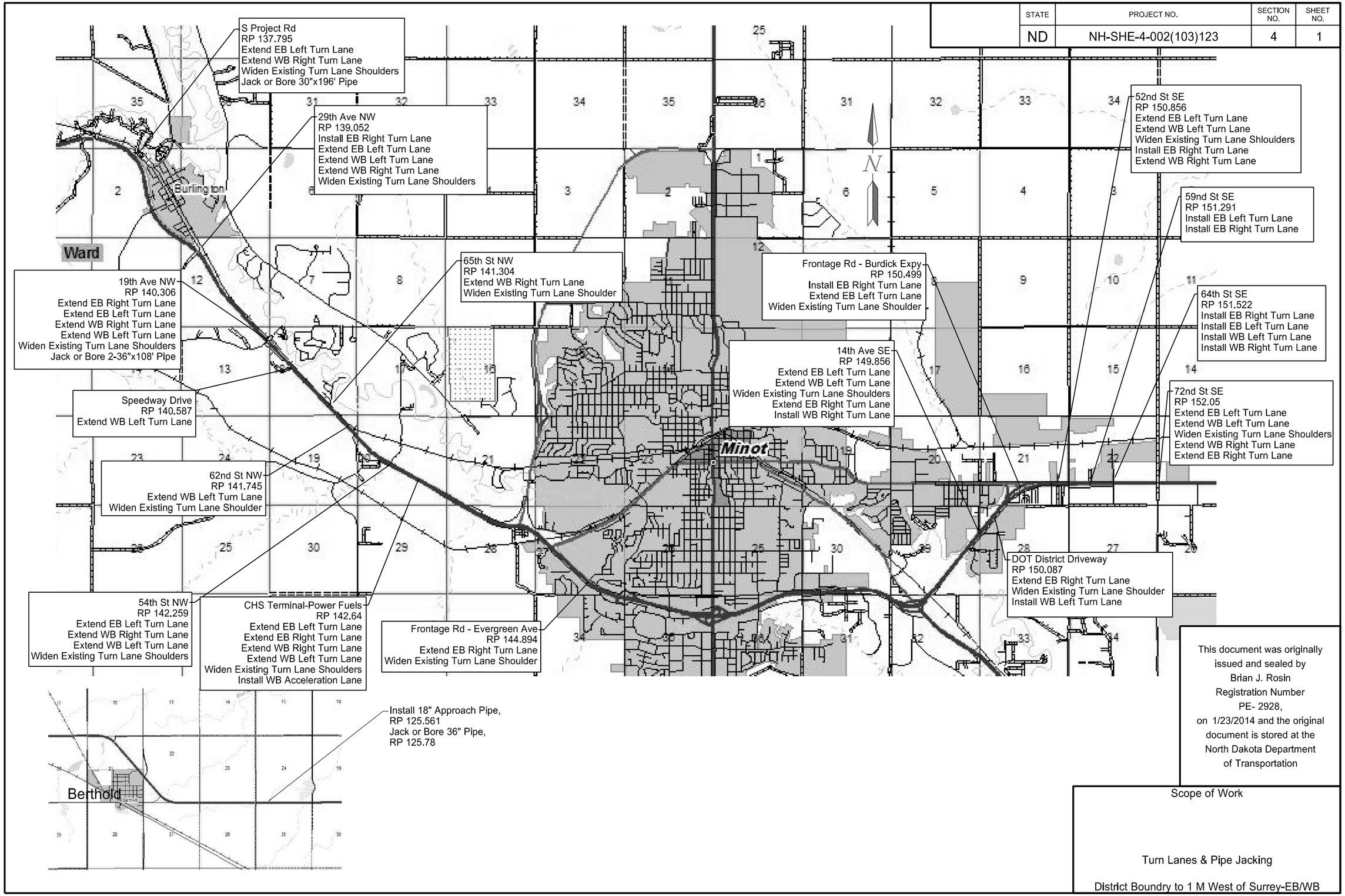

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Scope of Work

Turn Lanes & Pipe Jacking

District Boundry to 1 M West of Surrey-EB/WB

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NOTES

GENERAL NOTES

100-P01 COORDINATION OF PROJECTS: A number of other projects will be under contract during the 2014 construction season in the vicinity of this project. It shall be the contractor's responsibility to coordinate activities, schedules, and traffic control delineations between projects.

100-P02 CROSS SECTIONS: All cross sections were generated from record drawings. No electronic data is available for this project.

107-P01 HAUL ROADS: No roads off the state system will be used as haul roads unless the contractor obtains written approval from the local government agency or agencies and the Engineer. The Engineer will determine what government agency or agencies approvals are appropriate

200-010 SHRINKAGE: 30 percent additional volume is included for shrinkage in earth embankment.

202-P01 REMOVAL OF BITUMINOUS SURFACING: The tonnage of "Removal of Bituminous Surfacing" is based on the existing typical sections shown in section 30. The tonnage includes the area of existing bituminous surfacing, existing base, and any other material needed to be removed for the new turn lane installation. This material shall become the property of the contractor.

202-P02 ABUTTING PAVEMENT: Where the new Hot Bituminous Pavement will abut existing pavement, a full-depth vertical saw cut shall be made along the entire length of the butt joint. The material to be removed shall then be removed without disturbing the material that is designated to remain. The new HBP shall be placed as to match the existing pavement and to provide a satisfactory surface profile.

The areas to be sawed are shown on the plan sheets. Sawing shall be paid as "Saw Bituminous Surfacing-Full Depth."

203-P01 TOPSOIL: The existing topsoil within the turn lane work area shall be salvaged. Removal of topsoil is based upon a 6" depth. The median topsoil stockpile must have foreslopes 4:1 or flatter and approach slopes that are 10:1 or flatter. All work as described above shall be paid for by the unit price bid for "Topsoil".

For all wetland areas to be impacted, topsoil shall be removed to a maximum depth of 6 inches. Wetland topsoil shall be stockpiled separately from dry land topsoil. All wetland topsoil that is stripped shall be spread in the wetland mitigation and restorations sites so that it is evenly distributed to a minimum depth of 6 inches. All costs for removal, stockpiling and relaying wetland topsoil shall be included in the price bid per cubic yard for "Topsoil-Wetland".

203-P02 BORROW EXCAVATION: Borrow required for widening the shoulders, constructing the turn lanes and turn lane extensions will not be obtained from within the existing right of way. Borrow material may be obtained from the Common Excavation - Waste material on project SNH-4-002(099)134 if it is suitable for embankment. It will be the Contractor's responsibility to obtain any other borrow areas.

203-P03 HAUL: No average haul has been computed for this project.

410-P01 SUPERPAVE FAA 43: The hot bituminous pavement shall be paver laid in three lifts. The top lift shall be 2" in depth.

410-P02 AGGREGATE AND MIX DESIGN PROPERTIES: The aggregate blend and properties shall meet the requirements outlined in Section 410 Superpave Volumetric Mix Design. The following aggregate and mix design properties are required:

Test	Criteria	Reference
Coarse Aggregate Angularity	75% min	NDDOT Field Sampling/ Testing Manual
Fine Aggregate Angularity	43% min	AASHTO T 304
Gyratory Effort, # Gyrations	N_{ini}=7, N_{des}=75, N_{max}=115	AASHTO R 35
Voids Filled with Asphalt	65-78%	AASHTO M 323, T 166
$\%G_{mm}$ @ N_{ini}	89% max	AASHTO M 323, T 166

411-P01 MILLING PAVEMENT SURFACE: All milled material shall be become the property of the contractor.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

704-P01 TRAFFIC CONTROL: The traffic control for the construction of this project shall consist of one lane road closures and flagging. Traffic control devices shall comply with the following Standard Drawings.

D-704-7, 8, 9, 10, 11, 12, 13, and 14 as applicable.

D-704-15, Type A: For work at intersecting roadways.

D-704-20, Layout G: For terminal sign spacing.

D-704-22, Layouts Type K and L: For construction trucks hauling materials.

D-704-24, Layouts Type R and T: For Jacking or Boring Culverts, shoulder preparation, topsoil, seeding and mulching.

D-704-26, Layouts Type BB, CC, EE, GG and Z.

D-704-34: Sign Layout for One-Lane Closure for the construction of the turn lanes, milling and paving. Two lane closures have been provided. Quantities for these lane closures were based on using a 0.25 mile work area length. Delineator drums will be used in-place of tubular markers for these lane closures.

D-704-50: Portable Sign Support Assembly.

708-P01 MULCHING: All excavation and embankment areas shall be stabilized with mulch after the completion of the permanent seeding operation. Temporary mulching may also be required in order for the Contractor to meet the requirements of the NDPES Construction Permit. 40% extra mulching has been added to the quantity for any temporary mulching needed.

708-P02 FIBER ROLLS 12IN: A quantity of 2000 LF of Fiber Rolls 12in has been added for use in the field by the engineer.

714-P01 PIPE CONDUIT 30” and 36” - JACKED OR BORED: The method used to install the conduits indicated as jacked or bored on the plans shall be left to the discretion of the contractor. The boring or jacked methods are acceptable.

If the boring method is used, the contractor may use smooth wall steel pipe in lieu of RCP. Jacked concrete pipe sections may be Cl. III, but concrete compressive strength shall be a minimum of 6,000 psi or greater. If smooth walled steel pipe is to be used, this material shall be welded steel pipe of new material, meeting ASTM Specifications A-139, Grade B with minimum yield strength of 35,000 psi. For 30” conduit the wall thickness shall be 0.406 inches and for 36” conduit the wall thickness shall be 0.469 inches.

Regardless of the method or type of pipe used, the price bid for jacked pipe shall be considered full compensation for the pipe and its installation. All costs for labor, equipment and materials required installing the pipe through the roadway by boring or jacking shall be included in the price bid for the items “Pipe Conduit 30 IN – Jacked or Bored” or “Pipe Conduit 36 IN – Jacked or Bored”.

714-P02 PIPE CONDUIT 24” & 30”: All costs associated with the installation of the external pipe connection bands shall be included in the price bid for the appropriate size conduit.

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NOTES

SECTION 110

754-P01 SIGN REMOVAL: The "Wellhead Protection" sign at RP 139.129 lt shall be delivered to and become the property of the City of Burlington. The cost of the delivery shall not be bid separately but shall be included in the price for other items.

754-P02 REMOVED SIGNS AND SUPPORTS: All signs and supports not to be reset shall become property of the contractor.

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

SECTION 140

770-900 RELOCATE LIGHT STANDARD: New internal wiring and fuse connector kits shall be provided for each light standard relocated.

Internal wiring shall meet the requirement of the ND Standard Specification section 895.03.B.1. Fuse Kits section 895.08.

Internal wiring and fuse connector kits shall not be measured for payment but shall be included in the price bid for the item "Revise Lighting System."

770-P01 RELOCATE LIGHT STANDARD: The bolt circle for the relocated light standard shall be determined by the Contractor.

The conduit and conductor shall be abandoned as shown on the plans. The conductor at the light standard foundation shall be disconnected and removed below ground level.

Any costs associated with this shall not be bid separately but shall be included price bid for the item “Revise Lighting System.”

770-P02 UNDERGROUND CONDUCTOR: The plans call for using Multiple Underground Conductor in various locations. In lieu of the Multiple Underground Conductor, the contractor may furnish and install Underground Cable with conduit of the same size as shown in the plans for the Multiple Underground Conductor.

If the contractor chooses to use Underground Cable, the cost to furnish and install cable shall be included in the price bid for the "Revise Lighting System".

770-P03 LIGHTING STANDARDS: The design of the Lighting standards shall meet the requirements of AASHTO publication, Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (5th Edition 2010 Interim). A wind velocity of 90 mph with the necessary coefficient of height correction factor shall be used in the calculations. Each structure component shall be designed using the requirements of Table 11-1, “Fatigue Importance Factor, I_F” Fatigue Category I shall be used for High Mast Lighting and Fatigue Category III shall be used for Lighting Standards. All the necessary calculations and drawings used in the design of these poles shall be furnished with the shop drawing submittal. Calculations and work drawings used in the design of Lighting Standards shall be signed, sealed, and dated by a Professional Engineer duly registered in the State of North Dakota.

This document was originally issued and sealed by Douglas A Schumaker, Registration Number PE-5047, on 1/9/2014 and the original document is stored at the North Dakota Department of Transportation.

ENVIRONMENTAL COMMITMENTS

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

COMMITMENT NO. 1: Approximately 0.00 *natural/jurisdictional*, 0.00 *natural/non-jurisdictional*, 0.00 *artificial/jurisdictional*, and 0.32 *artificial/non-jurisdictional* acres of wetlands will be impacted permanently, and 0.47 acres will be impacted temporarily.

ACTION TAKEN/REQUIRED: 0.00 acres of permanent impacts to wetlands will require mitigation.

Wetland Number	Location	LONG / LAT (Dec. Deg.)	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands*	Impacts to Wetlands	
								Temp.	Perm.
1	Sec. 18,T155N, R83W	-101.404010W 48.252228 N	PEMAx	Ditch	0.15	Artificial	N/A	0.03	0.11
2	Sec. 18,T155N, R83W	-101.389266W 48.241753N	PEMAx	Ditch	0.08	Artificial	N/A	0.03	0.05
3	Sec. 20,T155N, R83W	-101.372522W 48.231872N	PEMC	Drainage	0.20	Natural	X	0.05	0.00
4	Sec. 20,T155N, R83W	-101.368036W 48.229503N	PEMAx	Ditch	0.06	Artificial	N/A	0.01	0.00
5	Sec. 27,T155N, R83W	-101.327557W 48.213560N	PEMAx	Ditch	0.20	Artificial	N/A	0.07	0.01
6	Sec. 27,T155N, R83W	-101.324989W 48.212868N	PEMAx	Ditch	0.28	Artificial	N/A	0.00	0.00
7	Sec. 29,T155N, R82W	-101.231987W 48.219886N	PEMAx	Ditch	0.15	Artificial	N/A	0.04	0.00
8	Sec. 28,T155N, R82W	-101.230516W 48.222129N	PEMCx	Ditch	0.47	Artificial	N/A	0.02	0.00
9	Sec. 21,T155N, R82W	-101.211352W 48.229396N	PEMCx	Ditch	0.32	Artificial	N/A	0.00	0.00
10	Sec. 28,T155N, R82W	-101.228647W 48.222664N	PEMCx	Ditch	0.25	Artificial	N/A	0.00	0.00
11	Sec. 21,T155N, R82W	-101.222437W 48.227080N	PEMCx	Ditch	1.07	Artificial	N/A	0.05	0.15
12	Sec. 22,T155N, R82W	-101.207726W 48.228795N	PEMCx	Ditch	0.43	Artificial	N/A	0.00	0.00
13	Sec. 22,T155N, R82W	-101.204477W 48.228816N	PEMCx	Ditch	0.05	Artificial	N/A	0.03	0.00
TOTALS					**3.71**			**0.33**	**0.32**

* A wetland Preliminary & Approved Jurisdictional Determination was issued by the USACE on 09/07/2012; NWO-2012-1922-BIS.

ENVIRONMENTAL COMMITMENTS

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		USFWS Easement Impacts		WETLAND MITIGATION			
											Mitigation Required			
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	11990	USACE	Location	Onsite Mitigation Acres
14a	Sec.24, T156N, R86W	PEMC	Slope / Drainageway	0.23	Natural	Yes	0.05	0.00	0.00	0.00	N	N		--
14b	Sec.24, T156N, R86W	PEMCx	Ditch	0.38	Artificial	Yes	0.00	0.00	0.00	0.00	N	N		--
14c	Sec.23, T156N, R86W	PEMAx	Ditch	0.02	Artificial	Yes	0.00	0.00	0.00	0.00	N	N		--
14d	Sec.25, T156N, R86W	PEMC	Drainageway	0.18	Natural	Yes	0.02	0.00	0.00	0.00	N	N		--
14e	Sec.25, T156N, R86W	PEMCx	Ditch	0.12	Artificial	Yes	0.00	0.00	0.00	0.00	N	N		--
15a	Sec.25, T156N, R86W	PEMCx	Ditch	0.04	Artificial	Preamble	0.02	0.00	0.00	0.00	N	N		--
15b	Sec.26, T156N, R86W	PEMCx	Ditch	0.08	Artificial	Preamble	0.05	0.00	0.00	0.00	N	N		--
			Totals	**1.05**			**0.14**	**0.00**	**0.00**	**0.00**				**0.00**

* A wetland Jurisdictional Determination was issued by the USACE on 8/20/2013; NWO-2012-1922-BIS.

Total Permanent Impact Summary		Additional Impact Info for 404 Permit	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/Non-JD	0.00	Permanent JD ≥ 0.10	**0.00**
Artificial /Non-JD	0.32	Temporary JD	**0.12**
Natural /JD	0.00	POW	**0.00/0**
Artificial /JD	0.00		
Totals	**0.00**		

PERMITS REQUIRED:

- Section 404 Permit (US Army Corps of Engineers)

ESTIMATE OF QUANTITIES

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SPEC	CODE	ITEM DESCRIPTION	UNIT	SHE-4-002 103)123	NH-4-002 103)123	TOTAL
103	0100	CONTRACT BOND	L SUM	0.5	0.1	0.6
202	0130	REMOVAL OF CURB & GUTTER	LF	415		415
202	0135	REMOVAL OF BITUMINOUS SURFACING	TON	14,148		14,148
202	0153	SAW BITUMINOUS SURFACING-FULL DEPTH	LF	23,418		23,418
202	0169	REMOVAL OF END SECTION-ALL TYPES & SIZES	EA	2		2
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	57		57
203	0109	TOPSOIL	CY	19,230		19,230
203	0121	TOPSOIL-WETLAND	CY	400		400
203	0140	BORROW-EXCAVATION	CY	35,931		35,931
216	0100	WATER	M GAL	1,050		1,050
302	0100	SALVAGED BASE COURSE	TON	34,574		34,574
401	0100	MC70 OR 250 LIQUID ASPHALT	GAL	10,106		10,106
401	0150	SS1H OR CSS1H OR MS1 EMULSIFIED ASPHALT	GAL	4,157		4,157
410	0213	SUPERPAVE FAA 43	TON	12,845		12,845
410	0445	PG 58-28 ASPHALT CEMENT	TON	771		771
411	0105	MILLING PAVEMENT SURFACE	SY	3,300		3,300
702	0100	MOBILIZATION	L SUM	0.5	0.1	0.6
704	0100	FLAGGING	MHR	4,400	100	4,500
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4,676	265	4,941
704	1052	TYPE III BARRICADE	EA	4		4
704	1060	DELINEATOR DRUMS	EA	60	15	75
704	1067	TUBULAR MARKERS	EA		20	20
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2	1	3
708	1430	FIBER ROLLS 12IN	LF	11,560	530	12,090
708	2240	SEEDING-TYPE B-CL II	ACRE	15	1	16
708	2260	SEEDING-TYPE B-CL IV	ACRE	15	1	16
708	5500	MULCHING	ACRE	21	1	22
714	4097	PIPE CONDUIT 15IN-STORM DRAIN	LF	14		14
714	4099	PIPE CONDUIT 18IN-APPROACH	LF	32	82	114
714	4100	PIPE CONDUIT 18IN	LF	8		8
714	4105	PIPE CONDUIT 24IN	LF	350.5		350.5
714	4110	PIPE CONDUIT 30IN	LF	30		30

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	SHE-4-002 103)123	NH-4-002 103)123	TOTAL
714	4124	PIPE CONDUIT 36IN-JACKED OR BORED	LF	224	176	400
714	4166	PIPE CONDUIT 30IN-JACKED OR BORED	LF	196		196
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA	5		5
722	3500	INLET-TYPE 1	EA	1		1
722	4565	MEDIAN DRAIN PRECAST CONCRETE-TYPE A	EA	2		2
722	4580	RESET PRECAST CONCRETE MEDIAN DRAIN	EA	2		2
748	0140	CURB & GUTTER-TYPE I	LF	415		415
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	109		109
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	204		204
754	0162	REMOVE & RESET DELINEATORS	EA	28		28
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	791		791
754	0592	RESET SIGN PANEL	EA	9		9
754	0593	RESET SIGN SUPPORT	EA	12		12
754	0596	RESET MILE POST	EA	3		3
754	1104	REMOVE SIGN FOUNDATION	EA	4		4
762	0111	EPOXY PVMT MK 12IN LINE	LF	590		590
762	0112	EPOXY PVMT MK MESSAGE	SF	2,048		2,048
762	0113	EPOXY PVMT MK 4IN LINE	LF	31,784		31,784
762	0115	EPOXY PVMT MK 8IN LINE	LF	20,945		20,945
762	1500	OBLITERATION OF PVMT MK	SF	1,292		1,292
770	4525	REVISE LIGHTING SYSTEM	EA	1		1

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	10	1

South Project Rd. RP 137.795	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	286			335		621
Milling - 2" Depth	SY				595		595
Saw Bituminous Surfacing - Full Depth	LF	761			680		1441
Topsoil	CY	640			735		1375
Borrow Excavation	CY	828			3577		4405
Salvaged Base	TON	1002			618		1620
HBP - Superpave FAA 43 (All Lifts)	TON	365			239		604
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	21.9			14.34		36.24
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	130			117		247
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	325			290		615

Speedway Drive RP 140.587	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton			230			230
Milling - 2" Depth	SY			345			345
Saw Bituminous Surfacing - Full Depth	LF			717			717
Topsoil	CY			471			471
Borrow Excavation	CY			1200			1200
Salvaged Base	TON			769			769
HBP - Superpave FAA 43 (All Lifts)	TON			307			307
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON			18.42			18.42
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal			194			194
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal			323			323

29th Ave. NW RP 139.052	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	189	380	122	200		891
Milling - 2" Depth	SY			182	298		480
Saw Bituminous Surfacing - Full Depth	LF	490	545	420	345		1800
Topsoil	CY	461	320	488	488		1757
Borrow Excavation	CY	495	442	781	2040		3758
Salvaged Base	TON	600	628	491	327		2046
HBP - Superpave FAA 43 (All Lifts)	TON	216	222	170	119		727
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	12.96	13.32	10.2	7.14		43.62
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	77	81	69	55		282
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	193	272	151	116		732

65th St NW RP 141.304	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton				315		315
Milling - 2" Depth	SY				417		417
Saw Bituminous Surfacing - Full Depth	LF				478		478
Topsoil	CY				678		678
Borrow Excavation	CY				1435		1435
Salvaged Base	TON				548		548
HBP - Superpave FAA 43 (All Lifts)	TON				194		194
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON				11.64		11.64
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal				88		88
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal				180		180

19th Ave. NW RP 140.306	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	286	522	562	325		1695
Milling - 2" Depth	SY				410		410
Saw Bituminous Surfacing - Full Depth	LF	615	646	761	468		2490
Topsoil	CY	710	564	353	683		2310
Borrow Excavation	CY	673	617	945	1425		3660
Salvaged Base	TON	751	763	735	462		2711
HBP - Superpave FAA 43 (All Lifts)	TON	262	260	415	160		1097
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	15.72	15.6	24.9	9.6		65.82
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	109	109	124	85		427
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	239	250	310	175		974

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Basis of Estimate

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	10	2

62nd St NW RP 141.745	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton			200			200
Milling - 2" Depth	SY			242			242
Saw Bituminous Surfacing - Full Depth	LF			557			557
Topsoil	CY			732			732
Borrow Excavation	CY			1205			1205
Salvaged Base	TON			710			710
HBP - Superpave FAA 43 (All Lifts)	TON			255			255
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON			15.3			15.3
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal			101			101
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal			215			215

Frontage Rd - Evergreen Ave	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton		302				302
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF		350				350
Topsoil	CY		360				360
Borrow Excavation	CY		330				330
Salvaged Base	TON		415				415
HBP - Superpave FAA 43 (All Lifts)	TON		140				140
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON		8.4				8.4
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal		50				50
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal		111				111

54th ST NW RP 142.259	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	217		327	405		949
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	405		375	295		1075
Topsoil	CY	538		570	578		1686
Borrow Excavation	CY	390		745	1320		2455
Salvaged Base	TON	776		735	540		2051
HBP - Superpave FAA 43 (All Lifts)	TON	242		225	177		644
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	14.52		13.5	10.62		38.64
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	69		64	49		182
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	139		120	85		344

14th Ave SE	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	212	377	195	317		1101
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	410	341	490	590		1831
Topsoil	CY	437	236	389	398		1460
Borrow Excavation	CY	290	177	595	1226		2288
Salvaged Base	TON	707	440	790	640		2577
HBP - Superpave FAA 43 (All Lifts)	TON	378	141	478	267		1264
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	22.68	8.46	28.68	16.02		75.84
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	147	138	138	144		567
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	345	345	345	345		1380

CHS Terminal - Power Fuels RP 142.64	Unit	EB Left	EB Right	WB Left	WB Right	Accel. Lane	Total
Removal of Bituminous Surfacing	Ton	217	385	143	222	1640	2607
Milling - 2" Depth	SY			127	230	451	808
Saw Bituminous Surfacing - Full Depth	LF	405	336	297	266	1035	2339
Topsoil	CY	538	534	612	570	478	2732
Borrow Excavation	CY	389	395	810	968	1695	4257
Salvaged Base	TON	777	495	445	355	1005	3077
HBP - Superpave FAA 43 (All Lifts)	TON	242	170	147	115	401	1075
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	14.52	10.2	8.82	6.9	24.06	64.5
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	69	55	28	48	170	370
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	139	104	92	80	423	838

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Basis of Estimate

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	10	3

DOT District Driveway	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton		435	202			637
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF		436	617			1053
Topsoil	CY		278	410			688
Borrow Excavation	CY		285	775			1060
Salvaged Base	TON		536	700			1236
HBP - Superpave FAA 43 (All Lifts)	TON		185	262			447
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON		11.1	15.72			26.82
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal		66	95			161
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal		153	238			391

Frontage Rd - Burdick Expy	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	245	500				745
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	466	391				857
Topsoil	CY	400	320				720
Borrow Excavation	CY	305	355				660
Salvaged Base	TON	760	490				1250
HBP - Superpave FAA 43 (All Lifts)	TON	250	165				415
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	15	9.9				24.9
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	73	58				131
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	165	130				295

52nd St SE	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	191	291	270	205		957
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	416	450	487	415		1768
Topsoil	CY	382		385	270		1037
Borrow Excavation	CY	320		590	712		1622
Salvaged Base	TON	790	592	600	450		2432
HBP - Superpave FAA 43 (All Lifts)	TON	263	189	216	160		828
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	15.78	11.34	12.96	9.6		49.68
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	77	57	77	58		269
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	180	142	180	144		646

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Basis of Estimate

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	10	4

59th St SE	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	195	281				476
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	607	415				1022
Topsoil	CY	296	320				616
Borrow Excavation	CY	450	355				805
Salvaged Base	TON	700	627				1327
HBP - Superpave FAA 43 (All Lifts)	TON	261	222				483
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	15.66	13.32				28.98
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	95	58				153
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	236	144				380

64th St SE	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	194	281	305	267		1047
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	876	551	762	565		2754
Topsoil	CY	296	330	410	322		1358
Borrow Excavation	CY	770	300	2006	890		3966
Salvaged Base	TON	3150	830	2990	638		7608
HBP - Superpave FAA 43 (All Lifts)	TON	1205	270	1190	270		2935
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	72.3	16.2	71.4	16.2		176.1
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	142	81	142	81		446
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	536	200	595	200		1531

72nd St SE	Unit	EB Left	EB Right	WB Left	WB Right		Total
Removal of Bituminous Surfacing	Ton	282	350	427	316		1375
Milling - 2" Depth	SY						0
Saw Bituminous Surfacing - Full Depth	LF	795	662	797	632		2886
Topsoil	CY	468	330	482	365		1645
Borrow Excavation	CY	505	300	965	1055		2825
Salvaged Base	TON	1185	1040	1185	787		4197
HBP - Superpave FAA 43 (All Lifts)	TON	400	325	400	305		1430
PG 58-28 Asphalt cement @ 6% (All Lifts)	TON	24	19.5	24	18.3		85.8
SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY - 2 Lifts	Gal	135	112	135	107		489
MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY	Gal	323	260	323	245		1151

Project Totals

14148 Ton	Removal of Bituminous Surfacing
3297 SY	Milling - 2" Depth
23418 LF	Saw Bituminous Surfacing - Full Depth
19625 CY	Topsoil
35931 CY	Borrow Excavation
34574 Ton	Salvaged Base
12845 Ton	HBP - Superpave FAA 43 (All Lifts)
770.7 Ton	PG 58-28 Asphalt cement @ 6% (All Lifts)
4157 Gal	SS1H or CSS1H or MS1 Emulsified Asphalt @ 0.05 Gal/SY
10106 Gal	MC 70 or 250 Liquid Asphalt @ 0.25 Gal/SY

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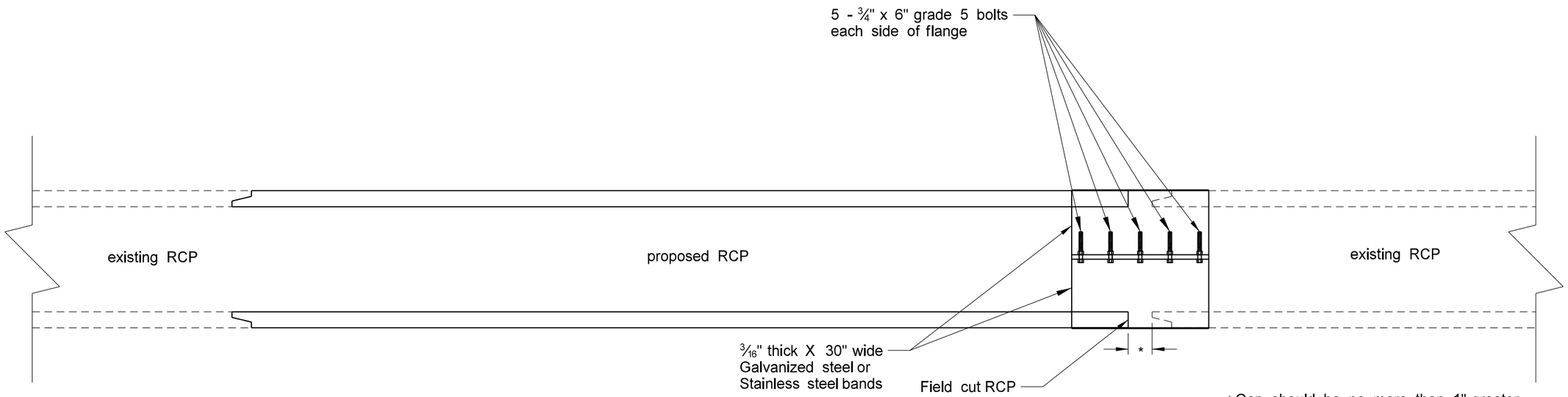
Basis of Estimate

Turn Lanes

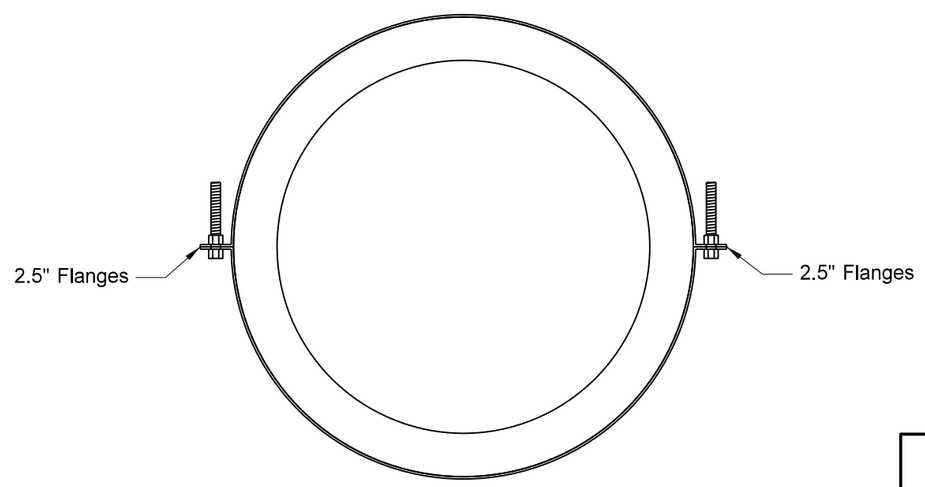
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	20	1



* Gap should be no more than 1" greater than the RCP tongue length.

Pipe Connection Bands Used at
Speedway Driveway
62nd St SW
64th St SE



Notes:

A butyl joint material shall be used to seal the pipes to the band.

All joints shall be tied according to Standard D-714-22.

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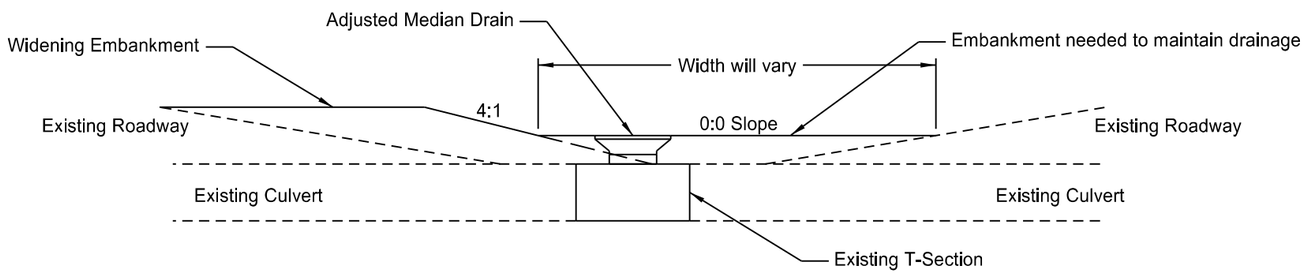
External Pipe Connection Band Detail

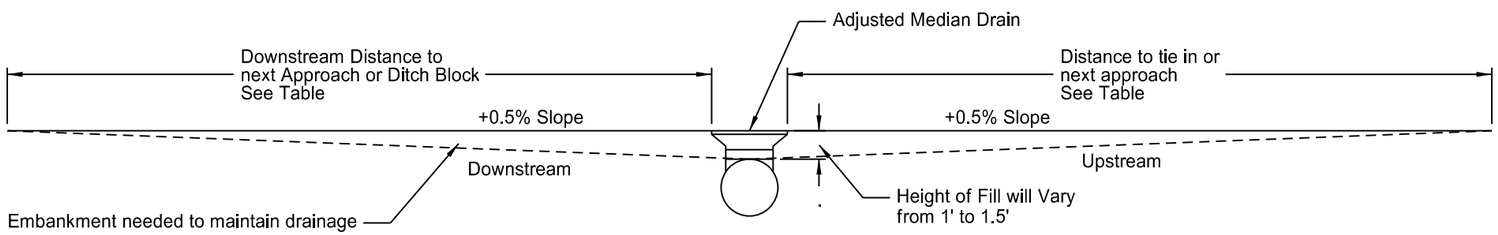
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	20	2



Median Ditch
Cross Section View



Median Ditch
Profile View

Location	Existing Slope	Distance Upstream	Distance Downstream
S Project Rd	0.9 %	115'	50'
Johnson St./ 29th Ave NW	0.98 %	105'	50'
Speedway Dr.	0.52 %	240'	50'
14th Ave SE	0.10 %	700'	100'

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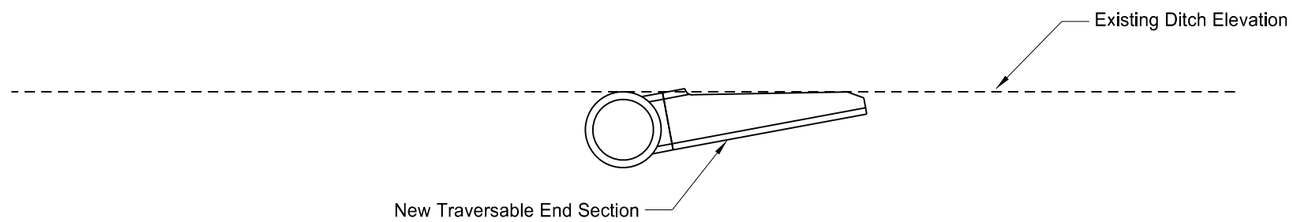
Ditch Detail at Median Drains

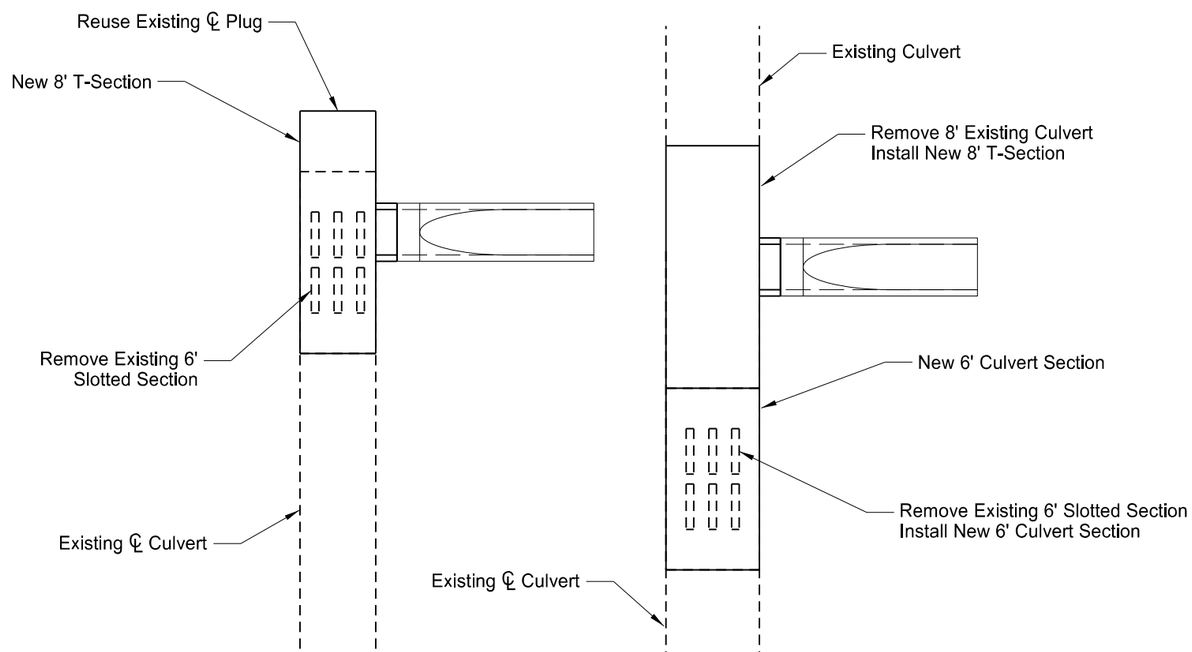
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	20	3



Cross Section View



Plan View

Locations

29th Ave NW
19th Ave NW
Speedway Driveway
62 St SW
54th St NW
CHS Terminal
DOT Driveway

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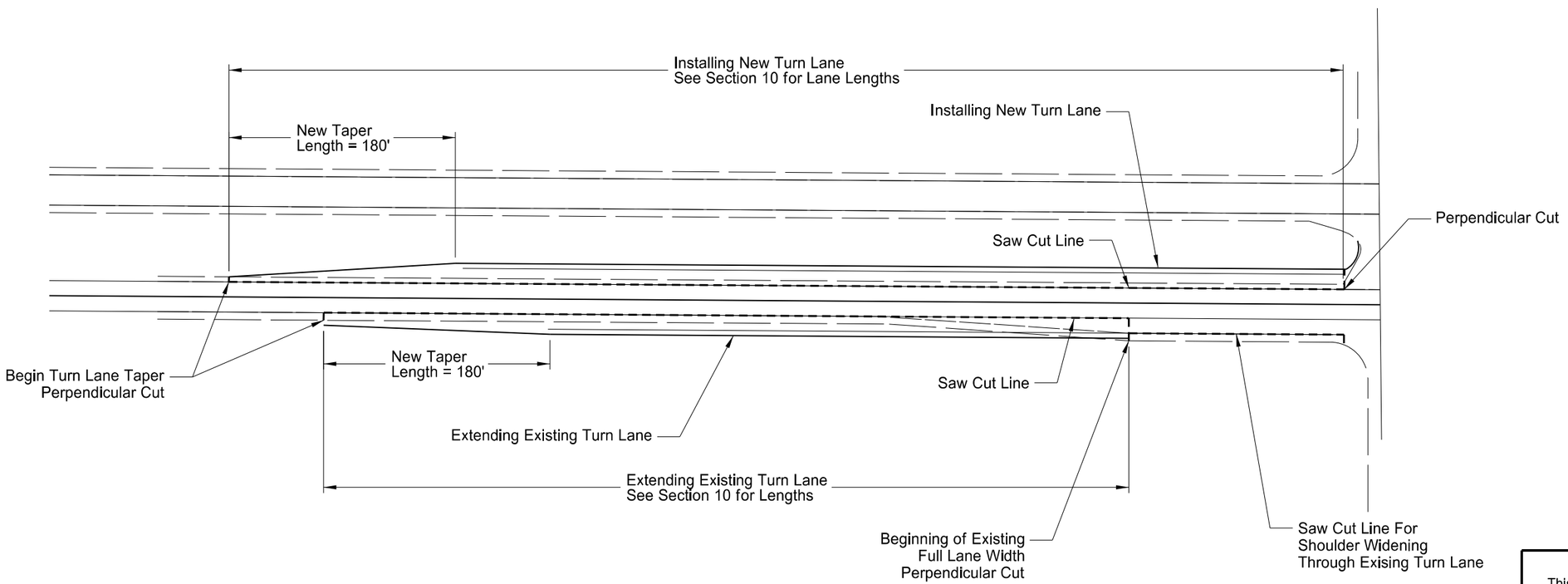
Ditch Detail at Centerline Drains

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	20	4



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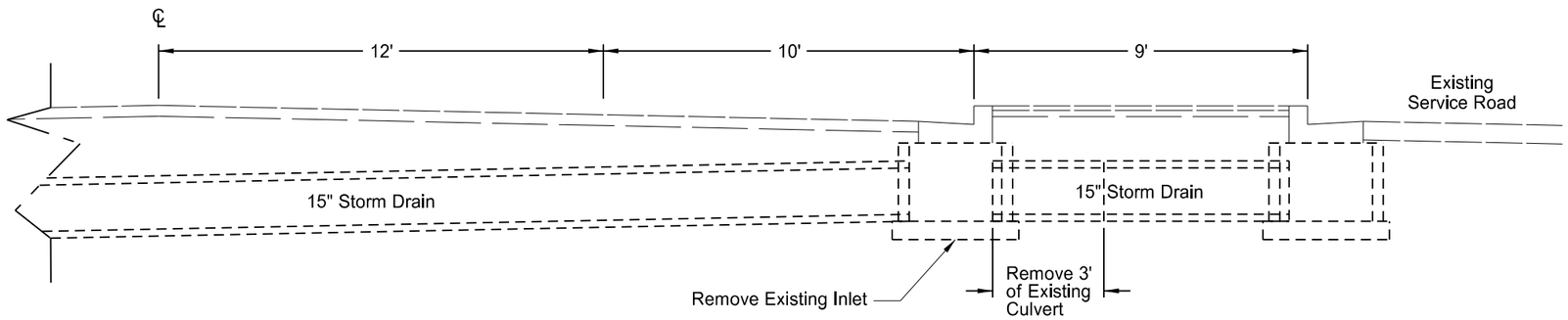
Saw Cut Detail

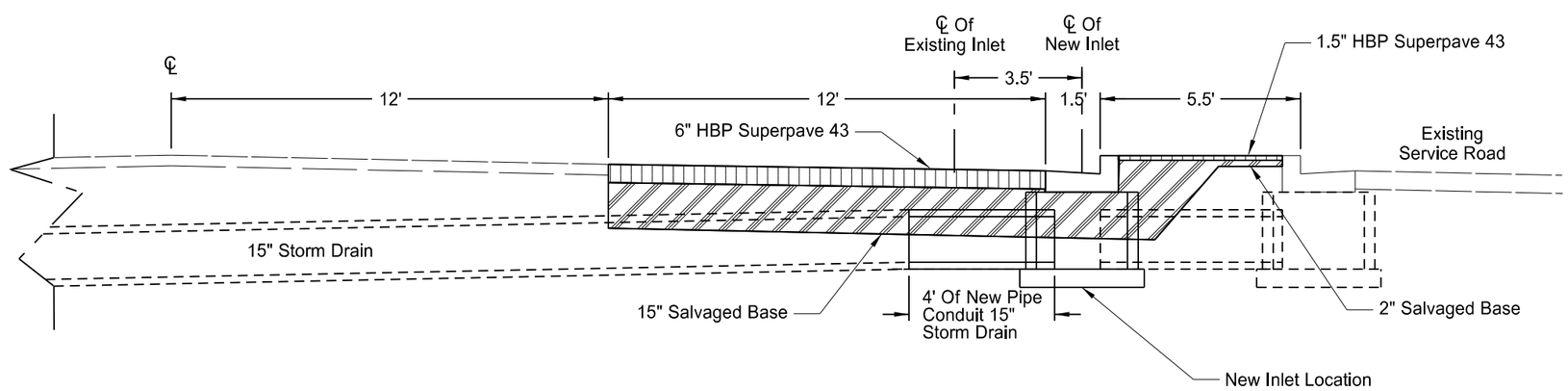
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	20	5



Existing Inlet at 52nd St. SE



Proposed Inlet at 52nd St. SE

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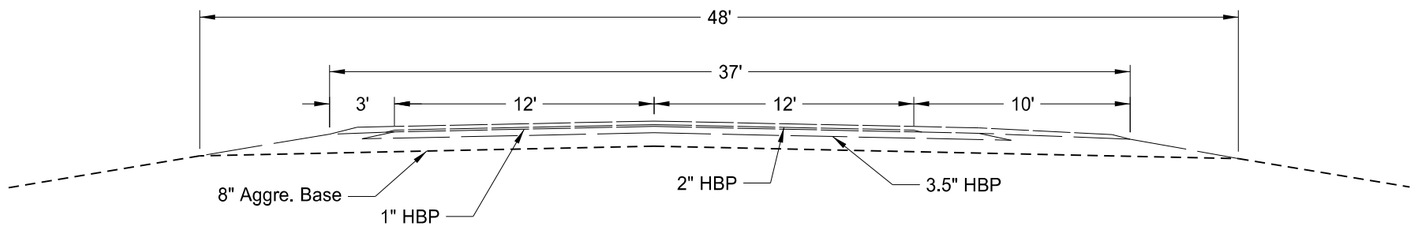
Curb & Gutter Detail

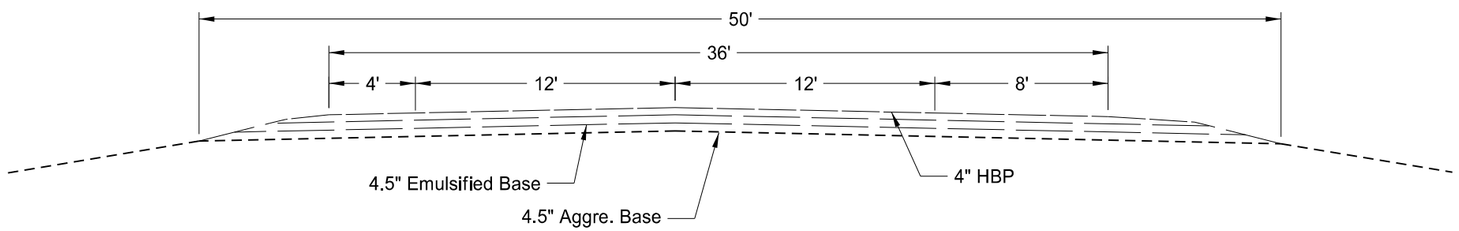
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

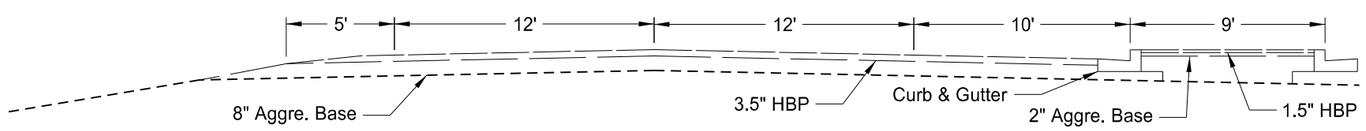
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	1



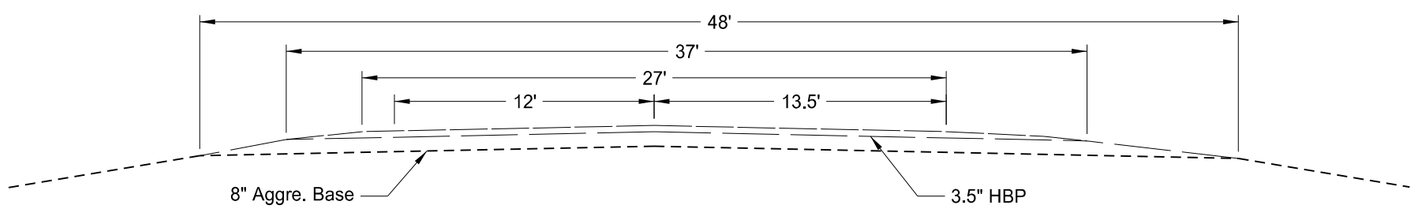
Eastbound RP 130.95 to 145.179



Eastbound RP 148.753 to 150.841



Eastbound RP 150.841 to 151.054



Eastbound RP 151.054 to 156.275

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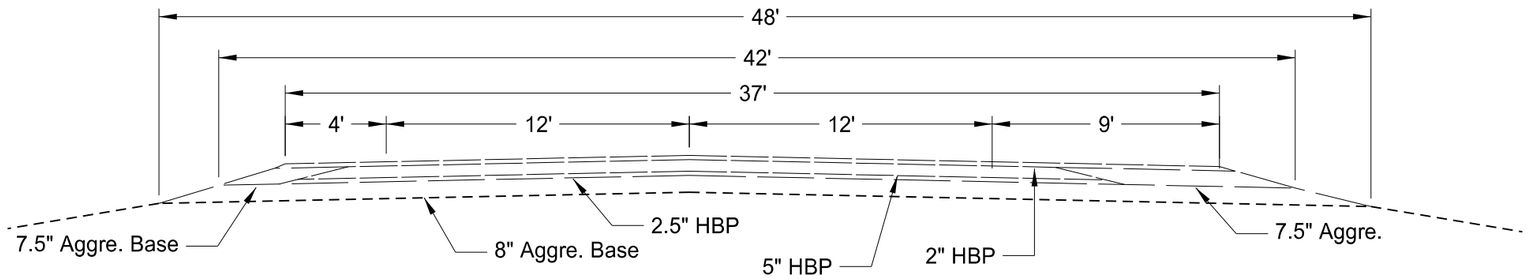
Existing Typicals - Eastbound Existing

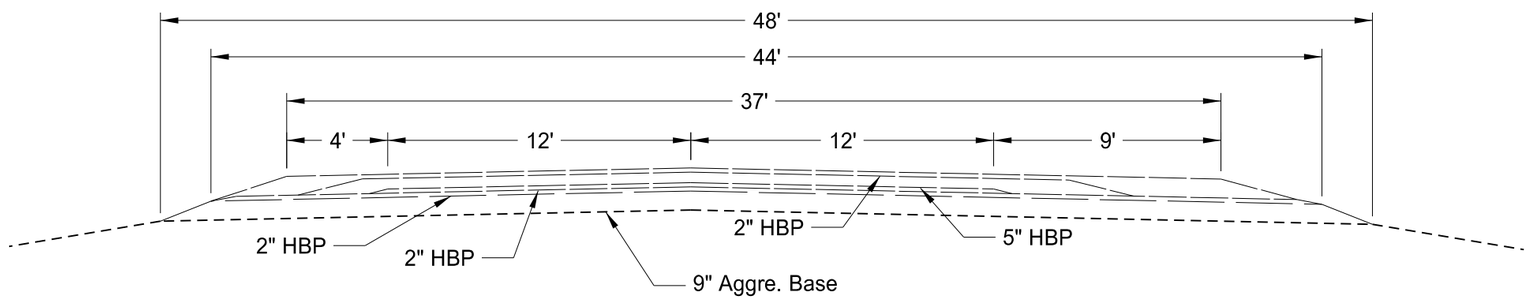
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

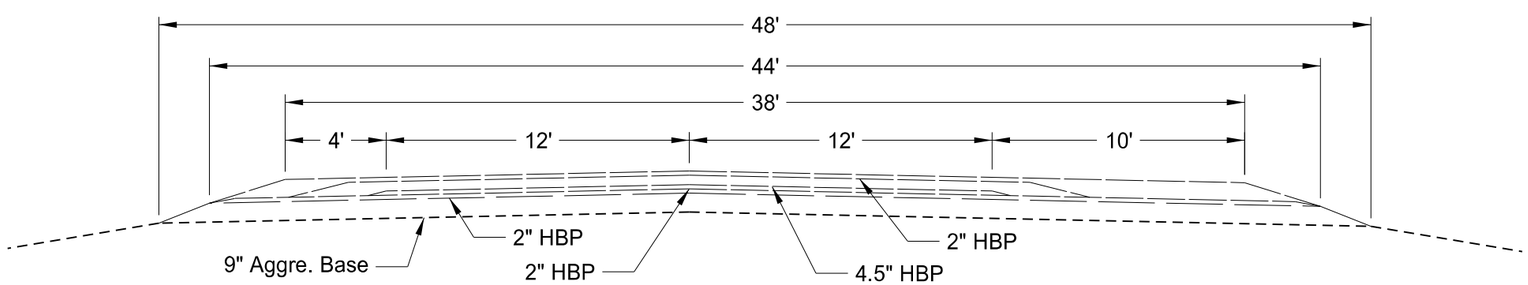
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	2



Westbound RP 137.563 to 139.251



Westbound RP 139.251 to 143.178



Westbound RP 144.326 to 145.179

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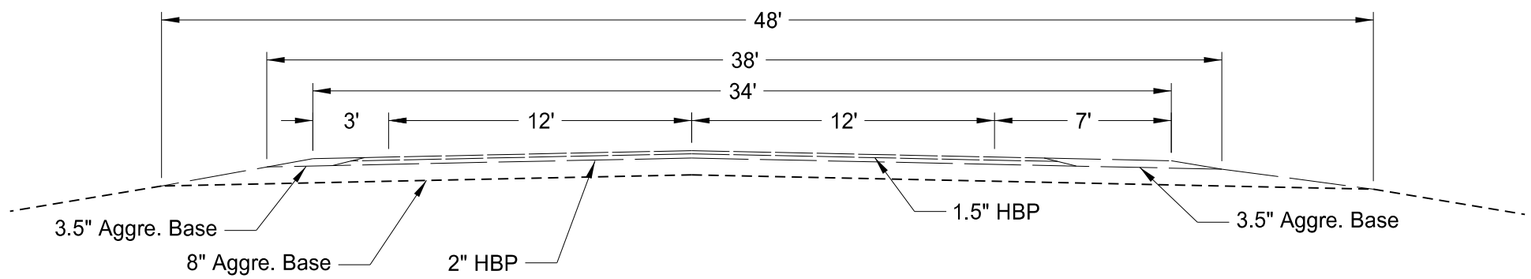
Existing Typicals - Westbound Existing

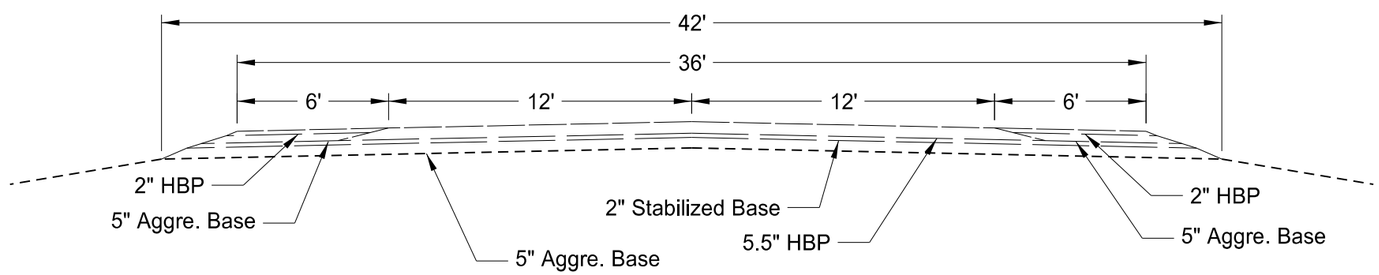
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	3



Westbound RP 148.753 to 150.841



Westbound RP 150.841 to 152.275

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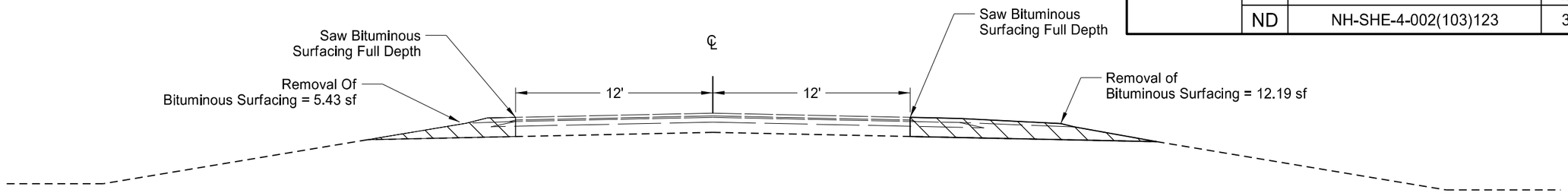
Typical Sections - Westbound Existing

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

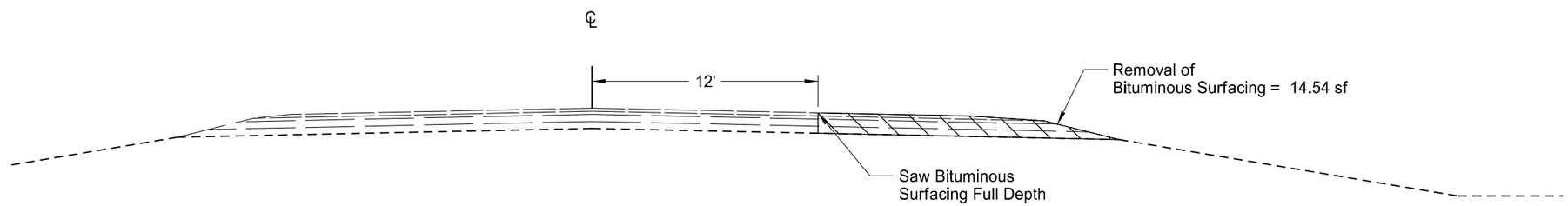
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	4



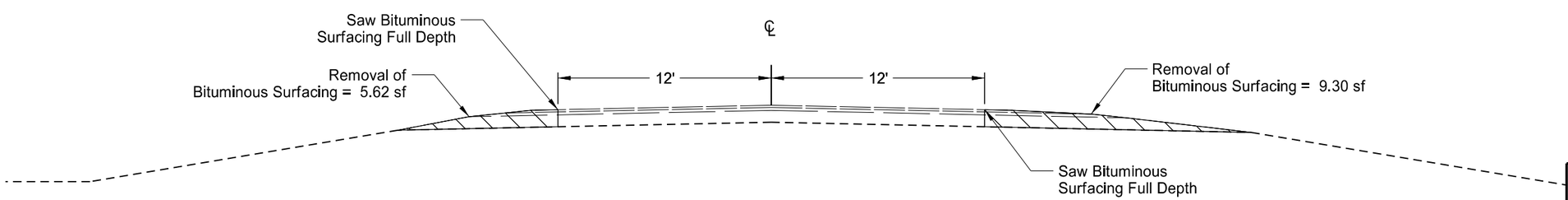
RP 137.795 - S Project Rd - Extend EB Left Turn Lane
RP 139.052 - 29th Ave NW - Extend EB Left Turn Lane
RP 140.306 - 19th Ave NW - Extend EB Left Turn Lane

RP 137.563 to
RP 144.894

RP 139.052 - 29th Ave NW - Install EB Right Turn Lane
RP 140.306 - 19th Ave NW - Extend EB Right Turn Lane
RP 142.64 - CHS Terminal - Extend EB Right Turn Lane
RP 144.894 - Evergreen Ave - Extend EB Right Turn Lane



RP 150.087 - DOT District Drwy - Extend EB Right Turn Lane
RP 150.499 - Frontage Rd Burdick Expy - Extend EB Right Turn Lane



RP 151.291 - 59th St SE - Install EB Left Turn Lane

RP 151.291 - 59th St SE - Extend EB Right Turn Lane

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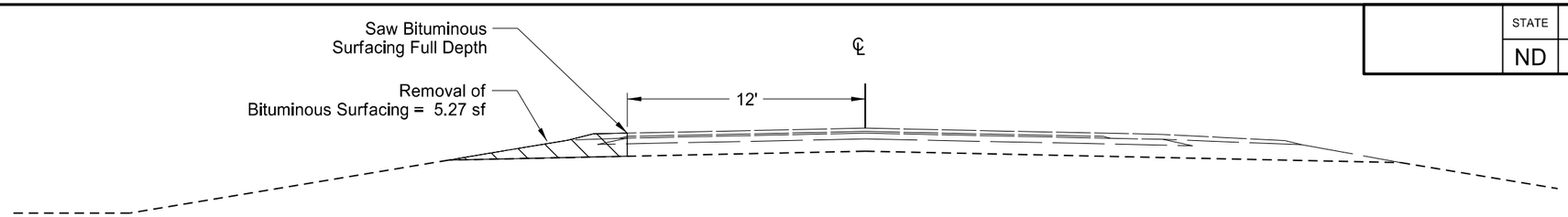
Typical Sections-Removals

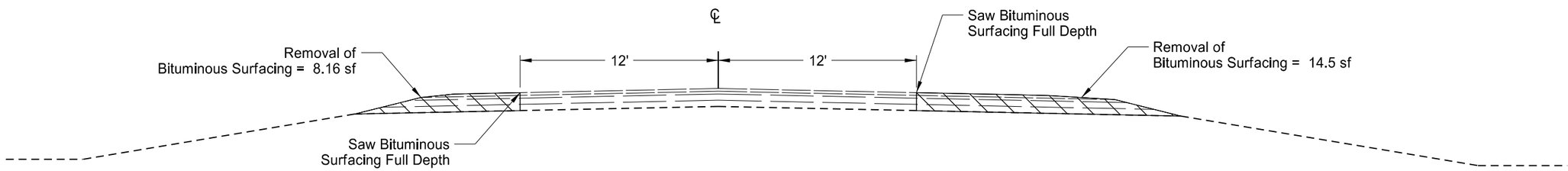
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	5

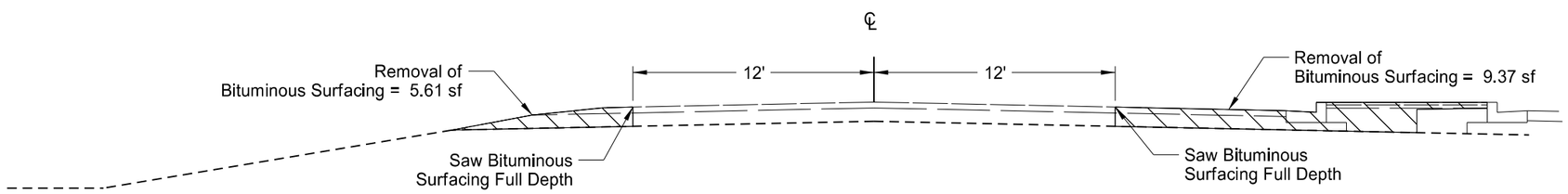


RP 142.259 - 54th Ave NW - Extend EB Left Turn Lane
RP 142.64 - CHS Terminal - Extend EB Left Turn Lane



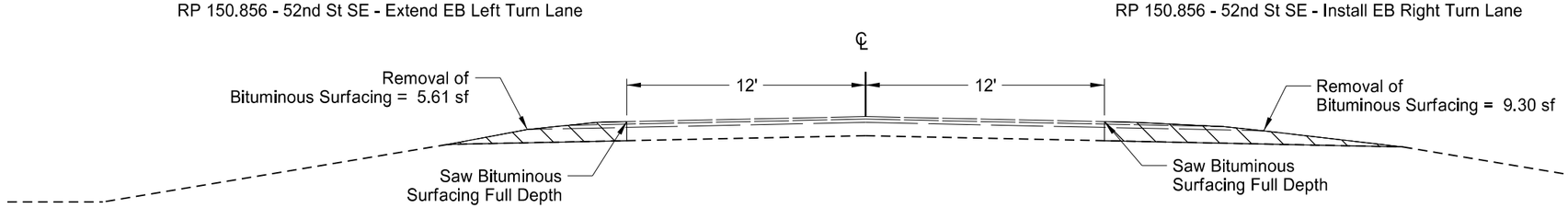
RP 149.856 - 14th Ave SE - Extend EB Left Turn Lane
RP 150.499 - Frontage Rd Burdick Expy - Extend EB Left Turn Lane

RP 149.856 - 14th Ave SE - Extend EB Right Turn Lane



RP 150.856 - 52nd St SE - Extend EB Left Turn Lane

RP 150.856 - 52nd St SE - Install EB Right Turn Lane



RP 151.522 - 64th St SE - Install EB Left Turn Lane
RP 152.05 - 72nd St SE - Extend EB Left Turn Lane

RP 151.522 - 64th St SE - Install EB Right Turn Lane
RP 152.05 - 72nd St SE - Extend EB Right Turn Lane

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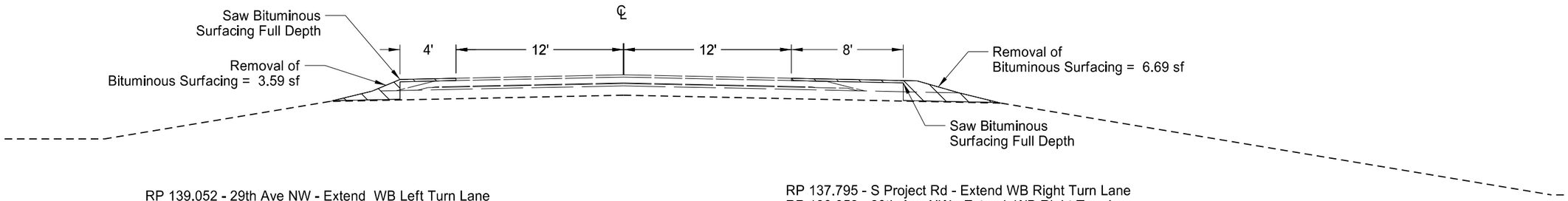
Typical Sections-Removals

Turn Lanes

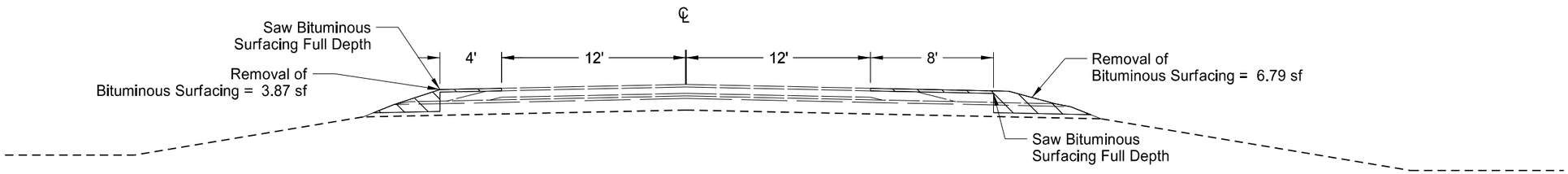
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	6



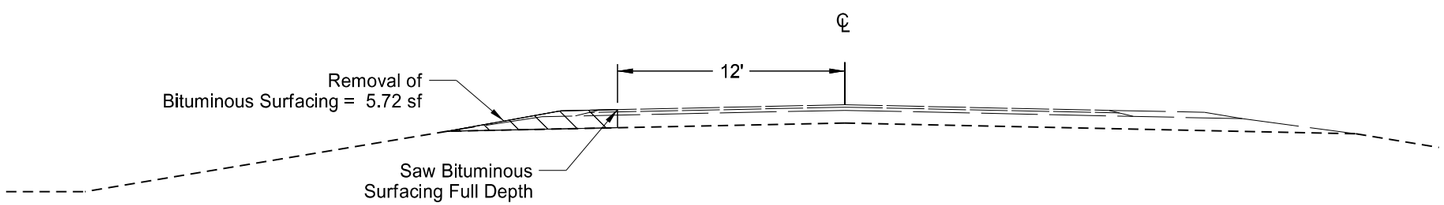
RP 139.052 - 29th Ave NW - Extend WB Left Turn Lane

RP 137.795 - S Project Rd - Extend WB Right Turn Lane
RP 139.052 - 29th Ave NW - Extend WB Right Turn Lane

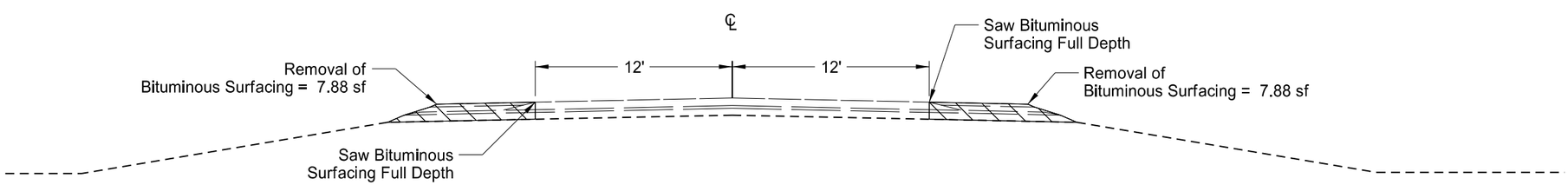


RP 140.587 - Speedway Drvwy - Extend WB Left Turn Lane
RP 141.745 - 62nd St SW - Extend WB Left Turn Lane
RP 142.64 - CHS Terminal - Extend WB Left Turn Lane
RP 142.64 - CHS Terminal - Acceleration Lane

RP 140.306 - 19th Ave NW- Extend WB Right Turn Lane
RP 141.304 - 65th St SW - Extend WB Right Turn Lane
RP 142.64 - CHS Terminal - Extend WB Right Turn Lane



RP 150.087 - DOT District Drwy - Install WB Left Turn Lane



RP 150.856 - 52nd St SE - Extend WB Left Turn Lane

RP 150.856 - 52nd St SE - Extend WB Right Turn Lane

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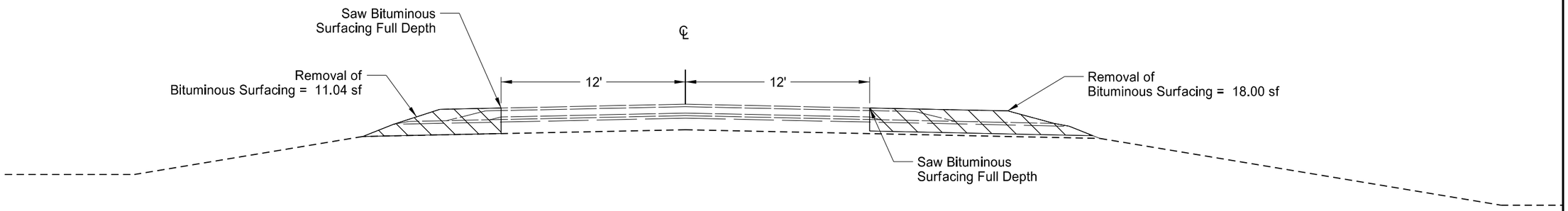
Typical Sections-Removals

Turn Lanes

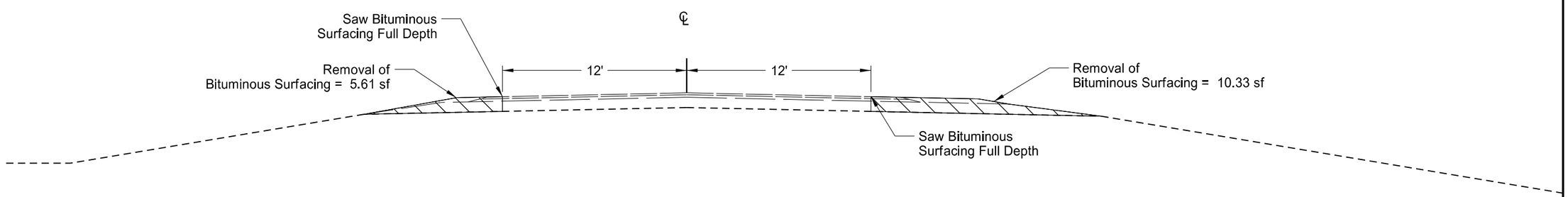
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	7



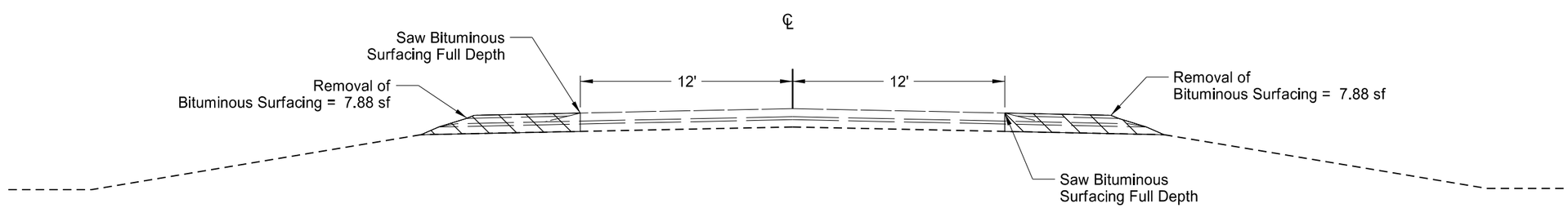
RP 140.306 - 19th Ave NW - Extend WB Left Turn Lane
RP 142.259 - 54th Ave NW - Extend WB Left Turn Lane

RP 142.259 - 54th Ave NW - Extend WB Right Turn Lane



RP 149.856 - 14th Ave SE - Extend WB Left Turn Lane

RP 149.856 - 14th Ave SE - Install WB Right Turn Lane



RP 151.522 - 64th St SE - Install WB Left Turn Lane
RP 152.05 - 72nd St SE - Extend WB Left Turn Lane

RP 151.522 - 64th St SE - Install WB Right Turn Lane
RP 152.05 - 72nd St SE - Extend WB Right Turn Lane

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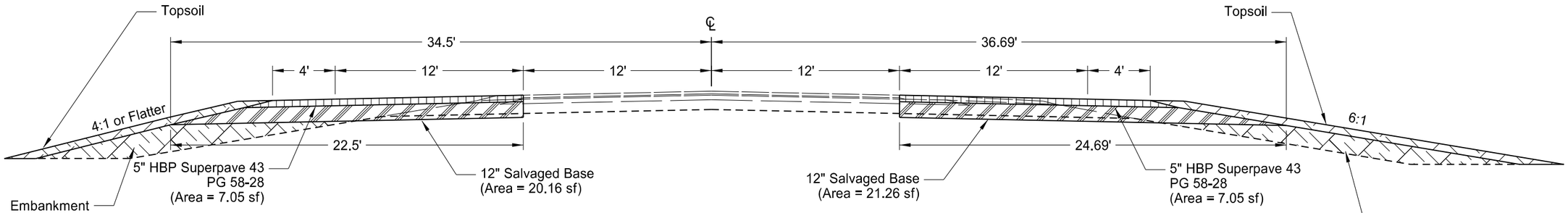
Typical Sections-Removals

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

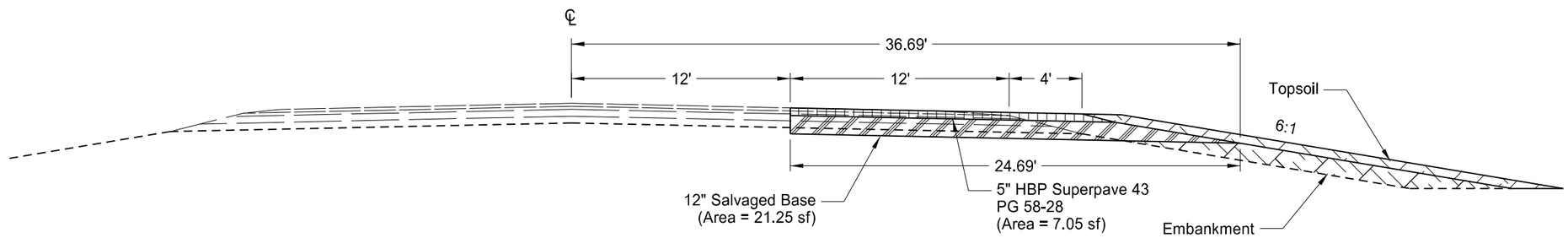
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	8



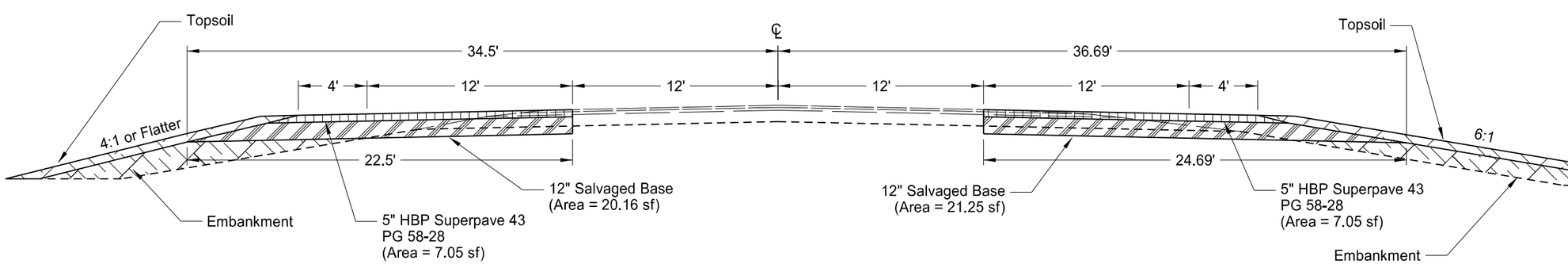
RP 137.795 - S Project Rd - Extend EB Left Turn Lane
RP 139.052 - 29th Ave NW - Extend EB Left Turn Lane
RP 140.306 - 19th Ave NW - Extend EB Left Turn Lane

RP 137.563 to
RP 144.894

RP 139.052 - 29th Ave NW - Install EB Right Turn Lane
RP 140.306 - 19th Ave NW - Extend EB Right Turn Lane
RP 142.64 - CHS Terminal - Extend EB Right Turn Lane
RP 144.894 - Evergreen Ave - Extend EB Right Turn Lane



RP 150.087 - DOT District Drwy - Extend EB Right Turn Lane
RP 150.499 - Frontage Rd Burdick Expy - Extend EB Right Turn Lane



RP 151.291 - 59th St SE - Install EB Left Turn Lane

RP 151.291 - 59th St SE - Extend EB Right Turn Lane

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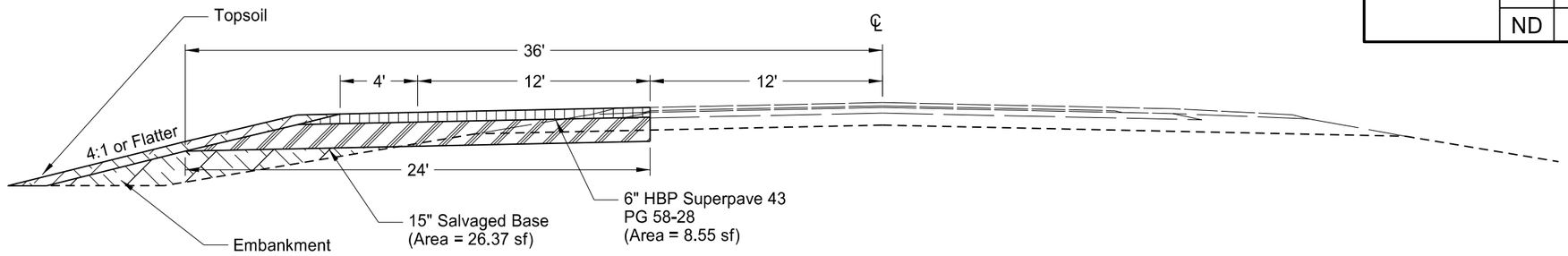
Typical Sections - Eastbound Proposed

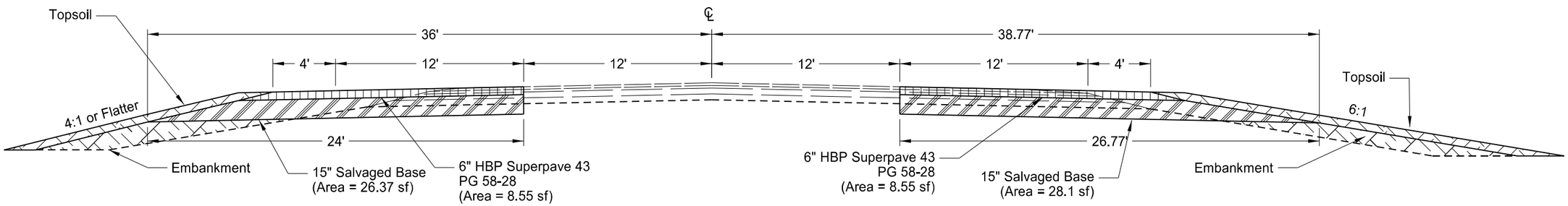
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	9

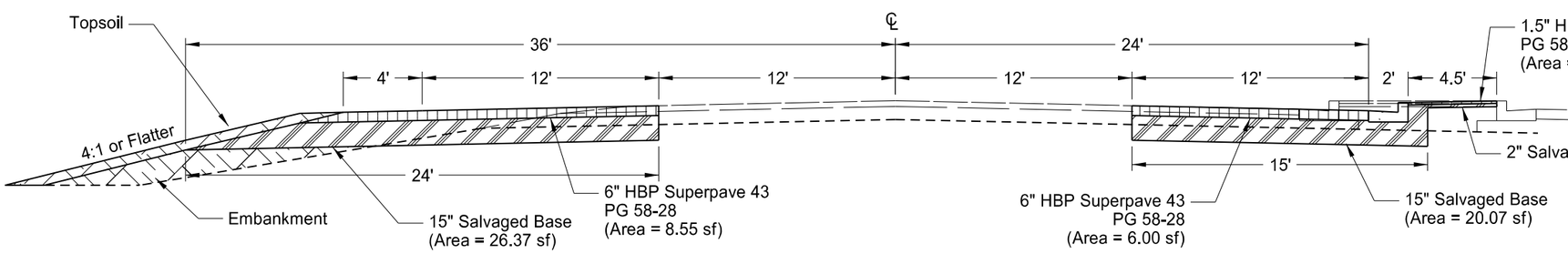


RP 142.259 - 54th Ave NW - Extend EB Left Turn Lane
RP 142.64 - CHS Terminal - Extend EB Left Turn Lane



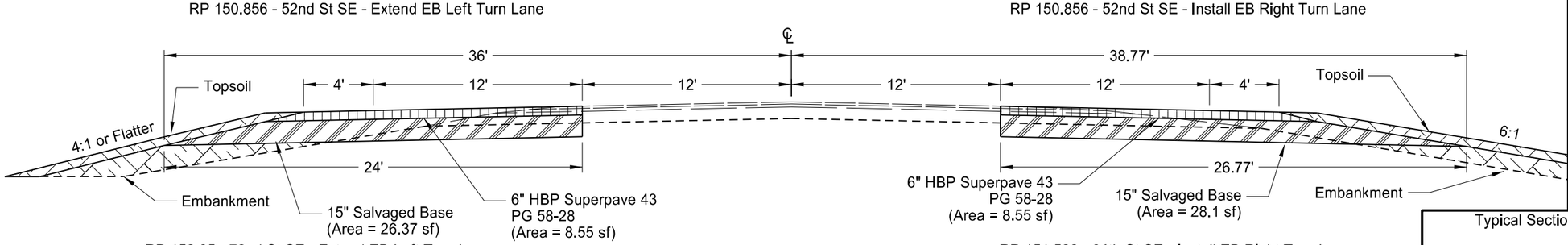
RP 149.856 - 14th Ave SE - Extend EB Left Turn Lane
RP 150.499 - Frontage Rd Burdick Expy - Extend EB Left Turn Lane

RP 149.856 - 14th Ave SE - Extend EB Right Turn Lane



RP 150.856 - 52nd St SE - Extend EB Left Turn Lane

RP 150.856 - 52nd St SE - Install EB Right Turn Lane



RP 152.05 - 72nd St SE - Extend EB Left Turn Lane

RP 151.522 - 64th St SE - Install EB Right Turn Lane
RP 152.05 - 72nd St SE - Extend EB Right Turn Lane

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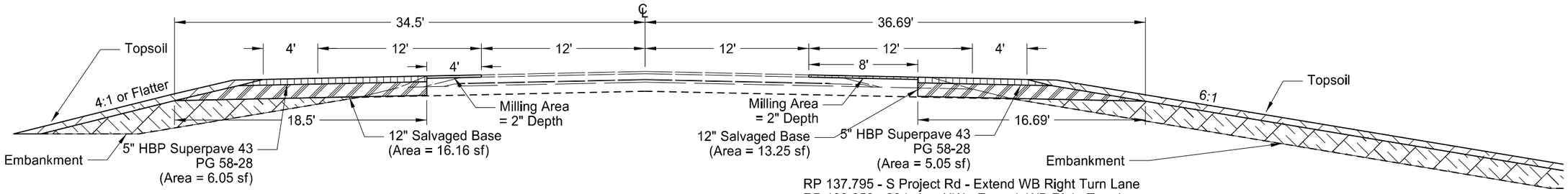
Typical Sections - Eastbound Proposed

Turn Lanes

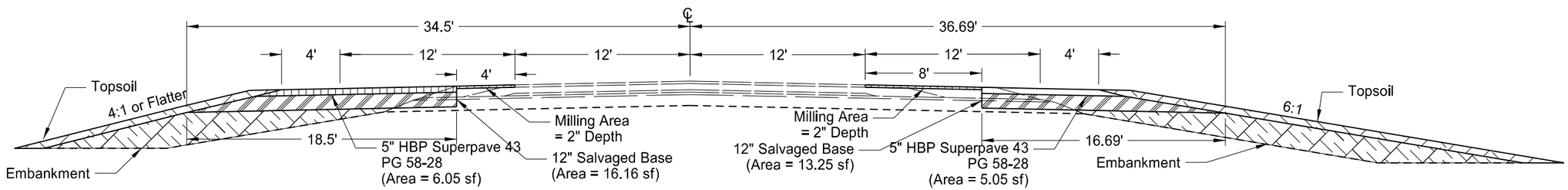
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	10



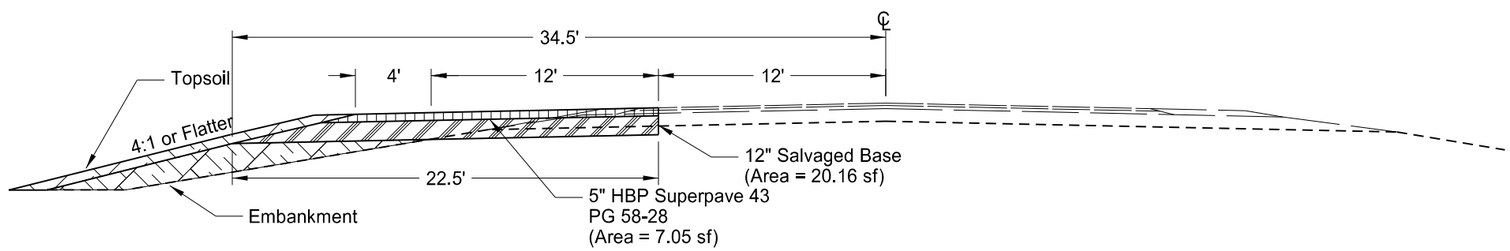
RP 139.052 - 29th Ave NW - Extend WB Left Turn Lane

RP 137.795 - S Project Rd - Extend WB Right Turn Lane
RP 139.052 - 29th Ave NW - Extend WB Right Turn Lane

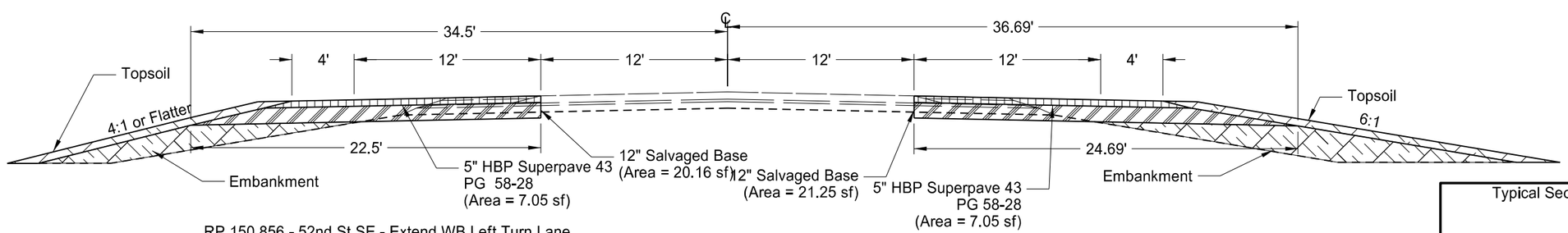


RP 140.587 - Speedway Drvwy - Extend WB Left Turn Lane
RP 141.745 - 62nd St SW - Extend WB Left Turn Lane
RP 142.64 - CHS Terminal - Extend WB Left Turn Lane
RP 142.64 - CHS Terminal - Acceleration Lane

RP 140.306 - 19th Ave NW- Extend WB Right Turn Lane
RP 141.304 - 65th St SW - Extend WB Right Turn Lane
RP 142.64 - CHS Terminal - Extend WB Right Turn Lane



RP 150.087 - DOT District Drwy - Install WB Left Turn Lane



RP 150.856 - 52nd St SE - Extend WB Left Turn Lane

RP 150.856 - 52nd St SE - Extend WB Right Turn Lane

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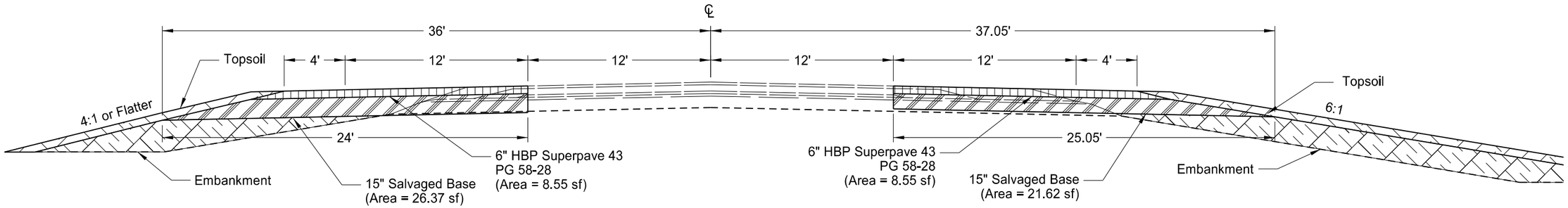
Typical Sections - Westbound Proposed

Turn Lanes

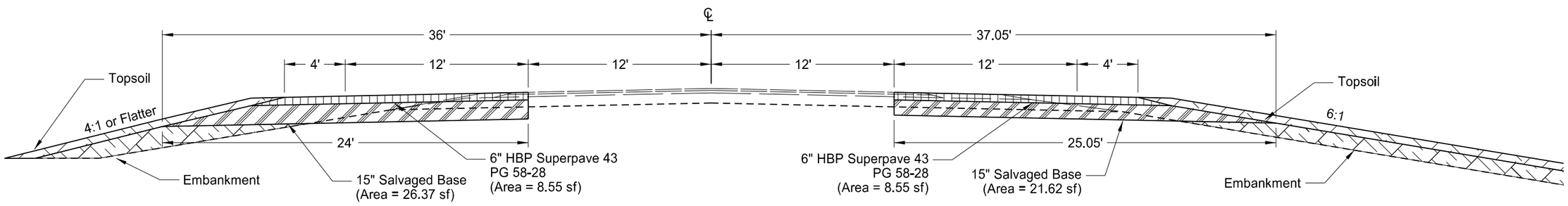
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	11



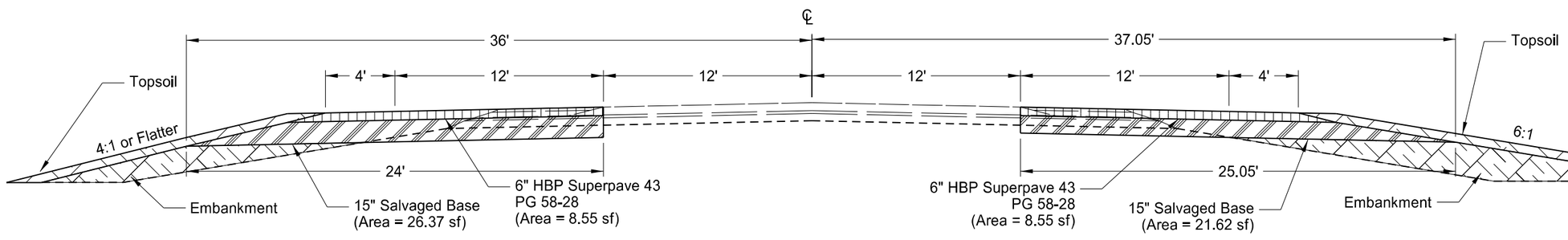
RP 140.306 - 19th Ave NW - Extend WB Left Turn Lane
RP 142.259 - 54th Ave NW - Extend WB Left Turn Lane

RP 142.259 - 54th Ave NW - Extend WB Right Turn Lane



RP 149.856 - 14th Ave SE - Extend WB Left Turn Lane

RP 149.856 - 14th Ave SE - Install WB Right Turn Lane



RP 152.05 - 72nd St SE - Extend WB Left Turn Lane

RP 151.522 - 64th St SE - Install WB Right Turn Lane
RP 152.05 - 72nd St SE - Extend WB Right Turn Lane

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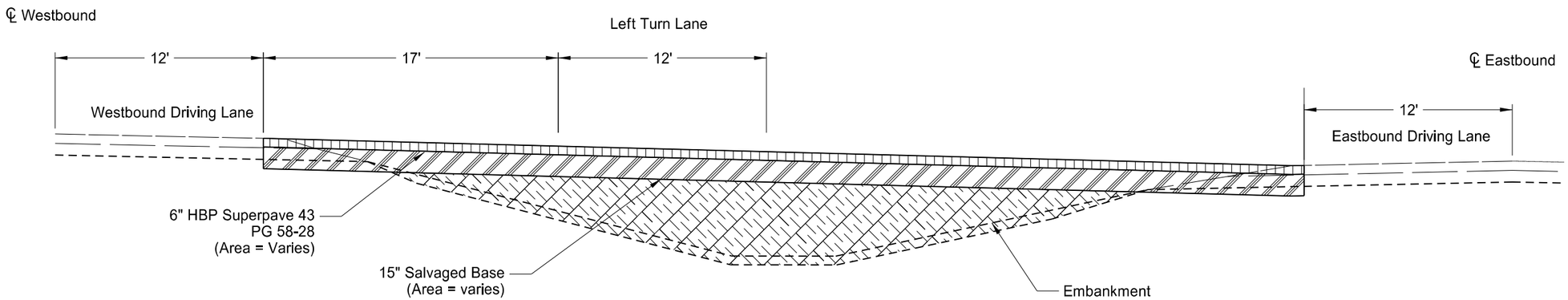
Typical Sections - Westbound Proposed

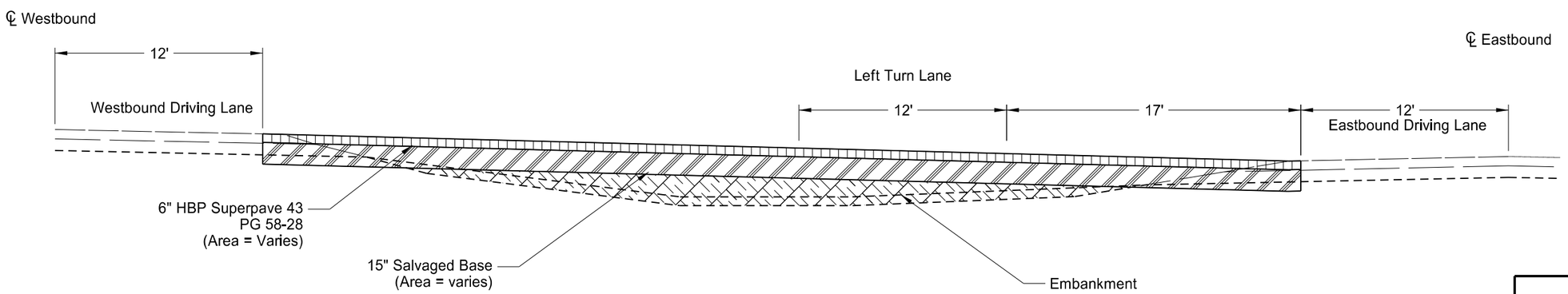
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	30	12



RP 151.522 - 64th St SE - Install WB Positive Offset Left Turn Lane



RP 151.522 - 64th St SE - Install EB Positive Offset Left Turn Lane

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Typical Sections - 64th St SE
Positive Offset Left Turn Lanes

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	50	1

HYDRAULIC DATA FOR NH-SHE-4-002(103)123 (A)

STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
RP 137.69 South Project Road	30" X 192' RCB	30" +30" (B)	108.6	47	2.59	7.03	1614.84	76	1616.36
RP 140.306 19th Ave NW	30" X 110' RCB	30" + two 36" (B)	302.5	91	2.82	10.05	1583.96	147	1585.40
RP 125.78 STA 6642+60	48" X 160' RCP	48" + 36" (B)	1289.0	153.0	5.01	1.49	2002.61	263.0	2006.71

(A) Hydraulic data provided is for smooth-walled (Manning's n=0.012) type conduits.

(B) 36" Jacked or Bored added at this location.

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Culvert Hydraulic Data

US 2

DISTRICT BOUNDARY TO 1 MILE WEST OF SURREY - EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	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)	(A) End Sections Begin	(A) End Sections End	Applicable Backfill Detail
				LF			In		In	In	SY	EA	EA	
RP 137.795 S. Project Rd.	WB Rt.	RP 137.795 S. Project Rd.	WB Rt.	196	30" Jacked or Bored			Reinforced Concrete Pipe (barrel length = 196 LF)	30			Y	Y	D-714-16
								Smooth Walled Steel Pipe	30	0.406				
RP 137.795 S. Project Rd.	WB Rt.	RP 137.795 S. Project Rd.	WB Rt.	6	30"			Reinforced Concrete Pipe - Class III (barrel length = 6 LF)	30					D-714-27
RP 139.052 29th Ave NW	EB Rt.	RP 139.052 29th Ave NW	EB Rt.	8	24"			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24					D-714-27
RP 139.052 29th Ave NW	WB Rt.	RP 139.052 29th Ave NW	WB Lt.	8	24" to 18" T-Section			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24				18" Traversable	D-714-27
RP 140.306 19th Ave NW	EB Rt.	RP 104.306 19th Ave NW	EB Rt.	8	24"			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24					D-714-27
RP 140.306 19th Ave NW	EB Lt.	RP 140.306 19th Ave NW	EB Lt.	8	24" to 18" T-Section			Reinforced Concrete Pipe - Class III (barrell length = 8 LF)	24				18" Traversable	D-714-27
RP 140.306 19th Ave NW	EB Lt.	RP 140.306 19th Ave NW	EB Lt.	8	24"			Reinforced Concrete Pipe - Class III (barrell length = 8 LF)	24					D-714-27
RP 140.306 19th Ave NW	WB Rt.	RP 140.306 19th Ave NW	WB Rt.	8	30"			Reinforced Concrete Pipe - Class III (barrell length = 8 LF)	30					D-714-27
RP 140.306 19th Ave NW	WB Rt.	RP 140.306 19th Ave NW	WB Rt.	112	36" Jacked or Bored			Reinforced Concrete Pipe (barrel length = 112 LF)	36			Y	Y	D-714-16
								Smooth Walled Steel Pipe	36	0.469				
RP 140.306 19th Ave NW	WB Rt.	RP 140.306 19th Ave NW	WB Rt.	112	36" Jacked or Bored			Reinforced Concrete Pipe (barrel length = 112 LF)	36			Y	Y	D-714-16
								Smooth Walled Steel Pipe	36	0.469				

(A) Not paid for separately, to be included in the price bid for Pipe Conduit.

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Pipe List

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	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)	(A) End Sections Begin	(A) End Sections End	Applicable Backfill Detail
				LF			In		In	In	SY	EA	EA	
RP 140.587 Speedway Dr.	WB Lt.	RP 140.587 Speedway Dr.	WB Lt.	8	24" to18" T-Section			Reinforced Concrete Pipe - Class III (barrell length = 8 LF)	30					D-714-27
RP 140.587 Speedway Dr.	WB Lt.	RP 140.587 Speedway Dr.	WB Lt.	8	24" to18" T-Section			Reinforced Concrete Pipe - Class III (barrell length = 8 LF)	24				18" Traversable	D-714-27
RP 140.587 Speedway Dr.	WB Lt.	RP 140.587 Speedway Dr.	WB Lt.	4	24"			Reinforced Concrete Pipe - Class III (barrell length = 4 LF)	24					D-714-27
RP 141.745 62nd St SW	WB Lt.	RP 141.745 62nd St SW	WB Lt.	8	30" to 18" T-Section			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	30				18" Traversable	D-714-27
RP 142.259 54th St NW	WB Lt.	RP 142.259 54th St NW	WB Lt.	8	24" to 18" T-Section			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24				18" Traversable	D-714-27
RP 142.64 CHS Terminal	WB Lt.	RP 142.64 CHS Terminal	WB Lt.	8	18" to 18" T-Section			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	18				18" Traversable	D-714-27
RP 149.856 14th Ave SE	WB Rt.	RP 149.856 14th Ave SE	WB Rt.	8	30			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	30					D-714-27
RP 150.087 DOT District Drwy	WB Lt.	RP 150.087 DOT District Drwy	WB Lt.	8	24" to 18" T-Section			Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24				18" Traversable	D-714-27
RP 150.087 DOT District Drwy	WB Lt.	RP 150.087 DOT District Drwy	WB Lt.	6	24			Reinforced Concrete Pipe - Class III (barrel length = 6 LF)	24					D-714-27
RP 150.856 52nd St SE	EB Lt.	RP 150.856 52nd St SE	EB Lt.	10			15"	Reinforced Concrete Pipe - Class III (barrel length = 10 LF)	15					D-714-27
RP 150.856 52nd St SE	EB Rt.	RP 150.856 52nd St SE	EB Rt.	4			15"	Reinforced Concrete Pipe - Class III (barrell length =4 LF)	15					D-714-27

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Pipe List

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	51	3

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)	(A) End Sections Begin	(A) End Sections End	Applicable Backfill Detail
				LF			In		In	In	SY	EA	EA	
RP 151.522 64th St SE	WB Lt.	RP 151.522 64th St SE	WB Lt.	8	24" to 24" T-Section			Reinforced Concrete Pipe - Class III (barrell length =8 LF)	24					D-714-27
RP 151.522 64th St SE	WB Lt.	RP 151.522 64th St SE	WB Lt.	8	24" to 24" T-Section			Reinforced Concrete Pipe - Class III (barrell length =8 LF)	24					D-714-27
RP 151.522 64th St SE	WB Lt.	RP 151.522 64th St SE	WB Lt.	2.5	24" Riser			Reinforced Concrete Pipe - Class III (barrell length =2.5 LF)	24					
RP 151.522 64th St SE	WB Lt.	RP 151.522 64th St SE	WB Lt.	250	24"			Reinforced Concrete Pipe - Class III (barrell length = 250 LF)	24				24" Traversable	D-714-27
RP 152.05 72nd St SE	WB Lt.	RP 152.05 72nd St SE	WB Lt.	32		18		Reinforced Concrete Pipe - Class III (barrel length = 32 LF)	18			Y	Y	
								Zinc Coated Steel (2-2/3" x 1/2" Ribs)	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.064				
								Polymeric Coated Steel (over zinc or aluminum coated steel)	18	0.064				
6629+73	86' RT	6630+55	86' RT	82'		18"		Reinforced Concrete Pipe - Class III (barrel length = 82 LF)	18			Y	Y	
								Zinc Coated Steel (2-2/3" x 1/2" Ribs)	18	0.064				
								Aluminum Coated Steel (Type 2)	18	0.064				
								Polymeric Coated Steel (over zinc or aluminum coated steel)	18	0.064				
6642+60	51.5' RT	6642+60	124.5' LT	176'	36" Jacked or Bored			Reinforced Concrete Pipe (barrel length = 176 LF)	36			Y	Y	D-714-16
								Smooth Walled Steel Pipe	36	0.469				

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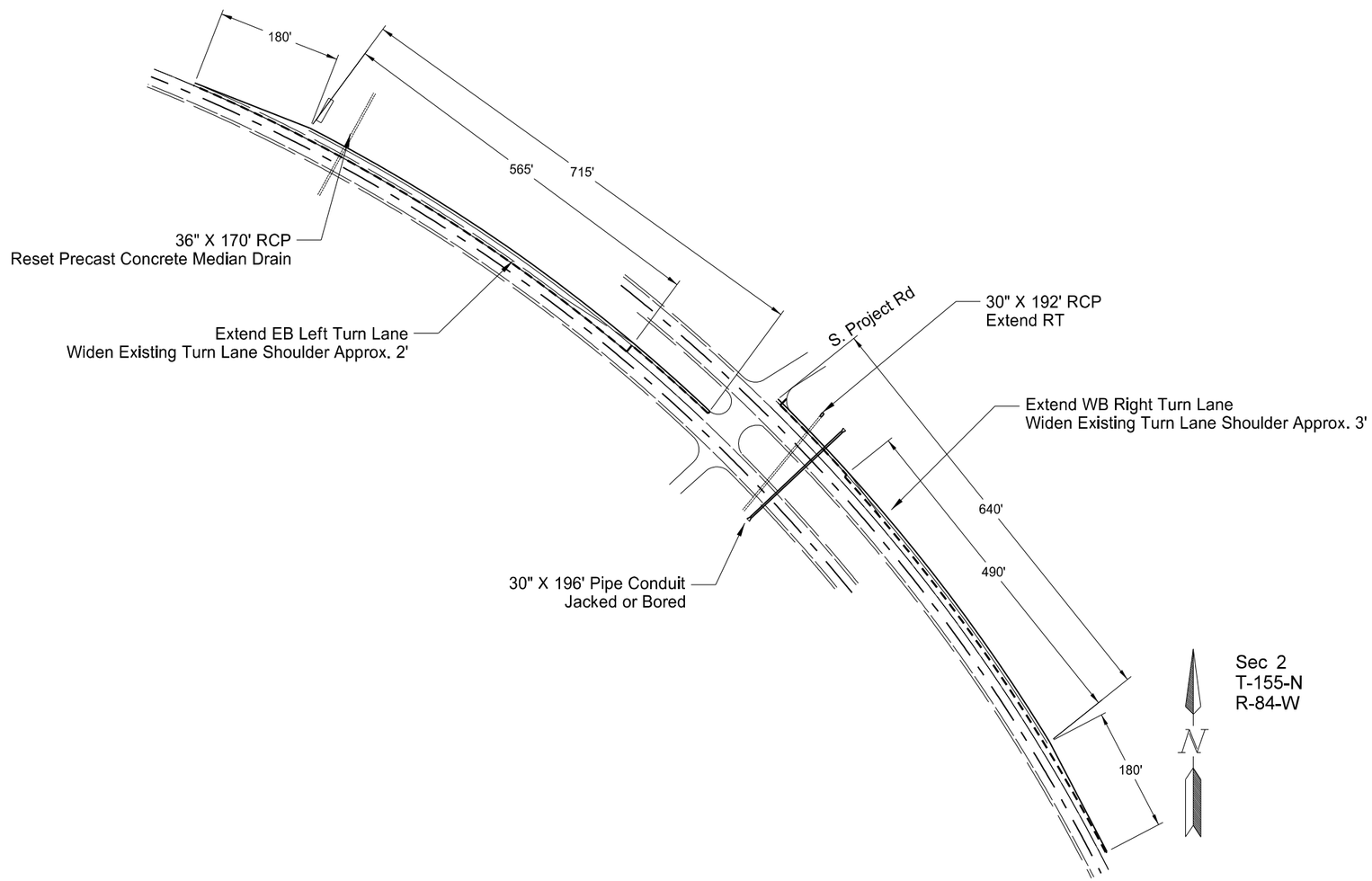
Pipe List

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	1



Saw Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	916 LF
Westbound Right Turn Lane	838 LF

Remove and Relay End Section - All Types and Sizes

30" X 192' RCP RT	1 EA

Reset Precast Concrete Median Drain

36" X 170' RCP	1 EA

Milling Pavement Surface

Westbound Right Turn Lane	595 SY

Pipe Conduit 30 IN - Jacked or Bored

South Project Rd	196 LF

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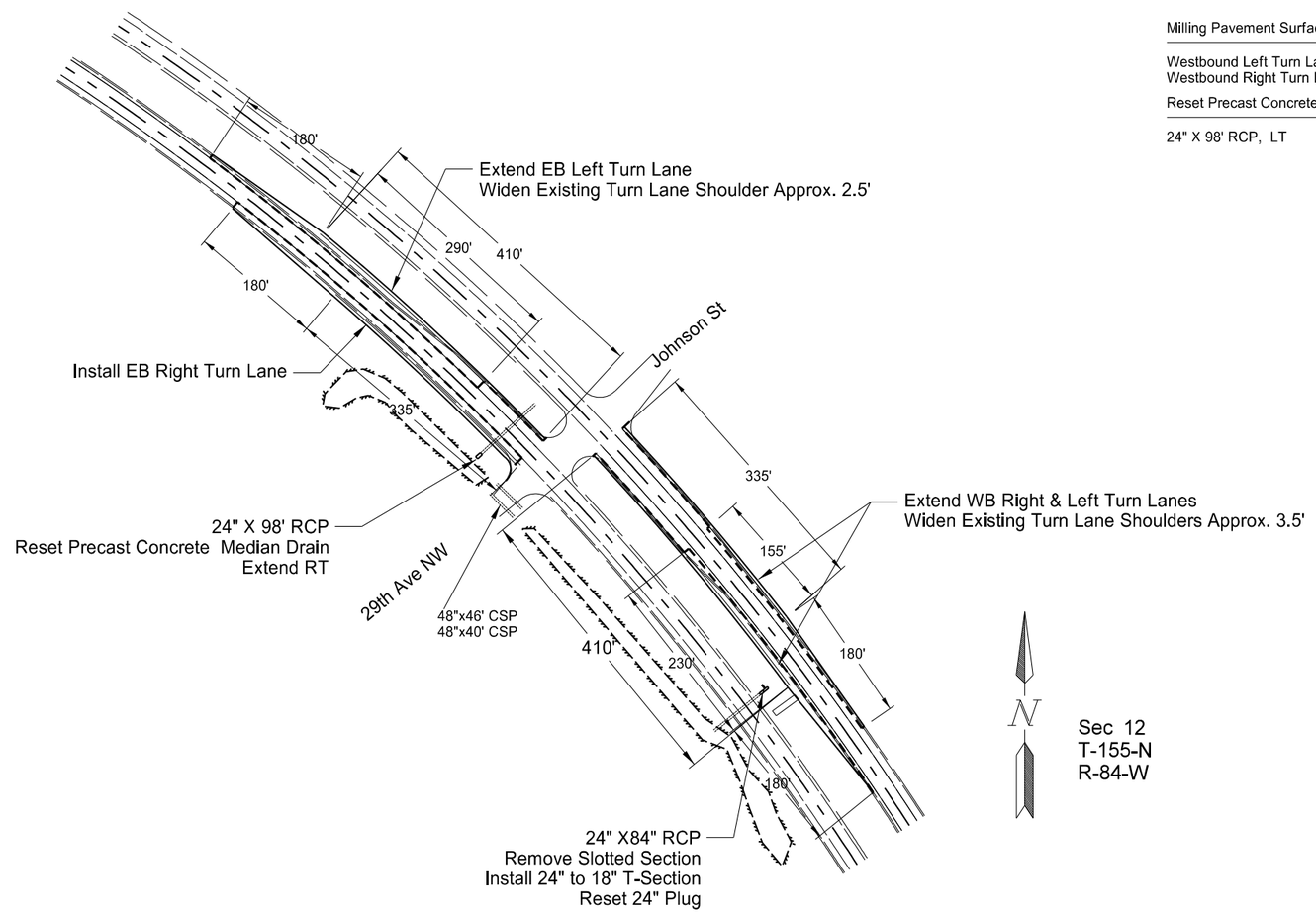
Plan Sheet

South Project Rd

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	2



Saw Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	614 LF
Eastbound Right Turn Lane	545 LF
Westbound Left Turn Lane	604 LF
Westbound Right Turn Lane	543 LF

Remove and Relay End Section - All Types and Sizes

24" X 98' RCP, RT	1 EA

Removal of Culverts - All Types and Sizes

24" X 84' RCP, LT	12 LF

Milling Pavement Surface

Westbound Left Turn Lane	182 SY
Westbound Right Turn Lane	298 SY

Reset Precast Concrete Median Drain

24" X 98' RCP, LT	1 EA

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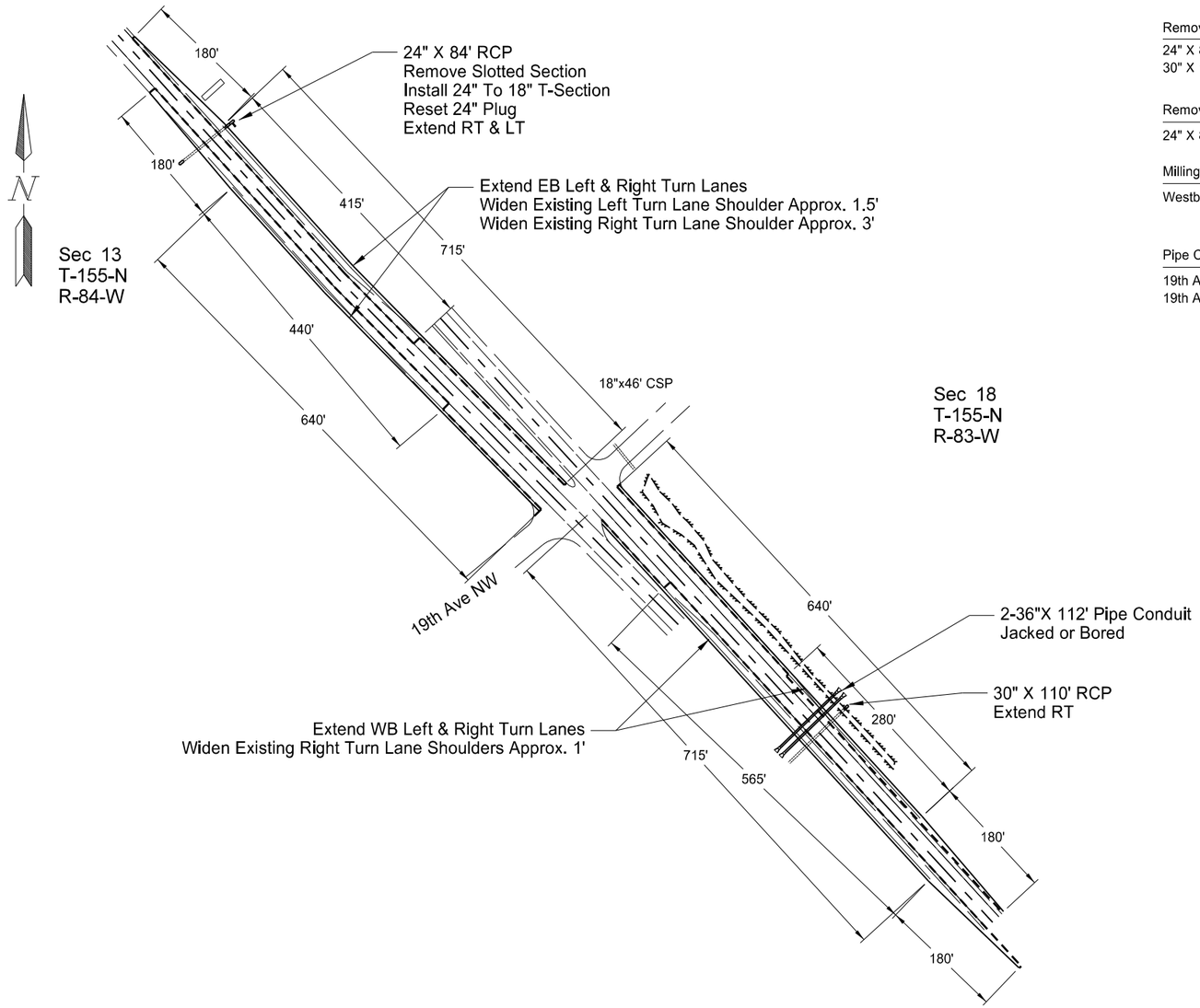
Plan Sheet

29th Ave NW/Johnson St

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	3



Saw Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	915 LF
Eastbound Right Turn Lane	858 LF
Westbound Left Turn Lane	895 LF
Westbound Right Turn Lane	830 LF

Remove and Relay End Sections - All Types and Sizes

24" X 84' RCP RT	1 EA
30" X 100' RCP RT	1 EA

Removal of Culverts - All Types and Sizes

24" X 84' RCP LT	6 LF

Milling Pavement Surface

Westbound Right Turn Lane	410 SY

Pipe Conduit 36 IN - Jacked or Bored

19th Ave NW	112 LF
19th Ave NW	112 LF

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Plan Sheet

19th Ave NW

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

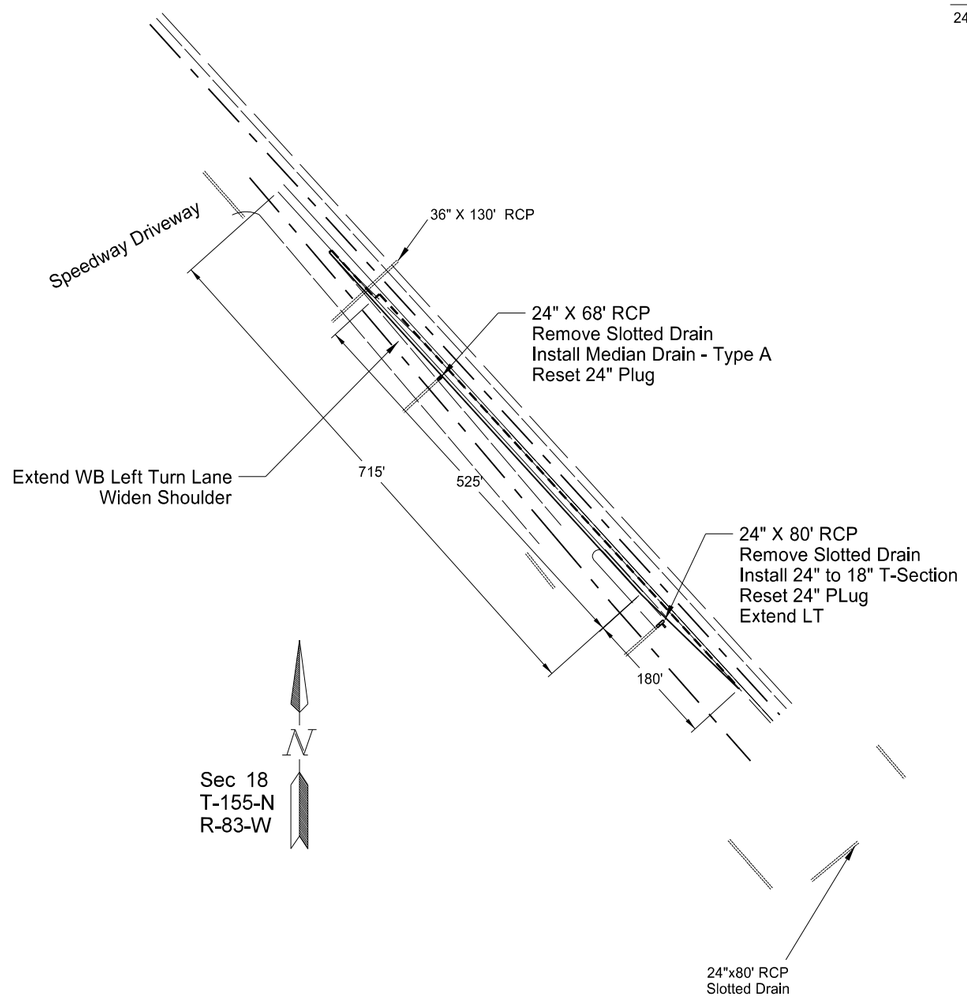
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	4

Saw Bituminous Surfacing - Full Depth	
Westbound Left Turn Lane	802 LF

Removal of Culverts - All Types and Sizes	
24" X 68' RCP LT	6 LF
24" X 80' RCP LT	10 LF

Milling Pavement Surface	
Westbound Left Turn Lane	345 SY

Median Drain Precast Concrete - Type A	
24" X 68' RCP LT	1 EA



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Plan Sheet

Speedway Driveway

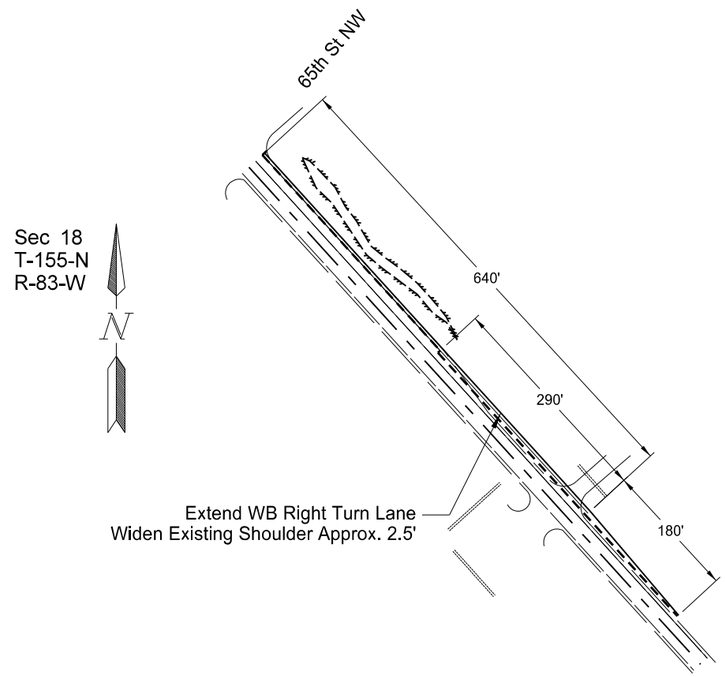
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	5

Saw Bituminous Surfacing - Full Depth	
Westbound Right Turn Lane	832 LF

Milling Pavement Surface	
Westbound Right Turn Lane	417 SY



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Plan Sheet

65th St. NW

Turn Lanes

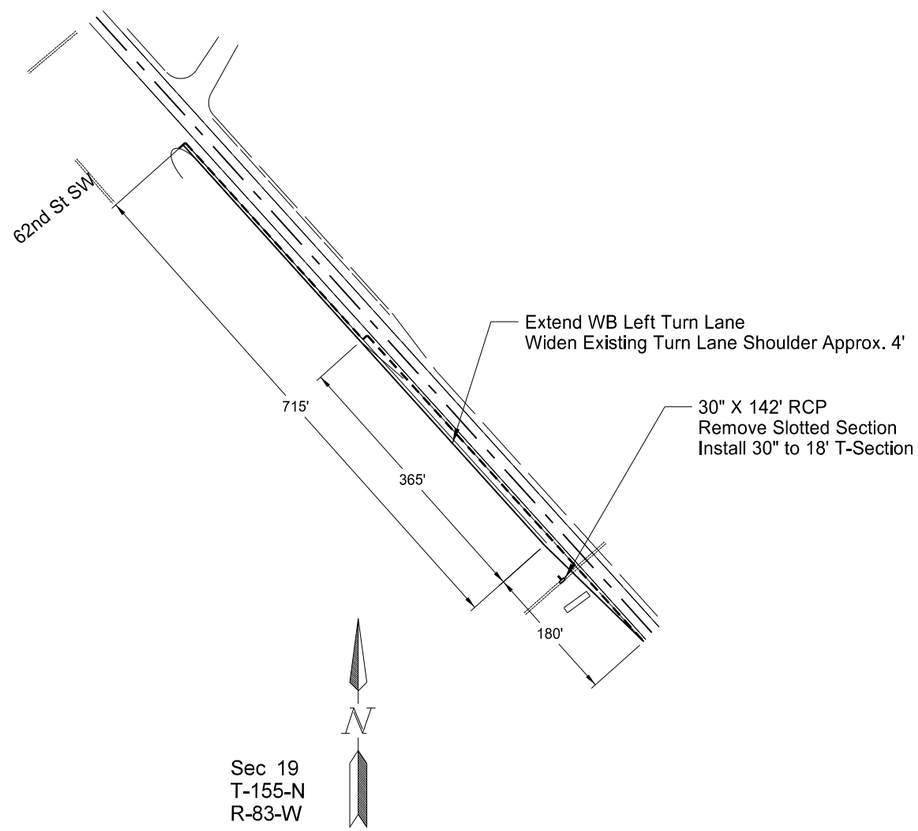
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	6

Saw Bituminous Surfacing - Full Depth	
Westbound Left Turn Lane	913 LF

Milling Pavement Surface	
Westbound Left Turn Lane	242 SY

Removal of Culverts - All Types and Sizes	
30" X 142' RCP LT	8 LF



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Plan Sheet

62nd St. SW

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

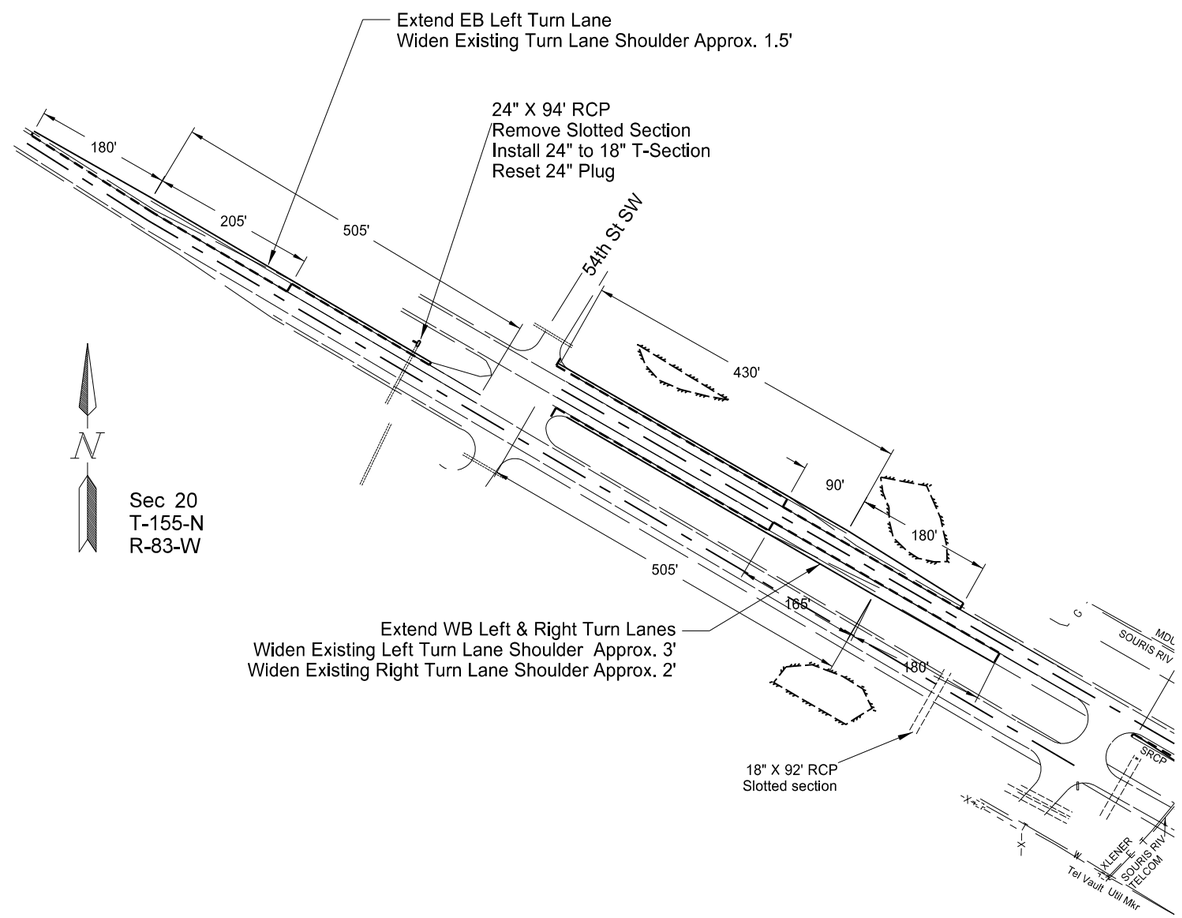
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	7

Saw Cut Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	705 LF
Westbound Left Turn Lane	729 LF
Westbound Right Turn Lane	638 LF

Removal Of Culverts - All Types and Sizes

24" X94' RCP LT	6 LF



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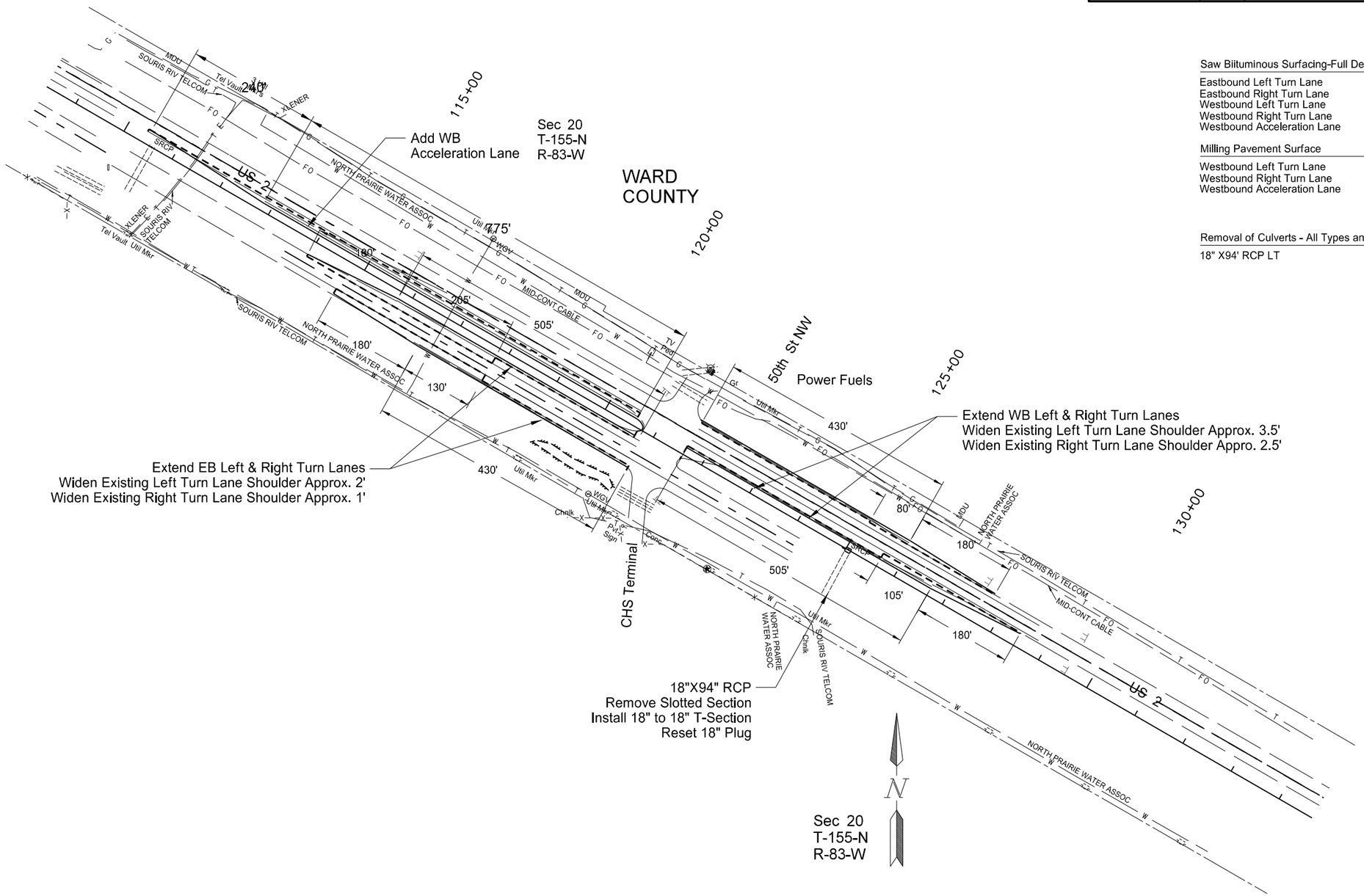
Plan Sheet

54th St. NW

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	8



Saw Biltuminous Surfacing-Full Depth

Eastbound Left Turn Lane	714 LF
Eastbound Right Turn Lane	642 LF
Westbound Left Turn Lane	722 LF
Westbound Right Turn Lane	616 LF
Westbound Acceleration Lane	1035 LF

Milling Pavement Surface

Westbound Left Turn Lane	127 SY
Westbound Right Turn Lane	230 SY
Westbound Acceleration Lane	451 SY

Removal of Culverts - All Types and Sizes

18" X94' RCP LT	6 LF

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Plan Sheet

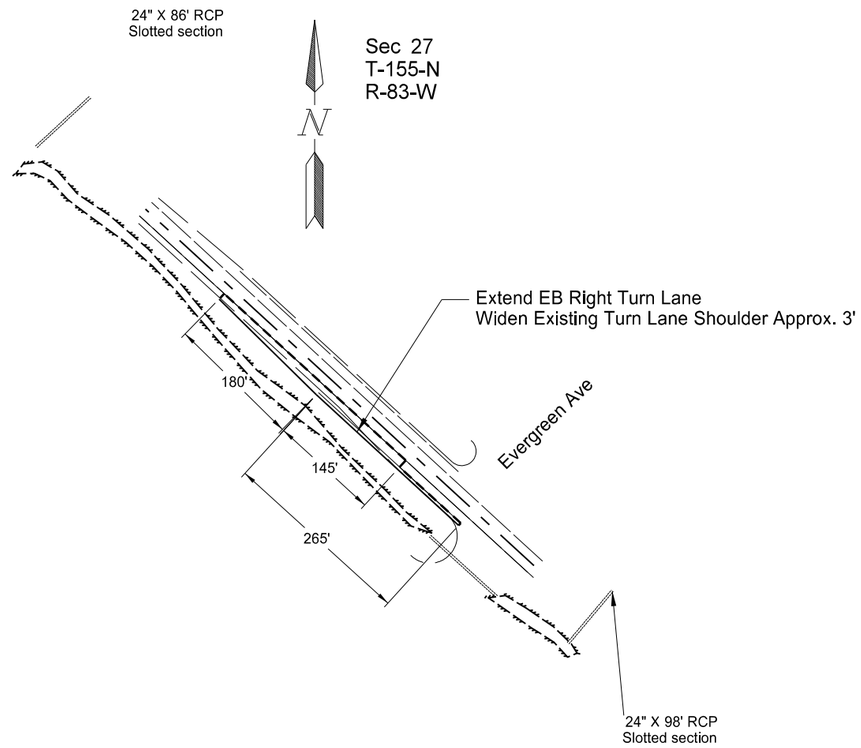
CHS Terminal/Power Fuels

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	9

Saw Bituminous Surfacing-Full Depth	
Eastbound Right Turn Lane	469 LF



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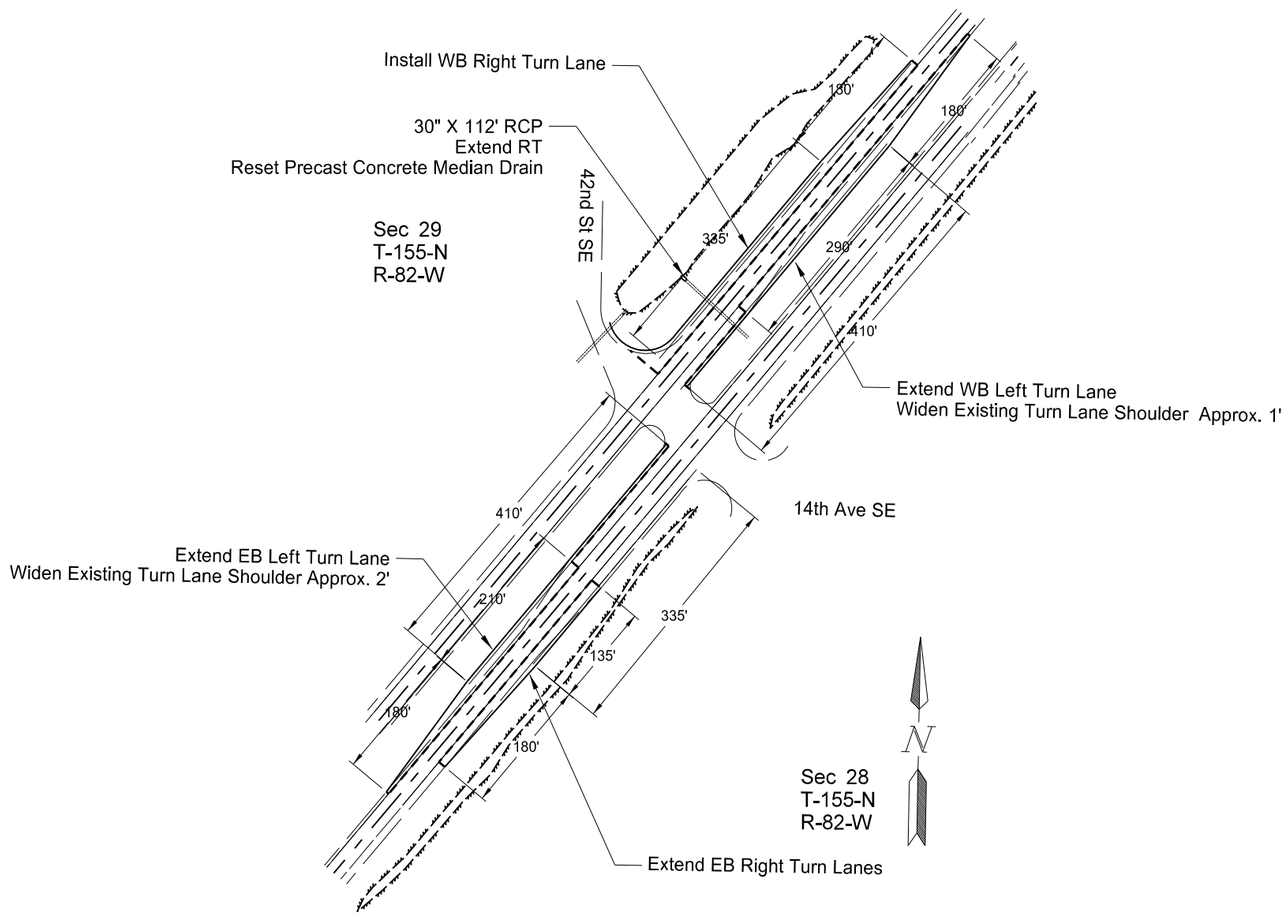
Plan Sheet

Frontage Road/Evergreen Ave

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	10



Saw Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	410 LF
Easbound Right Turn Lane	341 LF
Westbound Left Turn Lane	490 LF
Westbound Right Turn Lane	590 LF

Remove and Relay End Section

30" X 112' RCP, RT	1 EA

Reset Precast Concrete Median Drain

30" X 112' RCP, LT	1 EA

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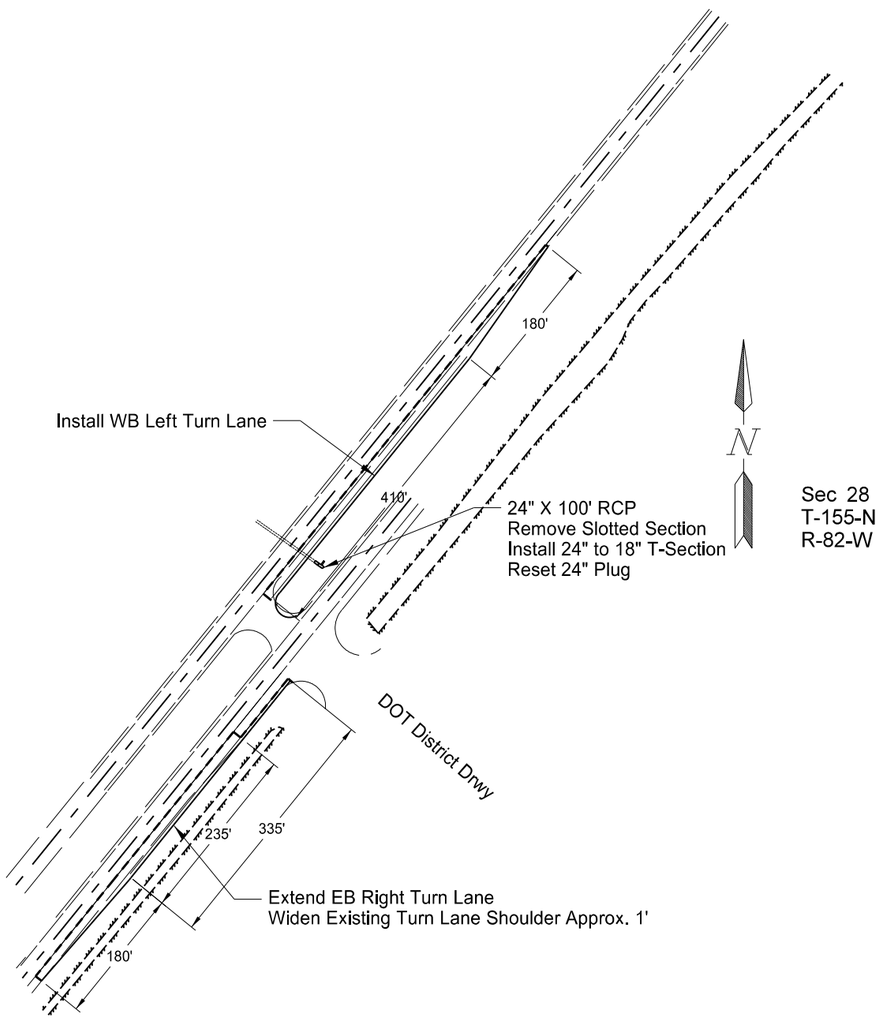
Plan Sheet

14th Ave SE/42nd St. SE

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	11



Saw Bituminous Surfacing-Full Depth

Eastbound Right Turn Lane	545 LF
Westbound Left Turn Lane	616 LF

Removal of Culverts - All Types and Sizes

24' X 100' RCP LT	6 LF

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Plan Sheet

DOT Entrance

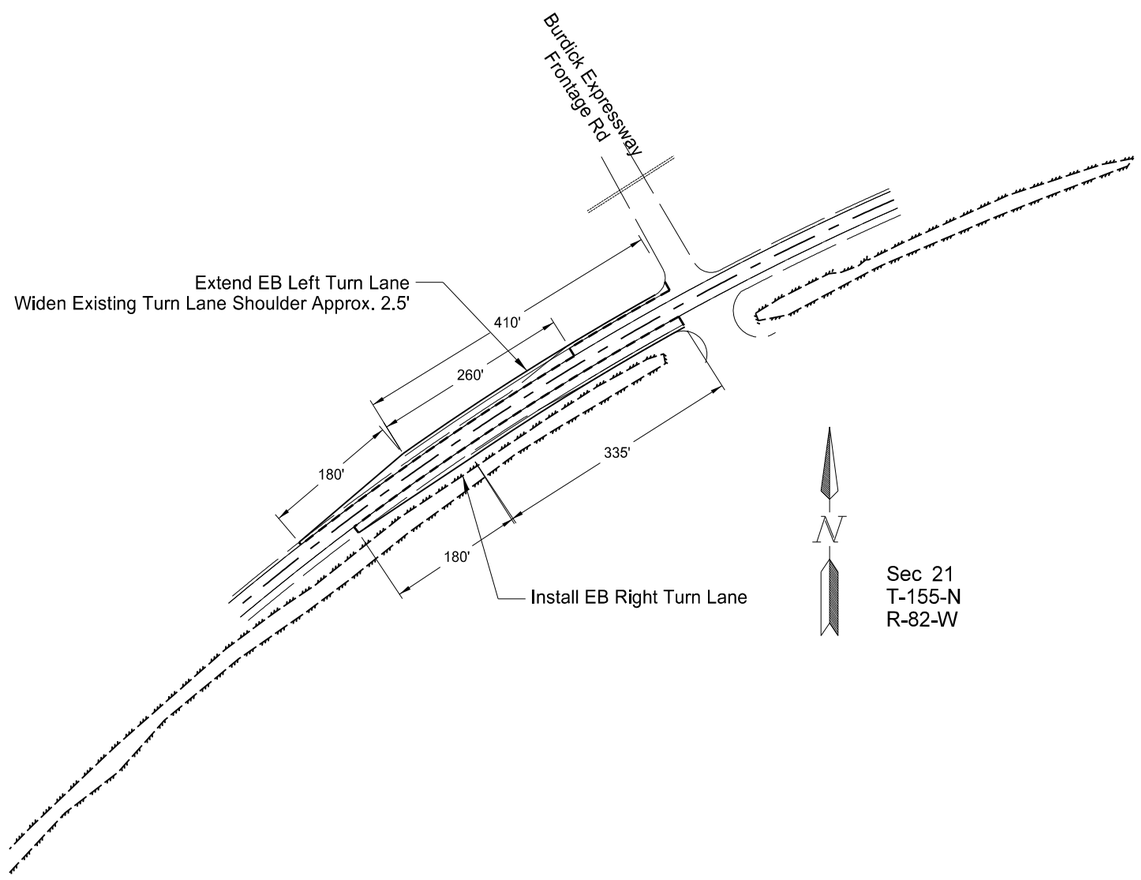
Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	12

Saw Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	618 LF
Eastbound Right Turn Lane	548 LF



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Plan Sheet

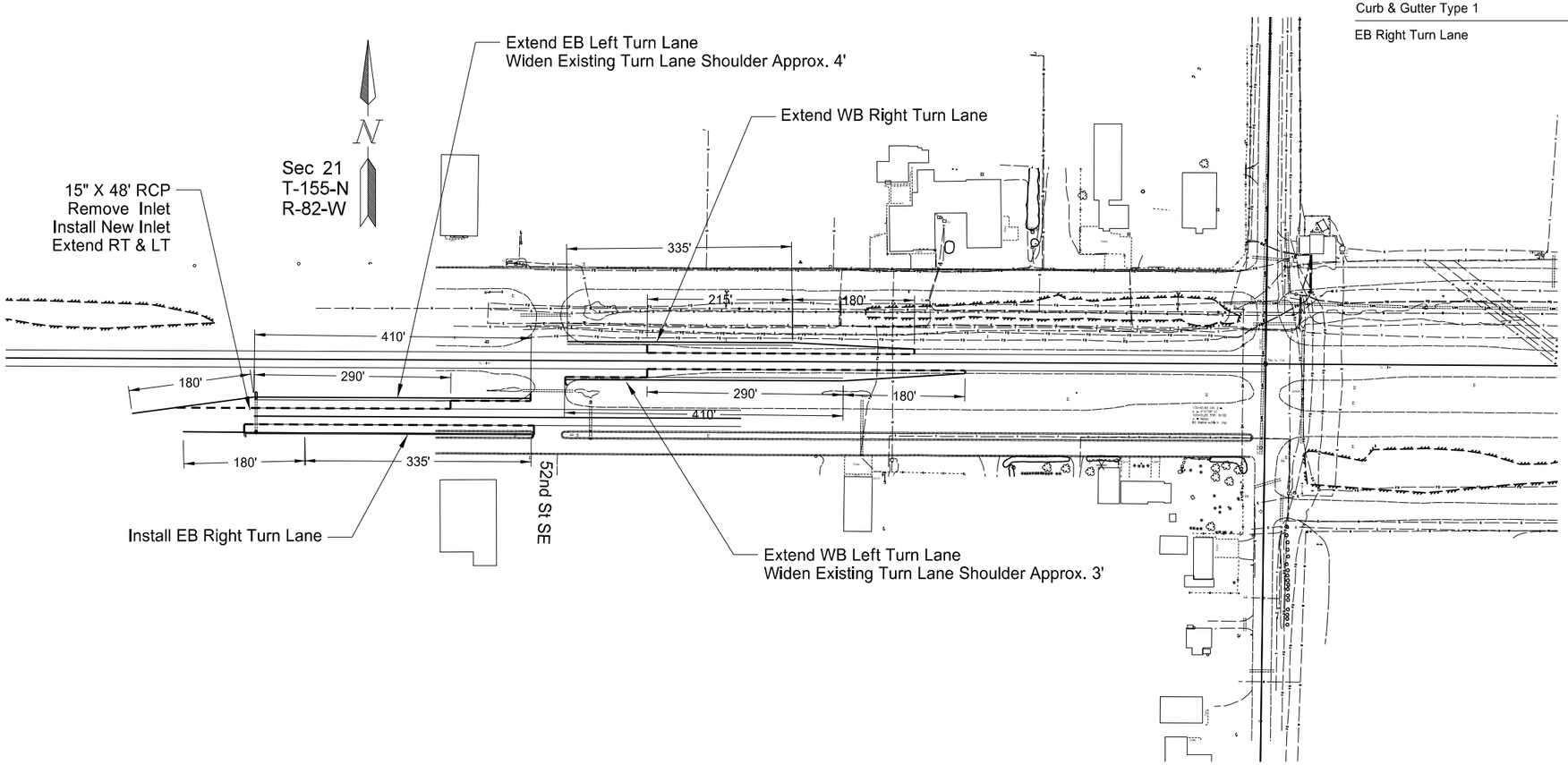
Frontage Rd/Burdick Expressway

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	13

Saw Bituminous Surfacing-Full Deph	
Eastbound Left Turn Lane	544 LF
Eastbound Right Turn Lane	456 LF
Westbound Left Turn Lane	620 LF
Westbound Right Turn Lane	414 LF
Removal of Curb & Gutter	
52nd St. SE	415 LF
Removal of Culverts - All Types and Sizes	
15" X 48' RCP RT	3 LF
Remove and Relay End Section	
15" X 48' RCP LT	1 EA
Inlet - Type 1	
15" X 48' RCP RT	1 EA
Curb & Gutter Type 1	
EB Right Turn Lane	415 LF



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Plan Sheet

52nd St. SE

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	14

Saw Bituminous Surfacing-Full Depth

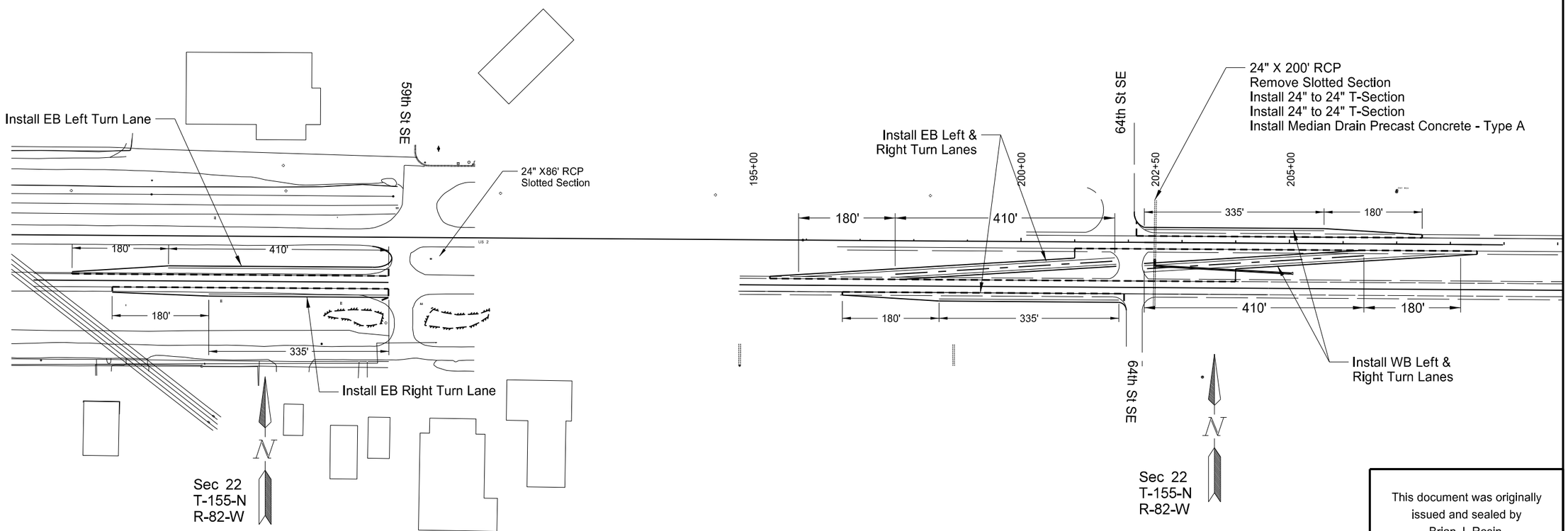
59th St SE	
Eastbound Left Turn Lane	607 LF
Eastbound Right Turn Lane	557 LF
64th ST SE	
Eastbound Left Turn Lane	876 LF
Eastbound Right Turn Lane	551 LF
Westbound Left Turn Lane	762 LF
Westbound Right Turn Lane	565 LF

Removal of Culverts - All Types and Sizes

24" X 200' RCP	16 LF

Median Drain Precast Concrete - Type A

24" X 200' RCP	1 EA



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Plan Sheet

59th St. SE/64th St SE

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

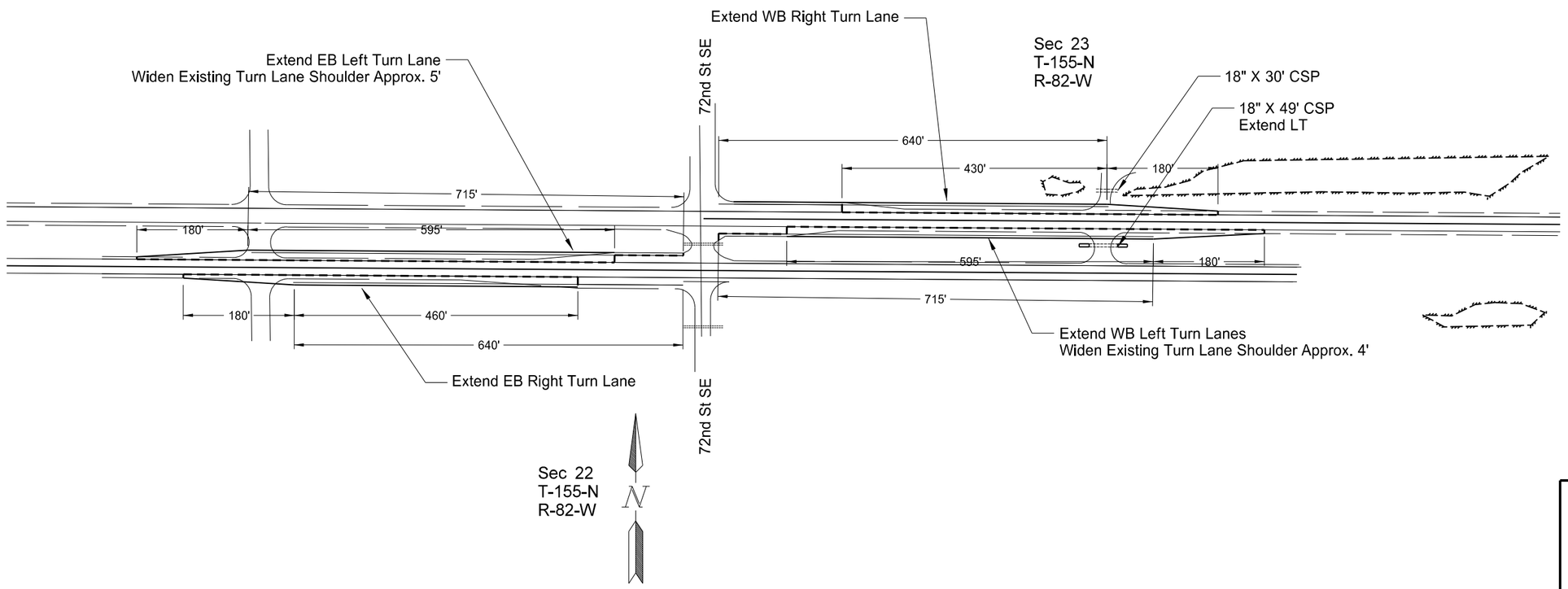
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	15

Saw Bituminous Surfacing-Full Depth

Eastbound Left Turn Lane	915 LF
Eastbound Right Turn Lane	662 LF
Westbound Left Turn Lane	924 LF
Westbound Right Turn Lane	632 LF

Remove End Sections - All Types and Sizes

18" X 49' CSP LT	2 EA



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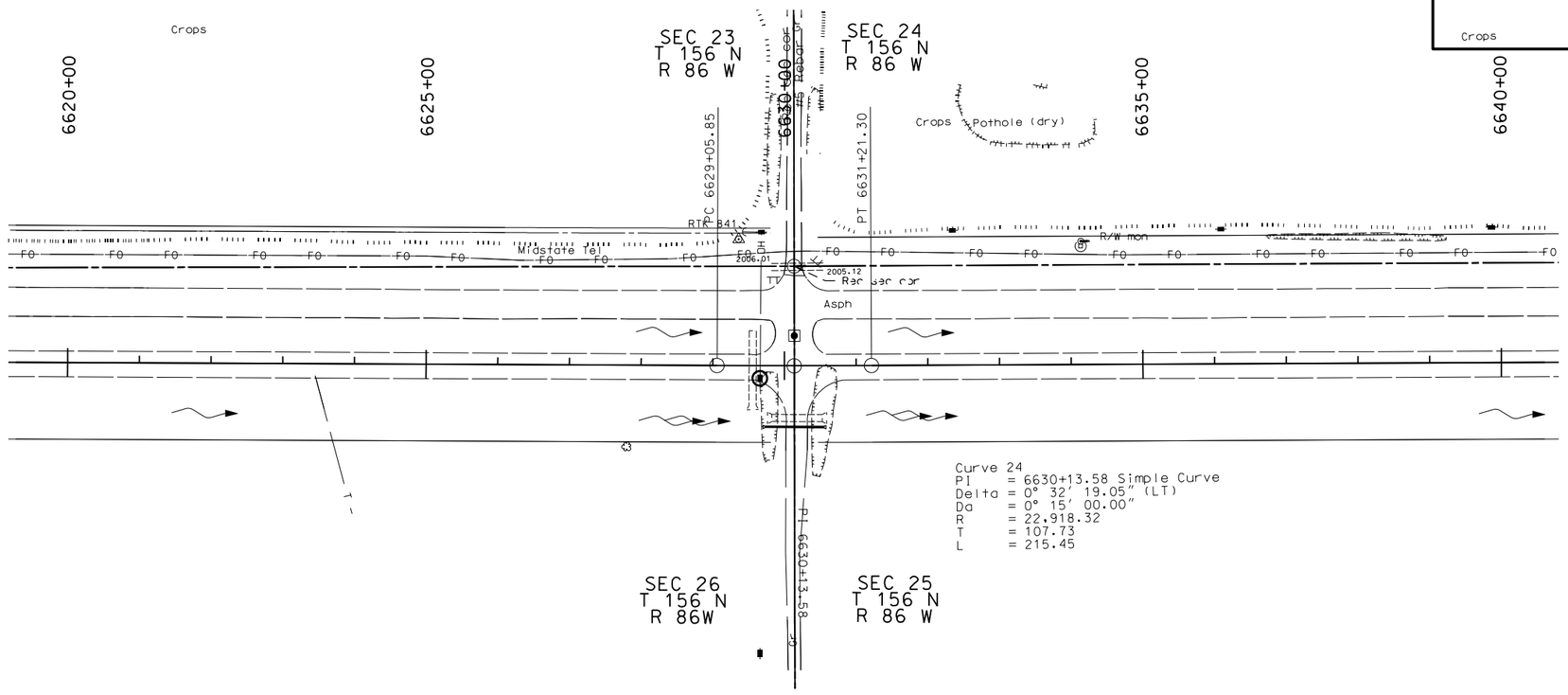
Plan Sheet

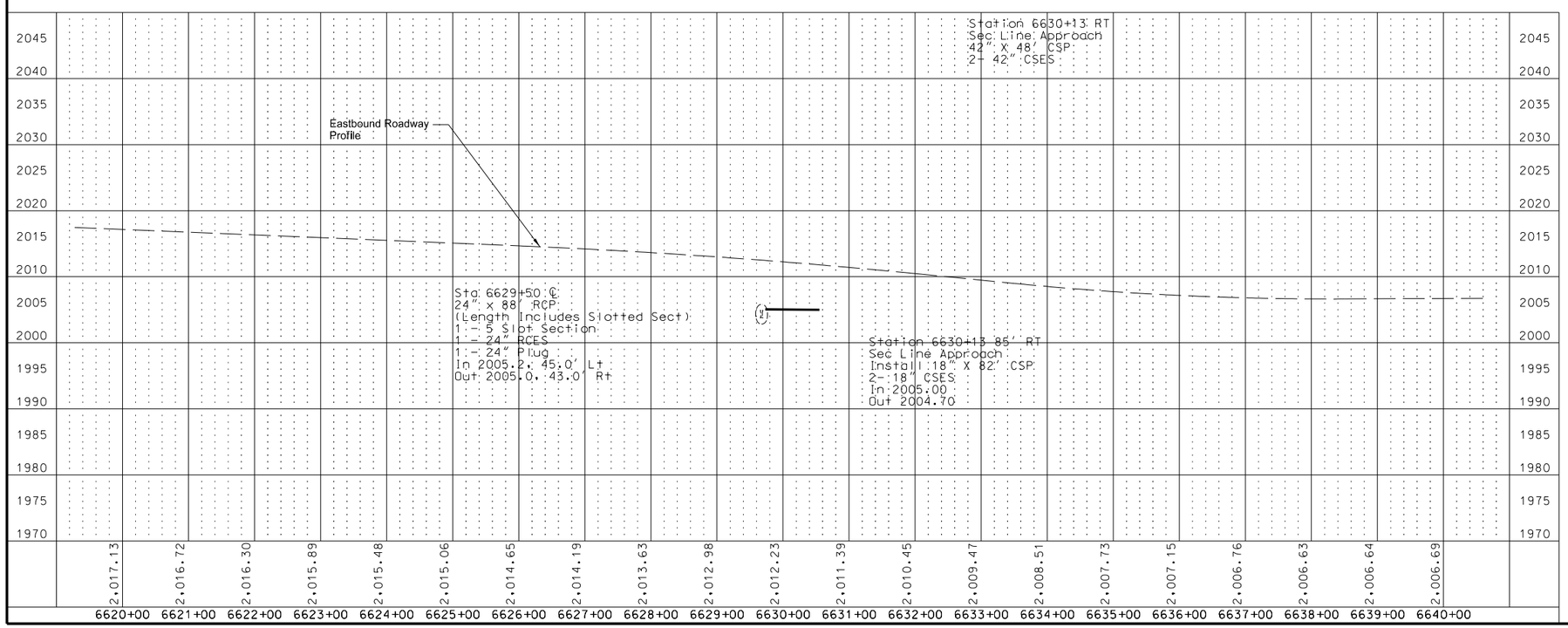
72nd St. SE

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	16





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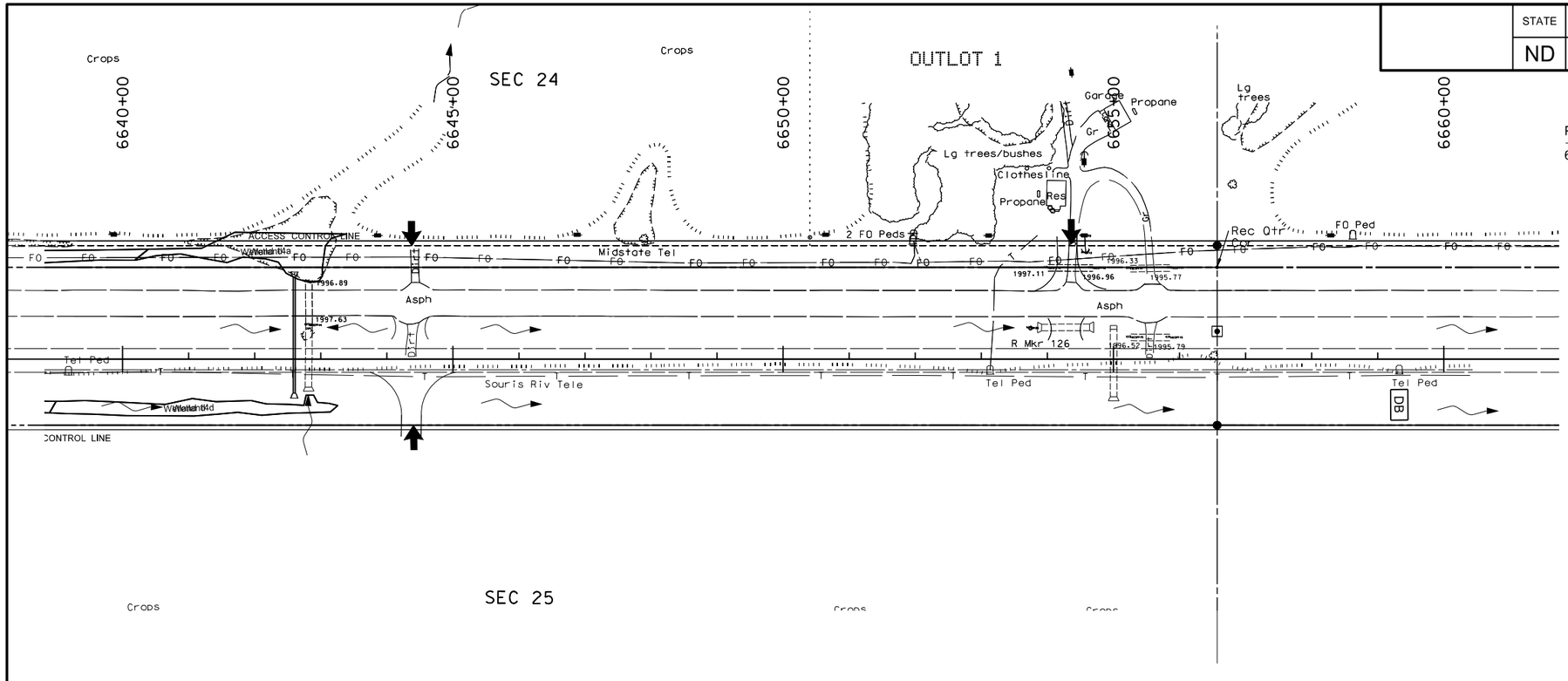
Plan & Profile Sheets

18" Pipe

Turn Lanes

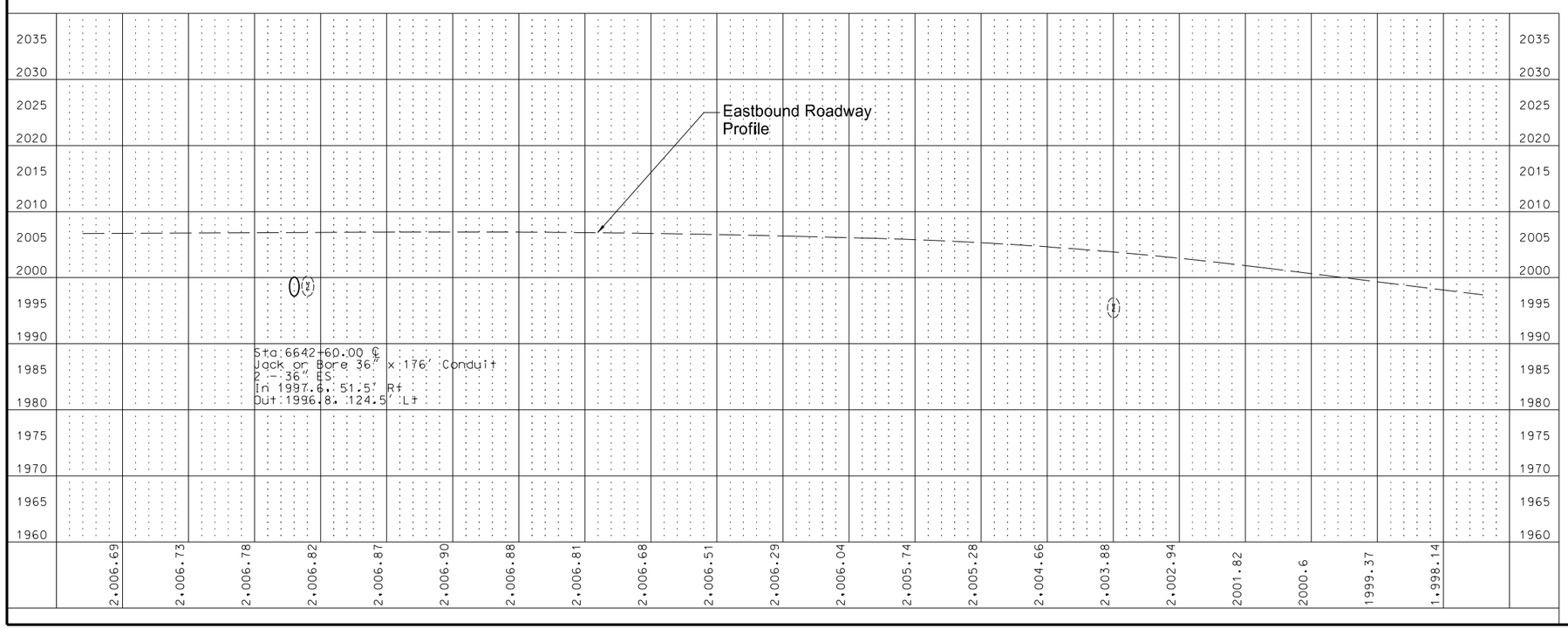
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	60	17



Pipe Conduit 36 IN - Jacked Or Bored

6642+60 ℄ 176 LF



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Plan & Profile Sheet

36" Pipe Jacking or Boring

Turn Lanes

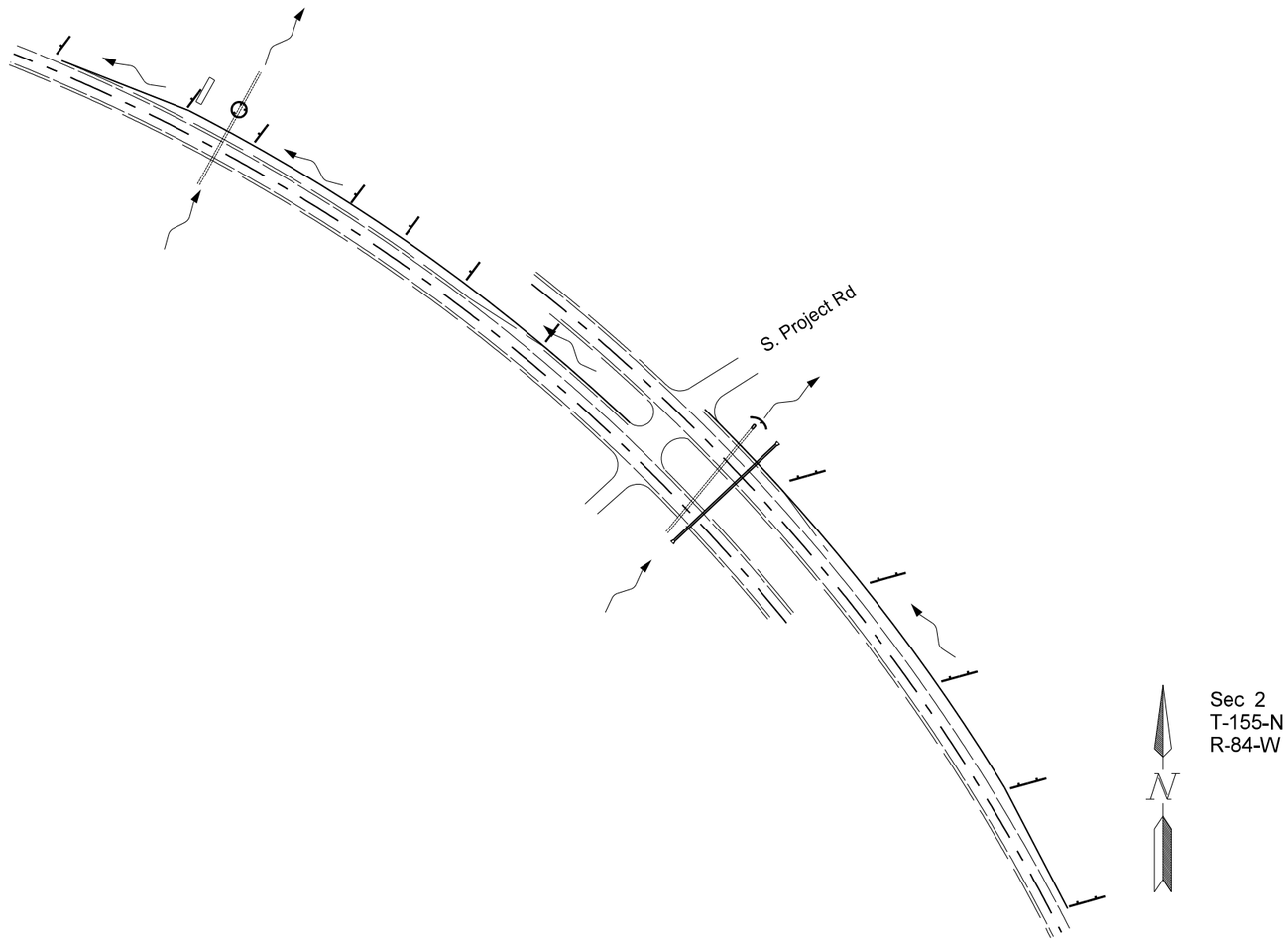
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	1

Permanent Erosion Control

Fiber Rolls 12IN

South Project Rd 520 LF



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Wetlands, Erosion Control & Seeding

South Project Rd

Turn Lanes

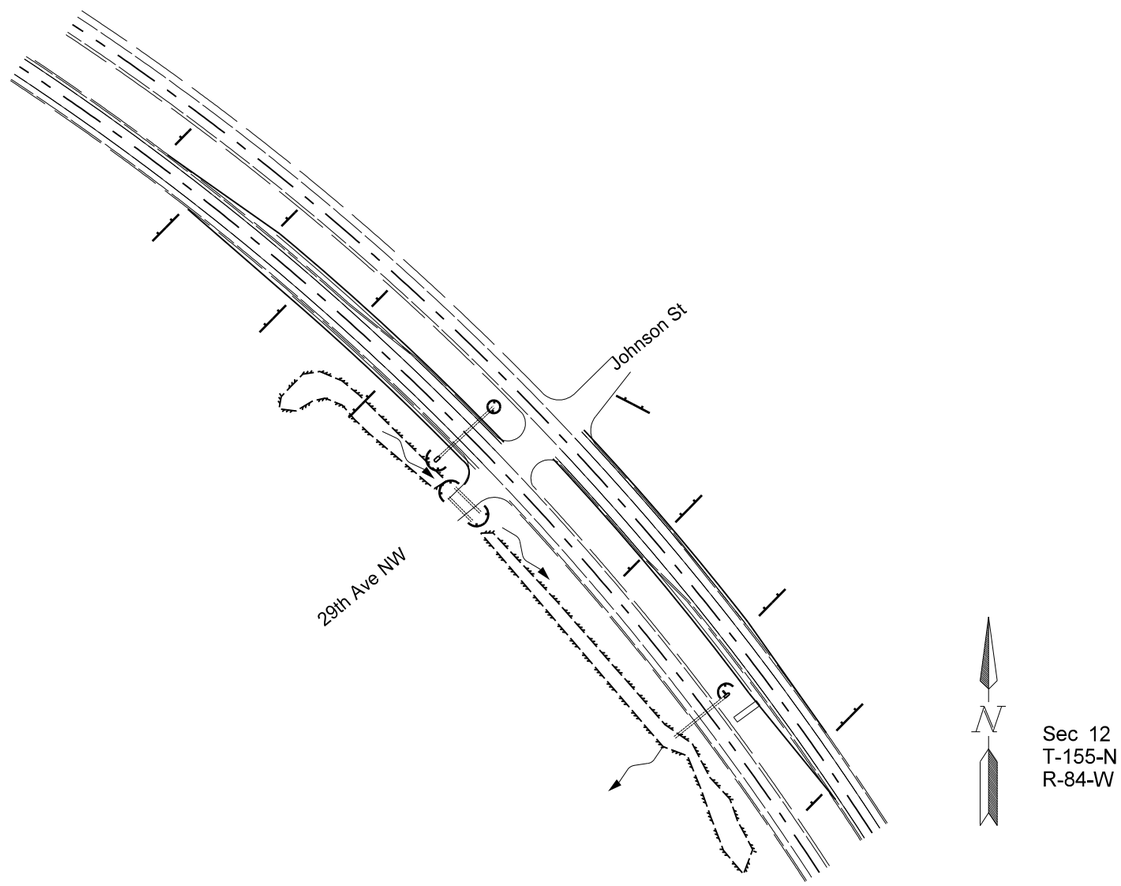
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	2

Permanent Erosion Control

Fiber Rolls 12 IN

29th Ave NW 710 LF



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Wetlands, Erosion Control & Seeding

29th Ave NW/Johnson St

Turn Lanes

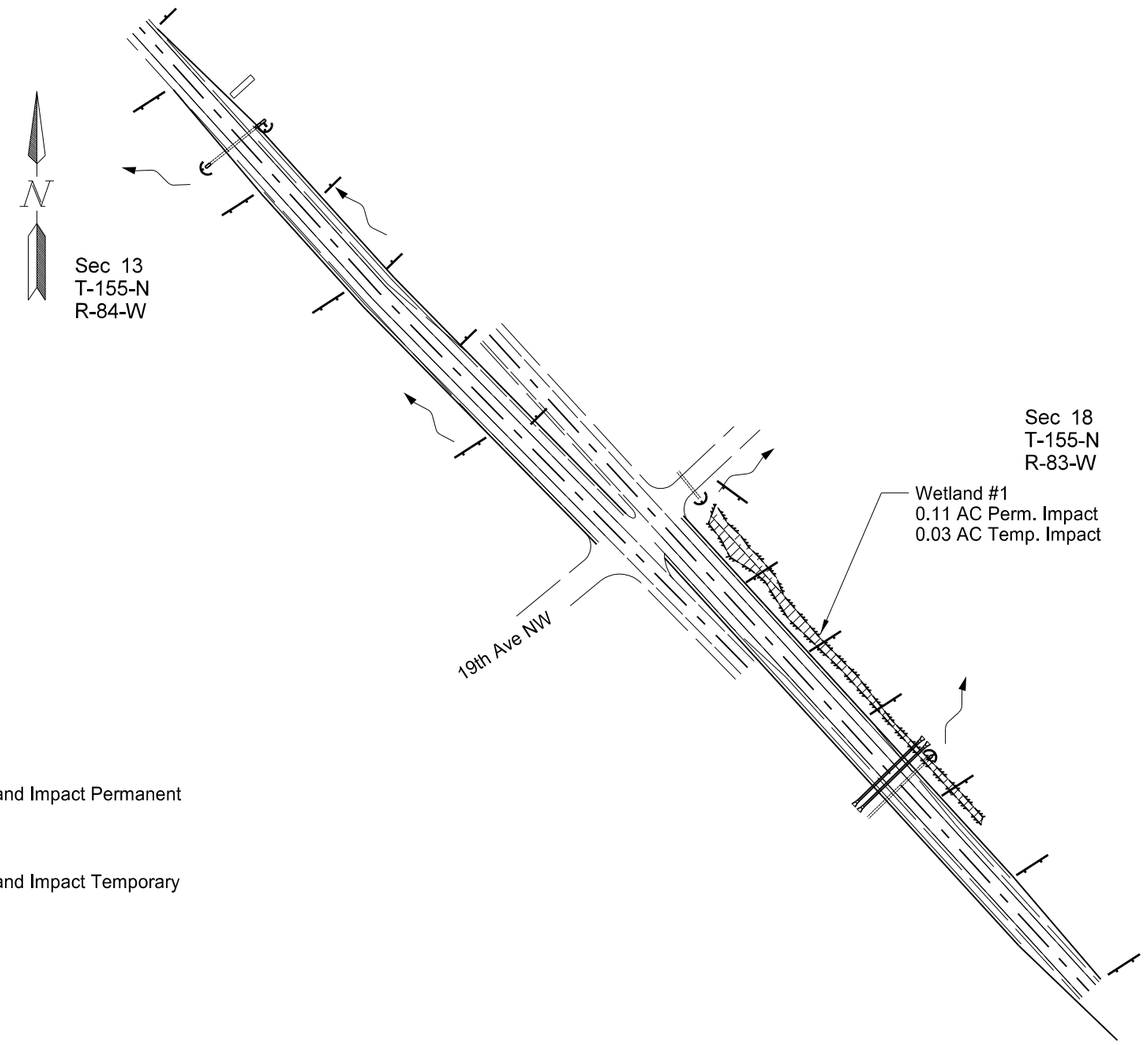
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	3

Permanent Erosion Control

Fiber Rolls 12 IN

19th Ave NW	820 LF



Wetland Impact Permanent

Wetland Impact Temporary

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Wetlands, Erosion Control & Seeding

19th Ave NW

Turn Lanes

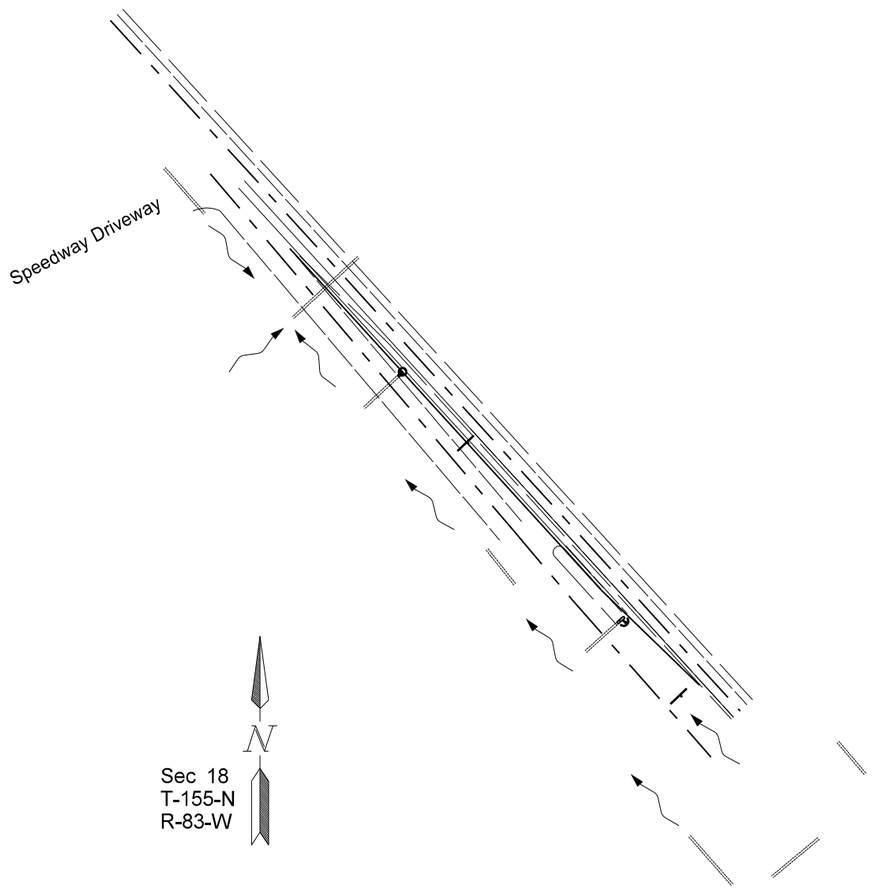
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	4

Permanent Erosion Control

Fiber Rolls 12 IN

Speedway Drive	120 LF



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Wetlands, Erosion Control & Seeding

Speedway Driveway

Turn Lanes

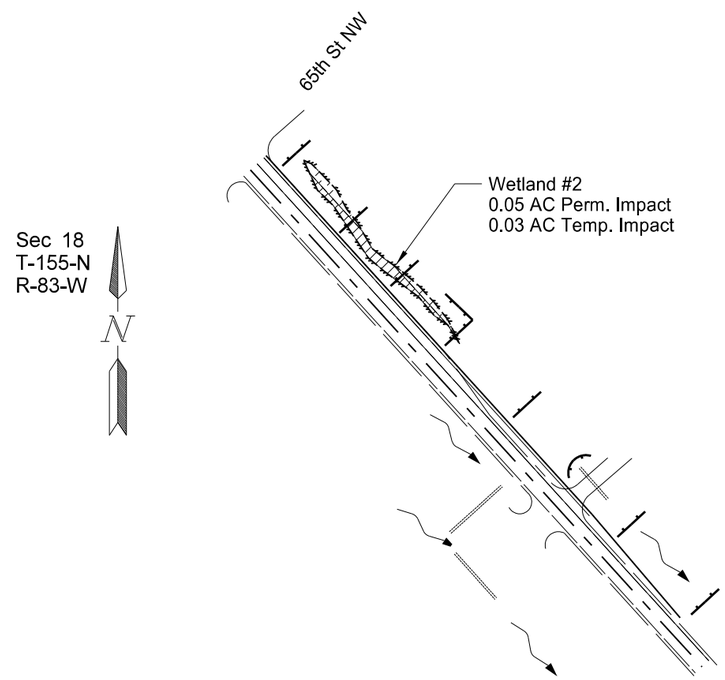
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	5

Permanent Erosion Control

Fiber Rolls 12 IN

65th St NW	450 LF



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Wetlands, Erosion Control & Seeding

65th St. NW

Turn Lanes

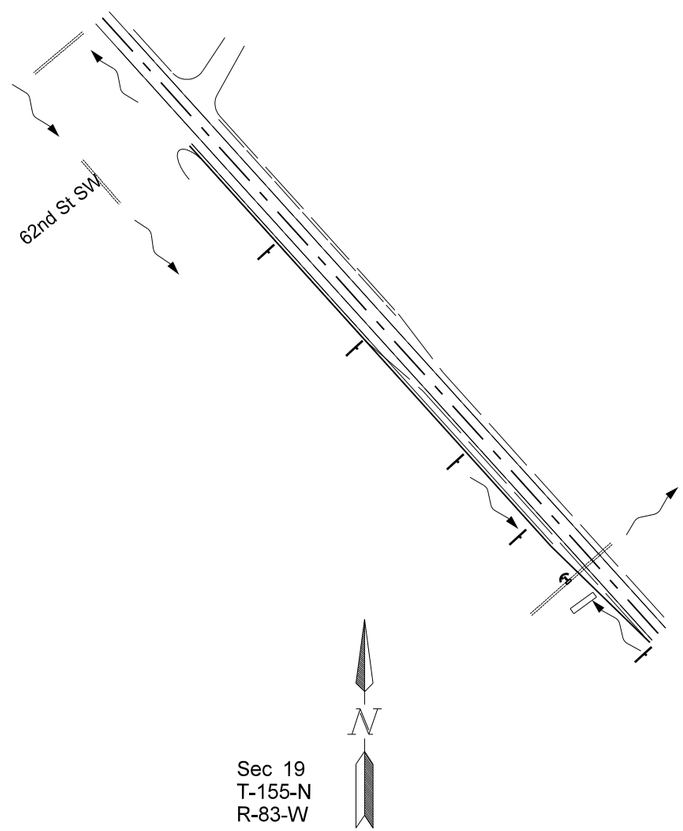
District Boundry to 1 M West of Surrey-EB/WB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-SHE-4-002(103)123	75	6

Permanent Erosion Control

Fiber Rolls 12 IN

62nd St SW	180 LF



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Wetlands, Erosion Control & Seeding

62nd St. SW

Turn Lanes

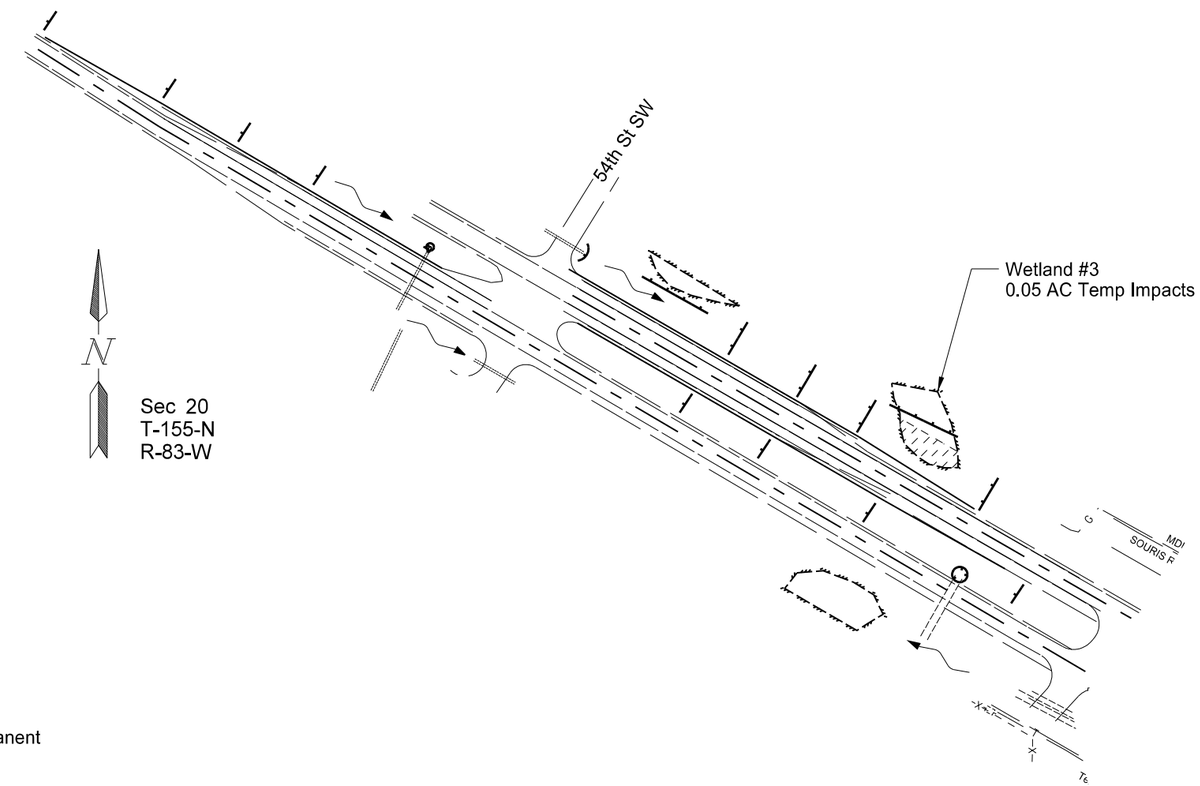
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	7

Permanent Erosion Control

Fiber Rolls 12 IN

54th St NW	640 LF



Wetland Impact Permanent

Wetland Impact Temporary

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Wetlands, Erosion Control & Seeding

54th St. NW

Turn Lanes

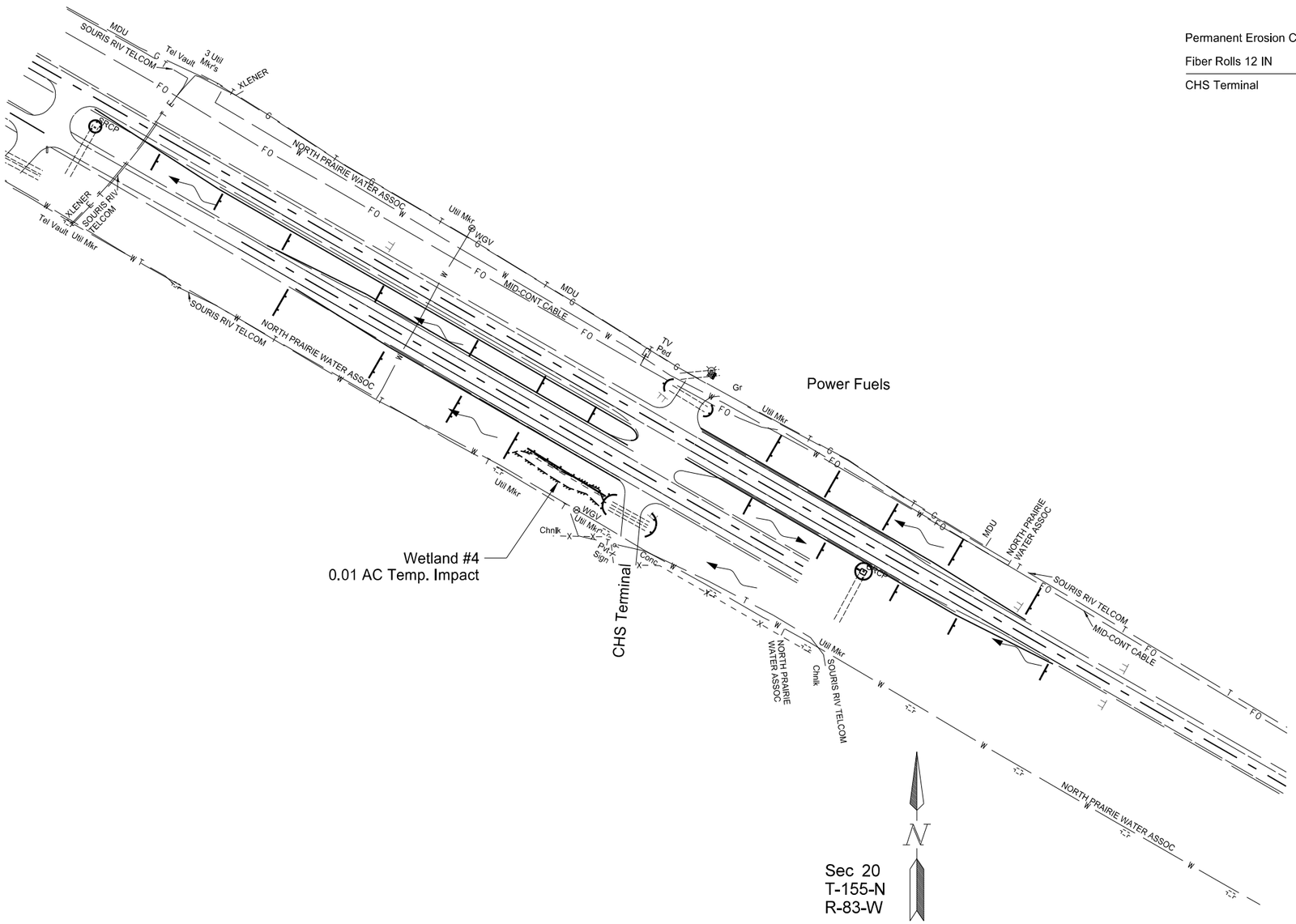
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	8

Permanent Erosion Control

Fiber Rolls 12 IN

CHS Terminal	1230 LF



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Wetlands, Erosion Control & Seeding

CHS Terminal/Power Fuels

Turn Lanes

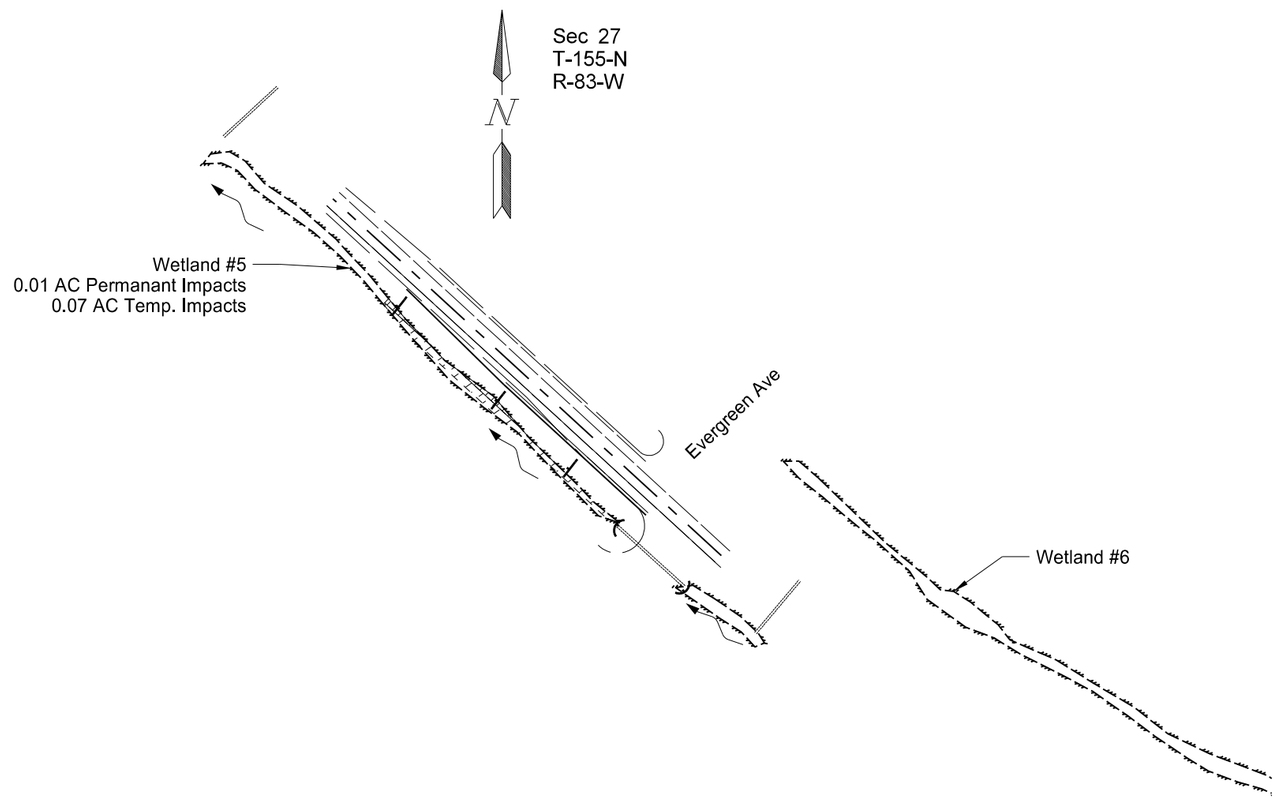
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	9

Permanent Erosion Control

Fiber Rolls 12 IN

Frontage Rd/Evergreen Ave	150 LF



Wetland Impact Permanent

Wetland Impact Temporary

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Wetlands, Erosion Control & Seeding

Frontage Road/Evergreen Ave

Turn Lanes

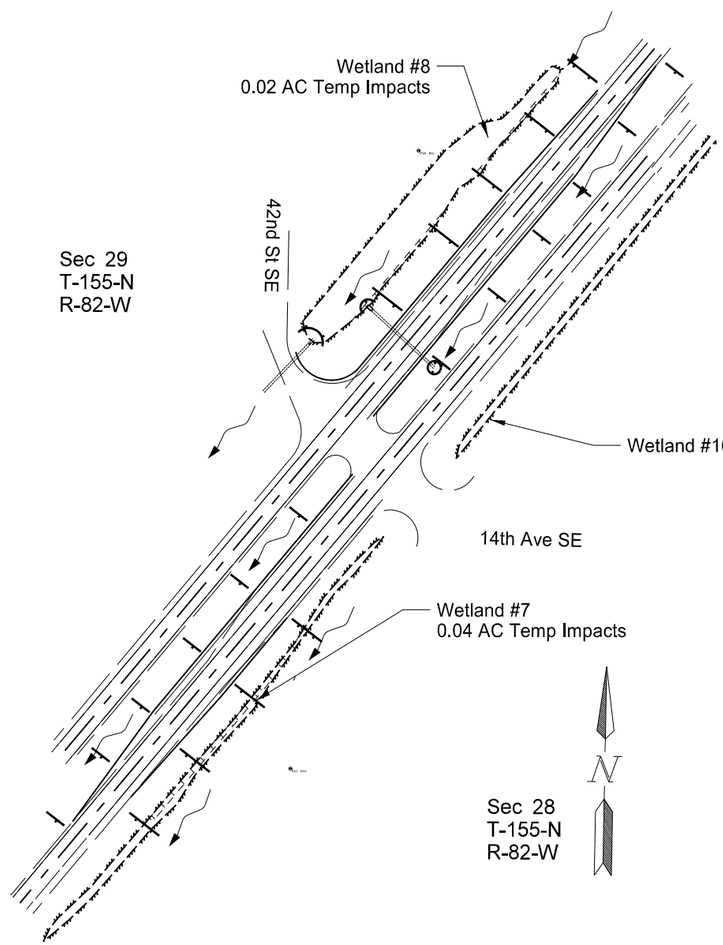
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	10

Permanent Erosion Control

Fiber Rolls 12 IN

14th Ave SE	920 LF



Wetland Impact Permanent

Wetland Impact Temporary

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Wetlands, Erosion Control & Seeding

14th Ave SE/42nd St. SE

Turn Lanes

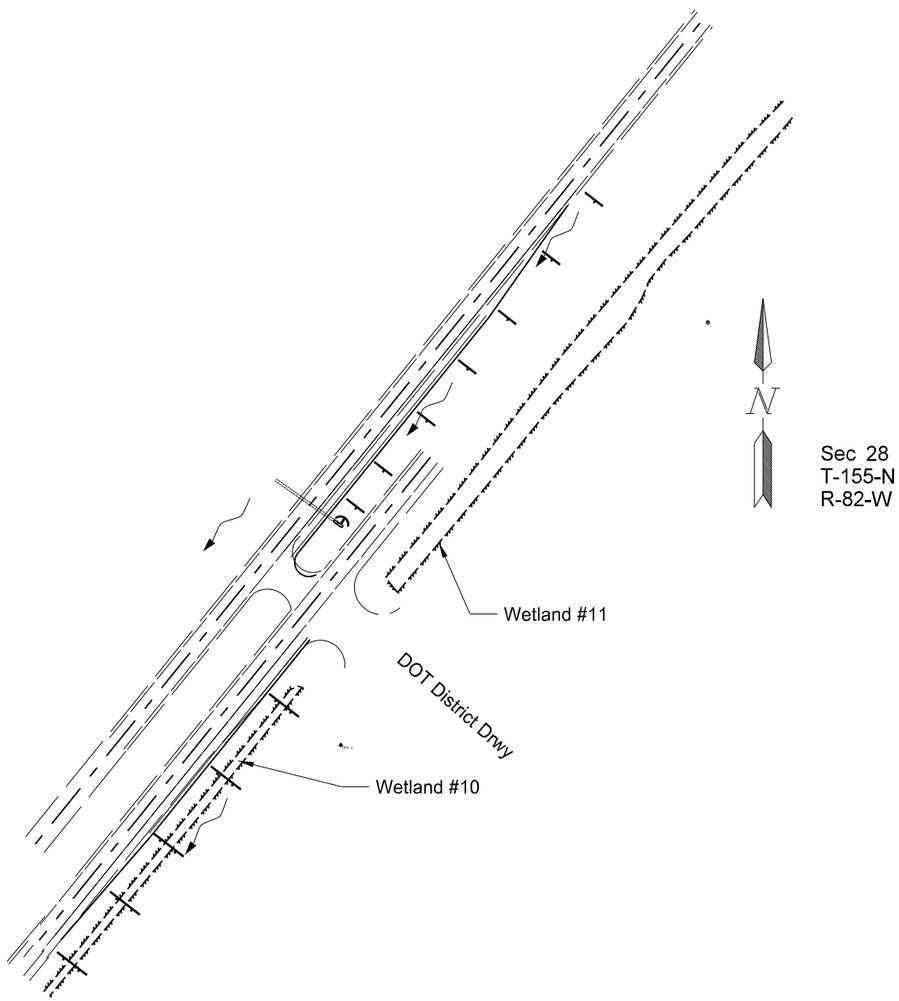
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	11

Permanent Erosion Control

Fiber Rolls 12 IN

DOT Driveway	490 LF



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Wetlands, Erosion Control & Seeding

DOT District Driveway

Turn Lanes

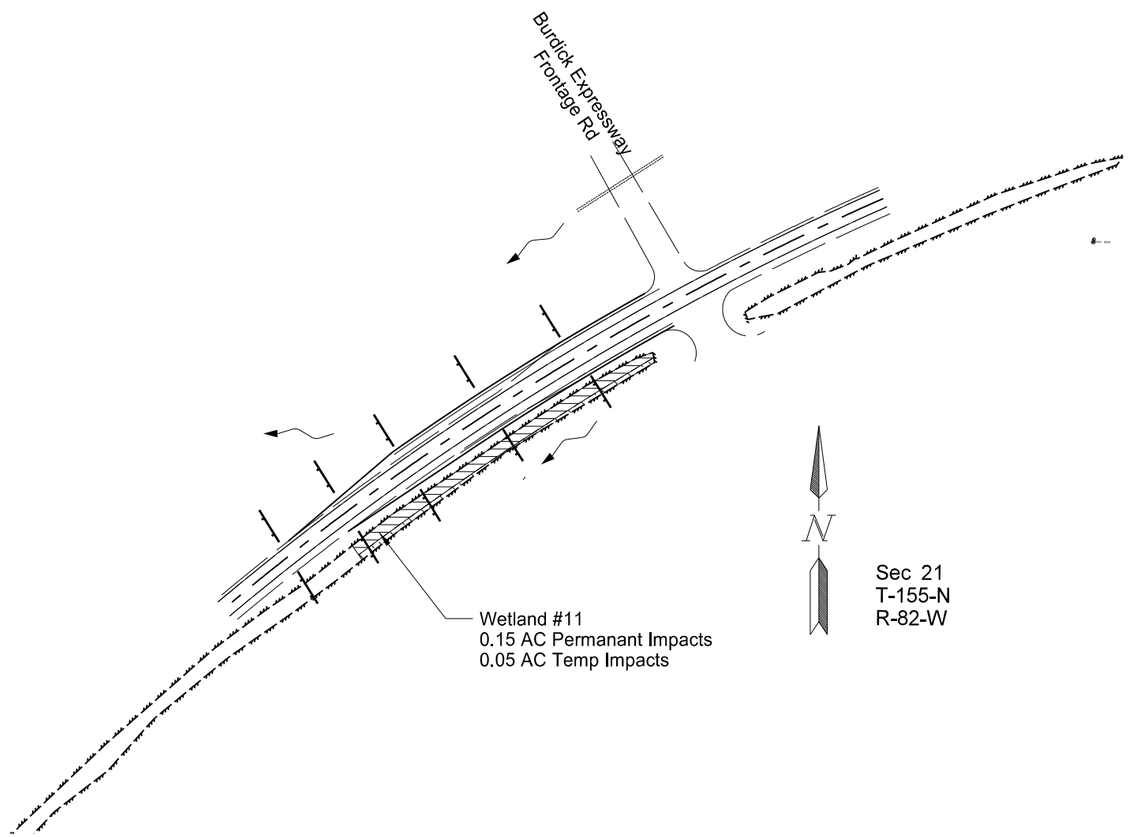
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	12

Permanent Erosion Control

Fiber Rolls 12 IN

Frontage Rd/Burdick Expressway	500 LF



Wetland Impact Permanent

Wetland Impact Temporary

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Wetlands, Erosion Control & Seeding

Frontage Rd/Burdick Expressway

Turn Lanes

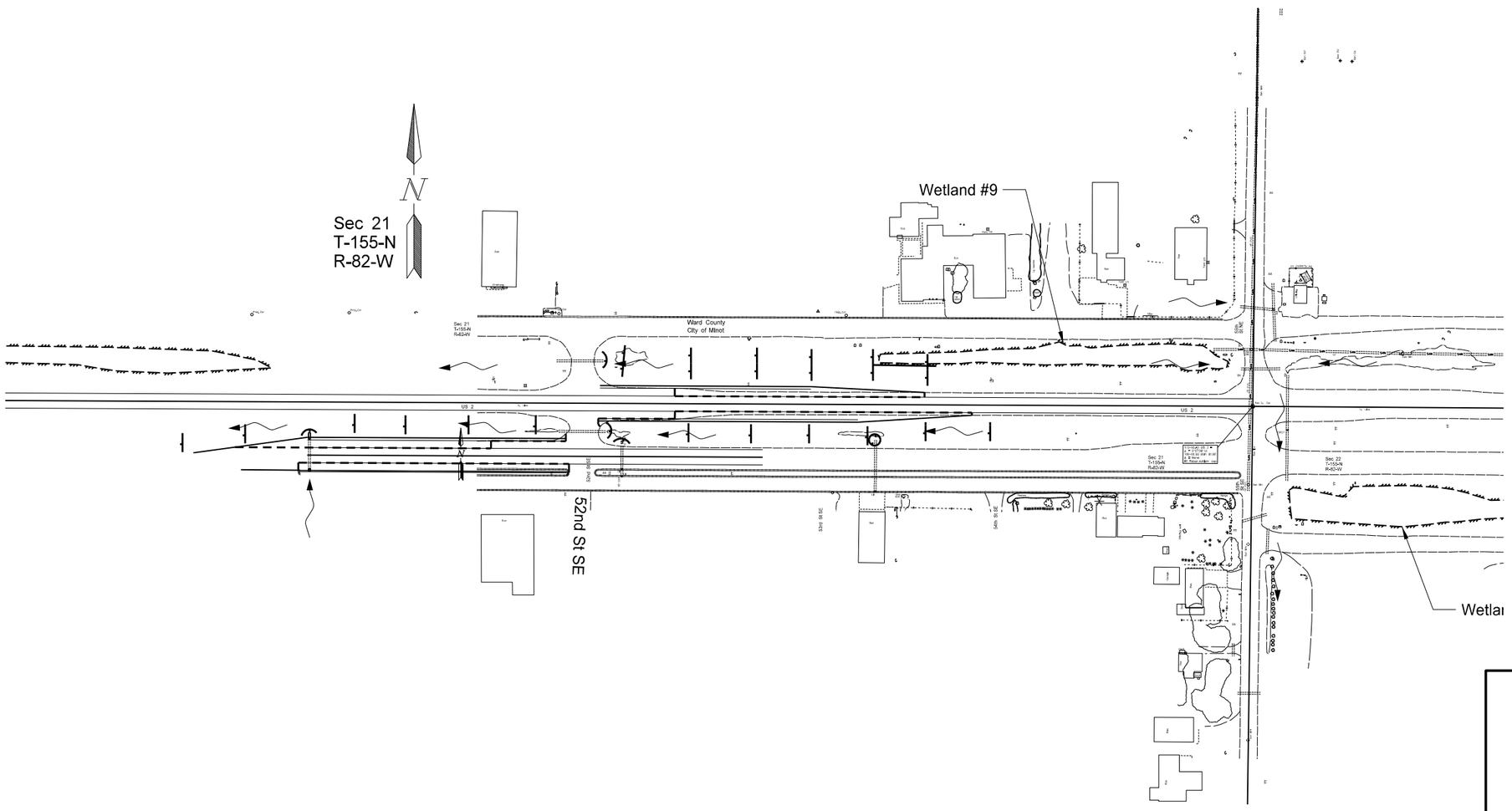
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	13

Permanent Erosion Control

Fiber Rolls 12 IN

52nd St SE 910 LF



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Wetlands, Erosion Control & Seeding

52nd St. SE

Turn Lanes

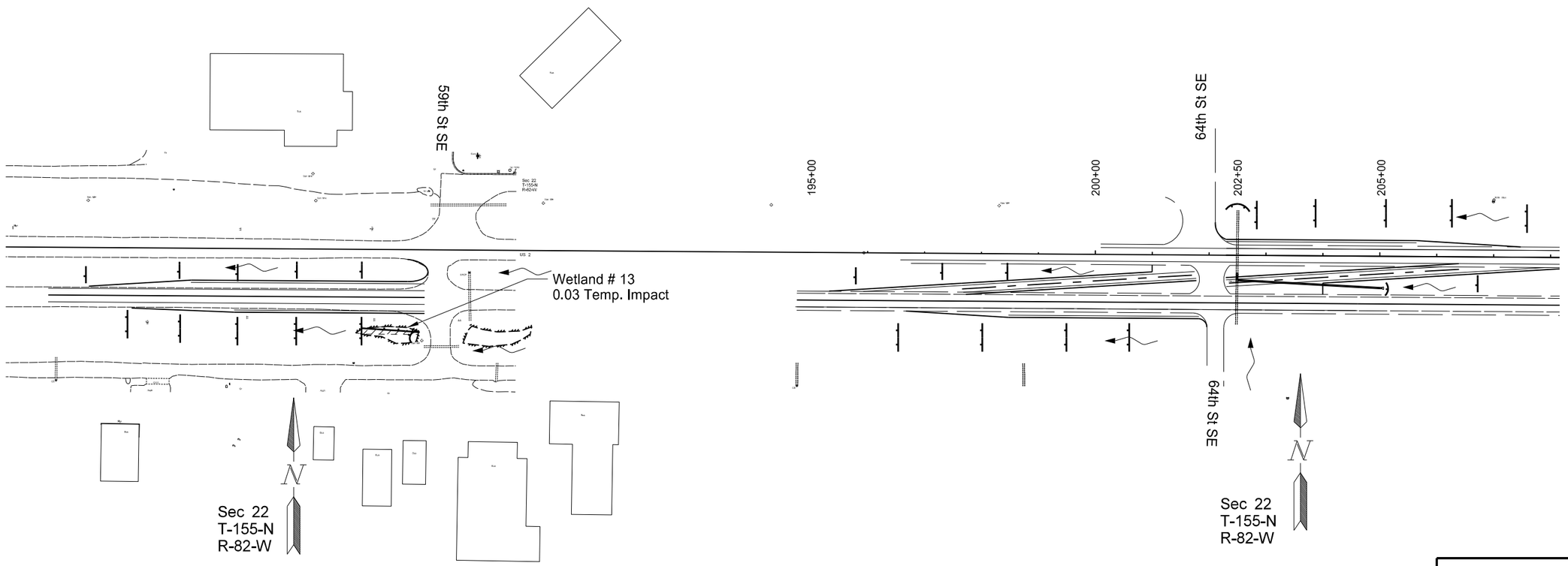
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	14

Permanent Erosion Control

Fiber Rolls 12 IN

59th St SE	530 LF
64th St SE	650 LF



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Wetlands, Erosion Control & Seeding

59th St. SE/64th St SE

Turn Lanes

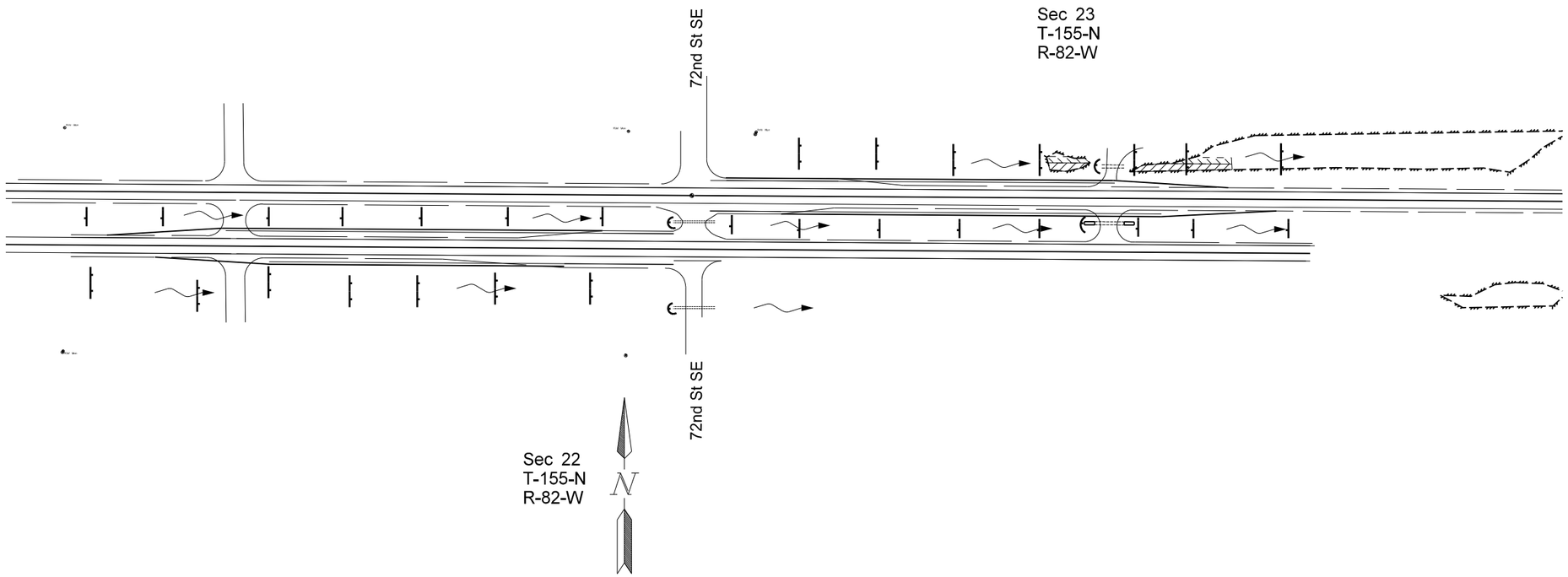
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	15

Permanent Erosion Control

Fiber Rolls 12 IN

72nd St SE	1270 LF



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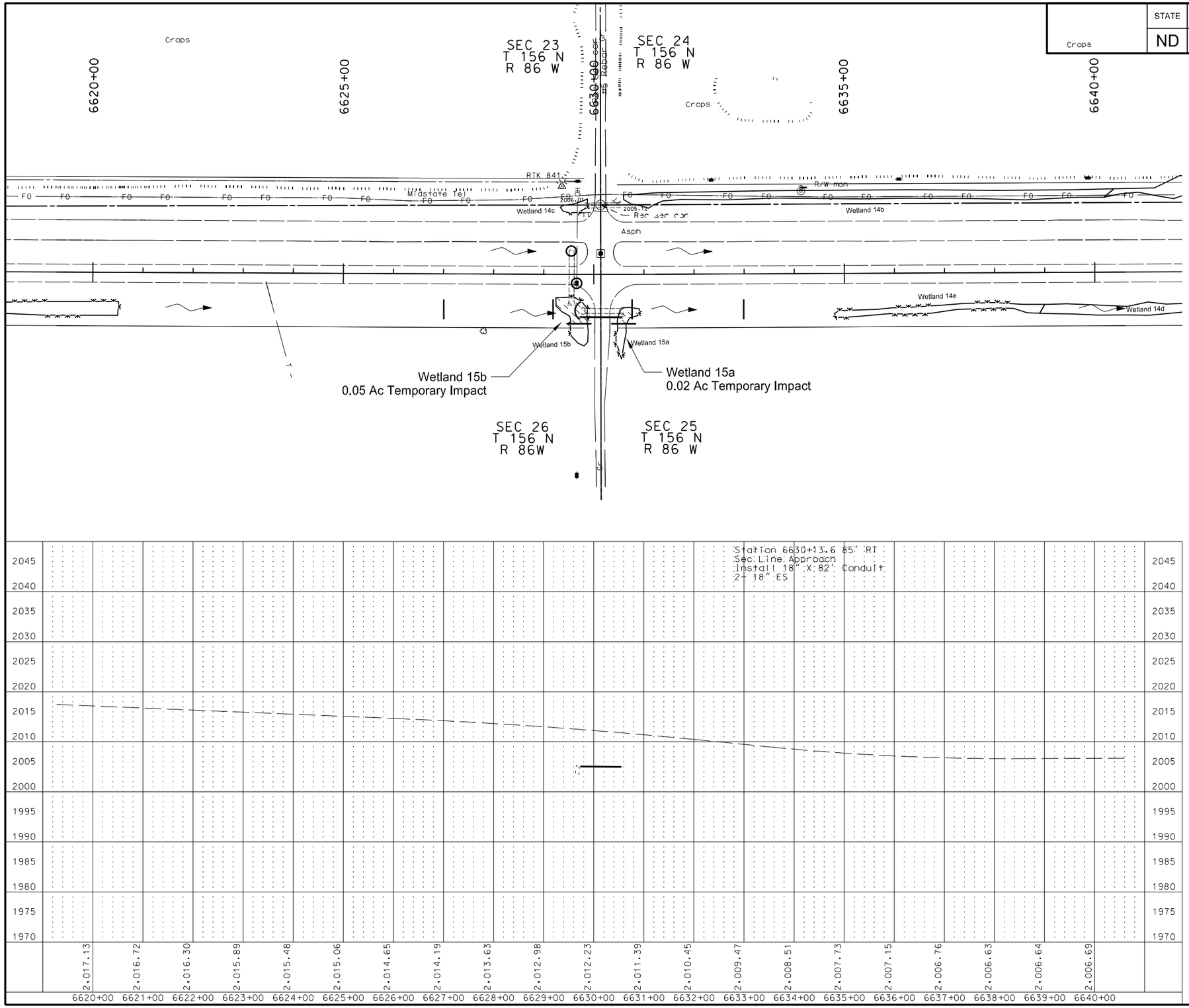
Wetlands, Erosion Control & Seeding

72nd St. SE

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	16



Permanent Erosion Control

Fiber Rolls 12 IN

Sta 6630+00 RT	180 LF

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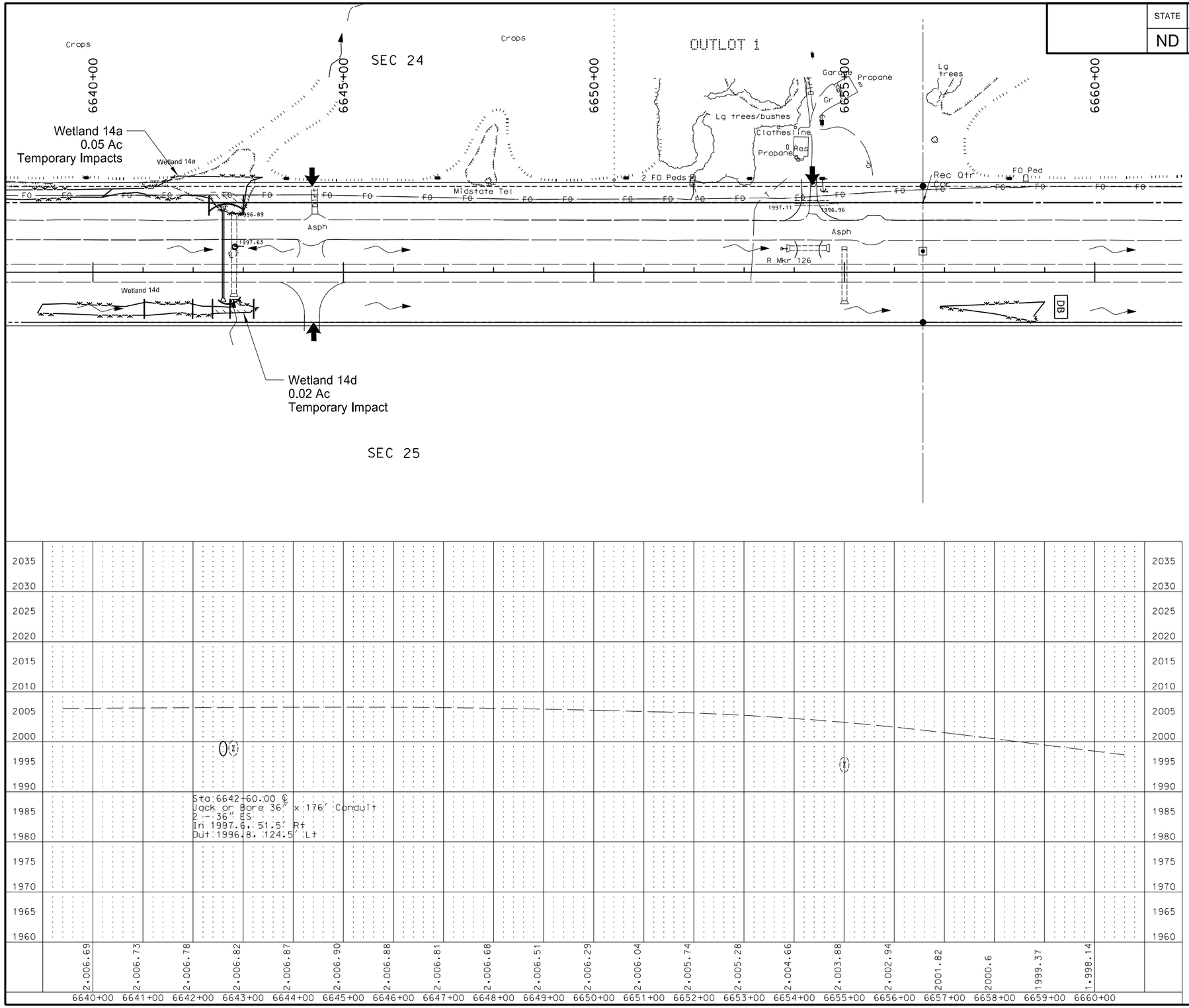
Wetlands, Erosion Control & Seeding

18" Conduit

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	75	17



Permanent Erosion Control

Fiber Roll 12 In

Sta 6643+00 ℄ 350 LF

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Wetlands, Erosion Control & Seeding

36" Jacked or Bored Conduit

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	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	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**6**	**34**	**204**
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**14**	**19**	**266**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**	**64**	**128**
G20-50a-72	**72"x36"**	**ROAD WORK NEXT __ MILES RT & LT ARROWS**	**15**	**37**	**555**
G20-52a-72	**72"x24"**	**ROAD WORK NEXT __ MILES RT or LT ARROW**	**6**	**30**	**180**
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**11**	**59**	**649**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	**48"x48"**	**STOP**	**4**	**32**	**128**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**4**	**5**	**20**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**21**	**39**	**819**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**5**	**10**	**50**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**4**	**39**	**156**
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		31	
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		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**2**	**35**	**70**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**8**	**35**	**280**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**4**	**35**	**140**
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**	**1**	**35**	**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**	**1**	**35**	**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.**	**2**	**35**	**70**
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**18**	**35**	**630**
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.**	**4**	**35**	**140**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**4**	**35**	**140**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	**54"x12"**	**NEXT __ MILES (Mounted on warning sign post)**	**3**	**12**	**36**
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	**48"x48"**	**FRESH OIL**	**1**	**35**	**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**	**3**	**35**	**105**
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**4941**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**4500**
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**	**75**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**20**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**3**
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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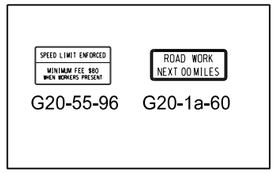
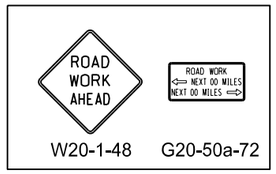
Traffic Control Devices List

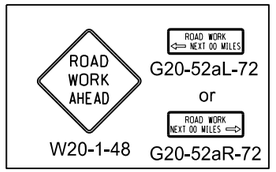
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	100	2



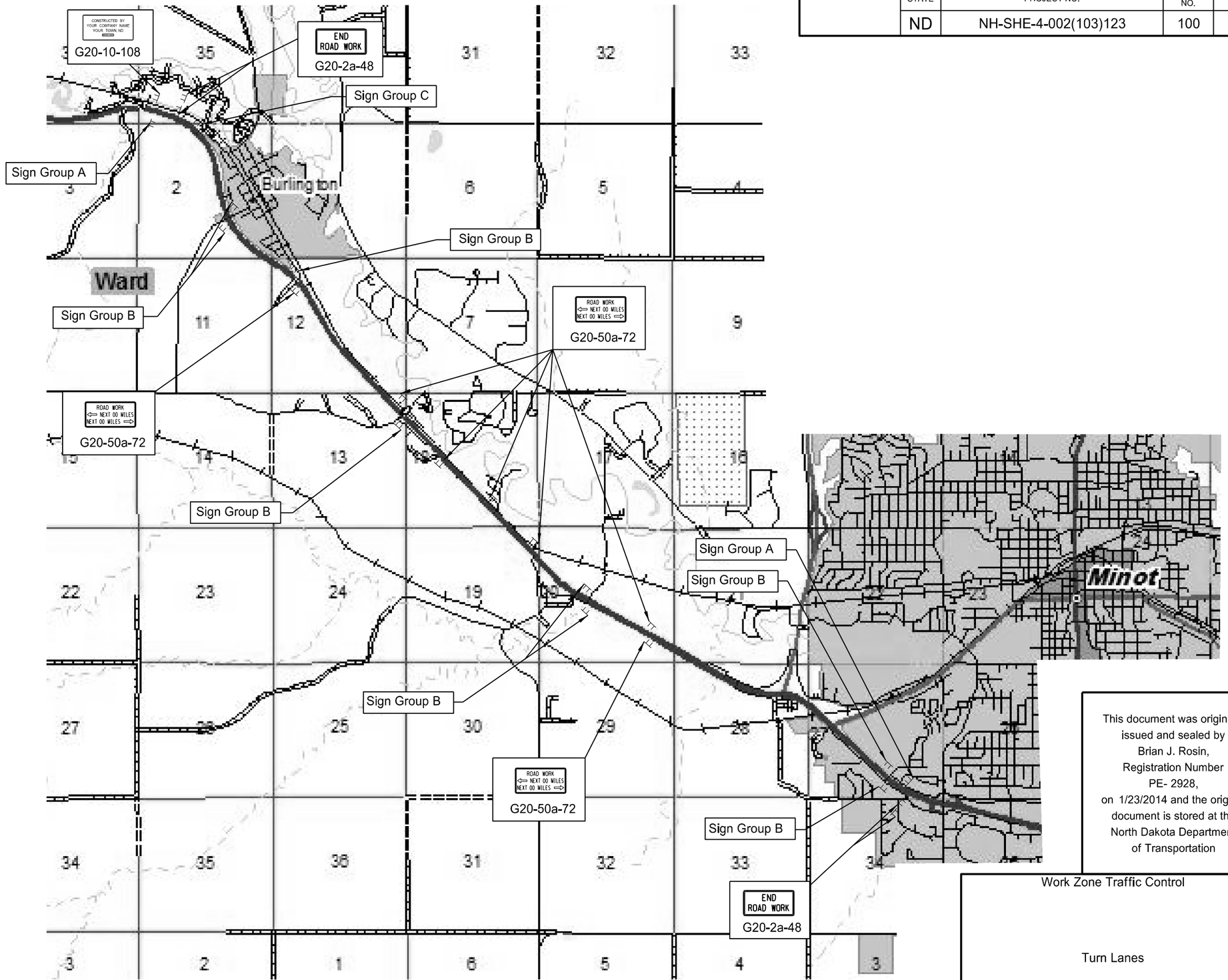
Sign Group A



Sign Group B



Sign Group C



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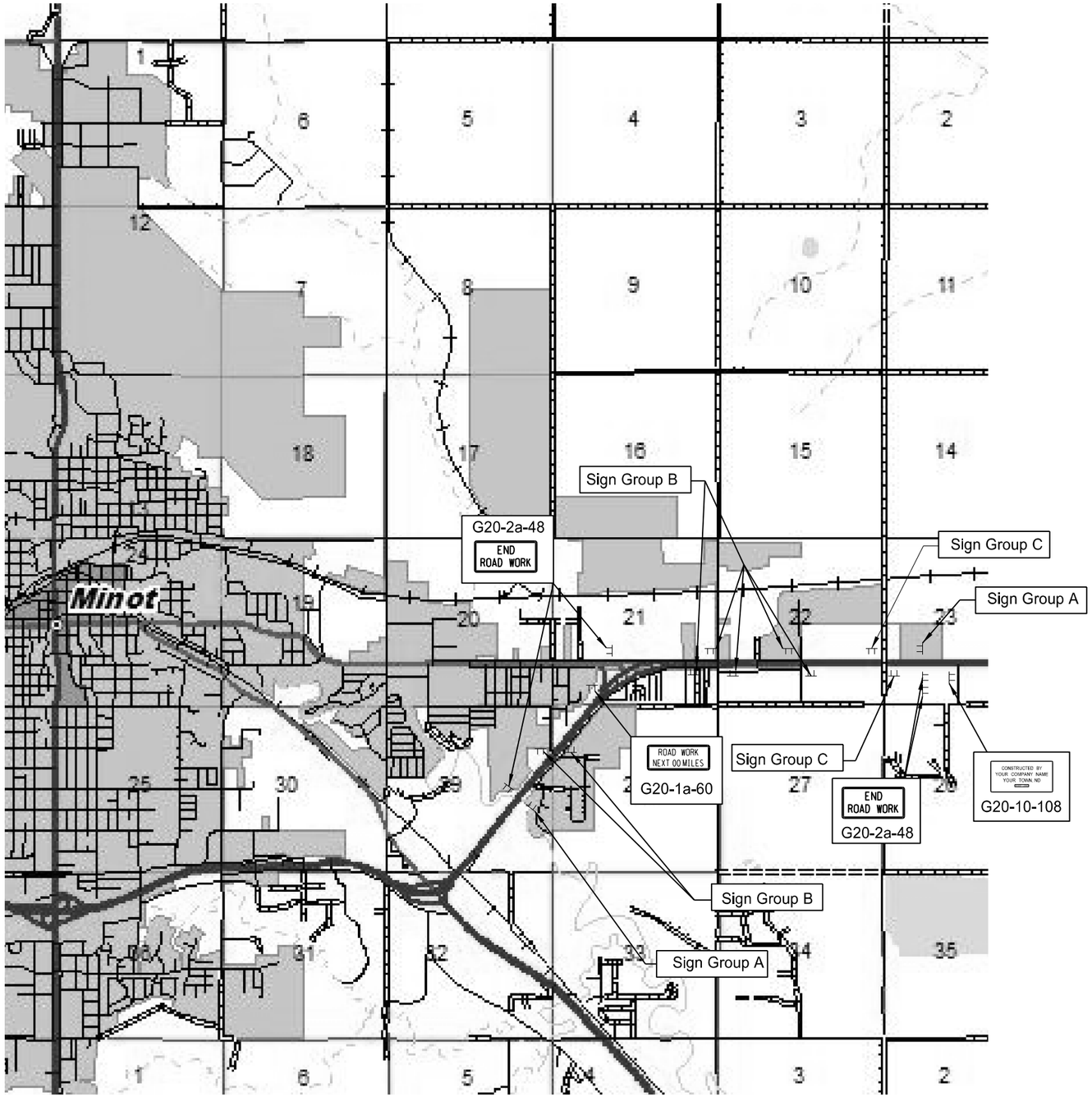
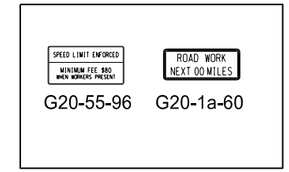
Work Zone Traffic Control

Turn Lanes

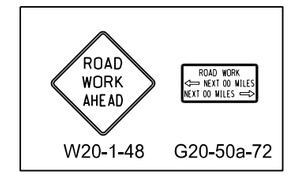
District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	100	3

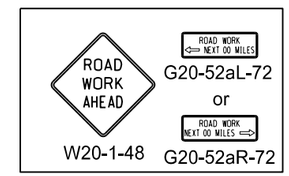




Sign Group A



Sign Group B



Sign Group C

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Work Zone Traffic Control

Turn Lanes

District Boundry to 1 M West of Surrey-EB/WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NH-SHE-4-002(103)123	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	Sign Support Length 2nd LF	Sign Support Length 3rd LF	Sign Support Length 4th LF	Support Size	Max Post Len LF	Sleeve Length 1st LF	Sleeve Length 2nd LF	Sleeve Length 3rd LF	Sleeve Length 4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
137.843 Lt	SN 1		35.0		13.0	13.5	13.9	14.4	2.5 x 2.5 12 ga	18.0	2.3	2.8	3.2	3.7	2.25 x 2.25 12 ga	4	4	3 x 3 7 ga			4	
138.898 Rt	SA A		17.8		16.3	16.5	16.6		2.5 x 2.5 12 ga	18.1						3	4	3 x 3 7 ga			3	
139.045 Rt																			1	1		
139.095 Lt	SA B		13.4		14.5				2.5 x 2.5 10 ga	16.1	4.4				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
139.152 Lt																			1	2		
139.227 Lt	SA B		13.4		14.5				2.5 x 2.5 10 ga	16.1	4.4				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
140.080 Rt	SA B		13.4		14.4				2.5 x 2.5 10 ga	16.1	4.3				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
140.156 Rt	SN 2		20.0		12.3	12.6	13.0		2.5 x 2.5 12 ga	13.4						3	4	3 x 3 7 ga			3	
140.162 Rt mdn		21		16.0	15.7	15.9			2.5 x 2.5 12 ga	20.0	3.8	3.9			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
140.381 Lt																			1	3		
140.419 Lt	SN 3		20.0		12.4	13.1			2.5 x 2.5 12 ga	15.7	3.2	3.8			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
140.457 Lt		21		16.0	14.6	14.9			2.25 x 2.25 12 ga	15.7	4.9	5.3			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
140.495 Lt	SA A		17.8		16.4	16.6	16.8		2.5 x 2.5 12 ga	18.1						3	4	3 x 3 7 ga			3	
140.678 Lt	SA C			14.0	14.3	14.6			2.5 x 2.5 10 ga	16.5						2	4	3 x 3 7 ga			2	
140.678 Lt mdn	SA C			14.0	15.5	15.8			2.25 x 2.25 12 ga	19.2	3.6	3.9			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
141.449 Lt		21		16.0	14.6	14.9			2.25 x 2.25 12 ga	15.7	4.9	5.3			2 x 2 12 ga	2	4	3 x 3 7 ga			2	
142.275 Lt		20		9.0	13.9				2.5 x 2.5 12 ga	14.7	4.9				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
142.758 Lt																			1	1		
150.304 Rt	SA D		17.9		16.0	16.2	16.3		2.5 x 2.5 12 ga	18.0						3	4	3 x 3 7 ga			3	
150.380 Rt	SA E		17.9		16.0	16.2	16.3		2.5 x 2.5 12 ga	18.0						3	4	3 x 3 7 ga			3	
150.418 Rt																			1	1		
150.442 Rt		33		6.0	12.6				2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga				
150.442 Rt mdn		33		6.0	13.9				2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga				
150.481 Rt		16		9.0	12.8				2.25 x 2.25 12 ga	13.8	4.4				2 x 2 12 ga	1	4	3 x 3 7 ga			1	
150.481 Rt mdn																			1	1		
151.268 Rt																			1	1		
151.903 Rt	SA A		17.8		16.3	16.4	16.6		2.5 x 2.5 12 ga	18.1						3	4	3 x 3 7 ga			3	
151.918 Rt		27		3.0	11.4				2 x 2 12 ga	13.2						1	4	2.25 x 2.25 12 ga				
152.121 Lt																			1	1		
152.121 Lt mdn																			1	1		
Sub Total			204.4	109.0		**Total**	622.5									**Total**	168		9	12	39	
Grand Total			204.4	109.0		**Total**	622.5									**Total**	168		9	12	39	

Basis of Estimate
Sign Support Lengths

The sign support lengths have been calculated
using the following vertical clearances:

Urban/rural expressway and freeway - 84" (Offset - 60")

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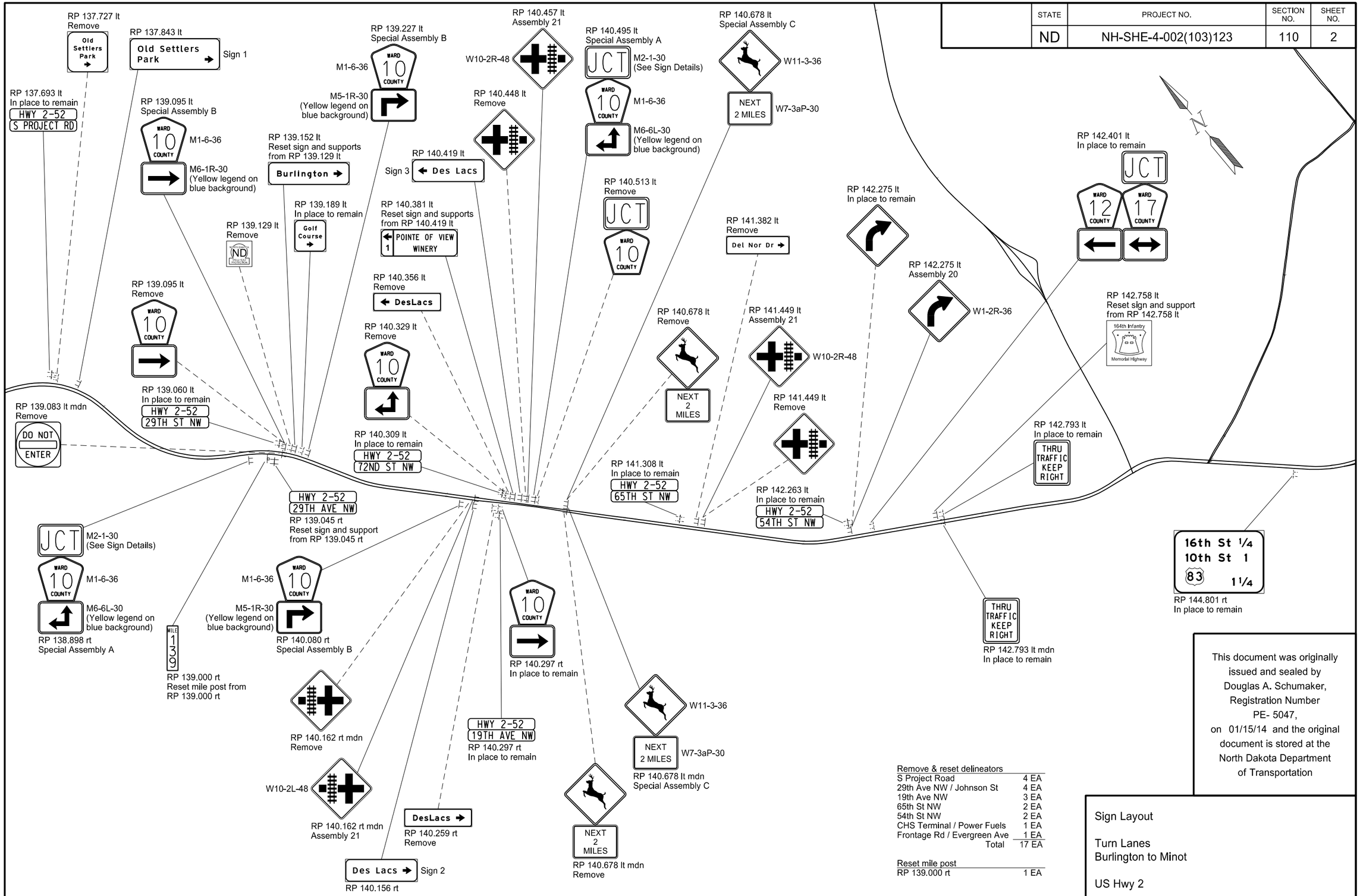
Sign Summary
Perforated Tube

Turn Lanes
Burlington to Minot

US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	110	2



Remove & reset delineators

S Project Road	4 EA
29th Ave NW / Johnson St	4 EA
19th Ave NW	3 EA
65th St NW	2 EA
54th St NW	2 EA
CHS Terminal / Power Fuels	1 EA
Frontage Rd / Evergreen Ave	1 EA
Total	17 EA

Reset mile post

RP 139.000 rt	1 EA

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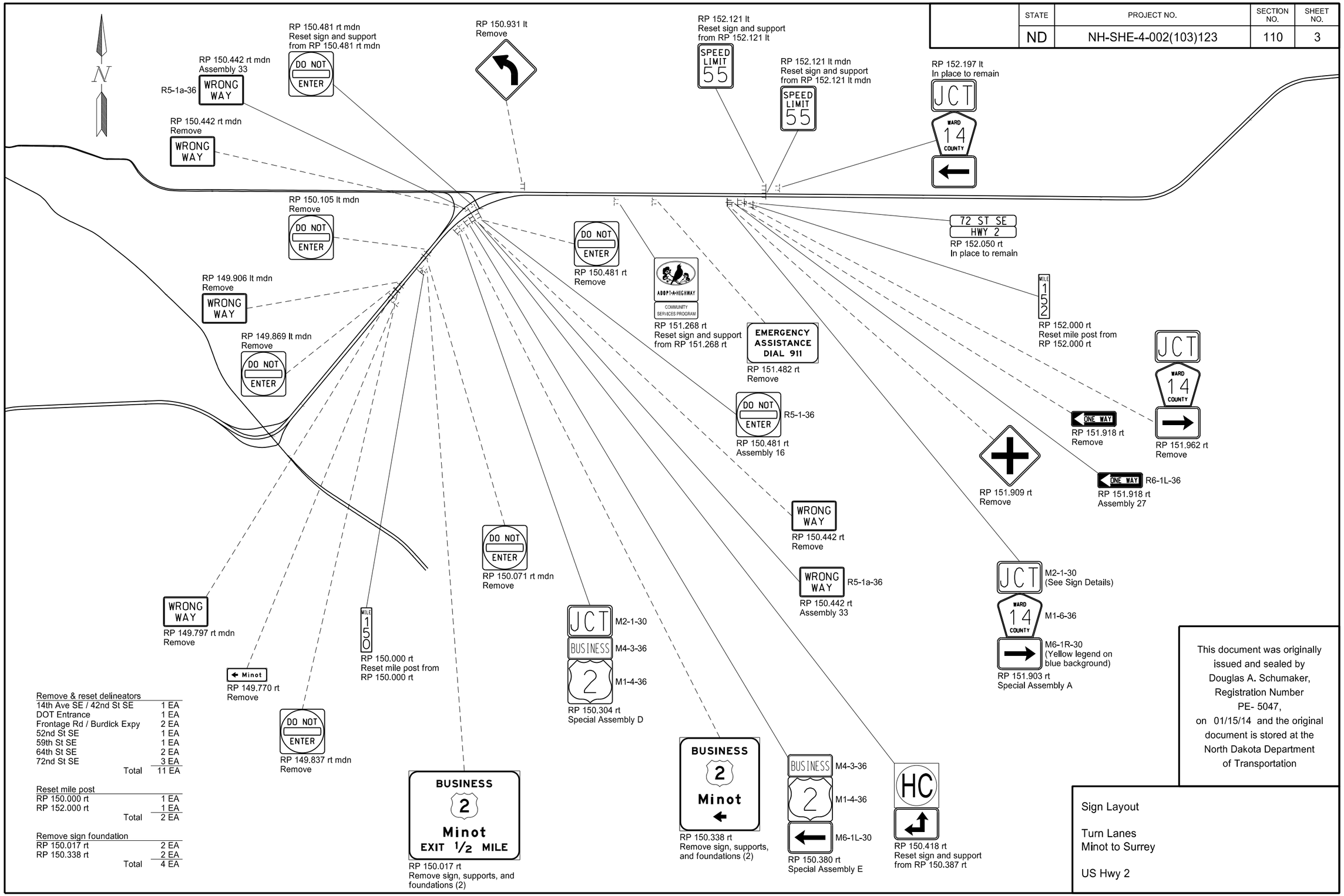
Sign Layout

Turn Lanes
Burlington to Minot

US Hwy 2

1/15/2014 11:02:27 AM tcork R:\project\40002123.103\traffic\110SN_002_LSign.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	110	3



Remove & reset delineators	
14th Ave SE / 42nd St SE	1 EA
DOT Entrance	1 EA
Frontage Rd / Burdick Expy	2 EA
52nd St SE	1 EA
59th St SE	1 EA
64th St SE	2 EA
72nd St SE	3 EA
Total	11 EA

Reset mile post	
RP 150.000 rt	1 EA
RP 152.000 rt	1 EA
Total	2 EA

Remove sign foundation	
RP 150.017 rt	2 EA
RP 150.338 rt	2 EA
Total	4 EA

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Sign Layout

Turn Lanes
Minot to Surrey

US Hwy 2

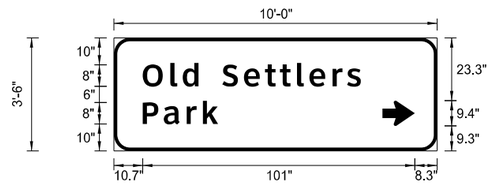
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	110	4

SIGN NUMBER	Sign 1
WIDTH x HEIGHT	10'-0" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Brown
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	99.7	9.3	9.4	12	0

STATION(S):
137.843 lt

AREA: 35.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Recreation.ssl

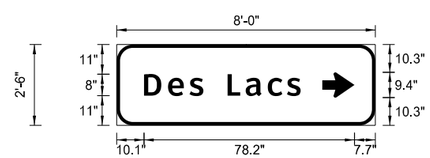
LETTER POSITION (X)												LENGTH	SIZE	SERIES
O	l	d		S	e	t	t	l	e	r	s	81	8/6.5	ClearviewHwy-5-W
10.7	21	25.6	31.4	40.3	48.3	56.1	61.6	68	72.6	81.2	86.6			
P	a	r	k									28	8/6.5	ClearviewHwy-5-W
10.7	18.5	27	33											

SIGN NUMBER	Sign 2
WIDTH x HEIGHT	8'-0" x 2'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	76.3	10.3	9.4	12	0

STATION(S):
140.156 rt

AREA: 20.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Destination.ssl

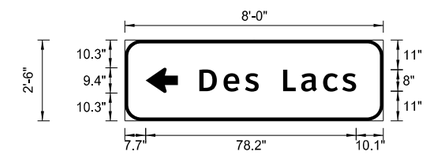
LETTER POSITION (X)												LENGTH	SIZE	SERIES
D	e	s		L	a	c	s					58.2	8/6.5	ClearviewHwy-5-W
10.1	19	27	32.1	41.2	47.9	56.1	63.2							

SIGN NUMBER	Sign 3
WIDTH x HEIGHT	8'-0" x 2'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	7.7	10.3	9.4	12	180

STATION(S):
140.419 lt

AREA: 20.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Destination.ssl

LETTER POSITION (X)												LENGTH	SIZE	SERIES
D	e	s		L	a	c	s					58.2	8/6.5	ClearviewHwy-5-W
27.7	36.6	44.6	49.7	58.8	65.5	73.7	80.8							

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Sign Details

US Hwy 2

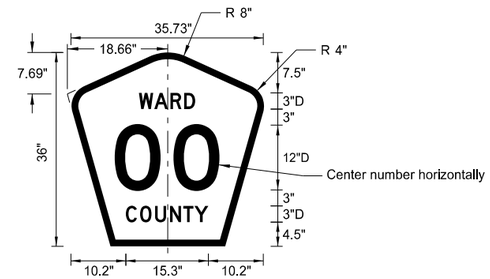
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	110	5

SIGN NUMBER	M1-6-36
WIDTH x HEIGHT	3'-0" x 3'-0"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	Varies
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: Yellow

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
138.898 rt
139.227 lt
140.080 rt
140.495 lt
151.903 rt

AREA: 9.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

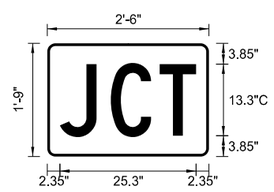
LETTER POSITION (X)																			LENGTH	SIZE	SERIES
W	A	R	D																10.4	3	D 2000
12.8	15.6	18.6	21.2																		
0	0																		19.4	12	D 2000
8.3	19.2																				
C	O	U	N	T	Y														15.3	3	D 2000
10.4	13	15.8	18.5	21	23.1																

SIGN NUMBER	M2-1-30
WIDTH x HEIGHT	2'-6" x 1'-9"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: Yellow

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
138.898 rt
140.495 lt
151.903 rt

AREA: 4.4 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

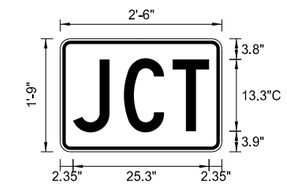
LETTER POSITION (X)																			LENGTH	SIZE	SERIES
J	C	T																	25.3	13.3	C 2000
2.4	11.8	20.9																			

SIGN NUMBER	M2-1-30
WIDTH x HEIGHT	2'-6" x 1'-9"
BORDER WIDTH	0.63" (inset 0.38")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
150.304 rt

AREA: 4.4 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

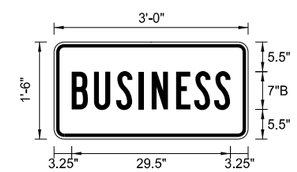
LETTER POSITION (X)																			LENGTH	SIZE	SERIES
J	C	T																	25.3	13.3	C 2000
2.4	11.8	20.9																			

SIGN NUMBER	M4-3-36
WIDTH x HEIGHT	3'-0" x 1'-6"
BORDER WIDTH	0.63" (inset 0.38")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
150.304 rt
150.380 rt

AREA: 4.5 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
B	U	S	I	N	E	S	S												29.5	7	B 2000
3.3	7.4	11.5	15.7	18.1	22.7	26	29.7														

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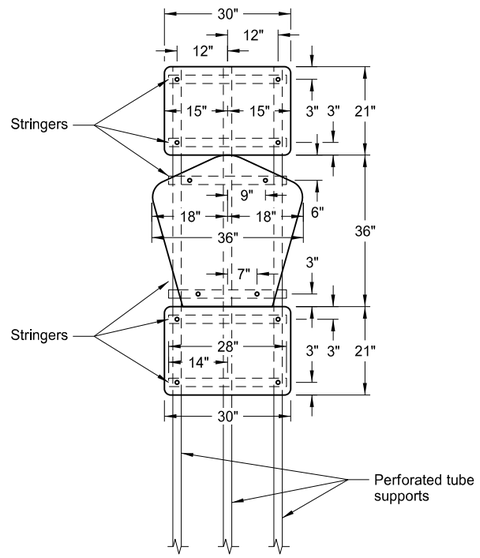
Sign Details

US Hwy 2

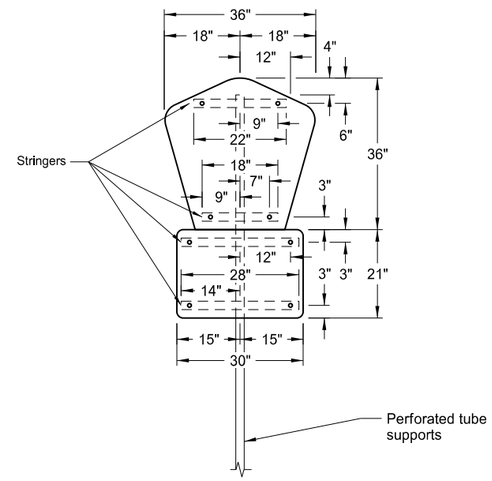
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	110	6



Special Assembly A

RP 138.898 rt
RP 140.495 lt
RP 151.903 rt

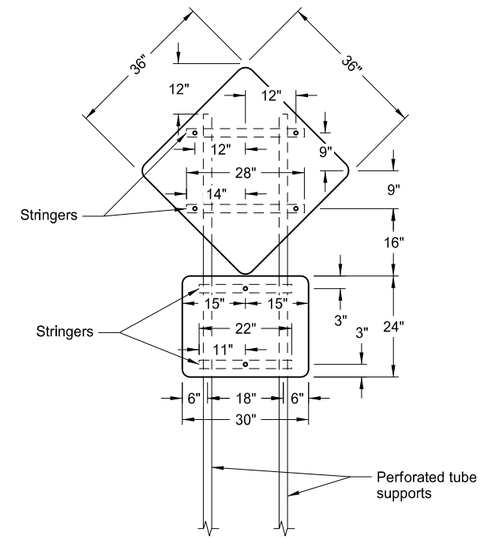
Pay Area: 17.8 SF



Special Assembly B

RP 139.095 lt
RP 139.227 lt
RP 140.080 rt

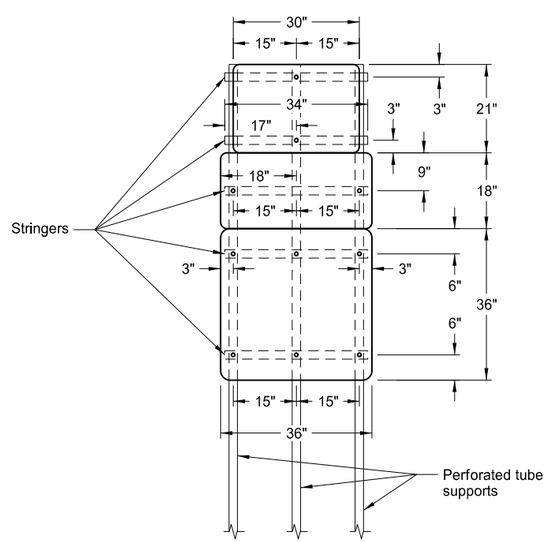
Pay Area: 13.4 SF



Special Assembly C

RP 140.678 lt
RP 140.678 lt mdn

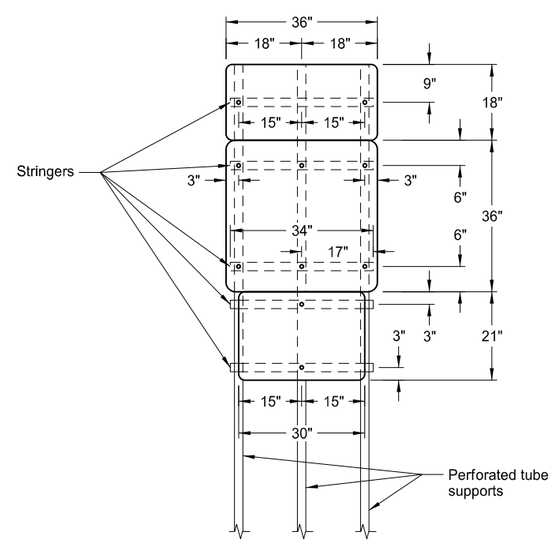
Pay Area: 14.0 SF



Special Assembly D

RP 150.304 rt

Pay Area: 17.9 SF



Special Assembly E

RP 150.380 rt

Pay Area: 17.9 SF

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Special Assembly Details

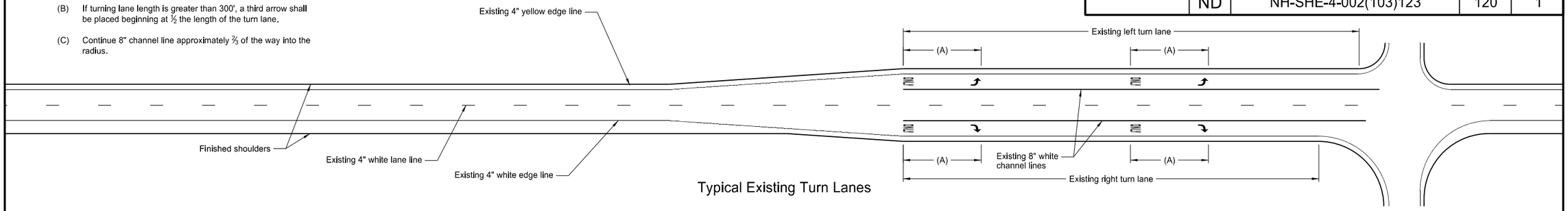
US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	120	1

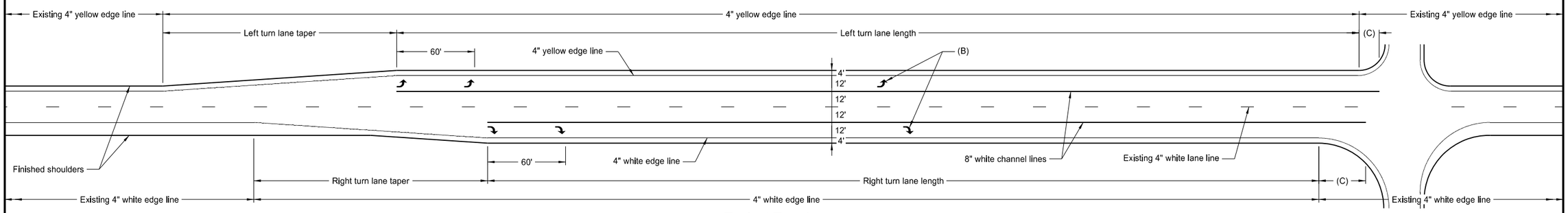
(A) Obliterate existing pavement marking messages.

(B) If turning lane length is greater than 300', a third arrow shall be placed beginning at ½ the length of the turn lane.

(C) Continue 8" channel line approximately ⅔ of the way into the radius.



Typical Existing Turn Lanes



Typical Turn Lanes

RP 137.795 (S Project Rd)

Epoxy pvmt mk message	
Left arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" yellow edge line	895 LF
Epoxy pvmt mk 8in line	
8" white channel line	735 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Left arrow (x1)	16 SF
Total	38 SF

RP 139.052 (29th Ave NW / Johnson St)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Left arrow (x1)	16 SF
Total	38 SF

RP 140.306 (19th Ave NW)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	820 LF
4" yellow edge line	895 LF
Total	1715 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	680 LF
8" white channel line (left)	735 LF
Total	1415 LF
Obliteration of pvmt mk	
ONLY (x4)	88 SF
Right arrow (x2)	32 SF
Left arrow (x2)	32 SF
Total	152 SF

RP 142.259 (54th St NW)

Epoxy pvmt mk message	
Left arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" yellow edge line	685 LF
Epoxy pvmt mk 8in line	
8" white channel line	525 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Left arrow (x1)	16 SF
Total	38 SF

RP 142.640 (CHS Terminal / Power Fuels)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	610 LF
4" yellow edge line	685 LF
Total	1295 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	470 LF
8" white channel line (left)	525 LF
Total	995 LF
Obliteration of pvmt mk	
ONLY (x2)	44 SF
Right arrow (x1)	16 SF
Left arrow (x1)	16 SF
Total	76 SF

RP 144.894 (Frontage Rd / Evergreen Ave)

Epoxy pvmt mk message	
Right arrow (x2)	32 SF
Epoxy pvmt mk 4in line	
4" white edge line	445 LF
Epoxy pvmt mk 8in line	
8" white channel line	305 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Right arrow (x1)	16 SF
Total	38 SF

RP 149.856 (14th Ave SE / 42nd St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Right arrow (x1)	16 SF
Total	38 SF

RP 150.087 (DOT District Driveway)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
Epoxy pvmt mk 8in line	
8" white channel line	375 LF

RP 150.499 (Frontage Rd-Burdick Expy)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF

RP 150.856 (52nd St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	340 LF
8" white channel line (left)	430 LF
Total	770 LF

RP 151.291 (59th St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF

RP 152.050 (72nd St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	820 LF
4" yellow edge line	895 LF
Total	1715 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	680 LF
8" white channel line (left)	735 LF
Total	1415 LF

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Pavement Marking Layout

Typical Turn Lanes - Divided Highway
Eastbound Roadway

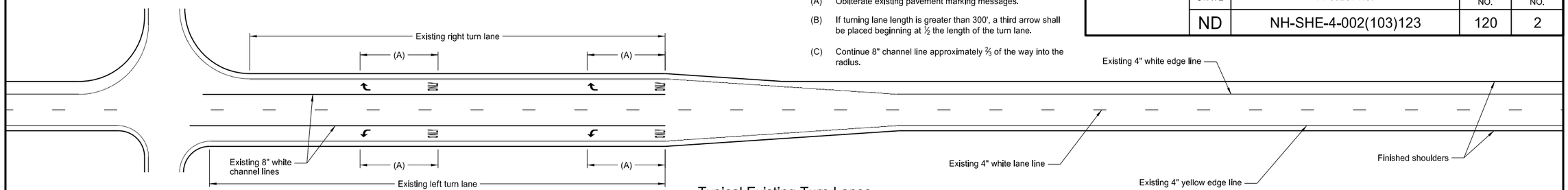
US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	120	2

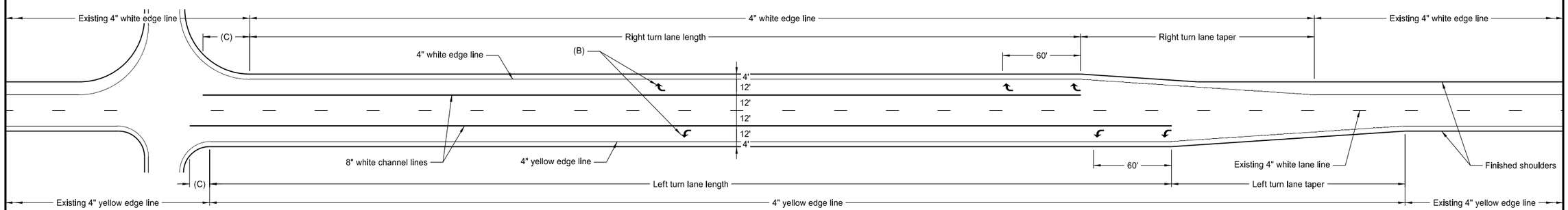
(A) Obliterate existing pavement marking messages.

(B) If turning lane length is greater than 300', a third arrow shall be placed beginning at ½ the length of the turn lane.

(C) Continue 8" channel line approximately ⅔ of the way into the radius.



Typical Existing Turn Lanes



Typical Turn Lanes

RP 137.795 (S Project Rd)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" white edge line	820 LF
Epoxy pvmt mk 8in line	
8" white channel line	680 LF
Obliteration of pvmt mk	
ONLY (x2)	44 SF
Right arrow (x2)	32 SF
Total	76 SF

RP 139.052 (29th Ave NW / Johnson St)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF
Obliteration of pvmt mk	
ONLY (x2)	44 SF
Right arrow (x1)	16 SF
Left arrow (x1)	16 SF
Total	76 SF

RP 140.306 (19th Ave NW)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	820 LF
4" yellow edge line	895 LF
Total	1715 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	680 LF
8" white channel line (left)	735 LF
Total	1415 LF
Obliteration of pvmt mk	
ONLY (x3)	66 SF
Right arrow (x2)	32 SF
Left arrow (x1)	16 SF
Total	114 SF

RP 140.587 (Speedway Drive)

Epoxy pvmt mk message	
Left arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" yellow edge line	895 LF
Epoxy pvmt mk 8in line	
8" white channel line	735 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Left arrow (x1)	16 SF
Total	38 SF

RP 141.304 (65th St NW)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" white edge line	820 LF
Epoxy pvmt mk 8in line	
8" white channel line	680 LF
Obliteration of pvmt mk	
ONLY (x2)	44 SF
Right arrow (x2)	32 SF
Total	76 SF

RP 141.745 (62nd Ave NW)

Epoxy pvmt mk message	
Left arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" yellow edge line	895 LF
Epoxy pvmt mk 8in line	
8" white channel line	735 LF
Obliteration of pvmt mk	
ONLY (x2)	44 SF
Left arrow (x2)	32 SF
Total	76 SF

RP 142.259 (54th St NW)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	610 LF
4" yellow edge line	685 LF
Total	1295 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	470 LF
8" white channel line (left)	525 LF
Total	995 LF
Obliteration of pvmt mk	
ONLY (x4)	88 SF
Right arrow (x2)	32 SF
Left arrow (x2)	32 SF
Total	152 SF

RP 142.640 (CHS Terminal-Power Fuels)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	610 LF
4" yellow edge line	685 LF
Total	1295 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	470 LF
8" white channel line (left)	525 LF
Total	995 LF
Obliteration of pvmt mk	
ONLY (x4)	88 SF
Right arrow (x2)	32 SF
Left arrow (x2)	32 SF
Total	152 SF

RP 149.856 (14th Ave SE / 42nd St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF
Obliteration of pvmt mk	
ONLY (x1)	22 SF
Left arrow (x1)	16 SF
Total	38 SF

RP 150.087 (DOT Driveway)

Epoxy pvmt mk message	
Left arrow (x3)	48 SF
Epoxy pvmt mk 4in line	
4" yellow edge line	590 LF
Epoxy pvmt mk 8in line	
8" white channel line	430 LF

RP 150.856 (52nd St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	515 LF
4" yellow edge line	590 LF
Total	1105 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	375 LF
8" white channel line (left)	430 LF
Total	805 LF

RP 152.050 (72nd St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4in line	
4" white edge line	820 LF
4" yellow edge line	895 LF
Total	1715 LF
Epoxy pvmt mk 8in line	
8" white channel line (right)	680 LF
8" white channel line (left)	735 LF
Total	1415 LF
Obliteration of pvmt mk	
ONLY (x2)	44 SF
Right arrow (x1)	16 SF
Left arrow (x1)	16 SF
Total	76 SF

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Pavement Marking Layout

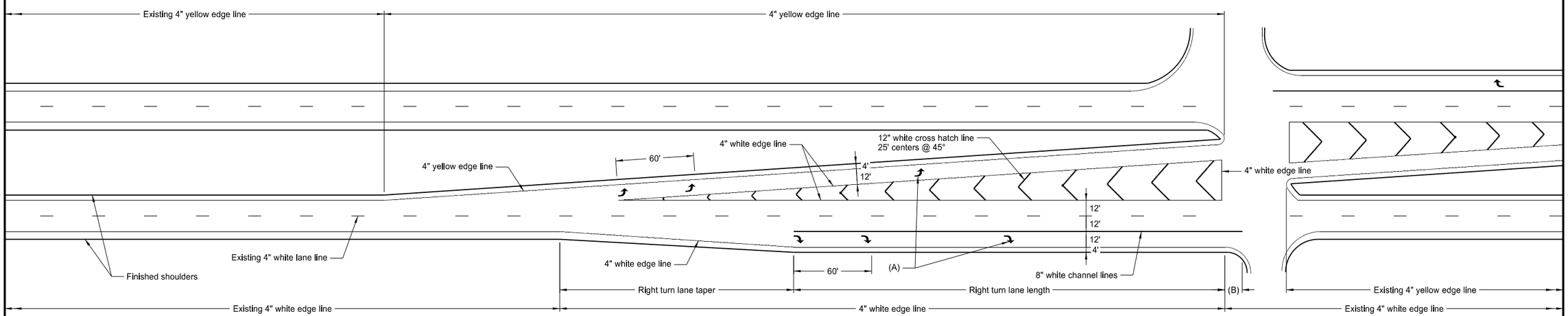
Typical Turn Lanes - Divided Highway
Westbound Roadway

US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	120	3

(A) If turning lane length is greater than 300', a third arrow shall be placed beginning at ½ the length of the turn lane.

(B) Continue 8" channel line approximately ⅔ of the way into the radius.



RP 151.522
(64th St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF

Epoxy pvmt mk 4in line	
4" white edge line (right)	515 LF
4" white edge line (left)	965 LF
4" yellow edge line	680 LF
Total	2160 LF

Epoxy pvmt mk 8in line	
8" white channel line (right)	345 LF

Epoxy pvmt mk 12in line	
12" white cross hatch line (25' centers @ 45°)	295 LF

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Pavement Marking Layout

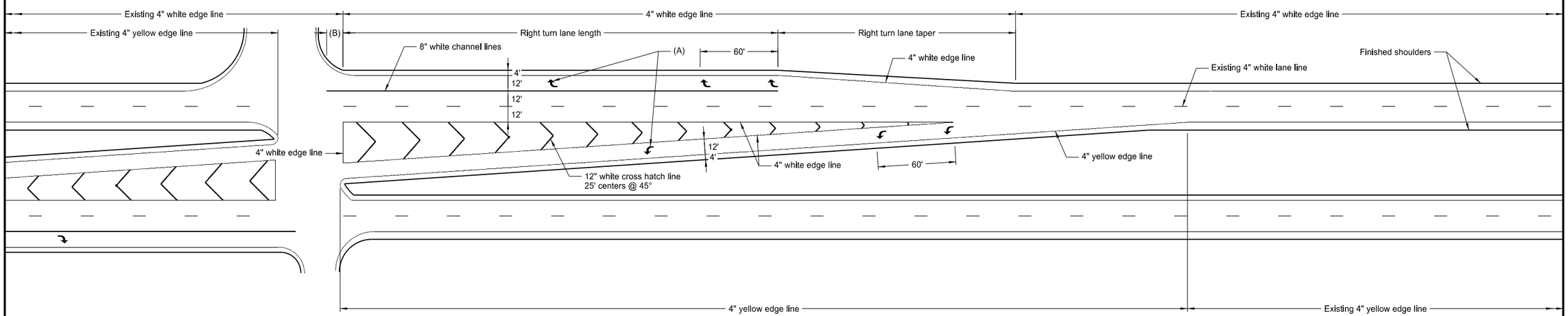
Turn Lanes with Angled Offset Left Turn
64th St SE - Eastbound Roadway

US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	120	4

(A) If turning lane length is greater than 300', a third arrow shall be placed beginning at ½ the length of the turn lane.

(B) Continue 8" channel line approximately ⅔ of the way into the radius.



RP 151.522
(64th St SE)

Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF

Epoxy pvmt mk 4in line	
4" white edge line (right)	515 LF
4" white edge line (left)	975 LF
4" yellow edge line	675 LF
Total	2165 LF

Epoxy pvmt mk 8in line	
8" white channel line (right)	350 LF

Epoxy pvmt mk 12in line	
12" white cross hatch line (25' centers @ 45°)	295 LF

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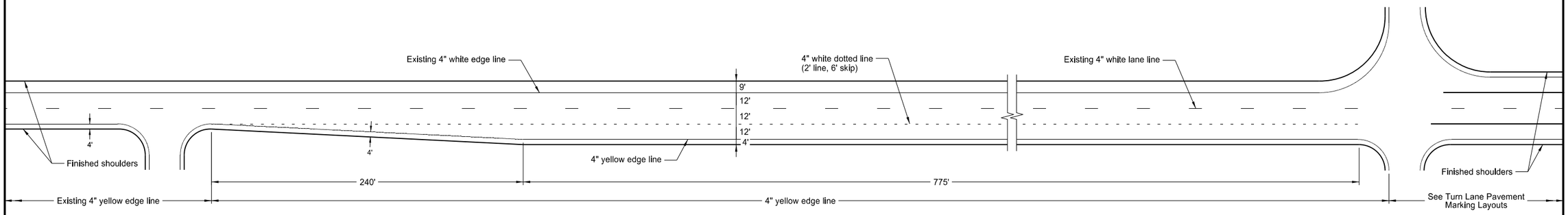
Pavement Marking Layout

Turn Lanes with Angled Offset Left Turn
64th St SE - Westbound Roadway

US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	120	5



Acceleration Lane

RP 142.640
(CHS Terminal / Power Fuels)

Epoxy pvmt mk 4in line	
4" yellow edge line	1060 LF
4" white dotted line (2' line, 6' skip)	254 LF
Total	1314 LF

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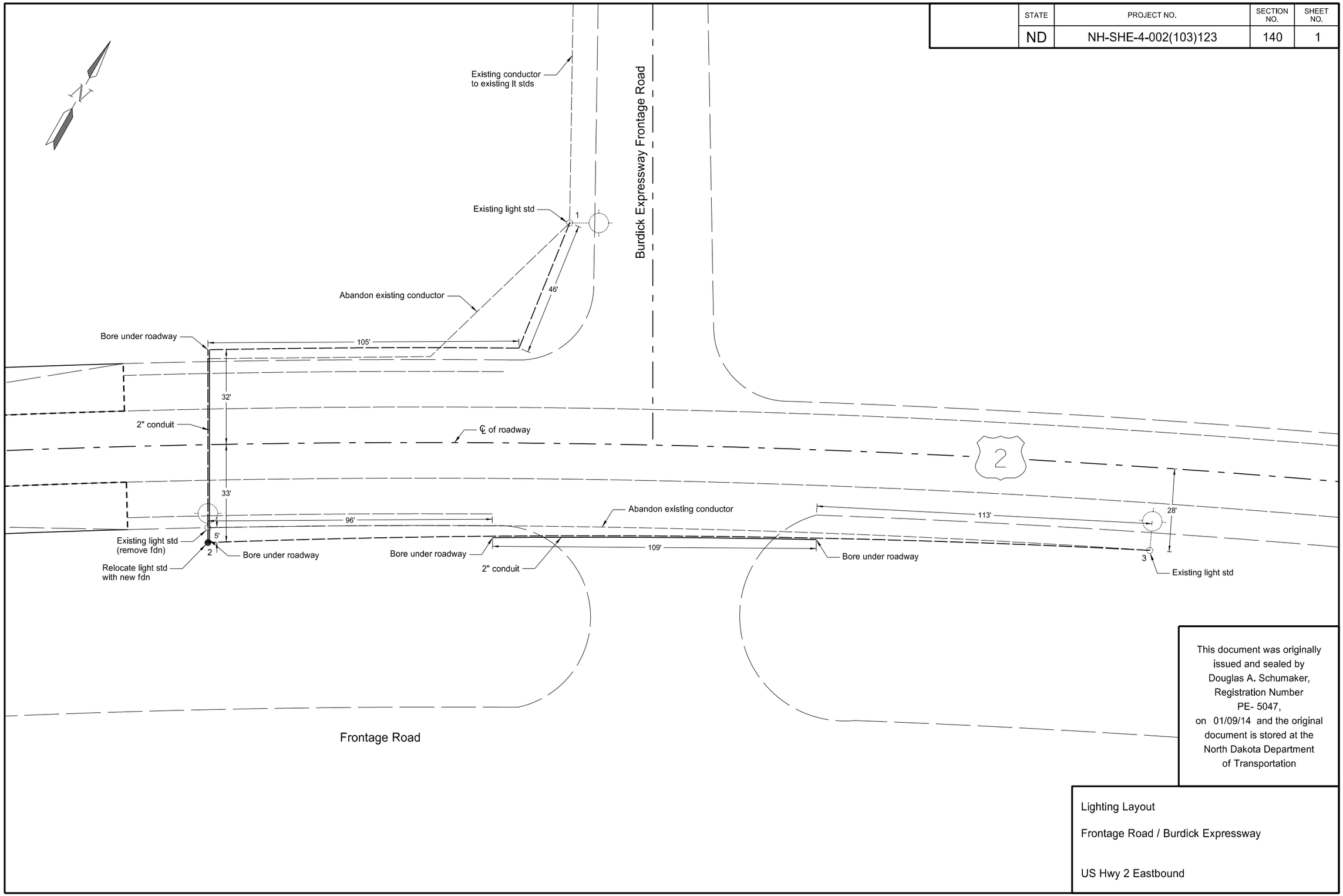
Pavement Marking Layout

Acceleration Lane
Westbound 84/166 oadway

US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	140	1



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Lighting Layout

Frontage Road / Burdick Expressway

US Hwy 2 Eastbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	140	2

Lighting Circuit					
Station	Conduit Runs		Trench	Multi. Und. Cable Runs	
	LF	DIA	LF	LF	TYPE
Lt std 1 to Lt std 2	67	2	216	228	2 No 4 USE 1 No 6 USE
Lt std 2 to Lt std 3	109	2	318	330	2 No 4 USE 1 No 6 USE

Light Standard Foundation Table				
Description	Foundation Depth			
	24" Dia.	30" Dia.	36" Dia.	42" Dia.
42' Pole- single mast arm	6'	6'	5'	5'

Lighting Quantities (A)							
Concrete Foundation-Highway Lighting	2IN Dia Rigid Conduit	Multiple Underground Cable 2 No 4, 1 No 6 Style USE	Cable Trench-Type II	Relocate Luminaire	Relocate Light Standard (42' pole, 6' mast arm)	Remove concrete foundation	REVISE LIGHTING SYSTEM
EA	LF	LF	LF	EA	EA	EA	EA
1	176	558	534	1	1	1	1

(A) These items shall shall be included in the price bid for the "Revise Lighting System."

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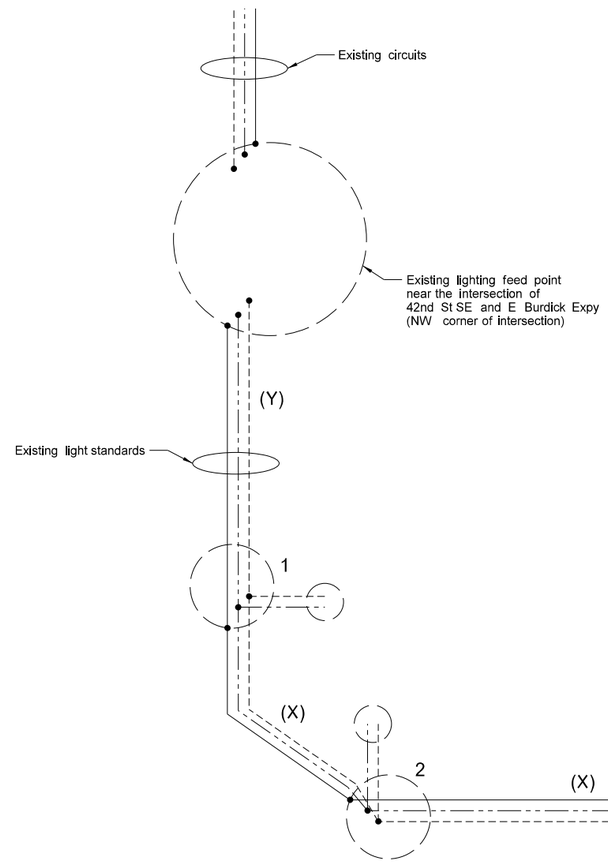
Lighting Layout

Frontage Road / Burdick Expressway

US Hwy 2 Eastbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	140	3



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LEGEND

- Phase Conductor
- Phase Conductor
- Ground Conductor
- (X) Multi 2 No 4 USE / Multi 1 No 6 USE
- (Y) Existing Multi 2 No 4 USE / Multi 1 No 6 USE
- Existing High Pressure Sodium Vapor Luminaire
- 2 Relocated Light Standard Number
- Existing Light Standard
- Existing Feed Point

Lighting Schematic

Frontage Road / Burdick Expressway

US Hwy 2 Eastbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	180	1

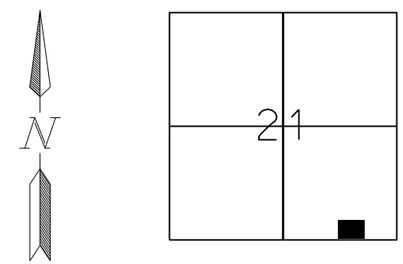
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

TEST HOLE PLAT

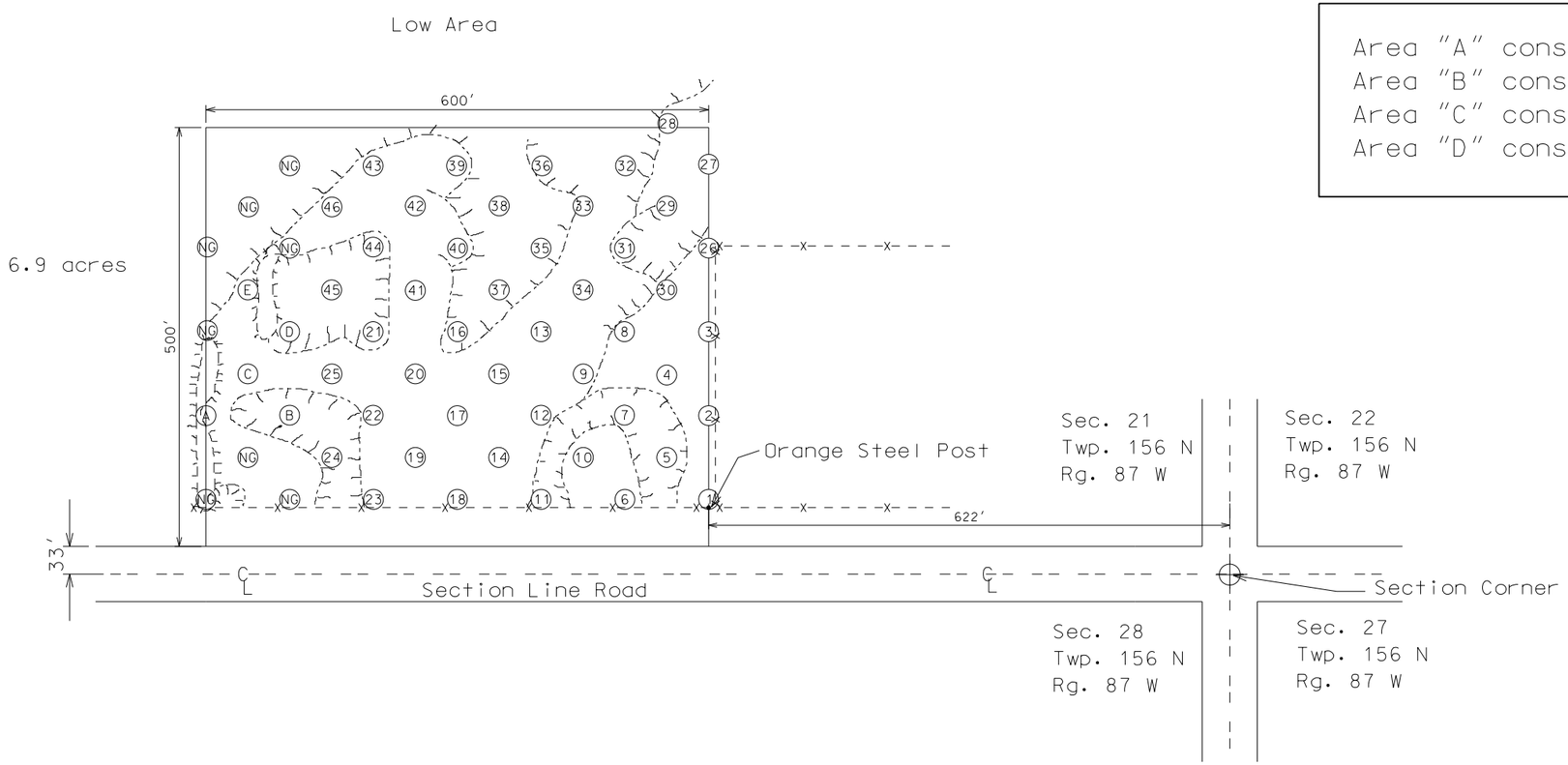
Location: SE1/4SE1/4 21-156-87 County: Ward

Ownership: State Owned Aggregate, Landowner: Jessie & G.C. Stredwick

LOCATION OF PIT IN SECTION



Area "A" consists of Test Holes 1 - 13
Area "B" consists of Test Holes 14 - 25
Area "C" consists of Test Holes 26 - 36
Area "D" consists of Test Holes 37 - 46



Scale 1" = 200'

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	180	2

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1 ½" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on # 4 Screen	Bottom of Test Hole
1	0.5	6.5 gr	1	8	24	34	SiCl
		1.0 sd					
		7.0 gr					
		1.0 sd					
		1.0 gr					
2	3.0	5.0 gr	0	2	15	24	+WL16.5
		2.0 sd					
		4.0 gr					
		1.0 sd					
		1.0 gr					
3	2.0	8.0 gr	0	10	26	37	+WL12.0
		2.0 FGr					
4	1.0	9.0 gr	0	8	20	37	SiCl
		2.0 sd					
		6.0 gr					
5	0.5	1.0 FS	0	3	15	21	SiCl
		3.0 gr					
		2.0 FS					
		1.0 gr					
6	2.5	3.5 gr	2	14	34	45	SiCl
		1.0 sd					
		6.0 gr					
7	3.5	0.5 FS	0	3	17	27	SiCl
		6.0 gr					
		2.0 sd					
		1.0 gr					
8	0.5	1.5 sd	1	7	23	34	SiCl
		5.0 gr					
		1.0 gr SiCl					
		2.5 gr					
9	8.0	2.0 sd	1	7	27	40	rk
		9.0 gr					
10	8.0	1.0 sd	0	6	22	31	rk
		4.5 gr					
11	6.0	1.5 gr	0	4	15	23	SiCl
		1.5 FS SiCl					
		3.0 sd					
		1.5 gr					
12	0.5	7.0 gr	1	11	31	41	SiCl
		0.5 gr SiCl					
13	2.0	5.0 gr	0	7	24	33	SiCl
		2.0 sd					
		1.0 gr					
		1.0 gr SiCl					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1 ½" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on # 4 Screen	Bottom of Test Hole
14	0.5	4.5 gr	0	2	19	32	SiCl
15	3.0	2.0 gr SiCl	0	4	22	34	SiCl
16	2.0	6.0 gr	2	7	25	33	SiCl
		1.0 gr SiCl					
		2.0 gr					
17	1.0	6.0 gr	0	3	22	34	SiCl
		1.0 CS					
18	2.0	4.0 gr	1	10	29	40	SiCl
		1.0 CS					
19	3.0	4.0 gr	0	7	21	31	SiCl
20	1.0	3.0 gr	1	5	22	34	SiCl
		4.0 gr SiCl					
		1.0 gr					
21	4.0	1.0 gr	2	6	16	23	SiCl
		4.0 FS					
		2.0 sd					
		6.5 gr					
22	0.5	5.5 gr	1	7	27	37	SiCl
23	1.0	4.0 gr	3	9	29	41	SiCl
24	6.0	2.0 FS	0	2	13	22	+WL19.0
		1.5 gr					
		1.5 FS					
		5.0 gr					
		1.0 CS					
		2.0 gr					
25	0.5	1.5 gr SiCl	1	9	27	39	SiCl
		4.0 gr					
		2.0 sd					
		5.0 gr					
26	2.0	4.0 gr	0	4	24	33	+WL14.0
		1.5 gr SiCl					
		4.5 gr					
		1.0 FS					
		1.0 gr					
27	0.5	3.5 gr	1	13	25	35	+WL4.0
28	1.0	6.0 gr	0	0	14	23	SiCl
		1.0 sd					
		1.0 gr					
		1.0 sd					
29	2.0	5.0 gr	1	10	28	41	SiCl
		1.0 gr SiCl					
		2.0 gr					
		1.5 gr SiCl					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1 ½" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on # 4 Screen	Bottom of Test Hole
30	0.5	9.5 gr	1	9	23	33	rk
		1.0 CS					
		1.0 gr					
31	0.5	9.5 gr	1	12	35	47	+WL10.0
32	1.0	2.5 gr	0	8	22	33	+WL12.0
		3.5 CS					
		5.0 gr					
33	1.0	4.0 gr	3	9	23	34	+WL14.5
		2.0 sd					
		7.5 gr					
34	0.5	3.5 gr	1	10	26	39	rk
		2.0 FS CoS					
		7.5 gr					
35	1.0	1.0 CS	0	4	21	31	+WL11.0
		9.0 gr					
36	3.0	2.0 gr	0	8	24	35	+WL 5.0
37	1.0	5.0 gr	0	6	19	29	SiCl
		3.0 sd					
38	1.0	2.0 gr	1	7	22	33	+WL9.5
		4.0 sd					
		2.5 gr					
39	1.0	8.5 gr	2	8	23	35	+WL9.5
40	2.0	6.5 gr	2	5	25	35	SiCl
41	0.5	8.5 gr	2	10	30	41	SiCl
42	0.5	8.5 gr	1	9	19	30	SiCl
43	4.0	3.0 gr	2	8	23	35	+WL14.0
		4.0 sd					
		3.0 gr					
44	0.5	3.5 gr	0	7	26	41	SiCl
		1.0 gr SiCl					
45	7.0	5.0 sd SiCl	0	3	11	18	SiCl
		3.0 gr					
		1.0 gr SiCl					
46	0.5	8.5 gr	1	4	16	27	SiCl
		1.5 sd					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1 ½" Screen	% Retained on 3/4" Screen	% Retained on 3/8" Screen	% Retained on # 4 Screen	Bottom of Test Hole
A	3.0	7.0 gr	0	4	20	30	gr SiCl
		1.0 gr SiCl					
		2.0 Fgr					
B	4.0	1.0 gr	1	7	28	44	+WL16.0
		1.0 Fgr					
		1.5 FS					
		8.5 gr					
C	3.5	6.5 gr	0	10	26	38	SiCl
D	7.5	3.5 gr SiCl	0	5	25	39	rk
		1.0 sd					
		1.0 CS CoS					
E	6.0	2.5 gr SiCl					FS SiCl
		2.5 sd SiCl					

RANGE 87 **TWP.** 156 **SEC.** SE¼SE¼ 21

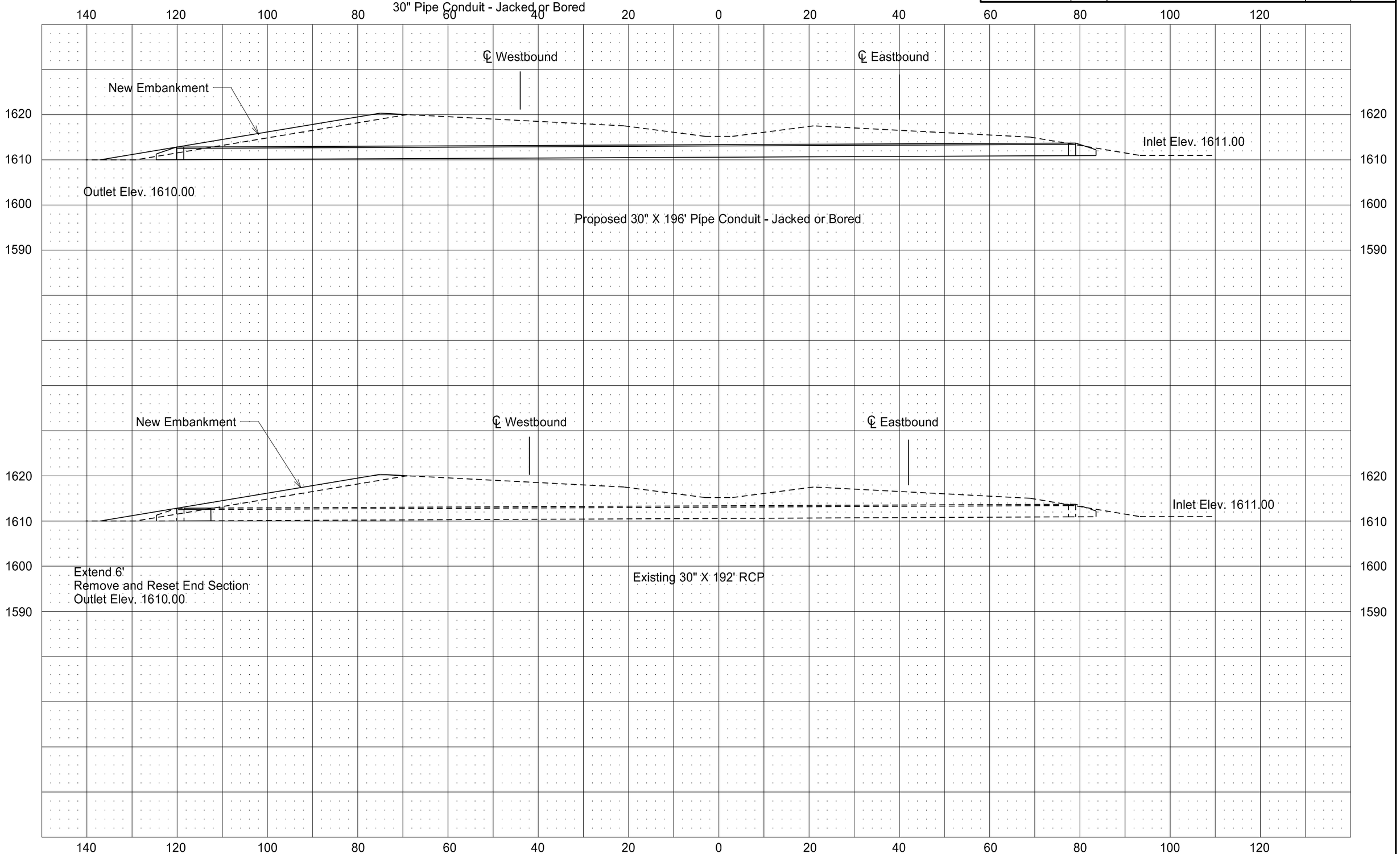
WARD **COUNTY**

PIT PROSPECTED BY WERRE 06/2002

INSPECTED & APPROVED WUTZKE

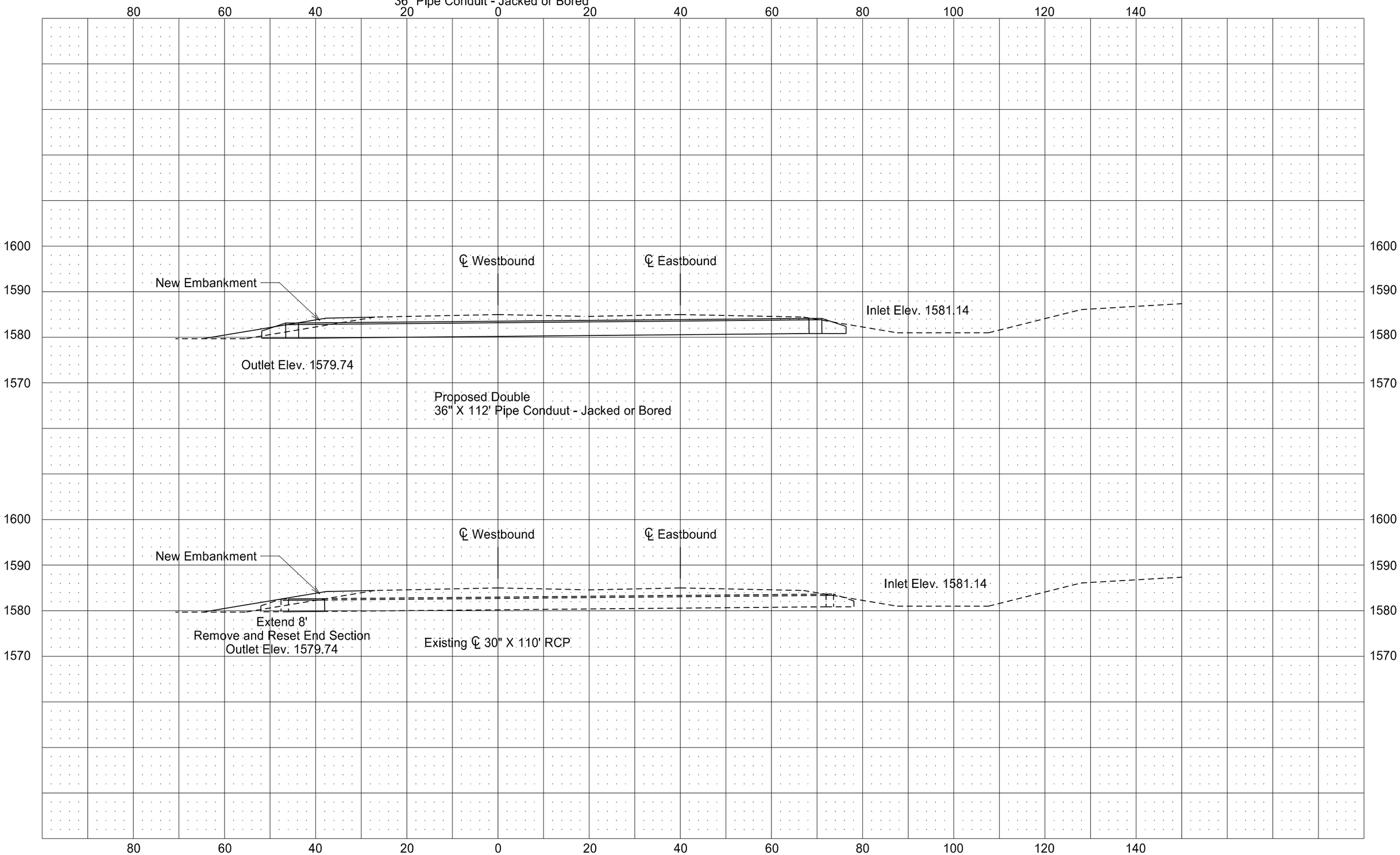
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	1

Cross Section
South Project Rd
30" Pipe Conduit - Jacked or Bored



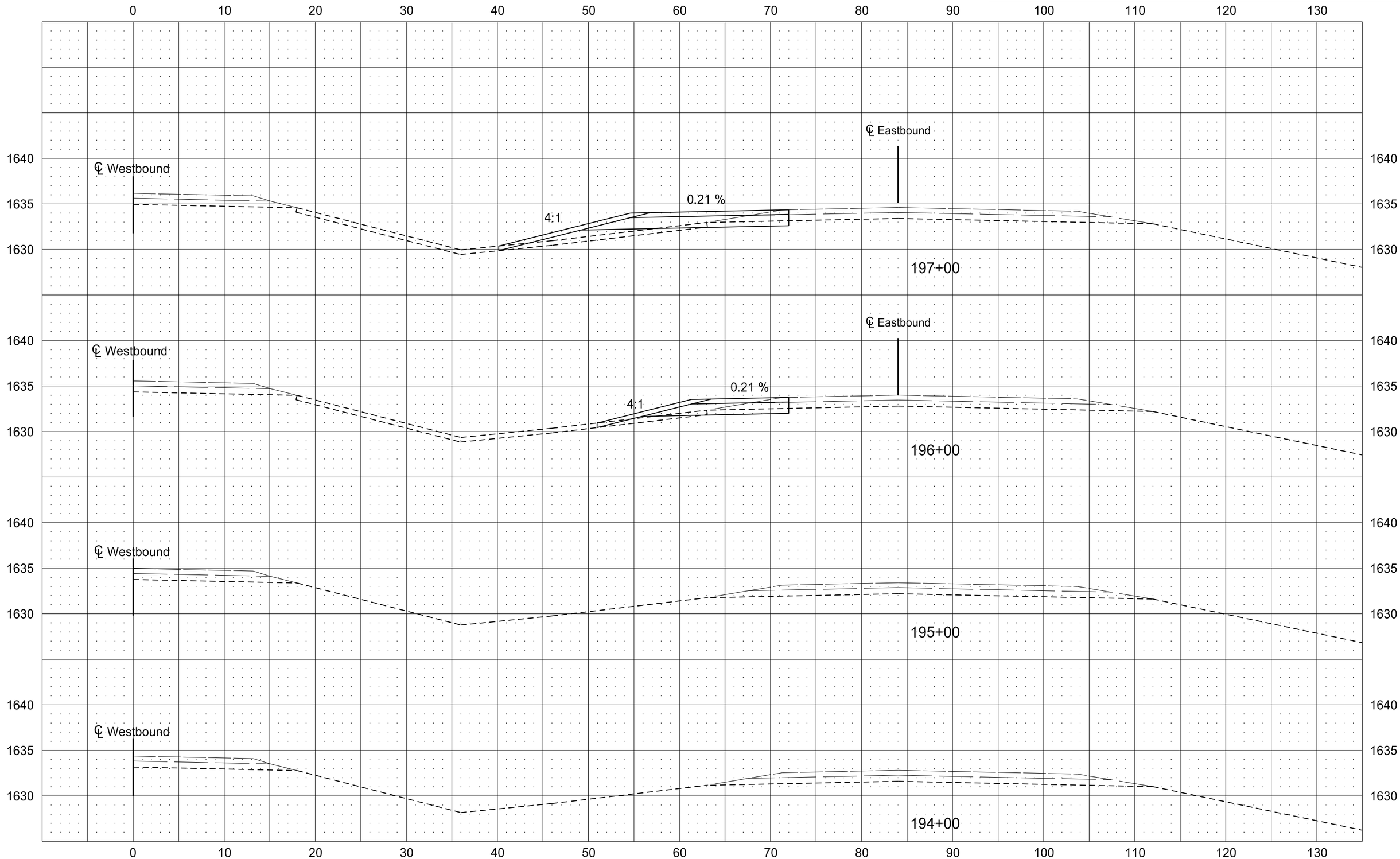
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	2

Cross Section
19th Ave. NW
36" Pipe Conduit - Jacked or Bored



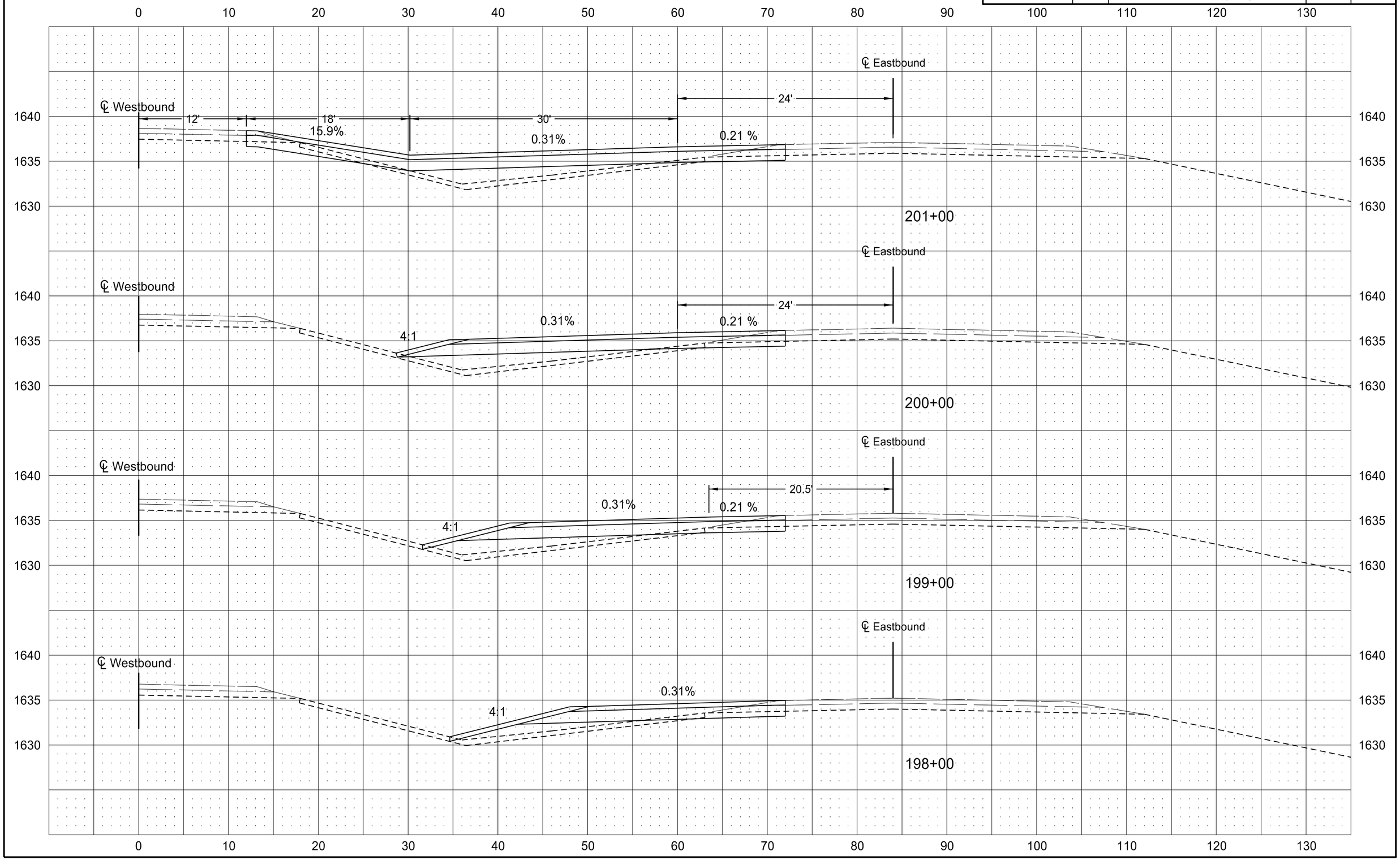
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	3

Cross Sections
64th St SE



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	4

Cross Sections
64th St SE



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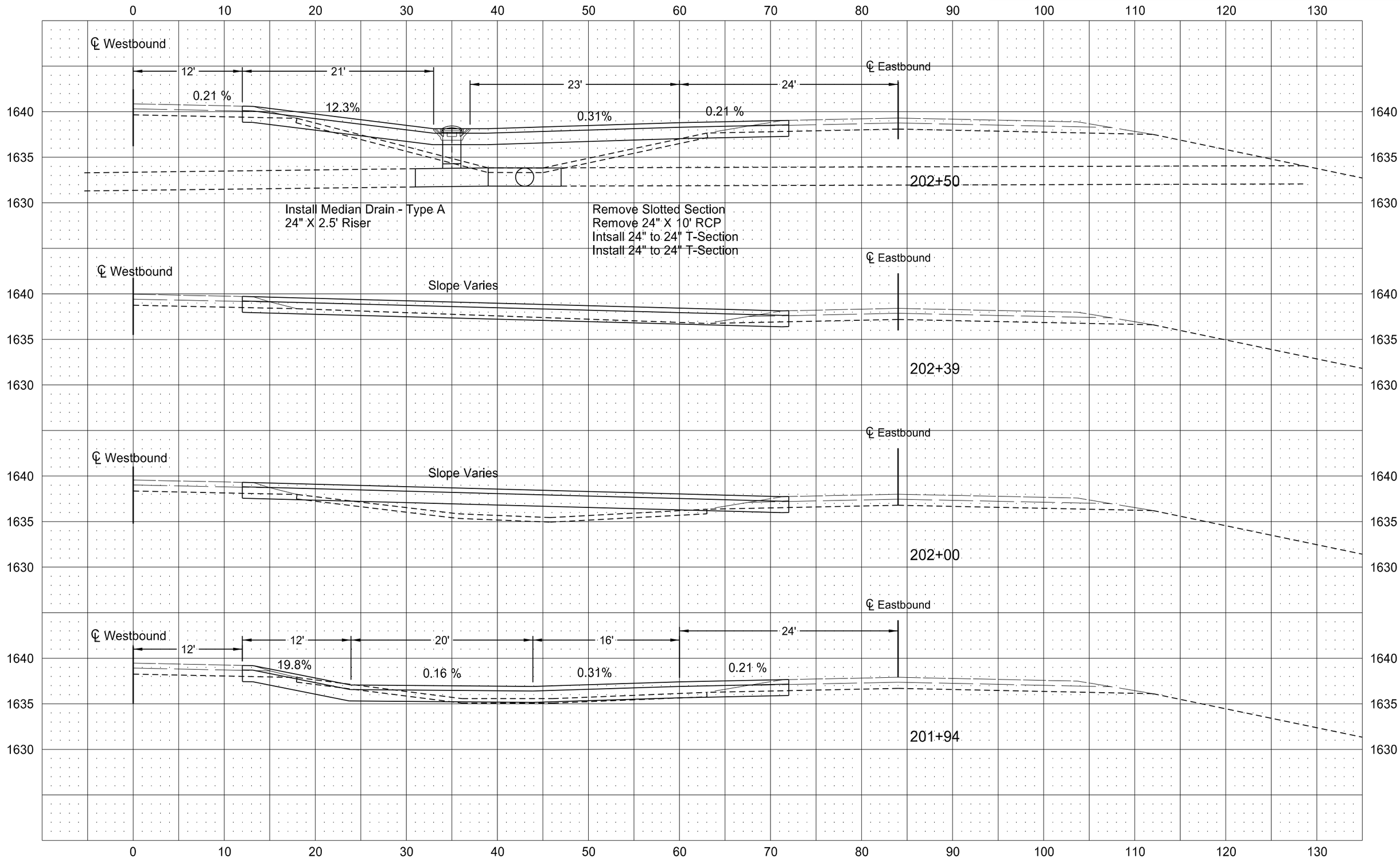
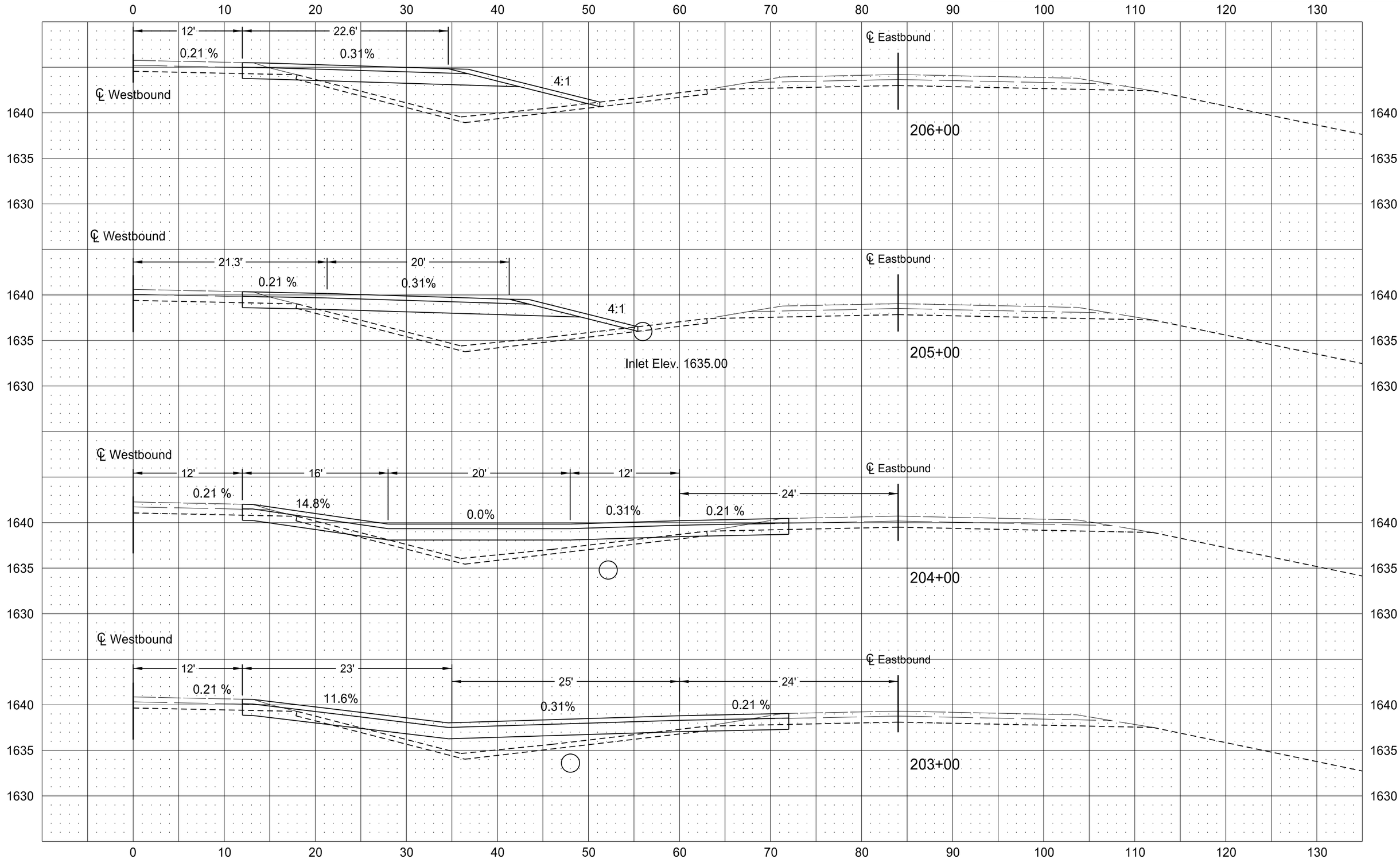
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	5

Cross Sections
64th St SE



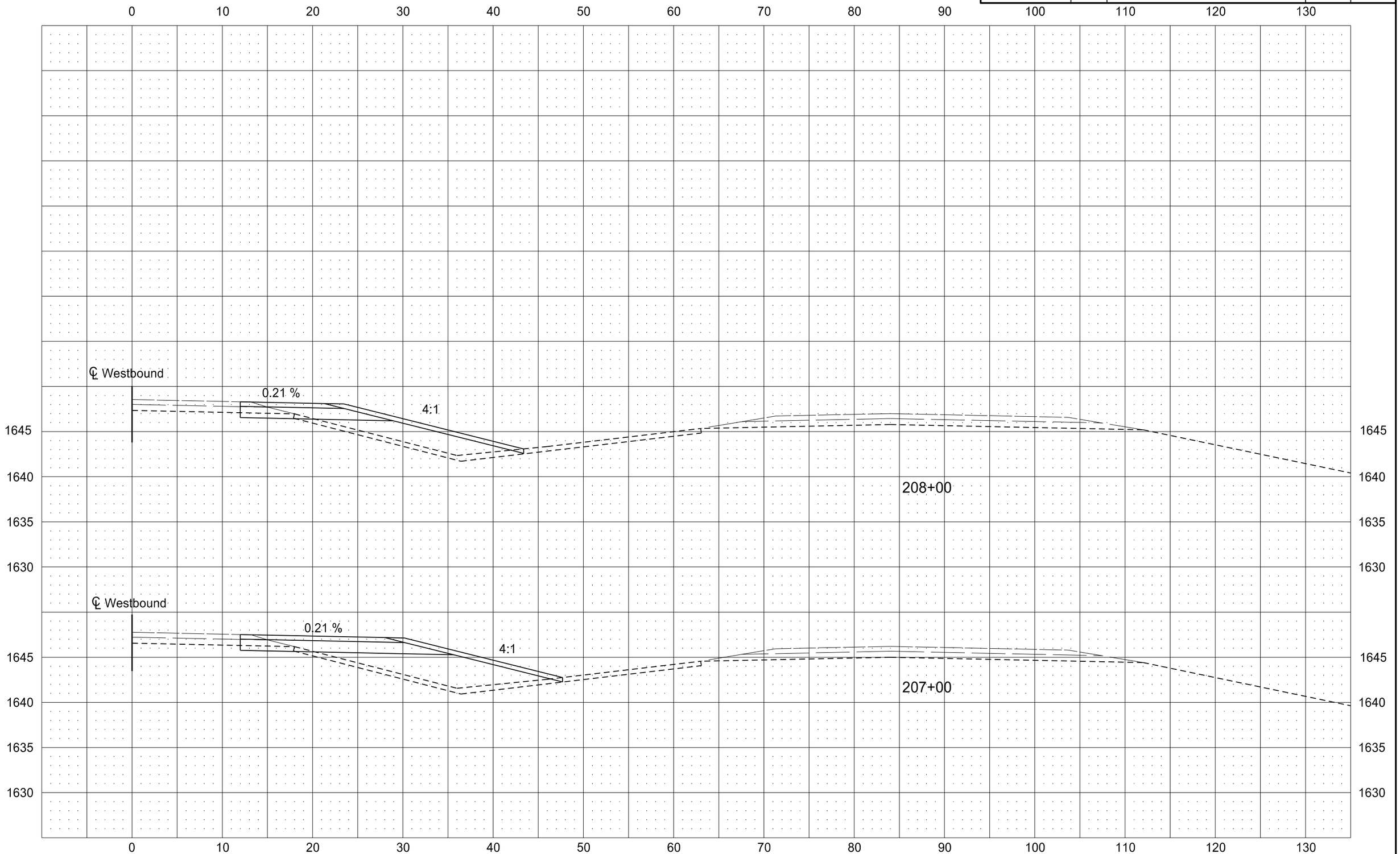
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	6

Cross Sections
64th St SE



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	7

Cross Sections
64th St SE



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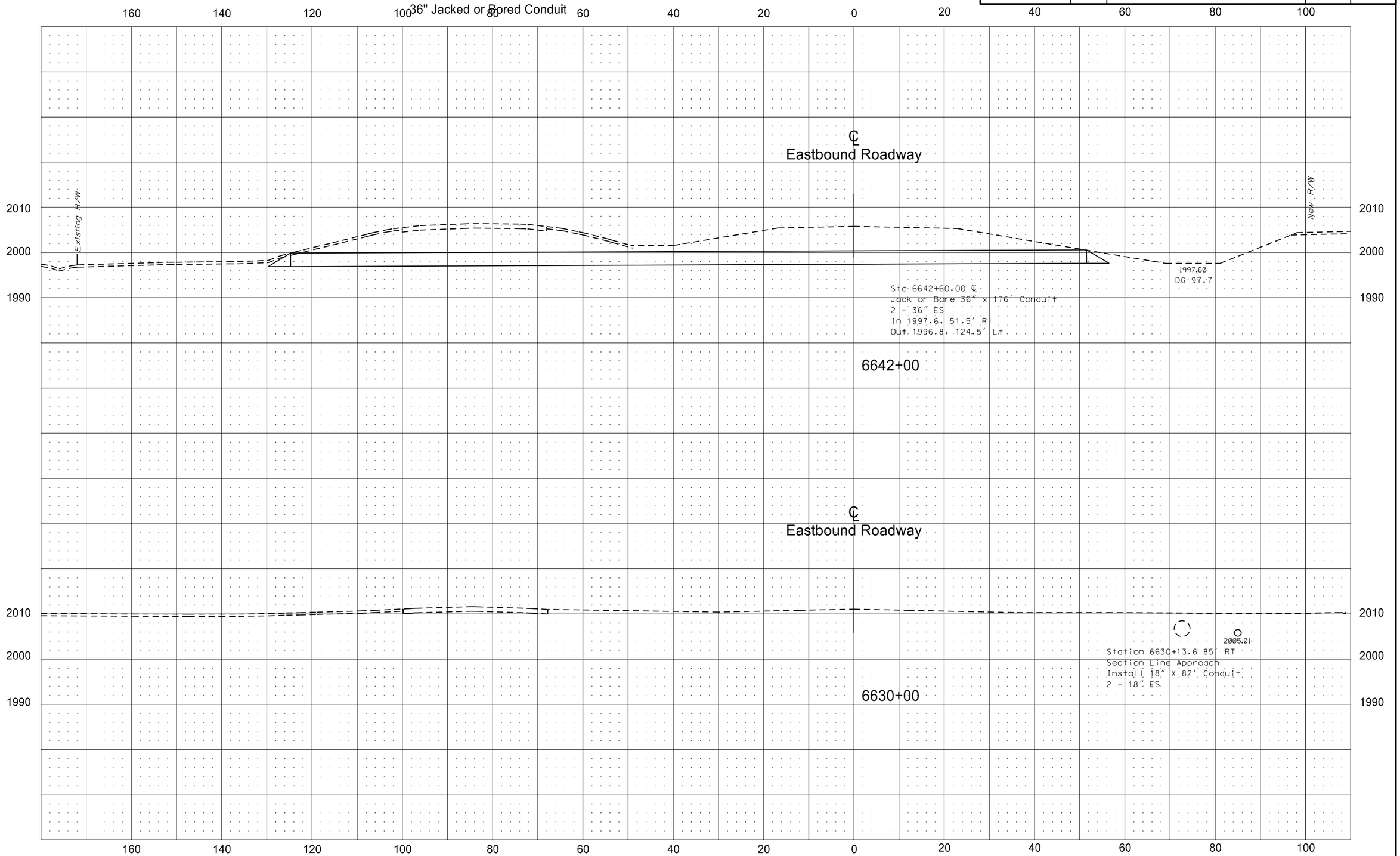
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-SHE-4-002(103)123	200	8

Cross Sections
18" Conduit
36" Jacked or Bored Conduit



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
ADA	Americans with Disabilities Act
A	ampere
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	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
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
FH	fire hydrant
Fl	flange
Flrd	flared
FES	flared end section
F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fs	foresight
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser
FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

06-15-10

REVISIONS

DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 11/01/13 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-20-2

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
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Obsn	observation
Ocpd	occupied
Ocpy	occupy
Off Loc	office location
O/s	offset
OC	on center
C	one dimensional consolidation
OC	organic content
Orig	original
O To O	out to out
OD	outside diameter
OH	overhead
PMT	pad mounted transformer
Pg	pages
Pntd	painted
Pr	pair
Pnl	panel
Pk	park
PK	Parker-Kalon nail
Pa	pascal
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post

Pen.	penetration
Perf	perforated
Per.	perimeter
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl	plate
Pt	point
PCC	point of compound curve
PC	point of curve
PI	point of intersection
PRC	point of reverse curvature
PT	point of tangent
POC	point on curve
POT	point on tangent
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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

06-15-10

REVISIONS

DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT ABBREVIATIONS

D-20-3

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

06-15-10

REVISIONS

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-20-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
AGC	Assiociated General Contractors of America
All PI	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BAKER ELEC	Baker Electric
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway
BOEING	Boeing
BRNS RWD	Barnes Rural Water District
BURK-DIV ELEC	Burke-Divide Electric Cooperative
BURL WU	Burleigh Water Users
Cable One	Cable One
CABLE SERV	Cable Services
CAP ELEC	Capital Electric Cooperative Incorporat
CASS CO ELEC	Cass County Electric Cooperative
CASS RWU	Cass Rural Water Users Incorporated
CAV ELEC	Cavalier Rural Electric Cooperative
CBLCOM	Cablecom Of Fargo
CENEX PL	Cenex Pipeline
CENT PL WATER DIST	Central Pipe Line Water District
CENT PWR ELEC	Central Power Electric Cooperative
COE	Corps of Engineers
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
ENVENTIS	Enventis Telephone
FALK MNG	Falkirk Mining Company
FHWA	Federal Highway Administration
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
IDEA1	Idea1
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ ELEC	McKenzie Electric Cooperative
MCKNZ WRD	McKenzie County Water Resource District
MCLEOD	McLeod USA
MCLN ELEC	McLean Electric Cooperative
MCLN-SHRDN R WAT	McLean-Sheridan Rural Water
MDU	Montana-dakota Utilities
MID-CONT CABLE	Mid-Continent Cable
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MRE LBTY TEL	Moore & Liberty Telephone
MUNICIPAL	City Water And Sewer
MUNICIPAL	City Of '.....'
N CENT ELEC	North Central Electric Cooperative
N VALL W DIST	North Valley Water District
ND PKS & REC	North Dakota Parks And Recreation
ND TEL	North Dakota Telephone Company
NDDOT	North Dakota Department of Transportation
NDSU SOIL SCI DEPT	NDSU Soil Science Department
NEMONT TEL	Nemont Telephone
NODAK R ELEC	Nodak Rural Electric Cooperative
NOON FRMS TEL	Noonan Farmers Telephone Company
NPR	Northern Plains Railroad
NSP	Northern States Power
NTH PRAIR RW	Northern Prairie Rural Water Association
NTHN BRDR PL	Northern Border Pipeline
NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated
NTHWSTRN REF	Northwestern Refinery Company
NW COMM	Northwest Communication Cooperation
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RAMSEY R SEW	Ramsey Rural Sewer Association
RAMSEY RW	Ramsey Rural Water Association
RAMSEY UTIL	Ramsey County Rural Utilities
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Coop
RRVW	Red River Valley & Western Railroad
RSR ELEC	R.S.R. Electric Cooperative
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STER ENG	Sterling Energy
STUT RWU	Stutsman Rural Water Users
SW PL PRJ	Southwest Pipeline Project
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TESORO HGH PLNS PL	Tesoro High Plains Pipeline
TRI-CNTY WU	Tri-County Water Users Incorporated
TRL CO RWU	Traill County Rural Water Users
UNTD TEL	United Telephone
UPPR SOUR WUA	Upper Souris Water Users Association
US SPRINT	U.S. Sprint
USAF MSL CABLE	U.S.A.F. Missile Cable
USFWS	US Fish and Wildlife Service
USW COMM	U.S. West Communications
VRNDRY ELEC	Verendrye Electric Cooperative
W RIV TEL	West River Telephone Incorporated
WEB	W. E. B. Water Development Association
WILLI RWA	Williams Rural Water Association
WILSTN BAS PL	Williston Basin Interstate Pipeline Company
WLSH RWD	Walsh Water Rural Water District
WOLVRTN TEL	Wolverton Telephone
XLENER	Xcel Energy
YSVR	Yellowstone Valley Railroad

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

6-15-10

REVISIONS

DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items, Changed Standard Name to Include Organizations

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 11/01/13 and the original document is stored at the North Dakota Department of Transportation

D-20-20

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
- D — Geotextile Fabric Type D
- E — Existing Electrical
- FO — Existing Fiber Optic Line
- FO — Existing TV Fiber Optic
- G — Existing Gas Pipe
- Geo — Geogrid
- OH — Existing Overhead Utility Line
- P — Existing Power
- PL — Existing Fuel Pipeline
- PL — Existing Undefined Above Ground Pipe Line
- R — Geotextile Fabric Type R
- R — Geotextile Fabric Type R1
- REMOVE — Remove Line
- RR — Geotextile Fabric Type RR
- S — Geotextile Fabric Type S
- S — Floating Silt Curtain
- T — Existing Telephone Line
- TV — Existing TV Line
- Void — Existing Assumed Ground (Not Surveyed)
- Void — Tentative Ground Line
- W — 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

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D-20-21

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

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

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CONSTRUCTION SIGN DETAIL

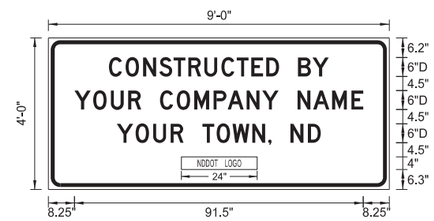
D-704-5

SIGN NUMBER	G20-10-108
WIDTH x HEIGHT	9'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: 3A Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Refl
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S):

AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
C	O	N	S	T	R	U	C	T	E	D		B	Y						69.7	6	D 2000
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7								
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E			91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96					
Y	O	U	R		T	O	W	N	,		N	D							64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2									

Notes:

1. Sign shall be placed a distance of ½A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

Advance Warning Sign Spacing (A)			
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

8-22-12

REVISIONS

DATE	CHANGE

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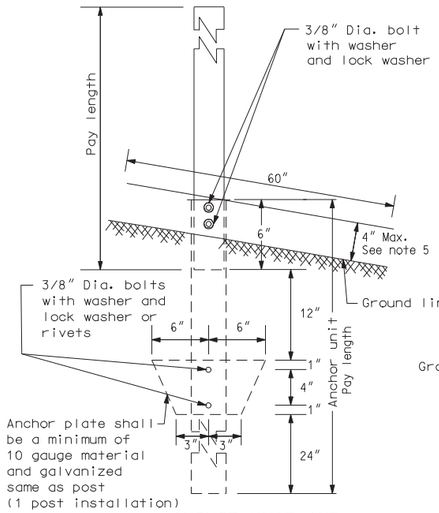
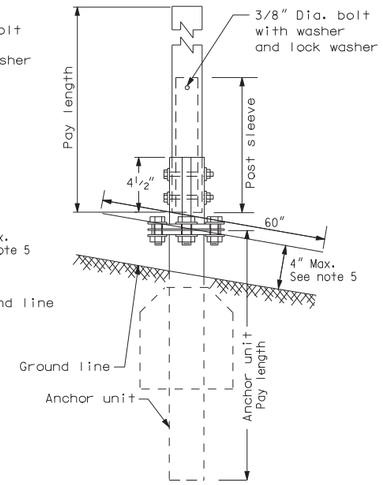
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

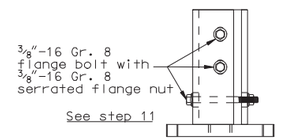
D-704-7

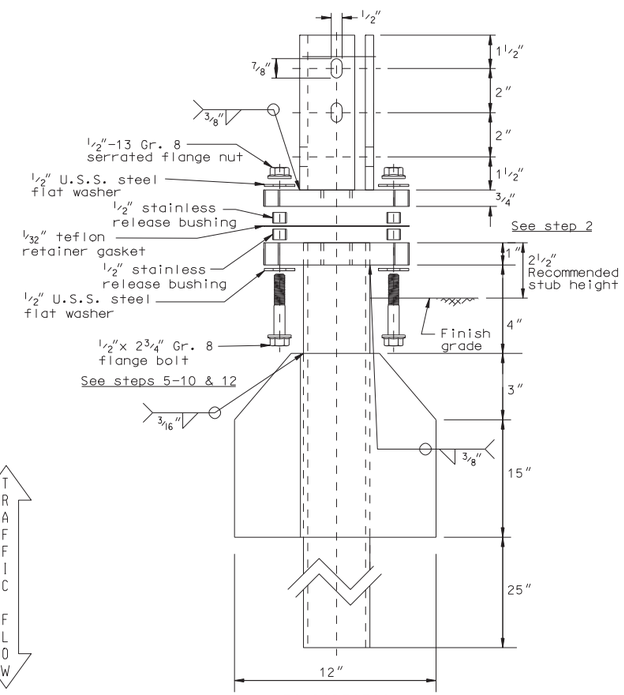


ANCHOR UNIT AND POST ASSEMBLY

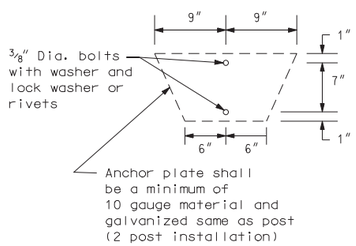


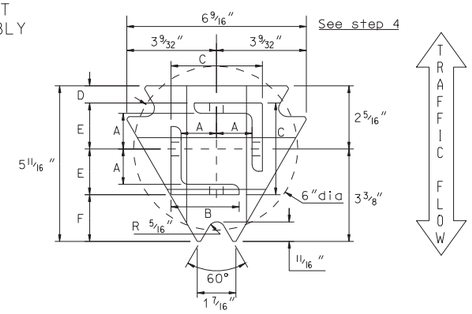
SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY





MULTI-DIRECTIONAL SLIP BASE ASSEMBLY



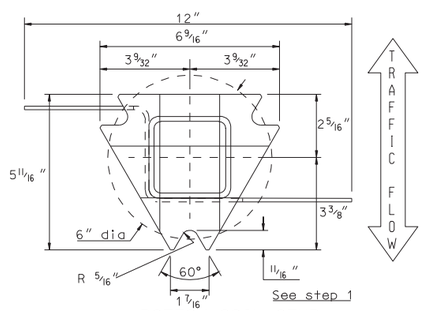


TOP POST RECEIVER

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

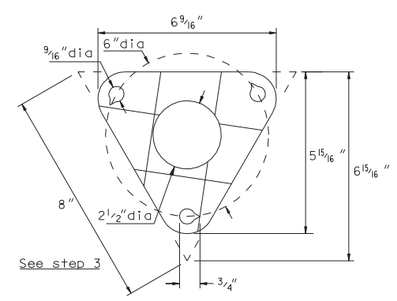
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 9/64"	2 1/2"	3 1/32"	25/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

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



BOTTOM SOIL STUB

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



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon

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

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

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

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

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

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

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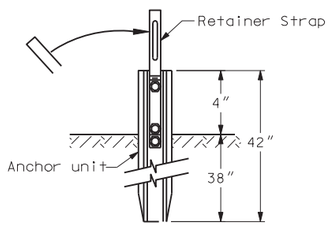
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

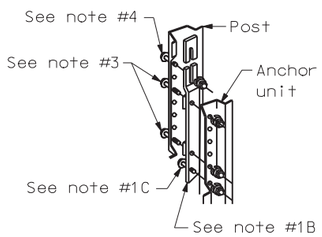
FLANGED CHANNEL



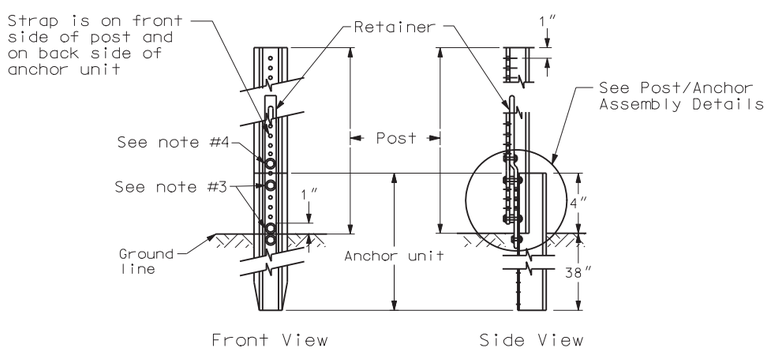
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

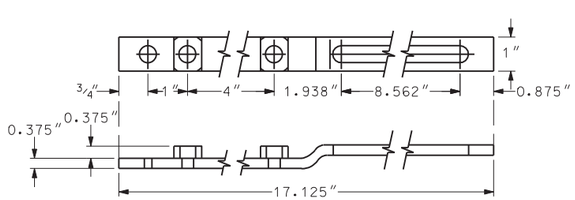
1. A) Drive anchor unit to within 12″ of ground level.
   B) Proper assembly established by lining up the top ¾″ slot of retainer spacer strap with top hole of anchor unit.
   C) Assemble strap to back of anchor unit using ⅜″-16 UNC x 2.0″ long bolt, lock washer and nut.
   D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4″ dimension.
   B) Rotate strap to vertical position.
3. A) Place ⅜″-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 ¾″ slot in the strap).
   B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening ⅜″-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



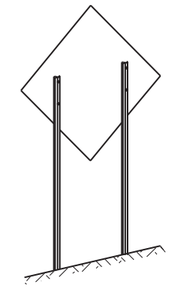
Sign Post Assembly Detail



Retainer/Spacer Strap Detail

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

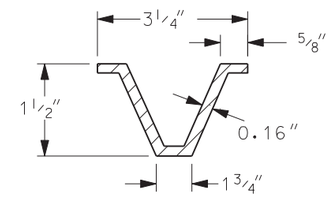
3 LB/FT U POSTS



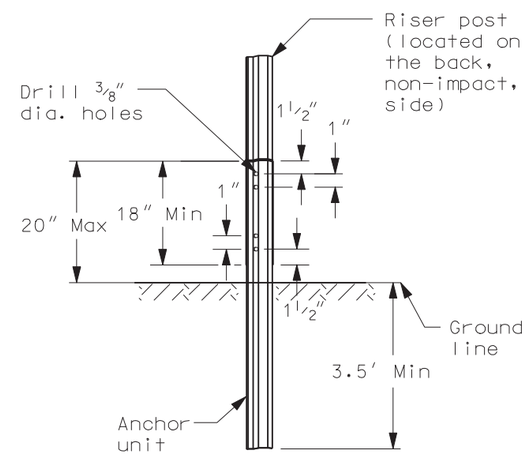
Typical Installation

Notes

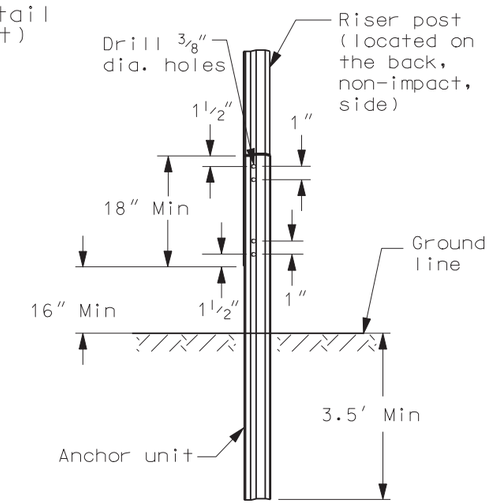
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7′ long and embedded at least 3.5′.
3. A splice shall overlap a minimum of 18″.
4. Use 4 bolts ⅝″ diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4″ above ground and embedded at least 3.5′.



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



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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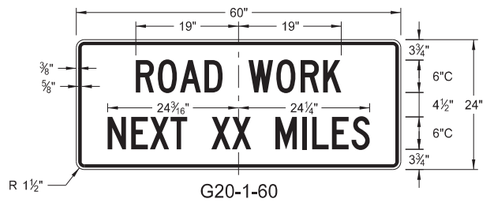
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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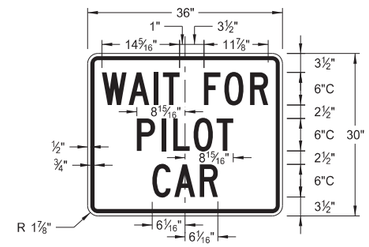

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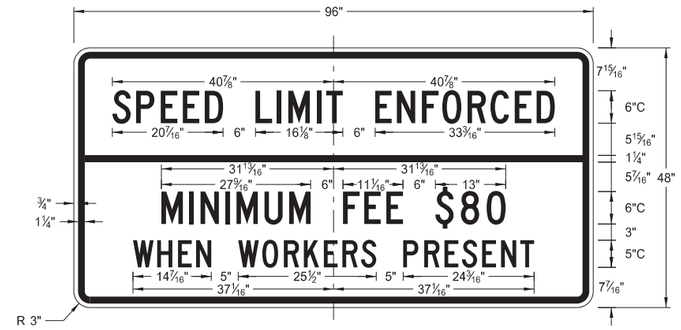

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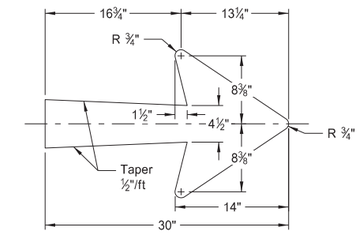
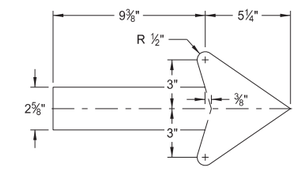


E5-1-48



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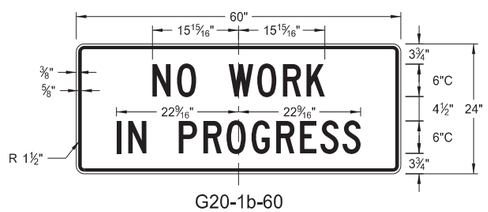
G20-52a-72



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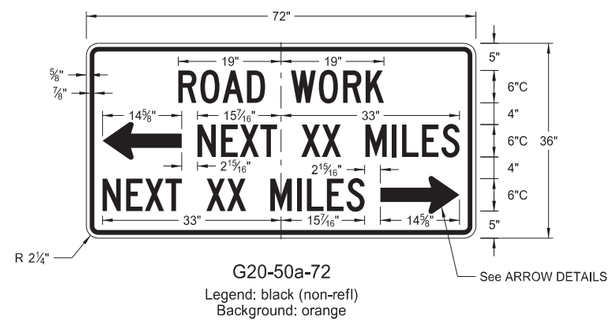

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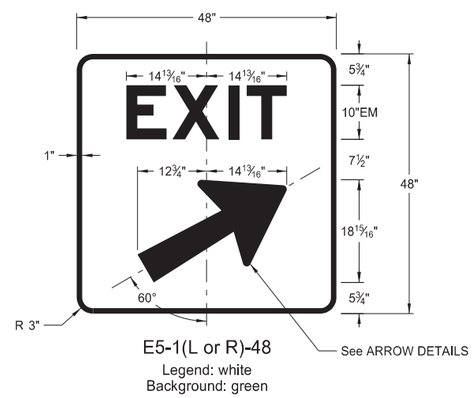

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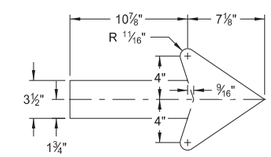

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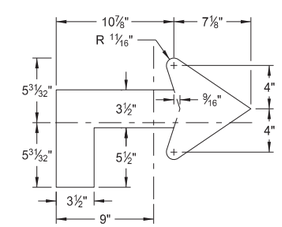

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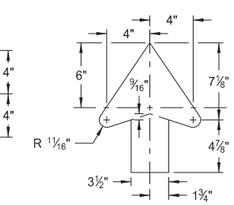
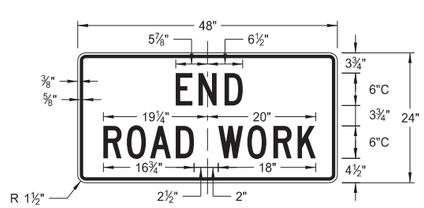
Advanced Right or Left



M4-9-30
Straight

ARROW DETAILS



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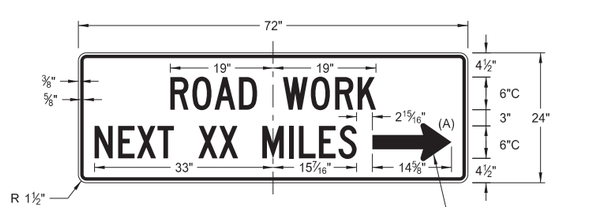

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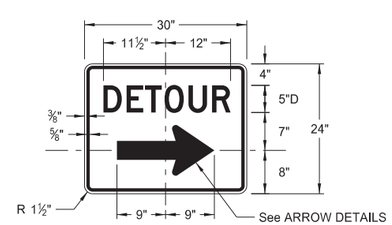

M4-9(L or R)-30 &
M4-9-30
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Background: orange

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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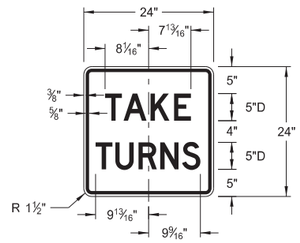
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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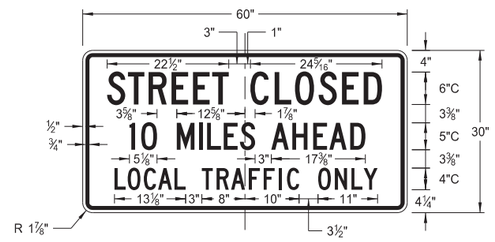

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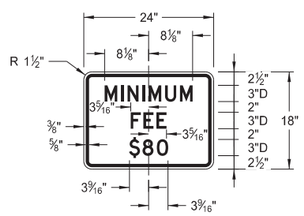

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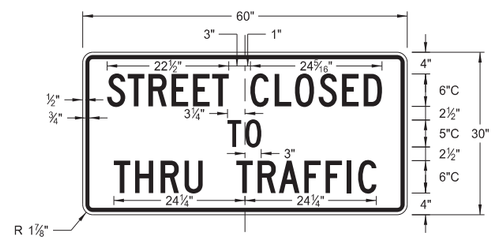

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R11-2a-48
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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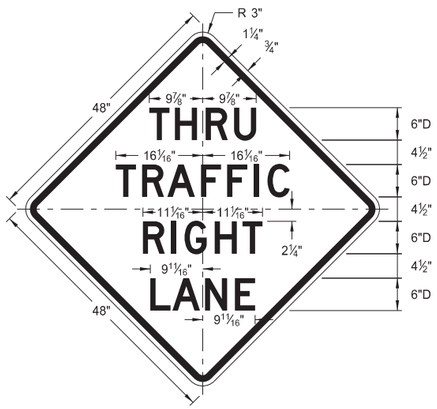
D-704-11

CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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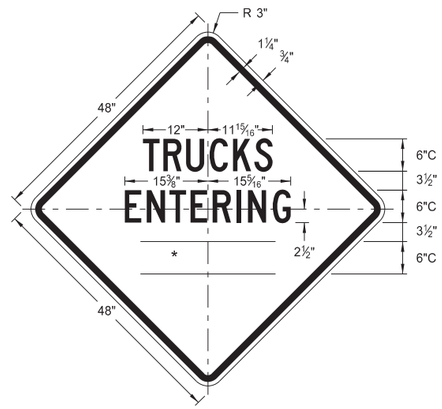

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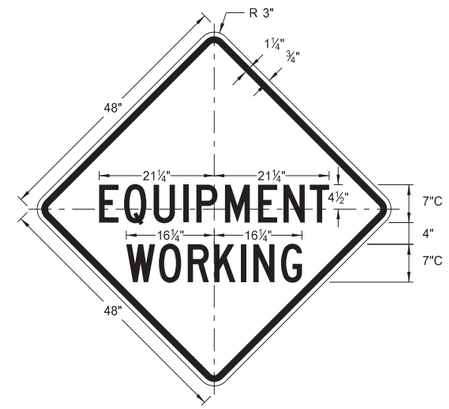

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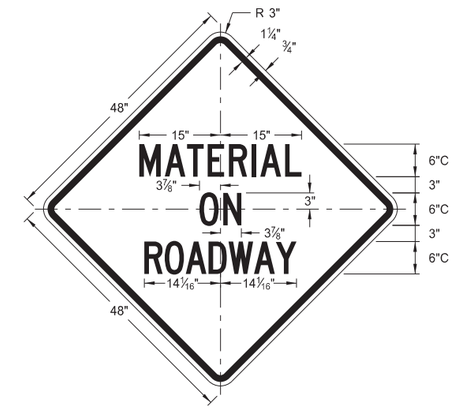

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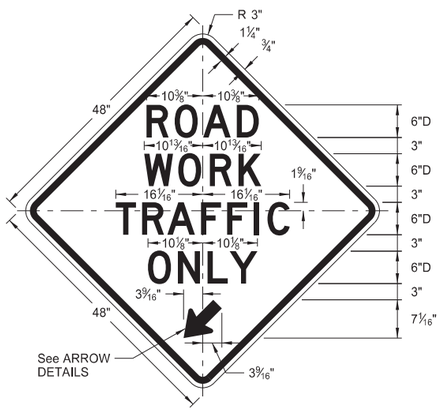
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



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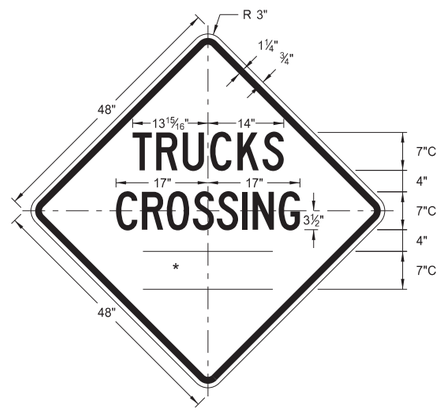

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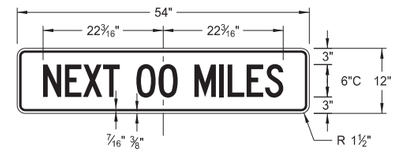

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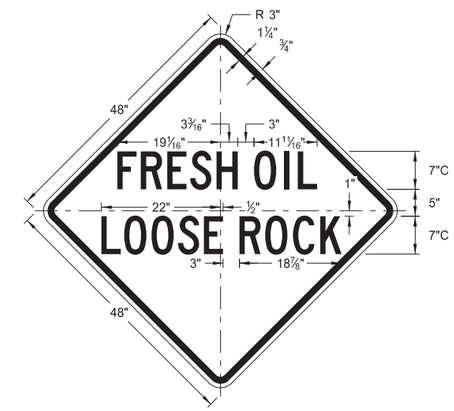

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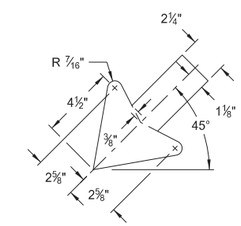
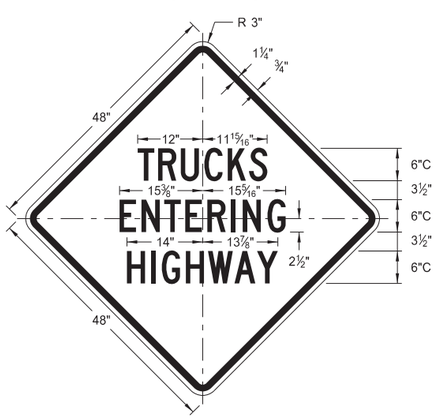


W5-9-48

ARROW DETAILS



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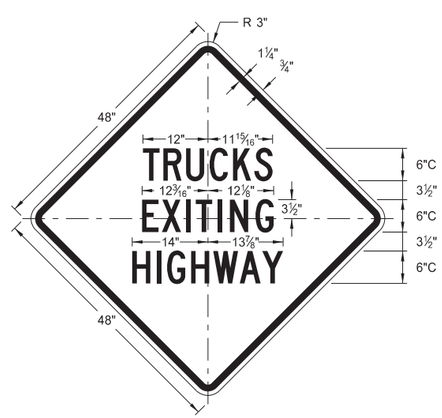

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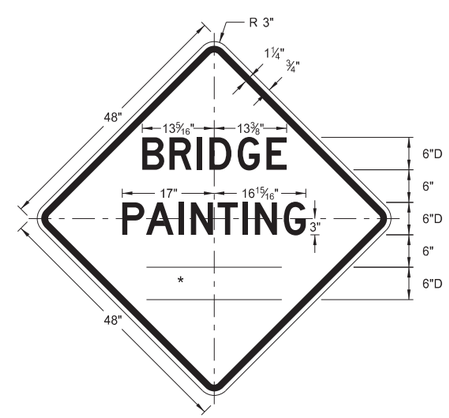

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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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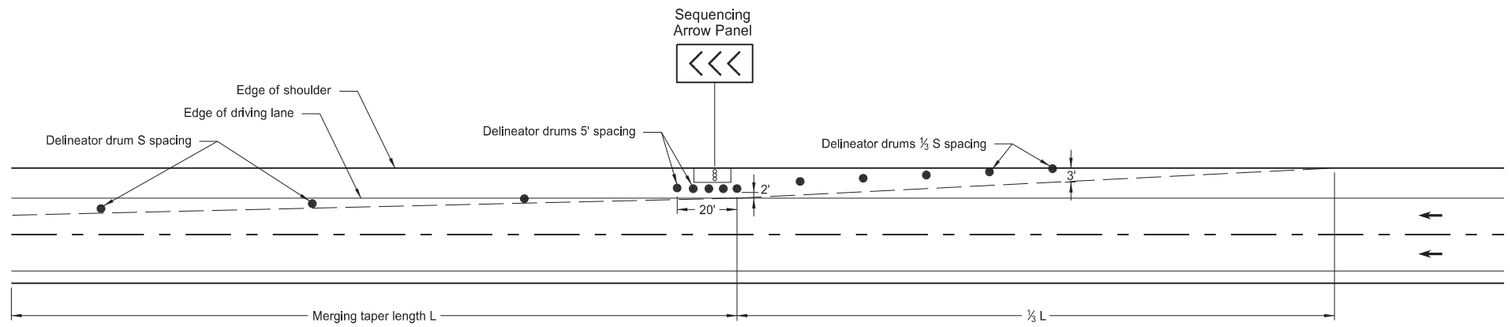
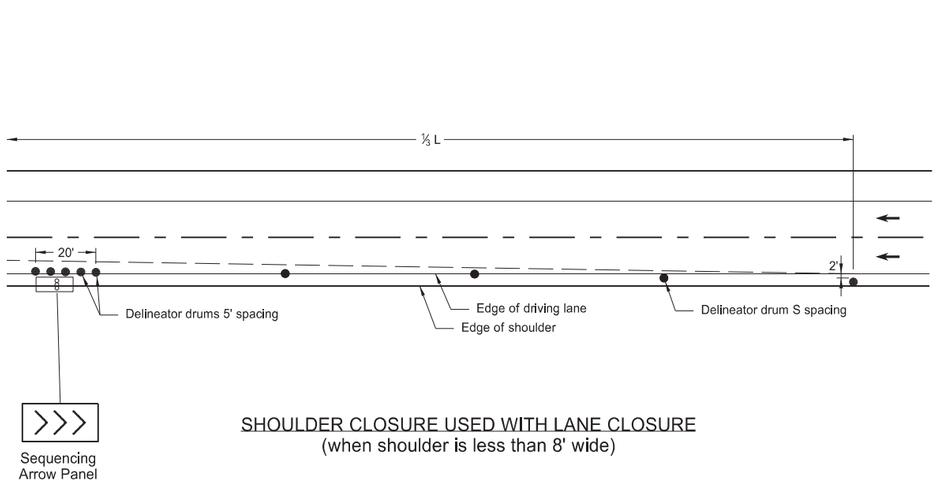
SHOULDER CLOSURE TAPERS

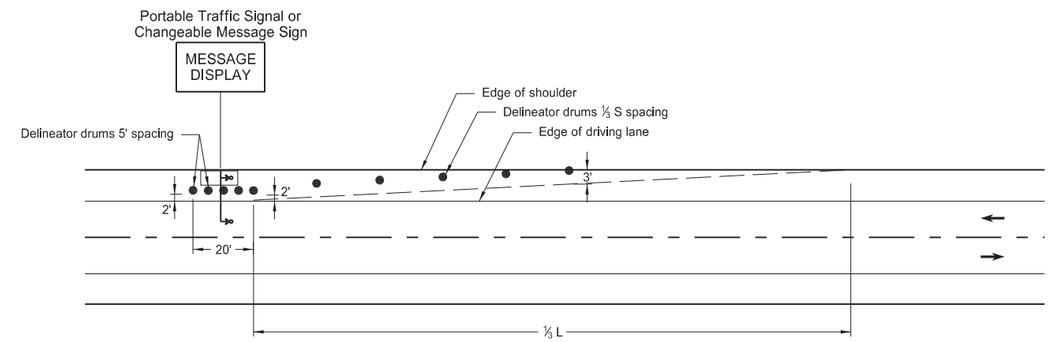
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY			
●	Delineator Drum	∞	Sequencing Arrow Panel
∘	Message Display		Portable Traffic Signal

Notes:

1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   $L = WS^2/60$ (40mph or less)
   L = WS (45mph or more)

2. If a shoulder taper is used, it should have a length of approximately ⅓L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.

3. When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
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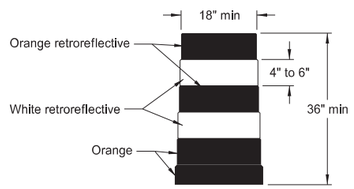
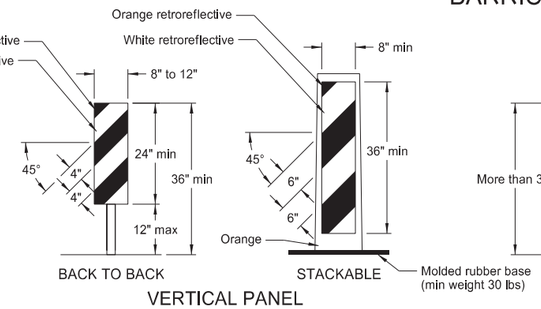
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



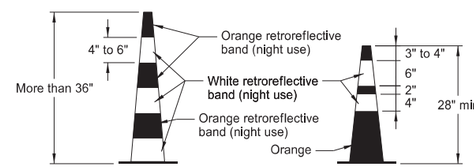
DELINEATOR DRUM

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



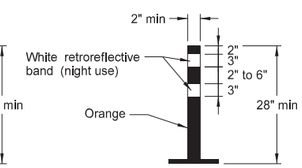
VERTICAL PANEL

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



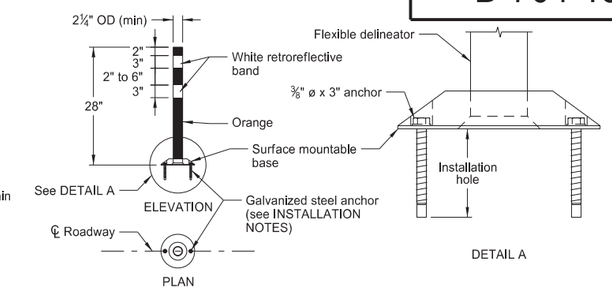
TRAFFIC CONE

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



TUBULAR MARKER

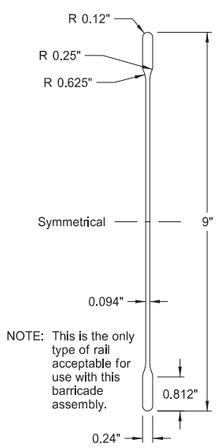
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

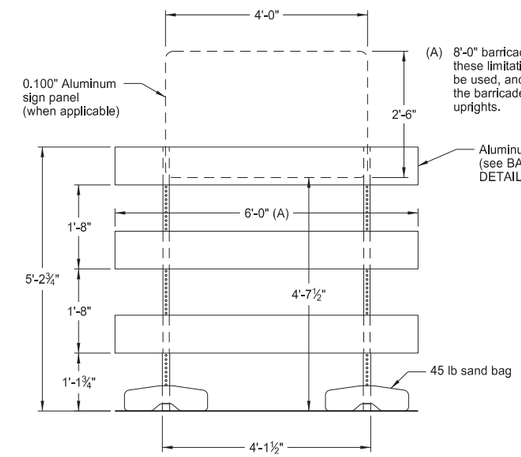
INSTALLATION NOTES:

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



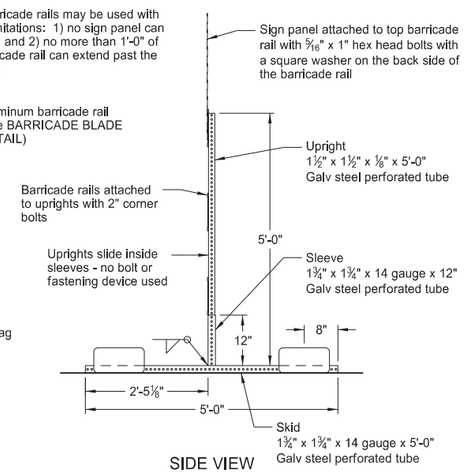
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



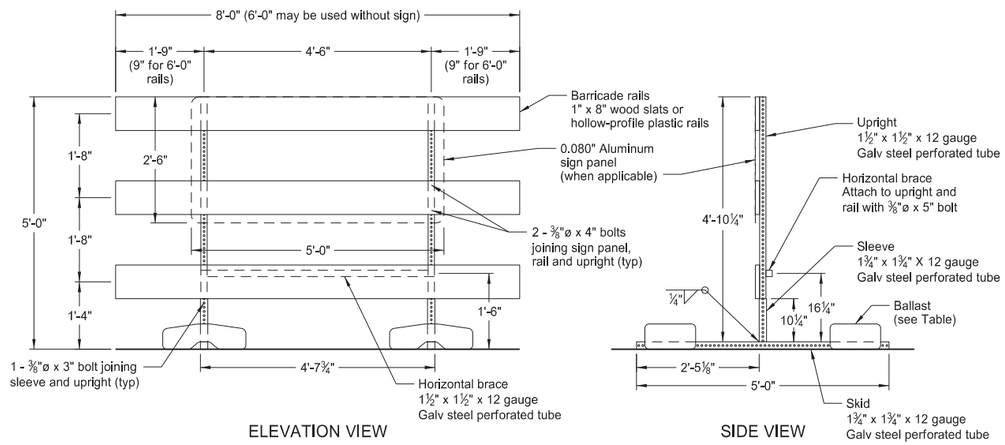
(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.

ELEVATION VIEW



SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

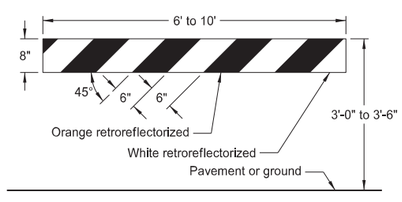


ELEVATION VIEW

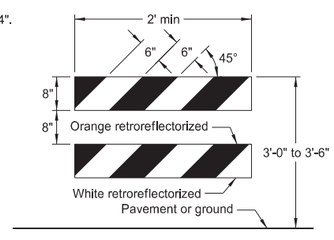
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

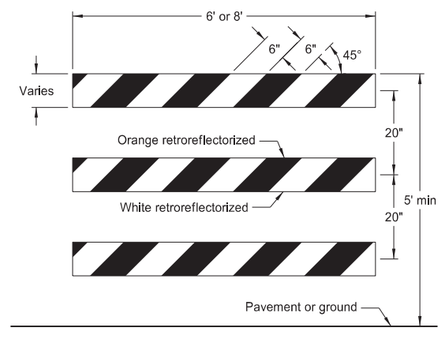
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

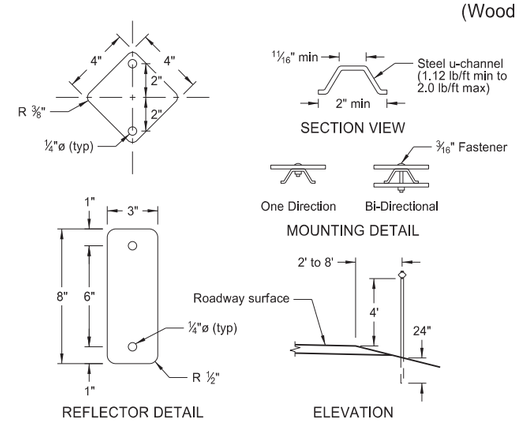


TYPE II BARRICADE



TYPE III BARRICADE

BARRICADE RAIL DETAILS



DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

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

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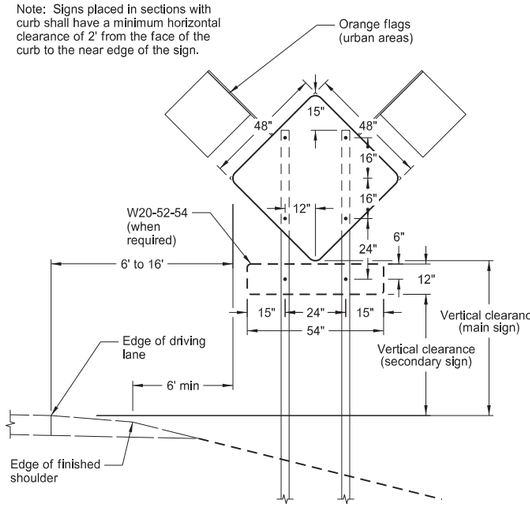
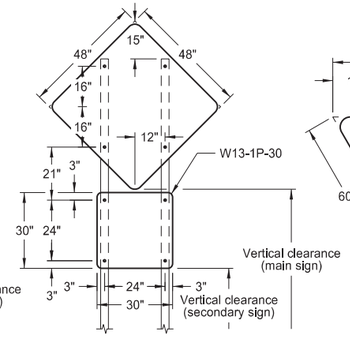
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

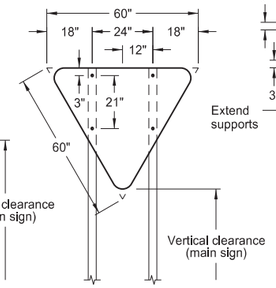
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



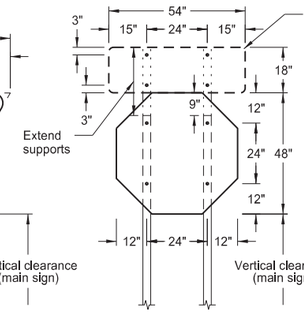
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



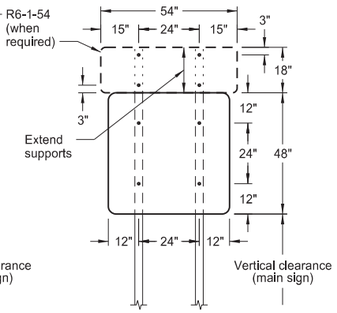
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



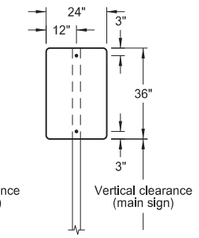
R1-2-60 - YIELD SIGN



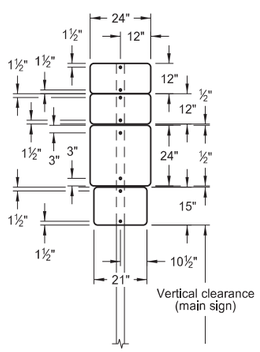
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



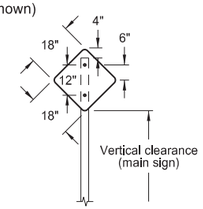
48" x 48" SIGN
(with R6-1-54 sign as required)



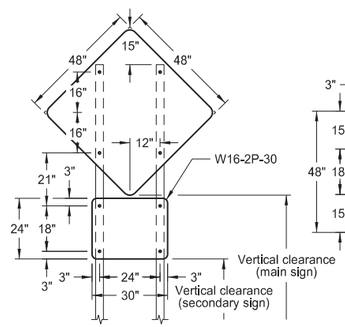
24" x 36" SIGN



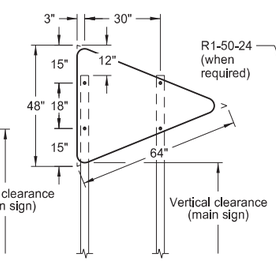
24" x 24"
ROUTE MARKER
ASSEMBLY



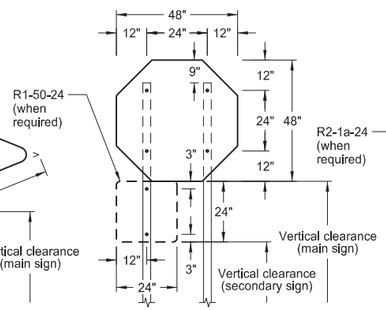
18" x 18"
DIAMOND SIGN



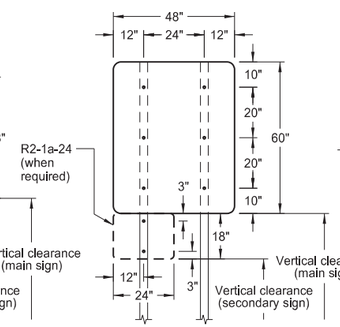
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



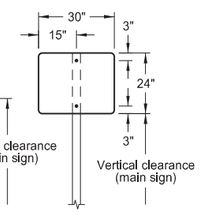
W14-3-64 - PENNANT SIGN



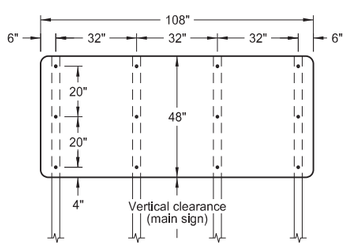
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



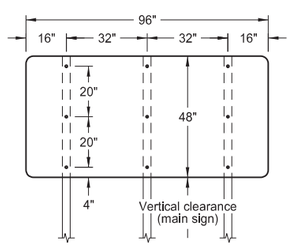
48" x 48" SIGN
(with R2-1a-24 sign as required)



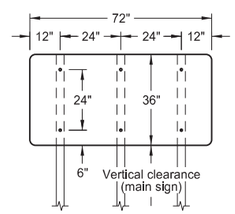
30" x 24" SIGN



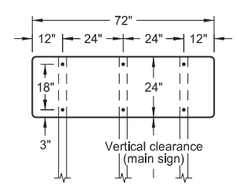
108" x 48" SIGN



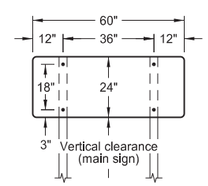
96" x 48" SIGN



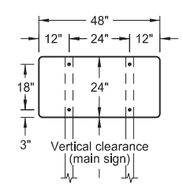
72" x 36" SIGN



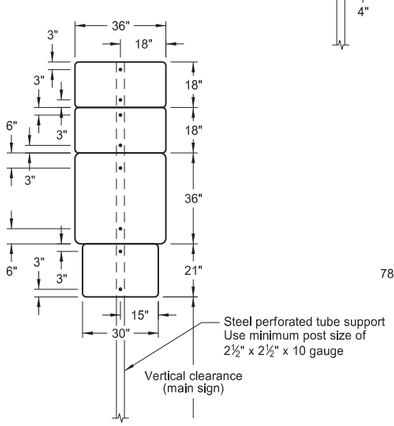
72" x 24" SIGN



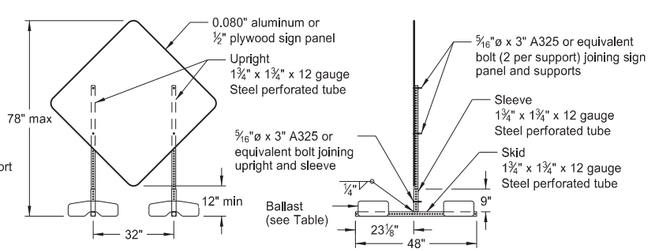
60" x 24" SIGN



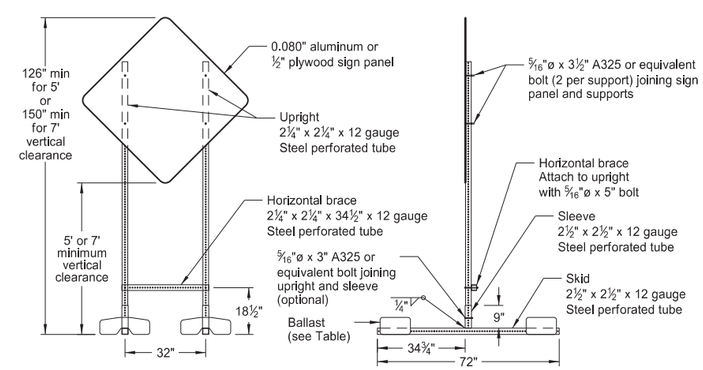
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

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

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.

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

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

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

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

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

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

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

   When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

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

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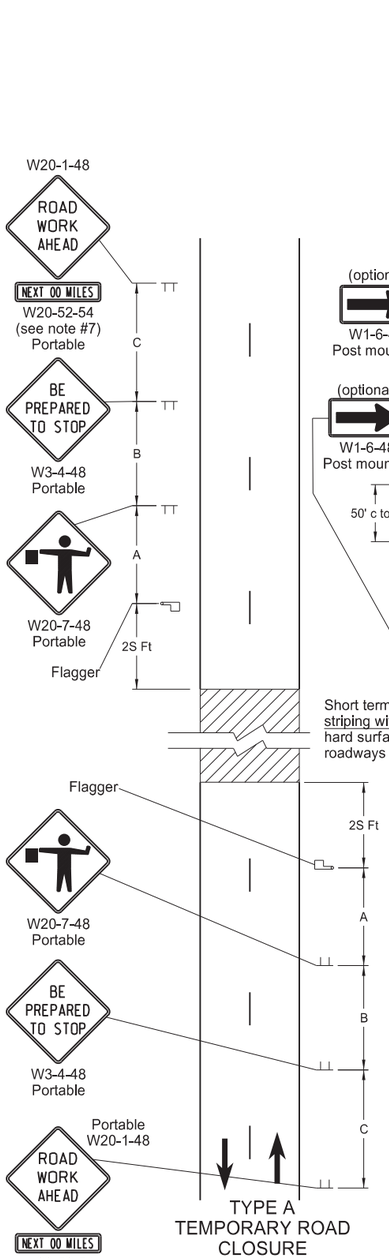
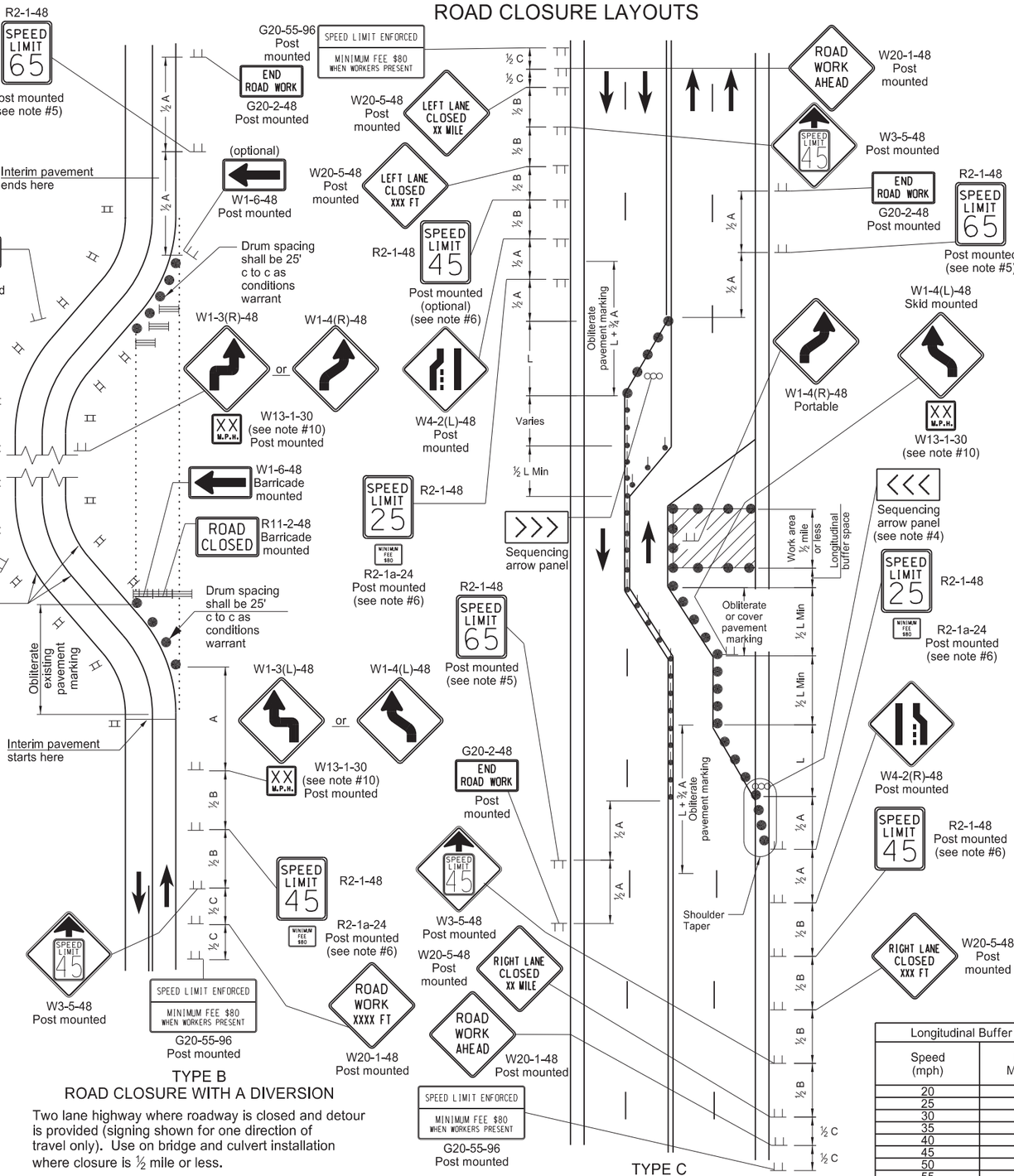
ROAD CLOSURE LAYOUTS

D-704-15



TYPE A
TEMPORARY ROAD CLOSURE

When a pilot car is used, there is no need to provide G20-55-96 or R2-1a-24 sign on the project as the pilot car will control the speed.



TYPE B
ROAD CLOSURE WITH A DIVERSION

Two lane highway where roadway is closed and detour is provided (signing shown for one direction of travel only). Use on bridge and culvert installation where closure is ½ mile or less.

TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE, HIGH SPEED HIGHWAY

4 lane undivided highway with half the roadway closed.

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. Barricades placed on roadway shall be on a moveable assembly. Signs 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. 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. See Shoulder Closure Standard Drawing.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
7. Use when work area is 1 mile or longer.
8. 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.
9. Existing speed limit signs within a reduced speed zone shall be covered.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
12. G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

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 III barricade		Work area
	Sign		Flagger
	Delineator drum		Sequencing arrow panel
	Tubular markers		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

9-27-13

REVISIONS

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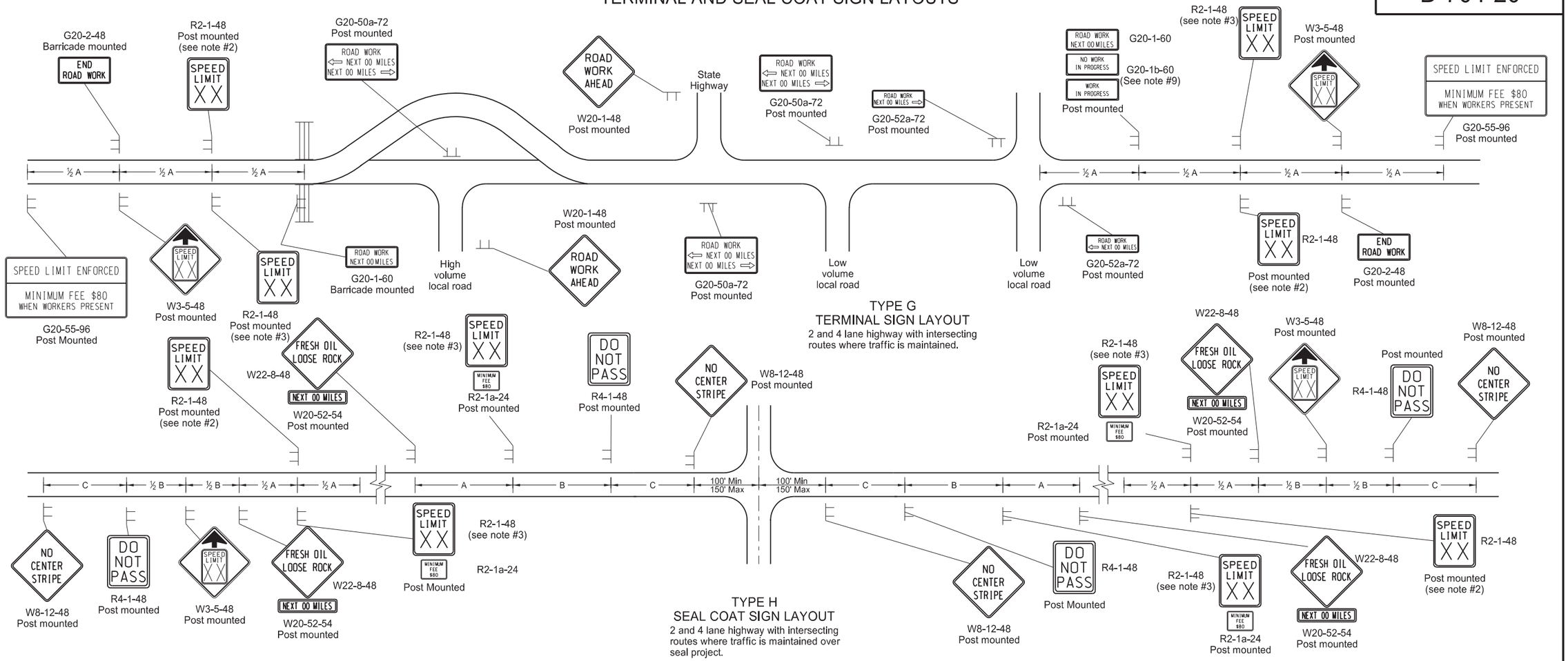
TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



TYPE G
TERMINAL SIGN LAYOUT

2 and 4 lane highway with intersecting routes where traffic is maintained.

TYPE H
SEAL COAT SIGN LAYOUT

2 and 4 lane highway with intersecting routes where traffic is maintained over seal project.

1. Barricades placed on roadway shall be on a moveable assembly. Signs 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. On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
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. Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
11. G20-55-96 sign is not required if work is less than 15 days.

KEY

Type III barricade

Sign

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

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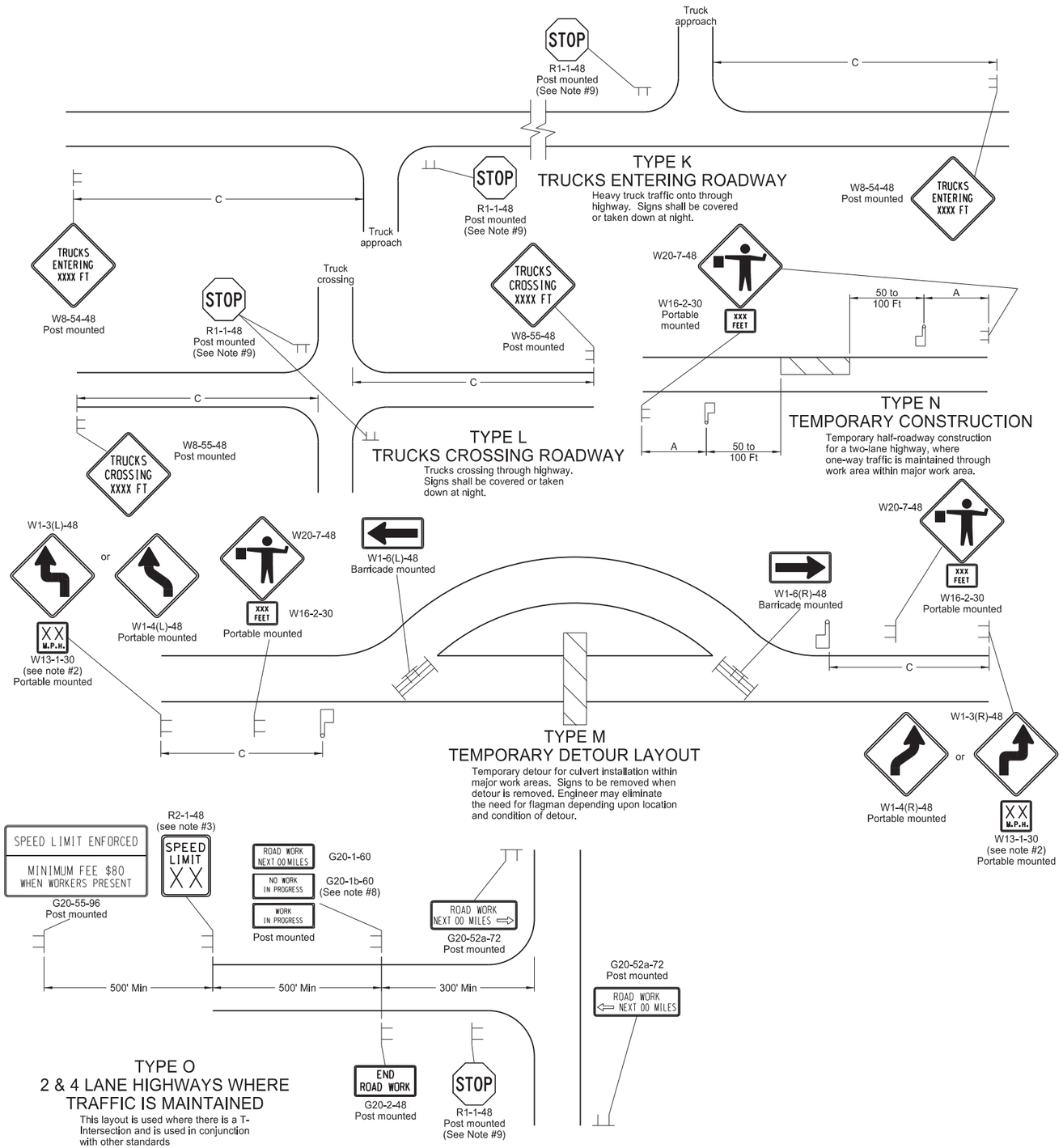
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



Notes

1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 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. 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 signs in accordance with the NDDOT Standard Specifications.
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.
10. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.

KEY

Type III barricade — Work area

Sign — Flagger

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 40mph)	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

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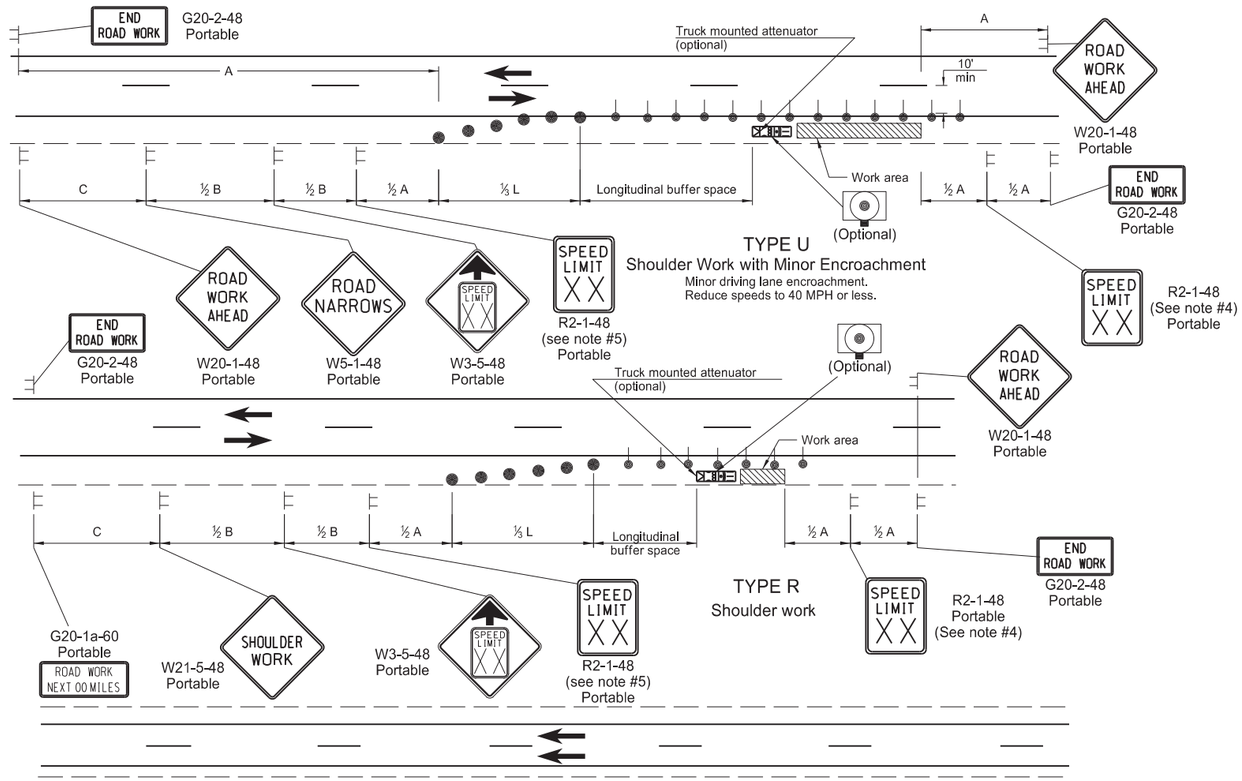
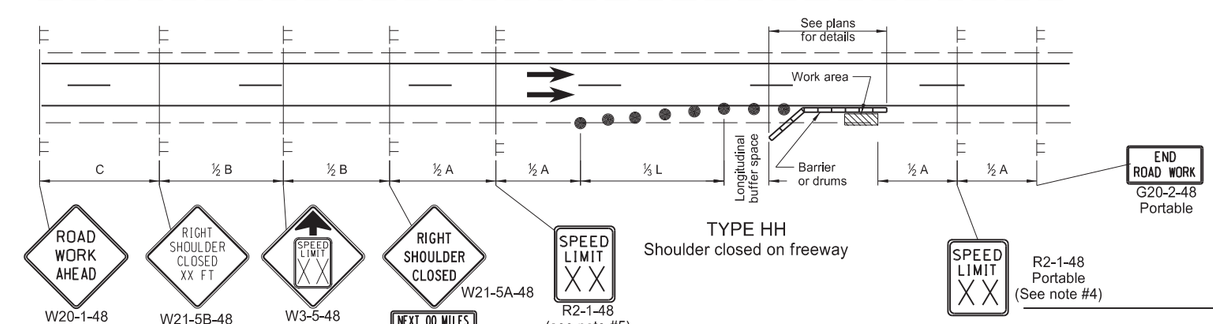
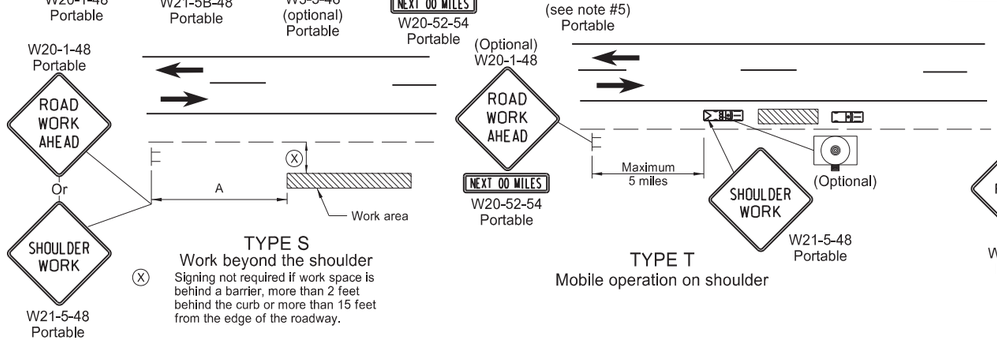
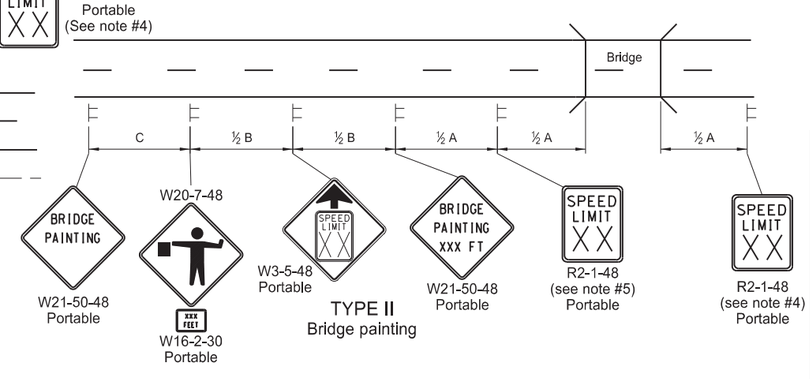
SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24









Notes

1. Variables
   - S = Numerical value of speed limit or 85th percentile.
   - W = The width of the 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. Delineator drums used for tapering traffic shall be spaced at dimension "S".
   Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
3. Sequencing Arrow Panels
   - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. 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 ½B.
6. 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.
7. Existing speed limit signs within a reduced speed zone shall be covered.
8. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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

- Sign
- Work area
- Delineator Drum
- Tubular Marker
- Sequencing Arrow Panel (Caution Mode)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

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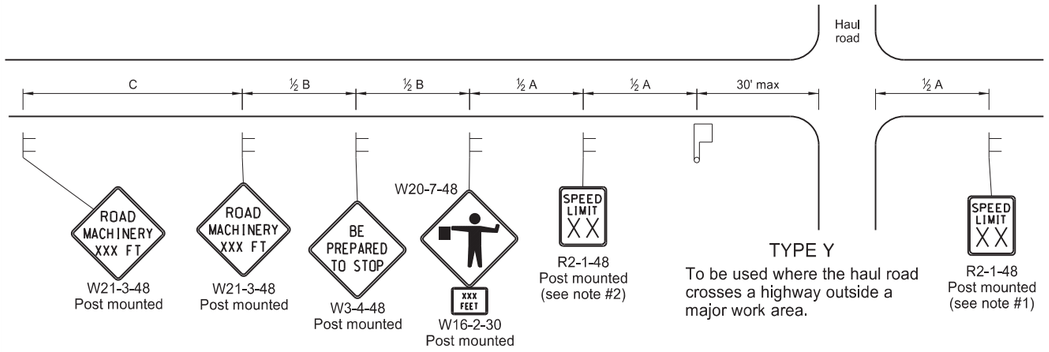
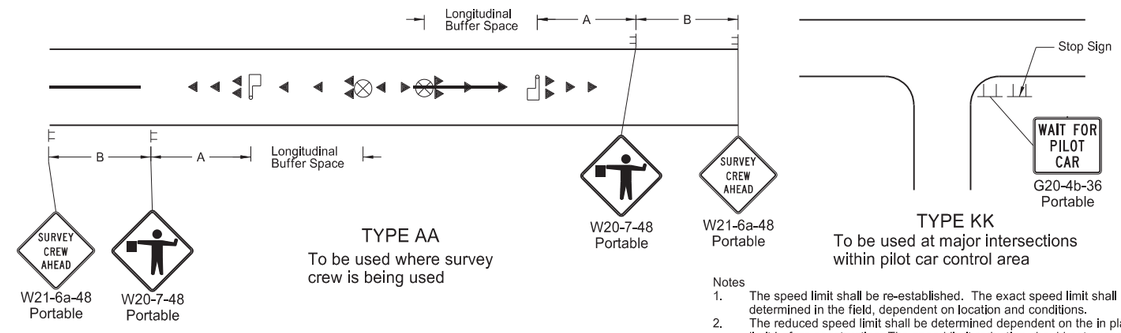
MISCELLANEOUS SIGN LAYOUTS

D-704-26



TYPE Y

To be used where the haul road crosses a highway outside a major work area.



TYPE AA

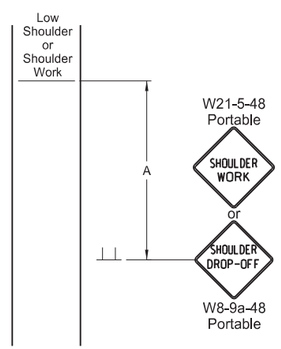
To be used where survey crew is being used

TYPE KK

To be used at major intersections within pilot car control area

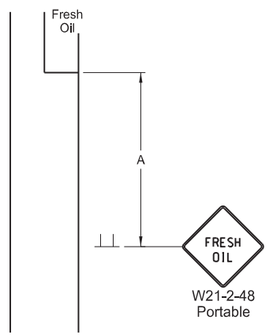
Notes

1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
2. 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.
3. 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.
4. Existing speed limit signs within a reduced speed zone shall be covered.
5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



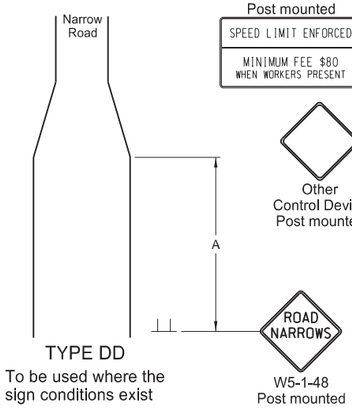
TYPE BB

To be used within a major work area where the sign conditions exist



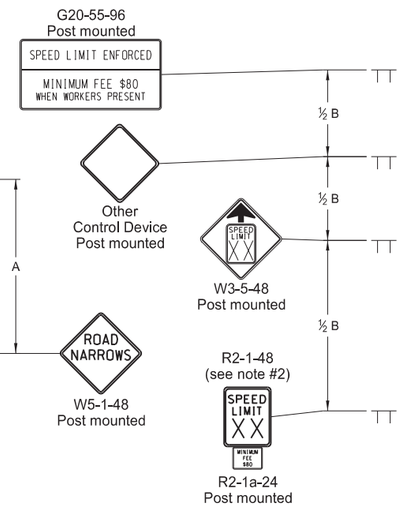
TYPE CC

To be used where the sign conditions exist



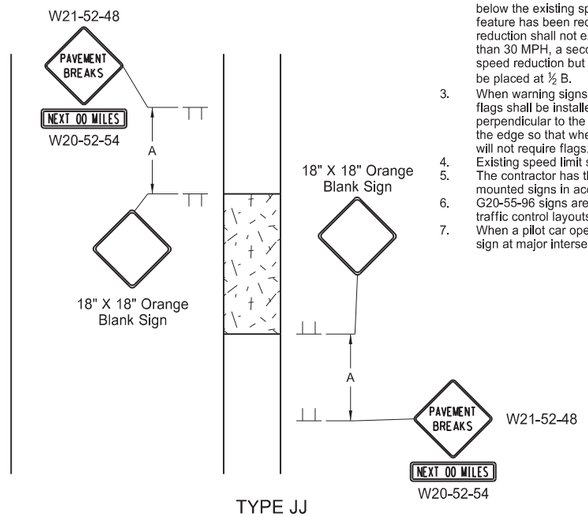
TYPE DD

To be used where the sign conditions exist



TYPE Z

To be used where speed zone is needed

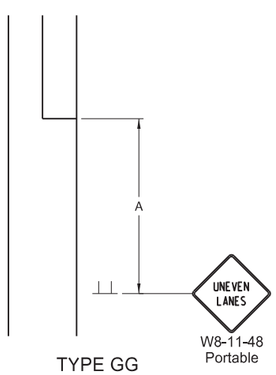


TYPE JJ

To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

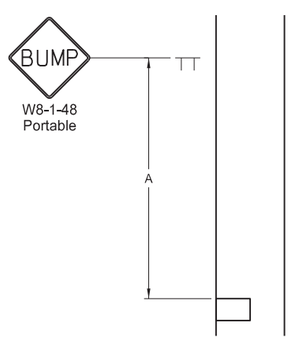
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



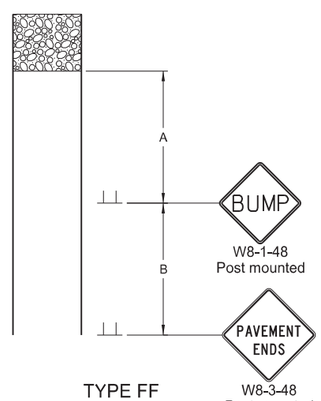
TYPE GG

To be used where a difference of elevation between lanes exist



TYPE EE

To be used where the sign conditions exist



TYPE FF

To be used where the sign conditions exist

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

Sign — Flagger

Cones

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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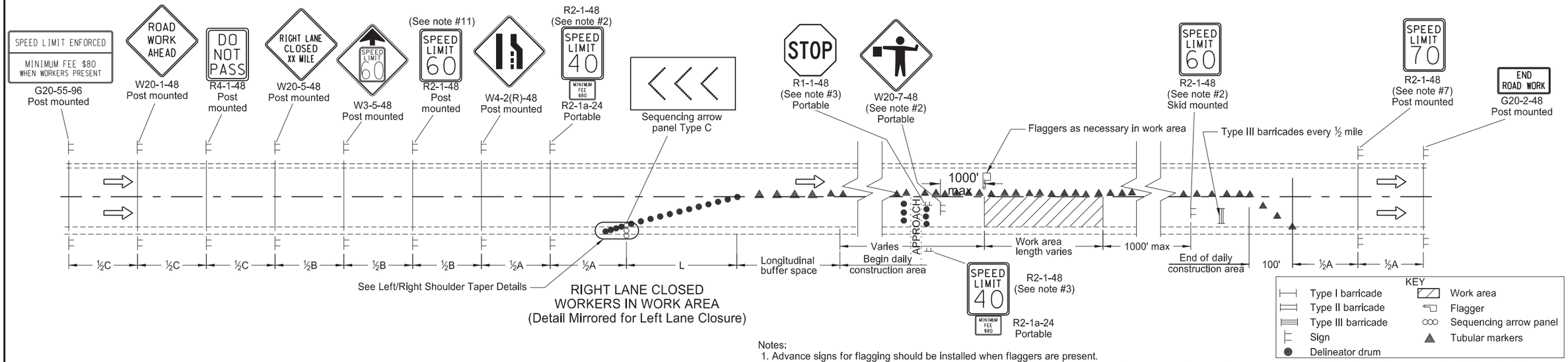
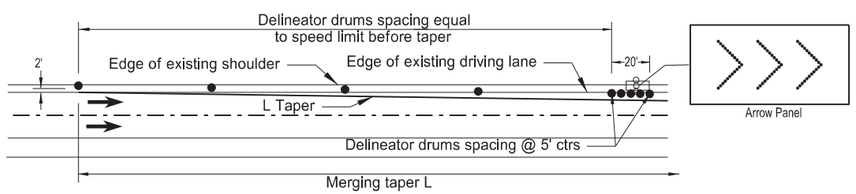
SIGN LAYOUT FOR ONE LANE CLOSURE

D-704-34

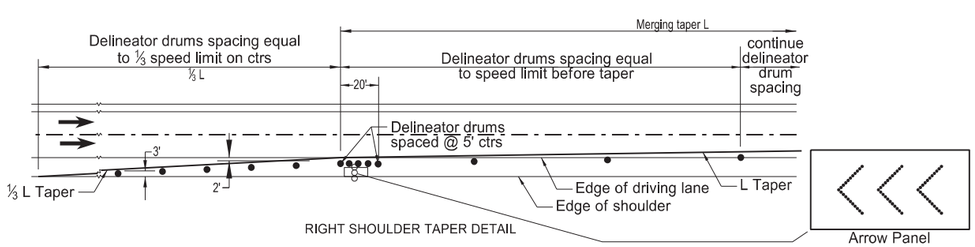


Notes:

1. Advance signs for flagging should be installed when flaggers are present.
2. The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 40 mph speed limit sign shall be spaced at ½A in advance of the flagger sign. The 60 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 40 mph speed limit and the Minimum Fee $80 signs shall be covered or removed. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. Approaches: When the work area encompasses an approach, the approach shall be controlled by installing a 40 mph speed limit sign. If this approach is on the side of the lane closure, the existing stop sign shall be covered and a new portable stop sign shall be installed. When the main line 40 mph speed zone is moved past the approach, the approach speed limit sign shall be removed.
4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.
5. Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
6. Sequencing arrow 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 or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
7. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
8. Existing speed limit signs within a reduced speed zone shall be covered.
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. 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 ½B.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
12. Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.



LEFT SHOULDER TAPER DETAIL



RIGHT SHOULDER TAPER DETAIL

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

*Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

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

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9-26-2012

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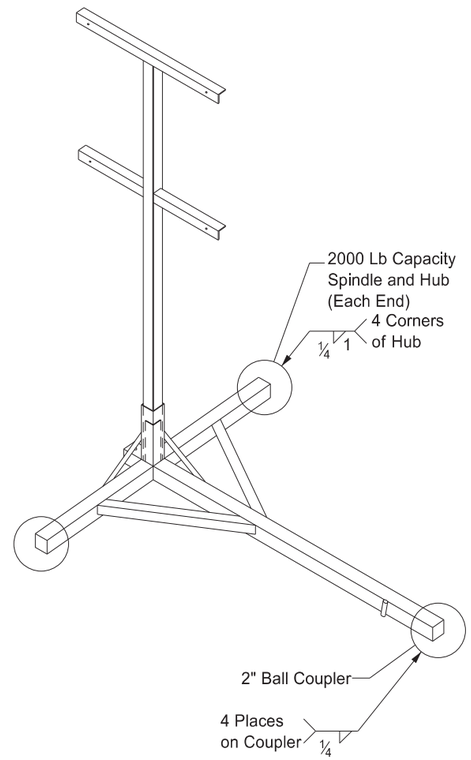
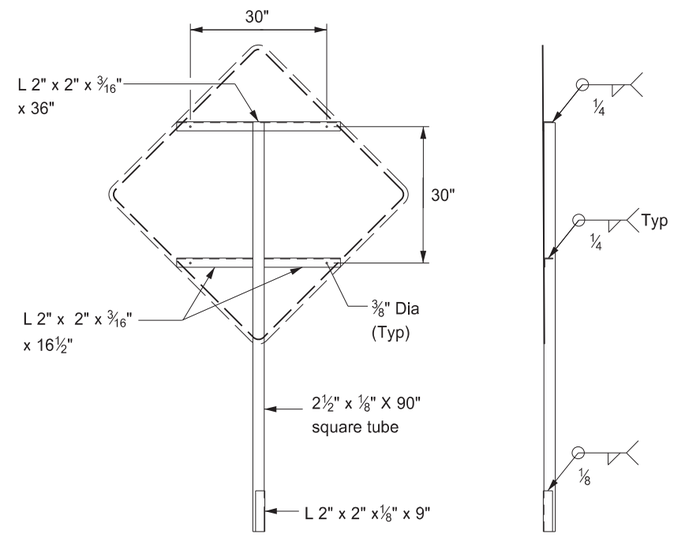
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50

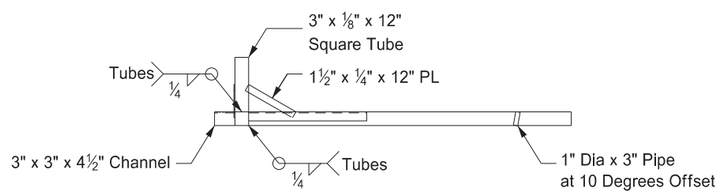




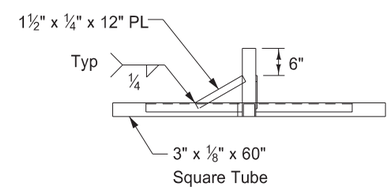
FRONT

RIGHT

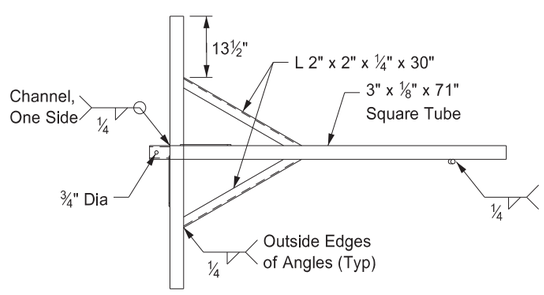
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

Notes:

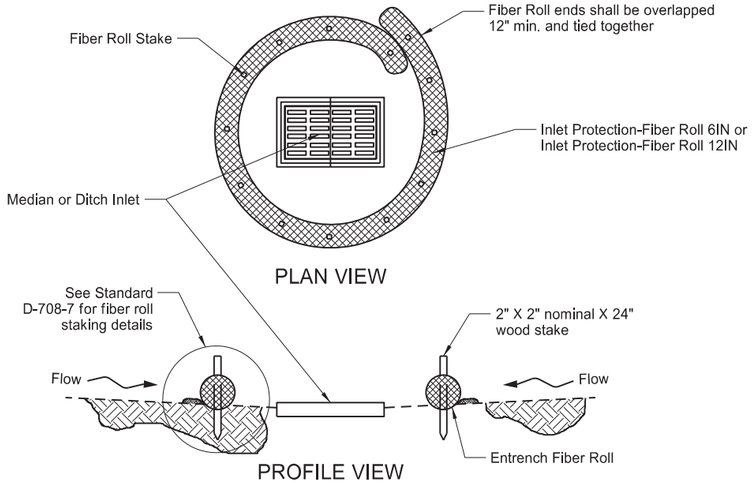
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

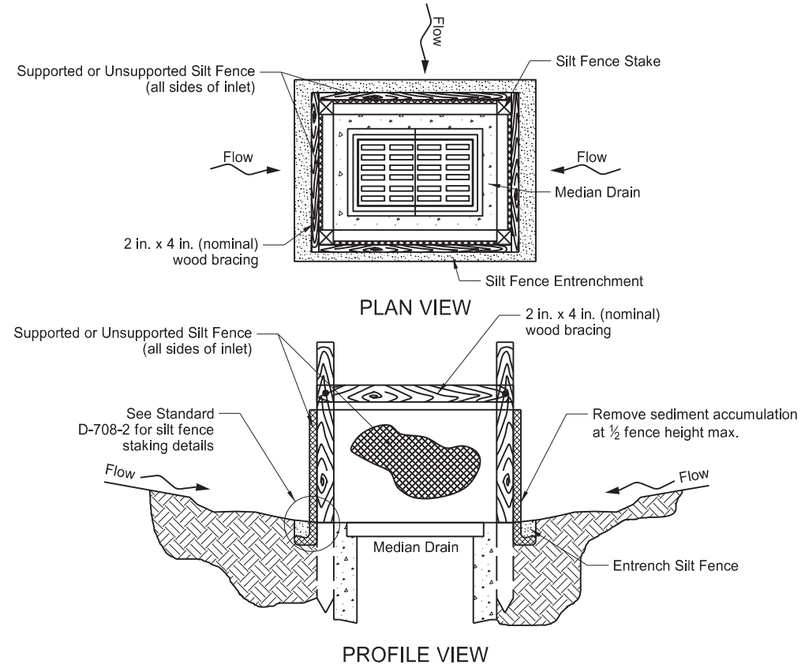
This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION

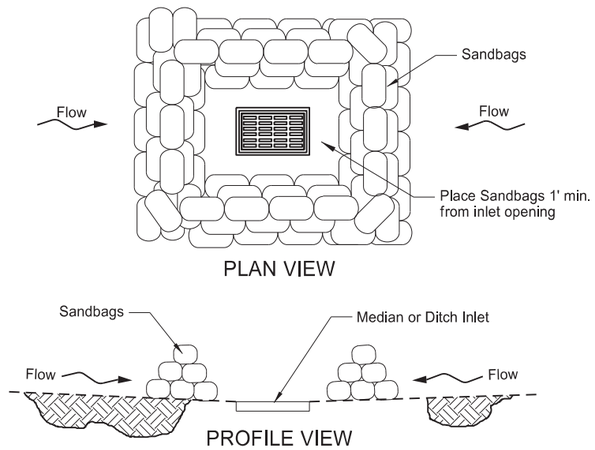
D-708-6



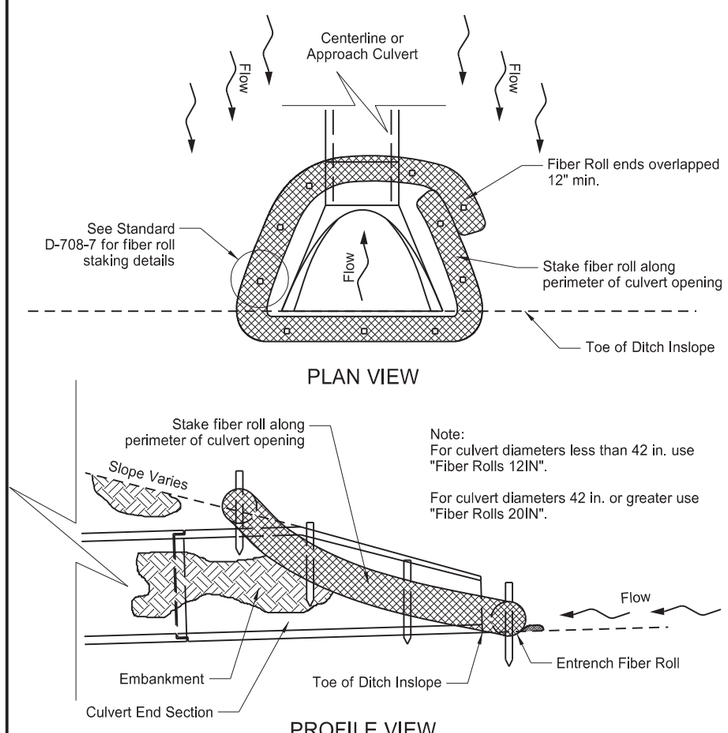
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



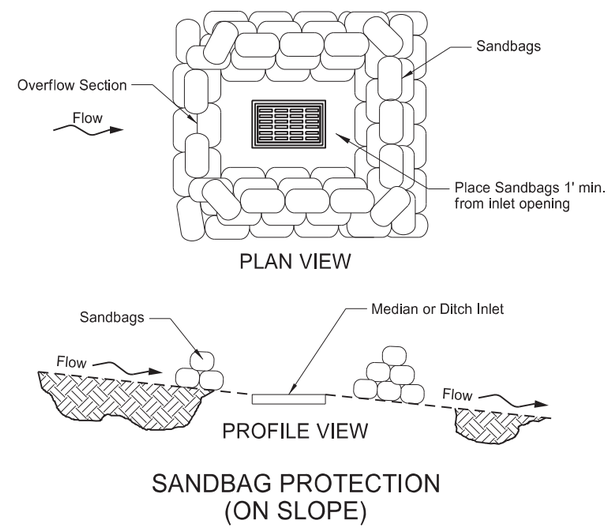
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



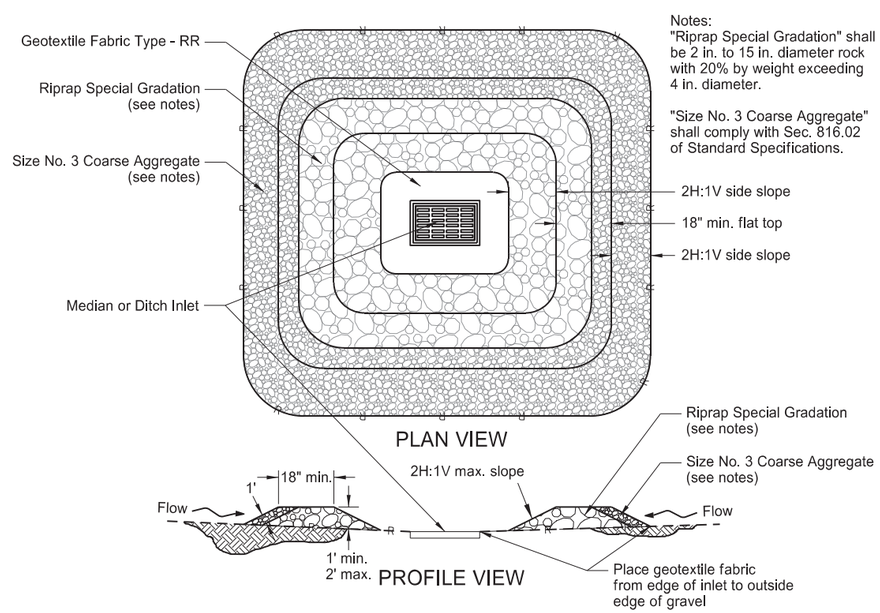
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



SANDBAG PROTECTION (ON SLOPE)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE

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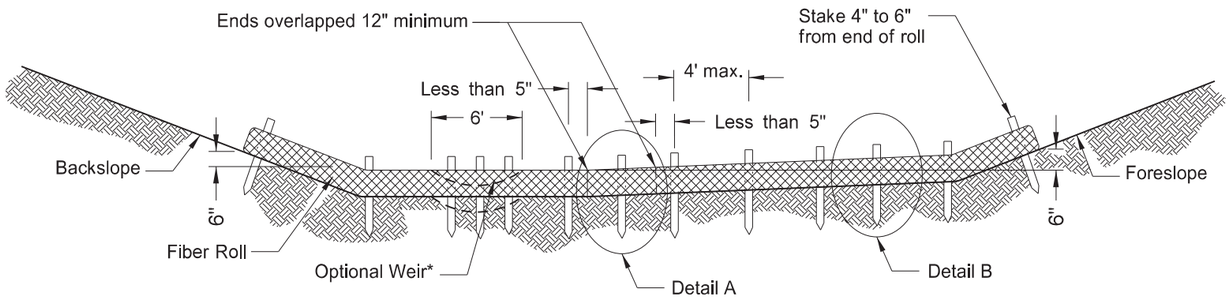
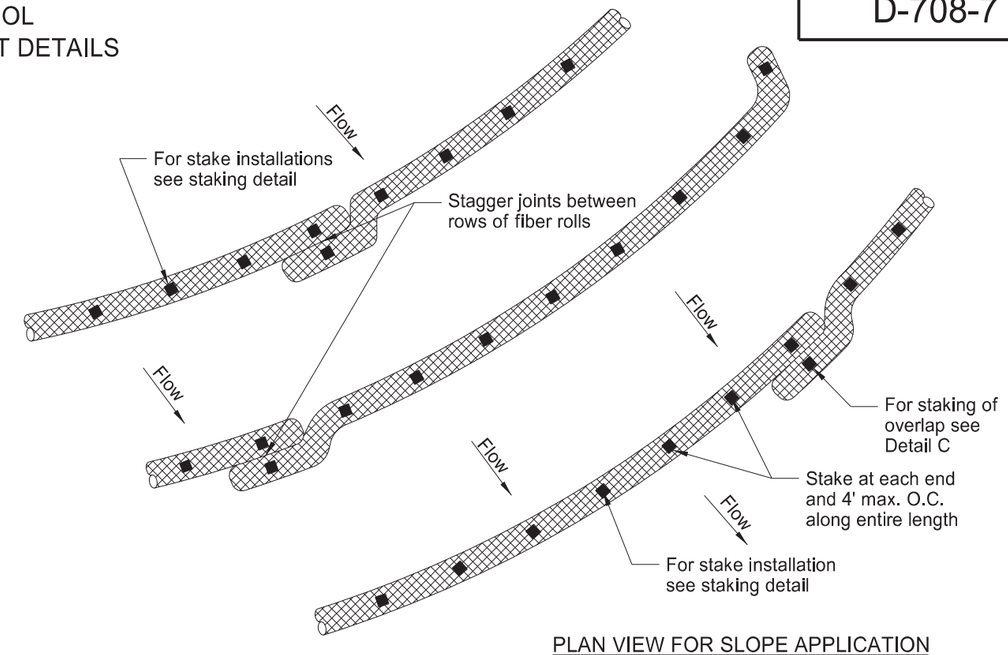
D-708-7

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

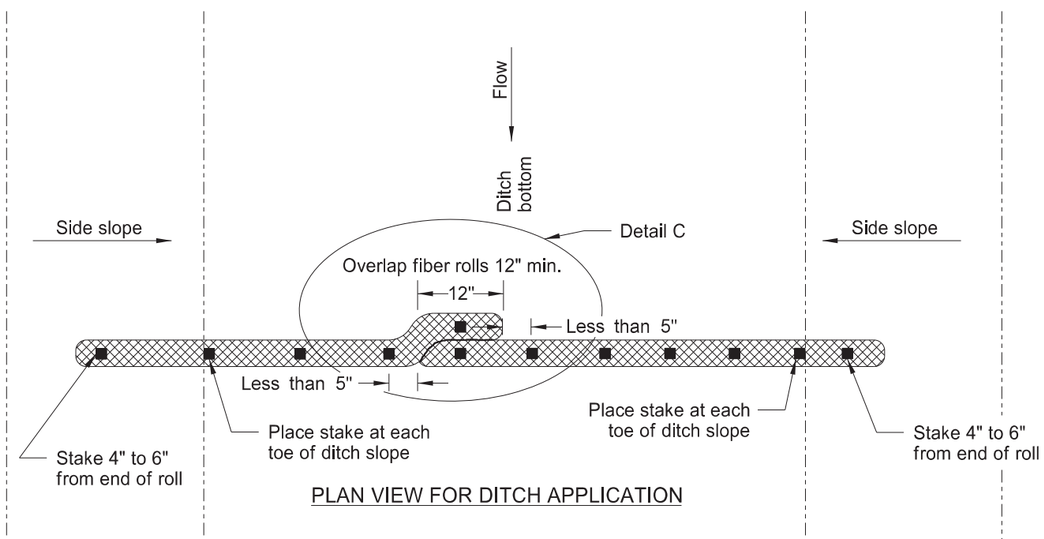


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

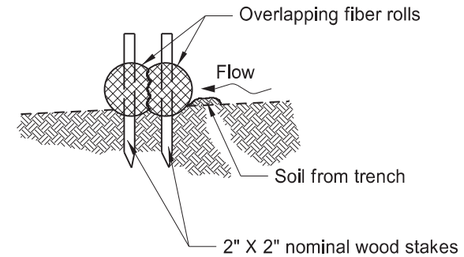
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

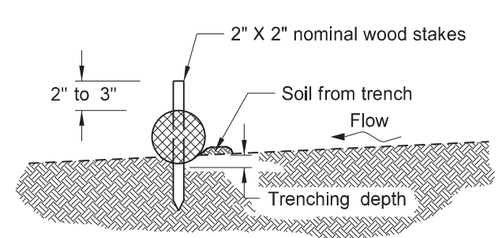


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-18-10

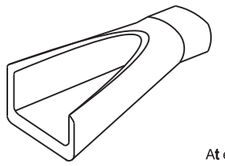
REVISIONS

DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.

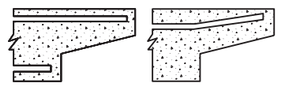
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/04/13 and the original document is stored at the North Dakota Department of Transportation

REINFORCED CONCRETE PIPE CULVERT AND END SECTIONS

D-714-01

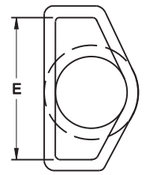


PERSPECTIVE

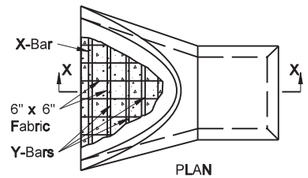


ARRANGEMENT FOR REINFORCEMENT

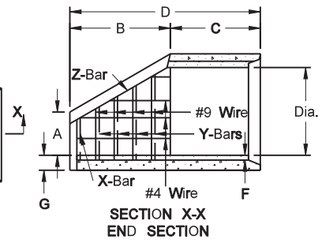
At end of 36" to 106" pipe. At end of 12" to 33" pipe.



END VIEW



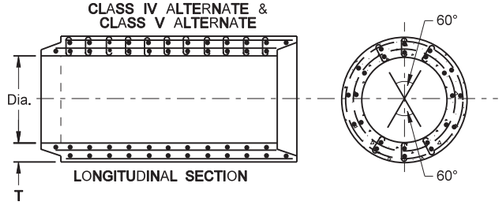
PLAN



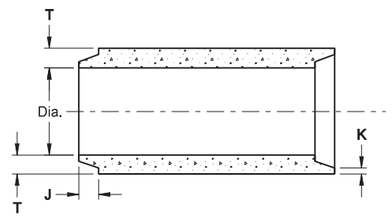
SECTION X-X
END SECTION
Equivalent to Class III Pipe

END SECTION										
TERMINAL DIMENSIONS								REINFORCING STEEL		
DIA	A	B	C	D	E	F	G	X	Y	Z
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	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'-7¾"	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'

CLASS IV ALTERNATE &
CLASS V ALTERNATE



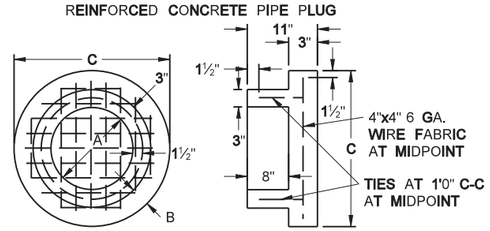
LONGITUDINAL SECTION



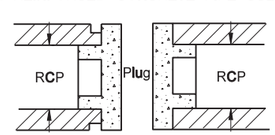
		All Classifications of Round Concrete Pipe				CLASS IV ALTERNATE								CLASS V ALTERNATE						
						D-LOAD TO PRODUCE A 0.01 INCH CRACK														
						2000								3000						
						D-LOAD TO PRODUCE ULTIMATE LOAD														
						3000								3750						
Internal Dia.of pipe in inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J. Groove End Min./Max.	Joint K. Tongue End Min.	Minimum Wall Thickness (T)	5000 P.S.I.						Height of Fill Normal Backfill		5000 P.S.I.						Height of Fill Normal Backfill
						Inner Cage	Ellip Cage	Outer Cage	Shear Steel					Inner Cage	Ellip Cage	Outer Cage	Shear Steel			
						Ai	Ae	Ao	N	S	Ar			Ai	Ae	Ao	N	S	Ar	
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	1⅝-2⅜	¾	2															
15	1.23	127	1¾-2¾	⅞	2¼															
18	1.77	168	1⅞-2⅞	1	2½															
21	2.40	214	1⅞-3⅛	1⅛	2¾															
24	3.14	265	2⅜-3¾	1⅛	3															
27	3.98	322	2½-4	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	3⅝-4¾	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	5⅝-6¾	2⅞	7	.64	.32	.48	8	6	.23	16-24		.96	.48	.72	8	6	.23	24-35
78	33.18	2098	6⅛-7¼	2⅞	7½	.70	.35	.53	9	6	.25	16-24		1.04	.52	.78	9	6	.25	24-35
84	38.48	2410	5⅝-7¾	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								

REINFORCED CONCRETE PIPE PLUG

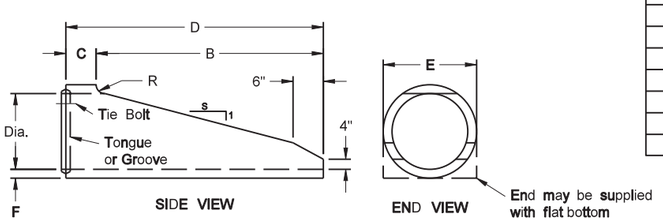
CONCRETE PIPE PLUG			
DIMENSIONS (in inches)			
PIPE DIAMETER	A	B	C
15	8	2.25	19.5
18	11	3.0	23.0
21	14	3.25	26.5
24	17	3.50	30.0
27	20	3.75	33.5
30	23	4.0	37.0
33	26	4.25	40.5
36	29	4.50	44.0
42	35	5.0	51.0
48	41	5.50	58.0



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"	2¼"	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.

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

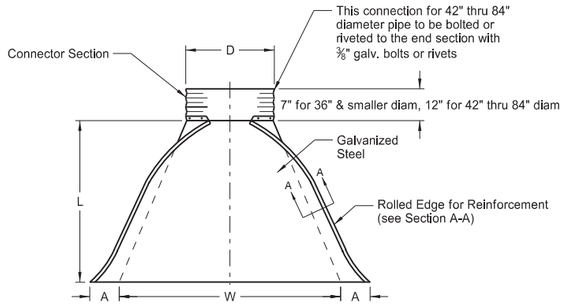
REVISIONS

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

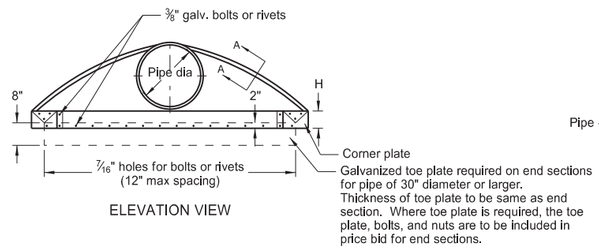
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674, on 12/18/2008 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

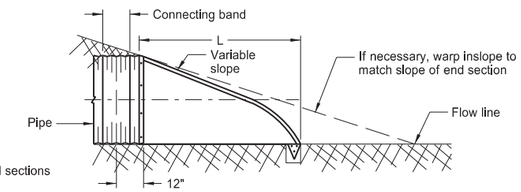
D-714-4



PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)

* * PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE	BODY
		A	B	H	L	W		
IN	IN	IN	IN	IN	IN	IN	RATE	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.

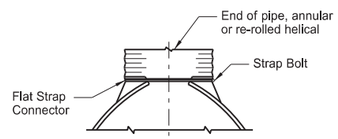
* * Pipe diameter is equal to dimension "D" of end section.

Manufacturers tolerances of above dimensions will be allowed.

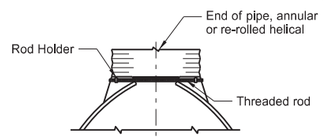
Splices to be the lap riveted type.

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 ±.

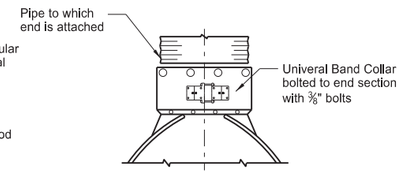
SECTION A-A



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



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

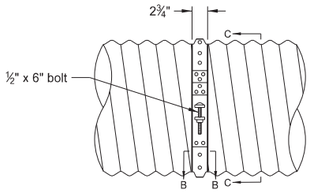


TYPE #3
For all pipe sizes

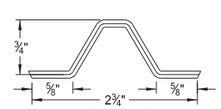
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"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

NOTES:

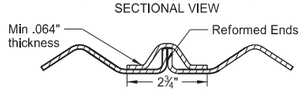
1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" 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

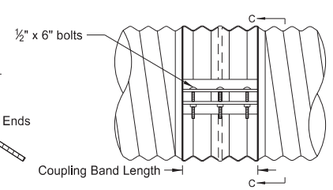


SECTIONAL VIEW



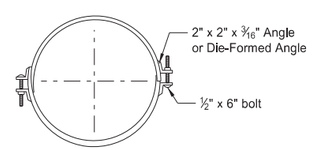
SECTION B-B

HAT BAND FOR FLANGED END PIPE

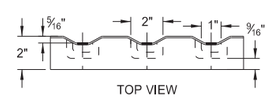


SIDE VIEW

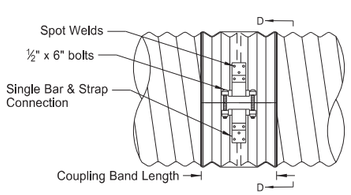
ANNULAR BAND



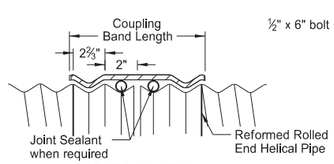
SECTION C-C
Angle Connection



TOP VIEW
Die-Formed Angle Connector

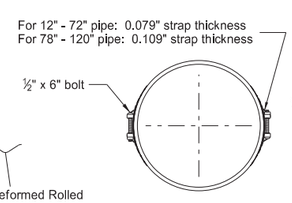


SIDE VIEW

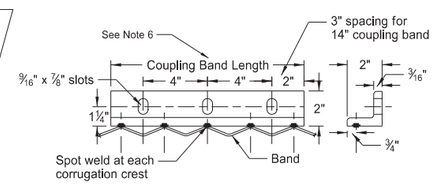


SECTIONAL VIEW

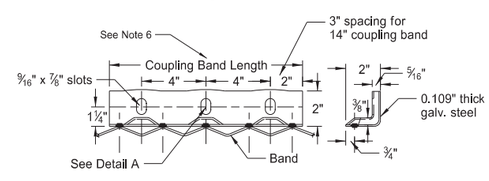
HUGGER COUPLING BAND



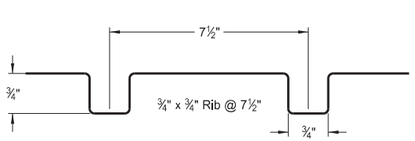
SECTION D-D
Bar & Strap Connection

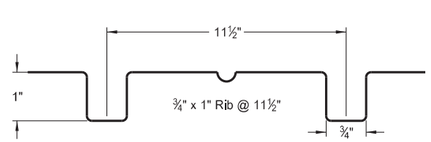


SIDE VIEW
END VIEW
2" x 2" x 3/16" Angle Connector

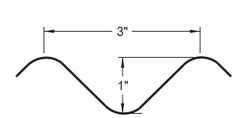


SIDE VIEW
END VIEW
Die-Formed Angle Connector

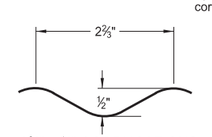




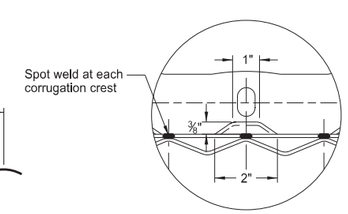
SPIRAL RIB CORRUGATIONS



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



2⅔" x ½" CORRUGATIONS



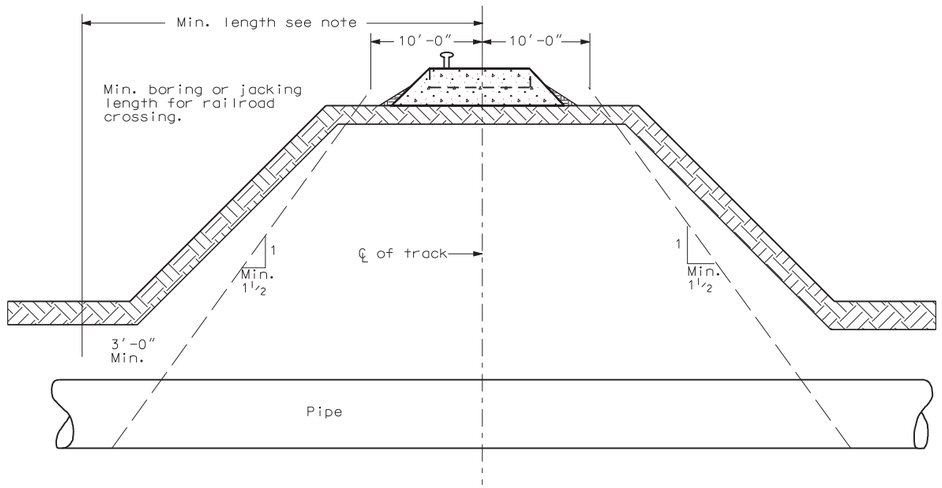
Detail A

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

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 08/06/2013 and the original document is stored at the North Dakota Department of Transportation

JACKED AND BORED PIPE

D-714-16



NOTES:

1. Pipe under railroad tracks and across railroad right-of-way shall extend to the greater of the following distances, measured at right angles to center line of track.
   a. 2 ft. beyond toe of slope
   b. 3 ft. beyond ditch
   c. A minimum distance of 25 ft. from center line of outside track when end of casing is below ground.

2. Depth Of Installation: Pipe under railway tracks and across railway right-of-way shall be not less than 5½ ft. from base of railway to top of casing at its closest point, except that under secondary or industry tracks this distance may be 4½ ft.

3. Pipe culverts shall be installed using equipment that encases the hole as the earth is removed. Boring or jacking without the concurrent installation of the pipe will not be permitted. Pipe shall extend through the undisturbed fill and shall be installed so as not to disrupt traffic nor damage roadway grade and surface. Use of water in the process of boring or jacking is prohibited.
   The boring or jacking shall be made in straight lines and to the grade and alignment shown on the plans. The flow line elevation at the starting point for boring or jacking shall be within 0.1 ft. of staked grade; the flow line shall not be reversed at any point; and the line and grade at any point within the pipe shall not vary by more than 0.5 ft. from the line and grade designated.

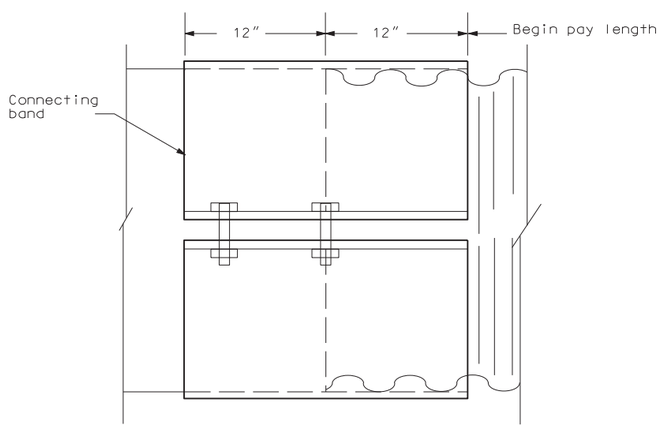
4. Jacked Pipe: The method used to install the pipe indicated as jacked on the plans shall be left to the discretion of the contractor. The boring or jacked methods are acceptable. If the boring method is used, the contractor may use smooth wall steel pipe in lieu of RCP. Regardless of the method or type of pipe used, the price bid for jacked pipe shall be considered full compensation for the pipe and its installation.

5. Pipe culverts that are bored or jacked shall conform to section 714 of the standard specifications.

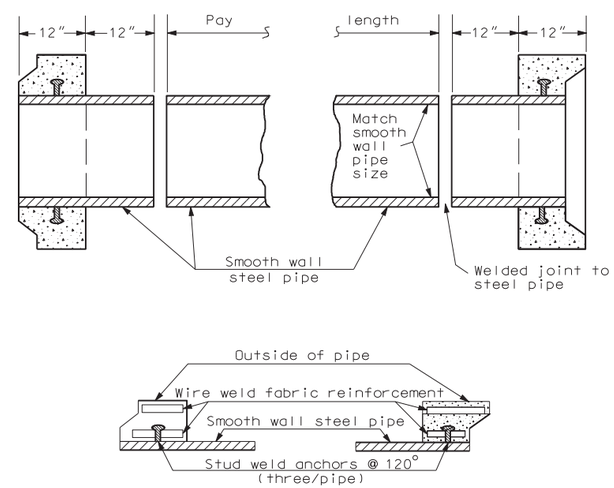
6. Reinforced concrete pipe, class V, shall be used at all railroad crossings unless otherwise indicated on the plans.

7. The price of connecting bands will be included in the price bid for "conduit pipe-jacked or bored."

TABLE OF MINIMUM WALL THICKNESS FOR S.W.S.P. UNDER R.R.	
Nominal Thickness (Inches)	Nominal Diameter (Inches)
0.188	Under 14
0.219	14 and 16
0.250	18
0.281	20
0.312	22
0.344	24
0.375	26
0.406	28 and 30
0.438	32
0.469	34 and 36
0.500	38, 40 and 42



STANDARD DETAIL FOR JOINTING SMOOTH WALL STEEL PIPE TO CORRUGATED PIPE



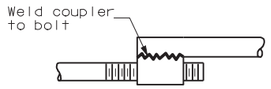
STANDARD DETAIL FOR JOINTING SMOOTH WALL STEEL PIPE TO REINFORCED CONCRETE PIPE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
04-03-89	
REVISIONS	
DATE	CHANGE
09-03-96	Weld anchor spacing
06-25-03	Layout revisions
12-01-04	PE Stamp added

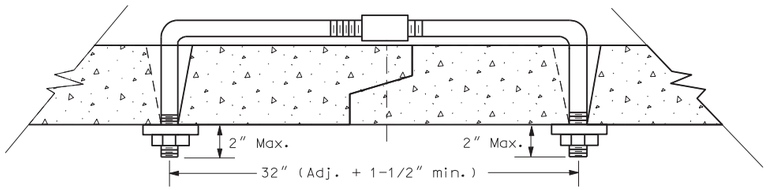
This document was originally issued and sealed by MARK S. GAYDOS Registration Number PE- 4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

D-714-22

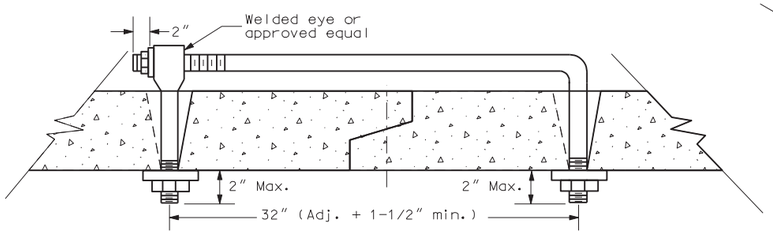
CONCRETE PIPE TIES



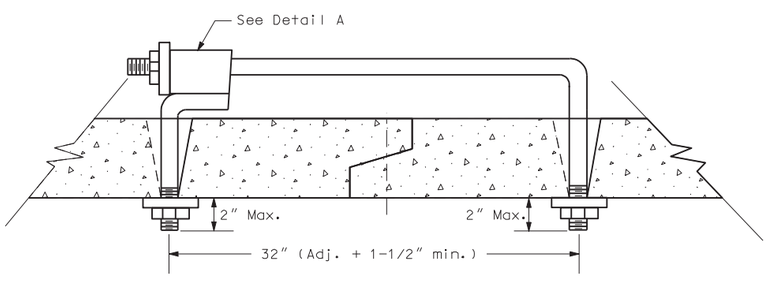
TOP VIEW



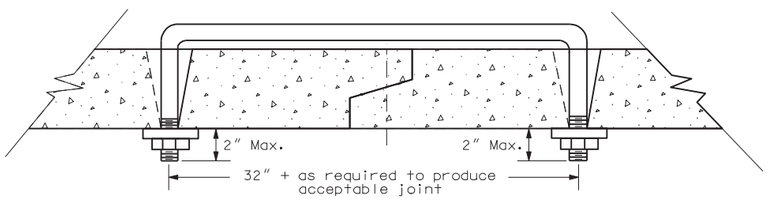
ADJUSTABLE TIE



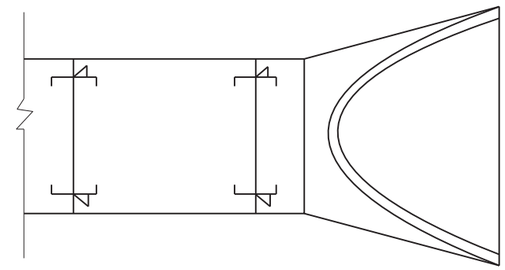
EYE BOLT TIE

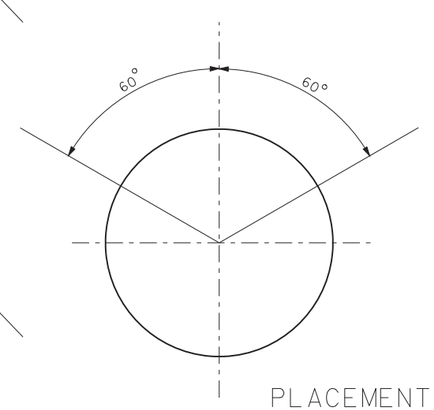


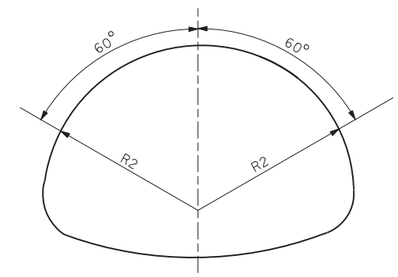
WELDED PIPE TIE



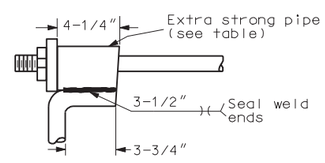
U BOLT TIE





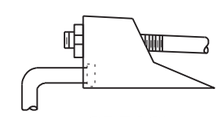


PLACEMENT OF HOLES



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

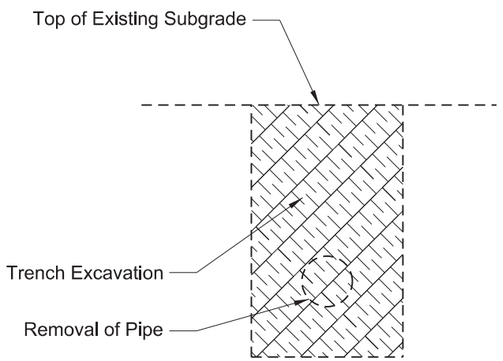
REVISIONS

DATE	CHANGE
12-09-94	Notes
06-26-03	Layout revisions
12-01-04	PE Stamp added

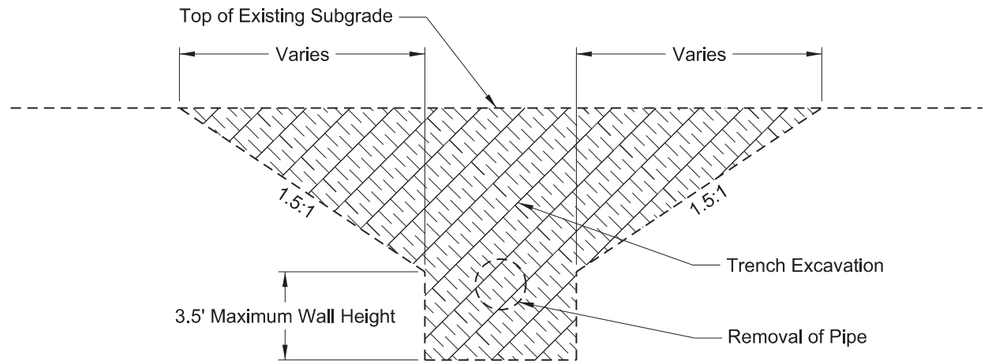
This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

PIPE EXCAVATION AND INSTALLATION DETAIL FOR LONGITUDINAL MAINLINE PIPE OR PIPE NOT UNDER THE ROADWAY

D-714-27



EXCAVATION DETAIL A



EXCAVATION DETAIL B

Pay Items
1) Pipe*
2) 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
5) Common Excavation - Type B

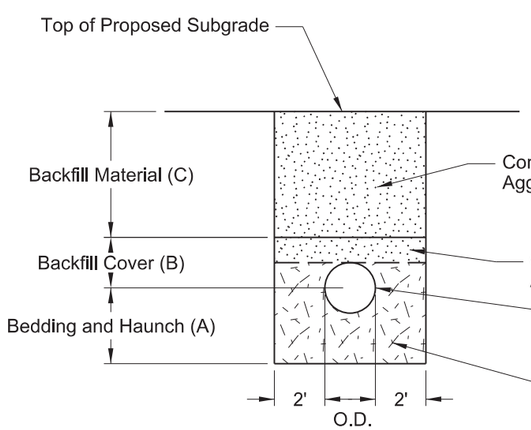
NOTES:
1) This drawing does not apply to pipes in approaches.

2) It is the contactor's option to select Detail A or B.

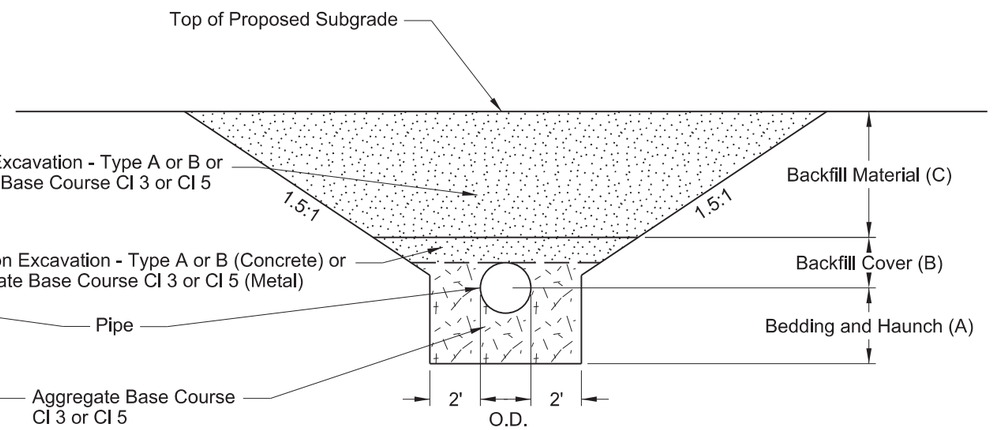
Bedding and Haunch (A)
Pipes Not Under Roadway = 0.5 O.D. + 4 Inches
Pipes Under the Roadway = 0.5 O.D. + 2 Feet

Backfill Cover (B)
Concete Pipe = 0.5 O.D.
Metal Pipe = 0.5 O.D. + 1 Foot
PVC/HDPE = 0.5 O.D. + 1 Foot

Backfill Material (C)
Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course Cl 3 or Cl 5
Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A
Pipe Not Under Roadway = Common Excavation - Type B



BACKFILL DETAIL A



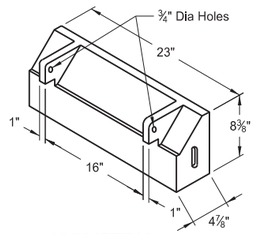
BACKFILL DETAIL B

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting

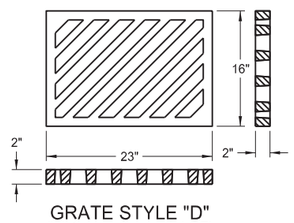
This document was originally issued and sealed by Ron Horner, Registration Number PE- 2087, on 10/15/13 and the original document is stored at the North Dakota Department of Transportation

INLET - TYPE I

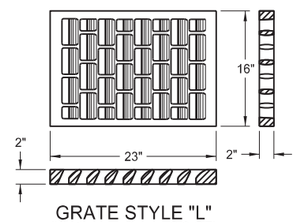
D-722-1



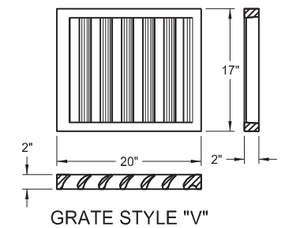
ISOMETRIC
(Grate Style "D" & "L")



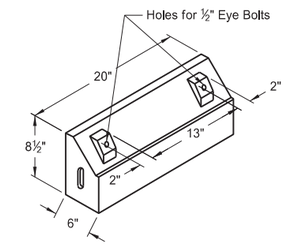
GRATE STYLE "D"
(Waterway Area = 1.1 SF)



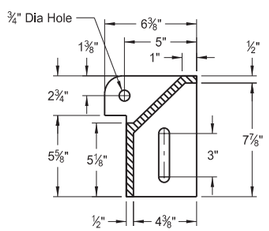
GRATE STYLE "L"
(Waterway Area = 0.9 SF)



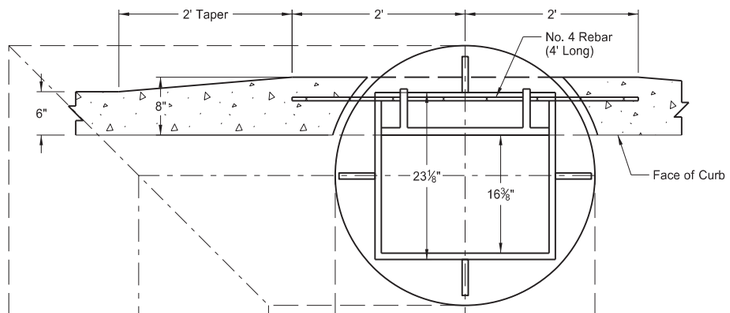
GRATE STYLE "V"
(Waterway Area = 1.3 SF)



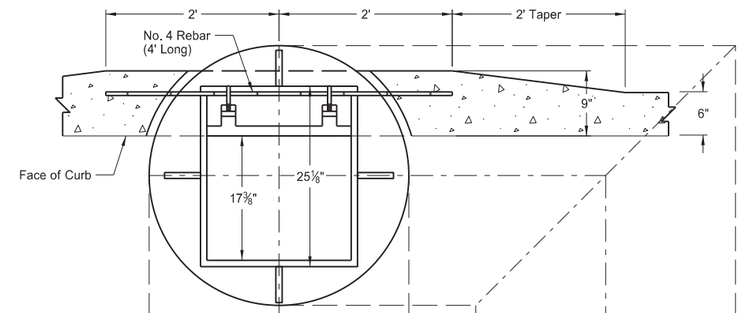
ISOMETRIC
(Grate Style "V")



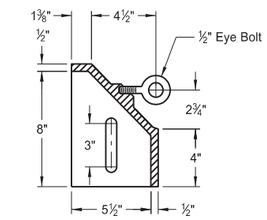
CURB BOX
(Grate Style "D" & "L")



TOP
(Grate Style "D" & "L")



TOP
(Grate Style "V")



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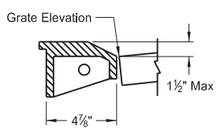
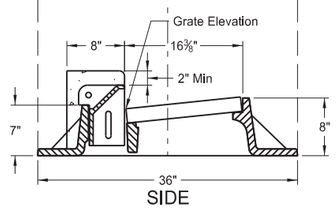
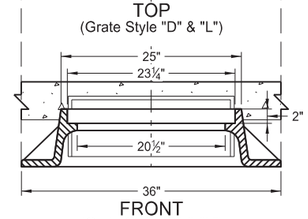


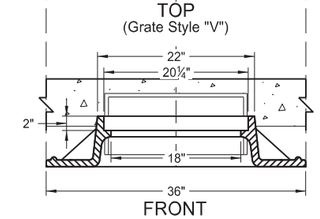
CURB PLATE
(Grate Style "D" & "L")



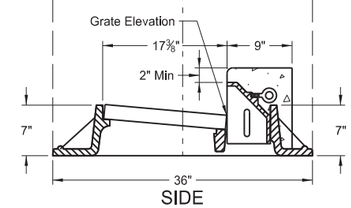
SIDE
(Grate Style "D" & "L")



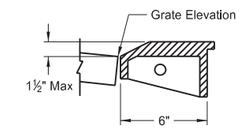
FRONT
(Grate Style "D" & "L")



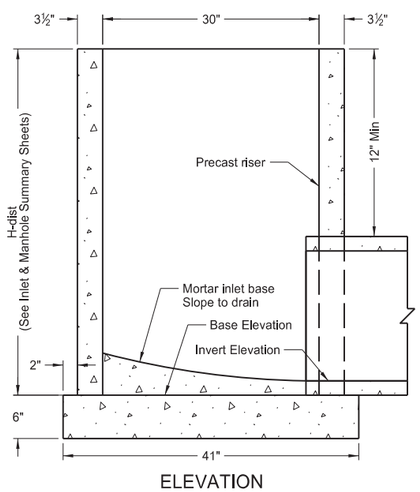
FRONT
(Grate Style "V")



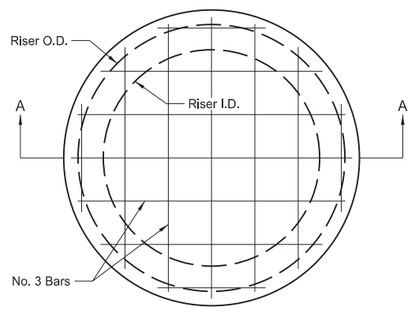
SIDE
(Grate Style "V")



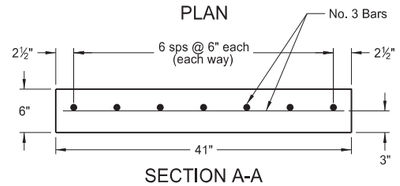
CURB PLATE
(Grate Style "D" & "L")



ELEVATION



PLAN



SECTION A-A

NOTES:

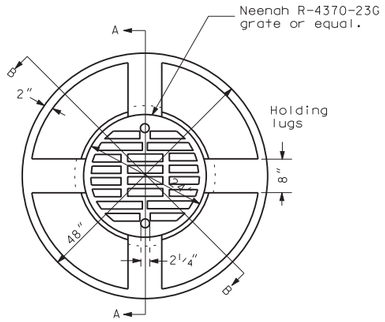
1. Other castings, similar in dimension, may be used if the casting conforms to the riser section and has a grate style as specified in the plans which meets or exceeds the waterway area listed. If modifications to the inlet are required to facilitate similar castings the contractor must receive written approval from the Engineer.
2. Castings shall be manufactured in accordance with AASHTO M306-09. Metal used in the manufacture of castings shall conform to AASHTO M105 Class 35B.
3. The contractor shall have the option of using precast or cast-in-place bases. Class of concrete shall be AE. The aggregate size shall be approved by the engineer in the field. Construction shall be in accordance with section 722.03 of the Standard Specifications.
4. Precast concrete risers shall be constructed in accordance with AASHTO M199.
5. On projects with P.C.C. pavement all inlet risers shall be constructed 4 to 5 inches below final elevation and adjusted to final grade after paving. Adjustment may be done with adjusting rings, masonry or cast-in-place concrete. All costs for this adjustment shall be included in the price bid for the inlet.
6. All reinforcing steel shall be Grade 60 steel.
7. Curb plates shall be used in lieu of curb boxes when curb height at inlet location is 4" or less.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-14-13	
REVISIONS	
DATE	CHANGE

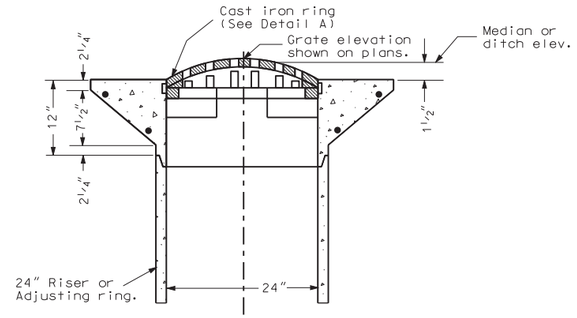
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 5-14-13 and the original document is stored at the North Dakota Department of Transportation

PRECAST CONCRETE MEDIAN DRAIN

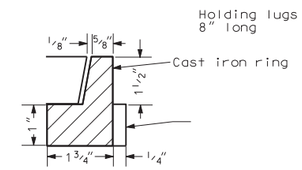
D-722-7



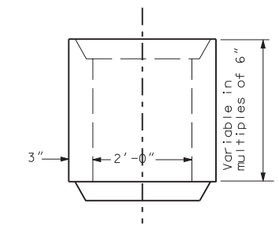
PLAN VIEW



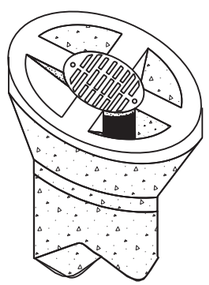
SECTION A-A

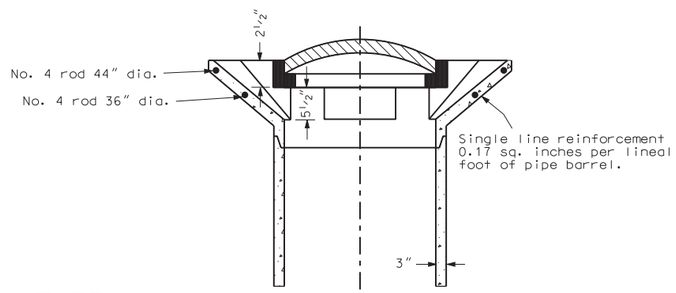


DETAIL A



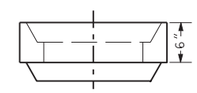
RISER SECTION



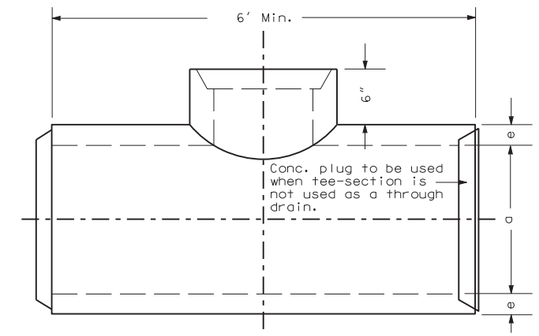


TYPE A

SECTION B-B

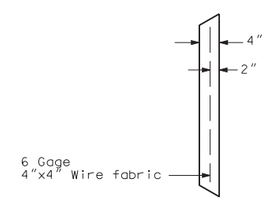


ADJUSTING RING

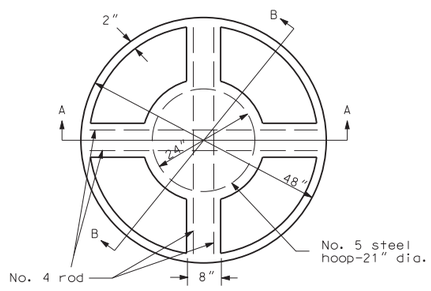


SIDE VIEW

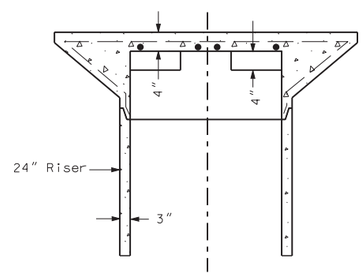
a = Diameter of drainage pipe
e = Wall thickness of drainage pipe



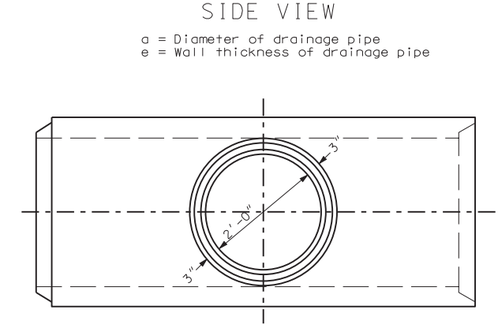
CONC. PLUG



PLAN VIEW



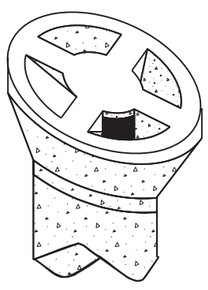
SECTION A-A

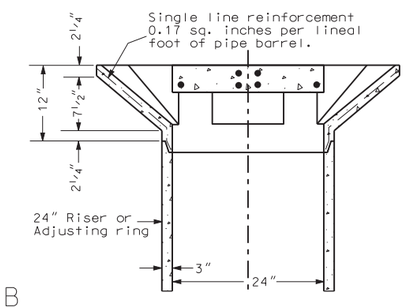


PLAN VIEW

Reinforcement in above sections shall be in accordance with Standard Specifications.

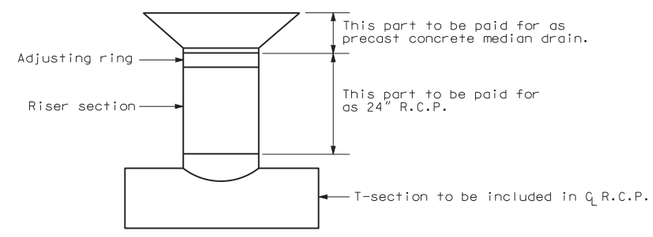
T - SECTION





TYPE B

SECTION B-B

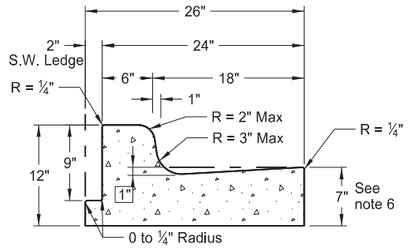


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
06-26-03	Layout revision
12-01-04	PE Stamp added

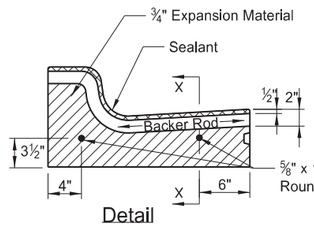
This document was originally issued and sealed by MARK S. GAYDOS Registration Number PE- 4518 , on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

Curb & Gutter and Valley Gutter

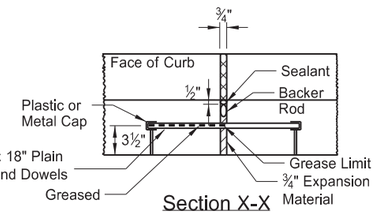
D-748-1



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

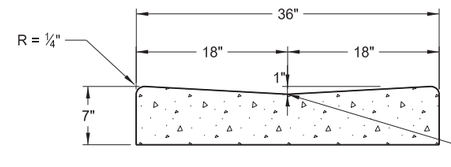


Detail

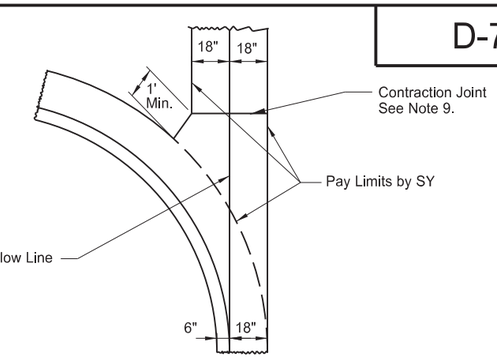


Section X-X

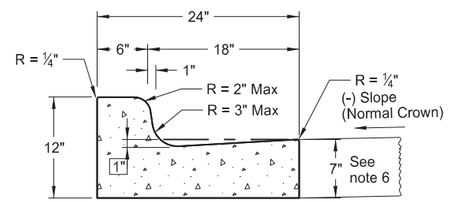
Isolation Joint



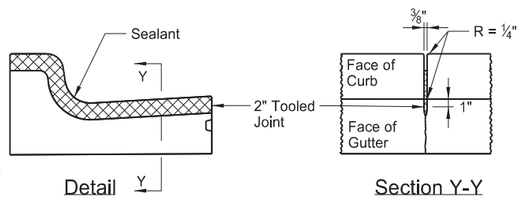
36" Concrete Valley Gutter Detail



36" Concrete Valley Gutter Plan



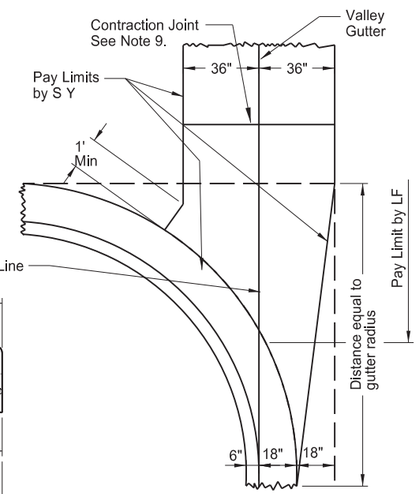
Curb & Gutter Type 1 (Sec. A)



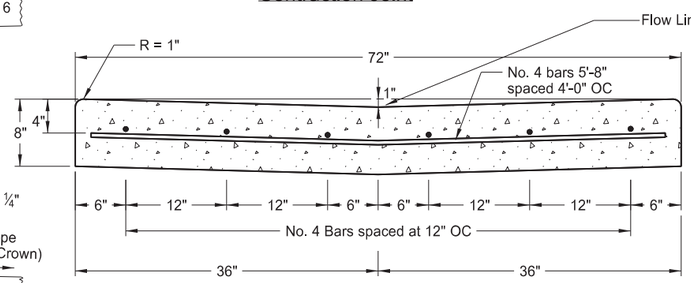
Detail
(10' Max Spacing)

Section Y-Y

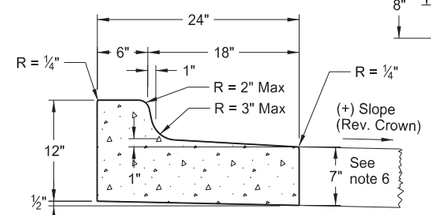
Contraction Joint



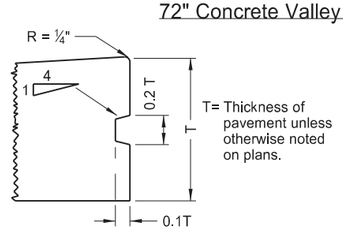
72" Concrete Valley Gutter Plan



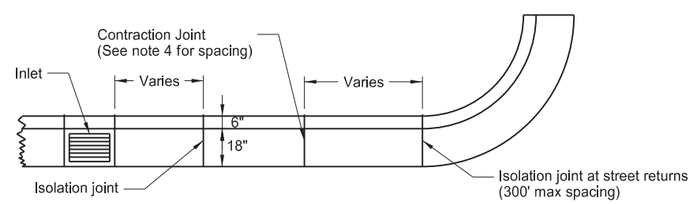
72" Concrete Valley Gutter Detail



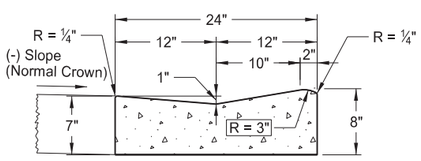
Curb & Gutter Type 1 (Sec. B)



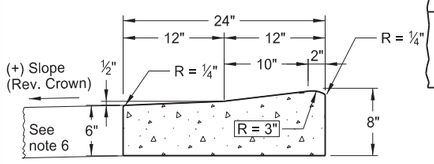
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



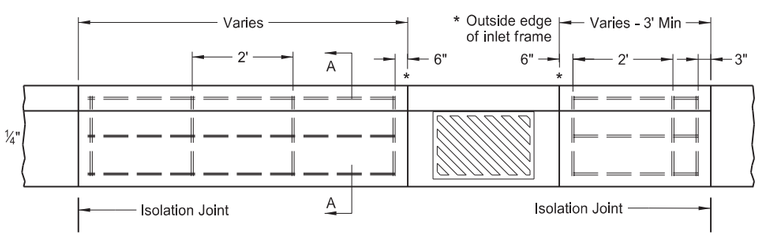
Joint Location Detail



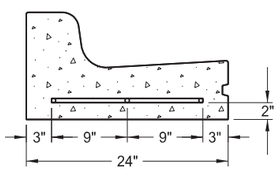
Mountable Curb & Gutter Type 1 (Sec. A)



Mountable Curb & Gutter Type 1 (Sec. B)



Curb & Gutter Reinforcing at Inlets



Section A-A

NOTES:

1. Curb and Gutter Type 1 (Sec. A & B) to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Isolation joint material shall be 3/4" preformed expansion joint filler conforming to the standard specifications. The opening for the backer rod and joint sealant shall be formed by a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint, plastic or metal caps and greased dowels shall be installed in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements the joint spacing for the curb and gutter shall be 10' max. with the panels on each side of the inlets. For concrete pavements the joint spacing for the curb and gutter shall match the pavement joint on PCC Pavements of approximately 15' spacing.
5. Joint sealing: All contraction and isolation joints shall be sealed as shown in the details. The joint sealant for contraction joints shall conform to section 826.02B.The sealant for expansion joints shall be as specified in note 3 above. The sealant shall be tooled and installed in accordance with the manufacturer's recommendations.
6. Depth of Face of Gutter: For hot bituminous pavement the depth of gutter shall be 7" as shown. For PCC pavements, the Contractor has the option to match the depth of gutter to the depth of the adjacent PCC pavement or to construct a 7" depth as shown.
7. When the curb and gutter abuts PCC pavement, it shall be tied to the PCC pavement. The tie bar shall consist of a No. 3 bar, 1'-6" in length spaced 4' center to center.
8. On street returns and other locations where the new curb and gutter ends and does not abut existing curb and gutter, the end two (2) feet of the curb shall be tapered from 6" in height to 0". A 1/2" premolded isolation joint which is full depth and the same shape as the curb and gutter shall be installed just ahead of the taper. An 18" tie bar shall be installed across the joint.
9. Valley Gutter Joints: Contraction joints are required at approx. 10' intervals. The contraction joints shall be ⅛" min. to ⅜" max. in width. The joints shall be formed by sawing or scoring to a minimum depth of 2". The joint sealant shall be a hot poured elastic type joint sealer in accordance with Section 826.02A.2 of the Standard Specifications. The joint and sealant shall be included in the price bid for Valley Gutter.

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

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

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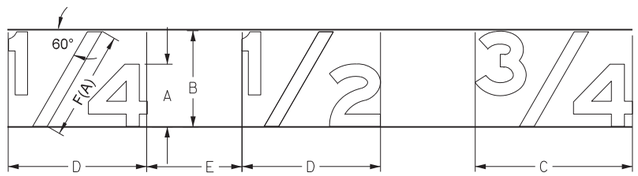
LETTER AND ARROW DETAILS FOR VARIABLE LENGTH SIGNS

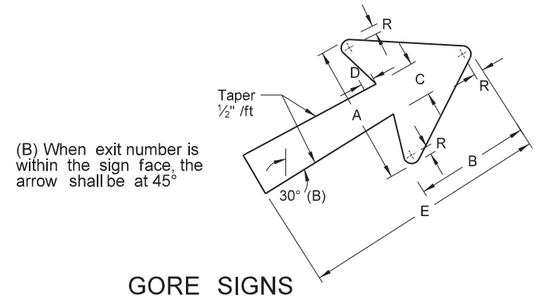
D-754-9



SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

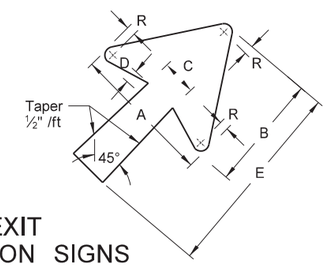
(A) Diagonal stroke of fraction is to be centered optically.



(B) When exit number is within the sign face, the arrow shall be at 45°

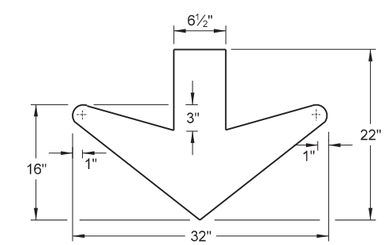
GORE SIGNS

"EXIT" LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15⅛"	11 9/16"	3¾"	1 5/16"	25"	13/16"
10" - 13⅓"	18¼"	14"	4½"	1½"	30"	¾"

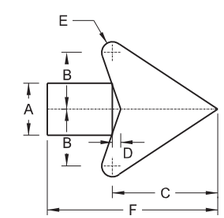


EXIT DIRECTION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15⅛"	11 9/16"	3¾"	1 5/16"	17"	13/16"
10" - 13⅓"	18¼"	14"	4½"	1½"	20"	¾"
16" - 20"	22¼"	17"	5⅜"	1¾"	25"	1"

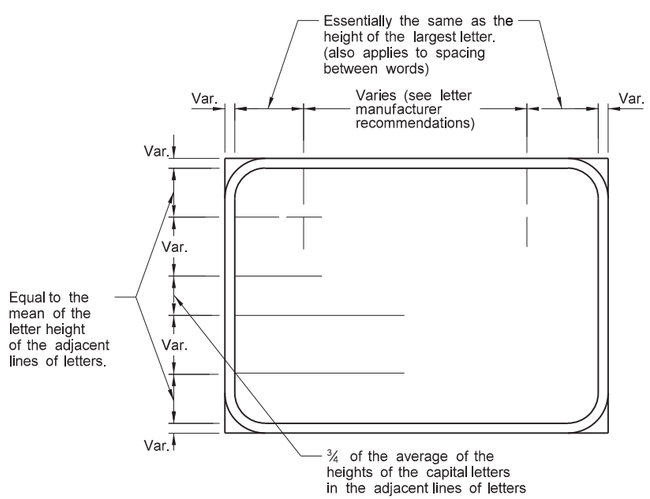


DOWN ARROW



DISTANCE AND DESTINATION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	F
6"	2¾"	3"	5 9/16"	7/16"	9/16"	9"
8"	3½"	4"	7⅛"	9/16"	11/16"	12"
12"	5¼"	6"	10⅝"	13/16"	1 1/16"	18"



TYPICAL SPACING

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE

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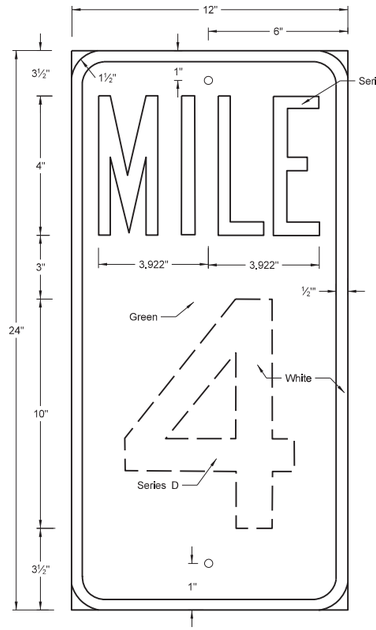
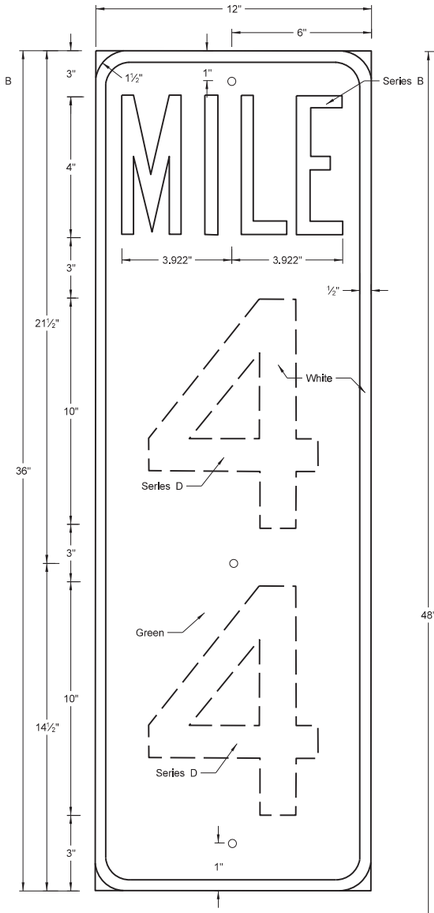
(EXPRESSWAY-FREEWAY USE) MILE POSTS

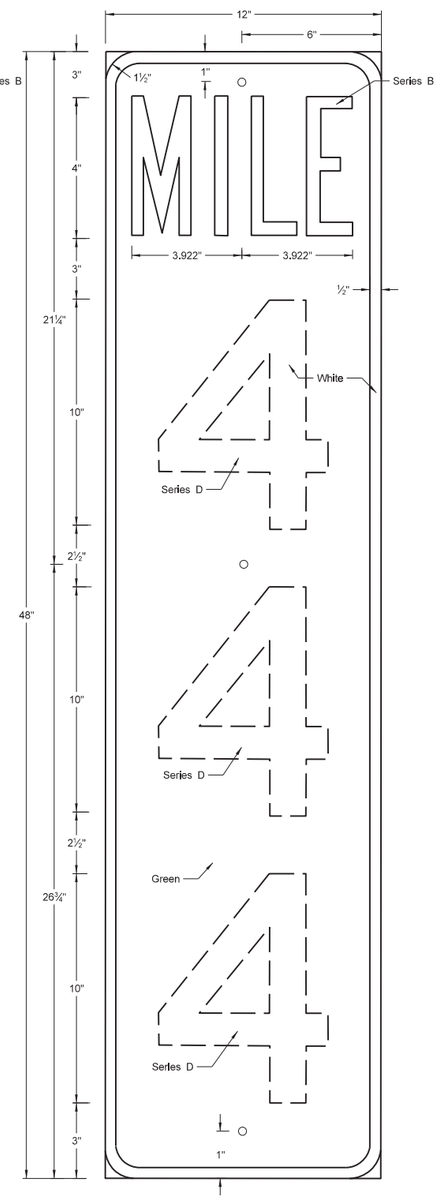
D-754-20



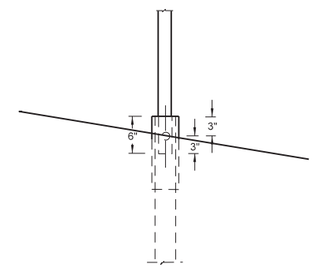
TYPE A
Area = 2.00 S.F.



TYPE B
Area = 3.00 S.F.

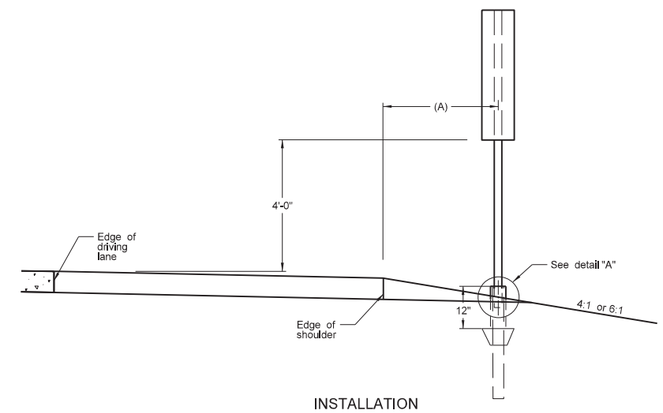


TYPE C
Area = 4.00 S.F.

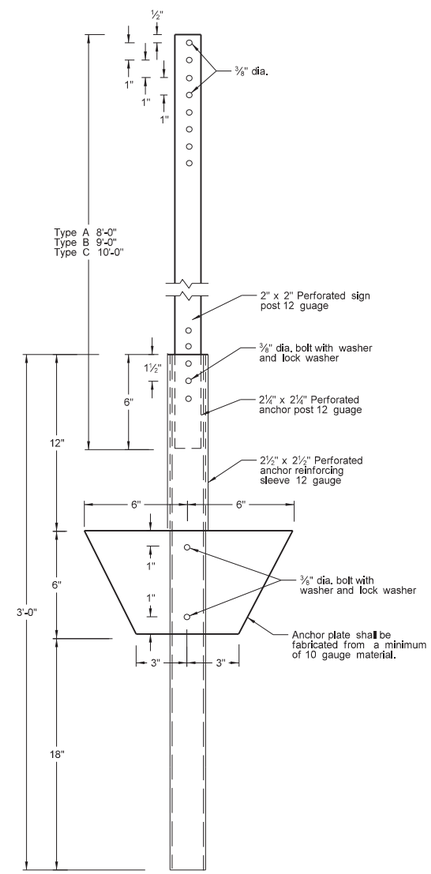


DETAIL "A"

(A) 8' Clearance to finished shoulder or in line with existing delineator posts



INSTALLATION



POST AND ANCHOR PLATE DETAIL

NOTES:
Installation: Posts shall be installed along right shoulder in line with delineators.

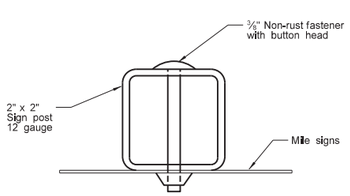
Mile Sign Backing: Backing shall be fabricated of 0.080 aluminum. Sheeting shall conform to section 894.01 of the Standard Specifications.

Posts: Posts shall conform to section 894.05 of the Standard Specifications.

Fasteners: The mile signs shall be attached to the post by tension pin type fastener or other suitable vandal resistant non-rust fastener.

Reflective Sheeting: Sheeting shall conform to section 894.02 (Type IIIA) of the Standard Specifications.

Numbers: Numbers shall be of the series shown and may be screened or applied copy. Screening and reflective sheeting for applied copy shall conform to section 754 & 894 of the Standard Specifications.



ASSEMBLY DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
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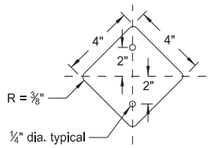
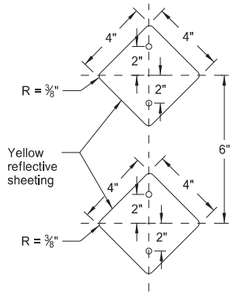
REFLECTORIZED DELINEATORS

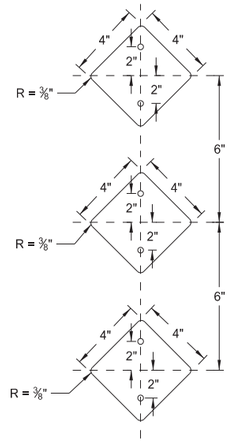
D-754-21



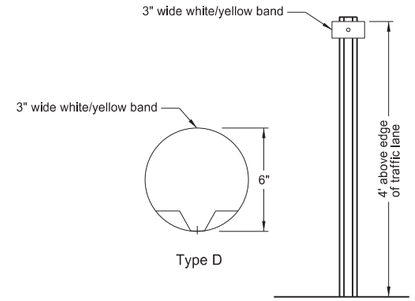
Main line
One reflector
(Type A delineator)



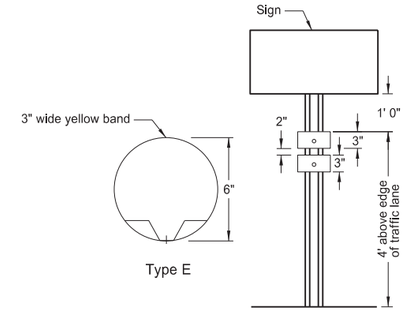
Ramps
Two reflectors
(Type B delineator)



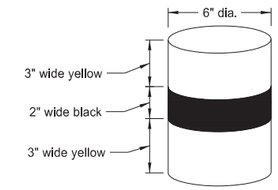
Narrow Bridges
Three reflectors
(Type C delineator)



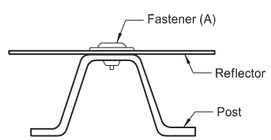
Median
One reflector
(Type D delineator)



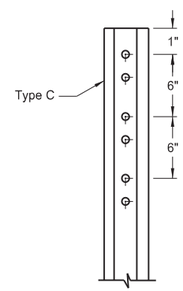
Median
One or Two reflectors
(Type E delineator)

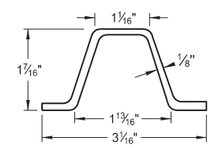


Alternate Type E

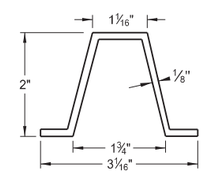


Delineator Attachment Detail





Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

Delineator Details
Type A, B, and C

Installation: Posts are to be installed along the right shoulder line unless shown otherwise on the plans.

Reflectors: Reflector shall be the same color as the adjacent pavement marking.

Spacing: Delineator spacing along main line tangents and curves with radius greater than 11500' (less than 0° 30') shall be at 528' centers. Curves with a radius less than 11500' but greater than 1200' the spacing shall be at 264' centers. With curves less than 1200' use spacing (S) = 3*√R-50

Material: Reflective material shall be ASTM Type IX.

Type E

Type E: Two yellow bands with a 2" spacing between bands.

Alternate Type E: One unit band consisting of two yellow stripes separated by a 2" black stripe.

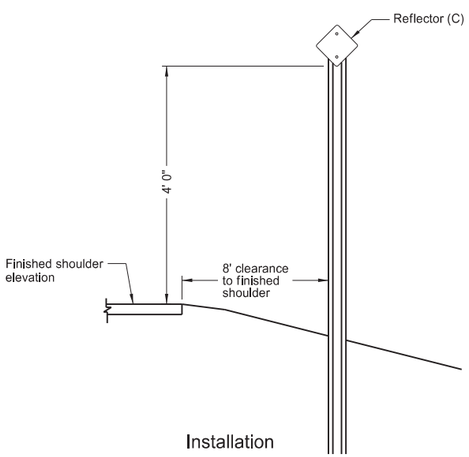
Material: Reflective material shall be Type IX.

(A) The fastener shall be ⅜" dia. with flat washer having a min. outside dia. of 13/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

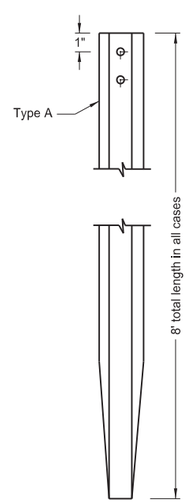
(B) The contractor may drill only those holes required to attach the number of reflectors on that post, or drill all the posts the same so that any number of reflectors may be added.

(C) Reflector to be mounted facing traffic at an angle of 93° away from oncoming traffic.

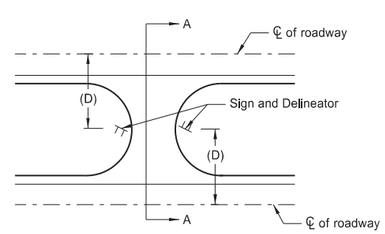
(D) The median width may vary. The sign and delineator assembly shall be placed in the median crossover an equal distance from each roadway.

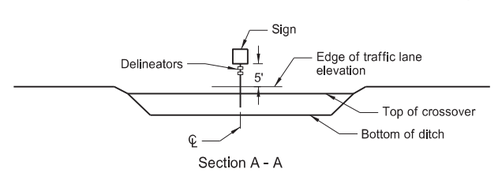


Installation



U-type Post





Section A - A

Median Crossovers
Signing and Delineation system

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

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

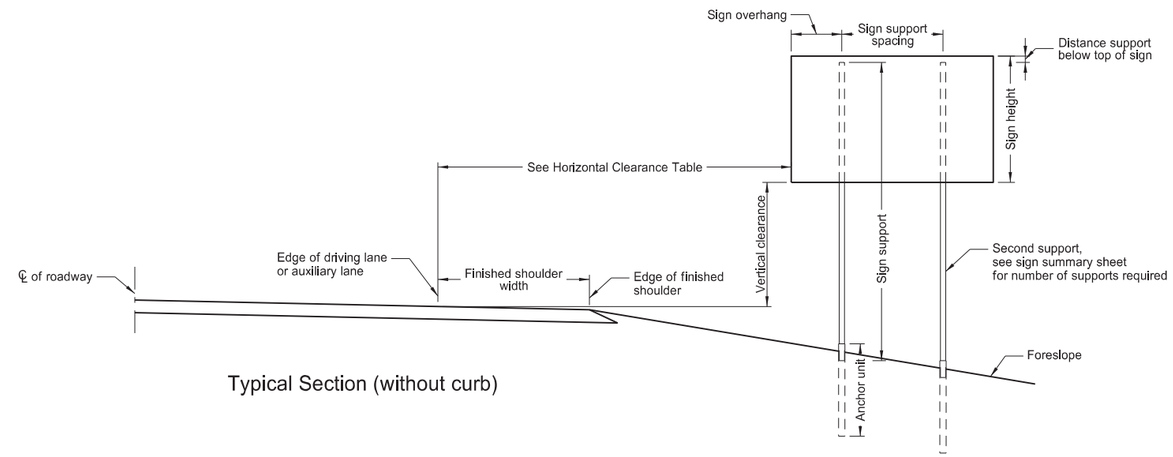
   Directional signs on expressways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane.

   All route signs, warning signs, and regulatory signs on expressways shall be at least 7' above the edge of the driving lane.

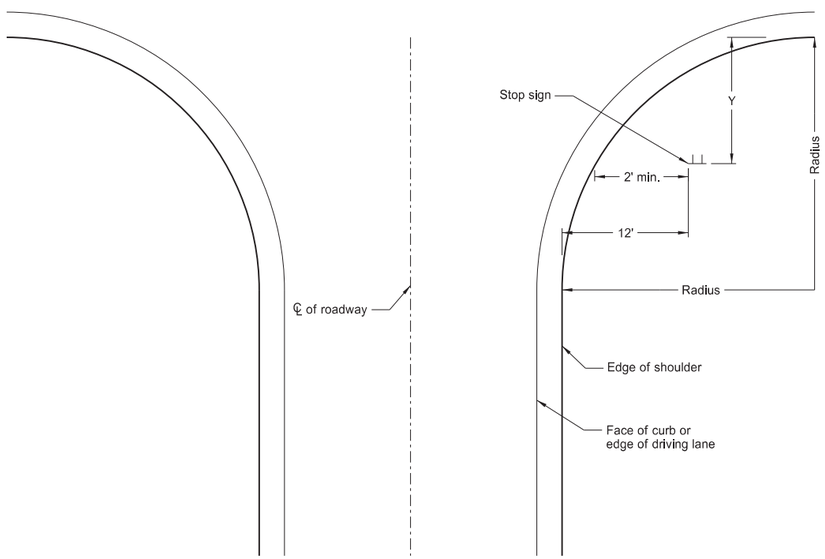
   Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.

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

3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.



Typical Section (without curb)

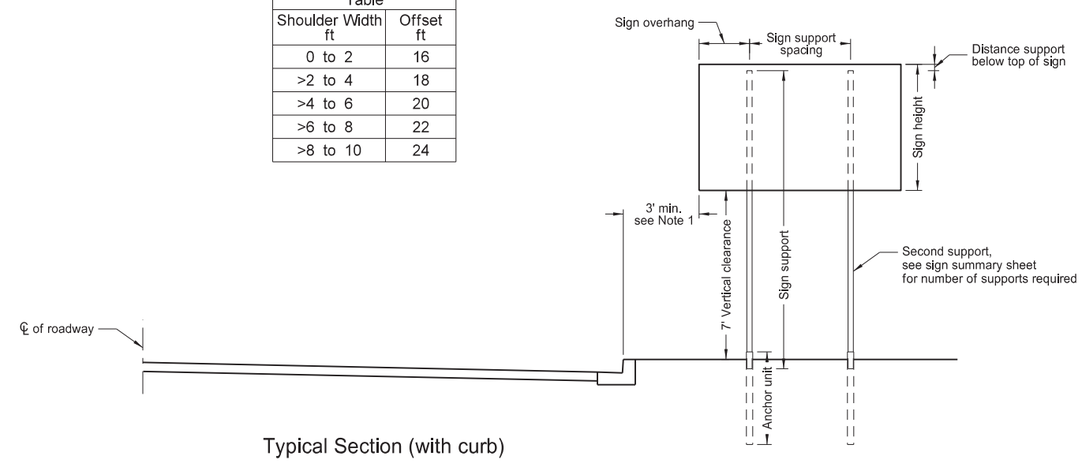


Stop Sign Location
Wide Throat Intersection

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

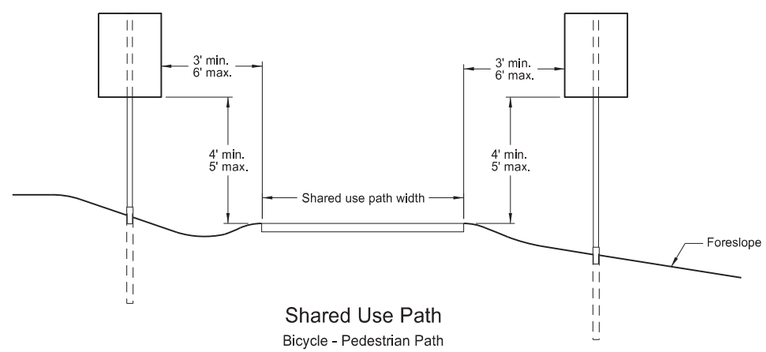
Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
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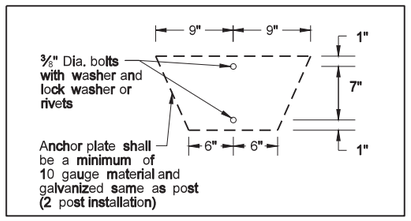
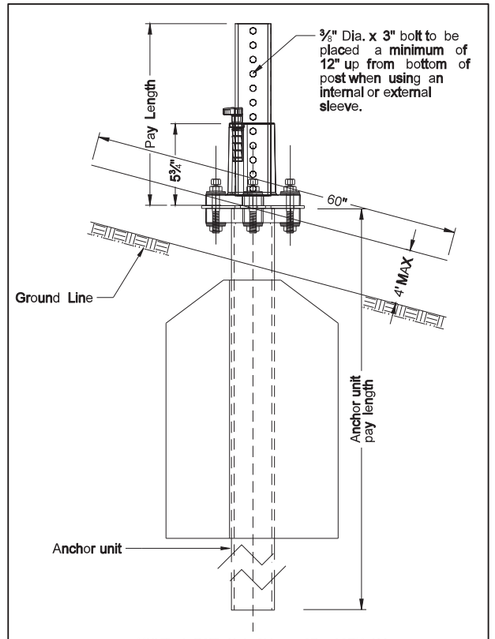
Mounting Details Perforated Tube

D-754-24

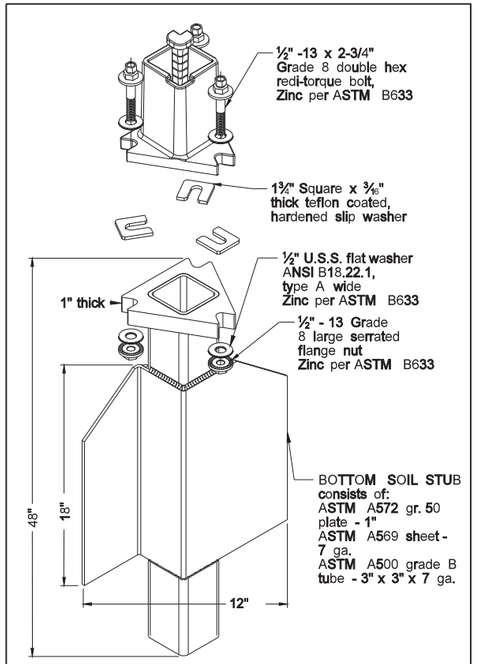
Number of Posts	Telescoping Perforated Tube: Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

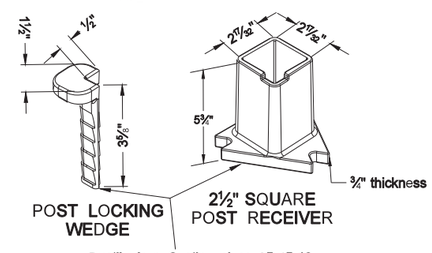




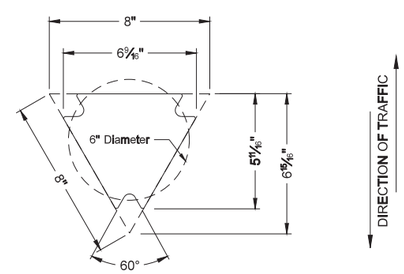
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY: 2½" x 12 ga. may be inserted with 2½" x 12 ga. & 2½" 10 ga. may be inserted with 2 3/16" x 10 ga. to achieve higher load ability.



SLIP BASE FOR 2½" POST



Ductile Iron Casting class 65-45-12. Hot Dip Galvanize ASTM A153



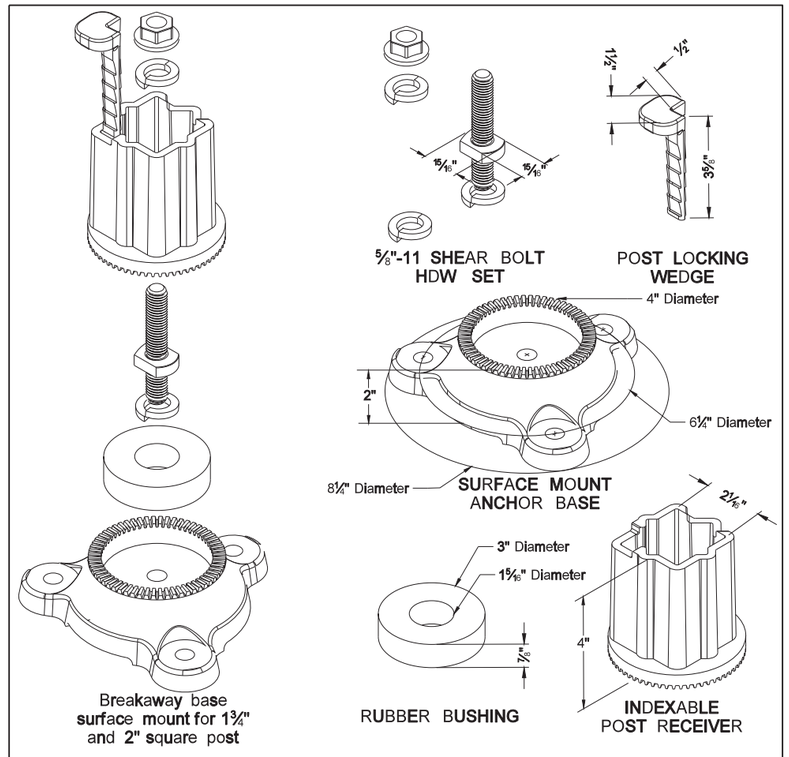
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulus In.³
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

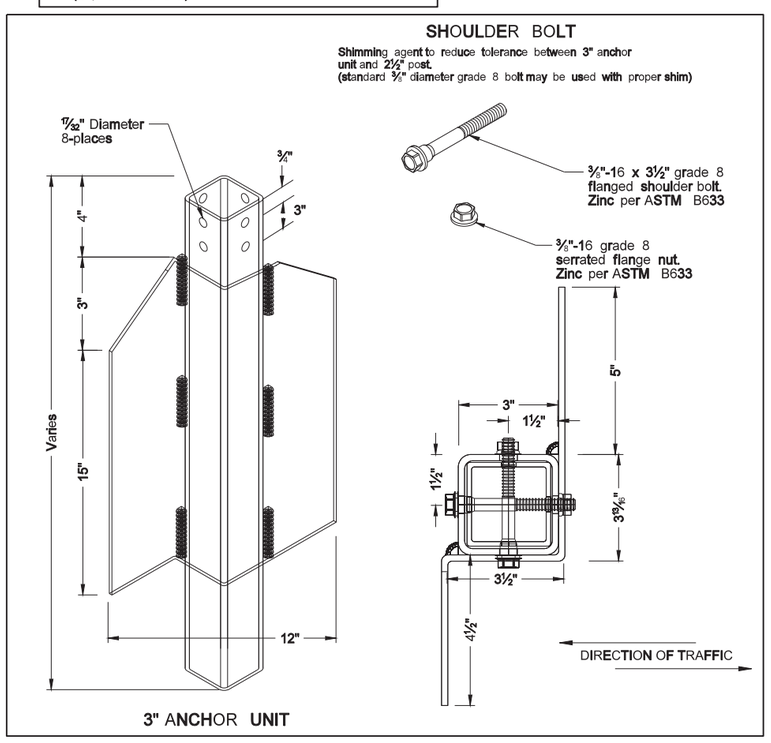
The 2 3/16" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

NOTE:

1. 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.
2. Anchor material shall be 7 guage H.R.P.O. Commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless orthervise noted.
3. When used in concrete sidewalk, anchor shall be the same concept without the wings
4. Four post signs shall have over 8' between the first and fourth posts.
5. Installation procedures as per manufacturers recommendation.
6. Concrete fasteners for surface mount breakaway base shall be a minimum ½" diameter x 4" grade 8.



SURFACE MOUNT ANCHOR BASE



3" ANCHOR UNIT

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

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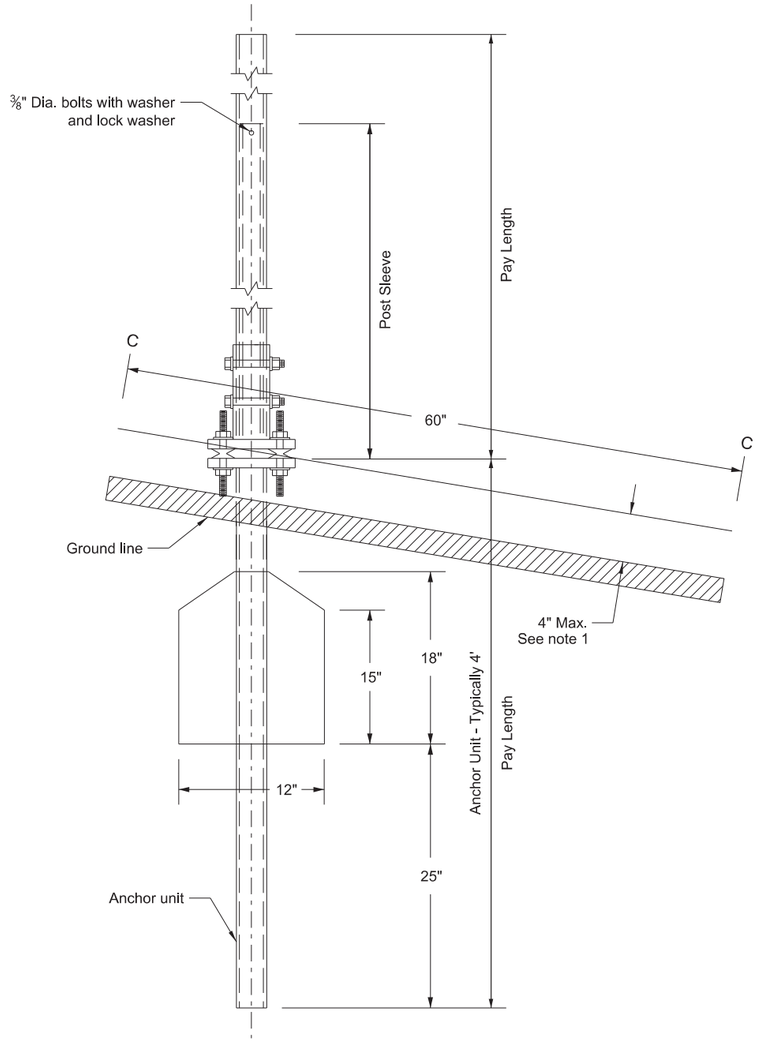
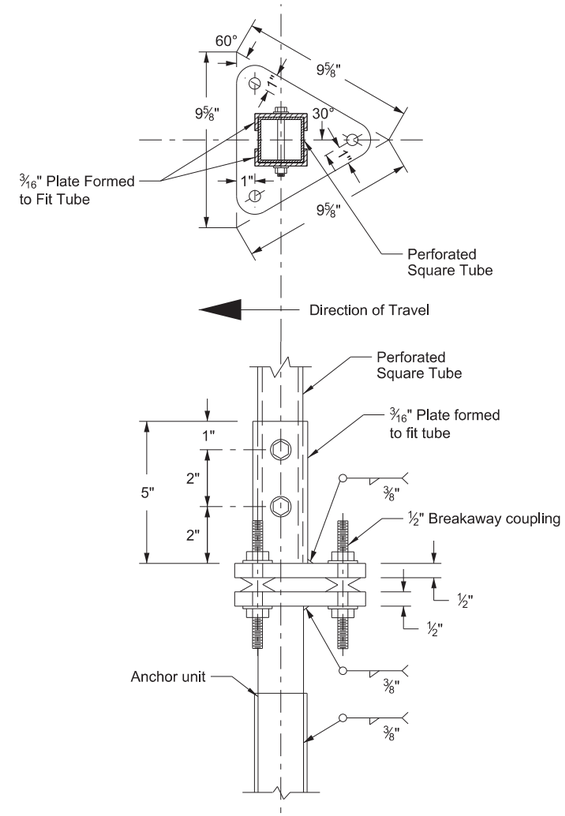
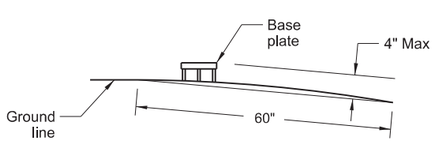
D-754-24A

Breakaway Coupler System for Perforated Tubes



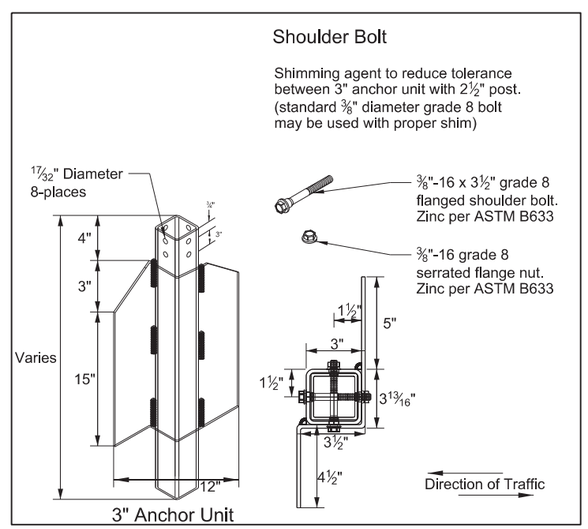


Base Plate with Breakaway Coupler



Section C-C

Max. protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



3" Anchor Unit

Notes:

1. 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.
2. Anchor unit shall be the same size as the post and shall have the same specification as the post.
3. Four post signs shall have over 8' between the first and fourth post.
4. In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
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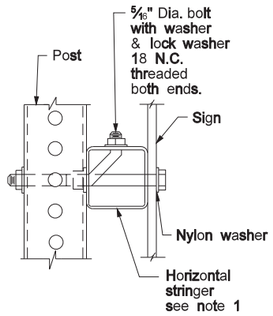
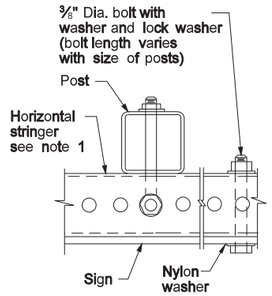
Mounting Details Perforated Tube

D-754-25

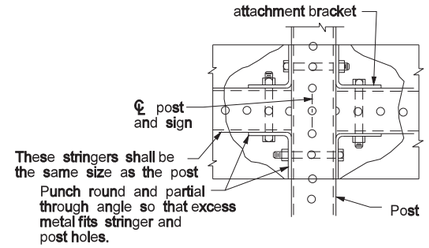


Side View

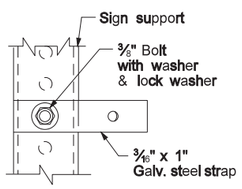


Top View

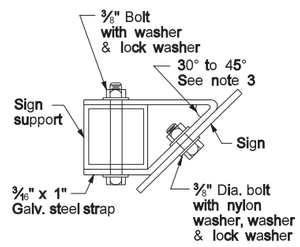
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



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

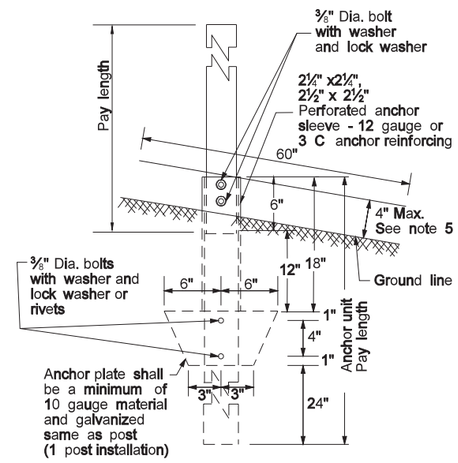


Side View

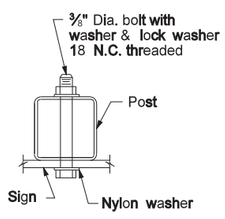


Top View

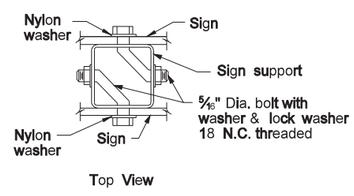
STRAP DETAIL



ANCHOR UNIT AND
POST ASSEMBLY

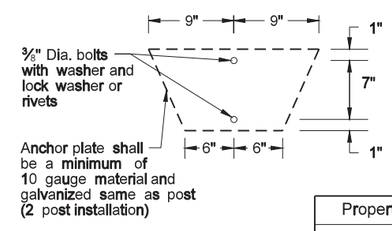


BOLT MOUNTING



Top View

BACK TO BACK
MOUNTING



Note:

1. Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
2. Metal washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
3. No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers. Material used for the attachment strap shall be included in the price bid for "Flat sheet for signs."
4. In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
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.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.^{4}	Cross Sect. area In.^{2}	Section Modulus In.^{3}
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
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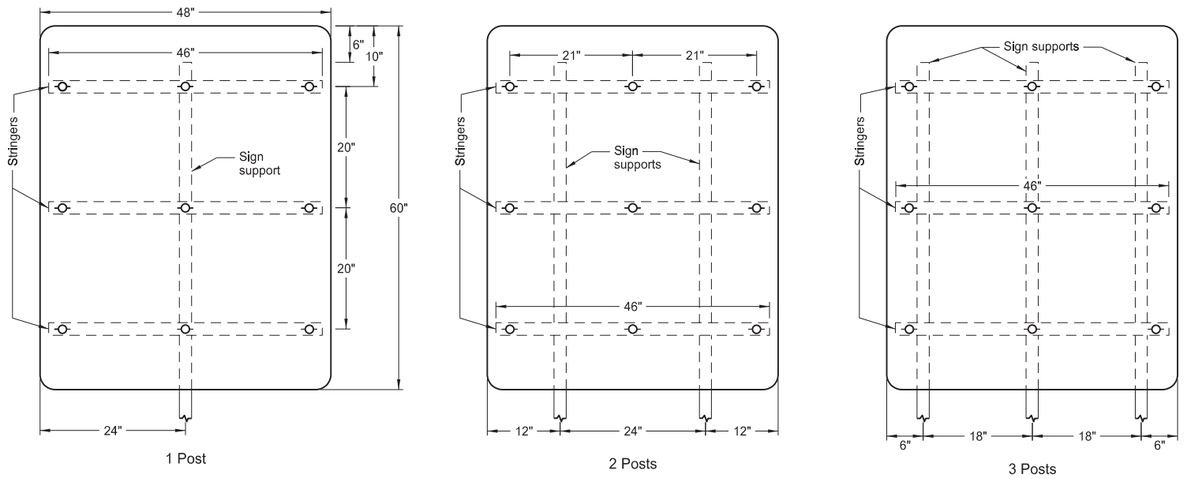
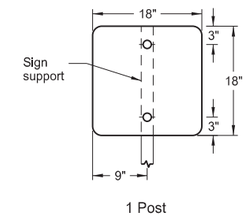
D-754-28

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



Assembly No. 12



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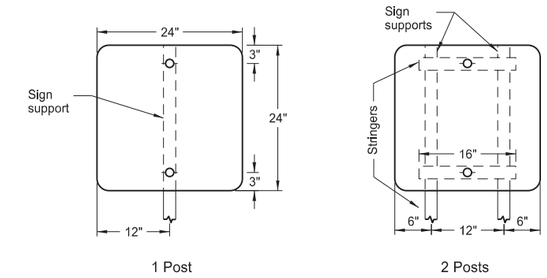

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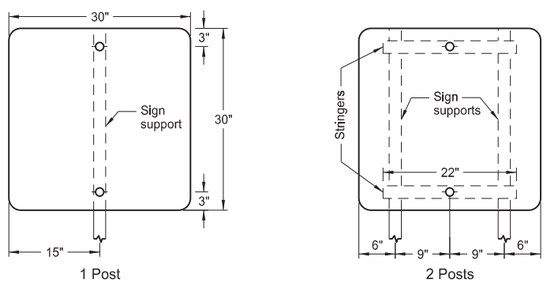

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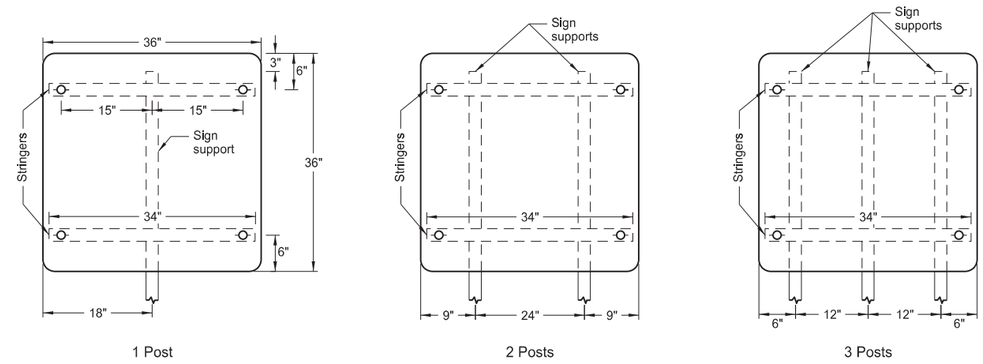

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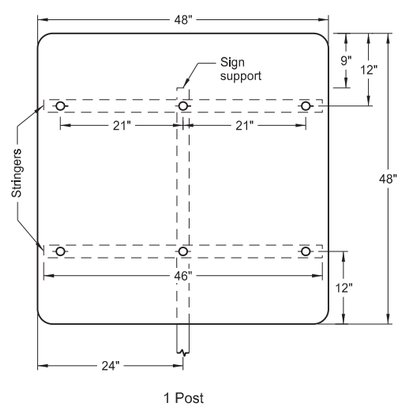

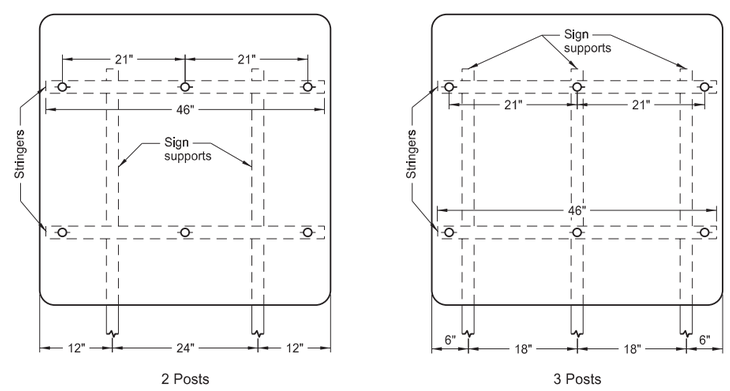

Assembly No. 17

Notes:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
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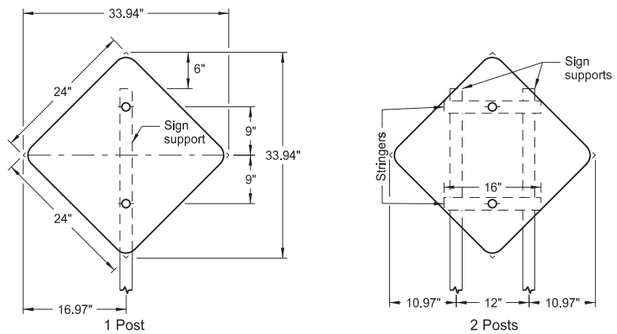
D-754-29

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



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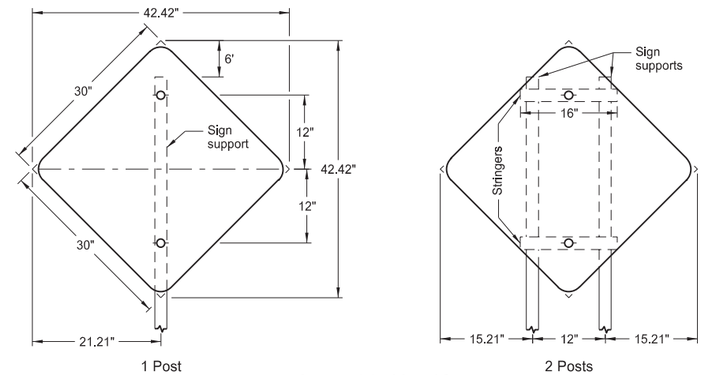

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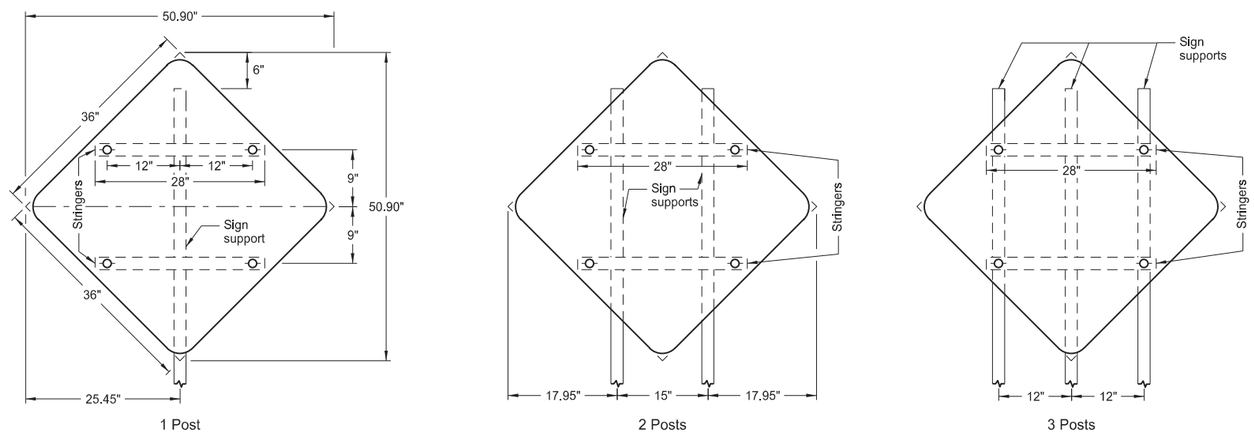

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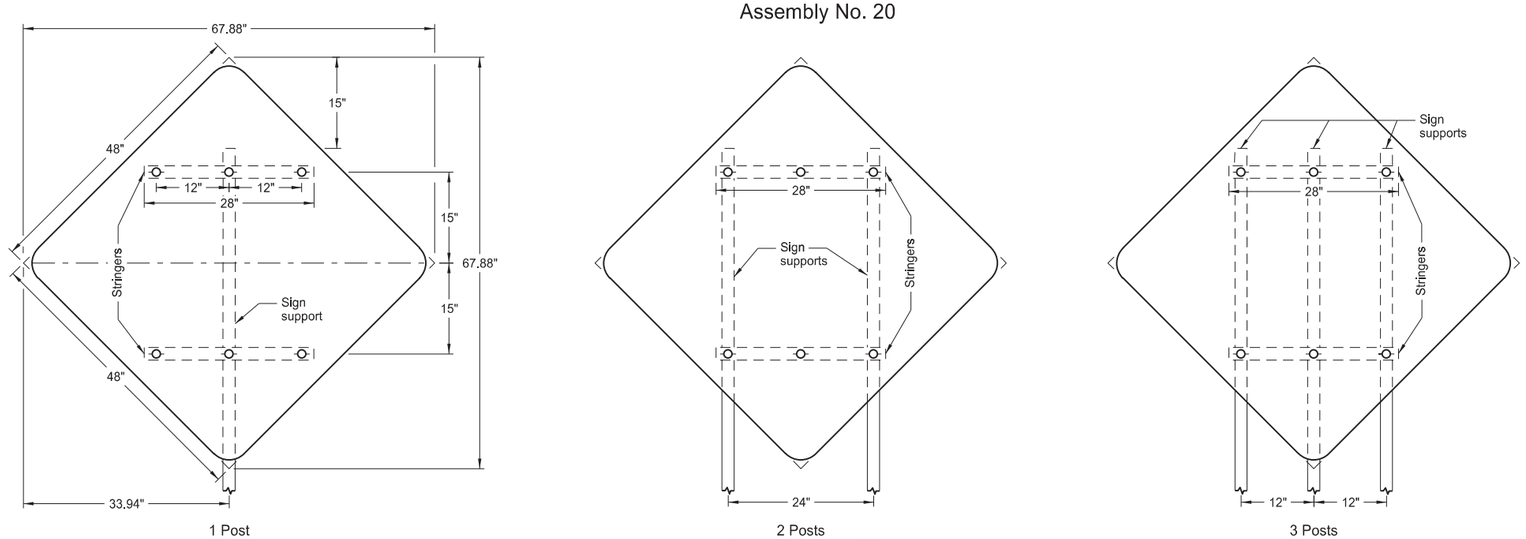

Assembly No. 21

Notes:

1. See Standard D-754-25 for mounting details.

2. The minimum sign backing material thickness shall be 0.100 inch.

3. Perforated square tube stringer shall be 1½" x 1½".

4. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
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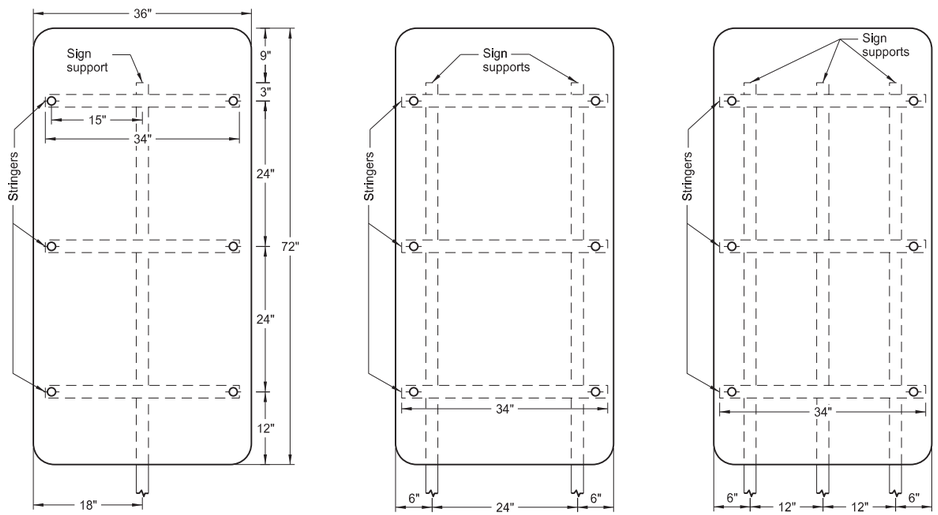
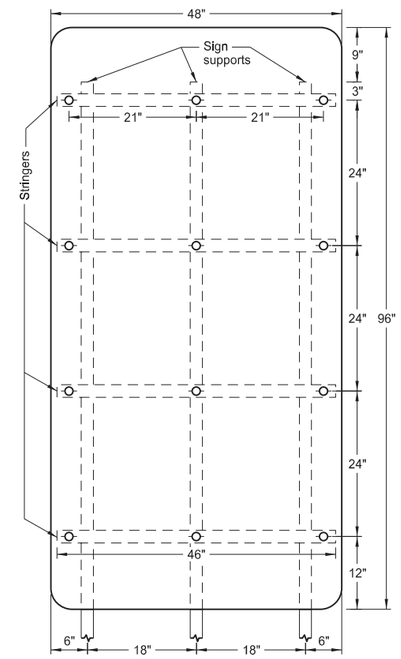
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

D-754-31



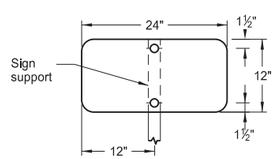
1 Post 2 Posts 3 Posts

Assembly No. 24



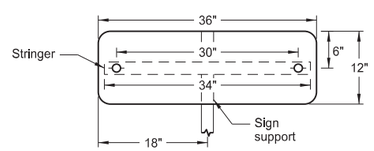
3 Posts

Assembly No. 25



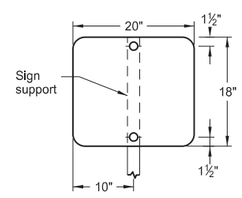
1 Post

Assembly No. 26



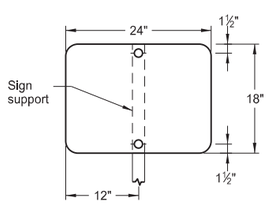
1 Post

Assembly No. 27



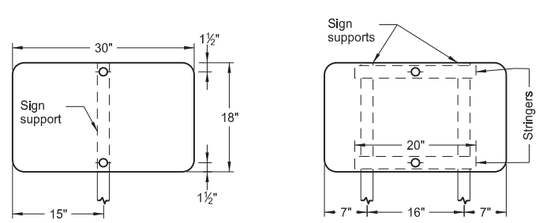
1 Post

Assembly No. 28



1 Post

Assembly No. 29



1 Post 2 Posts

Assembly No. 30

Notes:

1. See Standard D-754-25 for mounting details.

2. The minimum sign backing material thickness shall be 0.100 inch.

3. Perforated square tube stringer shall be 1½" x 1½".

4. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
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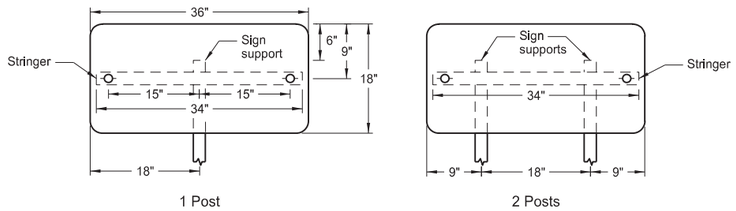
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

D-754-32



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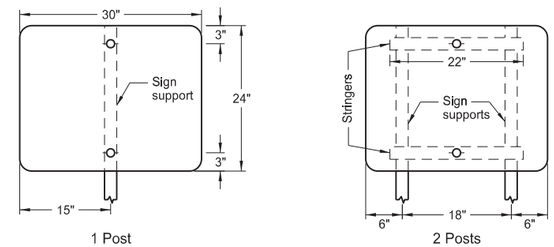
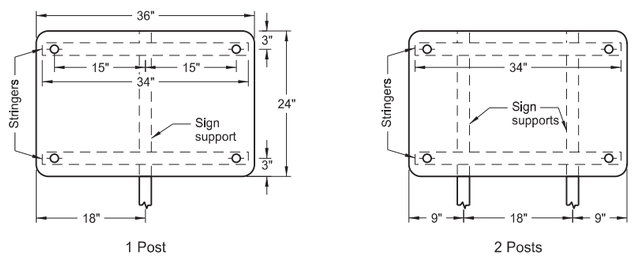


Assembly No. 32

Notes:

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



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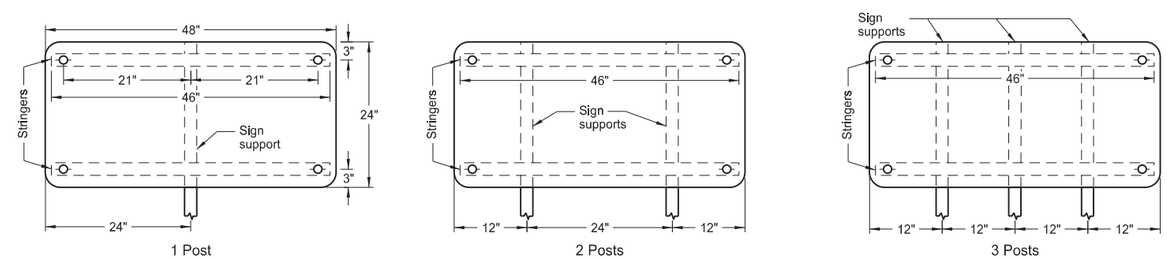

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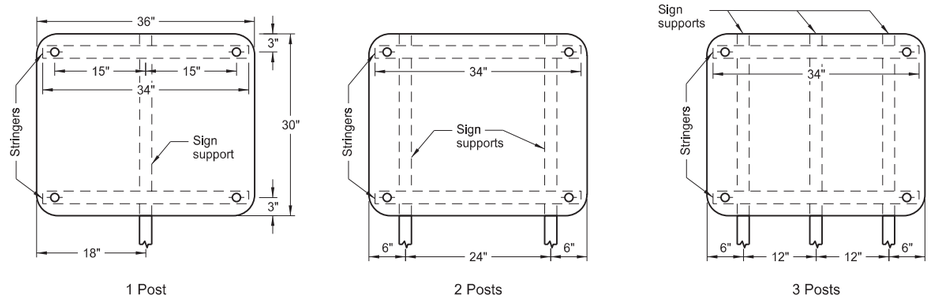

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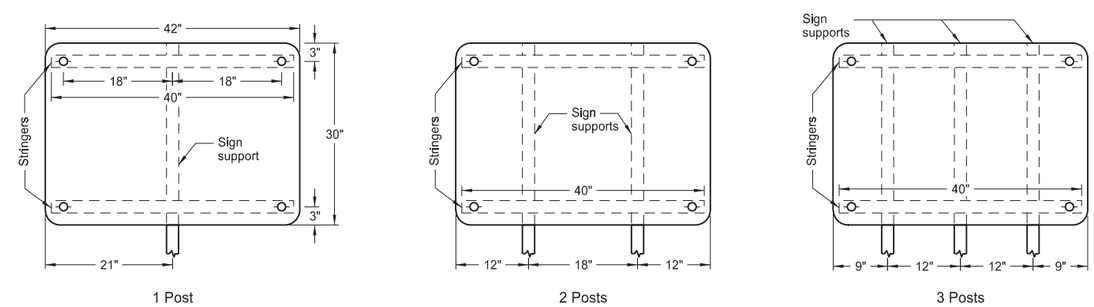
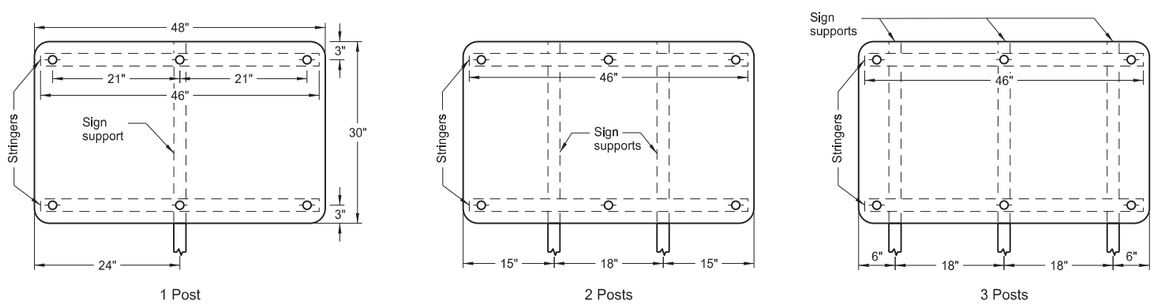


Assembly No. 36



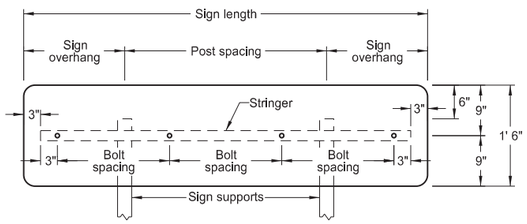
Assembly No. 37

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

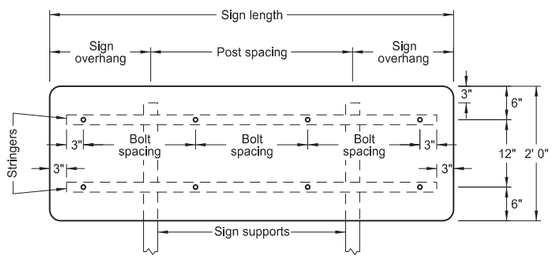
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 12-1-10 and the original document is stored at the North Dakota Department of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

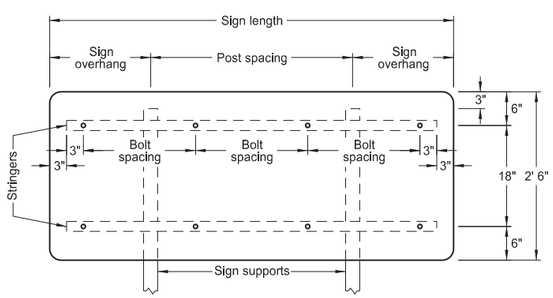
D-754-48



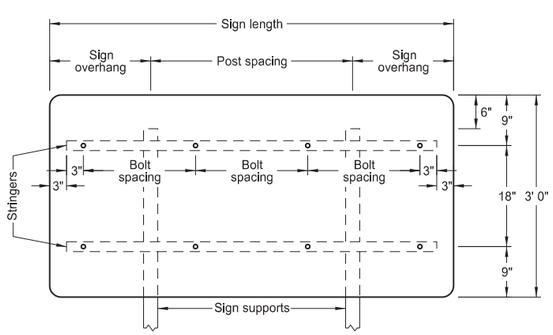
VARIES X 1'-6"



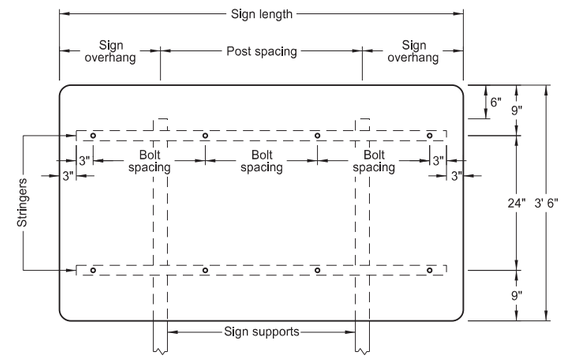
VARIES X 2'-0"



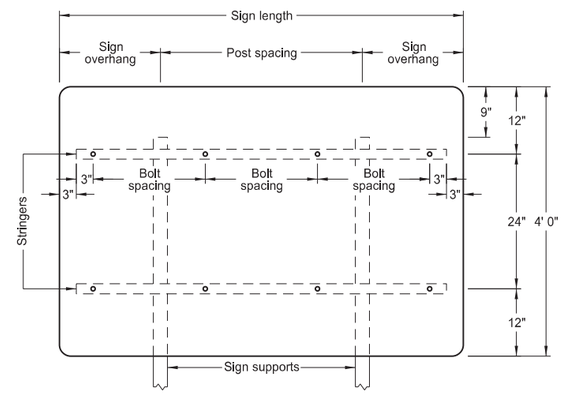
VARIES X 2'-6"



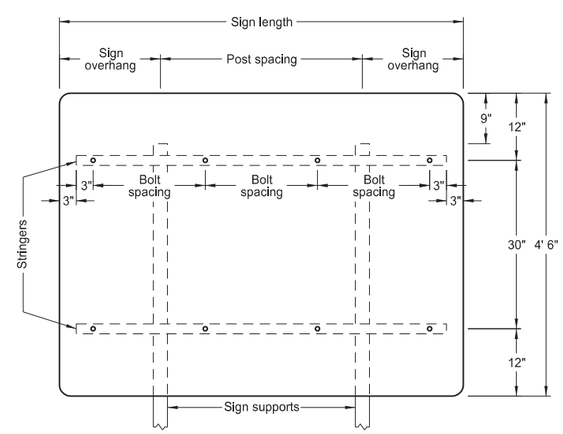
VARIES X 3'-0"



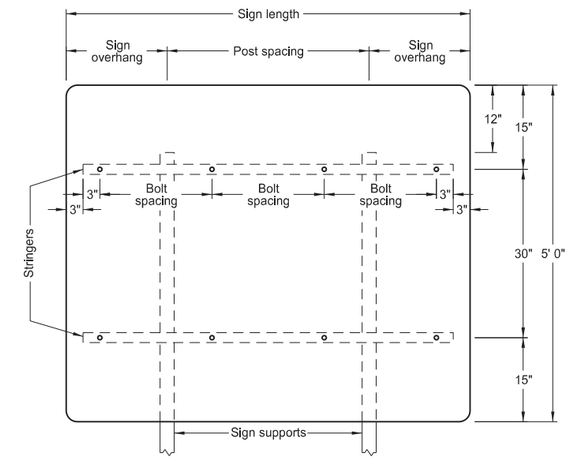
VARIES X 3'-6"



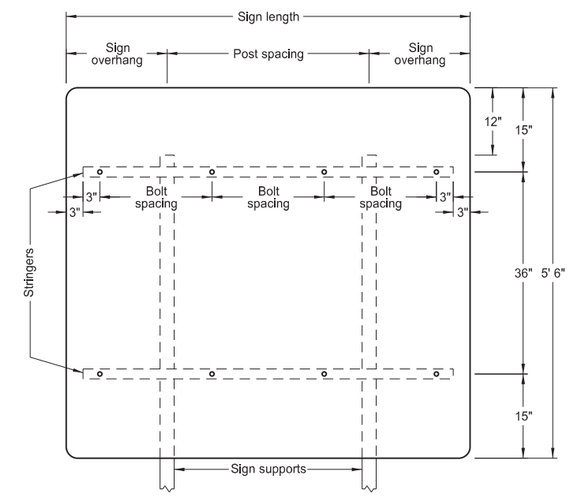
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0'	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	8-23" & 2-22"

Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½" x 1½".
3. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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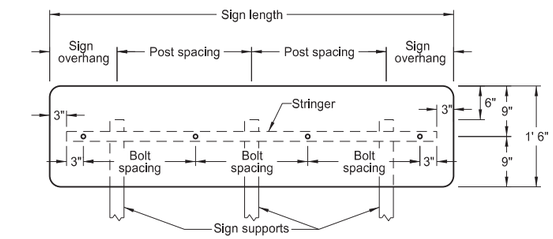
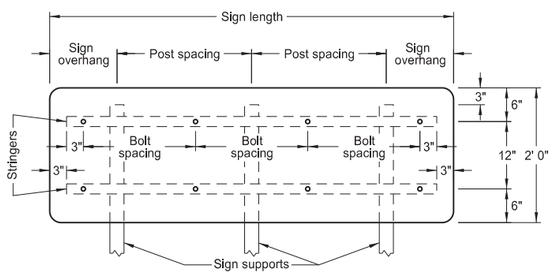
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

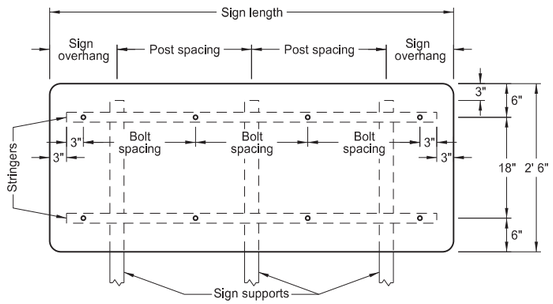
D-754-49



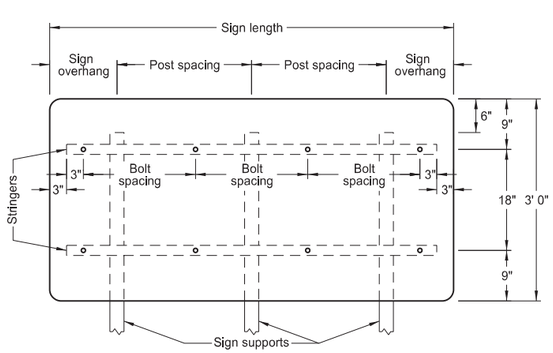
VARIES X 1'-6"



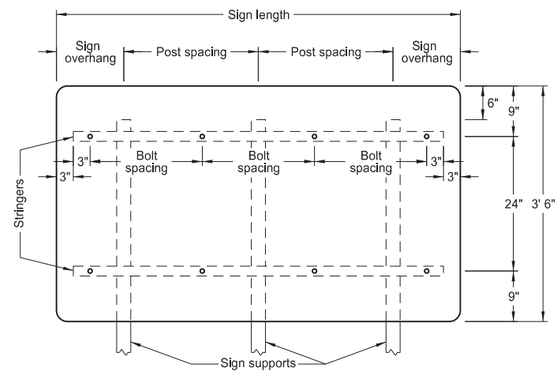
VARIES X 2'-0"



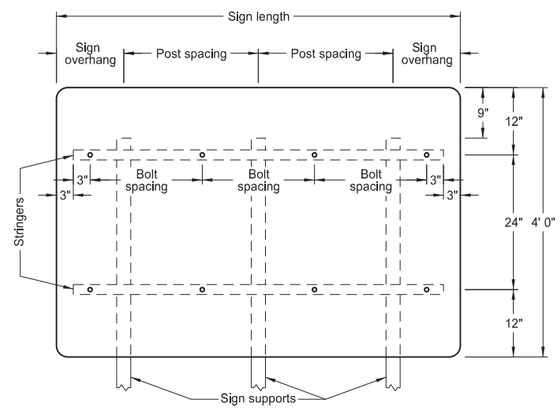
VARIES X 2'-6"



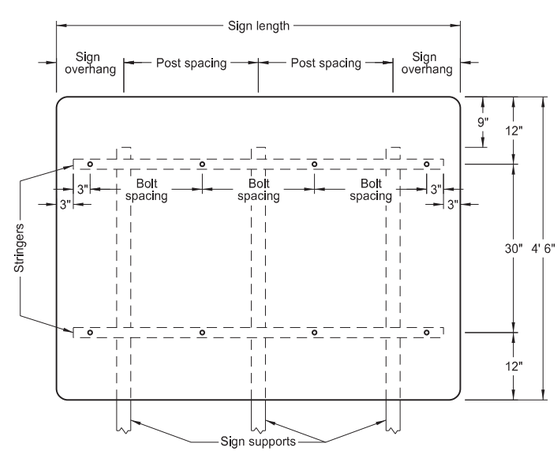
VARIES X 3'-0"



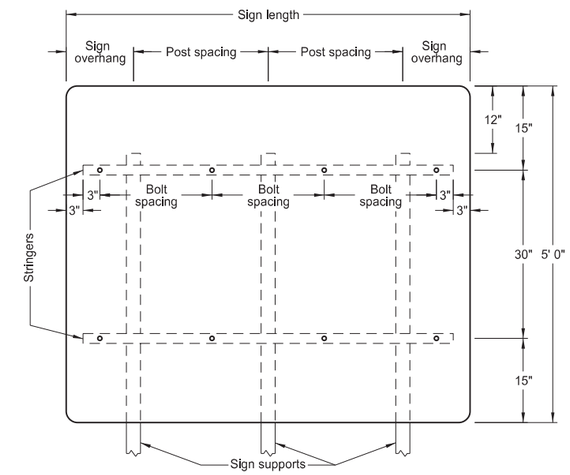
VARIES X 3'-6"



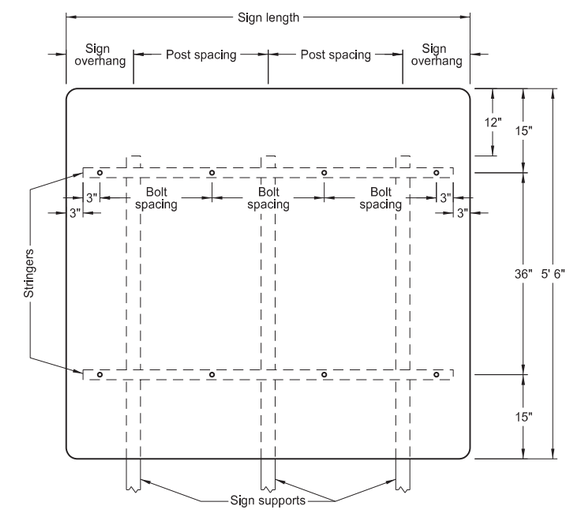
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

3 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	0'-6"	1'-6"	18"
4'-6"	0'-6"	1'-9"	21"
5'-0"	0'-6"	2'-0"	24"
5'-6"	1'-3"	1'-6"	18"
6'-0"	1'-0"	2'-0"	20"
6'-6"	1'-3"	2'-0"	22"
7'-0"	1'-6"	2'-0"	24"
7'-6"	1'-6"	2'-3"	2-20" & 2-19"
8'-0"	1'-9"	2'-3"	21"
8'-6"	2'-0"	2'-3"	2-22" & 2-23"
9'-0"	1'-6"	3'-0"	24"
9'-6"	1'-9"	3'-0"	4-20" & 1-22"
10'-0"	1'-9"	3'-3"	2-21" & 3-22"
10'-6"	1'-9"	3'-6"	4-23" & 1-22"
11'-0"	2'-0"	3'-6"	24"
11'-6"	2'-3"	3'-6"	21"
12'-0"	2'-4"	3'-8"	22"
12'-6"	2'-5"	3'-10"	23"
13'-0"	2'-6"	4'-0"	24"
13'-6"	2'-9"	4'-0"	3-22" & 4-21"
14'-0'	3'-0"	4'-0"	2-23" & 5-22"
14'-6"	3'-3"	4'-0"	6-23" & 1-24"
15'-0"	3'-6"	4'-0"	24"
15'-6"	2'-4"	5'-5"	6-22" & 2-21"
16'-0"	2'-5"	5'-7"	4-23" & 4-22"
16'-6"	2'-5"	5'-10"	6-23" & 2-24"
17'-0"	2'-6"	6'-0"	24"
17'-6"	3'-3"	5'-6"	22"
18'-0"	3'-6"	5'-6"	6-23" & 3-22"
18'-6"	3'-9"	5'-6"	6-23" & 3-24"
19'-0"	3'-6"	6'-0"	24"
19'-6"	4'-3"	5'-6"	8-22" & 2-23"
20'-0"	4'-4"	5'-8"	8-23" & 2-22"

Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½" x 1½".
3. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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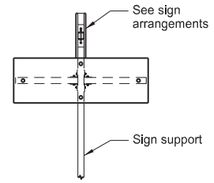
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

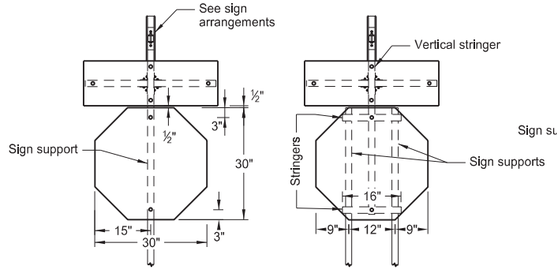
D-754-87

A - Single sign
B - Single sign back to back
C - Single sign each direction
D - Single sign one direction, back to back other direction
E - Back to back both directions



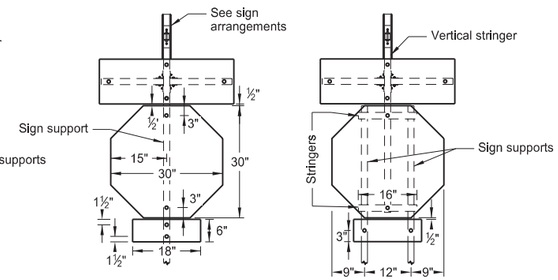
1 Post

Special Assembly 1 (A, B, C, D or E)



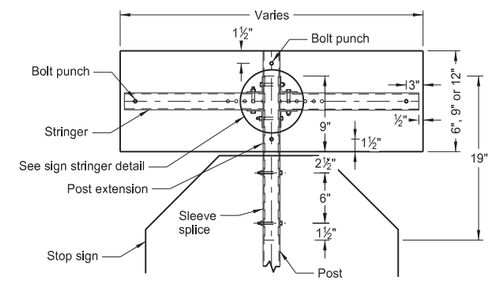
1 Post 2 Posts

Special Assembly 2 (A, B, C, D or E)



1 Post 2 Posts

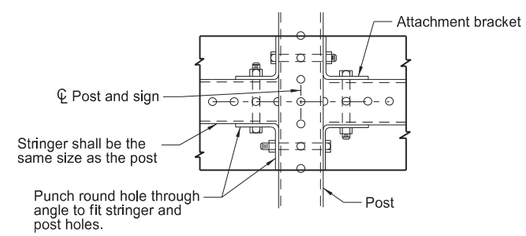
Special Assembly 3 (A, B, C, D or E)



Front View

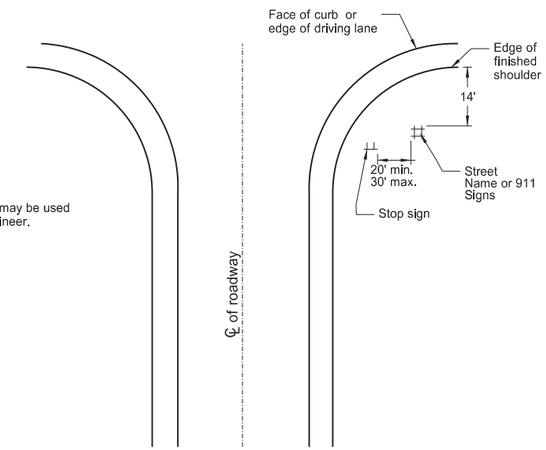
Sleeve Splice Detail

Note: The splice method may be used upon approval of the engineer.



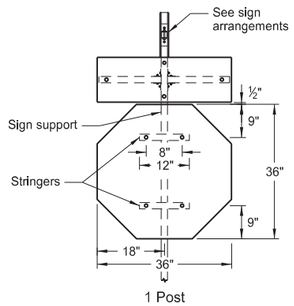
Sign Stringer Detail

Note: See Standard Drawing D-754-86 for 911 support information and sign layout details.

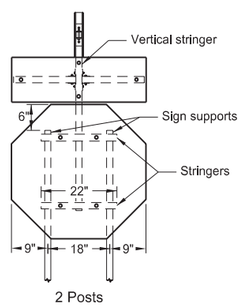


Intersection Layout

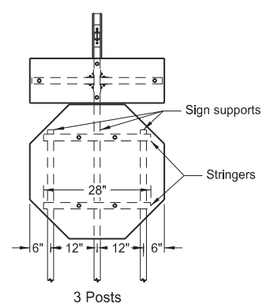
Note: This layout is to be used for street name signs or 911 signs that are used with Special Assembly 1 .



1 Post

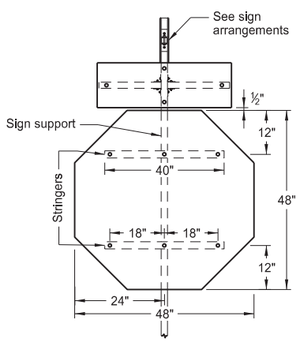


2 Posts

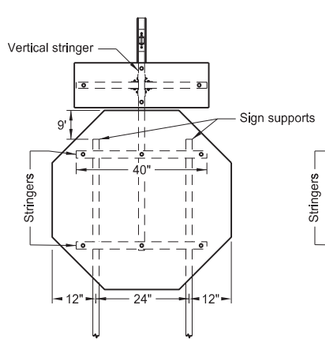


3 Posts

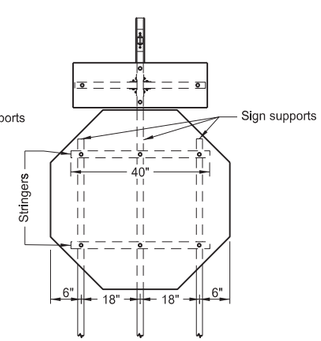
Special Assembly 4 (A, B, C, D or E)



1 Post

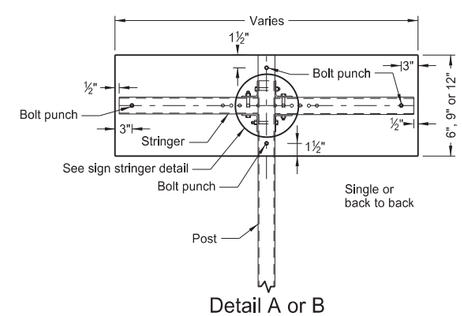


2 Posts

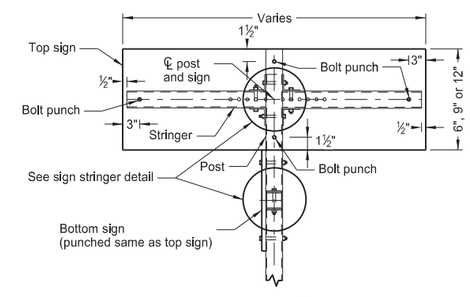


3 Posts

Special Assembly 5 (A, B, C, D or E)

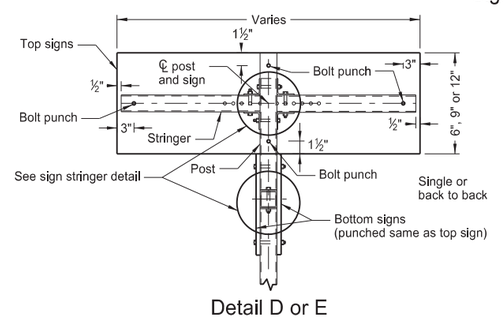


Detail A or B



Detail C

Sign Arrangements



Detail D or E

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

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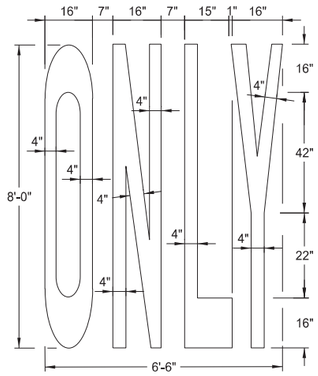
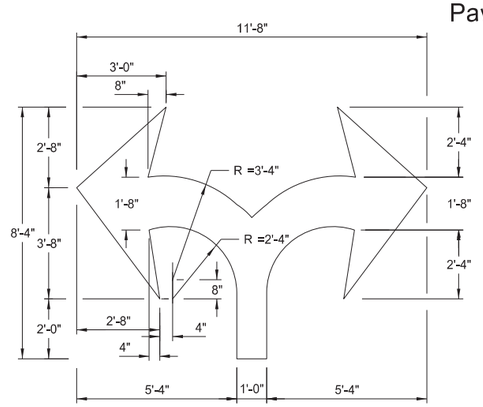
Pavement Marking Message Details

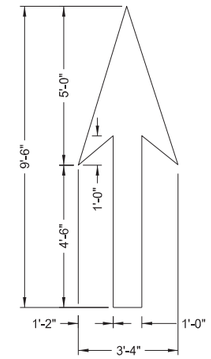
D-762-1



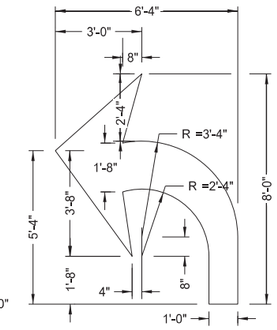
22 S. F.



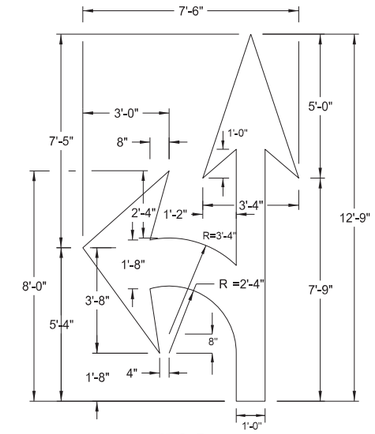
29 S. F.



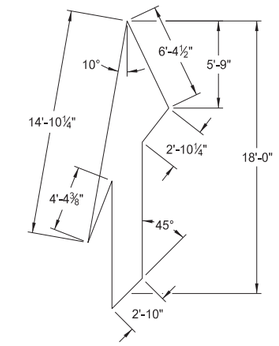
12 S. F.



16 S. F.

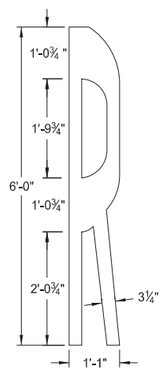


27 S. F.

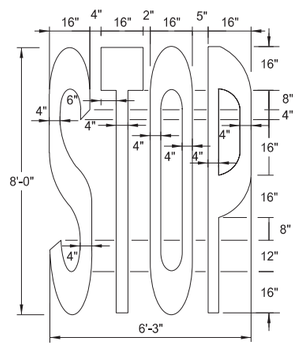


41 S. F.

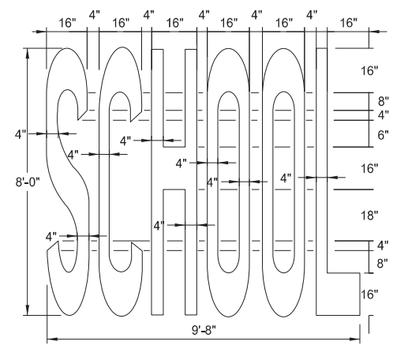
Note:
The merge arrow shall be rotated 20° from the edge of the roadway.



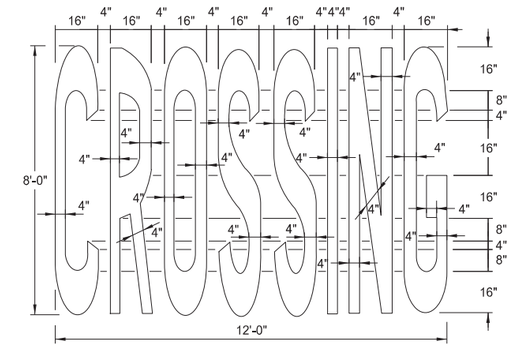
4 S. F.



22 S. F.



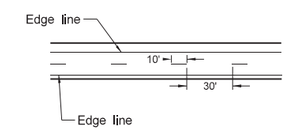
34.5 S. F.



46 S. F.

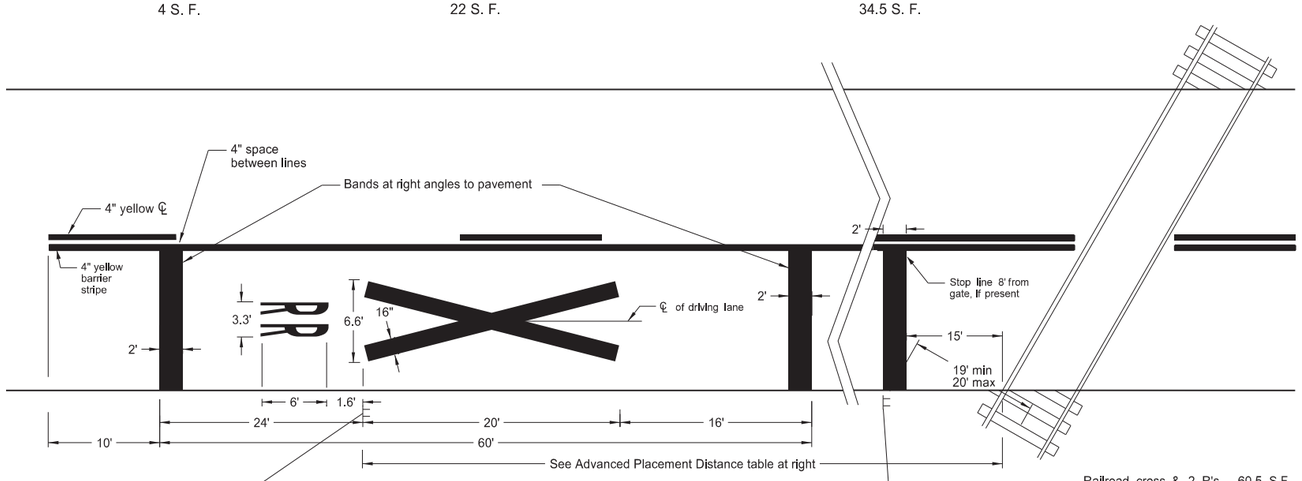
Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table



Centerline Pavement Marking Skip Spacing Detail

Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft

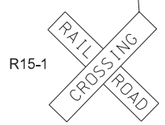


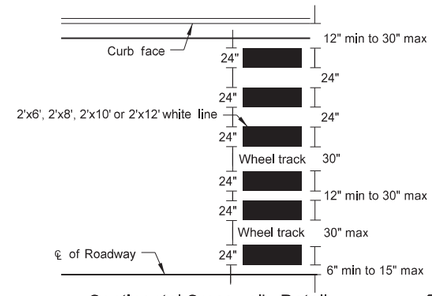
Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

See Standard Drawing D-754-81

Notes:
A three lane roadway should be marked with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, the transverse bands should extend across all approach lanes, and individual R X R symbols should be used in each approach lane.

See plans for correct message. All pavement markings shall be white unless noted otherwise.





Continental Crosswalk Detail

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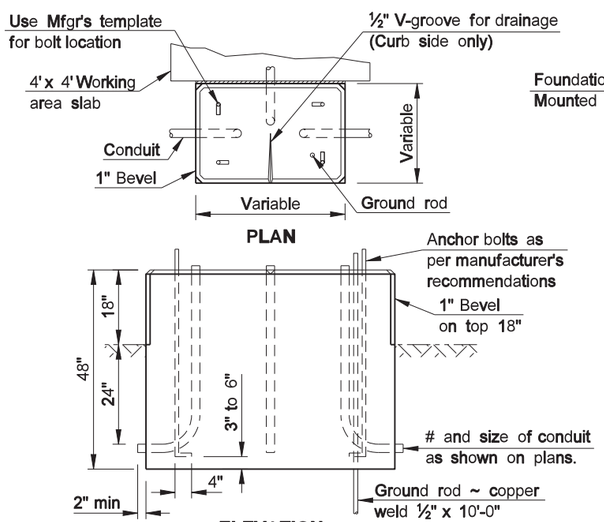
CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

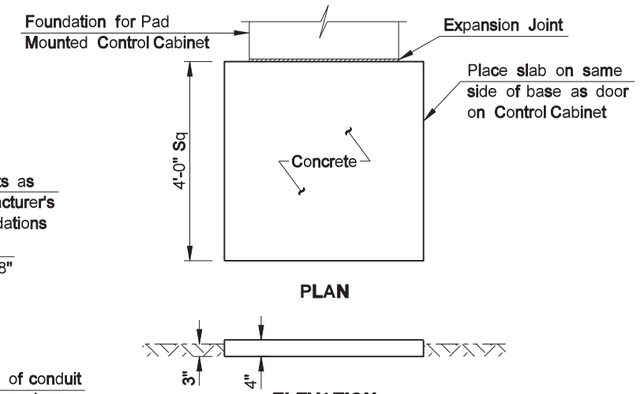
D-770-1



ELEVATION

CONTROLLER CABINET FOUNDATION PAD MOUNT

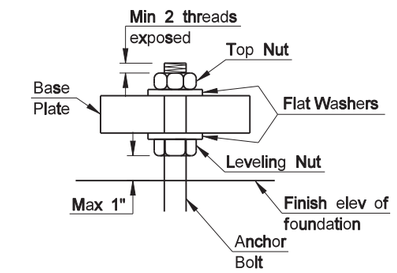
The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.



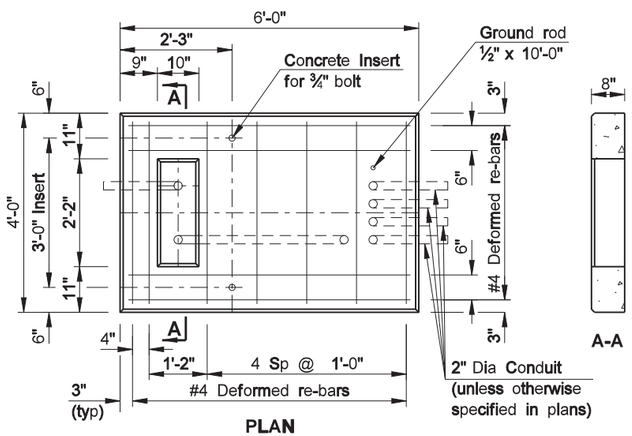
ELEVATION

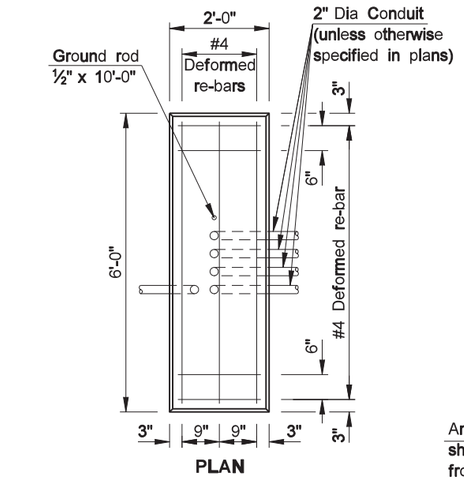
WORKING AREA SLAB

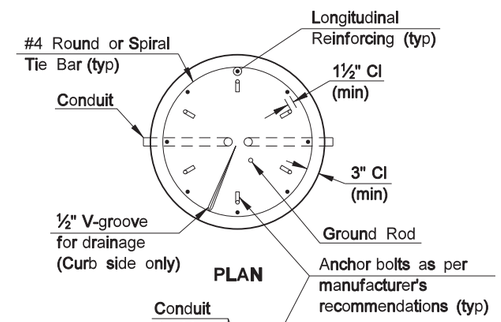
The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

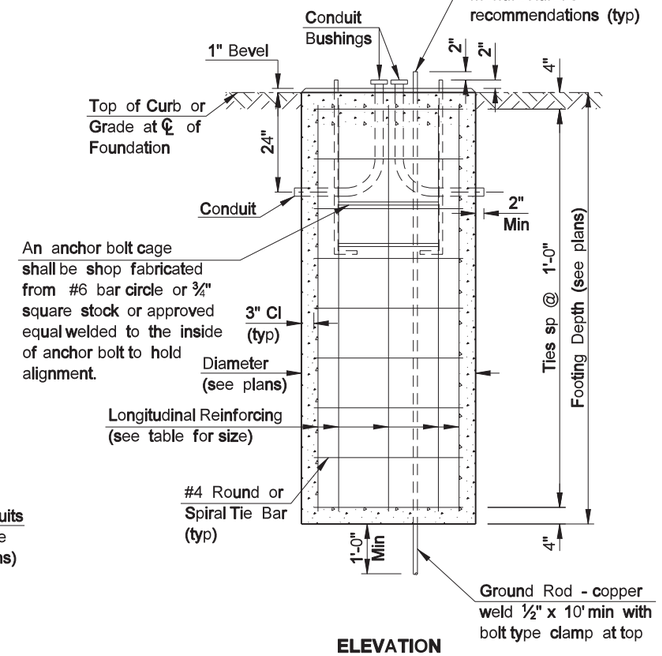


ANCHOR BOLT DETAIL



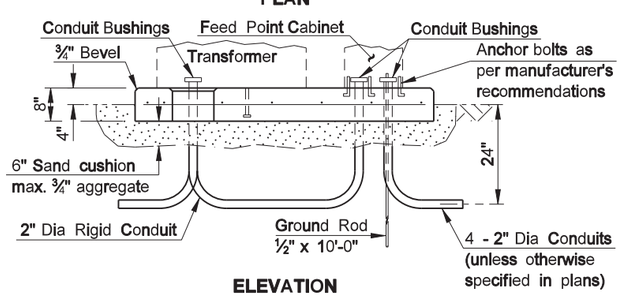






ELEVATION

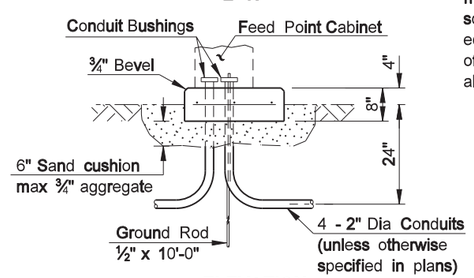
LIGHT & SIGNAL STANDARD FOUNDATION



ELEVATION

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.



ELEVATION

FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS: See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controler cabinet and the foundation by caulking, except for V-groove.

WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

LIGHT & SIGNAL FOUNDATION TABLE	
FOOTING DEPTH (ft)	LONGITUDINAL REINFORCING
≤ 12	8 - #5
13 - 14	8 - #6
15 - 16	8 - #7
17 - 19	8 - #8

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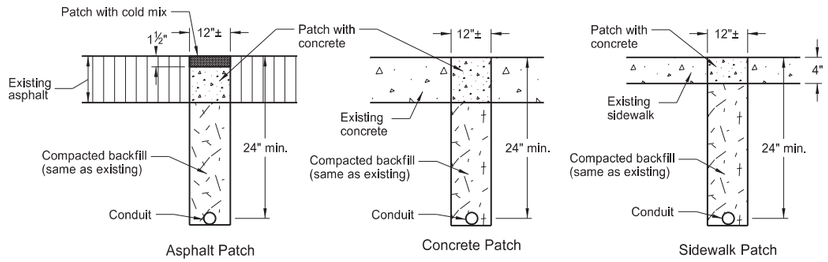
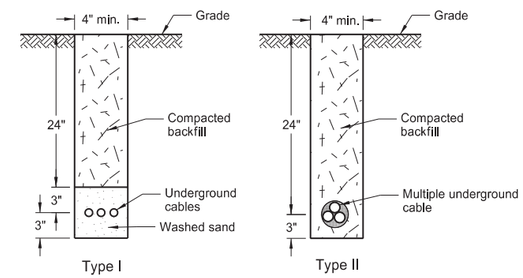
LIGHTING AND SIGNAL DETAILS

D-770-4



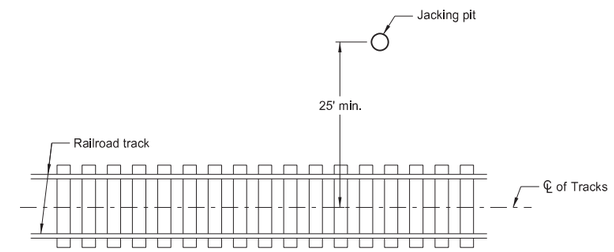
Surface Patch Details

Note: All trenches shall be saw cut. The replacement concrete shall be P.C.C. pavement and the coarse aggregate gradation, maximum size and method of curing shall be as approved by the Engineer. Immediately prior to pouring replacement concrete, all surfaces shall be painted with an approved epoxy compound.

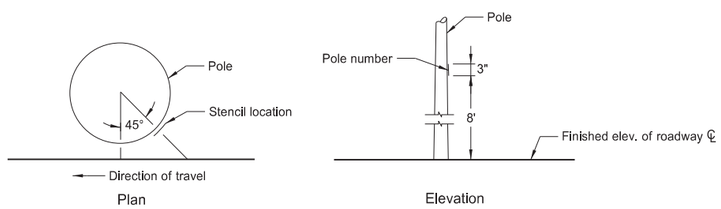


Cable Trench

Note: The entire area which is disturbed by the trenching shall be sodded or as directed by the Engineer.

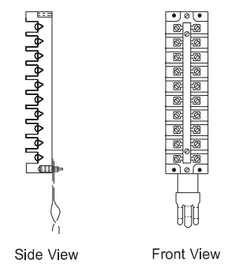


Plan View

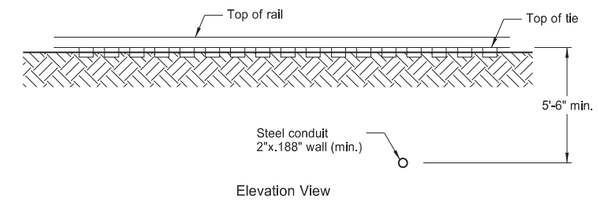


Light Standard Numbering

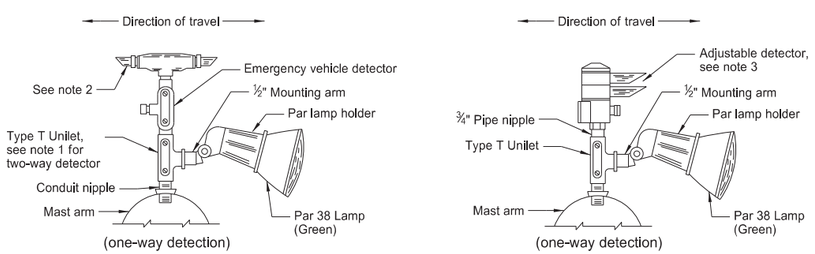
Note: On the roadway side of each light standard, the Contractor shall stencil on the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.



Terminal Block Detail



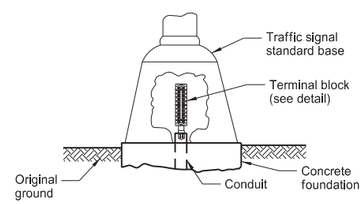
Conduit Placement under Railroad Tracks



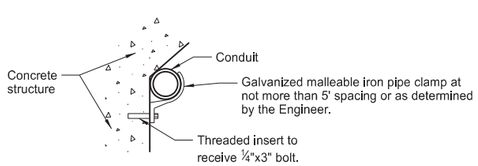
Emergency Vehicle Detector Detail

Alternate Emergency Vehicle Detector Detail (adjustable)

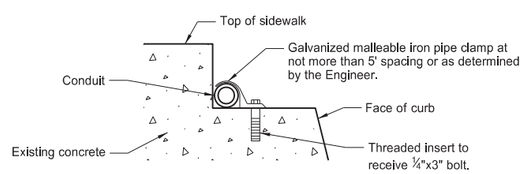
Notes:
1. Two-way Detector shall have Type X Unilet with two Par lamp holders and lamps. (one in each direction).
2. One-way Detector shall have the unused end plugged with metal pipe plug.
3. Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).



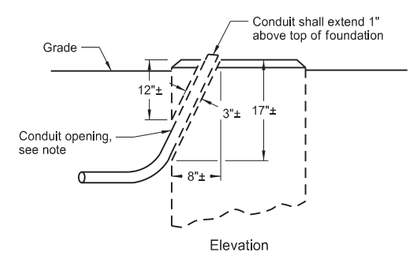
Terminal Block
(rigid mounted)



Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Revise Concrete Foundation

Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.

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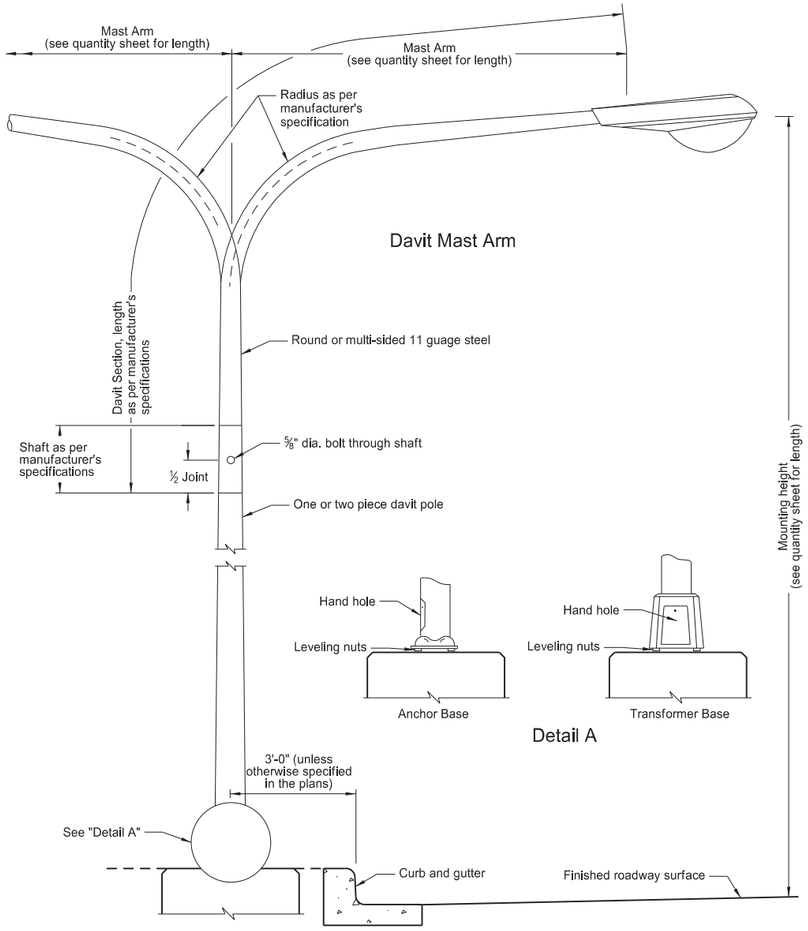
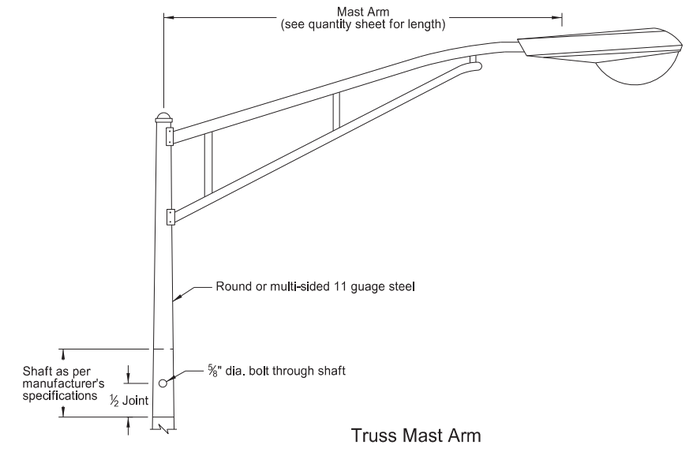
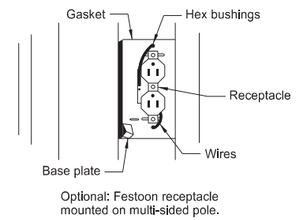
LIGHT STANDARD DETAILS

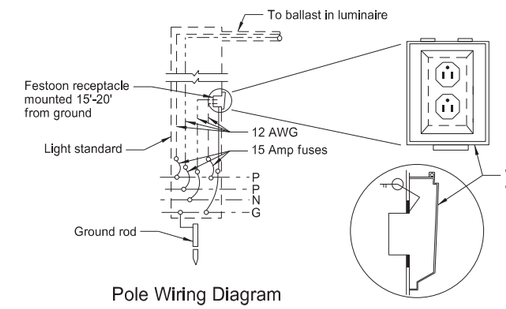
D-770-5



Light Standard Details



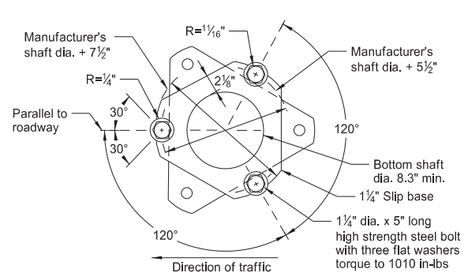




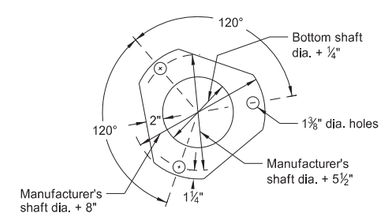
Pole Wiring Diagram

Receptacle Mounting Detail (B)

(B) Receptacle shall be mounted on the side of the pole that faces the street side. Festoon Receptacle shall be installed only when specified in the plans.



Top View



Plan View

Keeper Plate Detail (A)

(A) ASTM A446 Grade "A" 28 gauge keeper plate on top of middle flat washer. The Keeper plate shall be galvanized after fabrication.

Notes:

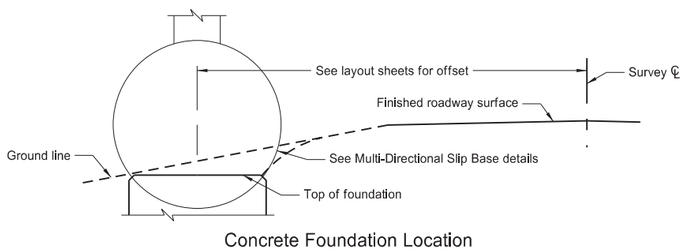
Light Standard Locations: The offset distance shall have a minimum offset from the curb face of 3 feet. Light standards that are placed in urban areas and where speeds are less than 30 mph, may be placed at 3 feet. Where speeds are 30 mph or more, light standards shall be placed at least 16 feet from the driving lane.

Steel Standards: Marred or scratched areas shall be touched up after erection.

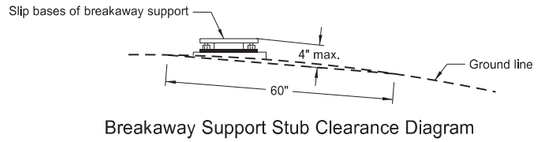
Luminaire: Shall be internal ballast-constant wattage 120x240 voltage. See layout sheets for type of luminaire, wattage, I.E.S. distribution, and operating system.

Fusing: Fusing in base, see specifications.

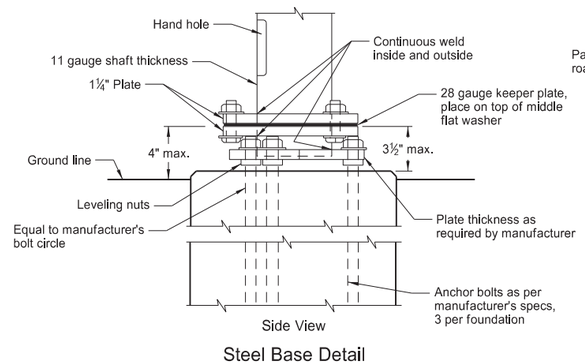
Slip Base Bolt Torque Procedure:
1. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and to clean bolt threads, then loosen.
2. Retighten bolts with a systematic order to prescribed torque.
3. Loosen each bolt and retighten to prescribed torque in the same order as initial retightening.
4. Burr threads of junction with nut using center punch to prevent nut loosening.



Concrete Foundation Location

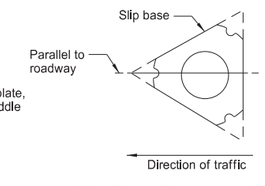


Breakaway Support Stub Clearance Diagram

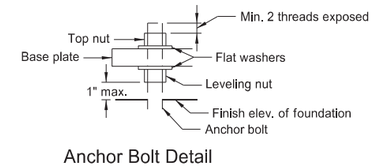


Side View

Steel Base Detail



Slip Base Placement Detail



Anchor Bolt Detail

Multi-Directional Slip Base

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