DESIGN DATA				
Traffic	Average Daily			
Current 2015 W; E	Pass: 2,710; 3,080	Trucks:1,170;1,120	Total: 3,880; 4,200	
Forecast 2035 W; E	Pass: 4,445; 5,055	Trucks:1,920;1,840	Total: 6,365; 6,895	
Clear Zone Distance: 34 ft		Design Speed: 70		
Minimum Sight Dist. for Stopping: 730 ft		Bridges: NA		
Limited Access Control				
Pavement Design Life (years)				
Design Accumulated One-way ESALs: NA				

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
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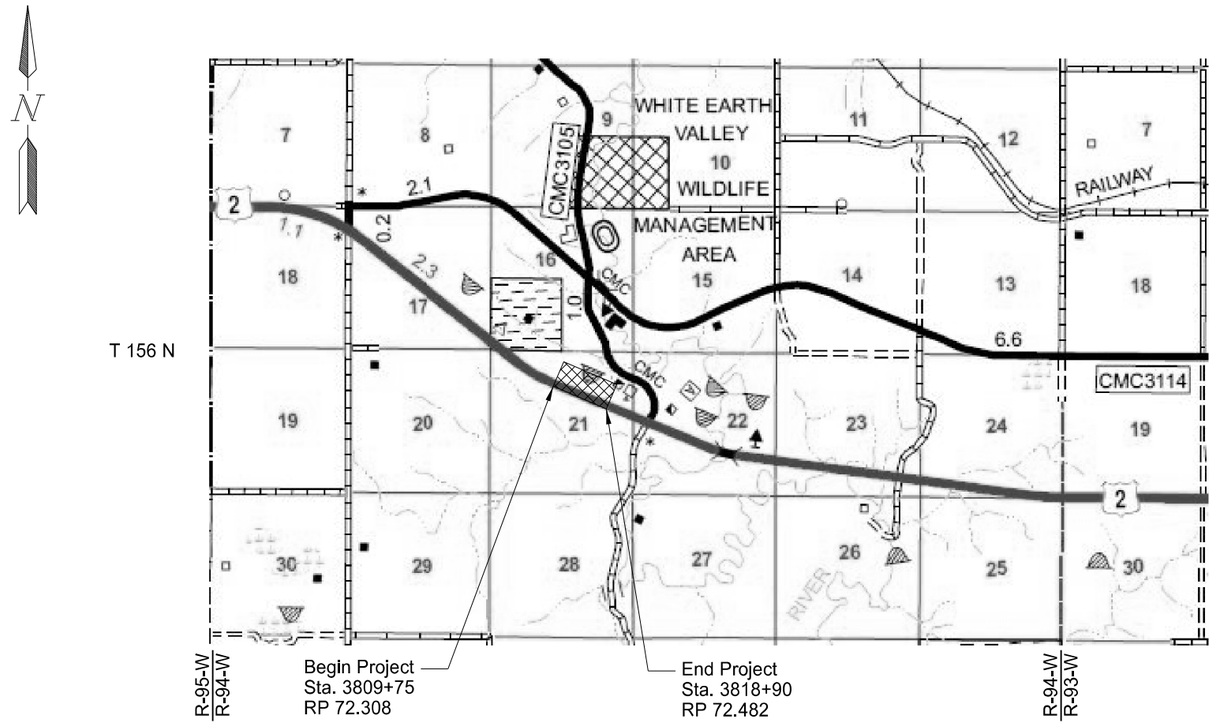
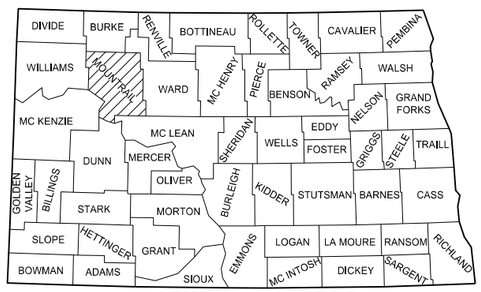
JOB # 30
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SOIB-CPU-7-002(158)072
Mountrail County
White Earth Slide Repair - RP 72.2
Slide Repair and Incidentals

GOVERNING SPECIFICATIONS:
2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SOIB-CPU-7-002(158)072	0.174	0.174





STATE COUNTY MAP

DESIGNERS

Kristen Weninger /s/

Colter Schwagler /s/

APPROVED DATE 3/16/2016

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

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

APPROVED DATE 3/16/16

James Douglas Rath /s/
NDDOT DESIGN DIVISION

This document was originally issued and sealed by James Douglas Rath Registration Number PE- 4288, on 3/16/16 and the original document is stored at the North Dakota Department of Transportation

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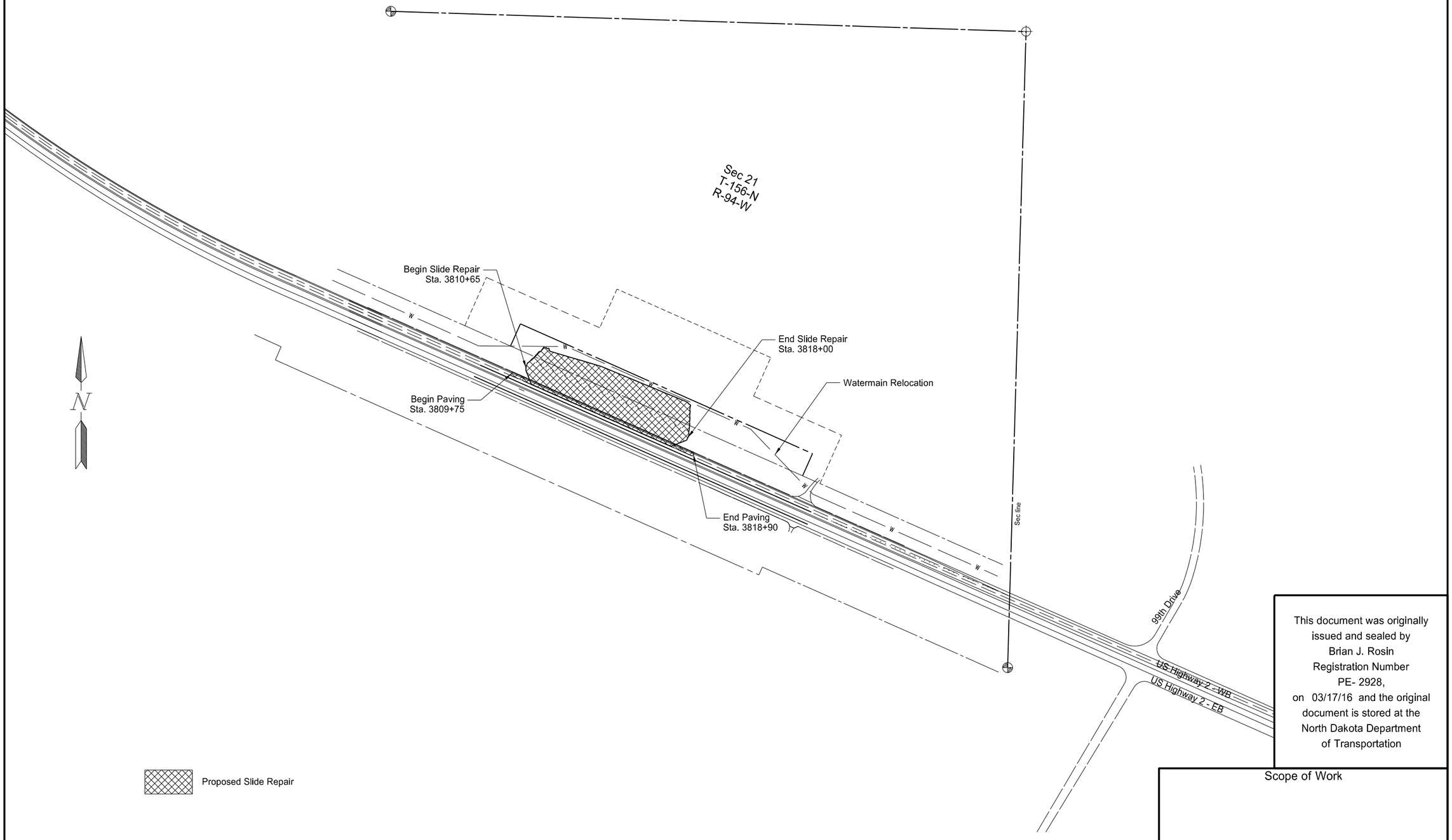

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Scope of Work

Slide Repair

White Earth Slide Repair - RP 72.2

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NOTES

100-P01: SEWER AND WATER CONTRACTOR: A ND licensed Sewer and Water Contractor is required. For a current list of licensed Sewer and Water contractors in ND, contact:

Laurie Walcker
Administrative Assistant
ND State Plumbing Board
1110 College Drive Suite 210
Bismarck, ND 58501
701-328-9977

100-P02 COORDINATION OF WORK: Give the fiber optic company a 20-day notice prior to the completion of the water main relocation:

Tim Jarski
Reservation Telephone Cooperative
701-862-5228

201-P01 CLEARING & GRUBBING: The District has cut down some of the trees at this location. Include tree removal, downed tree removal, and tree stump removal within the easements in the price bid for “Clearing & Grubbing”.

202-P01 REMOVE AGGREGATE BASE & SURFACING: Remove bituminous surfacing, blended base (3.5” Bit. Pvmt blended base with 8” Aggr. Base), and top inch of the bottom 3 inches of aggregate base.

203-010 SHRINKAGE: 15 percent additional volume is included for shrinkage in earth embankment.

203-P01 EXCAVATION REQUIREMENTS: Excavate the slide area from the top of the existing slope down.

203-P02 STOCKPILING EXCAVATED MATERIAL: Do not stockpile excavated material within the excavation limits.

203-P03 EXCAVATION: Include the cost of removal of the abandoned 12 Inch water main and abandoned fiber optic line within the excavation limits in the contract unit price for “Common Excavation-Type A.”

251-P01 SEEDING: Seed all disturbed areas within the project boundary with the following “Seeding Class III” mix:

Species	Recommended Variety	PLS lbs./ac
Blue Grama	Bad River	0.20
Canada Wildrye	Mandan	0.70
Green Needlegrass	Lodorm	0.60
Little Bluestem	Badlands	0.40
Prairie Junegrass	Common	0.10
Prairie Sandreed	Bowman	2.00
Sideoats Grama	Killdeer	3.00
Slender Wheatgrass	Revenue	1.50
Western Wheatgrass	Rodan	4.00
	Total	12.50

430-P01 COMMERCIAL GRADE HOT MIX ASPHALT: Use a commercial grade asphalt mix that meets Superpave FAA 45 requirements.

Include Prime, Tack, and PG 64-28 oil in the contract unit price bid for “Commercial Grade Hot Mix Asphalt”.

704-200 PRECAST CONCRETE MEDIAN BARRIERS – STATE FURNISHED: Obtain 101 barriers from the NDDOT Maintenance Yard in Stanley. Return barriers to the Stanley yard.

Some 4 inch x 4 inch boards are available at the return location. Provide any additional 4 inch x 4 inch boards necessary to stack barriers. The boards will become property of the Department. Include the cost for boards in the contract unit price for "Precast Concrete Median Barrier - State Furnished".

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704-P01 TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT: Provide traffic control consisting of a temporary lane closure and flagging.

Traffic control devices are based on a half mile limitation and the list below. The Department will pay for delineator drums used for approach access within the half mile limitation at the contract unit price. Provide additional devices at no cost to the Department.

1. Standard D-704-22, layouts K and L;
2. Standard D-704-26, layout GG;
3. Standard D-704-34; quantities include 20 delineator drums for approaches.

If the lane closure is removed and uneven lanes exist, provide traffic control as specified in Section 704.04 O, "Traffic Control for Uneven Pavement".

709-P01 GEOSYNTHETIC REINFORCEMENT: Supply a geosynthetic with a Long Term Tensile Strength (T_{al}) of 1,000 pounds per foot as per AASHTO R 69.

Submit manufacturer certification that the material meets the Long Term Tensile Strength requirements and has been tested for compliance by National Transportation Product Evaluation Program (NTPEP) at the preconstruction conference.

Install the geosynthetic as per section 709.04 with the following exceptions:

1. Place the geosynthetic reinforcement in continuous longitudinal panels with the strength (roll) direction oriented perpendicular to the face of the embankment slope.
2. Do not splice the geosynthetic reinforcement by any method in the primary strength direction.

The Engineer will measure and pay for Geosynthetic Reinforcement as per section 709.

714-P01 PLUG PIPE: At locations designated on the plans for plug pipe, provide cement-based grout/flowable fill with self-leveling, non-shrink characteristics and an unconfined compressive strength ranging from 50-125 psi. Cap/plug ends of pipe to remain in place. Submit mix design for approval by the Engineer at the preconstruction conference. Include all labor, materials, and equipment necessary to perform this work in the price bid for “Plug Pipe – All Types & Sizes”.

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NOTES

This project shall meet the Standards and Specifications as set forth in the North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, 2014 Edition and Supplemental Specifications with the following changes and/or additions:

SECTION 106 – CONTROL OF MATERIAL

All construction materials that are installed on this project must be new. Water piping and fittings must conform to the latest standards issued by ASTM, AWWA, NSF-61/ANSI, and AASHTO.

SECTION 216 – WATER

All water used for compaction will be incidental to other bid items.

SECTION 256 – Riprap

Any existing Rip-Rap shall be removed and salvaged during the construction of the water main and replaced after final compaction. This shall be incidental to other bid items.

SECTION 302 – AGGREGATE BASE AND SURFACE COURSE

302.03 MATERIALS

A. **Aggregate or Salvaged Material**. Bedding Material shall be Class 5 and shall meet Section 816.

SECTION 724 – WATER MAINS, WATER LINES, AND SEWER LINES

724.03 MATERIALS

A. **Pipes**.

1. **Polyvinyl Chloride Pipe** shall meet the requirements of American Water Works Association (AWWA) C900 with latest revisions and as specified in Section 830.03. The PVC pipe shall be JM EAGLE LOC 900DR 18 Class 235 internally restrained pipe or approved equal. Ductile Iron Pipe will not be allowed as an alternate pipe material; however it may be used for mechanical fittings. The pipe may be either of the Solvent Weld Coupling Type for small diameter pipe or of the "O" Ring Bell Joint Coupling Type. The installation of either must be in full accordance with the Manufacturer's instructions.

B. **Joints and Fittings** shall meet the requirements of AWWA. The underground fittings shall be ductile iron mechanical joint meeting AWWA C153. The fittings above the ground shall be flanged. The joints shall be installed according to the manufacturer's instructions. All Joints and Fittings shall be ductile iron pipe with nominal 10 mils Fusion Epoxy Coated exterior surfaces, ANSI Schedule 40, and shall meet the requirements of ASTM 53, cement lined inside in accordance to ANSI/AWWA C104/A21.4, and wrapped in polyethylene wrap. All bolts shall be stainless steel.

All connections to Existing Water Lines shall be made with ROMAC ALPHA RESTRAINED JOINT or HYMAX GRIP WIDE RANGE RESTRAINED COUPLINGS.

All End Caps shall be ROMAC ALPHA RESTRAINED or HYMAX GRIP WIDE RANGE RESTRAINED COUPLING End Caps.

Polyethylene encasement for gray and ductile cast iron piping shall be used on all joints, fittings, valves, fire hydrant risers, etc. Polyethylene film shall conform to the material requirements of the latest revision of ANSI/AWWA C105/A21.5 and have a minimum thickness of 0.008 in. (8 mils). All ends shall be sealed to adjoining pipe.

All Fittings 4-inch and larger shall be installed with MEGALUG Joint Restraints and on top of an 18” X 18” X 6” concrete block.

C. **Gate Valves** 2" and larger shall be iron body, brass mounted, and shall conform to American Flow Control Resilient Wedge Valve or approved equal to meet all pertinent requirements of the AWWA Standard C509 or to Fed. Spec. WW V 58, Class A.

Gate valves shall be designed for a minimum water working pressure of not less than 250 psi. Valves shall have Mechanical joint ends. Gate valves shall have a clear waterway equal to the full nominal diameter of the valve, they shall be opened by turning the system counter clockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening. Each valve shall have the maker's initials, pressure rating and year of manufacture, all cast on the body of the valve. Prior to shipment from the factory, each valve shall be tested by hydraulic pressure equal to twice the specified water working pressure. Gate valves shall be installed on top of an 18” X 18” X 6” concrete block and set plumb. The gate valve shall be equipped with a 4 foot gate valve stem extension with center plate.

All Fittings 4-inch and larger shall be installed with MEGALUG Joint Restraints.

D. **Valve Boxes** shall be made of cast iron and complete with screw type cover or lock type cover. They shall be of screw extension type for vertical adjustment with threaded base for Minneapolis Pattern Curb Stops and of the flared and saddle base type for all larger valves such as main line valves, etc.

Boxes shall be installed over all outside gate valves unless otherwise shown on the Plans. Box stems shall be of such length as will be adapted, without full extension, to depth of cover required at all locations. Valve boxes shall be carefully centered with the use of an Adaptor Inc. Valve Box Adaptor II over the valve. Earth fill shall be carefully tamped around each valve box to a distance of four (4) feet on all sides of the box, or to the undisturbed trench face, if less than four (4) feet.

The contractor shall install a T-post service marker with the top 2’ painted blue.

E. **Air Release & Vacuum Valve with Shutoff Valve**

1. The float shall be Stainless Steel 304SS Standard, the balance and internals parts shall be Stainless Steel and Delrin, and the seals shall be Nitrile Rubber or Viton.
2. The air release and vacuum valves shall be accessible for maintenance without removing the device from the line.
3. The air release and vacuum valves shall be A.R.I. D-070-P with one way valve or approved equal.
4. The air release shall be a 3 inch.
5. All costs of labor and materials to construct the Air Relief Valve including, but not limited to: air relief valves, 48IN manhole, D & L A-1172 valve manhole frame and insulated lid, furnishing and installing all fittings, pipe, tees, bends, valves, reducers, located inside the air relief pit, drain pipe, service marker and rock shall be included in the bid price per each for the bid item “Air Relief Valve & Manhole”
6. The Contractor shall install a T-post service marker with the top 2’ painted blue.

F. **Tapping Saddles** shall be Romac Style 306 All Stainless Steel Service Saddles.

G. **Hardware** including all Bolts, Nuts, and Washers shall be Stainless Steel.

724.04 CONSTRUCTION REQUIREMENTS

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B. **Excavation and Trenching**. When excavation is required along existing water main, the maximum unburied existing main shall be 40' or to assure no damage is done to the existing main, whichever is less.

1. **Excavation**. Trenches shall be excavated so the water main can be laid on 3 inches of bedding material. If unstable material is encountered, it shall be removed and replaced with backfill acceptable to the Engineer. Disposal of excess excavation and unstable material shall be off the right-of-way, at a location provided by the contractor and approved by the Engineer.

2. **Bedding**. The bedding material shall be shaped so that after the pipe is laid, the bedding extends up the sides of the pipe a distance of 1/3 the pipe diameter and below the pipe 3 inches. The bedding shall be tamped to provide uniform bearing along the entire length of the pipe. Bedding material shall be in-situ soil or if material is unsuitable shall be Class 5 and shall meet Section 816. Bedding Material shall not be paid for unless Class 5 material is required. No payment shall be made when bedding pipe with in-situ soil. Engineer shall determine if in-situ soil is suitable for backfill.

3. **Backfilling**. Backfill material shall consist of in-situ material excavated on-site. Backfill shall be placed and compacted without lateral displacement of the pipe, in 12-inch layers, and compacted to not less than 95 percent maximum dry density at optimum moisture content per AASHTO T 99.

4. **Exploratory Excavation**. The location of existing buried public utilities may need to be verified by exploratory excavation before construction. Exploratory excavation shall be used to locate, determine depth, verify pipe material and measure O.D. of the existing water line.

   Where authorized by the Engineer, the Contractor will be reimbursed for exploratory excavation work to locate utilities at the unit price bid per hour for a vactor truck with operator and a laborer to assist.

   The unit price per hour includes the vactor truck, operator, and one laborer based upon actual time, to the nearest one-half hour, that the equipment and personnel are used in actual excavating and backfilling operations including standby time between excavation and backfilling which allows the Engineer to make the necessary survey of the underground utilities.

   Exercise care to prevent damaging all utilities and repair any utility damage caused by exploratory excavation at no expense to the Owner if caused by Contractor error.

C. **Water Main Requirements**

3. **Testing and Disinfecting Lines**

Testing Lines. For final acceptance of the water system, a hydrostatic test shall be run on the system with the Project Engineer being present. The testing will be under his supervision with the Contractor, providing all of the necessary equipment needed for making the test or tests and performing all work in connection therewith. The testing shall be in accordance with AWWA C605.

The Contractor shall submit a detailed plan for filling, pressure testing, bacteriological testing and flushing. This plan shall include all components needed to complete these tasks including equipment. Plan & Drawings shall be submitted to the Engineer by the pre-construction meeting. If water service will be affected, the Contractor must prepare a notice 48 hours in advance.

The water main pressure shall be brought to 150 psi after all air has been removed from the lines at the western most connection. The test will be continued or held for a period of no less than 2 hours. As the water main pressure drops or reduces by 5 psi, water will be added, being measured in quantity by a standard water meter, with the pressure being brought back to the reading of 150 psi on the water main. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

(Eq. 1)

$$L = \frac{S\,D\,(P)^{1/2}}{148{,}000}$$ In inch-pound units,

Where:
L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

At all times the testing will be done under the supervision of the Project Engineer, the Contractor shall provide ample time, have everything in full readiness and arrange for agreeable dates with the party named above in connection with this testing.

The Contractor may, at his option and if felt to be to his advantage, make hydrostatic tests on all lines before backfilling and covering up any joints and/or fittings. This must be discussed with the Project Engineer so that an understanding and agreement will be verified before any covering up takes place.

Should any test disclose damage or defective materials or leakage greater than permitted, the Contractor shall, at the Contractors expense, locate and repair and/or replace the damages or defective material. Repeat the test until the leakage is within the permitted allowance and is satisfactory to the Engineer.

Disinfecting Lines. Before being placed in service, the entire water system shall be chlorinated in accordance with AWWA C 651. Chlorine may be applied by any of the following methods: liquid chlorine gas water mixture, direct chlorine gas feed or a calcium hypochlorite and water mixture. Before disinfection, the water main shall be flushed in accordance with AWWA C 600-93 Section 3.9.

The chlorinating agent shall be placed or applied at the beginning of the section adjacent to the feeder connection and shall be injected through a corporation cock, hydrant or any other connection which will insure treatment of the entire line or system.

Water shall be fed slowly into the new lines with chlorine being applied in an amount, which will produce a dosage of from 100 ppm. Up to a 4" wet tap will be allowable for filling of the new water line. This wet tap must be past the tie in points on the existing water main allowing this wet tap to be completely removed from the water system when the connection of the new line is complete.

Any mains previously filled shall be treated with a concentrated dosage at intervals along the lines and retained for a minimum of 48 hours. A residual of not less than 100 ppm shall be produced in all parts of the system. Operate all accessories, then flush the entire system until the expelled water is equal to the inserted water in all characteristics and at all extremities.

Liquid Chlorine: Chlorine gas water mixture shall be applied by means of a solution fed chlorination device. Chlorine gas shall be fed directly from a chlorine cylinder equipped with a suitable device for regulating the rate of flow and the effective diffusion of gas within the pipe. Calcium hypochlorite shall be comparable to commercial products known as "H.T.H.", "Perchloren", and "Maxochlor". A solution consisting of five (5) percent of powder to ninety five (95) percent of water by weight should be prepared. The calcium hypochlorite and water mixture, first made into a paste and then thinned to a slurry, shall be injected or pumped into the newly laid line under the conditions specified herein before.

Calcium Hypochlorite Tablets: Tablets shall consist of adhering calcium hypochlorite tablets in the water main during installation. During installation, 5-g tablets shall be placed in each section of pipe, each hydrant, hydrant branch and other appurtenance. The number of 5-g tablets required for each pipe section shall be $0.0012*(d)^2*(L)$

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NOTES

rounded up, where d is inside diameter, in inches, and L is length of pipe section, in feet. The tablets shall be attached with a food-grade NSF approved adhesive. Excess adhesive must be removed immediately using mechanical means or NSF-approved adhesive solvent. Tablets shall be placed at the top of the pipe.

Either method shall have a chlorine residual of one hundred (100) milligrams per liter for twenty four (24) hours or a chlorine residual of two hundred (200) milligrams per liter for three (3) hours.

The water main shall be flushed after disinfection and two satisfactory bacteriological samples, taken 24 hours apart shall be completed before the water main is put in service. The cost of the bacteriological tests shall be considered an incidental to the water main construction and no payments shall be paid for them.

All samples shall be analyzed by the State of North Dakota certified laboratory. Samples shall show the absence of coliform organisms; and the presence of chlorine residual. Samples shall also be tested for turbidity, PH, and standard heterotrophic plate count (HPC).

The highly chlorinated disinfection water shall not be discharged into a stream, river or other waterway where danger to aquatic life may occur. De-chlorination shall be necessary prior to discharge. Contractor shall be required to test discharge water. This testing shall be incidental.

It shall always be the responsibility of the Contractor to supply all water needed for the filling, flushing, testing, disinfecting and all other needed usages of the water, at the time the system is being made ready for final usage and turning over to the Owner. All costs in connection with the procurement of the needed water for these and other purposes shall be borne by the Contractor.

No water main shutdowns or water work connections will be allowed on Friday, both connections from the new water main to the existing water main shall be performed on the same day between 9am and 3pm Monday, Tuesday, Wednesday or Thursday. During shutdowns the Contractor shall give notice to the City of Stanley and the Engineer a minimum of 48 hours prior to actual shutdown. The Contractor shall man the job site and gate valves for shutdown with real time communication at all times. **The Contractor shall provide a detailed plan for all operations and equipment to complete any shutdown, which includes an emergency plan.**

All temporary pipe fittings/parts (blow offs, caps, plugs, etc.) are incidental to the connection and completion of this project.

All filling and flushing material are incidental to the contract.

4. **Concrete Thrust Blocks** shall be installed at all pipe tees and elbows where a change in direction occurs or at the ends of lines. The concrete shall fill the space between the pipe and the undisturbed earth. No separate measurement will be made for the work covered in this section and all costs to perform the work shall be included in the applicable contract lump sum or unit price for the structure item to which the work pertains, complete as shown on the drawings and as specified herein.

5. **Detectable Warning Tape & Tracer Wire**

A. Furnish and install detectable underground warning tape per Section 724.04 C.5. The tape shall be a minimum of 5 mil thickness, 6 inches width and have an aluminum core. Place tape directly over CL of pipe, between 18” and 30” below finished surface.

B. Furnish and install tracer wire for open-trench installation shall be a 12 AWG solid, PRO-TRACE HF-CCS PE45. Conductor shall be soft-drawn, 21% IACS, copper clad steel, utilizing an AISI 1006 low carbon steel core (required to meet break load and flexibility), with break load of 282 lbs (55,000 psi). Conductor shall be extruded with a 45 mil, high density polyethylene, and meet the APWA color code blue. Tracer wire shall be rated for direct burial use at 30 volts and RoHS compliant. Tracer wire shall be PRO-TRACE HF-CCS PE45 as manufactured by Pro-Line Safety Products and made in the USA, or an approved equal. Tracer Wire shall be installed with 2 Color Coded Copperhead Snake Pit Magnetized Heavy Duty Roadway Tracer Boxes at both gate valves. Refer to detail sheets.

D. Water Service Lines

Water service shall be maintained through the entirety of the project. For temporary water shutoff to enable water service connection, residents and businesses in the area to be affected shall be notified. The notification shall be no less than 48 hours in advance of the shutdown.

Should the Contractor choose to set up temporary water services to maintain water service during construction; any work or materials shall not be paid for separately, but shall be incidental to the other bid items.

Should the Contractor damage the existing mains during construction, the Contractor shall fix the lines immediately at no cost to the Owner. Any additional work necessary to maintain water service will not be paid for separately, but shall be incidental to the other bid items.

F. **Cleanup**. Upon completion of the installation of the water distribution lines, water supply lines and the various fittings and appurtenances, all debris and surplus materials resulting from the work shall be removed. All ground surfaces at the site of the work shall be machine and hand dressed, as may be required, so as to leave the site of the work either equal to or better than conditions were before any work was started. All disturbed areas shall be seeded and mulched. The finished condition of the site of all work must be such that it will be approved by the Project Engineer.

G. **Removals**. Where possible existing/abandoned water mains shall remain in-place. All vertical piping, curb boxes, and fire hydrants shall be removed. Any water main, gate valves, fire hydrants, etc. which are removed shall become the property of the Contractor and shall be disposed of off-site at no additional cost to the Owner.

724.04 METHOD OF MEASUREMENT

A. Water Mains of the various types and sizes specified will be measured by the Lineal Foot through fittings and from centerline of pipe to centerline of pipe complete and in place. All testing, detectable warning tape, excavation, trenching, disposal, backfilling, compaction, and all other incidentals required to install water mains shall be included in the price bid per Lineal Foot.

724.05 BASIS OF PAYMENT

All measurements and payments will be used on completed and accepted work performed in strict accordance with the plans and specifications. No separate payment will be made for testing or for excavation, trenching, disposal, backfilling, compaction, and landscaping etc. No separate payment will be made for removing and disposing of any water main, gate valves, fire hydrants etc. For items of work covered under this section of the specifications, all such costs pertinent to these items shall be included in the applicable unit prices therefore.

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ENVIRONMENTAL COMMITMENTS

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Based on the NEPA documentation, no additional permits or environmental commitments have been identified beyond what is covered by the NDDOT's Standard Specification of Road and Bridge Construction.

Wetland Number	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands	Impacts to Wetlands	
						Temp.	Perm.
There is one adjacent wetland within the project limits; however, no impacts are anticipated within the limits of construction.							
TOTALS:				**0.00**		**0.00**	**0.00**

*A wetland Jurisdictional Determination was issued by the USACE on 7/30/2015; NWO-2015-1338-BIS.

ESTIMATE OF QUANTITIES

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SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	WATERMAIN	TOTAL
103	0100	CONTRACT BOND	L SUM	0.79	0.21	1
201	0330	CLEARING & GRUBBING	L SUM	1		1
202	0021	REMOVE AGGREGATE BASE & SURFACING	TON	1,473.2		1,473.2
202	0312	REMOVE EXISTING FENCE	LF	2,700		2,700
203	0101	COMMON EXCAVATION-TYPE A	CY	84,967		84,967
203	0119	TOPSOIL-IMPORTED	CY	2,075		2,075
203	0140	BORROW-EXCAVATION	CY	14,836		14,836
203	0505	EXPLORATORY EXCAVATION	HR		25	25
216	0100	WATER	M GAL	1,026		1,026
251	0300	SEEDING CLASS III	ACRE	14.47		14.47
251	2000	TEMPORARY COVER CROP	ACRE	14.47		14.47
253	0101	STRAW MULCH	ACRE	28.94		28.94
255	0102	ECB TYPE 2	SY	14,149		14,149
260	0200	SILT FENCE SUPPORTED	LF	575		575
260	0201	REMOVE SILT FENCE SUPPORTED	LF	575		575
261	0112	FIBER ROLLS 12IN	LF	4,280		4,280
261	0113	REMOVE FIBER ROLLS 12IN	LF	4,280		4,280
265	0100	STABILIZED CONSTRUCTION ACCESS	EA	1		1
265	0101	REMOVE STABILIZED CONSTRUCTION ACCESS	EA	1		1
302	0100	SALVAGED BASE COURSE	TON	1,181.1		1,181.1
302	0121	AGGREGATE BASE COURSE CL 5	CY		200	200
411	0105	MILLING PAVEMENT SURFACE	SY	333.3		333.3
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	574.9		574.9
702	0100	MOBILIZATION	L SUM	0.79	0.21	1
704	0100	FLAGGING	MHR	300		300
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1,214		1,214
704	1044	ATTENUATION DEVICE-TYPE B-70	EA	1		1
704	1052	TYPE III BARRICADE	EA	1		1
704	1060	DELINEATOR DRUMS	EA	37		37
704	1067	TUBULAR MARKERS	EA	22		22
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	1		1
704	3510	PRECAST CONCRETE MED BARRIER-STATE FURNISHED	EA	101		101
706	0500	AGGREGATE LABORATORY	EA	1		1

ESTIMATE NUMBER: 16678 RUN DATE: 03/23/2016 TIME: 12:48:13

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	WATERMAIN	TOTAL
709	0200	GEOSYNTHETIC REINFORCEMENT	SY	69,697		69,697
714	9680	PLUG PIPE-ALL TYPES & SIZES	EA		2	2
720	0110	RIGHT OF WAY MARKERS	EA	3		3
720	0130	IRON PIN R/W MONUMENTS	EA	3		3
722	6695	AIR RELIEF VALVE & MANHOLE	EA		1	1
724	0314	GATE VALVE & BOX 12IN	EA		2	2
724	0850	WATERMAIN 12IN PVC	LF		1,864	1,864
724	0944	CONNECTION TO EXISTING MAIN	EA		2	2
724	6840	12IN 11.25DEG BEND	EA		1	1
724	6842	12IN 22.5DEG BEND	EA		4	4
752	0320	FENCE BARBED WIRE 4 STRAND-STEEL POST	LF	2,134		2,134
752	0905	TEMPORARY FENCE	LF	2,410		2,410
752	3150	CORNER ASSEMBLY BARBED WIRE-WOOD POST	EA	4		4
754	0151	RESET DELINEATOR POST-TYPE A	EA	1		1
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	0.173		0.173
762	0113	EPOXY PVMT MK 4IN LINE	LF	1,144		1,144
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	229		229

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	10	1

		Mainline WB Sta. 3810+75 to Sta. 3817+90 7.15 Sta.	
Material	**Unit**	Width (ft)	Qty per Sta
Remove Aggregate Base & Surfacing @ 1.875 Ton/CY	TON	-	206.0
Salvaged Base Course @ 1.875 Ton/CY	TON	-	165.2
*Prime Coat @ 0.20 Gal/SY (1st Lift)	GAL	17	37.8
*Tack Coat @ 0.05 Gal/SY (2nd Lift)	GAL	17	9.4
*Tack Coat @ 0.05 Gal/SY (3rd Lift)	GAL	16	8.9
Commercial Grade Hot Mix Asphalt @ 2 Ton/CY	TON	15	70.7
*PG 64 -28 Asphalt Cement @ 6.0% of Commercial Grade Hot Mix Asphalt	TON	-	4.24

Material Summary							
Location	Remove Aggregate Base & Surfacing (Ton)	Salvaged Base Course (Ton)	*Prime (Gal)	*Tack (Gal)	Commercial Grade Hot Mix Asphalt (Ton)	*PG 64-28 (Ton)	Water (Mgal)
Sta 3810+75 to Sta 3817+90	1473.2	1181.1	270	156	574.9	34.5	1026

*For estimating purposes only (Not to be measured).

Water

25 Mgal/Mile for Dust Palliative
20 Gal/Ton for Aggregates
10 Gal/CY for Embankment

RUMBLE STRIPS - ASPHALT SHOULDER

Sta. 3809+75 to Sta. 3818+90 0.173 MILE

RESET DELINEATOR - TYPE A

Sta 3814+57 1 EA

GEOSYNTHETIC REINFORCEMENT

Sta. 3810+65 to Sta. 3818+00 69,697 SY

Short Term 4IN Line - Type NR		
Location - Type	Basis	Quantity
Centerline - Top of Final Lift	Centerline Skips - 1,320 LF/Mile	229 LF

Permanent Pavement Marking		
Location - Type	Basis	Quantity
Centerline - Epoxy Pvmt MK 4IN Line	Centerline Skips - 1,320 LF/Mile	229 LF
Edge Line - Epoxy Pvmt MK 4IN Line	Edge Line - 5,280 LF/Mile	915 LF

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Basis of Estimate

Slide Repair

White Earth Slide Repair - RP 72.2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	11	1

Earthwork Summary

			EARTHWORK			TOPSOIL
Pay Item Computation Variable			A	B	C	P
LOCATION	STATION		Calculated Excavation* (Cut)	Calculated Embankment Required** (Fill)	(+)Waste (-) Borrow	Topsoil Proposed
	Begin	End	CY	CY	CY	CY
Slide Repair	3810+65	3818+00	84,967	99,803	-14,836	2,075
TOTALS			84,967	99,803	-14,836	2,075

*Any existing pavement and base has been calculated and removed from this quantity.

**15% additional volume has been added to embankment to account for shrinkage.

Pay Item	Computation	Quantity (CY)
COMMON EXCAVATION-TYPE A	A	84,967
TOPSOIL	S	2,075
BORROW EXCAVATION	C	14,836

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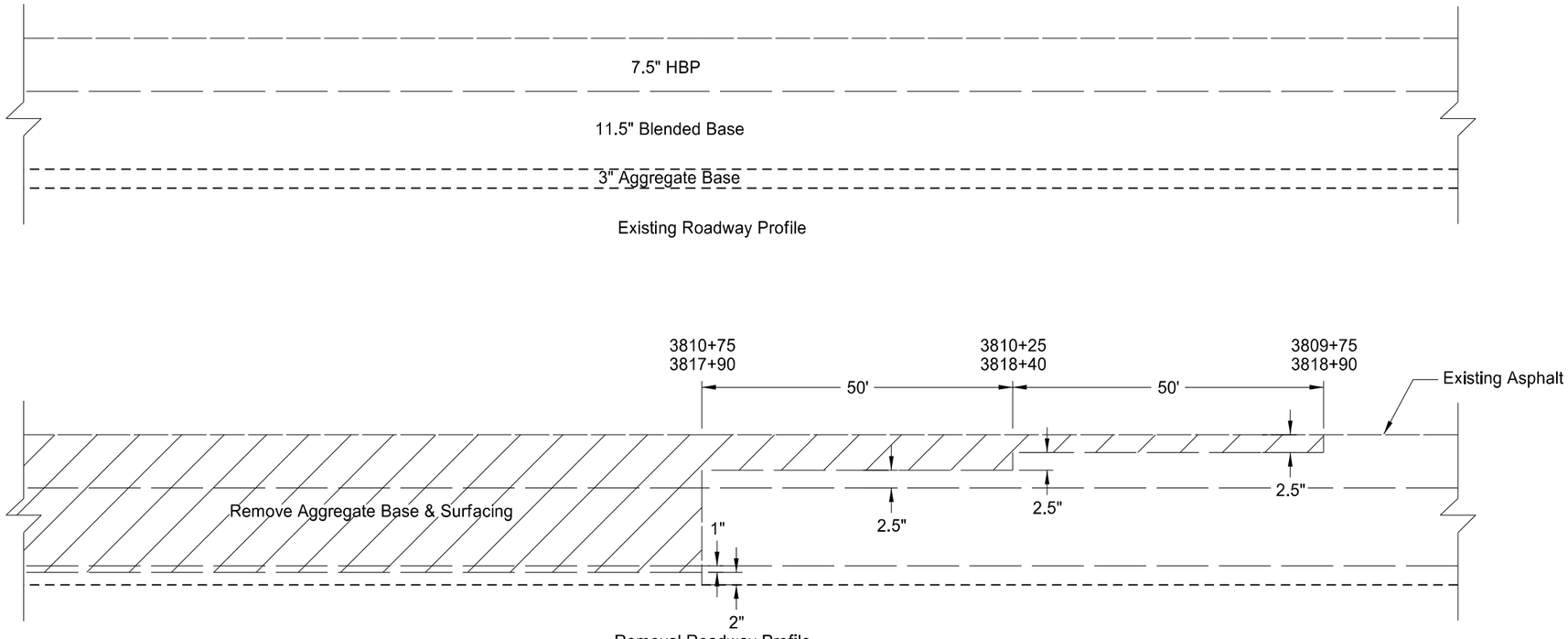
Earthwork Summary

Slide Repair

White Earth Slide Repair – RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	20	1



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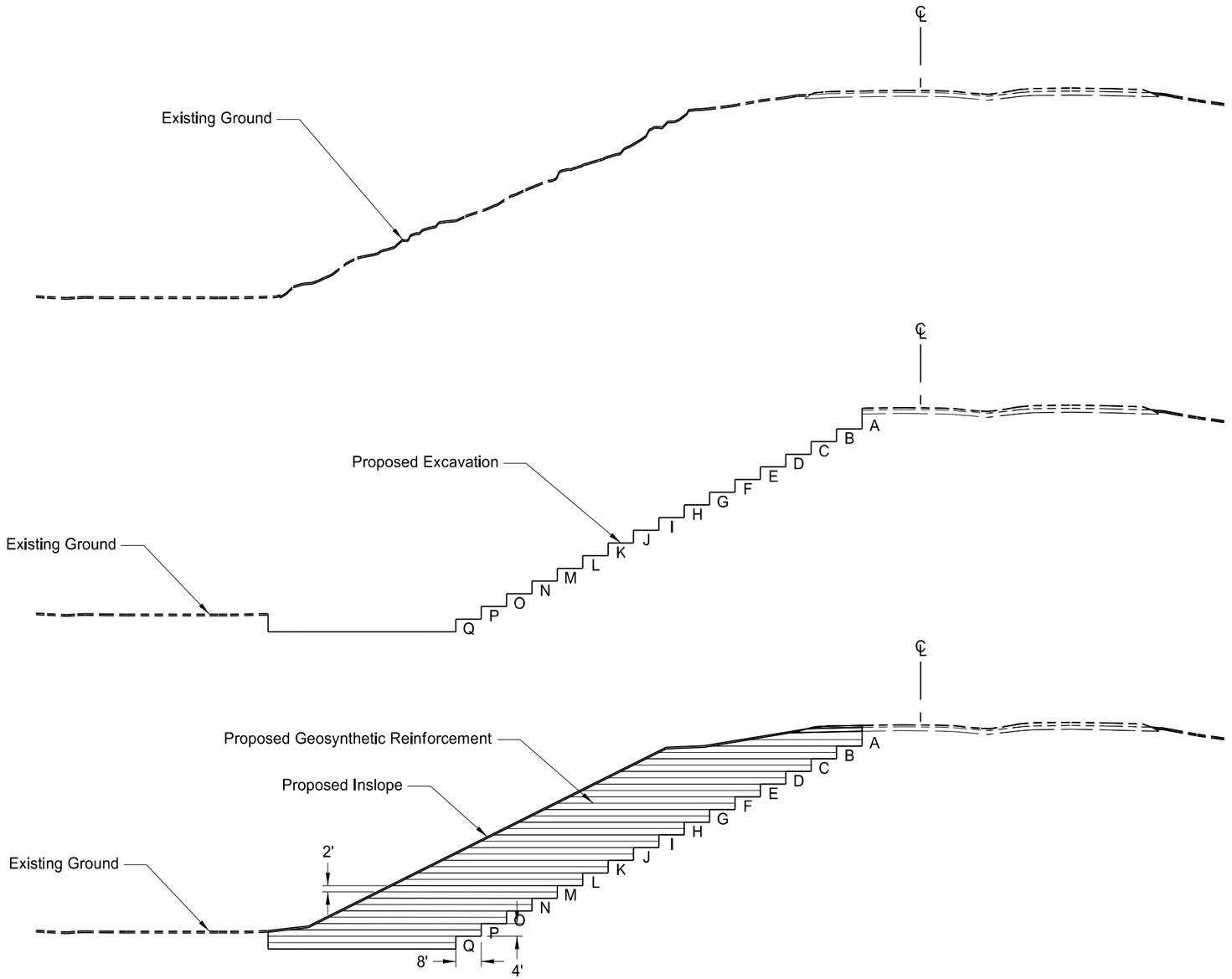
Paving Detail

Slide Repair

White Earth Slide Repair - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	20	2



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Benching Detail

Slide Repair

White Earth Slide Repair - RP 72.2

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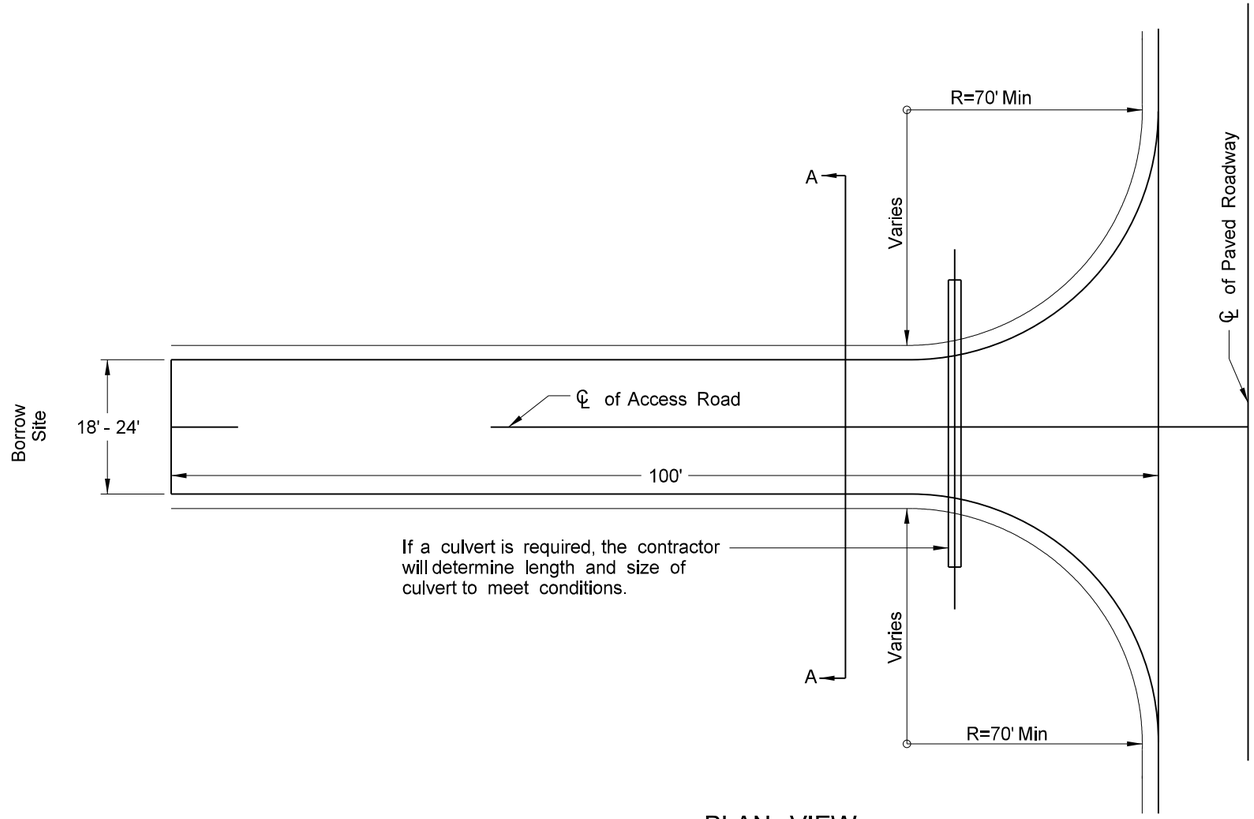
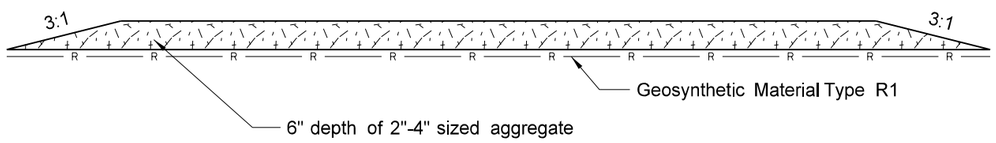
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	20	3

SPEC	CODE	BID ITEM	UNIT	QUANTITY
265	100	STABILIZED CONSTRUCTION ACCESS	EA	1
265	101	REMOVE STABILIZED CONSTRUCTION ACCESS	EA	1



PLAN VIEW



A - A Cross Section

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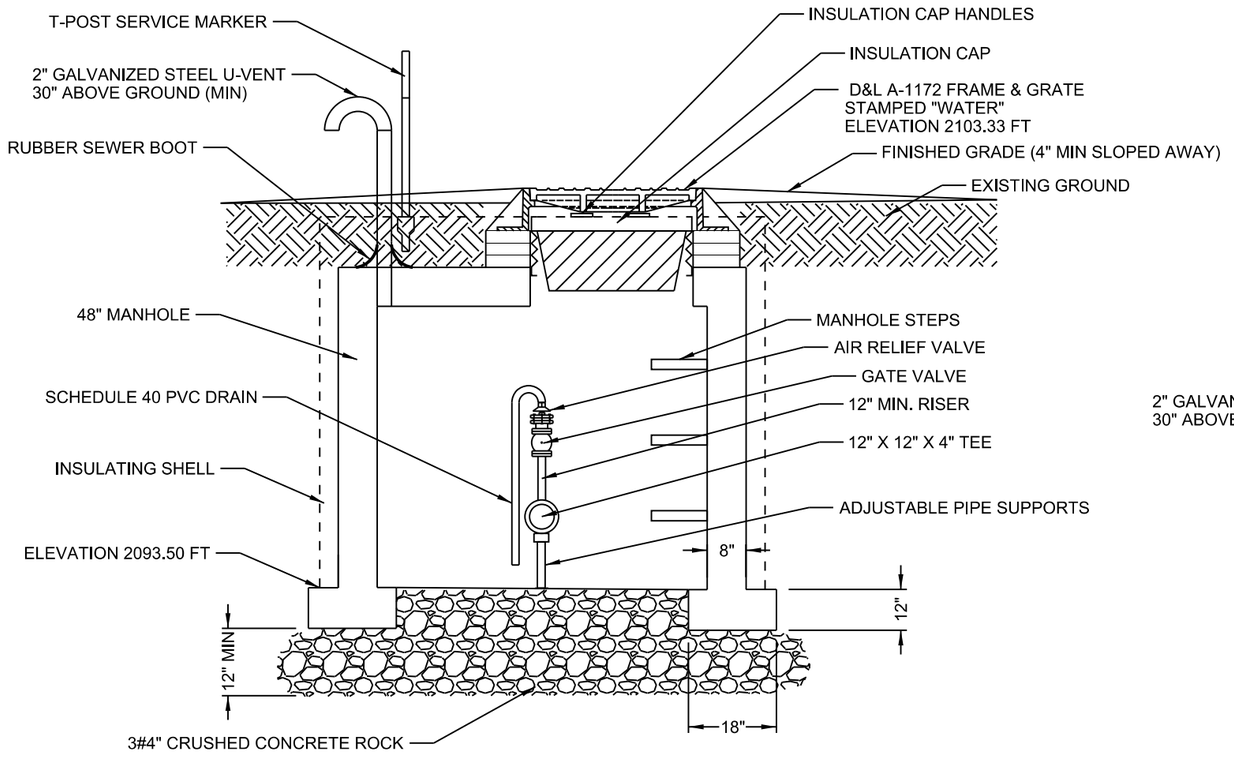
Stabilized Construction Access

Slide Repair

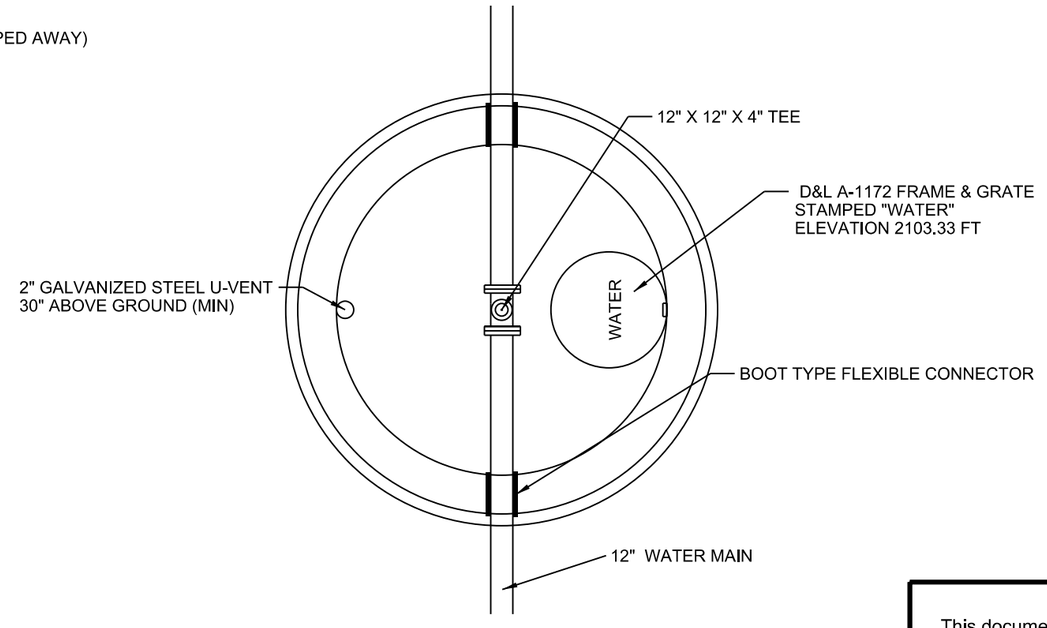
White Earth Slide Repair - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	20	4

AIR RELIEF VALVE DETAILS (SIDE VIEW)



AIR RELIEF VALVE DETAILS (TOP VIEW)



NOTE:

1. ABOVE DETAIL IS BASED ON 4" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES.
2. SUPPORT TEE INSIDE MANHOLE WITH ADJUSTABLE PIPE SUPPORTS ON EITHER SIDE (SEE DETAIL ON NEXT PLAN SHEET). PIPE SUPPORTS SHALL BE MOUNTED TO A 12"X12"X6" CONCRETE PAD WITH REBAR REINFORCEMENT.
3. STEPS SHALL BE CAST INTO MANHOLE FOR ACCESS.
4. THE MANHOLE SHALL BE WRAPPED WITH IPI URTECH RE INSULATING SHELL, OR APPROVED EQUAL. THIS SHALL INCLUDE INSULATING THE FRAME & GRATE.

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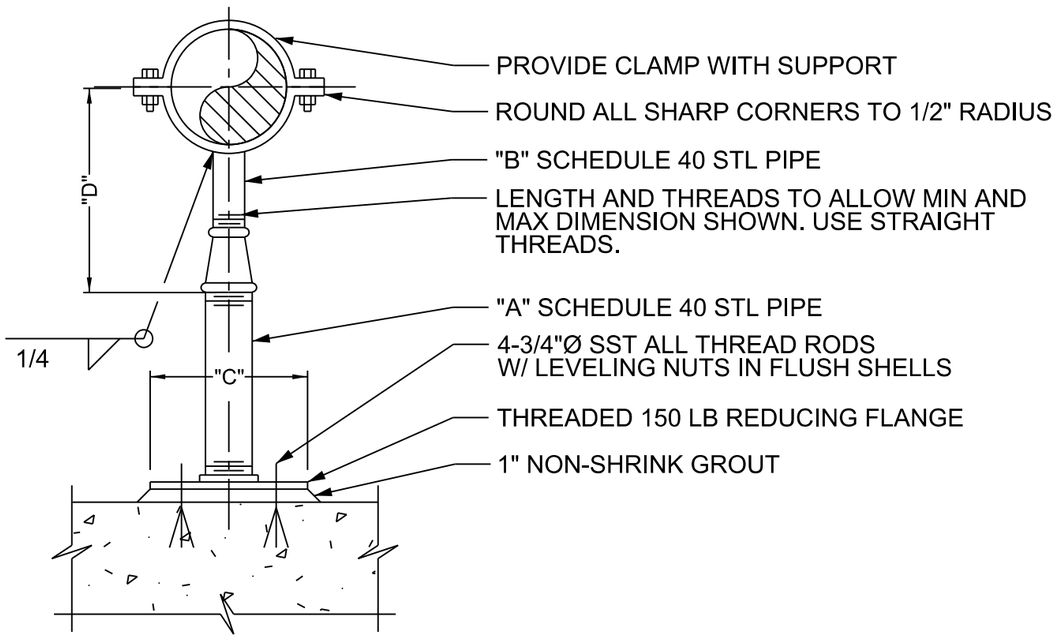
AIR RELIEF VALVE DETAILS

SLIDE REPAIR

WHITE EARTH SLIDE REPAIR - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	20	5

ADJUSTABLE PIPE SUPORTS (SIDE VIEW)



NOTE:

1. ALL MATERIAL TO BE STAINLESS STEEL.

ADJUSTABLE PIPE SADDLE SUPPORT SCHEDULE
DIMENSIONS IN INCHES

SIZE OF SUPPORTED PIPE	PIPE SIZE "A"	PIPE SIZE "B"	"C"	"D" MINIMUM	"D" MAXIMUM
* 2 1/2	2 1/2	1 1/2	9	8	13
3	2 1/2	1 1/2	9	8 1/2	13 1/2
3 1/2	2 1/2	1 1/2	9	8 1/2	13 1/2
4	3	2 1/2	9	9 1/2	14
6	3	2 1/2	9	10 1/2	15 1/2
8	3	2 1/2	9	11 1/2	16 1/2
10	3	2 1/2	9	13 1/2	18 1/2
12	3	2 1/2	9	15	19 1/2
14	4	3	11	16 1/2	20 1/2
16	4	3	11	17 1/2	22 1/2
18	6	3 1/2	13 1/2	19 1/2	24
20	6	3 1/2	13 1/2	21	25 1/2
24	6	4	13 1/2	23 1/2	28 1/2
30	6	4	13 1/2	27	31 1/2
32	6	4	13 1/2	28 1/2	32 1/2
36	6	4	13 1/2	30 1/2	34 1/2

* USE 2 1/2" SUPPORTS FOR PIPES LESS THAN 2 1/2"Ø

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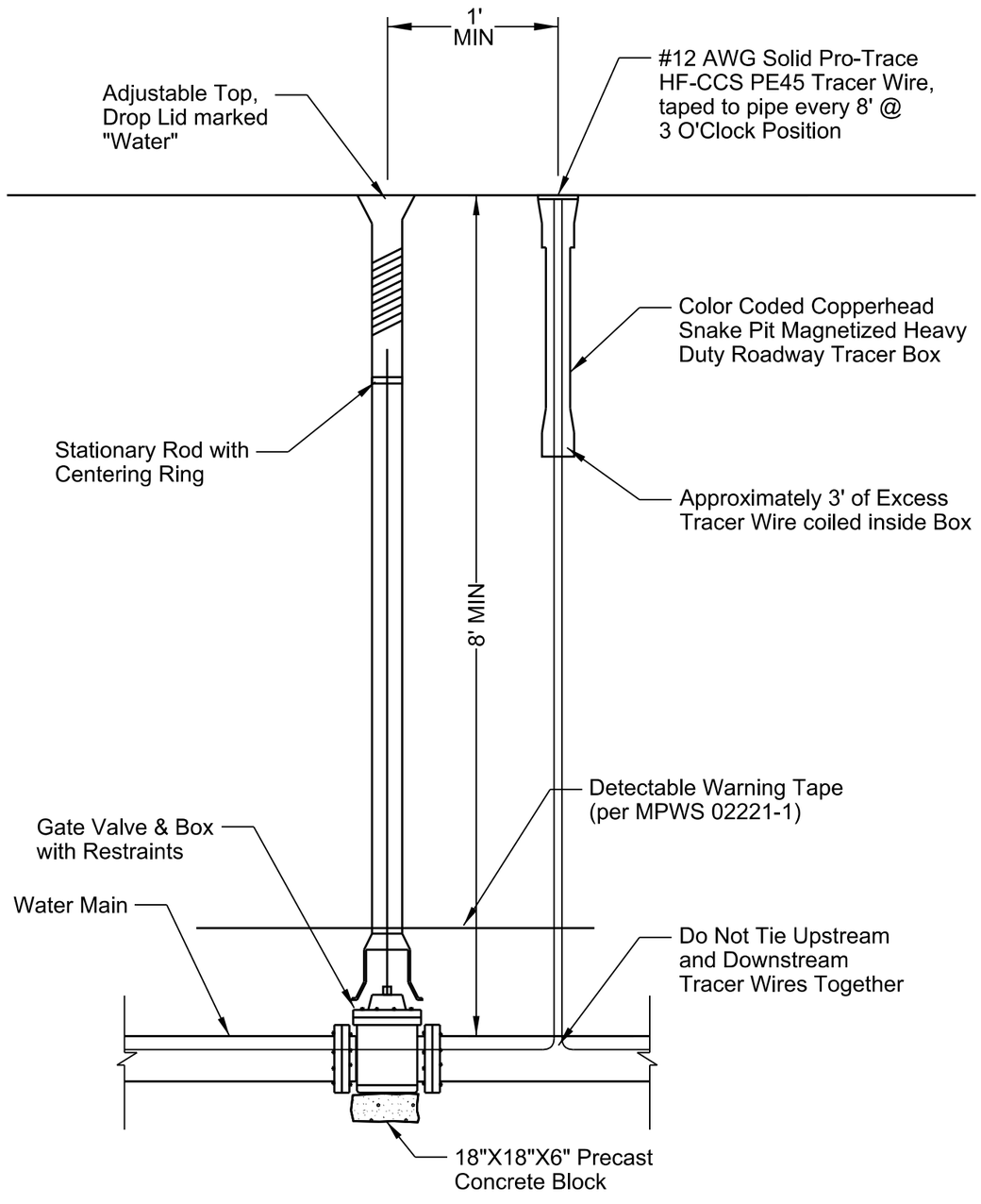
AIR RELIEF VALVE DETAILS

SLIDE REPAIR

WHITE EARTH SLIDE REPAIR - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	20	6

TYPICAL VALVE INSTALLATION



NOTES:

1. Water Main pipe shall be DR 18 Class 235.

2. Furnish and install detectable underground warning tape per Section 724.04 C.5. The tape shall be a minimum of 5 mil thickness, 6 inches width and have an aluminum core. Place tape directly over CL of pipe, between 18”and 30”below finished surface.

3. All fittings shall have MEGALUG Joint Restraints.

4. Gate Valves shall be Mueller 2300 series.

5. Valve boxes shall be cast iron w/ screw or lock type cover. They shall be screw or slide extension type for vertical adjustment with threaded base for Minneapolis Pattern Curb Stops and of the flared and saddle base type for all larger valves.

6. All hardware shall be Stainless Steel.

7. Survey and Computerized Asbuilts shall be turned into the Public Works Director, no field drawn or measured asbuilts shall be accepted.

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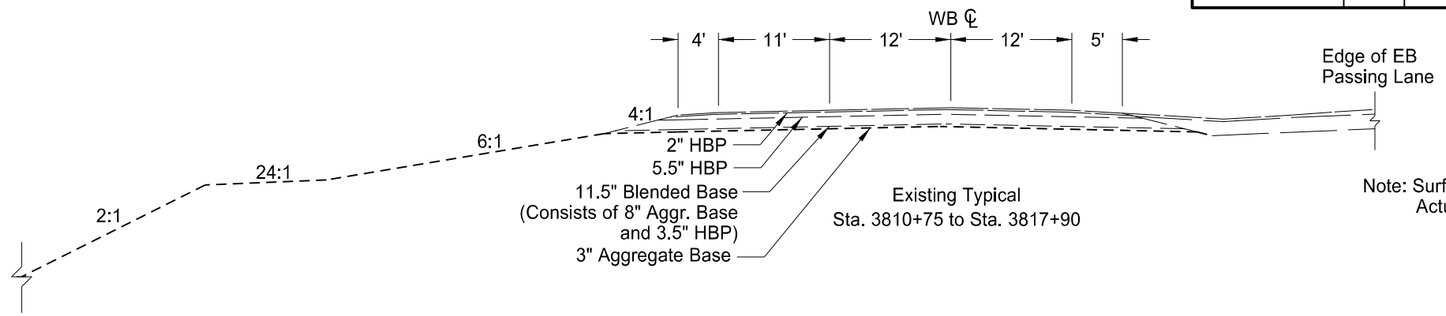
GATE VALVE DETAILS

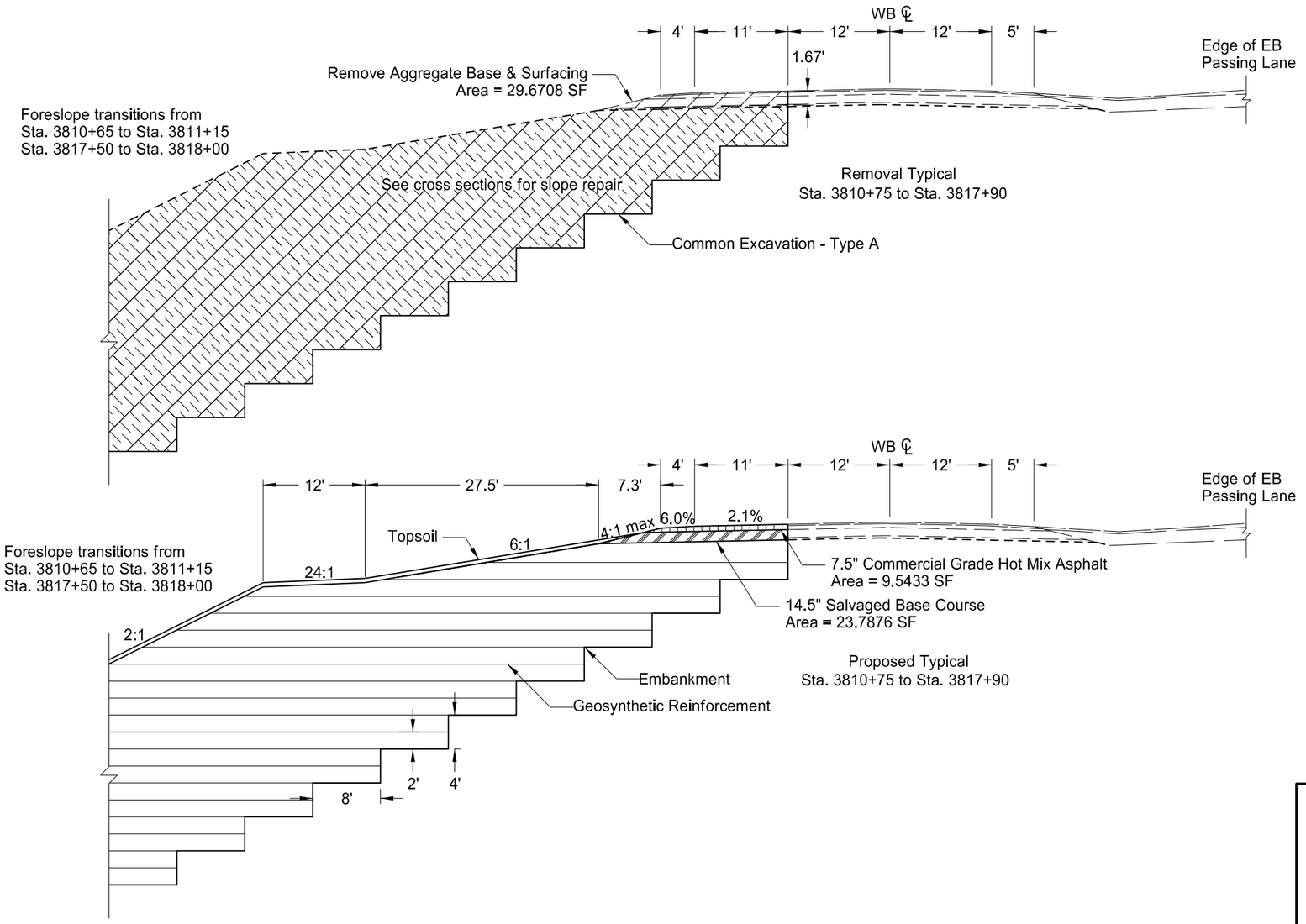
SLIDE REPAIR

WHITE EARTH SLIDE REPAIR - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	30	1



Note: Surfacing thickness was drawn from old plans.
Actual thickness may vary.



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Typical Sections

Slide Repair

White Earth Slide Repair - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	60	1

INSTALL 12" PVC WATER PIPE
AT THE FOLLOWING LOCATIONS:

2+76 - CL TO 21+40 - CL (1,864 LF)

INSTALL RESTRAINED COUPLING
AT THE FOLLOWING LOCATIONS:

3+76 - CL (1 EA)
20+40 - CL (1 EA)

INSTALL 22.5° BEND
AT THE FOLLOWING LOCATIONS:

4+16 - CL (1 EA)
7+98 - CL (1 EA)
16+18 - CL (1 EA)
20+00 - CL (1 EA)

INSTALL 11.25° BEND
AT THE FOLLOWING LOCATIONS:

19+35 - CL (1 EA)

INSTALL 4" AIR RELIEF VALVE WITH MANHOLE
& NEENAH R-1900-B FRAME & GRATE
AT THE FOLLOWING LOCATIONS:

19+65 - CL (1 EA)

CONNECT TO EXISITNG WATER MAIN
AT THE FOLLOWING CONNECTIONS:

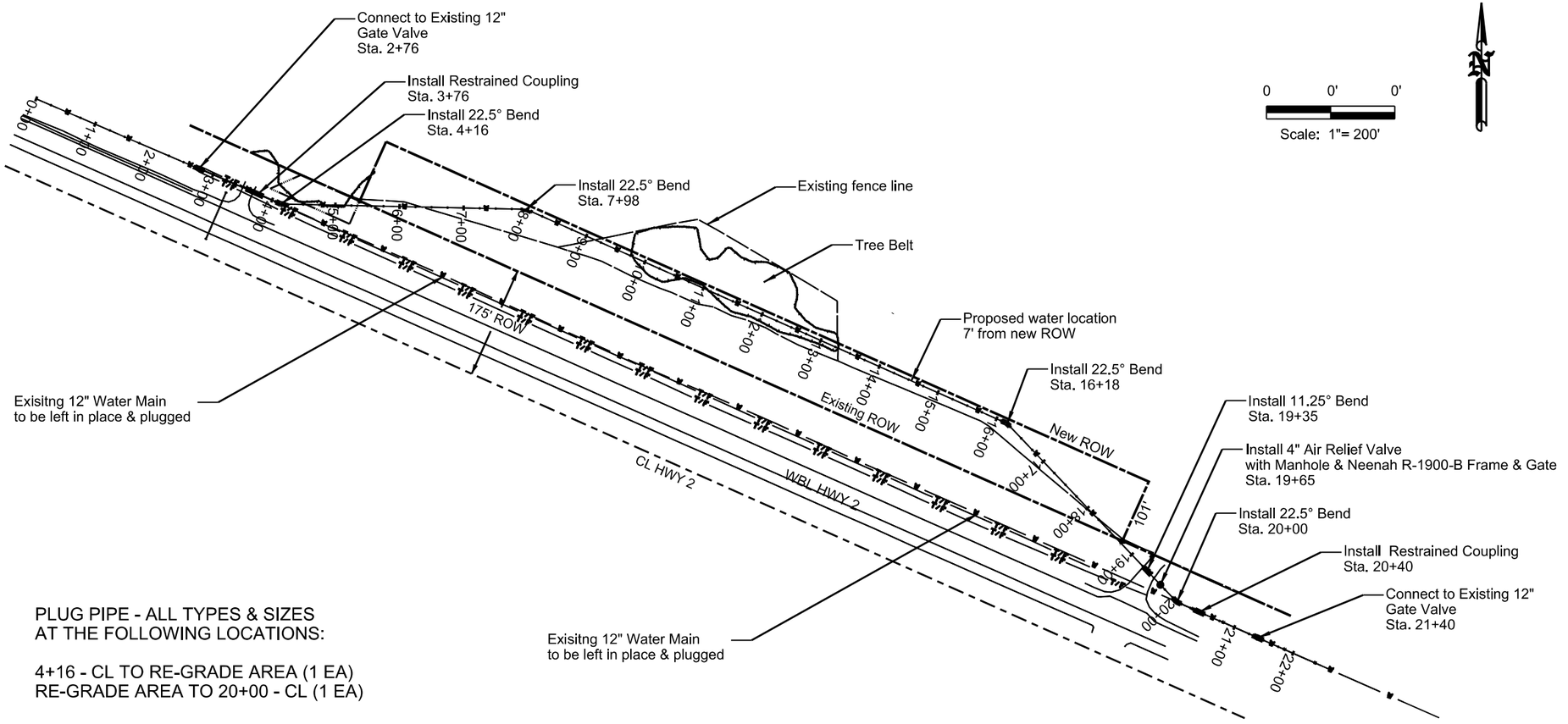
2+76 - CL (1 EA)
21+40 - CL (1 EA)

INSTALL 12" GATE VALVE
AT THE FOLLOWING CONNECTIONS:

2+76 - CL (1 EA)
21+40 - CL (1 EA)

CLEARING & GRUBBING AT THE FOLLOWING
LOCATIONS BUT NOT LIMITED TO:

4+00 - CL TO 6+00 - CL (LSUM)
9+00 - CL TO 14+00 - CL (LSUM)



0 0' 0'
Scale: 1"= 200'

PLUG PIPE - ALL TYPES & SIZES
AT THE FOLLOWING LOCATIONS:

4+16 - CL TO RE-GRADE AREA (1 EA)
RE-GRADE AREA TO 20+00 - CL (1 EA)

NOTE:
TWO SECTIONS OF THE EXISTING 12" WATER MAIN WILL BE LEFT IN PLACE. THESE TWO SECTIONS ARE ARE TO BE PLUGGED AND FILLED. THESE SECTIONS FALL OUTSIDE THE RE-GRADE AREA.

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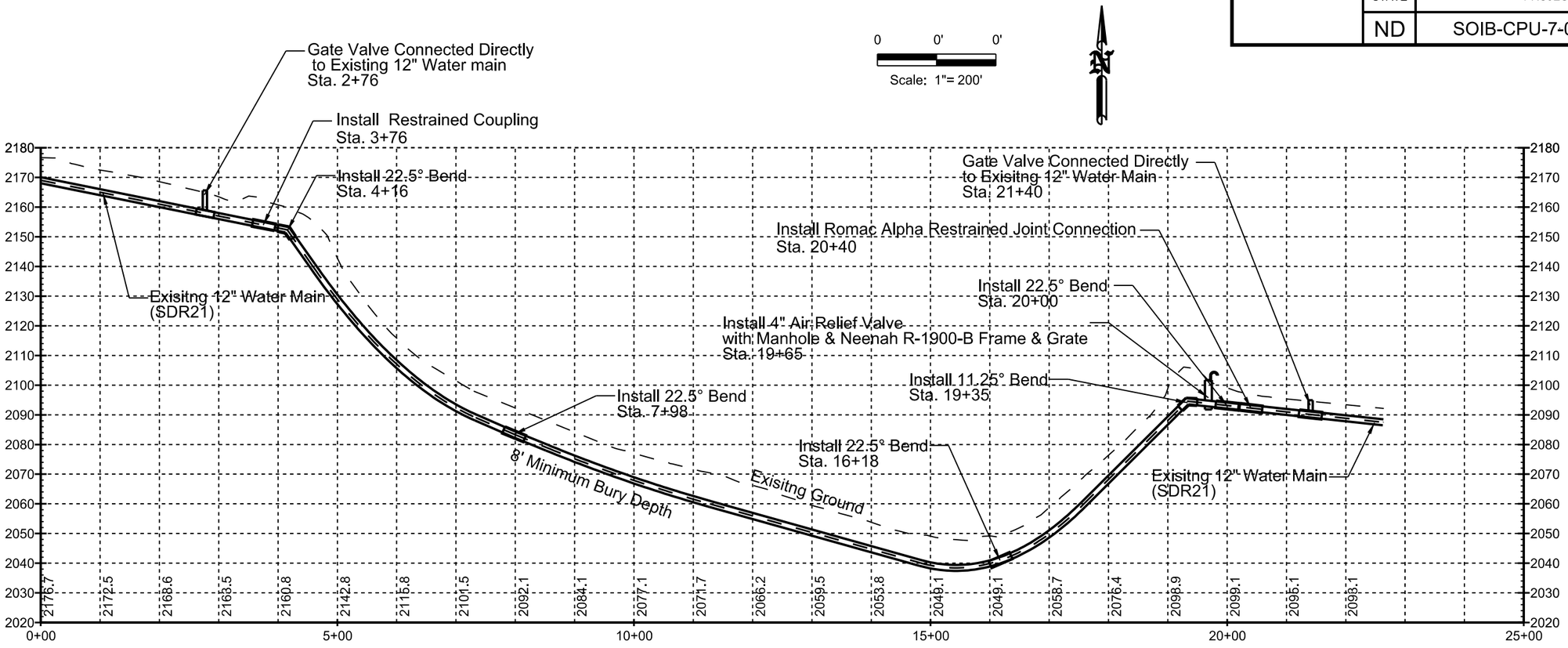
PLAN SHEET

SLIDE REPAIR

WHITE EARTH SLIDE REPAIR - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	60	2



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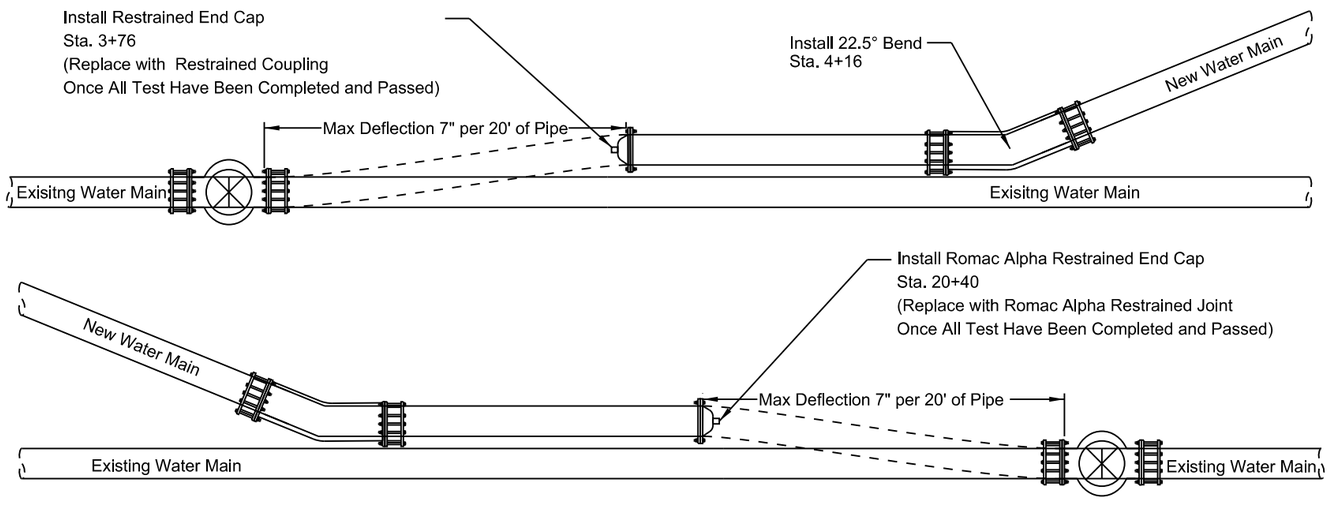
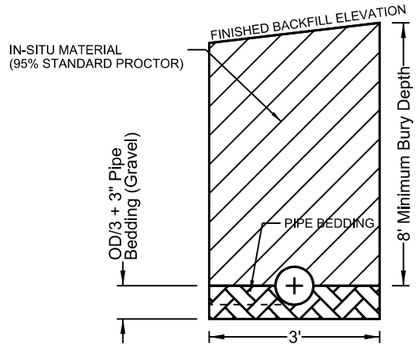
Connection Details:



Note: All pipe not included in bacterialogical sampling shall be installed with CalciumHypochlorite Tablets.

PIPE BEDDING MATERIAL TYPICAL SECTION



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PROFILE SHEET

SLIDE REPAIR

WHITE EARTH REPAIR - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	70	1

Temporary Easement

Permanent Easement

Slide Repair

R/W mkr disturbed

N

3806 3807 3808 3809 3810 3811 3812 3813 3814

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Contours

Slide Repair

White Earth Slide Repair - RP 72.2

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	70	2

Permanent Easement

Temporary Easement

Slide Repair

RW Mon

Sec 21
T-156-N
R-94-W

3816 3817 3818 3819 3820 3821 3822 3823 3824

IJS 2

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Contours

Slide Repair

White Earth Slide Repair - RP 72.2

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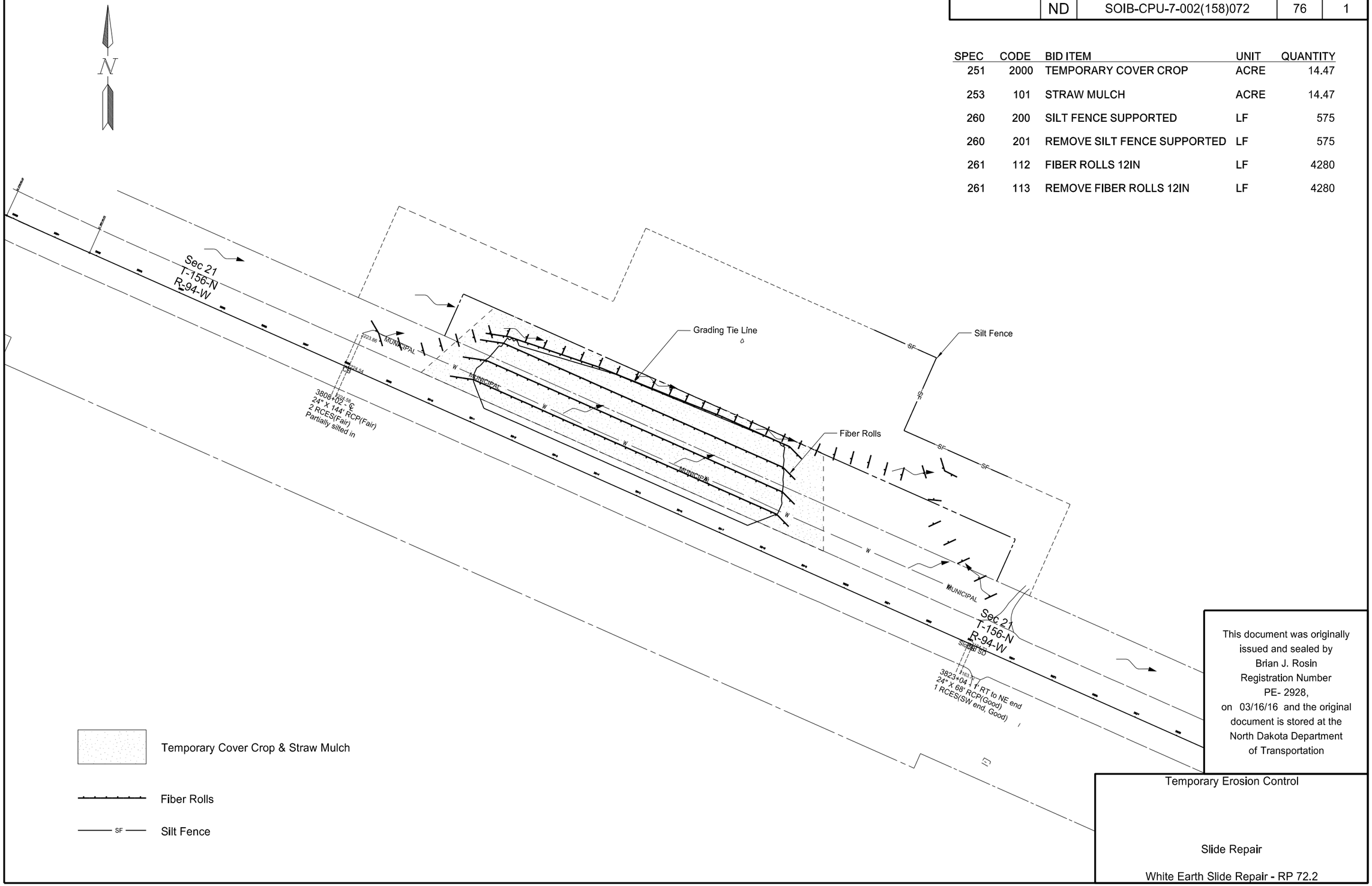
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	76	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
251	2000	TEMPORARY COVER CROP	ACRE	14.47
253	101	STRAW MULCH	ACRE	14.47
260	200	SILT FENCE SUPPORTED	LF	575
260	201	REMOVE SILT FENCE SUPPORTED	LF	575
261	112	FIBER ROLLS 12IN	LF	4280
261	113	REMOVE FIBER ROLLS 12IN	LF	4280



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Temporary Erosion Control

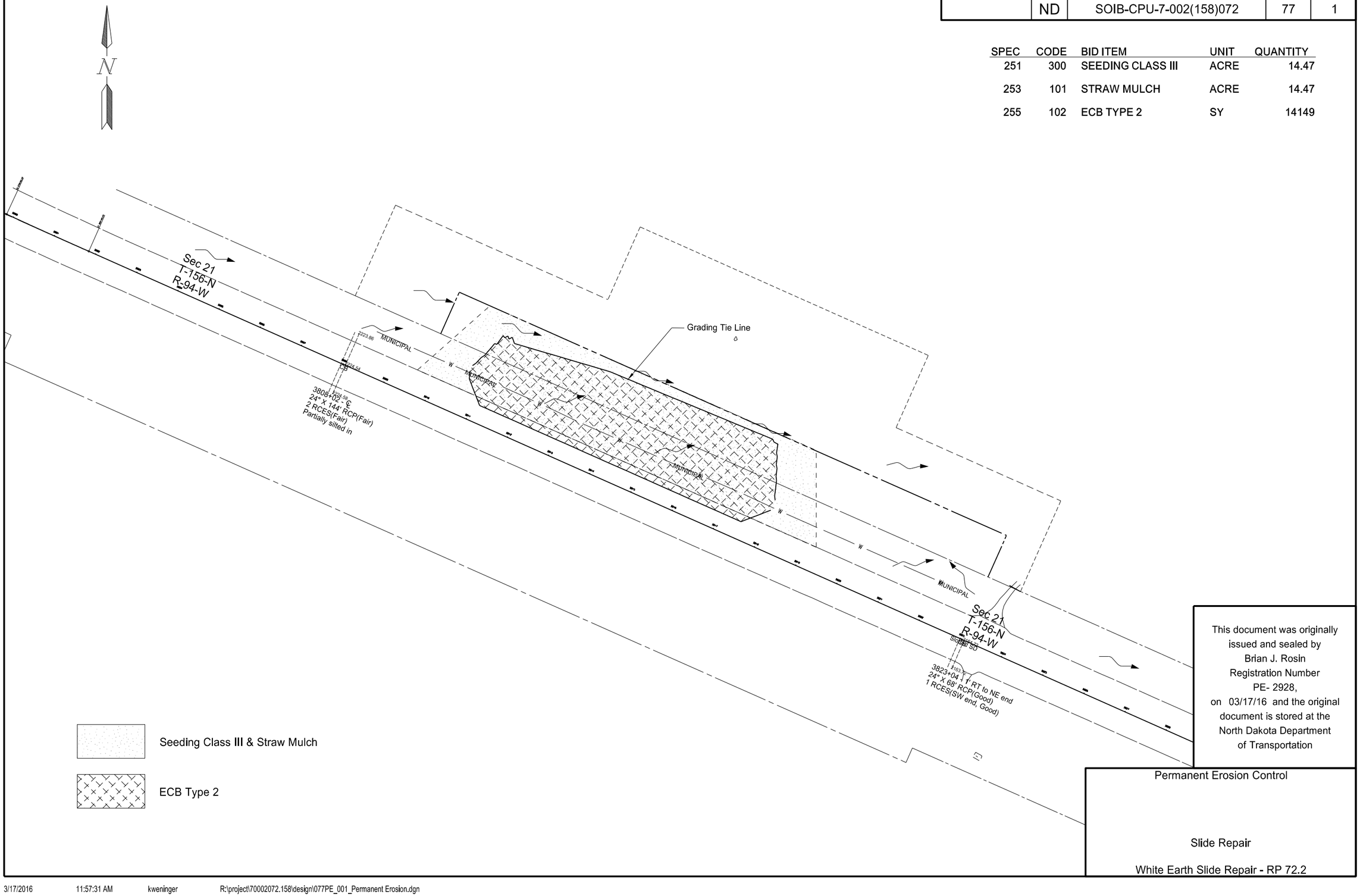
Slide Repair

White Earth Slide Repair - RP 72.2

3/17/2016 11:57:30 AM kweninger R:\project\70002072.158\design\076TE_001_Temporary Erosion.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	77	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
251	300	SEEDING CLASS III	ACRE	14.47
253	101	STRAW MULCH	ACRE	14.47
255	102	ECB TYPE 2	SY	14149



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Permanent Erosion Control

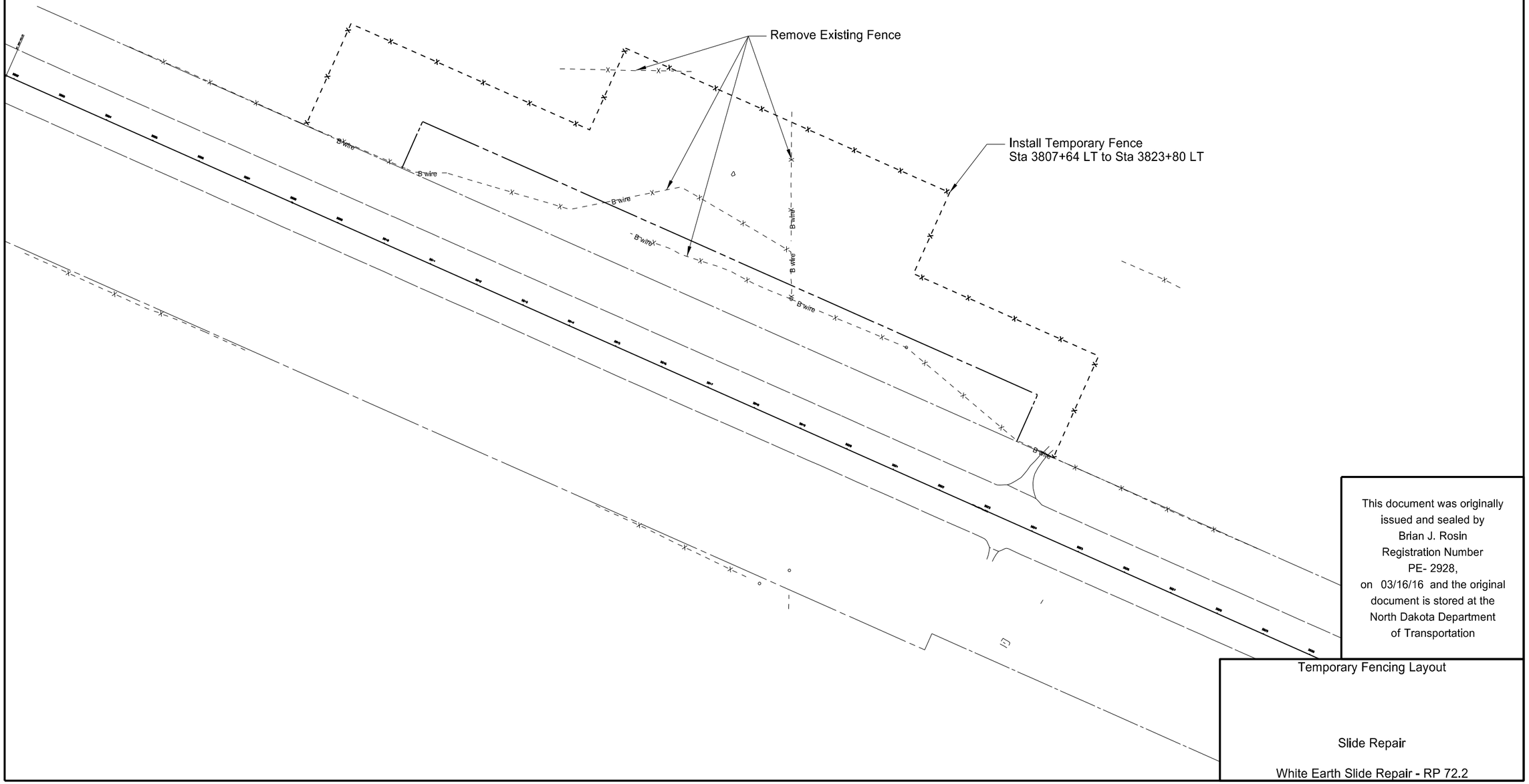
Slide Repair

White Earth Slide Repair - RP 72.2

3/17/2016 11:57:31 AM kweninger R:\project\70002072.158\design\077PE_001_Permanent Erosion.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	80	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	312	REMOVE EXISTING FENCE	LF	2700
752	905	TEMPORARY FENCE	LF	2410



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Temporary Fencing Layout

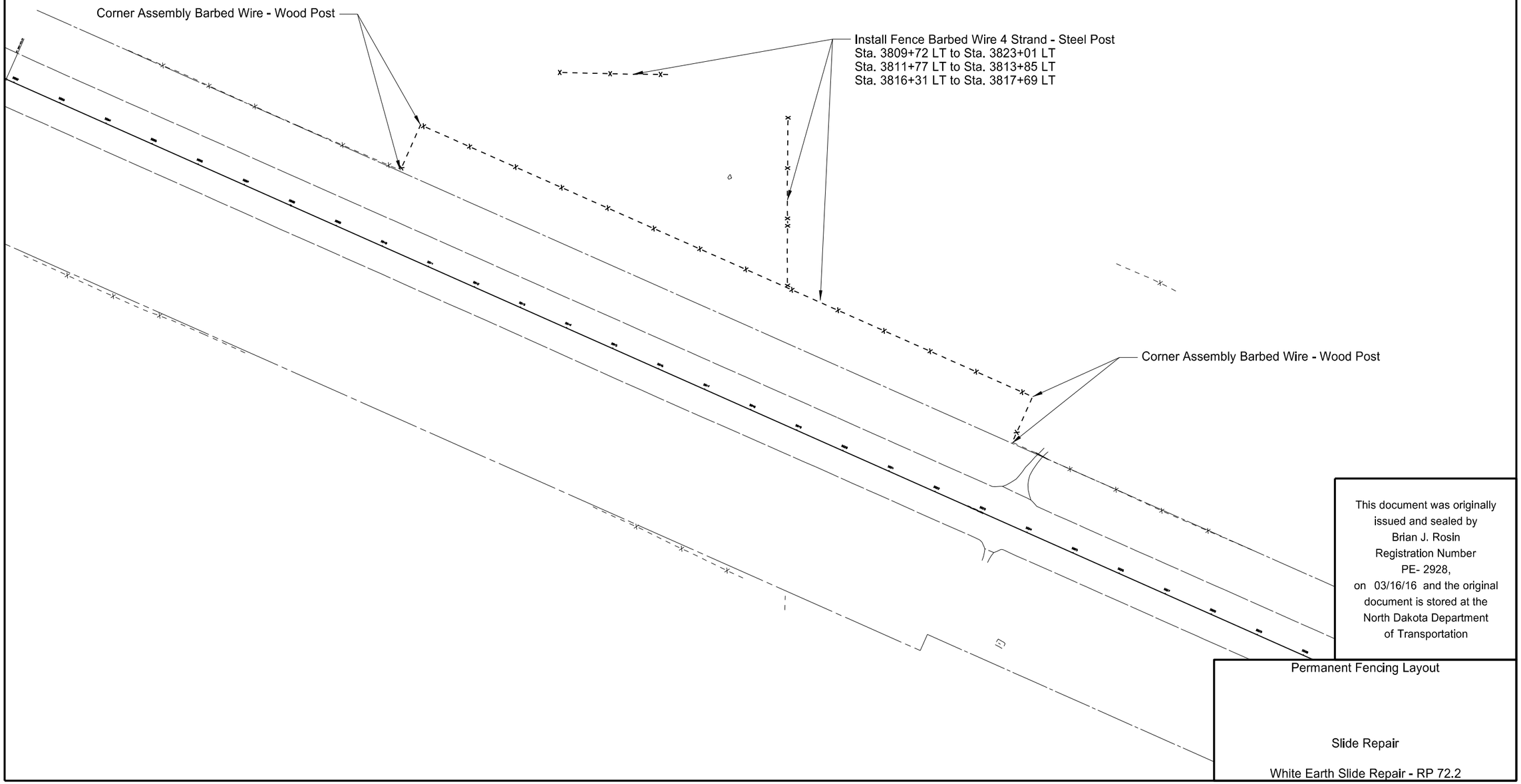
Slide Repair

White Earth Slide Repair - RP 72.2

3/17/2016 11:57:32 AM kweninger R:\project\70002072.158\design\080LO_001_Temporary Fencing.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	80	2

SPEC	CODE	BID ITEM	UNIT	QUANTITY
752	320	FENCE BARBED WIRE 4 STRAND - STEEL POST	LF	2134
752	3150	CORNER ASSEMBLY BARBED WIRE - WOOD POST	EA	4



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Permanent Fencing Layout

Slide Repair

White Earth Slide Repair - RP 72.2

3/17/2016 11:57:33 AM kweninger R:\project\70002072.158\design\080LO_002_Permanent Fencing.dgn

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - US 2 slide repair at RP 72.2 - White Earth

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
US 2 (Chain: SCL2)			
BEG	3714+24.29	496711.45	1408276.63
TS	3784+11.05	492249.88	1413653.36
SC	3786+11.05	492123.06	1413808.01
PI SCS304	3793+02.32	491680.74	1414339.24
CS	3799+83.55	491401.07	1414971.41
ST	3801+83.55	491318.79	1415153.70
Sec line	3833+07.82	490050.00	1418008.72
TS	3860+21.45	488947.96	1420488.51
SC	3862+21.45	488867.81	1420671.74
PI SCS301	3868+66.75	488604.68	1421260.97
CS	3875+03.66	488503.34	1421898.27
ST	3877+03.66	488470.42	1422095.54
END	3888+59.17	488286.90	1423236.38

CURVE DATA

ARC DEFINITION

SCS304	SCS301
PI STA = 3793+02.32	PI STA = 3868+66.75
Delta = 15° 43' 30" LT	Delta = 14° 49' 20" LT
D_a = 1° 00' 00"	D_a = 1° 00' 00"
R = 5729.58'	R = 5729.58'
L_s = -200.00'	L_s = -200.00'
S_c = 1° 00' 00"	S_c = 1° 00' 00"
T_s = 891.26'	T_s = 845.31'
L = 1372.50'	L = 1282.21'

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
N 1/4 Cor	Sec 21 T-156-N R-94-W	492527.51	1415437.08
E 1/4 Cor	Sec 21 T-156-N R-94-W	489798.36	1418001.42
NE Cor	Sec 21 T-156-N R-94-W	492443.59	1418078.14

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	CONTROL POINT DESCRIPTION
PRIMARY CONTROL						
GPS 1	491827.67	1414018.13	2299.02	3789+53	110' Rt	18" #5 Rebar
GPS 2	489164.57	1419760.13	2058.21	3852+68	98' Rt	18" #5 Rebar

REFERENCE MARKERS

R Mkr #	NORTHING	EASTING	STATION	OFFSET
72	491400	1415125	3801+25	62' Lt
72	491292	1415073	3801+20	57' Rt

NOTES: Sheet 1 of 1

Date Survey Completed 08/24/15

☐ Assumed Coordinates

☒ All coordinates on this sheet are Mountrail County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota North Zone Combination Factor (cf) = 0.9998350

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

INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88
☐ NGVD-29

☐ GEOID 09 ☐ _____
☒ GEOID 12A

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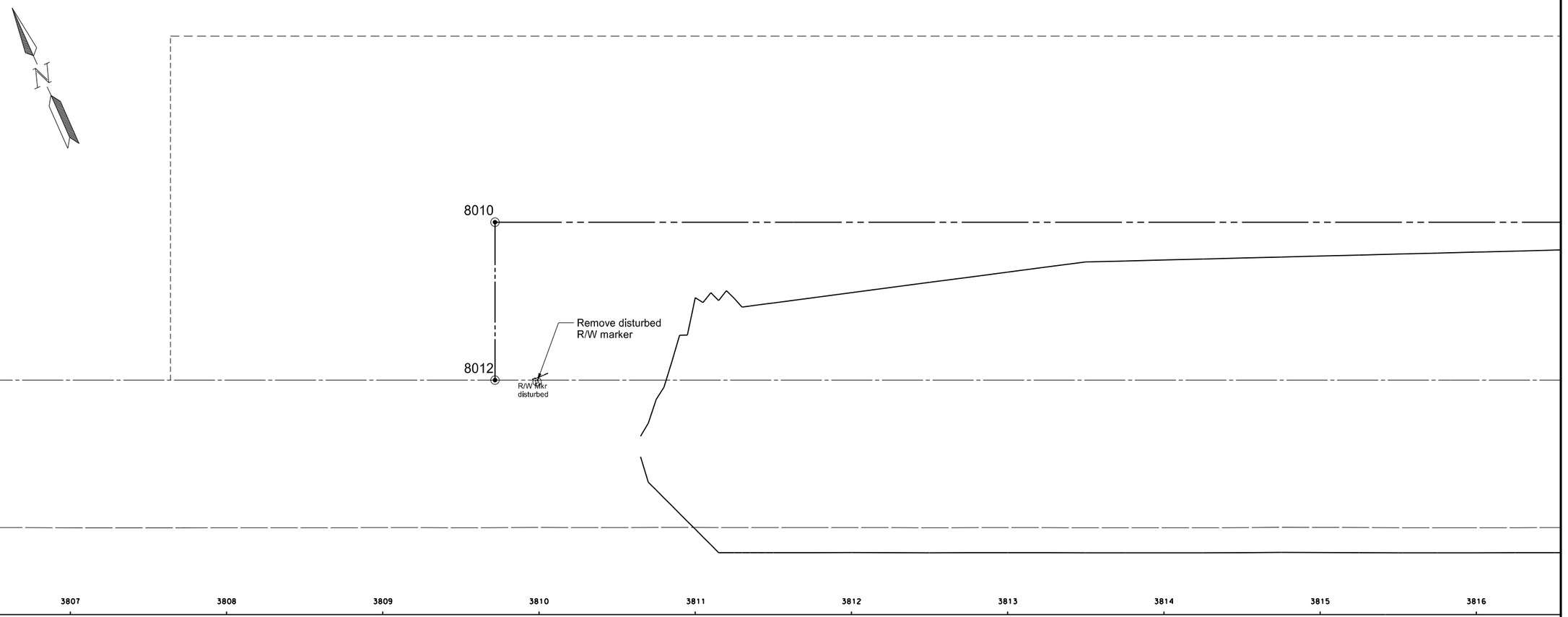
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	82	1



Point	Northing	Easting	Station	Offset	Iron Pin R/W Monument	R/W Marker (witness post)
8010	491228.0332	1415975.972	3809+71.83	-251.00	X	X
8012	491135.7349	1415934.957	3809+71.83	-150.00	X	X

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Monument and RW Markers

Slide Repair

White Earth Slide Repair - RP 72.2

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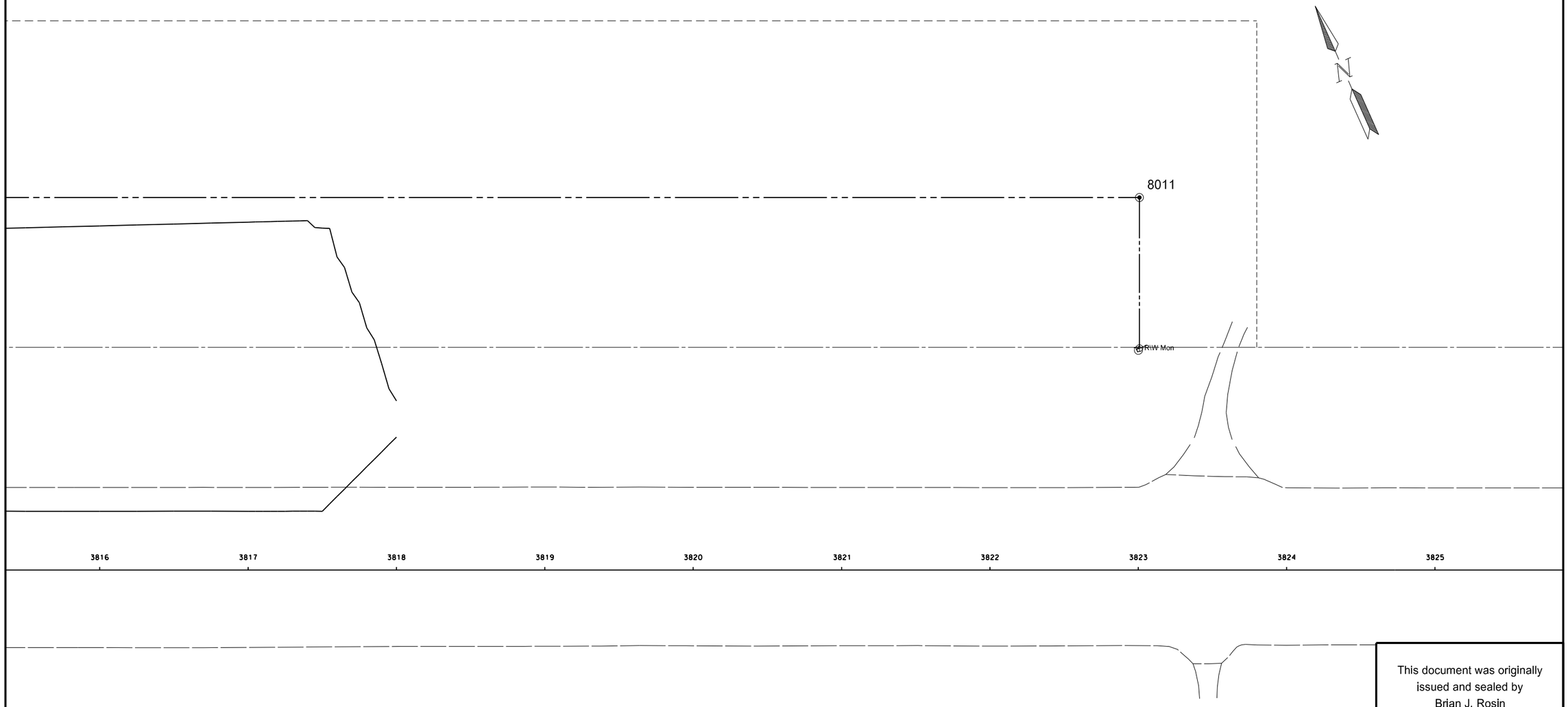
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	82	2



Point	Northing	Easting	Station	Offset	Iron Pin R/W Monument	R/W Marker (witness post)
8011	490688.3358	1417190.395	3823+00.77	-251.00	X	X

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Monument and RW Markers

Slide Repair

White Earth Slide Repair - RP 72.2

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**19**	**38**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**1**	**64**	**64**
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**2**	**59**	**118**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	**48"x48"**	**STOP**	**4**	**32**	**128**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**1**	**5**	**5**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**7**	**39**	**273**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**2**	**10**	**20**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**2**	**39**	**78**
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**2**	**35**	**70**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**2**	**35**	**70**
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	**48"x48"**	**UNEVEN LANES**	**1**	**35**	**35**
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT.**	**2**	**35**	**70**
W8-55-48	**48"x48"**	**TRUCKS CROSSING AHEAD or __ FT.**	**2**	**35**	**70**
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**2**	**35**	**70**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	**48"x48"**	**RIGHT or LEFT LANE CLOSED AHEAD or __ FT.**	**2**	**35**	**70**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**1**	**35**	**35**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	

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

SPECIAL SIGNS

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**1214**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**300**
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	**ATTENUATION DEVICE-TYPE B-70**	**EACH**	**1**
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**1**
704-1060	**DELINEATOR DRUMS**	**EACH**	**37**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**22**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**1**
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	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**	**101**
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	**SHORT TERM 4IN LINE - TYPE NR**	**LF**	**229**
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

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

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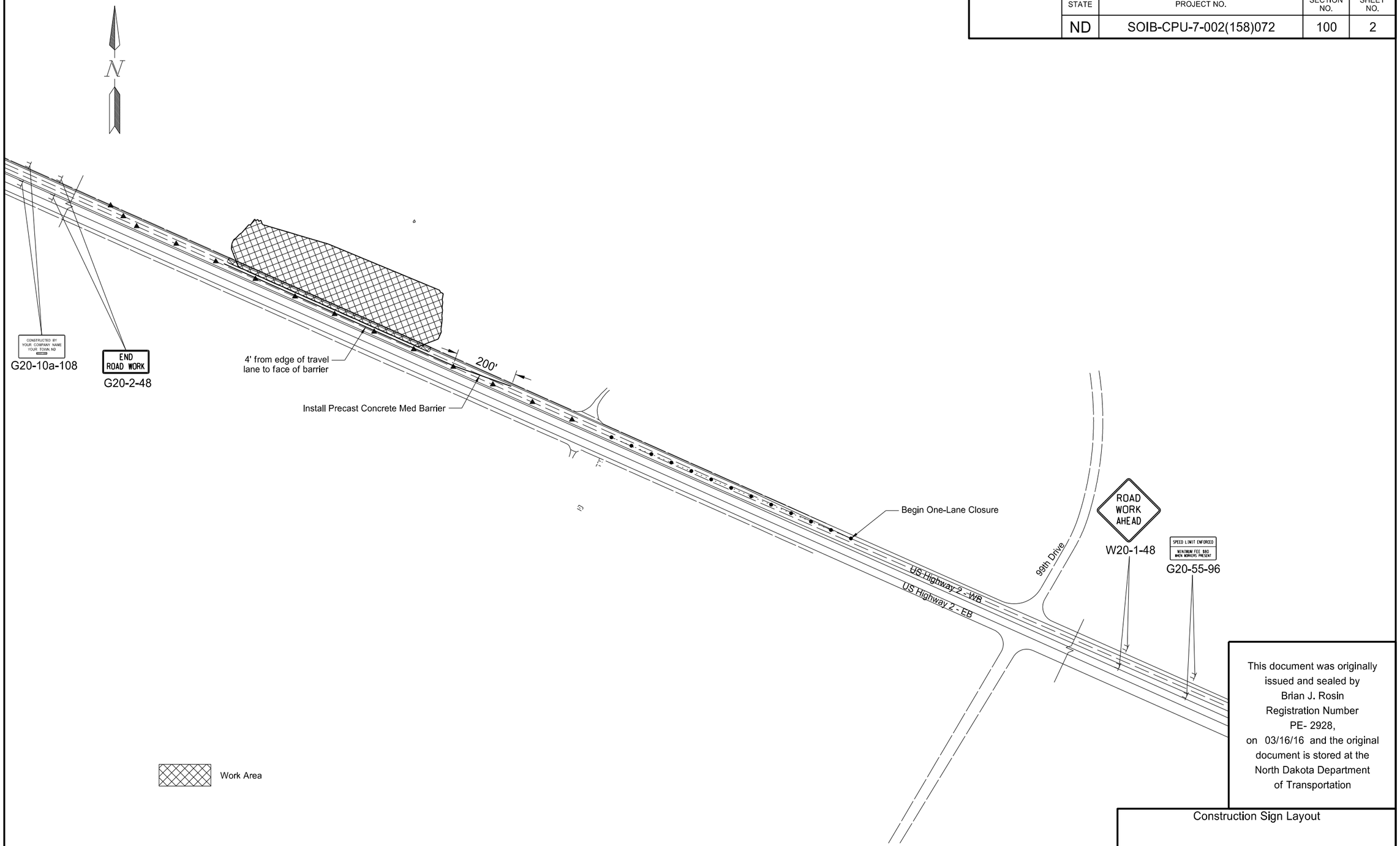
Traffic Control Devices List

Slide Repair

White Earth Slide Repair - RP 72.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-CPU-7-002(158)072	100	2



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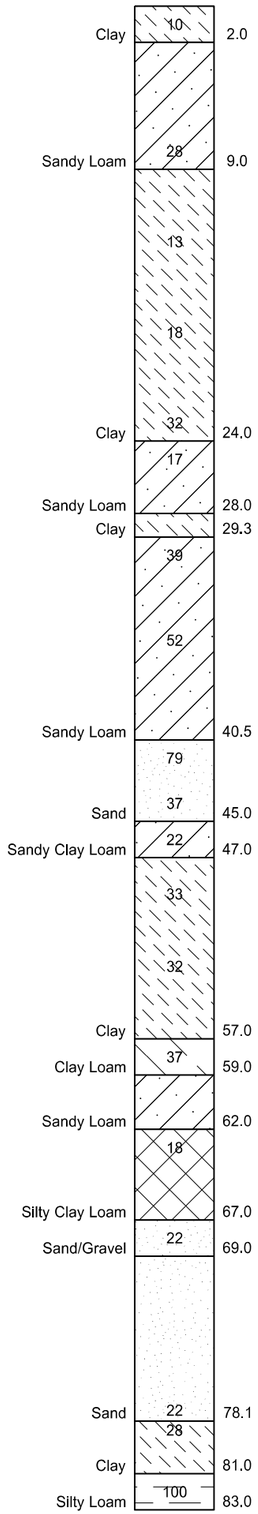
Construction Sign Layout

Slide Repair

White Earth Slide Repair - RP 72.2

3/17/2016 11:57:37 AM kweninger R:\project\70002072.158\design\100WZ_002_Construction Sign Layout.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	175	1



Project Number: SOIB-CPU-7-002(158)072
PCN: 20989
Bridge Number: NA
Location: PR 72.2 Near White Earth
Boring Number: 1
Dates Drilled: 5/19/15

RP + Feet: 72+2210
Station: 3823+82.67
Offset: 41.0' LT
Orientation: NA
Elevation of Boring: 2177.33'

Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	γ Unit Weight (pcf)
0.0-2.0	CLY	A-7-6(25)	3TW	UC	3885	---	1943		23.6	
2.0-4.0	SNDY LM	A-2-6(1)	SS	SPT	---	30	---	10	13	
5.0-7.0	SNDY LM	A-2-6(1)	3TW	M	---	---	---		8.9	
7.0-9.0	SNDY LM	A-2-4(0)	SS	SPT	---	35	---	28	20.6	
10.0-12.0	CLY	A-7-6(10)	3TW	UC	3547	---	1773		20.9	130.2
12.0-14.0	CLY	A-7-6(29)	SS	SPT	---	---	1625	13	20.8	
15.0-17.0	CLY	A-7-6(33)	3TW	UC	6250	---	3125		22.9	131.2
17.0-19.0	CLY	A-7-6(35)	SS	SPT	---	---	2250	18	19.9	
20.0-22.0	CLY	A-7-6(25)	3TW	UC	6867	---	3433		23.2	126.1
22.0-24.0	CLY	A-7-6(23)	SS	SPT	---	---	4000	32	14.7	
25.0-26.0			3TW		---	---	---			
26.0-28.0	SNDY LM	A-2-6(1)	SS	SPT	---	32	---	17	7.4	
28.0-29.3	CLY	A-7-6(25)	3TW	UC	3678	---	1839		20.9	125
29.3-31.3	SNDY LM	A-2-4(0)	SS	SPT	---	38	---	39	4.2	
33.0-34.0	SNDY LM	A-2-6(1)	3TW	M	---	---	---		11.9	
34.0-36.0	SNDY LM	A-2-6(1)	SS	SPT	---	40	---	52	18.4	
38.5-40.5	SNDY LM	A-2-4(0)	3TW		---	---	---		8.9	
40.5-42.5	SND	A-1-b(0)	SS	SPT	---	40	---	79	11.1	
43.0-45.0	SND	A-2-4(0)	SS	SPT	---	37.5	---	37	4.5	
45.0-47.0	SNDY CLY LM	A-7-6(8)	SS	SPT	---	---	2750	22	15.9	
48.0-50.0	CLY	A-7-6(18)	SS	SPT	---	---	4125	33	16.1	
50.0-52.0	CLY	A-7-6(15)	3TW	UC	14990	---	7495		15.9	
52.0-54.0	CLY	A-6(12)	SS	SPT	---	---	4000	32	15.3	
55.0-57.0	CLY	A-7-6(15)	3TW	UU	---	---	7739		14.6	
57.0-59.0	CLY LM	A-6(6)	SS	SPT	---	---	4625	37	14.3	
60.0-62.0	SNDY LM	A-2-4(0)	3TW	M	---	---	---		9.9	
62.0-64.0	SLTY CL LM	A-6(8)	SS	SPT	---	---	2250	18	18.8	
65.0-67.0	SLTY CL LM	A-4(8)	3TW	M	---	---	---		28.8	
67.0-69.0	SND/GRVL	A-1-a(1)	SS	SPT	---	33.5	---	22	4	
70.0-71.0	SND	A-1-b(0)	3TW		---	---	---		8.9	
75.0-77.0	SND	A-1-b(1)	3TW	M	---	---	---		5.9	
77.0-78.1	SND	A-1-b(1)	SS	SPT	---	33.5	---	22	3	
78.1-79.0	CLY	A-7-6(44)	SS	SPT	---	---	3500	28	21.3	
80.0-81.0	CLY	A-6(17)	3TW	M	---	---	---		19.7	
81.0-83.0	SLTY LM	A-4(7)	SS	SPT	---	---	12500	100	21.1	

SS - Split Spoon
3TW - 3" Thin Wall (Shelby Tube)
M - Moisture Test
D - Density Test
UC - Unconfined Compression Test
UU - Unconsolidated Undrained Triaxial Test
SPT - Standard Penetration Test

Friction and Cohesive values for split spoon samples are estimated from the blow counts. These values are used in absence of triaxial strength testing information.

Notes:
THE BORING DATA SHOWN IS FOR NORTH DAKOTA DEPARTMENT OF TRANSPORTATION'S (NDDOT) DESIGN AND ESTIMATING PURPOSES ONLY. THE BORING LOGS ARE ONLY REPRESENTATIVE OF THE EXACT LOCATION FROM WHICH THE SAMPLES WERE TAKEN AND INTERPRETATION BETWEEN THE SAMPLE LOCATIONS IS DISCOURAGED. THE NDDOT ASSUMES NO RESPONSIBILITY IF THE SOIL CONDITIONS ENCOUNTERED DURING CONSTRUCTION DIFFER FROM THOSE SHOWN. FURTHER SOIL INFORMATION MAY BE AVAILABLE AT:

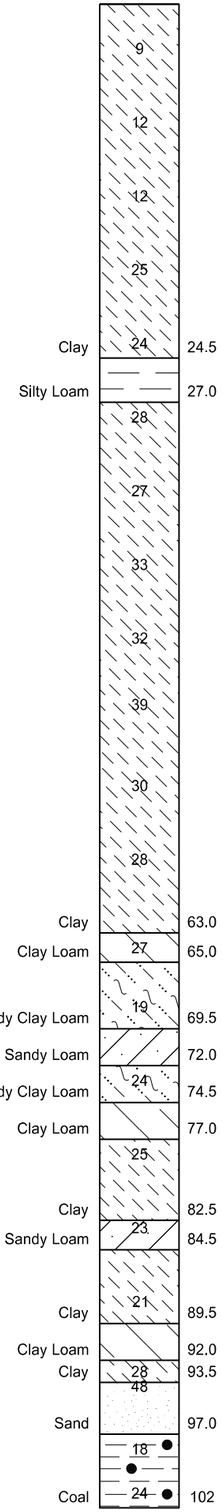
NDDOT
MATERIALS & RESEARCH DIVISION
300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

This document was originally issued and sealed by Clayton J. Schumaker Registration Number PE- 3225, on 3/17/16 and the original document is stored at the North Dakota Department of Transportation

Boring Log

White Earth Slide Area

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	175	2



Project Number: SOIB-CPU-7-002(158)072
PCN: 20989
Bridge Number: NA
Location: RP 72 Near White Earth
Boring Number: 2
Dates Drilled: 5/20/15 - 5/21/15

RP + Feet: 72+1406
Station: 3815+78.67
Offset: 45.0' LT
Orientation: NA
Elevation of Boring: 2202.30'

Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	γ Unit Weight (pcf)
0.0-2.0	CLY	A-7-6(21)	3TW	UC	1,698	---	849	---	29.8	119.9
2.0-4.0	CLY	A-7-6(20)	SS	STP	---	---	1,125	9	28.8	
5.0-7.0	CLY	A-7-6(24)	3TW	UU	---	---	2,041	---	21.9	127
7.0-9.0	CLY	A-7-6(32)	SS	STP	---	---	1,500	12	26.8	
10.0-12.0	CLY	A-7-6(19)	3TW	UU	---	---	2,827	---	19.2	132.7
12.0-14.0	CLY	A-7-6(17)	SS	STP	---	---	1,500	12	26.0	
15.0-17.0	CLY	A-7-6(18)	3TW	UU	---	---	4,764	---	19.8	133.4
17.0-19.0	CLY	A-7-6(29)	SS	STP	---	---	3,125	25	16.2	
20.0-21.2	CLY	A-7-6(20)	3TW	M	---	---	---	---	17.2	
21.2-22.0	CLY	A-7-6(19)	3TW	UU	---	---	6,377	---	18.9	131.9
22.0-24.0	CLY	A-7-6(22)	SS	STP	---	---	3,000	24	12.3	
25.0-27.0	SLTY LM	A-7-6(14)	3TW	UC	16,747	---	8,375	---	15.8	135.3
27.0-29.0	CLY	A-7-6(24)	SS	STP	---	---	3,500	28	15.4	
30.0-32.0	CLY	A-7-6(18)	3TW	UC	13,262	---	6,630	---	16.8	134
32.0-34.0	CLY	A-7-6(14)	SS	STP	---	---	3,375	27	16.3	
35.0-37.0	CLY	A-7-6(12)	3TW	UC	13,493	---	6,746	---	14.4	130.8
37.0-39.0	CLY	A-7-6(13)	SS	STP	---	---	4,125	33	13.5	
40.0-42.0	CLY	A-7-6(16)	3TW	UC	15,365	---	7,680	---	13.1	137
42.0-44.0	CLY	A-7-6(14)	SS	STP	---	---	4,000	32	17.2	
45.0-46.5	CLY	A-7-6(16)	3TW	UC	12,648	---	6,324	---	15.8	133.3
46.5-48.5	CLY	A-7-6(16)	SS	STP	---	---	4,875	39	15.6	
50.0-52.0	CLY	A-7-6(20)	3TW	M	---	---	---	---	13.3	
52.0-54.0	CLY	A-7-6(16)	SS	STP	---	---	3,750	30	11.6	
55.0-57.0	CLY	A-7-6(14)	3TW	UC	16,677	---	8,338	---	14.9	136.6
57.0-59.0	CLY	A-7-6(19)	SS	STP	---	---	3,500	28	17.5	
62.0-63.0	CLY	A-6(9)	3TW	M	---	---	---	---	10.1	
63.0-65.0	CLY LM	A-6(5)	SS	STP	---	---	3,375	27	9.6	
65.0-67.0	SNDY CLY LM	A-6(2)	3TW	M	---	---	---	---	54.1	
67.0-69.0	SNDY CLY LM	A-6(3)	SS	STP	---	---	2,375	19	10.8	
70.0-72.0	SNDY LM	A-2-4(0)	3TW	M	---	---	---	---	4.6	
72.0-74.0	SNDY CLY LM	A-4(1)	SS	STP	---	---	3,000	24	10.4	
75.0-77.0	CLY LM	A-6(4)	3TW	M	---	---	---	---	10.9	
77.0-79.0	CLY	A-6(11)	SS	STP	---	---	3,125	25	15.7	
80.0-82.0	CLY	A-7-6(17)	3TW	UC	4,330	---	2,166	---	24.4	133.3
82.0-82.5	CLY	A-7-6(22)	SS	STP	---	---	2,750	22	25.7	
82.5-84.0	SNDY LM	A-2-4(0)	SS	STP	---	33.5	---	24	12.7	
85.0-87.0	CLY	A-7-6(29)	3TW	UU	---	---	3,126	---	24.4	131.6
87.0-89.0	CLY	A-7-6(19)	SS	STP	---	---	2,625	21	16.1	
90.0-92.0	CLY LM	A-6(4)	3TW	UC	3,025	---	1,513	---	19.1	134.4
92.0-93.5	CLY	A-6(9)	SS	STP	---	---	3,500	28	17.5	
93.5-94.0	SND	A-1-b(1)	SS	STP	---	45	---	48	11.0	
95.0-97.0	SND	A-1-b(1)	3TW	M	---	---	---	---	3.6	
97.0-99.0	COAL	---	SS	STP	---	---	---	18	---	
100.0-102.0	COAL	---	SS	STP	---	---	---	24	---	

SS - Split Spoon
3TW - 3" Thin Wall (Shelby Tube)
M - Moisture Test
D - Density Test
UC - Unconfined Compression Test
UU - Unconsolidated Undrained Triaxial Test
SPT - Standard Penetration Test

Friction and Cohesive values for split spoon samples are estimated from the blow counts. These values are used in absence of triaxial strength testing information.

Notes:
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NDDOT
MATERIALS & RESEARCH DIVISION
300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

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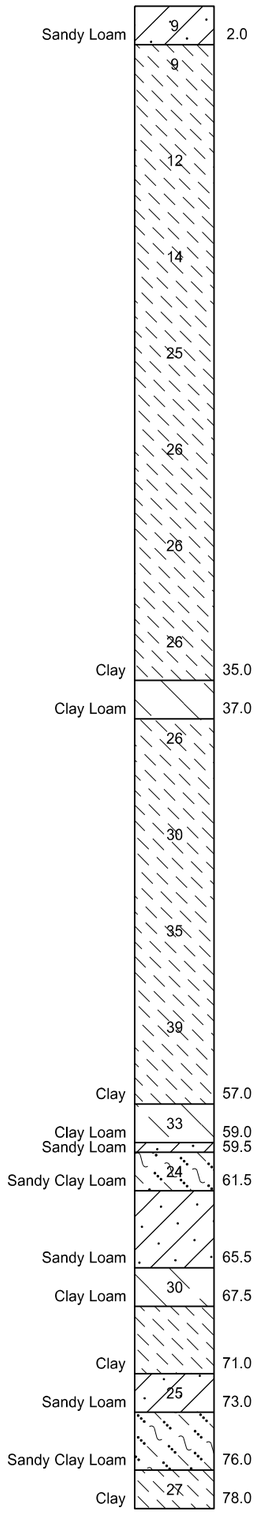
Boring Log

White Earth Slide Area

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	175	3



Project Number: SOIB-CPU-7-002(158)072
PCN: 20989
Bridge Number: NA
Location: RP 72 Near White Earth
Boring Number: 3
Dates Drilled: 9/1/2015

RP + Feet: 72+1484
Station: 3816+21.13
Offset: 42.0' LT
Orientation: NA
Elevation of Boring: 2192.87'

Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	γ Unit Weight (pcf)
0.0-2.0	SNDY LM	A-2-6(2)	SS	STP	---	---	29	9	2.9	---
2.0-4.0	CLY	A-7-6(18)	SS	STP	---	---	1,125	9	25.0	---
5.0-7.0	CLY	A-7-6(32)	3TW	UC	1,597	---	798	---	31.5	118
7.0-9.0	CLY	A-7-6(29)	SS	STP	---	---	1,500	12	28.3	---
10.0-12.0	CLY	A-7-6(25)	3TW	UC	4,480	---	2,241	---	23.7	126
12.0-14.0	CLY	A-7-6(18)	SS	STP	---	---	1,750	14	26.2	---
15.0-17.0	CLY	A-7-6(22)	3TW	UU	---	---	5,463	---	17.9	129
17.0-19.0	CLY	A-7-6(22)	SS	STP	---	---	3,125	25	12.7	---
20.0-22.0	CLY	A-7-6(43)	3TW	UC	8,297	---	4,149	---	22.4	126.2
22.0-24.0	CLY	A-6(12)	SS	STP	---	---	3,250	26	16.0	---
25.0-27.0	CLY	A-7-6(18)	3TW	UC	15,529	---	7,765	---	15.4	132.3
27.0-29.0	CLY	A-7-6(19)	SS	STP	---	---	3,250	26	14.2	---
30.0-32.0	CLY	A-7-6(23)	3TW	UC	10,366	---	5,183	---	18.8	127.3
32.0-34.0	CLY	A-7-6(16)	SS	STP	---	---	3,250	26	16.6	---
35.0-37.0	CLY LM	A-6(9)	3TW	UC	10,474	---	5,237	---	14.2	125.6
37.0-39.0	CLY	A-7-6(17)	SS	STP	---	---	3,250	26	14.6	---
40.0-42.0	CLY	A-7-6(13)	3TW	UC	15,667	---	7,836	---	14.3	131.6
42.0-44.0	CLY	A-7-6(18)	SS	STP	---	---	3,750	30	18.0	---
45.0-47.0	CLY	A-7-6(19)	3TW	UC	14,170	---	7,085	---	15.6	136.9
47.0-49.0	CLY	A-7-6(17)	SS	STP	---	---	4,375	35	14.6	---
50.0-52.0	CLY	A-7-6(17)	3TW	M	---	---	---	---	16.5	---
52.0-54.0	CLY	A-7-6(16)	SS	STP	---	---	4,875	39	13.2	---
55.0-57.0	CLY	A-7-6(13)	3TW	UC	11,249	---	5,625	---	14.7	132.5
57.0-59.0	CLY LM	A-6(7)	SS	STP	---	---	4,125	33	15.5	---
59.0-59.5	SNDY LM	A-6(1)	3TW	M	---	---	---	---	12.8	---
59.5-61.5	SNDY CLY LM	A-6(3)	SS	STP	---	---	3,000	24	11.8	---
64.0-65.5	SNDY LM	A-4(1)	3TW	M	---	---	---	---	10.9	---
65.5-67.5	CLY LM	A-6(8)	SS	STP	---	---	3,750	30	13.2	---
69.0-71.0	CLY	A-6(7)	3TW	M	---	---	---	---	13.6	---
71.0-73.0	SNDY LM	A-2-4(0)	SS	STP	---	---	34	25	13.0	---
74.0-76.0	SNDY CLY LM	A-4(0)	3TW	M	---	---	---	---	7.6	---
76.0-78.0	CLY	A-7-6(13)	SS	STP	---	---	3,375	27	4.6	---

SS - Split Spoon
3TW - 3" Thin Wall (Shelby Tube)
M - Moisture Test
D - Density Test
UC - Unconfined Compression Test
UU - Unconsolidated Undrained Triaxial Test
SPT - Standard Penetration Test

Friction and Cohesive values for split spoon samples are estimated from the blow counts. These values are used in absence of triaxial strength testing information.

Notes:
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NDDOT
MATERIALS & RESEARCH DIVISION
300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

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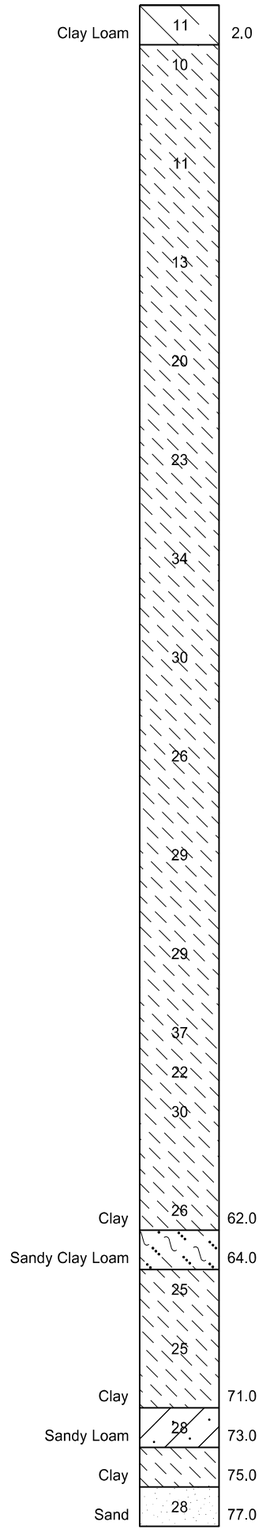
Boring Log

White Earth Slide Area

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	175	4



Project Number: SOIB-CPU-7-002(158)072
PCN: 20989
Bridge Number: NA
Location: RP 72 Near White Earth
Boring Number: 4
Dates Drilled: 9/1/2015

RP + Feet: 72+1529
Station: 3816+74.02
Offset: 42.0' LT
Orientation: NA
Elevation of Boring: 2190.13'

Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	γ Unit Weight (pcf)
0.0-2.0	CLY LM	A-7-5(9)	SS	STP	---	---	1,375	11	18.2	---
2.0-4.0	CLY	A-6(12)	SS	STP	---	---	1,250	10	21.3	---
5.0-7.0	CLY	A-7-5(9)	3TW	UC	4,499	---	2,249	---	20.7	130.9
7.0-9.0	CLY	A-7-6(40)	SS	STP	---	---	1,375	11	30.4	---
10.0-12.0	CLY	A-7-6(20)	3TW	UC	3,432	---	1,716	---	21.8	128.3
12.0-14.0	CLY	A-7-6(23)	SS	STP	---	---	1,625	13	32.9	---
15.0-17.0	CLY	A-7-6(28)	3TW	UU	---	---	2,570	---	23.5	130.1
17.0-19.0	CLY	A-7-6(29)	SS	STP	---	---	2,500	20	18.9	---
20.0-22.0	CLY	A-7-6(32)	3TW	UC	11,377	---	5,689	---	18.5	129.9
22.0-24.0	CLY	A-7-6(40)	SS	STP	---	---	2,875	23	17.4	---
25.0-27.0	CLY	A-7-6(22)	3TW	M	---	---	---	---	16.2	---
27.0-29.0	CLY	A-6(16)	SS	STP	---	---	4,250	34	14.3	---
30.0-32.0	CLY	A-7-6(49)	3TW	M	---	---	---	---	18.1	---
32.0-34.0	CLY	A-7-6(31)	SS	STP	---	---	3,750	30	21.5	---
35.0-37.0	CLY	A-7-6(19)	3TW	UC	15,062	---	7,530	---	17.7	136.8
37.0-39.0	CLY	A-7-6(16)	SS	STP	---	---	3,250	26	15.1	---
40.0-42.0	CLY	A-7-6(23)	3TW	UU	---	---	7,760	---	14.3	134.5
42.0-44.0	CLY	A-7-6(29)	SS	STP	---	---	3,625	29	16.7	---
45.0-47.0	CLY	A-7-6(15)	3TW	UC	12,783	---	6,391	---	16.3	136.4
47.0-49.0	CLY	A-6(6)	SS	STP	---	---	3,625	29	15.5	---
51.0-53.0	CLY	A-7-6(18)	SS	STP	---	---	4,625	37	17.2	---
53.0-55.0	CLY	A-7-6(27)	SS	STP	---	---	2,750	22	14.7	---
55.0-57.0	CLY	A-7-6(16)	SS	STP	---	---	3,750	30	14.5	---
58.0-60.0	CLY	A-7-6(34)	3TW	UU	---	---	8,782	---	16.5	132.8
60.0-62.0	CLY	A-7-6(24)	SS	STP	---	---	3,250	26	11.5	---
63.0-64.0	SNDY CLY LM	A-6(6)	3TW	M	---	---	---	---	9.6	---
64.0-66.0	CLY	A-6(12)	SS	STP	---	---	3,125	25	10.7	---
67.0-69.0	CLY	A-7-6(25)	SS	STP	---	---	3,125	25	17.2	---
69.0-71.0	CLY	A-7-6(42)	3TW	M	---	---	---	---	15.8	---
71.0-73.0	SNDY LM	A-4(1)	SS	STP	---	---	3,500	28	4.5	---
73.0-75.0	CLY	A-7-6(18)	3TW	---	---	---	---	---	---	---
75.0-77.0	SND	A-3(1)	SS	STP	---	35	---	28	2.1	---

SS - Split Spoon
3TW - 3" Thin Wall (Shelby Tube)
M - Moisture Test
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UU - Unconsolidated Undrained Triaxial Test
SPT - Standard Penetration Test

Friction and Cohesive values for split spoon samples are estimated from the blow counts. These values are used in absence of triaxial strength testing information.

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MATERIALS & RESEARCH DIVISION
300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

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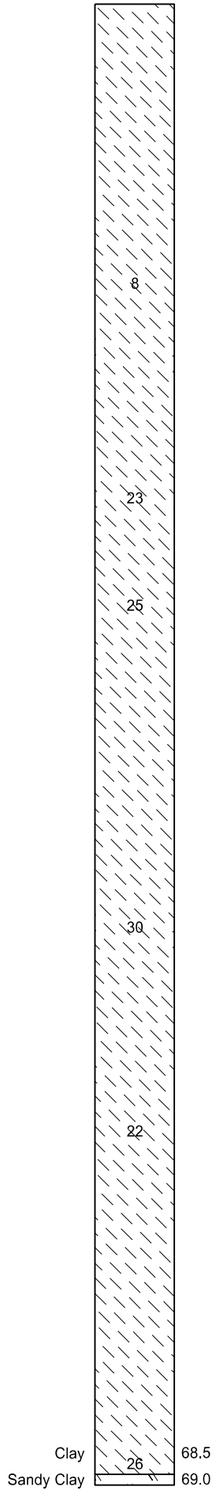
Boring Log

White Earth Slide Area

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-CPU-7-002(158)072	175	5



Project Number: SOIB-CPU-7-002(158)072	RP + Feet: 72+1346
PCN: 20989	Station: 3815+19.03
Bridge Number: NA	Offset: 59.0' LT
Location: RP 72 Near White Earth	Orientation: NA
Boring Number: 5	Elevation of Boring: 2197.76'
Dates Drilled: 12/29/2015	

Depth (ft.)	Textural Class	Soil Class	Sample Type	Test Type	Comp. Strength (psf)	Friction Angle (degr.)	Cohesion (Shear Strength) (psf)	Blow Count (bpf)	Field Moisture (%)	γ Unit Weight (pcf)
10.0-12.0	CLY	A-7-6(17)	3TW	CU	—	27.7	—	—	23.1	126.8
12.0-14.0	CLY	A-7-6(25)	SS	STP	—	---	—	8	17.7	—
20.0-22.0	CLY	A-7-6(52)	3TW	M	—	---	—	---	17.4	—
22.0-24.0	CLY	A-7-6(18)	SS	STP	—	---	—	23	17.0	—
25.0-27.0	CLY	A-7-6(22)	3TW	CU	—	26.2	—	—	16.2	131.6
27.0-29.0	CLY	A-7-6(24)	SS	STP	—	---	—	25	18.4	—
40.0-42.0	CLY	A-7-6(16)	3TW	M	—	---	—	---	14.9	—
42.0-44.0	CLY	A-7-6(19)	SS	STP	—	---	—	30	13.6	—
50.0-51.5	CLY	A-7-6(16)	3TW	M	—	---	—	---	15.5	—
51.5-53.5	CLY	A-7-6(18)	SS	STP	—	---	—	22	11.6	—
65.0-67.0	CLY	A-7-6(18)	3TW	CU	—	21.2	—	---	19.3	133.3
67.0-68.5	CLY	A-6(15)	SS	STP	—	---	—	26	20.4	—
68.5-69.0	SNDY CLY	A-6(2)	SS	STP	—	---	—	26	6.7	—

SS -	Split Spoon	UC -	Unconfined Compression Test
3TW -	3" Thin Wall (Shelby Tube)	UU -	Unconsolidated Undrained Triaxial Test
M -	Moisture Test	SPT -	Standard Penetration Test
D -	Density Test		

Friction and Cohesive values for split spoon samples are estimated from the blow counts. These values are used in absence of triaxial strength testing information.

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300 AIRPORT ROAD
BISMARCK, NORTH DAKOTA 58504-6005
PHONE (701)328-6900

SS - Split Spoon
3TW - 3" Thin Wall Shelby Tube
M - Moisture Test
D - Density Test
UC - Unconfined Compression Test
UU - Unconsolidated Undrained Triaxial Test
SPT - Standard Penetration Test

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Boring Log

White Earth Slide Area

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

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NDDOT ABBREVIATIONS

D-101-2

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

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NDDOT ABBREVIATIONS

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

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

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Line Styles

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

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Line Styles

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

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Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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Symbols

D-101-31

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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Symbols

D-101-32

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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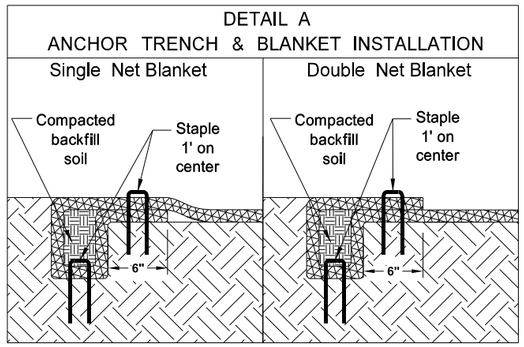
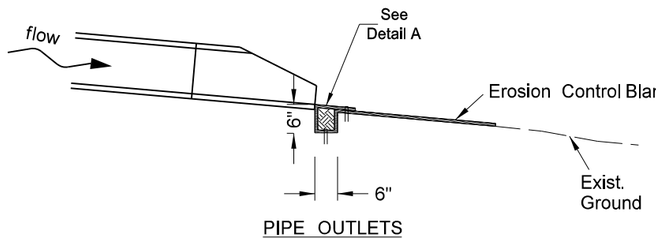
D-255-2

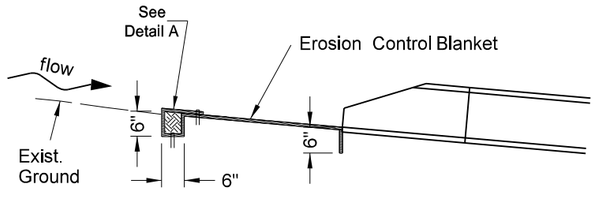
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



NOTE:
If a Single Net Blanket is used the side with the netting should be on the top once the blanket is installed.

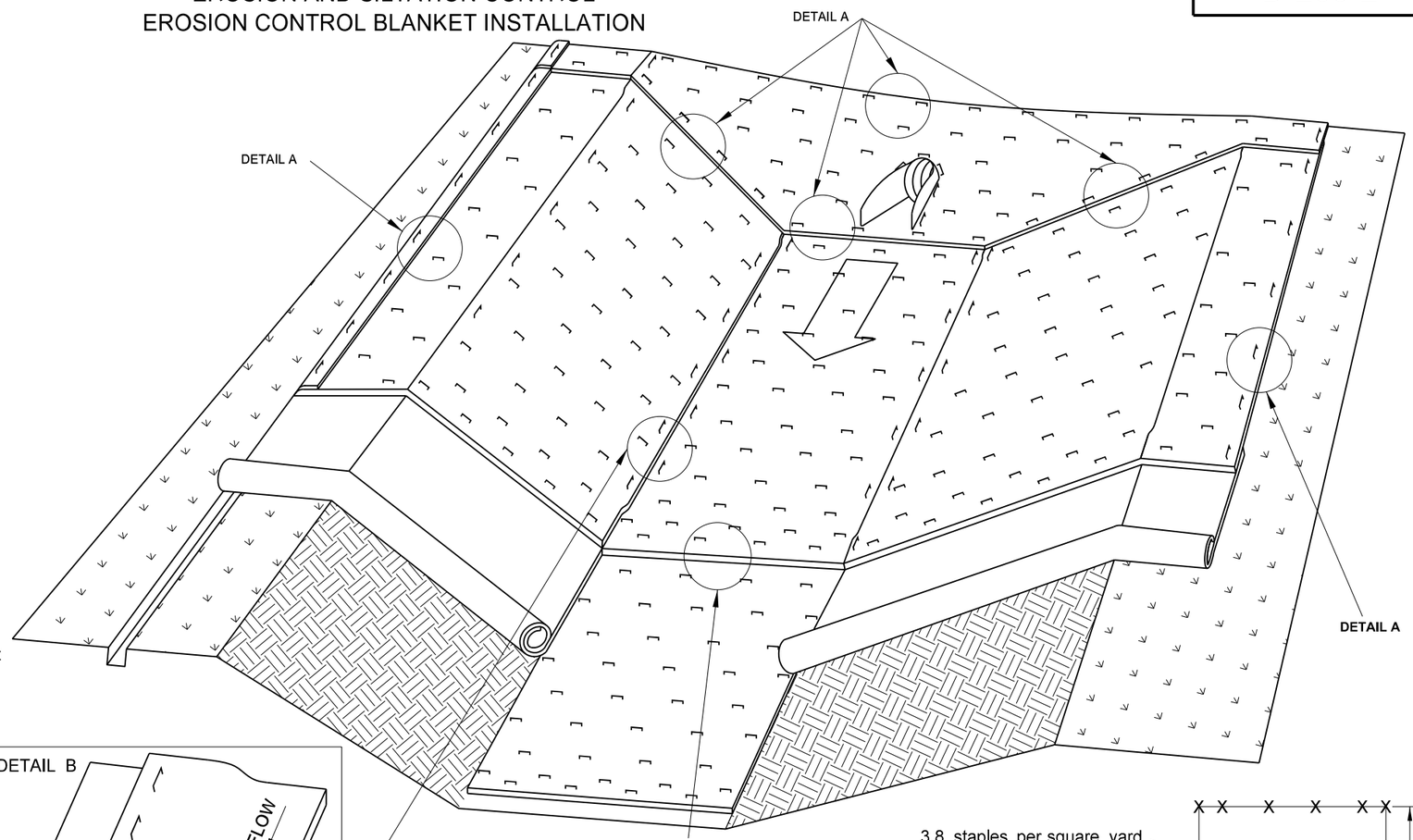


PIPE OUTLETS

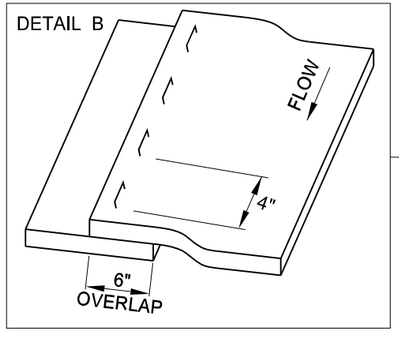


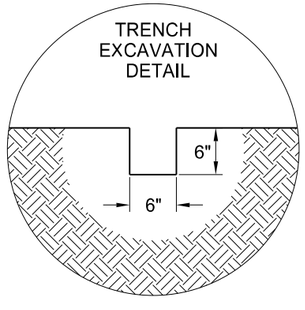
PIPE INLETS

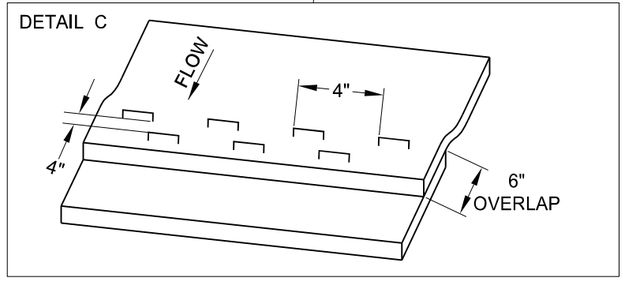
INSTALLATION AT PIPE ENDS



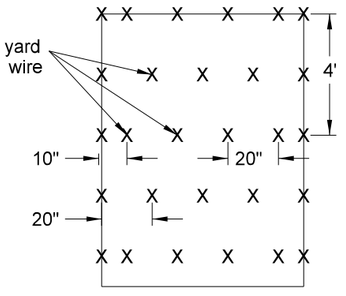
BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION







3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



STAPLE PATTERN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-709-5 to D-255-2.
07-27-15	Changed installation details such as trench depth and overlap dimensions.

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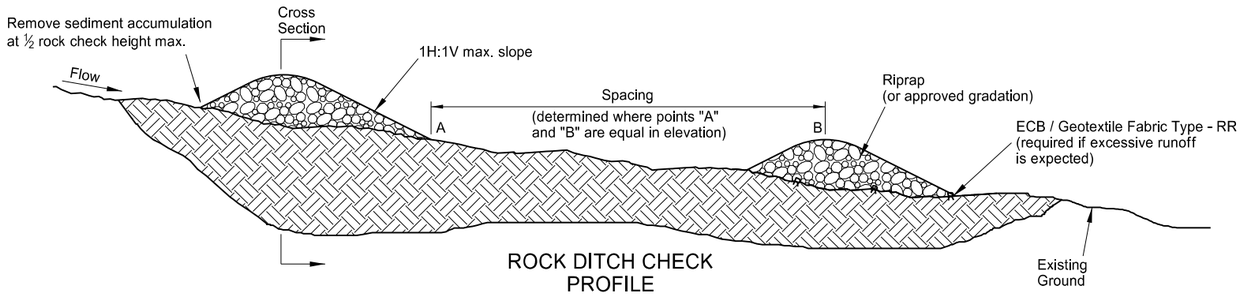
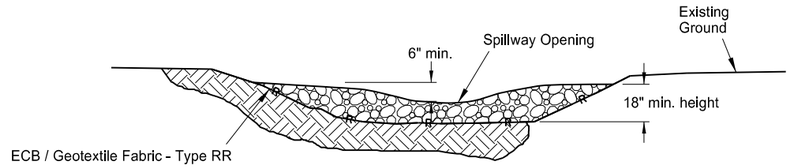
EROSION AND SILTATION CONTROLS

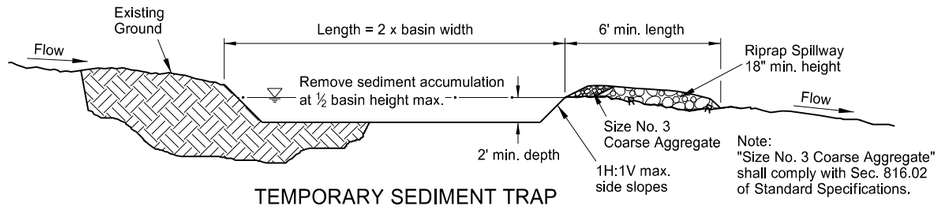
D-256-1



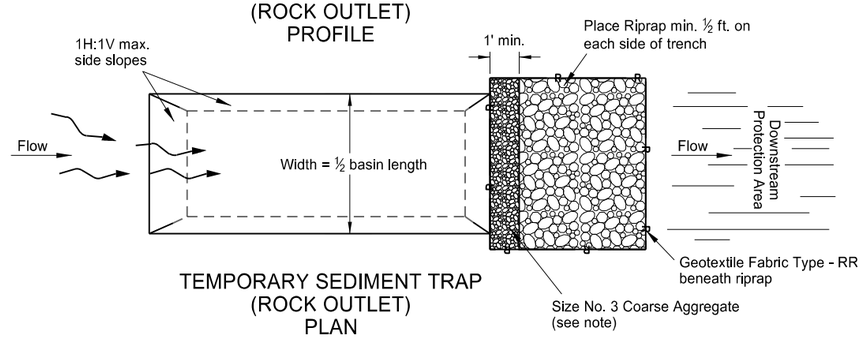
ROCK DITCH CHECK
PROFILE



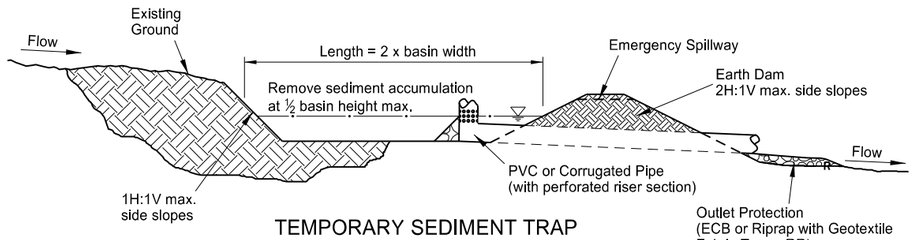
ROCK DITCH CHECK
CROSS SECTION



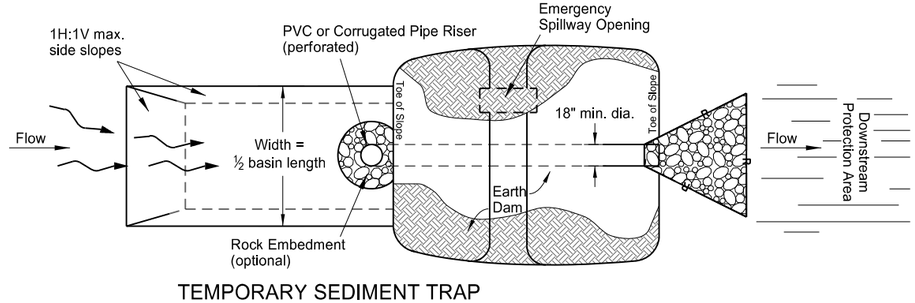
TEMPORARY SEDIMENT TRAP
(ROCK OUTLET)
PROFILE



TEMPORARY SEDIMENT TRAP
(ROCK OUTLET)
PLAN



TEMPORARY SEDIMENT TRAP
(RISER PIPE OUTLET)
PROFILE



TEMPORARY SEDIMENT TRAP
(RISER PIPE OUTLET)
PLAN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-2 to D-256-1. Deleted silt fence details.

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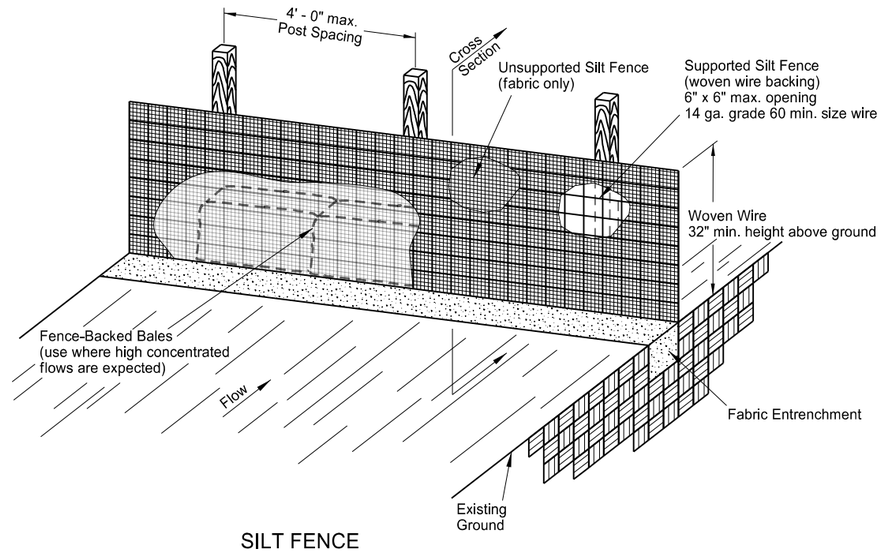
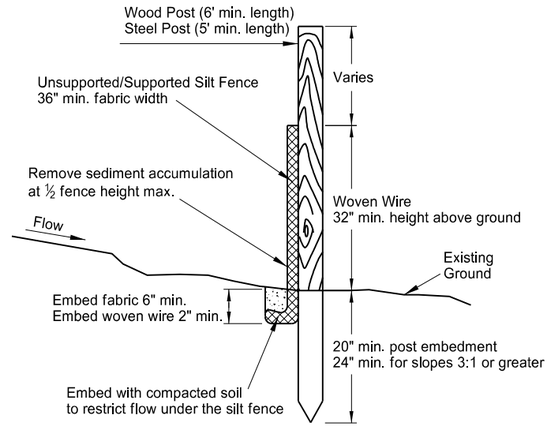
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1



SILT FENCE
SUPPORTED AND UNSUPPORTED



SILT FENCE
CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.

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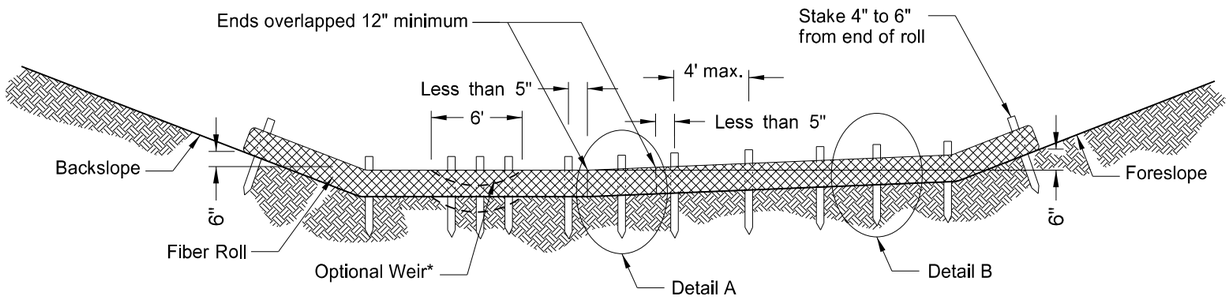
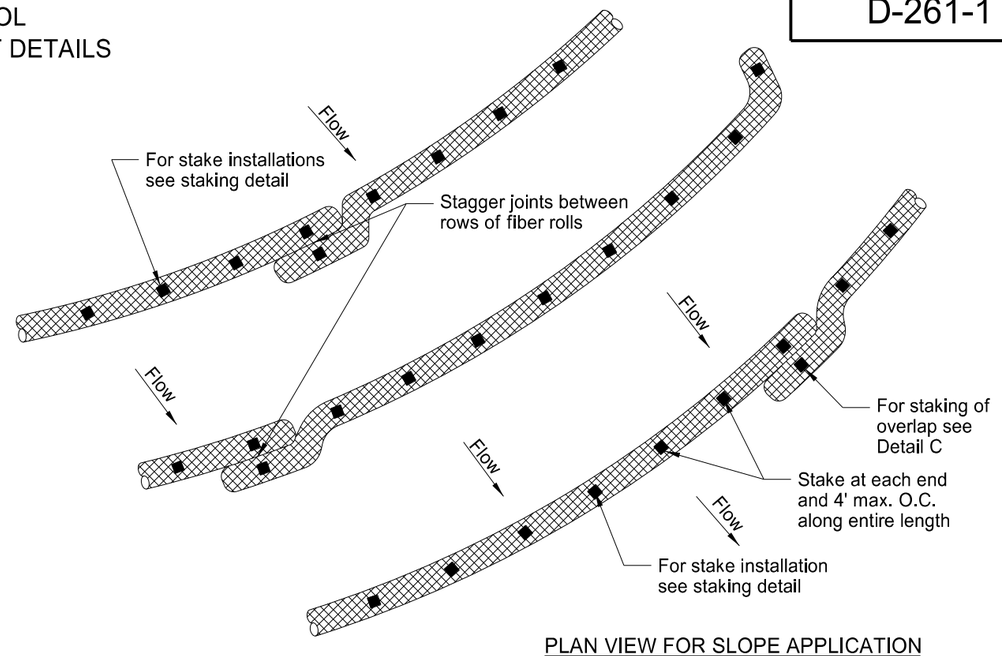
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

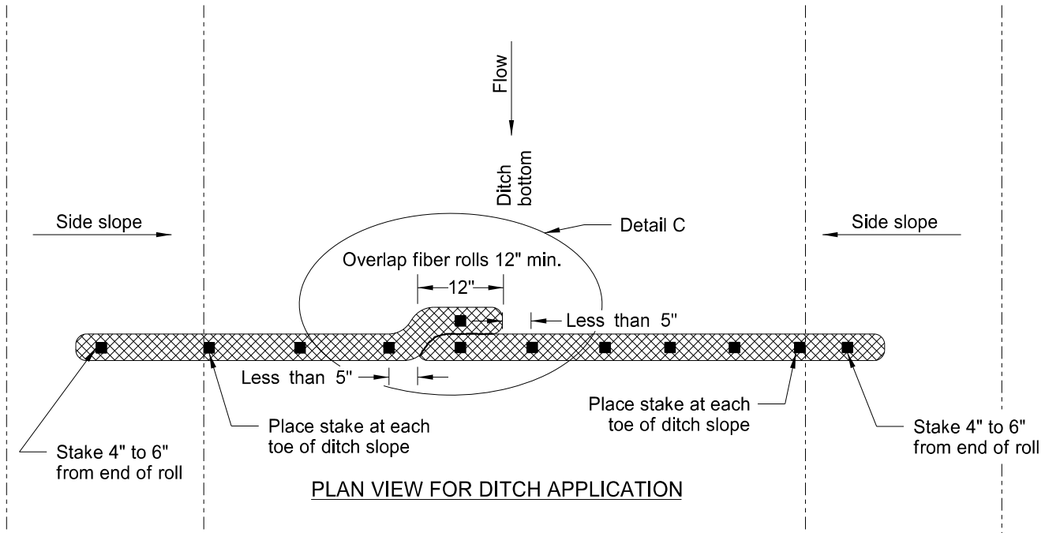


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

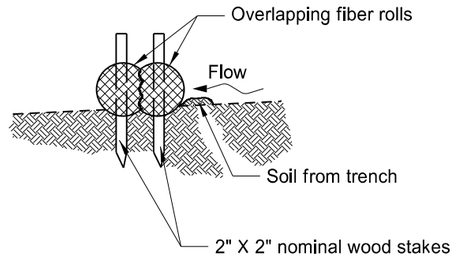
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

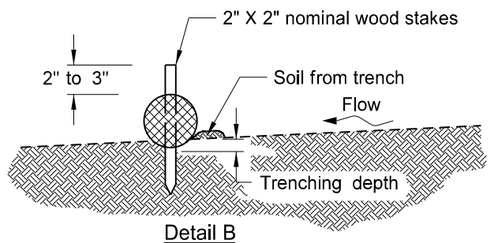


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

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

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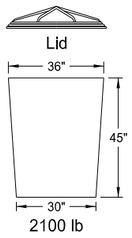
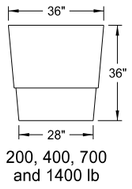
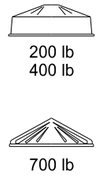
ATTENUATION DEVICE

D-704-1

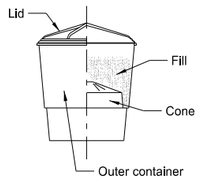




Outer Containers

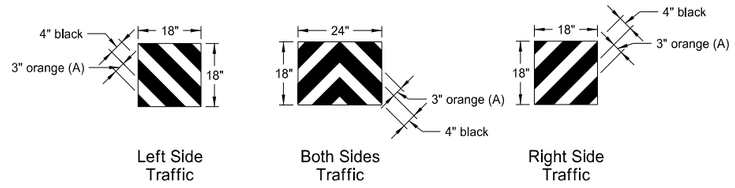


Cones



Typical Assembly

Typical Module
Construction Detail



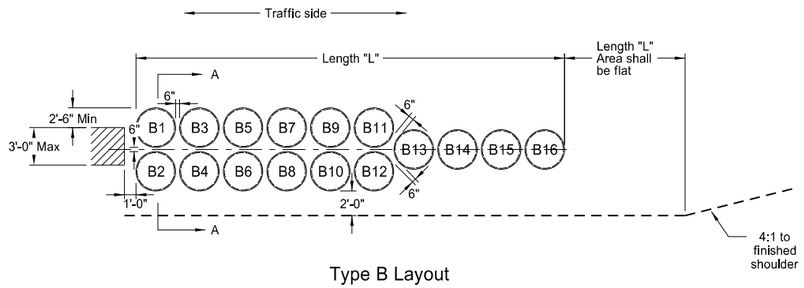
Left Side Traffic | Both Sides Traffic | Right Side Traffic

Reflective Sheet Detail

Note:
The last attenuation device facing traffic shall have a reflective sheet, following the details above, directly applied to the outer container. The sheet may also be applied to a metallic sheet and attached to the container with approved fasteners. The reflective sheeting shall be Type IV as specified in NDDOT Standard Specifications.

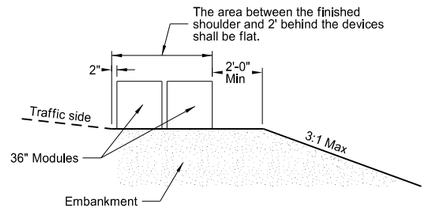
(A) 3" orange sheeting shall be used for temporary installations, and 3" yellow sheeting shall be used for permanent installations.

Fill Chart					
	Module Weights (LBS)				
	200	400	700	1400	2100
Distance from top edge	8½"	5"	4"	3"	0"



Type B Layout

Note:
When attenuation devices are placed at piers offset from roadway, they shall be angled 10 degrees towards traffic.



Section A-A
(Type B Layout)

Type B Attenuation Device											
Module Number	Dash Number										
	75	70	65	60	55	50	45	40	35	30	25
	Module Weights (LBS)										
B1	2100										
B2	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200
Length (L)	34.2'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	27.2'	27.2'
Module Weights (LBS)	Replacement Module										
2100	1	1	1	1	1	1	1	1	1		
1400	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1

Notes:

1. Materials
   A) Modules shall be manufactured from a frangible polyethylene material which will shatter upon impact.
   B) Modules shall be filled with class 43 aggregate meeting the requirements for aggregate according to NDDOT Standard Specifications. The fill unit weight shall be at least 100 pounds per cubic foot. Fill left over winter shall have a moisture content of 2% or less.

2. Modules
   The modules shall be provided in two sizes to contain volumes of either 2, 4, 7, 14, or 21 cubic feet as a minimum.
   A) The module for the 2, 4 or 7 cubic foot container shall consist of three components:
      1) A 14 C.F., yellow outer container.
      2) A black lid which locks securely over the top lip of the container.
      3) A cone-shaped supporting insert. The insert shall be varied to allow for the three sizes of modules and capable of supporting 200, 400, or 700 pounds of sand mass. The cone inserts shall be placed inside the 14 cubic foot container.
   B) The module for the 21 cubic foot container shall consist of two components:
      1) A 36" height X 36" width yellow outer container.
      2) A black lid which locks securely over the top of the container.

3. For temporary use: The modules shall be Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. The attenuation devices may be placed on pallets to facilitate maintenance. Pallets shall have a maximum thickness of 3½".

4. For permanent use: Barrel Attenuation Device installations, the outer sand container portion of the modules shall consist of a one-piece container with separate detachable lid. The modules which meet these requirements are Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. Modules having outer sand containers assembled from multiple pieces shall not be accepted for permanent installations.

5. The Typical Module Construction Detail and Type B Layout are based on the Energite Crash Cushion manufactured by Energy Absorption. The manufacturer of other sand filled attenuation modules shall provide any necessary layouts and details required which differ from those shown here.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised sheeting in reflective sheet detail

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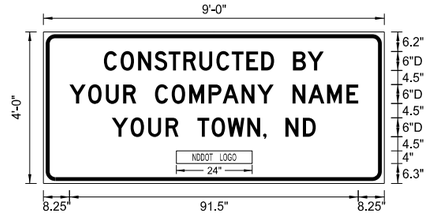
CONSTRUCTION SIGN DETAIL

D-704-5

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

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S): AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

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

Notes:

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV

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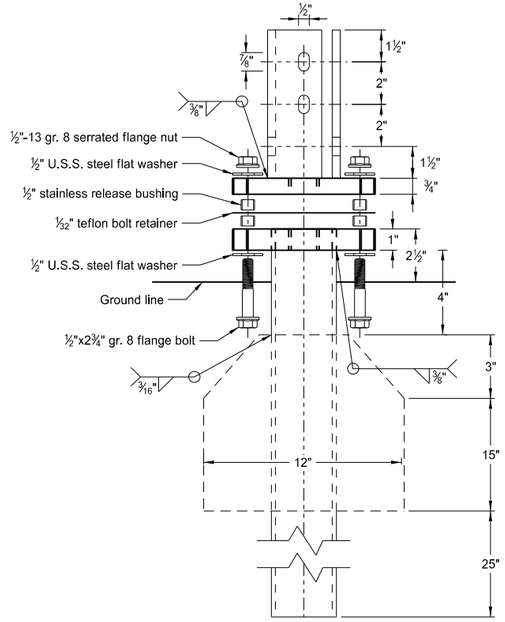
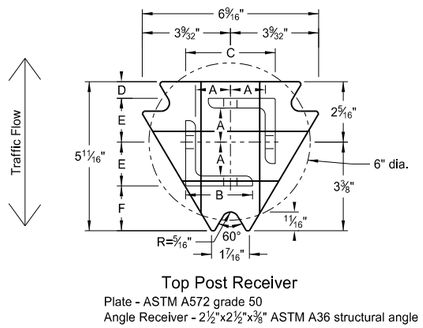
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

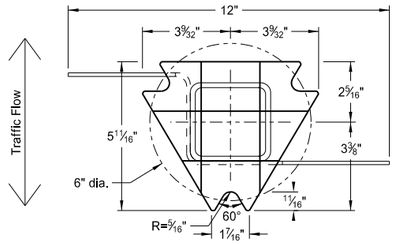


Multi-Directional
Slip Base Assembly

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

Notes:

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

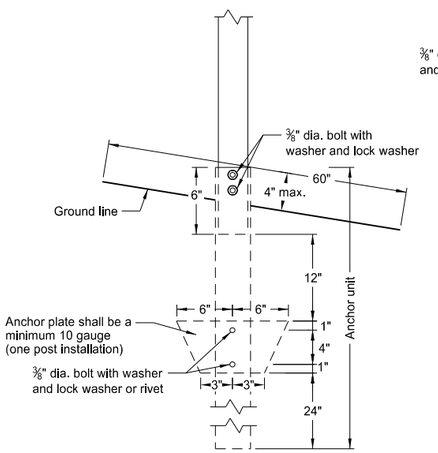
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	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	2³⁄₁₆	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
2³⁄₁₆ x 2³⁄₁₆	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

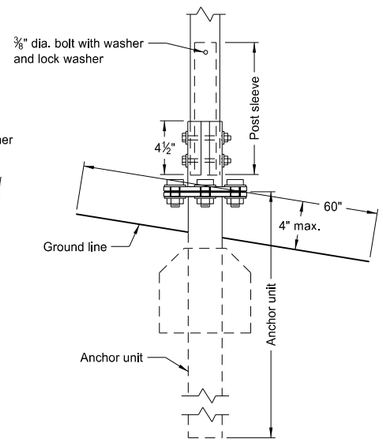
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⅝"	⅝"	1²¹⁄₃₂"	1¾"

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

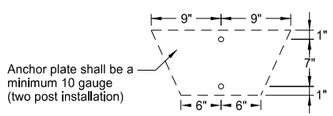
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

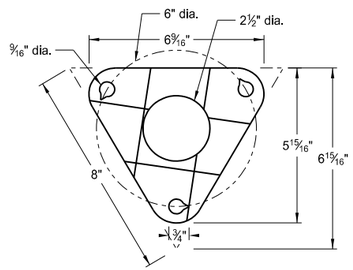


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





Bolt Retainer for Base Connection
Bolt Retainer- ³⁄₃₂" Reprocessed Teflon

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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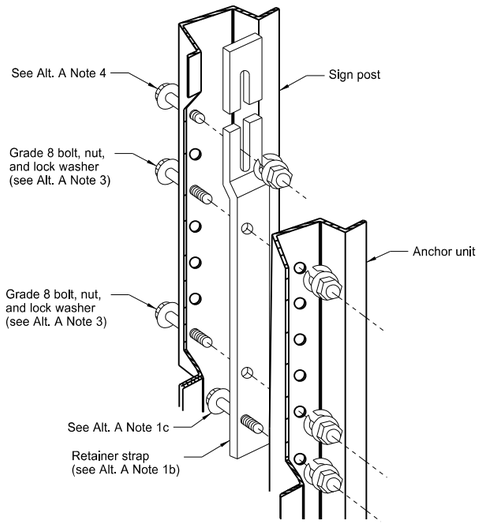
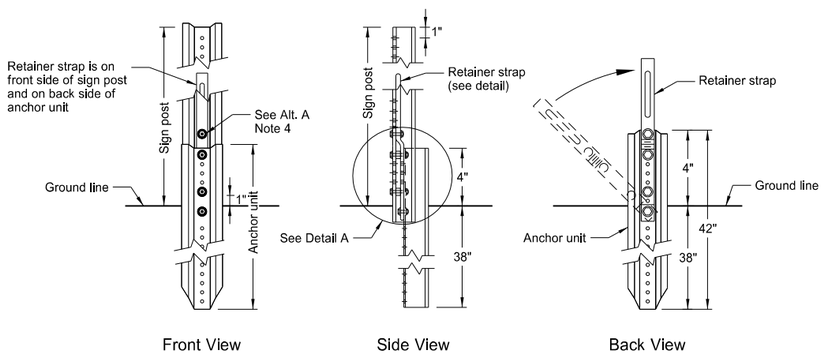
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



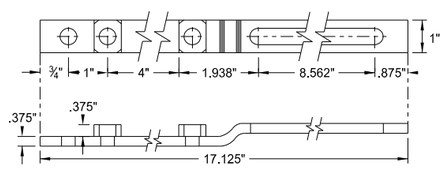
Detail A



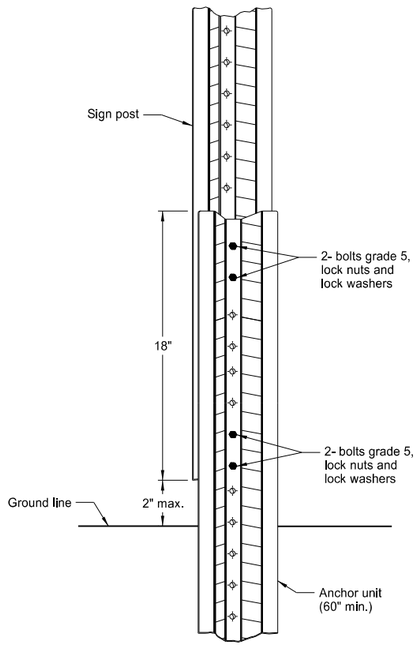
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

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

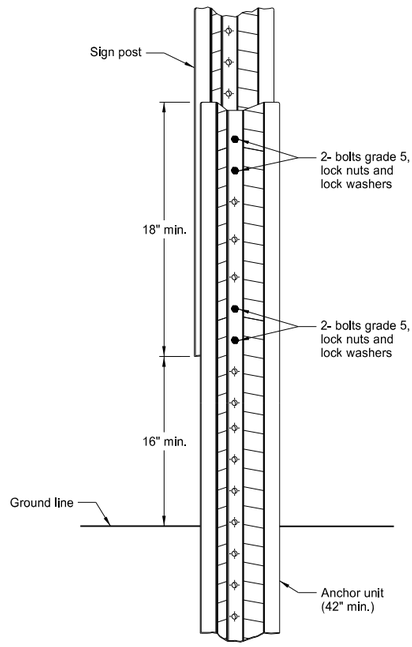


Retainer Strap Detail



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

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



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

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

Alternate A Steps of Installation:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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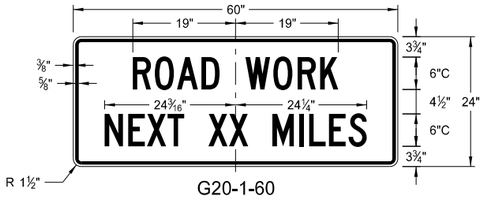
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
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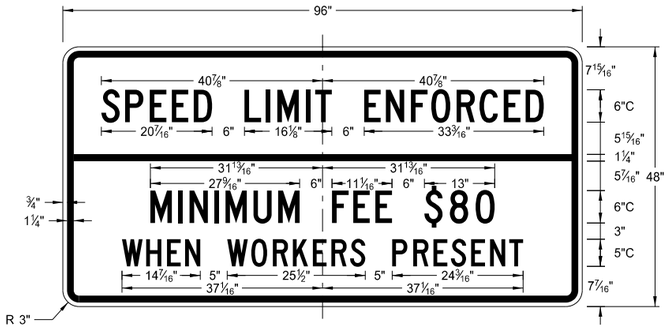
Background: orange

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



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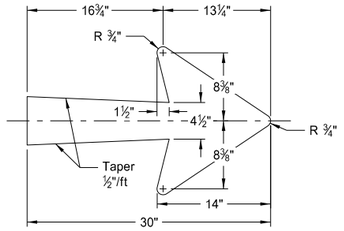
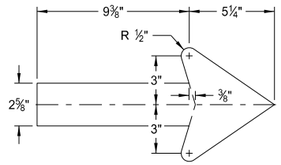
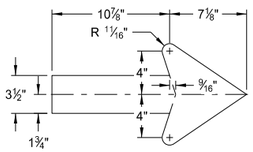


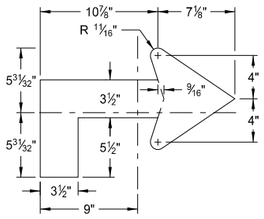
E5-1-48



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



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



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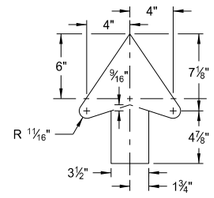
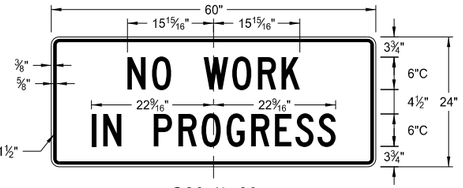
Advanced Right or Left



M4-9-30
Straight



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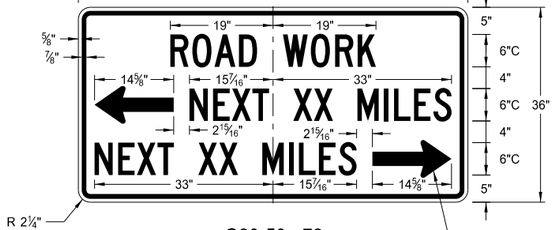

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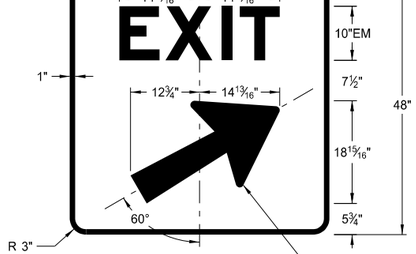

E5-1(L or R)-48
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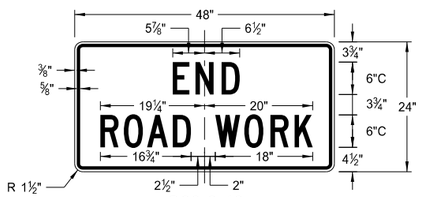

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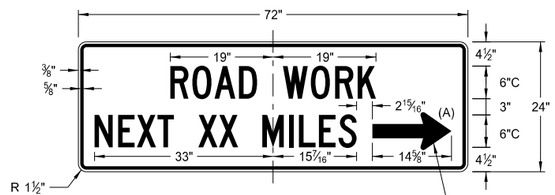

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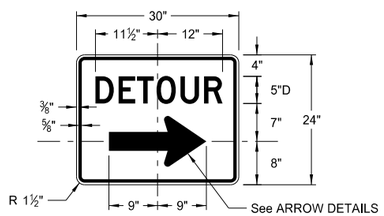

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

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

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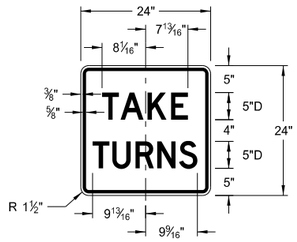
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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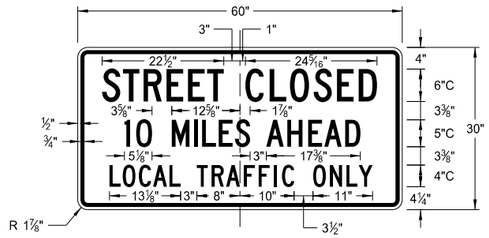

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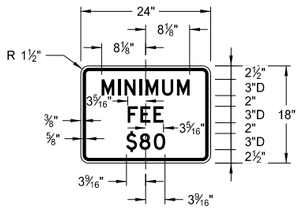

R2-1a-24
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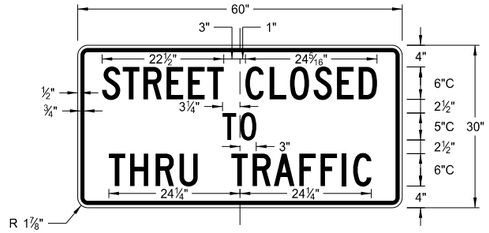

R11-4a-60
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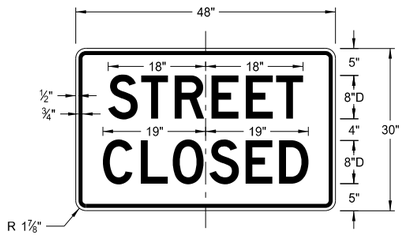

R11-2a-48
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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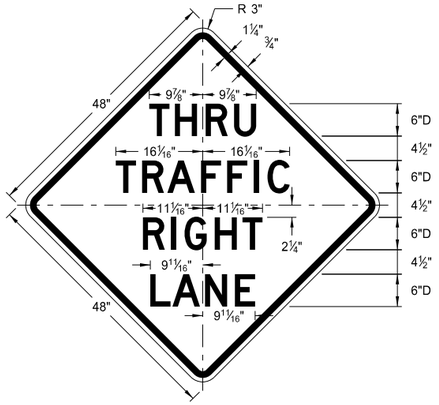
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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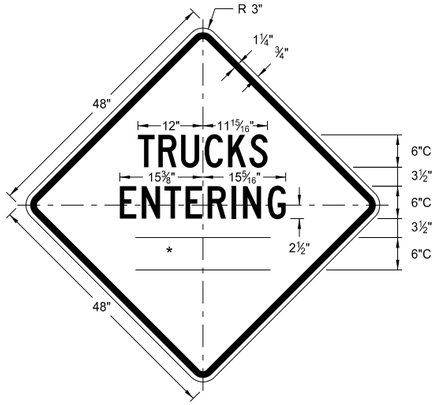

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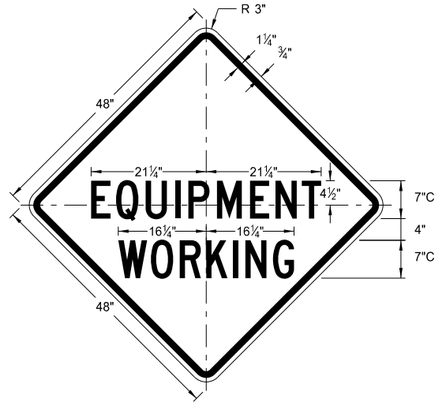
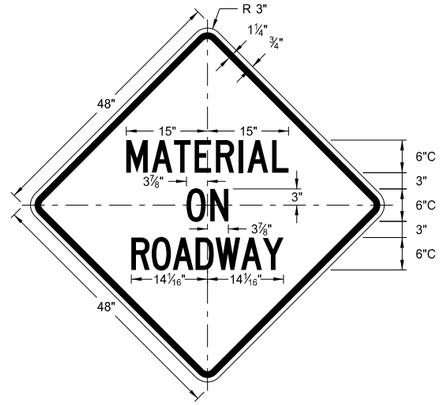


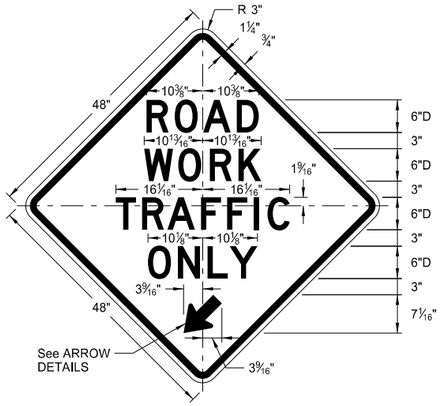
W20-51-48
Legend: black (non-refl)
Background: orange



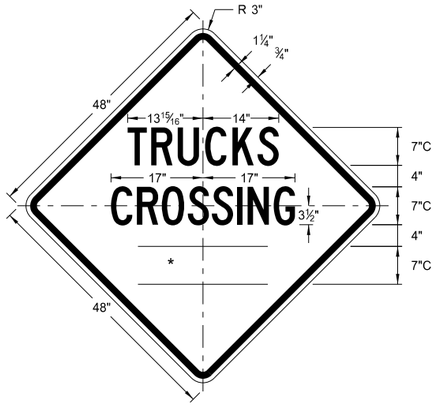
W21-51-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES

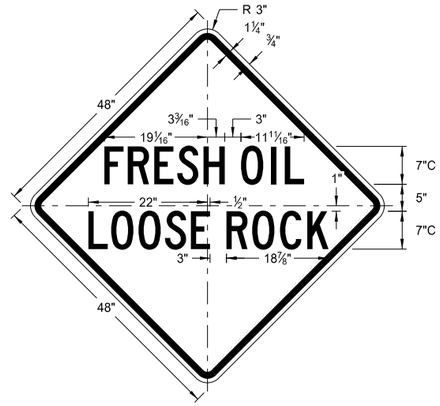


W5-9-48
Legend: black (non-refl)
Background: orange



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

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



W22-8-48
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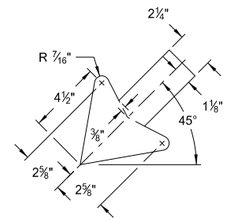
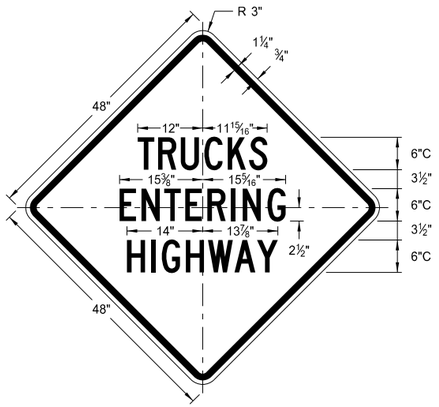
Background: orange

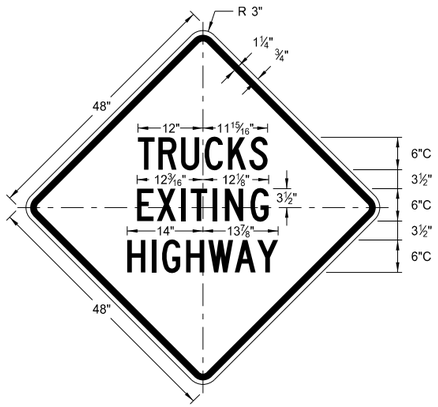


W5-9-48

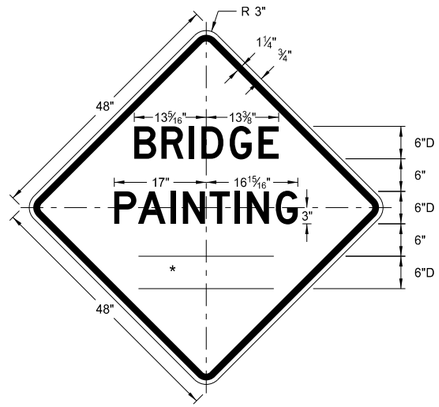
ARROW DETAILS



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



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



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

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

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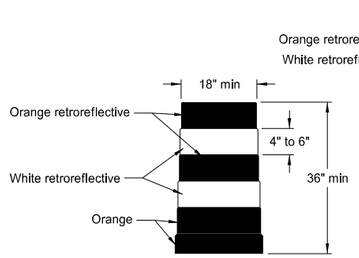
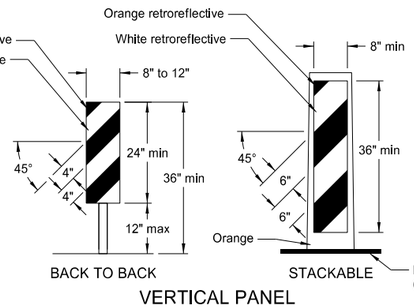
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



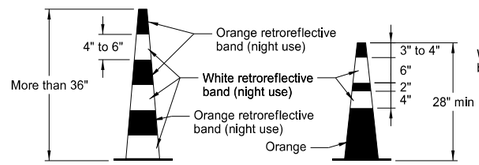
DELINEATOR DRUM

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



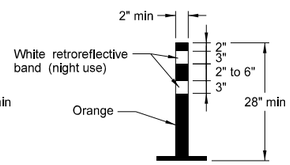
VERTICAL PANEL

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



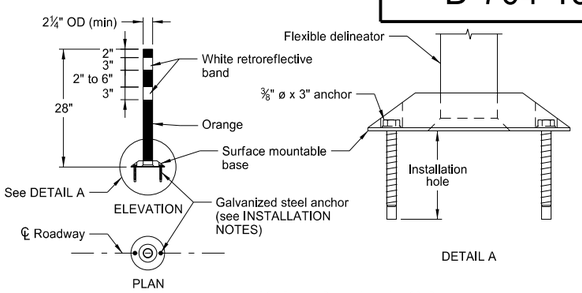
TRAFFIC CONE

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



TUBULAR MARKER

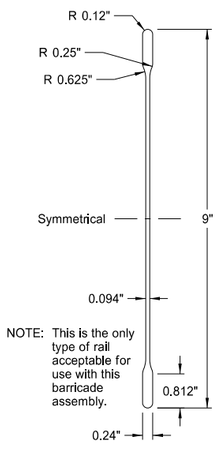
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



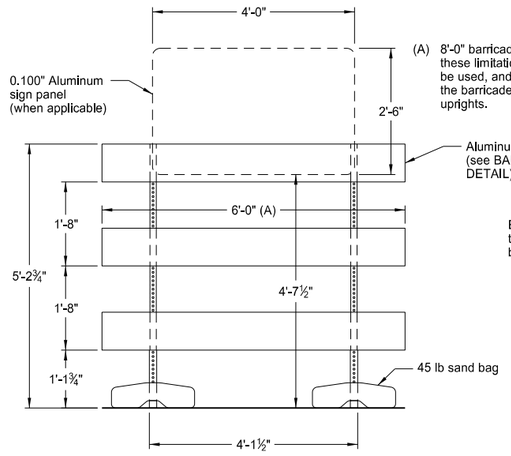
FLEXIBLE DELINEATOR

INSTALLATION NOTES:

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

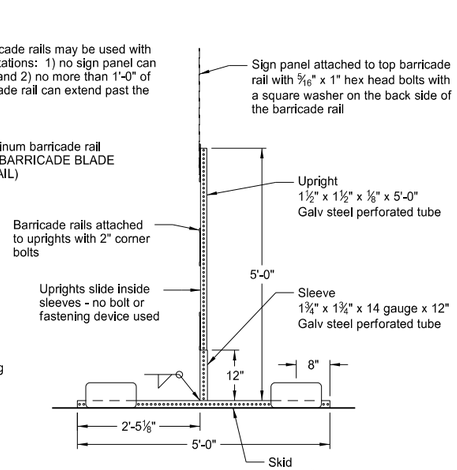


BARRICADE BLADE DETAIL



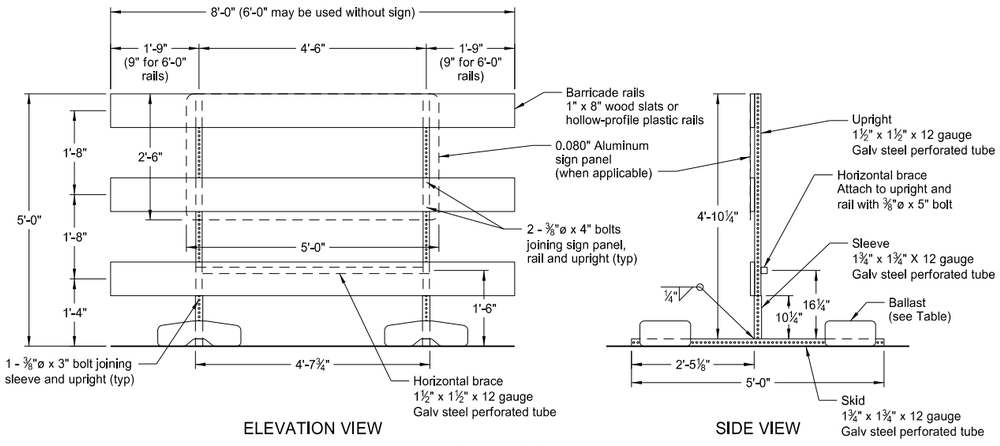
ELEVATION VIEW

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



SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

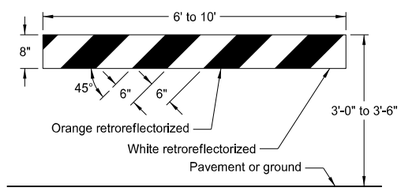


ELEVATION VIEW

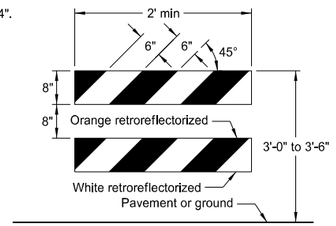
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

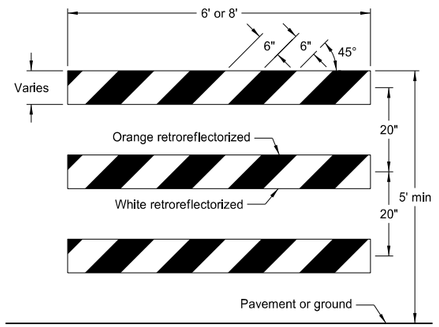
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

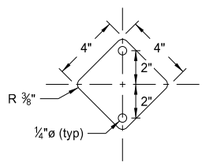


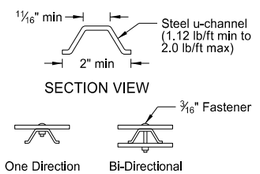
TYPE II BARRICADE

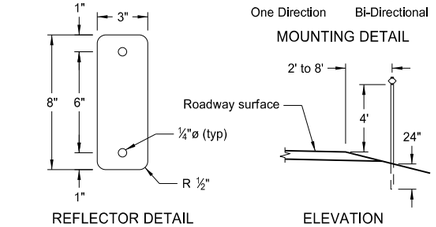


TYPE III BARRICADE

BARRICADE RAIL DETAILS







DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

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

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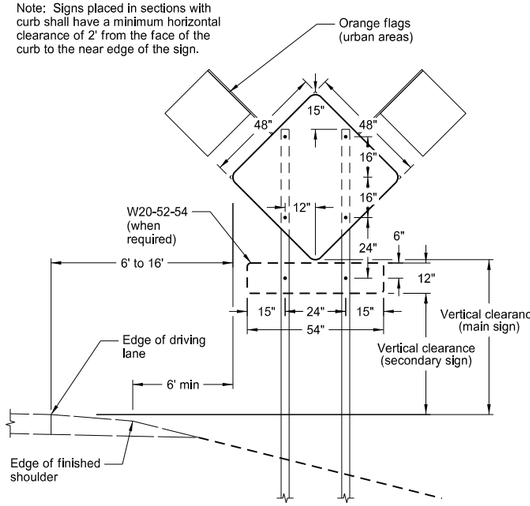
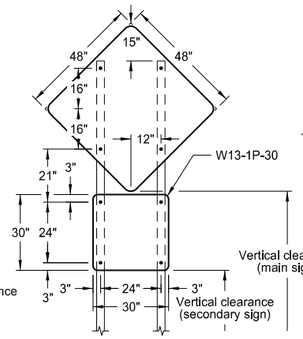
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

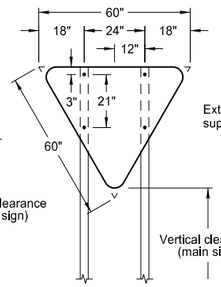
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



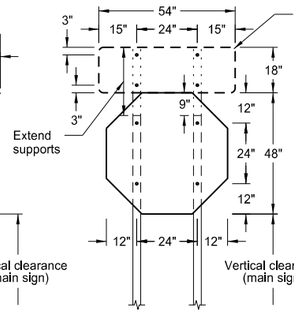
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



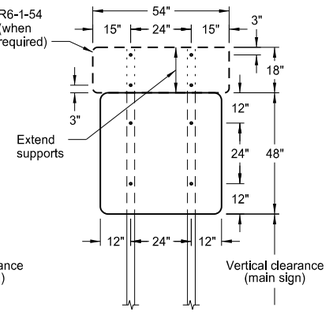
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



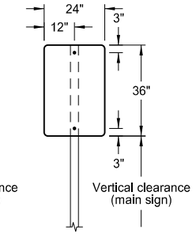
R1-2-60 - YIELD SIGN



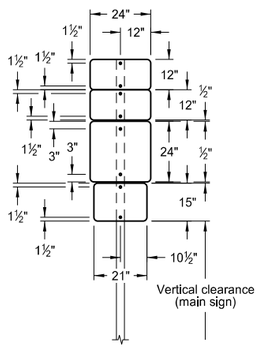
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



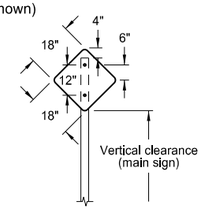
48" x 48" SIGN
(with R6-1-54 sign as required)



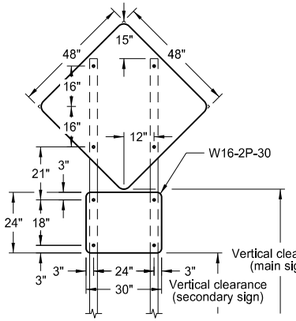
24" x 36" SIGN



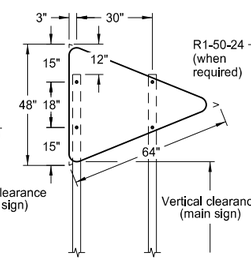
24" x 24"
ROUTE MARKER
ASSEMBLY



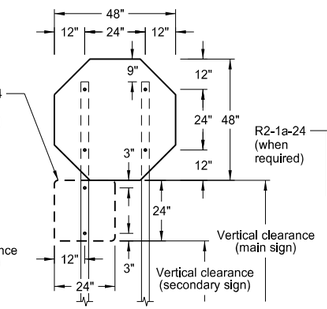
18" x 18"
DIAMOND SIGN



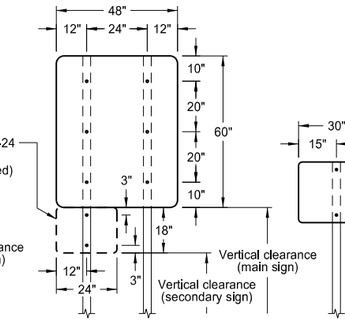
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



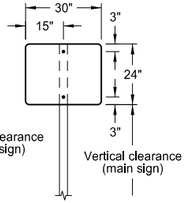
W14-3-64 - PENNANT SIGN



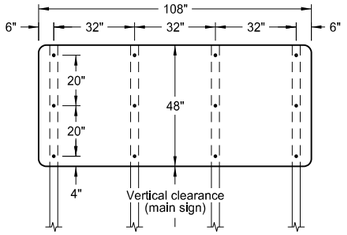
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



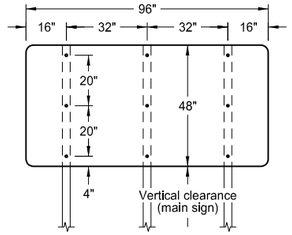
48" x 48" SIGN
(with R2-1a-24 sign as required)



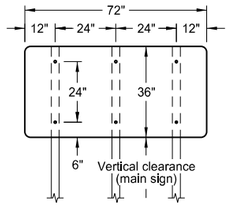
30" x 24" SIGN



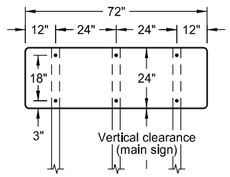
108" x 48" SIGN



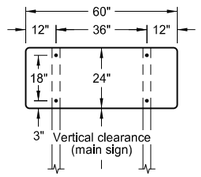
96" x 48" SIGN



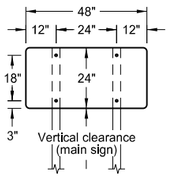
72" x 36" SIGN



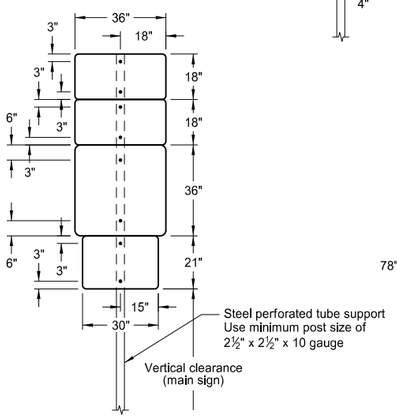
72" x 24" SIGN



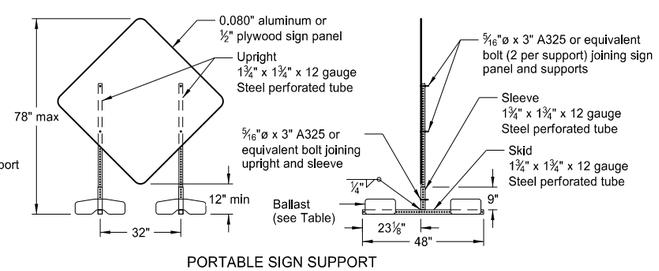
60" x 24" SIGN



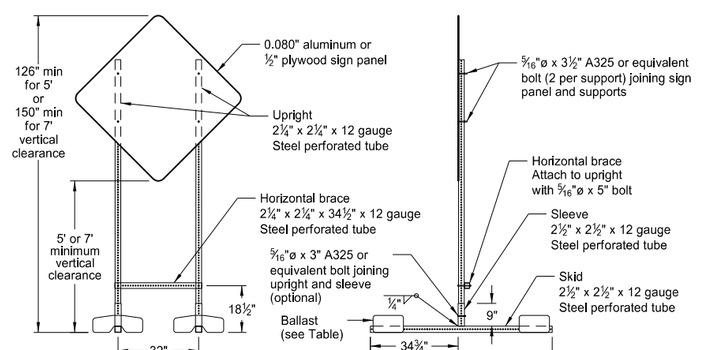
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

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

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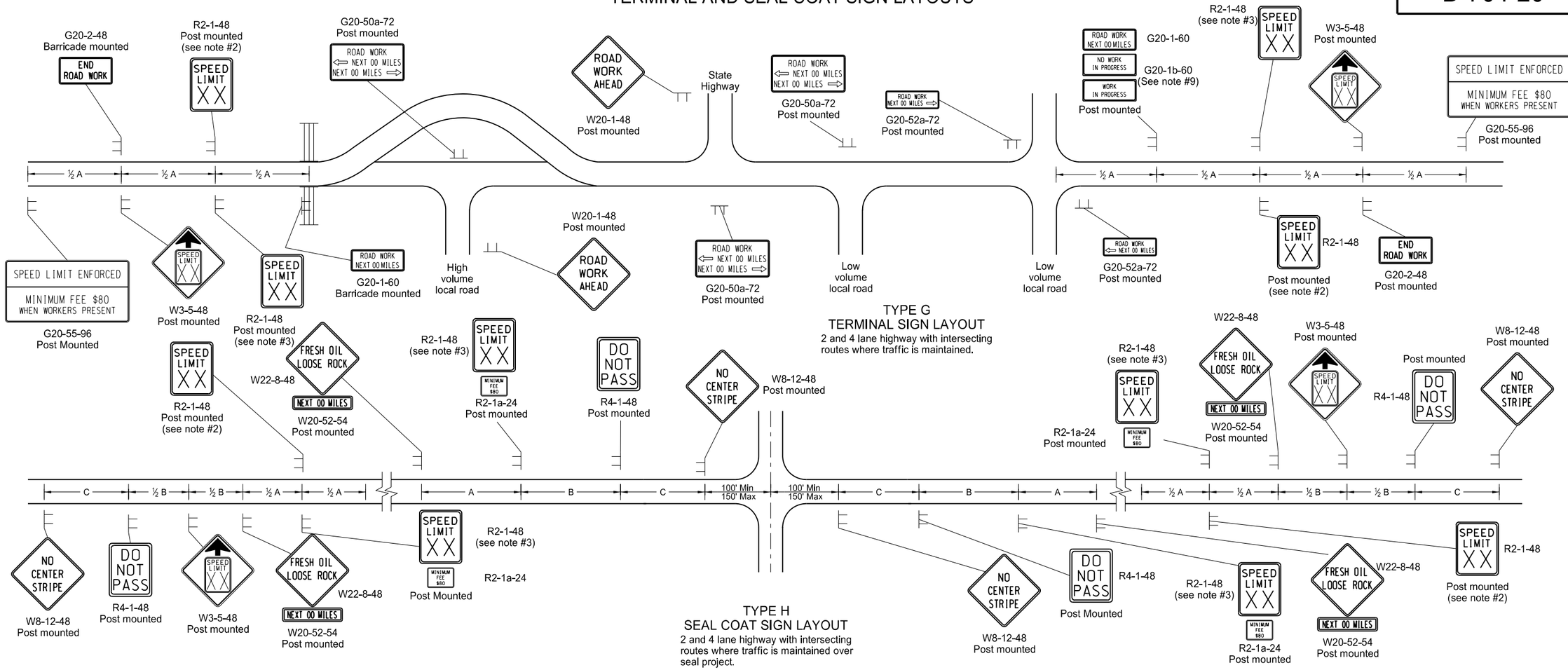
TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
9. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
10. Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
11. G20-55-96 sign is not required if work is less than 15 days.

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

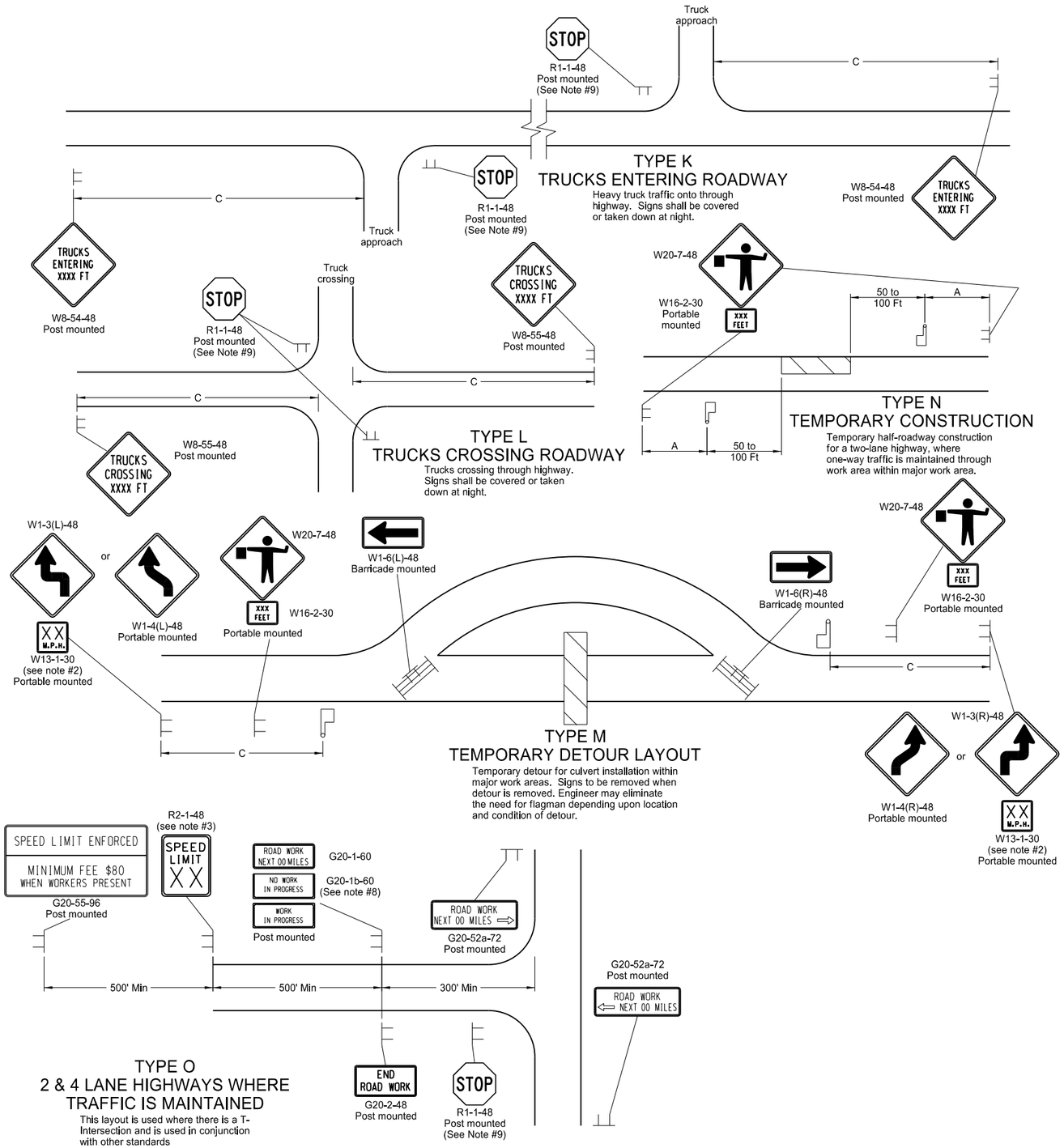
Sign

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 09/27/13 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



Notes

1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.

KEY

Type III barricade — Work area

Sign — Flagger

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

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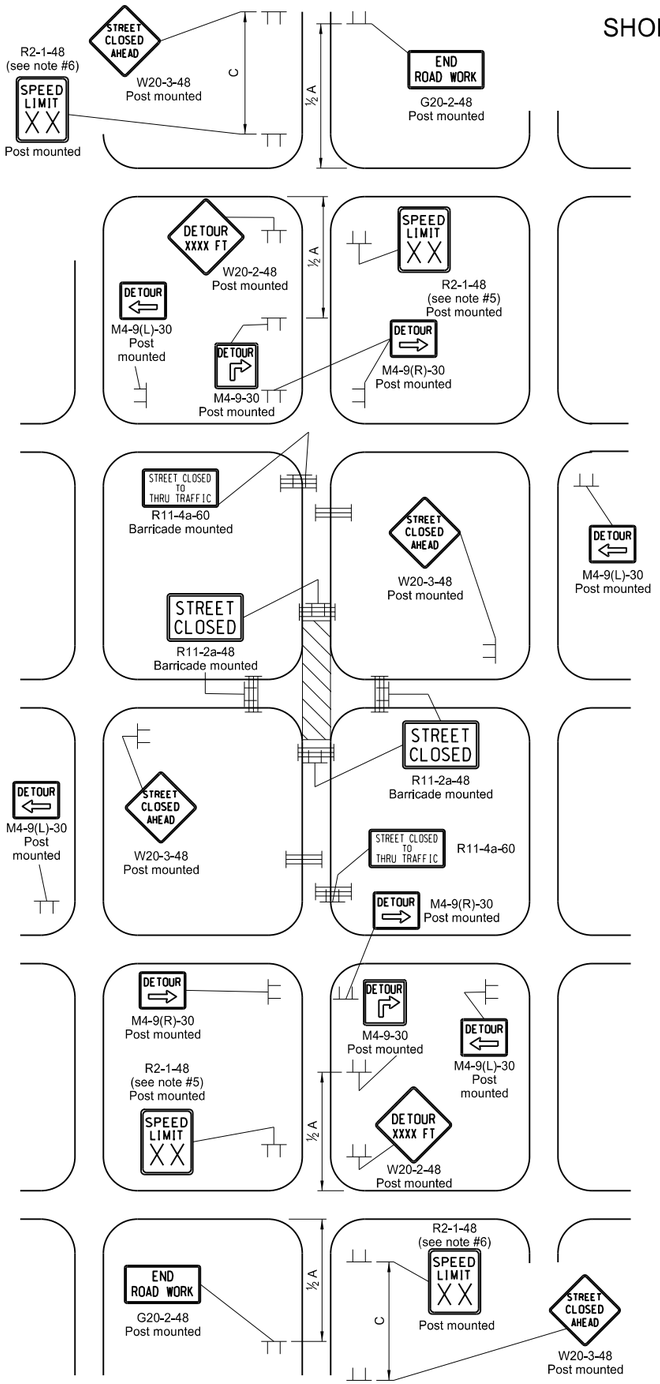
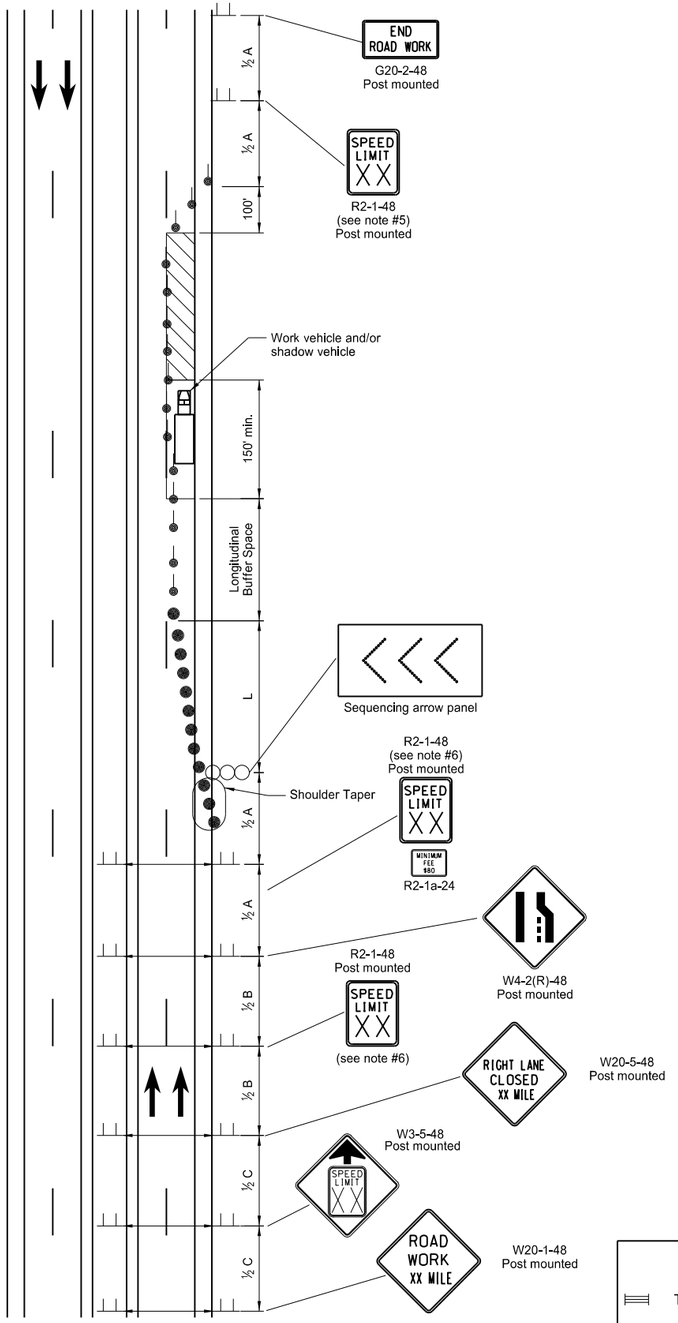
SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23



TYPE Q
DETOUR FOR A CLOSED STREET
Where city streets are
used for detouring traffic.
Urban projects do not require the
G20-55-96 and R2-1a-24 signs.



TYPE P
STATIONARY LANE CLOSURE ON A DIVIDED HIGHWAY
4 lane divided roadway where
½ of roadway is closed.
Short-term (more than 1 hour within a single daylight period.)

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
3. Delineator drums used for tapering traffic shall be spaced at dimension "S".
   Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
7. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. Obliterated or covered payment marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
10. Intersection control for Type Q may have to be changed on detour. The Engineer in the field shall determine what control is necessary.
11. Where necessary, safe speed to be determined by the Engineer. When parking is present, signs shall be placed so they are entirely visible above parked vehicles or placed at the edge of the parking area so they are visible to oncoming traffic. These signs may be skid mounted when placed on the roadway surface.
12. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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

KEY

Type III barricade	Work area
Sign	Sequencing arrow panel
Delineator Drum	Tubular Markers

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE

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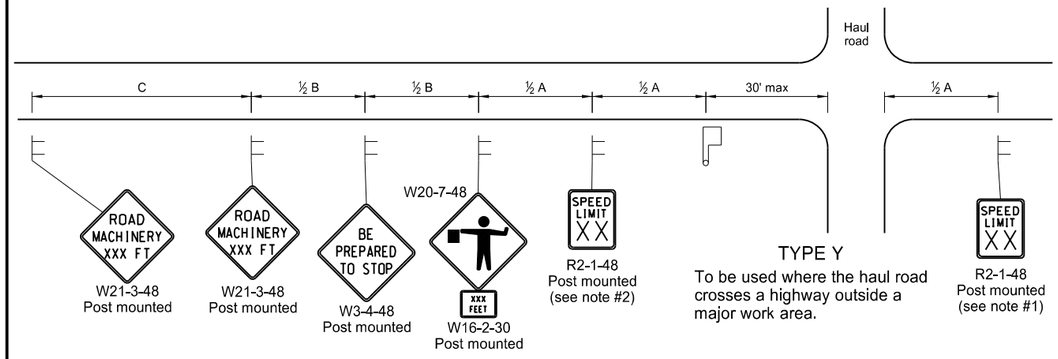
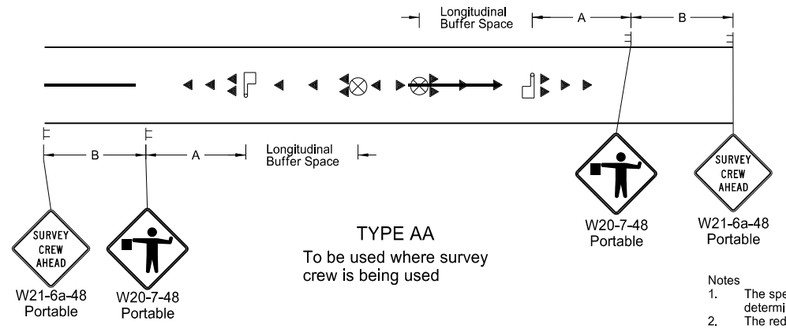
MISCELLANEOUS SIGN LAYOUTS

D-704-26



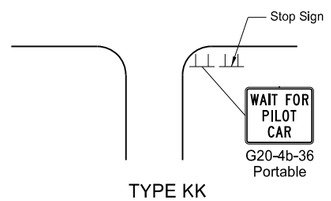
TYPE Y

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



TYPE AA

To be used where survey crew is being used

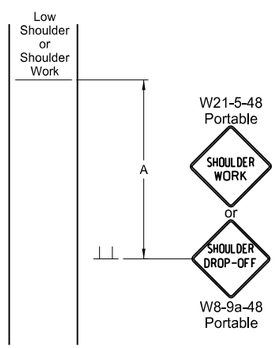


TYPE KK

To be used at major intersections within pilot car control area

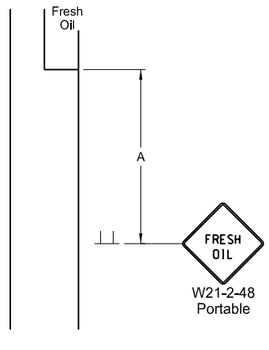
Notes

1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
4. Existing speed limit signs within a reduced speed zone shall be covered.
5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



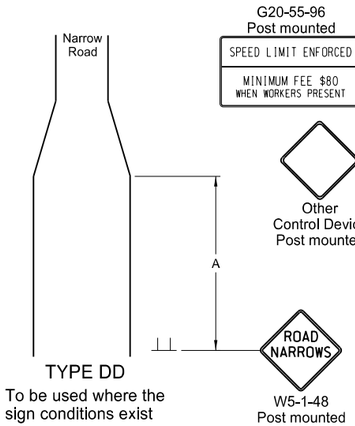
TYPE BB

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



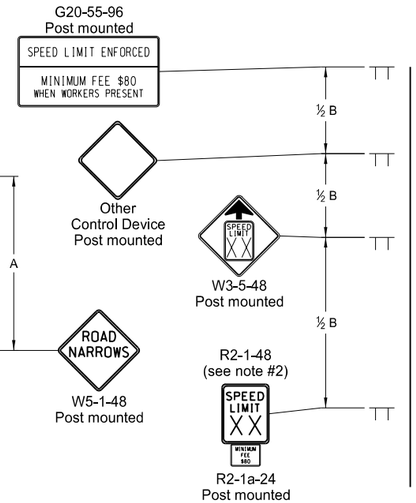
TYPE CC

To be used where the sign conditions exist



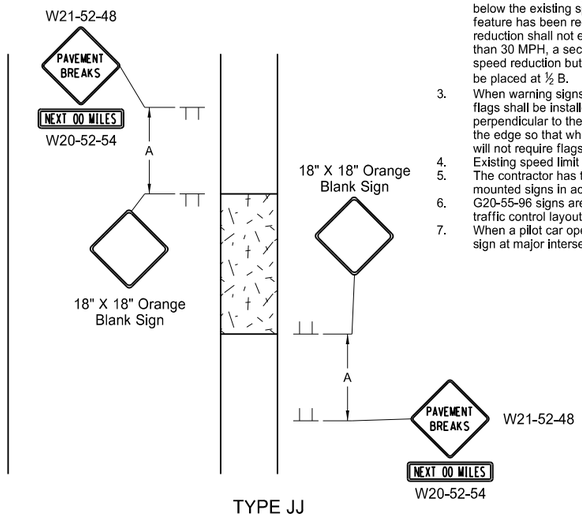
TYPE DD

To be used where the sign conditions exist



TYPE Z

To be used where speed zone is needed

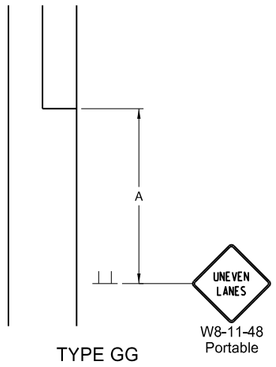


TYPE JJ

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

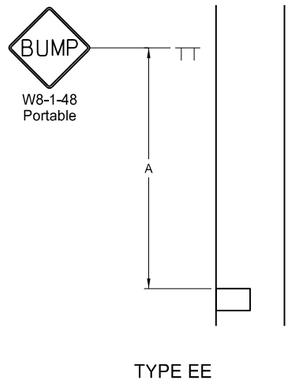
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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



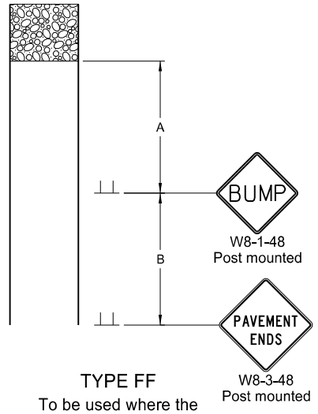
TYPE GG

To be used where a difference of elevation between lanes exist



TYPE EE

To be used where the sign conditions exist



TYPE FF

To be used where the sign conditions exist

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

KEY

Sign — Flagger

Cones

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

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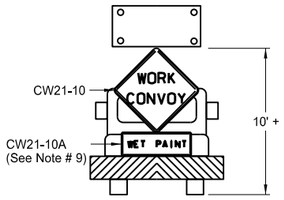
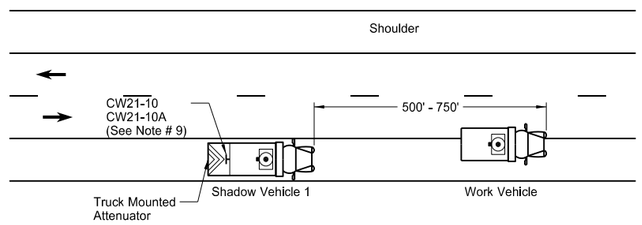
TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

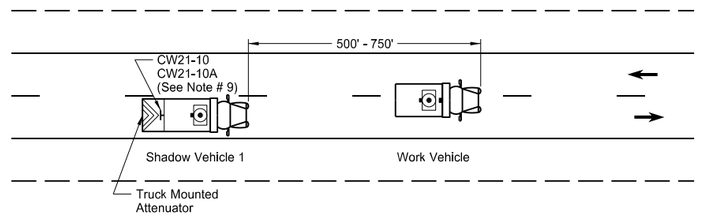
D-704-27



Typical Shadow Vehicle 1
Two-Way Roaday



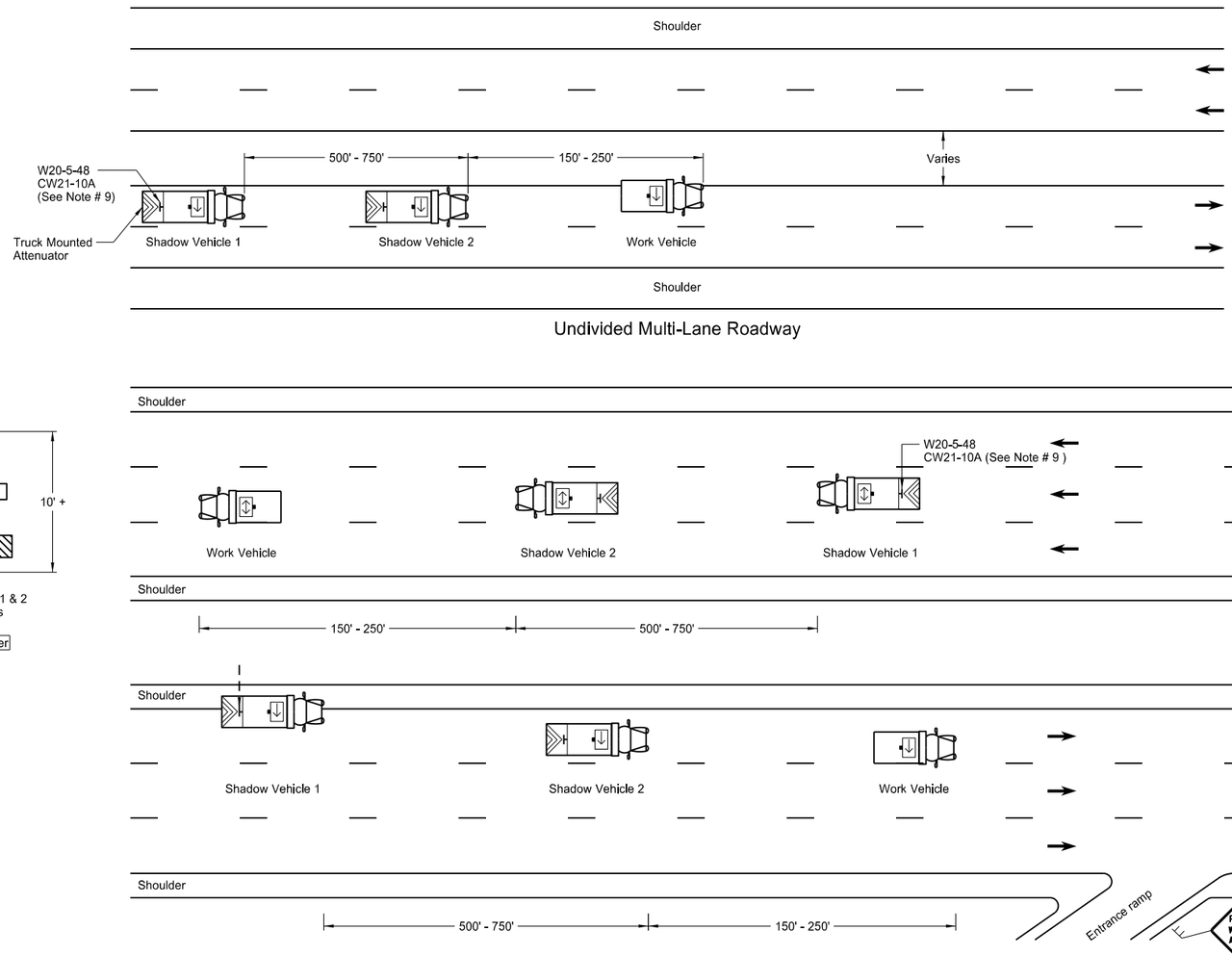
Two-Way Roadway with Paved Shoulders



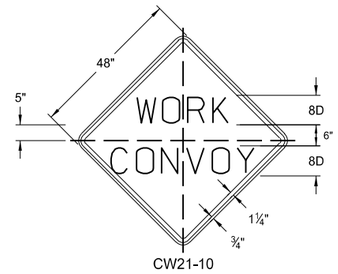
Two-Way Roadway without Paved Shoulders

Notes

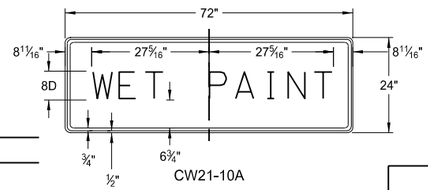
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two-way electronic communication capability.
5. When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
6. Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
7. Sign Colors
   Letters = Black
   Border = Black
   Background = Orange
8. Shadow vehicle 2 may be used as the paint tender vehicle.
9. Sign CW21-10A shall only be used during a painting operation.
10. On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.



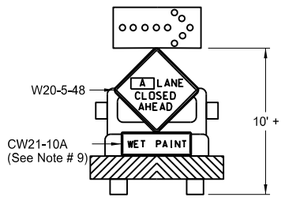
Sign Details



CW21-10



CW21-10A



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center

KEY

- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

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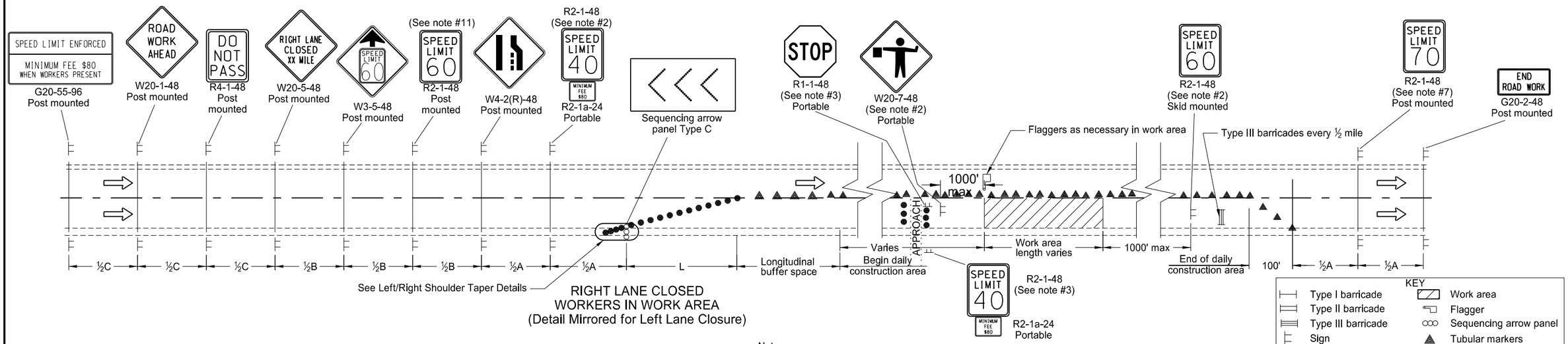
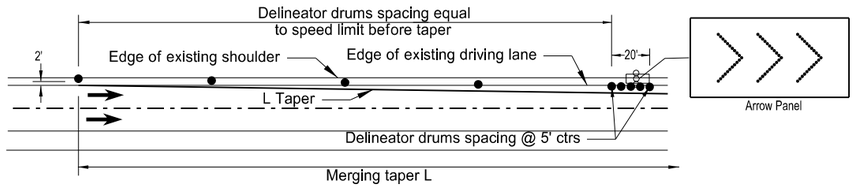
SIGN LAYOUT FOR ONE LANE CLOSURE

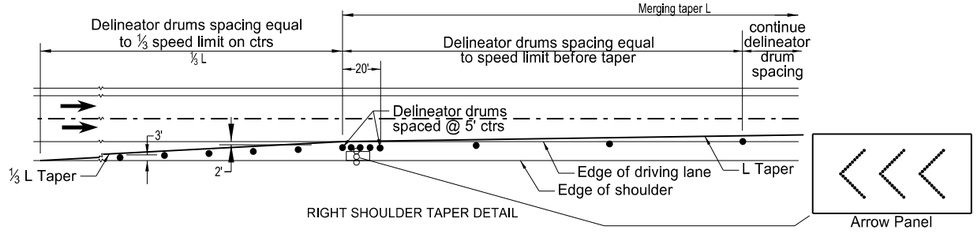
D-704-34



RIGHT LANE CLOSED
WORKERS IN WORK AREA
(Detail Mirrored for Left Lane Closure)



LEFT SHOULDER TAPER DETAIL



RIGHT SHOULDER TAPER DETAIL

Notes:

1. Advance signs for flagging should be installed when flaggers are present.
2. The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 40 mph speed limit sign shall be spaced at ½A in advance of the flagger sign. The 60 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 40 mph speed limit and the Minimum Fee $80 signs shall be covered or removed. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. Approaches: When the work area encompasses an approach, the approach shall be controlled by installing a 40 mph speed limit sign. If this approach is on the side of the lane closure, the existing stop sign shall be covered and a new portable stop sign shall be installed. When the main line 40 mph speed zone is moved past the approach, the approach speed limit sign shall be removed.
4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.
5. Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
6. Sequencing arrow panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
7. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
10. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 mph. Where speed limits are to be reduced more than 30 mph, a second speed limit sign shall be installed with the desired speed reduction, but shall not exceed 30 mph. The second speed limit sign shall be placed at ½B.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
12. Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.

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

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-26-2012

REVISIONS

DATE	CHANGE

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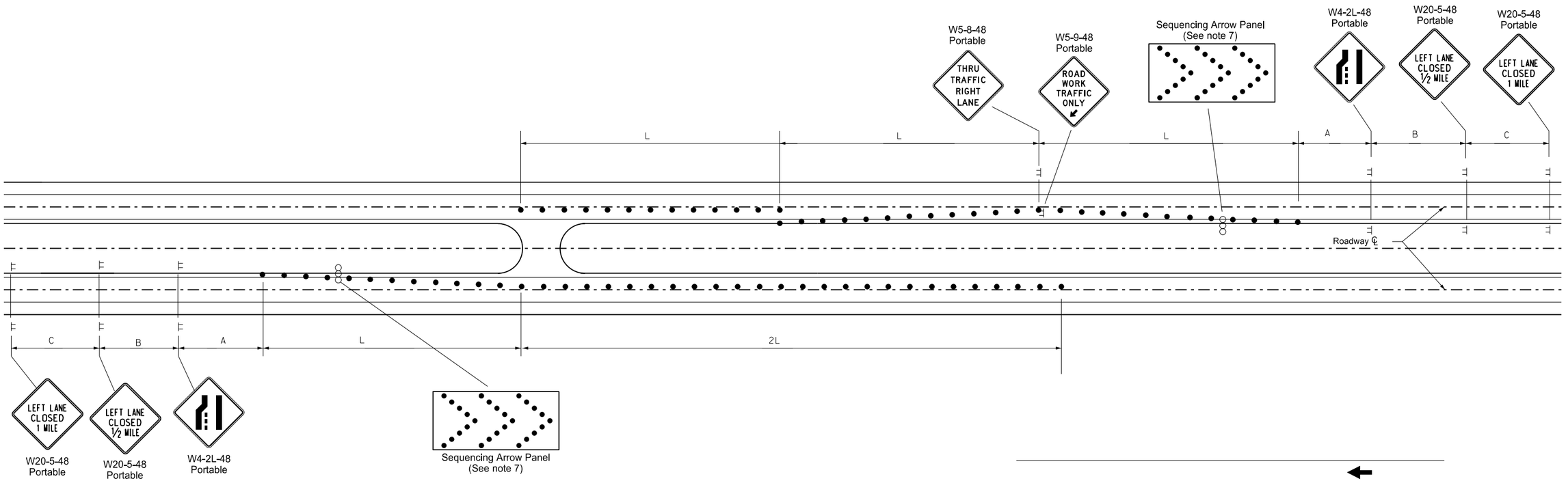
CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS
CONSTRUCTION TRAFFIC MEDIAN CROSSING

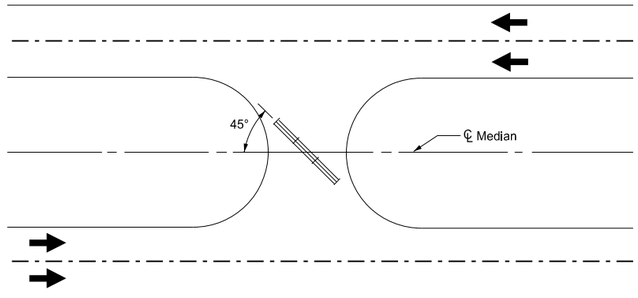
D-704-49



Notes:
1. All costs for construction signing and devices at the median crossovers shall be at the contractor's expense.
2. The construction signs and channelizing devices shall be removed daily and the median access shall be barricaded during nonworking hours.
3. The distance between the work area and the crossover shall be a minimum of one mile. If the distance from the work area to an interchange is less than two miles the interchange shall be used and no median access will be allowed.
4. The construction traffic shall not decelerate until they are well into the crossover lane.
5. Variables:
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper
   L = Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or WxSxS/60 for urban, residential, and other streets with speed of 40 mph or less
6. Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S".
7. Sequencing Arrow Panels:
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and over 5000 ADT).

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

KEY
- Sign
- Delineator Drum
- Sequencing Arrow Panel
- Type III Barricade



BARRICADE LOCATION DETAIL

Barricades shall be installed on the median access when not in use.
The barricades shall be placed at 45° away from approaching traffic.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-19-12	
REVISIONS	
DATE	CHANGE
06-24-14	Changed W5-9-48 to portable mounted.

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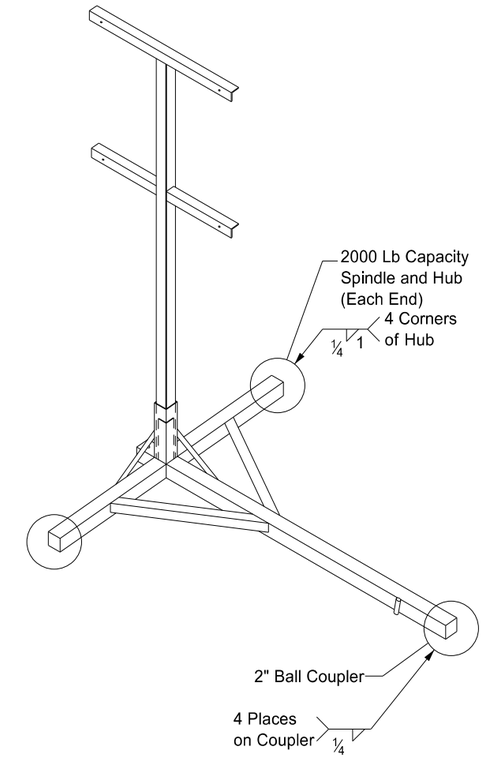
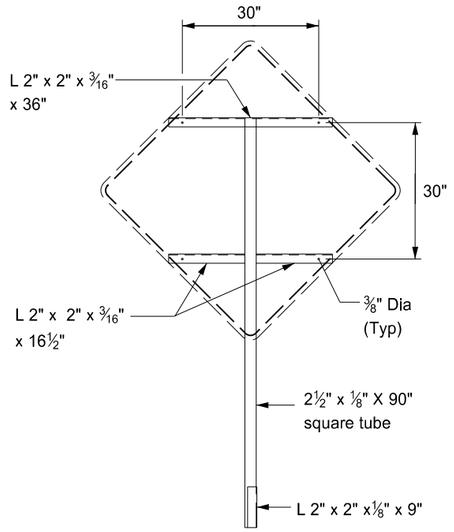
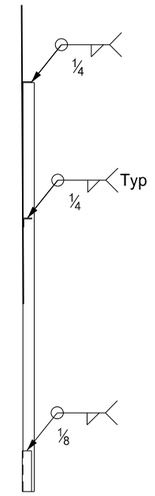
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



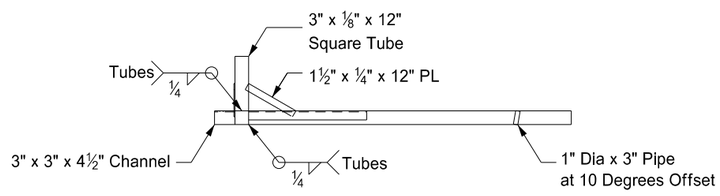


FRONT

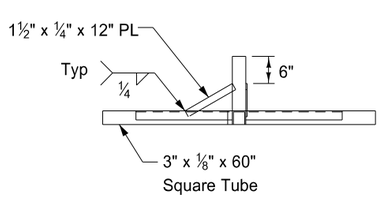


RIGHT

SIGN SUPPORT



FRONT



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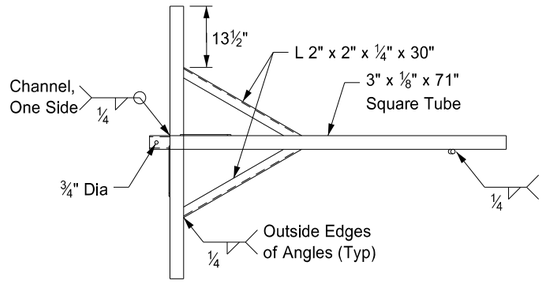

TOP

TRAILER

Notes:

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

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

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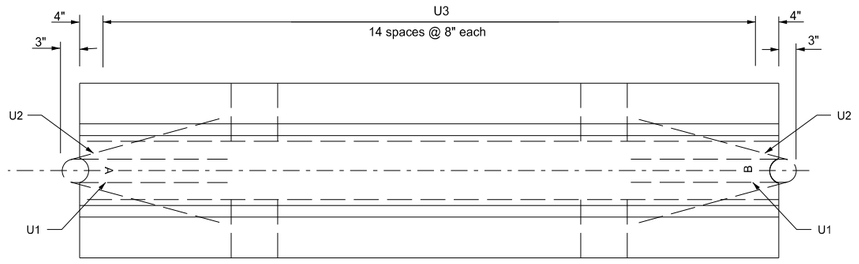
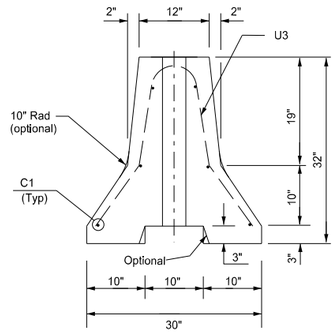
PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)

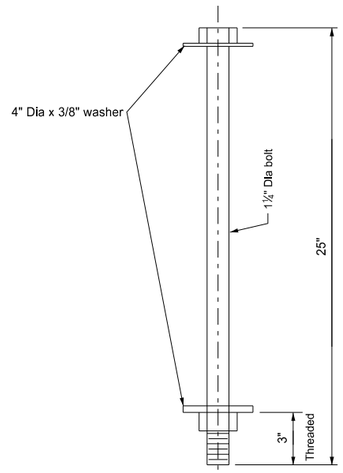
D-704-51



Plan View



End View

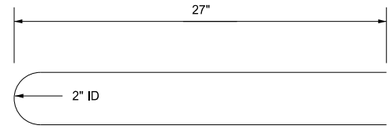


Connecting Bolt Detail

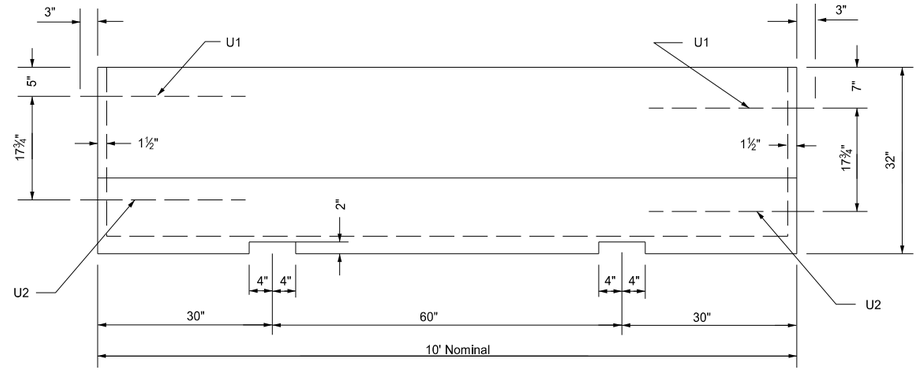
(One per 10 Ft section)

Notes:

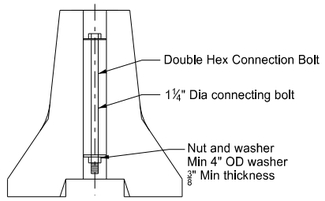
1. All exposed hardware shall be galvanized as per ASTM A153, except for the loop inserts.
2. Concrete shall be Class AAE-3.
3. All steel shall conform to Section 612 of the NDDOT Standard Specifications.
4. Barrier ends shall be imprinted A and B as shown with 4 inch letters. Field placement shall match the A end with the B end.
5. Barrier markers shall be placed at the center of the barrier at 20' centers.
6. Barrier sections shall be connected together with the 1 ¼" Dia A-307 double hex connecting bolt. The bottom nut and washer connection shall be maintained by the contractor for the duration of the barrier installation.
7. Barrier shall be placed such that openings between individual sections shall be kept to a minimum.



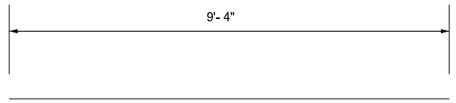
U1 Bar Detail



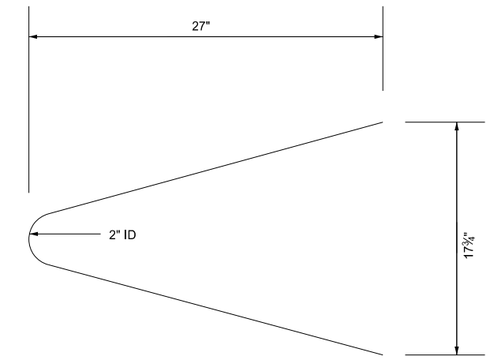
Side View



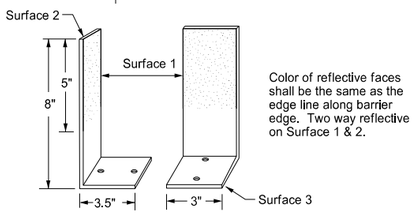
Bolt Connection Detail



C1 Bar Detail

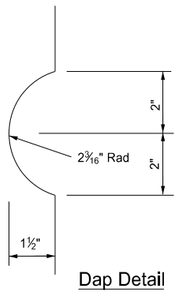


U2 Bar Detail

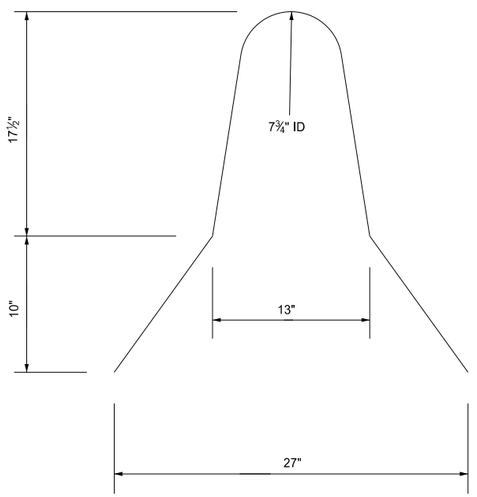


Color of reflective faces shall be the same as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

Barrier Marker Detail



Dap Detail



U3 Bar Detail

Marker Body
The marker shall be made of a high impact, weatherable engineering thermo-plastic material which conforms to the following:

Property	Result	ASTM Test Method
Thickness (min)	.090"	——
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI ¼" @ 73°F	8,000	D790
Flexural modulus, PSI ¼" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

Reflective Tape
The reflector shall be a retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1° measured in candlepower:

Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

Adhesive
Markers shall be temporarily mounted to the portable concrete barrier with factory applied solid butyl rubber ⅛" thick, 2" wide on 2¼" wide release paper on surface 3.

Bar List				
Mark	Size	No.	Length	Shape
C1	4	6	9'- 4"	Straight
U1	4	2	4'- 8"	Bent
U2	4	2	4'- 10¼"	Bent
U3	4	15	5'- 4"	Bent

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE

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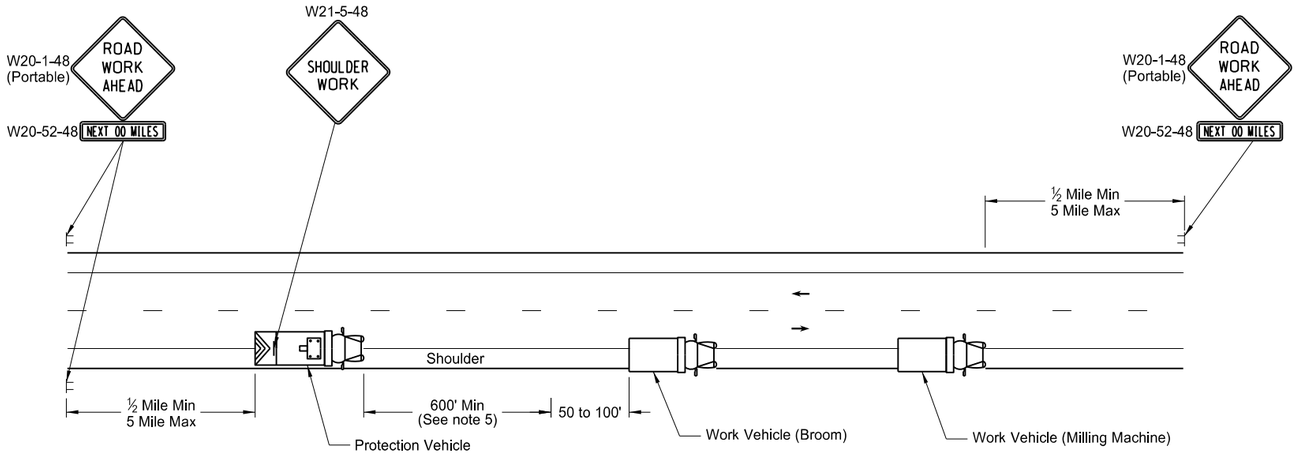
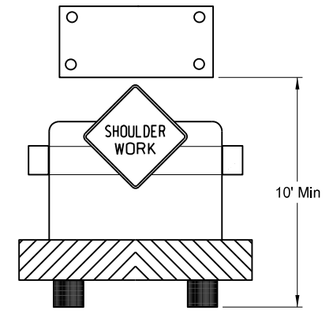
MOBILE OPERATION
Grinding Shoulder Rumble Strips

D-704-56



TWO LANE - TWO WAY ROADWAY

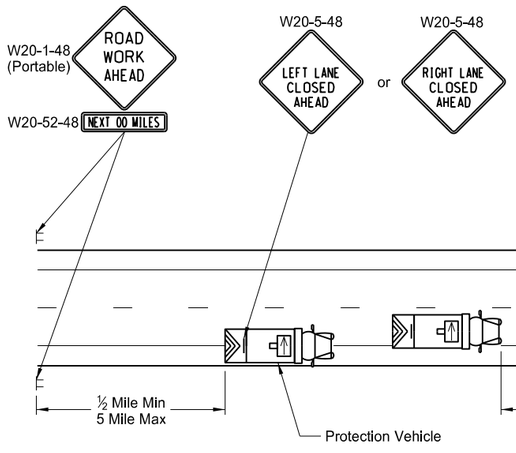


TWO LANE - TWO WAY ROADWAY

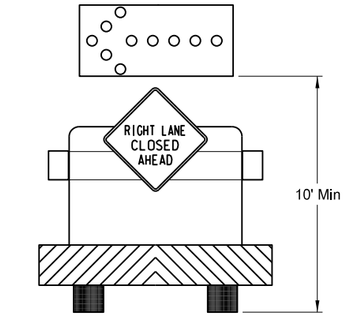
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

Notes:

1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two - way electronic communication capability.
5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.

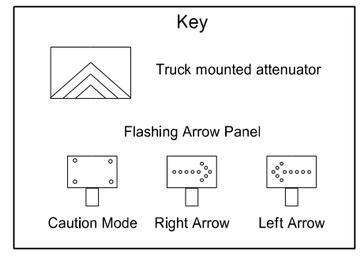


INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY

Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

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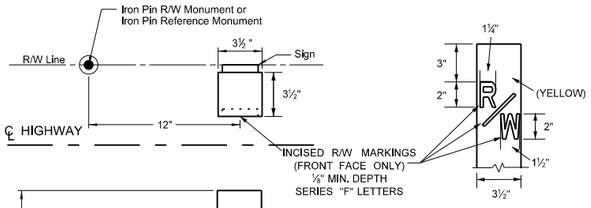
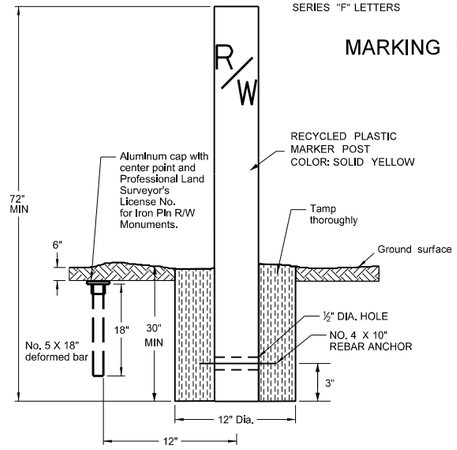
STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

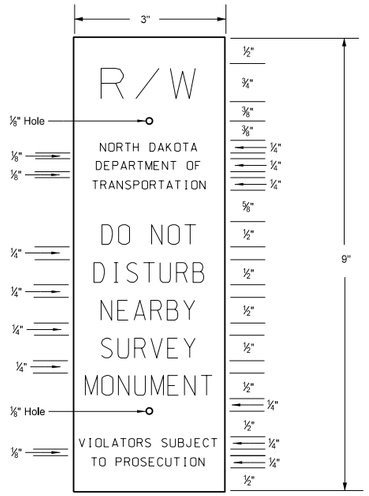
D-720-1



MARKING DETAIL



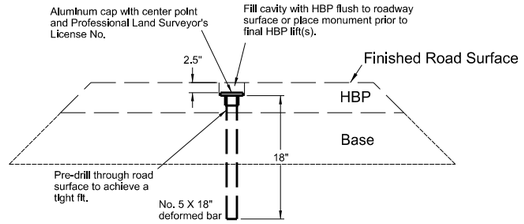
RECYCLED PLASTIC RIGHT OF WAY MARKER (WITNESS POST) DETAILS & IRON PIN REFERENCE AND R/W MONUMENT DETAILS



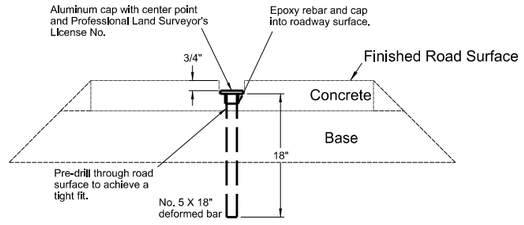
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Sign shall be attached by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Sign shall be installed 2" from top of post.

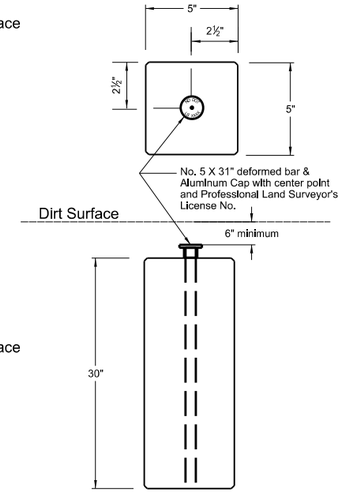
ALIGNMENT MONUMENT DETAILS



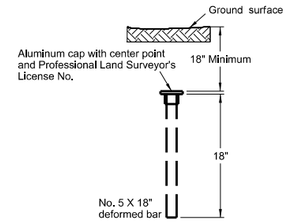
IRON PIN
(Within Finished Roadway Surface)



IRON PIN
(Within Finished Roadway Surface)



PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)

NOTES:

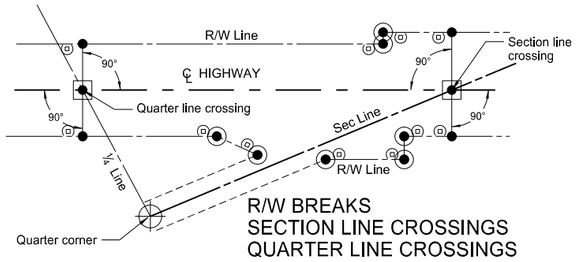
The construction and installation of Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) shall conform to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS:
Iron Pin or Precast Concrete Alignment Monuments with aluminum caps will be placed on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

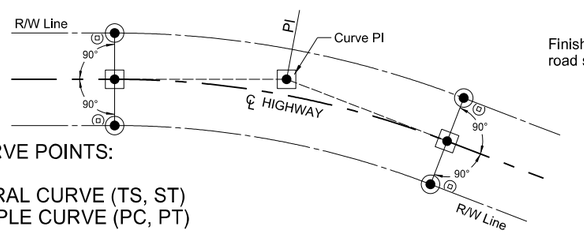
IRON PIN R/W MONUMENT:
Iron pins with aluminum caps (No. 5 X 18") will be placed at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

IRON PIN REFERENCE MONUMENT:
Iron Pins without aluminum caps (No. 5 X 18") will be placed as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

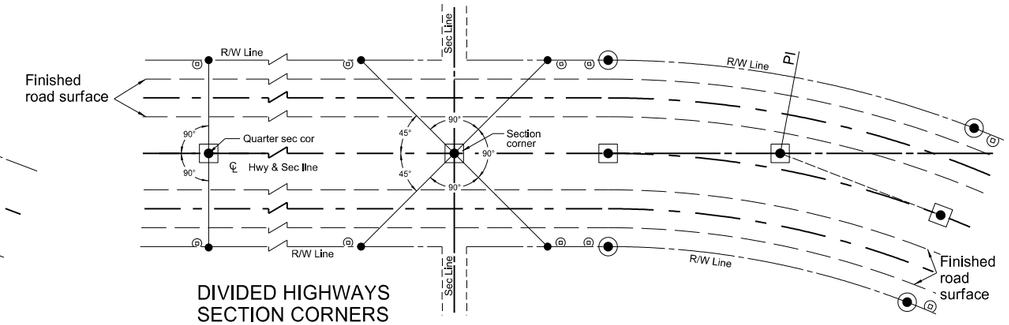
VARIOUS MONUMENT AND MARKER PLACEMENTS



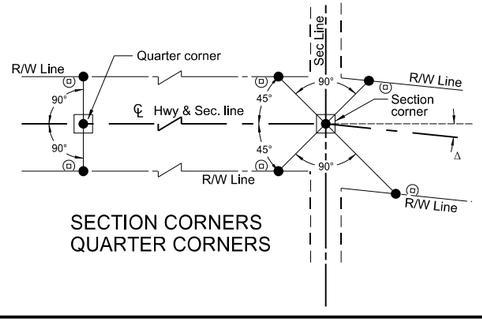
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



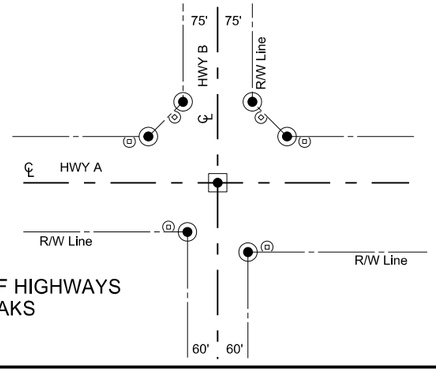
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS



INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38

LEGEND
- Iron Pin Reference Monument
- R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

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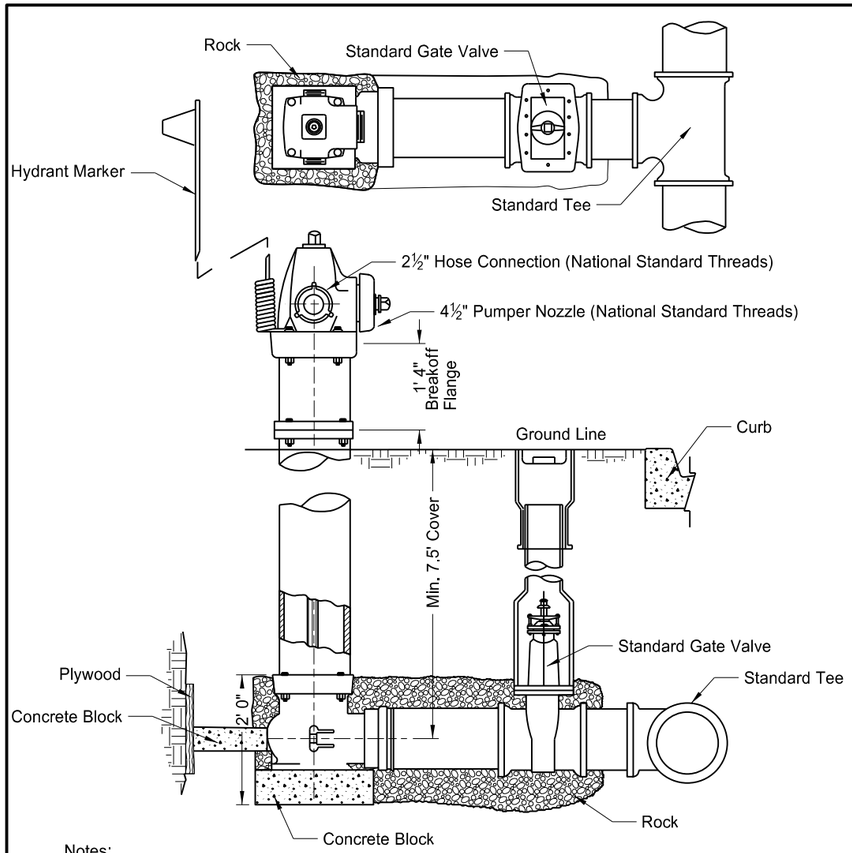
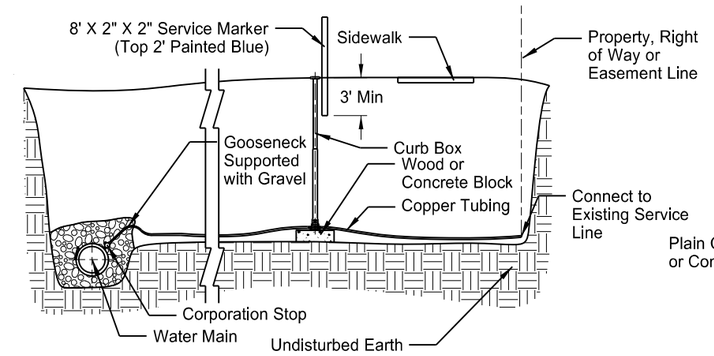
WATERWORKS

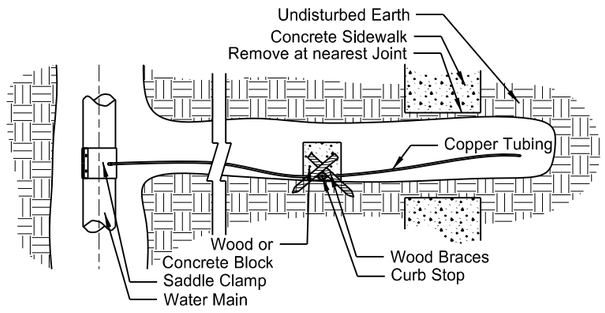


Notes:
1. Operating & Cap Nuts: City Standards

2. Supply and furnish and install hydrant marker. Cost will be included with the unit bid price for the hydrant. The hydrant marker shall be current with city standards or as approved by the engineer in the field.

STANDARD FIRE HYDRANT & CONNECTION

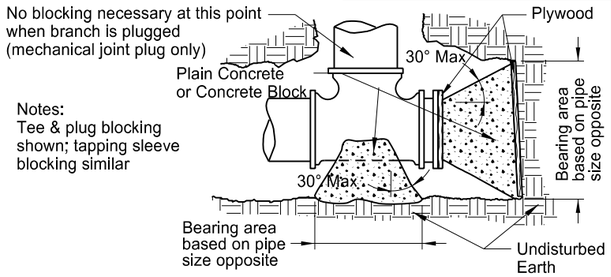




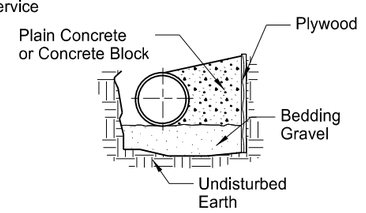
Notes:
1. Service clamp are not required where small size service lines are connected to large cast iron or ductile iron pipe and three threads of the corporation stop make contact with the wall.

2. Trench shall be gravel backfill from water main to back of curb line and under sidewalk areas or standard compaction of earth backfill where specified.

WATER CURB CONNECTION



Notes:
Tee & plug blocking shown; tapping sleeve blocking similar

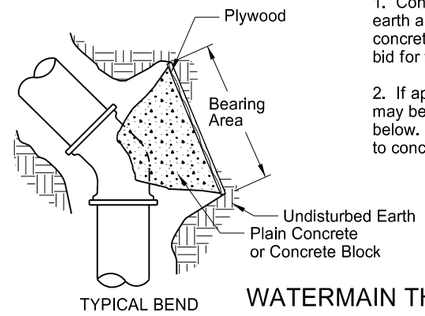


TYPICAL SECTION

Table of Required Bearing Areas					
Size of Pipe	90° Bend	45° Bend	22.5° Bend	11.25° Bend	Tees, Plugs & Tapping Sleeves
4"	2' Sq	2' Sq	2' Sq	2' Sq	2' Sq
6"	3' Sq	2' Sq	2' Sq	2' Sq	3' Sq
8"	5' Sq	3' Sq	2' Sq	2' Sq	4' Sq
10"	8' Sq	4' Sq	3' Sq	2' Sq	6' Sq
12"	11' Sq	6' Sq	3' Sq	2' Sq	8' Sq
16"	20' Sq	11' Sq	6' Sq	4' Sq	15' Sq
18"	25' Sq	14' Sq	7' Sq	4' Sq	18' Sq

Notes:
1. Concrete blocking to be poured against undisturbed earth and plywood. Keep bells and bolts free of concrete. Concrete in place to be included in price bid for water main.

2. If approved by the engineer, solid concrete blocks may be used for blocking on 8" Dia. pipe and below. 10" Dia. pipe and above will conform to concrete poured in place areas as shown above.

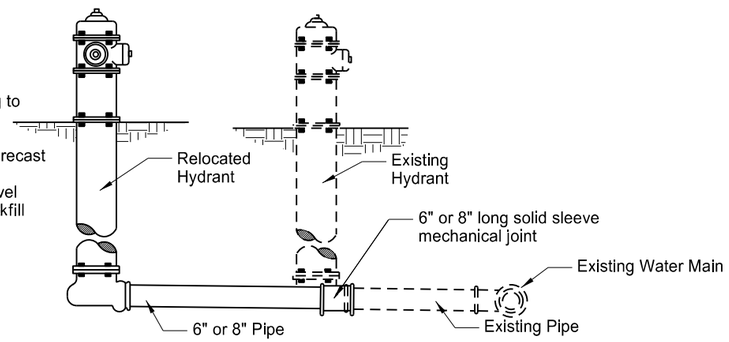


TYPICAL BEND

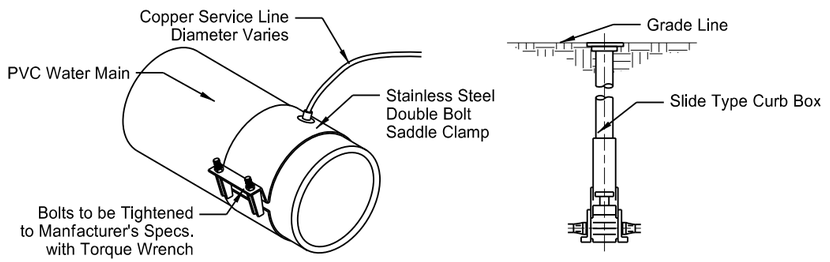
WATERMAIN THRUST BLOCK DETAILS

Notes:
1. Concrete thrust blocking to be placed as directed.

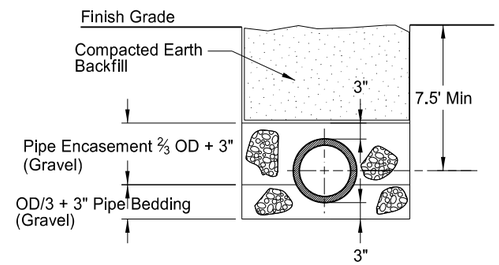
2. Hydrant to be set on a precast concrete pad. The hydrant shall be surrounded by gravel according to the trench backfill detail.



LAYOUT FOR RELOCATION OF HYDRANTS



TYPICAL CORPORATION STOP AND CURB STOP



TRENCH BACKFILL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-22-10	
REVISIONS	
DATE	CHANGE

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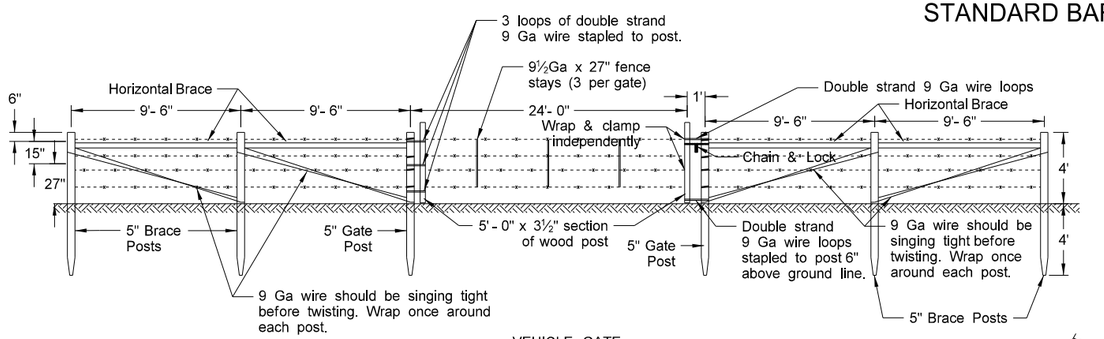
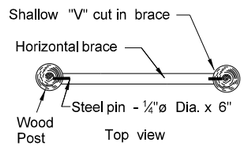
STANDARD BARBED WIRE FENCE

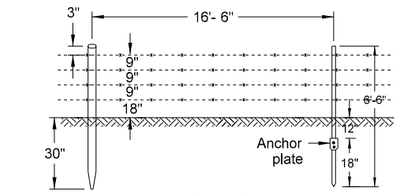
D-752-1



VEHICLE GATE



HORIZONTAL BRACE DETAIL



Wood line post (16'-6" Spacing) LINE POST DETAIL Steel line post (16'-6" Spacing)

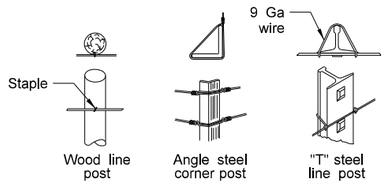
NOTES

1. No deduction in measured pay length of cable fence will be made for gates, corner assemblies, double brace assemblies, fence terminals, or depression fencing. Abutment fencing shall be included in the price bid for fencing bid items.

2. Double brace assemblies shall be installed at locations shown on the plans or established by the Engineer. The distance between adjacent fence terminals, corner assemblies, or double brace assemblies shall not exceed 1,320 feet.

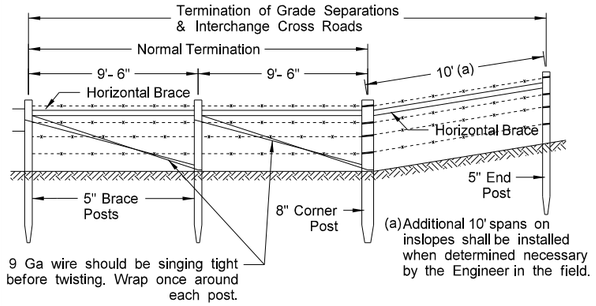
3. Cost of furnishing and installing inserts and eyebolts shall be included in the unit price bid for fencing bid items. Eyebolts shall be galvanized according to AASHTO designation M-30; inserts of corrosion resistant material need not be galvanized. Concrete inserts shall be of such design that, when installed in the concrete, will be capable of developing the full strength of the ⅝" diameter threaded eyebolt.

4. The type of posts to be used, either wood or steel, shall be determined by the contractor unless otherwise specified in the plans.

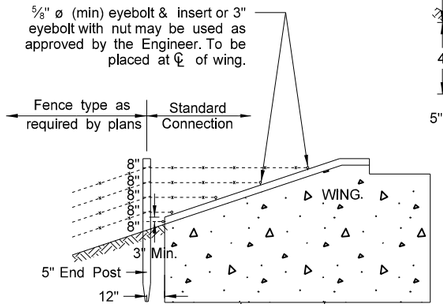


FASTENING TO POSTS

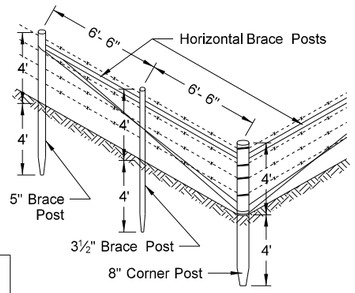
POST SIZES					
	TREATED WOOD		STEEL		
USE OF POST	Post dia.	Post length	Post length	Post wt. Lbs/Ft	Anchor wt. Lbs.
Line post	3½"	6'-6"	6'-6"	1.33	0.67
Corner post	8"	8'	7'	4.10	(Conc.)
End post	5"	8'			
Brace post	5" / 3½"	8'	7'	3.19	(Conc.)
Gate post	5"	8'			
Horizontal brace	3½"	Var.	As appoved by the Engineer		



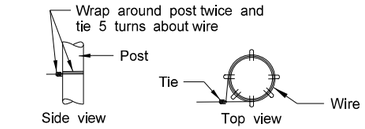
FENCE TERMINAL



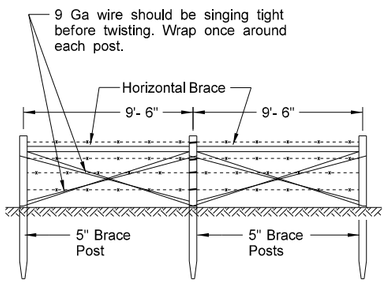
DETAIL FOR TYING FENCE TO WINGS OF ABUTMENTS



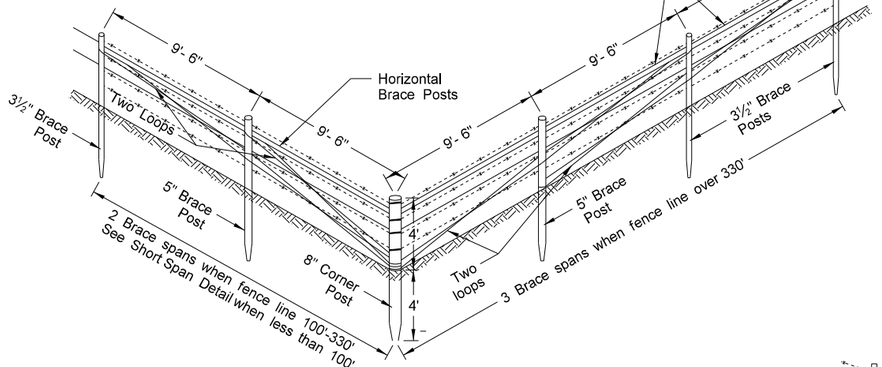
SHORT SPAN DETAIL (FENCE LINE 100' OR LESS)



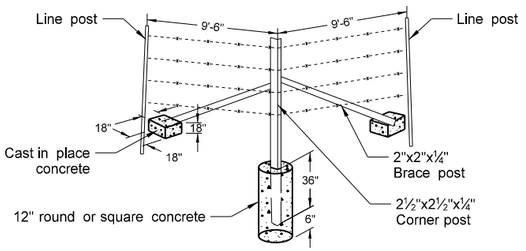
WRAP-AROUND DETAIL



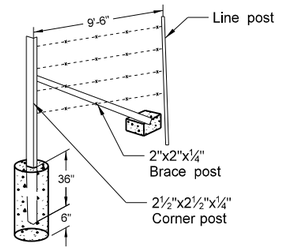
DOUBLE BRACE ASSEMBLY



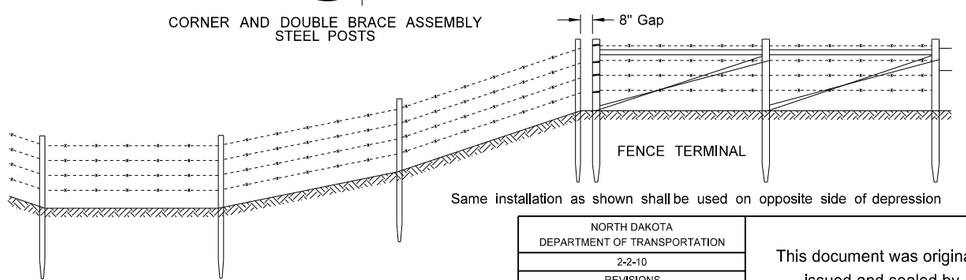
CORNER ASSEMBLY



CORNER AND DOUBLE BRACE ASSEMBLY STEEL POSTS

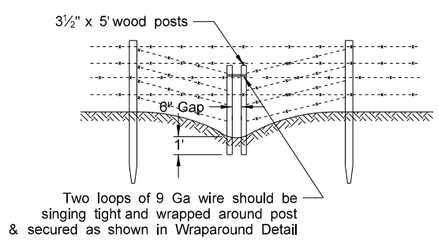


FENCE TERMINAL STEEL POSTS

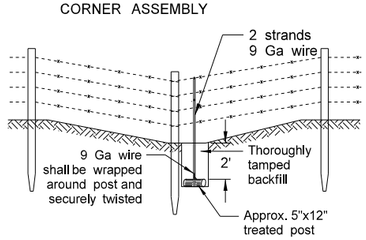


Same installation as shown shall be used on opposite side of depression

FENCING FOR WIDE DEPRESSIONS



BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING

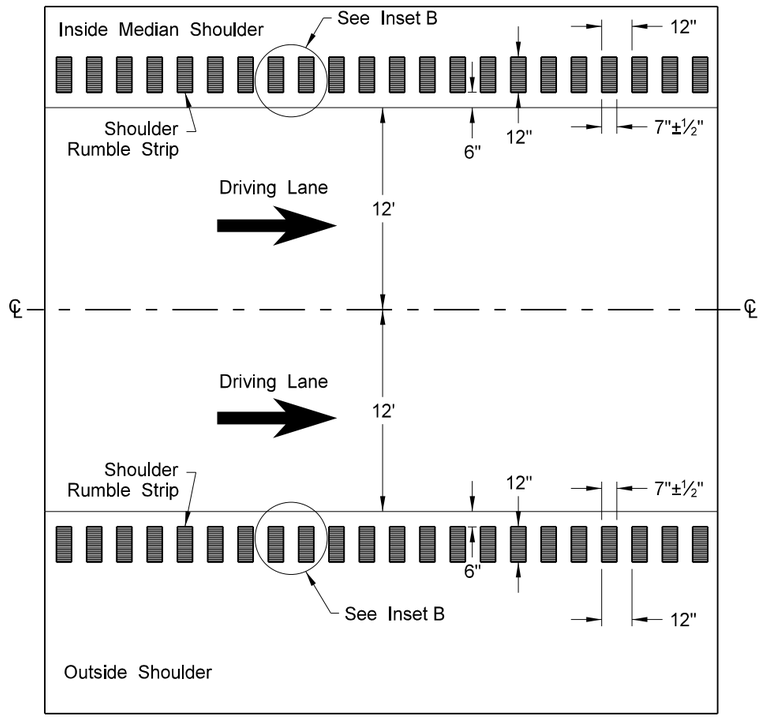


DETAIL FOR ANCHORING FENCES IN DEPRESSIONS*
*Locations shall be determined in the field and included in price bid for fencing. Other methods of anchoring the fence may be used if approved by the Engineer.

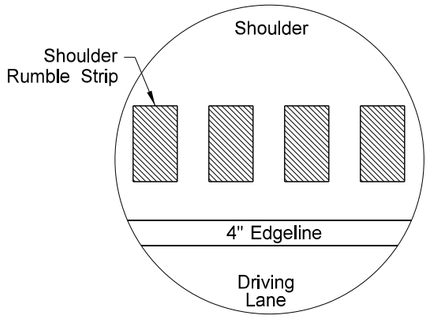
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-2-10	
REVISIONS	
DATE	CHANGE
10-02-12	Notes, steel assemblies/posts
11-25-13	Revised Vehicle Gate

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/25/2013 and the original document is stored at the North Dakota Department of Transportation

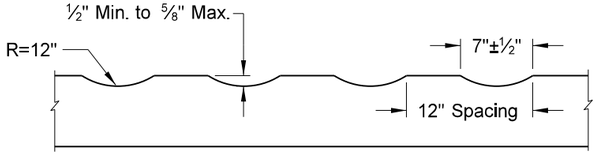
RUMBLE STRIPS
DIVIDED HIGHWAYS (NON-INTERSTATE)



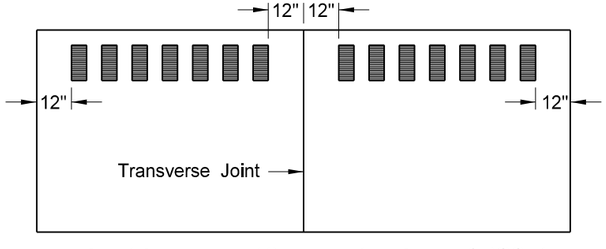
Divided Highways (Non-Interstate)



Inset B - Shoulder Rumble Strip



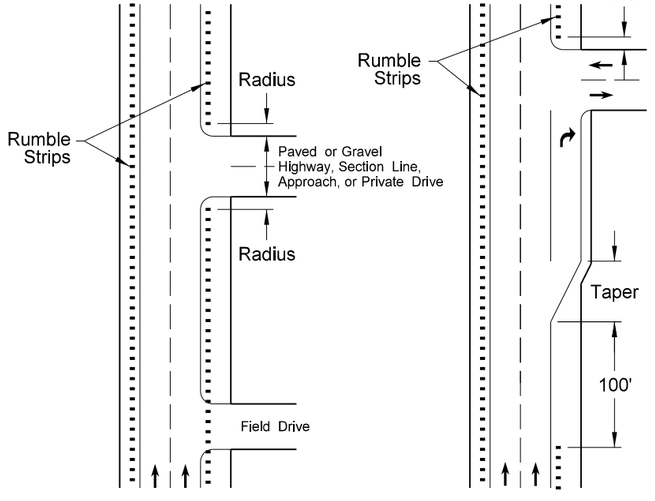
Profile of Rumble Strips - Bituminous and PCC Pavements



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint

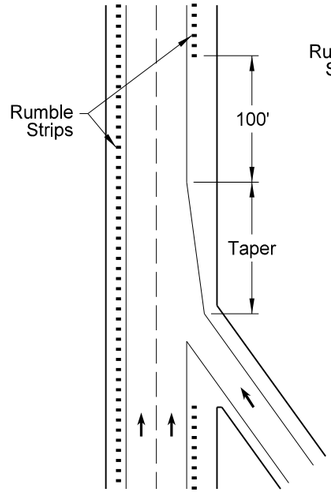
NOTES:

1) Discontinue rumble strips through the entire length of turn lanes & ramps, 100' before turn lane tapers, 100' before or after ramp tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive as shown below.

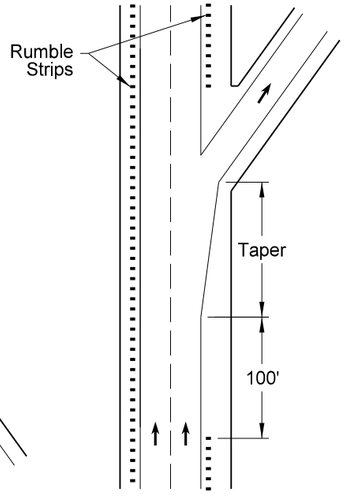


Entrance Roadways

Turn Lane (Right & Left)



Entrance Ramp



Exit Ramp

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
9-8-11	Revised Notes and D-760-2.

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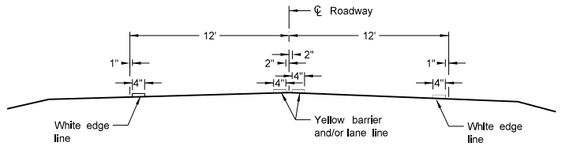
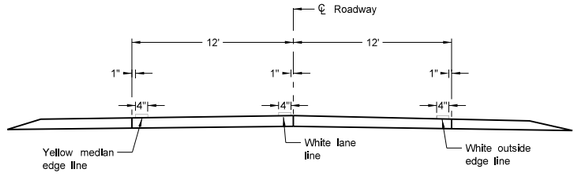
PAVEMENT MARKING

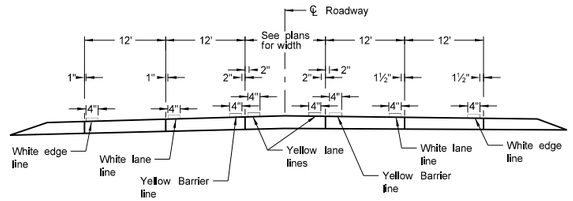
D-762-4



Two Lane Two Way
RURAL ROADWAY



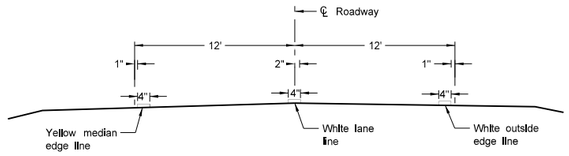
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



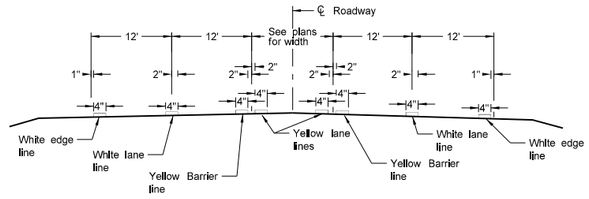
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

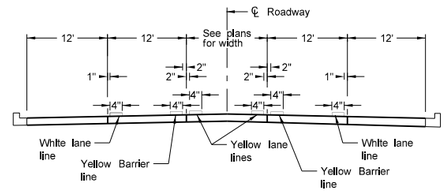
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



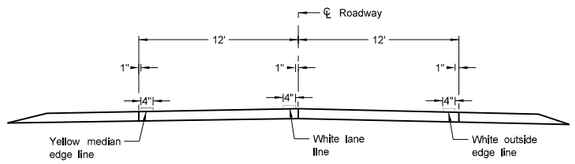
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



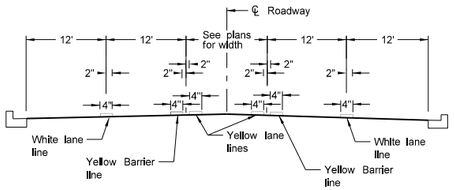
RURAL FIVE LANE ROADWAY
Asphalt Section



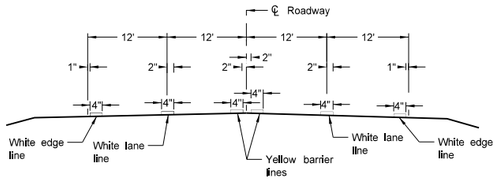
URBAN FIVE LANE SECTION
Concrete Section



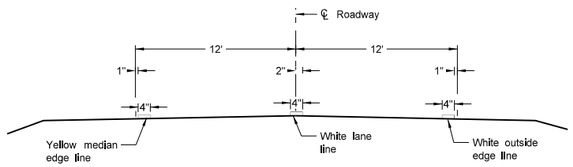
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



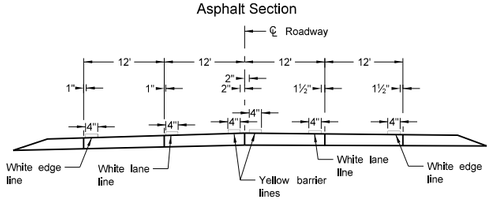
URBAN FIVE LANE SECTION
Asphalt Section



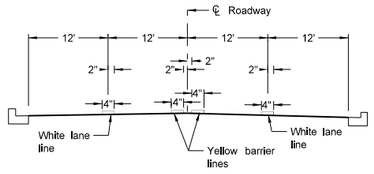
RURAL FOUR LANE ROADWAY
Asphalt Section



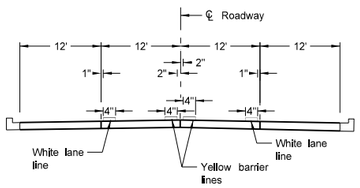
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



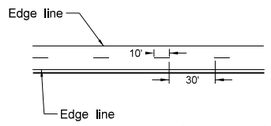
RURAL FOUR LANE ROADWAY
Concrete Section



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

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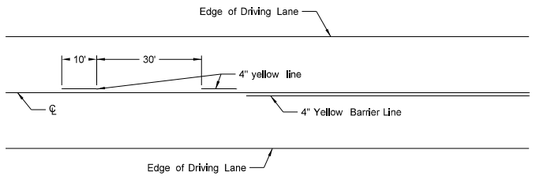
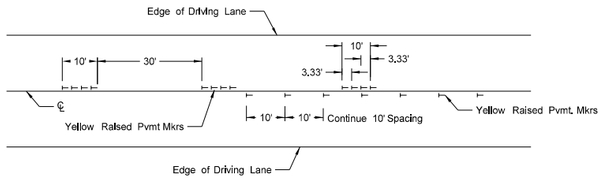
SHORT-TERM PAVEMENT MARKING

D-762-6

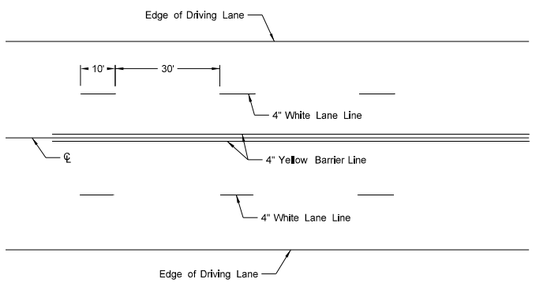


Painted or Tape Lines



Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY



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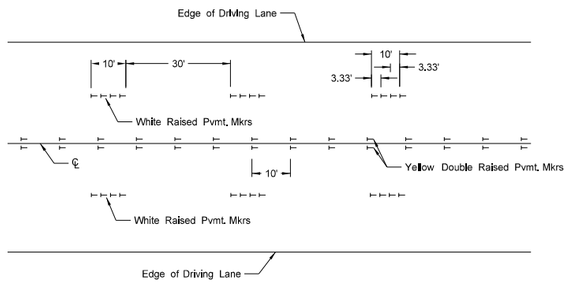
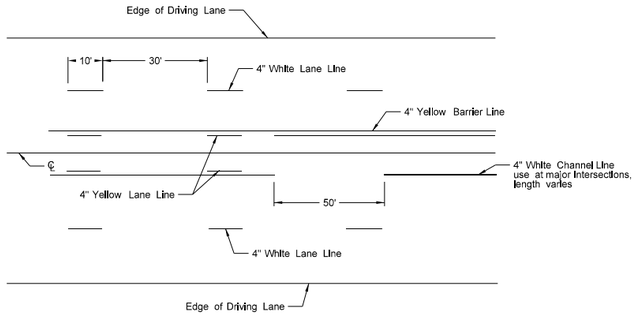


Raised Pavement Markers

FOUR LANE ROADWAY



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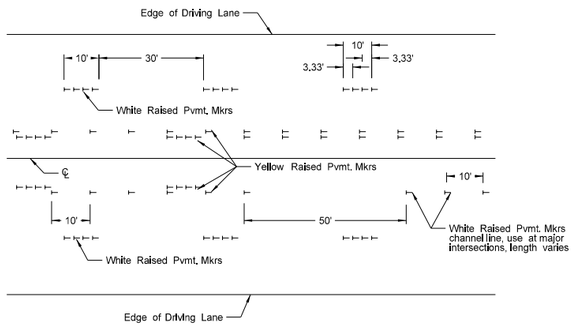
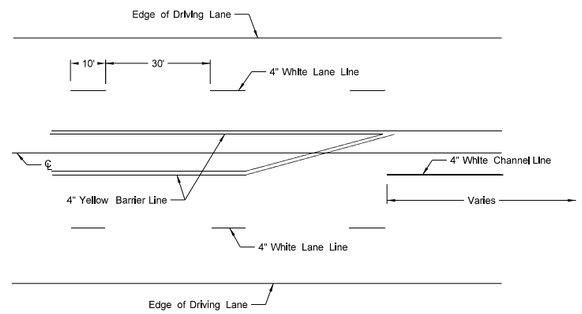


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



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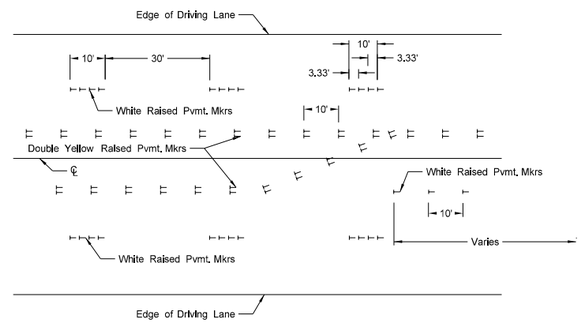

Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.

2. Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.

3. Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

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

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