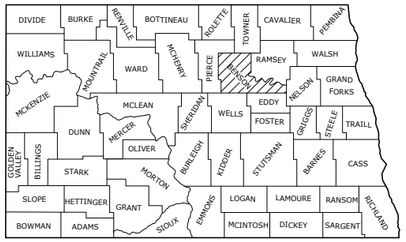
DESIGN DATA				
Traffic	Average Daily			Max.Hr.
Current 2019	Pass: <750	Trucks: -	Total: <750	
Forecast	Pass:	Trucks:	Total:	
Clear Zone Distance: -		Design Speed: 55 M.P.H.		
Minimum Sight Dist. for Stopping: 495 FT				
Minimum Sight Dist. for Safe Passing: -				
Sight Dist. for No Passing Zone: 900 FT				



JOB # 23758
BENSON COUNTY
NORTH DAKOTA

FEDERAL AID PROJECT

HEC-0003(024)

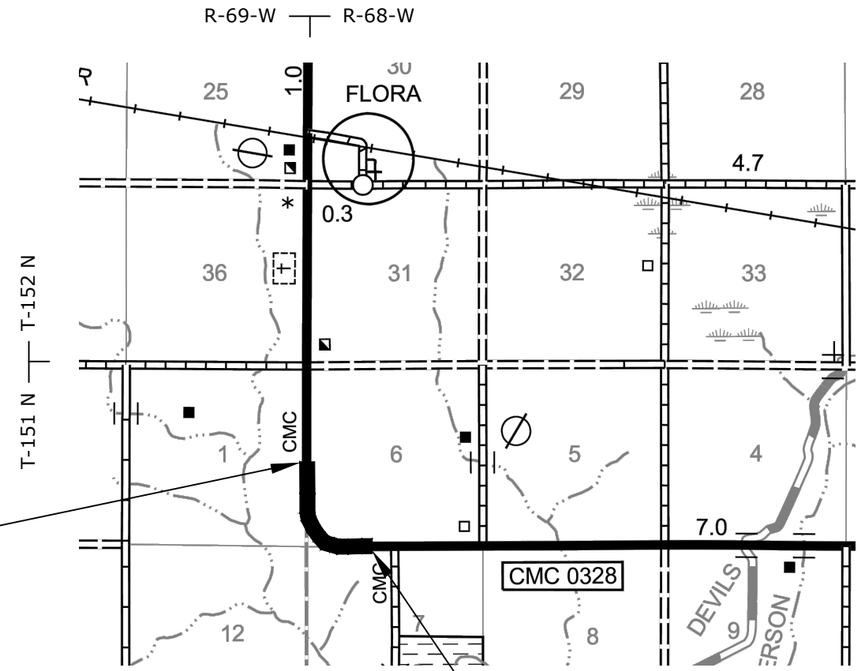
CURVE REALIGNMENT, GRADING, HBP AND INCIDENTALS

CMC 0319 2.5 Miles South of Flora, thence South and East 0.653 Miles

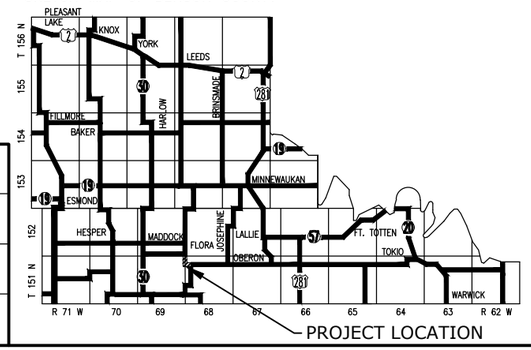
STATE.	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	23758	1	1

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2024
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
HEC-0003(024)	0.653	0.653
SPUR Road	0.130	0.130
Total:	0.783	0.783



SKETCH MAP OF BENSON COUNTY



DESIGNER
Jesse R. Brandvold P.E.
DESIGNER
Jessica D. Tagestad P.E.
DESIGNER
Seth R. DeMontigny P.E.
DESIGNER

WOLD ENGINEERING, P.C. SINCE 1955

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 03/04/2025

Jesse R. Brandvold, P.E. /s/

Wold Engineering, P.C.

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PLAN SECTIONS

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D-101-20, 21	Line Styles
D-101-30, 31-33	Symbols
D-101-40	Cross Section Legend
D-203-8	Standard Rural Approaches
D-261-1	Erosion Control - Fiber Roll Placement Details
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
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D-704-9	Construction Sign Details - Terminal And Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
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D-704-14	Construction Sign Punching And Mounting Details
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D-706-1	Bituminous Laboratory
D-708-6	Erosion And Siltation Controls - Median Or Ditch Inlet Protection
D-714-22	Concrete Pipe, Cattle Pass, or Precast Concrete Box Culvert Ties
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SSP 3	Local Agency Contracts
SSP 8	Federal Prohibition on Certain Technological Hardware

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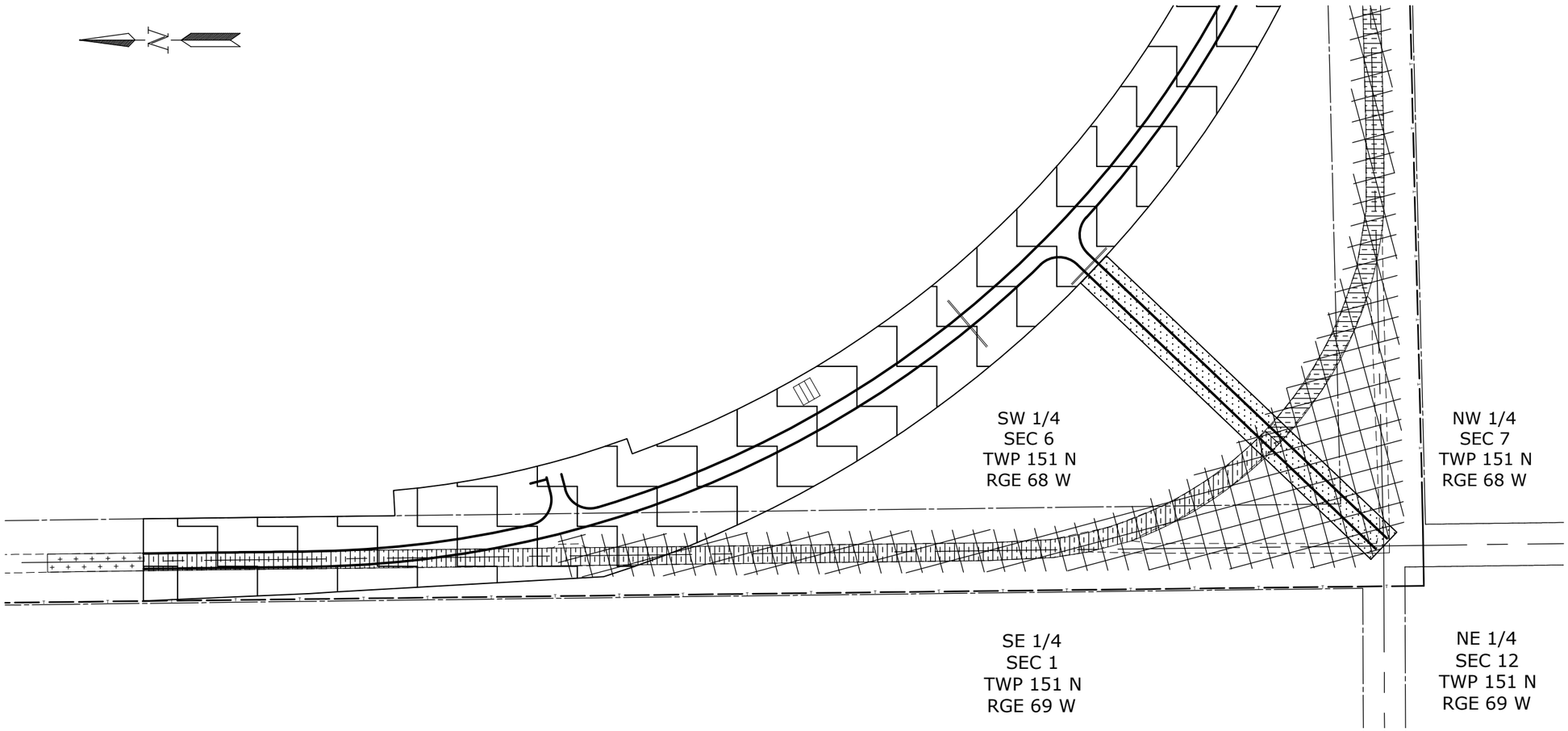

LEGEND

- TRANSITION MILL & 4" HMA
- MILLING PAVEMENT SURFACE - FULL DEPTH
- GRADING, 6" CL 5 AGGREGATE BASE, 4" HMA, INCIDENTALS
- ROADWAY OBLITERATION
- SPUR ROAD GRADING & 3" CL 13 AGGREGATE SURFACING

WOLD ENGINEERING, P.C.

SCOPE OF WORK
STA. 5+50 TO STA. 25+00

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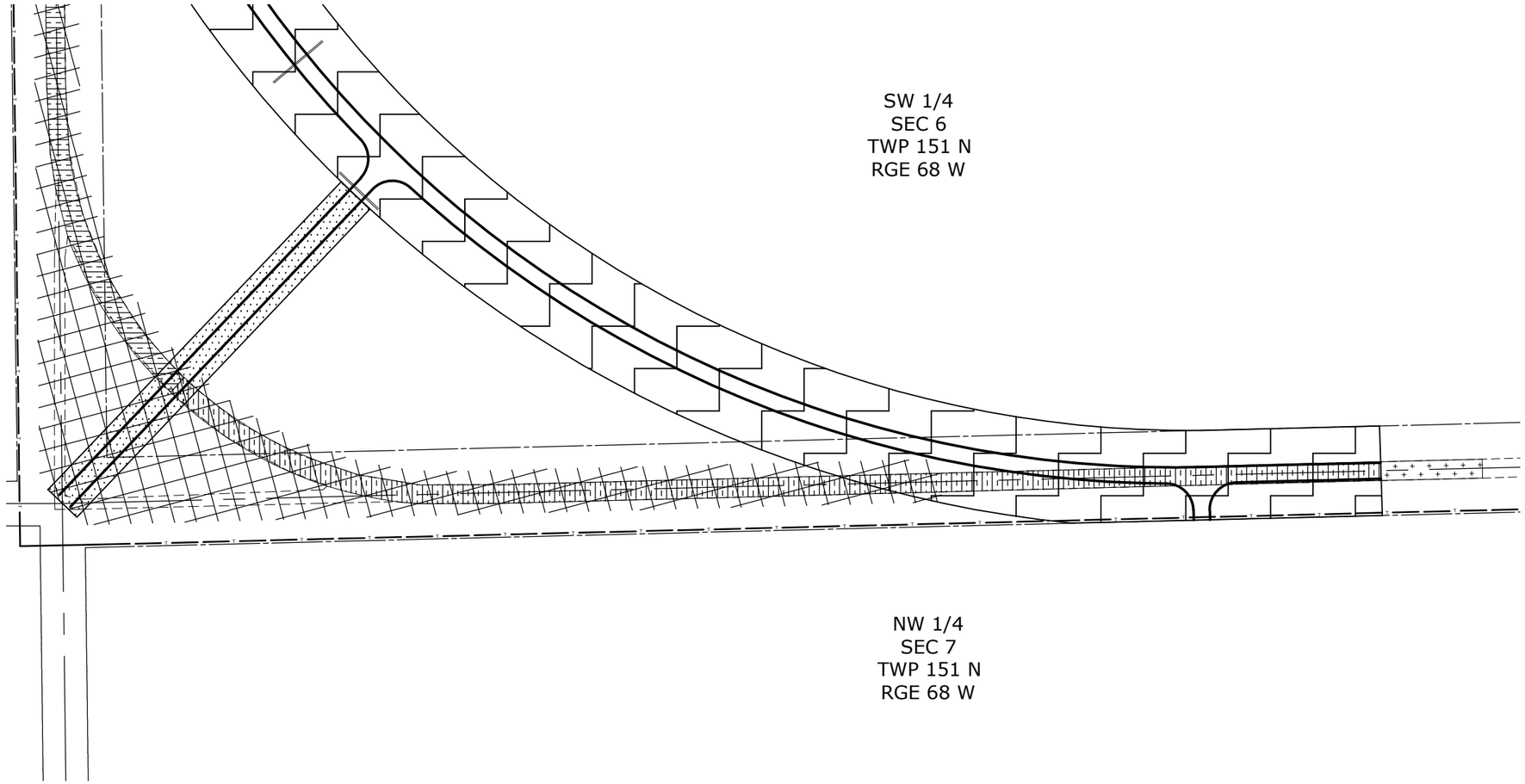

LEGEND

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SCOPE OF WORK
STA. 25+00 TO STA. 40+00

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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100-P01 UTILITIES: Notice will be given to the utility companies a minimum of 2 weeks prior to work on the project. Utilities that the Engineer has been made aware of are shown on the plans. Other utilities may exist that are not shown. Power lines, telephone cables, rural water lines, and other utilities may be encountered on this project. The Contractor will be responsible to verify the locations and to notify all utility and pipeline companies to have the locations flagged and marked prior to beginning construction. Any charges by the utility companies for locates will be paid by the Contractor. The Contractor will be liable for any costs resulting from damage to utilities or pipelines.

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

Northern Plains Electric Cooperative
PO Box 180
Carrington, ND 58421-0180
(701) 652-3156
Contact: Chris Pierson

Central Plains Water District
105 Main Avenue South
Fessenden, ND 58438
(701) 547-3751

North Dakota Telephone Company
211 22nd St. NW
Devils Lake, ND 58301
(701) 662-6492
Contact: TeeJay Kurtz

One-call Service: 1-800-795-0555 or 811

100-P02 WORK SCHEDULE: The project as a whole will be completed by October 18, 2025**.**

100-P03 PIT RELEASE STATEMENTS: The County will require a pit release and receipt from the landowner(s) before final payment being issued for the borrow and aggregate used on this project.

100-P04 COMPLETION OF ROAD: Upon completion of the placement of embankment material and aggregate base on the new realigned curve and connections to the existing roads on each end, the Contractor may allow the road to be open to traffic. If paving operations are scheduled to start more than 7 days after completion of embankment placement and aggregate placement then the road will be opened to traffic until such time when paving will begin.

While the road is open to traffic, all detour signs will remain covered and will be uncovered once the roadway is closed. Traffic control measures to be used while roadway is open to traffic include: “Bump” W8-1-48, “Speed Limit” R2-1-36 (40 MPH), “No Center Line” W8-12-48, “Do Not Pass” R4-1-48, and “Tubular Markers” along centerline of the roadway. All traffic control signs used, while roadway is open to traffic, will be skid mounted.

100-P05 TYPICAL SECTION: The dimensions shown for the aggregate base, aggregate surface, and bituminous pavement courses are approximate. Plan quantities will be placed uniformly throughout except where the Engineer authorizes a change.

105-P01 PAVEMENT PROTECTION: The Contractor will protect the existing pavement outside the construction limits. The Contractor, at the Contractor’s expense, will repair any pavement damaged due to their operations before the project, will be accepted. Repairs may include, but are not limited to sawing, removals and additional hot bituminous pavement to damaged areas.

107-P01 ENVIRONMENTAL COMMITMENT: The Contractor will contact the US Fish & Wildlife Service to confirm the sources of water the Contractor wishes to use are not part of the USFWS refuge system, including wetland easements.

107-P02 ENVIRONMENTAL PROTECTION: Any land use by the Contractor outside the Right of Way limits, for any purpose, must be approved by the landowner and the Project Engineer.

107-P03 STORM WATER AND EROSION CONTROL: The Contractor is required to obtain a NDDEQ Construction Permit. The Contractor will place erosion control devices as needed to comply with their permit and SWPPP. Fiber Rolls have been provided for use in areas susceptible to erosion. These areas are identified on the Erosion Control Plan Sheet. Other areas may be identified by the Engineer. Erosion control materials will be in place before disturbing any area in a watershed. A supply of erosion control materials will remain on hand for repairs. Maintenance, removal, and resetting of fiber rolls will be included in the price bid for “Fiber Rolls – 12IN”.

203-P01 TOPSOIL: Quantities for topsoil in excavation and embankment areas are based upon an average depth of six (6) inches. Payment for Topsoil will be contract quantity. Measurement will not be required unless the Engineer determines that an insufficient amount of Topsoil has been removed or the Contractor requests measurement. The Contractor will provide written notice to the Engineer explaining the reason for measurement. Likewise, the Engineer will provide written notice to the Contractor explaining the reason for measurement. Once Topsoil has been measured, the Contractor forfeits the contract quantity of Topsoil and will be paid the measured quantity.

203-P02 SHRINKAGE: Thirty percent (30%) additional volume in yardage computed by the end area method is allowed for shrinkage in earth embankment.

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

203-P04 EMBANKMENT CONSTRUCTION: Embankment construction will be in accordance with Std. Specs. Sec. 203.04 G.1. Compaction of the roadbed will be in accordance with Std. Specs. Sec. 203.04 G.3 Type B. The roadbed will be considered all that area lying within 32 feet of the road centerline.

Before acceptance of the mainline embankment road top and prior to the aggregate base placement, a proof roll test will be performed. The test will include the use of a loaded tandem truck, having a minimum gross weight of 50,000 lbs, being driven up and down in each driving lane. The truck should remain within 2' to 3' of the centerline on one pass and 2' to 3' of the outer edge on the other pass. The truck will be driven at 2 to 3 mph during the test. Any deflection of more than ½ inch will cause for corrective action by the Contractor at their own expense. The area corrected would then be retested for acceptance.

203-P05 BORROW: The Borrow quantity will be paid for by the unit price bid of "Borrow – Excavation" by the CY. The Borrow Quantity has been estimated with 30% shrinkage at an approximate total for the project of 21,850 CY. No Contract adjustment to the Unit Price of "Borrow-Excavation" by the CY will be made for any underrun or overrun of the estimated borrow quantity. It is the responsibility of the Contractor to bid the "Borrow – Excavation" quantity based on field calculations.

The Contractor will be responsible for obtaining areas to provide suitable "Borrow-Excavation" material and will bear all costs of obtaining, opening, and restoring the site. The final "Borrow-Excavation" quantity is to be determined by cross sectioning before and after removal. Compaction of embankment material will be in accordance with Std. Specs. Sec. 203.04 F. All material will be obtained from a non-wetland source and need to have archaeological clearance. All sites must have material source clearance prior to use per Std. Specs. Sec. 107.05.

Borrow quantities will be calculated by the cross-section method of the borrow areas. The Contractor will give the Engineer 5 days advanced notice prior to stripping of any Contractor-furnished borrow sites. The initial cross sectioning of the site will be done once the topsoil has been stripped. Before the topsoil has been replaced on the borrow sites, the Engineer will cross-section the borrow site to determine a borrow quantity.

203-P06 ROADWAY OBLITERATION: "Roadway Obliteration" includes topsoil removal and replacement, excavation, embankment construction, seeding, and mulching. Existing asphalt roadway material removal will be included in the unit bid price for "Milling Pavement Surface". The roadway obliteration includes approximately 21,340 CY of material excavation, of which approximately 18,500 CY will be used for embankment construction. Material removed for roadway obliteration will be used for spur road and within 3 feet of the finished dirt grade of the new roadway typical section of the curve. Beyond that point, the material can only be used on the outside edge of new roadway for inslope construction. All cost associated with topsoil removal, the removal of existing roadway material, filling in existing ditches, grading, replacement of topsoil, seeding, and mulching within roadway obliteration will be included in the unit price bid for "Roadway Obliteration".

261-P01 FIBER ROLLS – 12IN: Fiber Rolls – 12IN will be installed and maintained as per Std. Specs. Sec. 261.04 A. The quantities of fiber rolls shown on the plans may be increased or decreased as directed by the Engineer based on weather, Contractor operations, or actual site conditions that occur during construction of the project. Such variation in quantity will not be considered as a change in character of work.

302-P01 AGGREGATE BASE COURSE CLASS 5 - APPROACHES: The Class 5 Aggregate is provided if needed for base material for new approaches and fill material in approach radius and pavement ends at the discretion of the Engineer.

302-P02 AGGREGATE SURFACE COURSE CLASS 13: The Class 13 Aggregate is provided for surface material on the new spur road.

411-P01 MILLING PAVEMENT SURFACE: Mill bituminous material to a maximum size of 3/4 inch. Milled material will be stockpiled at two sites. Contractor will haul and stockpile 75% of the millings to the first site located at a pit west of Maddock, ND in the SE 1/4 of Sec. 23, Twp. 152 N, Rge. 70 W. Contractor will haul and stockpile the remaining 25% of the millings to the second sight located at the Benson County Shop in Minnewaukan, ND. All costs for labor and equipment to mill, haul, and stockpile the material will be included in the unit price bid for "Milling Pavement Surface".

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411-P02 MILLING TRANSITIONS: Tapered milling transition locations will be ramped using millings to allow the smooth passage of traffic during construction. The millings will be removed prior to paving operations beginning. All costs associated with this work will be included in the unit price bid for “Milling Pavement Surface”.

430-P01 MIX DESIGN: The mix design will be Contractor developed with the aggregate and asphalt to be used on the project. The mix design will be done in the manner specified in NDDOT Standard Specification Section 430, prior to the start of the paving operation. The Contractor will submit a HMA mix design to the Engineer 10 days prior to the start of the construction. This cost will be included in the unit price bid for “Superpave FAA 42.”

430-P02 COMPACTION: Compaction of hot mix asphalt will be in accordance to NDDOT Standard Specification Section 430.04 I.3 Ordinary Compaction. The compaction equipment used will include not less than two vibratory rollers.

430-P03 PG ASPHALT ACCEPTANCE: The Engineer will accept asphalt cement as outlined in the Combined State Binder Group agreement for North Dakota. The asphalt cement supplier will provide manifests as outlined in the Combined State Binder Group agreement for North Dakota, but no asphalt cement samples, or testing will be required at the point of delivery.

430-P04 HOT MIX ASPHALT: Superpave FAA 42 will have the aggregate and mix design properties as shown in Table 430-03, with this exception – the number of gyrations used in the mix design will be 50, as well as $N_{initial}$=6 and N_{max}=75.

430-P05 APPROACH PAVING: The approaches will be paved prior to or concurrent with the placement of the mainline top lift. An adequate transition to match existing conditions will be required.

706-P01 BITUMINOUS LABORATORY: Supply a copy machine, with reduction capabilities, and toner. The payment for these items will be included in the price bid for “BITUMINOUS LABORATORY.”

704-P01 DETOUR MAINTENANCE: The Contractor will be responsible for all maintenance and watering for dust control of the detour route while it is being used. Water used for dust control measures will be paid per MGAL used and included in the unit price bid for “Water”. All costs associated with maintaining the detour route will be included in the project as a whole.

714-P01 CORRUGATED STEEL PIPE: Bands for steel pipe will be 24 inches wide and will be incidental to Pipe Corr Steel bid items.

714-P02 CORRUGATED STEEL PIPE INSTALLATION: Contractor does not need to follow pipe installation detail on Sec. 20, Sheet 3 of the project plans when installing the “Pipe Corr. Steel .064IN 24 IN”. Contractor may install pipe using standard approach pipe installation with embankment used as bedding and backfill material.

754-P01 EXISTING SIGNS: All existing signs and posts removed and not designated to be reset will be salvaged and delivered to the Benson County Shop located in Minnewauken, ND. All costs associated with salvaging and delivering the signs will be included in the price bid for “Traffic Control Signs”.

754-P02 RESET SIGNS: There are two sign panels designated to be reset. All costs associated with removing old sign assembly and resetting sign panels on new support will be included in the price bid for “Flat Sheet Signs for Signs-Type XI Refl. Sheeting”.

754-P03 FLAT SHEET FOR SIGNS: All signs and sign assemblies will conform to the *Manual on Uniform Traffic Control Devices for Streets and Highways* and Std. Specs. 754. The cost of two inch (2”) perforated tubular galvanized steel posts, all bolt ties and fittings will be included in price bid for “Steel Galv Posts – Telescoping Perforated Tube”.

762-P01 PERMANENT PAVEMENT MARKINGS: Permanent pavement markings will be placed no sooner than 7 days and no later than 21 days after completion of the short-term pavement markings.

762-P02 PAVEMENT MARKINGS EDGE LINES: Edge lines will be continued through private and field drives and broken at intersections.

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ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): Benson County, the North Dakota Department of Transportation and FHWA have made several environmental commitments to various agencies and the public to secure approval of this project. The environmental commitments are as follows:

EN #1 - Any waste material from this project will be disposed of properly.

EN #2 - Dust will be minimized as much as possible during construction through the use of water. The Contractor will be required to submit a storm water permit before construction begins. Noise levels are not expected to exceed limits and will be short-term.

EN #3 - An erosion control plan has been developed and included on the plans. It will be the Contractor's responsibility to install erosion control as specified and at the direction of the Engineer and assure avoidable erosion doesn't occur. Any disturbed areas that do not receive other surfacing will be reseeded with an approved grass mixture.

EN #4 - Construction noise levels would be minimized by ensuring that construction equipment is equipped with a recommended muffler in good working order. Impact to noise levels would be minimized by limiting construction activities that occur during early morning or late evening hours.

EN #5 - There are no jurisdictional wetlands within the project limits. There will be impacts to non-jurisdictional wetlands, totaling 0.28 acres. Mitigation will be occur on-site, per plans. The impact table and mitigation plan are located in Section 75 of the plans.

PERMITS REQUIRED:

1. North Dakota Department of Health – NDPDES Permit

Status: To be obtained by the Contractor prior to construction, Owner is to be Benson County.

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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline	Approaches			TOTAL
103	0100	CONTRACT BOND	L SUM	1				1
203	0102	COMMON EXCAVATION-TYPE B	CY	5750				5750
203	0109	TOPSOIL	CY	6240				6240
203	0140	BORROW-EXCAVATION	CY	21850				21850
203	0180	ROADWAY OBLITERATION	LF	2790				2790
216	0100	WATER	M GAL	300				300
251	0200	SEEDING CLASS II	ACRE	6.4				6.4
251	1000	WETLAND SEED	ACRE	0.3				0.3
251	2000	TEMPORARY COVER CROP	ACRE	6.7				6.7
253	0101	STRAW MULCH	ACRE	6.7				6.7
261	0112	FIBER ROLLS 12IN	LF	3806				3806
302	0120	AGGREGATE BASE COURSE CL 5	TON	3718	45			3763
302	0356	AGGREGATE SURFACE COURSE CL 13	TON		292			292
401	0050	TACK COAT	GAL	540	14			554
411	0105	MILLING PAVEMENT SURFACE	SY	12468				12468
430	0042	SUPERPAVE FAA 42	TON	2444	60			2504
430	5815	PG 58S-34 ASPHALT CEMENT	TON	159	4			163
702	0100	MOBILIZATION	L SUM	1				1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1316				1316
704	1052	TYPE III BARRICADE	EA	12				12
704	1060	DELINEATOR DRUMS	EA	20				20
704	1067	TUBULAR MARKERS	EA	40				40
706	0550	BITUMINOUS LABORATORY	EA	1				1
706	0600	CONTRACTOR'S LABORATORY	EA	1				1
714	0615	PIPE CONC REINF 24IN CL III	LF	78				78
714	3020	END SECT-CONC REINF 24IN	EA	2				2
714	5035	PIPE CORR STEEL .064IN 24IN	LF		96			96
714	5820	END SECT CORR STEEL .064IN 24IN	EA		2			2
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	97				97
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	294				294
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	6972				6972
762	1106	PVMT MK PAINTED 6IN LINE	LF	8863				8863

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BASIS OF ESTIMATE - ROADWAY

QUANTITY PER MILE	WIDTH	UNIT	DESCRIPTION
2,021	30'	TON	SUPERPAVE FAA 42 HOT BITUMINOUS PAVEMENT AT 2.0 TON/CY (2" - BASE COURSE)
132	30'	TON	PG 58S-34 ASPHALT CEMENT FOR SUPERPAVE FAA 42 AT 6.5% (2" - BASE COURSE)
821	30'	GAL	EMULSIFIED ASPHALT FOR TACK COAT AT 0.05 GAL/SY (SURFACE COURSE)
1,891	28'	TON	SUPERPAVE FAA 42 HOT BITUMINOUS PAVEMENT AT 2.0 TON/CY (2" - SURFACE COURSE)
123	28'	TON	PG 58S-34 ASPHALT CEMENT FOR SUPERPAVE FAA 42 AT 6.5% (2" - SURFACE COURSE)
6,234	32'	TON	AGGREGATE BASE COURSE, CL 5 AT 1.5 TON/CY + 25% (6" BASE COURSE)
50	32'	MGAL	WATER FOR AGGREGATE BASE COURSE
VARIES	-	MGAL	WATER FOR EMBANKMENT @ 5 GAL/CY
2,246	24'	TON	AGGREGATE SURFACE COURSE CL 13 FOR SPUR ROAD AT 1.5 TON/CY +25% (3" SURFACE COURSE) - 0.130 Miles

BASIS OF ESTIMATE - MILLING

DESCRIPTION	WIDTH	UNIT	QUANTITY
STA. 5+50 TO 7+00 - 2" TO 4" TRANSITION @ BOP	26'	SY	434
STA. 38+50 TO 40+00 - 2" TO 4" TRANSITION @ EOP	26'	SY	434
FULL DEPTH MILL EXISTING ROAD = 3,600 LF	29'	SY	11,600
		TOTAL:	12,468

BASIS OF ESTIMATE - PAVEMENT MARKING

PAVEMENT MARKING PAINTED LINE (PERMANENT)			
CENTERLINE: 6" YELLOW, 10 FT. LINES, 30 FT. SKIP 1,320 LF/MILE			
BARRIER LINES: 6" YELLOW 4" BETWEEN LINES			
EDGE LINE: 6" WHITE 10,560 LF/MILE			
NPZ:			
STA. 29+00 TO STA. 34+00 RT	=	500 LF	
STA. 34+00 TO STA. 40+00 LT	=	600 LF	
SHORT TERM 4IN LINE-TYPE NR:			
		BROKEN LINE:	863 LF
		NPZ:	1,100 LF
		TOTAL:	6,972 LF
PVMT MK PAINTED 6IN LINE:			
		BROKEN LINE:	863 LF
		NPZ:	1,100 LF
		EDGE LINE:	6,900 LF
		TOTAL:	8,863 LF

BASIS OF ESTIMATE - EARTHWORK TABLE

ROADWAY OBLITERATION (CY)	COMMON EXCAVATION- TYPE B (CY)	EMBANKMENT (CY)	BORROW-EXCAVATION (CY)	TOPSOIL (CY)
A	B	C	D = C-(A+B)	E
18,500	5,750	46,100	21,850	6,240

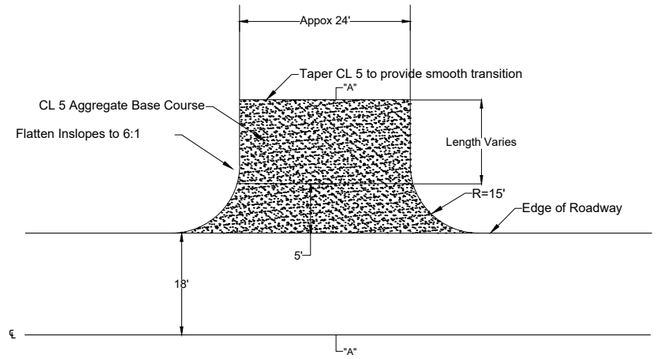
BASIS OF ESTIMATE - APPROACHES

DESCRIPTION	UNIT	SECTION LINE	FIELD	TOTAL
NUMBER OF LOCATIONS	#	1	2	3
AGGREGATE BASE COURSE CL 5	TON	50	25	100
TACK COAT	GAL	10	2	14
SUPERPAVE FAA 42	TON	30	15	60
PG 58S-34 ASPHALT CEMENT	TON	2	1	4

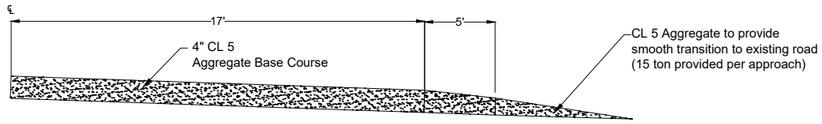
WOLD ENGINEERING, P.C.

BASIS OF ESTIMATE

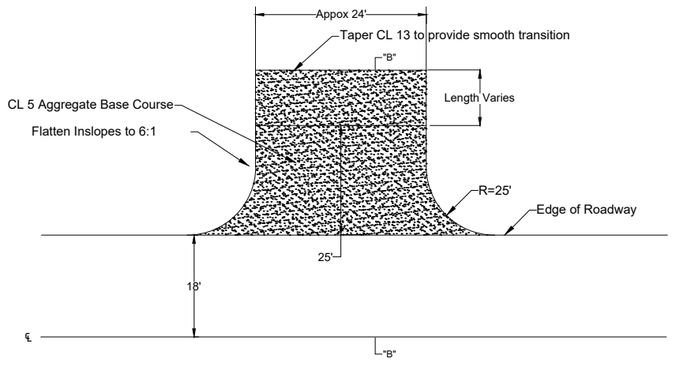
STATE.	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	20	1



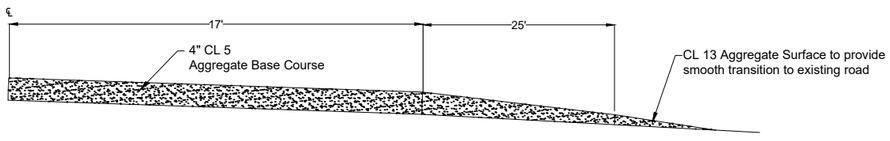
FIELD APPROACH



SECTION A-A



PRIVATE DRIVE / SECTION LINE APPROACH



SECTION B-B

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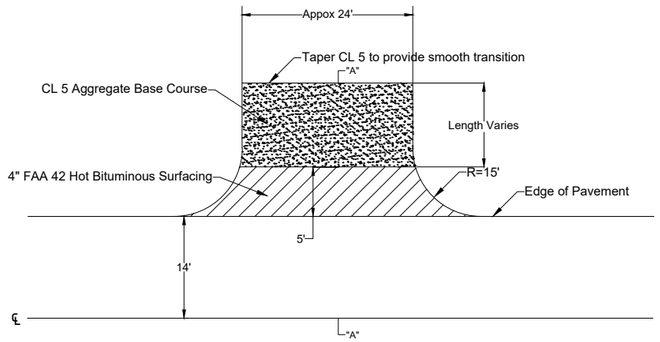
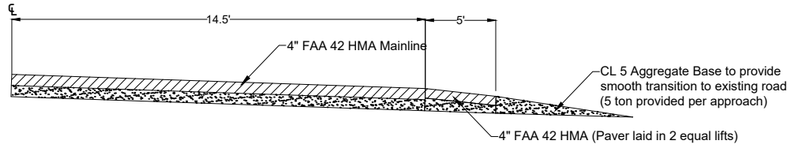
APPROACH DETAILS AGGREGATE BASE

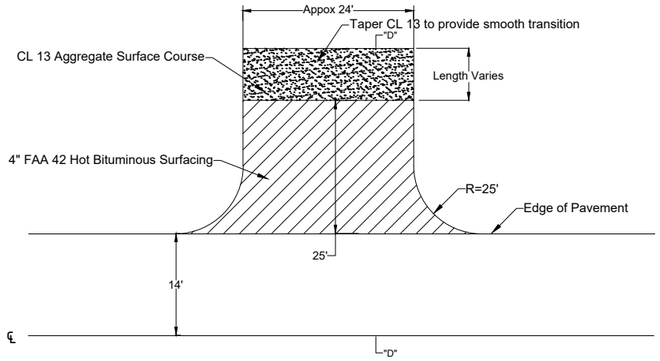
STATE.	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	20	2



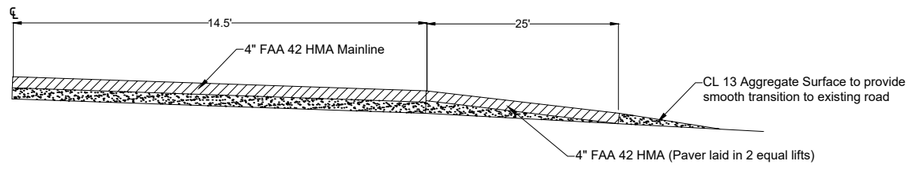
FIELD APPROACH



SECTION A-A



SECTION LINE APPROACH



SECTION D-D

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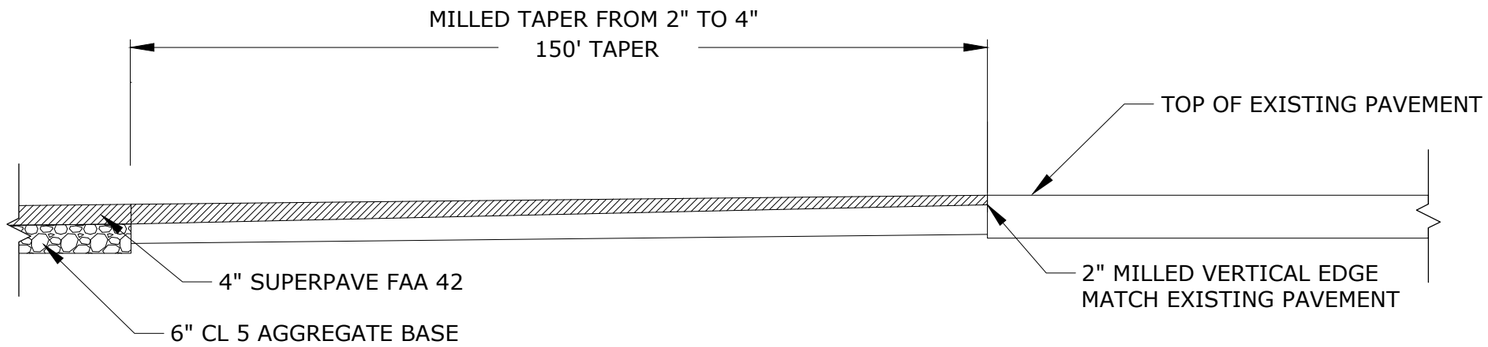
APPROACH DETAILS HMA

STATE.	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	20	3



TYPICAL MILLING TRANSITION DETAIL

STA. 5+50 TO 7+00 - BOP
STA. 38+50 TO 40+00 - EOP

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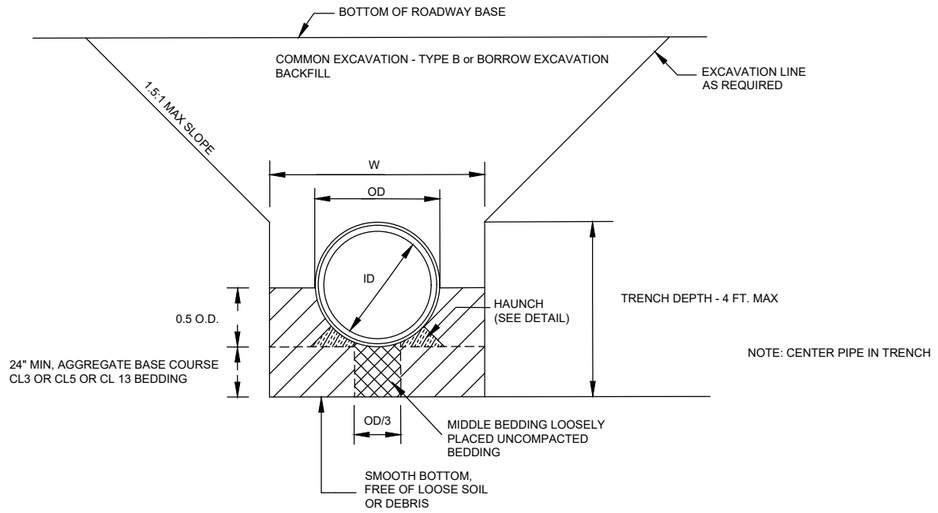
MILLING DETAILS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	20	4



STANDARD TRENCH INSTALLATION

GENERAL NOTES

A. IF LOCAL SOIL CONDITIONS MEET MINIMUM BEDDING REQUIREMENTS BEDDING IS NOT REQUIRED.

B. ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACK FILLED TO THE MINIMUM COVER DEPTH "24" ABOVE THE PIPE AND COMPACTED AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY.

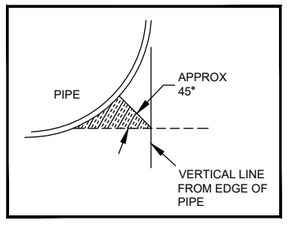
C. FOR TRENCHES WITH IN SITU SOIL WALLS, THE SOIL SHALL BE AT RELATIVELY AS DENSE AS THE MAJORITY OF THE SUBGRADE AS DETERMINED BY THE ENGINEER. SOIL NOT MEETING THIS REQUIREMENT SHALL BE REMOVED AND REPLACED.

D. FOR MULTIPLE PIPES MINIMUM SPACING BETWEEN PIPES IS:
36" PIPES AND SMALLER: EQUAL TO THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
PIPES LARGER THAN 36": EQUAL TO HALF THE OUTSIDE DIAMETER OF THE LARGEST PIPE.

E. THE BACKFILL SHALL BE COMMON EXCAVATION - TYPE B BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 8 INCH LOOSE LIFT THICKNESS AND BROUGHT UP EVENLY AND SIMULTANEOUSLY ON BOTH SIDES OF THE PIPE.

INCLUDED IN PIPE PAY ITEM

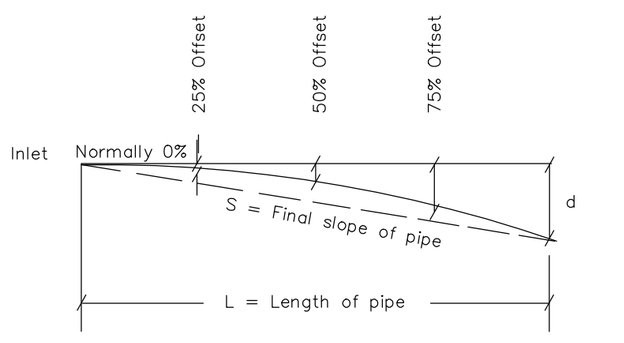
1. PIPE
2. TRENCH EXCAVATION
3. DISPOSAL OF UNSUITABLE EXCAVATED MATERIAL AND PLACEMENT OF SUITABLE EXCAVATED MATERIAL ON INSLOPE
4. BACKFILL OF SUITABLE EXCAVATED MATERIAL
5. AGGREGATE BASE COURSE CL 3 OR CL 5 OR CL 13



MINIMUM HAUNCH AREA DETAIL

TABLE A

PIPE CULVERT	
PIPE DIA	W
18"	5.5'
24"	6.0'
30"	6.5'
36	7.0'
42"	7.5'
48"	8.0'
54"	8.5'
60"	9.0'
66"	9.5'
72"	10.0'
78"	10.5'
84"	11.0'



d = SL

Where – d is in feet
S is in %
L is in 100' sta.

CAMBER FOR CULVERT PIPES

Point of offset in % of length from inlet end	OFFSET TO FLOW LINE		
	Hard Foundation	Firm Foundation	Yielding Foundation
25%	0.06d	0.03d	0.01d
50%	0.25d	0.20d	0.10d
75%	0.56d	0.50d	0.40d
100%	1.00d	1.00d	1.00d

AGGREGATE BASE COURSE CL3 or CL5 or CL13

AGGREGATE BASE COURSE CL3 or CL5

COMMOM EXCAVATION TYPE B OR FIRM IN SITU SOIL COMPACTED TO COMMON EXCAVATION TYPE B DENSITY

HAUNCH AREA, SHOVEL COMPACTED

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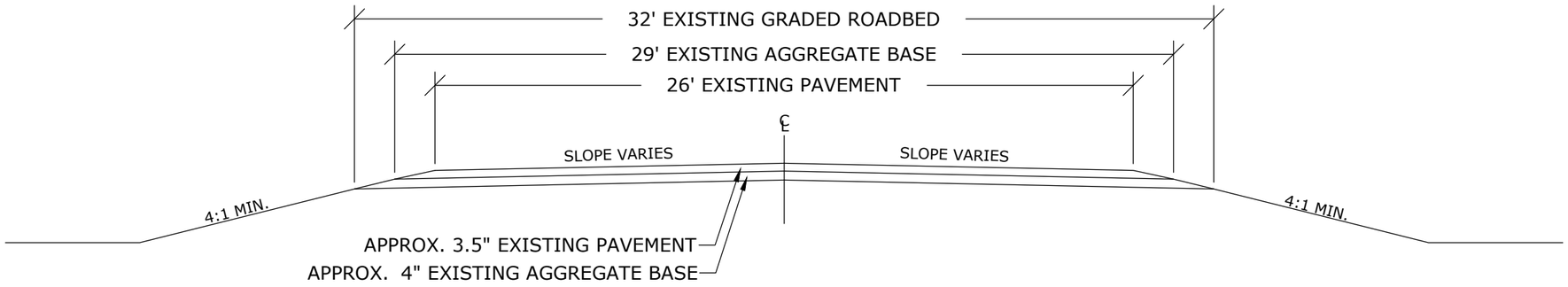
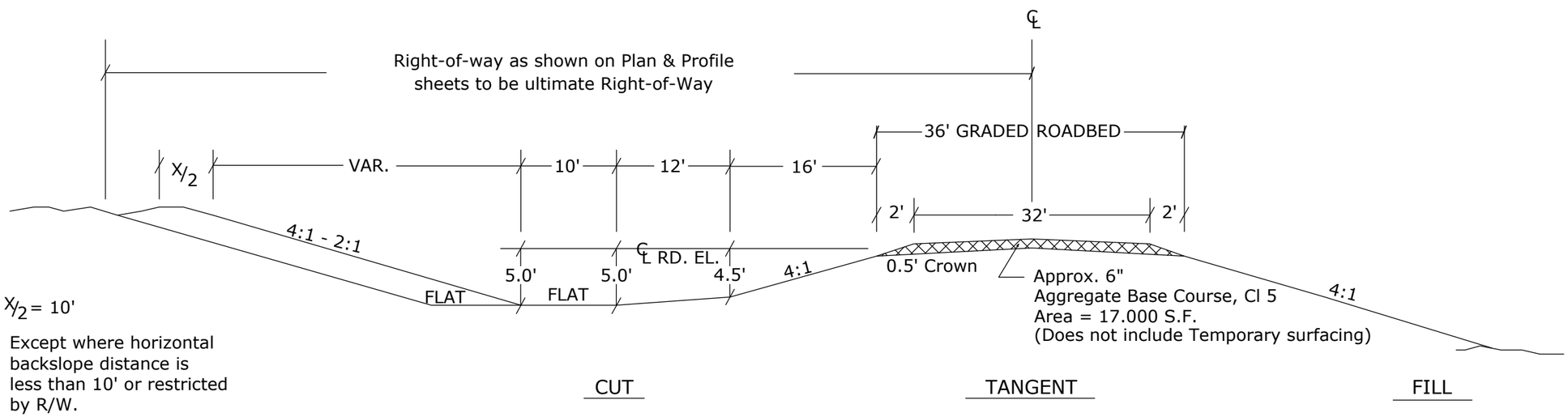
PIPE INSTALLATION DETAIL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	30	1



EXISTING TYPICAL SECTION



TYPICAL GRADING SECTION

STA. 7+00 TO STA. 38+50

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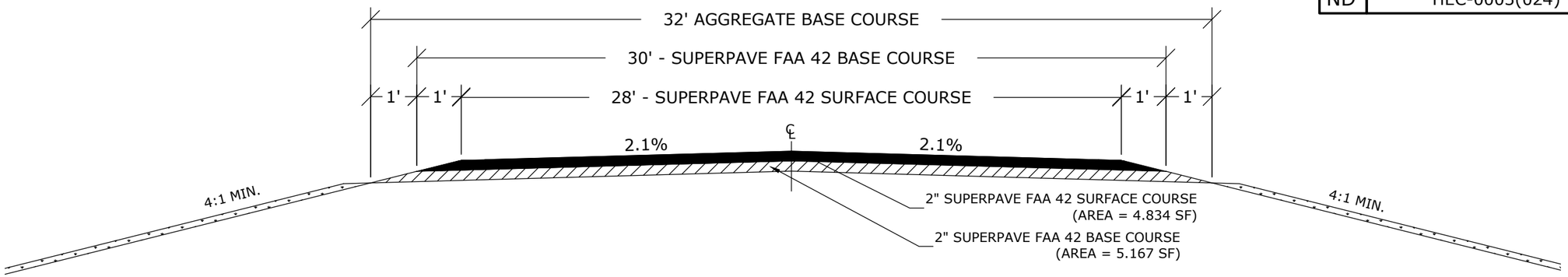
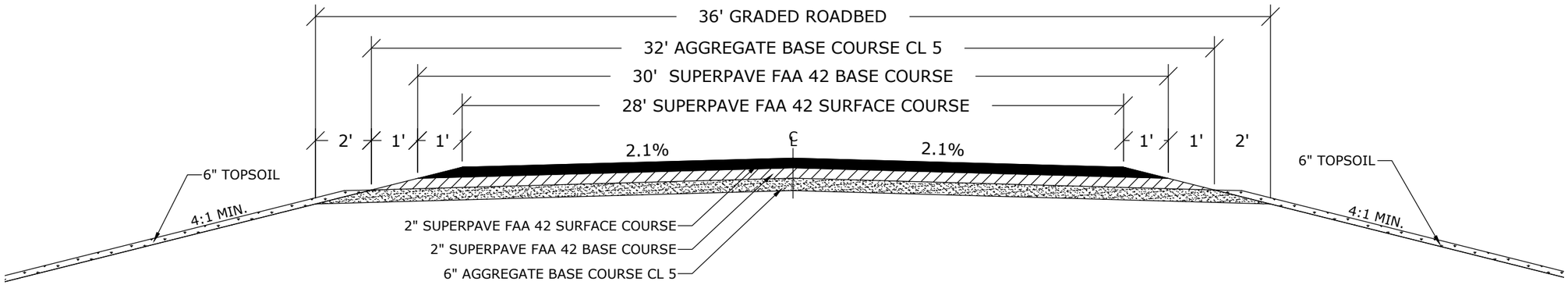
TYPICAL SECTIONS

S:\COUNTY\Benson\2024\24-102 HEC-0003(024) PCN 23758\CMC-0328 FLORA CURVE\PLAN SHEETS\030TP_001_TYP.dwg 3/3/25 9:11:47 AM

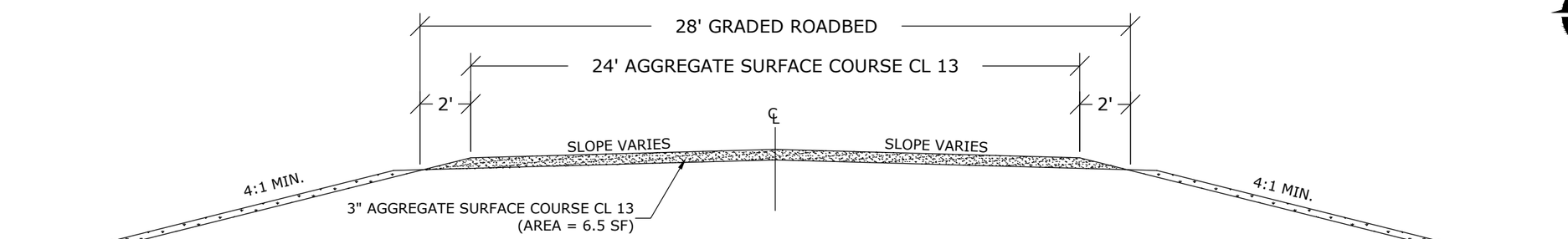
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	30	2



PROPOSED PAVING SECTION



ULTIMATE TYPICAL SECTION



PROPOSED GRADING SECTION
SPUR ROAD

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SINCE 1955

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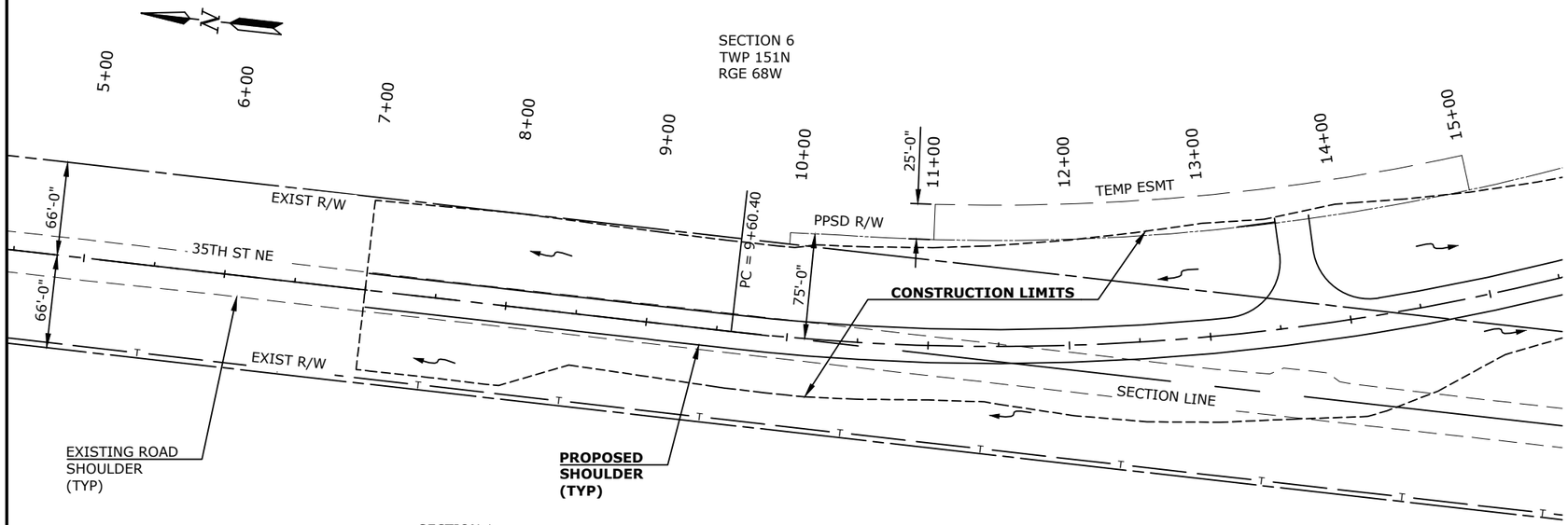
TYPICAL SECTIONS

S:\COUNTY\Benson\2024\24-102 HEC-0003(024) PCN 23758\CMC-0328 FLORA CURVE\PLAN SHEETS\030TP_002_TYP.dwg 3/3/25 9:12:31 AM

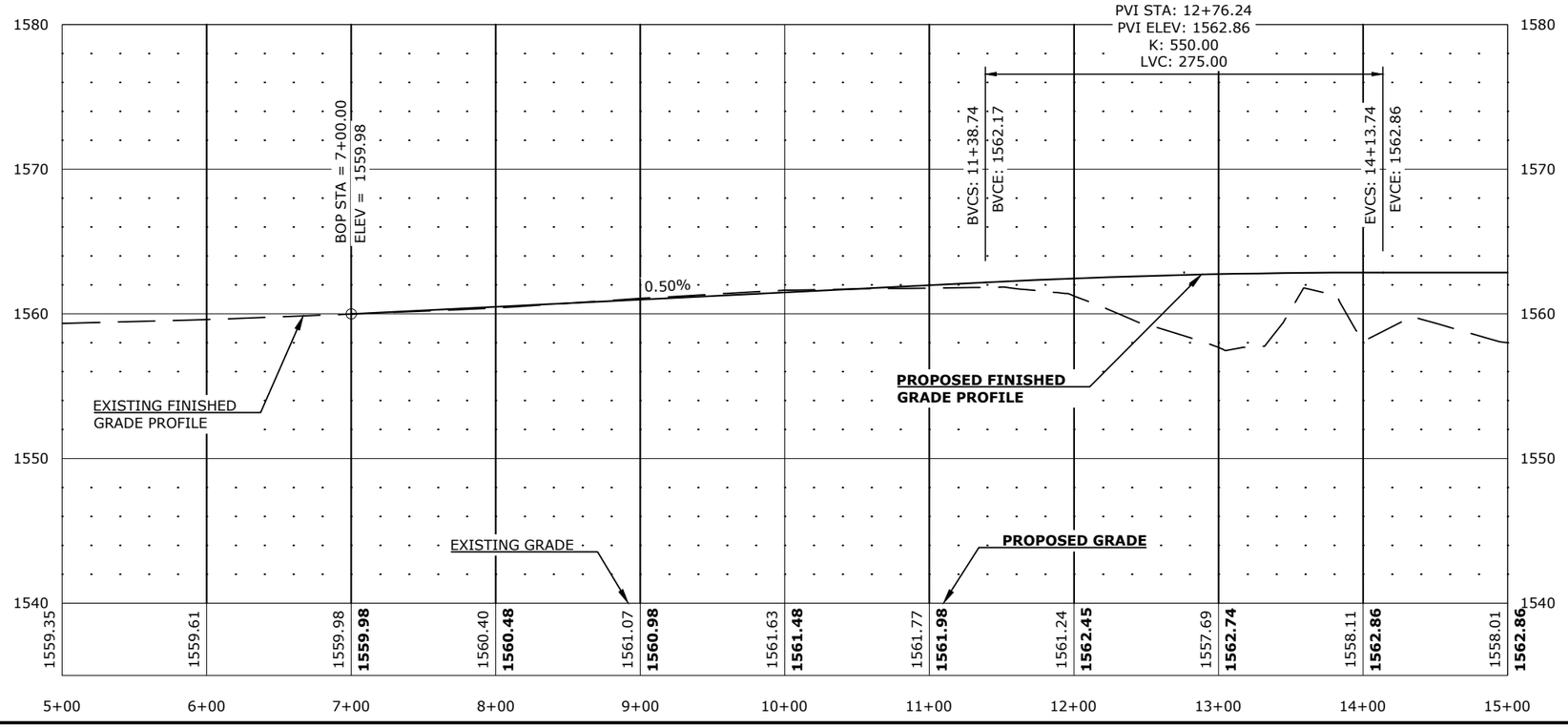
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(24)	60	1

SPEC CODE	BID ITEM	QTY	UNIT
302 0120	AGGREGATE BASE COURSE CL 5		
STA. 10+00 TO 15+00 - 32' Width		590	TON



SCALES:
H: 1" = 100'
V: 1" = 10'

STA. 13+60 LT
FIELD APPROACH
660 CY PROVIDED



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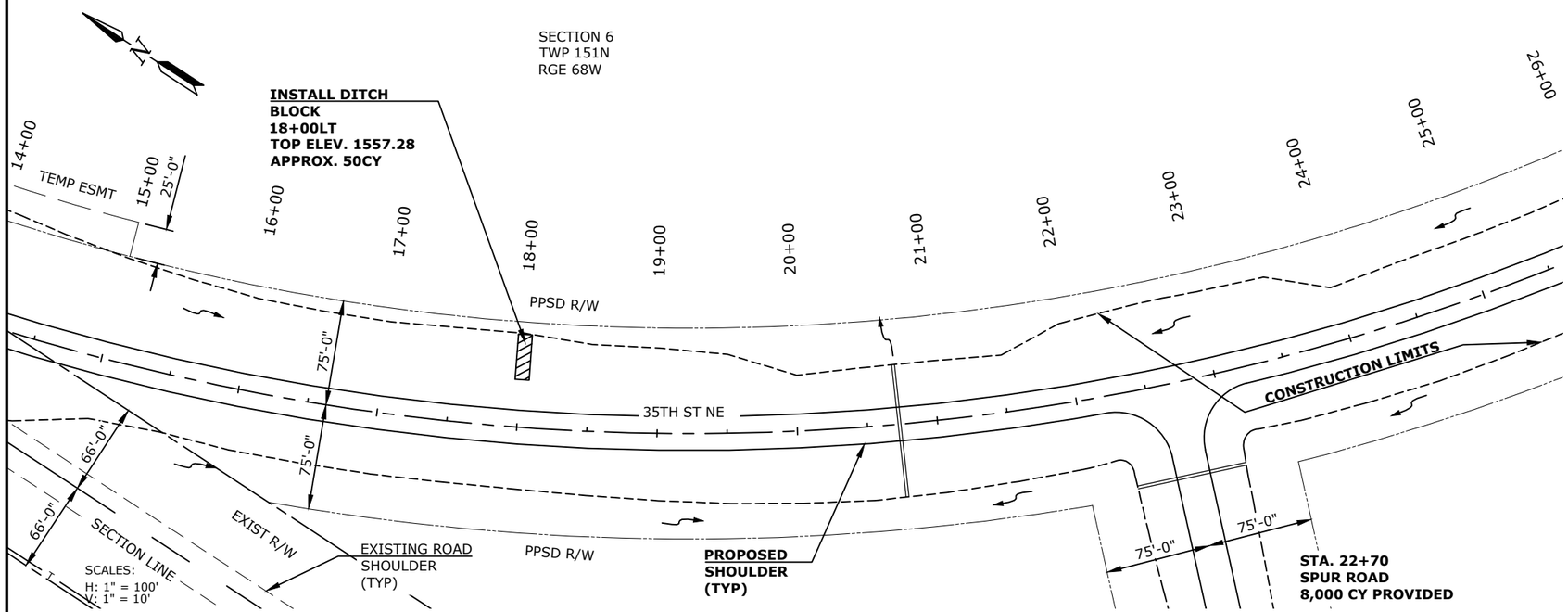
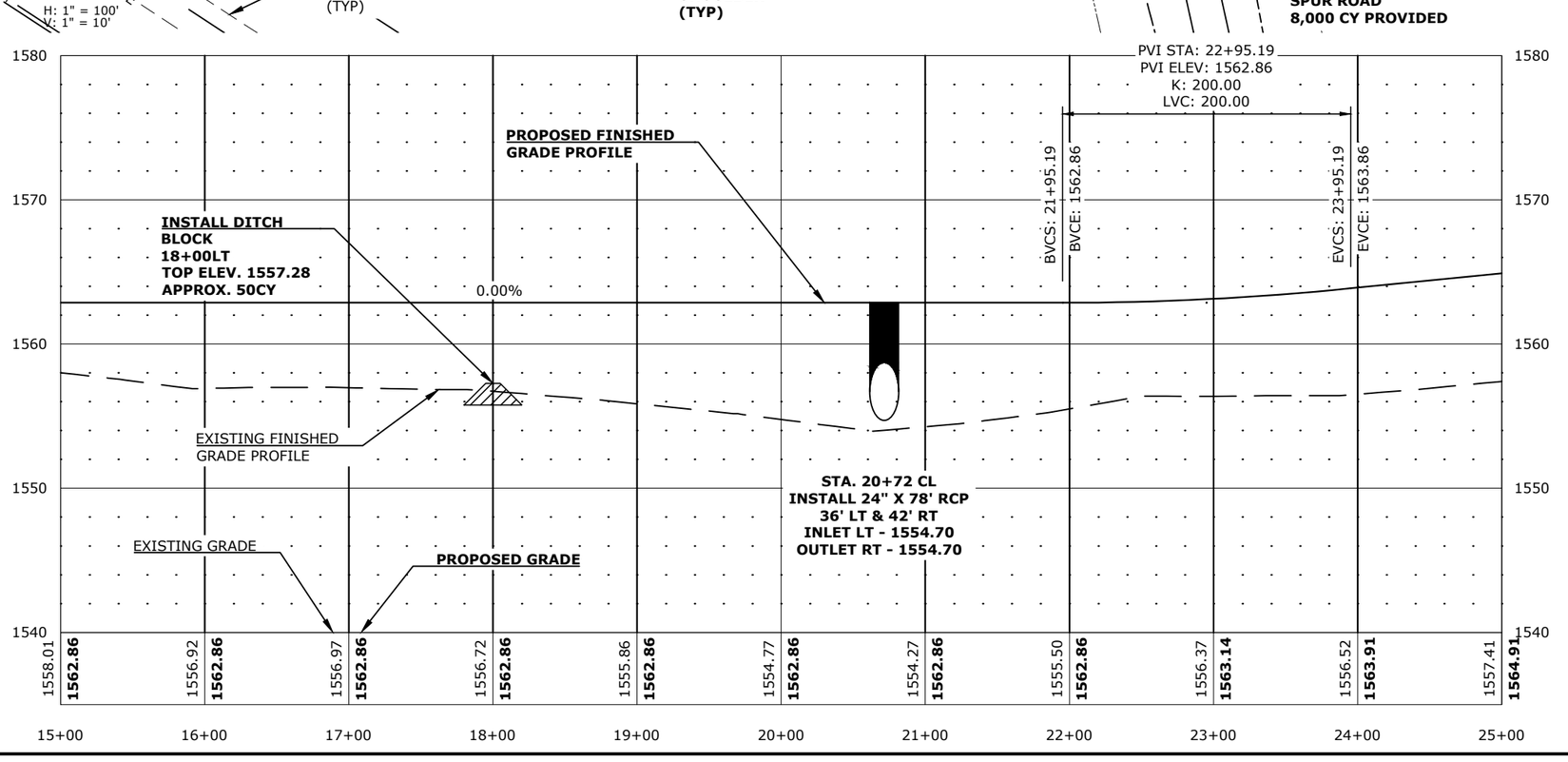
PLAN & PROFILE
STA. 7+00 TO 15+00

FILE: 060PP_001.dwg

0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(24)	60	2





SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
STA. 15+00 TO 25+00 - 32' Width			1,181	TON
714	0615	PIPE CONC REINF 24IN CL III		
STA. 20+72 CL			78	LF
714	3020	END SECT-CONC REINF 24IN		
STA. 20+72 CL			2	EA
714	5035	PIPE CORR STEEL .064IN 24IN		
STA. 22+70 - 70' RT			96	LF
714	5035	END SECT CORR STEEL .064IN 24IN		
STA. 22+70 - 70' RT			2	EA

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PLAN & PROFILE

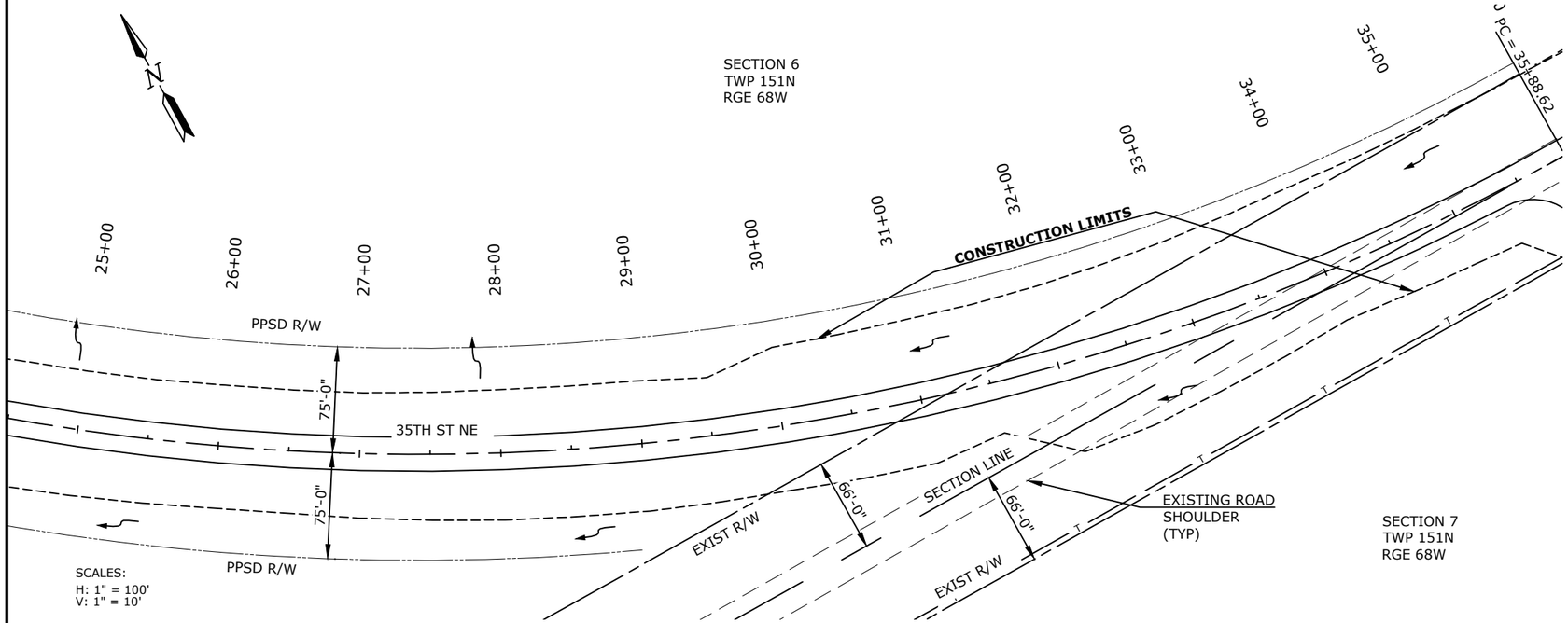
STA. 15+00 TO 25+00

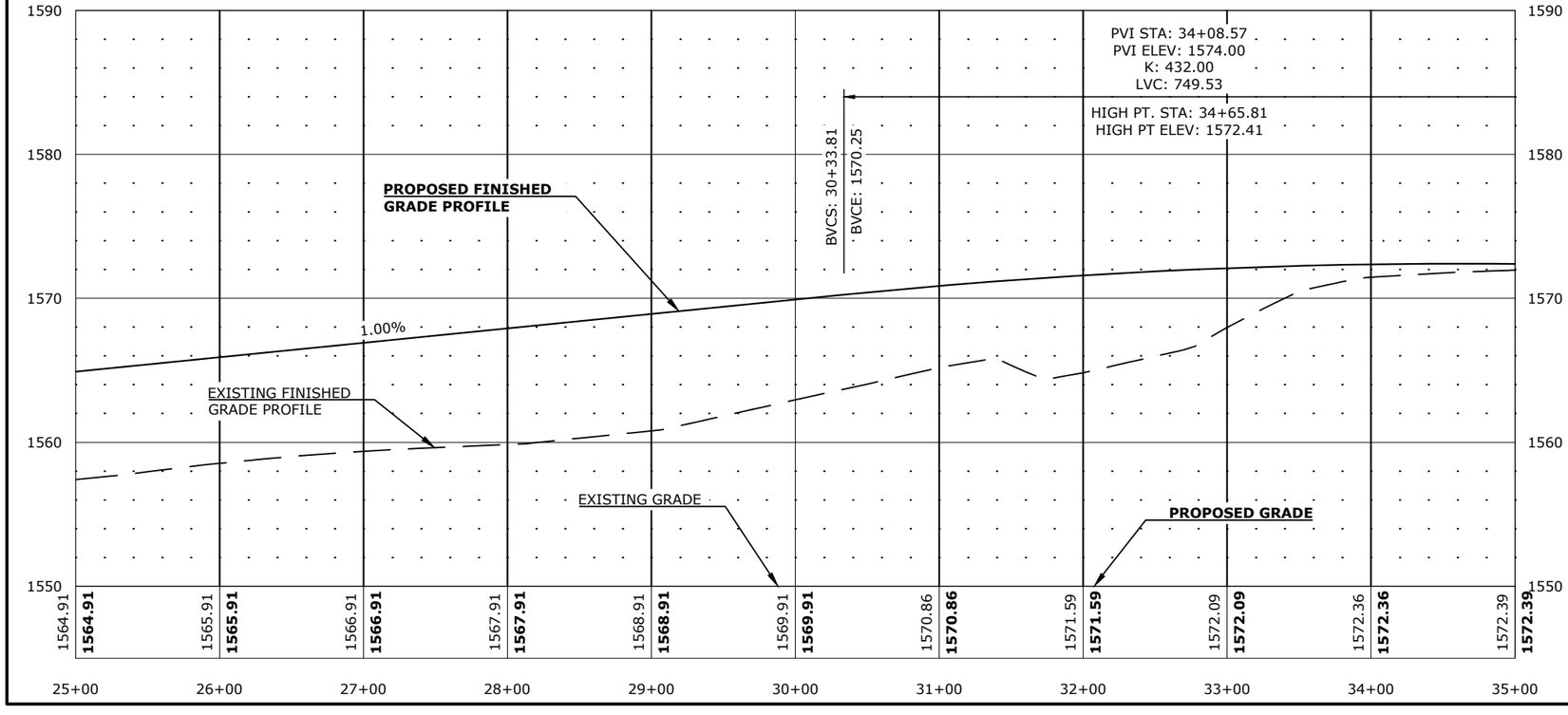
FILE: 060PP_002.dwg

0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(24)	60	3

SPEC CODE	BID ITEM	QTY	UNIT
302 0120	AGGREGATE BASE COURSE CL 5		
STA. 25+00 TO 33+00 - 32' Width		945	TON





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PLAN & PROFILE

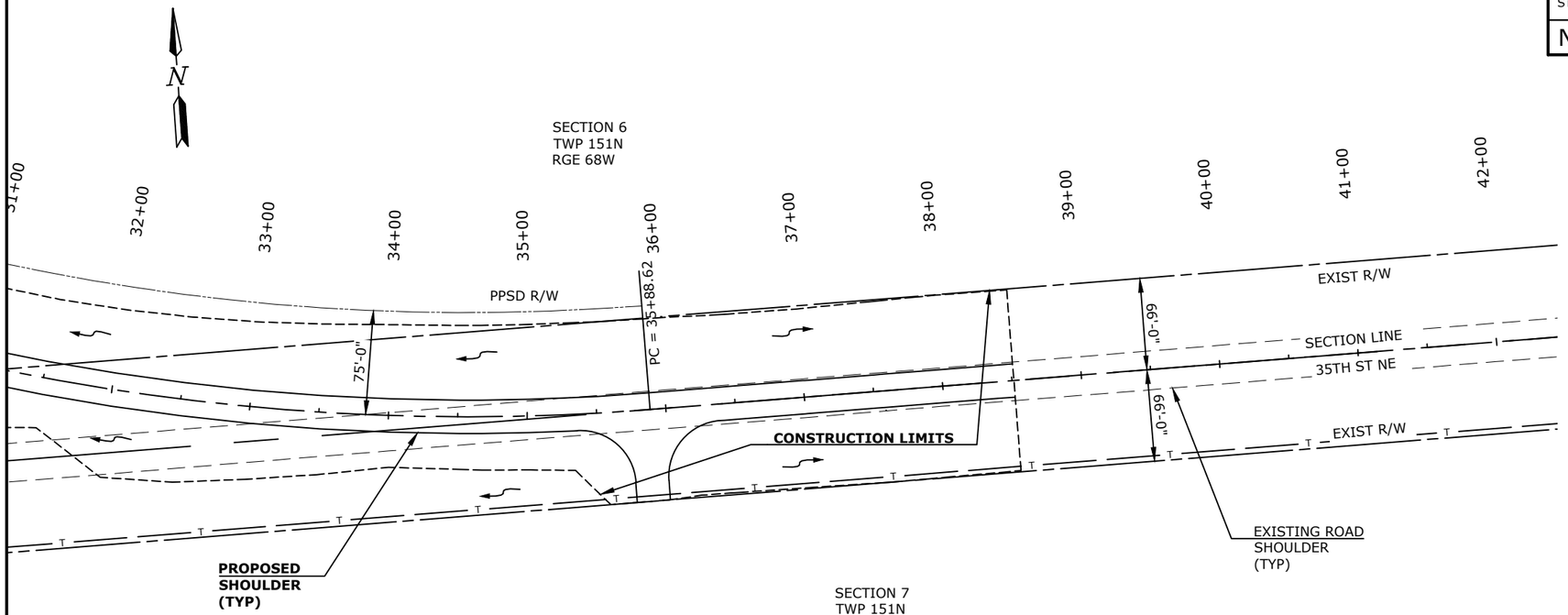
STA. 25+00 TO 33+00

FILE: 060PP_003.dwg

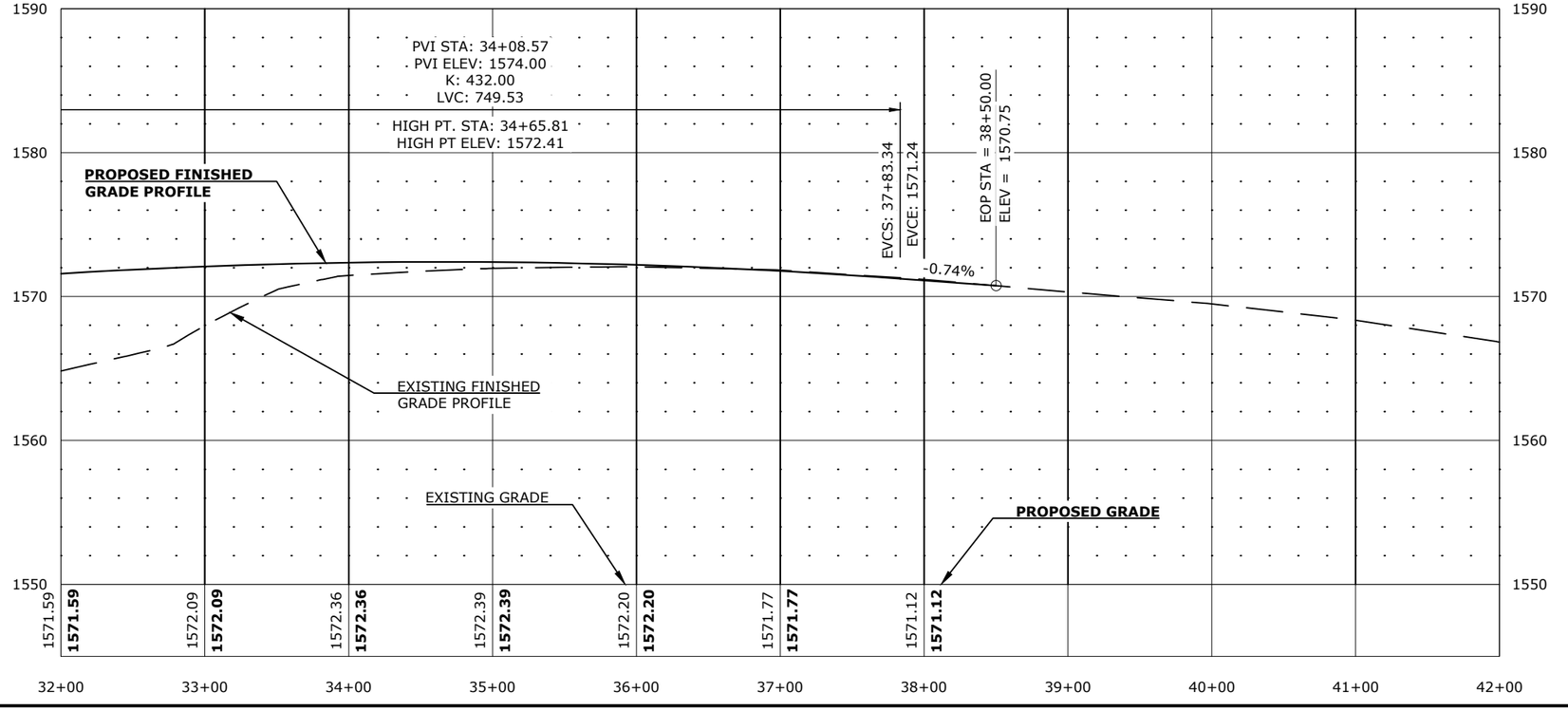
0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(24)	60	4

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
STA. 33+00 TO 38+50 - 32' Width			649	TON



SCALES:
H: 1" = 100'
V: 1" = 10'



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PLAN & PROFILE

STA. 32+00 TO 38+50

FILE: 060PP_004.dwg

0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts Acre(s)		Wetland Mitigation												
							Mitigation Required			USACE/11990 Bank		11990 Bank		USFWS Bank		Onsite			
					Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)	Mitigation Location; Ratio	Acre(s)	Constructed Site #	Constructed Size Acre(s)
1	Sec. 6, T151N, R68W	Salt Flat	Natural	N	0.00	0.00	Y	N	N	N/A	0		0.00	N/A	0	N/A	0.00	N/A	N/A
2	Sec.36 T151N, R68W	Depression	Natural	N	0.00	0.28	Y	N	N	N/A	0		0.00	N/A	0	1:1	0.280	N/A	0.280
					0	**0.28**					0.00		0.00		0.00		**0.280**		0.280

[1] A wetland Jurisdictional Determination was issued by the USACE on August 13, 2024; NWO-2024-1109-BIS.

[2] 11990 requirements - All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to wetlands require mitigation.
USACE requirements – All jurisdictional impacts greater than 0.10 acre to each resource (cumulative. eg 1a ,1b,1c..etc.) requires mitigation. Other Water impact greater than 300 linear feet requires mitigation.

[3] All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), and temporary impacts do not require mitigation.

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	0	**Temporary JD**	0
Natural/Non-JD	0.280	**Non-JD Temporary**	0
Artificial/JD	0	**Permanent JD > 0.10**	0
Artificial /Non-JD	0	**Permanent OW**	0
Total	**0.280**	**Temporary OW**	0.0 ac /0 ft.

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only	N/A	N/A	N/A	N/A	N/A
EO 11990 Only	ROAD DITCH	0.28	N/A	N/A	N/A
USACE/11990	N/A	N/A	N/A	N/A	N/A
USFWS	N/A	N/A	N/A	N/A	N/A
	Total	**0.28**	**0**	**0**	**0**

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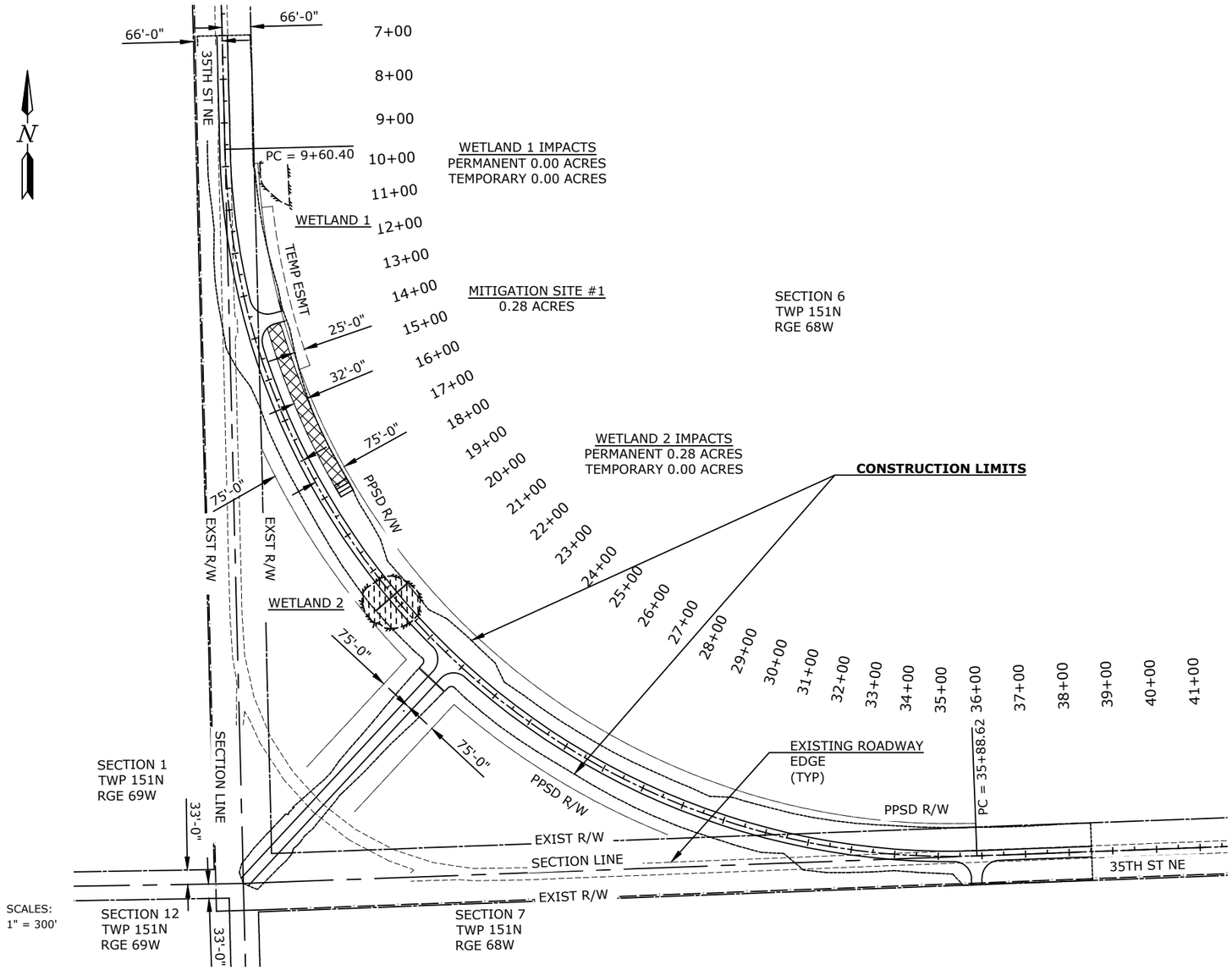
WETLANDS MITIGATION AND ENVIRONMENTAL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	75	2



- TEMPORARY IMPACTS
- PERMANENT IMPACTS
- ONSITE MITIGATION

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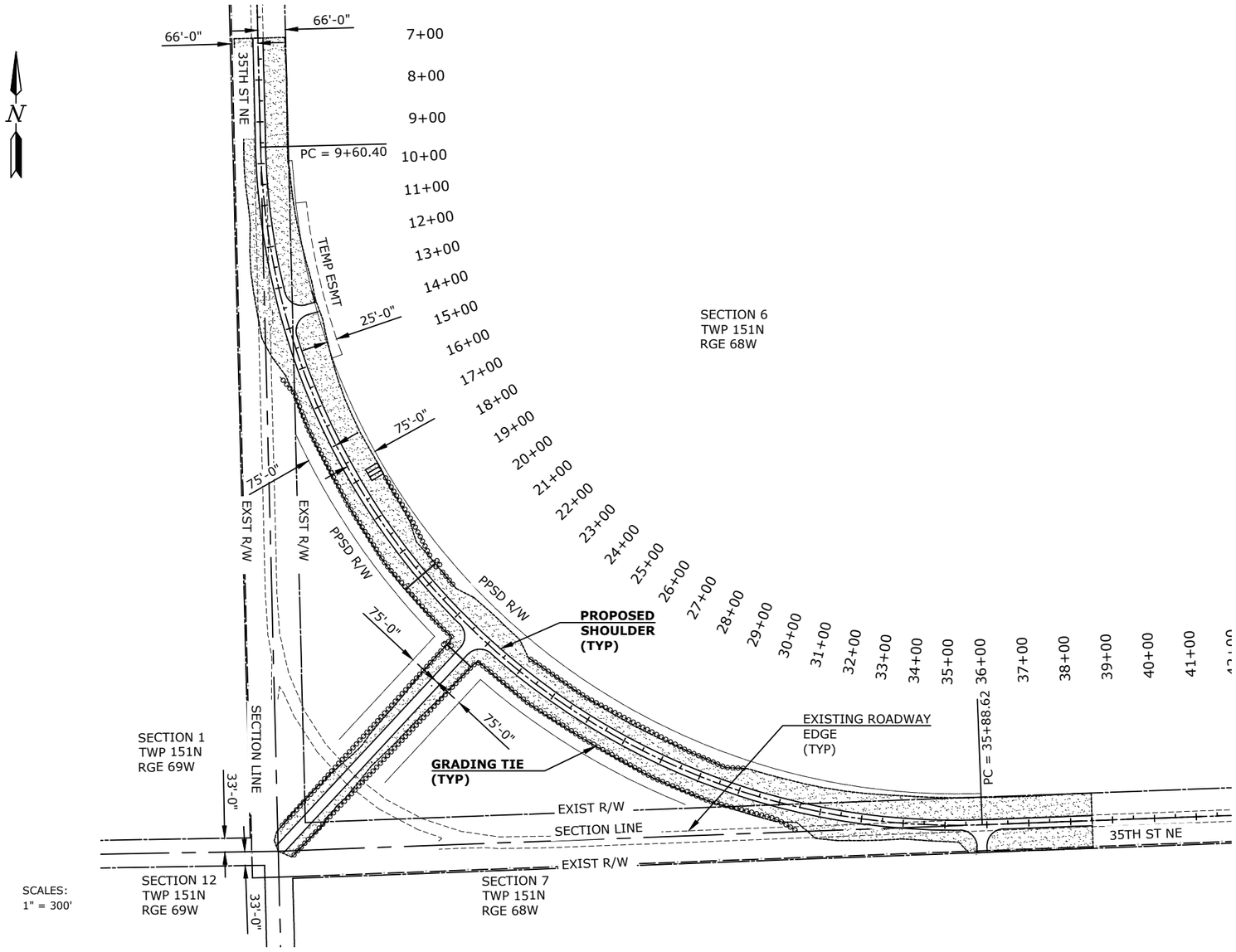
WETLAND IMPACTS

FILE: 075WL_001_WTLD.dwg

0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	76	1



SCALES:
1" = 300'

TEMPORARY COVER CROP AND MULCHING

SPEC	CODE	BID ITEM	QTY	UNIT
251	0000	TEMPORARY COVER CROP		
STA. 7+00 TO 38+50 LT			3.4	ACRE
STA. 7+00 TO 38+50 RT			3.3	ACRE
253	0101	STRAW MULCH		
STA. 7+00 TO 38+50 LT			3.4	ACRE
STA. 7+00 TO 38+50 RT			3.6	ACRE
261	0112	FIBER ROLLS 12 IN		
STA. 15+00 TO 22+50 RT			1340	LF
STA. 18+00 TO 21+50 LT			350	LF
STA. 23+00 TO 31+50 RT			1516	LF
STA. 24+00 TO 30+00 LT			600	LF

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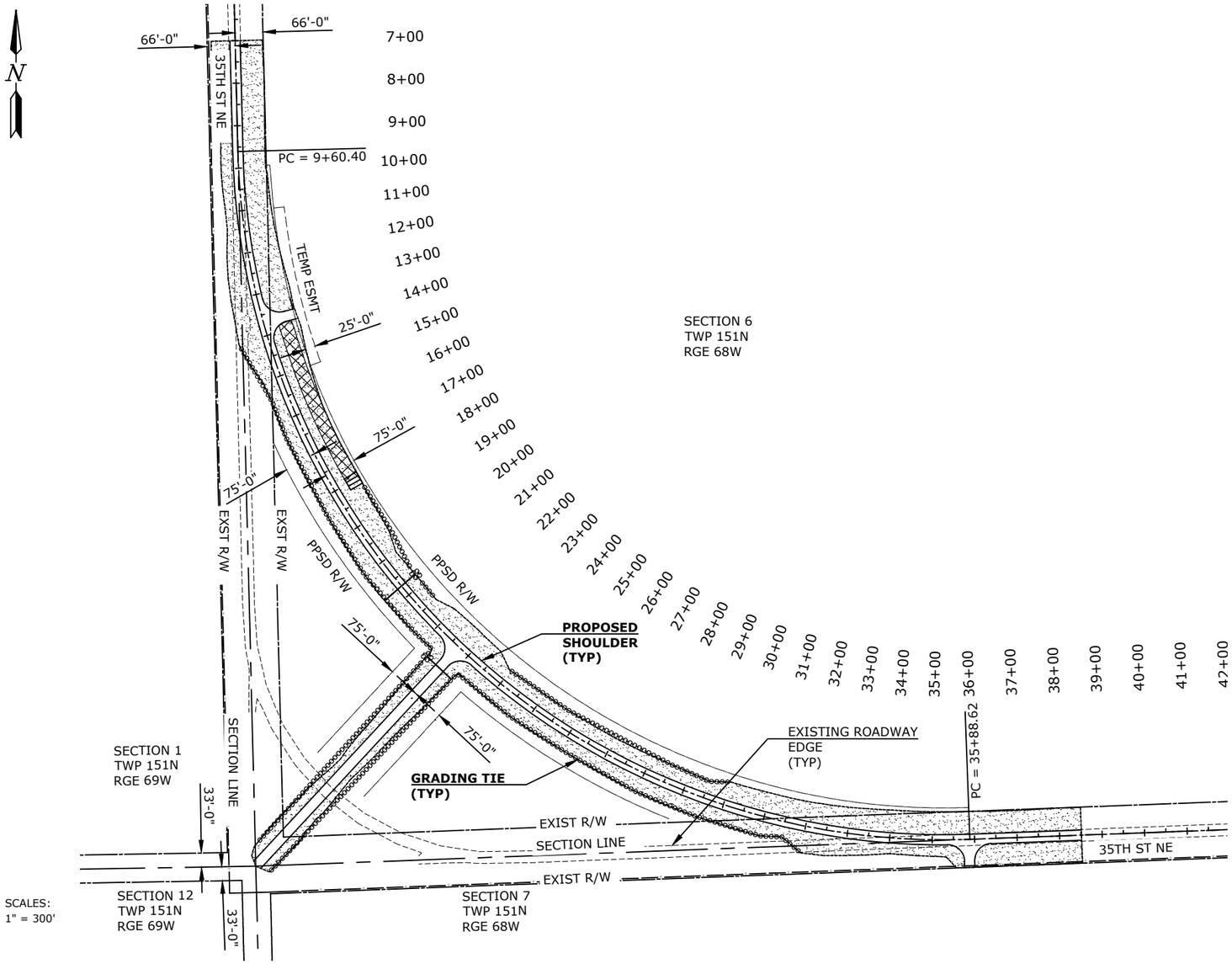
TEMPORARY EROSION CONTROL STA. 7+00 TO 38+50

FILE: 076TE_001_TEMP.dwg

0 50 100 150
SCALE IN FEET

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	77	1



SEEDING CLASS II AND MULCHING

WETLAND SEED AND MULCHING

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
STA. 7+00 TO 38+50 LT			3.1	ACRE
STA. 7+00 TO 38+50 RT			3.3	ACRE
251	1000	WETLAND SEED		
STA. 14+00 TO 18+00 LT			0.3	ACRE
253	0101	STRAW MULCH		
STA. 7+00 TO 38+50 LT			3.4	ACRE
STA. 7+00 TO 38+50 RT			3.3	ACRE

WOLD ENGINEERING, P.C.

PERMANENT EROSION CONTROL STA. 7+00 TO 38+50

FILE: 077PE_001_PERM.dwg

0 50 100 150
SCALE IN FEET

PRELIMINARY SURVEY COORDINATE AND CURVE DATA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
BOP	7+00.00	339082.9462	2232143.7606
PC	9+58.95	338824.0131	2232146.9492
PT	35+87.22	337184.9642	2233848.0058
EOP	38+50.00	337191.4834	2234110.7042

CURVE DATA

ARC DEFINITION

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
W QTR COR	6-151-68	339784.2880	2232135.1240
SW SEC COR	6-151-68	337143.2660	2232167.7220
S QTR COR	6-151-68	337205.4610	2234673.9470

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	CONTROL POINT DESCRIPTION
1	339751.6020	2232100.7380	1555.417	0+32.26	34.78' RT	5/8" Rebar with center punch
2	337147.9780	2232116.1480	1560.018	22+46.51	735.08' RT	5/8" Rebar with center punch
3	337136.1510	2234556.1560	1561.731	42+95.34	66.37' RT	5/8" Rebar with center punch

NOTES: Sheet 1 of 1

Date Survey Completed xx/xx/xx

☐ Assumed Coordinates

☒ All coordinates on this sheet are Benson County Ground (BCG) coordinates. They are derived from the NAD83(CORS96) reference frame; North Dakota North Zone

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
CAN 1 (OPUS)

☒ NAVD-88
☐ NGVD-29

☒ GEOID 03 ☐ _____
☐ GEOID 18

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	48"x24"	END ROAD WORK		26	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR		18	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		11	
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)**	**9**	**7**	**63**
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	**24"x12"**	**WEST (Mounted on route marker post)**	**9**	**7**	**63**
M4-8-24	**24"x12"**	**DETOUR (Mounted on route marker post)**	**16**	**7**	**112**
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	**48"x18"**	**DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)**	**2**	**7**	**14**
M5-1-21	**21"x15"**	**ADVANCE TURN ARROW RT or LT(Mounted on route marker post)**	**5**	**7**	**35**
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	**21"x15"**	**DIRECTIONAL ARROW RT or LT (Mounted on route marker post)**	**8**	**7**	**56**
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	**21"x15"**	**DIRECTIONAL ARROW UP (Mounted on route marker post)**	**3**	**7**	**21**
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**4**	**30**	**120**
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1aP-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**2**	**39**	**78**
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	**48"x30"**	**ROAD CLOSED (Mounted on barricade)**	**2**	**12**	**24**
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	**60"x30"**	**ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)**	**4**	**15**	**60**
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD		35	
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	**48"x48"**	**BUMP**	**2**	**35**	**70**
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	**48"x48"**	**NO CENTER LINE**	**2**	**35**	**70**
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	**48"x48"**	**TRUCKS ENTERING HIGHWAY**	**2**	**35**	**70**
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or _ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	48"x48"	ROAD WORK AHEAD or _FT or _ MILE		35	
W20-2-48	**48"x48"**	**DETOUR AHEAD or __ FT or _ MILE**	**2**	**35**	**70**
W20-3-48	**48"x48"**	**ROAD or STREET CLOSED AHEAD or __ FT or _ MILE**	**6**	**35**	**210**
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE		35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE		35	
W20-7-48	48"x48"	FLAGGER		35	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back		5	
W20-52P-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE		35	

SPECIAL SIGNS

M1-6-24	**24"x24"**	**COUNTY ROUTE MARKER (Sign, Post and Installation)**	**18**	**10**	**180**

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**1316**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**12**
704-1060	**DELINEATOR DRUMS**	**EACH**	**20**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**40**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	STACKABLE VERTICAL PANELS	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	
704-1500	OBLITERATION OF PVMT MK	SF	
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	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
http://www.dot.nd.gov/

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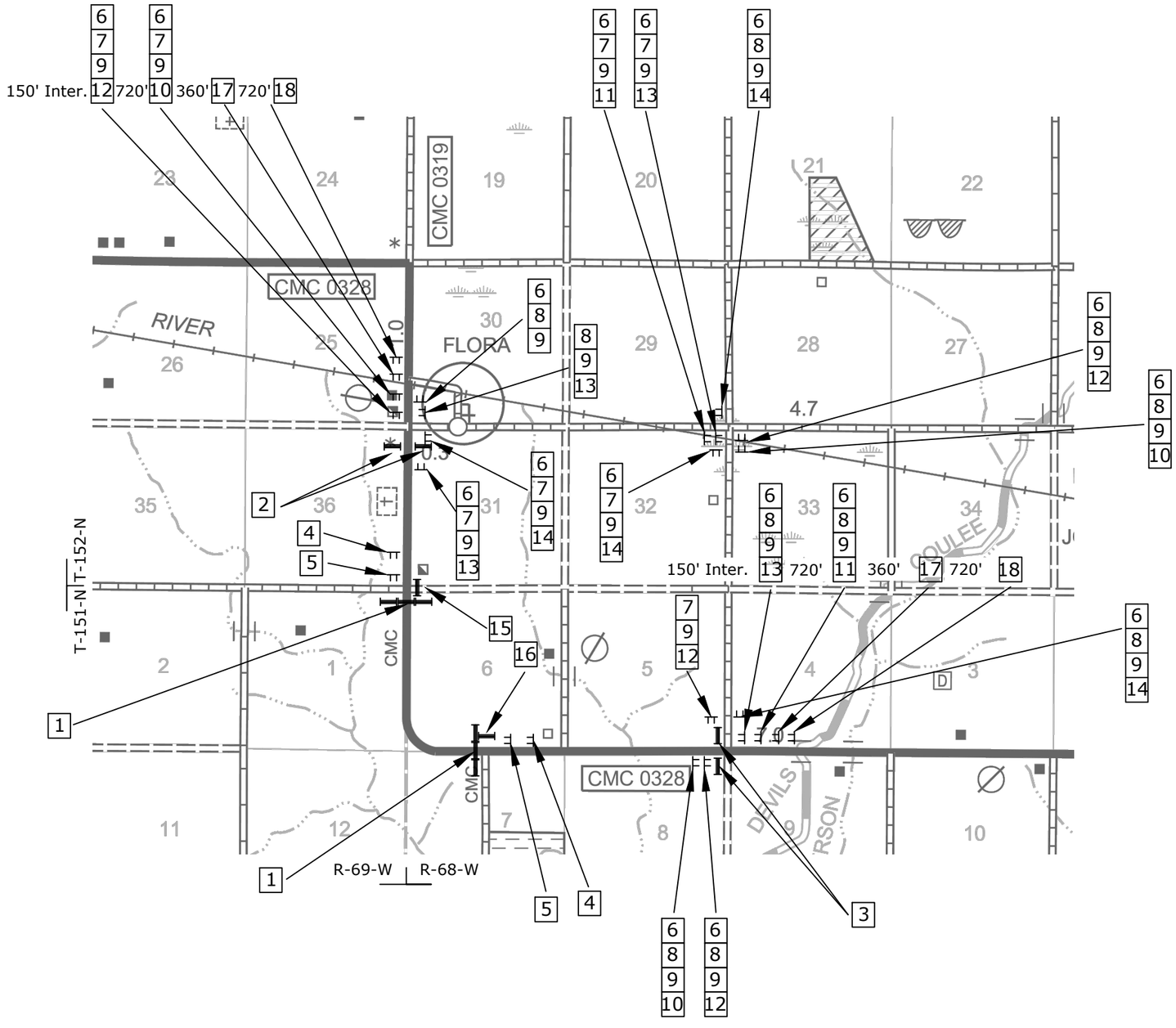
Traffic Control Devices List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	100	2



1 R11-2-48: ROAD CLOSED (Mounted on Barricade)

2 R11-3a-60: ROAD CLOSED 1.0 MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on Barricade)

3 R11-3a-60: ROAD CLOSED 1.5 MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on Barricade)

4 W20-3-48: ROAD CLOSED 1440 FT (Post Mounted)

5 W20-3-48: ROAD CLOSED 720 FT (Post Mounted)

6 M4-8-24: DETOUR (Mounted on Route Marker Post)

7 M3-2-24: EAST (Mounted on Route Marker Post)

8 M3-4-24: WEST (Mounted on Route Marker Post)

9 M1-6-24: BOTTINEAU CO RD 3 Route Mkr (Post Mounted)

10 M5-1-21: ADVANCED TURN ARROW LT (Mounted on Route Marker Post)

11 M5-1-21: ADVANCED TURN ARROW RT (Mounted on Route Marker Post)

12 M6-1-21: DIRECTIONAL ARROW LT (Mounted on Route Marker Post)

13 M6-1-21: DIRECTIONAL ARROW RT (Mounted on Route Marker Post)

14 M6-3-21: DIRECTIONAL ARROW UP (Mounted on Route Marke Post)

15 M4-10-48: DETOUR ARROW LEFT (Mounted on Barricade)

16 M4-10-48: DETOUR ARROW RIGHT (Mounted on Barricade)

17 W20-2-48: DETOUR AHEAD _ FT (Post Mounted)

18 W20-3-48: ROAD CLOSED AHEAD (Post Mounted)

WOLD ENGINEERING, P.C.

Traffic Control & Detour Layout

TRAFFIC CONTROL
DETOUR LAYOUT

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	100	3

1 R11-2-48: ROAD CLOSED
(Mounted on Barricade)

2 R11-3a-60: ROAD CLOSED 1.0 MILES AHEAD
LOCAL TRAFFIC ONLY (Mtd on Barricade)

3 R11-3a-60: ROAD CLOSED 1.5 MILES AHEAD
LOCAL TRAFFIC ONLY (Mtd on Barricade)

4 W20-3-48: ROAD CLOSED 1440 FT
(Post Mounted)

5 W20-3-48: ROAD CLOSED 720 FT
(Post Mounted)

6 M4-8-24: DETOUR
(Mounted on Route Marker Post)

7 M3-2-24: EAST
(Mounted on Route Marker Post)

8 M3-4-24: WEST
(Mounted on Route Marker Post)

9 M1-6-24: BOTTINEAU CO RD 3 Route Mkr
(Post Mounted)

10 M5-1-21: ADVANCED TURN ARROW LT
(Mounted on Route Marker Post)

11 M5-1-21: ADVANCED TURN ARROW RT
(Mounted on Route Marker Post)

12 M6-1-21: DIRECTIONAL ARROW LT
(Mounted on Route Marker Post)

13 M6-1-21: DIRECTIONAL ARROW RT
(Mounted on Route Marker Post)

14 M6-3-21: DIRECTIONAL ARROW UP
(Mounted on Route Marke Post)

15 M4-10-48: DETOUR ARROW LEFT
(Mounted on Barricade)

16 M4-10-48: DETOUR ARROW RIGHT
(Mounted on Barricade)

17 W20-2-48: DETOUR AHEAD _ FT
(Post Mounted)

18 W20-3-48: ROAD CLOSED AHEAD
(Post Mounted)

1

R11-2-48
Type III Barricade
Skid Mounted

2

R11-3a-60
Type III Barricade
Post Mounted

3

R11-3a-60
Type III Barricade
Post Mounted

4

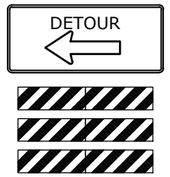
W20-3-48
Post Mounted

5

W20-3-48
Post Mounted

15

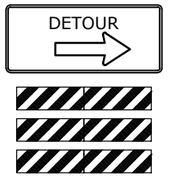
M4-10L-48
Barricade Mounted



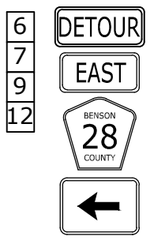
Type III Barricade
Post Mounted

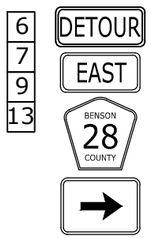
16

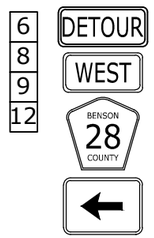
M4-10R-48
Barricade Mounted

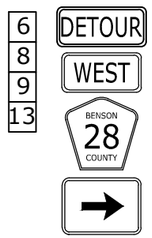


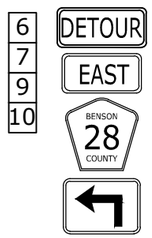
Type III Barricade
Post Mounted

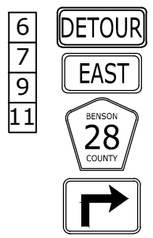


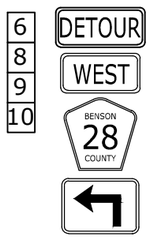


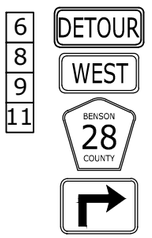


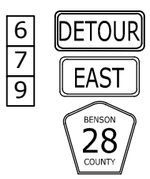


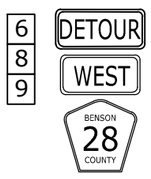


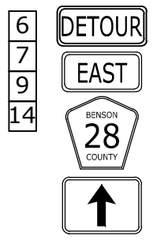


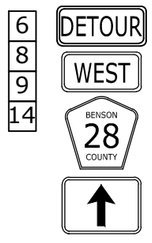










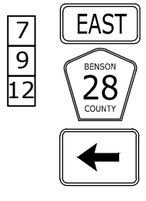


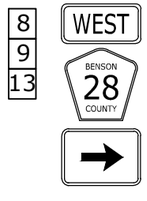
17

W20-2-48
Post Mounted

18

W20-2-48
Post Mounted





WOLD
ENGINEERING, P.C.
SINCE 1955

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WORK ZONE TRAFFIC CONTROL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	HEC-0003(024)	110	1

Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Vert Clear-ance FT	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
Sta. 6+35 Rt	W1-2L	19		6.3	13.2				5.0	2.5 x 2.5 12 ga	14.6						1	4	3 x 3 7 ga				
Sta. 9+60 Rt	Chevron	8		3.0	12.1				5.0	2 x 2 12 ga	14.6						1	4	2.25 x 2.25 12 ga				
Sta. 11+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 13+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 15+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 17+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 19+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 21+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 23+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 25+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 27+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 29+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 31+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 33+60 Rt	Chevron Dbl			6.0	12.1				5.0	2.25 x 2.25 12 ga	12.4						1	4	2.5 x 2.5 12 ga				
Sta. 35+45 Rt	Chevron	8		3.0	12.1				5.0	2 x 2 12 ga	14.6						1	4	2.25 x 2.25 12 ga				
Sta. 39+10 Lt	W1-2R	19		6.3	13.2				5.0	2.5 x 2.5 12 ga	14.6						1	4	3 x 3 7 ga				
Sta. 23+00 Rt	R1-1	1		5.2	12.6				5.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
Sta. 37+75 Rt	M1-6/M6-1	371			13.1				5.0	2.5 x 2.5 12 ga	16.2						1	4	3 x 3 7 ga	2			
Sub Total			0.0	95.8	**Total**	221.1											**Total**	72.0		2	0	0	
Grand Total			**0.0**	**95.8**	**Total**	**221.1**											**Total**	**72**	**0**	**2**	**0**	**0**	

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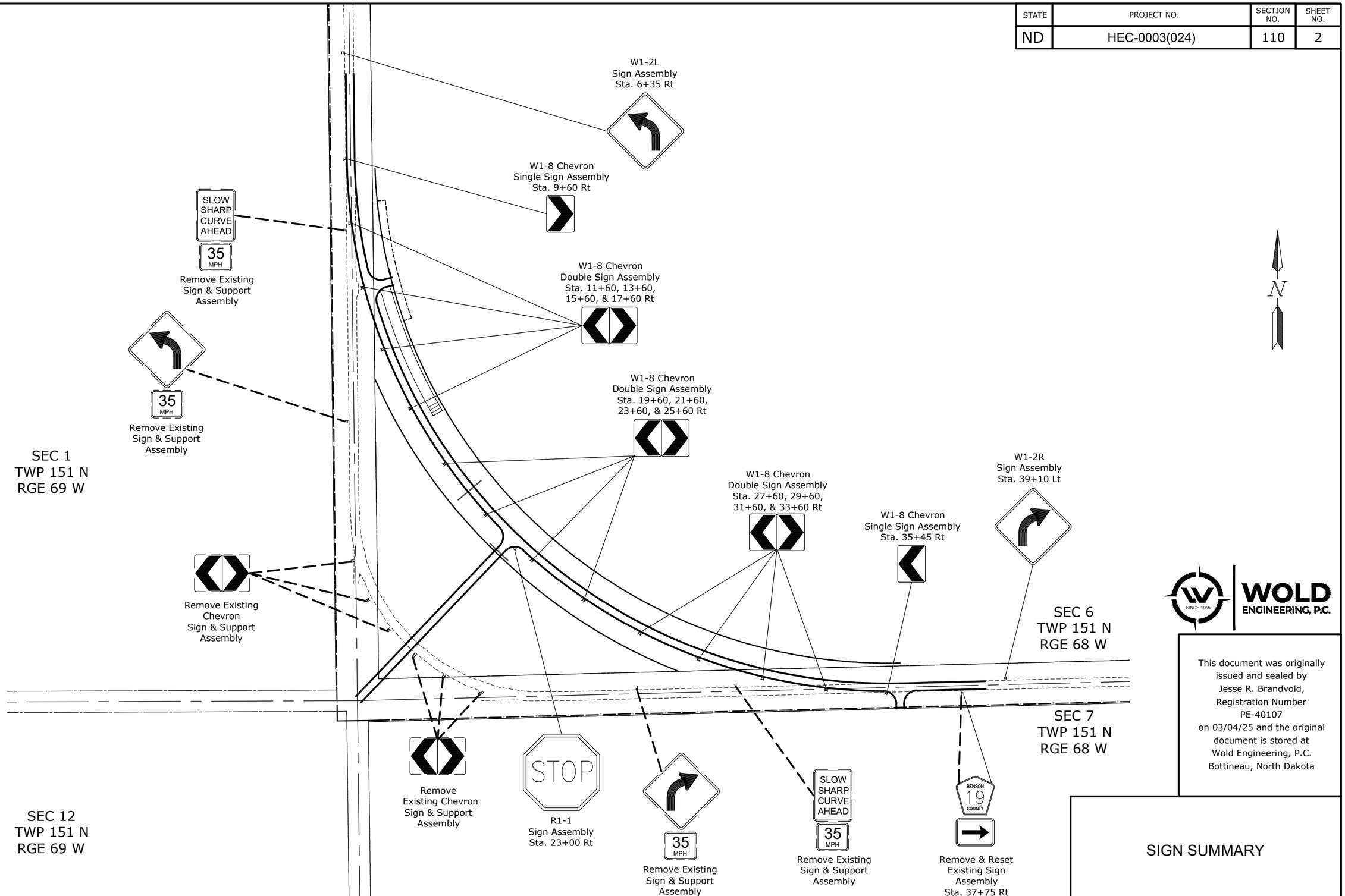
Sign Summary
Perforated Tube

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEC-0003(024)	110	2



WOLD ENGINEERING, P.C.

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SIGN SUMMARY

S:\COUNTY\Benson\2024\24-102 HEC-0003(024) PCN 23758\CMC-0328 FLORA CURVE\PLAN SHEETS\110SN_002_ PERM.dwg 3/3/25 9:26:23 AM

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
&	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
Bk	back
BF	back face
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
BI	beehive inlet
Beg	begin
BG	below grade
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
BH	bore hole
Bot	bottom
Blvd	Boulevard
Bndry	boundary
Brkwy	breakaway
Br	bridge
Bldg	building
Bus.	business
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
CL or ℄	centerline
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
CECB	concrete erosion control blanket
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
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
Co	County
Crse	course
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	crossroad
Crn	crown
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia or ø	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
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
Fed	Federal
FP	feed point
Fn	fence
Fn P	fence post
FO	fiber optic
FD	field drive
F	fill
FAA	fine aggregate angularity
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
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	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
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NORTH DAKOTA
08/16/22

NDDOT ABBREVIATIONS

D-101-2

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
Gov	government
Grd	graded/grade
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ht	height
Hel	helical
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
HTCG	high tension cable guardrail
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IP	iron pipe
Jt	joint
Jct	junction

Ln	lane
Lg	large
Lat	latitude
Lt	left
Lens	lenses
Lvl	level
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Liq	liquid
LL	liquid limit
Loc	location
Long.	longitude
Lp	loop
LD	loop detector
Lum	luminaire
Mb	mailbox
ML	main line
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
MGS	Midwest Guardrail System
MM	mile marker
MP	mile post
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Neop	neoprene
Ntwk	network
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number

Obsc	obscure(d)
Ocpd	occupied
Ocpy	occupy
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
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
Perm	permanent
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl or ℄	plate
Pt	point
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd or Pref	preformed
Prep	preperation
Press.	pressure
PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box

Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RC	rapid curing
Rec	record
Rcy	recycle
RAP	recycled asphalt pavement
RPCC	recycled portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
RCTES	reinforced concrete traversable end section
Reinf	reinforcement
Res	reservation
Res	residence
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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Salv	salvage(d)
San	sanitary sewer line
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw or Sdwk	sidewalk
SD	sight distance
SN	sign number
Sig	signal
Sgl	single
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
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
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical

Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	thinwall tube sample
Ts	topsoil
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
Trans	transition
TT	transmission tower
TES	traversable end section
Trans	transverse
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VCP	vitrified clay pipe
Vol	volume
VSFS	vehicle speed feedback sign
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
Wrng	wearing
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner

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08/16/22

NDDOT ABBREVIATIONS

MEASUREMENTS

ac	acres
A	ampere
Bd Ft	board feet
Cd	candela
cm	centimeter
C	coulomb
CF	cubic feet
m3	cubic meter
m3/s	cubic meters per second
CY	cubic yard
CY/mi	cubic yards per mile
D or Deg	degree
F	Fahrenheit
F	farad
ft	feet/foot
Gal	gallon
G	giga
Ha	hectare
H	henry
Hz	hertz
hr	hour(s)
in	inch
J	joule
K	kelvin
kN	kilo newton
kPa	kilo pascal
kg	kilogram
kg/m3	kilogram per cubic meter
km	kilometer
K	Kip(s)
LF	linear foot
L	litre
Lm	lumen
L sum	lump sum
Lx	lux
M Hr	man hour
M	mega
m	meter
m/s	meters per second
mi	mile
mL	milliliter
mm	millimeter
mm/hr	millimeters per hour
n	nano
N	newton
Pa	pascal
lb	pounds
sec	seconds
S	siemens
SF	square feet
km2	square kilometer
m2	square meter
SY	square yard
Sta Yd	station yards
SI	Systems International
T	tesla
T/mi	tons per mile
V	volt
W	watt
Wb	weber

SURVEY DESCRIPTIONS

Az	azimuth
Bs	backsight
Brg	bearing
BP Cap	blue plastic cap
BS	both sides
BC	brass cap
CS	curve to spiral
Eq	equation
E	external of curve
FS	far side
FB	field book
Fs	foresight
Geod	geodetic
GIS	Geographical Information System
GPS	Global Positioning System
HI	height of instrument
IM	iron monument
I Pn	iron pin
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
L	length of curve
LC	long chord
LB	level book
Mer	meridian
M	mid ordinate of curve
NGS	National Geodetic Survey
NS	near side
Obsn	observation
Off Loc	office location
OP Cap	orange plastic cap
PK	Parker-Kalon nail
P Cap	plastic cap
PP Cap	pink plastic cap
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
RTP	random traverse point
Rge	range
RP Cap	red plastic cap
SC	spiral to curve
ST	spiral to tangent
Sta	station
SE	superelevation
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Twp	township
TB	transit book
TP	traverse point
TP	turning point
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
VC	vertical curve
WGS	World Geodetic System
YP Cap	yellow plastic cap
Z	zenith

SOIL TYPES

Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Co S	coal slack
C Gr	coarse gravel
CS	coarse sand
FS	fine sand
Gr	gravel
Lig Co	lignite coal
Lig Sl	lignite slack
Lm	loam
Rk	rock
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
Sc	scoria
Sh	shale
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
07-01-14

REVISIONS

DATE	CHANGE
12-18-20	Sheet Added - Continued from D-101-3

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12 18 2020

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
AGC	Assiociated General Contractors of America
ALL PL	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
CENTURYLINK	CenturyLink
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
EQUINOR	Equinor Pipeline
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
GTR RAMSEY WD	Greater Ramsey Water District
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
MIDCO	MidContinent Communications
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS VALL COMM	Missouri Valley Communications
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
NWRWD	Northwest Rural Water District
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
PAAP	Plains All American Pipeline
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
RED RIV COMM	Red River Rural Communications
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Cooperative
RRVW	Red River Valley & Western Railroad
S CENT REG WD	South Central Regional Water District
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
WAPA	Western Area Power Administration
WAWSA	Western Area Water Supply Authority
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	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

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08/16/22

LINE STYLES

D-101-20

Existing Topography

- Existing Ground Void
- Existing Cemetary Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter
- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts

Proposed Topography

- 3-Cable w Posts
- Flow
- Fence
- Remove Line
- Wall
- Retaining Wall (Plan View)
- W-Beam w Posts
- High Tension Cable Guardrail with Posts

Existing Utilities

- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Existing Culvert
- Existing Telephone Line
- Existing TV Line
- Existing Water or Steam Line
- Existing Under Drain
- Existing Slotted Drain
- Existing Conduit
- Existing Conductor
- Existing Down Guy Wire Down Guy
- Existing Underground Vault or Lift Station

Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

Traffic Utilities

- Conductor
- Fiber Optic
- Existing Loop Detector
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Micro Loop Detector
- Micro Loop Detector
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm

Sign Structures

- Existing Overhead Sign Structure
- Existing Overhead Sign Structure Cantilever
- Overhead Sign Structure Cantilever

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
09-23-16 12-18-20	Added and Revised Items, Organized by Functional Groups General Revisions

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12 18 2020

LINE STYLES

D-101-21

Right Of Way

- Easement
- Existing Easement
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Existing Right of Way Not State Owned
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines
- Sight Distance Triangle Line
- Dimension Leader

Boundary Control

- Existing City Corporate Limits or Reservation Boundary
- Existing State or International Line
- Existing Township
- Existing County
- Existing Section Line
- Existing Quarter Section Line
- Existing Sixteenth Section Line
- Existing Centerline
- Tangent Line

Cross Sections and Typicals

- Existing Ground
- Existing Topsoil (Cross Section View)
- Existing Ground Void (Not Surveyed) (void — void — void — v)
- Existing Concrete
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar

Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

- 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

Pavement Joints

- Doweled Joint
- Tie Bar 30 Inch 4 Foot Center to Center
- Tie Bar 18 Inch 3 Foot Center to Center
- Tie Bar at Random Spacing

Bridge Details

- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Existing Conditions Object
- Centerline Main
- Centerline Secondary
- Excavation Limits
- Proposed Ground
- Sheet Piling

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

Environmental

- Wetland Mitigation
- Existing Wetland Easement USFWS
- Existing Wetland Jurisdictional
- Existing Wetland
- Tree Row

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16 12-18-20	Added and Revised Items, Organized by Functional Groups General Revisions

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SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

Right of Way Marker (Exst, Ppsd, Reset)

Existing Federal Reference Corner

Existing Section Corner (Full, Quarter, Sixteenth, Meander)

Existing Witness Corner

Existing Control Point (CP, GPS-RTK, TRI)

Existing Traverse PI Aerial Panel

Existing Reference Marker Point NGS

Existing EFB Misc

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

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SYMBOLS

D-101-31

- Flexible Delineator
- Flexible Delineator Type A (Exst, Ppsd)
- Flexible Delineator Type B (Exst, Ppsd)
- Flexible Delineator Type C (Exst, Ppsd)
- Flexible Delineator Type D (Exst, Ppsd)
- Flexible Delineator Type E (Exst, Ppsd)
- Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type C (Exst, Ppsd, Diamond Grade)
- Delineator Type D (Exst, Ppsd, Diamond Grade)
- Delineator Type E (Exst, Ppsd, Diamond Grade)
- Barricade (Type I, Type II, Type III}
- Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)
- Attenuation Device
- Truck Mounted Attenuator
- Delineator Drums
- Flagger
- Tubular Marker
- Traffic Cone
- Back to Back Vertical Panel Sign

- Highway Sign (Exst, Ppsd)
- Mile Post Type A (Exst-Ppsd-Reset)
- Mile Post Type B (Exst, Ppsd)
- Mile Post Type C (Exst, Ppsd)
- Object Marker Type I (Exst, Ppsd)
- Object Marker Type II (Exst, Ppsd)
- Object Marker Type III (Exst, Ppsd)
- Existing Reference Marker
- Road Closure Gate 18 Ft (Exst, Ppsd)
- Road Closure Gate 28 Ft (Exst, Ppsd)
- Road Closure Gate 40 Ft (Exst, Ppsd)
- Existing Railroad Battery Box
- Existing RR Profile Spot
- Existing Railroad Crossbuck
- Existing Railroad Frog
- Existing Mailbox (Private, Federal)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

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SYMBOLS

D-101-32

- Existing Luminaire
- Luminaire LED
- Existing Light Standard Luminaire
- Relocate Light Standard
- Light Standard Light LED Luminaire
- Light Standard 35 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 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 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 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Emergency Vehicle Detector
- Video Detection Camera

- High Mast Light Standard 3 Luminaire (Exst, Ppsd)
- High Mast Light Standard 4 Luminaire (Exst, Ppsd)
- High Mast Light Standard 5 Luminaire (Exst, Ppsd)
- High Mast Light Standard 6 Luminaire (Exst, Ppsd)
- High Mast Light Standard 7 Luminaire (Exst, Ppsd)
- High Mast Light Standard 8 Luminaire (Exst, Ppsd)
- High Mast Light Standard 9 Luminaire (Exst, Ppsd)
- High Mast Light Standard 10 Luminaire (Exst, Ppsd)
- Overhead Sign Structure Load Center (Exst, Ppsd)
- Traffic Signal Controller (Exst, Ppsd)
- Pad Mounted Traffic Signal Controller (Exst, Ppsd)
- Flashing Beacon (Exst, Ppsd)
- Concrete Foundation (Exst, Ppsd)
- Pipe Mounted Flasher (Exst, Ppsd)
- Pad Mounted Feed Point (Exst, Ppsd)
- Pipe Mounted Feed Point with Pad (Exst, Ppsd)
- Pole Mounted Feed Point (Exst, Ppsd)
- Junction Box (Exst, Ppsd)
- Existing Pedestrian Head with Number
- Existing Signal Head
- Pole Mounted Head
- Existing Lighting Standard Pole

- Existing Traffic Signal Standard
- Pull Box (Exst-Ppsd-Undefined)
- Intelligent Transportation Pull Box (Exst, Ppsd)
- Transformer (Exst, Ppsd)
- Power Pole (Exst-Ppsd-with Transformer)
- Wood Pole (Exst, Ppsd)
- Pedestrian Push Button Post (Exst, Ppsd)
- Existing Pole
- Existing Telephone Pole
- Existing Post
- Connection Conductor (Ground, Neutral, Phase 1, Phase 2)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

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SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)

Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)

Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)

Force Main Storm Drain Manhole (Exst, Exst with Valve)

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

Existing Curb Inlet (Round, Square)

Existing Slotted Reinforced Concrete Pipe

Catch Basin (Riser 30 Inch, Beehive, Type A)

Inlet Mountable Curb (Type A, Type B)

Inlet Saddle Base (Type 1, Type 2)

Inlet Special (Catch Basin, Type 1, Type A)

Inlet (Tee, Type 1, Type 2, Type 2 Double)

Median Drain

Headwall (Exst, Ppsd, Ppsd Single with Vegitation Barrier, Ppsd Double with Vegitation Barrier)

Cap or Stub
Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water

Existing Pedestal
Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined

Existing Pipe Vent
Gas, Fuel, Sanitary, Storm Drain, Water, Undefined

Valve
Exst Gas, Exst Water, Ppsd Water, Exst Undefined

Pump
Sanitary, Storm Drain, Exst Water

Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

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12 18 2020

Cross Section Legend

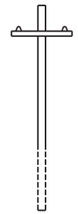
D-101-40

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	CBL1	CBL2
Conduit Line	CDU1	CDU2
Electric Line	E1	E2
Fiber Optic Line	F1	F2
Gas Main Line	GM1	GM2
Gas Service Line	GS1	GS2
Gas Transmission Line	GT1	GT2
Fuel Pipeline	PL1	PL2
Sanitary Sewer Force Main	SSF1	SSF2
Sanitary Sewer	SS1	SS2
Steam Line	STE1	STE2
Storm Drain (Assumed Depth)	SD1	SD2
Telephone Line	T1	T2
TV Line	TV1	TV2
Water Main Line	WM1	WM2
Water Service Line	WS1	WS2

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Overhead Power Transmission Line	OHT1	OHT2
Overhead Line	OH1	OH2

Light Standard - Multiple Variations
- Concrete
- Steel
- Wood
- with Traffic Signal

Pole - Multiple Variations
- Utility
- Brace
- Feed Point
- Guy
- Power
- Power Structure
- Power with Light
- Power with Transformer



Manhole - Multiple Variations
- Electric
- Fiber Optic
- Gas
- Inlet
- Sanitary Force Main
- Sanitary
- Sanitary with Valve
- Steam
- Storm
- Storm Force Main
- Storm with Valve
- Telephone
- Water
- Water with Meter
- Water with Valve
- Water with Air Release Valve

Anchor

High Tension Cable Guardrail

* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.

Connection to infer that probably will not be displayed

When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

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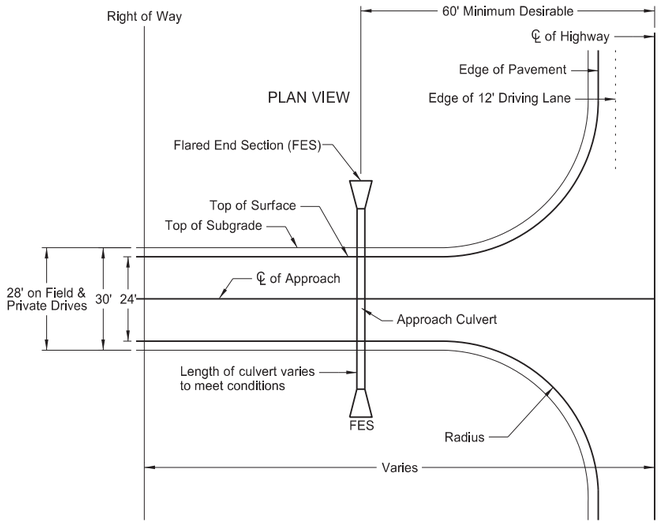
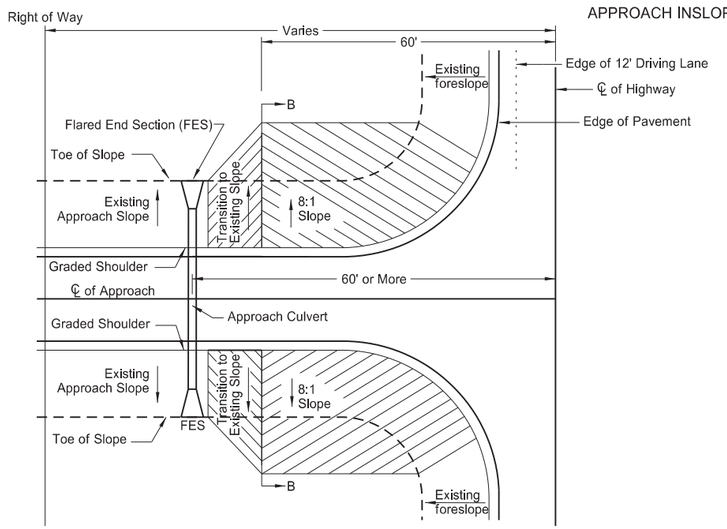
06/14/23

STANDARD RURAL APPROACHES

D-203-8

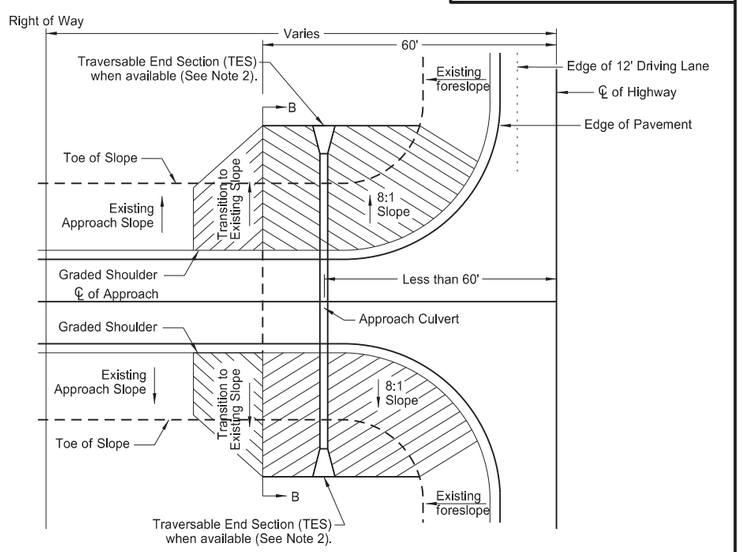


APPROACH INSLOPES



CASE 1

APPROACH PIPE LOCATED
60' OR MORE FROM ℄



CASE 2

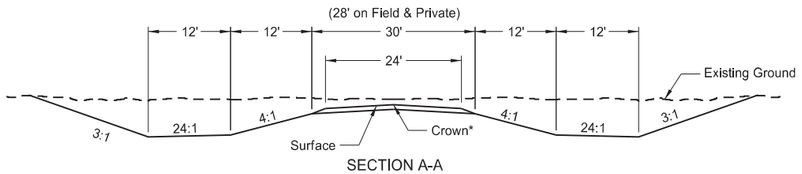
APPROACH PIPE LOCATED
LESS THAN 60' FROM ℄

Approach Pipe Traversable End Sections (TES)

RCP	CSP	CSP Arch
15"	15"	
18"	18"	21"x15"
		24"x18"
24"	24"	28"x20"

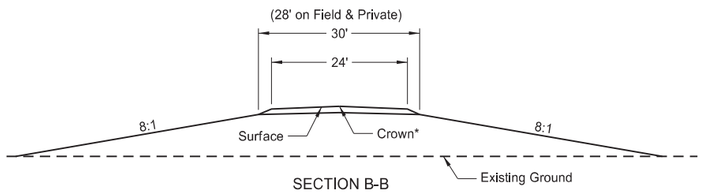
CRITERIA FOR RURAL APPROACH TYPES

	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=40 ft	R=40 ft	R=50 ft
Maximum Grade	10%	7%	7%
Storage Platform	24 ft	24 ft	50 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)

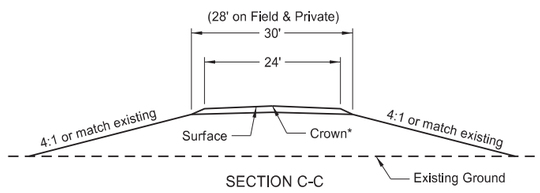


SECTION A-A

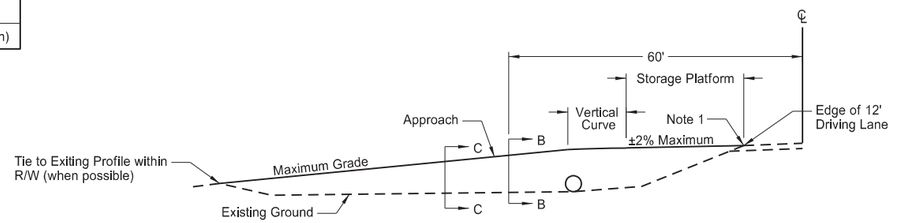
*2.1% crown for paved surface
*3.0% crown for gravel surface



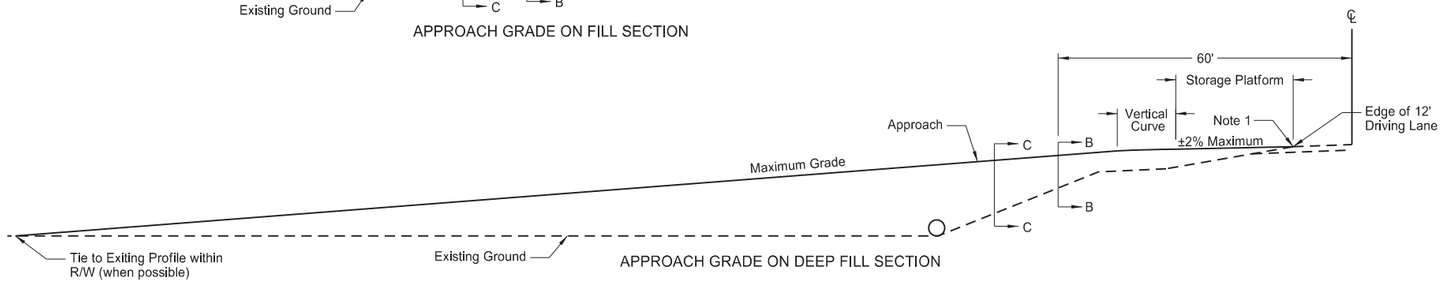
SECTION B-B



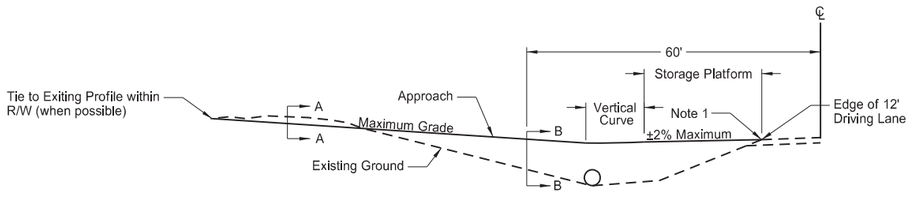
SECTION C-C



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION



APPROACH GRADE ON CUT SECTION

NOTES:

1. 5% Max Rollover between approach storage platform and highway.
2. Approach pipes up to 24" diameter are acceptable (with traversable end sections) for Case 2. Install approach pipes larger than 24" diameter in accordance with Case 1.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
REVISIONS	
DATE	CHANGE
06-30-17	Revised Radius, Storage Platform, Inslope dimensions, and Note 1
10-25-19	Changed "Inslope" to "Foreslope"
06-29-22	Added "TES", Table, and Note 2

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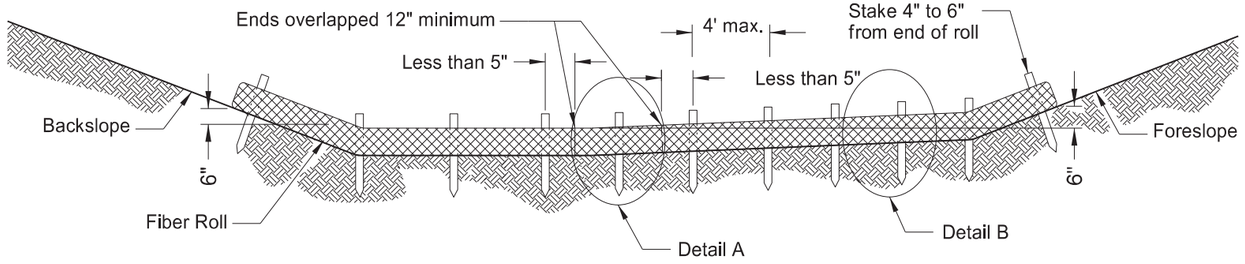
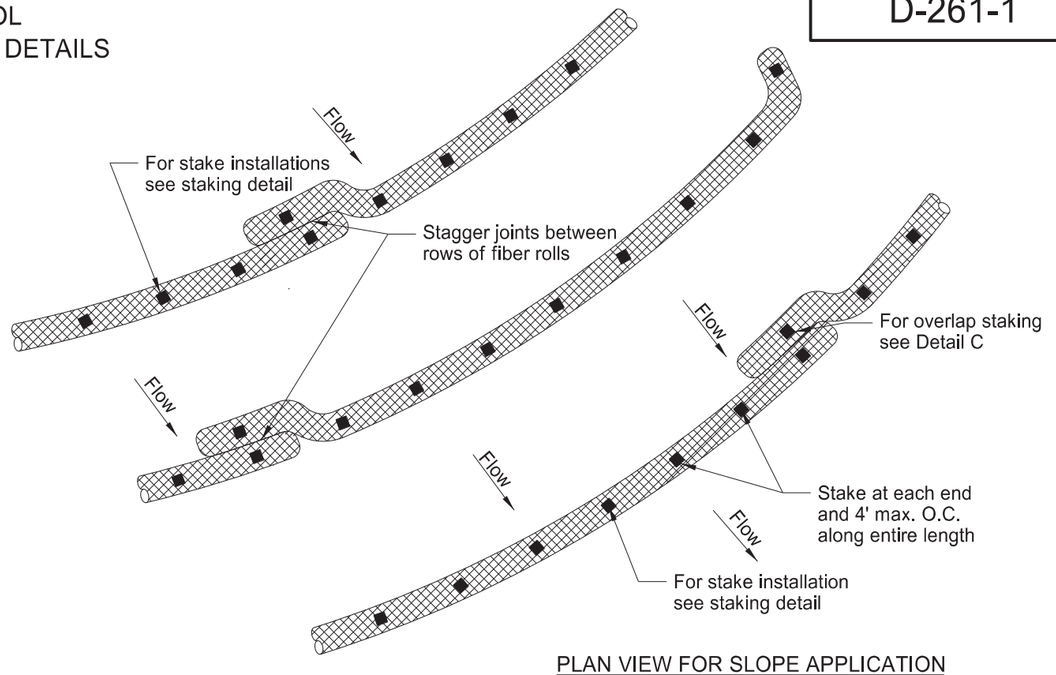
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

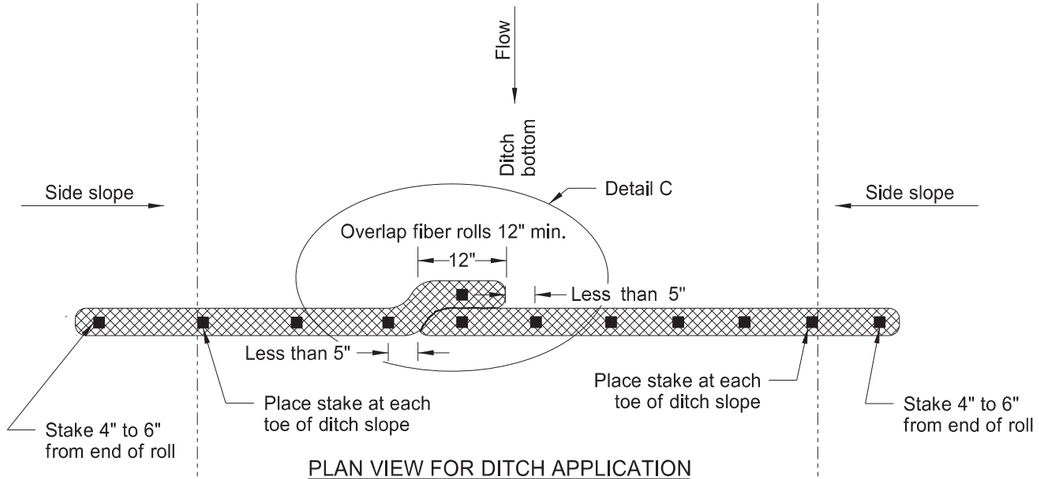


12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



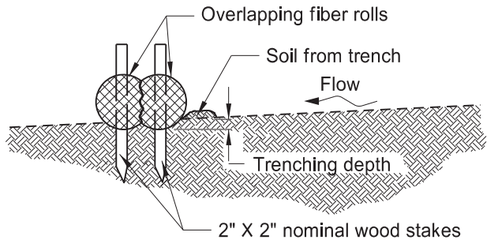
PLAN VIEW FOR SLOPE APPLICATION

Ensure fiber rolls are placed along the contours of the slope.



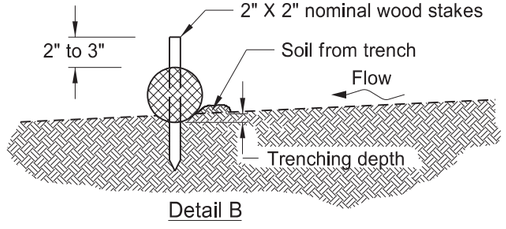
PLAN VIEW FOR DITCH APPLICATION

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"



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp
04-22-24	Slope Plan View-Overlap Change.

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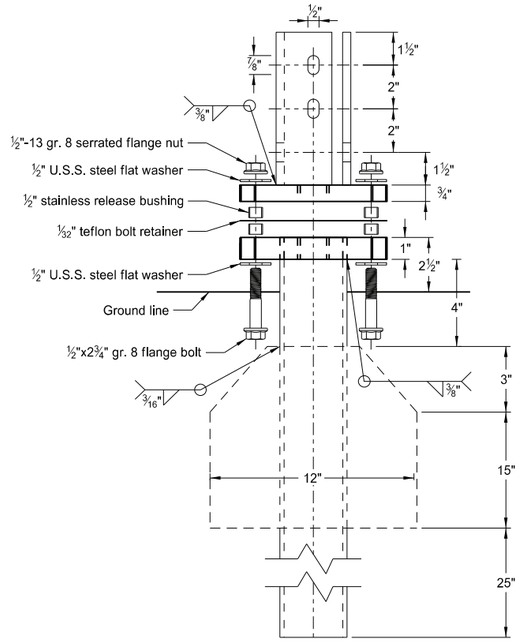
04/22/24

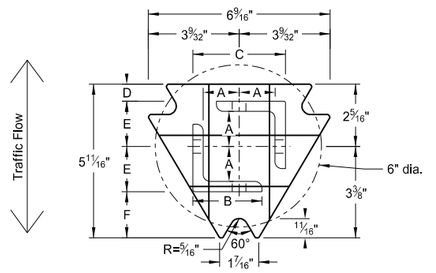
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

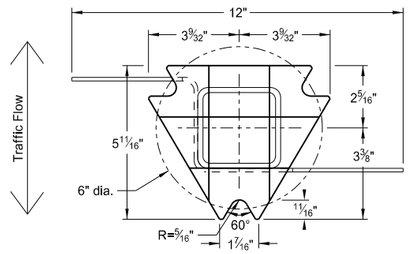


Multi-Directional
Slip Base Assembly

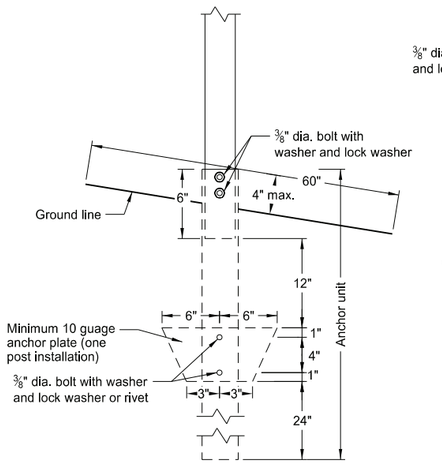
Perforated Tube



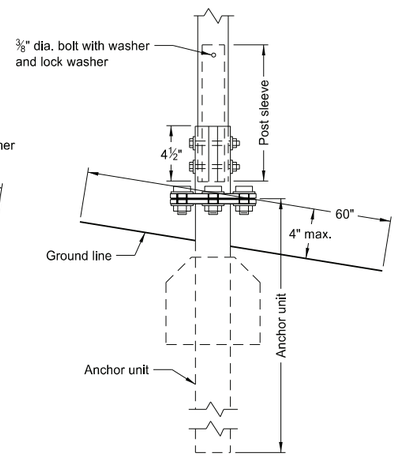
Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



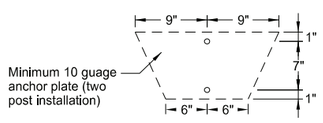
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

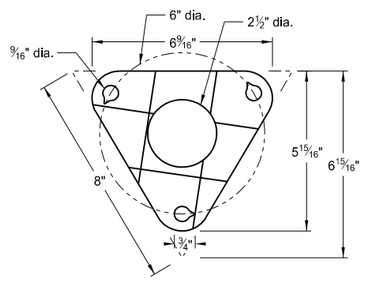


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





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

Notes:

1. Torque slip base bolts as specified by manufacturer.
2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
4. In concrete sidewalk, use same anchor without wings.
5. Provide more than 7' between the first and fourth posts of a four post sign.

Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in.⁴	Cross Sec. Area in.²	Section Modulus in.³
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	0.785

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2½"	3 1/32"	25/32"	1 33/64"	1 7/8"
2½"x10 ga.	1 9/32"	2½"	3 5/16"	⅝"	1 21/32"	1¾"

(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

(B) For additional wind load, insert the 2 3/16"x10 ga. into 2½"x10 ga.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

KIRK J. HOFF
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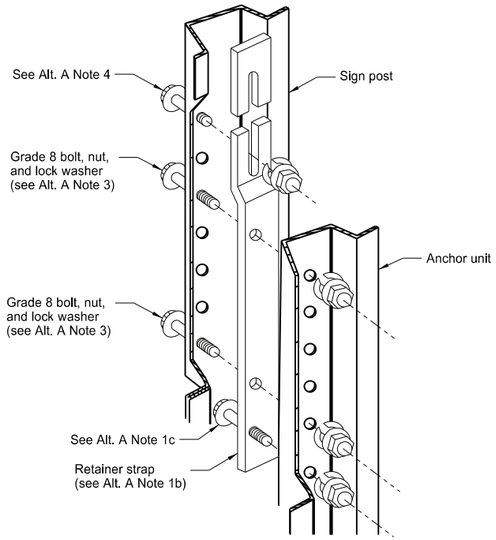
08/01/24

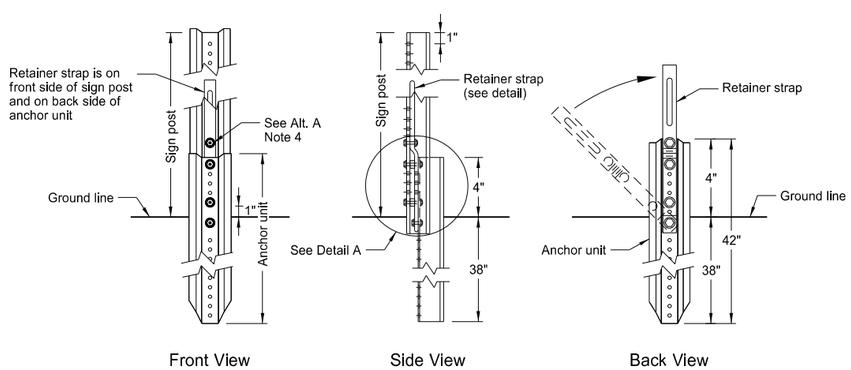
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



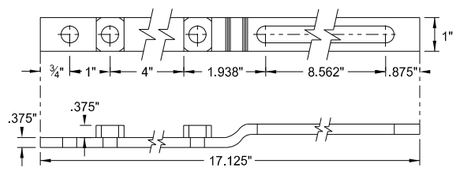
Detail A



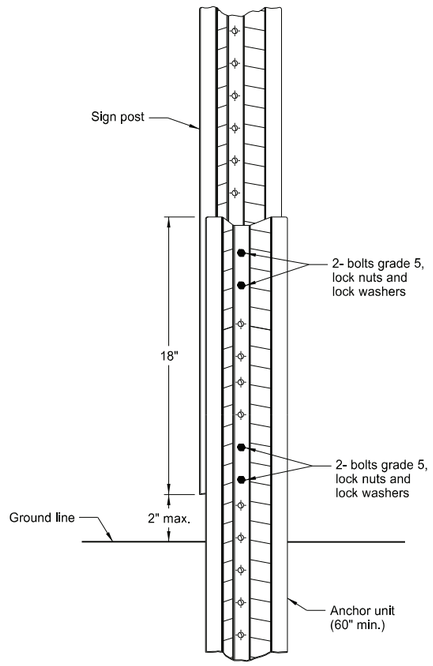
Front View | Side View | Back View

Breakaway U-Channel Detail Alternate A

Install a maximum of 2 posts within 7'.

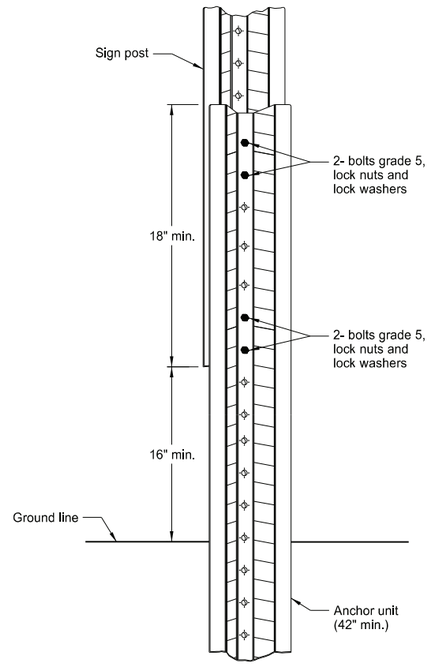


Retainer Strap Detail



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

Install a maximum of 3 posts within 7'.



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

Install a maximum of 3 posts within 7'.

Alternate A Steps of Installation:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
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DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

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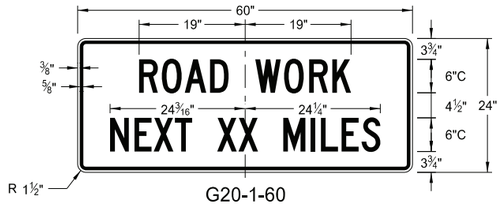
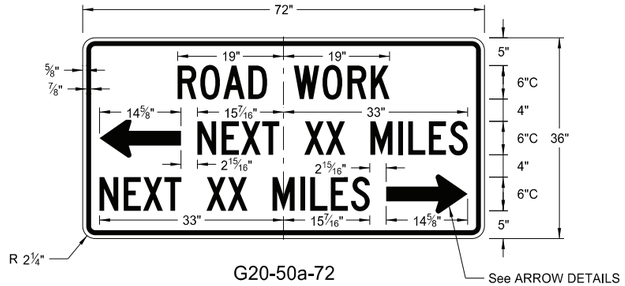
08/01/24

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

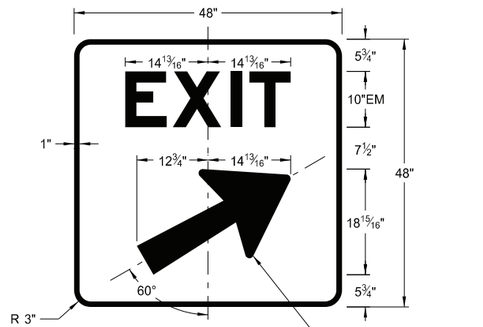
D-704-9



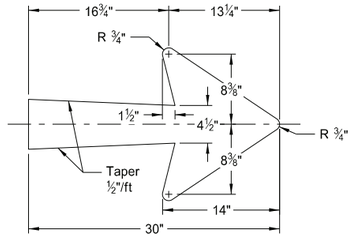
G20-1-60
Legend: black (non-refl)
Background: orange



G20-50a-72
Legend: black (non-refl)
Background: orange

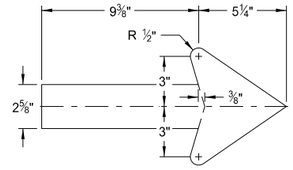


E5-1(L or R)-48
Legend: white
Background: green (orange optional)

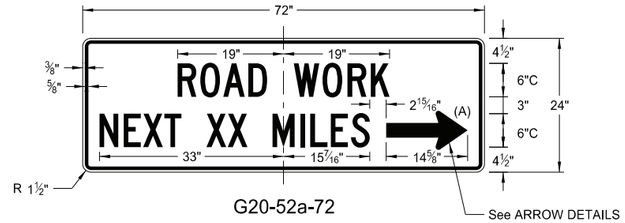


E5-1-48

G20-1b-60
Legend: black (non-refl)
Background: orange



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



G20-52a-72
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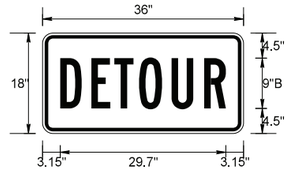
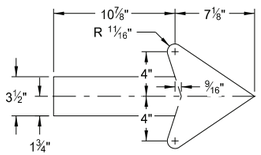
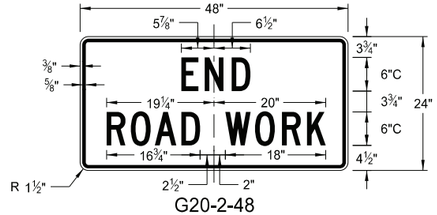
Background: orange



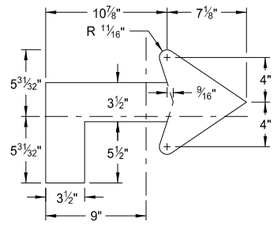
M4-8-36
Legend: black (non-refl)
Background: orange



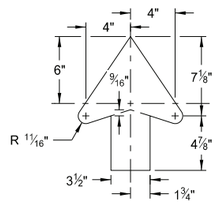
M4-9(L or R)-30
Right or Left



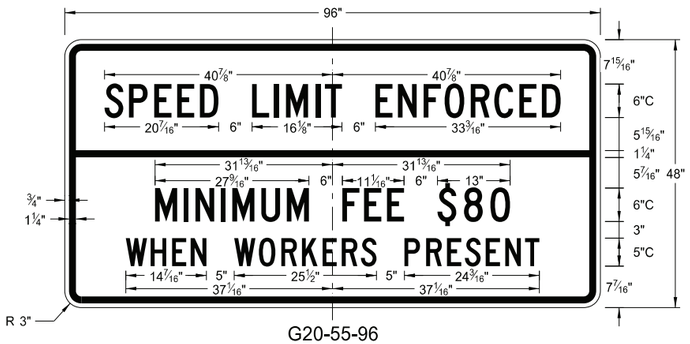
G20-2-48
Legend: black (non-refl)
Background: orange



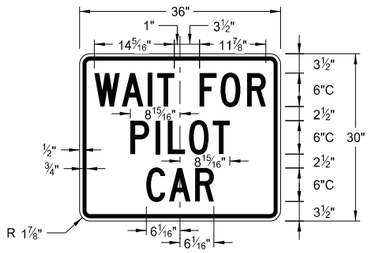
M4-9(L or R)-30
Advanced Right or Left



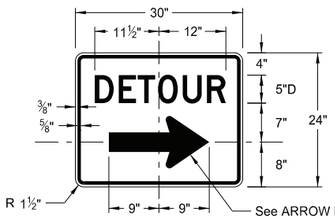
M4-9-30
Straight



G20-55-96
Legend: black (non-refl)
Background: orange



G20-4b-36
Legend: black (non-refl)
Background: orange



M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

ARROW DETAILS

NOTES:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp
8-01-24	Electronic Stamp/Signature

KIRK J. HOFF
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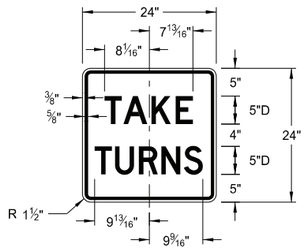
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50P-24
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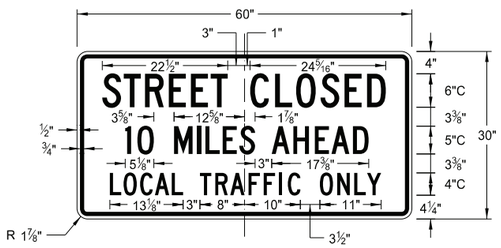
Background: white



R11-3c-60
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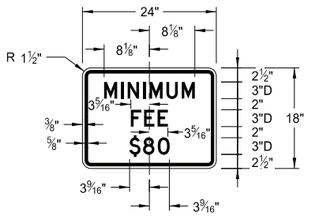
Background: white



R2-1aP-24
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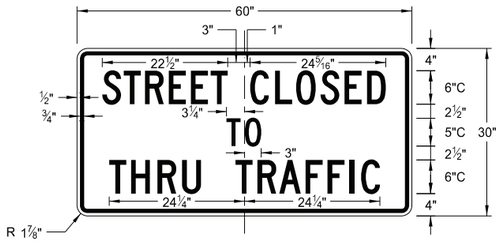
Background: white



R11-4a-60
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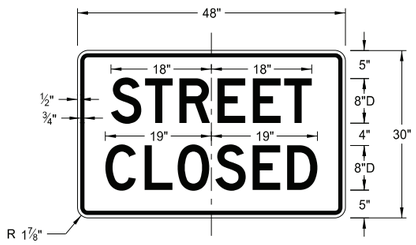

R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp
8-01-24	Electronic Stamp/Signature

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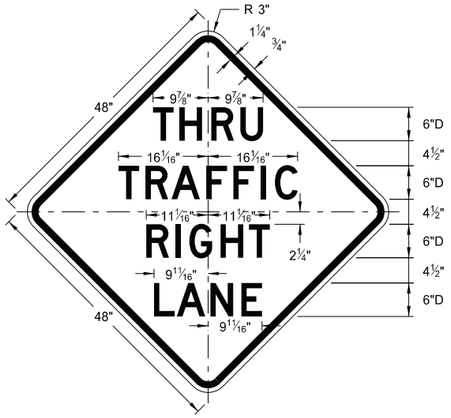
08/01/24

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



W5-8-48
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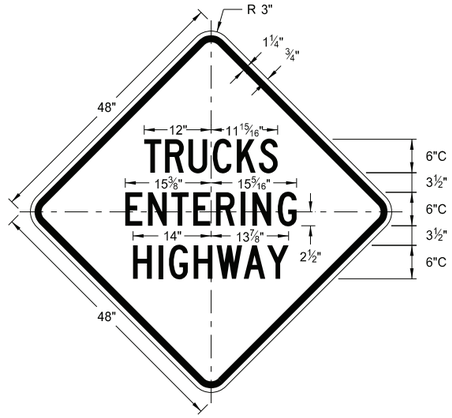
Background: orange



W8-53-48
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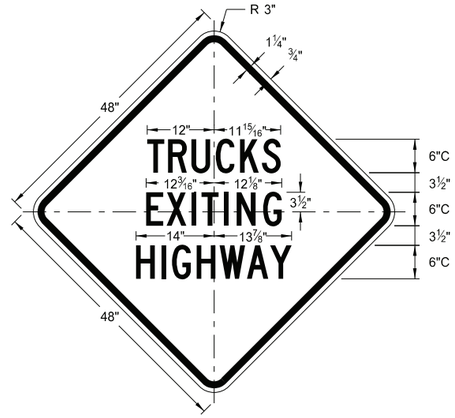
Background: orange



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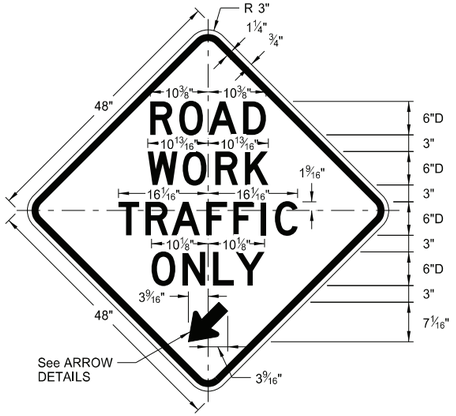
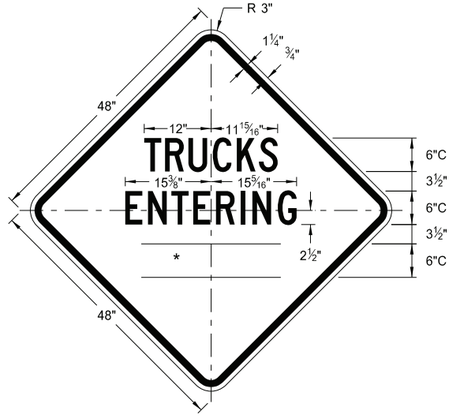
Background: orange



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



W8-54-48
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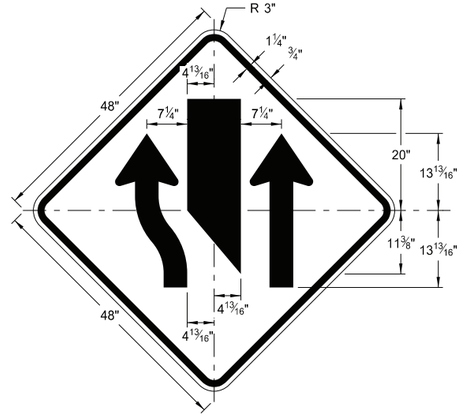
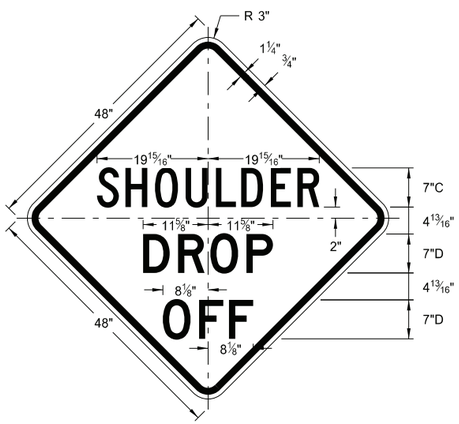
Background: orange



W9-3a-48
Legend; black (non-refl)
Background: orange



W8-9a-48
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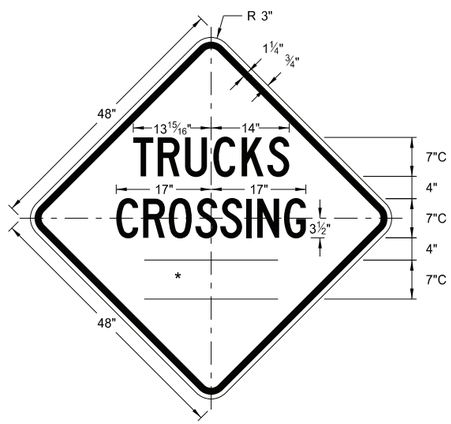
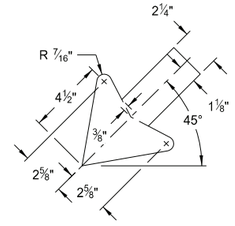


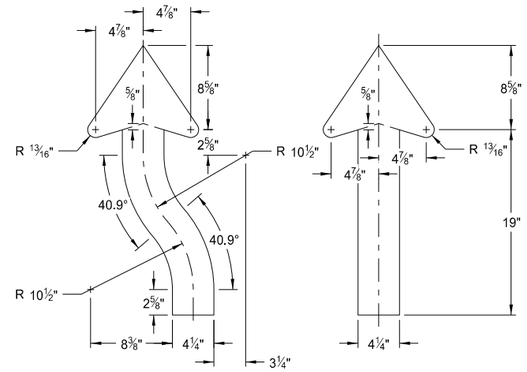
W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp
8-01-24	Electronic Stamp/Signature

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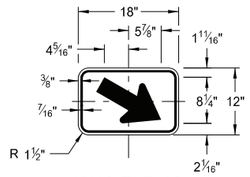
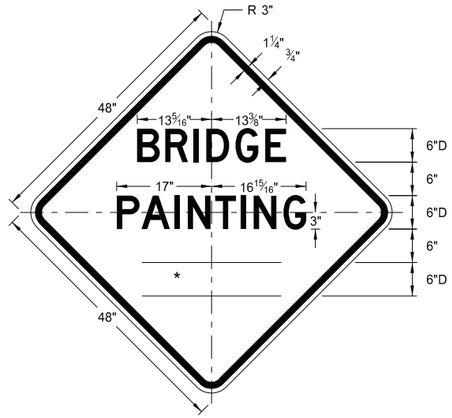
08/01/24

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

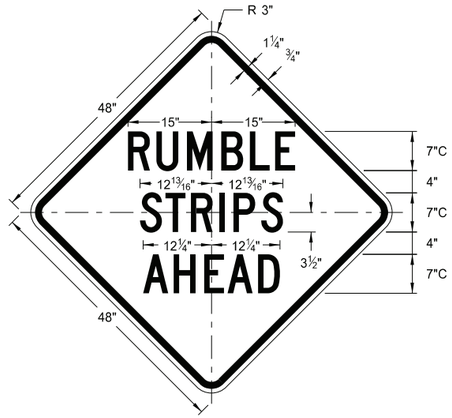
D-704-11A



W16-7aP-18
Legend: black (non-refl)
Background: orange



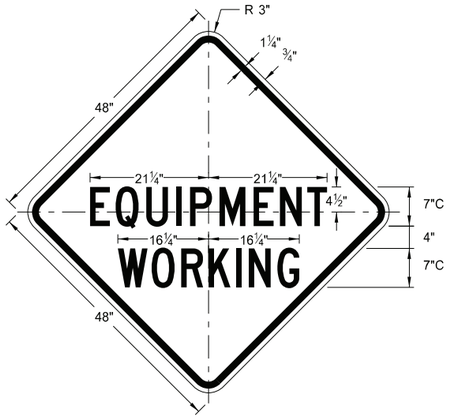
W21-50-48
Legend: black (non-refl)
Background: orange



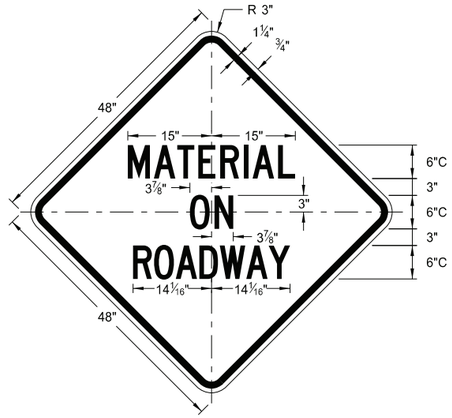
W21-53-48
Legend: black (non-refl)
Background: orange

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

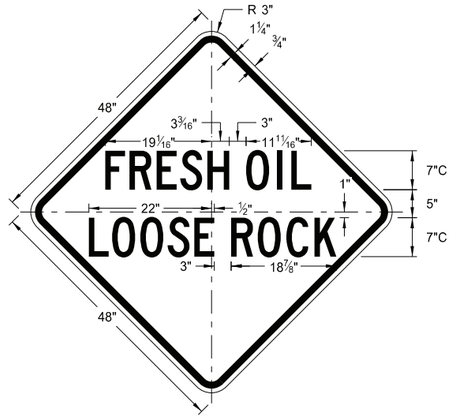
* DISTANCE MESSAGES



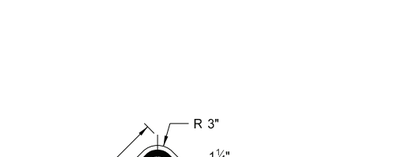
W20-51-48
Legend: black (non-refl)
Background: orange



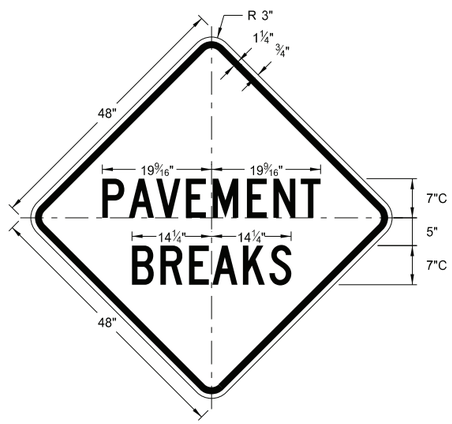
W21-51-48
Legend: black (non-refl)
Background: orange



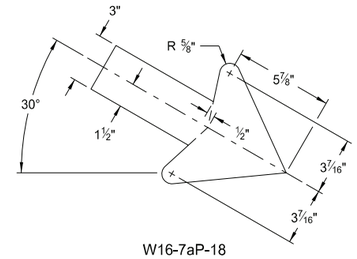
W22-8-48
Legend: black (non-refl)
Background: orange



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



W21-52-48
Legend: black (non-refl)
Background: orange



W16-7aP-18

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.
8-01-24	Electronic Stamp/Signature.

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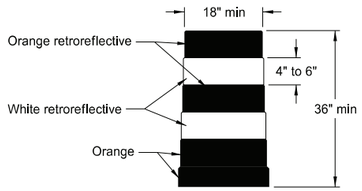
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

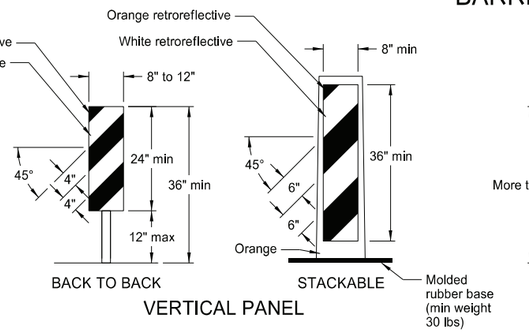
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



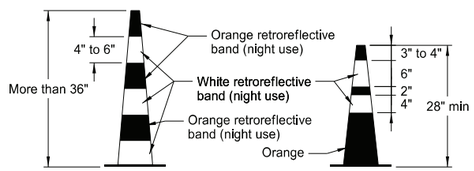
DELINEATOR DRUM

Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectorized spaces between the horizontal orange and white stripes. Avoid placement of stripes on drum ribs or indentations. Use closed top drums that will not allow collection of debris. Do not place ballast on the top of drum.



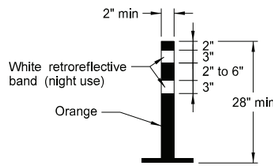
VERTICAL PANEL

Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with 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, use a stripe width of 6 inches.



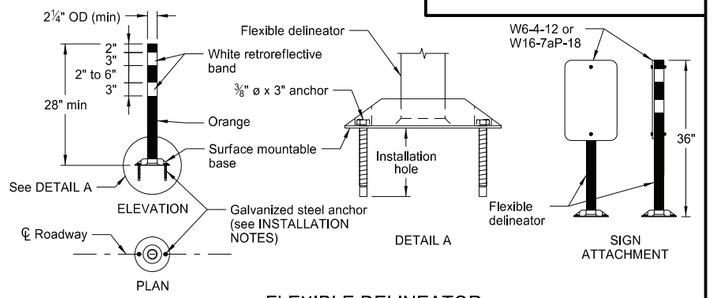
TRAFFIC CONE

Provide retroreflectorization of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectorized space between the orange and white stripes.



TUBULAR MARKER

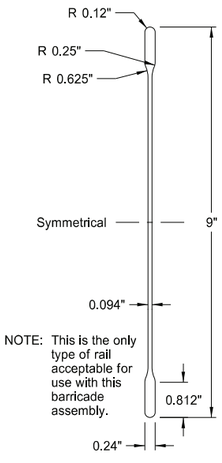
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



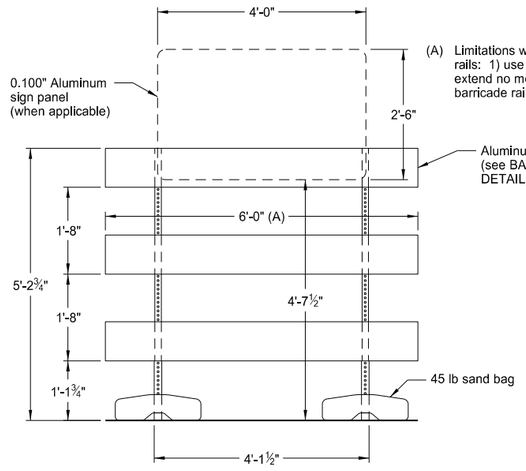
FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth 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, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close as possible to pavement surface.

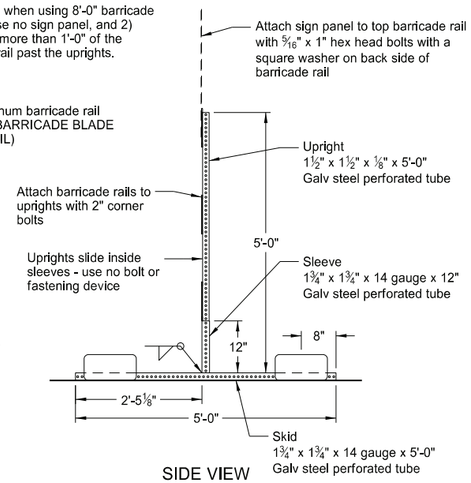


BARRICADE BLADE DETAIL



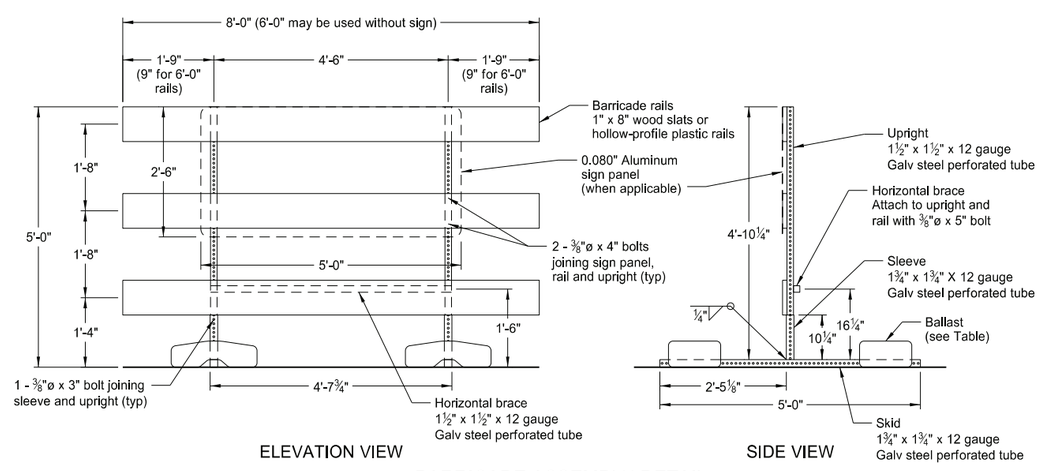
ELEVATION VIEW

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.



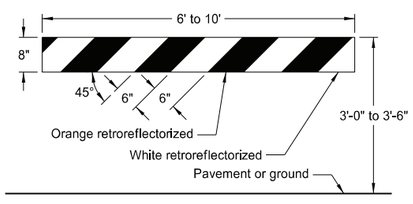
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

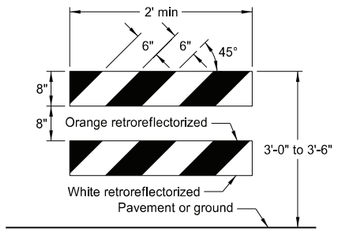


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

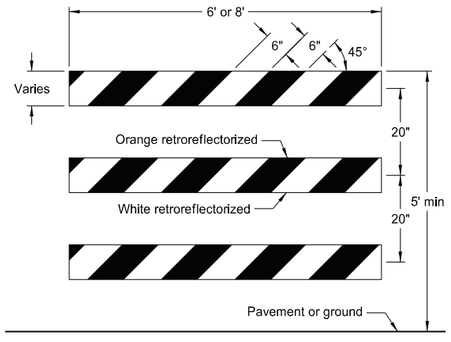
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", use a rail stripe width of 4".



TYPE I BARRICADE

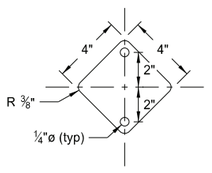


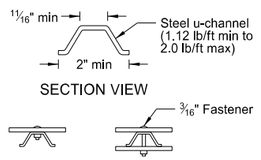
TYPE II BARRICADE

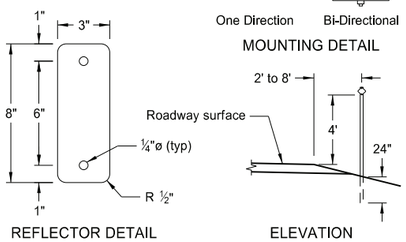


TYPE III BARRICADE

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: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	Revised details for Flexible Delineator
8-01-24	Electronic Stamp/Signature

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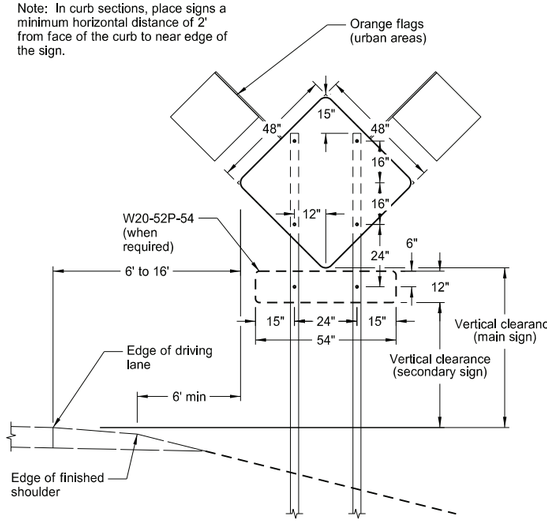
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

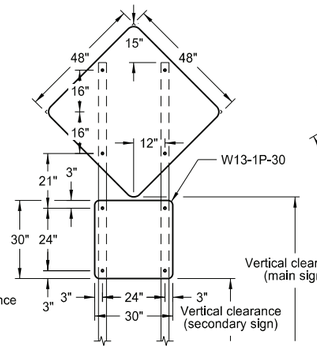
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

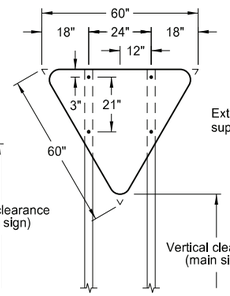
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



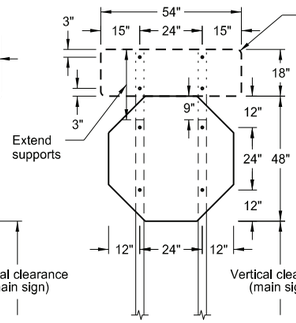
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



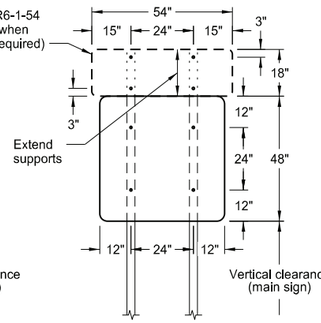
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



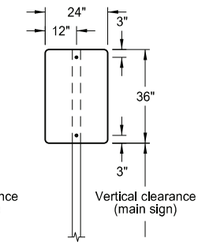
R1-2-60 - YIELD SIGN



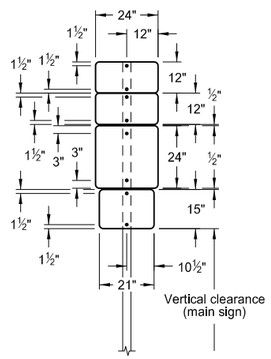
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



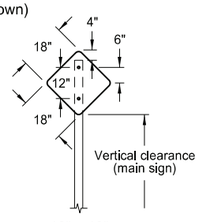
48" x 48" SIGN
(with R6-1-54 sign as required)



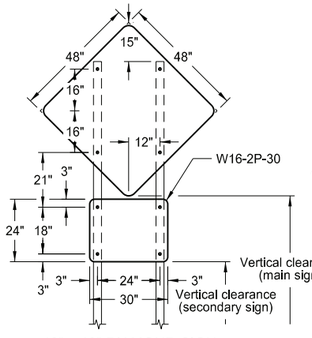
24" x 36" SIGN



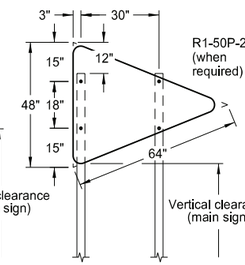
24" x 24"
ROUTE MARKER
ASSEMBLY



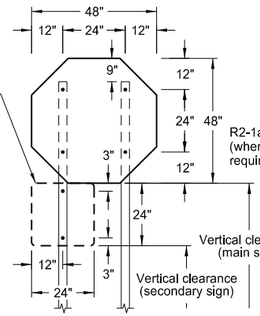
18" x 18"
DIAMOND SIGN



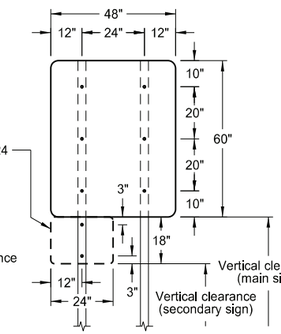
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



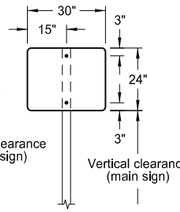
W14-3-64 - PENNANT SIGN



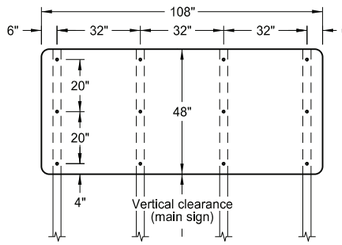
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



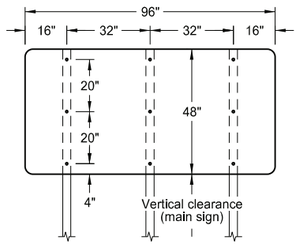
48" x 48" SIGN
(with R2-1aP-24 sign as required)



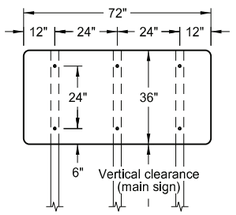
30" x 24" SIGN



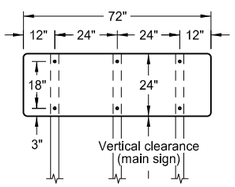
108" x 48" SIGN



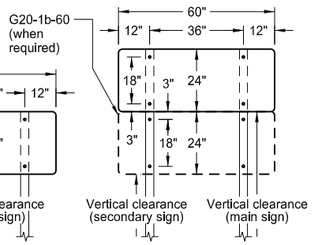
96" x 48" SIGN



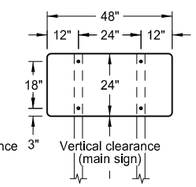
72" x 36" SIGN



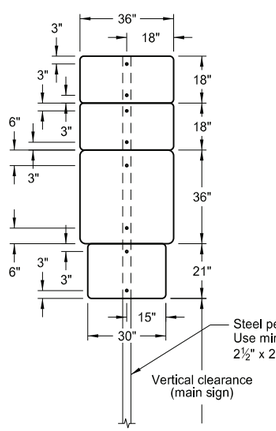
72" x 24" SIGN



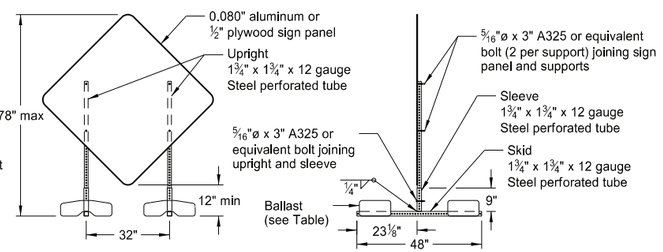
60" x 24" SIGN



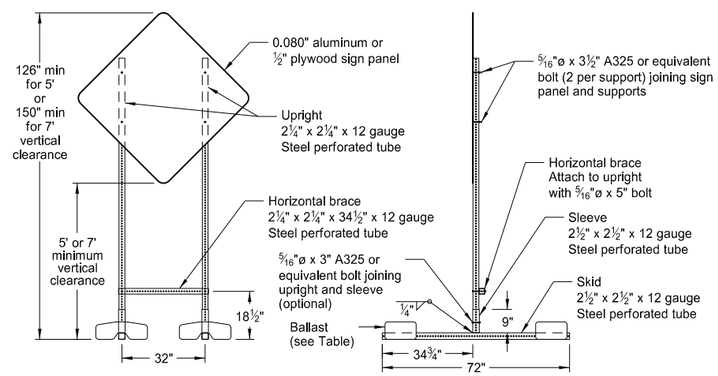
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. 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, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.

   Place signs over 50 square feet on 2½" x 2½" perforated tube supports as a minimum.

   Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.

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

3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on 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 stated above.

   Provide a minimum clearance of 7'-0" from the ground at the post for signs with an area exceeding 50 square feet.

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

   Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed 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. Use of R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 is allowed for longer than 5 days.

   Restrict signs mounted on portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT details to 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. Place sandbags at or near the ends of skids.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

10-4-13

REVISIONS

DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail
8-01-24	Electronic Stamp/Signature

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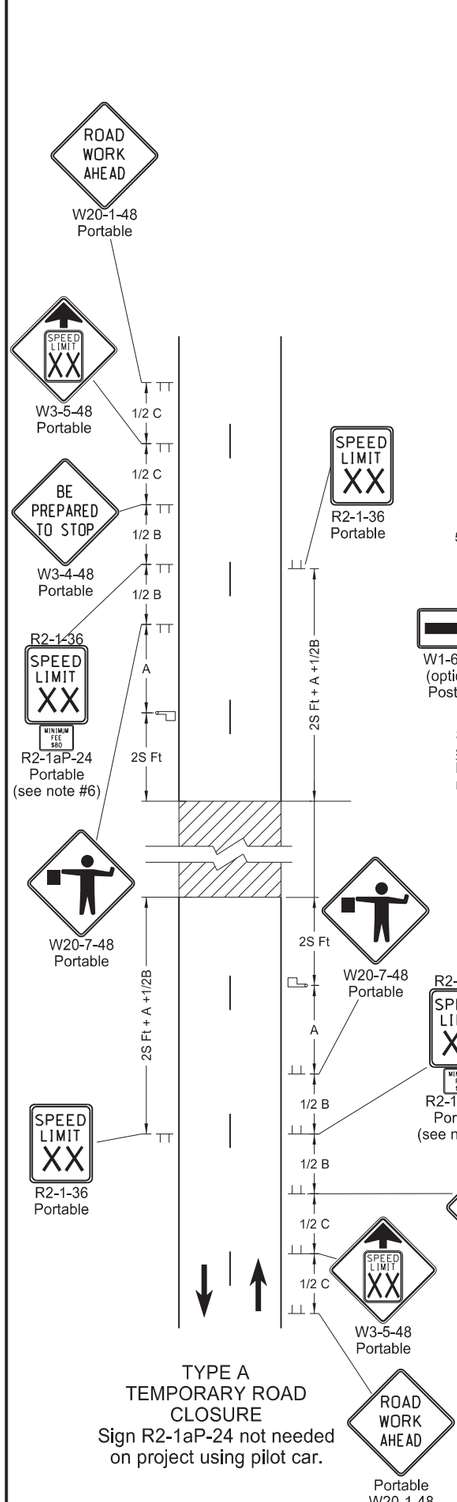
ENGINEER
NORTH DAKOTA

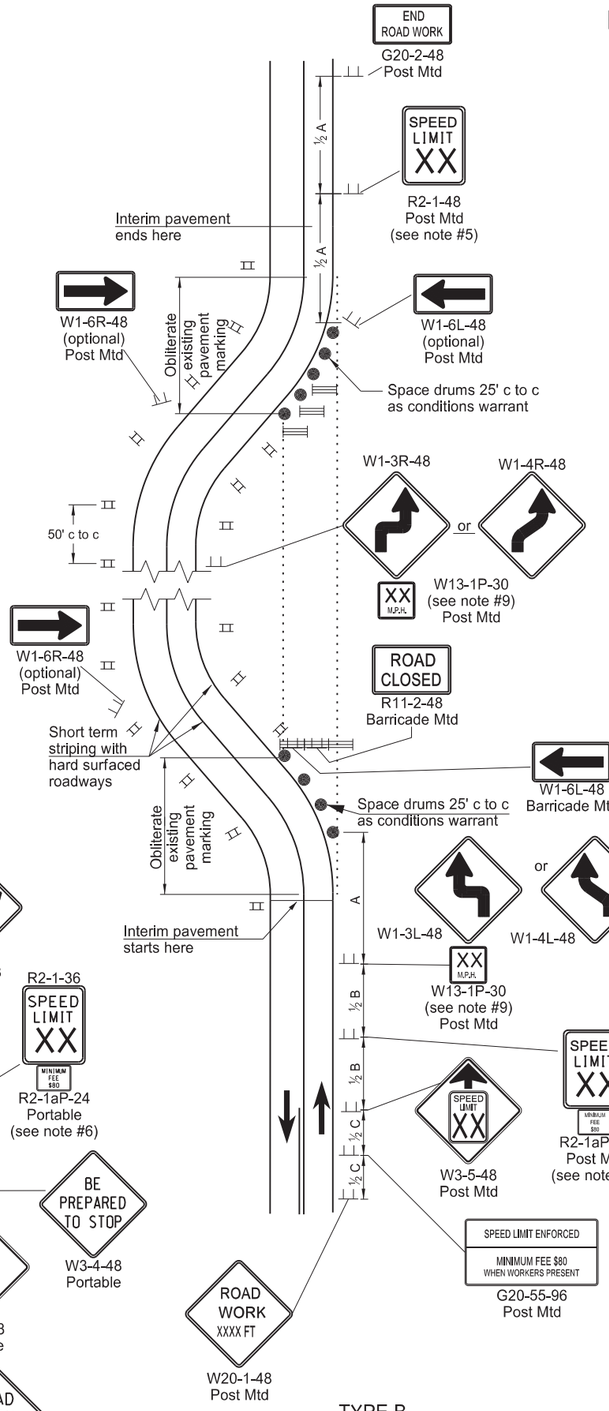
08/01/24

ROAD CLOSURE LAYOUTS

D-704-15

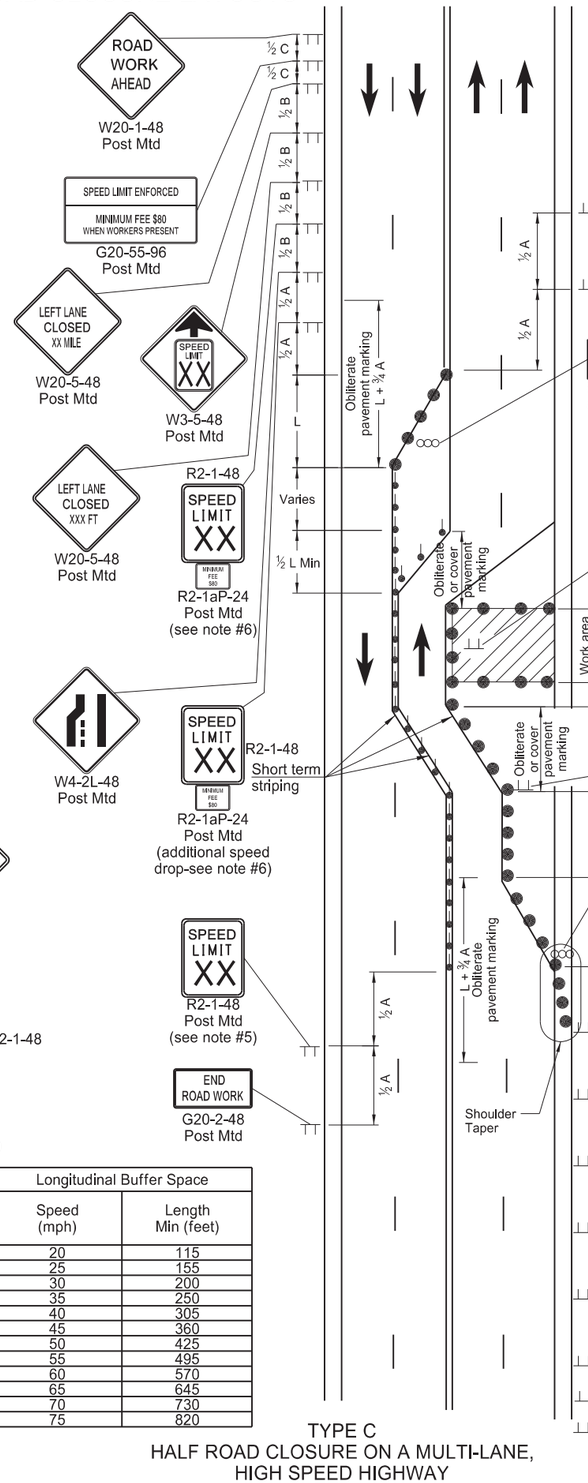


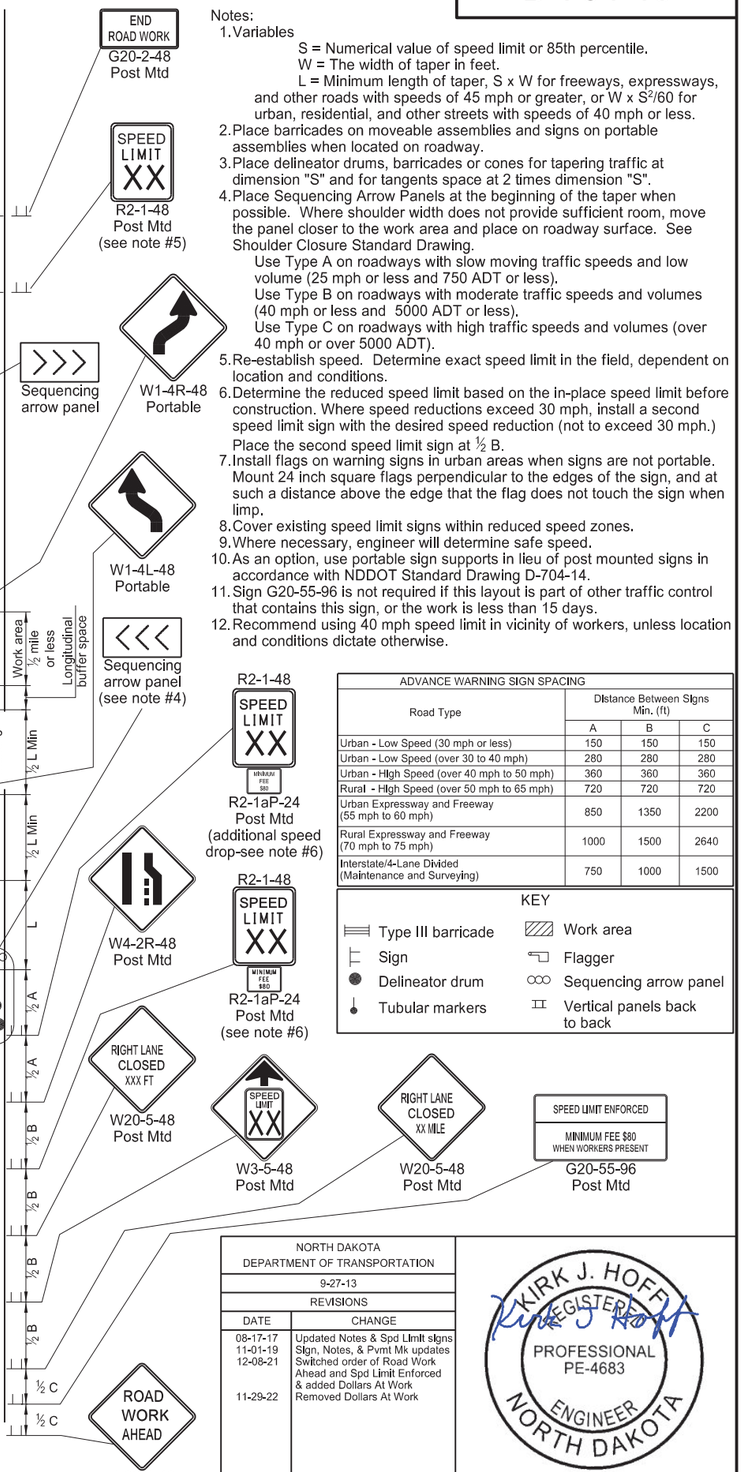
TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.



TYPE B
ROAD CLOSURE WITH A DIVERSION
Two lane highway where roadway is closed and detour provided (signing shown for one direction only). Use on bridge and culvert installation with ½ mile or less closure.

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





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 in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and 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. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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
- Sign
- Delineator drum
- Tubular markers
- Work area
- Flagger
- Sequencing arrow panel
- Vertical panels back to back

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pvmt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

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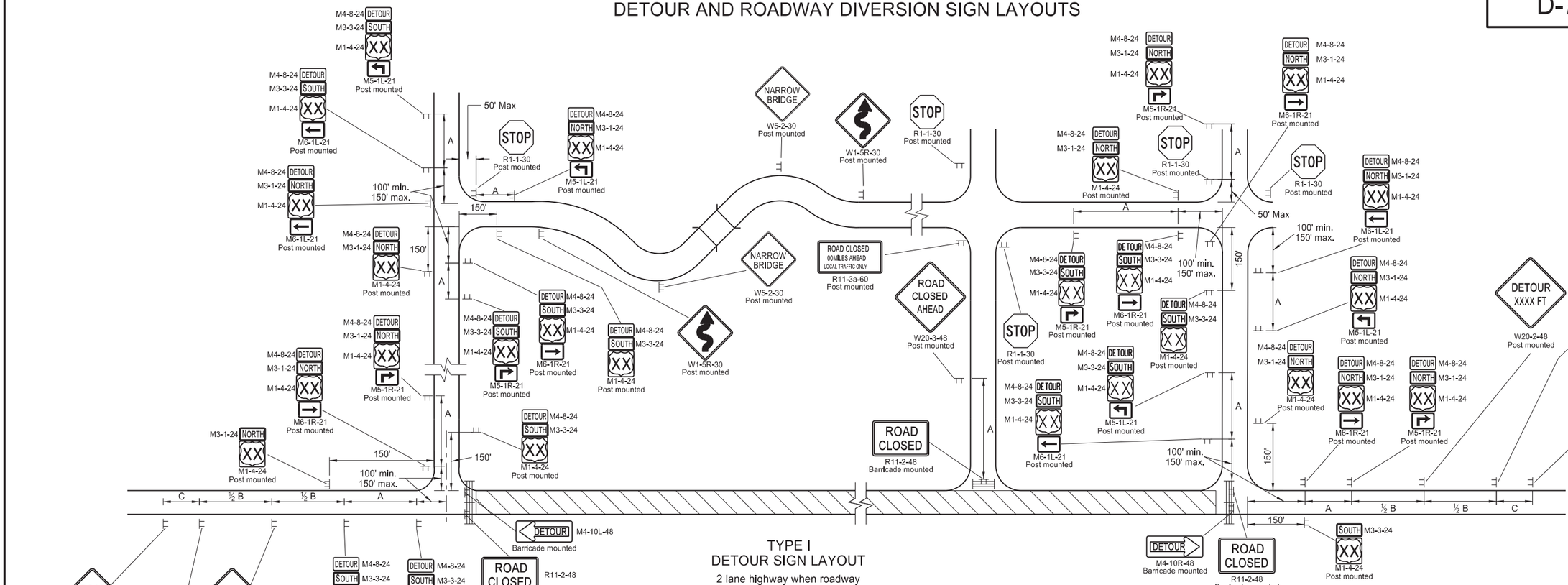
11/29/22

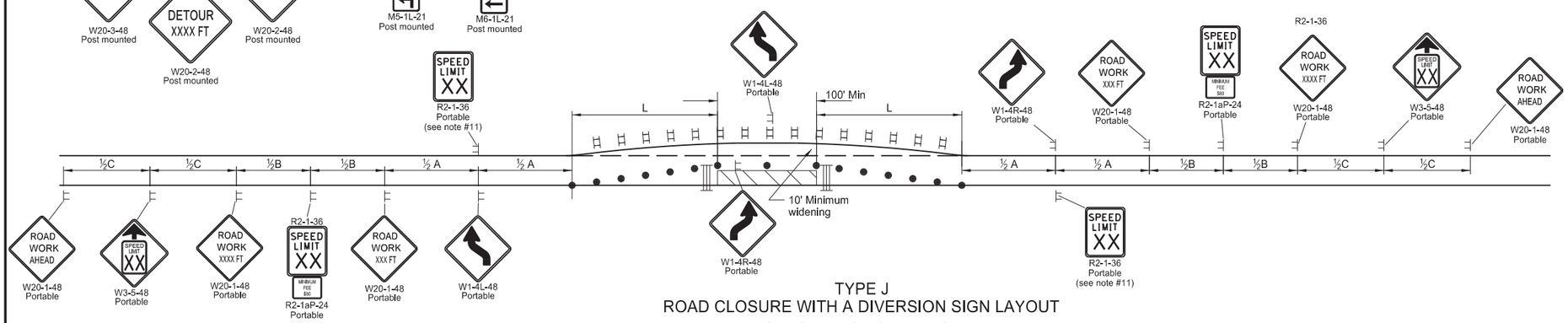
DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



TYPE I
DETOUR SIGN LAYOUT

2 lane highway when roadway
is closed and detour provided



TYPE J
ROAD CLOSURE WITH A DIVERSION SIGN LAYOUT

2 lane highway with widened section,
traffic maintained in both directions.

Use layout when work is less than 5 days or is within a project.

KEY

- Type III barricade
- Work area
- Sign
- Vertical panels back to back
- Delineator drum

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 $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when on roadway.
3. Space delineator drums and vertical panels at dimension "S" for tapering traffic. Space delineator drums, tubular markers and vertical panels at 2 times "S" for tangents.
4. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limits exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
5. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inches square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
6. Cover existing speed limit signs within a reduced speed limit zone.
7. Covered (when approved by engineer) or obliterated payment marking measured as Obliteration of Pavement Marking.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. If the tangent between tapers is less than 600', as an option, use sign W24-1-48 in place of double reverse curve signs.
10. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
11. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.

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

9-27-13

REVISIONS

DATE	CHANGE
08-17-17	Updated notes & added spd limit
11-01-19	Revised sign #s and note 8
12-08-21	Added Dollars At Work sign
11-29-22	Removed Dollars At Work

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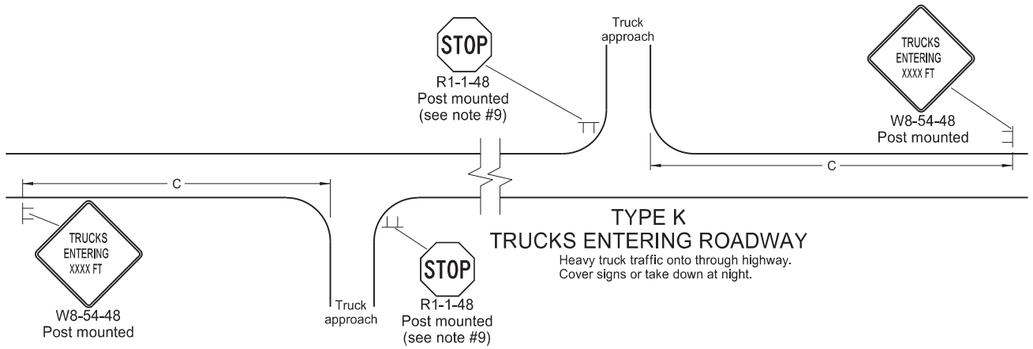
NORTH DAKOTA

11/29/22

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

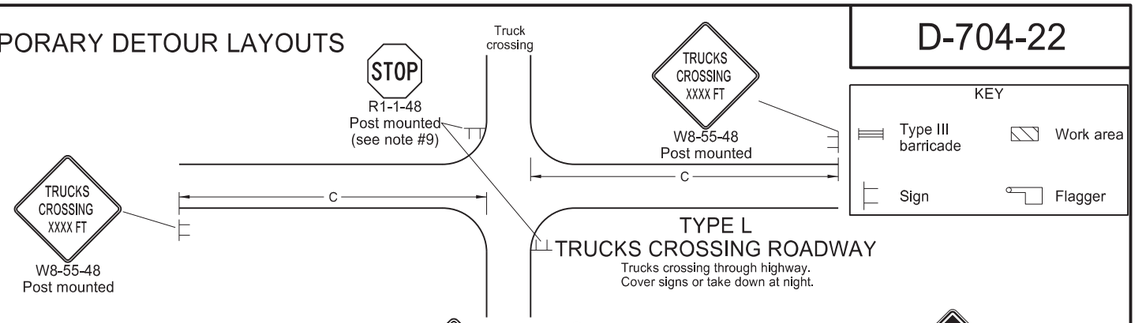
D-704-22

KEY
- Type III barricade
- Work area
- Sign
- Flagger



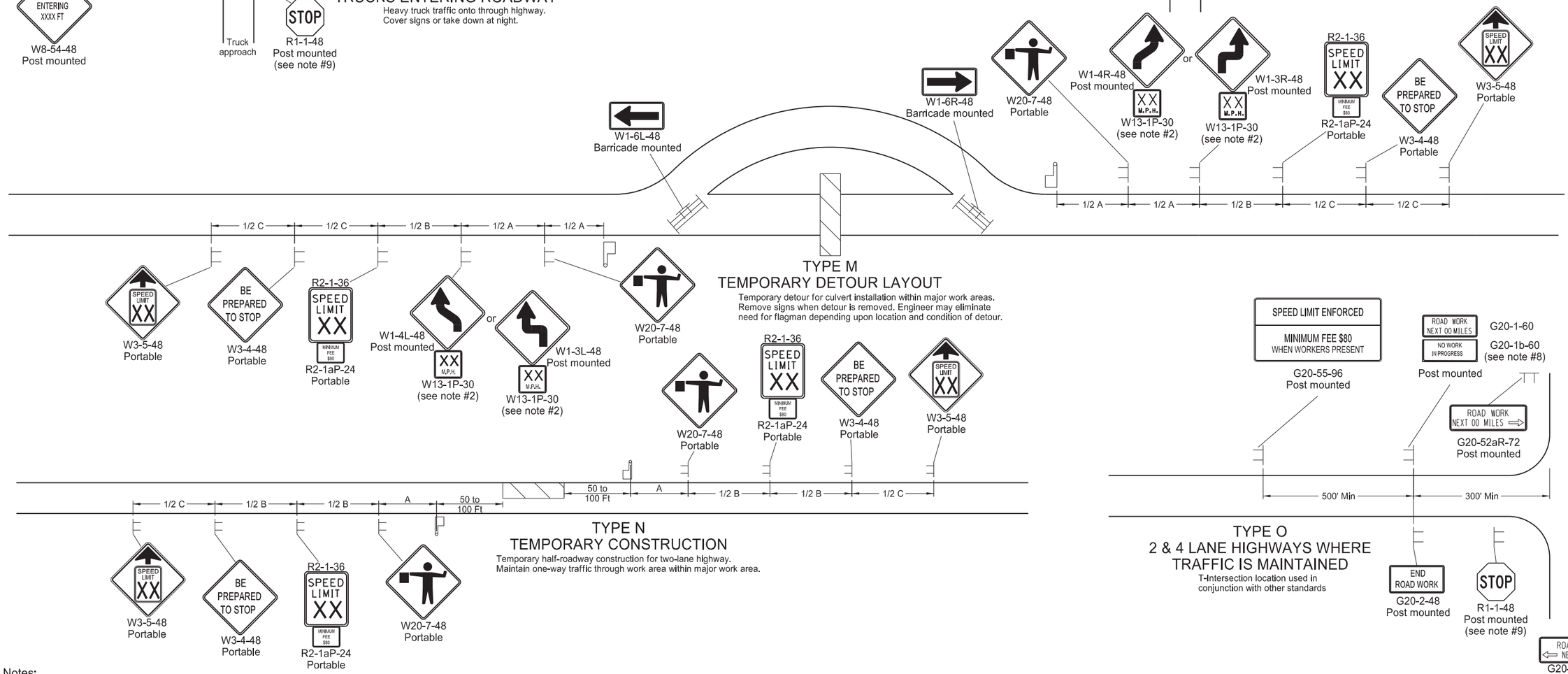
TYPE K
TRUCKS ENTERING ROADWAY

Heavy truck traffic onto through highway.
Cover signs or take down at night.



TYPE L
TRUCKS CROSSING ROADWAY

Trucks crossing through highway.
Cover signs or take down at night.



TYPE M
TEMPORARY DETOUR LAYOUT

Temporary detour for culvert installation within major work areas.
Remove signs when detour is removed. Engineer may eliminate need for flagman depending upon location and condition of detour.

TYPE N
TEMPORARY CONSTRUCTION

Temporary half-roadway construction for two-lane highway.
Maintain one-way traffic through work area within major work area.

TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED

T-Intersection location used in conjunction with other standards

Notes:

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control that contains this sign, or if work is less than 15 days.
11. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work

KIRK J. HOFF
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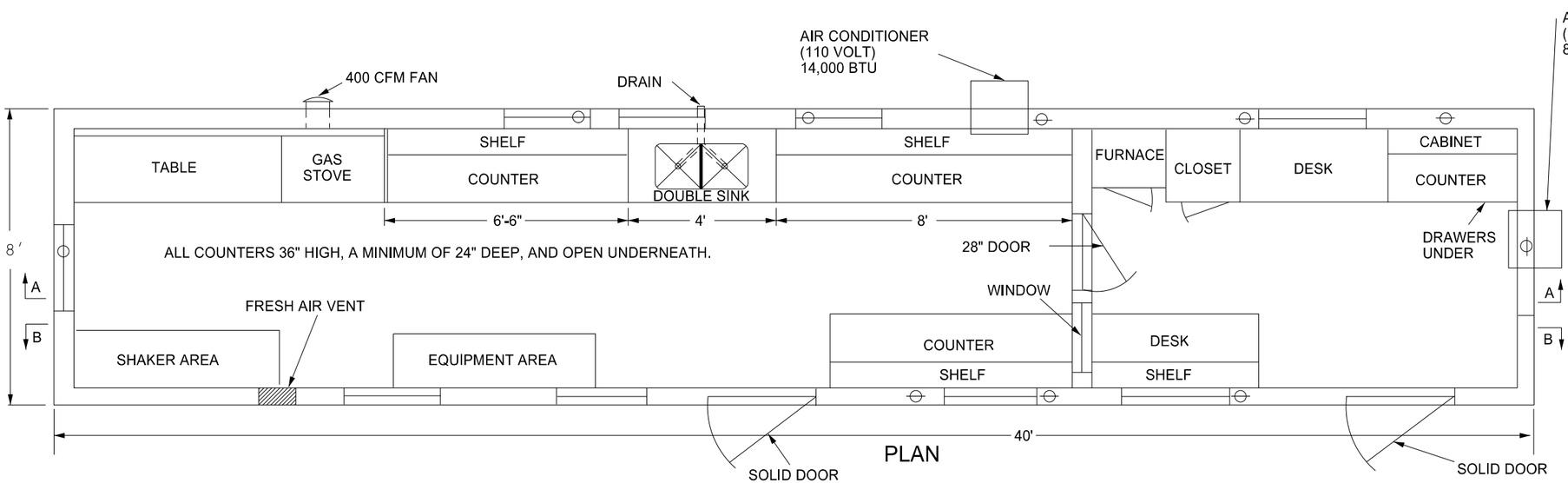
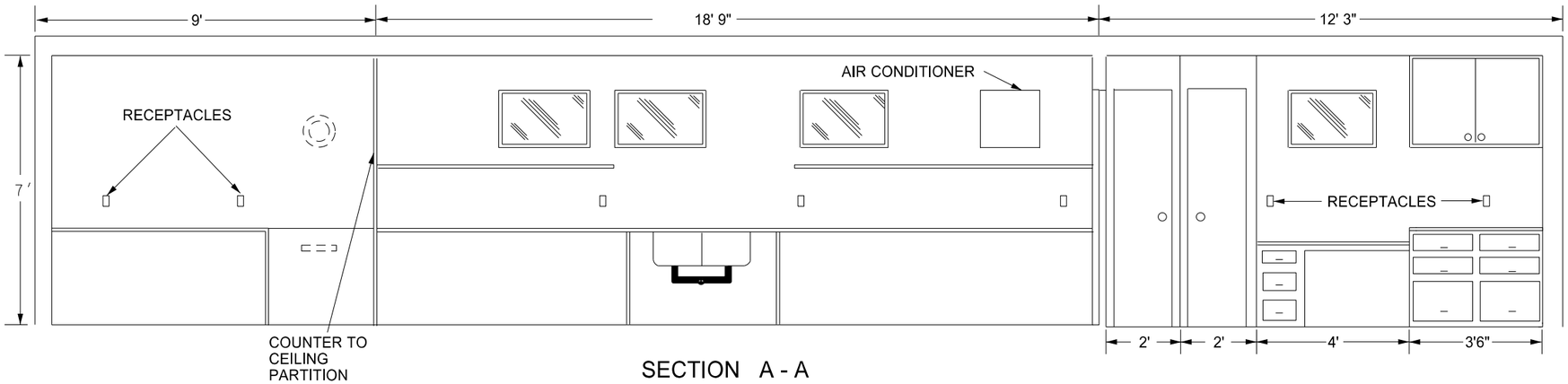
NORTH DAKOTA

11/29/22

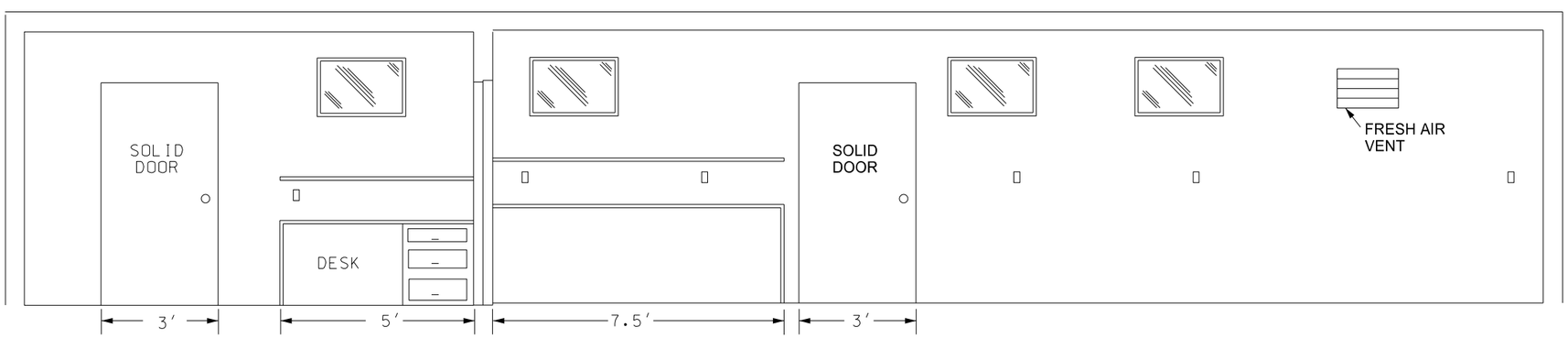
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

Provide a laboratory with the following:

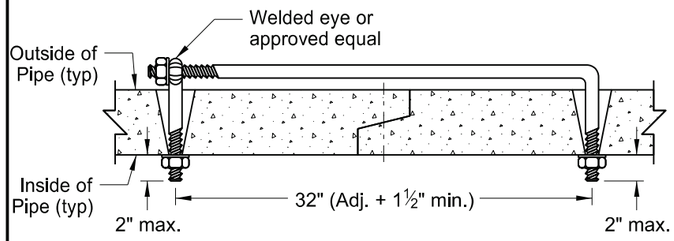
1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

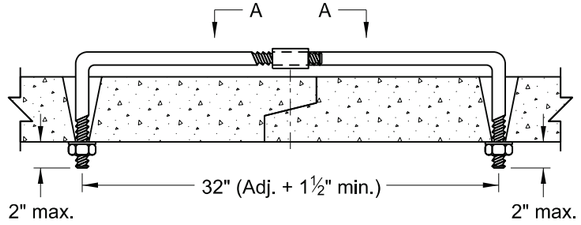
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 08/27/19 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES

D-714-22

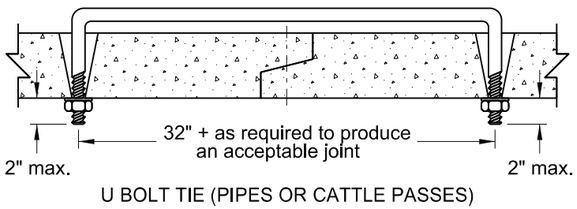


EYE BOLT TIE (PIPES ONLY)

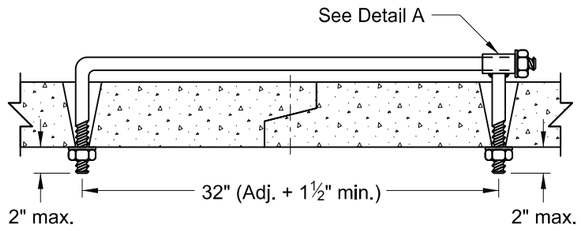


ADJUSTABLE TIE (PIPES ONLY)

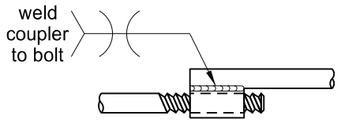
REQUIRED SIZE OF TIE BOLTS		
PIPE SIZE	THREAD ø	XXS PIPE SLEEVE INNER ø
18" - 24"	⅝" SEE NOTE 3	¾"
30" - 66"	¾"	1"
72" - 120"	1"	1¼"
RCB/CATTLE PASS		



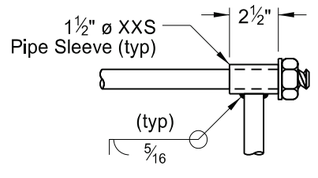
U BOLT TIE (PIPES OR CATTLE PASSES)



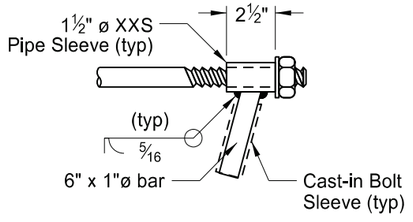
WELDED TIE (PIPES ONLY)



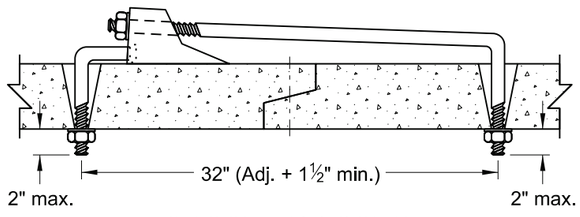
SECTION A-A



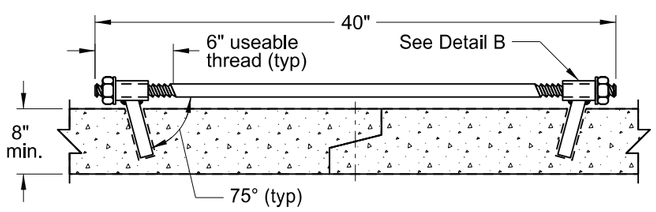
DETAIL A



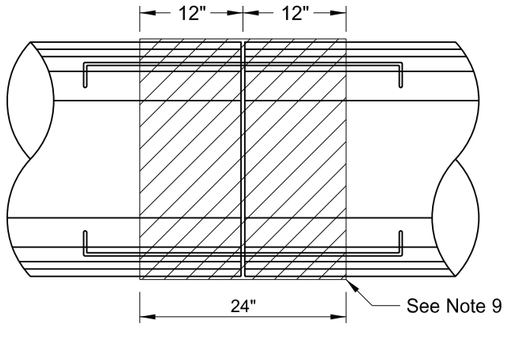
DETAIL B



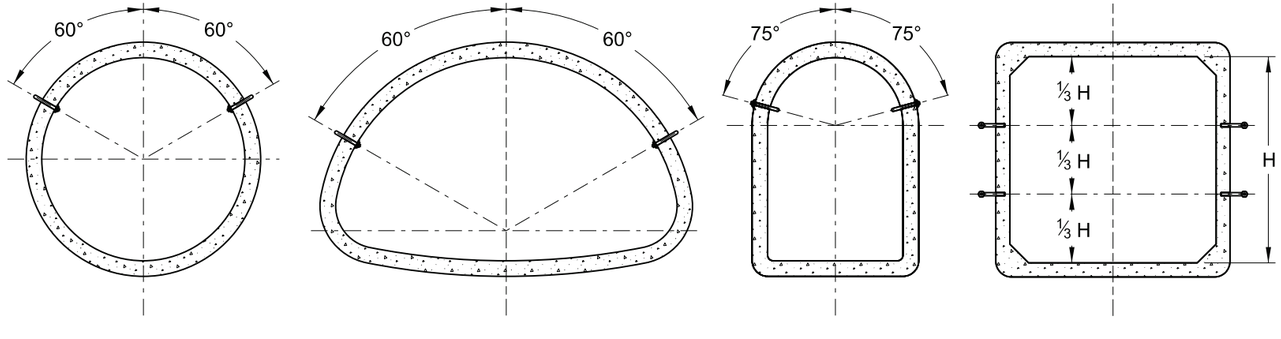
CANOPY TIE (PIPES ONLY)



HIDDEN TIE (RCB ONLY)



PLAN VIEW (PIPES ONLY)



END VIEW

NOTES:

1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Insert pipe ties from the inside of the pipes and grout into place for Cattle Pass and Jacked and Bored pipes. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
3. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Insert and grout tie bars into place where nuts and washers are not used.
4. Do not use pipe ties to pull the pipe or RCB sections tight. The ties are only for holding sections together.
5. Use only tie bolt assemblies that have been hot dip galvanized in accordance with ASTM A 153.
6. Holes in pipes to accommodate tie bolts will be precast. Tapered holes are permitted. Use holes that have a diameter ¼" larger than the diameter of the thread. In precast RCB's, use holes that contain cast-in bolt sleeves with an inside diameter of 1¼".
7. Include the cost of precasting the required holes and furnishing and installing the tie bolts in the price bid for the appropriate conduit or RCB pay item.
8. Tie all centerline and approach RCP culvert joints. Tie all joints including the end sections of all free ends of storm drain systems. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
9. Place joint wrap prior to installing ties. Firmly secure the wrap around the full perimeter. For concrete pipes, use Type S2 geotextile fabric and overlap the joint by 12" in both directions. For box culverts, use a waterproof membrane that meets ASTM C990. Provide a membrane that is a minimum of 12" wide and center it at the joint. Provide a minimum overlap of 2.5" at the seams.
10. Use tie bolts that conform to ASTM A 36. Use heavy hex nuts that conform to ASTM A 563. Use washers that conform to ASTM F 436, Type 1. Use welded pipe sleeves and cast-in bolt sleeves that conform to ASTM A 53, Grade B.
11. Provide lock washers or burr threads of concrete box ties after installation and tightening to prevent nut rotation.
12. Tie RCB's as noted in the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

3-18-14

REVISIONS

DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11 Table, Title, Labels
8-11-21	Notes 2-12 Table, Label
01-17-25	Notes 9-13 Table, Labels Section A-A, End View

REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE 01/17/25
NORTH DAKOTA

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

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

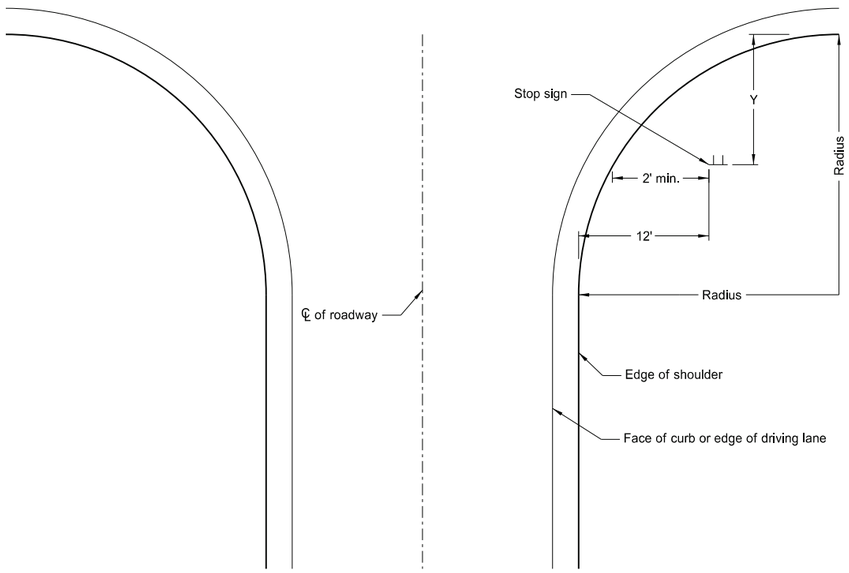
   Install signs on expressways a minimum height of 7'.

   Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.

   Maximum vertical clearance is 6" greater than the minimum vertical clearance.

3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.

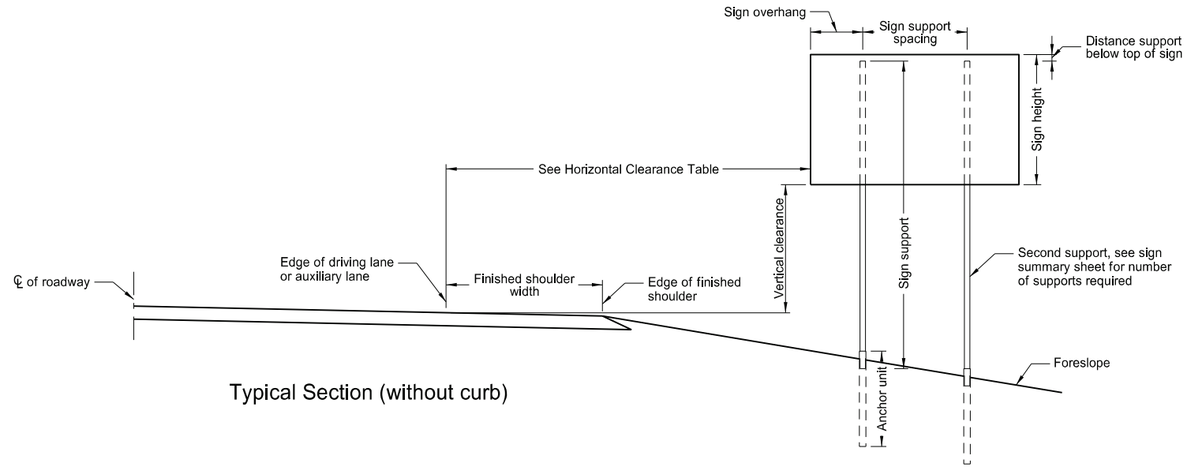
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

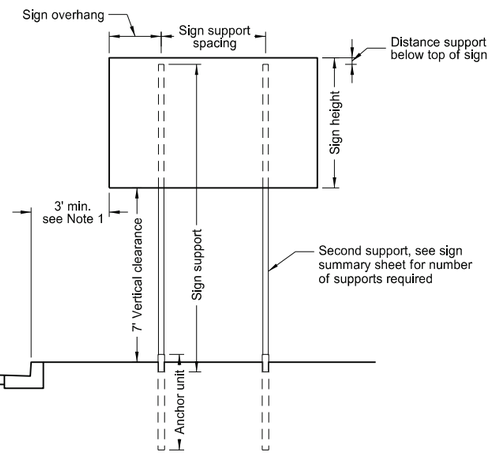
Use layout for the placement of "Stop" signs.

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



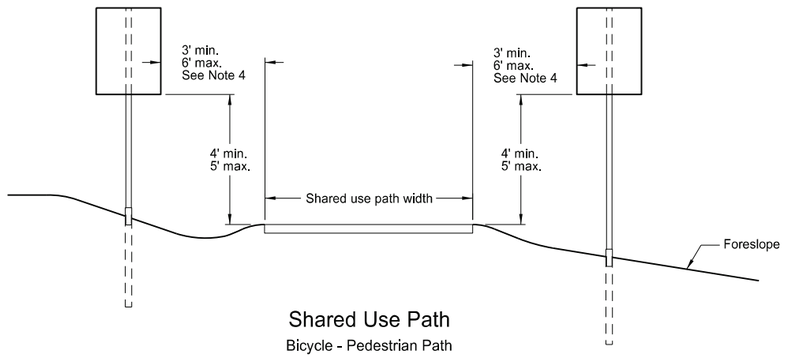
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

Kirk J. Hoff

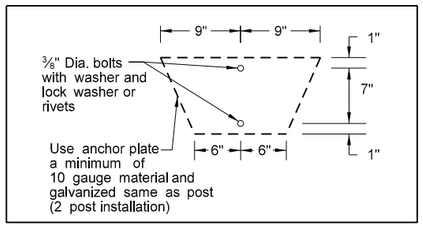
08/05/24

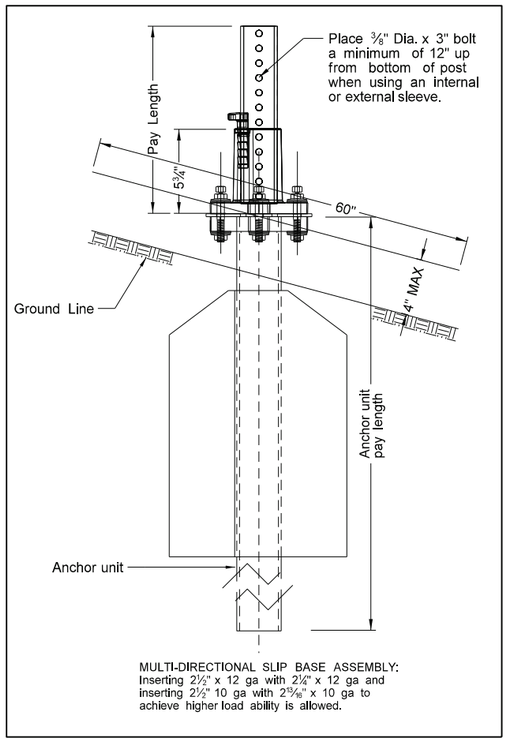
Mounting Details Perforated Tube

D-754-24

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) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will 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.

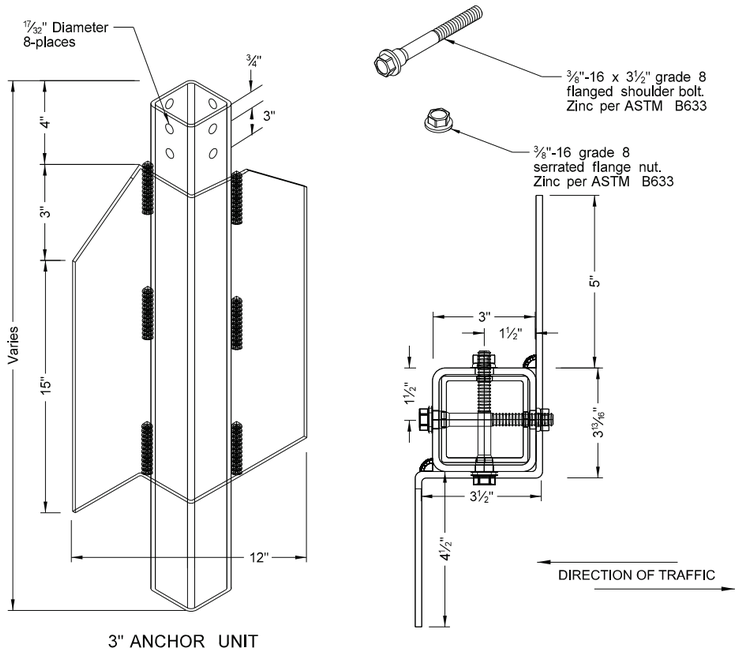




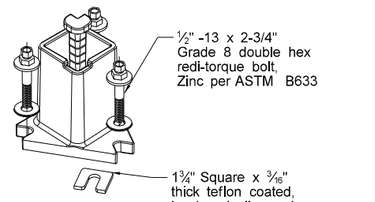
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2 15/16" x 10 ga to achieve higher load ability is allowed.

SHOULDER BOLT

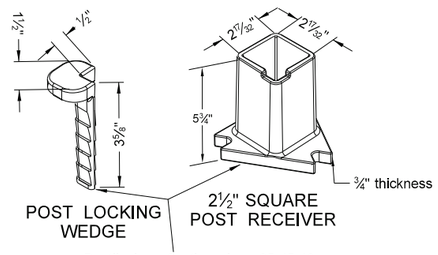
Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(use standard ⅜" diameter grade 8 bolt with proper shim)

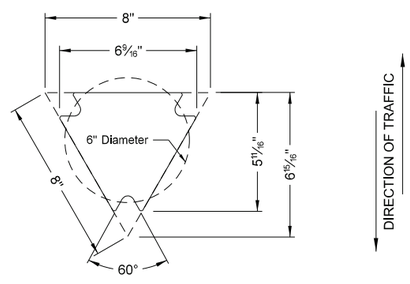


3" ANCHOR UNIT



SLIP BASE FOR 2½" POST





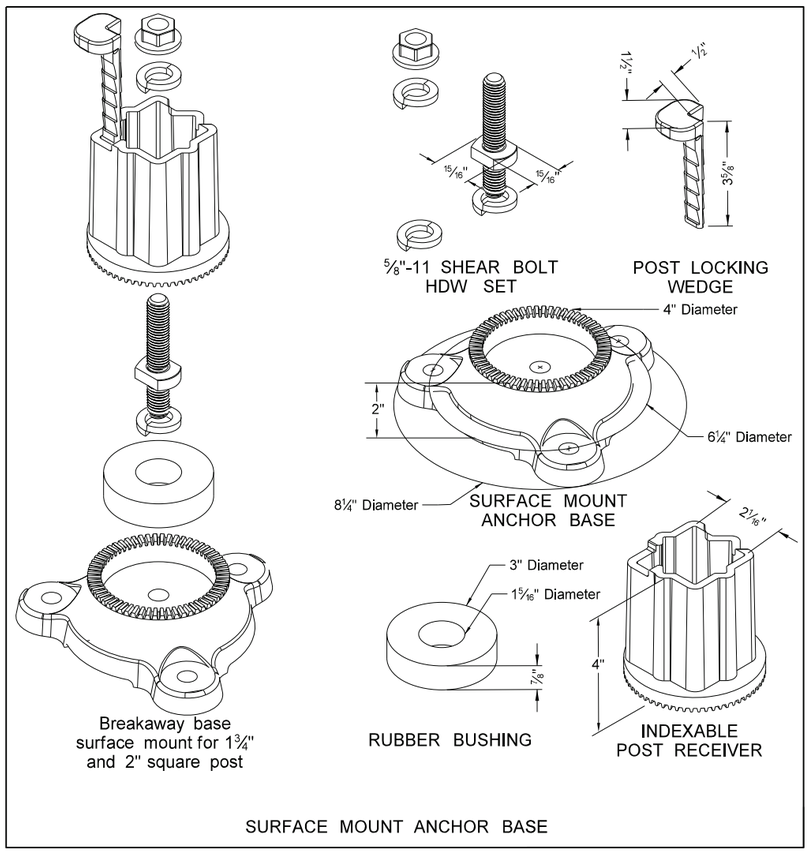
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes: Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud 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 is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE

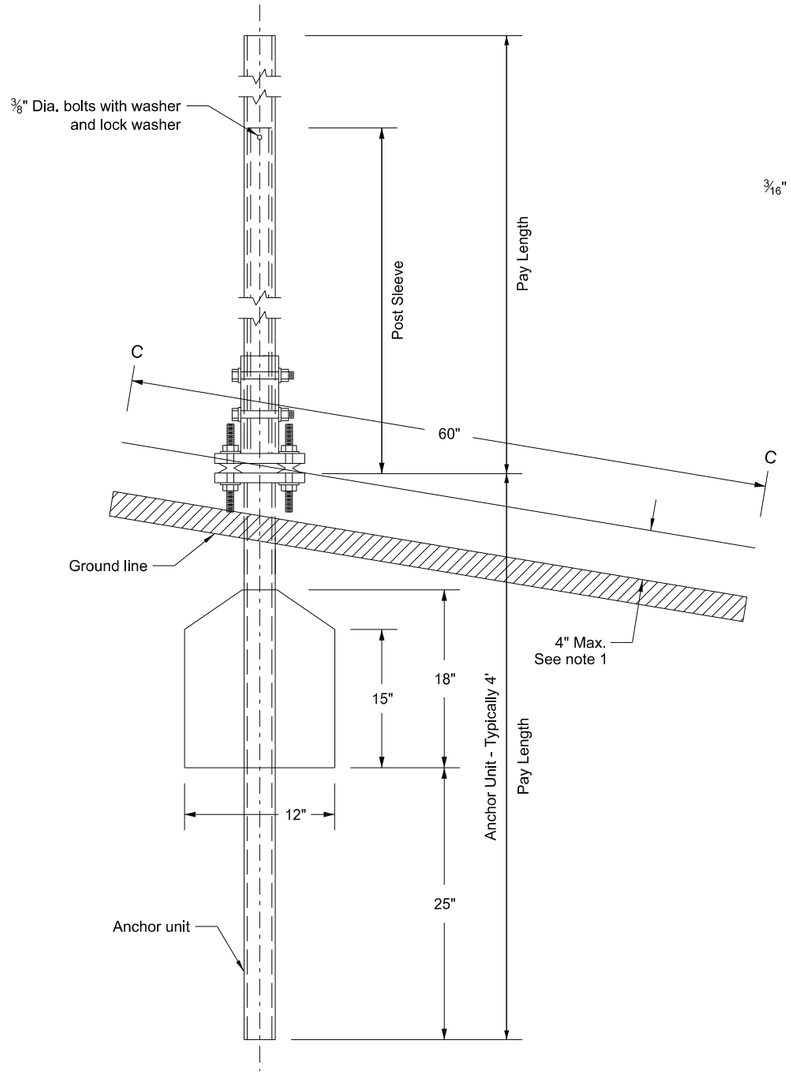
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.

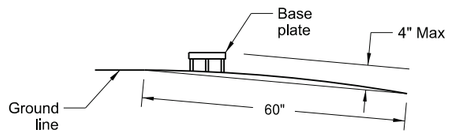
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/05/24

Breakaway Coupler System for Perforated Tubes

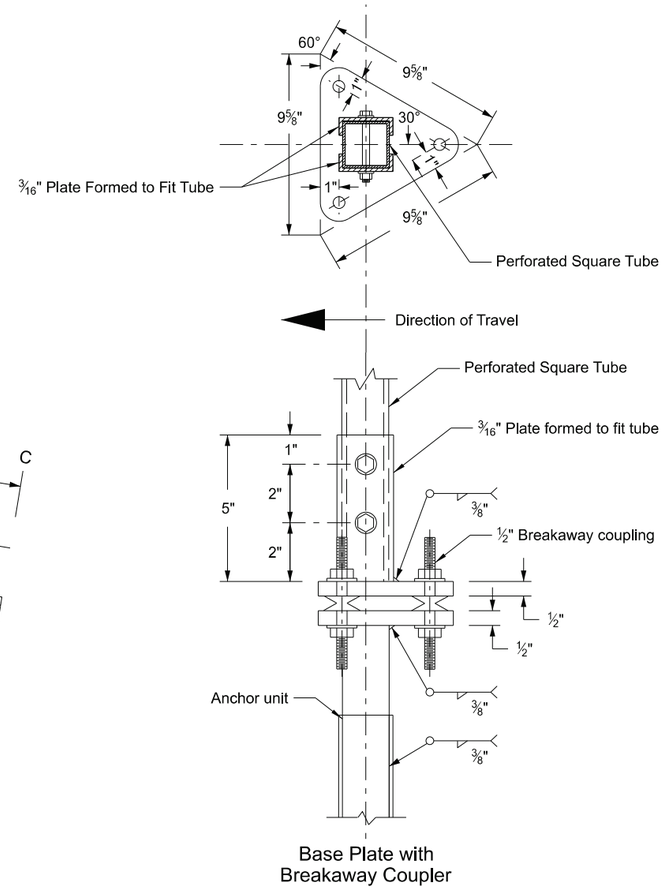
D-754-24A



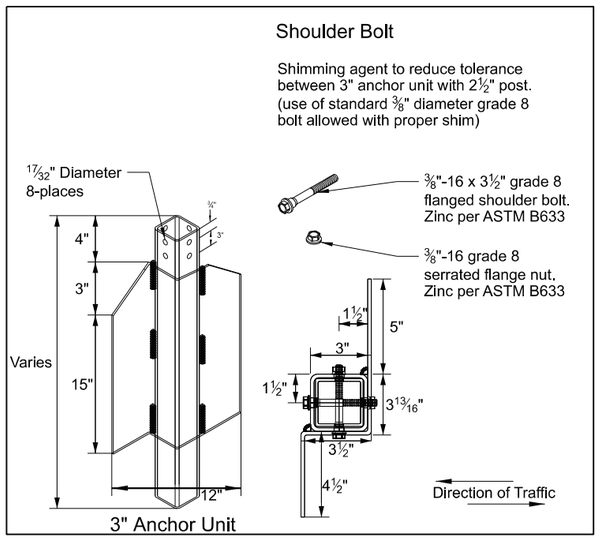


Section C-C

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.



Base Plate with Breakaway Coupler



3" Anchor Unit

Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4. Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements 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) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-3-2013

REVISIONS

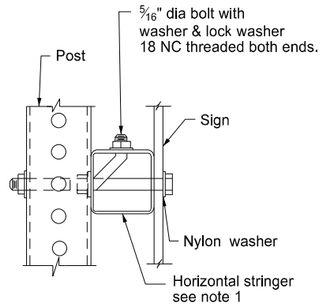
DATE	CHANGE
8-30-18	Updated notes to active volce.
8-30-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.

KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

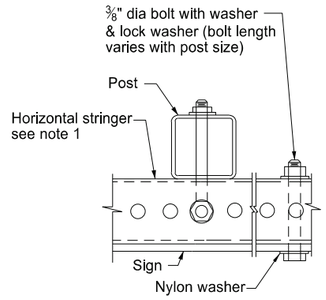
08/05/24

Mounting Details Perforated Tube

D-754-25

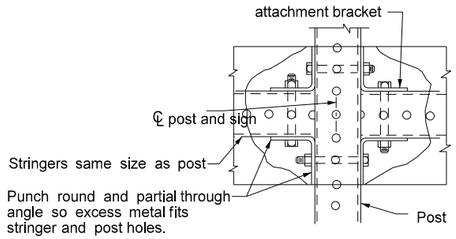


Side View



Top View

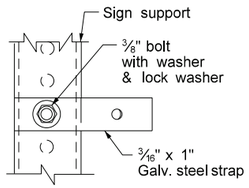
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



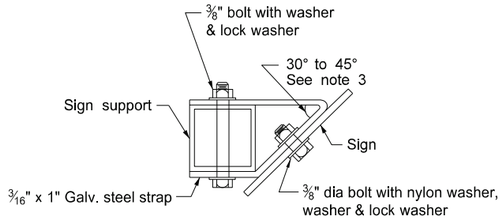
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

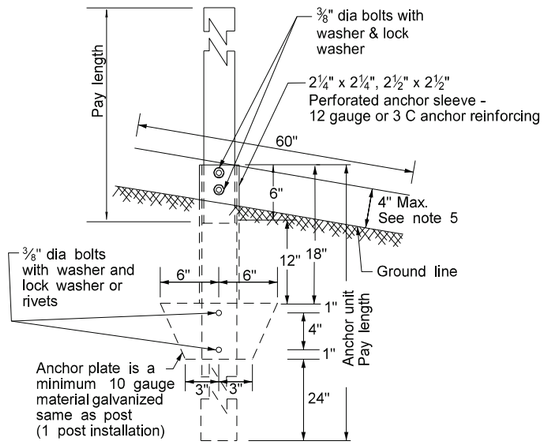


Side View



Top View

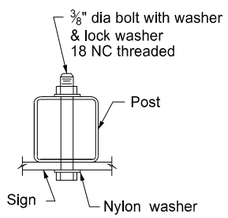
STRAP DETAIL



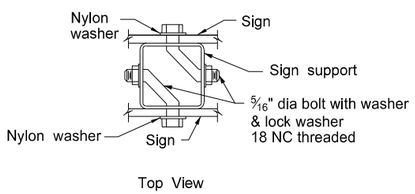
ANCHOR UNIT AND POST ASSEMBLY

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) - When placing 2½", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if 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.

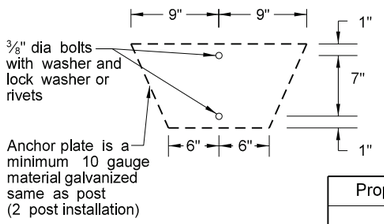


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



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

REVISIONS

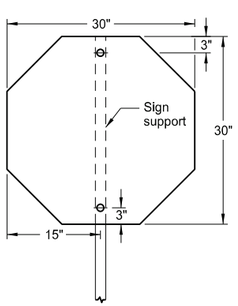
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

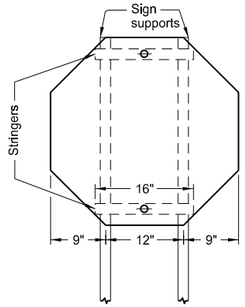
08/05/24

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

D-754-26

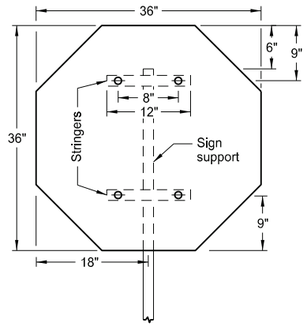


1 Post

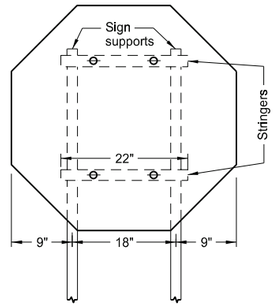


2 Posts

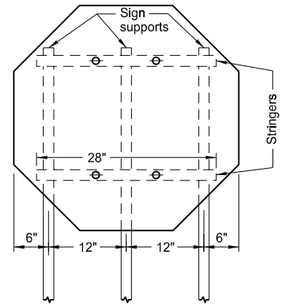
Assembly No. 1



1 Post



2 Posts

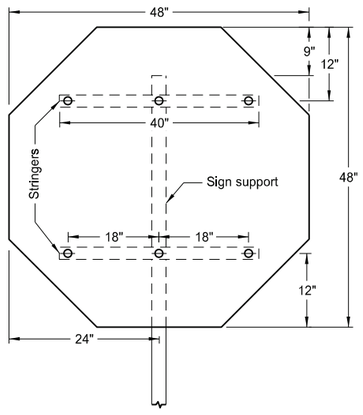


3 Posts

Assembly No. 2

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



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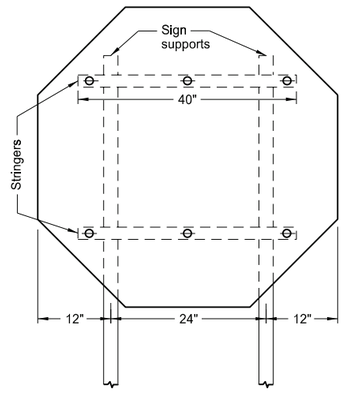
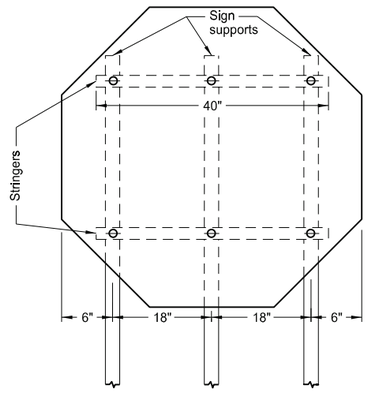
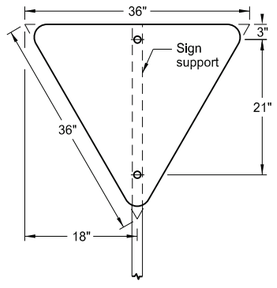


2 Posts

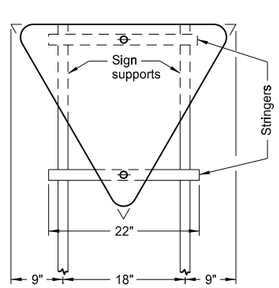


3 Posts

Assembly No. 3

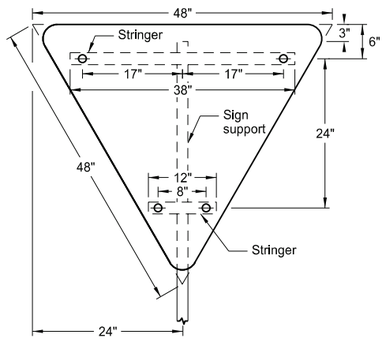


1 Post

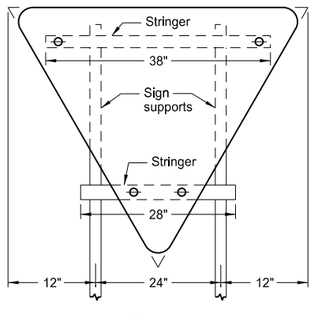


2 Posts

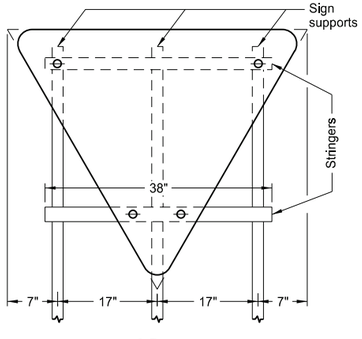
Assembly No. 4



1 Post



2 Posts



3 Posts

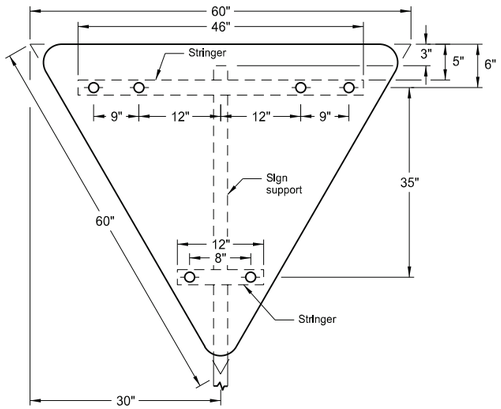
Assembly No. 5

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19 8-05-24	Updated notes to active voice. New Design Engineer PE Stamp. Electronic Stamp/Signature.

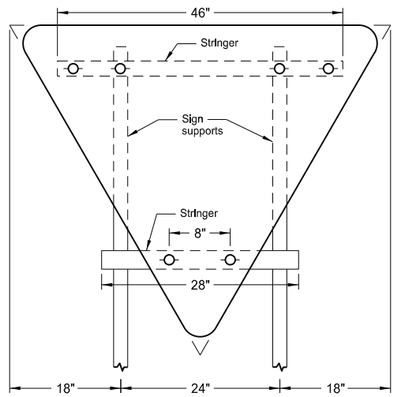
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
08/05/24

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

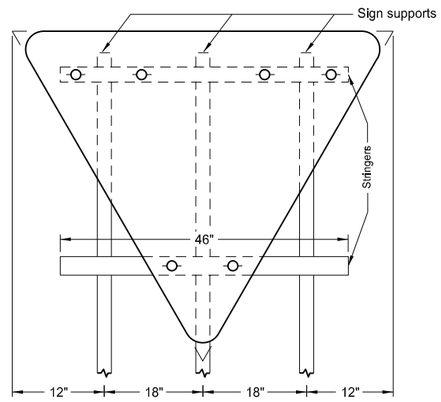
D-754-27



1 Post



2 Posts

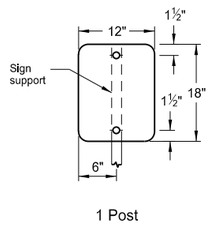


3 Posts

Assembly No. 6

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



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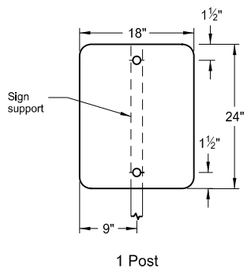

1 Post

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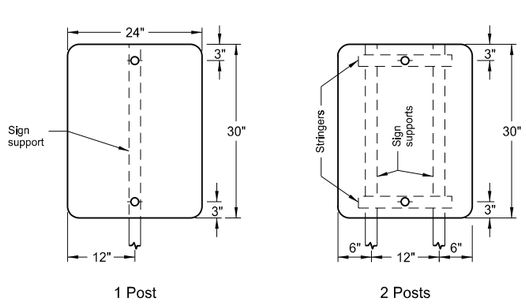
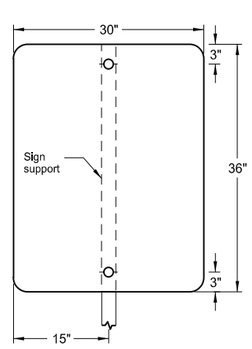


1 Post

2 Posts

Assembly No. 9



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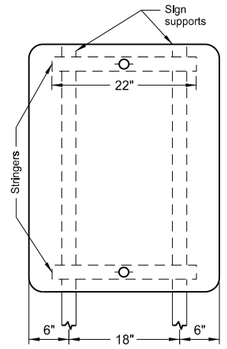
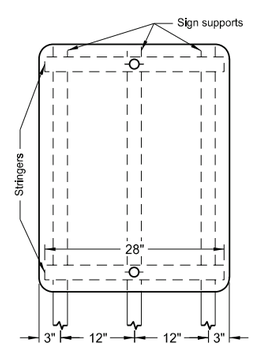
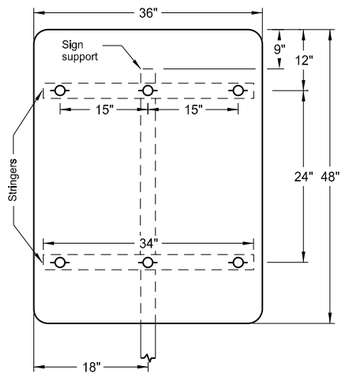


2 Posts



3 Posts

Assembly No. 10



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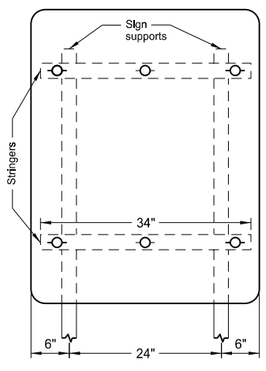
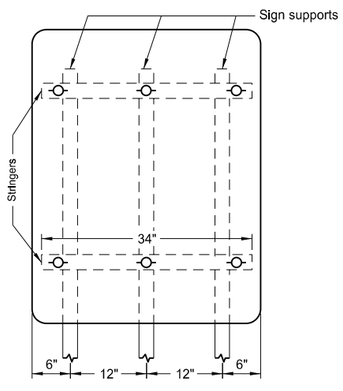


2 Posts



3 Posts

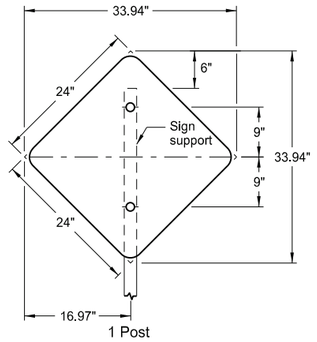
Assembly No. 11

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.
8-06-24	Electronic Stamp/Signature.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/06/24

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



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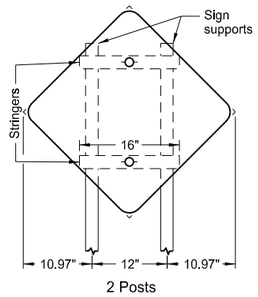
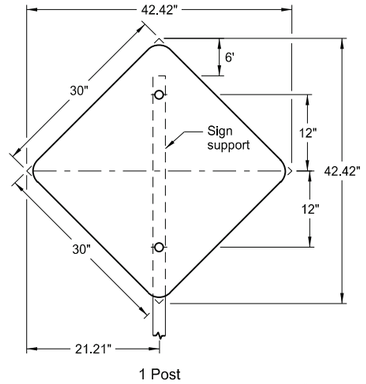


2 Posts

Assembly No. 18



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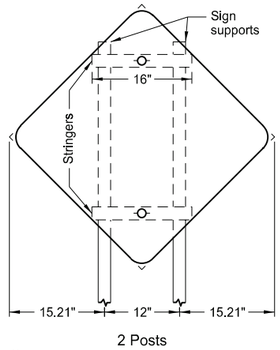
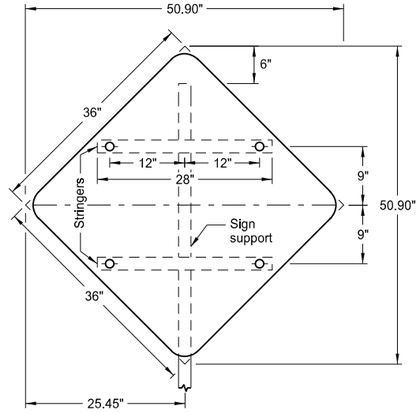


2 Posts

Assembly No. 19



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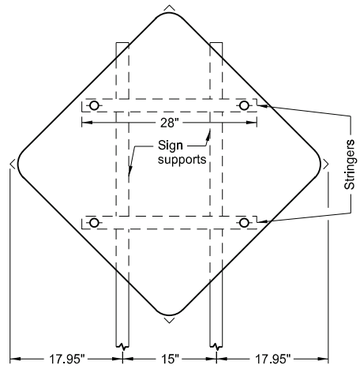
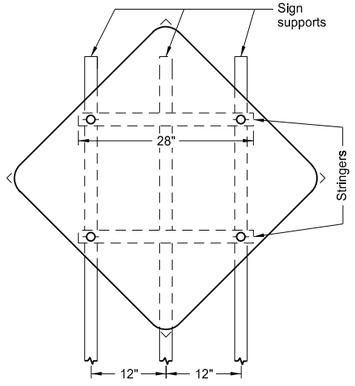
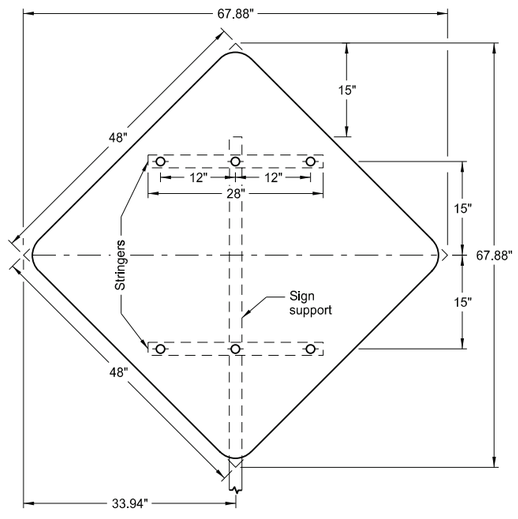


2 Posts

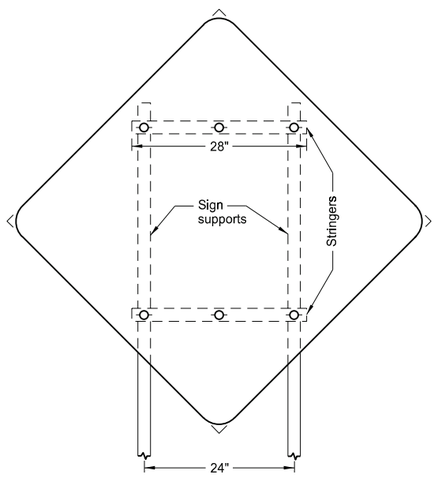


3 Posts

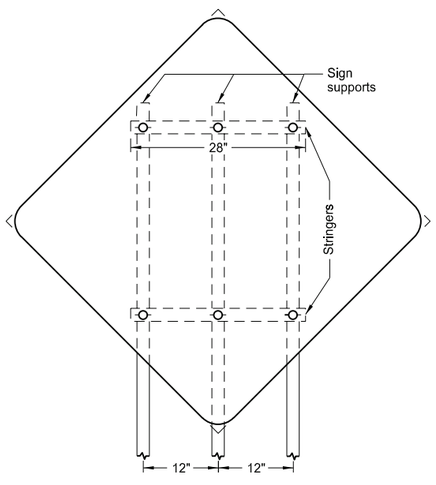
Assembly No. 20



1 Post



2 Posts



3 Posts

Assembly No. 21

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

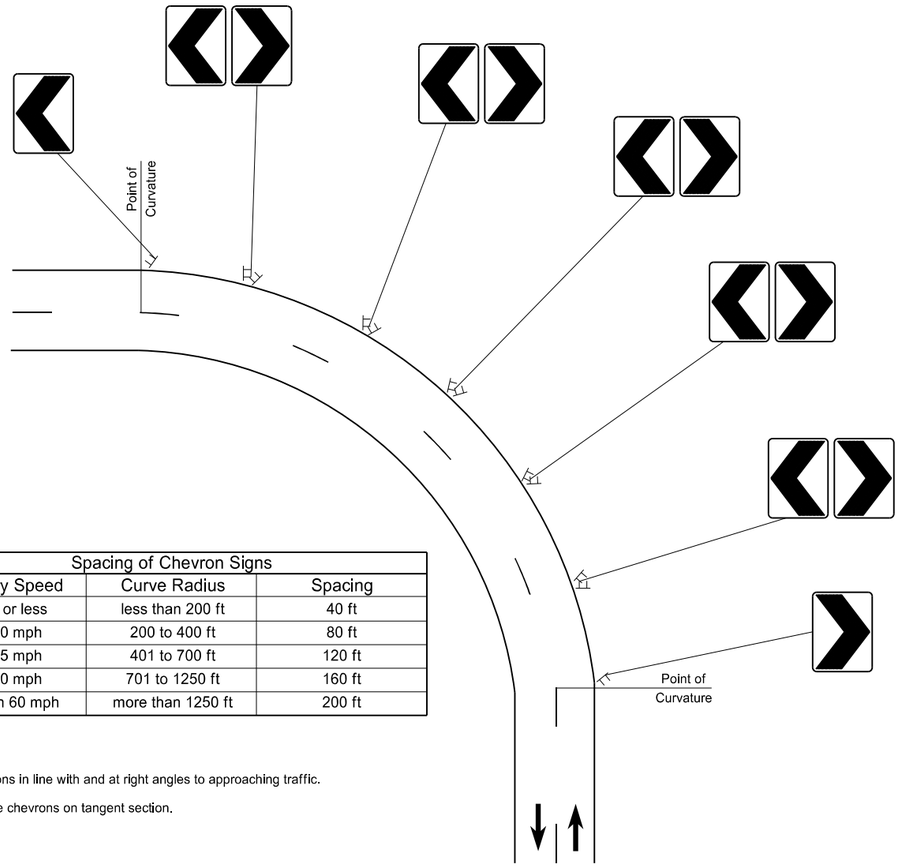
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.
8-06-24	Electronic Stamp/Signature.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/06/24

CHEVRON INSTALLATION DETAILS

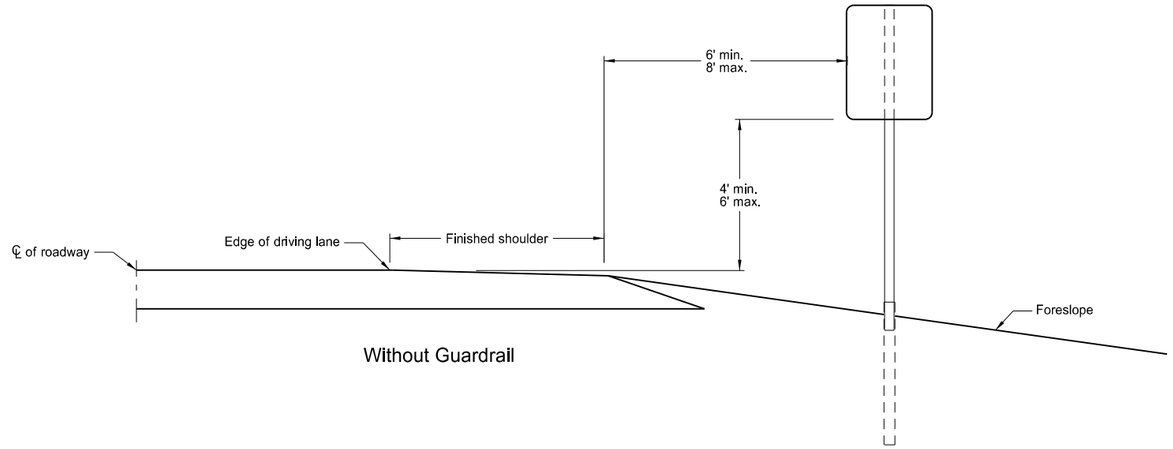
D-754-79



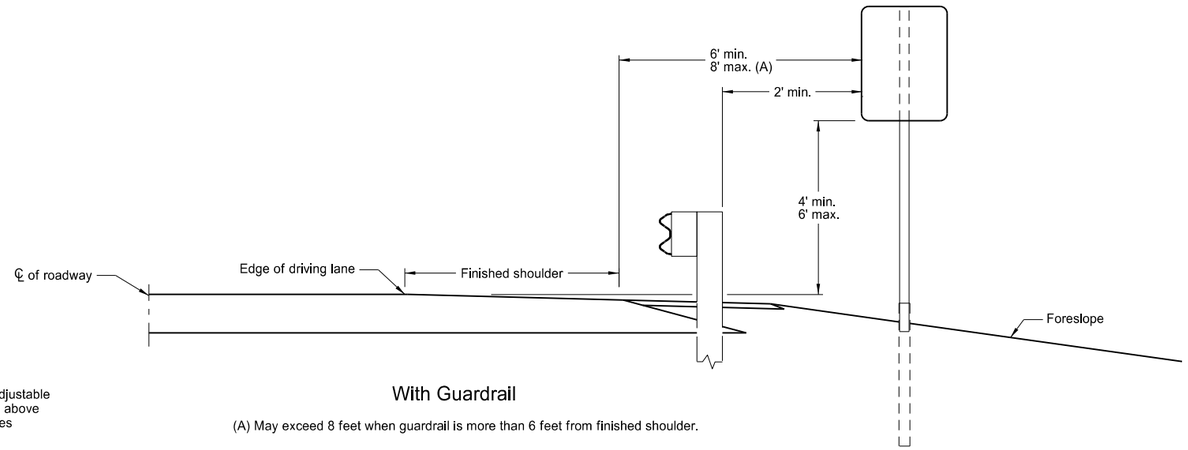
Spacing of Chevron Signs		
Advisory Speed	Curve Radius	Spacing
15 mph or less	less than 200 ft	40 ft
20 to 30 mph	200 to 400 ft	80 ft
35 to 45 mph	401 to 700 ft	120 ft
50 to 60 mph	701 to 1250 ft	160 ft
more than 60 mph	more than 1250 ft	200 ft

Notes:

1. Align chevrons in line with and at right angles to approaching traffic.
2. Do not place chevrons on tangent section.

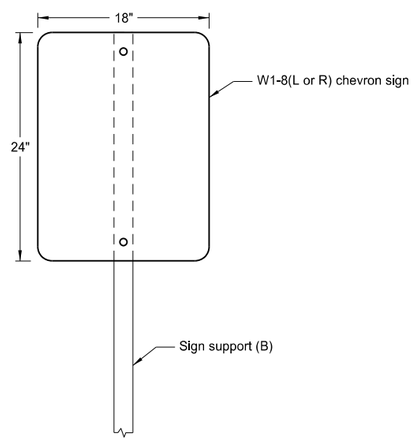


Without Guardrail



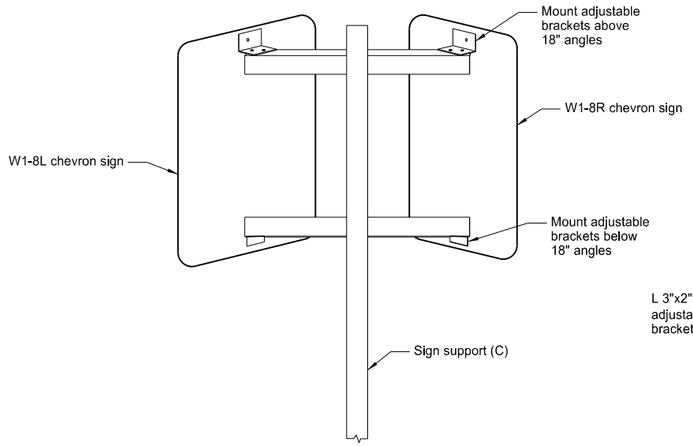
With Guardrail

(A) May exceed 8 feet when guardrail is more than 6 feet from finished shoulder.



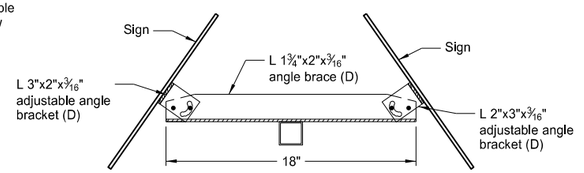
Chevron Single Sign Assembly

(B) Use 2x2x12ga. perforated tube single sign support and 2.25x2.25x12ga. perforated tube anchor unit.



Chevron Double Sign Assembly

(C) Use 2.25x2.25x12ga. perforated tube double sign support and 2.5x2.5x12ga. perforated tube anchor unit.



Top View

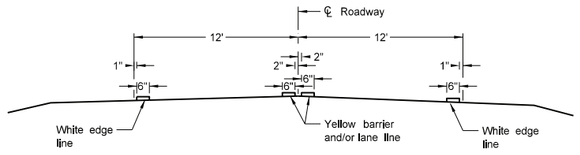
(D) Use aluminum or steel angles. Sizes are minimums, use larger sizes only when approved by the Engineer.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-10-13	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

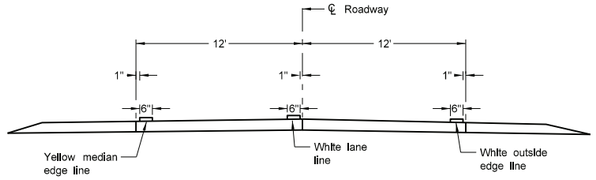
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING

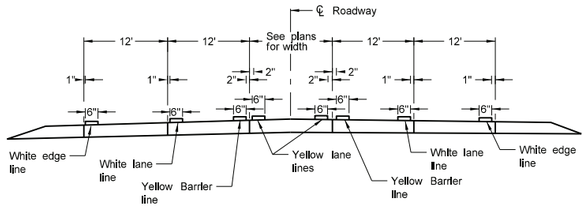
D-762-4



Two Lane Two Way
RURAL ROADWAY



Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



RURAL FIVE LANE ROADWAY
Concrete Section

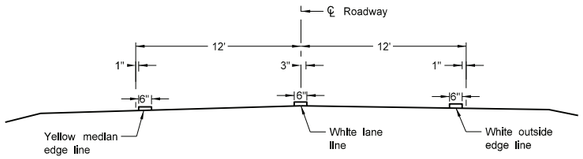
NOTES:

1. Continue edge lines through private drives and field drives. Break edge lines for intersections.

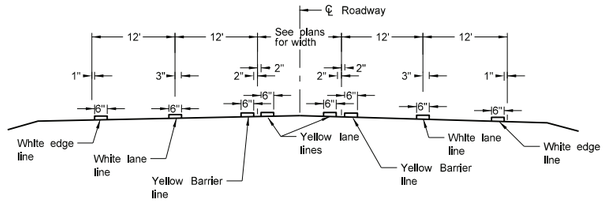
   For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.

2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph,

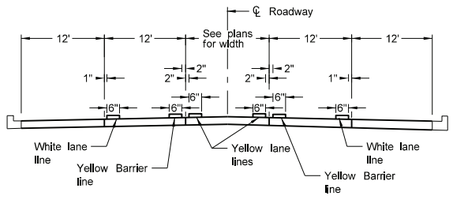
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.



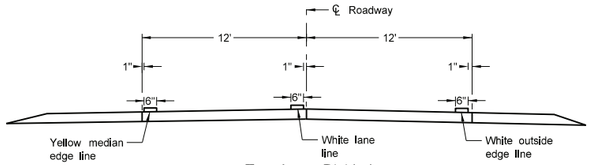
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



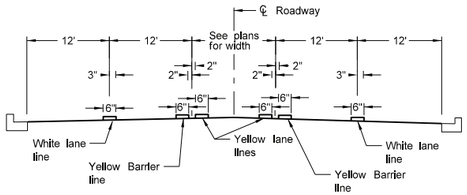
RURAL FIVE LANE ROADWAY
Asphalt Section



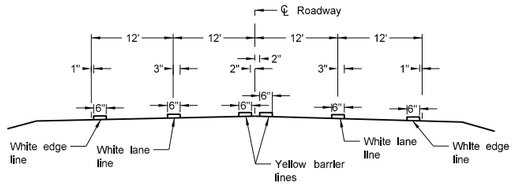
URBAN FIVE LANE SECTION
Concrete Section



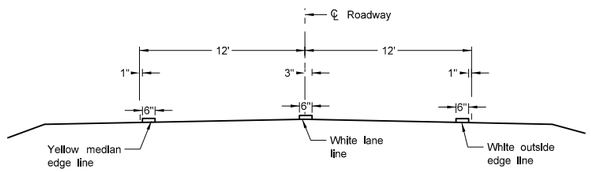
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



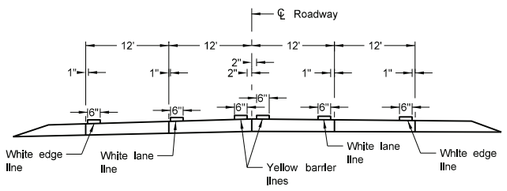
URBAN FIVE LANE SECTION
Asphalt Section



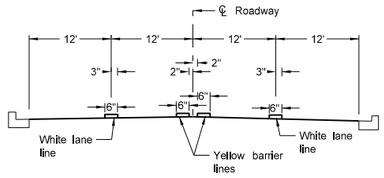
RURAL FOUR LANE ROADWAY
Asphalt Section



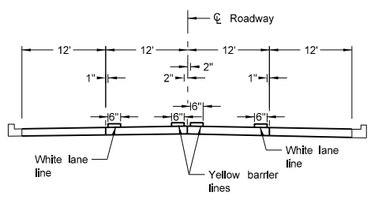
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



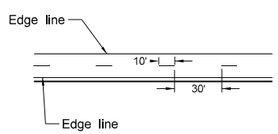
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



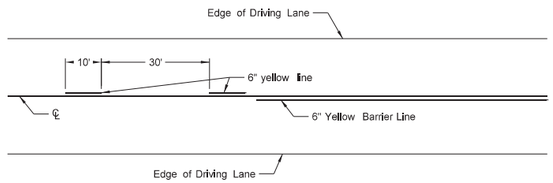
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
07-09-24	Modified Note 1.

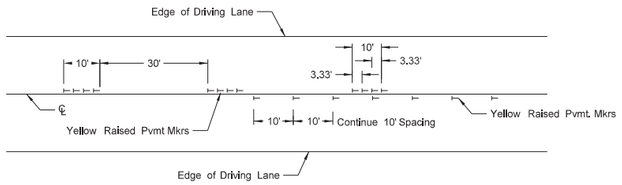
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
07/09/24
ENGINEER
NORTH DAKOTA

SHORT-TERM PAVEMENT MARKING

D-762-11

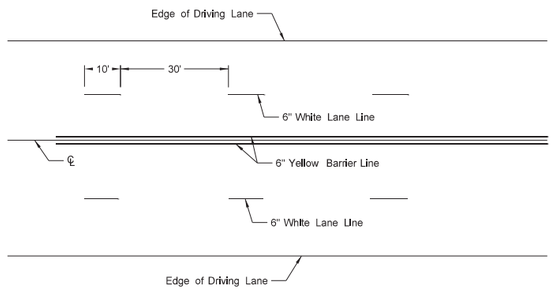


Painted or Tape Lines

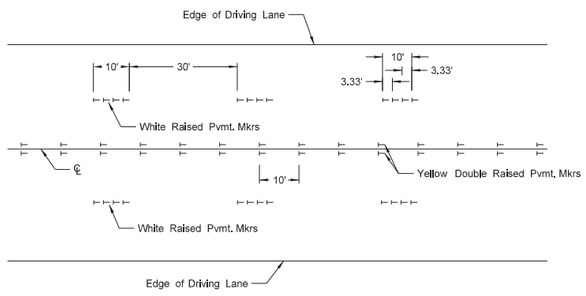


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

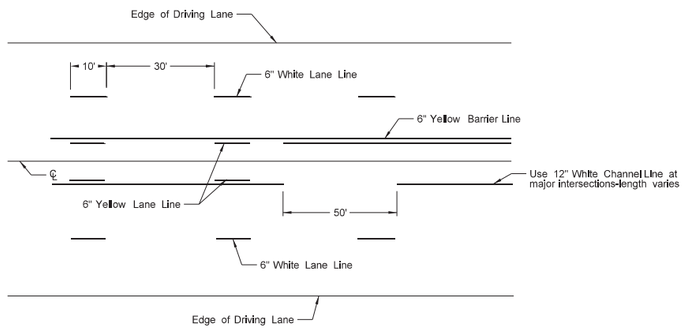


Painted or Tape Lines

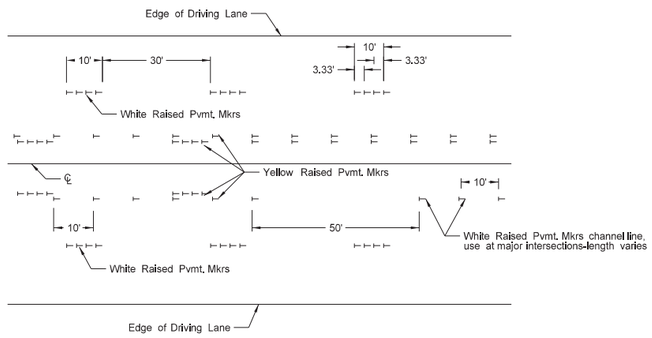


Raised Pavement Markers

FOUR LANE ROADWAY

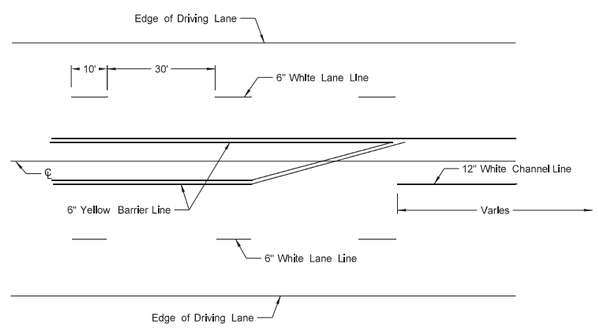


Painted or Tape Lines

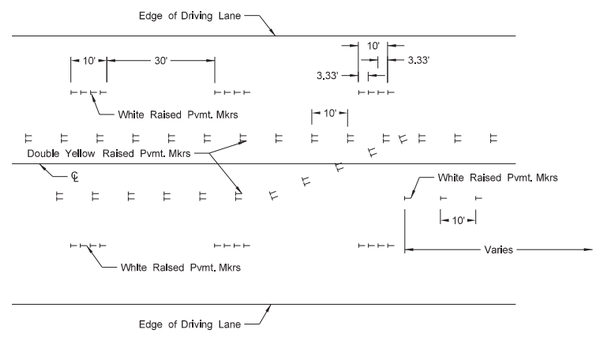


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
1-17-24	Revised wide pvmt marking width.

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REGISTERED
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01/17/24
ENGINEER
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